

ENGINE CONTROL SYSTEM

SECTION EC

CONTENTS

	KA24DE	
TROUBLE DIAGNOSIS - INDEX	18	
Alphabetical & P No. Index for DTC	18	
PRECAUTIONS	23	
Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"	23	
Precautions for On Board Diagnostic (OBD) System of Engine	23	
Engine Fuel & Emission Control System	24	
Precautions	25	
Wiring Diagrams and Trouble Diagnosis	26	
PREPARATION	27	
Special Service Tools	27	
Commercial Service Tools	27	
ENGINE AND EMISSION CONTROL OVERALL SYSTEM	29	
Engine Control Component Parts Location	29	
Circuit Diagram	31	
System Diagram	32	
Vacuum Hose Drawing	33	
System Chart	34	
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION	35	
Multiport Fuel Injection (MFI) System	35	
Distributor Ignition (DI) System	37	
Air Conditioning Cut Control	39	
Fuel Cut Control (at no load & high engine speed)	39	
Evaporative Emission System	40	
On Board Refueling Vapor Recovery (ORVR)	45	
Positive Crankcase Ventilation	55	
BASIC SERVICE PROCEDURE	57	
Fuel Pressure Release	57	
Fuel Pressure Check	57	
Fuel Pressure Regulator Check	58	
Injector	58	
Fast Idle Cam (FIC)	59	

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment	59	
ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION	73	
Introduction	73	
Two Trip Detection Logic	73	
Emission-related Diagnostic Information	74	
Malfunction Indicator Lamp (MIL)	88	
OBD System Operation Chart	88	
CONSULT-II	94	
Generic Scan Tool (GST)	106	
TROUBLE DIAGNOSIS - INTRODUCTION	108	
Introduction	108	
Work Flow	110	
TROUBLE DIAGNOSIS - BASIC INSPECTION	112	
Basic Inspection	112	
TROUBLE DIAGNOSIS - GENERAL DESCRIPTION	126	
DTC Inspection Priority Chart	126	
Fail-safe Chart	127	
Symptom Matrix Chart	128	
CONSULT-II Reference Value in Data Monitor Mode	132	
Major Sensor Reference Graph in Data Monitor Mode	134	
ECM Terminals and Reference Value	137	
TROUBLE DIAGNOSIS - SPECIFICATION VALUE	146	
Description	146	
Testing Condition	146	
Inspection Procedure	146	
Diagnostic Procedure	147	
TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT	150	
Description	150	
Diagnostic Procedure	150	
TROUBLE DIAGNOSIS FOR POWER SUPPLY	151	
Main Power Supply and Ground Circuit	151	
DTC P0031, P0032 HO2S1 HEATER	158	

GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

CONTENTS (Cont'd)

Description	158	On Board Diagnosis Logic.....	191
CONSULT-II Reference Value in Data Monitor		DTC Confirmation Procedure	192
Mode	158	Wiring Diagram	195
ECM Terminals and Reference Value	158	Diagnostic Procedure	196
On Board Diagnosis Logic.....	158	DTC P0125 ECT SENSOR	204
DTC Confirmation Procedure	159	Component Description	204
Wiring Diagram	160	On Board Diagnosis Logic.....	204
Diagnostic Procedure	161	DTC Confirmation Procedure	204
DTC P0037, P0038 HO2S2 HEATER	163	Wiring Diagram	206
Description	163	Diagnostic Procedure	207
CONSULT-II Reference Value in Data Monitor		DTC P0128 THERMOSTAT FUNCTION	209
Mode	163	On Board Diagnosis Logic.....	209
ECM Terminals and Reference Value	163	Possible Cause.....	209
On Board Diagnosis Logic.....	163	DTC Confirmation Procedure	209
DTC Confirmation Procedure	164	Diagnostic Procedure	210
Wiring Diagram	165	DTC P0132 HO2S1	211
Diagnostic Procedure	166	Component Description	211
DTC P0101, P0102, P0103 MAF SENSOR	168	CONSULT-II Reference Value in Data Monitor	
Component Description	168	Mode	211
CONSULT-II Reference Value in Data Monitor		ECM Terminals and Reference Value	211
Mode	168	On Board Diagnosis Logic.....	212
ECM Terminals and Reference Value	168	DTC Confirmation Procedure	212
On Board Diagnosis Logic.....	168	Wiring Diagram	213
DTC Confirmation Procedure	169	Diagnostic Procedure	214
Overall Function Check	171	DTC P0133 HO2S1	218
Wiring Diagram	172	Component Description	218
Diagnostic Procedure	173	CONSULT-II Reference Value in Data Monitor	
DTC P0107, P0108 ABSOLUTE PRESSURE		Mode	218
SENSOR	178	ECM Terminals and Reference Value	218
Component Description	178	On Board Diagnosis Logic.....	219
On Board Diagnosis Logic.....	178	DTC Confirmation Procedure	219
DTC Confirmation Procedure	178	Overall Function Check	220
Diagnostic Procedure	179	Wiring Diagram	221
DTC P0112, P0113, P0127 IAT SENSOR	180	Diagnostic Procedure	222
Component Description	180	DTC P0134 HO2S1	229
On Board Diagnosis Logic.....	180	Component Description	229
DTC Confirmation Procedure	181	CONSULT-II Reference Value in Data Monitor	
Wiring Diagram	182	Mode	229
Diagnostic Procedure	183	ECM Terminals and Reference Value	229
DTC P0117, P0118 ECT SENSOR	185	On Board Diagnosis Logic.....	230
Component Description	185	DTC Confirmation Procedure	231
CONSULT-II Reference Value in Data Monitor		Overall Function Check	232
Mode	185	Wiring Diagram	233
On Board Diagnosis Logic.....	185	Diagnostic Procedure	234
DTC Confirmation Procedure	186	DTC P0138 HO2S2	237
Wiring Diagram	187	Component Description	237
Diagnostic Procedure	188	CONSULT-II Reference Value in Data Monitor	
DTC P0121, P0122, P0123 TP SENSOR	190	Mode	237
Component Description	190	ECM Terminals and Reference Value	237
CONSULT-II Reference Value in Data Monitor		On Board Diagnosis Logic.....	237
Mode	190	DTC Confirmation Procedure	238
ECM Terminals and Reference Value	191	Overall Function Check	238

CONTENTS (Cont'd)

Wiring Diagram	239	
Diagnostic Procedure	240	
DTC P0139 HO2S2	245	
Component Description	245	
CONSULT-II Reference Value in Data Monitor Mode	245	
ECM Terminals and Reference Value	245	
On Board Diagnosis Logic.....	245	
DTC Confirmation Procedure	246	
Overall Function Check	247	
Wiring Diagram	248	
Diagnostic Procedure	249	
DTC P0171 FUEL INJECTION SYSTEM FUNCTION	255	
On Board Diagnosis Logic.....	255	
DTC Confirmation Procedure	255	
Wiring Diagram	257	
Diagnostic Procedure	258	
DTC P0172 FUEL INJECTION SYSTEM FUNCTION	262	
On Board Diagnosis Logic.....	262	
DTC Confirmation Procedure	262	
Wiring Diagram	264	
Diagnostic Procedure	265	
DTC P0181, P0182, P0183 FTT SENSOR	269	
Component Description	269	
On Board Diagnosis Logic.....	269	
DTC Confirmation Procedure	270	
Wiring Diagram	271	
Diagnostic Procedure	272	
DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION	275	
On Board Diagnosis Logic.....	275	
Overall Function Check	275	
Diagnostic Procedure	277	
Main 11 Causes of Overheating.....	280	
DTC P0300 - P0304 NO. 4 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE	281	
On Board Diagnosis Logic.....	281	
DTC Confirmation Procedure	281	
Diagnostic Procedure	282	
DTC P0327, P0328 KS	290	
Component Description	290	
ECM Terminals and Reference Value	290	
On Board Diagnosis Logic.....	290	
DTC Confirmation Procedure	290	
Wiring Diagram	291	
Diagnostic Procedure	292	
DTC P0335 CKP SENSOR (OBD)	294	
Component Description	294	
ECM Terminals and Reference Value	294	
On Board Diagnosis Logic.....	294	
DTC Confirmation Procedure	295	GI
Wiring Diagram	296	
Diagnostic Procedure	297	
DTC P0340 CMP SENSOR	300	MA
Component Description	300	
ECM Terminals and Reference Value	300	EM
On Board Diagnosis Logic.....	301	
DTC Confirmation Procedure	302	
Wiring Diagram	303	LC
Diagnostic Procedure	304	
DTC P0400 EGR FUNCTION	308	
Description	308	EC
On Board Diagnosis Logic.....	309	
DTC Confirmation Procedure	310	
Overall Function Check	311	FE
Wiring Diagram	312	
Diagnostic Procedure	313	CL
DTC P0402 EGRC-BPT VALVE FUNCTION	320	
Description	320	
On Board Diagnosis Logic.....	320	MT
DTC Confirmation Procedure	321	
Overall Function Check	322	AT
Diagnostic Procedure	323	
DTC P0405, P0406 EGRT SENSOR	328	
Component Description	328	TF
On Board Diagnosis Logic.....	328	
DTC Confirmation Procedure	329	
Overall Function Check	330	PD
Wiring Diagram	331	
Diagnostic Procedure	332	AX
DTC P0420 THREE WAY CATALYST FUNCTION	334	
On Board Diagnosis Logic.....	334	
DTC Confirmation Procedure	334	SU
Overall Function Check	335	
Diagnostic Procedure	336	
DTC P0441 EVAP CONTROL SYSTEM PURGE FLOW MONITORING	339	BR
System Description.....	339	
On Board Diagnosis Logic.....	339	ST
DTC Confirmation Procedure	340	
Overall Function Check	340	RS
Diagnostic Procedure	341	
DTC P0442 EVAP CONTROL SYSTEM	350	
On Board Diagnosis Logic.....	350	BT
DTC Confirmation Procedure	351	
Diagnostic Procedure	353	HA
DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	366	
Description	366	SC
CONSULT-II Reference Value in Data Monitor Mode	366	
ECM Terminals and Reference Value	367	EL

CONTENTS (Cont'd)

On Board Diagnosis Logic.....	367	DTC P0500 VSS	430
DTC Confirmation Procedure	368	Component Description	430
Wiring Diagram	369	ECM Terminals and Reference Value	430
Diagnostic Procedure	370	On Board Diagnosis Logic.....	430
DTC P0447 EVAP CANISTER VENT CONTROL		DTC Confirmation Procedure	430
VALVE	373	Overall Function Check	431
Component Description	373	Wiring Diagram	432
CONSULT-II Reference Value in Data Monitor		Diagnostic Procedure	433
Mode	373	DTC P0505 ISC SYSTEM	434
ECM Terminals and Reference Value	373	Description	434
On Board Diagnosis Logic.....	373	CONSULT-II Reference Value in Data Monitor	
DTC Confirmation Procedure	374	Mode	435
Wiring Diagram	375	ECM Terminals and Reference Value	435
Diagnostic Procedure	376	On Board Diagnosis Logic.....	435
DTC P0452, P0453 EVAP CONTROL SYSTEM		DTC Confirmation Procedure	436
PRESSURE SENSOR	380	Wiring Diagram	437
Component Description	380	Diagnostic Procedure	438
CONSULT-II Reference Value in Data Monitor		DTC P0510 CTP SWITCH	440
Mode	380	Component Description	440
ECM Terminals and Reference Value	380	ECM Terminals and Reference Value	440
On Board Diagnosis Logic.....	381	On Board Diagnosis Logic.....	440
DTC Confirmation Procedure	382	DTC Confirmation Procedure	441
Wiring Diagram	383	Overall Function Check	441
Diagnostic Procedure	384	Wiring Diagram	442
DTC P0455 EVAP CONTROL SYSTEM	393	Diagnostic Procedure	443
On Board Diagnosis Logic.....	393	DTC P0605 ECM	447
DTC Confirmation Procedure	394	Component Description	447
Diagnostic Procedure	395	On Board Diagnosis Logic.....	447
DTC P0456, P1456 EVAP CONTROL SYSTEM	405	DTC Confirmation Procedure	447
On Board Diagnosis Logic.....	405	Diagnostic Procedure	448
Possible Cause	405	DTC P1143 HO2S1	449
DTC Confirmation Procedure	406	Component Description	449
Diagnostic Procedure	408	CONSULT-II Reference Value in Data Monitor	
DTC P0460 FUEL LEVEL SENSOR	420	Mode	449
Component Description	420	ECM Terminals and Reference Value	449
On Board Diagnostic Logic.....	420	On Board Diagnosis Logic.....	450
Possible Cause	420	DTC Confirmation Procedure	450
DTC Confirmation Procedure	420	Overall Function Check	451
Wiring Diagram	421	Diagnostic Procedure	451
Diagnostic Procedure	422	DTC P1144 HO2S1	456
DTC P0461 FUEL LEVEL SENSOR	424	Component Description	456
Component Description	424	CONSULT-II Reference Value in Data Monitor	
On Board Diagnostic Logic.....	424	Mode	456
Possible Cause	424	ECM Terminals and Reference Value	456
Overall Function Check	424	On Board Diagnosis Logic.....	457
DTC P0462, P0463 FUEL LEVEL SENSOR	426	DTC Confirmation Procedure	457
Component Description	426	Overall Function Check	458
On Board Diagnostic Logic.....	426	Diagnostic Procedure	458
Possible Cause	426	DTC P1146 HO2S2	463
DTC Confirmation Procedure	426	Component Description	463
Wiring Diagram	427	CONSULT-II Reference Value in Data Monitor	
Diagnostic Procedure	428	Mode	463

CONTENTS (Cont'd)

ECM Terminals and Reference Value	463	
On Board Diagnosis Logic.....	463	
DTC Confirmation Procedure	464	
Overall Function Check	465	
Wiring Diagram	466	
Diagnostic Procedure	467	
DTC P1147 HO2S2	473	
Component Description	473	
CONSULT-II Reference Value in Data Monitor Mode	473	GI
ECM Terminals and Reference Value	473	
On Board Diagnosis Logic.....	473	
DTC Confirmation Procedure	474	
Overall Function Check	475	MA
Wiring Diagram	476	
Diagnostic Procedure	477	EM
DTC P1148 CLOSED LOOP CONTROL	483	
On Board Diagnosis Logic.....	483	
DTC Confirmation Procedure	483	
Overall Function Check	484	
Diagnostic Procedure	484	LC
DTC P1217 ENGINE OVER TEMPERATURE	485	
On Board Diagnosis Logic.....	485	
Overall Function Check	485	EC
Diagnostic Procedure	486	
Main 11 Causes of Overheating.....	489	FE
DTC P1336 CKP SENSOR (OBD)	490	
Component Description	490	
ECM Terminals and Reference Value	490	
On Board Diagnosis Logic.....	491	
DTC Confirmation Procedure	491	
Wiring Diagram	492	
Diagnostic Procedure	493	CL
DTC P1400 EGRC-SOLENOID VALVE	496	
Component Description	496	
CONSULT-II Reference Value in Data Monitor Mode	496	MT
ECM Terminals and Reference Value	496	
On Board Diagnosis Logic.....	496	
DTC Confirmation Procedure	497	
Overall Function Check	497	AT
Wiring Diagram	498	
Diagnostic Procedure	499	TF
DTC P1402 EGR FUNCTION	503	
Description	503	
On Board Diagnosis Logic.....	504	
DTC Confirmation Procedure	504	
Wiring Diagram	506	
Diagnostic Procedure	507	
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	512	
Description	512	PD
CONSULT-II Reference Value in Data Monitor Mode	512	AX
ECM Terminals and Reference Value	513	
On Board Diagnosis Logic.....	513	
DTC Confirmation Procedure	514	
Wiring Diagram	515	SU
Diagnostic Procedure	516	
DTC P1446 EVAP CANISTER VENT CONTROL VALVE	523	
Component Description	523	
CONSULT-II Reference Value in Data Monitor Mode	523	BR
ECM Terminals and Reference Value	523	
On Board Diagnosis Logic.....	523	
DTC Confirmation Procedure	524	ST
Diagnostic Procedure	525	
DTC P1448 EVAP CANISTER VENT CONTROL VALVE	529	
Component Description	529	
CONSULT-II Reference Value in Data Monitor Mode	529	RS
ECM Terminals and Reference Value	529	
On Board Diagnosis Logic.....	529	
DTC Confirmation Procedure	530	
Overall Function Check	531	BT
Diagnostic Procedure	531	
DTC P1464 FUEL LEVEL SENSOR	536	
Component Description	536	HA
On Board Diagnostic Logic.....	536	
Possible Cause.....	536	
DTC Confirmation Procedure	536	SC
Wiring Diagram	537	
Diagnostic Procedure	538	EL
DTC P1490 VACUUM CUT VALVE BYPASS VALVE	539	
Description	539	
CONSULT-II Reference Value in Data Monitor Mode	539	IDX
ECM Terminals and Reference Value	539	
On Board Diagnosis Logic.....	540	
DTC Confirmation Procedure	540	
Wiring Diagram	541	
Diagnostic Procedure	542	
DTC P1491 VACUUM CUT VALVE BYPASS VALVE	546	
Description	546	
CONSULT-II Reference Value in Data Monitor Mode	546	
ECM Terminals and Reference Value	546	
On Board Diagnosis Logic.....	547	
DTC Confirmation Procedure	547	
Overall Function Check	548	

CONTENTS (Cont'd)

Fuel Pressure Check.....	644	
Fuel Pressure Regulator Check	645	
Injector	645	
Fast Idle Cam (FIC).....	646	
Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment	648	
ON BOARD DIAGNOSTIC SYSTEM		
DESCRIPTION	660	
Introduction	660	
Two Trip Detection Logic.....	660	
Emission-related Diagnostic Information.....	661	
Malfunction Indicator Lamp (MIL).....	675	
OBD System Operation Chart.....	676	
CONSULT-II	682	
Generic Scan Tool (GST)	695	
TROUBLE DIAGNOSIS - INTRODUCTION	697	
Introduction	697	
Work Flow	699	
TROUBLE DIAGNOSIS - BASIC INSPECTION	701	
Basic Inspection.....	701	
TROUBLE DIAGNOSIS - GENERAL		
DESCRIPTION	715	
DTC Inspection Priority Chart.....	715	
Fail-safe Chart	716	
Symptom Matrix Chart.....	717	
CONSULT-II Reference Value in Data Monitor Mode	721	
Major Sensor Reference Graph in Data Monitor Mode	723	
ECM Terminals and Reference Value	726	
TROUBLE DIAGNOSIS - SPECIFICATION		
VALUE	735	
Description	735	
Testing Condition	735	
Inspection Procedure.....	735	
Diagnostic Procedure	736	
TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT	739	
Description	739	
Diagnostic Procedure	739	
TROUBLE DIAGNOSIS FOR POWER SUPPLY	740	
Main Power Supply and Ground Circuit.....	740	
DTC P0031, P0032, P0051, P0052 HO2S1 HEATER	746	
Description	746	
CONSULT-II Reference Value in Data Monitor Mode	746	
ECM Terminals and Reference Value	746	
On Board Diagnosis Logic.....	746	
DTC Confirmation Procedure	747	
Wiring Diagram	748	
Diagnostic Procedure	750	
DTC P0037, P0038, P0057, P0058 HO2S2 HEATER	753	GI
Description	753	
CONSULT-II Reference Value in Data Monitor Mode	753	MA
ECM Terminals and Reference Value	753	
On Board Diagnosis Logic.....	754	EM
DTC Confirmation Procedure	754	
Wiring Diagram	755	LC
Diagnostic Procedure	757	
DTC P0101, P0102, P0103 MAF SENSOR	761	EC
Component Description	761	
CONSULT-II Reference Value in Data Monitor Mode	761	FE
ECM Terminals and Reference Value	761	
On Board Diagnosis Logic.....	761	
DTC Confirmation Procedure	762	CL
Overall Function Check	764	
Wiring Diagram	765	
Diagnostic Procedure	766	MT
DTC P0112, P0113, P0127 IAT SENSOR	770	
Component Description	770	
On Board Diagnosis Logic.....	770	AT
DTC Confirmation Procedure	770	
Wiring Diagram	772	TF
Diagnostic Procedure	773	
DTC P0117, P0118 ECT SENSOR	775	
Component Description	775	PD
On Board Diagnosis Logic.....	775	
DTC Confirmation Procedure	776	
Wiring Diagram	777	AX
Diagnostic Procedure	778	
DTC P0121, P0122, P0123 TP SENSOR	780	SU
Description	780	
CONSULT-II Reference Value in Data Monitor Mode	780	BR
ECM Terminals and Reference Value	781	
On Board Diagnosis Logic.....	781	
DTC Confirmation Procedure	782	ST
Wiring Diagram	785	
Diagnostic Procedure	786	
DTC P0125 ECT SENSOR	793	RS
Description	793	
On Board Diagnosis Logic.....	793	
DTC Confirmation Procedure	794	BT
Wiring Diagram	795	
Diagnostic Procedure	796	HA
DTC P0128 THERMOSTAT FUNCTION	798	
On Board Diagnosis Logic.....	798	SC
DTC Confirmation Procedure	798	
Diagnostic Procedure	799	
DTC P0132, P0152 HO2S1	800	EL

CONTENTS (Cont'd)

Component Description	800	Wiring Diagram	855
CONSULT-II Reference Value in Data Monitor		Diagnostic Procedure	857
Mode	800	DTC P0172, P0175 FUEL INJECTION SYSTEM	
ECM Terminals and Reference Value	800	FUNCTION	862
On Board Diagnosis Logic.....	801	On Board Diagnosis Logic.....	862
DTC Confirmation Procedure	801	DTC Confirmation Procedure	863
Wiring Diagram	802	Wiring Diagram	864
Diagnostic Procedure	804	Diagnostic Procedure	866
DTC P0133, P0153 HO2S1	808	DTC P0181, P0182, P0183 FTT SENSOR	870
Component Description	808	Component Description	870
CONSULT-II Reference Value in Data Monitor		On Board Diagnosis Logic.....	870
Mode	808	DTC Confirmation Procedure	871
ECM Terminals and Reference Value	808	Wiring Diagram	872
On Board Diagnosis Logic.....	809	Diagnostic Procedure	873
DTC Confirmation Procedure	809	DTC P0217 COOLANT OVERTEMPERATURE	
Overall Function Check	810	ENRICHMENT PROTECTION	875
Wiring Diagram	811	On Board Diagnosis Logic.....	875
Diagnostic Procedure	813	Possible Cause.....	875
DTC P0134, P0154 HO2S1	822	Overall Function Check	876
Component Description	822	Diagnostic Procedure	878
CONSULT-II Reference Value in Data Monitor		Main 12 Causes of Overheating.....	881
Mode	822	DTC P0300 - P0306 NO. 6 - 1 CYLINDER	
ECM Terminals and Reference Value	822	MISFIRE, MULTIPLE CYLINDER MISFIRE	882
On Board Diagnosis Logic.....	823	On Board Diagnosis Logic.....	882
DTC Confirmation Procedure	824	DTC Confirmation Procedure	883
Overall Function Check	825	Diagnostic Procedure	883
Wiring Diagram	826	DTC P0327, P0328 KS	891
Diagnostic Procedure	828	Component Description	891
DTC P0138, P0158 HO2S2	833	ECM Terminals and Reference Value	891
Component Description	833	On Board Diagnosis Logic.....	891
CONSULT-II Reference Value in Data Monitor		DTC Confirmation Procedure	891
Mode	833	Wiring Diagram	892
ECM Terminals and Reference Value	833	Diagnostic Procedure	893
On Board Diagnosis Logic.....	833	DTC P0335 CKP SENSOR (OBD)	895
DTC Confirmation Procedure	834	Component Description	895
Overall Function Check	834	ECM Terminals and Reference Value	895
Wiring Diagram	836	On Board Diagnosis Logic.....	896
Diagnostic Procedure	838	DTC Confirmation Procedure	896
DTC P0139, P0159 HO2S2	843	Wiring Diagram	897
Component Description	843	Diagnostic Procedure	898
CONSULT-II Reference Value in Data Monitor		DTC P0340 CMP SENSOR	901
Mode	843	Component Description	901
ECM Terminals and Reference Value	843	ECM Terminals and Reference Value	901
On Board Diagnosis Logic.....	843	On Board Diagnosis Logic.....	902
DTC Confirmation Procedure	844	DTC Confirmation Procedure	903
Overall Function Check	845	Wiring Diagram	904
Wiring Diagram	846	Diagnostic Procedure	905
Diagnostic Procedure	848	DTC P0420, P0430 THREE WAY CATALYST	
DTC P0171, P0174 FUEL INJECTION SYSTEM		FUNCTION	908
FUNCTION	853	On Board Diagnosis Logic.....	908
On Board Diagnosis Logic.....	853	DTC Confirmation Procedure	908
DTC Confirmation Procedure	854	Overall Function Check	909

CONTENTS (Cont'd)

Diagnostic Procedure	910	
DTC P0441 EVAP CONTROL SYSTEM	913	
System Description	913	
On Board Diagnosis Logic	913	
DTC Confirmation Procedure	914	
Overall Function Check	915	
Diagnostic Procedure	916	
DTC P0442 EVAP CONTROL SYSTEM	925	
On Board Diagnosis Logic	925	
DTC Confirmation Procedure	927	
Diagnostic Procedure	928	
DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	939	
Description	939	
CONSULT-II Reference Value in Data Monitor Mode	939	
ECM Terminals and Reference Value	940	
On Board Diagnosis Logic	941	
DTC Confirmation Procedure	941	
Wiring Diagram	942	
Diagnostic Procedure	943	
DTC P0447 EVAP CANISTER VENT CONTROL VALVE	946	
Component Description	946	
CONSULT-II Reference Value in Data Monitor Mode	946	
ECM Terminals and Reference Value	946	
On Board Diagnosis Logic	947	
DTC Confirmation Procedure	947	
Wiring Diagram	948	
Diagnostic Procedure	949	
DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR	952	
Component Description	952	
CONSULT-II Reference Value in Data Monitor Mode	952	
ECM Terminals and Reference Value	952	
On Board Diagnosis Logic	953	
DTC Confirmation Procedure	953	
Wiring Diagram	954	
Diagnostic Procedure	955	
Component Inspection	961	
DTC P0455 EVAP CONTROL SYSTEM	963	
On Board Diagnosis Logic	963	
DTC Confirmation Procedure	964	
Diagnostic Procedure	966	
DTC P0456, P1456 EVAP CONTROL SYSTEM	976	
On Board Diagnosis Logic	976	
DTC Confirmation Procedure	977	
Overall Function Check	978	
Diagnostic Procedure	979	
DTC P0460 FUEL LEVEL SENSOR	990	
Component Description	990	GI
ECM Terminals and Reference Value	990	
On Board Diagnosis Logic	990	
DTC Confirmation Procedure	991	MA
Wiring Diagram	992	
Diagnostic Procedure	993	EM
DTC P0461 FUEL LEVEL SENSOR	995	
Component Description	995	
On Board Diagnosis Logic	995	LC
Overall Function Check	995	
DTC P0462, P0463 FUEL LEVEL SENSOR	997	
Component Description	997	EC
ECM Terminals and Reference Value	997	
On Board Diagnosis Logic	997	
DTC Confirmation Procedure	998	FE
Wiring Diagram	999	
Diagnostic Procedure	1000	CL
DTC P0500 VSS	1002	
Component Description	1002	
ECM Terminals and Reference Value	1002	MT
On Board Diagnosis Logic	1002	
DTC Confirmation Procedure	1002	AT
Overall Function Check	1003	
Wiring Diagram	1004	
Diagnostic Procedure	1005	TF
DTC P0505 ISC SYSTEM	1006	
Description	1006	
CONSULT-II Reference Value in Data Monitor Mode	1007	PD
ECM Terminals and Reference Value	1007	
On Board Diagnosis Logic	1007	AX
DTC Confirmation Procedure	1008	
Wiring Diagram	1009	SU
Diagnostic Procedure	1010	
DTC P0510 CTP SWITCH	1012	
Component Description	1012	BR
CONSULT-II Reference Value in Data Monitor Mode	1012	
ECM Terminals and Reference Value	1012	ST
On Board Diagnosis Logic	1012	
DTC Confirmation Procedure	1013	RS
Overall Function Check	1013	
Wiring Diagram	1014	
Diagnostic Procedure	1015	BT
DTC P0600 A/T CONTROL	1019	
System Description	1019	HA
ECM Terminals and Reference Value	1019	
On Board Diagnosis Logic	1019	
DTC Confirmation Procedure	1020	SC
Overall Function Check	1020	
Wiring Diagram	1021	
Diagnostic Procedure	1022	EL

CONTENTS (Cont'd)

DTC P0605 ECM	1024	Main 12 Causes of Overheating.....	1070
Component Description	1024	DTC P1336 CKP SENSOR (OBD)	1071
On Board Diagnosis Logic.....	1024	Component Description	1071
DTC Confirmation Procedure	1024	ECM Terminals and Reference Value	1071
Diagnostic Procedure	1025	On Board Diagnosis Logic.....	1072
DTC P1143, P1163 HO2S1	1026	DTC Confirmation Procedure	1072
Component Description	1026	Wiring Diagram	1073
CONSULT-II Reference Value in Data Monitor		Diagnostic Procedure	1074
Mode	1026	DTC P1442 EVAP CONTROL SYSTEM	1078
ECM Terminals and Reference Value	1026	On Board Diagnosis Logic.....	1078
On Board Diagnosis Logic.....	1027	DTC Confirmation Procedure	1079
DTC Confirmation Procedure	1028	Diagnostic Procedure	1079
Overall Function Check	1029	DTC P1444 EVAP CANISTER PURGE VOLUME	
Diagnostic Procedure	1029	CONTROL SOLENOID VALVE	1080
DTC P1144, P1164 HO2S1	1035	Description	1080
Component Description	1035	CONSULT-II Reference Value in Data Monitor	
CONSULT-II Reference Value in Data Monitor		Mode	1080
Mode	1035	ECM Terminals and Reference Value	1081
ECM Terminals and Reference Value	1035	On Board Diagnosis Logic.....	1081
On Board Diagnosis Logic.....	1036	DTC Confirmation Procedure	1082
DTC Confirmation Procedure	1037	Wiring Diagram	1083
Overall Function Check	1038	Diagnostic Procedure	1084
Diagnostic Procedure	1038	DTC P1446 EVAP CANISTER VENT CONTROL	
DTC P1146, P1166 HO2S2	1044	VALVE	1092
Component Description	1044	Component Description	1092
CONSULT-II Reference Value in Data Monitor		CONSULT-II Reference Value in Data Monitor	
Mode	1044	Mode	1092
ECM Terminals and Reference Value	1044	ECM Terminals and Reference Value	1092
On Board Diagnosis Logic.....	1044	On Board Diagnosis Logic.....	1093
DTC Confirmation Procedure	1045	DTC Confirmation Procedure	1093
Overall Function Check	1046	Wiring Diagram	1094
Wiring Diagram	1047	Diagnostic Procedure	1095
Diagnostic Procedure	1049	DTC P1448 EVAP CANISTER VENT CONTROL	
DTC P1147, P1167 HO2S2	1054	VALVE	1099
Component Description	1054	Component Description	1099
CONSULT-II Reference Value in Data Monitor		CONSULT-II Reference Value in Data Monitor	
Mode	1054	Mode	1099
ECM Terminals and Reference Value	1054	ECM Terminals and Reference Value	1099
On Board Diagnosis Logic.....	1054	On Board Diagnosis Logic.....	1099
DTC Confirmation Procedure	1055	DTC Confirmation Procedure	1100
Overall Function Check	1056	Overall Function Check	1101
Wiring Diagram	1057	Wiring Diagram	1102
Diagnostic Procedure	1059	Diagnostic Procedure	1103
DTC P1148, P1168 CLOSED LOOP CONTROL	1064	DTC P1464 FUEL LEVEL SENSOR	1107
On Board Diagnosis Logic.....	1064	Component Description	1107
DTC Confirmation Procedure	1064	ECM Terminals and Reference Value	1107
Overall Function Check	1065	On Board Diagnosis Logic.....	1107
Diagnostic Procedure	1065	DTC Confirmation Procedure	1107
DTC P1217 ENGINE OVER TEMPERATURE	1066	Wiring Diagram	1109
On Board Diagnosis Logic.....	1066	Diagnostic Procedure	1110
Overall Function Check	1066	DTC P1490 VACUUM CUT VALVE BYPASS	
Diagnostic Procedure	1067	VALVE	1111

CONTENTS (Cont'd)

Wiring Diagrams and Trouble Diagnosis.....	1185	ECM Terminals and Reference Value	1299
PREPARATION	1186	TROUBLE DIAGNOSIS - SPECIFICATION	
Special Service Tools	1186	VALUE	1308
Commercial Service Tools	1186	Description	1308
ENGINE AND EMISSION CONTROL OVERALL		Testing Condition	1308
SYSTEM	1189	Inspection Procedure.....	1308
Engine Control Component Parts Location.....	1189	Diagnostic Procedure	1309
Circuit Diagram	1191	TROUBLE DIAGNOSIS FOR INTERMITTENT	
System Diagram	1192	INCIDENT	1312
Vacuum Hose Drawing	1193	Description	1312
System Chart.....	1194	Diagnostic Procedure	1312
ENGINE AND EMISSION BASIC CONTROL		TROUBLE DIAGNOSIS FOR POWER SUPPLY	1313
SYSTEM DESCRIPTION	1195	Main Power Supply and Ground Circuit.....	1313
Multiport Fuel Injection (MFI) System	1195	DTC P0031, P0032, P0051, P0052 HO2S1	
Distributor Ignition (DI) System	1197	HEATER	1319
Air Conditioning Cut Control.....	1198	Description	1319
Fuel Cut Control (at no load & high engine		CONSULT-II Reference Value in Data Monitor	
speed)	1199	Mode	1319
Evaporative Emission System	1199	ECM Terminals and Reference Value	1319
On Board Refueling Vapor Recovery (ORVR)	1205	On Board Diagnosis Logic.....	1319
Positive Crankcase Ventilation	1215	DTC Confirmation Procedure	1320
BASIC SERVICE PROCEDURE	1217	Wiring Diagram	1321
Fuel Pressure Release	1217	Diagnostic Procedure	1323
Fuel Pressure Check	1217	DTC P0037, P0038, P0057, P0058 HO2S2	
Fuel Pressure Regulator Check	1218	HEATER	1326
Injector	1218	Description	1326
Fast Idle Cam (FIC).....	1219	CONSULT-II Reference Value in Data Monitor	
Idle Speed/Ignition Timing/Idle Mixture Ratio		Mode	1326
Adjustment	1220	ECM Terminals and Reference Value	1326
ON BOARD DIAGNOSTIC SYSTEM		On Board Diagnosis Logic.....	1327
DESCRIPTION	1232	DTC Confirmation Procedure	1327
Introduction	1232	Wiring Diagram	1328
Two Trip Detection Logic.....	1232	Diagnostic Procedure	1330
Emission-related Diagnostic Information	1233	DTC P0101, P0102, P0103 MAF SENSOR	1334
Malfunction Indicator Lamp (MIL).....	1247	Component Description	1334
OBD System Operation Chart	1248	CONSULT-II Reference Value in Data Monitor	
CONSULT-II	1254	Mode	1334
Generic Scan Tool (GST)	1267	ECM Terminals and Reference Value	1334
TROUBLE DIAGNOSIS - INTRODUCTION	1269	On Board Diagnosis Logic.....	1334
Introduction	1269	DTC Confirmation Procedure	1335
Work Flow	1271	Overall Function Check	1337
TROUBLE DIAGNOSIS - BASIC INSPECTION	1273	Wiring Diagram	1338
Basic Inspection.....	1273	Diagnostic Procedure	1339
TROUBLE DIAGNOSIS - GENERAL		DTC P0112, P0113, P0127 IAT SENSOR	1343
DESCRIPTION	1288	Component Description	1343
DTC Inspection Priority Chart.....	1288	On Board Diagnosis Logic.....	1343
Fail-safe Chart	1289	DTC Confirmation Procedure	1343
Symptom Matrix Chart.....	1290	Wiring Diagram	1345
CONSULT-II Reference Value in Data Monitor		Diagnostic Procedure	1346
Mode	1294	DTC P0117, P0118 ECT SENSOR	1348
Major Sensor Reference Graph in Data Monitor		Component Description	1348
Mode	1296	On Board Diagnosis Logic.....	1348

CONTENTS (Cont'd)

DTC Confirmation Procedure	1349	
Wiring Diagram	1350	
Diagnostic Procedure	1351	
DTC P0121, P0122, P0123 TP SENSOR	1353	
Description	1353	
CONSULT-II Reference Value in Data Monitor Mode	1353	
ECM Terminals and Reference Value	1354	
On Board Diagnosis Logic.....	1354	
DTC Confirmation Procedure	1355	
Wiring Diagram	1358	
Diagnostic Procedure	1359	
DTC P0125 ECT SENSOR	1366	
Description	1366	
On Board Diagnosis Logic.....	1366	
DTC Confirmation Procedure	1367	
Wiring Diagram	1368	
Diagnostic Procedure	1369	
DTC P0128 THERMOSTAT FUNCTION	1372	
On Board Diagnosis Logic.....	1372	
DTC Confirmation Procedure	1372	
Diagnostic Procedure	1373	
DTC P0132, P0152 HO2S1	1374	
Component Description	1374	
CONSULT-II Reference Value in Data Monitor Mode	1374	
ECM Terminals and Reference Value	1374	
On Board Diagnosis Logic.....	1375	
DTC Confirmation Procedure	1375	
Wiring Diagram	1376	
Diagnostic Procedure	1378	
DTC P0133, P0153 HO2S1	1382	
Component Description	1382	
CONSULT-II Reference Value in Data Monitor Mode	1382	
ECM Terminals and Reference Value	1382	
On Board Diagnosis Logic.....	1383	
DTC Confirmation Procedure	1383	
Overall Function Check	1384	
Wiring Diagram	1385	
Diagnostic Procedure	1387	
DTC P0134, P0154 HO2S1	1396	
Component Description	1396	
CONSULT-II Reference Value in Data Monitor Mode	1396	
ECM Terminals and Reference Value	1396	
On Board Diagnosis Logic.....	1397	
DTC Confirmation Procedure	1398	
Overall Function Check	1399	
Wiring Diagram	1400	
Diagnostic Procedure	1402	
DTC P0138, P0158 HO2S2	1407	
Component Description	1407	GI
CONSULT-II Reference Value in Data Monitor Mode	1407	
ECM Terminals and Reference Value	1407	MA
On Board Diagnosis Logic.....	1407	
DTC Confirmation Procedure	1408	EM
Overall Function Check	1408	
Wiring Diagram	1410	
Diagnostic Procedure	1412	LC
DTC P0139, P0159 HO2S2	1417	
Component Description	1417	EC
CONSULT-II Reference Value in Data Monitor Mode	1417	
ECM Terminals and Reference Value	1417	FE
On Board Diagnosis Logic.....	1417	
DTC Confirmation Procedure	1418	CL
Overall Function Check	1419	
Wiring Diagram	1420	
Diagnostic Procedure	1422	MT
DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION	1427	
On Board Diagnosis Logic.....	1427	AT
DTC Confirmation Procedure	1428	
Wiring Diagram	1429	TF
Diagnostic Procedure	1431	
DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION	1436	
On Board Diagnosis Logic.....	1436	PD
DTC Confirmation Procedure	1437	
Wiring Diagram	1438	AX
Diagnostic Procedure	1440	
DTC P0181, P0182, P0183 FTT SENSOR	1444	
Component Description	1444	SU
On Board Diagnosis Logic.....	1444	
DTC Confirmation Procedure	1445	BR
Wiring Diagram	1446	
Diagnostic Procedure	1447	
DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION	1449	ST
On Board Diagnosis Logic.....	1449	
Possible Cause.....	1449	RS
Overall Function Check	1450	
Diagnostic Procedure	1452	BT
Main 12 Causes of Overheating.....	1455	
DTC P0245 SCB VALVE CONTROL SOLENOID VALVE	1456	
Description	1456	HA
CONSULT-II Reference Value in Data Monitor Mode	1457	SC
ECM Terminals and Reference Value	1457	
On Board Diagnosis Logic.....	1457	EL
DTC Confirmation Procedure	1458	

CONTENTS (Cont'd)

Wiring Diagram	1459	Wiring Diagram	1522
Diagnostic Procedure	1460	Diagnostic Procedure	1523
DTC P0300 - P0306 NO. 6 - 1 CYLINDER		DTC P0447 EVAP CANISTER VENT CONTROL	
MISFIRE, MULTIPLE CYLINDER MISFIRE	1462	VALVE	1526
On Board Diagnosis Logic.....	1462	Component Description	1526
DTC Confirmation Procedure	1463	CONSULT-II Reference Value in Data Monitor	
Diagnostic Procedure	1463	Mode	1526
DTC P0327, P0328 KS	1471	ECM Terminals and Reference Value	1526
Component Description	1471	On Board Diagnosis Logic.....	1527
ECM Terminals and Reference Value	1471	DTC Confirmation Procedure	1527
On Board Diagnosis Logic.....	1471	Wiring Diagram	1528
DTC Confirmation Procedure	1471	Diagnostic Procedure	1529
Wiring Diagram	1472	DTC P0452, P0453 EVAP CONTROL SYSTEM	
Diagnostic Procedure	1473	PRESSURE SENSOR	1532
DTC P0335 CKP SENSOR (OBD)	1475	Component Description	1532
Component Description	1475	CONSULT-II Reference Value in Data Monitor	
ECM Terminals and Reference Value	1475	Mode	1532
On Board Diagnosis Logic.....	1476	ECM Terminals and Reference Value	1532
DTC Confirmation Procedure	1476	On Board Diagnosis Logic.....	1533
Wiring Diagram	1477	DTC Confirmation Procedure	1533
Diagnostic Procedure	1478	Wiring Diagram	1534
DTC P0340 CMP SENSOR	1481	Diagnostic Procedure	1535
Component Description	1481	Component Inspection.....	1541
ECM Terminals and Reference Value	1481	DTC P0455 EVAP CONTROL SYSTEM	1543
On Board Diagnosis Logic.....	1482	On Board Diagnosis Logic.....	1543
DTC Confirmation Procedure	1483	DTC Confirmation Procedure	1544
Wiring Diagram	1484	Diagnostic Procedure	1546
Diagnostic Procedure	1485	DTC P0456, P1456 EVAP CONTROL SYSTEM	1556
DTC P0420, P0430 THREE WAY CATALYST		On Board Diagnosis Logic.....	1556
FUNCTION	1488	DTC Confirmation Procedure	1557
On Board Diagnosis Logic.....	1488	Overall Function Check	1558
DTC Confirmation Procedure	1488	Diagnostic Procedure	1559
Overall Function Check	1489	DTC P0460 FUEL LEVEL SENSOR	1570
Diagnostic Procedure	1490	Component Description	1570
DTC P0441 EVAP CONTROL SYSTEM	1493	ECM Terminals and Reference Value	1570
System Description.....	1493	On Board Diagnosis Logic.....	1570
On Board Diagnosis Logic.....	1493	DTC Confirmation Procedure	1571
DTC Confirmation Procedure	1494	Wiring Diagram	1572
Overall Function Check	1495	Diagnostic Procedure	1573
Diagnostic Procedure	1496	DTC P0461 FUEL LEVEL SENSOR	1575
DTC P0442 EVAP CONTROL SYSTEM	1505	Component Description	1575
On Board Diagnosis Logic.....	1505	On Board Diagnosis Logic.....	1575
DTC Confirmation Procedure	1507	Overall Function Check	1575
Diagnostic Procedure	1508	DTC P0462, P0463 FUEL LEVEL SENSOR	1577
DTC P0444, P0445 EVAP CANISTER PURGE		Component Description	1577
VOLUME CONTROL SOLENOID VALVE	1519	ECM Terminals and Reference Value	1577
Description	1519	On Board Diagnosis Logic.....	1577
CONSULT-II Reference Value in Data Monitor		DTC Confirmation Procedure	1578
Mode	1519	Wiring Diagram	1579
ECM Terminals and Reference Value	1520	Diagnostic Procedure	1580
On Board Diagnosis Logic.....	1521	DTC P0500 VSS	1582
DTC Confirmation Procedure	1521	Component Description	1582

CONTENTS (Cont'd)

ECM Terminals and Reference Value	1582	
On Board Diagnosis Logic.....	1582	
DTC Confirmation Procedure	1582	
Overall Function Check	1583	
Wiring Diagram	1584	
Diagnostic Procedure	1585	
DTC P0505 ISC SYSTEM	1586	
Description	1586	
CONSULT-II Reference Value in Data Monitor		
Mode	1587	
ECM Terminals and Reference Value	1587	
On Board Diagnosis Logic.....	1587	
DTC Confirmation Procedure	1588	
Wiring Diagram	1589	
Diagnostic Procedure	1590	
DTC P0510 CTP SWITCH	1592	
Component Description	1592	
CONSULT-II Reference Value in Data Monitor		
Mode	1592	
ECM Terminals and Reference Value	1592	
On Board Diagnosis Logic.....	1592	
DTC Confirmation Procedure	1593	
Overall Function Check	1593	
Wiring Diagram	1594	
Diagnostic Procedure	1595	
DTC P0600 A/T CONTROL	1599	
System Description.....	1599	
ECM Terminals and Reference Value	1599	
On Board Diagnosis Logic.....	1599	
DTC Confirmation Procedure	1600	
Wiring Diagram	1601	
Diagnostic Procedure	1602	
DTC P0605 ECM	1604	
Component Description	1604	
On Board Diagnosis Logic.....	1604	
DTC Confirmation Procedure	1604	
Diagnostic Procedure	1605	
DTC P1143, P1163 HO2S1	1606	
Component Description	1606	
CONSULT-II Reference Value in Data Monitor		
Mode	1606	
ECM Terminals and Reference Value	1606	
On Board Diagnosis Logic.....	1607	
DTC Confirmation Procedure	1608	
Overall Function Check	1609	
Diagnostic Procedure	1609	
DTC P1144, P1164 HO2S1	1615	
Component Description	1615	
CONSULT-II Reference Value in Data Monitor		
Mode	1615	
ECM Terminals and Reference Value	1615	
On Board Diagnosis Logic.....	1616	
DTC Confirmation Procedure	1617	GI
Overall Function Check	1618	
Diagnostic Procedure	1618	
DTC P1146, P1166 HO2S2	1624	MA
Component Description	1624	
CONSULT-II Reference Value in Data Monitor		
Mode	1624	EM
ECM Terminals and Reference Value	1624	
On Board Diagnosis Logic.....	1624	LC
DTC Confirmation Procedure	1625	
Overall Function Check	1626	
Wiring Diagram	1627	EC
Diagnostic Procedure	1629	
DTC P1147, P1167 HO2S2	1634	
Component Description	1634	FE
CONSULT-II Reference Value in Data Monitor		
Mode	1634	CL
ECM Terminals and Reference Value	1634	
On Board Diagnosis Logic.....	1634	MT
DTC Confirmation Procedure	1635	
Overall Function Check	1636	
Wiring Diagram	1637	AT
Diagnostic Procedure	1639	
DTC P1148, P1168 CLOSED LOOP CONTROL	1644	
On Board Diagnosis Logic.....	1644	TF
DTC Confirmation Procedure	1644	
Overall Function Check	1645	
Diagnostic Procedure	1645	PD
DTC P1217 ENGINE OVER TEMPERATURE	1646	
On Board Diagnosis Logic.....	1646	AX
Overall Function Check	1646	
Diagnostic Procedure	1647	
Main 12 Causes of Overheating.....	1650	SU
DTC P1336 CKP SENSOR (OBD)	1651	
Component Description	1651	
ECM Terminals and Reference Value	1651	BR
On Board Diagnosis Logic.....	1652	
DTC Confirmation Procedure	1652	
Wiring Diagram	1653	ST
Diagnostic Procedure	1654	
DTC P1442 EVAP CONTROL SYSTEM	1658	
On Board Diagnosis Logic.....	1658	RS
DTC Confirmation Procedure	1659	
Diagnostic Procedure	1659	BT
DTC P1444 EVAP CANISTER PURGE VOLUME		
CONTROL SOLENOID VALVE	1660	HA
Description	1660	
CONSULT-II Reference Value in Data Monitor		
Mode	1660	SC
ECM Terminals and Reference Value	1661	
On Board Diagnosis Logic.....	1661	
DTC Confirmation Procedure	1662	EL

CONTENTS (Cont'd)

Wiring Diagram	1663	DTC P1605 A/T DIAGNOSIS COMMUNICATION	
Diagnostic Procedure	1664	LINE	1706
DTC P1446 EVAP CANISTER VENT CONTROL		Component Description	1706
VALVE	1672	ECM Terminals and Reference Value	1706
Component Description	1672	On Board Diagnosis Logic.....	1706
CONSULT-II Reference Value in Data Monitor		DTC Confirmation Procedure	1706
Mode	1672	Wiring Diagram	1707
ECM Terminals and Reference Value	1672	Diagnostic Procedure	1708
On Board Diagnosis Logic.....	1673	DTC P1706 PNP SWITCH	1709
DTC Confirmation Procedure	1673	Component Description	1709
Wiring Diagram	1674	CONSULT-II Reference Value in Data Monitor	
Diagnostic Procedure	1675	Mode	1709
DTC P1448 EVAP CANISTER VENT CONTROL		ECM Terminals and Reference Value	1709
VALVE	1679	On Board Diagnosis Logic.....	1709
Component Description	1679	DTC Confirmation Procedure	1710
CONSULT-II Reference Value in Data Monitor		Overall Function Check	1711
Mode	1679	Wiring Diagram	1712
ECM Terminals and Reference Value	1679	Diagnostic Procedure	1713
On Board Diagnosis Logic.....	1679	IGNITION SIGNAL	1718
DTC Confirmation Procedure	1680	Component Description	1718
Overall Function Check	1681	ECM Terminals and Reference Value	1718
Wiring Diagram	1682	Wiring Diagram	1719
Diagnostic Procedure	1683	Diagnostic Procedure	1720
DTC P1464 FUEL LEVEL SENSOR	1687	INJECTOR	1724
Component Description	1687	Component Description	1724
ECM Terminals and Reference Value	1687	CONSULT-II Reference Value in Data Monitor	
On Board Diagnosis Logic.....	1687	Mode	1724
DTC Confirmation Procedure	1687	ECM Terminals and Reference Value	1724
Wiring Diagram	1689	Wiring Diagram	1725
Diagnostic Procedure	1690	Diagnostic Procedure	1726
DTC P1490 VACUUM CUT VALVE BYPASS		START SIGNAL	1729
VALVE	1691	CONSULT-II Reference Value in Data Monitor	
Description	1691	Mode	1729
CONSULT-II Reference Value in Data Monitor		ECM Terminals and Reference Value	1729
Mode	1691	Wiring Diagram	1730
ECM Terminals and Reference Value	1691	Diagnostic Procedure	1731
On Board Diagnosis Logic.....	1692	FUEL PUMP	1733
DTC Confirmation Procedure	1692	System Description.....	1733
Wiring Diagram	1693	Component Description	1733
Diagnostic Procedure	1694	CONSULT-II Reference Value in Data Monitor	
DTC P1491 VACUUM CUT VALVE BYPASS		Mode	1733
VALVE	1697	ECM Terminals and Reference Value	1734
Description	1697	Wiring Diagram	1735
CONSULT-II Reference Value in Data Monitor		Diagnostic Procedure	1736
Mode	1697	POWER STEERING OIL PRESSURE SWITCH	1740
ECM Terminals and Reference Value	1697	Component Description	1740
On Board Diagnosis Logic.....	1698	CONSULT-II Reference Value in Data Monitor	
DTC Confirmation Procedure	1698	Mode	1740
Overall Function Check	1699	ECM Terminals and Reference Value	1740
Wiring Diagram	1700	Wiring Diagram	1741
Diagnostic Procedure	1701	Diagnostic Procedure	1742
		IACV-FICD SOLENOID VALVE	1745

CONTENTS (Cont'd)

Component Description	1745	Engine Coolant Temperature Sensor	1752	GI
ECM Terminals and Reference Value	1745	Heated Oxygen Sensor 1 Heater	1752	
Wiring Diagram	1746	Fuel Pump	1752	MA
Diagnostic Procedure	1747	IACV-AAC Valve	1752	
MIL & DATA LINK CONNECTORS	1751	Injector	1753	EM
Wiring Diagram	1751	Throttle Position Sensor	1753	
SERVICE DATA AND SPECIFICATIONS (SDS)	1752	Calculated Load Value.....	1753	LC
Fuel Pressure Regulator.....	1752	Intake Air Temperature Sensor.....	1753	
Idle Speed and Ignition Timing.....	1752	Heated Oxygen Sensor 2 Heater.....	1753	EC
Ignition Coil	1752	Crankshaft Position Sensor (OBD).....	1753	
Mass Air Flow Sensor.....	1752	Fuel Tank Temperature Sensor	1753	

EC

FE

CL

MT

AT

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AX

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BR

ST

RS

BT

HA

SC

EL

IDX

TROUBLE DIAGNOSIS — INDEX

KA24DE

Alphabetical & P No. Index for DTC

Alphabetical & P No. Index for DTC

NGEC0001

ALPHABETICAL INDEX FOR DTC

NGEC0001S01

Items (CONSULT-II screen terms)	DTC*1*2	Reference page
	CONSULT-II GST	
Unable to access ECM	—	EC-127
ABSL PRES SEN/CIRC	P0107	EC-178
ABSL PRES SEN/CIRC	P0108	EC-178
CKP SEN/CIRCUIT	P0335	EC-294
CKP SENSOR (COG)	P1336	EC-490
CLOSED LOOP-B1	P1148	EC-483
CLOSED TP SW/CIRC	P0510	EC-440
CMP SEN/CIRCUIT	P0340	EC-300
CYL1 MISFIRE	P0301	EC-281
CYL2 MISFIRE	P0302	EC-281
CYL3 MISFIRE	P0303	EC-281
CYL4 MISFIRE	P0304	EC-281
ECM	P0605	EC-447
ECT SEN/CIRCUIT	P0117*3	EC-185
ECT SEN/CIRCUIT	P0118*3	EC-185
ECT SENSOR	P0125	EC-204
EGR SYSTEM	P0400	EC-308
EGR SYSTEM	P1402	EC-503
EGR TEMP SEN/CIRC	P0405	EC-328
EGR TEMP SEN/CIRC	P0406	EC-328
EGRC-BPT VALVE	P0402	EC-320
EGRC SOLENOID/V	P1400	EC-496
ENG OVER TEMP	P0217	EC-275
ENG OVER TEMP	P1217	EC-485
EVAP GROSS LEAK	P0455	EC-393
EVAP PURG FLOW/MON	P0441	EC-339
EVAP SMALL LEAK	P0442	EC-350
EVAP SYS PRES SEN	P0452	EC-380
EVAP SYS PRES SEN	P0453	EC-380
EVAP VERY SML LEAK	P0456	EC-405
EVAP VERY SML LEAK	P1456	EC-405
FTT SEN/CIRCUIT	P0182	EC-269
FTT SEN/CIRCUIT	P0183	EC-269
FTT SENSOR	P0181	EC-269

TROUBLE DIAGNOSIS — INDEX

KA24DE

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

Items (CONSULT-II screen terms)	DTC*1*2	Reference page	GI
	CONSULT-II GST		MA
FUEL LEV SEN SLOSH	P0460	EC-420	EM
FUEL LEVEL SEN/CIRC	P1464	EC-536	LC
FUEL LEVEL SENSOR	P0461	EC-424	EC
FUEL LEVL SEN/CIRC	P0462	EC-426	FE
FUEL LEVL SEN/CIRC	P0463	EC-426	CL
FUEL SYS-LEAN-B1	P0171	EC-255	MT
FUEL SYS-RICH-B1	P0172	EC-262	AT
HO2S1 (B1)	P0132	EC-211	TF
HO2S1 (B1)	P0133	EC-218	PD
HO2S1 (B1)	P0134	EC-229	AX
HO2S1 (B1)	P1143	EC-449	SU
HO2S1 (B1)	P1144	EC-456	BR
HO2S1 HTR (B1)	P0031	EC-158	ST
HO2S1 HTR (B1)	P0032	EC-158	RS
HO2S2 HTR (B1)	P0037	EC-163	BT
HO2S2 HTR (B1)	P0038	EC-163	HA
HO2S2 (B1)	P0138	EC-237	SC
HO2S2 (B1)	P0139	EC-245	EL
HO2S2 (B1)	P1146	EC-463	ID
HO2S2 (B1)	P1147	EC-473	ID
IAT SEN/CIRCUIT	P0112*3	EC-180	ID
IAT SEN/CIRCUIT	P0113*3	EC-180	ID
IAT SENSOR	P0127	EC-180	ID
ISC SYSTEM/CIRC	P0505	EC-434	ID
KNOCK SEN/CIRC-B1	P0327	EC-290	ID
KNOCK SEN/CIRC-B1	P0328	EC-290	ID
MAF SEN/CIRCUIT	P0101	EC-168	ID
MAF SEN/CIRCUIT	P0102*3	EC-168	ID
MAF SEN/CIRCUIT	P0103*3	EC-168	ID
MULTI CYL MISFIRE	P0300	EC-281	ID
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	P0000	—	ID
P-N POS SW/CIRCUIT	P1706	EC-556	ID
PURG VOLUME CONT/V	P0444	EC-366	ID
PURG VOLUME CONT/V	P0445	EC-366	ID
PURG VOLUME CONT/V	P1444	EC-512	ID

TROUBLE DIAGNOSIS — INDEX

KA24DE

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

Items (CONSULT-II screen terms)	DTC*1*2	Reference page
	CONSULT-II GST	
THERMSTAT FNCTN	P0128	EC-209
TP SEN/CIRCUIT	P0121	EC-190
TP SEN/CIRCUIT	P0122*3	EC-190
TP SEN/CIRCUIT	P0123*3	EC-190
TW CATALYST SYS-B1	P0420	EC-334
VC CUT/V BYPASS/V	P1491	EC-546
VC/V BYPASS/V	P1490	EC-539
VEH SPEED SEN/CIRC	P0500	EC-430
VENT CONTROL VALVE	P0447	EC-373
VENT CONTROL VALVE	P1446	EC-523
VENT CONTROL VALVE	P1448	EC-529

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

*2: These numbers are prescribed by SAE J2012.

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

P NO. INDEX FOR DTC

NGEC0001S02

DTC*1*2	Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST		
—	Unable to access ECM	EC-127
P0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	—
P0031	HO2S1 HTR (B1)	EC-158
P0032	HO2S1 HTR (B1)	EC-158
P0037	HO2S2 HTR (B1)	EC-163
P0038	HO2S2 HTR (B1)	EC-163
P0101	MAF SEN/CIRCUIT	EC-168
P0102*3	MAF SEN/CIRCUIT	EC-168
P0103*3	MAF SEN/CIRCUIT	EC-168
P0107	ABSL PRES SEN/CIRC	EC-178
P0108	ABSL PRES SEN/CIRC	EC-178
P0112*3	IAT SEN/CIRCUIT	EC-180
P0113*3	IAT SEN/CIRCUIT	EC-180
P0117*3	ECT SEN/CIRCUIT	EC-185
P0118*3	ECT SEN/CIRCUIT	EC-185
P0121	TP SEN/CIRCUIT	EC-190
P0122*3	TP SEN/CIRCUIT	EC-190
P0123*3	TP SEN/CIRCUIT	EC-190

TROUBLE DIAGNOSIS — INDEX

KA24DE

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

DTC*1*2	Items (CONSULT-II screen terms)	Reference page	
CONSULT-II GST			GI
P0125	ECT SENSOR	EC-204	MA
P0127	IAT SENSOR	EC-180	
P0128	THERMSTAT FNCTN	EC-209	EM
P0132	HO2S1 (B1)	EC-211	
P0133	HO2S1 (B1)	EC-218	LC
P0134	HO2S1 (B1)	EC-229	
P0138	HO2S2 (B1)	EC-237	EC
P0139	HO2S2 (B1)	EC-245	
P0171	FUEL SYS-LEAN-B1	EC-255	FE
P0172	FUEL SYS-RICH-B1	EC-262	
P0181	FTT SENSOR	EC-269	CL
P0182	FTT SEN/CIRCUIT	EC-269	
P0183	FTT SEN/CIRCUIT	EC-269	MT
P0217	ENG OVER TEMP	EC-275	
P0300	MULTI CYL MISFIRE	EC-281	AT
P0301	CYL1 MISFIRE	EC-281	
P0302	CYL2 MISFIRE	EC-281	TF
P0303	CYL3 MISFIRE	EC-281	
P0304	CYL4 MISFIRE	EC-281	PD
P0327	KNOCK SEN/CIRC-B1	EC-290	AX
P0328	KNOCK SEN/CIRC-B1	EC-290	
P0335	CKP SEN/CIRCUIT	EC-294	SU
P0340	CMP SEN/CIRCUIT	EC-300	
P0400	EGR SYSTEM	EC-308	BR
P0402	EGRC-BPT VALVE	EC-320	
P0405	EGR TEMP SEN/CIRC	EC-328	ST
P0406	EGR TEMP SEN/CIRC	EC-328	
P0420	TW CATALYST SYS-B1	EC-334	RS
P0441	EVAP PURG FLOW/MON	EC-339	
P0442	EVAP SMALL LEAK	EC-350	BT
P0444	PURG VOLUME CONT/V	EC-366	
P0445	PURG VOLUME CONT/V	EC-366	HA
P0447	VENT CONTROL VALVE	EC-373	
P0452	EVAP SYS PRES SEN	EC-380	SC
P0453	EVAP SYS PRES SEN	EC-380	
P0455	EVAP GROSS LEAK	EC-393	EL

TROUBLE DIAGNOSIS — INDEX

KA24DE

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

DTC*1*2	Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST		
P0456	EVAP VERY SML LEAK	EC-405
P0460	FUEL LEV SEN SLOSH	EC-420
P0461	FUEL LEVEL SENSOR	EC-424
P0462	FUEL LEVL SEN/CIRC	EC-426
P0463	FUEL LEVL SEN/CIRC	EC-426
P0500	VEH SPEED SEN/CIRC	EC-430
P0505	ISC SYSTEM/CIRC	EC-434
P0510	CLOSED TP SW/CIRC	EC-440
P0605	ECM	EC-447
P1143	HO2S1 (B1)	EC-449
P1144	HO2S1 (B1)	EC-456
P1146	HO2S2 (B1)	EC-463
P1147	HO2S2 (B1)	EC-473
P1148	CLOSED LOOP-B1	EC-483
P1217	ENG OVER TEMP	EC-485
P1336	CKP SENSOR (COG)	EC-490
P1400	EGRC SOLENOID/V	EC-496
P1402	EGR SYSTEM	EC-503
P1444	PURG VOLUME CONT/V	EC-512
P1446	VENT CONTROL VALVE	EC-523
P1448	VENT CONTROL VALVE	EC-529
P1456	EVAP VERY SML LEAK	EC-405
P1464	FUEL LEVEL SEN/CIRC	EC-536
P1490	VC/V BYPASS/V	EC-539
P1491	VC CUT/V BYPASS/V	EC-546
P1706	P-N POS SW/CIRCUIT	EC-556

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

*2: These numbers are prescribed by SAE J2012.

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

PRECAUTIONS

KA24DE

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

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

NGEC0002

The Supplemental Restraint System "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a seat belt, help to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.

In addition to the supplemental air bag modules for a frontal collision, the supplemental side air bag used along with the seat belt helps to reduce the risk or severity of injury to the driver and front passenger in a side collision. The supplemental side air bag consists of air bag modules (located in the outer side of front seats), satellite sensor, diagnosis sensor unit (one of components of supplemental air bags for a frontal collision), wiring harness, warning lamp (one of components of supplemental air bags for a frontal collision). Information necessary to service the system safely is included in the **RS section** of this Service Manual.

WARNING:

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

Precautions for On Board Diagnostic (OBD) System of Engine

NGEC0003

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

CAUTION:

- Be sure to turn the ignition switch OFF and disconnect the negative battery terminal before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.
- Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)
- Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to "Description", "HARNESS CONNECTOR", *EL-7*.
- 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 EGR system or fuel injection system, etc.
- Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM before returning the vehicle to the customer.

Engine Fuel & Emission Control System

NGEC0004

ECM

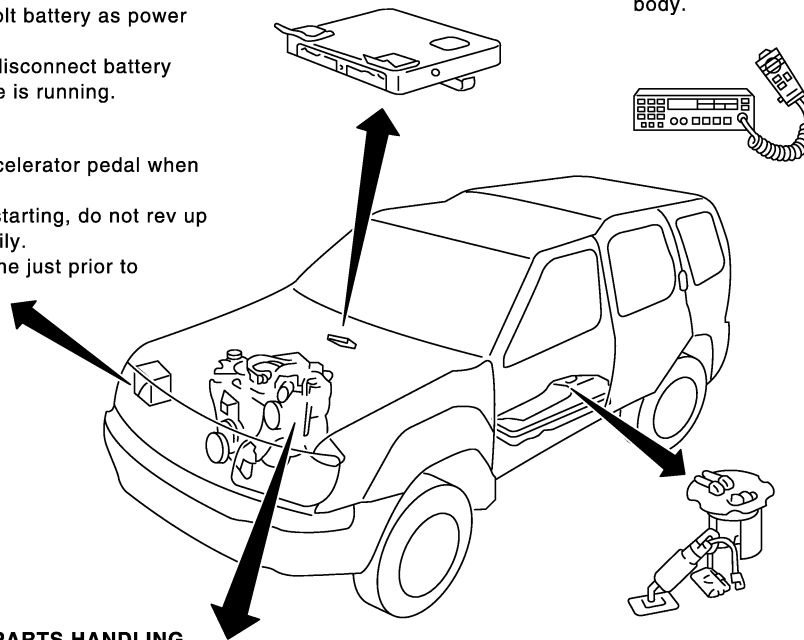
- Do not disassemble ECM.
- If a battery terminal is disconnected, the memory will return to the ECM value.
The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a problem. Do not replace parts because of a slight variation.

BATTERY

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

WHEN STARTING

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



ECM PARTS HANDLING

- Handle mass air flow sensor carefully to avoid damage.
- Do not disassemble mass air flow sensor.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble IACV-AAC valve.
- Even a slight leak in the air intake system can cause serious problems.
- Do not shock or jar the camshaft position sensor or crankshaft position sensor (OBD).



WIRELESS EQUIPMENT

- When installing CB ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on its installation location.
 - 1) Keep the antenna as far away as possible from the electronic control units.
 - 2) Keep the antenna feeder line more than 20 cm (7.9 in) away from the harness of electronic controls.
Do not let them run parallel for a long distance.
 - 3) Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
 - 4) Be sure to ground the radio to vehicle body.

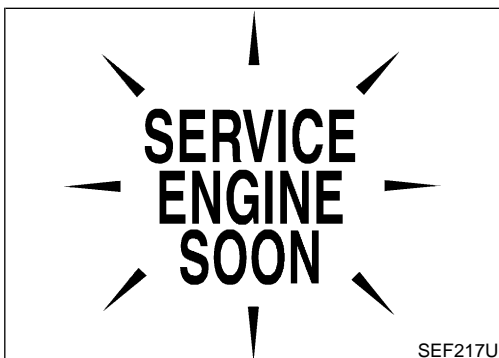
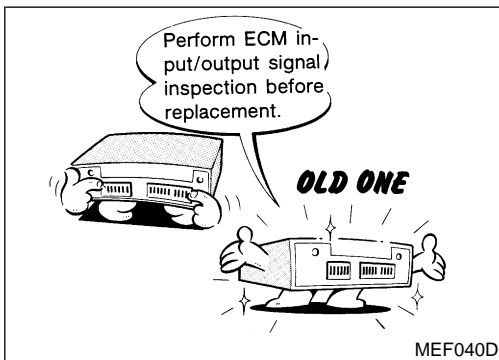
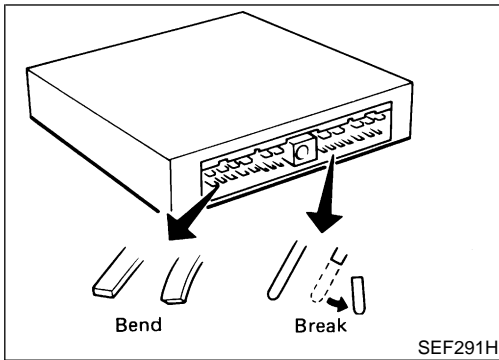
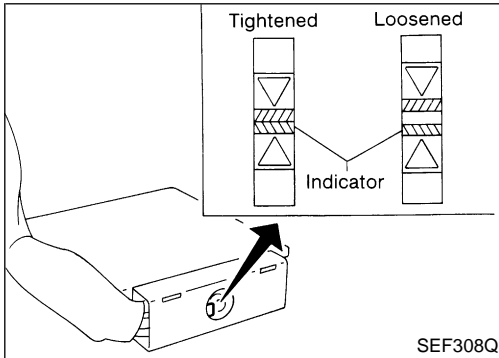
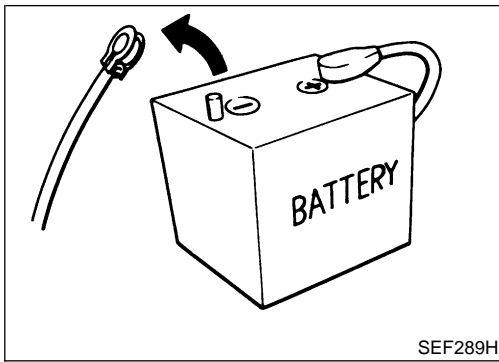
FUEL PUMP

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

ECM HARNESS HANDLING


- Securely connect ECM harness connectors.
A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep engine control system harness at least 10 cm (3.9 in.) away from adjacent harnesses to prevent an engine control system malfunction due to receiving external noise, degraded operation of ICs, etc.
- Keep engine control system parts and harnesses dry.
- Before removing parts, turn off ignition switch and then disconnect battery ground cable.

SEC744C



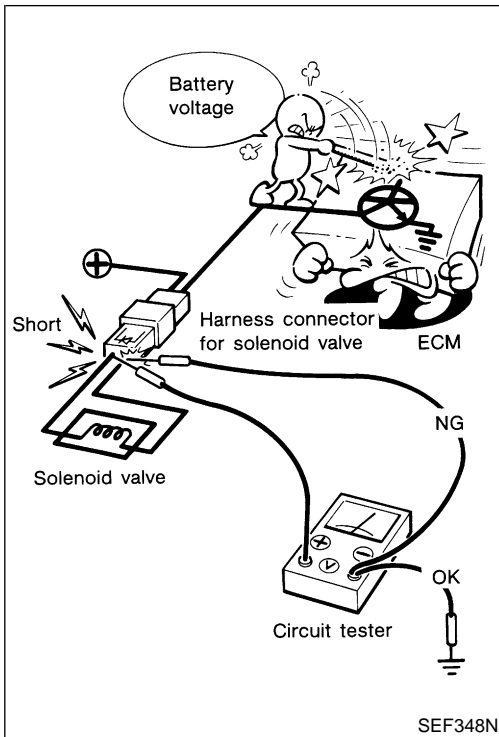
Precautions

NGEC0005

- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery terminal. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned off.
- When connecting ECM harness connector, tighten securing bolt until the gap between orange indicators disappears.
 -  : 3 - 5 N·m (0.3 - 0.5 kg·m, 26 - 43 in·lb)
- 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 terminals when connecting pin connectors.
- Before replacing ECM, perform Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-137.
- After performing each TROUBLE DIAGNOSIS, perform "Overall Function Check" or "DTC Confirmation Procedure". 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.

GI
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Precautions (Cont'd)



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

Wiring Diagrams and Trouble Diagnosis

NGEC0006

When you read Wiring diagrams, refer to the following:

- "HOW TO READ WIRING DIAGRAMS", **GI-10**.
- "POWER SUPPLY ROUTING", **EL-10**.

When you perform trouble diagnosis, refer to the following:

- "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES" in **GI-33**.
- "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT", **GI-22**.

PREPARATION

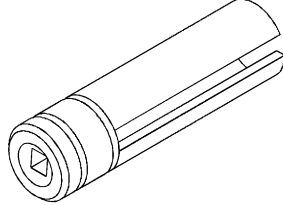
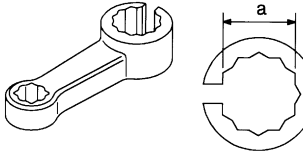
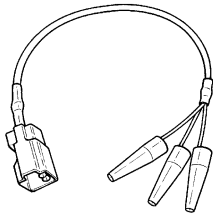
KA24DE

Special Service Tools

Special Service Tools

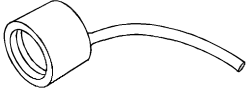
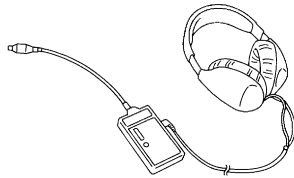
NGEC0007

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

Tool number (Kent-Moore No.) Tool name	Description		
KV10117100 (J36471-A) Heated oxygen sensor wrench		Loosening or tightening heated oxygen sensor 1 with 22 mm (0.87 in) hexagon nut	GI MA EM LC EC
KV10114400 (J-38365) Heated oxygen sensor wrench		Loosening or tightening heated oxygen sensor 2 a: 22 mm (0.87 in)	FE CL
(J-45178) TPS test connector		Used to test the throttle position sensor	MT AT TF PD AX

Commercial Service Tools

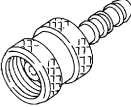
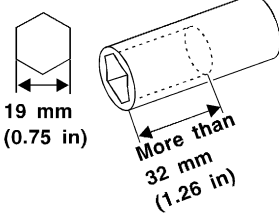
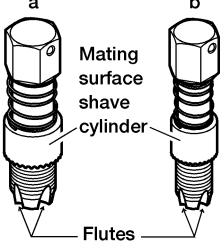
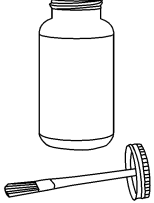
NGEC0008

Tool name	Description		
Fuel filler cap adapter		Checking fuel tank vacuum relief valve opening pressure	BR ST RS
Leak detector (J41416)		Locating the EVAP leak	BT HA SC EL

PREPARATION

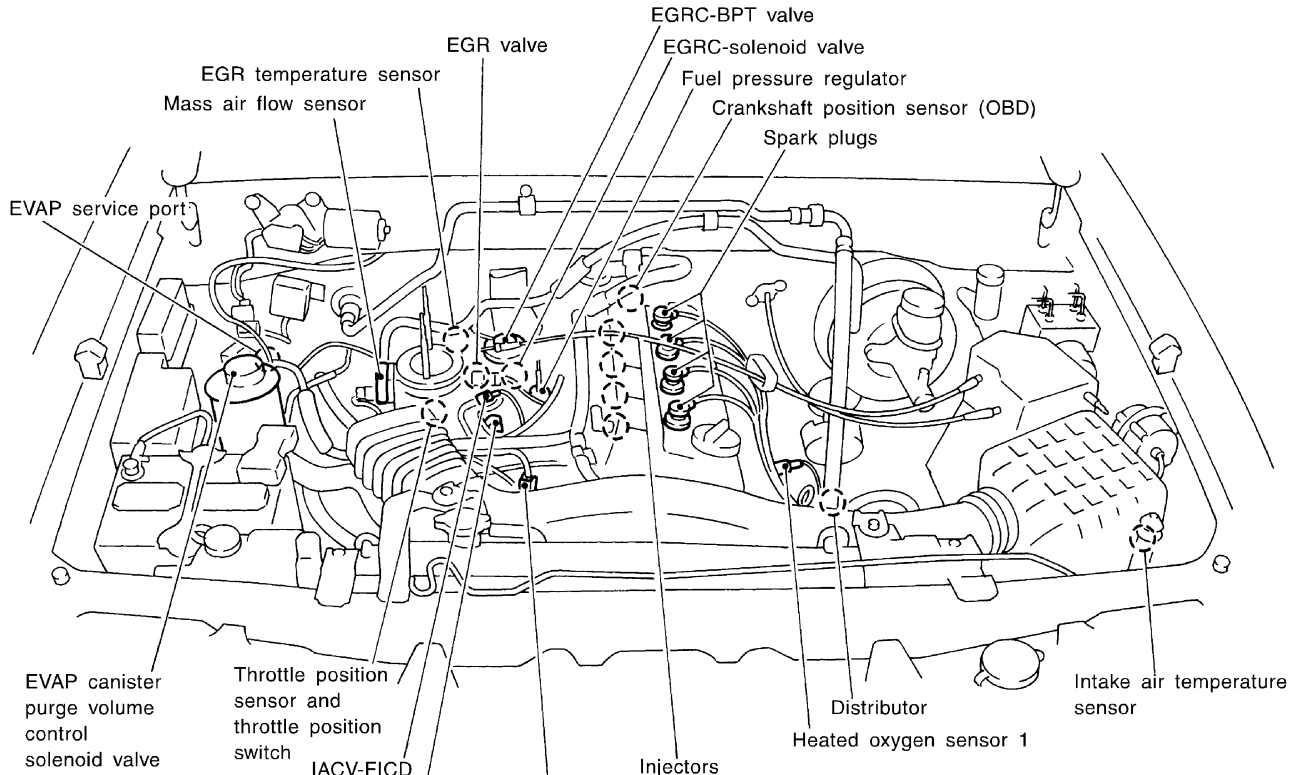
KA24DE

Commercial Service Tools (Cont'd)

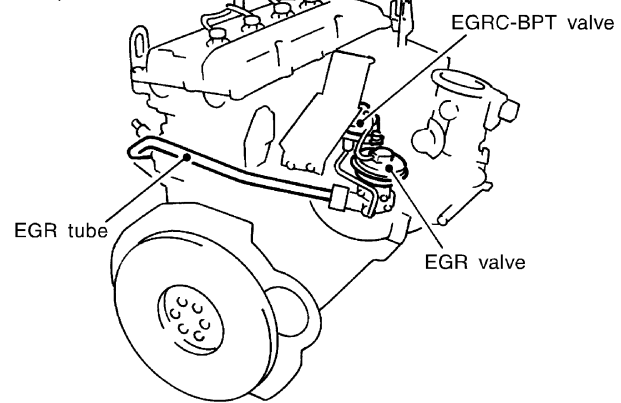
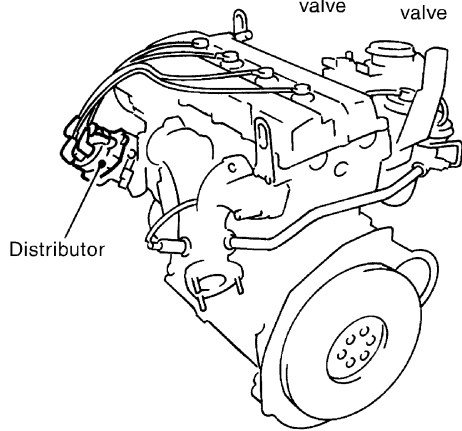
Tool name	Description
EVAP service port adapter (J41413-OBD)	Applying positive pressure through EVAP service port  NT704
Socket wrench	Removing and installing engine coolant temperature sensor  NT705
Oxygen sensor thread cleaner (J-43897-18) (J-43897-12)	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown in "Commercial Service tools". a: J-43897-18 18 mm diameter, for Zirconia Oxygen Sensor b: J-43897-12 12 mm diameter, for Titania Oxygen Sensor  AEM488
Anti-seize lubricant (Permatex [®] 133AR or equivalent meeting MIL specification MIL-A-907)	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.  AEM489

Engine Control Component Parts Location

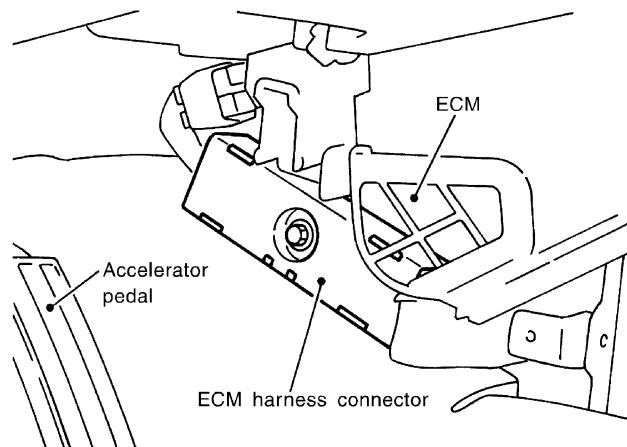
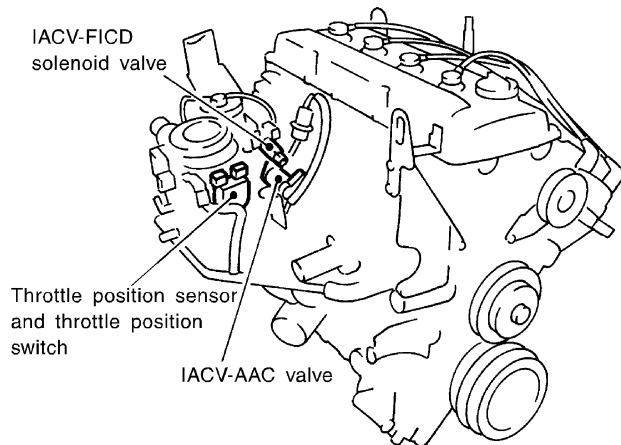
NGEC0009



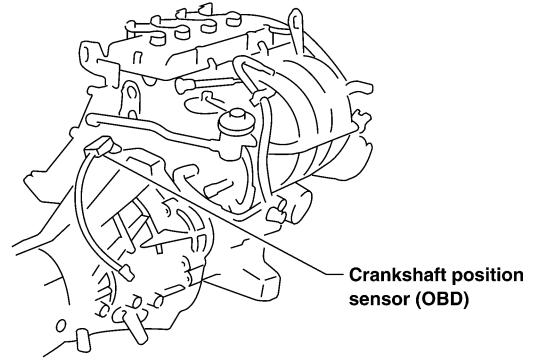
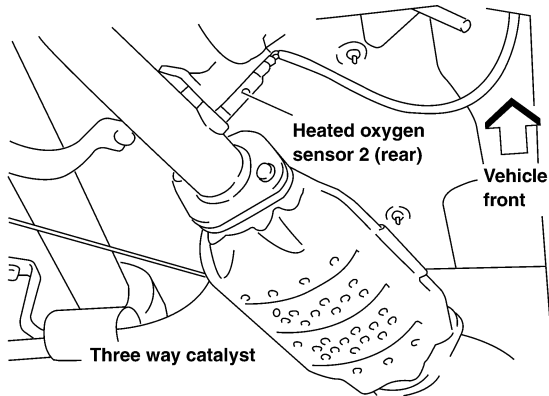
- GI
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- SC
- EL
- IDX



Driver side



SEF711ZA

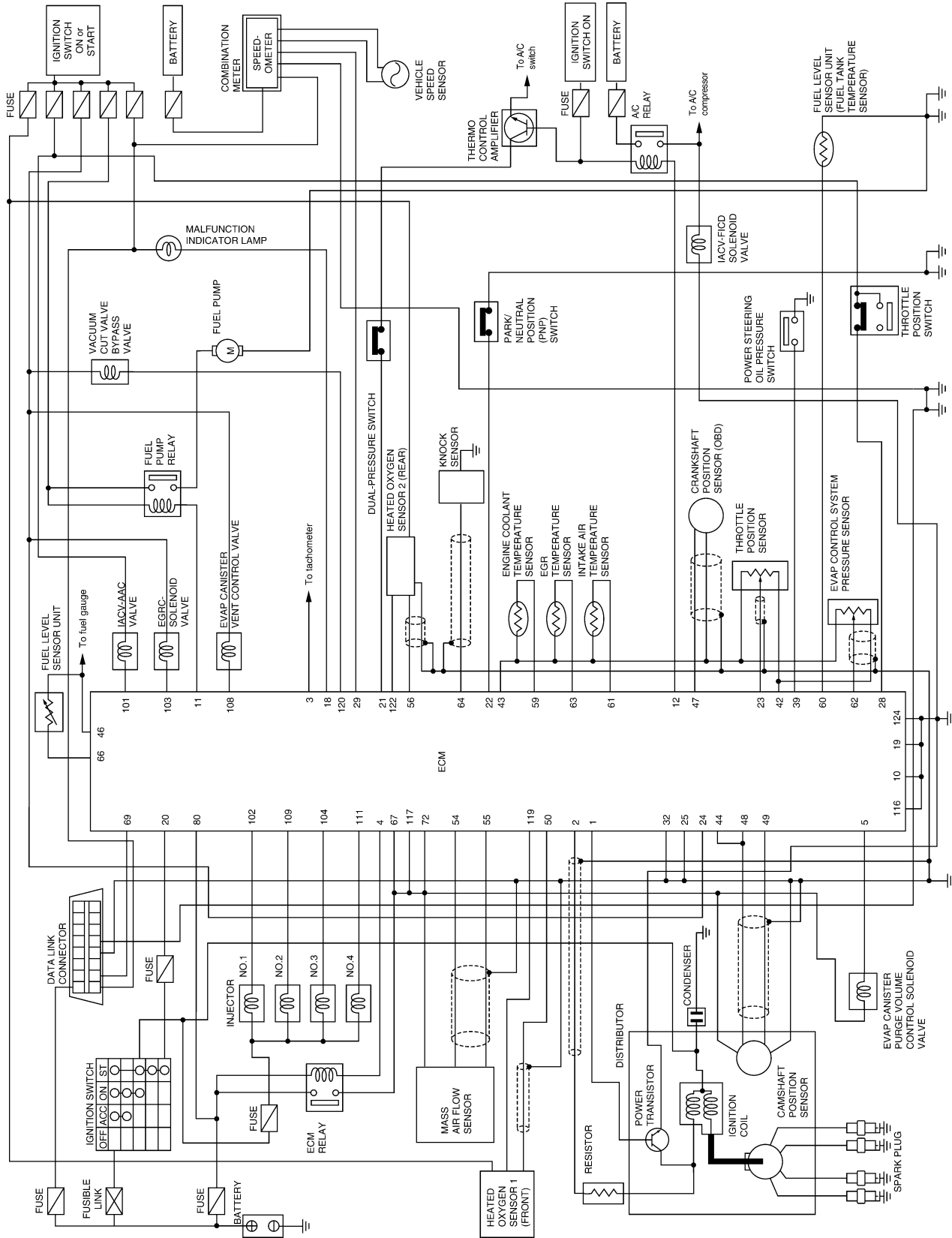


WEC550

Circuit Diagram

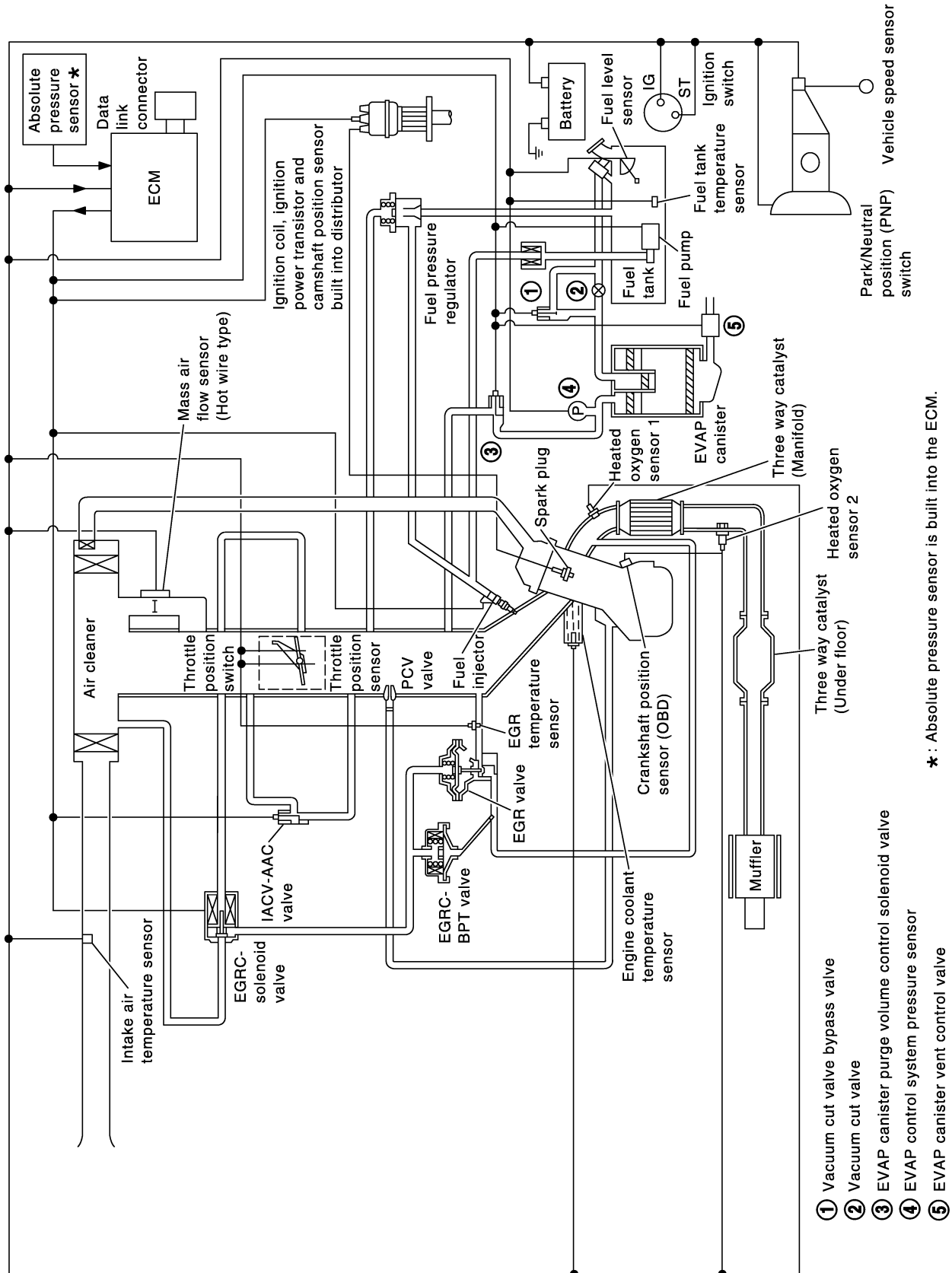
NGEC0010

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System Diagram

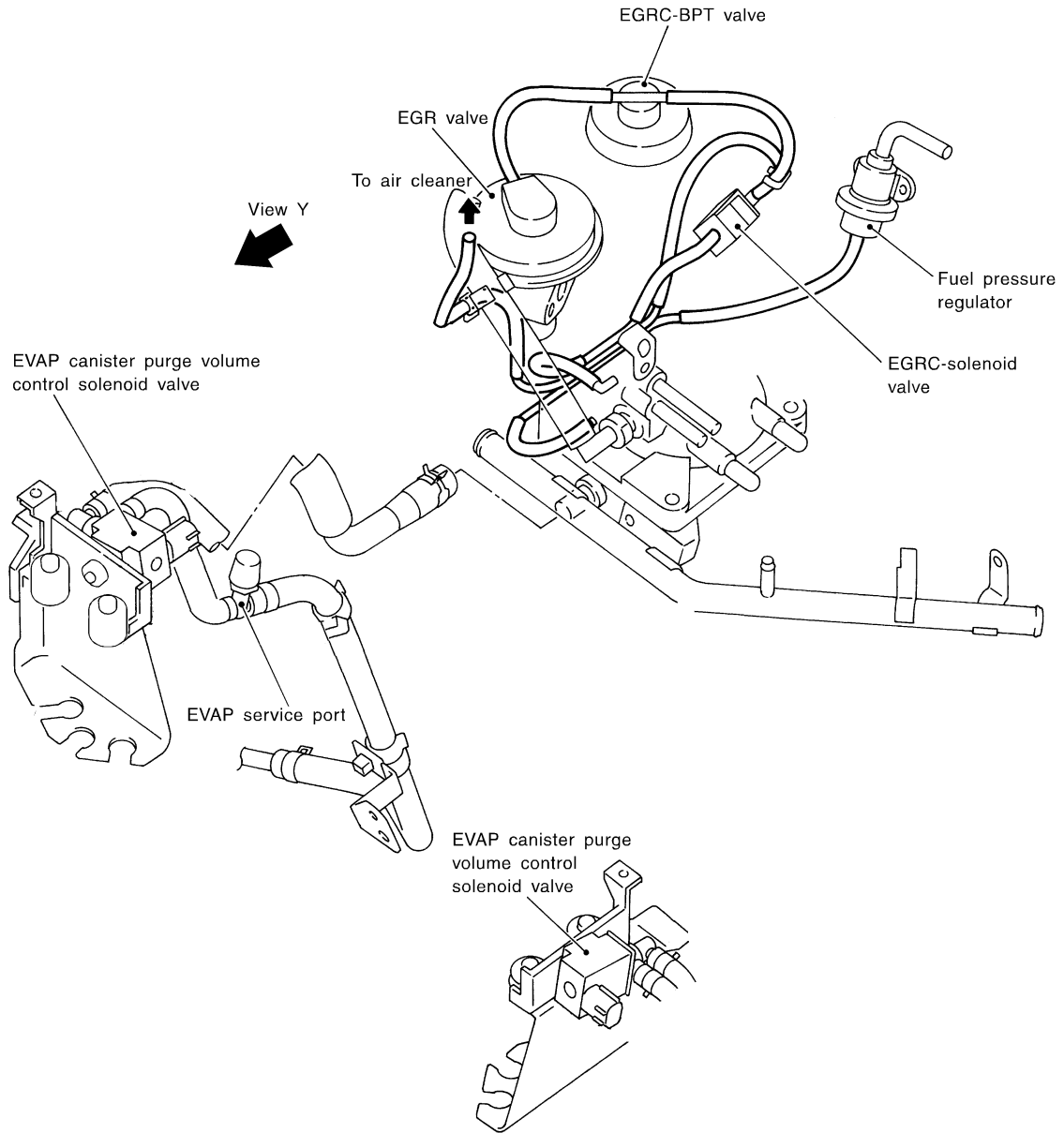
NGEC0011



Vacuum Hose Drawing

NGEC0012

Refer to "System Diagram" on EC-32 for vacuum control system.



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

View Y

GI

MA

EM

LC

EC

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WEC551

IDX

System Chart

NGEC0013

Input (Sensor)	ECM Function	Output (Actuator)
<ul style="list-style-type: none"> ● Camshaft position sensor ● Mass air flow sensor ● Engine coolant temperature sensor ● Heated oxygen sensor 1 ● Ignition switch ● Throttle position sensor ● PNP switch ● Air conditioner switch ● Knock sensor ● EGR temperature sensor*1 ● Crankshaft position sensor (OBD) ● EVAP control system pressure sensor*1 ● Fuel tank temperature sensor ● Battery voltage ● Power steering oil pressure switch ● Vehicle speed sensor ● Intake air temperature sensor ● Heated oxygen sensor 2*2 ● Closed throttle position switch*3 	Fuel injection & mixture ratio control	Injectors
	Distributor ignition system	Power transistor
	Idle air control system	IACV-AAC valve and IACV-FICD solenoid valve
	Fuel pump control	Fuel pump relay
	Heated oxygen sensor 1 monitor & on board diagnostic system	Malfunction indicator lamp (On the instrument panel)
	EGR control	EGRC-solenoid valve
	Heated oxygen sensors 1, 2 heater control	Heated oxygen sensor heater
	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
	Air conditioning cut control	Air conditioner relay
	ON BOARD DIAGNOSIS for EVAP system	<ul style="list-style-type: none"> ● EVAP canister vent control valve ● Vacuum cut valve bypass valve

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

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

*3: This switch will operate in place of the throttle position sensor to control EVAP parts if the sensor malfunctions.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

Multiport Fuel Injection (MFI) System

Multiport Fuel Injection (MFI) System

DESCRIPTION

Input/Output Signal Chart

NGEC0014

NGEC0014S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed and piston position	Fuel injection & mixture ratio control	Injector
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Heated oxygen sensor 1	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position Throttle valve idle position		
PNP switch	Gear position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Air conditioner switch	Air conditioner operation		
Knock sensor	Engine knocking condition		
Battery	Battery voltage		
Power steering oil pressure switch	Power steering operation		
Heated oxygen sensor 2*	Density of oxygen in exhaust gas		

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

Basic Multiport Fuel Injection System

NGEC0014S02

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

Various Fuel Injection Increase/Decrease Compensation

NGEC0014S03

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

<Fuel increase>

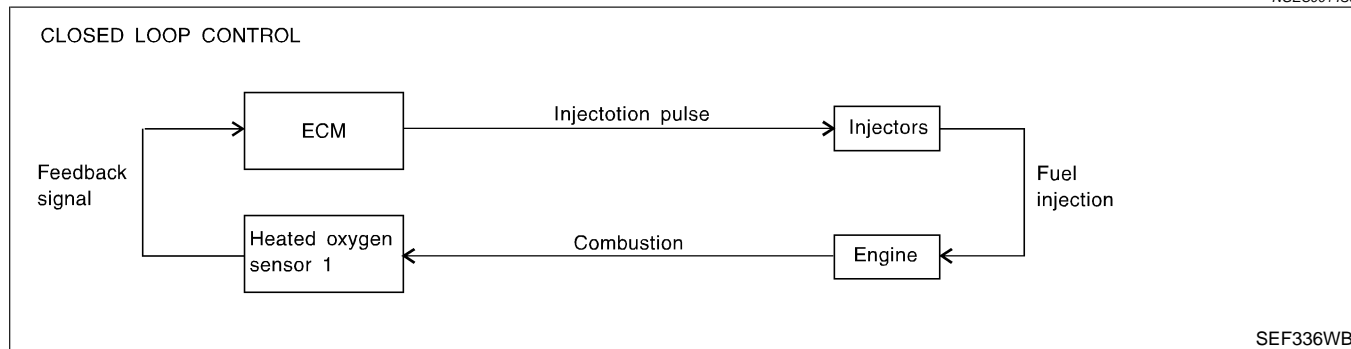
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

Mixture Ratio Feedback Control (Closed loop control)

NGEC0014S04



SEF336WB

The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst can then better reduce CO, HC and NOx emissions. This system uses a heated oxygen sensor 1 in the exhaust manifold to monitor if the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about the heated oxygen sensor 1, refer to EC-229. 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. Even if the switching characteristics of the heated oxygen sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from the heated oxygen sensor 2.

Open Loop Control

NGEC0014S05

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

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

Mixture Ratio Self-learning Control

NGEC0014S06

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

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

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

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

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

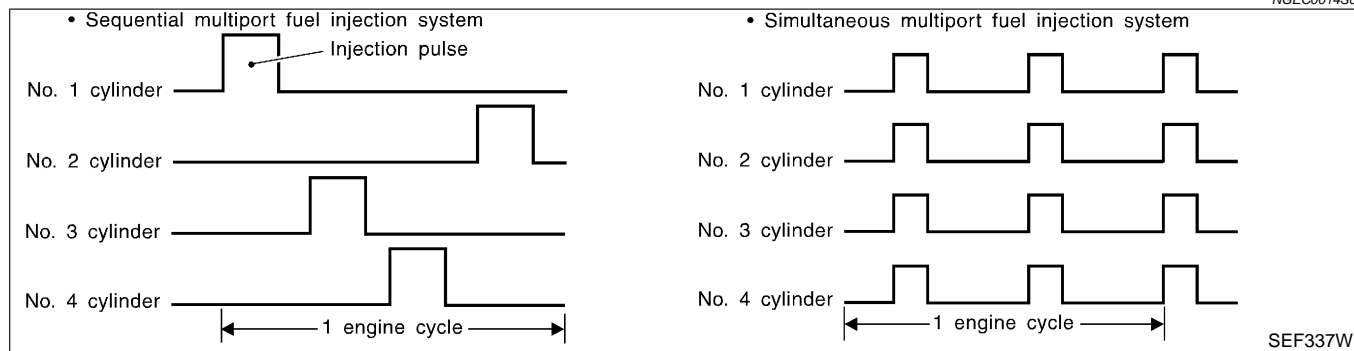
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

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

Fuel Injection Timing

NGEC0014S07



SEF337W

Two types of systems are used.

Sequential Multiport Fuel Injection System

NGEC0014S0701

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

NGEC0014S0702

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

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

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

Fuel Shut-off

NGEC0014S08

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

Distributor Ignition (DI) System

DESCRIPTION

Input/Output Signal Chart

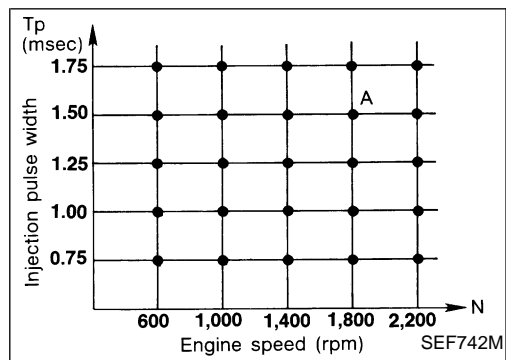
NGEC0015

NGEC0015S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed and piston position	Ignition timing control	Power transistor
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position Throttle valve idle position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Knock sensor	Engine knocking		
PNP switch	Gear position		
Battery	Battery voltage		

System Description

NGEC0015S02



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

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

e.g., N: 1,800 rpm, Tp: 1.50 msec

A°BTDC

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

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

The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions.

If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

Air Conditioning Cut Control

Air Conditioning Cut Control

DESCRIPTION

Input/Output Signal Chart

=NGEC0016

NGEC0016S01

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner "ON" signal	Air conditioner cut control	Air conditioner relay
Throttle position sensor	Throttle valve opening angle		
Camshaft position sensor	Engine speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Vehicle speed sensor	Vehicle speed		
Power steering oil pressure switch	Power steering operation		

System Description

NGEC0016S02

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.
- When the engine coolant temperature becomes excessively high.
- When operating power steering and air conditioner during low engine speed or when fully releasing accelerator pedal.
- When engine speed is excessively low.

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

DESCRIPTION

Input/Output Signal Chart

NGEC0017

NGEC0017S01

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Fuel cut control	Injectors
PNP switch	Neutral position		
Throttle position sensor	Throttle position		
Camshaft position sensor	Engine speed		

If the engine speed is above 3,000 rpm with no load, (for example, in Neutral and engine speed over 3,000 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will operate until the engine speed reaches 1,500 rpm, then fuel cut is cancelled.

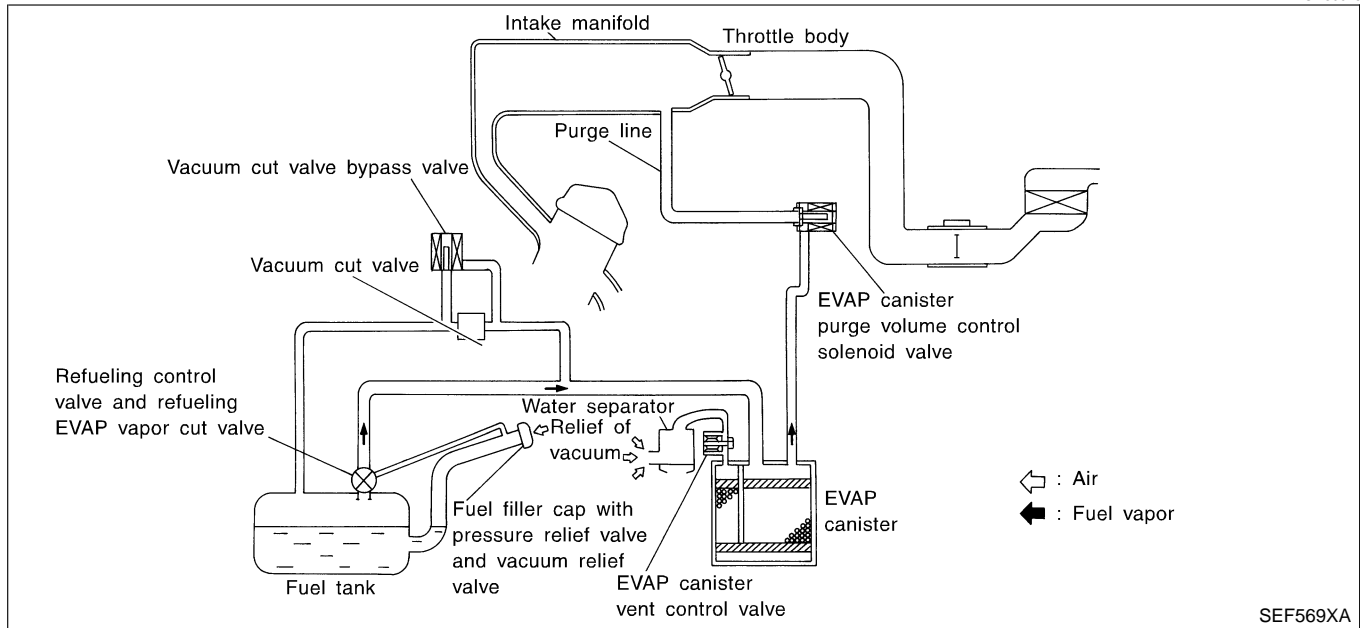
NOTE:

This function is different from deceleration control listed under "Multiport Fuel Injection (MFI) System", EC-35.

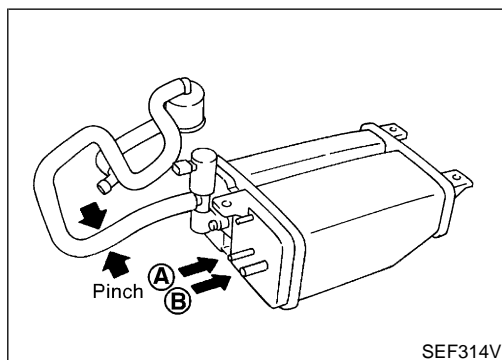
Evaporative Emission System

DESCRIPTION

=NGEC0018



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.



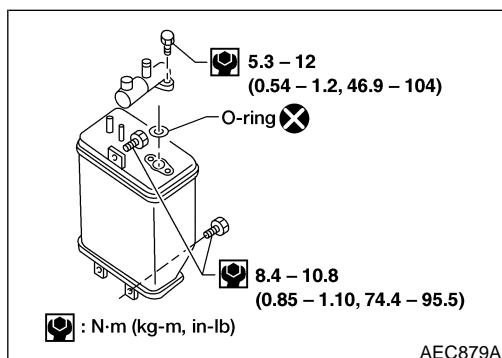
INSPECTION EVAP Canister

NGEC0019

NGEC0019S01

Check EVAP canister as follows:

1. Pinch the fresh air hose.
2. Blow air into port A and check that air flows freely through port B.



Tightening Torque

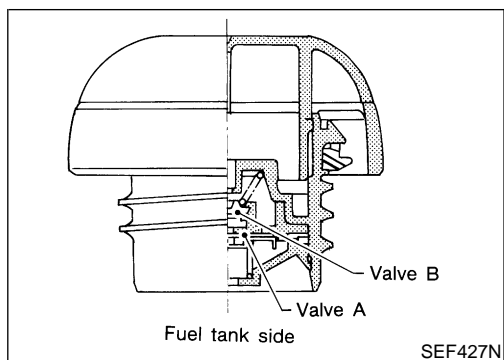
NGEC0019S02

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

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

Evaporative Emission System (Cont'd)



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

NGEC0019S03

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

Pressure:

16.0 - 20.0 kPa (0.163 - 0.204 kg/cm², 2.32 - 2.90 psi)

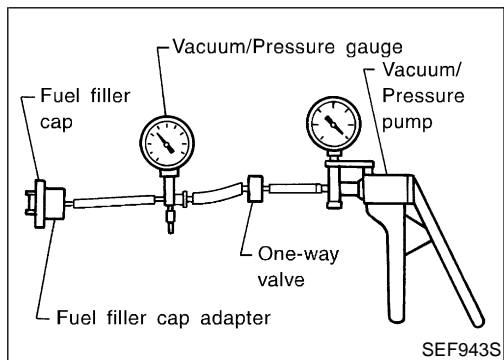
Vacuum:

-6.0 to -3.5 kPa (-0.061 to -0.036 kg/cm², -0.87 to -0.51 psi)

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

CAUTION:

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



Vacuum Cut Valve and Vacuum Cut Valve Bypass Valve

NGEC0019S05

Refer to EC-546.

EVAP Canister Purge Volume Control Solenoid Valve

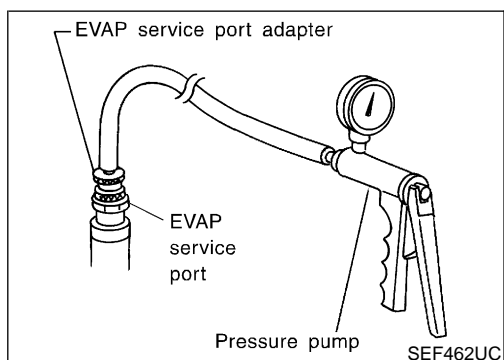
NGEC0019S06

Refer to EC-512.

Fuel Tank Temperature Sensor

NGEC0019S08

Refer to EC-269.



EVAP Service Port

NGEC0019S09

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

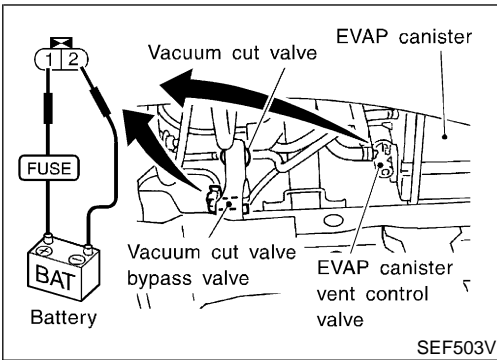
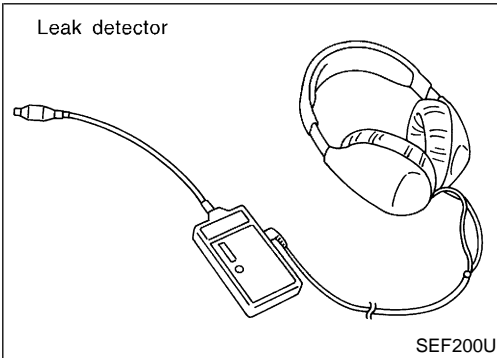
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

Evaporative Emission System (Cont'd)

EVAP SYSTEM CLOSE
APPLY PRESSURE TO EVAP SYSTEM FROM SERVICE PORT USING HAND PUMP WITH PRESSURE GAUGE AT NEXT SCREEN. NEVER USE COMPRESSED AIR OR HIGH PRESSURE PUMP! DO NOT START ENGINE. TOUCH START.

PEF658U



How to Detect Fuel Vapor Leakage

NGEC0019S10

CAUTION:

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

NOTE:

Improper installation of adapter to the service port may cause a leak.

With CONSULT-II

- 1) Attach the EVAP service port adapter securely to the EVAP service port.
- 2) Also attach the pressure pump and hose.
- 3) Turn ignition switch "ON".
- 4) Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT MODE" with CONSULT-II.
- 5) Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
- 6) Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
- 7) Remove the EVAP service port adapter and hose with pressure pump.
- 8) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-43.

Without CONSULT-II

- 1) Attach the EVAP service port adapter securely to the EVAP service port and pressure pump with pressure gauge to the EVAP service port.
- 2) Apply battery voltage to between the terminals of both EVAP canister vent control valve and vacuum cut valve bypass valve to make a closed EVAP system.
- 3) To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm², 0.2 to 0.4 psi).
- 4) Remove the EVAP service port adapter and hose with pressure pump.
- 5) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-43.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

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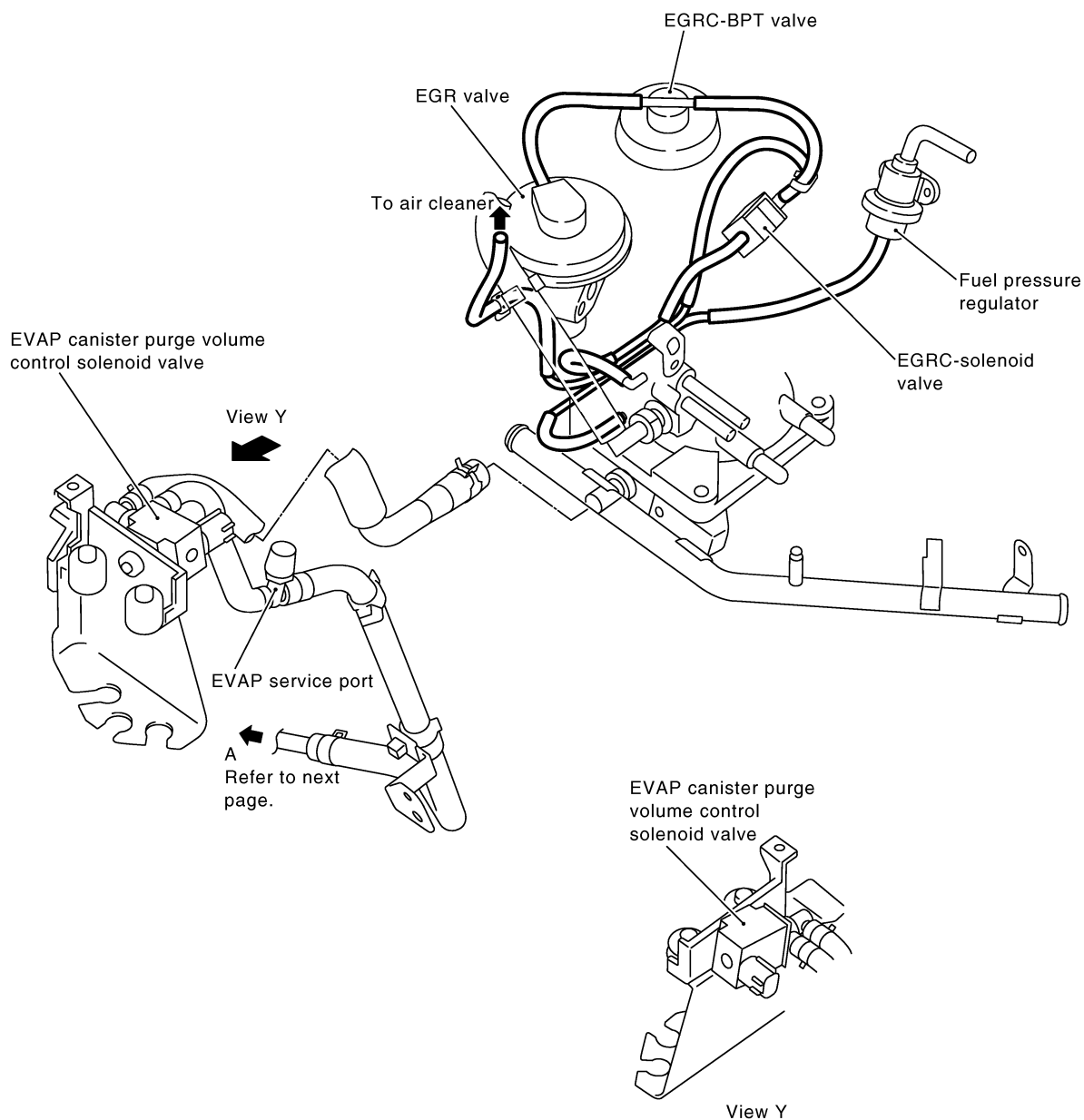
Evaporative Emission System (Cont'd)

EVAPORATIVE EMISSION LINE DRAWING

-NGEC0020

NOTE:

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



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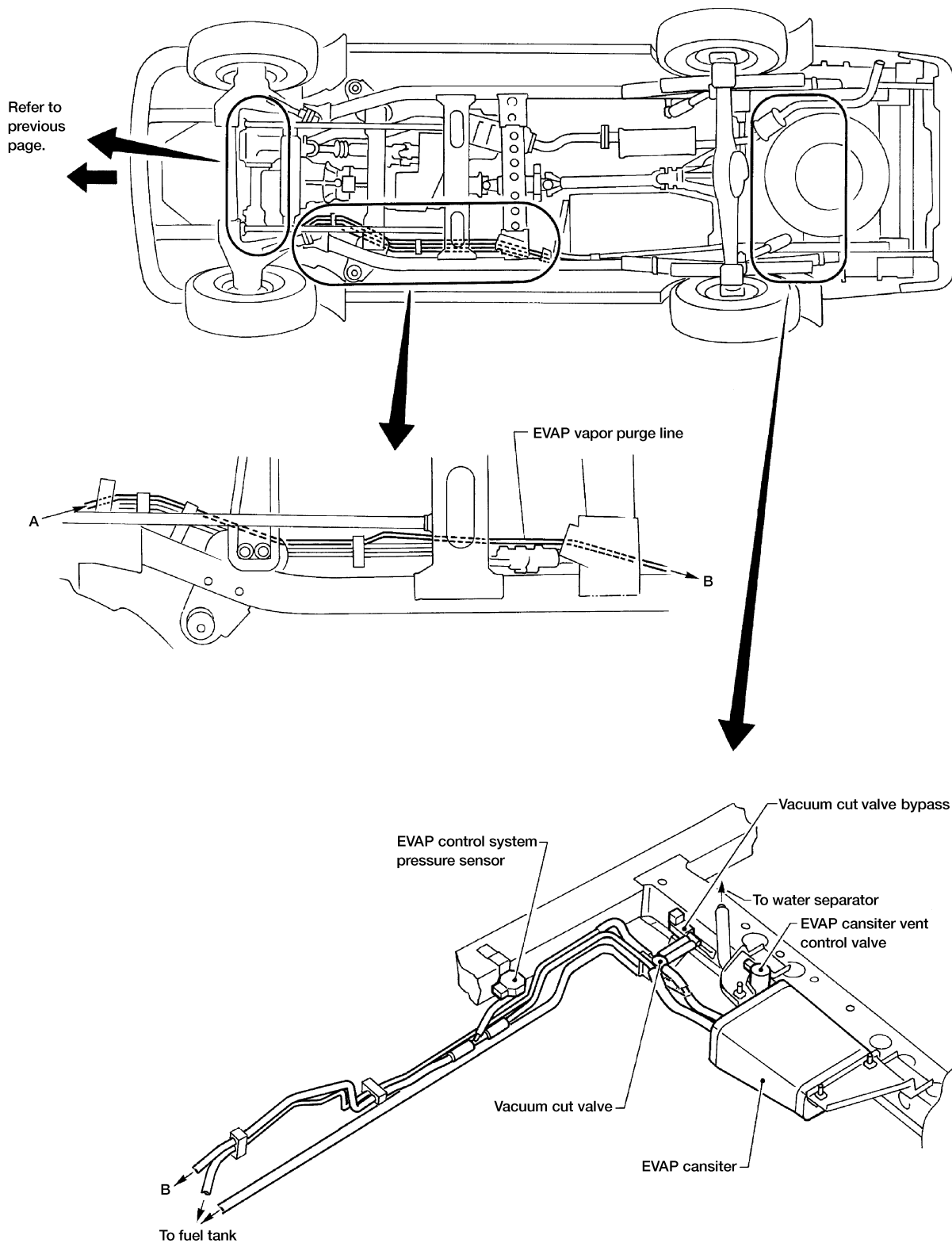
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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

Evaporative Emission System (Cont'd)



WEC555

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

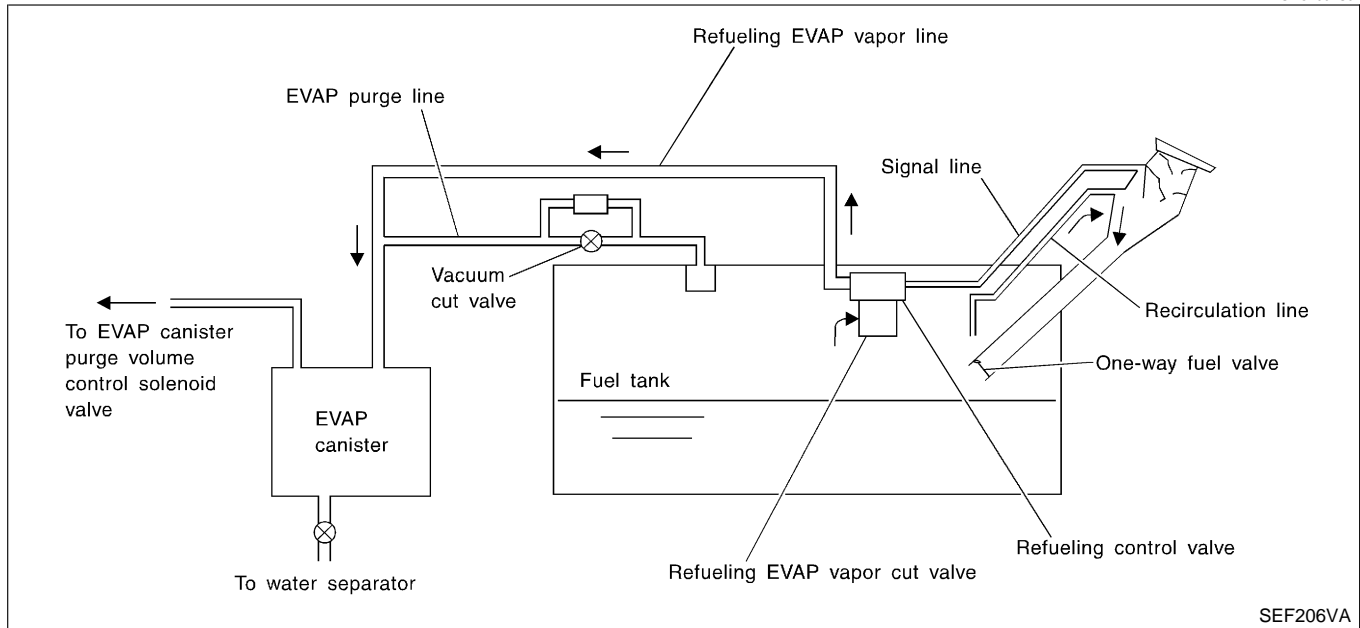
On Board Refueling Vapor Recovery (ORVR)

On Board Refueling Vapor Recovery (ORVR)

NGEC1002

SYSTEM DESCRIPTION

NGEC1002S01



From the beginning of refueling, the fuel tank pressure goes up. When the pressure reaches the setting value of the refueling control valve (RCV) opening pressure, the RCV is opened. After RCV opens, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve, RCV and refueling vapor line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.

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

The RCV is always closed during driving and the evaporative emission control system is operated the same as conventional system.

WARNING:

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

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

CAUTION:

- Before removing fuel line parts, carry out the following procedures:
 - a) Put drained fuel in an explosion-proof container and put lid on securely.
 - b) Release fuel pressure from fuel line. Refer to "Fuel Pressure Release", EC-57.
 - c) Disconnect battery ground cable.
- Always replace O-ring when the fuel gauge retainer is removed.
- Do not kink or twist hose and tube when they are installed.
- Do not tighten hose and clamps excessively to avoid damaging hoses.
- After installation, run engine and check for fuel leaks at connection.
- Do not attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically. Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

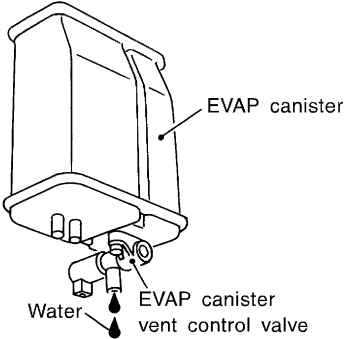
DIAGNOSTIC PROCEDURE

NGEC1002S02

Symptom: Fuel Odor from EVAP Canister Is Strong.

NGEC1002S0201

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

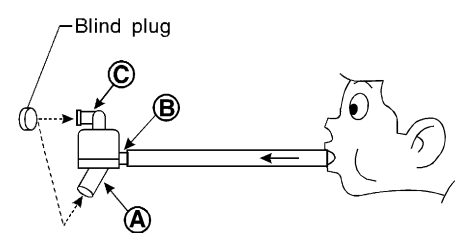
2	CHECK IF EVAP CANISTER SATURATED WITH WATER	
Does water drain from the EVAP canister?		
		
SEF596U		
Yes or No		
Yes	▶	GO TO 3.
No (With CONSULT-II)	▶	GO TO 6.
No (Without CONSULT-II)	▶	GO TO 7.

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

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

4	CHECK WATER SEPARATOR	<p>1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged.</p> <div style="text-align: center;">  <p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p> </div> <p style="text-align: right;">SEF829T</p> <p>5. In case of NG in items 2 - 4, replace the parts. NOTE: • Do not disassemble water separator.</p> <p style="text-align: center;">OK or NG</p>	GI MA EM LC EC FE CL MT
OK	▶	GO TO 5.	
NG	▶	Replace water separator.	

5	DETECT MALFUNCTIONING PART	<p>Check the EVAP hose between EVAP canister and water separator for clogging or poor connection.</p> <p style="text-align: center;">▶</p> <p>Repair or replace EVAP hose.</p>	AT TF PD AX SU BR ST RS BT HA SC EL IDX
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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

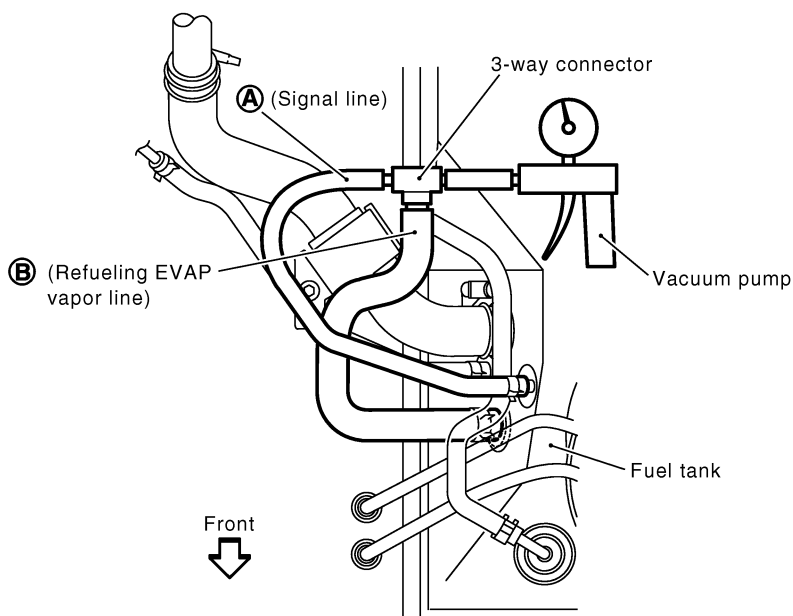
KA24DE

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

6 CHECK REFUELING EVAP VAPOR CUT VALVE

With CONSULT-II

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



SEF707Z

OK



GO TO 8.

NG



Replace refueling EVAP vapor cut valve with fuel tank.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

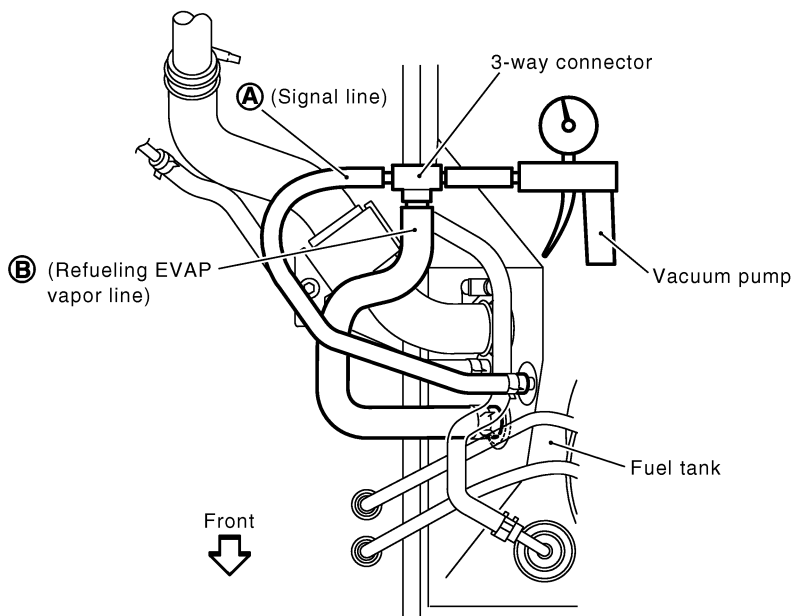
7 CHECK REFUELING EVAP VAPOR CUT VALVE

⊗ Without CONSULT-II

1. Remove fuel tank. Refer to **FE-4**, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:
 - a. Remove fuel gauge retainer.
 - b. Drain fuel from the tank using a hand pump into a fuel container.
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.
 - a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
 - b. Remove fuel gauge retainer with fuel gauge unit.

Always replace O-ring with new one.

 - c. Put fuel tank upside down.
 - d. Apply vacuum pressure to both hose ends A and B [-13.3 kPa (-100 mmHg, -3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



SEF707Z

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

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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

8	CHECK REFUELING CONTROL VALVE	<ol style="list-style-type: none"> 1. Remove fuel filler cap. 2. Check air continuity between hose ends A and B. Blow air into the hose end B. Air should flow freely into the fuel tank. 3. Blow air into hose end A and check there is no leakage. 4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage. <div style="text-align: center; margin-top: 20px;"> </div> <p style="text-align: right; margin-top: 10px;">SEF706Z</p>
OK or NG		
OK	▶	INSPECTION END
NG	▶	Replace refueling control valve with fuel tank.

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

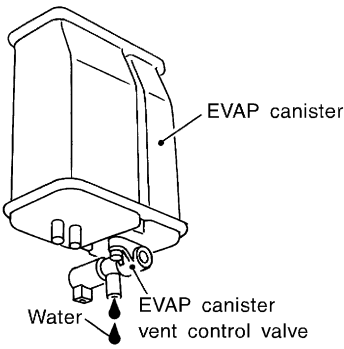
NGEC1002S0202

1	CHECK EVAP CANISTER	<ol style="list-style-type: none"> 1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Weigh the EVAP canister with EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb). <p style="text-align: center; margin-top: 10px;">OK or NG</p>
OK	▶	GO TO 2.
NG	▶	GO TO 3.

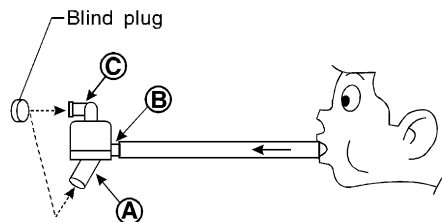
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

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

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

4	CHECK WATER SEPARATOR	
<ol style="list-style-type: none"> 1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged. 		
		
<p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p>		
SEF829T		
5. In case of NG in items 2 - 4, replace the parts.		
NOTE:		
● Do not disassemble water separator.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace water separator.

5	DETECT MALFUNCTIONING PART	
Check the EVAP hose between EVAP canister and water separator for clogging or poor connection.		
▶		
		Repair or replace EVAP hose.

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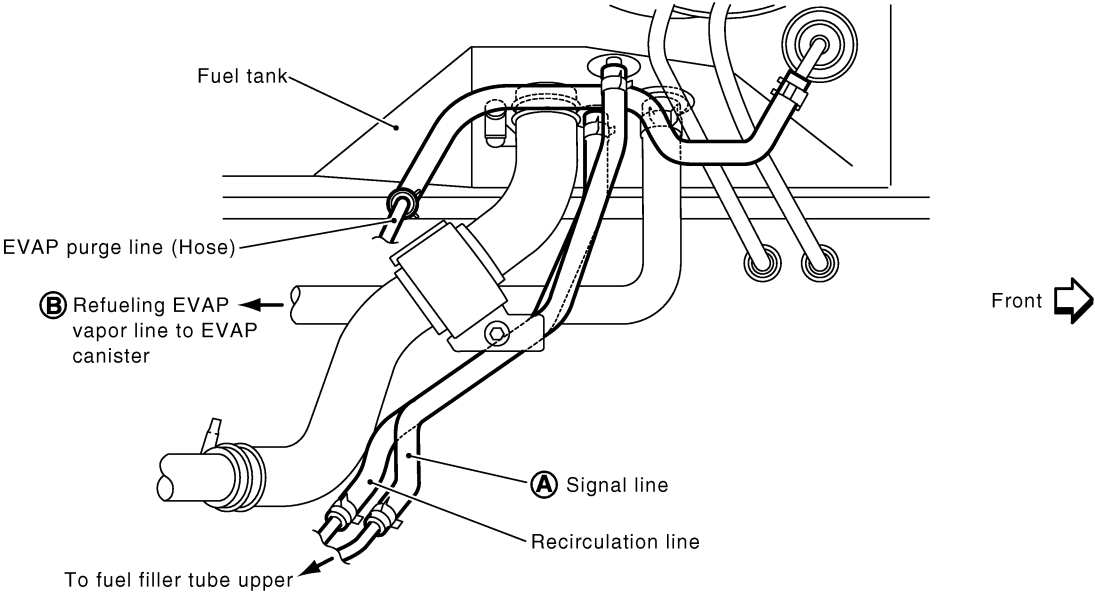
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

6	CHECK VENT HOSES AND VENT TUBES	
Check hoses and tubes between EVAP canister and refueling control valve for clogging, kink, looseness and improper connection.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Repair or replace hoses and tubes.

7	CHECK FILLER NECK TUBE	
Check signal line and recirculation line for clogging, dents and cracks.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace filler neck tube.

8	CHECK REFUELING CONTROL VALVE	
<ol style="list-style-type: none"> 1. Remove fuel filler cap. 2. Check air continuity between hose ends A and B. Blow air into the hose end B. Air should flow freely into the fuel tank. 3. Blow air into hose end A and check there is no leakage. 4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage. 		
		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 9.
OK (Without CONSULT-II)	▶	GO TO 10.
NG	▶	Replace refueling control valve with fuel tank.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

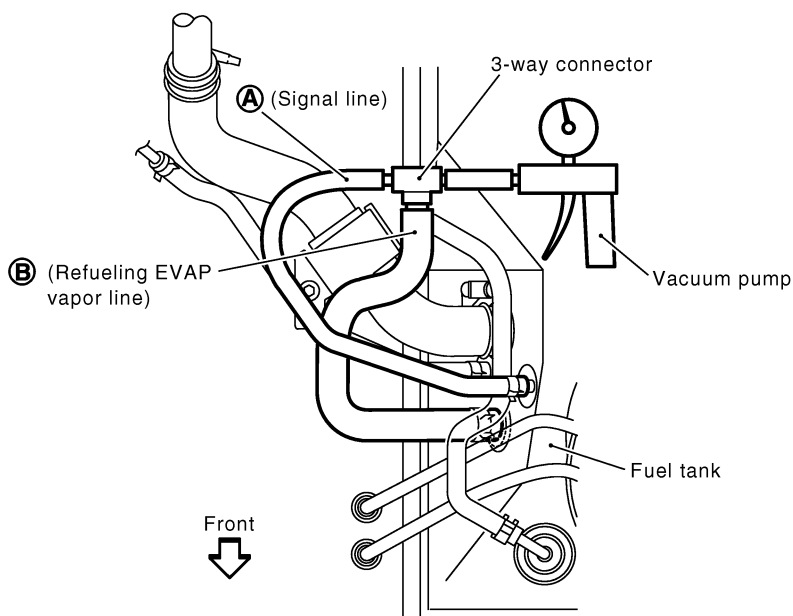
KA24DE

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

9 CHECK REFUELING EVAP VAPOR CUT VALVE

With CONSULT-II

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



SEF707Z

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

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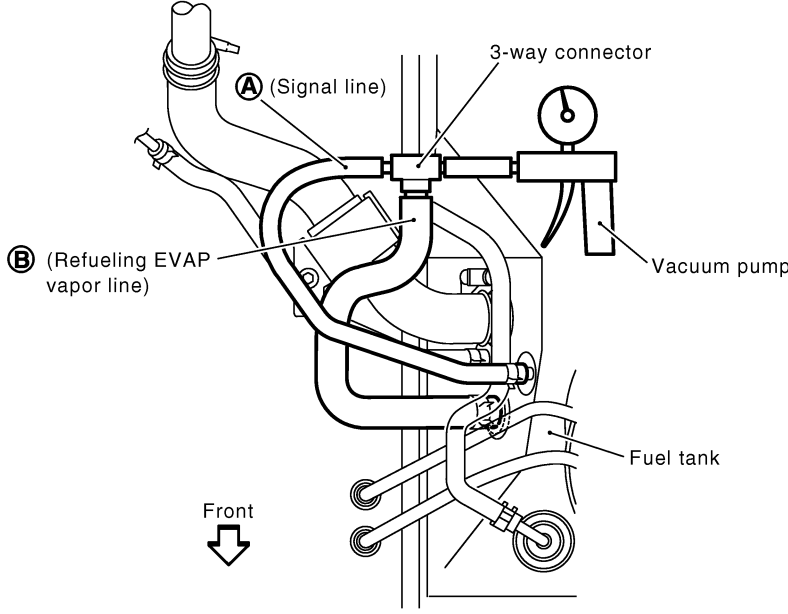
EL

IDX

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

10	CHECK REFUELING EVAP VAPOR CUT VALVE
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Remove fuel tank. Refer to FE-4, "FUEL SYSTEM". 2. Drain fuel from the tank as follows: <ol style="list-style-type: none"> a. Remove fuel gauge retainer. b. Drain fuel from the tank using a hand pump into a fuel container. 3. Check refueling EVAP vapor cut valve for being stuck to close as follows. Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank. 4. Check EVAP vapor cut valve for being stuck to open as follows. <ol style="list-style-type: none"> a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector. b. Remove fuel gauge retainer with fuel gauge unit. <p>Always replace O-ring with new one.</p> <ol style="list-style-type: none"> c. Put fuel tank upside down. d. Apply vacuum pressure to both hose ends A and B [-13.3 kPa (-100 mmHg, -3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable. 	
	
OK or NG	
OK	▶ GO TO 11.
NG	▶ Replace refueling EVAP vapor cut valve with fuel tank.

11	CHECK FUEL FILLER TUBE
Check filler neck tube and hose connected to the fuel tank for clogging, dents and cracks.	
OK or NG	
OK	▶ GO TO 12.
NG	▶ Replace fuel filler tube.

12	CHECK ONE-WAY FUEL VALVE-I
Check one-way valve for clogging.	
OK or NG	
OK	▶ GO TO 13.
NG	▶ Repair or replace one-way fuel valve with fuel tank.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

KA24DE

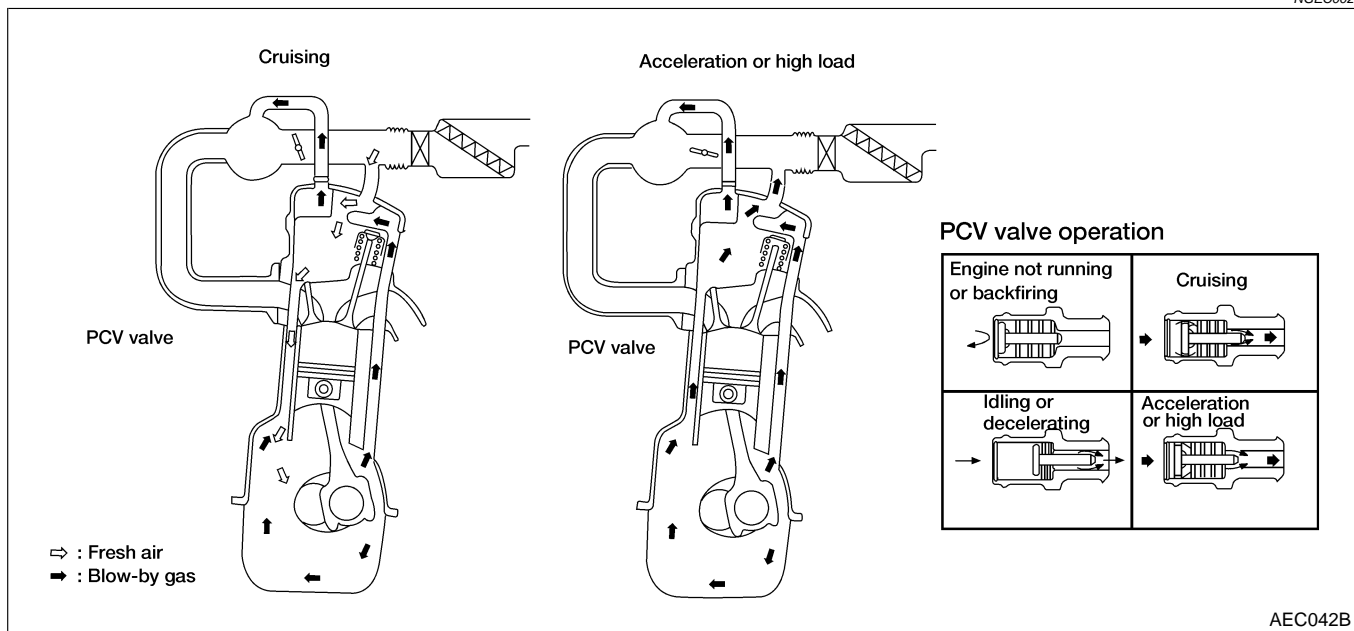
On Board Refueling Vapor Recovery (ORVR) (Cont'd)

13	CHECK ONE-WAY FUEL VALVE-II
<p>1. Make sure that fuel is drained from the tank. 2. Remove fuel filler tube and hose. 3. Check one-way fuel valve for operation as follows. When a stick is inserted, the valve should open, when removing stick it should close.</p> <p style="text-align: center;">After removing filler tube</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SEF665U</p> <p>Do not drop any material into the tank.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ INSPECTION END
NG	▶ Replace fuel filler tube or replace one-way fuel valve with fuel tank.

Positive Crankcase Ventilation

DESCRIPTION

NGEC0022



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

The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.

During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.

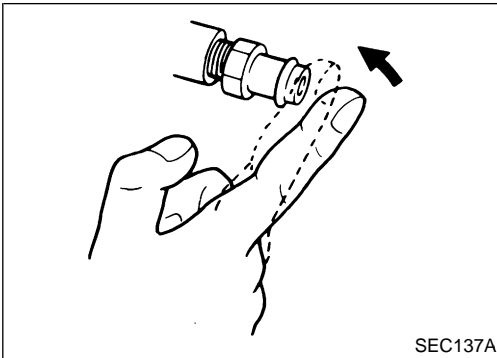
Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.

The ventilating air is then drawn from the air duct into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.

Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.

On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the intake collector under all conditions.

Positive Crankcase Ventilation (Cont'd)



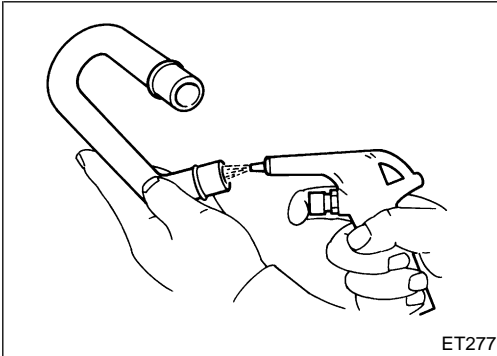
INSPECTION

PCV (Positive Crankcase Ventilation) Valve

NGEC0023

NGEC0023S01

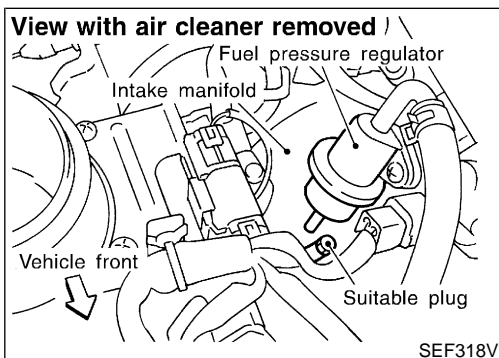
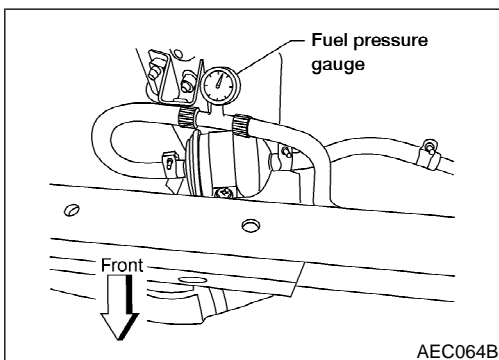
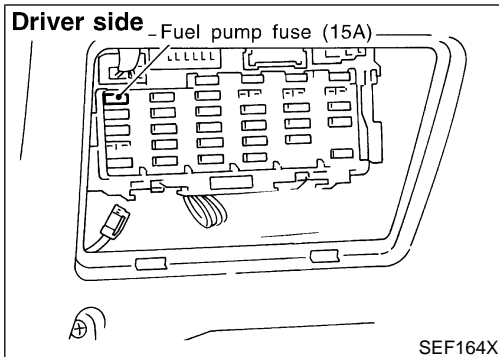
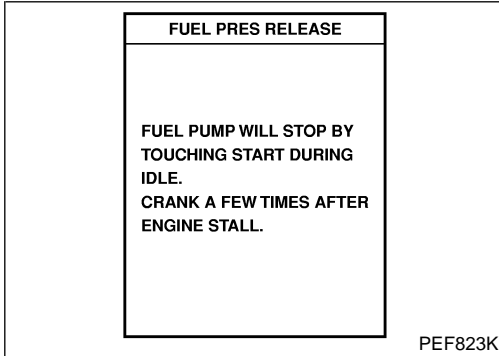
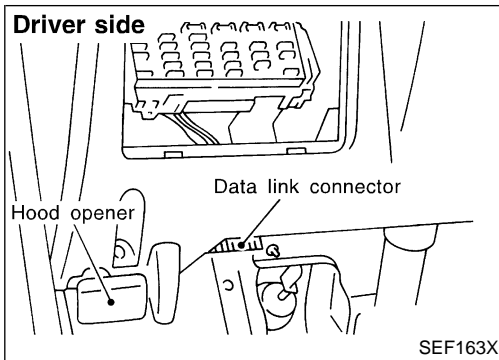
With engine running at idle, remove PCV valve from breather separator. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over the valve inlet.



Ventilation Hose

NGEC0023S02

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.



Fuel Pressure Release

NGE0024

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

Ⓜ WITH CONSULT-II

NGE0024S01

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

ⓧ WITHOUT CONSULT-II

NGE0024S02

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

Fuel Pressure Check

NGE0025

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

1. Release fuel pressure to zero.
2. Disconnect fuel hose between fuel filter and fuel tube (engine side).
3. Install pressure gauge between fuel filter and fuel tube.
4. Start engine and check for fuel leakage.
5. Read the indication of fuel pressure gauge.

At idle speed:

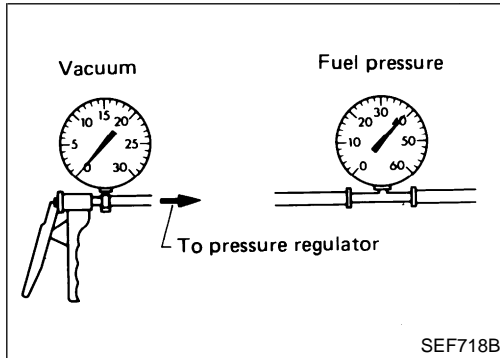
With vacuum hose connected

Approximately 235 kPa (2.4 kg/cm², 34 psi)

With vacuum hose disconnected

Approximately 294 kPa (3.0 kg/cm², 43 psi)

If results are unsatisfactory, perform Fuel Pressure Regulator Check, EC-58.

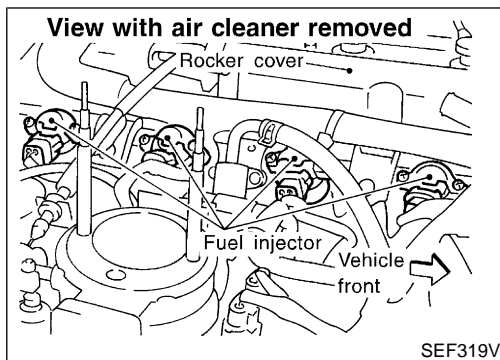


Fuel Pressure Regulator Check

NGEC0026

1. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold.
2. Plug intake manifold with a rubber cap.
3. Connect variable vacuum source to fuel pressure regulator.
4. Start engine and read indication of fuel pressure gauge as vacuum is changed.

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



Injector

REMOVAL AND INSTALLATION

NGEC0027

1. Release fuel pressure to zero.
2. Remove injector tube assembly with injectors from intake manifold.
3. Remove injectors from injector tube assembly.
 - Push injector tail piece.
 - Do not pull on the connector.
4. Install injector to fuel tube assembly.
 - a. Clean exterior of injector tail piece.
 - b. Use new O-rings.

Always replace O-rings with new ones.

Lubricate O-rings with a smear of engine oil.

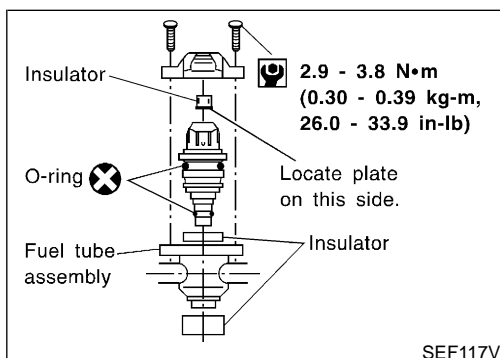
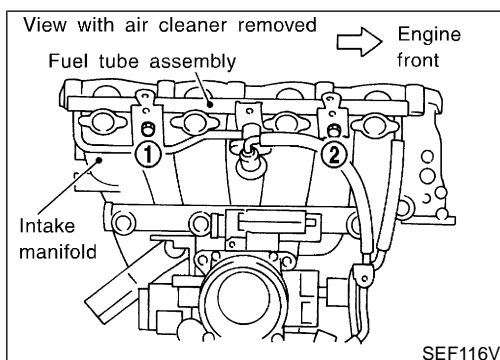
5. Install injectors with fuel tube assembly to intake manifold.

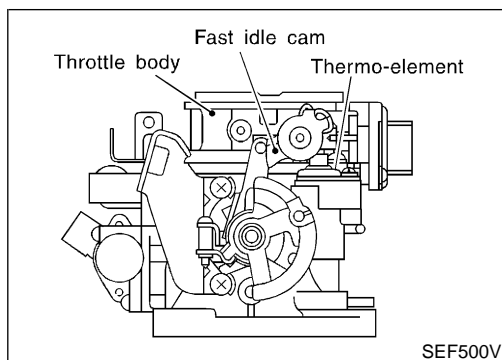
Tighten in numerical order shown in the figure.

 - a. First, tighten all bolts to 9.3 to 10.8 N·m (0.95 to 1.1 kg-m, 6.9 to 8.0 ft-lb).
 - b. Then, tighten all bolts to 21 to 26 N·m (2.1 to 2.7 kg-m, 15 to 20 ft-lb).
6. Install fuel hoses to fuel tube assembly.
7. Reinstall any parts removed in reverse order of removal.

CAUTION:

After properly connecting injectors to fuel tube assembly, check connections for fuel leakage.





Fast Idle Cam (FIC)

COMPONENT DESCRIPTION

The FIC is installed on the throttle body to maintain adequate engine speed while the engine is cold. It is operated by a volumetric change in wax located inside the thermo-element. The thermo-element is operated by engine coolant temperature. For inspection refer to "TROUBLE DIAGNOSIS-BASIC INSPECTION", "Basic Inspection", EC-112.

NGEC0502

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Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

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NGEC0028S01

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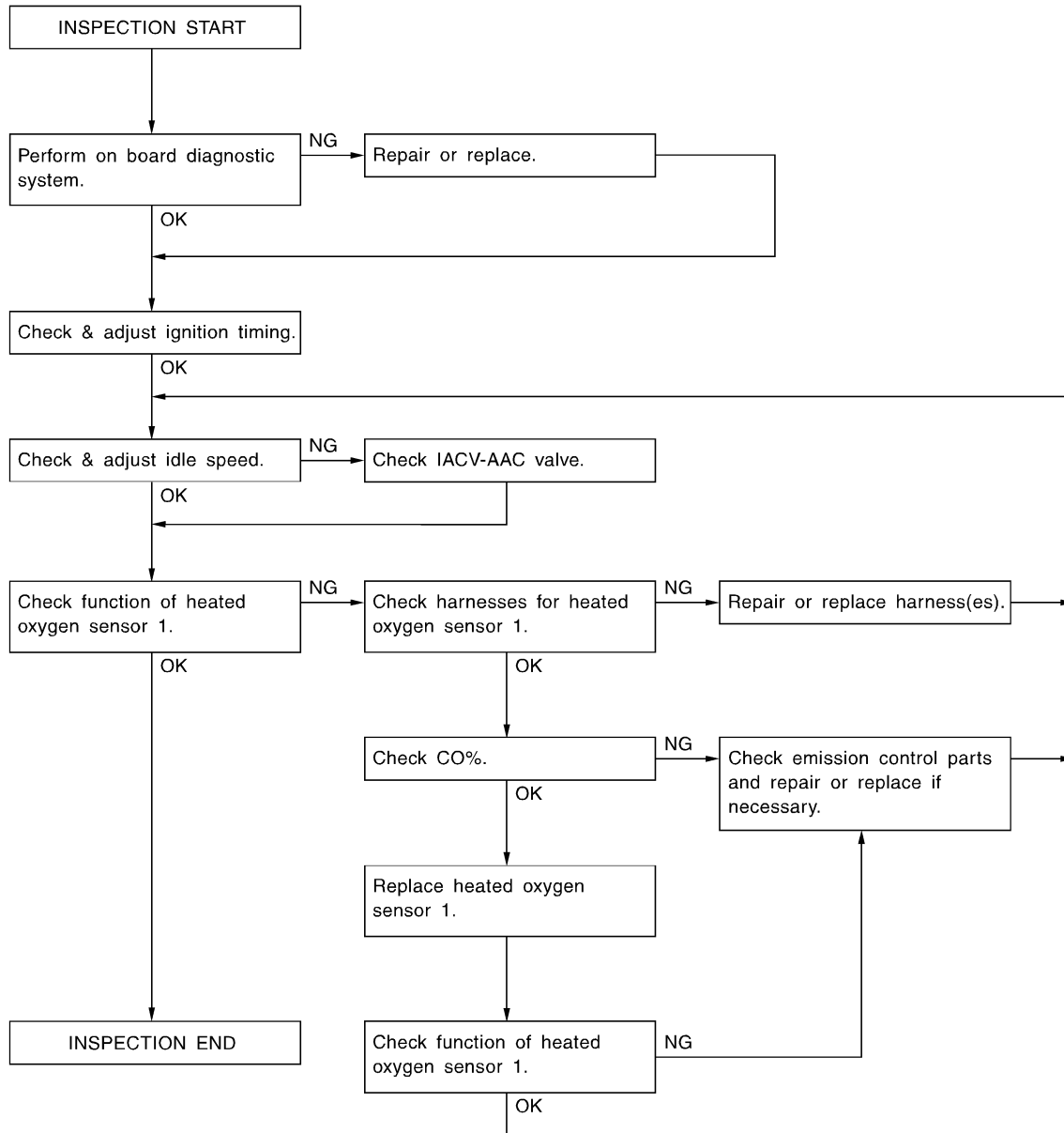
IDX

PREPARATION

- Make sure that the following parts are in good order.
 - a) Battery
 - b) Ignition system
 - c) Engine oil and coolant levels
 - d) Fuses
 - e) ECM harness connector
 - f) Vacuum hoses
 - g) Air intake system
(Oil filler cap, oil level gauge, etc.)
 - h) Fuel pressure
 - i) Engine compression
 - j) EGR valve operation
 - k) Throttle valve
 - l) EVAP system
- On models equipped with air conditioner, checks should be carried out while the air conditioner is "OFF".
- When measuring "CO" percentage, insert probe more than 40 cm (15.7 in) into tail pipe.
- Turn off headlamps, heater blower, rear window defogger.
- Keep front wheels pointed straight ahead.

Overall Inspection Sequence

NGEC0028S0101



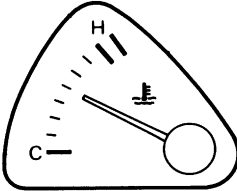
SEF554YA

NOTE:

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

INSPECTION PROCEDURE

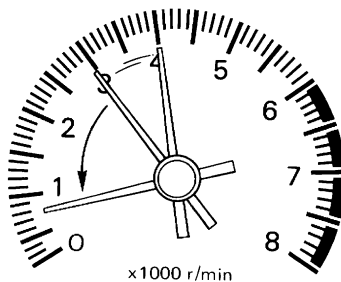
=NGEC0028S02

1	INSPECTION START	<p>1. Visually check the following:</p> <ul style="list-style-type: none"> ● Air cleaner clogging ● Hoses and duct for leaks ● EGR valve operation ● Electrical connectors ● Gasket (intake manifold, cylinder head, exhaust system) ● Throttle valve and throttle position sensor operation <p>2. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge. Ensure engine speed stays below 1,000 rpm.</p> <div style="text-align: center; margin: 20px 0;">  </div> <p style="text-align: right; margin-right: 20px;">SEF810K</p> <p>3. Open engine hood and run engine at about 2,000 rpm for about 2 minutes under no-load.</p> <p>4. Make sure that no DTC is displayed with CONSULT-II or GST.</p> <p style="text-align: center;">OK or NG</p>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white; padding: 5px;">EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p> <p>TF</p> <p>PD</p> <p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>
OK	▶	<ul style="list-style-type: none"> ● GO TO 2. (With CONSULT-II) ● GO TO 3. (Without CONSULT-II) 	
NG	▶	<ol style="list-style-type: none"> 1. Repair or replace components as necessary. 2. GO TO 2. (With CONSULT-II) 3. GO TO 3. (Without CONSULT-II) 	

2 CHECK IGNITION TIMING

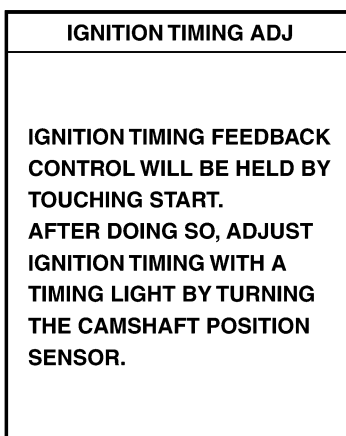
With CONSULT-II

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



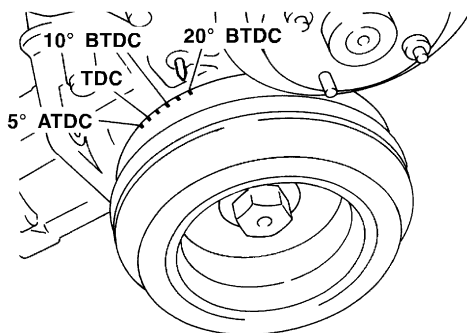
3. Select "IGNITION TIMING ADJ" in WORK SUPPORT mode.
4. Touch "START".

SEF978U



PEF546N

5. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.
6. Check ignition timing with a timing light.



SEF320V

MT: 20°±2° BTDC

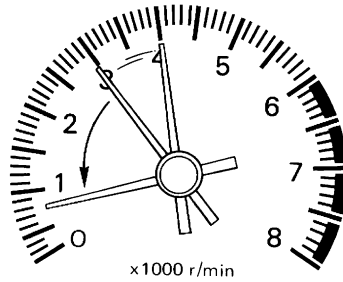
OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

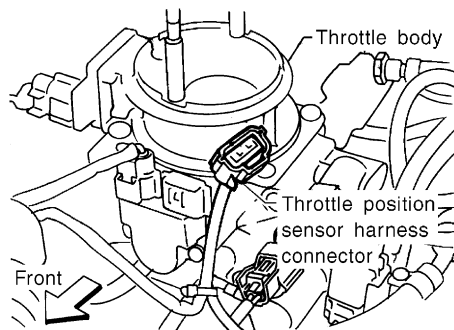
3 CHECK IGNITION TIMING

⊗ Without CONSULT-II

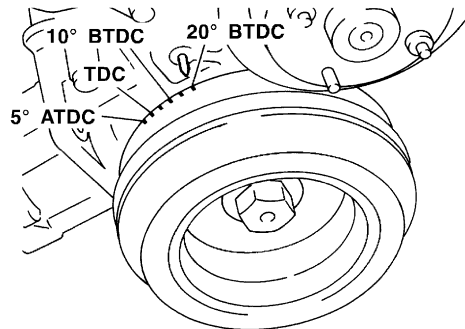
1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine two or three times under no-load, then run engine at idle speed for about 1 minute.



3. Turn off engine and disconnect throttle position sensor harness connector.



4. Start engine and rev it (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.
5. Check ignition timing with a timing light.

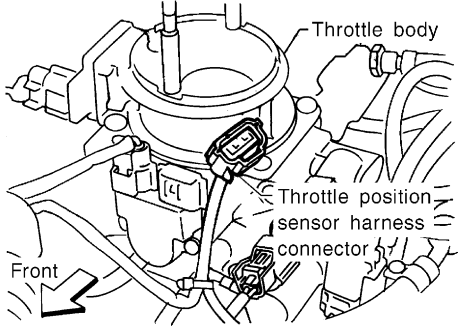


MT: 20°±2° BTDC

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

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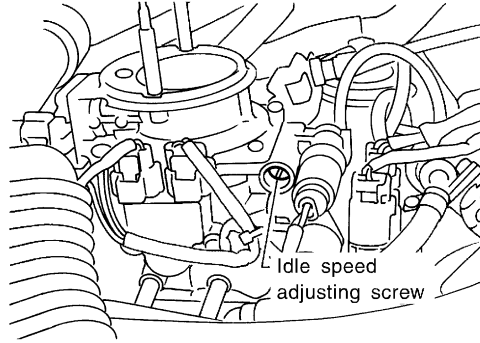
4	ADJUST IGNITION TIMING	
<p>With CONSULT-II</p> <p>1. Adjust ignition timing to the specified value by turning distributor after loosening bolts which secure distributor.</p>		
<p>Without CONSULT-II</p> <p>1. Adjust ignition timing to the specified value by turning distributor after loosening bolts which secure distributor.</p> <p>2. Turn off engine and connect throttle position sensor harness connector to throttle position sensor.</p>		
		
SEF265S		
Models with CONSULT-II		▶ GO TO 2.
Models without CONSULT-II		▶ GO TO 3.

5	CHECK BASE IDLE SPEED																							
<p>With CONSULT-II</p> <p>1. Read idle speed in "IGNITION TIMING ADJ" in "WORK SUPPORT" mode.</p>																								
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><td colspan="2" style="text-align: center;">IGNITION TIMING ADJ</td></tr> <tr><td colspan="2" style="text-align: center;">CONDITION SETTING</td></tr> <tr><td style="text-align: center;">IGN/T FEEDBACK</td><td style="text-align: center;">HOLD</td></tr> <tr><td colspan="2" style="text-align: center;">MONITOR</td></tr> <tr><td style="text-align: center;">ENG SPEED</td><td style="text-align: center;">XXX rpm</td></tr> <tr><td style="text-align: center;">IGN TIMING</td><td style="text-align: center;">XXX BTDC</td></tr> <tr><td style="text-align: center;">CLSD THL POS</td><td style="text-align: center;">ON</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>			IGNITION TIMING ADJ		CONDITION SETTING		IGN/T FEEDBACK	HOLD	MONITOR		ENG SPEED	XXX rpm	IGN TIMING	XXX BTDC	CLSD THL POS	ON								
IGNITION TIMING ADJ																								
CONDITION SETTING																								
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CLSD THL POS	ON																							
MT: 750±50 rpm																								
SEF713Z																								
<p>Without CONSULT-II</p> <p>1. Check idle speed.</p> <p style="color: blue; font-weight: bold;">MT: 750±50 rpm</p>																								
OK or NG																								
OK (With CONSULT-II)		▶ GO TO 7.																						
OK (Without CONSULT-II)		▶ GO TO 8.																						
NG		▶ GO TO 6.																						

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6 ADJUST BASE IDLE SPEED

- Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.
- Adjust idle speed by turning idle speed adjusting screw.



MT: 750±50 rpm

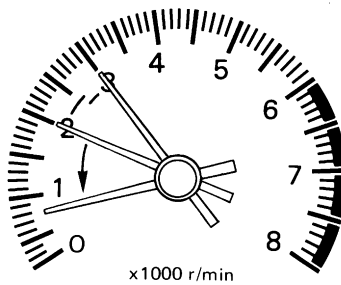
SEF240SA

Models with CONSULT-II ► GO TO 7.

Models without CONSULT-II ► GO TO 8.

7 CHECK TARGET IDLE SPEED
With CONSULT-II

- Touch "BACK" on CONSULT-II.
- Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.



SEF602K

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

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

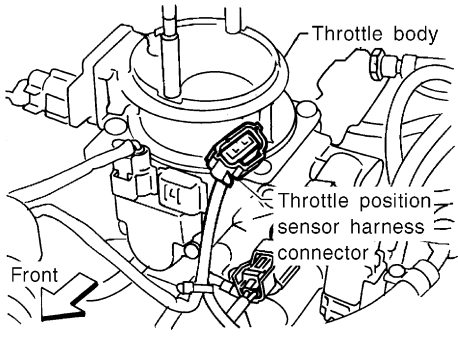
SEF058Y

MT: 800±50 rpm

OK or NG

OK ► GO TO 10.

NG ► GO TO 9.

8	CHECK TARGET IDLE SPEED
<p>⊗ Without CONSULT-II</p> <p>1. Turn off engine and connect throttle position sensor harness connector.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF265S</p> <p>2. Start engine. 3. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed. 4. Check target idle speed. MT: 800±50 rpm</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 10.
NG	▶ GO TO 9.

9	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <p>1. Check IACV-AAC valve and replace if necessary. Refer to EC-434. 2. Check IACV-AAC valve harness and repair if necessary. Refer to EC-434. 3. Check ECM function by substituting another known good ECM. (ECM may be the cause of a problem, but this is rarely the case.)</p>	
▶	GO TO 10.

BASIC SERVICE PROCEDURE

KA24DE

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

10	CHECK HEATED OXYGEN SENSOR 1 SIGNAL								
<p>☑ With CONSULT-II</p> <ol style="list-style-type: none"> 1. See "HO2S1 MNTR (B1)" in "DATA MONITOR" mode. 2. Run engine at about 2,000 rpm for about 2 minutes under no-load. 3. Maintain engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature) and check that the monitor fluctuates between "LEAN" and "RICH" more than five times during 10 seconds. <div style="text-align: center; margin: 10px 0;"> <table border="1" style="border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="padding: 2px;">DATA MONITOR</th> </tr> <tr> <th style="padding: 2px;">MONITOR</th> <th style="padding: 2px;">NO DTC</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">ENG SPEED</td> <td style="padding: 2px;">XXX rpm</td> </tr> <tr> <td style="padding: 2px;">HO2S1 MNTR (B1)</td> <td style="padding: 2px;">RICH</td> </tr> </tbody> </table> </div> <p style="text-align: right; margin-right: 20px;">SEF820Y</p> <p>1 cycle: RICH → LEAN → RICH 2 cycles: RICH → LEAN → RICH → LEAN → RICH</p>		DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm	HO2S1 MNTR (B1)	RICH
DATA MONITOR									
MONITOR	NO DTC								
ENG SPEED	XXX rpm								
HO2S1 MNTR (B1)	RICH								
<p>☒ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Run engine at about 2,000 rpm for about 2 minutes under no-load. 2. Set voltmeter probe between ECM terminal 50 and ground. 3. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> <p style="text-align: center;">OK or NG</p>									
OK	▶ INSPECTION END								
NG	▶ GO TO 11.								

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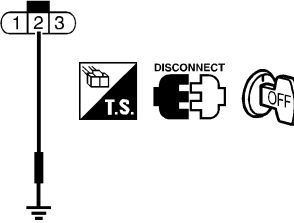
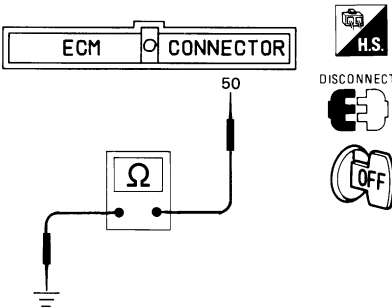
BT

HA

SC

EL

IDX

11	CHECK HEATED OXYGEN SENSOR 1 HARNESS
<ol style="list-style-type: none"> 1. Turn off engine and disconnect battery ground cable. 2. Disconnect ECM harness connector. 3. Disconnect heated oxygen sensor 1 harness connector. 4. Then connect harness connector terminal for heated oxygen sensor 1 to ground with a jumper wire. 	
<p>Heated oxygen sensor 1 harness connector</p> 	
SEF508VB	
<ol style="list-style-type: none"> 5. Check for continuity between terminal 50 of ECM harness connector and body ground. 	
	
SEF250P	
<p>Continuity exists...OK Continuity does not exist...NG</p> <p style="text-align: center;">OK or NG</p>	
OK	<p>▶ 1. Connect ECM harness connector to ECM. 2. Connect battery ground cable. 3. GO TO 13.</p>
NG	<p>▶ 1. Repair or replace harness. 2. GO TO 12.</p>

12 PREPARATION FOR IDLE SPEED ADJUSTING
Ⓜ With CONSULT-II

1. Select "IGNITION TIMING ADJ" in "WORK SUPPORT" mode.
2. Touch "START".

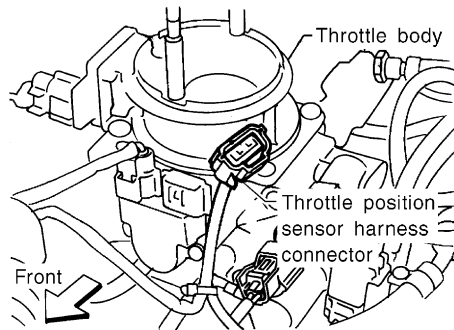
IGNITION TIMING ADJ

IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING START. AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CAMSHAFT POSITION SENSOR.

PEF546N

ⓧ Without CONSULT-II

1. Stop engine and disconnect throttle position sensor harness connector.



SEF265S

2. Start engine.


GO TO 6.

 GI
 MA
 EM
 LC
EC
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 AT
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 PD
 AX
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 BR
 ST
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 HA
 SC
 EL
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13 PREPARATION FOR "CO" % CHECK

With CONSULT-II

1. Select "ENGINE COOLANT TEMP" in "ACTIVE TEST" mode.
2. Set "COOLANT TEMP" to 5°C (41°F) by touching "Qu" and "Qd" and "UP", "DOWN".

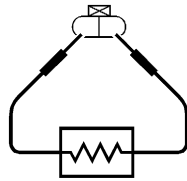
ACTIVE TEST	
ENG COOLANT TEMP	XXX °C
MONITOR	
ENG SPEED	XXX rpm
INJ PULSE-B1	XXX msec
IGN TIMING	XXX BTDC

SEF172Y

1. Connect ECM harness connector to ECM.
2. Disconnect engine coolant temperature sensor harness connector.
3. Connect a resistor (4.4 kΩ) between terminals of engine coolant temperature sensor harness connector.



Engine coolant temperature sensor harness connector



4.4 kΩ resistor

SEF053RA

4. Connect battery ground cable.

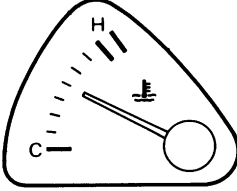
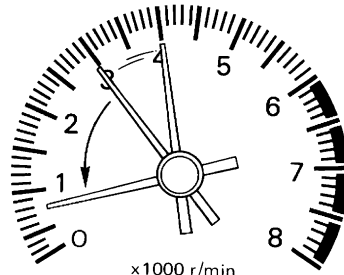


GO TO 14.

BASIC SERVICE PROCEDURE

KA24DE

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

14	CHECK "CO" %
<p><input checked="" type="checkbox"/> Without CONSULT-II</p> <p>1. Start engine and warm it up until engine coolant temperature indicator points to middle of gauge. (Be sure to start engine after setting "COOLANT TEMP" or installing a 4.4 kΩ resistor.)</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF810K</p> <p>2. Rev engine two or three times under no-load, then run engine at idle speed.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF978U</p> <p>3. Check "CO"%. Idle CO: 2.9 - 10.8% and engine runs smoothly.</p> <p>4. <input type="checkbox"/> With CONSULT-II After checking CO%, touch "BACK".</p> <p>5. <input checked="" type="checkbox"/> Without CONSULT-II After checking CO%,</p> <p>a. Disconnect the resistor from terminals of engine coolant temperature sensor harness connector. b. Connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 15.
NG	▶ GO TO 16.

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BASIC SERVICE PROCEDURE

KA24DE

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

15	CHECK HEATED OXYGEN SENSOR 1 SIGNAL	
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Replace heated oxygen sensor 1. 2. See "HO2S1 MNTR (B1)" in "DATA MONITOR" mode. 3. Maintain engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.). Check that the monitor fluctuates between "LEAN" and "RICH" more than five times during 10 seconds. 1 cycle: RICH → LEAN → RICH 2 cycles: RICH → LEAN → RICH → LEAN → RICH 		
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Stop engine. 2. Replace heated oxygen sensor 1. 3. Start engine and warm it up to normal operating temperature. 4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load. 5. Set voltmeter probe between ECM terminal 50 and ground. 6. Make sure that voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V <p style="text-align: center;">OK or NG</p>		
OK		▶ GO TO 12.
NG		▶ GO TO 16.

16	DETECT MALFUNCTIONING PART	
<ol style="list-style-type: none"> 1. Connect heated oxygen sensor 1 harness connector to heated oxygen sensor 1. 2. Check fuel pressure regulator. Refer to EC-58. 3. Check mass air flow sensor and its circuit. Refer to EC-168. 4. Check injector and its circuit. Refer to EC-571. Clean or replace if necessary. 5. Check engine coolant temperature sensor and its circuit. Refer to EC-185, 204. 6. Check ECM function by substituting another known-good ECM. (ECM may be the cause of a problem, but this is rarely the case.) 		
		▶ GO TO 12.

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

Introduction

NGEC0029

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

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

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

X: Applicable —: Not applicable

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

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

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-127.)

Two Trip Detection Logic

NGEC0030

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.

X: 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 - P0304 is being detected	X	—	—	—	—	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	—	—	X	—	—	X	—	—
Coolant overtemperature enrichment protection — DTC: P0217	—	X	—	—	X	—	X	—
Closed loop control — DTC: P1148	—	X	—	—	X	—	X	—
Fail-safe items (Refer to EC-127.)	—	X	—	—	X*1	—	X*1	—
Except above	—	—	—	X	—	X	X	—

*1: Except "ECM"

Emission-related Diagnostic Information

NGEC0031

DTC AND 1ST TRIP DTC

NGEC0031S01

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed. If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory. Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION". Refer to EC-86.

For malfunctions in which 1st trip DTCs are displayed, refer to EC-84. These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-II.

1st trip DTC is specified in Mode 7 of SAE J1979. 1st trip DTC detection occurs without lighting up the MIL and therefore does not warn the driver of a problem. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in "Work Flow" procedure Step II, refer to page EC-110. Then perform "DTC Confirmation Procedure" or "Overall Function Check" to try to duplicate the problem. If the malfunction is duplicated, the item requires repair.

How to read DTC and 1st Trip DTC

NGEC0031S0101

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 SAE J2012.

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

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

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

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

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

DTC display	SELF DIAG RESULTS		1st trip DTC display	SELF DIAG RESULTS	
	DTC RESULTS	TIME		DTC RESULTS	TIME
	MAF SEN/CIRCUIT [P0101]	0		MAF SEN/CIRCUIT [P0101]	1t

SEC745C

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

NGEC0031S02

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

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data.

The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-II 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-97.

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 - P0304 Fuel Injection System Function — DTC: P0171, P0172
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 "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION". Refer to EC-86.

SYSTEM READINESS TEST (SRT) CODE

NGEC0031S03

System Readiness Test (SRT) code is specified in Mode 1 of SAE J1979.

As part of enhanced emissions test for Inspection and Maintenance (I/M), certain states require that 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 "incomplete", use the information in this service manual to set the SRT to "complete".

In most cases, the ECM will automatically complete its self-diagnosis cycle during normal usage and the SRT status will indicate "complete" for each application system. Once set as "complete", the SRT status remains "complete" 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 and the SRT will indicate "incomplete" for these items.

NOTE:

The SRT will also indicate "incomplete" 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 "complete" for all test items, the inspector will continue with the emissions test. However, if the SRT indicates "incomplete" 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 "complete" for all test items. Therefore, it is important to check SRT ("complete") and DTC (No DTCs) before the inspection.

This service manual contains the service procedure and support information to perform a comprehensive road test that enables the ECM to complete the SRT.

GI
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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

KA24DE

Emission-related Diagnostic Information (Cont'd)

SRT Item

=NGEC0031S0308

The following table 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	3	Three way catalyst function	P0420
EVAP SYSTEM	2	EVAP control system	P0442
	3	EVAP control system	P0456, P1456
	3	EVAP control system purge flow monitoring	P0441
HO2S	3	Heated oxygen sensor 1	P0134
		Heated oxygen sensor 1	P1143
		Heated oxygen sensor 1	P1144
		Heated oxygen sensor 1	P0133
		Heated oxygen sensor 1	P0132
		Heated oxygen sensor 2	P1146
		Heated oxygen sensor 2	P1147
		Heated oxygen sensor 2	P0139
		Heated oxygen sensor 2	P0138
HO2S HTR	3	Heated oxygen sensor 1 heater	P0031, P0032
		Heated oxygen sensor 2 heater	P0037, P0038
EGR SYSTEM	3	EGR function	P0400
		EGRC-BPT valve function	P0402
	1	EGR function	P1402

*: 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

-NGEC0031S0310

SRT is set as “complete” after self-diagnosis has been performed one or more times. Completion of SRT will occur if the result is OK or NG. The set timing is different between them and is shown in the following table.

Self-diagnosis result		Example				
		Diagnosis	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF
All OK	Case 1	P0400	OK (1)	– (1)	OK (2)	– (2)
		P0402	OK (1)	– (1)	– (1)	OK (2)
		P1402	OK (1)	OK (2)	– (2)	– (2)
		SRT of EGR	“complete”	“complete”	“complete”	“complete”
	Case 2	P0400	OK (1)	– (1)	– (1)	– (1)
		P0402	– (0)	– (0)	OK (1)	– (1)
		P1402	OK (1)	OK (2)	– (2)	– (2)
		SRT of EGR	“incomplete”	“incomplete”	“complete”	“complete”
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	“incomplete”	“incomplete”	“incomplete”	“complete”

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

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

– : Self-diagnosis is not carried out.

When all SRT related self-diagnoses showed OK results in a same cycle (Ignition OFF – ON – OFF), the SRT will indicate “complete”.

→ Case 1 above

When all SRT related self-diagnoses show OK results through several different cycles, the SRT will indicate “complete” 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 “complete”.

→ Case 3 above

The previous table shows that the minimum number of cycles for setting SRT as “incomplete” is one (1) for each self-diagnosis (Case 1 and 2) or two (2) for one self-diagnosis (Case 3). However, in preparation for the State emissions inspection, it is unnecessary of each self-diagnosis to be executed twice (Case 3) because of the following reasons;

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

NOTE:

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

How to Display SRT Code

1. 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.

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Emission-related Diagnostic Information (Cont'd)

2. With GST

Selecting Mode 1 with GST (Generic Scan Tool)

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

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

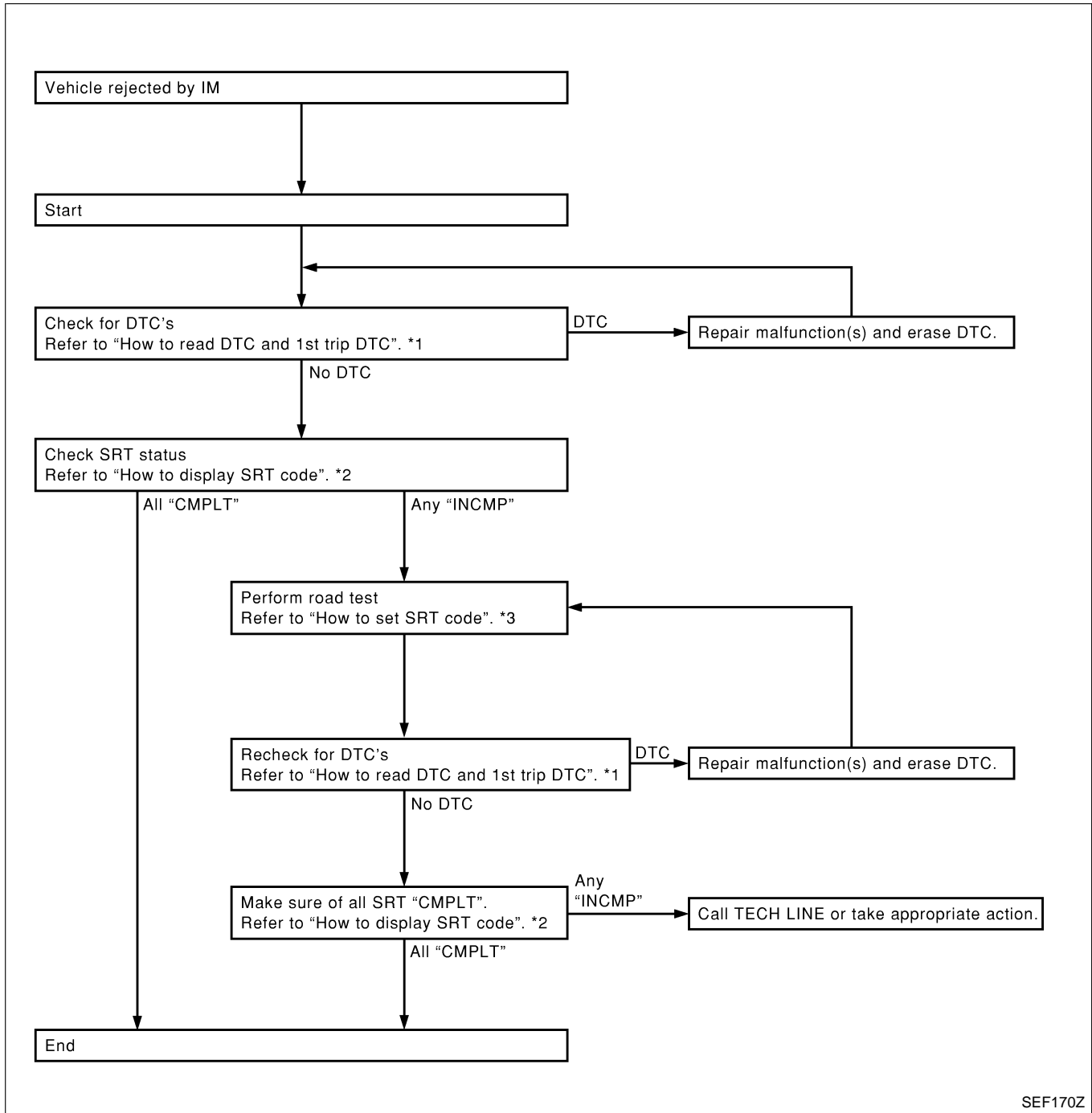
SRT STATUS	
CATALYST	CMPLT
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	CMPLT
EGR SYSTEM	INCMP

SEF713Y

SRT Service Procedure

=NGEC0031S0311

If a vehicle has been rejected for the State emissions inspection due to one or more SRT items indicating "incomplete", review the following flowchart diagnostic sequence.



SEF170Z

*1 EC-74

*2 EC-77

*3 EC-80

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How to Set SRT Code

-NGEC0031S0302

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.

① With CONSULT-II

Perform corresponding DTC confirmation procedure one by one based on "Performance Priority" in the table on EC-76.

② Without CONSULT-II

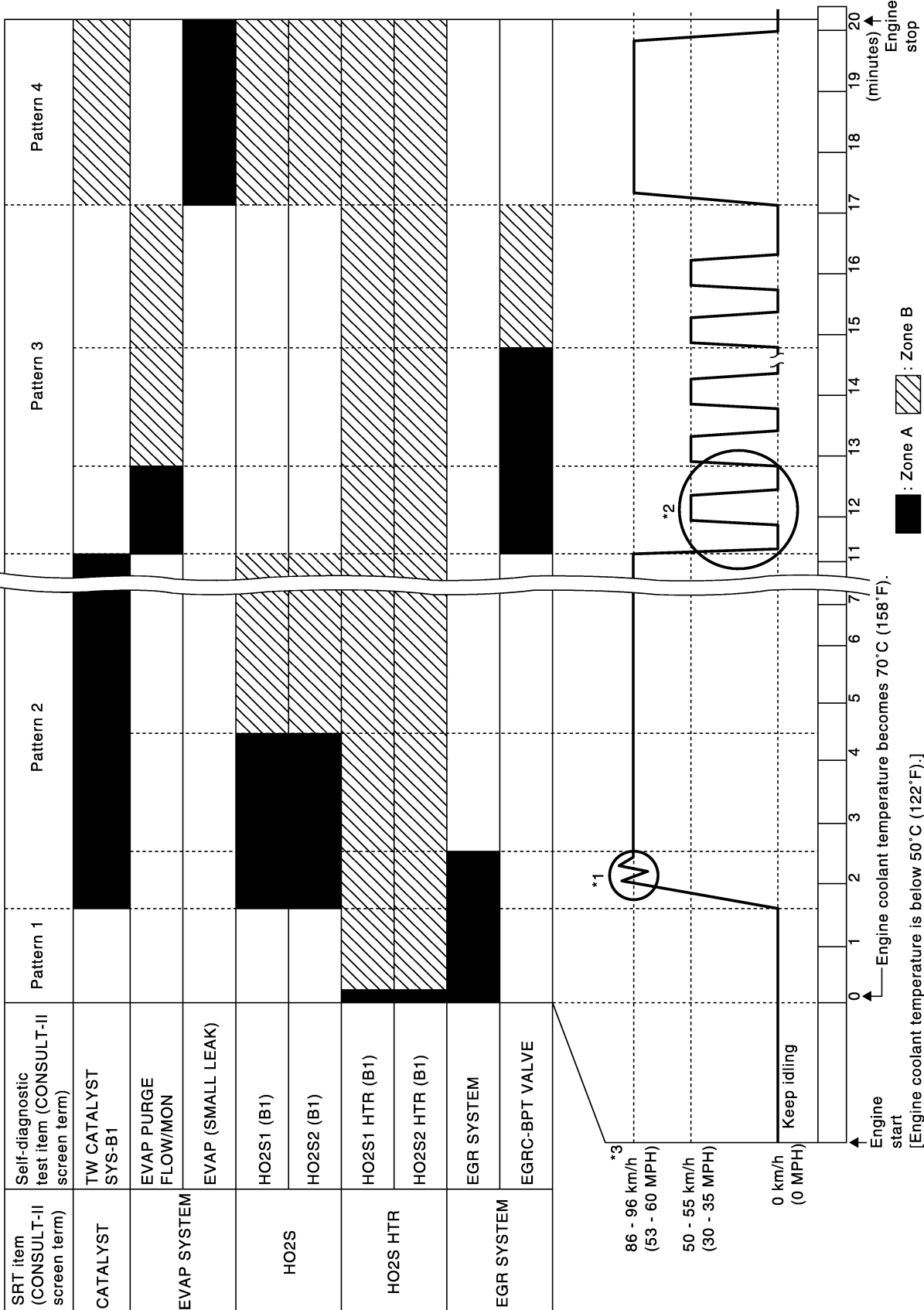
The most efficient driving pattern in which SRT codes can be properly set is explained on EC-81. The driving pattern should be performed one or more times to set all SRT codes.

Driving Pattern

NGEC0031S0303

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

Driving pattern



GI
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IDX

Emission-related Diagnostic Information (Cont'd)

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

*: Normal conditions refer to the following:

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

Pattern 1:

- **The engine is started at the engine coolant temperature of -10 to 35°C (14 to 95°F) (where the voltage between the ECM terminals 59 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 terminals 59 and ground is lower than 1.4V).**
- **The engine is started at the tank fuel temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 60 and ground is less than 4.1V).**

Pattern 2:

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

Pattern 3:

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

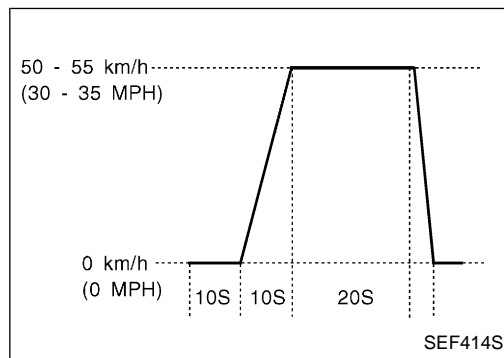
Pattern 4:

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

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

*2: Operate the vehicle in the following driving pattern.

- 1) Decelerate vehicle to 0 km/h (0 MPH) and let engine idle.
- 2) Repeat driving pattern shown below at least 10 times.
- **During acceleration, hold the accelerator pedal as steady as possible.**
- 3) Repeat steps 1 and 2 until the EGR system SRT is set.



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

Suggested upshift speeds for M/T models

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

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

KA24DE

Emission-related Diagnostic Information (Cont'd)

	For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:		For quick acceleration in low altitude areas and high altitude areas [over 1,219 m (4,000 ft)]:
Gear change	ACCEL shift point km/h (MPH)	CRUISE shift point km/h (MPH)	km/h (MPH)
1st to 2nd	24 (15)	24 (15)	24 (15)
2nd to 3rd	40 (25)	29 (18)	40 (25)
3rd to 4th	58 (36)	48 (30)	64 (40)
4th to 5th	64 (40)	63 (39)	72 (45)

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

NGEC0031S04

The following is the information specified in Mode 6 of SAE J1979.

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

Items for which these data (test value and test limit) are displayed are the same as SRT code items (9 test items).

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

X: Applicable —: Not applicable

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
CATALYST	Three way catalyst function	01H	01H	Max.	X
		02H	81H	Min.	X
EVAP SYSTEM	EVAP control system (Small leak)	05H	03H	Max.	X
	EVAP control system purge flow monitoring	06H	83H	Min.	X
HO2S	Heated oxygen sensor 1	09H	04H	Max.	X
		0AH	84H	Min.	X
		0BH	04H	Max.	X
		0CH	04H	Max.	X
	Heated oxygen sensor 2	0DH	04H	Max.	X
		19H	86H	Min.	X
		1AH	86H	Min.	X
		1BH	06H	Max.	X
HO2S HTR	Heated oxygen sensor 1 heater	1CH	06H	Max.	X
		29H	08H	Max.	X
	Heated oxygen sensor 2 heater	2AH	88H	Min.	X
		2DH	0AH	Max.	X
		2EH	8AH	Min.	X

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

KA24DE

Emission-related Diagnostic Information (Cont'd)

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
EGR SYSTEM	EGR function	31H	8CH	Min.	X
		32H	8CH	Min.	X
		33H	8CH	Min.	X
		34H	8CH	Min.	X
		35H	0CH	Max.	X
	EGRC-BPT valve function	36H	0CH	Max.	X
		37H	8CH	Min.	X

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

X: Applicable —: Not applicable NGEC0031S05

Items (CONSULT-II screen terms)	DTC*1*2	SRT code	Test value/Test limit (GST only)	1st trip DTC	Reference page
	CONSULT-II GST				
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	P0000	—	—	—	—
HO2S1 HTR (B1)	P0031	X	X	X*5	EC-158
HO2S1 HTR (B1)	P0032	X	X	X*5	EC-158
HO2S2 HTR (B1)	P0037	X	X	X*5	EC-163
HO2S2 HTR (B1)	P0038	X	X	X*5	EC-163
MAF SEN/CIRCUIT	P0101	—	—	X	EC-168
MAF SEN/CIRCUIT	P0102*3	—	—	—	EC-168
MAF SEN/CIRCUIT	P0103*3	—	—	—	EC-168
ABSL PRES SEN/CIRC	P0107	—	—	X	EC-178
ABSL PRES SEN/CIRC	P0108	—	—	X	EC-178
IAT SEN/CIRCUIT	P0112*3	—	—	—	EC-180
IAT SEN/CIRCUIT	P0113*3	—	—	—	EC-180
ECT SEN/CIRCUIT	P0117*3	—	—	—	EC-185
ECT SEN/CIRCUIT	P0118*3	—	—	—	EC-185
TP SEN/CIRCUIT	P0121	—	—	X	EC-190
TP SEN/CIRCUIT	P0122*3	—	—	—	EC-190
TP SEN/CIRCUIT	P0123*3	—	—	—	EC-190
ECT SENSOR	P0125	—	—	X	EC-204
IAT SENSOR	P0127	—	—	X	EC-180
THERMSTAT FNCTN	P0128	—	—	X	EC-209
HO2S1 (B1)	P0132	X	X	X*5	EC-211
HO2S1 (B1)	P0133	X	X	X*5	EC-218
HO2S1 (B1)	P0134	X	X	X*5	EC-229
HO2S2 (B1)	P0138	X	X	X*5	EC-237

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

KA24DE

Emission-related Diagnostic Information (Cont'd)

Items (CONSULT-II screen terms)	DTC*1*2	SRT code	Test value/Test limit (GST only)	1st trip DTC	Reference page	
	CONSULT-II GST					
HO2S2 (B1)	P0139	X	X	X*5	EC-245	GI
FUEL SYS-LEAN-B1	P0171	—	—	X	EC-255	MA
FUEL SYS-RICH-B1	P0172	—	—	X	EC-262	EM
FTT SENSOR	P0181	—	—	X	EC-269	
FTT SEN/CIRCUIT	P0182	—	—	X	EC-269	LC
FTT SEN/CIRCUIT	P0183	—	—	X	EC-269	
ENG OVER TEMP	P0217	—	—	X	EC-275	EC
MULTI CYL MISFIRE	P0300	—	—	X	EC-281	
CYL1 MISFIRE	P0301	—	—	X	EC-281	FE
CYL2 MISFIRE	P0302	—	—	X	EC-281	
CYL3 MISFIRE	P0303	—	—	X	EC-281	CL
CYL4 MISFIRE	P0304	—	—	X	EC-281	
KNOCK SEN/CIRC-B1	P0327	—	—	—	EC-290	MT
KNOCK SEN/CIRC-B1	P0328	—	—	—	EC-290	
CKP SEN/CIRCUIT	P0335	—	—	X	EC-294	AT
CMP SEN/CIRCUIT	P0340	—	—	X	EC-300	
EGR SYSTEM	P0400	X	X	X*5	EC-308	TF
EGRC-BPT VALVE	P0402	X	X	X*5	EC-320	
EGR TEMP SEN/CIRC	P0405	—	—	X	EC-328	PD
EGR TEMP SEN/CIRC	P0406	—	—	X	EC-328	AX
TW CATALYST SYS-B1	P0420	X	X	X*5	EC-334	
EVAP PURG FLOW/MON	P0441	X	X	X*5	EC-339	SU
EVAP SMALL LEAK	P0442	X	X	X*5	EC-350	
PURG VOLUME CONT/V	P0444	—	—	X	EC-366	BR
PURG VOLUME CONT/V	P0445	—	—	X	EC-366	
VENT CONTROL VALVE	P0447	—	—	X	EC-373	ST
EVAP SYS PRES SEN	P0452	—	—	X	EC-380	
EVAP SYS PRES SEN	P0453	—	—	X	EC-380	RS
EVAP GROSS LEAK	P0455	X	X	X*5	EC-393	
EVAP VERY SML LEAK	P0456	X*4	X	X*5	EC-405	BT
FUEL LEV SEN SLOSH	P0460	—	—	X	EC-420	
FUEL LEVEL SENSOR	P0461	—	—	X	EC-424	HA
FUEL LEVL SEN/CIRC	P0462	—	—	X	EC-426	
FUEL LEVL SEN/CIRC	P0463	—	—	X	EC-426	SC
VEH SPEED SEN/CIRC	P0500	—	—	X	EC-430	
ISC SYSTEM/CIRC	P0505	—	—	X	EC-434	EL

Emission-related Diagnostic Information (Cont'd)

Items (CONSULT-II screen terms)	DTC*1*2	SRT code	Test value/Test limit (GST only)	1st trip DTC	Reference page
	CONSULT-II GST				
CLOSED TP SW/CIRC	P0510	—	—	X	EC-440
ECM	P0605	—	—	X	EC-447
HO2S1 (B1)	P1143	X	X	X*5	EC-449
HO2S1 (B1)	P1144	X	X	X*5	EC-456
HO2S2 (B1)	P1146	X	X	X*5	EC-463
HO2S2 (B1)	P1147	X	X	X*5	EC-473
CLOSED LOOP-B1	P1148	—	—	X	EC-483
ENG OVER TEMP	P1217	—	—	X	EC-485
CKP SENSOR (COG)	P1336	—	—	X	EC-490
EGRC SOLENOID/V	P1400	—	—	X	EC-496
EGR SYSTEM	P1402	X	X	X*5	EC-503
PURG VOLUME CONT/V	P1444	—	—	X	EC-512
VENT CONTROL VALVE	P1446	—	—	X	EC-523
VENT CONTROL VALVE	P1448	—	—	X	EC-529
EVAP VERY SML LEAK	P1456	X*4	X	X*5	EC-405
FUEL LEVEL SEN/CIRC	P1464	—	—	X	EC-536
VC/V BYPASS/V	P1490	—	—	X	EC-539
VC CUT/V BYPASS/V	P1491	—	—	X	EC-546
P-N POS SW/CIRCUIT	P1706	—	—	X	EC-556

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

*2: These numbers are prescribed by SAE J2012.

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

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

*5: These are not displayed with GST.

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

NGEC0031S06

Ⓟ How to Erase DTC (With CONSULT-II)

NGEC0031S0601

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. 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 5 seconds and then turn it "ON" (engine stopped) 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)	
ACTIVE TEST	
DTC & SRT CONFIRMATION	
ECM PART NUMBER	

3. Touch "SELF-DIAG RESULTS".

SELF DIAG RESULTS	
DTC RESULTS	
MAF SEN/CIRCUIT [P0101]	TIME
	0

4. Touch "ERASE". (The DTC in the ECM will be erased.)

SEC747C

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

How to Erase DTC (With GST)

NGEC0031S0602

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. Select Mode 4 with GST (Generic Scan Tool).

The emission-related diagnostic information in the ECM can be erased by selecting Mode 4 with GST (Generic Scan Tool).

NOTE:

- If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 24 hours.
- The following data are cleared when the ECM memory is erased.
 - 1) Diagnostic trouble codes
 - 2) 1st trip diagnostic trouble codes
 - 3) Freeze frame data
 - 4) 1st trip freeze frame data
 - 5) System readiness test (SRT) codes
 - 6) Test values
 - 7) Others

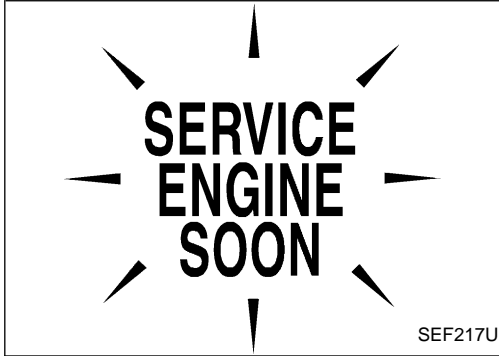
Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

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Malfunction Indicator Lamp (MIL)

DESCRIPTION

NGEC0032






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 "WARNING LAMPS", **EL-94** or see EC-598.
2. When the engine is started, the MIL should go off.
 - If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.

On Board Diagnostic System Function

NGEC0032S01

The on board diagnostic system has the following two functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in "ON" position  Engine stopped 	BULB CHECK	This function checks the MIL bulb for damage (blown, open circuit, etc.). If the MIL does not come on, check MIL circuit.
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MIL in the 1st trip. <ul style="list-style-type: none"> ● "Coolant overtemperature enrichment protection" ● "Misfire (Possible three way catalyst damage)" ● "Closed loop control" ● Fail-safe mode

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 **EL-94**, "WARNING LAMPS" or see EC-598.

NGEC0032S03

Diagnostic Test Mode I — Malfunction Warning

NGEC0032S04

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

OBD System Operation Chart

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

NGEC0033

- 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.

NGEC0033S01

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

KA24DE

OBD System Operation Chart (Cont'd)

- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on. For details, refer to “Two Trip Detection Logic” on EC-73.
- 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

NGEC0033S02

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-91.

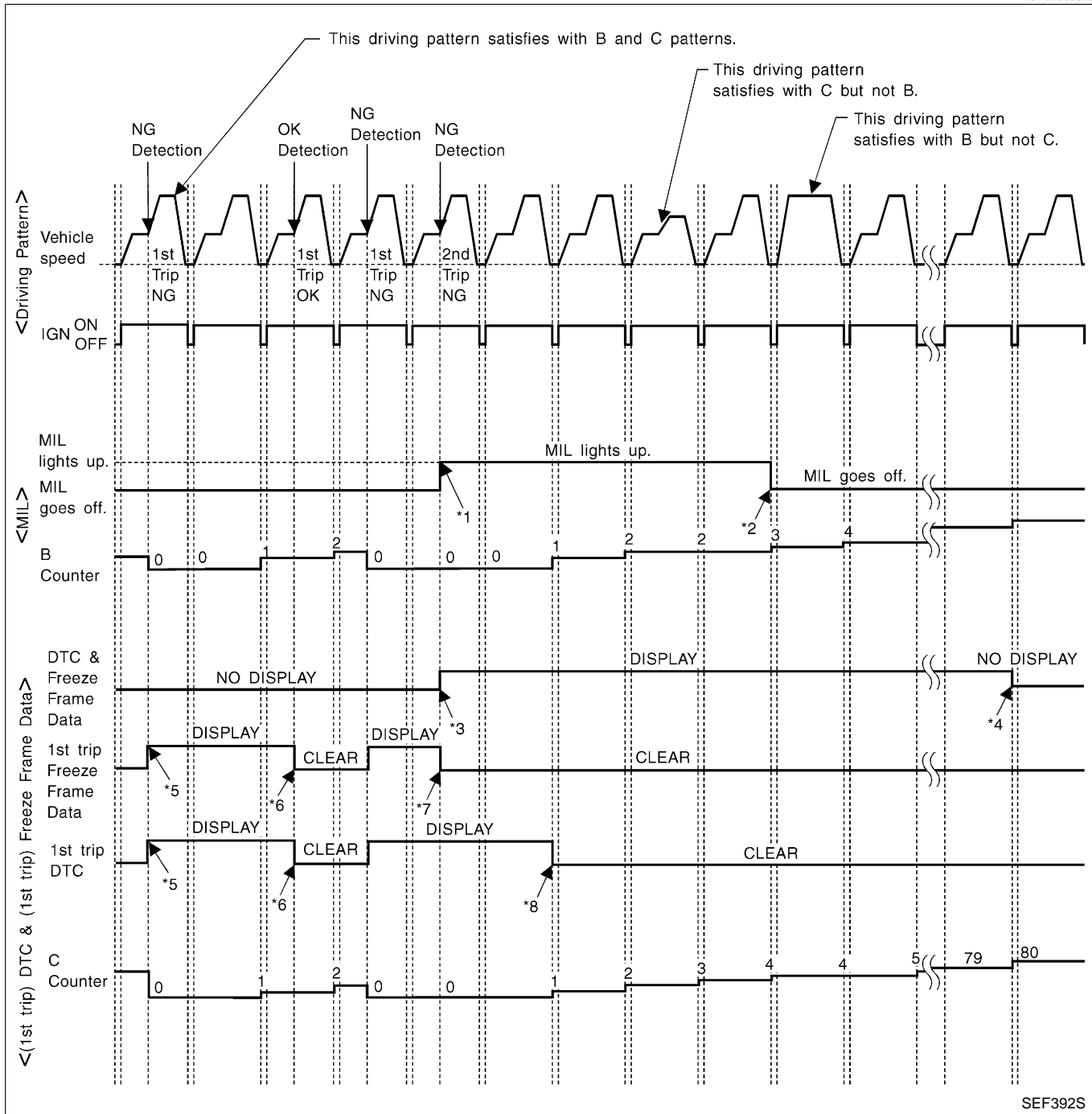
For details about patterns “A” and “B” under “Other”, see EC-93.

*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"

NGEC0033S03



SEF392S

- *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”

NGEC0033S04

NGEC0033S0401

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

NGEC0033S0402

Driving pattern C means the vehicle operation as follows:

1) The following conditions should be satisfied at the same time:

Engine speed: (Engine speed in the freeze frame data) ± 375 rpm

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

Engine coolant temperature (T) condition:

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

Example:

If the stored freeze frame data is as follows:

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

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

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

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

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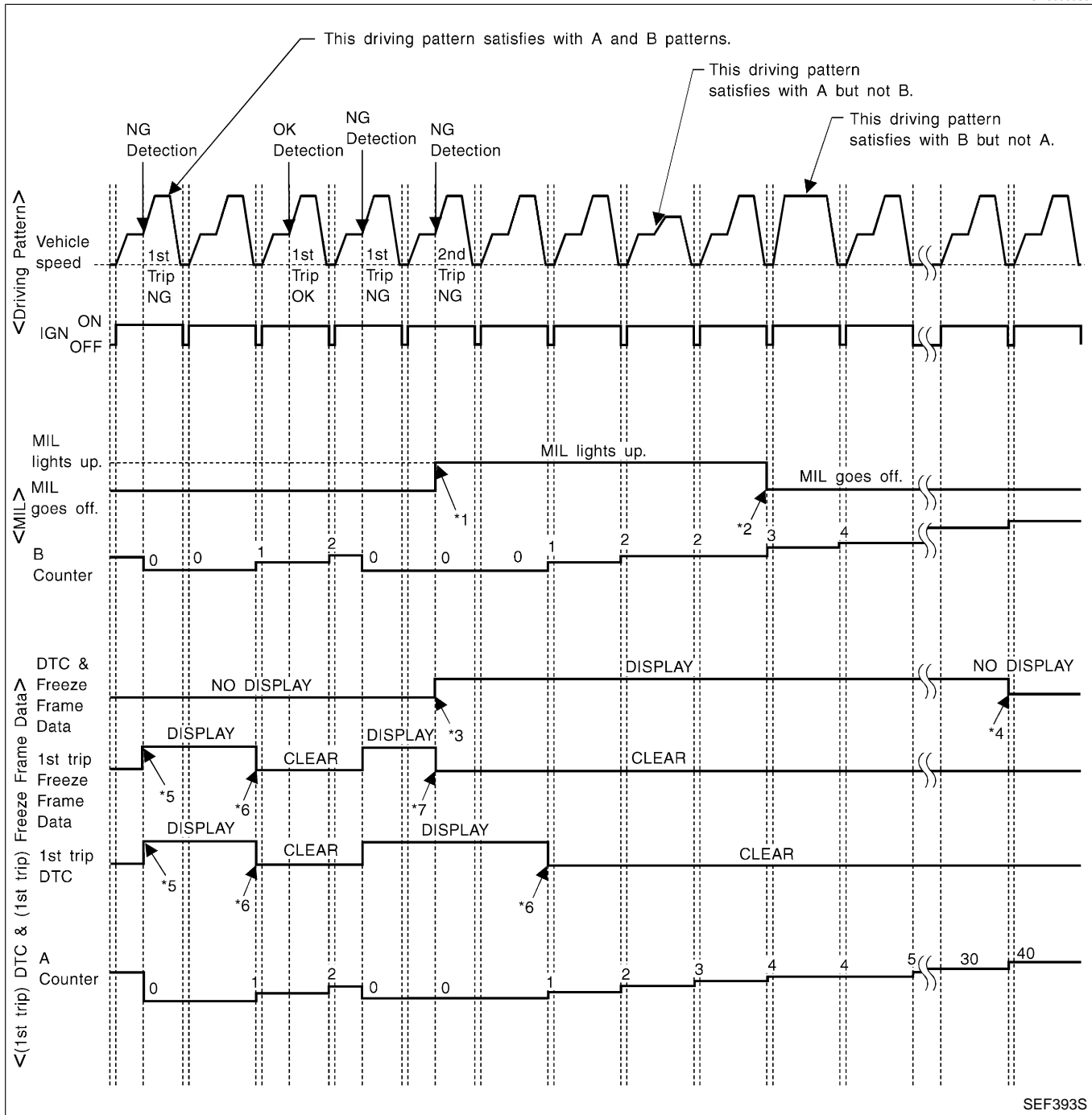
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RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

NGEC0033S05



- *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

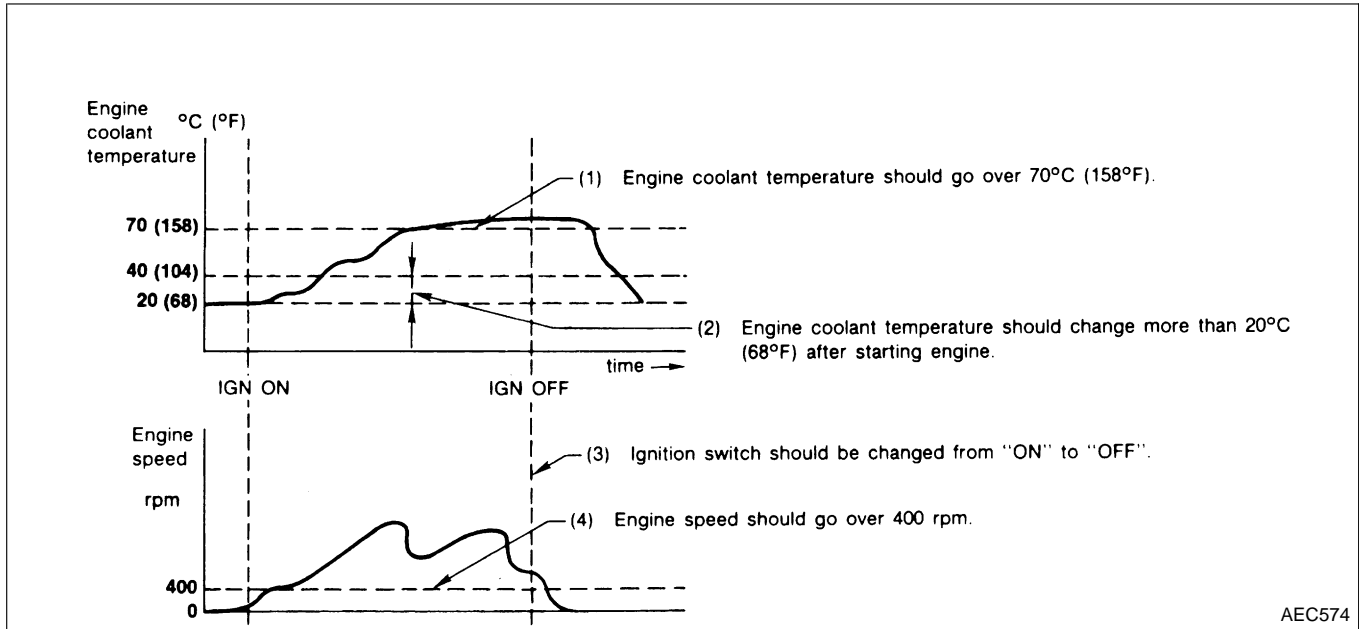
- and the 1st trip freeze frame data will be stored in ECM.
- *6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.
- *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

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

Driving Pattern A

NGEC0033S06

NGEC0033S0601



- 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

NGEC0033S0602

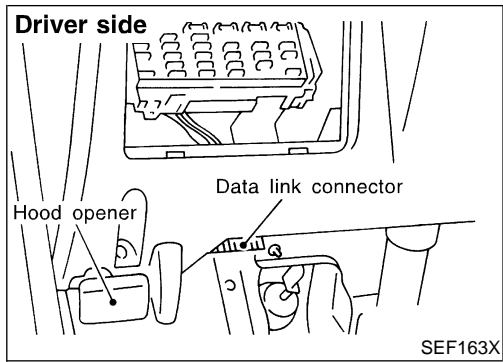
Driving pattern B means the vehicle operation as follows:

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").

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CONSULT-II



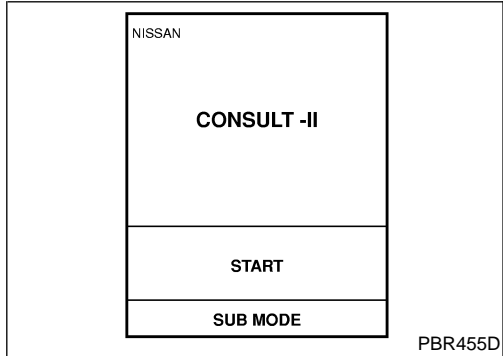
CONSULT-II

CONSULT-II INSPECTION PROCEDURE

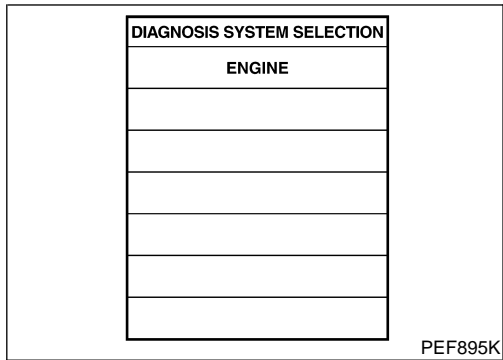
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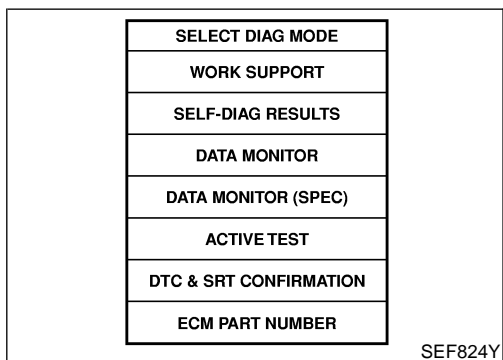
1. Turn ignition switch OFF.
2. Connect "CONSULT-II" to data link connector which is located behind the fuse box cover.



3. Turn ignition switch ON.
4. Touch "START".



5. Touch "ENGINE".



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

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

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

NGEC0034S02

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 STA-TUS	DTC WORK SUP-PORT
Camshaft position sensor		X	X	X	X			
Mass air flow sensor		X		X	X			
Engine coolant temperature sensor		X	X	X	X	X		
Heated oxygen sensor 1		X		X	X		X	X
Heated oxygen sensor 2		X		X	X		X	X
Vehicle speed sensor		X	X	X	X			
Throttle position sensor	X	X		X	X			
Fuel tank temperature sensor		X		X	X	X		
EVAP control system pressure sensor		X		X	X			
Absolute pressure sensor		X	X	X	X			
EGR temperature sensor		X		X	X			
Intake air temperature sensor		X		X	X			
Crankshaft position sensor (OBD)		X						
Knock sensor		X						
Fuel level sensor		X		X	X			
Ignition switch (start signal)				X	X			
Closed throttle position switch		X		X	X			
Closed throttle position switch (throttle position sensor signal)				X	X			
Air conditioner switch				X	X			
Park/Neutral position (PNP) switch		X		X	X			
Power steering oil pressure switch				X	X			
Air conditioner pressure switch				X	X			
Battery voltage				X	X			
Ambient air temperature switch				X	X			

ENGINE CONTROL COMPONENT PARTS

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

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CONSULT-II (Cont'd)

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 STA-TUS	DTC WORK SUP-PORT	
ENGINE CONTROL COMPONENT PARTS	OUT-PUT	Injectors				X	X	X		
		Power transistor (Ignition timing)	X	X		X	X	X		
		IACV-AAC valve	X	X		X	X	X		
		EVAP canister purge volume control solenoid valve		X		X	X	X		X
		Air conditioner relay				X	X			
		Fuel pump relay	X			X	X	X		
		EGRC-solenoid valve		X		X	X	X		
		Heated oxygen sensor 1 heater		X		X	X		X	
		Heated oxygen sensor 2 heater		X		X	X		X	
		EVAP canister vent control valve		X		X	X	X		
		Vacuum cut valve bypass valve		X		X	X	X		X
		Calculated load value			X	X	X			

X: Applicable

*1: This item includes 1st trip DTCs.

*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-74.

FUNCTION

NGEC0034S03

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

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

- 1) Diagnostic trouble codes
- 2) 1st trip diagnostic trouble codes
- 3) Freeze frame data

- 4) 1st trip freeze frame data
- 5) System readiness test (SRT) codes
- 6) Test values
- 7) Others

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WORK SUPPORT MODE

NGEC0034S04

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WORK ITEM	CONDITION	USAGE
TP SW/TP SEN IDLE POSI ADJ	<ul style="list-style-type: none"> ● FOLLOW THE BASIC INSPECTION IN THE SERVICE MANUAL. 	When adjusting the idle throttle position
IGNITION TIMING ADJ	<ul style="list-style-type: none"> ● IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING "START". AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CRANKSHAFT POSITION SENSOR. 	When adjusting initial ignition timing
FUEL PRESSURE RELEASE	<ul style="list-style-type: none"> ● FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS. 	When releasing fuel pressure from fuel line
SELF-LEARNING CONT	<ul style="list-style-type: none"> ● THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT. 	When releasing fuel pressure from fuel line
EVAP SYSTEM CLOSE	<p>OPEN THE VACUUM CUT VALVE BYPASS VALVE AND CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS.</p> <ul style="list-style-type: none"> ● BATTERY VOLTAGE IS SUFFICIENT. ● IGN SW "ON" ● ENGINE NOT RUNNING ● AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). ● NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM ● TANK FUEL TEMP. IS MORE THAN 0°C (32°F). ● WITHIN 10 MINUTES AFTER STARTING "EVAP SYSTEM CLOSE" <p>WHEN TRYING TO EXECUTE "EVAP SYSTEM CLOSE" UNDER THE CONDITIONS ABOVE, CONSULT-II WILL DISCONTINUE AND DISPLAY INSTRUCTIONS.</p> <p>NOTE: WHEN STARTING ENGINE, CONSULT-II MAY DISPLAY "BATTERY VOLTAGE IS LOW. CHARGE BATTERY", EVEN WHEN USING A CHARGED BATTERY.</p>	When detecting EVAP vapor leak point of EVAP system
TARGET IDLE RPM ADJ*	<ul style="list-style-type: none"> ● IDLE CONDITION 	When setting target idle speed

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

SELF DIAGNOSTIC MODE

NGEC0034S05

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DTC and 1st Trip DTC

Regarding items of "DTC and 1st trip DTC", refer to "TROUBLE DIAGNOSIS — INDEX", EC-18.

NGEC0034S0501

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Freeze Frame Data and 1st Trip Freeze Frame Data

NGEC0034S0502

BT

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	<ul style="list-style-type: none"> ● Engine Control component part/control system has a trouble code, it is displayed as "PXXXX". [Refer to "Alphabetical & P No. Index for DTC" (EC-18).]

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

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CONSULT-II (Cont'd)

Freeze frame data item*	Description
FUEL SYS-B1	<ul style="list-style-type: none"> ● "Fuel injection system status" at the moment a malfunction is detected is displayed. ● One mode in the following is displayed. "MODE 2": Open loop due to detected system malfunction "MODE 3": Open loop due to driving conditions (power enrichment, deceleration enrichment) "MODE 4": Closed loop - using oxygen sensor(s) as feedback for fuel control "MODE 5": Open loop - has not yet satisfied condition to go to closed loop
CAL/LD VALUE [%]	<ul style="list-style-type: none"> ● The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	<ul style="list-style-type: none"> ● The engine coolant temperature at the moment a malfunction is detected is displayed.
S-FUEL TRIM-B1 [%]	<ul style="list-style-type: none"> ● "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.
L-FUEL TRIM-B1 [%]	<ul style="list-style-type: none"> ● "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.
ENGINE SPEED [rpm]	<ul style="list-style-type: none"> ● The engine speed at the moment a malfunction is detected is displayed.
VEHICLE SPEED [km/h] or [mph]	<ul style="list-style-type: none"> ● The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH-P/S [%]	<ul style="list-style-type: none"> ● The throttle valve opening angle at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	<ul style="list-style-type: none"> ● The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	<ul style="list-style-type: none"> ● 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

NGEC0034S06

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	○	○	<ul style="list-style-type: none"> ● Indicates the engine speed computed from the REF signal (180° signal) of the camshaft position sensor. 	<ul style="list-style-type: none"> ● 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]	○	○	<ul style="list-style-type: none"> ● The signal voltage of the mass air flow sensor is displayed. 	<ul style="list-style-type: none"> ● When the engine is stopped, a certain value is indicated.
B/FUEL SCHDL [msec]		○	<ul style="list-style-type: none"> ● "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction. 	
A/F ALPHA-B1 [%]			<ul style="list-style-type: none"> ● Indicates the mean value of the air-fuel ratio feedback correction factor per cycle. 	<ul style="list-style-type: none"> ● When the engine is stopped, a certain value is indicated. ● This data also includes the data for the air-fuel ratio learning control.
COOLAN TEMP/S [°C] or [°F]	○	○	<ul style="list-style-type: none"> ● The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed. 	<ul style="list-style-type: none"> ● 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.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

KA24DE

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
HO2S1 (B1) [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the heated oxygen sensor 1 is displayed. 	
HO2S2 (B1) [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the heated oxygen sensor 2 is displayed. 	
HO2S1 MNTR (B1) [RICH/LEAN]	○	○	<ul style="list-style-type: none"> Display of heated oxygen sensor 1 signal during air-fuel ratio feedback control: RICH ... means the mixture became "rich", and control is being affected toward a leaner mixture. LEAN ... means the mixture became "lean", and control is being affected toward a rich mixture. 	<ul style="list-style-type: none"> After turning ON the ignition switch, "RICH" is displayed until air-fuel mixture ratio feedback control begins. When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
HO2S2 MNTR (B1) [RICH/LEAN]	○		<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated.
VHCL SPEED SE [km/h] or [mph]	○	○	<ul style="list-style-type: none"> The vehicle speed computed from the vehicle speed sensor signal is displayed. 	
BATTERY VOLT [V]	○	○	<ul style="list-style-type: none"> The power supply voltage of ECM is displayed. 	
THRTL POS SEN [V]	○	○	<ul style="list-style-type: none"> The throttle position sensor signal voltage is displayed. 	
FUEL T/TMP SE [°C] or [°F]	○		<ul style="list-style-type: none"> The fuel temperature judged from the fuel tank temperature sensor signal voltage is displayed. 	
INT/A TEMP SE [°C] or [°F]	○		<ul style="list-style-type: none"> The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated. 	
EGR TEMP SEN [V]	○		<ul style="list-style-type: none"> The signal voltage of the EGR temperature sensor is displayed. 	
EVAP SYS PRES [V]		○	<ul style="list-style-type: none"> The signal voltage of EVAP control system pressure sensor is displayed. 	
ABSOL PRES/SE [V]			<ul style="list-style-type: none"> The signal voltage of the absolute pressure sensor is displayed. 	
FULL LEVEL SE [V]			<ul style="list-style-type: none"> The signal voltage of the fuel level sensor is displayed. 	
START SIGNAL [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the starter signal. 	<ul style="list-style-type: none"> After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates idle position [ON/OFF] computed by ECM according to the throttle position sensor signal. 	
CLSD THL/P SW [ON/OFF]			<ul style="list-style-type: none"> Indicates mechanical contact [ON/OFF] condition of the closed throttle position switch. 	

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

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CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
AIR COND SIG [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioning signal. 	
P/N POSI SW [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the PNP switch signal. 	
PW/ST SIGNAL [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure switch signal. 	
IGNITION SW [ON/OFF]	○		<ul style="list-style-type: none"> Indicates [ON/OFF] condition from ignition switch. 	
INJ PULSE-B1 [msec]		○	<ul style="list-style-type: none"> Indicates the actual fuel injection pulse width compensated by ECM according to the input signals. 	<ul style="list-style-type: none"> When the engine is stopped, a certain computed value is indicated.
IGN TIMING [BTDC]		○	<ul style="list-style-type: none"> Indicates the ignition timing computed by ECM according to the input signals. 	
CAL/LD VALUE [%]			<ul style="list-style-type: none"> "Calculated load value" indicates the value of the current airflow divided by peak airflow. 	
ABSOL TH-P/S [%]			<ul style="list-style-type: none"> "Absolute throttle position sensor" indicates the throttle opening computed by ECM according to the signal voltage of the throttle position sensor. 	
MASS AIRFLOW [g·m/s]			<ul style="list-style-type: none"> Indicates the mass airflow computed by ECM according to the signal voltage of the mass air flow sensor. 	
IACV-AAC/V [%]		○	<ul style="list-style-type: none"> Indicates the IACV-AAC valve control value computed by ECM according to the input signals. 	
PURG VOL C/V [%]		○	<ul style="list-style-type: none"> Indicates the EVAP canister purge volume control value computed by the ECM according to the input signals. The opening becomes larger as the value increases. 	
AIR COND RLY [ON/OFF]			<ul style="list-style-type: none"> Indicates the air conditioner relay control condition determined by ECM according to the input signals. 	
EGRC SOL/V [ON/OFF] (FLOW/CUT)			<ul style="list-style-type: none"> Indicates the control condition of the EGRC-solenoid valve determined by ECM according to the input signals. ON ... EGR valve is operational OFF ... EGR valve operation is cut-off 	
FUEL PUMP RLY [ON/OFF]			<ul style="list-style-type: none"> Indicates the fuel pump relay control condition determined by ECM according to the input signals. 	
VC/V BYPASS/V [ON/OFF]			<ul style="list-style-type: none"> The control condition of the vacuum cut valve bypass valve (determined by ECM according to the input signal) is indicated. ON ... Open OFF ... Closed 	

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

KA24DE

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
VENT CONT/V [ON/OFF]			<ul style="list-style-type: none"> ● The control condition of the EVAP canister vent control valve (determined by ECM according to the input signal) is indicated. ● ON ... Closed ● OFF ... Open 	
HO2S1 HTR (B1) [ON/OFF]			<ul style="list-style-type: none"> ● Indicates [ON/OFF] condition of heated oxygen sensor 1 heater determined by ECM according to the input signals. 	
HO2S2 HTR (B1) [ON/OFF]			<ul style="list-style-type: none"> ● Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals. 	
VOLTAGE [V]			<ul style="list-style-type: none"> ● Voltage measured by the voltage probe. 	
Frequency [msec] or [Hz] or [%]			<ul style="list-style-type: none"> ● Pulse width, frequency or duty cycle measured by the pulse probe. 	<ul style="list-style-type: none"> ● 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.

NOTE:

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

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DATA MONITOR (SPEC) MODE

=NGEC0034S11

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	○	○	<ul style="list-style-type: none"> Indicates the engine speed computed from the REF signal (180° signal) of the camshaft position sensor. 	
MAS A/F SE-B1 [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the mass air flow sensor specification is displayed. 	<ul style="list-style-type: none"> When engine is running specification range is indicated.
B/FUEL SCHDL [msec]			<ul style="list-style-type: none"> "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction. 	<ul style="list-style-type: none"> When engine is running specification range is indicated.
A/F ALPHA-B1 [%]		○	<ul style="list-style-type: none"> The mean value of the air-fuel ratio feedback correction factor per cycle is indicated. 	<ul style="list-style-type: none"> 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

NGEC0034S07

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Change the amount of fuel injection using CONSULT-II. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Harness and connector Fuel injectors Heated oxygen sensor 1
IGNITION TIMING	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Timing light: Set Retard the ignition timing using CONSULT-II. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Adjust initial ignition timing
IACV-AAC/V OPENING	<ul style="list-style-type: none"> Engine: After warming up, idle the engine. Change the IACV-AAC valve opening percent using CONSULT-II. 	Engine speed changes according to the opening percent.	<ul style="list-style-type: none"> Harness and connector IACV-AAC valve
POWER BALANCE	<ul style="list-style-type: none"> Engine: After warming up, idle the engine. Air conditioner switch "OFF" Shift lever "N" Cut off each injector signal one at a time using CONSULT-II. 	Engine runs rough or dies.	<ul style="list-style-type: none"> Harness and connector Compression Injectors Power transistor Spark plugs Ignition coils
ENG COOLANT TEMP	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Change the engine coolant temperature indication using CONSULT-II. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Harness and connector Engine coolant temperature sensor Fuel injectors
FUEL PUMP RELAY	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> Harness and connector Fuel pump relay
EGRC SOLENOID VALVE	<ul style="list-style-type: none"> Ignition switch: ON Turn EGRC-solenoid valve "ON" and "OFF" using CONSULT-II and listen to operating sound. 	EGRC-solenoid valve makes an operating sound.	<ul style="list-style-type: none"> Harness and connector EGRC-solenoid valve

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

KA24DE

CONSULT-II (Cont'd)

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
PURG VOL CONT/V	<ul style="list-style-type: none"> ● Engine: After warming up, run engine at 1,500 rpm. ● Change the EVAP canister purge volume control valve opening step using CONSULT-II. 	Engine speed changes according to the opening step.	<ul style="list-style-type: none"> ● Harness and connector ● EVAP canister purge volume control valve
FUEL T/TEMP SEN	<ul style="list-style-type: none"> ● Change the fuel tank temperature using CONSULT-II. 		
VENT CONTROL/V	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Turn solenoid valve "ON" and "OFF" using CONSULT-II and listen to operating sound. 	Solenoid valve makes an operating sound.	<ul style="list-style-type: none"> ● Harness and connector ● Solenoid valve
VC/V BYPASS/V	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Turn solenoid valve "ON" and "OFF" using CONSULT-II and listen to operating sound. 	Solenoid valve makes an operating sound.	<ul style="list-style-type: none"> ● Harness and connector ● Solenoid valve

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DTC & SRT CONFIRMATION MODE

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SRT STATUS Mode

NGEC0034S0801

For details, refer to "SYSTEM READINESS TEST (SRT) CODE", EC-75.

SRT Work Support Mode

NGEC0034S0803

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

DTC Work Support Mode

NGEC0034S0802

TEST MODE	TEST ITEM	CONDITION	REFERENCE PAGE
EVAP SYSTEM	PURG FLOW P0441	Refer to corresponding trouble diagnosis for DTC.	EC-339
	EVAP SML LEAK P0442/P1442		EC-350
	EVAP V/S LEAK P0456/P1456		EC-405
	PURG VOL CN/V P1444		EC-512
	VC CUT/V BP/V P1491		EC-546
HO2S1	HO2S1 (B1) P0133		EC-218
	HO2S1 (B1) P0134		EC-229
	HO2S1 (B1) P1143		EC-449
	HO2S1 (B1) P1144		EC-456
HO2S2	HO2S2 (B1) P0139		EC-245
	HO2S2 (B1) P1146	EC-463	
	HO2S2 (B1) P1147	EC-473	
EGR SYSTEM	EGR SYSTEM P0400	EC-308	
	EGRC-BPT/VLV P0402	EC-320	
	EGR SYSTEM P1402	EC-503	

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

NGEC0034S10

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

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

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

Use these triggers as follows:

1) "AUTO TRIG"

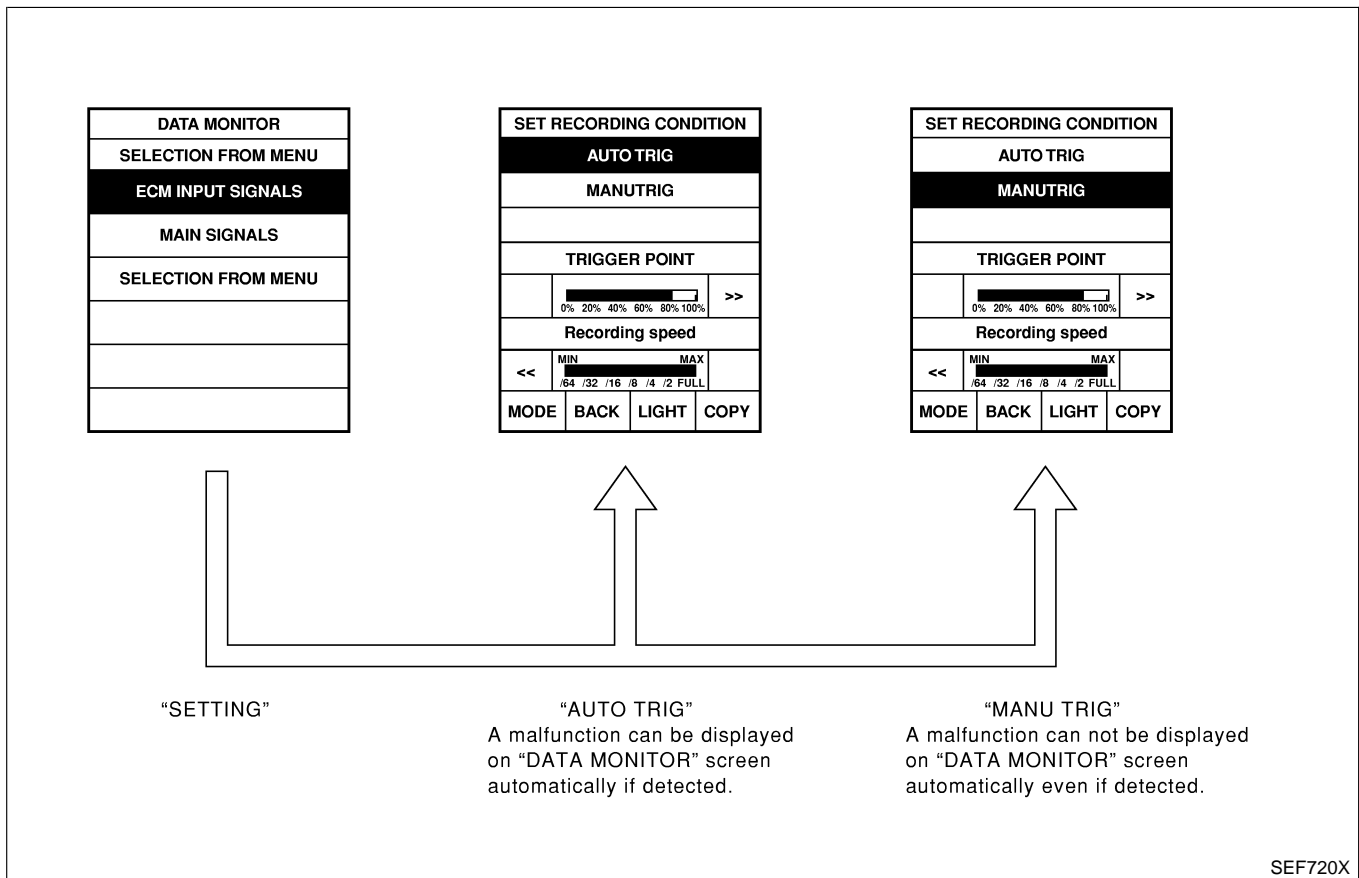
- While trying to detect the DTC/1st trip DTC by performing the "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE", be sure to select to "DATA MONITOR (AUTO TRIG)" mode. You can confirm the malfunction at the moment it is detected.

- While narrowing down the possible causes, CONSULT-II should be set in "DATA MONITOR (AUTO TRIG)" mode, especially in case the incident is intermittent.

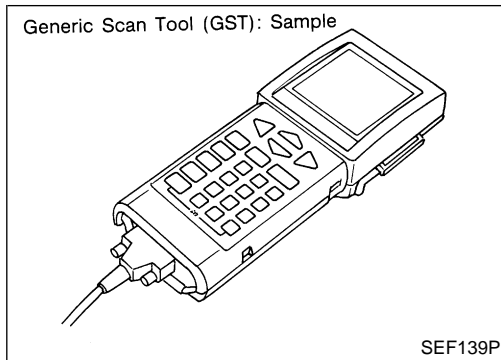
When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE", the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to "Incident Simulation Tests" in "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT", **GI-22**.)

2) "MANU TRIG"

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



Generic Scan Tool (GST)

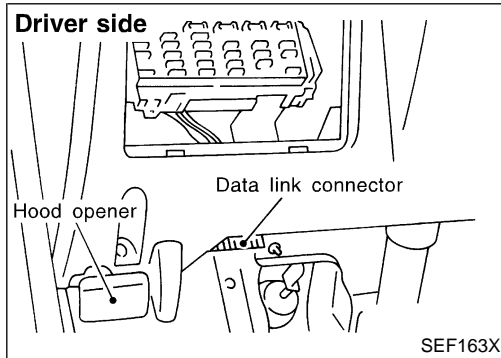


Generic Scan Tool (GST) DESCRIPTION

NGEC0035

NGEC0035S01

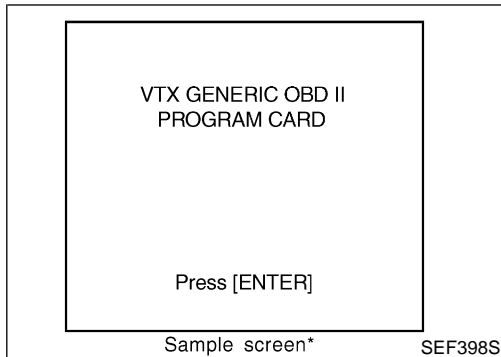
Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 8 different functions explained on the next page. ISO9141 is used as the protocol. The name "GST" or "Generic Scan Tool" is used in this service manual.



GST INSPECTION PROCEDURE

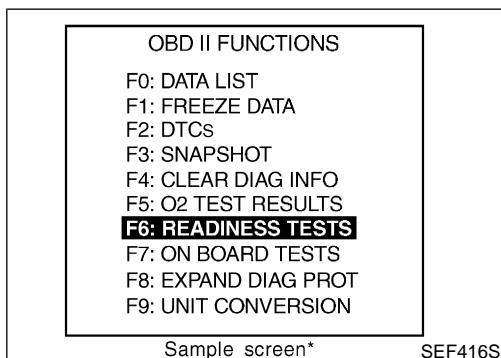
NGEC0035S02

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



3. Turn ignition switch ON.
4. Enter the program according to instruction on the screen or in the operation manual.

(*: Regarding GST screens in this section, sample screens are shown.)



5. Perform each diagnostic mode according to each service procedure.

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

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

KA24DE

Generic Scan Tool (GST) (Cont'd)

FUNCTION

NGEC0035S03

Diagnostic test mode		Function
MODE 1	READINESS TESTS	This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode gains access to emission-related data value which were stored by ECM during the freeze frame. [For details, refer to "Freeze Frame Data" (EC-97).]
MODE 3	DTCs	This mode gains access to emission-related power train trouble codes which were stored by ECM.
MODE 4	CLEAR DIAG INFO	This mode can clear all emission-related diagnostic information. This includes: <ul style="list-style-type: none"> ● Clear number of diagnostic trouble codes (MODE 1) ● Clear diagnostic trouble codes (MODE 3) ● Clear trouble code for freeze frame data (MODE 1) ● Clear freeze frame data (MODE 2) ● Reset status of system monitoring test (MODE 1) ● Clear on board monitoring test results (MODE 6 and 7)
MODE 6	(ON BOARD TESTS)	This mode accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
MODE 7	(ON BOARD TESTS)	This mode enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
MODE 8	—	This mode can close EVAP system in ignition switch "ON" position (Engine stopped). When this mode is performed, the following parts can be opened or closed. <ul style="list-style-type: none"> ● EVAP canister vent control valve open ● Vacuum cut valve bypass valve closed In the following conditions, this mode cannot function. <ul style="list-style-type: none"> ● Low ambient temperature ● Low battery voltage ● Engine running ● Ignition switch OFF ● Low fuel temperature ● Too much pressure is applied to EVAP system
MODE 9	(CALIBRATION ID)	This mode is to enable the off-board to request vehicle specific information such as Vehicle Identification Number (VIN) and Calibration ID.

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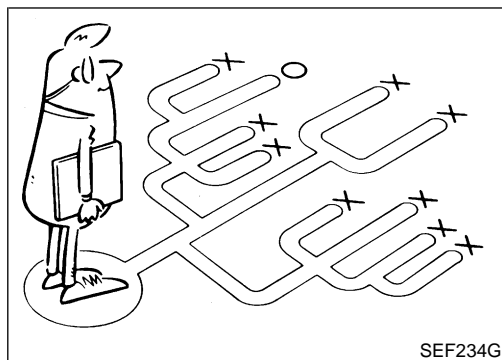
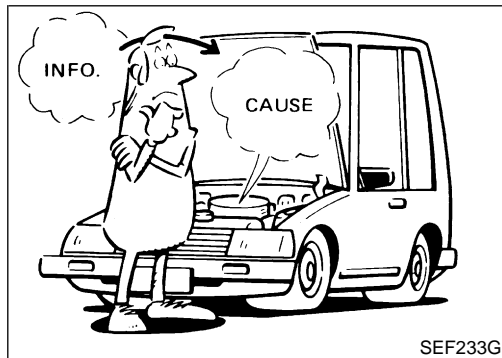
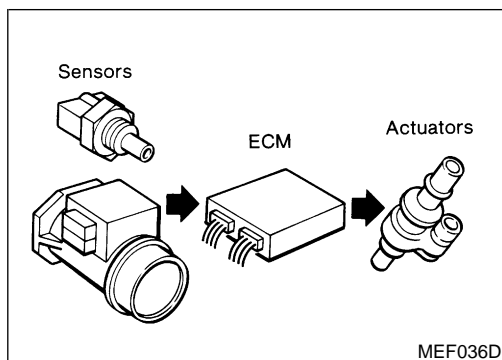
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KEY POINTS

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

SEF907L

Introduction

NGEC0036

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

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

A visual check only may not find the cause of the problems. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the "Work Flow" on EC-110.

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

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

DIAGNOSTIC WORKSHEET

NGEC0036S01

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

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

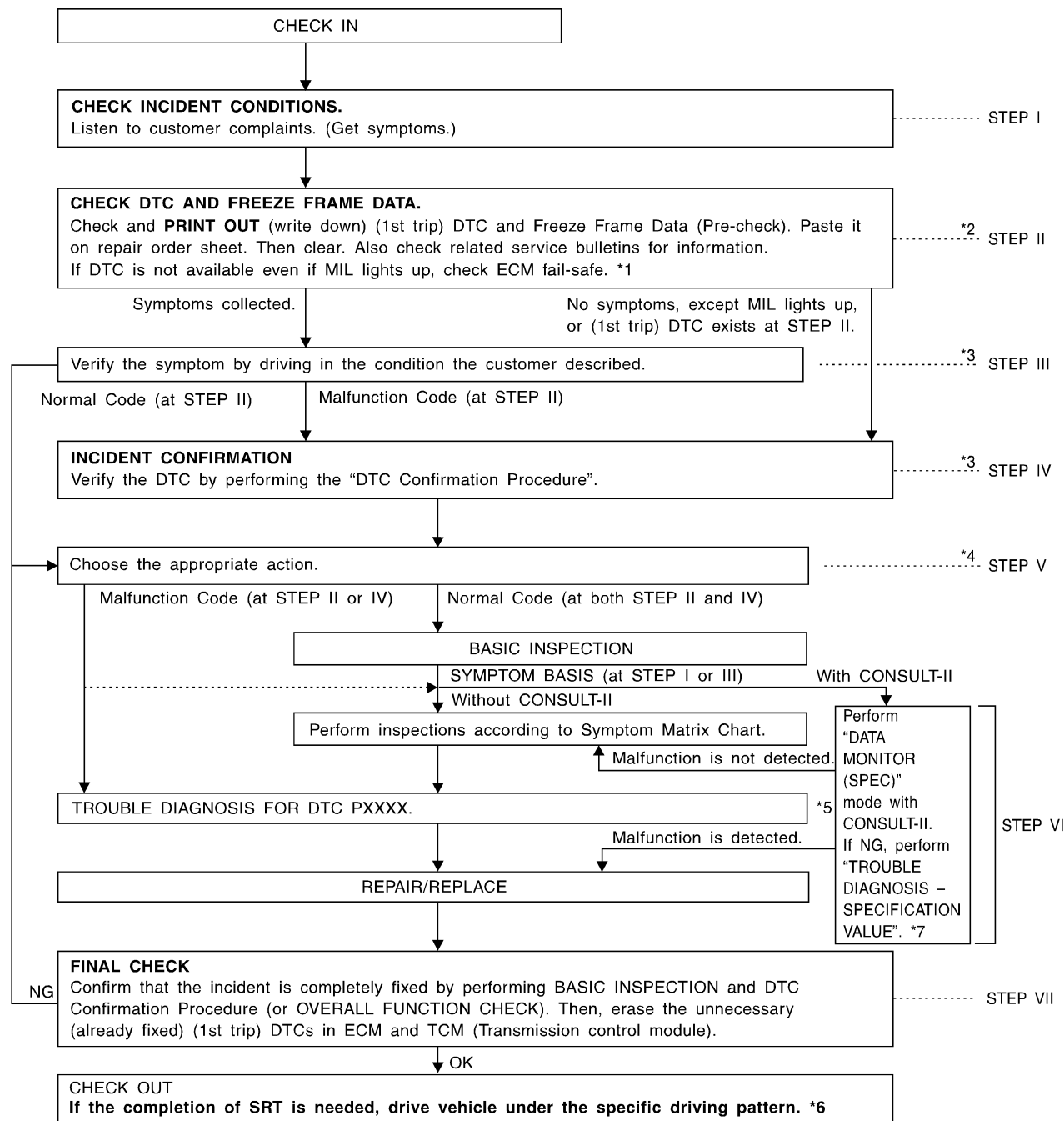
Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.

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

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

Work Flow

NGEC0037



SEF510ZF

*1: EC-127

*2: If time data of "SELF-DIAG RESULTS" is other than "0" or "1" refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT", EC-150.

*3: If the incident cannot be duplicated, refer to "TROUBLE

DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.

*4: If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to "TROUBLE DIAGNOSIS FOR POWER SUPPLY", EC-151.

*5: If the malfunctioning part cannot be found, refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.

*6: EC-81

*7: EC-146

TROUBLE DIAGNOSIS — INTRODUCTION

KA24DE

Work Flow (Cont'd)

DESCRIPTION FOR WORK FLOW

NGEC0037S01

STEP	DESCRIPTION	
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET", EC-109.	GI
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II or Generic Scan Tool) the (1st trip) Diagnostic Trouble Code (DTC) and the (1st trip) freeze frame data, then erase the code and the data. (Refer to EC-86.) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV. Study the relationship between the cause, specified by (1st trip) DTC, and the symptom described by the customer. (The "Symptom Matrix Chart" will be useful. See EC-128.) Also check related service bulletins for information.	MA EM LC
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 "Incident Simulation Tests", GI-23 . If the malfunction code is detected, skip STEP IV and perform STEP V.	EC FE
STEP IV	Try to detect the (1st trip) Diagnostic Trouble Code by driving in (or performing) the "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE". Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT-II or Generic Scan Tool. During the (1st trip) DTC verification, be sure to connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform "Incident Simulation Tests", GI-23 . In case the "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" is not available, perform the "OVERALL FUNCTION CHECK" instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified "check" is an effective alternative. The "NG" result of the "OVERALL FUNCTION CHECK" is the same as the (1st trip) DTC detection.	CL MT AT
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-112.) If CONSULT-II is available, perform "DATA MONITOR (SPEC)" mode with CONSULT-II and proceed to the "TROUBLE DIAGNOSIS — SPECIFICATION VALUE", EC-146. (If malfunction is detected, proceed to "REPAIR/REPLACE".) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-128.)	TF PD
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-137. 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 "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT", "Circuit Inspection", GI-25 . Repair or replace the malfunction parts.	AX SU BR
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 "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" and confirm the normal code [Diagnostic trouble code No. P0000] is detected. If the incident is still detected in the final check, perform STEP VI by using a different method from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM. (Refer to EC-86.)	ST RS BT

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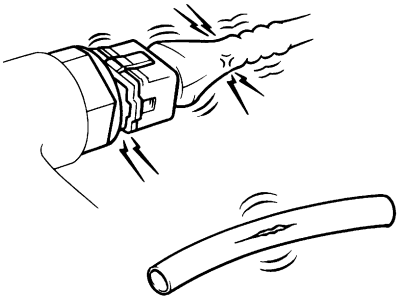
Basic Inspection

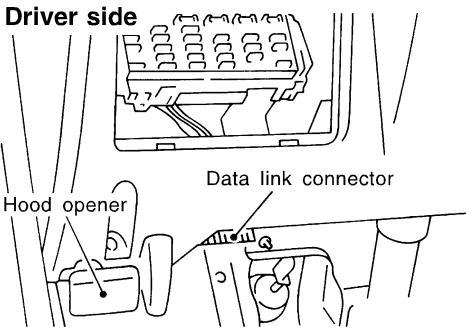
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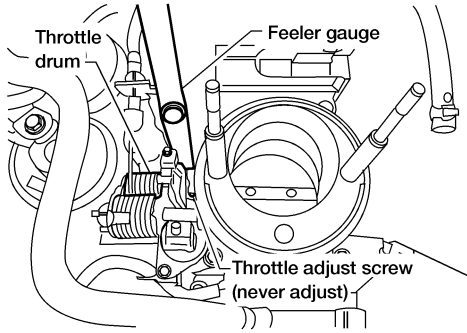
Precaution:


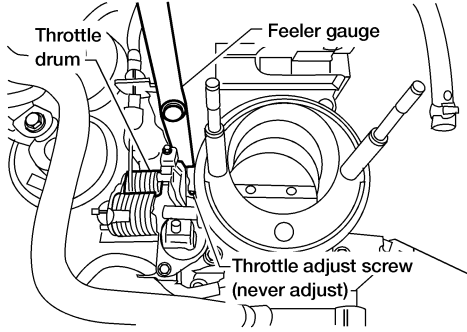
Perform Basic Inspection without electrical or mechanical loads applied;

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

1	INSPECTION START	<p>1. Check service records for any recent repairs that may indicate a related problem, or the current need for scheduled maintenance.</p> <p>2. Open engine hood and check the following:</p> <ul style="list-style-type: none"> ● Harness connectors for improper connections ● Vacuum hoses for splits, kinks, or improper connections ● Wiring for improper connections, pinches, or cuts
		
SEF142I		
With CONSULT-II		▶ GO TO 2.
With GST		▶ GO TO 4.
No tools		▶ GO TO 5.

2	CONNECT CONSULT-II TO THE VEHICLE	<p>Connect "CONSULT-II" to the data link connector and select "ENGINE" from the menu. Refer to EC-94.</p>
		
SEF163X		
		▶ GO TO 3.

3	CHECK FI CAM FUNCTION	<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Adjust accelerator wire. Refer to “Adjust Accelerator Wire”, FE-3. 2. Warm up engine to 75°C (167°F). 3. Stop engine and wait at least 5 seconds, then turn ignition switch ON. 4. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II. 5. When the engine coolant temp is 75 to 85°C (167 to 185°F), confirm the clearance is less than 0.05mm (0.002in), between stopper and throttle drum as shown in the figure. <div style="text-align: center;">  <p style="text-align: right;">AEC871A</p> </div> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 6.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td> <ol style="list-style-type: none"> 1. Replace throttle body assembly. Refer to “OUTER COMPONENT PARTS”, EM-12. 2. GO TO 6. </td> </tr> </table>	OK	▶	GO TO 6.	NG	▶	<ol style="list-style-type: none"> 1. Replace throttle body assembly. Refer to “OUTER COMPONENT PARTS”, EM-12. 2. GO TO 6.
OK	▶	GO TO 6.						
NG	▶	<ol style="list-style-type: none"> 1. Replace throttle body assembly. Refer to “OUTER COMPONENT PARTS”, EM-12. 2. GO TO 6. 						

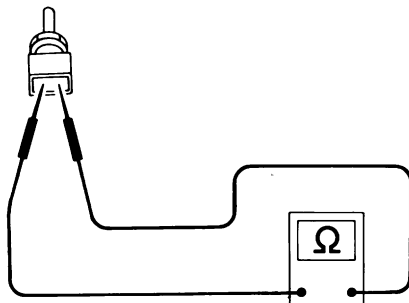
4	CHECK FI CAM FUNCTION	<p> With GST</p> <ol style="list-style-type: none"> 1. Adjust accelerator wire. Refer to “Adjust Accelerator Wire”, FE-3. 2. Warm up engine to 75°C (167°F). 3. Stop engine and wait at least 10 seconds, then turn ignition switch ON. 4. Select “MODE 1” with GST. 5. When the engine coolant temp is 75 to 85°C (167 to 185°F), confirm the clearance is less than 0.05mm (0.002in), between stopper and throttle drum as shown in the figure. <div style="text-align: center;">  <p style="text-align: right;">AEC871A</p> </div> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK (With CONSULT-II)</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 6.</td> </tr> <tr> <td>OK (Without CONSULT-II)</td> <td style="text-align: center;">▶</td> <td>GO TO 14.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td> <ol style="list-style-type: none"> 1. Replace throttle body assembly. Refer to “OUTER COMPONENT PARTS”, EM-12. 2. With CONSULT-II: GO TO 6. Without CONSULT-II: GO TO 14. </td> </tr> </table>	OK (With CONSULT-II)	▶	GO TO 6.	OK (Without CONSULT-II)	▶	GO TO 14.	NG	▶	<ol style="list-style-type: none"> 1. Replace throttle body assembly. Refer to “OUTER COMPONENT PARTS”, EM-12. 2. With CONSULT-II: GO TO 6. Without CONSULT-II: GO TO 14.
OK (With CONSULT-II)	▶	GO TO 6.									
OK (Without CONSULT-II)	▶	GO TO 14.									
NG	▶	<ol style="list-style-type: none"> 1. Replace throttle body assembly. Refer to “OUTER COMPONENT PARTS”, EM-12. 2. With CONSULT-II: GO TO 6. Without CONSULT-II: GO TO 14. 									

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5 CHECK FI CAM FUNCTION

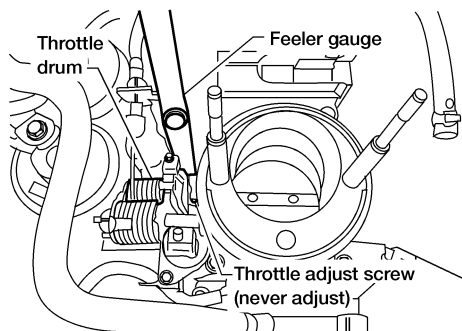
NO TOOLS

1. Adjust accelerator wire. Refer to "Adjust Accelerator Wire", **FE-3**.
2. Disconnect engine coolant temperature sensor harness connector and check resistance as shown in the figure.



SEF536H

3. Warm up engine until the resistance of coolant temperature sensor is 0.26 to 0.39 kΩ.
4. Turn ignition switch OFF.
5. When engine coolant temperature is 75 to 85°C (167 to 185°F), with the voltage between 1.10 to 1.36V, make sure that the clearance is less than 0.05 mm (0.002 in), between stopper and throttle adjusting screw as shown in the figure.



AEC871A

OK or NG

OK	▶	GO TO 14.
NG	▶	<ol style="list-style-type: none"> 1. Replace throttle body assembly. Refer to "OUTER COMPONENT PARTS", EM-12. 2. GO TO 14.

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6 CHECK IGNITION TIMING

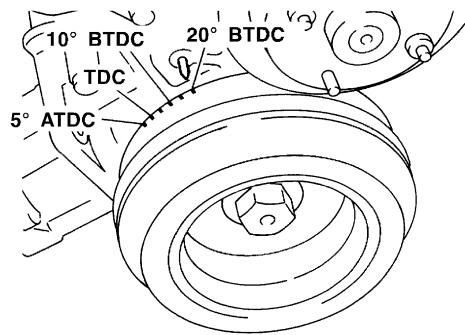
Ⓜ With CONSULT-II

1. Warm up engine to normal operating temperature.
2. Select "IGNITION TIMING ADJ" in "WORK SUPPORT" mode.
3. Touch "START".

IGNITION TIMING ADJ

IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING START. AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CAMSHAFT POSITION SENSOR.

4. Check ignition timing at idle using timing light.



PEF546N

SEF320V

Ignition timing:
MT: 20°±2° BTDC

OK or NG

OK	▶	GO TO 7.
NG	▶	1. Adjust ignition timing by turning distributor. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-59. 2. GO TO 7.

Basic Inspection (Cont'd)

7	CHECK BASE IDLE SPEED																							
<p>Ⓜ With CONSULT-II</p> <p>1. Select "IGNITION TIMING ADJ" in "WORK SUPPORT" mode and touch "START".</p>																								
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><td colspan="2" style="text-align: center;">IACV-AAC/V ADJ</td></tr> <tr><td colspan="2" style="text-align: center;">ADJ MONITOR</td></tr> <tr><td style="text-align: center;">ENG SPEED</td><td style="text-align: center;">700 rpm</td></tr> <tr><td colspan="2" style="text-align: center;">CONDITION SETTING</td></tr> <tr><td style="text-align: center;">IACV-ACC/V</td><td style="text-align: center;">FIXED</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td colspan="2" style="text-align: center;">MONITOR</td></tr> <tr><td style="text-align: center;">COOLAN TEMP/S</td><td style="text-align: center;">XXX°C</td></tr> <tr><td style="text-align: center;">CLSD THL POS</td><td style="text-align: center;">XXX N</td></tr> <tr><td> </td><td> </td></tr> </table>			IACV-AAC/V ADJ		ADJ MONITOR		ENG SPEED	700 rpm	CONDITION SETTING		IACV-ACC/V	FIXED					MONITOR		COOLAN TEMP/S	XXX°C	CLSD THL POS	XXX N		
IACV-AAC/V ADJ																								
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IACV-ACC/V	FIXED																							
MONITOR																								
COOLAN TEMP/S	XXX°C																							
CLSD THL POS	XXX N																							
<p>2. Check idle speed. MT: 750±50 rpm</p>																								
SEF714Z																								
OK or NG																								
OK	▶	GO TO 8.																						
NG	▶	1. Adjust base idle speed by turning idle speed adjusting screw. Refer to "Idle Speed/ Ignition Timing/Idle Mixture Ratio Adjustment", EC-59. 2. GO TO 8.																						

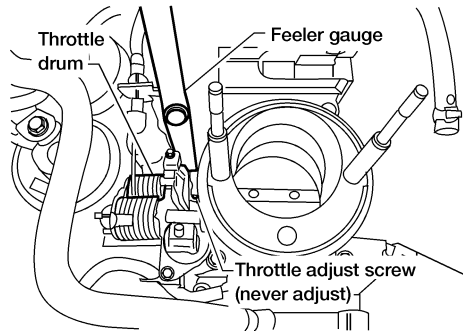
8 CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION (CHECK THROTTLE POSITION SENSOR IDLE POSITION)

 With CONSULT-II

NOTE:

Always check ignition timing and base idle speed before performing the following.

1. Warm up engine to normal operating temperature.
2. Check FI cam. Refer to procedure 3.
3. Stop engine.
4. Turn ignition switch ON.
5. Select "DATA MONITOR" mode with CONSULT-II.
6. Select "CLSD THL/P SW" from the menu.
7. Read "CLSD THL/P SW" signal under the following conditions.
 - Insert a 0.1 mm (0.004 in) and 0.3 mm (0.012 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure and check the signal.



AEC871A

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
CLSD THL/P SW	ON

SEF197Y

"CLSD THL/P SW" signal should remain "ON" while inserting 0.1 mm (0.004 in) feeler gauge.
 "CLSD THL/P SW" signal should remain "OFF" while inserting 0.3 mm (0.012 in) feeler gauge.

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 9.

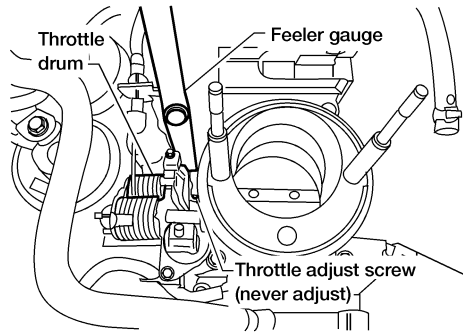
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9 ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-1

With CONSULT-II

NOTE:

- **Never adjust throttle adjust screw (TAS).**
 - **Do not touch throttle drum when checking “CLSD THL/P SW” signal.**
Doing so may cause an incorrect adjustment.
1. Warm engine up to normal operating temperature.
 2. Check FI cam. Refer to procedure 3.
 3. Stop engine.
 4. Loosen throttle position sensor fixing bolts.
 5. Turn ignition switch ON.
 6. Select “CLSD THL/P SW” in “DATA MONITOR” mode.
 7. Insert a 0.1 mm (0.004 in) feeler gauge between throttle adjust screw and throttle drum as shown in the figure.



AEC871A

8. Open throttle valve and then close.
9. Check “CLSD THL/P SW” signal.


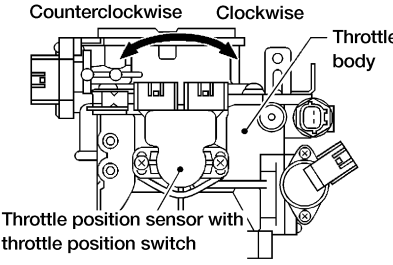
DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
CLSD THL/P SW	ON

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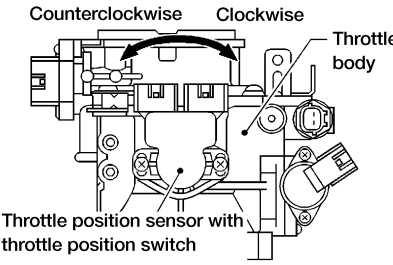
“CLSD THL/P SW” signal should remain “OFF” when the throttle valve is closed.
 If it is impossible to adjust closed throttle position switch, replace throttle position sensor.


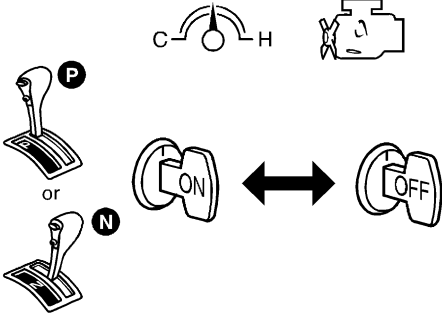
OK or NG


OK	▶	GO TO 11.
NG	▶	GO TO 10.

10	ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-2
<p> With CONSULT-II Turn throttle position sensor body counterclockwise until "CLSD THL/P SW" signal switches to "OFF".</p>	
	
AEC872A	
▶	GO TO 11.

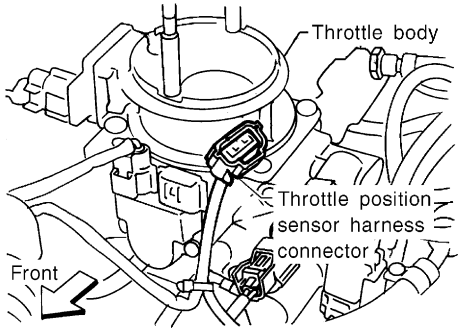
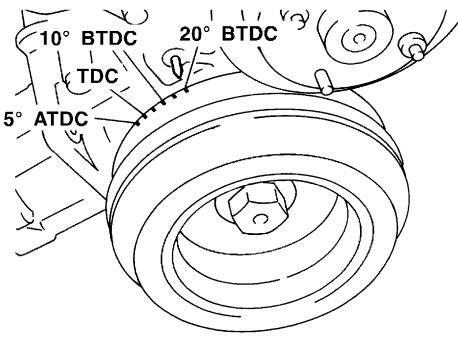
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11	ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-3
<p> With CONSULT-II 1. Temporarily tighten sensor body fixing bolts as follows. ● Gradually move the sensor body clockwise and stop it when "CLSD THL/P SW" signal switches from "OFF" to "ON" when tightening sensor body fixing bolts.</p>	
	
AEC872A	
<p>2. Make sure two or three times that the signal is "ON" when the throttle valve is closed and "OFF" when it is opened. 3. Remove 0.1 mm (0.004 in) feeler gauge then insert 0.3 mm (0.012 in) feeler gauge. 4. Make sure two or three times that the signal remains "OFF" when the throttle valve is closed. 5. Tighten throttle position sensor. 6. Check "CLSD THL/P SW" signal again. The signal remains "OFF" while closing throttle valve.</p>	
OK or NG	
OK	▶ 1. Remove 0.3 mm (0.012 in) feeler gauge. 2. GO TO 12.
NG	▶ GO TO 9.

12	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY						
<p> With CONSULT-II</p> <p>NOTE: Always warm up engine to normal operating temperature. If engine is cool, the throttle position sensor idle position memory will not be reset correctly.</p> <ol style="list-style-type: none"> 1. Start engine. 2. Warm up engine to normal operating temperature. 3. Select "CLSD THL POS" in "DATA MONITOR" mode manual trigger. 4. Stop engine. (Turn ignition switch OFF.) 5. Turn ignition switch ON and wait at least 5 seconds. <div style="text-align: center; margin: 10px 0;">  </div> <ol style="list-style-type: none"> 6. Turn ignition switch OFF and wait at least 5 seconds. 7. Repeat steps 5 and 6 until "CLSD THL POS" in "DATA MONITOR" mode with CONSULT-II changes to "ON". <div style="text-align: right; margin-top: 10px;">SEF864V</div>							
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITORING</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>CLSD THL/P SW</td> <td>ON</td> </tr> </tbody> </table> <div style="text-align: right; margin-top: 10px;">SEF715Z</div>		DATA MONITOR		MONITORING	NO DTC	CLSD THL/P SW	ON
DATA MONITOR							
MONITORING	NO DTC						
CLSD THL/P SW	ON						
▶	GO TO 13.						

13	CHECK TARGET IDLE SPEED
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Select "ENG SPEED" in "DATA MONITOR" mode. 3. Check idle speed. MT: 800±50 rpm <p style="text-align: center; margin: 10px 0;">OK or NG</p>	
OK	▶ INSPECTION END
NG	▶ Adjust idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-59. Inspection end after adjust idle speed.

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14	CHECK IGNITION TIMING
<p>⊗ Without CONSULT-II</p> <p>1. Warm up engine to normal operating temperature. 2. Stop engine and disconnect throttle position sensor harness connector.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF265S</p> <p>3. Start engine. 4. Rev engine (2,000 to 3,000 rpm) two or three times under no-load and then run engine at idle speed. 5. Check ignition timing at idle using timing light.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF320V</p> <p>Ignition timing: MT: 20°±2° BTDC</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 15.
NG	▶ 1. Adjust ignition timing by turning distributor. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-59. 2. GO TO 15.

15	CHECK BASE IDLE SPEED
<p>⊗ Without CONSULT-II</p> <p>Make sure that engine speed falls to the following speed. MT: 750±50 rpm</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 16.
NG	▶ 1. Adjust base idle speed by turning idle speed adjusting screw. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-59. 2. GO TO 16.

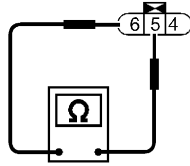
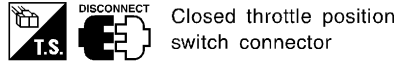
16	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION (CHECK THROTTLE POSITION SENSOR IDLE POSITION)
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Without CONSULT-II

NOTE:

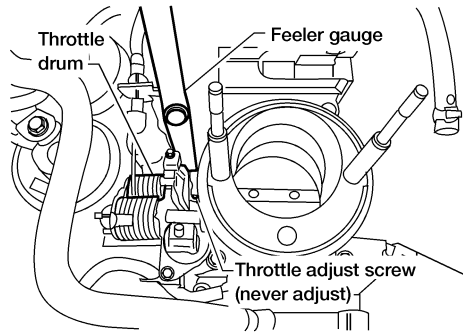
Always check ignition timing and base idle speed before performing the following.

1. Warm up engine to normal operating temperature.
2. Check FI cam. Refer to procedure 5.
3. Stop engine.
4. Disconnect closed throttle position switch harness connector .
5. Connect the tester probe to closed throttle position switch terminals 5 and 6.
6. Check harness continuity under the following conditions.



SEF862V

- Insert the 0.1 mm (0.004 in) and 0.3 mm (0.012 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure.



AEC871A

“Continuity should exist” while inserting 0.1 mm (0.004 in) feeler gauge.
“Continuity should not exist” while inserting 0.3 mm (0.012 in) feeler gauge.

OK or NG

OK	▶	GO TO 20.
NG	▶	GO TO 17.

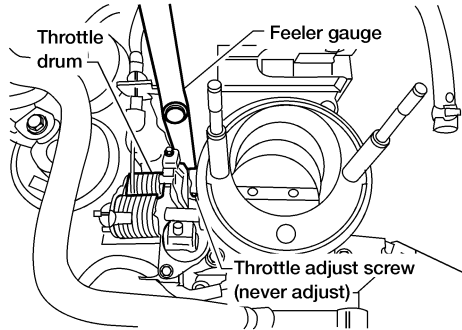
17 ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-1

⊗ Without CONSULT-II

NOTE:

- Never adjust throttle adjust screw (TAS).
- Do not touch throttle drum when checking "continuity".
Doing so may cause an incorrect adjustment.

1. Warm engine up to normal operating temperature.
2. Check FI cam. Refer to procedure 5.
3. Stop engine.
4. Loosen throttle position sensor fixing bolts.
5. Disconnect closed throttle position sensor harness connector.
6. Insert 0.1 mm (0.004 in) feeler gauge between the throttle adjust screw and throttle drum as shown in the figure.

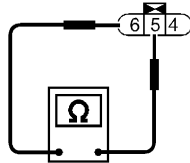


AEC871A

7. Open throttle valve then close.
8. Check continuity between closed throttle position switch terminal 5 and 6.



Closed throttle position switch connector



SEF862V

The continuity should not exist while closing the throttle position sensor body.
If it is impossible to adjust closed throttle position switch, replace throttle position sensor.

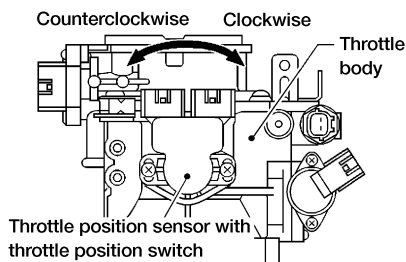
OK or NG

OK	▶	GO TO 19.
NG	▶	GO TO 18.

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18 ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-2**⊗ Without CONSULT-II**

Turn throttle position sensor body counterclockwise until continuity does not exist.



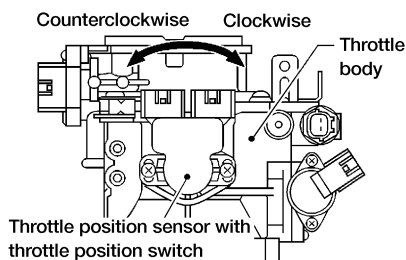
AEC872A

▶ GO TO 19.

19 ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-3**⊗ Without CONSULT-II**

1. Temporarily tighten sensor body fixing bolts as follows.

- Gradually move the sensor body clockwise and stop it when the continuity comes to exist, then tighten sensor body fixing bolts.



AEC872A

2. Make sure two or three times that the continuity exists when the throttle valve is closed and continuity does not exist when it is opened.
3. Remove 0.1 mm (0.004 in) feeler gauge then insert 0.3 mm (0.012 in) feeler gauge.
4. Make sure two or three times that continuity does not exist when the throttle valve is closed.
5. Tighten throttle position sensor.
6. Check the continuity again.

Continuity does not exist while closing the throttle valve.

OK or NG

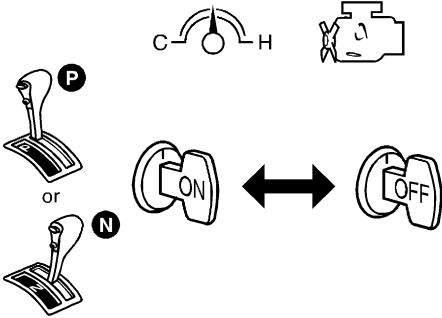
OK ▶ GO TO 20.

NG ▶ GO TO 17.

20 REINSTALLATION**⊗ Without CONSULT-II**

1. Remove 0.3 mm (0.012 in) feeler gauge.
2. Reconnect throttle position sensor harness connector and closed throttle position switch harness connector.
3. Rev engine (2,000 to 3,000 rpm) two or three times under no-load and then run engine at idle speed.

▶ GO TO 21.

21	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY
<p>⊗ Without CONSULT-II</p> <p>NOTE: Always warm up engine to normal operating temperature. If engine is cool, the throttle position sensor idle position memory will not be reset correctly.</p> <ol style="list-style-type: none"> 1. Start engine. 2. Warm up engine to normal operating temperature. 3. Stop engine. (Turn ignition switch "OFF".) 4. Turn ignition switch "ON" and wait at least 5 seconds. <div style="text-align: center; margin: 10px 0;">  </div> <ol style="list-style-type: none"> 5. Turn ignition switch "OFF" and wait at least 5 seconds. 6. Repeat steps 4 and 5, 20 times. 	
SEF864V	
▶	GO TO 22.

22	CHECK TARGET IDLE SPEED
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. MT: 800±50 rpm <p style="text-align: center; margin: 10px 0;">OK or NG</p>	
OK	▶ GO TO 23.
NG	▶ <ol style="list-style-type: none"> 1. Adjust target idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-59. 2. GO TO 23.

23	ERASE UNNECESSARY DTC
<p>After this inspection, unnecessary DTC No. might be displayed. Erase the stored memory in ECM and TCM. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", (EC-86) .</p>	
▶	INSPECTION END

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DTC Inspection Priority Chart

NGEC0039

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

Priority	Detected items (DTC)
1	<ul style="list-style-type: none"> ● P0101, P0102, P0103 MAF sensor ● P0112, P0113, P0127 IAT sensor ● P0117, P0118, P0125 ECT sensor ● P0121, P0122, P0123 TP sensor ● P0128 Thermostat function ● P0181, P0182, P0183 FTT sensor ● P0327, P0328 KS ● P0340 CMP sensor ● P0460, P0461, P0462, P0463, P1464 Fuel level sensor ● P0500 VSS ● P0605 ECM ● P1400 EGRC-solenoid valve ● P1706 PNP switch
2	<ul style="list-style-type: none"> ● P0031, P0032 HO2S1 heater ● P0037, P0038 HO2S2 heater ● P0107, P0108 Absolute pressure sensor ● P0132, P0133, P0134, P1143, P1144 HO2S1 ● P0138, P0139, P1146, P1147 HO2S2 ● P0335, P1336 CKP sensor ● P0405, P0406 EGRT sensor ● P0441 EVAP control system purge flow monitoring ● P0444, P0445, P1444 EVAP canister purge volume control solenoid valve ● P0447, P1446, P1448 EVAP canister vent control valve ● P0452, P0453 EVAP control system pressure sensor ● P0510 CTP switch ● P1490, P1491 Vacuum cut valve bypass valve
3	<ul style="list-style-type: none"> ● P0171, P0172 Fuel injection system function ● P0300 — P0304 Misfire ● P0400, P1402 EGR function ● P0402 EGRC-BPT valve ● P0420 Three way catalyst function ● P0442, P0455, P0456, P1456 EVAP control system ● P0505 ISC system ● P1148 Closed loop control

Fail-safe Chart

=NGEC0040

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

DTC No.	Detected items	Engine operating condition in fail-safe mode	
CONSULT-II GST			
P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.	
P0112 P0113	Intake air temperature sensor	The ECM functions on the assumption that the intake air temperature is 25°C (77°F).	
P0117 P0118	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch to 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 to 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)
P0122 P0123	Throttle position sensor circuit	Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.	
		Condition	Driving condition
		When engine is idling	Normal
		When accelerating	Poor acceleration
Unable to access ECM	ECM	ECM fail-safe activating condition The computing function of the ECM was judged to be malfunctioning. When the fail-safe system activates (i.e., if the ECM detects a malfunction condition in the CPU of ECM), the MIL on the instrument panel lights to warn the driver. However it is not possible to access ECM and DTC cannot be confirmed.	
		Engine control with fail-safe When ECM fail-safe is operating, fuel injection, ignition timing, fuel pump operation and IACV-AAC valve operation are controlled under certain limitations.	
		ECM fail-safe operation	
		Engine speed	Engine speed will not rise more than 3,000 rpm
		Fuel injection	Simultaneous multiport fuel injection system
		Ignition timing	Ignition timing is fixed at the preset valve
		Fuel pump	Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls
		IACV-AAC valve	Full open
		Replace ECM, if ECM fail-safe condition is confirmed.	

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

KA24DE

Symptom Matrix Chart

Symptom Matrix Chart SYSTEM — ENGINE CONTROL SYSTEM

NGEC0041

NGEC0041S01

		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	OVERHEAT/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-580
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-58
	Injector circuit	1	1	2	3	2		2	2			2			EC-571
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-40
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-55
	Incorrect idle speed adjustment	3	3				1	1	1	1		1			EC-59
	IACV-AAC valve circuit	1	1	2	3	3	2	2	2	2		2		2	EC-434
	IACV-FICD solenoid valve circuit	2	2	3	3	3	3	3	3	3		3			EC-592
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-59
	Ignition circuit	1	1	2	2	2		2	2			2			EC-562
EGR	EGRC-solenoid valve circuit		2	2	3	3						3			EC-496
	EGR system	2	1	2	3	3	3	2	2	3		3			EC-308, 320, 503
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3		2	EC-151
Air conditioner circuit		2	2	3	3	3	3	3	3	3		3		2	HA-26

1 - 6: The numbers refer to the order of inspection.
(continued on next page)

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

KA24DE

Symptom Matrix Chart (Cont'd)

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Camshaft position sensor circuit	2	2	3	3	3		3	3			3			EC-300
Mass air flow sensor circuit	1	1	2	2	2		2	2			2			EC-168
Heated oxygen sensor 1 (front) circuit		1	2	3	2		2	2			2			EC-229, 449
Engine coolant temperature sensor circuit	1	1	2	3	2	3	2	2	3		2			EC-185, 204
Throttle position sensor circuit		1	2		2	2	2	2	2		2			EC-190
Incorrect throttle position sensor adjustment		3	1		1	1	1	1	1		1			EC-112
Vehicle speed sensor circuit		2	3		3						3			EC-430
Knock sensor circuit			2								3			EC-290
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-447, 127
Start signal circuit	2													EC-576
PNP switch circuit			3		3		3	3			3			EC-556
Power steering oil pressure switch circuit		2					3	3						EC-588

1 - 6: The numbers refer to the order of inspection.
(continued on next page)

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

KA24DE

Symptom Matrix Chart (Cont'd)

SYSTEM — ENGINE MECHANICAL & OTHER

NGEC0041S03

		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												FE-5	
	Fuel piping			5	5	5		5	5			5				
	Vapor lock															
	Valve deposit															
	Poor fuel (Heavy weight gasoline, Low octane)	5		5	5	5		5	5				5			
Air	Air duct		5	5											FE-3	
	Air cleaner															
	Air leakage from air duct (Mass air flow sensor — throttle body)				5	5		5	5	5			5			
	Throttle body, Throttle wire	5				5		5			5					
	Air leakage from intake manifold/Collector/Gasket															
Crank- ing	Battery	1	1	1		1		1	1					1	SC-4	
	Alternator circuit														SC-26	
	Starter circuit	3										1			SC-10	
	Flywheel	6													EM-52	
	PNP switch	4													—	

1 - 6: The numbers refer to the order of inspection.
(continued on next page)

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

KA24DE

Symptom Matrix Chart (Cont'd)

		SYMPTOM												Reference page															
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)														
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA															
Engine	Cylinder head	5	5	5	5	5		5	5			4	5	3	EM-29, EM-44														
	Cylinder head gasket																												
	Cylinder block	6	6	6	6	6		6	6																				
	Piston																												
	Piston ring																												
	Connecting rod																												
	Bearing																												
	Crankshaft																												
Valve mechanism	Timing chain														5		5	5	5	5		5	5				5	3	EM-18, EM-29
	Camshaft																												
	Intake valve																												
	Exhaust valve																												
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5				5		FE-9														
	Three way catalyst																												
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5				5		MA-21, LC-6														
	Oil level (Low)/Filthy oil																												
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5						LC-11														
	Thermostat																												
	Water pump																												
	Water gallery																												
	Coolant level (low)/Contaminated coolant																												

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

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CONSULT-II Reference Value in Data Monitor Mode

NGE0042

Remarks:

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

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

(i.e., Adjust ignition timing with a timing light before monitoring IGN TIMING. Specification data might be displayed even when ignition timing is not adjusted to specification. This IGN TIMING monitors the data calculated by the ECM according to the input signals from the camshaft position sensor and other ignition timing related sensors.)

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

MONITOR ITEM	CONDITION		SPECIFICATION
ENG SPEED	<ul style="list-style-type: none"> ● Tachometer: Connect ● Run engine and compare tachometer indication with the CONSULT-II value. 		Almost the same speed as the CONSULT-II value.
MAS A/F SE-B1	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load 	Idle	0.9 - 1.8V
		2,500 rpm	1.9 - 2.3V
B/FUEL SCHDL	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle	0.8 - 1.2 msec
		2,000 rpm	0.8 - 1.2 msec
A/F ALPHA-B1	<ul style="list-style-type: none"> ● Engine: After warming up 	Maintaining engine speed at 2,000 rpm	50 - 159%
COOLAN TEMP/S	<ul style="list-style-type: none"> ● Engine: After warming up 		More than 70°C (158°F)
HO2S1 (B1)	<ul style="list-style-type: none"> ● Engine: After warming up 	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ↔ RICH Changes more than 5 times during 10 seconds.
HO2S2 (B1)	<ul style="list-style-type: none"> ● Engine: After warming up 	Revving engine from idle to 3,000 rpm quickly	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ↔ RICH
VHCL SPEED SE	<ul style="list-style-type: none"> ● Turn drive wheels and compare speedometer indication with the CONSULT-II value 		Almost the same speed as the CONSULT-II value
BATTERY VOLT	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) 		11 - 14V
THRTL POS SEN	<ul style="list-style-type: none"> ● Engine: After warming up ● Ignition switch: ON (Engine stopped) 	Throttle valve fully closed	0.2 - 0.8V
		Throttle valve fully opened	3.5 - 4.5V
EGR TEMP SEN	<ul style="list-style-type: none"> ● Engine: After warming up 		Less than 4.5V
EVAP SYS PRES	<ul style="list-style-type: none"> ● Ignition switch: ON 		Approx. 3.4V
ABSOL PRES/SE	<ul style="list-style-type: none"> ● Ignition switch: ON 		Approx. 4.4V
START SIGNAL	<ul style="list-style-type: none"> ● Ignition switch: ON → START → ON 		OFF → ON → OFF
CLSD THL POS	<ul style="list-style-type: none"> ● Engine: After warming up ● Ignition switch: ON (Engine stopped) 	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF
CLSD THL/P SW	<ul style="list-style-type: none"> ● Engine: After warming up ● Ignition switch: ON (Engine stopped) 	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

KA24DE

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

MONITOR ITEM	CONDITION	SPECIFICATION
AIR COND SIG	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine 	A/C switch: OFF
		A/C switch: ON (Compressor operates.)
P/N POSI SW	<ul style="list-style-type: none"> ● Ignition switch: ON 	Shift lever: Neutral
		Except above
PW/ST SIGNAL	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine 	Steering wheel in neutral position (forward direction)
		The steering wheel is turned
IGNITION SW	<ul style="list-style-type: none"> ● Ignition switch: ON → OFF → ON 	ON → OFF → ON
INJ PULSE-B1	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,000 rpm
IGN TIMING	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,000 rpm
CAL/LD VALUE	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,500 rpm
ABSOL TH-P/S	<ul style="list-style-type: none"> ● Engine: After warming up, engine stopped ● Ignition switch: ON 	Throttle valve: fully closed
		Throttle valve: fully opened
MASS AIRFLOW	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,500 rpm
IACV-AAC/V	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,000 rpm
PURG VOL C/V	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● No-load 	Idle
		2,000 rpm (More than 200 seconds after starting engine)
AIR COND RLY	<ul style="list-style-type: none"> ● Air conditioner switch: OFF → ON 	OFF → ON
EGRC SOL/V	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		Engine speed: Revving engine from idle to 3,000 rpm quickly.
FUEL PUMP RLY	<ul style="list-style-type: none"> ● Ignition switch is turned to ON (Operates for 5 seconds) ● Engine running and cranking 	ON
	<ul style="list-style-type: none"> ● Except as shown above 	OFF
VC/V BYPASS/V	<ul style="list-style-type: none"> ● Ignition switch: ON 	OFF
VENT CONT/V	<ul style="list-style-type: none"> ● Ignition switch: ON 	OFF

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

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1)	<ul style="list-style-type: none"> ● Engine speed: Below 3,000 rpm (All models) For 6 seconds after engine speed exceeds 3,000 rpm (4WD models only) 	ON
	<ul style="list-style-type: none"> ● Engine speed: Above 3,000 rpm (2WD models) More than 6 seconds after engine speed exceeds 3,000 rpm (4WD models) 	OFF
HO2S2 HTR (B1)	<ul style="list-style-type: none"> ● Engine speed: Idle after driving for 2 minutes at 70 km/h (43 MPH) or more 	ON
	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) 	OFF

Major Sensor Reference Graph in Data Monitor Mode

NGEC0043

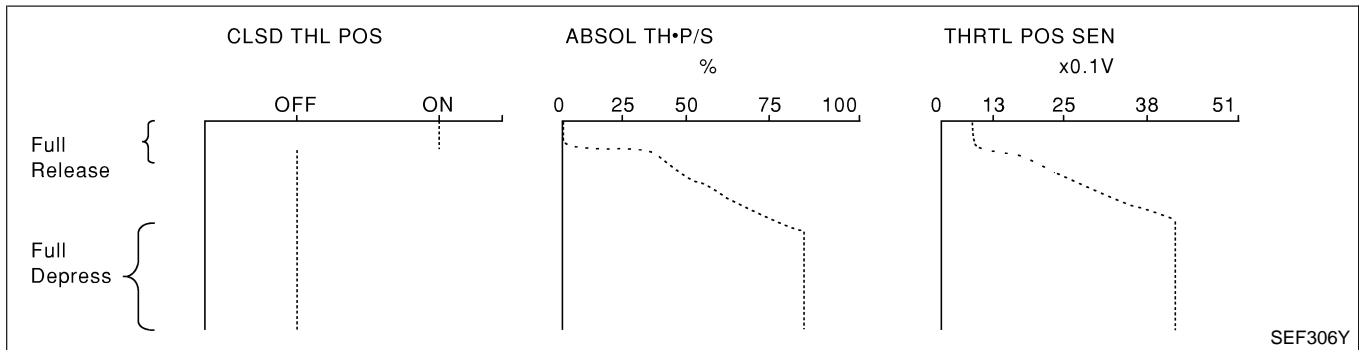
The following are the major sensor reference graphs in "DATA MONITOR" mode.
(Select "MANU TRIG" in "DATA MONITOR" with CONSULT-II. "Trigger Point" is set to 100%, "Recording Speed" is set to MAX..)

THRTL POS SEN, ABSOL TH·P/S, CLSD THL POS

NGEC0043S01

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

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



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

NGEC0043S02

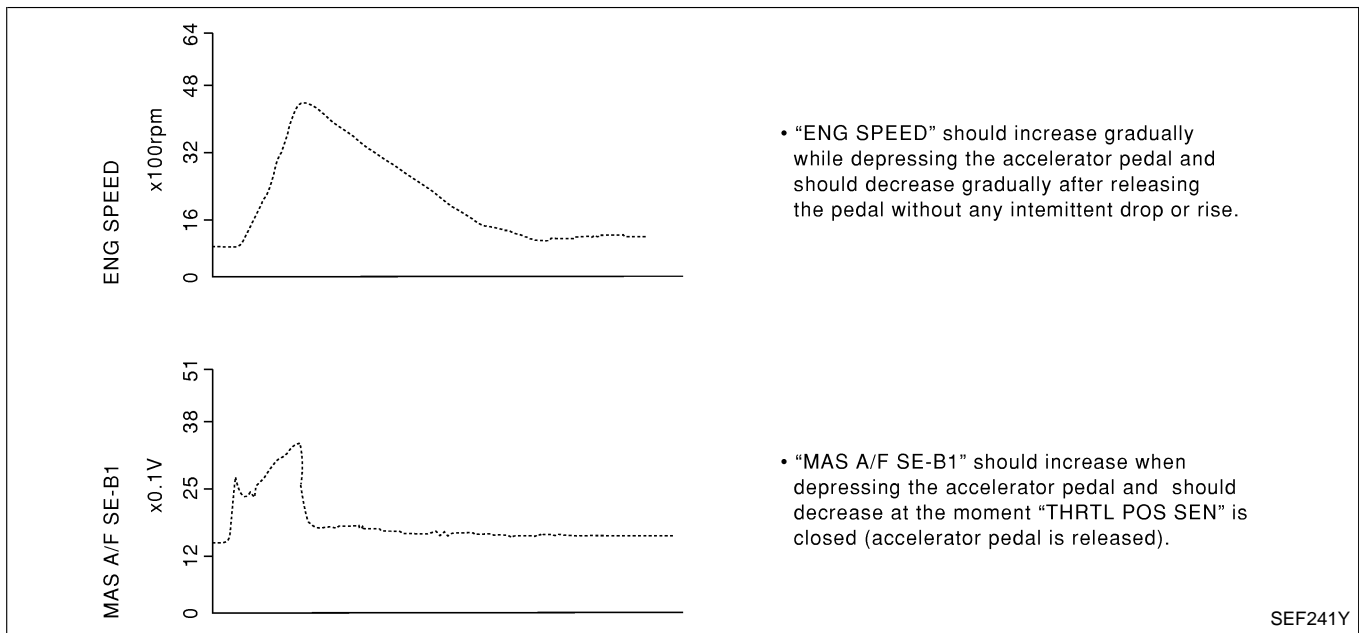
Below is the data for "ENG SPEED", "MAS A/F SE-B1", "THRTL POS SEN", "HO2S2 (B1)", "HO2S1 (B1)" and "INJ PULSE-B1" when revving engine quickly up to 4,800 rpm under no load after warming up engine to normal operating temperature.

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

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

KA24DE

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



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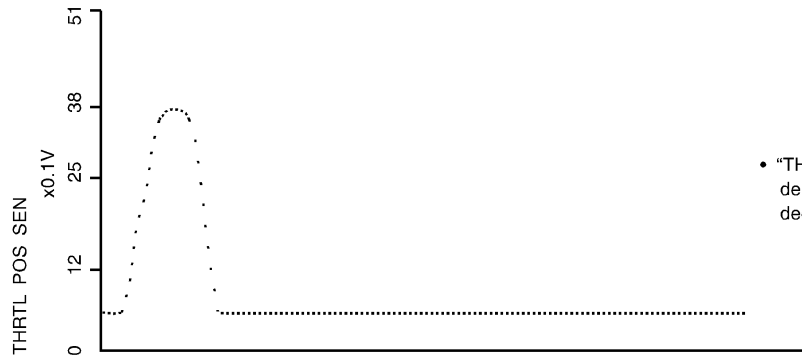
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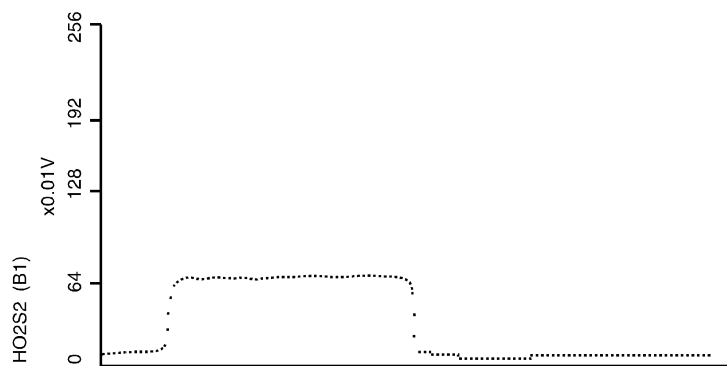
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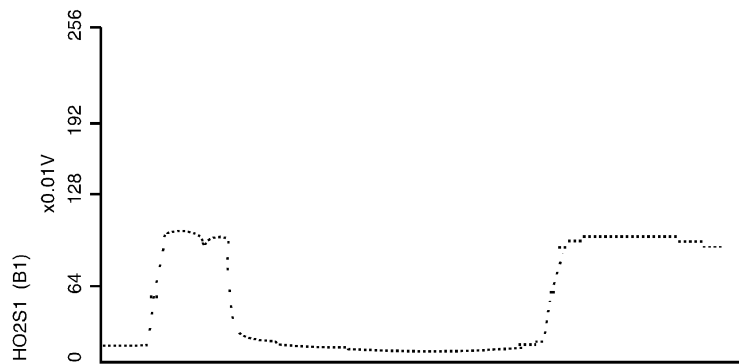
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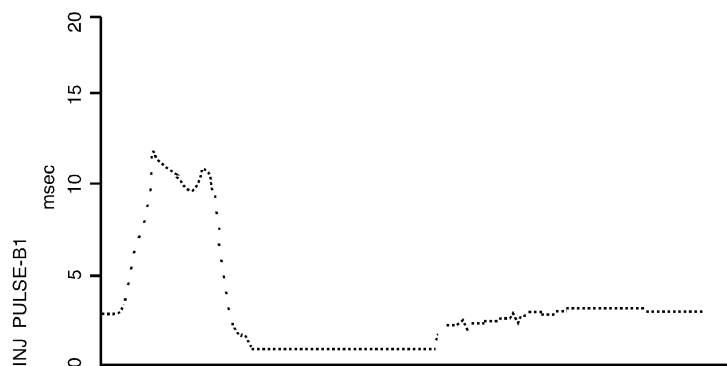
- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



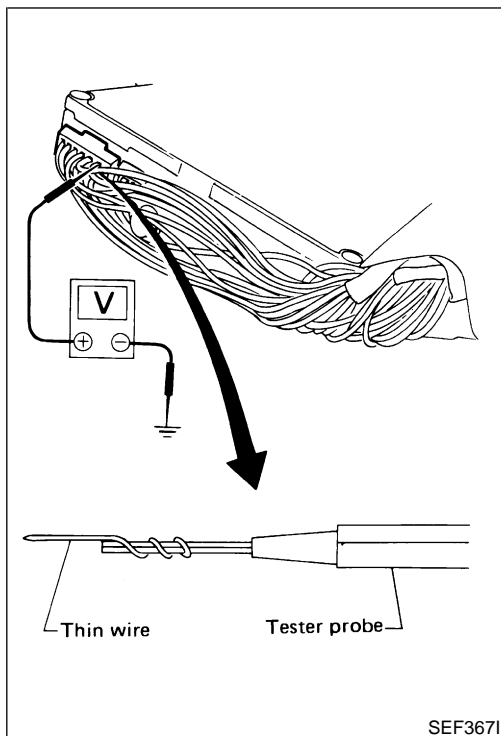
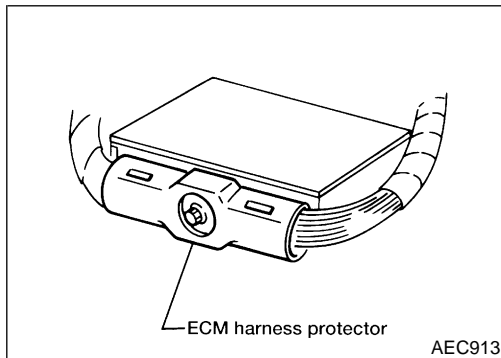
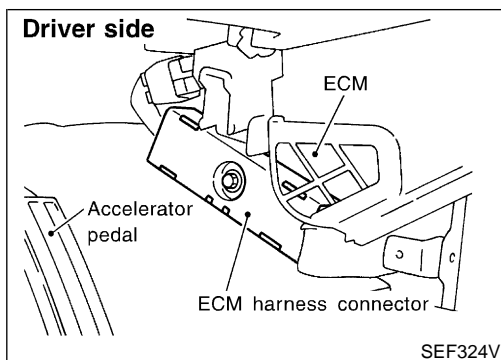
- "HO2S2 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



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



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



ECM Terminals and Reference Value

NGEC0044

PREPARATION

NGEC0044S01

1. ECM is located behind the instrument lower cover. For this inspection:

- Remove instrument lower cover.

2. Remove ECM harness protector.

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

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

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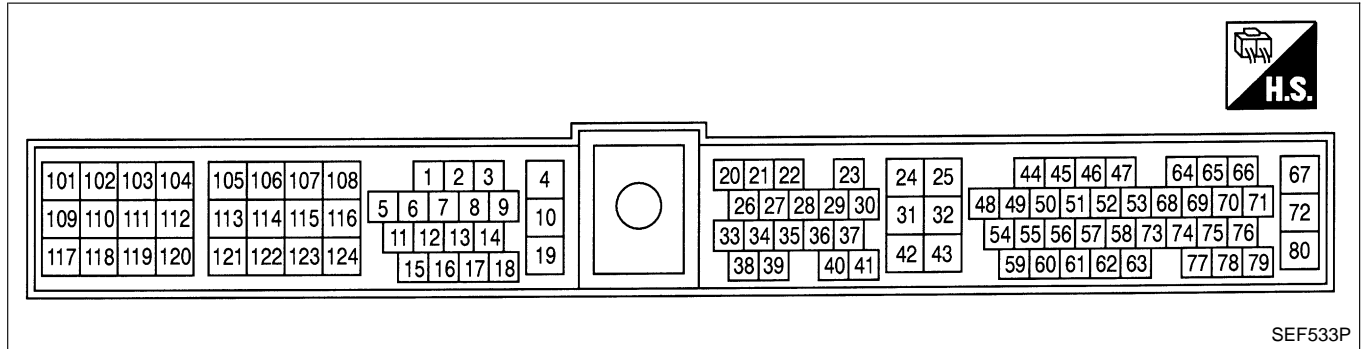
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ECM HARNESS CONNECTOR TERMINAL LAYOUT

NGEC0044S02


ECM INSPECTION TABLE

NGEC0044S03

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

CAUTION:

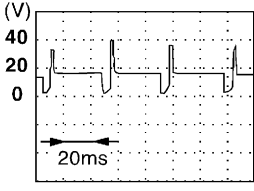
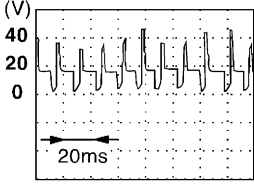
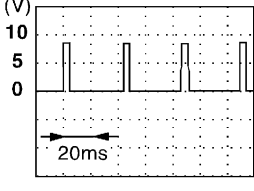
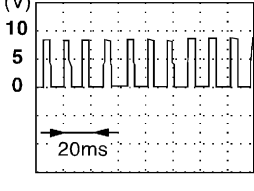
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	PU/W	Ignition signal	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>0 - 0.5V</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	<p>0.2 - 1.0V</p>

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

KA24DE

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	B	Ignition check	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>12 - 14V</p> 
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	<p>12 - 13V</p> 
3	P/L	Tachometer	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>0 - 1V</p> 
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	<p>0.5 - 2V</p> 
4	LG/R	ECM relay (Self shut-off)	<p>[Engine is running] [Ignition switch OFF]</p> <ul style="list-style-type: none"> ● For a few seconds after turning ignition switch OFF 	<p>0 - 1V</p>
			<p>[Ignition switch OFF]</p> <ul style="list-style-type: none"> ● More than a few seconds after turning ignition switch OFF 	<p>BATTERY VOLTAGE (11 - 14V)</p>

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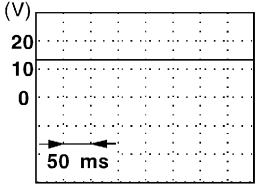
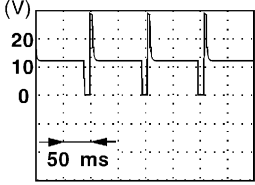
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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

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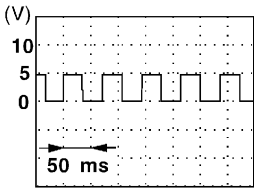
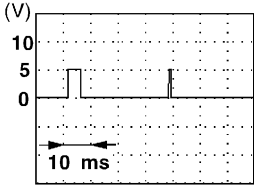
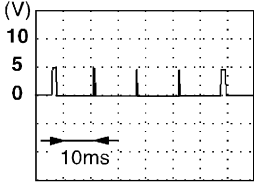
ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	R/Y	EVAP canister purge volume control solenoid valve	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	<p>BATTERY VOLTAGE (11 - 14V)</p> 
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm (More than 200 seconds after starting engine) 	<p>12 - 13V</p> 
10	B/R	ECM ground	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	Engine ground
11	W/R	Fuel pump relay	<p>[Ignition switch ON]</p> <ul style="list-style-type: none"> ● For 5 seconds after turning ignition switch ON. <p>[Engine is running]</p>	0 - 1V
			<p>[Ignition switch ON]</p> <ul style="list-style-type: none"> ● More than 5 seconds after turning ignition switch ON 	BATTERY VOLTAGE (11 - 14V)
12	P	Air conditioner relay	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Both A/C switch and blower switch are ON* *: Any mode except "OFF", ambient air temperature above 10°C (50°F). 	Approximately 0V
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● A/C switch is OFF 	BATTERY VOLTAGE (11 - 14V)
18	R/W	Malfunction indicator lamp	<p>[Ignition switch ON]</p>	0 - 1V
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V)
19	B/R	ECM ground	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	Engine ground
20	L/OR	Start signal	<p>[Ignition switch ON]</p>	Approximately 0V
			<p>[Ignition switch START]</p>	BATTERY VOLTAGE (11 - 14V)
21	G/R	Air conditioner dual-pressure switch	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Both air conditioner switch and blower switch are ON (Compressor operates) 	Approximately 0V
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Air conditioner switch is OFF 	BATTERY VOLTAGE (11 - 14V)
22	L/B	Park/neutral position (PNP) switch	<p>[Ignition switch ON]</p> <ul style="list-style-type: none"> ● Gear position is "Neutral" 	Approximately 0V
			<p>[Ignition switch ON]</p> <ul style="list-style-type: none"> ● Except the above gear position 	Approximately 5V

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

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ECM Terminals and Reference Value (Cont'd)

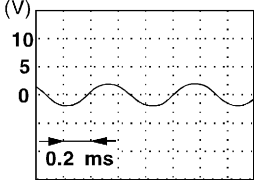
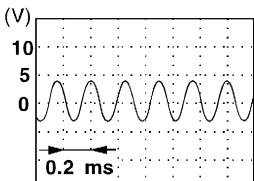
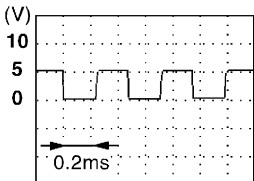
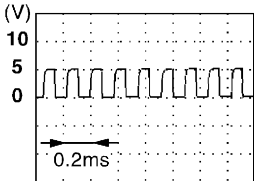
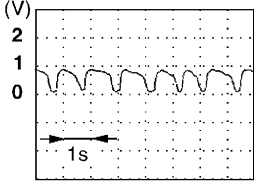
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
23	L	Throttle position sensor	[Ignition switch ON] ● Warm-up condition ● Accelerator pedal fully released	0.2 - 0.8V
			[Ignition switch ON] ● Accelerator pedal fully depressed	3.5 - 4.5V
24	W/G	Ignition switch	[Ignition switch OFF]	0V
			[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
25	B/Y	ECM ground	[Engine is running] ● Idle speed	Engine ground
28	BR/W	Throttle position switch (Closed position)	[Ignition switch ON] ● Warm-up condition ● Accelerator pedal released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch ON] ● Accelerator pedal depressed	Approximately 0V
29	G/B	Vehicle speed sensor	[Engine is running] ● Lift up the vehicle ● In 2nd gear position ● 40 km/h (25 MPH)	1 - 4V 
32	B/Y	ECM ground	[Engine is running] ● Idle speed	Engine ground
39	GY/R	Power steering oil pressure switch	[Engine is running] ● Steering wheel is fully turned	Approximately 0V
			[Engine is running] ● Steering wheel is not turned	Approximately 5V
42	BR	Sensors' power supply	[Ignition switch ON]	Approximately 5V
43	B/W	Sensors' ground	[Engine is running] ● Idle speed	Approximately 0V
44	PU	Camshaft position sen- sor (Reference signal)	[Engine is running] ● Warm-up condition ● Idle speed	0.2 - 0.5V 
			[Engine is running] ● Engine speed is 2,000 rpm	0 - 0.5V 

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

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ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
45	B/R	Absolute pressure sensor	[Ignition switch ON]	Approximately 4.4V
46	OR/B	Fuel level sensor	[Ignition switch ON]	Approximately 0 - 4.8V Output voltage varies with fuel level.
47	L	Crankshaft position sensor (OBD)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V 
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 0V 
49	LG	Camshaft position sensor (Position signal)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 2.6V 
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 2.5 - 2.6V 
50	B	Heated oxygen sensor 1	[Engine is running] ● After warming up to normal operating temperature and engine speed is 2,000 rpm.	0 - Approximately 1.0V 
54	R	Mass air flow sensor	[Engine is running] ● Warm-up condition ● Idle speed	0.9 - 1.8V
			[Engine is running] ● Warm-up condition ● Engine speed is 2,500 rpm	1.8 - 2.3V

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

KA24DE

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	
55	G	Mass air flow sensor ground	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V	GI MA
56	OR	Heated oxygen sensor 2	[Engine is running] ● After warming up to normal operating temperature and revving engine from idle to 3,000 rpm quickly	0 - Approximately 1.0V	EM
59	LG/R	Engine coolant temperature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature	LC EC
60	Y/B	Fuel tank temperature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with fuel temperature	FE
61	PU/R	Intake air temperature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with intake air temperature	CL
62	Y	EVAP control system pressure sensor	[Ignition switch ON]	Approximately 3.4V	MT
63	G/OR	EGR temperature sensor	[Engine is running] ● Warm-up condition ● Idle speed	Less than 4.5V	AT
			[Engine is running] ● Warm-up condition ● EGR system is operating	0 - 1.5V	TF
64	W	Knock sensor	[Engine is running] ● Idle speed	Approximately 2.4V	PD
66	B	Fuel level sensor ground	[Engine is running] ● Idle speed	Approximately 0V	AX
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)	SU
72	B/P				
69	LG/R	Data link connector	[Ignition switch ON] ● CONSULT-II or GST is disconnected.	Approximately 2V	BR
80	SB	Power supply (Back-up)	[Ignition switch OFF]	BATTERY VOLTAGE (11 - 14V)	ST

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

KA24DE

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	OR/L	IACV-AAC valve	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>10.5 - 11.5V</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	<p>1 - 13V</p>
102	W/B	Injector No. 1	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>BATTERY VOLTAGE (11 - 14V)</p>
104	W/R	Injector No. 3		<p>BATTERY VOLTAGE (11 - 14V)</p>
109	W/L	Injector No. 2	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	<p>BATTERY VOLTAGE (11 - 14V)</p>
111	W/PU	Injector No. 4		<p>BATTERY VOLTAGE (11 - 14V)</p>
103	G/W	EGRC-solenoid valve	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	0 - 1V
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Revving engine from idle to 3,000 rpm quickly 	<p>BATTERY VOLTAGE (11 - 14V)</p>
108	R/G	EVAP canister vent control valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
116	B/R	ECM ground	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	Engine ground
117	B/P	Current return	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V)

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

KA24DE

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
119	BR/Y	Heated oxygen sensor heater 1	[Engine is running] <ul style="list-style-type: none"> ● Engine speed is below 3,000 rpm. (All models) 	Approximately 0.4V
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is above 3,000 rpm. (2WD mod- els) ● More than 6 seconds after engine speed exceeds 3,000 rpm (4WD models) 	BATTERY VOLTAGE (11 - 14V)
120	P/B	Vacuum cut valve bypass valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
122	R/B	Heated oxygen sensor heater 2	[Engine is running] <ul style="list-style-type: none"> ● Idle speed after driving 2 minutes at 70 km/h (43 MPH) or more 	Approximately 0.4V
			[Ignition switch ON] <ul style="list-style-type: none"> ● Engine is not running 	BATTERY VOLTAGE (11 - 14V)
124	B/R	ECM ground	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	Engine ground

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Description

The specification (SP) value indicates the tolerance of the value that is displayed in “DATA MONITOR (SPEC)” mode of CONSULT-II during normal operation of the Engine Control System. When the value in “DATA 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:

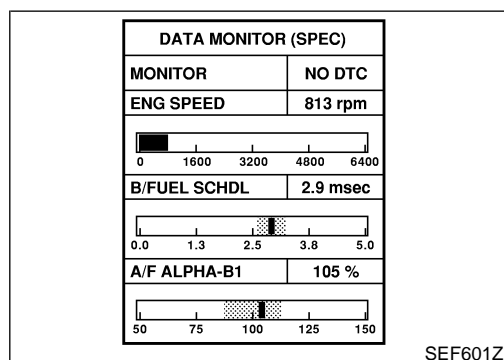
- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1/B2 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Testing Condition

- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 101.3 kPa (760.0 mmHg, 29.92 inHg)±3 kPa (22.5 mmHg, 0.89 inHg)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up*1
- Electrical load: Not applied*2
- Engine speed: Idle

*1: For M/T models, drive vehicle for 5 minutes after the engine is warmed up to normal operating temperature.

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



Inspection Procedure

NOTE:

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

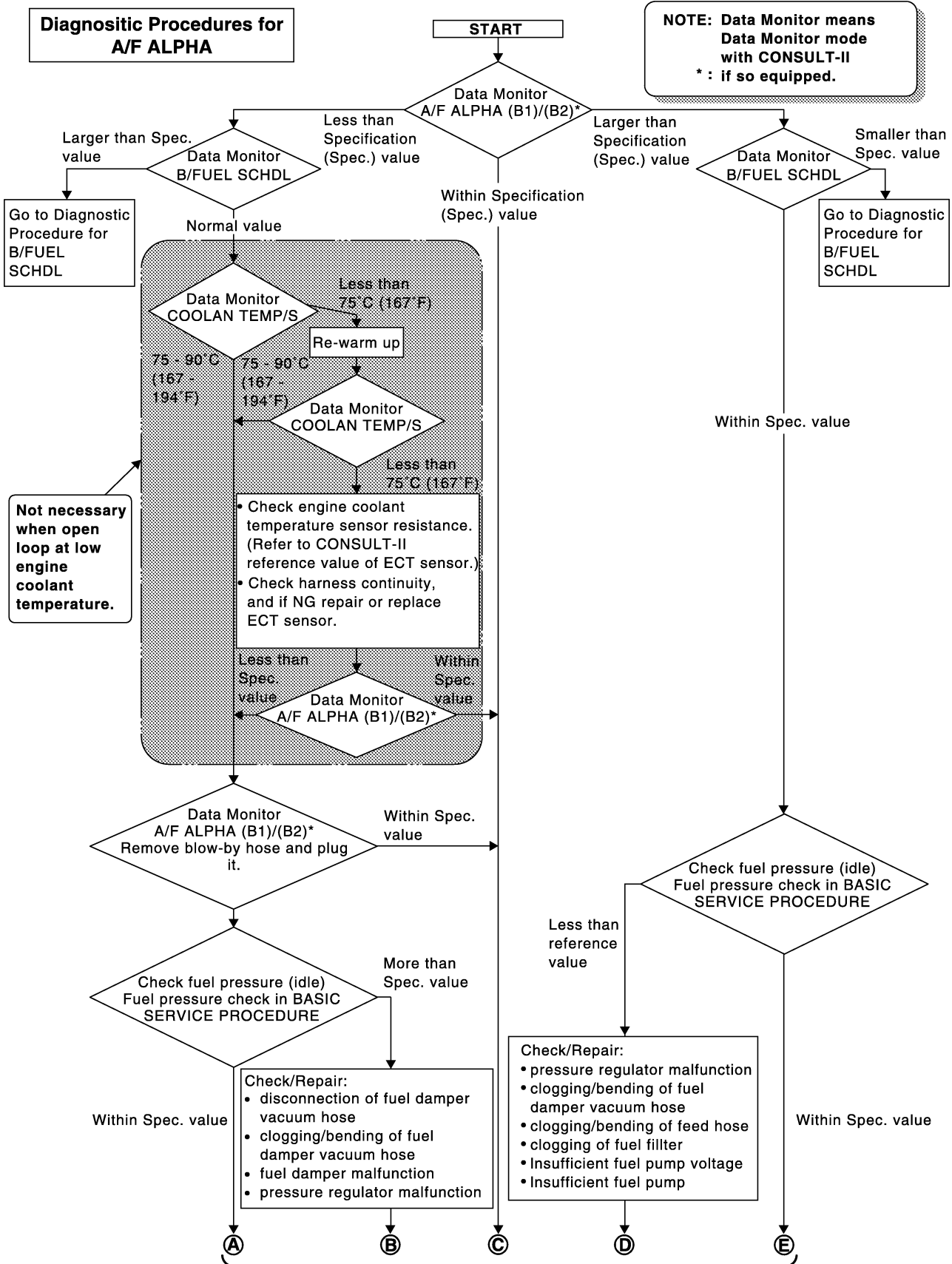
1. Perform “Basic Inspection”, EC-112.
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1” and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to “Diagnostic Procedure”, EC-147.

Diagnostic Procedure

NGEC1006

Diagnostic Procedures for A/F ALPHA

NOTE: Data Monitor means Data Monitor mode with CONSULT-II * : if so equipped.

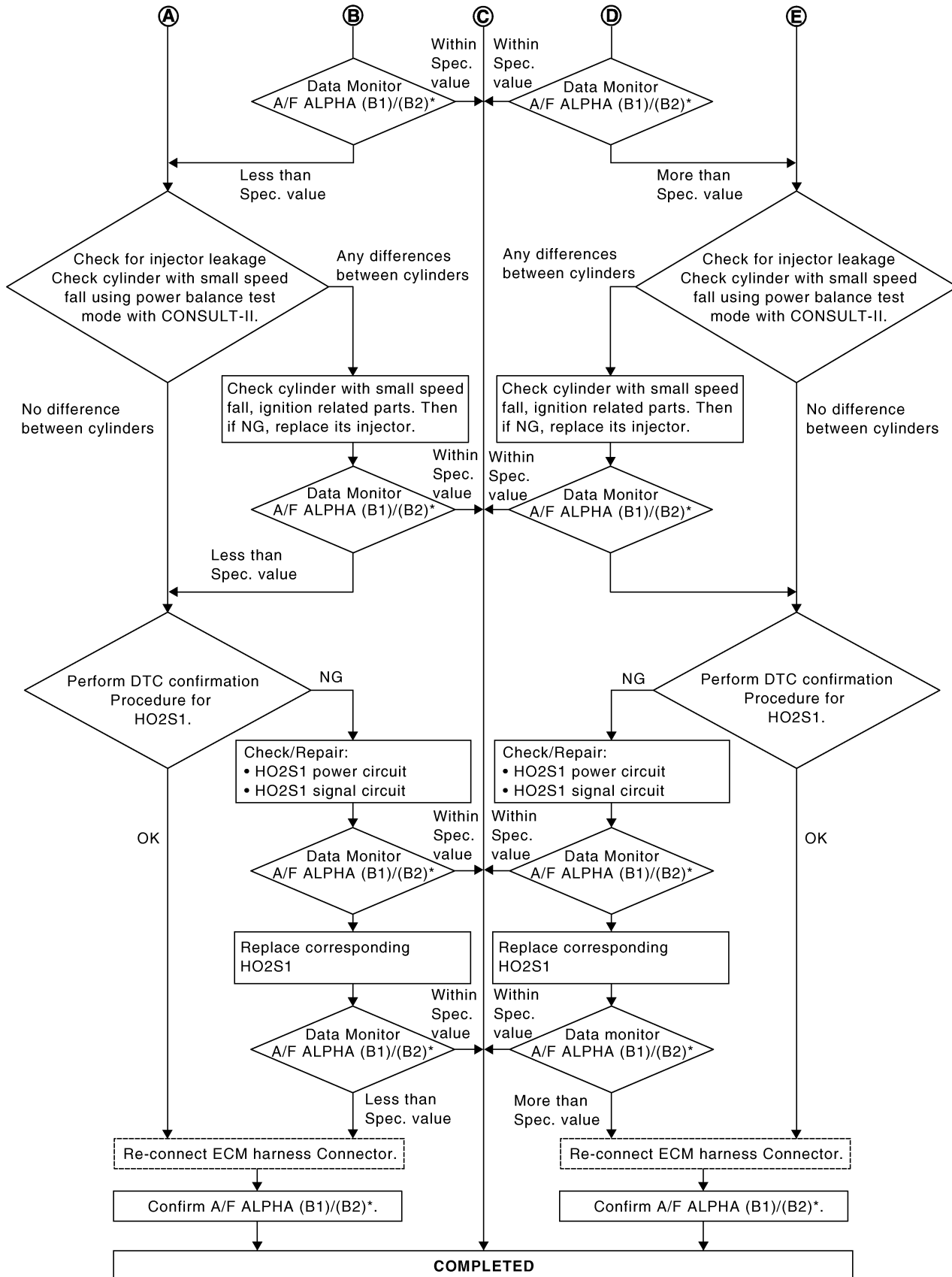


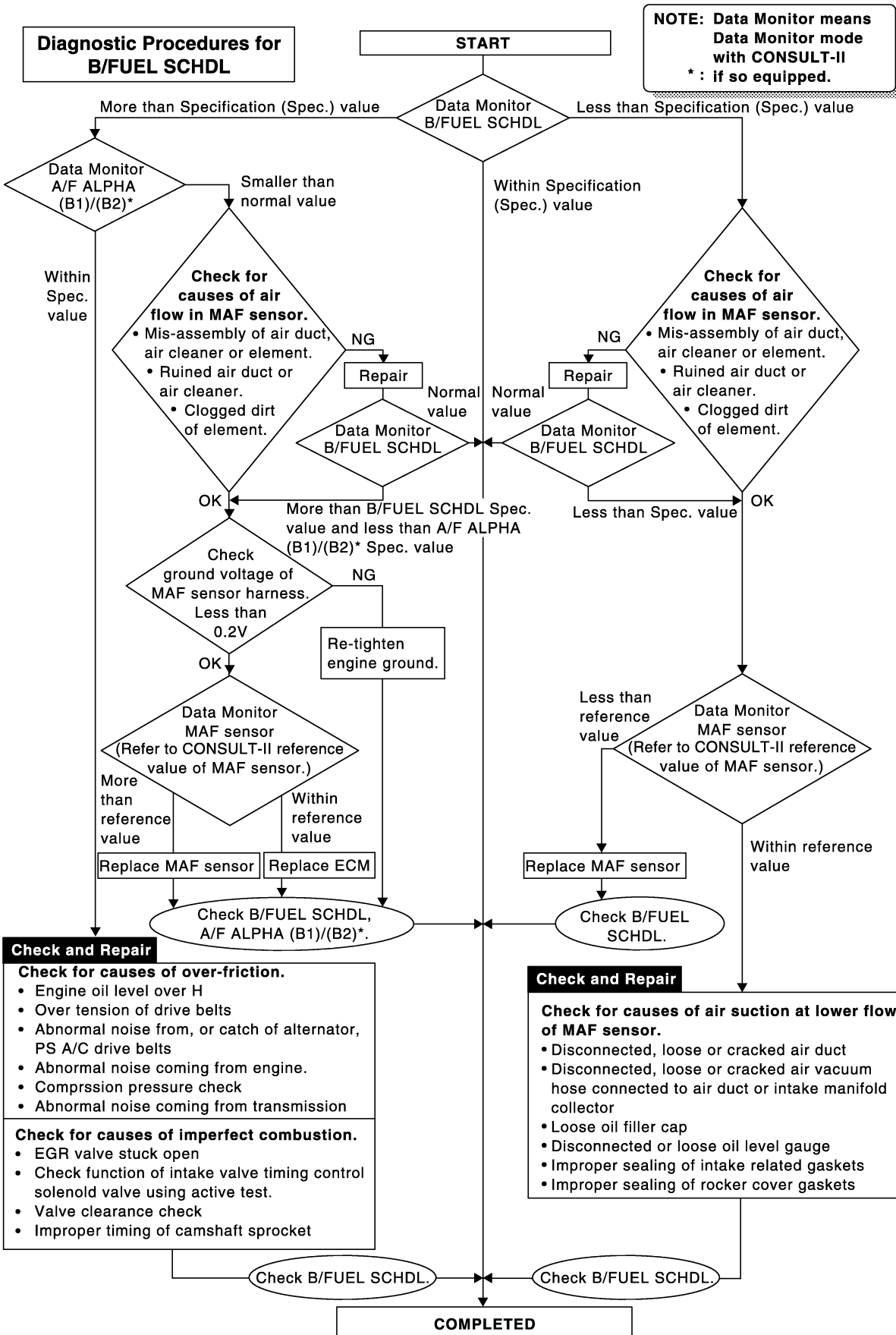
Not necessary when open loop at low engine coolant temperature.

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(Go to next page.)

SEF613ZD





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Description

Description

NGEC0045

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

COMMON I/I REPORT SITUATIONS

NGEC0045S01

STEP in Work Flow	Situation
II	The CONSULT-II is used. The SELF-DIAG RESULTS screen shows time data other than "0" or "1t".
III	The symptom described by the customer does not recur.
IV	(1st trip) DTC data does not appear during the DTC CONFIRMATION PROCEDURE.
VI	The TROUBLE DIAGNOSIS for PXXXX does not indicate the problem area.

Diagnostic Procedure

NGEC0046

1	INSPECTION START
Erase (1st trip) DTCs. Refer to "HOW TO ERASE EMISSION-RELATED INFORMATION", EC-86.	
	▶ GO TO 2.

2	CHECK GROUND TERMINALS
Check ground terminals for corroding or loose connection. Refer to "Circuit Inspection", "GROUND INSPECTION", GI-28 .	
OK or NG	
OK	▶ GO TO 3.
NG	▶ Repair or replace.

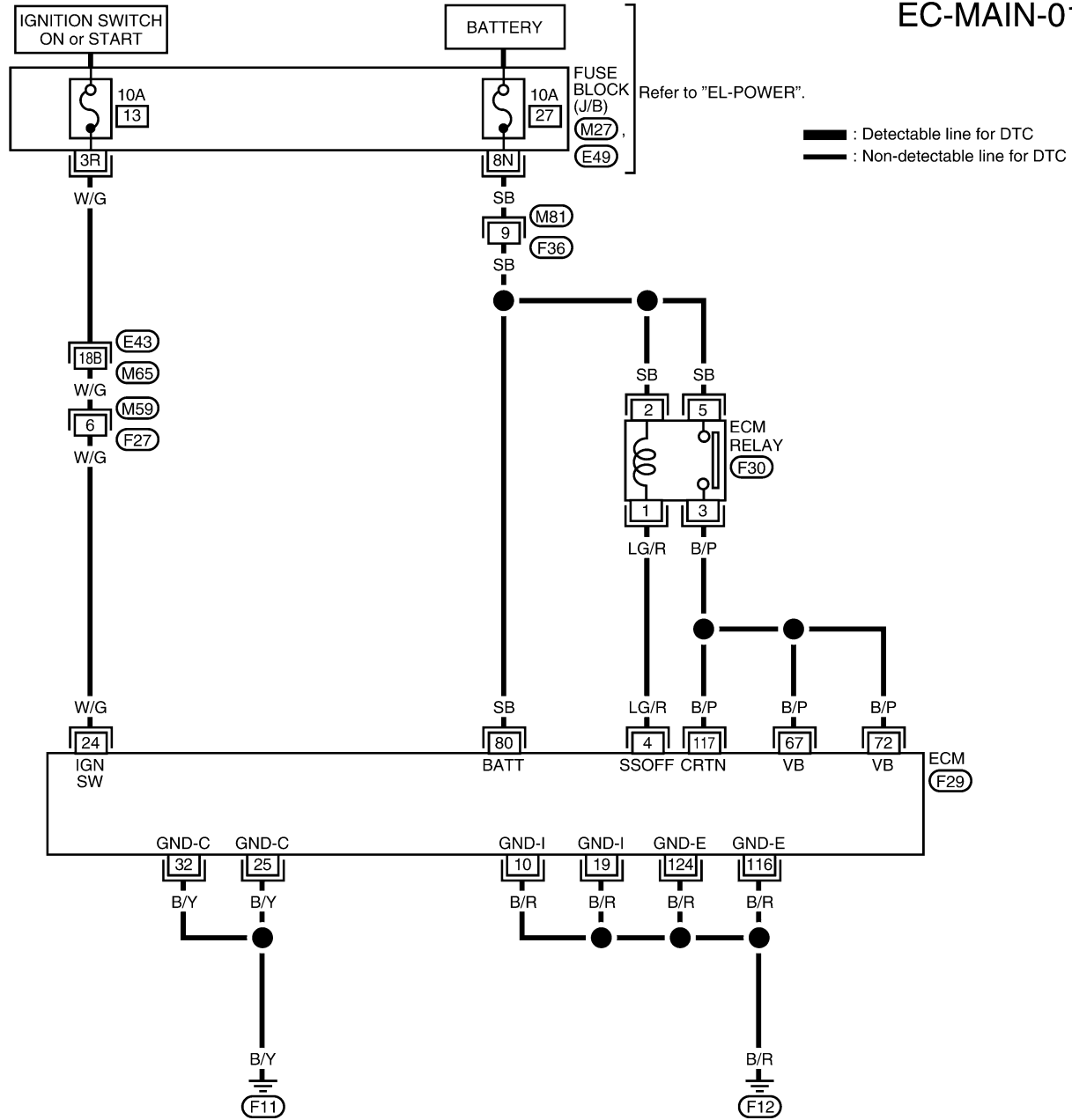
3	SEARCH FOR ELECTRICAL INCIDENT
Perform "Incident Simulation Tests", GI-23 .	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Repair or replace.

4	CHECK CONNECTOR TERMINALS
Refer to "How to Check Enlarged Contact Spring of Terminal", GI-20 .	
OK or NG	
OK	▶ INSPECTION END
NG	▶ Repair or replace connector.

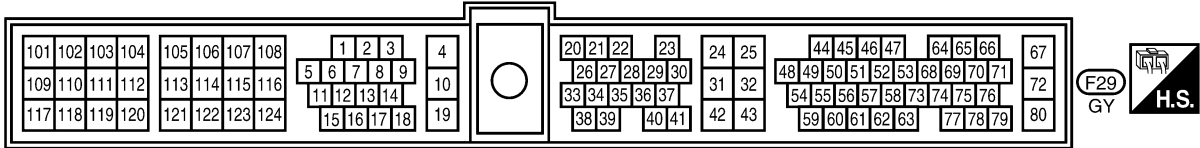
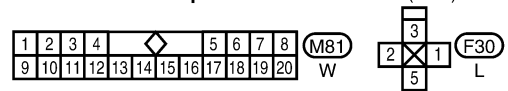
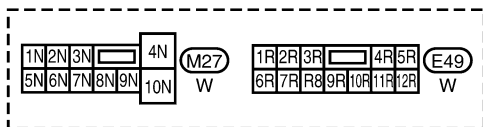
Main Power Supply and Ground Circuit WIRING DIAGRAM

NGEC0047

EC-MAIN-01



Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



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TROUBLE DIAGNOSIS FOR POWER SUPPLY

KA24DE

Main Power Supply and Ground Circuit (Cont'd)

ECM TERMINALS AND REFERENCE VALUE

NGEC0048

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

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	LG/R	ECM relay (Self shut-off)	[Engine is running] [Ignition switch OFF] ● For a few seconds after turning ignition switch OFF	0 - 1V
			[Ignition switch OFF] ● A few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
10	B/R	ECM ground	[Engine is running] ● Idle speed	Engine ground
19	B/R	ECM ground	[Engine is running] ● Idle speed	Engine ground
24	W/G	Ignition switch	[Ignition switch OFF]	0V
			[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
25	B/Y	ECM ground	[Engine is running] ● Idle speed	Engine ground
32	B/Y	ECM ground	[Engine is running] ● Idle speed	Engine ground
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
72	B/P			
80	SB	Power supply (Back-up)	[Ignition switch OFF]	BATTERY VOLTAGE (11 - 14V)
116	B/R	ECM ground	[Engine is running] ● Idle speed	Engine ground
117	B/P	Current return	[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)
124	B/R	ECM ground	[Engine is running] ● Idle speed	Engine ground

TROUBLE DIAGNOSIS FOR POWER SUPPLY

KA24DE

Main Power Supply and Ground Circuit (Cont'd)

DIAGNOSTIC PROCEDURE

-NGEC0049

1	INSPECTION START	
Start engine. Is engine running?		
Yes or No		
Yes	▶	GO TO 4.
No	▶	GO TO 2.

GI

MA

EM

2	CHECK POWER SUPPLY-I	
<p>1. Turn ignition switch OFF and then ON. 2. Check voltage between ECM terminal 24 and ground with CONSULT-II or tester.</p>		
<p>Voltage: Battery voltage</p> <p style="text-align: right;">SEF600P</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 12.
NG	▶	GO TO 3.

LC

EC

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PD

3	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M65, E43 ● Harness connectors M59, F27 ● Fuse block (J/B) connector E49 ● 10A fuse ● Harness for open or short between ECM and fuse 		
	▶	Repair harness or connectors.

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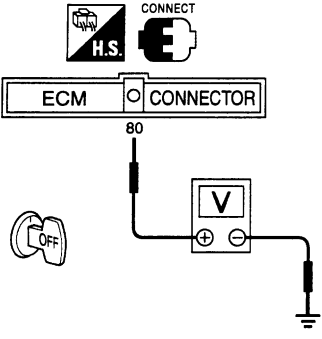
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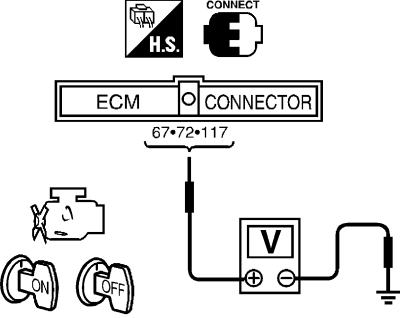
EL

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4	CHECK POWER SUPPLY-II	
<p>1. Stop engine. 2. Check voltage between ECM terminal 80 and ground with CONSULT-II or tester.</p>		
		
<p>Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

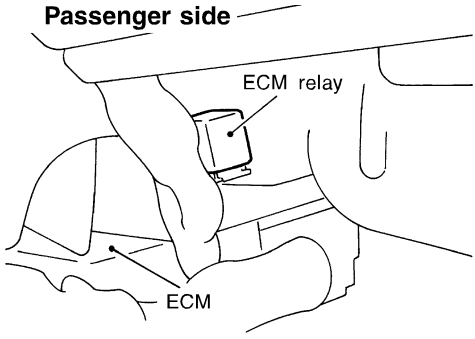
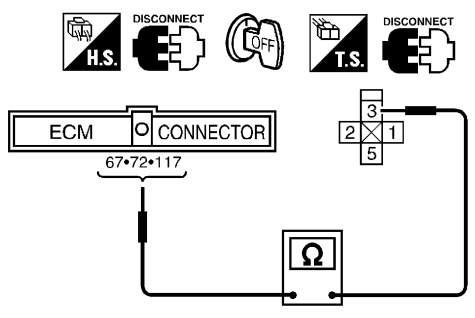
MEC698B

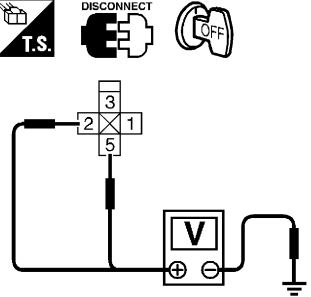
5	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M81, F36 ● Fuse block (J/B) connector M27 ● 10A fuse ● Harness for open or short between ECM and fuse 		
▶		Repair harness or connectors.

6	CHECK POWER SUPPLY-III	
<p>1. Turn ignition switch ON and then OFF. 2. Check voltage between ECM terminals 67, 72, 117 and ground with CONSULT-II or tester.</p>		
		
<p>Voltage: After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop to approximately 0V.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 12.
NG (Battery voltage does not exist.)	▶	GO TO 7.
NG (Battery voltage exists for more than a few seconds.)	▶	GO TO 11.

SEF121V

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7	CHECK HARNESS CONTINUITY BETWEEN ECM RELAY AND ECM						
<p>1. Disconnect ECM harness connector. 2. Disconnect ECM relay.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF323VA</p> <p>3. Check harness continuity between ECM terminals 67, 72, 117 and ECM relay terminal 3.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF122V</p> <p>Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 8.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Repair open circuit or short to ground or short to power in harness or connectors.</td> </tr> </table>		OK	▶	GO TO 8.	NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.
OK	▶	GO TO 8.					
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.					

8	CHECK VOLTAGE BETWEEN ECM RELAY AND GROUND						
<p>Check voltage between ECM relay terminals 2, 5 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF120V</p> <p>Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 10.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 9.</td> </tr> </table>		OK	▶	GO TO 10.	NG	▶	GO TO 9.
OK	▶	GO TO 10.					
NG	▶	GO TO 9.					

9	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness for open or short between ECM relay and harness connector F36 	
	Repair harness or connectors.

10	CHECK OUTPUT SIGNAL CIRCUIT
1. Check harness continuity between ECM terminal 4 and ECM relay terminal 1.	
SEF605P	
Continuity should exist.	
2. 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 RELAY
1. Apply 12V direct current between ECM relay terminals 1 and 2. 2. Check continuity between ECM relay terminals 3 and 5.	
SEF511P	
12V (1 - 2) applied: Continuity exists. No voltage applied: No continuity	
OK or NG	
OK	GO TO 12.
NG	Replace ECM relay.

TROUBLE DIAGNOSIS FOR POWER SUPPLY

KA24DE

Main Power Supply and Ground Circuit (Cont'd)

12	CHECK GROUND CIRCUIT
<p>1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminals 10, 19, 25, 32, 116, 124 and engine ground.</p>	
SEF119V	
<p>Continuity should exist.</p> <p>4. Also check harness for short to power.</p>	
OK or NG	
OK	▶ GO TO 13.
NG	▶ Repair open circuit or short to power in harness or connectors.

13	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.	
▶	INSPECTION END

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Description

Description

NGEC0136

SYSTEM DESCRIPTION

NGEC0136S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater

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

OPERATION

NGEC0136S02

Engine speed	Heated oxygen sensor 1 heater
Above 3,000 rpm	OFF
Below 3,000 rpm	ON

CONSULT-II Reference Value in Data Monitor Mode

NGEC0137

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1)	● Engine speed: Below 3,000 rpm	ON
	● Engine speed: Above 3,000 rpm	OFF

ECM Terminals and Reference Value

NGEC0138

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)
119	BR/Y	Heated oxygen sensor 1 heater	[Engine is running] ● Engine speed is below 3,000 rpm.	Approximately 0.4V
			[Engine is running] ● Engine speed is above 3,000 rpm.	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0139

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0031 P0032	<ul style="list-style-type: none"> ● The current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range. [An excessively low (P0031) or high (P0032) voltage signal is sent to ECM through the heated oxygen sensor 1 heater.] 	<ul style="list-style-type: none"> ● Harness or connectors (The heated oxygen sensor 1 heater circuit is open or shorted.) ● Heated oxygen sensor 1 heater

DTC Confirmation Procedure

NGEC0140

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

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

2	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

 **With CONSULT-II**

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF" and wait at least 5 seconds.
- 3) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- 4) Start engine and run it for at least 5 seconds at idle speed.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-161.

 **With GST**

- 1) Start engine and warm it up to normal operating temperature.
 - 2) Turn ignition switch "OFF" and wait at least 5 seconds.
 - 3) Start engine and run it for at least 6 seconds at idle speed.
 - 4) Turn ignition switch OFF and wait least 5 seconds.
 - 5) Start engine and run it for at least 6 seconds at idle speed.
 - 6) Select "MODE 3" with GST.
 - 7) If DTC is detected, go to "Diagnostic Procedure", EC-161.
- **When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

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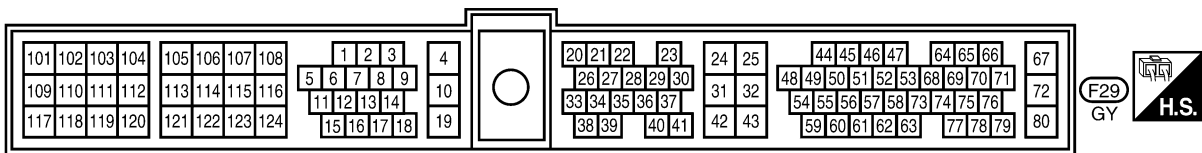
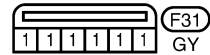
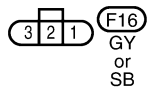
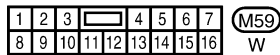
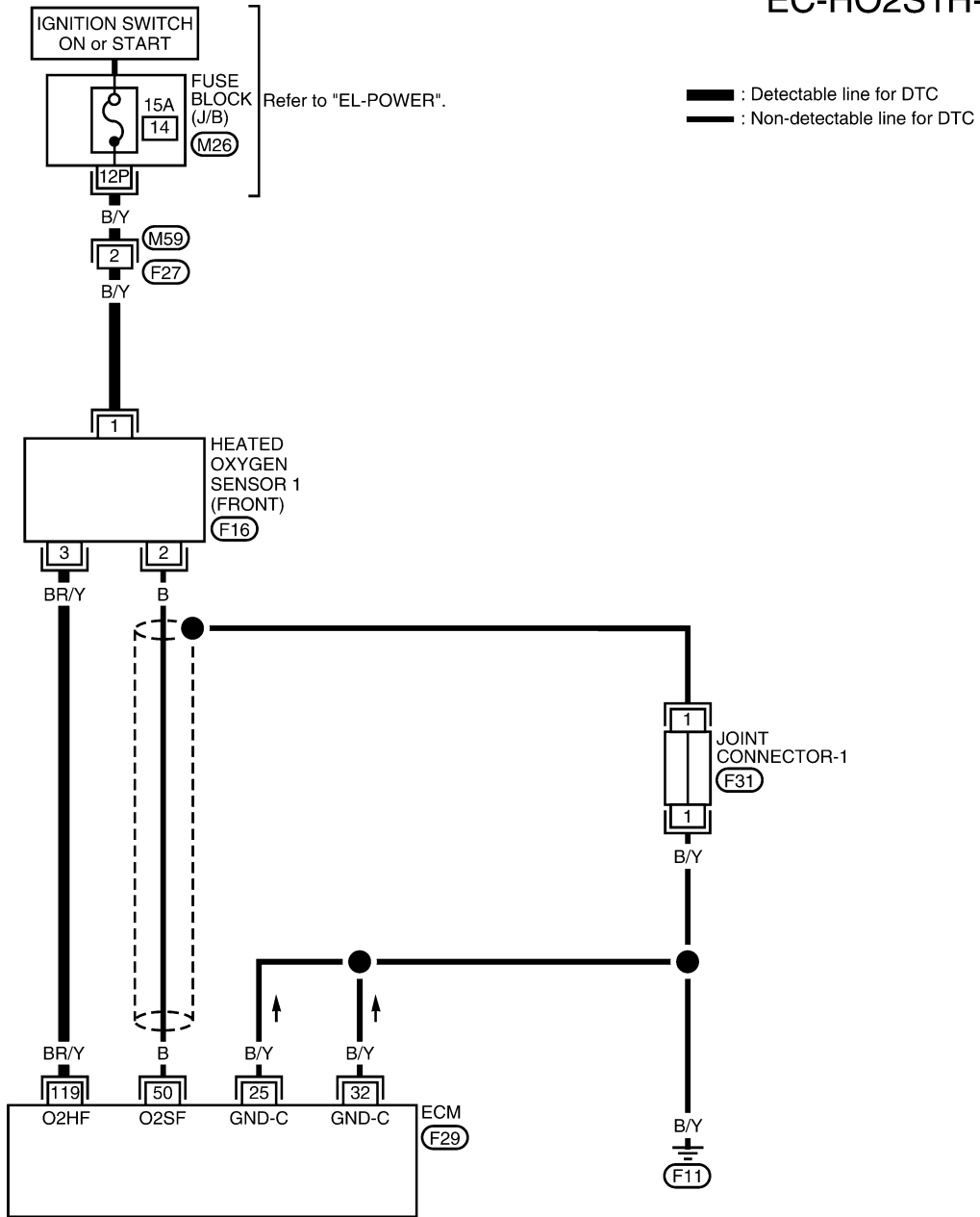
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Wiring Diagram

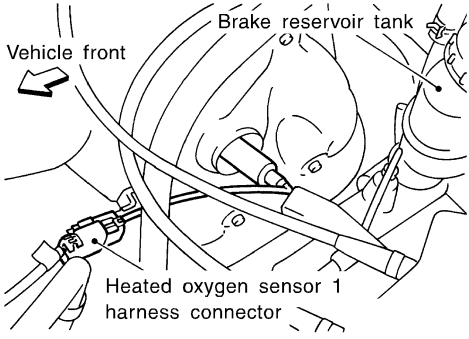
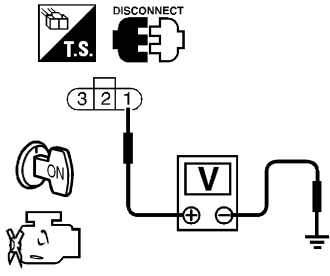
NGEC0141

EC-HO2S1H-01



Diagnostic Procedure

NGEC0142

1	CHECK POWER SUPPLY	
<p>1. Turn ignition switch OFF. 2. Disconnect heated oxygen sensor 1 harness connector.</p> <div style="text-align: center;">  </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p>Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

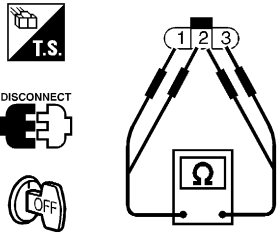
SEF331VB

SEF213W

2	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M59, F27 ● 15A fuse ● Fuse block (J/B) connector M26 ● Harness for open or short between heated oxygen sensor 1 and 15A fuse 		
▶		Repair harness or connectors.

3	CHECK OUTPUT SIGNAL CIRCUIT	
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between heated oxygen sensor 1 terminal 3 and ECM terminal 119. Refer to the wiring diagram. Continuity should exist.</p> <p>4. Also check harness for short to ground or short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

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4	CHECK HEATED OXYGEN SENSOR 1 HEATER						
<p>Check resistance between terminals 3 and 1.</p> <div style="text-align: center; margin: 10px 0;">  </div> <p style="text-align: right; margin-top: 10px;">SEF220W</p> <p>Resistance: 2.3 - 4.3 Ω at 25°C (77°F)</p> <p>Check continuity between terminals 2 and 1, 3 and 2.</p> <p>Continuity should not exist.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center; margin-top: 10px;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 20%; padding: 2px;">OK</td> <td style="width: 5%; text-align: center; padding: 2px;">▶</td> <td style="padding: 2px;">GO TO 5.</td> </tr> <tr> <td style="padding: 2px;">NG</td> <td style="text-align: center; padding: 2px;">▶</td> <td style="padding: 2px;">Replace heated oxygen sensor 1.</td> </tr> </table>		OK	▶	GO TO 5.	NG	▶	Replace heated oxygen sensor 1.
OK	▶	GO TO 5.					
NG	▶	Replace heated oxygen sensor 1.					

5	CHECK INTERMITTENT INCIDENT			
<p>Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 20%;"></td> <td style="width: 5%; text-align: center;">▶</td> <td style="text-align: center;">INSPECTION END</td> </tr> </table>			▶	INSPECTION END
	▶	INSPECTION END		

Description

NGEC0180

SYSTEM DESCRIPTION

NGEC0180S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed.

OPERATION

NGEC0180S02

Engine condition	Heated oxygen sensor 2 heater
Ignition switch ON Engine stopped	OFF
Engine is running.	ON

CONSULT-II Reference Value in Data Monitor Mode

NGEC0181

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1)	● Engine speed: Idle [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more]	ON
	● Ignition switch ON (Engine stopped)	OFF

ECM Terminals and Reference Value

NGEC0182

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)
122	R/B	Heated oxygen sensor 2 heater	[Engine is running] ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more	Approximately 0.4V
			[Ignition switch "ON"] ● Engine stopped	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0183

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0141	● The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. [An excessively low (P0037) or high (P0038) voltage signal is sent to ECM through the heated oxygen sensor 2 heater.]	● Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.) ● Heated oxygen sensor 2 heater

DTC Confirmation Procedure

NGEC0184

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

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

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

SEF175Y

With CONSULT-II

- 1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-166.

With GST

- 1) Start engine.
- 2) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 3) Stop vehicle and let engine idle for at least 6 seconds.
- 4) Turn ignition switch OFF and wait at least 10 seconds.
- 5) Start engine.
- 6) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 7) Stop vehicle and let engine idle for at least 6 seconds.
- 8) Select "MODE 3" with GST.
- 9) If DTC is detected, go to "Diagnostic Procedure", EC-166.

When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.

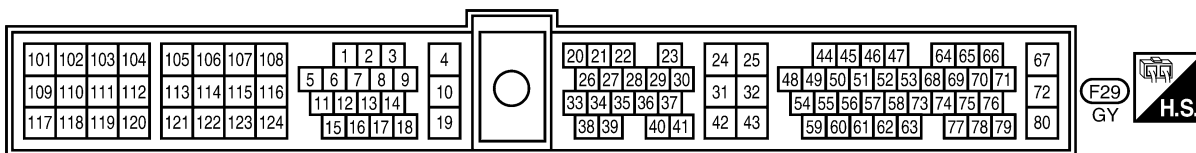
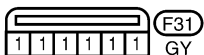
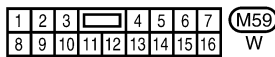
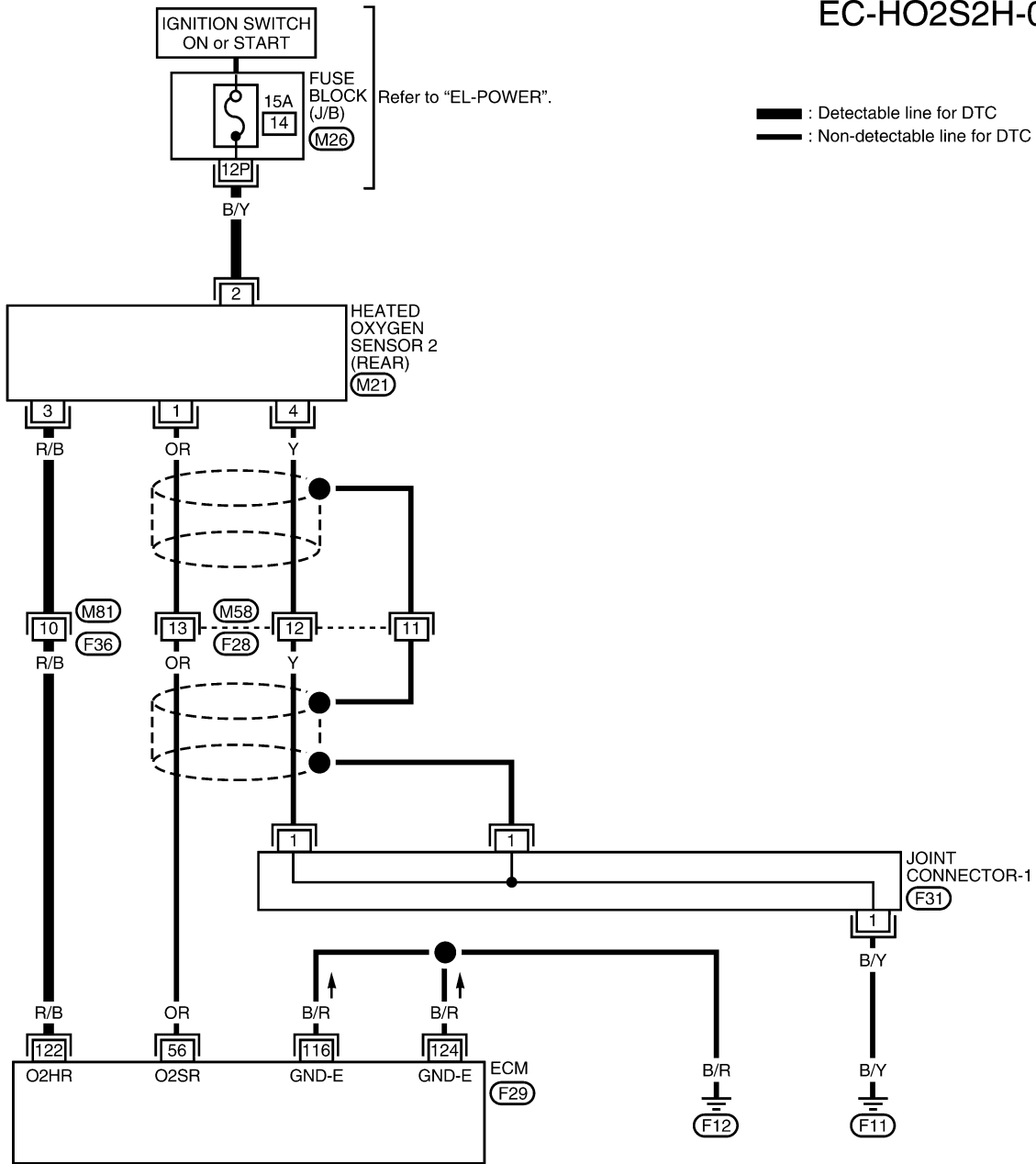
DTC P0037, P0038 HO2S2 HEATER

KA24DE
Wiring Diagram

Wiring Diagram

NGEC0185

EC-HO2S2H-01



WEC968

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Diagnostic Procedure

NGEC0186

1	CHECK POWER SUPPLY		
<p>1. Turn ignition switch OFF. 2. Disconnect heated oxygen sensor 2 harness connector. 3. Turn ignition switch ON. 4. Check voltage between terminal 2 and ground.</p>			
SEF218W			
OK or NG			
OK	▶	GO TO 3.	
NG	▶	GO TO 2.	

2	DETECT MALFUNCTIONING PART		
<p>Check the following.</p> <ul style="list-style-type: none"> ● Fuse block (J/B) connector M26 ● 15A fuse ● Harness for open or short between heated oxygen sensor 2 and 15A fuse 			
		▶	Repair harness or connectors.

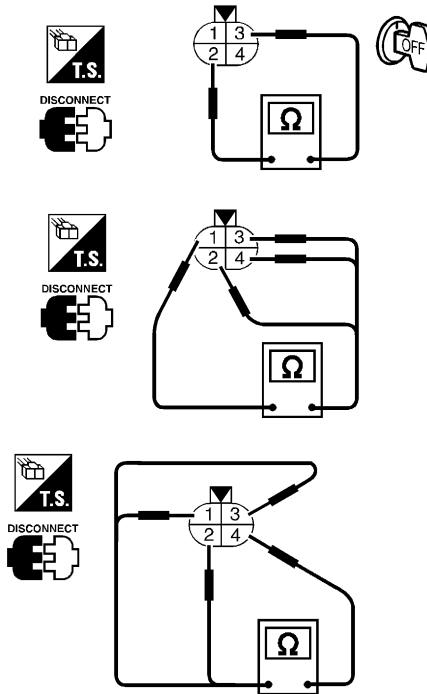
3	CHECK OUTPUT SIGNAL CIRCUIT		
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between heated oxygen sensor 2 terminal 3 and ECM terminal 122. Refer to the wiring diagram. Continuity should exist. 4. Also check harness for short to ground or short to power.</p>			
OK or NG			
OK	▶	GO TO 5.	
NG	▶	GO TO 4.	

4	DETECT MALFUNCTIONING PART		
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M81, F36 ● Harness for open or short between heated oxygen sensor 2 and ECM 			
		▶	Repair open circuit or short to ground or short to power in harness or connectors.

5 CHECK HEATED OXYGEN SENSOR 2 HEATER

Check the following.

1. Check resistance between terminals 2 and 3.



Resistance: 2.3 - 4.3Ω at 25°C (77°F)

2. Check continuity.

Terminal No.	Continuity
1 and 2, 3, 4	No
4 and 1, 2, 3	

SEF221W

MTBL0330

CAUTION:

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

OK or NG

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

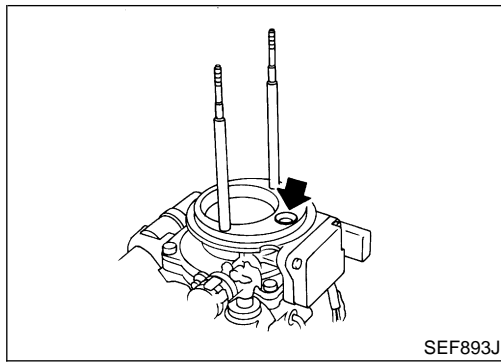
6 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.

▶ **INSPECTION END**

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Component Description



Component Description

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

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

NGEC0051

MONITOR ITEM	CONDITION	SPECIFICATION
MAS AIR/FL SE	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load Idle	0.9 - 1.8V
	2,500 rpm	1.9 - 2.3V
CAL/LD VALUE	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load Idle	9.5 - 34.0%
	2,500 rpm	13.9 - 24.9%
MASS AIRFLOW	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load Idle	0.9 - 5.8 g·m/s
	2,500 rpm	7.5 - 13.2 g·m/s

ECM Terminals and Reference Value

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

NGEC0052

CAUTION:

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

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
54	R	Mass air flow sensor	[Engine is running] ● Warm-up condition ● Idle speed	0.9 - 1.8V
			[Engine is running] ● Warm-up condition ● Engine speed is 2,500 rpm	1.9 - 2.3V
55	G	Mass air flow sensor ground	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V

On Board Diagnosis Logic

NGEC0053

DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P0103	A)	An excessively high voltage from the sensor is sent to ECM when engine is not running.	● Harness or connectors (The sensor circuit is open or shorted.)
P0101	C)	A high voltage from the sensor is sent to ECM under light load driving condition.	● Mass air flow sensor

DTC P0101, P0102, P0103 MAF SENSOR

KA24DE

On Board Diagnosis Logic (Cont'd)

DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P0102	B)	An excessively low voltage from the sensor is sent to ECM* when engine is running.	<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air leaks ● Mass air flow sensor
P0101	D)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	

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

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

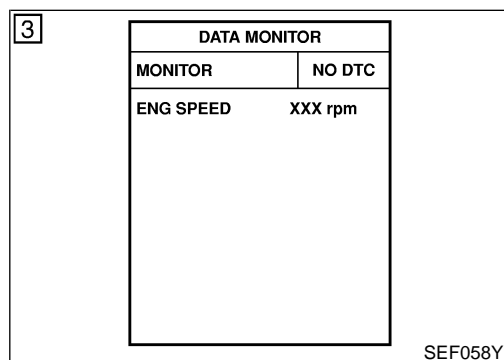
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DTC Confirmation Procedure

Perform "PROCEDURE FOR MALFUNCTION A" first. If the 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B". If there is no problem on "PROCEDURE FOR MALFUNCTION B", perform "PROCEDURE FOR MALFUNCTION C". If there is no problem on "PROCEDURE FOR MALFUNCTION C", perform "PROCEDURE FOR MALFUNCTION D".


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 5 seconds before conducting the next test.



PROCEDURE FOR MALFUNCTION A

- With CONSULT-II**
- 1) Turn ignition switch ON.
 - 2) Select "DATA MONITOR" mode with CONSULT-II.
 - 3) Wait at least 6 seconds.
 - 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-173.
If 1st trip DTC is not detected, go to next step.
 - 5) Start engine and let it idle for at least 6 seconds.
 - 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-173.

 **With GST**
Follow the procedure "With CONSULT-II".

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm


SEF058Y

PROCEDURE FOR MALFUNCTION B

NGEC0054S02

 **With CONSULT-II**

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait 5 seconds at most.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-173.

 **With GST**
Follow the procedure "With CONSULT-II".

NOTE:

If 1st trip DTC is confirmed after more than 5 seconds, there may be malfunction C.

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

PROCEDURE FOR MALFUNCTION C


NGEC0054S03

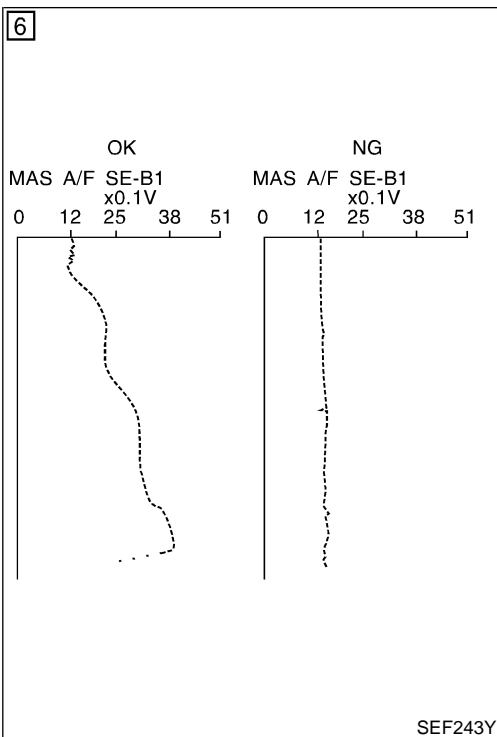
NOTE:

If engine will not start or stops soon, wait at least 10 seconds with engine stopped (Ignition switch "ON") instead of running engine at idle speed.

 **With CONSULT-II**

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and warm it up to normal operating temperature.
- 4) Run engine for at least 10 seconds at idle speed.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-173.

 **With GST**
Follow the procedure "With CONSULT-II".



PROCEDURE FOR MALFUNCTION D

NGEC0054S04

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Start engine and warm it up to normal operating temperature. If engine cannot be started, go to "Diagnostic Procedure", EC-173.
- 3) Select "DATA MONITOR" mode with CONSULT-II.
- 4) Check the voltage of "MAS A/F SE-B1" with "DATA MONITOR".
- 5) Increases engine speed to about 4,000 rpm.
- 6) Monitor the linear voltage rise in response to engine speed increases.
If NG, go to "Diagnostic Procedure", EC-173.
If OK, go to following step.
- 7) Maintain the following conditions for at least 10 consecutive seconds.

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

7

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

SEF175Y

- 8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-173.

CALC LOAD	20%
COOLANT TEMP	95°C
SHORT FT #1	2%
LONG FT #1	0%
SHORT FT #2	4%
LONG FT #2	0%
ENGINE SPD	2637RPM
VEHICLE SPD	0MPH
IGN ADVANCE	41.0°
INTAKE AIR	41°C
MAF	14.1gm/sec
THROTTLE POS	3%

SEF534P

Overall Function Check

NGEC0055

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

PROCEDURE FOR MALFUNCTION D

NGEC0055S01

With GST

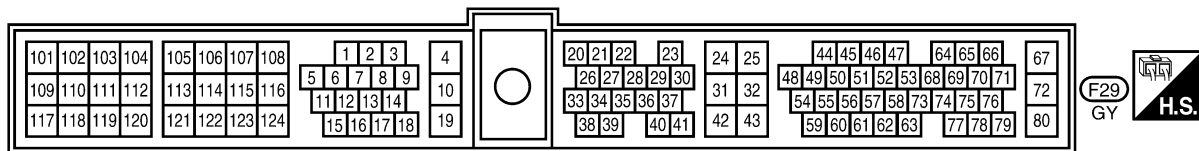
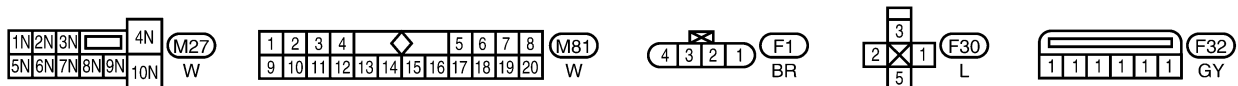
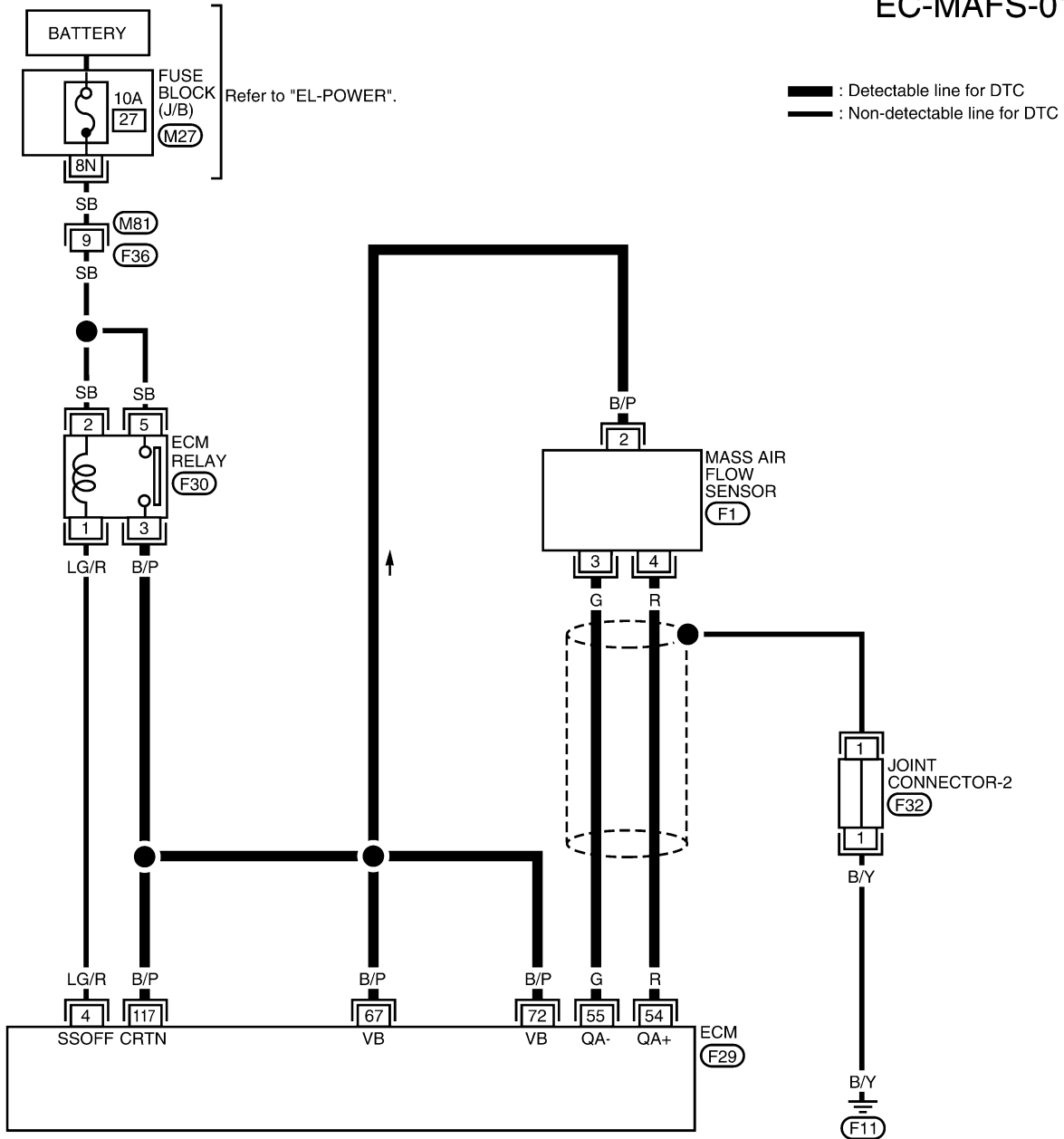
- 1) Turn ignition switch ON.
- 2) Start engine and warm it up to normal operating temperature.
- 3) Select "MODE 1" with GST.
- 4) Check the mass air flow sensor signal with "MODE 1".
- 5) Check for linear mass air flow rise in response to increases to about 4,000 rpm in engine speed.
- 6) If NG, go to "Diagnostic Procedure", EC-173.

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Wiring Diagram

NGEC0056

EC-MAFS-01

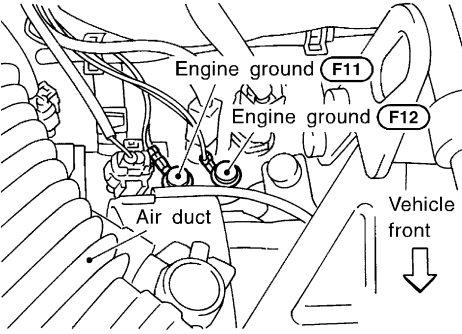


Diagnostic Procedure

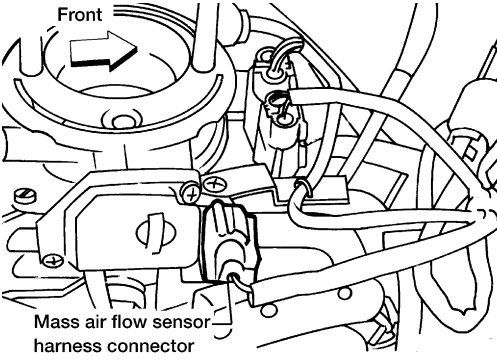
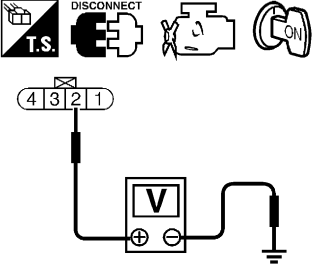
NGEC0057

1	INSPECTION START							
Which malfunction (A, B, C or D) is duplicated?								
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">MALFUNCTION</th> <th style="width: 50%;">Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">A and/or C</td> <td style="text-align: center;">I</td> </tr> <tr> <td style="text-align: center;">B and/or D</td> <td style="text-align: center;">II</td> </tr> </tbody> </table>			MALFUNCTION	Type	A and/or C	I	B and/or D	II
MALFUNCTION	Type							
A and/or C	I							
B and/or D	II							
MTBL0063								
Type I or Type II								
Type I	▶	GO TO 3.						
Type II	▶	GO TO 2.						

2	CHECK INTAKE SYSTEM	
Check the followings for connection.		
<ul style="list-style-type: none"> ● Air duct ● Air cleaner ● Vacuum hoses ● Intake air passage between air duct to collector 		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Reconnect the parts.

3	RETIGHTEN GROUND SCREWS	
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws. 		
		
SEF325V		
▶		GO TO 4.

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4	CHECK POWER SUPPLY		
<p>1. Disconnect mass air flow sensor harness connector.</p> <div style="text-align: center;">  </div>			
<p>2. Turn ignition switch ON.</p> <p>3. Check voltage between terminal 2 and ground with CONSULT-II or tester.</p>			
			
<p>Voltage: Battery voltage</p>			
<p>OK or NG</p>			
OK	▶	GO TO 6.	
NG	▶	GO TO 5.	

AEC131A

SEF126V

5	DETECT MALFUNCTIONING PART		
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness for open or short between ECM relay and mass air flow sensor ● Harness for open or short between mass air flow sensor and ECM 			
		▶	Repair harness or connectors.

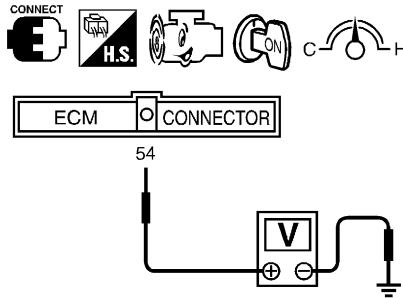
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6	CHECK GROUND CIRCUIT	
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect ECM harness connector.</p> <p>3. Check harness continuity between mass air flow sensor terminal 3 and ECM terminal 55. Refer to EC-172.</p>		
SEF124V		
<p style="color: blue;">Continuity should exist.</p> <p>4. Also check harness for short to ground or short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 7.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK INPUT SIGNAL CIRCUIT	
<p>1. Reconnect all harness connectors.</p> <p>2. Check harness continuity between terminal 4 and ECM terminal 54.</p>		
SEF125V		
<p style="color: blue;">Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
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

1. Reconnect all harness connectors.
2. Turn ignition switch ON.
3. Start engine and warm it up to normal operating temperature.
4. Check voltage between ECM terminal 54 (mass air flow sensor signal) and ground.



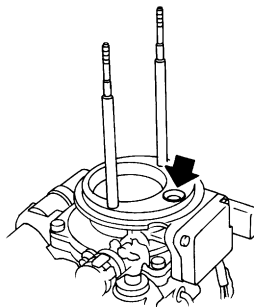
SEF326V

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.8
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.9 - 2.3
Idle to about 4,000 rpm*	1.3 - 1.7 to Approx. 3.0

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

MTBL0326

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



SEF893J

OK or NG

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

DTC P0101, P0102, P0103 MAF SENSOR

KA24DE

Diagnostic Procedure (Cont'd)

9	CHECK SHIELD CIRCUIT	
	<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect joint connector-2.</p> <p>3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector-1 terminal 1 and ground ● Joint connector-2 (Refer to "HARNES LAYOUT", <i>EL-250</i>.) <p style="margin-left: 20px;">Continuity should exist.</p> <p>4. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	
	OK	▶ GO TO 10.
	NG	▶ Repair open circuit or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT	
	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.	
	▶	INSPECTION END

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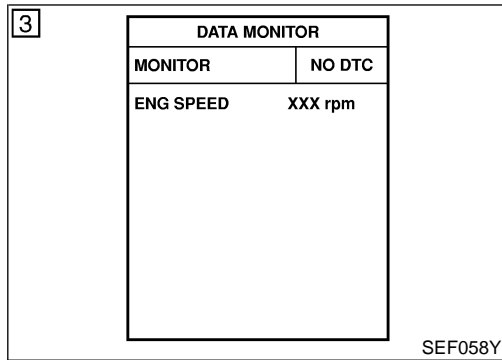
Component Description

The absolute pressure sensor detects ambient barometric pressure and sends the voltage signal to the ECM. As the pressure increases, the voltage rises. The absolute pressure sensor is built into ECM. NGEC1007

On Board Diagnosis Logic

NGEC1008

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0107 P0108	An excessively low (P0107) or high (P0108) voltage from the sensor is sent to the micro computer.	<ul style="list-style-type: none"> ● ECM



DTC Confirmation Procedure

NGEC1009

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 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 6 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-179.

With GST

Follow the procedure "With CONSULT-II" above.

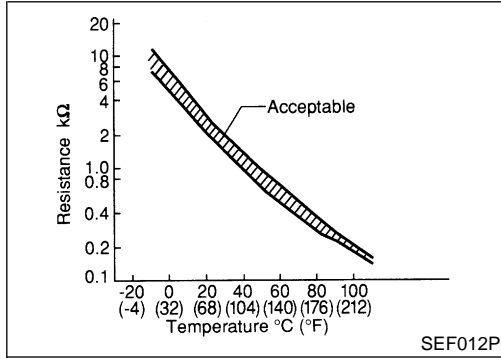
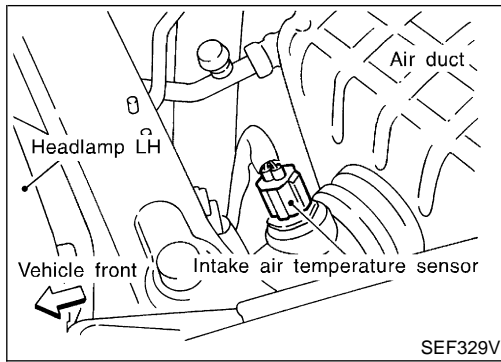
Diagnostic Procedure

NGEC1011

1	INSPECTION START	
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select "SELF DIAG RESULTS" mode with CONSULT-II. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure". See previous page. 5. Is the 1st trip DTC P0107 or P0108 displayed again? 		
<p> With GST</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select MODE 4 with GST. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure". See previous page. 5. Is the 1st trip DTC P0107 or P0108 displayed again? 		
Yes or No		
Yes	▶	Replace ECM.
No	▶	INSPECTION END

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Component Description



Component Description

NGEC0066

The intake air temperature sensor is mounted to the air duct housing. The sensor detects intake air temperature and transmits a signal to the ECM.

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

<Reference data>

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

*: These data are reference values and are measured between ECM terminal 61 (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

NGEC0067

DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P0112 P0113	A)	An excessively low (P0112) or high (P0113) voltage from the sensor is sent to ECM.	<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air temperature sensor
P0127	B)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	

Engine operating condition in fail-safe mode

The ECM functions on the assumption that the intake air temperature is 25°C (77°F).

DTC Confirmation Procedure

Perform "PROCEDURE FOR MALFUNCTION A" first. If the 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B".

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

NGEC0068S01

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-183.

With GST

Follow the procedure "With CONSULT-II".

5

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

SEF176Y

PROCEDURE FOR MALFUNCTION B

NGEC0068S02

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

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

With CONSULT-II

- 1) Wait until engine coolant temperature is less than 90°C (194°F).
 - a) Turn ignition switch ON.
 - b) Select "DATA MONITOR" mode with CONSULT-II.
 - c) Check the engine coolant temperature.
 - d) If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch "OFF" and cool down engine.
 - Perform the following steps before engine coolant temperature is above 90°C (194°F).
- 2) Turn ignition switch ON.
- 3) Select "DATA MONITOR" mode with CONSULT-II.
- 4) Start engine.
- 5) Hold vehicle speed more than 70 km/h (43 MPH) for 100 consecutive seconds.
- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-183.

With GST

Follow the procedure "With CONSULT-II".

GI

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AX

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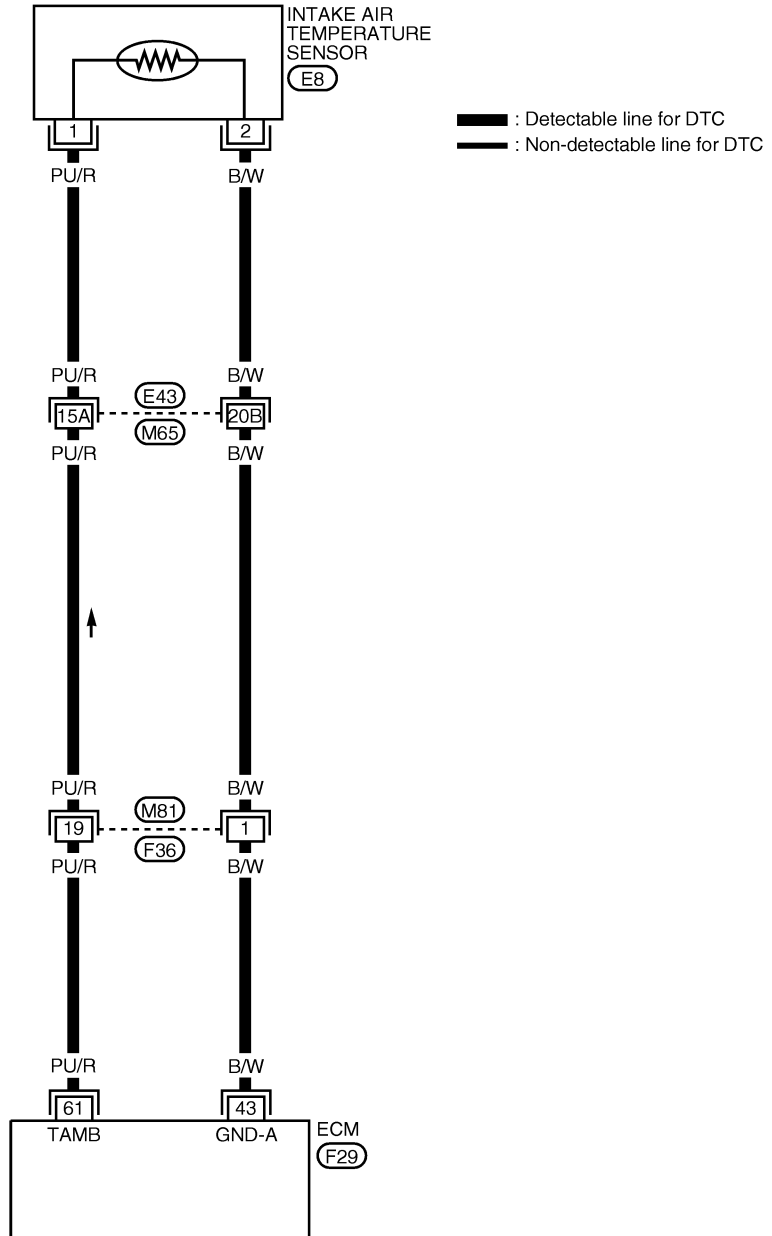
EL

IDX

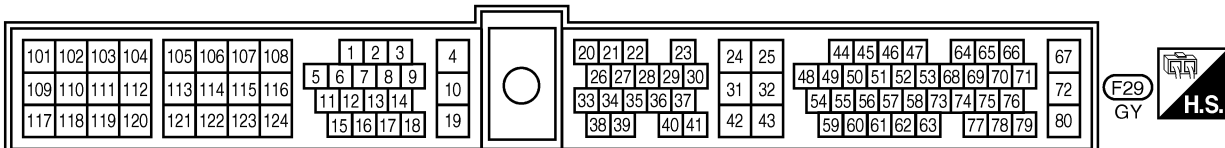
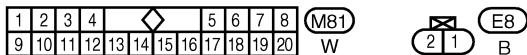
Wiring Diagram

NGEC0069

EC-IATS-01

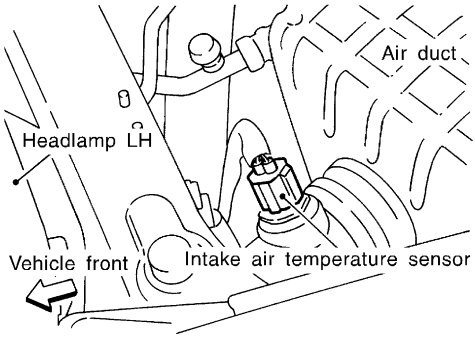
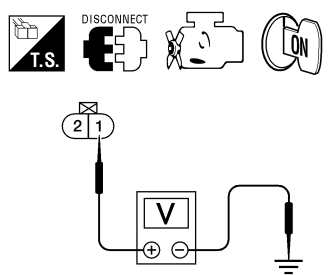


Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



Diagnostic Procedure

NGEC0070

1	CHECK POWER SUPPLY	
<p>1. Turn ignition switch OFF. 2. Disconnect intake air temperature sensor harness connector.</p> <div style="text-align: center;">  </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p>Voltage: Approximately 5V</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

SEF329V

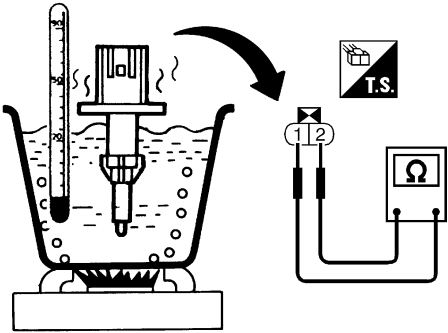
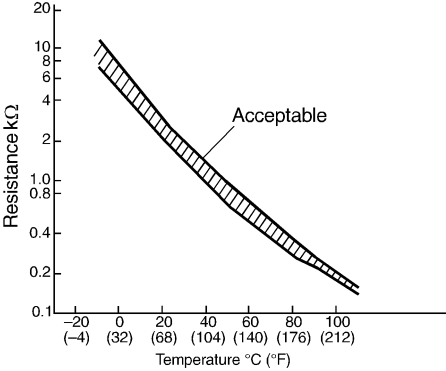
AEC570A

2	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M81, F36 ● Harness for open or short between ECM and intake air temperature sensor 		
▶		Repair harness or connectors.

3	CHECK GROUND CIRCUIT	
<p>1. Turn ignition switch OFF. 2. Check harness continuity between intake air temperature sensor terminal 2 and engine ground. Refer to the wiring diagram. Continuity should exist.</p> <p>3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

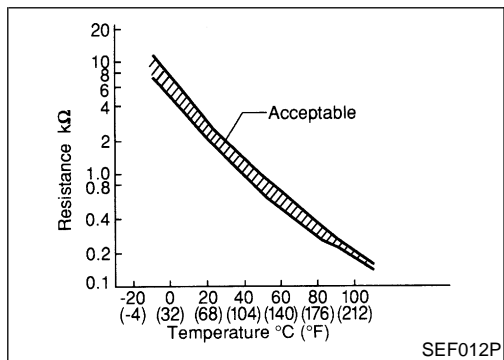
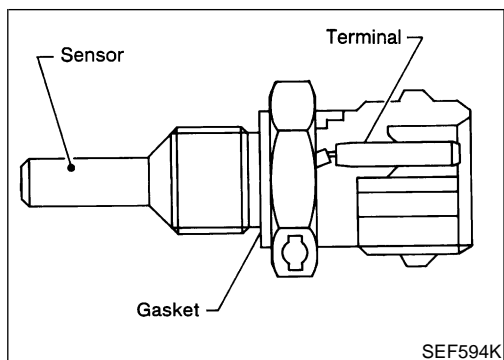
GI
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FE
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BR
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RS
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SC
EL
IDX

4	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M81, F36 ● Harness for open or short between ECM and intake air temperature sensor 	
	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK INTAKE AIR TEMPERATURE SENSOR						
Check resistance as shown in the figure.							
	<p><Reference data></p> <table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Temperature °C (°F)</th> <th style="text-align: center;">Resistance kΩ</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">20 (68)</td> <td style="text-align: center;">2.1 - 2.9</td> </tr> <tr> <td style="text-align: center;">80 (176)</td> <td style="text-align: center;">0.27 - 0.38</td> </tr> </tbody> </table>	Temperature °C (°F)	Resistance kΩ	20 (68)	2.1 - 2.9	80 (176)	0.27 - 0.38
Temperature °C (°F)	Resistance kΩ						
20 (68)	2.1 - 2.9						
80 (176)	0.27 - 0.38						
							
OK or NG							
OK	GO TO 6.						
NG	Replace intake air temperature sensor.						

SEF302X

6	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.	
	INSPECTION END



Component Description

NGEC0072

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.

GI
MA
EM
LC

<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

EC

FE

CL

*: These data are reference values and are measured between ECM terminal 59 (Engine coolant temperature sensor) and ground.

MT

CAUTION:

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

AT

TF

PD

AX

CONSULT-II Reference Value in Data Monitor Mode

NGEC0073

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

BR

On Board Diagnosis Logic

NGEC0074

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0117 P0118	● An excessively low (P0117) or high (P0118) voltage from the sensor is sent to ECM.*	<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Engine coolant temperature sensor

ST

RS

BT

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

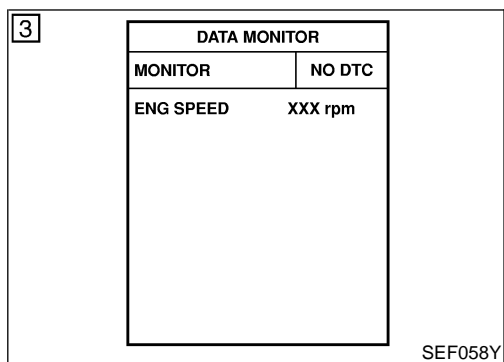
HA

SC

EL

IDX

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 to 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 to 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)



DTC Confirmation Procedure

NGEC0075

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-188.

With GST

Follow the procedure "With CONSULT-II".

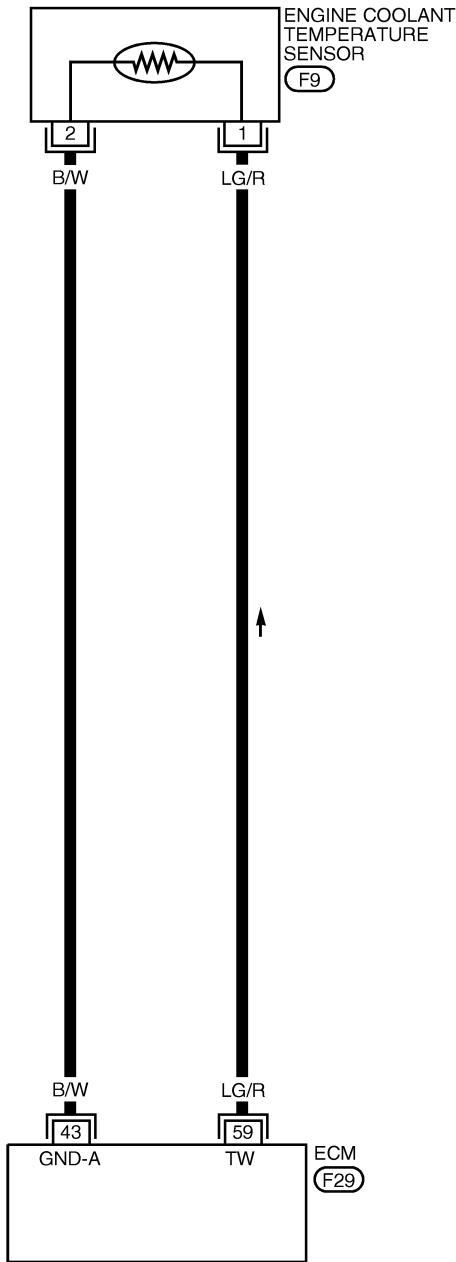
DTC P0117, P0118 ECT SENSOR

KA24DE
Wiring Diagram

Wiring Diagram

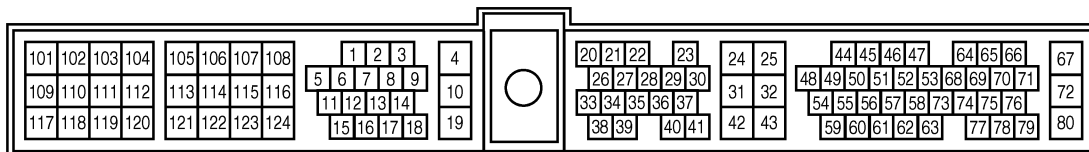
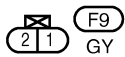
NGEC0076

EC-ECTS-01



: Detectable line for DTC
 : Non-detectable line for DTC

- GI
- MA
- EM
- LC
- EC**
- FE
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- MT
- AT
- TF
- PD
- AX
- SU
- BR
- ST
- RS
- BT
- HA
- SC
- EL
- IDX



AEC984A

Diagnostic Procedure

NGEC0077

1	CHECK POWER SUPPLY	
<p>1. Turn ignition switch OFF. 2. Disconnect engine coolant temperature sensor harness connector.</p>		
<p>3. Turn ignition switch ON. 4. Check voltage between engine coolant temperature sensor terminal 1 and ground with CONSULT-II or tester.</p>		
<p>Voltage: Approximately 5V</p>		
<p>OK or NG</p>		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

SEF330V

SEF206W

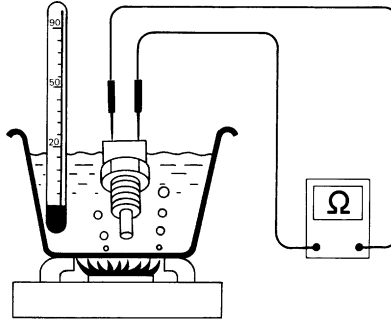
2	DETECT MALFUNCTIONING PART
Check the harness for open or short between ECM and engine coolant temperature sensor.	
▶ Repair harness or connectors.	

3	CHECK GROUND CIRCUIT	
<p>1. Turn ignition switch OFF. 2. Check harness continuity between engine coolant temperature sensor terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p>		
<p>OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART
Check the harness for open or short between ECM and engine coolant temperature sensor.	
▶ Repair open circuit or short to ground or short to power in harness or connectors.	

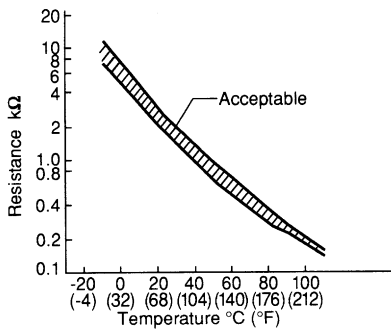
5 CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.



<Reference data>

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



OK or NG

- OK ► GO TO 6.
- NG ► Replace engine coolant temperature sensor.

6 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.

► **INSPECTION END**

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Component Description

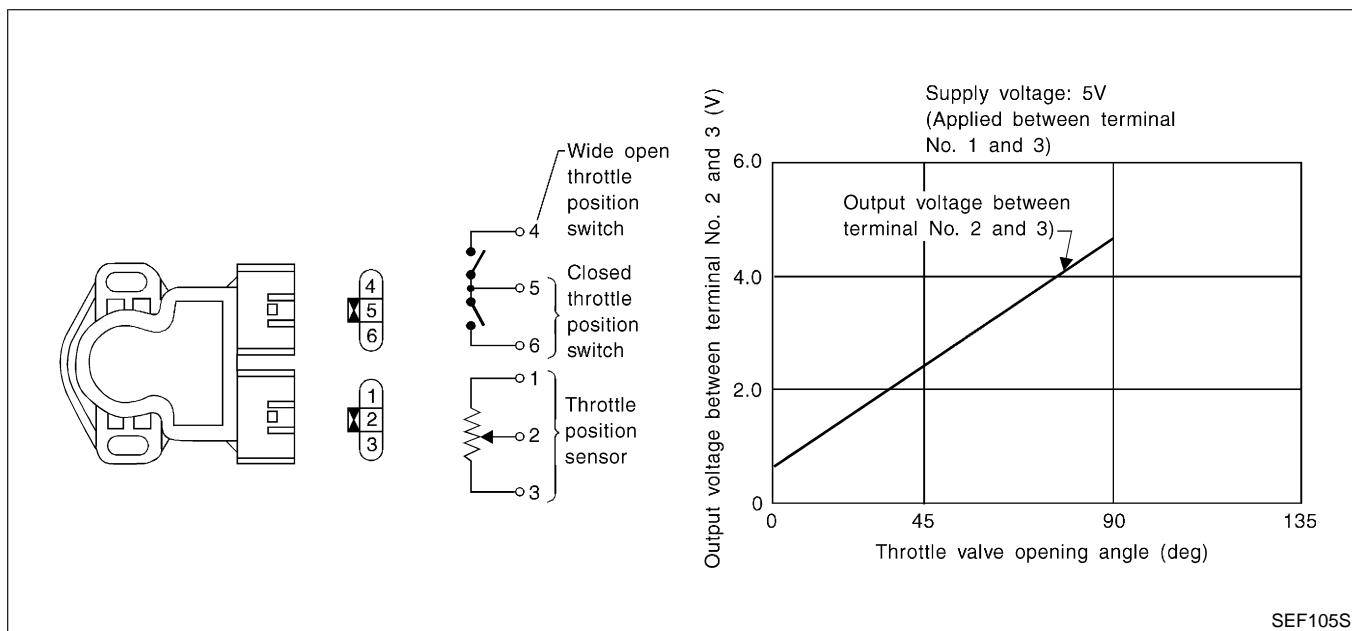
NGEC0079

NOTE:

If DTC P0121, P0122 or P0123 is displayed with DTC P0510, first perform trouble diagnosis for DTC P0510, EC-440.

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

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



SEF105S

CONSULT-II Reference Value in Data Monitor Mode

NGEC0080

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL POS SEN	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Engine: After warming up 	Throttle valve: fully closed	0.2 - 0.8V
		Throttle valve: fully opened	3.5 - 4.5V
ABSOL TH-P/S	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Engine: After warming up 	Throttle valve: fully closed	0.0%
		Throttle valve: fully opened	Approx. 80%

ECM Terminals and Reference Value

=NGEC0081

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

CAUTION:

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

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
23	L	Throttle position sensor	[Ignition switch ON] ● Warm-up condition ● Accelerator pedal fully released	0.2 - 0.8V
			[Ignition switch ON] ● Accelerator pedal fully depressed	3.5 - 4.5V
42	BR	Sensors' power supply	[Ignition switch ON]	Approximately 5V
43	B/W	Sensors' ground	[Engine is running] ● Idle speed	Approximately 0V

On Board Diagnosis Logic

NGEC0082

DTC No.		Malfunction is detected when ...	Check Items (Possible Cause)
P0122 P0123	A)	An excessively low (P0122) or high (P0123) voltage from the sensor is sent to ECM.*	<ul style="list-style-type: none"> ● Harness or connectors (The throttle position sensor circuit is open or shorted.) ● Throttle position sensor
P0121	B)	A high voltage from the sensor is sent to ECM under light load driving condition.	<ul style="list-style-type: none"> ● Harness or connectors (The throttle position sensor circuit is open or shorted.) ● Throttle position sensor ● Fuel injector ● Camshaft position sensor ● Mass air flow sensor
	C)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	<ul style="list-style-type: none"> ● Harness or connectors (The throttle position sensor circuit is open or shorted.) ● Intake air leaks ● Throttle position sensor

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

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

DTC Confirmation Procedure

Perform "PROCEDURE FOR MALFUNCTION A" first. If the 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B". If there is no problem on "PROCEDURE FOR MALFUNCTION B", perform "PROCEDURE FOR MALFUNCTION C".

=NGEC0083

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

NGEC0083S01

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is more than 10V at idle.
- This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
P/N POSI SW	OFF

SEF065Y

With CONSULT-II

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

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

- 3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-196.

With GST

Follow the procedure "With CONSULT-II".

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B

NGEC0083S02

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and let it idle for at least 10 seconds. If idle speed is over 1,100 rpm, maintain the following conditions for at least 10 seconds to keep engine speed below 1,100 rpm.

Selector lever	Suitable position except "N" (Higher gear position such as 3rd or 4th is better to keep low engine rpm.)
Accelerator pedal	Released
Vehicle speed	As slow as possible

4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-196.

With GST

Follow the procedure "With CONSULT-II".

PROCEDURE FOR MALFUNCTION C

CAUTION:

Always drive vehicle at a safe speed.

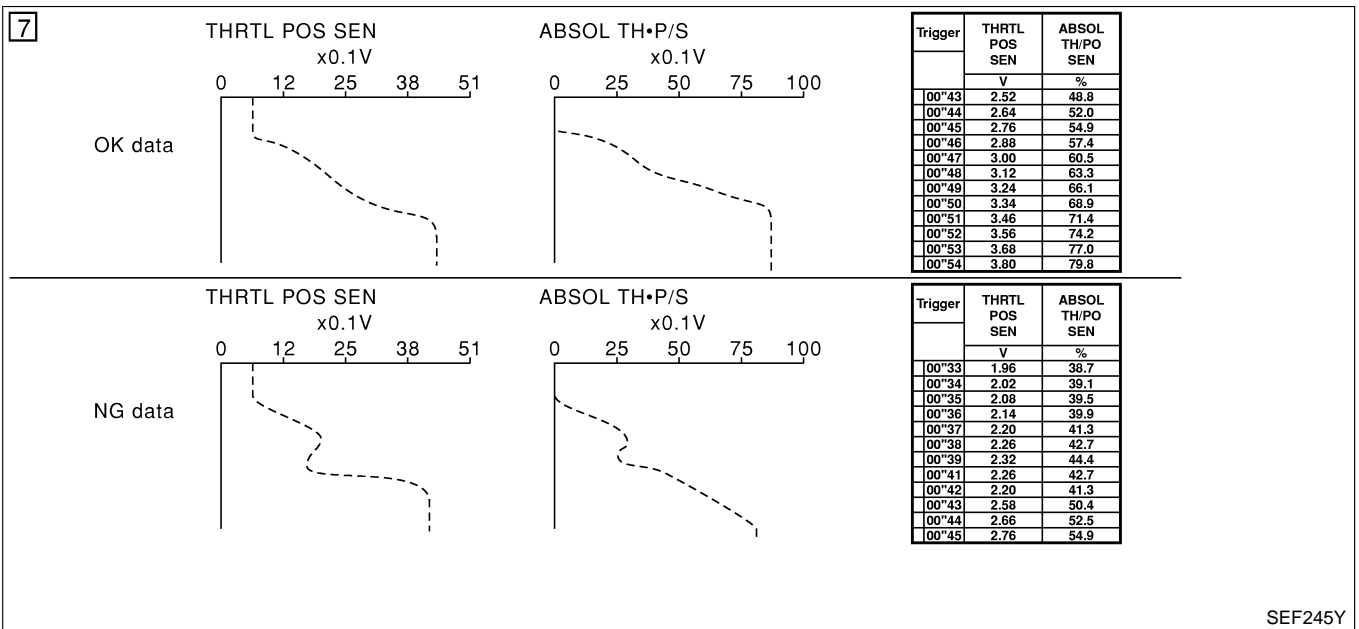
With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
 - 2) Turn ignition switch OFF and wait at least 5 seconds.
 - 3) Turn ignition switch ON.
 - 4) Select "MANU TRIG" in "DATA MONITOR" mode with CONSULT-II.
 - 5) Select "THRTL POS SEN" and "ABSOL TH·P/S" in "DATA MONITOR" mode with CONSULT-II.
 - 6) Press RECORD on CONSULT-II SCREEN at the same time accelerator pedal is depressed.
 - 7) Print out the recorded graph and check the following:
 - The voltage rise is linear in response to accelerator pedal depression.
 - The voltage when accelerator pedal is fully depressed is approximately 4V.
- If NG, go to "Diagnostic Procedure", EC-196.
If OK, go to following step.

6

DATA MONITOR	
MONITOR	NO DTC
THRTL POS SEN	XXX V
ABSOL TH·P/S	XXX %

SEF177Y



DTC P0121, P0122, P0123 TP SENSOR

KA24DE

DTC Confirmation Procedure (Cont'd)

9

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C

SEF178Y

- 8) Select "AUTO TRIG" in "DATA MONITOR" mode with CONSULT-II.
- 9) Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm
MAS A/F SE-B1	More than 3V
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

- 10) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-196.



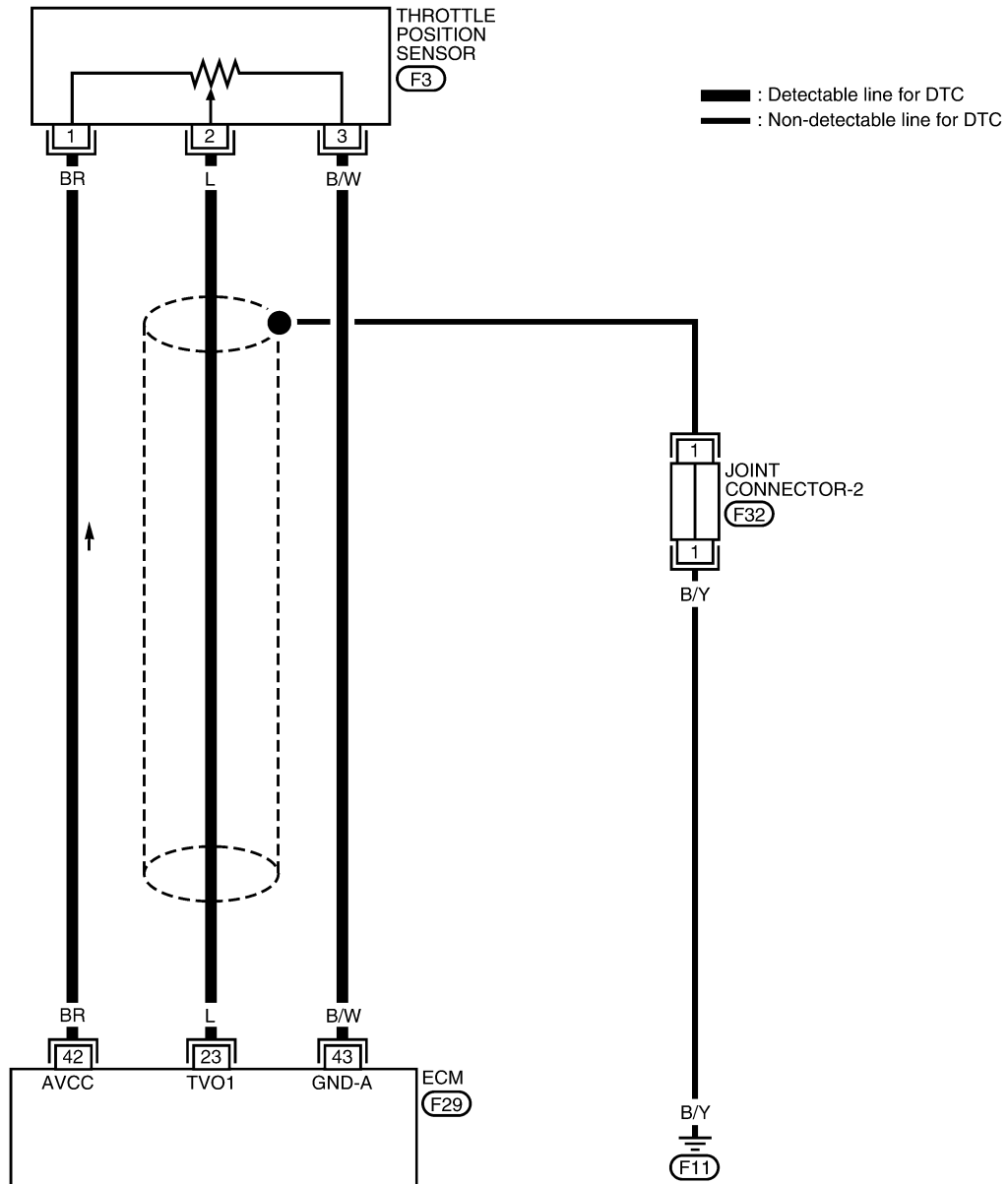
With GST

Follow the procedure "With CONSULT-II".

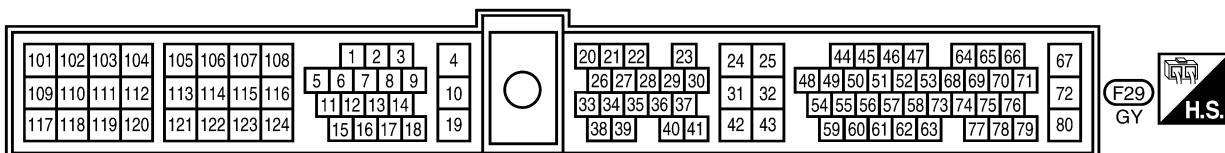
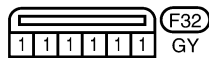
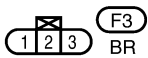
Wiring Diagram

NGEC0084

EC-TPS-01



- GI
- MA
- EM
- LC
- EC**
- FE
- CL
- MT
- AT
- TF
- PD
- AX
- SU
- BR
- ST
- RS
- BT
- HA
- SC
- EL
- IDX



WEC964

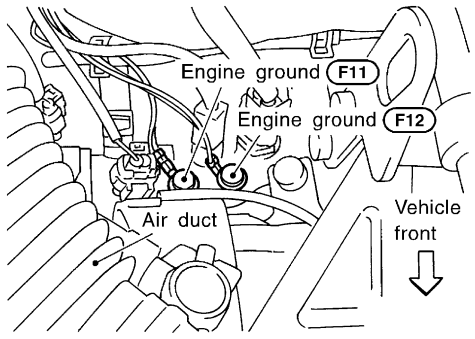
Diagnostic Procedure

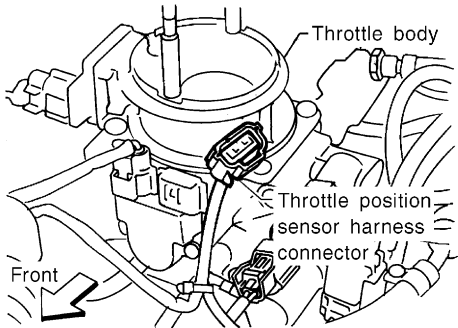
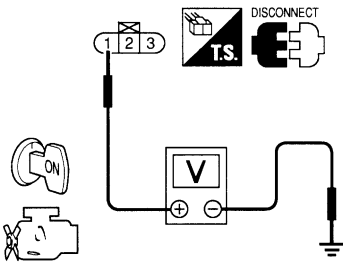
NGEC0085

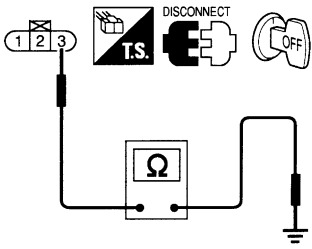
1	INSPECTION START									
Which malfunction A, B or C is duplicated?										
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">MALFUNCTION</th> <th style="width: 50%;">Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">A</td> <td style="text-align: center;">A</td> </tr> <tr> <td style="text-align: center;">B</td> <td style="text-align: center;">B</td> </tr> <tr> <td style="text-align: center;">C</td> <td style="text-align: center;">C</td> </tr> </tbody> </table>			MALFUNCTION	Type	A	A	B	B	C	C
MALFUNCTION	Type									
A	A									
B	B									
C	C									
MTBL0066										
Type A, B or C										
Type A or B	▶	GO TO 4.								
Type C	▶	GO TO 2.								

2	ADJUST THROTTLE POSITION SENSOR											
1. Check the following items. Refer to "Basic Inspection", EC-112.												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Items</th> <th style="width: 50%;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>20° ± 2° BTDC</td> </tr> <tr> <td>Base idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>800 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table>			Items	Specifications	Ignition timing	20° ± 2° BTDC	Base idle speed	750 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF	Target idle speed	800 ± 50 rpm (in "P" or "N" position)
Items	Specifications											
Ignition timing	20° ± 2° BTDC											
Base idle speed	750 ± 50 rpm (in "P" or "N" position)											
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF											
Target idle speed	800 ± 50 rpm (in "P" or "N" position)											
MTBL0328												
OK or NG												
OK	▶	GO TO 3.										

3	CHECK INTAKE SYSTEM	
Check the following for connection.		
<ul style="list-style-type: none"> ● Air duct ● Air cleaner ● Vacuum hoses ● Intake air passage between air duct to intake manifold collector 		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Reconnect the parts.

4	RETIGHTEN GROUND SCREWS	<p>1. Turn ignition switch OFF.</p> <p>2. Loosen and retighten engine ground screws.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF325V</p>	GI MA EM LC EC
▶ GO TO 5.			FE

5	CHECK POWER SUPPLY	<p>1. Disconnect throttle position sensor harness connector.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF265S</p> <p>2. Turn ignition switch ON.</p> <p>3. Check voltage between terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="text-align: center;">Voltage: Approximately 5V</p> <p style="text-align: center;">OK or NG</p> <p style="text-align: right;">SEF564P</p>	CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX
▶ GO TO 6.			
▶ Repair harness or connectors.			

6	CHECK GROUND CIRCUIT	
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Check harness continuity between throttle position sensor terminal 3 and engine ground. Refer to the wiring diagram. 		
		
SEF565P		
<p style="color: blue; margin: 0;">Continuity should exist.</p> <ol style="list-style-type: none"> 3. Also check harness for short to power. 		
OK or NG		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART	
Check harness for open or short between ECM and throttle position sensor.		
▶ Repair open circuit or short to ground or short to power in harness or connectors.		

8	CHECK INPUT SIGNAL CIRCUIT	
<ol style="list-style-type: none"> 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 23 and terminal 2. Refer to Wiring Diagram. <p style="color: blue; margin: 0;">Continuity should exist.</p> <ol style="list-style-type: none"> 3. Also check harness for short to ground and short to power. 		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 9.
OK (Without CONSULT-II)	▶	GO TO 10.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK THROTTLE POSITION SENSOR											
<p>Ⓟ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Reconnect all harness connectors. 2. Start engine and warm it up to normal operating temperature. 3. Stop engine and turn ignition switch ON. 4. Select "DATA MONITOR" mode with CONSULT-II. 5. Check voltage of "THRTL POS SEN" under the following conditions. 												
<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>COOLAN TEMP/S</td> <td>XXX °C</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm	COOLAN TEMP/S	XXX °C	THRTL POS SEN	XXX V
DATA MONITOR												
MONITOR	NO DTC											
ENG SPEED	XXX rpm											
COOLAN TEMP/S	XXX °C											
THRTL POS SEN	XXX V											
<p>NOTE: Voltage measurement must be made with throttle position sensor installed in vehicle.</p>												
<table border="1" style="margin: auto;"> <thead> <tr> <th>Throttle valve conditions</th> <th>Voltage V</th> </tr> </thead> <tbody> <tr> <td>Completely closed</td> <td>0.2 - 0.8 (a)</td> </tr> <tr> <td>Partially open</td> <td>Between (a) and (b)</td> </tr> <tr> <td>Completely open</td> <td>3.5 - 4.5 (b)</td> </tr> </tbody> </table>			Throttle valve conditions	Voltage V	Completely closed	0.2 - 0.8 (a)	Partially open	Between (a) and (b)	Completely open	3.5 - 4.5 (b)		
Throttle valve conditions	Voltage V											
Completely closed	0.2 - 0.8 (a)											
Partially open	Between (a) and (b)											
Completely open	3.5 - 4.5 (b)											
<p>If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-112.</p>												
OK or NG												
OK (Type B in step 1)	▶	GO TO 11.										
OK (Type A or C in step 1)	▶	GO TO 14.										
NG	▶	Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-112.										

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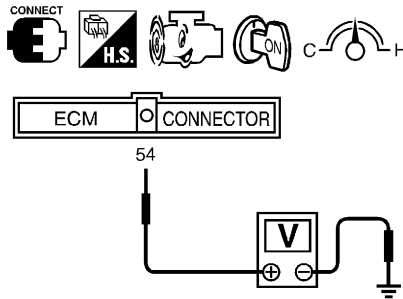
MTBL0579

10	CHECK THROTTLE POSITION SENSOR								
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Reconnect all harness connectors. 2. Start engine and warm it up to normal operating temperature. 3. Stop engine and turn ignition switch ON. 4. Check voltage between ECM terminal 23 (Throttle position sensor signal) and ground under the following conditions. 									
<p>NOTE: Voltage measurement must be made with throttle position sensor installed in vehicle.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Throttle valve conditions</th> <th style="text-align: center;">Voltage V</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Completely closed</td> <td style="text-align: center;">0.2 - 0.8 (a)</td> </tr> <tr> <td style="text-align: center;">Partially open</td> <td style="text-align: center;">Between (a) and (b)</td> </tr> <tr> <td style="text-align: center;">Completely open</td> <td style="text-align: center;">3.5 - 4.5 (b)</td> </tr> </tbody> </table>		Throttle valve conditions	Voltage V	Completely closed	0.2 - 0.8 (a)	Partially open	Between (a) and (b)	Completely open	3.5 - 4.5 (b)
Throttle valve conditions	Voltage V								
Completely closed	0.2 - 0.8 (a)								
Partially open	Between (a) and (b)								
Completely open	3.5 - 4.5 (b)								
SEF767W									
MTBL0579									
If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-112.									
OK or NG									
OK (Type B in step 1)	▶ GO TO 11.								
OK (Type A or C in step 1)	▶ GO TO 14.								
NG	▶ Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-112.								

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11 CHECK MASS AIR FLOW SENSOR

1. Turn ignition switch ON.
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.



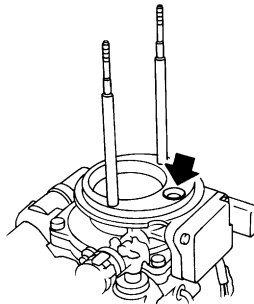
SEF326V

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.8
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.9 - 2.3
Idle to about 4,000 rpm*	1.3 - 1.7 to Approx. 3.0

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

MTBL0326

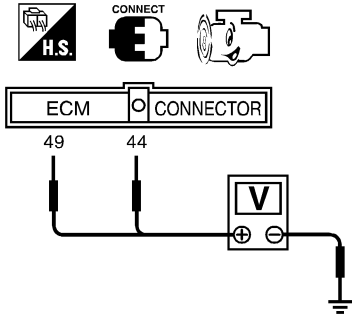
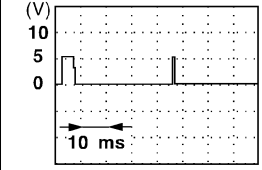
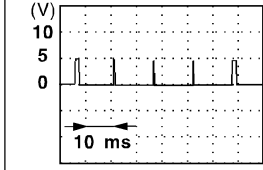
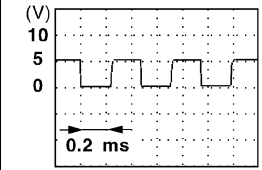
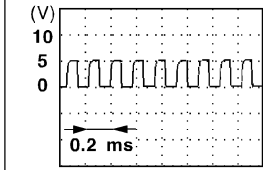
4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Repeat above check.
5. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.

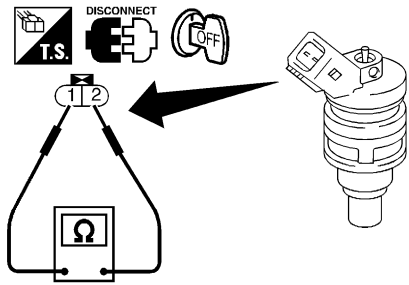


SEF893J

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace mass air flow sensor.

12	CHECK CAMSHAFT POSITION SENSOR	
<p>1. Start engine and warm it up to normal operating temperature. 2. Check voltage between ECM terminals 49 and engine ground, ECM terminal 44 and engine ground.</p>		
		
Terminal 44 and engine ground		
Condition	Idle	2,000 rpm
Voltage	0.2 - 0.5V	0 - 0.5V
Pulse signal		
Terminal 49 and engine ground		
Condition	Idle	2,000 rpm
Voltage	Approximately 2.6V	Approximately 2.5 - 2.6V
Pulse signal		
SEF868Z		
OK or NG		
OK	▶	GO TO 13.
NG	▶	Replace distributor assembly with camshaft position sensor.

13	CHECK FUEL INJECTOR	
<p>1. Disconnect injector harness connector. 2. Check resistance between terminals as shown in the figure.</p>		
		
Resistance: 10 - 14Ω [at 25°C (77°F)]		
SEF273W		
OK or NG		
OK	▶	GO TO 14.
NG	▶	Replace fuel injector.

DTC P0121, P0122, P0123 TP SENSOR

KA24DE

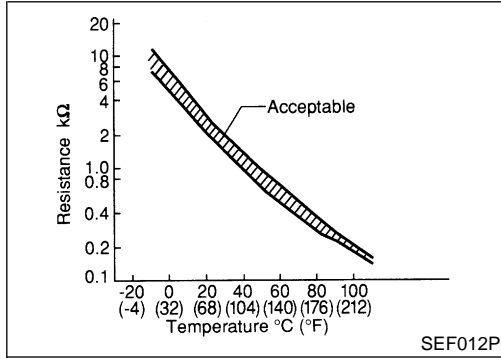
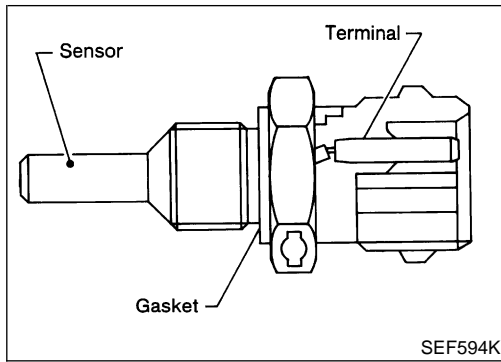
Diagnostic Procedure (Cont'd)

14	CHECK SHIELD CIRCUIT	
	<p>1. Turn ignition switch OFF.</p> <p>2. Remove joint connector-1.</p> <p>3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector-1 terminal 1 and ground ● Joint connector-1 (Refer to "HARNES LAYOUT", <i>EL-250</i>.) <p style="margin-left: 20px;">Continuity should exist.</p> <p>4. Also check harness for short to power.</p> <p>5. Then reconnect joint connector.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶	GO TO 15.
NG	▶	Repair open circuit or short to power in harness or connectors.

15	CHECK INTERMITTENT INCIDENT	
	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.	
	▶	INSPECTION END

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Component Description



Component Description

NGEC0087

NOTE:

If DTC P0125 is displayed with P0117 or P0118, first perform trouble diagnosis for DTC P0117 or P0118, EC-185.

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

<Reference data>

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

*: These data are reference values and are measured between ECM terminal 59 (Engine coolant temperature sensor) and ground.

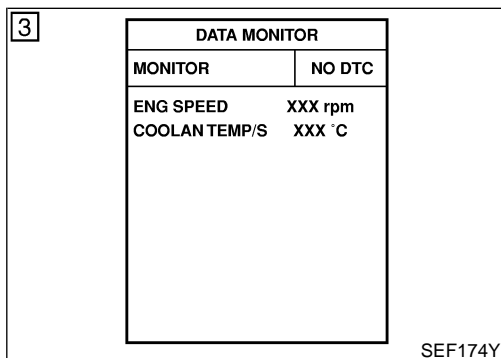
CAUTION:

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

NGEC0089

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0125	<ul style="list-style-type: none"> • Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. • Engine coolant temperature is insufficient for closed loop fuel control. 	<ul style="list-style-type: none"> • Harness or connectors (High resistance in the circuit) • Engine coolant temperature sensor • Thermostat



DTC Confirmation Procedure

NGEC0090

CAUTION:

Be careful not to overheat engine.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.

DTC P0125 ECT SENSOR

KA24DE

DTC Confirmation Procedure (Cont'd)

- 3) Start engine and run it for 65 minutes at idle speed.
If **“COOLAN TEMP/S” increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.**
- 4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-207.

 **With GST**

Follow the procedure “With CONSULT-II”.

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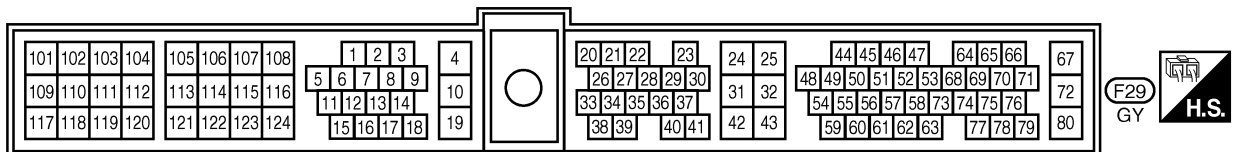
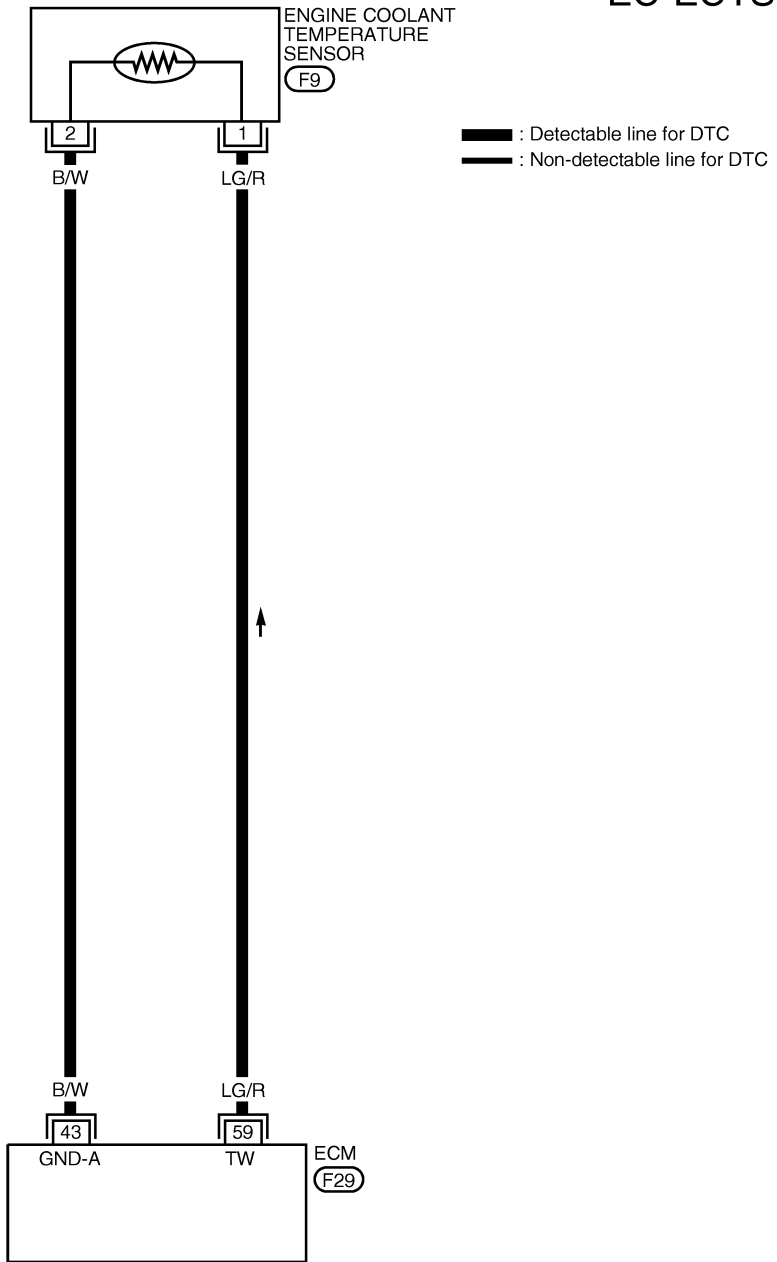
EL

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Wiring Diagram

NGEC0091

EC-ECTS-01



Diagnostic Procedure

NGEC0092

1	CHECK POWER SUPPLY	
<p>1. Turn ignition switch OFF. 2. Disconnect engine coolant temperature sensor harness connector.</p>		
<p>3. Turn ignition switch ON. 4. Check voltage between engine coolant temperature sensor terminal 1 and ground with CONSULT-II or tester.</p>		
<p>Voltage: Approximately 5V</p>		
<p>OK or NG</p>		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

SEF330V
SEF206W

2	DETECT MALFUNCTIONING PART
Check the harness for open or short between ECM and engine coolant temperature sensor.	
▶ Repair harness or connectors.	

3	CHECK GROUND CIRCUIT	
<p>1. Turn ignition switch OFF. 2. Check harness continuity between engine coolant temperature sensor terminal 2 and engine ground. Refer to the wiring diagram. Continuity should exist.</p>		
3. Also check harness for short to power.		
<p>OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART
Check the harness for open or short between ECM and engine coolant temperature sensor.	
▶ Repair open circuit or short to ground or short to power in harness or connectors.	

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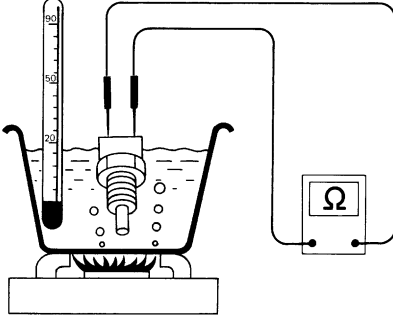
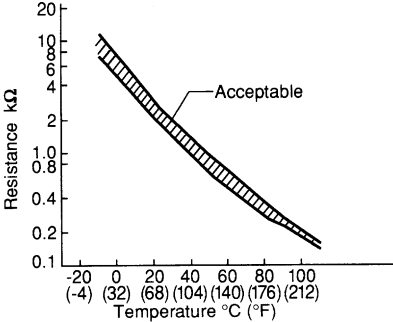
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5	CHECK ENGINE COOLANT TEMPERATURE SENSOR								
<p>Check resistance as shown in the figure.</p> <div style="text-align: center;">  </div>									
<p><Reference data></p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Temperature °C (°F)</th> <th style="text-align: center;">Resistance kΩ</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">20 (68)</td> <td style="text-align: center;">2.1 - 2.9</td> </tr> <tr> <td style="text-align: center;">50 (122)</td> <td style="text-align: center;">0.68 - 1.00</td> </tr> <tr> <td style="text-align: center;">90 (194)</td> <td style="text-align: center;">0.236 - 0.260</td> </tr> </tbody> </table>		Temperature °C (°F)	Resistance kΩ	20 (68)	2.1 - 2.9	50 (122)	0.68 - 1.00	90 (194)	0.236 - 0.260
Temperature °C (°F)	Resistance kΩ								
20 (68)	2.1 - 2.9								
50 (122)	0.68 - 1.00								
90 (194)	0.236 - 0.260								
SEF152P									
MTBL0285									
<div style="display: flex; align-items: center; justify-content: center;">  </div>									
SEF012P									
OK or NG									
OK	▶	GO TO 6.							
NG	▶	Replace engine coolant temperature sensor.							

6	CHECK THERMOSTAT OPERATION	
<p>When the engine is cooled [lower than 76.5°C (170°F)], condition grasp lower radiator hose and confirm the engine coolant does not flow.</p>		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Repair or replace thermostat. Refer to "Thermostat", "ENGINE COOLING SYSTEM", LC-13 .

7	CHECK INTERMITTENT INCIDENT
<p>Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.</p>	
▶ INSPECTION END	

On Board Diagnosis Logic

NGEC1028

Engine coolant temperature has not risen enough to open the thermostat even though the engine has run long enough. This is due to a leak in the seal or the thermostat open stuck. Malfunction is detected when the engine coolant temperature does not reach to specified temperature even though the engine has run long enough.

GI
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Possible Cause

NGEC1029

- Thermostat function
- Leakage from sealing portion of thermostat
- Engine coolant temperature sensor

EC
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DTC Confirmation Procedure

NGEC1030

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- For best results, perform at ambient temperature of **-10°C (14°F) or higher.**
- For best results, perform at engine coolant temperature of **-10°C (14°F) to 60°C (140°F).**

AT
TF
PD
AX

WITH CONSULT-II

NGEC1030S01

- 1) Replace thermostat with new one. Refer to **LC-13**, “Thermostat”. Use only a genuine NISSAN thermostat as a replacement. If an incorrect thermostat is used, the MIL may come on.
- 2) Turn ignition switch “ON”.
- 3) Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
- 4) Check that the “COOLAN TEMP/S” is above 60°C (140°F). If it is below 60°C (140°F), go to following step. If it is above 60°C (140°F), stop engine and cool down the engine to less than 60°C (140°F), then retry from step 1.
- 5) Drive vehicle for 10 consecutive minutes under the following conditions.

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

If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-210.

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WITH GST

NGEC1030S02

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

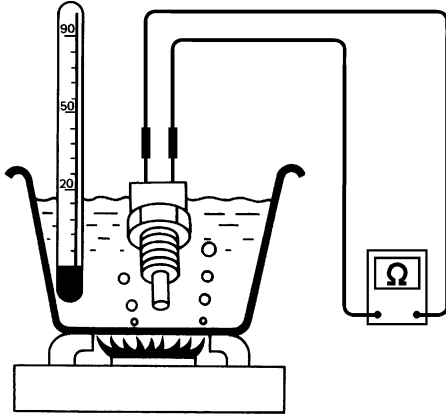
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Diagnostic Procedure

NGEC1031

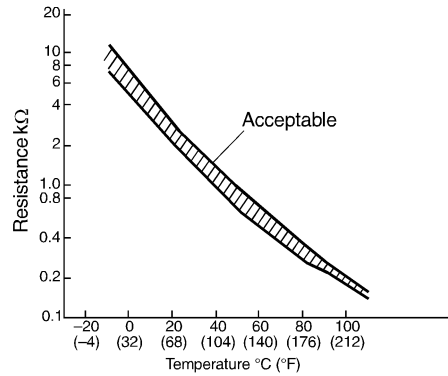
1 CHECK ENGINE COOLANT TEMPERATURE SENSOR

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



<Reference data>

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

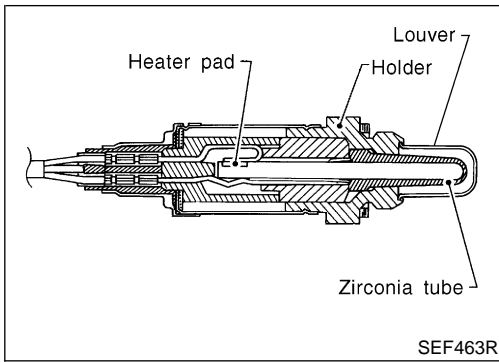


SEF304X

OK or NG

OK ► INSPECTION END

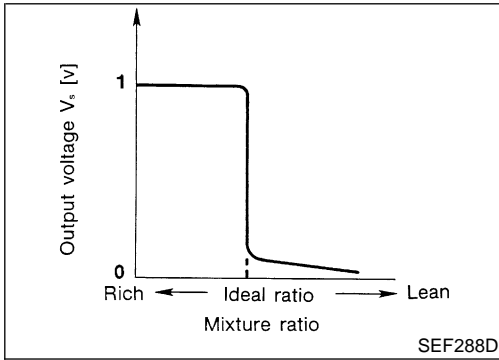
NG ► Replace engine coolant temperature sensor.



Component Description

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

NGEC0128



CONSULT-II Reference Value in Data Monitor Mode

NGEC0129

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	<ul style="list-style-type: none"> Engine: After warming up 	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

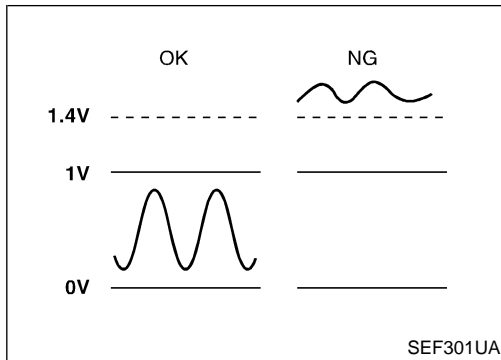
NGEC0130

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	B	Heated oxygen sensor 1	<p>[Engine is running]</p> <ul style="list-style-type: none"> After warming up to normal operating temperature and engine speed is 2,000 rpm 	<p>0 - Approximately 1.0V</p> <p>SEF008W</p>



On Board Diagnosis Logic

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 output is not inordinately high. NGEC0131

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0132	<ul style="list-style-type: none"> An excessively high voltage from the sensor is sent to ECM. 	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open or shorted.) Heated oxygen sensor 1

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

DTC Confirmation Procedure

NGEC0132

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 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 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Restart engine and let it idle for 35 seconds.
- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-214.

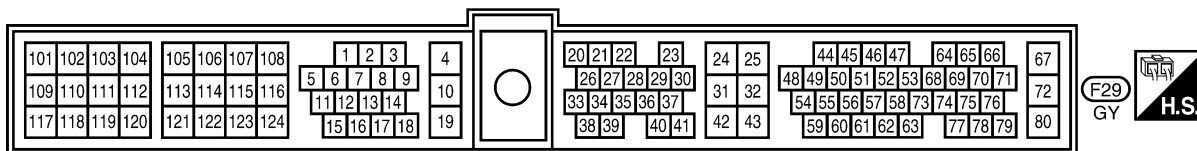
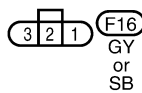
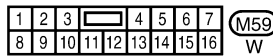
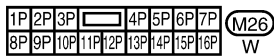
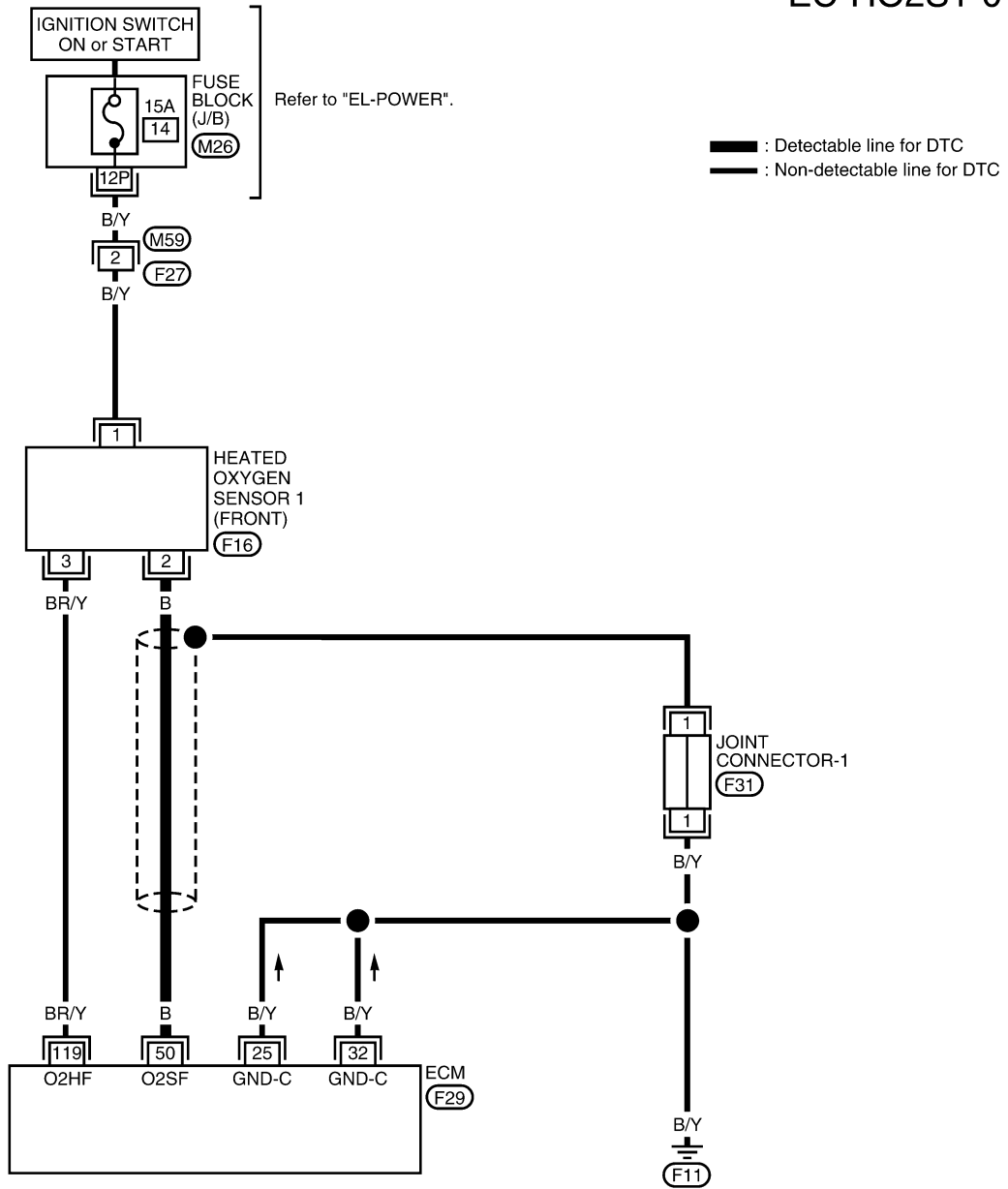
Ⓜ With GST

- 1) Start engine and warm it up to normal operating temperature.
 - 2) Turn ignition switch OFF and wait at least 5 seconds.
 - 3) Restart engine and let it idle for 35 seconds.
 - 4) Turn ignition switch OFF and wait at least 5 seconds.
 - 5) Restart engine and let it idle for 35 seconds.
 - 6) Select "MODE 3" with GST.
 - 7) If DTC is detected, go to "Diagnostic Procedure", EC-214.
- **When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

Wiring Diagram

NGEC0133

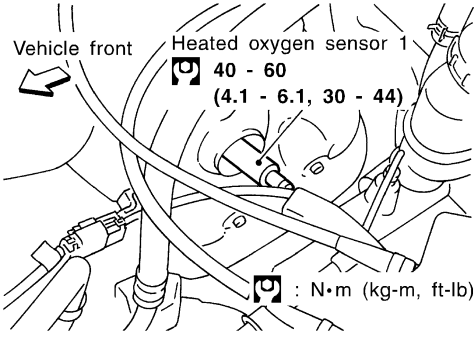
EC-HO2S1-01

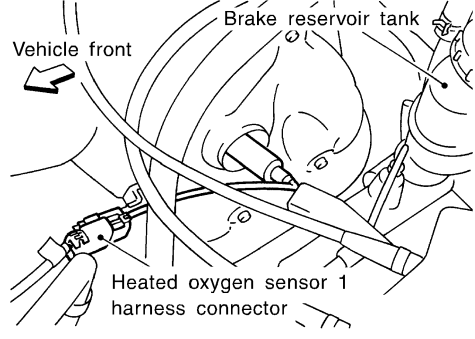
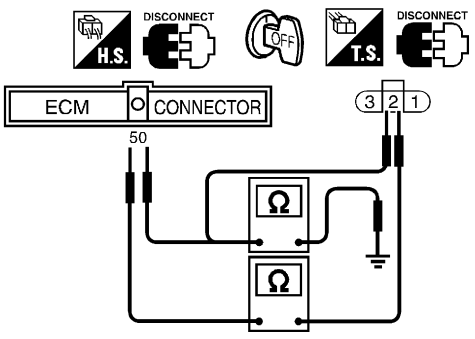


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Diagnostic Procedure

NGEC0134

1	RETIGHTEN HEATED OXYGEN SENSOR 1
<p>1. Turn ignition switch OFF. 2. Loosen and retighten heated oxygen sensor 1.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF332VB</p> <p>Tightening torque: 40 - 60 N-m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)</p>	
▶	GO TO 2.

2	CHECK INPUT SIGNAL CIRCUIT
<p>1. Disconnect heated oxygen sensor 1 harness connector and ECM harness connector.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF331VB</p> <p>2. Check harness continuity between ECM terminal 50 and terminal 2.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF141V</p> <p>Continuity should exist.</p> <p>3. Check harness continuity between ECM terminal 50 (or terminal 2) and ground. Continuity should not exist.</p> <p>4. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 3.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK HARNESS CONNECTOR	
Check heated oxygen sensor 1 harness connector for water. Water should not exist.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 4.
OK (Without CONSULT-II)	▶	GO TO 5.
NG	▶	Repair or replace harness connector.

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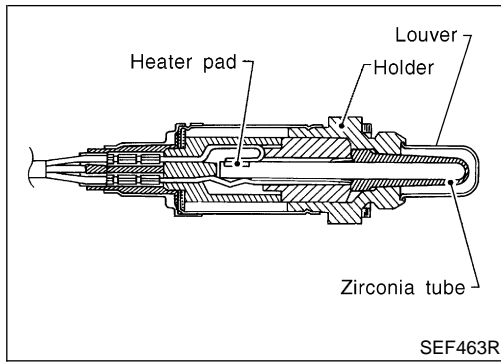
5	CHECK HEATED OXYGEN SENSOR 1
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Reconnect all harness connectors. Start engine and warm it up to normal operating temperature. Set voltmeter probes between ECM terminal 50 (Heated oxygen sensor 1 signal) and engine ground. 	
AEC873A	
<ol style="list-style-type: none"> Check the following with engine speed held at 2,000 rpm constant under no load. <ul style="list-style-type: none"> The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five times within 10 seconds. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V The maximum voltage is over 0.6V at least one time. The minimum voltage is below 0.3V at least one time. The voltage never exceeds 1.0V. <p>CAUTION:</p> <ul style="list-style-type: none"> Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 6.
NG	▶ Replace heated oxygen sensor 1.

6	CHECK SHIELD CIRCUIT
<ol style="list-style-type: none"> Turn ignition switch OFF. Remove joint connector-1. Check the following. <ul style="list-style-type: none"> Continuity between joint connector-1 terminal 1 and ground Joint connector-1 (Refer to "HARNESS LAYOUT", <i>EL-250</i>.) Continuity should exist. Also check harness for short to ground and short to power. Then reconnect joint connector. <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 7.
NG	▶ Repair open circuit, short to power in harness or connectors.

7	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.	
	▶ INSPECTION END

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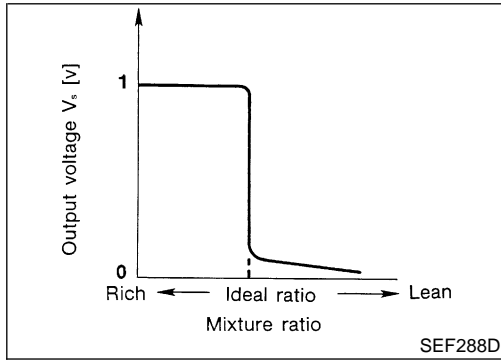
Component Description



Component Description

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

NGEC0119



CONSULT-II Reference Value in Data Monitor Mode

NGEC0120

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	<ul style="list-style-type: none"> Engine: After warming up 	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

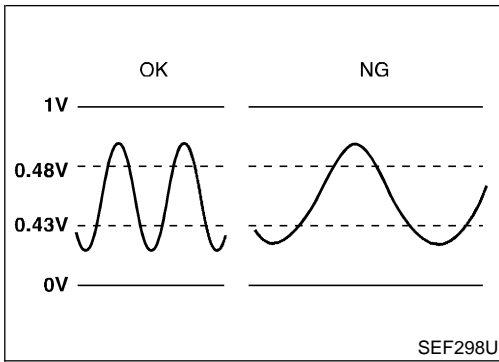
NGEC0121

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

CAUTION:

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

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1	<p>[Engine is running]</p> <ul style="list-style-type: none"> After warming up to normal operating temperature and engine speed is 2,000 rpm 	<p>0 - Approximately 1.0V</p>



On Board Diagnosis Logic

NGEC0122

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

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0133	<ul style="list-style-type: none"> The response of the voltage signal from the sensor takes more than the specified time. 	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open or shorted.) Heated oxygen sensor 1 Heated oxygen sensor 1 heater Fuel pressure Injectors Intake air leaks Exhaust gas leaks PCV Mass air flow sensor

6 HO2S1 (B1) P0133

OUT OF CONDITION

MONITOR

ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
THRTL POS SEN	XXX V

SEF656Y

6 HO2S1 (B1) P0133

TESTING

MONITOR

ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
THRTL POS SEN	XXX V

SEF657Y

6 HO2S1 (B1) P0133

COMPLETED

SEF658Y

DTC Confirmation Procedure

NGEC0123

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 5 seconds before conducting the next test.

TESTING CONDITION:

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

With CONSULT-II

- Start engine and warm it up to normal operating temperature.
- Stop engine and wait at least 5 seconds.
- Turn ignition switch ON and select "HO2S1 (B1) P0133" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
- Touch "START".
- Start engine and let it idle for at least 3.0 minutes.

NOTE:

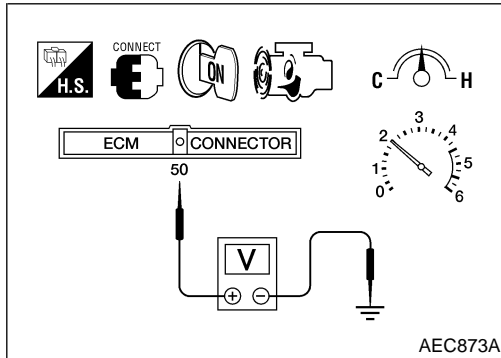
Never raise engine speed above 3,000 rpm after this step. If the engine speed limit is exceeded, return to step 5.

- When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 20 seconds.)

ENG SPEED	1,750 - 3,750 rpm
Vehicle speed	More than 80 km/h (50 MPH)
B/FUEL SCHDL	3.5 - 15.5 msec
Selector lever	Suitable position

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

- 7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-222.



Overall Function Check

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed. NGEC0124

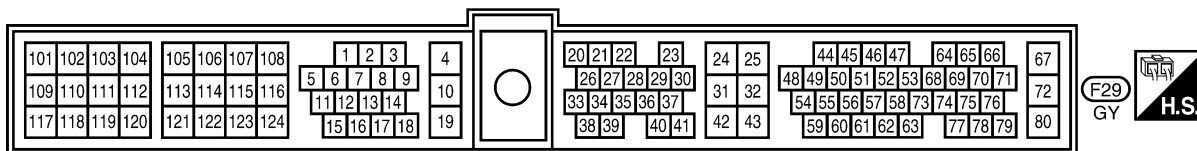
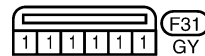
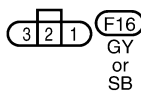
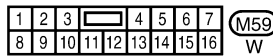
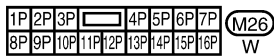
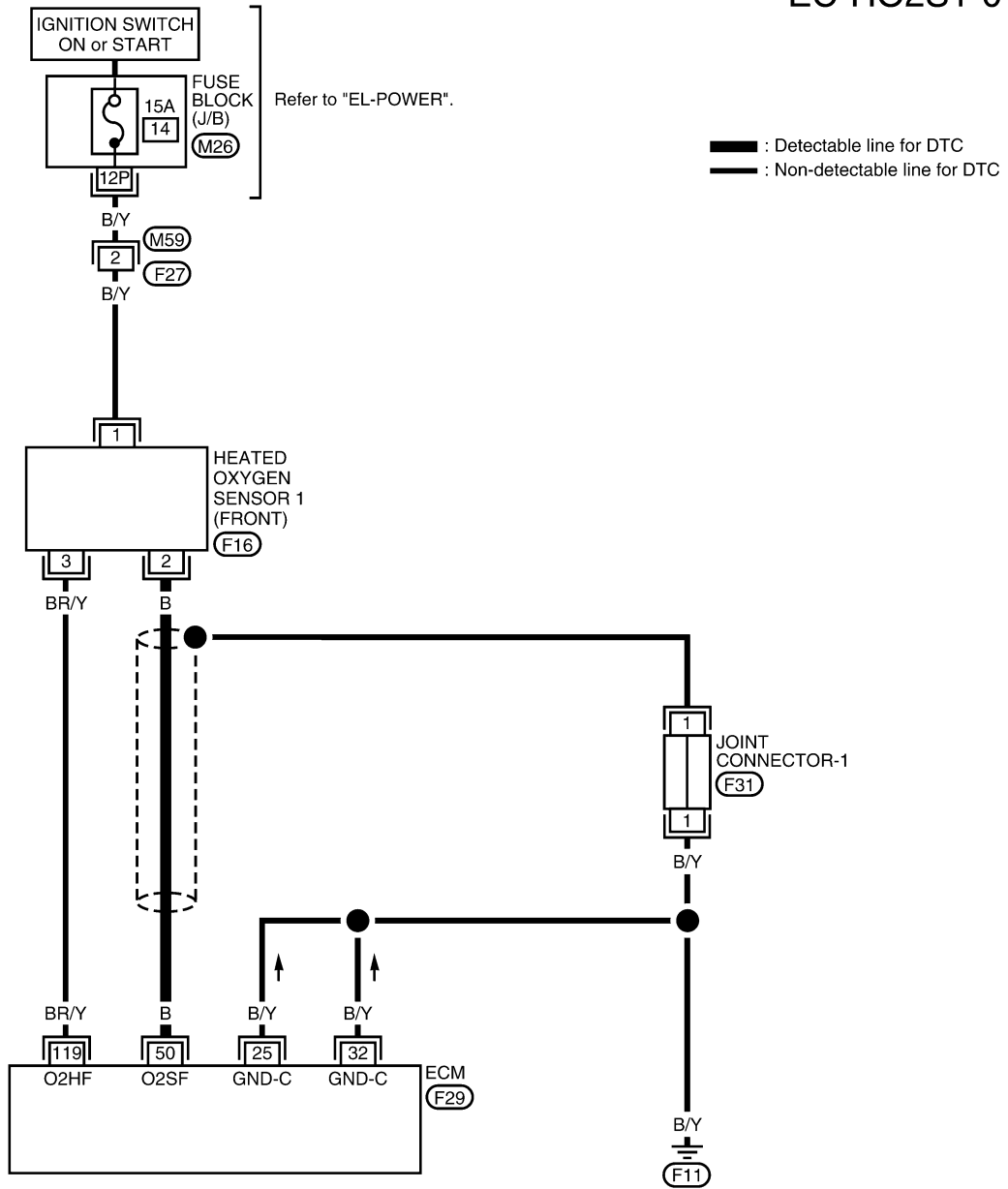
With GST

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 (Heated oxygen sensor 1 signal) and engine ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five times within 10 seconds.
 - 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V**
 - 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V**
- 4) If NG, go to "Diagnostic Procedure", EC-222.

Wiring Diagram

NGEC0125

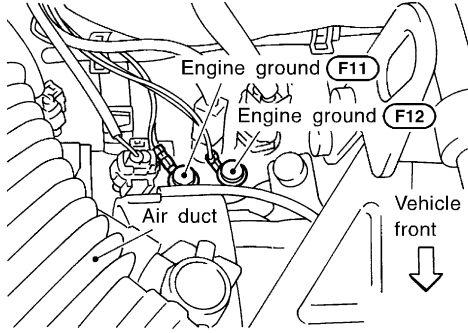
EC-HO2S1-01

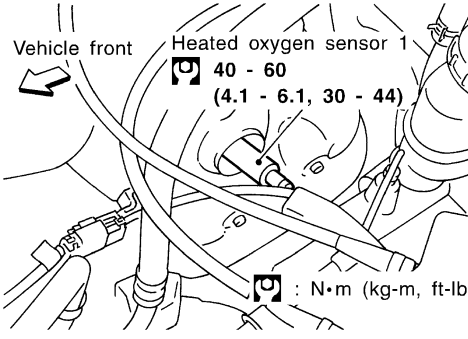


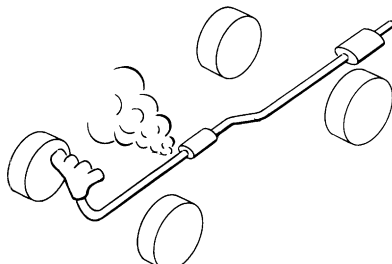
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Diagnostic Procedure

NGEC0126

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p>	
	
SEF325V	
▶	GO TO 2.

2	RETIGHTEN HEATED OXYGEN SENSOR 1
Loosen and retighten heated oxygen sensor 1.	
	
SEF332VB	
<p>Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)</p>	
▶	GO TO 3.

3	CHECK EXHAUST AIR LEAK
<p>1. Start engine and run it at idle. 2. Listen for an exhaust air leak before three way catalyst.</p>	
	
SEF099P	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Repair or replace.

4	CHECK FOR INTAKE AIR LEAK	
Listen for an intake air leak between the mass air flow sensor and the intake manifold.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Repair or replace.

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5	CLEAR THE SELF-LEARNING DATA							
<p>Ⓟ With CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II. Clear the self-learning control coefficient by touching "CLEAR". 								
<table border="1" style="margin: auto;"> <tr> <th colspan="2">WORK SUPPORT</th> </tr> <tr> <td>SELF-LEARNING CONT</td> <td>B1 100%</td> </tr> <tr> <td colspan="2" style="text-align: center;">CLEAR</td> </tr> </table>			WORK SUPPORT		SELF-LEARNING CONT	B1 100%	CLEAR	
WORK SUPPORT								
SELF-LEARNING CONT	B1 100%							
CLEAR								
<p>4. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?</p>								

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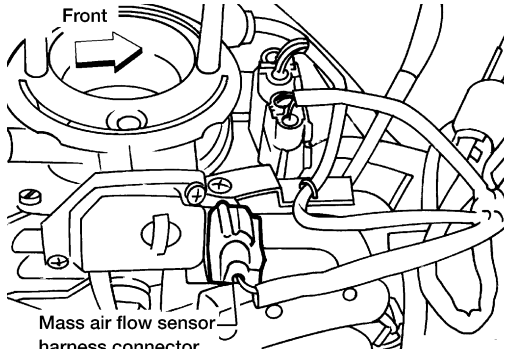
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<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Turn ignition switch "OFF". Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed. 		
 <p style="text-align: center;">Mass air flow sensor harness connector</p>		
<p>4. Stop engine and reconnect mass air flow sensor harness connector. 5. Make sure 1st trip DTC P0102 is displayed. 6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-86. 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 P0172 detected? Is it difficult to start engine?</p>		
Yes or No		
Yes	▶	Perform trouble diagnosis for DTC P0171, P0172. Refer to EC-255, 262.
No	▶	GO TO 6.

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6 CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 1 harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal 50 and terminal 2.

SEF141V

Continuity should exist.

4. Check harness continuity between ECM terminal 50 (or terminal 2) and ground.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

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

7 CHECK HEATED OXYGEN SENSOR 1 HEATER

Check resistance between terminals 3 and 1.

SEF220W

Resistance: 2.3 - 4.3 Ω at 25°C (77°F)

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

Continuity should not exist.

CAUTION:

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

OK or NG

OK (With CONSULT-II)	▶	GO TO 8.
OK (Without CONSULT-II)	▶	GO TO 9.
NG	▶	Replace heated oxygen sensor 1.

8 CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Reconnect all harness connectors.
2. Start engine and warm it up to normal operating temperature.
3. Select "MANU TRIG" in "DATA MONITOR" mode, and the trigger point is adjusted to 100%.
4. Select "HO2S1 (B1)" and "HO2S1 MNTR (B1)" in item selection.
5. Hold engine speed at 2,000 rpm under no load during the following steps.
6. Touch "START" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

7. Check the following.

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

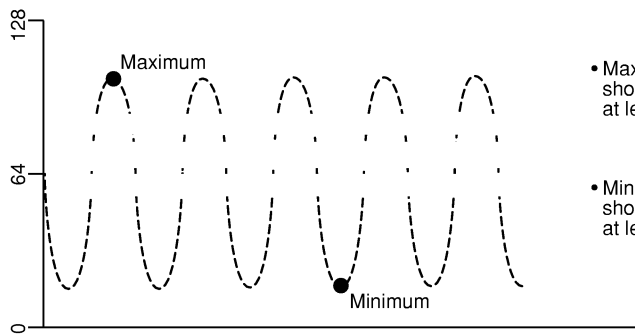
cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

R means HO2S1 MNTR (B1) indicates RICH
 L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

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

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



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

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

OK or NG

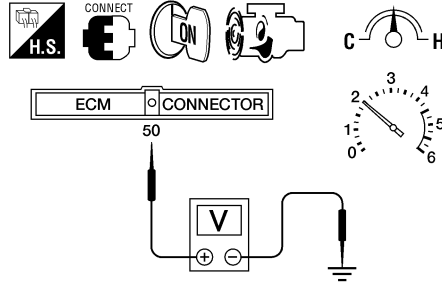
OK	▶	GO TO 10.
NG	▶	Replace heated oxygen sensor 1.

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9 CHECK HEATED OXYGEN SENSOR 1

⊗ Without CONSULT-II

1. Reconnect all harness connectors.
2. Start engine and warm it up to normal operating temperature.
3. Set voltmeter probes between ECM terminal 50 (Heated oxygen sensor 1 signal) and engine ground.



AEC873A

4. Check the following with engine speed held at 2,000 rpm constant under no load.
 - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five times within 10 seconds.
1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
 - The maximum voltage is over 0.6V at least one time.
 - The minimum voltage is below 0.3V at least one time.
 - The voltage never exceeds 1.0V.

CAUTION:

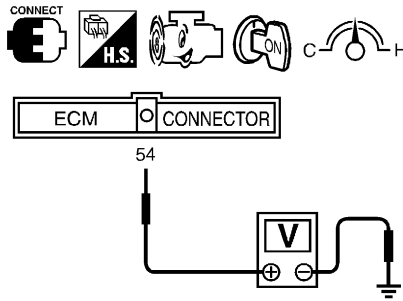
- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved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

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace heated oxygen sensor 1.

10 CHECK MASS AIR FLOW SENSOR

1. Turn ignition switch ON.
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.



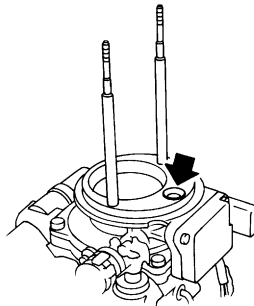
SEF326V

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.8
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.9 - 2.3
Idle to about 4,000 rpm*	1.3 - 1.7 to Approx. 3.0

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

MTBL0326

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

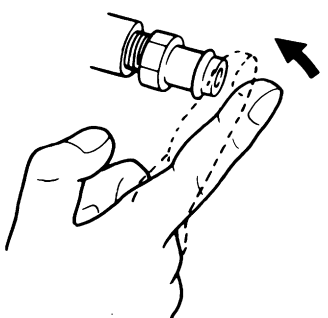


SEF893J

OK or NG

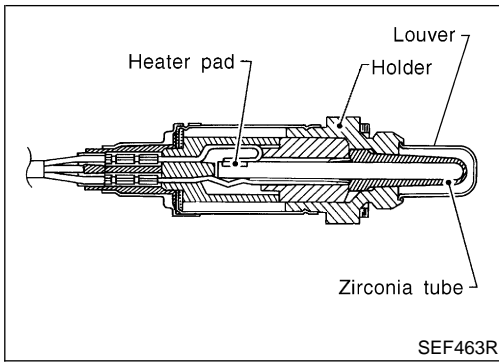
OK	▶	GO TO 11.
NG	▶	Replace mass air flow sensor.

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11	CHECK PCV VALVE
<p>1. With engine running at idle, remove PCV valve from breather separator.</p> <p>2. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over the valve inlet.</p>	
	
SEC137A	
OK or NG	
OK	▶ GO TO 12.
NG	▶ Repair or replace PCV valve.

12	CHECK SHIELD CIRCUIT
<p>1. Turn ignition switch OFF.</p> <p>2. Remove joint connector-1.</p> <p>3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector-1 terminal 1 and ground ● Joint connector-1 (Refer to "HARNES LAYOUT", <i>EL-250</i>.) <p style="margin-left: 20px;">Continuity should exist.</p> <p>4. Also check harness for short to power.</p> <p>5. Then reconnect joint connector.</p>	
OK or NG	
OK	▶ GO TO 13.
NG	▶ Repair open circuit, short to power in harness or connectors.

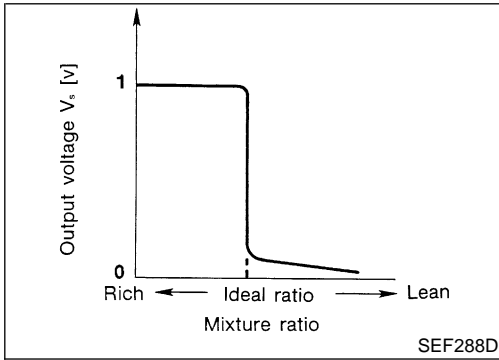
13	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.	
	▶ INSPECTION END



Component Description

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

NGEC0094



CONSULT-II Reference Value in Data Monitor Mode

NGEC0095

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	<ul style="list-style-type: none"> Engine: After warming up 	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NGEC0096

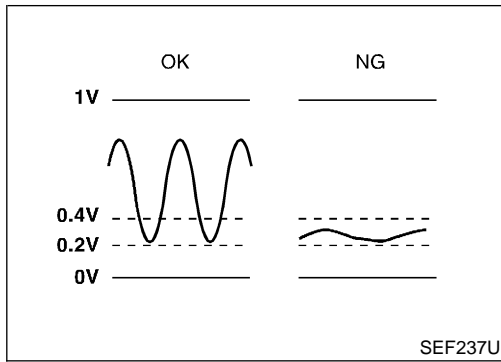
Specification data are reference values and are measured between each terminal and ground.

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	B	Heated oxygen sensor 1	<p>[Engine is running]</p> <ul style="list-style-type: none"> After warming up to normal operating temperature and engine speed is 2,000 rpm 	<p>0 - Approximately 1.0V</p>

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On Board Diagnosis Logic

Under the condition in which the heated oxygen sensor 1 signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 mV range is monitored, and the diagnosis checks that this time is not inordinately long.

NGEC0097

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0134	<ul style="list-style-type: none"> The voltage from the sensor is constantly approx. 0.3V. 	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open or shorted.) Heated oxygen sensor 1

=NGEC0098

5	HO2S1 (B1) P0134	
	OUT OF CONDITION	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	THRTL POS SEN	XXX V

SEC748C

5	HO2S1 (B1) P0134	
	TESTING	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	THRTL POS SEN	XXX V

SEC749C

5	HO2S1 (B1) P0134	
	COMPLETED	

SEC750C

DTC Confirmation Procedure

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 5 seconds before conducting the next test.

TESTING CONDITION:

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

Ⓜ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Select "HO2S1 (B1) P0134" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 3) Touch "START".
- 4) Let it idle for at least 3 minutes.

NOTE:

Never raise engine speed above 3,000 rpm after this step. If the engine speed limit is exceeded, return to step 4.

- 5) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 10 to 60 seconds.)

ENG SPEED	1,400 - 4,000 rpm
Vehicle speed	64 - 130 km/h (40 - 81 MPH)
B/FUEL SCHDL	3.5 - 17 msec
Selector lever	Suitable position

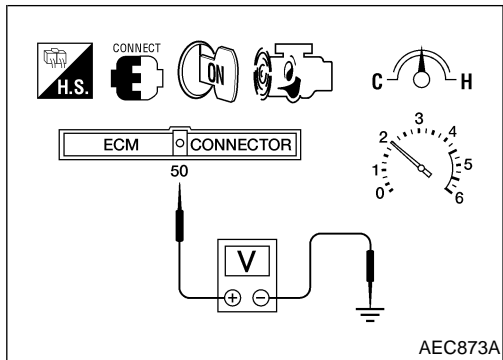
If "TESTING" is not displayed after 5 minutes, retry from step 2.

- 6) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-234.

During this test, P1148 may be displayed on CONSULT-II screen.

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Overall Function Check



Overall Function Check

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed. =NGEC0099

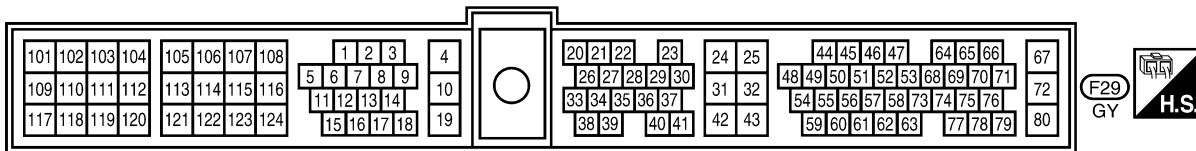
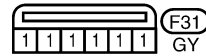
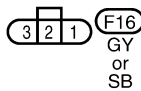
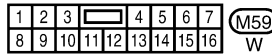
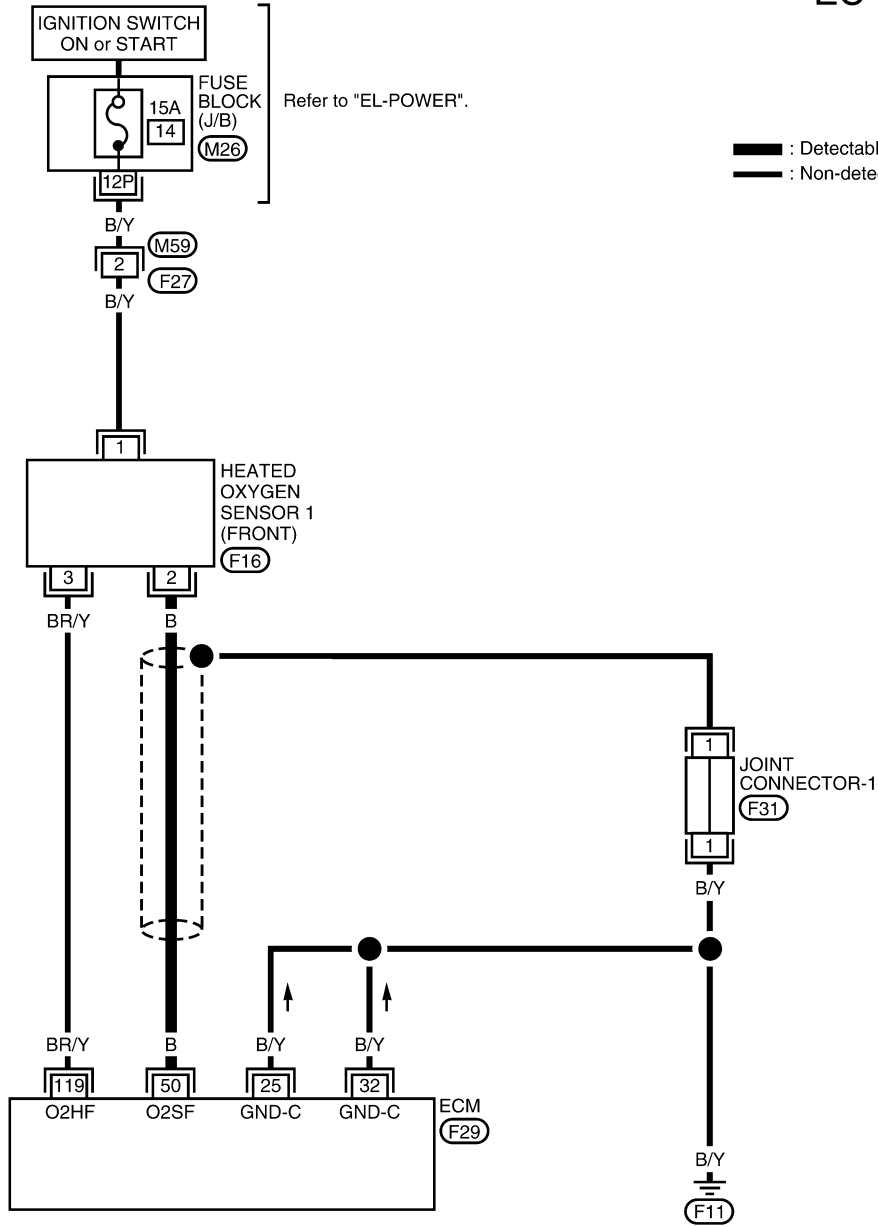
⊗ Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 (Heated oxygen sensor 1 signal) and engine ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - The voltage does not remain in the range of 0.2 - 0.4V.
- 4) If NG, go to "Diagnostic Procedure", EC-234.

Wiring Diagram

NGEC0100

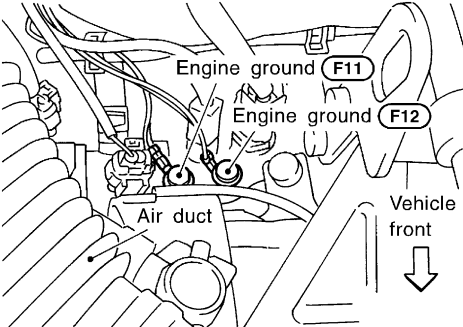
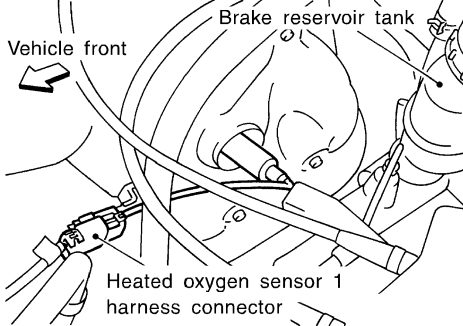
EC-HO2S1-01

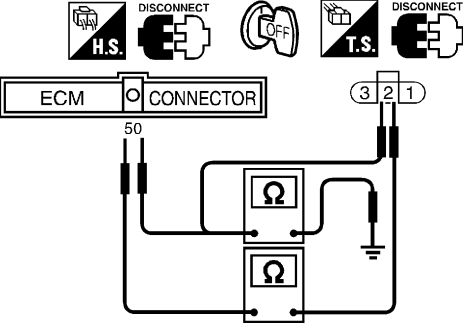


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Diagnostic Procedure

NGEC0101

1	INSPECTION START	<ol style="list-style-type: none"> Turn ignition switch OFF. Loosen and retighten engine ground screws. 	
			SEF325V
		<ol style="list-style-type: none"> Disconnect heated oxygen sensor 1 harness connector. 	
			SEF331VB
▶		GO TO 2.	

2	CHECK INPUT SIGNAL CIRCUIT	<ol style="list-style-type: none"> Disconnect ECM harness connector. Check harness continuity between ECM terminal 50 and terminal 2. 	
			SEF141V
		<p>Continuity should exist.</p> <ol style="list-style-type: none"> Check harness continuity between ECM terminal 50 (or terminal 2) and ground. <p>Continuity should not exist.</p> <ol style="list-style-type: none"> Also check harness for short to power. 	
OK or NG			
OK (With CONSULT-II) ▶		GO TO 3.	
OK (Without CONSULT-II) ▶		GO TO 4.	
NG ▶		Repair open circuit or short to ground or short to power in harness or connectors.	

3 CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Reconnect all harness connectors.
2. Start engine and warm it up to normal operating temperature.
3. Select "MANU TRIG" in "DATA MONITOR" mode, and the trigger point is adjusted to 100%.
4. Select "HO2S1 (B1)" AND "HO2S1 MNTR (B1)" in Item Selection.
5. Hold engine speed at 2,000 rpm under no load during the following steps.
6. Touch "START" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

7. Check the following.

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

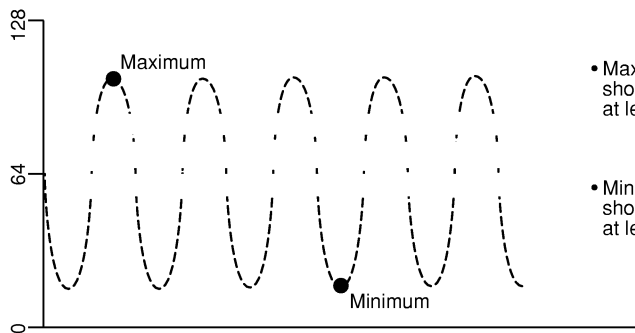
cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

R means HO2S1 MNTR (B1) indicates RICH
 L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

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

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



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

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

OK or NG

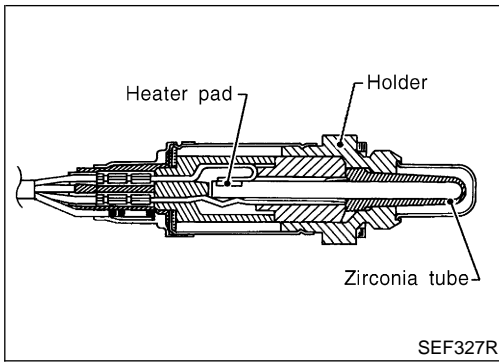
OK	▶	GO TO 5.
NG	▶	Replace heated oxygen sensor 1.

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4	CHECK HEATED OXYGEN SENSOR 1	
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Reconnect all harness connectors. 2. Start engine and warm it up to normal operating temperature. 3. Set voltmeter probes between ECM terminal 50 (Heated oxygen sensor 1 signal) and engine ground. 		
AEC873A		
<ol style="list-style-type: none"> 4. Check the following with engine speed held at 2,000 rpm constant under no load. <ul style="list-style-type: none"> ● The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five times within 10 seconds. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V ● The maximum voltage is over 0.6V at least one time. ● The minimum voltage is below 0.3V at least one time. ● The voltage never exceeds 1.0V. <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	Replace heated oxygen sensor 1.

5	CHECK SHIELD CIRCUIT	
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Remove joint connector-1. 3. Check the following. <ul style="list-style-type: none"> ● Continuity between joint connector-1 terminal 1 and ground ● Joint connector-1 (Refer to "HARNESS LAYOUT", <i>EL-250</i>.) Continuity should exist. 4. Also check harness for short to power. 5. Then reconnect joint connector. <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	Repair open circuit, short to power in harness or connectors.

6	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.		
	▶	INSPECTION END



Component Description

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

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1)	<ul style="list-style-type: none"> Engine: After warming up Revving engine from idle to 3,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)		LEAN ↔ RICH

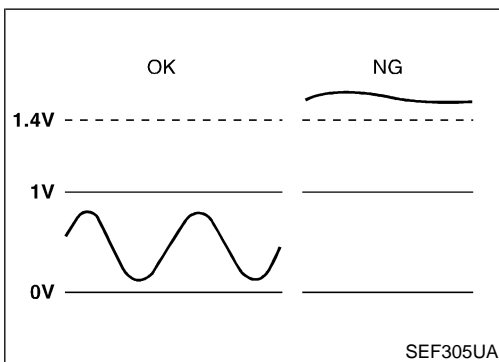
ECM Terminals and Reference Value

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2	[Engine is running] <ul style="list-style-type: none"> After warming up to normal operating temperature and revving engine from idle to 3,000 rpm 	0 - Approximately 1.0V



On Board Diagnosis Logic

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether or not the voltage is too high during various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0138	<ul style="list-style-type: none"> An excessively high voltage from the sensor is sent to ECM. 	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open or shorted.) Heated oxygen sensor 2

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

SEF189Y

DTC Confirmation Procedure

NGEC0175

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 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 drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 3) Maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	1,100 - 3,600 rpm
VHCL SPEED SE	32 - 120 km/h (20 - 75 MPH)
B/FUEL SCHDL	3.5 - 15.5 msec
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	Suitable position

- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-240.

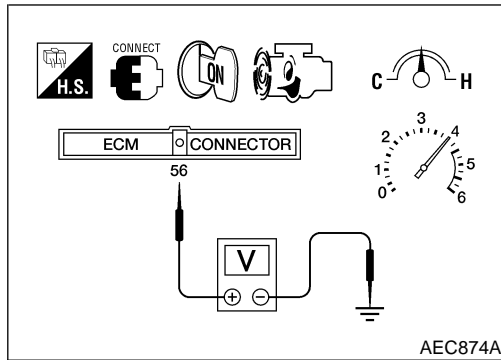
Overall Function Check

NGEC0176

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.

⊗ Without CONSULT-II

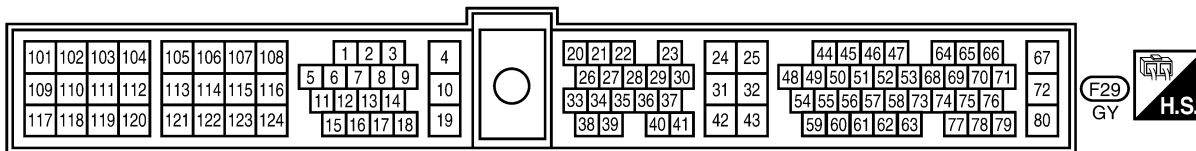
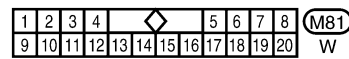
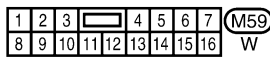
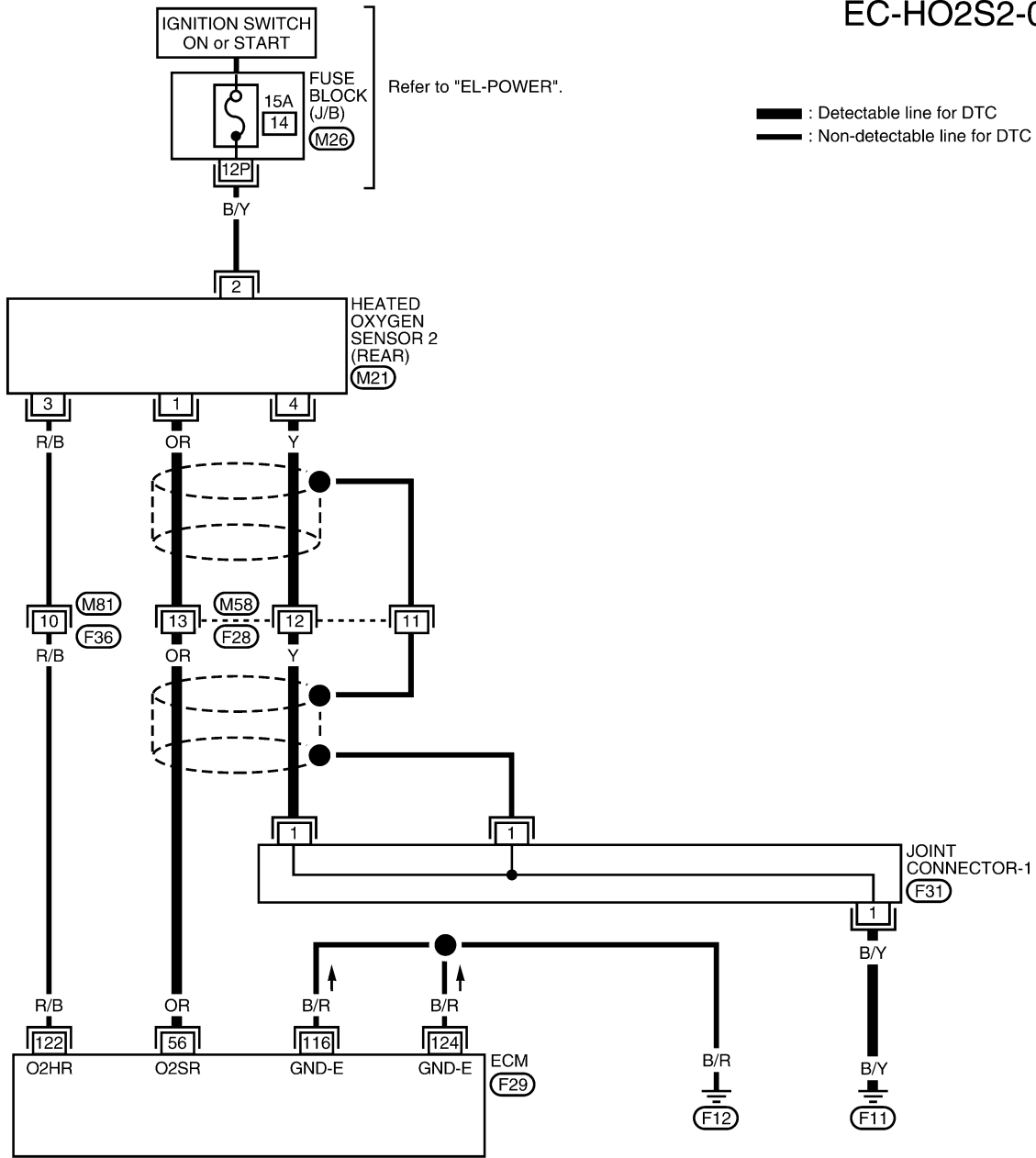
- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminals 56 (Heated oxygen sensor 2 signal) and engine ground.
- 4) Check the voltage after revving up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should be below 1.4V during this procedure.
- 5) If NG, go to "Diagnostic Procedure", EC-240.



Wiring Diagram

NGEC0177

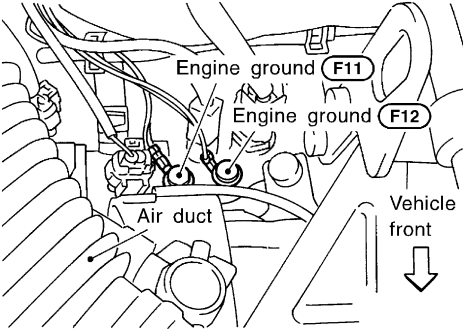
EC-HO2S2-01

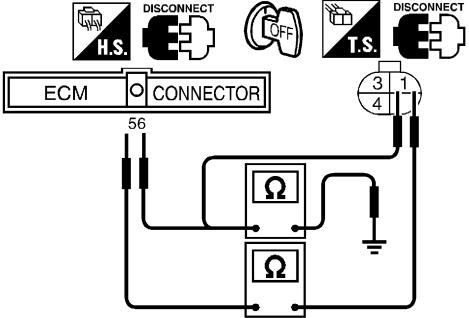


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Diagnostic Procedure

NGEC0178

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p>	
	
SEF325V	
▶ GO TO 2.	

2	CHECK INPUT SIGNAL CIRCUIT						
<p>1. Disconnect heated oxygen sensor 2 harness connector and ECM harness connector. 2. Check harness continuity between ECM terminal 56 and terminal 1.</p>							
							
SEF157V							
<p>Continuity should exist.</p> <p>3. Check harness continuity between ECM terminal 56 (or terminal 1) and ground. Continuity should not exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>							
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; border-right: 1px solid black;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 4.</td> </tr> <tr> <td style="border-right: 1px solid black;">NG</td> <td style="text-align: center;">▶</td> <td>GO TO 3.</td> </tr> </table>		OK	▶	GO TO 4.	NG	▶	GO TO 3.
OK	▶	GO TO 4.					
NG	▶	GO TO 3.					

3	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M58, F28 ● Harness for open or short between heated oxygen sensor 2 and ECM 	
▶ Repair open circuit or short to ground or short to power in harness or connectors.	

4	CHECK GROUND CIRCUIT	
1. Check harness continuity between heated oxygen sensor 2 terminal 4 and engine ground. Refer to Wiring Diagram. Continuity should exist.		
2. 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.		
<ul style="list-style-type: none"> ● Harness connectors M58, F28 ● Joint connector-1 ● Harness for open or short between heated oxygen sensor 2 and engine ground 		
▶		Repair open circuit or short to power in harness or connectors.

6	CHECK HARNESS CONNECTOR	
Check heated oxygen sensor 2 harness connector for water. Water should not exist.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 7.
OK (Without CONSULT-II)	▶	GO TO 8.
NG	▶	Repair or replace harness connector.

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7 CHECK HEATED OXYGEN SENSOR 2

With CONSULT-II

1. Reconnect all harness connectors.
2. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
3. Stop vehicle with engine running.
4. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-II.
5. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.

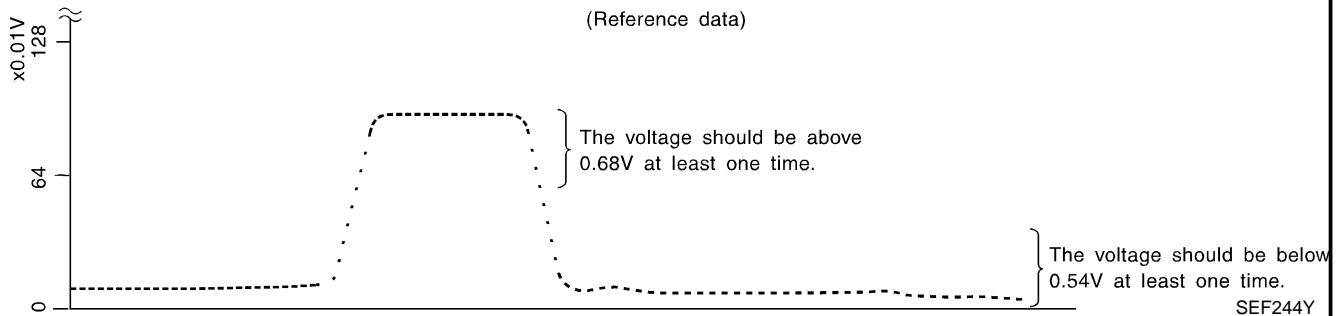
ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

"HO2S2 (B1)" should be above 0.56V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)" should be below 0.54V at least once when the "FUEL INJECTION" is -25%.

CAUTION:

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



OK or NG

OK ► GO TO 9.

NG ► Replace heated oxygen sensor 2.

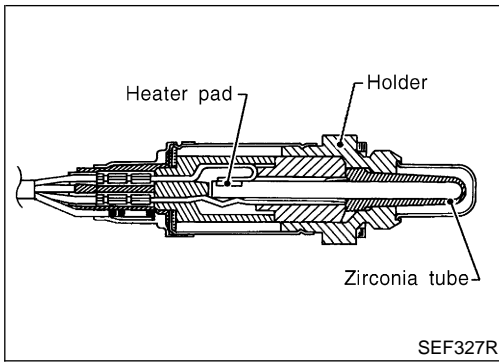
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8	CHECK HEATED OXYGEN SENSOR 2	<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Reconnect all harness connectors. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. Stop vehicle with engine running. Set voltmeter probes between ECM terminals 56 (Heated oxygen sensor 2 signal) and engine ground. <div style="text-align: center;"> </div> <ol style="list-style-type: none"> 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 0.56V at least once. If the voltage is above 0.56V at step 4, step 5 is not necessary. Check the voltage when revving up to 5,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position. The voltage should be below 0.54V at least once. <p>CAUTION:</p> <ul style="list-style-type: none"> Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 9.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace heated oxygen sensor 2.</td> </tr> </table>	OK	▶	GO TO 9.	NG	▶	Replace heated oxygen sensor 2.	<p>AEC874A</p>
OK	▶	GO TO 9.							
NG	▶	Replace heated oxygen sensor 2.							

9	CHECK SHIELD CIRCUIT	<ol style="list-style-type: none"> Turn ignition switch OFF. Disconnect harness connectors M58, F28. Check harness continuity between harness connector F28 terminal 4 and ground. <div style="text-align: center;"> </div> <p style="text-align: center;">Continuity should exist.</p> <ol style="list-style-type: none"> Also check harness for short to power. Then reconnect harness connectors. <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 11.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 10.</td> </tr> </table>	OK	▶	GO TO 11.	NG	▶	GO TO 10.	<p>SEF698Z</p>
OK	▶	GO TO 11.							
NG	▶	GO TO 10.							

Diagnostic Procedure (Cont'd)

10	DETECT MALFUNCTIONING PART
Check the following.	
<ul style="list-style-type: none">● Joint connector-1 (Refer to "HARNESS LAYOUT", <i>EL-250</i>.)● Harness for open or short between harness connector F28 and engine ground	
▶	Repair open circuit, short to ground or short to power in harness or connectors.
11	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.	
▶	INSPECTION END



Component Description

NGEC0162

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

CONSULT-II Reference Value in Data Monitor Mode

NGEC0163

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1)	<ul style="list-style-type: none"> Engine: After warming up Revving engine from idle to 3,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)		LEAN ↔ RICH

ECM Terminals and Reference Value

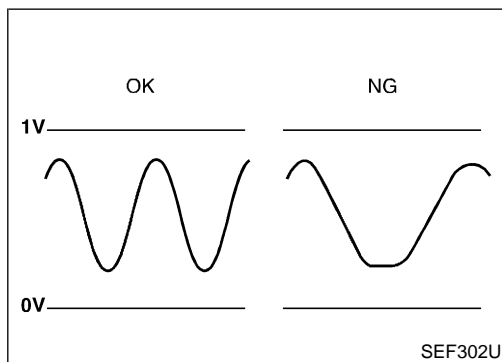
NGEC0164

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)
56	OR	Heated oxygen sensor 2	[Engine is running] <ul style="list-style-type: none"> After warming up to normal operating temperature and revving engine from idle to 3,000 rpm 	0 - Approximately 1.0V

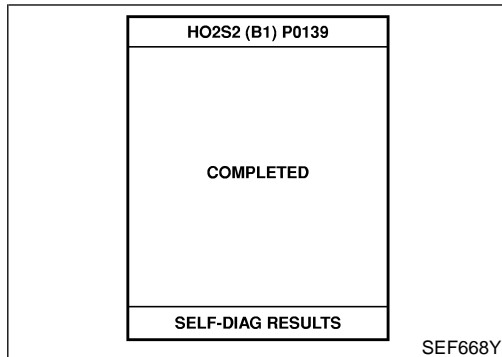
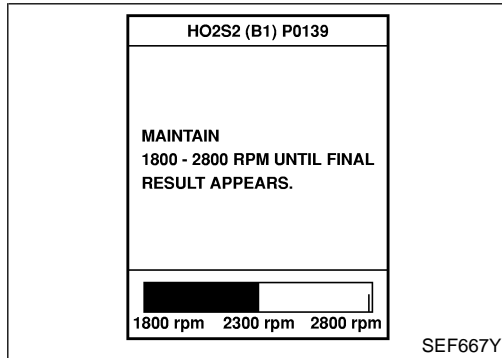
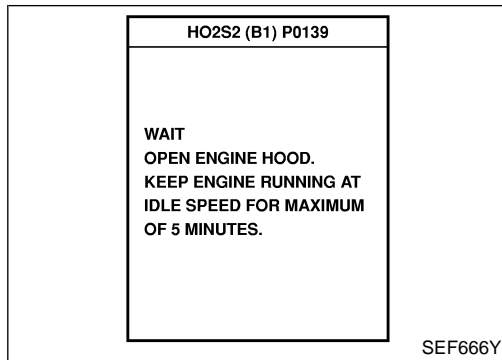


On Board Diagnosis Logic

NGEC0165

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst 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 various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0139	<ul style="list-style-type: none"> It takes more than the specified time for the sensor to respond between rich and lean. 	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open or shorted.) Heated oxygen sensor 2 Fuel pressure Injectors Intake air leaks



DTC Confirmation Procedure

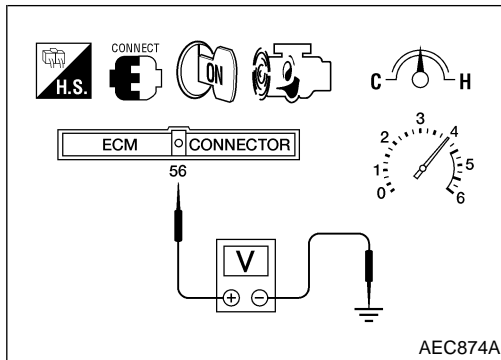
NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Open engine hood before conducting following procedure With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Make sure the "COOLANT TEMP/S" is more then 70°C (158°F).
- 6) Select "HO2S2 (B1) P0139" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 7) Start engine and follow the instructions of CONSULT-II.
- 8) Make sure the "OK" is displayed after touching "SELF-DIAG RESULTS".
If NG is displayed, refer to "Diagnostic Procedure", EC-249.
If "CAN NOT BE DIAGNOSED" is displayed, perform the following.
 - a) Stop engine and cool down "COOLANT TEMP/S" to less then 70°C (158°F).
 - b) Turn ignition switch ON
 - c) Select "DATA MONITOR" mode with CONSULT-II.
 - d) Start engine.
 - e) Perform from step 6) again when the "COOLANT TEMP/S" reach to 70°C (158°F).



Overall Function Check

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. =NGEC0167

CAUTION:

Always drive vehicle at a safe speed.

⊗ Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminals 56 (Heated oxygen sensor 2 signal) and engine ground.
- 4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should change at more than 0.06V for 1 second during this procedure.
If the voltage can be confirmed in step 4, step 5 is not necessary.
- 5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position.
The voltage should change at more than 0.06V for 1 second during this procedure.
- 6) If NG, go to "Diagnostic Procedure", EC-249.

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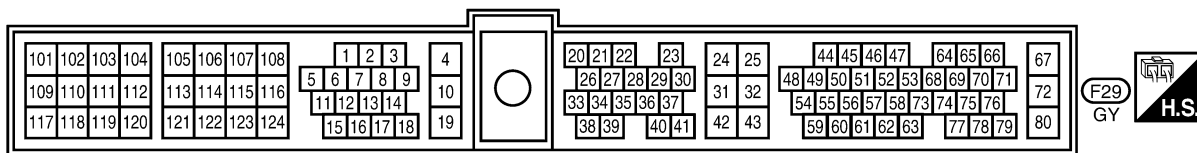
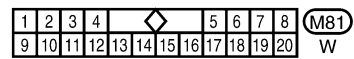
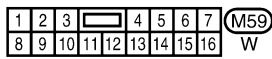
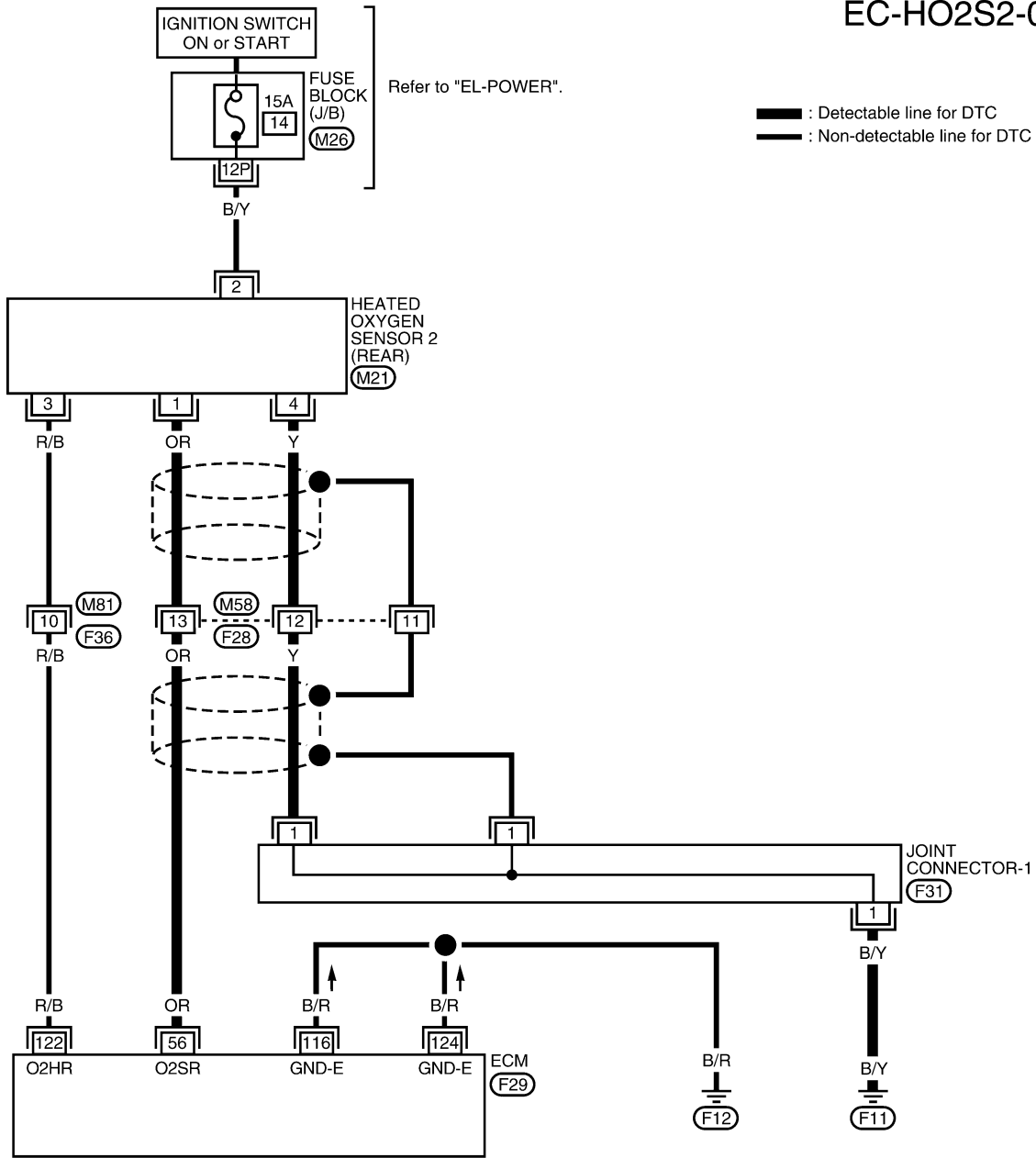
EL

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Wiring Diagram

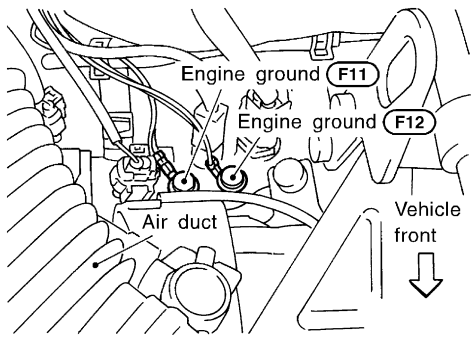
NGEC0168

EC-HO2S2-01



Diagnostic Procedure

NGEC0169

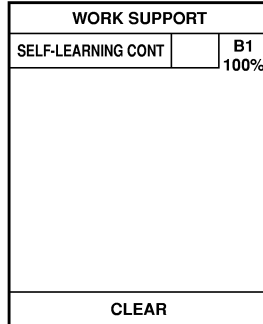
1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p>  <p>The diagram shows a top-down view of the engine compartment. Two engine ground screws are labeled F11 and F12. An air duct is also shown. An arrow points to the front of the vehicle.</p>	
▶	GO TO 2.

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- IDX

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".

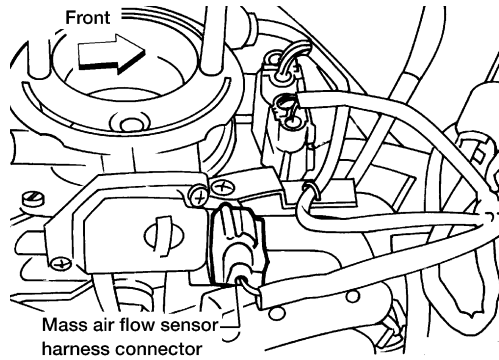


SEF215Z

4. Run engine for at least 10 minutes at idle speed.
Is the 1st trip DTC P0171 or P0172 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 3 seconds at idle speed.



AEC131A

4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0102 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-86.
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 P0172 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-255 or EC-262.
No	▶	GO TO 3.

3	CHECK INPUT SIGNAL CIRCUIT
<p>1. Disconnect heated oxygen sensor 2 harness connector and ECM harness connector.</p> <p>2. Check harness continuity between ECM terminal 56 and terminal 1.</p>	
SEF157V	
<p>Continuity should exist.</p> <p>3. Check harness continuity between ECM terminal 56 (or terminal 1) and ground.</p> <p>Continuity should not exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

4	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M58, F28 ● Harness for open or short between heated oxygen sensor 2 and ECM 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK GROUND CIRCUIT
<p>1. Check harness continuity between heated oxygen sensor 2 terminal 4 and engine ground. Refer to the wiring diagram.</p> <p>Continuity should exist.</p> <p>2. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK (With CONSULT-II)	▶ GO TO 7.
OK (Without CONSULT-II)	▶ GO TO 8.
NG	▶ GO TO 6.

6	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M58, F28 ● Joint connector-1 ● Harness for open or short between heated oxygen sensor 2 and engine ground 	
▶	Repair open circuit or short to power in harness or connectors.

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7 CHECK HEATED OXYGEN SENSOR 2

With CONSULT-II

1. Reconnect all harness connectors.
2. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
3. Stop vehicle with engine running.
4. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-II.
5. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.

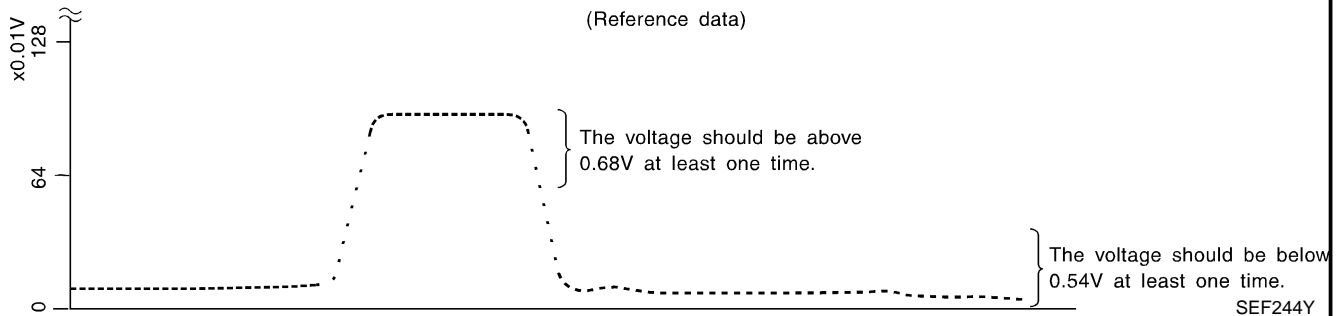
ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

"HO2S2 (B1)" should be above 0.56V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)" should be below 0.54V at least once when the "FUEL INJECTION" is -25%.

CAUTION:

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



OK or NG

OK ► GO TO 9.

NG ► Replace heated oxygen sensor 2.

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8	CHECK HEATED OXYGEN SENSOR 2	<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Reconnect all harness connectors. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. Stop vehicle with engine running. Set voltmeter probes between ECM terminals 56 (Heated oxygen sensor 2 signal) and engine ground. <div style="text-align: center;"> </div> <p style="text-align: right;">AEC874A</p> <ol style="list-style-type: none"> 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 0.56V at least once. If the voltage is above 0.56V at step 4, step 5 is not necessary. Check the voltage when revving up to 5,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position. The voltage should be below 0.54V at least once. <p>CAUTION:</p> <ul style="list-style-type: none"> Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 9.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace heated oxygen sensor 2.</td> </tr> </table>	OK	▶	GO TO 9.	NG	▶	Replace heated oxygen sensor 2.
OK	▶	GO TO 9.						
NG	▶	Replace heated oxygen sensor 2.						

9	CHECK SHIELD CIRCUIT	<ol style="list-style-type: none"> Turn ignition switch OFF. Disconnect harness connectors M58, F28. Check harness continuity between harness connector F28 terminal 4 and ground. <div style="text-align: center;"> </div> <p style="text-align: right;">SEF698Z</p> <p>Continuity should exist.</p> <ol style="list-style-type: none"> Also check harness for short to power. Then reconnect harness connectors. <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 11.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 10.</td> </tr> </table>	OK	▶	GO TO 11.	NG	▶	GO TO 10.
OK	▶	GO TO 11.						
NG	▶	GO TO 10.						

Diagnostic Procedure (Cont'd)

10	DETECT MALFUNCTIONING PART
Check the following.	
<ul style="list-style-type: none">● Joint connector-1 (Refer to "HARNES LAYOUT", <i>EL-250</i>.)● Harness for open or short between harness connector F28 and engine ground	
▶	Repair open circuit, short to ground or short to power in harness or connectors.
11	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.	
▶	INSPECTION END

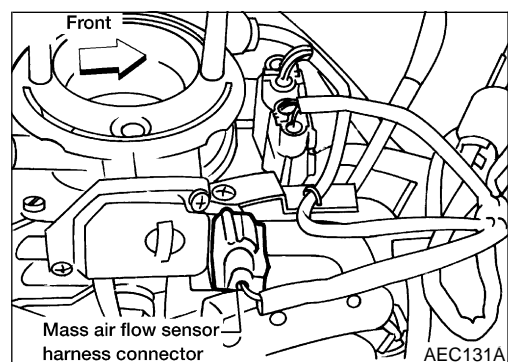
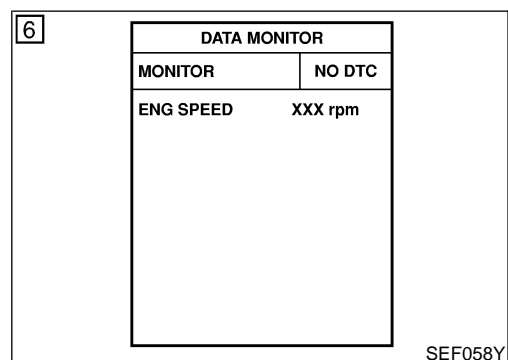
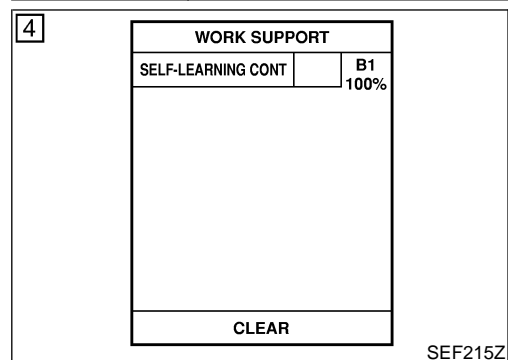
On Board Diagnosis Logic

NGEC0188

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection & mixture ratio control	Injectors

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0171	<ul style="list-style-type: none"> Fuel injection system does not operate properly. The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.) 	<ul style="list-style-type: none"> Intake air leaks Heated oxygen sensor 1 Injectors Exhaust gas leaks Incorrect fuel pressure Lack of fuel Mass air flow sensor Incorrect PCV hose connection



DTC Confirmation Procedure

NGEC0189

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

Ⓜ With CONSULT-II

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 5 seconds.
- Turn ignition switch ON and select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
- Clear the self-learning control coefficient by touching "CLEAR".
- Select "DATA MONITOR" mode with CONSULT-II.
- Start engine again and let it idle for at least 10 minutes. The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-258.
- If it is difficult to start engine at step 6, the fuel injection system has a malfunction.
- Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-258. If engine does not start, visually check for exhaust and intake air leak.

Ⓜ With GST

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 5 seconds.
- Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
- Stop engine and reconnect mass air flow sensor harness connector.
- Select "MODE 7" with GST. Make sure 1st trip DTC P0102 is detected.
- Select "MODE 4" with GST and erase the 1st trip DTC P0102.

DTC P0171 FUEL INJECTION SYSTEM FUNCTION

KA24DE

DTC Confirmation Procedure (Cont'd)

- 7) Start engine again and run it for at least 10 minutes at idle speed.
- 8) Select "MODE 7" with GST. The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-258.
- 9) If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
- 10) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-258. If engine does not start, visually check for exhaust and intake air leak.

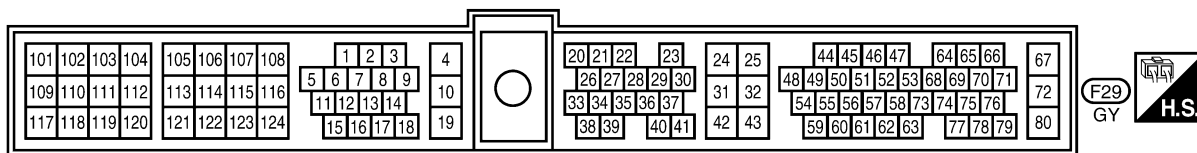
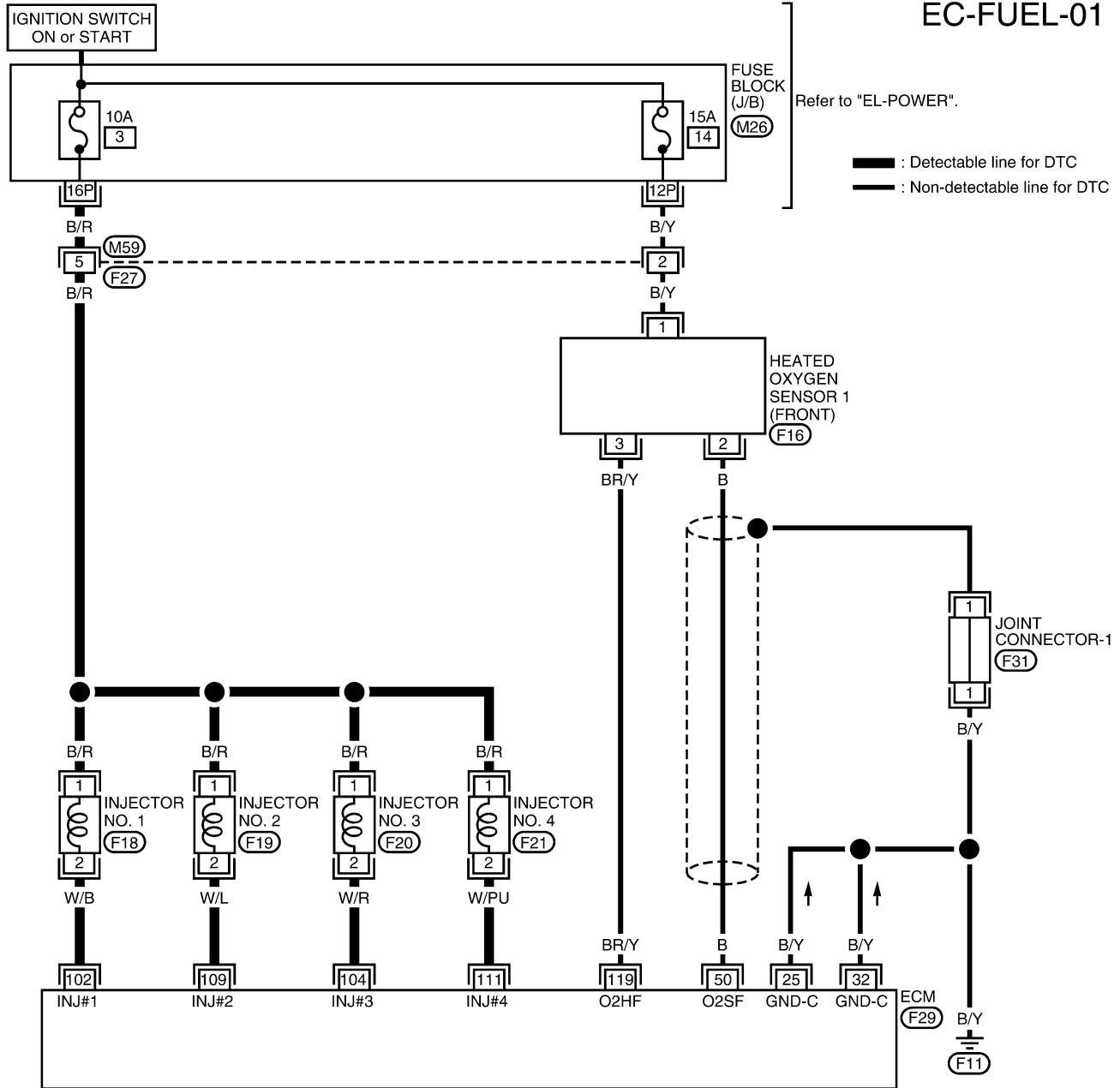
DTC P0171 FUEL INJECTION SYSTEM FUNCTION

KA24DE

Wiring Diagram

Wiring Diagram

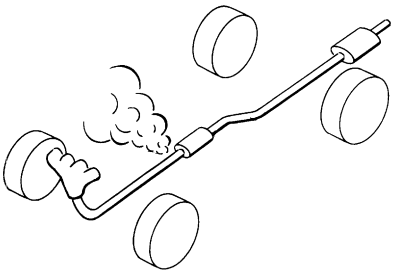
NGEC0190



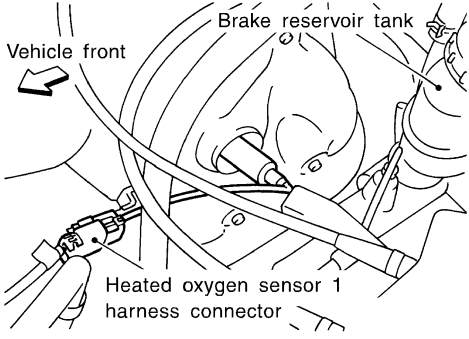
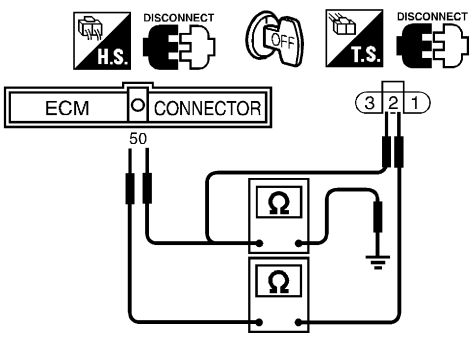
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Diagnostic Procedure

NGEC0191



1	CHECK EXHAUST AIR LEAK	
1. Start engine and run it at idle. 2. Listen for an exhaust air leak before three way catalyst.		
		
SEF099P		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair or replace.



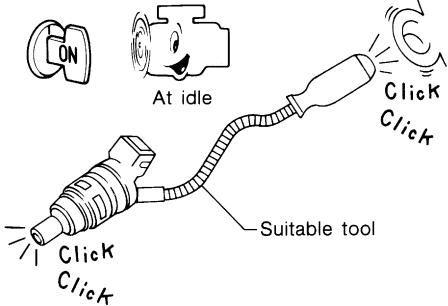
2	CHECK FOR INTAKE AIR LEAK AND PCV HOSE	
1. Listen for an intake air leak between the mass air flow sensor and the intake manifold. 2. Check PCV hose connection.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace.

3	CHECK HEATED OXYGEN SENSOR 1 CIRCUIT	<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect heated oxygen sensor 1 harness connector and ECM harness connector.</p> <div style="text-align: center;">  </div> <p>3. Check harness continuity between ECM terminal 50 and terminal 2.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF331VB</p> <p>Continuity should exist.</p> <p>4. Check harness continuity between ECM terminal 50 (or terminal 2) and ground.</p> <p>Continuity should not exist.</p> <p>5. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p> <p style="text-align: right;">SEF141V</p>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p>EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p> <p>TF</p> <p>PD</p> <p>AX</p>
OK	▶	GO TO 4.	
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.	

4	CHECK FUEL PRESSURE	<p>1. Release fuel pressure to zero. Refer to EC-57.</p> <p>2. Install fuel pressure gauge and check fuel pressure.</p> <p>At idling:</p> <p style="padding-left: 20px;">When fuel pressure regulator valve vacuum hose is connected. 235 kPa (2.4 kg/cm², 34 psi)</p> <p style="padding-left: 20px;">When fuel pressure regulator valve vacuum hose is disconnected. 294 kPa (3.0 kg/cm², 43 psi)</p> <p style="text-align: center;">OK or NG</p>	<p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p>
OK	▶	GO TO 6.	BT
NG	▶	GO TO 5.	

5	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Fuel pump and circuit, refer to EC-580. ● Fuel pressure regulator, refer to EC-58. ● Fuel lines, refer to "Checking Fuel Lines", MA-19. ● Fuel filter for clogging 	<p>HA</p> <p>SC</p> <p>EL</p>
	▶	Repair or replace.	

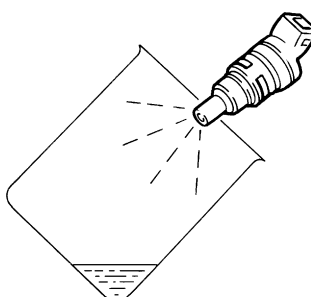
6	CHECK MASS AIR FLOW SENSOR	
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. at idling: 0.9 - 5.8 g-m/sec at 2,500 rpm: 7.5 - 13.2 g-m/sec 		
<p> With GST</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Check mass air flow sensor signal in MODE 1 with GST. at idling: 0.9 - 5.8 g-m/sec at 2,500 rpm: 7.5 - 13.2 g-m/sec 		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-168.

7	CHECK FUNCTION OF INJECTORS																	
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Install all parts removed. 2. Start engine. 3. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II. 																		
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>POWER BALANCE</td><td></td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>MAS A/F SE-B1</td><td>XXX V</td></tr> <tr><td>IACV-AAC/V</td><td>XXX step</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		POWER BALANCE		MONITOR		ENG SPEED	XXX rpm	MAS A/F SE-B1	XXX V	IACV-AAC/V	XXX step				
ACTIVE TEST																		
POWER BALANCE																		
MONITOR																		
ENG SPEED	XXX rpm																	
MAS A/F SE-B1	XXX V																	
IACV-AAC/V	XXX step																	
SEF190Y																		
<p>4. Make sure that each circuit produces a momentary engine speed drop.</p>																		
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Install all parts removed. 2. Start engine. 3. Listen to each injector operating sound. 																		
																		
Clicking noise should be heard.																		
OK or NG																		
OK	▶	GO TO 8.																
NG	▶	Perform trouble diagnosis for "INJECTORS", EC-571.																

MEC703B

8	REMOVE INJECTOR
<ol style="list-style-type: none"> 1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle. 2. Turn ignition switch OFF. 3. Remove injector with fuel tube assembly. Refer to EC-58. Keep fuel hose and all injectors connected to injector gallery. The injector harness connectors should remain connected. 	
▶	GO TO 9.

GI
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9	CHECK INJECTOR
<ol style="list-style-type: none"> 1. Disconnect all ignition coil harness connectors. 2. Place pans or saucers under each injector. 3. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors. 	
	
<p>Fuel should be sprayed evenly for each cylinder.</p> <p>SEF595Q</p> <p>OK or NG</p>	
OK	▶ GO TO 10.
NG	▶ Replace injectors from which fuel does not spray out. Always replace O-ring with new one.

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10	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.	
▶	INSPECTION END

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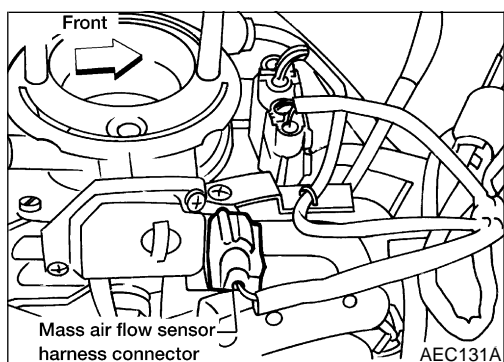
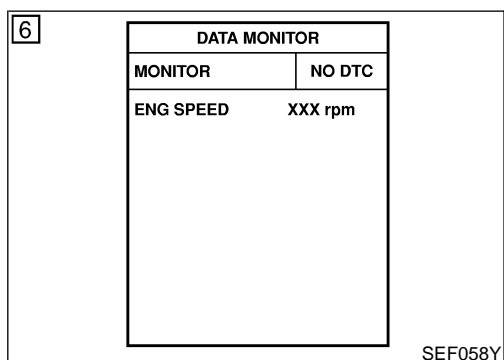
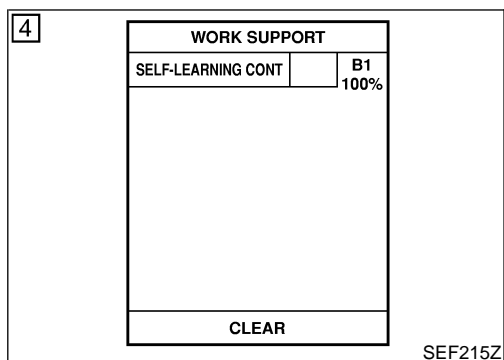
On Board Diagnosis Logic

NGEC0192

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection & mixture ratio control	Injectors

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0172	<ul style="list-style-type: none"> Fuel injection system does not operate properly. The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.) 	<ul style="list-style-type: none"> Heated oxygen sensor 1 Injectors Exhaust gas leaks Incorrect fuel pressure Mass air flow sensor



DTC Confirmation Procedure

NGEC0193

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

Ⓜ With CONSULT-II

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 5 seconds.
- Turn ignition switch ON and select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
- Clear the self-learning control coefficient by touching "CLEAR".
- Select "DATA MONITOR" mode with CONSULT-II.
- Start engine again and let it idle for at least 10 minutes. The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-265.
- If it is difficult to start engine at step 6, the fuel injection system has a malfunction.
- Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-265. If engine does not start, remove ignition plugs and check for fouling, etc.

Ⓜ With GST

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 5 seconds.
- Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
- Stop engine and reconnect mass air flow sensor harness connector.
- Select "MODE 7" with GST. Make sure 1st trip DTC P0102 is detected.
- Select "MODE 4" with GST and erase the 1st trip DTC P0102.

DTC P0172 FUEL INJECTION SYSTEM FUNCTION

KA24DE

DTC Confirmation Procedure (Cont'd)

- 7) Start engine again and run it for at least 10 minutes at idle speed.
- 8) Select "MODE 7" with GST. The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-265.
- 9) If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
- 10) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-265. If engine does not start, remove ignition plugs and check for fouling, etc.

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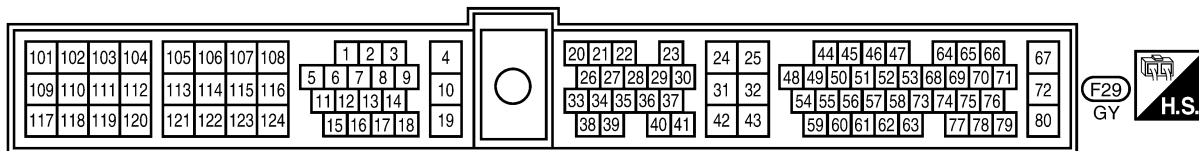
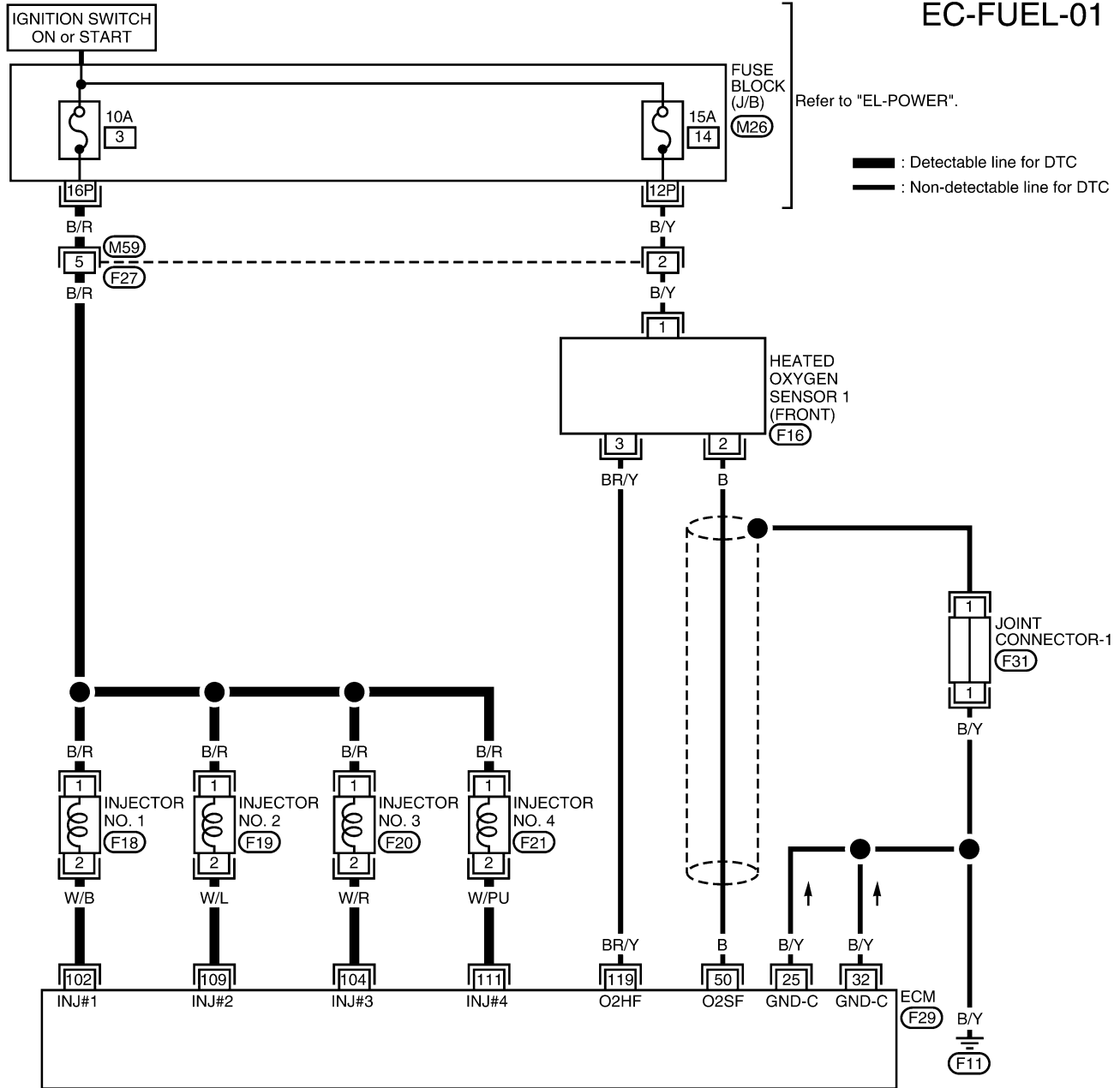
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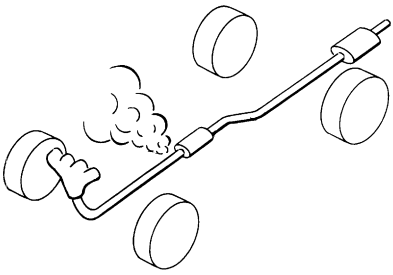
Wiring Diagram

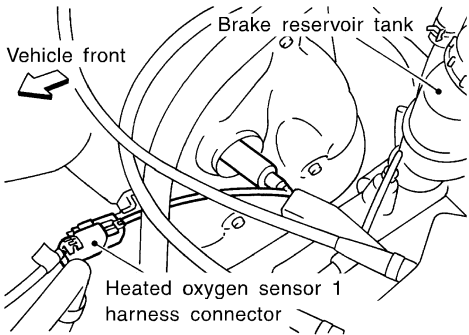
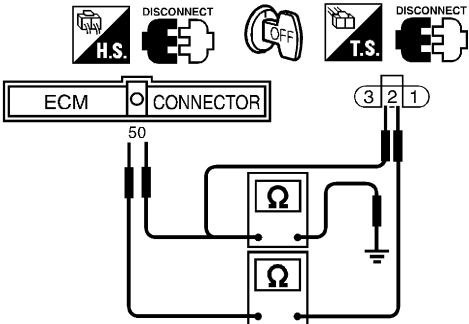
NGEC0194



Diagnostic Procedure

NGEC0195

1	CHECK FOR EXHAUST AIR LEAK		
		1. Start engine and run it at idle. 2. Listen for an exhaust air leak before three way catalyst.	
			
		OK or NG	SEF099P
OK	▶	GO TO 2.	
NG	▶	Repair or replace.	

2	CHECK HEATED OXYGEN SENSOR 1 CIRCUIT		
		1. Turn ignition switch OFF. 2. Disconnect heated oxygen sensor 1 harness connector and ECM harness connector.	
			
		3. Check harness continuity between ECM terminal 50 and terminal 2.	SEF331VB
			
		Continuity should exist.	SEF141V
		4. Check harness continuity between ECM terminal 50 (or terminal 2) and ground. Continuity should not exist.	
		5. Also check harness for short to ground and short to power.	
		OK or NG	
OK	▶	GO TO 3.	
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.	

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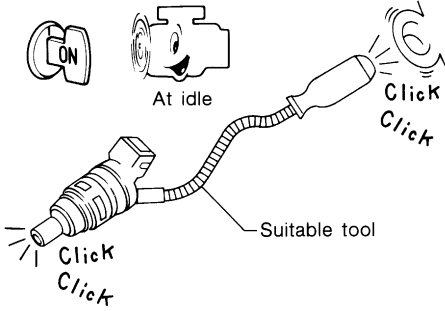
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3	CHECK FUEL PRESSURE	
<p>1. Release fuel pressure to zero. Refer to EC-57.</p> <p>2. Install fuel pressure gauge and check fuel pressure.</p> <p style="margin-left: 20px;">At idling:</p> <p style="margin-left: 40px;">When fuel pressure regulator valve vacuum hose is connected. Approximately 235 kPa (2.4 kg/cm², 34 psi)</p> <p style="margin-left: 40px;">When fuel pressure regulator valve vacuum hose is disconnected. Approximately 294 kPa (3.0 kg/cm², 43 psi)</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Fuel pump and circuit (Refer to EC-580.) ● Fuel pressure regulator (Refer to EC-58.) 		
▶		Repair or replace.

5	CHECK MASS AIR FLOW SENSOR	
<p> With CONSULT-II</p> <p>1. Start engine and warm it up to normal operating temperature.</p> <p>2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II.</p> <p style="margin-left: 20px;">at idling: 0.9 - 5.8 g-m/sec</p> <p style="margin-left: 20px;">at 2,500 rpm: 7.5 - 13.2 g-m/sec</p>		
<p> With GST</p> <p>1. Start engine and warm it up to normal operating temperature.</p> <p>2. Check mass air flow sensor signal in MODE 1 with GST.</p> <p style="margin-left: 20px;">at idling: 0.9 - 5.8 g-m/sec</p> <p style="margin-left: 20px;">at 2,500 rpm: 7.5 - 13.2 g-m/sec</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-168.

6	CHECK FUNCTION OF INJECTORS																
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Install all parts removed. 2. Start engine. 3. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II. 																	
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>POWER BALANCE</td><td></td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>MAS A/F SE-B1</td><td>XXX V</td></tr> <tr><td>IACV-AAC/V</td><td>XXX step</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>		ACTIVE TEST		POWER BALANCE		MONITOR		ENG SPEED	XXX rpm	MAS A/F SE-B1	XXX V	IACV-AAC/V	XXX step				
ACTIVE TEST																	
POWER BALANCE																	
MONITOR																	
ENG SPEED	XXX rpm																
MAS A/F SE-B1	XXX V																
IACV-AAC/V	XXX step																
SEF190Y																	
<p>4. Make sure that each circuit produces a momentary engine speed drop.</p>																	
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Install all parts removed. 2. Start engine. 3. Listen to each injector operating sound. 																	
																	
MEC703B																	
<p>Clicking noise should be heard.</p> <p>OK or NG</p>																	
OK	▶	GO TO 7.															
NG	▶	Perform trouble diagnosis for "INJECTORS", EC-571.															

7	REMOVE INJECTOR
<ol style="list-style-type: none"> 1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle. 2. Turn ignition switch OFF. 3. Remove injector assembly. Refer to EC-58. Keep fuel hose and all injectors connected to injector gallery. 	
▶ GO TO 8.	

8	CHECK INJECTOR	
<ol style="list-style-type: none"> 1. Disconnect all injector harness connectors. 2. Disconnect all ignition coil harness connectors. 3. Prepare pans or saucers under each injectors. 4. Crank engine for about 3 seconds. Make sure fuel does not drip from injector. 		
OK or NG		
OK (Does not drip)	▶	GO TO 9.
NG (Drips)	▶	Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

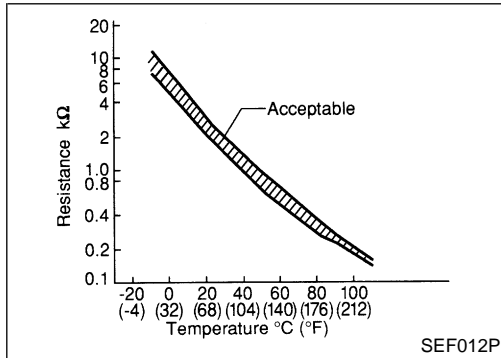
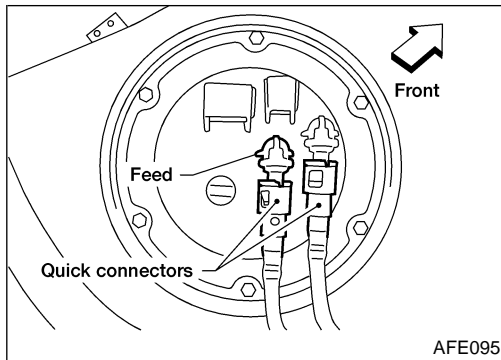
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DTC P0172 FUEL INJECTION SYSTEM FUNCTION

KA24DE

Diagnostic Procedure (Cont'd)

9	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.	
	▶ INSPECTION END



Component Description

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

<Reference data>

Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: These data are reference values and are measured between ECM terminal 60 (Fuel tank temperature sensor) and ground.

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

On Board Diagnosis Logic

NGEC0197

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0182 P0183	<ul style="list-style-type: none"> An excessively low (P0182) or high (P0183) voltage is sent to ECM. 	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open or shorted.) Fuel tank temperature sensor
P0181	<ul style="list-style-type: none"> Rationally incorrect voltage is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor. 	

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DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

DTC Confirmation Procedure

=NGEC0198

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 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.
If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-272.
If the result is OK, go to following step.

NOTE:

If "COOLAN TEMP/S" is already less than 60°C (140°F) before step 4), the result will be OK. If "COOLAN TEMP/S" is above 60°C (140°F), go to the following step.

- 4) Check "COOLAN TEMP/S" signal.
If the signal is less than 60°C (140°F), the result will be OK.
If the signal is above 60°C (140°F), go to the following step.
- 5) Cool engine down until "COOLAN TEMP/S" signal is less than 60°C (140°F).
- 6) Wait at least 10 seconds.
- 7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-272.

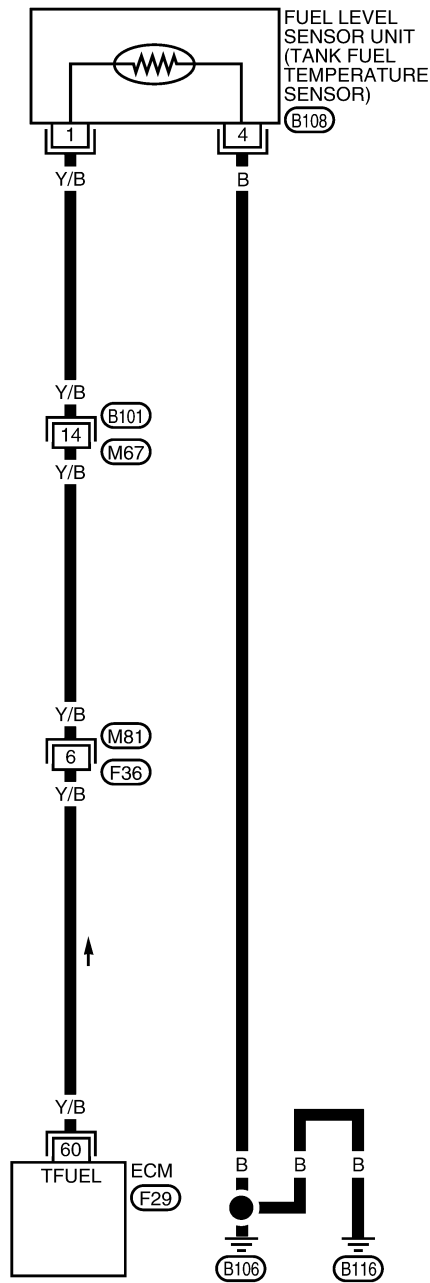
With GST

Follow the procedure "With CONSULT-II".

Wiring Diagram

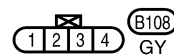
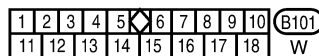
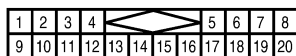
NGEC0199

EC-FTTS-01

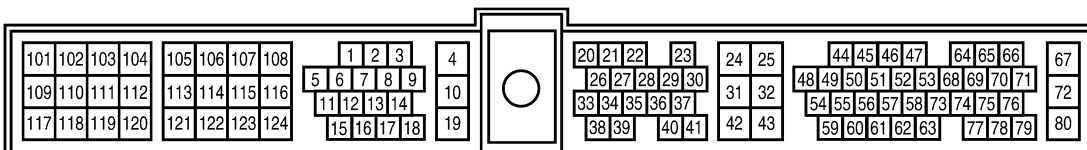


— : Detectable line for DTC
— : Non-detectable line for DTC

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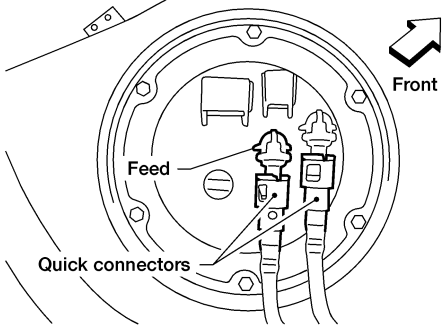
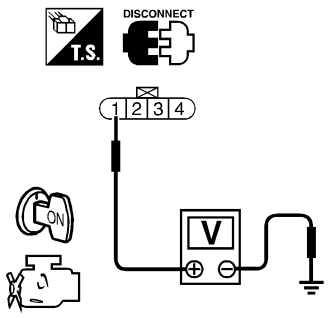


WEC970

- SC
- EL

Diagnostic Procedure

NGEC0200

1	CHECK POWER SUPPLY	<p>1. Turn ignition switch OFF. 2. Disconnect fuel level sensor unit harness connector.</p> <div style="text-align: center;">  </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="color: blue; font-weight: bold;">Voltage: Approximately 5V</p> <p style="text-align: center; font-weight: bold;">OK or NG</p>	<p>AFE095</p> <p>SEF708Z</p>
OK	▶	GO TO 3.	
NG	▶	GO TO 2.	

2	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors B101, M67 ● Harness connectors M81, F36 ● Harness for open or short between ECM and fuel tank temperature sensor 	
	▶	Repair harness or connector.	

3 CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check harness continuity between terminal 4 and body ground.

SEF709Z

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.

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4 CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.

2. Check resistance by heating with hot water or heat gun as shown in the figure.

AFE095

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

SEF710Z

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace fuel tank temperature sensor.

MTBL0291

DTC P0181, P0182, P0183 FTT SENSOR

KA24DE

Diagnostic Procedure (Cont'd)

5	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.	
	▶ INSPECTION END

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

KA24DE

On Board Diagnosis Logic

On Board Diagnosis Logic

NGEC1492

This diagnosis checks whether the engine coolant temperature is extraordinary high, even when the load is not heavy.

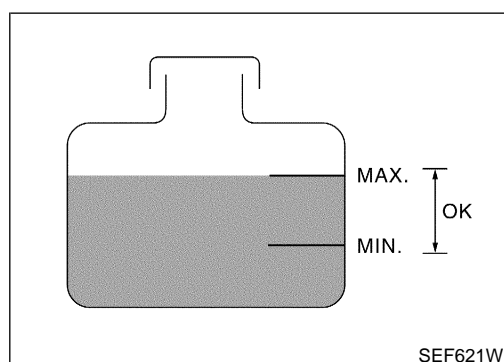
When malfunction is detected, the MIL will light up even in the first trip.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0217	<ul style="list-style-type: none"> Engine coolant temperature is excessively high under normal engine speed. 	<ul style="list-style-type: none"> Cooling fan (Crankshaft driven) Thermostat Improper ignition timing Engine coolant temperature sensor Blocked radiator Blocked front end (Improper fitting of nose mask) Crushed vehicle frontal area (Vehicle damage from a collision but not repaired) Blocked air passage by improper installation of front fog lamp or fog lamps. Improper mixture ratio of coolant Damaged bumper <p>For more information, refer to "MAIN 11 CAUSES OF OVERHEATING", EC-280.</p>

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to **MA-17**, "Changing Engine Coolant". Also, replace the engine oil.

- Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to **MA-15**, "Anti-freeze Coolant Mixture Ratio".
- After refilling coolant, run engine to ensure that no water-flow noise is emitted.



SEF621W

Overall Function Check

NGEC1493

Use this procedure to check the overall function of the coolant overtemperature enrichment protection check, a DTC might not be confirmed.

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high-pressure fluid escaping from the radiator.

Wrap a thick cloth around the cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

- Check the coolant level and mixture ratio (using coolant tester) in the reservoir tank and radiator.

Allow engine to cool before checking coolant level and mixture ratio.

 - If the coolant level in the reservoir and/or radiator is below the proper range, go to "Diagnostic Procedure", EC-277.
 - If the coolant mixture ratio is out of the range of 45 to 55%, replace the coolant in the following procedure **MA-17**, "Changing Engine Coolant".
- Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant from a kettle. Be sure to use coolant with the proper mixture ratio. Refer to **MA-15**,

EC-275

- “Anti-freeze Coolant Mixture Ratio”.
- b) After refilling coolant, run engine to ensure that no water-flow noise is emitted.
 - c) After checking or replacing coolant, go to step 3 below.
 - 2) Ask the customer if engine coolant has been added. If it has been added, go to “Diagnostic Procedure”, EC-277. After repair, go to the next step.
 - 3) Start engine and let it idle.
 - 4) Make sure that A/C switch is “OFF” and air conditioner is not operating. If NG, check air conditioner circuit. Refer to **HA-85** or **HA-85**, “TROUBLE DIAGNOSES”. After repair, go to the next step.
 - 5) Start engine and make sure that cooling fan operates.
Be careful not to overheat engine.
If NG, check cooling fan. Refer to **LC-16**, “Cooling Fan (Crankshaft driven)”. After repair, go to the next step.
 - 6) Check for blocked coolant passage.
 - a) Warm up engine to normal operating temperature, then grasp radiator upper hose and lower hose and make sure that coolant flows.
If NG, go to “Diagnostic Procedure”, EC-277. After repair, go to the next step.
Be extremely careful not to touch any moving or adjacent parts.
 - 7) Check for blocked radiator air passage.
 - a) When market fog lamps have been installed, check for damaged fans and clogging in the condenser and radiator.
 - b) Check the front end for clogging caused by insects or debris.
 - c) Check for improper fitting of front-end cover, damaged radiator grille or bumper, damaged vehicle front.
If NG, take appropriate action and then go to the next step.
 - 8) Check function of ECT sensor.
Refer to step 4 of “Diagnostic Procedure”, EC-277.
If NG, replace ECT sensor and go to the next step.
 - 9) Check ignition timing. Refer to basic inspection, EC-277.
Make sure that ignition timing is $20^{\circ} \pm 2^{\circ}$ at idle.
If NG, adjust ignition timing and then recheck.

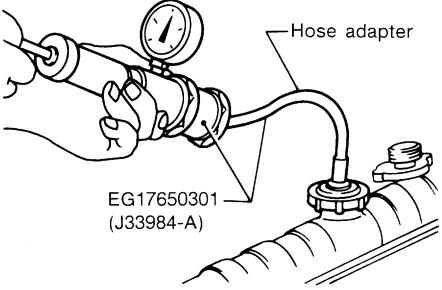
DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

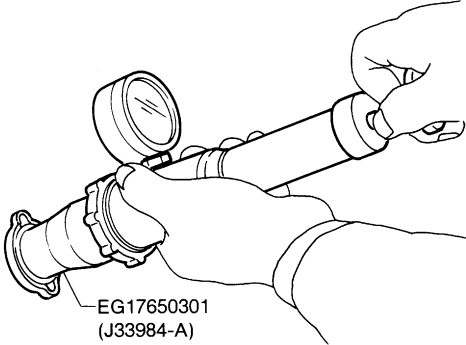
KA24DE

Diagnostic Procedure

Diagnostic Procedure

NGEC1494

1	CHECK COOLING SYSTEM FOR LEAK	<p>Apply pressure to the cooling system with a tester, and check if the pressure drops. Testing pressure: 157 kPa (1.6 kg/cm², 23 psi) CAUTION: Higher than the specified pressure may cause radiator damage.</p> <div style="text-align: center;">  <p>EG17650301 (J33984-A)</p> </div> <p style="text-align: right;">SLC754A</p> <p style="text-align: center;">Pressure should not drop.</p> <p style="text-align: center;">OK or NG</p>	GI MA EM LC EC FE CL MT AT TF
OK	▶	GO TO 2.	
NG	▶	Check the following for leak. <ul style="list-style-type: none"> ● Hose ● Radiator ● Water pump Refer to LC-12 , "Water Pump".	

2	CHECK RADIATOR CAP	<p>Apply pressure to cap with a tester.</p> <div style="text-align: center;">  <p>EG17650301 (J33984-A)</p> </div> <p style="text-align: right;">SLC755A</p> <p style="text-align: center;">Radiator cap relief pressure: 78 - 98 kPa (0.8 - 1.0 kg/cm², 11 - 14 psi)</p> <p style="text-align: center;">OK or NG</p>	PD AX SU BR ST RS
OK	▶	GO TO 3.	
NG	▶	Replace radiator cap.	

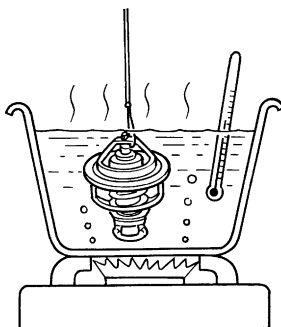
DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

KA24DE

Diagnostic Procedure (Cont'd)

3 CHECK THERMOSTAT

1. Check valve seating condition at normal room temperatures.
It should seat tightly.
2. Check valve opening temperature and valve lift.



SLC343

Valve opening temperature:
76.5°C (170°F) [standard]

Valve lift:
More than 8 mm/90°C (0.31 in/194°F)

3. Check if valve is closed at 5°C (9°F) below valve opening temperature.
For details, refer to **LC-13**, "Thermostat".

OK or NG

OK



GO TO 4.

NG



Replace thermostat

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

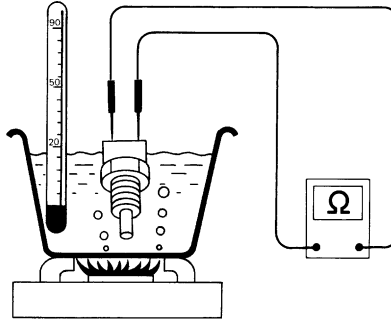
KA24DE

Diagnostic Procedure (Cont'd)

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4 CHECK ENGINE COOLANT TEMPERATURE SENSOR

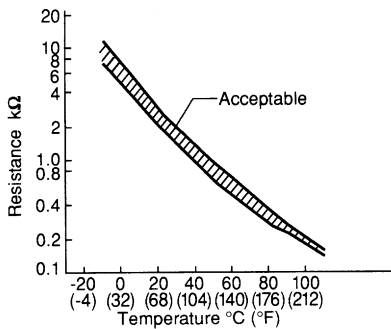
Check resistance as shown in the figure.



<Reference data>

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

SEF152P



MTBL0285

SEF012P

OK or NG

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

5 CHECK COOLING FAN

Refer to **LC-16**, "Cooling Fan (Crankshaft driven)".

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace cooling fan.

6 CHECK MAIN 11 CAUSES

If the cause cannot be isolated, go to "MAIN 11 CAUSES OF OVERHEATING", EC-280.

	▶	INSPECTION END
--	---	-----------------------

Perform FINAL CHECK by the following procedure after repair is completed.

1. Warm up engine. Run the vehicle for at least 20 minutes. Pay attention to engine coolant temperature gauge on the instrument panel. If the reading shows an abnormally high temperature, another part may be malfunctioning.
2. Stop vehicle and let engine idle. Check the intake and exhaust

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

KA24DE

Diagnostic Procedure (Cont'd)

systems for leaks by listening for noise or visually inspecting the components.

3. Allow engine to cool and visually check for oil and coolant leaks. Then, perform "OVERALL FUNCTION CHECK".

Main 11 Causes of Overheating

NGEC1495

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	<ul style="list-style-type: none"> ● Blocked radiator ● Blocked condenser ● Blocked radiator grille ● Blocked bumper 	<ul style="list-style-type: none"> ● Visual 	No blocking	—
	2	<ul style="list-style-type: none"> ● Coolant mixture 	<ul style="list-style-type: none"> ● Coolant tester 	50 - 50% coolant mixture	See MA-13 , "RECOMMENDED FLUIDS AND LUBRICANTS".
	3	<ul style="list-style-type: none"> ● Coolant level 	<ul style="list-style-type: none"> ● Visual 	Coolant up to MAX level in reservoir tank and radiator filler neck	See MA-17 , "Changing Engine Coolant".
	4	<ul style="list-style-type: none"> ● Radiator cap 	<ul style="list-style-type: none"> ● Pressure tester 	78 - 98 kPa (0.8 - 1.0 kg/cm ² , 11 - 14 psi) 59 - 98 kPa (0.6 - 1.0 kg/cm ² , 9 - 14 psi) (Limit)	See LC-11 , "System Check".
ON*2	5	<ul style="list-style-type: none"> ● Coolant leaks 	<ul style="list-style-type: none"> ● Visual 	No leaks	See LC-11 , "System Check".
ON*2	6	<ul style="list-style-type: none"> ● Thermostat 	<ul style="list-style-type: none"> ● Touch the upper and lower radiator hoses 	Both hoses should be hot	See LC-13 , "Thermostat" and LC-14 , "Radiator".
OFF	7	<ul style="list-style-type: none"> ● Combustion gas leak 	<ul style="list-style-type: none"> ● Color checker chemical tester 4 Gas analyzer 	Negative	—
ON*3	8	<ul style="list-style-type: none"> ● Coolant temperature gauge 	<ul style="list-style-type: none"> ● Visual 	Gauge less than 3/4 when driving	—
		<ul style="list-style-type: none"> ● Coolant overflow to reservoir tank 	<ul style="list-style-type: none"> ● Visual 	No overflow during driving and idling	See MA-17 , "Changing Engine Coolant".
OFF*4	9	<ul style="list-style-type: none"> ● Coolant return from reservoir tank to radiator 	<ul style="list-style-type: none"> ● Visual 	Should be initial level in reservoir tank	See MA-16 , "ENGINE MAINTENANCE".
OFF	10	<ul style="list-style-type: none"> ● Cylinder head 	<ul style="list-style-type: none"> ● Straight gauge feeler gauge 	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-31 , "Inspection".
	11	<ul style="list-style-type: none"> ● Cylinder block and pistons 	<ul style="list-style-type: none"> ● Visual 	No scuffing on cylinder walls or piston	See EM-45 , "Inspection".

*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to **LC-17**, "OVERHEATING CAUSE ANALYSIS".

DTC P0300 - P0304 NO. 4 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

KA24DE

On Board Diagnosis Logic

On Board Diagnosis Logic

NGEC0202

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the CKP sensor signal to vary, the ECM can determine that a misfire is occurring.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (OBD)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

- One Trip Detection Logic (Three Way Catalyst Damage)**
 On the 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.
- 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.	Malfunction is detected when ...	Check Items (Possible Cause)
P0300	<ul style="list-style-type: none"> Multiple cylinders misfire. 	<ul style="list-style-type: none"> Improper spark plug Insufficient compression
P0301	<ul style="list-style-type: none"> No. 1 cylinder misfires. 	<ul style="list-style-type: none"> Incorrect fuel pressure EGR valve The injector circuit is open or shorted
P0302	<ul style="list-style-type: none"> No. 2 cylinder misfires. 	<ul style="list-style-type: none"> Injectors Intake air leak
P0303	<ul style="list-style-type: none"> No. 3 cylinder misfires. 	<ul style="list-style-type: none"> The ignition secondary circuit is open or shorted Lack of fuel Flywheel
P0304	<ul style="list-style-type: none"> No. 4 cylinder misfires. 	<ul style="list-style-type: none"> Heated oxygen sensor 1 Incorrect distributor rotor

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

DTC Confirmation Procedure

NGEC0203

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 5 seconds before conducting the next test.

With CONSULT-II

- Turn ignition switch ON, and select "DATA MONITOR" mode with CONSULT-II.
- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 5 seconds.
- Start engine again and drive at 1,500 to 3,000 rpm for at least 3 minutes.
Hold the accelerator pedal as steady as possible.

NOTE:

Refer to the freeze frame data for the test driving conditions.

- If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-282.

With GST

Follow the procedure "With CONSULT-II".

DTC P0300 - P0304 NO. 4 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

KA24DE

Diagnostic Procedure

Diagnostic Procedure

NGEC0204

1	CHECK FOR INTAKE AIR LEAK
1. Start engine and run it at idle speed. 2. Listen for the sound of the intake air leak.	
OK or NG	
OK	▶ GO TO 2.
NG	▶ Discover air leak location and repair.

2	CHECK FOR EXHAUST SYSTEM CLOGGING
Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.	
OK or NG	
OK	▶ GO TO 3.
NG	▶ Repair or replace it.

3	CHECK EGR FUNCTION
Perform DTC Confirmation Procedure for DTC P1402 EGR FUNCTION (OPEN). Refer to EC-503.	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Repair EGR system.

DTC P0300 - P0304 NO. 4 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

KA24DE

Diagnostic Procedure (Cont'd)

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4 PERFORM POWER BALANCE TEST

With CONSULT-II
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.

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

SEF190Y

2. Is there any cylinder which does not produce a momentary engine speed drop?

Without CONSULT-II
When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?

View with air cleaner removed

Yes or No

Yes	▶	GO TO 5.
No	▶	GO TO 8.

5 CHECK INJECTOR

Does each injector make an operating sound at idle?

Yes or No

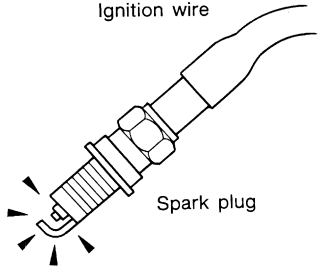
Yes	▶	GO TO 6.
No	▶	Check injector(s) and circuit(s). Refer to EC-571.

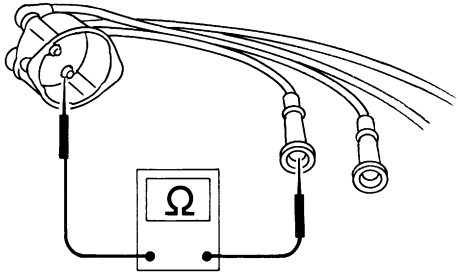
MEC703B

DTC P0300 - P0304 NO. 4 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

KA24DE

Diagnostic Procedure (Cont'd)

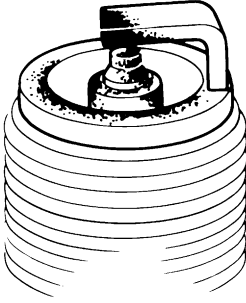
6	CHECK IGNITION SPARK	
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect ignition wire from spark plug. 3. Connect a known good spark plug to the ignition wire. 4. Place end of spark plug against a suitable ground and crank engine. 5. Check for spark. 		
		
SEF282G		
OK or NG		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	CHECK IGNITION WIRES	
<ol style="list-style-type: none"> 1. Inspect wires for cracks, damage, burned terminals and for improper fit. 2. Measure the resistance of wires to their distributor cap terminal. Move each wire while testing to check for intermittent breaks. 		
		
SEF174P		
Resistance:		
13.6 - 18.4 kΩ/m (4.15 - 5.61 kΩ/ft) at 25°C (77°F)		
If the resistance exceeds the above specification, inspect ignition wire to distributor cap connection. Clean connection or replace the ignition wire with a new one.		
OK or NG		
OK	▶	Check distributor rotor head for incorrect parts. Check ignition coil, power transistor and their circuits. Refer to EC-562.
NG	▶	Replace.

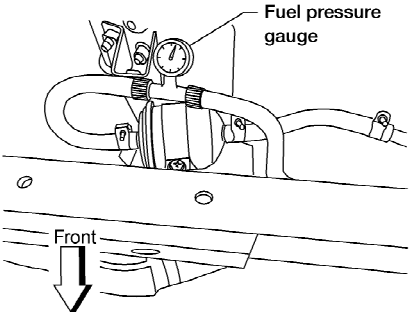
DTC P0300 - P0304 NO. 4 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

KA24DE

Diagnostic Procedure (Cont'd)

8	CHECK SPARK PLUGS	Remove the spark plugs and check for fouling, etc.	
		SEF156I	
OK or NG			
OK	▶	GO TO 9.	
NG	▶	Repair or replace spark plug(s) with standard type one(s). For spark plug type, refer to "ENGINE MAINTENANCE", MA-16 .	

9	CHECK COMPRESSION PRESSURE	Refer to EM-15 .	
<ul style="list-style-type: none"> ● Check compression pressure. <ul style="list-style-type: none"> Standard: 1,226 kPa (12.5 kg/cm², 178 psi)/300 rpm Minimum: 1,030 kPa (10.5 kg/cm², 149 psi)/300 rpm Difference between each cylinder: 98 kPa (1.0 kg/cm², 14 psi)/300 rpm 			
OK or NG			
OK	▶	GO TO 10.	
NG	▶	Check pistons, piston rings, valves, valve seats and cylinder head gaskets.	

10	CHECK FUEL PRESSURE	<ol style="list-style-type: none"> 1. Install any parts removed. 2. Release fuel pressure to zero. Refer to EC-57. 3. Install fuel pressure gauge and check fuel pressure. 	
		AEC064B	
At idle: Approx. 235 kPa (2.4 kg/cm², 34 psi)			
OK or NG			
OK	▶	GO TO 12.	
NG	▶	GO TO 11.	

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DTC P0300 - P0304 NO. 4 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

KA24DE

Diagnostic Procedure (Cont'd)

11	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Fuel pump and circuit refer to EC-580. ● Fuel pressure regulator refer to EC-58. ● Fuel lines refer to "Checking Fuel Lines", MA-19. ● Fuel filter for clogging 	
▶	Repair or replace.

12	CHECK IGNITION TIMING										
<p>1. Check the following items. Refer to "Basic Inspection", EC-112.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Items</th> <th style="text-align: center;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>20° ± 2° BTDC</td> </tr> <tr> <td>Base idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>800 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">MTBL0328</p> <p style="text-align: center;">OK or NG</p>		Items	Specifications	Ignition timing	20° ± 2° BTDC	Base idle speed	750 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF	Target idle speed	800 ± 50 rpm (in "P" or "N" position)
Items	Specifications										
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Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF										
Target idle speed	800 ± 50 rpm (in "P" or "N" position)										
OK (With CONSULT-II)	▶ GO TO 13.										
OK (Without CONSULT-II)	▶ GO TO 14.										
NG	▶ Adjust ignition timing.										

DTC P0300 - P0304 NO. 4 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

KA24DE

Diagnostic Procedure (Cont'd)

13 CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode, and the trigger point is adjusted to 100%.
3. Select "HO2S1 (B1)" and "HO2S1 MNTR (B1)" in item selection.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "START" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

6. Check the following.

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

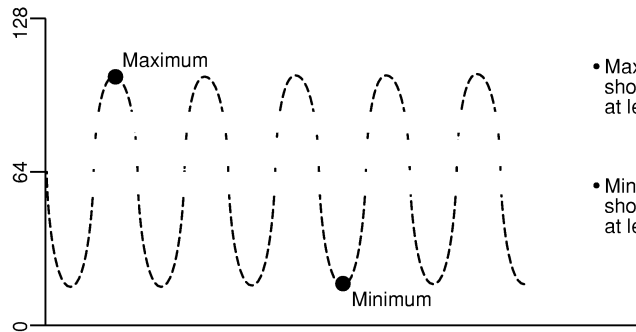
cycle | 1 | 2 | 3 | 4 | 5 |
HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R

R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

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

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



SEF648Y

CAUTION:

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

OK or NG

OK	▶	GO TO 15.
NG	▶	Replace heated oxygen sensor 1.

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DTC P0300 - P0304 NO. 4 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

KA24DE

Diagnostic Procedure (Cont'd)

14	CHECK HEATED OXYGEN SENSOR 1
<p>⊗ Without CONSULT-II</p> <p>1. Start engine and warm it up to normal operating temperature.</p> <p>2. Set voltmeter probes between ECM terminal 50 (Heated oxygen sensor 1 signal) and engine ground.</p>	
AEC873A	
<p>3. Check the following with engine speed held at 2,000 rpm constant under no load.</p> <ul style="list-style-type: none"> ● The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five times within 10 seconds. <ul style="list-style-type: none"> 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V ● The maximum voltage is over 0.6V at least one time. ● The minimum voltage is below 0.3V at least one time. ● The voltage never exceeds 1.0V. <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 15.
NG	▶ Replace heated oxygen sensor 1.

15	CHECK MASS AIR FLOW SENSOR
<p>Ⓜ With CONSULT-II</p> <p>Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II.</p> <p style="color: blue;">at idling: 0.9 - 5.8 g-m/sec</p> <p style="color: blue;">at 2,500 rpm: 7.5 - 13.2 g-m/sec</p>	
<p>Ⓜ With GST</p> <p>Check mass air flow sensor signal in MODE 1 with GST.</p> <p style="color: blue;">at idling: 0.9 - 5.8 g-m/sec</p> <p style="color: blue;">at 2,500 rpm: 7.5 - 13.2 g-m/sec</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 17.
NG	▶ GO TO 16.

16	CHECK CONNECTORS
<p>Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-168.</p> <p style="text-align: center;">OK or NG</p>	
NG	▶ Repair or replace it.

DTC P0300 - P0304 NO. 4 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

KA24DE

Diagnostic Procedure (Cont'd)

17	CHECK SYMPTOM MATRIX CHART	
Check items on the rough idle symptom in "Symptom Matrix Chart", EC-128.		
OK or NG		
OK	▶	GO TO 18.
NG	▶	Repair or replace.

GI

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18	ERASE THE 1ST TRIP DTC	
Some tests may cause a 1st trip DTC to be set. Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-86.		
	▶	GO TO 19.

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EC

19	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.		
	▶	INSPECTION END

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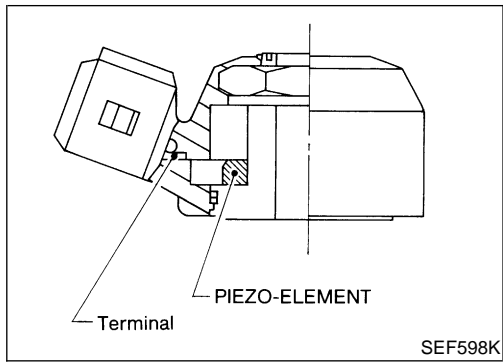
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Component Description



Component Description

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM. **Freeze frame data will not be stored in the ECM for the knock sensor. The MIL will not light for knock sensor malfunction. The knock sensor has one trip detection logic.**

NGEC0206

ECM Terminals and Reference Value

NGEC0207

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

CAUTION:

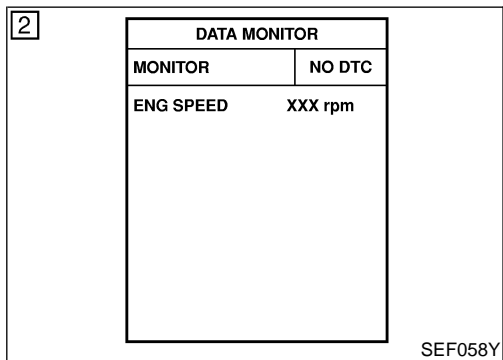
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
64	W	Knock sensor	[Engine is running] ● Idle speed	Approximately 2.4V

On Board Diagnosis Logic

NGEC0208

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0327 P0328	● An excessively low (P0327) or high (P0328) voltage from the knock sensor is sent to ECM.	● Harness or connectors (The knock sensor circuit is open or shorted.) ● Knock sensor



DTC Confirmation Procedure

NGEC0209

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

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

With CONSULT-II

- 1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and run it for at least 5 seconds at idle speed.
- 3) If DTC is detected, go to "Diagnostic Procedure", EC-292.

With GST

Follow the procedure "With CONSULT-II".

Wiring Diagram

NGEC0210

EC-KS-01 GI

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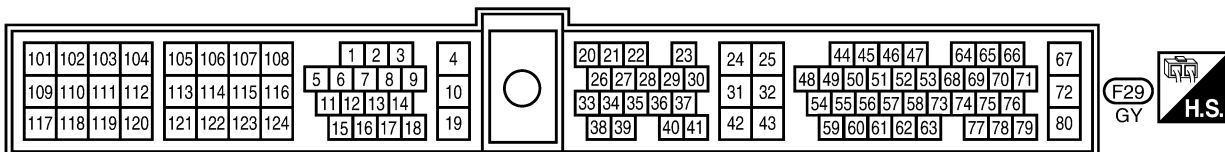
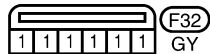
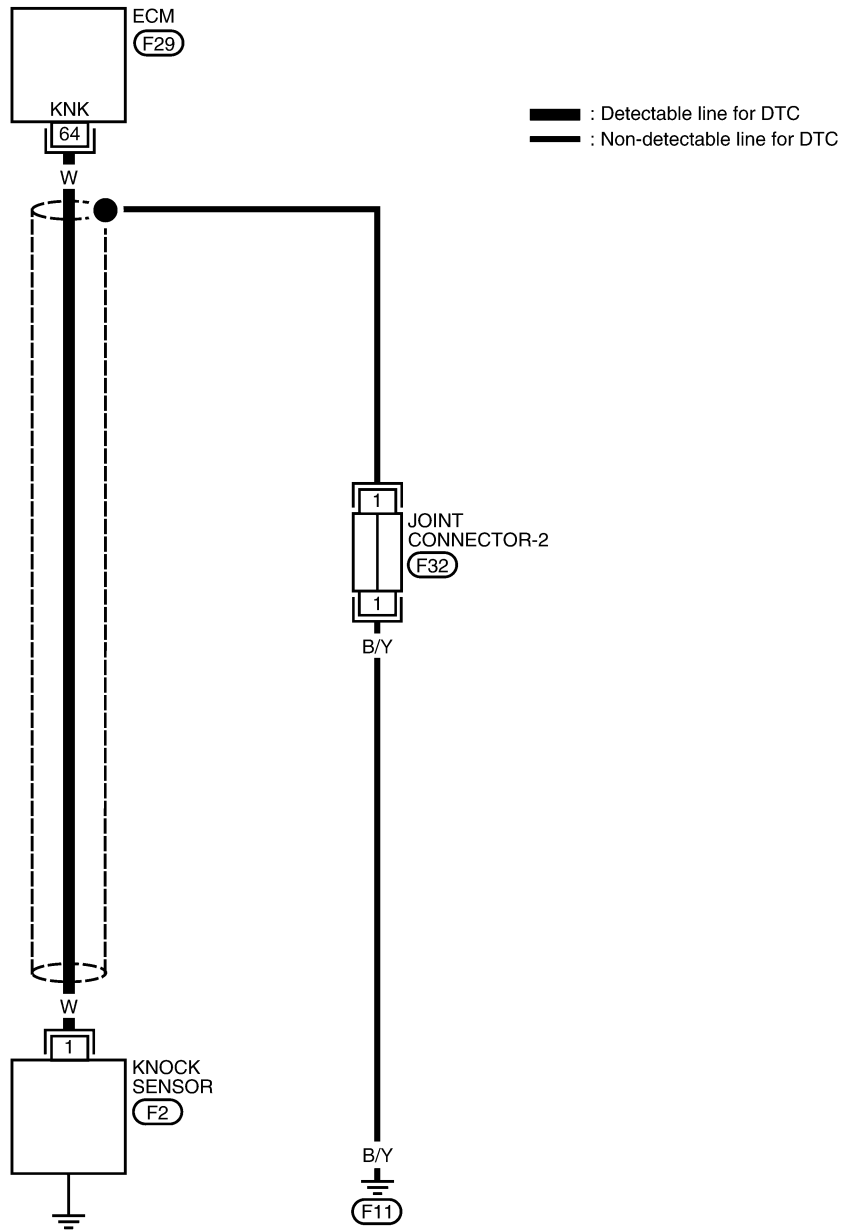
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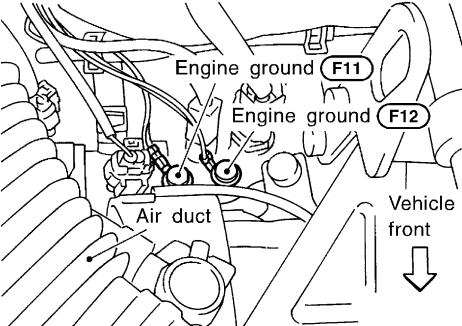
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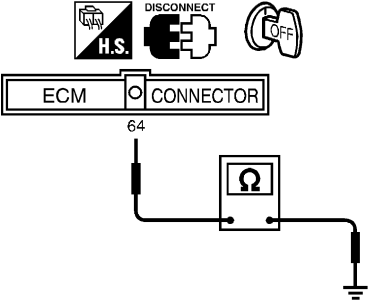


WEC777

Diagnostic Procedure

NGEC0211

1	RETIGHTEN GROUND SCREWS
<p>Loosen and retighten engine ground screws.</p> <div style="text-align: center;">  </div>	
SEF325V	
▶	GO TO 2.

2	CHECK INPUT SIGNAL CIRCUIT-1
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 64 and ground.</p> <div style="text-align: center;">  </div> <p style="color: blue;">Resistance: Approximately 500 - 620 kΩ [at 25°C (77°F)] It is necessary to use an ohmmeter which can measure more than 10 MΩ.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
SEF173V	
OK	▶ GO TO 4.
NG	▶ GO TO 3.

3	DETECT MALFUNCTIONING PART
<p>Check the harness for open or short between knock sensor and ECM.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 4.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK KNOCK SENSOR
<p>Use an ohmmeter which can measure more than 10 MΩ.</p> <ol style="list-style-type: none"> 1. Disconnect knock sensor harness connector. 2. Check resistance between terminal 1 and ground. 	
<p>Resistance: 500 - 620 kΩ [at 25°C (77°F)]</p> <p>CAUTION: Discard any knock sensors that have been dropped or physically damaged. Use only new ones.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ Replace knock sensor.

SEF174V

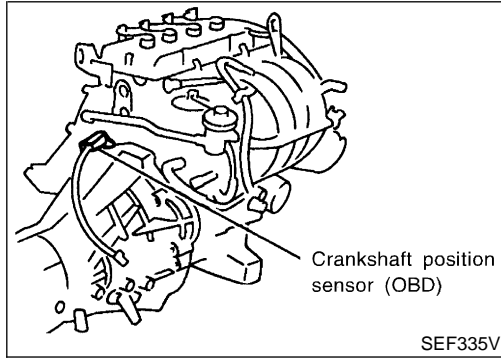
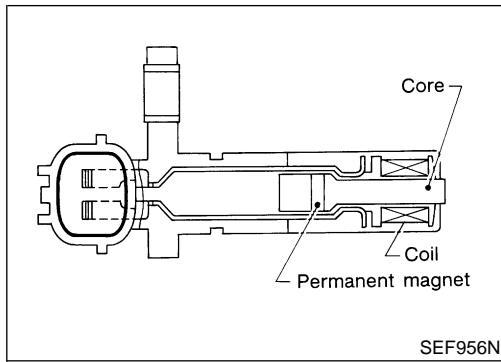
5	CHECK SHIELD CIRCUIT
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Remove joint connector-2. 3. Check the following. Refer to the wiring diagram. <ul style="list-style-type: none"> ● Continuity between joint connector-2 terminal 1 and ground ● Joint connector-2 (Refer to "HARNESS LAYOUT", <i>EL-250</i>.) <p style="text-align: center;">Continuity should exist.</p> 4. Also check harness for short to power. 5. Then reconnect harness connectors. 	
OK or NG	
OK	▶ GO TO 7.
NG	▶ GO TO 6.

6	DETECT MALFUNCTIONING PART
Check the joint connector-2. (Refer to "HARNESS LAYOUT", <i>EL-250</i> .)	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.	
▶	INSPECTION END

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Component Description



Component Description

NGEC0213

The crankshaft position sensor (OBD) is located on the transaxle housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet, core and coil.

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.

This sensor is not directly used to control the engine system. It is used only for the on board diagnosis.

ECM Terminals and Reference Value

NGEC0214

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

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
47	L	Crankshaft position sensor (OBD)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	

On Board Diagnosis Logic

NGEC0215

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0335	<ul style="list-style-type: none"> ● The proper pulse signal from the crankshaft position sensor (OBD) is not sent to ECM while the engine is running at the specified engine speed. 	<ul style="list-style-type: none"> ● Harness or connectors (The crankshaft position sensor (OBD) circuit is open.) ● Crankshaft position sensor (OBD) ● Dead battery

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NGEC0216

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 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 run it for at least 15 seconds at idle speed.
- 3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-297.

Ⓜ With GST

Follow the procedure "With CONSULT-II".

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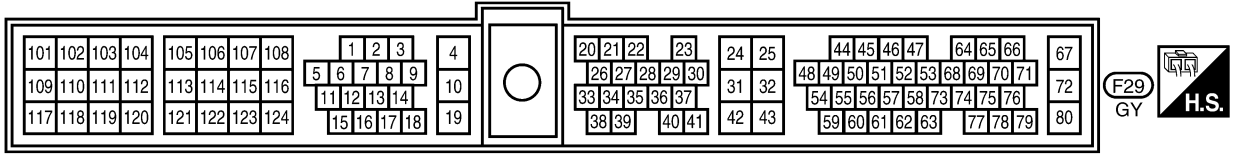
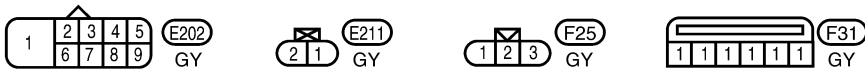
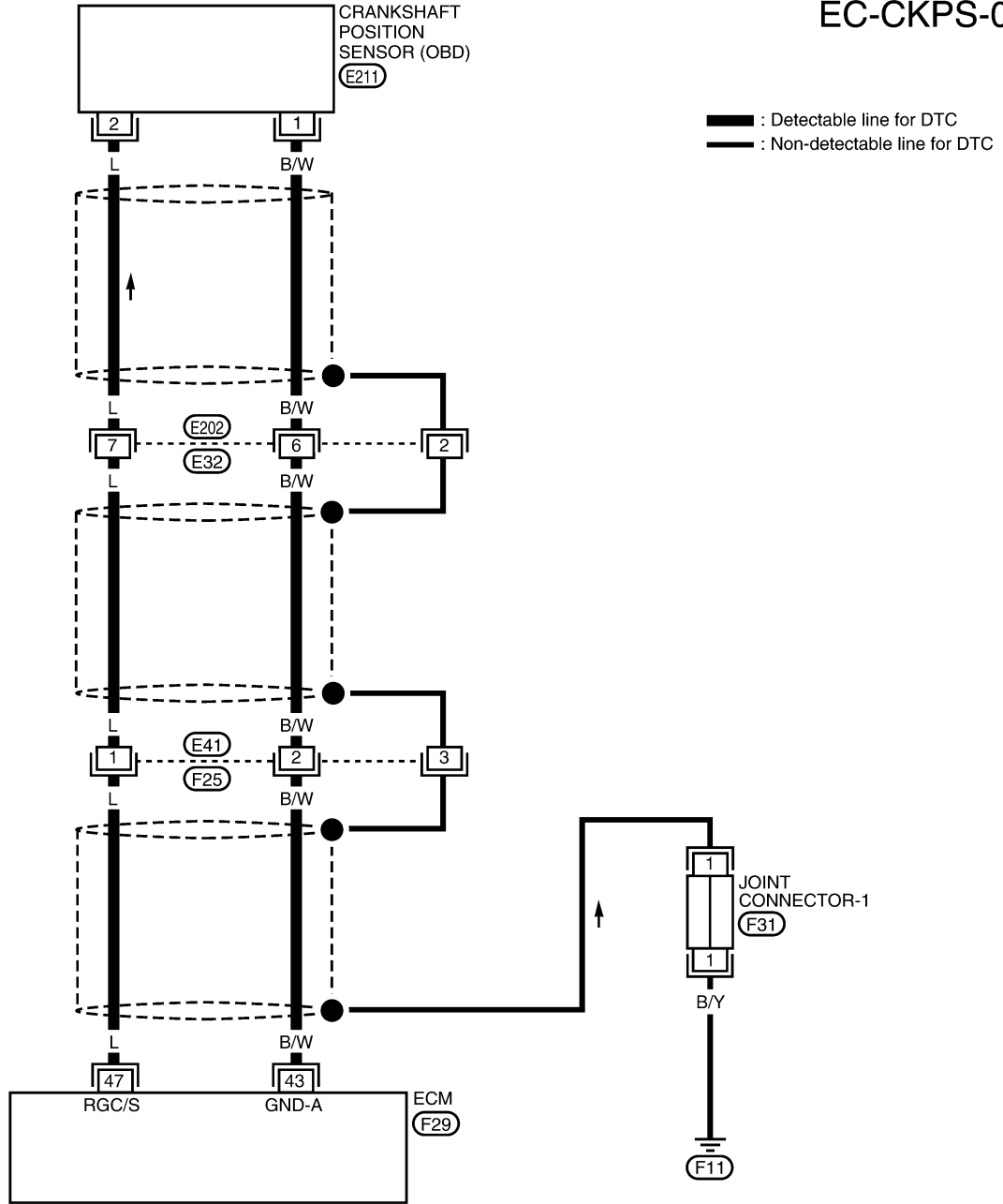
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Wiring Diagram

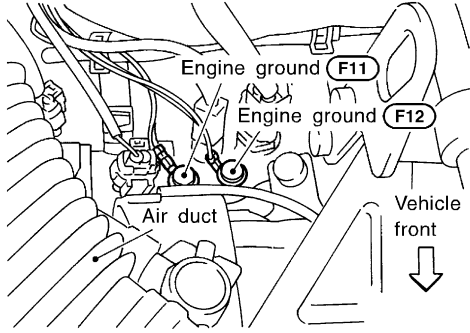
NGEC0217

EC-CKPS-01

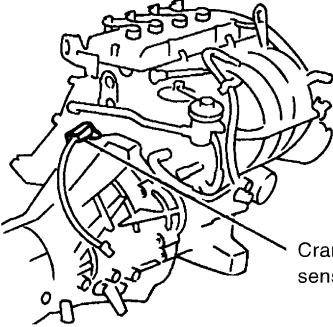
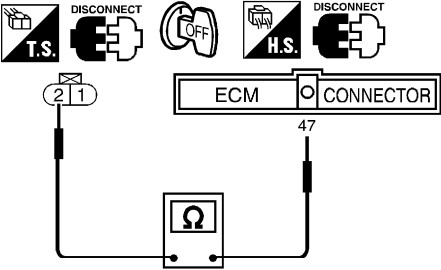


Diagnostic Procedure

NGEC0218

1	RETIGHTEN GROUND SCREWS	<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF325V</p>
▶		GO TO 2.

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2	CHECK INPUT SIGNAL CIRCUIT	<p>1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF335V</p> <p>2. Check continuity between ECM terminal 47 and terminal 2.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF175V</p> <p>Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>
▶		GO TO 4.
▶		GO TO 3.

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DTC P0335 CKP SENSOR (OBD)

KA24DE

Diagnostic Procedure (Cont'd)

3	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Harness connectors E202, E32 ● Harness connectors E41, F25 ● Harness for open or short between crankshaft position sensor (OBD) and ECM 		
▶		Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK GROUND CIRCUIT	
1. Reconnect ECM harness connector. 2. Check harness continuity between crankshaft position sensor (OBD) terminal 1 and engine ground. Refer to the 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. <ul style="list-style-type: none"> ● Harness connectors E202, E32 ● Harness connectors E41, F25 ● Harness for open or short between crankshaft position sensor (OBD) and ECM 		
▶		Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK SHIELD CIRCUIT	
1. Turn ignition switch OFF. 2. Disconnect harness connector E202, E32. 3. Check harness continuity between harness connector E32 terminal 2 and ground.		
Continuity should exist.		
4. Also check harness for short to power. 5. Then reconnect harness connectors.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

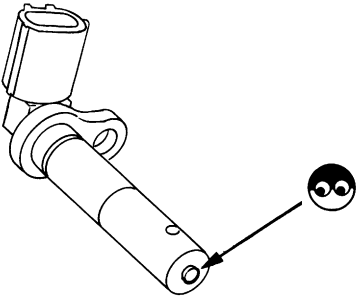
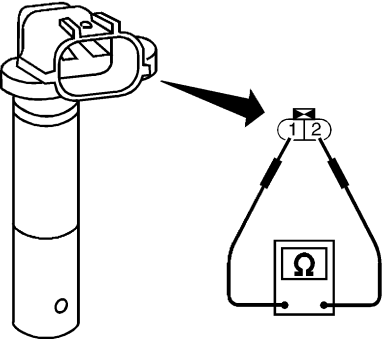
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DTC P0335 CKP SENSOR (OBD)

KA24DE

Diagnostic Procedure (Cont'd)

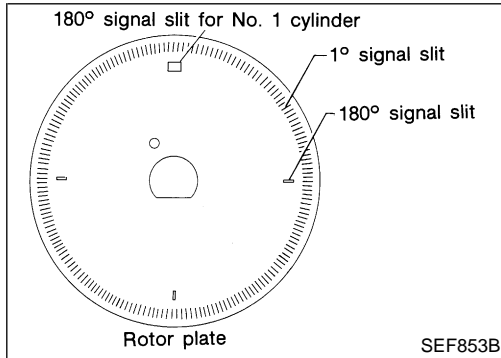
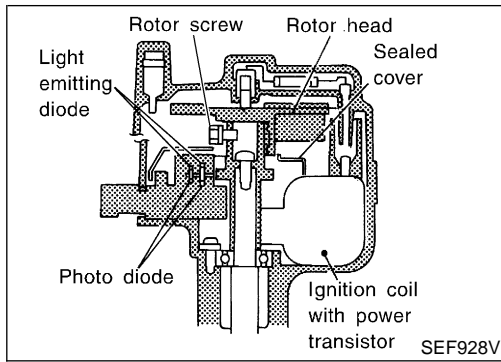
7	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E41, F25 ● Joint connector-1 (Refer to "HARNESS LAYOUT", <i>EL-250</i>.) ● Harness for open or short between harness connector E32 and engine ground 	
▶	Repair open circuit or short to power in harness or connectors.

8	CHECK CRANKSHAFT POSITION SENSOR (OBD)
<ol style="list-style-type: none"> 1. Disconnect crankshaft position sensor (OBD) harness connector. 2. Loosen the fixing bolt of the sensor. 3. Remove the sensor. 4. Visually check the sensor for chipping. 	
	
<p>5. Check resistance as shown in the figure.</p>	
	
<p>Resistance: Approximately 512 - 632Ω [at 20°C (68°F)]</p> <p>OK or NG</p>	
OK	▶ GO TO 9.
NG	▶ Replace crankshaft position sensor (OBD).

9	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.	
▶	INSPECTION END

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Component Description



Component Description

NGEC0220

The camshaft position sensor is a basic component of the engine control system. It monitors engine speed and piston position. These input signals to the engine control system are used to control fuel injection, ignition timing and other functions.

The camshaft position sensor has a rotor plate and a wave-forming circuit. The rotor plate has 360 slits for a 1° (POS) signal and 4 slits for a 180° (REF) signal. The wave-forming circuit consists of Light Emitting Diodes (LED) and photo diodes.

The rotor plate is positioned between the LED and the photo diode. The LED transmits light to the photo diode. As the rotor plate turns, the slits cut the light to generate rough-shaped pulses. These pulses are converted into on-off signals by the wave-forming circuit and sent to the ECM.

The distributor is not repairable and must be replaced as an assembly except distributor cap and rotor head.

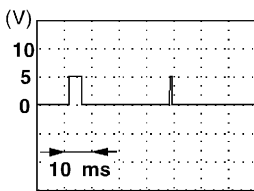
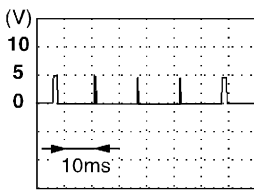
ECM Terminals and Reference Value

NGEC0221

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

CAUTION:

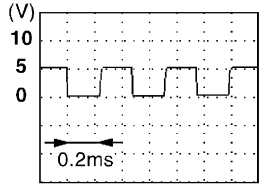
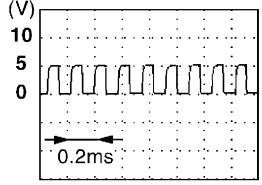
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	LG/R	ECM relay (Self shut-off)	[Engine is running] [Ignition switch OFF] ● For a few seconds after turning ignition switch OFF	0 - 1V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
44 48	PU PU	Camshaft position sensor (Reference signal)	[Engine is running] (Warm-up condition) ● Idle speed	0.2 - 0.5V 
			[Engine is running] ● Engine speed is 2,000 rpm	0 - 0.5V 

DTC P0340 CMP SENSOR

KA24DE

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	LG	Camshaft position sensor (Position signal)	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 2.6V 
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 2.5 - 2.6V 
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0222

DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P0340	A)	Either 1° or 180° signal is not sent to ECM for the first few seconds during engine cranking.	<ul style="list-style-type: none"> ● Harness or connectors (The camshaft position sensor circuit is open or shorted.) ● Camshaft position sensor ● Starter motor (Refer to SC-10.) ● Starting system circuit (Refer to SC-13.) ● Dead (Weak) battery
	B)	Either 1° or 180° signal is not sent to ECM often enough while the engine speed is higher than the specified engine speed.	
	C)	The relation between 1° and 180° signal is not in the normal range during the specified engine speed.	

DTC Confirmation Procedure

Perform “Procedure for malfunction A” first. If DTC cannot be confirmed, perform “Procedure for malfunction B and C”. =NGEC0223

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V.

2	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION ANGEC0223S01**With CONSULT-II**

- 1) Turn ignition switch ON.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Crank engine for at least 2 seconds.
- 4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-304.

With GST

Follow the procedure “With CONSULT-II”.

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B AND CNGEC0223S02**With CONSULT-II**

- 1) Turn ignition switch ON.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Start engine and run it for at least 2 seconds at idle speed.
- 4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-304.

With GST

Follow the procedure “With CONSULT-II”.

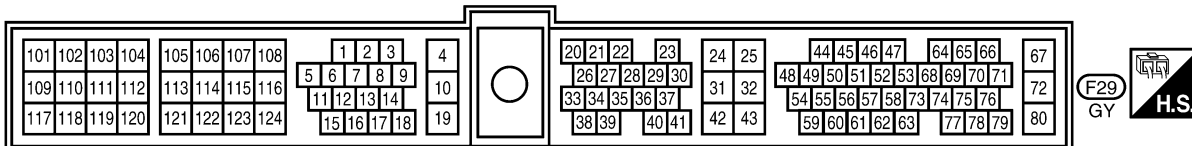
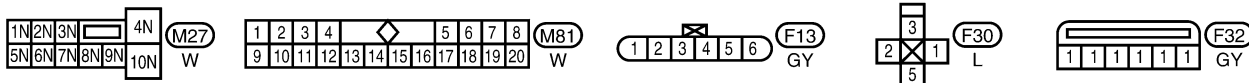
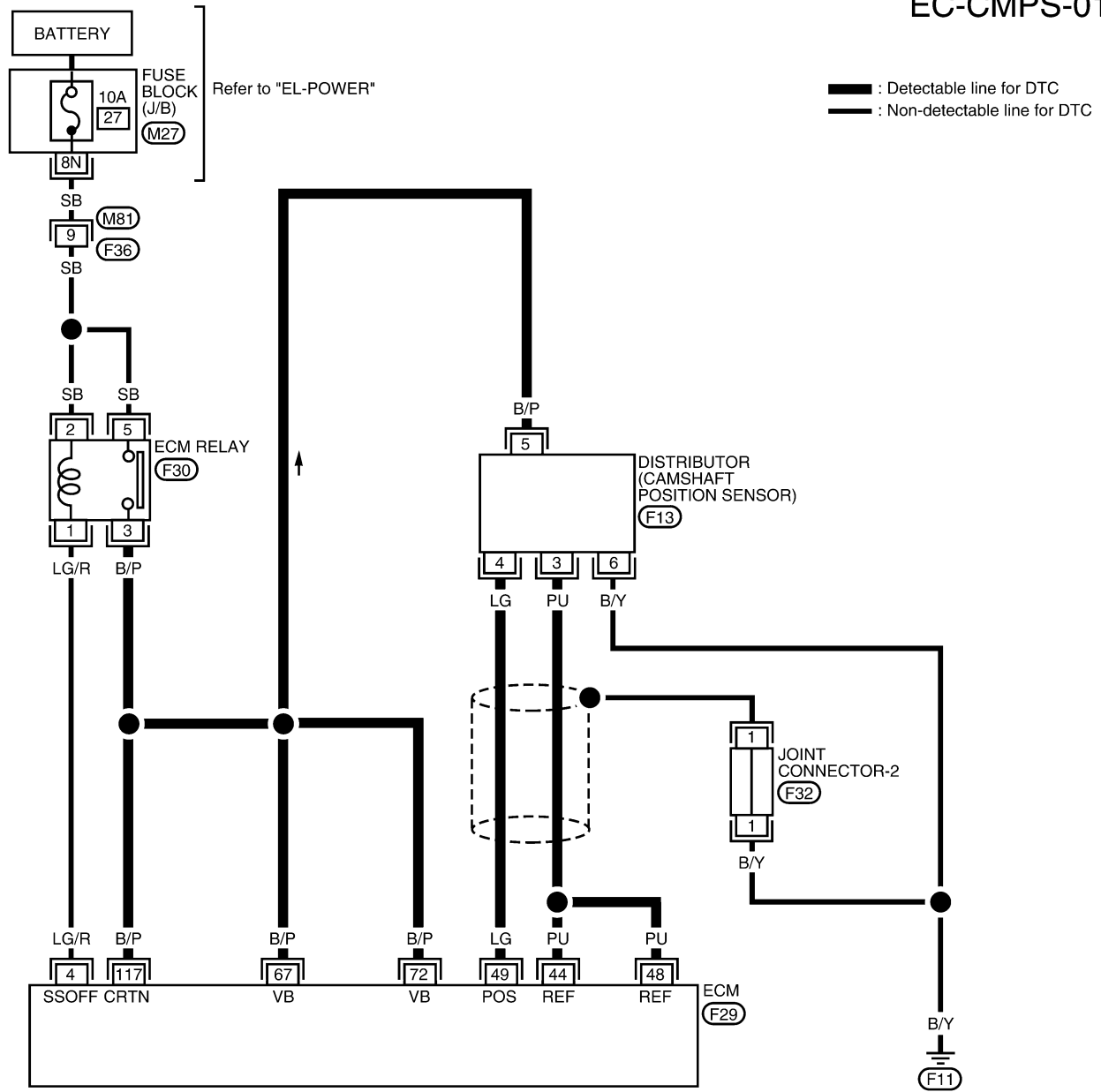
DTC P0340 CMP SENSOR

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Wiring Diagram

Wiring Diagram

NGEC0224

EC-CMPS-01



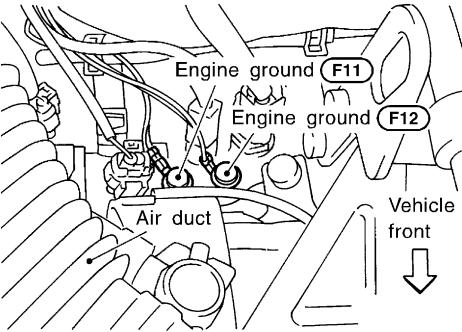
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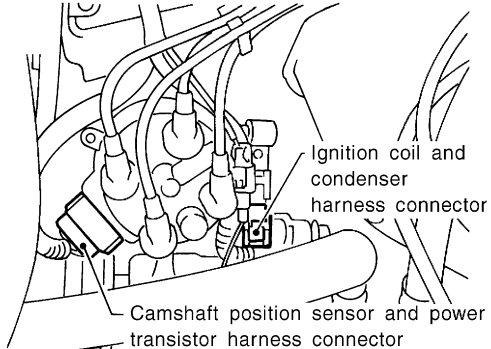
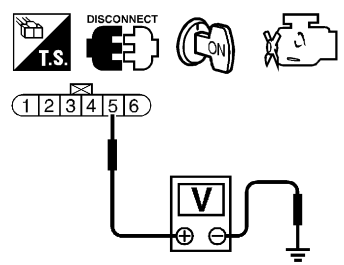
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Diagnostic Procedure

NGEC0225

1	CHECK STARTING SYSTEM	
Does the engine turn over? (Does the starter motor operate?)		
Yes or No		
Yes	▶	GO TO 2.
No	▶	Check starting system. (Refer to SC-10 .)

2	RETIGHTEN GROUND SCREWS	
1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.		
		
<small>SEF325V</small>		
▶		GO TO 3.

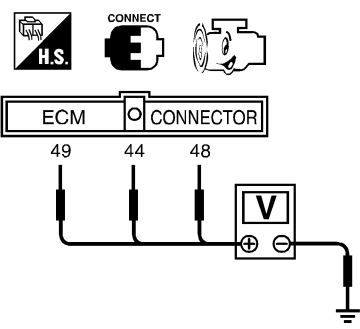
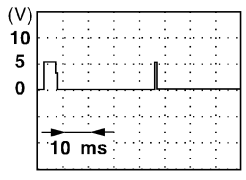
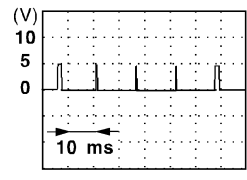

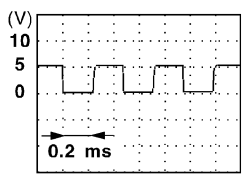
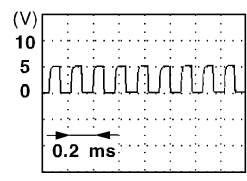
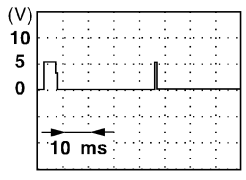
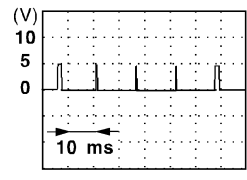
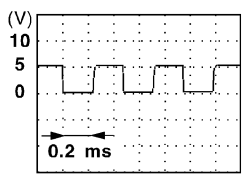
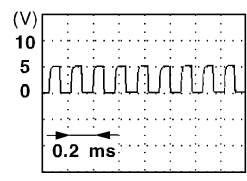
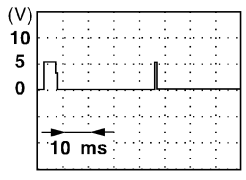
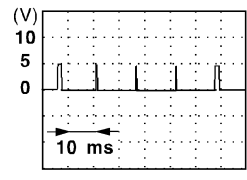
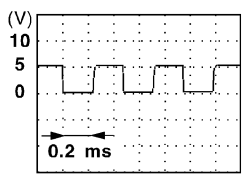
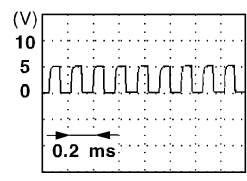
3	CHECK POWER SUPPLY		
1. Disconnect camshaft position sensor harness connector.		 <p style="text-align: right;">Ignition coil and condenser harness connector</p> <p style="text-align: center;">Camshaft position sensor and power transistor harness connector</p>	SEF128S
2. Turn ignition switch ON. 3. Check voltage between terminal 5 and ground with CONSULT-II or tester.			
			SEF040S
		Voltage: Battery voltage	
		OK or NG	
OK	▶	GO TO 5.	
NG	▶	GO TO 4.	

4	DETECT MALFUNCTIONING PART		
Check the following.			
<ul style="list-style-type: none"> ● Harness for open or short between camshaft position sensor and ECM relay ● Harness for open or short between camshaft position sensor and ECM 			
	▶	Repair open circuit or short to ground or short to power in harness or connectors.	

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5	CHECK INPUT SIGNAL CIRCUIT
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between sensor terminal 4 and ECM terminal 49, sensor terminal 3 and ECM terminals 44, 48. 	
SEF178V	
<p>Continuity should exist.</p>	
<ol style="list-style-type: none"> 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 GROUND CIRCUIT
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Check harness continuity between distributor (camshaft position sensor) terminal 6 and engine ground. Refer to the wiring diagram. 	
<p>Continuity should exist.</p>	
<ol style="list-style-type: none"> 3. Also check harness for short to power. 	
OK or NG	
OK	▶ GO TO 7.
NG	▶ Repair open circuit or short to power in harness or connectors.

7	CHECK CAMSHAFT POSITION SENSOR																			
<ol style="list-style-type: none"> 1. Reconnect all harness connectors disconnected. 2. Start engine and warm it up to normal operating temperature. 3. Check voltage between ECM terminal 49 and engine ground, ECM terminals 44, 48 and engine ground. 																				
<div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p>Terminals 44, 48 and engine ground</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 20%;">Condition</th> <th style="width: 40%;">Idle</th> <th style="width: 40%;">2,000 rpm</th> </tr> </thead> <tbody> <tr> <td>Voltage</td> <td style="text-align: center;">0.2 - 0.5V</td> <td style="text-align: center;">0 - 0.5V</td> </tr> <tr> <td>Pulse signal</td> <td style="text-align: center;">  </td> <td style="text-align: center;">  </td> </tr> </tbody> </table> </div> </div> <div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p>Terminal 49 and engine ground</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 20%;">Condition</th> <th style="width: 40%;">Idle</th> <th style="width: 40%;">2,000 rpm</th> </tr> </thead> <tbody> <tr> <td>Voltage</td> <td style="text-align: center;">Approximately 2.6V</td> <td style="text-align: center;">Approximately 2.5 - 2.6V</td> </tr> <tr> <td>Pulse signal</td> <td style="text-align: center;">  </td> <td style="text-align: center;">  </td> </tr> </tbody> </table> </div> </div>			Condition	Idle	2,000 rpm	Voltage	0.2 - 0.5V	0 - 0.5V	Pulse signal			Condition	Idle	2,000 rpm	Voltage	Approximately 2.6V	Approximately 2.5 - 2.6V	Pulse signal		
Condition	Idle	2,000 rpm																		
Voltage	0.2 - 0.5V	0 - 0.5V																		
Pulse signal																				
Condition	Idle	2,000 rpm																		
Voltage	Approximately 2.6V	Approximately 2.5 - 2.6V																		
Pulse signal																				
SEC751C																				
OK or NG																				
OK	▶	GO TO 8.																		
NG	▶	Replace camshaft position sensor.																		

8	CHECK SHIELD CIRCUIT	
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect joint connector-2. 3. Check the following. <ul style="list-style-type: none"> ● Continuity between joint connector-2 terminal 1 and ground ● Joint connector-2 (Refer to "HARNES LAYOUT", EL-250.) Continuity should exist. 4. Also check harness for short to power. 5. Then reconnect joint connector-2. 		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Repair open circuit, short to power in harness or connectors.

9	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.		
▶	INSPECTION END	

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Description SYSTEM DESCRIPTION

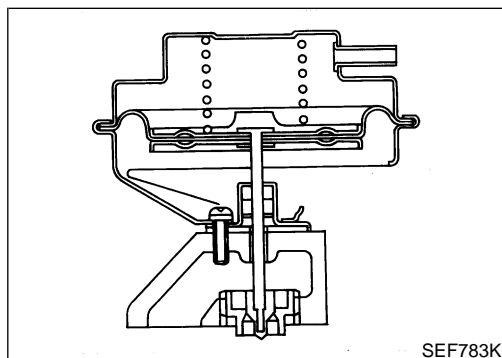
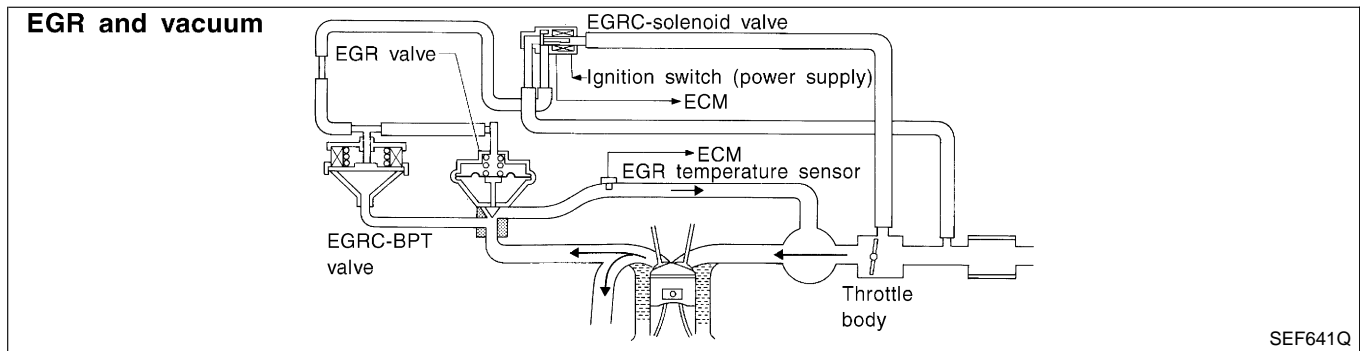
NGEC0227

NGEC0227S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EGR control	EGRC-solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Intake air temperature sensor	Intake air temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Vehicle speed sensor	Vehicle speed		

This system cuts and controls vacuum applied to the EGR valve to suit engine operating conditions. This cut-and-control operation is accomplished through the ECM and the EGRC-solenoid valve. When the ECM detects any of the following conditions, current flows through the solenoid valve is cut. This causes the vacuum to be discharged into the atmosphere. The EGR valve remains closed.

- Low engine coolant temperature
- Engine starting
- High-speed engine operation
- Engine idling
- Excessively high engine coolant temperature
- Mass air flow sensor malfunction
- Low intake air temperature



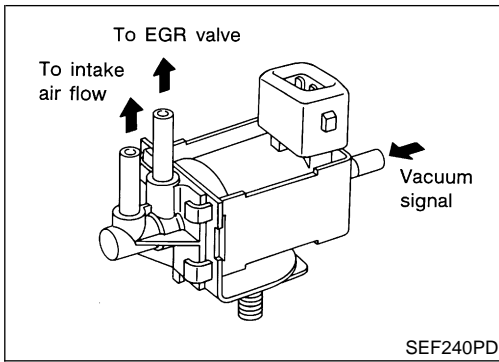
COMPONENT DESCRIPTION

NGEC0227S02

Exhaust Gas Recirculation (EGR) Valve

NGEC0227S0201

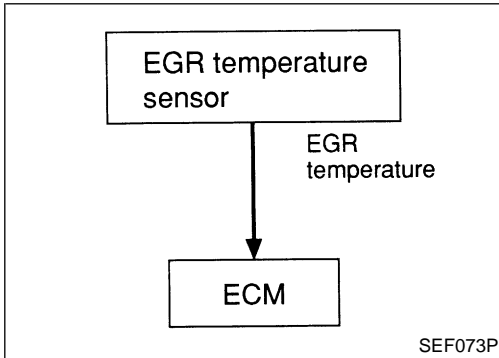
The EGR valve controls the amount of exhaust gas routed to the intake manifold. Vacuum is applied to the EGR valve in response to throttle valve opening. The vacuum controls the movement of a taper valve connected to the vacuum diaphragm in the EGR valve.



EGRC-Solenoid Valve

NGEC0227S0202

The EGRC-solenoid valve responds to signals from the ECM. When the ECM sends an OFF signal, the vacuum signal passes through the solenoid valve. The signal then reaches the EGR valve. When the ECM sends an ON signal, a plunger will then move to cut the vacuum signal from the intake manifold collector to the EGR valve.



On Board Diagnosis Logic

NGEC0228

If the absence of EGR flow is detected by EGR temperature sensor under the condition that calls for EGR, a low-flow malfunction is diagnosed.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0400	<ul style="list-style-type: none"> No EGR flow is detected under conditions that call for EGR. 	<ul style="list-style-type: none"> EGR valve stuck closed EGRC-BPT valve Vacuum hose EGRC-solenoid valve EGR passage EGR temperature sensor Exhaust gas leaks

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8

EGR SYSTEM P0400	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF191Y

8

EGR SYSTEM P0400	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF192Y

8

EGR SYSTEM P0400	
COMPLETED	

SEF235Y

DTC Confirmation Procedure

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 5 seconds before conducting the next test.
- P0400 will not be displayed at “SELF-DIAG RESULTS” mode with CONSULT-II even though DTC work support test result is “NG”.

TESTING CONDITION:

For best results, perform the test at a temperature above 5°C (41°F).

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Check “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II and confirm it is within the range listed below.

COOLAN TEMP/S: Less than 40°C (104°F)

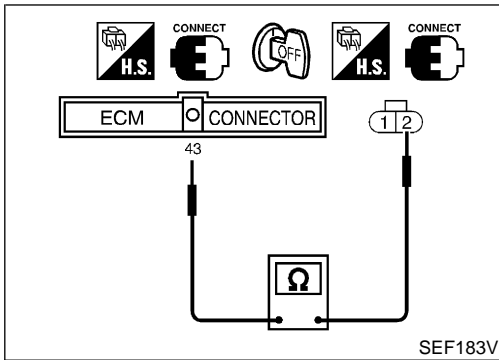
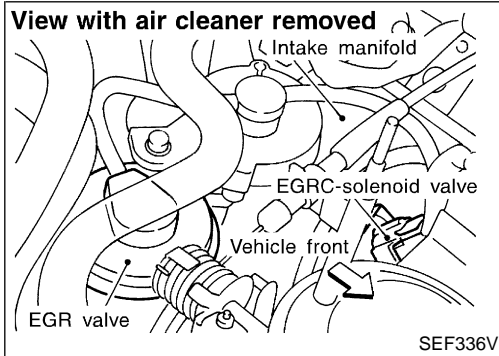
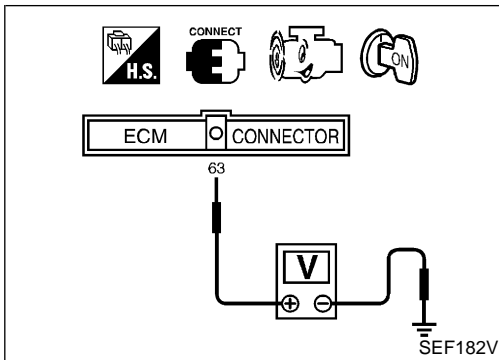
If the value is out of range, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to lower the coolant temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.

- 3) Start engine and let it idle monitoring “COOLAN TEMP/S” value. When the “COOLAN TEMP/S” value reaches 70°C (158°F), immediately go to the next step.
- 4) Select “EGR SYSTEM P0400” of “EGR SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
- 5) Touch “START”.
- 6) Accelerate vehicle to a speed of 40 km/h (25 MPH) once and then stop vehicle with engine running.
If “COMPLETED” appears on CONSULT-II screen, go to step 9.
If “COMPLETED” does not appear on CONSULT-II screen, go to the following step.
- 7) Check the output voltage of “THRTL POS SEN” (at closed throttle position) and note it.
- 8) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions until “TESTING” changes to “COMPLETED”. (It will take approximately 30 seconds or more.)

ENG SPEED	2,000 - 2,800 rpm
Vehicle speed	10 km/h (6 MPH) or more
B/FUEL SCHDL	7 - 10 msec
THRTL POS SEN	$(X + 0.23) - (X + 0.74) V$ X = Voltage value measured at step 7
Selector lever	Suitable position

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

- 9) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to “Diagnostic Procedure”, EC-313.

NGEC0230


Overall Function Check

Use this procedure to check the overall EGR function. 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) Check the EGR valve lifting when revving engine from 2,000 rpm to 4,000 rpm quickly under no load using the following methods.
 - Disconnect EGRC-solenoid valve harness connector. (The DTC for EGRC-solenoid valve will be displayed, however, ignore it.)

EGR valve should lift up and down without sticking.

If NG, go to "Diagnostic Procedure", EC-313.

- 3) Check voltage between ECM terminal 63 (EGR temperature sensor signal) and ground at idle speed.

Less than 4.5V should exist.

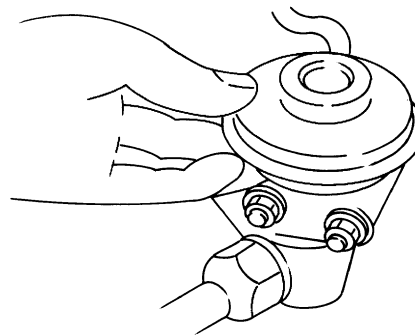
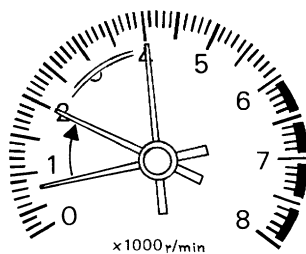
If NG, go to next step.

- 4) Turn ignition switch OFF.
- 5) Check harness continuity between EGR temperature sensor harness connector terminal 2 and ECM terminal 43 (ECM ground).

Continuity should exist.

- 6) Check "EGR TEMPERATURE SENSOR". Refer to "CHECK EGR TEMPERATURE SENSOR" in "Diagnostic Procedure".

Overall function check



Check the EGR valve lifting when revving engine from 2,000 rpm up to 4,000 rpm.

SEF642Q

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DTC P0400 EGR FUNCTION

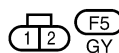
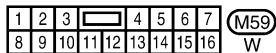
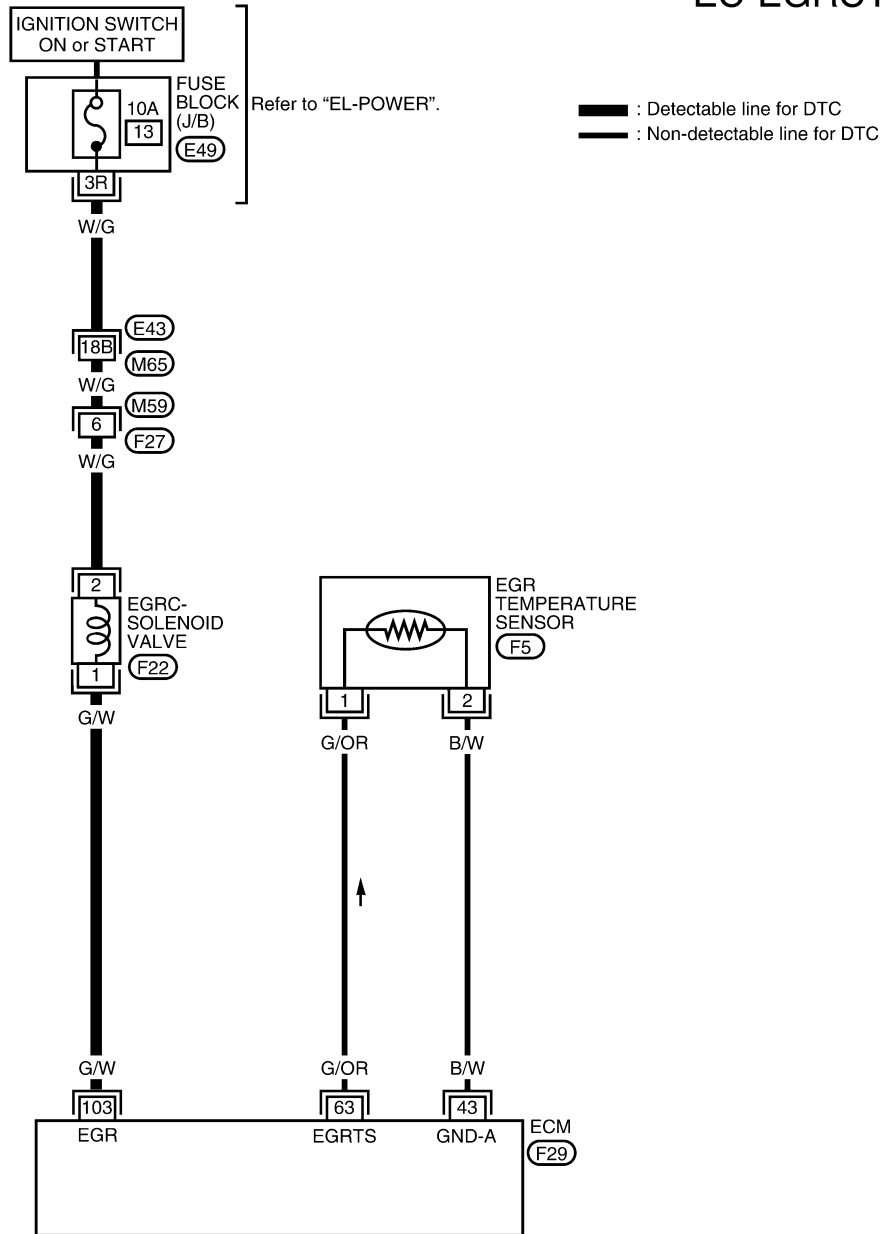
KA24DE

Wiring Diagram

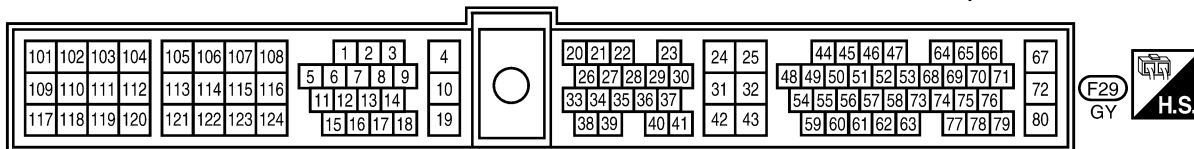
Wiring Diagram

NGEC0231

EC-EGRC1-01



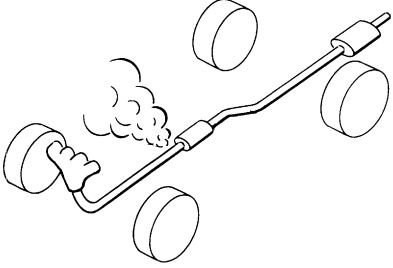
Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



LEC114A

Diagnostic Procedure

NGEC0232

1	CHECK EXHAUST SYSTEM	
<p>1. Start engine. 2. Check exhaust pipes and muffler for leaks.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF099P</p> <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II)	▶	GO TO 2.
OK (Without CONSULT-II)	▶	GO TO 3.
NG	▶	Repair or replace exhaust system.

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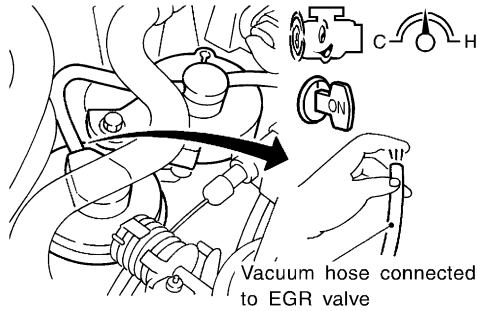
EL

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2 CHECK VACUUM SOURCE TO EGR VALVE

With CONSULT-II

1. Warm engine up to normal operating temperature.
2. Disconnect vacuum hose to EGR valve.
3. Check for vacuum existence at idle.



SEF337V

Vacuum should not exist at idle.

4. Select "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode with CONSULT-II and turn the solenoid valve OFF.
5. Check for vacuum existence when revving engine from 2,000 rpm up to 4,000 rpm.

ACTIVE TEST	
EGRC SOL/V	ON
(EGR)	CUT
MONITOR	
ENG SPEED	XXX rpm

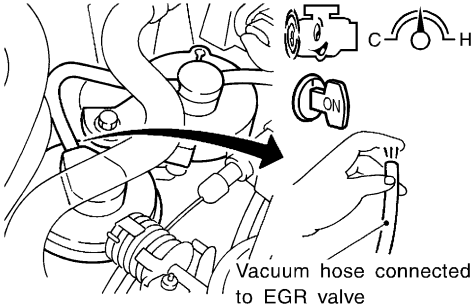
SEF716Z

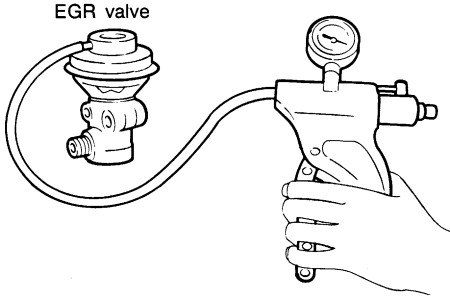
Vacuum should exist when revving engine.

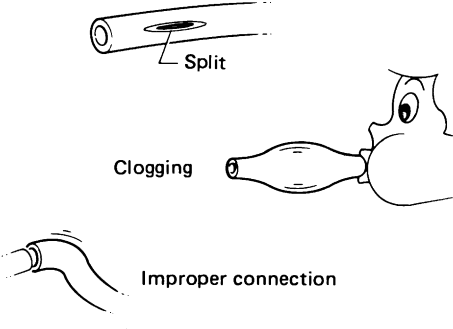
OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 5.

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3	CHECK VACUUM SOURCE TO EGR VALVE
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Warm engine up to normal operating temperature. 2. Disconnect vacuum hose to EGR valve. 3. Check for vacuum existence at idle. 	
 <p style="text-align: center;">Vacuum hose connected to EGR valve</p>	
SEF337V	
<p>Vacuum should not exist at idle.</p> <ol style="list-style-type: none"> 4. Disconnect EGRC-solenoid valve harness connector. (The 1st trip DTC for EGRC-solenoid valve will be displayed, but ignore it.) 5. Check for vacuum existence when revving engine from 2,000 rpm up to 4,000 rpm. <p>Vacuum should exist when revving engine.</p>	
OK or NG	
OK	▶▶ GO TO 4.
NG	▶▶ GO TO 5.

4	CHECK EGR VALVE
<ul style="list-style-type: none"> ● Apply vacuum to EGR vacuum port with a hand vacuum pump. 	
	
MEF137D	
<p>EGR valve spring should lift.</p> <ul style="list-style-type: none"> ● Check for sticking. 	
OK or NG	
OK	▶▶ GO TO 11.
NG	▶▶ Repair or replace EGR valve.

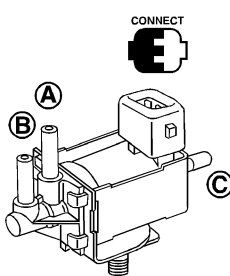
5	CHECK VACUUM HOSE	
<p>1. Turn ignition switch OFF. 2. Check vacuum hose for clogging, cracks or improper connection.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF109L</p> <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	Repair or replace vacuum hose.

6	CHECK EGRC-SOLENOID VALVE OPERATION																									
<p><input checked="" type="checkbox"/> With CONSULT-II</p> <p>1. Turn ignition switch ON. 2. Turn EGRC-solenoid valve "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT-II and check operating sound.</p> <div style="text-align: center;"> <table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>EGRC SOL/V</th> <th>ON</th> </tr> <tr> <th>(EGR)</th> <th>CUT</th> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <th>ENG SPEED</th> <th>XXX rpm</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table> </div> <p style="text-align: right;">SEF716Z</p> <p style="text-align: center;">Clicking noise should be heard.</p> <p style="text-align: center;">OK or NG</p>			ACTIVE TEST		EGRC SOL/V	ON	(EGR)	CUT	MONITOR		ENG SPEED	XXX rpm														
ACTIVE TEST																										
EGRC SOL/V	ON																									
(EGR)	CUT																									
MONITOR																										
ENG SPEED	XXX rpm																									
OK	▶	GO TO 9.																								
NG	▶	GO TO 8.																								

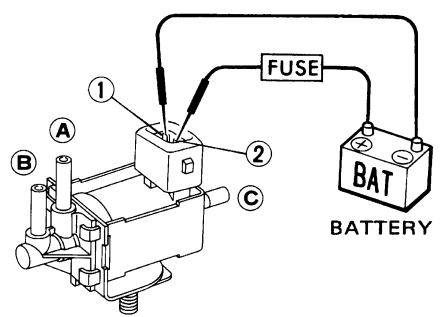
7	CHECK EGRC-SOLENOID VALVE OPERATION	
<p><input checked="" type="checkbox"/> Without CONSULT-II</p> <p>Check operating sound of the solenoid valve when disconnecting and reconnecting EGRC-solenoid valve harness connector. (The DTC or the 1st trip DTC for the EGRC-solenoid valve will be displayed, however, ignore it.) Clicking noise should be heard.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	CHECK EGRC-SOLENOID VALVE CIRCUIT	
<p>1. Turn ignition switch "OFF".</p> <p>2. Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M59, F27 ● 10A fuse ● Harness for open or short between fuse block and EGRC-solenoid valve ● Harness for open or short between ECM and EGRC-solenoid valve <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 9.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

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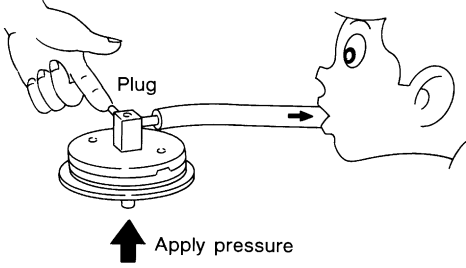
9	CHECK EGRC-SOLENOID VALVE																																		
<p> With CONSULT-II Check air passage continuity. Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode.</p>																																			
	<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>EGRC SOL/V</th> <th>ON</th> </tr> <tr> <th>(EGR)</th> <th>CUT</th> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <th>ENG SPEED</th> <th>XXX rpm</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table>	ACTIVE TEST		EGRC SOL/V	ON	(EGR)	CUT	MONITOR		ENG SPEED	XXX rpm															<table border="1" style="margin: auto;"> <thead> <tr> <th>Condition</th> <th>Air passage continuity between A and B</th> <th>Air passage continuity between A and C</th> </tr> </thead> <tbody> <tr> <td>ON</td> <td style="text-align: center;">Yes</td> <td style="text-align: center;">No</td> </tr> <tr> <td>OFF</td> <td style="text-align: center;">No</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table> <p style="text-align: center;">Operation takes less than 1 second.</p>	Condition	Air passage continuity between A and B	Air passage continuity between A and C	ON	Yes	No	OFF	No	Yes
ACTIVE TEST																																			
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(EGR)	CUT																																		
MONITOR																																			
ENG SPEED	XXX rpm																																		
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ON	Yes	No																																	
OFF	No	Yes																																	
SEC752C																																			

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<p> Without CONSULT-II Check air passage continuity shown in the figure.</p>											
											
AEC919											
<table border="1" style="margin: auto;"> <thead> <tr> <th>Condition</th> <th>Air passage continuity between A and B</th> <th>Air passage continuity between A and C</th> </tr> </thead> <tbody> <tr> <td>12V direct current supply between terminals 1 and 2</td> <td style="text-align: center;">Yes</td> <td style="text-align: center;">No</td> </tr> <tr> <td>No supply</td> <td style="text-align: center;">No</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table> <p style="text-align: center;">Operation takes less than 1 second.</p>	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		
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									
MTBL0664											
OK or NG											
OK	▶	GO TO 10.									
NG	▶	Replace EGRC-solenoid valve.									

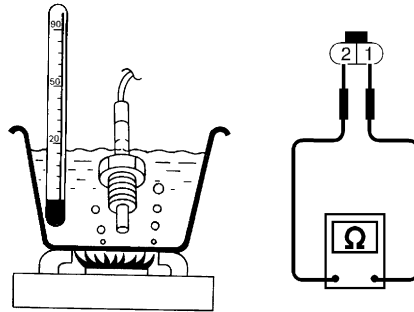
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10	CHECK EGRC-BPT VALVE	
<p>1. Plug one of two ports of EGRC-BPT valve.</p> <p>2. Vacuum from the other port and check for leakage while applying a pressure above 0.981 kPa (100 mmH₂O, 3.94 inH₂O) from under EGRC-BPT valve.</p>		
		
SEF083P		
<p>3. If a leakage is noted, replace the valve.</p>		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace EGRC-BPT valve.

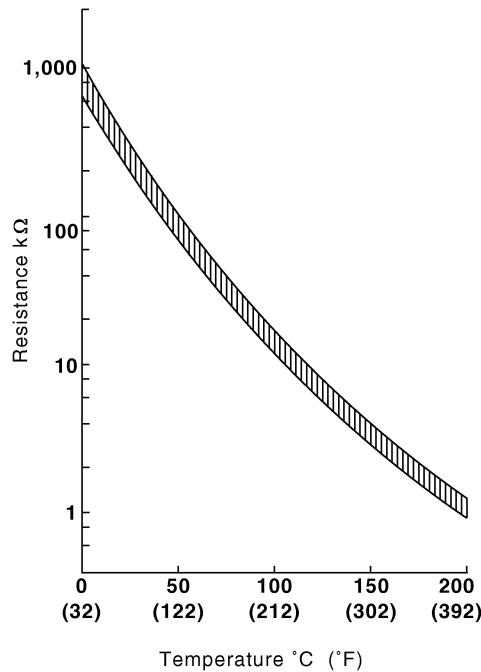
11 CHECK EGR TEMPERATURE SENSOR

Check resistance change and resistance value.



<Reference data>

EGR temperature °C (°F)	Voltage V	Resistance M.Ω
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015



OK or NG

- | | | |
|----|---|---------------------------------|
| OK | ▶ | GO TO 12. |
| NG | ▶ | Replace EGR temperature sensor. |

12 CHECK INTERMITTENT INCIDENT

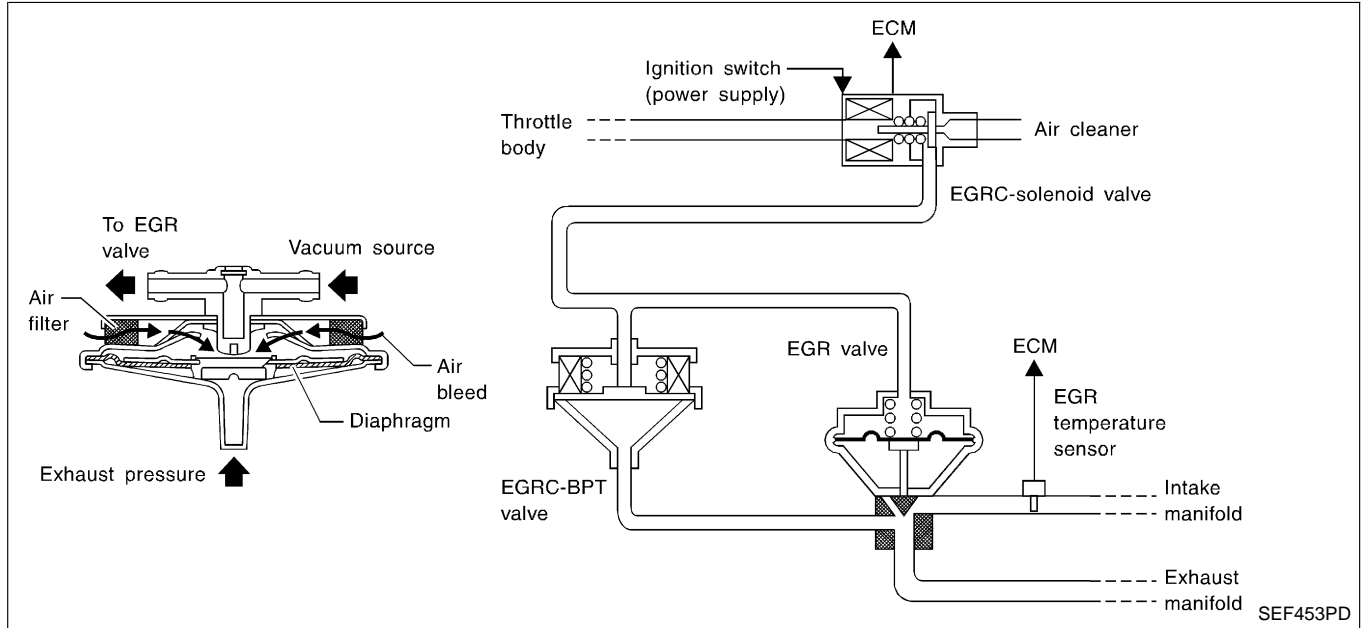
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.

▶ **INSPECTION END**

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Description

NGEC0234



SEF453PD

SYSTEM DESCRIPTION

NGEC0234S01

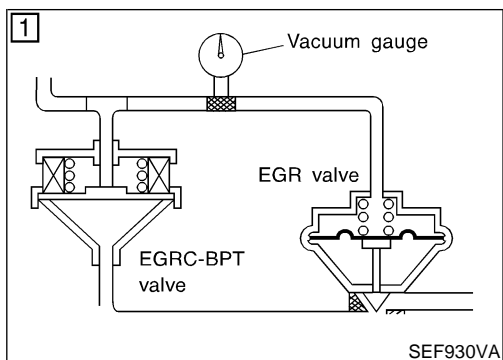
The EGRC-BPT valve monitors exhaust pressure to activate the diaphragm, controlling throttle body vacuum applied to the EGR valve. In other words, recirculated exhaust gas is controlled in response to positioning of the EGR valve or to engine operation.

On Board Diagnosis Logic

NGEC0235

If too much EGR flow exists due to an EGRC-BPT valve malfunction, off idle engine roughness will increase. If the roughness is large, then the vacuum to the EGR valve is interrupted through the EGRC-solenoid valve. If the engine roughness is reduced at that time, the EGRC-BPT valve malfunction is indicated.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0402	<ul style="list-style-type: none"> The EGRC-BPT valve does not operate properly. 	<ul style="list-style-type: none"> EGRC-BPT valve EGR valve Loose or disconnected rubber tube Blocked rubber tube Camshaft position sensor Blocked exhaust system Orifice Mass air flow sensor EGRC-solenoid valve



DTC Confirmation Procedure

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 5 seconds before conducting the next test.

TESTING CONDITION:

- Always perform at a temperature above 5°C (41°F).
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

With CONSULT-II

- 1) Install vacuum gauge between EGRC-BPT valve and EGR valve as shown in the illustration.
- 2) Start engine and warm it up to normal operating temperature.
- 3) Stop engine and wait at least 5 seconds.
- 4) Turn ignition switch ON and select "EGRC-BPT VLV P0402" of "EGR SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 5) Start engine and let it idle.
- 6) Touch "START".
- 7) Check the output voltage of "THRTL POS SEN" (at closed throttle position) and note it.
- 8) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen and the bar chart may increase. Maintain the conditions many times until "COMPLETED" appears.

Selector lever	Suitable position
ENG SPEED	1,400 - 2,000 rpm
Vehicle speed	30 - 100 km/h (19 - 62 MPH)
B/FUEL SCHDL	5 - 7.5 msec
THRTL POS SEN	$X - (X + 0.88) V$ X = Voltage value measured at step 7

NOTE:

- The bar chart on CONSULT-II screen indicates the status of this test. However, the test may be finished before the bar chart becomes full scale.
 - If the bar chart indication does not continue to progress, completely release accelerator pedal once and try to meet the conditions again.
 - If "TESTING" does not appear on CONSULT-II screen, retry from step 2.
- 9) If CONSULT-II instructs to carry out "Overall Function Check", go to next step. If "NG" is displayed, refer to "Diagnostic Procedure", EC-323.
 - 10) Open engine hood.
 - 11) Raise engine speed to 2,400 to 3,200 rpm under no-load and hold it. Then touch "NEXT" on CONSULT-II screen.

8

EGRC-BPT VLV P0402

OUT OF CONDITION

MONITOR

ENG SPEED	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

0% 20% 40% 60% 80% 100%

SEF718Z

8

EGRC-BPT VLV P0402

TESTING

MONITOR

ENG SPEED	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

0% 20% 40% 60% 80% 100%

SEF719Z

8

EGRC-BPT VLV P0402

COMPLETED

SEC753C

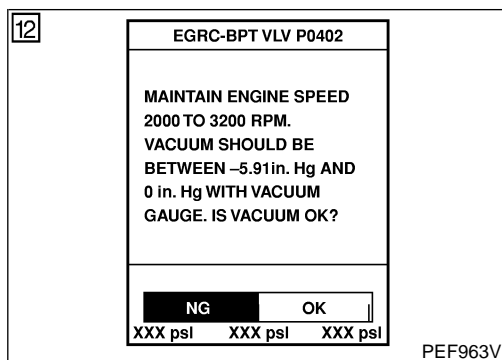
11

EGRC-BPT VLV P0402

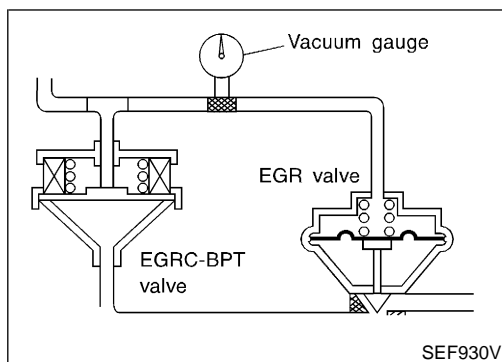
INCREASE ENGINE SPEED AND MAINTAIN BETWEEN 2400 TO 3200 RPM. TOUCH NEXT.

2400 2800 3200

SEF384X



- 12) Check vacuum gauge while keeping engine speed at 2,400 to 3,200 rpm.
Vacuum should be 0 to -20 kPa (0 to -150 mmHg, 0 to -5.91 inHg).
 If NG, go to "Diagnostic Procedure", EC-323.
 If OK, touch "YES" on the CONSULT-II screen.
- 13) Check the EGR valve lifting when revving from 2,000 rpm to 4,000 rpm quickly under no load.
 EGR valve should lift up, and go down without sticking when the engine is returned to idle.
 If NG, check EGR valve.
 If OK, touch "YES" or the CONSULT-II screen.
- 14) Check the rubber tube between intake manifold collector, EGRC-solenoid valve, EGR valve and EGRC-BPT valve for cracks, blockages or twisting.
 If NG, repair or replace.
 If OK, touch "YES" on the CONSULT-II screen.



Overall Function Check

Use this procedure to check the overall function of the EGRC-BPT valve. During this check, a 1st trip DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Install vacuum gauge between EGRC-BPT valve and EGR valve as shown in the illustration.
- 2) Lift up vehicle.
- 3) Start engine and shift to 1st gear position.
- 4) Check vacuum gauge while keeping engine speed at 2,400 to 3,200 rpm.
Vacuum should be 0 to -20 kPa (0 to -150 mmHg, 0 to -5.91 inHg).
 If NG, go to "Diagnostic Procedure", EC-323.
 If OK, go to next step.
- 5) Check the EGR valve lifting when revving from 2,000 rpm to 4,000 rpm quickly under no load.
 EGR valve should lift up, and go down without sticking when the engine is returned to idle.
- 6) Check rubber tube between intake manifold collector, EGRC-solenoid valve, EGR valve and EGRC-BPT valve for misconnection, cracks or blockages.
- 7) If NG, go to "Diagnostic Procedure", EC-323.

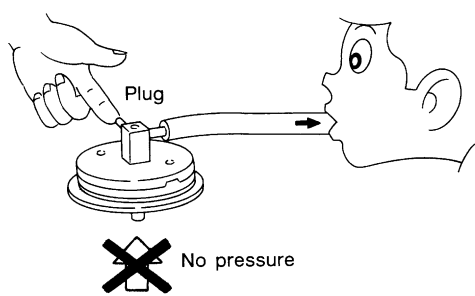
Diagnostic Procedure

=NGEC0238

1	CHECK HOSE	
Check vacuum hose for clogging and improper connection.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair or replace vacuum hose.

2	CHECK EXHAUST SYSTEM	
Check exhaust system for collapse.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace exhaust system.

3	CHECK ORIFICE	
Check if orifice is installed in vacuum hose between EGRC-BPT valve and EGRC-solenoid valve.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Replace vacuum hose.

4	CHECK EGRC-BPT VALVE	
1. Plug one of two ports of EGRC-BPT valve. 2. Vacuum from the other port and check leakage without applying any pressure from under EGR-BPT valve. Leakage should exist.		
		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace EGRC-BPT valve.

SEF172P

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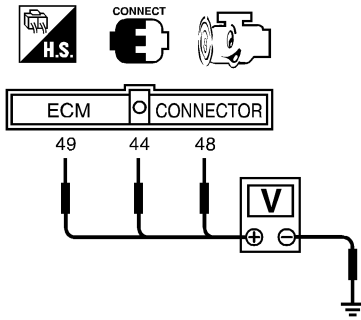
DTC P0402 EGRC-BPT VALVE FUNCTION

KA24DE

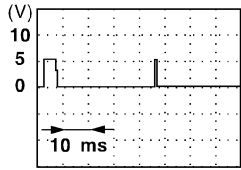
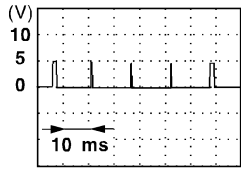
Diagnostic Procedure (Cont'd)

5 CHECK CAMSHAFT POSITION SENSOR

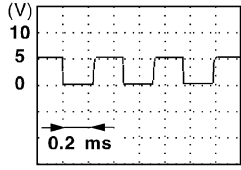
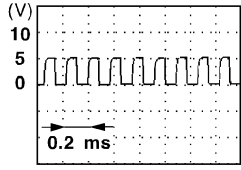
1. Start engine and warm it up to normal operating temperature.
2. Check voltage between ECM terminals 49 and engine ground ECM terminals 44, 48 and engine ground.



Terminals 44, 48 and engine ground

Condition	Idle	2,000 rpm
Voltage	0.2 - 0.5V	0 - 0.5V
Pulse signal		

Terminal 49 and engine ground

Condition	Idle	2,000 rpm
Voltage	Approximately 2.6V	Approximately 2.5 - 2.6V
Pulse signal		

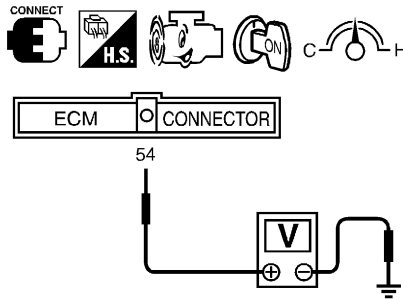
SEC751C

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace camshaft position sensor.

6 CHECK MASS AIR FLOW SENSOR

1. Turn ignition switch ON.
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.



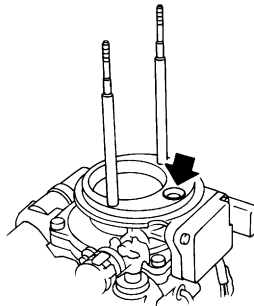
SEF326V

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.8
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.9 - 2.3
Idle to about 4,000 rpm*	1.3 - 1.7 to Approx. 3.0

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

MTBL0326

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



SEF893J

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace mass air flow sensor.

GI

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DTC P0402 EGRC-BPT VALVE FUNCTION

KA24DE

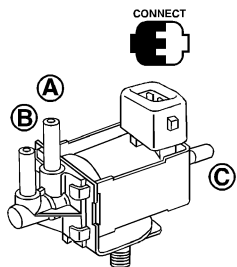
Diagnostic Procedure (Cont'd)

7 CHECK EGRC-SOLENOID VALVE

With CONSULT-II

Check air passage continuity.

Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode.



ACTIVE TEST	
EGRC SOL/V	ON
(EGR)	CUT
MONITOR	
ENG SPEED	XXX rpm

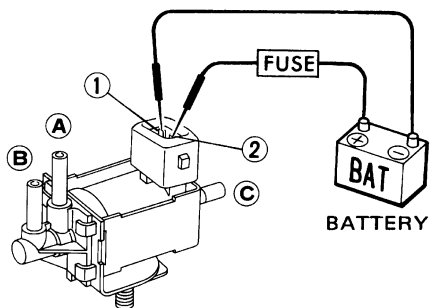
Condition EGRC SOLENOID VALVE	Air passage continuity between A and B	Air passage continuity between A and C
ON	Yes	No
OFF	No	Yes

Operation takes less than 1 second.

SEC752C

Without CONSULT-II

Check air passage continuity shown in the figure.



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.

AEC919

MTBL0664

OK or NG

OK



GO TO 8.

NG

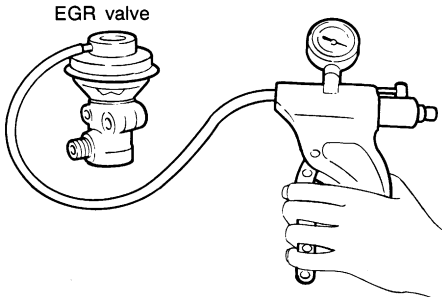


Replace EGRC-solenoid valve.

DTC P0402 EGRC-BPT VALVE FUNCTION

KA24DE

Diagnostic Procedure (Cont'd)

8	CHECK EGR VALVE	
<ul style="list-style-type: none"> Apply vacuum to EGR vacuum port with a hand vacuum pump. 		
		
<p>EGR valve spring should lift.</p> <ul style="list-style-type: none"> Check for sticking. 		
MEF137D		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Replace EGR valve.

9	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.		
	▶	INSPECTION END

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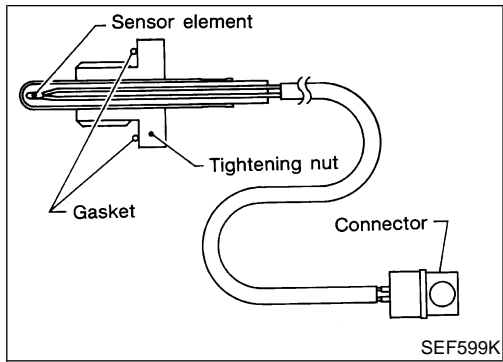
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Component Description



Component Description

NGEC0342

The EGR temperature sensor detects temperature changes in the EGR passageway. When the EGR valve opens, hot exhaust gases flow, and the temperature in the passageway changes. The EGR temperature sensor is a thermistor that modifies a voltage signal sent from the ECM. This modified signal then returns to the ECM as an input signal. As the temperature increases, EGR temperature sensor resistance decreases. This sensor is not used to control the engine system.

It is used only for the on board diagnosis.

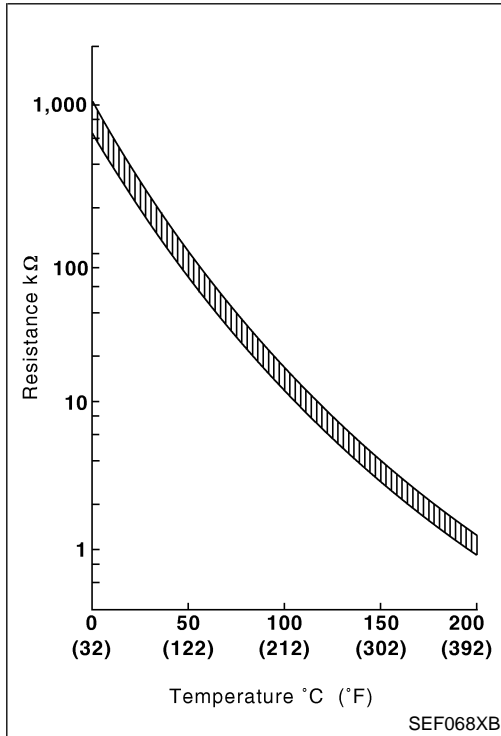
<Reference data>

EGR temperature °C (°F)	Voltage* V	Resistance MΩ
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

*: These data are reference values and are measured between ECM terminal 63 (EGR temperature sensor) and ground.

When EGR system is operating.

Voltage: 0 - 1.5V



On Board Diagnosis Logic

NGEC0343

DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P0405	A)	An excessively low voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is low.	<ul style="list-style-type: none"> ● Harness or connectors (The EGR temperature sensor circuit is shorted.) ● EGR temperature sensor ● Malfunction of EGR function, EGRC-BPT valve or EGRC-solenoid valve
P0406	B)	An excessively high voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is high.	<ul style="list-style-type: none"> ● Harness or connectors (The EGR temperature sensor circuit is open.) ● EGR temperature sensor ● Malfunction of EGR function, EGRC-BPT valve or EGRC-solenoid valve

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

DTC Confirmation Procedure

NGEC0344

Perform "PROCEDURE FOR MALFUNCTION A" first. If 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B".

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

NGEC0344S01

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Verify that engine coolant temperature is less than 50°C (122°F).

If the engine coolant temperature is above the range, cool the engine down.

- 4) Start engine and let it idle for at least 8 seconds.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-332.

With GST

- Follow the procedure "With CONSULT-II".

PROCEDURE FOR MALFUNCTION B

NGEC0344S02

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

Always perform the test at a temperature above 5°C (41°F).

With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Run engine at idle for at least 2 minutes.
- 3) Confirm that EGR valve is not lifting.
If the result is NG, perform trouble diagnosis for DTC P1402. Refer to EC-503.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Read "EGR TEMP SEN" at about 1,500 rpm while holding the EGR valve in full open position by hand.
Voltage should decrease to less than 1.0V.
If the result is NG, go to "Diagnostic Procedure", EC-332.
If the result is OK, go to following step.
- 6) Turn ignition switch OFF and wait at least 5 seconds.
- 7) Turn ignition switch ON.
- 8) Check the output voltage of "THRTL POS SEN" (at closed throttle position) and note it.
- 9) Start engine.
- 10) Maintain the following conditions for at least 5 consecutive seconds.

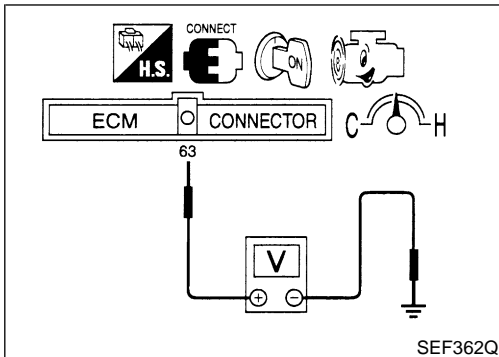
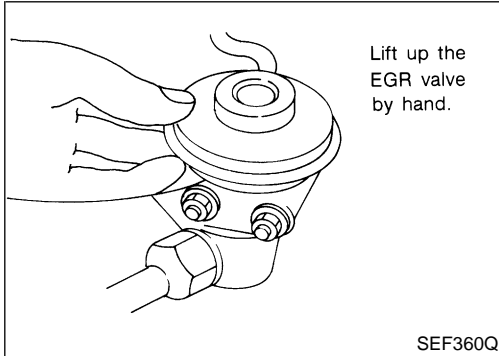
9

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

SEF201Y

ENG SPEED	2,000 - 2,800 rpm
VHCL SPEED SE	10 km/h (6 MPH) or more
B/FUEL SCHDL	7 - 10.5 msec
THRTL POS SEN	(X + 0.23) - (X + 0.74) V X = Voltage value measured at step 7
Selector lever	Suitable position

- 11) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-332.



Overall Function Check

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

NGEC0345

PROCEDURE FOR MALFUNCTION B

NGEC0345S01

⊗ Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Run engine at idle for at least 2 minutes.
- 3) Confirm that EGR valve is not lifting. If NG, perform trouble diagnosis for DTC P1402. Refer to EC-504.
- 4) Check voltage between ECM terminal 63 (EGR temperature sensor signal) and ground at about 1,500 rpm with EGR valve lifted up to the full position by hand.
Voltage should decrease to less than 1.0V.
- 5) If NG, go to "Diagnostic Procedure", EC-332.
If OK, perform trouble diagnoses for DTC P0400 and P1400. Refer to EC-308, 496.

DTC P0405, P0406 EGRT SENSOR

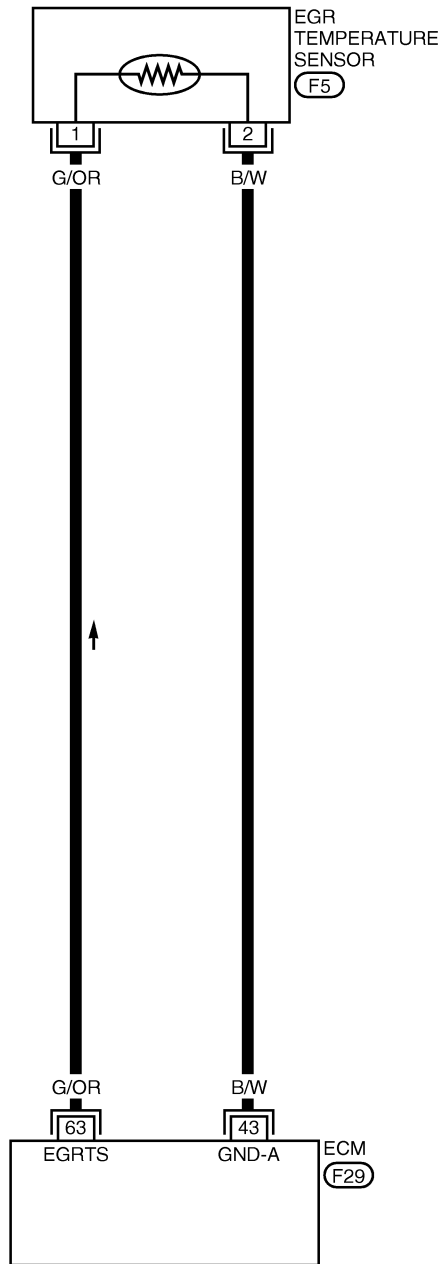
KA24DE

Wiring Diagram

Wiring Diagram

NGEC0346

EC-EGR/TS-01



— : Detectable line for DTC
 — : Non-detectable line for DTC

GI

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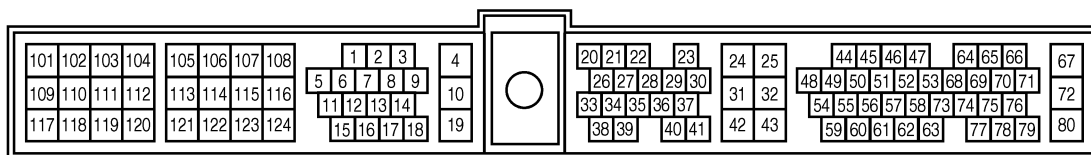
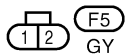
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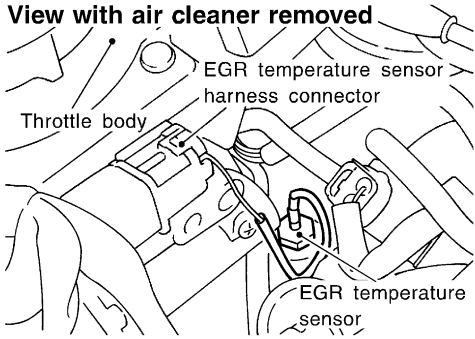
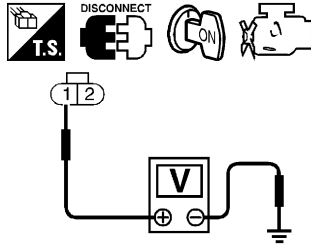
IDX



AEC006B

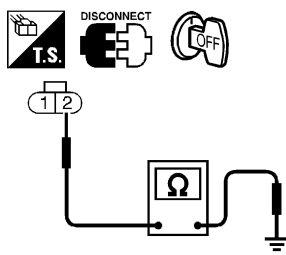
Diagnostic Procedure

NGEC0347

1	CHECK POWER SUPPLY		
<p>1. Turn ignition switch OFF. 2. Disconnect EGR temperature sensor harness connector.</p> <div style="text-align: center;"> <p>View with air cleaner removed</p>  <p>Throttle body EGR temperature sensor harness connector EGR temperature sensor</p> </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p>DISCONNECT 1.S ON</p> <p>V</p> </div> <p style="color: blue;">Voltage: Approximately 5V</p> <p style="text-align: center;">OK or NG</p>			
OK		▶	GO TO 2.
NG		▶	Repair harness or connectors.

SEF345V

SEF263W

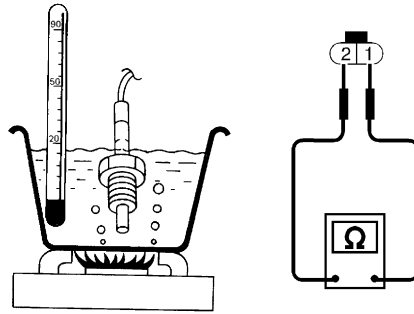
2	CHECK GROUND CIRCUIT		
<p>1. Turn ignition switch OFF. 2. Check harness continuity between EGR temperature sensor terminal 2 and engine ground. Refer to the wiring diagram.</p> <div style="text-align: center;">  <p>DISCONNECT 1.S OFF</p> <p>Ω</p> </div> <p style="color: blue;">Continuity should exist.</p> <p>3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>			
OK		▶	GO TO 4.
NG		▶	GO TO 3.

SEF264W

3	DETECT MALFUNCTIONING PART		
<p>Check the harness for open or short between EGR temperature sensor and ECM.</p>			
		▶	Repair open circuit or short to ground or short to power in harness or connector.

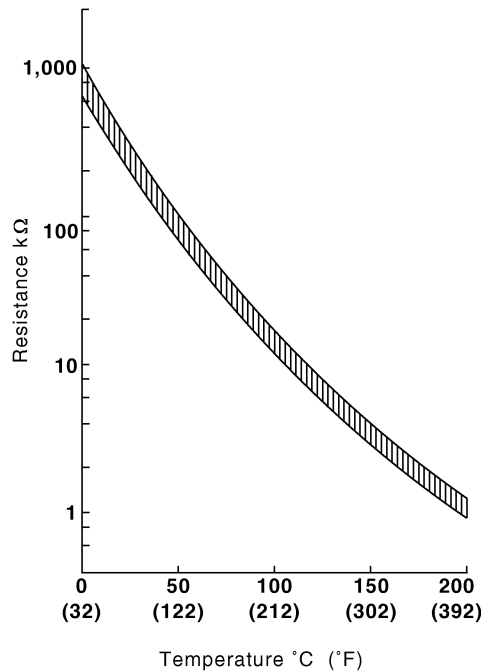
4 CHECK EGR TEMPERATURE SENSOR

Check resistance change and resistance value.



<Reference data>

EGR temperature °C (°F)	Voltage V	Resistance M.Ω
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015


OK or NG

OK	▶	GO TO 5.
NG	▶	Replace EGR temperature sensor.

5 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.

 ▶ **INSPECTION END**

GI

MA

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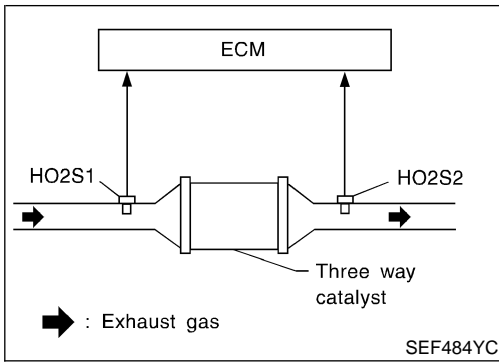
BT

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IDX



On Board Diagnosis Logic

NGEC1042

The ECM monitors the switching frequency ratio of heated oxygen sensor 1 and 2.

A three way catalyst with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.

When the frequency ratio of heated oxygen sensors 1 and 2 approaches a specified limit value, the three way catalyst malfunction is diagnosed.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0420	<ul style="list-style-type: none"> • Three way catalyst does not operate properly. • Three way catalyst does not have enough oxygen storage capacity. 	<ul style="list-style-type: none"> • Three way catalyst • Exhaust tube • Intake air leaks • Injectors • Injector leaks • Spark plug • Improper ignition timing

3

SRT WORK SUPPORT	
CATALYST	INCMP
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
EGR SYSTEM	INCMP
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE B1	XXX V
B/FUEL SCHDL	XXX msec
A/F ALPHA-B1	XXX V
COOLANT TEMP/S	XX °C
HO2S1 (B1)	XXX V

SEC754C

7

SRT WORK SUPPORT	
CATALYST	CMPLT
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
EGR SYSTEM	INCMP
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE B1	XXX V
B/FUEL SCHDL	XXX msec
A/F ALPHA-B1	XXX V
COOLANT TEMP/S	XX °C
HO2S1 (B1)	XXX V

SEC755C

SELF DIAG RESULTS	
DTC RESULTS	TIME
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	

SEF560X

DTC Confirmation Procedure

NGEC1043

NOTE:

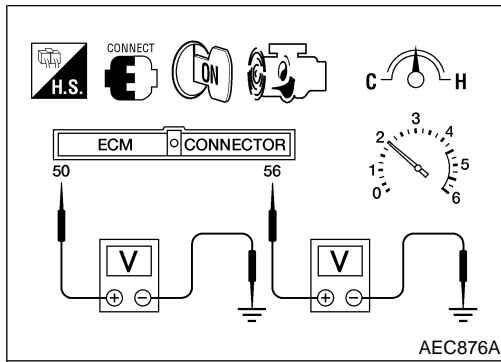
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- Open engine hood before conducting following procedure.
- Do not hold engine speed more than specified minutes below.

With CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT-II.
- 3) Start engine.
- 4) Rev engine up to 2,500 to 3,500 rpm and hold it for 3 consecutive minutes then release then accelerator pedal completely. If "INCMP" of "CATALYST" changes to "CMPLT", go to step 7.
- 5) Wait 5 seconds at idle.
- 6) Rev engine up to 2,000 to 3,000 rpm and hold it until "INCMP" of "CATALYST" changes to "CMPLT". (It will take maximum of approximately 5 minute.)
- 7) Select "SELF-DIAG RESULTS" mode with CONSULT-II. If the 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-283. If not "COMPLT" stop engine and cool down "COOLANT TEMP/SE" to less than 70°C (158°F) and then retest from step 1).



Overall Function Check

NGEC0242

Use this procedure to check the overall function of the three way catalyst. During this check, a 1st trip DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeters probes between ECM terminals 50 (Heated oxygen sensor 1 signal), 56 (Heated oxygen sensor 2 signal) and engine ground.
- 4) Keep engine speed at 2,000 rpm constant under no load.
- 5) Make sure that the voltage switching frequency (high & low) between ECM terminal 56 and engine ground is much less than that of ECM terminal 50 and engine ground.

Switching frequency ratio = A/B

A: Heated oxygen sensor 2 voltage switching frequency

B: Heated oxygen sensor 1 voltage switching frequency

This ratio should be less than 0.75.

If the ratio is greater than above, it means three way catalyst does not operate properly.

NOTE:

If the voltage at terminal 50 does not switch periodically more than 5 times within 10 seconds at step 4, perform trouble diagnosis for DTC P0133 first. (See EC-219.)

GI

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RS

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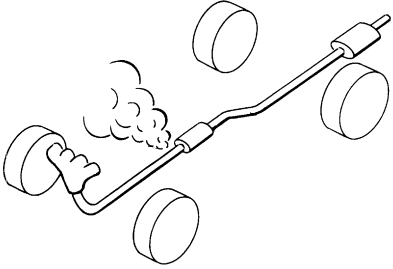
EL

IDX

Diagnostic Procedure

=NGEC0243

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 AIR LEAK	
1. Start engine and run it at idle. 2. Listen for an exhaust air leak before three way catalyst.		
		
SEF099P		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace.

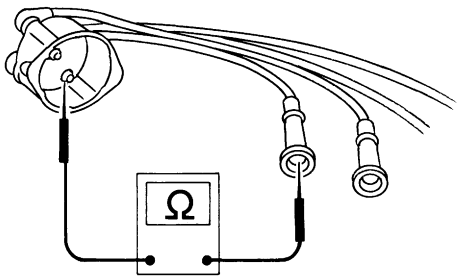
3	CHECK INTAKE AIR LEAK	
Listen for an intake air leak after the mass air flow sensor.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace.

4	CHECK IGNITION TIMING											
1. Check the following items. Refer to "Basic Inspection", EC-112.												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Items</th> <th style="text-align: center;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>20° ± 2° BTDC</td> </tr> <tr> <td>Base idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>800 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table>			Items	Specifications	Ignition timing	20° ± 2° BTDC	Base idle speed	750 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF	Target idle speed	800 ± 50 rpm (in "P" or "N" position)
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Target idle speed	800 ± 50 rpm (in "P" or "N" position)											
MTBL0328												
OK or NG												
OK	▶	GO TO 5.										
NG	▶	Adjust ignition timing.										

5	CHECK INJECTORS	<ol style="list-style-type: none"> 1. Refer to Wiring Diagram for Injectors, EC-572. 2. Stop engine and then turn ignition switch ON. 3. Check voltage between ECM terminals 102, 104, 109, 111 and ground with CONSULT-II or tester. <div style="text-align: center; margin: 10px 0;"> </div> <p style="margin-top: 10px;">Battery voltage should exist.</p> <p style="text-align: right; margin-right: 20px;">SEC756C</p>
OK or NG		
OK	▶	GO TO 6.
NG	▶	Perform "Diagnostic Procedure" INJECTOR, EC-573.

GI
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 TF
 PD
 AX
 SU
 BR
 ST
 RS
 BT
 HA
 SC
 EL
 IDX

6	CHECK IGNITION SPARK	<ol style="list-style-type: none"> 1. Disconnect ignition wire from spark plug. 2. Connect a known good spark plug to the ignition wire. 3. Place end of spark plug against a suitable ground and crank engine. 4. Check for spark. <div style="text-align: center; margin: 10px 0;"> </div> <p style="text-align: right; margin-right: 20px;">SEF282G</p>
OK or NG		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	CHECK IGNITION WIRES	
<ol style="list-style-type: none"> 1. Inspect wires for cracks, damage, burned terminals and for improper fit. 2. Measure the resistance of wires to their distributor cap terminal. Move each wire while testing to check for intermittent breaks. 		
		
SEF174P		
<p>Resistance: 13.6 - 18.4 kΩ/m (4.15 - 5.61 kΩ/ft) at 25°C (77°F)</p> <p>If the resistance exceeds the above specification, inspect ignition wire to distributor cap connection. Clean connection or replace the ignition wire with a new one.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	Check ignition coil, power transistor and their circuits. Refer to EC-562.
NG	▶	Replace.

8	CHECK INJECTOR	
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Remove injector assembly. Refer to EC-58. Keep fuel hose and all injectors connected to injector gallery. 3. Disconnect camshaft position sensor harness connector. 4. Turn ignition switch ON. Make sure fuel does not drip from injector. 		
OK or NG		
OK (Does not drip.)	▶	GO TO 9.
NG (Drips.)	▶	Replace the injector(s) from which fuel is dripping.

9	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.		
Trouble is fixed.	▶	INSPECTION END
Trouble is not fixed.	▶	Replace three way catalyst.

DTC P0441 EVAP CONTROL SYSTEM PURGE FLOW MONITORING

KA24DE

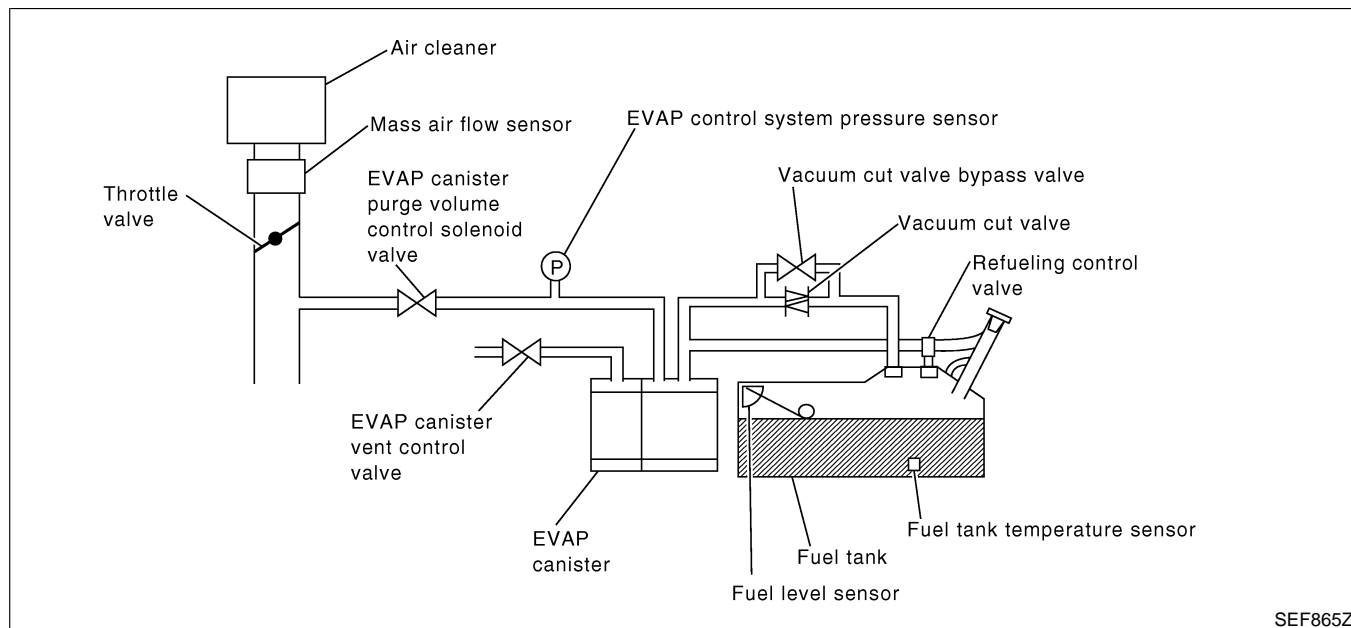
System Description

System Description

NGEC0373

NOTE:

If DTC P0441 is displayed with DTC P0510, perform trouble diagnosis for “DTC P0510” first. (See EC-440.)



SEF865Z

In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

On Board Diagnosis Logic

NGEC0374

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a fault is determined.

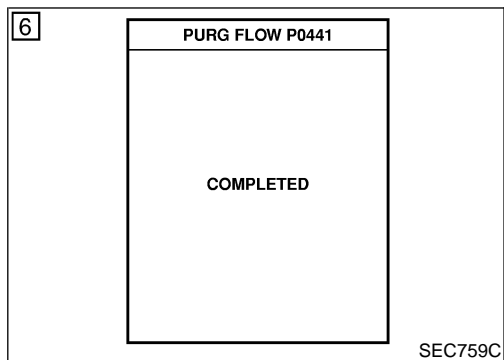
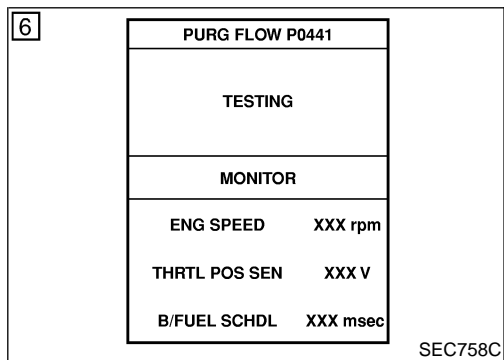
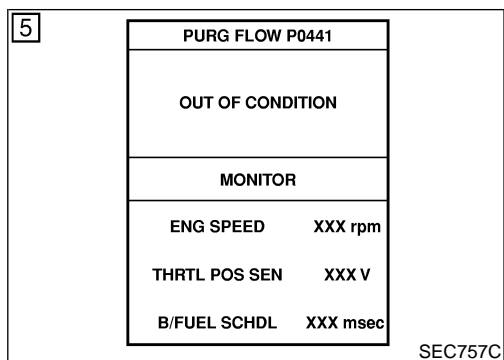
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0441	<ul style="list-style-type: none"> ● EVAP control system does not operate properly. ● EVAP control system has a leak between intake manifold and EVAP control system pressure sensor. 	<ul style="list-style-type: none"> ● EVAP canister purge volume control solenoid valve stuck closed ● EVAP control system pressure sensor and the circuit ● Loose, disconnected or improper connection of rubber tube ● Blocked rubber tube ● Cracked EVAP canister ● Closed throttle position switch ● Blocked purge port ● EVAP canister vent control valve

DTC P0441 EVAP CONTROL SYSTEM PURGE FLOW MONITORING

KA24DE

DTC Confirmation Procedure

NGEC0375



DTC Confirmation Procedure

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 5 seconds before conducting the next test.

TESTING CONDITION:

- For best results perform test at a temperature of 5°C (41°F) or more.
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

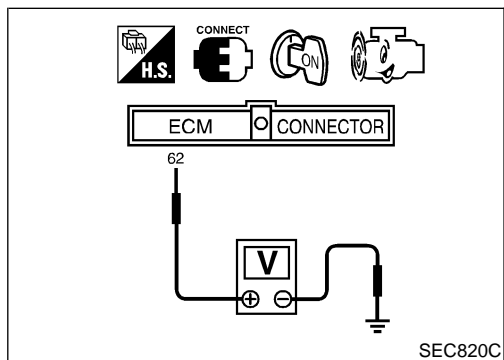
With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Start engine and let it idle for at least 60 seconds.
- 4) Select "PURG FLOW P0441" of "EVAP SYSTEM" in "DTC CONFIRMATION" mode with CONSULT-II.
- 5) Touch "START".
If "COMPLETED" is displayed, go to step 7.
- 6) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 30 seconds.)

Selector lever	Suitable position
Vehicle speed	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,750 rpm
Engine coolant temperature	More than 70°C (158°F)

If "TESTING" is not changed for a long time, retry from step 2.

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



Overall Function Check

NGEC0376

Use this procedure to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

Without CONSULT-II

- 1) Lift up drive wheels.
- 2) Start engine and warm it up to normal operating temperature.
- 3) Turn ignition switch OFF, wait at least 5 seconds.
- 4) Start engine and wait at least 60 seconds.
- 5) Set voltmeter probes to ECM terminals 62 (EVAP control system pressure sensor signal) and ground.

DTC P0441 EVAP CONTROL SYSTEM PURGE FLOW MONITORING

KA24DE

Overall Function Check (Cont'd)

- 6) Check EVAP control system pressure sensor value at idle speed and note it.
- 7) Establish and maintain the following conditions for at least 1 minute.

- Air conditioner switch: ON**
- Steering wheel: Fully turned**
- Headlamp switch: ON**
- Rear window defogger switch: ON**
- Engine speed: Approx. 3,000 rpm**
- Gear position:**

Any position other than "Neutral" or "Reverse"

Verify that EVAP control system pressure sensor value stays 0.1V less than the value at idle speed (measured at step 6) for at least 1 second.

GI
MA
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LC
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Diagnostic Procedure

NGEC0377

1	CHECK EVAP CANISTER		
1. Turn ignition switch OFF. 2. Check EVAP canister for cracks.			AT
OK or NG			TF
OK (With CONSULT-II)	▶	GO TO 2.	PD
OK (Without CONSULT-II)	▶	GO TO 3.	AX
NG	▶	Replace EVAP canister.	SU

AT
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PD
AX
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BT
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SC
EL
IDX

DTC P0441 EVAP CONTROL SYSTEM PURGE FLOW MONITORING

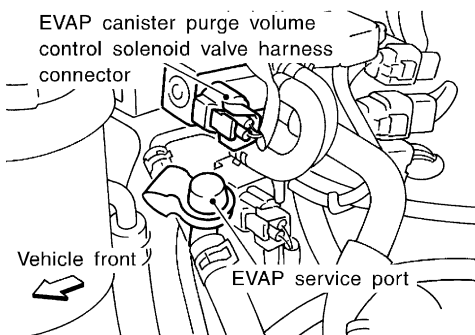
KA24DE

Diagnostic Procedure (Cont'd)

2 CHECK PURGE FLOW

With CONSULT-II

1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.



SEF339V

2. Start engine and let it idle.
3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

SEF801Y

4. Rev engine up to 2,000 rpm.
5. Touch "Qd" and "Qu" on CONSULT-II screen to adjust "PURG VOL CONT/V" opening.
 - 100.0%: Vacuum should exist.**
 - 0.0%: Vacuum should not exist.**

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 4.

DTC P0441 EVAP CONTROL SYSTEM PURGE FLOW MONITORING

KA24DE

Diagnostic Procedure (Cont'd)

3	CHECK PURGE FLOW	<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. <div style="text-align: center; margin: 10px 0;"> <p style="font-size: small;">EVAP canister purge volume control solenoid valve harness connector</p> <p style="font-size: small;">Vehicle front</p> <p style="font-size: small;">EVAP service port</p> </div> <ol style="list-style-type: none"> 4. Start engine and let it idle for at least 60 seconds. 5. Check vacuum gauge indication when revving engine up to 2,000 rpm. Vacuum should exist. 6. Release the accelerator pedal fully and let idle. Vacuum should not exist. <p style="text-align: center; margin-top: 10px;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 8.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 4.</td> </tr> </table>	OK	▶	GO TO 8.	NG	▶	GO TO 4.	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white; padding: 2px;">EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p>
OK	▶	GO TO 8.							
NG	▶	GO TO 4.							

SEF339V

4	CHECK EVAP PURGE LINE	<p>Check EVAP purge line for improper connection or disconnection. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-43.</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 5.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Repair it.</td> </tr> </table>	OK	▶	GO TO 5.	NG	▶	Repair it.	<p>TF</p> <p>PD</p> <p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>
OK	▶	GO TO 5.							
NG	▶	Repair it.							

DTC P0441 EVAP CONTROL SYSTEM PURGE FLOW MONITORING

KA24DE

Diagnostic Procedure (Cont'd)

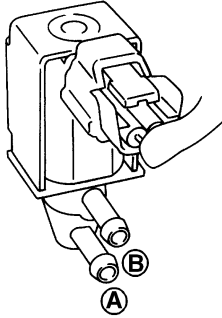
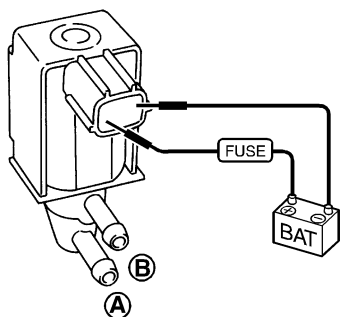
5	CHECK EVAP PURGE HOSE AND PURGE PORT
<p>1. Disconnect purge hoses connected to EVAP service port A and EVAP canister purge volume control solenoid valve B.</p> <div style="text-align: center;"> </div>	
<p>2. Blow air into each hose and EVAP purge port C.</p> <p>3. Check that air flows freely.</p> <div style="text-align: center;"> </div>	
SEF367U	
OK or NG	
OK (With CONSULT-II)	▶ GO TO 6.
OK (Without CONSULT-II)	▶ GO TO 7.
NG	▶ Repair or clean hoses and/or purge port.

6	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																				
<p> With CONSULT-II</p> <p>1. Start engine.</p> <p>2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.</p>																					
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> </thead> <tbody> <tr> <td>PURG VOL CONT/V</td> <td>XXX %</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td>XXX %</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td>LEAN</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>		ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	HO2S1 MNTR (B1)	LEAN	THRTL POS SEN	XXX V						
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PURG VOL CONT/V	XXX %																				
MONITOR																					
ENG SPEED	XXX rpm																				
A/F ALPHA-B1	XXX %																				
HO2S1 MNTR (B1)	LEAN																				
THRTL POS SEN	XXX V																				
SEF801Y																					
OK or NG																					
OK	▶ GO TO 8.																				
NG	▶ GO TO 7.																				

DTC P0441 EVAP CONTROL SYSTEM PURGE FLOW MONITORING

KA24DE

Diagnostic Procedure (Cont'd)

7	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE							
<p>Ⓟ With CONSULT-II Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.</p>								
								
<table border="1" style="margin: auto;"> <thead> <tr> <th style="text-align: center;">Condition PURG VOL CONT/V value</th> <th style="text-align: center;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">100.0%</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td style="text-align: center;">0.0%</td> <td style="text-align: center;">No</td> </tr> </tbody> </table>			Condition PURG VOL CONT/V value	Air passage continuity between A and B	100.0%	Yes	0.0%	No
Condition PURG VOL CONT/V value	Air passage continuity between A and B							
100.0%	Yes							
0.0%	No							
SEF334X								
<p>ⓧ Without CONSULT-II Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.</p>								
								
<table border="1" style="margin: auto;"> <thead> <tr> <th style="text-align: center;">Condition</th> <th style="text-align: center;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">12V direct current supply between terminals 1 and 2</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td style="text-align: center;">No supply</td> <td style="text-align: center;">No</td> </tr> </tbody> </table>			Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	Yes	No supply	No
Condition	Air passage continuity between A and B							
12V direct current supply between terminals 1 and 2	Yes							
No supply	No							
SEF335X								
OK or NG								
OK	▶	GO TO 8.						
NG	▶	Replace EVAP canister purge volume control solenoid valve.						

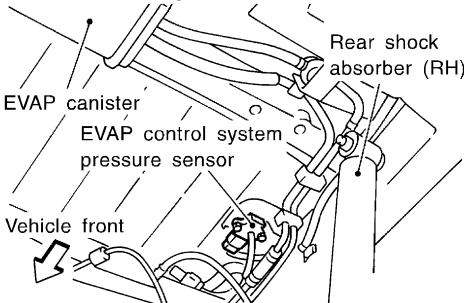
8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	
<p>1. Turn ignition switch OFF. 2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.</p>		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Repair it.

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DTC P0441 EVAP CONTROL SYSTEM PURGE FLOW MONITORING

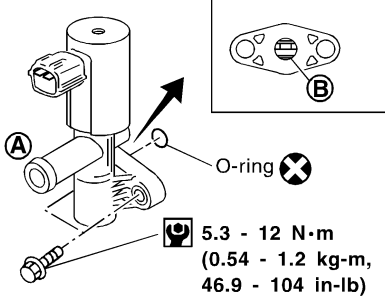
KA24DE

Diagnostic Procedure (Cont'd)

9	CHECK CONNECTOR		
<p>1. Disconnect EVAP control system pressure sensor harness connector.</p> <div style="text-align: center;"> <p>View with spare tire removed.</p>  </div>			
<p>2. Check connectors for water. Water should not exist.</p> <p style="text-align: center;">OK or NG</p>			
OK		▶	GO TO 10.
NG		▶	Replace EVAP control system pressure sensor.

SEF341V

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR AND CIRCUIT		
<p>Refer to "DTC Confirmation Procedure" for DTC P0452, P0453, EC-382.</p> <p style="text-align: center;">OK or NG</p>			
OK (With CONSULT-II)		▶	GO TO 11.
OK (Without CONSULT-II)		▶	GO TO 12.
NG		▶	Replace EVAP control system pressure sensor.

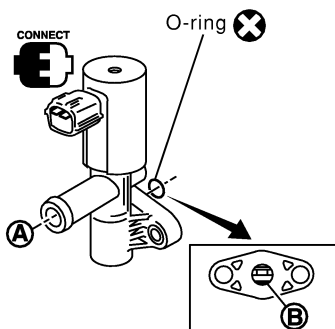
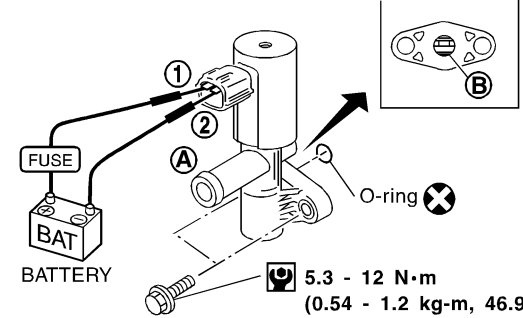
11	CHECK EVAP CANISTER VENT CONTROL VALVE-I		
<p>1. Remove EVAP canister vent control valve from EVAP canister.</p> <p>2. Check portion B of EVAP canister vent control valve for being rusted.</p> <div style="text-align: center;">  </div>			
OK or NG			
OK		▶	GO TO 12.
NG		▶	Replace EVAP canister vent control valve.

SEF337X

DTC P0441 EVAP CONTROL SYSTEM PURGE FLOW MONITORING

KA24DE

Diagnostic Procedure (Cont'd)

12	CHECK EVAP CANISTER VENT CONTROL VALVE-II	<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Reconnect harness connectors disconnected. 2. Turn ignition switch "ON". 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode. 4. Check air passage continuity and operation delay time. <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 30%;">  </div> <div style="width: 30%;"> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>VENT CONTROL/V</th> <th>OFF</th> </tr> <tr> <th colspan="2">MONITOR</th> </tr> </thead> <tbody> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td>XXX %</td> </tr> <tr> <td>HO2S1 (B1)</td> <td>XXX V</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table> </div> <div style="width: 35%;"> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Condition VENT CONTROL/V</th> <th>Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td>ON</td> <td>No</td> </tr> <tr> <td>OFF</td> <td>Yes</td> </tr> </tbody> </table> <p>Operation takes less than 1 second.</p> </div> </div> <p style="text-align: right; margin-top: 10px;">SEF803Y</p>	ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	HO2S1 (B1)	XXX V	THRTL POS SEN	XXX V							Condition VENT CONTROL/V	Air passage continuity between A and B	ON	No	OFF	Yes
ACTIVE TEST																												
VENT CONTROL/V	OFF																											
MONITOR																												
ENG SPEED	XXX rpm																											
A/F ALPHA-B1	XXX %																											
HO2S1 (B1)	XXX V																											
THRTL POS SEN	XXX V																											
Condition VENT CONTROL/V	Air passage continuity between A and B																											
ON	No																											
OFF	Yes																											
		<p>ⓧ Without CONSULT-II</p> <p>Check air passage continuity and operation delay time under the following conditions.</p> <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 30%;">  </div> <div style="width: 35%;"> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Condition</th> <th>Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td>12V direct current supply between terminals 1 and 2</td> <td>No</td> </tr> <tr> <td>OFF</td> <td>Yes</td> </tr> </tbody> </table> <p>Operation takes less than 1 second.</p> </div> </div> <p style="text-align: right; margin-top: 10px;">SEF339X</p> <p>Make sure new O-ring is installed properly.</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 25%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 14.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 13.</td> </tr> </table>	Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	No	OFF	Yes	OK	▶	GO TO 14.	NG	▶	GO TO 13.														
Condition	Air passage continuity between A and B																											
12V direct current supply between terminals 1 and 2	No																											
OFF	Yes																											
OK	▶	GO TO 14.																										
NG	▶	GO TO 13.																										

13	CHECK EVAP CANISTER VENT CONTROL VALVE-III	<ol style="list-style-type: none"> 1. Clean the air passage (Portion A to B) of EVAP canister vent control valve using an air blower. 2. Perform Test No. 12 again. <p style="text-align: center; margin-top: 10px;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 25%;">OK (With CONSULT-II)</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 14.</td> </tr> <tr> <td>OK (Without CONSULT-II)</td> <td style="text-align: center;">▶</td> <td>GO TO 15.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace EVAP canister vent control valve.</td> </tr> </table>	OK (With CONSULT-II)	▶	GO TO 14.	OK (Without CONSULT-II)	▶	GO TO 15.	NG	▶	Replace EVAP canister vent control valve.
OK (With CONSULT-II)	▶	GO TO 14.									
OK (Without CONSULT-II)	▶	GO TO 15.									
NG	▶	Replace EVAP canister vent control valve.									

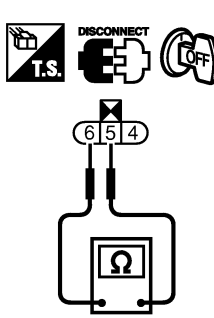
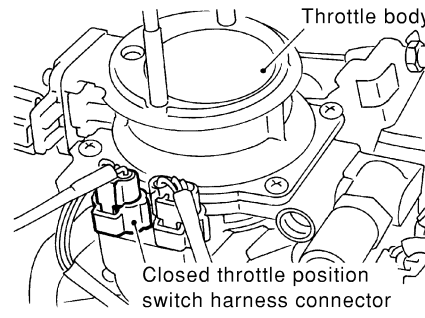
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DTC P0441 EVAP CONTROL SYSTEM PURGE FLOW MONITORING

KA24DE

Diagnostic Procedure (Cont'd)

14	CHECK THROTTLE POSITION SWITCH						
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Install all removed parts. 2. Start engine and warm it up to normal operating temperature. 3. Turn ignition switch "OFF". 4. Turn ignition switch "ON". 5. Select "DATA MONITOR" mode with CONSULT-II. 6. Check indication of "CLSD THL/P SW" under the following conditions. Measurement must be made with throttle position switch installed in vehicle. <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; width: 60%;"> <thead> <tr> <th style="text-align: center;">Throttle valve conditions</th> <th style="text-align: center;">CLSD THL/P SW</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Completely closed</td> <td style="text-align: center;">ON</td> </tr> <tr> <td style="text-align: center;">Partially open or completely open</td> <td style="text-align: center;">OFF</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">MTBL0355</p> <p style="text-align: center;">OK or NG</p>		Throttle valve conditions	CLSD THL/P SW	Completely closed	ON	Partially open or completely open	OFF
Throttle valve conditions	CLSD THL/P SW						
Completely closed	ON						
Partially open or completely open	OFF						
OK	▶ GO TO 17.						
NG	▶ GO TO 16.						

15	CHECK THROTTLE POSITION SWITCH						
<ol style="list-style-type: none"> 1. Install all removed parts. 2. Start engine and warm it up to normal operating temperature. 3. Turn ignition switch "OFF". 4. Disconnect closed throttle position switch harness connector. 5. Check continuity between closed throttle position switch terminals 5 and 6 under the following conditions. Resistance measurement must be made with throttle position switch installed in vehicle. <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 25%;">  <p style="font-size: small;">DISCONNECT T.S. OFF</p> </div> <div style="width: 45%; text-align: center;">  <p style="font-size: small;">Throttle body</p> <p style="font-size: small;">Closed throttle position switch harness connector</p> </div> <div style="width: 25%;"> <table border="1" style="border-collapse: collapse; width: 100%;"> <thead> <tr> <th style="text-align: center;">Throttle valve conditions</th> <th style="text-align: center;">Continuity</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Completely closed</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td style="text-align: center;">Partially open or completely open</td> <td style="text-align: center;">No</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">SEC779C</p> </div> </div> <p style="text-align: center;">OK or NG</p>		Throttle valve conditions	Continuity	Completely closed	Yes	Partially open or completely open	No
Throttle valve conditions	Continuity						
Completely closed	Yes						
Partially open or completely open	No						
OK	▶ GO TO 17.						
NG	▶ GO TO 16.						

DTC P0441 EVAP CONTROL SYSTEM PURGE FLOW MONITORING

KA24DE

Diagnostic Procedure (Cont'd)

16	ADJUST THROTTLE POSITION SWITCH											
Check the following items. Refer to "Basic Inspection", EC-112 .												
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Items</th> <th style="width: 50%;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>20° ± 2° BTDC</td> </tr> <tr> <td>Base idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>800 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table>			Items	Specifications	Ignition timing	20° ± 2° BTDC	Base idle speed	750 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF	Target idle speed	800 ± 50 rpm (in "P" or "N" position)
Items	Specifications											
Ignition timing	20° ± 2° BTDC											
Base idle speed	750 ± 50 rpm (in "P" or "N" position)											
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF											
Target idle speed	800 ± 50 rpm (in "P" or "N" position)											
MTBL0328												
Is it possible to adjust closed throttle position switch?												
Yes or No												
Yes	▶	GO TO 17.										
No	▶	Replace throttle position switch.										

17	CHECK EVAP PURGE LINE	
Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-43.		
OK or NG		
OK	▶	GO TO 18.
NG	▶	Replace it.

18	CLEAN EVAP PURGE LINE	
Clean EVAP purge line (pipe and rubber tube) using air blower.		
	▶	GO TO 19.

19	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.		
	▶	INSPECTION END

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On Board Diagnosis Logic

NGEC0244

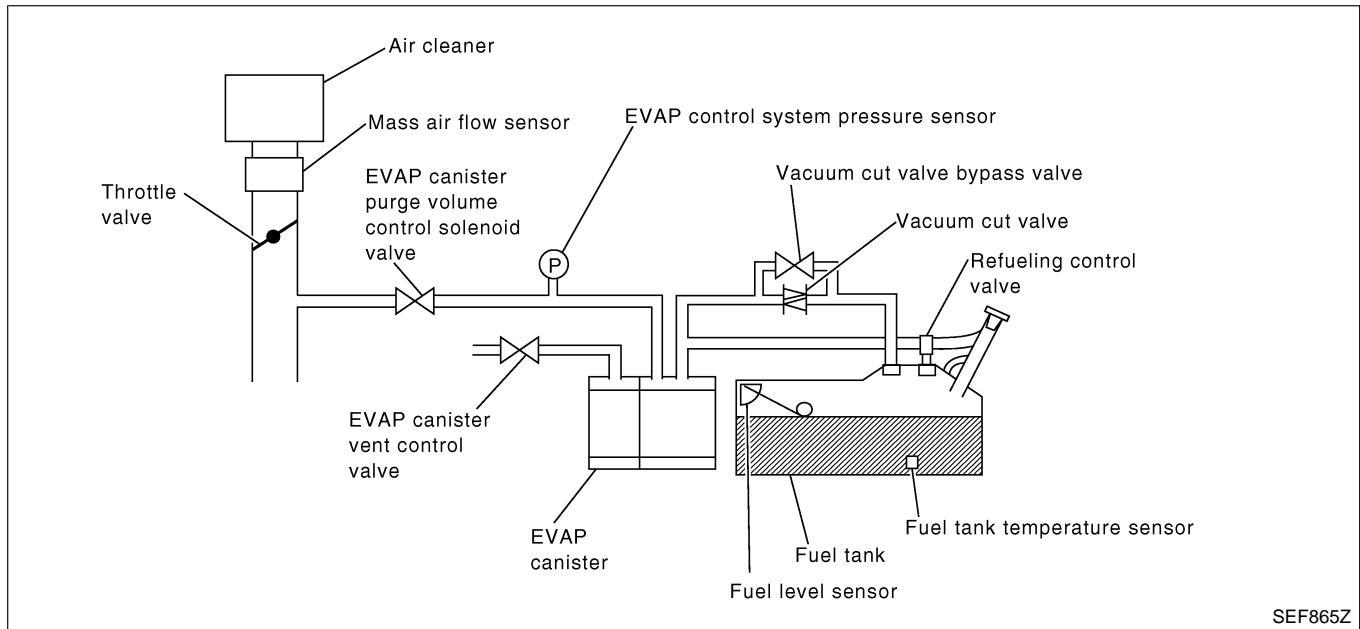
NOTE:

If DTC P0442 is displayed with DTC P1448, perform trouble diagnosis for DTC P1448 first. (See EC-529.)

This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.

If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve under the following "Vacuum test" conditions.

The vacuum cut valve bypass valve is opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP canister vent control valve will then be closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve is opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.



DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0442	<ul style="list-style-type: none"> ● EVAP control system has a leak. ● EVAP control system does not operate properly. 	<ul style="list-style-type: none"> ● Incorrect fuel tank vacuum relief valve ● Incorrect fuel filler cap used ● Fuel filler cap remains open or fails to close. ● Foreign matter caught in fuel filler cap. ● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. ● Foreign matter caught in EVAP canister vent control valve. ● EVAP canister or fuel tank leaks ● EVAP purge line (pipe and rubber tube) leaks ● EVAP purge line rubber tube bent. ● Blocked or bent rubber tube to EVAP control system pressure sensor ● Loose or disconnected rubber tube ● EVAP canister vent control valve and the circuit ● EVAP canister purge volume control solenoid valve and the circuit ● Absolute pressure sensor ● Fuel tank temperature sensor ● O-ring of EVAP canister vent control valve is missing or damaged. ● Water separator ● EVAP canister is saturated with water. ● EVAP control system pressure sensor ● Fuel level sensor and the circuit ● Refueling control valve ● ORVR system leaks

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

GI

MA

EM

LC

EVAP SML LEAK P0442/P1442

1)FOR BEST RSLT,PERFORM AT FOLLOWING CONDITIONS.
 -FUEL LEVEL: 1/4-3/4
 -AMBIENT TEMP: 0-30 C(32-86F)
 -OPEN ENGINE HOOD.
 2)START ENG WITH VHCL STOPPED. IF ENG IS ON,STOP FOR 5 SEC. THEN RESTART.
 3)TOUCH START.

SEC760C

DTC Confirmation Procedure

NGEC0245

NOTE:

- If DTC P0442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. Refer to EC-529.
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

EC

FE

With CONSULT-II

TESTING CONDITION:

- Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.
 - Always perform test at a temperature of 0 to 30°C (32 to 86°F).
 - It is better that the fuel level is low.
- 1) Turn ignition switch ON.
 - 2) Turn ignition switch OFF and wait at least 5 seconds.
 - 3) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
 - 4) Check that the following conditions are met.

CL

MT

AT

TF

PD

EVAP SML LEAK P0442/P1442

WAIT
2 TO 10 MINUTES.
KEEP ENGINE RUNNING
AT IDLE SPEED.

SEC761C

COOLAN TEMP/S	0 - 70°C (32 - 158°F)
INT/A TEMP SE	0 - 60°C (32 - 140°F)

AX

SU

EVAP SML LEAK P0442/P1442

MAINTAIN
1600 - 2100 RPM UNTIL FINAL
RESULT APPEARS.
(APPROX. 3 MINUTES)

1600 rpm 1850 rpm 2100 rpm

SEC762C

- 5) Select “EVAP SML LEAK P0442/P1442” of “EVAP SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II. Follow the instruction displayed.

BR

NOTE:

- If the engine cannot be maintained within the range on CONSULT-II screen, go to “Basic Inspection”, EC-112.
- 6) Make sure that “OK” is displayed.
If “NG” is displayed, refer to “Diagnostic Procedure”, EC-353.

ST

RS

NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

BT

With GST

- 1) Start engine.
- 2) Drive vehicle according to “Driving pattern”, EC-81.

HA

NOTE:

Be sure to read the explanation of “Driving pattern” on EC-81 before driving vehicle.

SC

- 3) Stop vehicle.
- 4) Select “MODE 1” with GST.

EL

- If SRT of EVAP system is not set yet, go to the following step.

EVAP SML LEAK P0442/P1442

OK

SELF-DIAG RESULTS

NO DTC DETECTED.
FURTHER TESTING
MAY BE REQUIRED.

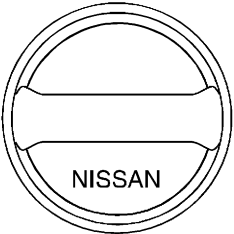
SEC763C

IDX

- If SRT of EVAP system is set, the result will be OK.
- 5) Turn ignition switch OFF and wait at least 5 seconds.
- 6) Start engine.
It is not necessary to cool engine down before driving.
- 7) Drive vehicle again according to the "Driving pattern", EC-81.
- 8) Stop vehicle.
- 9) Select "MODE 3" with GST.
- If P0441 is displayed on the screen, go to "Diagnostic Procedure", EC-341.
- If P0442 is displayed on the screen, go to "Diagnostic Procedure", EC-353.
- If P0441 and P0442 are not displayed on the screen, go to the following step.
- 10) Select "MODE 1" with GST.
- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 5.

Diagnostic Procedure

=NGEC0246

1	CHECK FUEL FILLER CAP DESIGN	
1. Turn ignition switch OFF. 2. Check for genuine NISSAN fuel filler cap design.		
		
SEF915U		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

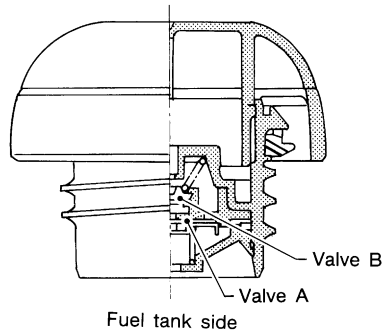
2	CHECK FUEL FILLER CAP INSTALLATION	
Check that the cap is tightened properly rotating the cap clockwise.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	<ul style="list-style-type: none"> ● Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. ● Retighten until ratcheting sound is heard.

3	CHECK FUEL FILLER CAP FUNCTION	
Check for air releasing sound while opening the fuel filler cap.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

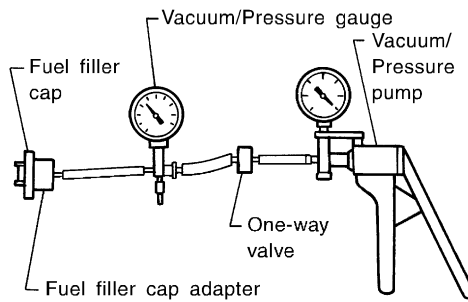
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4 CHECK FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)

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



SEF427N



SEF943S

Pressure:

16.0 - 20.0 kPa (0.163 - 0.204 kg/cm², 2.32 - 2.90 psi)

Vacuum:

-6.0 to -3.5 kPa (-0.061 to -0.036 kg/cm², -0.87 to -0.51 psi)

CAUTION:

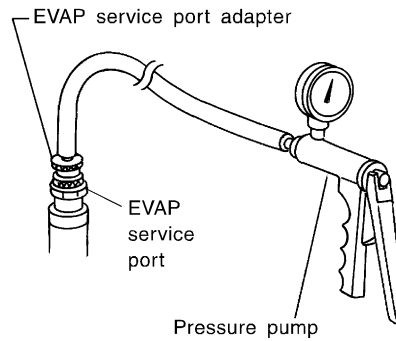
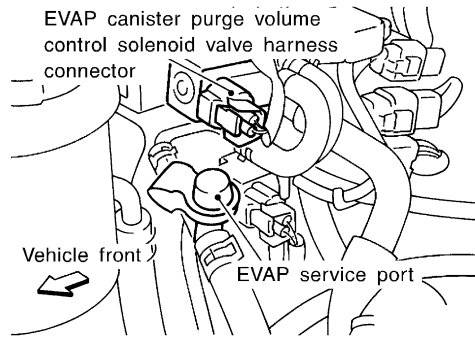
Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

5 INSTALL PRESSURE PUMP

1. Install the EVAP service port adapter and the pressure pump securely to EVAP service port.



SEF339V

SEF462UE

NOTE:

- Improper installation of service port may cause leaking.

Models with CONSULT-II ► GO TO 6.

Models without CONSULT-II ► GO TO 7.

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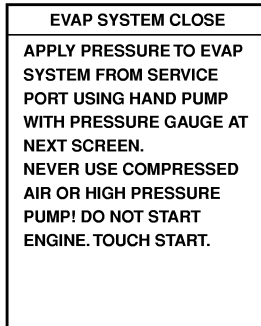
EL

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6 CHECK FOR EVAP LEAK

With CONSULT-II

1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.

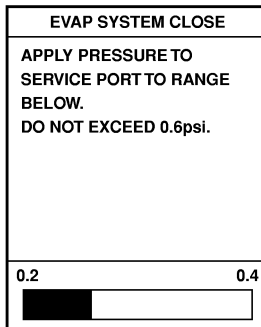


PEF658U

3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of bar graph.

NOTE:

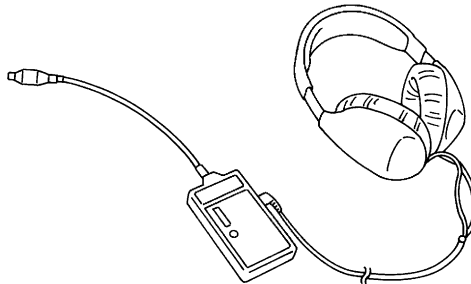
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.



PEF917U

4. Using EVAP leak detector, locate the leak portion. For the leak detector, refer to instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-43.

Leak detector



SEF200U

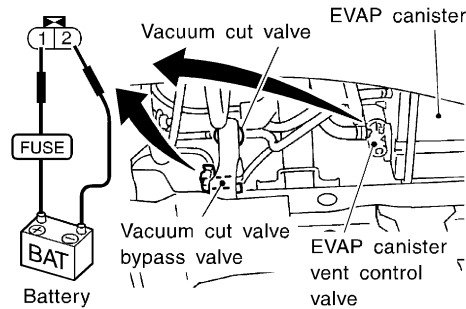
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

7 CHECK FOR EVAP LEAK

⊗ **Without CONSULT-II**

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)



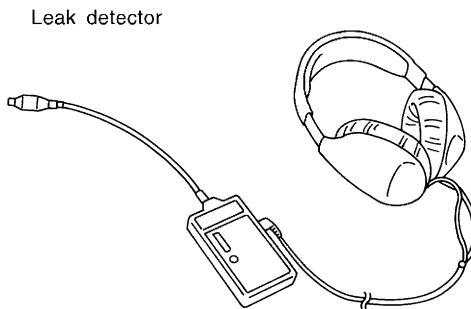
SEF503V

3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12 volts until the end of test.) Shown in the above figure.
4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg).

NOTE:

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

5. Using EVAP leak detector, locate the leak. For the leak detector, refer to instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-43.

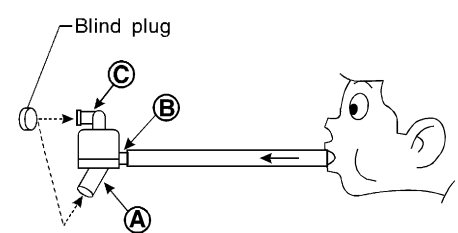


SEF200U

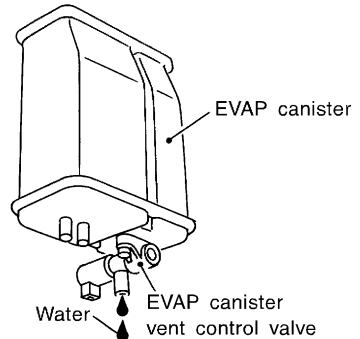
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

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8	CHECK WATER SEPARATOR	
<ol style="list-style-type: none"> 1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged. 		
		
<p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p>		
SEF829T		
<ol style="list-style-type: none"> 5. In case of NG in items 2 - 4, replace the parts. <p>● Do not disassemble water separator.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 9.
NG	▶	Replace water separator.

9	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT	
Refer to "DTC Confirmation Procedure", EC-374.		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connectors.

10	CHECK IF EVAP CANISTER IS SATURATED WITH WATER	
<ol style="list-style-type: none"> 1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister. 		
		
Yes or No		
Yes	▶	GO TO 11.
No (With CONSULT-II)	▶	GO TO 13.
No (Without CONSULT-II)	▶	GO TO 14.

SEF596U

DTC P0442 EVAP CONTROL SYSTEM

KA24DE

Diagnostic Procedure (Cont'd)

11	CHECK EVAP CANISTER	
Weigh the EVAP canister with EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 13.
OK (Without CONSULT-II)	▶	GO TO 14.
NG	▶	GO TO 12.

12	DETECT MALFUNCTIONING PART	
Check the following.		
1. Visually check the EVAP canister for damage.		
2. Check hose connection between EVAP canister and water separator for clogging and poor connection.		
	▶	Repair hose or replace EVAP canister.

13	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																					
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 2. Start engine. 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode. 4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%. 5. Check vacuum hose for vacuum. 																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td>XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	HO2S1 MNTR (B1)	LEAN	THRTL POS SEN	XXX V						
ACTIVE TEST																						
PURG VOL CONT/V	XXX %																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
THRTL POS SEN	XXX V																					
Vacuum should exist.																						
SEF595Y																						
OK or NG																						
OK	▶	GO TO 17.																				
NG	▶	GO TO 15.																				

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 4. Start engine and let it idle for at least 60 seconds. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. <p>Vacuum should exist.</p>		
OK or NG		
OK	▶	GO TO 17.
NG	▶	GO TO 15.

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DTC P0442 EVAP CONTROL SYSTEM

KA24DE

Diagnostic Procedure (Cont'd)

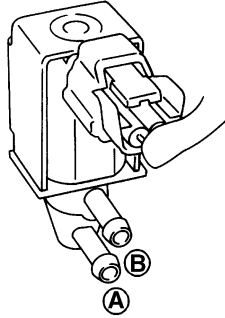
15	CHECK VACUUM HOSE	
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-33.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 16.
OK (Without CONSULT-II)	▶	GO TO 17.
NG	▶	Repair or reconnect the hose.

16	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																					
<p>ⓘ With CONSULT-II</p> <p>1. Start engine.</p> <p>2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.</p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td style="font-size: small;">PURG VOL CONT/V</td> <td style="font-size: small;">XXX %</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td style="font-size: small;">ENG SPEED</td> <td style="font-size: small;">XXX rpm</td> </tr> <tr> <td style="font-size: small;">A/F ALPHA-B1</td> <td style="font-size: small;">XXX %</td> </tr> <tr> <td style="font-size: small;">HO2S1 MNTR (B1)</td> <td style="font-size: small;">LEAN</td> </tr> <tr> <td style="font-size: small;">THRTL POS SEN</td> <td style="font-size: small;">XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	HO2S1 MNTR (B1)	LEAN	THRTL POS SEN	XXX V						
ACTIVE TEST																						
PURG VOL CONT/V	XXX %																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
THRTL POS SEN	XXX V																					
SEF801Y																						
OK or NG																						
OK	▶	GO TO 18.																				
NG	▶	GO TO 17.																				

17 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

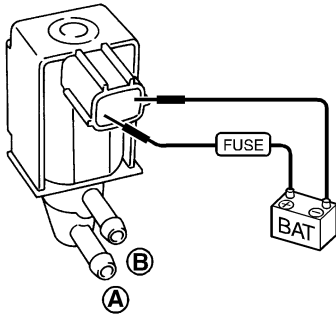


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

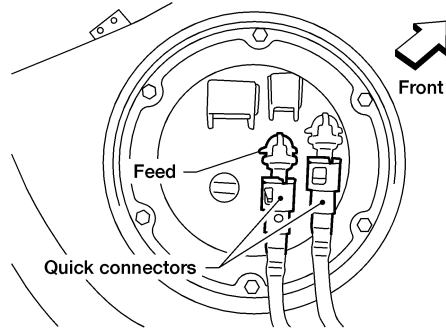
OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

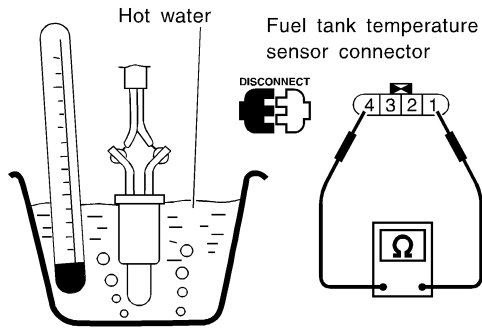
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18 CHECK FUEL TANK TEMPERATURE SENSOR

Check resistance by heating with hot water or heat gun as shown in the figure.



AFE095



SEF710Z

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

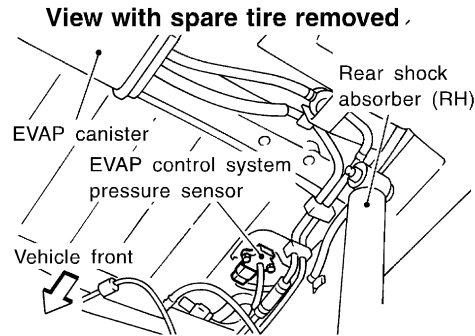
MTBL0291

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace fuel tank temperature sensor.

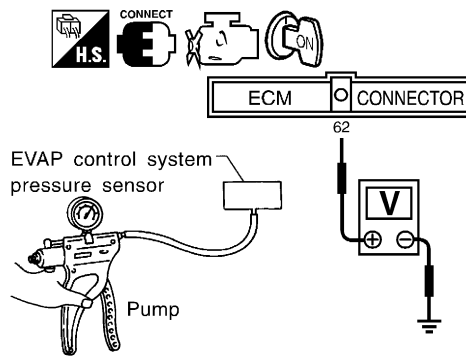
19 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.



SEF341V

2. Remove hose from EVAP control system pressure sensor.
3. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
4. Check output voltage between ECM terminal 62 and engine ground.



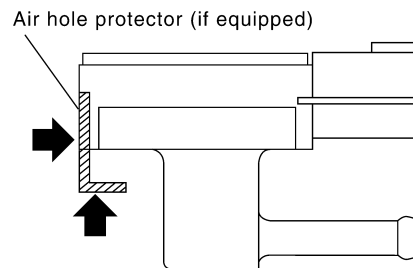
SEF198V

Pressure (Relative to atmospheric pressure)	Voltage (V)
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6

MTBL0295

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -20 kPa (-150 mmHg, -5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.



SEF799W

- Never apply force to the air hole protector of the sensor, if equipped.
- Discard any EVAP control system pressure sensor which has been dropped from height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 20.
NG	▶	Replace EVAP control system pressure sensor.

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DTC P0442 EVAP CONTROL SYSTEM

KA24DE

Diagnostic Procedure (Cont'd)

20	CHECK EVAP PURGE LINE
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-43.	
OK or NG	
OK	▶ GO TO 21.
NG	▶ Repair or reconnect the hose.

21	CLEAN EVAP PURGE LINE
Clean EVAP purge line (pipe and rubber tube) using air blower.	
	▶ GO TO 22.

22	CHECK REFUELING EVAP VAPOR LINE
Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to "ON BOARD REFUELING VAPOR RECOVERY (ORVR)", EC-45.	
OK or NG	
OK	▶ GO TO 23.
NG	▶ Repair or replace hoses and tubes.

23	CHECK SIGNAL LINE AND RECIRCULATION LINE
Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.	
OK or NG	
OK	▶ GO TO 24.
NG	▶ Repair or replace hoses, tubes or filler neck tube.

24	CHECK REFUELING CONTROL VALVE	<ol style="list-style-type: none"> 1. Remove fuel filler cap. 2. Check air continuity between hose ends A and B. Blow air into the hose end B. Air should flow freely into the fuel tank. 3. Blow air into hose end A and check there is no leakage. 4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage. 	GI MA EM LC EC FE CL MT AT TF PD
		OK or NG	
OK	▶	GO TO 25.	
NG	▶	Replace refueling control valve with fuel tank.	

25	CHECK FUEL LEVEL SENSOR	<ol style="list-style-type: none"> 1. Remove fuel level sensor assembly. Refer to FE-4. 2. Refer to "FUEL LEVEL SENSOR UNIT CHECK", EL-89 	AX SU BR
		OK or NG	
OK	▶	GO TO 26.	
NG	▶	Replace fuel level sensor.	

26	CHECK INTERMITTENT INCIDENT	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.	ST RS
		▶ INSPECTION END	

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

KA24DE

Description

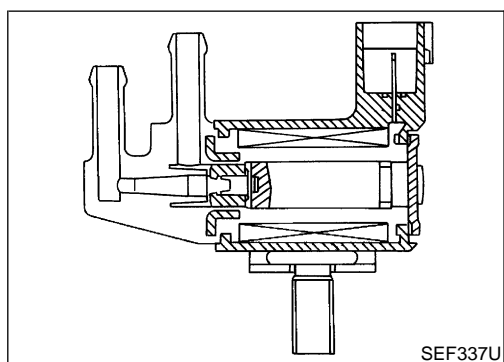
Description SYSTEM DESCRIPTION

NGEC0248

NGEC0248S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	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		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Throttle position switch	Closed throttle position		
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.



COMPONENT DESCRIPTION

NGEC0248S02

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

NGEC0249

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch "OFF" ● Shift lever: "N" ● No-load 	Idle (Vehicle stopped)	0%
		2,000 rpm	—

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

KA24DE

ECM Terminals and Reference Value

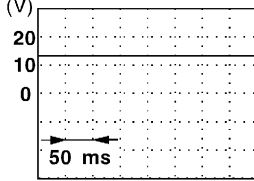
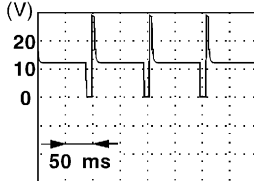
ECM Terminals and Reference Value

NGEC0250

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

CAUTION:

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

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	LG/R	ECM relay (Self-shut-off)	[Engine is running] [Ignition switch OFF] <ul style="list-style-type: none"> For a few seconds after turning ignition switch OFF 	0 - 1V
			[Ignition switch OFF] <ul style="list-style-type: none"> A few seconds passed after turning ignition switch OFF 	BATTERY VOLTAGE (11 - 14V)
5	R/Y	EVAP canister purge volume control solenoid valve	[Engine is running] <ul style="list-style-type: none"> Idle speed 	BATTERY VOLTAGE (11 - 14V) 
			[Engine is running] <ul style="list-style-type: none"> Engine speed is 2,000 rpm (More than 200 seconds after starting engine) 	BATTERY VOLTAGE (11 - 14V) 
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	[Engine is running] <ul style="list-style-type: none"> Idle speed 	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0251

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0444 P0445	An excessively low (P0444) or high (P0445) voltage signal is sent to ECM through the valve.	<ul style="list-style-type: none"> Harness or connectors (The valve circuit is open or shorted.) EVAP canister purge volume control solenoid valve

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DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

KA24DE

DTC Confirmation Procedure

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

=NGEC0252

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 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 30 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-370.

With GST

Follow the procedure "With CONSULT-II".

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

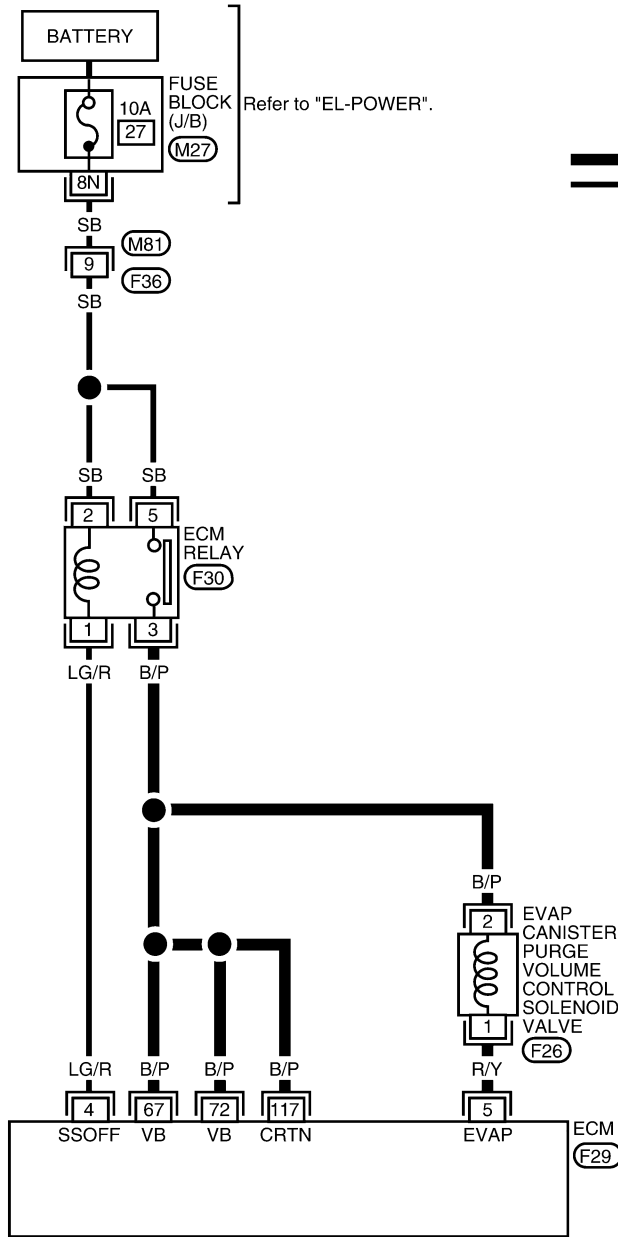
KA24DE

Wiring Diagram

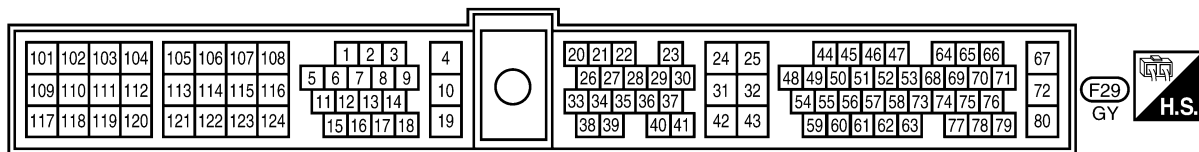
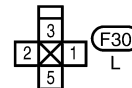
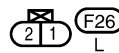
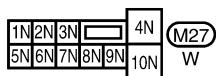
Wiring Diagram

NGEC0253

EC-PGC/V-01



— : Detectable line for DTC
 — : Non-detectable line for DTC



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WEC974

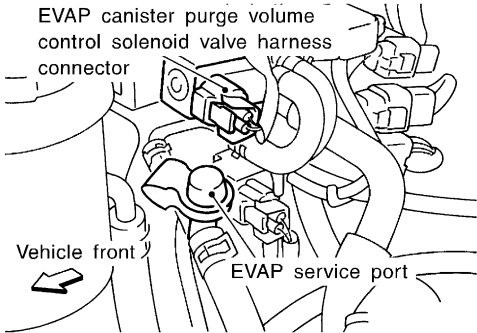
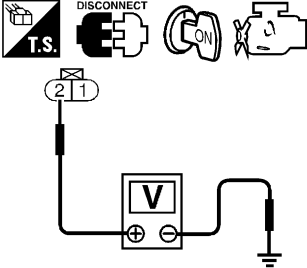
DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

KA24DE

Diagnostic Procedure

Diagnostic Procedure

NGEC0254

1	CHECK POWER SUPPLY	
	<p>1. Turn ignition switch OFF. 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.</p> <div style="text-align: center;">  <p>EVAP canister purge volume control solenoid valve harness connector</p> <p>Vehicle front</p> <p>EVAP service port</p> </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 2 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p>DISCONNECT</p> <p>T.S.</p> <p>ON</p> <p>2 1</p> <p>V</p> </div> <p>Voltage: Battery voltage</p> <p>OK or NG</p>	
	OK	▶ GO TO 3.
	NG	▶ GO TO 2.

SEF339V

SEF192V

2	DETECT MALFUNCTIONING PART	
	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM 	
	▶	Repair harness or connectors.

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

KA24DE

Diagnostic Procedure (Cont'd)

3 CHECK OUTPUT SIGNAL CIRCUIT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check harness continuity between ECM terminal 5 and terminal 1.

SEF193V

Continuity should exist.

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

OK or NG

OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	GO TO 4.

4 DETECT MALFUNCTIONING PART

Check the harness for open or short between EVAP canister purge volume control solenoid valve and ECM.

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

5 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

- Start engine.
- Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

SEF801Y

OK or NG


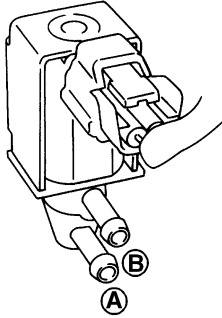

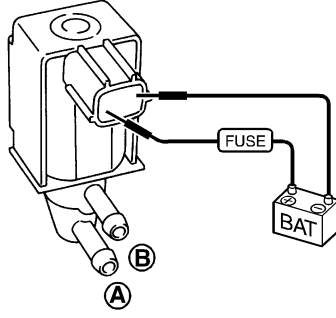
OK	▶	GO TO 7.
NG	▶	GO TO 6.

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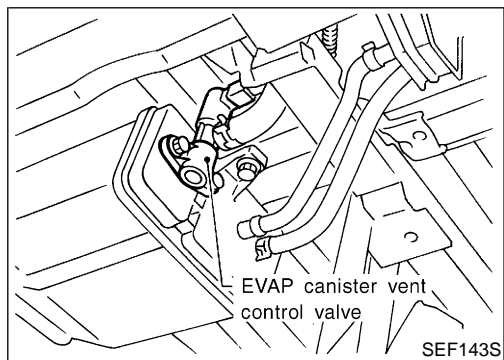
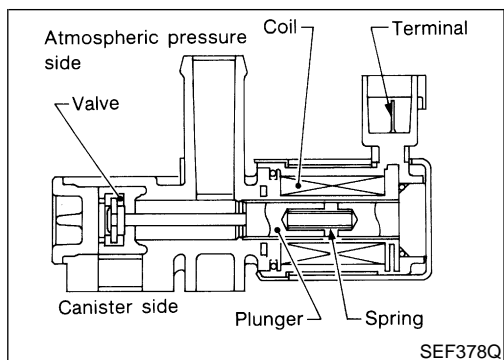
DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

KA24DE

Diagnostic Procedure (Cont'd)

6	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE							
<p> With CONSULT-II Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.</p>								
								
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Condition PURG VOL CONT/V value</th> <th style="text-align: center;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">100.0%</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td style="text-align: center;">0.0%</td> <td style="text-align: center;">No</td> </tr> </tbody> </table>			Condition PURG VOL CONT/V value	Air passage continuity between A and B	100.0%	Yes	0.0%	No
Condition PURG VOL CONT/V value	Air passage continuity between A and B							
100.0%	Yes							
0.0%	No							
SEF334X								
<p> Without CONSULT-II Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.</p>								
								
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Condition</th> <th style="text-align: center;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">12V direct current supply between terminals 1 and 2</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td style="text-align: center;">No supply</td> <td style="text-align: center;">No</td> </tr> </tbody> </table>			Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	Yes	No supply	No
Condition	Air passage continuity between A and B							
12V direct current supply between terminals 1 and 2	Yes							
No supply	No							
SEF335X								
OK or NG								
OK	▶	GO TO 7.						
NG	▶	Replace EVAP canister purge volume control solenoid valve.						

7	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.		
▶		INSPECTION END



Component Description

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent. NGEC0256

This solenoid (the EVAP canister vent control valve) responds to signals from the ECM.

When the ECM sends an ON signal, the coil in the solenoid valve is energized.

A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

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CONSULT-II Reference Value in Data Monitor Mode

NGEC0257

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

ECM Terminals and Reference Value

NGEC0258

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

CAUTION:

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

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0259

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0447	● An excessively low voltage signal is sent to ECM through EVAP canister vent control valve.	<ul style="list-style-type: none"> ● Harness or connectors (EVAP canister vent control valve circuit is open.) ● EVAP canister vent control valve

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NGEC0260

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 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 wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-376.

With GST

Follow the procedure "With CONSULT-II".

DTC P0447 EVAP CANISTER VENT CONTROL VALVE

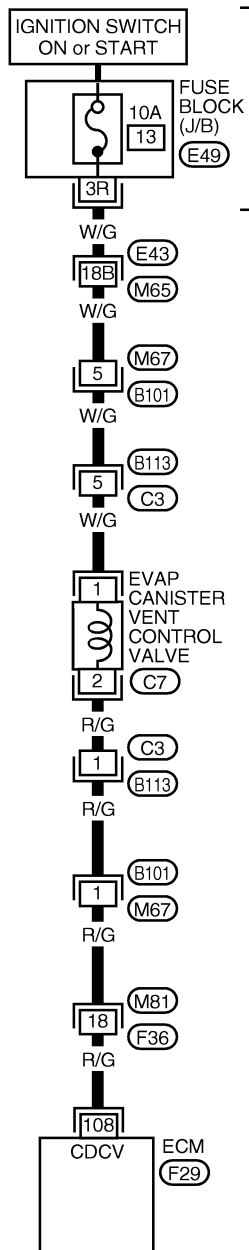
KA24DE

Wiring Diagram

Wiring Diagram

NGEC0261

EC-VENT/V-01



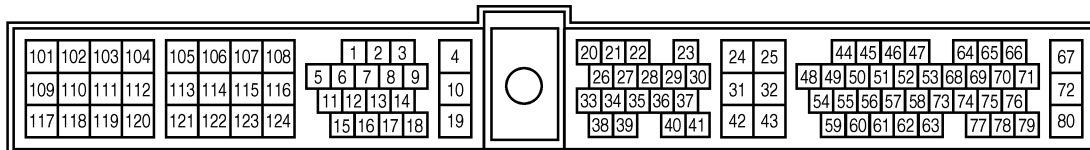
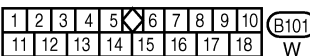
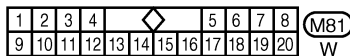
Refer to "EL-POWER".

: Detectable line for DTC
 : Non-detectable line for DTC

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Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



AEC997A

Diagnostic Procedure

NGEC0262

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

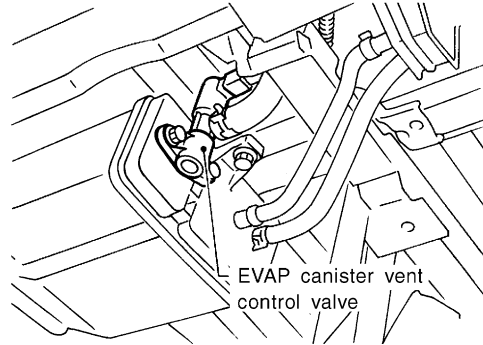
2	CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT																					
<p>1. Turn ignition switch ON.</p> <p>2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.</p>																						
<table border="1" style="margin: auto; border-collapse: collapse; font-size: small;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td style="padding: 2px;">VENT CONTROL/V</td> <td style="padding: 2px;">OFF</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td style="padding: 2px;">ENG SPEED</td> <td style="padding: 2px;">XXX rpm</td> </tr> <tr> <td style="padding: 2px;">A/F ALPHA-B1</td> <td style="padding: 2px;">XXX %</td> </tr> <tr> <td style="padding: 2px;">HO2S1 (B1)</td> <td style="padding: 2px;">XXX V</td> </tr> <tr> <td style="padding: 2px;">THRTL POS SEN</td> <td style="padding: 2px;">XXX V</td> </tr> <tr> <td style="padding: 2px;"> </td> <td style="padding: 2px;"> </td> </tr> <tr> <td style="padding: 2px;"> </td> <td style="padding: 2px;"> </td> </tr> <tr> <td style="padding: 2px;"> </td> <td style="padding: 2px;"> </td> </tr> </table>			ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	HO2S1 (B1)	XXX V	THRTL POS SEN	XXX V						
ACTIVE TEST																						
VENT CONTROL/V	OFF																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
HO2S1 (B1)	XXX V																					
THRTL POS SEN	XXX V																					
<p>3. Make sure that ratcheting sound is heard from the vent control valve.</p> <p style="text-align: center;">OK or NG</p>																						
OK	▶	GO TO 7.																				
NG	▶	GO TO 3.																				

SEF802Y

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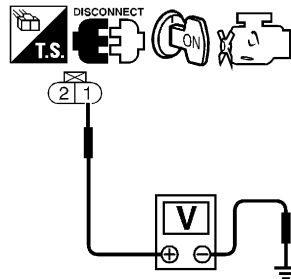
3 CHECK POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EVAP canister vent control valve harness connector.



SEF143S

3. Turn ignition switch ON.
4. Check voltage between terminal 1 and ground with CONSULT-II or tester.



SEF240W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4 DETECT MALFUNCTIONING PART

Check the following.

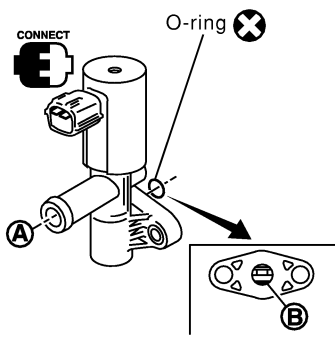
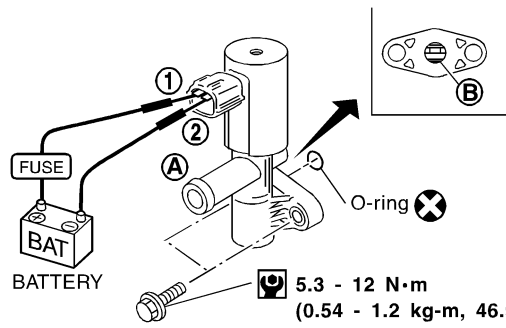
- Harness connectors E43, M65
- Harness connectors M67, B101
- Harness connectors B113, C3
- Fuse block (J/B) connector E49
- 10A fuse
- Harness for open or short between EVAP canister vent control valve and 10A fuse

▶ Repair harness or connectors.

5	CHECK OUTPUT SIGNAL CIRCUIT	<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 108 and terminal 2. 	
SEF241W			
<p style="color: blue;">Continuity should exist.</p>			
<ol style="list-style-type: none"> 4. Also check harness for short to ground and short to power. 			
OK or NG			
OK	▶	GO TO 8.	
NG	▶	GO TO 6.	

6	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors B101, M67 ● Harness connectors M81, F36 ● Harness connectors B113, C3 ● Harness for open or short between EVAP canister vent control valve and ECM 	
		▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK EVAP CANISTER VENT CONTROL VALVE-I	<ol style="list-style-type: none"> 1. Remove EVAP canister vent control valve from EVAP canister. 2. Check portion B of EVAP canister vent control valve for being rusted. 	
SEF337X			
OK or NG			
OK	▶	GO TO 8.	
NG	▶	Replace EVAP canister vent control valve.	

8	CHECK EVAP CANISTER VENT CONTROL VALVE-II																										
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Reconnect harness connectors disconnected. 2. Turn ignition switch "ON". 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode. 4. Check air passage continuity and operation delay time. 																											
<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;">  </div> <div style="width: 30%;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>VENT CONTROL/V</th> <th>OFF</th> </tr> </thead> <tbody> <tr> <td colspan="2" style="text-align: center;">MONITOR</td> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td>XXX %</td> </tr> <tr> <td>HO2S1 (B1)</td> <td>XXX V</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table> </div> <div style="width: 35%;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Condition</th> <th>Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td>ON</td> <td>No</td> </tr> <tr> <td>OFF</td> <td>Yes</td> </tr> </tbody> </table> <p>Operation takes less than 1 second.</p> </div> </div>		ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	HO2S1 (B1)	XXX V	THRTL POS SEN	XXX V							Condition	Air passage continuity between A and B	ON	No	OFF	Yes
ACTIVE TEST																											
VENT CONTROL/V	OFF																										
MONITOR																											
ENG SPEED	XXX rpm																										
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THRTL POS SEN	XXX V																										
Condition	Air passage continuity between A and B																										
ON	No																										
OFF	Yes																										
SEF803Y																											
<p>ⓧ Without CONSULT-II</p> <p>Check air passage continuity and operation delay time under the following conditions.</p>																											
<div style="display: flex; justify-content: space-between;"> <div style="width: 40%;">  </div> <div style="width: 55%;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Condition</th> <th>Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td>12V direct current supply between terminals 1 and 2</td> <td>No</td> </tr> <tr> <td>OFF</td> <td>Yes</td> </tr> </tbody> </table> <p>Operation takes less than 1 second.</p> </div> </div>		Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	No	OFF	Yes																				
Condition	Air passage continuity between A and B																										
12V direct current supply between terminals 1 and 2	No																										
OFF	Yes																										
SEF339X																											
Make sure new O-ring is installed properly.																											
OK or NG																											
OK	▶	GO TO 10.																									
NG	▶	GO TO 9.																									

9	CHECK EVAP CANISTER VENT CONTROL VALVE-III	
<ol style="list-style-type: none"> 1. Clean the air passage (Portion A to B) of EVAP canister vent control valve using an air blower. 2. Perform Test No. 8 again. 		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Replace EVAP canister vent control valve.

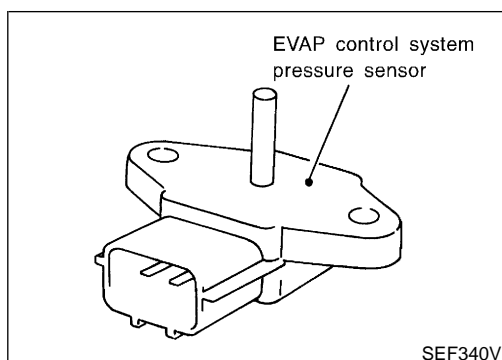
10	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.		
	▶	INSPECTION END

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DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

KA24DE

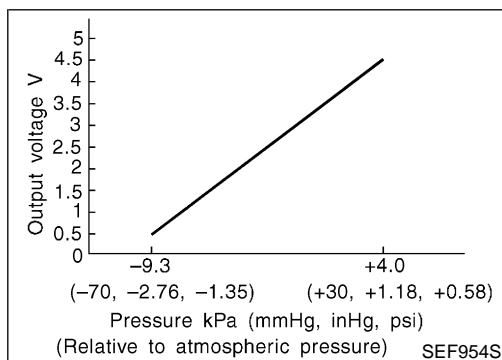
Component Description



Component Description

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases. The EVAP control system pressure sensor is not used to control the engine system. It is used only for on board diagnosis.

NGEC0264



CONSULT-II Reference Value in Data Monitor Mode

NGEC0265

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	● Ignition switch: ON	Approx. 3.4V

ECM Terminals and Reference Value

NGEC0266

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

CAUTION:

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

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	BR	Sensors' power supply	[Ignition switch ON]	Approximately 5V
43	B/W	Sensors' ground	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
62	Y	EVAP control system pressure sensor	[Ignition switch ON]	Approximately 3.4V

DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

KA24DE

On Board Diagnosis Logic

On Board Diagnosis Logic

NGEC0267

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0452 P0453	<ul style="list-style-type: none"> ● An excessively low (P0452) or high (P0453) voltage signal from EVAP control system pressure sensor is sent to ECM. 	<ul style="list-style-type: none"> ● Harness or connectors (The EVAP control system pressure sensor circuit is open or shorted.) ● Rubber hose to EVAP control system pressure is clogged, vent, kinked, disconnected or improper connection. ● EVAP control system pressure sensor ● EVAP canister vent control valve ● EVAP canister purge volume control solenoid valve ● EVAP canister ● Rubber hose from EVAP canister vent control valve to water separator

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DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

KA24DE

DTC Confirmation Procedure

6

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
FUEL T/TMP SE	XXX °C

SEF194Y

DTC Confirmation Procedure

=NGEC0268

NOTE:

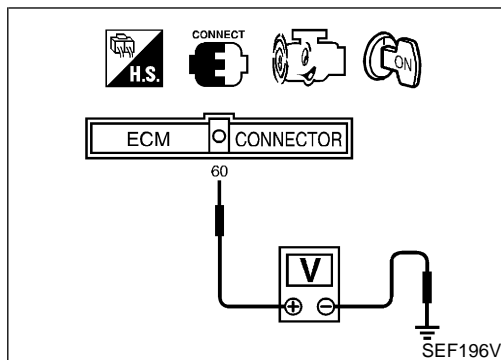
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- Always perform test at a temperature above 5°C (41°F).
- Before performing the following procedure, confirm 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 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Make sure that "FUEL T/TMP SE" is more than 0°C (32°F).
- 6) Start engine and wait at least 20 seconds.
- 7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-384.



With GST

- 1) Start engine and warm it up to normal operating temperature.
- 2) Check that voltage between ECM terminal 60 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
- 3) Turn ignition switch OFF and wait at least 5 seconds.
- 4) Start engine and wait at least 20 seconds.
- 5) Select "MODE 7" with GST.
- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-384.

DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

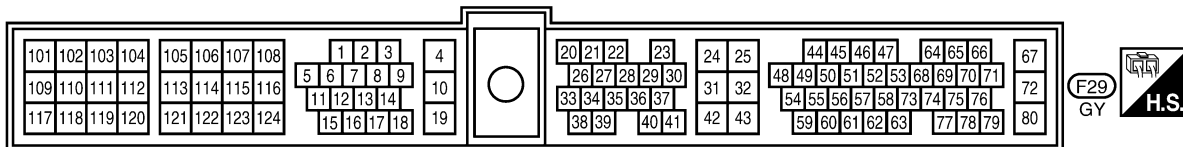
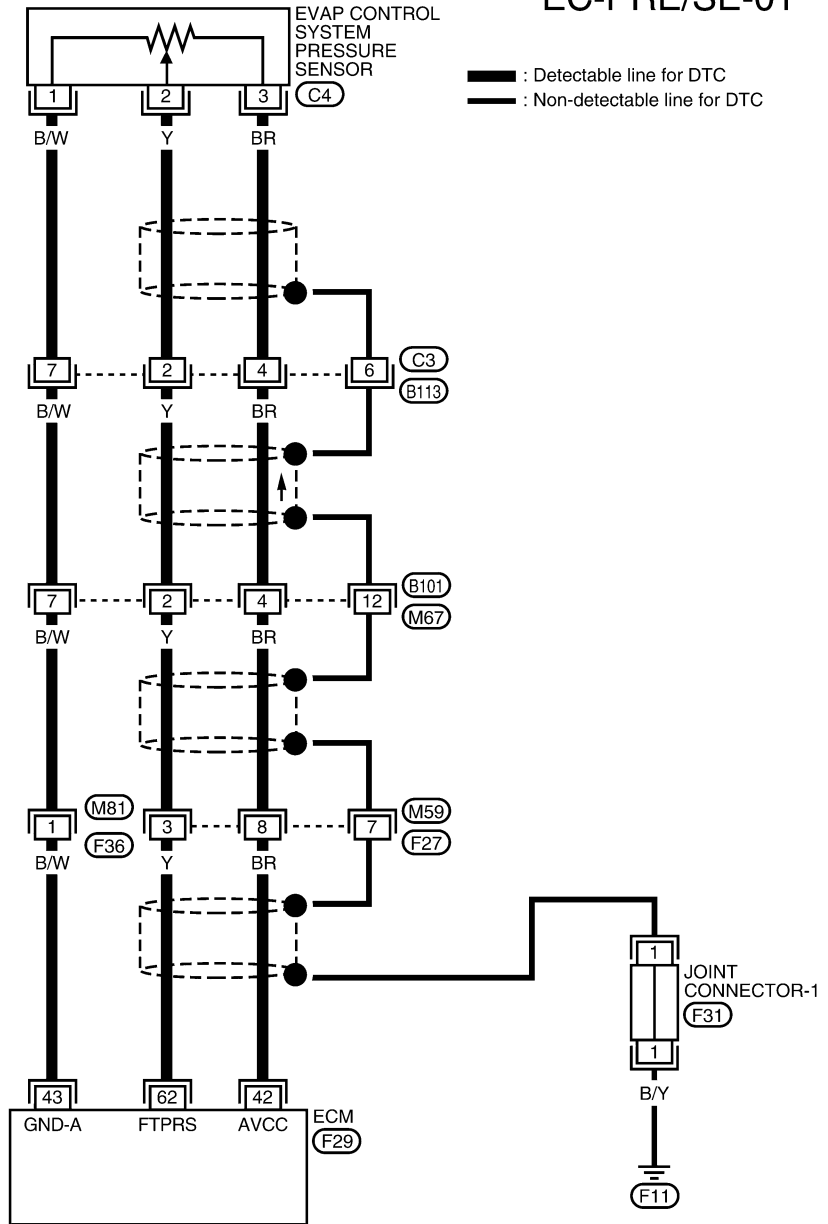
KA24DE

Wiring Diagram

Wiring Diagram

NGEC0269

EC-PRE/SE-01



WEC975

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DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

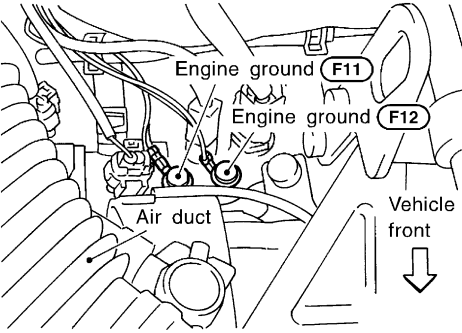
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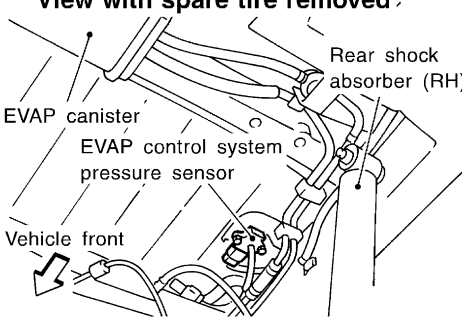
Diagnostic Procedure

Diagnostic Procedure

NGEC0270

1	CHECK RUBBER TUBE CONNECTED TO THE SENSOR	
Check rubber tube connected to the sensor for clogging, vent, kink, disconnection or improper connection.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Reconnect, repair or replace.

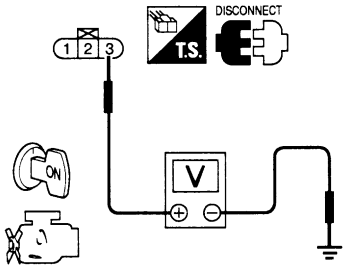
2	RETIGHTEN GROUND SCREWS	
<ol style="list-style-type: none"> Turn ignition switch OFF. Loosen and retighten engine ground screws. 		
		
SEF325V		
▶		GO TO 3.

3	CHECK HARNESS CONNECTOR	
<ol style="list-style-type: none"> Disconnect EVAP control system pressure sensor harness connector. 		
<p>View with spare tire removed.</p> 		
SEF341V		
<ol style="list-style-type: none"> Check sensor harness connector for water. Water should not exist. 		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace harness connector.

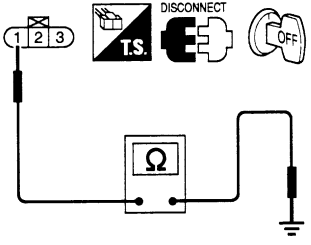
DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

KA24DE

Diagnostic Procedure (Cont'd)

4	CHECK POWER SUPPLY	<p>1. Turn ignition switch ON.</p> <p>2. Check voltage between terminal 3 and engine ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="color: blue; font-weight: bold;">Voltage: Approximately 5V</p> <p style="text-align: right;">SEF410Q</p> <p style="text-align: center;">OK or NG</p>	GI MA EM LC EC FE CL	
	OK	▶	GO TO 6.	
	NG	▶	GO TO 5.	

5	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors C3, B113 ● Harness connectors B101, M67 ● Harness connectors M59, F27 ● Harness for open or short between EVAP control system pressure sensor and ECM 		
		▶	Repair harness or connectors.	

6	CHECK GROUND CIRCUIT	<p>1. Turn ignition switch OFF.</p> <p>2. Check harness continuity between EVAP control system pressure sensor terminal 1 and engine ground.</p> <div style="text-align: center;">  </div> <p style="color: blue; font-weight: bold;">Continuity should exist.</p> <p style="text-align: right;">SEF411Q</p> <p style="text-align: center;">OK or NG</p>	PD AX SU BR ST RS BT HA	
	OK	▶	GO TO 8.	
	NG	▶	GO TO 7.	

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DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

KA24DE

Diagnostic Procedure (Cont'd)

7	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors C3, B113 ● Harness connectors B101, M67 ● Harness connectors M81, F36 ● Harness for open or short between EVAP control system pressure sensor and ECM 	
▶ Repair open circuit or short to ground or short to power in harness or connectors.	

8	CHECK INPUT SIGNAL CIRCUIT
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 62 and terminal 2.</p>	
SEF412Q	
<p>Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK (With CONSULT-II) ▶	GO TO 10.
OK (Without CONSULT-II) ▶	GO TO 11.
NG ▶	GO TO 9.

9	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors C3, B113 ● Harness connectors B101, M67 ● Harness connectors M59, F27 ● Harness for open or short between EVAP control system pressure sensor and ECM 	
▶ Repair open circuit or short to ground or short to power in harness or connectors.	

DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

KA24DE

Diagnostic Procedure (Cont'd)

10	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																					
<p> With CONSULT-II</p> <p>1. Start engine.</p> <p>2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.</p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td>XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	HO2S1 MNTR (B1)	LEAN	THRTL POS SEN	XXX V						
ACTIVE TEST																						
PURG VOL CONT/V	XXX %																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
THRTL POS SEN	XXX V																					
SEF801Y																						
OK or NG																						
OK	▶	GO TO 12.																				
NG	▶	GO TO 11.																				

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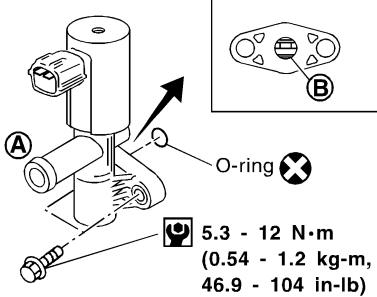
11	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE							
<p> With CONSULT-II</p> <p>Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.</p>								
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Condition PURG VOL CONT/V value</th> <th style="text-align: center;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">100.0%</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td style="text-align: center;">0.0%</td> <td style="text-align: center;">No</td> </tr> </tbody> </table>			Condition PURG VOL CONT/V value	Air passage continuity between A and B	100.0%	Yes	0.0%	No
Condition PURG VOL CONT/V value	Air passage continuity between A and B							
100.0%	Yes							
0.0%	No							
SEF334X								
<p> Without CONSULT-II</p> <p>Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.</p>								
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Condition</th> <th style="text-align: center;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">12V direct current supply between terminals 1 and 2</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td style="text-align: center;">No supply</td> <td style="text-align: center;">No</td> </tr> </tbody> </table>			Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	Yes	No supply	No
Condition	Air passage continuity between A and B							
12V direct current supply between terminals 1 and 2	Yes							
No supply	No							
SEF335X								
OK or NG								
OK	▶	GO TO 12.						
NG	▶	Replace EVAP canister purge volume control solenoid valve.						

DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

KA24DE

Diagnostic Procedure (Cont'd)

12	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	
1. Turn ignition switch "OFF". 2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.		
OK or NG		
OK	▶	GO TO 13.
NG	▶	Repair it.

13	CHECK EVAP CANISTER VENT CONTROL VALVE-I	
1. Remove EVAP canister vent control valve from EVAP canister. 2. Check portion B of EVAP canister vent control valve for being rusted.		
		
OK or NG		
OK	▶	GO TO 14.
NG	▶	Replace EVAP canister vent control valve.

DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

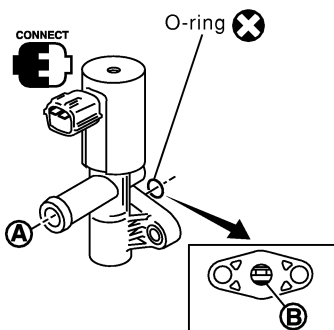
KA24DE

Diagnostic Procedure (Cont'd)

14 CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch "ON".
3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 (B1)	XXX V
THRTL POS SEN	XXX V

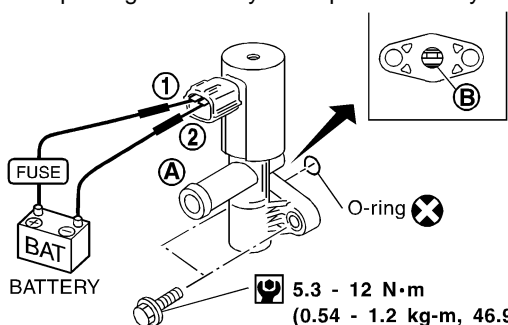
Condition	Air passage continuity between A and B
VENT CONTROL/V ON	No
VENT CONTROL/V OFF	Yes

Operation takes less than 1 second.

SEF803Y

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.

SEF339X

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 16.
NG	▶	GO TO 15.

15 CHECK EVAP CANISTER VENT CONTROL VALVE-III

1. Clean the air passage (Portion A to B) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 13 again.

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace EVAP canister vent control valve.

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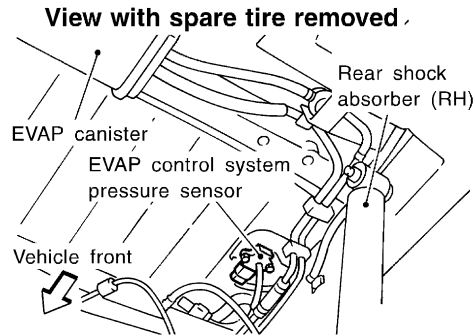
DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

KA24DE

Diagnostic Procedure (Cont'd)

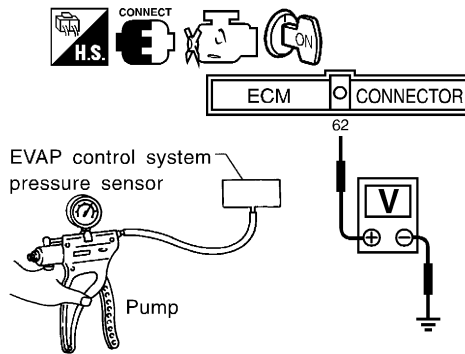
16 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.



SEF341V

2. Remove hose from EVAP control system pressure sensor.
3. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
4. Check output voltage between ECM terminal 62 and engine ground.



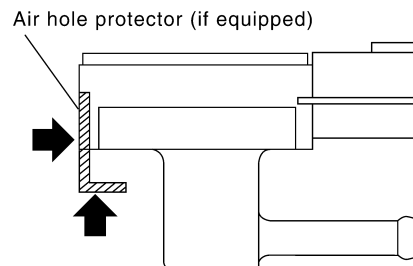
SEF198V

Pressure (Relative to atmospheric pressure)	Voltage (V)
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6

MTBL0295

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -20 kPa (-150 mmHg, -5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.



SEF799W

- Never apply force to the air hole protector of the sensor, if equipped.
- Discard any EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

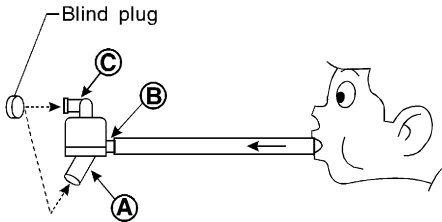
OK or NG

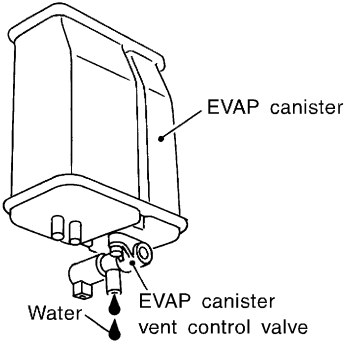
OK	▶	GO TO 17.
NG	▶	Replace EVAP control system pressure sensor.

DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

KA24DE

Diagnostic Procedure (Cont'd)

17	CHECK RUBBER TUBE FOR CLOGGING	
<p>Check obstructed water separator and rubber tube to EVAP canister vent control valve and clean the rubber tube using air blower.</p> <p>Check water separator.</p> <ol style="list-style-type: none"> 1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged. 		
		
<p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p>		
SEF829T		
<p>5. In case of NG in items 2 - 4, replace the parts.</p> <ul style="list-style-type: none"> ● Do not disassemble water separator. 		
OK or NG		
OK	▶	GO TO 18.
NG	▶	Clean, repair or replace rubber tube and/or water separator.

18	CHECK IF EVAP CANISTER SATURATED WITH WATER	
<ol style="list-style-type: none"> 1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister. 		
		
SEF596U		
Yes or No		
Yes	▶	GO TO 19.
No	▶	GO TO 21.

19	CHECK EVAP CANISTER	
<p>Weigh the EVAP canister with EVAP canister vent control valve attached.</p> <p>The weight should be less than 1.8 kg (4.0 lb).</p>		
OK or NG		
OK	▶	GO TO 21.
NG	▶	GO TO 20.

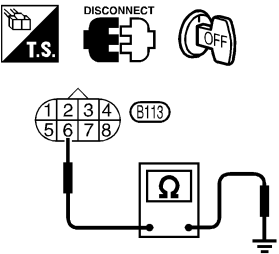
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DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

KA24DE

Diagnostic Procedure (Cont'd)

20	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ol style="list-style-type: none"> 1. Visually check the EVAP canister for damage. 2. Check hose connection between EVAP canister and water separator for clogging and poor connection. 	
	Repair hose or replace EVAP canister or water separator.

21	CHECK SHIELD CIRCUIT
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Reconnect disconnected harness connectors. 3. Disconnect harness connectors B113. 4. Check harness continuity between harness connector B113 terminal 6 and ground. 	
	
<p>Continuity should exist.</p> <ol style="list-style-type: none"> 5. Also check harness for short to power. 6. Then reconnect harness connectors. 	
OK or NG	
OK	GO TO 23.
NG	GO TO 22.

SEF699Z

22	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M59, F27 ● Joint connector-1 (Refer to "HARNES LAYOUT", <i>EL-250</i>.) ● Harness for open or short between harness connector M67 and engine ground 	
	Repair open circuit, short to ground or short to power in harness or connectors.

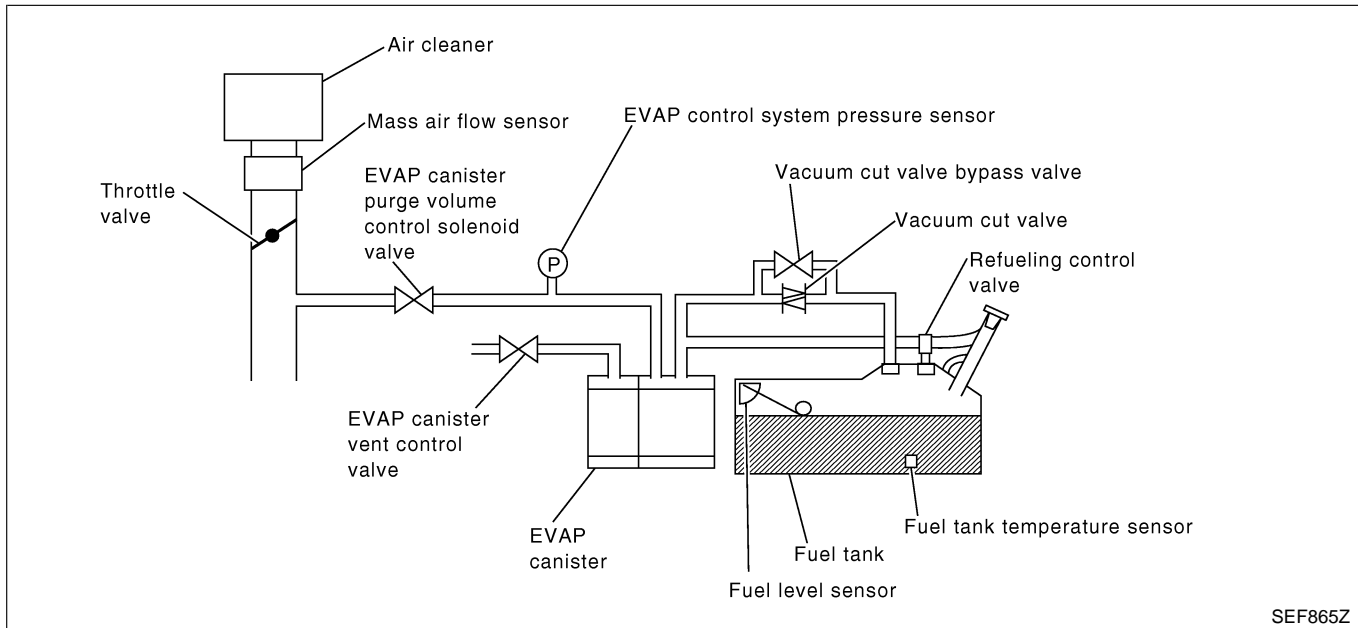
23	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.	
	INSPECTION END

On Board Diagnosis Logic

NGEC0951
NOTE:

If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-529.)

This diagnosis detects a very large leak (fuel filler cap fell off etc.) in the EVAP system between the fuel tank and the EVAP canister purge volume control solenoid valve.



Malfunction is detected when EVAP control system has a very large leak, such as fuel filler cap fell off, EVAP control system does not operate properly.

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

POSSIBLE CAUSE
NGEC0951S01

- Fuel filler cap remains open or fails to close.
- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent.
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve and the circuit
- Absolute pressure sensor

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- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- EVAP control system pressure sensor

6	<p>EVAP SML LEAK P0442/P1442</p> <p>1)FOR BEST RSLT,PERFORM AT FOLLOWING CONDITIONS. -FUEL LEVEL: 1/4-3/4 -AMBIENT TEMP: 0-30 C(32-86F) -OPEN ENGINE HOOD. 2)START ENG WITH VHCL STOPPED. IF ENG IS ON,STOP FOR 5 SEC. THEN RESTART. 3)TOUCH START.</p>	SEC760C
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5	<p>EVAP SML LEAK P0442/P1442</p> <p>WAIT 2 TO 10 MINUTES. KEEP ENGINE RUNNING AT IDLE SPEED.</p>	SEC761C
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5	<p>EVAP SML LEAK P0442/P1442</p> <p>MAINTAIN 1600 - 2100 RPM UNTIL FINAL RESULT APPEARS. (APPROX. 3 MINUTES)</p> <div style="border: 1px solid black; width: 100%; height: 15px; margin-top: 5px;"> <div style="background-color: black; width: 25%;"></div> </div> <p style="font-size: small; margin-top: 2px;">1600 rpm 1850 rpm 2100 rpm</p>	SEC762C
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6	<p>EVAP SML LEAK P0442/P1442</p> <p style="text-align: center; font-size: large; margin: 10px 0;">OK</p> <hr/> <p style="text-align: center; font-size: small;">SELF-DIAG RESULTS</p> <hr/> <p style="text-align: center; font-size: small;">NO DTC DETECTED. FURTHER TESTING MAY BE REQUIRED.</p>	SEC763C
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DTC Confirmation Procedure

NGEC0952

CAUTION:

Never remove fuel filter cap during the DTC confirmation procedure.

NOTE:

- If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-529.)
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

TESTING CONDITION:

- Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.
- Open engine hood before conducting the following procedure.
- It is better that the fuel level is low.

Ⓜ With CONSULT-II

- 1) Tighten fuel filter cap securely until ratcheting sound is heard.
- 2) Turn ignition switch ON.
- 3) Turn ignition switch OFF and wait at least 5 seconds.
- 4) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
- 5) Make sure that the following conditions are met.
COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
INT/A TEMP SE: 0 - 60°C (32 - 140°F)
- 6) Select “EVAP SML LEAK P0442/P1442” of “EVAP SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
 Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to “Basic Inspection”, EC-112.

- 7) Make sure that “OK” is displayed.
 If “NG” is displayed, select “SELF-DIAG RESULTS” mode with CONSULT-II and make sure that “EVAP GROSS LEAK [P0455]” is displayed. If it is displayed, refer to “Diagnostic Procedure”, EC-395.
 If P0442 is displayed, perform “Diagnostic Procedure” for DTC P0442.

 **With GST**

NOTE:

- Be sure to read the explanation of “Driving Pattern” on EC-81 before driving vehicle.
- It is better that the fuel level is low.
- 1) Start engine.
- 2) Drive vehicle according to “Driving Pattern”, EC-81.
- 3) Stop vehicle.
- 4) Select “MODE 1” with GST.
- If SRT of EVAP system is not set yet, go to the following step.
- If SRT of EVAP system is set, the result will be OK.
- 5) Turn ignition switch “OFF” and wait at least 5 seconds.
- 6) Start engine.
- It is not necessary to cool engine down before driving.**
- 7) Drive vehicle again according to the “Driving Pattern”, EC-81.
- 8) Stop vehicle.
- 9) Select “MODE 3” with GST.
- If P0455 is displayed on the screen, go to “Diagnostic Procedure”, EC-395.
- If P0442 is displayed on the screen, go to “Diagnostic Procedure”, EC-353.
- If P0441 is displayed on the screen, go to “Diagnostic Procedure”, EC-341.
- If P0441, P0442 and P0445 are not displayed on the screen, go to the following step.
- 10) Select “MODE 1” with GST.
- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 6.

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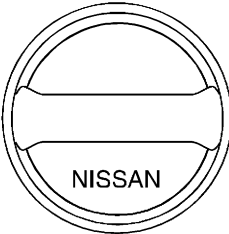
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AX

Diagnostic Procedure

NGEC0953

SU

1	CHECK FUEL FILLER CAP DESIGN	
<p>1. Turn ignition switch OFF. 2. Check for genuine NISSAN fuel filler cap design.</p> <div style="text-align: center;">  </div> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

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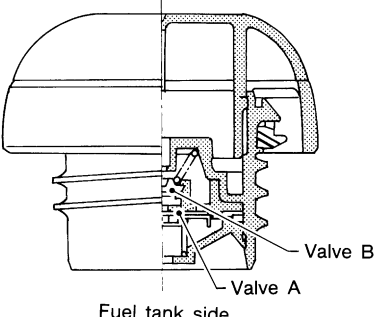
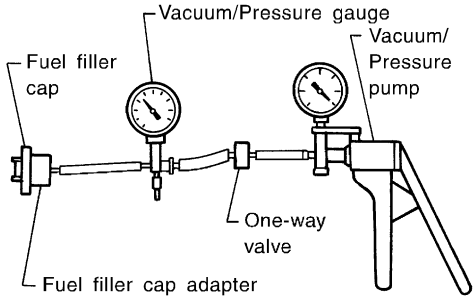
DTC P0455 EVAP CONTROL SYSTEM

KA24DE

Diagnostic Procedure (Cont'd)

2	CHECK FUEL FILLER CAP INSTALLATION	
Check that the cap is tightened properly by rotating the cap clockwise.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	<ul style="list-style-type: none"> ● Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. ● Retighten until ratcheting sound is heard.

3	CHECK FUEL FILLER CAP FUNCTION	
Check for air releasing sound while opening the fuel filler cap.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 4.

4	CHECK FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)	
<ol style="list-style-type: none"> 1. Wipe clean valve housing. 2. Check valve opening pressure and vacuum. 		
		
SEF427N		
		
SEF943S		
<p>Pressure: 16.0 - 20.0 kPa (0.163 - 0.204 kg/cm², 2.32 - 2.90 psi)</p> <p>Vacuum: -6.0 to -3.5 kPa (-0.061 to -0.036 kg/cm², -0.87 to -0.51 psi)</p> <p>CAUTION: Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.</p>		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

DTC P0455 EVAP CONTROL SYSTEM

KA24DE

Diagnostic Procedure (Cont'd)

5	CHECK EVAP PURGE LINE
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection or disconnection. Refer to "Evaporative Emission System", EC-40.	
OK or NG	
OK	▶ GO TO 6.
NG	▶ Repair or reconnect the hose.

6	CLEAN EVAP PURGE LINE
Clean EVAP purge line (pipe and rubber tube) using air blower.	
	▶ GO TO 7.

7	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT
Refer to "DTC Confirmation Procedure", EC-374.	
OK or NG	
OK	▶ GO TO 8.
NG	▶ Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

8	INSTALL THE PRESSURE PUMP
To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.	
<p>The diagram consists of two parts. The top part is a perspective view of the engine compartment showing the location of the EVAP service port. Labels include 'EVAP canister purge volume control solenoid valve harness connector', 'Vehicle front' (with an arrow pointing left), and 'EVAP service port'. The bottom part is a detailed view of the 'EVAP service port adapter' connected to the 'EVAP service port'. A 'Pressure pump' is attached to the other end of the adapter, which has a gauge.</p>	
SEF339V	
NOTE: Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.	
Models with CONSULT-II	▶ GO TO 9.
Models without CON-SULT-II	▶ GO TO 10.

SEF339V

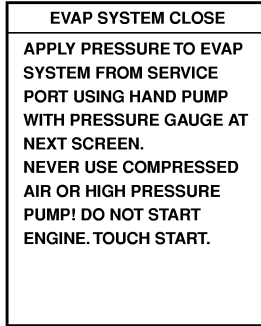
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9 CHECK FOR EVAP LEAK

With CONSULT-II

1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.

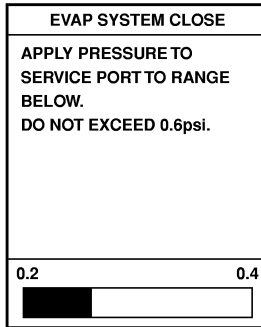


PEF658U

3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

NOTE:

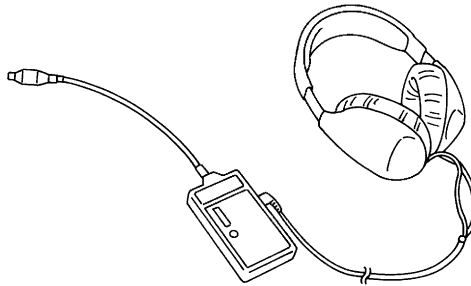
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-43.

Leak detector



SEF200U

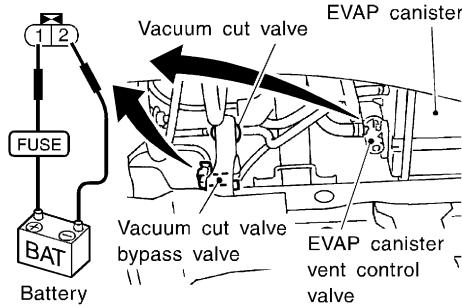
OK or NG

OK	▶	GO TO 11.
NG	▶	Repair or replace.

10 CHECK FOR EVAP LEAK

⊗ **Without CONSULT-II**

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



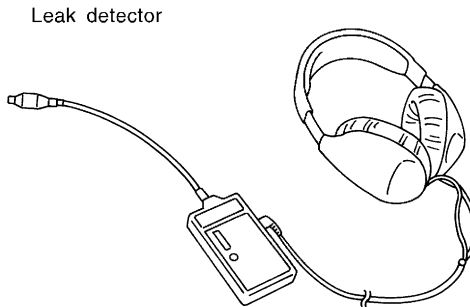
SEF503V

4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

NOTE:

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

5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-43.



SEF200U

OK or NG

OK	▶	GO TO 12.
NG	▶	Repair or replace.

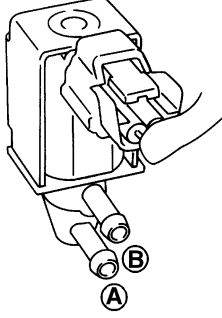
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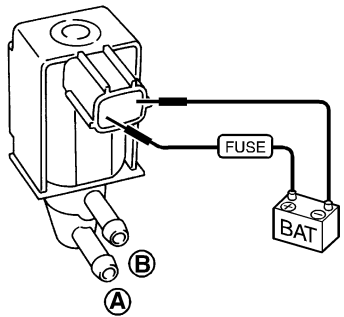
11	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION																					
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 2. Start engine. 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode. 4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. 																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td>XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	HO2S1 MNTR (B1)	LEAN	THRTL POS SEN	XXX V						
ACTIVE TEST																						
PURG VOL CONT/V	XXX %																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
THRTL POS SEN	XXX V																					
Vacuum should exist.																						
SEF595Y																						
OK or NG																						
OK	▶	GO TO 14.																				
NG	▶	GO TO 13.																				

12	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION	
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 4. Start engine and let it idle for at least 80 seconds. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. <p style="margin-left: 20px;">Vacuum should exist.</p>		
OK or NG		
OK	▶	GO TO 14.
NG	▶	GO TO 13.

13	CHECK VACUUM HOSE	
<p>Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-33.</p>		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 14.
OK (Without CONSULT-II)	▶	GO TO 15.
NG	▶	Repair or reconnect the hose.

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																					
<p>Ⓟ With CONSULT-II</p> <p>1. Start engine.</p> <p>2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.</p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td>XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	HO2S1 MNTR (B1)	LEAN	THRTL POS SEN	XXX V						
ACTIVE TEST																						
PURG VOL CONT/V	XXX %																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
THRTL POS SEN	XXX V																					
SEF801Y																						
OK or NG																						
OK	▶	GO TO 16.																				
NG	▶	GO TO 15.																				

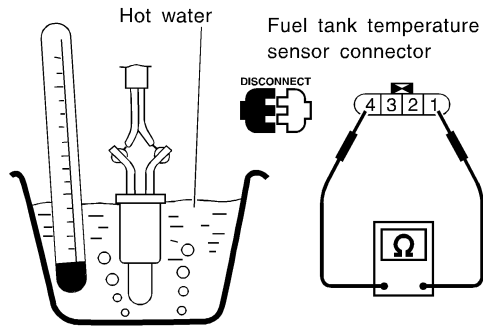
15	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE							
<p>Ⓟ With CONSULT-II</p> <p>Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.</p>								
								
SEF334X								
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th>Condition PURG VOL CONT/V value</th> <th>Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td>100.0%</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td>0.0%</td> <td style="text-align: center;">No</td> </tr> </tbody> </table>			Condition PURG VOL CONT/V value	Air passage continuity between A and B	100.0%	Yes	0.0%	No
Condition PURG VOL CONT/V value	Air passage continuity between A and B							
100.0%	Yes							
0.0%	No							

<p>⊗ Without CONSULT-II</p> <p>Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.</p>		
		
SEF335X		
OK or NG		
OK	▶	GO TO 16.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

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16 CHECK FUEL TANK TEMPERATURE SENSOR

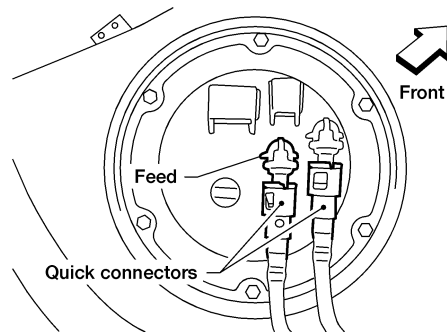
Check resistance by heating with hot water or heat gun as shown in the figure.



SEF710Z

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

MTBL0234



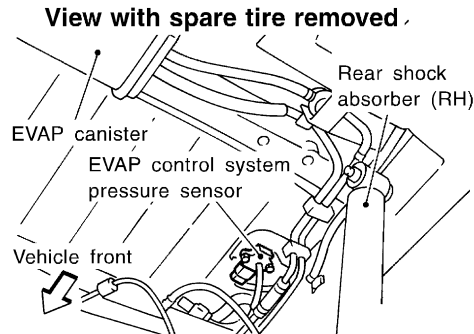
AFE095

OK or NG

OK	▶	GO TO 17.
NG	▶	Replace fuel tank temperature sensor, refer to <i>FE-4</i> .

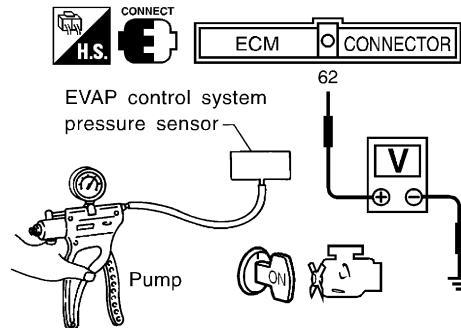
17 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.



SEF341V

2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch ON.
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
5. Check input voltage between ECM terminal 62 and ground.



SEF894U

Pressure (Relative to atmospheric pressure)	Voltage (V)
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6

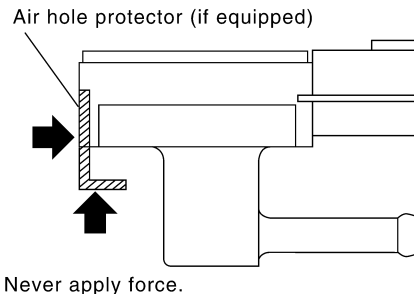
MTBL0246

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -20 kPa (-150 mmHg, -5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.

CAUTION:

- Never apply force to the air hole protector of the sensor if equipped.



SEF799W

- Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP control system pressure sensor.

DTC P0455 EVAP CONTROL SYSTEM

KA24DE

Diagnostic Procedure (Cont'd)

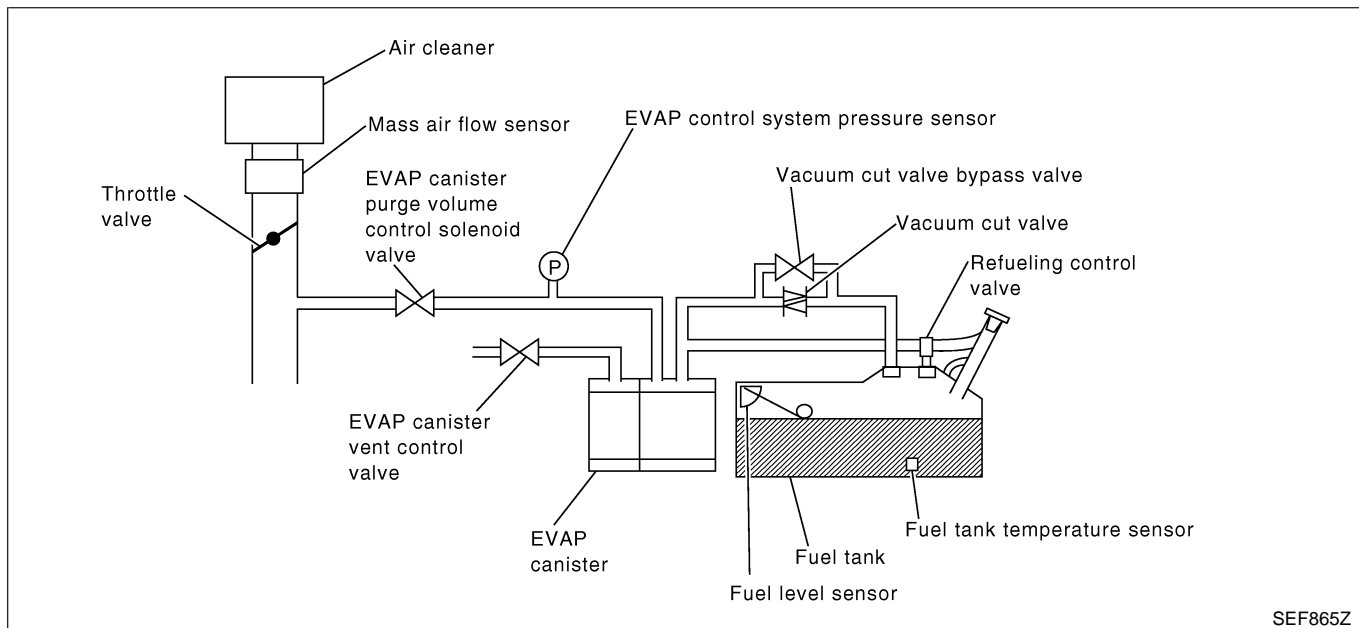
18	CHECK FUEL LEVEL SENSOR
1. Remove fuel level sensor assembly. Refer to FE-4 .	
2. Refer to "FUEL LEVEL SENSOR UNIT CHECK", EL-89 .	
OK or NG	
OK	▶ GO TO 19.
NG	▶ Replace fuel level sensor.
19	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.	
	▶ INSPECTION END

On Board Diagnosis Logic

NGEC1032

This diagnosis detects very small leaks in the EVAP line between the fuel tank and the EVAP canister purge volume control solenoid valve using intake manifold vacuum (P0456) or vapor pressure in the fuel tank (P1456) in the same way as conventional EVAP small leak diagnosis.

If the ECM judges a leak equivalent to a very small leak, the very small leak DTC P0456 or P1456 will be detected. If the ECM judges a leak equivalent to a small leak, the EVAP small leak DTC P0442 will be detected. Correspondingly, if the ECM judges there is no leak, the diagnosis result is OK.



Malfunction is detected when EVAP control system has a very small leak, EVAP control system does not operate properly.

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

Possible Cause


NGEC1033

- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close.
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks

- EVAP purge line rubber tube bent.
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve
- Absolute pressure sensor
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- Water separator
- EVAP canister is saturated with water.
- Fuel level sensor and the circuit
- EVAP control system pressure sensor
- Refueling control valve
- ORVR system leaks
- Fuel level sensor and the circuit

EVAP V/S LEAK P0456/P1456	
CHECK FUEL LEVEL SENSOR(V). SEE SERVICE MANUAL FOR SPECIFICATION. IS THE VOLTAGE WITHIN THE SPECIFICATION?	
MONITOR	
FUEL LEVEL SE	XXX V

SEC764C

EVAP V/S LEAK P0456/P1456	
MAINTAIN 1800-2800 RPM UNTIL FINAL RESULT APPEARS.	
	
1800 rpm	2300 rpm
	2800 rpm

SEC765C

EVAP V/S LEAK P0456/P1456	
OK	

SEC766C

DTC Confirmation Procedure

NGEC1034

CAUTION:

Never remove fuel filler cap during the DTC confirmation procedure.

NOTE:

- If DTC P0456 or P1456 is displayed with P0442, perform TROUBLE DIAGNOSIS FOR DTC P0456 or P1456 first.
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.
- After repair, make sure that the hoses and clips are installed properly.

TESTING CONDITION:

- Open engine hood before conducting following procedure.
- If any of following condition is met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.
 - a) Fuel filler cap is removed.
 - b) Refilled or drained the fuel.
 - c) EVAP component parts is/are removed.
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

Ⓜ With CONSULT-II

- 1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
- 2) Make sure the following conditions are met.

FUEL LEVEL SE: 1.08 - 0.2V

COOLAN TEMP/S: 0 - 32°C (32 - 90°F)

FUEL T/TMP SE: 0 - 32°C (32 - 90°F)

INT A/TEMP SE: More than 0°C (32°F)

If NG, turn ignition switch “OFF” and leave the vehicle in a cool

place (soak the vehicle) or refilling/draining fuel until the output voltage condition of the "FUEL LEVEL SE" meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1).

- 3) Turn ignition switch "OFF" and wait at least 5 seconds.
- 4) Turn ignition switch "ON".
- 5) Select "EVAP V/S LEAK P0456/P1456" of "EVAP SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II. Follow the instruction displayed.
- 6) Make sure that "OK" is displayed.
If "NG" is displayed, refer to "Diagnostic Procedure", EC-408.

NOTE:

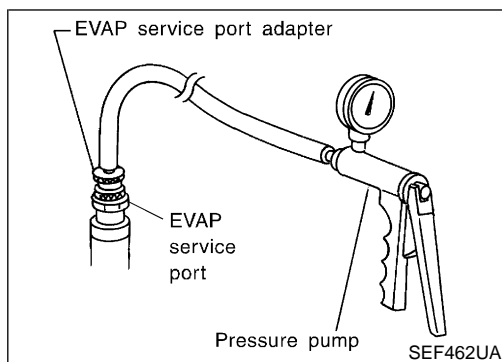
- If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to "Basic inspection", EC-112.
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

OVERALL FUNCTION CHECK

NGEC1034S01

With GST

Use this procedure to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.

**CAUTION:**

- Never use compressed air, doing so may damage the EVAP system.
 - Do not start engine.
 - Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi).
- 1) Attach the EVAP service port adapter securely to the EVAP service port.
 - 2) Set the pressure pump and a hose.
 - 3) Also set a vacuum gauge via 3-way connector and a hose.
 - 4) Turn ignition switch "ON".
 - 5) Connect GST and select mode 8.
 - 6) Using mode 8 control the EVAP canister vent control valve (close) and vacuum cut valve bypass valve (open).
 - 7) Apply pressure and make sure the following conditions are satisfied.

Pressure to be applied: 2.7 kPa (20 mmHg, 0.79 inHg)

Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (3 mmHg, 0.12 inHg)

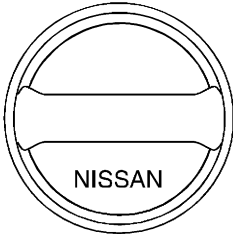
If NG, go to diagnostic procedure, EC-408.

NOTE:

For more information, refer to GST instruction manual.

Diagnostic Procedure

NGEC1035

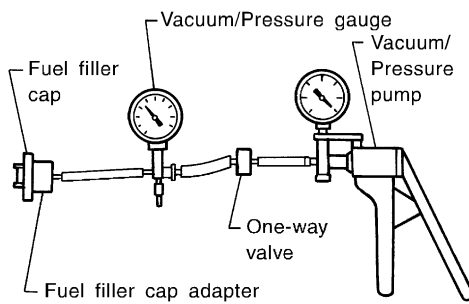
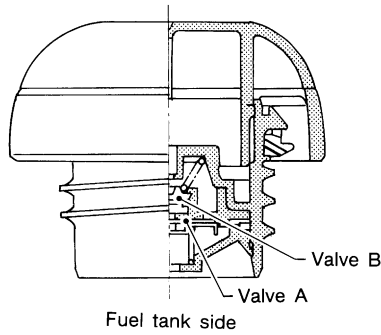
1	CHECK FUEL FILLER CAP DESIGN	
1. Turn ignition switch "OFF". 2. Check for genuine NISSAN fuel filler cap design.		
		
SEF915U		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

2	CHECK FUEL FILLER CAP INSTALLATION	
Check that the cap is tightened properly by rotating the cap clockwise.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	<ul style="list-style-type: none"> ● Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. ● Retighten until ratcheting sound is heard.

3	CHECK FUEL FILLER CAP FUNCTION	
Check for air releasing sound while opening the fuel filler cap.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4 CHECK FUEL TANK VACUUM RELIEF VALVE

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



SEF427N

SEF943S

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

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

CAUTION:

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

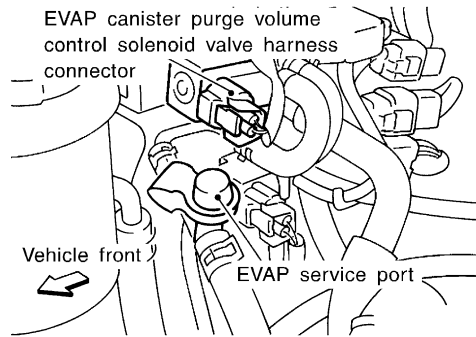
OK or NG

OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

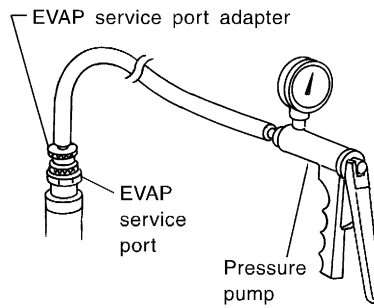
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5 INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



SEF339V



SEF916U

NOTE:

Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II	▶ GO TO 6.
Models without CONSULT-II	▶ GO TO 7.

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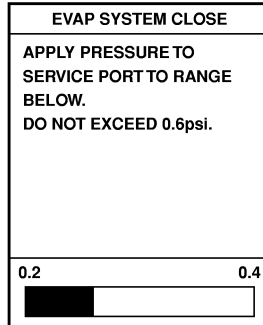
6 CHECK FOR EVAP LEAK

Ⓢ With CONSULT-II

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

NOTE:

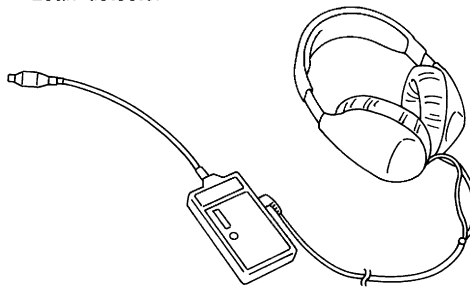
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-43.

Leak detector



SEF200U

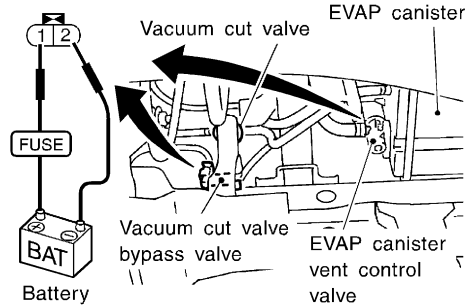
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

7 CHECK FOR EVAP LEAK

⊗ Without CONSULT-II

1. Turn ignition switch "OFF".
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)



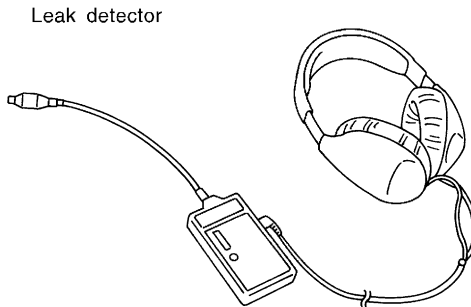
SEF503V

3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)
4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

NOTE:

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

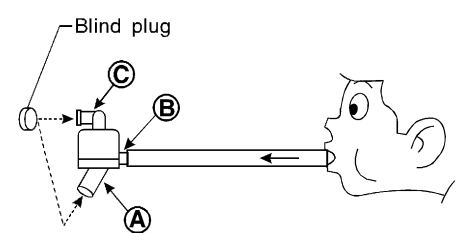
5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-43.



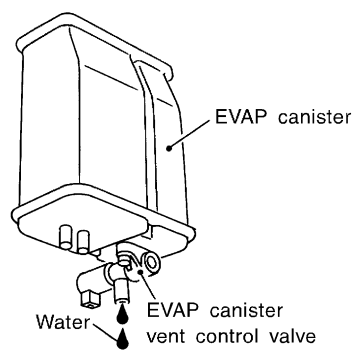
SEF200U

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

8	CHECK WATER SEPARATOR	<p>1. Check visually for insect nests in the water separator air inlet.</p> <p>2. Check visually for cracks or flaws in the appearance.</p> <p>3. Check visually for cracks or flaws in the hose.</p> <p>4. Check that A and C are not clogged by blowing air into B with A, and then C plugged.</p> <div style="text-align: center;">  <p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p> </div> <p style="text-align: right;">SEF829T</p> <p>5. In case of NG in items 2 - 4, replace the parts.</p> <p>NOTE:</p> <ul style="list-style-type: none"> Do not disassemble water separator. <p style="text-align: center;">OK or NG</p>	
OK	▶	GO TO 9.	
NG	▶	Replace water separator.	

9	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT	<p>Refer to "DTC Confirmation Procedure", EC-374.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶	GO TO 10.	
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.	

10	CHECK IF EVAP CANISTER SATURATED WITH WATER	<p>1. Remove EVAP canister with EVAP canister vent control valve attached.</p> <p>2. Does water drain from the EVAP canister?</p> <div style="text-align: center;">  <p style="text-align: right;">SEF596U</p> </div> <p style="text-align: center;">Yes or No</p>	
Yes	▶	GO TO 11.	
No (With CONSULT-II)	▶	GO TO 13.	
No (Without CONSULT-II)	▶	GO TO 14.	

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11	CHECK EVAP CANISTER	
Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 13.
OK (Without CONSULT-II)	▶	GO TO 14.
NG	▶	GO TO 12.

12	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 		
		▶ Repair hose or replace EVAP canister.

13	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION																					
ⓘ With CONSULT-II <ol style="list-style-type: none"> 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 2. Start engine. 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode. 4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. 																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td>XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>HO2S1 MNTR (B2)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V		
ACTIVE TEST																						
PURG VOL CONT/V	XXX %																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
HO2S1 MNTR (B2)	LEAN																					
THRTL POS SEN	XXX V																					
Vacuum should exist.																						
SEF984Y																						
OK or NG																						
OK	▶	GO TO 16.																				
NG	▶	GO TO 15.																				


14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION	
ⓘ Without CONSULT-II <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 4. Start engine and let it idle for at least 80 seconds. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. 		
Vacuum should exist.		
OK or NG		
OK	▶	GO TO 17.
NG	▶	GO TO 15.

DTC P0456, P1456 EVAP CONTROL SYSTEM

KA24DE

Diagnostic Procedure (Cont'd)

15	CHECK VACUUM HOSE	
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-33.		
OK or NG		
OK (With CONSULT-II)	▶▶	GO TO 16.
OK (Without CONSULT-II)	▶▶	GO TO 17.
NG	▶▶	Repair or reconnect the hose.

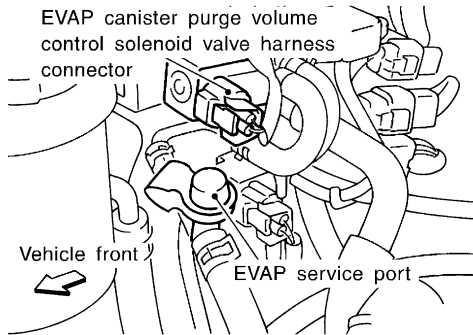
16	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																					
<p> With CONSULT-II</p> <p>1. Start engine.</p> <p>2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.</p>																						
<table border="1"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td>PURG VOL CONT/V</td> <td>0.0%</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td>XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td>XXX %</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td>RICH</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td>RICH</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>			ACTIVE TEST		PURG VOL CONT/V	0.0%	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	RICH	HO2S1 MNTR (B2)	RICH	THRTL POS SEN	XXX V		
ACTIVE TEST																						
PURG VOL CONT/V	0.0%																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	RICH																					
HO2S1 MNTR (B2)	RICH																					
THRTL POS SEN	XXX V																					
SEF985Y																						
OK or NG																						
OK	▶▶	GO TO 18.																				
NG	▶▶	GO TO 17.																				

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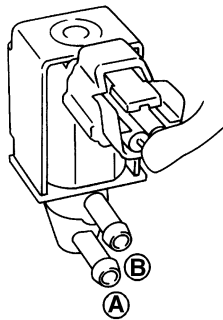
17 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF339V

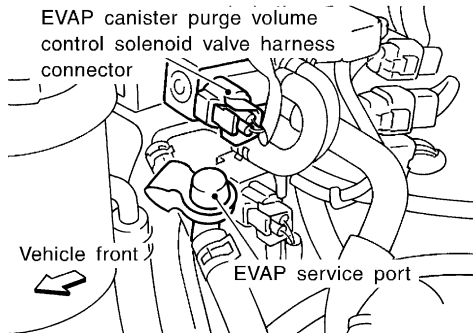


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

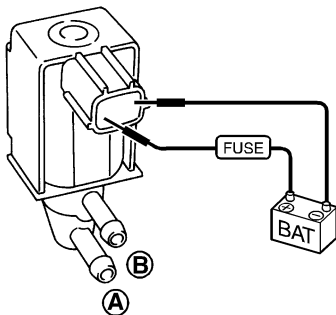
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF339V



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

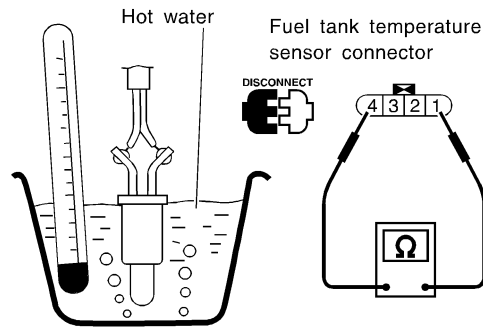
SEF335X

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

18 CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit and fuel pump terminals 1 and 4 by heating with hot water or heat gun as shown in the figure.



SEF710Z

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

MTBL0291

OK or NG

- | | | |
|----|---|---------------------------------|
| OK | ▶ | GO TO 19. |
| NG | ▶ | Replace fuel level sensor unit. |

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19	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR
<p>1. Remove EVAP control system pressure sensor with its harness connector connected.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● Never apply force to the air hole protector of the sensor if equipped. 	
SEF799W	
<p>2. Remove hose from EVAP control system pressure sensor.</p> <p>3. Turn ignition switch "ON".</p> <p>4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● Always calibrate the vacuum pump gauge when using it. ● Do not apply below -20 kPa (-150 mmHg, -5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure. <p>5. Check input voltage between ECM terminal 62 and ground.</p>	
SEF705Z	
<p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. 	
OK or NG	
OK	▶ GO TO 20.
NG	▶ Replace EVAP control system pressure sensor.

20	CHECK EVAP PURGE LINE
<p>Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to "Evaporative Emission System", EC-40.</p>	
OK or NG	
OK	▶ GO TO 21.
NG	▶ Repair or reconnect the hose.

21	CLEAN EVAP PURGE LINE
<p>Clean EVAP purge line (pipe and rubber tube) using air blower.</p>	
▶	GO TO 22.

DTC P0456, P1456 EVAP CONTROL SYSTEM

KA24DE

Diagnostic Procedure (Cont'd)

22	CHECK FUEL LEVEL SENSOR	
Refer to EL-8 , "Fuel Level Sensor Unit Check".		
OK or NG		
OK	▶	GO TO 23.
NG	▶	Replace fuel level sensor unit.

23	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.		
	▶	INSPECTION END

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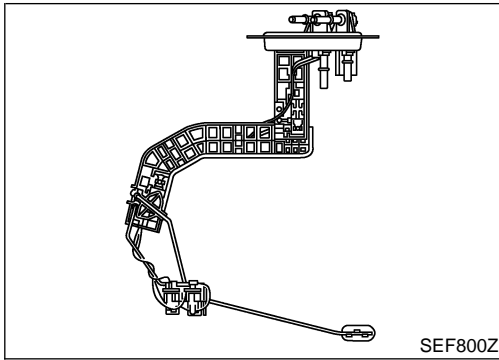
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Component Description



Component Description

The fuel level sensor is mounted in the fuel level sensor unit. ^{NGEC1012} The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

On Board Diagnostic Logic

When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected. ^{NGEC1013}

Malfunction is detected when even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.

Possible Cause

- Fuel level sensor circuit
(The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

^{NGEC1014}

3

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test. ^{NGEC1015}

Ⓜ WITH CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait maximum of 2 consecutive minutes.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-422. ^{NGEC1015S01}

Ⓜ WITH GST

Follow the procedure "WITH CONSULT-II" above. ^{NGEC1015S02}

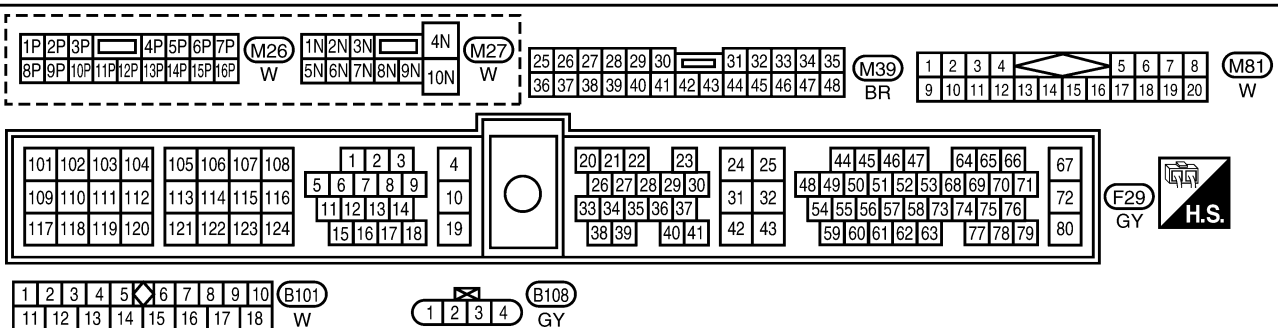
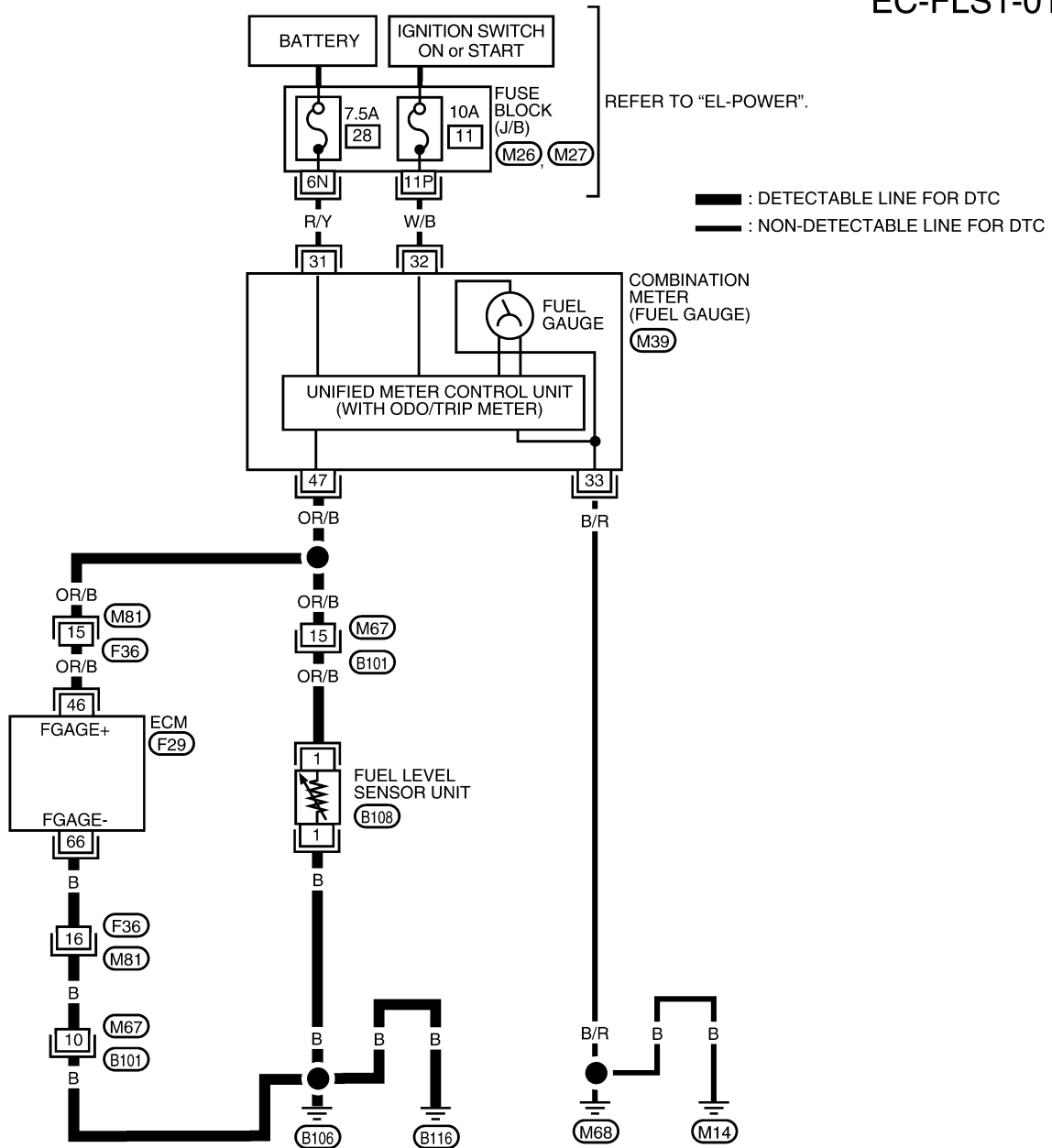
DTC P0460 FUEL LEVEL SENSOR

KA24DE
Wiring Diagram

Wiring Diagram

NGEC1016

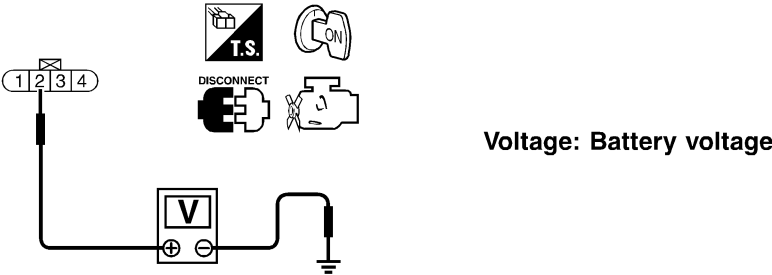
EC-FLS1-01



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Diagnostic Procedure

=NGEC1017

1	CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT	
1. Turn ignition switch "OFF". 2. Disconnect fuel level sensor until harness connector. 3. Turn ignition switch "ON". 4. Check voltage between fuel level sensor unit terminal 2 and ground with CONSULT-II or a tester.		
		
SEF702ZA		
OK or NG		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Harness connectors M67, B101 ● Harness for open or short between combination meter and fuel level sensor unit 		
▶ Repair or replace harness or connectors.		

3	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch "OFF". 2. Check harness continuity between fuel level sensor unit terminal 4 and body 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 FUEL LEVEL SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 46 and fuel level sensor unit terminal 2, ECM terminal 66 and fuel level sensor unit terminal 4. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

DTC P0460 FUEL LEVEL SENSOR

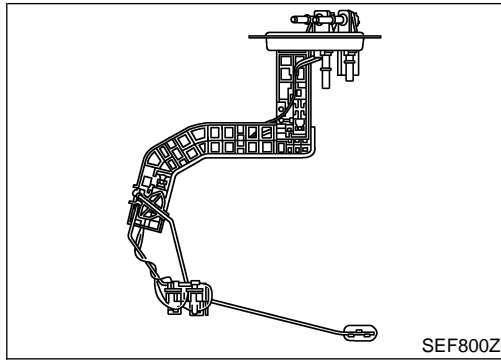
KA24DE

Diagnostic Procedure (Cont'd)

5	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Harness connectors M81, F36 ● Harness connectors M67, B101 ● Harness for open or short between ECM and fuel level sensor unit 		
▶		Repair open circuit or short to ground or short to power in harness or connectors.
6	CHECK FUEL LEVEL SENSOR	
Refer to EL-8 , "Fuel Level Sensor Unit Check".		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Replace fuel level sensor unit.
7	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.		
▶		INSPECTION END

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Component Description



Component Description

The fuel level sensor is mounted in the fuel level sensor unit. ^{=NGEC1018} The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

On Board Diagnostic Logic

Driving long distances naturally affect fuel gauge level. ^{NGEC1019} This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven. Malfunction is detected when the output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance.

Possible Cause

- Harness or connectors (The level sensor circuit is open or shorted.)
- Fuel level sensor

NGEC1020

Overall Function Check

Use this procedure to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed. ^{NGEC1021}

WARNING:

When performing following procedure, be sure to observe the handling of the fuel. Refer to FE-5, "Fuel Tank".

TESTING CONDITION:

Before starting overall function check, preparation of draining fuel and refilling fuel is required.

7	DATA MONITOR	
	MONITOR	NO DTC
	FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V	

SEF195Y

Ⓜ WITH CONSULT-II

NOTE:

Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

- 1) Prepare a fuel container and a spare hose.
- 2) Release fuel pressure from fuel line, refer to "Fuel Pressure Release", EC-57.
- 3) Remove the fuel feed hose on the fuel level sensor unit.
- 4) Connect a spare fuel hose where the fuel feed hose was removed.

NGEC1021S01

DTC P0461 FUEL LEVEL SENSOR

KA24DE

Overall Function Check (Cont'd)

- 5) Turn ignition switch "OFF" and wait at least 10 seconds then turn "ON".
- 6) Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT-II.
- 7) Check "FUEL LEVEL SE" output voltage and note it.
- 8) Select "FUEL PUMP" in "ACTIVE TEST" mode with CONSULT-II.
- 9) Touch "ON" and drain fuel approximately 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
- 10) Fill fuel into the fuel tank for 30ℓ (7-7/8 US gal, 6-5/8 Imp gal).
- 11) Check "FUEL LEVEL SE" output voltage and note it.
- 12) Check "FUEL LEVEL SE" output voltage and confirm whether the voltage changes more than 0.03V during step 7 to 11. If NG, check the fuel level sensor, refer to **EL-89**, "FUEL LEVEL SENSOR UNIT CHECK".

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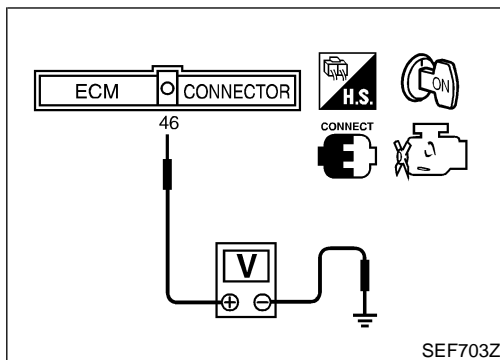
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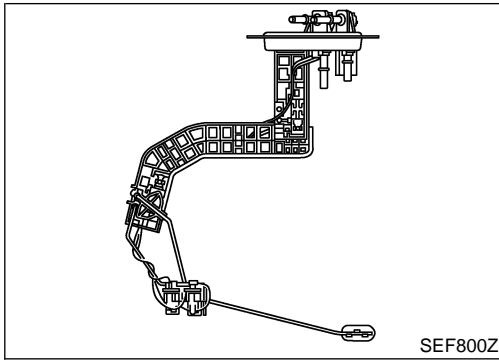
NGEC1021S02

NOTE:

Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

- 1) Prepare a fuel container and a spare hose.
- 2) Release fuel pressure from fuel line, refer to "Fuel Pressure Release", EC-57.
- 3) Remove the fuel feed hose on the fuel level sensor unit.
- 4) Connect a spare fuel hose where the fuel feed hose was removed.
- 5) Turn ignition switch "OFF".
- 6) Set voltmeters probe between ECM terminal 46 (fuel level sensor signal) and ground.
- 7) Turn ignition switch "ON".
- 8) Check voltage between ECM terminal 46 and ground and note it.
- 9) Drain fuel by 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
- 10) Fill fuel into the fuel tank for 30ℓ (7-7/8 US gal, 6-5/8 Imp gal).
- 11) Confirm that the voltage between ECM terminal 46 and ground changes more than 0.03V during step 8 - 10. If NG, check component of fuel level sensor, refer to **EL-89**, "FUEL LEVEL SENSOR UNIT CHECK".

Component Description



Component Description

The fuel level sensor is mounted in the fuel level sensor unit. ^{NGEC1022} The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

On Board Diagnostic Logic

ECM receives two signals from the fuel level sensor circuit. ^{NGEC1023} One is fuel level sensor power supply circuit, and the other is fuel level sensor ground circuit.

This diagnosis indicates the former, to detect open or short circuit malfunction.

Malfunction is detected when an excessively low (P0462) or high (P0463) voltage is sent from the sensor is sent to ECM.

Possible Cause

- Fuel level sensor circuit (The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

^{NGEC1024}

DTC Confirmation Procedure

NOTE:

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at ignition switch "ON".

^{NGEC1025}

2

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

WITH CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-428.

^{NGEC1025S01}

WITH GST

Follow the procedure "WITH CONSULT-II" above.

^{NGEC1025S02}

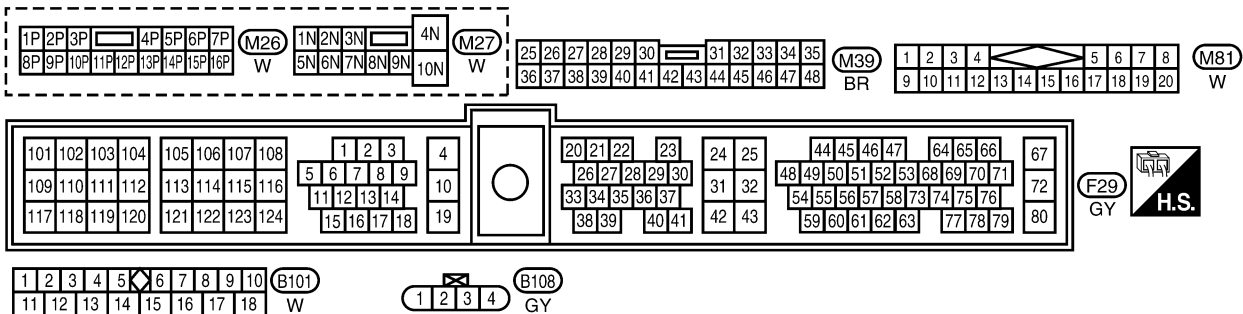
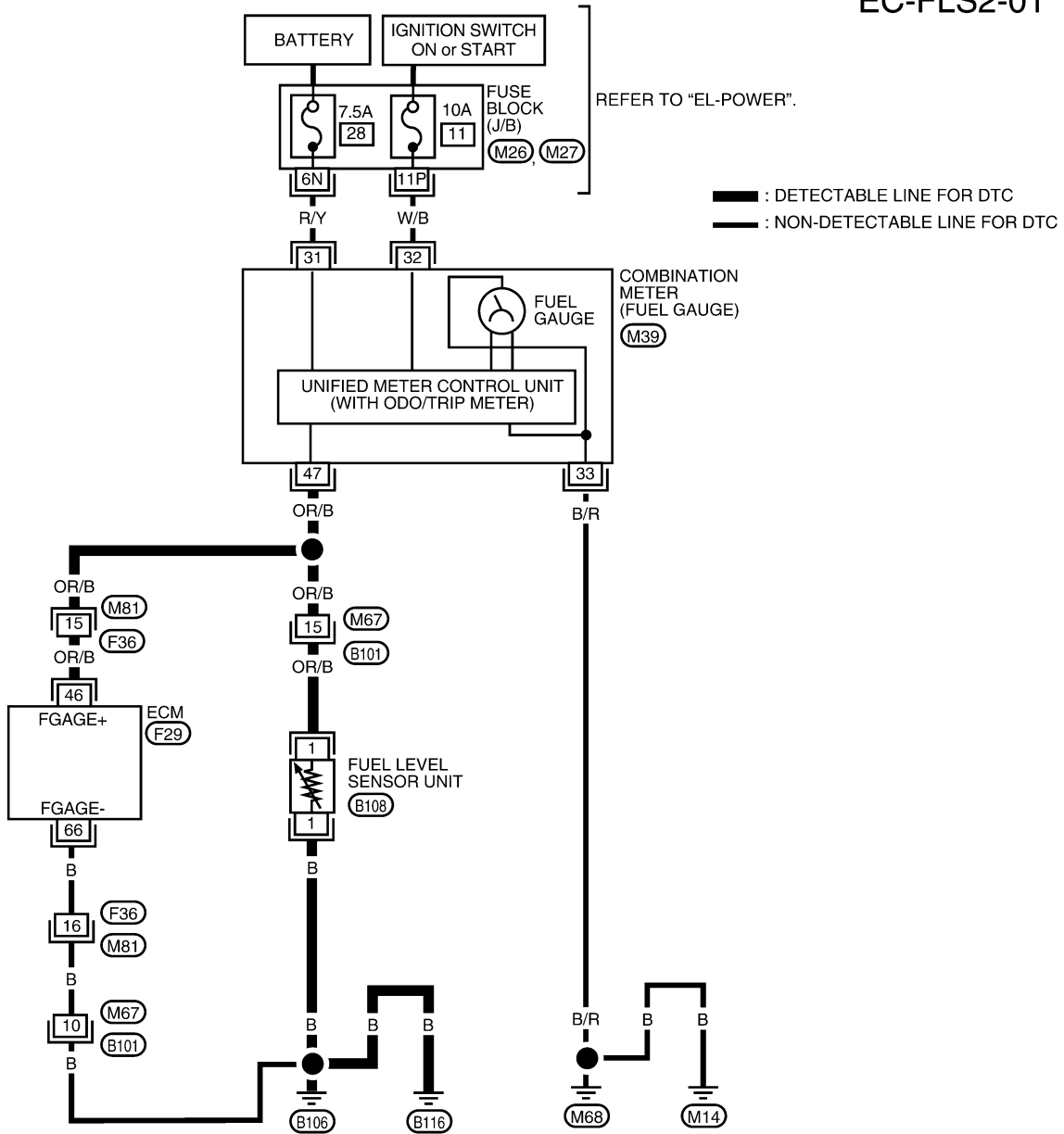
DTC P0462, P0463 FUEL LEVEL SENSOR

KA24DE
Wiring Diagram

Wiring Diagram

NGEC1026

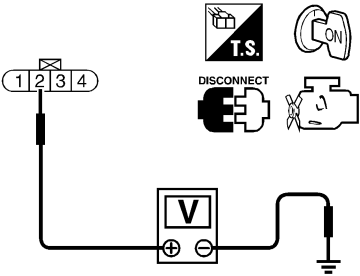
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Diagnostic Procedure

=NGEC1027

1	CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT	
<p>1. Turn ignition switch "OFF". 2. Disconnect fuel level sensor until harness connector. 3. Turn ignition switch "ON". 4. Check voltage between fuel level sensor unit terminal 2 and ground with CONSULT-II or tester.</p>		
		
SEF702ZA		
OK or NG		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M67, B101 ● Harness for open or short between combination meter and fuel level sensor until 		
▶ Repair or replace harness or connectors.		

3	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch "OFF". 2. Check harness continuity between fuel level sensor unit terminal 4 and body ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p>		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to power in harness or connectors.

4	CHECK FUEL LEVEL SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 46 and fuel level sensor unit terminal 2. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power.</p>		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

DTC P0462, P0463 FUEL LEVEL SENSOR

KA24DE

Diagnostic Procedure (Cont'd)

5	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Harness connectors M81, F36 ● Harness connectors M67, B101 ● Harness for open or short between ECM and fuel level sensor unit 		
▶		Repair open circuit or short to power in harness on connectors.

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6	CHECK FUEL LEVEL SENSOR	
Refer to EL-89 , "Fuel Level Sensor Unit Check".		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Replace fuel level sensor unit.

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7	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.		
▶		INSPECTION END

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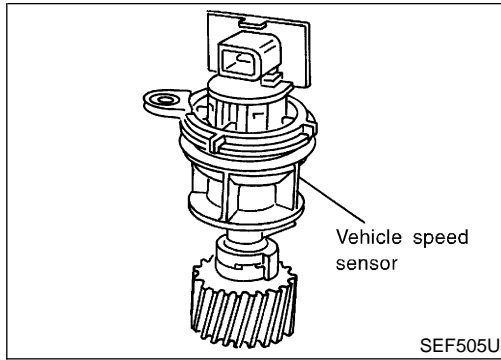
HA

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Component Description



Component Description

The vehicle speed sensor is installed in the transaxle. It contains a pulse generator which provides a vehicle speed signal to the speedometer. The speedometer then sends a signal to the ECM.

NGEC0272

ECM Terminals and Reference Value

NGEC0273

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

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	G/B	Vehicle speed sensor	<p>[Engine is running]</p> <ul style="list-style-type: none"> • Lift up the vehicle • In 2nd gear position • Vehicle speed is 40 km/h (25 MPH) 	<p>1 - 4V</p> <p>SEF003W</p>

On Board Diagnosis Logic

NGEC0274

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0500	<ul style="list-style-type: none"> • The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven. 	<ul style="list-style-type: none"> • Harness or connector (The vehicle speed sensor circuit is open or shorted.) • Vehicle speed sensor

DTC Confirmation Procedure

NGEC0275

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 5 seconds before conducting the next test.

TESTING CONDITION:

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

6

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

SEF196Y

With CONSULT-II

- 1) Start engine
- 2) Read vehicle speed sensor signal in "DATA MONITOR" mode with CONSULT-II. The vehicle speed on CONSULT-II should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
- 3) If NG, go to "Diagnostic Procedure", EC-433. If OK, go to following step.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Warm engine up to normal operating temperature.
- 6) Maintain the following conditions for at least 1 consecutive minute.

ENG SPEED	1,800 - 6,000 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	7 - 15msec
Selector lever	Suitable position
PW/ST SIGNAL	OFF

- 7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-433.

FUEL SYS #1	CLOSED
FUEL SYS #2	CLOSED
CALC LOAD	19%
COOLANT TEMP	93°C
SHORT FT #1	1%
LONG FT #1	0%
SHORT FT #2	3%
LONG FT #2	0%
ENGINE SPD	2037RPM
VEHICLE SPD	12MPH
IGN ADVANCE	38.0°
INTAKE AIR	43°C

SEF568P

Overall Function Check

Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a 1st trip DTC might not be confirmed.

With GST

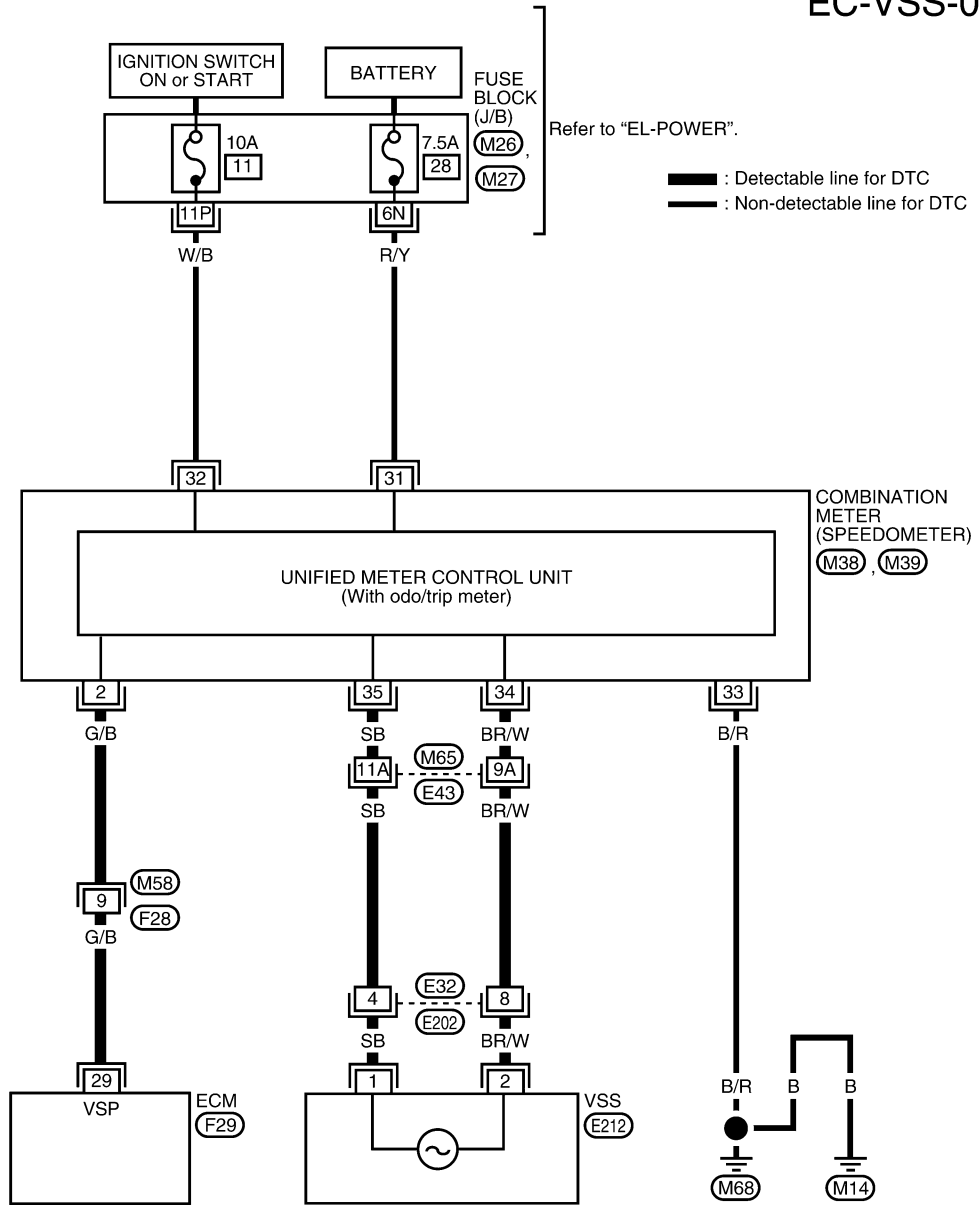
- 1) Lift up drive wheels.
- 2) Start engine.
- 3) Read vehicle speed sensor signal in "MODE 1" with GST. The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
- 4) If NG, go to "Diagnostic Procedure", EC-433.

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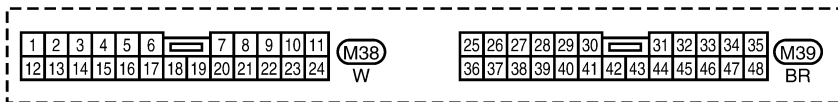
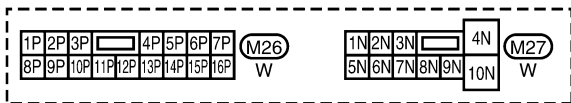
Wiring Diagram

NGEC0277

EC-VSS-01



Refer to "EL-POWER".
 — : Detectable line for DTC
 — : Non-detectable line for DTC



Refer to the following.
 (M65), (E43) - SUPER MULTIPLE JUNCTION (SMJ)
 (F29) - ELECTRICAL UNITS

Diagnostic Procedure

NGEC0278

1	CHECK INPUT SIGNAL CIRCUIT	
1. Turn ignition switch OFF. 2. Disconnect ECM harness connector and combination meter harness connector M38. 3. Check harness continuity between ECM terminal 29 and meter 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 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Harness connectors M58, F28 ● Harness for open or short between ECM and combination meter 		
		▶ Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK SPEEDOMETER FUNCTION	
Make sure that speedometer functions properly.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors E32, E202 ● Harness for open or short between combination meter and vehicle speed sensor 		
		▶ Repair harness or connectors. Check vehicle speed sensor and its circuit. Refer to EL-85 .

5	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.		
		▶ INSPECTION END

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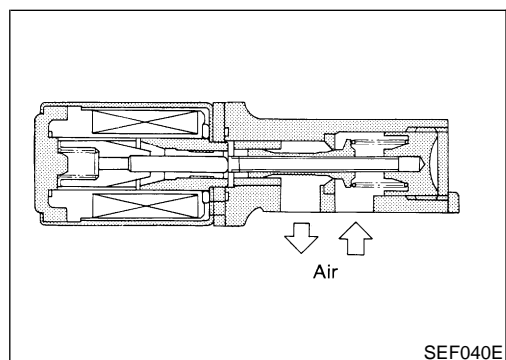
Description
SYSTEM DESCRIPTION

NGEC0279

NGEC0279S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Idle air control	IACV-AAC valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
PNP switch	Park/Neutral position		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Battery	Battery voltage		
Vehicle speed sensor	Vehicle speed		
Absolute pressure sensor	Ambient barometric pressure		
Intake air temperature sensor	Intake air temperature		

This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which bypasses the throttle valve via IACV-AAC valve. The IACV-AAC valve repeats ON/OFF operation according to the signal sent from the ECM. The camshaft position sensor detects the actual engine speed and sends a signal to the ECM. The ECM then controls the ON/OFF time of the IACV-AAC valve so that engine speed coincides with the target value memorized in ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warm up, deceleration, and engine load (air conditioner, power steering and cooling fan operation).



COMPONENT DESCRIPTION

NGEC0279S02

The IAC valve-AAC valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of air that will flow through the valve. The more air that flows through the valve, the higher the idle speed.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0280

MONITOR ITEM	CONDITION		SPECIFICATION
IACV-AAC/V	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle	Approx. 30%
		2,000 rpm	—

ECM Terminals and Reference Value

NGEC0281

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

CAUTION:

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

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	OR/L	IACV-AAC valve	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>10.5 - 11.5V</p> <p>SEF015W</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	<p>1 - 13V</p> <p>SEF016W</p>

On Board Diagnosis Logic

NGEC0282

DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P0505	A)	The IACV-AAC valve does not operate properly.	<ul style="list-style-type: none"> ● Harness or connectors (The IACV-AAC valve circuit is open.) ● IACV-AAC valve
	B)	The IACV-AAC valve does not operate properly.	<ul style="list-style-type: none"> ● Harness or connectors (The IACV-AAC valve circuit is shorted.) ● IACV-AAC valve

DTC Confirmation Procedure

=NGEC0283

NOTE:

- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.
- **Perform “Procedure for malfunction A” first. If DTC cannot be confirmed, perform “Procedure for malfunction B”.**

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

NGEC0283S01

TESTING CONDITION:

Before performing the following procedure, confirm 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) Start engine and run it at idle at least 2 seconds.
- 4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-438.

 **With GST**

Follow the procedure “With CONSULT-II”.

4	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C	

SEF174Y

PROCEDURE FOR MALFUNCTION B

NGEC0283S02

TESTING CONDITION:

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

 **With CONSULT-II**

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON again and select “DATA MONITOR” mode with CONSULT-II.
- 4) Start engine and run it for at least 6 minute at idle speed.
- 5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-438.

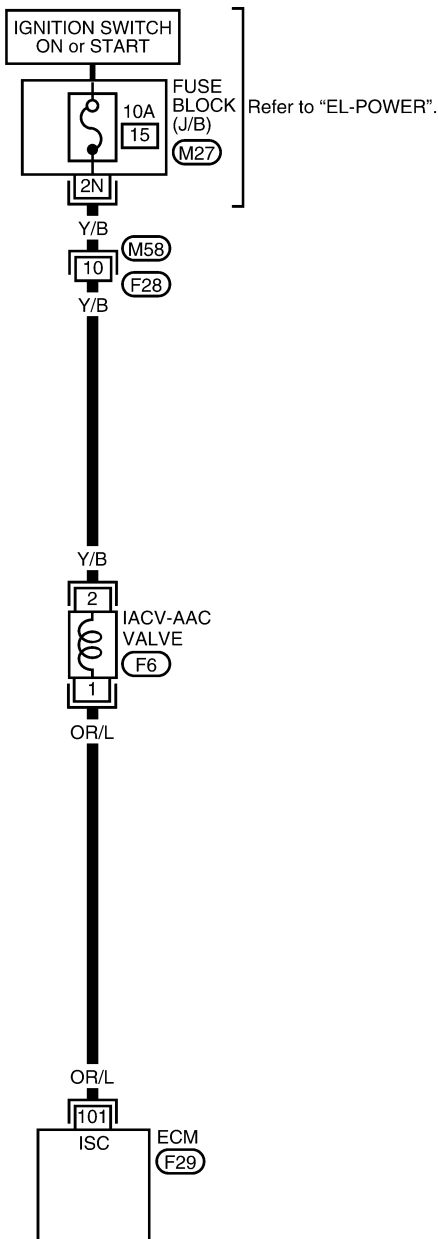
 **With GST**

Follow the procedure “With CONSULT-II”.

Wiring Diagram

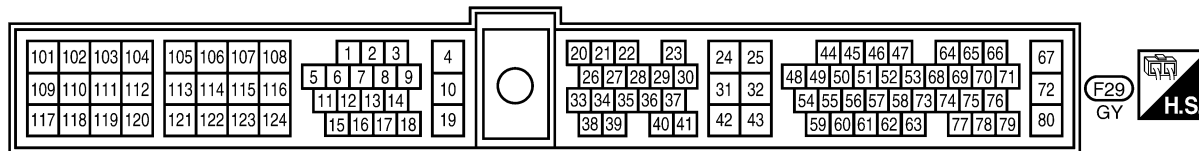
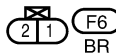
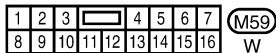
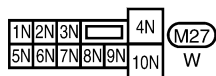
NGEC0284

EC-AAC/V-01



Refer to "EL-POWER".
— : Detectable line for DTC
— : Non-detectable line for DTC

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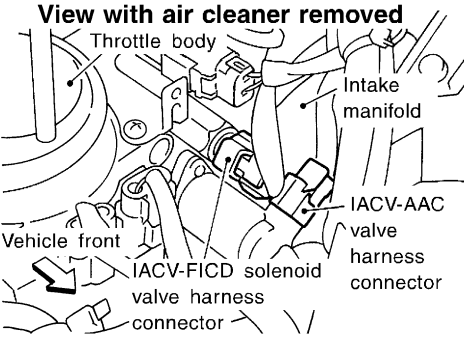
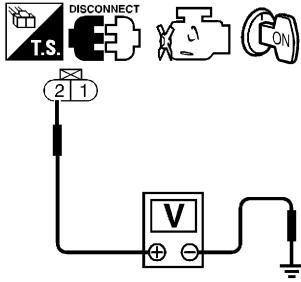


- RS
- BT
- HA
- SC
- EL
- IDX

LEC116A

Diagnostic Procedure

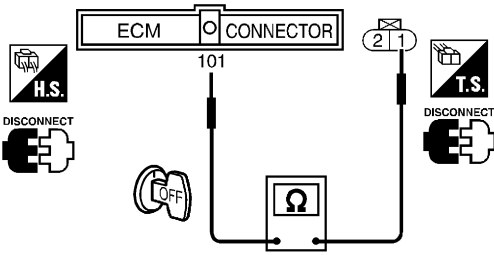
NGEC0285

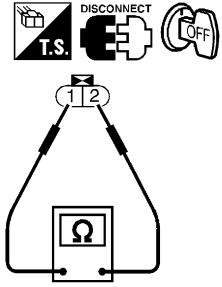
1	CHECK POWER SUPPLY		
<p>1. Stop engine. 2. Disconnect IACV-AAC valve harness connector.</p> <div style="text-align: center;"> <p>View with air cleaner removed</p>  </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 2 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p>Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>			
OK		▶	GO TO 3.
NG		▶	GO TO 2.

SEF342V

SEF247W

2	DETECT MALFUNCTIONING PART		
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M58, F28 ● Fuse block (J/B) connector M27 ● 10A fuse ● Harness for open or short between IACV-AAC valve and 10A fuse 			
		▶	Repair harness or connectors.

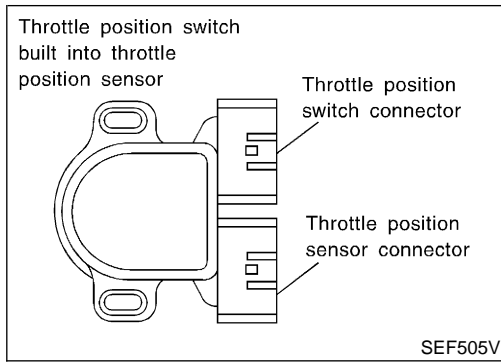
3	CHECK OUTPUT SIGNAL CIRCUIT	<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect ECM harness connector.</p> <p>3. Check harness continuity between ECM terminal 101 and terminal 1.</p>	
			
		SEF248W	
		<p>Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶	GO TO 4.	
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.	

4	CHECK IACV-AAC VALVE	<p>Disconnect IACV-AAC valve harness connector.</p> <ul style="list-style-type: none"> • Check IACV-AAC valve resistance. 	
			
		SEF249W	
		<p>Resistance: Approximately 10 Ω [at 25°C (77°F)]</p> <ul style="list-style-type: none"> • Check plunger for seizing or sticking. • Check for broken spring. <p style="text-align: center;">OK or NG</p>	
OK	▶	GO TO 5.	
NG	▶	Replace IACV-AAC valve.	

5	CHECK INTERMITTENT INCIDENT	<p>Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.</p>	
		▶	INSPECTION END

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Component Description



Component Description

NGEC0287

A closed throttle position switch and wide open throttle position switch are built into the throttle position sensor unit. The wide open throttle position switch is used only for A/T control.

When the throttle valve is in the closed position, the closed throttle position switch sends a voltage signal to the ECM. The ECM only uses this signal to open or close the EVAP canister purge control valve when the throttle position sensor is malfunctioning.

ECM Terminals and Reference Value

NGEC0288

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

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
28	BR/W	Throttle position switch (Closed position)	[Ignition switch ON] ● Warm-up condition ● Accelerator pedal released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch ON] ● Accelerator pedal depressed	Approximately 0V

On Board Diagnosis Logic

NGEC0289

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0510	<ul style="list-style-type: none"> Battery voltage from the closed throttle position switch is sent to ECM with the throttle valve opened. 	<ul style="list-style-type: none"> Harness or connectors (The closed throttle position switch circuit is shorted.) Closed throttle position switch Throttle position sensor

=NGEC0290

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
CLSD THL/P SW	ON

SEF197Y

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
THRTL POS SEN	XXX V

SEF198Y

DTC Confirmation Procedure

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 5 seconds before conducting the next test.

With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Select "CLSD THL/P SW" in "DATA MONITOR" mode with CONSULT-II and check the value under the following conditions.

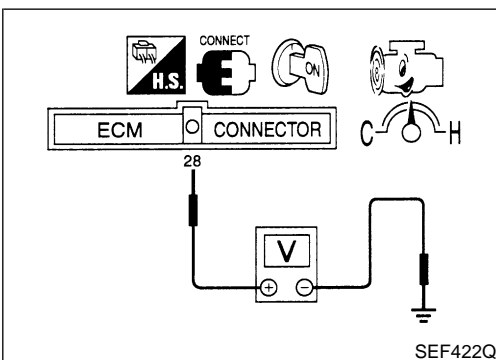
Condition	Signal indication
Throttle valve: Idle position	ON
Throttle valve: Slightly open	OFF

If the result is NG, go to "Diagnostic Procedure", EC-443.
If OK, go to following step.

- 3) Select "DATA MONITOR" mode with CONSULT-II.
- 4) Drive the vehicle for at least 5 consecutive seconds under the following condition.

THRTL POS SEN	More than 2.5V
VHCL SPEED SE	More than 4 km/h (2 MPH)
Selector lever	Suitable position
Driving pattern	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-443.



Overall Function Check

Use this procedure to check the overall function of the closed throttle position switch circuit. During this check, a 1st trip DTC might not be confirmed.

Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Check the voltage between ECM terminal 28 (Closed throttle position switch signal) and ground under the following conditions.

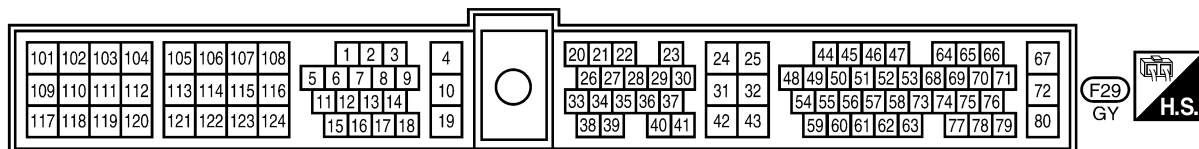
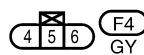
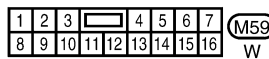
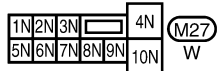
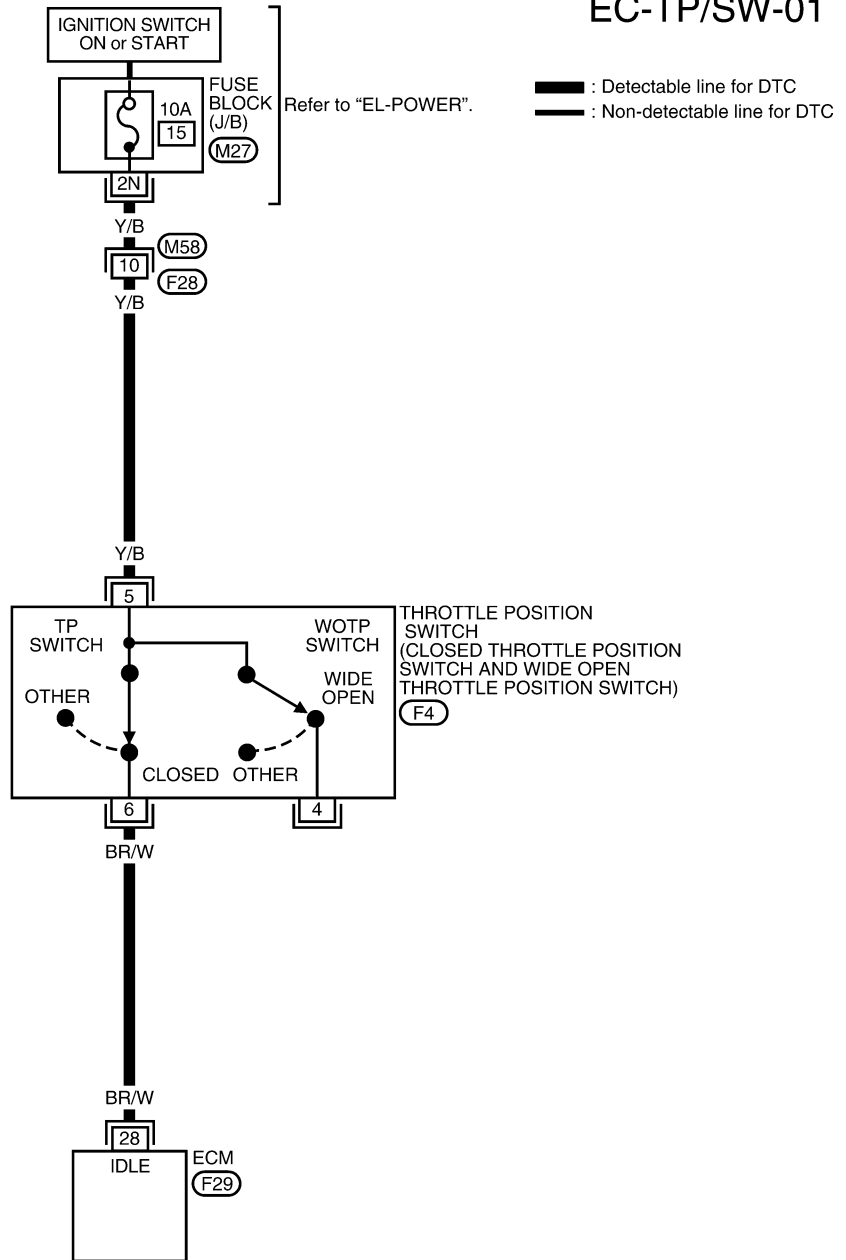
Condition	Voltage
At idle	Battery voltage
At 2,000 rpm	Approximately 0 - 1V

- 3) If NG, go to "Diagnostic Procedure", EC-443.

Wiring Diagram

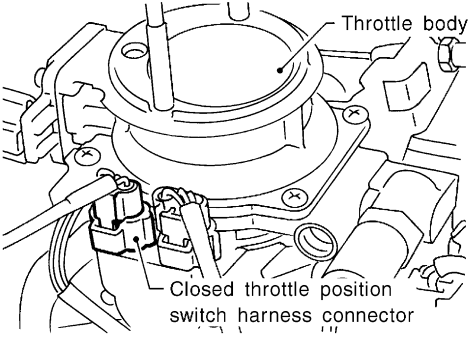
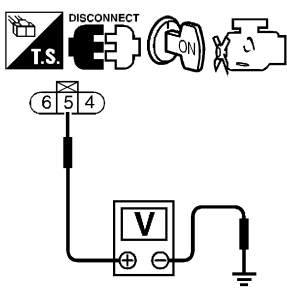
NGEC0292

EC-TP/SW-01



Diagnostic Procedure

NGENC0293

1	CHECK POWER SUPPLY		
		<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect throttle position switch harness connector. <div style="text-align: center;">  <p>Throttle body</p> <p>Closed throttle position switch harness connector</p> </div> <ol style="list-style-type: none"> 3. Turn ignition switch ON. 4. Check voltage between terminal 5 and engine ground with CONSULT-II or tester. <div style="text-align: center;">  <p>DISCONNECT T.S.</p> <p>ON</p> <p>6 5 4</p> <p>V</p> <p>+</p> <p>-</p> </div> <p style="text-align: right;">SEF158S</p> <p style="text-align: right;">SEF250W</p> <p>Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	GI MA EM LC EC FE CL MT AT TF PD
	OK	▶	GO TO 3.
	NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART		
		Check the following. <ul style="list-style-type: none"> ● Harness connectors M58, F28 ● Fuse block (J/B) connector M27 ● 10A fuse ● Harness for open or short between throttle position switch and 10A fuse 	SU BR ST RS BT HA SC EL IDX
		▶	Repair harness or connectors.

3	CHECK INPUT SIGNAL CIRCUIT
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 28 and terminal 6. 	
AEC571A	
<p style="color: blue; margin: 0;">Continuity should exist.</p> <ol style="list-style-type: none"> 4. Also check harness for short to ground and short to power. <p style="text-align: center; margin: 0;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

4	DETECT MALFUNCTIONING PART
Check the harness for open or short between throttle position switch and ECM.	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	ADJUST THROTTLE POSITION SWITCH IDLE POSITION										
1. Check the following items. Refer to "Basic Inspection", EC-112.											
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Items</th> <th style="text-align: center;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>20° ± 2° BTDC</td> </tr> <tr> <td>Base idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>800 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table>	Items	Specifications	Ignition timing	20° ± 2° BTDC	Base idle speed	750 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF	Target idle speed	800 ± 50 rpm (in "P" or "N" position)	MTBL0328
Items	Specifications										
Ignition timing	20° ± 2° BTDC										
Base idle speed	750 ± 50 rpm (in "P" or "N" position)										
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF										
Target idle speed	800 ± 50 rpm (in "P" or "N" position)										
▶	GO TO 6.										

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6 CHECK CLOSED THROTTLE POSITION SWITCH

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and turn ignition switch ON.
3. Select "DATA MONITOR" mode with CONSULT-II.
4. Check indication of "CLSD THL/P SW" under the following conditions.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
CLSD THL/P SW	ON

Throttle valve conditions	CLSD THL/P SW
Completely closed	ON
Partially open or completely open	OFF

SEF721Z

NOTE:

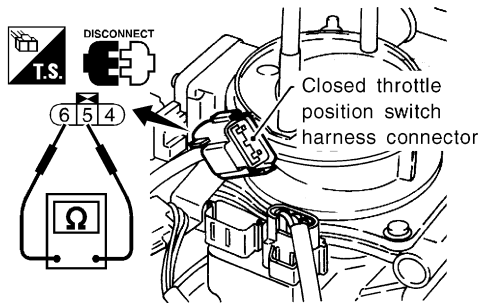
Measurement must be made with closed throttle position switch installed in vehicle.

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-112.

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

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect throttle position switch harness connector.
4. Check continuity between terminals 5 and 6 under the following conditions.



SEF159S

Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No

MTBL0299

NOTE:

Continuity measurement must be made with closed throttle position switch installed in vehicle.

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-112.

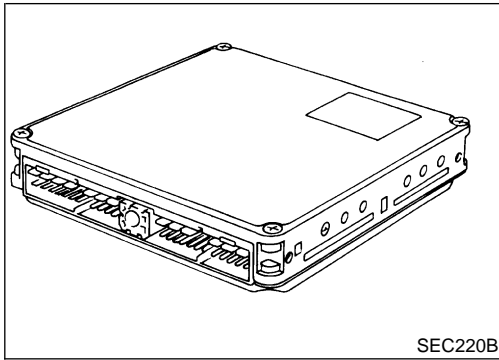
5. If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace closed throttle position switch.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace throttle position switch.

7	CHECK THROTTLE POSITION SENSOR										
<p>④ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine and turn ignition switch ON. 3. Select "DATA MONITOR" mode with CONSULT-II. 4. Check voltage of "THRTL POS SEN" under the following conditions. <div style="text-align: center; margin: 10px 0;"> <table border="1" style="border-collapse: collapse; width: 150px;"> <thead> <tr> <th colspan="2" style="text-align: center;">DATA MONITOR</th> </tr> <tr> <th style="text-align: left;">MONITOR</th> <th style="text-align: left;">NO DTC</th> </tr> </thead> <tbody> <tr> <td>COOLAN TEMP/S</td> <td>XXX °C</td> </tr> <tr> <td>VHCL SPEED SE</td> <td>XXX km/h</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> </tbody> </table> </div> <p style="text-align: right; margin-right: 20px;">SEF198Y</p> <p>NOTE: Voltage measurement must be made with throttle position sensor installed in vehicle. If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-112.</p> <ol style="list-style-type: none"> 5. If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace throttle position sensor. 		DATA MONITOR		MONITOR	NO DTC	COOLAN TEMP/S	XXX °C	VHCL SPEED SE	XXX km/h	THRTL POS SEN	XXX V
DATA MONITOR											
MONITOR	NO DTC										
COOLAN TEMP/S	XXX °C										
VHCL SPEED SE	XXX km/h										
THRTL POS SEN	XXX V										
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine and turn ignition switch ON. 3. Check voltage between ECM terminal 23 (Throttle position sensor signal) and ground under the following conditions. <div style="text-align: center; margin: 10px 0;"> </div> <p style="text-align: right; margin-right: 20px;">SEF767W</p> <table border="1" style="border-collapse: collapse; width: 100%; margin: 10px 0;"> <thead> <tr> <th style="text-align: center;">Throttle valve conditions</th> <th style="text-align: center;">Voltage V</th> </tr> </thead> <tbody> <tr> <td>Completely closed</td> <td style="text-align: center;">0.15 - 0.85 (a)</td> </tr> <tr> <td>Partially open</td> <td style="text-align: center;">Between (a) and (b)</td> </tr> <tr> <td>Completely open</td> <td style="text-align: center;">3.5 - 4.7 (b)</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">MTBL0329</p> <p>NOTE: Voltage measurement must be made with throttle position sensor installed in vehicle. If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-112.</p> <ol style="list-style-type: none"> 4. If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace throttle position sensor. <p style="text-align: center; margin: 10px 0;">OK or NG</p>		Throttle valve conditions	Voltage V	Completely closed	0.15 - 0.85 (a)	Partially open	Between (a) and (b)	Completely open	3.5 - 4.7 (b)		
Throttle valve conditions	Voltage V										
Completely closed	0.15 - 0.85 (a)										
Partially open	Between (a) and (b)										
Completely open	3.5 - 4.7 (b)										
OK	▶ GO TO 8.										
NG	▶ Replace throttle position sensor.										

8	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.	
▶	INSPECTION END



Component Description

The ECM consists of a microcomputer along with connectors for signal input and output and for power supply. The ECM controls the engine.

NGEC0295

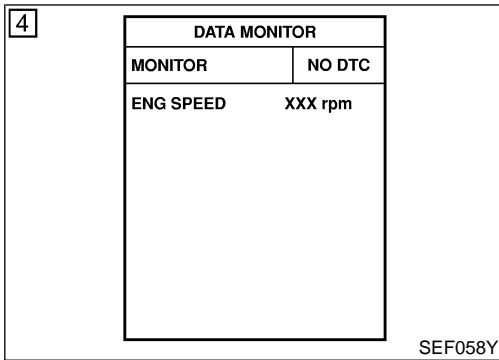
GI
MA
EM
LC

On Board Diagnosis Logic

NGEC0296

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0605	<ul style="list-style-type: none"> ECM calculation function is malfunctioning. 	<ul style="list-style-type: none"> ECM

EC
FE
CL



DTC Confirmation Procedure

NGEC0297

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 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.
- 4) Run engine for at least 30 seconds at idle speed.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-448.

AT
TF
PD
AX
SU

With GST

Follow the procedure "With CONSULT-II".



BR
ST
RS

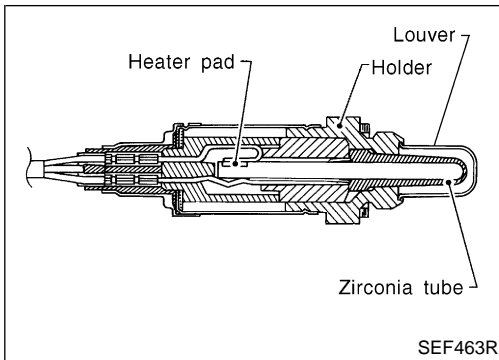
BT
HA
SC
EL

IDX

Diagnostic Procedure

NGEC0298

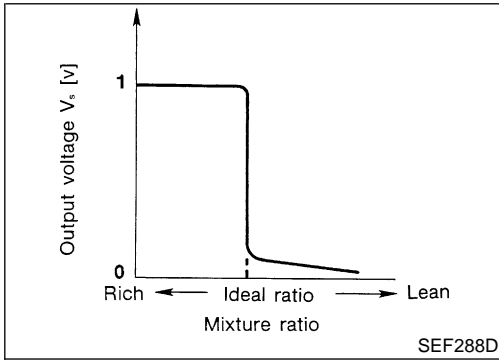
1	INSPECTION START	
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select "SELF DIAG RESULTS" mode with CONSULT-II. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure". See previous page. 5. Is the 1st trip DTC P0605 displayed again? 		
<p> With GST</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select MODE 4 with GST. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure". See previous page. 5. Is the 1st trip DTC P0605 displayed again? 		
Yes or No		
Yes	▶	Replace ECM.
No	▶	INSPECTION END



Component Description

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

NGEC0103



CONSULT-II Reference Value in Data Monitor Mode

NGEC0104

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	<ul style="list-style-type: none"> Engine: After warming up 	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NGEC0105

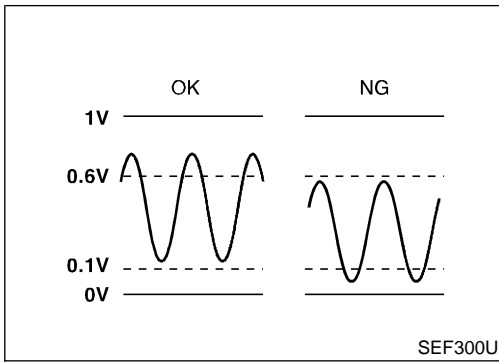
Specification data are reference values and are measured between each terminal and ground.

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	B	Heated oxygen sensor 1	<p>[Engine is running]</p> <ul style="list-style-type: none"> After warming up to normal operating temperature and engine speed is 2,000 rpm 	<p>0 - Approximately 1.0V</p>

GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX



On Board Diagnosis Logic

NGEC0106

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

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1143	<ul style="list-style-type: none"> The maximum and minimum voltages from the sensor are not reached to the specified voltages. 	<ul style="list-style-type: none"> Heated oxygen sensor 1 Heated oxygen sensor 1 heater Fuel pressure Injectors Intake air leaks

6	HO2S1 (B1) P1143	
	OUT OF CONDITION	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	THRTL POS SEN	XXX V
	SEC767C	

DTC Confirmation Procedure

NGEC0107

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 5 seconds before conducting the next test.

TESTING CONDITION:

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

6	HO2S1 (B1) P1143	
	TESTING	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	THRTL POS SEN	XXX V
	SEC768C	

- With CONSULT-II**
- Start engine and warm it up to normal operating temperature.
 - Stop engine and wait at least 5 seconds.
 - Turn ignition switch ON and select “HO2S1 (B1) P1143” in “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
 - Touch “START”.
 - Start engine and let it idle for at least 3.0 minutes.

NOTE:
Never raise engine speed above 3,000 rpm after this step. If the engine speed limit is exceeded, return to step 5.

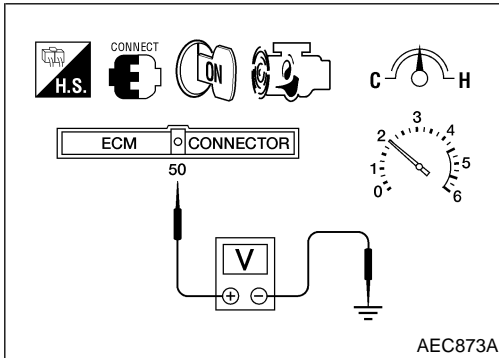
6	HO2S1 (B1) P1143	
	COMPLETED	
SEC769C		

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

ENG SPEED	1,200 - 3,150 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	3.5 - 15 msec
Selector lever	Suitable position

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

- 7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-451.



Overall Function Check

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

Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 (Heated oxygen sensor 1 signal) and engine ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - The maximum voltage is over 0.6V at least one time.
 - The minimum voltage is over 0.1V at least one time.
- 4) If NG, go to "Diagnostic Procedure", EC-451.

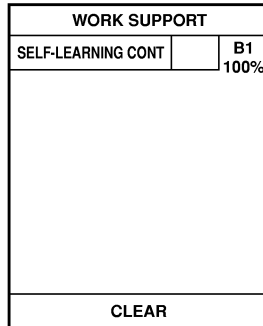
Diagnostic Procedure

1	RETIGHTEN HEATED OXYGEN SENSOR 1
<p>1. Turn ignition switch OFF. 2. Loosen and retighten heated oxygen sensor 1.</p> <div style="text-align: center;"> </div> <p>Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)</p>	
▶	GO TO 2.

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".

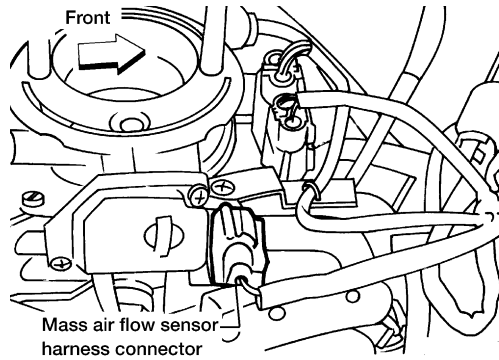


SEF215Z

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

ⓧ 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 3 seconds at idle speed.



AEC131A

4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0102 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-86.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.

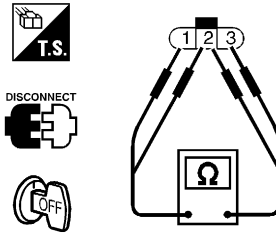
Is the 1st trip DTC P0171 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171. Refer to EC-255.
No	▶	GO TO 3.

3 CHECK HEATED OXYGEN SENSOR 1 HEATER

Check resistance between terminals 3 and 1.



SEF220W

Resistance: 2.3 - 4.3 Ω at 25°C (77°F)

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

Continuity should not exist.

CAUTION:

Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK (With CONSULT-II) ▶	GO TO 4.
OK (Without CONSULT-II) ▶	GO TO 5.
NG ▶	Replace heated oxygen sensor 1.

GI
MA
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4 CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Reconnect all harness connectors.
2. Start engine and warm it up to normal operating temperature.
3. Select "MANU TRIG" in "DATA MONITOR" mode, and the trigger point is adjusted to 100%.
4. Select "HO2S1 (B1)" AND "HO2S1 MNTR (B1)" in Item Selection.
5. Hold engine speed at 2,000 rpm under no load during the following steps.
6. Touch "START" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

7. Check the following.
 - "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below:

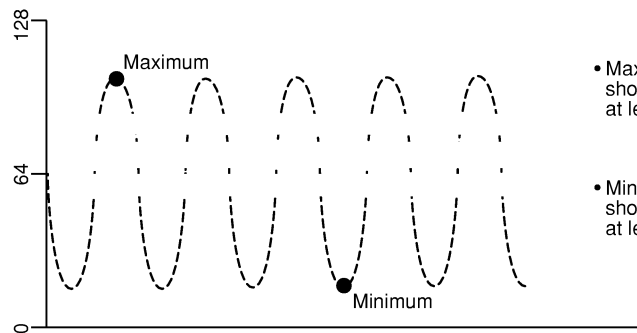
cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

R means HO2S1 MNTR (B1) indicates RICH
 L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

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

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



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

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

OK or NG

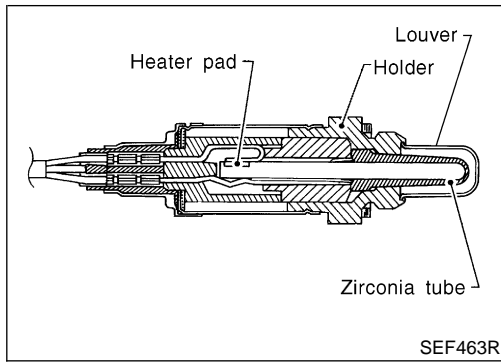
OK	▶	GO TO 6.
NG	▶	Replace heated oxygen sensor 1.

GI
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HA
SC
EL
IDX

5	CHECK HEATED OXYGEN SENSOR 1	
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Reconnect all harness connectors. 2. Start engine and warm it up to normal operating temperature. 3. Set voltmeter probes between ECM terminal 50 (Heated oxygen sensor 1 signal) and engine ground. 		
AEC873A		
<ol style="list-style-type: none"> 4. Check the following with engine speed held at 2,000 rpm constant under no load. <ul style="list-style-type: none"> ● The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five times within 10 seconds. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V ● The maximum voltage is over 0.6V at least one time. ● The minimum voltage is below 0.3V at least one time. ● The voltage never exceeds 1.0V. <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	Replace heated oxygen sensor 1.

6	CHECK INTERMITTENT INCIDENT
<p>Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150. Refer to "Wiring Diagram", EC-233, for circuit.</p>	
<p style="text-align: right;">▶ INSPECTION END</p>	

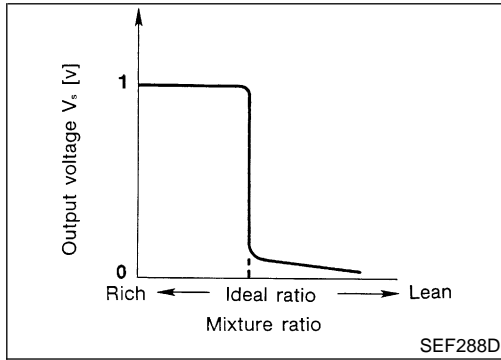
Component Description



Component Description

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

NGEC0111



CONSULT-II Reference Value in Data Monitor Mode

NGEC0112

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	<ul style="list-style-type: none"> Engine: After warming up 	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

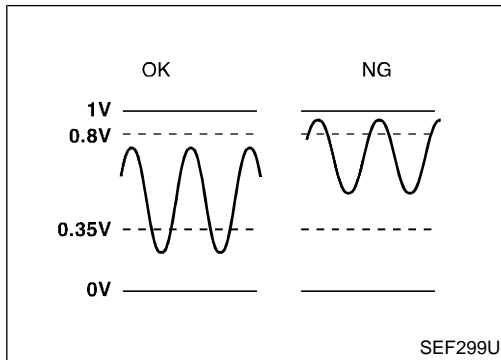
NGEC0113

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

CAUTION:

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

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1	<p>[Engine is running]</p> <ul style="list-style-type: none"> After warming up to normal operating temperature and engine speed is 2,000 rpm 	<p>0 - Approximately 1.0V</p> <p>SEF008W</p>

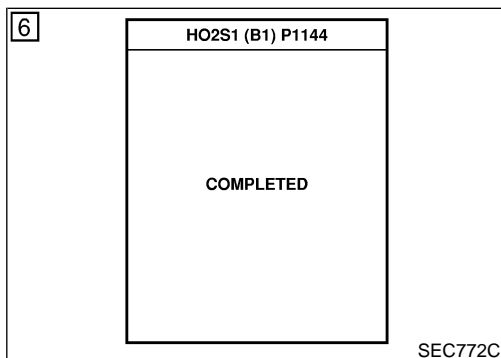
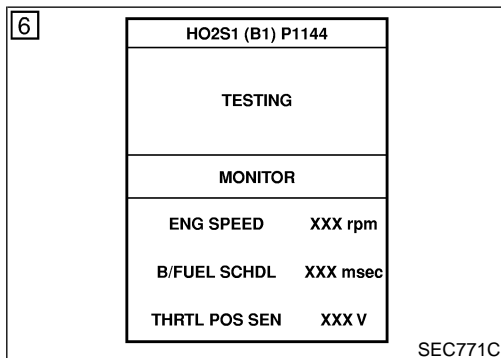
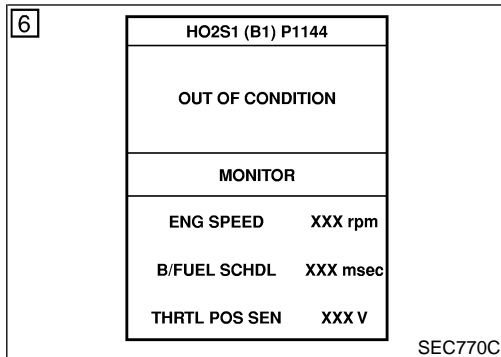


On Board Diagnosis Logic

NGEC0114

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

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1144	<ul style="list-style-type: none"> The maximum and minimum voltages from the sensor are beyond the specified voltages. 	<ul style="list-style-type: none"> Heated oxygen sensor 1 Heated oxygen sensor 1 heater Fuel pressure Injectors



DTC Confirmation Procedure

NGEC0115

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 5 seconds before conducting the next test.

TESTING CONDITION:

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

- Ⓜ With CONSULT-II
- Start engine and warm it up to normal operating temperature.
 - Stop engine and wait at least 5 seconds.
 - Turn ignition switch ON and select “HO2S1 P1144” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
 - Touch “START”.
 - Start engine and let it idle for at least 3.0 minutes.

NOTE:
Never raise engine speed above 3,000 rpm after this step. If the engine speed limit is exceeded, return to step 5.

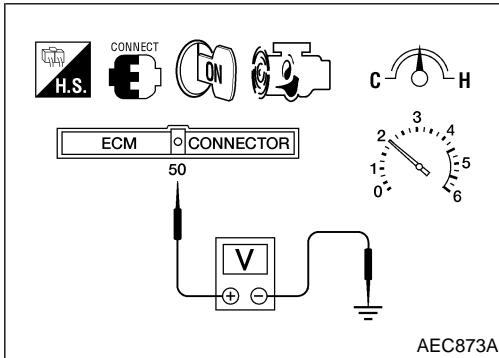
6) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)

ENG SPEED	1,200 - 3,150 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	3.5 - 15 msec
Selector lever	Suitable position

GI
MA
EM
LC
EC
FE
CL
MT
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EL
IDX

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

- 7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-458.



Overall Function Check

NGEC0116

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

Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 (Heated oxygen sensor 1 signal) and engine ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - The maximum voltage is below 0.8V at least one time.
 - The minimum voltage is below 0.35V at least one time.
- 4) If NG, go to "Diagnostic Procedure", EC-458.

Diagnostic Procedure

NGEC0117

1	RETIGHTEN HEATED OXYGEN SENSOR 1
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Loosen and retighten heated oxygen sensor 1. 	
<p>Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)</p>	
▶	GO TO 2.

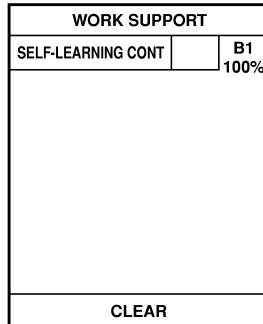
SEF332VB

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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".

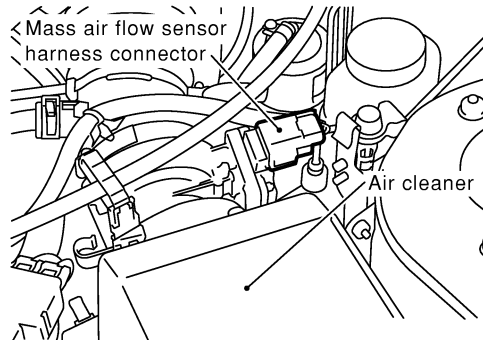


SEF215Z

4. Run engine for at least 10 minutes at idle speed.
Is the 1st trip DTC P0172 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 3 seconds at idle speed.



SEF293W

4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0102 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-86.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

Yes or No

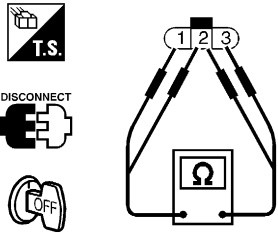
Yes	▶	Perform trouble diagnosis for DTC P0172. Refer to EC-262.
No	▶	GO TO 3.

3 CHECK HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Check harness connector for water.
Water should not exit.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace harness connector.

4	CHECK HEATED OXYGEN SENSOR 1 HEATER	
<p>Check resistance between terminals 3 and 1.</p> <div style="text-align: center;">  </div>		
SEF220W		
<p>Resistance: 2.3 - 4.3 Ω at 25°C (77°F)</p> <p>Check continuity between terminals 2 and 1, 3 and 2.</p> <p>Continuity should not exist.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Replace heated oxygen sensor 1.

5 CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Reconnect all harness connectors.
2. Start engine and warm it up to normal operating temperature.
3. Select "MANU TRIG" in "DATA MONITOR" mode, and the trigger point is adjusted to 100%.
4. Select "HO2S1 (B1)" and "HO2S1 MNTR (B1)" in item selection.
5. Hold engine speed at 2,000 rpm under no load during the following steps.
6. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

7. Check the following.

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

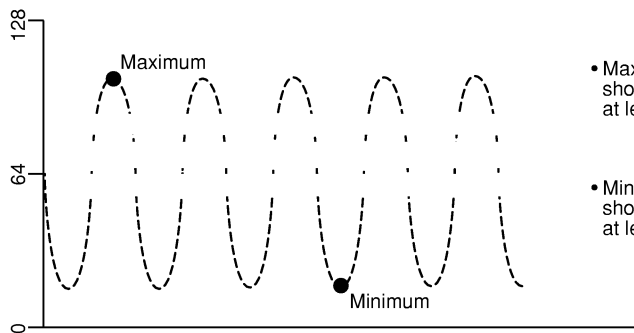
cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

R means HO2S1 MNTR (B1) indicates RICH
 L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

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

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



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

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

OK or NG

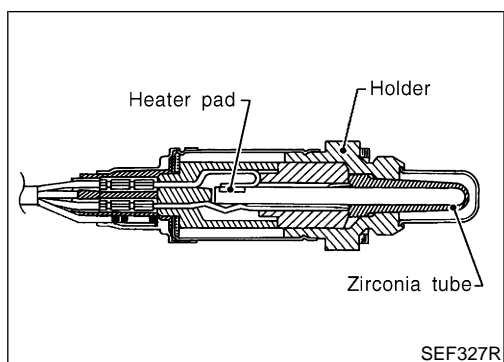
OK	▶	GO TO 7.
NG	▶	Replace heated oxygen sensor 1.

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6	CHECK HEATED OXYGEN SENSOR 1						
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Reconnect all harness connectors. 2. Start engine and warm it up to normal operating temperature. 3. Set voltmeter probes between ECM terminal 50 (Heated oxygen sensor 1 signal) and engine ground. <div style="text-align: center; margin: 10px 0;"> </div> <ol style="list-style-type: none"> 4. Check the following with engine speed held at 2,000 rpm constant under no load. <ul style="list-style-type: none"> ● The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five times within 10 seconds. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V ● The maximum voltage is over 0.6V at least one time. ● The minimum voltage is below 0.3V at least one time. ● The voltage never exceeds 1.0V. <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 7.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace heated oxygen sensor 1.</td> </tr> </table>		OK	▶	GO TO 7.	NG	▶	Replace heated oxygen sensor 1.
OK	▶	GO TO 7.					
NG	▶	Replace heated oxygen sensor 1.					

AEC873A

7	CHECK INTERMITTENT INCIDENT
<p>Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150. Refer to "Wiring Diagram", EC-233, for circuit.</p>	
<p>▶ INSPECTION END</p>	



Component Description

NGEC0144

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

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

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0145

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1)	<ul style="list-style-type: none"> Engine: After warming up Revving engine from idle to 3,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)		LEAN ↔ RICH

ECM Terminals and Reference Value

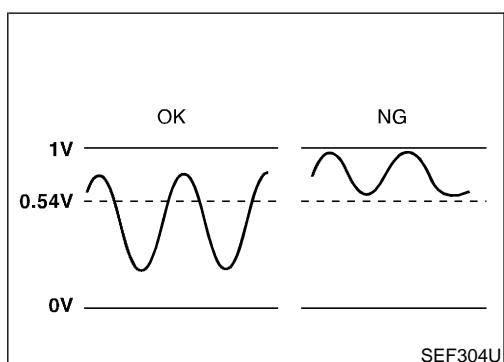
NGEC0146

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

CAUTION:

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

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2	[Engine is running] <ul style="list-style-type: none"> After warming up to normal operating temperature and revving engine from idle to 3,000 rpm quickly 	0 - Approximately 1.0V



On Board Diagnosis Logic

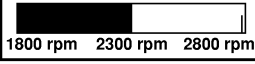
NGEC0147

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

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1146	<ul style="list-style-type: none"> The minimum voltage from the sensor does not reach the specified voltage. 	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open or shorted.) Heated oxygen sensor 2 Fuel pressure Injectors

6	HO2S2 (B1) P1146
	<p>WAIT OPEN ENGINE HOOD. KEEP ENGINE RUNNING AT IDLE SPEED FOR MAXIMUM OF 5 MINUTES.</p>

SEC773C

8	HO2S2 (B1) P1146
	<p>MAINTAIN 1800 - 2800 RPM UNTIL FINAL RESULT APPEARS.</p>
	 <p>1800 rpm 2300 rpm 2800 rpm</p>

SEC774C

8	HO2S2 (B1) P1146
	<p>COMPLETED</p>
	<p>SELF-DIAG RESULTS</p>

SEC775C

DTC Confirmation Procedure

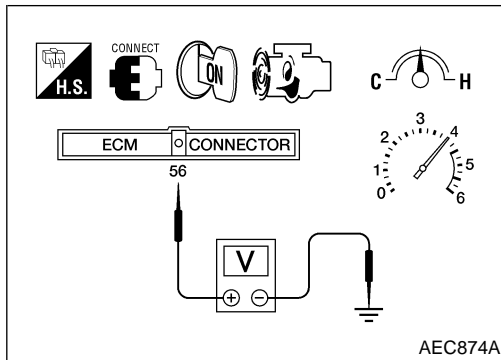
NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Open engine hood before conducting following procedure With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Make sure the "COOLANT TEMP/S" is more then 70°C (158°F).
- 6) Select "HO2S2 (B1) P1146", of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 7) Start engine and follow the instructions of CONSULT-II.
- 8) Make sure the "OK" is displayed after touching "SELF-DIAG RESULTS".
 - If NG is displayed, refer to "Diagnostic Procedure", EC-467.
 - If "CAN NOT BE DIAGNOSED" is displayed, perform the following.
 - a) Stop engine and cool down "COOLANT TEMP/S" to less then 70°C (158°F).
 - b) Turn ignition switch ON.
 - c) Select "DATA MONITOR" mode with CONSULT-II.
 - d) Start engine.
 - e) Perform from step 6) again when the "COOLANT TEMP/S" reach to 70°C (158°F).



Overall Function Check

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. =NGEC0149

CAUTION:

Always drive vehicle at a safe speed.

⊗ Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminals 56 (Heated oxygen sensor 2 signal) and engine ground.
- 4) Check the voltage when revving engine up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should be below 0.54V at least once during this procedure.
If the voltage can be confirmed in step 4, step 5 is not necessary.
- 5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position.
The voltage should be below 0.54V at least once during this procedure.
- 6) If NG, go to "Diagnostic Procedure", EC-467.

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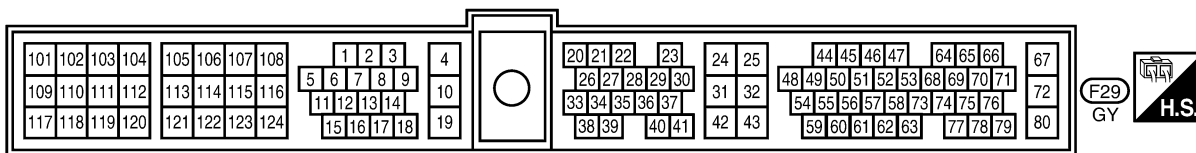
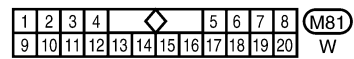
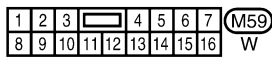
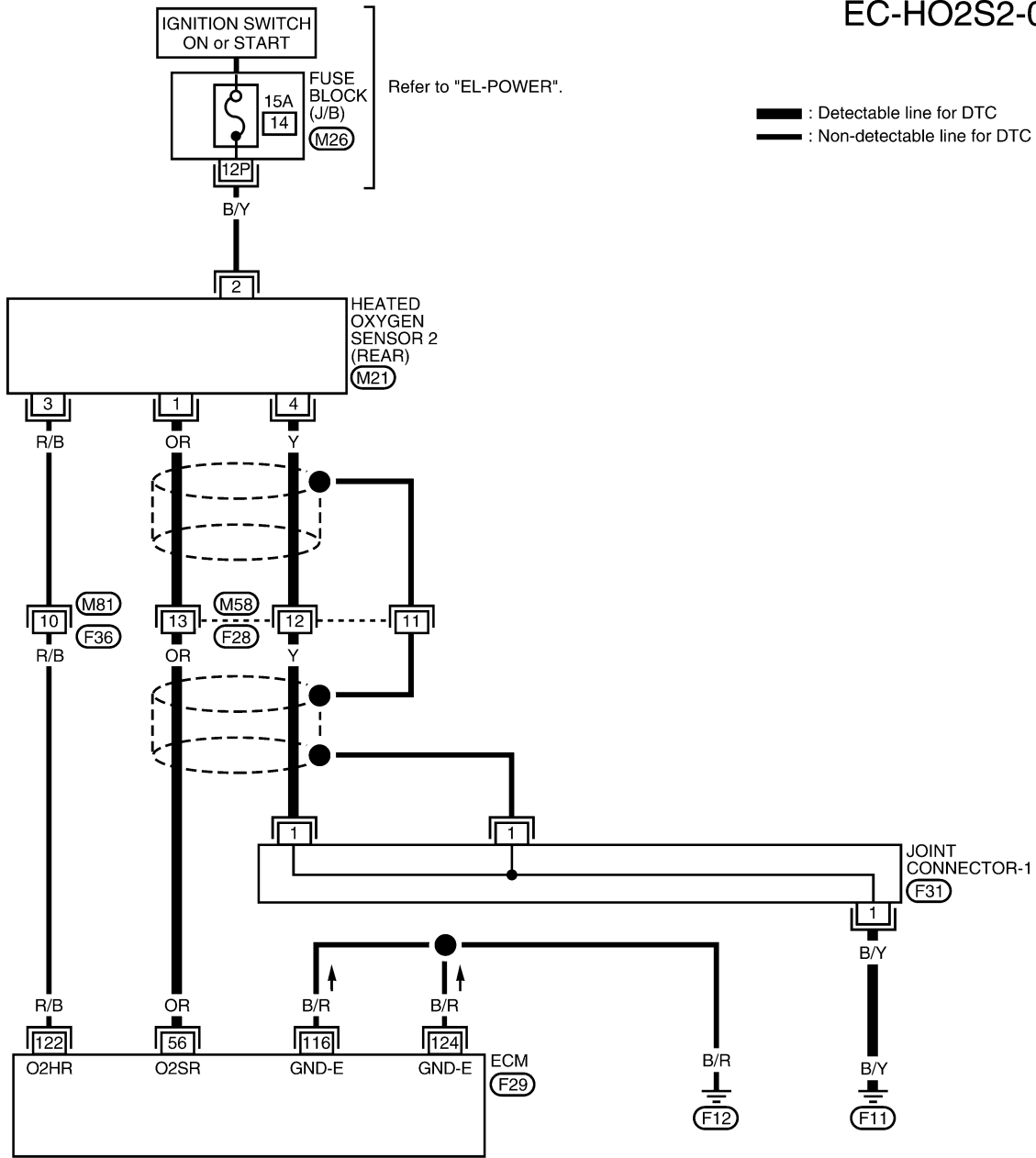
EL

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Wiring Diagram

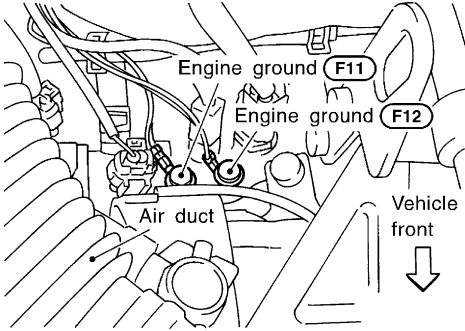
NGEC0150

EC-HO2S2-01



Diagnostic Procedure

NGEC0151

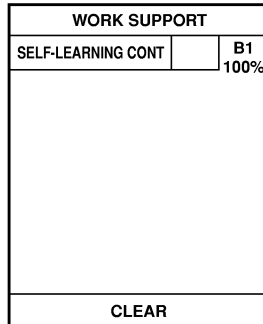
1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p>	
 <p>The diagram shows a top-down view of the engine compartment. Two engine ground screws are labeled 'Engine ground F11' and 'Engine ground F12'. An 'Air duct' is also shown. A downward arrow indicates the 'Vehicle front' direction.</p>	
SEF325V	
▶	GO TO 2.

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- EL
- IDX

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".

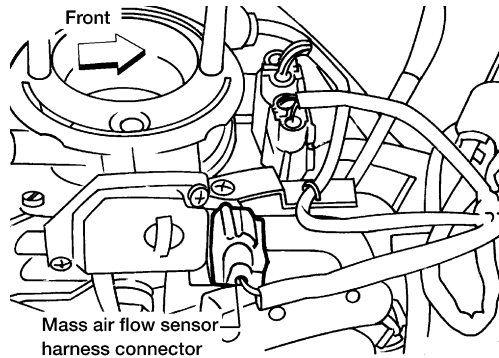


SEF215Z

4. Run engine for at least 10 minutes at idle speed.
Is the 1st trip DTC P0172 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 3 seconds at idle speed.



AEC131A

4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0102 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-86.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0172. Refer to EC-262.
No	▶	GO TO 3.

3	CHECK INPUT SIGNAL CIRCUIT
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect heated oxygen sensor 2 harness connector and ECM harness connector.</p> <p>3. Check harness continuity between ECM terminal 56 and terminal 1.</p>	
SEF157V	
<p>Continuity should exist.</p> <p>4. Check harness continuity between ECM terminal 56 (or terminal 1) and ground.</p> <p>Continuity should not exist.</p> <p>5. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

4	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M58, F28 ● Harness for open or short between heated oxygen sensor 2 and ECM 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK GROUND CIRCUIT
<p>1. Check harness continuity between heated oxygen sensor 2 terminal 4 and engine ground. Refer to Wiring Diagram.</p> <p>Continuity should exist.</p> <p>2. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK (With CONSULT-II)	▶ GO TO 7.
OK (Without CONSULT-II)	▶ GO TO 8.
NG	▶ GO TO 6.

6	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M58, F28 ● Joint connector-1 ● Harness for open or short between heated oxygen sensor 2 and engine ground 	
▶	Repair open circuit or short to power in harness or connectors.

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7 CHECK HEATED OXYGEN SENSOR 2

With CONSULT-II

1. Reconnect all harness connectors.
2. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
3. Stop vehicle with engine running.
4. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-II.
5. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.

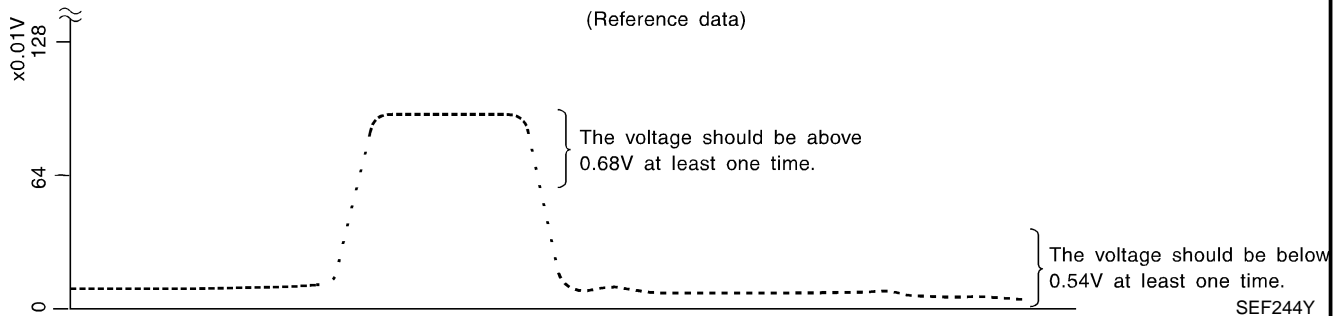
ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

"HO2S2 (B1)" should be above 0.56V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)" should be below 0.54V at least once when the "FUEL INJECTION" is -25%.

CAUTION:

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



OK or NG

OK ► GO TO 9.

NG ► Replace heated oxygen sensor 2.

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8	CHECK HEATED OXYGEN SENSOR 2							
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Reconnect all harness connectors. 2. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 3. Stop vehicle with engine running. 4. Set voltmeter probes between ECM terminals 56 (Heated oxygen sensor 2 signal) and ground. <div style="text-align: center; margin: 10px 0;"> </div> <ol style="list-style-type: none"> 5. 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 0.56V at least once. If the voltage is above 0.56V at step 4, step 5 is not necessary. 6. Check the voltage when revving up to 5,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position. The voltage should be below 0.54V at least once. <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 9.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace heated oxygen sensor 2.</td> </tr> </table>			OK	▶	GO TO 9.	NG	▶	Replace heated oxygen sensor 2.
OK	▶	GO TO 9.						
NG	▶	Replace heated oxygen sensor 2.						

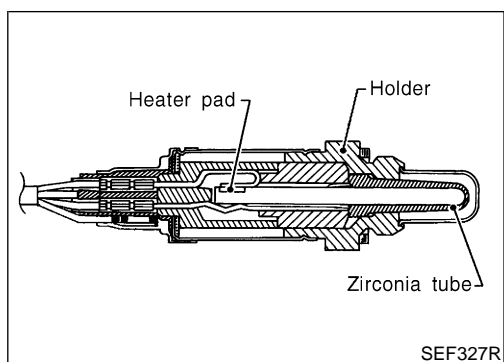
AEC874A

9	CHECK SHIELD CIRCUIT							
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect harness connectors M58, F28. 3. Check harness continuity between harness connector F28 terminal 4 and ground. <div style="text-align: center; margin: 10px 0;"> </div> <p style="text-align: center; color: blue;">Continuity should exist.</p> <ol style="list-style-type: none"> 4. Also check harness for short to power. 5. Then reconnect harness connectors. <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 11.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 10.</td> </tr> </table>			OK	▶	GO TO 11.	NG	▶	GO TO 10.
OK	▶	GO TO 11.						
NG	▶	GO TO 10.						

SEF698Z

Diagnostic Procedure (Cont'd)

10	DETECT MALFUNCTIONING PART
Check the following.	
<ul style="list-style-type: none">● Joint connector-1 (Refer to "HARNESS LAYOUT", <i>EL-250</i>.)● Harness for open or short between harness connector F28 and engine ground	
▶	Repair open circuit, short to ground or short to power in harness or connectors.
11	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.	
▶	INSPECTION END



Component Description

NGEC0153

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

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

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0154

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1)	<ul style="list-style-type: none"> Engine: After warming up Revving engine from idle to 3,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)		LEAN ↔ RICH

ECM Terminals and Reference Value

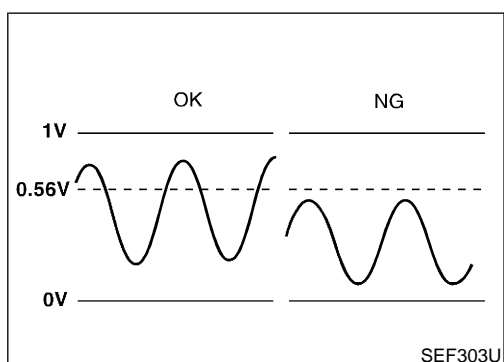
NGEC0155

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)
56	OR	Heated oxygen sensor 2	[Engine is running] <ul style="list-style-type: none"> After warming up to normal operating temperature and revving engine from idle to 3,000 rpm quickly 	0 - Approximately 1.0V

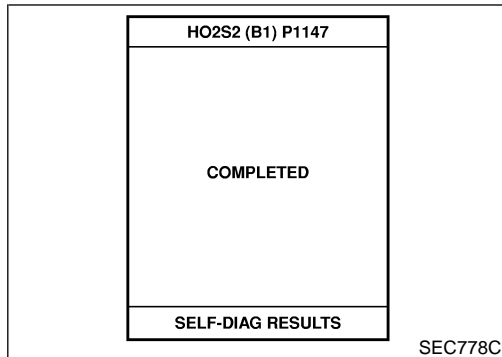
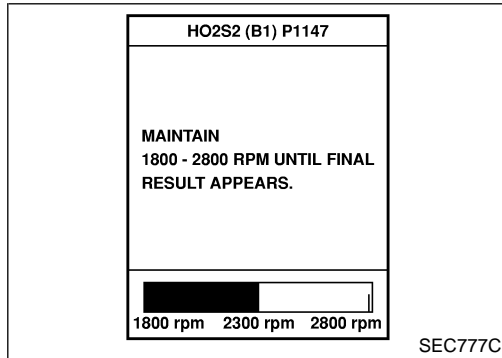
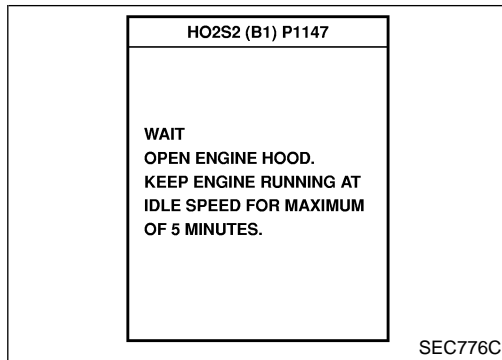


On Board Diagnosis Logic

NGEC0156

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst 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 various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1147	<ul style="list-style-type: none"> The maximum voltage from the sensor does not reach the specified voltage. 	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open or shorted.) Heated oxygen sensor 2 Fuel pressure Injectors Intake air leaks



DTC Confirmation Procedure

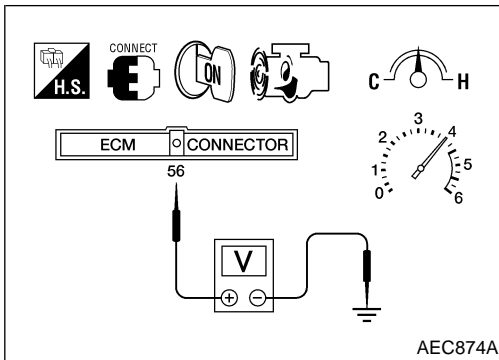
NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Open engine hood before conducting following procedure
With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Make sure the "COOLANT TEMP/S" is more then 70°C (158°F).
- 6) Select "HO2S1 (B1) P1147", of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 7) Start engine and follow the instructions of CONSULT-II.
- 8) Make sure the "OK" is displayed after touching "SELF-DIAG RESULTS".
 - If NG is displayed, refer to "Diagnostic Procedure", EC-477.
 - If "CAN NOT BE DIAGNOSED" is displayed, perform the following.
 - a) Stop engine and cool down "COOLANT TEMP/S" to less then 70°C (158°F).
 - b) Turn ignition switch ON.
 - c) Select "DATA MONITOR" mode with CONSULT-II.
 - d) Start engine.
 - e) Perform from step 6) again when the "COOLANT TEMP/S" reach to 70°C (158°F).



Overall Function Check

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. =NGEC0158

CAUTION:

Always drive vehicle at a safe speed.

⊗ Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminals 56 (Heated oxygen sensor 2 signal) and engine ground.
- 4) Check the voltage when revving engine up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
The voltage should be above 0.56V at least once during this procedure.
If the voltage can be confirmed in step 4, step 5 is not necessary.
- 5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position .
The voltage should be above 0.56V at least once during this procedure.
- 6) If NG, go to "Diagnostic Procedure", EC-477.

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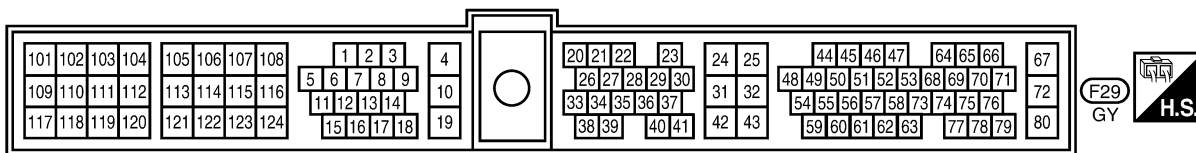
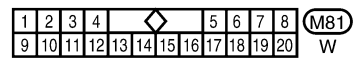
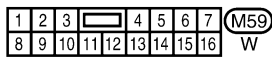
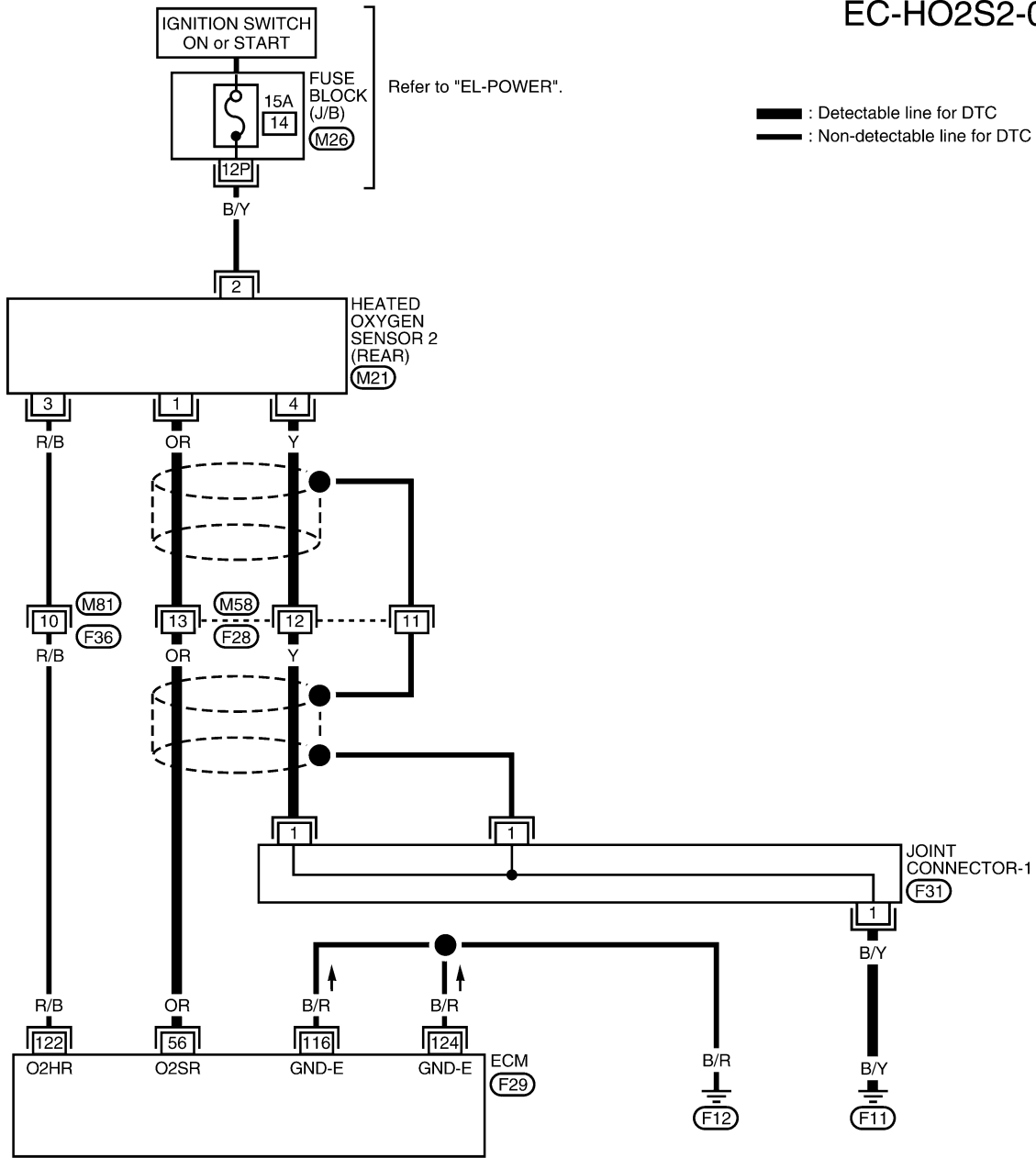
EL

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Wiring Diagram

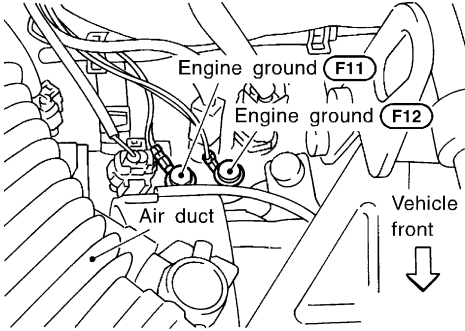
NGEC0159

EC-HO2S2-01



Diagnostic Procedure

NGEC0160

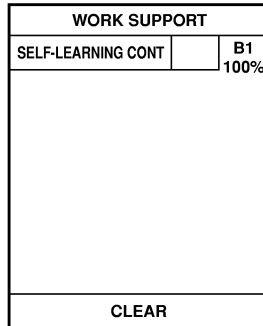
1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p>	
 <p>The diagram shows a top-down view of the engine compartment. Two engine ground screws are labeled 'Engine ground F11' and 'Engine ground F12'. An 'Air duct' is also shown. A downward arrow indicates the 'Vehicle front' direction.</p>	
SEF325V	
▶	GO TO 2.

- GI
- MA
- EM
- LC
- EC**
- FE
- CL
- MT
- AT
- TF
- PD
- AX
- SU
- BR
- ST
- RS
- BT
- HA
- SC
- EL
- IDX

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".

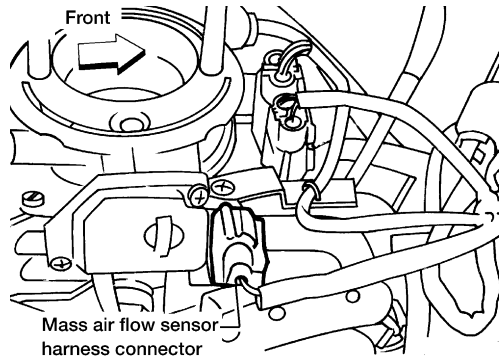


SEF215Z

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

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 3 seconds at idle speed.



AEC131A

4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0102 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-86.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171. Refer to EC-255.
No	▶	GO TO 3.

3	CHECK INPUT SIGNAL CIRCUIT
<p>1. Disconnect heated oxygen sensor 2 harness connector and ECM harness connector.</p> <p>2. Check harness continuity between ECM terminal 56 and terminal 1.</p>	
SEF157V	
<p>Continuity should exist.</p> <p>3. Check harness continuity between ECM terminal 56 (or terminal 1) and ground.</p> <p>Continuity should not exist.</p> <p>4. Also check harness for short to ground and short to power.</p>	
OK or NG	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

GI
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4	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M58, F28 ● Harness for open or short between ECM and heated oxygen sensor 2 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

AT
TF
PD

5	CHECK GROUND CIRCUIT
<p>1. Check harness continuity between heated oxygen sensor 2 terminal 4 and engine ground. Refer to Wiring Diagram.</p> <p>Continuity should exist.</p> <p>2. Also check harness for short to power.</p>	
OK or NG	
OK (With CONSULT-II)	▶ GO TO 7.
OK (Without CONSULT-II)	▶ GO TO 8.
NG	▶ GO TO 6.

AX
SU
BR
ST

6	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M58, F28 ● Joint connector-1 ● Harness for open or short between heated oxygen sensor 2 and engine ground 	
▶	Repair open circuit or short to power in harness or connectors.

RS
BT
HA

SC
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IDX

7 CHECK HEATED OXYGEN SENSOR 2

With CONSULT-II

1. Reconnect all harness connectors.
2. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
3. Stop vehicle with engine running.
4. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-II.
5. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$.

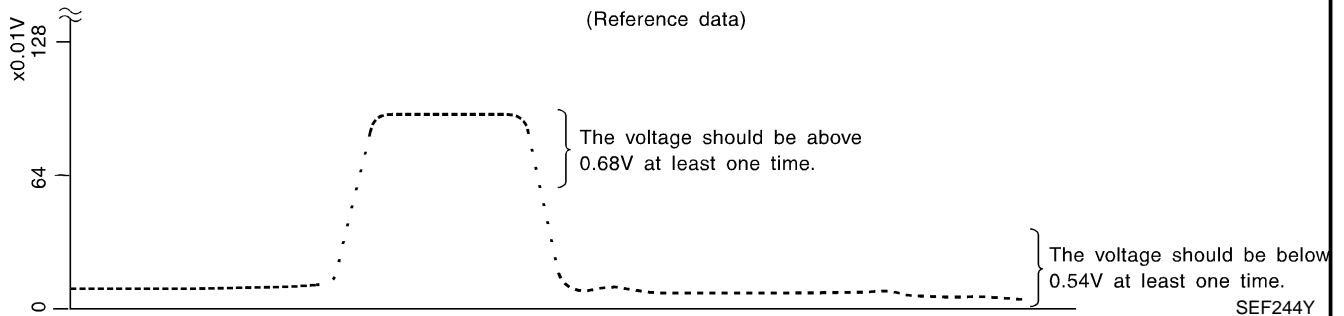
ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

"HO2S2 (B1)" should be above 0.56V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)" should be below 0.54V at least once when the "FUEL INJECTION" is -25%.

CAUTION:

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



OK or NG

OK ► GO TO 9.

NG ► Replace heated oxygen sensor 2.

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8	CHECK HEATED OXYGEN SENSOR 2						
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Reconnect all harness connectors. 2. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 3. Stop vehicle with engine running. 4. Set voltmeter probes between ECM terminals 56 (Heated oxygen sensor 2 signal) and ground. <div style="text-align: center; margin: 10px 0;"> </div> <ol style="list-style-type: none"> 5. 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 0.56V at least once. If the voltage is above 0.56V at step 4, step 5 is not necessary. 6. Check the voltage when revving up to 5,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position. The voltage should be below 0.54V at least once. <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 9.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace heated oxygen sensor 2.</td> </tr> </table>		OK	▶	GO TO 9.	NG	▶	Replace heated oxygen sensor 2.
OK	▶	GO TO 9.					
NG	▶	Replace heated oxygen sensor 2.					

AEC874A

9	CHECK SHIELD CIRCUIT						
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect harness connectors M58, F28. 3. Check harness continuity between harness connector F28 terminal 4 and ground. <div style="text-align: center; margin: 10px 0;"> </div> <p style="text-align: center; color: blue;">Continuity should exist.</p> <ol style="list-style-type: none"> 4. Also check harness for short to power. 5. Then reconnect harness connectors. <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 11.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 10.</td> </tr> </table>		OK	▶	GO TO 11.	NG	▶	GO TO 10.
OK	▶	GO TO 11.					
NG	▶	GO TO 10.					

SEF698Z

Diagnostic Procedure (Cont'd)

10	DETECT MALFUNCTIONING PART
Check the following.	
<ul style="list-style-type: none">● Joint connector-1 (Refer to "HARNESS LAYOUT", <i>EL-250</i>.)● Harness for open or short between harness connector F28 and engine ground	
▶	Repair open circuit, short to ground or short to power in harness or connectors.
11	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.	
▶	INSPECTION END

On Board Diagnosis Logic

NGEC0307

★ The closed loop control has the one trip detection logic.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1148	<ul style="list-style-type: none"> The closed loop control function does not operate even when vehicle is driving in the specified condition. 	<ul style="list-style-type: none"> The heated oxygen sensor 1 circuit is open or shorted. Heated oxygen sensor 1 Heated oxygen sensor 1 heater

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
VHCL SPEED SE	XXX km/h

SEF682Y

DTC Confirmation Procedure

NGEC0308

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 5 seconds before conducting the next test.

TESTING CONDITION:

- **Never raise engine speed above 3,000 rpm during the “DTC Confirmation Procedure”. If the engine speed limit is exceeded, retry the procedure from step 4.**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

With CONSULT-II

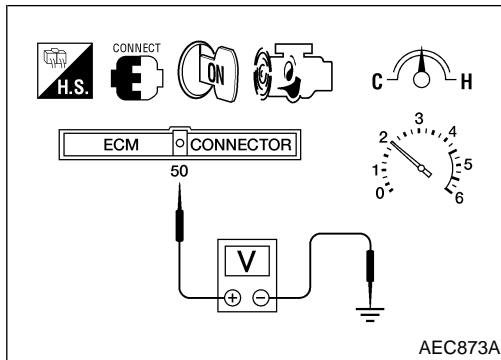
- 1) Start engine and warm it up to normal operating temperature.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Hold engine speed at 2,000 rpm and check the following.
 - “HO2S1 (B1)” voltage should go above 0.70V at least once.
 - “HO2S1 (B1)” voltage should go below 0.21V at least once. If the result is NG, perform “Diagnostic Procedure”, EC-484. If the result is OK, perform the following step.
- 4) Let engine idle at least 3 minutes.
- 5) Maintain the following condition at least 50 consecutive seconds.

B/FUEL SCHDL	4 msec or more
ENG SPEED	1,800 - 3,000 rpm
Selector lever	Suitable position
VHCL SPEED SE	More than 70 km/h (43 MPH)

During this test, DTC P0134 may be displayed on CONSULT-II screen.

- 6) If DTC is detected, go to “Diagnostic Procedure”, EC-484.

Overall Function Check



Overall Function Check

NGEC0309

Use this procedure to check the overall function of the closed loop control. During this check, a DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 (Heated oxygen sensor 1 signal) and engine ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - The voltage should go above 0.70V at least once.
 - The voltage should go below 0.21V at least once.
- 4) If NG, go to "Diagnostic Procedure", EC-484.

Diagnostic Procedure

NGEC0310

Refer to "Diagnostic Procedure" for DTC P0133, EC-222.

On Board Diagnosis Logic

NGEC1496

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.

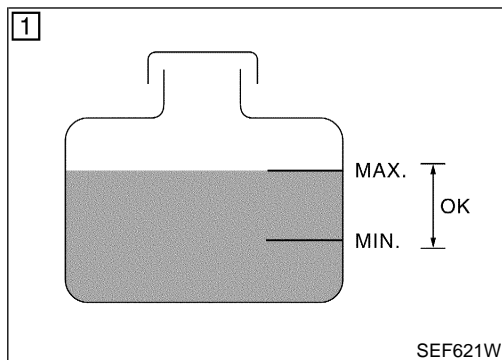
When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1217	<ul style="list-style-type: none"> Engine coolant temperature reaches an abnormally high temperature. 	<ul style="list-style-type: none"> Cooling fan (Crankshaft driven) Radiator hose Radiator Radiator cap Water pump Thermostat Engine coolant temperature sensor <p>For more information, refer to "MAIN 11 CAUSES OF OVERHEATING", EC-489.</p>

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to *MA-17*, "Changing Engine Coolant". Also, replace the engine oil.

- Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to *MA-15*, "Anti-freeze Coolant Mixture Ratio".
- After refilling coolant, run engine to ensure that no water-flow noise is emitted.



Overall Function Check

NGEC1497

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

- Check the coolant level in the reservoir tank and radiator. **Allow engine to cool before checking coolant level.** If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to "Diagnostic Procedure", EC-486.
- Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "Diagnostic Procedure", EC-486.

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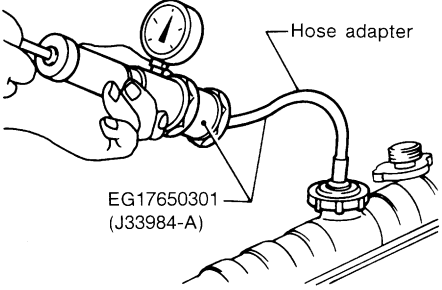
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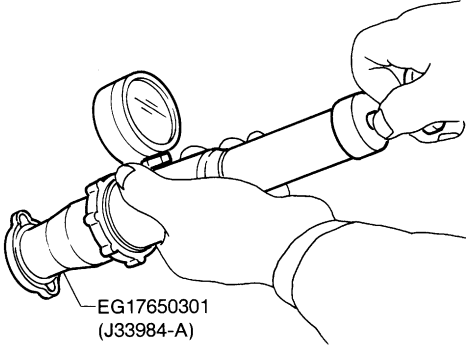
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Diagnostic Procedure

NGE1498

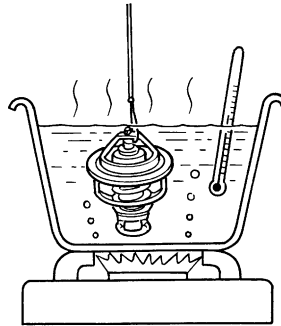
1	CHECK COOLING SYSTEM FOR LEAK	<p>Apply pressure to the cooling system with a tester, and check if the pressure drops.</p> <p style="color: blue;">Testing pressure: 157 kPa (1.6 kg/cm², 23 psi)</p> <p style="color: red;">CAUTION: Higher than the specified pressure may cause radiator damage.</p> <div style="text-align: center;">  <p style="margin-left: 100px;">Hose adapter</p> <p style="margin-left: 100px;">EG17650301 (J33984-A)</p> </div> <p style="text-align: right;">SLC754A</p>
		<p>Pressure should not drop.</p> <p style="margin-left: 100px;">OK or NG</p>
OK	▶	GO TO 2.
NG	▶	<p>Check the following for leak.</p> <ul style="list-style-type: none"> ● Hose ● Radiator ● Water pump <p>Refer to LC-12, "Water Pump".</p>

2	CHECK RADIATOR CAP	<p>Apply pressure to cap with a tester.</p> <div style="text-align: center;">  <p style="margin-left: 100px;">EG17650301 (J33984-A)</p> </div> <p style="text-align: right;">SLC755A</p>
		<p style="color: blue;">Radiator cap relief pressure: 78 - 98 kPa (0.8 - 1.0 kg/cm², 11 - 14 psi)</p> <p style="margin-left: 100px;">OK or NG</p>
OK	▶	GO TO 3.
NG	▶	Replace radiator cap.

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3 CHECK THERMOSTAT

1. Check valve seating condition at normal room temperatures.
It should seat tightly.
2. Check valve opening temperature and valve lift.



SLC343

Valve opening temperature:
76.5°C (170°F) [standard]

Valve lift:
More than 8 mm/90°C (0.31 in/194°F)

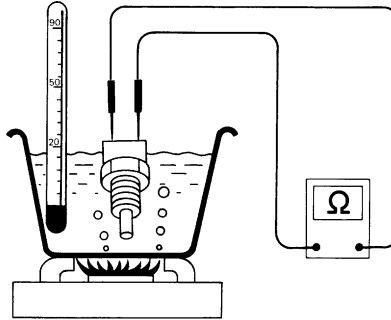
3. Check if valve is closed at 5°C (9°F) below valve opening temperature.
For details, refer to **LC-13**, "Thermostat".

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace thermostat

4 CHECK ENGINE COOLANT TEMPERATURE SENSOR

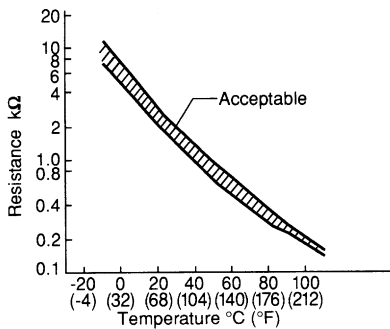
Check resistance as shown in the figure.



<Reference data>

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

SEF152P



MTBL0285

SEF012P

OK or NG

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

5 CHECK COOLING FAN

Refer to **LC-16**, "Cooling Fan (Crankshaft driven)".

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace cooling fan.

6 CHECK MAIN 11 CAUSES

If the cause cannot be isolated, go to "MAIN 11 CAUSES OF OVERHEATING", EC-489.

▶ **INSPECTION END**

Perform FINAL CHECK by the following procedure after repair is completed.

1. Warm up engine. Run the vehicle for at least 20 minutes. Pay attention to engine coolant temperature gauge on the instrument panel. If the reading shows an abnormally high temperature, another part may be malfunctioning.
2. Stop vehicle and let engine idle. Check the intake and exhaust

systems for leaks by listening for noise or visually inspecting the components.

3. Allow engine to cool and visually check for oil and coolant leaks. Then, perform "OVERALL FUNCTION CHECK".

Main 11 Causes of Overheating

NGEC1499

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	<ul style="list-style-type: none"> ● Blocked radiator ● Blocked condenser ● Blocked radiator grille ● Blocked bumper 	<ul style="list-style-type: none"> ● Visual 	No blocking	—
	2	<ul style="list-style-type: none"> ● Coolant mixture 	<ul style="list-style-type: none"> ● Coolant tester 	50 - 50% coolant mixture	See MA-13 , "RECOMMENDED FLUIDS AND LUBRICANTS".
	3	<ul style="list-style-type: none"> ● Coolant level 	<ul style="list-style-type: none"> ● Visual 	Coolant up to MAX level in reservoir tank and radiator filler neck	See MA-17 , "Changing Engine Coolant".
	4	<ul style="list-style-type: none"> ● Radiator cap 	<ul style="list-style-type: none"> ● Pressure tester 	78 - 98 kPa (0.8 - 1.0 kg/cm ² , 11 - 14 psi) 59 - 98 kPa (0.6 - 1.0 kg/cm ² , 9 - 14 psi) (Limit)	See LC-11 , "System Check".
ON*2	5	<ul style="list-style-type: none"> ● Coolant leaks 	<ul style="list-style-type: none"> ● Visual 	No leaks	See LC-11 , "System Check".
ON*2	6	<ul style="list-style-type: none"> ● Thermostat 	<ul style="list-style-type: none"> ● Touch the upper and lower radiator hoses 	Both hoses should be hot	See LC-13 , "Thermostat" and LC-14 , "Radiator".
OFF	7	<ul style="list-style-type: none"> ● Combustion gas leak 	<ul style="list-style-type: none"> ● Color checker chemical tester 4 Gas analyzer 	Negative	—
ON*3	8	<ul style="list-style-type: none"> ● Coolant temperature gauge 	<ul style="list-style-type: none"> ● Visual 	Gauge less than 3/4 when driving	—
		<ul style="list-style-type: none"> ● Coolant overflow to reservoir tank 	<ul style="list-style-type: none"> ● Visual 	No overflow during driving and idling	See MA-17 , "Changing Engine Coolant".
OFF*4	9	<ul style="list-style-type: none"> ● Coolant return from reservoir tank to radiator 	<ul style="list-style-type: none"> ● Visual 	Should be initial level in reservoir tank	See MA-16 , "ENGINE MAINTENANCE".
OFF	10	<ul style="list-style-type: none"> ● Cylinder head 	<ul style="list-style-type: none"> ● Straight gauge feeler gauge 	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-31 , "Inspection".
	11	<ul style="list-style-type: none"> ● Cylinder block and pistons 	<ul style="list-style-type: none"> ● Visual 	No scuffing on cylinder walls or piston	See EM-45 , "Inspection".

*1: Turn the ignition switch ON.

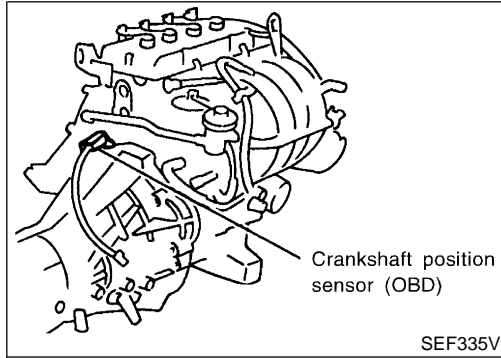
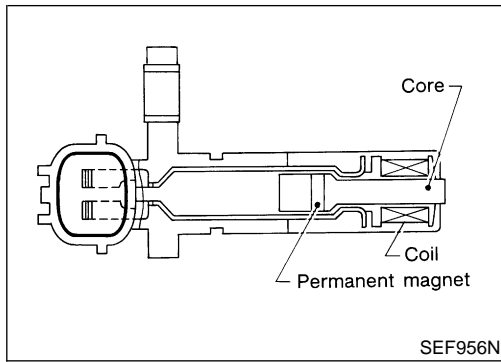
*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to **LC-17**, "OVERHEATING CAUSE ANALYSIS".

Component Description



Component Description

NGEC0327

The crankshaft position sensor (OBD) is located on the transmission housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet, core and coil.

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.

This sensor is not used to control the engine system.

It is used only for the on board diagnosis.

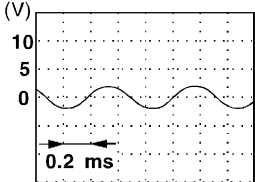
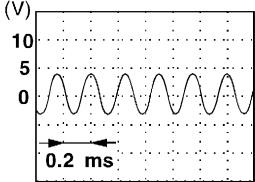
ECM Terminals and Reference Value

NGEC0328

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

CAUTION:

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

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
43	B/W	Sensors' ground	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
47	L	Crankshaft position sensor (OBD)	[Engine is running] ● Warm-up condition ● Idle speed	Approx. 0V 
			[Engine is running] ● Engine speed is 2,000 rpm	Approx. 0V 

On Board Diagnosis Logic

NGEC0329

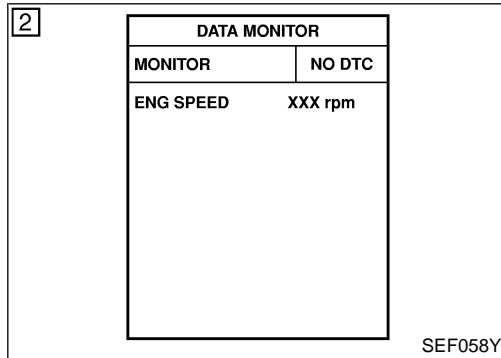
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1336	<ul style="list-style-type: none"> ● A chipping of the flywheel or drive plate gear tooth (cog) is detected by the ECM. 	<ul style="list-style-type: none"> ● Harness or connectors ● Crankshaft position sensor (OBD) ● Drive plate/Flywheel

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DTC Confirmation Procedure

NGEC0330

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 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 run it for at least 2 minutes at idle speed.
- 3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-493.

With GST

Follow the procedure "With CONSULT-II".

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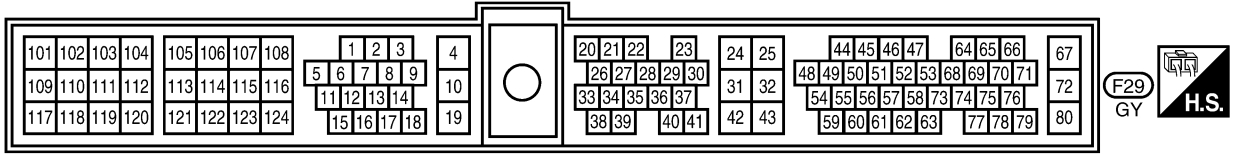
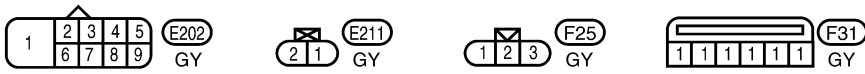
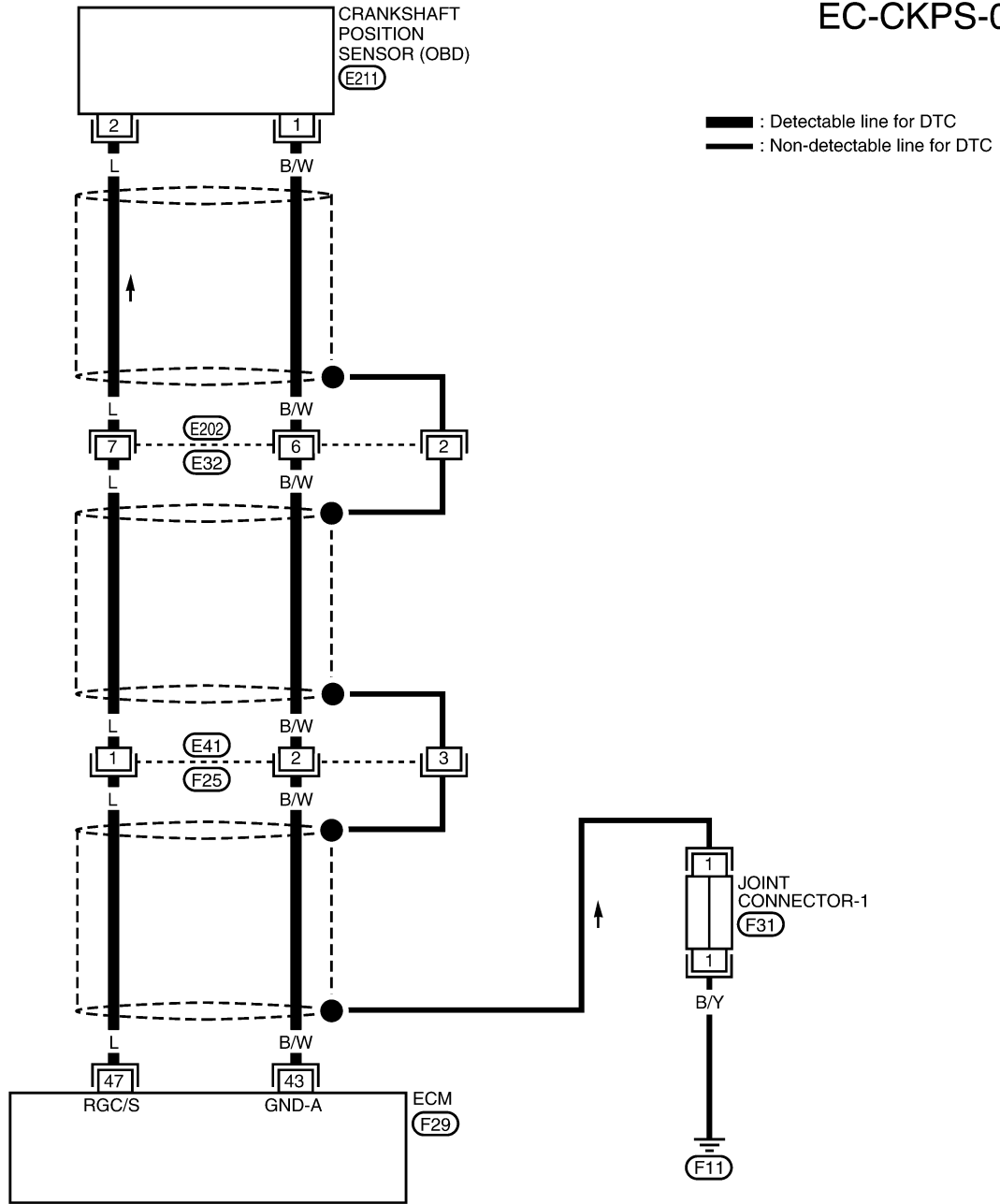
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Wiring Diagram

NGEC0331

EC-CKPS-01

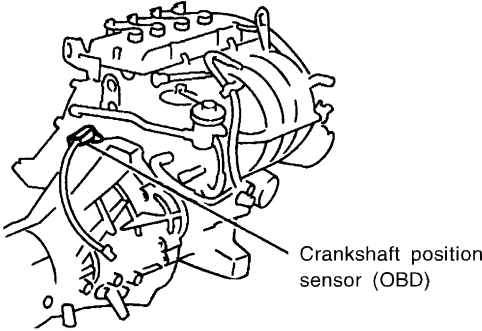
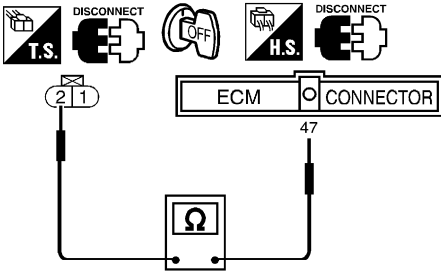


Diagnostic Procedure

NGEC0332

1	RETIGHTEN GROUND SCREWS
1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.	
▶	GO TO 2.

GI
MA

2	CHECK INPUT SIGNAL CIRCUIT
1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.	
	
2. Check continuity between ECM terminal 47 and terminal 2.	
	
<p>Continuity should exist.</p> <p>OK or NG</p>	
OK	▶ GO TO 4.
NG	▶ GO TO 3.

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3	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors E202, E32 ● Harness connectors E41, F25 ● Harness for open or short between crankshaft position sensor (OBD) and ECM 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

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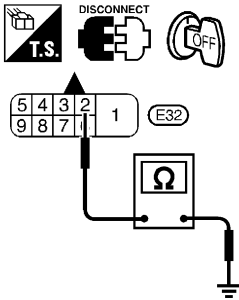
DTC P1336 CKP SENSOR (OBD)

KA24DE

Diagnostic Procedure (Cont'd)

4	CHECK GROUND CIRCUIT	
<p>1. Reconnect ECM harness connectors.</p> <p>2. Check harness continuity between crankshaft position sensor (OBD) terminal 1 and engine ground. Refer to the wiring diagram.</p> <p style="color: blue; margin-left: 20px;">Continuity should exist.</p> <p>3. Also check harness for short to power.</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

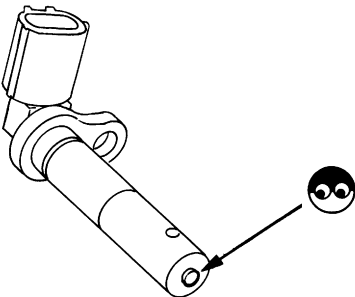
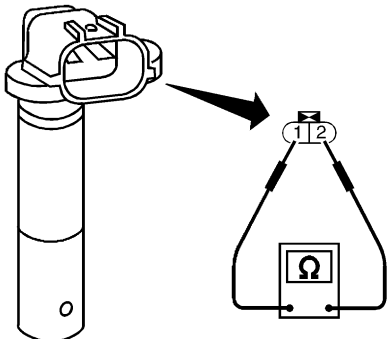
5	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E202, E32 ● Harness connectors E41, F25 ● Harness for open or short between crankshaft position sensor (OBD) and ECM 		
▶		Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK SHIELD CIRCUIT	
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect harness connectors E202, E32.</p> <p>3. Check harness continuity between harness connector E32 terminal 2 and ground.</p>		
		
Continuity should exist		
<p>4. Also check harness for short to power.</p> <p>5. Then reconnect harness connectors.</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

SEF552V

7	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E41, F25 ● Joint connector-1 (Refer to "HARNESS LAYOUT", <i>EL-250</i>.) ● Harness for open or short between harness connector E32 and engine ground 		
▶		Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK IMPROPER INSTALLATION	
Loosen and retighten the fixing bolt of the crankshaft position sensor (OBD). Then retest.		
Trouble is not fixed.	▶	GO TO 9.

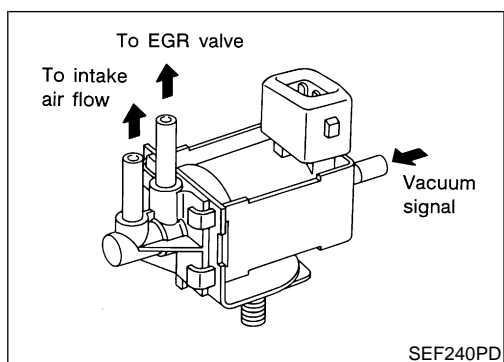
9	CHECK CRANKSHAFT POSITION SENSOR (OBD)	
<ol style="list-style-type: none"> 1. Disconnect crankshaft position sensor (OBD) harness connector. 2. Loosen the fixing bolt of the sensor. 3. Remove the sensor. 4. Visually check the sensor for chipping. 		
		
<ol style="list-style-type: none"> 5. Check resistance as shown in the figure. 		
		
<p>Resistance: Approximately 512 - 632Ω [at 20°C (68°F)]</p> <p>OK or NG</p>		
OK	▶	GO TO 10.
NG	▶	Replace crankshaft position sensor (OBD).

10	CHECK GEAR TOOTH	
Visually check for chipping flywheel or drive plate gear tooth (cog).		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace the flywheel or drive plate.

11	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.		
▶		INSPECTION END

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Component Description



Component Description

The EGRC-solenoid valve responds to signals from the ECM. When the ECM sends an OFF signal, the vacuum signal passes through the solenoid valve. The signal then reaches the EGR valve. When the ECM sends an ON signal, a plunger will then move to cut the vacuum signal from the throttle body to the EGR valve.

NGEC0334

CONSULT-II Reference Value in Data Monitor Mode

NGEC0335

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EGRC SOL/V	● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" (A/T models) ● No-load	Idle ON
		Rev engine up from idle to 3,000 rpm quickly. OFF

ECM Terminals and Reference Value

NGEC0336

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

CAUTION:

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

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
103	G/W	EGRC-solenoid valve	[Engine is running] ● Warm-up condition ● Idle speed	0 - 1V
			[Engine is running] ● Warm-up condition ● M/T models: Lift up drive wheels and shift to 1st gear position. ● Rev engine up from 2,000 to 4,000 rpm.	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0337

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1400	● The improper voltage signal is sent to ECM through EGRC-solenoid valve.	● Harness or connectors (The EGRC-solenoid valve circuit is open or shorted.) ● EGRC-solenoid valve

NGEC0338

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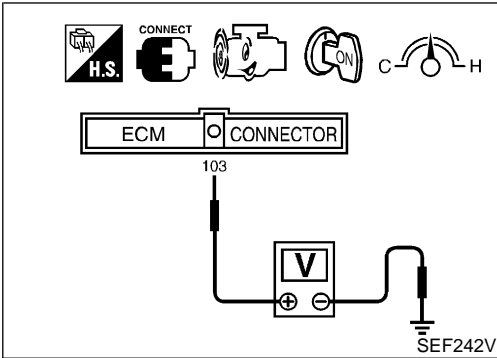
DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

2

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

SEF201Y



DTC Confirmation Procedure

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Always perform at a temperature above 0°C (32°F).

Ⓜ 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 conditions for at least 5 consecutive seconds.

ENG SPEED	Less than 3,000 rpm
B/FUEL SCHDL	Less than 12.6 msec
VHCL SPEED SE	Suitable speed

- 4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-499.

Ⓜ With GST

- Follow the procedure with “CONSULT-II”.

Overall Function Check

NGEC0521

Use this procedure to check the overall function of the EGR temperature sensor. 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) Check the voltage between ECM terminal 103 and ground at idle.

Voltage: 0 - 1V

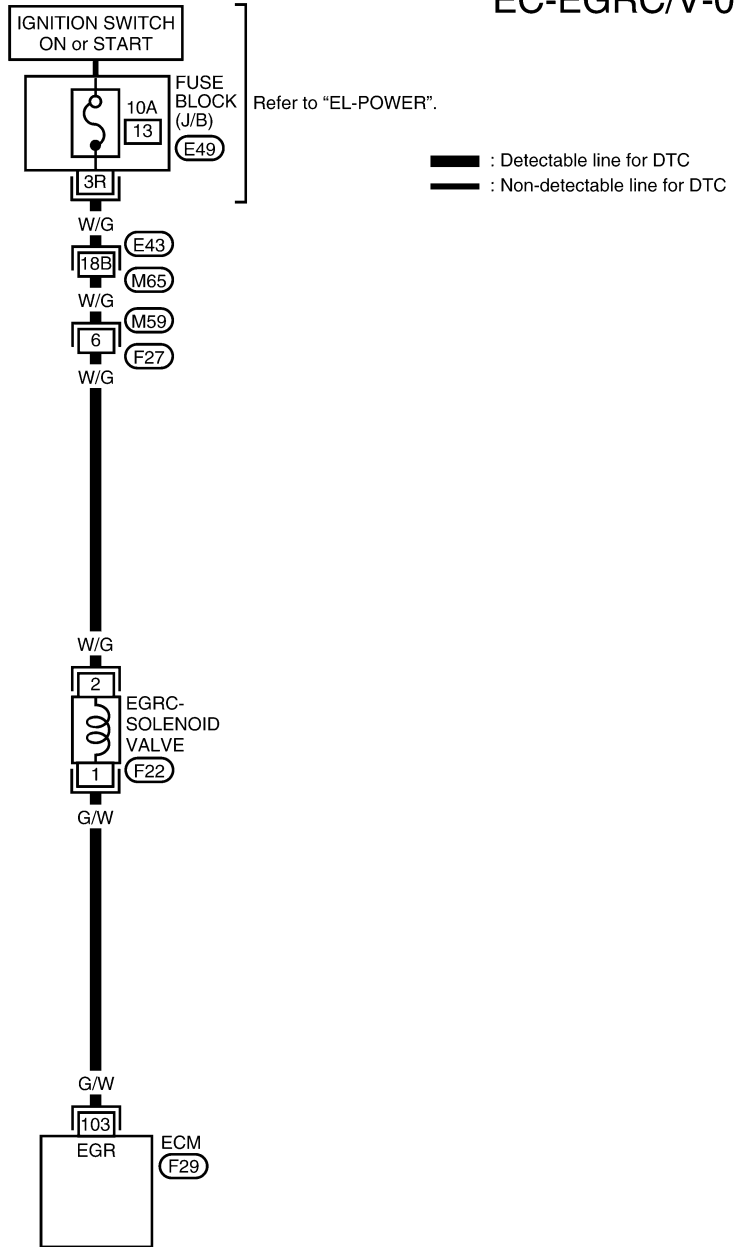
- 3) Check that the voltage changes to battery voltage and returns to 0 - 1V when revving the engine from idle to 3,000 rpm quickly.
- 4) If NG, go to “Diagnostic Procedure”, EC-499.

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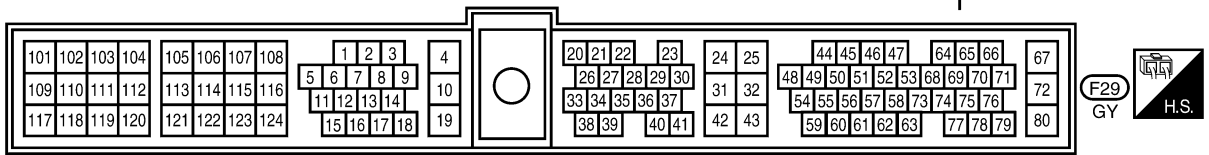
Wiring Diagram

NGEC0339

EC-EGRC/V-01



Refer to the following.
M65, **E43** - SUPER MULTIPLE JUNCTION (SMJ)

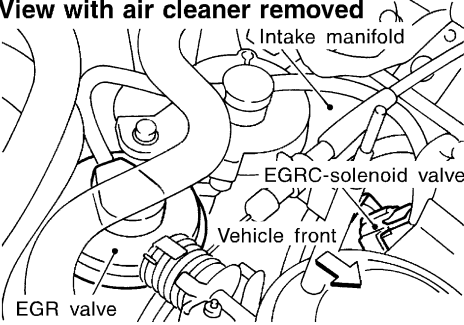
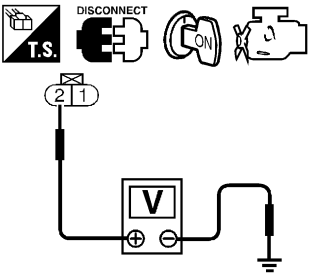


Diagnostic Procedure

NGEC0340

1	CHECK EGRC-SOLENOID VALVE																							
<p> With CONSULT-II</p> <p>1. Turn ignition switch ON.</p> <p>2. Turn EGRC-solenoid valve "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT-II and check operating sound.</p>																								
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>EGRC SOL/V</th> <th>ON</th> </tr> <tr> <th>(EGR)</th> <th>CUT</th> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <th>ENG SPEED</th> <th>XXX rpm</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table>			ACTIVE TEST		EGRC SOL/V	ON	(EGR)	CUT	MONITOR		ENG SPEED	XXX rpm												
ACTIVE TEST																								
EGRC SOL/V	ON																							
(EGR)	CUT																							
MONITOR																								
ENG SPEED	XXX rpm																							
<small>SEF716Z</small>																								
<p> Without CONSULT-II</p> <p>1. Start engine and rev engine up to 3,000 rpm quickly.</p> <p>2. When disconnecting and reconnecting the EGRC-solenoid valve harness connector, make sure that the EGRC-solenoid valve makes operating sound. (The DTC or the 1st trip DTC for the EGRC-solenoid valve will be displayed, however, ignore it.)</p>																								
OK or NG																								
OK (With CONSULT-II)	▶	GO TO 6.																						
OK (Without CONSULT-II)	▶	GO TO 7.																						
NG	▶	GO TO 2.																						

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2	CHECK POWER SUPPLY		
<p>1. Turn ignition switch OFF. 2. Disconnect EGRC-solenoid valve harness connector.</p> <div style="text-align: center;"> <p>View with air cleaner removed</p>  </div> <p style="text-align: right;">SEF336V</p> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 2 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF192V</p> <p>Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>			
OK		▶	GO TO 4.
NG		▶	GO TO 3.

3	DETECT MALFUNCTIONING PART		
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M59, F27 ● Fuse block (J/B) connector E49 ● 10A fuse ● Harness for open or short between EGRC-solenoid valve and 10A fuse 			
		▶	Repair harness or connectors.

4 CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 103 and terminal 1.

SEF243V

Continuity should exist.

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

OK or NG

OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	GO TO 5.

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5 DETECT MALFUNCTIONING PART

Check the harness for open or short between EGRC-solenoid valve and ECM.

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

6 CHECK EGRC-SOLENOID VALVE

Ⓜ With CONSULT-II
Check air passage continuity.
Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode.

ACTIVE TEST	
EGRC SOL/V	ON
(EGR)	CUT
MONITOR	
ENG SPEED	XXX rpm

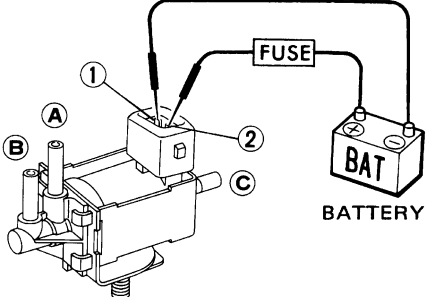
Condition EGRC SOLENOID VALVE	Air passage continuity between A and B	Air passage continuity between A and C
ON	Yes	No
OFF	No	Yes

Operation takes less than 1 second.

SEC752C

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EGRC-solenoid valve.

7	CHECK EGRC-SOLENOID VALVE									
<p> Without CONSULT-II Check air passage continuity shown in the figure.</p>										
										
AEC919										
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 5px;">Condition</th> <th style="padding: 5px;">Air passage continuity between A and B</th> <th style="padding: 5px;">Air passage continuity between A and C</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">12V direct current supply between terminals 1 and 2</td> <td style="text-align: center; padding: 5px;">Yes</td> <td style="text-align: center; padding: 5px;">No</td> </tr> <tr> <td style="padding: 5px;">No supply</td> <td style="text-align: center; padding: 5px;">No</td> <td style="text-align: center; padding: 5px;">Yes</td> </tr> </tbody> </table> <p style="margin-top: 5px;">Operation takes less than 1 second.</p>		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
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								
MTBL0664										
OK or NG										
OK	▶ GO TO 8.									
NG	▶ Replace EGRC-solenoid valve.									

8	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.	
▶	INSPECTION END

Description SYSTEM DESCRIPTION

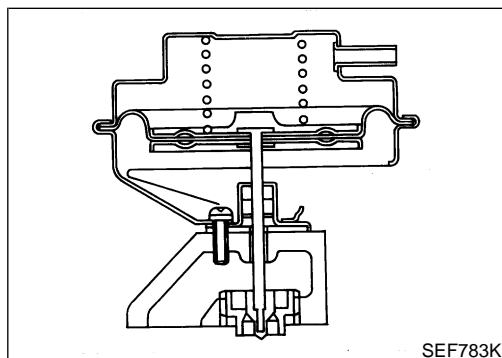
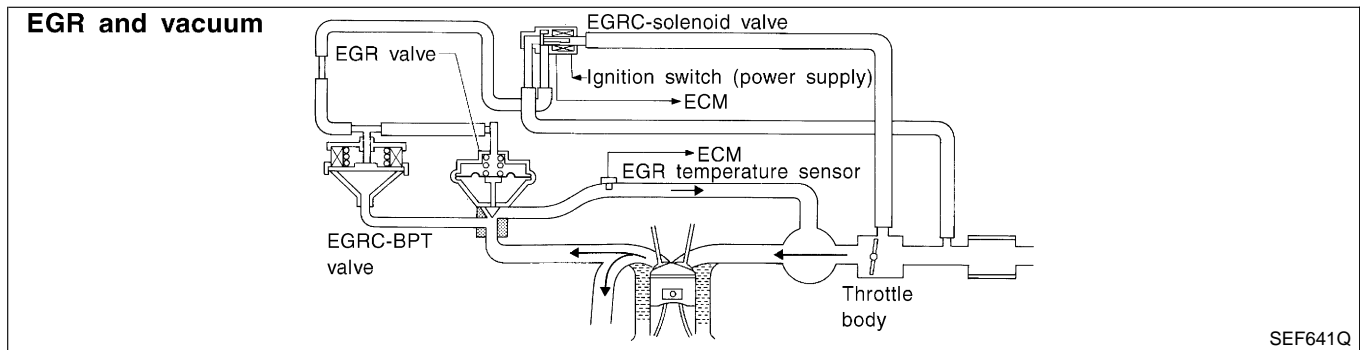
NGE0349

NGE0349S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EGR control	EGRC-solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		

This system cuts and controls vacuum applied to the EGR valve to suit engine operating conditions. This cut-and-control operation is accomplished through the ECM and the EGRC-solenoid valve. When the ECM detects any of the following conditions, current through the solenoid valve is cut. This causes the vacuum to be cut. The EGR valve remains closed.

- Low engine coolant temperature
- Engine starting
- High-speed engine operation
- Engine idling
- Excessively high engine coolant temperature
- Mass air flow sensor malfunction



COMPONENT DESCRIPTION

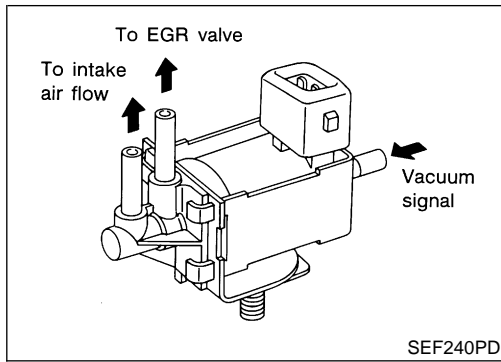
Exhaust Gas Recirculation (EGR) Valve

NGE0349S02

NGE0349S0201

The EGR valve controls the amount of exhaust gas routed to the intake manifold. Vacuum is applied to the EGR valve in response to throttle valve opening. The vacuum controls the movement of a taper valve connected to the vacuum diaphragm in the EGR valve.

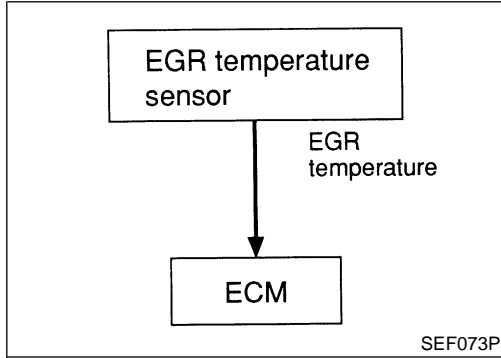
Description (Cont'd)



EGRC-solenoid Valve

NGEC0349S0202

The EGRC-solenoid valve responds to signals from the ECM. When the ECM sends an OFF signal, the vacuum signal passes through the solenoid valve. A plunger will then move to cut the vacuum signal (from the throttle body to the EGR valve). When the ECM sends an ON signal, a plunger will then move to cut the vacuum signal from the throttle body to the EGR valve.



On Board Diagnosis Logic

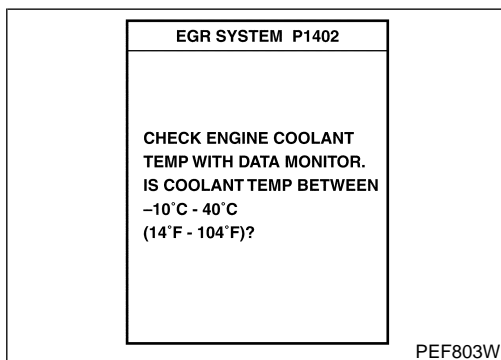
NGEC0350

If EGR temperature sensor detects EGR flow under the condition that does not call for EGR, a high-flow malfunction is diagnosed.

NOTE:

Diagnosis for this DTC will occur when engine coolant temperature is approx. 50 to 60°C (122 to 140°F). Therefore, it will be better to turn ignition switch "ON" (Start engine) at the engine coolant temperature below 40°C (104°F) when starting DTC confirmation procedure.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1402	<ul style="list-style-type: none"> EGR flow is detected under conditions that do not call for EGR. 	<ul style="list-style-type: none"> EGRC-solenoid valve EGR valve leaking or stuck open EGR temperature sensor EGRC-BPT valve



DTC Confirmation Procedure

NGEC0351

NOTE:

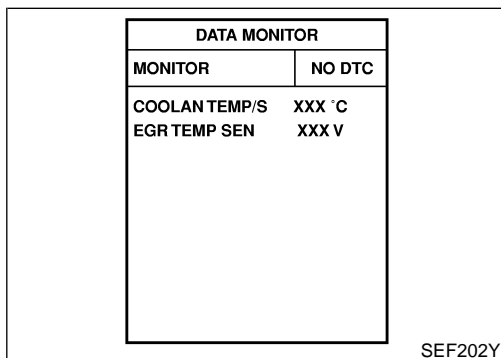
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- Engine coolant temperature and EGR temperature must be verified in "DATA MONITOR" mode with CONSULT-II before starting DTC WORK SUPPORT test. If it is out of range below, the test cannot be conducted.
COOLAN TEMP/S: -10 to 60°C (14 to 140°F)*
EGR TEMP SEN: Less than 3.7V

If the values are out of the ranges indicated above, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to reduce the engine coolant or EGR temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.

*: Although CONSULT-II screen displays "-10 to 40°C (14 to 104°F)" as a range of engine coolant temperature, ignore it.



DTC P1402 EGR FUNCTION

KA24DE

DTC Confirmation Procedure (Cont'd)

4	EGR SYSTEM P1402
	OUT OF CONDITION
	MONITOR
	ENG SPEED XXX rpm
	THRTL POS SEN XXX V
	B/FUEL SCHDL XXX msec

SEF203Y

4	EGR SYSTEM P1402
	TESTING
	MONITOR
	ENG SPEED XXX rpm
	THRTL POS SEN XXX V
	B/FUEL SCHDL XXX msec

SEF204Y

4	EGR SYSTEM P1402
	COMPLETED

SEF236Y

With CONSULT-II

- 1) Turn ignition switch OFF and wait at least 5 seconds, then turn ignition switch ON.
- 2) Select "EGR SYSTEM P1402" of "EGR SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 3) Touch "START". Follow instruction of CONSULT-II.
- 4) Start engine and let it idle until "TESTING" on CONSULT-II screen is turned to "COMPLETED". (It will take 60 seconds or more.)

If "TESTING" is not displayed after 5 minutes, turn ignition "OFF" and cool the engine coolant temperature to the range of -10 to 40°C (14 to 104°F). Retry from step 1.

- 5) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-507.

With GST

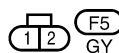
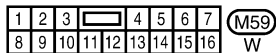
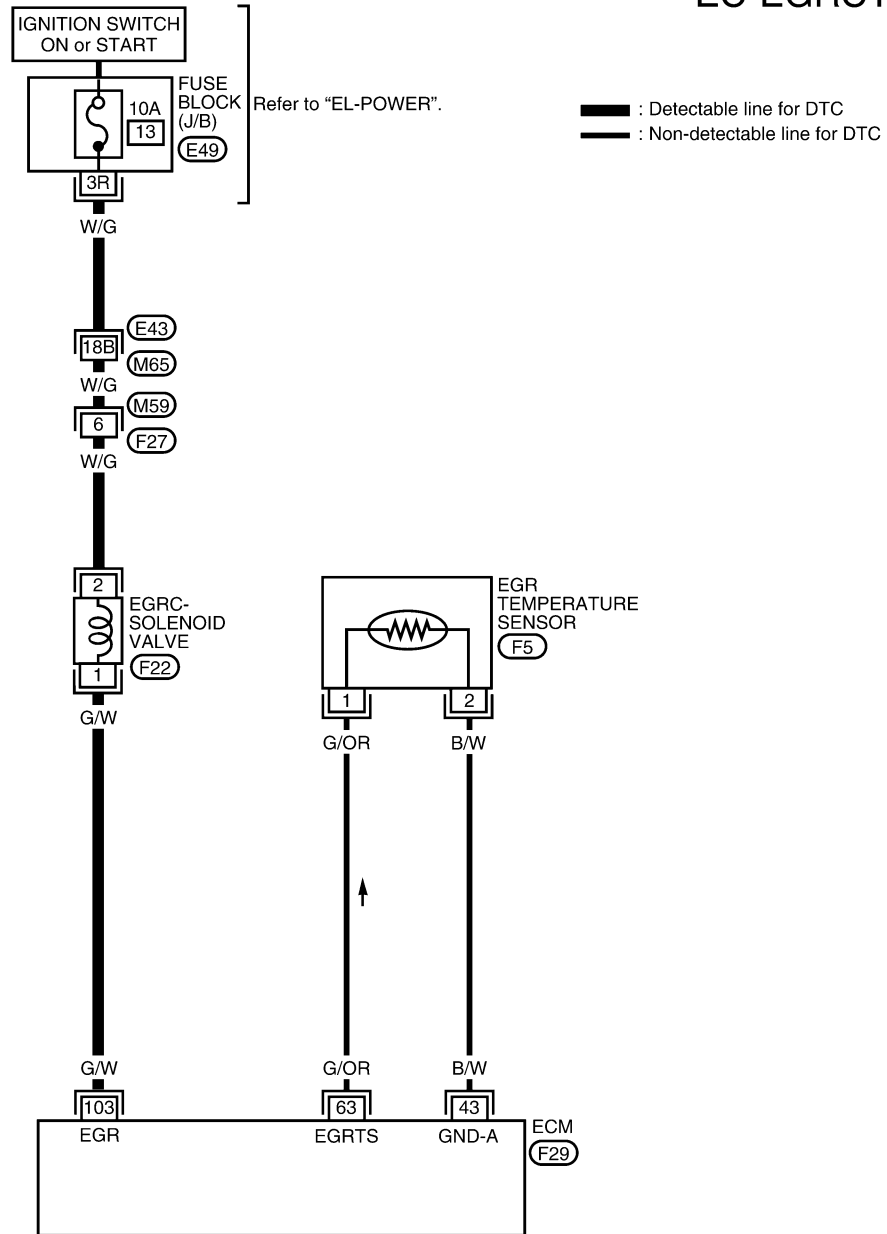
- 1) Turn ignition switch ON and select "MODE 1" with GST.
- 2) Check that engine coolant temperature is within the range of -10 to 35°C (14 to 95°F).
- 3) Check that voltage between ECM terminal 63 (EGR temperature sensor signal) and ground is less than 4.8V.
- 4) Start engine and let it idle for at least 60 seconds.
- 5) Stop engine.
- 6) Perform from step 1 to 4.
- 7) Select "MODE 3" with GST.
- 8) If DTC is detected, go to "Diagnostic Procedure", EC-507.

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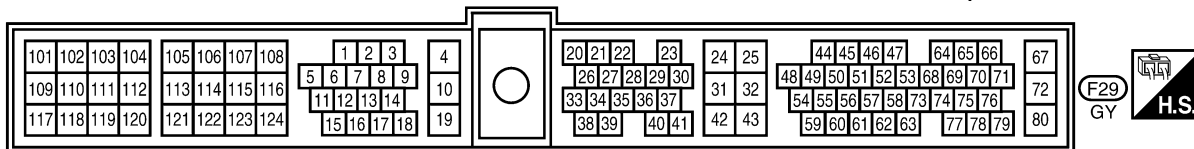
Wiring Diagram

NGEC0352

EC-EGRC1-01

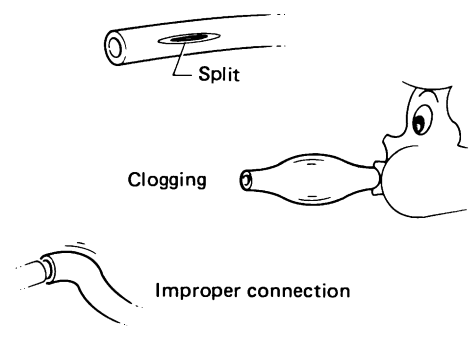


Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



Diagnostic Procedure

NGEC0353

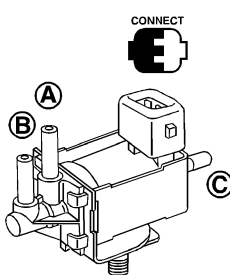
1	CHECK VACUUM HOSE	
<p>Check vacuum hose for clogging, cracks or improper connection. Refer to "Vacuum Hose Drawing", EC-33.</p> <div style="text-align: center;">  <p style="margin-left: 100px;">Split</p> <p style="margin-left: 100px;">Clogging</p> <p style="margin-left: 100px;">Improper connection</p> </div> <p style="text-align: right;">SEF109L</p> <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II) ▶		GO TO 2.
OK (Without CONSULT-II) ▶		GO TO 3.
NG ▶		Repair or replace vacuum hose.

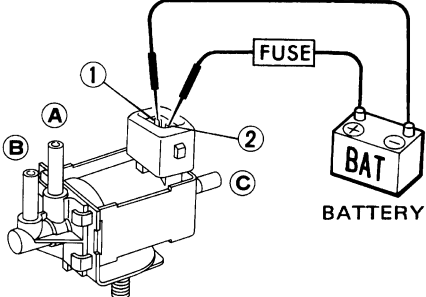
2	CHECK EGRC-SOLENOID VALVE CIRCUIT																					
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Turn EGRC-solenoid valve "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT-II and check operating sound. <div style="text-align: center; margin: 10px 0;"> <table border="1" style="border-collapse: collapse; width: 150px;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>EGRC SOL/V</td><td>ON</td></tr> <tr><td>(EGR)</td><td>CUT</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table> </div> <p style="margin-left: 50px;">Clicking noise should be heard.</p> <p style="text-align: center;">OK or NG</p> <p style="text-align: right;">SEF716Z</p>			ACTIVE TEST		EGRC SOL/V	ON	(EGR)	CUT	MONITOR		ENG SPEED	XXX rpm										
ACTIVE TEST																						
EGRC SOL/V	ON																					
(EGR)	CUT																					
MONITOR																						
ENG SPEED	XXX rpm																					
OK ▶		GO TO 5.																				
NG ▶		GO TO 4.																				

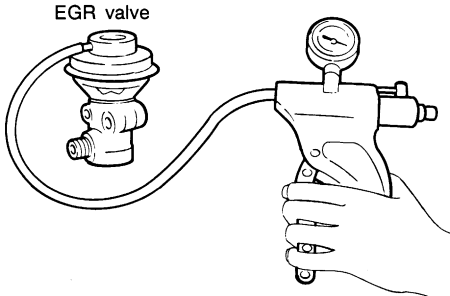
3	CHECK EGRC-SOLENOID VALVE CIRCUIT	
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect EGRC-solenoid valve harness connector. 3. Turn ignition switch ON. 4. Check operating sound of the solenoid valve when disconnecting and reconnecting EGRC-solenoid valve harness connector. (The DTC or the 1st trip DTC for the EGRC-solenoid valve will be displayed, however, ignore it.) <p style="text-align: center;">OK or NG</p>		
OK ▶		GO TO 6.
NG ▶		GO TO 4.

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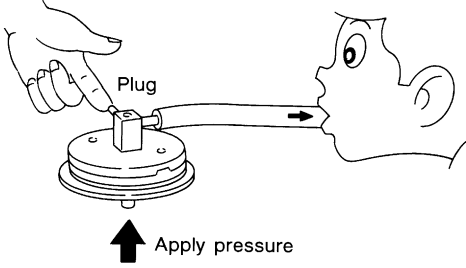
4	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M59, F27 ● Fuse block (J/B) connector E49 ● 10A fuse ● Harness for open or short between fuse block and EGRC-solenoid valve ● Harness for open or short between ECM and EGRC-solenoid valve 		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to power in harness or connector.

5	CHECK EGRC-SOLENOID VALVE																														
④ With CONSULT-II Check air passage continuity. Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode.																															
	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> </thead> <tbody> <tr> <td>EGRC SOL/V</td> <td>ON</td> </tr> <tr> <td>(EGR)</td> <td>CUT</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>	ACTIVE TEST		EGRC SOL/V	ON	(EGR)	CUT	MONITOR		ENG SPEED	XXX rpm											<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Condition EGRC SOLENOID VALVE</th> <th>Air passage continuity between A and B</th> <th>Air passage continuity between A and C</th> </tr> </thead> <tbody> <tr> <td>ON</td> <td>Yes</td> <td>No</td> </tr> <tr> <td>OFF</td> <td>No</td> <td>Yes</td> </tr> </tbody> </table> <p style="text-align: center;">Operation takes less than 1 second.</p>	Condition EGRC SOLENOID VALVE	Air passage continuity between A and B	Air passage continuity between A and C	ON	Yes	No	OFF	No	Yes
ACTIVE TEST																															
EGRC SOL/V	ON																														
(EGR)	CUT																														
MONITOR																															
ENG SPEED	XXX rpm																														
Condition EGRC SOLENOID VALVE	Air passage continuity between A and B	Air passage continuity between A and C																													
ON	Yes	No																													
OFF	No	Yes																													
SEC752C																															
OK or NG																															
OK	▶	GO TO 7.																													
NG	▶	Replace EGRC-solenoid valve.																													

6	CHECK EGRC-SOLENOID VALVE	<p>⊗ Without CONSULT-II Check air passage continuity shown in the figure.</p> <div style="text-align: center;">  </div> <div style="text-align: right; margin-top: 10px;">AEC919</div> <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">Condition</th> <th style="width: 35%;">Air passage continuity between A and B</th> <th style="width: 35%;">Air passage continuity between A and C</th> </tr> </thead> <tbody> <tr> <td>12V direct current supply between terminals 1 and 2</td> <td style="text-align: center;">Yes</td> <td style="text-align: center;">No</td> </tr> <tr> <td>No supply</td> <td style="text-align: center;">No</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table> <p style="text-align: center; margin-top: 5px;">Operation takes less than 1 second.</p> <div style="text-align: right; margin-top: 10px;">MTBL0664</div> <p style="text-align: center; margin-top: 10px;">OK or NG</p>	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
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									
OK	▶	GO TO 7.									
NG	▶	Replace EGRC-solenoid valve.									

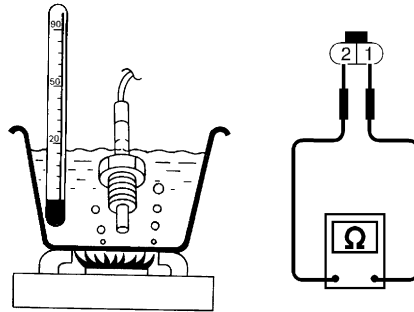
7	CHECK EGR VALVE	<p>● Apply vacuum to EGR vacuum port with a hand vacuum pump.</p> <div style="text-align: center;">  </div> <div style="text-align: right; margin-top: 10px;">MEF137D</div> <p>EGR valve spring should lift.</p> <p>● Check for sticking.</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>
OK	▶	GO TO 8.
NG	▶	Replace EGR valve.

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8	CHECK EGRC-BPT VALVE	<p>1. Plug one of two ports of EGRC-BPT valve.</p> <p>2. Vacuum from the other port and check for leakage while applying a pressure above 0.981 kPa (100 mmH₂O, 3.94 inH₂O) from under EGRC-BPT valve.</p> <div style="text-align: center;">  <p style="text-align: center;">↑ Apply pressure</p> </div> <p style="text-align: right;">SEF083P</p> <p>3. If a leakage is noted, replace the valve.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶	GO TO 9.	
NG	▶	Replace EGRC-BPT valve.	

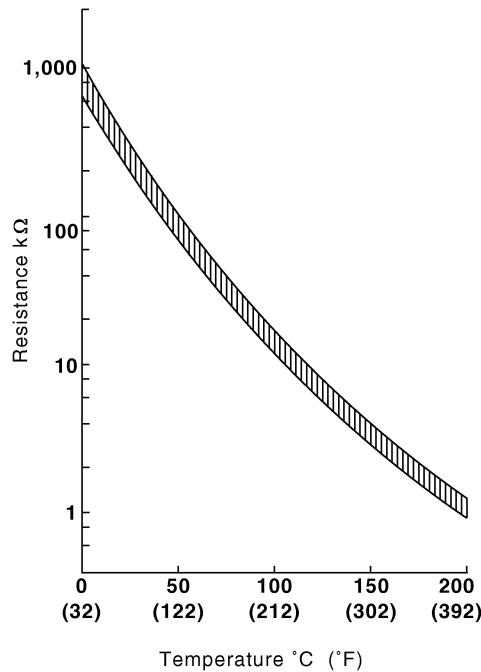
9 CHECK EGR TEMPERATURE SENSOR

Check resistance change and resistance value.



<Reference data>

EGR temperature °C (°F)	Voltage V	Resistance M.Ω
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015



OK or NG

- | | | |
|----|---|---------------------------------|
| OK | ▶ | GO TO 10. |
| NG | ▶ | Replace EGR temperature sensor. |

10 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.

▶ **INSPECTION END**

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DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

KA24DE

Description

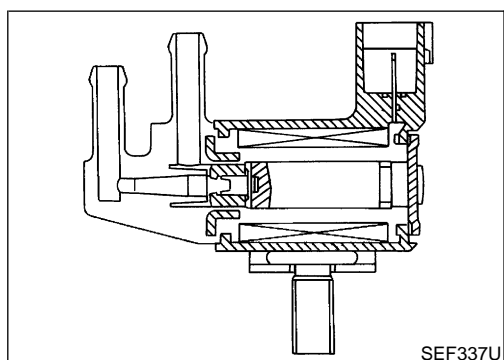
Description SYSTEM DESCRIPTION

NGEC0359

NGEC0359S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	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		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Throttle position switch	Closed throttle position		
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.



COMPONENT DESCRIPTION

NGEC0359S02

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

NGEC0360

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	<ul style="list-style-type: none"> Engine: After warming up Air conditioner switch "OFF" Shift lever: "N" No-load 	Idle (Vehicle stopped)	0%
		2,000 rpm (200 seconds after starting engine)	—

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

KA24DE

ECM Terminals and Reference Value

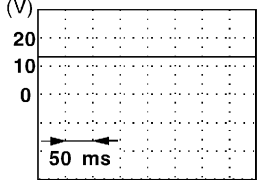
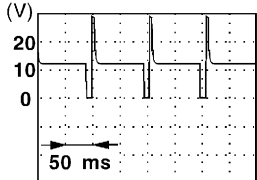
ECM Terminals and Reference Value

NGEC0361

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

CAUTION:

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

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	LG/R	ECM relay (Self-shut-off)	[Engine is running] [Ignition switch "OFF"] <ul style="list-style-type: none"> ● For a few seconds after turning ignition switch "OFF" 	0 - 1V
			[Ignition switch "OFF"] <ul style="list-style-type: none"> ● A few seconds passed after turning ignition switch "OFF" 	BATTERY VOLTAGE (11 - 14V)
5	R/Y	EVAP canister purge volume control solenoid valve	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V) 
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	BATTERY VOLTAGE (11 - 14V) 
67	B/P	Power supply for ECM	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0362

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1444	The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.	<ul style="list-style-type: none"> ● EVAP control system pressure sensor ● EVAP canister purge volume control solenoid valve (The valve is stuck open.) ● EVAP canister vent control valve ● EVAP canister ● Hoses (Hoses are connected incorrectly or clogged.)

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

KA24DE

DTC Confirmation Procedure

DTC Confirmation Procedure

=NGEC0363

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
FUEL T/TMP SE	XXX °C

SEF194Y

PURG VOL CN/V P1444	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF205Y

PURG VOL CN/V P1444	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF206Y

PURG VOL CN/V P1444	
COMPLETED	

SEF237Y

With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Check that "FUEL T/TMP SE" is 0°C (32°F) or more.
- 6) Select "PURG VOL C/V P1444" of "EVAP SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 7) Touch "START".
- 8) Start engine and let it idle until "TESTING" on CONSULT-II changes to "COMPLETED". (It will take for at least 10 seconds.)
If "TESTING" is not displayed after 5 minutes, retry from step 2.
- 9) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-516.

With GST

Follow the procedure "With CONSULT-II".

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

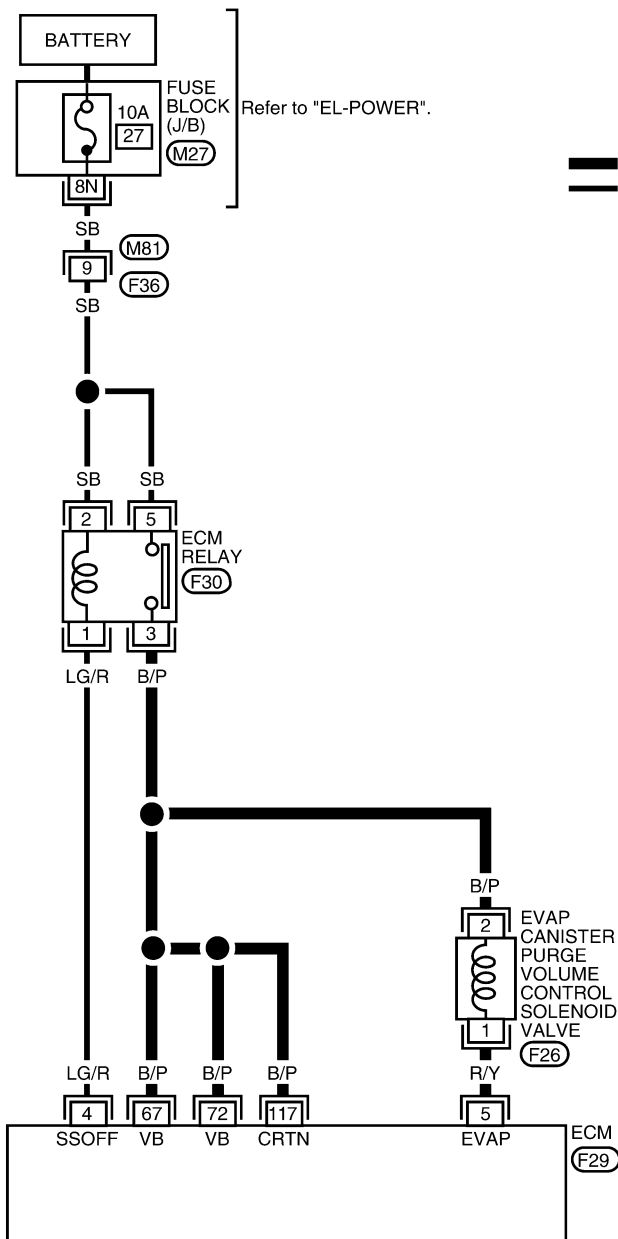
KA24DE

Wiring Diagram

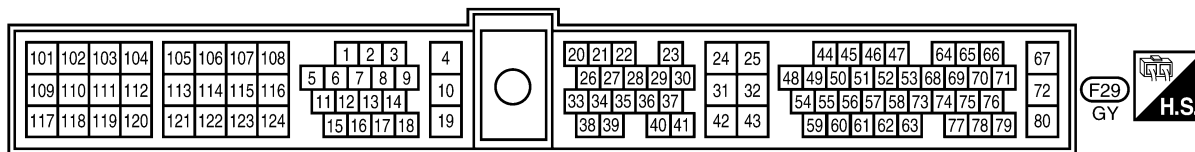
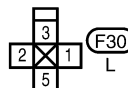
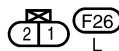
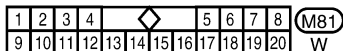
Wiring Diagram

NGEC0504

EC-PGC/V-01



— : Detectable line for DTC
 — : Non-detectable line for DTC



WEC974

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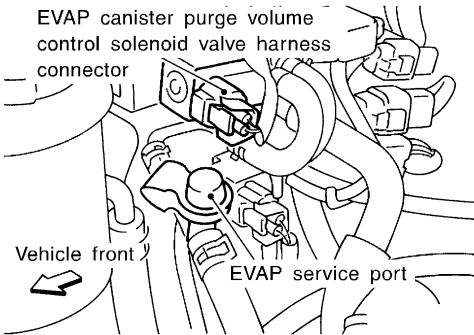
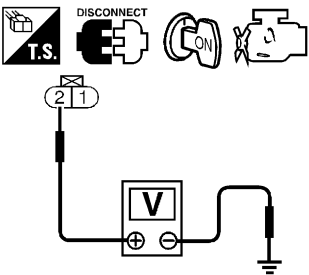
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

KA24DE

Diagnostic Procedure

Diagnostic Procedure

=NGEC0364

1	CHECK POWER SUPPLY
<p>1. Turn ignition switch OFF. 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.</p> <div style="text-align: center;">  <p>EVAP canister purge volume control solenoid valve harness connector</p> <p>Vehicle front</p> <p>EVAP service port</p> </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 2 and engine ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p>DISCONNECT</p> <p>T.S.</p> <p>2 1</p> <p>V</p> </div> <p>Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

SEF339V

SEF192V

2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM 	
▶	Repair harness or connectors.

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

KA24DE

Diagnostic Procedure (Cont'd)

3	CHECK OUTPUT SIGNAL CIRCUIT
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 5 and terminal 1.</p>	
<p>Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

SEF193V

4	DETECT MALFUNCTIONING PART
<p>Check the harness for open or short between EVAP canister purge volume control solenoid valve and ECM.</p>	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

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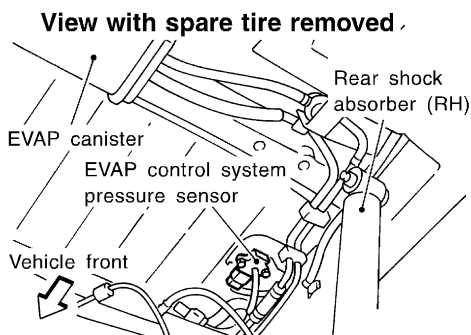
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

KA24DE

Diagnostic Procedure (Cont'd)

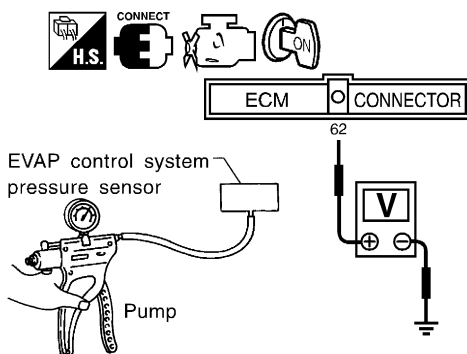
5 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.



SEF341V

2. Remove hose from EVAP control system pressure sensor.
3. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
4. Check output voltage between ECM terminal 62 and engine ground.



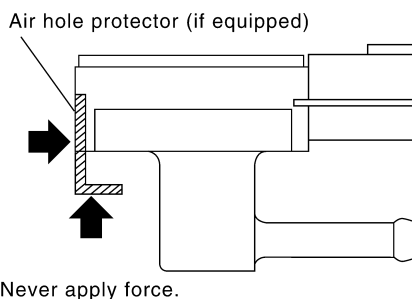
SEF198V

Pressure (Relative to atmospheric pressure)	Voltage (V)
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
-9.3 kPa (-70 mmHg, -2.76 inHg)	0.4 - 0.6

MTBL0295

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -20 kPa (-150 mmHg, -5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.



SEF799W

- Never apply force to the air hole protector of the sensor, if equipped.
- Discard any EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	Replace EVAP control system pressure sensor.

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

KA24DE

Diagnostic Procedure (Cont'd)

6 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Ⓟ With CONSULT-II

- Start engine.
- Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

OK or NG

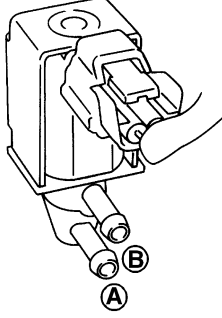
OK	▶	GO TO 8.
NG	▶	GO TO 7.

SEF801Y

7 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Ⓟ With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

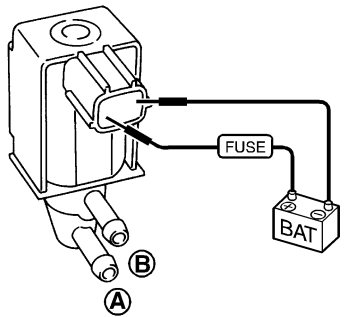


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

SEF334X

ⓧ Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

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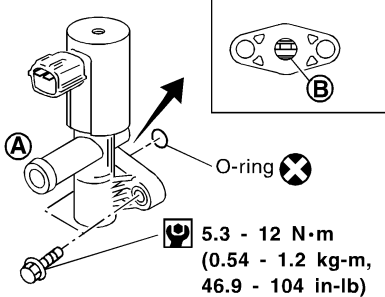
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE


KA24DE


Diagnostic Procedure (Cont'd)

8 CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



O-ring 


 5.3 - 12 N·m
(0.54 - 1.2 kg-m,
46.9 - 104 in-lb)

SEF337X

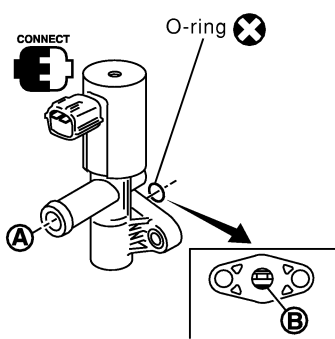
OK or NG


OK	▶	GO TO 9.
NG	▶	Replace EVAP canister vent control valve.

9 CHECK EVAP CANISTER VENT CONTROL VALVE-II

 **With CONSULT-II**

1. Reconnect harness connectors disconnected.
2. Turn ignition switch "ON".
3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time.




O-ring 

ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 (B1)	XXX V
THRTL POS SEN	XXX V

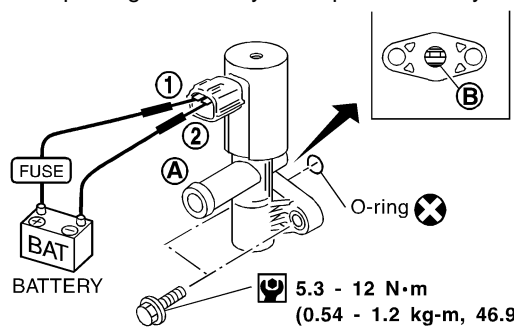
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF803Y

 **Without CONSULT-II**


Check air passage continuity and operation delay time under the following conditions.




FUSE

BAT

BATTERY

O-ring 

 5.3 - 12 N·m
(0.54 - 1.2 kg-m, 46.9 - 104 in-lb)

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.

SEF339X

Make sure new O-ring is installed properly.

OK or NG

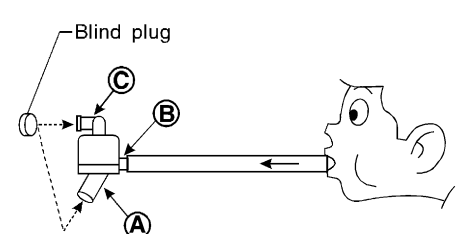
OK	▶	GO TO 11.
NG	▶	GO TO 10.

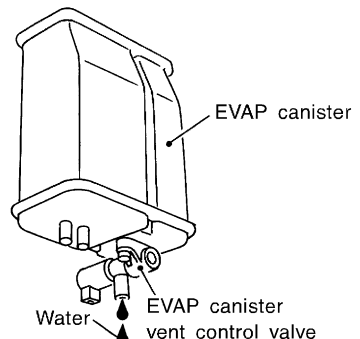
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

KA24DE

Diagnostic Procedure (Cont'd)

10	CHECK EVAP CANISTER VENT CONTROL VALVE-III	
1. Clean the air passage (Portion A to B) of EVAP canister vent control valve using an air blower. 2. Perform Test No. 13 again.		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace EVAP canister vent control valve.

11	CHECK RUBBER TUBE	
Check for obstructed water separator and rubber tube connected to EVAP canister vent control valve and clean the rubber tube using air blower. Check water separator.		
1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A , and then C plugged.		
		
* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)		
5. In case of NG in items 2 - 4, replace the parts. ● Do not disassemble water separator.		
SEF829T		
OK or NG		
OK	▶	GO TO 12.
NG	▶	Clean, repair or replace rubber tube and/or water separator.

12	CHECK IF EVAP CANISTER SATURATED WITH WATER	
1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister.		
		
SEF596U		
Yes or No		
Yes	▶	GO TO 13.
No	▶	GO TO 15.

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DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

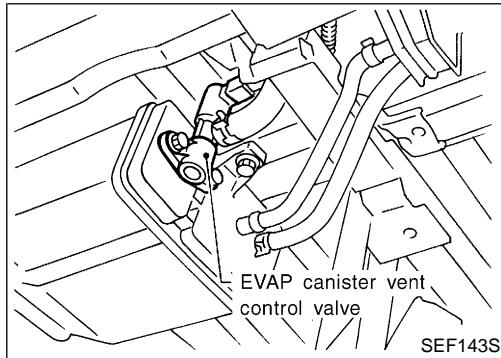
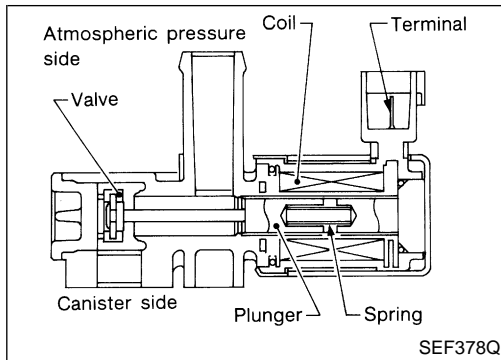
KA24DE

Diagnostic Procedure (Cont'd)

13	CHECK EVAP CANISTER
Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).	
OK or NG	
OK	▶ GO TO 15.
NG	▶ GO TO 14.

14	DETECT MALFUNCTIONING PART
Check the following.	
<ul style="list-style-type: none">● EVAP canister for damage● EVAP hose between EVAP canister and water separator for clogging or poor connection	
	▶ Repair hose or replace EVAP canister.

15	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.	
	▶ INSPECTION END



Component Description

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent. NGEC0366

This solenoid (the EVAP canister vent control valve) responds to signals from the ECM.

When the ECM sends an ON signal, the coil in the solenoid valve is energized.

A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

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CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

NGEC0367

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

ECM Terminals and Reference Value

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

NGEC0368

CAUTION:

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

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

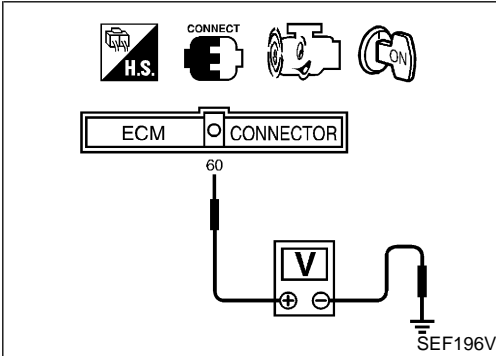
NGEC0369

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1446	<ul style="list-style-type: none"> ● EVAP canister vent control valve remains closed under specified driving conditions. 	<ul style="list-style-type: none"> ● EVAP canister vent control valve ● EVAP control system pressure sensor and the circuit ● Blocked rubber tube to EVAP canister vent control valve ● Water separator ● EVAP canister is saturated with water.

4

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

SEF189Y



DTC Confirmation Procedure

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 5 seconds before conducting the next test.

TESTING CONDITION:

Always perform at a temperature above 0°C (32°F).

Ⓜ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Check that "FUEL T/TMP SE" is 0°C (32°F) or more.
- 6) Drive vehicle at a speed of approximately 80 km/h (50 MPH) for a maximum of 15 minutes.
- 7) If 1st trip DTC is detected, go to "Diagnostic Procedure" on EC-525.

NOTE:

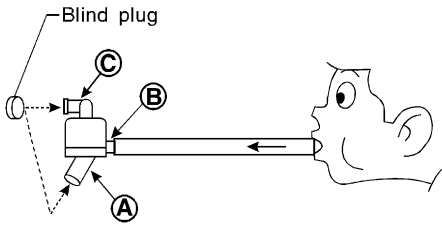
If a malfunction exists, NG result may be displayed quicker.

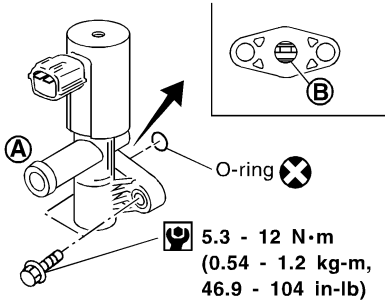
Ⓜ With GST

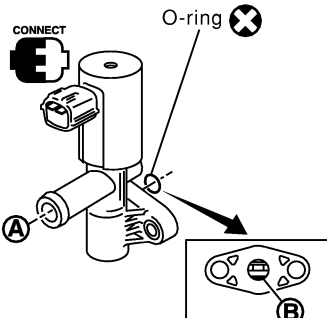
- 1) Start engine and warm it up to normal operating temperature.
- 2) Check that voltage between ECM terminal 60 (fuel tank temperature sensor signal) and ground is less than 4.2V.
- 3) Drive vehicle at a speed of approximately 80 km/h (50 MPH) for 15 minutes.
- 4) Select "MODE 7" with GST.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure" on EC-525.

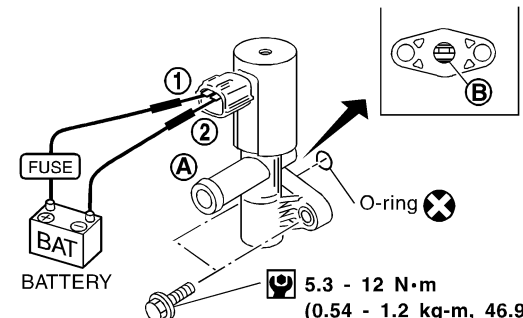
Diagnostic Procedure

=NGEC0371

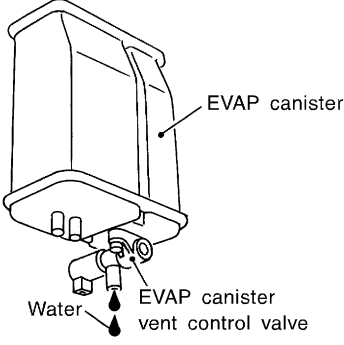
1	CHECK RUBBER TUBE FOR CLOGGING	<p>Check obstructed water separator and rubber tube to EVAP canister vent control valve and clean the rubber tube using air blower.</p> <p>Check water separator.</p> <ol style="list-style-type: none"> 1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged. <div style="text-align: center;">  <p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p> </div> <p>5. In case of NG in items 2 - 4, replace the parts.</p> <ul style="list-style-type: none"> ● Do not disassemble water separator. <p style="text-align: right;">SEF829T</p>	GI MA EM LC EC FE CL MT AT TF
OK or NG			
OK	▶	GO TO 2.	▶
NG	▶	Clean, repair or replace rubber tube and/or water separator.	▶

2	CHECK EVAP CANISTER VENT CONTROL VALVE-I	<ol style="list-style-type: none"> 1. Remove EVAP canister vent control valve from EVAP canister. 2. Check portion B of EVAP canister vent control valve for being rusted. <div style="text-align: center;">  <p>(A) : Torque: 5.3 - 12 N·m (0.54 - 1.2 kg-m, 46.9 - 104 in-lb)</p> <p>(B) : O-ring</p> </div> <p style="text-align: right;">SEF337X</p>	PD AX SU BR ST RS BT HA SC EL IDX
OK or NG			
OK	▶	GO TO 3.	▶
NG	▶	Replace EVAP canister vent control valve.	▶

3	CHECK EVAP CANISTER VENT CONTROL VALVE-II																												
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Reconnect harness connectors disconnected. 2. Turn ignition switch "ON". 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode. 4. Check air passage continuity and operation delay time. 																													
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 30%;">  </div> <div style="width: 30%; border: 1px solid black; padding: 5px;"> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>VENT CONTROL/V</td><td>OFF</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr> <tr><td>HO2S1 (B1)</td><td>XXX V</td></tr> <tr><td>HO2S1 (B2)</td><td>XXX V</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table> </div> <div style="width: 30%;"> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr><th>Condition</th><th>Air passage continuity between A and B</th></tr> <tr><td>ON</td><td>No</td></tr> <tr><td>OFF</td><td>Yes</td></tr> </table> <p>Operation takes less than 1 second.</p> </div> </div>		ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 (B1)	XXX V	HO2S1 (B2)	XXX V	THRTL POS SEN	XXX V					Condition	Air passage continuity between A and B	ON	No	OFF	Yes
ACTIVE TEST																													
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ENG SPEED	XXX rpm																												
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THRTL POS SEN	XXX V																												
Condition	Air passage continuity between A and B																												
ON	No																												
OFF	Yes																												
SEF991Y																													

<p>ⓧ Without CONSULT-II</p> <p>Check air passage continuity and operation delay time under the following conditions.</p>							
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 40%;">  </div> <div style="width: 55%;"> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr><th>Condition</th><th>Air passage continuity between A and B</th></tr> <tr><td>12V direct current supply between terminals 1 and 2</td><td>No</td></tr> <tr><td>OFF</td><td>Yes</td></tr> </table> <p>Operation takes less than 1 second.</p> </div> </div>		Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	No	OFF	Yes
Condition	Air passage continuity between A and B						
12V direct current supply between terminals 1 and 2	No						
OFF	Yes						
SEF339X							
Make sure new O-ring is installed properly.							
OK or NG							
OK	▶ GO TO 5.						
NG	▶ GO TO 4.						

4	CHECK EVAP CANISTER VENT CONTROL VALVE-III
<ol style="list-style-type: none"> 1. Clean the air passage (Portion A to B) of EVAP canister vent control valve using an air blower. 2. Perform Test No. 13 again. 	
OK or NG	
OK	▶ GO TO 5.
NG	▶ Replace EVAP canister vent control valve.

5	CHECK IF EVAP CANISTER IS SATURATED WITH WATER	
1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister.		
		
SEF596U		
Yes or No		
Yes	▶	GO TO 6.
No	▶	GO TO 8.

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6	CHECK EVAP CANISTER	
Weigh the EVAP canister with EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).		
OK or NG		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

FE
CL
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7	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Visually check the EVAP canister for damage. ● Check hose connection between EVAP canister and water separator for clogging and poor connection. 		
▶ Repair hose or replace EVAP canister.		

PD
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8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Install hose properly or replace it.

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9	CHECK HARNESS CONNECTOR	
1. Disconnect EVAP control system pressure sensor harness connector. 2. Check harness connector for water. Water should not exist.		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor.

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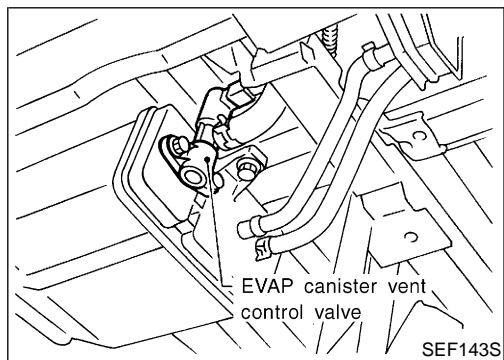
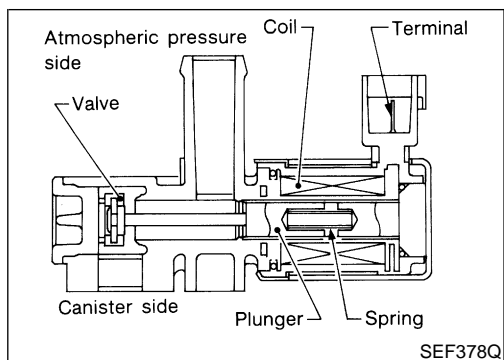
DTC P1446 EVAP CANISTER VENT CONTROL VALVE

KA24DE

Diagnostic Procedure (Cont'd)

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR AND CIRCUIT
Refer to "DTC Confirmation Procedure", EC-382.	
OK or NG	
OK	▶ GO TO 11.
NG	▶ Replace EVAP control system pressure sensor and repair or replace harness and connector.

11	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.	
	▶ INSPECTION END



Component Description

NGEC0379

NOTE:

If DTC P1448 is displayed with P0442, perform trouble diagnosis for DTC P1448 first.

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

This solenoid (the EVAP canister vent control valve) responds to signals from the ECM.

When the ECM sends an ON signal, the coil in the solenoid valve is energized.

A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0380

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

ECM Terminals and Reference Value

NGEC0381

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)
108	R/G	EVAP canister vent control valve	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0382

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1448	<ul style="list-style-type: none"> ● EVAP canister vent control valve remains opened under specified driving conditions. 	<ul style="list-style-type: none"> ● EVAP canister vent control valve ● EVAP control system pressure sensor ● Blocked rubber tube to EVAP canister vent control valve ● Water separator ● EVAP canister is saturated with water. ● Vacuum cut valve

5
EVAP SML LEAK P0442/P1442

1)FOR BEST RSLT,PERFORM AT FOLLOWING CONDITIONS.
 -FUEL LEVEL: 1/4-3/4
 -AMBIENT TEMP: 0-30 C(32-86F)
 -OPEN ENGINE HOOD.
 2)START ENG WITH VHCL STOPPED. IF ENG IS ON,STOP FOR 5 SEC.THEN RESTART.
 3)TOUCH START.

SEC760C

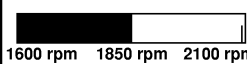
5
EVAP SML LEAK P0442/P1442

WAIT
2 TO 10 MINUTES.
KEEP ENGINE RUNNING
AT IDLE SPEED.

SEC761C

6
EVAP SML LEAK P0442/P1442

MAINTAIN
1600 - 2100 RPM UNTIL FINAL
RESULT APPEARS.
(APPROX. 3 MINUTES)



SEC762C

EVAP SML LEAK P0442/P1442

OK

SELF-DIAG RESULTS

NO DTC DETECTED.
FURTHER TESTING
MAY BE REQUIRED.

SEC763C

DTC Confirmation Procedure

NOTE:

- If DTC P1448 is displayed with P0442, perform trouble diagnosis for DTC P1448 first.
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

With CONSULT-II

TESTING CONDITION:

- Perform “DTC WORK SUPPORT” when the fuel level is less than 3/4 full and vehicle is placed on flat level surface.
 - Always perform test at a temperature of 0 to 30°C (32 to 86°F).
 - It is better that the fuel level is low.
- 1) Turn ignition switch ON.
 - 2) Turn ignition switch OFF and wait at least 5 seconds.
 - 3) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
 - 4) Check that the following conditions are met.

COOLAN TEMP/S	0 - 70°C (32 - 158°F)
INT/A TEMP SE	0 - 60°C (32 - 140°F)

- 5) Select “EVAP SML LEAK P0442/P1442” of “EVAP SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II. Follow the instruction displayed.

NOTE:

- If the CONSULT-II screen shown at left is displayed, stop the engine and stabilize the vehicle temperature at 25°C (77°F) or cooler. After “FUEL T/TMP SE” becomes less than 30°C (86°F), retest. (Use a fan to reduce the stabilization time.)
 - If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to “Basic Inspection”, EC-112.
 - The engine idle portion of this test (See illustration at left.) will take approximately 5 minutes.
- 6) Make sure that “OK” is displayed.
If “NG” is displayed, go to following step.

NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

- 7) Stop engine and wait at least 5 seconds, then turn “ON”.
- 8) Disconnect hose from water separator.
- 9) Select “VENT CONTROL/V” of “ACTIVE TEST” mode with CONSULT-II.
- 10) Touch “ON” and “OFF” alternately.

DTC P1448 EVAP CANISTER VENT CONTROL VALVE

KA24DE

DTC Confirmation Procedure (Cont'd)

ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 (B1)	XXX V
THRTL POS SEN	XXX V

SEF805Y

11) Make sure of the following.

Condition	Air passage continuity between A and B
Touching "ON"	No
Touching "OFF"	Yes

If the result is NG, go to "Diagnostic Procedure", EC-531.
If the result is OK, go to "Diagnostic Procedure" for DTC P0442, EC-353.

AEC783A

Overall Function Check

NGEC0384

Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a DTC might not be confirmed.

Without CONSULT-II

- 1) Disconnect hose from water separator.
- 2) Disconnect EVAP canister vent control valve harness connector.
- 3) Verify the following.

Condition	Air passage continuity
12V direct current supply between terminals 1 and 2	No
No supply	Yes

If the result is NG, go to "Diagnostic Procedure", EC-531.
If the result is OK, perform trouble diagnosis for DTC P0442. Refer to EC-350.

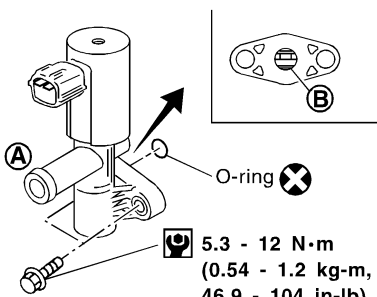
Diagnostic Procedure

NGEC0385

1	CHECK RUBBER TUBE
1. Turn ignition switch OFF. 2. Check disconnection or obstruction of rubber tube connected to EVAP canister vent control valve.	
OK or NG	
OK	▶ GO TO 2.
NG	▶ Repair or clean rubber tube.

2 CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



O-ring

5.3 - 12 N·m
(0.54 - 1.2 kg-m,
46.9 - 104 in-lb)

SEF337X

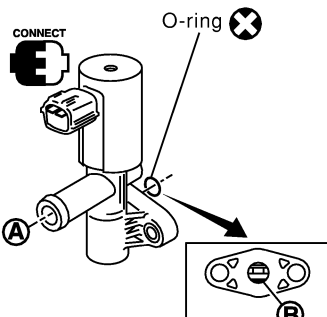
OK or NG

OK	▶	GO TO 3.
NG	▶	Replace EVAP canister vent control valve.

3 CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch "ON".
3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time.



O-ring

ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

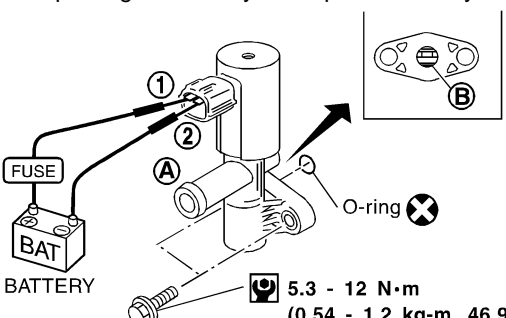
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF991Y

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



O-ring

5.3 - 12 N·m
(0.54 - 1.2 kg-m, 46.9 - 104 in-lb)

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.

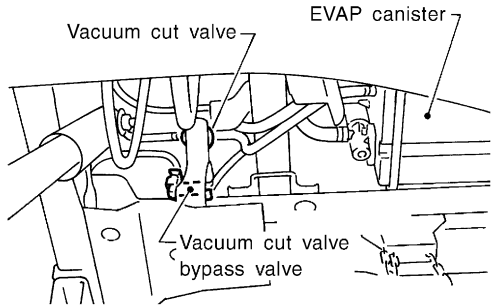
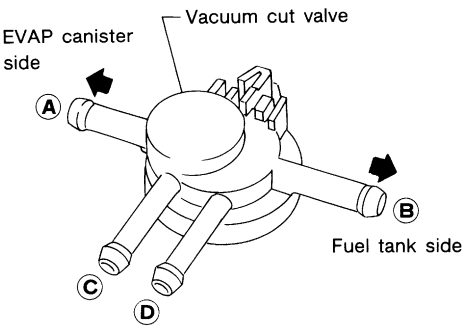
SEF339X

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	CHECK EVAP CANISTER VENT CONTROL VALVE-III	
1. Clean the air passage (Portion A to B) of EVAP canister vent control valve using an air blower. 2. Perform Test No. 13 again.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace EVAP canister vent control valve.

5	CHECK VACUUM CUT VALVE	
Check vacuum cut valve as follows:		
		
SEF186S		
		
SEF379Q		
1. Plug port C and D with fingers. 2. Apply vacuum to port A and check that there is no suction from port B . 3. Apply vacuum to port B and check that there is suction from port A . 4. Blow air in port B and check that there is a resistance to flow out of port A . 5. Open port C and D . 6. Blow air in port A check that air flows freely out of port C . 7. Blow air in port B check that air flows freely out of port D .		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Replace vacuum cut valve.

GI

MA

EM

LC

EC

FE

CL

MT

AT

TF

PD

AX

SU

BR

ST

RS

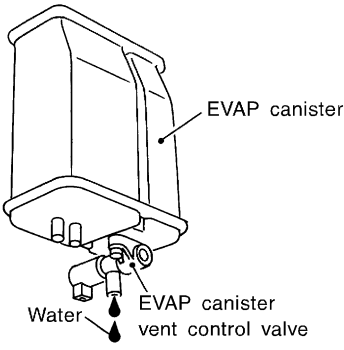
BT

HA

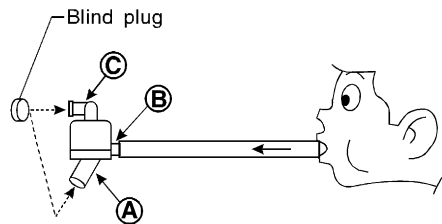
SC

EL

IDX

6	CHECK IF EVAP CANISTER IS SATURATED WITH WATER	
<p>1. Remove EVAP canister with the vent control valve attached.</p> <p>2. Check if water will drain from the EVAP canister.</p>		
		
SEF596U		
Yes or No		
Yes	▶	GO TO 9.
No	▶	GO TO 7.

7	CHECK EVAP CANISTER	
<p>Weigh the EVAP canister with EVAP canister vent control valve attached.</p> <p>The weight should be less than 1.8 kg (4.0 lb).</p>		
OK or NG		
OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ol style="list-style-type: none"> 1. Visually check the EVAP canister for damage. 2. Check hose connection between EVAP canister and water separator for clogging and poor connection. 3. Check water separator. <ol style="list-style-type: none"> a. Check visually for insect nests in the water separator air inlet. b. Check visually for cracks or flaws in the appearance. c. Check visually for cracks or flaws in the hose. d. Check that A and C are not clogged by blowing air into B with A, and then C plugged. 		
		
<p>* (A) : Bottom hole (To atmosphere)</p> <p> (B) : Emergency tube (From EVAP canister)</p> <p> (C) : Inlet port (To member)</p>		
SEF829T		
<p>e. In case of NG in items 2 - 4, replace the parts.</p> <p>● Do not disassemble water separator.</p>		
▶		Repair hose or replace EVAP canister or water separator.

DTC P1448 EVAP CANISTER VENT CONTROL VALVE

KA24DE

Diagnostic Procedure (Cont'd)

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Install hose properly or replace it.

GI

MA

EM

10	CHECK HARNESS CONNECTOR	
1. Disconnect EVAP control system pressure sensor harness connector. 2. Check harness connector for water. Water should not exist.		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

LC

EC

FE

11	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	
Perform "DTC Confirmation Procedure", EC-382.		
OK or NG		
OK	▶	GO TO 12.
NG	▶	Replace EVAP control system pressure sensor and repair or replace harness and connector.

CL

MT

AT

12	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.		
	▶	INSPECTION END

TF

PD

AX

SU

BR

ST

RS

BT

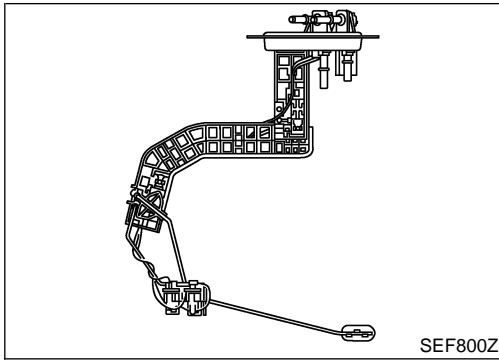
HA

SC

EL

IDX

Component Description



Component Description

The fuel level sensor is mounted in the fuel level sensor unit. ^{NGEC1036} The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

On Board Diagnostic Logic

ECM receives two signals from the fuel level sensor. ^{NGEC1037}

One is fuel level sensor power supply circuit, and the other is fuel level sensor ground circuit.

This diagnosis indicates the latter to detect open circuit malfunction. Malfunction is detected when a high voltage from the sensor is sent to ECM.

Possible Cause

- Fuel level sensor circuit
(The fuel level sensor circuit is open or shorted.) ^{NGEC1038}

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test. ^{NGEC1039}

3

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

Ⓟ WITH CONSULT-II

- 1) Turn ignition switch "ON". ^{NGEC1039S01}
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-538.

Ⓢ WITH GST

Follow the procedure "WITH CONSULT-II" above. ^{NGEC1039S02}

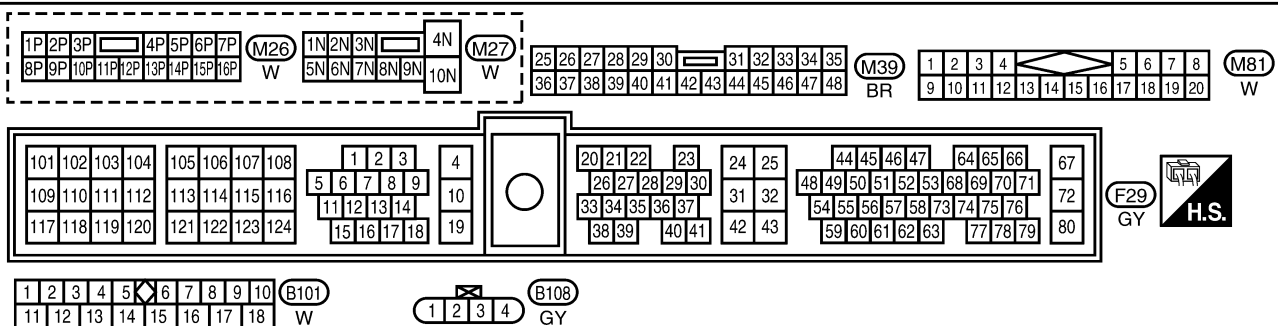
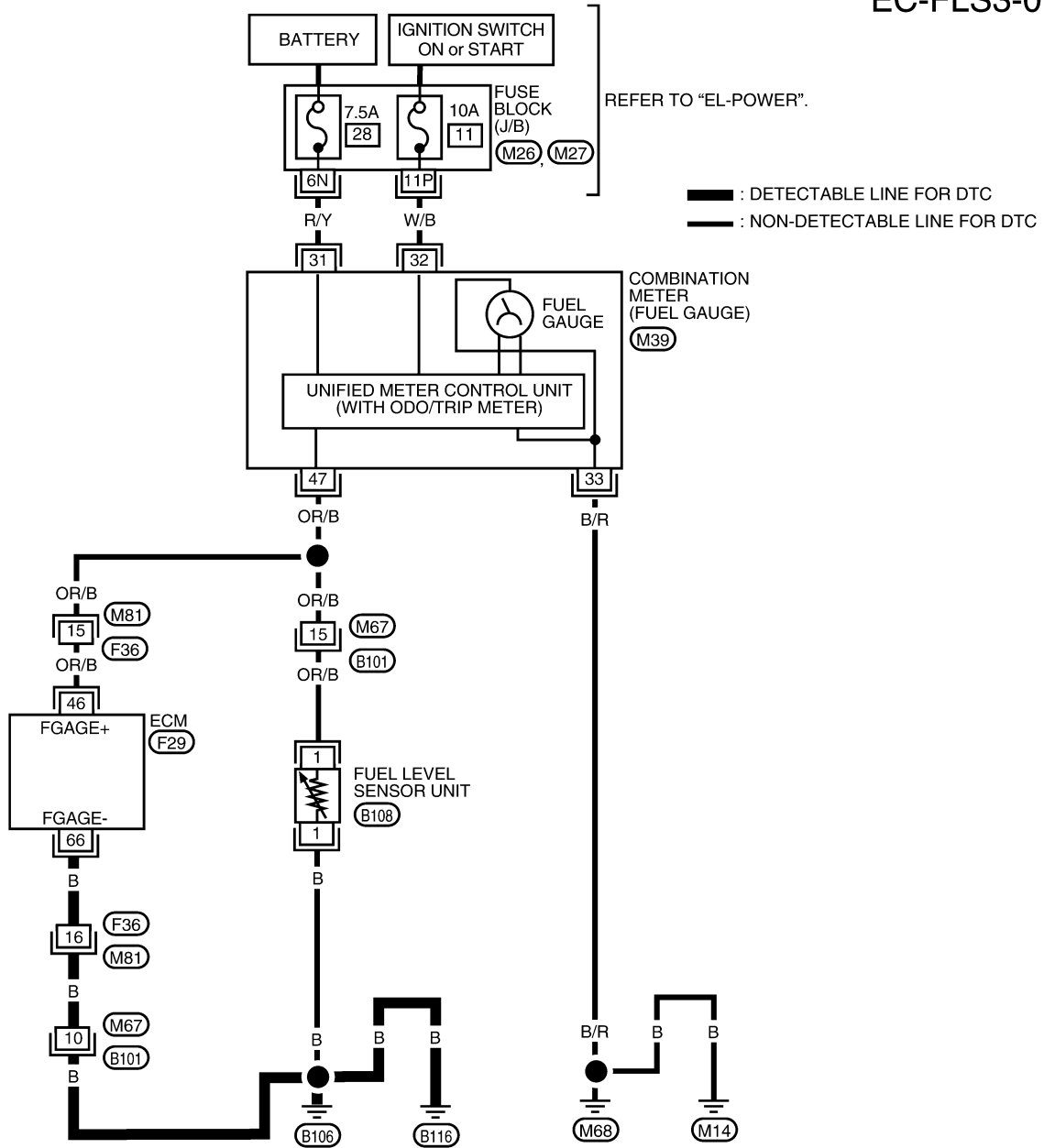
DTC P1464 FUEL LEVEL SENSOR

KA24DE
Wiring Diagram

Wiring Diagram

NGEC1040

EC-FLS3-01



GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
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BT
HA
SC
EL
IDX

Diagnostic Procedure

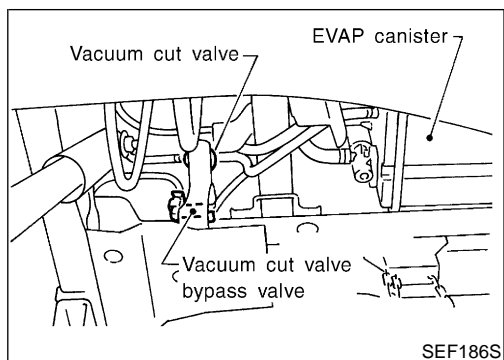
=NGEC1041

1	CHECK FUEL LEVEL 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 body 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	
1. Check the following. <ul style="list-style-type: none"> ● Harness connectors F36, M81 ● Harness connectors M67, B101 ● Harness for open and short between ECM and body ground 		
▶		Replace open circuit or short to power in harness or connectors.

3	CHECK FUEL LEVEL SENSOR	
Refer to EL-89 , "Fuel Level Sensor Unit Check".		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Replace fuel level sensor unit.

4	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.		
OK or NG		
▶		INSPECTION END



Description

COMPONENT DESCRIPTION

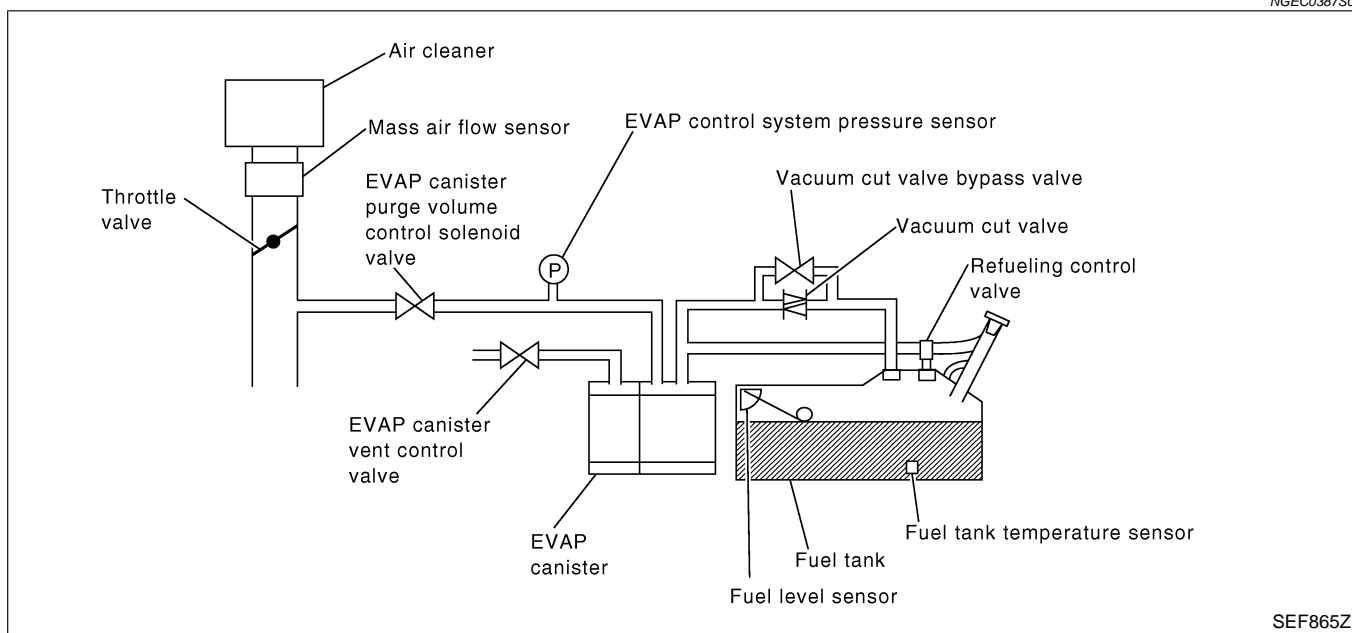
The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.

The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.

The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened. The vacuum cut valve is then bypassed to apply intake manifold vacuum to the fuel tank.

EVAPORATIVE EMISSION SYSTEM DIAGRAM



CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	● Ignition switch: ON	OFF

ECM Terminals and Reference Value

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
120	P/B	Vacuum cut valve bypass valve	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0390

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1490	<ul style="list-style-type: none"> An improper voltage signal is sent to ECM through vacuum cut valve bypass valve. 	<ul style="list-style-type: none"> Harness or connectors (The vacuum cut valve bypass valve circuit is open or shorted.) Vacuum cut valve bypass valve

DTC Confirmation Procedure

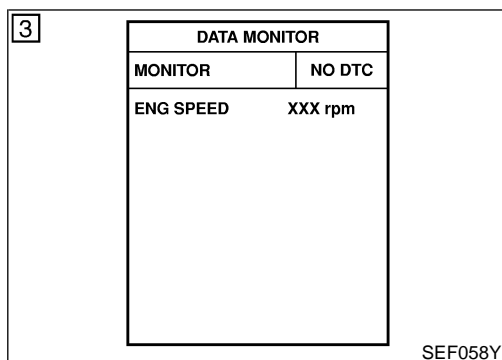
NGEC0391

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 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 wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-542.

With GST

Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0392

EC-BYPS/V-01

GI

MA

EM

LC

EC

FE

CL

MT

AT

TF

PD

AX

SU

BR

ST

RS

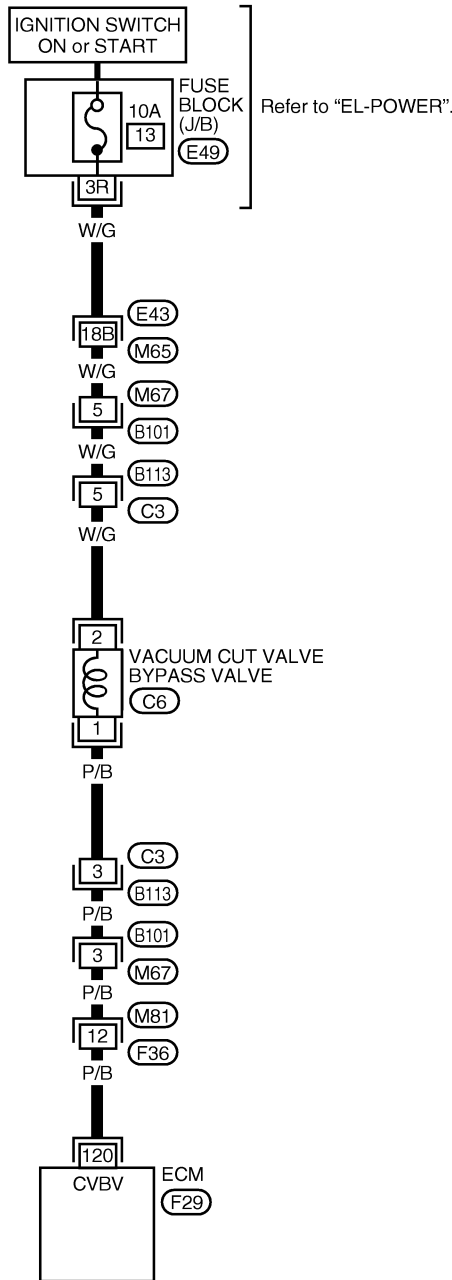
BT

HA

SC

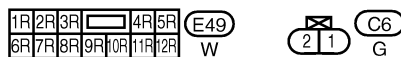
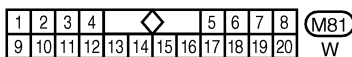
EL

IDX

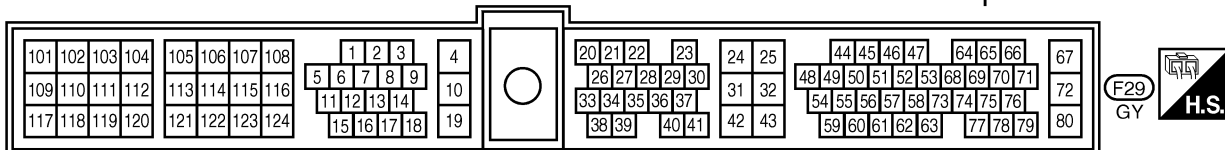
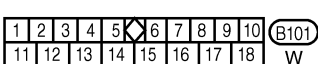


Refer to "EL-POWER".

— : Detectable line for DTC
— : Non-detectable line for DTC



Refer to the following.
M65, E43 - SUPER
MULTIPLE JUNCTION (SMJ)



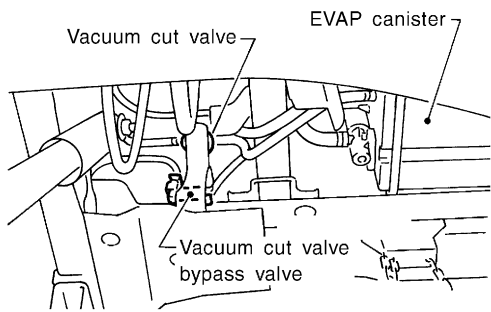
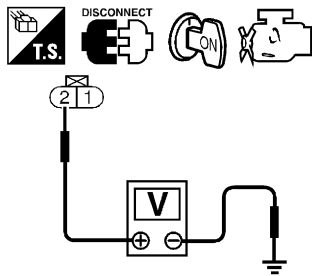
Diagnostic Procedure

NGEC0393

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK VACUUM CUT VALVE BYPASS VALVE CIRCUIT																					
<p>1. Turn ignition switch ON. 2. Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.</p>																						
<table border="1"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td>VC/V BYPASS/V</td> <td>OFF</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td>XXX %</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td>RICH</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </table>			ACTIVE TEST		VC/V BYPASS/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	HO2S1 MNTR (B1)	RICH	THRTL POS SEN	XXX V						
ACTIVE TEST																						
VC/V BYPASS/V	OFF																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
HO2S1 MNTR (B1)	RICH																					
THRTL POS SEN	XXX V																					
<p>3. Make sure that clicking sound is heard from the vacuum cut valve bypass valve.</p>																						
OK or NG																						
OK	▶	GO TO 7.																				
NG	▶	GO TO 3.																				

SEF806Y

3	CHECK POWER SUPPLY	<p>1. Turn ignition switch OFF. 2. Disconnect vacuum cut valve bypass valve harness connector.</p> <div style="text-align: center;">  </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 2 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p>Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 5.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 4.</td> </tr> </table>	OK	▶	GO TO 5.	NG	▶	GO TO 4.	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white; text-align: center;">EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p> <p>TF</p> <p>PD</p> <p>AX</p>
OK	▶	GO TO 5.							
NG	▶	GO TO 4.							

SEF186S

SEF192V

4	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M67, B101 ● Harness connectors B113, C3 ● Fuse block (J/B) connector E49 ● 10A fuse ● Harness for open or short between vacuum cut valve bypass valve and 10A fuse <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;"></td> <td style="width: 5%; text-align: center;">▶</td> <td>Repair harness or connectors.</td> </tr> </table>		▶	Repair harness or connectors.	<p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>
	▶	Repair harness or connectors.				

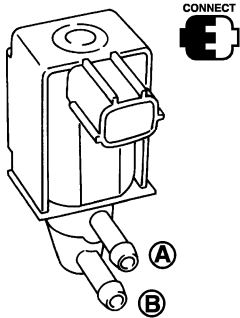
5	CHECK OUTPUT SIGNAL CIRCUIT
<p>1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 120 and terminal 1.</p>	
SEF253V	
<p>Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 7.
NG	▶ GO TO 6.

6	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M81, F36 ● Harness connectors M67, B101 ● Harness connectors B113, C3 ● Harness for open or short between vacuum cut valve bypass valve and ECM 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

7 CHECK VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II

Check air passage continuity.
Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.



ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	RICH
THR TL POS SEN	XXX V

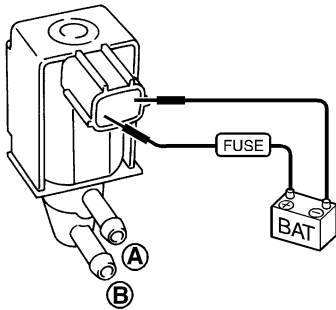
Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEF807Y

Without CONSULT-II

Check air passage continuity shown in the figure.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

Operation takes less than 1 second.

SEF557Y

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace vacuum cut valve bypass valve.

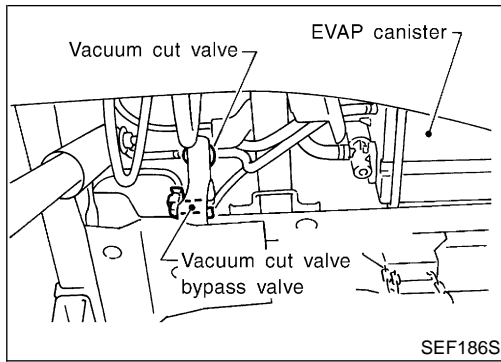
8 CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.

▶	INSPECTION END
---	-----------------------

GI
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Description



Description

COMPONENT DESCRIPTION

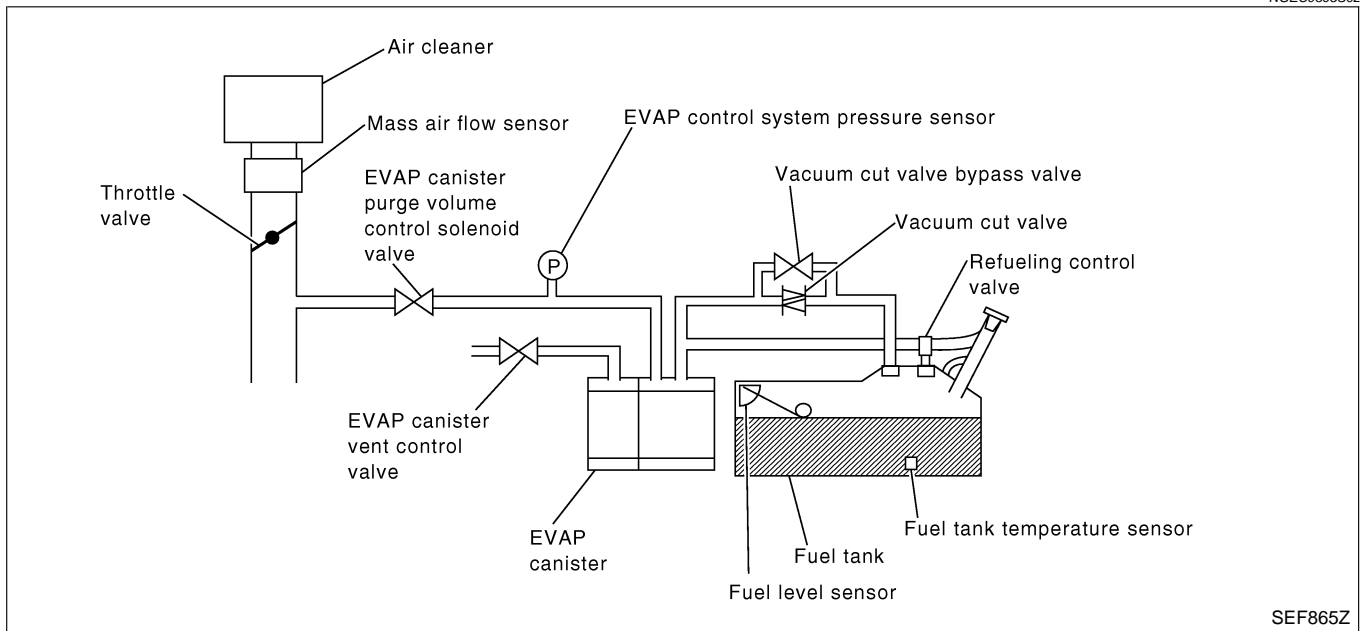
The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.

The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.

The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened. The vacuum cut valve is then bypassed to apply intake manifold vacuum to the fuel tank.

EVAPORATIVE EMISSION SYSTEM DIAGRAM



CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	● Ignition switch: ON	OFF

ECM Terminals and Reference Value

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

CAUTION:

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

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
120	P/B	Vacuum cut valve bypass valve	[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0398

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1491	Vacuum cut valve bypass valve does not operate properly.	<ul style="list-style-type: none"> • Vacuum cut valve bypass valve • Vacuum cut valve • Bypass hoses for clogging • EVAP control system pressure sensor • EVAP canister vent control valve • Hose between fuel tank and vacuum cut valve clogged • Hose between vacuum cut valve and EVAP canister clogged • EVAP canister • EVAP purge port of fuel tank for clogging

GI
MA
EM
LC
EC

7	VC CUT/V BP/V P1491	
	OUT OF CONDITION	
	MONITOR	
	ENG SPEED	XXX rpm
	VHCL SPEED SE	XXX km/h
	B/FUEL SCHDL	XXX msec

SEF210Y

7	VC CUT/V BP/V P1491	
	TESTING	
	MONITOR	
	ENG SPEED	XXX rpm
	VHCL SPEED SE	XXX km/h
	B/FUEL SCHDL	XXX msec

SEF211Y

7	VC CUT/V BP/V P1491	
	COMPLETED	

SEF239Y

DTC Confirmation Procedure

NGEC0399

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 5 seconds before conducting the next test.

TESTING CONDITION:

- Always perform test at a temperature of 5 to 30°C (41 to 86°F).
- This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

Ⓜ With CONSULT-II

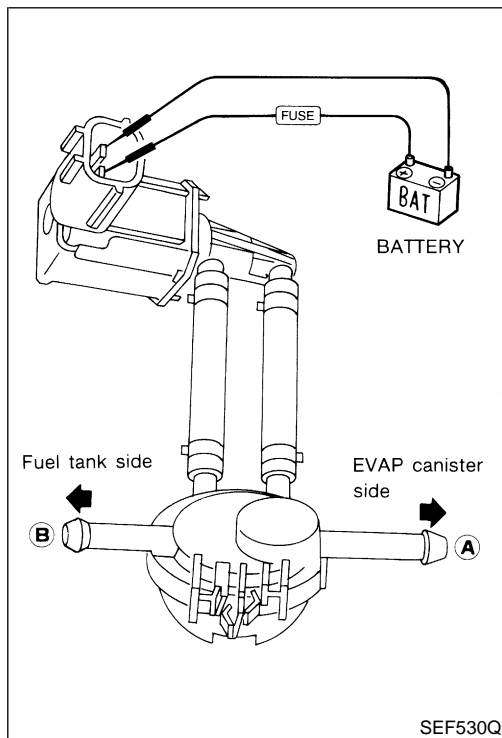
- 1) Turn ignition switch ON.
- 2) Start engine and warm it up to normal operating temperature.
- 3) Turn ignition switch OFF and wait at least 5 seconds.
- 4) Start engine and let it idle for at least 60 seconds.
- 5) Select "VC CUT/V BP/V P1491" of "EVAP SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 6) Touch "START".
- 7) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 30 seconds.)

ENG SPEED	More than 1,000 rpm
Selector lever	Suitable position
Vehicle speed	36 - 120 km/h (22 - 75 MPH)
B/FUEL SCHDL	Less than 10 msec

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BR
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RS
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EL
IDX

If “TESTING” is not displayed after 5 minutes, retry from step 3.

- 8) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to “Diagnostic Procedure”.



Overall Function Check

Use this procedure to check the overall function of vacuum cut valve bypass valve. During this check, the 1st trip DTC might not be confirmed.

NGEC0400

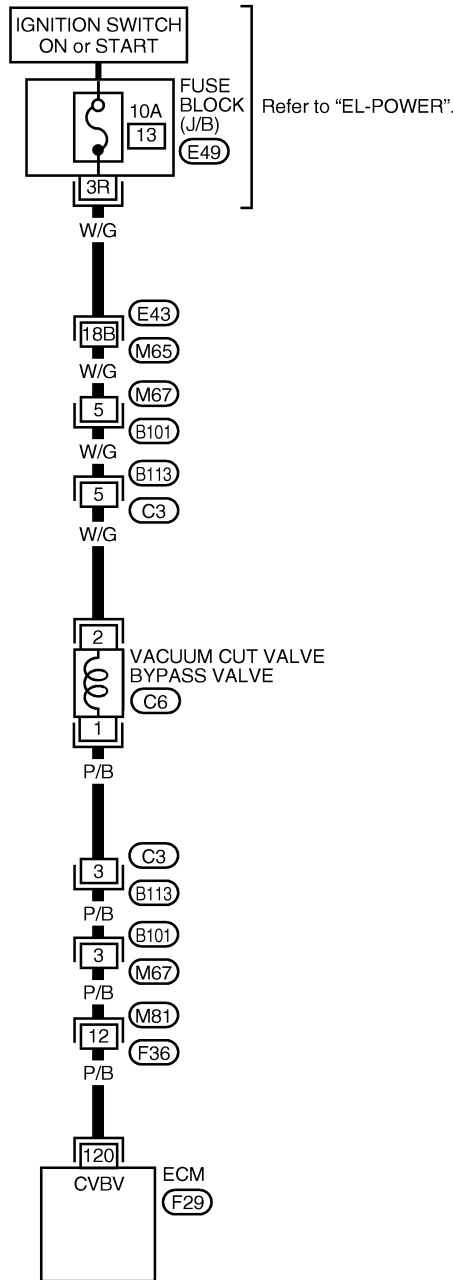
⊗ Without CONSULT-II

1. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
2. Apply vacuum to port **A** and check that there is no suction from port **B**.
3. Apply vacuum to port **B** and check that there is suction from port **A**.
4. Blow air in port **B** and check that there is a resistance to flow out of port **A**.
5. Supply battery voltage to the terminal.
6. Blow air in port **A** and check that air flows freely out of port **B**.
7. Blow air in port **B** and check that air flows freely out of port **A**.
8. If NG, go to “DIAGNOSTIC PROCEDURE” on EC-550.

Wiring Diagram

NGEC0505

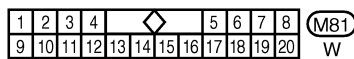
EC-BYPS/V-01



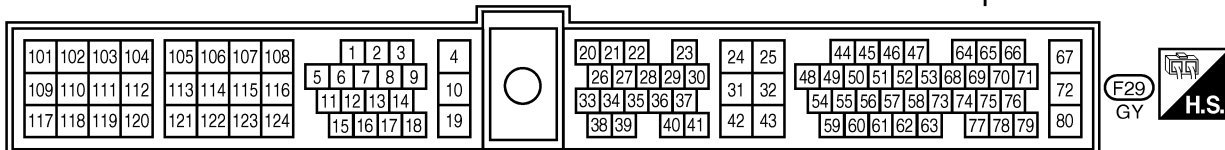
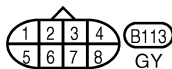
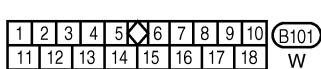
Refer to "EL-POWER".

— : Detectable line for DTC
 — : Non-detectable line for DTC

- GI
- MA
- EM
- LC
- EC**
- FE
- CL
- MT
- AT
- TF
- PD
- AX
- SU
- BR
- ST



Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)

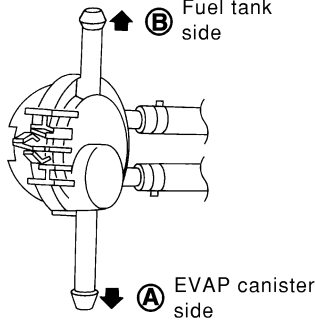


- RS
- BT
- HA
- SC
- EL
- IDX

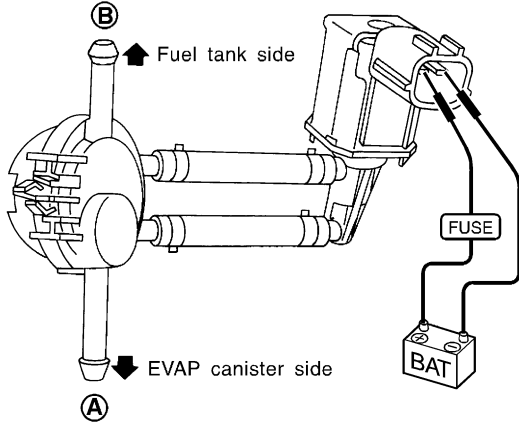
Diagnostic Procedure

NGEC0401

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK COMPONENT																					
<p>🔧 With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly. 3. Apply vacuum to port A and check that there is no suction from port B. 4. Apply vacuum to port B and check that there is suction from port A. 5. Blow air in port B and check that there is a resistance to flow out of port A. 6. Turn ignition switch ON. 7. Select "VC/V BYPASS/V" in "ACTIVE TEST" mode with CONSULT-II and touch "ON". 8. Blow air in port A and check that air flows freely out of port B. 9. Blow air in port B and check that air flows freely out of port A. 																						
																						
<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> </thead> <tbody> <tr> <td>VC/V BYPASS/V</td> <td>OFF</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td>XXX %</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td>RICH</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>			ACTIVE TEST		VC/V BYPASS/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	HO2S1 MNTR (B1)	RICH	THRTL POS SEN	XXX V						
ACTIVE TEST																						
VC/V BYPASS/V	OFF																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
HO2S1 MNTR (B1)	RICH																					
THRTL POS SEN	XXX V																					
OK or NG																						
OK	▶	GO TO 4.																				
NG	▶	GO TO 5.																				

SEF808Y

3	CHECK COMPONENT
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly. 3. Apply vacuum to port A and check that there is no suction from port B. 4. Apply vacuum to port B and check that there is suction from port A. 5. Blow air in port B and check that there is a resistance to flow out of port A. 6. Disconnect vacuum cut valve bypass valve harness connector. 7. Supply battery voltage to the terminal. 8. Blow air in port A and check that air flows freely out of port B. 9. Blow air in port B and check that air flows freely out of port A. 	
	
OK or NG	
OK	▶ GO TO 4.
NG	▶ GO TO 5.

4	CHECK EVAP PURGE LINE
<ol style="list-style-type: none"> 1. Check EVAP purge line between EVAP canister and fuel tank for clogging or disconnection. 2. Check EVAP purge port of fuel tank for clogging. 3. Check EVAP canister. Refer to EC-40. 	
OK or NG	
OK	▶ GO TO 8.
NG (Step 1)	▶ Repair it.
NG (Step 2)	▶ Clean EVAP purge port.
NG (Step 3)	▶ Replace EVAP canister.

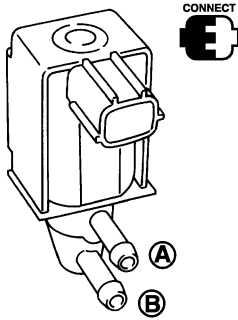
5	CHECK BYPASS HOSE
Check bypass hoses for clogging.	
OK or NG	
OK	▶ GO TO 6.
NG	▶ Repair or replace hoses.

GI
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 EL
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6 CHECK VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II

Check air passage continuity.
Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.



ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	RICH
THR TL POS SEN	XXX V

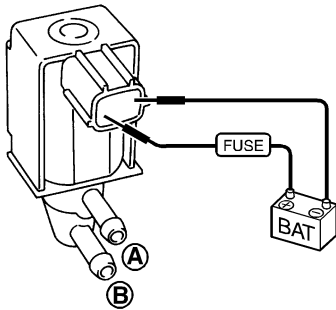
Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEF807Y

Without CONSULT-II

Check air passage continuity shown in the figure.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

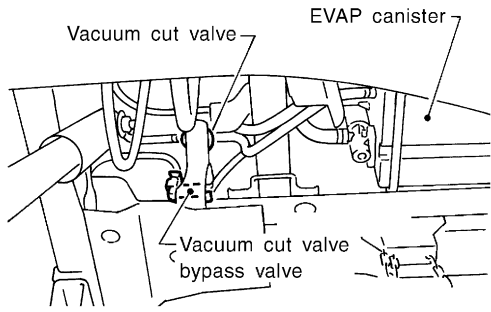
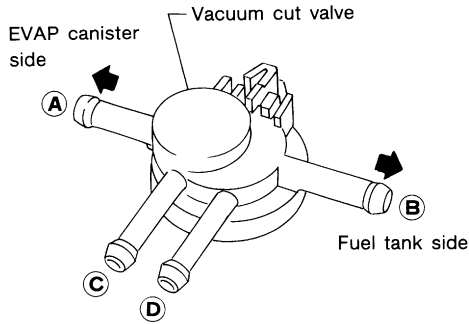
Operation takes less than 1 second.

SEF557Y

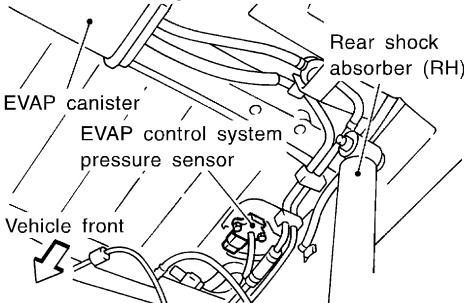
OK or NG

OK ► GO TO 7.

NG ► Replace vacuum cut valve bypass valve.

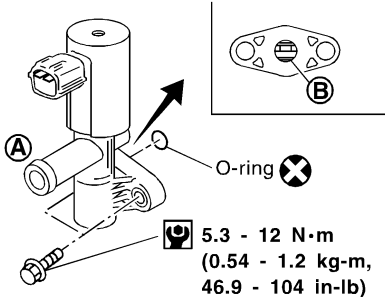
7	CHECK VACUUM CUT VALVE	<p>Check vacuum cut valve as follows:</p> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF186S</p> <p style="text-align: right;">SEF379Q</p> <ol style="list-style-type: none"> 1. Plug port C and D with fingers. 2. Apply vacuum to port A and check that there is no suction from port B. 3. Apply vacuum to port B and check that there is suction from port A. 4. Blow air in port B and check that there is a resistance to flow out of port A. 5. Open port C and D. 6. Blow air in port A check that air flows freely out of port C. 7. Blow air in port B check that air flows freely out of port D. <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 8.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace vacuum cut valve.</td> </tr> </table>	OK	▶	GO TO 8.	NG	▶	Replace vacuum cut valve.	GI MA EM LC EC FE CL MT AT TF PD AX SU
OK	▶	GO TO 8.							
NG	▶	Replace vacuum cut valve.							

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor. <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 9.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Repair it</td> </tr> </table>	OK	▶	GO TO 9.	NG	▶	Repair it	BR ST RS BT HA SC EL IDX
OK	▶	GO TO 9.							
NG	▶	Repair it							

9	CHECK CONNECTOR		
1. Disconnect EVAP control system pressure sensor harness connector.			
View with spare tire removed.			
			
2. Check connectors for water. Water should not exist.			
OK or NG			
OK	▶	GO TO 10.	
NG	▶	Replace EVAP control system pressure sensor.	

SEF341V

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR		
Perform "DTC Confirmation Procedure", EC-382.			
OK or NG			
OK	▶	GO TO 11.	
NG	▶	Replace EVAP control system pressure sensor.	

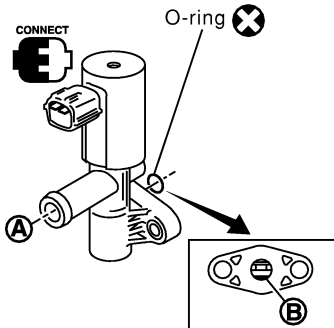
11	CHECK EVAP CANISTER VENT CONTROL VALVE-I		
1. Remove EVAP canister vent control valve from EVAP canister. 2. Check portion B of EVAP canister vent control valve for being rusted.			
			
OK or NG			
OK	▶	GO TO 12.	
NG	▶	Replace EVAP canister vent control valve.	

SEF337X

12 CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Turn ignition switch ON.
2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
3. Check air passage continuity and operation delay time.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 (B1)	XXX V
THRTL POS SEN	XXX V

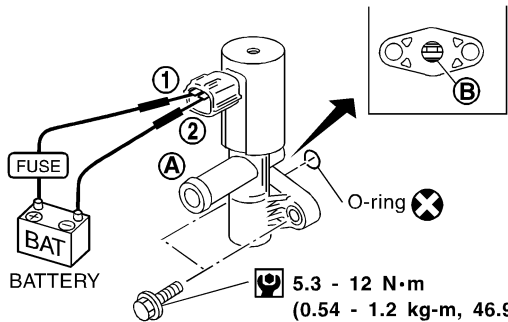
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF803Y

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.

SEF339X

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 14.
NG	▶	GO TO 13.

13 CHECK EVAP CANISTER VENT CONTROL VALVE-III

1. Clean the air passage (Portion A to B) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 3 again.

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace EVAP canister vent control valve.

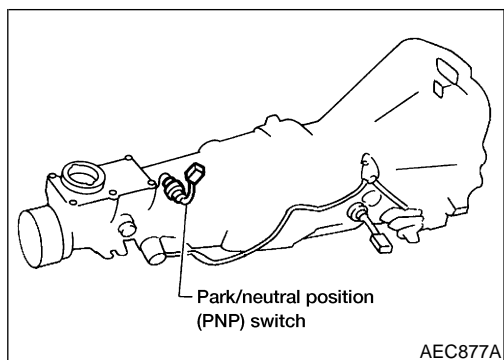
14 CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.

▶	INSPECTION END
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Component Description



Component Description

When the gear position is "N", park/neutral position (PNP) switch is "ON". NGEC0424

ECM detects the park/neutral position when continuity with ground exists.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0425

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: "N" ON
		Except above OFF

ECM Terminals and Reference Value

NGEC0426

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

CAUTION:

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

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22	L/B	PNP switch	[Ignition switch "ON"] ● Gear position is "Neutral position"	Approximately 0V
			[Ignition switch "ON"] ● Except the above gear position	Approximately 5V

On Board Diagnosis Logic

NGEC0427

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1706	<ul style="list-style-type: none"> ● The signal of the PNP switch is not changed in the process of engine starting and driving. 	<ul style="list-style-type: none"> ● Harness or connectors (The PNP switch circuit is open or shorted.) ● PNP switch

=NGEC0428

DATA MONITOR	
MONITOR	NO DTC
P/N POSI SW	ON

SEF212Y

5

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

SEF213Y

DTC Confirmation Procedure

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 5 seconds before conducting the next test.

④ With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-II. Then check the "P/N POSI SW" signal under the following conditions.

Position (Selector lever)	Known-good signal
Neutral position	ON
Except the above position	OFF

If NG, go to "Diagnostic Procedure", EC-560.

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 - 4,000 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	3.5 - 17 msec
VHCL SPEED SE	More than 64 km/h (40 MPH)
Selector lever	Suitable position

- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-560.

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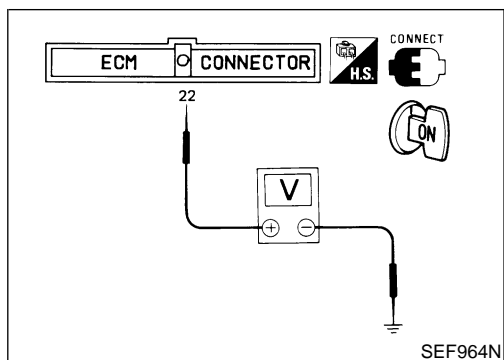
HA

SC

EL

IDX

Overall Function Check



Overall Function Check

Use this procedure to check the overall function of the park/neutral position switch circuit. During this check, a 1st trip DTC might not be confirmed. =NGEC0429

⊗ Without CONSULT-II

- 1) Turn ignition switch ON.
- 2) Check voltage between ECM terminal 22 (PNP switch signal) and body ground under the following conditions.

Condition (Gear position)	Voltage (V) (Known-good data)
Neutral position	Approx. 0
Except the above position	Approx. 5

- 3) If NG, go to "Diagnostic Procedure", EC-560.

DTC P1706 PNP SWITCH

KA24DE
Wiring Diagram

Wiring Diagram

NGEC0430

EC-PNP/SW-01

GI

MA

EM

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EC

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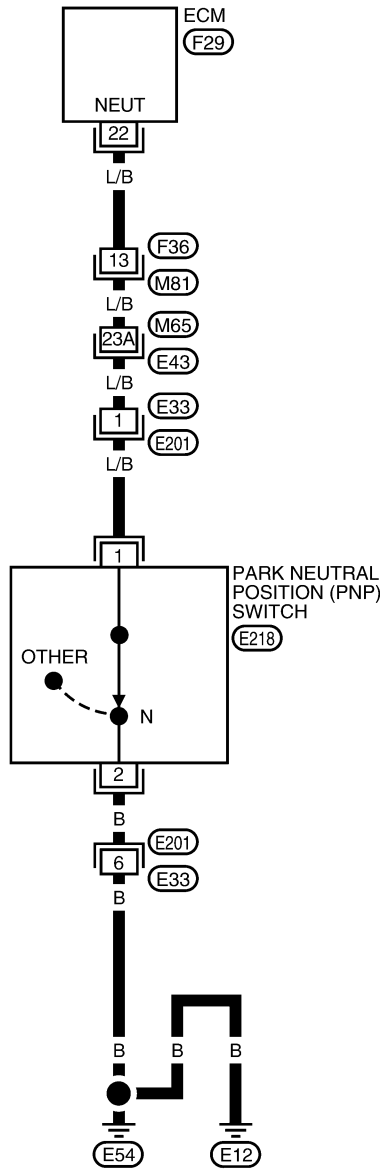
BT

HA

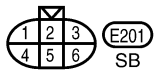
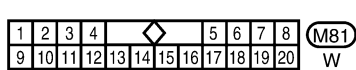
SC

EL

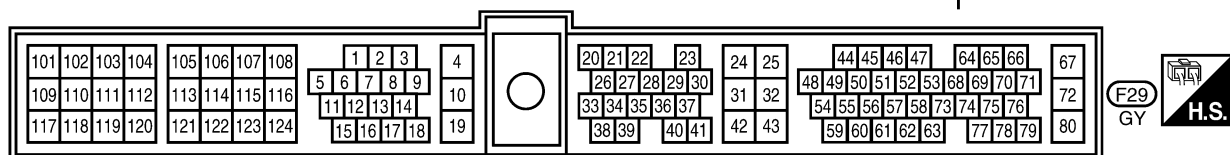
IDX



— : Detectable line for DTC
— : Non-detectable line for DTC



Refer to the following.
M65, E43 - SUPER
MULTIPLE JUNCTION (SMJ)



LEC980

DTC P1706 PNP SWITCH

KA24DE

Diagnostic Procedure For M/T Models (Cont'd)

3	CHECK INPUT SIGNAL CIRCUIT		
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 22 and terminal 1.</p>			
SEF219V			
<p>Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>			
OK	▶	GO TO 5.	
NG	▶	GO TO 4.	

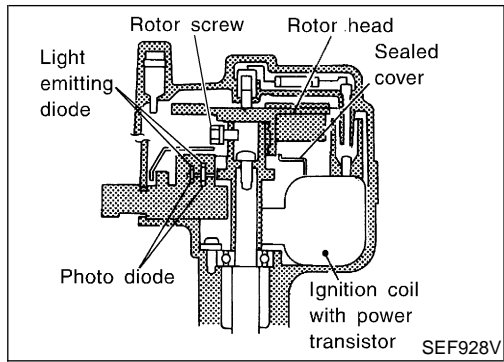
4	DETECT MALFUNCTIONING PART		
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F36, M81 ● Harness connectors M65, E43 ● Harness connectors E33, E201 ● Harness for open or short between ECM and PNP switch 			
▶		Repair open circuit or short to ground or short to power in harness or connectors.	

5	CHECK PNP SWITCH		
Refer to MT-8 .			
OK or NG			
OK	▶	GO TO 6.	
NG	▶	Replace PNP switch.	

6	CHECK INTERMITTENT INCIDENT		
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.			
▶		INSPECTION END	

GI
MA
EM
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Component Description



Component Description

IGNITION COIL & POWER TRANSISTOR

NGEC0319

NGEC0319S01

The ignition signal from the ECM is sent to the power transistor. The power transistor switches the ignition coil primary circuit on and off. As the primary circuit is turned on and off, the proper high voltage is induced in the coil secondary circuit. The distributor is not repairable and must be replaced as an assembly except distributor cap and rotor head.

NOTE:

The rotor screw which secures the distributor rotor head to the distributor shaft must be tightened properly.

: 3.3 - 3.9 N-m (0.34 - 0.40 kg-m, 29.5 - 34.7 in-lb)

CONSULT-II Reference Value in Data Monitor Mode

NGEC0320

MONITOR ITEM	CONDITION		SPECIFICATION
IGN TIMING	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle	Approx. 20° BTDC
		2,000 rpm	More than 25° BTDC

IGNITION SIGNAL

KA24DE

ECM Terminals and Reference Value

ECM Terminals and Reference Value

=NGEC0321

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

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	PU/W	Ignition signal	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>0 - 0.5V</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	<p>0.2 - 1.0V</p>
2	B	Ignition check	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>12 - 14V</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	<p>12 - 13V</p>

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IGNITION SIGNAL

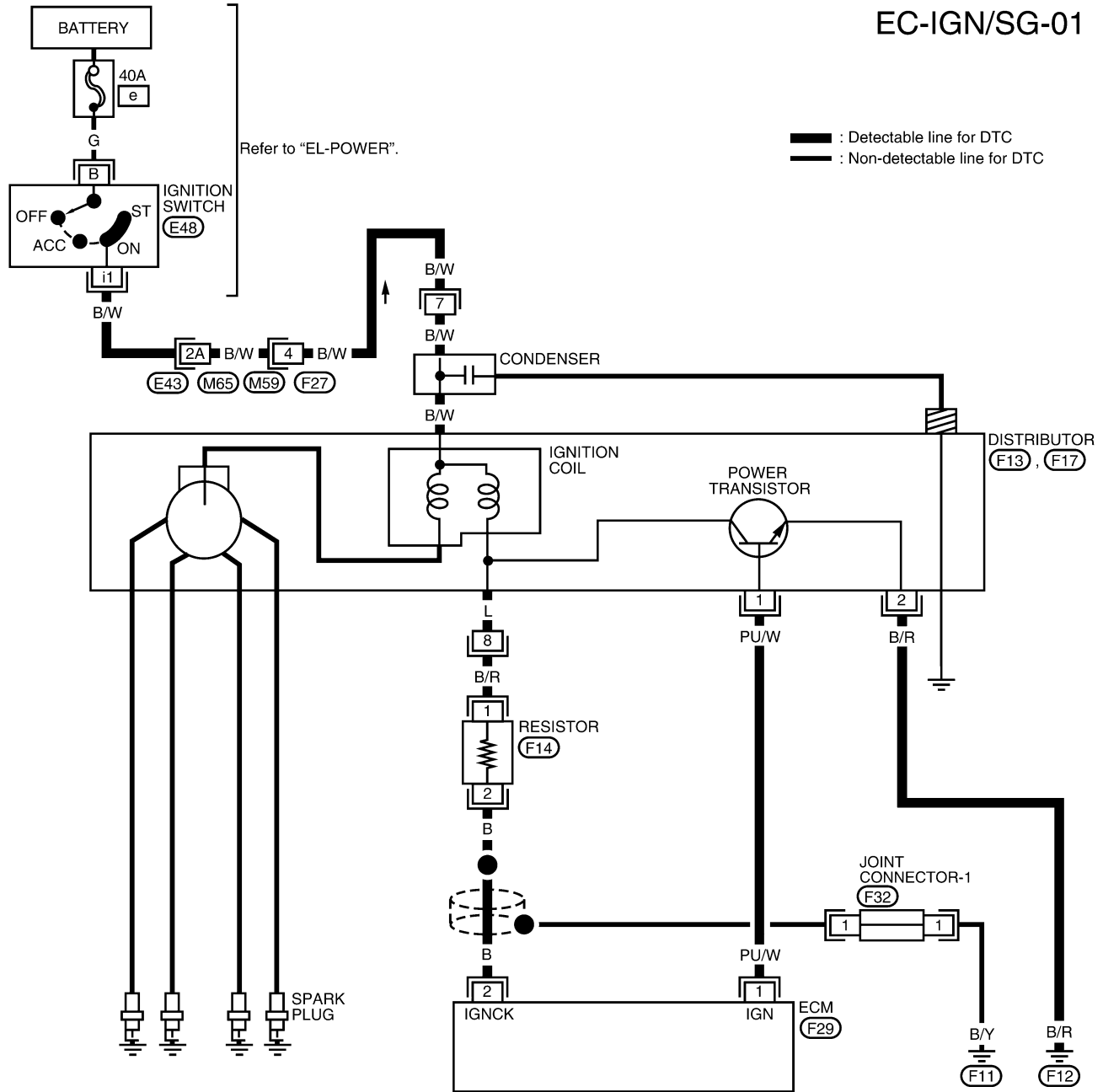
KA24DE

Wiring Diagram

Wiring Diagram

NGEC0324

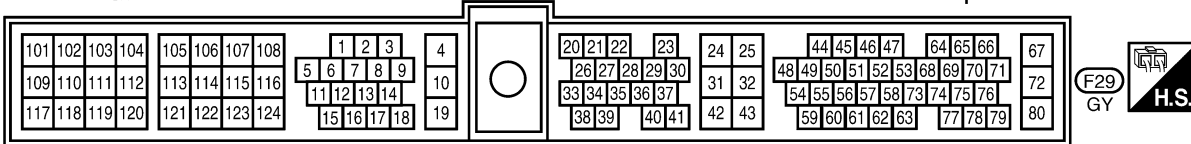
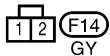
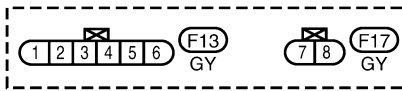
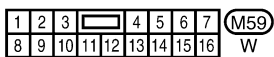
EC-IGN/SG-01



: Detectable line for DTC
 : Non-detectable line for DTC

Refer to "EL-POWER".

Refer to the following.
 (M65, E43) - SUPER
 MULTIPLE JUNCTION (SMJ)
 (F32) - JOINT CONNECTOR



LEC981

Diagnostic Procedure

NGE0325

1	INSPECTION 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.

 GI
MA
EM
LC

2	CHECK OVERALL FUNCTION																	
Ⓜ With CONSULT-II 1. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II. 2. Make sure that all circuits do not produce a momentary engine speed drop.																		
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>POWER BALANCE</th> <th></th> </tr> <tr> <th colspan="2">MONITOR</th> </tr> </thead> <tbody> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>MAS A/F SE-B1</td> <td>XXX V</td> </tr> <tr> <td>IACV-AAC/V</td> <td>XXX %</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>			ACTIVE TEST		POWER BALANCE		MONITOR		ENG SPEED	XXX rpm	MAS A/F SE-B1	XXX V	IACV-AAC/V	XXX %				
ACTIVE TEST																		
POWER BALANCE																		
MONITOR																		
ENG SPEED	XXX rpm																	
MAS A/F SE-B1	XXX V																	
IACV-AAC/V	XXX %																	
OK or NG																		
OK ▶	▶	INSPECTION END																
NG ▶	▶	GO TO 7.																

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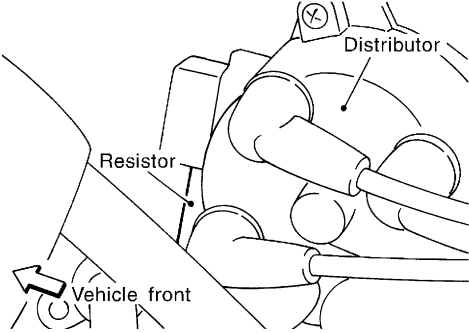
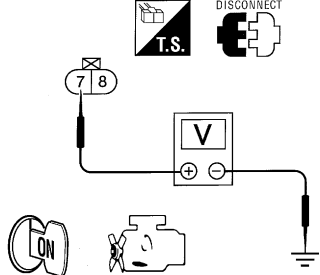
SEF981Z

3	CHECK OVERALL FUNCTION	
⊗ Without CONSULT-II 1. Let engine idle. 2. Read the voltage signal between ECM terminal 1 and ground with an oscilloscope. 3. Verify that the oscilloscope screen shows the signal wave as shown below.		
OK or NG		
OK ▶	▶	INSPECTION END
NG ▶	▶	GO TO 7.

 AX
SU
BR
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SEF984Z

 EL
IDX

4	CHECK POWER SUPPLY		
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect ignition coil harness connector. 			
			
SEF344V			
<ol style="list-style-type: none"> 3. Turn ignition switch ON. 4. Check voltage between terminal 7 and ground with CONSULT-II or tester. 			
			
AEC698			
Voltage: Battery voltage			
OK or NG			
OK	▶	GO TO 6.	
NG	▶	GO TO 5.	

5	DETECT MALFUNCTIONING PART		
Check the following. <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M59, F27 ● Harness for open or short between ignition coil and ignition switch 			
		▶	Repair harness or connectors.

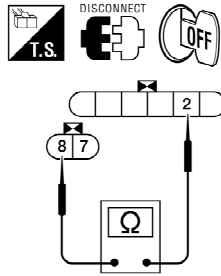
6	CHECK GROUND CIRCUIT		
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect power transistor harness connector. 3. Check harness continuity between power transistor terminal 2 and engine ground. Refer to the wiring diagram. Continuity should exist. 4. Also check harness for short to power. 			
OK or NG			
OK	▶	GO TO 7.	
NG	▶	Repair open circuit or short to power in harness or connectors.	

7	CHECK INPUT SIGNAL CIRCUIT	<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 1 and power transistor terminal 1.</p> <div style="text-align: center;"> </div> <p style="text-align: right;">AEC700</p> <p>Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	GI MA EM LC EC FE CL
OK	▶	GO TO 8.	
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.	

8	CHECK IGNITION COIL	<p>1. Disconnect ignition coil harness connector. 2. Remove distributor cap. 3. Check resistance as shown in the figure.</p> <div style="text-align: center;"> </div> <div style="text-align: right;">AEC150A</div> <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Terminal</th> <th style="text-align: center;">Resistance [at 25°C (77°F)]</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">7 - 8</td> <td style="text-align: center;">Less than 1Ω</td> </tr> <tr> <td style="text-align: center;">7 - 9</td> <td style="text-align: center;">7 - 13Ω</td> </tr> </tbody> </table> <div style="text-align: right;">MTBL0300</div> <p style="text-align: center;">OK or NG</p>	Terminal	Resistance [at 25°C (77°F)]	7 - 8	Less than 1Ω	7 - 9	7 - 13Ω	MT AT TF PD AX SU BR ST RS BT HA SC EL IDX
Terminal	Resistance [at 25°C (77°F)]								
7 - 8	Less than 1Ω								
7 - 9	7 - 13Ω								
OK	▶	GO TO 9.							
NG	▶	Replace distributor assembly as a unit.							

9 CHECK POWER TRANSISTOR

1. Disconnect camshaft position sensor & power transistor harness connector and ignition coil harness connector.
2. Check power transistor resistance between terminals 2 and 8.



AEC151A

Terminals	Resistance	Result
2 and 8	Except 0Ω	OK
	0Ω	NG

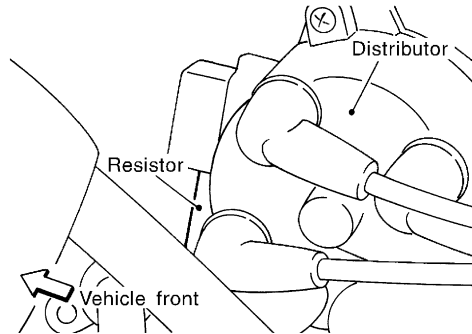
MTBL0301

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace distributor assembly.

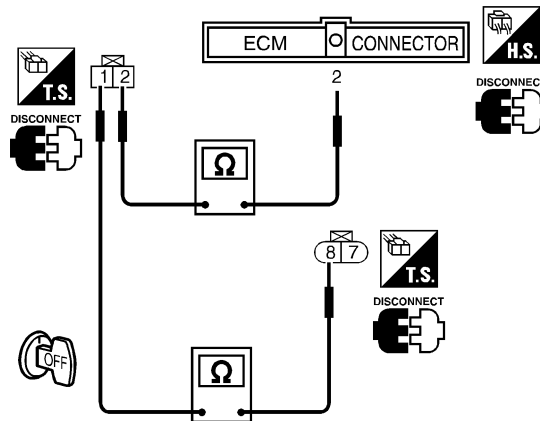
10 CHECK INPUT SIGNAL CIRCUIT

1. Stop engine.
2. Disconnect ignition coil harness connector.
3. Strip tape covering resistor.
4. Disconnect resistor harness connector.



SEF344V

5. Disconnect ECM harness connector.
6. Check harness continuity between ignition coil terminal 8 and resistor terminal 1, resistor terminal 2 and ECM terminal 2.



SEF179X

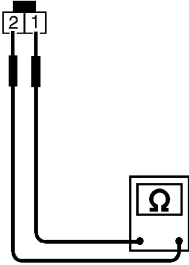
Continuity should exist.

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

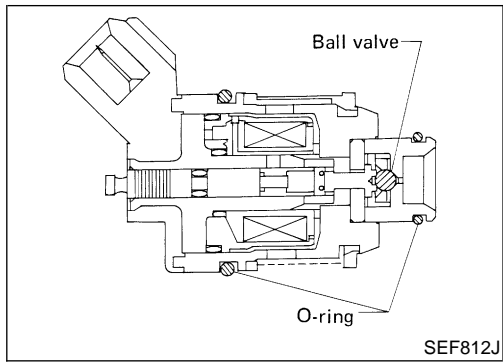
OK or NG

OK	▶	GO TO 11.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

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11	CHECK RESISTOR	
<p>1. Disconnect resistor harness connector. 2. Check resistance between terminals 1 and 2.</p>		
		
<p>Resistance: Approximately 2.2 kΩ [at 25°C (77°F)]</p>		
SEF240V		
OK or NG		
OK	▶	GO TO 12.
NG	▶	Replace resistor.

12	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.		
▶		INSPECTION END



Component Description

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.

ECM Terminals and Reference Value

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

CAUTION:

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

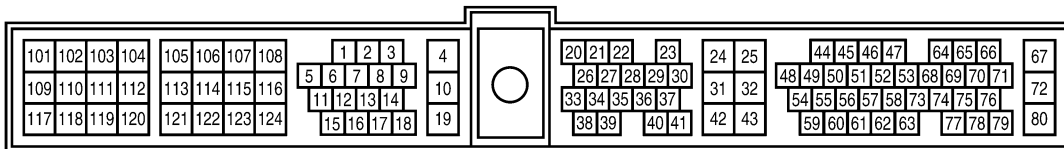
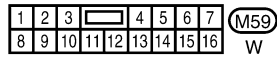
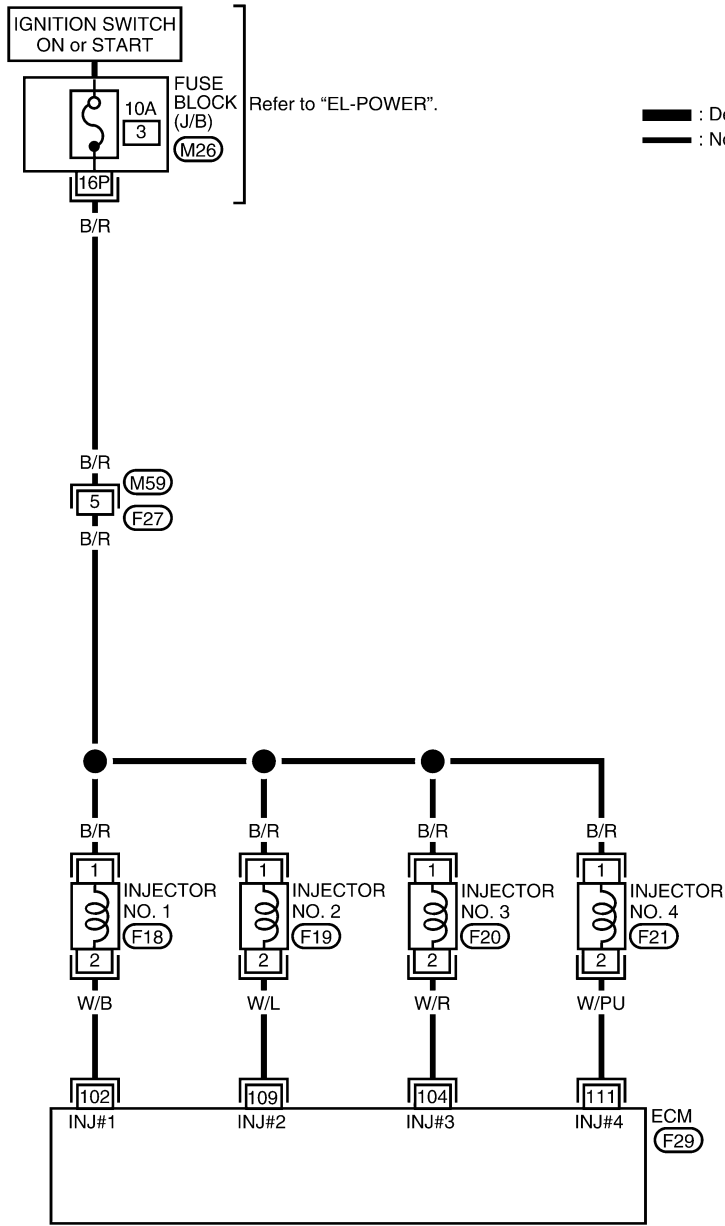
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102 104 109 111	W/B W/R W/L W/PU	Injector No. 1 Injector No. 3 Injector No. 2 Injector No. 4	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>BATTERY VOLTAGE (11 - 14V)</p> <p style="text-align: right;">SEF011W</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	<p>BATTERY VOLTAGE (11 - 14V)</p> <p style="text-align: right;">SEF012W</p>

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Wiring Diagram

NGEC0434

EC-INJECT-01



Diagnostic Procedure

NGEC0438

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1 CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

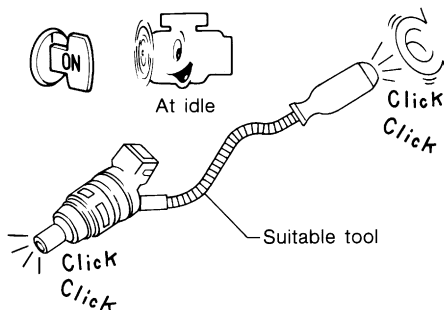
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

SEF190Y

3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.



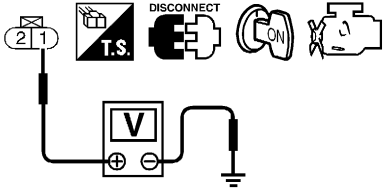
MEC703B

Clicking noise should be heard.

OK or NG

OK ► **INSPECTION END**

NG ► GO TO 2.

2	CHECK POWER SUPPLY
<ol style="list-style-type: none"> 1. Stop engine. 2. Disconnect injector harness connector. 3. Turn ignition switch ON. 4. Check voltage between injector terminal 1 and ground with CONSULT-II or tester. 	
	
<p style="color: blue;">Voltage: Battery voltage</p> <p>OK or NG</p>	
OK	▶ GO TO 4.
NG	▶ GO TO 3.

SEF271W

3	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors F27, M59 ● Fuse block (J/B) connector M26 ● 10A fuse ● Harness for open or short between injector and fuse 	
▶	Repair harness or connectors.

4	CHECK OUTPUT SIGNAL CIRCUIT
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between injector terminal 2 and ECM terminals 102, 104, 109, 111. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. 	
<p>OK or NG</p>	
OK	▶ GO TO 6.
NG	▶ GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the harness for open or short between ECM and injector.	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

INJECTOR

KA24DE

Diagnostic Procedure (Cont'd)

6	CHECK INJECTOR
1. Disconnect injector harness connector. 2. Check resistance between terminals as shown in the figure.	
Resistance: 7.3 - 9.9Ω [at 25°C (77°F)]	
SEF273W	
OK or NG	
OK	▶ GO TO 7.
NG	▶ Replace injector.

7	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.	
	▶ INSPECTION END

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START SIGNAL

KA24DE

CONSULT-II Reference Value in Data Monitor Mode

CONSULT-II Reference Value in Data Monitor Mode

NGEC0441

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
START SIGNAL	● Ignition switch: ON → START → ON	OFF → ON → OFF

ECM Terminals and Reference Value

NGEC0442

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

CAUTION:

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

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
20	L/OR	Start signal	[Ignition switch "ON"]	Approximately 0V
			[Ignition switch "START"]	BATTERY VOLTAGE (11 - 14V)

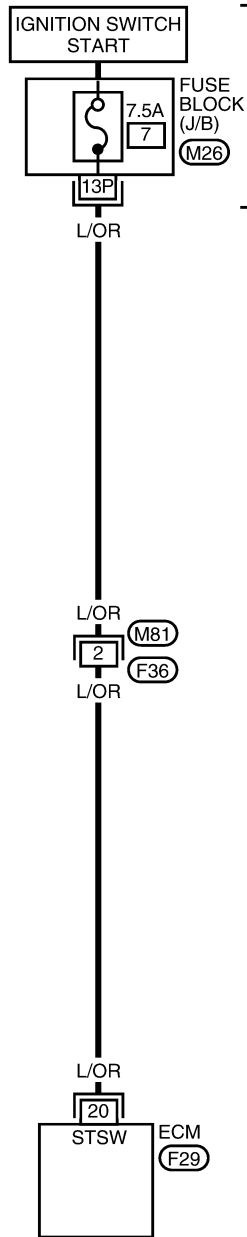
START SIGNAL

KA24DE
Wiring Diagram

Wiring Diagram

NGEC0440

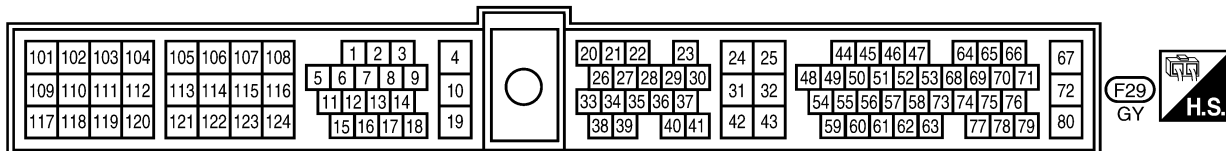
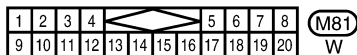
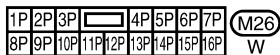
EC-S/SIG-01



Refer to "EL-POWER".

— : Detectable line for DTC
— : Non-detectable line for DTC

- GI
- MA
- EM
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- EC**
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- PD
- AX
- SU
- BR
- ST



LEC982

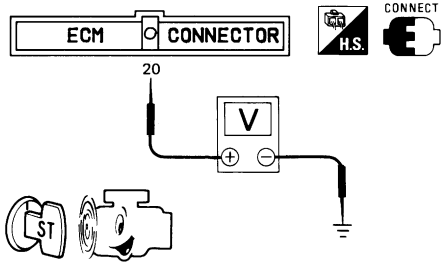
- RS
- BT
- HA
- SC
- EL
- IDX

Diagnostic Procedure

=NGEC0443

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK OVERALL FUNCTION							
Ⓜ With CONSULT-II 1. Turn ignition switch ON. 2. Check "START SIGNAL" in "DATA MONITOR" mode with CONSULT-II under the following conditions.								
<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>START SIGNAL</td> <td>OFF</td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	START SIGNAL	OFF
DATA MONITOR								
MONITOR	NO DTC							
START SIGNAL	OFF							
<table border="1" style="margin: auto;"> <thead> <tr> <th>Condition</th> <th>"START SIGNAL"</th> </tr> </thead> <tbody> <tr> <td>Ignition switch "ON"</td> <td>OFF</td> </tr> <tr> <td>Ignition switch "START"</td> <td>ON</td> </tr> </tbody> </table>			Condition	"START SIGNAL"	Ignition switch "ON"	OFF	Ignition switch "START"	ON
Condition	"START SIGNAL"							
Ignition switch "ON"	OFF							
Ignition switch "START"	ON							
SEF227Y								
OK or NG								
OK	▶	INSPECTION END						
NG	▶	GO TO 4.						

3	CHECK OVERALL FUNCTION							
⊗ Without CONSULT-II 1. Turn ignition switch to START. 2. Check voltage between ECM terminal 20 and ground under the following conditions.								
								
SEF109P								
<table border="1" style="margin: auto;"> <thead> <tr> <th>Condition</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>Ignition switch "START"</td> <td>Battery voltage</td> </tr> <tr> <td>Except above</td> <td>Approximately 0V</td> </tr> </tbody> </table>			Condition	Voltage	Ignition switch "START"	Battery voltage	Except above	Approximately 0V
Condition	Voltage							
Ignition switch "START"	Battery voltage							
Except above	Approximately 0V							
MTBL0143								
OK or NG								
OK	▶	INSPECTION END						
NG	▶	GO TO 4.						

START SIGNAL

KA24DE

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART	
Check the 7.5A fuse.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace 7.5A fuse.

5	CHECK INPUT SIGNAL CIRCUIT	
<ol style="list-style-type: none"> Turn ignition switch OFF. Disconnect ECM harness connector and 7.5A fuse. Check harness continuity between ECM terminal 20 and fuse block. 		
SEF224V		
<p>Continuity should exist.</p> <ol style="list-style-type: none"> 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.		
<ul style="list-style-type: none"> ● Harness connectors M81, F36 ● Fuse block (J/B) connector M26 ● Harness for open or short between ECM and fuse block 		
▶ Repair open circuit or short to ground or short to power in harness or connectors.		

7	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.		
▶ INSPECTION END		

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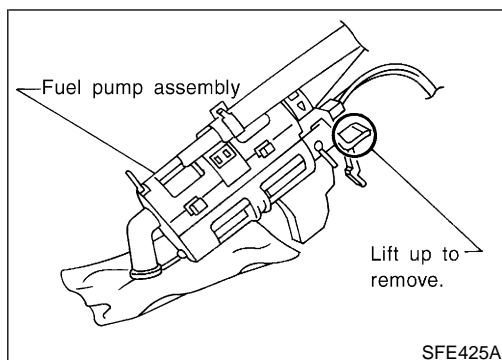
System Description

NGEC0444

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Fuel pump control	Fuel pump relay
Ignition switch	Start signal		

The ECM activates the fuel pump for several seconds after the ignition switch is turned on to improve engine startability. If the ECM receives a 180° signal from the camshaft position sensor, it knows that the engine is rotating, and causes the pump to perform. If the 180° signal is not received when the ignition switch is on, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 5 seconds.
Engine running and cranking	Operates.
Except as shown above	Stops.



Component Description

NGEC0501

The fuel pump with a fuel damper is an in-tank type (the pump and damper are located in the fuel tank).

CONSULT-II Reference Value in Data Monitor Mode

NGEC0445

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	<ul style="list-style-type: none"> ● Ignition switch is turned to ON (Operates for 5 seconds) ● Engine running and cranking 	ON
	<ul style="list-style-type: none"> ● Except as shown above 	OFF

FUEL PUMP

KA24DE

ECM Terminals and Reference Value

ECM Terminals and Reference Value

=NGEC0446

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

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	W/R	Fuel pump relay	[Ignition switch "ON"] ● For 5 seconds after turning ignition switch "ON" [Engine is running]	0 - 1V
			[Ignition switch "ON"] ● More than 5 seconds after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)

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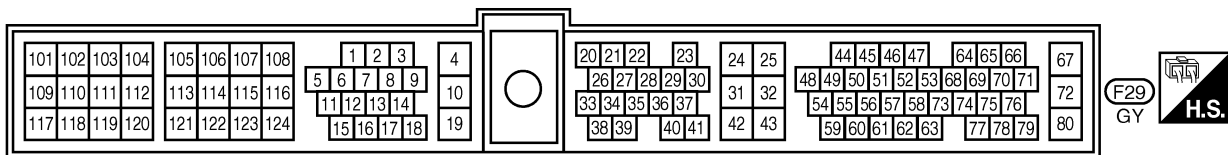
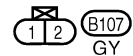
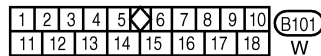
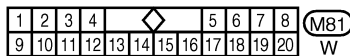
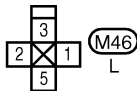
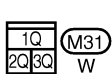
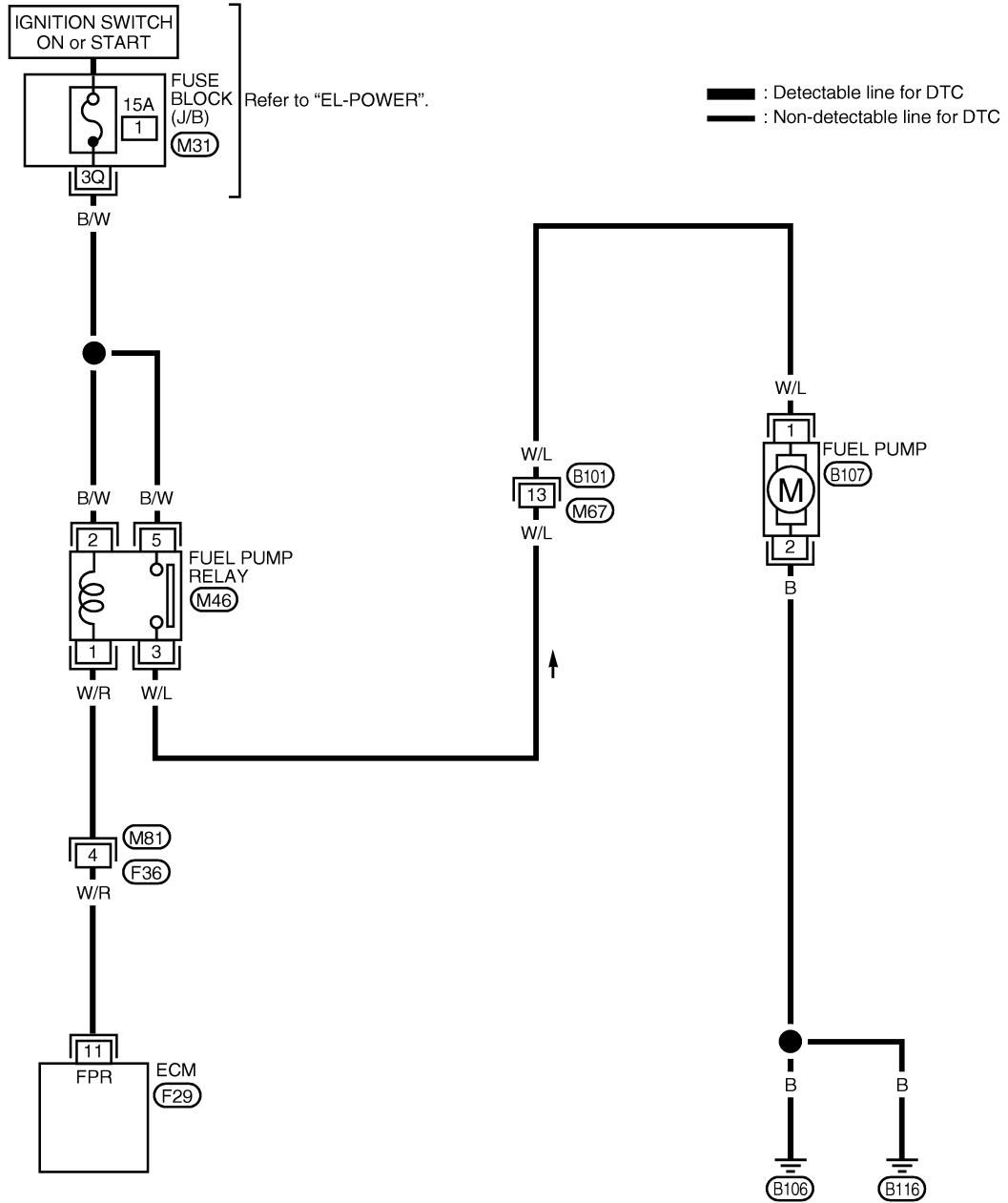
EL

IDX

Wiring Diagram

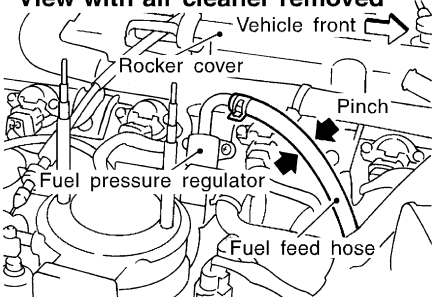
NGEC0447

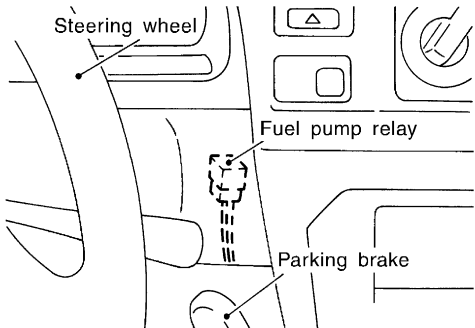
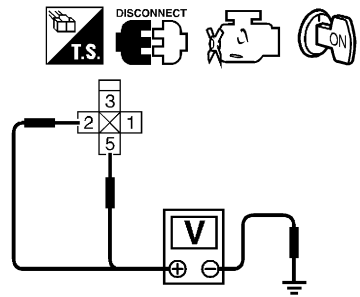
EC-F/PUMP-01



Diagnostic Procedure

NGENC0448

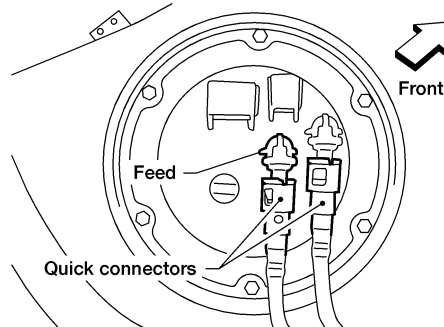
1	CHECK OVERALL FUNCTION	<p>1. Turn ignition switch ON. 2. Pinch fuel feed hose with two fingers.</p> <div style="text-align: center;"> <p>View with air cleaner removed</p>  </div> <p style="text-align: right;">SEF348V</p> <p>Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned "ON".</p> <p style="text-align: center;">OK or NG</p>	GI MA EM LC EC FE CL MT
OK	▶	INSPECTION END	
NG	▶	GO TO 2.	

2	CHECK POWER SUPPLY	<p>1. Turn ignition switch OFF. 2. Disconnect fuel pump relay.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF349V</p> <p>3. Turn ignition switch ON. 4. Check voltage between terminals 2, 5 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF225V</p> <p>Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	AT TF PD AX SU BR ST RS BT HA SC EL IDX
OK	▶	GO TO 4.	
NG	▶	GO TO 3.	

3	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● 15A fuse ● Fuse block (J/B) connector M31 ● Harness for open or short between fuse and fuel pump relay 	
	Repair harness or connectors.

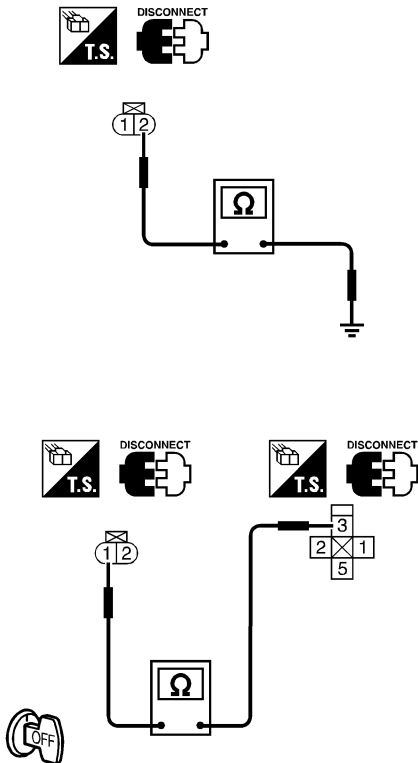
4	CHECK FUEL PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT
----------	---

1. Turn ignition switch OFF.
2. Disconnect fuel pump harness connector.



AFE095

3. Check harness continuity between terminal 2 and body ground, terminal 1 and fuel pump relay connector terminal 3.



SEF700Z

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK		GO TO 6.
NG		GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors B101, M67 ● Harness for open or short between fuel pump and body ground ● Harness for open or short between fuel pump and fuel pump relay 	
▶	Repair open circuit or short to power in harness or connectors.

 GI
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6	CHECK OUTPUT SIGNAL CIRCUIT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 11 and fuel pump relay connector terminal 1.	
<p style="color: blue;">Continuity should exist.</p> 3. Also check harness for short to ground and short to power.	
OK or NG	
OK	▶ GO TO 8.
NG	▶ GO TO 7.

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SEF227V

7	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors F36, M81 ● Harness for open or short between ECM and fuel pump relay 	
▶	Repair open circuit or short to power in harness or connectors.

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8 CHECK FUEL PUMP RELAY

With CONSULT-II

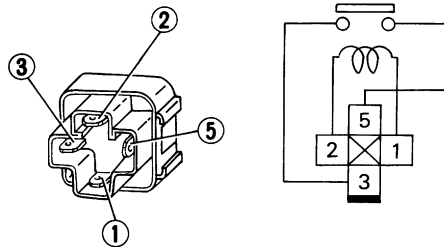
1. Reconnect fuel pump relay, fuel pump harness connector and ECM harness connector.
2. Turn ignition switch ON.
3. Turn fuel pump relay "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT-II and check operating sound.

ACTIVE TEST	
FUEL PUMP RELAY	ON
MONITOR	
ENG SPEED	XXX rpm

SEF724Z

Without CONSULT-II

Check continuity between terminals 3 and 5.



SEF511P

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

MTBL0306

OK or NG

OK ▶ GO TO 9.

NG ▶ Replace fuel pump relay.

FUEL PUMP

KA24DE

Diagnostic Procedure (Cont'd)

9	CHECK FUEL PUMP	<p>1. Disconnect fuel pump harness connector.</p> <div style="text-align: center;"> </div>	
		SEF701Z	EC
		<p>2. Check resistance between terminals 1 and 2. Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]</p> <p style="text-align: center;">OK or NG</p>	
OK	▶	GO TO 10.	
NG	▶	Replace fuel pump.	

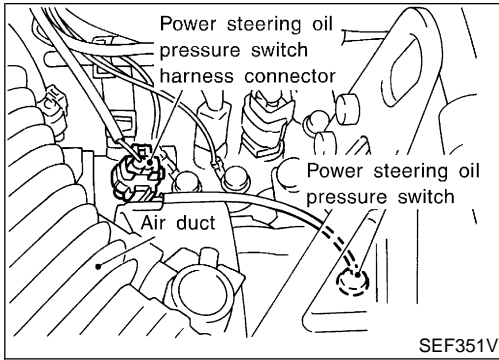
10	CHECK INTERMITTENT INCIDENT	<p>Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.</p>	
		▶	INSPECTION END

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POWER STEERING OIL PRESSURE SWITCH

KA24DE

Component Description



Component Description

The power steering oil pressure switch is attached to the power steering high-pressure tube and detects a power steering load. When a power steering load is detected, it signals the ECM. The ECM adjusts the IACV-AAC valve to increase the idle speed and adjust for the increased load.

NGEC0451

CONSULT-II Reference Value in Data Monitor Mode

NGEC0452

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
PW/ST SIGNAL	<ul style="list-style-type: none"> Engine: After warming up, idle the engine 	Steering wheel in neutral position (forward direction) OFF
		The steering wheel is fully turned ON

ECM Terminals and Reference Value

NGEC0453

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)
39	GY/R	Power steering oil pressure switch	[Engine is running] <ul style="list-style-type: none"> Steering wheel is fully turned 	Approximately 0V
			[Engine is running] <ul style="list-style-type: none"> Steering wheel is not turned 	Approximately 5V

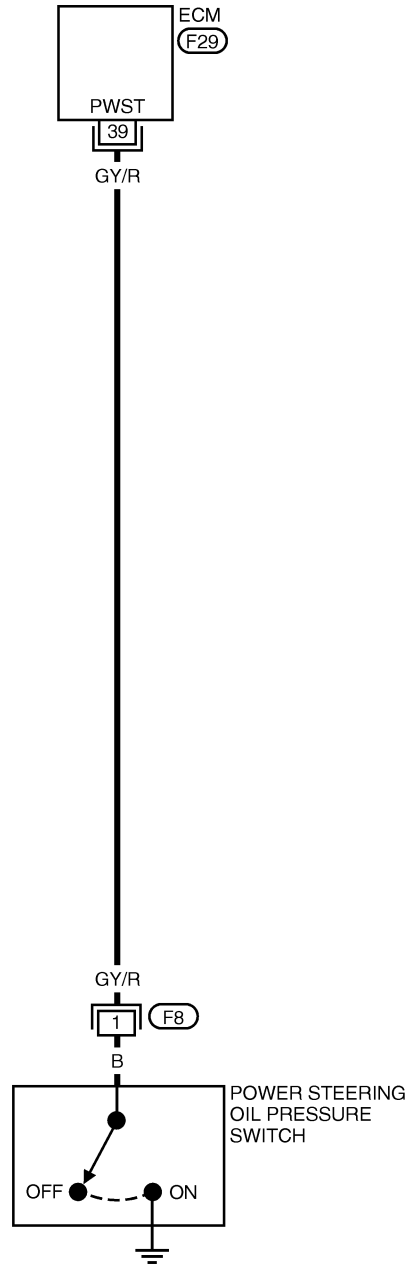
POWER STEERING OIL PRESSURE SWITCH

KA24DE
Wiring Diagram

Wiring Diagram

NGEC0450

EC-PST/SW-01



— : Detectable line for DTC
— : Non-detectable line for DTC

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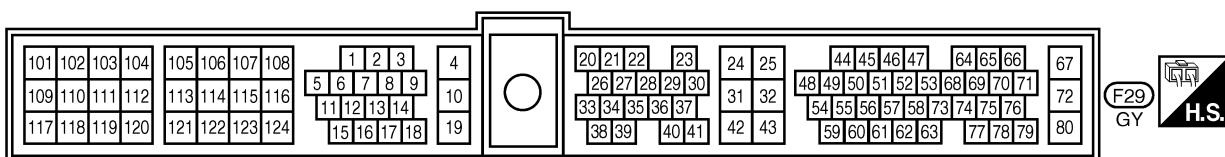
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AEC012B

Diagnostic Procedure

=NGEC0454

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK OVERALL FUNCTION							
Ⓜ With CONSULT-II 1. Start engine. 2. Check "PW/ST SIGNAL" in "DATA MONITOR" mode with CONSULT-II under the following conditions.								
<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>PW/ST SIGNAL</td> <td>OFF</td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	PW/ST SIGNAL	OFF
DATA MONITOR								
MONITOR	NO DTC							
PW/ST SIGNAL	OFF							
<table border="1" style="margin: auto;"> <thead> <tr> <th>Conditions</th> <th>PW/ST SIGNAL</th> </tr> </thead> <tbody> <tr> <td>Steering is in neutral position</td> <td>OFF</td> </tr> <tr> <td>Steering is turned</td> <td>ON</td> </tr> </tbody> </table>			Conditions	PW/ST SIGNAL	Steering is in neutral position	OFF	Steering is turned	ON
Conditions	PW/ST SIGNAL							
Steering is in neutral position	OFF							
Steering is turned	ON							
SEF054Y								
OK or NG								
OK	▶	INSPECTION END						
NG	▶	GO TO 4.						

3	CHECK OVERALL FUNCTION							
⊗ Without CONSULT-II 1. Start engine. 2. Check voltage between ECM terminal 39 and ground under the following conditions.								
SEF662P								
<table border="1" style="margin: auto;"> <thead> <tr> <th>Condition</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>When steering wheel is turned quickly</td> <td>Approximately 0V</td> </tr> <tr> <td>Except above</td> <td>Approximately 5V</td> </tr> </tbody> </table>			Condition	Voltage	When steering wheel is turned quickly	Approximately 0V	Except above	Approximately 5V
Condition	Voltage							
When steering wheel is turned quickly	Approximately 0V							
Except above	Approximately 5V							
MTBL0142								
OK or NG								
OK	▶	INSPECTION END						
NG	▶	GO TO 4.						

POWER STEERING OIL PRESSURE SWITCH

KA24DE

Diagnostic Procedure (Cont'd)

4	CHECK INPUT SIGNAL CIRCUIT		
<p>1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 39 and terminal 1.</p>			
<p>Continuity should exist.</p>			
<p>4. Also check harness for short to ground and short to power.</p>			
OK or NG			
OK	▶	GO TO 6.	
NG	▶	GO TO 5.	

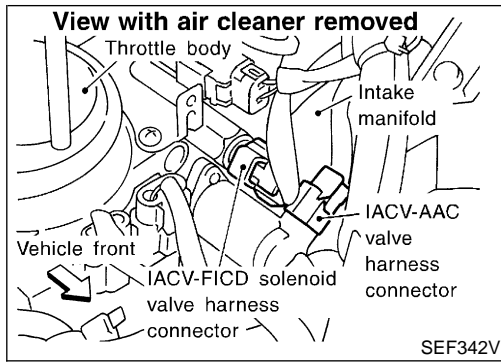
5	DETECT MALFUNCTIONING PART		
<p>Check the harness for open or short between ECM and power steering oil pressure switch.</p>			
▶		Repair open circuit or short to ground or short to power in harness or connectors.	

6	CHECK POWER STEERING OIL PRESSURE SWITCH								
<p>1. Disconnect power steering oil pressure switch harness connector then start engine. 2. Check continuity between terminals 1 and ground.</p>									
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;">Conditions</th> <th>Continuity</th> </tr> </thead> <tbody> <tr> <td>Steering wheel is being turned</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td>Steering wheel is not being turned</td> <td style="text-align: center;">No</td> </tr> </tbody> </table>				Conditions	Continuity	Steering wheel is being turned	Yes	Steering wheel is not being turned	No
Conditions	Continuity								
Steering wheel is being turned	Yes								
Steering wheel is not being turned	No								
OK or NG									
OK	▶	GO TO 7.							
NG	▶	Replace power steering oil pressure switch.							

7	CHECK INTERMITTENT INCIDENT		
<p>Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.</p>			
▶		INSPECTION END	

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Component Description



Component Description

When the air conditioner is on, the IAC valve-FICD solenoid valve supplies additional air to adjust to the increased load.

NGEC0462

ECM Terminals and Reference Value

NGEC0463

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

CAUTION:

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

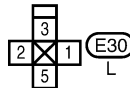
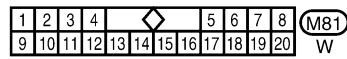
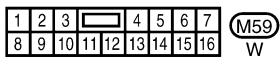
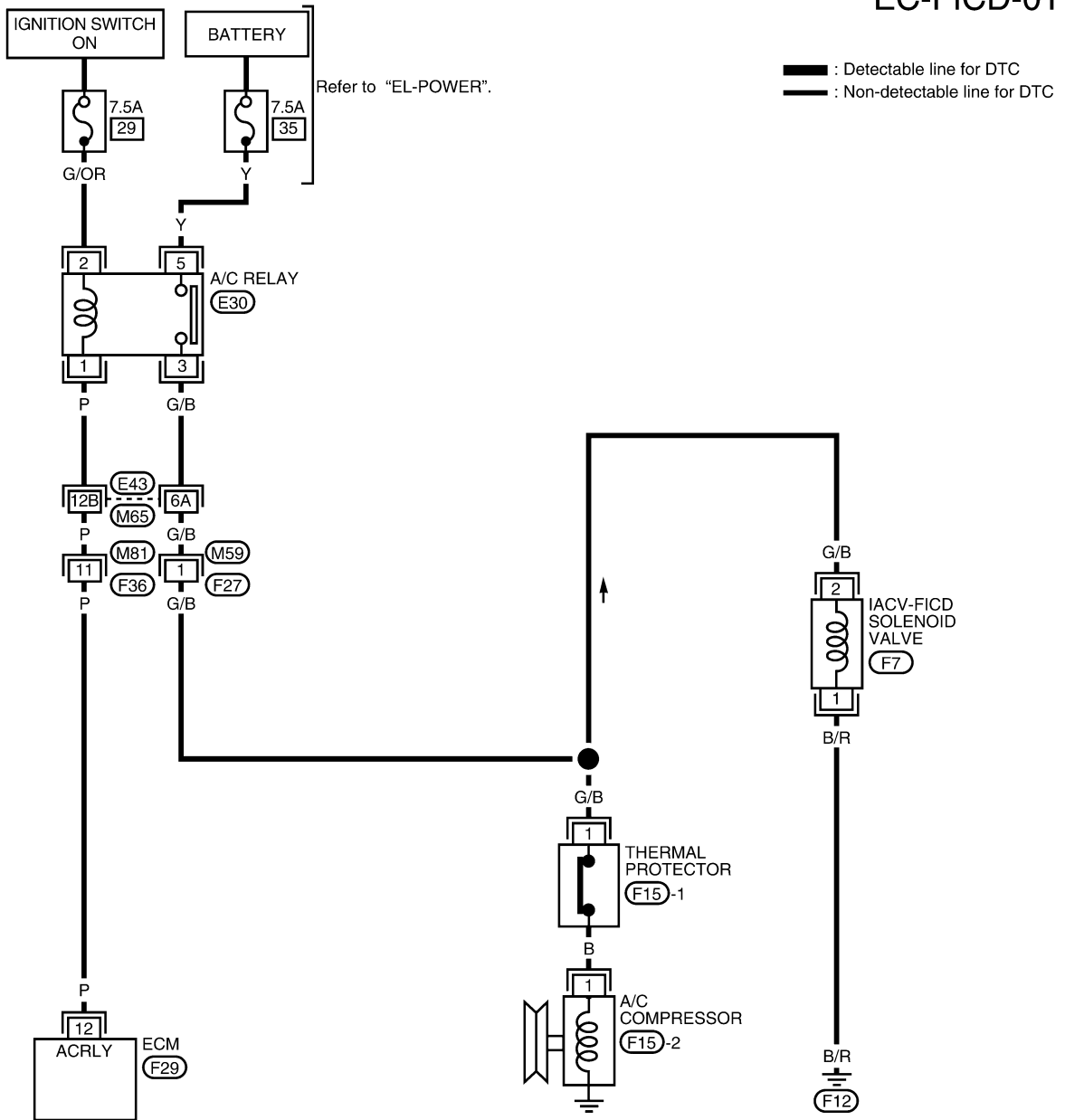
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
12	P	Air conditioner relay	[Engine is running] ● Both A/C switch and blower switch are ON★	Approximately 0V
			[Engine is running] ● A/C switch is OFF	BATTERY VOLTAGE (11 - 14V)

★ Ambient air temperature above 10°C (50°F) and in any mode except OFF.

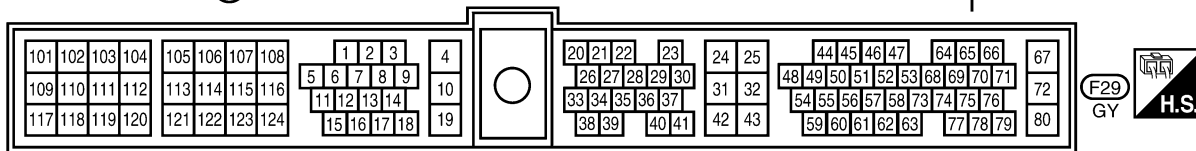
Wiring Diagram

NGEC0461

EC-FICD-01



Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



* : This connector is not shown in "HARNESS LAYOUT" of EL section.

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Diagnostic Procedure

=NGEC0464

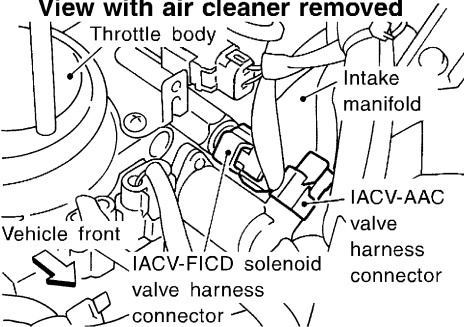
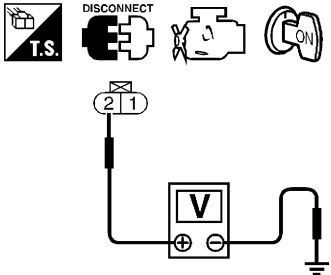
1	CHECK OVERALL FUNCTION	<p>1. Start engine and warm it up to normal operating temperature.</p> <p>2. Check idle speed. 800±50 rpm If NG, adjust idle speed.</p> <p>3. Push air conditioner switch ON and turn fan switch to 4-speed.</p> <p>4. Recheck idle speed.</p> <div style="text-align: center; margin: 10px 0;"> </div> <p style="text-align: right; margin-right: 20px;"><small>MEF634E</small></p> <p style="text-align: center; margin-top: 10px;">875 rpm or more</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>
OK	▶	INSPECTION END
NG	▶	GO TO 2.

2	CHECK AIR CONDITIONER FUNCTION	<p>Check if air conditioner compressor functions normally.</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>
OK	▶	GO TO 3.
NG	▶	Refer to "Symptom Table" in "TROUBLE DIAGNOSIS", HA-28 .

IACV-FICD SOLENOID VALVE

KA24DE

Diagnostic Procedure (Cont'd)

3	CHECK POWER SUPPLY	<p>1. Stop engine. 2. Disconnect IACV-FICD solenoid valve harness connector.</p> <div style="text-align: center;"> <p>View with air cleaner removed</p>  </div> <p>3. Start engine, then push A/C switch ON and turn fan switch to 4-speed. 4. Check voltage between terminal 2 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="color: blue;">Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white; text-align: center;">EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p> <p>TF</p>
	OK	▶ GO TO 5.	
	NG	▶ GO TO 4.	

4	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness for open or short between IACV-FICD solenoid valve and harness connector F27 <p style="text-align: center;">▶ Repair open circuit, short to ground or short to power in harness or connectors.</p>	<p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>
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IACV-FICD SOLENOID VALVE

KA24DE

Diagnostic Procedure (Cont'd)

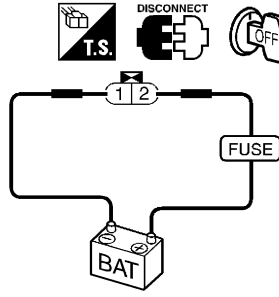
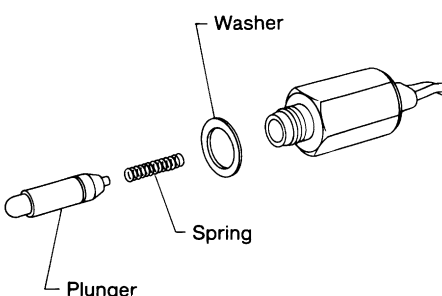
5	CHECK GROUND CIRCUIT
<p>1. Turn ignition switch OFF. 2. Check harness continuity between solenoid valve terminal 1 and body ground.</p>	
<p>Continuity should exist.</p> <p>3. Also check harness for short to power.</p> <p style="text-align: right;">SEF134V</p>	
OK or NG	
OK	▶ GO TO 7.
NG	▶ GO TO 6.

6	DETECT MALFUNCTIONING PART
<p>Check the harness for open or short between IACV-FICD solenoid valve and body ground.</p>	
	▶ Repair open circuit or short to power in harness or connectors.

IACV-FICD SOLENOID VALVE

KA24DE

Diagnostic Procedure (Cont'd)

7	CHECK IACV-FICD SOLENOID VALVE	<p>Disconnect IACV-FICD solenoid valve harness connector.</p> <div style="text-align: center;">  </div> <ul style="list-style-type: none"> ● Check for clicking sound when applying 12V direct current to terminals. ● Check plunger for seizing or sticking. ● Check for broken spring. <div style="text-align: center;">  </div> <p style="text-align: right;">SEF231V</p> <p style="text-align: right;">SEF097K</p>	
		OK or NG	
OK		▶	GO TO 8.
NG		▶	Replace IACV-FICD solenoid valve.

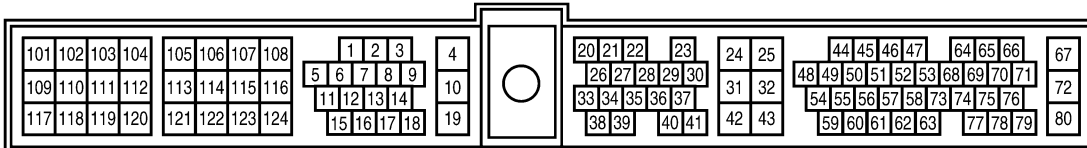
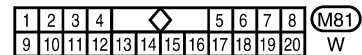
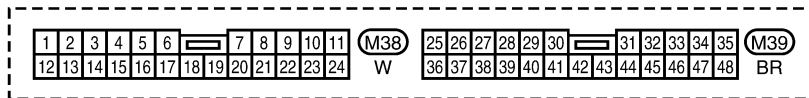
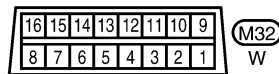
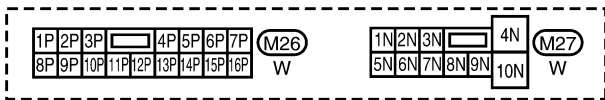
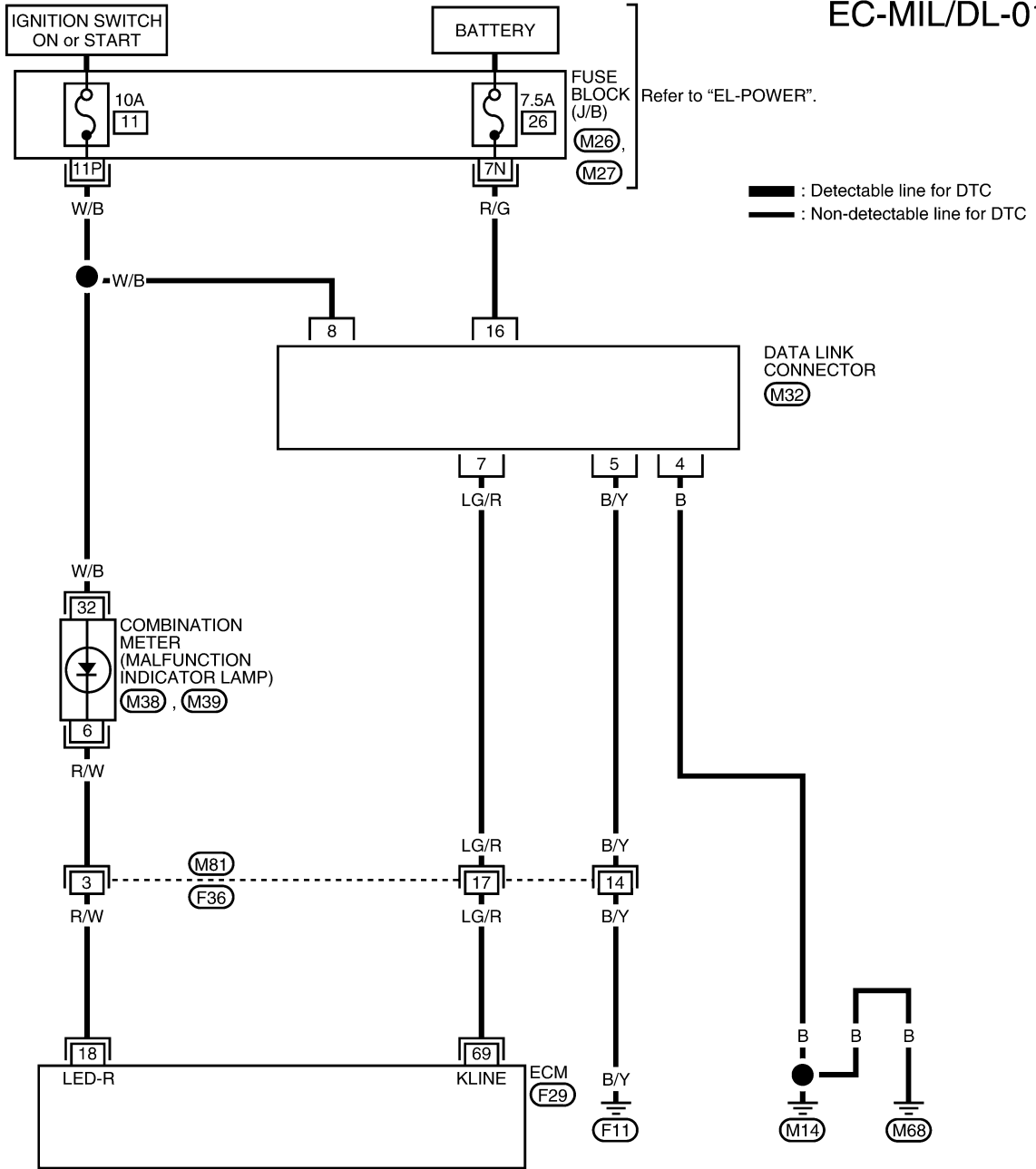
8	CHECK INTERMITTENT INCIDENT	<p>Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-150.</p>	
		▶	INSPECTION END

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Wiring Diagram

NGEC0466

EC-MIL/DL-01



Fuel Pressure Regulator

NGEC0467

Fuel pressure at idling kPa (kg/cm ² , psi)	Vacuum hose is connected	Approximately 235 (2.4, 34)
	Vacuum hose is disconnected	Approximately 294 (3.0, 43)

Idle Speed and Ignition Timing

NGEC0468

Base idle speed*1 rpm	No-load*3 (in "P" or "N" position)	750±50
Target idle speed*2 rpm	No-load*3 (in "P" or "N" position)	800±50
Air conditioner: ON rpm	In "P" or "N" position	875 or more
Ignition timing*1	In "P" or "N" position	20°±2° BTDC

*1: Throttle position sensor harness connector disconnected or using CONSULT-II "WORK SUPPORT" mode

*2: Throttle position sensor harness connector connected

*3: Under the following conditions:

- Air conditioner switch: OFF
- Electrical load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Coil

NGEC0469

Primary voltage V	Battery voltage 12
Primary resistance [at 20°C (68°F)] Ω	Approximately 1.0
Secondary resistance [at 20°C (68°F)] kΩ	Approximately 10

Mass Air Flow Sensor

NGEC0470

Supply voltage V	Battery voltage (11 - 14)
Output voltage V	0.9 - 1.8*
Mass air flow (Using CONSULT-II or GST) g·m/sec	0.9 - 5.8 at idle* 7.5 - 13.2 at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and idling under no-load.

Engine Coolant Temperature Sensor

NGEC0471

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

EGR Temperature Sensor

NGEC0472

EGR temperature °C (°F)	Voltage (V)	Resistance (MΩ)
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

Fuel Pump

NGEC0473

Resistance [at 25°C (77°F)] Ω	0.2 - 5.0
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IACV-AAC Valve

NGEC0474

Resistance [at 25°C (77°F)] Ω	Approximately 10.0
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SERVICE DATA AND SPECIFICATIONS (SDS)

KA24DE

Injector

Injector

NGEC0475

Resistance [at 25°C (77°F)] Ω	7.3 - 9.9
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Resistor

NGEC0476

Resistance [at 25°C (77°F)] $k\Omega$	Approximately 2.2
---------------------------------------	-------------------

Throttle Position Sensor

NGEC0477

Throttle valve conditions	Voltage (at normal operating temp., engine off, ignition switch on)
Completely closed (a)	0.15 - 0.85V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.7V

Heated Oxygen Sensor 1 Heater

NGEC0478

Resistance [at 25°C (77°F)] Ω	2.3 - 4.3
--------------------------------------	-----------

Calculated Load Value

NGEC0479

	Calculated load value % (Using CONSULT-II or GST)
At idle	9.5 - 34.0%
At 2,500 rpm	13.9 - 24.9%

Intake Air Temperature Sensor

NGEC0480

Temperature $^{\circ}\text{C}$ ($^{\circ}\text{F}$)	Resistance $k\Omega$
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38

Heated Oxygen Sensor 2 Heater

NGEC0483

Resistance [at 25°C (77°F)] Ω	2.3 - 4.3
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Crankshaft Position Sensor (OBD)

NGEC0484

Resistance [at 20°C (68°F)] Ω	512 - 632
--------------------------------------	-----------

Fuel Tank Temperature Sensor

NGEC0485

Temperature $^{\circ}\text{C}$ ($^{\circ}\text{F}$)	Resistance $k\Omega$
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

Alphabetical & P No. Index for DTC

NGEC0522

NGEC0522S01

ALPHABETICAL INDEX FOR DTC

Items (CONSULT-II screen terms)	DTC*1*2	Reference page
	CONSULT-II GST	
Unable to access ECM	—	EC-716
A/T 1ST GR FNCTN	P0731	AT-125
A/T 2ND GR FNCTN	P0732	AT-131
A/T 3RD GR FNCTN	P0733	AT-137
A/T 4TH GR FNCTN	P0734	AT-143
A/T COMM LINE	P0600*4	EC-1019
A/T DIAG COMM LINE	P1605	EC-1126
A/T TCC S/V FNCTN	P0744	AT-157
ATF TEMP SEN/CIRC	P0710	AT-110
CKP SEN/CIRCUIT	P0335	EC-895
CKP SENSOR (COG)	P1336	EC-1071
CLOSED LOOP-B1	P1148	EC-1064
CLOSED LOOP-B2	P1168	EC-1064
CLOSED TP SW/CIRC	P0510	EC-1012
CMP SEN/CIRCUIT	P0340	EC-901
CYL1 MISFIRE	P0301	EC-882
CYL2 MISFIRE	P0302	EC-882
CYL3 MISFIRE	P0303	EC-882
CYL4 MISFIRE	P0304	EC-882
CYL5 MISFIRE	P0305	EC-882
CYL6 MISFIRE	P0306	EC-882
ECM	P0605	EC-1024
ECT SEN/CIRCUIT	P0117*3	EC-775
ECT SEN/CIRCUIT	P0118*3	EC-775
ECT SENSOR	P0125	EC-793
ENG OVER TEMP	P0217	EC-875
ENG OVER TEMP	P1217	EC-1066
ENGINE SPEED SIG	P0725	AT-121
EVAP GROSS LEAK	P0455	EC-963
EVAP PURG FLOW/MON	P0441	EC-913
EVAP SMALL LEAK	P0442	EC-925
EVAP SMALL LEAK	P1442	EC-1078
EVAP SYS PRES SEN	P0452	EC-952
EVAP SYS PRES SEN	P0453	EC-952
EVAP VERY SML LEAK	P0456	EC-976

TROUBLE DIAGNOSIS — INDEX

VG33E

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

Items (CONSULT-II screen terms)	DTC*1*2	Reference page
	CONSULT-II GST	
EVAP VERY SML LEAK	P1456	EC-976
FTT SEN/CIRCUIT	P0182	EC-870
FTT SEN/CIRCUIT	P0183	EC-870
FTT SENSOR	P0181	EC-870
FUEL LEV SEN SLOSH	P0460	EC-990
FUEL LEVEL SEN/CIRC	P1464	EC-1107
FUEL LEVEL SENSOR	P0461	EC-995
FUEL LEVL SEN/CIRC	P0462	EC-997
FUEL LEVL SEN/CIRC	P0463	EC-997
FUEL SYS-LEAN-B1	P0171	EC-853
FUEL SYS-LEAN-B2	P0174	EC-853
FUEL SYS-RICH-B1	P0172	EC-862
FUEL SYS-RICH-B2	P0175	EC-862
HO2S1 (B1)	P0132	EC-800
HO2S1 (B1)	P0133	EC-808
HO2S1 (B1)	P0134	EC-822
HO2S1 (B1)	P1143	EC-1026
HO2S1 (B1)	P1144	EC-1035
HO2S1 (B2)	P0152	EC-800
HO2S1 (B2)	P0153	EC-808
HO2S1 (B2)	P0154	EC-822
HO2S1 (B2)	P1163	EC-1026
HO2S1 (B2)	P1164	EC-1035
HO2S1 HTR (B1)	P0031	EC-746
HO2S1 HTR (B1)	P0032	EC-746
HO2S1 HTR (B2)	P0051	EC-746
HO2S1 HTR (B2)	P0052	EC-746
HO2S2 HTR (B1)	P0037	EC-753
HO2S2 HTR (B1)	P0038	EC-753
HO2S2 HTR (B2)	P0057	EC-753
HO2S2 HTR (B2)	P0058	EC-753
HO2S2 (B1)	P0138	EC-833
HO2S2 (B1)	P0139	EC-843
HO2S2 (B1)	P1146	EC-1044
HO2S2 (B1)	P1147	EC-1054
HO2S2 (B2)	P0158	EC-833
HO2S2 (B2)	P0159	EC-843

TROUBLE DIAGNOSIS — INDEX

VG33E

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

Items (CONSULT-II screen terms)	DTC*1*2	Reference page	
	CONSULT-II GST		
HO2S2 (B2)	P1166	EC-1044	GI
HO2S2 (B2)	P1167	EC-1054	MA
IAT SEN/CIRCUIT	P0112	EC-770	
IAT SEN/CIRCUIT	P0113	EC-770	EM
IAT SENSOR	P0127	EC-770	
ISC SYSTEM/CIRC	P0505	EC-1006	LC
KNOCK SEN/CIRC-B1	P0327	EC-891	
KNOCK SEN/CIRC-B1	P0328	EC-891	EC
L/PRES SOL/CIRC	P0745	AT-164	
MAF SEN/CIRCUIT	P0101	EC-761	FE
MAF SEN/CIRCUIT	P0102*3	EC-761	
MAF SEN/CIRCUIT	P0103*3	EC-761	CL
MULTI CYL MISFIRE	P0300	EC-882	
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	P0000	—	MT
P-N POS SW/CIRCUIT	P1706	EC-1129	AT
PNP SW/CIRC	P0705	AT-104	
PURG VOLUME CONT/V	P0444	EC-939	TF
PURG VOLUME CONT/V	P0445	EC-939	
PURG VOLUME CONT/V	P1444	EC-1080	PD
SFT SOL A/CIRC	P0750*3	AT-169	
SFT SOL B/CIRC	P0755*3	AT-174	AX
TCC SOLENOID/CIRC	P0740	AT-152	SU
THERMSTAT FNCTN	P0128	EC-798	
TP SEN/CIRC A/T	P1705*5	AT-179	BR
TP SEN/CIRCUIT	P0121	EC-780	
TP SEN/CIRCUIT	P0122*3	EC-780	ST
TP SEN/CIRCUIT	P0123*3	EC-780	
TW CATALYST SYS-B1	P0420	EC-908	RS
TW CATALYST SYS-B2	P0430	EC-908	
VC CUT/V BYPASS/V	P1491	EC-1117	BT
VC/V BYPASS/V	P1490	EC-1111	
VEH SPD SEN/CIR AT	P0720	AT-116	HA
VEH SPEED SEN/CIRC	P0500*5	EC-1002	
VENT CONTROL VALVE	P0447	EC-946	SC
VENT CONTROL VALVE	P1446	EC-1092	
VENT CONTROL VALVE	P1448	EC-1099	EL

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

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

*2: These numbers are prescribed by SAE J2012.

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

*4: This DTC is displayed with CONSULT-II only.

*5: The MIL illuminates when both the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

NOTE:

Regarding D22 models, "B1" indicates bank 1, "B2" indicates bank 2.

TROUBLE DIAGNOSIS — INDEX

VG33E

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

P NO. INDEX FOR DTC

=NGEC0522S02

DTC*1*2 CONSULT-II GST	Items (CONSULT-II screen terms)	Reference page	
—	Unable to access ECM	EC-716	GI
P0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	—	MA
P0031	HO2S1 HTR (B1)	EC-746	EM
P0032	HO2S1 HTR (B1)	EC-746	LC
P0037	HO2S2 HTR (B1)	EC-753	EC
P0038	HO2S2 HTR (B1)	EC-753	EC
P0051	HO2S1 HTR (B2)	EC-746	FE
P0052	HO2S1 HTR (B2)	EC-746	FE
P0057	HO2S2 HTR (B2)	EC-753	CL
P0058	HO2S2 HTR (B2)	EC-753	CL
P0101	MAF SEN/CIRCUIT	EC-761	MT
P0102*3	MAF SEN/CIRCUIT	EC-761	MT
P0103*3	MAF SEN/CIRCUIT	EC-761	AT
P0112	IAT SEN/CIRCUIT	EC-770	AT
P0113	IAT SEN/CIRCUIT	EC-770	TF
P0117*3	ECT SEN/CIRCUIT	EC-775	TF
P0118*3	ECT SEN/CIRCUIT	EC-775	PD
P0121	TP SEN/CIRCUIT	EC-780	PD
P0122*3	TP SEN/CIRCUIT	EC-780	AX
P0123*3	TP SEN/CIRCUIT	EC-780	AX
P0125	ECT SENSOR	EC-793	SU
P0127	IAT SENSOR	EC-770	SU
P0128	THERMSTAT FNCTN	EC-798	BR
P0132	HO2S1 (B1)	EC-800	BR
P0133	HO2S1 (B1)	EC-808	ST
P0134	HO2S1 (B1)	EC-822	ST
P0138	HO2S2 (B1)	EC-833	RS
P0139	HO2S2 (B1)	EC-843	RS
P0152	HO2S1 (B2)	EC-746	BT
P0153	HO2S1 (B2)	EC-808	BT
P0154	HO2S1 (B2)	EC-822	HA
P0158	HO2S2 (B2)	EC-833	HA
P0159	HO2S2 (B2)	EC-843	SC
P0171	FUEL SYS-LEAN-B1	EC-853	SC
P0172	FUEL SYS-RICH-B1	EC-853	EL

TROUBLE DIAGNOSIS — INDEX

VG33E

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

DTC*1*2	Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST		
P0174	FUEL SYS-LEAN-B2	EC-862
P0175	FUEL SYS-RICH-B2	EC-862
P0181	FTT SENSOR	EC-870
P0182	FTT SEN/CIRCUIT	EC-870
P0183	FTT SEN/CIRCUIT	EC-870
P0217	ENG OVER TEMP	EC-875
P0300	MULTI CYL MISFIRE	EC-882
P0301	CYL1 MISFIRE	EC-882
P0302	CYL2 MISFIRE	EC-882
P0303	CYL3 MISFIRE	EC-882
P0304	CYL4 MISFIRE	EC-882
P0305	CYL5 MISFIRE	EC-882
P0306	CYL6 MISFIRE	EC-882
P0327	KNOCK SEN/CIRC-B1	EC-891
P0328	KNOCK SEN/CIRC-B1	EC-891
P0335	CKP SEN/CIRCUIT	EC-895
P0340	CMP SEN/CIRCUIT	EC-901
P0420	TW CATALYST SYS-B1	EC-908
P0430	TW CATALYST SYS-B2	EC-908
P0441	EVAP PURG FLOW/MON	EC-913
P0442	EVAP SMALL LEAK	EC-925
P0444	PURG VOLUME CONT/V	EC-939
P0445	PURG VOLUME CONT/V	EC-939
P0447	VENT CONTROL VALVE	EC-946
P0452	EVAP SYS PRES SEN	EC-952
P0453	EVAP SYS PRES SEN	EC-952
P0455	EVAP GROSS LEAK	EC-963
P0456	EVAP VERY SML LEAK	EC-976
P0460	FUEL LEV SEN SLOSH	EC-990
P0461	FUEL LEVEL SENSOR	EC-995
P0462	FUEL LEVL SEN/CIRC	EC-997
P0463	FUEL LEVL SEN/CIRC	EC-997
P0500*5	VEH SPEED SEN/CIRC	EC-1002
P0505	ISC SYSTEM/CIRC	EC-1006
P0510	CLOSED TP SW/CIRC	EC-1012
P0600*4	A/T COMM LINE	EC-1019
P0605	ECM	EC-1024

TROUBLE DIAGNOSIS — INDEX

VG33E

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

DTC*1*2	Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST		
P0705	PNP SW/CIRC	AT-104
P0710	ATF TEMP SEN/CIRC	AT-110
P0720	VEH SPD SEN/CIR AT	AT-116
P0725	ENGINE SPEED SIG	AT-121
P0731	A/T 1ST GR FNCTN	AT-125
P0732	A/T 2ND GR FNCTN	AT-131
P0733	A/T 3RD GR FNCTN	AT-137
P0734	A/T 4TH GR FNCTN	AT-143
P0740	TCC SOLENOID/CIRC	AT-152
P0744	A/T TCC S/V FNCTN	EC-169
P0745	L/PRESS SOL/CIRC	AT-164
P0750*3	SFT SOL A/CIRC	AT-169
P0755*3	SFT SOL B/CIRC	AT-174
P1143	HO2S1 (B1)	EC-1026
P1144	HO2S1 (B1)	EC-1035
P1146	HO2S2 (B1)	EC-1044
P1147	HO2S2 (B1)	EC-1054
P1148	CLOSED LOOP-B1	EC-1064
P1163	HO2S1 (B2)	EC-1026
P1164	HO2S1 (B2)	EC-1035
P1166	HO2S2 (B2)	EC-1044
P1167	HO2S2 (B2)	EC-1054
P1168	CLOSED LOOP-B2	EC-1064
P1217	ENG OVER TEMP	EC-1066
P1336	CKP SENSOR (COG)	EC-1071
P1442	EVAP SMALL LEAK	EC-1078
P1444	PURG VOLUME CONT/V	EC-1080
P1446	VENT CONTROL VALVE	EC-1092
P1448	VENT CONTROL VALVE	EC-1099
P1456	EVAP VERY SML LEAK	EC-976
P1464	FUEL LEVEL SEN/CIRK	EC-1107
P1490	VC/V BYPASS/V	EC-1111
P1491	VC CUT/V BYPASS/V	EC-1117
P1605	A/T DIAG COMM LINE	EC-1126
P1705*5	TP SEN/CIRC A/T	AT-179
P1706	P-N POS SW/CIRCUIT	EC-1129
P1760	O/R CLTCH SOL/CIRC	AT-188

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

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

*2: These numbers are prescribed by SAE J2012.

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

*4: This DTC is displayed with CONSULT-II only.

*5: The MIL illuminates when both the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

NOTE:

Regarding D22 models, "B1" indicates bank 1, "B2" indicates bank 2.

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

NGEC0523

The Supplemental Restraint System "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a seat belt, help to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.

In addition to the supplemental air bag modules for a frontal collision, the supplemental side air bag used along with the seat belt helps to reduce the risk or severity of injury to the driver and front passenger in a side collision. The supplemental side air bag consists of air bag modules (located in the outer side of front seats), satellite sensor, diagnosis sensor unit (one of components of supplemental air bags for a frontal collision), wiring harness, warning lamp (one of components of supplemental air bags for a frontal collision). Information necessary to service the system safely is included in the **RS section** of this Service Manual.

WARNING:

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

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

NGEC0524

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

CAUTION:

- **Be sure to turn the ignition switch OFF and disconnect the negative battery terminal before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to EL section, "Description", "HARNES 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 EGR system or fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.**

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Engine Fuel & Emission Control System

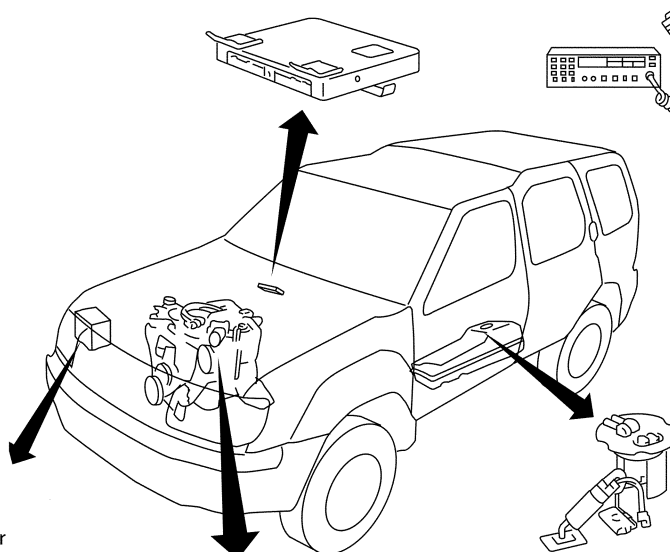
NGE0525

ECM

- Do not disassemble ECM.
- Do not turn on board diagnostic test mode selector forcibly.
- If a battery terminal 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 problem. Do not replace parts because of a slight variation.

WIRELESS EQUIPMENT

- When installing CB ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on its installation location.
 - 1) Keep the antenna as far away as possible from the electronic control units.
 - 2) Keep the antenna feeder line more than 20 cm (7.9 in) away from the harness of electronic controls.
Do not let them run parallel for a long distance.
 - 3) Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
 - 4) Be sure to ground the radio to vehicle body.



BATTERY

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

WHEN STARTING

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

ECM PARTS HANDLING

- Handle mass air flow sensor carefully to avoid damage.
- Do not disassemble mass air flow sensor.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble IACV-AAC valve.
- Even a slight leak in the air intake system can cause serious problems.
- Do not shock or jar the camshaft position sensor or crankshaft position sensor (OBD).



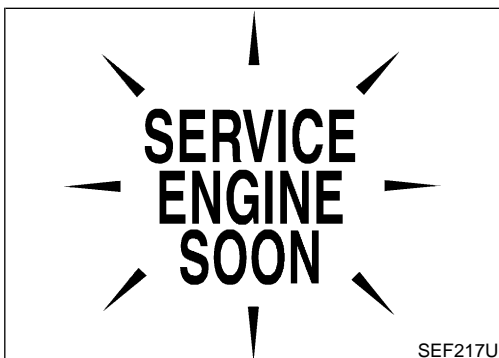
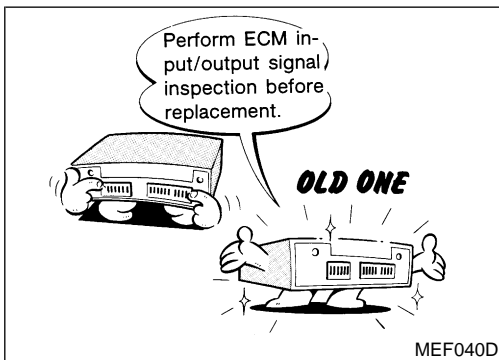
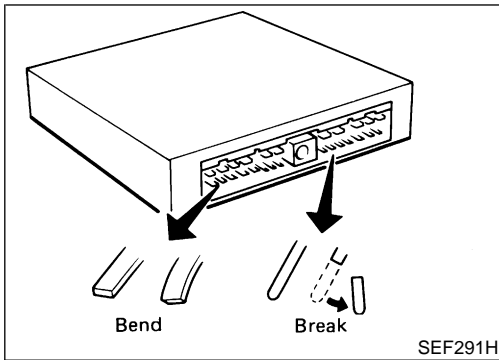
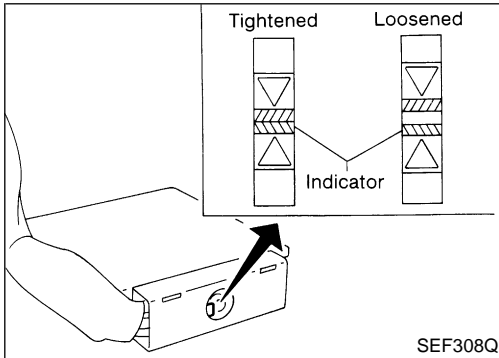
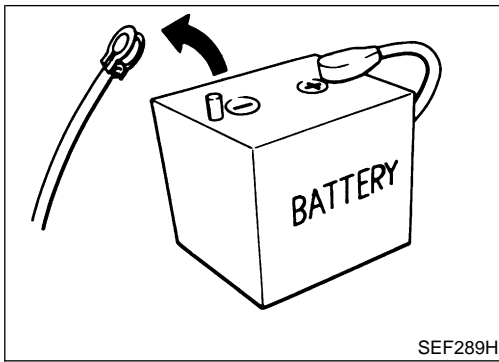
FUEL PUMP

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

ECM HARNESS HANDLING

- Securely connect ECM harness connectors.
A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep ECM harness at least 10 cm (3.9 in.) away from adjacent harnesses to prevent an ECM system malfunction due to receiving external noise, degraded operation of ICs, etc.
- Keep ECM parts and harnesses dry.
- Before removing parts, turn off ignition switch and then disconnect battery ground cable.

AEC045B



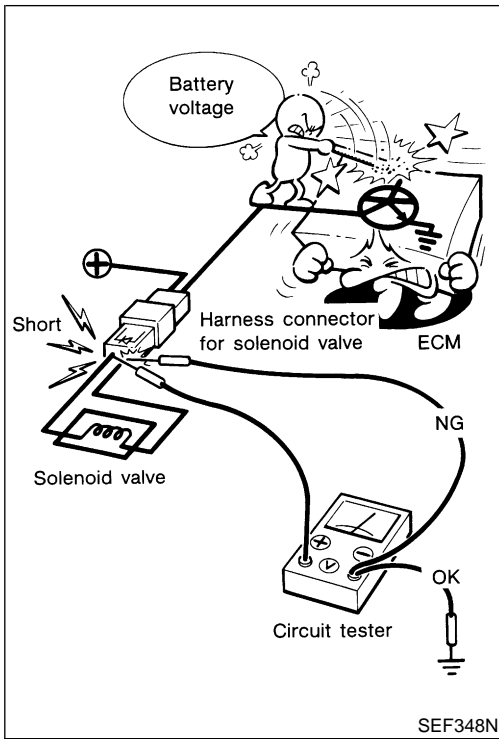
Precautions

NGEC0526

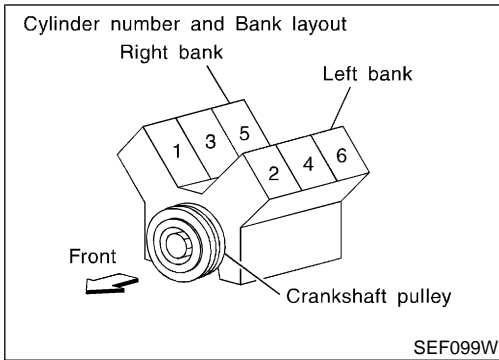
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery terminal. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned off.
- When connecting ECM harness connector, tighten securing bolt until the gap between orange indicators disappears.
 - : 3 - 5 N·m (0.3 - 0.5 kg·m, 26 - 43 in·lb)
- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break). Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- Before replacing ECM, perform “ECM Terminals and Reference Value” inspection and make sure ECM functions properly. Refer to EC-726.
- 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.

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Precautions (Cont'd)



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



- Regarding model D22, “-B1” indicates the right bank and “-B2” indicates the left bank as shown in the figure.

Wiring Diagrams and Trouble Diagnosis

NGEC0527

When you read Wiring diagrams, refer to the following:

- “HOW TO READ WIRING DIAGRAMS” in GI section
- “POWER SUPPLY ROUTING” for power distribution circuit in EL section

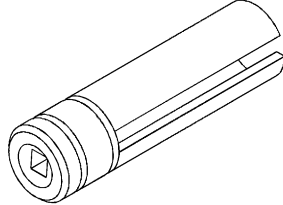
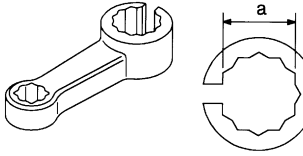
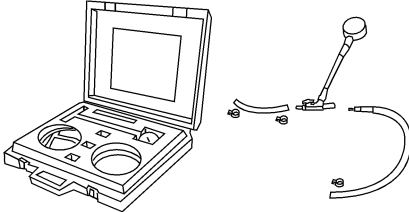
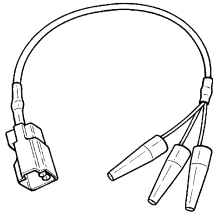
When you perform trouble diagnosis, refer to the following:

- “HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES” in GI section
- “HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT” in GI section

Special Service Tools

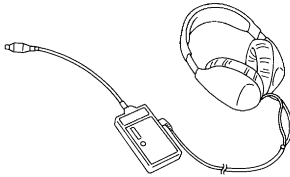
NGEC0528

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

Tool number (Kent-Moore No.) Tool name	Description		
KV10117100 (J36471-A) Heated oxygen sensor wrench	 <p>NT379</p>	Loosening or tightening front heated oxygen sensor with 22 mm (0.87 in) hexagon nut	GI MA EM LC EC
KV10114400 (J-38365) Heated oxygen sensor wrench	 <p>NT636</p>	Loosening or tightening rear heated oxygen sensor a: 22 mm (0.87 in)	FE CL
(J-44321) Fuel pressure gauge kit	 <p>LEC642</p>	Checking fuel pressure	MT AT TF
(J-45178) TPS test connector	 <p>LEC120A</p>	Used to test the throttle position sensor	PD AX SU BR

Commercial Service Tools

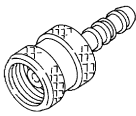
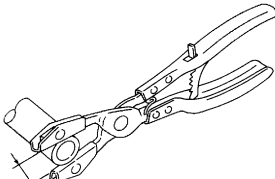
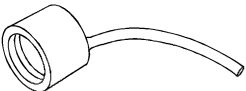
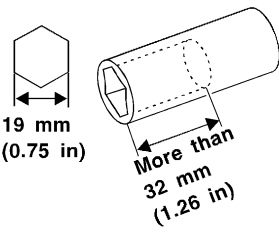
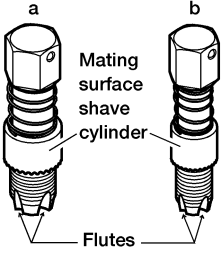
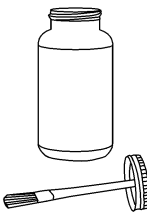
NGEC0529

Tool name (Kent-Moore No.)	Description		
Leak detector (J41416)	 <p>NT703</p>	Locating the EVAP leak	ST RS BT HA SC EL IDX

PREPARATION

VG33E

Commercial Service Tools (Cont'd)

Tool name (Kent-Moore No.)	Description
EVAP service port adapter (J41413-OBD)	Applying positive pressure through EVAP service port  NT704
Hose clipper	Clamping the EVAP purge hose between the fuel tank and EVAP canister applied to DTC P1442 [EVAP control system (small leak-positive pressure)]  Approx. 20 mm (0.79 in) NT720
Fuel filler cap adapter	Checking fuel tank vacuum relief valve opening pressure  NT653
Socket wrench	Removing and installing engine coolant temperature sensor  19 mm (0.75 in) More than 32 mm (1.26 in) NT705
Oxygen sensor thread cleaner (J-43897-18) (J-43897-12)	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown in "Commercial Service Tools". a: J-43897-18 18 mm diameter, for Zirconia Oxygen Sensor b: J-43897-12 12 mm diameter, for Titania Oxygen Sensor  NT705
Anti-seize lubricant (Permatex [®] 133AR or equivalent meeting MIL specification MIL-A-907)	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.  AEM489

PREPARATION

VG33E

Commercial Service Tools (Cont'd)

Tool name (Kent-Moore No.)	Description
Fuel injector cleaner kit (J-45701)	<div style="display: flex; justify-content: space-between;"> <div> </div> <div>Cleaning fuel injectors</div> </div> <p>LEC161A</p>

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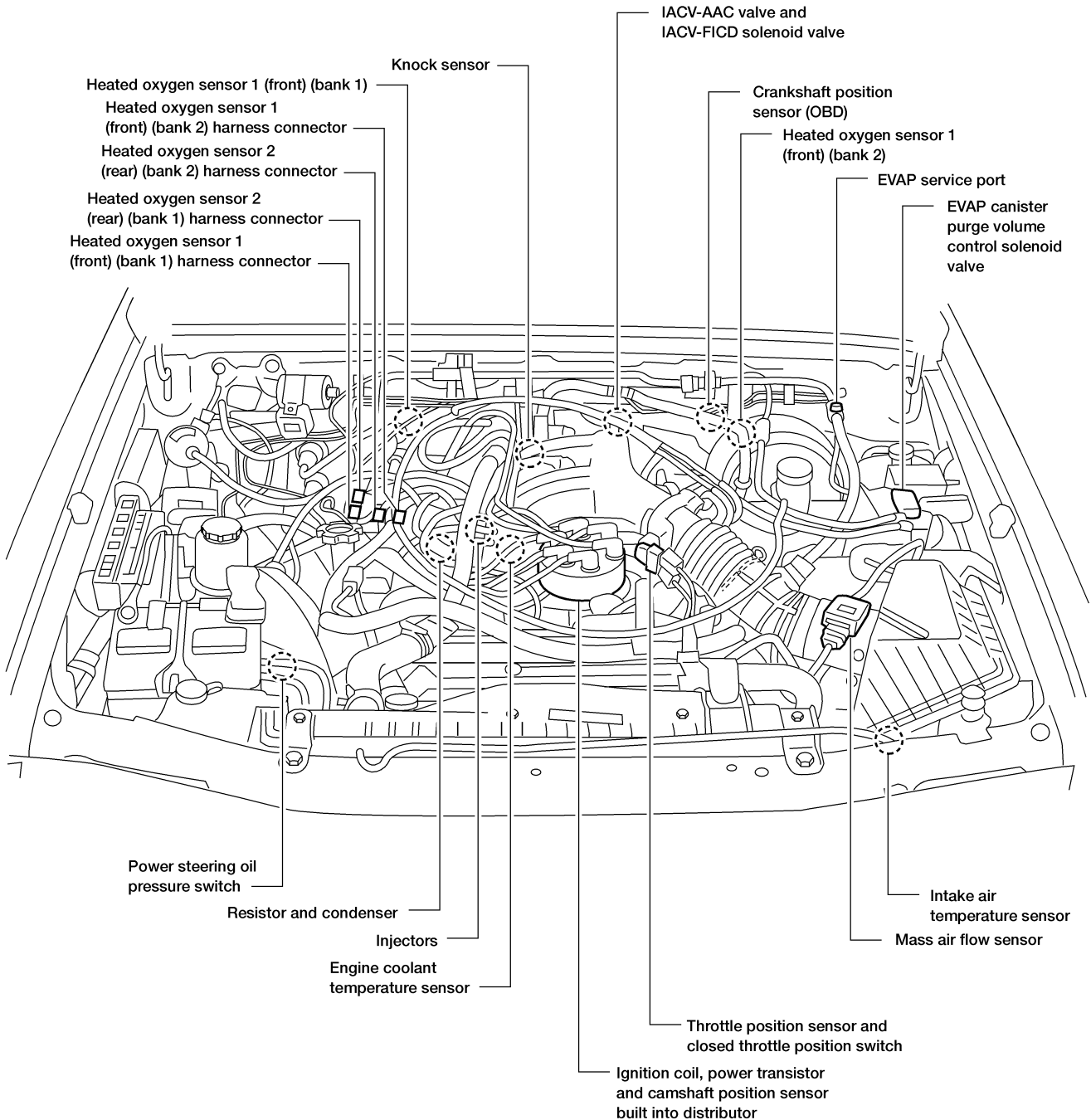
SC

EL

IDX

Engine Control Component Parts Location

NGEC0530



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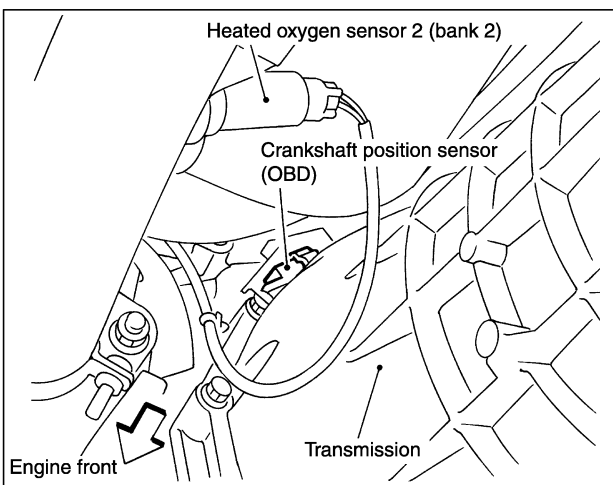
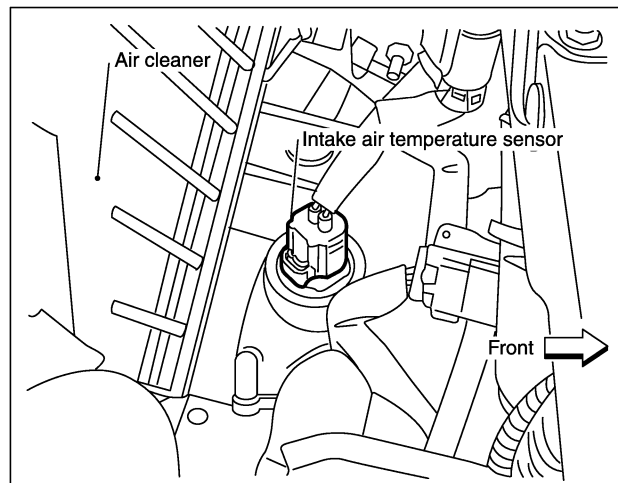
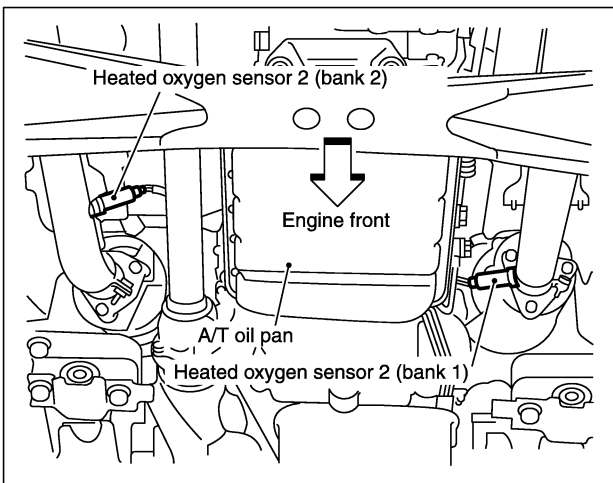
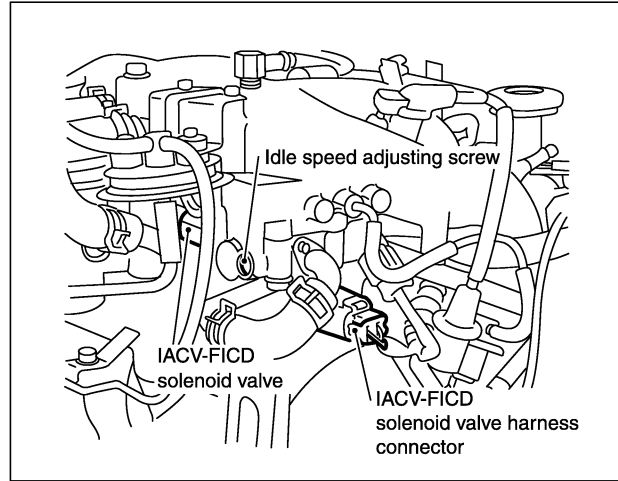
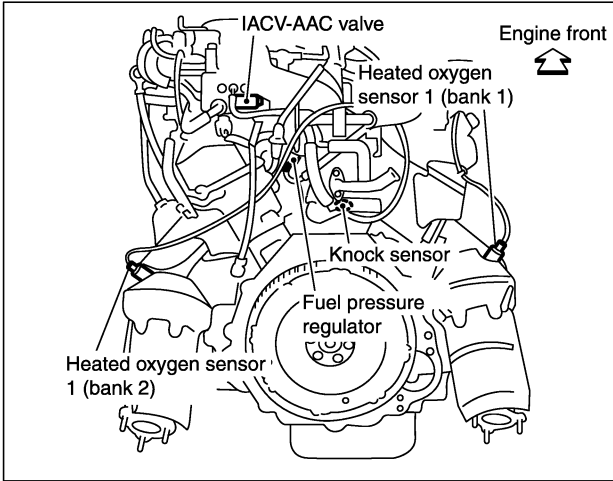
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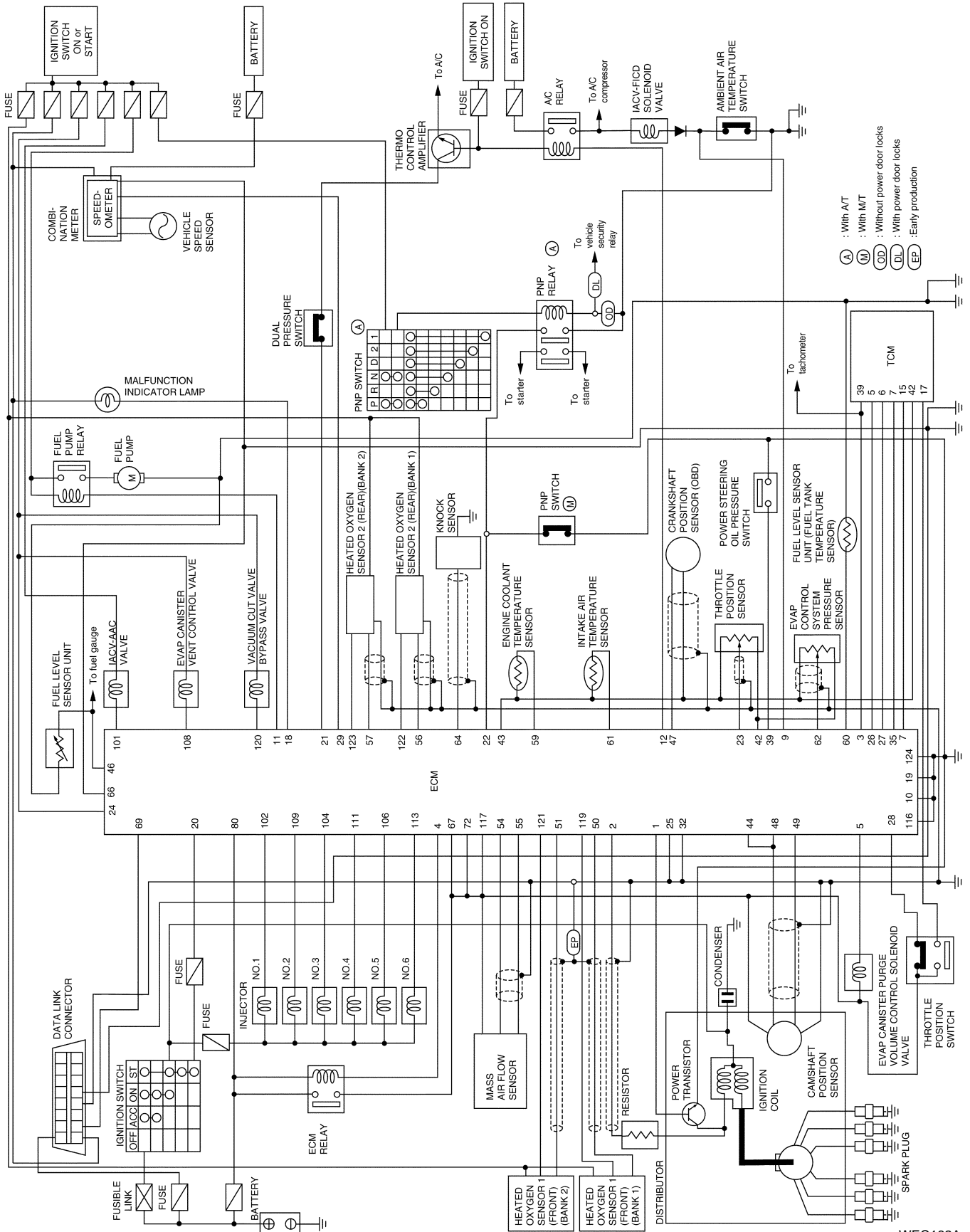
EL

IDX



Circuit Diagram

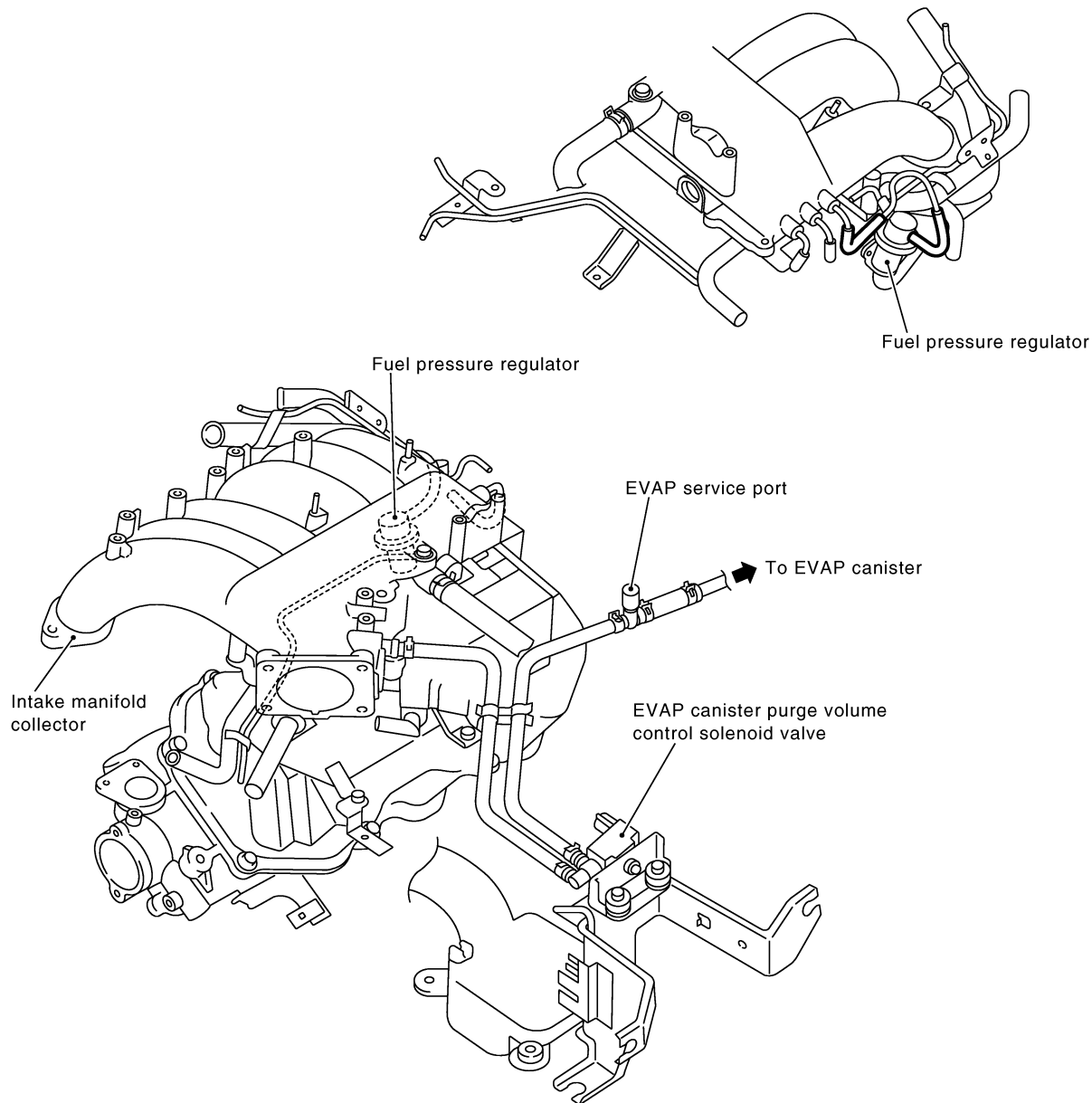
NGECO531



Vacuum Hose Drawing

NGEC0533

Refer to "System Diagram", EC-619 for Vacuum Control System.



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

SEF794Z

System Chart

NGEC0534

Input (Sensor)	ECM Function	Output (Actuator)
<ul style="list-style-type: none"> ● Camshaft position sensor ● Mass air flow sensor ● Engine coolant temperature sensor ● Heated oxygen sensor 1 ● Ignition switch ● Throttle position sensor ● Closed throttle position switch *4 ● Park/neutral position (PNP) switch ● Air conditioner switch ● Knock sensor ● Intake air temperature sensor ● EVAP control system pressure sensor *1 ● Battery voltage ● Power steering oil pressure switch ● Vehicle speed sensor ● Fuel tank temperature sensor *1 ● Crankshaft position sensor (OBD) *1 ● Rear heated oxygen sensor *3 ● TCM (Transmission control module) *2 ● Ambient air temperature switch 	Fuel injection & mixture ratio control	Injectors
	Distributor ignition system	Power transistor
	Idle air control system	IACV-AAC valve and IACV-FICD solenoid valve
	Fuel pump control	Fuel pump relay
	On board diagnostic system	MIL (On the instrument panel)
	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
	Air conditioning cut control	Air conditioner relay
	Cooling fan control	Cooling fan relays
	ON BOARD DIAGNOSIS for EVAP system	<ul style="list-style-type: none"> ● EVAP canister vent control valve ● Vacuum cut valve bypass valve

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

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

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

*4: This switch will operate in place of the throttle position sensor to control EVAP parts if the sensor malfunctions.

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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

Multiport Fuel Injection (MFI) System

Multiport Fuel Injection (MFI) System

DESCRIPTION

Input/Output Signal Chart

NGEC0535

NGEC0535S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed and piston position	Fuel injection & mixture ratio control	Injectors
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Heated oxygen sensor 1 (front)	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position Throttle valve idle position		
Park/neutral position (PNP) switch	Gear position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Air conditioner switch	Air conditioner operation		
Knock sensor	Engine knocking condition		
Battery	Battery voltage		
Power steering oil pressure switch	Power steering operation		
Heated oxygen sensor 2 (rear)*	Density of oxygen in exhaust gas		

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

Basic Multiport Fuel Injection System

NGEC0535S02

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

Various Fuel Injection Increase/Decrease Compensation

NGEC0535S03

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

<Fuel increase>

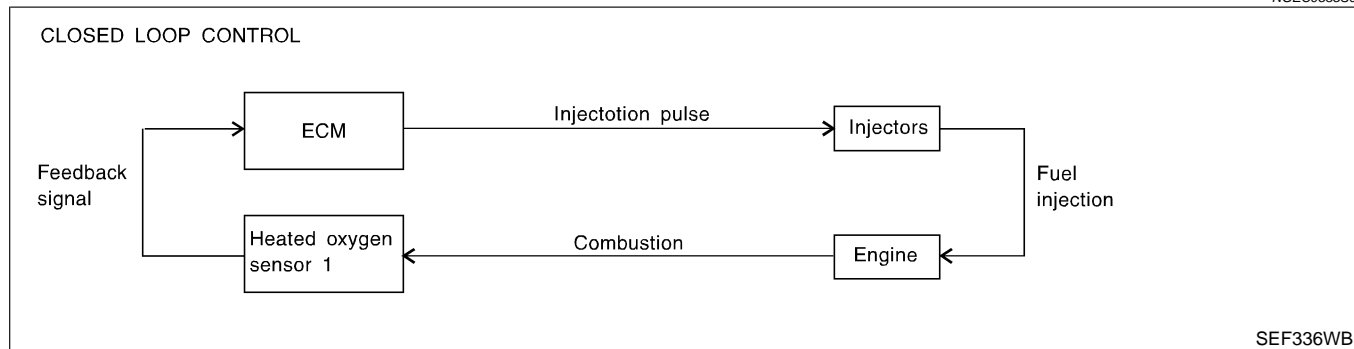
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from "N" to "D"
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

Mixture Ratio Feedback Control (Closed loop control)

NGE0535S04



SEF336WB

The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The warm-up three way catalyst can then better reduce CO, HC and NOx emissions. This system uses a heated oxygen sensor 1 in the exhaust manifold to monitor if the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about the heated oxygen sensor 1, refer to EC-822. 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 warm-up three way catalyst. Even if the switching characteristics of the heated oxygen sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from the heated oxygen sensor 2.

Open Loop Control

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

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

Mixture Ratio Self-learning Control

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

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

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

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

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

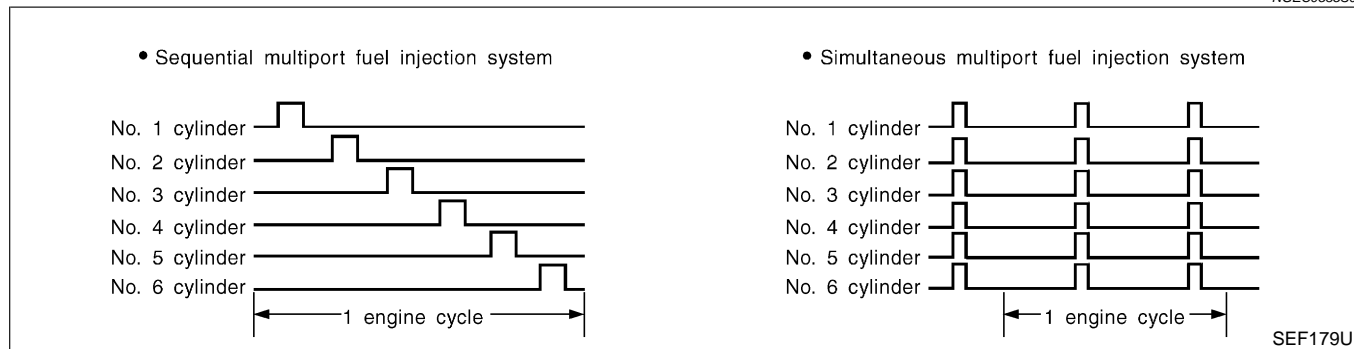
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

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

Fuel Injection Timing

NGEC0535S07



Two types of systems are used.

Sequential Multipoint Fuel Injection System

NGEC0535S0701

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 Multipoint Fuel Injection System

NGEC0535S0702

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

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

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

Fuel Shut-off

NGEC0535S08

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

Distributor Ignition (DI) System

DESCRIPTION

Input/Output Signal Chart

NGEC0536

NGEC0536S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed and piston position	Ignition timing control	Power transistor
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position Throttle valve idle position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch	Gear position		
Battery	Battery voltage		

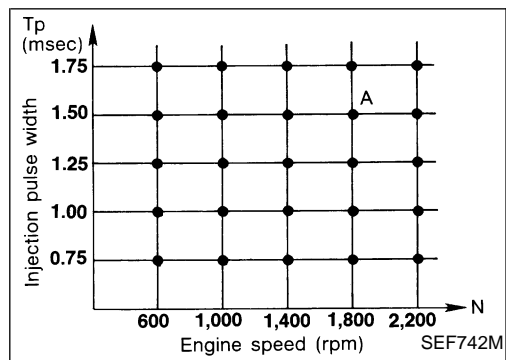
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

Distributor Ignition (DI) System (Cont'd)

System Description

NGEC0536S02



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

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

e.g., N: 1,800 rpm, Tp: 1.50 msec
A °BTDC

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

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

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

Air Conditioning Cut Control

DESCRIPTION

Input/Output Signal Chart

NGEC0537

NGEC0537S01

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner "ON" signal	Air conditioner cut control	Air conditioner relay
Throttle position sensor	Throttle valve opening angle		
Camshaft position sensor	Engine speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Vehicle speed sensor	Vehicle speed		
Power steering oil pressure switch	Power steering operation		

System Description

NGEC0537S02

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.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

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

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

DESCRIPTION

Input/Output Signal Chart

NGEC0538

NGEC0538S01

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Fuel cut control	Injectors
Park/neutral position (PNP) switch	Neutral position		
Throttle position sensor	Throttle position		
Engine coolant temperature sensor	Engine coolant temperature		
Camshaft position sensor	Engine speed		

If the engine speed is above 2,500 rpm with no load (for example, in neutral and engine speed over 2,500 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will operate until the engine speed reaches 2,000 rpm, then fuel cut is cancelled.

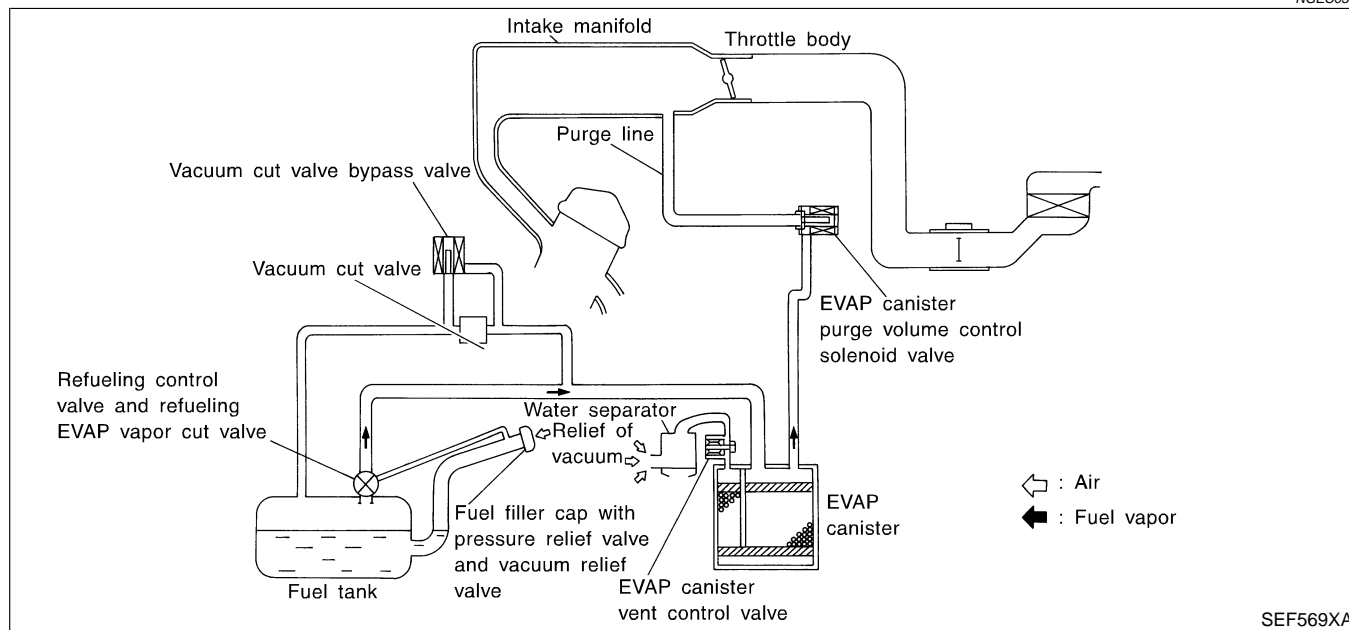
NOTE:

This function is different from deceleration control listed under “Multiport Fuel Injection (MFI) System”, EC-622.

Evaporative Emission System

DESCRIPTION

NGEC0539



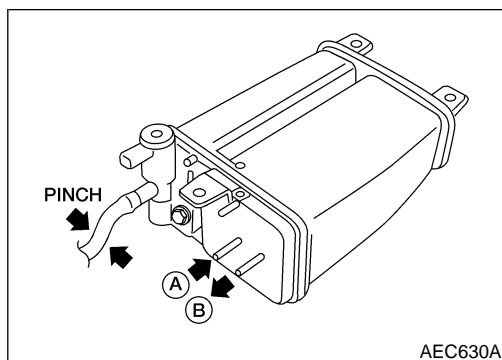
SEF569XA

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.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

Evaporative Emission System (Cont'd)



AEC630A

INSPECTION

EVAP Canister

Check EVAP canister as follows:

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

NGEC0540

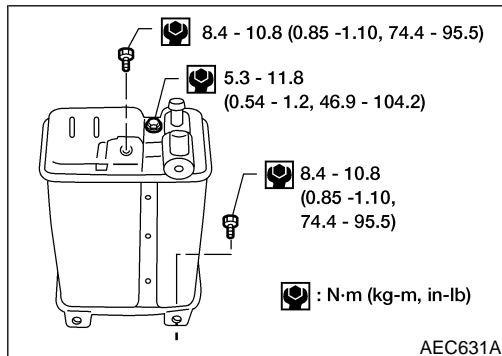
NGEC0540S01

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AEC631A

Tightening Torque

Tighten EVAP canister as shown in the figure.

Make sure new O-ring is installed properly between EVAP canister and EVAP canister vent control valve.

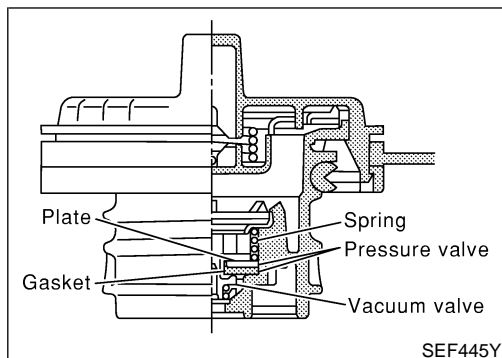
NGEC0540S02

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SEF445Y

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

NGEC0540S03

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

Pressure:

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

Vacuum:

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

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

CAUTION:

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

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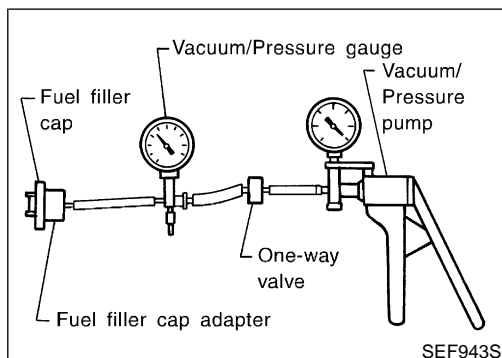
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SEF943S

Vacuum Cut Valve and Vacuum Cut Valve Bypass Valve

NGEC0540S04

Refer to EC-1117.

BT

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve

NGEC0540S05

Refer to EC-939.

HA

SC

Tank Fuel Temperature Sensor

NGEC0540S06

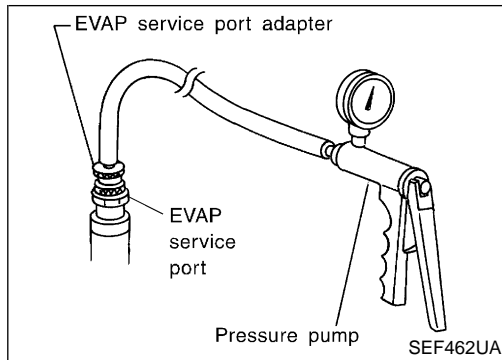
Refer to EC-870.

EL

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

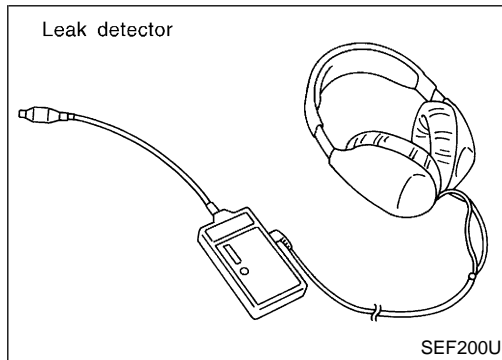
Evaporative Emission System (Cont'd)



Evap Service Port

NGEC0540S07

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



How to Detect Fuel Vapor Leakage

NGEC0540S08

CAUTION:

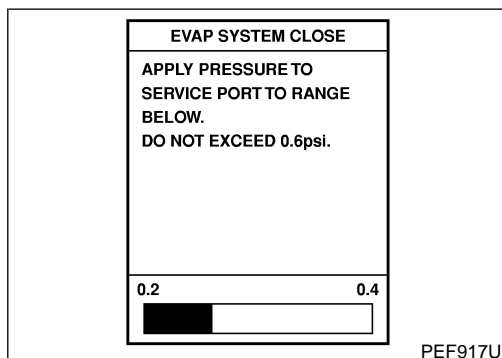
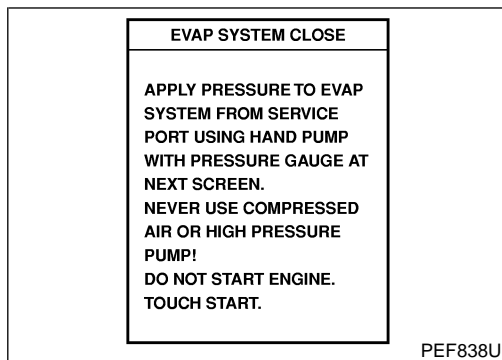
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in EVAP system.

NOTE:

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

Ⓜ With CONSULT-II

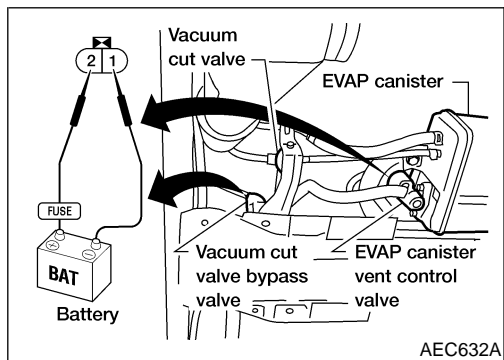
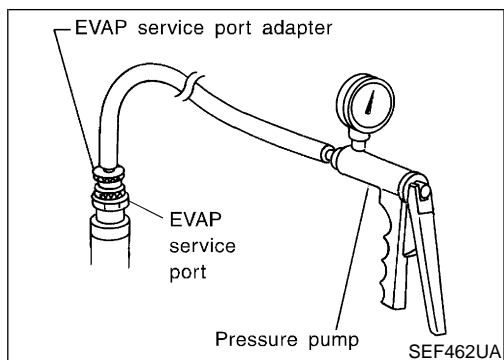
- 1) Attach the EVAP service port adapter securely to the EVAP service port.
- 2) Also attach the pressure pump and hose to the EVAP service port adapter.
- 3) Turn ignition switch ON.
- 4) Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT MODE" with CONSULT-II.
- 5) Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
- 6) Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
- 7) Remove EVAP service port adapter and hose with pressure pump.
- 8) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-630.



ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

Evaporative Emission System (Cont'd)



⊗ Without CONSULT-II

- 1) Attach the EVAP service port adapter securely to the EVAP service port.
- 2) Also attach the pressure pump with pressure gauge to the EVAP service port adapter.
- 3) Apply battery voltage to between the terminals of both EVAP canister vent control valve and vacuum cut valve bypass valve to make a closed EVAP system.
- 4) To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm², 0.2 to 0.4 psi).
- 5) Remove EVAP service port adapter and hose with pressure pump.
- 6) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-630.

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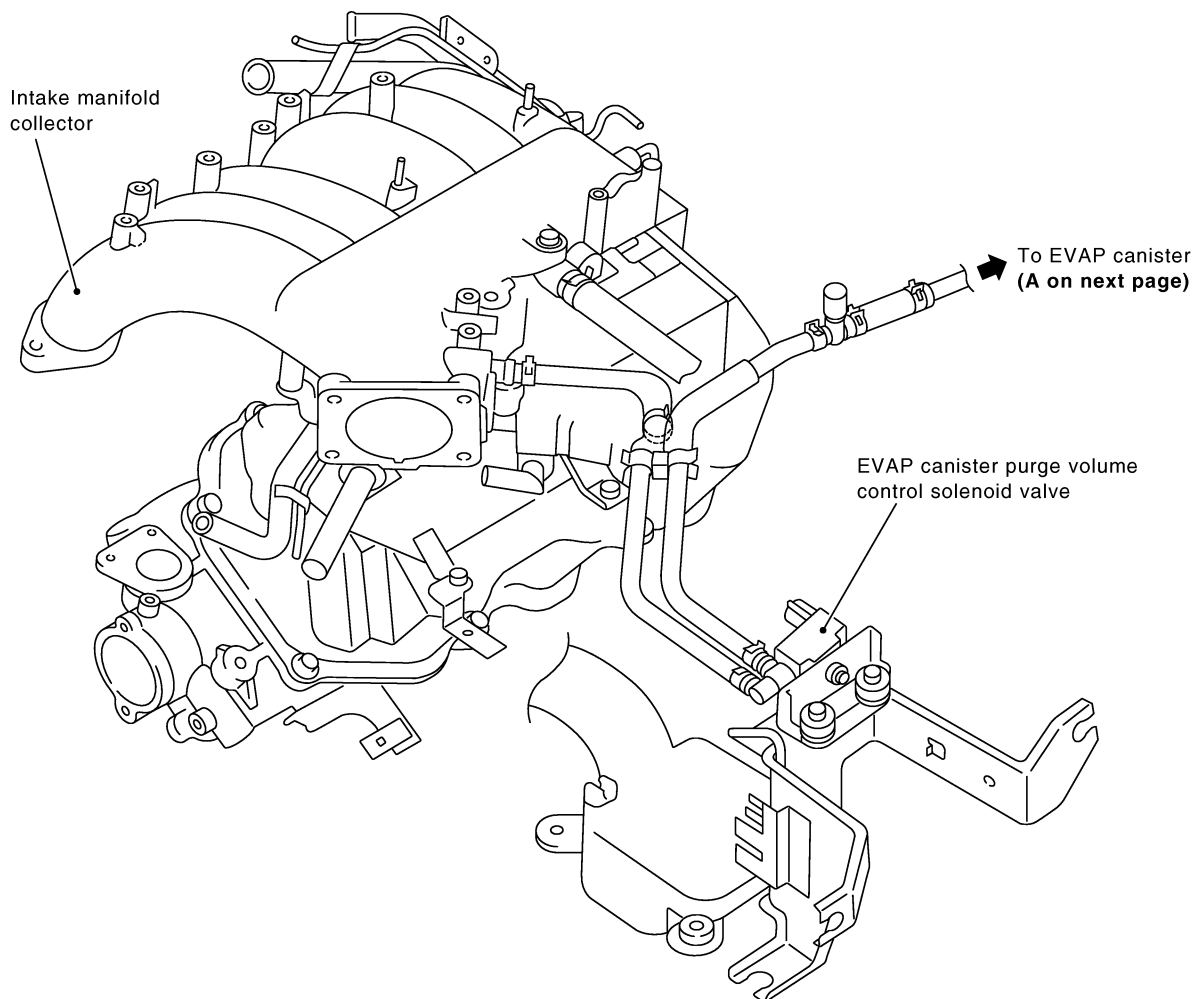
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

Evaporative Emission System (Cont'd)

EVAPORATIVE EMISSION LINE DRAWING

NGEC0541



NOTE:

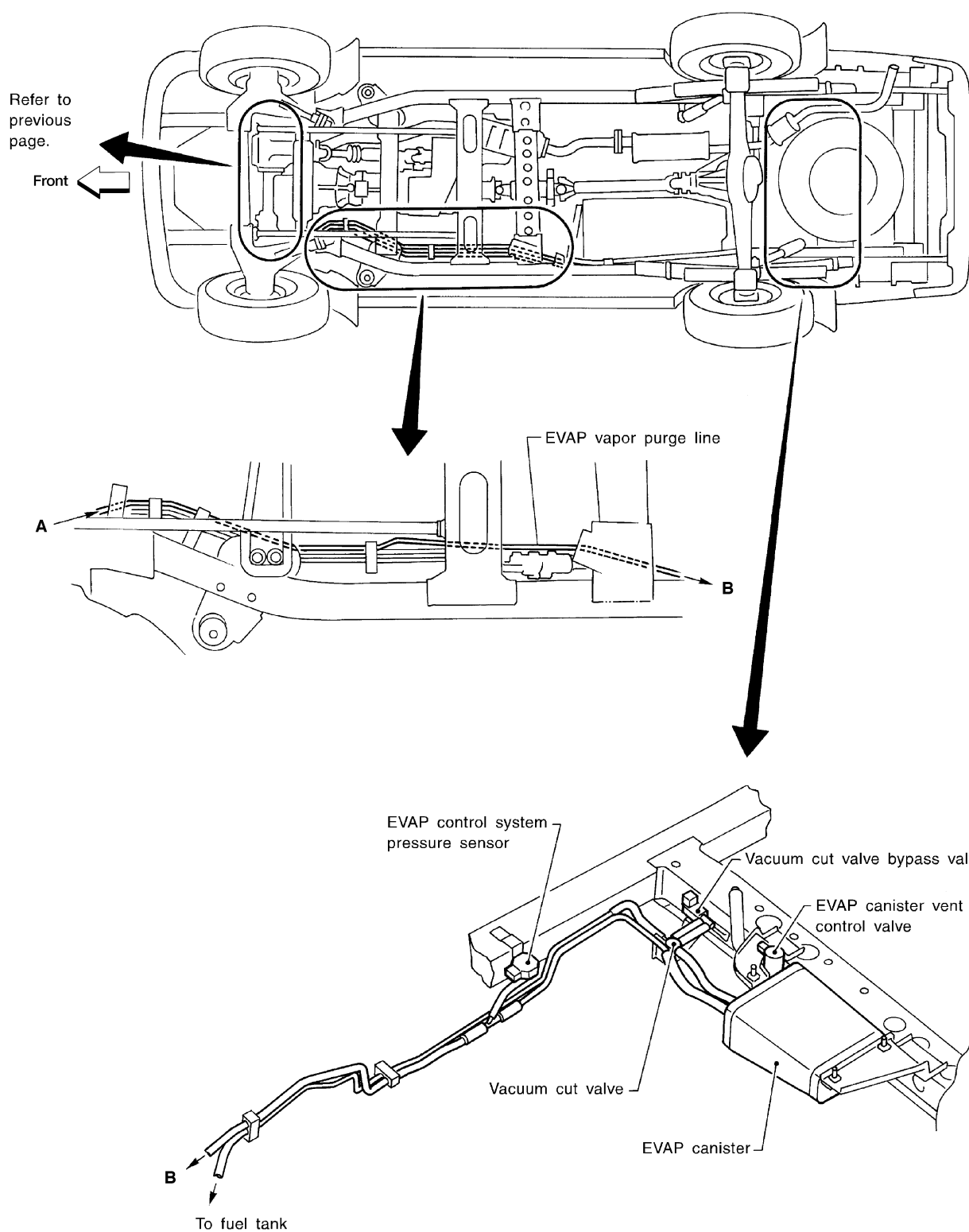
Do not use soapy water or any type of solvent while installing vacuum hoses or purge hoses.

SEF795Z

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

Evaporative Emission System (Cont'd)



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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

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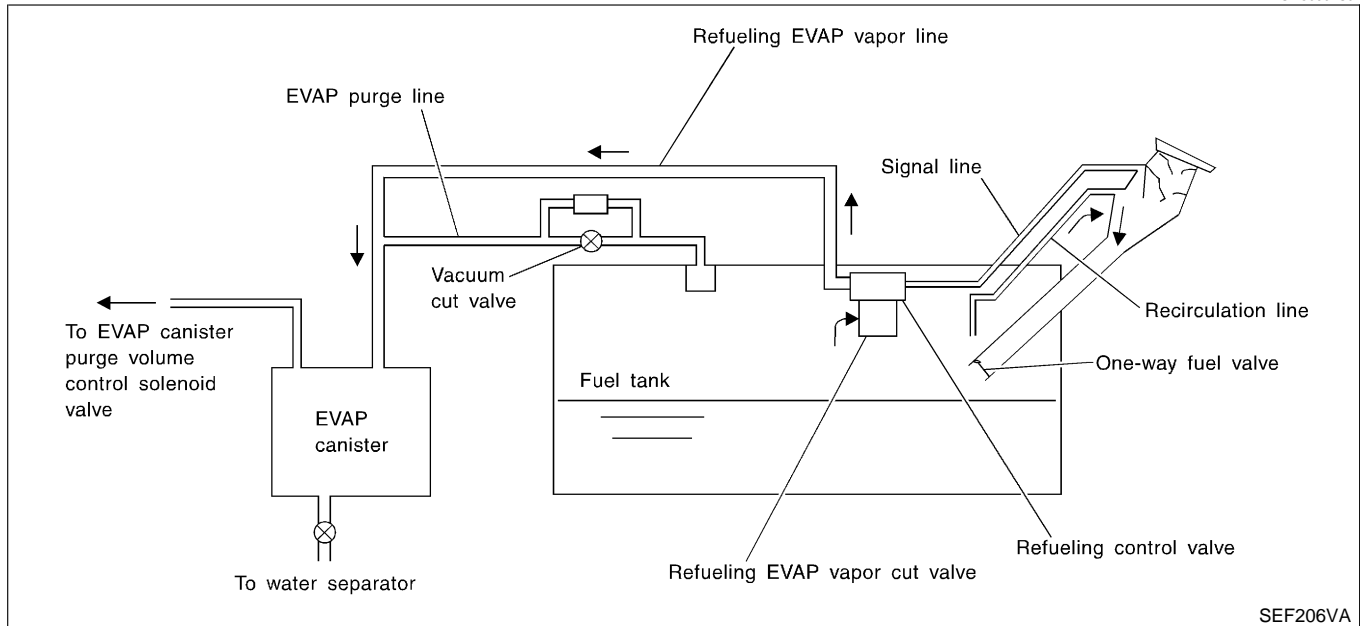
On Board Refueling Vapor Recovery (ORVR)

On Board Refueling Vapor Recovery (ORVR)

NGEC0957

SYSTEM DESCRIPTION

NGEC0957S01



From the beginning of refueling, the fuel tank pressure goes up. When the pressure reaches the setting value of the refueling control valve (RCV) opening pressure, the RCV is opened. After RCV opens, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve, RCV and refueling vapor line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.

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

The RCV is always closed during driving and the evaporative emission control system is operated the same as conventional system.

WARNING:

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

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

CAUTION:

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

- a) Put drained fuel in an explosion-proof container and put lid on securely.
 - b) Release fuel pressure from fuel line. Refer to "Fuel Pressure Release", EC-644.
 - c) Disconnect battery ground cable.
- Always replace O-ring when the fuel gauge retainer is removed.
 - Do not kink or twist hose and tube when they are installed.
 - Do not tighten hose and clamps excessively to avoid damaging hoses.
 - After installation, run engine and check for fuel leaks at connection.
 - Do not attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically. Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

DIAGNOSTIC PROCEDURE

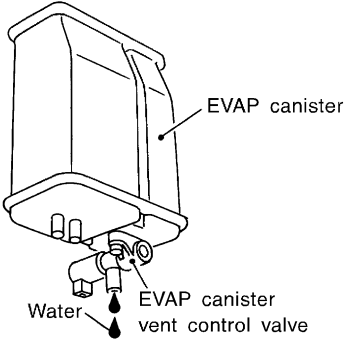
NGEC0957S02

Symptom: Fuel Odor from EVAP Canister Is Strong.

NGEC0957S0201

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

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

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

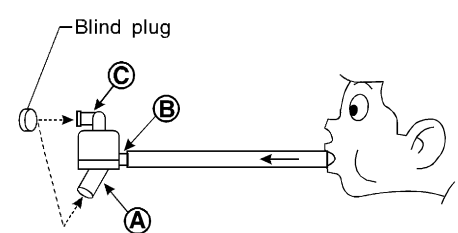
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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

4	CHECK WATER SEPARATOR
<p>1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged.</p> <div style="text-align: center;">  <p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p> </div> <p style="text-align: right;">SEF829T</p> <p>5. In case of NG in items 2 - 4, replace the parts. NOTE: • Do not disassemble water separator.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ Replace water separator.

5	DETECT MALFUNCTIONING PART
<p>Check the EVAP hose between EVAP canister and water separator for clogging or poor connection.</p>	
▶	Repair or replace EVAP hose.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

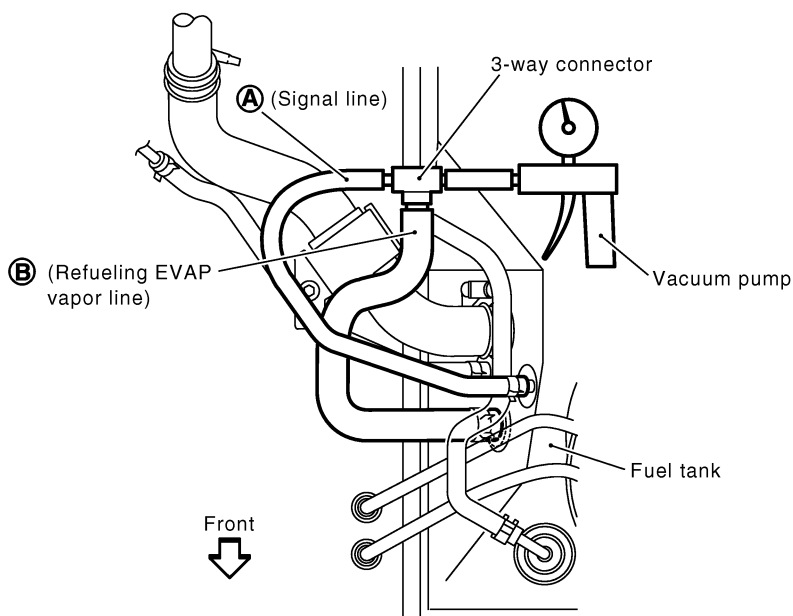
VG33E

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

6 CHECK REFUELING EVAP VAPOR CUT VALVE

Ⓟ With CONSULT-II

1. Remove fuel tank. Refer to **FE-5**, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:
 - a. Remove fuel feed hose located on the fuel gauge retainer.
 - b. Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
 - c. Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-II.
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.
 - a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
 - b. Remove fuel gauge retainer with fuel gauge unit.
Always replace O-ring with new one.
 - c. Put fuel tank upside down.
 - d. Apply vacuum pressure to both hose ends A and B [-13.3 kPa (-100 mmHg, -3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



SEF707Z

OK or NG

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

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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

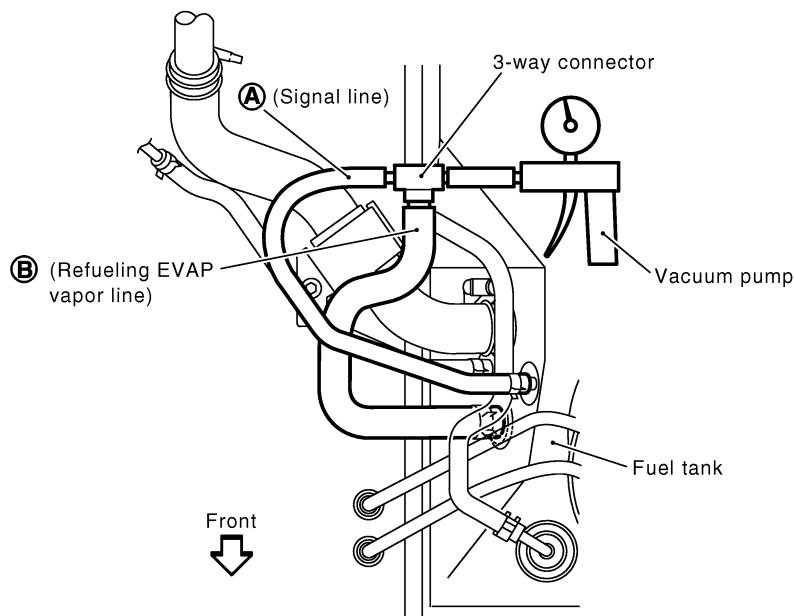
7 CHECK REFUELING EVAP VAPOR CUT VALVE

⊗ Without CONSULT-II

1. Remove fuel tank. Refer to **FE-5**, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:
 - a. Remove fuel gauge retainer.
 - b. Drain fuel from the tank using a hand pump into a fuel container.
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.
 - a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
 - b. Remove fuel gauge retainer with fuel gauge unit.

Always replace O-ring with new one.

 - c. Put fuel tank upside down.
 - d. Apply vacuum pressure to both hose ends A and B [-13.3 kPa (-100 mmHg , -3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



SEF707Z

OK or NG

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

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

8	CHECK REFUELING CONTROL VALVE	<ol style="list-style-type: none"> 1. Remove fuel filler cap. 2. Check air continuity between hose ends A and B. Blow air into the hose end B. Air should flow freely into the fuel tank. 3. Blow air into hose end A and check there is no leakage. 4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage. 	GI MA EM LC EC FE CL MT AT TF PD
		OK or NG	
OK	▶	INSPECTION END	
NG	▶	Replace refueling control valve with fuel tank.	

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

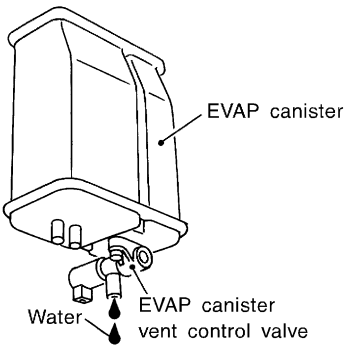
NGEC0957S0202

1	CHECK EVAP CANISTER	<ol style="list-style-type: none"> 1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Weigh the EVAP canister with EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb). 	AX SU BR ST RS BT HA SC EL IDX
		OK or NG	
OK	▶	GO TO 2.	
NG	▶	GO TO 3.	

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

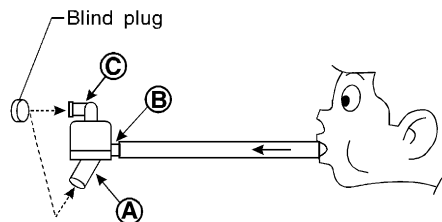
VG33E

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

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

SEF596U

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

4	CHECK WATER SEPARATOR		
<ol style="list-style-type: none"> 1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged. 			
			
<p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p>			
SEF829T			
5. In case of NG in items 2 - 4, replace the parts.			
NOTE:			
● Do not disassemble water separator.			
OK or NG			
OK	▶	GO TO 5.	
NG	▶	Replace water separator.	

5	DETECT MALFUNCTIONING PART		
Check the EVAP hose between EVAP canister and water separator for clogging or poor connection.			
		▶	Repair or replace EVAP hose.

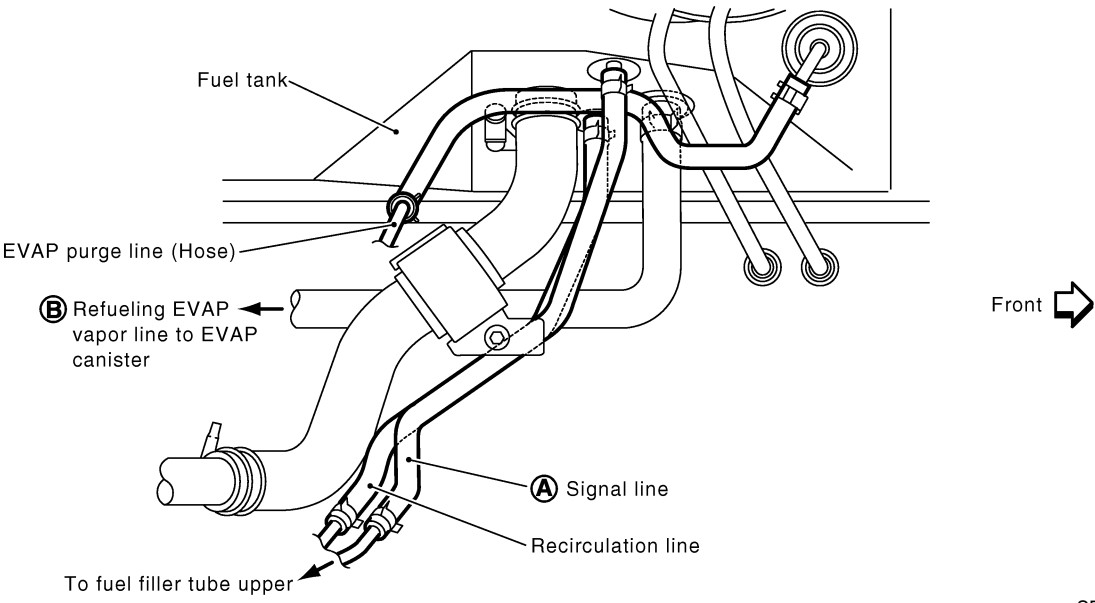
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

6	CHECK VENT HOSES AND VENT TUBES	
Check hoses and tubes between EVAP canister and refueling control valve for clogging, kink, looseness and improper connection.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Repair or replace hoses and tubes.

7	CHECK FILLER NECK TUBE	
Check signal line and recirculation line for clogging, dents and cracks.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace filler neck tube.

8	CHECK REFUELING CONTROL VALVE	
<ol style="list-style-type: none"> 1. Remove fuel filler cap. 2. Check air continuity between hose ends A and B. Blow air into the hose end B. Air should flow freely into the fuel tank. 3. Blow air into hose end A and check there is no leakage. 4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage. 		
		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 9.
OK (Without CONSULT-II)	▶	GO TO 10.
NG	▶	Replace refueling control valve with fuel tank.

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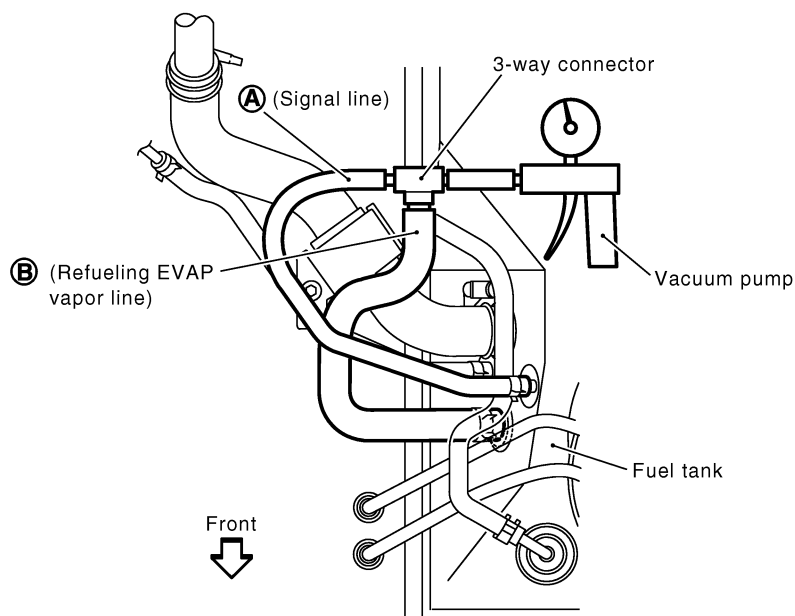
VG33E

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

9 CHECK REFUELING EVAP VAPOR CUT VALVE

With CONSULT-II

1. Remove fuel tank. Refer to **FE-5**, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:
 - a. Remove fuel feed hose located on the fuel gauge retainer.
 - b. Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
 - c. Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-II.
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.
 - a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
 - b. Remove fuel gauge retainer with fuel gauge unit.
Always replace O-ring with new one.
 - c. Put fuel tank upside down.
 - d. Apply vacuum pressure to both hose ends A and B [-13.3 kPa (-100 mmHg, -3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



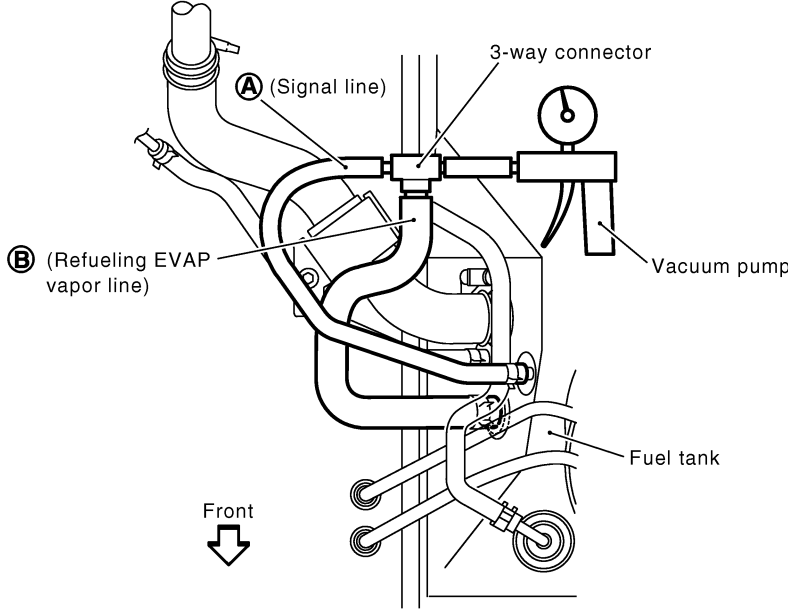
OK or NG

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

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

10	CHECK REFUELING EVAP VAPOR CUT VALVE
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Remove fuel tank. Refer to FE-5, "FUEL SYSTEM". 2. Drain fuel from the tank as follows: <ol style="list-style-type: none"> a. Remove fuel gauge retainer. b. Drain fuel from the tank using a hand pump into a fuel container. 3. Check refueling EVAP vapor cut valve for being stuck to close as follows. Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank. 4. Check EVAP vapor cut valve for being stuck to open as follows. <ol style="list-style-type: none"> a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector. b. Remove fuel gauge retainer with fuel gauge unit. <p style="margin-left: 20px;">Always replace O-ring with new one.</p> <ol style="list-style-type: none"> c. Put fuel tank upside down. d. Apply vacuum pressure to both hose ends A and B [-13.3 kPa (-100 mmHg, -3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable. 	
	
OK or NG	
OK	▶ GO TO 11.
NG	▶ Replace refueling EVAP vapor cut valve with fuel tank.

11	CHECK FUEL FILLER TUBE
Check filler neck tube and hose connected to the fuel tank for clogging, dents and cracks.	
OK or NG	
OK	▶ GO TO 12.
NG	▶ Replace fuel filler tube.

12	CHECK ONE-WAY FUEL VALVE-I
Check one-way valve for clogging.	
OK or NG	
OK	▶ GO TO 13.
NG	▶ Repair or replace one-way fuel valve with fuel tank.

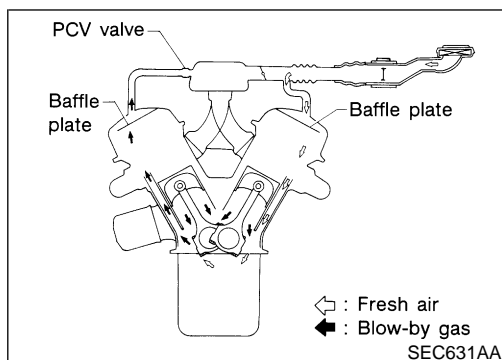
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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

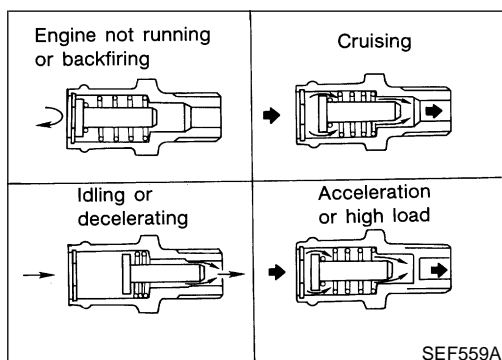
13	CHECK ONE-WAY FUEL VALVE-II
<p>1. Make sure that fuel is drained from the tank. 2. Remove fuel filler tube and hose. 3. Check one-way fuel valve for operation as follows. When a stick is inserted, the valve should open, when removing stick it should close.</p> <p style="text-align: center;">After removing filler tube</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SEF665U</p> <p>Do not drop any material into the tank.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ INSPECTION END
NG	▶ Replace fuel filler tube or replace one-way fuel valve with fuel tank.



Positive Crankcase Ventilation DESCRIPTION

NGEC0542

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



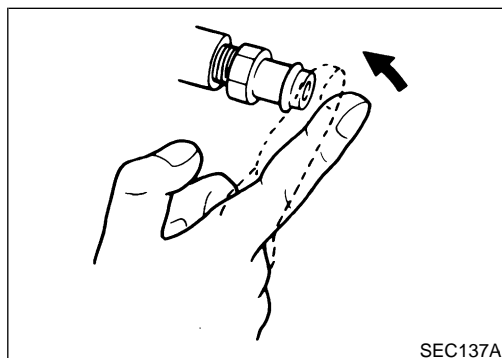
INSPECTION

NGEC0543

PCV (Positive Crankcase Ventilation) Valve

NGEC0543S01

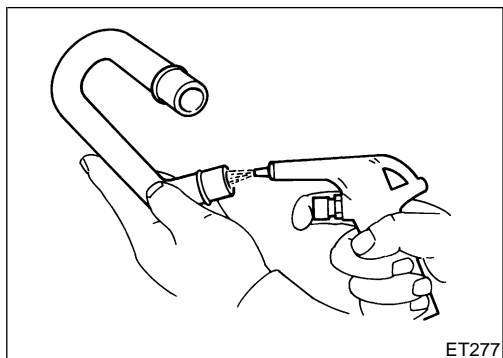
With engine running at idle, remove PCV valve ventilation hose from PCV valve; if the valve is working properly, a hissing noise will be heard as air passes through it and a strong vacuum should be felt immediately when a finger is placed over valve inlet.



ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33E

Positive Crankcase Ventilation (Cont'd)



PCV Valve Ventilation Hose

NGEC0543S02

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

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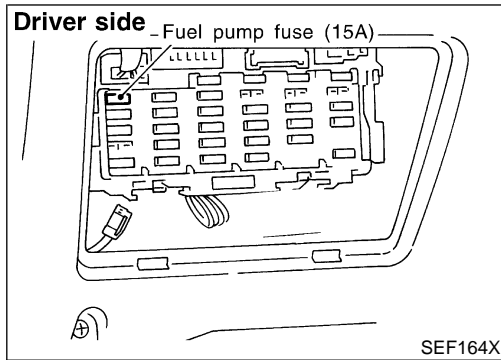
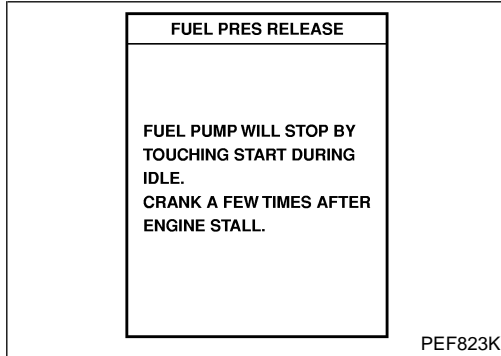
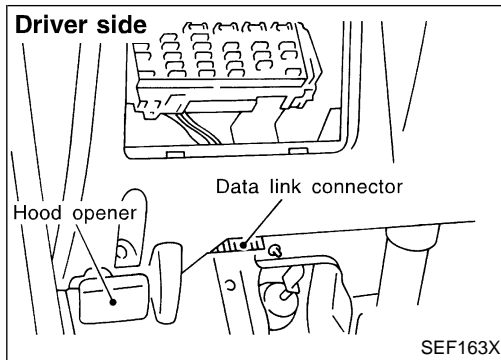
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Fuel Pressure Release



Fuel Pressure Release

Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger. NGEC0544

WITH CONSULT-II NGEC0544S01

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 NGEC0544S02

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

Fuel Pressure Check

- Use Fuel Pressure Gauge J-44321 to check fuel pressure. NGEC0545
- Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defog., A/C ect.). Fuel pressure gauge may indicate false readings due to varying engine loads and changes in manifold vacuum.

1. Release fuel pressure to zero.
2. Install the inline fuel quick disconnect fitting between the connection of the fuel feed hose (from tank) and the fuel hose (to engine).
3. Connect the fuel pressure test gauge (quick connect adapter hose) to quick disconnect fitting.
4. Start engine and check for fuel leakage.
5. Read the indication of fuel pressure gauge.

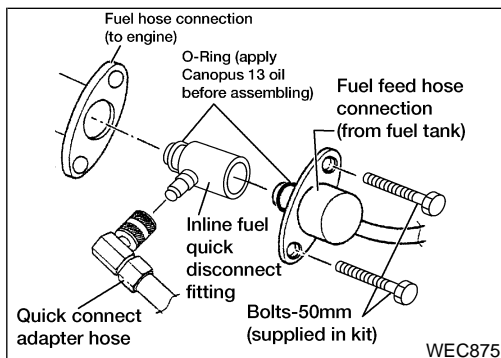
At idling:

With vacuum hose connected

Approximately 235 kPa (2.4 kg/cm², 34 psi)

With vacuum hose disconnected

Approximately 294 kPa (3.0 kg/cm², 43 psi)



If results are unsatisfactory, perform Fuel Pressure Regulator Check.

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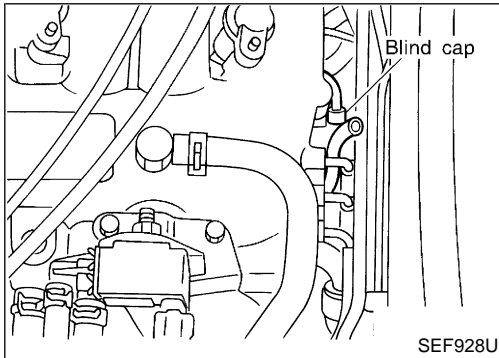
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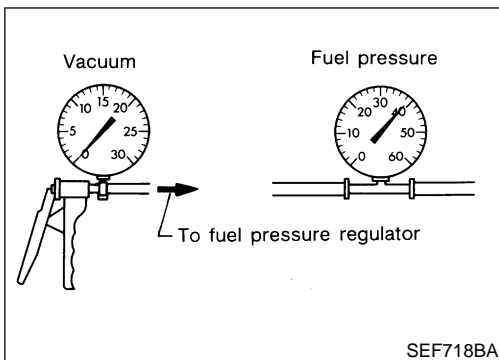
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Fuel Pressure Regulator Check

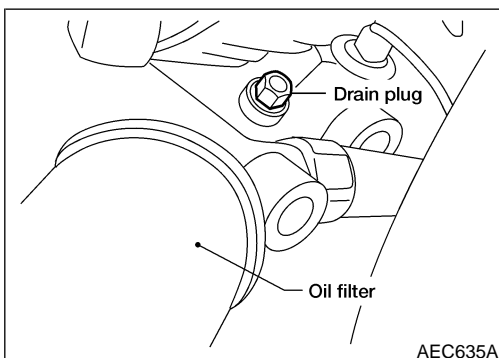
NGEC0546

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



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

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

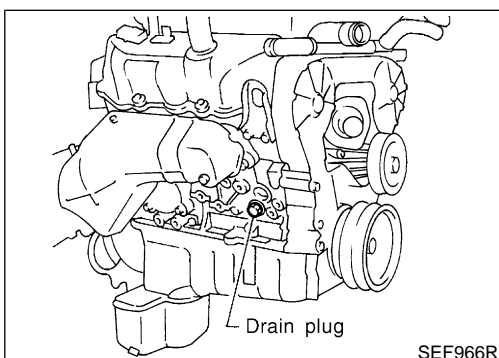


Injector

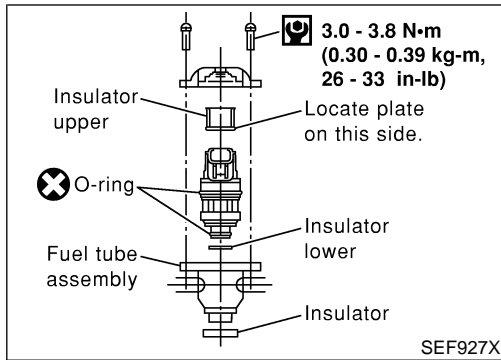
REMOVAL AND INSTALLATION

NGEC0547

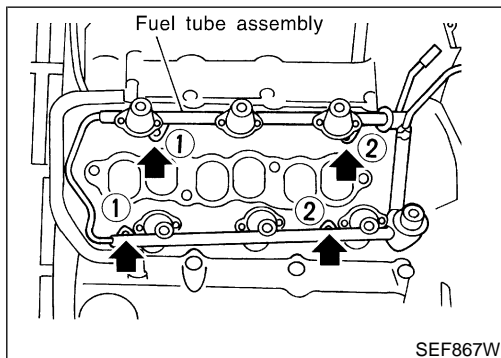
1. Release fuel pressure to zero. Refer to EC-644.
2. Drain coolant by removing drain plugs from both sides of cylinder block.
3. Separate ASCD and accelerator control wire from intake manifold collector.
4. Remove intake manifold collector from engine. The following parts should be disconnected or removed.
 - a. Harness connectors for
 - IACV-AAC valve
 - IACV-FICD solenoid valve
 - Throttle position sensor and closed throttle position switch assembly
 - Ground harness
 - b. PCV valve ventilation hoses
 - c. Vacuum hoses for
 - Brake booster
 - Fuel pressure regulator
 - d. Air hoses from
 - Air duct



- IACV-AAC valve
- e. Water hoses for
- Throttle body
- Air relief plug
- f. EVAP canister purge hose
- 5. Remove injector fuel tube assembly.
The following parts should be disconnected or removed.
- Vacuum hose for fuel pressure regulator
- Fuel feed and return hose
- All injectors harness connectors
- **Push injector tail piece.**
- **Do not pull on connector.**
- **Do not extract injector by pinching.**

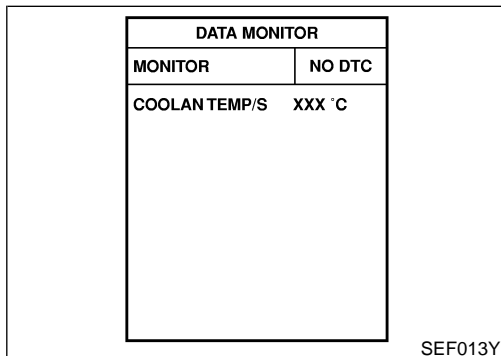


6. Push out any malfunctioning injector from injector fuel tube.
7. Replace or clean injector as necessary.
- **Always replace O-rings with new ones.**
- **Lubricate O-rings with engine oil.**
8. Install injector to injector fuel tube assembly.



9. Install injectors with fuel tube assembly to intake manifold.
Tighten in numerical order shown in the figure.
- a. First, tighten all bolts to 4.9 to 6.0 N·m (0.5 to 0.61 kg·m, 3.6 to 4.4 ft·lb).
- b. Then, tighten all bolts to 10.8 to 14.7 N·m (1.1 to 1.5 kg·m, 8 to 11 ft·lb).
10. Reinstall any part removed in reverse order of removal.

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



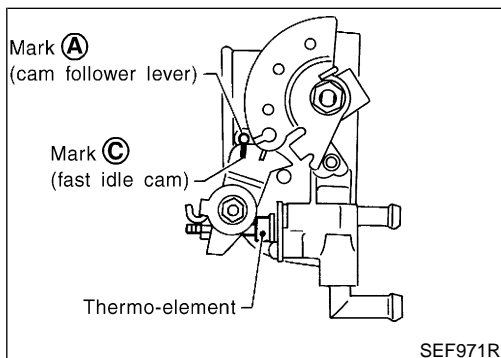
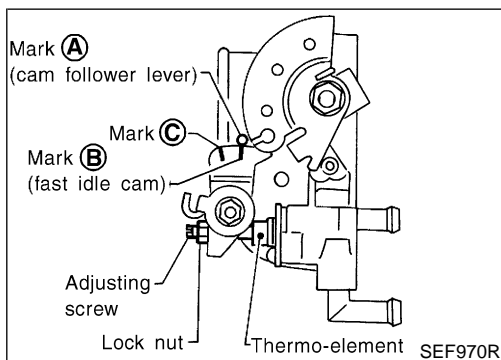
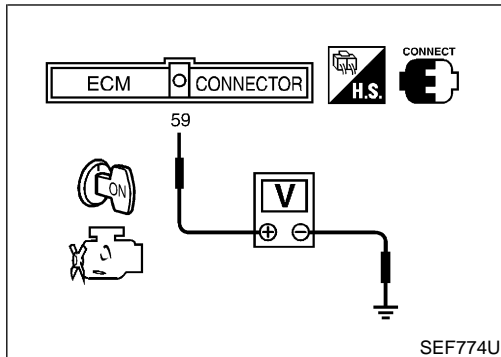
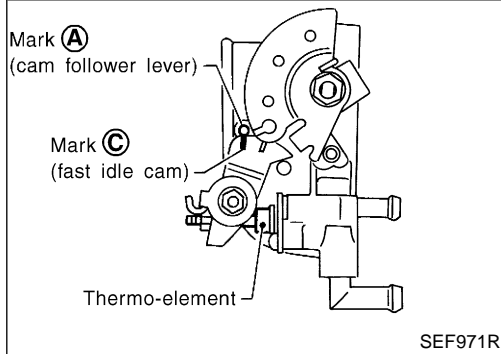
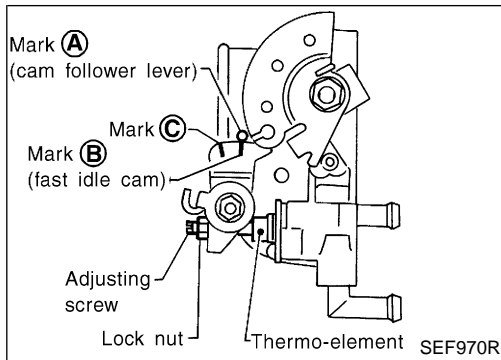
Fast Idle Cam (FIC) INSPECTION AND ADJUSTMENT

With CONSULT-II

1. Turn ignition switch ON.
2. See "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
3. When engine coolant temperature is 20 to 30°C (68 to 86°F), make sure that the center of mark **A** is aligned with mark **B** as shown in the figure.

NGEC0548

NGEC0548S01



- If NG, adjust by turning adjusting screw.

Lock nut:

: 0.98 - 1.96 N·m (10 - 20 kg·cm, 8.7 - 17.4 in·lb)

4. Start engine and warm it up.
5. When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following.
 - The center of mark A is aligned with mark C.
 - The cam follower lever's roller is not touching the fast idle cam.
 - If NG, replace thermo-element and perform the above inspection and adjustment again.

~~⊗~~ **Without CONSULT-II**
NGEC0548S02

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 59 (Engine coolant temperature sensor signal) and ground.
3. When the voltage is between 3.12 to 3.52V, make sure that the center of mark A is aligned with mark B as shown in the figure.

- If NG, adjust by turning adjusting screw.

Lock nut:

: 0.98 - 1.96 N·m (10 - 20 kg·cm, 8.7 - 17.4 in·lb)

4. Start engine and warm it up.
5. When the voltage is between 1.10 to 1.36V, check the following.
 - The center of mark A is aligned with mark C.
 - The cam follower lever's roller is not touching the fast idle cam.
 - If NG, replace thermo-element and perform the above inspection and adjustment again.

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Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

NGEC0549

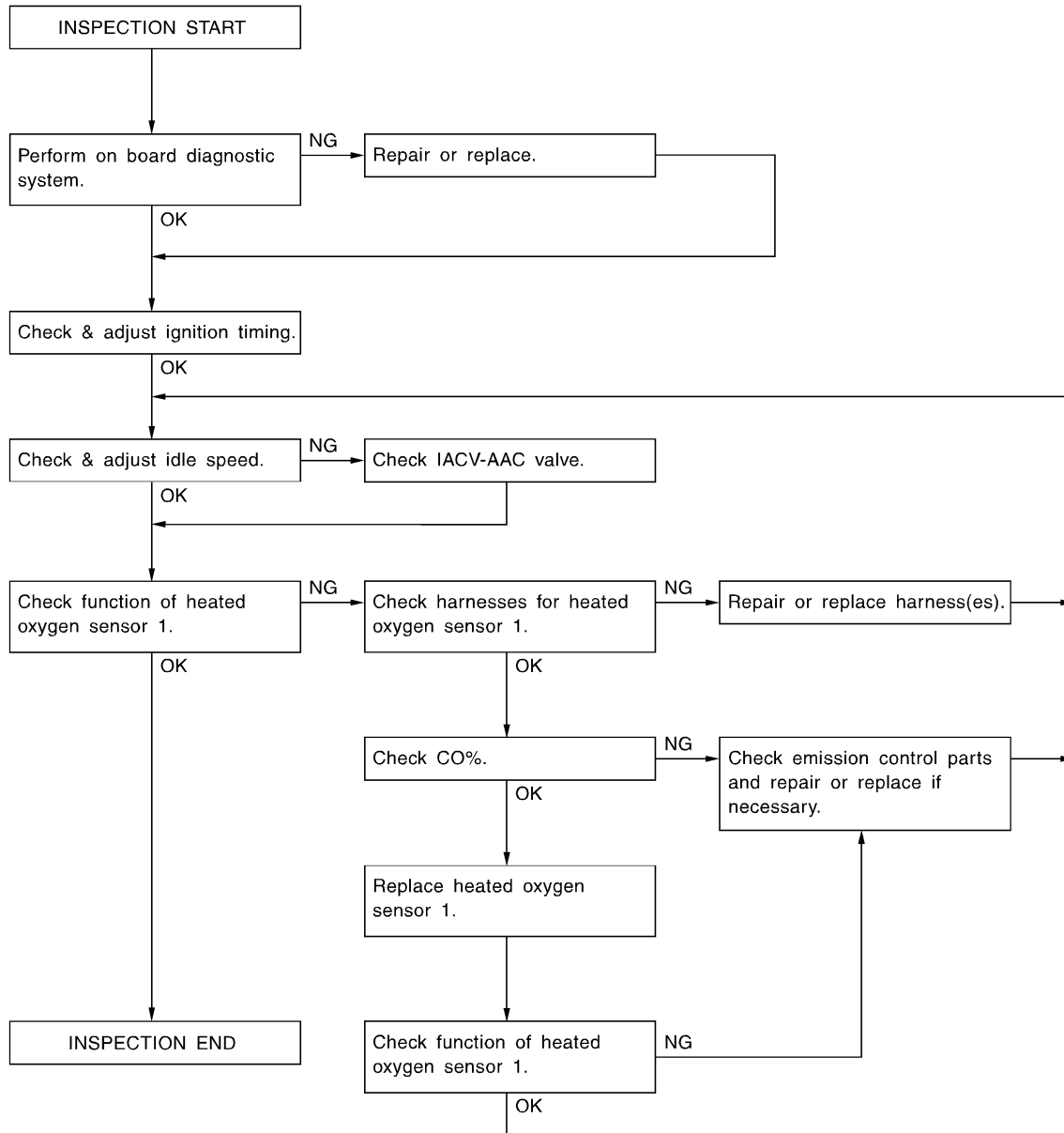
NGEC0549S01

PREPARATION

- 1) Make sure that the following parts are in good order.
 - Battery
 - Ignition system
 - Engine oil and coolant levels
 - Fuses
 - ECM harness connector
 - Vacuum hoses
 - Air intake system
(Oil filler cap, oil level gauge, etc.)
 - Fuel pressure
 - Engine compression
 - Throttle valve
 - Evaporative emission system
- 2) On air conditioner equipped models, checks should be carried out while the air conditioner is OFF.
- 3) On automatic transmission equipped models, when checking idle rpm, ignition timing and mixture ratio, checks should be carried out while shift lever is in "N" position.
- 4) When measuring "CO" percentage, insert probe more than 40 cm (15.7 in) into tail pipe.
- 5) Turn off headlamps, heater blower, rear defogger.
- 6) Keep front wheels pointed straight ahead.
- 7) Make the check after the cooling fan has stopped.

Overall Inspection Sequence

NGEC0549S0101



SEF554YA

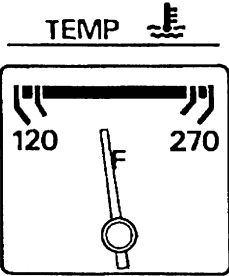
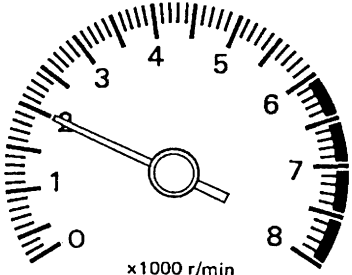
NOTE:

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

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INSPECTION PROCEDURE

=NGEC0549S02

1	INSPECTION START	<p>1. Visually check the following:</p> <ul style="list-style-type: none"> ● Air cleaner clogging ● Hoses and ducts for leaks ● Electrical connectors ● Gasket ● Throttle valve and throttle position sensor operation <p>2. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge. Ensure engine stays below 1,000 rpm.</p> <div style="text-align: center; margin: 20px 0;">  <p>TEMP </p> </div> <p>3. Open engine hood and run engine at about 2,000 rpm for about 2 minutes under no-load.</p> <div style="text-align: center; margin: 20px 0;">  <p>x 1000 r/min</p> </div> <p>4. Make sure that no DTC is displayed with CONSULT-II or GST.</p> <p style="text-align: center;">OK or NG</p>	SEF976U
	OK	▶ GO TO 2.	
	NG	▶ 1. Repair or replace components as necessary. 2. GO TO 2.	

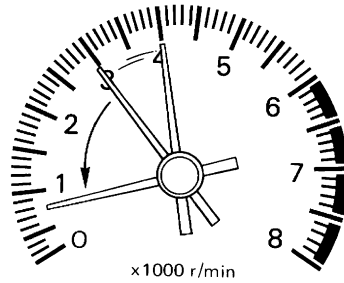
BASIC SERVICE PROCEDURE

VG33E

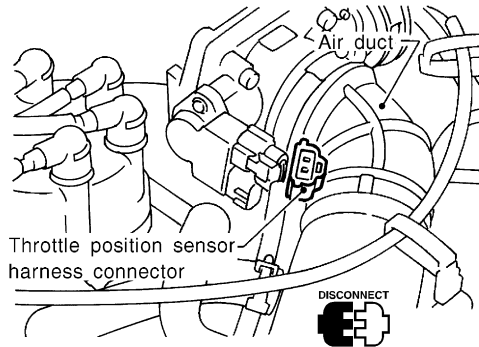
Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

2 CHECK IGNITION TIMING

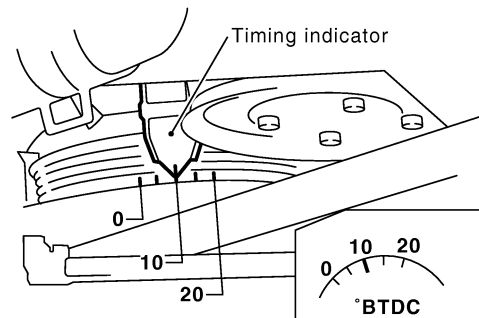
1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.



3. Turn off engine and disconnect throttle position sensor harness connector.



4. Start and rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run at idle speed.
5. Check ignition timing with a timing light.



10°±2° BTDC (in "P" or "N" position)

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

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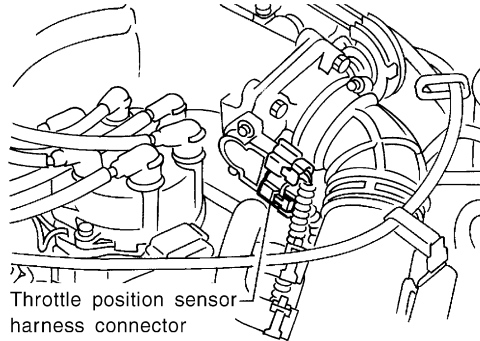
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3 ADJUST IGNITION TIMING

1. Adjust ignition timing by turning distributor after loosening securing bolts.
2. Turn off engine and connect throttle position sensor harness connector to throttle position sensor.



SEF972R

▶ GO TO 2.

4 CHECK BASE IDLE SPEED

☑ With CONSULT-II

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

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

700±50 rpm (in "P" or "N" position)

SEF058Y

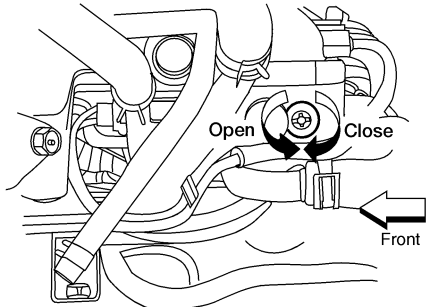
☒ Without CONSULT-II


1. Check idle speed.


700±50 rpm (in "P" or "N" position)

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	ADJUST BASE IDLE SPEED
<p>1. Rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load then run engine at idle speed. 2. Adjust idle speed by turning idle speed adjusting screw.</p>	
	
<p>700±50 rpm (in "P" or "N" position)</p>	
<p>LEC513</p>	
<p>▶ GO TO 6.</p>	

6	CHECK TARGET IDLE SPEED						
<p> With CONSULT-II</p> <p>1. Turn off engine and connect throttle position sensor harness connector. 2. Start and rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load then run at idle speed. 3. Read idle speed in "DATA MONITOR" mode with CONSULT-II.</p>							
<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> </tbody> </table>		DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm
DATA MONITOR							
MONITOR	NO DTC						
ENG SPEED	XXX rpm						
<p>750±50 rpm (in "P" or "N" position)</p>							
<p>SEF058Y</p>							

<p> Without CONSULT-II</p> <p>1. Turn off engine and connect throttle position sensor harness connector. 2. Start and rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load then run at idle speed. 3. Check idle speed.</p>	
<p>750±50 rpm (in "P" or "N" position)</p>	
<p>OK or NG</p>	
<p>OK (With CONSULT-II) ▶</p>	<p>GO TO 8.</p>
<p>OK (Without CONSULT-II) ▶</p>	<p>GO TO 9.</p>
<p>NG ▶</p>	<p>GO TO 7.</p>

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BASIC SERVICE PROCEDURE

VG33E

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

7	DETECT MALFUNCTIONING PART							
<p>Check the following.</p> <ol style="list-style-type: none"> 1. Check IACV-AAC valve and replace if necessary. Refer to EC-1006. 2. Check IACV-AAC valve harness and repair if necessary. Refer to EC-1006. 3. Check ECM function by substituting another known-good ECM. (ECM may be the cause of a problem, but this is rarely the case.) 								
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">With CONSULT-II</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 8.</td> </tr> <tr> <td>Without CONSULT-II</td> <td style="text-align: center;">▶</td> <td>GO TO 9.</td> </tr> </table>			With CONSULT-II	▶	GO TO 8.	Without CONSULT-II	▶	GO TO 9.
With CONSULT-II	▶	GO TO 8.						
Without CONSULT-II	▶	GO TO 9.						

8	CHECK HEATED OXYGEN SENSOR 1 (BANK 2) SIGNAL											
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Run engine at about 2,000 rpm for about 2 minutes under no-load. 2. See "HO2S1 MNTR (B2)" in "DATA MONITOR" mode. 3. Running engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds. 												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td>LEAN</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td>RICH</td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	RICH
DATA MONITOR												
MONITOR	NO DTC											
ENG SPEED	XXX rpm											
HO2S1 MNTR (B1)	LEAN											
HO2S1 MNTR (B2)	RICH											
<p>1 time: RICH → LEAN → RICH 2 times: RICH → LEAN → RICH → LEAN → RICH</p>												
SEF945Y												
OK or NG												
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 12.</td> </tr> <tr> <td>NG (Monitor does not fluctuate.)</td> <td style="text-align: center;">▶</td> <td>GO TO 17.</td> </tr> <tr> <td>NG (Monitor fluctuates less than 5 times.)</td> <td style="text-align: center;">▶</td> <td>GO TO 10.</td> </tr> </table>			OK	▶	GO TO 12.	NG (Monitor does not fluctuate.)	▶	GO TO 17.	NG (Monitor fluctuates less than 5 times.)	▶	GO TO 10.	
OK	▶	GO TO 12.										
NG (Monitor does not fluctuate.)	▶	GO TO 17.										
NG (Monitor fluctuates less than 5 times.)	▶	GO TO 10.										

9	CHECK HEATED OXYGEN SENSOR 1 (BANK 2) SIGNAL										
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Run engine at about 2,000 rpm for about 2 minutes under no-load. 2. Set voltmeter probe between ECM terminal 62 and ground. 3. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p>											
OK or NG											
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 12.</td> </tr> <tr> <td>NG (Voltage does not fluctuate.)</td> <td style="text-align: center;">▶</td> <td>GO TO 17.</td> </tr> <tr> <td>NG (Voltage fluctuates less than 5 times.)</td> <td style="text-align: center;">▶</td> <td>GO TO 10.</td> </tr> </table>			OK	▶	GO TO 12.	NG (Voltage does not fluctuate.)	▶	GO TO 17.	NG (Voltage fluctuates less than 5 times.)	▶	GO TO 10.
OK	▶	GO TO 12.									
NG (Voltage does not fluctuate.)	▶	GO TO 17.									
NG (Voltage fluctuates less than 5 times.)	▶	GO TO 10.									

BASIC SERVICE PROCEDURE

VG33E

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

10	CHECK HEATED OXYGEN SENSOR 1 (BANK 2) SIGNAL	
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Stop engine. 2. Replace heated oxygen sensor 1 (bank 2). 3. Start engine and warm it up to normal operating temperature. 4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load. 5. See "HO2S1 MNTR (B2)" in "DATA MONITOR" mode. 6. Running engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds. 1 time: RICH → LEAN → RICH 2 times: RICH → LEAN → RICH → LEAN → RICH 		
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Stop engine. 2. Replace heated oxygen sensor 1 (bank 2). 3. Start engine and warm it up to normal operating temperature. 4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load. 5. Set voltmeter probe between ECM terminal 62 and ground. 6. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V <p style="text-align: center;">OK or NG</p>		
	▶	GO TO 12.
	▶	GO TO 13.
	▶	GO TO 11.

11	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ol style="list-style-type: none"> 1. Check fuel pressure regulator. Refer to EC-645. 2. Check mass air flow sensor and its circuit. Refer to EC-761. 3. Check injector and its circuit. Refer to EC-1145. Clean or replace if necessary. 4. Check engine coolant temperature sensor and its circuit. Refer to EC-793. 5. Check ECM function by substituting another known good ECM. (ECM may be the cause of a problem, but this is rarely the case.) 		
	▶	GO TO 2.

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BASIC SERVICE PROCEDURE

VG33E

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

12	CHECK HEATED OXYGEN SENSOR 1 (BANK 1) SIGNAL											
<p>④ With CONSULT-II</p> <p>1. See "HO2S1 (B1)" in "DATA MONITOR" mode.</p> <p>2. Maintaining engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.</p>												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">DATA MONITOR</th> </tr> <tr> <th style="text-align: center;">MONITOR</th> <th style="text-align: center;">NO DTC</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td style="text-align: center;">HO2S1 MNTR (B1)</td> <td style="text-align: center;">LEAN</td> </tr> <tr> <td style="text-align: center;">HO2S1 MNTR (B2)</td> <td style="text-align: center;">RICH</td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	RICH
DATA MONITOR												
MONITOR	NO DTC											
ENG SPEED	XXX rpm											
HO2S1 MNTR (B1)	LEAN											
HO2S1 MNTR (B2)	RICH											
<p>1 time: RICH → LEAN → RICH 2 times: RICH → LEAN → RICH → LEAN → RICH</p>												
SEF945Y												
OK or NG												
OK	▶	INSPECTION END										
NG (Monitor does not fluctuate.)	▶	GO TO 16.										
NG (Monitor fluctuates less than 5 times.)	▶	GO TO 14.										

13	CHECK HEATED OXYGEN SENSOR 1 (BANK 1) SIGNAL	
<p>⊗ Without CONSULT-II</p> <p>1. Set voltmeter probe between ECM terminal 63 and ground.</p> <p>2. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.</p> <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p>		
OK or NG		
OK	▶	INSPECTION END
NG (Voltage does not fluctuate.)	▶	GO TO 16.
NG (Voltage fluctuates less than 5 times.)	▶	GO TO 14.

BASIC SERVICE PROCEDURE

VG33E

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

14	CHECK HEATED OXYGEN SENSOR 1 (BANK 1) SIGNAL	
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Stop engine. 2. Replace heated oxygen sensor 1 (bank 1). 3. Start engine and warm it up to normal operating temperature. 4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load. 5. See "HO2S1 MNTR (B1)" in "DATA MONITOR" mode. 6. Maintaining engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds. 1 time: RICH → LEAN → RICH 2 times: RICH → LEAN → RICH → LEAN → RICH 		
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Stop engine. 2. Replace heated oxygen sensor 1 (bank 1). 3. Start engine and warm it up to normal operating temperature. 4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load. 5. Set voltmeter probe between ECM terminal 63 and ground. 6. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V <p style="text-align: center;">OK or NG</p>		
OK		▶ INSPECTION END
NG		▶ GO TO 15.

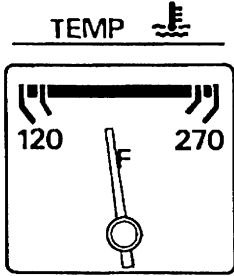
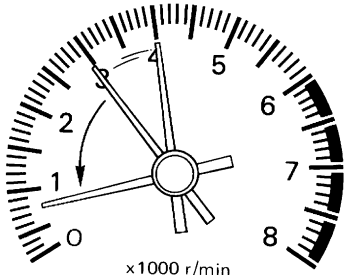
15	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ol style="list-style-type: none"> 1. Check fuel pressure regulator. Refer to EC-645. 2. Check mass air flow sensor and its circuit. Refer to EC-761. 3. Check injector and its circuit. Refer to EC-1145. Clean or replace if necessary. 4. Check engine coolant temperature sensor and its circuit. Refer to EC-793. 5. Check ECM function by substituting another known good ECM. (ECM may be the cause of a problem, but this is rarely the case.) 		
		▶ GO TO 2.

16	CHECK HEATED OXYGEN SENSOR 1 (BANK 1) HARNESS	
<ol style="list-style-type: none"> 1. Turn off engine and disconnect battery ground cable. 2. Disconnect ECM harness connector. 3. Disconnect heated oxygen sensor 1 (bank 1) harness connector. 4. Check harness continuity between ECM terminal 50 and heated oxygen sensor 1 (bank 1) harness connector. Continuity should exist. <p style="text-align: center;">OK or NG</p>		
OK		▶ 1. Connect ECM harness connector. 2. GO TO 18.
NG		▶ 1. Repair or replace harness. 2. GO TO 8. (With CONSULT-II) GO TO 9. (Without CONSULT-II)

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17	CHECK HEATED OXYGEN SENSOR 1 (BANK 2) HARNESS	
<ol style="list-style-type: none"> 1. Turn off engine and disconnect battery ground cable. 2. Disconnect ECM harness connector. 3. Disconnect heated oxygen sensor 1 (bank 2) harness connector. 4. Check harness continuity between ECM terminal 51 and heated oxygen sensor 1 (bank 2) harness connector. Continuity should exist. <p style="text-align: center;">OK or NG</p>		
OK	▶	<ol style="list-style-type: none"> 1. Connect ECM harness connector. 2. GO TO 18.
NG	▶	<ol style="list-style-type: none"> 1. Repair or replace harness. 2. GO TO 8. (With CONSULT-II) GO TO 9. (Without CONSULT-II)

18	PREPARATION FOR "CO" % CHECK																					
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Select "COOLANT TEMP" in "ACTIVE TEST" mode. 2. Set "COOLANT TEMP" to 5°C (41°F) by touching "DWN" and "Qd". 																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td>ENG COOLANT TEMP</td> <td>XXX °C</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>INJ PULSE-B1</td> <td>XXX msec</td> </tr> <tr> <td>IGN TIMING</td> <td>XXX BTDC</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </thead></table>			ACTIVE TEST		ENG COOLANT TEMP	XXX °C	MONITOR		ENG SPEED	XXX rpm	INJ PULSE-B1	XXX msec	IGN TIMING	XXX BTDC								
ACTIVE TEST																						
ENG COOLANT TEMP	XXX °C																					
MONITOR																						
ENG SPEED	XXX rpm																					
INJ PULSE-B1	XXX msec																					
IGN TIMING	XXX BTDC																					
SEF172Y																						
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Disconnect engine coolant temperature sensor harness connector. 2. Connect a resistor (4.4 kΩ) between terminals of engine coolant temperature sensor harness connector. 																						
<p style="text-align: center;">Engine coolant temperature sensor harness connector (F9)</p> <p style="text-align: center;">4.4 kΩ resistor</p>																						
AEC036B																						
▶		GO TO 19.																				

19	CHECK "CO" %	
<p>1. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge.</p> <div style="text-align: center;">  <p>TEMP </p> </div>		
<p>2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.</p> <div style="text-align: center;">  <p>x1000 r/min</p> </div>		
<p>3. Check "CO" %.</p> <p style="padding-left: 20px;">Idle CO: 1.5 - 9.5%</p> <p>4. Without CONSULT-II After checking CO%,</p> <p style="padding-left: 20px;">a. Disconnect the resistor from terminals of engine coolant temperature sensor.</p> <p style="padding-left: 20px;">b. Connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	<p>1. Replace front heated oxygen sensor LH.</p> <p>2. GO TO 10.</p>
NG	▶	GO TO 20.

20	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ol style="list-style-type: none"> 1. Connect front heated oxygen sensor harness connectors to front heated oxygen sensors. 2. Check fuel pressure regulator. Refer to EC-645. 3. Check mass air flow sensor and its circuit. Refer to EC-761. 4. Check injector and its circuit. Refer to EC-1145. Clean or replace if necessary. 5. Check engine coolant temperature sensor and its circuit. Refer to EC-793. 6. Check ECM function by substituting another known good ECM. (ECM may be the cause of a problem, but this is rarely the case.) 		
	▶	GO TO 2.

GI
 MA
 EM
 LC
EC
 FE
 CL
 MT
 AT
 TF
 PD
 AX
 SU
 BR
 ST
 RS
 BT
 HA
 SC
 EL
 IDX

Introduction

NGEC0550

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

Emission-related diagnostic information	SAE Mode
Diagnostic Trouble Code (DTC)	Mode 3 of SAE J1979
Freeze Frame data	Mode 2 of SAE J1979
System Readiness Test (SRT) code	Mode 1 of SAE J1979
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Mode 7 of SAE J1979
1st Trip Freeze Frame data	
Test values and Test limits	Mode 6 of SAE J1979

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

X: Applicable —: Not applicable

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

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

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-716.)

Two Trip Detection Logic

NGEC0551

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.

X: 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				
Coolant overtemperature enrichment protection — DTC: P0217	—	X	—	—	X	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	X	—	—	—	—	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	—	—	X	—	—	X	—	—
Closed loop control — DTC: P1148, P1168	—	X	—	—	X	—	X	—
Fail-safe items (Refer to EC-716.)	—	X	—	—	X*1	—	X*1	—
Except above	—	—	—	X	—	X	X	—

*1: Except “ECM”

Emission-related Diagnostic Information

NGEC0552

NGEC0552S01

DTC AND 1ST TRIP DTC

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

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

Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-673.

For malfunctions in which 1st trip DTCs are displayed, refer to EC-670. These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-II.

1st trip DTC is specified in Mode 7 of SAE J1979. 1st trip DTC detection occurs without lighting up the MIL and therefore does not warn the driver of a problem. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in "Work Flow" procedure Step II, refer to EC-699. Then perform "DTC Confirmation Procedure" or "Overall Function Check" to try to duplicate the problem. If the malfunction is duplicated, the item requires repair.

How to Read DTC and 1st Trip DTC

NGEC0552S0101

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, P0705, P0750, etc.

These DTCs are prescribed by SAE J2012.

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

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

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

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

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

DTC display	SELF DIAG RESULTS		1st trip DTC display	SELF DIAG RESULTS	
	DTC RESULTS			DTC RESULTS	
	MAF SEN/CIRCUIT [P0101]	0		MAF SEN/CIRCUIT [P0101]	1t

SEC652C

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

NGEC0552S02

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

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data.

Emission-related Diagnostic Information (Cont'd)

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-686.

Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0306 Fuel Injection System Function — DTC: P0171, P0172, P0174, P0175
2		Except the above items (Includes A/T related items)
3	1st trip freeze frame data	

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

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-673.

SYSTEM READINESS TEST (SRT) CODE

NGEC0552S03

System Readiness Test (SRT) code is specified in Mode 1 of SAE J1979.

As part of enhanced emissions test for Inspection and Maintenance (I/M), certain states require that 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 and 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.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33E

Emission-related Diagnostic Information (Cont'd)

SRT Item

=NGEC0552S0314

The following table 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	3	Three way catalyst function	P0420, P0430
EVAP SYSTEM	2	EVAP control system (small leak) (negative pressure)	P0442
	3	EVAP control system (very small leak) (negative pressure)/ (positive pressure)	P0456, P1456
	3	EVAP control system purge flow monitoring	P0441
HO2S	3	Heated oxygen sensor 1 (circuit)	P0134, P0154
		Heated oxygen sensor 1 (lean shift monitoring)	P1143, P1163
		Heated oxygen sensor 1 (rich shift monitoring)	P1144, P1164
		Heated oxygen sensor 1 (response monitoring)	P0133, P0153
		Heated oxygen sensor 1 (high voltage)	P0132, P0152
		Heated oxygen sensor 2 (min. voltage monitoring)	P1146, P1166
		Heated oxygen sensor 2 (max. voltage monitoring)	P1147, P1167
		Heated oxygen sensor 2 (response monitoring)	P0139, P0159
		Heated oxygen sensor 2 (high voltage)	P0138, P0158
HO2S HEATER	3	Heated oxygen sensor 1 heater (front)	P0031, P0032, P0051, P0052
		Heated oxygen sensor 2 heater (rear)	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

NGEC0552S0301

SRT is set as "CMPLT" after self-diagnosis has been performed one or more times. Completion of SRT will occur if the result is OK or NG. The set timing is different between them and is shown in the following table.

Self-diagnosis result		Example				
		Diagnosis	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF
All OK	Case 1	P0400	OK (1)	– (1)	OK (2)	– (2)
		P0402	OK (1)	– (1)	– (1)	OK (2)
		P1402	OK (1)	OK (2)	– (2)	– (2)
		SRT of EGR	“CMPLT”	“CMPLT”	“CMPLT”	“CMPLT”
	Case 2	P0400	OK (1)	– (1)	– (1)	– (1)
		P0402	– (0)	– (0)	OK (1)	– (1)
		P1402	OK (1)	OK (2)	– (2)	– (2)
		SRT of EGR	“INCMP”	“INCMP”	“CMPLT”	“CMPLT”
NG exists	Case 3	P0400	OK	OK	–	–
		P0402	–	–	–	–
		P1402	NG	–	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	–	1st trip DTC	DTC (=MIL “ON”)
		SRT of EGR	“INCMP”	“INCMP”	“INCMP”	“CMPLT”

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

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

–: Self-diagnosis is not carried out.

When all SRT related self-diagnoses showed OK results in a same cycle (Ignition OFF – ON – OFF), the SRT will indicate “CMPLT”.

→ Case 1 above

When all SRT related self-diagnoses show 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 previous table shows that the minimum number of cycles for setting SRT as “INCMP” is one (1) for each self-diagnosis (Case 1 and 2) or two (2) for one self-diagnosis (Case 3). However, in preparation for the State emissions inspection, it is unnecessary of each self-diagnosis to be executed twice (Case 3) because of 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 result.
- 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”.

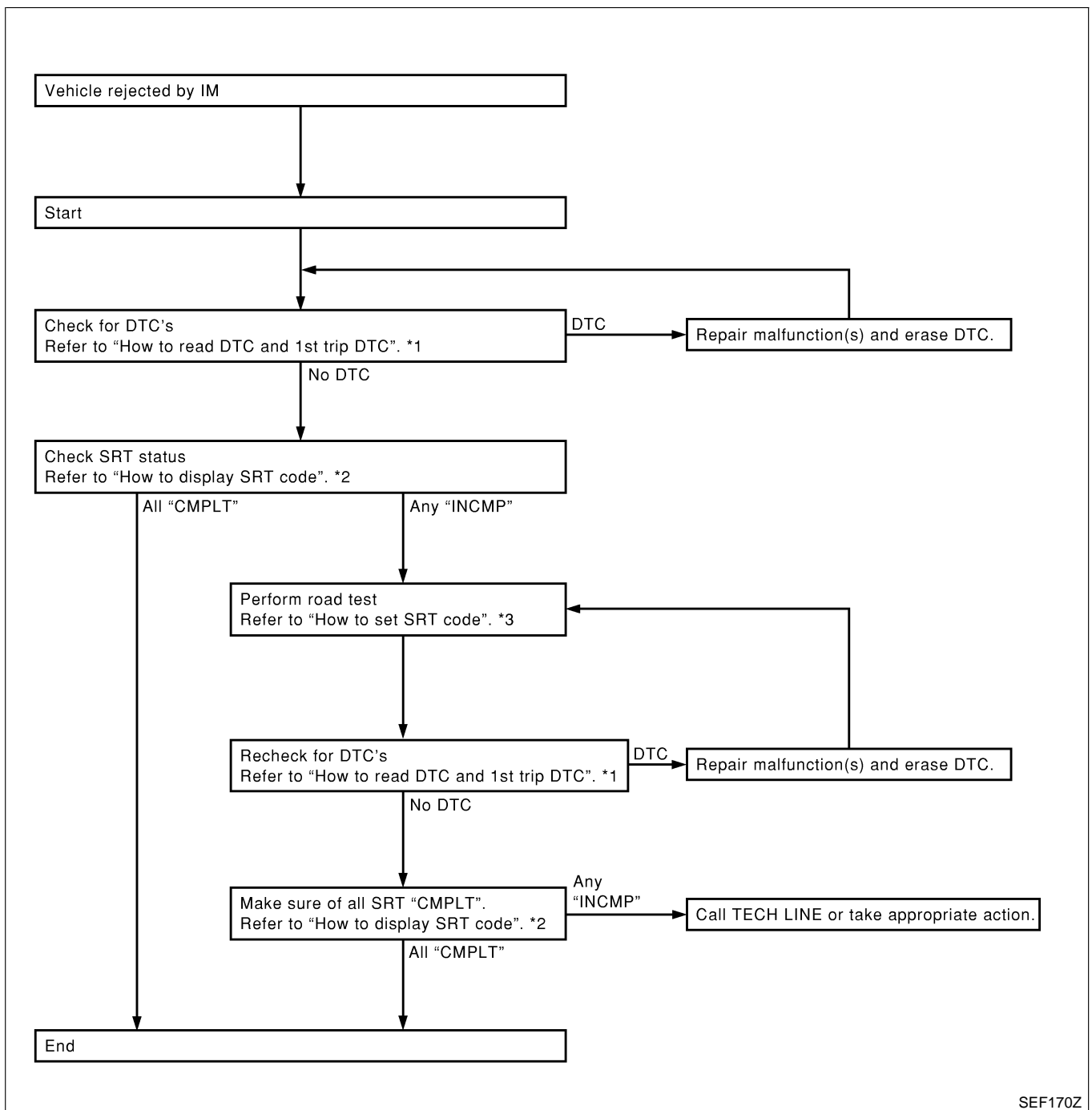
NOTE:

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 been rejected for the State emissions inspection due to one or more SRT items indicating “INCMP”, review the following flowchart diagnostic sequence on the next page.

NGEC0552S0302



*1 EC-661

*2 EC-665

*3 EC-666

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.

- With GST**
 Selecting Mode 1 with GST (Generic Scan Tool)

A sample of CONSULT-II display for SRT code is shown below.
 "INCMP" means the self-diagnosis is incomplete and SRT is not set. "CMPLT" means the self-diagnosis is complete and SRT is set.

GI
 MA
 EM
 LC
 EC
 FE
 CL
 MT
 AT
 TF
 PD
 AX
 SU
 BR
 ST
 RS
 BT
 HA
 SC
 EL
 IDX

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

SEF949Z

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. NGEC0552S0304

With CONSULT-II

Perform corresponding DTC confirmation procedure one by one based on "Performance Priority" in the table on EC-661.

Without CONSULT-II

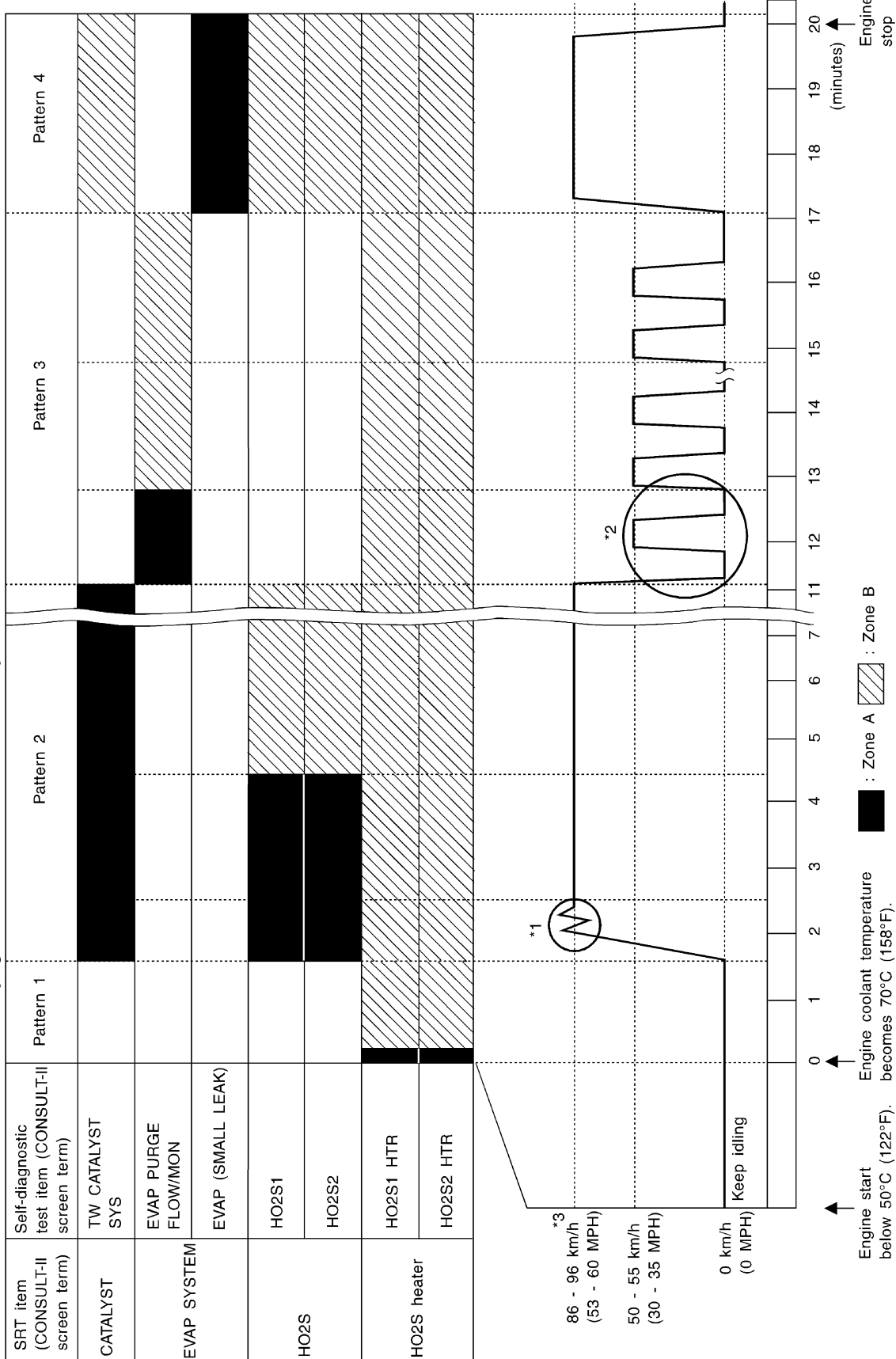
The most efficient driving pattern in which SRT codes can be properly set is explained on EC-667. The driving pattern should be performed one or more times to set all SRT codes.

Driving Pattern

NGEC0552S0305

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

Driving pattern



GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

SEF947YA

Emission-related Diagnostic Information (Cont'd)

- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.
Zone A refers to the range where the time required, for the diagnosis under normal conditions*, 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 59 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 59 and ground is lower than 1.4V).**
- **The engine is started at the tank fuel temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 60 and ground is less than 4.1V).**

Pattern 2:

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

Pattern 3:

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

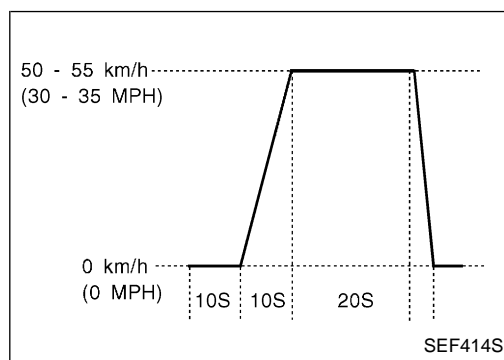
Pattern 4:

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

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

*2: Operate the vehicle in the following driving pattern.

- 1) Decelerate vehicle to 0 km/h (0 MPH) and let engine idle.
 - 2) Repeat driving pattern shown below at least 10 times.
- **During acceleration, hold the accelerator pedal as steady as possible.**



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

Suggested Transmission Gear Position for A/T Models

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

Suggested upshift speeds for M/T models

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

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33E

Emission-related Diagnostic Information (Cont'd)

Gear change	For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:		For quick acceleration in low altitude areas and high altitude areas [over 1,219 m (4,000 ft)]:
	ACCEL shift point km/h (MPH)	CRUISE shift point km/h (MPH)	km/h (MPH)
1st to 2nd	24 (15)	24 (15)	24 (15)
2nd to 3rd	40 (25)	29 (18)	40 (25)
3rd to 4th	58 (36)	48 (30)	64 (40)
4th to 5th	64 (40)	63 (39)	72 (45)

Suggested Maximum Speed in Each Gear

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

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

Gear	km/h (MPH) 2WD (AUTO mode)
1st	50 (30)
2nd	95 (60)

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

NGEC0552S04

The following is the information specified in Mode 6 of SAE J1979.

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

Items for which these data (test value and test limit) are displayed are the same as SRT code items (30 test items).

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

X: Applicable —: Not applicable

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
CATALYST	Three way catalyst function (Right bank)	01H	01H	Max.	X
	Three way catalyst function (Left bank)	03H	02H	Max.	X
EVAP SYSTEM	EVAP control system (Small leak)	05H	03H	Max.	X
	EVAP control system purge flow monitoring	06H	83H	Min.	X

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33E

Emission-related Diagnostic Information (Cont'd)

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
HO2S	Heated oxygen sensor 1 (bank 1)	09H	04H	Max.	X
		0AH	84H	Min.	X
		0BH	04H	Max.	X
		0CH	04H	Max.	X
		0DH	04H	Max.	X
	Heated oxygen sensor 1 (bank 2)	11H	05H	Max.	X
		12H	85H	Min.	X
		13H	05H	Max.	X
		14H	05H	Max.	X
		15H	05H	Max.	X
	Heated oxygen sensor 2 (bank 1)	19H	86H	Min.	X
		1AH	86H	Min.	X
		1BH	06H	Max.	X
		1CH	06H	Max.	X
	Heated oxygen sensor 2 (bank 2)	21H	87H	Min.	X
		22H	87H	Min.	X
23H		07H	Max.	X	
24H		07H	Max.	X	
HO2S HEATER	Heated oxygen sensor 1 heater (bank 1)	29H	08H	Max.	X
		2AH	88H	Min.	X
	Heated oxygen sensor 1 heater (bank 2)	2BH	09H	Max.	X
		2CH	89H	Min.	X
	Heated oxygen sensor 2 heater (bank 1)	2DH	0AH	Max.	X
		2EH	8AH	Min.	X
Heated oxygen sensor 2 heater (bank 2)	2FH	0BH	Max.	X	
	30H	8BH	Min.	X	

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

X: Applicable —: Not applicable NGEC0552S05

Items (CONSULT-II screen terms)	DTC*1*2	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
	CONSULT-II GST				
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	P0000	—	—	—	—
HO2S1 HTR (B1)	P0031	X	X	X*5	EC-746
HO2S1 HTR (B1)	P0032	X	X	X*5	EC-746
HO2S2 HTR (B1)	P0037	X	X	X*5	EC-753
HO2S2 HTR (B1)	P0038	X	X	X*5	EC-753

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33E

Emission-related Diagnostic Information (Cont'd)

Items (CONSULT-II screen terms)	DTC*1*2	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
	CONSULT-II GST				
HO2S1 HTR (B2)	P0051	X	X	X*5	EC-746
HO2S1 HTR (B2)	P0052	X	X	X*5	EC-746
HO2S2 HTR (B2)	P0057	X	X	X*5	EC-753
HO2S2 HTR (B2)	P0058	X	X	X*5	EC-753
MAF SEN/CIRCUIT	P0101	—	—	X	EC-761
MAF SEN/CIRCUIT	P0102*3	—	—	—	EC-761
MAF SEN/CIRCUIT	P0103*3	—	—	—	EC-761
IAT SEN/CIRCUIT	P0112	—	—	—	EC-770
IAT SEN/CIRCUIT	P0113	—	—	—	EC-770
ECT SEN/CIRCUIT	P0117*3	—	—	—	EC-775
ECT SEN/CIRCUIT	P0118*3	—	—	—	EC-775
TP SEN/CIRCUIT	P0121	—	—	X	EC-780
TP SEN/CIRCUIT	P0122*3	—	—	—	EC-780
TP SEN/CIRCUIT	P0123*3	—	—	—	EC-780
ECT SENSOR	P0125	—	—	X	EC-793
IAT SENSOR	P0127	—	—	X	EC-770
THERMSTAT FNCTN	P0128	—	—	X	EC-798
HO2S1 (B1)	P0132	X	X	X*5	EC-800
HO2S1 (B1)	P0133	X	X	X*5	EC-808
HO2S1 (B1)	P0134	X	X	X*5	EC-822
HO2S2 (B1)	P0138	X	X	X*5	EC-833
HO2S2 (B1)	P0139	X	X	X*5	EC-843
HO2S1 (B2)	P0152	X	X	X*5	EC-1056
HO2S1 (B2)	P0153	X	X	X*5	EC-808
HO2S1 (B2)	P0154	X	X	X*5	EC-822
HO2S2 (B2)	P0158	X	X	X*5	EC-833
HO2S2 (B2)	P0159	X	X	X*5	EC-843
FUEL SYS-LEAN-B1	P0171	—	—	X	EC-853
FUEL SYS-RICH-B1	P0172	—	—	X	EC-853
FUEL SYS-LEAN-B2	P0174	—	—	X	EC-862
FUEL SYS-RICH-B2	P0175	—	—	X	EC-862
FTT SENSOR	P0181	—	—	X	EC-870
FTT SEN/CIRCUIT	P0182	—	—	X	EC-870
FTT SEN/CIRCUIT	P0183	—	—	X	EC-870
ENG OVER TEMP	P0217	—	—	X	EC-875
MULTI CYL MISFIRE	P0300	—	—	X	EC-882
CYL1 MISFIRE	P0301	—	—	X	EC-882

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33E

Emission-related Diagnostic Information (Cont'd)

Items (CONSULT-II screen terms)	DTC*1*2	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
	CONSULT-II GST				
CYL2 MISFIRE	P0302	—	—	X	EC-882
CYL3 MISFIRE	P0303	—	—	X	EC-882
CYL4 MISFIRE	P0304	—	—	X	EC-882
CYL5 MISFIRE	P0305	—	—	X	EC-882
CYL6 MISFIRE	P0306	—	—	X	EC-882
KNOCK SEN/CIRC-B1	P0327	—	—	—	EC-891
KNOCK SEN/CIRC-B1	P0328	—	—	—	EC-891
CKP SEN/CIRCUIT	P0335	—	—	X	EC-895
CMP SEN/CIRCUIT	P0340	—	—	X	EC-901
TW CATALYST SYS-B1	P0420	X	X	X*5	EC-908
TW CATALYST SYS-B2	P0430	X	X	X*5	EC-908
EVAP PURG FLOW/MON	P0441	X	X	X*5	EC-913
EVAP SMALL LEAK	P0442	X	X	X*5	EC-925
PURG VOLUME CONT/V	P0444	—	—	X	EC-939
PURG VOLUME CONT/V	P0445	—	—	X	EC-939
VENT CONTROL VALVE	P0447	—	—	X	EC-946
EVAP SYS PRES SEN	P0452	—	—	X	EC-952
EVAP SYS PRES SEN	P0453	—	—	X	EC-952
EVAP GROSS LEAK	P0455	X	X	X*5	EC-963
EVAP VERY SML LEAK	P0456	X*4	X	X*5	EC-976
FUEL LEV SEN SLOSH	P0460	—	—	X	EC-990
FUEL LEVEL SENSOR	P0461	—	—	X	EC-995
FUEL LEVL SEN/CIRC	P0462	—	—	X	EC-997
FUEL LEVL SEN/CIRC	P0463	—	—	X	EC-997
VEH SPEED SEN/CIRC	P0500*5	—	—	X	EC-1002
ISC SYSTEM/CIRC	P0505	—	—	X	EC-1006
CLOSED TP SW/CIRC	P0510	—	—	X	EC-1012
A/T COMM LINE	P0600*4	—	—	—	EC-1019
ECM	P0605	—	—	X	EC-1024
PNP SW/CIRC	P0705	—	—	X	AT-104
ATF TEMP SEN/CIRC	P0710	—	—	X	AT-110
VEH SPD SEN/CIR AT	P0720	—	—	X	AT-116
ENGINE SPEED SIG	P0725	—	—	X	AT-121
A/T 1ST GR FNCTN	P0731	—	—	X	AT-125
A/T 2ND GR FNCTN	P0732	—	—	X	AT-131
A/T 3RD GR FNCTN	P0733	—	—	X	AT-137
A/T 4TH GR FNCTN	P0734	—	—	X	AT-143

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33E

Emission-related Diagnostic Information (Cont'd)

Items (CONSULT-II screen terms)	DTC*1*2	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
	CONSULT-II GST				
TCC SOLENOID/CIRC	P0740	—	—	X	AT-152
A/T TCC S/V FNCTN	P0744	—	—	X	AT-157
L/PRESS SOL/CIRC	P0745	—	—	X	AT-167
SFT SOL A/CIRC	P0750*3	—	—	X	AT-169
SFT SOL B/CIRC	P0755*3	—	—	X	AT-174
HO2S1 (B1)	P1143	X	X	X*5	EC-1026
HO2S1 (B1)	P1144	X	X	X*5	EC-1035
HO2S1 (B1)	P1146	X	X	X*5	EC-1044
HO2S2 (B1)	P1147	X	X	X*5	EC-1054
CLOSED LOOP-B1	P1148	—	—	X*5	EC-1064
HO2S1 (B2)	P1163	X	X	X*5	EC-1026
HO2S1 (B2)	P1164	X	X	X*5	EC-1035
HO2S2 (B2)	P1166	X	X	X*5	EC-1044
HO2S2 (B2)	P1167	X	X	X*5	EC-1054
CLOSED LOOP-B2	P1168	—	—	X	EC-1064
ENG OVER TEMP	P1217	—	—	X	EC-1066
CKP SENSOR (COG)	P1336	—	—	X	EC-1071
EVAP SMALL LEAK	P1442	X	X	X*5	EC-1078
PURG VOLUME CONT/V	P1444	—	—	X	EC-1080
VENT CONTROL VALVE	P1446	—	—	X	EC-1092
VENT CONTROL VALVE	P1448	—	—	X	EC-1099
EVAP VERY SML LEAK	P1456	X*4	X	X*5	EC-976
FUEL LEVEL SEN/CIRK	P1464	—	—	X	EC-1107
VC/V BYPASS/V	P1490	—	—	X	EC-1111
VC CUT/V BYPASS/V	P1491	—	—	X	EC-1117
A/T DIAG COMM LINE	P1605	—	—	X	EC-1126
TP SEN/CIRC A/T	P1705*5	—	—	X	AT-179
P-N POS SW/CIRCUIT	P1706	—	—	X	EC-1129
O/R CLTCH SOL/CIRC	P1760	—	—	X	AT-188

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

*2: These numbers are prescribed by SAE J2012.

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

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

*5: These are not displayed with GST.

NOTE:

Regarding D22 models, "B1" indicates bank 1, "B2" indicates bank 2.

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase DTC (📄 With CONSULT-II)

NOTE:

If the DTC is not for A/T related items (see EC-601), skip steps 2 through 4.

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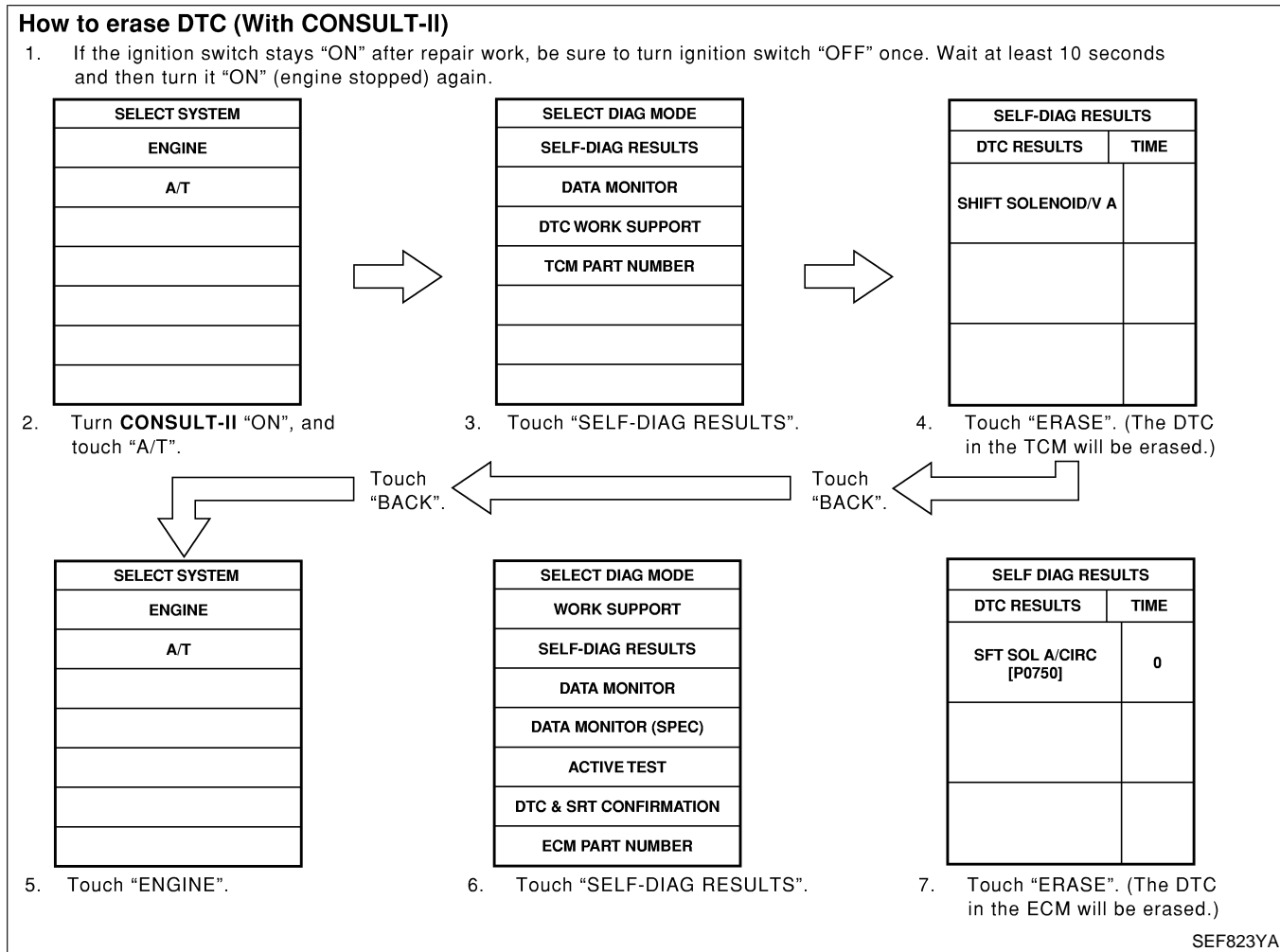
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Emission-related Diagnostic Information (Cont'd)

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. Turn CONSULT-II "ON" and touch "A/T".
 3. Touch "SELF-DIAG RESULTS".
 4. Touch "ERASE". [The DTC in the TCM (Transmission control module) will be erased.] Then touch "BACK" twice.
 5. Touch "ENGINE".
 6. Touch "SELF-DIAG RESULTS".
 7. Touch "ERASE". (The DTC in the ECM will be erased.)
- If DTCs are displayed for both ECM and TCM (Transmission control module), they need to be erased individually from the ECM and TCM (Transmission control module).



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

How to Erase DTC (GST With GST)

NGEC0552S0602

NOTE:

If the DTC is not for A/T related items (see EC-601), skip step 2.

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. Perform "SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II)" in AT section titled "TROUBLE DIAGNOSIS", "Self-diagnosis". (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Select Mode 4 with GST (Generic Scan Tool).

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

- If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 24 hours.
- Erasing the emission-related diagnostic information using CONSULT-II or GST is easier and quicker than switching the mode selector on the ECM.
- The following data are cleared when the ECM memory is erased.
 - 1) Diagnostic trouble codes
 - 2) 1st trip diagnostic trouble codes
 - 3) Freeze frame data
 - 4) 1st trip freeze frame data
 - 5) System readiness test (SRT) codes
 - 6) Test values
 - 7) Others

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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.

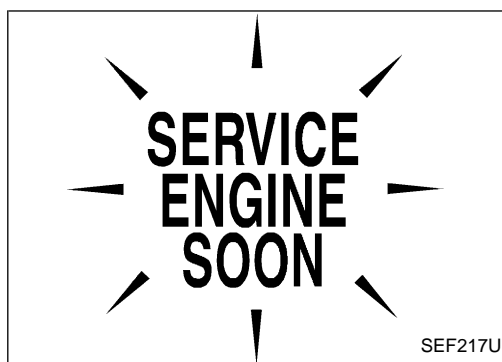
EC

Malfunction Indicator Lamp (MIL)

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DESCRIPTION

NGEC0553



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The MIL is located on the instrument panel.

1. The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
- If the MIL does not light up, refer to EL section ("WARNING LAMPS") or see EC-1171.
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.

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On Board Diagnostic System Function

=NGEC0553S01

The on board diagnostic system has the following two 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-1171.)
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MIL in the 1st trip. <ul style="list-style-type: none"> ● Coolant overtemperature enrichment protection ● "Misfire (Possible three way catalyst damage)" ● "Closed loop control" ● Fail-safe mode

Diagnostic Test Mode I — Bulb Check

NGEC0553S03

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to "WARNING LAMPS", **EL-94** or see EC-1171.

Diagnostic Test Mode I — Malfunction Warning

NGEC0553S04

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

OBD System Operation Chart

NGEC0554

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

NGEC0554S01

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on. For details, refer to "Two Trip Detection Logic" on EC-660.
- 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

NGEC0554S02

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)

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33E

OBD System Operation Chart (Cont'd)

Items	Fuel Injection System	Misfire	Other
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-679.

For details about patterns "A" and "B" under "Other", see EC-681.

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

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

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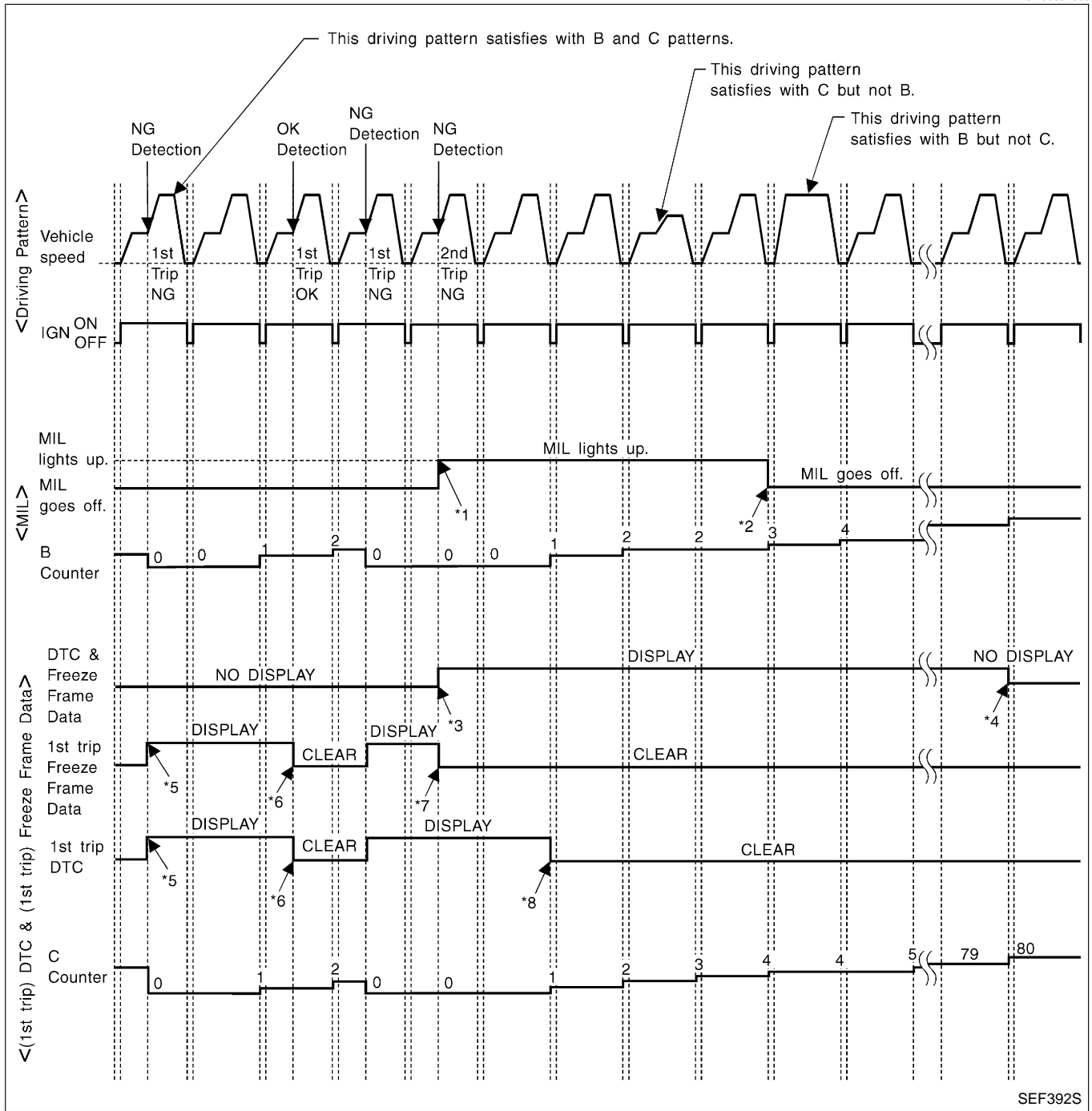
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RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS FOR “MISFIRE” <EXHAUST QUALITY DETERIORATION>, “FUEL INJECTION SYSTEM”

=NGEC0554S03



- *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>

NGEC0554S04

NGEC0554S0401

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>

NGEC0554S0402

Driving pattern C means the vehicle operation as follows:

1) The following conditions should be satisfied at the same time:

Engine speed: (Engine speed in the freeze frame data) ± 375 rpm

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

Engine coolant temperature (T) condition:

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

Example:

If the stored freeze frame data is as follows:

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

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

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

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

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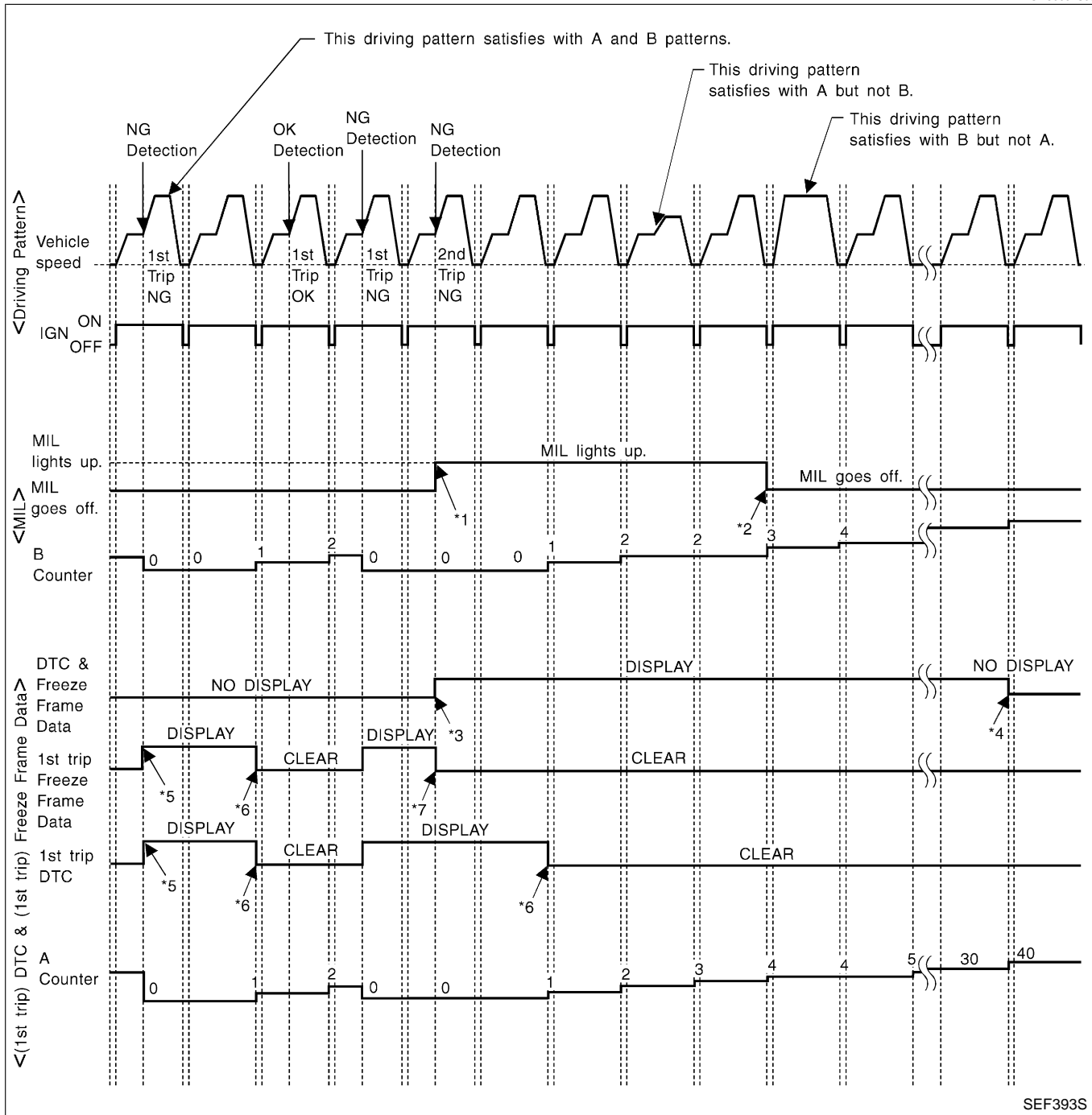
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RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

NGEC0554S05



- *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

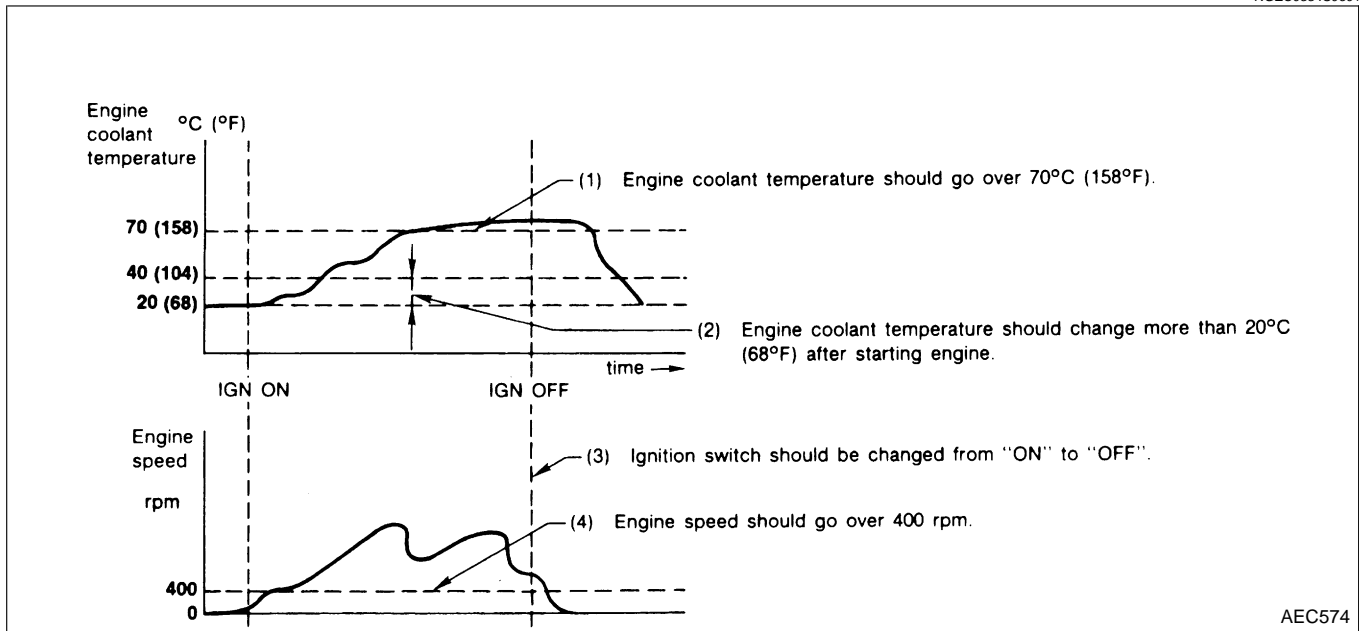
- and the 1st trip freeze frame data will be stored in ECM.
- *6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.
- *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

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

<Driving Pattern A>

NGEC0554S06

NGEC0554S0601



- 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>

NGEC0554S0602

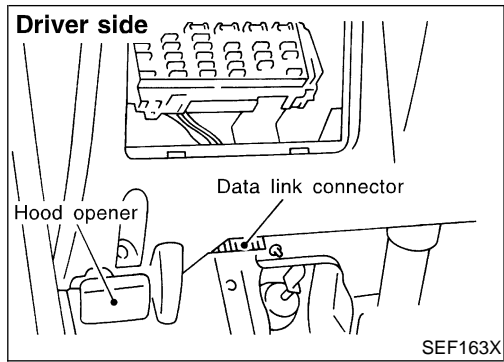
Driving pattern B means the vehicle operation as follows:

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").

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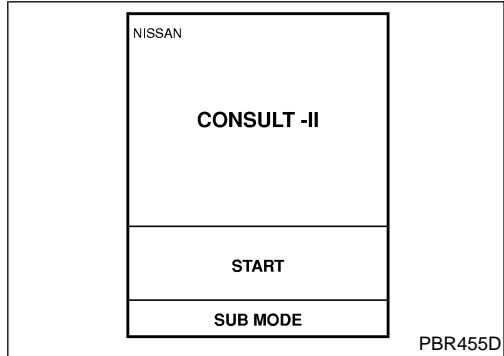
CONSULT-II

CONSULT-II INSPECTION PROCEDURE

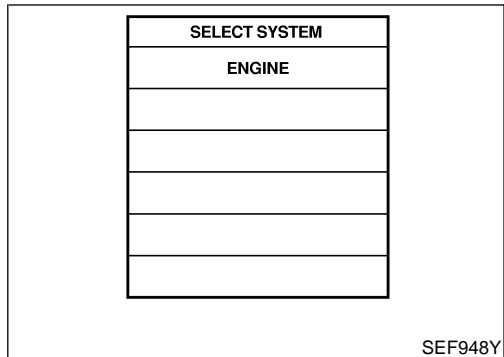
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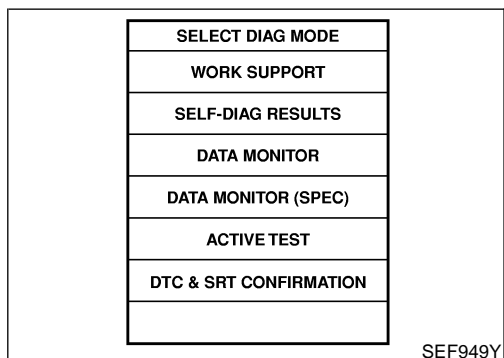
1. Turn ignition switch OFF.
2. Connect "CONSULT-II" to data link connector which is located under LH dash panel near the fuse box cover.



3. Turn ignition switch ON.
4. Touch "START".



5. Touch "ENGINE".



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

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

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

NGEC0555S02

Item		DIAGNOSTIC TEST MODE							GI		
		WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION		MA	
			DTC*1	FREEZE FRAME DATA*2				SRT STA-TUS			DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	INPUT	Camshaft position sensor	X	X	X	X				LC	
	Mass air flow sensor	X		X	X					EC	
	Engine coolant temperature sensor	X	X	X	X	X				FE	
	Heated oxygen sensor 1	X		X	X		X	X		FE	
	Heated oxygen sensor 2	X		X	X		X	X		CL	
	Vehicle speed sensor	X	X	X	X					CL	
	Throttle position sensor	X		X	X					MT	
	Fuel tank temperature sensor	X		X	X	X				MT	
	EVAP control system pressure sensor	X		X	X					AT	
	Intake air temperature sensor	X		X	X					AT	
	Crankshaft position sensor (OBD)	X				X				TF	
	Knock sensor	X				X				TF	
	Ignition switch (start signal)				X	X				PD	
	Closed throttle position switch	X			X	X				PD	
	Closed throttle position switch (throttle position sensor signal)				X	X				AX	
	Air conditioner switch				X	X				SU	
	Park/neutral position (PNP) switch	X			X	X				BR	
	Power steering oil pressure switch				X	X				BR	
	Battery voltage				X	X				ST	
	Ambient air temperature switch				X	X				ST	

GI
MA
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IDX

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33E

CONSULT-II (Cont'd)

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 STA-TUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS OUTPUT	Injectors				X	X	X		
	Power transistor (Ignition timing)				X	X	X		
	IACV-AAC valve	X	X		X	X	X		
	EVAP canister purge volume control solenoid valve		X		X	X	X		X
	Air conditioner relay				X	X			
	Fuel pump relay	X			X	X	X		
	Cooling fan		X		X	X	X		
	Heated oxygen sensor 1 heater		X		X	X		X	
	Heated oxygen sensor 2 heater		X		X	X		X	
	EVAP canister vent control valve		X		X	X	X		
	Vacuum cut valve bypass valve		X		X	X	X		X
	Calculated load value			X	X	X			

X: Applicable

*1: This item includes 1st trip DTCs.

*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-661.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33E

CONSULT-II (Cont'd)

FUNCTION

—NGEC0555S03

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

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

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

WORK SUPPORT MODE

—NGEC0555S04

WORK ITEM	CONDITION	USAGE
TP SW/TP SEN IDLE POSI ADJ	<ul style="list-style-type: none"> ● FOLLOW THE BASIC INSPECTION INSTRUCTION IN THE SERVICE MANUAL. 	When adjusting the idle throttle position
TARGET IGNITION TIMING ADJ	<ul style="list-style-type: none"> ● IDLE CONDITION 	When adjusting target ignition timing After adjustment, confirm target ignition timing with a timing light by turning the distributor.
FUEL PRESSURE RELEASE	<ul style="list-style-type: none"> ● FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS. 	When releasing fuel pressure from fuel line
SELF-LEARNING CONT	<ul style="list-style-type: none"> ● THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT. 	When clean the coefficient of self-learning control valve

WORK ITEM	CONDITION	USAGE
EVAP SYSTEM CLOSE	OPEN THE VACUUM CUT VALVE BYPASS VALVE AND CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS. <ul style="list-style-type: none"> ● IGN SW ON ● ENGINE NOT RUNNING ● AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). ● NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM ● FUEL TANK TEMP. IS MORE THAN 0°C (32°F). ● WITHIN 10 MINUTES AFTER STARTING “EVAP SYSTEM CLOSE” ● WHEN TRYING TO EXECUTE “EVAP SYSTEM CLOSE” UNDER THE CONDITION EXCEPT ABOVE, CONSULT-II WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION. NOTE: WHEN STARTING ENGINE, CONSULT-II MAY DISPLAY “BATTERY VOLTAGE IS LOW. CHARGE BATTERY”, EVEN IN USING CHARGED BATTERY.	When detecting EVAP vapor leak point of EVAP system
TARGET IDLE RPM ADJ	SET ENGINE SPEED AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITIONS. <ul style="list-style-type: none"> ● ENGINE WARMED UP ● NO-LOAD 	When adjusting initial ignition timing and idle speed

SELF-DIAGNOSTIC MODE

DTC and 1st Trip DTC

NGEC0555S05

Regarding items of “DTC and 1st trip DTC”, refer to “TROUBLE DIAGNOSIS — INDEX” (See EC-601.)

NGEC0555S0501

Freeze Frame Data and 1st Trip Freeze Frame Data

NGEC0555S0502

Freeze frame data item *1	Description
DIAG TROUBLE CODE [PXXXX]	<ul style="list-style-type: none"> ● The engine control component part/control system has a trouble code, it is displayed as “PXXXX”. (Refer to “TROUBLE DIAGNOSIS — INDEX”, EC-601.)
FUEL SYS-B1 *2	<ul style="list-style-type: none"> ● “Fuel injection system status” at the moment a malfunction is detected is displayed. ● One mode in the following is displayed. <ul style="list-style-type: none"> “MODE 2”: Open loop due to detected system malfunction “MODE 3”: Open loop due to driving conditions (power enrichment, deceleration enrichment) “MODE 4”: Closed loop - using oxygen sensor(s) as feedback for fuel control “MODE 5”: Open loop - has not yet satisfied condition to go to closed loop
FUEL SYS-B2 *2	
CAL/LD VALUE [%]	<ul style="list-style-type: none"> ● The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	<ul style="list-style-type: none"> ● The engine coolant temperature at the moment a malfunction is detected is displayed.
S-FUEL TRIM-B1 [%]	<ul style="list-style-type: none"> ● “Short-term fuel trim” at the moment a malfunction is detected is displayed.
S-FUEL TRIM-B2 [%]	<ul style="list-style-type: none"> ● The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
L-FUEL TRIM-B1 [%]	<ul style="list-style-type: none"> ● “Long-term fuel trim” at the moment a malfunction is detected is displayed.
L-FUEL TRIM-B2 [%]	<ul style="list-style-type: none"> ● The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
ENGINE SPEED [rpm]	<ul style="list-style-type: none"> ● The engine speed at the moment a malfunction is detected is displayed.
VHCL SPEED [km/h] or [mph]	<ul style="list-style-type: none"> ● The vehicle speed at the moment a malfunction is detected is displayed.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33E

CONSULT-II (Cont'd)

Freeze frame data item *1	Description
ABSOL PRESS [kPa] or [kg/cm ²] or [psi]	<ul style="list-style-type: none"> The absolute pressure at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	<ul style="list-style-type: none"> The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	<ul style="list-style-type: none"> The intake air temperature at the moment a malfunction is detected is displayed.

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

*2: Regarding D22 model, "-B1" indicates right bank and "-B2" indicates left bank.

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DATA MONITOR MODE

=NGEC0555S06

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	○		<ul style="list-style-type: none"> Indicates the engine speed computed from the REF signal (120° signal) of the camshaft position sensor. 	
MAS AIR/FL SE [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the mass air flow sensor is displayed. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated.
COOLAN TEMP/S [°C] or [°F]	○	○	<ul style="list-style-type: none"> The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed. 	<ul style="list-style-type: none"> When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
HO2S1 (B1) [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the heated oxygen sensor 1 is displayed. 	
HO2S1 (B2) [V]	○	○		
HO2S2 (B1) [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the heated oxygen sensor 2 is displayed. 	
HO2S2 (B2) [V]	○	○		
HO2S1 MNTR (B1) [RICH/LEAN]	○		<ul style="list-style-type: none"> Display of heated oxygen sensor 1 signal during air-fuel ratio feedback control: RICH ... means the mixture became "rich", and control is being affected toward a leaner mixture. LEAN ... means the mixture became "lean", and control is being affected toward a rich mixture. 	<ul style="list-style-type: none"> After turning ON the ignition switch, "RICH" is displayed until air-fuel mixture ratio feedback control begins. When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
HO2S1 MNTR (B2) [RICH/LEAN]	○			
HO2S2 MNTR (B1) [RICH/LEAN]	○		<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated.
HO2S2 MNTR (B2) [RICH/LEAN]	○			
VHCL SPEED SE [km/h] or [mph]	○	○	<ul style="list-style-type: none"> The vehicle speed computed from the vehicle speed sensor signal is displayed. 	
BATTERY VOLT [V]	○	○	<ul style="list-style-type: none"> The power supply voltage of ECM is displayed. 	
THRTL POS SEN [V]	○	○	<ul style="list-style-type: none"> The throttle position sensor signal voltage is displayed. 	
TANK F/TMP SE [°C] or [°F]	○		<ul style="list-style-type: none"> The fuel temperature judged from the fuel tank temperature sensor signal voltage is displayed. 	
INT/A TEMP SE [°C] or [°F]	○		<ul style="list-style-type: none"> The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated. 	
EVAP SYS PRES [V]			<ul style="list-style-type: none"> The signal voltage of EVAP control system pressure sensor is displayed. 	
FUEL LEVEL SE [V]	○		<ul style="list-style-type: none"> The signal voltage of the fuel level sensor is displayed. 	

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33E

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks	
START SIGNAL [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the starter signal. 	<ul style="list-style-type: none"> After starting the engine, [OFF] is displayed regardless of the starter signal. 	GI
CLSD THL POS [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates idle position [ON/OFF] computed by ECM according to the throttle position sensor signal. 		MA
CLSD THL/P SW [ON/OFF]			<ul style="list-style-type: none"> Indicates mechanical contact [ON/OFF] condition of the closed throttle position switch. 		EM
AIR COND SIG [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal. 		LC
P/N POSI SW [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal. 		EC
PW/ST SIGNAL [ON/OFF]	○	○	<ul style="list-style-type: none"> [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure signal is indicated. 		FE
AMB TEMP SW [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the ambient air temperature switch signal. 		CL
IGNITION SW [ON/OFF]	○		<ul style="list-style-type: none"> Indicates [ON/OFF] condition from ignition switch. 		MT
INJ PULSE-B2 [msec]		○	<ul style="list-style-type: none"> Indicates the actual fuel injection pulse width compensated by ECM according to the input signals. 	<ul style="list-style-type: none"> When the engine is stopped, a certain computed value is indicated. 	AT
INJ PULSE-B1 [msec]					TF
B/FUEL SCHDL [msec]		○	<ul style="list-style-type: none"> "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction. 		PD
IGN TIMING [BTDC]		○	<ul style="list-style-type: none"> Indicates the ignition timing computed by ECM according to the input signals. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated. 	AX
IACV-AAC/V [%]		○	<ul style="list-style-type: none"> Indicates the IACV-AAC valve control value computed by ECM according to the input signals. 		SU
PURG VOL C/V [%]		○	<ul style="list-style-type: none"> 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. 		BR
A/F ALPHA-B2 [%]			<ul style="list-style-type: none"> The mean value of the air-fuel ratio feedback correction factor per cycle is indicated. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated. 	ST
A/F ALPHA-B1 [%]				<ul style="list-style-type: none"> This data also includes the data for the air-fuel ratio learning control. 	RS
AIR COND RLY [ON/OFF]			<ul style="list-style-type: none"> The air conditioner relay control condition (determined by ECM according to the input signal) is indicated. 		BT
FUEL PUMP RLY [ON/OFF]			<ul style="list-style-type: none"> Indicates the fuel pump relay control condition determined by ECM according to the input signals. 		HA

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33E

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
COOLING FAN [ON/OFF]			<ul style="list-style-type: none"> Indicates the control condition of the cooling fan (determined by ECM according to the input signal). ON ... Operation OFF ... Stop 	
VENT CONT/V [ON/OFF]			<ul style="list-style-type: none"> The control condition of the EVAP canister vent control valve (determined by ECM according to the input signal) is indicated. ON ... Closed OFF ... Open 	
HO2S1 HTR (B1) [ON/OFF]			<ul style="list-style-type: none"> Indicates [ON/OFF] condition of front heated oxygen sensor heater determined by ECM according to the input signals. 	
HO2S1 HTR (B1) [ON/OFF]				
HO2S2 HTR (B1) [ON/OFF]			<ul style="list-style-type: none"> Indicates [ON/OFF] condition of rear heated oxygen sensor heater determined by ECM according to the input signals. 	
HO2S2 HTR (B2) [ON/OFF]				
VC/V BYPASS/V [ON/OFF]			<ul style="list-style-type: none"> The control condition of the vacuum cut valve bypass valve (determined by ECM according to the input signal) is indicated. ON ... Open OFF ... Closed 	
CAL/LD VALUE [%]			<ul style="list-style-type: none"> "Calculated load value" indicates the value of the current airflow divided by peak airflow. 	
ABSOL TH-P/S [%]			<ul style="list-style-type: none"> "Absolute throttle position sensor" indicates the throttle opening computed by ECM according to the signal voltage of the throttle position sensor. 	
MASS AIRFLOW [g·m/s]			<ul style="list-style-type: none"> Indicates the mass airflow computed by ECM according to the signal voltage of the mass airflow sensor. 	
VOLTAGE [V]			<ul style="list-style-type: none"> Voltage measured by the voltage probe. 	
FREQUENCY [msec] or [Hz] or [%]			<ul style="list-style-type: none"> Pulse width, frequency or duty cycle measured by the pulse probe. 	<ul style="list-style-type: none"> 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.

NOTE:

- Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.
- Regarding D22 model, "-B1" indicates right bank and "-B2" indicates left bank.

DATA MONITOR (SPEC) MODE

NGE0555S11

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
MAS A/F SE-B1 [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the mass air flow sensor specification is displayed. 	<ul style="list-style-type: none"> When the engine is running, specification range is indicated.
B/FUEL SCHDL [msec]			<ul style="list-style-type: none"> "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction. 	<ul style="list-style-type: none"> When the engine is running, specification range is indicated.
A/F ALPHA-B1 [%]		○	<ul style="list-style-type: none"> Indicates the mean value of the air-fuel ratio feedback correction factor per cycle. 	<ul style="list-style-type: none"> When the engine is running, specification range is indicated. This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B2 [%]		○		

NOTE:

- Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.
- Regarding D22 model, "B1" indicates bank 1 and "B2" indicates bank 2.

ACTIVE TEST MODE

NGE0555S07

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Change the amount of fuel injection using CONSULT-II. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Harness and connector Fuel injectors Front heated oxygen sensor
IGNITION TIMING	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Timing light: Set Retard the ignition timing using CONSULT-II. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Adjust initial ignition timing
IACV-AAC/V OPENING	<ul style="list-style-type: none"> Engine: After warming up, idle the engine. Change the IACV-AAC valve opening percent using CONSULT-II. 	Engine speed changes according to the opening percent.	<ul style="list-style-type: none"> Harness and connector IACV-AAC valve
POWER BALANCE	<ul style="list-style-type: none"> Engine: After warming up, idle the engine. A/C switch "OFF" Shift lever "N" Cut off each injector signal one at a time using CONSULT-II. 	Engine runs rough or dies.	<ul style="list-style-type: none"> Harness and connector Compression Injectors Power transistor Spark plugs Ignition coils
ENG COOLANT TEMP	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Change the engine coolant temperature using CONSULT-II. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Harness and connector Engine coolant temperature sensor Fuel injectors
COOLING FAN	<ul style="list-style-type: none"> Ignition switch: ON Turn the cooling fan "ON" and "OFF" using CONSULT-II. 	Cooling fan moves and stops.	<ul style="list-style-type: none"> Harness and connector Cooling fan motor Cooling fan relay
FUEL PUMP RELAY	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> Harness and connector Fuel pump relay

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33E

CONSULT-II (Cont'd)

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
PURG VOL CONT/V	<ul style="list-style-type: none"> ● 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.	<ul style="list-style-type: none"> ● Harness and connector ● Solenoid valve
FUEL/T TEMP SEN	<ul style="list-style-type: none"> ● Change the fuel tank temperature using CONSULT-II. 		
VENT CONTROL/V	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Turn solenoid valve "ON" and "OFF" with the CONSULT-II and listen to operating sound. 	Solenoid valve makes an operating sound.	<ul style="list-style-type: none"> ● Harness and connector ● Solenoid valve
VC/V BYPASS/V	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Turn solenoid valve "ON" and "OFF" with the CONSULT-II and listen to operating sound. 	Solenoid valve makes an operating sound.	<ul style="list-style-type: none"> ● Harness and connector ● Solenoid valve

DTC CONFIRMATION MODE

NGEC0555S08

SRT STATUS Mode

NGEC0555S0801

For details, refer to "SYSTEM READINESS TEST (SRT) CODE", EC-662.

SRT WORK SUPPORT Mode

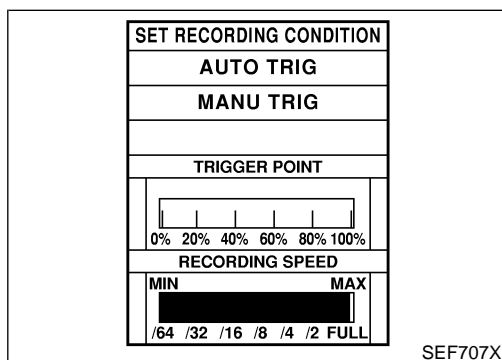
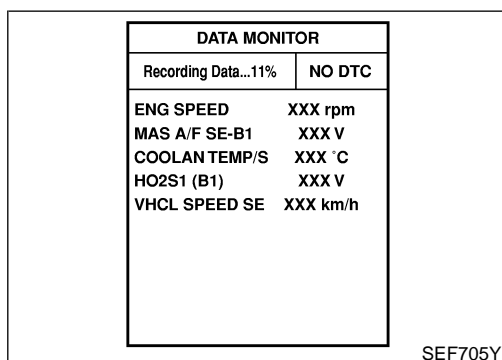
NGEC0555S0803

SRT status and some of the data monitor item can be read.

DTC Work Support Mode

NGE0555S0802

Test mode	Test item	Condition	Reference page
EVAPORATIVE SYSTEM	EVAP SML LEAK P0442/P1442	Refer to corresponding trouble diagnosis for DTC.	EC-925
	EVAP VERY SML LEAK P0456/1456		EC-976
	PURG VOL CN/V P1444		EC-1080
	PURGE FLOW P0441		EC-913
	VC CUT/V BP/V P1491		EC-1117
HO2S1	HO2S1 (B1) P0134		EC-822
	HO2S1 (B1) P1143		EC-1026
	HO2S1 (B1) P1144		EC-1035
	HO2S1 (B1) P0133		EC-808
	HO2S1 (B2) P0154		EC-822
	HO2S1 (B2) P1163		EC-1026
	HO2S1 (B2) P1164		EC-1035
	HO2S1 (B2) P0153		EC-808
HO2S2	HO2S2 (B1) P1146		EC-1044
	HO2S2 (B1) P1147		EC-1054
	HO2S2 (B1) P0139	EC-843	
	HO2S2 (B2) P1166	EC-1044	
	HO2S2 (B2) P1167	EC-1054	
	HO2S2 (B2) P0159	EC-843	



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

NGE0555S09

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

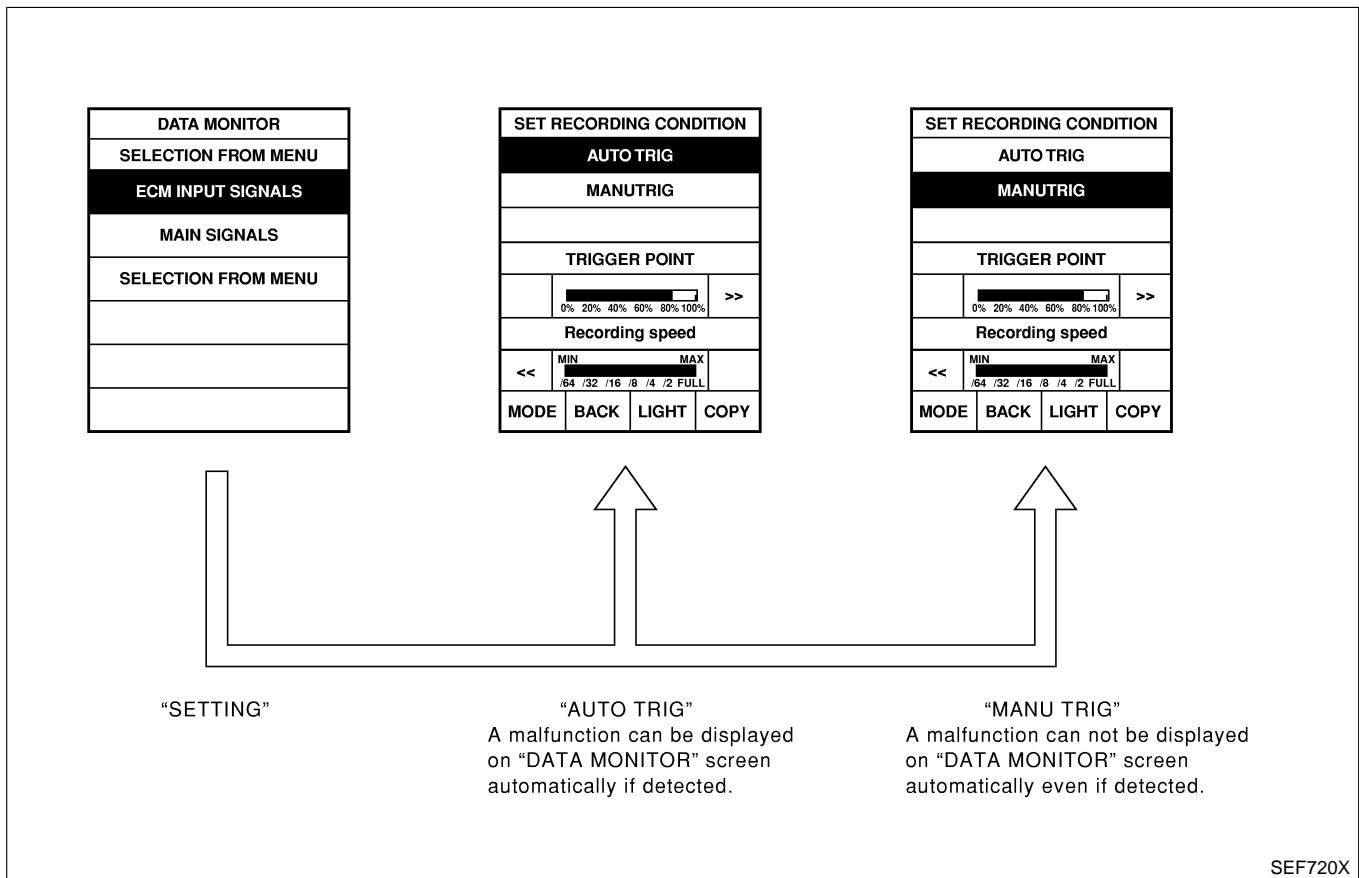
- 1) "AUTO TRIG" (Automatic trigger):
 - The malfunction will be identified on the CONSULT-II screen in real time. In other words, DTC/1st trip DTC and malfunction item will be displayed if the malfunction is detected by ECM. At the moment a malfunction is detected by ECM, "MONITOR" in "DATA MONITOR"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

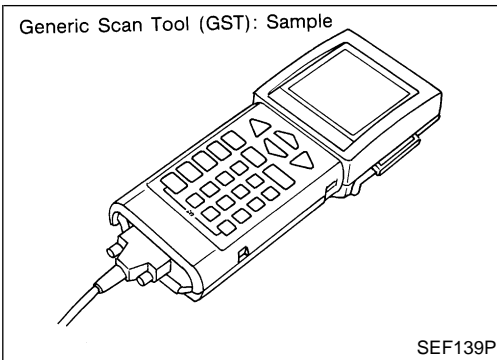
automatically on CONSULT-II screen even though a malfunction is detected by ECM.

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

Use these triggers as follows:

- 1) "AUTO TRIG"
 - While trying to detect the DTC/1st trip DTC by performing the "DTC Confirmation Procedure", be sure to select to "DATA MONITOR (AUTO TRIG)" mode. You can confirm the malfunction at the moment it is detected.
 - While narrowing down the possible causes, CONSULT-II should be set in "DATA MONITOR (AUTO TRIG)" mode, especially in case the incident is intermittent. When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the "DTC Confirmation Procedure", the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to "Incident Simulation Tests" in "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT", **G1-23**.)
- 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.





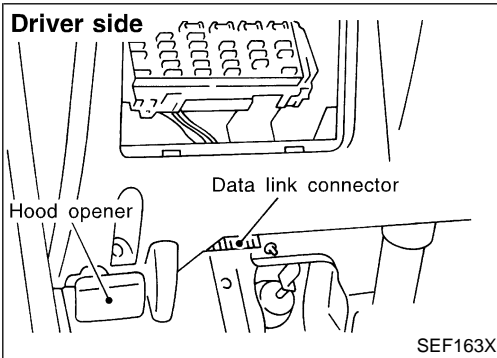
Generic Scan Tool (GST)

=NGEC0556

DESCRIPTION

NGEC0556S01

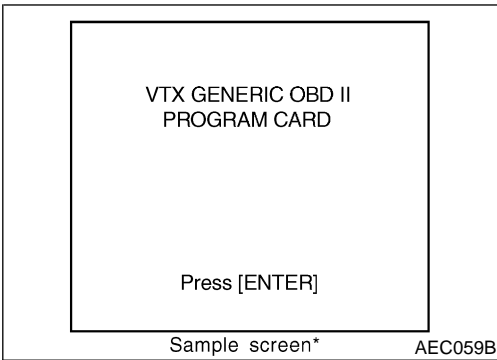
Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 7 different functions explained on the next page. ISO9141 is used as the protocol. The name "GST" or "Generic Scan Tool" is used in this service manual.



GST INSPECTION PROCEDURE

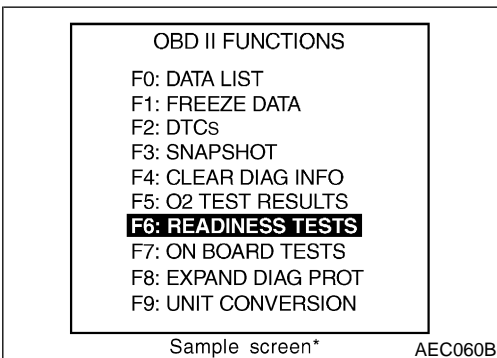
NGEC0556S02

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



3. Turn ignition switch ON.
4. Enter the program according to instruction on the screen or in the operation manual.

(*: Regarding GST screens in this section, sample screens are shown.)



5. Perform each diagnostic mode according to each service procedure.

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

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

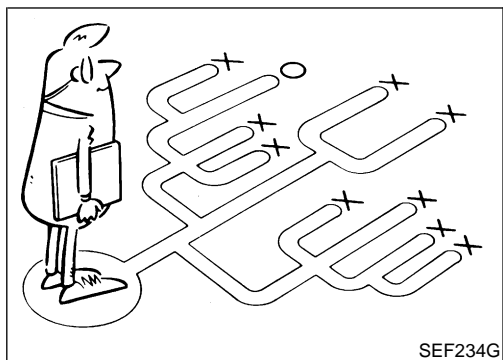
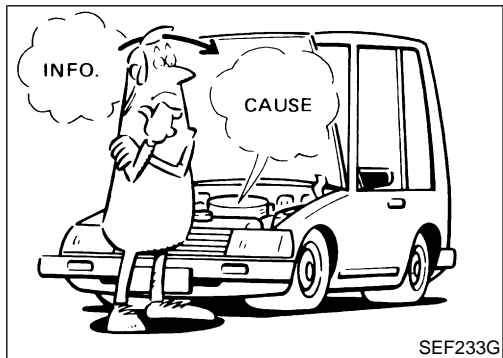
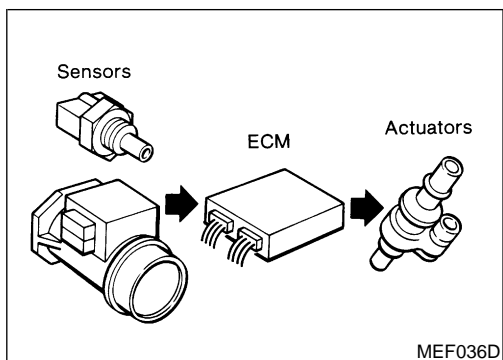
VG33E

Generic Scan Tool (GST) (Cont'd)

FUNCTION

NGEC0556S03

Diagnostic test mode		Function
MODE 1	READINESS TESTS	This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode gains access to emission-related data value which were stored by ECM during the freeze frame. [For details, refer to "Freeze Frame Data" (EC-686).]
MODE 3	DTCs	This mode gains access to emission-related power train trouble codes which were stored by ECM.
MODE 4	CLEAR DIAG INFO	This mode can clear all emission-related diagnostic information. This includes: <ul style="list-style-type: none"> ● Clear number of diagnostic trouble codes (MODE 1) ● Clear diagnostic trouble codes (MODE 3) ● Clear trouble code for freeze frame data (MODE 1) ● Clear freeze frame data (MODE 2) ● Reset status of system monitoring test (MODE 1) ● Clear on board monitoring test results (MODE 6 and 7)
MODE 6	(ON BOARD TESTS)	This mode accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
MODE 7	(ON BOARD TESTS)	This mode enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
MODE 8	—	This mode can close EVAP system in ignition switch "ON" position (Engine stopped). When this mode is performed, the following parts can be opened or closed. <ul style="list-style-type: none"> ● EVAP canister vent control valve open ● Vacuum cut valve bypass valve closed In the following conditions, this mode cannot function. <ul style="list-style-type: none"> ● Low ambient temperature ● Low battery voltage ● Engine running ● Ignition switch OFF ● Low fuel temperature ● Too much pressure is applied to EVAP system
MODE 9	CALIBRATION ID	This mode is to enable the off-board to request vehicle specific vehicle information such as Vehicle Identification Number (VIN) and calibration IDs.



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

SEF907L

Introduction

NGEC0557

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

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

A visual check only may not find the cause of the problems. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the "Work Flow" on EC-699.

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

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

DIAGNOSTIC WORKSHEET

NGEC0557S01

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

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

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

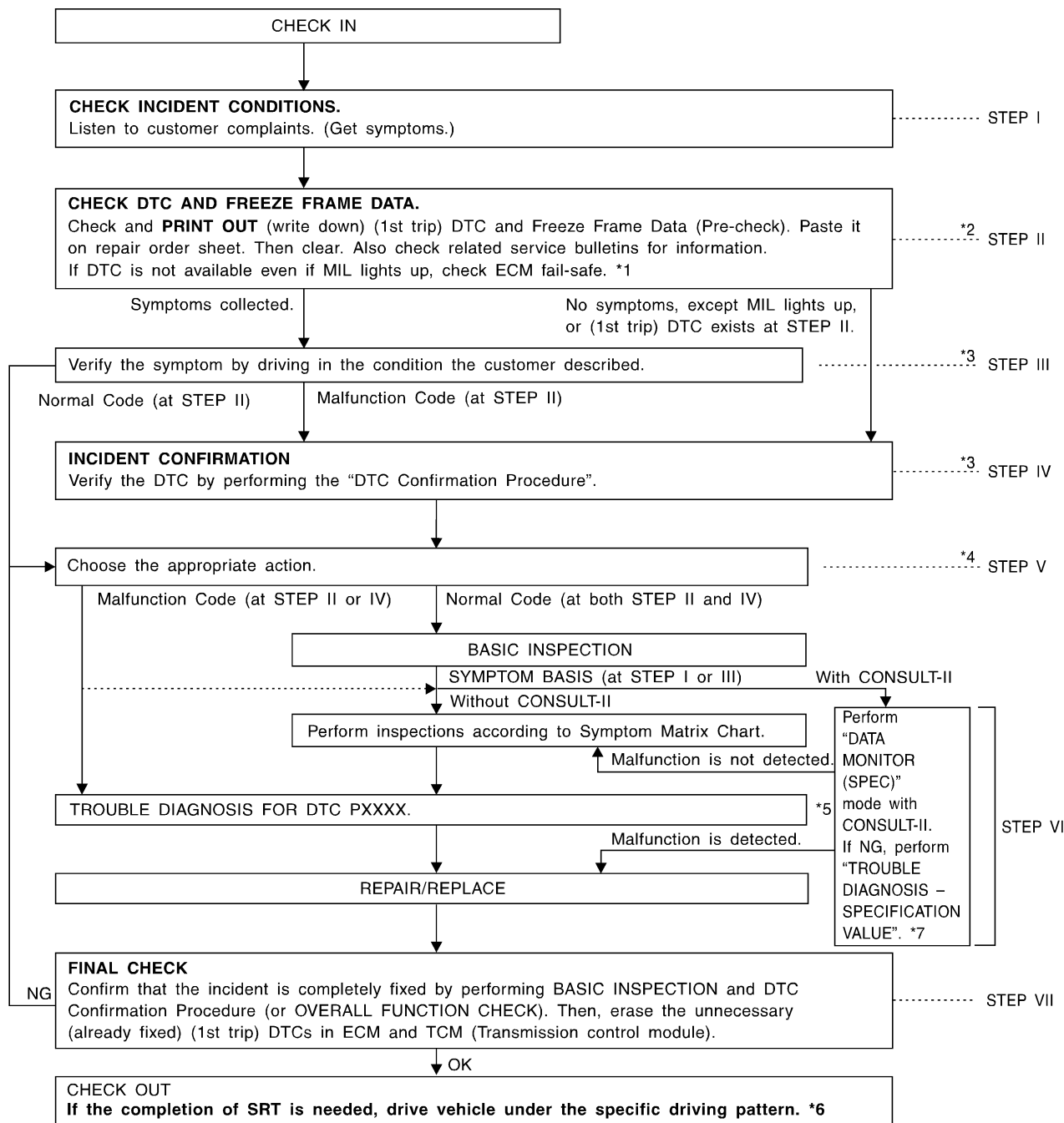
Some conditions may cause the MIL to come on steady or blink and DTC to be detected. Examples:

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere [for the models with EVAP (SMALL LEAK) diagnosis].

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Work Flow

NGEC0558



*1 EC-716

*2 If time data of "SELF-DIAG RESULTS" is other than "0" or "[1t]", perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.

*3 If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.

*4 If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to "TROUBLE DIAGNOSIS FOR POWER SUPPLY", EC-740.

*5 If malfunctioning part cannot be

detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.

*6 EC-667

*7 EC-735

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DESCRIPTION FOR WORK FLOW

NGEC0558S01

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET", EC-698.
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II or GST) the (1st trip) DTC and the (1st trip) freeze frame data, then erase the DTC and the data. (Refer to EC-673.) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739. Study the relationship between the cause, specified by (1st trip) DTC, and the symptom described by the customer. (The "Symptom Matrix Chart" will be useful. See EC-717.) Also check related service bulletins for information.
STEP III	Try to confirm the symptom and under what conditions the incident occurs. The "DIAGNOSTIC WORK SHEET" and the freeze frame data are useful to verify the incident. Connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739. If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the (1st trip) DTC by driving in (or performing) the "DTC Confirmation Procedure". Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT-II or GST. During the (1st trip) DTC verification, be sure to connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739. In case the "DTC Confirmation Procedure" is not available, perform the "Overall Function Check" instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified "check" is an effective alternative. The "NG" result of the "Overall Function Check" is the same as the (1st trip) DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-701.) If CONSULT-II is available, perform "DATA MONITOR (SPEC)" mode with CONSULT-II and proceed to the "TROUBLE DIAGNOSIS — SPECIFICATION VALUE", EC-735. (If malfunction is detected, proceed to "REPAIR REPLACE".) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-717.)
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-721, EC-726. 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 "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT", "Circuit Inspection", GI-25 . Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the "DTC Confirmation Procedure" and confirm the normal code [DTC No. P0000 or 0505] is detected. If the incident is still detected in the final check, perform STEP VI by using a different method from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM and TCM (Transmission control module). (Refer to EC-673.)

Basic Inspection

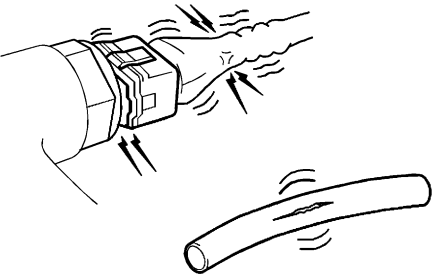
NGEC0559



Precaution:

Perform Basic Inspection without electrical or mechanical loads applied;

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

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1	INSPECTION START	
<p>1. Check service records for any recent repairs that may indicate a related problem, or the current need for scheduled maintenance.</p> <p>2. Open engine hood and check the following:</p> <ul style="list-style-type: none"> ● Harness connectors for improper connections ● Vacuum hoses for splits, kinks, or improper connections ● Wiring for improper connections, pinches, or cuts 		
		
SEF983U		
Models with CONSULT-II	▶	GO TO 2.
Models with GST	▶	GO TO 2.
Models with No Tools	▶	GO TO 16.

2	CONNECT CONSULT-II OR GST TO THE VEHICLE	
<p> With CONSULT-II Connect "CONSULT-II" to the data link connector for CONSULT-II and select "ENGINE" from the menu. Refer to EC-682.</p>		
<p> With GST Connect "GST" to the data link connector for GST. Refer to EC-695.</p>		
Models with CONSULT-II	▶	GO TO 3.
Models with GST	▶	GO TO 15.

3 CHECK FI CAM FUNCTION

④ With CONSULT-II

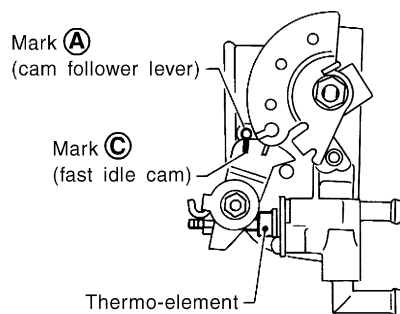
1. Turn ignition switch ON.
2. Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
3. Start engine and warm it up.

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C

SEF013Y

4. When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following.

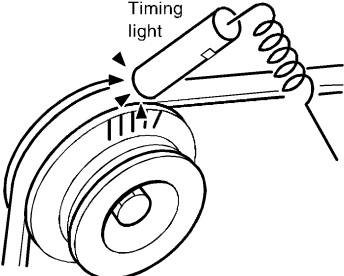
- The center of mark **A** is aligned with mark **C**.
- The cam follower lever's roller is not touching the fast idle cam.



SEF971R

OK or NG

OK	▶	GO TO 4.
NG	▶	1. Check FI cam. Refer to "Fast Idle Cam (FIC)", EC-646. 2. GO TO 4.

4	CHECK IGNITION TIMING		
<p>④ With CONSULT-II</p> <p>1. Warm up engine to normal operating temperature.</p> <p>2. Select "TARGET IDLE RPM ADJ" in "WORK SUPPORT" mode and touch "START".</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p style="text-align: center; margin: 0;">TARGET IDLE RPM ADJ</p> <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> <p style="text-align: center; margin: 0;">SET ENGINE RPM AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITION.</p> <p style="text-align: center; margin: 0;">-ENG WARMED UP ENOUGH</p> <p style="text-align: center; margin: 0;">-NO LOAD</p> </div> <p>3. Check ignition timing at idle using a timing light.</p> <div style="text-align: center; margin: 10px 0;">  </div> <p style="color: blue; font-weight: bold;">Ignition timing: 10°±2° BTDC</p> <p style="text-align: center; font-weight: bold;">OK or NG</p>			
OK		▶	GO TO 5.
NG		▶	<p>1. Adjust ignition timing by turning distributor. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-648.</p> <p>2. GO TO 5.</p>

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5	CHECK BASE IDLE SPEED		
<p>④ With CONSULT-II</p> <p>1. Select "TARGET IDLE RPM ADJ" in "WORK SUPPORT" mode and touch "START".</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p style="text-align: center; margin: 0;">TARGET IDLE RPM ADJ</p> <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> <p style="text-align: center; margin: 0;">SET ENGINE RPM AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITION.</p> <p style="text-align: center; margin: 0;">-ENG WARMED UP ENOUGH</p> <p style="text-align: center; margin: 0;">-NO LOAD</p> </div> <p>2. Check idle speed.</p> <p style="color: blue; font-weight: bold;">700±50 rpm (in "P" or "N" position)</p> <p style="text-align: center; font-weight: bold;">OK or NG</p>			
OK		▶	GO TO 6.
NG		▶	<p>1. Adjust engine speed by turning idle speed adjusting screw. Refer to "Idle Speed/ Ignition Timing/Idle Mixture Ratio Adjustment", EC-648.</p> <p>2. GO TO 6.</p>

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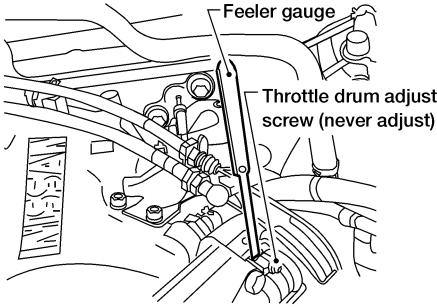
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6	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION-I
<p> With CONSULT-II NOTE: Always check ignition timing and base idle speed before performing the following.</p> <ol style="list-style-type: none"> 1. Warm up engine to normal operating temperature. 2. Check FI cam, refer to procedure 3. 3. Stop engine. 	
	GO TO 7.

7	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION-II						
<ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select "CLSD THL/P SW" in "DATA MONITOR" mode. 3. Read "CLSD THL/P SW" signal under the following conditions. <ul style="list-style-type: none"> ● Insert a 0.3 mm (0.012 in) and 0.4 mm (0.016 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure and check the signal. 							
							
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>CLSD THL/P SW</td> <td>ON</td> </tr> </tbody> </table>		DATA MONITOR		MONITOR	NO DTC	CLSD THL/P SW	ON
DATA MONITOR							
MONITOR	NO DTC						
CLSD THL/P SW	ON						
<p>“CLSD THL/P SW” signal should remain “ON” while inserting 0.3 mm (0.012 in) feeler gauge. “CLSD THL/P SW” signal should remain “OFF” while inserting 0.4 mm (0.016 in) feeler gauge.</p> <p>OK or NG</p>							
OK	GO TO 12.						
NG	GO TO 8.						

LEC517

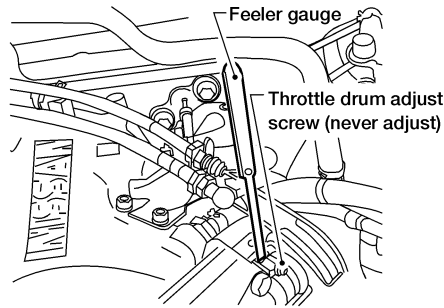
SEF173Y

8	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION
<p> With CONSULT-II NOTE:</p> <ul style="list-style-type: none"> ● Never adjust throttle adjust screw (TAS). ● Do not touch throttle drum when checking “CLSD THL/P SW” signal, doing so may cause an incorrect adjustment. <ol style="list-style-type: none"> 1. Warm up engine to normal operating temperature. 2. Check FI cam. Refer to procedure 3. 3. Stop engine. 4. Loosen throttle position sensor fixing bolts. 	
	GO TO 9.

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9 ADJUSTMENT CLOSED THROTTLE POSITION SWITCH IDLE POSITION-II

1. Turn ignition switch ON.
2. Select "CLSD THL/P SW" in "DATA MONITOR" mode.
3. Insert 0.35 mm (0.0138 in) feeler gauge between throttle adjust screw and throttle drum as shown in the figure.



4. Open throttle valve and then close.
5. Check "CLSD THL/P SW" signal.

LEC517

DATA MONITOR	
MONITOR	NO DTC
CLSD THL/P SW	OFF

SEF305Y

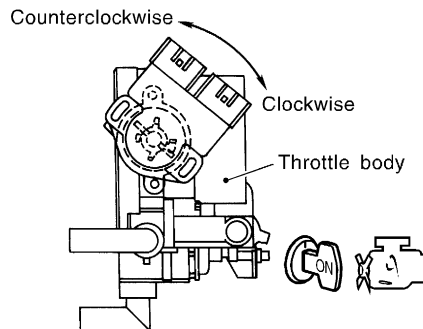
"CLSD THL/P SW" signal should remain "OFF" when the throttle valve is closed.

OK or NG

- | | | |
|----|---|-----------|
| OK | ▶ | GO TO 10. |
| NG | ▶ | GO TO 8. |

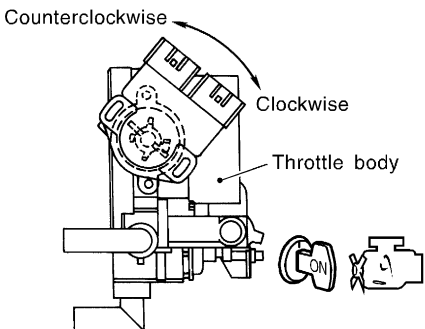
10 ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-III

- Ⓟ With CONSULT-II**
Turn throttle position sensor body clockwise until "CLSD THL/P SW" signal switches to "OFF".


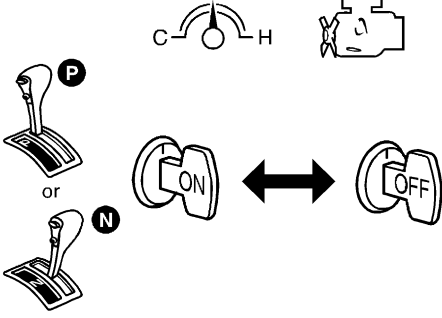



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| ▶ | GO TO 11. |
|---|-----------|

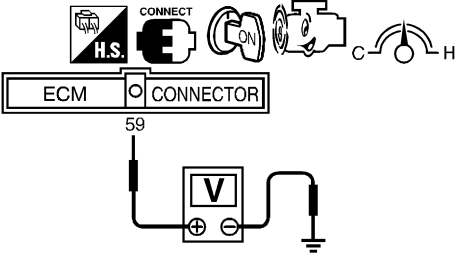
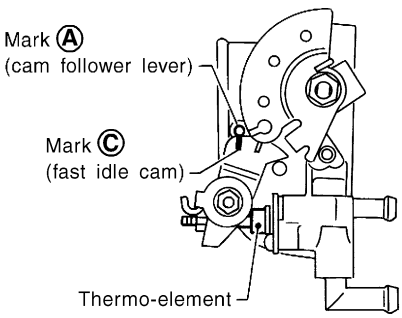
11	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-IV
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Remove 0.35 mm (0.0138 in) feeler gauge then insert 0.3 mm (0.012 in) feeler gauge. 2. Temporarily tighten sensor body fixing bolts as follows. <ul style="list-style-type: none"> ● Gradually move the sensor body counterclockwise and stop it when “CLSD THL/P SW” signal switches from “OFF” to “ON”, then temporarily tighten sensor body fixing bolts. <div style="text-align: center; margin: 10px 0;">  </div> <p style="text-align: right; margin-right: 50px;">SEF689W</p> <ol style="list-style-type: none"> 3. Make sure two or three times that the signal is “ON” when the throttle valve is closed and “OFF” when it is opened. 4. Remove 0.3 mm (0.012 in) feeler gauge then insert 0.4 mm (0.016 in) feeler gauge. 5. Make sure two or three times that the signal remains “OFF” when the throttle valve is closed. 6. Tighten throttle position sensor. 7. Check the “CLSD THL/P SW” signal again. <p style="margin-left: 20px;">The signal remains “OFF” while closing throttle valve.</p> <p style="text-align: center; margin: 10px 0;">OK or NG</p>	
OK	▶ GO TO 12.
NG	▶ GO TO 8.

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12	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY										
<p> With CONSULT-II</p> <p>NOTE: Always warm up engine to normal operating temperature. If engine is cool, the throttle position sensor idle position memory will not be reset correctly.</p> <ol style="list-style-type: none"> 1. Remove feeler gauge. 2. Start engine. 3. Warm up engine to normal operating temperature. 4. Select "CLSD THL POS" in "DATA MONITOR" mode. 5. Stop engine. (Turn ignition switch OFF.) 6. Turn ignition switch ON and wait at least 5 seconds. <div style="text-align: center; margin: 10px 0;">  </div> <ol style="list-style-type: none"> 7. Turn ignition switch OFF and wait at least 5 seconds. 8. Repeat steps 5 and 6 until "CLSD THL POS" signal changes to "ON". <div style="text-align: center; margin: 10px 0;"> <table border="1" style="border-collapse: collapse;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>COOLAN TEMP/S</td> <td>XXX °C</td> </tr> <tr> <td>CLSD THL/P SW</td> <td>ON</td> </tr> </tbody> </table> </div>		DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm	COOLAN TEMP/S	XXX °C	CLSD THL/P SW	ON
DATA MONITOR											
MONITOR	NO DTC										
ENG SPEED	XXX rpm										
COOLAN TEMP/S	XXX °C										
CLSD THL/P SW	ON										
<p>SEF864V</p> <p>SEF197Y</p>											
<p>▶ GO TO 13.</p>											

13	CHECK TARGET IDLE SPEED
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Select "ENG SPEED" in "DATA MONITOR" mode. 3. Check idle speed. 750±50 rpm (in "P" or "N" position) <p style="text-align: center; margin: 10px 0;">OK or NG</p>	
OK	▶ INSPECTION END
NG	▶ Adjust idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-648.

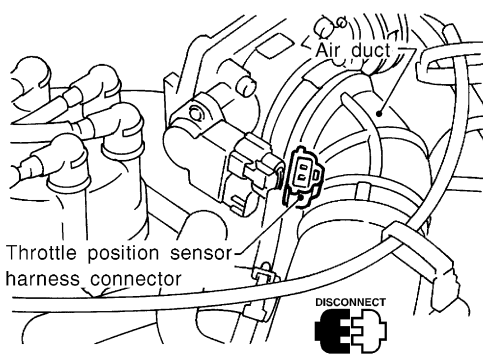
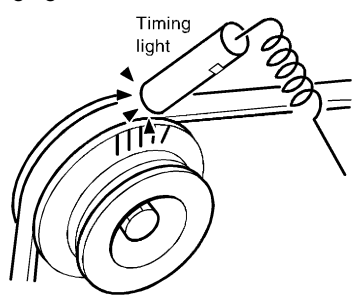
14	CHECK FI CAM FUNCTION
<p> With GST</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select "MODE 1" with GST. 3. Start engine and warm it up. 4. When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following. <ul style="list-style-type: none"> ● The center of mark A is aligned with mark C. ● The cam follower lever's roller is not touching the fast idle cam. <div style="text-align: center; margin: 20px 0;"> <p style="margin-left: 100px;">Mark A (cam follower lever)</p> <p style="margin-left: 100px;">Mark C (fast idle cam)</p> <p style="margin-left: 100px;">Thermo-element</p> </div> <p style="text-align: right; margin-right: 50px;">SEF971R</p> <p style="text-align: center; margin: 10px 0;">OK or NG</p>	
OK	▶ GO TO 16.
NG	▶ <ol style="list-style-type: none"> 1. Check FI cam. Refer to "Fast Idle Cam (FIC)", EC-646. 2. GO TO 16.

15	CHECK FI CAM FUNCTION
<p>NO TOOLS</p> <ol style="list-style-type: none"> Set the voltmeter between ECM terminal 59 (Engine coolant temperature sensor signal) and ground. Start engine and warm it up.  <ol style="list-style-type: none"> When the voltage is between 1.10 to 1.36V, check the following. <ul style="list-style-type: none"> The center of mark A is aligned with mark C. The cam follower lever's roller is not touching the fast idle cam.  <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 16.
NG	▶ 1. Check FI cam. Refer to "Fast Idle Cam (FIC)", EC-646. 2. GO TO 16.

SEF119W

SEF971R

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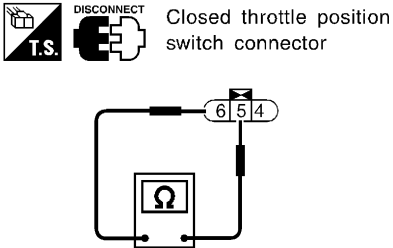
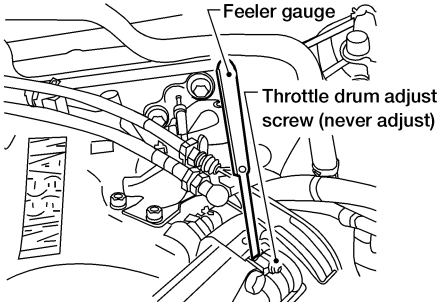
16	CHECK IGNITION TIMING
<p>⊗ Without CONSULT-II</p> <p>1. Warm up engine to normal operating temperature.</p> <p>2. Stop engine and disconnect throttle position sensor harness connector.</p>	
	
<p>3. Start engine.</p> <p>4. Check ignition timing at idle using a timing light.</p>	
	
<p>Ignition timing: 10°±2° BTDC</p> <p>OK or NG</p>	
OK	▶ GO TO 17.
NG	▶ 1. Adjust ignition timing by turning distributor. Refer to "Idle Speed/ Ignition Timing/ Idle Mixture Ratio Adjustment", EC-648. 2. GO TO 17.

SEF975R

SEF984U

17	CHECK BASE IDLE SPEED
<p>⊗ Without CONSULT-II</p> <p>Does engine speed fall to the following speed?</p> <p>700±50 rpm (in "P" or "N" position)</p>	
<p>OK or NG</p>	
OK	▶ GO TO 18.
NG	▶ 1. Adjust engine speed by turning idle speed adjusting screw. Refer to "Idle Speed/ Ignition Timing/ Idle Mixture Ratio Adjustment", EC-648. 2. GO TO 18.

18	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION
<p>⊗ Without CONSULT-II</p> <p>NOTE:</p> <p>Always check ignition timing and base idle speed before performing the following.</p> <p>1. Warm up engine to normal operating temperature.</p> <p>2. Check FI cam, refer to procedure 12 or 13.</p> <p>3. Stop engine.</p>	
▶	GO TO 19.

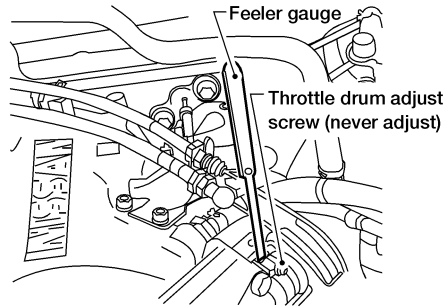
19	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION-I
<p>1. Disconnect closed throttle position switch harness connector.</p> <p>2. Check continuity between closed throttle position switch terminals 5 and 6 under the following conditions.</p>	
 <p style="text-align: center;">Closed throttle position switch connector</p>	
<p style="text-align: right;">SEF862V</p> <ul style="list-style-type: none"> ● Insert the 0.3 mm (0.012 in) and 0.4 mm (0.016 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure. 	
	
<p style="text-align: right;">LEC517</p> <p>“Continuity should exist” while inserting 0.3 mm (0.012 in) feeler gauge. “Continuity should not exist” while inserting 0.4 mm (0.016 in) feeler gauge.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 24.
NG	▶ GO TO 20.

20	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION
<p>⊗ Without CONSULT-II</p> <p>NOTE:</p> <ul style="list-style-type: none"> ● Never adjust throttle adjust screw (TAS). ● Do not touch throttle drum when checking “continuity”, doing so may cause an incorrect adjustment. <ol style="list-style-type: none"> 1. Warm up engine to normal operating temperature. 2. Check FI cam. Refer to procedure 12 or 13. 3. Stop engine. 4. Loosen throttle position sensor fixing bolts. 	
▶	GO TO 21.

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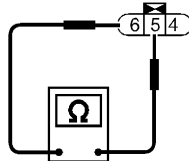
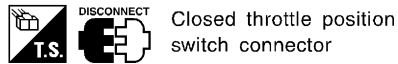
21 | ADJUSTMENT CLOSED THROTTLE POSITION SWITCH IDLE POSITION-II

1. Disconnect closed throttle position switch harness connector.
2. Insert 0.35 mm (0.0138 in) feeler gauge between the throttle adjust screw and throttle drum as shown in the figure.



LEC517

3. Open throttle valve then close.
4. Check continuity between closed throttle position switch terminals 5 and 6.



SEF862V

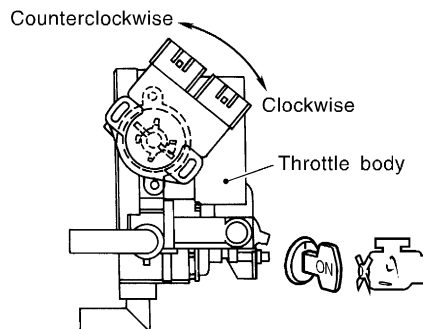
Continuity should not exist while closing the throttle position sensor.

OK or NG

OK	▶	GO TO 23.
NG	▶	GO TO 22.

22 | ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-III

- ⊗ Without CONSULT-II**
 Turn throttle position sensor body clockwise until continuity does not exist.



SEF689W

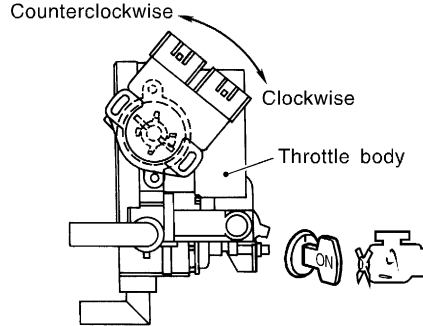
▶ GO TO 23.

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23 ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-IV

⊗ Without CONSULT-II

1. Remove 0.35 mm (0.0138 in) feeler gauge then insert 0.3 mm (0.012 in) feeler gauge.
2. Temporarily tighten sensor body fixing bolts as follows.
 - Gradually move the sensor body counterclockwise and stop it when the continuity comes to exist, then temporarily tighten sensor body fixing bolts.



SEF689W

3. Make sure two or three times that the continuity exists when the throttle valve is closed and continuity does not exist when it is opened.
4. Remove 0.3 mm (0.012 in) feeler gauge then insert 0.4 mm (0.016 in) feeler gauge.
5. Make sure two or three times that the continuity does not exist when the throttle valve is closed.
6. Tighten throttle position sensor.
7. Check the continuity again.

Continuity does not exist while closing the throttle valve.

OK or NG

OK	▶	GO TO 24.
NG	▶	GO TO 20.

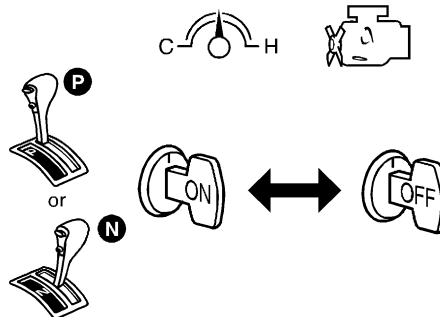
24 RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

⊗ Without CONSULT-II

NOTE:

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

1. Remove feeler gauge.
2. Start engine.
3. Warm up engine to normal operating temperature.
4. Stop engine. (Turn ignition switch OFF.)
5. Turn ignition switch ON and wait at least 5 seconds.



SEF864V

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

▶	GO TO 25.
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Basic Inspection (Cont'd)

25	REINSTALLATION
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Reconnect throttle position sensor harness connector and closed throttle position switch harness connector. 2. Start engine and rev it (2,000 to 3,000 rpm) two or three times under no-load and then run engine at idle speed. 	
<p>▶ GO TO 26.</p>	

26	CHECK TARGET IDLE SPEED
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. 750±50 rpm (in "P" or "N" position) <p style="text-align: center;">OK or NG</p>	
<p>OK ▶ GO TO 27.</p>	
<p>NG ▶ <ol style="list-style-type: none"> 1. Adjust idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-648. 2. GO TO 27. </p>	

27	ERASE UNNECESSARY DTC
<p>After this inspection, unnecessary DTC No. might be displayed. Erase the stored memory in ECM and TCM (Transmission control module). Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-673 and "HOW TO ERASE DTC", AT-35.</p>	
<p>▶ INSPECTION END</p>	

DTC Inspection Priority Chart

NGEC0560

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

Priority	Detected items (DTC)	
1	<ul style="list-style-type: none"> ● P0101, P0102, P0103 Mass air flow sensor ● P0112, P0113, P0127 Intake air temperature sensor ● P0117, P0118, P0125 Engine coolant temperature sensor ● P0121, P0122, P0123 Throttle position sensor ● P0181, P0182, P0183 Fuel tank temperature sensor ● P0327, P0328 Knock sensor ● P0335 P1336 Crankshaft position sensor (OBD) ● P0340 Camshaft position sensor ● P0460 P0461 P1464 Fuel level sensor ● P0500 Vehicle speed sensor ● P0600 A/T communication line ● P0605 ECM ● P1605 A/T diagnosis communication line ● P1706 Park/Neutral position (PNP) switch 	GI MA EM LC EC FE
2	<ul style="list-style-type: none"> ● P0132-P0134, P1143, P1144/P0152-P0154, P1163, P1164 Heated oxygen sensor 1 ● P0031, P0032/P0051, P0052 Heated oxygen sensor 1 heater ● P0138, P0139, P1146, P1147/P0158, P0159, P1166, P1167 Heated oxygen sensor 2 ● P0037, P0038/P0057, P0058 Heated oxygen sensor 2 heater ● P0217 Engine coolant overtemperature enrichment protection ● P0444, P0445, P1444 EVAP canister purge volume control solenoid valve ● P0447 P1446 P1448 EVAP canister vent control valve ● P0452, P0453 EVAP control system pressure sensor ● P0510 Closed throttle position switch ● P0705-P0755 P1705 P1760 A/T related sensors, solenoid valves and switches ● P0456, P1456 EVAP control system (VERY SMALL LEAK) ● P1447 EVAP control system purge flow monitoring ● P1490 P1491 Vacuum cut valve bypass valve 	CL MT AT TF
3	<ul style="list-style-type: none"> ● P0171 P0172 P0174 P0175 Fuel injection system function ● P0306 - P0300 Misfire ● P0420 P0430 Three way catalyst function ● P0442/P1442 EVAP control system (SMALL LEAK) ● P0455 EVAP control system (GROSS LEAK) ● P0505 IACV-AAC valve ● P0731-P0734 P0744 A/T function ● P1148 P1168 Closed loop control 	PD AX SU

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Fail-safe Chart

=NGEC0561

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

DTC No.	Detected items	Engine operating condition in fail-safe mode	
CONSULT-II GST		Condition	Engine coolant temperature decided (CONSULT-II display)
P0101 P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.	
P0117 P0118	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch ON or START. CONSULT-II displays the engine coolant temperature decided by ECM.	
		Condition	Engine coolant temperature decided (CONSULT-II display)
		Just as ignition switch is turned ON or Start	40°C (104°F)
		More than approx. 4 minutes after ignition ON or Start	80°C (176°F)
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
P0121 P0122 P0123	Throttle position sensor circuit	Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.	
		Condition	Driving condition
		When engine is idling	Normal
		When accelerating	Poor acceleration
Unable to access ECM	ECM	<p>ECM fail-safe activating condition The computing function of the ECM was judged to be malfunctioning. When the fail-safe system activates (i.e., if the ECM detects a malfunction condition in the CPU of ECM), the MIL on the instrument panel lights to warn the driver. However it is not possible to access ECM and DTC cannot be confirmed.</p> <p>Engine control with fail-safe When ECM fail-safe is operating, fuel injection, ignition timing, fuel pump operation, and IACV-AAC valve operation are controlled under certain limitations.</p>	
			ECM fail-safe operation
		Engine speed	Engine speed will not rise more than 3,000 rpm
		Fuel injection	Simultaneous multiport fuel injection system
		Ignition timing	Ignition timing is fixed at the preset value
		Fuel pump	Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls
		IACV-AAC valve	Full open
		Replace ECM, if ECM fail-safe condition is confirmed.	

Symptom Matrix Chart
SYSTEM — BASIC ENGINE CONTROL SYSTEM

NGEC0562

NGEC0562S01

		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	OVERHEAT/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		3	2					3	1	EC-1153
	Injector circuit							2								EC-1145
	Fuel pressure regulator system	4	4	4	4	4	4	4	3	3				4		EC-645
	Evaporative emission system															EC-626
Air	Positive crankcase ventilation system	4	4	4	4	4	4	4	3	3				4	1	EC-642
	Incorrect idle speed adjustment															3
	IACV-AAC valve circuit	2	1	3	3	3	2	2	2	2				3		EC-1006
	IACV-FICD solenoid valve circuit		2				3	3								3
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1					1		EC-648
	Ignition circuit							1	1							2
Main power supply and ground circuit		1	2	3	3	3		3	2		1			3	1	EC-740
Air conditioner circuit		2														3

1 - 6: The numbers refer to the order of inspection.
(continued on next page)

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33E

Symptom Matrix Chart (Cont'd)

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Camshaft position sensor circuit	1			2				2						EC-901
Mass air flow sensor circuit		1	2		2							2		
Heated oxygen sensor 1 (front) circuit				3			2							EC-822
Engine coolant temperature sensor circuit	1	2	3		3	3			2		3			EC-775, 793
Throttle position sensor circuit		1	2		2	2					2			EC-780
Incorrect throttle position sensor adjustment		3	1		1	1	1	1	1		1			EC-701
Vehicle speed sensor circuit		2												EC-1002
Knock sensor circuit			3		3						3			EC-891
ECM	2	2		3		3	3	2	2	1				EC-1024, 716
Start signal circuit	1													EC-1150
Park/neutral position (PNP) switch circuit			3		3						3			EC-1129
Power steering oil pressure switch circuit		2					3	2						EC-1161

1 - 6: The numbers refer to the order of inspection.
(continued on next page)

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33E

Symptom Matrix Chart (Cont'd)

SYSTEM — ENGINE MECHANICAL & OTHER

NGEC0562S02

		SYMPTOM												Reference section	
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5	5												FE-4
	Fuel piping			5	5	5		5	4		5				
	Vapor lock														
	Valve deposit														
	Poor fuel (Heavy weight gasoline, Low octane)	5		5	5	5		5	4		5				
Air	Air duct														—
	Air cleaner														
	Air leakage from air duct (Mass air flow sensor — throttle body)		5	5	5	5		5	4		5				
	Throttle body, Throttle wire	5					5			4					
	Air leakage from intake manifold/Collector/Gasket				5										
Cranking	Battery		1	1		1		1	1			1	1	SC-10	
	Generator circuit	1													
	Starter circuit														
	Park/neutral position (PNP) switch														
	Drive plate/Flywheel		6												

1 - 6: The numbers refer to the order of inspection.
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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33E

Symptom Matrix Chart (Cont'd)

		SYMPTOM												Reference section	
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Engine	Cylinder head														EM-92, EM-82 and EM-115
	Cylinder head gasket	5	5	5	5	5		5	5		2	5	2		
	Cylinder block														
	Piston												3		
	Piston ring														
	Connecting rod	6	6	6	6	6		6	6			6			
	Bearing														
	Crankshaft														
Valve mechanism	Timing chain														FE-9
	Camshaft														
	Intake valve	6	6	6	6	6		6	6			6	2		
	Exhaust valve														
	Hydraulic lash adjuster														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	6	6	6	6	6		6	6			6			MA-32, EM-79 and LC-20
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	6	6	6	6	6		6	6			6	2		MA-32
	Oil level (Low/Filthy) oil														
Cooling	Radiator/Hose/Radiator filler cap														LC-27
	Thermostat						5				5				
	Water pump														
	Water gallery	6	6	6	6	6		6	6		2	6			
	Cooling fan						5				5				
	Coolant level (low)/Contaminated coolant														

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

CONSULT-II Reference Value in Data Monitor Mode

NGE0563

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.

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

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	<ul style="list-style-type: none"> ● Tachometer: Connect ● Run engine and compare tachometer indication with the CONSULT-II value. 	Almost the same speed as the CONSULT-II value.
MAS AIR/FL SE	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle 2,500 rpm
		1.0 - 1.7V 1.7 - 2.3V
COOLAN TEMP/S	<ul style="list-style-type: none"> ● Engine: After warming up 	More than 70°C (158°F)
HO2S1 (B1) HO2S1 (B2)	<ul style="list-style-type: none"> ● Engine: After warming up 	Maintaining engine speed at 2,000 rpm
HO2S1 MNTR (B1) HO2S1 MNTR (B2)		0 - 0.3V ↔ Approx. 0.6 - 1.0V LEAN ↔ RICH Changes more than 5 times during 10 seconds.
HO2S2 (B1) HO2S2 (B2)	<ul style="list-style-type: none"> ● Engine: After warming up 	Maintaining engine speed at 2,000 rpm
HO2S2 MNTR (B1) HO2S2 MNTR (B2)		0 - 0.3V ↔ Approx. 0.6 - 1.0V LEAN ↔ RICH
VHCL SPEED SE	<ul style="list-style-type: none"> ● Turn drive wheels and compare speedometer indication with the CONSULT-II value 	Almost the same speed as the CONSULT-II value
BATTERY VOLT	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) 	11 - 14V
THRTL POS SEN	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine 	Throttle valve: fully closed (a)
	<ul style="list-style-type: none"> ● Engine: After warming up ● Ignition switch: ON (Engine stopped) 	Throttle valve: Partially open
		Throttle valve: fully opened (b)
START SIGNAL	<ul style="list-style-type: none"> ● Ignition switch: ON → START → ON 	OFF → ON → OFF
CLSD THL POS CLSD THL/P SW	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine 	Throttle valve: Idle position
		Throttle valve: Slightly open
AIR COND SIG	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine 	Air conditioner switch: OFF
		Air conditioner switch: ON (Compressor operates.)
P/N POSI SW	<ul style="list-style-type: none"> ● Ignition switch: ON 	Shift lever: "P" or "N"
		Except above
PW/ST SIGNAL	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine 	Steering wheel in neutral position (forward direction)
		The steering wheel is turned

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33E

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

MONITOR ITEM	CONDITION	SPECIFICATION
AMB TEMP SW	<ul style="list-style-type: none"> ● Ignition switch: ON ● Compare ambient air temperature with the following: 	Below 19°C (66°F)
		Above 25°C (77°F)
IGNITION SW	<ul style="list-style-type: none"> ● Ignition switch: ON → OFF → ON 	ON → OFF → ON
INJ PULSE-B2 INJ PULSE-B1	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,000 rpm
B/FUEL SCHDL	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,000 rpm
IGN TIMING	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,000 rpm
IACV-AAC/V	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,000 rpm
PURG VOL C/V	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,000 rpm
A/F ALPHA-B2 A/F ALPHA-B1	<ul style="list-style-type: none"> ● Engine: After warming up 	Maintaining engine speed at 2,000 rpm
EVAP SYS PRES	<ul style="list-style-type: none"> ● Ignition switch: ON 	Approx. 1.8 - 4.8V
AIR COND RLY	<ul style="list-style-type: none"> ● Air conditioner switch: OFF → ON 	OFF → ON
FUEL PUMP RLY	<ul style="list-style-type: none"> ● Ignition switch is turned to ON (Operates for 5 seconds) ● Engine running and cranking 	ON
	Except as shown above	OFF
COOLING FAN	<ul style="list-style-type: none"> ● After warming up engine, idle the engine. ● Air conditioner switch: OFF 	Engine coolant temperature is 94°C (201°F) or less
		Engine coolant temperature is 95°C (203°F) or more
VENT CONT/V	<ul style="list-style-type: none"> ● Ignition switch: ON 	OFF
HO2S1 HTR (B1) HO2S1 HTR (B2)	<ul style="list-style-type: none"> ● Engine speed: Below 3,200 rpm 	ON
	<ul style="list-style-type: none"> ● Engine speed: Above 3,200 rpm 	OFF
HO2S2 HTR (B1) HO2S2 HTR (B2)	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Engine speed: Above 3,200 rpm 	OFF
	<ul style="list-style-type: none"> ● Engine speed: Below 3,200 rpm [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more] 	ON
VC/V BYPASS/V	<ul style="list-style-type: none"> Ignition switch: ON 	OFF
CAL/LD VALUE	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,500 rpm

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33E

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

MONITOR ITEM	CONDITION	SPECIFICATION
ABSOL TH·P/S	<ul style="list-style-type: none"> ● Engine: After warming up ● Ignition switch: ON 	Throttle valve: fully closed 0.0%
	<ul style="list-style-type: none"> ● Engine: After warming up ● Ignition switch: ON (Engine stopped) 	Throttle valve: fully open Approx. 80%
MASS AIRFLOW	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle 3.3 - 4.8 g·m/s
		2,500 rpm 12.0 - 14.9 g·m/s

Major Sensor Reference Graph in Data Monitor Mode

NGEC0564

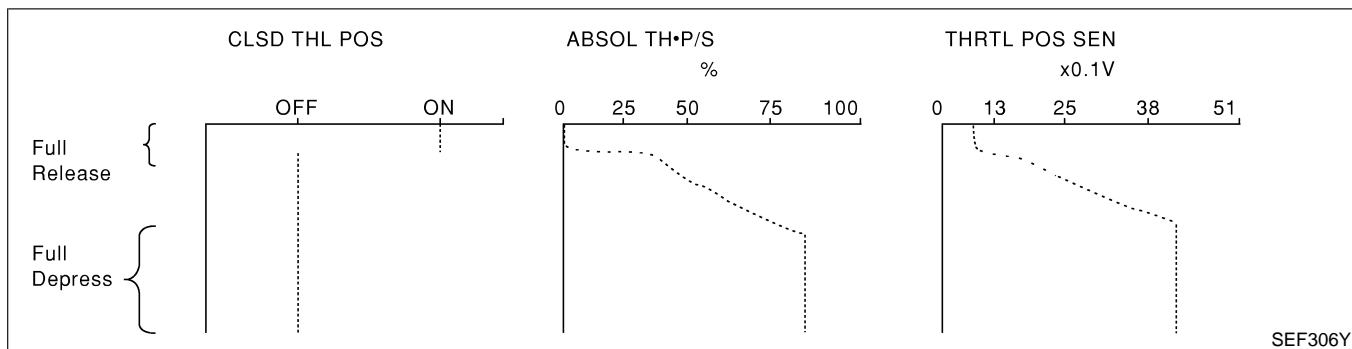
The following are the major sensor reference graphs in "DATA MONITOR" mode.
(Select "HI SPEED" in "DATA MONITOR" with CONSULT-II.)

THRTL POS SEN, ABSOL TH·P/S, CLSD THL POS

NGEC0564S01

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

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



SEF306Y

ENG SPEED, MAS AIR/FL SE, THRTL POS SEN, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1

NGEC0564S02

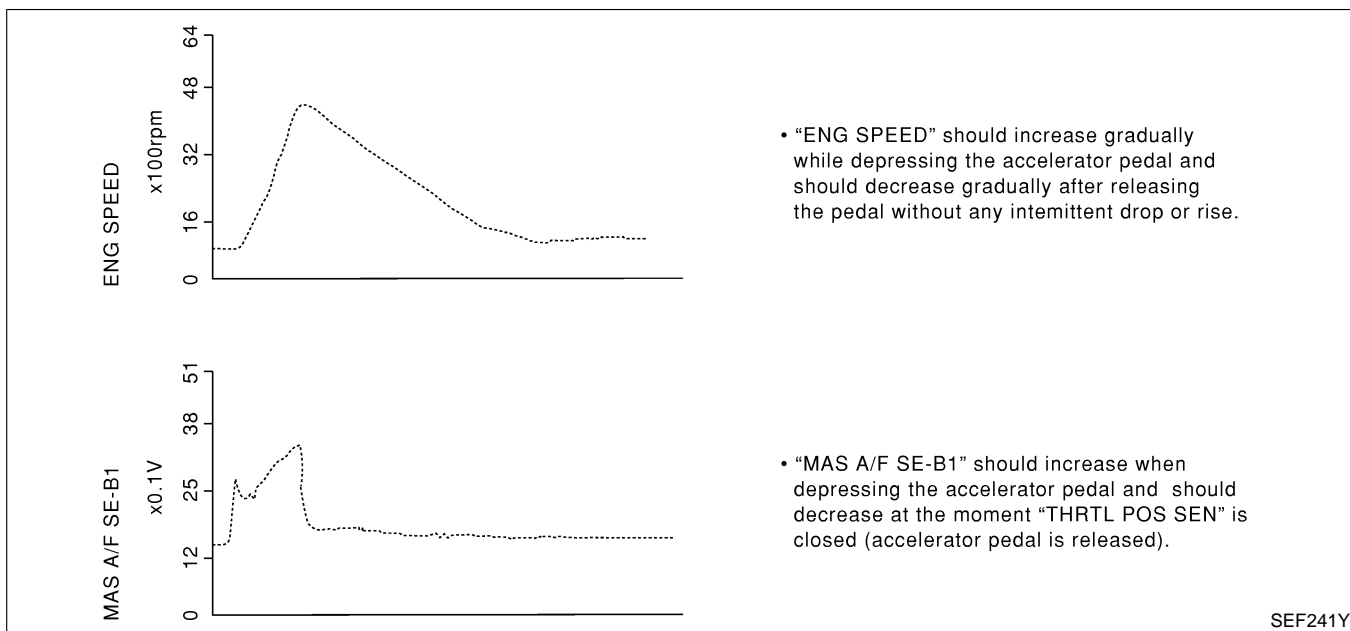
Below is the data for "ENG SPEED", "MAS AIR/FL SE", "THRTL POS SEN", "HO2S2 (B1)", "HO2S1 (B1)" and "INJ PULSE-B1" when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.

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

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33E

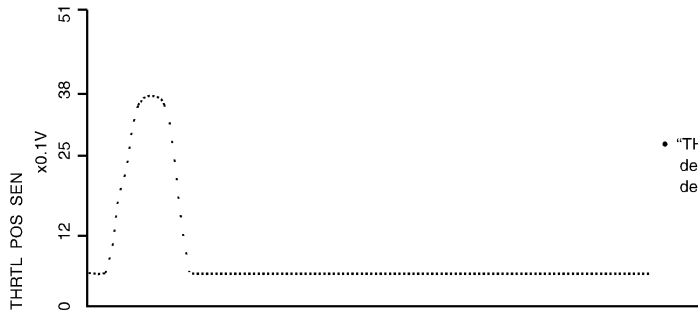
Major Sensor Reference Graph in Data Monitor Mode (Cont'd)



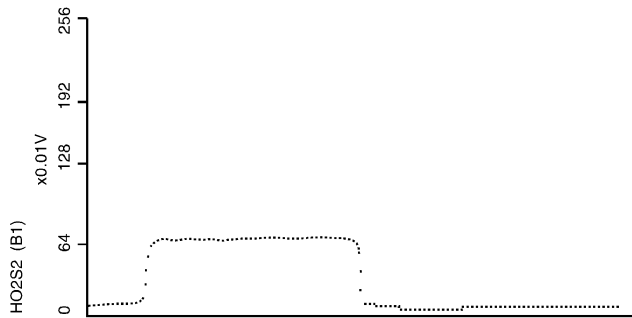
TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33E

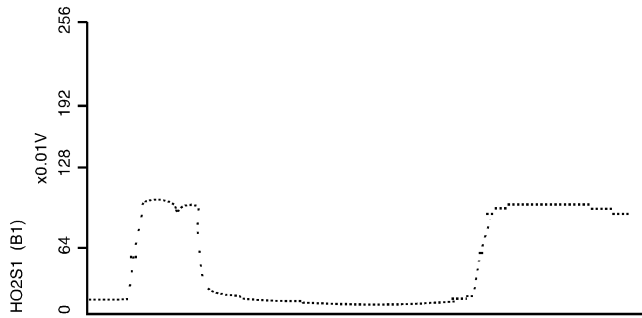
Major Sensor Reference Graph in Data Monitor Mode (Cont'd)



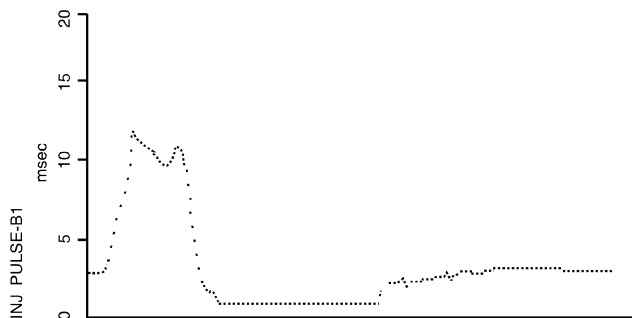
- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



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



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



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

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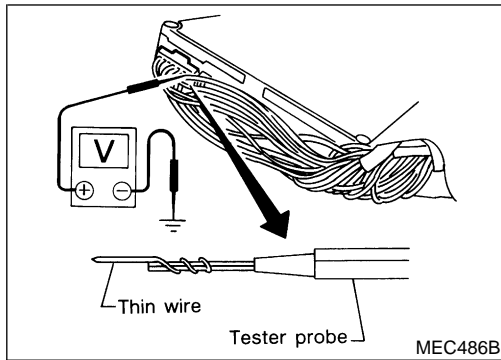
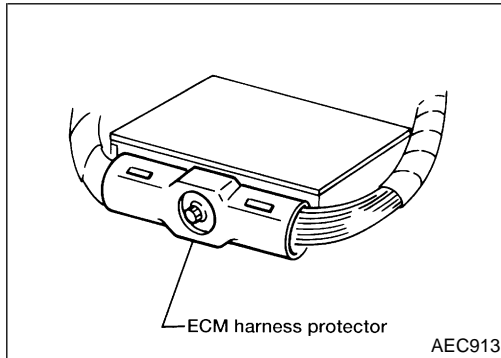
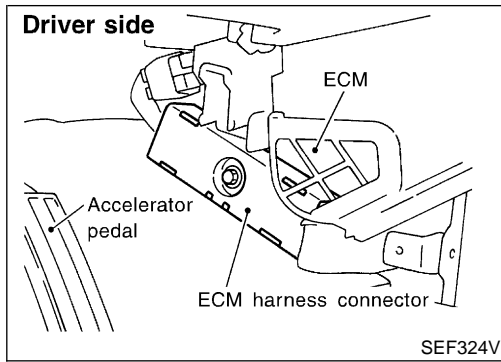
HA

SC

SEF242YD

EL

IDX



ECM Terminals and Reference Value

NGEC0565

PREPARATION

NGEC0565S01

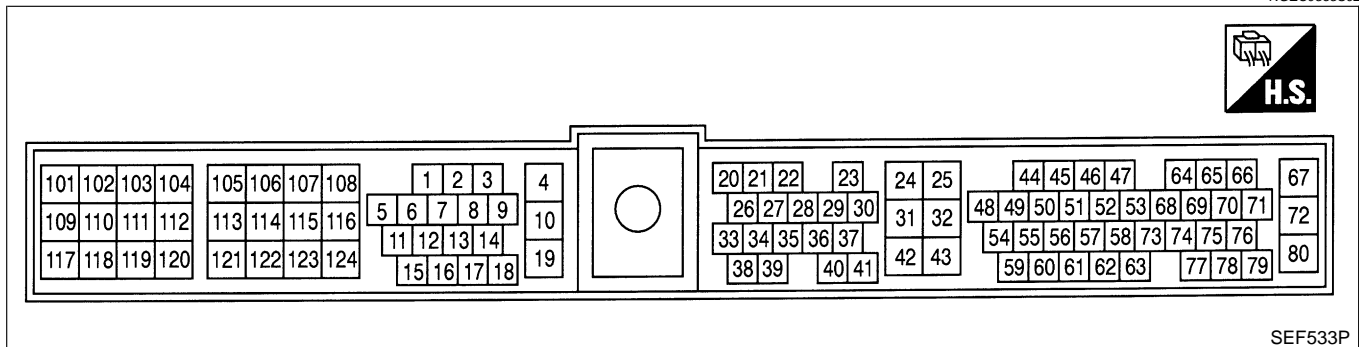
1. ECM is located behind the instrument lower cover. For this inspection:
 - Remove instrument lower cover.

2. Remove ECM harness protector.

3. Perform all voltage measurements with the connector connected. Extend tester probe as shown to perform tests easily.
 - Open harness securing clip to make testing easier.
 - Use extreme care not to touch 2 pins at one time.
 - Data is for comparison and may not be exact.

ECM HARNESS CONNECTOR TERMINAL LAYOUT

NGEC0565S02



ECM INSPECTION TABLE

NGEC0565S03

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

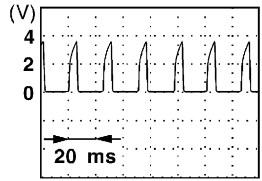
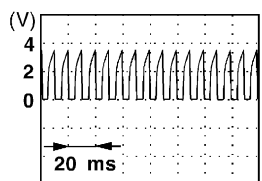
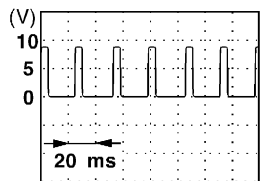
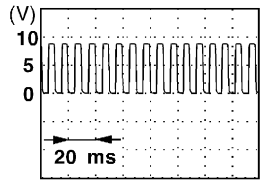
CAUTION:

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 the ECM terminals, such as the ground.

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33E

ECM Terminals and Reference Value (Cont'd)

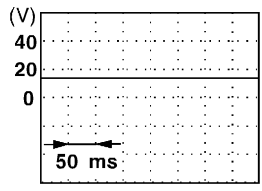
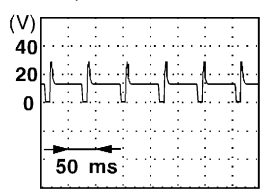
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	PU/W	Ignition signal	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	<p>Approximately 0.7V</p>  <p style="text-align: right; font-size: small;">SEF988U</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	<p>1.1 - 1.5V</p>  <p style="text-align: right; font-size: small;">SEF989U</p>
3	R/L	Tachometer	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>1 - 2V</p>  <p style="text-align: right; font-size: small;">SEF992U</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	<p>3 - 5V</p>  <p style="text-align: right; font-size: small;">SEF993U</p>
4	OR/B	ECM relay (Self shut-off)	<p>[Engine is running] [Ignition switch OFF]</p> <ul style="list-style-type: none"> ● For a few seconds after turning ignition switch OFF 	<p>0 - 1.5V</p>
			<p>[Ignition switch OFF]</p> <ul style="list-style-type: none"> ● A few seconds passed after turning ignition switch OFF 	<p>BATTERY VOLTAGE (11 - 14V)</p>

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33E

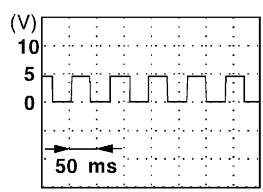
ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	R/Y	EVAP canister purge volume control sole- noid valve	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	<p>BATTERY VOLTAGE (11 - 14V)</p>  <p style="text-align: right;">SEF994U</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm (More than 100 sec- onds after starting engine) 	<p>BATTERY VOLTAGE (11 - 14V)</p>  <p style="text-align: right;">SEF995U</p>
7	Y/G	A/T check signal	<p>[Ignition switch ON] [Engine is running]</p>	0 - 3.0V
9	B/Y	Ambient air tempera- ture switch	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed ● Ambient air temperature is above 25°C (77°F) ● Air conditioner is operating 	0V
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is operating 	BATTERY VOLTAGE (11 - 14V)
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is not operating 	Approximately 5V
10	B/R	ECM ground	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	Engine ground
11	W/R	Fuel pump relay	<p>[Ignition switch ON]</p> <ul style="list-style-type: none"> ● For 5 seconds after turning ignition switch ON <p>[Engine is running]</p>	0 - 1V
			<p>[Ignition switch ON]</p> <ul style="list-style-type: none"> ● More than 5 seconds after turning ignition switch ON 	BATTERY VOLTAGE (11 - 14V)
12	P	Air conditioner relay	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Both A/C switch and blower switch are ON* 	0 - 1V
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● A/C switch is OFF 	BATTERY VOLTAGE (11 - 14V)
18	R/W	Malfunction indicator lamp	<p>[Ignition switch ON]</p>	0 - 1V
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V)
19	B/R	ECM ground	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	Engine ground

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33E

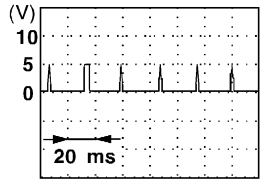
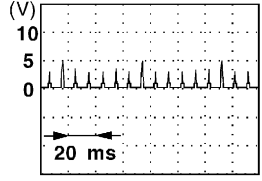
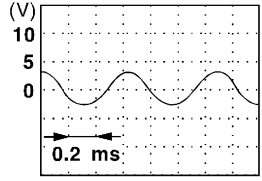
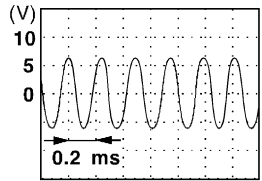
ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	
20	L/OR	Start signal	[Ignition switch ON]	Approximately 0V	GI
			[Ignition switch START]	9 - 12V	MA
21	G/R	Air conditioner switch	[Engine is running] ● Both A/C switch and blower switch are ON (Compressor operates)*	Approximately 0V	EM
			[Engine is running] ● A/C switch is OFF	BATTERY VOLTAGE (11 - 14V)	LC
22	L/B	Park/neutral position (PNP) switch	[Ignition switch ON] ● Gear position is "N" or "P"	Approximately 0V	EC
			[Ignition switch ON] ● Except the above gear position	Approximately 5V	FE
23	L	Throttle position sensor	[Engine is running] ● Warm-up condition ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump. ● Accelerator pedal fully released	0.15 - 0.85V	CL
			[Ignition switch ON] ● Accelerator pedal fully depressed	3.5 - 4.7V	MT
24	W/L	Ignition switch	[Ignition switch OFF]	0V	AT
			[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)	TF
25	B/Y	ECM ground	[Engine is running] ● Idle speed	Engine ground	PD
26	PU/W	A/T signal No. 1	[Ignition switch ON] [Engine is running] ● Idle speed	6 - 8V	AX
27	P/B	A/T signal No. 2	[Ignition switch ON] [Engine is running] ● Idle speed	6 - 8V	SU
28	BR/W	Throttle position switch (Closed position)	[Engine is running] ● Warm-up condition ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump. ● Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)	BR
			[Ignition switch ON] ● Accelerator pedal depressed	Approximately 0V	ST
29	G/B	Vehicle speed sensor	[Engine is running] ● Lift up the vehicle. ● In 2nd gear position ● Vehicle speed is 40 km/h (25 MPH)	2 - 3V	BT
				 <p style="text-align: right; margin-top: 5px;">SEF996U</p>	HA
32	B/Y	ECM ground	[Engine is running] ● Idle speed	Engine ground (Probe this terminal with (-) tester probe when measuring)	SC

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33E

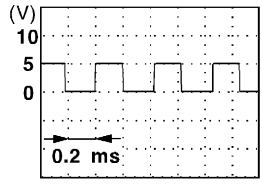
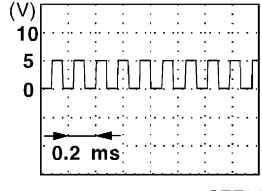
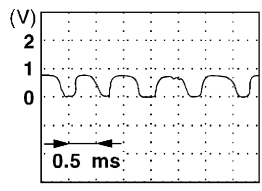
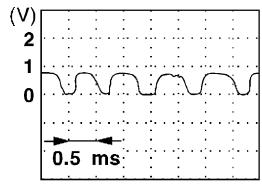
ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	G/R	A/T signal No. 3	[Ignition switch ON]	0V
39	GY/R	Power steering oil pressure switch	[Engine is running] ● Steering wheel is being turned	Approximately 0V
			[Engine is running] ● Steering wheel is not being turned	Approximately 5V
42	B/W	Sensors' power supply	[Ignition switch ON]	Approximately 5V
43	BR	Sensors' ground	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
44	PU	Camshaft position sensor (Reference signal)	[Engine is running] ● Idle speed	0.3 - 0.5V 
			[Engine is running] ● Engine speed is 2,000 rpm	0.3 - 0.5V 
46	OR/B	Fuel level sensor	[Ignition switch ON]	Approximately 0 - 4.8V Output voltage varies with fuel level.
47	L	Crankshaft position sensor (OBD)	[Engine is running] ● Warm-up condition ● Idle speed	1 - 2V (AC range) 
			[Engine is running] ● Engine speed is 2,000 rpm	3 - 4V (AC range) 

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33E

ECM Terminals and Reference Value (Cont'd)

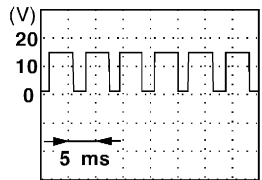
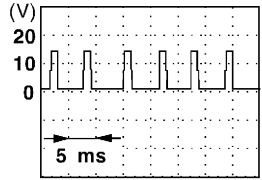
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	LG	Camshaft position sensor (Position signal)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>Approximately 2.5V</p> 
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	<p>Approximately 2.5V</p> 
50	B	Heated oxygen sensor 1 (bank 1)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	<p>0 - Approximately 1.0V</p> 
51	G	Heated oxygen sensor 1 (bank 2)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	<p>0 - Approximately 1.0V</p> 
54	R	Mass air flow sensor	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>1.0 - 1.7V</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,500 rpm 	<p>1.7 - 2.3V</p>
55	G	Mass air flow sensor ground	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>Approximately 0V</p>
56	OR	Heated oxygen sensor 2 (bank 1)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	<p>0 - Approximately 1.0V</p>
57	Y	Heated oxygen sensor 2 (bank 2)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	<p>0 - Approximately 1.0V</p>
59	LG/R	Engine coolant temperature sensor	<p>[Engine is running]</p>	<p>Approximately 0 - 4.8V</p> <p>Output voltage varies with engine coolant temperature</p>

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33E

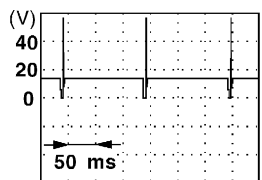
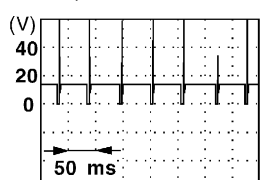
ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
60	Y/B	Fuel tank temperature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with fuel temperature
61	PU/R	Intake air temperature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
62	Y	EVAP control system pressure sensor	[Ignition switch ON]	Approximately 1.8 - 4.8V
64	W	Knock sensor	[Engine is running] ● Idle speed	Approximately 2.5V
66	B	Fuel level sensor ground	[Engine is running] ● Idle speed	Approximately 0V
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
69	LG/R	Data link connector for GST	[Engine is running] ● Idle speed (GST is disconnected)	6 - 10V
72	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
75	Y/R	Data link connector for CONSULT-II	[Engine is running]	0 - 4V
76	GY/L		● Idle speed (Connect CONSULT-II and turned on.)	3 - 9V
80	SB	Power supply (Back-up)	[Ignition switch OFF]	BATTERY VOLTAGE (11 - 14V)
101	OR/L	IACV-AAC valve	[Engine is running] ● Warm-up condition ● Idle speed	8 - 11V  SEF005V
			[Engine is running] ● Warm-up condition ● Engine speed is 3,000 rpm	7 - 10V  SEF692W

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33E

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102 104 106 109 111 113	W/B W/R W/G W/L W/PU W	Injector No. 1 Injector No. 3 Injector No. 5 Injector No. 2 Injector No. 4 Injector No. 6	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	BATTERY VOLTAGE (11 - 14V)  <p style="text-align: right; margin-top: 5px;">SEF007V</p>
			[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	BATTERY VOLTAGE (11 - 14V)  <p style="text-align: right; margin-top: 5px;">SEF008V</p>
108	R/G	EVAP canister vent control valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
116	B/R	ECM ground	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	Engine ground
117	B/P	Current return	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V)
119	BR/Y	Heated oxygen sensor 1 heater (bank 1)	[Engine is running] <ul style="list-style-type: none"> ● Engine speed is below 3,200 rpm 	Approximately 0.4V
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is above 3,200 rpm 	BATTERY VOLTAGE (11 - 14V)
120	P/B	Vacuum cut valve bypass valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
121	BR	Heated oxygen sensor 1 heater (bank 2)	[Engine is running] <ul style="list-style-type: none"> ● Engine speed is below 3,200 rpm 	Approximately 0.4V
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is above 3,200 rpm 	BATTERY VOLTAGE (11 - 14V)
122	R/B	Heated oxygen sensor 2 heater (bank 1)	[Engine is running] <ul style="list-style-type: none"> ● Engine speed is below 3,200 rpm ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more. 	Approximately 0.4V
			[Ignition switch ON] <ul style="list-style-type: none"> ● Engine stopped [Engine is running] <ul style="list-style-type: none"> ● Engine speed is above 3,200 rpm 	BATTERY VOLTAGE (11 - 14V)
123	R/Y	Heated oxygen sensor 2 heater (bank 2)	[Engine is running] <ul style="list-style-type: none"> ● Engine speed is below 3,200 rpm ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more. 	Approximately 0.4V
			[Ignition switch ON] <ul style="list-style-type: none"> ● Engine stopped [Engine is running] <ul style="list-style-type: none"> ● Engine speed is above 3,200 rpm 	BATTERY VOLTAGE (11 - 14V)

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33E

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
124	B/R	ECM ground	[Engine is running] <ul style="list-style-type: none">● Idle speed	Engine ground

*: Any mode except OFF, ambient air temperature is above 25°C (77°F).

Description

The specification (SP) value indicates the tolerance of the value that is displayed in “DATA MONITOR (SPEC)” mode of CONSULT-II during normal operation of the Engine Control System. When the value in “DATA 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:

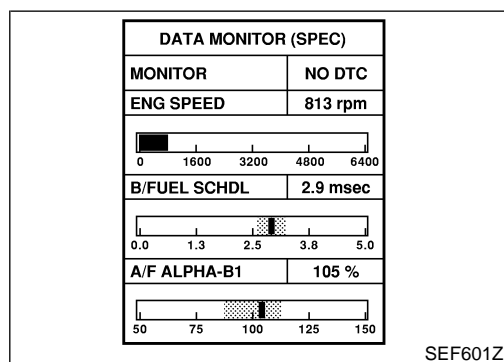
- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1/B2 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Testing Condition

- Vehicle driven distance: More than 5,000 km (3,100 miles)
- Barometric pressure: 101.3 kPa (760.0 mmHg, 29.92 inHg)±3 kPa (22.5 mmHg, 0.89 inHg)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up*1
- Electrical load: Not applied*2
- Engine speed: Idle

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

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



Inspection Procedure

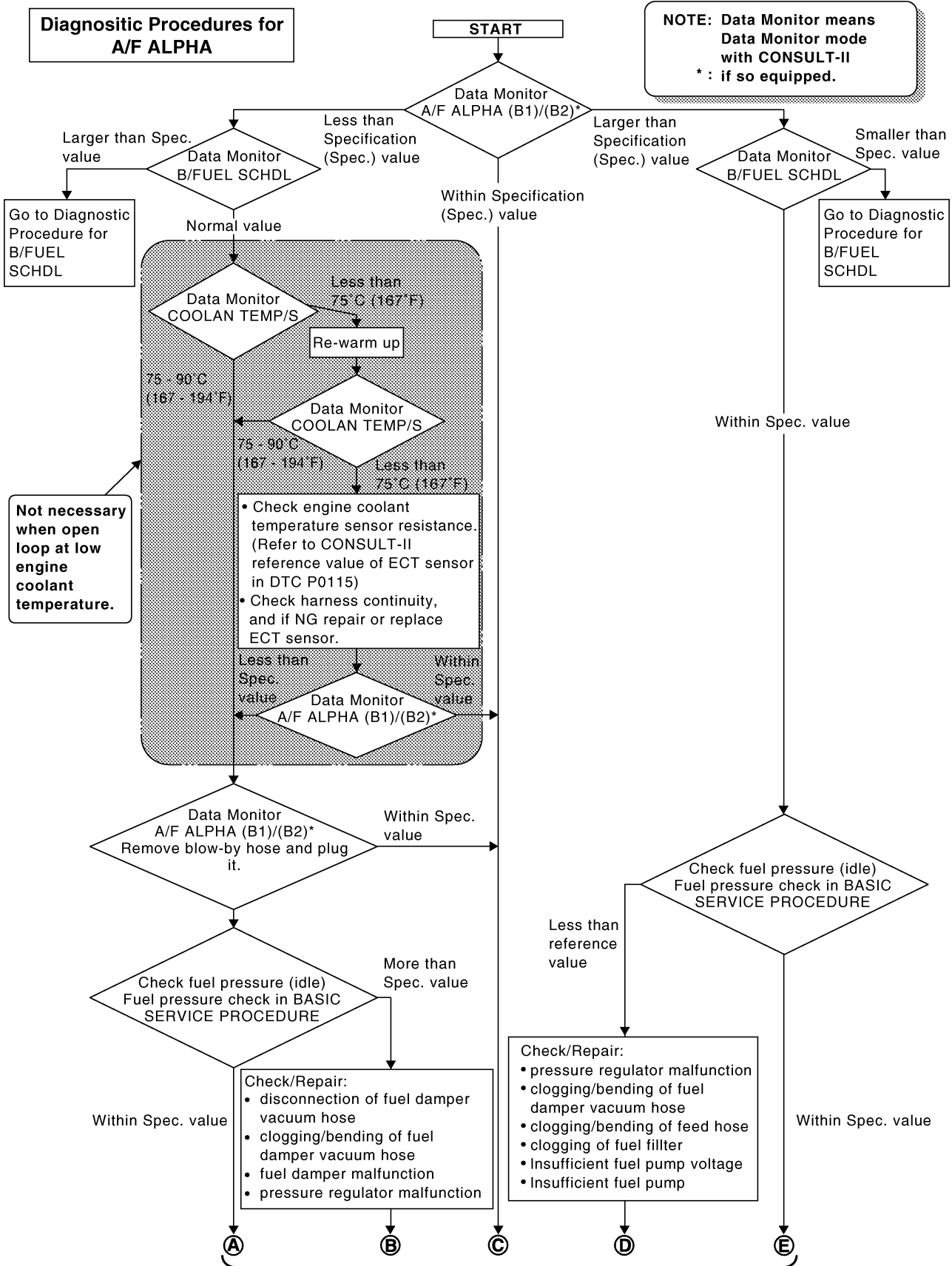
NOTE:

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

1. Perform “Basic Inspection”, EC-701.
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1”, “A/F ALPHA-B2” and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to “Diagnostic Procedure”, EC-736.

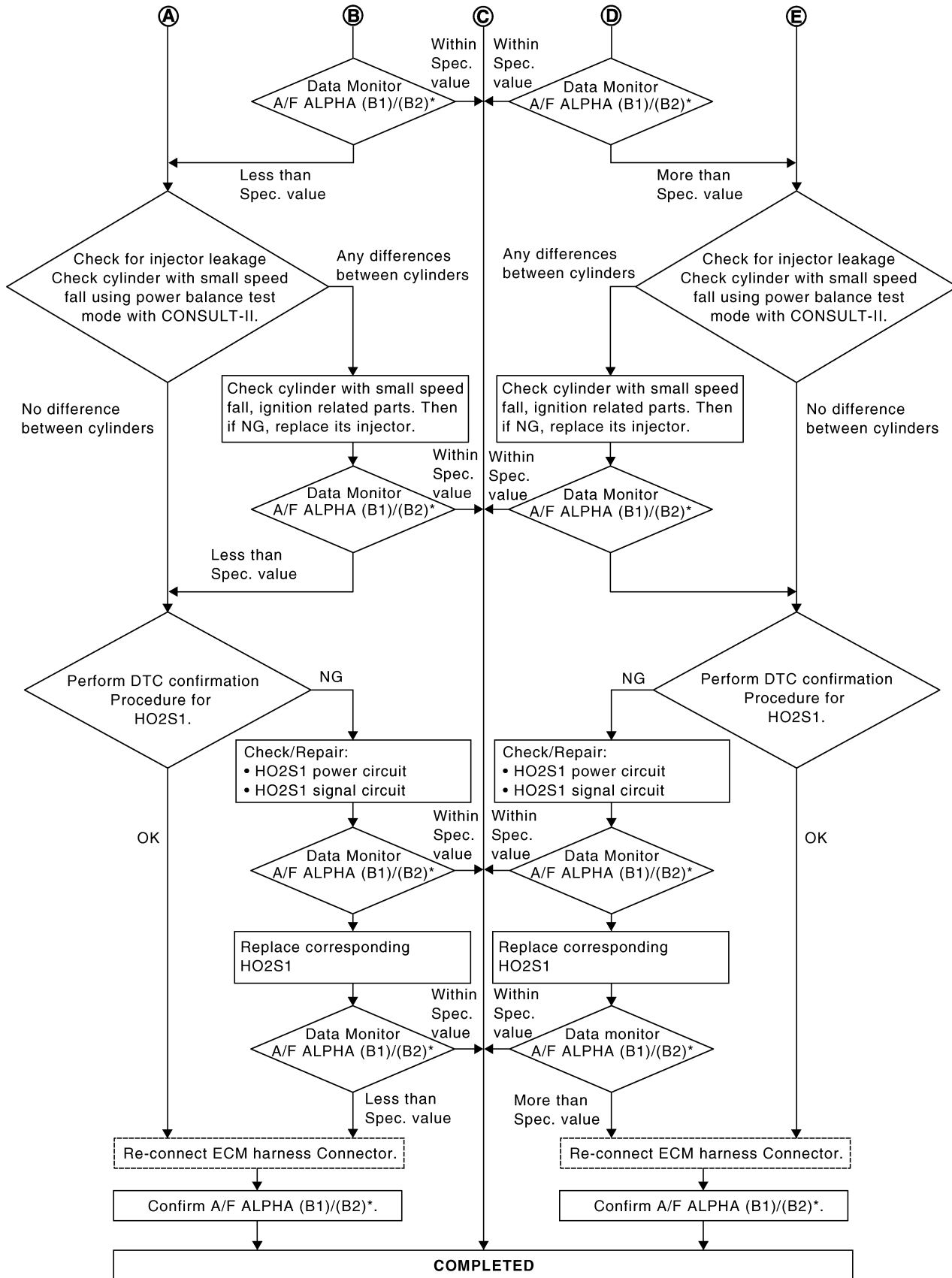
Diagnostic Procedure

NGEC0961



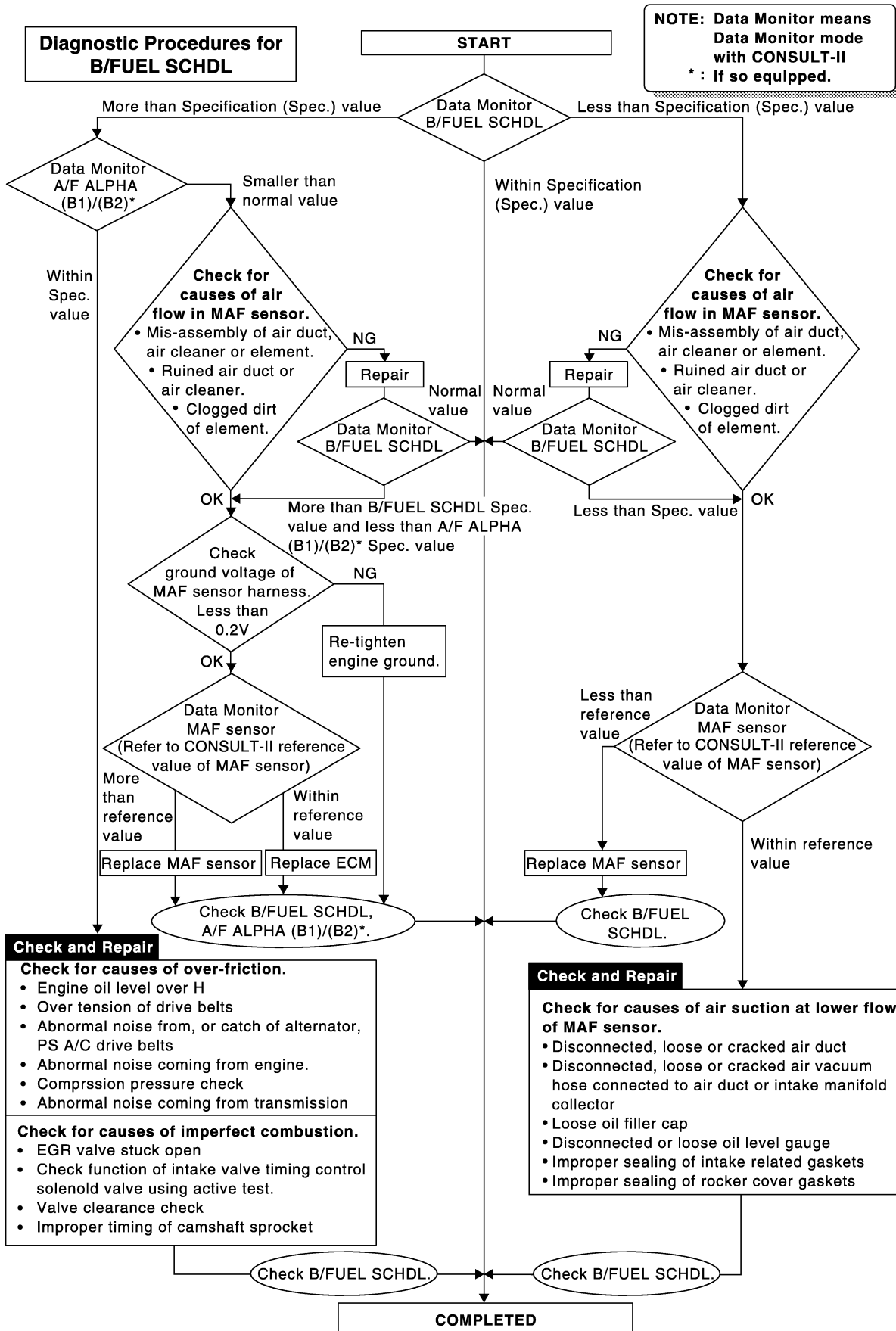
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Description

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

COMMON I/I REPORT SITUATIONS

NGEC0566S01

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

Diagnostic Procedure

NGEC0567

1	INSPECTION START
Erase (1st trip) DTCs. Refer to "HOW TO ERASE EMISSION — RELATED INFORMATION", EC-673.	
	▶ GO TO 2.
2	CHECK GROUND TERMINALS
Check ground terminals for corroding or loose connection. Refer to "Circuit Inspection", "GROUND INSPECTION", GI-28 .	
OK or NG	
OK	▶ GO TO 3.
NG	▶ Repair or replace.
3	SEARCH FOR ELECTRICAL INCIDENT
Perform "Incident Simulation Tests", GI-23 .	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Repair or replace.
4	CHECK CONNECTOR TERMINALS
Refer to "How to Check Enlarged Contact Spring of Terminal", GI-20 .	
OK or NG	
OK	▶ INSPECTION END
NG	▶ Repair or replace connector.

TROUBLE DIAGNOSIS FOR POWER SUPPLY

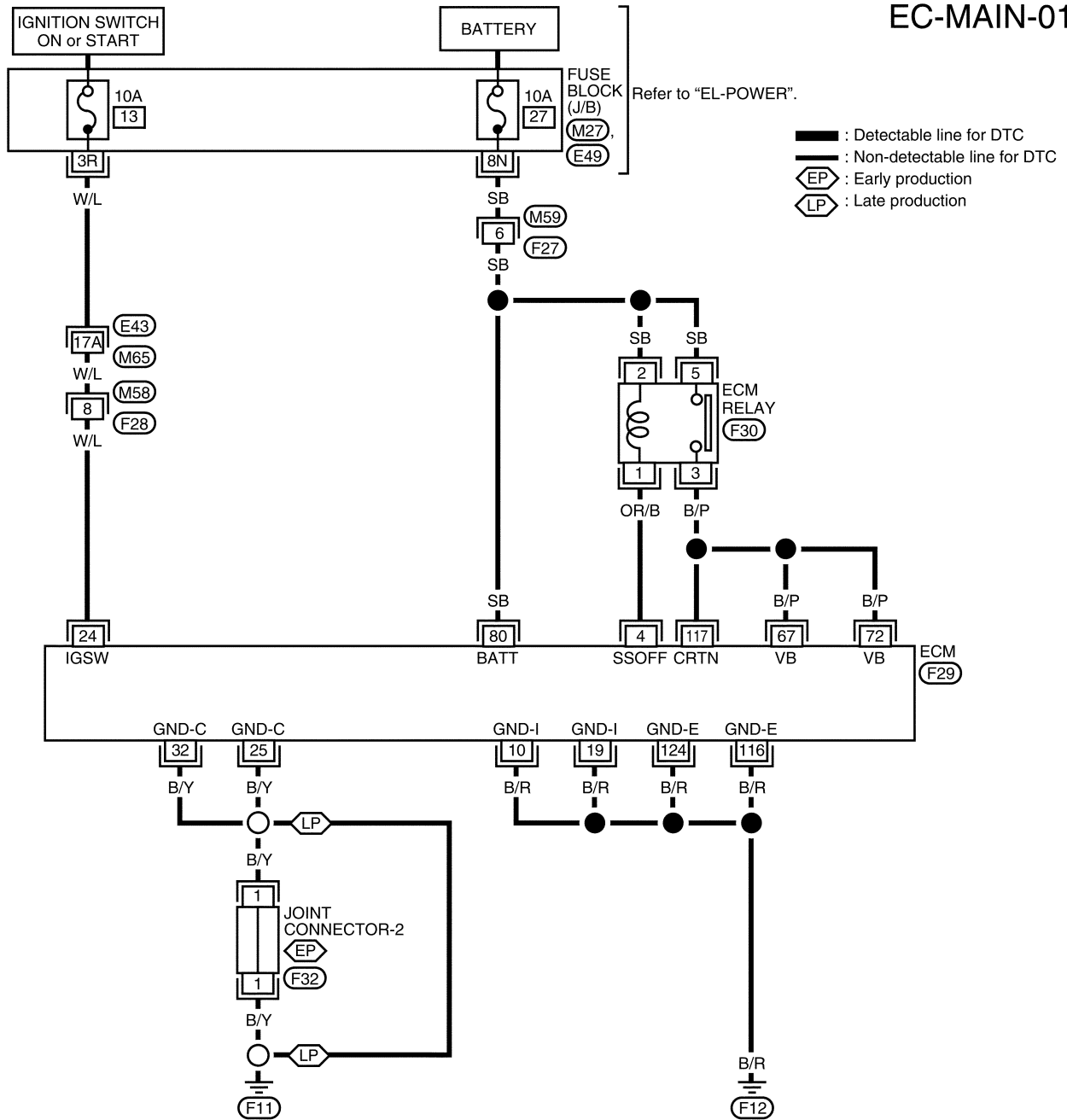
VG33E

Main Power Supply and Ground Circuit

Main Power Supply and Ground Circuit WIRING DIAGRAM

NGECO568

EC-MAIN-01



- : Detectable line for DTC
- : Non-detectable line for DTC
- : Early production
- : Late production

1N	2N	3N	4N	M27	1R	2R	3R	4R	5R	E49		
5N	6N	7N	8N	W	6R	7R	8R	9R	10R	11R	12R	W

1	2	3	4	5	6	7	8	M58				
9	10	11	12	13	14	15	16	17	18	19	20	W

Refer to the following.
 - SUPER MULTIPLE JUNCTION (SMJ)

1	2	3	4	5	6	7	8	9	10	M59
11	12	13	14	15	16	17	18	W		

3	1	5
2	X	L

1	1	1	1	1	1	F32
GY						

101	102	103	104	105	106	107	108	1	2	3	4	20	21	22	23	24	25	44	45	46	47	64	65	66	67																																												
109	110	111	112	113	114	115	116	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	68	69	70	71	72	73	74	75	76	77	78	79	80

TROUBLE DIAGNOSIS FOR POWER SUPPLY

VG33E

Main Power Supply and Ground Circuit (Cont'd)

ECM TERMINALS AND REFERENCE VALUE

NGEC0569

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 the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self-shutoff)	[Engine is running] [Ignition switch OFF] ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch OFF] ● A few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
10	B/R	ECM ground	[Engine is running] ● Idle speed	Engine ground
19	B/R	ECM ground	[Engine is running] ● Idle speed	Engine ground
24	W/L	Ignition switch	[Ignition switch OFF]	0V
			[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
25	B/Y	ECM ground	[Engine is running] ● Idle speed	Engine ground
32	B/Y	ECM ground	[Engine is running] ● Idle speed	Engine ground (Probe this terminal with (-) tester probe when measuring)
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
72	B/P			
80	SB	Power supply (Back-up)	[Ignition switch OFF]	BATTERY VOLTAGE (11 - 14V)
116	B/R	ECM ground	[Engine is running] ● Idle speed	Engine ground
117	B/P	Current return	[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)
124	B/R	ECM ground	[Engine is running] ● Idle speed	Engine ground

DIAGNOSTIC PROCEDURE

NGEC0570

1	INSPECTION START		
Start engine.			
Is engine running?			
Yes or No			
Yes	▶	GO TO 6.	
No	▶	GO TO 2.	

TROUBLE DIAGNOSIS FOR POWER SUPPLY

VG33E

Main Power Supply and Ground Circuit (Cont'd)

2	CHECK ECM POWER SUPPLY CIRCUIT-I
<p>1. Turn ignition switch OFF and then ON. 2. Check voltage between ECM terminal 24 and ground with CONSULT-II or tester.</p>	
SEF674U	
OK or NG	
OK	▶ GO TO 4.
NG	▶ GO TO 3.

3	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M58, F28 ● Fuse block (J/B) connector E49 ● 10A fuse ● Harness for open or short between ECM and fuse 	
▶	Repair harness or connectors.

4	CHECK ECM GROUND CIRCUIT-I FOR OPEN AND SHORT
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminals 10, 19, 25, 32, 116, 124 and engine ground. Refer to WIRING DIAGRAM. Continuity should exist. 4. Also check harness for short to power.</p>	
OK or NG	
OK	▶ GO TO 15.
NG	▶ GO TO 5.

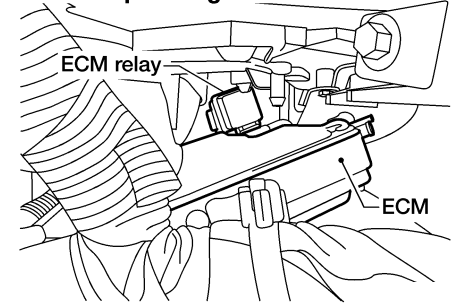
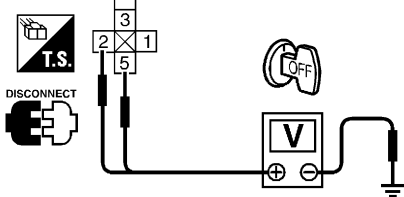
5	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Joint connector-2 (if equipped) ● Harness for open between ECM and engine ground 	
▶	Repair open circuit or short to power in harness or connectors.

6	CHECK ECM POWER SUPPLY CIRCUIT-II		
<p>1. Stop engine. 2. Check voltage between ECM terminal 80 and ground with CONSULT-II or tester.</p>			
<p>Voltage: Battery voltage</p> <p style="text-align: right;">SEF678U</p> <p style="text-align: center;">OK or NG</p>			
OK	▶	GO TO 8.	
NG	▶	GO TO 7.	

7	DETECT MALFUNCTIONING PART		
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M59, F27 ● Fuse block (J/B) connector M27 ● 10A fuse ● Harness for open or short between ECM and fuse 			
▶		Repair harness or connectors.	

8	CHECK ECM POWER SUPPLY CIRCUIT-III		
<p>1. Turn ignition switch ON and then OFF. 2. Check voltage between ECM terminals 67, 72, 117 and ground with CONSULT-II or tester.</p>			
<p>Voltage: After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop to approximately 0V.</p> <p style="text-align: right;">SEF679U</p> <p style="text-align: center;">OK or NG</p>			
OK	▶	GO TO 14.	
NG (Battery voltage does not exist.)	▶	GO TO 9.	
NG (Battery voltage exists for more than a few seconds.)	▶	GO TO 13.	

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9	CHECK ECM POWER SUPPLY CIRCUIT-IV
<p>1. Disconnect ECM relay.</p> <div style="text-align: center;"> <p>View from passenger side</p>  </div>	
<p>2. Check voltage between terminals 2, 5 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="color: blue; margin-left: 20px;">Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 11.
NG	▶ GO TO 10.

AEC927A

SEF625W

10	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness for open or short between ECM relay and harness connector F27 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

11	CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
<p>1. Disconnect ECM harness connector.</p> <p>2. Check harness continuity between ECM terminal 4 and ECM relay terminal 1. Refer to WIRING DIAGRAM. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 12.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.

12	CHECK HARNESS CONTINUITY BETWEEN ECM RELAY AND ECM FOR OPEN AND SHORT
<p>1. Check harness continuity between ECM terminals 67, 72, 117 and ECM relay terminal 3. Refer to WIRING DIAGRAM. Continuity should exist.</p> <p>2. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 13.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.

TROUBLE DIAGNOSIS FOR POWER SUPPLY

VG33E

Main Power Supply and Ground Circuit (Cont'd)

13	CHECK ECM RELAY	
<ol style="list-style-type: none"> Apply 12V direct current between relay terminals 1 and 2. Check continuity between relay terminals 3 and 5. 		
<p>12V (1 - 2) applied: Continuity exists. No voltage applied: No continuity</p> <p style="text-align: right;">SEF039W</p>		
OK or NG		
OK	▶	GO TO 14.
NG	▶	Replace ECM relay.

14	CHECK ECM GROUND CIRCUIT-II FOR OPEN AND SHORT	
<ol style="list-style-type: none"> Turn ignition switch OFF. Disconnect ECM harness connector. Check harness continuity between ECM terminals 10, 19, 25, 32, 116, 124 and engine ground. Refer to WIRING DIAGRAM. Continuity should exist. Also check harness for short to power. 		
OK or NG		
OK	▶	GO TO 15.
NG	▶	GO TO 5.

15	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.		
▶		INSPECTION END

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Description

Description

NGEC0644

SYSTEM DESCRIPTION

NGEC0644S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heaters

The ECM performs ON/OFF control of the heated oxygen sensor 1 heaters corresponding to the engine speed.

OPERATION

NGEC0644S02

Engine speed rpm	Heated oxygen sensor 1 heaters
Above 3,200	OFF
Below 3,200	ON

CONSULT-II Reference Value in Data Monitor Mode

NGEC0645

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1) HO2S1 HTR (B2)	● Engine speed: Below 3,200 rpm	ON
	● Engine speed: Above 3,200 rpm	OFF

ECM Terminals and Reference Value

NGEC0646

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
119	BR/Y	Heated oxygen sensor 1 heater (bank 1)	[Engine is running] ● Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is below 3,200 rpm	Approximately 0.4V
121	BR	Heated oxygen sensor 1 heater (bank 2)	[Engine is running] ● Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is below 3,200 rpm	Approximately 0.4V

On Board Diagnosis Logic

NGEC0647

Malfunction is detected when the current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range. [An excessively low (P0031) (B1)/(P0051) (B2) or high (P0032) (B1)/(P0052) (B2) voltage signal is sent to ECM through the heated oxygen sensor 1 heater.]

POSSIBLE CAUSE

NGEC0647S01

- Harness or connectors [The heated oxygen sensor 1 heater circuit is open or shorted.]
- Heated oxygen sensor 1 heater

2	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NGEC0648

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 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 run it for at least 6 seconds at idle speed.
- 3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-750.

Ⓜ With GST

- 1) Start engine and run it for at least 6 seconds at idle speed.
- 2) Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
- 3) Start engine and run it for at 6 seconds at idle speed.
- 4) Select "MODE 3" with GST.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-750.

- **When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

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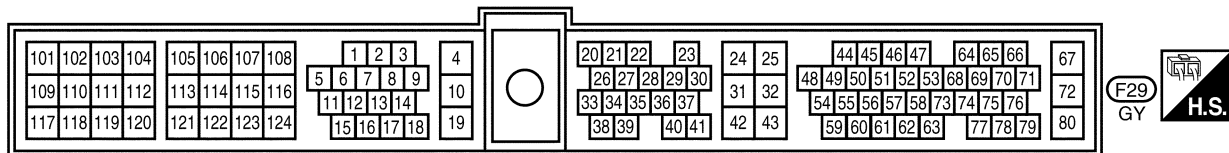
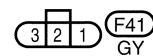
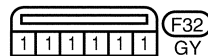
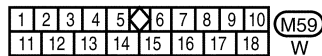
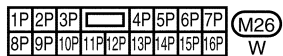
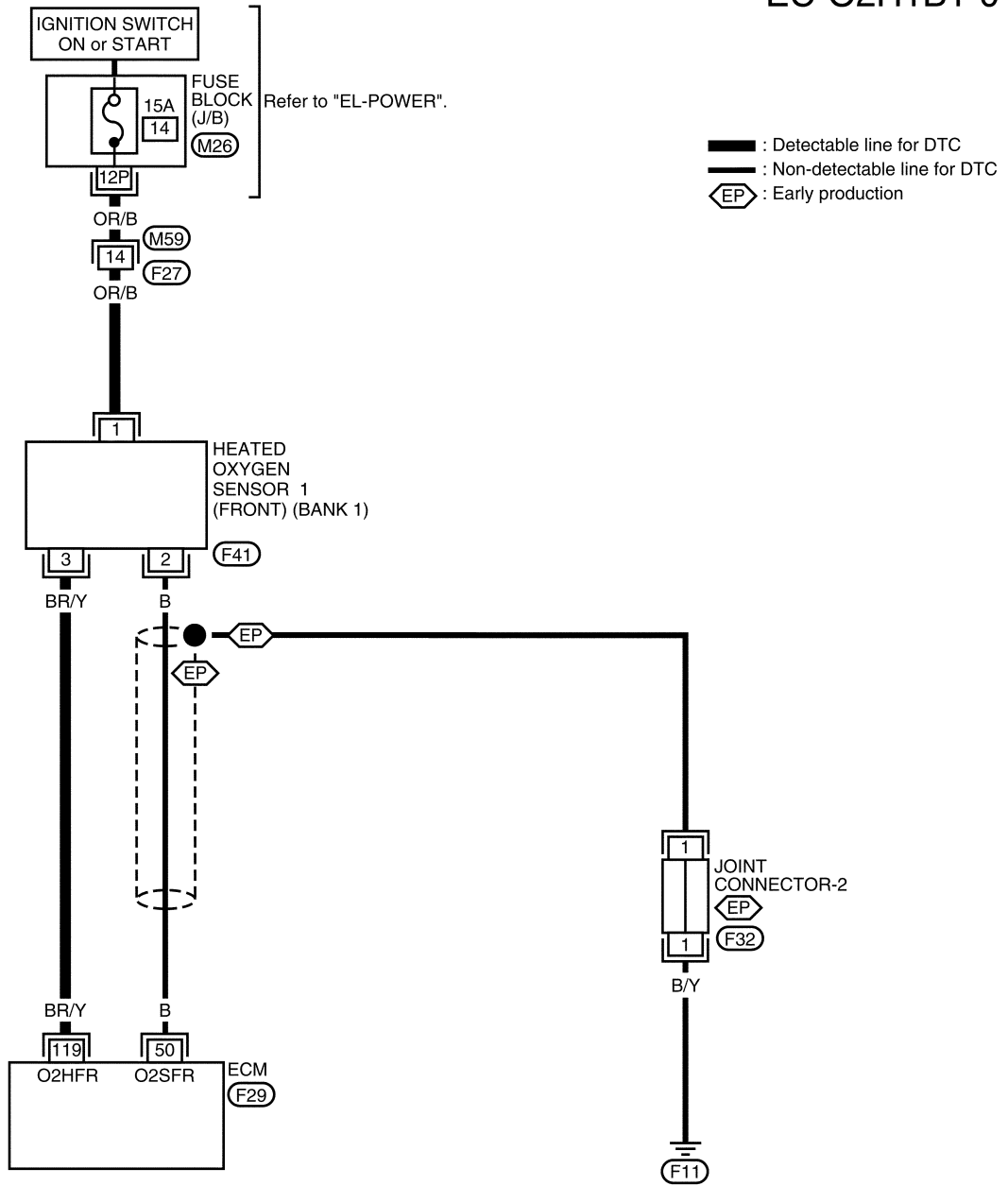
Wiring Diagram

NGEC0649

NGEC0649S01

RIGHT BANK

EC-O2H1B1-01



DTC P0031, P0032, P0051, P0052 HO2S1 HEATER

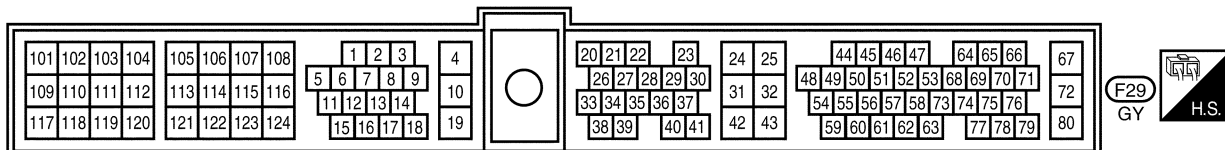
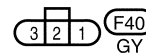
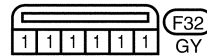
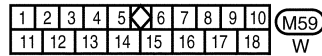
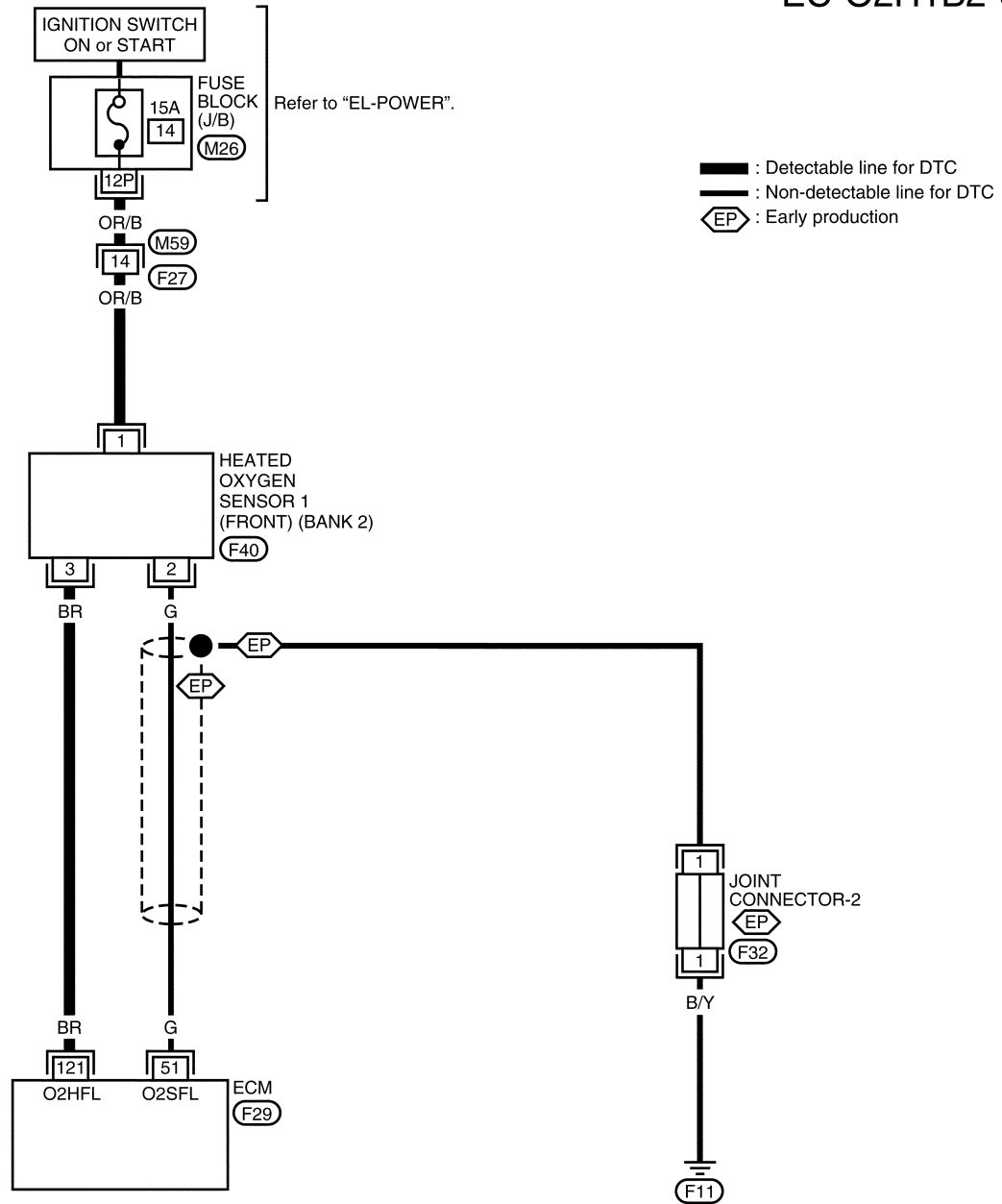
VG33E

Wiring Diagram (Cont'd)

LEFT BANK

NGEC0649S02

EC-O2H1B2-01

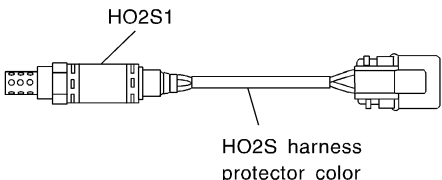
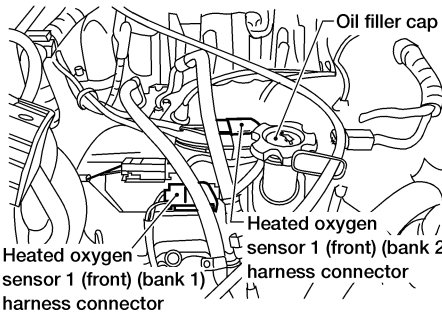
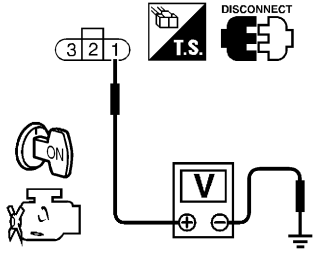


WEC165A

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Diagnostic Procedure

NGEC0650

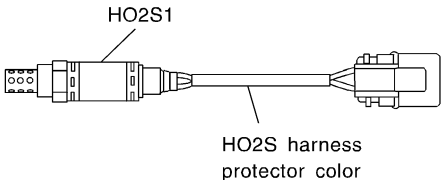
1	CHECK HO2S1 POWER SUPPLY CIRCUIT	<p>1. Turn ignition switch OFF. 2. Check heated oxygen sensor 1 harness protector.</p> <div style="text-align: center;">  <p>HO2S1 HO2S harness protector color</p> </div> <p style="text-align: center;">HO2S1 (bank 1): Black HO2S1 (bank 2): Blue</p> <p>3. Disconnect corresponding heated oxygen sensor 1 harness connector.</p> <div style="text-align: center;">  <p>Oil filler cap Heated oxygen sensor 1 (front) (bank 2) harness connector Heated oxygen sensor 1 (front) (bank 1) harness connector</p> </div> <p>4. Turn ignition switch ON. 5. Check voltage between HO2S1 terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p>DISCONNECT T.S. ON V +</p> </div> <p style="text-align: center;">Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	<p>SEF505YB</p> <p>WEC545</p> <p>SEF633W</p>
	OK	▶ GO TO 3.	
	NG	▶ GO TO 2.	

2	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M59, F27 ● Fuse block (J/B) connector M26 ● 10A fuse ● Harness for open or short between heated oxygen sensor 1 and fuse 	
		▶ Repair harness or connectors.	

3	CHECK HO2S1 HEATER OUTPUT CIRCUIT FOR OPEN AND SHORT															
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0031, P0032</td> <td>119</td> <td>3</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0051, P0052</td> <td>121</td> <td>3</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM	Sensor	P0031, P0032	119	3	Bank 1 (Right)	P0051, P0052	121	3	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM	Sensor														
P0031, P0032	119	3	Bank 1 (Right)													
P0051, P0052	121	3	Bank 2 (Left)													
SEC658C																
<p style="color: blue;">Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>																
OK	▶	GO TO 4.														
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.														

4	CHECK HEATED OXYGEN SENSOR 1 HEATER	
<p>Check resistance between HO2S1 terminals 3 and 1.</p>		
AEC158A		
<p style="color: blue;">Resistance: 2.3 - 4.3Ω at 25°C (77°F)</p> <p>Check continuity between HO2S1 terminals 2 and 1, 3 and 2.</p> <p style="color: blue;">Continuity should not exist.</p> <p style="color: red;">CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

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5	REPLACE HEATED OXYGEN SENSOR 1
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Check heated oxygen sensor 1 harness protector color. 	
	
<p>HO2S1 (bank 1): Black HO2S1 (bank 2): Blue</p>	
SEF505YB	
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 1.

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.	
▶	INSPECTION END

Description

NGEC0683

SYSTEM DESCRIPTION

NGEC0683S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heaters

The ECM performs ON/OFF control of the heated oxygen sensor 2 heaters corresponding to the engine speed.

OPERATION

NGEC0683S02

Engine speed rpm	Heated oxygen sensor 2 heaters
Above 3,200	OFF
Below 3,200	ON

CONSULT-II Reference Value in Data Monitor Mode

NGEC0684

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1) HO2S2 HTR (B2)	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Engine is running above 3,200 rpm. 	OFF
	<ul style="list-style-type: none"> Engine is running below 3,200 rpm after driving for 2 minutes at a speed of 70 km/h (43 MPH) or more. 	ON

ECM Terminals and Reference Value

NGEC0685

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
122	R/B	Heated oxygen sensor 2 heater (bank 1)	[Ignition switch "ON"] <ul style="list-style-type: none"> Engine stopped [Engine is running] <ul style="list-style-type: none"> Engine speed is above 3,200 rpm 	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] <ul style="list-style-type: none"> Engine speed is below 3,200 rpm After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more 	Approximately 0.4V
123	R/Y	Heated oxygen sensor 2 heater (bank 2)	[Ignition switch "ON"] <ul style="list-style-type: none"> Engine stopped [Engine is running] <ul style="list-style-type: none"> Engine speed is above 3,200 rpm 	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] <ul style="list-style-type: none"> Engine speed is below 3,200 rpm After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more 	Approximately 0.4V

On Board Diagnosis Logic

Malfunction is detected when the current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. NGEC0686
 [An excessively low (P0037) (B1)/(P0057) (B2) or high (P0038) (B1)/(P0058) (B2) voltage signal is sent to ECM through the heated oxygen sensor 2 heater.]

POSSIBLE CAUSE

- Harness or connectors
 (The heated oxygen sensor 2 heater circuit is open or shorted.)
- Heated oxygen sensor 2 heater NGEC0686S01

4	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test. NGEC0687

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.
- 3) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 4) Stop vehicle and let engine idle for at least 6 seconds.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-757.

With GST

Follow the procedure "With CONSULT-II".

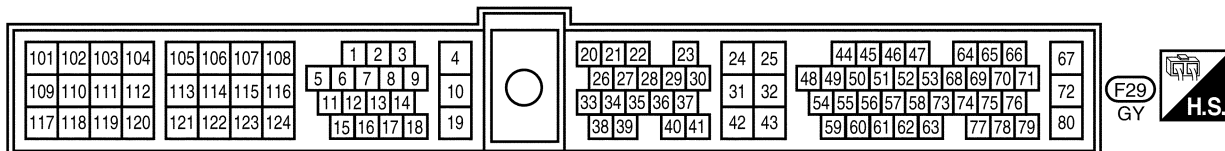
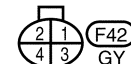
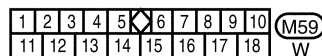
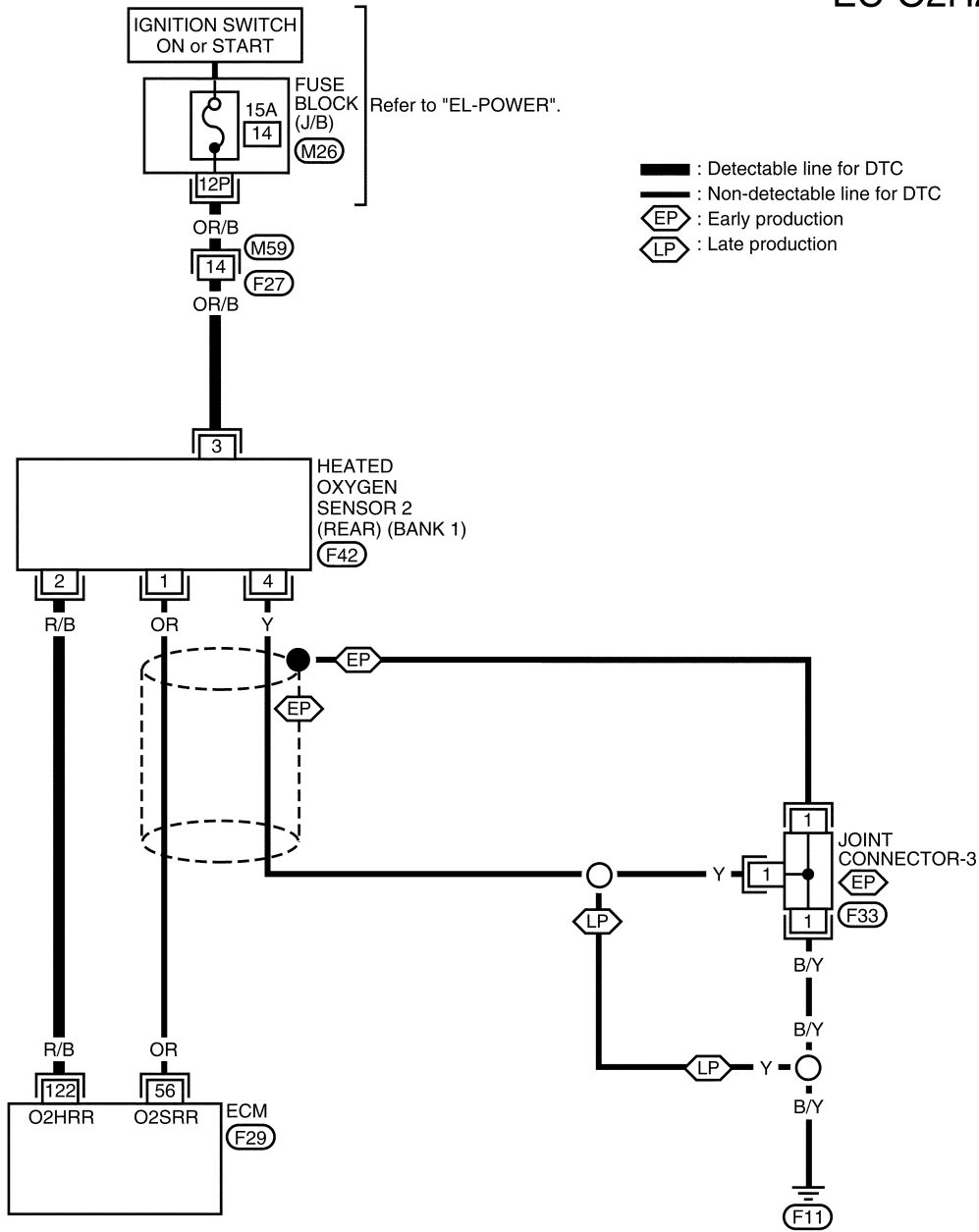
Wiring Diagram

RIGHT BANK

NGEC0688

NGEC0688S01

EC-O2H2B1-01



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DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

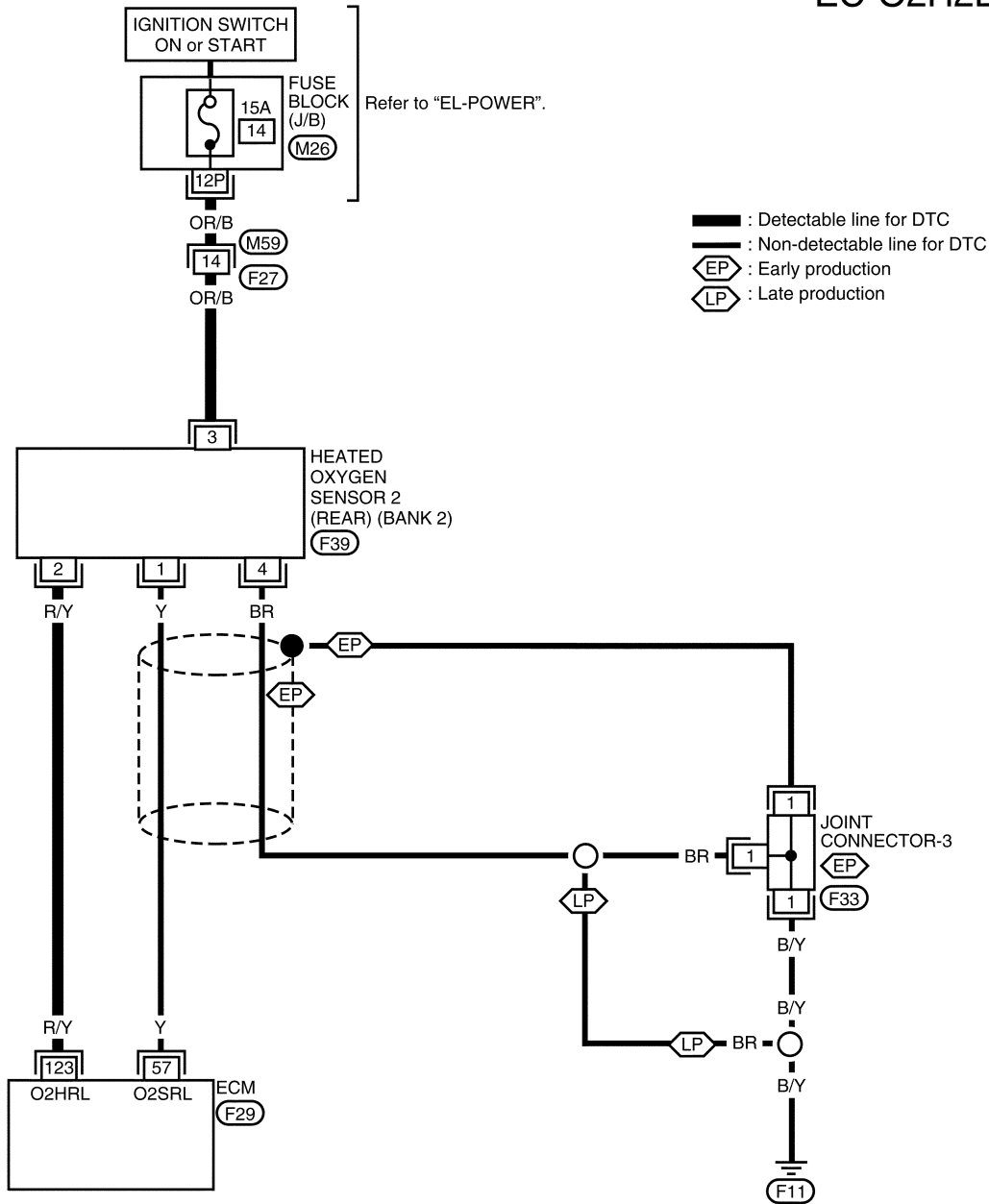
VG33E

Wiring Diagram (Cont'd)

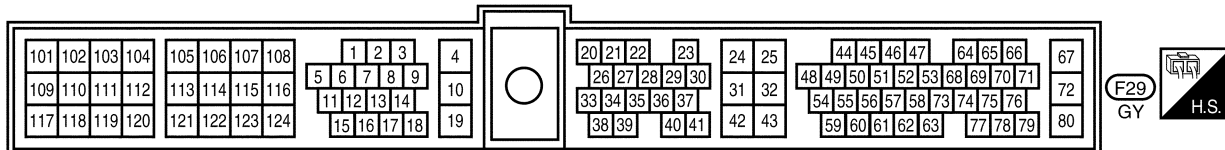
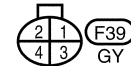
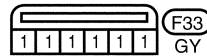
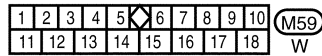
LEFT BANK

NGEC0688S02

EC-O2H2B2-01



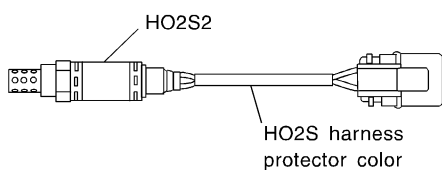
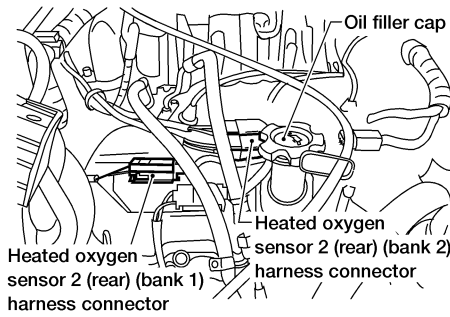
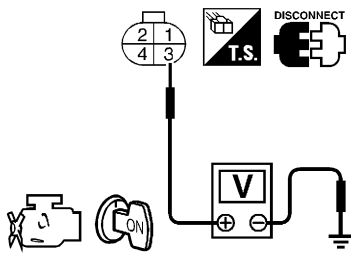
- : Detectable line for DTC
- : Non-detectable line for DTC
- EP : Early production
- LP : Late production



WEC167A

Diagnostic Procedure

NGEC0689

1	CHECK HO2S2 POWER SUPPLY CIRCUIT								
		<p>1. Turn ignition switch "OFF". 2. Check heated oxygen sensor 2 harness protector color.</p> <div style="text-align: center;">  <p>HO2S2 (bank 1): White or Gray HO2S2 (bank 2): Red or Red/Brown</p> </div> <p>3. Disconnect corresponding heated oxygen sensor 2 harness connector.</p> <div style="text-align: center;">  </div> <p>4. Turn ignition switch ON. 5. Check voltage between HO2S2 terminal 3 and ground.</p> <div style="text-align: center;">  <p>Voltage: Battery voltage</p> <p>OK or NG</p> </div>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p>EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p> <p>TF</p> <p>PD</p> <p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p>						
		<table border="1" style="width: 100%;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td style="width: 75%;">GO TO 3.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 2.</td> </tr> </table>	OK	▶	GO TO 3.	NG	▶	GO TO 2.	<p>SEF372ZA</p> <p>WEC546</p> <p>SEF637W</p>
OK	▶	GO TO 3.							
NG	▶	GO TO 2.							
2	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M59, F27 ● Fuse block (J/B) connector M26 ● 10A fuse ● Harness for open or short between heated oxygen sensor 2 and fuse <table border="1" style="width: 100%;"> <tr> <td style="width: 20%;"></td> <td style="width: 5%; text-align: center;">▶</td> <td style="width: 75%;">Repair harness or connectors.</td> </tr> </table>		▶	Repair harness or connectors.	<p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>			
	▶	Repair harness or connectors.							

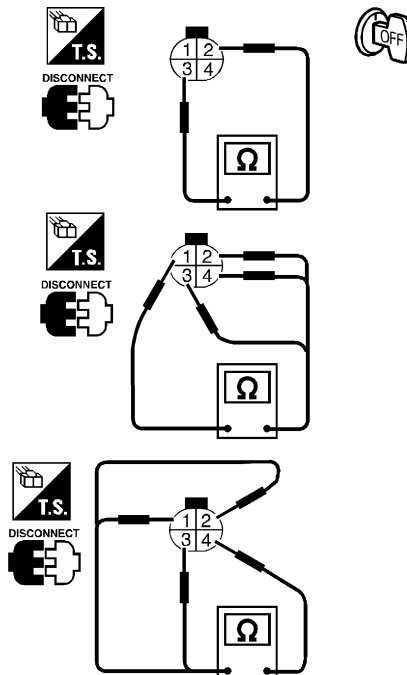
3	CHECK HO2S2 HEATER OUTPUT CIRCUIT FOR OPEN AND SHORT																
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect ECM harness connector.</p> <p>3. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.</p>																	
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0037, P0038</td> <td style="text-align: center;">122</td> <td style="text-align: center;">2</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0057, P0058</td> <td style="text-align: center;">123</td> <td style="text-align: center;">2</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>				DTC	Terminals		Bank	ECM	Sensor	P0037, P0038	122	2	Bank 1 (Right)	P0057, P0058	123	2	Bank 2 (Left)
DTC	Terminals		Bank														
	ECM	Sensor															
P0037, P0038	122	2	Bank 1 (Right)														
P0057, P0058	123	2	Bank 2 (Left)														
SEC665C																	
<p>Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>																	
OK	▶	GO TO 5.															
NG	▶	GO TO 4.															

4	DETECT MALFUNCTIONING PART		
<p>Check the following.</p> <ul style="list-style-type: none"> ● Joint connector-3 (if equipped) ● Harness for open or short between heated oxygen sensor 2 and engine ground. 			
<p>▶ Repair open circuit or short to ground or short to power in harness or connectors.</p>			

5 CHECK HEATED OXYGEN SENSOR 2 HEATER

Check the following.

1. Check resistance between HO2S2 terminals 2 and 3.



Resistance: 2.3 - 4.3Ω at 25°C (77°F)

SEF716W

2. Check continuity.

Terminal No.	Continuity
1 and 2, 3, 4	No
4 and 1, 2, 3	

MTBL0233

CAUTION:

Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

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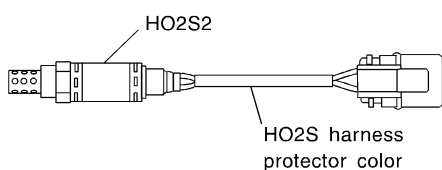
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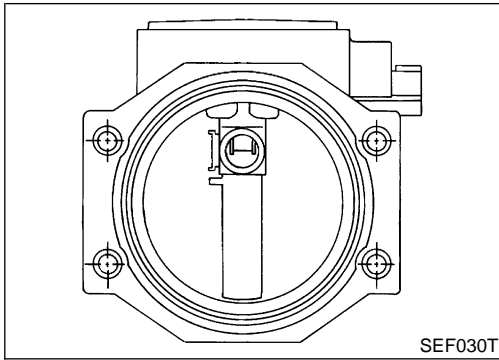
SC

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6	REPLACE HEATED OXYGEN SENSOR 2
<p>Check heated oxygen sensor 2 (rear) harness protector color.</p> <div style="text-align: center;">  </div> <p style="text-align: center;"> HO2S2 (bank 1): White or Gray HO2S2 (bank 2): Red or Red/Brown </p> <p style="text-align: right;">SEF372ZA</p> <p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 2.

7	CHECK INTERMITTENT INCIDENT
<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.</p>	
▶	INSPECTION END



Component Description

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

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS AIR/FL SE	<ul style="list-style-type: none"> Engine: After warming up Air conditioner switch: OFF Shift lever: "N" No-load 	Idle	1.0 - 1.7V
		2,500 rpm	1.7 - 2.3V
CAL/LD VALUE	ditto	Idle	18.5 - 26.0%
		2,500 rpm	18.0 - 21.0%
MASS AIRFLOW	ditto	Idle	3.3 - 4.8 g·m/s
		2,500 rpm	12.0 - 14.9 g·m/s

ECM Terminals and Reference Value

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

CAUTION:

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

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
54	R	Mass air flow sensor	[Engine is running] <ul style="list-style-type: none"> Warm-up condition Idle speed 	1.0 - 1.7V
			[Engine is running] <ul style="list-style-type: none"> Warm-up condition Engine speed is 2,500 rpm 	1.7 - 2.3V
55	G	Mass air flow sensor ground	[Engine is running] <ul style="list-style-type: none"> Warm-up condition Idle speed 	Approximately 0V

On Board Diagnosis Logic

Malfunction is detected when
 (Malfunction A, P0103) an excessively high voltage from the sensor is sent to ECM when engine is not running,
 (Malfunction B, P0102) an excessively low voltage from the sensor is sent to ECM when engine is running,
 (Malfunction C, P0101) a high voltage from the sensor is sent to ECM under light load driving condition,
 (Malfunction D, P0101) a low voltage from the sensor is sent to ECM under heavy load driving condition.

DTC P0101, P0102, P0103 MAF SENSOR

VG33E

On Board Diagnosis Logic (Cont'd)

POSSIBLE CAUSE

Malfunction A or C

NGEC0574S01

NGEC0574S0101

- Harness or connectors
(The sensor circuit is open or shorted.)
- Mass air flow sensor

Malfunction B or D

NGEC0574S0102

- Harness or connectors
(The sensor circuit is open or shorted.)
- Intake air leaks
- Mass air flow sensor

FAIL-SAFE MODE

NGEC0574S02

When the malfunction B 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

NGEC0575

Perform "PROCEDURE FOR MALFUNCTION A" first.

If the 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B".

If there is no problem on "PROCEDURE FOR MALFUNCTION B", perform "PROCEDURE FOR MALFUNCTION C".

If there is no problem on "PROCEDURE FOR MALFUNCTION C", perform "PROCEDURE FOR MALFUNCTION D".

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

NGEC0575S01

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 6 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-766.
If 1st trip DTC is not detected, go to next step.
- 5) Start engine and let it idle for at least 6 seconds.
- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-766.

EC-762

 **With GST**

Follow the procedure "With CONSULT-II".

GI

MA

EM

LC

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B

NGEC0575S02

 **With CONSULT-II**

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait 5 seconds at most.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-766.

EC

FE

CL

 **With GST**

Follow the procedure "With CONSULT-II".

MT

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

PROCEDURE FOR MALFUNCTION C

NGEC0575S03

NOTE:

If engine will not start or stops soon, wait at least 10 seconds with engine stopped (Ignition switch ON) instead of running engine at idle speed.

 **With CONSULT-II**

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and warm it up to normal operating temperature.
- 4) Run engine for at least 10 seconds at idle speed.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-766.

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 **With GST**

Follow the procedure "With CONSULT-II".

BR

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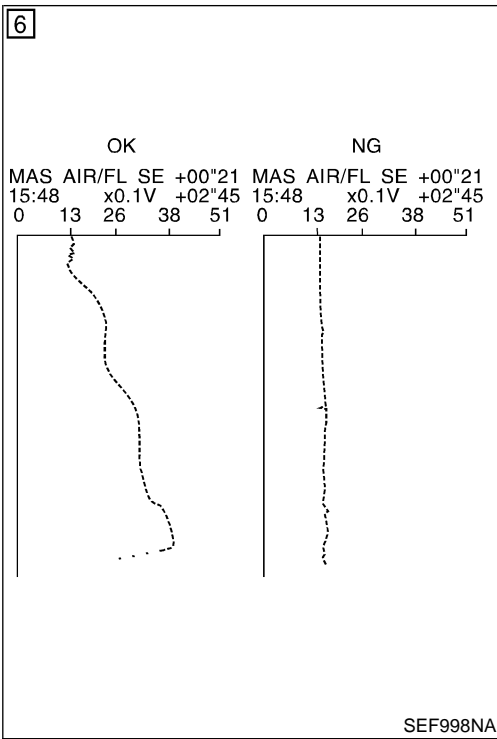
BT

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PROCEDURE FOR MALFUNCTION D

CAUTION:

Always drive vehicle at a safe speed.

Ⓜ With CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Start engine and warm it up to normal operating temperature. **If engine cannot be started, go to "Diagnostic Procedure", EC-766.**
- 3) Select "DATA MONITOR" mode with CONSULT-II.
- 4) Check the voltage of MAS AIR/FL SE with "DATA MONITOR".
- 5) Increases engine speed to about 4,000 rpm.
- 6) Monitor the linear voltage rise in response to engine speed increases.
If NG, go to "Diagnostic Procedure", EC-766.
If OK, go to following step.
- 7) Maintain the following conditions for at least 10 consecutive seconds.

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

- 8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-766.

7

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

SEF175Y

CALC LOAD	20%
COOLANT TEMP	95°C
SHORT FT #1	2%
LONG FT #1	0%
SHORT FT #2	4%
LONG FT #2	0%
ENGINE SPD	2637RPM
VEHICLE SPD	0MPH
IGN ADVANCE	41.0°
INTAKE AIR	41°C
MAF	14.1gm/sec
THROTTLE POS	3%

SEF534P

Overall Function Check

PROCEDURE FOR MALFUNCTION D

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

Ⓜ With GST

- 1) Start engine and warm it up to normal operating temperature.
- 2) Select "MODE 1" with GST.
- 3) Check the mass air flow sensor signal with "MODE 1".
- 4) Check for linear mass air flow sensor signal value rise in response to increases to about 4,000 rpm in engine speed.
- 5) If NG, go to "Diagnostic Procedure", EC-766.

DTC P0101, P0102, P0103 MAF SENSOR

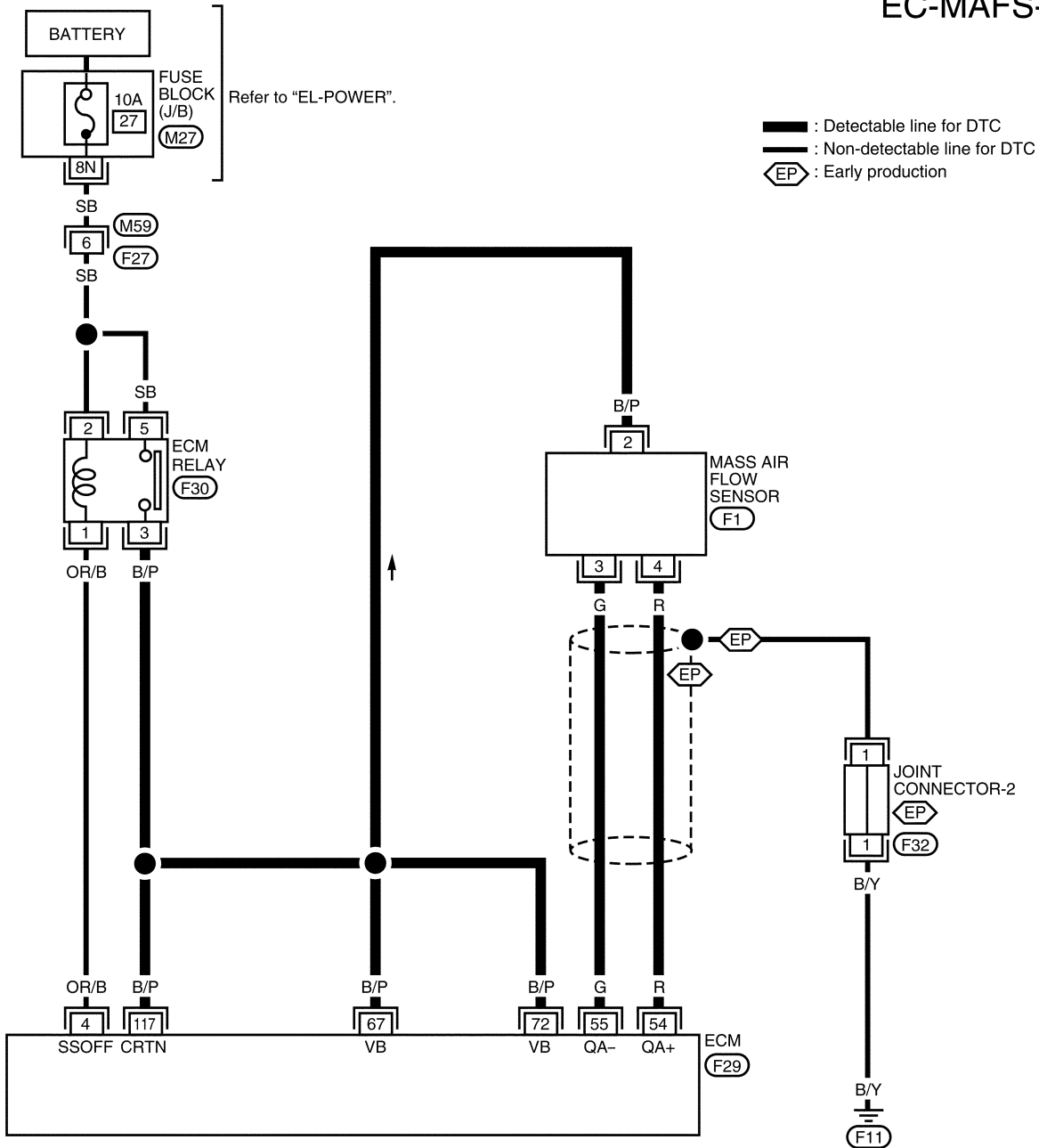
VG33E

Wiring Diagram

Wiring Diagram

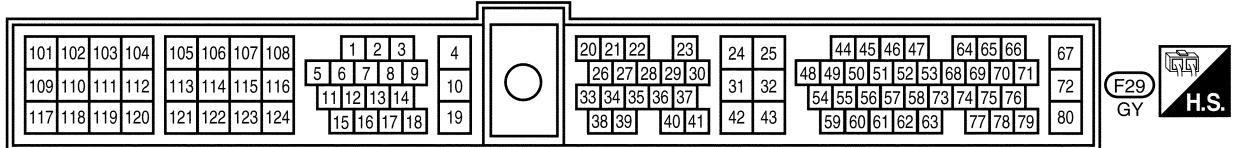
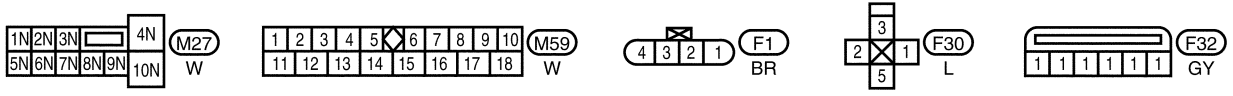
NGEC0577

EC-MAFS-01



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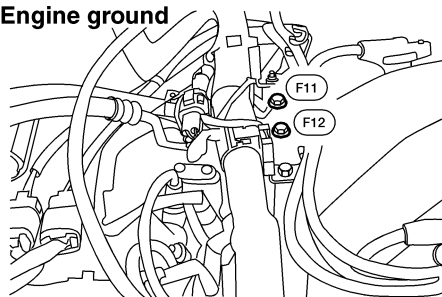
WEC168A

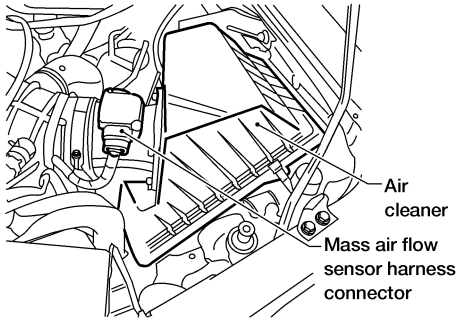
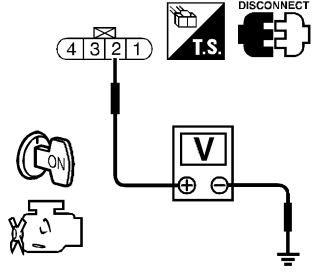
Diagnostic Procedure

NGEC0578

1	INSPECTION START							
Which malfunction (A, B, C or D) is duplicated?								
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">MALFUNCTION</th> <th style="width: 50%;">Type</th> </tr> </thead> <tbody> <tr> <td>A and/or C</td> <td style="text-align: center;">I</td> </tr> <tr> <td>B and/or D</td> <td style="text-align: center;">II</td> </tr> </tbody> </table>			MALFUNCTION	Type	A and/or C	I	B and/or D	II
MALFUNCTION	Type							
A and/or C	I							
B and/or D	II							
MTBL0063								
Type I or Type II								
Type I	▶	GO TO 3.						
Type II	▶	GO TO 2.						

2	CHECK INTAKE SYSTEM	
Check the following for connection.		
<ul style="list-style-type: none"> ● Air duct ● Vacuum hoses ● Intake air passage between air duct to intake manifold collector 		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Reconnect the parts.

3	RETIGHTEN GROUND SCREWS	
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws. 		
<p>Engine ground</p>  <p>The diagram shows a close-up of the engine's ground screw assembly. Two screws are labeled F11 and F12. The assembly includes various hoses, wires, and metal components. The screws are shown being tightened or loosened.</p>		
LEC518		
		▶ GO TO 4.

4	CHECK MAFS POWER SUPPLY CIRCUIT	<p>1. Disconnect mass air flow sensor harness connector.</p> <div style="text-align: center; margin: 10px 0;">  <p style="margin-left: 400px;">Air cleaner</p> <p style="margin-left: 350px;">Mass air flow sensor harness connector</p> </div> <p style="text-align: right; margin-right: 20px;">AEC641A</p> <p>2. Turn ignition switch ON.</p> <p>3. Check voltage between terminal 2 and ground with CONSULT-II or tester.</p> <div style="text-align: center; margin: 10px 0;">  <p style="margin-left: 400px;">DISCONNECT</p> <p style="margin-left: 400px;">I.S.</p> </div> <p style="margin-left: 100px; color: blue;">Voltage: Battery voltage</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>	
	OK	▶	GO TO 6.
	NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness for open or short between ECM relay and mass air flow sensor ● Harness for open or short between mass air flow sensor and ECM <p style="text-align: right; margin-right: 20px;">AX</p> <p style="text-align: center; margin-top: 10px;">▶ Repair harness or connectors.</p> <p style="text-align: right; margin-right: 20px;">SU</p>	
----------	-----------------------------------	---	--

6	CHECK MAFS GROUND CIRCUIT FOR OPEN AND SHORT	<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect ECM harness connector.</p> <p>3. Check harness continuity between MAFS terminal 3 and ECM terminal 55. Refer to Wiring Diagram.</p> <p style="color: blue;">Continuity should exist.</p> <p>4. Also check harness for short to power.</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>	
	OK	▶	GO TO 7.
	NG	▶	Repair open circuit or short to power in harness or connectors.

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DTC P0101, P0102, P0103 MAF SENSOR

VG33E

Diagnostic Procedure (Cont'd)

7	CHECK MAFS INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Check harness continuity between MAFS terminal 4 and ECM terminal 54. Refer to Wiring Diagram. Continuity should exist.</p> <p>2. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
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											
<p>1. Reconnect harness connectors disconnected.</p> <p>2. Start engine and warm it up to normal operating temperature.</p> <p>3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.</p>												
SEF747U												
<table border="1"> <thead> <tr> <th>Condition</th> <th>Voltage V</th> </tr> </thead> <tbody> <tr> <td>Ignition switch "ON" (Engine stopped.)</td> <td>Less than 1.0</td> </tr> <tr> <td>Idle (Engine is warmed-up to normal operating temperature.)</td> <td>1.0 - 1.7</td> </tr> <tr> <td>2,500 rpm (Engine is warmed-up to normal operating temperature.)</td> <td>1.7 - 2.3</td> </tr> <tr> <td>Idle to about 4,000 rpm*</td> <td>1.0 - 1.7 to Approx. 4.0</td> </tr> </tbody> </table>			Condition	Voltage V	Ignition switch "ON" (Engine stopped.)	Less than 1.0	Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.3	Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0
Condition	Voltage V											
Ignition switch "ON" (Engine stopped.)	Less than 1.0											
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7											
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.3											
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0											
<p>*Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.</p>												
LEC102A												
<p>4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Then repeat above check.</p> <p>5. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.</p>												
SEF030T												
OK or NG												
OK	▶	GO TO 9.										
NG	▶	Replace mass air flow sensor.										

DTC P0101, P0102, P0103 MAF SENSOR

VG33E

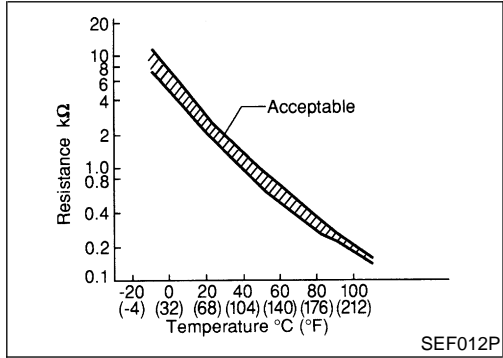
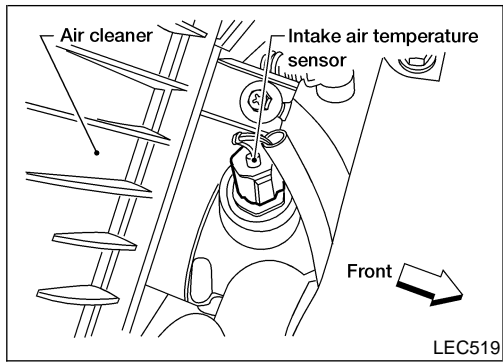
Diagnostic Procedure (Cont'd)

9	CHECK MAFS SHIELD CIRCUIT FOR OPEN AND SHORT (IF EQUIPPED)	
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect joint connector-2.</p> <p>3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground Refer to Wiring Diagram. ● Joint connector (Refer to "HARNESS LAYOUT", <i>EL-250</i>.) Continuity should exist. <p>4. Also check harness for short to power.</p> <p>5. Then reconnect joint connector-2.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 10.
NG	▶	Repair open circuit or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.		
	▶	INSPECTION END

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Component Description



Component Description

NGEC0585

The intake air temperature sensor is mounted to the air duct housing. The sensor detects intake air temperature and transmits a signal to the ECM.

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

<Reference data>

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

*: These data are reference values and are measured between ECM terminal 61 (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 the ECM terminals, such as the ground.

On Board Diagnosis Logic

NGEC0586

Malfunction is detected when (Malfunction A) an excessively low (P0112) or high (P0113) voltage from the sensor is sent to ECM, (Malfunction B, P0127) rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.

POSSIBLE CAUSE

NGEC0586S01

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

DTC Confirmation Procedure

NGEC0587

Perform "PROCEDURE FOR MALFUNCTION A" first. If 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B".

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

NGEC0587S01

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-773.

With GST

Follow the procedure "With CONSULT-II".

5	DATA MONITOR	
	MONITOR	NO DTC
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SE	XXX km/h

SEF176Y

PROCEDURE FOR MALFUNCTION B

NGEC0587S02

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

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

With CONSULT-II

- 1) Wait until engine coolant temperature is less than 90°C (194°F).
- a) Turn ignition switch ON.
- b) Select "DATA MONITOR" mode with CONSULT-II.
- c) Check the engine coolant temperature.
- d) If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch OFF and cool down engine.
 - Perform the following steps before engine coolant temperature is above 90°C (194°F).
- 2) Turn ignition switch ON.
- 3) Select "DATA MONITOR" mode with CONSULT-II.
- 4) Start engine.
- 5) Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds.
- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-773.

With GST

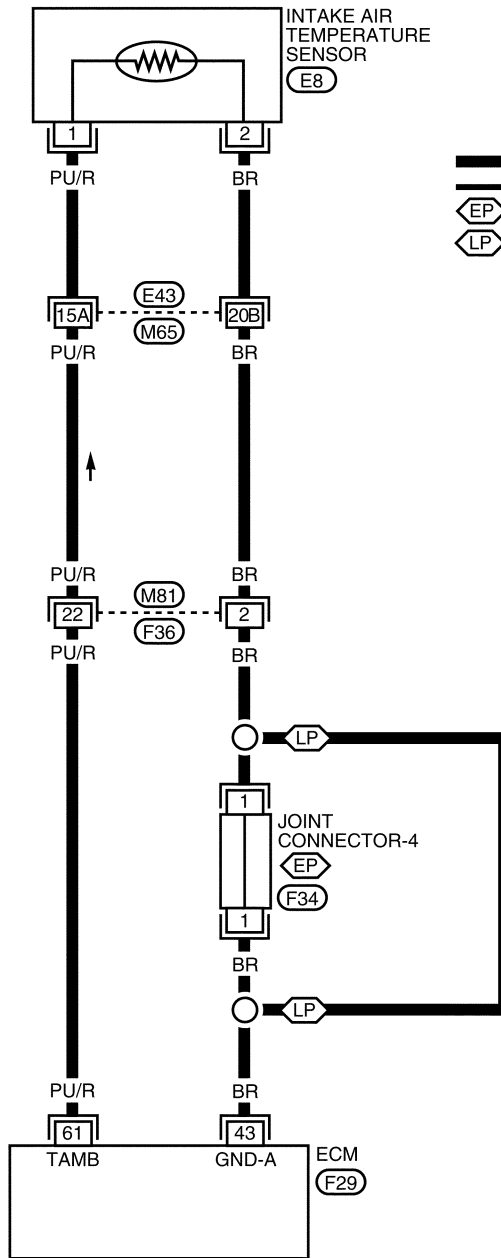
Follow the procedure "With CONSULT-II".

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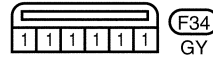
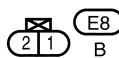
Wiring Diagram

NGEC0588

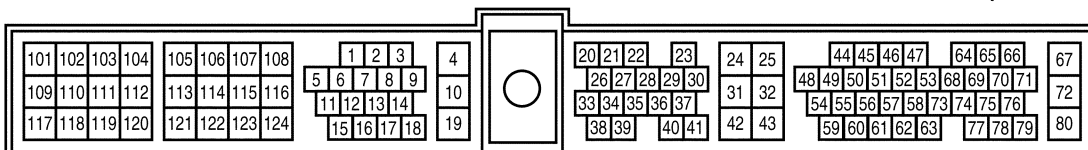
EC-IATS-01



- : Detectable line for DTC
- : Non-detectable line for DTC
- : Early production
- : Late production

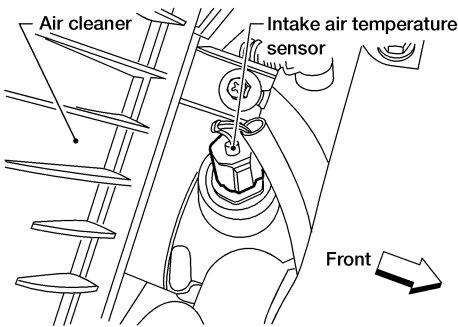
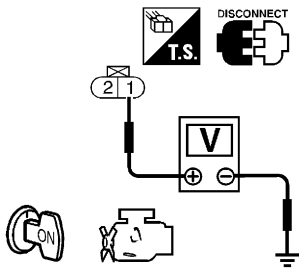


Refer to the following.
 (E43) - SUPER MULTIPLE JUNCTION (SMJ)



Diagnostic Procedure

NGEC0589

1	CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT
<p>1. Turn ignition switch OFF. 2. Disconnect intake air temperature sensor harness connector.</p> <div style="text-align: center;">  </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 1 and ground.</p> <div style="text-align: center;">  </div> <p style="color: blue; font-weight: bold;">Voltage: Approximately 5V</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

LEC519

SEF203W

2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M81, F36 ● Harness for open or short between ECM and intake air temperature sensor 	
▶	Repair harness or connectors.

3	CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch OFF. 2. Check harness continuity between sensor terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

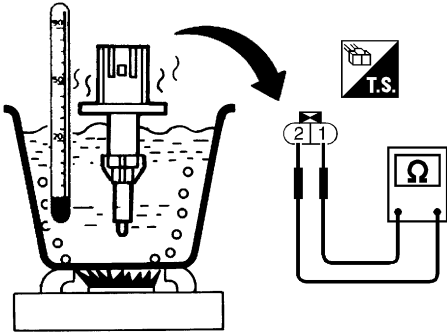
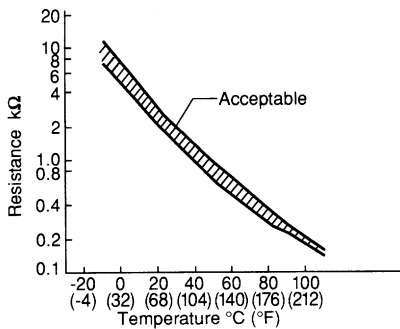
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DTC P0112, P0113, P0127 IAT SENSOR

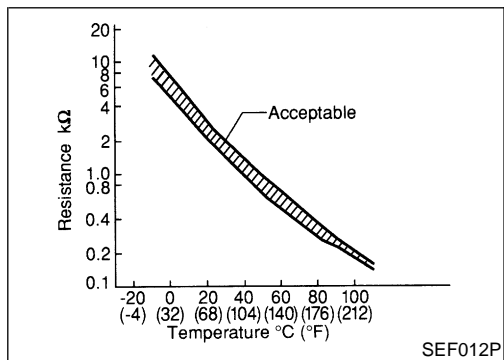
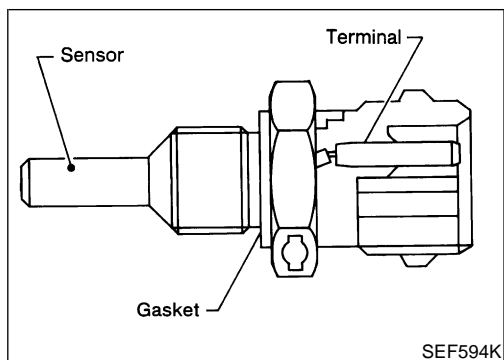
VG33E

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M81, F36 ● Joint connector-4 (if equipped) ● Harness for open or short between ECM and intake air temperature sensor 	
▶	Repair open circuit or short to power in harness or connectors.

5	CHECK INTAKE AIR TEMPERATURE SENSOR						
<p>Check resistance as shown in the figure.</p> <div style="text-align: center;">  </div>							
SEF947Q							
<p><Reference data></p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Intake air temperature °C (°F)</th> <th style="text-align: center;">Resistance kΩ</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">20 (68)</td> <td style="text-align: center;">2.1 - 2.9</td> </tr> <tr> <td style="text-align: center;">80 (176)</td> <td style="text-align: center;">0.27 - 0.38</td> </tr> </tbody> </table>		Intake air temperature °C (°F)	Resistance kΩ	20 (68)	2.1 - 2.9	80 (176)	0.27 - 0.38
Intake air temperature °C (°F)	Resistance kΩ						
20 (68)	2.1 - 2.9						
80 (176)	0.27 - 0.38						
MTBL0228							
<div style="display: flex; justify-content: center; align-items: center;">  </div>							
SEF012P							
OK or NG							
OK	▶ GO TO 6.						
NG	▶ Replace intake air temperature sensor.						

6	CHECK INTERMITTENT INCIDENT
<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.</p>	
▶	INSPECTION END



Component Description

NGEC0590

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.

GI
MA
EM
LC

<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

EC

FE

CL

*: These data are reference values and are measured between ECM terminal 59 (Engine coolant temperature sensor) and ground.

MT

CAUTION:

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

AT

TF

PD

AX

On Board Diagnosis Logic

NGEC0591

Malfunction is detected when an excessively high (P0118) or low (P0117) voltage from the sensor is sent to ECM.

SU

POSSIBLE CAUSE

NGEC0591S01

- Harness or connectors (The sensor circuit is open or shorted.)
- Engine coolant temperature sensor

BR

ST

FAIL-SAFE MODE

NGEC0591S02

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

RS

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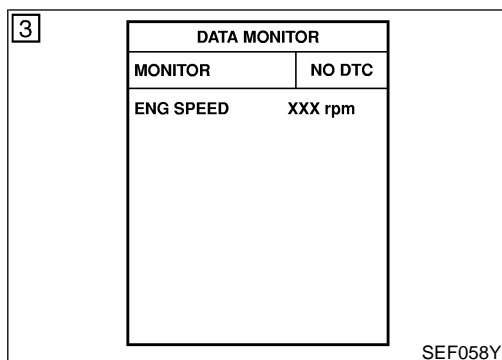
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DTC P0117, P0118 ECT SENSOR

VG33E

On Board Diagnosis Logic (Cont'd)

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)



DTC Confirmation Procedure

NGEC0592

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-778.

With GST

Follow the procedure "With CONSULT-II".

DTC P0117, P0118 ECT SENSOR

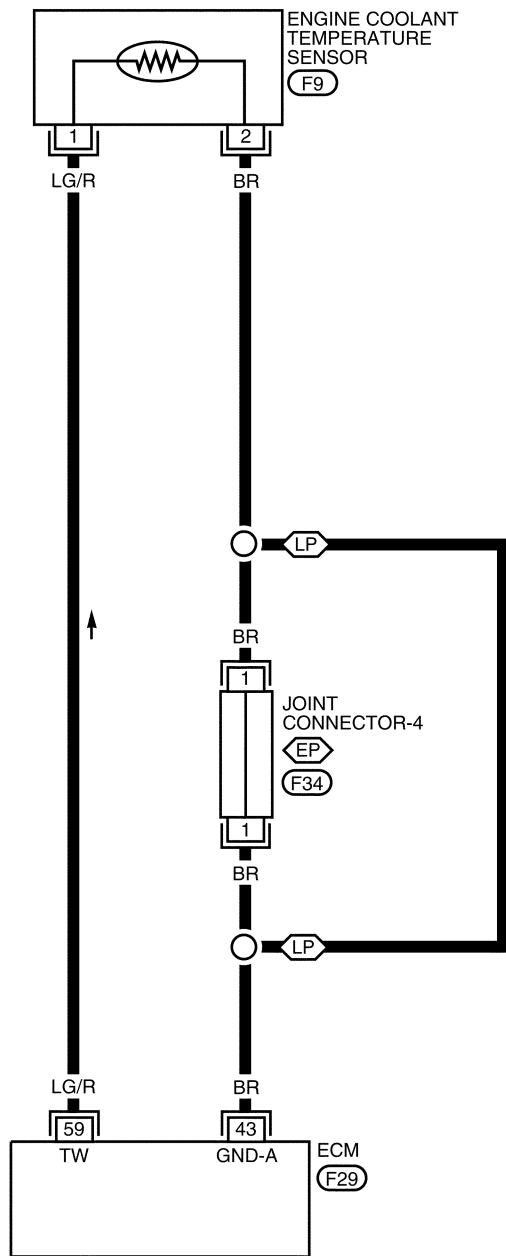
VG33E

Wiring Diagram

Wiring Diagram

NGEC0593

EC-ECTS-01



- : Detectable line for DTC
- : Non-detectable line for DTC
- EP : Early production
- LP : Late production

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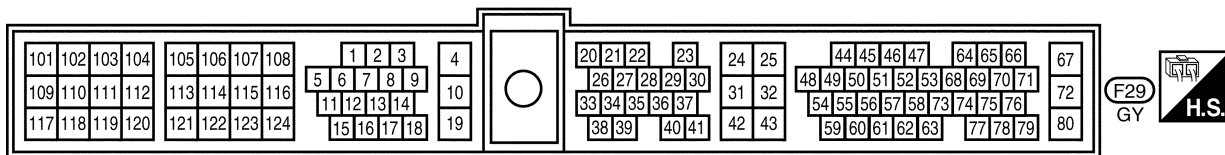
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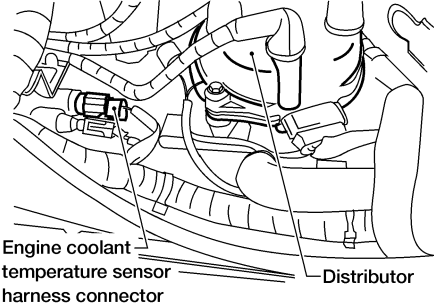
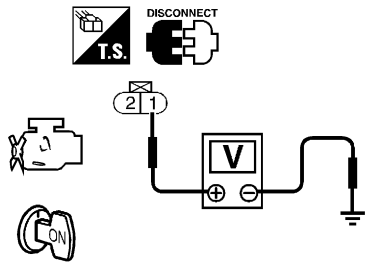
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WEC170A

Diagnostic Procedure

NGE0594

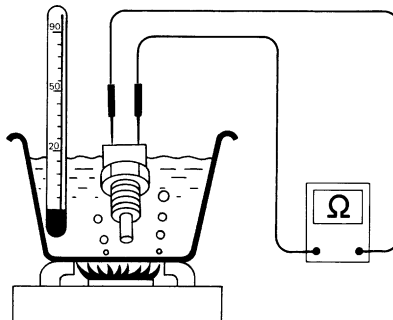
1	CHECK ECTS POWER SUPPLY CIRCUIT
<p>1. Turn ignition switch OFF. 2. Disconnect engine coolant temperature sensor harness connector.</p> <div style="text-align: center;">  <p>Engine coolant temperature sensor harness connector Distributor</p> </div> <p style="text-align: right;">AEC643A</p> <p>3. Turn ignition switch ON. 4. Check voltage between ECTS terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF206W</p> <p style="text-align: center; color: blue;">Voltage: Approximately 5V</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 2.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.

2	CHECK ECTS GROUND CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch OFF. 2. Check harness continuity between ECTS terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 4.
NG	▶ GO TO 3.

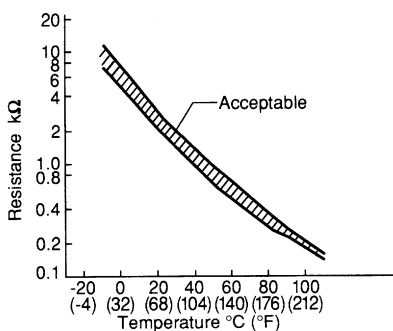
3	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Joint connector-4 (if equipped) ● Harness for open between ECM and engine coolant temperature sensor 	
▶	Repair open circuit or short to power in harness or connectors.

4 CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.


<Reference data>

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


OK or NG

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

5 CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.

 ▶ **INSPECTION END**

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MTBL0229

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Description

NGEC0595

NOTE:

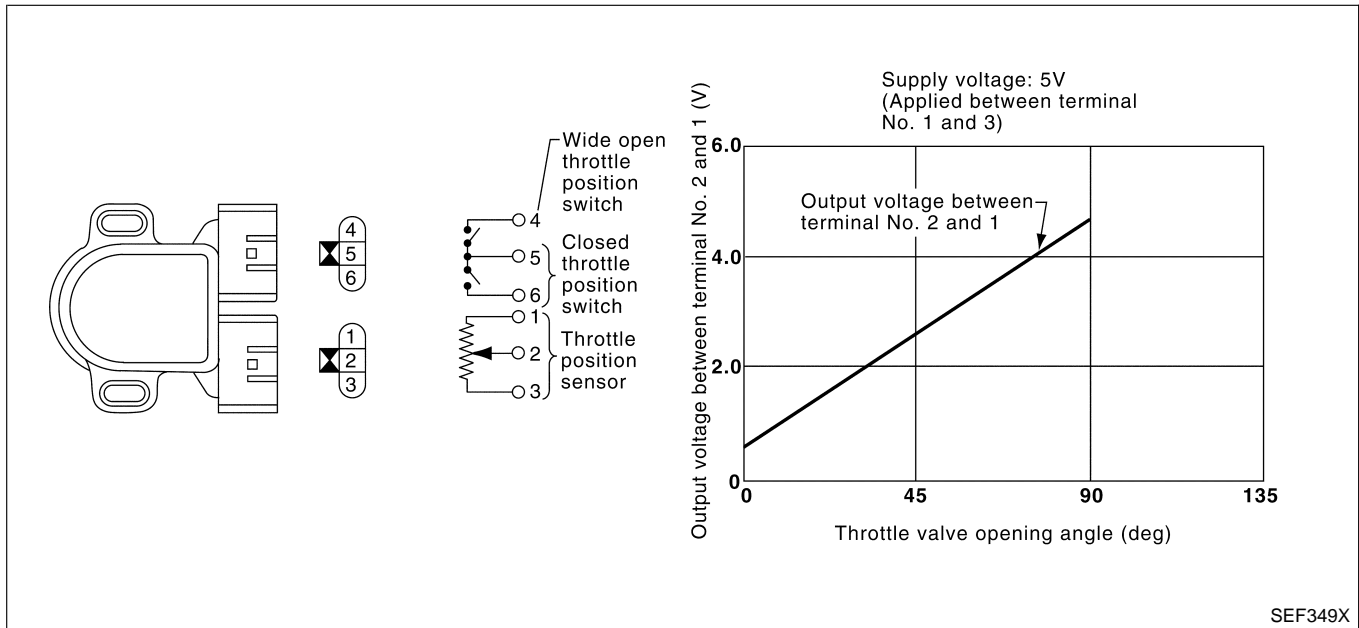
If DTC P0121, P0122, P0123 is displayed with DTC P0510, first perform the trouble diagnosis for DTC P0510. Refer to EC-1012.

COMPONENT DESCRIPTION

NGEC0595S01

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

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



CONSULT-II Reference Value in Data Monitor Mode

NGEC0596

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL POS SEN	● Engine: After warming up, idle the engine	Throttle valve: fully closed (a)	0.15 - 0.85V
	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: Partially open	Between (a) and (b)
		Throttle valve: fully open (b)	3.5 - 4.7V
ABSOL TH-P/S	● Engine: After warming up ● Ignition switch: ON ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump.	Throttle valve: fully closed	0.0%
	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully open	Approx. 80%

ECM Terminals and Reference Value

=NGEC0597

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 the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
23	L	Throttle position sensor	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Accelerator pedal fully released 	0.15 - 0.85V
			[Ignition switch ON] <ul style="list-style-type: none"> ● Accelerator pedal fully depressed 	3.5 - 4.7V
42	B/W	Sensors' power supply	[Ignition switch ON]	Approximately 5V
43	BR	Sensors' ground	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	Approximately 0V

On Board Diagnosis Logic

NGEC0598

Malfunction is detected when (Malfunction A) an excessively low (P0122) or high (P0123) voltage from the sensor is sent to ECM, (Malfunction B, P0121) a high voltage from the sensor is sent to ECM under light load driving conditions, (Malfunction C, P0121) a low voltage from the sensor is sent to ECM under heavy load driving conditions.

POSSIBLE CAUSE

Malfunction A

NGEC0598S01
NGEC0598S0101

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

Malfunction B

NGEC0598S0102

- Harness or connectors
(The throttle position sensor circuit is open or shorted.)
- Throttle position sensor
- Fuel injector
- Camshaft position sensor
- Mass air flow sensor

Malfunction C

NGEC0598S0103

- Harness or connectors
(The throttle position sensor circuit is open or shorted.)
- Intake air leaks
- Throttle position sensor

FAIL-SAFE MODE

NGEC0598S02

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

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

DTC Confirmation Procedure

NGEC0599

NOTE:

- Perform “PROCEDURE FOR MALFUNCTION A” first. If the 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B”.
- If there is no problem on “PROCEDURE FOR MALFUNCTION B”, perform “PROCEDURE FOR MALFUNCTION C”.
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

NGEC0599S01

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is more than 10V at idle.
- This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
P/N POSI SW	OFF

SEF065Y

With CONSULT-II

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

Vehicle speed	More than 5 km/h (3 MPH)
Selector lever	Suitable position except “P” or “N” position

- 3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-786.

With GST

Follow the procedure “With CONSULT-II”.

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B

NGEC0599S02

Ⓜ With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and let it idle for at least 10 seconds.
If idle speed is over 1,000 rpm, maintain the following conditions for at least 10 seconds to keep engine speed below 1,000 rpm.

Selector lever	Suitable position except "P" or "N"
Brake pedal	Depressed
Vehicle speed	0 km/h (0 MPH)

- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-786.

Ⓜ With GST

Follow the procedure "With CONSULT-II".

6	DATA MONITOR	
	MONITOR	NO DTC
	THRTL POS SEN	XXX V
	ABSOL TH-P/S	XXX %

SEF177Y

PROCEDURE FOR MALFUNCTION C

NGEC0599S03

CAUTION:

Always drive vehicle at a safe speed.

Ⓜ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II.
- 5) Select "THRTL POS SEN" and "ABSOL TH-P/S" in "DATA MONITOR" mode with CONSULT-II.
- 6) Press RECORD on CONSULT-II SCREEN at the same time accelerator pedal is depressed.
- 7) Print out the recorded graph and check the following:
 - The voltage rise is linear in response to accelerator pedal depression.
 - The voltage when accelerator pedal is fully depressed is approximately 4V.
 If NG, go to "Diagnostic Procedure", EC-786.
 If OK, go to following step.

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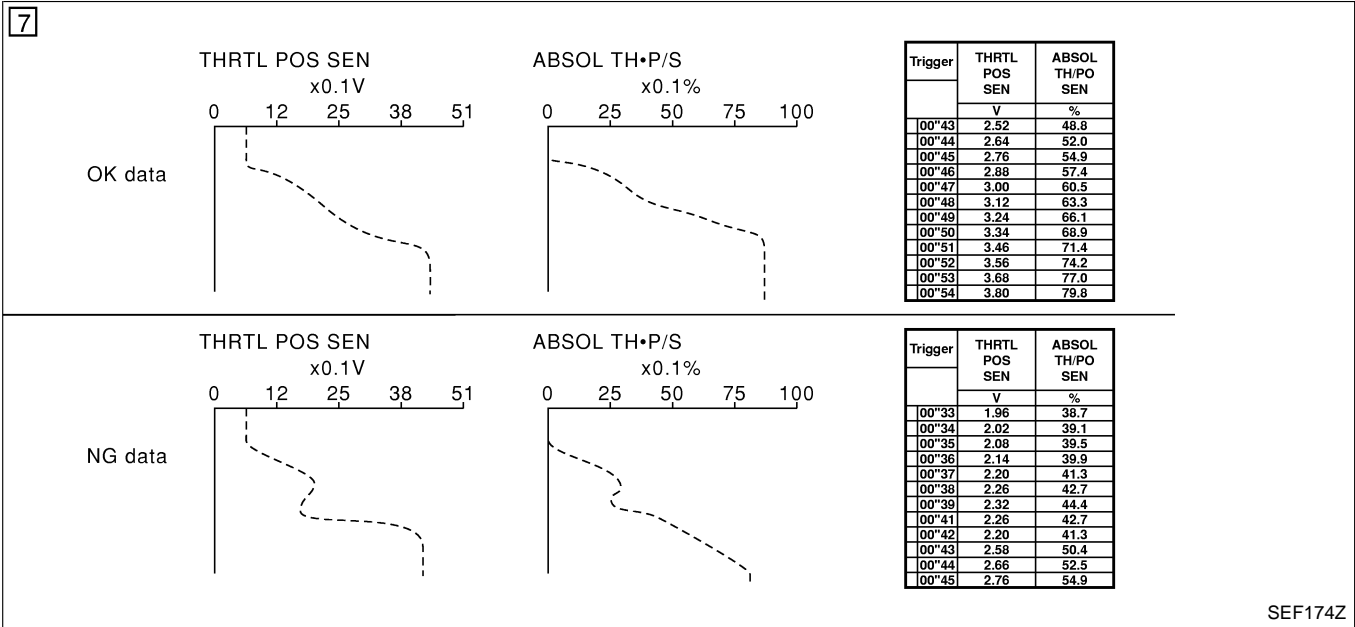
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DTC P0121, P0122, P0123 TP SENSOR

VG33E

DTC Confirmation Procedure (Cont'd)



9

DATA MONITOR	
MONITORING	NO DTC
ENG SPEED	XXX rpm
MAS AIR/FL SE	XXX V
COOLAN TEMP/S	XXX °C
IACV-AAC/V	XXX %

SEF805Z

- 8) Select "AUTO TRIG" in "DATA MONITOR" mode with CONSULT-II.
- 9) Maintain the following conditions for at least 10 consecutive seconds.

CMPS-RPM (REF)	More than 2,000 rpm
MAS AIR/FL SE	More than 3V
COOLAN TEMP/S	More than 70°C (158°F)
IACV-AAC/V	Less than 80%
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

- 10) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-786.



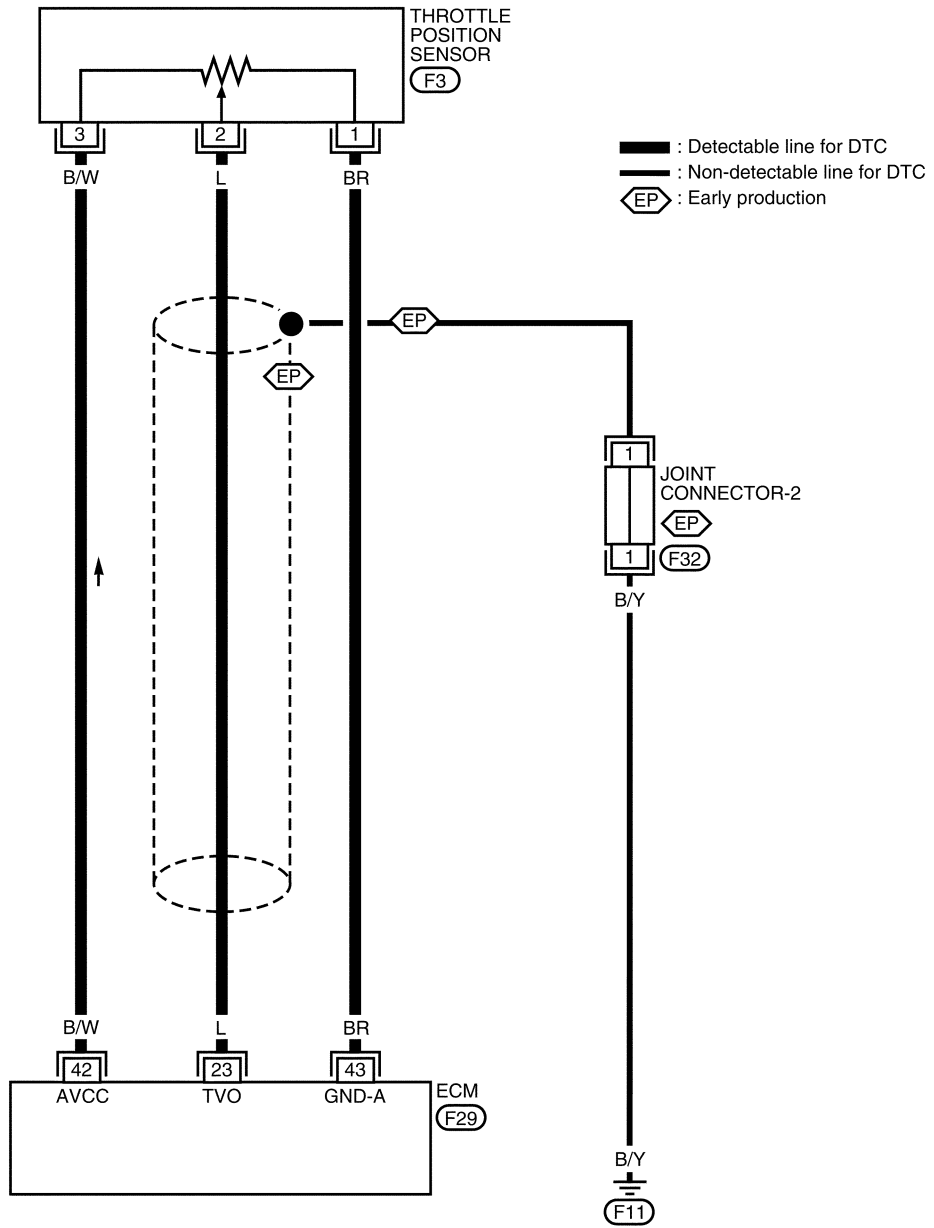
With GST

Follow the procedure "With CONSULT-II".

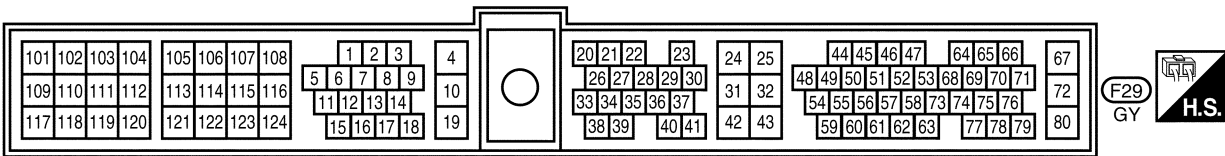
Wiring Diagram

NGEC0600

EC-TPS-01



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Diagnostic Procedure

NGEC0601

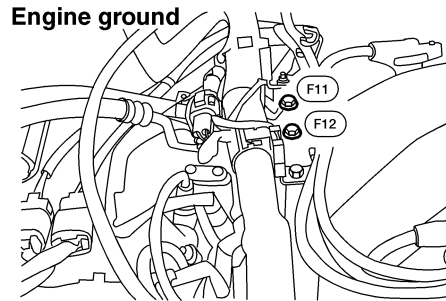
1	INSPECTION START									
Which malfunction A, B or C is duplicated?										
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">MALFUNCTION</th> <th style="width: 50%;">Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">A</td> <td style="text-align: center;">A</td> </tr> <tr> <td style="text-align: center;">B</td> <td style="text-align: center;">B</td> </tr> <tr> <td style="text-align: center;">C</td> <td style="text-align: center;">C</td> </tr> </tbody> </table>			MALFUNCTION	Type	A	A	B	B	C	C
MALFUNCTION	Type									
A	A									
B	B									
C	C									
MTBL0066										
Type A, B or C										
Type A or B	▶	GO TO 4.								
Type C	▶	GO TO 2.								

2	ADJUST THROTTLE POSITION SENSOR											
Check the following items. Refer to "Basic Inspection", EC-701.												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Items</th> <th style="width: 50%;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>10° ± 2° BTDC</td> </tr> <tr> <td>Base idle speed</td> <td>700 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table>			Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
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Target idle speed	750 ± 50 rpm (in "P" or "N" position)											
MTBL0576												
	▶	GO TO 3.										

3	CHECK INTAKE SYSTEM.	
1. Turn ignition switch OFF. 2. Check the following for connection. <ul style="list-style-type: none"> ● Air duct ● Vacuum hoses ● Intake air passage between air duct to intake manifold collector 		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Reconnect the parts.

4 RETIGHTEN GROUND SCREWS

1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.

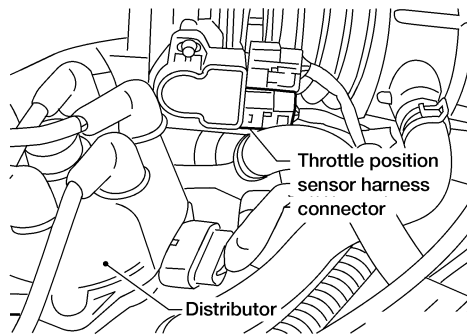


LEC518

► GO TO 5.

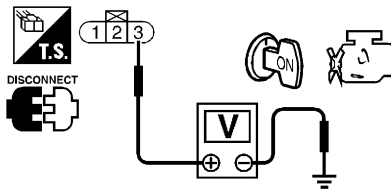
5 CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect throttle position sensor harness connector.



AEC638A

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



SEF630W

Voltage: Approximately 5V
OK or NG

- | | | |
|----|---|--|
| OK | ► | GO TO 6. |
| NG | ► | Repair open circuit or short to ground or short to power in harness or connectors. |

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DTC P0121, P0122, P0123 TP SENSOR

VG33E

Diagnostic Procedure (Cont'd)

6	CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch OFF. 2. Check harness continuity between sensor terminal 1 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART	
Check harness for open between ECM and throttle position sensor.		
▶ Repair open circuit or short to power in harness or connectors.		

8	CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 23 and sensor terminal 2. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 9.
OK (Without CONSULT-II)	▶	GO TO 10.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK THROTTLE POSITION SENSOR											
ⓘ With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Stop engine (ignition switch OFF). 3. Turn ignition switch ON. 4. Select "DATA MONITOR" mode with CONSULT-II. 5. Check voltage of "THRTL POS SEN" under the following conditions. Voltage measurement must be made with throttle position sensor installed in vehicle.												
<table border="1" style="margin: 10px auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">DATA MONITOR</th> </tr> <tr> <th style="text-align: left;">MONITOR</th> <th style="text-align: left;">NO DTC</th> </tr> </thead> <tbody> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>COOLAN TEMP/S</td> <td>XXX °C</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm	COOLAN TEMP/S	XXX °C	THRTL POS SEN	XXX V
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THRTL POS SEN	XXX V											
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Throttle valve conditions	THRTL POS SEN											
Completely closed (a)	0.15 - 0.85V											
Partially open	Between (a) and (b)											
Completely open (b)	3.5 - 4.7V											
SEF062Y												
OK or NG												
OK	▶	GO TO 12.										
NG	▶	GO TO 11.										

DTC P0121, P0122, P0123 TP SENSOR

VG33E

Diagnostic Procedure (Cont'd)

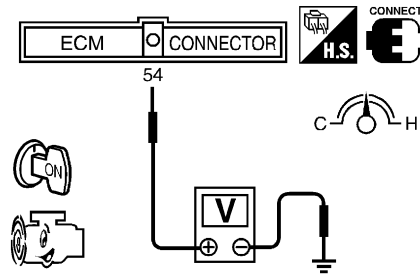
10	CHECK THROTTLE POSITION SENSOR									
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine (ignition switch OFF). 3. Turn ignition switch ON. 4. Check voltage between ECM terminal 23 (Throttle position sensor signal) and ground. <p style="text-align: center;">Voltage measurement must be made with throttle position sensor installed in vehicle.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Throttle valve conditions</th> <th style="text-align: center;">Voltage</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Completely closed (a)</td> <td style="text-align: center;">0.15 - 0.85V</td> </tr> <tr> <td style="text-align: center;">Partially open</td> <td style="text-align: center;">Between (a) and (b)</td> </tr> <tr> <td style="text-align: center;">Completely open (b)</td> <td style="text-align: center;">3.5 - 4.7V</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">MTBL0231</p> <p style="text-align: center;">OK or NG</p>			Throttle valve conditions	Voltage	Completely closed (a)	0.15 - 0.85V	Partially open	Between (a) and (b)	Completely open (b)	3.5 - 4.7V
Throttle valve conditions	Voltage									
Completely closed (a)	0.15 - 0.85V									
Partially open	Between (a) and (b)									
Completely open (b)	3.5 - 4.7V									
OK	▶	GO TO 12.								
NG	▶	GO TO 11.								

11	ADJUST CLOSED THROTTLE POSITION SWITCH											
<p>Adjust closed throttle position switch. Refer to "Basic Inspection", EC-701.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Items</th> <th style="text-align: center;">Specifications</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Ignition timing</td> <td style="text-align: center;">10° ± 2° BTDC</td> </tr> <tr> <td style="text-align: center;">Base idle speed</td> <td style="text-align: center;">700 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td style="text-align: center;">Closed throttle position switch idle position adjustment</td> <td style="text-align: center;">Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF</td> </tr> <tr> <td style="text-align: center;">Target idle speed</td> <td style="text-align: center;">750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">MTBL0576</p> <p style="text-align: center;">OK or NG</p>			Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
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Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF											
Target idle speed	750 ± 50 rpm (in "P" or "N" position)											
OK	▶	GO TO 12.										
NG	▶	Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-701.										

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12 CHECK MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.



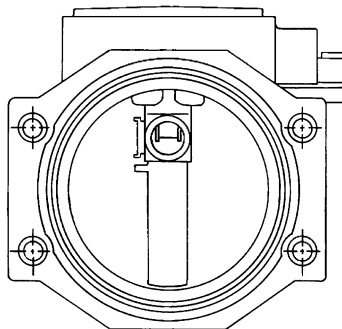
SEF747U

Condition	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.3
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0

*Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.

LEC102A

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



SEF030T

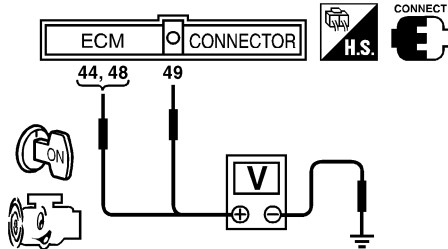
OK or NG

OK	▶	GO TO 13.
NG	▶	Replace mass air flow sensor.

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13 CHECK CAMSHAFT POSITION SENSOR

1. Install any parts removed.
2. Start engine.
3. Check voltage between ECM terminals 44, 48 and ground, ECM terminal 49 and ground with DC range.


Terminal 44 or 48 and engine ground

Condition	Idle	2,000 rpm
Voltage	0.3 - 0.5V	0.3 - 0.5V
Pulse signal		

Terminal 49 and engine ground

Condition	Idle	2,000 rpm
Voltage	Approximately 2.5V	Approximately 2.5V
Pulse signal		

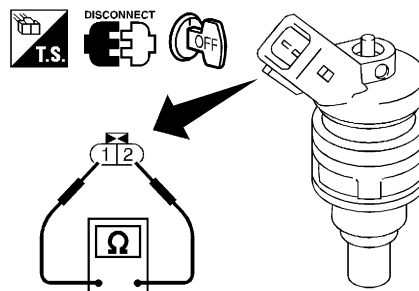
AEC072B

OK or NG

- | | | |
|----|---|---|
| OK | ▶ | GO TO 14. |
| NG | ▶ | Replace distributor assembly with camshaft position sensor. |

14 CHECK FUEL INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.


Resistance: 10 - 14Ω [at 25°C (77°F)]

SEF625V

OK or NG

- | | | |
|----|---|------------------------|
| OK | ▶ | GO TO 15. |
| NG | ▶ | Replace fuel injector. |

DTC P0121, P0122, P0123 TP SENSOR

VG33E

Diagnostic Procedure (Cont'd)

15	CHECK THROTTLE POSITION SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT (IF EQUIPPED)
1. Turn ignition switch OFF. 2. Disconnect joint connector-2. 3. Check the following. <ul style="list-style-type: none">● Continuity between joint connector terminal 1 and ground● Joint connector (Refer to EL-250, "HARNESS LAYOUT".) Continuity should exist.	
4. Also check harness for short to power. 5. Then reconnect joint connector-2.	
OK or NG	
OK	▶ GO TO 16.
NG	▶ Repair open circuit or short to power in harness or connectors.

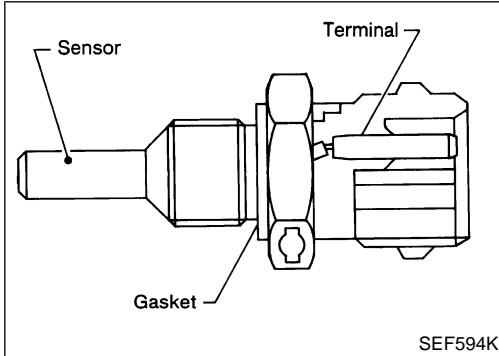
16	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.	
	▶ INSPECTION END

Description

NGEC0602

NOTE:

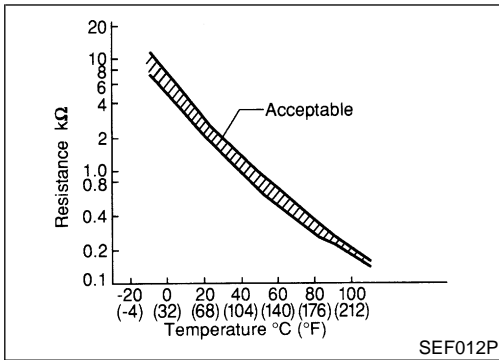
If DTC P0125 is displayed with P0117, P0118, first perform the trouble diagnosis for DTC P0117, P0118. Refer to EC-775.



COMPONENT DESCRIPTION

NGEC0602S01

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	9.2
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 59 (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 the ECM terminals, such as the ground.

On Board Diagnosis Logic

NGEC0603

Malfunction is detected when voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine, or engine coolant temperature is insufficient for closed loop fuel control.

POSSIBLE CAUSE

NGEC0603S01

- Harness or connectors (High resistance in the circuit)
- Engine coolant temperature sensor
- Thermostat

4	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C

SEF174Y

DTC Confirmation Procedure

=NGEC0604

CAUTION:

Be careful not to overheat engine.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Check that "COOLAN TEMP/S" is above 10°C (50°F).
If it is above 10°C (50°F), the test result will be OK.
If it is below 10°C (50°F), go to following step.
- 4) Start engine and run it for 65 minutes at idle speed.
If "COOLAN TEMP/S" increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-796.

With GST

Follow the procedure "With CONSULT-II".

DTC P0125 ECT SENSOR

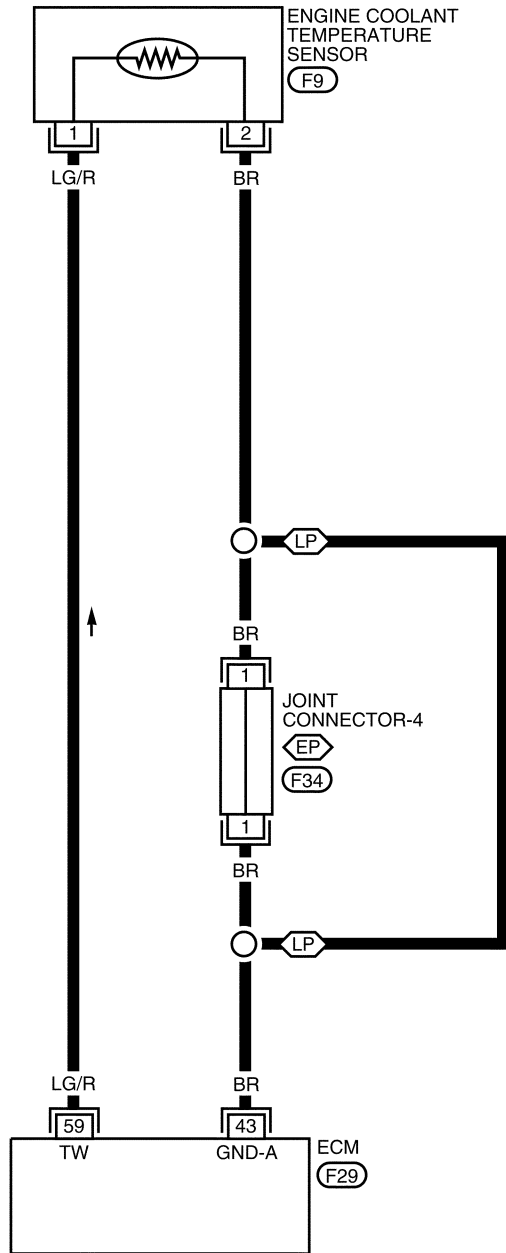
VG33E

Wiring Diagram

Wiring Diagram

NGEC0605

EC-ECTS-01



- : Detectable line for DTC
- : Non-detectable line for DTC
- EP : Early production
- LP : Late production

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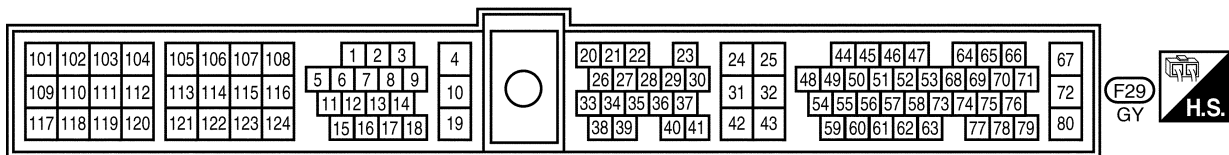
BT

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WEC170A

DTC P0125 ECT SENSOR

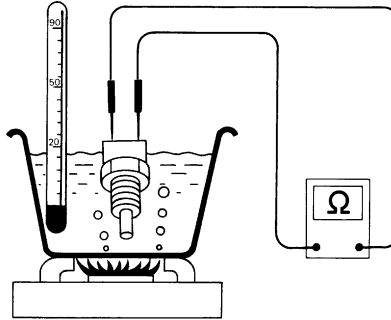
VG33E

Diagnostic Procedure (Cont'd)

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4 CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.

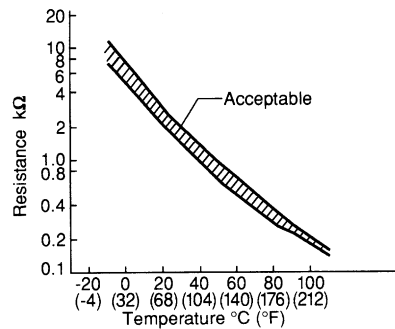


<Reference data>

SEF152P

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

MTBL0229



SEF012P

OK or NG

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

5 CHECK THERMOSTAT OPERATION

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

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair or replace thermostat. Refer to "Thermostat", "ENGINE COOLING SYSTEM", LC-13 .

6 CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.

	▶	INSPECTION END
--	---	-----------------------

On Board Diagnosis Logic

Engine coolant temperature has not risen enough to open the thermostat even though the engine has run long enough. NGEC0986

This is due to a leak in the seal or the thermostat open stuck. Malfunction is detected when the engine coolant temperature does not reach to specified temperature even though the engine has run long enough.

POSSIBLE CAUSE

- Thermostat function
- Leakage from sealing portion of thermostat
- Engine coolant temperature sensor

NGEC0986S01

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test. NGEC0988

TESTING CONDITION:

- For best results, perform at ambient temperature of -10°C (14°F) or higher.
- For best results, perform at engine coolant temperature of -10°C (14°F) to 70°C (158°F).

WITH CONSULT-II

- 1) Replace thermostat with new one. Refer to **LC-13**, "Thermostat". Use only a genuine NISSAN thermostat as a replacement. If an incorrect thermostat is used, the MIL may come on. NGEC0988S01
- 2) Turn ignition switch "ON".
- 3) Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
- 4) Check that the "COOLAN TEMP/S" is above 70°C (158°F).
If it is below 70°C (158°F), go to following step.
If it is above 70°C (158°F), stop engine and cool down the engine to less than 70°C (158°F), then retry from step 1.
- 5) Drive vehicle for 10 consecutive minutes under the following conditions.

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

If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-601.

WITH GST

- 1) Follow the procedure "WITH CONSULT-II" above.

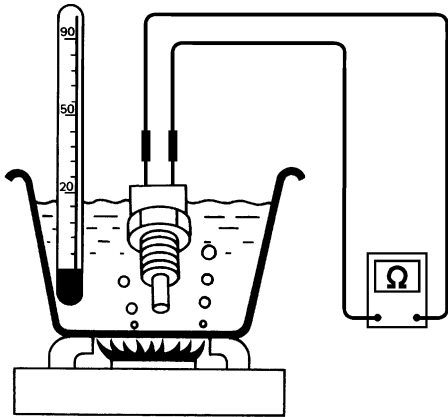
NGEC0988S02

Diagnostic Procedure

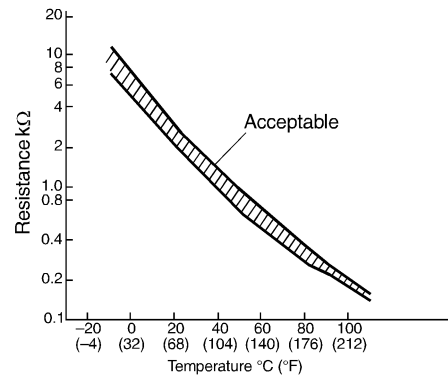
NGEC0989

1 CHECK ENGINE COOLANT TEMPERATURE SENSOR

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


<Reference data>

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


SEF304X
OK or NG

OK


INSPECTION END

NG



Replace engine coolant temperature sensor.

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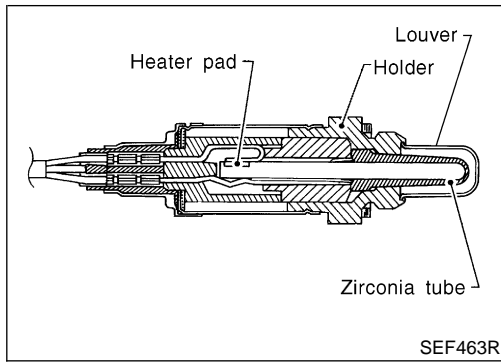
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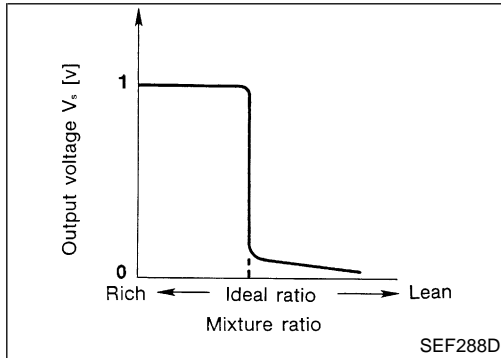
Component Description



Component Description

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

NGEC0637



CONSULT-II Reference Value in Data Monitor Mode

NGEC0638

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)	<ul style="list-style-type: none"> Engine: After warming up 	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NGEC0639

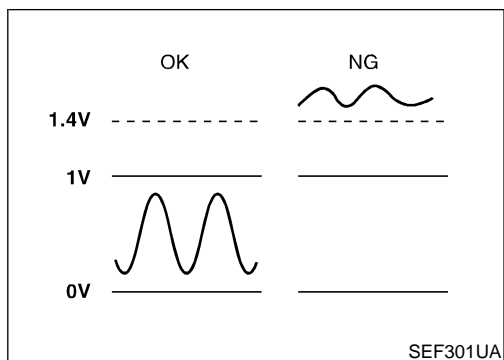
Specification data are reference values and are measured between each terminal and ground.

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (Bank 1)	[Engine is running] <ul style="list-style-type: none"> After warming up to normal operating temperature and engine speed is 2,000 rpm 	0 - Approximately 1.0V
51	G	Heated oxygen sensor 1 (Bank 2)		

SEF002V



On Board Diagnosis Logic

NGEC0640

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 output is not inordinately high. Malfunction is detected when an excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

NGEC0640S01

- Harness or connectors (The sensor circuit is open or shorted.)
- Heated oxygen sensor 1

5

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

DTC Confirmation Procedure

NGEC0641

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 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 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Restart engine and let it idle for 25 seconds.
- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-804.

With GST

Follow the procedure "With CONSULT-II".

- When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.

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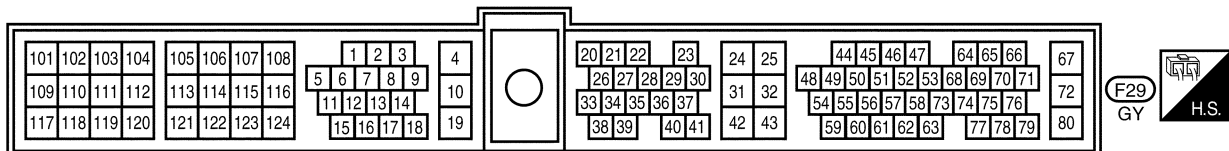
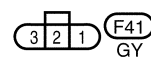
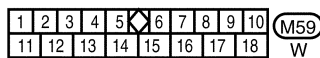
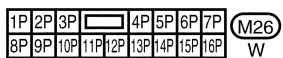
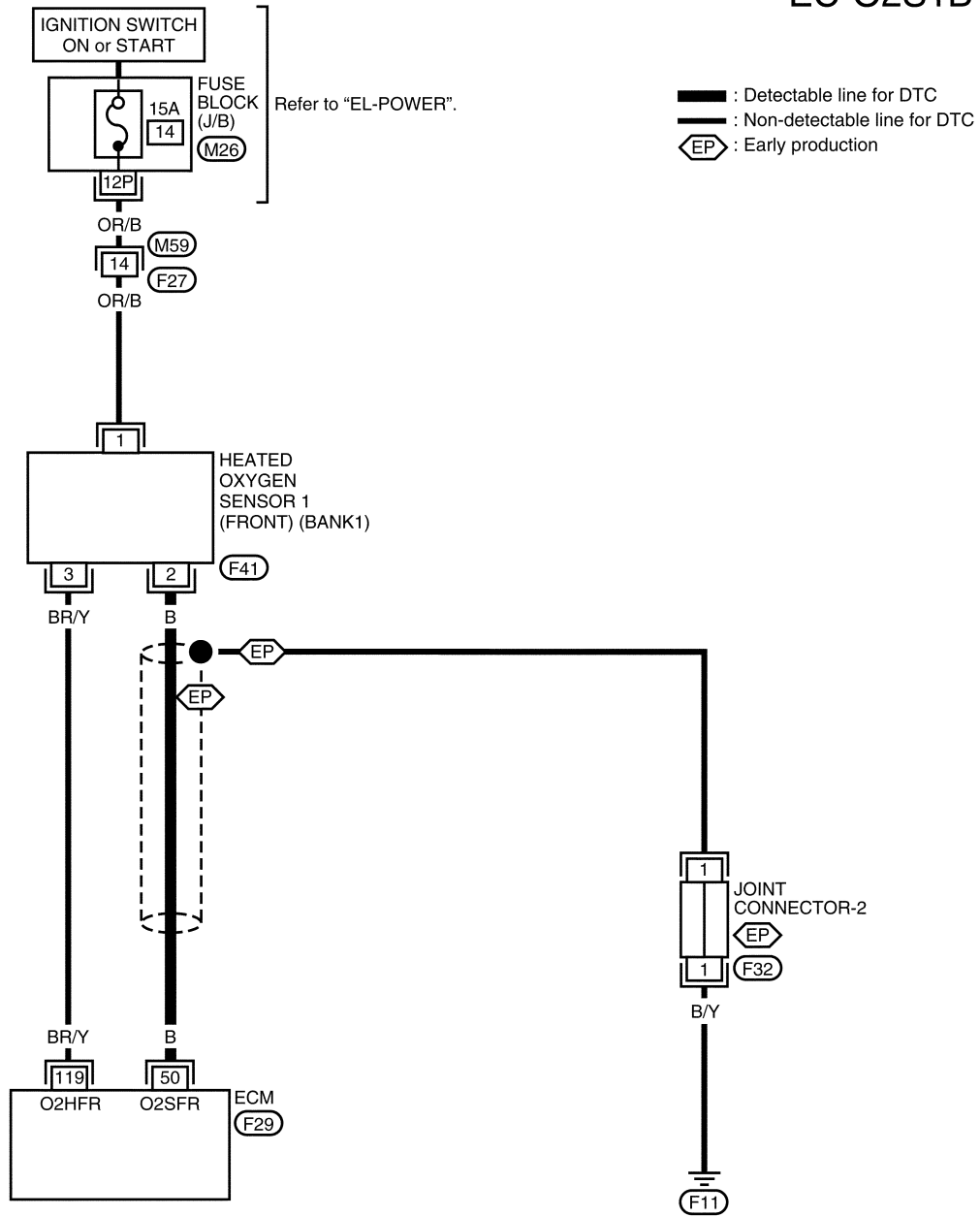
Wiring Diagram

NGEC0642

NGEC0642S01

RIGHT BANK

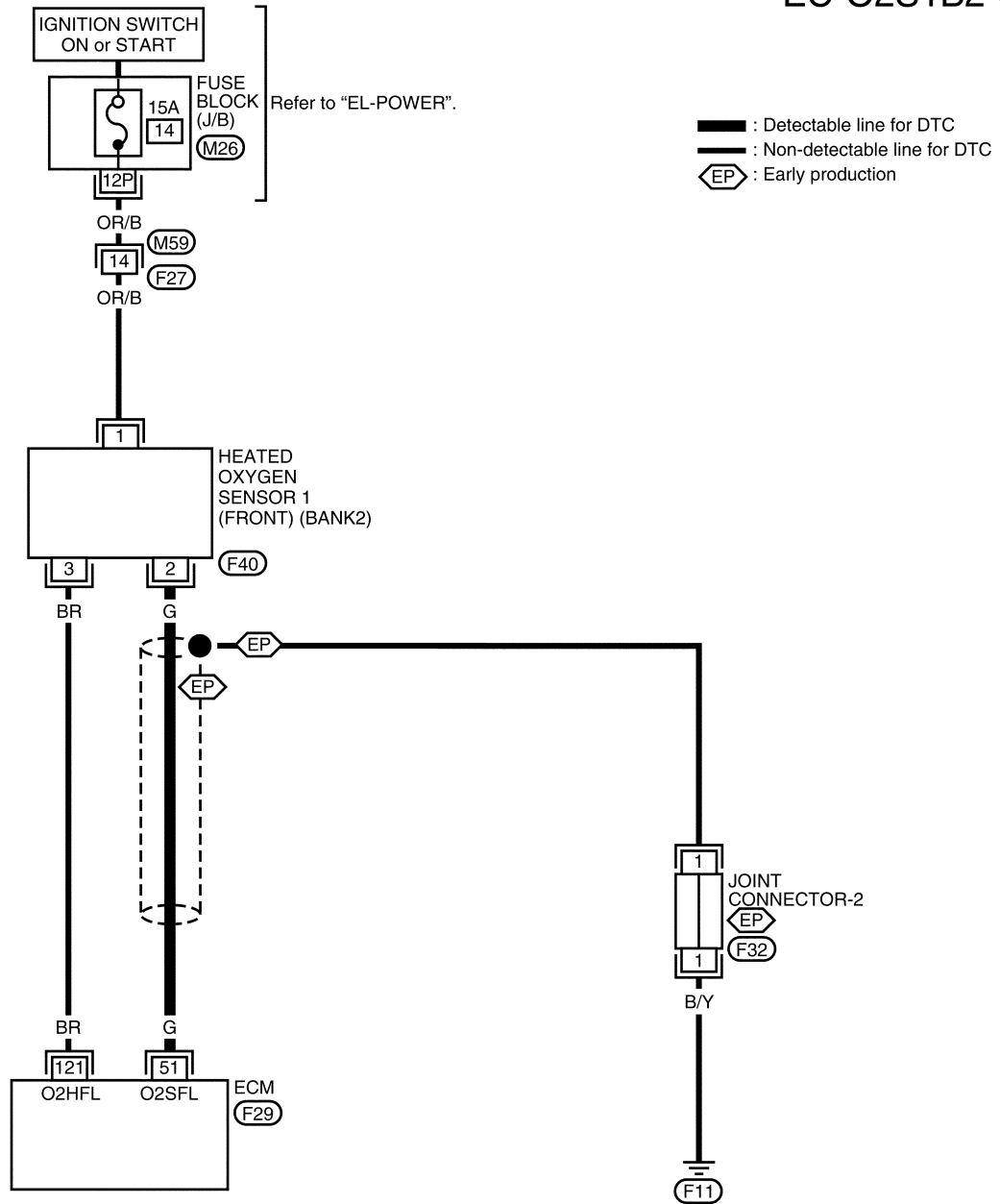
EC-O2S1B1-01



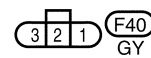
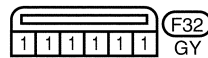
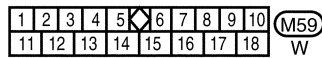
LEFT BANK

NGEC0642S02

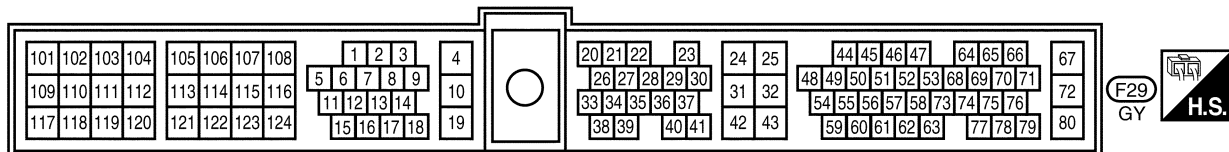
EC-O2S1B2-01



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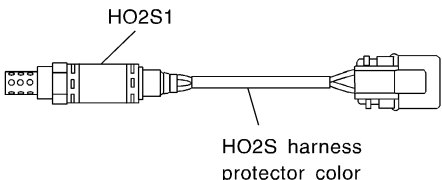
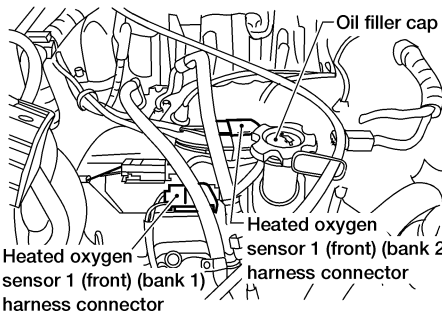
RS
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Diagnostic Procedure

NGEC0643

1	INSPECTION START
<p>1. Turn ignition switch OFF. 2. Check heated oxygen sensor 1 harness protector.</p> <div style="text-align: center;">  <p>HO2S1</p> <p>HO2S harness protector color</p> </div> <p>HO2S1 (bank 1): Black HO2S1 (bank 2): Blue</p> <p>3. Disconnect corresponding heated oxygen sensor 1 harness connector.</p> <div style="text-align: center;">  <p>Oil filler cap</p> <p>Heated oxygen sensor 1 (front) (bank 2)</p> <p>Heated oxygen sensor 1 (front) (bank 1)</p> <p>harness connector</p> </div>	
SEF505YB	
WEC545	
▶	GO TO 2.

2	RETIGHTEN HEATED OXYGEN SENSOR 1
<p>1. Loosen and retighten corresponding heated oxygen sensor 1.</p> <p style="color: blue;">Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg·m, 30 - 44 ft·lb)</p>	
▶	GO TO 3.

3	CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT															
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0132</td> <td style="text-align: center;">50</td> <td style="text-align: center;">2</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0152</td> <td style="text-align: center;">51</td> <td style="text-align: center;">2</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM	Sensor	P0132	50	2	Bank 1 (Right)	P0152	51	2	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM	Sensor														
P0132	50	2	Bank 1 (Right)													
P0152	51	2	Bank 2 (Left)													
SEC656C																
<p style="text-align: center; color: blue;">Continuity should exist.</p> <p>3. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM or sensor</th> <th>Ground</th> </tr> </thead> <tbody> <tr> <td>P0132</td> <td style="text-align: center;">50 or 2</td> <td style="text-align: center;">Ground</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0152</td> <td style="text-align: center;">51 or 2</td> <td style="text-align: center;">Ground</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM or sensor	Ground	P0132	50 or 2	Ground	Bank 1 (Right)	P0152	51 or 2	Ground	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM or sensor	Ground														
P0132	50 or 2	Ground	Bank 1 (Right)													
P0152	51 or 2	Ground	Bank 2 (Left)													
SEC657C																
<p style="text-align: center; color: blue;">Continuity should not exist.</p> <p>4. Also check harness for short to power.</p>																
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 FRONT HO2S1 CONNECTOR FOR WATER	
<p>1. Disconnect heated oxygen sensor 1 harness connector. 2. Check connectors for water. Water should not exist.</p>		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Repair or replace harness or connectors.

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5 CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

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

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

SEF967Y

5. Check the following.

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

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

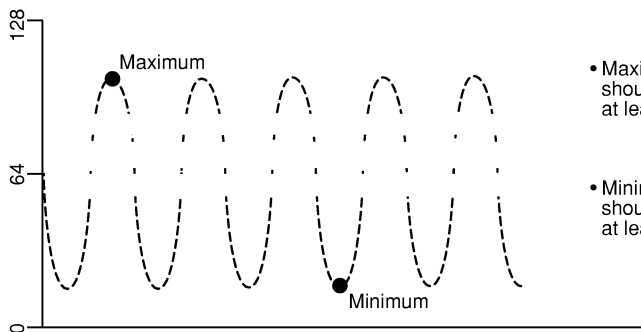
Bank 2
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

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

SEF647Y

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

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



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

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

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

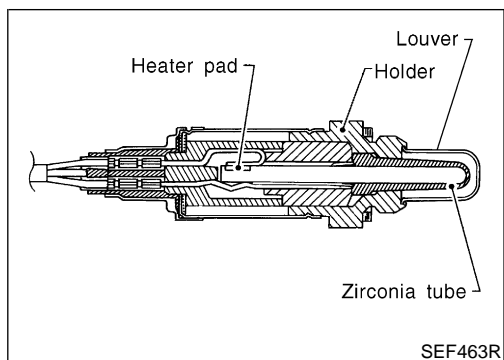
6	CHECK HEATED OXYGEN SENSOR 1
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground. Check the following with engine speed held at 2,000 rpm constant under no load. 	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> </div> <div style="width: 50%;"> <ul style="list-style-type: none"> • The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least one time. • The minimum voltage is below 0.3V at least one time. • The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>	
SEF796Z	
<p>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.</p>	
OK or NG	
OK	▶ GO TO 8.
NG	▶ GO TO 7.

7	REPLACE HEATED OXYGEN SENSOR 1
<ol style="list-style-type: none"> Turn ignition switch "OFF". Check heated oxygen sensor 1 harness protector color. 	
<p>HO2S1 (bank 1): Black HO2S1 (bank 2): Blue</p>	
SEF505YB	
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 1.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.	
▶	INSPECTION END

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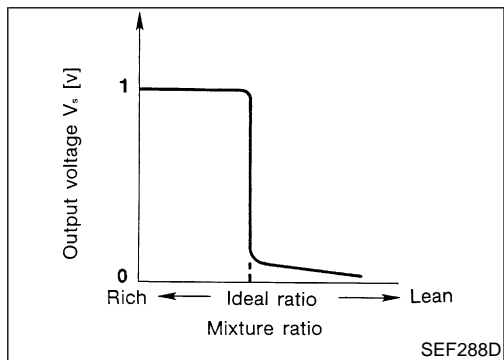
Component Description



Component Description

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

NGEC0629



CONSULT-II Reference Value in Data Monitor Mode

NGEC0630

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)	<ul style="list-style-type: none"> Engine: After warming up 	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NGEC0631

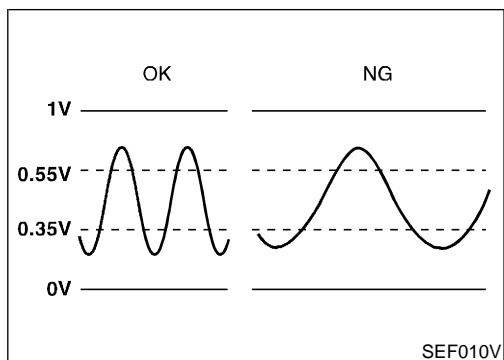
Specification data are reference values and are measured between each terminal and ground.

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 the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (Bank 1)	[Engine is running] <ul style="list-style-type: none"> After warming up to normal operating temperature and engine speed is 2,000 rpm 	0 - Approximately 1.0V
51	G	Heated oxygen sensor 1 (Bank 2)		

SEF002V



On Board Diagnosis Logic

NGEC0632

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

Malfunction is detected when the response of the voltage signal from the sensor takes more than the specified time.

POSSIBLE CAUSE

NGEC0632S01

- Harness or connectors (The sensor circuit is open or shorted.)
- Heated oxygen sensor 1
- Heated oxygen sensor 1 heater
- Fuel pressure
- Injectors
- Intake air leaks
- Exhaust gas leaks
- PCV valve
- Mass air flow sensor

DTC Confirmation Procedure

NGEC0633

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 5 seconds before conducting the next test.

TESTING CONDITION:

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

GI
MA
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HO2S1 (B1) P0133

OUT OF CONDITION

MONITOR

ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

SEF338Z

HO2S1 (B1) P0133

TESTING

MONITOR

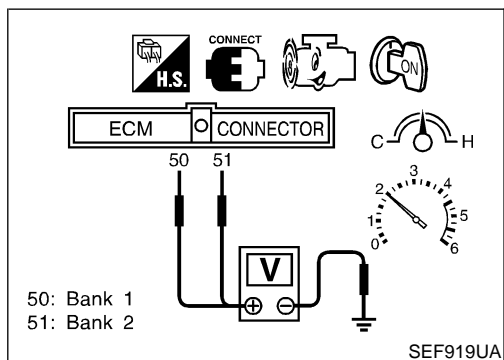
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

SEF339Z

HO2S1 (B1) P0133

COMPLETED

SEF658Y



With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Stop engine and wait at least 5 seconds.
- 3) Turn ignition switch ON and select "HO2S1 (B1)/(B2) P0133/P0153" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 4) Touch "START".
- 5) Start engine and let it idle for at least 3.5 minutes.

NOTE:

Never raise engine speed above 3,200 rpm after this step. If the engine speed limit is exceeded, return to step 5.

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

ENG SPEED	1,800 - 3,300 rpm
Vehicle speed	More than 80 km/h (50 MPH)
B/FUEL SCHDL	2.8 - 13 msec
Selector lever	Suitable position

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

- 7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-813.

Overall Function Check

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

Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
 - 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V**
 - 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V**
- 4) If NG, go to "Diagnostic Procedure", EC-813.

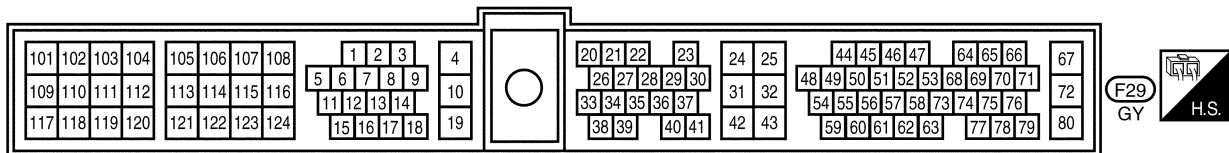
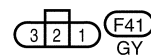
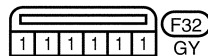
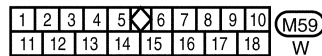
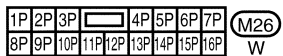
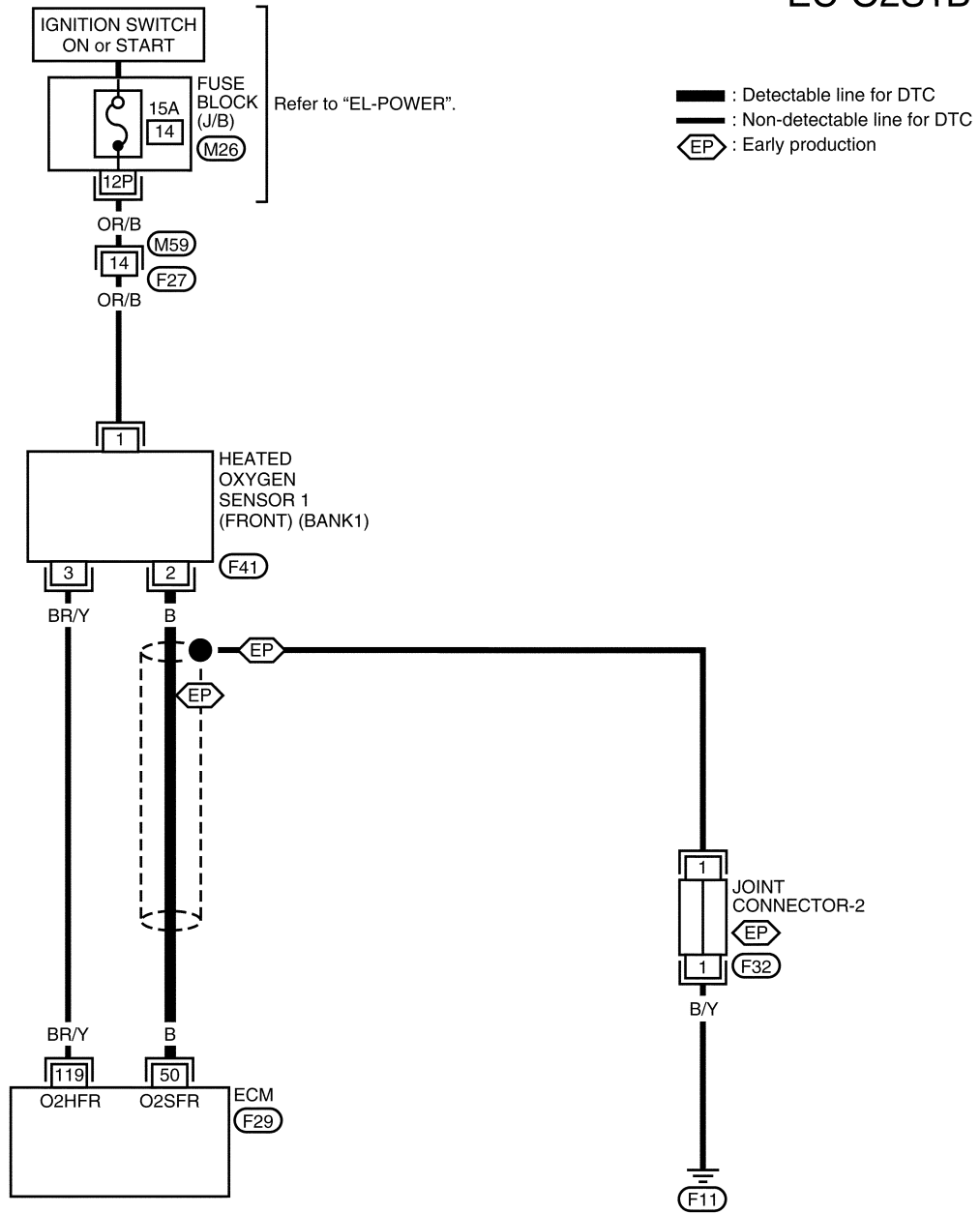
Wiring Diagram

RIGHT BANK

NGEC0635

NGEC0635S01

EC-O2S1B1-01



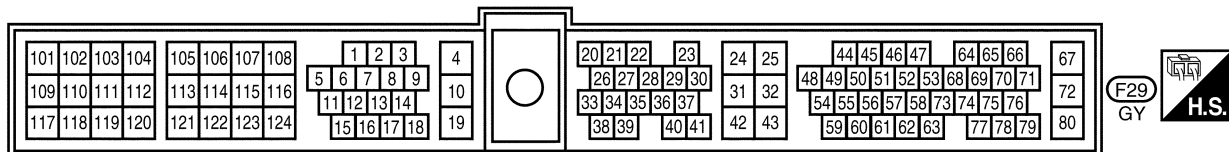
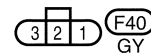
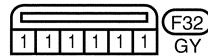
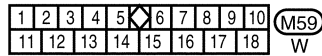
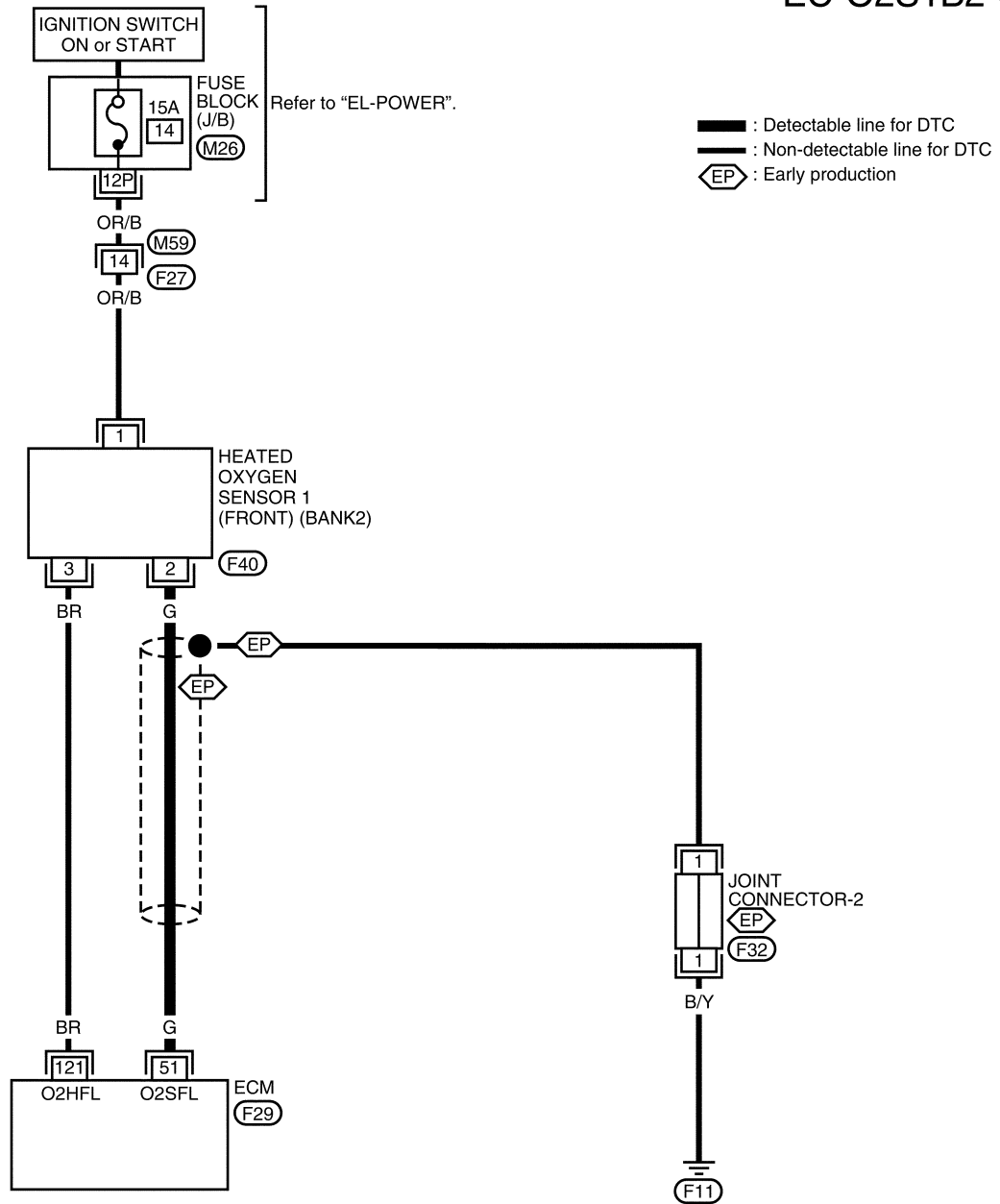
WEC172A

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LEFT BANK

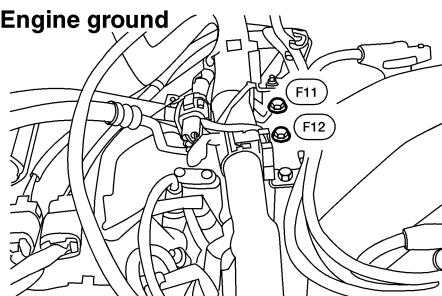
NGEC0635S02

EC-O2S1B2-01



Diagnostic Procedure

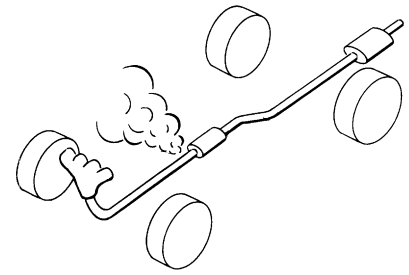
NGEC0636

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p>	
<p>Engine ground</p> 	
LEC518	
▶	GO TO 2.

GI
MA
EM
LC
EC

2	RETIGHTEN HEATED OXYGEN SENSOR 1
<p>Loosen and retighten corresponding heated oxygen sensor 1. Tightening torque: 40 - 60 N-m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)</p>	
▶	GO TO 3.

FE
CL
MT
AT

3	CHECK FOR EXHAUST AIR LEAK
<p>1. Start engine and run it at idle. 2. Listen for an exhaust air leak before three way catalyst.</p>	
	
SEF099P	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Repair or replace.

TF
PD
AX
SU
BR
ST
RS

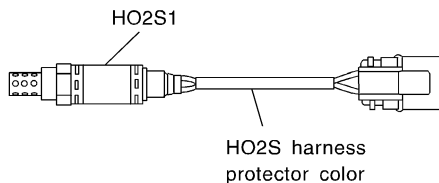
4	CHECK FOR INTAKE AIR LEAK
<p>Listen for an intake air leak after the mass air flow sensor.</p>	
OK or NG	
OK	▶ GO TO 5.
NG	▶ Repair or replace.

BT
HA
SC
EL

5	CLEAR THE SELF-LEARNING DATA									
<p><input checked="" type="checkbox"/> With CONSULT-II</p> <ol style="list-style-type: none"> 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". <div style="text-align: center; margin: 10px 0;"> <table border="1" style="border-collapse: collapse;"> <tr> <th colspan="2" style="padding: 2px;">WORK SUPPORT</th> </tr> <tr> <td style="padding: 2px;">SELF-LEARNING CONT</td> <td style="padding: 2px;">CLEAR</td> </tr> <tr> <td style="padding: 2px;"></td> <td style="padding: 2px;">B1 100 %</td> </tr> <tr> <td style="padding: 2px;"></td> <td style="padding: 2px;">B2 100 %</td> </tr> </table> </div> <p style="text-align: right; margin-top: 10px;">SEF968Y</p> <ol style="list-style-type: none"> 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? 			WORK SUPPORT		SELF-LEARNING CONT	CLEAR		B1 100 %		B2 100 %
WORK SUPPORT										
SELF-LEARNING CONT	CLEAR									
	B1 100 %									
	B2 100 %									
<p><input checked="" type="checkbox"/> Without CONSULT-II</p> <ol style="list-style-type: none"> 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 1st trip DTC P0100 is displayed. 6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-673. 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? <p style="text-align: center; margin-top: 10px;">Yes or No</p>										
Yes	▶	Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-853, 862.								
No	▶	GO TO 6.								

6 CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

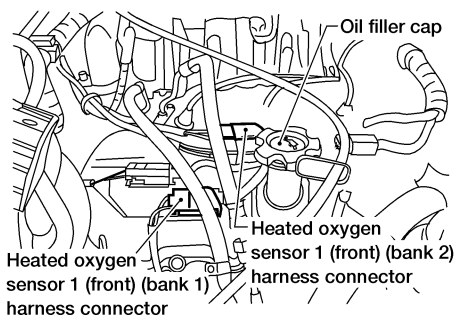
1. Turn ignition switch OFF.
2. Check heated oxygen sensor 1 harness protector.



HO2S1 (bank 1): Black
 HO2S1 (bank 2): Blue

SEF505YB

3. Disconnect corresponding heated oxygen sensor 1 harness connector.



WEC545

4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0133	50	2	Bank 1 (Right)
P0153	51	2	Bank 2 (Left)

MTBL0587

Continuity should exist.

6. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0133	50 or 2	Ground	Bank 1 (Right)
P0153	51 or 2	Ground	Bank 2 (Left)

MTBL0588




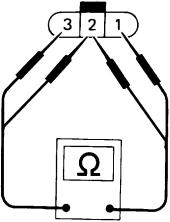
Continuity should not exist.

7. Also check harness for short to power.

OK or NG

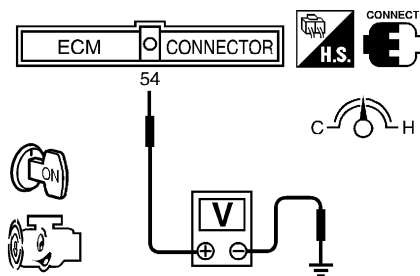
OK	▶	GO TO 7.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

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7	CHECK HEATED OXYGEN SENSOR 1 HEATER	
<p>Check resistance between HO2S1 terminals 3 and 1.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">    </div> <div style="text-align: center;">  </div> </div> <p style="text-align: right;">AEC158A</p> <p>Resistance: 2.3 - 4.3Ω at 25°C (77°F)</p> <p>Check continuity between HO2S1 terminals 2 and 1, 3 and 2.</p> <p>Continuity should not exist.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center;">OK or NG</p>		
OK	▶▶	GO TO 8.
NG	▶▶	GO TO 12.

8 CHECK MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.

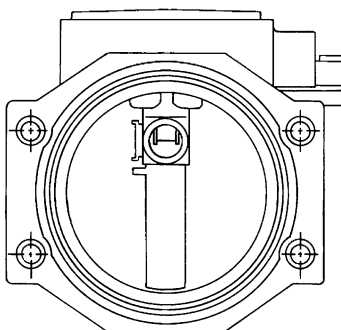


SEF747U

Condition	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.3
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0

MTBL0227

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



SEF030T

OK or NG

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

GI

MA

EM

LC

EC

FE

CL

MT

AT

TF

PD

AX

SU

BR

ST

RS

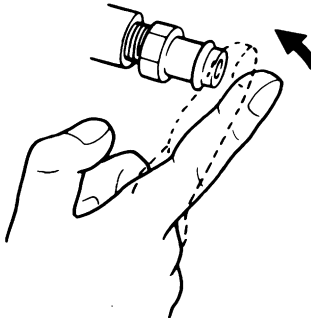
BT

HA

SC

EL

IDX

9	CHECK PCV VALVE	<p>With engine running at idle, remove PCV valve ventilation hose from PCV valve; make sure that a hissing noise will be heard as air passes through it and a strong vacuum should be felt immediately when a finger is placed over valve inlet.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEC137A</p> <p style="text-align: center;">OK or NG</p>	
	OK (With CONSULT-II) ▶		GO TO 10.
	OK (Without CONSULT-II) ▶		GO TO 11.
	NG ▶		Replace PCV valve.

10 CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

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

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

SEF967Y

5. Check the following.

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

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

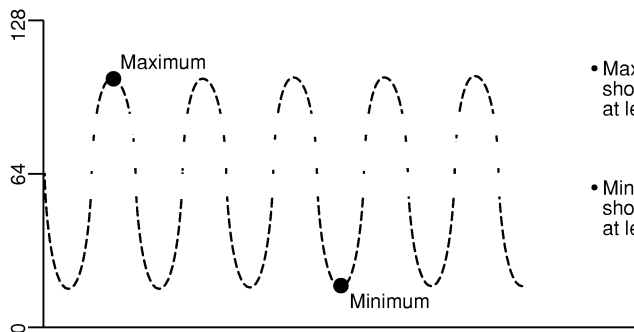
Bank 2
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

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

SEF647Y

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

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



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

SEF648Y

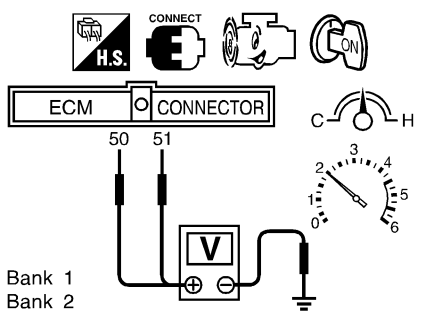
CAUTION:

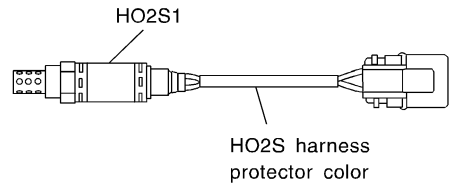
- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved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

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace malfunctioning heated oxygen sensor 1.

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11	CHECK FRONT HEATED OXYGEN SENSOR 1
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground. 3. Check the following with engine speed held at 2,000 rpm constant under no load. 	
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 45%;">  <p>50: Bank 1 51: Bank 2</p> </div> <div style="width: 50%;"> <ul style="list-style-type: none"> • The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least one time. • The minimum voltage is below 0.3V at least one time. • The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>	
SEF796Z	
<p>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.</p>	
OK or NG	
OK	▶ GO TO 13.
NG	▶ GO TO 12.

12	REPLACE HEATED OXYGEN SENSOR 1
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Check heated oxygen sensor 1 harness protector color. 	
	
<p>HO2S1 (bank 1): Black HO2S1 (bank 2): Blue</p>	
SEF505YB	
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 1.

13	CHECK HO2S1 SHIELD CIRCUIT FOR OPEN AND SHORT (IF EQUIPPED)	
<p>1. Turn ignition switch OFF. 2. Disconnect joint connector. 3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to "HARNES LAYOUT", <i>EL-250</i>.) Continuity should exist. <p>4. Also check harness for short to power. 5. Then reconnect joint connector.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 14.
NG	▶	Repair open circuit or short to power in harness or connectors.

14	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.		
	▶	INSPECTION END

GI

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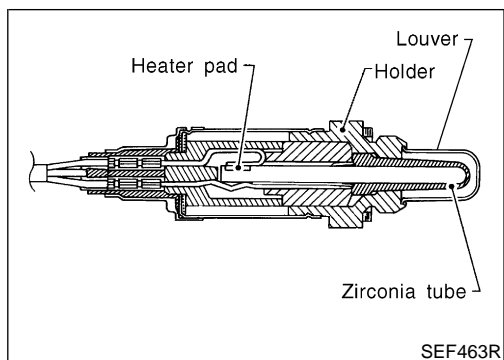
HA

SC

EL

IDX

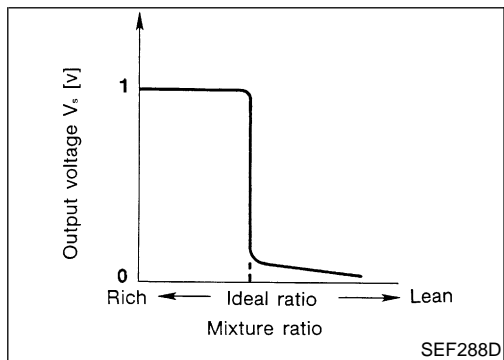
Component Description



Component Description

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

NGEC0607



CONSULT-II Reference Value in Data Monitor Mode

NGEC0608

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)	<ul style="list-style-type: none"> Engine: After warming up 	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NGEC0609

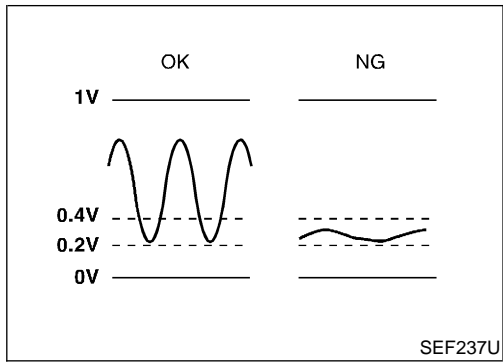
Specification data are reference values and are measured between each terminal and ground.

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 the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (bank 1)	[Engine is running] <ul style="list-style-type: none"> After warming up to normal operating temperature and engine speed is 2,000 rpm 	0 - Approximately 1.0V
51	G	Heated oxygen sensor 1 (bank 2)		

SEF002V



On Board Diagnosis Logic

Under the condition in which the heated oxygen sensor 1 signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 mV range is monitored, and the diagnosis checks that this time is not inordinately long. Malfunction is detected when the voltage from the sensor is constantly approx. 0.3V.

POSSIBLE CAUSE

- Harness or connectors (The sensor circuit is open or shorted.)
- Heated oxygen sensor 1

GI
MA

EM

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EC

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EL

IDX

5	HO2S1 (B1) P0134	
	OUT OF CONDITION	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SEN	XXX km/h

SEC701C

5	HO2S1 (B1) P0134	
	TESTING	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SEN	XXX km/h

SEC702C

5	HO2S1 (B1) P0134	
	COMPLETED	

SEC703C

DTC Confirmation Procedure

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 5 seconds before conducting the next test.

TESTING CONDITION:

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

④ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Select “HO2S1 (B1)/(B2) P0134/P0154” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
- 3) Touch “START”.
- 4) Let it idle for at least 3.5 minutes.

NOTE:

Never raise engine speed above 3,200 rpm after this step. If the engine speed limit is exceeded, return to step 4.

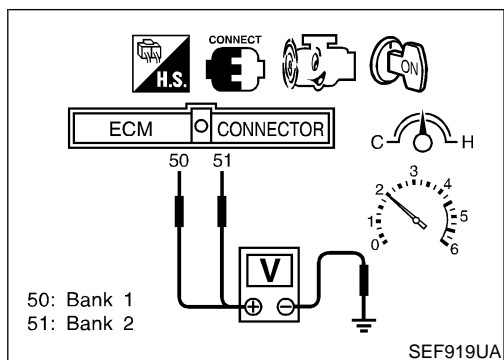
- 5) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 10 to 60 seconds.)

ENG SPEED	1,800 - 3,100 rpm
Vehicle speed	More than 65 km/h (40 MPH)
B/FUEL SCHDL	2.8 - 13 msec
Selector lever	Suitable position

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

- 6) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to “Diagnostic Procedure”, EC-828.

During this test, P1148 and P1168 may be stored in ECM.



Overall Function Check

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed. =NGEC0612

Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - The voltage does not remain in the range of 0.2 - 0.4V.
- 4) If NG, go to "Diagnostic Procedure", EC-828.

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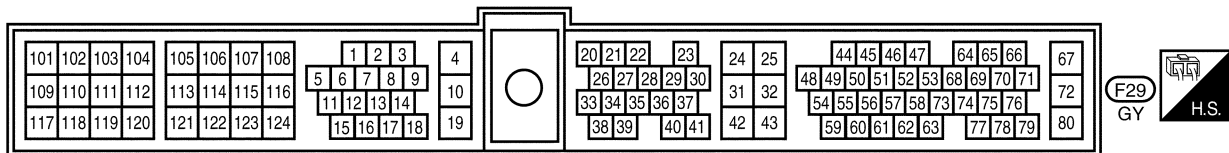
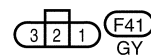
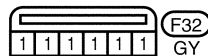
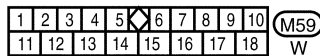
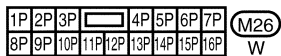
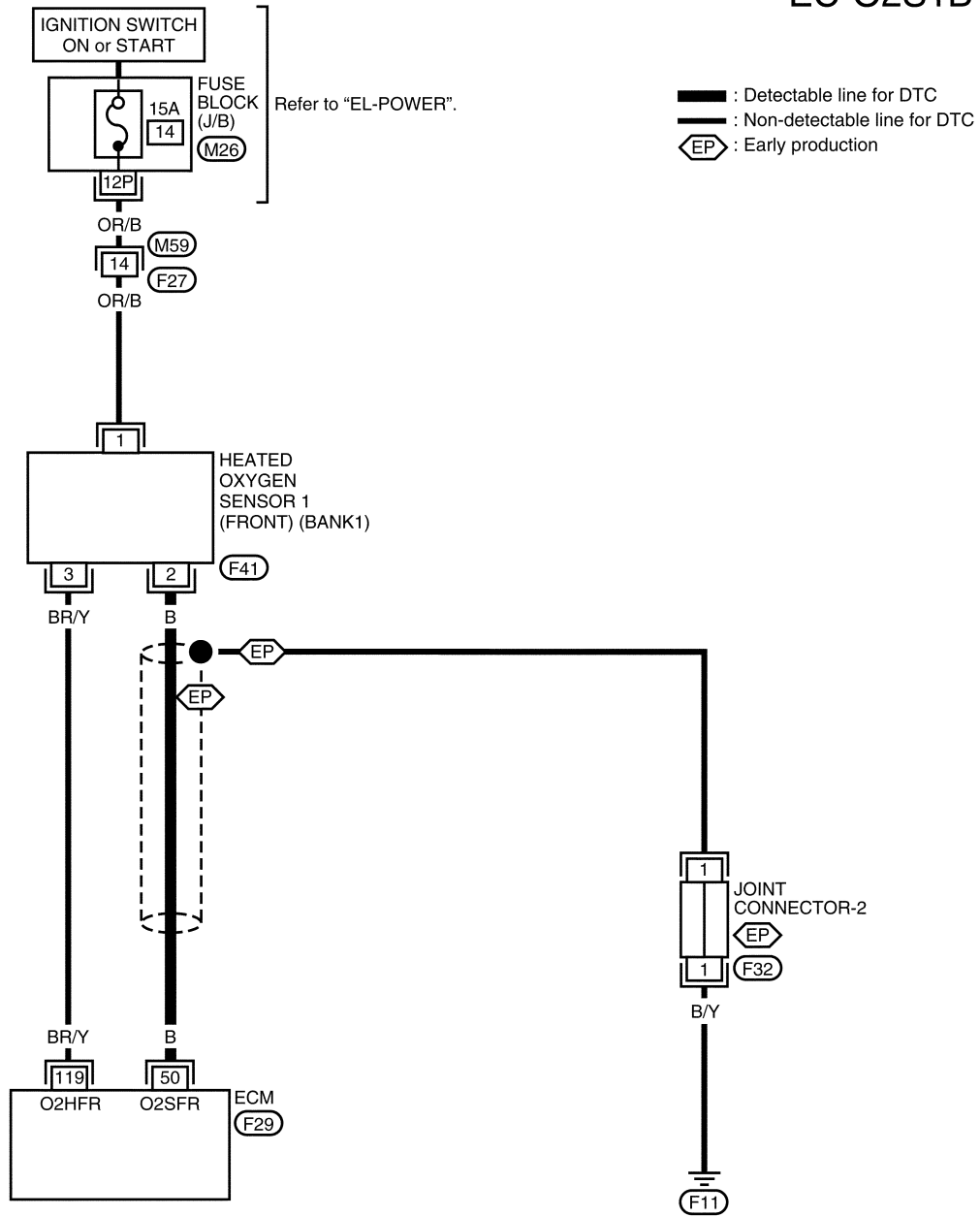
Wiring Diagram

NGEC0613

NGEC0613S01

RIGHT BANK

EC-O2S1B1-01



DTC P0134, P0154 HO2S1

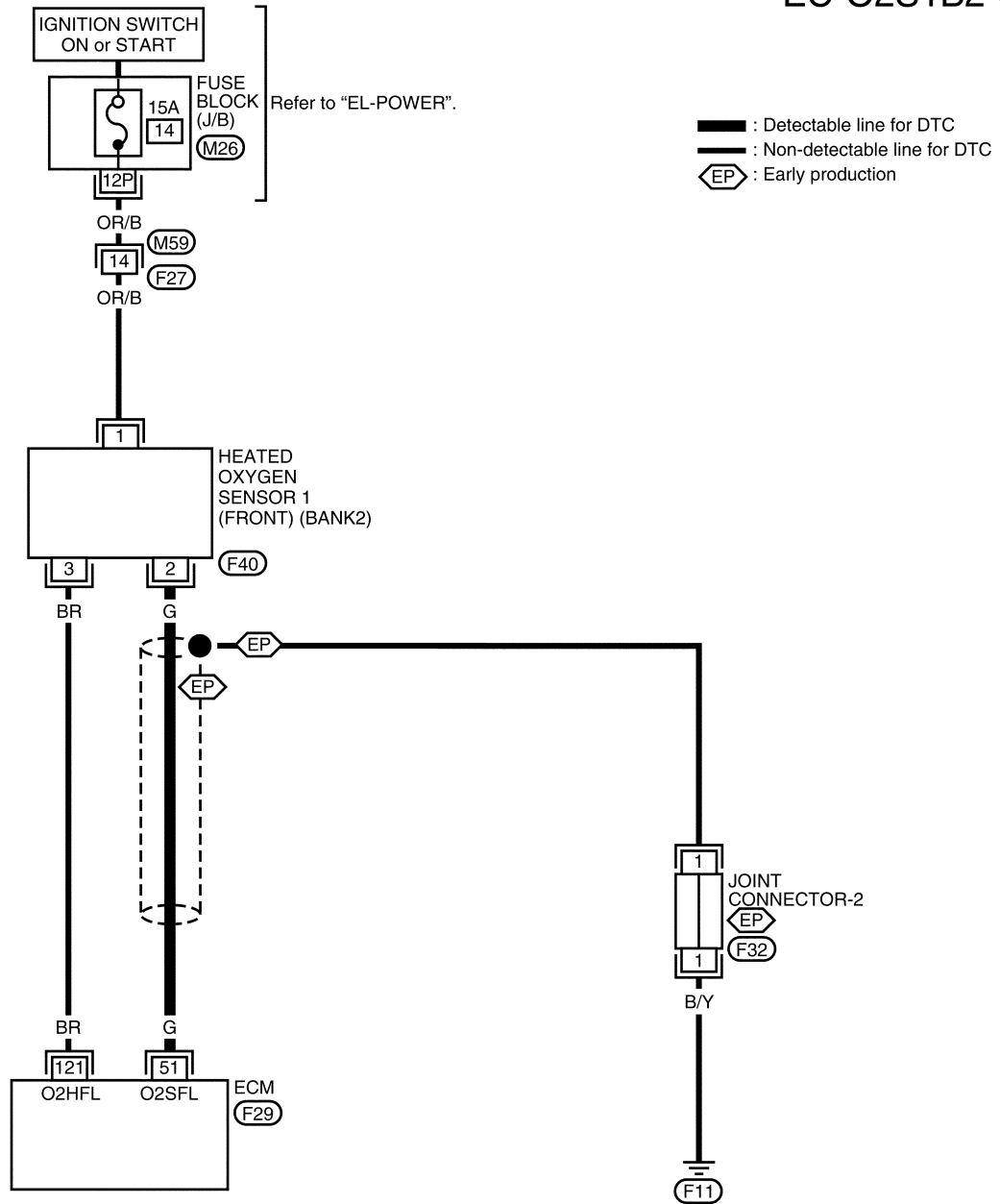
VG33E

Wiring Diagram (Cont'd)

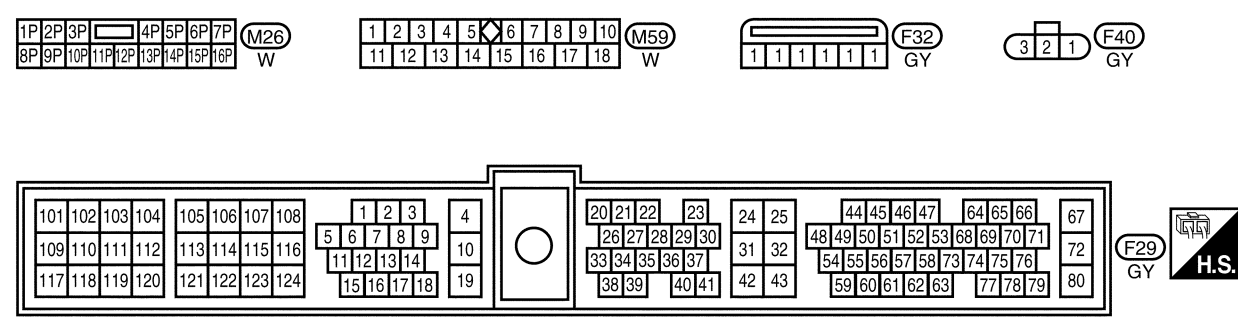
NGEC0613S02

LEFT BANK

EC-O2S1B2-01



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WEC173A

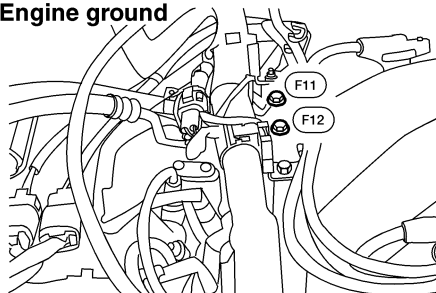
Diagnostic Procedure

NGEC0614

1 INSPECTION START

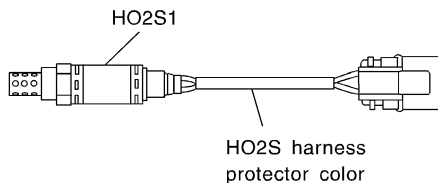
1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.

Engine ground



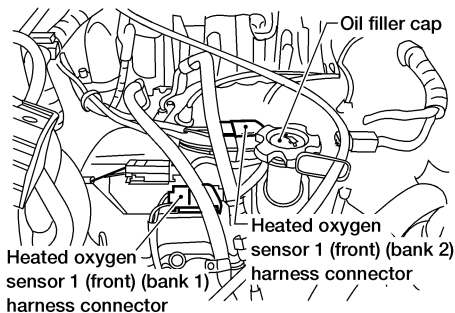
LEC518

3. Make sure HO2S 1 harness protector color, and disconnect corresponding heated oxygen sensor 1 harness connector.



HO2S1 (bank 1): Black
 HO2S1 (bank 2): Blue

SEF505YB



WEC545

▶ GO TO 2.

2 CHECK HO2S 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC	Terminals		Bank
	ECM	Sensor	
P0134	50	2	Bank 1 (Right)
P0154	51	2	Bank 2 (Left)

SEC654C

Continuity should exist.

3. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0134	50 or 2	Ground	Bank 1 (Right)
P0154	51 or 2	Ground	Bank 2 (Left)

SEC655C

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

OK (With CONSULT-II) ►	GO TO 3.
OK (Without CONSULT-II) ►	GO TO 4.
NG ►	Repair open circuit or short to ground or short to power in harness or connectors.

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3 CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

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

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

SEF967Y

5. Check the following.

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

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

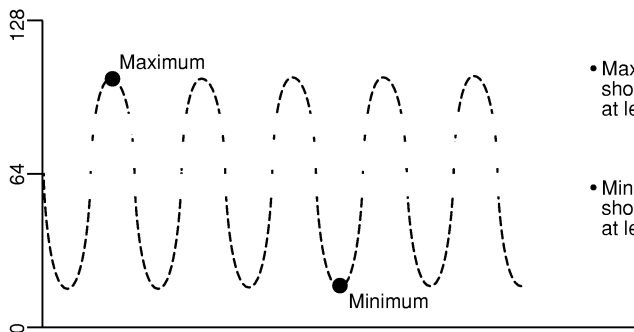
Bank 2
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

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

SEF647Y

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

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



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

SEF648Y

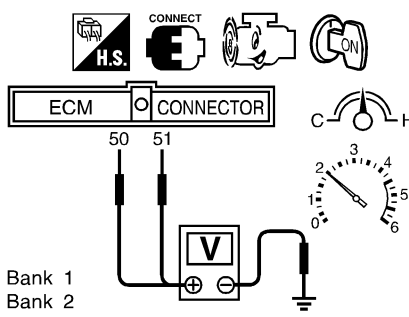
CAUTION:

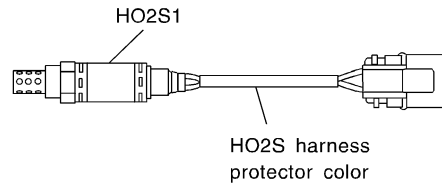
- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved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

OK or NG

OK ► GO TO 5.

NG ► Replace malfunctioning heated oxygen sensor 1.

4	CHECK HEATED OXYGEN SENSOR 1
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground. Check the following with engine speed held at 2,000 rpm constant under no load. 	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  <p>50: Bank 1 51: Bank 2</p> </div> <div style="width: 50%;"> <ul style="list-style-type: none"> • The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least one time. • The minimum voltage is below 0.3V at least one time. • The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>	
SEF796Z	
<p>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.</p>	
OK or NG	
OK	▶ GO TO 6.
NG	▶ GO TO 5.

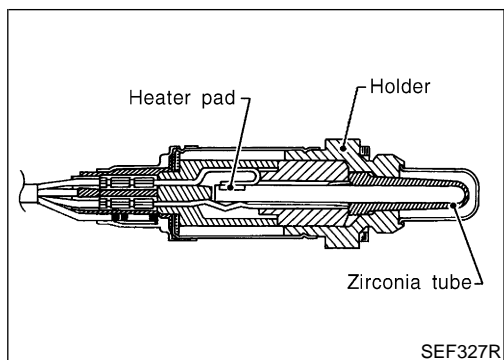
5	REPLACE HEATED OXYGEN SENSOR 1
<ol style="list-style-type: none"> Turn ignition switch "OFF". Check heated oxygen sensor 1 harness protector color. 	
	
<p>HO2S1 (bank 1): Black HO2S1 (bank 2): Blue</p>	
SEF505YB	
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 1.

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Diagnostic Procedure (Cont'd)

6	CHECK HO2S 1 SHIELD CIRCUIT FOR OPEN AND SHORT (IF EQUIPPED)	
1. Turn ignition switch OFF. 2. Disconnect joint connector-2. 3. Check the following. <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to "HARNES LAYOUT", <i>EL-250</i>.) Continuity should exist. 4. Also check harness for short to power. 5. Then reconnect joint connector-2.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Repair open circuit or short to power in harness or connectors.

7	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.		
▶		INSPECTION END



Component Description

NGEC0675

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

CONSULT-II Reference Value in Data Monitor Mode

NGEC0676

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	● Engine: After warming up	Revsing engine from idle up to 2,000 rpm	LEAN ↔ RICH

ECM Terminals and Reference Value

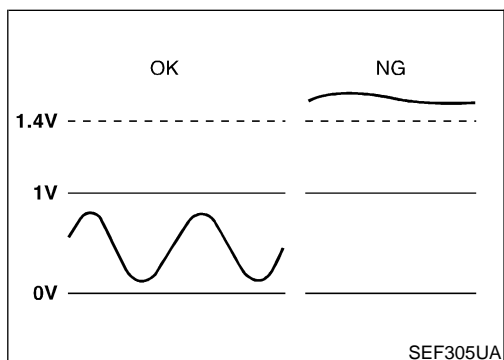
NGEC0677

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 the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (bank 1)	[Engine is running] ● Warm-up condition ● Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V
57	Y	Heated oxygen sensor 2 (bank 2)		



On Board Diagnosis Logic

NGEC0678

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst 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. Malfunction is detected when an excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

=NGEC0678S01

- Harness or connectors
(The sensor circuit is open or shorted.)
- Heated oxygen sensor 2

5

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

SEF189Y

DTC Confirmation Procedure

NGEC0679

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

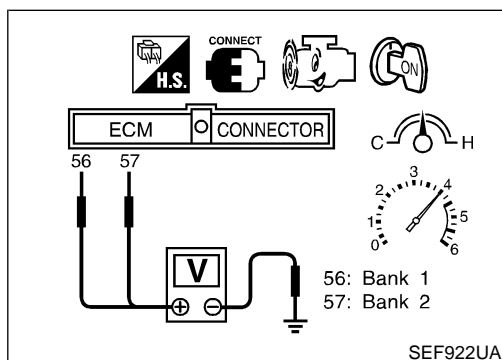
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

- 1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 3) Stop vehicle with engine running.
- 4) Let engine idle for 1 minute.
- 5) Maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	Less than 3,600 rpm
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	Suitable position

- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-838.



Overall Function Check

NGEC0680

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed.

Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground.
- 4) Check the voltage when racing up to 4,000 rpm under no load

at least 10 times.
(depress and release accelerator pedal as soon as possible)

The voltage should be below 1.4V during this procedure.

- 5) If NG, go to "Diagnostic Procedure", EC-838.

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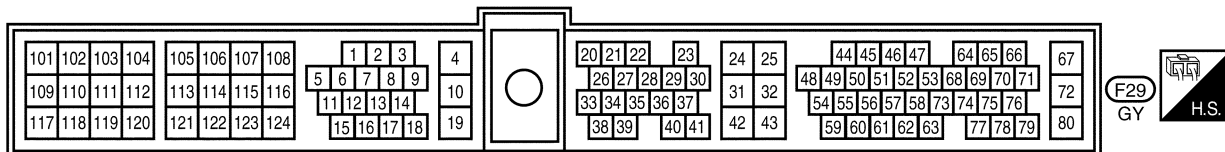
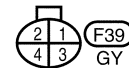
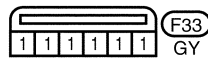
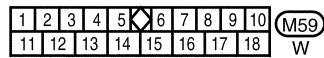
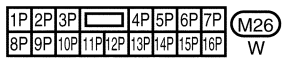
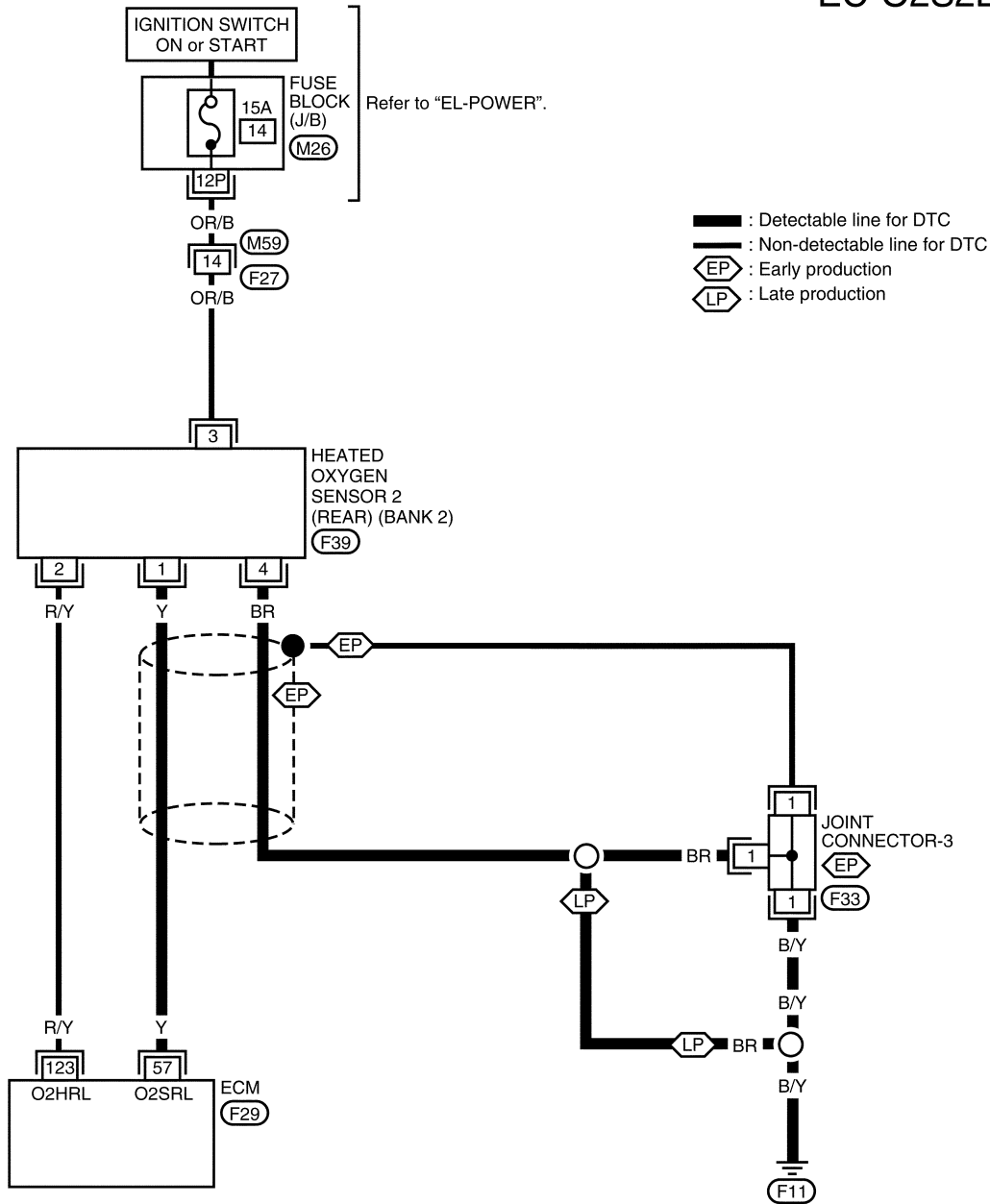
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LEFT BANK

NGEC0681S02

EC-O2S2B2-01



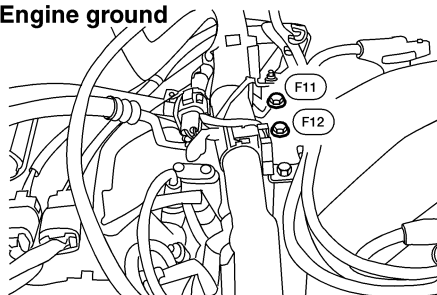
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Diagnostic Procedure

NGEC0682

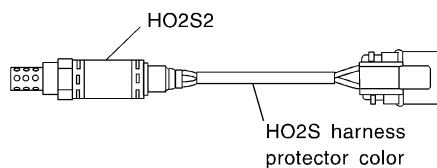
1 INSPECTION START

1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.

Engine ground

3. Check heated oxygen sensor 2 harness protector color.

LEC518



HO2S2 (bank 1): White or Gray
 HO2S2 (bank 2): Red or Red/Brown

SEF372ZA

4. Disconnect corresponding heated oxygen sensor 2 harness connector.
5. Disconnect ECM harness connector.



GO TO 2.


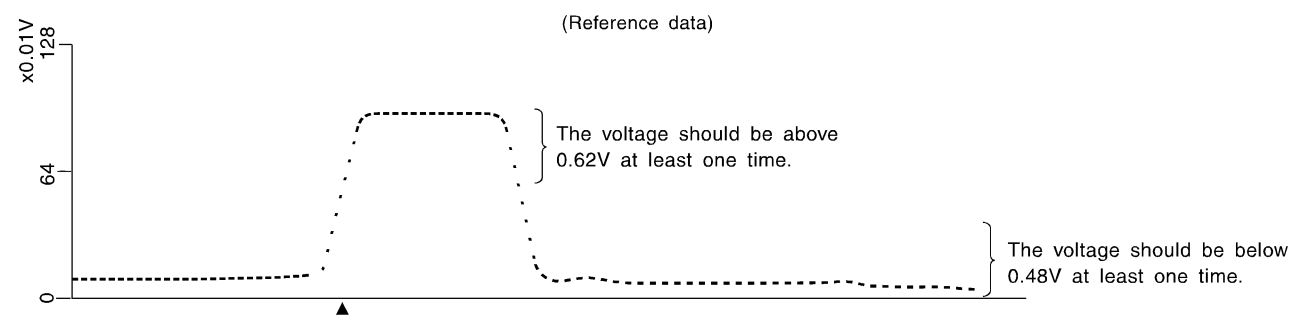
2	CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT															
<p>1. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0138</td> <td style="text-align: center;">56</td> <td style="text-align: center;">1</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0158</td> <td style="text-align: center;">57</td> <td style="text-align: center;">1</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM	Sensor	P0138	56	1	Bank 1 (Right)	P0158	57	1	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM	Sensor														
P0138	56	1	Bank 1 (Right)													
P0158	57	1	Bank 2 (Left)													
SEC663C																
<p style="color: blue; text-align: center;">Continuity should exist.</p> <p>2. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM or sensor</th> <th>Ground</th> </tr> </thead> <tbody> <tr> <td>P0138</td> <td style="text-align: center;">56 or 1</td> <td style="text-align: center;">Ground</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0158</td> <td style="text-align: center;">57 or 1</td> <td style="text-align: center;">Ground</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM or sensor	Ground	P0138	56 or 1	Ground	Bank 1 (Right)	P0158	57 or 1	Ground	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM or sensor	Ground														
P0138	56 or 1	Ground	Bank 1 (Right)													
P0158	57 or 1	Ground	Bank 2 (Left)													
SEC664C																
<p style="color: blue; text-align: center;">Continuity should not exist.</p> <p>3. Also check harness for short to power.</p>																
OK or NG																
OK	▶	GO TO 3.														
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.														

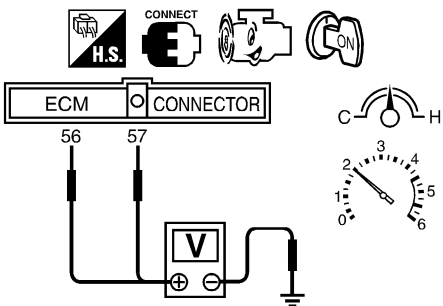
3	CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Check harness continuity between HO2S2 terminal 4 and engine ground. Refer to Wiring Diagram.</p> <p style="color: blue; text-align: center;">Continuity should exist.</p> <p>2. Also check harness for short to power.</p>		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Joint connector-3 (if equipped) ● Harness for open between heated oxygen sensor 2 and engine ground. 		
	▶	Repair open circuit or short to power in harness or connectors.

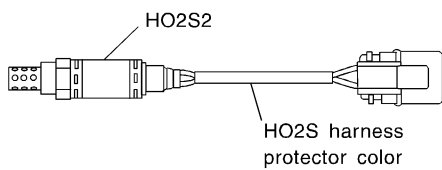
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5	CHECK HO2S2 CONNECTORS FOR WATER	
Check heated oxygen sensor 2 connector and harness connector for water. Water should not exist.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	Repair or replace harness or connectors.

6	CHECK HEATED OXYGEN SENSOR 2	
<p> With CONSULT-II</p> <ol style="list-style-type: none"> Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. Stop vehicle with engine running. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$. 		
<div style="display: flex; align-items: center;">  </div> <p style="text-align: right;">SEF989RD</p>		
<p>"HO2S2 (B1)/(B2)" should be above 0.62V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)/(B2)" should be below 0.48V at least once when the "FUEL INJECTION" is -25%.</p> <p>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.</p>		
OK or NG		
OK	▶	GO TO 9.
NG	▶	GO TO 8.

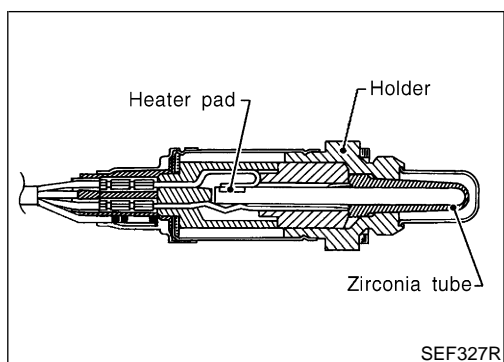
7	CHECK HEATED OXYGEN SENSOR 2						
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground. 4. Check the voltage when racing up to 4,000 rpm under no load at least 10 times. (depress and release accelerator pedal as soon as possible) <div style="display: flex; align-items: center; justify-content: center; margin: 10px 0;">  <div style="margin-left: 20px;"> <p>The voltage should be above 0.62V at least once during this procedure.</p> </div> </div> <p style="text-align: right; font-size: small;">SEF797ZB</p> <ol style="list-style-type: none"> 5. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T). The voltage should be below 0.48V at least once during this procedure. <p>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.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 9.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 8.</td> </tr> </table>		OK	▶	GO TO 9.	NG	▶	GO TO 8.
OK	▶	GO TO 9.					
NG	▶	GO TO 8.					

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8	REPLACE HEATED OXYGEN SENSOR 2			
<ol style="list-style-type: none"> 1. Stop vehicle and turn ignition switch OFF. 2. Check heated oxygen sensor 2 (rear) harness protector color. <div style="text-align: center; margin: 10px 0;">  </div> <div style="text-align: center; margin: 10px 0;"> <p>HO2S2 (bank 1): White or Gray HO2S2 (bank 2): Red or Red/Brown</p> </div> <p style="text-align: right; font-size: small;">SEF372ZA</p> <p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 20%;"></td> <td style="width: 5%; text-align: center;">▶</td> <td>Replace malfunctioning heated oxygen sensor 2.</td> </tr> </table>			▶	Replace malfunctioning heated oxygen sensor 2.
	▶	Replace malfunctioning heated oxygen sensor 2.		

9	CHECK HO2S2 SHIELD CIRCUIT FOR OPEN AND SHORT (IF EQUIPPED)	
<p>1. Turn ignition switch OFF. 2. Disconnect joint connector. 3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to EL-250, "HARNES LAYOUT".) Continuity should exist. <p>4. Also check harness for short to power. 5. Then reconnect joint connector.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 10.
NG	▶	Repair open circuit or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.		
	▶	INSPECTION END



Component Description

NGEC0667

The heated oxygen sensor 2, after three way catalyst, monitors the oxygen level in the exhaust gas on each bank.

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

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0668

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	● Engine: After warming up	Revsing engine from idle up to 2,000 rpm	LEAN ↔ RICH

ECM Terminals and Reference Value

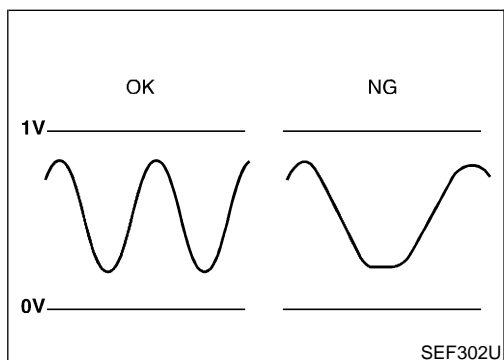
NGEC0669

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 the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (bank 1)	[Engine is running] ● Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V
57	Y	Heated oxygen sensor 2 (bank 2)		



On Board Diagnosis Logic

NGEC0670

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst 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.

Malfunction is detected when it takes more time for the sensor to respond between rich and lean than the specified time.

POSSIBLE CAUSE

NGEC0670S01

- Harness or connectors
(The sensor circuit is open or shorted.)
- Heated oxygen sensor 2
- Fuel pressure
- Injectors
- Intake air leaks


6
HO2S2 (B1) P0139

WAIT
OPEN ENGINE HOOD.
KEEP ENGINE RUNNING AT
IDLE SPEED FOR MAXIMUM
OF 5 MINUTES.

SEF666Y

8
HO2S2 (B1) P0139

MAINTAIN
1800 - 2800 RPM UNTIL FINAL
RESULT APPEARS.



SEF667Y

8
HO2S2 (B1) P0139

COMPLETED

SELF-DIAG RESULTS

SEF668Y

DTC Confirmation Procedure

NGEC0671

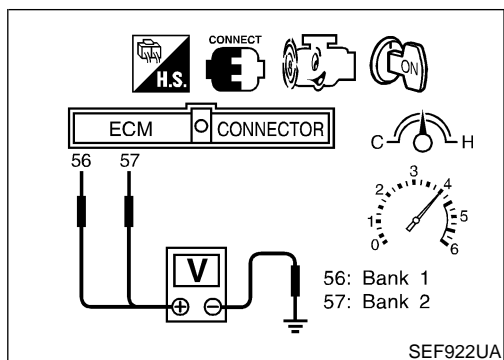
NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Open engine hood before conducting following procedure With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Make sure that "COOLANT TEMP/S" is more than 70°C (158°F).
- 6) Select "HO2S2 (B1)/(B2) P0139/P0159" of "HO2S2" in DTC WORK SUPPORT" mode with CONSULT-II.
- 7) Start engine and follow the instructions of CONSULT-II.
- 8) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
If NG is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-848.
If "CAN NOT BE DIAGNOSED" is displayed, perform the following.
 - a) Stop engine and cool down "COOLANT TEMP/SE" to less than 70°C (158°F).
 - b) Turn ignition switch ON.
 - c) Select "DATA MONITOR" mode with CONSULT-II.
 - d) Start engine.
 - e) Perform from step 6) again when the "COOLANT TEMP/S" reaches to 70°C (158°F)



Overall Function Check

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. =NGEC0672

CAUTION:

Always drive vehicle at a safe speed.

⊗ Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground.
- 4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
(depress and release accelerator pedal as soon as possible)
The voltage should change at more than 0.06V for 1 second during this procedure.
If the voltage can be confirmed in step 4, step 5 is not necessary.
- 5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T).
The voltage should change at more than 0.06V for 1 second during this procedure.
- 6) If NG, go to "Diagnostic Procedure", EC-848.

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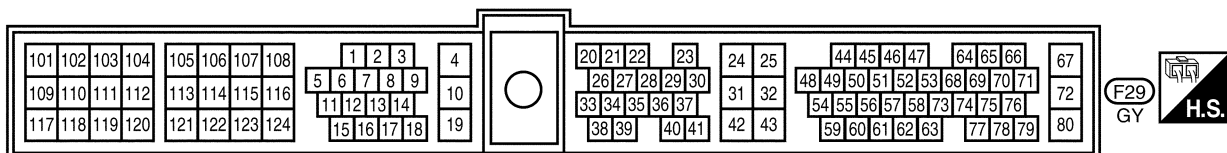
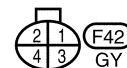
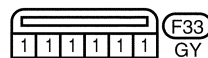
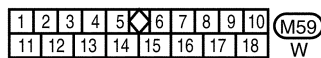
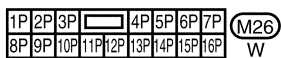
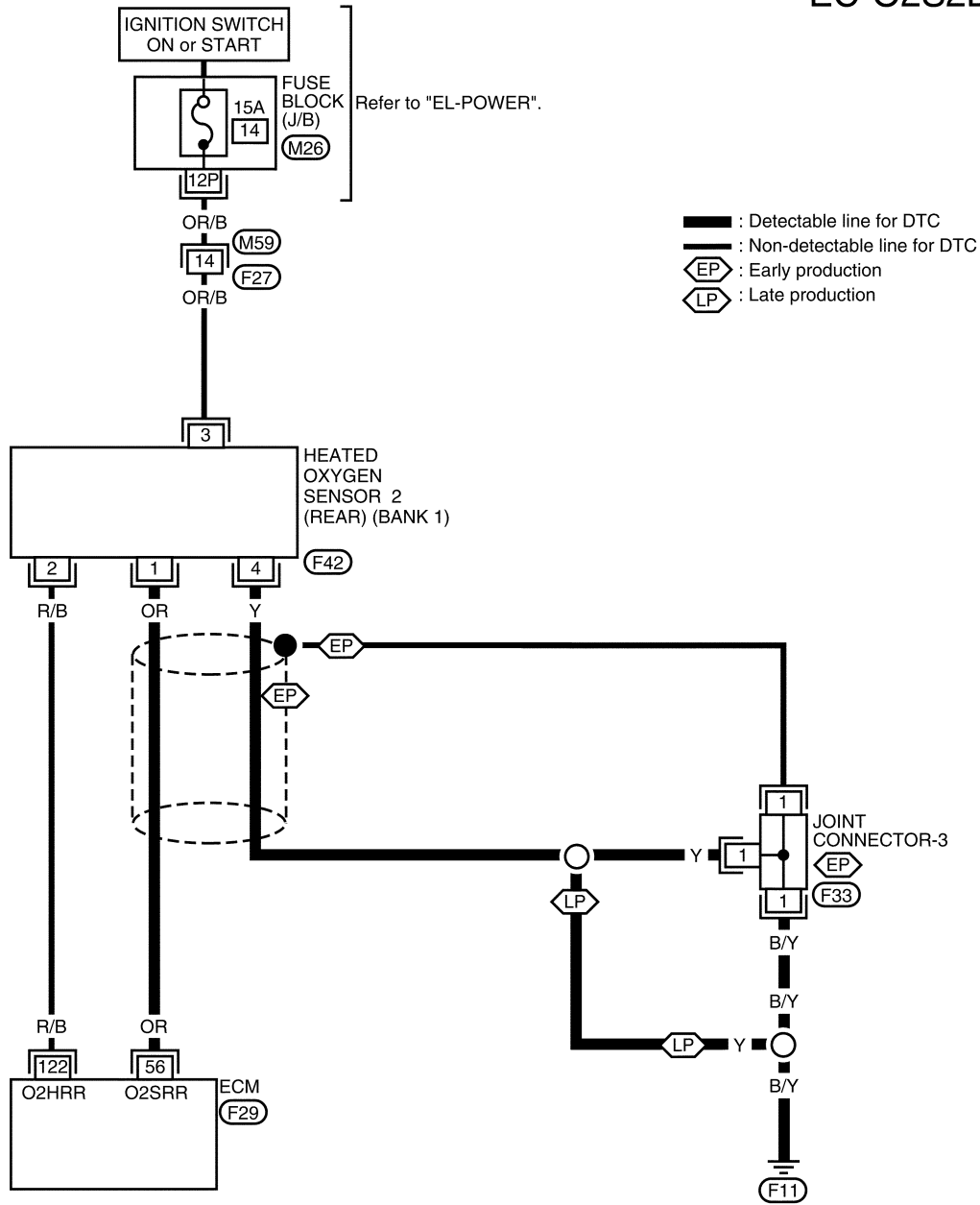
Wiring Diagram

NGEC0673

NGEC0673S01

RIGHT BANK

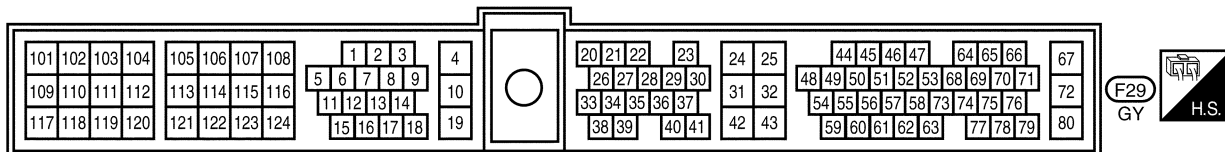
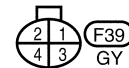
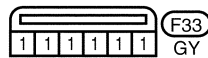
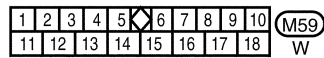
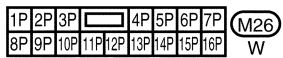
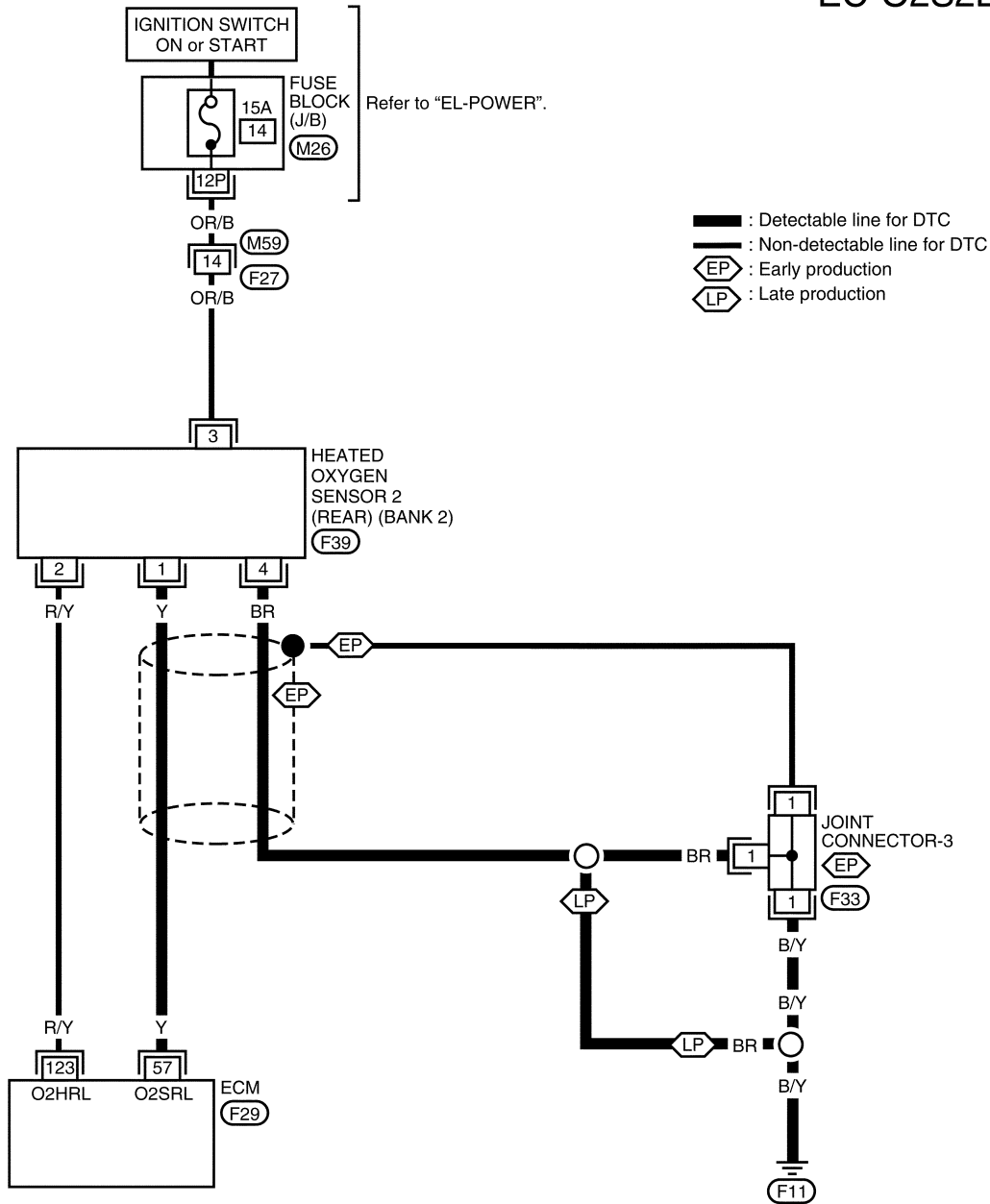
EC-O2S2B1-01



LEFT BANK

NGEC0673S02

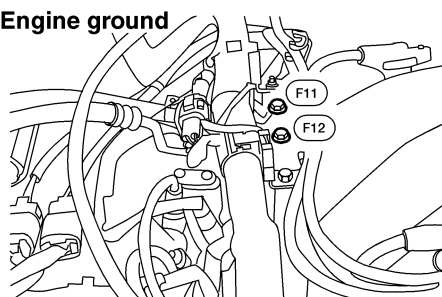
EC-O2S2B2-01



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Diagnostic Procedure

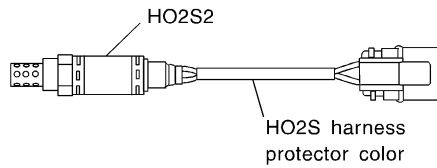
NGEC0674

1	RETIGHTEN GROUND SCREWS
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws. 	
 <p style="margin: 0;">Engine ground</p>	
LEC518	
▶ GO TO 2.	

2	CLEAR THE SELF-LEARNING DATA								
<p>☑ With CONSULT-II</p> <ol style="list-style-type: none"> 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". 									
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2" style="padding: 2px;">WORK SUPPORT</th> </tr> <tr> <td style="padding: 2px;">SELF-LEARNING CONT</td> <td style="padding: 2px;">CLEAR</td> </tr> <tr> <td></td> <td style="padding: 2px;">B1 100 %</td> </tr> <tr> <td></td> <td style="padding: 2px;">B2 100 %</td> </tr> </table>		WORK SUPPORT		SELF-LEARNING CONT	CLEAR		B1 100 %		B2 100 %
WORK SUPPORT									
SELF-LEARNING CONT	CLEAR								
	B1 100 %								
	B2 100 %								
SEF968Y									
<ol style="list-style-type: none"> 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? 									
<p>☒ Without CONSULT-II</p> <ol style="list-style-type: none"> 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 1st trip DTC P0102 is displayed. 6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-673. 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-853, 862.								
No ▶	GO TO 3.								

3 CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

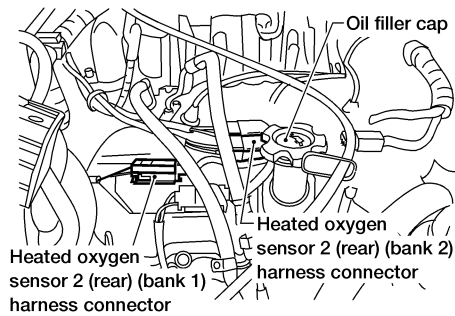
1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 harness protector color.



HO2S2 (bank 1): White or Gray
 HO2S2 (bank 2): Red or Red/Brown

SEF372ZA

3. Disconnect corresponding heated oxygen sensor 2 harness connector.



WEC546

4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0139	56	1	Bank 1 (Right)
P0159	57	1	Bank 2 (Left)

MTBL0591

Continuity should exist.

6. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0139	56 or 1	Ground	Bank 1 (Right)
P0159	57 or 1	Ground	Bank 2 (Left)

MTBL0592

Continuity should not exist.

7. Also check harness for short to power.

OK or NG

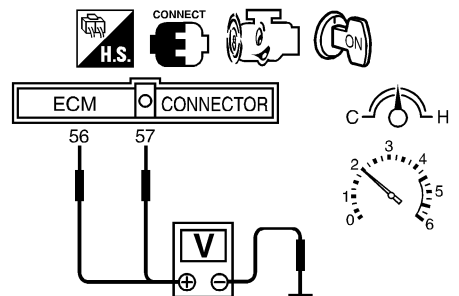
OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

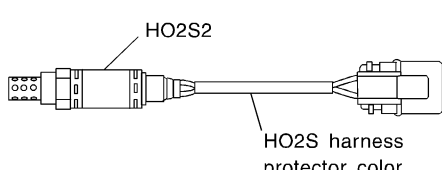
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4	CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT	
1. Check harness continuity between HO2S2 terminal 4 and engine ground. Refer to Wiring Diagram. Continuity should exist.		
2. Also check harness for short to power.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Joint connector-3 (if equipped) ● Harness for open between heated oxygen sensor 2 and engine ground. 		
	▶	Repair open circuit or short to power in harness or connectors.

6	CHECK HEATED OXYGEN SENSOR 2	
(P) With CONSULT-II		
1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II. 4. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.		
(Reference data)		
"HO2S2 (B1)/(B2)" should be above 0.62V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)/(B2)" should be below 0.48V at least once when the "FUEL INJECTION" is -25%.		
CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	GO TO 8.

7	CHECK HEATED OXYGEN SENSOR 2						
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground. 4. Check the voltage when racing up to 4,000 rpm under no load at least 10 times. (depress and release accelerator pedal as soon as possible) <div style="display: flex; align-items: center; justify-content: center; margin: 10px 0;">  <div style="margin-left: 20px;"> <p>The voltage should be above 0.62V at least once during this procedure.</p> </div> </div> <p style="text-align: right; margin-right: 50px;">SEF797ZB</p> <ol style="list-style-type: none"> 5. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T). The voltage should be below 0.48V at least once during this procedure. <p>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.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 9.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 8.</td> </tr> </table>		OK	▶	GO TO 9.	NG	▶	GO TO 8.
OK	▶	GO TO 9.					
NG	▶	GO TO 8.					

8	REPLACE HEATED OXYGEN SENSOR 2			
<ol style="list-style-type: none"> 1. Stop vehicle and turn ignition switch OFF. 2. Check heated oxygen sensor 2 (rear) harness protector color. <div style="text-align: center; margin: 10px 0;">  </div> <div style="text-align: center; margin: 10px 0;"> <p>HO2S2 (bank 1): White or Gray HO2S2 (bank 2): Red or Red/Brown</p> </div> <p style="text-align: right; margin-right: 50px;">SEF372ZA</p> <p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%;"></td> <td style="width: 10%; text-align: center;">▶</td> <td>Replace malfunctioning heated oxygen sensor 2.</td> </tr> </table>			▶	Replace malfunctioning heated oxygen sensor 2.
	▶	Replace malfunctioning heated oxygen sensor 2.		

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9	CHECK HO2S2 SHIELD CIRCUIT FOR OPEN AND SHORT (IF EQUIPPED)	
<p>1. Turn ignition switch OFF. 2. Disconnect joint connector. 3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to "HARNES LAYOUT", <i>EL-250</i> .) <p>Continuity should exist.</p> <p>4. Also check harness for short to power. 5. Then reconnect joint connector.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 10.
NG	▶	Repair open circuit or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.		
	▶	INSPECTION END

On Board Diagnosis Logic

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and light up the MIL (2 trip detection logic).

NGEC0690

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensors 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Injectors

Malfunction is detected when fuel injection system does not operate properly, the amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)

POSSIBLE CAUSE

NGEC0690S01

- Intake air leaks
- Heated oxygen sensor 1
- Injectors
- Exhaust gas leaks
- Incorrect fuel pressure
- Lack of fuel
- Mass air flow sensor
- PCV system (Loose or disconnected rubber tube)

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4	WORK SUPPORT		
	SELF-LEARNING CONT	CLEAR	B1 100 % B2 100 %
			SEF968Y

DTC Confirmation Procedure

=NGEC0691

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 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 5 seconds.
- 3) Turn ignition switch ON and select "SELF-LEARN CONTROL" in "WORK SUPPORT" mode with CONSULT-II.
- 4) Clear the self-learning control coefficient by touching "CLEAR".
- 5) Select "DATA MONITOR" mode with CONSULT-II.
- 6) Start engine again and let it idle for at least 10 minutes.
The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-857.
- 7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
- 8) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-857. If engine does not start, check exhaust and intake air leak visually.

With GST

Follow the procedure "With CONSULT-II".

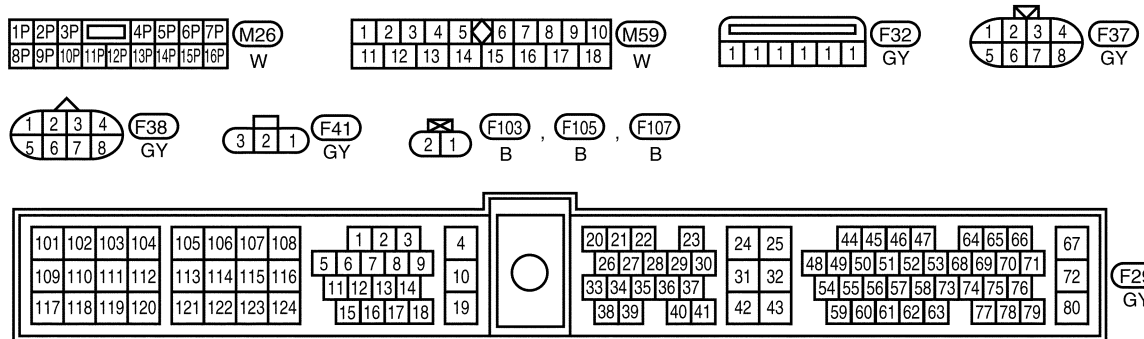
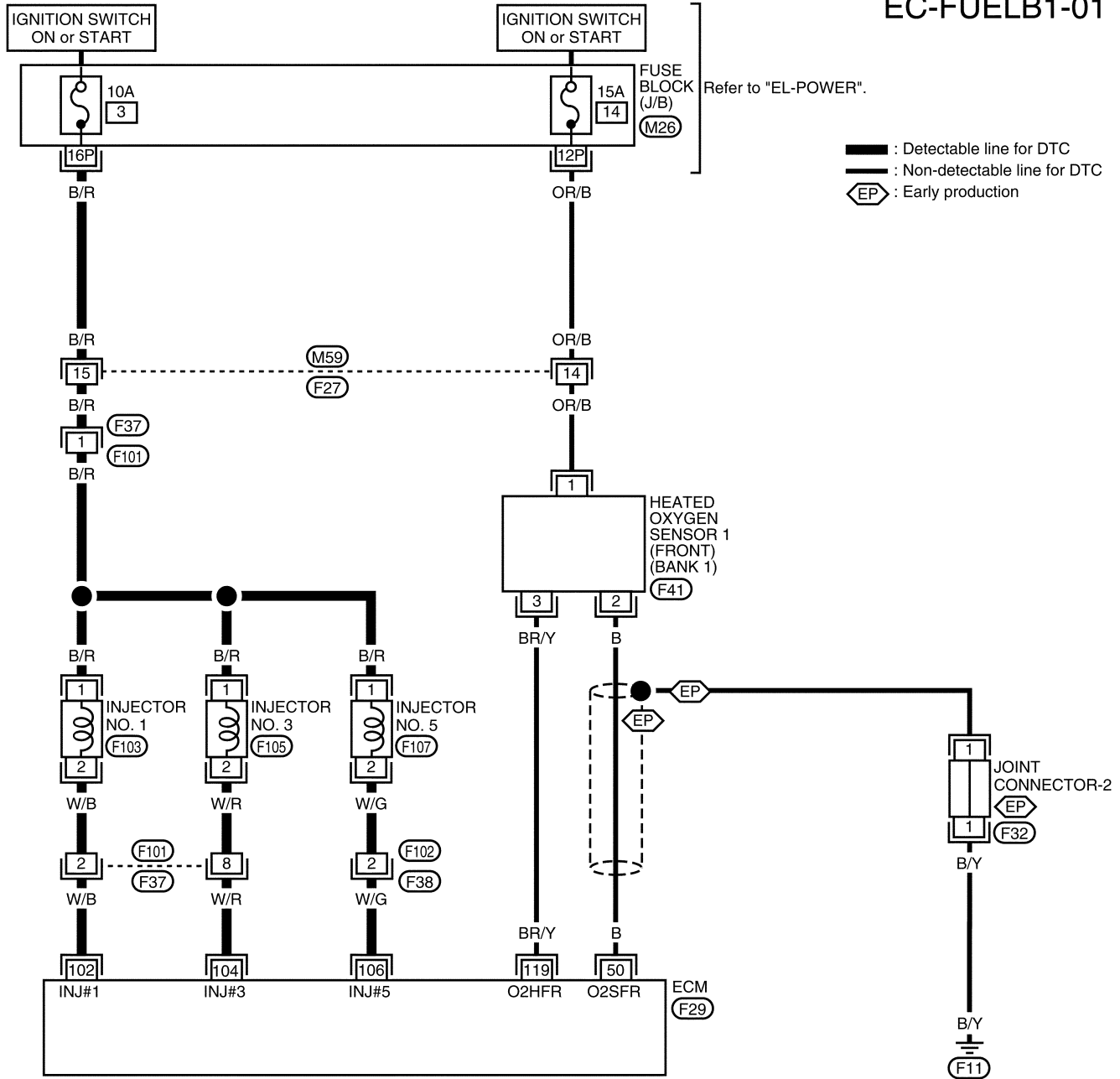
Wiring Diagram

NGEC0692

NGEC0692S01

RIGHT BANK

EC-FUELB1-01



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DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

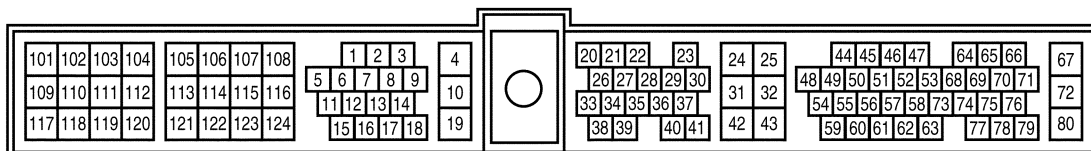
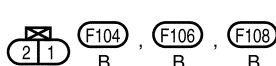
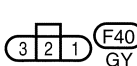
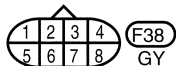
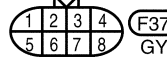
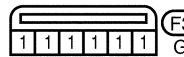
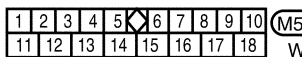
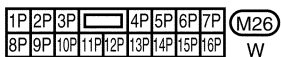
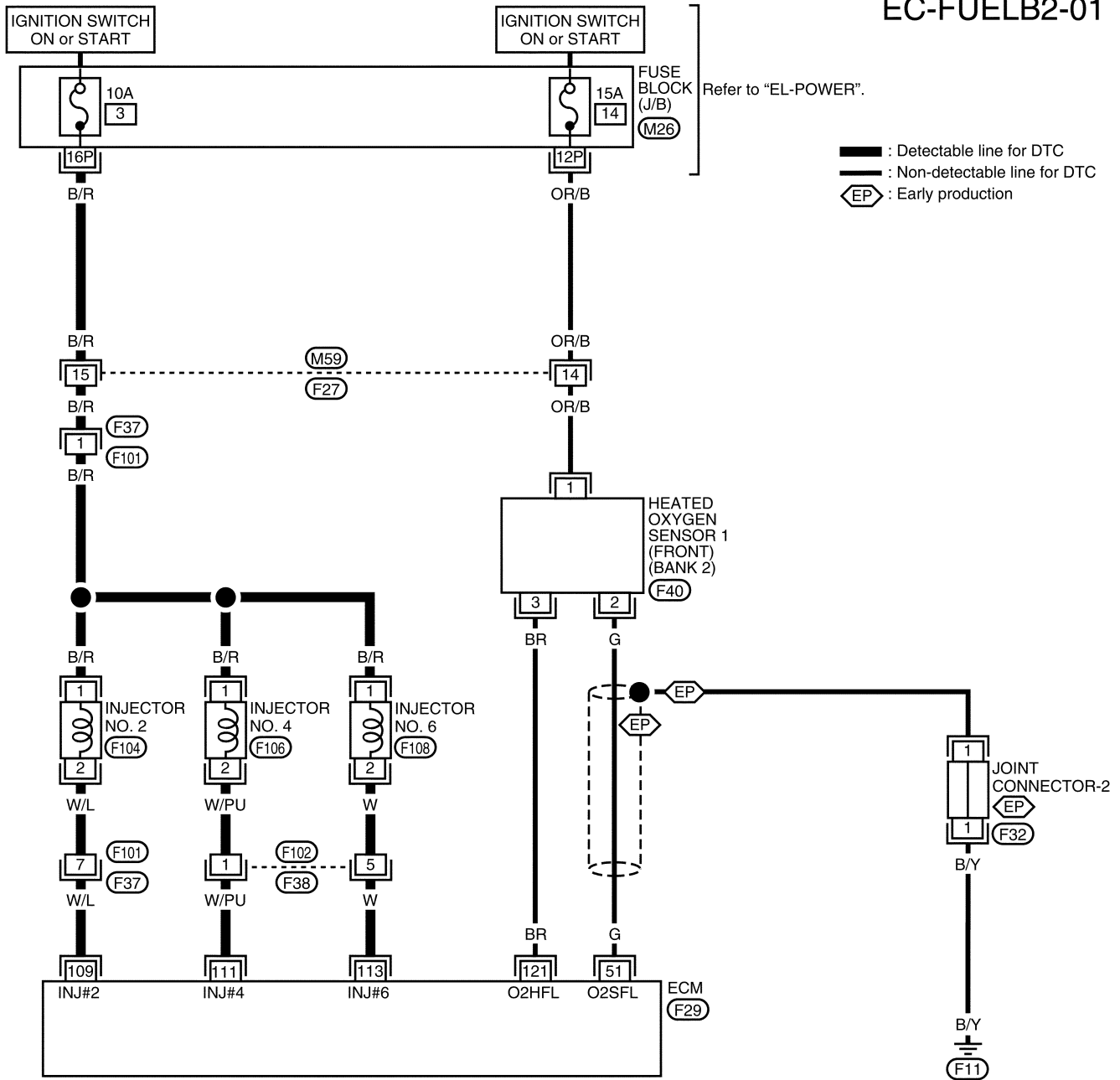
VG33E

Wiring Diagram (Cont'd)

NGEC0692S02

LEFT BANK

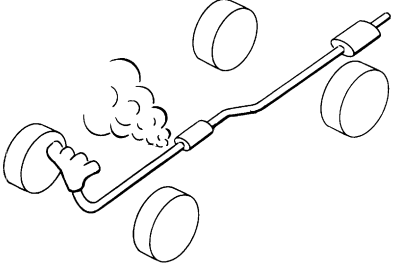
EC-FUEL2-01



WEC177A

Diagnostic Procedure

NGEC0693

1	CHECK EXHAUST AIR LEAK	
<p>1. Start engine and run it at idle. 2. Listen for an exhaust air leak before three way catalyst.</p>		
		
SEF099P		
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 FOR PCV HOSE	
Check PCV hose for loose connection or disconnection.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace.

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4	CHECK HEATED OXYGEN SENSOR 1 CIRCUIT FOR OPEN AND SHORT															
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect corresponding heated oxygen sensor 1 harness connector.</p> <p>3. Disconnect ECM harness connector.</p> <p>4. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0171</td> <td style="text-align: center;">50</td> <td style="text-align: center;">2</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0174</td> <td style="text-align: center;">51</td> <td style="text-align: center;">2</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM	Sensor	P0171	50	2	Bank 1 (Right)	P0174	51	2	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM	Sensor														
P0171	50	2	Bank 1 (Right)													
P0174	51	2	Bank 2 (Left)													
SEF831Z																
<p style="color: blue;">Continuity should exist.</p> <p>5. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM or sensor</th> <th>Ground</th> </tr> </thead> <tbody> <tr> <td>P0171</td> <td style="text-align: center;">50 or 2</td> <td style="text-align: center;">Ground</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0174</td> <td style="text-align: center;">51 or 2</td> <td style="text-align: center;">Ground</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM or sensor	Ground	P0171	50 or 2	Ground	Bank 1 (Right)	P0174	51 or 2	Ground	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM or sensor	Ground														
P0171	50 or 2	Ground	Bank 1 (Right)													
P0174	51 or 2	Ground	Bank 2 (Left)													
SEF832Z																
<p style="color: blue;">Continuity should not exist.</p> <p>6. Also check harness for short to power.</p>																
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 PRESSURE	
<p>1. Release fuel pressure to zero. Refer to EC-644.</p> <p>2. Install fuel pressure gauge and check fuel pressure.</p> <p style="color: blue;">At idling:</p> <p style="color: blue;">When fuel pressure regulator valve vacuum hose is connected. 235 kPa (2.4 kg/cm², 34 psi)</p> <p style="color: blue;">When fuel pressure regulator valve vacuum hose is disconnected. 294 kPa (3.0 kg/cm², 43 psi)</p>		
OK or NG		
OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Fuel pump and circuit (Refer to EC-1153.) ● Fuel pressure regulator (Refer to EC-645.) ● Fuel lines (Refer to "ENGINE MAINTENANCE", MA-26.) ● Fuel filter for clogging 		
▶	Repair or replace.	
7	CHECK MASS AIR FLOW SENSOR	
ⓘ With CONSULT-II <ol style="list-style-type: none"> 1. Install all parts removed. 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. <ul style="list-style-type: none"> 3.3 - 4.8 g-m/sec: at idling 12.0 - 14.9 g-m/sec: at 2,500 rpm 		
ⓘ With GST <ol style="list-style-type: none"> 1. Install all parts removed. 2. Check mass air flow sensor signal in MODE 1 with GST. <ul style="list-style-type: none"> 3.3 - 4.8 g-m/sec: at idling 12.0 - 14.9 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 engine grounds. Refer to EC-761.

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8 CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

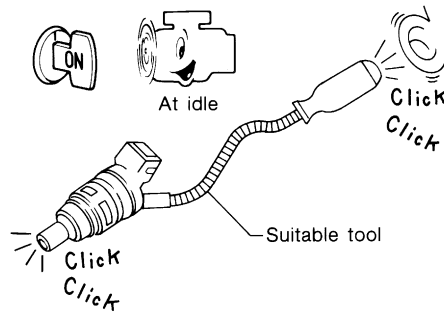
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX %

SEF981Z

3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.



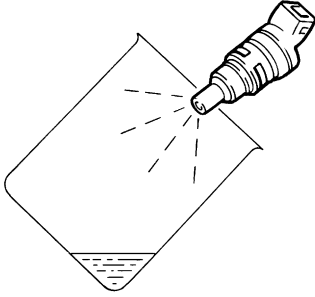
MEC703B

Clicking noise should be heard.

OK or NG

OK	▶	GO TO 9.
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NG	▶	Perform trouble diagnosis for "INJECTORS", EC-1145.
----	---	---

9	CHECK INJECTOR	
<ol style="list-style-type: none"> 1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle. 2. Turn ignition switch OFF. 3. Disconnect injector harness connectors on left bank (for DTC P0171), right bank (for DTC P0174). 4. Remove injector gallery assembly. Refer to EC-645. Keep fuel hose and all injectors connected to injector gallery. The injector harness connectors on right bank (for DTC P0171), left bank (for DTC P0174) should remain connected. 5. Disconnect all ignition coil harness connectors. 6. Prepare pans or saucers under each injector. 7. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors. 		
		
<p>Fuel should be sprayed evenly for each injector.</p> <p>SEF595Q</p>		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Replace injectors from which fuel does not spray out. Always replace O-ring with new ones.

10	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.		
▶		INSPECTION END

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On Board Diagnosis Logic

NGEC0694

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and light up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensors 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Injectors

Malfunction is detected when fuel injection system does not operate properly, the amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)

POSSIBLE CAUSE

NGEC0694S01

- Heated oxygen sensor 1
- Injectors
- Exhaust gas leaks
- Incorrect fuel pressure
- Mass air flow sensor

4	WORK SUPPORT		
	SELF-LEARNING CONT	CLEAR	B1 100 % B2 100 %
			SEF968Y

DTC Confirmation Procedure

=NGEC0695

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 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 5 seconds.
- 3) Turn ignition switch ON and select "SELF-LEARN CONTROL" in "WORK SUPPORT" mode with CONSULT-II.
- 4) Clear the self-learning control coefficient by touching "CLEAR".
- 5) Select "DATA MONITOR" mode with CONSULT-II.
- 6) Start engine again and let it idle for at least 10 minutes.
The 1st trip DTC P0172, P0175 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-866.
- 7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
- 8) Crank engine while depressing accelerator pedal.
If engine starts, go to "Diagnostic Procedure", EC-866. If engine does not start, remove ignition plugs and check for fouling, etc.

With GST

Follow the procedure "With CONSULT-II".

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DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

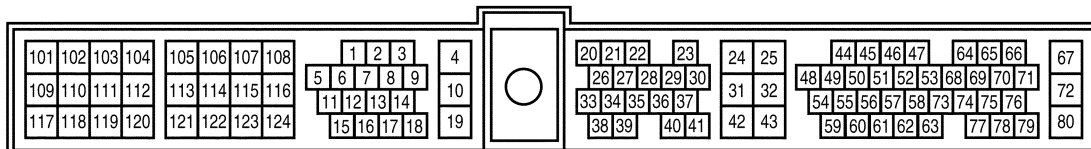
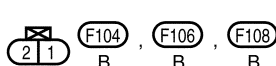
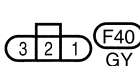
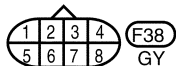
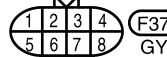
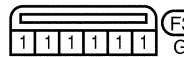
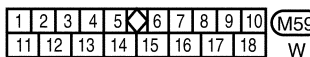
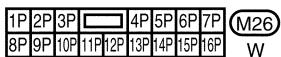
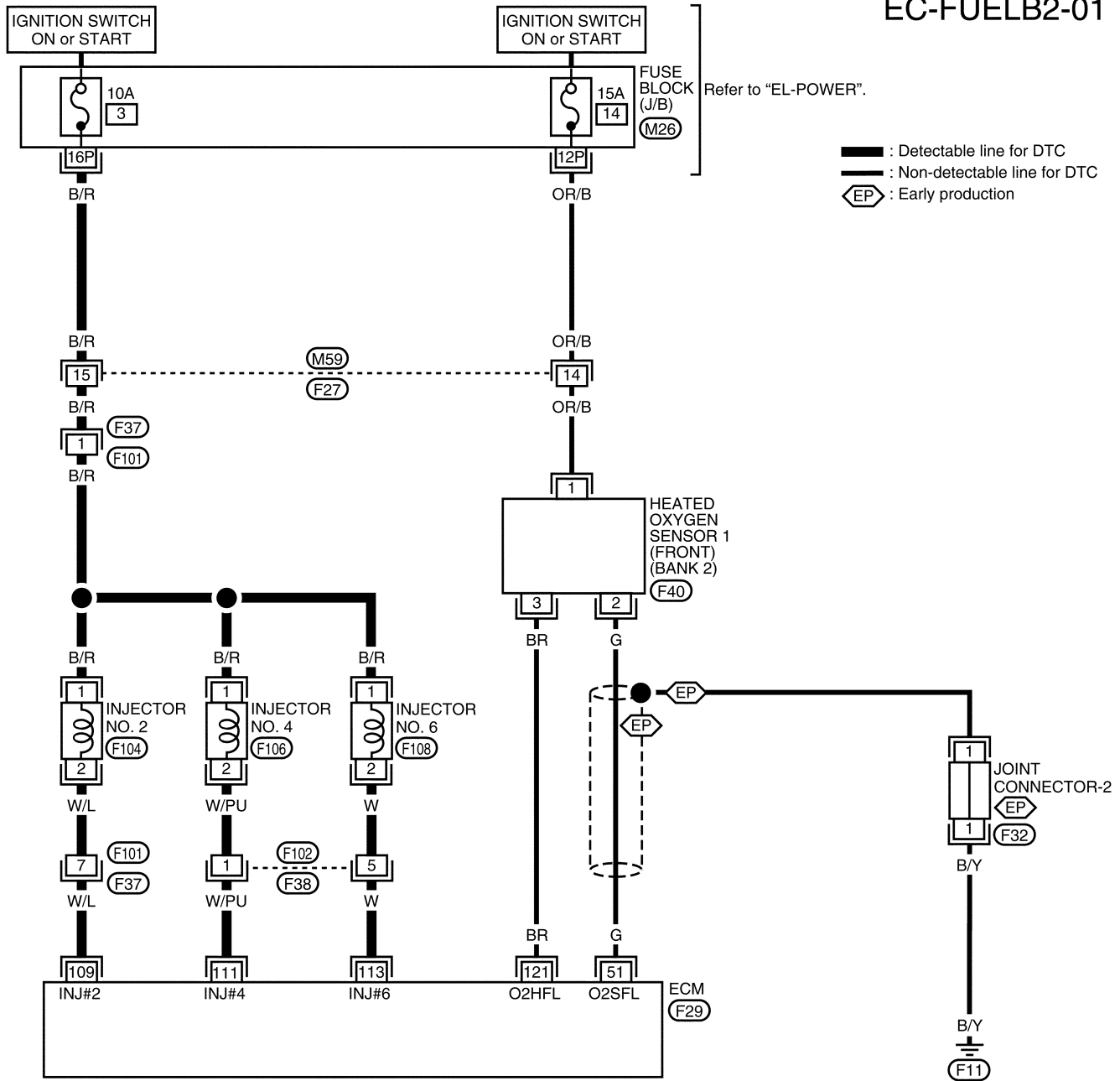
VG33E

Wiring Diagram (Cont'd)

NGEC0696S02

LEFT BANK

EC-FUEL2-01

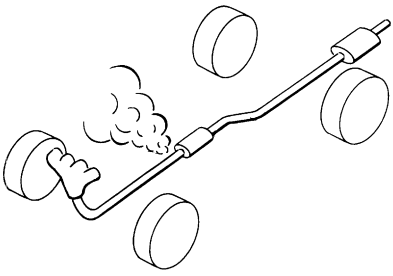


WEC177A

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Diagnostic Procedure

NGEC0697

1	CHECK EXHAUST AIR LEAK	
<p>1. Start engine and run it at idle. 2. Listen for an exhaust air leak before three way catalyst.</p>		
 <p>The diagram shows a cross-section of an exhaust manifold. A hand is shown pointing to a cloud of smoke or air escaping from a joint in the manifold. There are four circular ports shown: two on the left and two on the right, representing the exhaust valves.</p>		
SEF099P		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair or replace.

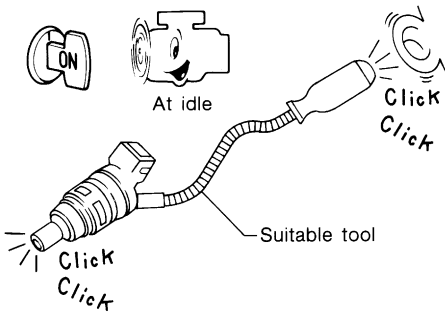
2	CHECK FOR INTAKE AIR LEAK	
Listen for an intake air leak after the mass air flow sensor.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace.

3	CHECK HEATED OXYGEN SENSOR 1 CIRCUIT FOR OPEN AND SHORT															
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect corresponding heated oxygen sensor 1 harness connector.</p> <p>3. Disconnect ECM harness connector.</p> <p>4. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.</p>																
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DTC	Terminals			Bank												
	ECM	Sensor														
P0172	50	2	Bank 1 (Right)													
P0175	51	2	Bank 2 (Left)													
SEF833Z																
<p style="color: blue;">Continuity should exist.</p> <p>5. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows. Refer to Wiring Diagram.</p>																
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DTC	Terminals			Bank												
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P0172	50 or 2	Ground	Bank 1 (Right)													
P0175	51 or 2	Ground	Bank 2 (Left)													
SEF834Z																
<p style="color: blue;">Continuity should not exist.</p> <p>6. Also check harness for short to power.</p>																
OK or NG																
OK	▶	GO TO 4.														
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.														

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4	CHECK FUEL PRESSURE	
<p>1. Release fuel pressure to zero. Refer to EC-644.</p> <p>2. Install fuel pressure gauge and check fuel pressure.</p> <p style="color: blue;">At idling:</p> <p style="color: blue;">When fuel pressure regulator valve vacuum hose is connected. 235 kPa (2.4 kg/cm², 34 psi)</p> <p style="color: blue;">When fuel pressure regulator valve vacuum hose is disconnected. 294 kPa (3.0 kg/cm², 43 psi)</p>		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Fuel pump and circuit (Refer to EC-1153.) ● Fuel pressure regulator (Refer to EC-645.) 		
▶		Repair or replace.
6	CHECK MASS AIR FLOW SENSOR	
ⓘ With CONSULT-II <ol style="list-style-type: none"> 1. Install all parts removed. 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. 3.3 - 4.8 g-m/sec: at idling 12.0 - 14.9 g-m/sec: at 2,500 rpm 		
ⓘ With GST <ol style="list-style-type: none"> 1. Install all parts removed. 2. Check mass air flow sensor signal in MODE 1 with GST. 3.3 - 4.8 g-m/sec: at idling 12.0 - 14.9 g-m/sec: at 2,500 rpm 		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-761.

7	CHECK FUNCTION OF INJECTORS																
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> Start engine. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II. 																	
<table border="1" style="margin: auto;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>POWER BALANCE</td><td></td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>MAS A/F SE-B1</td><td>XXX V</td></tr> <tr><td>IACV-AAC/V</td><td>XXX %</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>		ACTIVE TEST		POWER BALANCE		MONITOR		ENG SPEED	XXX rpm	MAS A/F SE-B1	XXX V	IACV-AAC/V	XXX %				
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POWER BALANCE																	
MONITOR																	
ENG SPEED	XXX rpm																
MAS A/F SE-B1	XXX V																
IACV-AAC/V	XXX %																
<p>3. Make sure that each circuit produces a momentary engine speed drop.</p>																	
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine. Listen to each injector operating sound. 																	
																	
<p>Clicking noise should be heard.</p>																	
<p>OK or NG</p>																	
OK	▶ GO TO 8.																
NG	▶ Perform trouble diagnosis for "INJECTORS", EC-1145.																

SEF981Z

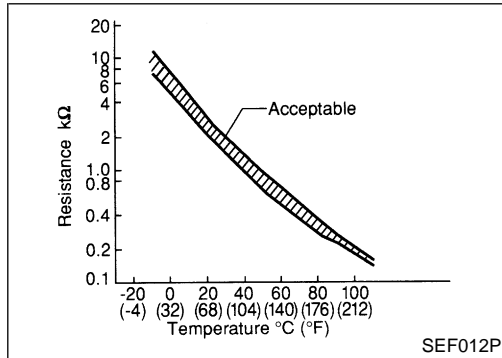
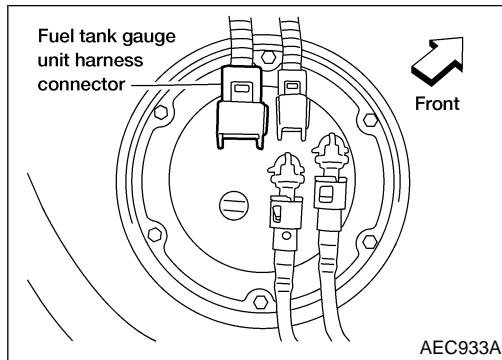
MEC703B

8	CHECK INJECTOR
<ol style="list-style-type: none"> Remove injector assembly. Refer to EC-645. Keep fuel hose and all injectors connected to injector gallery. Confirm that the engine is cooled down and there are no fire hazards near the vehicle. Disconnect injector harness connectors left bank (for DTC P0172), right bank (for P0175). The injector harness connectors on right bank (for P0172), left bank (for P0175) should remain connected. Disconnect all ignition coil harness connectors. Prepare pans or saucers under each injectors. Crank engine for about 3 seconds. Make sure fuel does not drip from injector. 	
<p>OK or NG</p>	
OK (Does not drip)	▶ GO TO 9.
NG (Drips)	▶ Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

9	CHECK INTERMITTENT INCIDENT
<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.</p>	
▶	INSPECTION END

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Component Description



Component Description

NGEC0698

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

<Reference data>

Fluid temperature °C (°F)	Voltage* (V)	Resistance (kΩ)
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: These data are reference values and are measured between ECM terminal 60 (Fuel tank temperature sensor) and ground.

CAUTION:

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

On Board Diagnosis Logic

NGEC0699

Malfunction is detected when an excessively high (P0183) or low (P0182) voltage is sent to ECM, rationally incorrect voltage (P0181) from the sensor is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.

POSSIBLE CAUSE

NGEC0699S01

- Harness or connectors
(The sensor circuit is open or shorted.)
- Fuel tank temperature sensor

DTC Confirmation Procedure

=NGEC0700

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C

SEF174Y

④ With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 10 seconds.
If the result is NG, go to "Diagnostic Procedure", EC-873.
If the result is OK, go to following step.
- 4) Check "COOLAN TEMP/S" value.
If "COOLAN TEMP/S" is less than 60°C (140°F), the result will be OK.
If "COOLAN TEMP/S" is above 60°C (140°F), go to the following step.
- 5) Cool engine down until "COOLAN TEMP/S" is less than 60°C (140°F).
- 6) Wait at least 10 seconds.
- 7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-873.

④ With GST

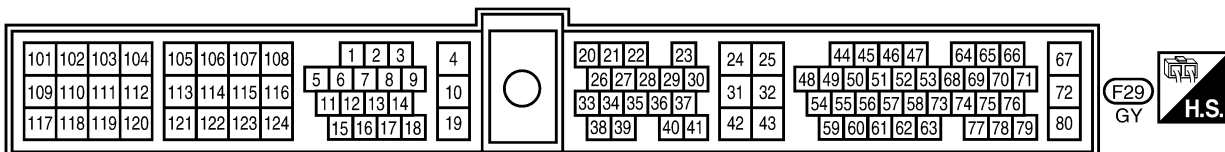
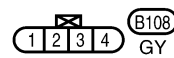
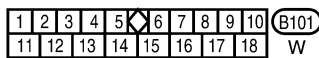
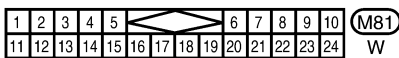
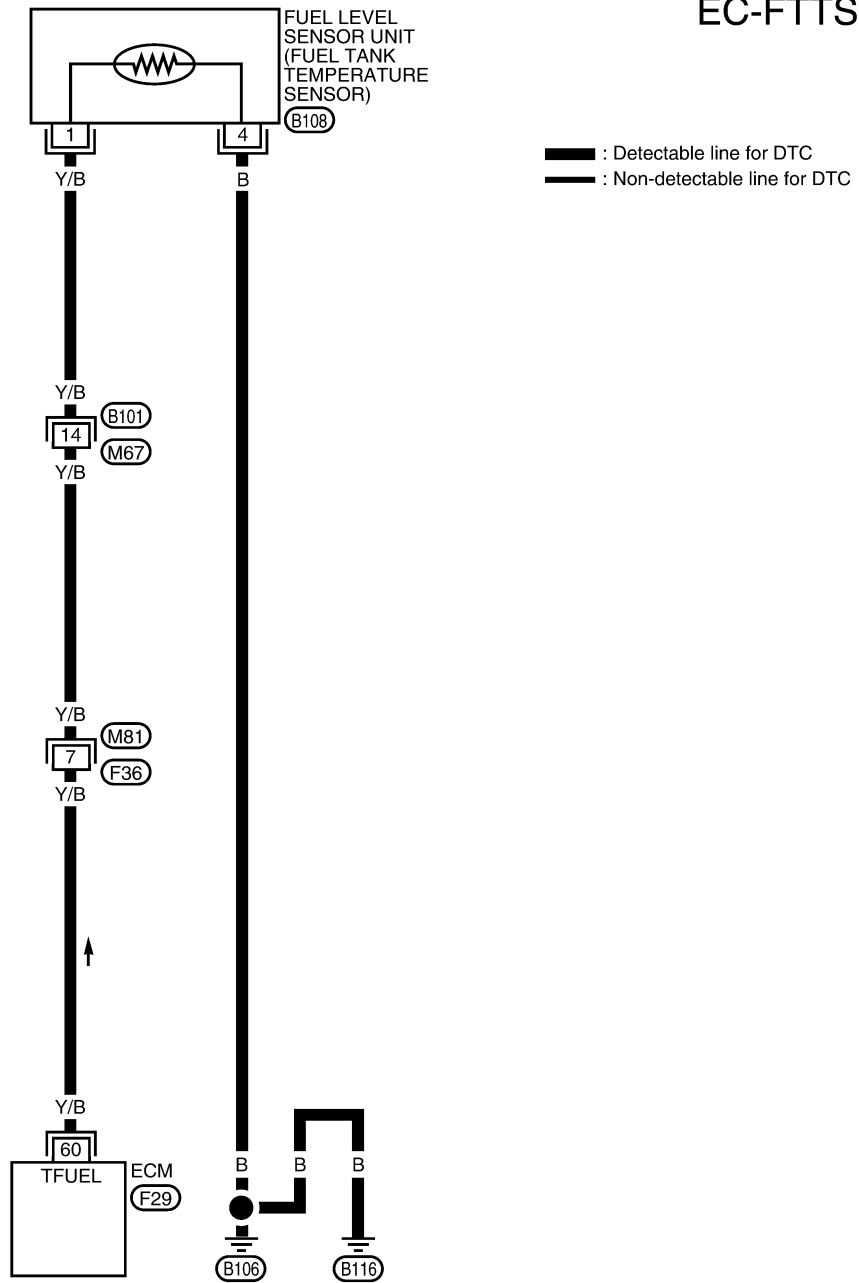
Follow the procedure "With CONSULT-II".

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Wiring Diagram

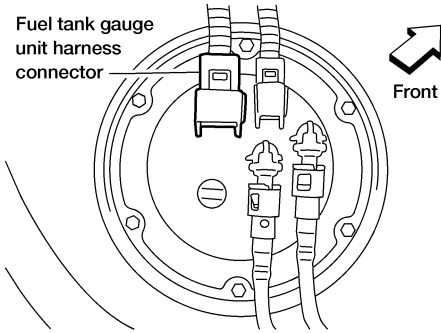
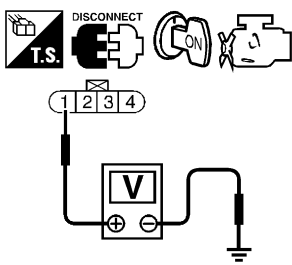
NGEC0701

EC-FTTS-01



Diagnostic Procedure

NGEC0702

1	CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT
<p>1. Turn ignition switch OFF. 2. Disconnect fuel tank gauge unit harness connector.</p> <div style="text-align: center;">  </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="color: blue;">Voltage: Approximately 5V</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

AEC933A

SEF639W

2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors B101, M67 ● Harness connectors M81, F36 ● Harness for open or short between ECM and fuel tank temperature sensor 	
	▶ Repair harness or connector.

3	CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch OFF. 2. Check harness continuity between sensor terminal 4 and body ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

4	DETECT MALFUNCTIONING PART
<p>Check harness for open between fuel tank temperature sensor and body ground.</p>	
	▶ Repair open circuit or short to power in harness or connectors.

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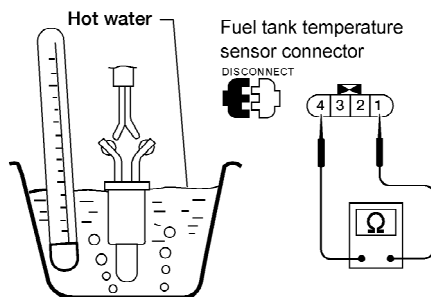
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5 CHECK FUEL TANK TEMPERATURE SENSOR

Check resistance by heating with hot water or heat gun as shown in the figure.



AEC052B

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

MTBL0234

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace fuel tank temperature sensor.

6 CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.

▶ **INSPECTION END**

On Board Diagnosis Logic

NGEC0965

This diagnosis checks whether the engine coolant temperature is extraordinary high, even when the load is not heavy.

When malfunction is detected, the malfunction indicator lamp (MIL) will light up even in the first trip.

Malfunction is detected when engine coolant temperature is excessively high under normal engine speed.

GI

MA

EM

LC

Possible Cause

NGEC0966

- Cooling fan (crankshaft driven)
- Thermostat
- Improper ignition timing
- Engine coolant temperature sensor
- Blocked radiator
- Blocked front end (Improper fitting of nose mask)
- Crushed vehicle frontal area (Vehicle frontal is collided but not repaired)
- Blocked air passage by improper installation of front fog lamp or fog lamps.
- Improper mixture ratio of coolant
- Damaged bumper

EC

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For more information, refer to "MAIN 12 CAUSES OF OVERHEATING", EC-881.

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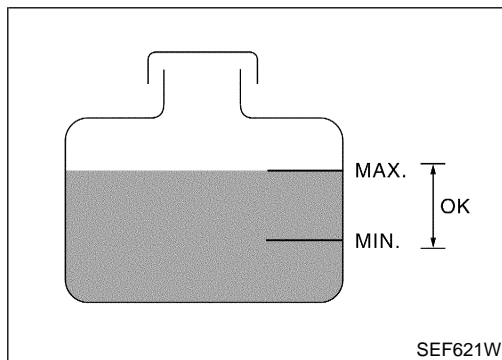
Overall Function Check

Use this procedure to check the overall function of the engine coolant over temperature enrichment protection check, a DTC might not be confirmed. =NGEC0704

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high-pressure fluid escaping from the radiator.

Wrap a thick cloth around the cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.



WITH CONSULT-II

1. Check the coolant level and mixture ratio (Using coolant tester) in the reservoir tank and radiator. NGEC0704S01

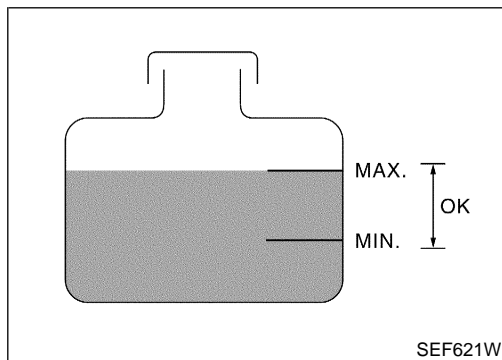
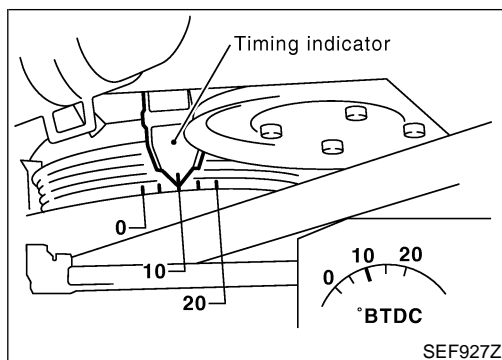
Allow engine to cool before checking coolant level and mixture ratio.

- If the coolant level in the reservoir and/or the radiator is below the proper range, skip following steps and go to “Diagnostic Procedure”, EC-878.
 - If the coolant mixture ratio is out of range between 45 to 55%, replace the coolant. Refer to “Changing Engine Coolant”, **MA-28**.
- a) Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to “Anti-freeze Coolant Mixture Ratio”, **MA-15**.
 - b) After refilling coolant, run engine to ensure that no water-flow noise is emitted. After checking or replacing coolant, go to step 3) below.
2. Confirm whether customer filled the engine coolant or not. If customer filled the engine coolant, skip following steps and go to “Diagnostic Procedure”, EC-878.
 3. Start engine and make sure that cooling fan (crankshaft driven) operates. If NG, go to “Diagnostic Procedure”, EC-878. After repair, go to next step.
 4. Check for blocked coolant passage.
Warm up engine to normal operating temperature, then grasp upper and lower radiator hoses and make sure that coolant flows.
If NG, go to step 4 of “Diagnostic Procedure”, EC-878. After repair, go to next step.
Be extremely careful not to touch any moving or adjacent parts.
 5. Check radiator for blocked air passage
Check for blocked condenser or radiator (condenser or radiator fins damaged, condenser or radiator clogged), after market fog lamps ...etc. Check for condenser or radiator fin damage, shroud damage, vehicle front end for clogging of debris or insects ...etc.
Check for improper fitting of front end cover, damaged radiator grille or bumper, vehicle frontal area damaged by collision but not repaired.
If NG, take appropriate action and then go to next step.
 6. Check ECT sensor for proper operation. Refer to step 5 of “Diagnostic Procedure”, EC-878. If NG, replace ECT sensor and go to next step.

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

VG33E

Overall Function Check (Cont'd)



7. Check ignition timing. Refer to "Basic Inspection", EC-701. Make sure that ignition timing is $10^\circ \pm 2^\circ$ at 700 ± 50 rpm. If NG, adjust ignition timing and then recheck.

GI

MA

EM

LC

⊗ WITHOUT CONSULT-II

NGEC0704S02

1. Check the coolant level and mixture ratio (Using coolant tester) in the reservoir tank and radiator.

Allow engine to cool before checking coolant level and mixture ratio.

- If the coolant level in the reservoir and/or radiator is below the proper range, skip the following steps and go to "Diagnostic Procedure", EC-878.
- If the coolant mixture ratio is out of range between 45 to 55%, replace the coolant. Refer to "Changing Engine Coolant", **MA-28**.

EC

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- a) Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to "Anti-freeze Coolant Mixture Ratio", **MA-13**.

AT

- b) After refilling coolant, run engine to ensure that no water-flow noise is emitted. After checking or replacing coolant, go to step 3) below.

TF

2. Confirm whether customer filled the engine coolant or not. If customer filled engine coolant, skip following steps and go to "Diagnostic Procedure", EC-878.

PD

3. Start engine and make sure that cooling fan (crankshaft driven) operates.

AX

Be careful not to overheat engine.

If NG, go to step 1 of "Diagnostic Procedure", EC-878. After repair, go to next step.

SU

4. Check for blocked coolant passage. Warm up engine to normal operating temperature, then grasp upper and lower radiator hoses and make sure that coolant flows.

BR

If NG, go to step 4 of "Diagnostic Procedure", EC-878. After repair, go to next step.

ST

Be extremely careful not to touch any moving or adjacent parts.

RS

5. Check radiator for blocked air passage. Check for blocked condenser or radiator (condenser or radiator fins damaged, condenser or radiator clogged), after market fog lamps,...etc. Check for condenser or radiator fin damage, shroud damage, vehicle front end for clogging of debris or insects ...etc.

BT

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Check for improper fitting of front end cover, damaged radiator grille or bumper, vehicle frontal area damaged by collision but not repaired.

SC

If NG, take appropriate action and then go to next step.

6. Check ECT sensor for proper operation. Refer to step 5 of "Diagnostic Procedure", EC-878. If NG, replace ECT sensor and go to next step.

EL

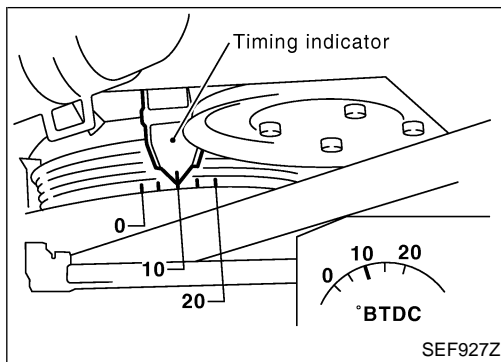
EC-877

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DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

VG33E

Overall Function Check (Cont'd)



7. Check ignition timing. Refer to "Basic Inspection", EC-701. Make sure that ignition timing is $10^\circ \pm 2^\circ$ at 700 ± 50 rpm. If NG, adjust ignition timing and then recheck.

Diagnostic Procedure

NGEC0706

1	CHECK COOLING FAN (CRANKSHAFT DRIVEN) OPERATION	
Start engine and make sure that cooling fan (crankshaft driven) operates.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Check cooling fan (crankshaft driven). Refer to LC-34 , "Cooling Fan".

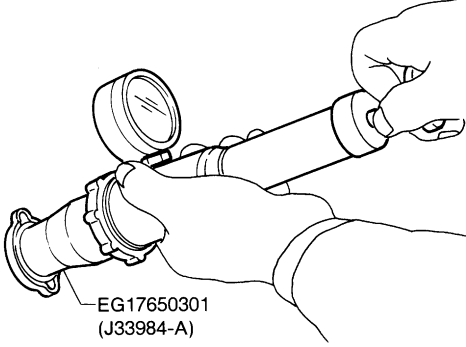
2	CHECK COOLING SYSTEM FOR LEAK	
Apply pressure to the cooling system with a tester, and check if the pressure drops.		
CAUTION: Higher than the specified pressure may cause radiator damage.		
Testing pressure: 157 kPa (1.6 kg/cm ² , 23 psi)		
Pressure should not drop.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Check the following for leak: <ul style="list-style-type: none"> ● Hose ● Radiator ● Water pump Refer to "Water Pump", LC-29 .

SLC754A

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

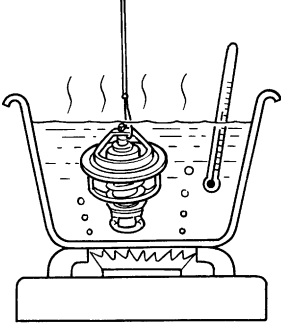
VG33E

Diagnostic Procedure (Cont'd)

3	CHECK RADIATOR CAP		
Apply pressure to cap with a tester and check radiator cap relief pressure.			
			
SLC755A			
<p>Radiator cap relief pressure: 59 - 98 kPa (0.6 - 1.0 kg/cm², 9 - 14 psi)</p> <p style="text-align: center;">OK or NG</p>			
OK	▶	GO TO 4.	
NG	▶	Replace radiator cap.	

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4	CHECK THERMOSTAT		
<p>1. Check valve seating condition at normal room temperatures. It should seat tightly.</p> <p>2. Check valve opening temperature and valve lift.</p>			
			
SLC343			
<p>Valve opening temperature: 82°C (180°F) [standard]</p> <p>Valve lift: More than 10 mm/95°C (0.31 in/203°F)</p> <p>3. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to "Thermostat", LC-31.</p> <p style="text-align: center;">OK or NG</p>			
OK	▶	GO TO 5.	
NG	▶	Replace thermostat.	

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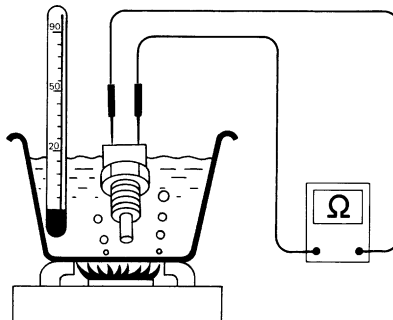
DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

VG33E

Diagnostic Procedure (Cont'd)

5 CHECK ENGINE COOLANT TEMPERATURE SENSOR

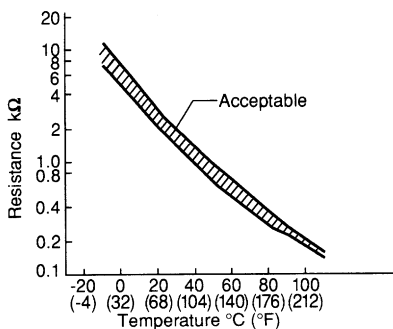
Check resistance as shown in the figure.



<Reference data>

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

SEF152P



MTBL0229

SEF012P

OK or NG

OK ► GO TO 6.

NG ► Replace engine coolant temperature sensor.

6 CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-881.

► **INSPECTION END**

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

VG33E

Main 12 Causes of Overheating

Main 12 Causes of Overheating

NGEC0707

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	<ul style="list-style-type: none"> ● Blocked radiator ● Blocked condenser ● Blocked radiator grille ● Blocked bumper 	<ul style="list-style-type: none"> ● Visual 	No blocking	—
	2	<ul style="list-style-type: none"> ● Coolant mixture 	<ul style="list-style-type: none"> ● Coolant tester 	50 - 50% coolant mixture	See "RECOMMENDED FLUIDS AND LUBRICANTS" in MA-13 .
	3	<ul style="list-style-type: none"> ● Coolant level 	<ul style="list-style-type: none"> ● Visual 	Coolant up to MAX level in reservoir tank and radiator filler neck	See "Changing Engine Coolant", "ENGINE MAINTENANCE" in MA-28 .
	4	<ul style="list-style-type: none"> ● Radiator cap 	<ul style="list-style-type: none"> ● Pressure tester 	59 - 98 kPa (0.6 - 1.0 kg/cm ² , 9 - 14 psi) (Limit)	See "System Check", "ENGINE COOLING SYSTEM" in LC-28 .
ON*1	5	<ul style="list-style-type: none"> ● Coolant leaks 	<ul style="list-style-type: none"> ● Visual 	No leaks	See "System Check", "ENGINE COOLING SYSTEM" in LC-29 .
ON*1	6	<ul style="list-style-type: none"> ● Thermostat 	<ul style="list-style-type: none"> ● Touch the upper and lower radiator hoses 	Both hoses should be hot	See "Thermostat" and "Radiator", "ENGINE COOLING SYSTEM" in LC-31, LC-32 .
ON*1	7	<ul style="list-style-type: none"> ● Cooling fan (Crankshaft driven) 	<ul style="list-style-type: none"> ● Visual 	Operating	See LC-34 , "Cooling Fan".
OFF	8	<ul style="list-style-type: none"> ● Combustion gas leak 	<ul style="list-style-type: none"> ● Color checker chemical tester 4 Gas analyzer 	Negative	—
ON*2	9	<ul style="list-style-type: none"> ● Coolant temperature gauge 	<ul style="list-style-type: none"> ● Visual 	Gauge less than 3/4 when driving	—
		<ul style="list-style-type: none"> ● Coolant overflow to reservoir tank 	<ul style="list-style-type: none"> ● Visual 	No overflow during driving and idling	See "Changing Engine Coolant", "ENGINE MAINTENANCE" in MA-28 .
OFF*3	10	<ul style="list-style-type: none"> ● Coolant return from reservoir tank to radiator 	<ul style="list-style-type: none"> ● Visual 	Should be initial level in reservoir tank	See "ENGINE MAINTENANCE" in MA-26 .
OFF	11	<ul style="list-style-type: none"> ● Cylinder head 	<ul style="list-style-type: none"> ● Straight gauge feeler gauge 	0.1 mm (0.004 in) Maximum distortion (warping)	See "Inspection", "CYLINDER HEAD" in EM-96 .
	12	<ul style="list-style-type: none"> ● Cylinder block and pistons 	<ul style="list-style-type: none"> ● Visual 	No scuffing on cylinder walls or piston	See "Inspection", "CYLINDER BLOCK" in EM-117 .

*1: Engine running at 3,000 rpm for 10 minutes.

*2: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*3: After 60 minutes of cool down time.

For more information, refer to "OVERHEATING CAUSE ANALYSIS", **LC-35**.

On Board Diagnosis Logic

NGEC0708

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the CKP sensor signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (OBD)	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.

Malfunction is detected when multiple cylinders misfire, No. 1 cylinder misfires, No. 2 cylinder misfires, No. 3 cylinder misfires, No. 4 cylinder misfires, No. 5 cylinder misfires and No. 6 cylinder misfires.

POSSIBLE CAUSE

NGEC0708S01

- Improper spark plug
- Insufficient compression
- Incorrect fuel pressure
- The injector circuit is open or shorted
- Injectors
- Intake air leak
- The ignition secondary circuit is open or shorted
- Lack of fuel
- Drive plate or flywheel
- Heated oxygen sensor 1
- Incorrect distributor rotor

DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33E

DTC Confirmation Procedure

4	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SE	XXX km/h
	P/N POSI SW	OFF
	B/FUEL SCHDL	XXX msec

SEF213Y

DTC Confirmation Procedure

=NGEC0709

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 5 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 5 seconds.
- 4) Start engine again and drive at 1,500 to 3,000 rpm for at least 3 minutes.

Hold the accelerator pedal as steady as possible.

NOTE:

Refer to the freeze frame data for the test driving conditions.

- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-883.

With GST

Follow the procedure "With CONSULT-II".

Diagnostic Procedure

NGEC0710

1	CHECK FOR INTAKE AIR LEAK	
1. Start engine and run it at idle speed. 2. Listen for the sound of the intake air leak.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Discover air leak location and repair.

2	CHECK FOR EXHAUST SYSTEM CLOGGING	
Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace it.

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DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33E

Diagnostic Procedure (Cont'd)

3 | PERFORM POWER BALANCE TEST

With CONSULT-II

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.

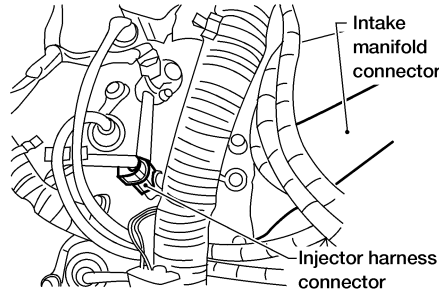
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX %

SEF981Z

2. Is there any cylinder which does not produce a momentary engine speed drop?

Without CONSULT-II

When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?



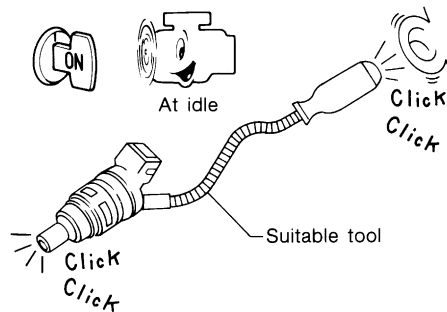
AEC646A

Yes or No

- | | | |
|-----|---|----------|
| Yes | ▶ | GO TO 4. |
| No | ▶ | GO TO 7. |

4 | CHECK INJECTOR

Does each injector make an operating sound at idle?



MEC703B

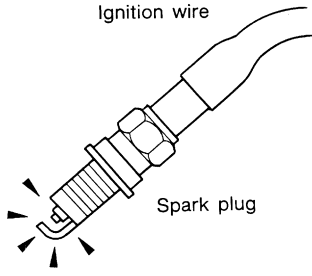
Yes or No

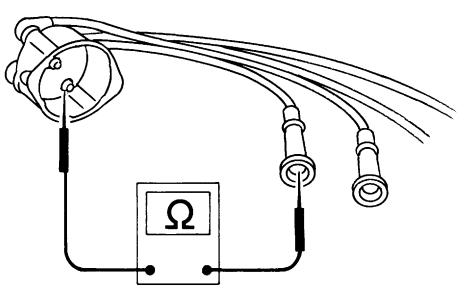
- | | | |
|-----|---|---|
| Yes | ▶ | GO TO 5. |
| No | ▶ | Check injector(s) and circuit(s). Refer to EC-1145. |

DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33E

Diagnostic Procedure (Cont'd)

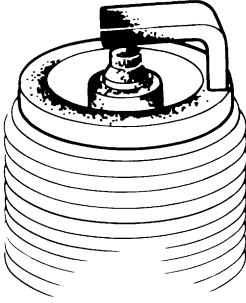
5	CHECK IGNITION SPARK	<ol style="list-style-type: none"> 1. Disconnect ignition wire from spark plug. 2. Connect a known good spark plug to the ignition wire. 3. Place end of spark plug against a suitable ground and crank engine. 4. Check for spark. <div style="text-align: center; margin: 20px 0;">  </div> <p style="text-align: right;">SEF282G</p> <p style="text-align: center;">OK or NG</p>	GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX
OK	▶	GO TO 7.	
NG	▶	GO TO 6.	

6	CHECK IGNITION WIRES	<ol style="list-style-type: none"> 1. Inspect wires for cracks, damage, burned terminals and for improper fit. 2. Measure the resistance of wires to their distributor cap terminal. Move each wire while testing to check for intermittent breaks. <div style="text-align: center; margin: 20px 0;">  </div> <p style="text-align: right;">SEF174P</p> <p>Resistance:</p> <table border="1" style="margin: 10px auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 5px;">Cylinder No.</th> <th style="padding: 5px;">Resistance kΩ [at 25°C (77°F)]</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">1</td> <td style="padding: 5px;">Approximately 6.5</td> </tr> <tr> <td style="padding: 5px;">2</td> <td style="padding: 5px;">Approximately 10.0</td> </tr> <tr> <td style="padding: 5px;">3</td> <td style="padding: 5px;">Approximately 8.5</td> </tr> <tr> <td style="padding: 5px;">4</td> <td style="padding: 5px;">Approximately 12.5</td> </tr> <tr> <td style="padding: 5px;">5</td> <td style="padding: 5px;">Approximately 8.5</td> </tr> <tr> <td style="padding: 5px;">6</td> <td style="padding: 5px;">Approximately 11.0</td> </tr> </tbody> </table> <p style="text-align: right;">MTBL0235</p> <p>If the resistance exceeds the above specification, inspect ignition wire to distributor cap connection. Clean connection or replace the ignition wire with a new one.</p> <p style="text-align: center;">OK or NG</p>	Cylinder No.	Resistance kΩ [at 25°C (77°F)]	1	Approximately 6.5	2	Approximately 10.0	3	Approximately 8.5	4	Approximately 12.5	5	Approximately 8.5	6	Approximately 11.0	GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX
Cylinder No.	Resistance kΩ [at 25°C (77°F)]																
1	Approximately 6.5																
2	Approximately 10.0																
3	Approximately 8.5																
4	Approximately 12.5																
5	Approximately 8.5																
6	Approximately 11.0																
OK	▶	Check the following: <ul style="list-style-type: none"> ● Distributor rotor head for incorrect parts ● Ignition coil, power transistor and their circuits Refer to EC-1138.															
NG	▶	Replace.															

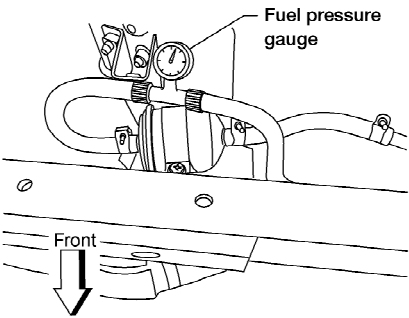
DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33E

Diagnostic Procedure (Cont'd)

7	CHECK SPARK PLUGS	
Remove the spark plugs and check for fouling, etc.		
		
SEF156I		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Repair or replace spark plug(s) with standard type one(s). For spark plug type, refer to "ENGINE MAINTENANCE", MA-34 .

8	CHECK COMPRESSION PRESSURE	
Refer to EM-77 .		
<ul style="list-style-type: none"> ● Check compression pressure. <ul style="list-style-type: none"> Standard: 1,196 kPa (12.2 kg/cm², 173 psi)/300 rpm Minimum: 883 kPa (9.0 kg/cm², 128 psi)/300 rpm Difference between each cylinder: 98 kPa (1.0 kg/cm², 14 psi)/300 rpm 		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

9	CHECK FUEL PRESSURE	
<ol style="list-style-type: none"> 1. Install any parts removed. 2. Release fuel pressure to zero. Refer to EC-644. 3. Install fuel pressure gauge and check fuel pressure. 		
		
AEC064B		
OK or NG		
OK	▶	GO TO 11.
NG	▶	GO TO 10.

At idle:
Approx. 235 kPa (2.4 kg/cm², 34 psi)

DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33E

Diagnostic Procedure (Cont'd)

10	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Fuel pump and circuit (Refer to EC-1153.) ● Fuel pressure regulator (Refer to EC-645.) ● Fuel lines (Refer to "ENGINE MAINTENANCE", MA-31.) ● Fuel filter for clogging 	
	Repair or replace.

GI
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11	CHECK IGNITION TIMING										
<p>Check the following items. Refer to "Basic Inspection", EC-701.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Items</th> <th style="text-align: center;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>10° ± 2° BTDC</td> </tr> <tr> <td>Base idle speed</td> <td>700 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">MTBL0576</p> <p style="text-align: center;">OK or NG</p>		Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
Items	Specifications										
Ignition timing	10° ± 2° BTDC										
Base idle speed	700 ± 50 rpm (in "P" or "N" position)										
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF										
Target idle speed	750 ± 50 rpm (in "P" or "N" position)										
OK (With CONSULT-II)	GO TO 12.										
OK (Without CONSULT-II)	GO TO 13.										
NG	Adjust ignition timing.										

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DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33E

Diagnostic Procedure (Cont'd)

12 CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

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

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

SEF967Y

5. Check the following.

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

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

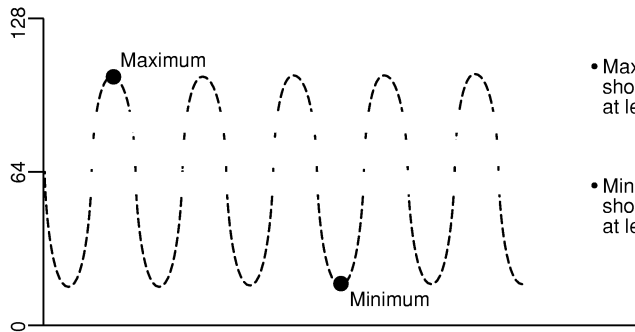
Bank 2
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

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

SEF647Y

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

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



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

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

OK or NG

OK ▶ GO TO 14.

NG ▶ Replace heated oxygen sensor 1.

DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33E

Diagnostic Procedure (Cont'd)

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13	CHECK FRONT HEATED OXYGEN SENSOR LH/RH
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Set voltmeter probes between ECM terminal 50 (right bank sensor signal) or 51 (left bank sensor signal) and engine ground. Check the following with engine speed held at 2,000 rpm constant under no load. 	
<div style="display: flex; align-items: flex-start;"> <div style="flex: 1;"> <p>50: Bank 1 51: Bank 2</p> </div> <div style="flex: 2;"> <ul style="list-style-type: none"> • The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least one time. • The minimum voltage is below 0.3V at least one time. • The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>	
SEF796Z	
<p>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.</p>	
OK or NG	
OK	▶ GO TO 15.
NG	▶ GO TO 14.

14	REPLACE HEATED OXYGEN SENSOR 2
<ol style="list-style-type: none"> Stop vehicle and turn ignition switch OFF. Check heated oxygen sensor 2 harness protector color. 	
<p>HO2S2 (bank 1): White or Gray HO2S2 (bank 2): Red or Red/Brown</p>	
SEF372ZA	
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 2.

DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33E

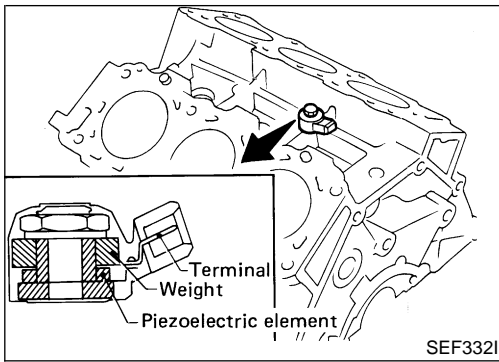
Diagnostic Procedure (Cont'd)

15	CHECK MASS AIR FLOW SENSOR
 With CONSULT-II Check mass air flow sensor signal in "DATA MONITOR" mode with CONSULT-II. 3.3 - 4.8 g-m/sec: at idling 12.0 - 14.9 g-m/sec: at 2,500 rpm	
 With GST Check mass air flow sensor signal in MODE 1 with GST. 3.3 - 4.8 g-m/sec: at idling 12.0 - 14.9 g-m/sec: at 2,500 rpm	
OK or NG	
OK	▶ GO TO 16.
NG	▶ Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-761.

16	CHECK SYMPTOM MATRIX CHART
Check items on the rough idle symptom in "Symptom Matrix Chart", EC-717.	
OK or NG	
OK	▶ GO TO 17.
NG	▶ Repair or replace.

17	ERASE THE 1ST TRIP DTC
Some tests may cause a 1st trip DTC to be set. Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-673.	
	▶ GO TO 18.

18	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.	
	▶ INSPECTION END



Component Description

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM. **Freeze frame data will not be stored in the ECM for the knock sensor. The MIL will not light for knock sensor malfunction. The knock sensor has one trip detection logic.**

ECM Terminals and Reference Value

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

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
64	W	Knock sensor	[Engine is running] ● Idle speed	Approximately 2.5V

On Board Diagnosis Logic

Malfunction is detected when an excessively low or high voltage from the knock sensor is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (The knock sensor circuit is open or shorted.)
- Knock sensor

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

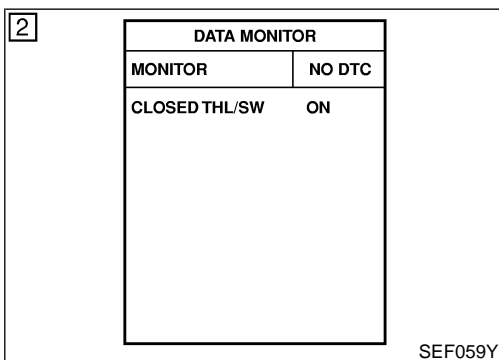
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

With CONSULT-II

- 1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and run it for at least 5 seconds at idle speed.
- 3) If DTC is detected, go to "Diagnostic Procedure", EC-893.

With GST

Follow the procedure "With CONSULT-II".



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Diagnostic Procedure

NGEC0716

1	CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I	
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check resistance between ECM terminal 64 and engine ground. NOTE: It is necessary to use an ohmmeter which can measure more than 10 MΩ. Resistance: Approximately 500 - 620 kΩ [at 25°C (77°F)]</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	GO TO 2.

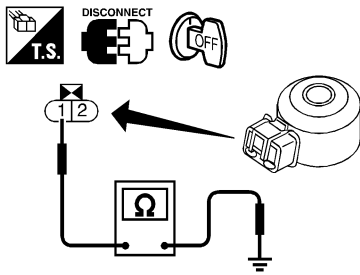
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2	CHECK INPUT SIGNAL CIRCUIT-II	
<p>1. Disconnect knock sensor harness connector. 2. Check harness continuity between ECM terminal 64 and knock sensor terminal 1. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 4.
NG	▶	GO TO 3.

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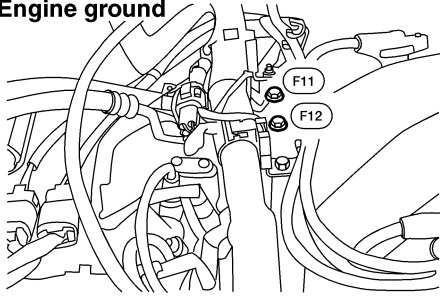
3	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connector F37, F101 ● Harness for open or short between ECM and knock sensor 		
▶		Repair open circuit or short to ground or short to power in harness or connectors.

TF
PD
AX

4	CHECK KNOCK SENSOR	
<ul style="list-style-type: none"> ● Use an ohmmeter which can measure more than 10 MΩ. <p>1. Disconnect knock sensor harness connector. 2. Check resistance between terminal 1 and ground.</p> <div style="display: flex; align-items: center;"> <div style="flex: 1;">  </div> <div style="flex: 1; text-align: center;"> <p>Resistance: 500 - 620 kΩ [at 25°C (77°F)]</p> </div> </div> <p>CAUTION: Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 8.
NG	▶	Replace knock sensor.

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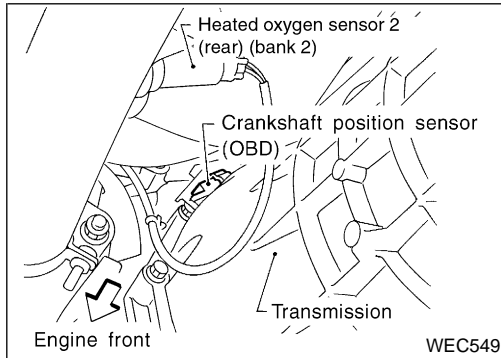
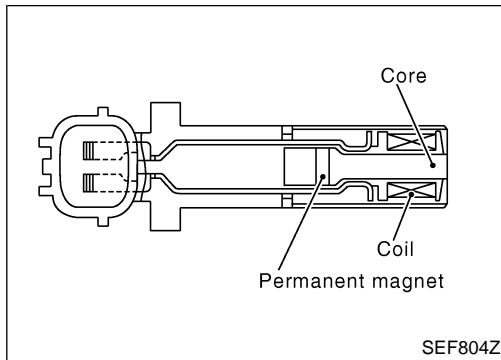
SEF799Z

5	RETIGHTEN GROUND SCREWS
<p>Loose and retighten engine ground screws.</p> <div style="text-align: center;"> <p>Engine ground</p>  </div> <p style="text-align: right;">LEC518</p>	
▶ GO TO 6.	

6	CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT
<p>1. Disconnect harness connectors F37, F101. 2. Check harness continuity between harness connector F37 terminal 6 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 8.
NG	▶ GO TO 7.

7	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F37, F101 ● Joint connector 1 (if equipped) ● Harness for open between harness connector F37 and engine ground 	
▶ Repair open circuit or short to power in harness or connectors.	

8	CHECK INTERMITTENT INCIDENT
<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.</p>	
▶ INSPECTION END	



Component Description

NGEC0717

The crankshaft position sensor (OBD) is located on the transaxle housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet, core and coil.

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.

This sensor is not used to control the engine system. It is used only for the on board diagnosis.

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ECM Terminals and Reference Value

NGEC0718

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 the ECM terminals, such as the ground.

AT

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TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
47	L	Crankshaft position sensor (OBD)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>1 - 2V (AC range)</p> <p>SEF690W</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	<p>3 - 4V (AC range)</p> <p>SEF691W</p>

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On Board Diagnosis Logic

Malfunction is detected when the proper pulse signal from the crankshaft position sensor (OBD) is not sent to ECM while the engine is running at the specified engine speed. NGEC0719

POSSIBLE CAUSE

- Harness or connectors
[The crankshaft position sensor (OBD) circuit is open.]
- Crankshaft position sensor (OBD)

NGEC0719S01

2	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: center;">DATA MONITOR</th> </tr> <tr> <td style="text-align: center;">MONITOR</td> <td style="text-align: center;">NO DTC</td> </tr> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> </table>	DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm
DATA MONITOR							
MONITOR	NO DTC						
ENG SPEED	XXX rpm						

SEF058Y

DTC Confirmation Procedure

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test. NGEC0720

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 15 seconds at idle speed.
- 3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-898.

With GST

Follow the procedure “With CONSULT-II”.

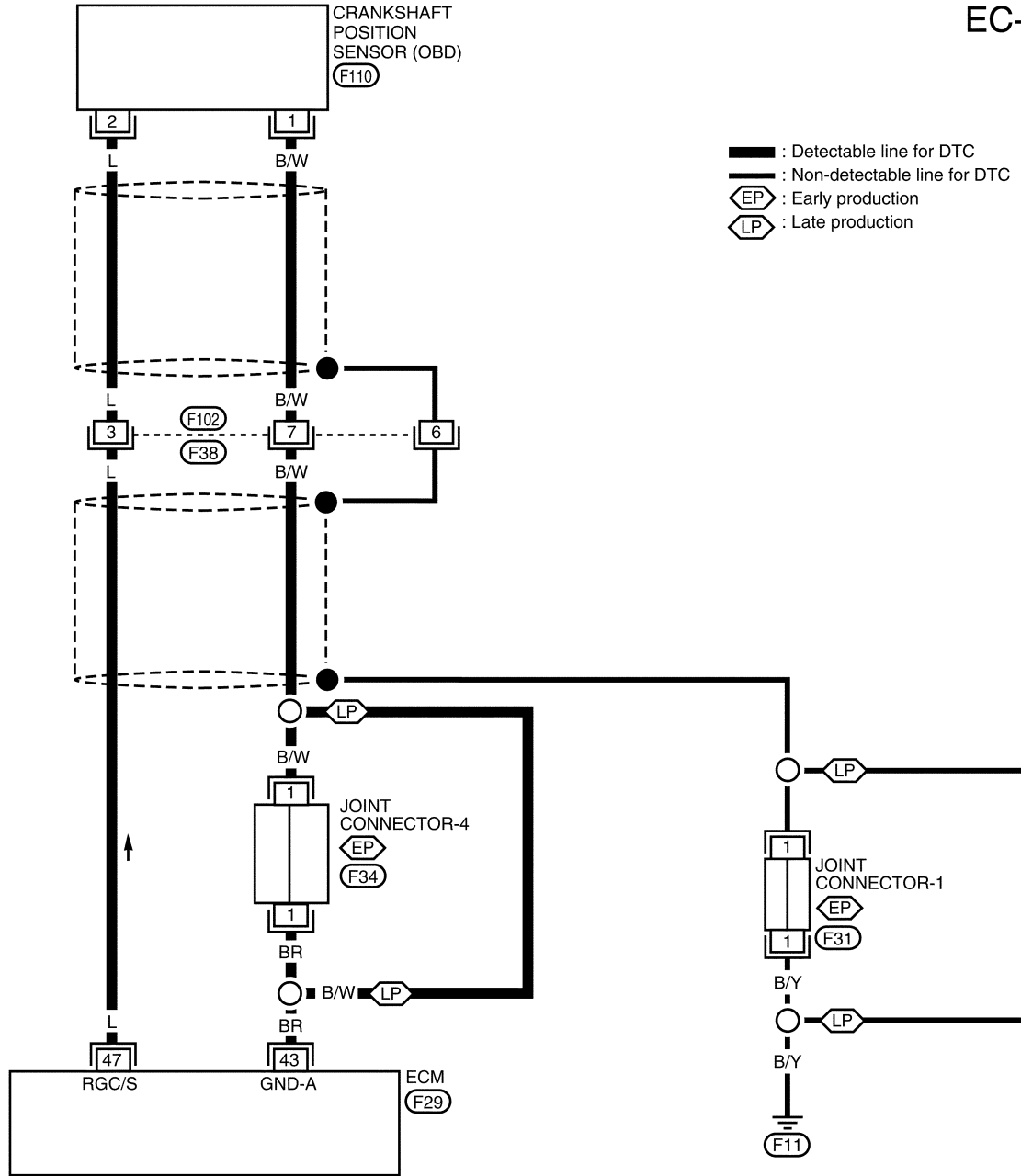
DTC P0335 CKP SENSOR (OBD)

VG33E
Wiring Diagram

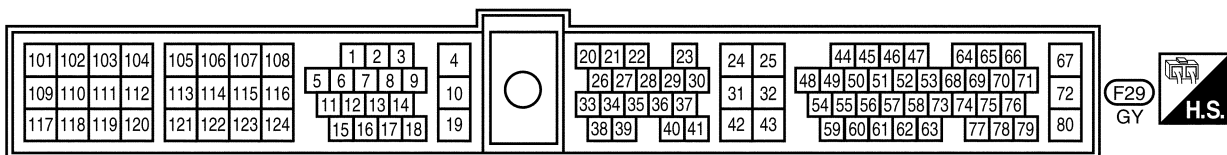
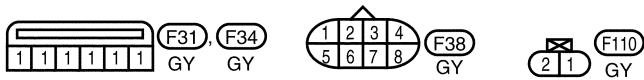
Wiring Diagram

NGEC0721

EC-CKPS-01



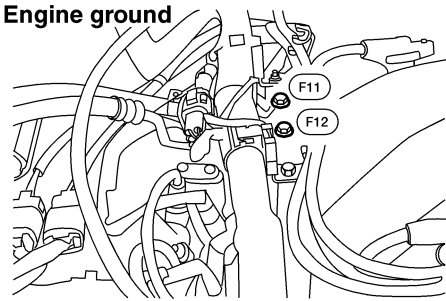
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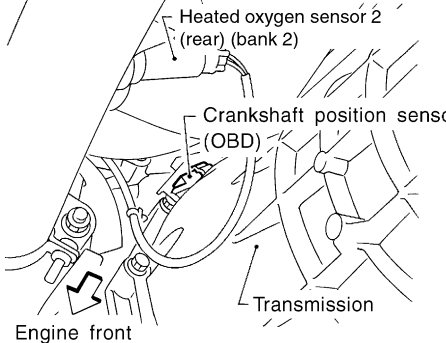


WEC179A

Diagnostic Procedure

NGEC0722

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p> <div style="text-align: center;">  <p>Engine ground</p> </div> <p style="text-align: right;">LEC518</p>	
<p>▶ GO TO 2.</p>	

2	CHECK CKPS (OBD) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT						
<p>1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">WEC549</p> <p>2. Check continuity between ECM terminal 47 and sensor terminal 2. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>							
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%; border-right: 1px solid black;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 4.</td> </tr> <tr> <td style="border-right: 1px solid black;">NG</td> <td style="text-align: center;">▶</td> <td>GO TO 3.</td> </tr> </table>		OK	▶	GO TO 4.	NG	▶	GO TO 3.
OK	▶	GO TO 4.					
NG	▶	GO TO 3.					

3	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Harness for open or short between ECM and crankshaft position sensor (OBD) 	
<p>▶ Repair open circuit or short to ground or short to power in harness or connectors.</p>	

DTC P0335 CKP SENSOR (OBD)

VG33E

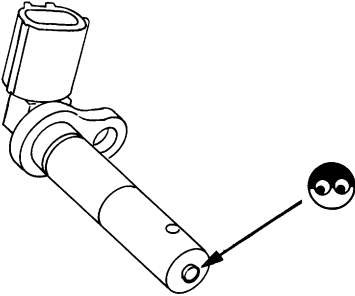
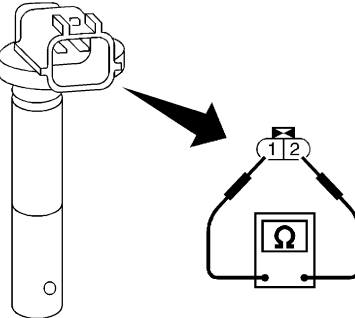
Diagnostic Procedure (Cont'd)

4	CHECK CKPS (OBD) GROUND CIRCUIT FOR OPEN AND SHORT	
1. Reconnect ECM harness connector. 2. Check harness continuity between sensor terminal 1 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

GI
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5	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Joint connector-4 (if equipped) ● Harness for open or short between crankshaft position sensor (OBD) and ECM 		
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

EC
FE

6	CHECK CRANKSHAFT POSITION SENSOR (OBD)	
1. Disconnect crankshaft position sensor (OBD) harness connector. 2. Loosen the fixing bolt of the sensor. 3. Remove the sensor. 4. Visually check the sensor for chipping.		
		
5. Check resistance as shown in the figure.		
		
<p style="text-align: center;">Resistance: Approximately 512 - 632Ω [at 20°C (68°F)]</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 7.
NG	▶	Replace crankshaft position sensor (OBD).

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SEF504V

DTC P0335 CKP SENSOR (OBD)

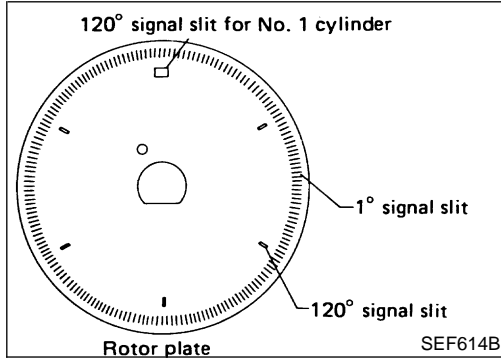
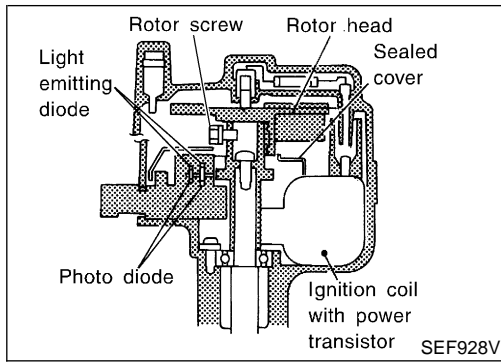
VG33E

Diagnostic Procedure (Cont'd)

7	CHECK CKPS (OBD) SHIELD CIRCUIT FOR OPEN AND SHORT
1. Disconnect harness connectors F38, F102. 2. Check harness continuity between harness connector F38 terminal 6 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.	
OK or NG	
OK	▶ GO TO 9.
NG	▶ GO TO 8.

8	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness connectors F38, F102● Joint connector-1 (if equipped)● Harness for open between harness connector F38 and engine ground	
	▶ Repair open circuit or short to power in harness or connectors.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.	
	▶ INSPECTION END



Component Description

NGEC0723

The camshaft position sensor is a basic component of the engine control system. It monitors engine speed and piston position. These input signals to the ECM are used to control fuel injection, ignition timing and other functions.

The camshaft position sensor has a rotor plate and a wave-forming circuit. The rotor plate has 360 slits for a 1° (POS) signal and 6 slits for a 120° (REF) signal. The wave-forming circuit consists of Light Emitting Diodes (LED) and photo diodes.

The rotor plate is positioned between the LED and the photo diode. The LED transmits light to the photo diode. As the rotor plate turns, the slits cut the light to generate rough-shaped pulses. These pulses are converted into on-off signals by the wave-forming circuit and sent to the ECM.

The distributor is not repairable and must be replaced as an assembly except distributor cap and rotor head.

NOTE:

The rotor screw which secures the distributor rotor head to the distributor shaft must be torqued properly.

: **3.6±0.3 N·m (37±3 kg-cm, 32±3 in-lb)**

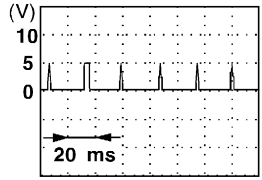
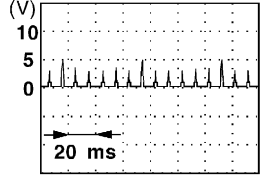
ECM Terminals and Reference Value

NGEC0724

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

CAUTION:

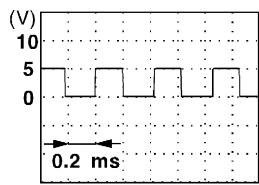
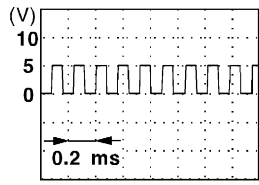
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self shut-off)	[Engine is running] [Ignition switch OFF] ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch OFF] ● A few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
44	PU	Camshaft position sensor (Reference signal)	[Engine is running] ● Idle speed	0.3 - 0.5V 
48	PU		[Engine is running] ● Engine speed is 2,000 rpm	0.3 - 0.5V 

DTC P0340 CMP SENSOR

VG33E

ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	LG	Camshaft position sensor (Position signal)	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	Approximately 2.5V 
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	Approximately 2.5V 
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0725

Malfunction is detected when
 (Malfunction A) either 1° or 120° signal is not sent to ECM for the first few seconds during engine cranking,
 (Malfunction B) either 1° or 120° signal is not sent to ECM often enough while the engine speed is higher than the specified engine speed,
 (Malfunction C) the relation between 1° and 120° signal is not in the normal range during the specified engine speed.

POSSIBLE CAUSE

NGEC0725S01

- Harness or connectors
(The camshaft position sensor circuit is open or shorted.)
- Camshaft position sensor
- Starter motor (Refer to **SC-11**.)
- Starting system circuit (Refer to **SC-14**.)
- Dead (Weak) battery

DTC Confirmation Procedure

NGEC0726

NOTE:

- Perform “PROCEDURE FOR MALFUNCTION A” first. If DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B AND C”.
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

PROCEDURE FOR MALFUNCTION A

NGEC0726S01

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Crank engine for at least 2 seconds.
- 4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-905.

With GST

Follow the procedure “With CONSULT-II”.

2

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C

SEF013Y

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B AND C

NGEC0726S02

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Start engine and run it for at least 2 seconds at idle speed.
- 4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-905.

With GST

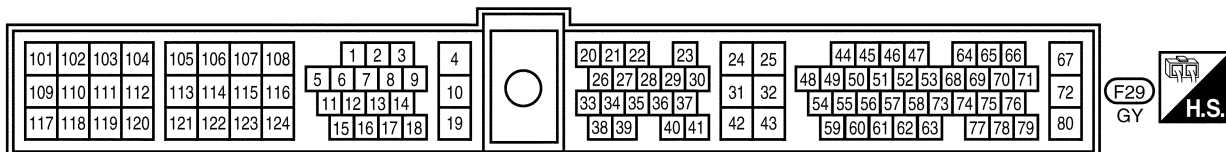
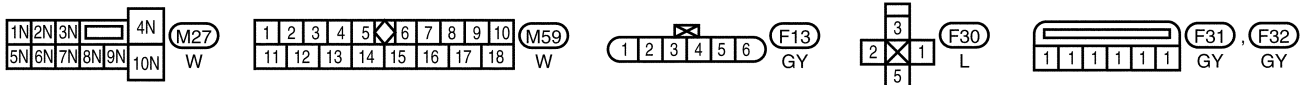
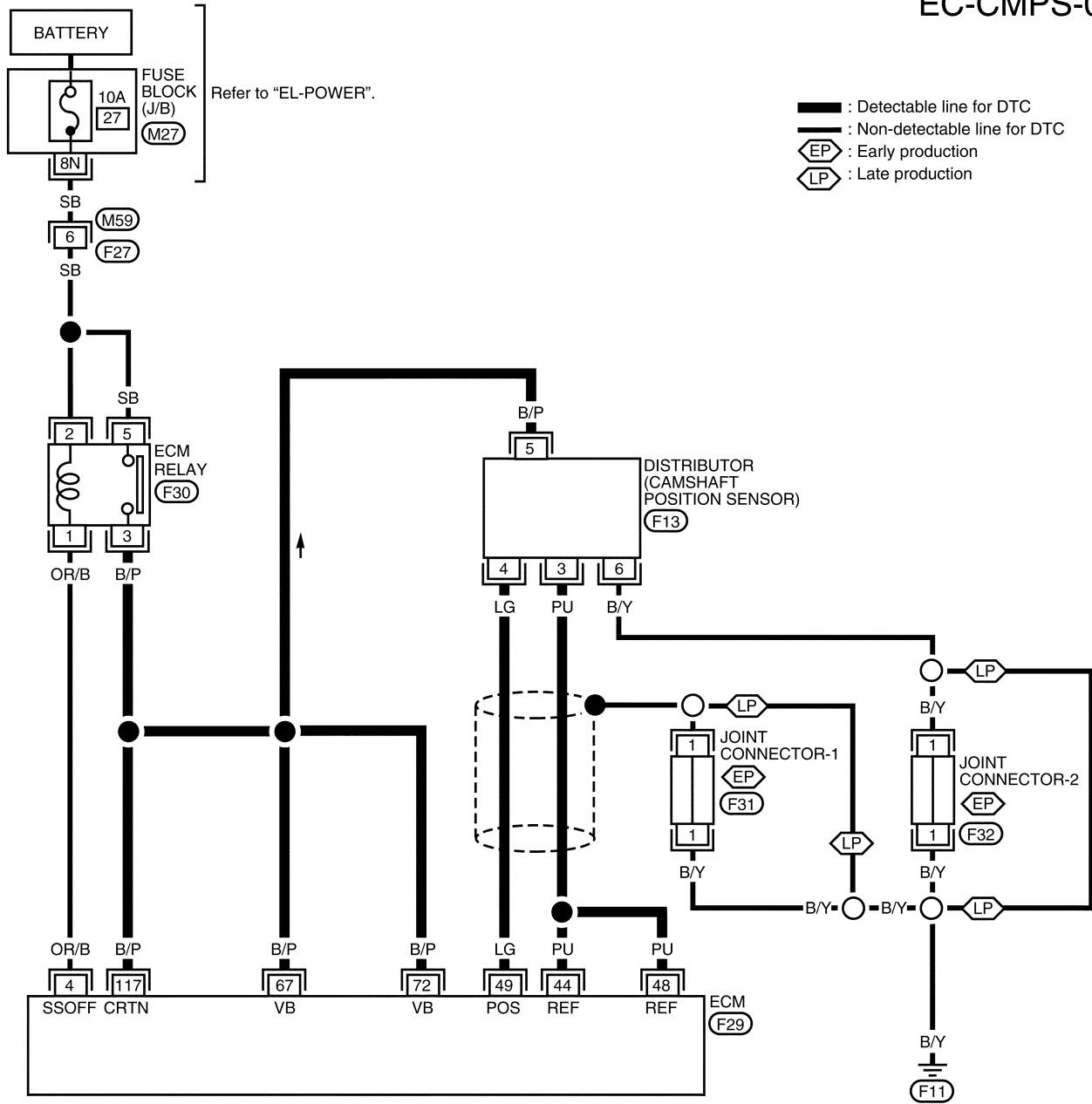
Follow the procedure “With CONSULT-II”.

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Wiring Diagram

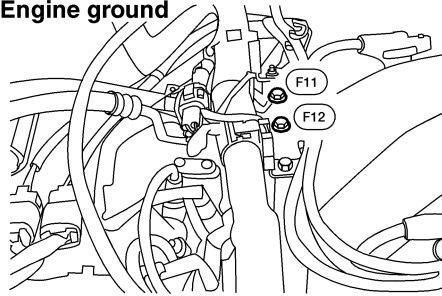
NGEC0727

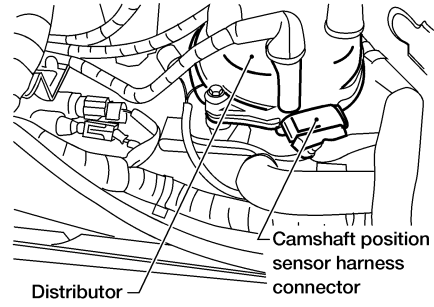
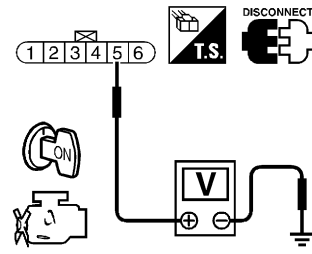
EC-CMPS-01



Diagnostic Procedure

NGENC0728

1	RETIGHTEN GROUND SCREWS	<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p> <div style="text-align: center;"> <p>Engine ground</p>  </div> <p style="text-align: right;">LEC518</p>	GI MA EM LC EC FE CL
▶		GO TO 2.	

2	CHECK CMPS POWER SUPPLY CIRCUIT	<p>1. Disconnect camshaft position sensor harness connector.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">AEC647A</p> <p>2. Turn ignition switch ON. 3. Check voltage between terminal 5 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="color: blue;">Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	MT AT TF PD AX SU BR ST RS
OK		▶ GO TO 4.	
NG		▶ GO TO 3.	

3	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness for open or short between camshaft position sensor and ECM relay ● Harness for open or short between camshaft position sensor and ECM 	SC EL
▶		Repair harness or connectors.	

DTC P0340 CMP SENSOR

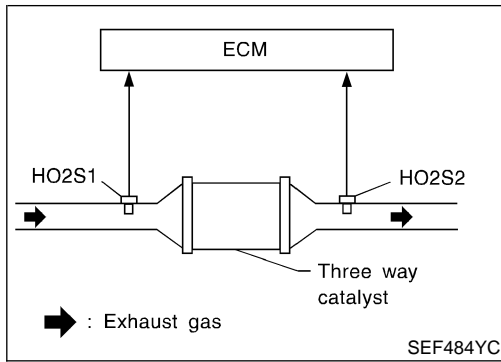
VG33E

Diagnostic Procedure (Cont'd)

4		CHECK CMPS INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between sensor terminal 4 and ECM terminal 49, sensor terminal 3 and ECM terminals 44, 48. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5		CHECK CMPS GROUND CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch OFF. 2. Check harness continuity between sensor terminal 6 and engine ground. Continuity should exist. 3. Also check harness for short to power. <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 7.
NG	▶	GO TO 6.

6		DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Joint connector-2 (if equipped)● Harness for open between camshaft position sensor and engine ground		
	▶	Repair open circuit or short to power in harness or connector.



On Board Diagnosis Logic

NGEC0740

The ECM monitors the switching frequency ratio of heated oxygen sensors 1 and 2.

A warm-up three way catalyst with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.

When the frequency ratio of heated oxygen sensors 1 and 2 approaches a specified limit value, the warm-up three way catalyst malfunction is diagnosed.

Malfunction is detected when warm-up three way catalyst does not operate properly, warm-up three way catalyst does not have enough oxygen storage capacity.

POSSIBLE CAUSE

NGEC0740S01

- Warm-up three way catalyst
- Exhaust tube
- Intake air leaks
- Injectors
- Injector leaks
- Spark plug
- Improper ignition timing

SRT WORK SUPPORT	
CATALYST	INCMP
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
THRTL POS SEN	XXX V

SEF344Z

SRT WORK SUPPORT	
CATALYST	CMPLT
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
THRTL POS SEN	XXX V

SEF345Z

SELF DIAG RESULTS	
DTC RESULTS	TIME
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	

SEF560X

DTC Confirmation Procedure

NGEC0741

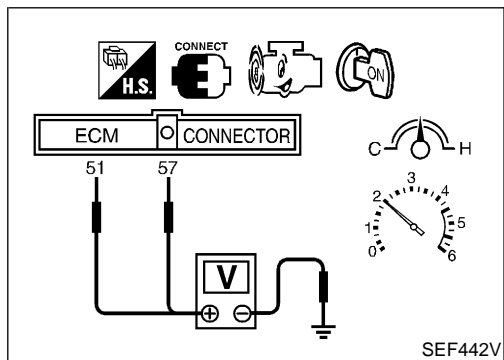
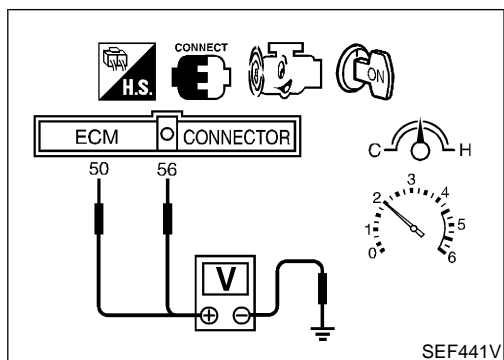
NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II TESTING CONDITION

- **Open engine hood before conducting the following procedure.**
- **Do not hold engine speed for more than the specified minutes below.**
 - 1) Turn ignition switch ON.
 - 2) Select "DTC & SRT CONFIRMATION" the SRT WORK SUPPORT" mode with CONSULT-II.
 - 3) Start engine.
 - 4) Rev engine up to 2,500 to 3,500 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
 - 5) Wait 5 seconds at idle.
 - 6) Rev engine up to 2,000 to 3,000 rpm and maintain it until "INCMP" of "CATALYST" changes to "CMPLT" (It will take maximum of approximately 5 minute.).
 - 7) Select "SELF-DIAG RESULTS" mode with CONSULT-II. If the 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-910. If not "CMPLT", stop engine and cool down "COOLANT TEMP/SE" to less than 70°C (158°F) and retest from step 1).

NGEC0742



Overall Function Check

Use this procedure to check the overall function of the warm-up three way catalyst. During this check, a 1st trip DTC might not be confirmed.

CAUTION:

Always drive vehicle at a safe speed.

Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeters probes between ECM terminals 50 [heated oxygen sensor 1 (bank 1) signal], 51 [heated oxygen sensor 1 (bank 2) signal] and engine ground, and ECM terminals 56 [heated oxygen sensor 2 (bank 1) signal], 57 [heated oxygen sensor 2 (bank 2) signal] and engine ground.
- 4) Keep engine speed at 2,000 rpm constant under no load.
- 5) Make sure that the voltage switching frequency (high & low) between ECM terminals 56 and engine ground, or 57 and engine ground is very less than that of ECM terminals 50 and engine ground, or 51 and engine ground.

Switching frequency ratio = A/B

A: Heated oxygen sensor 2 voltage switching frequency

B: Heated oxygen sensor 1 voltage switching frequency

This ratio should be less than 0.75.

If the ratio is greater than above, it means warm-up three way catalyst does not operate properly. Go to "Diagnostic Procedure", EC-910.

NOTE:

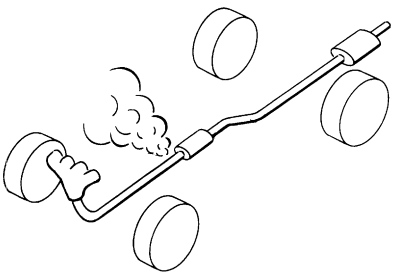
If the voltage at terminal 50 or 51 does not switch periodically more than 5 times within 10 seconds at step 5, perform trouble diagnosis for "DTC P0133, P0153" first. (See EC-808.)

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Diagnostic Procedure

=NGEC0743

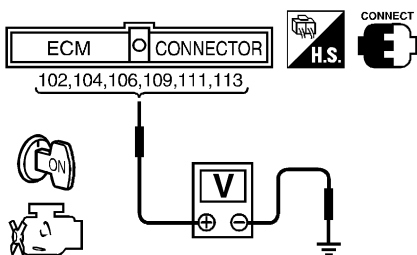
1	CHECK EXHAUST SYSTEM	
Visually check exhaust tubes and muffler for dent.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair or replace it.

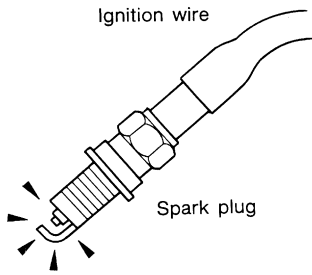
2	CHECK EXHAUST AIR LEAK	
1. Start engine and run it at idle. 2. Listen for an exhaust air leak before the warm-up three way catalyst.		
		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace.

3	CHECK INTAKE AIR LEAK	
Listen for an intake air leak after the mass air flow sensor.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace.

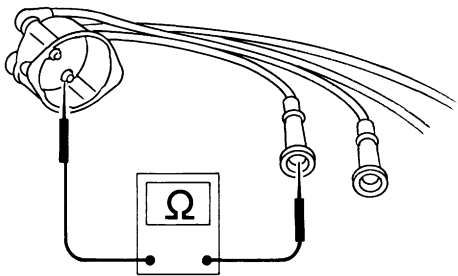
4	CHECK IGNITION TIMING											
Check the following items. Refer to "Basic Inspection", EC-701.												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Items</th> <th style="text-align: center;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>10° ± 2° BTDC</td> </tr> <tr> <td>Base idle speed</td> <td>700 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table>			Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
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Target idle speed	750 ± 50 rpm (in "P" or "N" position)											
OK or NG												
OK	▶	GO TO 5.										
NG	▶	Adjust ignition timing.										

MTBL0576

5	CHECK INJECTORS	<ol style="list-style-type: none"> 1. Refer to WIRING DIAGRAM for Injectors, EC-1145. 2. Stop engine and then turn ignition switch ON. 3. Check voltage between ECM terminals 102, 104, 106, 109, 111 and 113 and ground with CONSULT-II or tester. <div style="text-align: center; margin: 10px 0;">  </div> <p style="color: blue; font-weight: bold;">Battery voltage should exist.</p> <p style="text-align: center; font-weight: bold;">OK or NG</p>	SEF711U
OK	▶	GO TO 6.	
NG	▶	Perform "Diagnostic Procedure", "INJECTOR", EC-1146.	

6	CHECK IGNITION SPARK	<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect ignition wire from spark plug. 3. Connect a known good spark plug to the ignition wire. 4. Place end of spark plug against a suitable ground and crank engine. 5. Check for spark. <div style="text-align: center; margin: 10px 0;">  </div> <p style="text-align: center; font-weight: bold;">OK or NG</p>	SEF282G
OK	▶	GO TO 8.	
NG	▶	GO TO 7.	

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7	CHECK IGNITION WIRES															
<ol style="list-style-type: none"> 1. Inspect wires for cracks, damage, burned terminals and for improper fit. 2. Measure the resistance of wires to their distributor cap terminal. Move each wire while testing to check for intermittent breaks. 																
																
<p>Resistance:</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Cylinder No.</th> <th style="text-align: center;">Resistance kΩ [at 25°C (77°F)]</th> </tr> </thead> <tbody> <tr><td style="text-align: center;">1</td><td style="text-align: center;">Approximately 6.5</td></tr> <tr><td style="text-align: center;">2</td><td style="text-align: center;">Approximately 10.0</td></tr> <tr><td style="text-align: center;">3</td><td style="text-align: center;">Approximately 8.5</td></tr> <tr><td style="text-align: center;">4</td><td style="text-align: center;">Approximately 12.5</td></tr> <tr><td style="text-align: center;">5</td><td style="text-align: center;">Approximately 8.5</td></tr> <tr><td style="text-align: center;">6</td><td style="text-align: center;">Approximately 11.0</td></tr> </tbody> </table>			Cylinder No.	Resistance kΩ [at 25°C (77°F)]	1	Approximately 6.5	2	Approximately 10.0	3	Approximately 8.5	4	Approximately 12.5	5	Approximately 8.5	6	Approximately 11.0
Cylinder No.	Resistance kΩ [at 25°C (77°F)]															
1	Approximately 6.5															
2	Approximately 10.0															
3	Approximately 8.5															
4	Approximately 12.5															
5	Approximately 8.5															
6	Approximately 11.0															
SEF174P																
MTBL0235																
<p>If the resistance exceeds the above specification, inspect ignition wire to distributor cap connection. Clean connection or replace the ignition wire with a new one.</p> <p style="text-align: center;">OK or NG</p>																
OK	▶	Check ignition coil, power transistor and their circuits. Refer to EC-1138.														
NG	▶	Replace.														

8	CHECK INJECTOR	
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Remove injector assembly. Refer to EC-645. Keep fuel hose and all injectors connected to injector gallery. 3. Disconnect all ignition coil harness connectors. 4. Turn ignition switch ON. Make sure fuel does not drip from injector. 		
OK or NG		
OK (Does not drip)	▶	GO TO 9.
NG (Drips)	▶	Replace the injector(s) from which fuel is dripping.

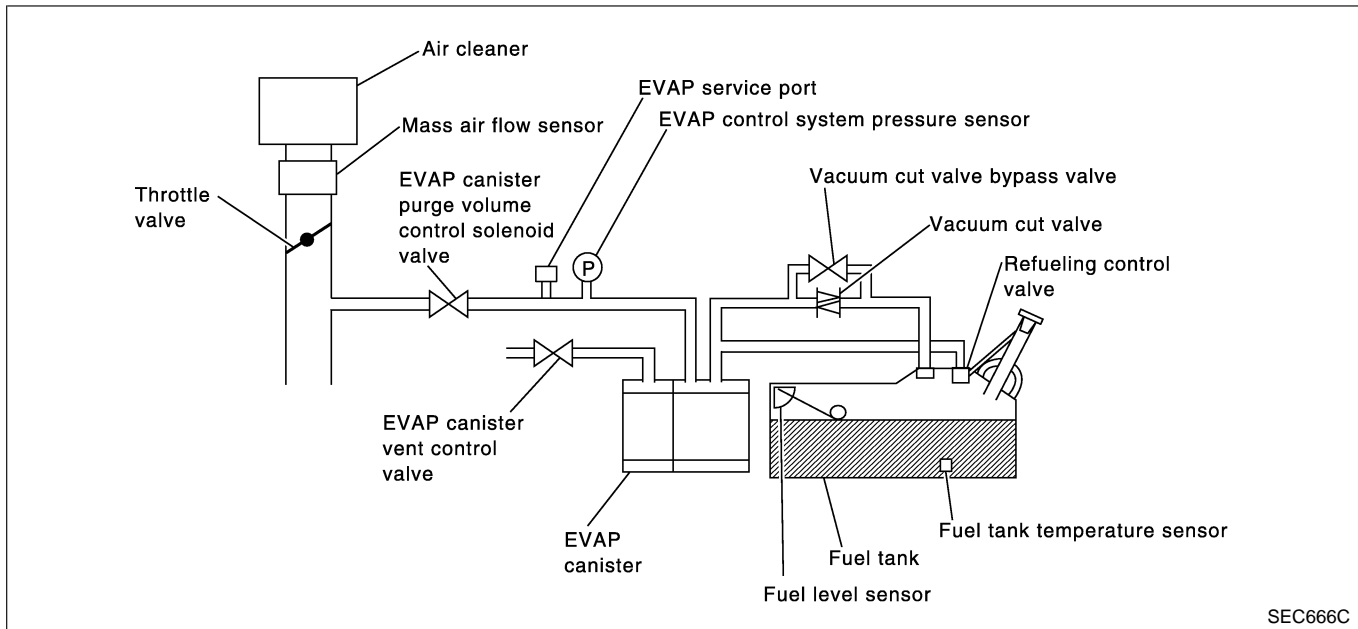
9	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.		
Trouble is fixed	▶	INSPECTION END
Trouble is not fixed	▶	Replace warm-up three way catalyst.

System Description

NGE0859

NOTE:

If DTC P0441 is displayed with P0510, perform trouble diagnosis for DTC P0510 first. (See EC-1012.)



In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

On Board Diagnosis Logic

NGE0860

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a fault is determined.

Malfunction is detected when EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.

POSSIBLE CAUSE

NGE0860S01

- EVAP canister purge volume control solenoid valve stuck closed
- EVAP control system pressure sensor and the circuit
- Loose, disconnected or improper connection of rubber tube
- Blocked rubber tube
- Blocked or bent rubber tube to MAP/BARO switch solenoid valve
- Cracked EVAP canister
- EVAP canister purge volume control solenoid valve circuit
- Closed throttle position switch
- Blocked purge port
- EVAP canister vent control valve

5	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">PURG FLOW P0441</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">OUT OF CONDITION</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">MONITOR</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td>B/FUEL SCHDL</td> <td>XXX msec</td> </tr> </table>	ENG SPEED	XXX rpm	THRTL POS SEN	XXX V	B/FUEL SCHDL	XXX msec	SEC723C
ENG SPEED	XXX rpm							
THRTL POS SEN	XXX V							
B/FUEL SCHDL	XXX msec							

6	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">PURG FLOW P0441</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">TESTING</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">MONITOR</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td>B/FUEL SCHDL</td> <td>XXX msec</td> </tr> </table>	ENG SPEED	XXX rpm	THRTL POS SEN	XXX V	B/FUEL SCHDL	XXX msec	SEC724C
ENG SPEED	XXX rpm							
THRTL POS SEN	XXX V							
B/FUEL SCHDL	XXX msec							

6	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">PURG FLOW P0441</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px; text-align: center;">COMPLETED</div>	SEC725C
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DTC Confirmation Procedure

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 5 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

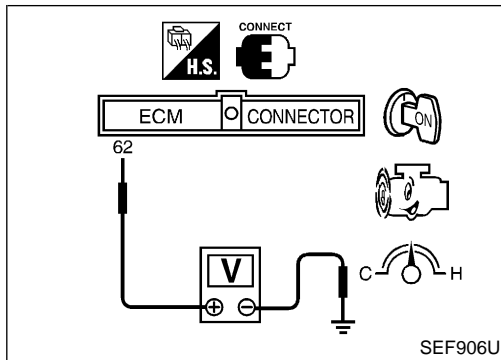
With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Start engine and let it idle for at least 70 seconds.
- 4) Select "PURG FLOW P0441" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 5) Touch "START".
If "COMPLETED" is displayed, go to step 7.
- 6) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 35 seconds.)

Selector lever	Suitable position
Vehicle speed	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,400 rpm
B/FUEL SCHDL	1.0 - 10.0 msec
Engine coolant temperature	70 - 100°C (158 - 212°F)

If "TESTING" is not changed for a long time, retry from step 2.

- 7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-916.



Overall Function Check

=NGEC0862

Use this procedure to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Lift up drive wheels.
- 2) Start engine and warm it up to normal operating temperature.
- 3) Turn ignition switch OFF, wait at least 5 seconds.
- 4) Start engine and wait at least 70 seconds.
- 5) Set voltmeter probes to ECM terminals 62 (EVAP control system pressure sensor signal) and ground.
- 6) Check EVAP control system pressure sensor value at idle speed and note it.
- 7) Establish and maintain the following conditions for at least 1 minute.

Air conditioner switch	ON
Steering wheel	Fully turned
Headlamp switch	ON
Rear window defogger switch	ON
Engine speed	Approx. 3,000 rpm
Gear position	Any position other than "P", "N" or "R"

- 8) Verify that EVAP control system pressure sensor value stays 0.1V less than the value at idle speed (measured at step 6) for at least 1 second.
- 9) If NG, go to "Diagnostic Procedure", EC-916.

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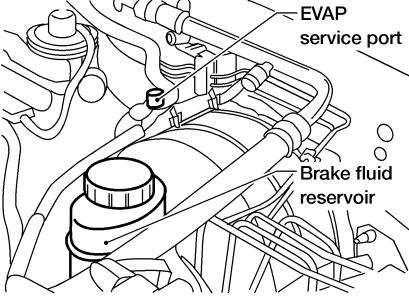
EL

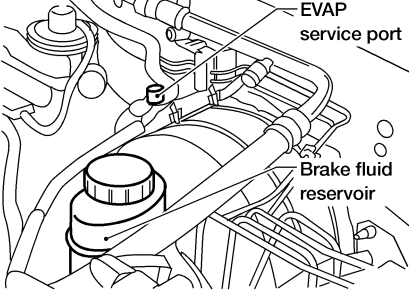
IDX

Diagnostic Procedure

=NGEC0863

1	CHECK EVAP CANISTER	
1. Turn ignition switch OFF. 2. Check EVAP canister for cracks.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 2.
OK (Without CONSULT-II)	▶	GO TO 3.
NG	▶	Replace EVAP canister.

2	CHECK PURGE FLOW																					
(P) With CONSULT-II 1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.																						
																						
AEC649A																						
2. Start engine and let it idle. 3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. 4. Rev engine up to 2,000 rpm. 5. Touch "Qd" and "Qu" on CONSULT-II screen to adjust "PURG VOL CONT/V" opening.																						
<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>PURG VOL CONT/V</th> <th>XXX %</th> </tr> </thead> <tbody> <tr> <td colspan="2" style="text-align: center;">MONITOR</td> </tr> <tr> <th>ENG SPEED</th> <th>XXX rpm</th> </tr> <tr> <td>A/F ALPHA-B1</td> <td>XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td>XXX %</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td>LEAN</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td>LEAN</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V		
ACTIVE TEST																						
PURG VOL CONT/V	XXX %																					
MONITOR																						
ENG SPEED	XXX rpm																					
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HO2S1 MNTR (B1)	LEAN																					
HO2S1 MNTR (B2)	LEAN																					
THRTL POS SEN	XXX V																					
<table border="1" style="margin: auto;"> <thead> <tr> <th>PURG VOL CONT/V</th> <th>VACUUM</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">100.0%</td> <td style="text-align: center;">Should exist</td> </tr> <tr> <td style="text-align: center;">0.0%</td> <td style="text-align: center;">Should not exist</td> </tr> </tbody> </table>			PURG VOL CONT/V	VACUUM	100.0%	Should exist	0.0%	Should not exist														
PURG VOL CONT/V	VACUUM																					
100.0%	Should exist																					
0.0%	Should not exist																					
SEF012Z																						
OK or NG																						
OK	▶	GO TO 7.																				
NG	▶	GO TO 4.																				

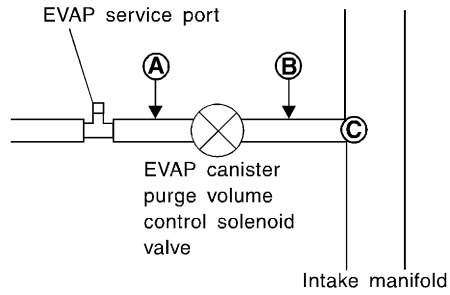
3	CHECK PURGE FLOW							
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. <div style="text-align: center; margin: 10px 0;">  </div> <ol style="list-style-type: none"> 4. Start engine and let it idle for at least 80 seconds. 5. Check vacuum gauge indication when revving engine up to 2,000 rpm. Vacuum should exist. 6. Release the accelerator pedal fully and let idle. Vacuum should not exist. <p style="text-align: right; margin-right: 20px;">AEC649A</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 7.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 4.</td> </tr> </table>			OK	▶	GO TO 7.	NG	▶	GO TO 4.
OK	▶	GO TO 7.						
NG	▶	GO TO 4.						

4	CHECK EVAP PURGE LINE							
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Check EVAP purge line for improper connection or disconnection. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-630. <p style="text-align: center; margin-top: 10px;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 5.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Repair it.</td> </tr> </table>			OK	▶	GO TO 5.	NG	▶	Repair it.
OK	▶	GO TO 5.						
NG	▶	Repair it.						

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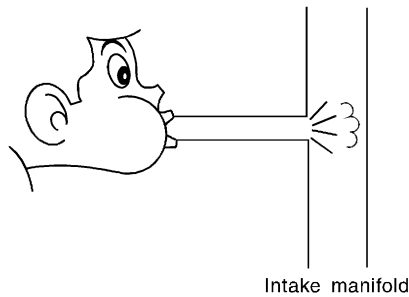
5 CHECK EVAP PURGE HOSE AND PURGE PORT

1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B**.



SEF367U

2. Blow air into each hose and EVAP purge port **C**.
3. Check that air flows freely.



SEF368U

OK or NG

OK (with CONSULT-II)	▶	GO TO 6.
OK (without CONSULT-II)	▶	GO TO 7.
NG	▶	Repair or clean hoses and/or purge port.

6 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

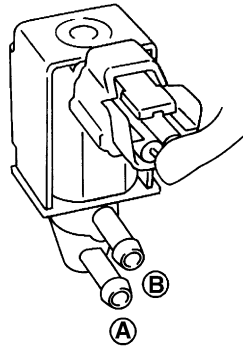
With CONSULT-II

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

If OK, inspection end. If NG, go to following step.

3. Check air passage continuity.



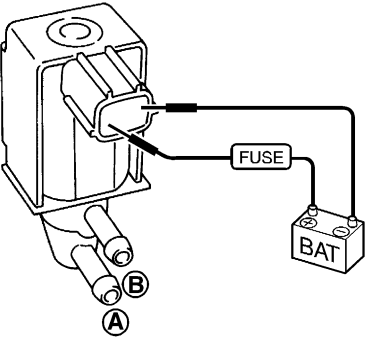
Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

If NG, replace the EVAP canister purge volume control solenoid valve.

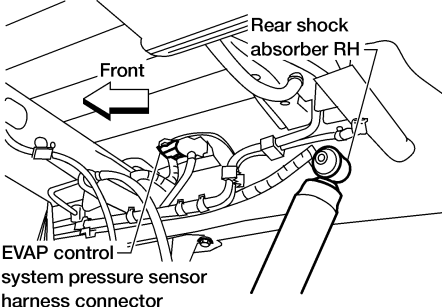
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

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7	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE							
<p>⊗ Without CONSULT-II Check air passage continuity.</p>								
								
SEF661U								
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 5px;">Condition</th> <th style="padding: 5px;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">12V direct current supply between terminals 1 and 2</td> <td style="padding: 5px; text-align: center;">Yes</td> </tr> <tr> <td style="padding: 5px;">No supply</td> <td style="padding: 5px; text-align: center;">No</td> </tr> </tbody> </table>			Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	Yes	No supply	No
Condition	Air passage continuity between A and B							
12V direct current supply between terminals 1 and 2	Yes							
No supply	No							
MTBL0242								
<p>If NG, replace the EVAP canister purge volume control solenoid valve.</p> <p style="text-align: center;">OK or NG</p>								
OK	▶	GO TO 8.						
NG	▶	Replace EVAP canister purge volume control solenoid valve.						

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	
<p>1. Turn ignition switch OFF. 2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.</p>		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Repair it.

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR	
<p>1. Disconnect EVAP control system pressure sensor harness connector.</p>		
		
AEC651A		
<p>2. Check connectors for water. Water should not exist.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor.

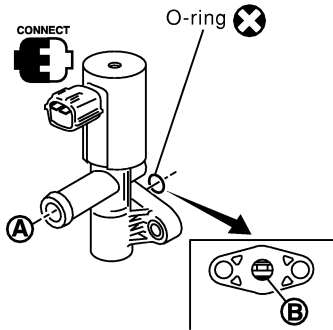
10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION	
Refer to "DTC Confirmation Procedure" for DTC P0452, P0453, EC-953.		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

11 CHECK EVAP CANISTER VENT CONTROL VALVE

Check air passage continuity.

With CONSULT-II

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

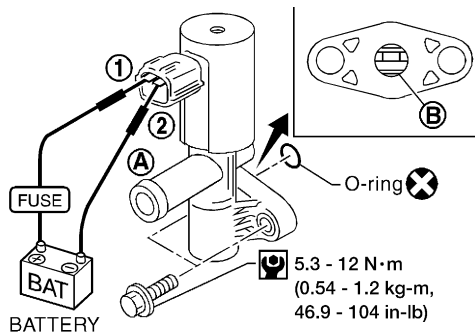
SEF991Y

Without CONSULT-II

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.



AEC783A

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP canister vent control valve.

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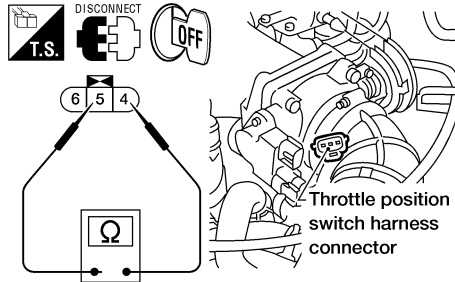
12	CHECK CLOSED THROTTLE POSITION SWITCH																
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch OFF. 3. Turn ignition switch ON. 4. Select "DATA MONITOR" mode with CONSULT-II. 5. Check indication of "CLSD THL/P SW". <p>Measurement must be made with closed throttle position switch installed in vehicle.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Throttle valve conditions</th> <th style="text-align: center;">CLSD THL/P SW</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Completely closed</td> <td style="text-align: center;">ON</td> </tr> <tr> <td style="text-align: center;">Partially open or completely open</td> <td style="text-align: center;">OFF</td> </tr> </tbody> </table> <p style="text-align: right;">MTBL0355</p> <p>If NG, adjust closed throttle position switch. Check the following items. Refer to "Basic Inspection", EC-701.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Items</th> <th style="text-align: center;">Specifications</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Ignition timing</td> <td style="text-align: center;">10° ± 2° BTDC</td> </tr> <tr> <td style="text-align: center;">Base idle speed</td> <td style="text-align: center;">700 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td style="text-align: center;">Closed throttle position switch idle position adjustment</td> <td style="text-align: center;">Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF</td> </tr> <tr> <td style="text-align: center;">Target idle speed</td> <td style="text-align: center;">750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table> <p style="text-align: right;">MTBL0576</p> <p>6. If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace closed throttle position switch.</p> <p style="text-align: center;">OK or NG</p>		Throttle valve conditions	CLSD THL/P SW	Completely closed	ON	Partially open or completely open	OFF	Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
Throttle valve conditions	CLSD THL/P SW																
Completely closed	ON																
Partially open or completely open	OFF																
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Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF																
Target idle speed	750 ± 50 rpm (in "P" or "N" position)																
OK	▶ GO TO 14.																
NG	▶ Replace throttle position switch with throttle position sensor.																

13 CHECK CLOSED THROTTLE POSITION SWITCH



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect closed throttle position switch harness connector.
4. Check continuity between closed throttle position switch terminals 4 and 5.
Resistance measurement must be made with closed throttle position switch installed in vehicle.



AEC654A

Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No

MTBL0247

If NG, adjust closed throttle position switch.
Check the following items. Refer to "Basic Inspection", EC-701.

Items	Specifications
Ignition timing	10° ± 2° BTDC
Base idle speed	700 ± 50 rpm (in "P" or "N" position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	750 ± 50 rpm (in "P" or "N" position)

MTBL0576

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

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace throttle position switch with throttle position sensor.

14 CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.
Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-630.

OK or NG

OK	▶	GO TO 15.
NG	▶	Replace it.

15 CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

	▶	GO TO 16.
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DTC P0441 EVAP CONTROL SYSTEM

VG33E

Diagnostic Procedure (Cont'd)

16	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.	
▶	INSPECTION END

On Board Diagnosis Logic

NGEC0744

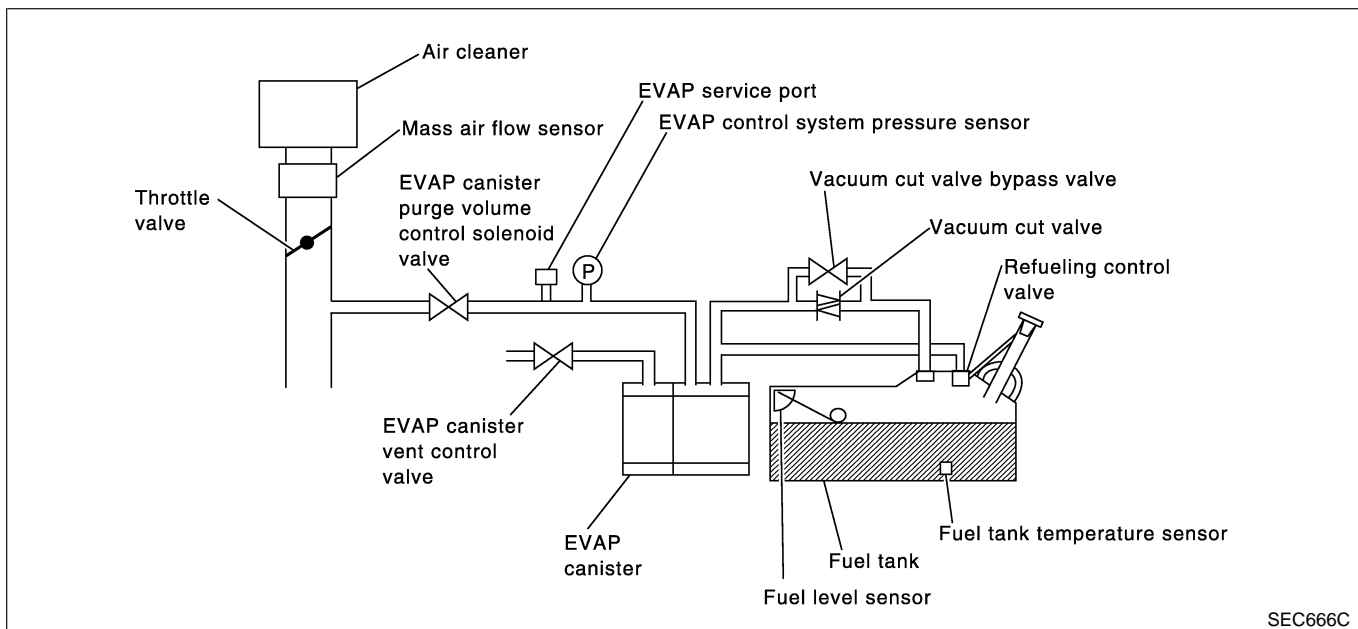
NOTE:

If DTC P0442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1099.)

This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.

If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following "Vacuum test" conditions.

The vacuum cut valve bypass valve is opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP canister vent control valve will then be closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve is opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.



SEC666C

Malfunction is detected when EVAP control system has a leak, EVAP control system does not operate properly.

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

POSSIBLE CAUSE

NGEC0744S01

- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close.
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent.

DTC P0442 EVAP CONTROL SYSTEM

VG33E

On Board Diagnosis Logic (Cont'd)

- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve and the circuit
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- Water separator
- EVAP canister is saturated with water.
- EVAP control system pressure sensor
- Fuel level sensor and the circuit.
- Refueling EVAP vapor cut
- ORVR system leaks

NGEC0745

5

EVAP SML LEAK P0442/P1442

1)FOR BEST RSLT,PERFORM AT FOLLOWING CONDITIONS.
 -FUEL LEVEL: 1/4-3/4
 -AMBIENT TEMP: 0-30 C(32-86F)
 -OPEN ENGINE HOOD.
 2)START ENG WITH VHCL STOPPED. IF ENG IS ON,STOP FOR 5 SEC.THEN RESTART.
 3)TOUCH START.

SEC716C

5

EVAP SML LEAK P0442/P1442

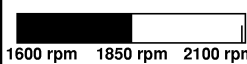
WAIT
2 TO 10 MINUTES.
KEEP ENGINE RUNNING AT IDLE SPEED.

SEC717C

5

EVAP SML LEAK P0442/P1442

MAINTAIN
1600 - 2100 RPM UNTIL FINAL RESULT APPEARS.
(APPROX. 3 MINUTES)



SEC718C

5

EVAP SML LEAK P0442/P1442

OK

SELF-DIAG RESULTS

NO DTC DETECTED.
FURTHER TESTING
MAY BE REQUIRED.

SEC719C

DTC Confirmation Procedure

NOTE:

- If DTC P0442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1099.)
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.
- Open engine hood before conducting the following procedure.

Ⓜ With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
- 4) Make sure that the following conditions are met.
COOLAN TEMP/S: 0 - 32°C (32 - 90°F)
INT/A TEMP SE: More than 0°C (32°F)
- 5) Select “EVAP SML LEAK P0442” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II. Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to “Basic Inspection”, EC-701.

- 6) Make sure that “OK” is displayed.
If “NG” is displayed, refer to “Diagnostic Procedure”, EC-928.

NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

Ⓜ With GST

NOTE:

Be sure to read the explanation of “Driving Pattern” on EC-667 before driving vehicle.

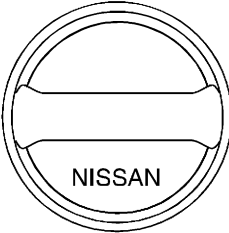
- 1) Start engine.
- 2) Drive vehicle according to “Driving Pattern”, EC-667.
- 3) Stop vehicle.
- 4) Select “MODE 1” with GST.
 - If SRT of EVAP system is not set yet, go to the following step.
 - If SRT of EVAP system is set, the result will be OK.
- 5) Turn ignition switch OFF and wait at least 5 seconds.
- 6) Start engine.
It is not necessary to cool engine down before driving.
- 7) Drive vehicle again according to the “Driving Pattern”, EC-667.
- 8) Stop vehicle.
- 9) Select “MODE 3” with GST.
 - If P0442 is displayed on the screen, go to “Diagnostic Procedure”, EC-928.
 - If P0441 is displayed on the screen, go to “Diagnostic Procedure” for “DTC P0441”, EC-916.
 - If P0442 and P0441 are not displayed on the screen, go to the following step.

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- 10) Select "MODE 1" with GST.
 - If SRT of EVAP system is set, the result will be OK.
 - If SRT of EVAP system is not set, go to step 6.

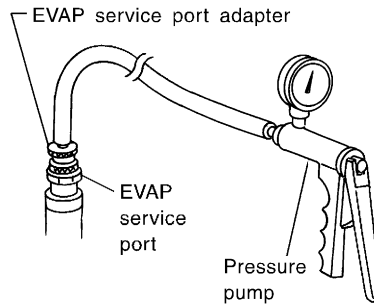
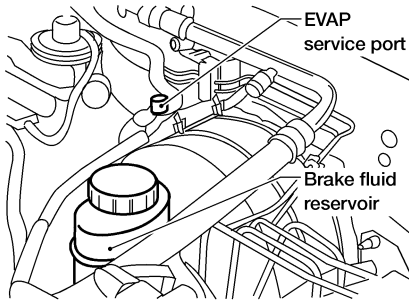
Diagnostic Procedure

NGEC0967

1	CHECK FUEL FILLER CAP DESIGN	
1. Turn ignition switch "OFF". 2. Check for genuine NISSAN fuel filler cap design.		
		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.
SEF915U		
2	CHECK FUEL FILLER CAP INSTALLATION	
Check that the cap is tightened properly by rotating the cap clockwise.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	<ul style="list-style-type: none"> ● Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. ● Retighten until ratcheting sound is heard.
3	CHECK FUEL FILLER CAP FUNCTION	
Check for air releasing sound while opening the fuel filler cap.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 4.
4	CHECK FUEL TANK VACUUM RELIEF VALVE	
Refer to "Evaporative Emission System", EC-626.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

5 INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



AEC649A

SEF916U

NOTE:

Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II	▶	GO TO 6.
Models without CONSULT-II	▶	GO TO 7.

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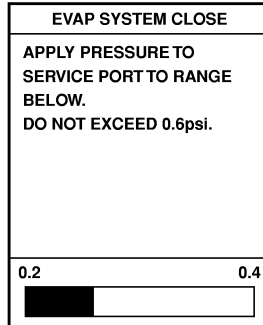
6 CHECK FOR EVAP LEAK

④ With CONSULT-II

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

NOTE:

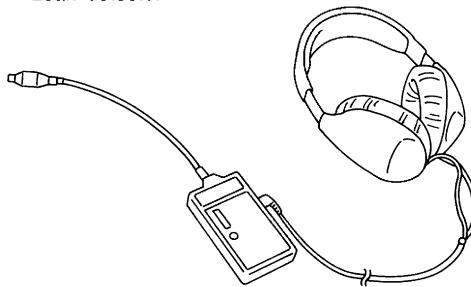
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-630.

Leak detector



SEF200U

OK or NG

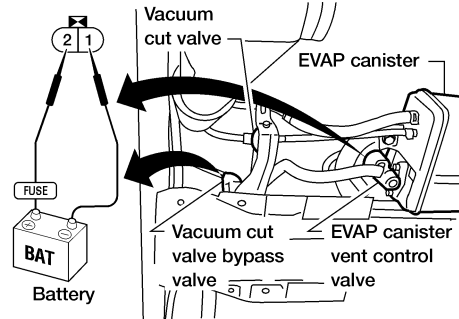
OK	▶	GO TO 8.
NG	▶	Repair or replace.

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7 CHECK FOR EVAP LEAK

⊗ **Without CONSULT-II**

1. Turn ignition switch "OFF".
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



AEC632A

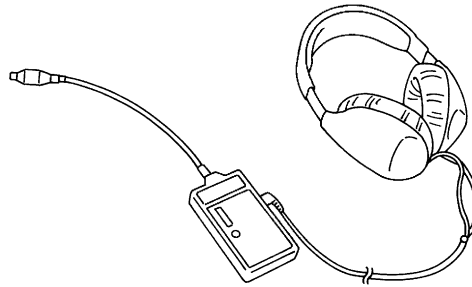
4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

NOTE:

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

5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-630.

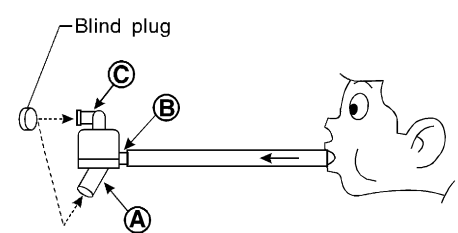
Leak detector



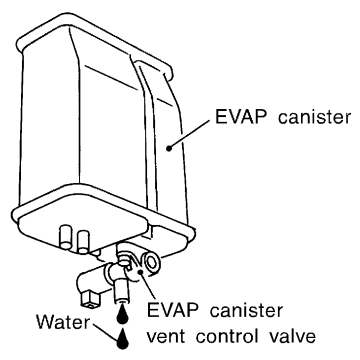
SEF200U

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

8	CHECK WATER SEPARATOR
<ol style="list-style-type: none"> 1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged. <div style="text-align: center; margin: 10px 0;">  <p style="margin: 0;">* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p> </div> <p style="text-align: right; margin-right: 50px;">SEF829T</p>	
5. In case of NG in items 2 - 4, replace the parts.	
NOTE:	
<ul style="list-style-type: none"> ● Do not disassemble water separator. 	
OK or NG	
OK	▶ GO TO 9.
NG	▶ Replace water separator.

9	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT
Refer to "DTC Confirmation Procedure", EC-947.	
OK or NG	
OK	▶ GO TO 10.
NG	▶ Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

10	CHECK IF EVAP CANISTER SATURATED WITH WATER
<ol style="list-style-type: none"> 1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister. <div style="text-align: center; margin: 10px 0;">  <p style="margin: 0;">Water</p> </div> <p style="text-align: right; margin-right: 50px;">SEF596U</p>	
Yes or No	
Yes	▶ GO TO 11.
No (With CONSULT-II)	▶ GO TO 13.
No (Without CONSULT-II)	▶ GO TO 14.

DTC P0442 EVAP CONTROL SYSTEM

VG33E

Diagnostic Procedure (Cont'd)

11	CHECK EVAP CANISTER	
Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 13.
OK (Without CONSULT-II)	▶	GO TO 14.
NG	▶	GO TO 12.

12	DETECT MALFUNCTIONING PART	
Check the following.		
<ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 		
	▶	Repair hose or replace EVAP canister.

13	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION																					
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 2. Start engine. 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode. 4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. 																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td>XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>HO2S1 MNTR (B2)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V		
ACTIVE TEST																						
PURG VOL CONT/V	XXX %																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
HO2S1 MNTR (B2)	LEAN																					
THRTL POS SEN	XXX V																					
Vacuum should exist.																						
SEF984Y																						
OK or NG																						
OK	▶	GO TO 17.																				
NG	▶	GO TO 15.																				

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION	
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 4. Start engine and let it idle for at least 80 seconds. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. <p>Vacuum should exist.</p>		
OK or NG		
OK	▶	GO TO 17.
NG	▶	GO TO 15.

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DTC P0442 EVAP CONTROL SYSTEM

VG33E

Diagnostic Procedure (Cont'd)

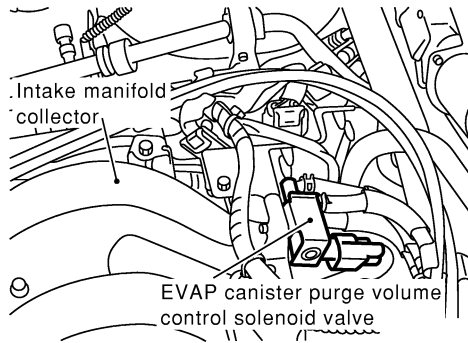
15	CHECK VACUUM HOSE
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-620.	
OK or NG	
OK	▶ GO TO 16.
NG	▶ Repair or reconnect the hose.

16	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																				
④ With CONSULT-II																					
1. Start engine.																					
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.																					
<table border="1"><thead><tr><th colspan="2">ACTIVE TEST</th></tr></thead><tbody><tr><td>PURG VOL CONT/V</td><td>0.0%</td></tr><tr><th colspan="2">MONITOR</th></tr><tr><td>ENG SPEED</td><td>XXX rpm</td></tr><tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr><tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr><tr><td>HO2S1 MNTR (B1)</td><td>RICH</td></tr><tr><td>HO2S1 MNTR (B2)</td><td>RICH</td></tr><tr><td>THRTL POS SEN</td><td>XXX V</td></tr><tr><td> </td><td> </td></tr></tbody></table>		ACTIVE TEST		PURG VOL CONT/V	0.0%	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	RICH	HO2S1 MNTR (B2)	RICH	THRTL POS SEN	XXX V		
ACTIVE TEST																					
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MONITOR																					
ENG SPEED	XXX rpm																				
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HO2S1 MNTR (B1)	RICH																				
HO2S1 MNTR (B2)	RICH																				
THRTL POS SEN	XXX V																				
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OK or NG																					
OK	▶ GO TO 18.																				
NG	▶ GO TO 17.																				

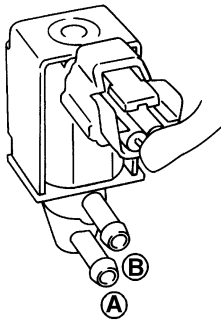
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17 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
④ With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF266X

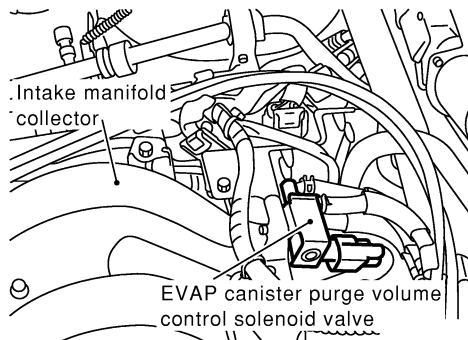


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

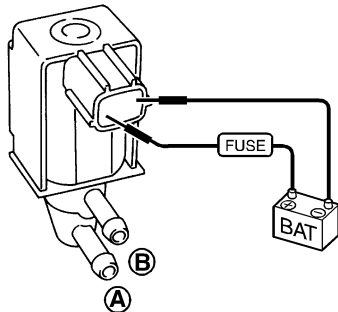
SEF334X

⊗ Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF266X

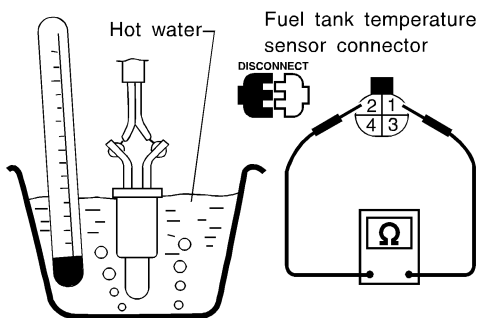


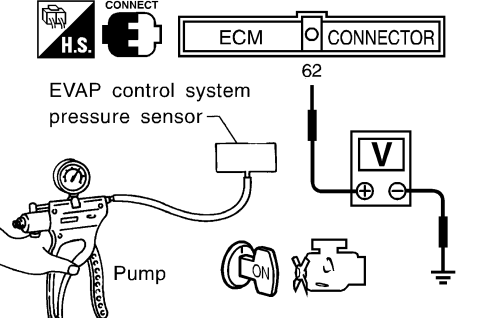
Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

18	CHECK FUEL TANK TEMPERATURE SENSOR	<p>1. Remove fuel level sensor unit.</p> <p>2. Check resistance between fuel level sensor unit and fuel pump terminals 1 and 2 by heating with hot water or heat gun as shown in the figure.</p>							
		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Temperature °C (°F)</th> <th style="text-align: center;">Resistance kΩ</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">20 (68)</td> <td style="text-align: center;">2.3 - 2.7</td> </tr> <tr> <td style="text-align: center;">50 (122)</td> <td style="text-align: center;">0.79 - 0.90</td> </tr> </tbody> </table>		Temperature °C (°F)	Resistance kΩ	20 (68)	2.3 - 2.7	50 (122)	0.79 - 0.90
Temperature °C (°F)	Resistance kΩ								
20 (68)	2.3 - 2.7								
50 (122)	0.79 - 0.90								
SEF974Y									
OK or NG									
OK		▶	GO TO 19.						
NG		▶	Replace fuel tank temperature sensor.						

19	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	<p>1. Remove EVAP control system pressure sensor with its harness connector connected.</p> <p>2. Remove hose from EVAP control system pressure sensor.</p> <p>3. Turn ignition switch "ON".</p> <p>4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● Always calibrate the vacuum pump gauge when using it. ● Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure. <p>5. Check input voltage between ECM terminal 62 and ground.</p>							
		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Applied vacuum</th> <th style="text-align: center;">Voltage V</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Not applied</td> <td style="text-align: center;">1.8 - 4.8</td> </tr> <tr> <td style="text-align: center;">-26.7 kPa (-200 mmHg, -7.87 inHg)</td> <td style="text-align: center;">1.0 to 1.4V lower than above value</td> </tr> </tbody> </table>		Applied vacuum	Voltage V	Not applied	1.8 - 4.8	-26.7 kPa (-200 mmHg, -7.87 inHg)	1.0 to 1.4V lower than above value
Applied vacuum	Voltage V								
Not applied	1.8 - 4.8								
-26.7 kPa (-200 mmHg, -7.87 inHg)	1.0 to 1.4V lower than above value								
SEC649C									
CAUTION:									
<ul style="list-style-type: none"> ● Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. 									
OK or NG									
OK		▶	GO TO 20.						
NG		▶	Replace EVAP control system pressure sensor.						

20	CHECK EVAP PURGE LINE	<p>Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to "Evaporative Emission System", EC-626.</p>	
OK or NG			
OK		▶	GO TO 21.
NG		▶	Repair or reconnect the hose.

DTC P0442 EVAP CONTROL SYSTEM

VG33E

Diagnostic Procedure (Cont'd)

21	CLEAN EVAP PURGE LINE
Clean EVAP purge line (pipe and rubber tube) using air blower.	
▶	GO TO 22.

22	CHECK REFUELING EVAP VAPOR LINE
Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to "ON BOARD REFUELING VAPOR RECOVERY (ORVR)", EC-632.	
OK or NG	
OK	▶ GO TO 23.
NG	▶ Repair or replace hoses and tubes.

23	CHECK SIGNAL LINE AND RECIRCULATION LINE
Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.	
OK or NG	
OK	▶ GO TO 24.
NG	▶ Repair or replace hoses, tubes or filler neck tube.

24	CHECK REFUELING CONTROL VALVE
<ol style="list-style-type: none"> 1. Remove fuel filler cap. 2. Check air continuity between hose ends A and B. Blow air into the hose end B. Air should flow freely into the fuel tank. 3. Blow air into hose end A and check there is no leakage. 4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage. 	
OK or NG	
OK	▶ GO TO 25.
NG	▶ Replace refueling control valve with fuel tank.

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DTC P0442 EVAP CONTROL SYSTEM

VG33E

Diagnostic Procedure (Cont'd)

25	CHECK FUEL LEVEL SENSOR
Refer to EL-89 , "Fuel Level Sensor Unit Check".	
OK or NG	
OK	▶ GO TO 26.
NG	▶ Replace fuel level sensor unit.

26	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.	
	▶ INSPECTION END

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33E
Description

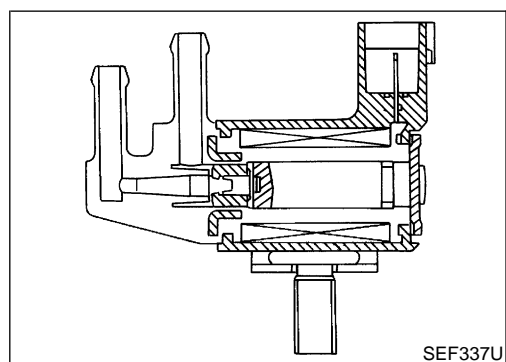
Description SYSTEM DESCRIPTION

NGEC0747

NGEC0747S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	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		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Throttle position switch	Closed throttle position		
Heated oxygen sensors 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.



COMPONENT DESCRIPTION

NGEC0747S02

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

NGEC0748

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch OFF ● Shift lever: "N" ● No-load Idle (Vehicle stopped)	0%
	2,000 rpm	—

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33E

ECM Terminals and Reference Value

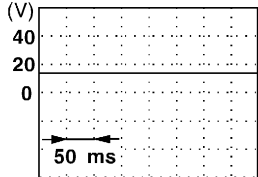
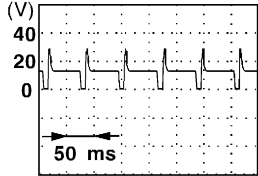
ECM Terminals and Reference Value

NGEC0749

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 the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self shut-off)	[Engine is running] [Ignition switch OFF] <ul style="list-style-type: none"> ● For a few seconds after turning ignition switch OFF 	0 - 1.5V
			[Ignition switch OFF] <ul style="list-style-type: none"> ● A few seconds passed after turning ignition switch OFF 	BATTERY VOLTAGE (11 - 14V)
5	R/Y	EVAP canister purge volume control solenoid valve	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V)  <p style="text-align: right; margin-right: 20px;">SEF994U</p>
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm (More than 100 seconds after starting engine) 	BATTERY VOLTAGE (11 - 14V)  <p style="text-align: right; margin-right: 20px;">SEF995U</p>
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V)

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33E

On Board Diagnosis Logic

On Board Diagnosis Logic

Malfunction is detected when an excessively low (P0444) or high (P0445) voltage signal is sent to ECM through the valve. =NGEC0750

POSSIBLE CAUSE

- Harness or connectors (The valve circuit is open or shorted.)
- EVAP canister purge volume control solenoid valve

NGEC0750S01

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NGEC0751

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 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 "Diagnostic Procedure", EC-943.

With GST

Follow the procedure "With CONSULT-II".

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DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

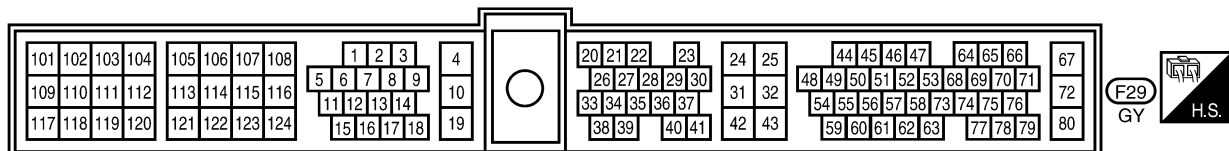
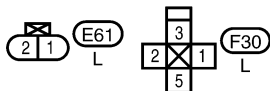
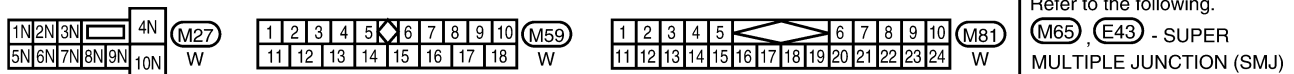
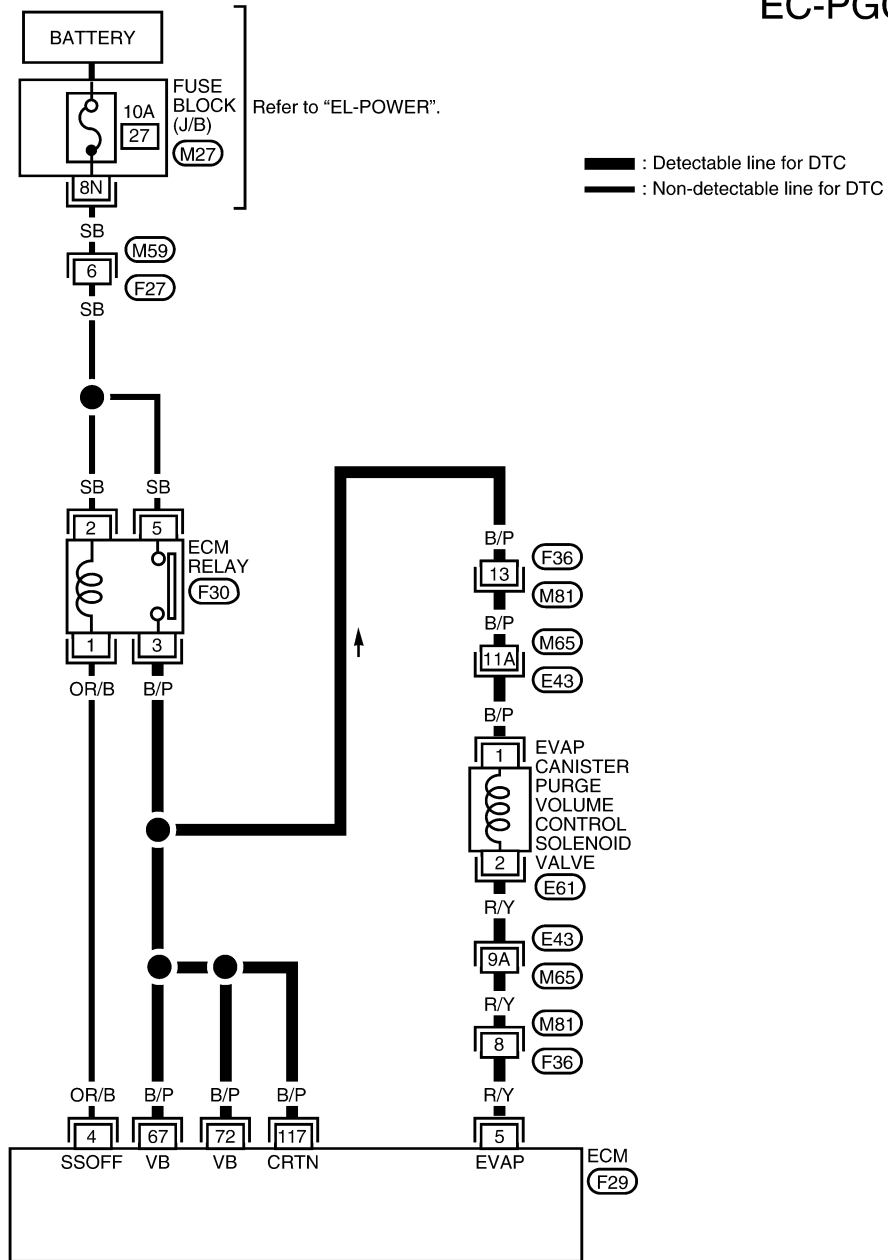
VG33E

Wiring Diagram

Wiring Diagram

NGEC0752

EC-PGC/V-01



LEC813

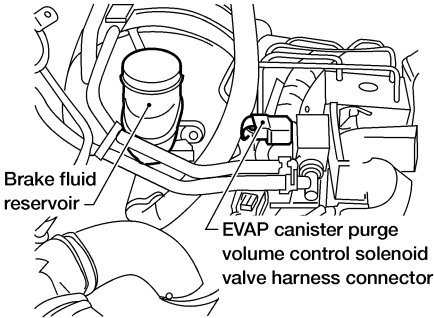
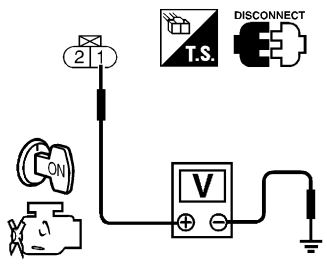
DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33E

Diagnostic Procedure

Diagnostic Procedure

NGEC0753

1	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT
<p>1. Turn ignition switch OFF. 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.</p> <div style="text-align: center;">  <p>Brake fluid reservoir</p> <p>EVAP canister purge volume control solenoid valve harness connector</p> </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p>Voltage: Battery voltage</p> <p>OK or NG</p> </div>	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

AEC652A

SEF646W

2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F36, M81 ● Harness connectors M65, E43 ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay 	
▶	Repair harness or connectors.

3	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 5 and solenoid terminal 2. Refer to Wiring Diagram. Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK (With CONSULT-II)	▶ GO TO 5.
OK (Without CONSULT-II)	▶ GO TO 6.
NG	▶ GO TO 4.

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DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33E

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M81, F36 ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM 	
	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION																				
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine. 2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening. 																					
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td>PURG VOL CONT/V</td> <td style="text-align: center;">0.0%</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>		ACTIVE TEST		PURG VOL CONT/V	0.0%	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	RICH	HO2S1 MNTR (B2)	RICH	THRTL POS SEN	XXX V		
ACTIVE TEST																					
PURG VOL CONT/V	0.0%																				
MONITOR																					
ENG SPEED	XXX rpm																				
A/F ALPHA-B1	XXX %																				
A/F ALPHA-B2	XXX %																				
HO2S1 MNTR (B1)	RICH																				
HO2S1 MNTR (B2)	RICH																				
THRTL POS SEN	XXX V																				
SEF985Y																					
OK or NG																					
OK	GO TO 7.																				
NG	GO TO 6.																				

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

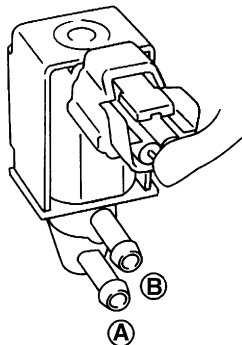
VG33E

Diagnostic Procedure (Cont'd)

6 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Check air passage continuity under the following conditions.



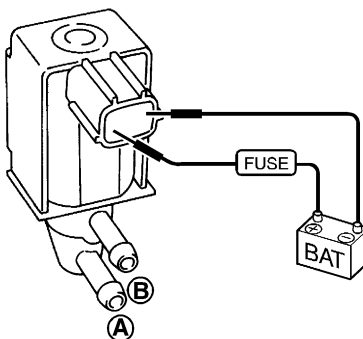
SEF660U

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

MTBL0241

Without CONSULT-II

1. Check air passage continuity under the following conditions.



SEF661U

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

MTBL0242

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

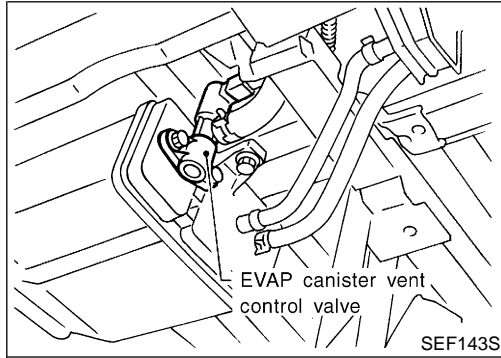
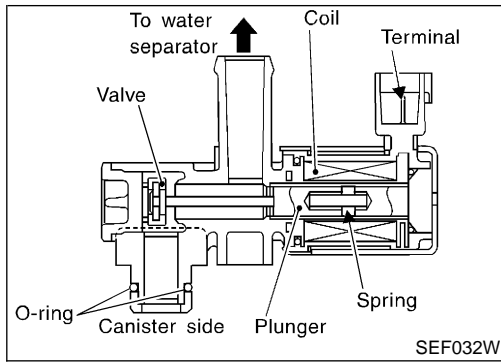
7 CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.

▶ **INSPECTION END**

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Component Description



Component Description

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent. NGEC0754

This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

NGEC0755

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

ECM Terminals and Reference Value

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

NGEC0756

CAUTION:

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

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

Malfunction is detected when an improper voltage signal is sent to ECM through EVAP canister vent control valve. =NGEC0757

POSSIBLE CAUSE

- Harness or connectors
(The valve circuit is open or shorted.)
- EVAP canister vent control valve

NGEC0757S01

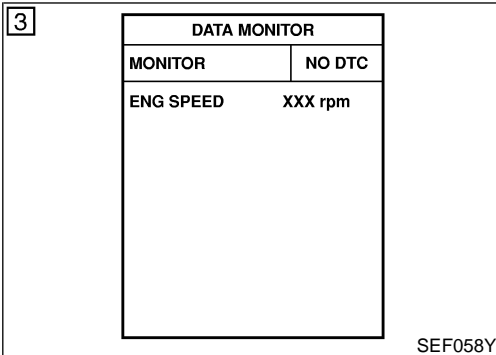
DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test. NGEC0758

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 wait at least 8 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-949.

Ⓜ With GST

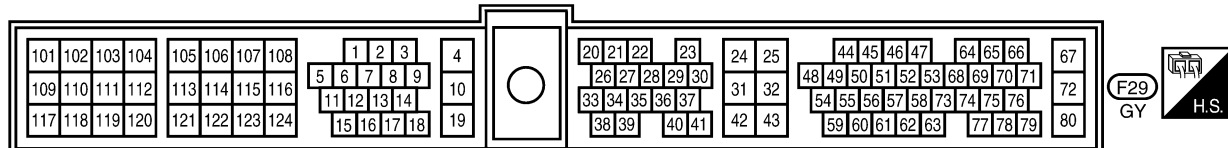
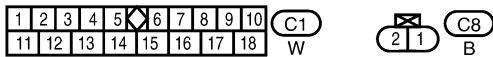
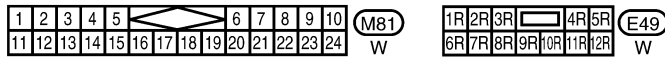
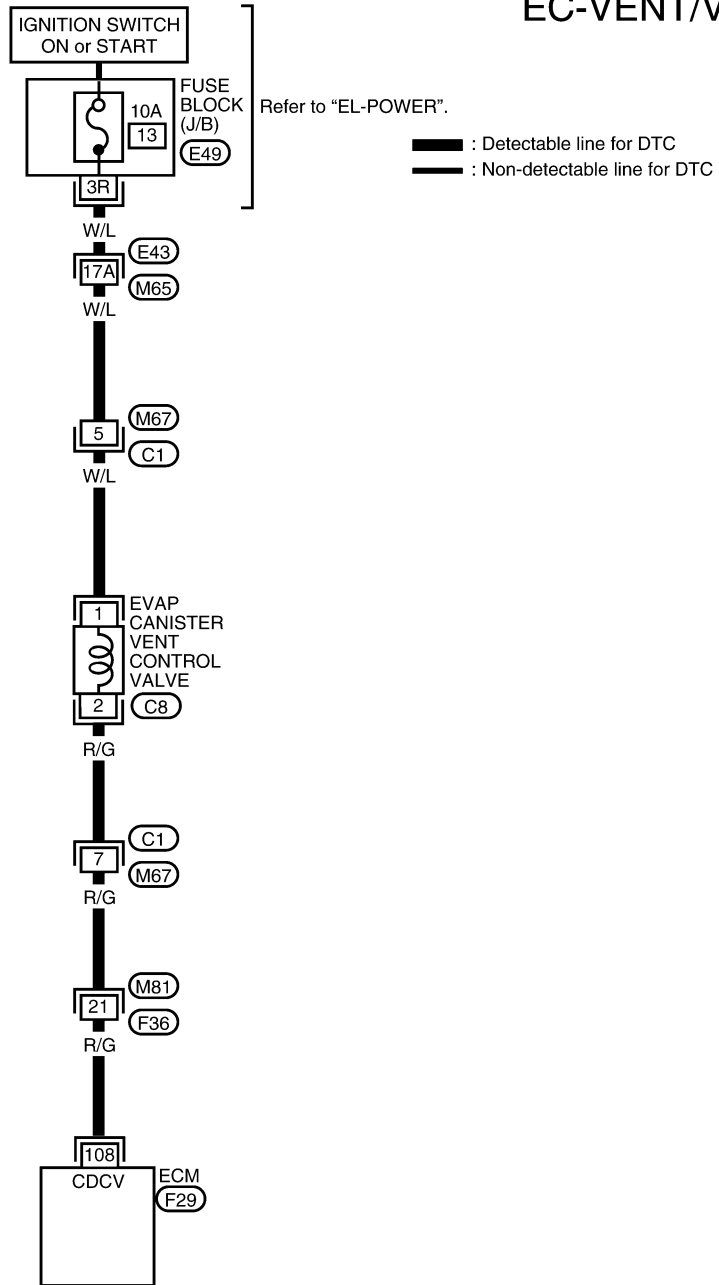
Follow the procedure "With CONSULT-II".

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Wiring Diagram

NGEC0759

EC-VENT/V-01



Refer to the following.
(M65), **(E43)** - SUPER
 MULTIPLE JUNCTION (SMJ)

Diagnostic Procedure

NGEC0760

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

GI
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2	CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT																					
<p>1. Turn ignition switch OFF and then turn ON. 2. Select "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-II. 3. Touch "ON/OFF" on CONSULT-II screen.</p>																						
<table border="1" style="margin: auto;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>VENT CONTROL/V</td><td>OFF</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr> <tr><td>HO2S1 (B1)</td><td>XXX V</td></tr> <tr><td>HO2S1 (B2)</td><td>XXX V</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 (B1)	XXX V	HO2S1 (B2)	XXX V	THRTL POS SEN	XXX V		
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VENT CONTROL/V	OFF																					
MONITOR																						
ENG SPEED	XXX rpm																					
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A/F ALPHA-B2	XXX %																					
HO2S1 (B1)	XXX V																					
HO2S1 (B2)	XXX V																					
THRTL POS SEN	XXX V																					
<p>4. Check for operating sound of the valve. Clicking noise should be heard.</p>																						
OK or NG																						
OK	▶	GO TO 7.																				
NG	▶	GO TO 3.																				

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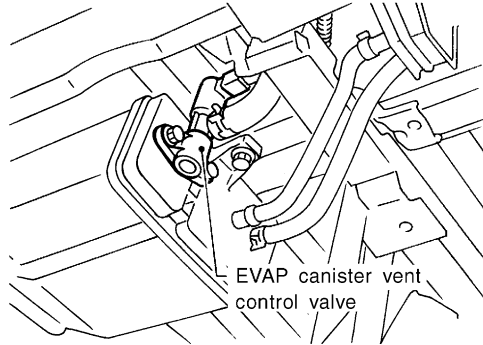
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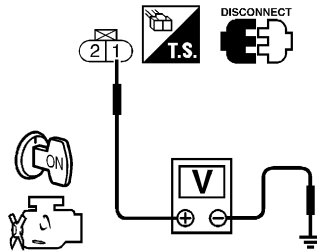
3 CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister vent control valve harness connector.



SEF143S

3. Turn ignition switch ON.
4. Check voltage between terminal 1 and ground with CONSULT-II or tester.



SEF648W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4 DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E43, M65
- Harness connectors M67, C1
- Fuse block (J/B) connector E49
- 10A fuse
- Harness for open or short between EVAP canister vent control valve and fuse

▶ Repair harness or connectors.

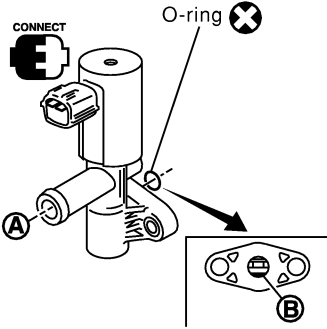
5 CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

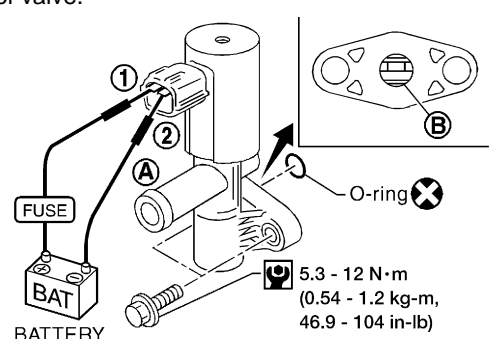
1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and valve terminal 2.
Refer to Wiring Diagram.
Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors C1, M67 ● Harness connectors M81, F36 ● Harness for open or short between EVAP canister vent control valve and ECM 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK EVAP CANISTER VENT CONTROL VALVE																								
(E) With CONSULT-II <ol style="list-style-type: none"> 1. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode. 2. Check air passage continuity and operation delay time. 																									
	<table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <thead> <tr> <th colspan="2" style="text-align: center;">ACTIVE TEST</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">VENT CONTROL/V</td> <td style="text-align: center;">OFF</td> </tr> <tr> <th colspan="2" style="text-align: center;">MONITOR</th> </tr> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td style="text-align: center;">A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td style="text-align: center;">A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td style="text-align: center;">HO2S1 (B1)</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td style="text-align: center;">HO2S1 (B2)</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td style="text-align: center;">THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Condition VENT CONTROL/V</th> <th style="text-align: center;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">ON</td> <td style="text-align: center;">No</td> </tr> <tr> <td style="text-align: center;">OFF</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table> <p>Operation takes less than 1 second.</p>	ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 (B1)	XXX V	HO2S1 (B2)	XXX V	THRTL POS SEN	XXX V	Condition VENT CONTROL/V	Air passage continuity between A and B	ON	No	OFF	Yes
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VENT CONTROL/V	OFF																								
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ON	No																								
OFF	Yes																								
SEF991Y																									

(X) Without CONSULT-II <ol style="list-style-type: none"> 1. Check air passage continuity and operation delay time under the following conditions. 							
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Condition</th> <th style="text-align: center;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">12V direct current supply between terminals 1 and 2</td> <td style="text-align: center;">No</td> </tr> <tr> <td style="text-align: center;">OFF</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table>	Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	No	OFF	Yes	 <p style="text-align: right; margin-right: 50px;"> 5.3 - 12 N·m (0.54 - 1.2 kg-m, 46.9 - 104 in-lb) </p>
Condition	Air passage continuity between A and B						
12V direct current supply between terminals 1 and 2	No						
OFF	Yes						
If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary. If portion B is rusted, replace control valve.							
MTBL0240							
<p>Make sure new O-ring is installed properly.</p> <p>OK or NG</p>							
OK	▶ GO TO 8.						
NG	▶ Replace EVAP canister vent control valve.						

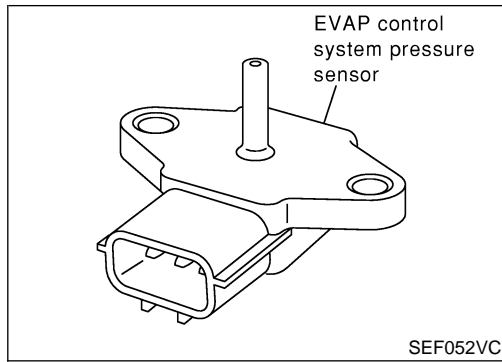
8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.	
▶	INSPECTION END

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DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

VG33E

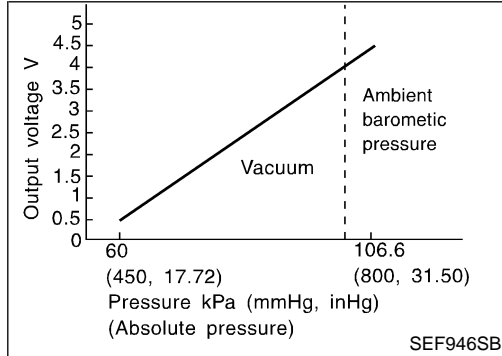
Component Description



Component Description

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases. The EVAP control system pressure sensor is not used to control the engine system. It is used only for on board diagnosis.

NGEC0761



CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

NGEC0762

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	● Ignition switch: ON	Approx. 1.8 - 4.8V

ECM Terminals and Reference Value

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

NGEC0763

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	B/W	Sensors' power supply	[Ignition switch ON]	Approximately 5V
43	BR	Sensors' ground	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
62	Y	EVAP control system pressure sensor	[Ignition switch ON]	Approximately 1.8 - 4.8V

DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

VG33E

On Board Diagnosis Logic

On Board Diagnosis Logic

Malfunction is detected when an excessively low (P0452) or high (P0453) voltage signal from EVAP control system pressure sensor is sent to ECM. =NGEC0764

POSSIBLE CAUSE

- Harness or connectors (The EVAP control system pressure sensor circuit is open or shorted.) NGEC0764S01
- Rubber hose to EVAP control system pressure sensor is clogged, vent, kinked, disconnected or improper connection.
- EVAP control system pressure sensor
- EVAP canister vent control valve
- EVAP canister purge volume control solenoid valve
- EVAP canister
- Rubber hose from EVAP canister vent control valve to water separator

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
FUEL T/TMP SE	XXX °C

SEF194Y

With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Make sure that "TANK F/TEMP SE" is more than 0°C (32°F).
- 6) Start engine and wait at least 20 seconds.
- 7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-955.

With GST

Follow the procedure "With CONSULT-II".

DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

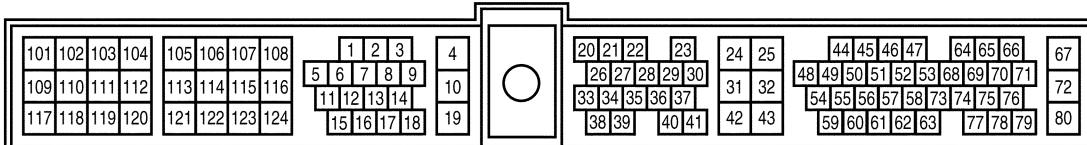
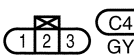
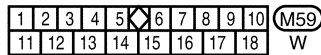
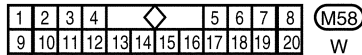
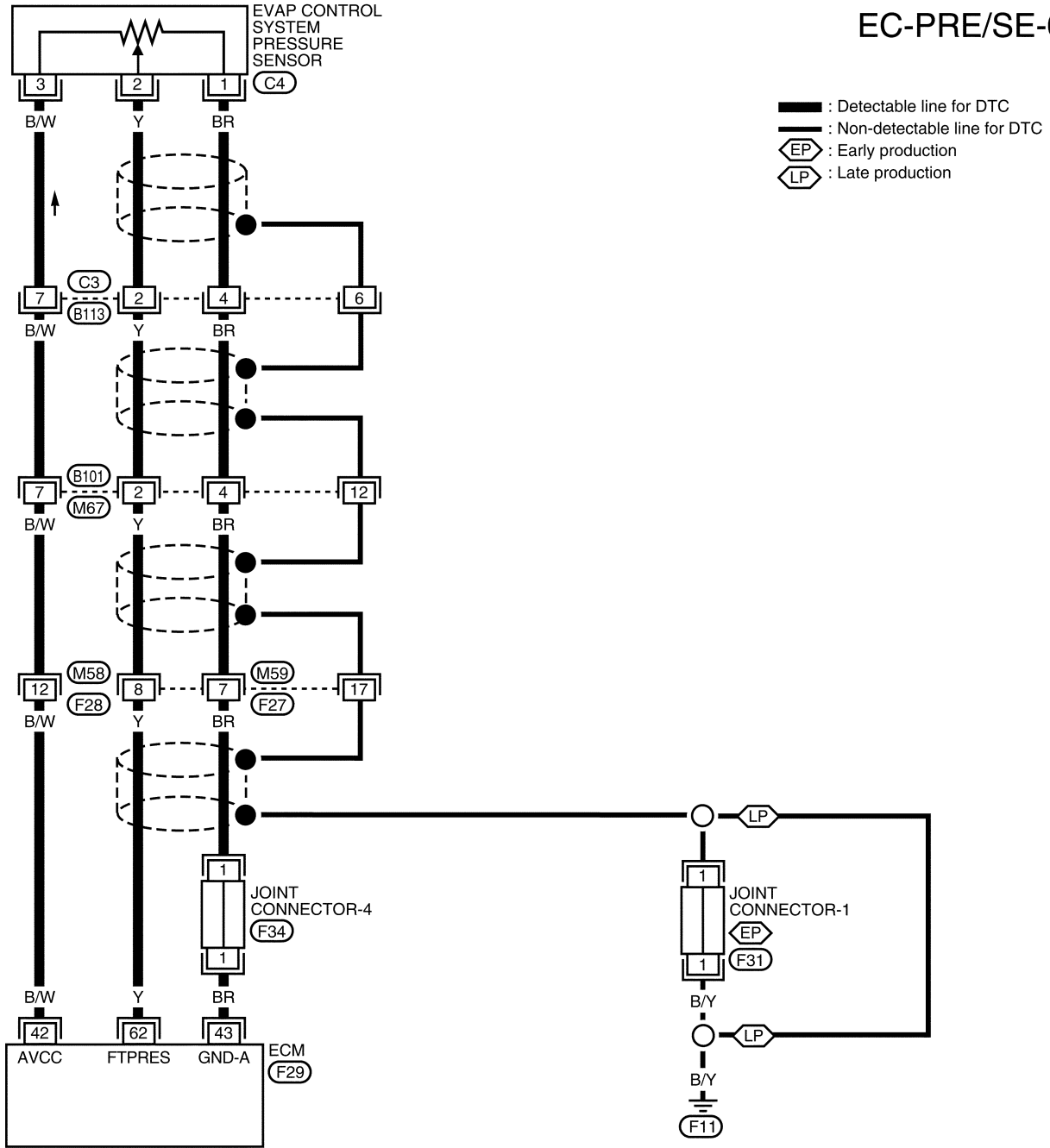
VG33E

Wiring Diagram

Wiring Diagram

NGEC0766

EC-PRE/SE-01



WEC181A

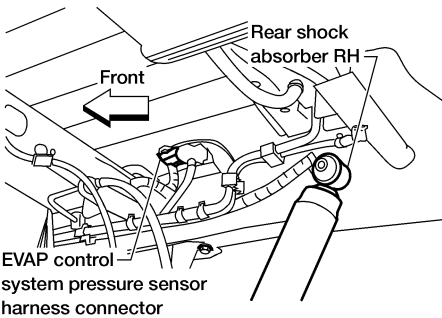
DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

VG33E

Diagnostic Procedure

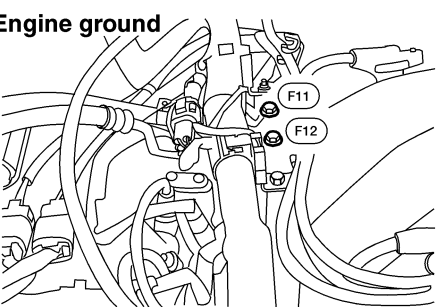
Diagnostic Procedure

NGEC0767

1	CHECK RUBBER TUBE		
<p>1. Turn ignition switch OFF. 2. Check rubber tube connected to the sensor for clogging, vent, kink, disconnection or improper connection.</p>			
			
AEC651A			
OK or NG			
OK	▶	GO TO 2.	
NG	▶	Reconnect, repair or replace.	

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2	RETIGHTEN GROUND SCREWS		
<p>1. Loosen and retighten engine ground screws.</p>			
			
LEC518			
▶		GO TO 3.	

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3	CHECK CONNECTOR		
<p>1. Disconnect EVAP control system pressure sensor harness connector. 2. Check sensor harness connector for water. Water should not exist.</p>			
OK or NG			
OK	▶	GO TO 4.	
NG	▶	Repair or replace harness connector.	

BR
ST
RS
BT

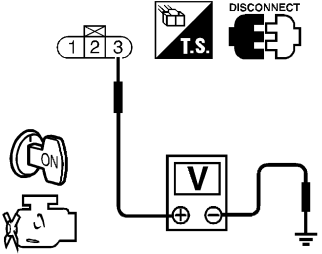
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DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

VG33E

Diagnostic Procedure (Cont'd)

4	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT	
<p>1. Turn ignition switch ON. 2. Check voltage between terminal 3 and ground with CONSULT-II or tester.</p>		
		
<p>Voltage: Approximately 5V</p> <p>OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

SEF889U

5	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors C3, B113 and B101, M67 ● Harness connectors M58, F28 ● Harness for open or short between EVAP control system pressure sensor and ECM 		
▶		Repair harness or connectors.

6	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch OFF. 2. Check harness continuity between sensor terminal 1 and engine ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to power.</p>		
OK or NG		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors C3, B113 and B101, M67 ● Harness connectors F27, M59 ● Joint connector-4 (if equipped) ● Harness for open or short between EVAP control system pressure sensor and ECM 		
▶		Repair open circuit or short to power in harness or connectors.

DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

VG33E

Diagnostic Procedure (Cont'd)

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Disconnect ECM harness connector.</p> <p>2. Check harness continuity between ECM terminal 62 and sensor terminal 2. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II) ▶		GO TO 10.
OK (Without CONSULT-II) ▶		GO TO 11.
NG ▶		GO TO 9.

9	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors C3, B113 and B101, M67 ● Harness connectors M59, F27 ● Harness for open or short between ECM and EVAP control system pressure sensor 		
▶		Repair open circuit or short to ground or short to power in harness or connectors.

10	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																					
<p>Ⓜ With CONSULT-II</p> <p>1. Start engine.</p> <p>2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.</p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td>PURG VOL CONT/V</td> <td style="text-align: center;">0.0%</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td>FR O2 MNTR-B1</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>FR O2 MNTR-B2</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>			ACTIVE TEST		PURG VOL CONT/V	0.0%	MONITOR		ENG SPEED	XXX rpm	FR O2 MNTR-B1	RICH	FR O2 MNTR-B2	RICH	THRTL POS SEN	XXX V	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %		
ACTIVE TEST																						
PURG VOL CONT/V	0.0%																					
MONITOR																						
ENG SPEED	XXX rpm																					
FR O2 MNTR-B1	RICH																					
FR O2 MNTR-B2	RICH																					
THRTL POS SEN	XXX V																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
OK or NG																						
OK ▶		GO TO 12.																				
NG ▶		GO TO 11.																				

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DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

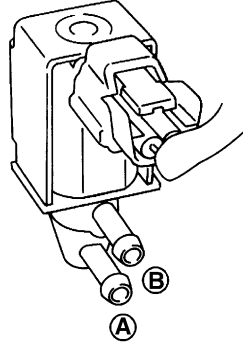
VG33E

Diagnostic Procedure (Cont'd)

11 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Check air passage continuity under the following conditions.



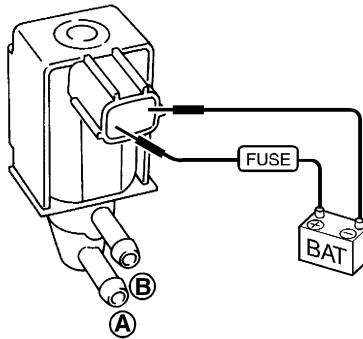
Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

SEF660U

MTBL0241

Without CONSULT-II

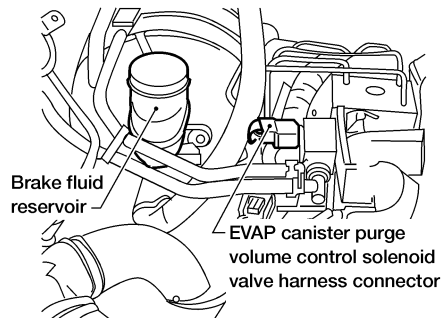
1. Check air passage continuity under the following conditions.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF661U

MTBL0242



AEC652A

OK or NG

OK



GO TO 12.

NG



Replace EVAP canister purge volume control solenoid valve.

DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

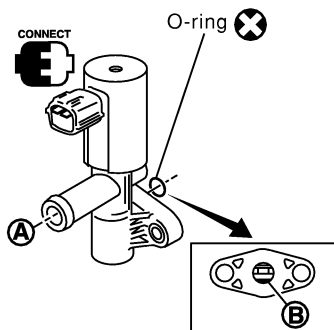
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Diagnostic Procedure (Cont'd)

12 CHECK EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

1. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
2. Check air passage continuity and operation delay time under the following conditions.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF991Y

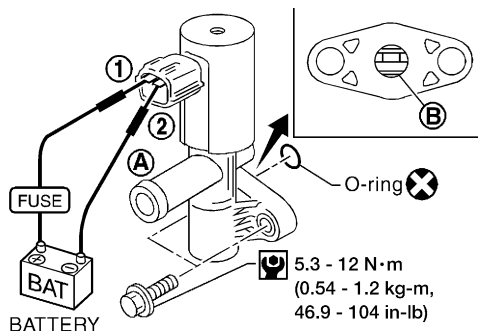
Without CONSULT-II

1. Check air passage continuity and operation delay time under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.



AEC783A

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace EVAP canister vent control valve.

13 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to "Component Inspection", EC-961

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace EVAP control system pressure sensor.

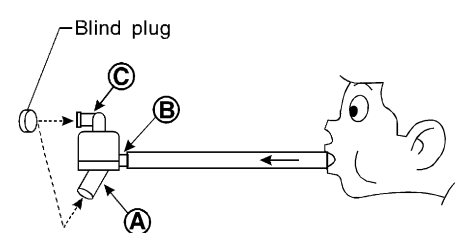
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DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

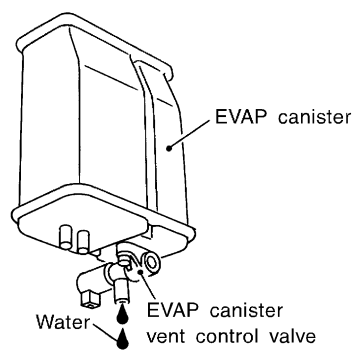
VG33E

Diagnostic Procedure (Cont'd)

14	CHECK RUBBER TUBE	
Check obstructed rubber tube connected to EVAP canister vent control valve.		
OK or NG		
OK	▶	GO TO 15.
NG	▶	Clean, repair or replace rubber tube.

15	CHECK WATER SEPARATOR	
<ol style="list-style-type: none"> 1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged. 		
 <p style="text-align: center;">* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p>		
5. In case of NG in items 2 - 4, replace the parts.		
NOTE:		
<ul style="list-style-type: none"> ● Do not disassemble water separator. 		
OK or NG		
OK	▶	GO TO 16.
NG	▶	Replace water separator.

SEF829T

16	CHECK IF EVAP CANISTER SATURATED WITH WATER	
<ol style="list-style-type: none"> 1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister. 		
		
Yes or No		
Yes	▶	GO TO 17.
No	▶	GO TO 19.

SEF596U

DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

VG33E

Diagnostic Procedure (Cont'd)

17	CHECK EVAP CANISTER	
Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).		
OK or NG		
OK	▶	GO TO 19.
NG	▶	GO TO 18.

GI
MA
EM

18	DETECT MALFUNCTIONING PART	
Check the following.		
<ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 		
▶		Repair hose or replace EVAP canister.

LC
EC

19	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT	
<ol style="list-style-type: none"> 1. Reconnect harness connectors disconnected. 2. Disconnect harness connectors C3, B113. 3. Check harness continuity between harness connector B113 terminal 6 and engine ground. Continuity should exist. 4. Also check harness for short to power. 		
OK or NG		
OK	▶	GO TO 21.
NG	▶	GO TO 20.

FE
CL
MT

20	DETECT MALFUNCTIONING PART	
Check the following.		
<ul style="list-style-type: none"> ● Harness connectors B113 and B101, M67 ● Harness connectors M59, F27 ● Joint connector-1 (if equipped) ● Harness for open between harness connector B113 and engine ground 		
▶		Repair open circuit or short to power in harness or connectors.

TF
PD
AX

21	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.		
▶		INSPECTION END

SU
BR
ST

Component Inspection

EVAP CONTROL SYSTEM PRESSURE SENSOR

NGEC1500

1. Remove EVAP control system pressure sensor with its harness connector connected. NGEC1500S01
2. Remove hose from EVAP control system pressure sensor.
3. Install a vacuum pump to EVAP control system pressure sensor.

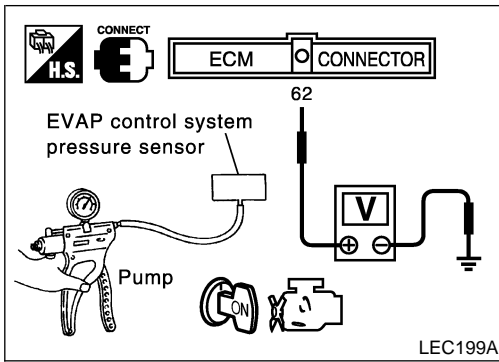
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DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

VG33E

Component Inspection (Cont'd)



- Turn ignition switch ON and check output voltage between ECM terminal 62 and ground under the following conditions.

Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 – 4.8
-26.7 (-200, -7.87)	2.1 to 2.5V lower than above value

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
 - Do not apply vacuum below -93.3 kPa (-700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).
- If NG, replace EVAP control system pressure sensor.

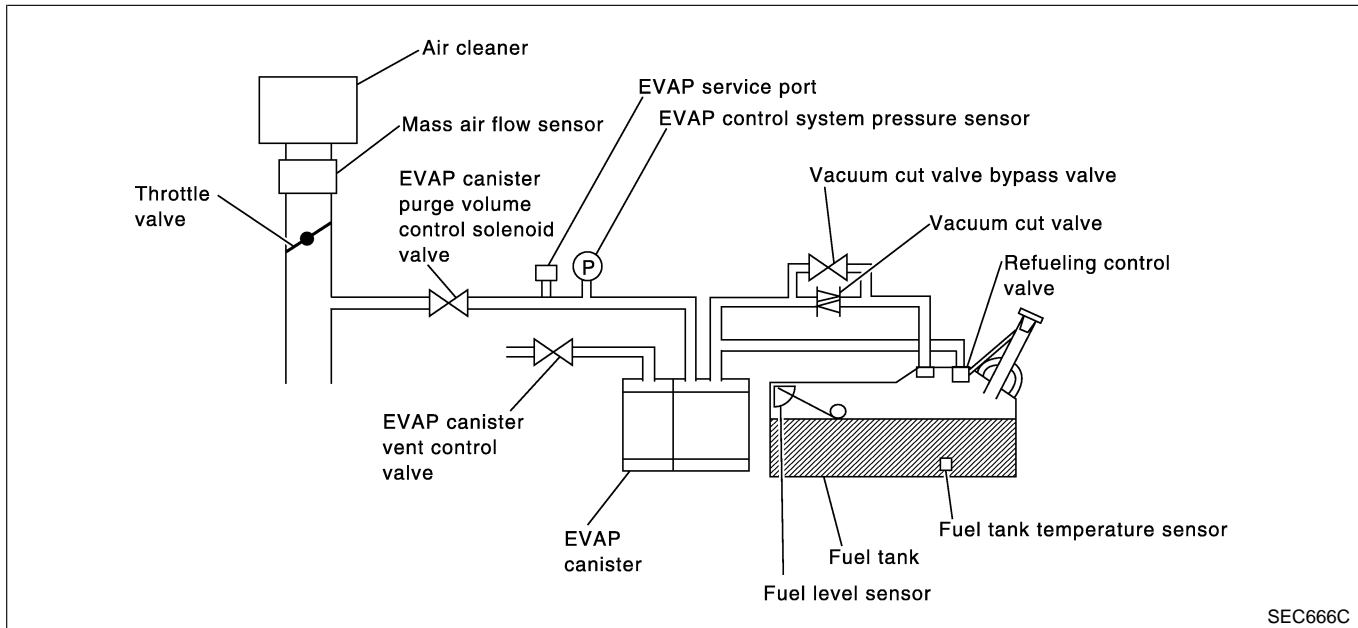
On Board Diagnosis Logic

NGEC0954

NOTE:

If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1103.)

This diagnosis detects a very large leak (fuel filler cap fell off etc.) in the EVAP system between the fuel tank and the EVAP canister purge volume control solenoid valve.



SEC666C

Malfunction is detected when EVAP control system has a very large leak, such as fuel filler cap fell off, EVAP control system does not operate properly.

CAUTION:

- Fuel filler cap remains open or fails to close.
- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

POSSIBLE CAUSE

NGEC0954S01

- Fuel filler cap remains open or fails to close.
- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent.
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve and the circuit
- Fuel tank temperature sensor

- O-ring of EVAP canister vent control valve is missing or damaged.
- EVAP control system pressure sensor
- Refueling control valve
- ORVR system leaks

DTC Confirmation Procedure

NGEC0955

CAUTION:

Never remove fuel filter cap during the DTC confirmation procedure.

6

EVAP SML LEAK P0442/P1442

1)FOR BEST RSLT,PERFORM AT FOLLOWING CONDITIONS.
-FUEL LEVEL: 1/4-3/4
-AMBIENT TEMP: 0-30 C(32-86F)
-OPEN ENGINE HOOD.
2)START ENG WITH VHCL STOPPED. IF ENG IS ON,STOP FOR 5 SEC.THEN RESTART.
3)TOUCH START.

SEC716C

6

EVAP SML LEAK P0442/P1442

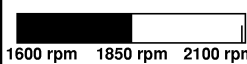
WAIT
2 TO 10 MINUTES.
KEEP ENGINE RUNNING AT IDLE SPEED.

SEC717C

6

EVAP SML LEAK P0442/P1442

MAINTAIN
1600 - 2100 RPM UNTIL FINAL RESULT APPEARS.
(APPROX. 3 MINUTES)



SEC718C

6

EVAP SML LEAK P0442/P1442

OK

SELF-DIAG RESULTS

NO DTC DETECTED.
FURTHER TESTING
MAY BE REQUIRED.

SEC719C

NOTE:

- If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1103.)
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.
- Open engine hood before conducting the following procedure.

P **With CONSULT-II**

- 1) Tighten fuel filter cap securely until ratcheting sound is heard.
- 2) Turn ignition switch ON.
- 3) Turn ignition switch OFF and wait at least 5 seconds.
- 4) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
- 5) Make sure that the following conditions are met.
COOLAN TEMP/S: 0 - 32°C (32 - 90°F)
INT/A TEMP SE: More than 0°C (32°F)
- 6) Select “EVAP SML LEAK P0442” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II. Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to “Basic Inspection”, EC-701.

- 7) Make sure that “OK” is displayed.
If “NG” is displayed, select “SELF-DIAG RESULTS” mode with CONSULT-II and make sure that “EVAP GROSS LEAK [P0455] is displayed, refer to “Diagnostic Procedure”, EC-966. If P0442 is displayed, perform “Diagnostic Procedure” for DTC P0442.

G **With GST**
NOTE:

Be sure to read the explanation of “Driving Pattern” on EC-667 before driving vehicle.

- 1) Start engine.
- 2) Drive vehicle according to “Driving Pattern”, EC-667.
- 3) Stop vehicle.
- 4) Select “MODE 1” with GST.
 - If SRT of EVAP system is not set yet, go to the following step.
 - If SRT of EVAP system is set, the result will be OK.
- 5) Turn ignition switch “OFF” and wait at least 5 seconds.
- 6) Start engine.
It is not necessary to cool engine down before driving.
- 7) Drive vehicle again according to the “Driving Pattern”, EC-667.
- 8) Stop vehicle.
- 9) Select “MODE 3” with GST.
 - If P0455 is displayed on the screen, go to “Diagnostic Procedure”, EC-966.

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DTC P0455 EVAP CONTROL SYSTEM

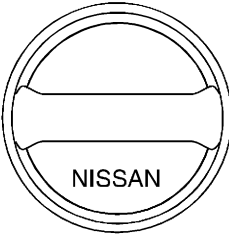
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DTC Confirmation Procedure (Cont'd)

- If P0442 is displayed on the screen, go to “Diagnostic Procedure”, EC-928.
 - If P0441 is displayed on the screen, go to “Diagnostic Procedure” for “DTC P0441”, EC-916.
 - If P0442, P0455 and P0441 are not displayed on the screen, go to the following step.
- 10) Select “MODE 1” with GST.
- If SRT of EVAP system is set, the result will be OK.
 - If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

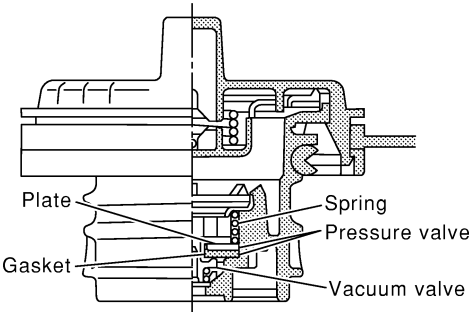
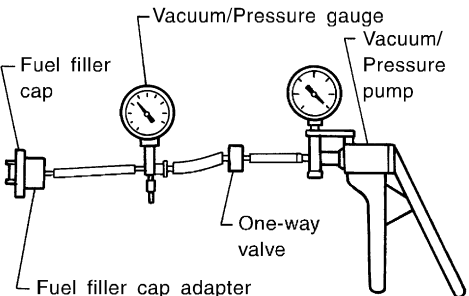
NGEC0956

1	CHECK FUEL FILLER CAP DESIGN
1. Turn ignition switch OFF. 2. Check for genuine NISSAN fuel filler cap design.	
	
OK or NG	
OK	▶ GO TO 2.
NG	▶ Replace with genuine NISSAN fuel filler cap.

SEF915U

2	CHECK FUEL FILLER CAP INSTALLATION
Check that the cap is tightened properly by rotating the cap clockwise.	
OK or NG	
OK	▶ GO TO 3.
NG	▶ <ul style="list-style-type: none">• Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.• Retighten until ratcheting sound is heard.

3	CHECK FUEL FILLER CAP FUNCTION
Check for air releasing sound while opening the fuel filler cap.	
OK or NG	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

4	CHECK FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)	<p>1. Wipe clean valve housing. 2. Check valve opening pressure and vacuum.</p> <div style="text-align: center;">  </div> <div style="text-align: center; margin-top: 20px;">  </div> <p style="text-align: right; margin-top: 10px;">SEF445Y</p> <p style="text-align: right; margin-top: 10px;">SEF943S</p> <p>Pressure: 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22 - 2.90 psi)</p> <p>Vacuum: -6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm², -0.87 to -0.48 psi)</p> <p>CAUTION: Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.</p> <p style="text-align: center;">OK or NG</p>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white; padding: 5px;">EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p> <p>TF</p> <p>PD</p> <p>AX</p> <p>SU</p>
OK	▶	GO TO 5.	
NG	▶	Replace fuel filler cap with a genuine one.	

5	CHECK EVAP PURGE LINE	<p>Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection. Refer to "Evaporative Emission System", EC-627.</p> <p style="text-align: center;">OK or NG</p>	<p>BR</p> <p>ST</p> <p>RS</p>
OK	▶	GO TO 6.	
NG	▶	Repair or reconnect the hose.	

6	CLEAN EVAP PURGE LINE	<p>Clean EVAP purge line (pipe and rubber tube) using air blower.</p> <p style="text-align: center;">▶ GO TO 7.</p>	<p>BT</p> <p>HA</p>
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7	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT	<p>Refer to "DTC Confirmation Procedure", EC-947.</p> <p style="text-align: center;">OK or NG</p>	<p>SC</p> <p>EL</p> <p>IDX</p>
OK	▶	GO TO 8.	
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.	

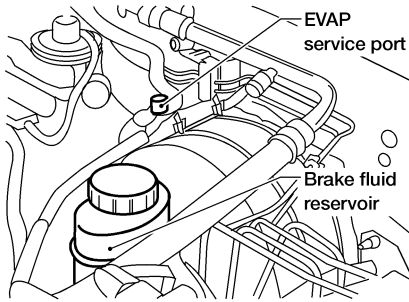
DTC P0455 EVAP CONTROL SYSTEM

VG33E

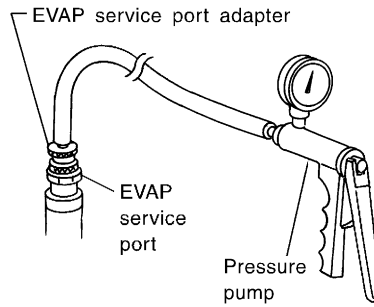
Diagnostic Procedure (Cont'd)

8 INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



AEC649A



SEF916U

NOTE:

Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II ► GO TO 9.

Models without CON-
SULT-II ► GO TO 10.

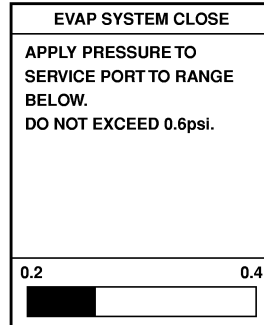
9 CHECK FOR EVAP LEAK

Ⓜ With CONSULT-II

1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

NOTE:

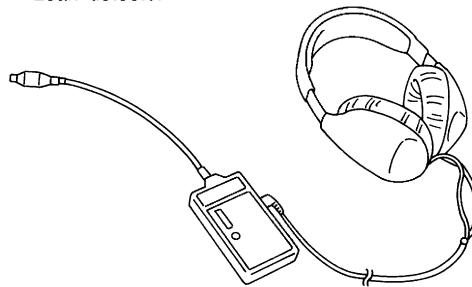
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-630.

Leak detector



SEF200U

OK or NG

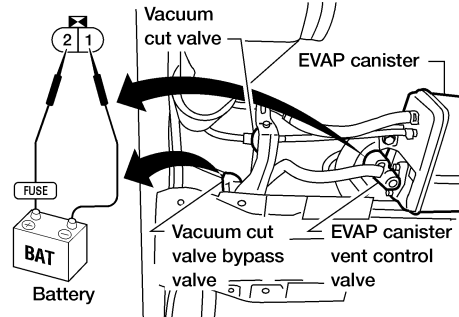
OK	▶	GO TO 11.
NG	▶	Repair or replace.

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10 CHECK FOR EVAP LEAK

⊗ **Without CONSULT-II**

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



AEC632A

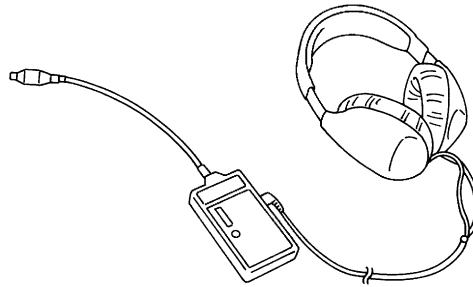
4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

NOTE:

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

5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-630.

Leak detector



SEF200U

OK or NG

OK	▶	GO TO 12.
NG	▶	Repair or replace.

11	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION																					
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 2. Start engine. 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode. 4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. 																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td>XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>HO2S1 MNTR (B2)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V		
ACTIVE TEST																						
PURG VOL CONT/V	XXX %																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
HO2S1 MNTR (B2)	LEAN																					
THRTL POS SEN	XXX V																					
<p>Vacuum should exist.</p>																						
SEF984Y																						
Vacuum should exist.																						
OK or NG																						
OK	▶	GO TO 14.																				
NG	▶	GO TO 13.																				

12	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION	
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 4. Start engine and let it idle for at least 80 seconds. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. <p>Vacuum should exist.</p>		
OK or NG		
OK	▶	GO TO 15.
NG	▶	GO TO 13.

13	CHECK VACUUM HOSE	
<p>Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-620.</p>		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 14.
OK (Without CONSULT-II)	▶	GO TO 15.
NG	▶	Repair or reconnect the hose.

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14 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

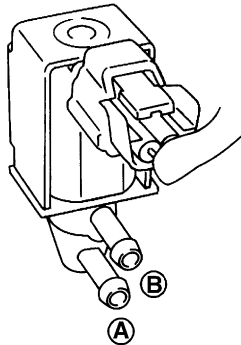
1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

If OK, inspection end. If NG, go to following step.

3. Check air passage continuity.



SEF660U

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

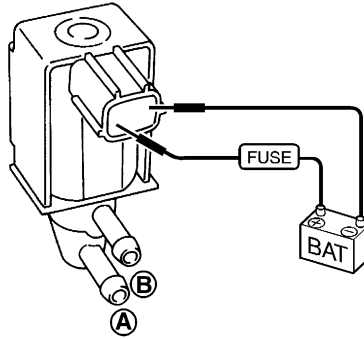
MTBL0241

OK or NG

- | | | |
|----|---|--|
| OK | ▶ | GO TO 16. |
| NG | ▶ | Replace EVAP canister purge volume control solenoid valve. |

15 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

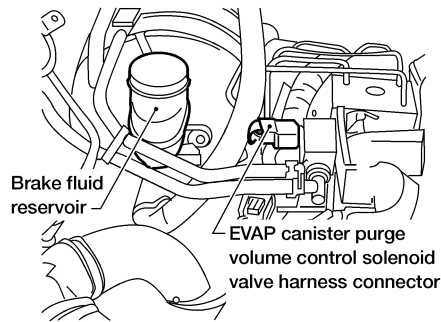
⊗ Without CONSULT-II
Check air passage continuity.



SEF661U

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

MTBL0242



AEC652A

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

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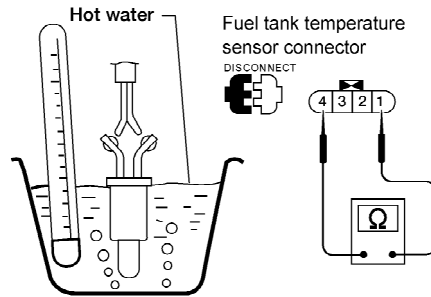
SC

EL

IDX

16 CHECK FUEL TANK TEMPERATURE SENSOR

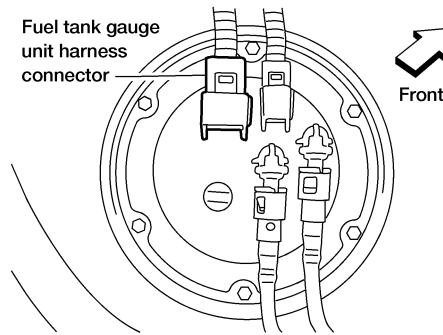
Check resistance by heating with hot water or heat gun as shown in the figure.



AEC052B

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

MTBL0234



AEC933A

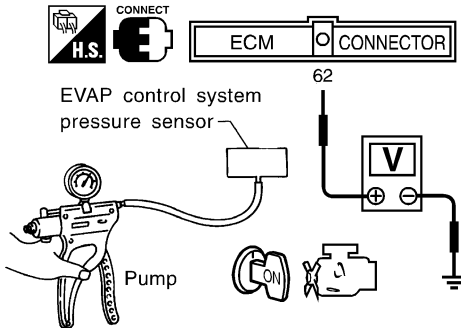
OK or NG

OK	▶	GO TO 17.
NG	▶	Replace fuel tank temperature sensor.

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17 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch ON.
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
5. Check input voltage between ECM terminal 62 and ground.

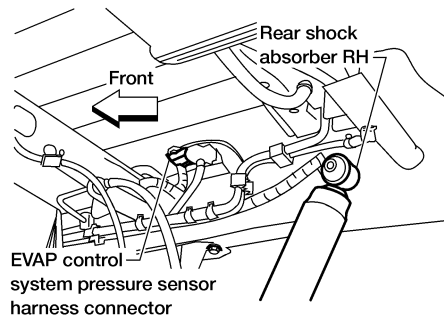


Applied vacuum	Voltage V
Not applied	1.8 - 4.8
-26.7 kPa (-200 mmHg, -7.87 inHg)	1.0 to 1.4V lower than above value

SEC649C

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.
- Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.



AEC651A

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP control system pressure sensor.

18 CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.

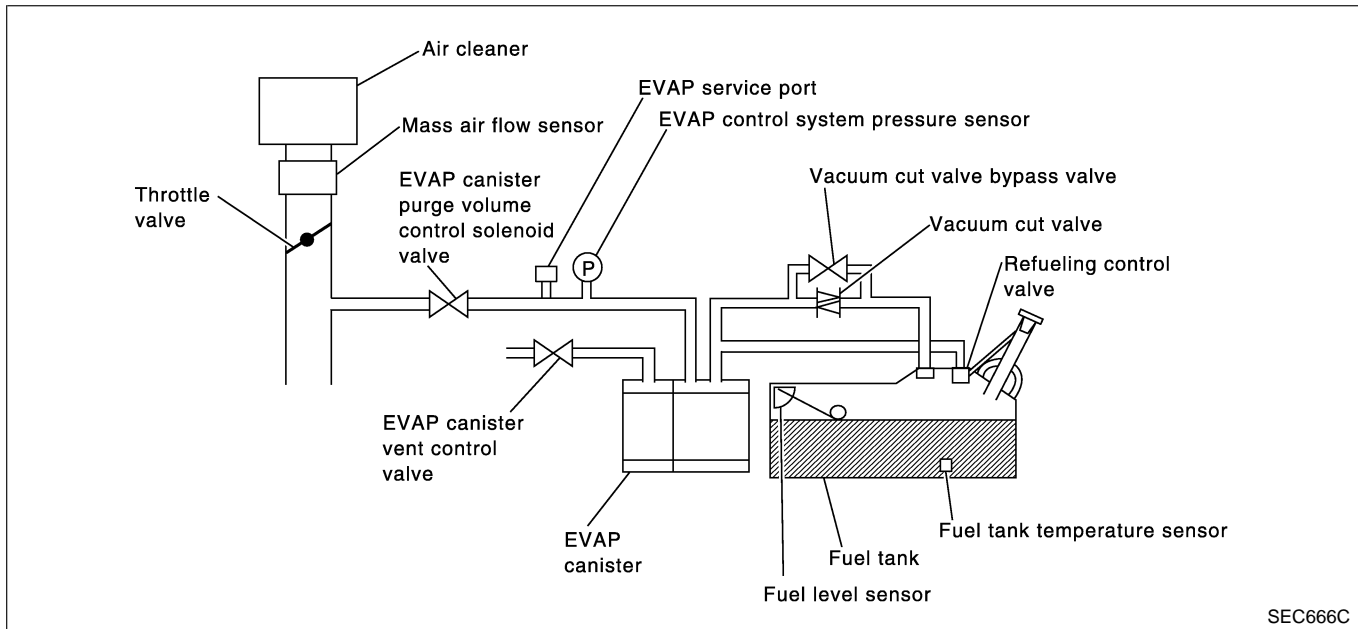
▶ **INSPECTION END**

On Board Diagnosis Logic

This diagnosis detects very small leaks in the EVAP line between the fuel tank and the EVAP canister purge volume control solenoid valve using intake manifold vacuum (negative pressure when P0456) or fuel tank vapor pressure (positive pressure when P1456) in the same way as conventional EVAP small leak diagnosis.

If the ECM judges a leak equivalent to a very small leak, the very small leak DTC P0456 or P1456 will be detected. If the ECM judges a leak equivalent to a small leak, the EVAP small leak DTC P0442 or P1442 will be detected. Correspondingly, if the ECM judges there is no leak, the diagnosis result is OK.

NGEC0990



SEC666C

Malfunction is detected when EVAP control system has a very small leak, EVAP control system does not operate properly.

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

POSSIBLE CAUSE

NGEC0990S02

- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close.
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent.
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit

- EVAP canister purge volume control solenoid valve
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- Water separator
- EVAP canister is saturated with water.
- Fuel level sensor and the circuit
- EVAP control system pressure sensor
- Refueling control valve
- ORVR system leaks

GI

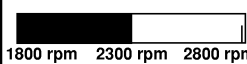
MA

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EVAP V/S LEAK P0456/P1456	
CHECK FUEL LEVEL SENSOR(V). SEE SERVICE MANUAL FOR SPECIFICATION. IS THE VOLTAGE WITHIN THE SPECIFICATION?	
MONITOR	
FUEL LEVEL SE	XXX V

SEC720C

EVAP V/S LEAK P0456/P1456	
MAINTAIN 1800-2800 RPM UNTIL FINAL RESULT APPEARS.	
	

SEC721C

EVAP V/S LEAK P0456/P1456	
OK	

SEC722C

DTC Confirmation Procedure

NGEC0992

CAUTION:

Never remove fuel filler cap during the DTC confirmation procedure.

NOTE:

- If DTC P0456 or P1456 is displayed with P0442, perform TROUBLE DIAGNOSIS FOR DTC P0456 or P1456 first.
- If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.
- After repair, make sure that the hoses and clips are installed properly.

TESTING CONDITION:

- Open engine hood before conducting following procedure.
- If any of following condition is met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.
 - a) Fuel filler cap is removed.
 - b) Refilled or drained the fuel.
 - c) EVAP component parts is/are removed.
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

With CONSULT-II

- 1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
- 2) Make sure the following conditions are met.
 - FUEL LEVEL SE: 1.08 - 0.2V**
 - COOLAN TEMP/S: 0 - 32°C (32 - 90°F)**
 - FUEL T/TMP SE: 0 - 35°C (32 - 95°F)**
 - INT A/TEMP SE: More than 0°C (32°F)**
 If NG, turn ignition switch “OFF” and leave the vehicle in a cool place (soak the vehicle) or refilling/draining fuel until the output voltage condition of the “FUEL LEVEL SE” meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1).
- 3) Turn ignition switch “OFF” and wait at least 5 seconds.
- 4) Turn ignition switch “ON”.
- 5) Select “EVAP VERY/SML LEAK P0456 or P1456” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II. Follow the instruction displayed.
- 6) Make sure that “OK” is displayed. If “NG” is displayed, refer to “Diagnostic Procedure”, EC-979.

EC

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NOTE:

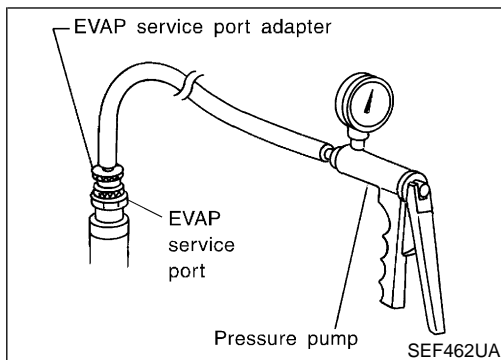
- If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to “Basic inspection”, EC-701.
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

Overall Function Check

NGEC1001

With GST

Use this procedure to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.

**CAUTION:**

- **Never use compressed air, doing so may damage the EVAP system.**
 - **Do not start engine.**
 - **Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi).**
- 1) Attach the EVAP service port adapter securely to the EVAP service port.
 - 2) Set the pressure pump and a hose.
 - 3) Also set a vacuum gauge via 3-way connector and a hose.
 - 4) Turn ignition switch “ON”.
 - 5) Connect GST and select mode 8.
 - 6) Using mode 8 control the EVAP canister vent control valve (close) and vacuum cut valve bypass valve (open).
 - 7) Apply pressure and make sure the following conditions are satisfied.

Pressure to be applied: 2.7 kPa (20 mmHg, 0.79 inHg)

Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (3 mmHg, 0.12 inHg)

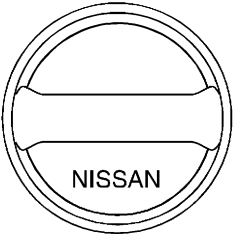
If NG, go to diagnostic procedure, EC-979.

NOTE:

For more information, refer to GST instruction manual.

Diagnostic Procedure

NGEC0993

1	CHECK FUEL FILLER CAP DESIGN	
1. Turn ignition switch "OFF". 2. Check for genuine NISSAN fuel filler cap design.		
		
SEF915U		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

GI
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LC
EC

2	CHECK FUEL FILLER CAP INSTALLATION	
Check that the cap is tightened properly by rotating the cap clockwise.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	<ul style="list-style-type: none"> ● Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. ● Retighten until ratcheting sound is heard.

FE
CL
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3	CHECK FUEL FILLER CAP FUNCTION	
Check for air releasing sound while opening the fuel filler cap.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

PD
AX
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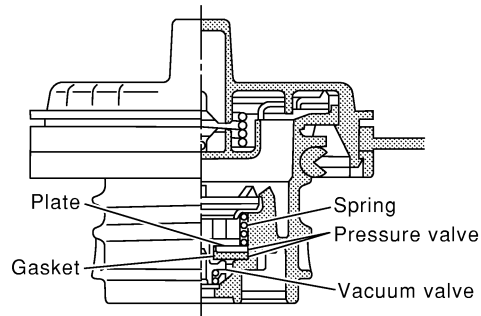
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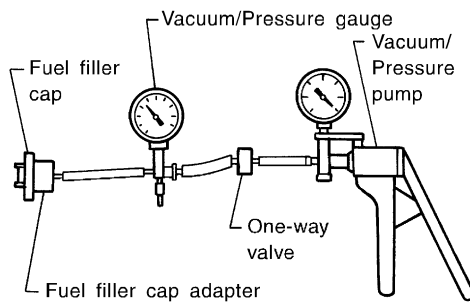
EL
IDX

4 CHECK FUEL TANK VACUUM RELIEF VALVE

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



SEF445Y



SEF943S

Pressure:

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

Vacuum:

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

CAUTION:

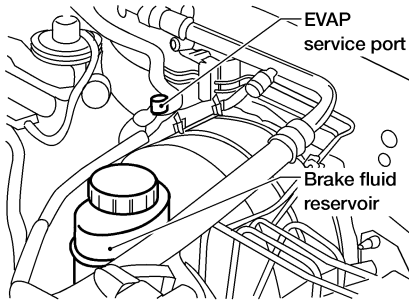
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

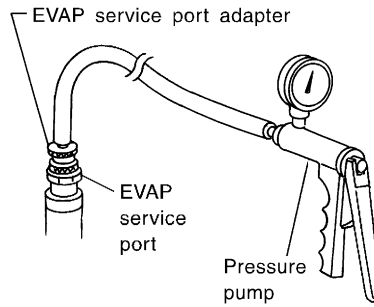
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

5 INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



AEC649A



SEF916U

NOTE:

Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II ► GO TO 6.

Models without CON-
SULT-II ► GO TO 7.

GI

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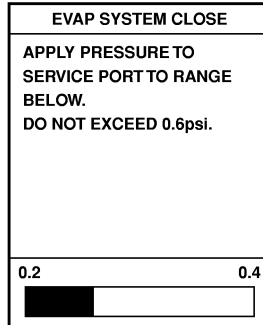
6 CHECK FOR EVAP LEAK

With CONSULT-II

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

NOTE:

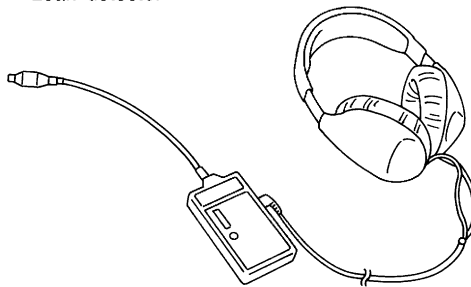
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-630.

Leak detector



SEF200U

OK or NG

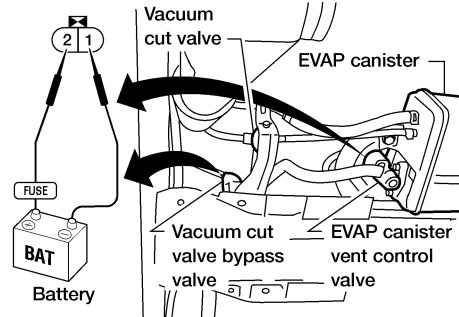
OK	▶	GO TO 8.
NG	▶	Repair or replace.

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7 CHECK FOR EVAP LEAK

⊗ **Without CONSULT-II**

1. Turn ignition switch "OFF".
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



AEC632A

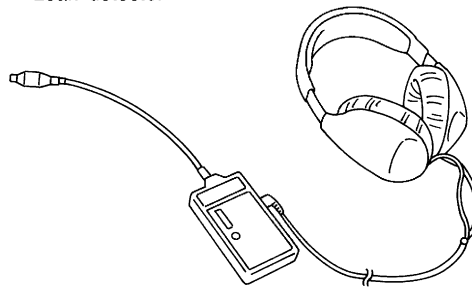
4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

NOTE:

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

5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-630.

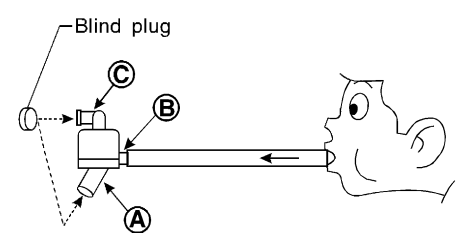
Leak detector



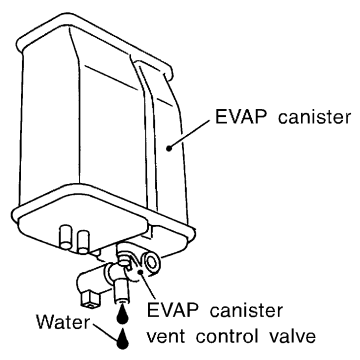
SEF200U

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

8	CHECK WATER SEPARATOR
<ol style="list-style-type: none"> 1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged. 	
 <p style="text-align: center;">* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p>	
SEF829T	
<p>5. In case of NG in items 2 - 4, replace the parts.</p> <p>NOTE:</p> <ul style="list-style-type: none"> ● Do not disassemble water separator. <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 9.
NG	▶ Replace water separator.


9	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT
Refer to "DTC Confirmation Procedure", EC-947.	
OK or NG	
OK	▶ GO TO 10.
NG	▶ Repair or replace EVAP canister vent control valve and O-ring or harness/connector.


10	CHECK IF EVAP CANISTER SATURATED WITH WATER
<ol style="list-style-type: none"> 1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Does water drain from the EVAP canister? 	
	
Yes or No	
Yes	▶ GO TO 11.
No (With CONSULT-II)	▶ GO TO 13.
No (Without CONSULT-II)	▶ GO TO 14.

SEF596U

11	CHECK EVAP CANISTER	
Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 13.
OK (Without CONSULT-II)	▶	GO TO 14.
NG	▶	GO TO 12.

12	DETECT MALFUNCTIONING PART	
Check the following.		
<ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 		
	▶	Repair hose or replace EVAP canister.

13	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION																					
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 2. Start engine. 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode. 4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. 																						
<table border="1" style="margin: auto;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td>XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>HO2S1 MNTR (B2)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V		
ACTIVE TEST																						
PURG VOL CONT/V	XXX %																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
HO2S1 MNTR (B2)	LEAN																					
THRTL POS SEN	XXX V																					
Vacuum should exist.																						
SEF984Y																						
OK or NG																						
OK	▶	GO TO 16.																				
NG	▶	GO TO 15.																				

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION	
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 4. Start engine and let it idle for at least 80 seconds. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. <p style="color: blue;">Vacuum should exist.</p>		
OK or NG		
OK	▶	GO TO 17.
NG	▶	GO TO 15.

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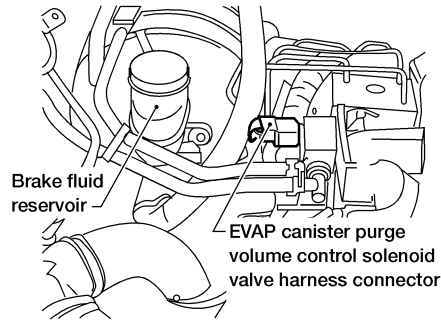
15	CHECK VACUUM HOSE	
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-620.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 16.
OK (Without CONSULT-II)	▶	GO TO 17.
NG	▶	Repair or reconnect the hose.

16	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																					
<p>ⓘ With CONSULT-II</p> <p>1. Start engine.</p> <p>2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.</p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td>PURG VOL CONT/V</td> <td style="text-align: center;">0.0%</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>			ACTIVE TEST		PURG VOL CONT/V	0.0%	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	RICH	HO2S1 MNTR (B2)	RICH	THRTL POS SEN	XXX V		
ACTIVE TEST																						
PURG VOL CONT/V	0.0%																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	RICH																					
HO2S1 MNTR (B2)	RICH																					
THRTL POS SEN	XXX V																					
SEF985Y																						
OK or NG																						
OK	▶	GO TO 18.																				
NG	▶	GO TO 17.																				

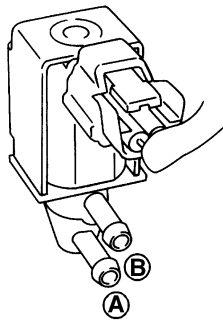
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17 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



WEC547

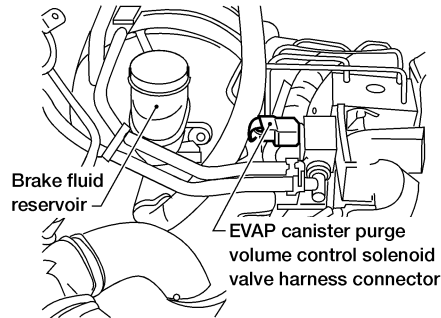


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

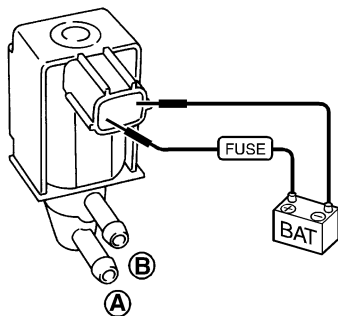
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



WEC547

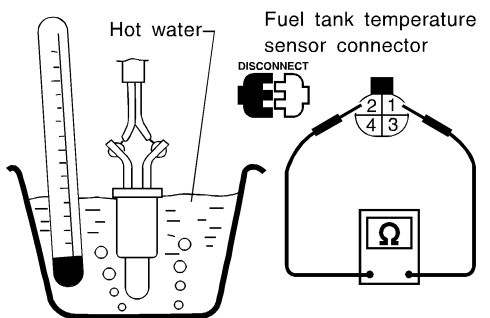


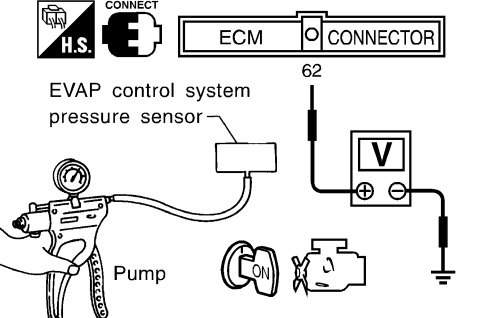
Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

18	CHECK FUEL TANK TEMPERATURE SENSOR								
<ol style="list-style-type: none"> 1. Remove fuel level sensor unit. 2. Check resistance between fuel level sensor unit and fuel pump terminals 1 and 2 by heating with hot water or heat gun as shown in the figure. 									
		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Temperature °C (°F)</th> <th style="text-align: center;">Resistance kΩ</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">20 (68)</td> <td style="text-align: center;">2.3 - 2.7</td> </tr> <tr> <td style="text-align: center;">50 (122)</td> <td style="text-align: center;">0.79 - 0.90</td> </tr> </tbody> </table>		Temperature °C (°F)	Resistance kΩ	20 (68)	2.3 - 2.7	50 (122)	0.79 - 0.90
Temperature °C (°F)	Resistance kΩ								
20 (68)	2.3 - 2.7								
50 (122)	0.79 - 0.90								
SEF974Y									
OK or NG									
OK		▶	GO TO 19.						
NG		▶	Replace fuel level sensor unit.						

19	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR								
<ol style="list-style-type: none"> 1. Remove EVAP control system pressure sensor with its harness connector connected. 2. Remove hose from EVAP control system pressure sensor. 3. Turn ignition switch "ON". 4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure. <p>CAUTION:</p> <ul style="list-style-type: none"> ● Always calibrate the vacuum pump gauge when using it. ● Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure. <ol style="list-style-type: none"> 5. Check input voltage between ECM terminal 62 and ground. 									
		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Applied vacuum</th> <th style="text-align: center;">Voltage V</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Not applied</td> <td style="text-align: center;">1.8 - 4.8</td> </tr> <tr> <td style="text-align: center;">-26.7 kPa (-200 mmHg, -7.87 inHg)</td> <td style="text-align: center;">1.0 to 1.4V lower than above value</td> </tr> </tbody> </table>		Applied vacuum	Voltage V	Not applied	1.8 - 4.8	-26.7 kPa (-200 mmHg, -7.87 inHg)	1.0 to 1.4V lower than above value
Applied vacuum	Voltage V								
Not applied	1.8 - 4.8								
-26.7 kPa (-200 mmHg, -7.87 inHg)	1.0 to 1.4V lower than above value								
SEC649C									
CAUTION:									
<ul style="list-style-type: none"> ● Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. 									
OK or NG									
OK		▶	GO TO 20.						
NG		▶	Replace EVAP control system pressure sensor.						

20	CHECK EVAP PURGE LINE		
<p>Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to "Evaporative Emission System", EC-626.</p>			
OK or NG			
OK		▶	GO TO 21.
NG		▶	Repair or reconnect the hose.

DTC P0456, P1456 EVAP CONTROL SYSTEM

VG33E*Diagnostic Procedure (Cont'd)*

21	CLEAN EVAP PURGE LINE
Clean EVAP purge line (pipe and rubber tube) using air blower.	
▶	GO TO 22.

GI

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22	CHECK FUEL LEVEL SENSOR
Refer to EL-89 , "Fuel Level Sensor Unit Check".	
OK or NG	
OK	▶ GO TO 23.
NG	▶ Replace fuel level sensor unit.

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23	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.	
▶	INSPECTION END

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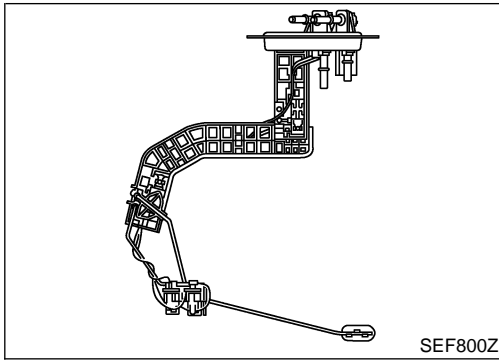
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Component Description



Component Description

The fuel level sensor is mounted in the fuel level sensor unit. ^{NGEC0968} The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. ^{NGEC0974}

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	OR/B	Fuel level sensor	[Ignition switch "ON"]	Approximately 0 - 4.8V Output voltage varies with fuel level.
66	B	Fuel level sensor ground	[Engine is running] ● Idle speed	Approximately 0V

On Board Diagnosis Logic

When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected. ^{NGEC0969}

Malfunction is detected when even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.

POSSIBLE CAUSE

- Fuel level sensor circuit (The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

^{NGEC0969S01}

3

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

DTC Confirmation Procedure

NGEC0971

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

WITH CONSULT-II

NGEC0971S01

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait maximum of 2 consecutive minutes.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-993.

WITH GST

NGEC0971S02

Follow the procedure "WITH CONSULT-II" above.

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DTC P0460 FUEL LEVEL SENSOR

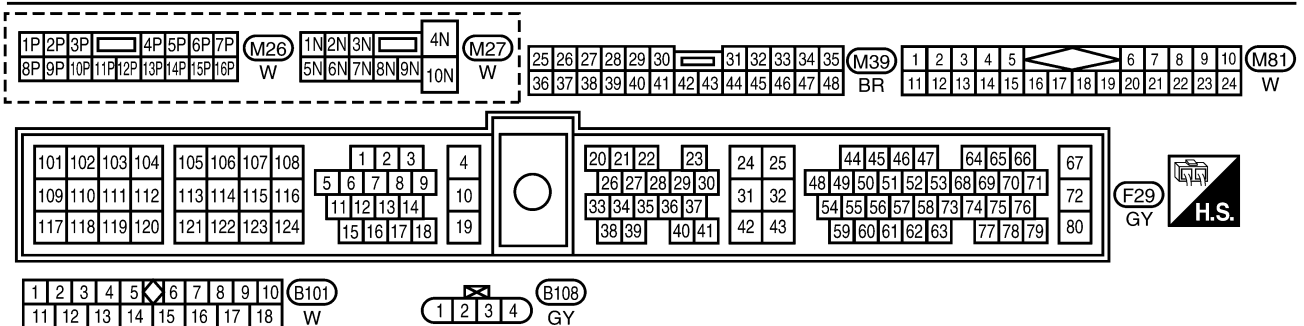
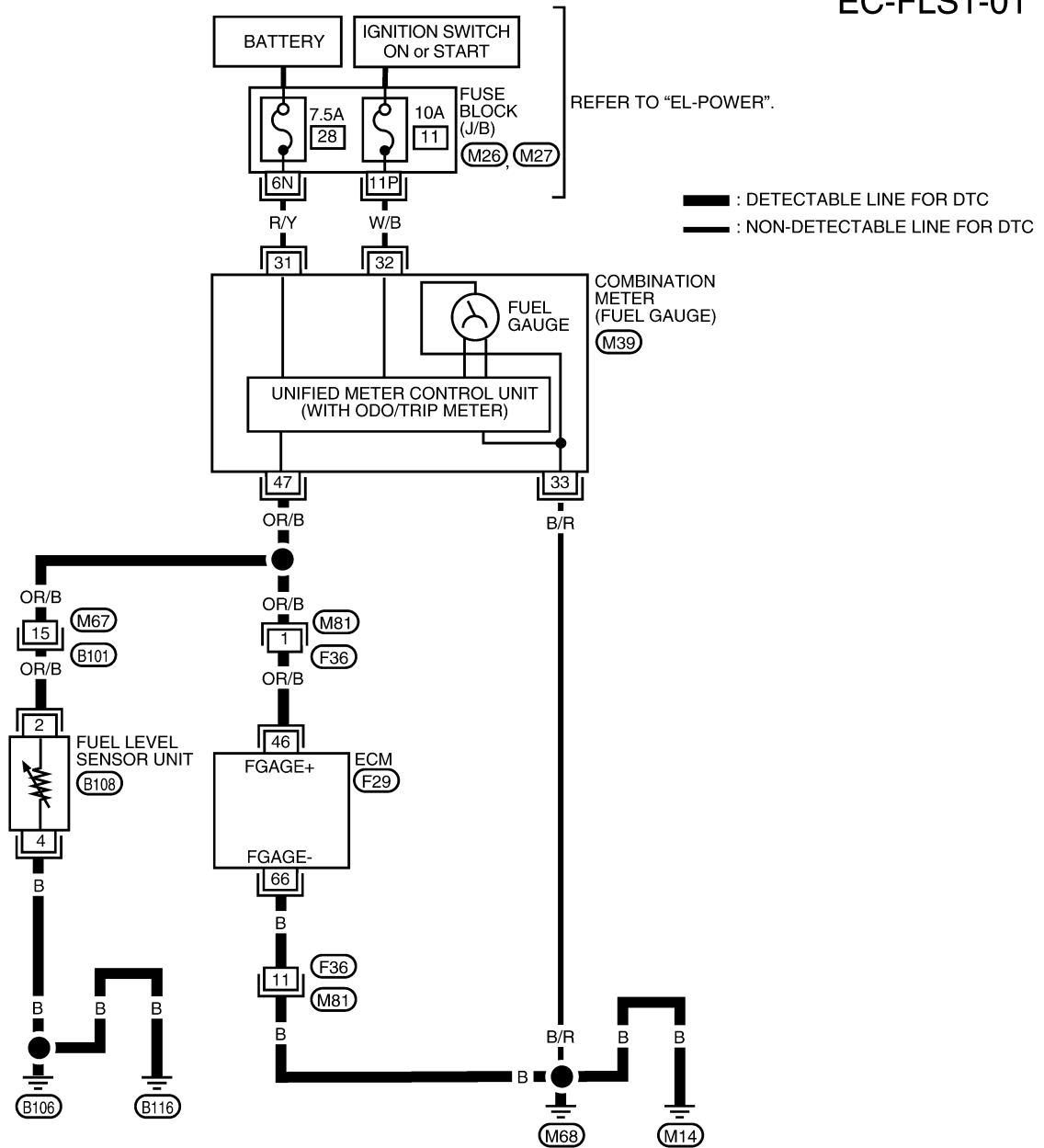
VG33E

Wiring Diagram

Wiring Diagram

NGEC0972

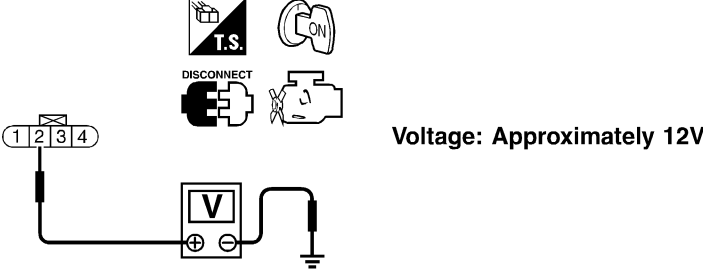
EC-FLS1-01



WEC993

Diagnostic Procedure

=NGEC0973

1	CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT	
1. Turn ignition switch "OFF". 2. Disconnect fuel level sensor until and fuel pump harness connector. 3. Turn ignition switch "ON". 4. Check voltage between fuel level sensor unit and fuel pump terminal 2 and ground with CONSULT-II or a tester.		
		
SEC650C		
OK or NG		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

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2	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Harness connectors M67, B101 ● Harness for open or short between combination meter and fuel level sensor until and fuel pump 		
▶ Repair or replace harness or connectors.		

AT

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3	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch "OFF". 2. Check harness continuity between fuel level sensor unit and fuel pump terminal 4 and body 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.

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4	CHECK FUEL LEVEL SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 46 and fuel level sensor unit and fuel pump terminal 2, ECM terminal 66 and fuel level sensor unit and fuel pump terminal 4. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

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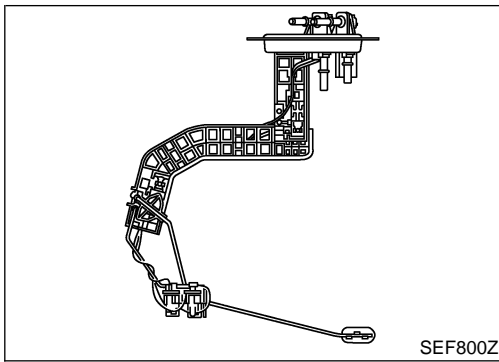
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DTC P0460 FUEL LEVEL SENSOR

VG33E

Diagnostic Procedure (Cont'd)

5	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness connectors M67, B101● Harness connectors M81, F36● Harness for open or short between ECM and fuel level sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.
6	CHECK FUEL LEVEL SENSOR
Refer to EL-89 , "Fuel Level Sensor Unit Check".	
OK or NG	
OK	▶ GO TO 7.
NG	▶ Replace fuel level sensor unit.
7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.	
▶	INSPECTION END



Component Description

The fuel level sensor is mounted in the fuel level sensor unit. ^{=NGEC0975} The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

On Board Diagnosis Logic

Driving long distances naturally affect fuel gauge level. This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven. ^{NGEC0976}

Malfunction is detected when the output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance.

POSSIBLE CAUSE

- Harness or connectors
(The level sensor circuit is open or shorted.)
- Fuel level sensor

^{NGEC0976S01}

Overall Function Check

Use this procedure to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed. ^{NGEC0978}

WARNING:

When performing following procedure, be sure to observe the handling of the fuel. Refer to *FE-5*, "Fuel Tank".

TESTING CONDITION:

Before starting overall function check, preparation of draining fuel and refilling fuel is required.

7	DATA MONITOR	
	MONITOR	NO DTC
	FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V	

SEF195Y

Ⓜ WITH CONSULT-II

^{NGEC0978S01}

NOTE:

Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

- 1) Prepare a fuel container and a spare hose.
- 2) Release fuel pressure from fuel line, refer to "Fuel Pressure Release", EC-644.
- 3) Remove the fuel feed hose on the fuel level sensor unit.
- 4) Connect a spare fuel hose where the fuel feed hose was removed.

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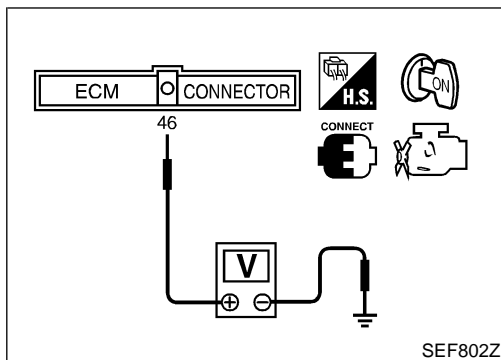
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- 5) Turn ignition switch "OFF" and wait at least 5 seconds then turn "ON".
- 6) Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT-II.
- 7) Check "FUEL LEVEL SE" output voltage and note it.
- 8) Select "FUEL PUMP" in "ACTIVE TEST" mode with CONSULT-II.
- 9) Touch "ON" and drain fuel approximately 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
- 10) Fill fuel into the fuel tank for 30ℓ (7-7/8 US gal, 6-5/8 Imp gal).
- 11) Check "FUEL LEVEL SE" output voltage and note it.
- 12) Check "FUEL LEVEL SE" output voltage and confirm whether the voltage changes more than 0.03V during step 7 to 11.
If NG, check the fuel level sensor, refer to **EL-89**, "FUEL LEVEL SENSOR UNIT CHECK".



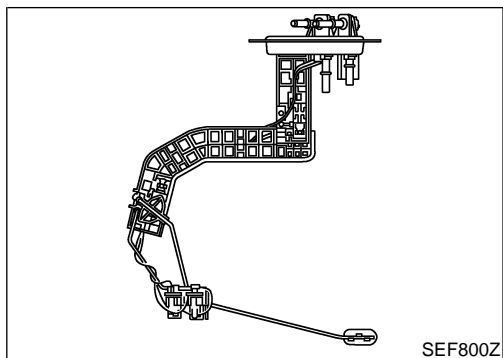
WITH GST

NGEC0978S02

NOTE:

Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

- 1) Prepare a fuel container and a spare hose.
- 2) Release fuel pressure from fuel line, refer to "Fuel Pressure Release", EC-644.
- 3) Remove the fuel feed hose on the fuel level sensor unit.
- 4) Connect a spare fuel hose where the fuel feed hose was removed.
- 5) Turn ignition switch "OFF".
- 6) Set voltmeters probe between ECM terminal 46 (fuel level sensor signal) and ground.
- 7) Turn ignition switch "ON".
- 8) Check voltage between ECM terminal 46 and ground and note it.
- 9) Drain fuel by 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
- 10) Fill fuel into the fuel tank for 30ℓ (7-7/8 US gal, 6-5/8 Imp gal).
- 11) Confirm that the voltage between ECM terminal 46 and ground changes more than 0.03V during step 8 - 10.
If NG, check component of fuel level sensor, refer to **EL-89**, "FUEL LEVEL SENSOR UNIT CHECK".



Component Description

The fuel level sensor is mounted in the fuel level sensor unit. ^{NGEC0979} The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. ^{NGEC0985}

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	OR/B	Fuel level sensor	[Ignition switch "ON"]	Approximately 0 - 4.8V Output voltage varies with fuel level.
66	B	Fuel level sensor ground	[Engine is running] ● Idle speed	Approximately 0V

On Board Diagnosis Logic

ECM receives two signals from the fuel level sensor circuit. ^{NGEC0980} One is fuel level sensor power supply circuit, and the other is fuel level sensor ground circuit.

This diagnosis indicates the former, to detect open or short circuit malfunction.

Malfunction is detected when an excessively low (P0462) or high (P0463) voltage is sent from the sensor is sent to ECM.

POSSIBLE CAUSE

- Fuel level sensor circuit (The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

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DTC Confirmation Procedure

NGEC0982

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at ignition switch "ON".

2	DATA MONITOR	
	MONITOR	NO DTC
	FUEL T/TMP SE	XXX °C
	FUEL LEVEL SE	XXX V

SEF195Y

WITH CONSULT-II

NGEC0982S01

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1000.

WITH GST

NGEC0982S02

Follow the procedure "WITH CONSULT-II" above.

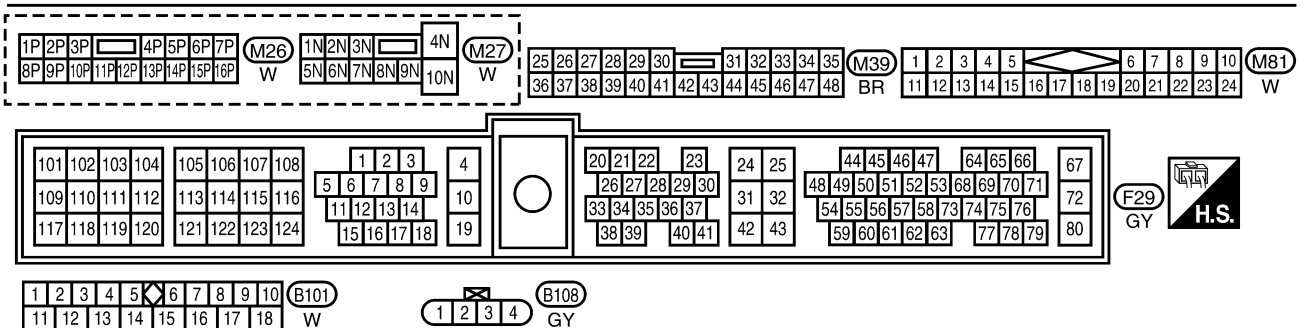
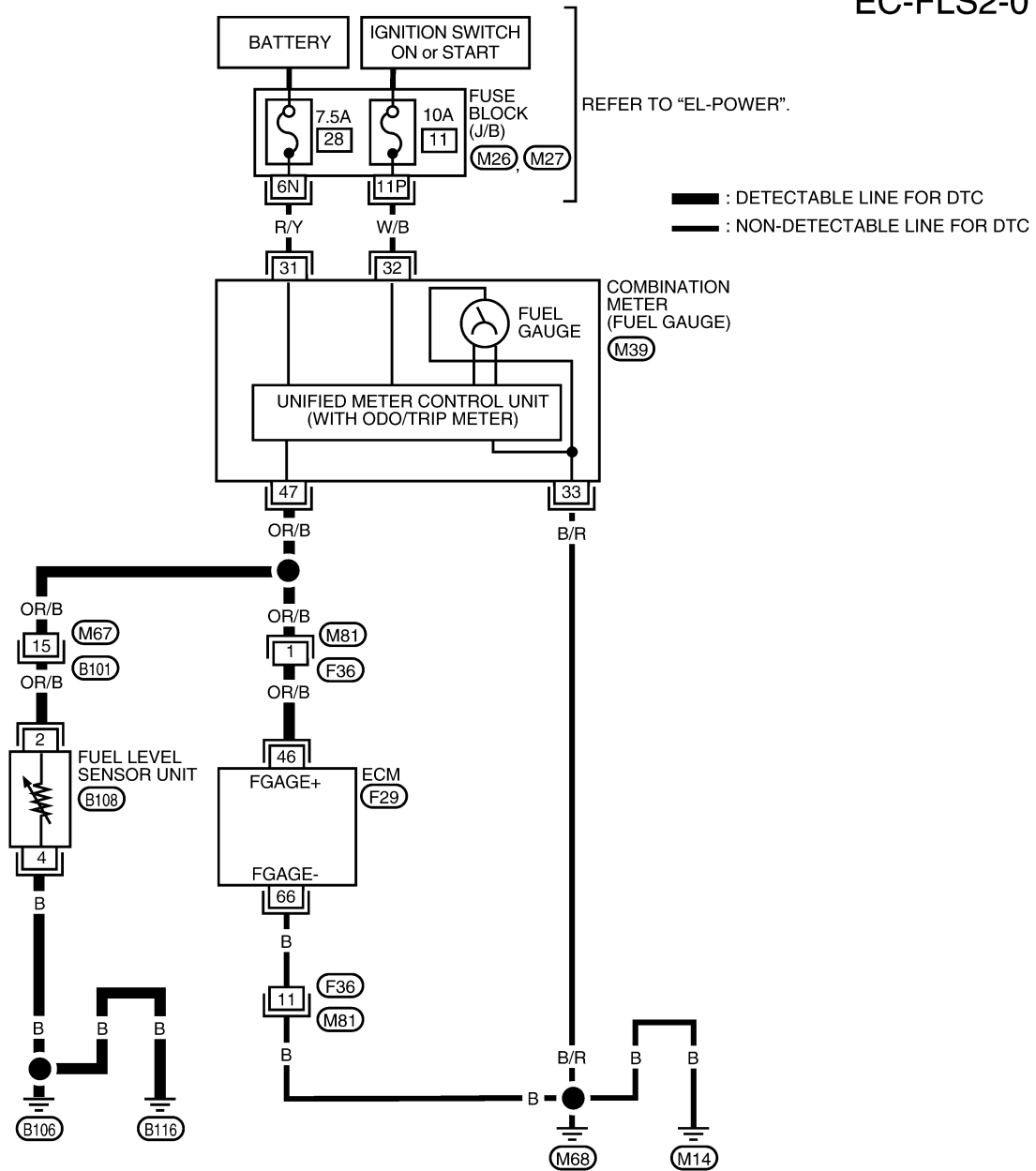
DTC P0462, P0463 FUEL LEVEL SENSOR

VG33E
Wiring Diagram

Wiring Diagram

NGEC0983

EC-FLS2-01

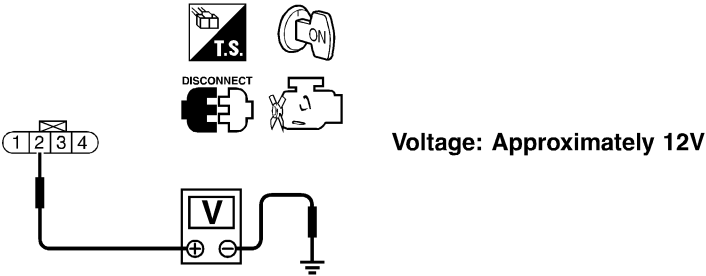


WEC994

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Diagnostic Procedure

=NGEC0984

1	CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT	
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Disconnect fuel level sensor unit and fuel pump harness connector. 3. Turn ignition switch "ON". 4. Check voltage between fuel level sensor unit and fuel pump terminal 2 and ground with CONSULT-II or tester. 		
		
SEC650C		
OK or NG		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M67, B101 ● Harness for open or short between combination meter and fuel level sensor unit and fuel pump 		
▶ Repair or replace harness or connectors.		

3	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Check harness continuity between fuel level sensor unit and fuel pump terminal 4 and body 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 FUEL LEVEL SENSOR INPUT CIRCUIT FOR OPEN AND SHORT	
<ol style="list-style-type: none"> 1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 46 and fuel level sensor unit and fuel pump 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	▶	GO TO 5.

DTC P0462, P0463 FUEL LEVEL SENSOR

VG33E

Diagnostic Procedure (Cont'd)

5	DETECT MALFUNCTIONING PART	
Check the following.		
<ul style="list-style-type: none">● Harness connectors M67, B101● Harness connectors M81, F36● Harness for open or short between ECM and fuel level sensor		
	▶	Repair open circuit or short to ground or short to power in harness on connectors.
6	CHECK FUEL LEVEL SENSOR	
Refer to EL-89 , "Fuel Level Sensor Unit Check".		
		OK or NG
OK	▶	GO TO 7.
NG	▶	Replace fuel level sensor unit.
7	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.		
	▶	INSPECTION END

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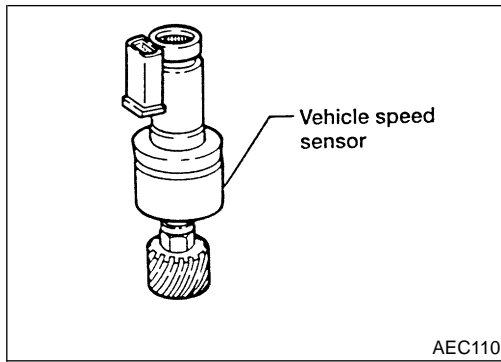
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Component Description



Component Description

The vehicle speed sensor is installed in the transaxle. It contains a pulse generator which provides a vehicle speed signal to the speedometer. The speedometer then sends a signal to the ECM. NGEC0768

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. NGEC0769

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	G/B	Vehicle speed sensor	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Lift up the vehicle ● In 1st gear position ● Vehicle speed is 40 km/h (25 MPH) 	<p>2 - 3V</p> <p style="text-align: right;">SEF996U</p>

On Board Diagnosis Logic

Malfunction is detected when the almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven. NGEC0770

POSSIBLE CAUSE

- Harness or connector (The vehicle speed sensor circuit is open or shorted.)
 - Vehicle speed sensor
- NGEC0770S01

DTC Confirmation Procedure

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 5 seconds before conducting the next test. NGEC0771

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.

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

SEF196Y

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 "Diagnostic Procedure", EC-1005.
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	More than 1,400 rpm (A/T models) More than 2,000 rpm (M/T models)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	4.5 - 9.0 msec
Selector lever	Suitable position
PW/ST SIGNAL	OFF

- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1005.

Overall Function Check

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

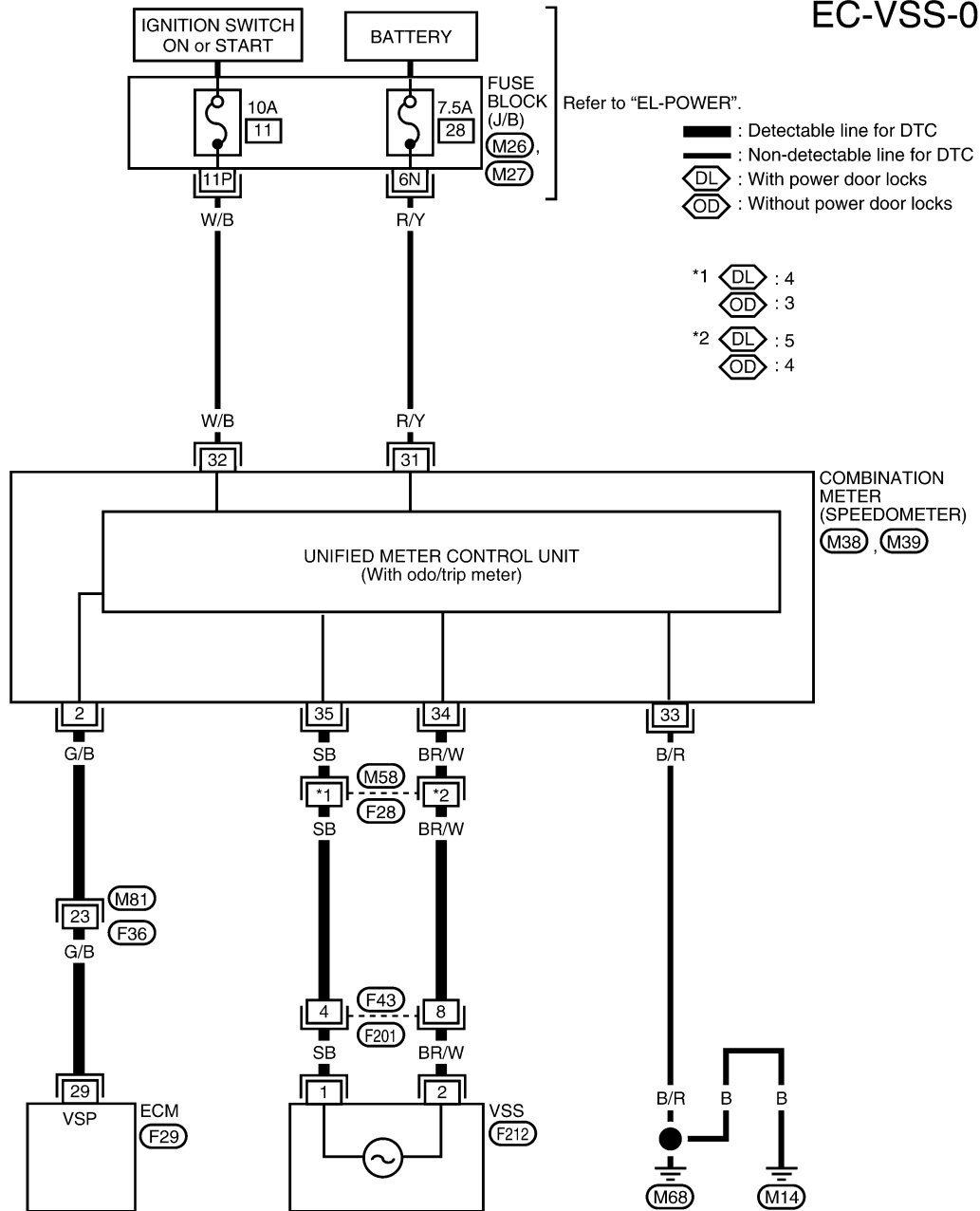
- 1) Lift up drive wheels.
- 2) Start engine.
- 3) Read vehicle speed sensor signal in "MODE 1" with GST.
The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
- 4) If NG, go to "Diagnostic Procedure", EC-1005.

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Wiring Diagram

NGEC0773

EC-VSS-01

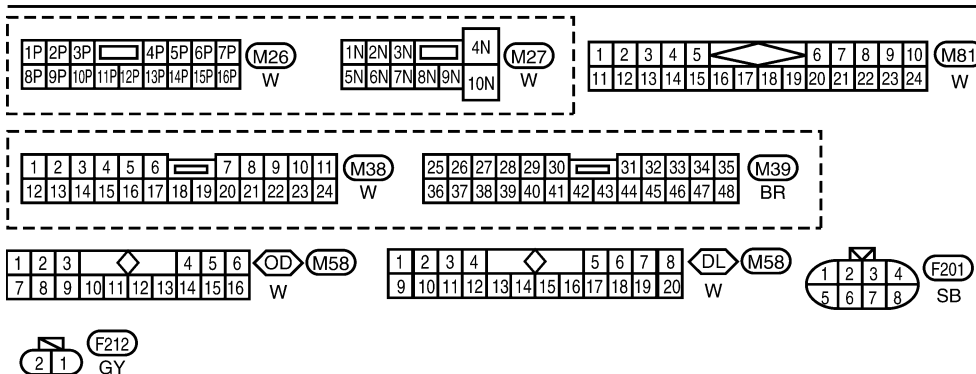


Refer to "EL-POWER".

- : Detectable line for DTC
- : Non-detectable line for DTC
- : With power door locks
- : Without power door locks

- *1 : 4
- : 3
- *2 : 5
- : 4

COMBINATION METER (SPEEDOMETER)
M38, M39



Refer to the following.
F29 - ELECTRICAL UNITS

Diagnostic Procedure

NGEC0774

1	CHECK VEHICLE SPEED SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch OFF. 2. Disconnect ECM harness connector and combination meter harness connector. 3. Check harness continuity between ECM terminal 29 and meter 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 3.
NG	▶	GO TO 2.

GI
MA
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2	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Harness connectors M81, F36 ● 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.

EC
FE
CL

3	CHECK SPEEDOMETER FUNCTION	
Make sure that speedometer functions properly.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

MT
AT
TF

4	CHECK SPEEDOMETER CIRCUIT FOR OPEN AND SHORT	
Check the following. <ul style="list-style-type: none"> ● Harness connectors M58, F28 ● Harness connectors F43, F201 ● Harness for open or short between combination meter and vehicle speed sensor 		
OK or NG		
OK	▶	Check combination meter and vehicle speed sensor. Refer to EL section.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

PD
AX
SU
BR

5	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.		
▶		INSPECTION END

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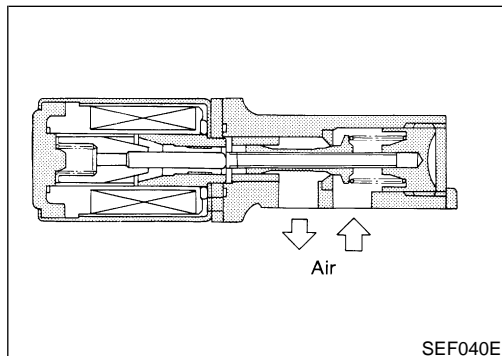
Description
SYSTEM DESCRIPTION

NGEC0775

NGEC0775S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Idle air control	IACV-AAC valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Park/neutral position (PNP) switch	Park/neutral position		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Battery	Battery voltage		
Vehicle speed sensor	Vehicle speed		
Ambient air temperature switch	Ambient air temperature		
Intake air temperature sensor	Intake air temperature		
Absolute pressure sensor	Ambient barometric pressure		

This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which bypasses the throttle valve via IACV-AAC valve. The IACV-AAC valve repeats ON/OFF operation according to the signal sent from the ECM. The camshaft position sensor detects the actual engine speed and sends a signal to the ECM. The ECM then controls the ON/OFF time of the IACV-AAC valve so that engine speed coincides with the target value memorized in ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warm up, deceleration, and engine load (air conditioner and power steering).



COMPONENT DESCRIPTION
IACV-AAC Valve

NGEC0775S02

NGEC0775S0201

The IACV-AAC valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of air that will flow through the valve. The more air that flows through the valve, the higher the idle speed.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0776

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
IACV-AAC/V	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load 	Idle
	2,000 rpm	—

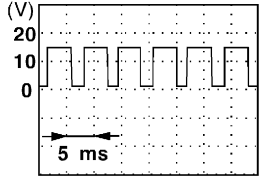
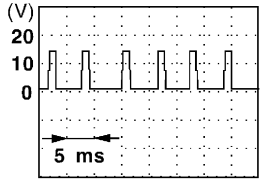
ECM Terminals and Reference Value

NGEC0777

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 the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	OR/L	IACV-AAC valve	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>8 - 11V</p>  <p style="text-align: right; font-size: small;">SEF005V</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 3,000 rpm 	<p>7 - 10V</p>  <p style="text-align: right; font-size: small;">SEF692W</p>

On Board Diagnosis Logic

NGEC0778

Malfunction is detected when
 (Malfunction A) the IACV-AAC valve does not operate properly,
 (Malfunction B) the IACV-AAC valve does not operate properly.

POSSIBLE CAUSE

NGEC0778S01

- Harness or connectors
(The IACV-AAC valve circuit is open.)
- Harness or connectors
(The IACV-AAC valve circuit is shorted.)
- IACV-AAC valve

DTC Confirmation Procedure

NGEC0779

NOTE:

- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.
- Perform “PROCEDURE FOR MALFUNCTION A” first. If 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B”.

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

NGEC0779S01

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) Wait at least 2 seconds.
- 4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1010.

Ⓜ With GST

Follow the procedure “With CONSULT-II”.

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

PROCEDURE FOR MALFUNCTION B

NGEC0779S02

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 5 seconds.
- 3) Turn ignition switch ON again and select “DATA MONITOR” mode with CONSULT-II.
- 4) Start engine and run it for at least 1 minute at idle speed.
- 5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1010.

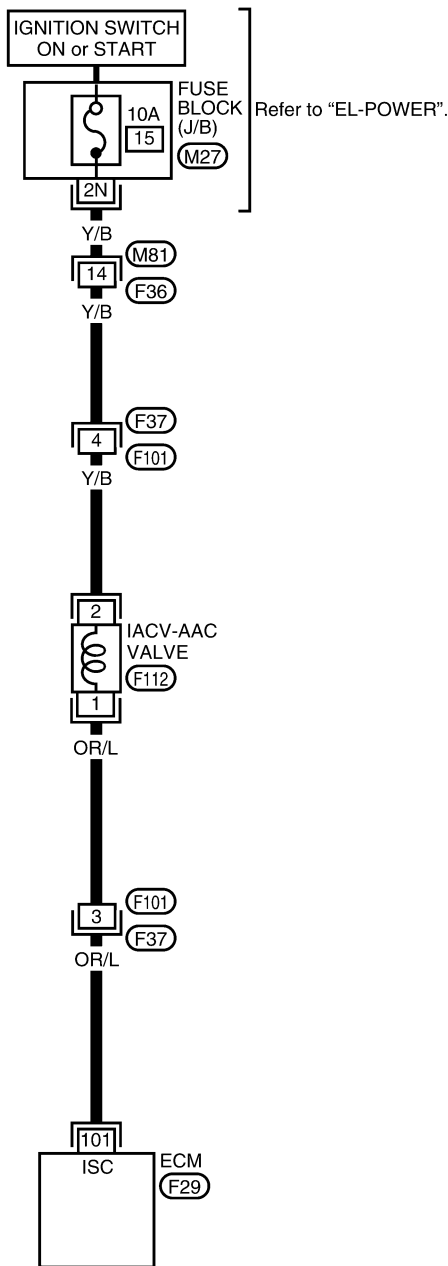
Ⓜ With GST

Follow the procedure “With CONSULT-II”.

Wiring Diagram

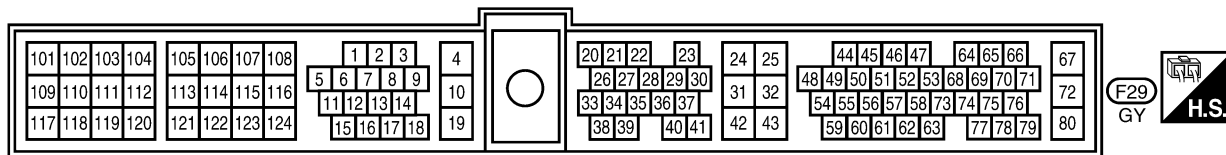
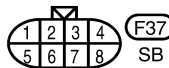
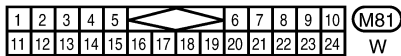
NGEC0780

EC-AAC/V-01



— : Detectable line for DTC
 — : Non-detectable line for DTC

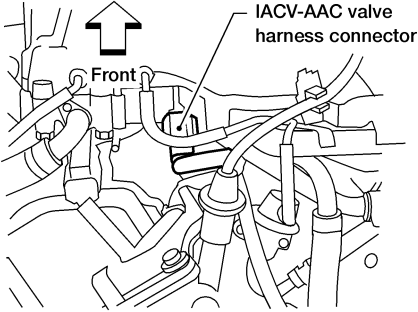
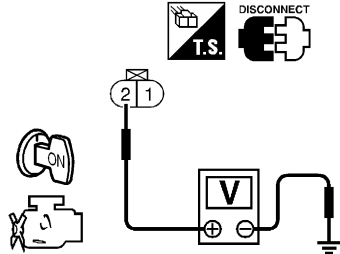
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Diagnostic Procedure

NGEC0781

1	CHECK IACV-AAC VALVE POWER SUPPLY CIRCUIT
<p>1. Stop engine. 2. Disconnect IACV-AAC valve harness connector.</p> <div style="text-align: center;">  </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 2 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="color: blue;">Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

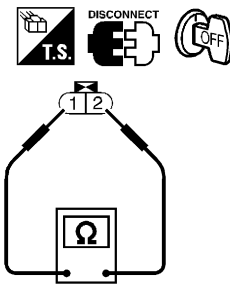
LEC514

SEF651W

2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M81, F36 ● Harness connectors F37, F101 ● Fuse block (J/B) connector M27 ● 10A fuse ● Harness for open or short between IACV-AAC valve and fuse <p style="text-align: right;">▶ Repair harness or connectors.</p>	

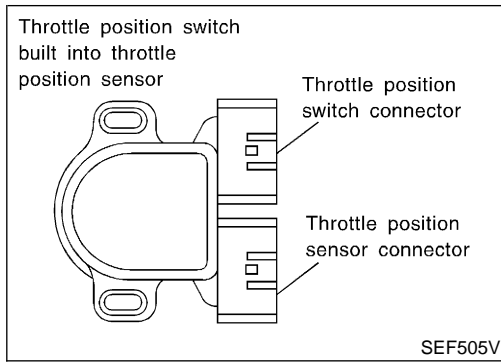
3	CHECK IACV-AAC VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 101 and IACV-AAC valve terminal 1. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

4	DETECT MALFUNCTIONING PART		
		Check the following. <ul style="list-style-type: none"> ● Harness connectors F101, F37 ● Harness for open or short between IACV-AAC valve and ECM 	GI MA
		▶ Repair open circuit or short to ground or short to power in harness or connectors.	

5	CHECK IACV-AAC VALVE		
		1. Disconnect IACV-AAC valve harness connector. 2. Remove IACV-AAC valve. <ul style="list-style-type: none"> ● Check IACV-AAC valve resistance. 	EM LC
			EC FE CL MT
		<p>Resistance: Approximately 10Ω [at 20°C (68°F)]</p> <ul style="list-style-type: none"> ● Check plunger for seizing or sticking. ● Check for broken spring. 3. Supply battery voltage between IACV-AAC valve connector terminals. Plunger should move.	AT TF
		OK or NG	PD
		OK ▶ GO TO 6.	AX
		NG ▶ Replace IACV-AAC valve.	

6	CHECK INTERMITTENT INCIDENT		
		Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.	SU
		▶ INSPECTION END	BR ST RS BT HA SC EL

Component Description



Component Description

NGEC0782

A closed throttle position switch and wide open throttle position switch are built into the throttle position sensor unit. The wide open throttle position switch is used only for A/T control.

When the throttle valve is in the closed position, the closed throttle position switch sends a voltage signal to the ECM. The ECM only uses this signal to open or close the EVAP canister purge volume control solenoid valve when the throttle position sensor is malfunctioning.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0783

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
CLSD THL/P SW	● Engine: After warming up, idle the engine	Throttle valve: Idle position ON
		Throttle valve: Slightly open OFF

ECM Terminals and Reference Value

NGEC0784

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 the ECM terminals, such as the ground.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
28	BR/W	Throttle position switch (Closed position)	[Engine is running] ● Warm-up condition ● Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"] ● Accelerator pedal depressed	Approximately 0V

On Board Diagnosis Logic

NGEC0785

Malfunction is detected when battery voltage from the closed throttle position switch is sent to ECM with the throttle valve opened.

POSSIBLE CAUSE

NGEC0785S01

- Harness or connectors (The closed throttle position switch circuit is shorted.)
- Closed throttle position switch
- Throttle position sensor

NGEC0786

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
CLSD THL/P SW	ON

SEF197Y

6

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
THRTL POS SEN	XXX V

SEF198Y

DTC Confirmation Procedure

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 5 seconds before conducting the next test.

④ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF, wait at least 5 seconds and then start engine.
- 3) Select “CLSD THL/P SW” in “DATA MONITOR” mode.
- 4) Check the signal under the following conditions.

Condition	Signal indication
Throttle valve: Idle position	ON
Throttle valve: Slightly open	OFF

If the result is NG, go to “Diagnostic Procedure”, EC-1015.
If OK, go to following step.

- 5) Select “DATA MONITOR” mode with CONSULT-II.
- 6) Drive the vehicle for at least 5 consecutive seconds under the following condition.

THRTL POS SEN	More than 2.5V
VHCL SPEED SE	More than 5 km/h (3 MPH)
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

- 7) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1015.

Overall Function Check

NGEC0787

Use this procedure to check the overall function of the closed throttle position switch circuit. During this check, a 1st trip DTC might not be confirmed.

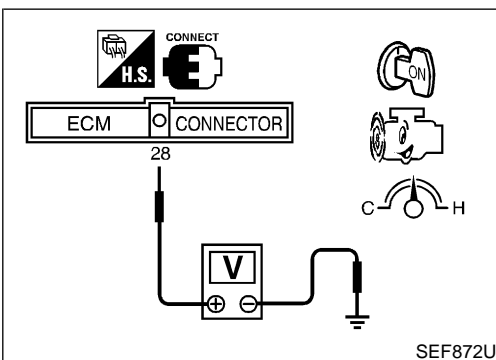
⊗ Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Check the voltage between ECM terminal 28 (Closed throttle position switch signal) and ground under the following conditions.

At idle: Battery voltage

At 2,000 rpm: Approximately 0V

- 3) If NG, go to “Diagnostic Procedure”, EC-1015.

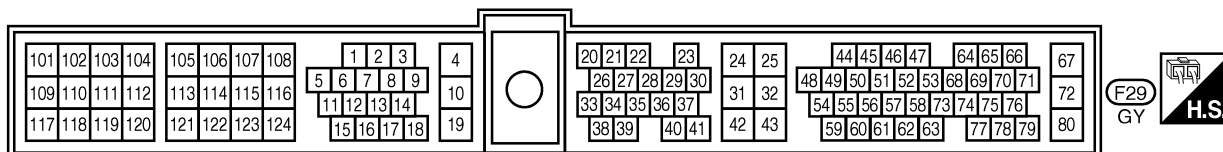
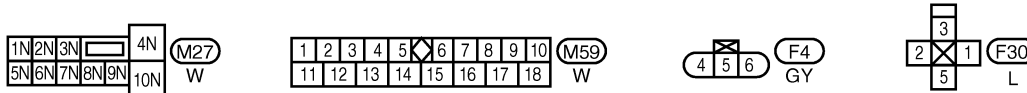
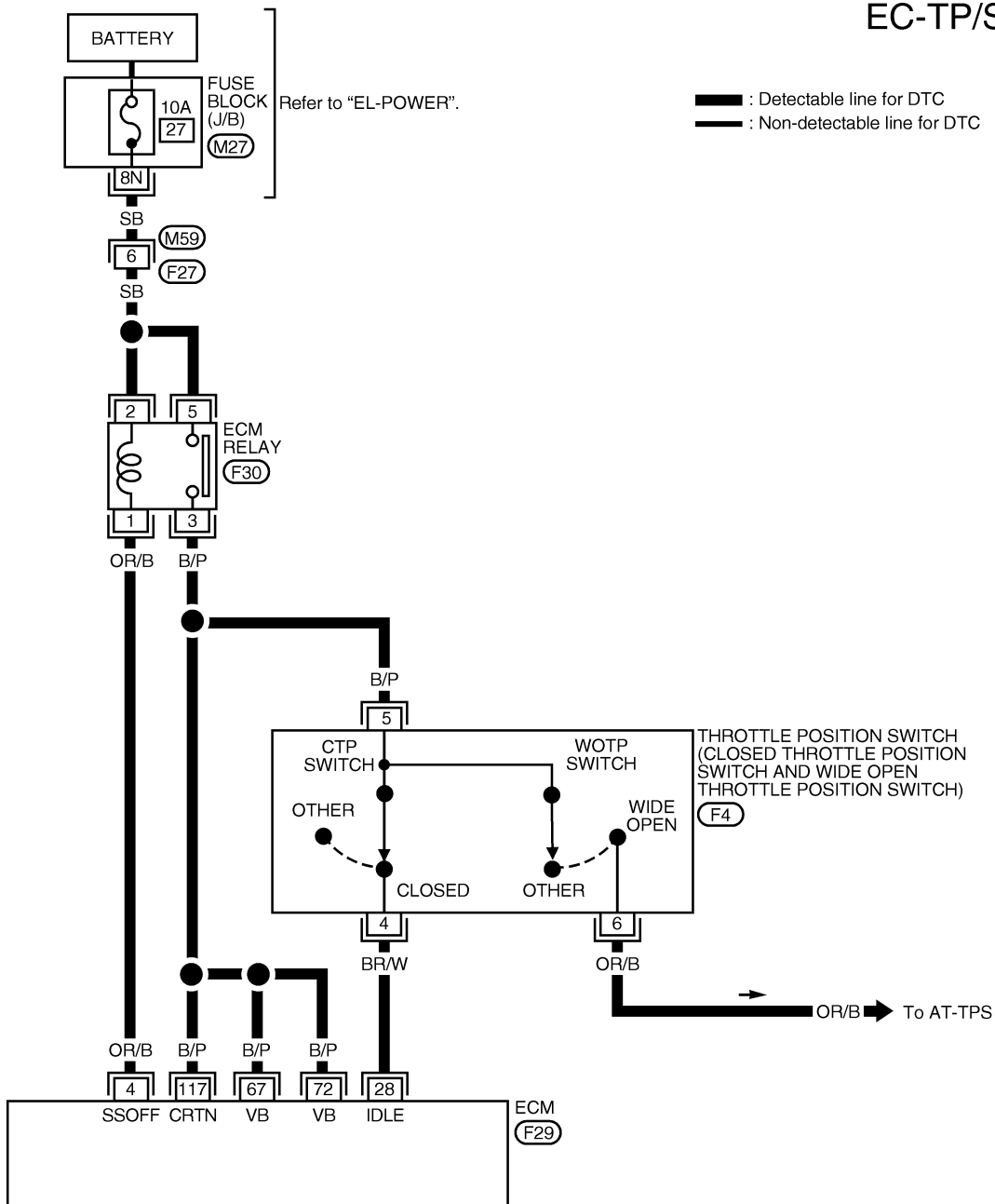


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Wiring Diagram

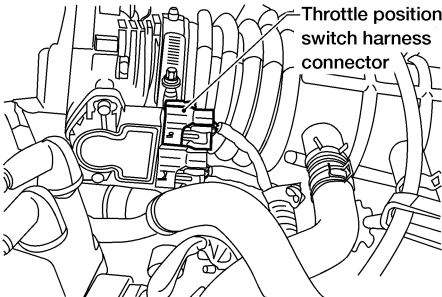
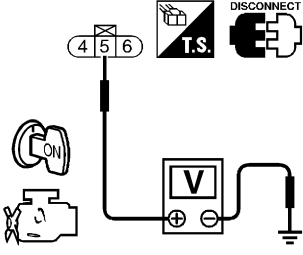
NGEC0788

EC-TP/SW-01



Diagnostic Procedure

NGE0789

1	CHECK CLOSED THROTTLE POSITION SWITCH POWER SUPPLY CIRCUIT	
1. Turn ignition switch OFF. 2. Disconnect throttle position switch harness connector.		
		
3. Turn ignition switch ON. 4. Check voltage between terminal 5 and engine ground with CONSULT-II or tester.		
AEC653A		
		
SEF715U		
Voltage: Battery voltage		
OK or NG		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

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2	DETECT MALFUNCTIONING PART	
Check the following.		
<ul style="list-style-type: none"> ● Harness for open or short between throttle position switch and ECM relay ● Harness for open or short between throttle position switch and ECM 		
▶		Repair harness or connectors.

SU

BR

3	CHECK CLOSED THROTTLE POSITION SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 28 and switch terminal 4. Refer to Wiring Diagram. Continuity should exist.		
4. Also check harness for short to ground and short to power.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

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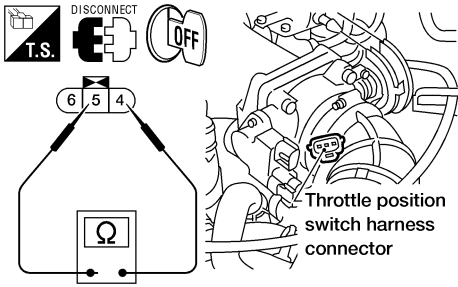
DTC P0510 CTP SWITCH

VG33E

Diagnostic Procedure (Cont'd)

4	ADJUST THROTTLE POSITION SWITCH											
Check the following items. Refer to "Basic Inspection", EC-701.												
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Items</th> <th style="width: 50%;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>10° ± 2° BTDC</td> </tr> <tr> <td>Base idle speed</td> <td>700 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table>			Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
Items	Specifications											
Ignition timing	10° ± 2° BTDC											
Base idle speed	700 ± 50 rpm (in "P" or "N" position)											
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF											
Target idle speed	750 ± 50 rpm (in "P" or "N" position)											
MTBL0576												
with CONSULT-II	▶	GO TO 5.										
without CONSULT-II	▶	GO TO 6.										

5	CHECK CLOSED THROTTLE POSITION SWITCH							
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch OFF. 3. Turn ignition switch ON. 4. Select "DATA MONITOR" mode with CONSULT-II. 5. Check indication of "CLSD THL/P SW". <p>Measurement must be made with closed throttle position switch installed in vehicle.</p>								
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Throttle valve conditions</th> <th style="width: 50%;">CLSD THL/P SW</th> </tr> </thead> <tbody> <tr> <td>Completely closed</td> <td style="text-align: center;">ON</td> </tr> <tr> <td>Partially open or completely open</td> <td style="text-align: center;">OFF</td> </tr> </tbody> </table>			Throttle valve conditions	CLSD THL/P SW	Completely closed	ON	Partially open or completely open	OFF
Throttle valve conditions	CLSD THL/P SW							
Completely closed	ON							
Partially open or completely open	OFF							
MTBL0355								
OK or NG								
OK	▶	GO TO 8.						
NG	▶	GO TO 7.						

6	CHECK CLOSED THROTTLE POSITION SWITCH							
<p>Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch OFF. 3. Disconnect closed throttle position switch harness connector. 4. Check continuity between closed throttle position switch terminals 4 and 5. Resistance measurement must be made with closed throttle position switch installed in vehicle. 								
								
AEC654A								
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;">Throttle valve conditions</th> <th style="width: 40%;">Continuity</th> </tr> </thead> <tbody> <tr> <td>Completely closed</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td>Partially open or completely open</td> <td style="text-align: center;">No</td> </tr> </tbody> </table>			Throttle valve conditions	Continuity	Completely closed	Yes	Partially open or completely open	No
Throttle valve conditions	Continuity							
Completely closed	Yes							
Partially open or completely open	No							
MTBL0247								
OK or NG								
OK	▶	GO TO 9.						
NG	▶	GO TO 7.						

7	ADJUST THROTTLE POSITION SWITCH											
<p>Check the following items. Refer to "Basic Inspection", EC-701.</p>												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 40%;">Items</th> <th style="width: 60%;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>10° ± 2° BTDC</td> </tr> <tr> <td>Base idle speed</td> <td>700 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table>			Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
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Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF											
Target idle speed	750 ± 50 rpm (in "P" or "N" position)											
MTBL0576												
<p>If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace closed throttle position switch.</p>												
OK or NG												
OK (with CONSULT-II)	▶	GO TO 8.										
OK (without CONSULT-II)	▶	GO TO 9.										
NG	▶	Replace throttle position switch.										

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DTC P0510 CTP SWITCH

VG33E

Diagnostic Procedure (Cont'd)

8	CHECK THROTTLE POSITION SENSOR									
<p>④ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine (ignition switch OFF). 3. Turn ignition switch ON. 4. Select "DATA MONITOR" mode with CONSULT-II. 5. Check voltage of "THRTL POS SEN". 										
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 2px;">Throttle valve conditions</th> <th style="padding: 2px;">THRTL POS SEN</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">Completely closed (a)</td> <td style="padding: 2px;">0.15 - 0.85V</td> </tr> <tr> <td style="padding: 2px;">Partially open</td> <td style="padding: 2px;">Between (a) and (b)</td> </tr> <tr> <td style="padding: 2px;">Completely open (b)</td> <td style="padding: 2px;">3.5 - 4.7V</td> </tr> </tbody> </table>			Throttle valve conditions	THRTL POS SEN	Completely closed (a)	0.15 - 0.85V	Partially open	Between (a) and (b)	Completely open (b)	3.5 - 4.7V
Throttle valve conditions	THRTL POS SEN									
Completely closed (a)	0.15 - 0.85V									
Partially open	Between (a) and (b)									
Completely open (b)	3.5 - 4.7V									
MTBL0230										
<p>Voltage measurement must be made with throttle position sensor installed in vehicle. If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-701.</p> <p style="text-align: center;">OK or NG</p>										
OK	▶	GO TO 10.								
NG	▶	Replace throttle position sensor.								

9	CHECK THROTTLE POSITION SENSOR									
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine (ignition switch OFF). 3. Turn ignition switch ON. 4. Check voltage between ECM terminal 23 (Throttle position sensor signal) and ground. <p>Voltage measurement must be made with throttle position sensor installed in vehicle.</p>										
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 2px;">Throttle valve conditions</th> <th style="padding: 2px;">Voltage</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">Completely closed (a)</td> <td style="padding: 2px;">0.15 - 0.85V</td> </tr> <tr> <td style="padding: 2px;">Partially open</td> <td style="padding: 2px;">Between (a) and (b)</td> </tr> <tr> <td style="padding: 2px;">Completely open (b)</td> <td style="padding: 2px;">3.5 - 4.7V</td> </tr> </tbody> </table>			Throttle valve conditions	Voltage	Completely closed (a)	0.15 - 0.85V	Partially open	Between (a) and (b)	Completely open (b)	3.5 - 4.7V
Throttle valve conditions	Voltage									
Completely closed (a)	0.15 - 0.85V									
Partially open	Between (a) and (b)									
Completely open (b)	3.5 - 4.7V									
MTBL0231										
<p>If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-701.</p> <p style="text-align: center;">OK or NG</p>										
OK	▶	GO TO 10.								
NG	▶	Replace throttle position sensor.								

10	CHECK INTERMITTENT INCIDENT	
<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.</p>		
▶		INSPECTION END

System Description

NGEC0790

These circuit lines are used to control the smooth shifting up and down of A/T during the hard acceleration/ deceleration.

Voltage signals are exchanged between ECM and TCM (Transmission Control Module).

ECM Terminals and Reference Value

NGEC0791

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 the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
26	PU/W	A/T signal No. 1	[Ignition switch "ON"] [Engine is running] ● Idle speed	6 - 8V
27	P/B	A/T signal No. 2	[Ignition switch "ON"] [Engine is running] ● Idle speed	6 - 8V
35	G/R	A/T signal No. 3	[Ignition switch "ON"]	0V

On Board Diagnosis Logic

NGEC0792

Malfunction is detected when ECM receives incorrect voltage from TCM (Transmission Control Module) continuously.

POSSIBLE CAUSE

NGEC0792S01

- Harness or connectors
[The circuit between ECM and TCM (Transmission Control Module) is open or shorted.]

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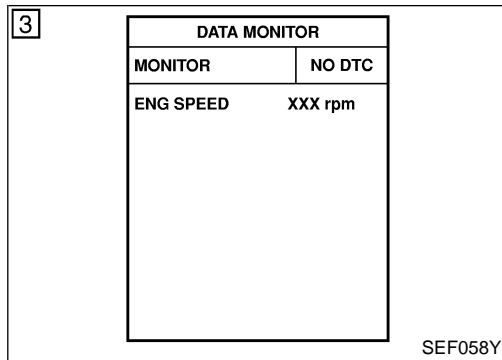
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DTC Confirmation Procedure



DTC Confirmation Procedure

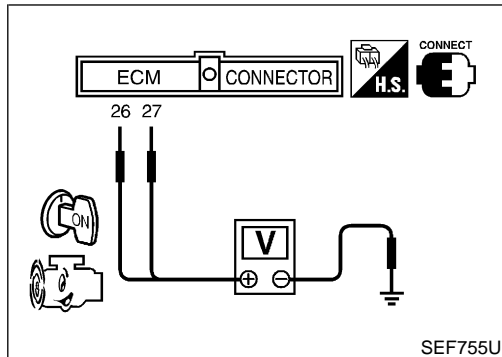
=NGEC0793

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

④ **With CONSULT-II**

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine, and rev engine more than 1,000 rpm once, then let it idle for more than 40 seconds.
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-1022.



Overall Function Check

NGEC0794

Use this procedure to check the overall function of the A/T control circuit. During this check, a DTC might not be confirmed.

⊗ **Without CONSULT-II**

- 1) Start engine.
- 2) Check voltage between
ECM terminal 26 and ground.
ECM terminal 27 and ground.

Voltage: 6 - 8V

- 3) If NG, go to "Diagnostic Procedure", EC-1022.

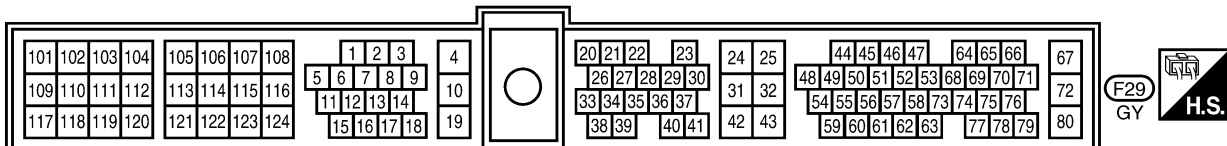
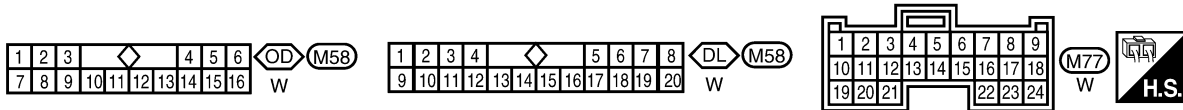
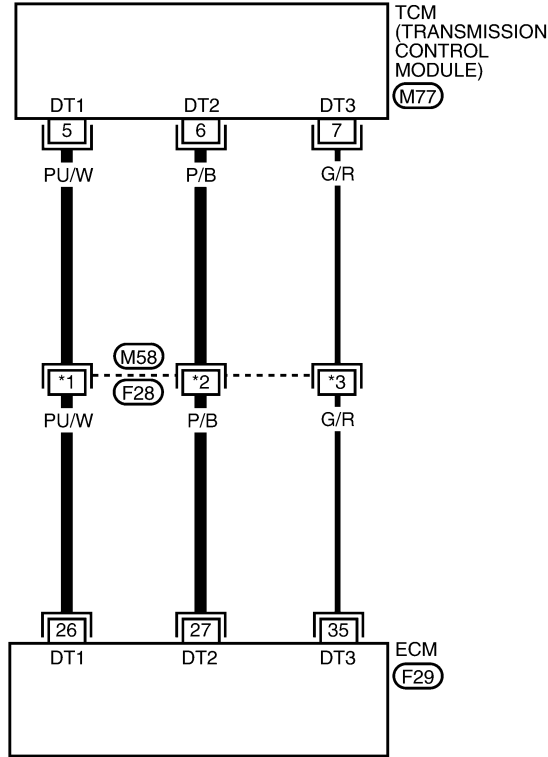
Wiring Diagram

NGEC0795

EC-AT/C-01

- : Detectable line for DTC
- - - : Non-detectable line for DTC
- DL : With power door locks
- OD : Without power door locks

- *1 DL : 16
- OD : 13
- *2 DL : 17
- OD : 14
- *3 DL : 18
- OD : 15

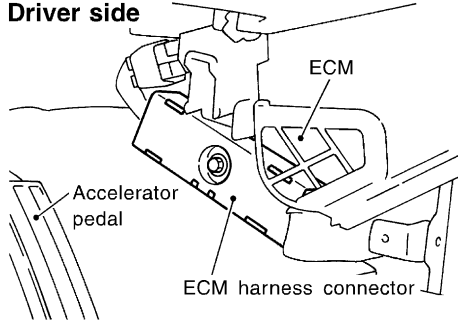
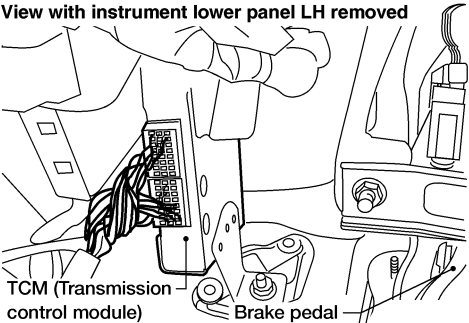


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Diagnostic Procedure

NGEC0796

1	CHECK A/T CONTROL INPUT SIGNAL CIRCUIT FOR OPEN						
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector and TCM (Transmission Control Module) harness connector.</p> <div style="text-align: center;"> <p>Driver side</p>  <p>SEF324V</p> </div> <div style="text-align: center;"> <p>View with instrument lower panel LH removed</p>  <p>AEC655A</p> </div> <p>3. Check harness continuity between ECM terminal 26 and terminal 5, ECM terminal 27 and terminal 6, ECM terminal 35 and terminal 7. Refer to Wiring Diagram. Continuity should exist.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 3.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 2.</td> </tr> </table>		OK	▶	GO TO 3.	NG	▶	GO TO 2.
OK	▶	GO TO 3.					
NG	▶	GO TO 2.					

2	DETECT MALFUNCTIONING PART			
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M58, F28 ● Harness for open or short between ECM and TCM (Transmission Control Module) <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;"></td> <td style="width: 10%; text-align: center;">▶</td> <td>Repair harness or connectors.</td> </tr> </table>			▶	Repair harness or connectors.
	▶	Repair harness or connectors.		

3	CHECK A/T CONTROL INPUT SIGNAL CIRCUIT FOR SHORT						
<p>1. Check harness continuity between ECM terminal 26 and ground, ECM terminal 27 and ground, ECM terminal 35 and ground. Refer to Wiring Diagram. Continuity should not exist.</p> <p>2. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 5.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 4.</td> </tr> </table>		OK	▶	GO TO 5.	NG	▶	GO TO 4.
OK	▶	GO TO 5.					
NG	▶	GO TO 4.					

DTC P0600 A/T CONTROL

VG33E

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
Check the harness for open or short between ECM and TCM (Transmission Control Module).	
▶	Repair open circuit or short to ground or short to power in harness.
5	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.	
▶	INSPECTION END

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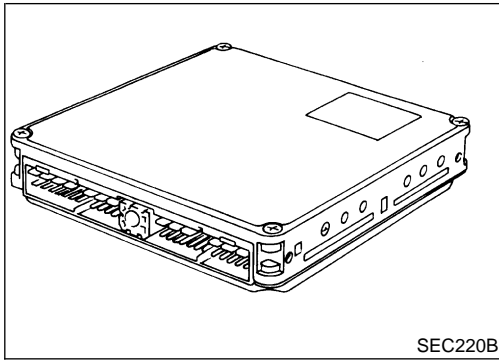
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Component Description



SEC220B

Component Description

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the engine. NGEC0797

On Board Diagnosis Logic

Malfunction is detected when ECM calculation function is malfunctioning. NGEC0798

POSSIBLE CAUSE

- ECM NGEC0798S01

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test. NGEC0799

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

 With CONSULT-II



- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine.
- 4) Run engine for at least 2 seconds at idle speed.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1025.

 With GST

Follow the procedure "With CONSULT-II".

Diagnostic Procedure

NGEC0800

1	INSPECTION START	
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select "SELF DIAG RESULTS" mode with CONSULT-II. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure". See EC-1024. 5. Is the 1st trip DTC P0605 displayed again? 		
<p> With GST</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select MODE 4 with GST. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure". See EC-1024. 5. Is the 1st trip DTC P0605 displayed again? 		
Yes or No		
Yes	▶	Replace ECM.
No	▶	INSPECTION END

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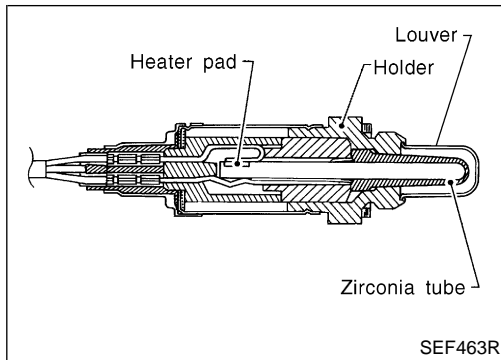
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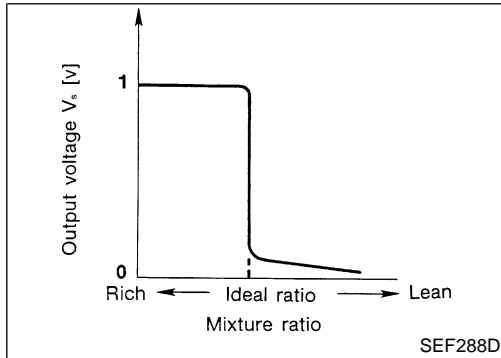
Component Description



Component Description

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

NGEC0615



CONSULT-II Reference Value in Data Monitor Mode

NGEC0616

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)	<ul style="list-style-type: none"> Engine: After warming up 	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NGEC0617

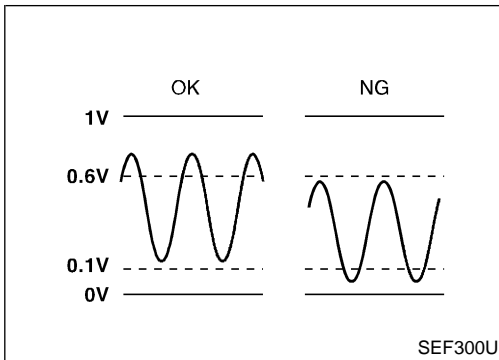
Specification data are reference values and are measured between each terminal and ground.

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor (bank 1)	[Engine is running] <ul style="list-style-type: none"> After warming up to normal operating temperature and engine speed is 2,000 rpm 	0 - Approximately 1.0V
51	G	Heated oxygen sensor (bank 2)		

SEF002V



On Board Diagnosis Logic

NGEC0618

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

Malfunction is detected when the maximum and minimum voltage from the sensor are not reached to the specified voltages.

POSSIBLE CAUSE

NGEC0618S01

- Heated oxygen sensor 1
- Heated oxygen sensor 1 heater
- Fuel pressure
- Injectors
- Intake air leaks

GI

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IDX

DTC Confirmation Procedure

=NGEC0619

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 5 seconds before conducting the next test.

TESTING CONDITION:

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

6	HO2S1 (B1) P1143	
	TESTING	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SEN	XXX km/h

SEC704C

6	HO2S1 (B1) P1143	
	TESTING	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SE	XXX km/h

SEC705C

6	HO2S1 (B1) P1143	
	COMPLETED	

SEC706C

Ⓜ **With CONSULT-II**

- 1) Start engine and warm it up to normal operating temperature.
- 2) Stop engine and wait at least 5 seconds.
- 3) Turn ignition switch “ON” and select “HO2S1 (B1)/(B2) P1143/P1163” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
- 4) Touch “START”.
- 5) Start engine and let it idle for at least 3.5 minutes.

NOTE:

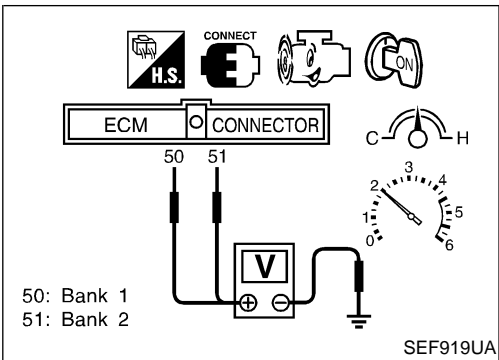
Never raise engine speed above 3,200 rpm after this step. If the engine speed limit is exceeded, return to step 5.

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

ENG SPEED	1,200 - 3,100 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	2.8 - 11 msec
Selector lever	Suitable position

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

- 7) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to “Diagnostic Procedure”, EC-1029.



Overall Function Check

NGEC0620

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

Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground.
- 3) Check one of the following with engine speed held at 2,000 rpm constant under no load.
 - The maximum voltage is over 0.6V at least one time.
 - The minimum voltage is over 0.1V at least one time.
- 4) If NG, go to "Diagnostic Procedure", EC-1029.

Diagnostic Procedure

NGEC0621

1	RETIGHTEN GROUND SCREWS
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws. 	
LEC518	
▶ GO TO 2.	

2	RETIGHTEN HEATED OXYGEN SENSOR 1
<p>Loosen and retighten corresponding heated oxygen sensor 1.</p> <p>Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg·m, 30 - 44 ft·lb)</p>	
▶ GO TO 3.	

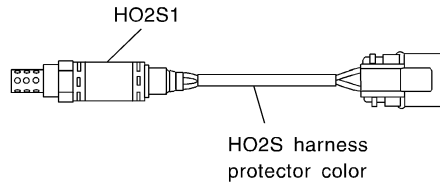
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3	CLEAR THE SELF-LEARNING DATA										
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II. Clear the self-learning control coefficient by touching "CLEAR". <div style="text-align: center; margin: 10px 0;"> <table border="1" style="border-collapse: collapse;"> <tr> <th colspan="3">WORK SUPPORT</th> </tr> <tr> <td style="padding: 2px;">SELF-LEARNING CONT</td> <td style="padding: 2px;">CLEAR</td> <td style="padding: 2px;">B1 100 %</td> </tr> <tr> <td colspan="2"></td> <td style="padding: 2px;">B2 100 %</td> </tr> </table> </div> <p style="text-align: right; margin-top: 20px;">SEF968Y</p> <ol style="list-style-type: none"> 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? 			WORK SUPPORT			SELF-LEARNING CONT	CLEAR	B1 100 %			B2 100 %
WORK SUPPORT											
SELF-LEARNING CONT	CLEAR	B1 100 %									
		B2 100 %									
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Turn ignition switch OFF. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed. Stop engine and reconnect mass air flow sensor harness connector. Make sure 1st trip DTC P0102 is displayed. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-673. Make sure DTC P0000 is displayed. 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? <p style="text-align: center;">Yes or No</p>											
Yes	▶	Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-853.									
No	▶	GO TO 4.									

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4 CHECK HEATED OXYGEN SENSOR 1 HEATER

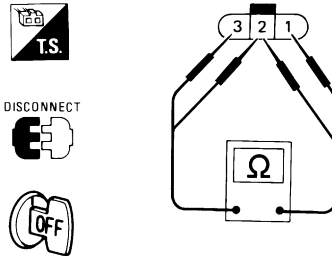
1. Stop engine.
2. Check heated oxygen sensor 1 harness protector color.



HO2S1 (bank 1): Black
HO2S1 (bank 2): Blue

SEF505YB

3. Check resistance between HO2S1 terminals 3 and 1.



AEC158A

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

4. Check continuity between HO2S1 terminals 2 and 1, 3 and 2.

Continuity should not exist.

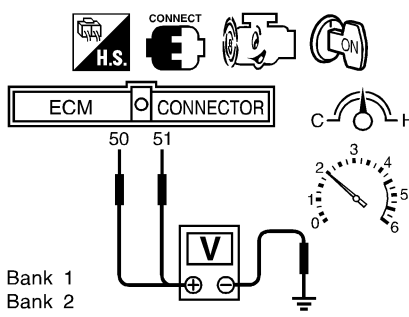
CAUTION:

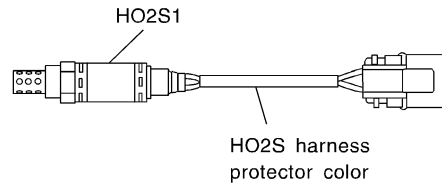
- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved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

OK or NG

OK (With CONSULT-II) ▶	GO TO 5.
OK (Without CONSULT-II) ▶	GO TO 6.
NG ▶	Replace malfunctioning heated oxygen sensor 1.

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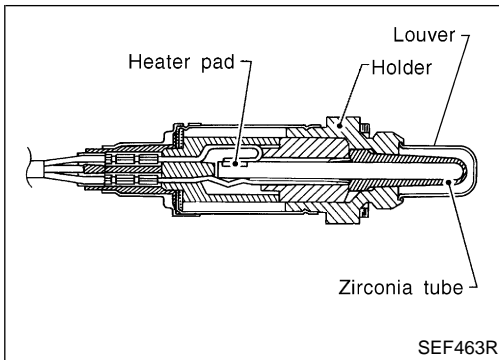
6	CHECK FRONT HEATED OXYGEN SENSOR 1
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground. Check the following with engine speed held at 2,000 rpm constant under no load. 	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  <p>50: Bank 1 51: Bank 2</p> </div> <div style="width: 50%;"> <ul style="list-style-type: none"> The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. The maximum voltage is over 0.6V at least one time. The minimum voltage is below 0.3V at least one time. The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>	
SEF796Z	
<p>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.</p>	
OK or NG	
OK	▶ GO TO 8.
NG	▶ GO TO 7.

7	REPLACE HEATED OXYGEN SENSOR 1
<ol style="list-style-type: none"> Turn ignition switch "OFF". Check heated oxygen sensor 1 harness protector color. 	
	
<p>HO2S1 (bank 1): Black HO2S1 (bank 2): Blue</p>	
SEF505YB	
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 1.

Diagnostic Procedure (Cont'd)

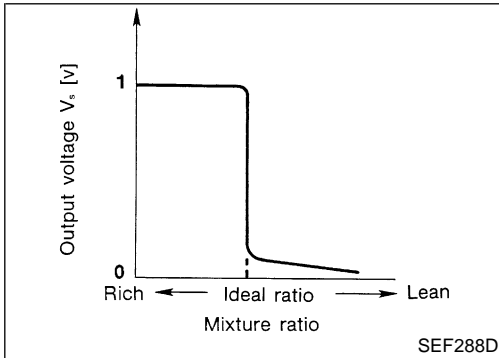
8	CHECK HO2S1 SHIELD CIRCUIT FOR OPEN AND SHORT (IF EQUIPPED)	
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect joint connector.</p> <p>3. For circuit, refer to "DTC P0134, P0154 HEATED OXYGEN SENSOR 1 (BANK 1)/(BANK 2) (CIRCUIT)", EC-822.</p> <p>4. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to EL-250, "HARNESS LAYOUT".) Continuity should exist. <p>5. Also check harness for short to power.</p> <p>6. Then reconnect joint connector.</p>		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Repair open circuit or short to power in harness or connectors.

9	CHECK INTERMITTENT INCIDENT	
<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.</p> <p>For circuit, refer to "DTC P0134, P0154 HEATED OXYGEN SENSOR (BANK 1)/(BANK 2) (CIRCUIT)", EC-822.</p>		
	▶	INSPECTION END



Component Description

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



CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)	<ul style="list-style-type: none"> Engine: After warming up 	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

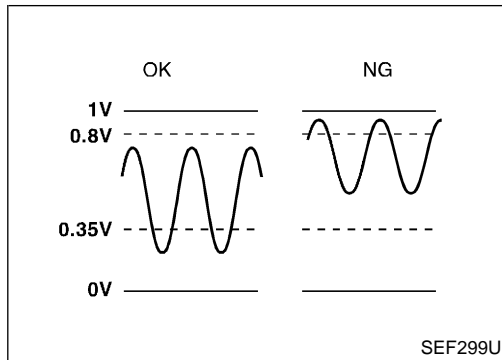
Specification data are reference values and are measured between each terminal and ground.

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (Bank 1)	[Engine is running] <ul style="list-style-type: none"> After warming up to normal operating temperature and engine speed is 2,000 rpm 	0 - Approximately 1.0V
51	G	Heated oxygen sensor 1 (Bank 2)		

GI
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On Board Diagnosis Logic

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

Malfunction is detected when the maximum and minimum voltages from the sensor are beyond the specified voltages.

POSSIBLE CAUSE

- Heated oxygen sensor 1
- Fuel pressure
- Injectors
- Heated oxygen sensor 1 heater

NGEC0625
NGEC0625S01

DTC Confirmation Procedure

=NGEC0626

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 5 seconds before conducting the next test.

TESTING CONDITION:

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

GI

MA

EM

LC

EC

FE

CL

MT

AT

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AX

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IDX

6	HO2S1 (B1) P1144	
	OUT OF CONDITION	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SE	XXX km/h

SEC707C

Ⓜ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Stop engine and wait at least 5 seconds.
- 3) Turn ignition switch ON and select “HO2S1 (B1)/(B2) P1144/P1164” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
- 4) Touch “START”.
- 5) Start engine and let it idle for at least 3.5 minutes.

NOTE:

Never raise engine speed above 3,200 rpm after this step. If the engine speed limit is exceeded, return to step 5.

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

END SPEED	1,200 - 3,100 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	2.8 - 11 msec
Selector lever	Suitable position

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

- 7) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to “Diagnostic Procedure”, EC-1038.

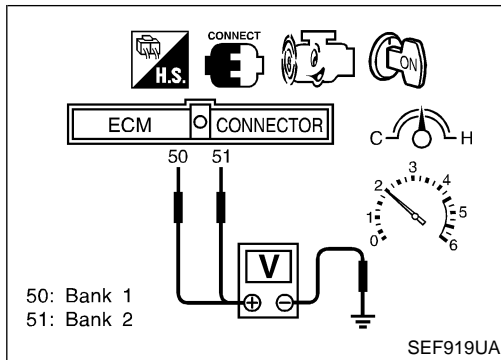
6	HO2S1 (B1) P1144	
	TESTING	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SE	XXX km/h

SEC708C

6	HO2S1 (B1) P1144	
	COMPLETED	

SEC709C

Overall Function Check



Overall Function Check

NGEC0627

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

⊗ Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground.
- 3) Check one of the following with engine speed held at 2,000 rpm constant under no load.
 - The maximum voltage is below 0.8V at least one time.
 - The minimum voltage is below 0.35V at least one time.
- 4) If NG, go to "Diagnostic Procedure", EC-1038.

Diagnostic Procedure

NGEC0628

1	RETIGHTEN GROUND SCREWS
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws. 	
<p>Engine ground</p>	
LEC518	
▶ GO TO 2.	

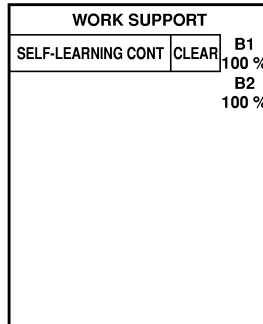
2	RETIGHTEN HEATED OXYGEN SENSOR 1
Loosen and retighten corresponding heated oxygen sensor 1.	
Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg·m, 30 - 44 ft·lb)	
▶ GO TO 3.	

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3 CLEAR THE SELF-LEARNING DATA

With CONSULT-II

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



SEF968Y

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

Without CONSULT-II

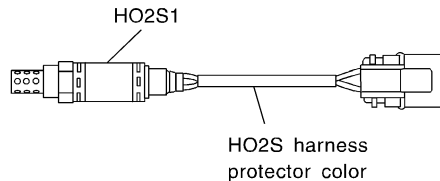
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0102 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-673.
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-862.
No	▶	GO TO 4.

4 CHECK HO2S 1 CONNECTOR FOR WATER

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 1 harness protector color.



HO2S1 (bank 1): Black
HO2S1 (bank 2): Blue

SEF505YB

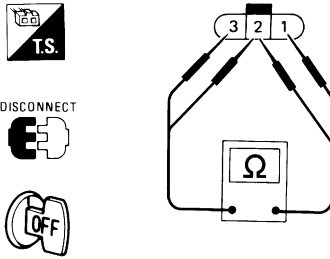
3. Disconnect heated oxygen sensor 1 harness connector.
4. Check connectors for water.
Water should not exist.

OK or NG

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

5 CHECK HEATED OXYGEN SENSOR 1 HEATER

Check resistance between HO2S1 terminals 3 and 1.



AEC158A

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

Check continuity between HO2S1 terminals 2 and 1, 3 and 2.

Continuity should not exist.

CAUTION:

Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK (With CONSULT-II) ▶	GO TO 6.
OK (Without CONSULT-II) ▶	GO TO 7.
NG ▶	GO TO 8.

6 CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

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

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

SEF967Y

5. Check the following.

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

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

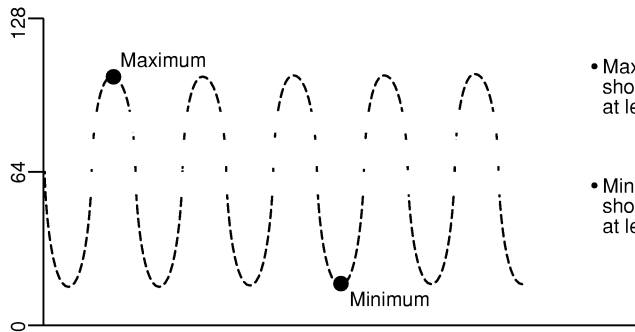
Bank 2
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

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

SEF647Y

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

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



• Maximum voltage should be over 0.6V at least one time.

• Minimum voltage should be below 0.30V at least one time.

SEF648Y

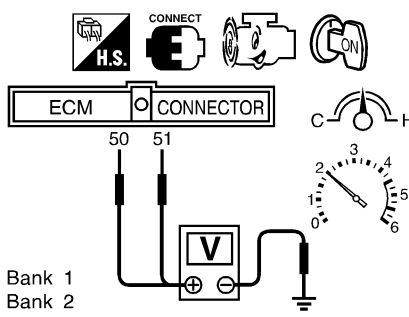
CAUTION:

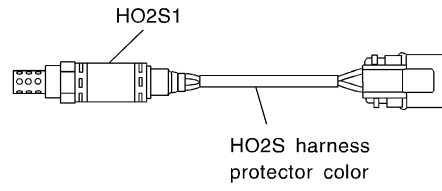
- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved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

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

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7	CHECK HEATED OXYGEN SENSOR 1	
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground. 3. Check the following with engine speed held at 2,000 rpm constant under no load. 		
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 45%;">  </div> <div style="width: 50%;"> <ul style="list-style-type: none"> • The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least one time. • The minimum voltage is below 0.3V at least one time. • The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>		
SEF796Z		
<p>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.</p>		
OK or NG		
OK	▶	GO TO 8.
NG	▶	GO TO 8.

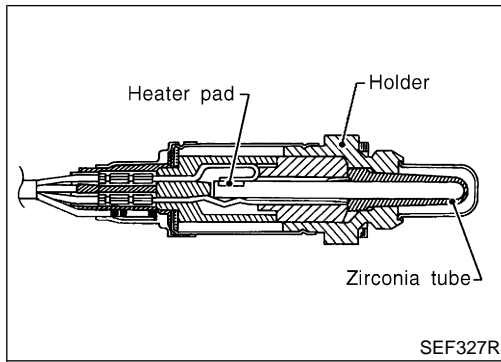
8	REPLACE HEATED OXYGEN SENSOR 1	
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Check heated oxygen sensor 1 harness protector color. 		
		
<p>HO2S1 (bank 1): Black HO2S1 (bank 2): Blue</p>		
SEF505YB		
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>		
▶		Replace malfunctioning heated oxygen sensor 1.

9	CHECK HO2S1 SHIELD CIRCUIT FOR OPEN AND SHORT (IF EQUIPPED)	
	<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect joint connector. For circuit, refer to "DTC P0134, P0154 HEATED OXYGEN SENSOR (BANK 1)/(BANK 2) (CIRCUIT)", EC-822.</p> <p>3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to EL-250, "HARNESS LAYOUT".) Continuity should exist. <p>4. Also check harness for short to power.</p> <p>5. Then reconnect joint connector.</p> <p style="text-align: center;">OK or NG</p>	
	OK	▶ GO TO 10.
	NG	▶ Repair open circuit or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT	
	<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739. For circuit, refer to "DTC P0134, P0154 FRONT HEATED OXYGEN SENSOR (BANK 1)/(BANK 2) (CIRCUIT)", EC-822.</p>	
	▶	INSPECTION END

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Component Description



Component Description

NGEC0651

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

CONSULT-II Reference Value in Data Monitor Mode

NGEC0652

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	● Engine: After warming up	Revsing engine from idle up to 2,000 rpm	LEAN ↔ RICH

ECM Terminals and Reference Value

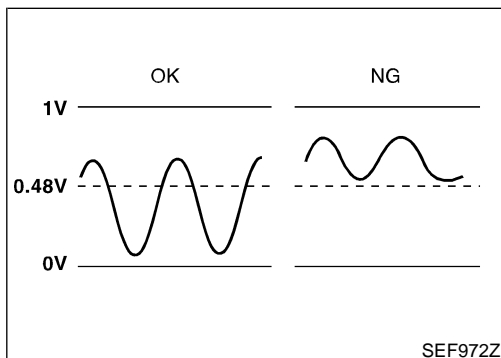
NGEC0653

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 the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (bank 1)	[Engine is running] ● Warm-up condition ● Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V
57	Y	Heated oxygen sensor 2 (bank 2)		



SEF972Z

On Board Diagnosis Logic

NGEC0654

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst 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. Malfunction is detected when the minimum voltage from the sensor is not reached to the specified voltage.

POSSIBLE CAUSE

NGEC0654S01

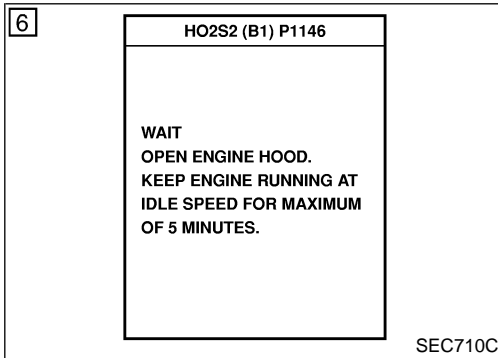
- Harness or connectors
(The sensor circuit is open or shorted.)
- Heated oxygen sensor 2
- Fuel pressure
- Injectors

GI

MA

EM

LC



DTC Confirmation Procedure

NGEC0655

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Open engine hood before conducting following procedure With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Make sure that "COOLANT TEMP/S" is more than 70°C (158°F).
- 6) Select "HO2S2 (B1)/(B2) P1146/P1166" of "HO2S2" in DTC WORK SUPPORT" mode with CONSULT.
- 7) Start engine and follow the instructions of CONSULT-II.
- 8) Make sure that "OK" is displayed after touching "SELF_DIAG RESULTS".

EC

FE

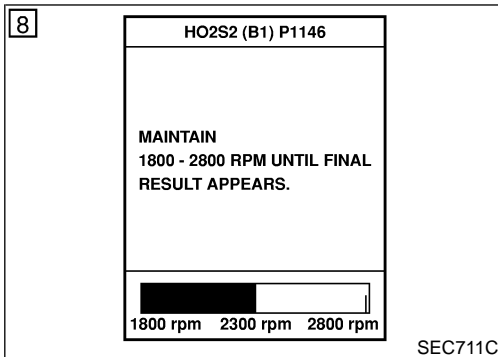
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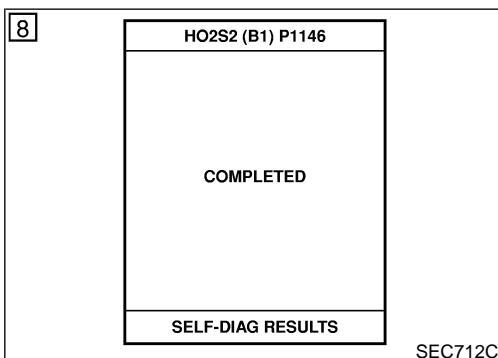
PD



If NG is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-1049.
If "CAN NOT BE DIAGNOSED" is displayed, perform the following.

AX

SU



- a) Stop engine and cool down "COOLANT TEMP/SE" to less than 70°C (158°F).
- b) Turn ignition switch ON.
- c) Select "DATA MONITOR" mode with CONSULT-II.
- d) Start engine.
- e) Perform from step 6) again when the "COOLANT TEMP/S" reaches to 70°C (158°F)

BR

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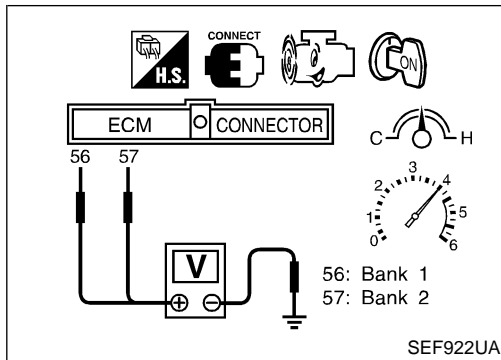
HA

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Overall Function Check



Overall Function Check

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. =NGEC0656

CAUTION:

Always drive vehicle at a safe speed.

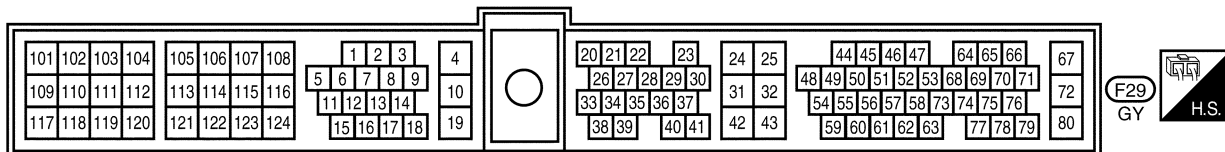
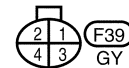
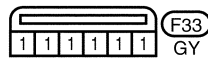
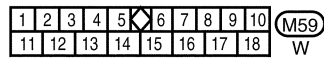
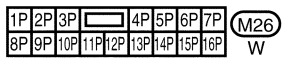
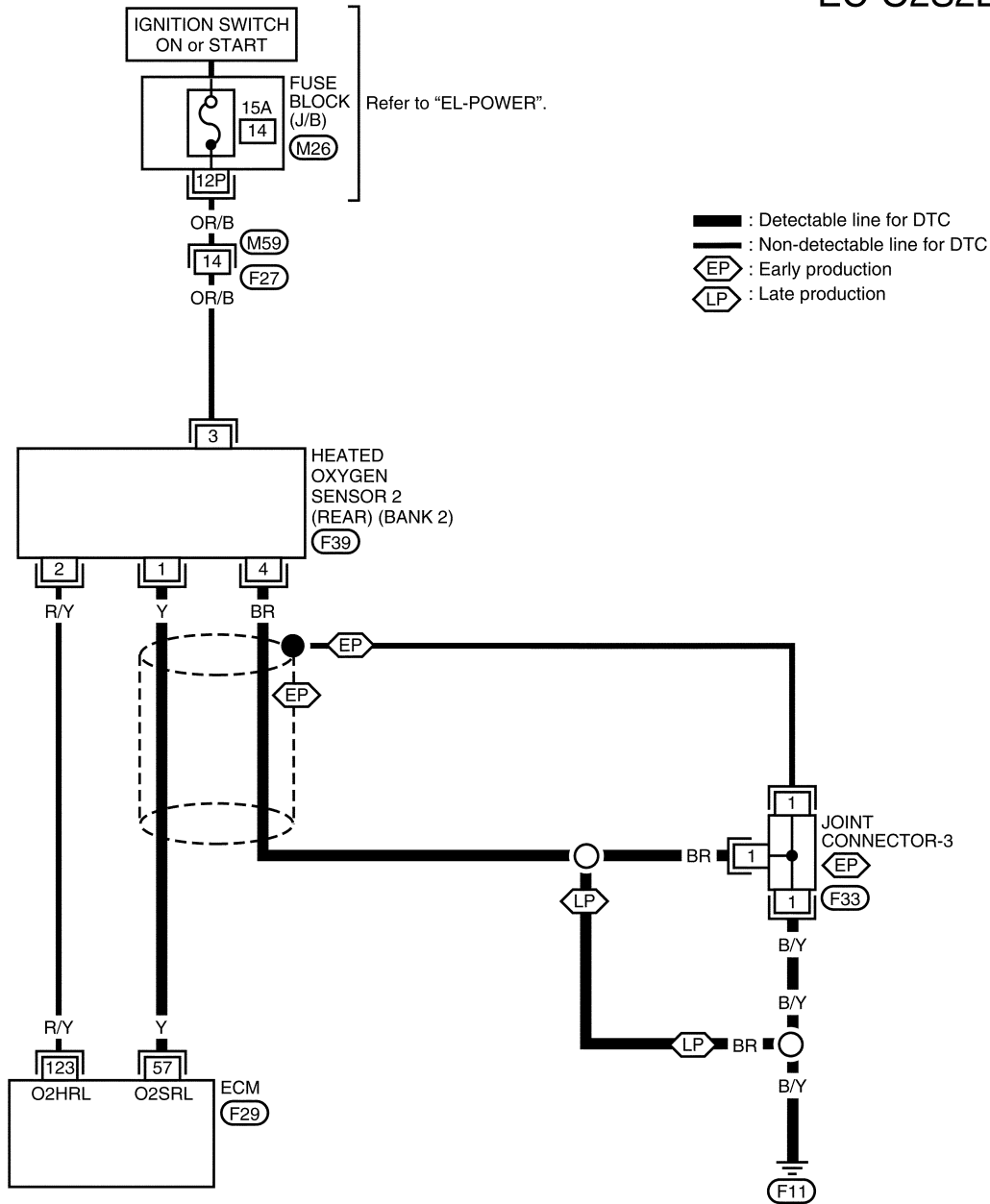
⊗ Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground.
- 4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
(depress and release accelerator pedal as soon as possible)
The voltage should be below 0.48V at least once during this procedure.
If the voltage can be confirmed in step 4, step 5 is not necessary.
- 5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T).
The voltage should be below 0.48V at least once during this procedure.
- 6) If NG, go to "Diagnostic Procedure", EC-1049.

LEFT BANK

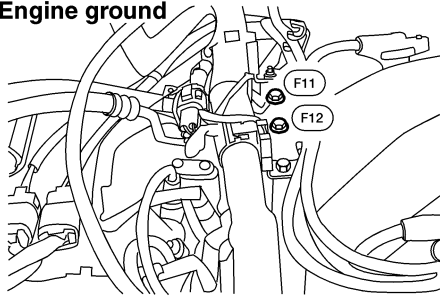
NGEC0657S02

EC-O2S2B2-01



Diagnostic Procedure

NGEC0658

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p> <div style="text-align: center;"> <p>Engine ground</p>  </div> <p style="text-align: right;">LEC518</p>	
<p>▶ GO TO 2.</p>	

GI
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2	CLEAR THE SELF-LEARNING DATA								
<p><input checked="" type="checkbox"/> With CONSULT-II</p> <p>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".</p> <div style="text-align: center;"> <table border="1" style="margin: auto;"> <tr> <th colspan="2">WORK SUPPORT</th> </tr> <tr> <td>SELF-LEARNING CONT</td> <td>CLEAR</td> </tr> <tr> <td></td> <td>B1 100 %</td> </tr> <tr> <td></td> <td>B2 100 %</td> </tr> </table> </div> <p style="text-align: right;">SEF968Y</p> <p>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?</p>		WORK SUPPORT		SELF-LEARNING CONT	CLEAR		B1 100 %		B2 100 %
WORK SUPPORT									
SELF-LEARNING CONT	CLEAR								
	B1 100 %								
	B2 100 %								
<p><input type="checkbox"/> Without CONSULT-II</p> <p>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 1st trip DTC P0102 is displayed. 6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-673. 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?</p> <p style="text-align: center;">Yes or No</p>									
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; border-right: 1px solid black;">Yes</td> <td style="border-right: 1px solid black; text-align: center;">▶</td> <td>Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-863.</td> </tr> <tr> <td style="border-right: 1px solid black;">No</td> <td style="border-right: 1px solid black; text-align: center;">▶</td> <td>GO TO 3.</td> </tr> </table>		Yes	▶	Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-863.	No	▶	GO TO 3.		
Yes	▶	Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-863.							
No	▶	GO TO 3.							

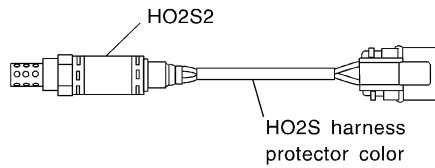
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3 CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

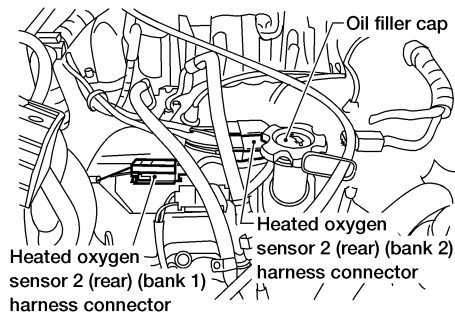
1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 harness protector color.



HO2S2 (bank 1): White or Gray
 HO2S2 (bank 2): Red or Red/Brown

SEF372ZA

3. Disconnect corresponding heated oxygen sensor 2 harness connector.



WEC546

4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P1146	56	1	Bank 1 (Right)
P1166	57	1	Bank 2 (Left)

MTBL0951

Continuity should exist.

6. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P1146	56 or 1	Ground	Bank 1 (Right)
P1166	57 or 1	Ground	Bank 2 (Left)

MTBL0952

Continuity should not exist.

7. 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 HO2S GROUND CIRCUIT FOR OPEN AND SHORT	
1. Check harness continuity between HO2S2 terminal 4 and engine ground. Refer to Wiring Diagram. Continuity should exist.		
2. Also check harness for short to power.		
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.		
<ul style="list-style-type: none"> ● Joint connector-3 (if equipped) ● Harness for open between heated oxygen sensor 2 and engine ground. 		
	▶	Repair open circuit or short to power in harness or connectors.

6	CHECK HEATED OXYGEN SENSOR 2	
(P) With CONSULT-II		
1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.		
2. Stop vehicle with engine running.		
3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II.		
4. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.		
(Reference data)		
SEF989RD		
"HO2S2 (B1)/(B2)" should be above 0.62V at least once when the "FUEL INJECTION" is +25%.		
"HO2S2 (B1)/(B2)" should be below 0.48V at least once when the "FUEL INJECTION" is -25%.		
CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	GO TO 8.

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7	CHECK HEATED OXYGEN SENSOR 2
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. Stop vehicle with engine running. Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground. Check the voltage when racing up to 4,000 rpm under no load at least 10 times. (depress and release accelerator pedal as soon as possible) 	
<p>56: Bank 1 57: Bank 2</p> <p style="text-align: right;">The voltage should be above 0.62V at least once during this procedure.</p>	
SEF797ZB	
<ol style="list-style-type: none"> Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T). The voltage should be below 0.48V at least once during this procedure. <p>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.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 9.
NG	▶ GO TO 8.

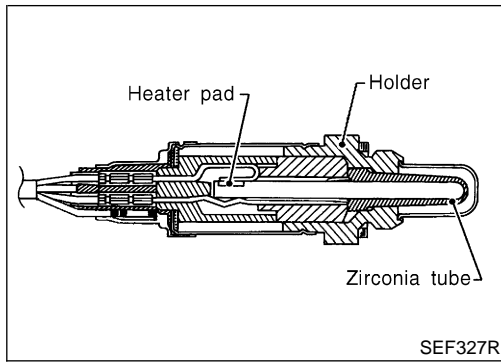
8	REPLACE HEATED OXYGEN SENSOR 2
<ol style="list-style-type: none"> Stop vehicle and turn ignition switch OFF. Check heated oxygen sensor 2 harness protector color. 	
<p>HO2S2 (bank 1): White or Gray HO2S2 (bank 2): Red or Red/Brown</p>	
SEF372ZA	
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 2.

9	CHECK HO2S2 SHIELD CIRCUIT FOR OPEN AND SHORT (IF EQUIPPED)	
<p>1. Turn ignition switch OFF. 2. Disconnect joint connector-3. 3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to EL-250, "HARNES LAYOUT".) Continuity should exist. <p>4. Also check harness for short to power. 5. Then reconnect joint connector-3.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 10.
NG	▶	Repair open circuit or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.		
	▶	INSPECTION END

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Component Description



Component Description

NGEC0659

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

CONSULT-II Reference Value in Data Monitor Mode

NGEC0660

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	<ul style="list-style-type: none"> Engine: After warming up 	Revving engine from idle up to 2,000 rpm	LEAN ↔ RICH

ECM Terminals and Reference Value

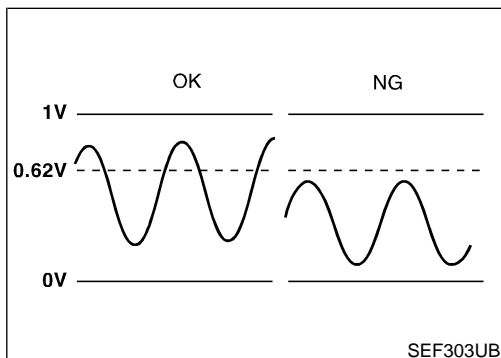
NGEC0661

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 the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (bank 1)	[Engine is running] <ul style="list-style-type: none"> Warm-up condition Revving engine from idle up to 2,000 rpm 	0 - Approximately 1.0V
57	Y	Heated oxygen sensor 2 (bank 2)		



On Board Diagnosis Logic

NGEC0662

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst 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. Malfunction is detected when the maximum voltage from the sensor is not reached to the specified voltage.

POSSIBLE CAUSE

NGEC0662S01

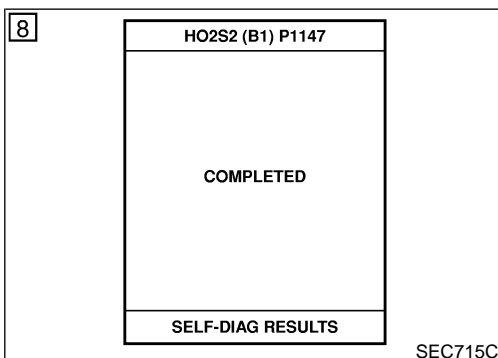
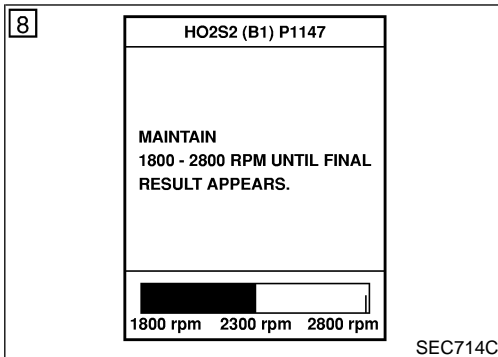
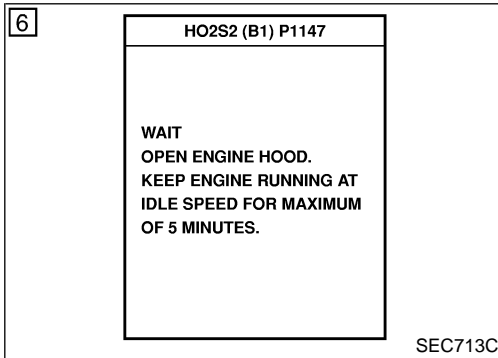
- Harness or connectors
(The sensor circuit is open or shorted.)
- Heated oxygen sensor 2
- Fuel pressure
- Injectors
- Intake air leaks

GI

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DTC Confirmation Procedure

NGEC0663

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Open engine hood before conducting following procedure With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Make sure that "COOLANT TEMP/S" is more than 70°C (158°F).
- 6) Select "HO2S2 (B1)/(B2), P1147/P1167" of "HO2S2" in DTC WORK SUPPORT" mode with CONSULT-II.
- 7) Start engine and follow the instructions of CONSULT-II.
- 8) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
If NG is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-1059.
If "CAN NOT BE DIAGNOSED" is displayed, perform the following.
 - a) Stop engine and cool down "COOLANT TEMP/SE" to less than 70°C (158°F).
 - b) Turn ignition switch ON.
 - c) Select "DATA MONITOR" mode with CONSULT-II.
 - d) Start engine.
 - e) Perform from step 6) again when the "COOLANT TEMP/S" reaches to 70°C (158°F)

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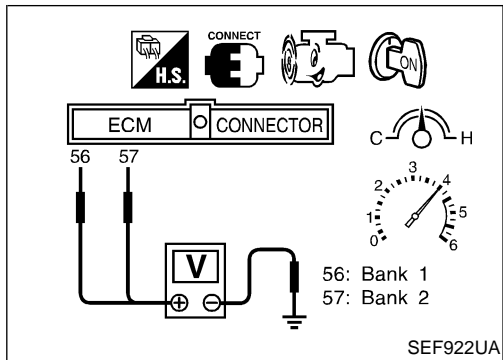
HA

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Overall Function Check



Overall Function Check

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. =NGEC0664

CAUTION:

Always drive vehicle at a safe speed.

⊗ Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground.
- 4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
(depress and release accelerator pedal as soon as possible)
The voltage should be above 0.62V at least once during this procedure.
If the voltage can be confirmed in step 4, step 5 is not necessary.
- 5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T).
The voltage should be above 0.62V at least once during this procedure.
- 6) If NG, go to "Diagnostic Procedure", EC-1059.

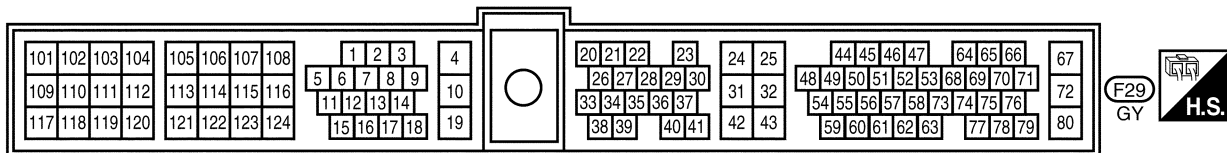
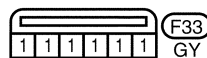
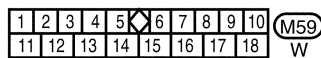
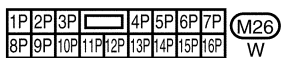
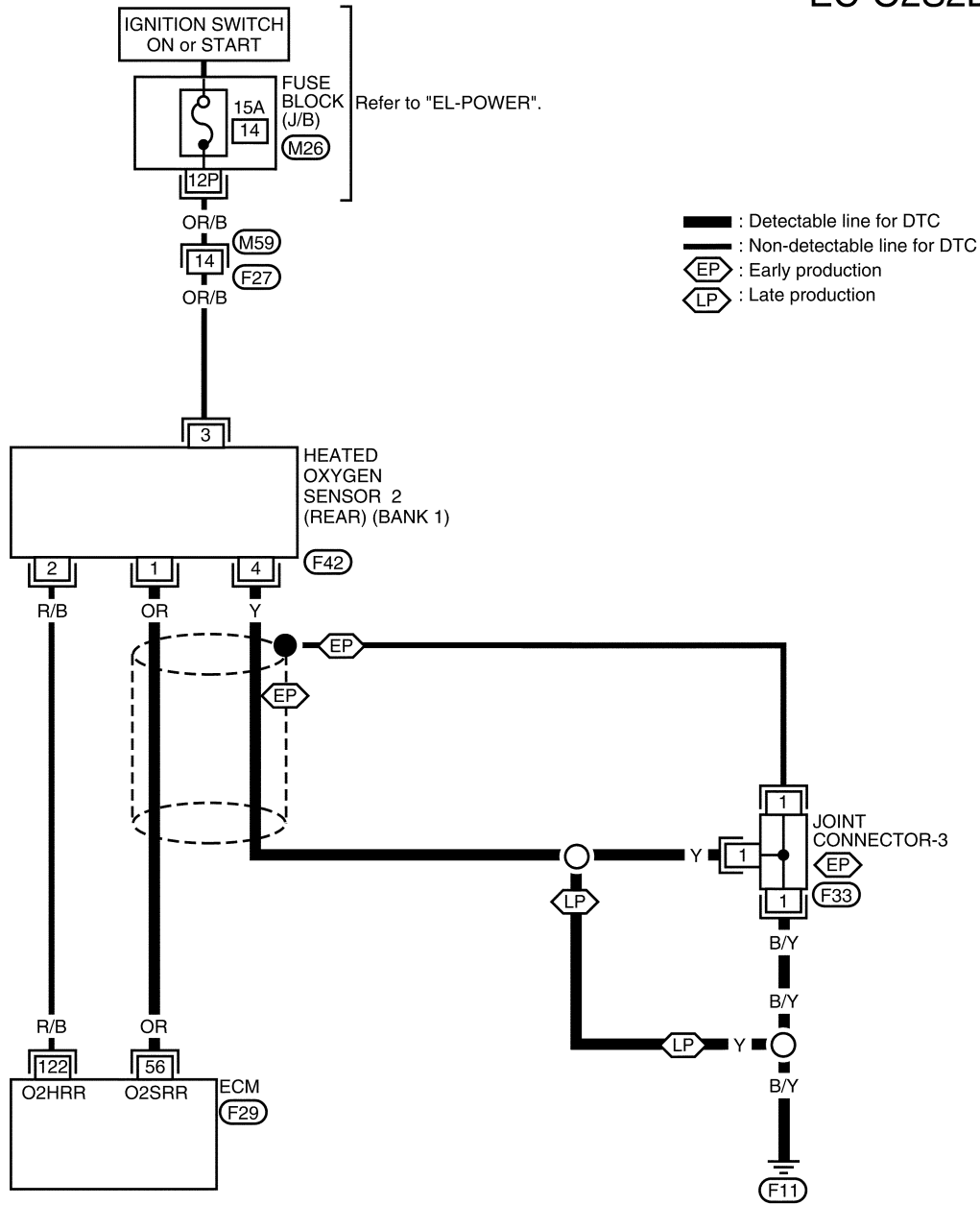
Wiring Diagram

RIGHT BANK

NGEC0665

NGEC0665S01

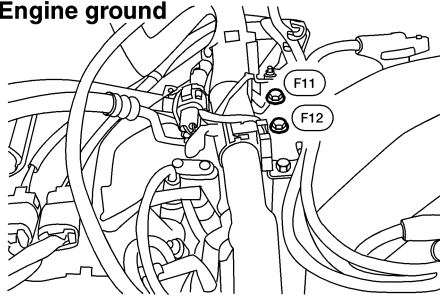
EC-O2S2B1-01



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Diagnostic Procedure

NGEC0666

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p> <div style="text-align: center;"> <p>Engine ground</p>  </div> <p style="text-align: right;">LEC518</p>	
<p>▶ GO TO 2.</p>	

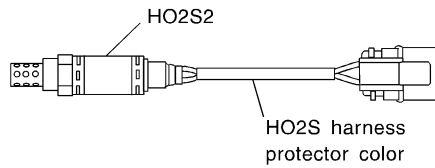
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2	CLEAR THE SELF-LEARNING DATA								
<p><input checked="" type="checkbox"/> With CONSULT-II</p> <p>1. Start engine and warm it up to normal operating temperature. 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II. 3. Clear the self-learning control coefficient by touching "CLEAR".</p> <div style="text-align: center;"> <table border="1" style="border-collapse: collapse;"> <tr> <th colspan="2">WORK SUPPORT</th> </tr> <tr> <td style="text-align: center;">SELF-LEARNING CONT</td> <td style="text-align: center;">CLEAR</td> </tr> <tr> <td></td> <td style="text-align: right;">B1 100 %</td> </tr> <tr> <td></td> <td style="text-align: right;">B2 100 %</td> </tr> </table> </div> <p style="text-align: right;">SEF968Y</p> <p>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?</p>		WORK SUPPORT		SELF-LEARNING CONT	CLEAR		B1 100 %		B2 100 %
WORK SUPPORT									
SELF-LEARNING CONT	CLEAR								
	B1 100 %								
	B2 100 %								
<p><input type="checkbox"/> Without CONSULT-II</p> <p>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 1st trip DTC P0102 is displayed. 6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-673. 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?</p> <p style="text-align: center;">Yes or No</p>									
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Yes</td> <td style="width: 5%; text-align: center;">▶</td> <td>Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-854.</td> </tr> <tr> <td>No</td> <td style="text-align: center;">▶</td> <td>GO TO 3.</td> </tr> </table>		Yes	▶	Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-854.	No	▶	GO TO 3.		
Yes	▶	Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-854.							
No	▶	GO TO 3.							

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3 CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 harness protector color.



HO2S2 (bank 1): White or Gray
 HO2S2 (bank 2): Red or Red/Brown

SEF372ZA

3. Disconnect corresponding heated oxygen sensor 2 harness connector.
4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P1147	56	1	Bank 1 (Right)
P1167	57	1	Bank 2 (Left)

SEC661C

Continuity should exist.

6. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or sensor	Ground	
P1147	56 or 1	Ground	Bank 1 (Right)
P1167	57 or 1	Ground	Bank 2 (Left)

SEC662C

Continuity should not exist.

7. 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 GROUND CIRCUIT FOR OPEN AND SHORT	
1. Check harness continuity between HO2S2 terminal 4 and engine ground. Refer to Wiring Diagram. Continuity should exist.		
2. Also check harness for short to power.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	GO TO 5.

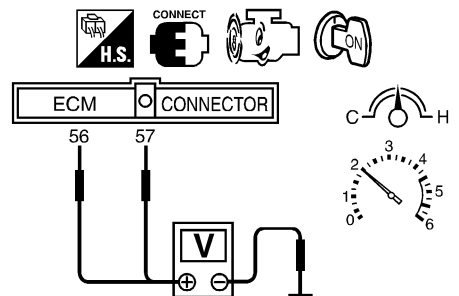
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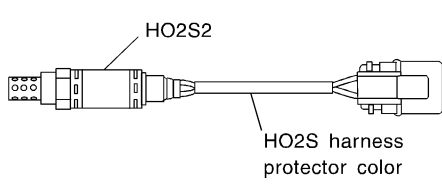
5	DETECT MALFUNCTIONING PART	
Check the following.		
<ul style="list-style-type: none"> ● Joint connector-3 (if equipped) ● Harness for open between heated oxygen sensor 2 and engine ground. 		
	▶	Repair open circuit or short to power in harness or connectors.

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6	CHECK HEATED OXYGEN SENSOR 2	
(P) With CONSULT-II		
1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.		
2. Stop vehicle with engine running.		
3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II.		
4. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.		
(Reference data)		
SEF989RD		
"HO2S2 (B1)/(B2)" should be above 0.62V at least once when the "FUEL INJECTION" is +25%.		
"HO2S2 (B1)/(B2)" should be below 0.48V at least once when the "FUEL INJECTION" is -25%.		
CAUTION:		
<ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. 		
OK or NG		
OK	▶	GO TO 9.
NG	▶	GO TO 8.

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7	CHECK HEATED OXYGEN SENSOR 2						
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground. 4. Check the voltage when racing up to 4,000 rpm under no load at least 10 times. (depress and release accelerator pedal as soon as possible) <div style="display: flex; align-items: center; justify-content: center; margin: 10px 0;">  <div style="margin-left: 20px;"> <p>The voltage should be above 0.62V at least once during this procedure.</p> </div> </div> <p>56: Bank 1 57: Bank 2</p> <p style="text-align: right; font-size: small;">SEF797ZB</p> <ol style="list-style-type: none"> 5. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T). The voltage should be below 0.48V at least once during this procedure. <p>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.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 9.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 8.</td> </tr> </table>		OK	▶	GO TO 9.	NG	▶	GO TO 8.
OK	▶	GO TO 9.					
NG	▶	GO TO 8.					

8	REPLACE HEATED OXYGEN SENSOR 2			
<ol style="list-style-type: none"> 1. Stop vehicle and turn ignition switch OFF. 2. Check heated oxygen sensor 2 harness protector color. <div style="text-align: center; margin: 20px 0;">  </div> <p style="text-align: center; font-size: small;">HO2S2 (bank 1): White or Gray HO2S2 (bank 2): Red or Red/Brown</p> <p style="text-align: right; font-size: small;">SEF372ZA</p> <p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%;"></td> <td style="width: 10%; text-align: center;">▶</td> <td>Replace malfunctioning heated oxygen sensor 2.</td> </tr> </table>			▶	Replace malfunctioning heated oxygen sensor 2.
	▶	Replace malfunctioning heated oxygen sensor 2.		

9	CHECK HO2S2 SHIELD CIRCUIT FOR OPEN AND SHORT (IF EQUIPPED)	
<p>1. Turn ignition switch OFF. 2. Disconnect joint connector. 3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to "HARNES LAYOUT", <i>EL-250</i>) Continuity should exist. <p>4. Also check harness for short to power. 5. Then reconnect joint connector.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 10.
NG	▶	Repair open circuit or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.		
	▶	INSPECTION END

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On Board Diagnosis Logic

★ **The closed loop control has the one trip detection logic.** NGEC0808
 Malfunction is detected when the closed loop control function for right bank does not operate even when vehicle is driving in the specified condition, the closed loop control function for left bank does not operate even when vehicle is driving in the specified condition.

POSSIBLE CAUSE

- The heated oxygen sensor 1 circuit is open or shorted. NGEC0808S01
- Heated oxygen sensor 1
- Heated oxygen sensor 1 heater

DTC Confirmation Procedure

NGEC0809

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 5 seconds before conducting the next test.

TESTING CONDITION:

- Never raise engine speed above 3,200 rpm during the “DTC Confirmation Procedure”. If the engine speed limit is exceeded, retry the procedure from step 2.
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

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

SEF967Y

Ⓜ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Hold engine speed at 2,000 rpm and check one of the following.
 - “HO2S1 (B1)/(B2)” voltage should go above 0.70V at least once.
 - “HO2S1 (B1)/(B2)” voltage should go below 0.21V at least once.
 If the check result is NG, perform “Diagnosis Procedure”, EC-1065.

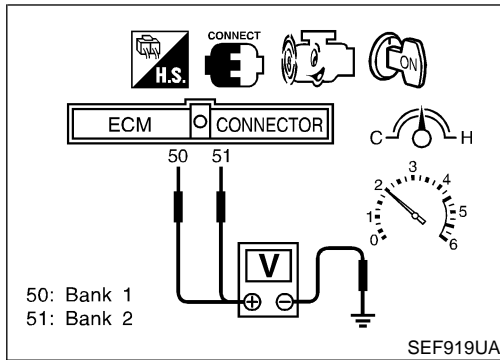
If the check result is OK, perform the following step.

- 4) Let engine idle at least 5 minutes.
- 5) Maintain the following condition at least 50 consecutive seconds.

B/FUEL SCHDL	3.3 msec or more
ENG SPEED	1,600 rpm or more
Selector lever	Suitable position
VHCL SPEED SE	More than 71 km/h (44 MPH)

During this test, P0134 and/or P0154 may be displayed on CONSULT-II screen.

- 6) If DTC is detected, go to "Diagnostic Procedure", EC-1065.



Overall Function Check

Use this procedure to check the overall function of the closed loop control. During this check, a DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 [heated oxygen sensor 1 (bank 1) signal] or 51 [heated oxygen sensor 1 (bank 2) signal] and engine ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no-load.
 - The voltage should go above 0.70V at least once.
 - The voltage should go below 0.21V at least once.
- 4) If NG, go to "Diagnostic Procedure", EC-1065.

Diagnostic Procedure

Perform trouble diagnosis for "DTC P0133, P0153", EC-808.

On Board Diagnosis Logic

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise. When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated. NGEC0904

Malfunction is detected when engine coolant temperature reaches an abnormally high temperature.

CAUTION:

When a malfunction is indicated be sure to replace the coolant, follow the procedure in “Changing Engine Coolant”, “ENGINE MAINTENANCE”, MA-28. Also, replace the engine oil.

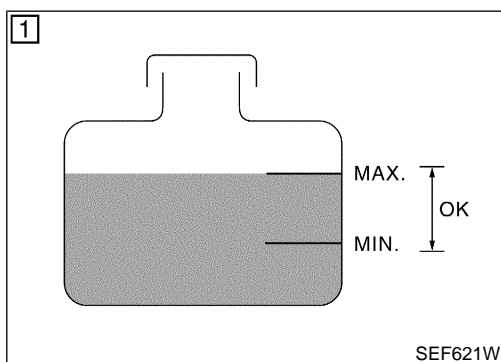
- 1) Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to “Anti-freeze Coolant Mixture Ratio”, “RECOMMENDED FLUIDS AND LUBRICANTS”, MA-15.
- 2) After refilling coolant, run engine to ensure that no water-flow noise is emitted.

POSSIBLE CAUSE

- Cooling fan (Crankshaft driven)
- Radiator hose
- Radiator
- Radiator cap
- Water pump
- Thermostat

NGEC0904S01

For more information, refer to “MAIN 12 CAUSES OF OVERHEATING”, EC-1070.



Overall Function Check

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed. NGEC0905

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

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 “Diagnostic Procedure”, EC-1067.
- 2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to “Diagnostic Procedure”, EC-1067.
- 3) Start engine.
- 4) Make sure that cooling fan (crankshaft driven) operates.
- 5) If NG, go to “Diagnostic Procedure”, EC-1067.

⊗ 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 "Diagnostic Procedure", EC-1067.
- 2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "Diagnostic Procedure", EC-1067.
- 3) Start engine and make sure that cooling fan (crankshaft driven) operates.
Be careful not to overheat engine.
- 4) If NG, go to "Diagnostic Procedure", EC-1067.

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Diagnostic Procedure

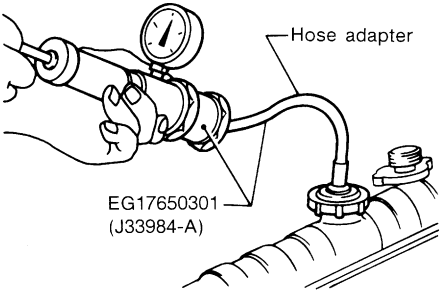
NGE0907

1	CHECK COOLING FAN (CRANKSHAFT DRIVEN) OPERATION	
Start engine and make sure that cooling fan (crankshaft driven) operates.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Check cooling fan (crankshaft driven). Refer to LC-16 , "Cooling Fan".

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2	CHECK COOLING SYSTEM FOR LEAK	
Apply pressure to the cooling system with a tester, and check if the pressure drops.		
CAUTION: Higher than the specified pressure may cause radiator damage.		
Testing pressure: 157 kPa (1.6 kg/cm ² , 23 psi)		
		
SLC754A		
Pressure should not drop.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Check the following for leak <ul style="list-style-type: none"> ● Hose ● Radiator ● Water pump Refer to "Water Pump", LC-12 .

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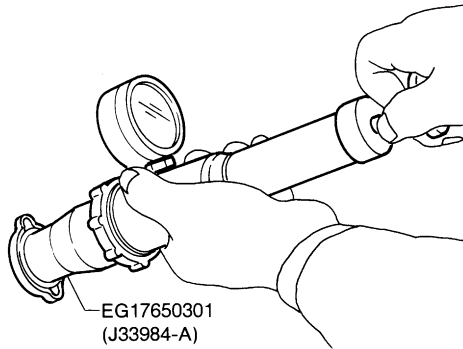
DTC P1217 ENGINE OVER TEMPERATURE

VG33E

Diagnostic Procedure (Cont'd)

3 CHECK RADIATOR CAP

Apply pressure to cap with a tester and check radiator cap relief pressure.



Radiator cap relief pressure:
59 - 98 kPa (0.6 - 1.0 kg/cm², 9 - 14 psi)

SLC755A

OK or NG

OK ► GO TO 4.

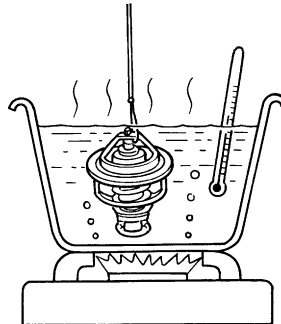
NG ► Replace radiator cap.

4 CHECK THERMOSTAT

1. Check valve seating condition at normal room temperatures.

It should seat tightly.

2. Check valve opening temperature and valve lift.



Valve opening temperature:
82°C (180°F) [standard]

Valve lift:
More than 10 mm/95°C (0.39 in/203°F)

SLC343

3. Check if valve is closed at 5°C (9°F) below valve opening temperature.
For details, refer to "Thermostat", **LC-13**.

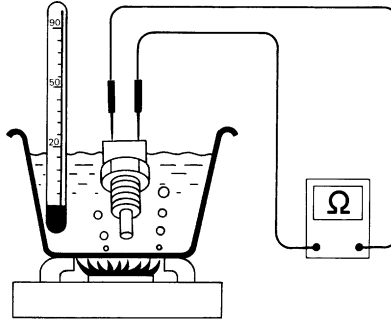
OK or NG

OK ► GO TO 5.

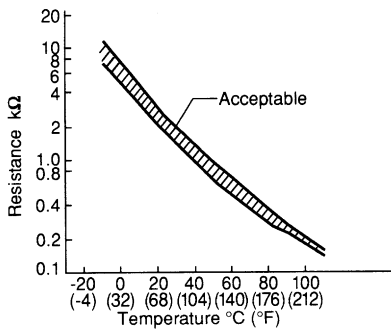
NG ► Replace thermostat

5 CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.


<Reference data>

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


OK or NG

OK	▶	GO TO 6.
NG	▶	Replace engine coolant temperature sensor.

6 CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-1070.

 ▶ **INSPECTION END**

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DTC P1217 ENGINE OVER TEMPERATURE

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Main 12 Causes of Overheating

Main 12 Causes of Overheating

NGEC0908

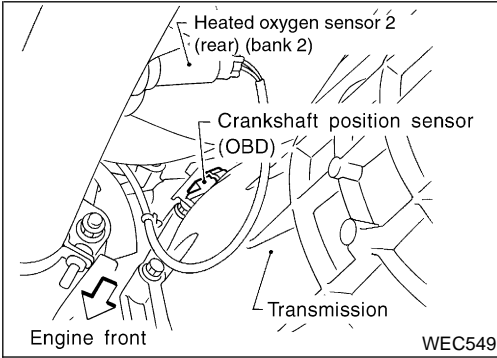
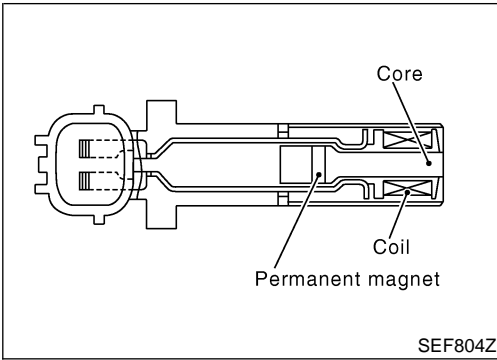
Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	<ul style="list-style-type: none"> Blocked radiator Blocked condenser Blocked radiator grille Blocked bumper 	<ul style="list-style-type: none"> Visual 	No blocking	—
	2	<ul style="list-style-type: none"> Coolant mixture 	<ul style="list-style-type: none"> Coolant tester 	50 - 50% coolant mixture	See "RECOMMENDED FLUIDS AND LUBRICANTS", MA-13 .
	3	<ul style="list-style-type: none"> Coolant level 	<ul style="list-style-type: none"> Visual 	Coolant up to MAX level in reservoir tank and radiator filler neck	See "Changing Engine Coolant", "ENGINE MAINTENANCE", MA-28 .
	4	<ul style="list-style-type: none"> Radiator cap 	<ul style="list-style-type: none"> Pressure tester 	59 - 98 kPa (0.6 - 1.0 kg/cm ² , 9 - 14 psi) (Limit)	See "System Check", "ENGINE COOLING SYSTEM", LC-28 .
ON*1	5	<ul style="list-style-type: none"> Coolant leaks 	<ul style="list-style-type: none"> Visual 	No leaks	See "System Check", "ENGINE COOLING SYSTEM", LC-29 .
ON*1	6	<ul style="list-style-type: none"> Thermostat 	<ul style="list-style-type: none"> Touch the upper and lower radiator hoses 	Both hoses should be hot	See "Thermostat" and "Radiator", "ENGINE COOLING SYSTEM", LC-31, LC-32 .
ON*1	7	<ul style="list-style-type: none"> Cooling fan (Crankshaft driven) 	<ul style="list-style-type: none"> Visual 	Operating	See LC-34 , "Cooling Fan".
OFF	8	<ul style="list-style-type: none"> Combustion gas leak 	<ul style="list-style-type: none"> Color checker chemical tester 4 Gas analyzer 	Negative	—
ON*2	9	<ul style="list-style-type: none"> Coolant temperature gauge 	<ul style="list-style-type: none"> Visual 	Gauge less than 3/4 when driving	—
		<ul style="list-style-type: none"> Coolant overflow to reservoir tank 	<ul style="list-style-type: none"> Visual 	No overflow during driving and idling	See "Changing Engine Coolant", "ENGINE MAINTENANCE", MA-28 .
OFF*3	10	<ul style="list-style-type: none"> Coolant return from reservoir tank to radiator 	<ul style="list-style-type: none"> Visual 	Should be initial level in reservoir tank	See "ENGINE MAINTENANCE", MA-26 .
OFF	11	<ul style="list-style-type: none"> Cylinder head 	<ul style="list-style-type: none"> Straight gauge feeler gauge 	0.1 mm (0.004 in) Maximum distortion (warping)	See "Inspection", "CYLINDER HEAD DISTORTION", EM-96 .
	12	<ul style="list-style-type: none"> Cylinder block and pistons 	<ul style="list-style-type: none"> Visual 	No scuffing on cylinder walls or piston	See "Inspection", "CYLINDER BLOCK DISTORTION AND WEAR", EM-117 .

*1: Engine running at 3,000 rpm for 10 minutes.

*2: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*3: After 60 minutes of cool down time.

For more information, refer to "Engine Cooling System", "OVERHEATING CAUSE ANALYSIS", **LC-35**.



Component Description

NGEC0818

The crankshaft position sensor (OBD) is located on the transmission housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet, core and coil.

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.

This sensor is not used to control the engine system.

It is used only for the on board diagnosis.

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ECM Terminals and Reference Value

NGEC0819

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 the ECM terminals, such as the ground.

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TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
47	L	Crankshaft position sensor (OBD)	<p>[Engine is running]</p> <ul style="list-style-type: none"> • Warm-up condition • Idle speed 	<p>1 - 2V (AC range)</p> <p>SEF690W</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> • Engine speed is 2,000 rpm 	<p>3 - 4V (AC range)</p> <p>SEF691W</p>

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On Board Diagnosis Logic

Malfunction is detected when a chipping of the flywheel or drive plate gear tooth (cog) is detected by the ECM. NGEC0820

POSSIBLE CAUSE

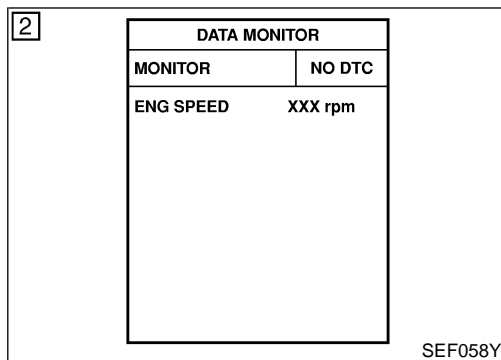
- Harness or connectors
- Crankshaft position sensor (OBD)
- Drive plate/Flywheel

NGEC0820S01

DTC Confirmation Procedure

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test. NGEC0821



Ⓜ With CONSULT-II

- 1) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
- 2) Start engine and run it for at least 2 minutes at idle speed.
- 3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1074.

Ⓜ With GST

Follow the procedure “With CONSULT-II”.

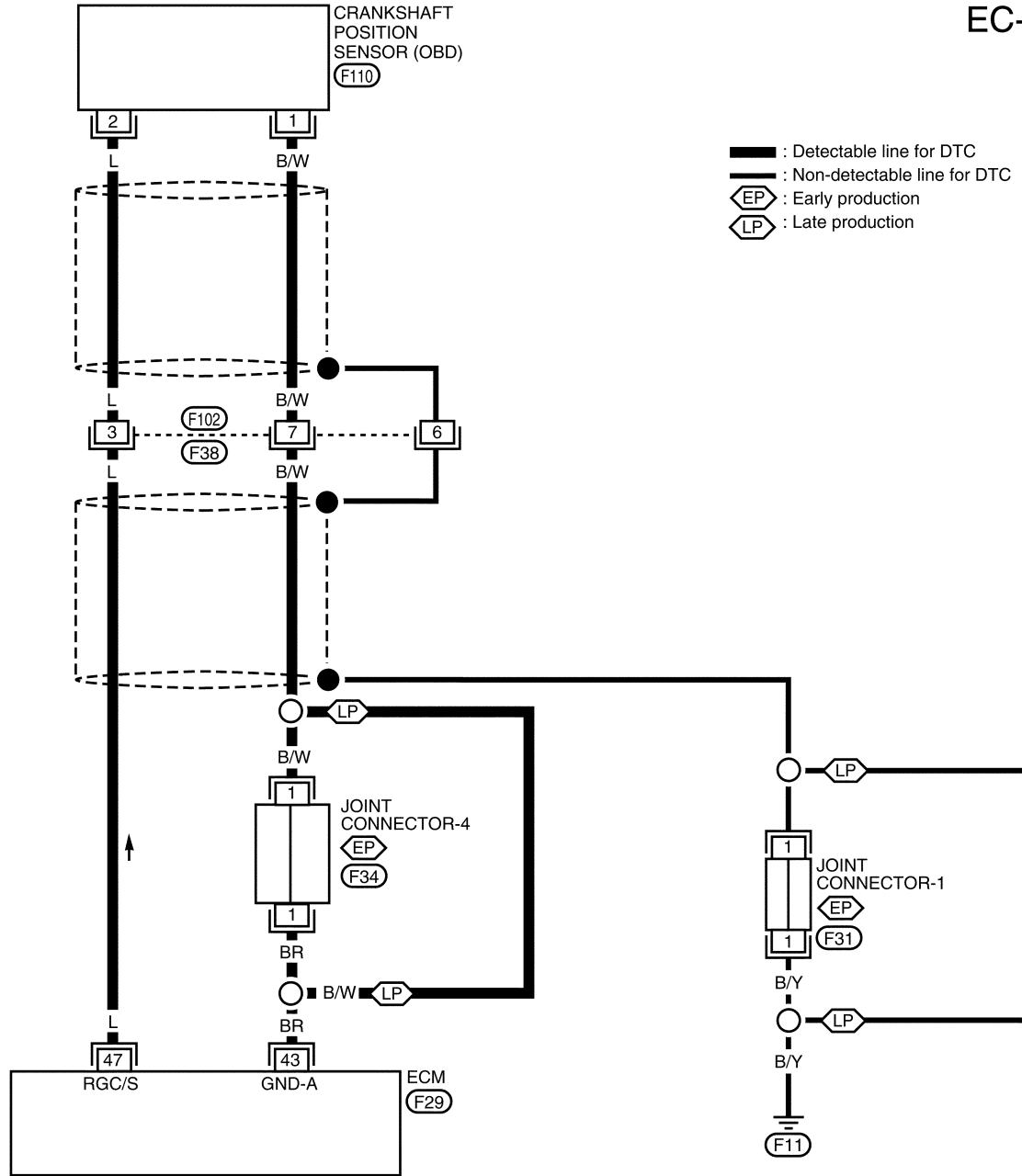
DTC P1336 CKP SENSOR (OBD)

VG33E
Wiring Diagram

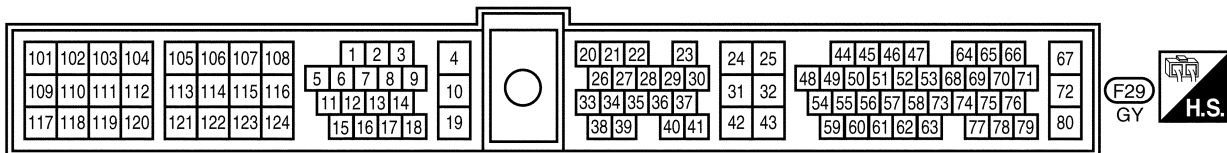
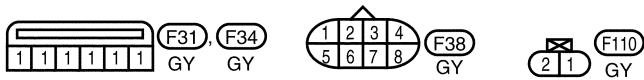
Wiring Diagram

NGEC0822

EC-CKPS-01



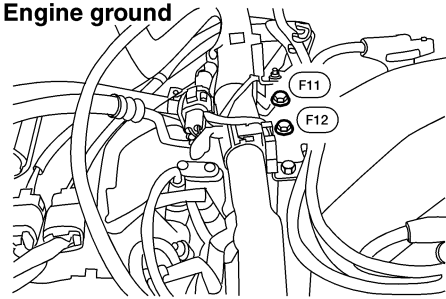
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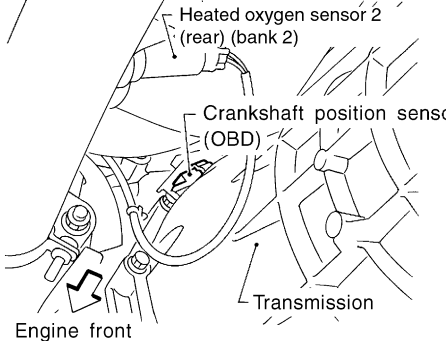


WEC179A

Diagnostic Procedure

NGEC0823

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p> <div style="text-align: center;">  <p>Engine ground</p> </div> <p style="text-align: right;">LEC518</p>	
<p>▶ GO TO 2.</p>	

2	CHECK CKPS (OBD) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT						
<p>1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.</p> <div style="text-align: center;">  </div> <p style="text-align: right;">WEC549</p> <p>2. Check continuity between ECM terminal 47 and sensor terminal 2. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>							
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 4.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 3.</td> </tr> </table>		OK	▶	GO TO 4.	NG	▶	GO TO 3.
OK	▶	GO TO 4.					
NG	▶	GO TO 3.					

3	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Harness for open or short between ECM and crankshaft position sensor (OBD) 	
<p>▶ Repair open circuit or short to ground or short to power in harness or connectors.</p>	

DTC P1336 CKP SENSOR (OBD)

VG33E

Diagnostic Procedure (Cont'd)

4 CHECK CKPS (OBD) GROUND CIRCUIT FOR OPEN AND SHORT		
1. Reconnect ECM harness connectors. 2. Check harness continuity between CKPS (OBD) terminal 1 and engine 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. <ul style="list-style-type: none">● Harness connectors F38, F102● Joint connector-4 (if equipped)● Harness for open between crankshaft position sensor (OBD) and ECM		
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

6 CHECK IMPROPER INSTALLATION		
1. Loosen and retighten the fixing bolt of the crankshaft position sensor (OBD). 2. Perform "DTC Confirmation Procedure", EC-1072 again.		
Is a 1st trip DTC P1336 detected?		
Yes	▶	GO TO 7.
No	▶	INSPECTION END

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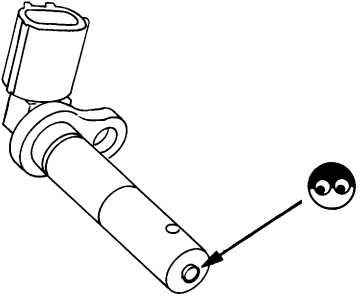
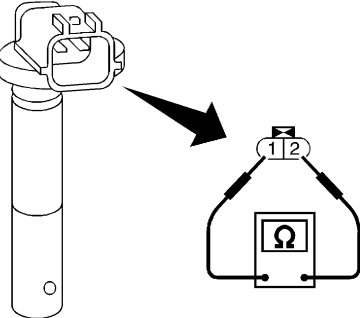
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7	CHECK CRANKSHAFT POSITION SENSOR (OBD)	<ol style="list-style-type: none"> 1. Disconnect crankshaft position sensor (OBD) harness connector. 2. Loosen the fixing bolt of the sensor. 3. Remove the sensor. 4. Visually check the sensor for chipping. 	
			
		SEF960N	
		<ol style="list-style-type: none"> 5. Check resistance as shown in the figure. 	
			
		SEF504V	
		<p>Resistance: Approximately 512 - 632Ω [at 20°C (68°F)]</p> <p>OK or NG</p>	
OK	▶	GO TO 8.	
NG	▶	Replace crankshaft position sensor (OBD).	

8	CHECK CKPS (OBD) SHIELD CIRCUIT FOR OPEN AND SHORT	<ol style="list-style-type: none"> 1. Disconnect harness connectors F38, F102. 2. Check harness continuity between harness connector F38 terminal 6 and engine ground. Continuity should exist. 3. Also check harness for short to power. 	
		OK or NG	
OK	▶	GO TO 10.	
NG	▶	GO TO 9.	

9	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Joint connector-1 (if equipped) ● Harness for open between harness connector F38 and engine ground 	
		▶	Repair open circuit or short to power in harness or connectors.

DTC P1336 CKP SENSOR (OBD)

VG33E

Diagnostic Procedure (Cont'd)

10	CHECK GEAR TOOTH
Visually check for chipping flywheel or drive plate gear tooth (cog).	
OK or NG	
OK	▶ GO TO 11.
NG	▶ Replace the flywheel or drive plate.

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11	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.	
	▶ INSPECTION END

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On Board Diagnosis Logic

NGEC1048

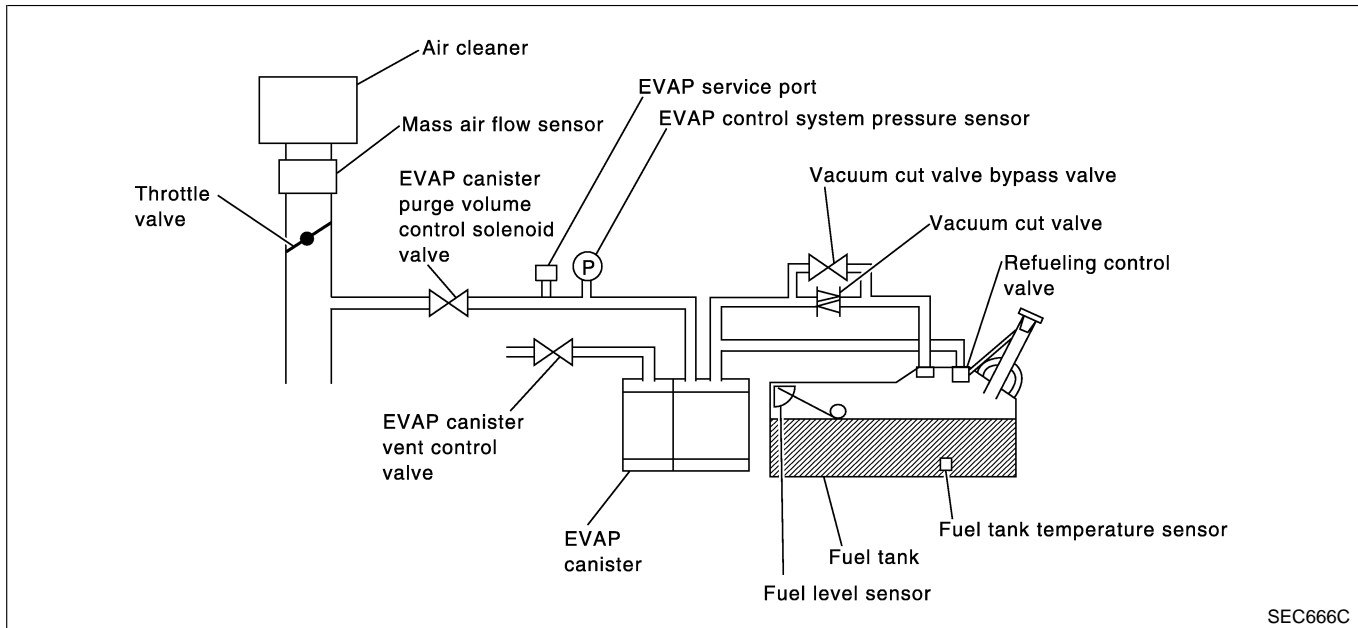
NOTE:

If DTC P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1099.)

This diagnosis detects leaks in the EVAP purge line using of vapor pressure in the fuel tank.

The EVAP canister vent control valve is closed to shut the EVAP purge line. The vacuum cut valve bypass valve will then be opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP control system pressure sensor can now monitor the pressure inside the fuel tank.

If pressure increases, the PCM will check for leaks in the line between the vacuum cut valve and EVAP canister purge volume control solenoid valve.



SEC666C

Malfunction is detected when EVAP control system has a leak, EVAP control system does not operate properly.

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

POSSIBLE CAUSE

NGEC1048S02

- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close
- Foreign matter caught in fuel filler cap
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve
- Foreign matter caught in EVAP canister vent control valve
- EVAP canister
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent

DTC P1442 EVAP CONTROL SYSTEM

VG33E

On Board Diagnosis Logic (Cont'd)

- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve
- Absolute pressure sensor
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged
- Water separator
- EVAP canister is saturated with water
- Fuel level sensor and the circuit
- EVAP control system pressure sensor
- Refueling control valve
- ORVR system leaks
- Foreign matter caught in EVAP canister purge volume control solenoid valve

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DTC Confirmation Procedure

Refer to "P0456, P1456 EVAP CONTROL SYSTEM (VERY SMALL LEAK) (NEGATIVE PRESSURE)", EC-976.

NGEC1050

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Diagnostic Procedure

Refer to "P0456, P1456 EVAP CONTROL SYSTEM (VERY SMALL LEAK) (NEGATIVE PRESSURE)", EC-976.

NGEC1051

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DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33E

Description

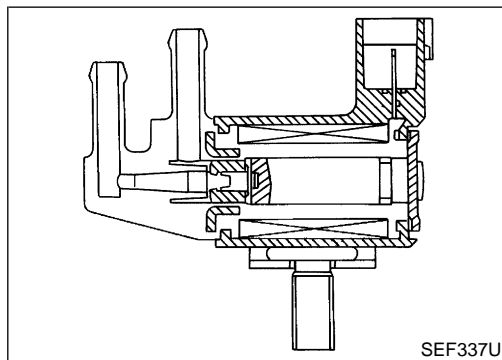
Description SYSTEM DESCRIPTION

NGEC0845

NGEC0845S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	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		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Throttle position switch	Closed throttle position		
Heated oxygen sensors 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.



COMPONENT DESCRIPTION

NGEC0845S02

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

NGEC0846

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
PURG VOL C/V	Idle (Vehicle stopped)	0%
	2,000 rpm	—

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33E

ECM Terminals and Reference Value

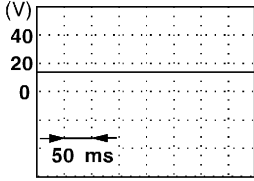
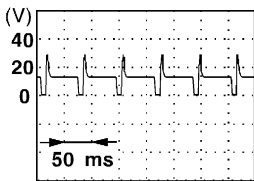
ECM Terminals and Reference Value

NGEC0847

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 the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self shut-off)	[Engine is running] [Ignition switch OFF] ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch OFF] ● A few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
5	R/Y	EVAP canister purge volume control solenoid valve	[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF994U
			[Engine is running] ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  SEF995U
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0848

Malfunction is detected when the canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.

POSSIBLE CAUSE

NGEC0848S01

- EVAP control system pressure sensor
- EVAP canister purge volume control solenoid valve (The valve is stuck open.)
- EVAP canister vent control valve
- EVAP canister

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33E

DTC Confirmation Procedure

- Hoses
(Hoses are connected incorrectly or clogged.)

DTC Confirmation Procedure

NGEC0849

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

6	PURG VOL CN/V P1444					
	OUT OF CONDITION					
	MONITOR					
	<table border="1"> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td>B/FUEL SCHDL</td> <td>XXX msec</td> </tr> </table>	ENG SPEED	XXX rpm	THRTL POS SEN	XXX V	B/FUEL SCHDL
ENG SPEED	XXX rpm					
THRTL POS SEN	XXX V					
B/FUEL SCHDL	XXX msec					

SEF205Y

6	PURG VOL CN/V P1444					
	TESTING					
	MONITOR					
	<table border="1"> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td>B/FUEL SCHDL</td> <td>XXX msec</td> </tr> </table>	ENG SPEED	XXX rpm	THRTL POS SEN	XXX V	B/FUEL SCHDL
ENG SPEED	XXX rpm					
THRTL POS SEN	XXX V					
B/FUEL SCHDL	XXX msec					

SEF206Y

6	PURG VOL CN/V P1444
	COMPLETED

SEF237Y

Ⓜ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select “PURG VOL CN/V P1444” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
- 5) Touch “START”.
- 6) Start engine and let it idle until “TESTING” on CONSULT-II changes to “COMPLETED”. (It will take for approximately 10 seconds.)

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

- 7) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to “Diagnostic Procedure”, EC-1084.

Ⓜ With GST

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Start engine and let it idle for at least 20 seconds.
- 4) Select “MODE 7” with GST.
- 5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1084.

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

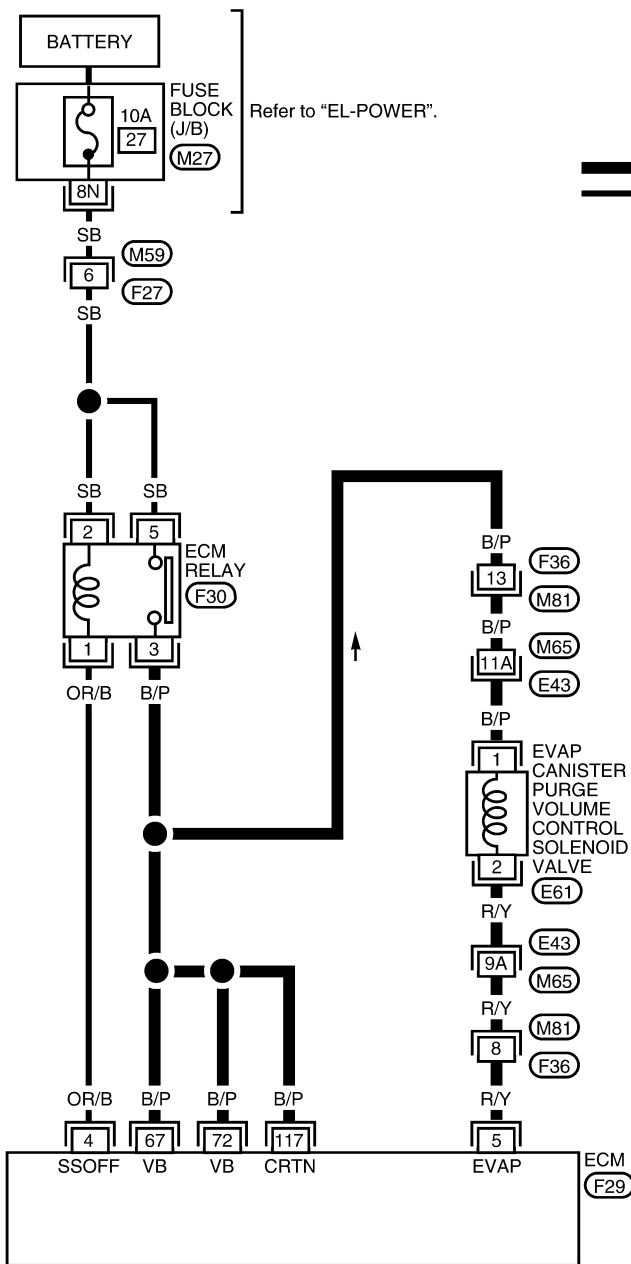
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Wiring Diagram

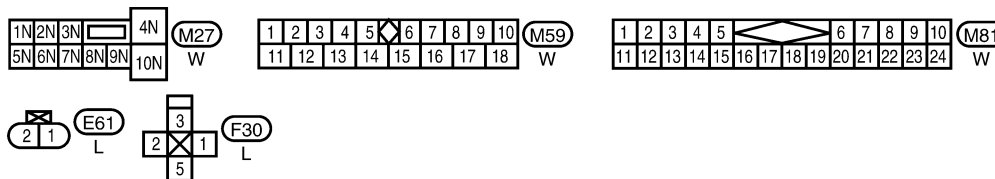
Wiring Diagram

NGEC0850

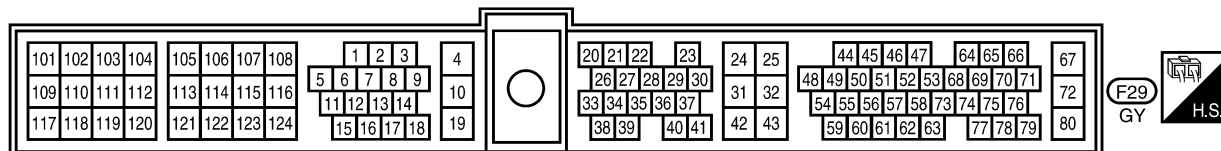
EC-PGC/V-01



: Detectable line for DTC
 : Non-detectable line for DTC



Refer to the following.
 (M65, E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



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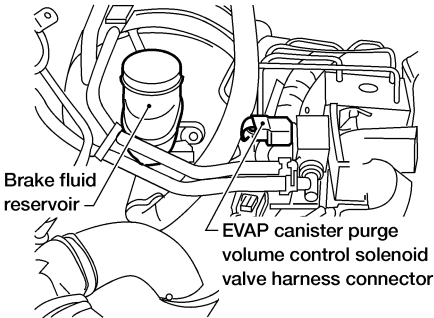
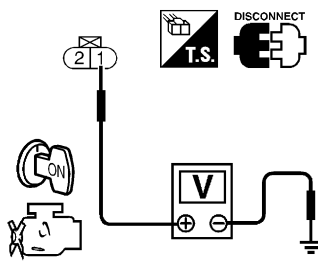
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33E

Diagnostic Procedure

Diagnostic Procedure

NGEC0851

1	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT
<p>1. Turn ignition switch OFF. 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.</p> <div style="text-align: center;">  <p>Brake fluid reservoir</p> <p>EVAP canister purge volume control solenoid valve harness connector</p> </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 1 and engine ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p>Voltage: Battery voltage</p> <p>OK or NG</p> </div>	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

AEC652A

SEF646W

2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F36, M81 ● Harness connectors M65, E43 ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay ● 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
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 5 and solenoid valve terminal 2. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

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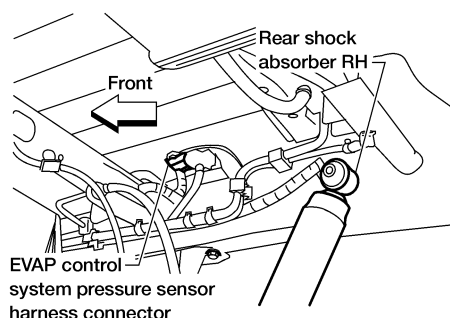
Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART		
Check the following. <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M81, F36 ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM 			
		▶	Repair open circuit or short to ground or short to power in harness or connectors.

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5	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE		
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.			
OK or NG			
OK		▶	GO TO 6.
NG		▶	Repair it.

EM
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6	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR		
1. Disconnect EVAP control system pressure sensor harness connector.			
			
AEC651A			
2. Check connectors for water. Water should not exist.			
OK or NG			
OK		▶	GO TO 7.
NG		▶	Replace EVAP control system pressure sensor.

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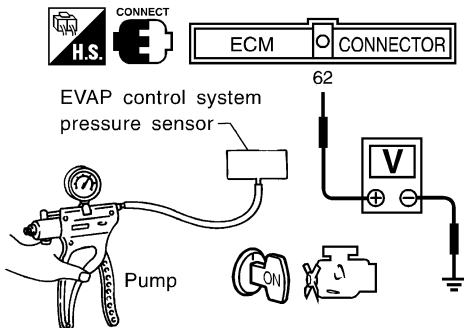
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33E

Diagnostic Procedure (Cont'd)

7 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch ON.
4. Use pump to apply vacuum to EVAP control system pressure sensor as shown in figure.
5. Check input voltage between ECM terminal 62 and ground.



Applied vacuum	Voltage V
Not applied	1.8 - 4.8
-26.7 kPa (-200 mmHg, -7.87 inHg)	1.0 to 1.4V lower than above value

SEC649C

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.
- Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5m (19.7in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK (with CONSULT-II) ▶	GO TO 8.
OK (without CONSULT-II) ▶	GO TO 9.
NG ▶	Replace EVAP control system pressure sensor.

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33E

Diagnostic Procedure (Cont'd)

8 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

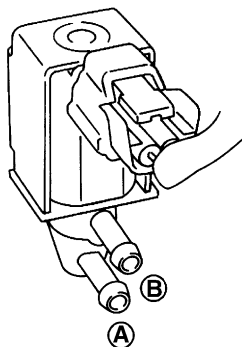
With CONSULT-II

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

If OK, inspection end. If NG, go to following step.

3. Check air passage continuity.



Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

If NG, replace the EVAP canister purge volume control solenoid valve.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

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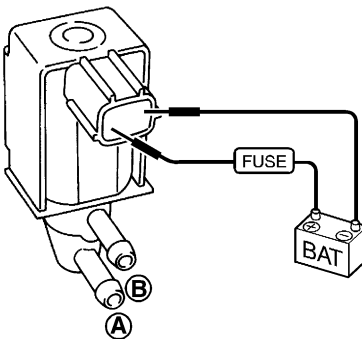
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33E

Diagnostic Procedure (Cont'd)

9 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

 **Without CONSULT-II**
Check air passage continuity.



SEF661U

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

MTBL0242

If NG, replace the EVAP canister purge volume control solenoid valve.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33E

Diagnostic Procedure (Cont'd)

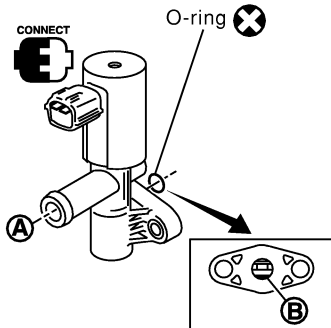
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10 CHECK EVAP CANISTER VENT CONTROL VALVE

Check air passage continuity.

With CONSULT-II

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

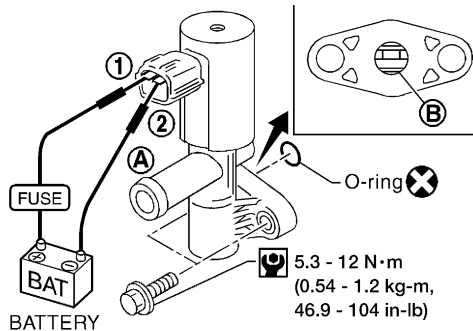
SEF991Y

Without CONSULT-II

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.



AEC783A

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP canister vent control valve.

11 CHECK RUBBER TUBE

Check for obstructed rubber tube connected to EVAP canister vent control valve.

OK or NG

OK	▶	GO TO 12.
NG	▶	Clean, repair or replace rubber tube.

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33E

Diagnostic Procedure (Cont'd)

12	CHECK WATER SEPARATOR						
<p>1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged.</p> <div style="text-align: center;"> <p style="font-size: small;">* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p> </div> <p style="text-align: right; font-size: x-small;">SEF829T</p> <p>5. In case of NG in items 2 - 4, replace the parts. NOTE: ● Do not disassemble water separator.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 13.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace water separator.</td> </tr> </table>		OK	▶	GO TO 13.	NG	▶	Replace water separator.
OK	▶	GO TO 13.					
NG	▶	Replace water separator.					

13	CHECK IF EVAP CANISTER SATURATED WITH WATER						
<p>1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister.</p> <div style="text-align: center;"> <p style="font-size: small;">Water</p> <p style="font-size: small;">EVAP canister vent control valve</p> </div> <p style="text-align: right; font-size: x-small;">SEF596U</p> <p style="text-align: center;">Yes or No</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Yes</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 14.</td> </tr> <tr> <td>No</td> <td style="text-align: center;">▶</td> <td>GO TO 16.</td> </tr> </table>		Yes	▶	GO TO 14.	No	▶	GO TO 16.
Yes	▶	GO TO 14.					
No	▶	GO TO 16.					

14	CHECK EVAP CANISTER						
<p>Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 16.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 15.</td> </tr> </table>		OK	▶	GO TO 16.	NG	▶	GO TO 15.
OK	▶	GO TO 16.					
NG	▶	GO TO 15.					

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33E

Diagnostic Procedure (Cont'd)

15	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● EVAP canister for damage● EVAP hose between EVAP canister and water separator for clogging or poor connection	
▶	Repair hose or replace EVAP canister.
16	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.	
▶	INSPECTION END

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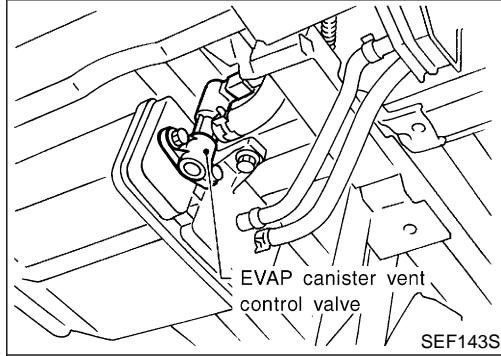
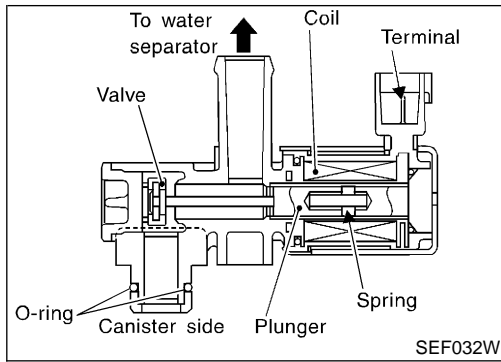
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Component Description



Component Description

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent. NGEC0852

This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values. NGEC0853

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. NGEC0854

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

Malfunction is detected when EVAP canister vent control valve remains closed under specified driving conditions. =NGEC0855

POSSIBLE CAUSE

- EVAP canister vent control valve NGEC0855S01
- EVAP control system pressure sensor and the circuit
- Blocked rubber tube to EVAP canister vent control valve
- Water separator
- EVAP canister is saturated with water.

4

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

SEF201Y

DTC Confirmation Procedure

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 5 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.
- 4) Drive vehicle at a speed of approximately 80 km/h (50 MPH) for a maximum of 15 minutes.

NOTE:

If a malfunction exists, NG result may be displayed quicker.

- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1095.

With GST

Follow the procedure "With CONSULT-II".

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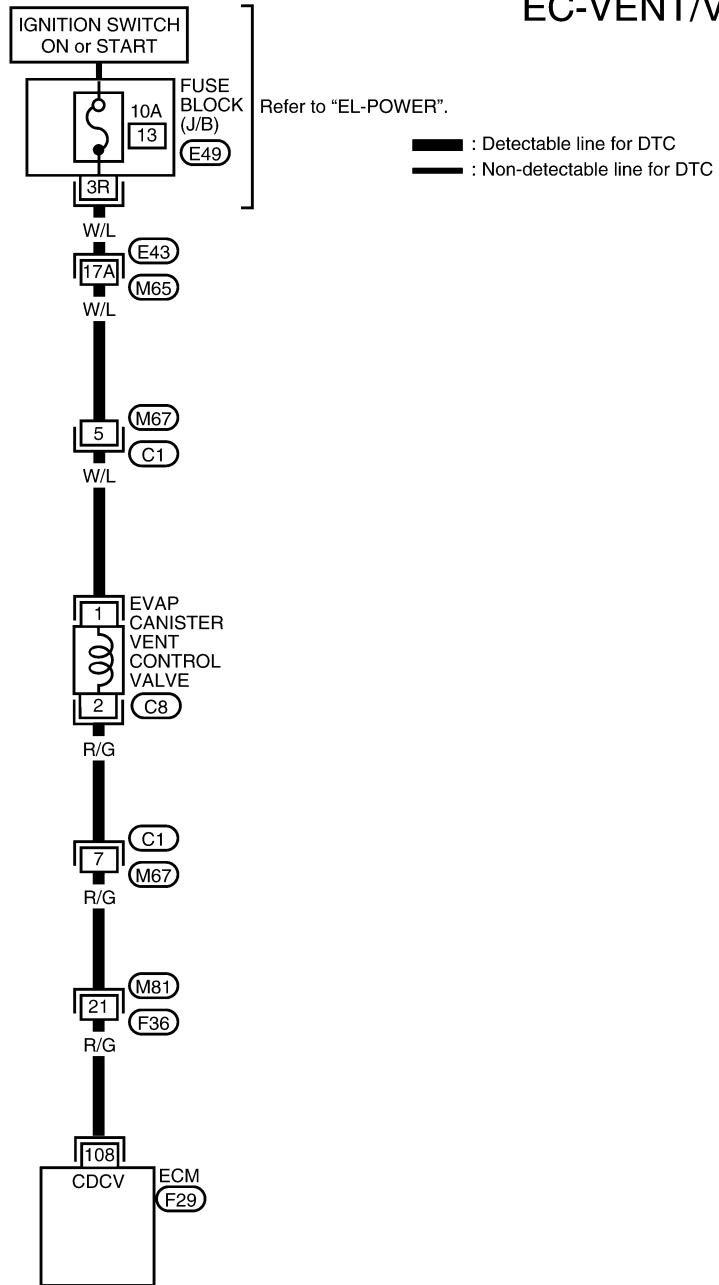
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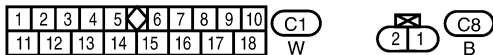
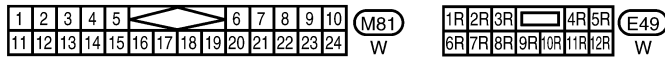
Wiring Diagram

NGEC0857

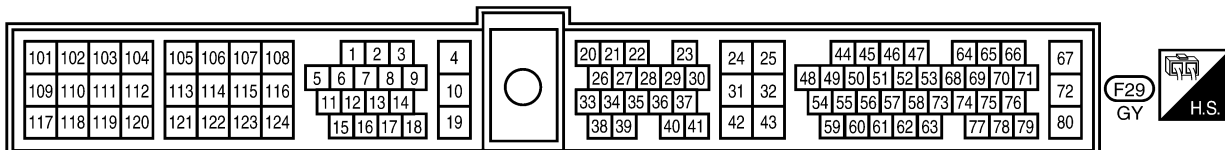
EC-VENT/V-01



Refer to "EL-POWER".
— : Detectable line for DTC
— : Non-detectable line for DTC

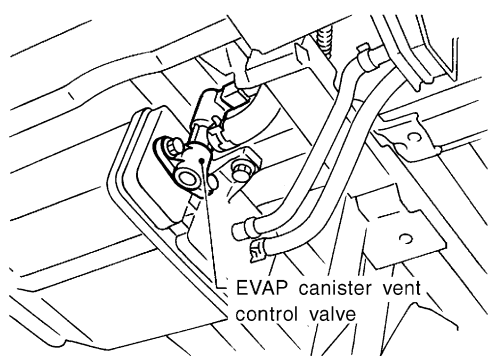


Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)

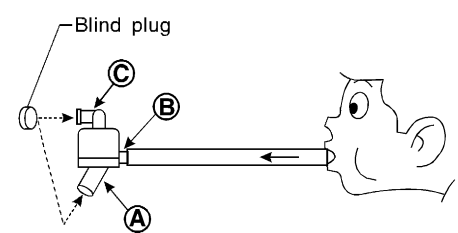


Diagnostic Procedure

NGEC0858

1	CHECK RUBBER TUBE	<p>1. Turn ignition switch OFF. 2. Check obstructed rubber tube connected to EVAP canister vent control valve.</p> <div style="text-align: center;">  <p>EVAP canister vent control valve</p> </div> <p style="text-align: right;">SEF143S</p>	
OK or NG			
OK	▶	GO TO 2.	
NG	▶	Clean, repair or replace rubber tube.	

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2	CHECK WATER SEPARATOR	<p>1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged.</p> <div style="text-align: center;">  <p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p> </div> <p style="text-align: right;">SEF829T</p>	
OK or NG			
OK	▶	GO TO 3.	
NG	▶	Replace water separator.	

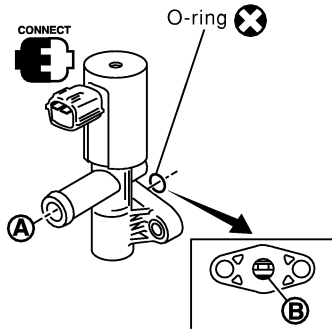
5. In case of NG in items 2 - 4, replace the parts.
NOTE:
● Do not disassemble water separator.

3 CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

Check air passage continuity.

With CONSULT-II

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

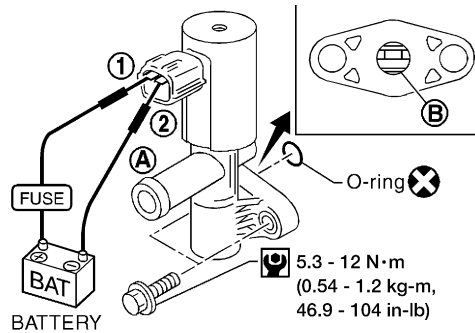
SEF991Y

Without CONSULT-II

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.

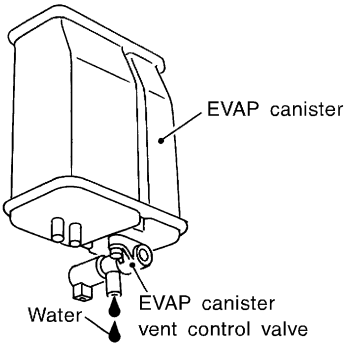


AEC783A

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace EVAP canister vent control valve and O-ring.

4	CHECK IF EVAP CANISTER SATURATED WITH WATER	
1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister.		
		
SEF596U		
Yes or No		
Yes	▶	GO TO 5.
No	▶	GO TO 7.

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5	CHECK EVAP CANISTER	
Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).		
OK or NG		
OK	▶	GO TO 7.
NG	▶	GO TO 6.

MT
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6	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 		
▶		Repair hose or replace EVAP canister.

PD
AX

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7	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Repair it.

BR
ST

RS

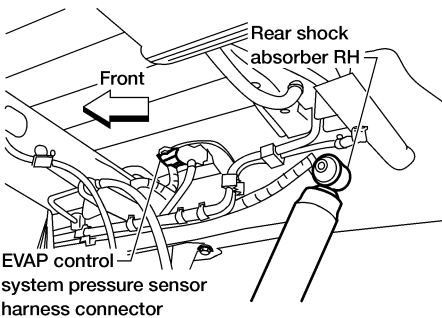
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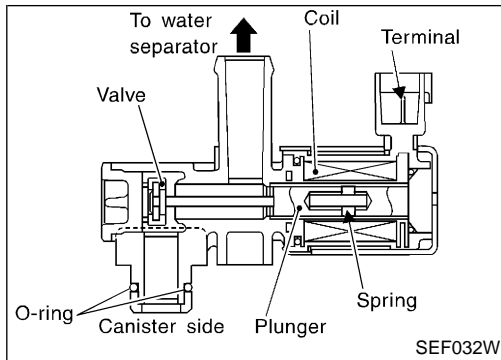
IDX

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR	
<p>1. Disconnect EVAP control system pressure sensor harness connector.</p> <div style="text-align: center;">  </div>		
<p>2. Check connectors for water. Water should not exist.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 9.
NG	▶	Replace EVAP control system pressure sensor.

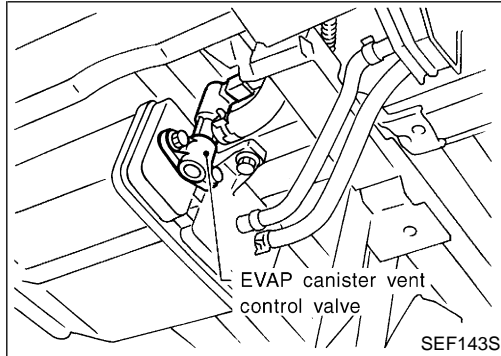
AEC651A

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION	
<p>Refer to "DTC Confirmation Procedure" for DTC P0452, P0453, EC-953.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor.

10	CHECK INTERMITTENT INCIDENT	
<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.</p>		
▶		INSPECTION END



SEF032W



SEF143S

Component Description

NGEC0864

NOTE:

If DTC P1448 is displayed with P0442, perform trouble diagnosis for DTC P1448 first.

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

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CONSULT-II Reference Value in Data Monitor Mode

NGEC0865

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

TF

PD

ECM Terminals and Reference Value

NGEC0866

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 the ECM terminals, such as the ground.

AX

SU

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)

BR

ST

RS

On Board Diagnosis Logic

NGEC0867

Malfunction is detected when EVAP canister vent control valve remains opened under specified driving conditions.

BT

HA

POSSIBLE CAUSE

NGEC0867S01

- EVAP canister vent control valve
- EVAP control system pressure sensor and circuit
- Blocked rubber tube to EVAP canister vent control valve
- Water separator
- EVAP canister is saturated with water.
- Vacuum cut valve

SC

EL

IDX

DTC Confirmation Procedure

NGEC0868

NOTE:

- If DTC P1448 is displayed with P0442, perform trouble diagnosis for DTC P1448 first.
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

EVAP SML LEAK P0442/P1442

1)FOR BEST RSLT,PERFORM AT FOLLOWING CONDITIONS.
 -FUEL LEVEL: 1/4-3/4
 -AMBIENT TEMP: 0-30 C(32-86F)
 -OPEN ENGINE HOOD.
 2)START ENG WITH VHCL STOPPED. IF ENG IS ON,STOP FOR 5 SEC. THEN RESTART.
 3)TOUCH START.

SEC716C

EVAP SML LEAK P0442/P1442

WAIT
2 TO 10 MINUTES.
KEEP ENGINE RUNNING
AT IDLE SPEED.

SEC717C

EVAP SML LEAK P0442/P1442

MAINTAIN
1600 - 2100 RPM UNTIL FINAL
RESULT APPEARS.
(APPROX. 3 MINUTES)

1600 rpm 1850 rpm 2100 rpm

SEC718C

ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

CONNECT O-ring

SEF013Z

With CONSULT-II

TESTING CONDITION:

- Perform “DTC WORK SUPPORT” when the fuel level is less than 3/4 full and vehicle is placed on flat level surface.
 - Always perform test at a temperature of 0 to 30°C (32 to 86°F).
 - It is better that the fuel level is low.
- 1) Turn ignition switch ON.
 - 2) Turn ignition switch OFF and wait at least 5 seconds.
 - 3) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
 - 4) Make sure that the following conditions are met.

COOLAN TEMP/S	0 - 32°C (32 - 90°F)
INT/A TEMP SE	More than 0°C (32°F)

- 5) Select “EVAP SML LEAK P0442” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II. Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to “Basic Inspection”, EC-701.

- 6) Make sure that “OK” is displayed.
If “NG” is displayed, go to the following step.

NOTE:

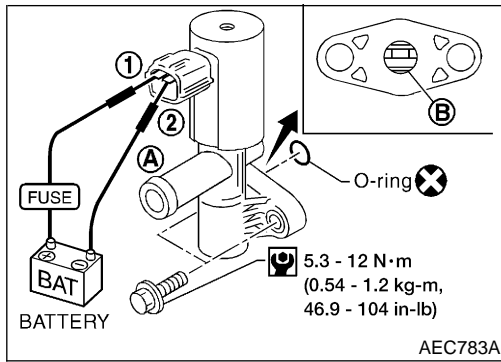
Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

- 7) Stop engine and wait at least 5 seconds, then turn ON.
- 8) Disconnect hose from water separator.
- 9) Select “VENT CONTROL/V” of “ACTIVE TEST” mode with CONSULT-II.
- 10) Touch ON and OFF alternately.

- 11) Make sure the following.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

If the result is NG, go to “Diagnostic Procedure”, EC-1103.
If the result is OK, go to “Diagnostic Procedure” for DTC P0442, EC-925.



Overall Function Check

NGEC0869

Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Disconnect hose from water separator.
- 2) Disconnect EVAP canister vent control valve harness connector.
- 3) Verify the following.

Condition	Air passage continuity
12V direct current supply between terminals 1 and 2	No
No supply	Yes

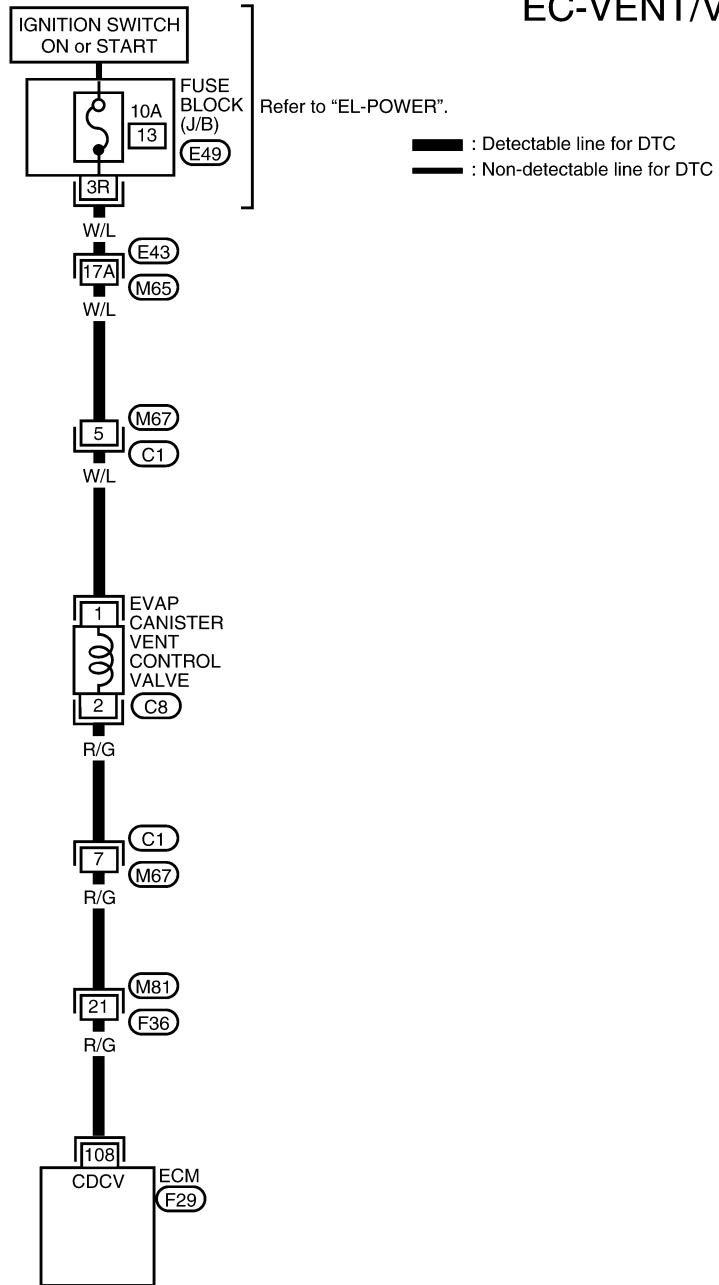
If the result is NG, go to “Diagnostic Procedure”, EC-1103.
 If the result is OK, go to “Diagnostic Procedure” for DTC P0442, EC-925.

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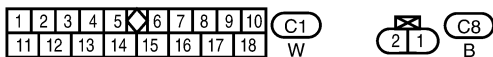
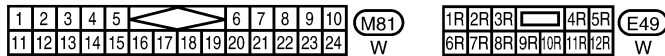
Wiring Diagram

NGEC0870

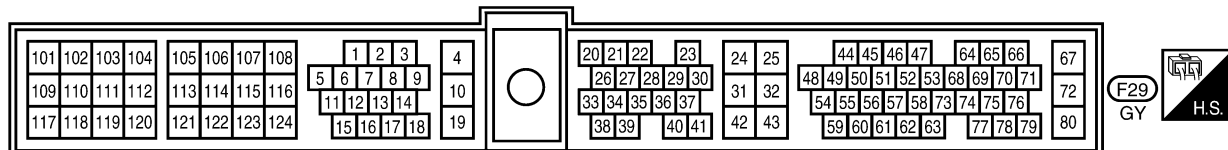
EC-VENT/V-01



Refer to "EL-POWER".
— : Detectable line for DTC
— : Non-detectable line for DTC

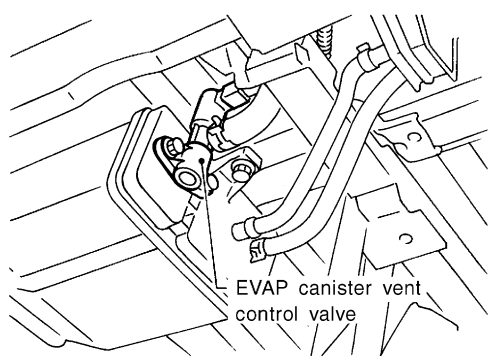


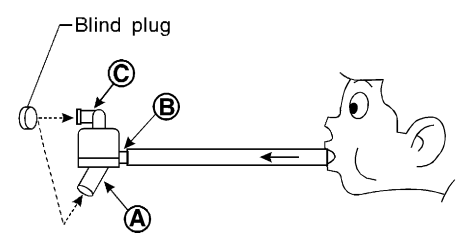
Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



Diagnostic Procedure

NGEC0871

1	CHECK RUBBER TUBE	<p>1. Turn ignition switch OFF.</p> <p>2. Check obstructed rubber tube connected to EVAP canister vent control valve.</p> <div style="text-align: center;">  <p>EVAP canister vent control valve</p> </div> <p style="text-align: right;">SEF143S</p> <p style="text-align: center;">OK or NG</p>		GI	MA	EM	LC	EC	FE	CL
	OK	▶	GO TO 2.							
	NG	▶	Clean, repair or replace rubber tube.							

2	CHECK WATER SEPARATOR	<p>1. Check visually for insect nests in the water separator air inlet.</p> <p>2. Check visually for cracks or flaws in the appearance.</p> <p>3. Check visually for cracks or flaws in the hose.</p> <p>4. Check that A and C are not clogged by blowing air into B with A, and then C plugged.</p> <div style="text-align: center;">  <p>Blind plug</p> </div> <p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p> <p style="text-align: right;">SEF829T</p> <p>5. In case of NG in items 2 - 4, replace the parts.</p> <p>NOTE:</p> <ul style="list-style-type: none"> Do not disassemble water separator. <p style="text-align: center;">OK or NG</p>		MT	AT	TF	PD	AX	SU	BR	ST
	OK	▶	GO TO 3.								
	NG	▶	Replace water separator.								

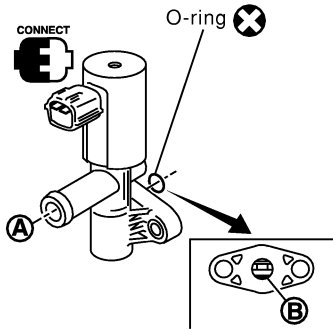
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3 CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

Check air passage continuity.

With CONSULT-II

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

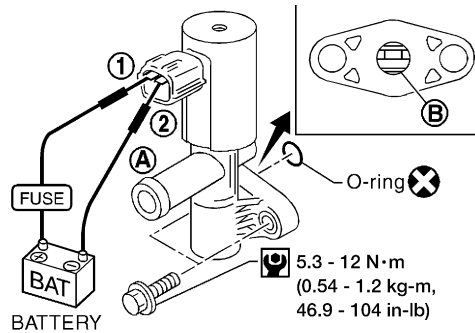
SEF991Y

Without CONSULT-II

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.



AEC783A

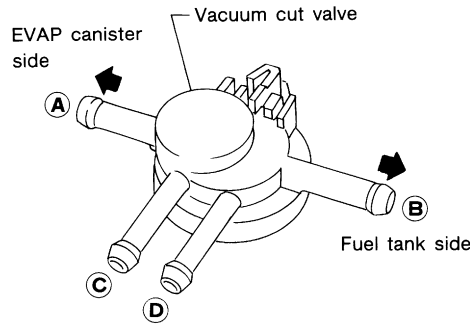
Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace EVAP canister vent control valve and O-ring.

4 CHECK VACUUM CUT VALVE

Check vacuum cut valve as follows:



SEF379Q

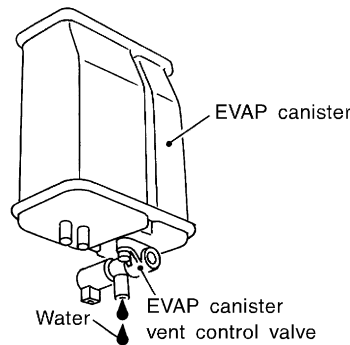
1. Plug port **C** and **D** with fingers.
2. Apply vacuum to port **A** and check that there is no suction from port **B**.
3. Apply vacuum to port **B** and check that there is suction from port **A**.
4. Blow air in port **B** and check that there is a resistance to flow out of port **A**.
5. Open port **C** and **D**.
6. Blow air in port **A** check that air flows freely out of port **C**.
7. Blow air in port **B** check that air flows freely out of port **D**.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace vacuum cut valve.

5 CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



SEF596U

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 8.

6 CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace the EVAP canister.

GI
MA
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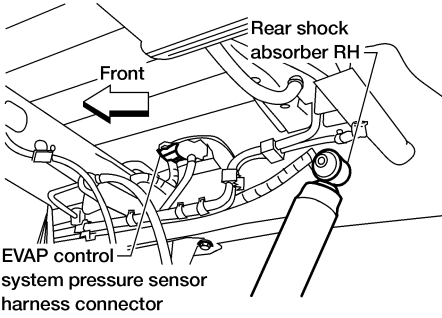
DTC P1448 EVAP CANISTER VENT CONTROL VALVE

VG33E

Diagnostic Procedure (Cont'd)

7	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 		
▶		Repair hose or replace EVAP canister.

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Repair it.

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR	
1. Disconnect EVAP control system pressure sensor harness connector.		
 <p style="text-align: center;">Rear shock absorber RH Front EVAP control system pressure sensor harness connector</p>		
AEC651A		
2. Check connectors for water. Water should not exist.		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor.

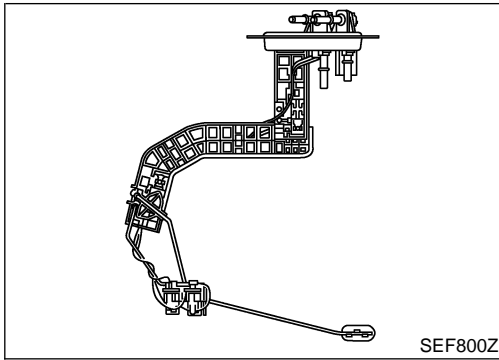
10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION	
Refer to "DTC Confirmation Procedure" for DTC P0452, P0453, EC-953.		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

11	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.		
▶		INSPECTION END

DTC P1464 FUEL LEVEL SENSOR

VG33E

Component Description



Component Description

The fuel level sensor is mounted in the fuel level sensor unit. ^{NGEC0994} The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

ECM Terminals and Reference Value

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

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	OR/B	Fuel level sensor	[Ignition switch "ON"]	Approximately 0 - 4.8V Output voltage varies with fuel level.
66	B	Fuel level sensor ground	[Engine is running] ● Idle speed	Approximately 0V

On Board Diagnosis Logic

ECM receives two signals from the fuel level sensor. One is fuel level sensor power supply circuit, and the other is fuel level sensor ground circuit.

This diagnosis indicates the latter to detect open circuit malfunction. Malfunction is detected when a high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

- Fuel level sensor circuit
(The fuel level sensor circuit is open or shorted.)

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

DTC P1464 FUEL LEVEL SENSOR

VG33E

DTC Confirmation Procedure (Cont'd)

3

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

WITH CONSULT-II

NGEC0997S01

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1110.

WITH GST

NGEC0997S02

Follow the procedure "WITH CONSULT-II" above.

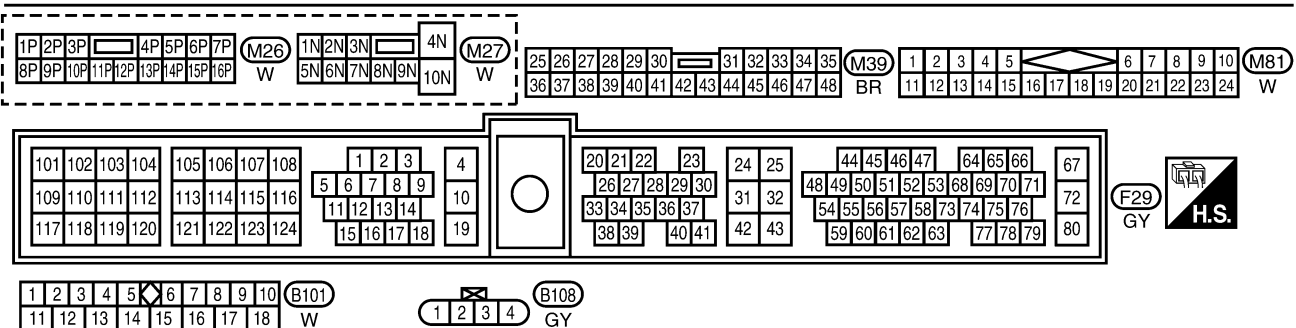
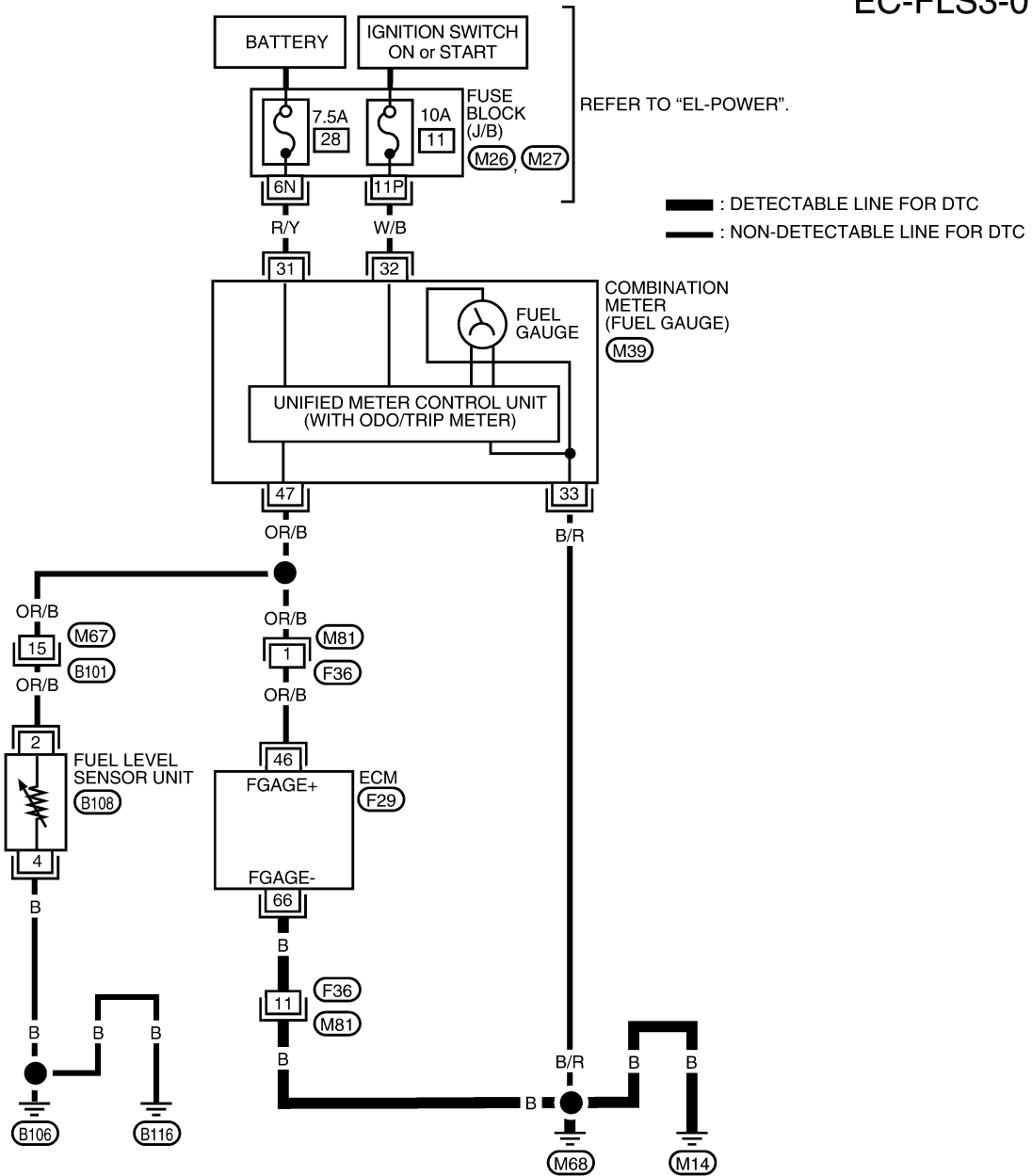
DTC P1464 FUEL LEVEL SENSOR

VG33E
Wiring Diagram

Wiring Diagram

NGEC0998

EC-FLS3-01



WEC998

GI
MA
EM
LC
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Diagnostic Procedure

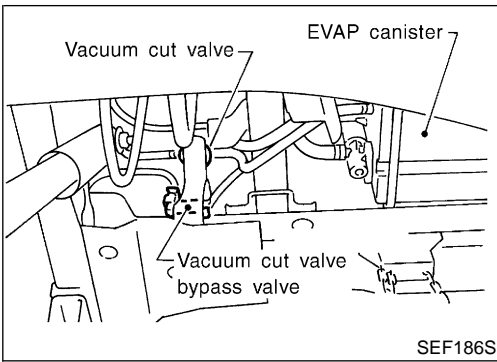
=NGEC0999

1	CHECK FUEL LEVEL 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 body 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	
1. Check the following. <ul style="list-style-type: none"> ● Harness connectors F36, M81 ● Harness for open and short between ECM and body ground 		
		▶
Replace open circuit or short to power in harness or connectors.		

3	CHECK FUEL LEVEL SENSOR	
Refer to EL-89 , "Fuel Level Sensor Unit Check".		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Replace fuel level sensor unit.

4	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739		
OK or NG		
		▶
INSPECTION END		



Description

COMPONENT DESCRIPTION

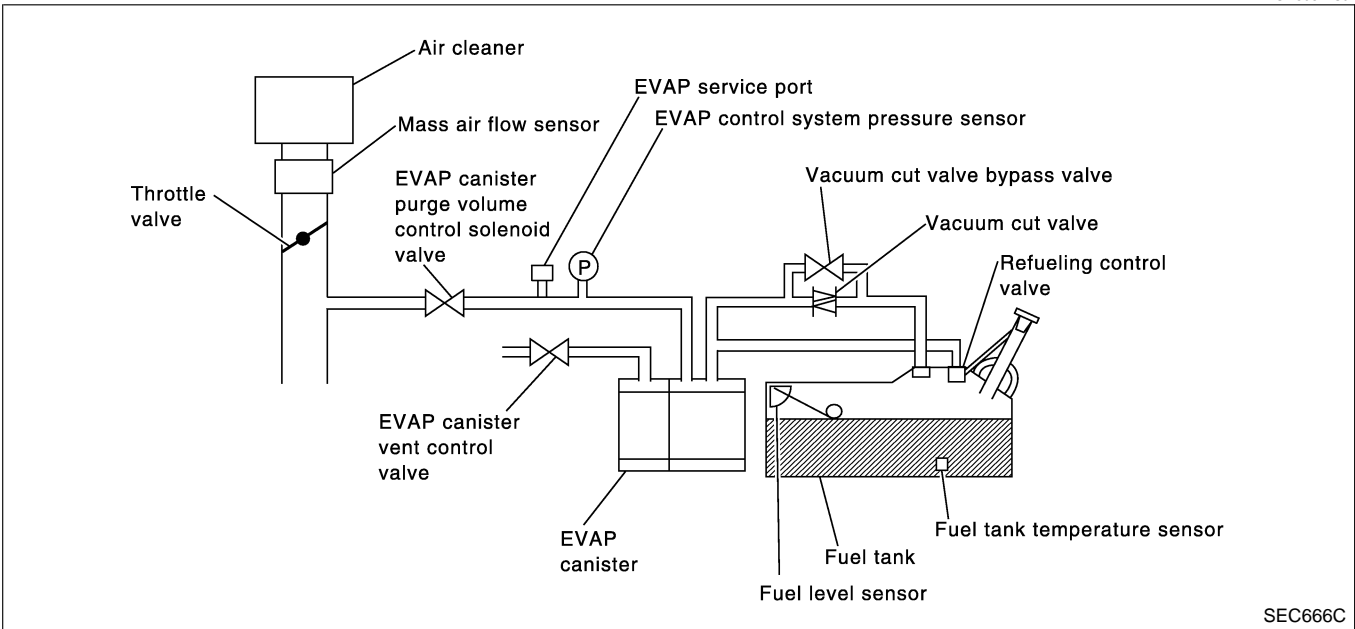
The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.

The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.

The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened. The vacuum cut valve is then bypassed to apply intake manifold vacuum to the fuel tank.

EVAPORATIVE EMISSION SYSTEM DIAGRAM



CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	● Ignition switch: ON	OFF

ECM Terminals and Reference Value

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

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
120	P/B	Vacuum cut valve bypass valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

Malfunction is detected when an improper voltage signal is sent to ECM through vacuum cut valve bypass valve. NGEC0875

POSSIBLE CAUSE

- Harness or connectors
(The vacuum cut valve bypass valve circuit is open or shorted.)
- Vacuum cut valve bypass valve

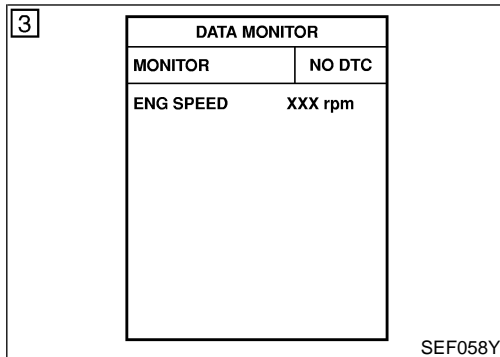
DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test. NGEC0876

TESTING CONDITION:

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



④ 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 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1114.

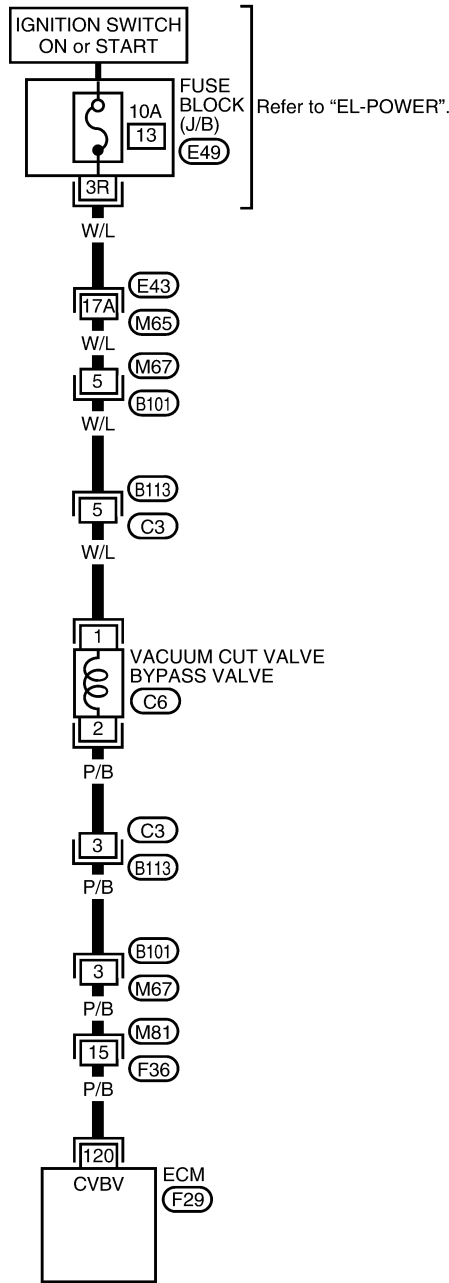
⑤ With GST

Follow the procedure "With CONSULT-II".

Wiring Diagram

NGEC0877

EC-BYPS/V-01



Refer to "EL-POWER".

: Detectable line for DTC
 : Non-detectable line for DTC

GI

MA

EM

LC

EC

FE

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MT

AT

TF

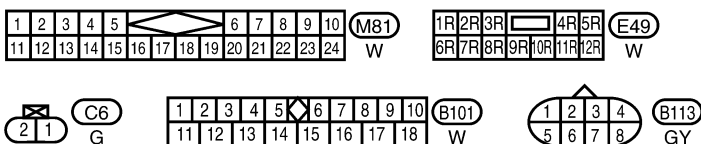
PD

AX

SU

BR

ST

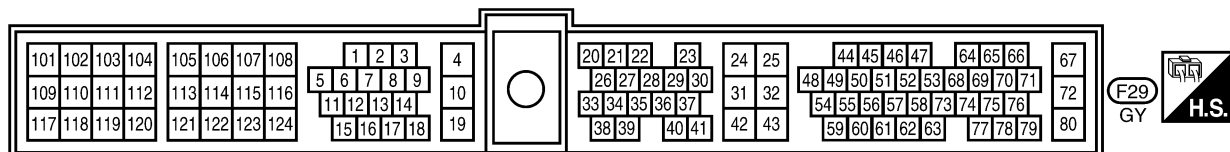


Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)

RS

BT

HA



SC

EL

LEC999

IDX

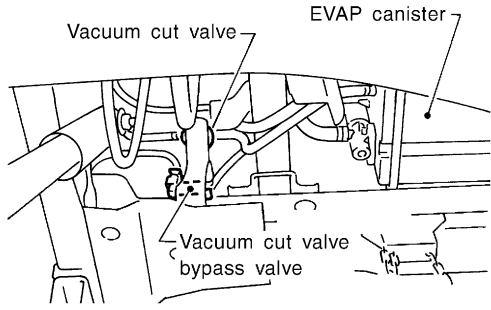
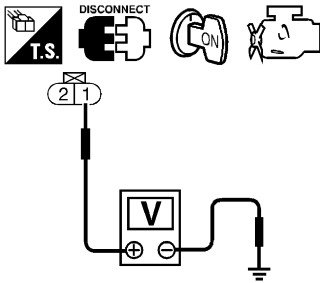
Diagnostic Procedure

NGEC0878

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK VACUUM CUT VALVE BYPASS VALVE CIRCUIT																					
<p> With CONSULT-II 1. Turn ignition switch OFF and then ON. 2. Select "VC/V BYPASS/V" in "ACTIVE TEST" mode with CONSULT-II. 3. Touch "ON/OFF" on CONSULT-II screen. </p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td style="width: 50%;">VC/V BYPASS/V</td> <td style="width: 50%;">OFF</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td>XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td>XXX %</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td>LEAN</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td>LEAN</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>			ACTIVE TEST		VC/V BYPASS/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V		
ACTIVE TEST																						
VC/V BYPASS/V	OFF																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
HO2S1 MNTR (B2)	LEAN																					
THRTL POS SEN	XXX V																					
<p>4. Make sure that clicking sound is heard from the vacuum cut valve bypass valve.</p>																						
OK or NG																						
OK	▶	GO TO 7.																				
NG	▶	GO TO 3.																				

SEF014Z

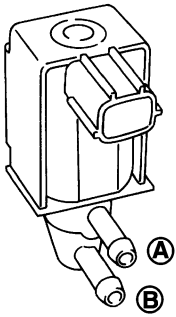
3	CHECK VACUUM CUT VALVE BYPASS VALVE POWER SUPPLY CIRCUIT	
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect vacuum cut valve bypass valve harness connector. 		
		
SEF186S		
<ol style="list-style-type: none"> 3. Turn ignition switch ON. 4. Check voltage between terminal 1 and ground with CONSULT-II or tester. 		
		
<p>Voltage: Battery voltage</p> <p>OK or NG</p>		
SEF659W		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

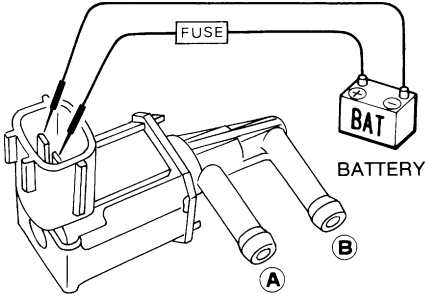
4	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M67, B101 and B113, C3 ● Fuse block (J/B) connector E49 ● 10A fuse ● Harness for open or short between vacuum cut valve bypass valve and fuse 	
▶ Repair harness or connectors.	

5	CHECK VACUUM CUT VALVE BYPASS VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 120 and valve terminal 2. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. 		
OK or NG		
OK	▶	GO TO 7.
NG	▶	GO TO 6.

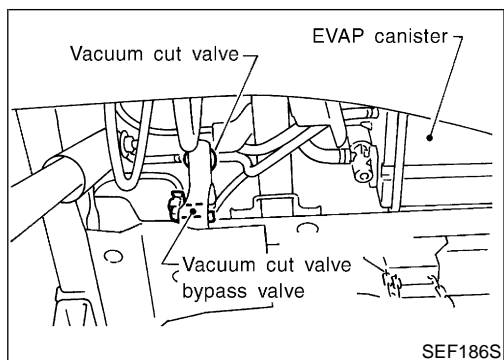
GI
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6	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors C3, B113 and B101, M67 ● Harness connectors M81, F36 ● Harness for open or short between vacuum cut valve bypass valve and ECM 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK VACUUM CUT VALVE BYPASS VALVE																								
(E) With CONSULT-II 1. Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode. 2. Check air passage continuity and operation delay time under the following conditions.																									
	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td>VC/V BYPASS/V</td> <td>OFF</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td>XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td>XXX %</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td>LEAN</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td>LEAN</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <th>Condition VC/V BYPASS/V</th> <th>Air passage continuity between A and B</th> </tr> <tr> <td>ON</td> <td>Yes</td> </tr> <tr> <td>OFF</td> <td>No</td> </tr> </table> <p style="text-align: center;">Operation takes less than 1 second.</p>	ACTIVE TEST		VC/V BYPASS/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V	Condition VC/V BYPASS/V	Air passage continuity between A and B	ON	Yes	OFF	No
ACTIVE TEST																									
VC/V BYPASS/V	OFF																								
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THRTL POS SEN	XXX V																								
Condition VC/V BYPASS/V	Air passage continuity between A and B																								
ON	Yes																								
OFF	No																								
SEF016Z																									

(X) Without CONSULT-II 1. Check air passage continuity and operation delay time under the following conditions.							
	SEF351Q						
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <th>Condition</th> <th>Air passage continuity between A and B</th> </tr> <tr> <td>12V direct current supply between terminals 1 and 2</td> <td>Yes</td> </tr> <tr> <td>No supply</td> <td>No</td> </tr> </table>		Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	Yes	No supply	No
Condition	Air passage continuity between A and B						
12V direct current supply between terminals 1 and 2	Yes						
No supply	No						
MTBL0242							
OK or NG							
OK	▶	GO TO 8.					
NG	▶	Replace vacuum cut valve bypass valve.					

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.	
▶	INSPECTION END



Description

COMPONENT DESCRIPTION

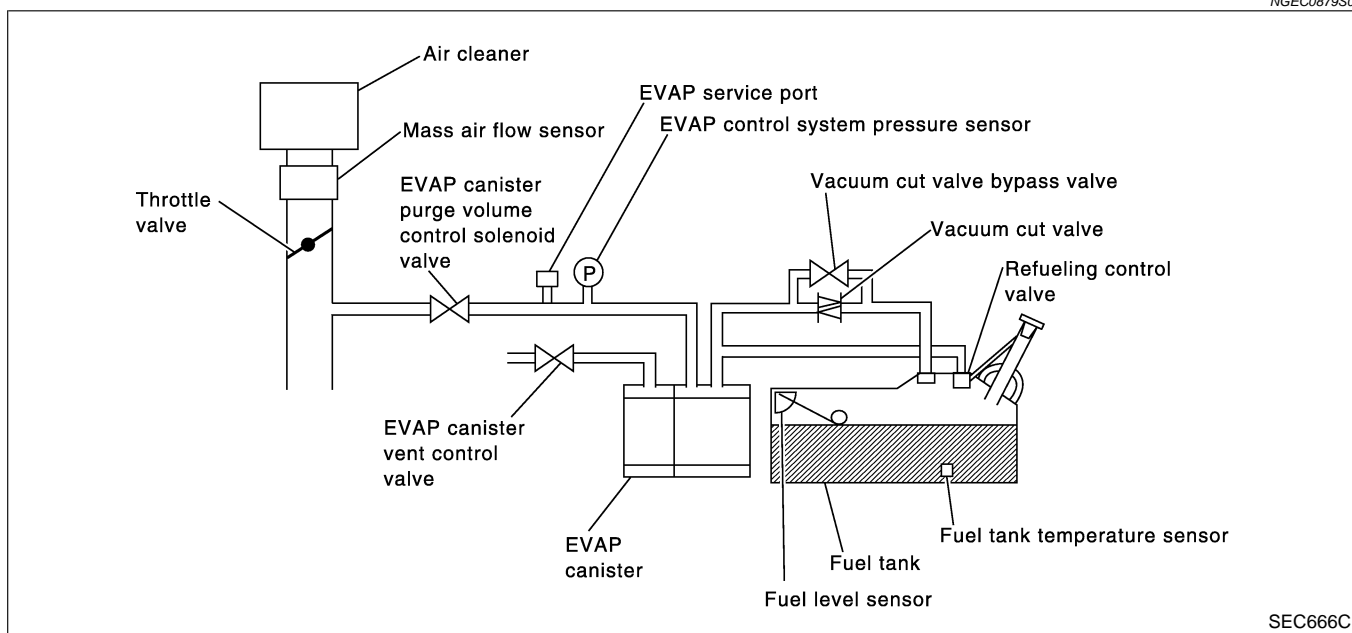
The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.

The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.

The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened. The vacuum cut valve is then bypassed to apply intake manifold vacuum to the fuel tank.

EVAPORATIVE EMISSION SYSTEM DIAGRAM



CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	● Ignition switch: ON	OFF

ECM Terminals and Reference Value

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

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
120	P/B	Vacuum cut valve bypass valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

Malfunction is detected when vacuum cut valve bypass valve does not operate properly. NGEC0882

POSSIBLE CAUSE

- Vacuum cut valve bypass valve NGEC0882S01
- Vacuum cut valve
- Bypass hoses for clogging
- EVAP control system pressure sensor and circuit
- EVAP canister vent control valve
- Hose between fuel tank and vacuum cut valve clogged
- Hose between vacuum cut valve and EVAP canister clogged
- EVAP canister
- EVAP purge port of fuel tank for clogging

7	VC CUT/V BP/V P1491
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

SEF210Y

7	VC CUT/V BP/V P1491
TESTING	
MONITOR	
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

SEF211Y

7	VC CUT/V BP/V P1491
COMPLETED	

SEF239Y

DTC Confirmation Procedure

CAUTION:
Always drive vehicle at a safe speed. NGEC0883

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
Always perform test at a temperature of 5 to 30°C (41 to 86°F).

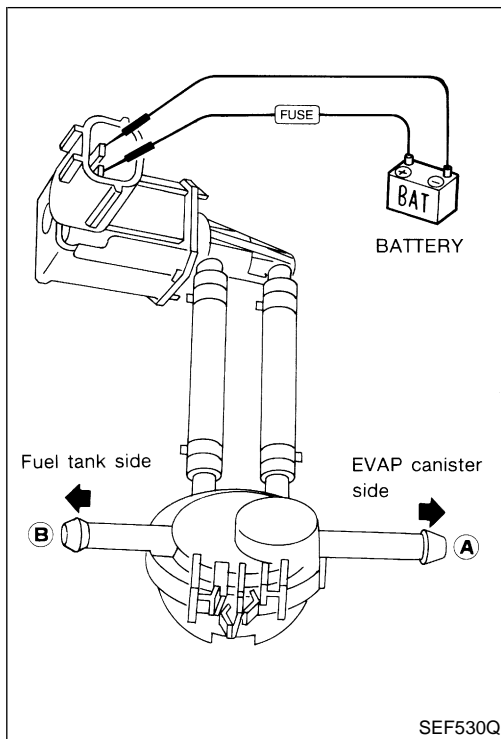
With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Start engine and warm it up to normal operating temperature.
- 3) Turn ignition switch OFF and wait at least 5 seconds.
- 4) Start engine and let it idle for at least 70 seconds.
- 5) Select "VC CUT/V BP/V P1491" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 6) Touch "START".
- 7) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 30 seconds.)

ENG SPEED	More than 500 rpm
Selector lever	Suitable position
Vehicle speed	More than 37 km/h (23 MPH)
B/FUEL SCHDL	1.0 - 10.0 msec

If "TESTING" is not displayed after 5 minutes, retry from step 3.

- 8) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-1121.



Overall Function Check

NGEC0884

Use this procedure to check the overall function of vacuum cut valve bypass valve. During this check, the 1st trip DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
- 2) Apply vacuum to port **A** and check that there is no suction from port **B**.
- 3) Apply vacuum to port **B** and check that there is suction from port **A**.
- 4) Blow air in port **B** and check that there is a resistance to flow out of port **A**.
- 5) Supply battery voltage to the terminal.
- 6) Blow air in port **A** and check that air flows freely out of port **B**.
- 7) Blow air in port **B** and check that air flows freely out of port **A**.
- 8) If NG, go to "Diagnostic Procedure", EC-1121.

GI

MA

EM

LC

EC

FE

CL

MT

AT

TF

PD

AX

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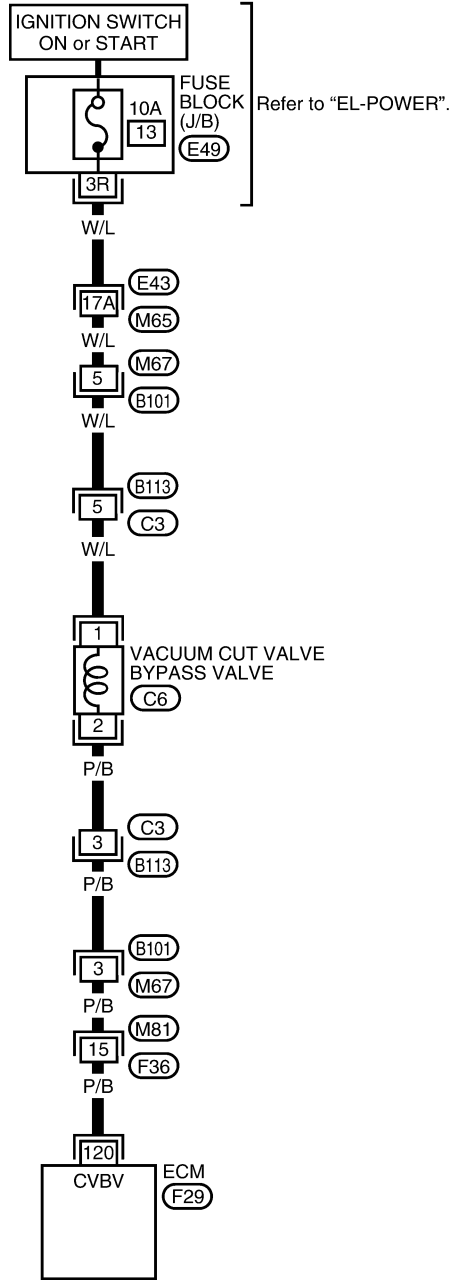
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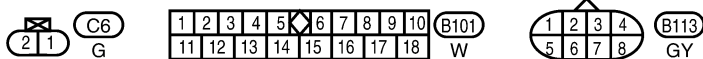
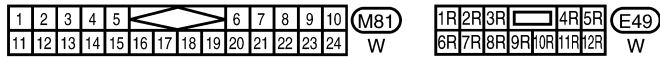
Wiring Diagram

NGEC0885

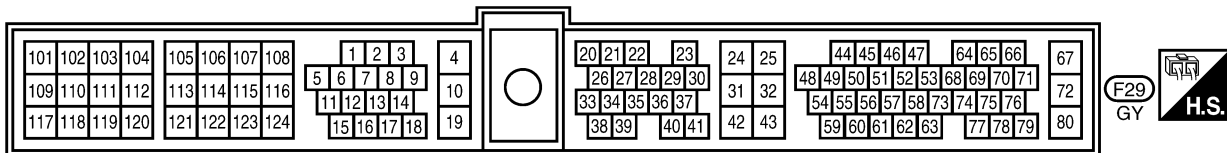
EC-BYPS/V-01



: Detectable line for DTC
 : Non-detectable line for DTC



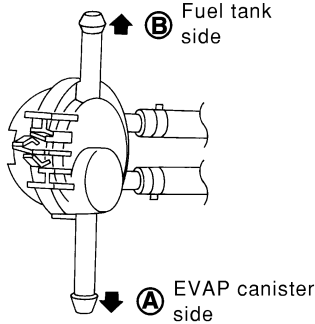
Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



Diagnostic Procedure

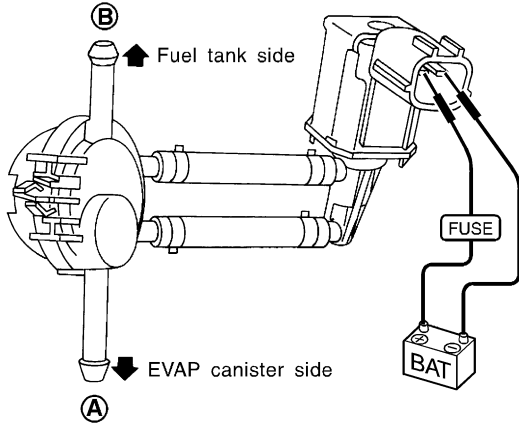
NGEC0886

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION																					
<p>With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly. 3. Apply vacuum to port A and check that there is no suction from port B. 4. Apply vacuum to port B and check that there is suction from port A. 5. Blow air in port B and check that there is a resistance to flow out of port A. 6. Turn ignition switch ON. 7. Select "VC/V BYPASS/V" in "ACTIVE TEST" mode with CONSULT-II and touch "ON". 8. Blow air in port A and check that air flows freely out of port B. 9. Blow air in port B and check that air flows freely out of port A. 																						
																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">ACTIVE TEST</th> </tr> <tr> <th style="text-align: center;">VC/V BYPASS/V</th> <th style="text-align: center;">OFF</th> </tr> </thead> <tbody> <tr> <td colspan="2" style="text-align: center;">MONITOR</td> </tr> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td style="text-align: center;">A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td style="text-align: center;">A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td style="text-align: center;">HO2S1 MNTR (B1)</td> <td style="text-align: center;">LEAN</td> </tr> <tr> <td style="text-align: center;">HO2S1 MNTR (B2)</td> <td style="text-align: center;">LEAN</td> </tr> <tr> <td style="text-align: center;">THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>			ACTIVE TEST		VC/V BYPASS/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V		
ACTIVE TEST																						
VC/V BYPASS/V	OFF																					
MONITOR																						
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A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
HO2S1 MNTR (B2)	LEAN																					
THRTL POS SEN	XXX V																					
OK or NG																						
OK	▶	GO TO 4.																				
NG	▶	GO TO 5.																				

SEF017Z

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3	CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION	
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly. 3. Apply vacuum to port A and check that there is no suction from port B. 4. Apply vacuum to port B and check that there is suction from port A. 5. Blow air in port B and check that there is a resistance to flow out of port A. 6. Disconnect vacuum cut valve bypass valve harness connector. 7. Supply battery voltage to the terminal. 8. Blow air in port A and check that air flows freely out of port B. 9. Blow air in port B and check that air flows freely out of port A. 		
		
OK or NG		
OK	▶	GO TO 4.
NG	▶	GO TO 5.

SEF914U

4	CHECK EVAP PURGE LINE	
<ol style="list-style-type: none"> 1. Check EVAP purge line between EVAP canister and fuel tank for clogging or disconnection. 2. Check EVAP purge port of fuel tank for clogging. 3. Check EVAP canister. Refer to EC-627. 		
OK or NG		
OK	▶	GO TO 8.
NG (Step 1)	▶	Repair it.
NG (Step 2)	▶	Clean EVAP purge port.
NG (Step 3)	▶	Replace EVAP canister.

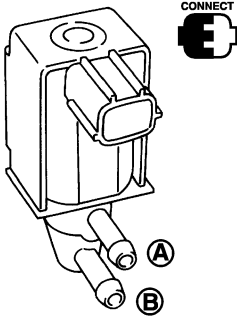
5	CHECK BYPASS HOSE	
Check bypass hoses for clogging.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Repair or replace hoses.

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6 CHECK VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II

1. Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.
2. Check air passage continuity and operation delay time under the following conditions.



ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V

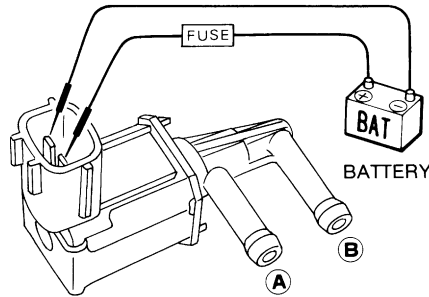
Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEF016Z

1. Check air passage continuity and operation delay time under the following conditions.

Without CONSULT-II



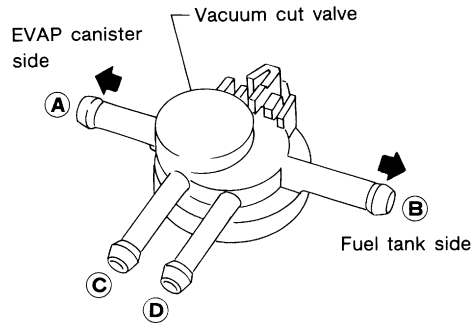
Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF351Q

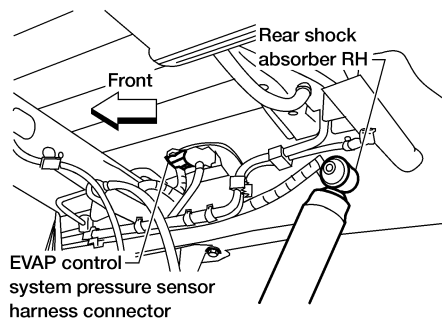
MTBL0242

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace vacuum cut valve bypass valve.

7	CHECK VACUUM CUT VALVE
<p>Check vacuum cut valve as follows:</p> <div style="text-align: center;">  </div>	
SEF379Q	
<ol style="list-style-type: none"> 1. Plug port C and D with fingers. 2. Apply vacuum to port A and check that there is no suction from port B. 3. Apply vacuum to port B and check that there is suction from port A. 4. Blow air in port B and check that there is a resistance to flow out of port A. 5. Open port C and D. 6. Blow air in port A check that air flows freely out of port C. 7. Blow air in port B check that air flows freely out of port D. 	
OK or NG	
OK	▶ GO TO 8.
NG	▶ Replace vacuum cut valve.

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor. 	
OK or NG	
OK	▶ GO TO 9.
NG	▶ Repair it

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR
<ol style="list-style-type: none"> 1. Disconnect EVAP control system pressure sensor harness connector. <div style="text-align: center;">  </div>	
AEC651A	
<ol style="list-style-type: none"> 2. Check connectors for water. Water should not exist. 	
OK or NG	
OK	▶ GO TO 10.
NG	▶ Replace EVAP control system pressure sensor.

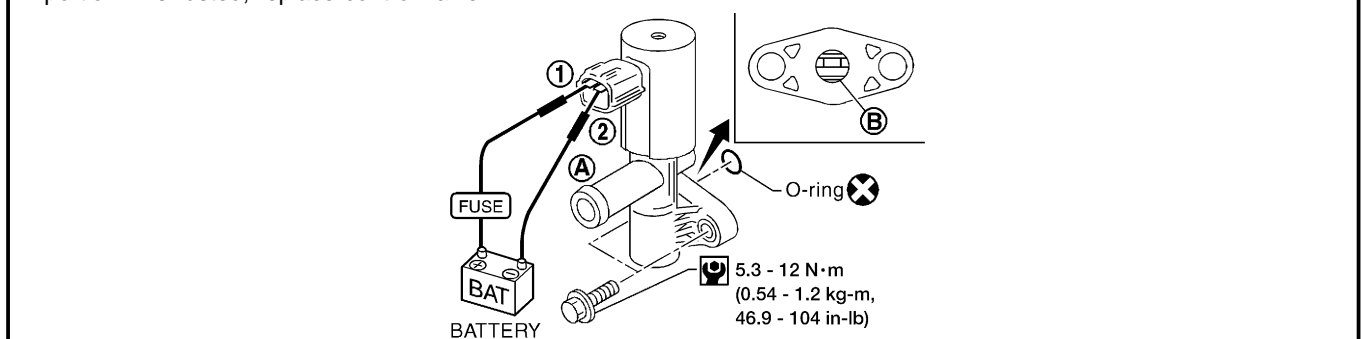
10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION	
Refer to "DTC Confirmation Procedure" for DTC P0452, P0453, EC-953.		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

11	CHECK EVAP CANISTER VENT CONTROL VALVE																									
Check air passage continuity.																										
E With CONSULT-II Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.																										
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">ACTIVE TEST</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">VENT CONTROL/V</td> <td style="text-align: center;">OFF</td> </tr> <tr> <th colspan="2" style="text-align: center;">MONITOR</th> </tr> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td style="text-align: center;">A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td style="text-align: center;">A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td style="text-align: center;">HO2S1 (B1)</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td style="text-align: center;">HO2S1 (B2)</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td style="text-align: center;">THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> </tbody> </table>	ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 (B1)	XXX V	HO2S1 (B2)	XXX V	THRTL POS SEN	XXX V	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Condition VENT CONTROL/V</th> <th style="text-align: center;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">ON</td> <td style="text-align: center;">No</td> </tr> <tr> <td style="text-align: center;">OFF</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table> <p style="text-align: center;">Operation takes less than 1 second.</p>	Condition VENT CONTROL/V	Air passage continuity between A and B	ON	No	OFF	Yes
	ACTIVE TEST																									
VENT CONTROL/V	OFF																									
MONITOR																										
ENG SPEED	XXX rpm																									
A/F ALPHA-B1	XXX %																									
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THRTL POS SEN	XXX V																									
Condition VENT CONTROL/V	Air passage continuity between A and B																									
ON	No																									
OFF	Yes																									
SEF991Y																										

X Without CONSULT-II								
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Condition</th> <th style="text-align: center;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">12V direct current supply between terminals 1 and 2</td> <td style="text-align: center;">No</td> </tr> <tr> <td style="text-align: center;">OFF</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table>		Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	No	OFF	Yes	
Condition	Air passage continuity between A and B							
12V direct current supply between terminals 1 and 2	No							
OFF	Yes							

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
 If portion **B** is rusted, replace control valve.



AEC783A		
Make sure new O-ring is installed properly.		
OK or NG		
OK	▶	GO TO 12.
NG	▶	Replace EVAP canister vent control valve.

12	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.		
▶		INSPECTION END

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Component Description

The malfunction information related to A/T (Automatic Transmission) is transferred through the line (circuit) from TCM (Transmission control module) to ECM. Therefore, be sure to erase the malfunction information such as DTC not only in TCM (Transmission control module) but also ECM after the A/T related repair.

ECM Terminals and Reference Value

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

CAUTION:

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

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
7	G/B	A/T check signal	[Ignition switch ON] [Engine is running]	0 - 3.0V

On Board Diagnosis Logic

Malfunction is detected when an incorrect signal from TCM (Transmission control module) is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors
[The communication line circuit between ECM and TCM (Transmission control module) is open or shorted.]
- Dead (Weak) battery
- TCM (Transmission control module)

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

④ With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait at least 40 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1128.

④ With GST

Follow the procedure "With CONSULT-II".

3

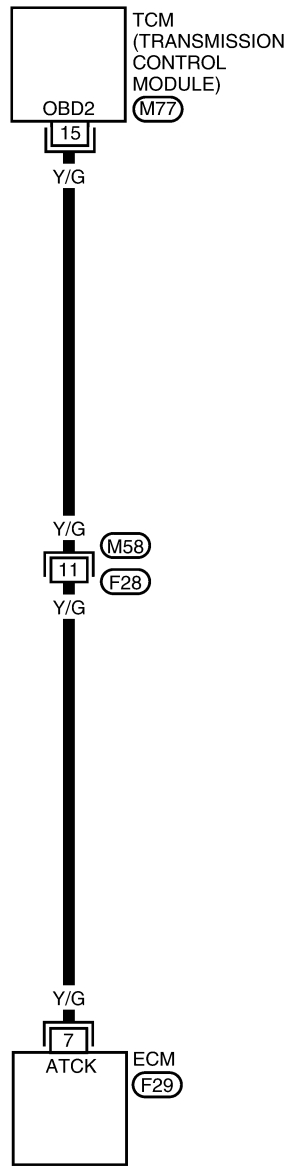
ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

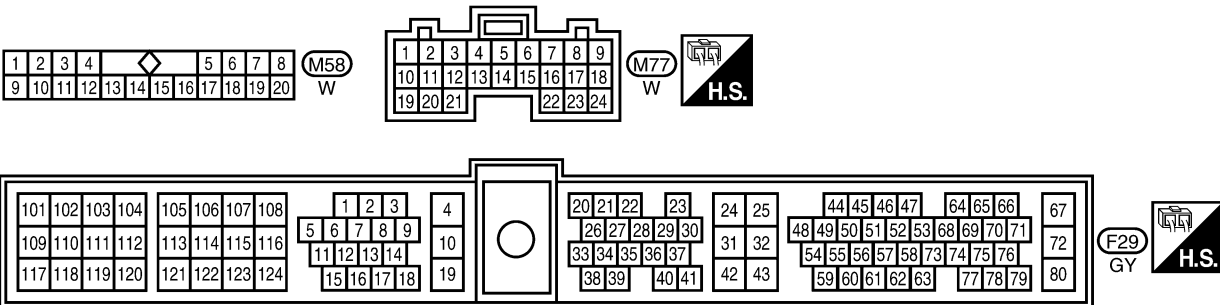
Wiring Diagram

NGEC0891

EC-ATDIAG-01



- GI
- MA
- EM
- LC
- EC**
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- MT
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- TF
- PD
- AX
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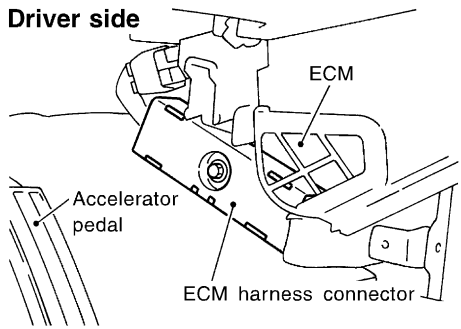
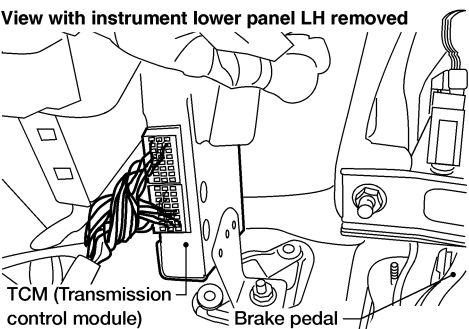


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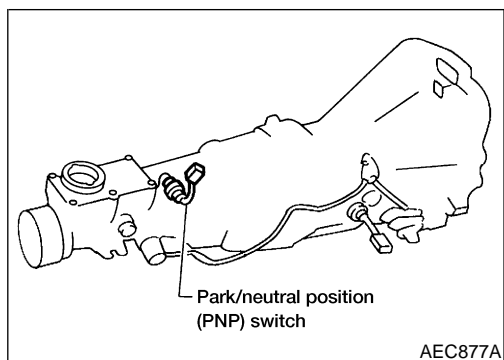
Diagnostic Procedure

NGEC0892

1	CHECK A/T DIAGNOSIS COMMUNICATION LINE INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector and TCM (Transmission Control Module) harness connector.</p> <div style="text-align: center;"> <p>Driver side</p>  <p>Labels: Accelerator pedal, ECM, ECM harness connector</p> </div> <div style="text-align: right; margin-top: 10px;"><small>SEF324V</small></div> <div style="text-align: center; margin-top: 20px;"> <p>View with instrument lower panel LH removed</p>  <p>Labels: TCM (Transmission control module), Brake pedal</p> </div> <div style="text-align: right; margin-top: 10px;"><small>AEC655A</small></div> <p>3. Check harness continuity between ECM terminal 7 and TCM (Transmission Control Module) terminal 15. Refer to Wiring Diagram. Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M58, F28 ● Harness for open or short between ECM and TCM (Transmission Control Module) 		
▶		Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.		
▶		INSPECTION END



Component Description

When the gear position is "P" (A/T models only) or "N", park/neutral position (PNP) switch is "ON". NGEC0893

ECM detects the position because the continuity of the line (the "ON" signal) exists.

For A/T models, the park/neutral position (PNP) switch assembly also includes a transmission range switch to detect selector lever position.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0894

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: "P" or "N" ON
		Except above OFF

ECM Terminals and Reference Value

NGEC0895

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22	L/B	Park/neutral position (PNP) switch	[Ignition switch ON] ● Gear position is "N" or "P" (A/T models) ● Gear position is neutral (M/T models)	Approximately 0V
			[Ignition switch ON] ● Except the above gear position	Approximately 5V

On Board Diagnosis Logic

NGEC0896

Malfunction is detected when the signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.

POSSIBLE CAUSE

NGEC0896S01

- Harness or connectors
[The park/neutral position (PNP) switch circuit is open or shorted.]
- Park/neutral position (PNP) switch

DTC Confirmation Procedure

NGEC0897
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 5 seconds before conducting the next test.

2		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: center;">DATA MONITOR</th> </tr> <tr> <th style="width: 50%;">MONITOR</th> <th style="width: 50%;">NO DTC</th> </tr> <tr> <td>P/N POSI SW</td> <td>ON</td> </tr> </table>	DATA MONITOR		MONITOR	NO DTC	P/N POSI SW	ON
DATA MONITOR								
MONITOR	NO DTC							
P/N POSI SW	ON							

SEF212Y

5		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: center;">DATA MONITOR</th> </tr> <tr> <th style="width: 50%;">MONITOR</th> <th style="width: 50%;">NO DTC</th> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>COOLAN TEMP/S</td> <td>XXX °C</td> </tr> <tr> <td>VHCL SPEED SE</td> <td>XXX km/h</td> </tr> <tr> <td>P/N POSI SW</td> <td>OFF</td> </tr> <tr> <td>B/FUEL SCHDL</td> <td>XXX msec</td> </tr> </table>	DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm	COOLAN TEMP/S	XXX °C	VHCL SPEED SE	XXX km/h	P/N POSI SW	OFF	B/FUEL SCHDL	XXX msec
DATA MONITOR																
MONITOR	NO DTC															
ENG SPEED	XXX rpm															
COOLAN TEMP/S	XXX °C															
VHCL SPEED SE	XXX km/h															
P/N POSI SW	OFF															
B/FUEL SCHDL	XXX msec															

SEF213Y
With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-II. Then check the "P/N POSI SW" signal under the following conditions.

Position (Selector lever)	Known good signal
"N" and "P" position	ON
Except the above position	OFF

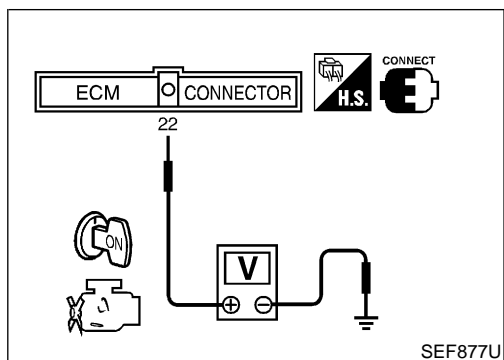
If NG, go to "Diagnostic Procedure", EC-1133.

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	1,600 - 2,700 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	3.3 - 13 msec
VHCL SPEED SE	More than 64 km/h (40 MPH)
Selector lever	Suitable position

- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1133.



Overall Function Check

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. =NGEC0898

⊗ **Without CONSULT-II**

- 1) Turn ignition switch ON.
- 2) Check voltage between ECM terminal 22 and body ground under the following conditions.

Condition (Gear position)	Voltage (V) (Known-good data)
"P" and "N" position	Approx. 0
Except the above position	Approx. 5

- 3) If NG, go to "Diagnostic Procedure", EC-1133.

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Wiring Diagram

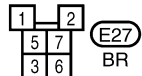
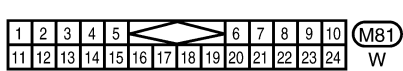
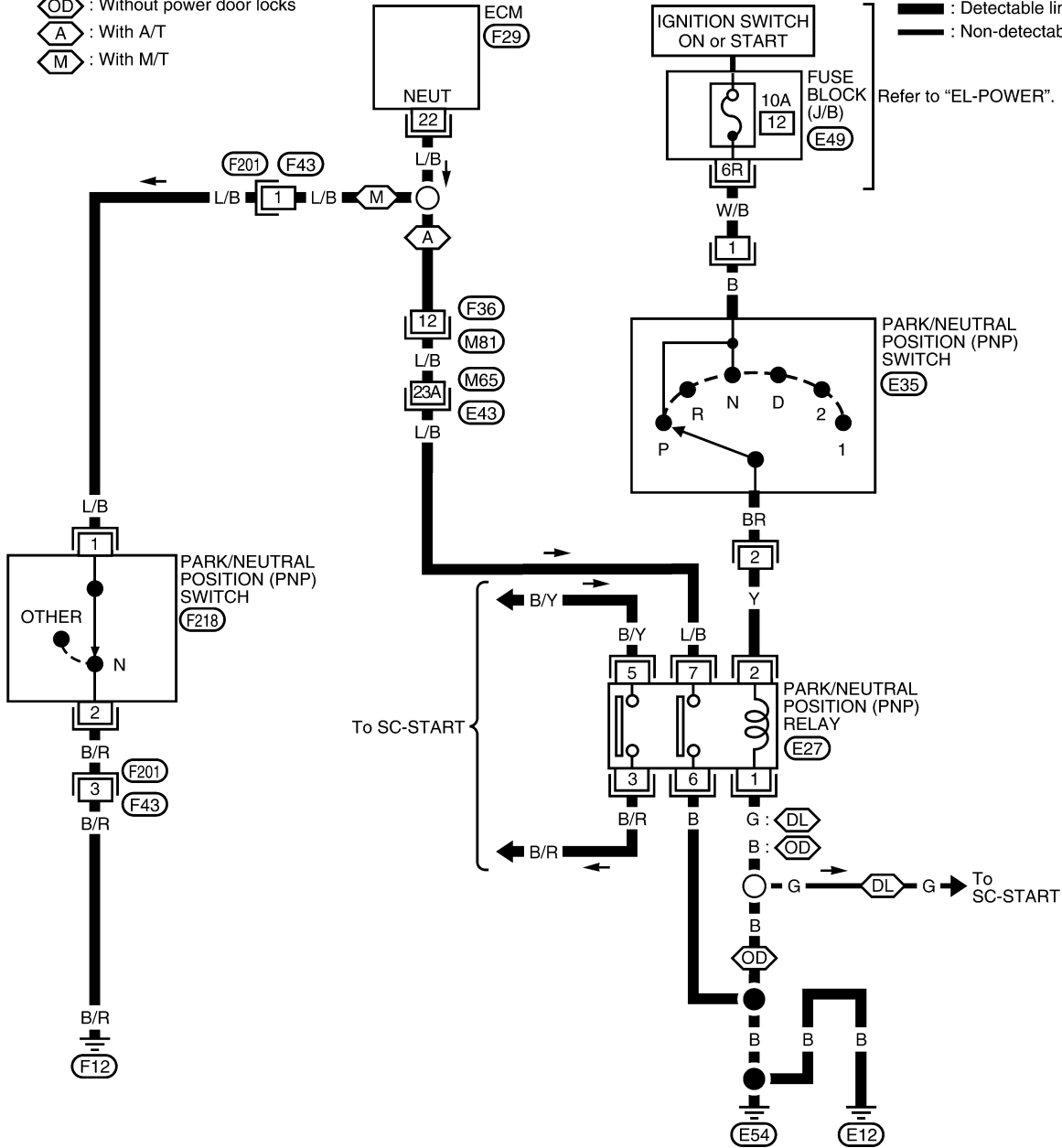
NGEC0899

EC-PNP/SW-01

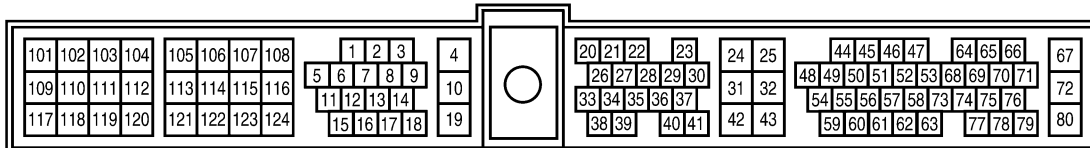
- : With power door locks
- : Without power door locks
- : With A/T
- : With M/T

: Detectable line for DTC
 : Non-detectable line for DTC

Refer to "EL-POWER".

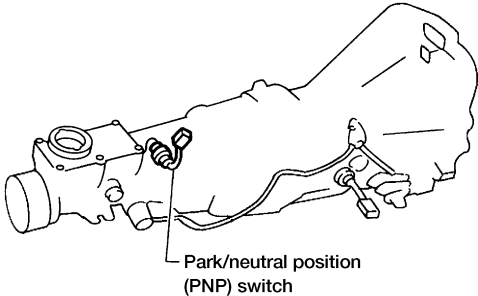


Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



Diagnostic Procedure FOR M/T MODELS

NGEC0900
NGEC0900S01

1	CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch OFF. 2. Disconnect park/neutral position (PNP) switch harness connector.</p> <div style="text-align: center;">  <p>Park/neutral position (PNP) switch</p> </div> <p>3. Check harness continuity between PNP switch terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>		
<small>AEC877A</small>		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F201, F43 ● Harness for open between park/neutral position (PNP) switch and engine ground 		
▶ Repair open circuit or short to power in harness or connectors.		

3	CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 22 and PNP switch terminal 1. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F43, F201 ● Harness for open or short between ECM and park/neutral position (PNP) switch 		
▶ Repair open circuit or short to ground or short to power in harness or connectors.		

5	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH	
<p>Refer to "Position Switch Check", "ON-VEHICLE SERVICE", MT-8.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	Replace park/neutral position (PNP) switch.

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DTC P1706 PNP SWITCH

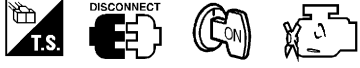
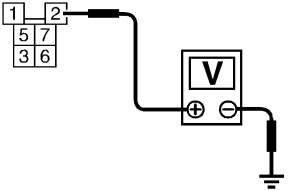
VG33E

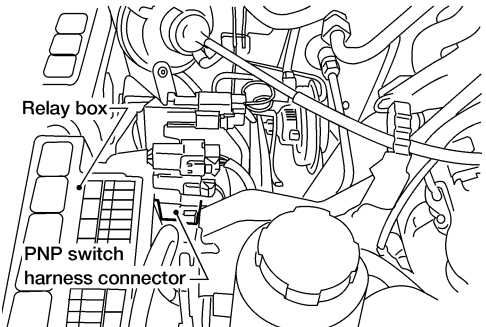
Diagnostic Procedure (Cont'd)

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.	
	▶ INSPECTION END

FOR A/T MODELS

=NGEC0900S02

1	CHECK PNP SWITCH POWER SUPPLY CIRCUIT-I	<p>1. Turn ignition switch OFF. 2. Disconnect park/neutral position (PNP) relay. 3. Turn ignition switch ON. 4. Shift selector lever to "P" or "N" position. 5. Check voltage between terminal 2 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> <p style="color: blue; margin-top: 10px;">Voltage: Battery voltage</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>	SEF661W
OK	▶	GO TO 6.	
NG	▶	GO TO 2.	

2	CHECK PNP SWITCH POWER SUPPLY CIRCUIT-II	<p>1. Turn ignition switch "OFF". 2. Disconnect park/neutral position (PNP) switch harness connector.</p> <div style="text-align: center;">  </div> <p style="text-align: right; margin-top: 10px;">AEC662A</p> <p>3. Check harness continuity between park/neutral position (PNP) switch terminal 2 and park/neutral position (PNP) relay terminal 2. Refer to Wiring Diagram. Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>	
OK	▶	GO TO 3.	
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.	

3	CHECK PNP SWITCH POWER SUPPLY CIRCUIT-III	<p>1. Turn ignition switch ON. 2. Check voltage between park/neutral position (PNP) switch terminal 1 and ground with CONSULT-II or tester. Refer to Wiring Diagram. Voltage: Battery voltage</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>	
OK	▶	GO TO 5.	
NG	▶	GO TO 4.	

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DTC P1706 PNP SWITCH

VG33E

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Fuse block (J/B) connector E49 ● 10A fuse ● Harness for open or short between park/neutral position (PNP) switch and fuse 		
▶	Repair open circuit or short to ground or short to power in harness or connectors.	

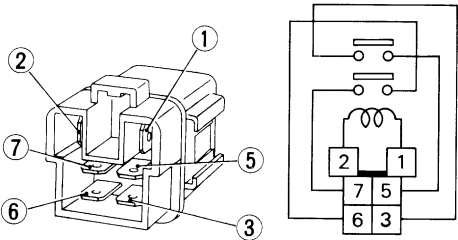
5	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH	
Refer to "Component Inspection", AT-109 .		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace park/neutral position (PNP) switch.

6	CHECK PNP RELAY GROUND CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch OFF. 2. Check harness continuity between relay terminals 1, 6 and body ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.		
OK or NG		
OK	▶	GO TO 8.
NG (With power door lock)	▶	GO TO 7.
NG (Without power door lock)	▶	Repair open circuit or short to power in harness or connectors.

7	DETECT MALFUNCTIONING PART	
Check the circuit between park/neutral position (PNP) relay and body ground. Refer to "STARTING SYSTEM", SC-10 .		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Repair or replace.

8	CHECK PNP RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 22 and relay 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 10.
NG	▶	GO TO 9.

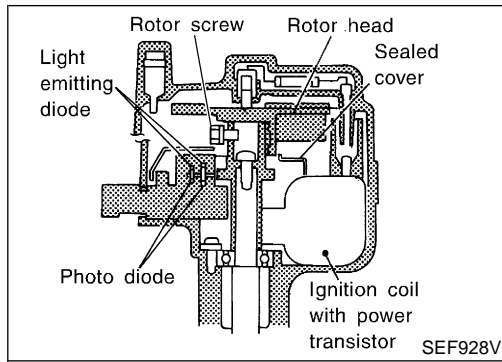
9	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Harness connectors F36, M81 ● Harness connectors M65, E43 ● Harness for open or short between ECM and park/neutral position (PNP) relay 		
▶	Repair open circuit or short to ground or short to power in harness or connectors.	

10	CHECK PARK/NEUTRAL POSITION (PNP) RELAY	
<p>1. Apply 12V direct current between park/neutral position (PNP) relay terminals 1 and 2. 2. Check continuity between park/neutral position (PNP) relay terminals 3 and 5, 6 and 7.</p>		
		
<p>12V (1 and 2) applied: Continuity should exist. No voltage applied: Continuity should not exist.</p>		
SEC202B		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace park/neutral position (PNP) relay.

11	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.		
▶		INSPECTION END

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Component Description



Component Description

IGNITION COIL & POWER TRANSISTOR

NGEC0812

NGEC0812S01

The power transistor switches on and off the ignition coil primary circuit according to the ECM signal. As the primary circuit is turned on and off, the proper high voltage is induced in the secondary circuit. The distributor is not repairable except for the distributor cap and rotor head.

NOTE:

The rotor screw which secures the distributor rotor head to the distributor shaft must be torqued properly.

: **3.6±0.3 N·m (37±3 kg·cm, 32±3 in·lb)**

ECM Terminals and Reference Value

NGEC0813

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 the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	PU/W	Ignition signal	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	<p>Approximately 0.7V</p> <p style="text-align: right;">SEF988U</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	<p>1.1 - 1.5V</p> <p style="text-align: right;">SEF989U</p>

IGNITION SIGNAL

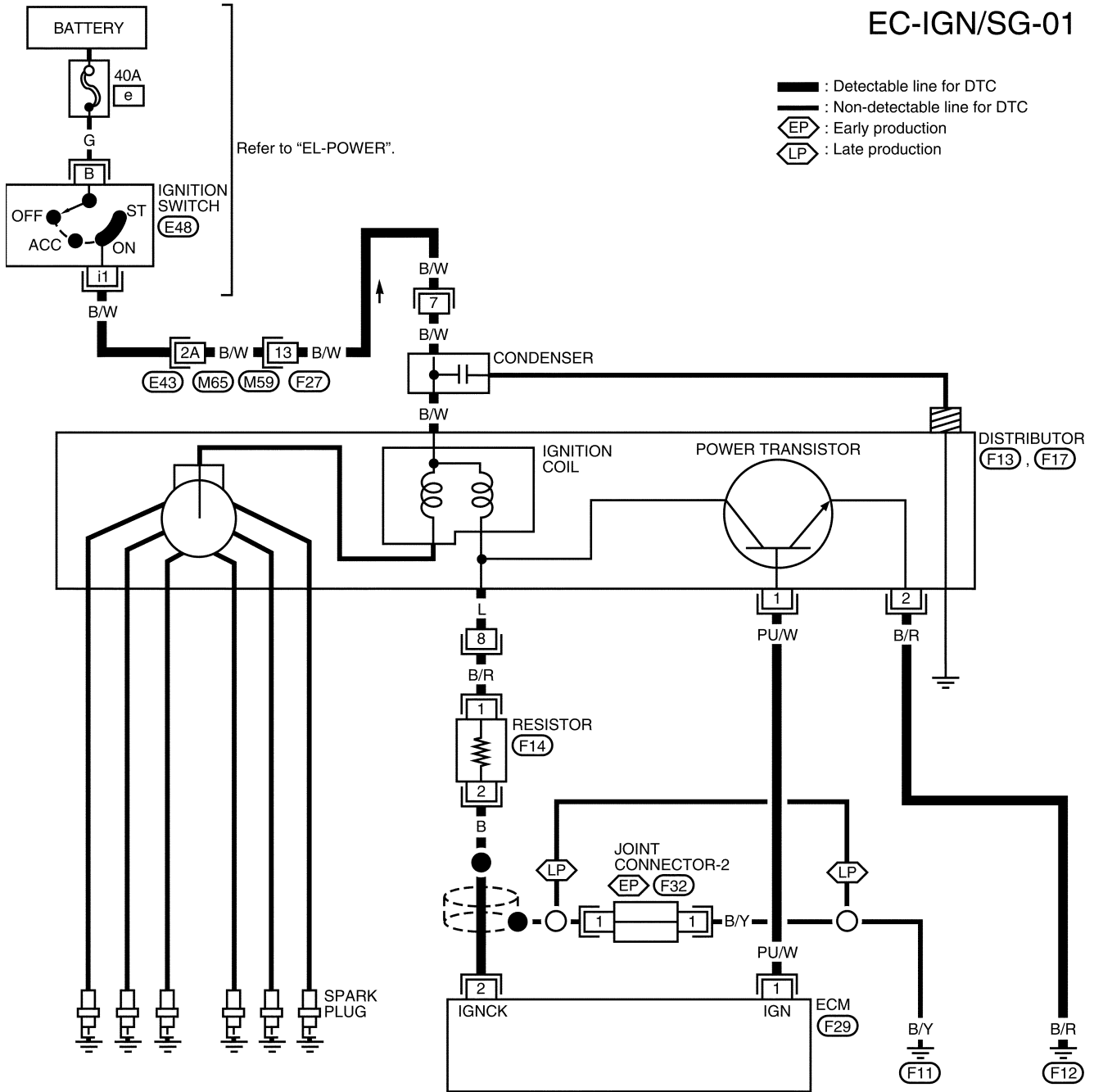
VG33E

Wiring Diagram

Wiring Diagram

NGEC0816

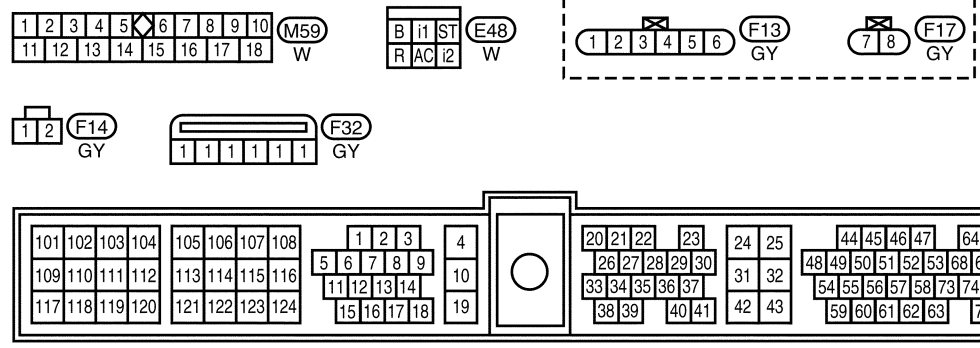
EC-IGN/SG-01



: Detectable line for DTC
 : Non-detectable line for DTC
EP : Early production
LP : Late production

Refer to "EL-POWER".

Refer to the following.
E43 - SUPER MULTIPLE JUNCTION (SMJ)



WEC182A

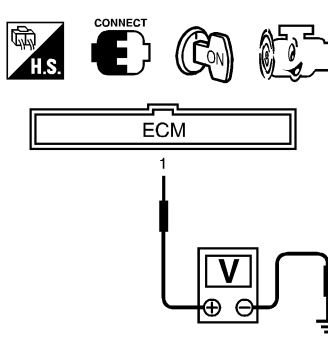
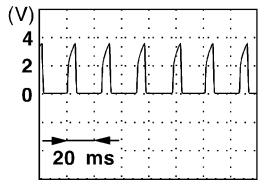
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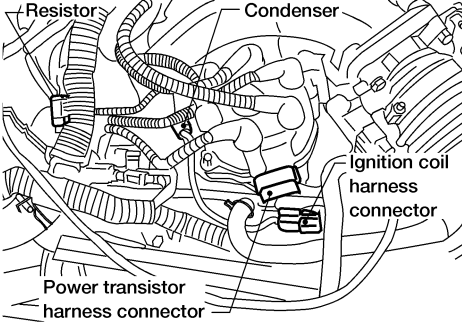
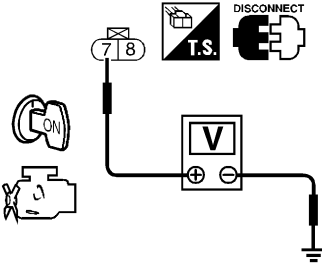
Diagnostic Procedure

NGEC0817

1	INSPECTION 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																	
(P) With CONSULT-II 1. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II. 2. Make sure that all circuits do not produce a momentary engine speed drop.																		
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>POWER BALANCE</th> <th></th> </tr> <tr> <th colspan="2">MONITOR</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td style="text-align: center;">MAS A/F SE-B1</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td style="text-align: center;">IACV-AAC/V</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>			ACTIVE TEST		POWER BALANCE		MONITOR		ENG SPEED	XXX rpm	MAS A/F SE-B1	XXX V	IACV-AAC/V	XXX %				
ACTIVE TEST																		
POWER BALANCE																		
MONITOR																		
ENG SPEED	XXX rpm																	
MAS A/F SE-B1	XXX V																	
IACV-AAC/V	XXX %																	
SEF981Z																		
OK ▶	INSPECTION END																	
NG ▶	GO TO 4.																	

3	CHECK OVERALL FUNCTION	
(X) Without CONSULT-II 1. Let engine idle. 2. Read the voltage signal between ECM terminal 1 and ground with an oscilloscope. 3. Verify that the oscilloscope screen shows the signal wave as shown below.		
		
		
SEC073C		
OK ▶	INSPECTION END	
NG ▶	GO TO 4.	

4	CHECK IGNITION COIL POWER SUPPLY CIRCUIT	<p>1. Turn ignition switch OFF. 2. Disconnect ignition coil harness connector.</p> <div style="text-align: center;">  </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 7 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="color: blue; font-weight: bold;">Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white; padding: 5px;">EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p> <p>TF</p>
OK	▶	GO TO 6.	
NG	▶	GO TO 5.	

5	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M59, F27 ● Harness for open or short between ignition coil and ignition switch <p style="text-align: right;">▶ Repair harness or connectors.</p>	<p>AX</p> <p>SU</p> <p>BR</p>
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6	CHECK POWER TRANSISTOR GROUND CIRCUIT FOR OPEN AND SHORT	<p>1. Turn ignition switch OFF. 2. Disconnect power transistor harness connector. 3. Check harness continuity between power transistor terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	<p>ST</p> <p>RS</p> <p>BT</p> <p>HA</p>
OK	▶	GO TO 7.	
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.	

7	CHECK POWER TRANSISTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 1 and power transistor 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 8.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

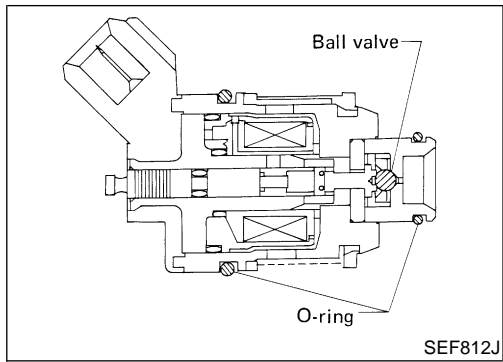
8	CHECK IGNITION COIL							
1. Disconnect ignition coil harness connector. 2. Check resistance as shown in the figure.								
SEF013S								
AEC657A								
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 5px;">Terminal</th> <th style="padding: 5px;">Resistance [at 25°C (77°F)]</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">7 - 8 (Primary coil)</td> <td style="padding: 5px;">0.5 - 1.0Ω</td> </tr> <tr> <td style="padding: 5px;">7 - 9 (Secondary coil)</td> <td style="padding: 5px;">Approximately 12 kΩ</td> </tr> </tbody> </table>			Terminal	Resistance [at 25°C (77°F)]	7 - 8 (Primary coil)	0.5 - 1.0Ω	7 - 9 (Secondary coil)	Approximately 12 kΩ
Terminal	Resistance [at 25°C (77°F)]							
7 - 8 (Primary coil)	0.5 - 1.0Ω							
7 - 9 (Secondary coil)	Approximately 12 kΩ							
MTBL0248								
For checking secondary coil, remove distributor cap and measure resistance between coil tower metal tip 9 and terminal 7.								
OK or NG								
OK	▶	GO TO 9.						
NG	▶	Replace distributor assembly.						

9	CHECK POWER TRANSISTOR									
<p>1. Disconnect camshaft position sensor & power transistor harness connector and ignition coil harness connector. 2. Check power transistor resistance between terminals 2 and 8.</p>										
SEF015S										
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">Terminals</th> <th style="width: 30%;">Resistance</th> <th style="width: 40%;">Result</th> </tr> </thead> <tbody> <tr> <td rowspan="2" style="text-align: center;">2 and 8</td> <td style="text-align: center;">Except 0Ω</td> <td style="text-align: center;">OK</td> </tr> <tr> <td style="text-align: center;">0Ω</td> <td style="text-align: center;">NG</td> </tr> </tbody> </table>			Terminals	Resistance	Result	2 and 8	Except 0Ω	OK	0Ω	NG
Terminals	Resistance	Result								
2 and 8	Except 0Ω	OK								
	0Ω	NG								
<p>OK or NG</p>										
OK	▶	GO TO 10.								
NG	▶	Replace distributor assembly.								

10	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.		
▶		INSPECTION END

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Component Description



Component Description

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

NGEC0910

MONITOR ITEM	CONDITION	SPECIFICATION
INJ PULSE-B2 INJ PULSE-B1	● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load Idle	2.4 - 3.7 msec
	2,000 rpm	1.9 - 3.3 msec
B/FUEL SCHDL	ditto Idle	1.0 - 1.6 msec
	2,000 rpm	0.7 - 1.4 msec

ECM Terminals and Reference Value

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

NGEC0911

CAUTION:

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

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102 104 106 109 111 113	W/B W/R W/G W/L W/PU W	Injector No. 1 Injector No. 3 Injector No. 5 Injector No. 2 Injector No. 4 Injector No. 6	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>BATTERY VOLTAGE (11 - 14V)</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	<p>BATTERY VOLTAGE (11 - 14V)</p>

Wiring Diagram

NGEC0912

EC-INJECT-01

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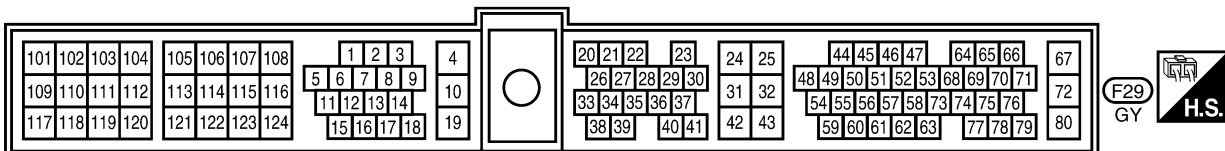
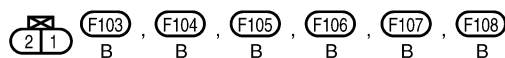
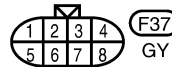
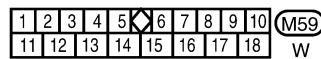
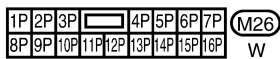
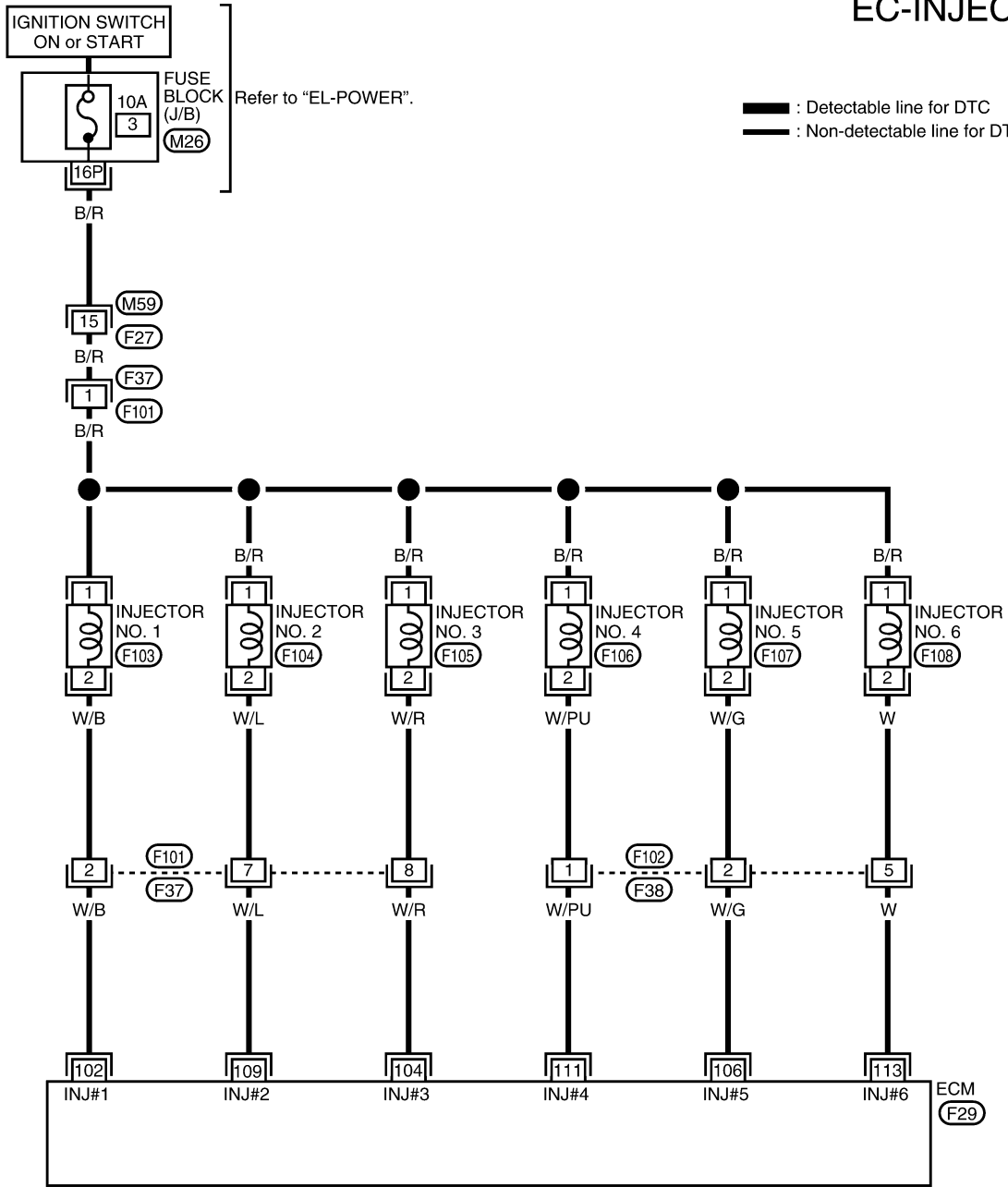
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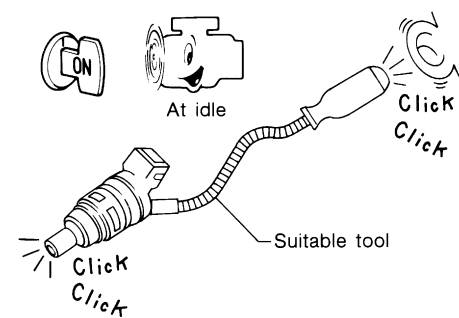
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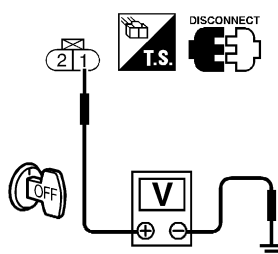
Diagnostic Procedure

NGEC0913

1	INSPECTION START	
Turn ignition switch to START. Is any cylinder ignited?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK OVERALL FUNCTION																					
<p> With CONSULT-II</p> <p>1. Start engine. 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.</p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><th colspan="2">POWER BALANCE</th></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>MAS AIR/FL SE</td><td>XXX V</td></tr> <tr><td>IACV-AAC/V</td><td>XXX %</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		POWER BALANCE		MONITOR		ENG SPEED	XXX rpm	MAS AIR/FL SE	XXX V	IACV-AAC/V	XXX %								
ACTIVE TEST																						
POWER BALANCE																						
MONITOR																						
ENG SPEED	XXX rpm																					
MAS AIR/FL SE	XXX V																					
IACV-AAC/V	XXX %																					
SEF806Z																						
3. Make sure that each circuit produces a momentary engine speed drop.																						
<p> Without CONSULT-II</p> <p>1. Start engine. 2. Listen to each injector operating sound.</p>																						
																						
Clicking noise should be heard.																						
OK or NG																						
OK	▶	INSPECTION END																				
NG	▶	GO TO 3.																				

MEC703B

3	CHECK INJECTOR POWER SUPPLY CIRCUIT	<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect injector harness connector.</p> <p>3. Check voltage between terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="color: blue;">Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	GI MA EM LC EC						
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 5.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 4.</td> </tr> </table>		OK	▶	GO TO 5.	NG	▶	GO TO 4.		FE CL
OK	▶	GO TO 5.							
NG	▶	GO TO 4.							

4	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M59, F27 ● Harness connectors F37, F101 ● Fuse block (J/B) connector M26 ● 10A fuse ● Harness for open or short between injector and fuse 	MT AT TF
▶		Repair harness or connectors.	

5	CHECK INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	<p>1. Disconnect ECM harness connector.</p> <p>2. Check harness continuity between injector harness connector terminal 2 and ECM terminals 102, 104, 106, 109, 111, 113. Refer to Wiring Diagram.</p> <p style="color: blue;">Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	PD AX SU						
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 7.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 6.</td> </tr> </table>		OK	▶	GO TO 7.	NG	▶	GO TO 6.		BR
OK	▶	GO TO 7.							
NG	▶	GO TO 6.							

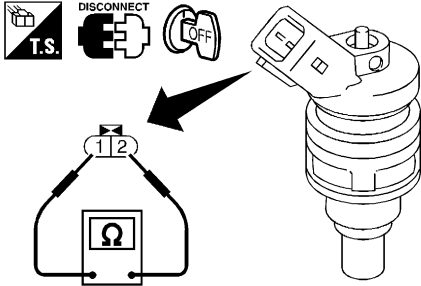
6	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F37, F101 ● Harness connectors F38, F102 ● Harness for open or short between ECM and injector 	ST RS
▶		Repair open circuit or short to ground or short to power in harness or connectors.	BT

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INJECTOR

VG33E

Diagnostic Procedure (Cont'd)

7	CHECK INJECTOR
<p>1. Disconnect injector harness connector. 2. Check resistance between terminals as shown in the figure.</p>  <p>Resistance: 10 - 14Ω [at 25°C (77°F)]</p> <p>SEF625V</p> <p>OK or NG</p>	
OK	▶ GO TO 8.
NG	▶ Replace injector.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.	
▶	INSPECTION END

START SIGNAL

VG33E

CONSULT-II Reference Value in Data Monitor Mode

CONSULT-II Reference Value in Data Monitor Mode

NGEC0914

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
START SIGNAL	● Ignition switch: ON → START → ON	OFF → ON → OFF

ECM Terminals and Reference Value

NGEC0915

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 the ECM terminals, such as the ground.

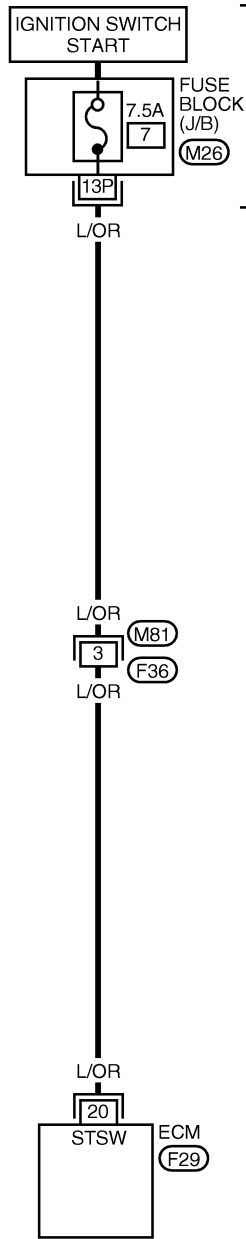
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
20	L/OR	Start signal	[Ignition switch ON]	Approximately 0V
			[Ignition switch START]	BATTERY VOLTAGE (11 - 14V)

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Wiring Diagram

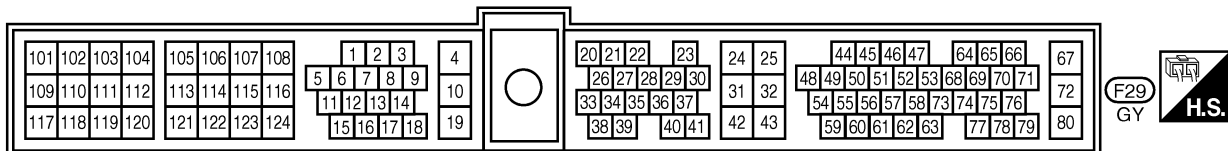
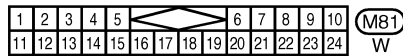
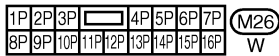
NGEC0916

EC-S/SIG-01



Refer to "EL-POWER".

— : Detectable line for DTC
 — : Non-detectable line for DTC



Diagnostic Procedure

NGE0917

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

 GI
MA
EM

2	CHECK OVERALL FUNCTION													
④ With CONSULT-II 1. Turn ignition switch ON. 2. Check "START SIGNAL" in "DATA MONITOR" mode with CONSULT-II under the following conditions.														
<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>START SIGNAL</td> <td>OFF</td> </tr> <tr> <td>CLSD THL POS</td> <td>ON</td> </tr> <tr> <td>AIR COND SIG</td> <td>OFF</td> </tr> <tr> <td>P/N POSI SW</td> <td>ON</td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	START SIGNAL	OFF	CLSD THL POS	ON	AIR COND SIG	OFF	P/N POSI SW	ON
DATA MONITOR														
MONITOR	NO DTC													
START SIGNAL	OFF													
CLSD THL POS	ON													
AIR COND SIG	OFF													
P/N POSI SW	ON													
<table border="1" style="margin: auto;"> <thead> <tr> <th>Condition</th> <th>"START SIGNAL"</th> </tr> </thead> <tbody> <tr> <td>Ignition switch "ON"</td> <td>OFF</td> </tr> <tr> <td>Ignition switch "START"</td> <td>ON</td> </tr> </tbody> </table>			Condition	"START SIGNAL"	Ignition switch "ON"	OFF	Ignition switch "START"	ON						
Condition	"START SIGNAL"													
Ignition switch "ON"	OFF													
Ignition switch "START"	ON													
SEF072Y														
OK or NG														
OK	▶	INSPECTION END												
NG	▶	GO TO 4.												

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FE
CL
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AT

3	CHECK OVERALL FUNCTION							
⊗ Without CONSULT-II Check voltage between ECM terminal 20 and ground under the following conditions.								
SEF733U								
<table border="1" style="margin: auto;"> <thead> <tr> <th>Condition</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>Ignition switch "START"</td> <td>Battery voltage</td> </tr> <tr> <td>Other positions</td> <td>Approximately 0V</td> </tr> </tbody> </table>			Condition	Voltage	Ignition switch "START"	Battery voltage	Other positions	Approximately 0V
Condition	Voltage							
Ignition switch "START"	Battery voltage							
Other positions	Approximately 0V							
MTBL0148								
OK or NG								
OK	▶	INSPECTION END						
NG	▶	GO TO 4.						

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EL

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START SIGNAL

VG33E

Diagnostic Procedure (Cont'd)

4	CHECK STARTING SYSTEM
Turn ignition switch OFF, then turn it to START. Does starter motor operate?	
Yes or No	
Yes	▶ GO TO 5.
No	▶ Refer to "STARTING SYSTEM", SC-10 .

5	CHECK FUSE
1. Turn ignition switch OFF. 2. Disconnect 7.5A fuse. 3. Check if 7.5A fuse is OK.	
OK or NG	
OK	▶ GO TO 6.
NG	▶ Replace 7.5A fuse.

6	CHECK START SIGNAL INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 20 and fuse block. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power.	
OK or NG	
OK	▶ GO TO 8.
NG	▶ GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness connectors M81, F36● Harness for open or short between ECM and fuse	
	▶ Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.	
	▶ INSPECTION END

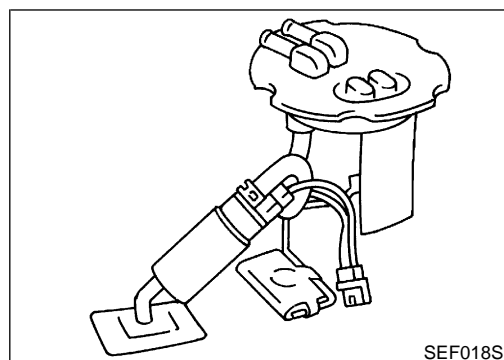
System Description

NGEC0918

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Fuel pump control	Fuel pump relay
Ignition switch	Start signal		

The ECM activates the fuel pump for several seconds after the ignition switch is turned on to improve engine startability. If the ECM receives a 120° signal from the camshaft position sensor, it knows that the engine is rotating, and causes the pump to operate. If the 120° signal is not received when the ignition switch is on, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 5 seconds
Engine running and cranking	Operates
When engine is stopped	Stops in 1.5 seconds
Except as shown above	Stops



Component Description

NGEC0919

The fuel pump with a fuel damper is an in-tank type (the pump and damper are located in the fuel tank).

CONSULT-II Reference Value in Data Monitor Mode

NGEC0920

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	<ul style="list-style-type: none"> Ignition switch is turned to ON. (Operates for 5 seconds.) Engine running and cranking 	ON
	Except as shown above	OFF

ECM Terminals and Reference Value

=NGEC0921

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

CAUTION:

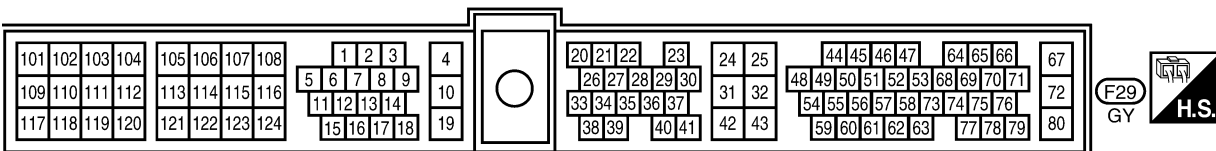
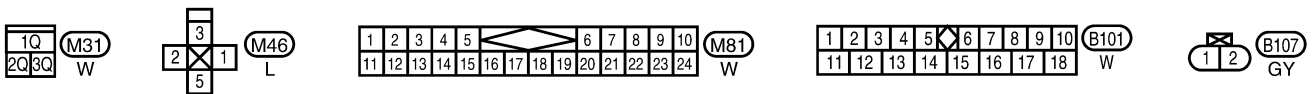
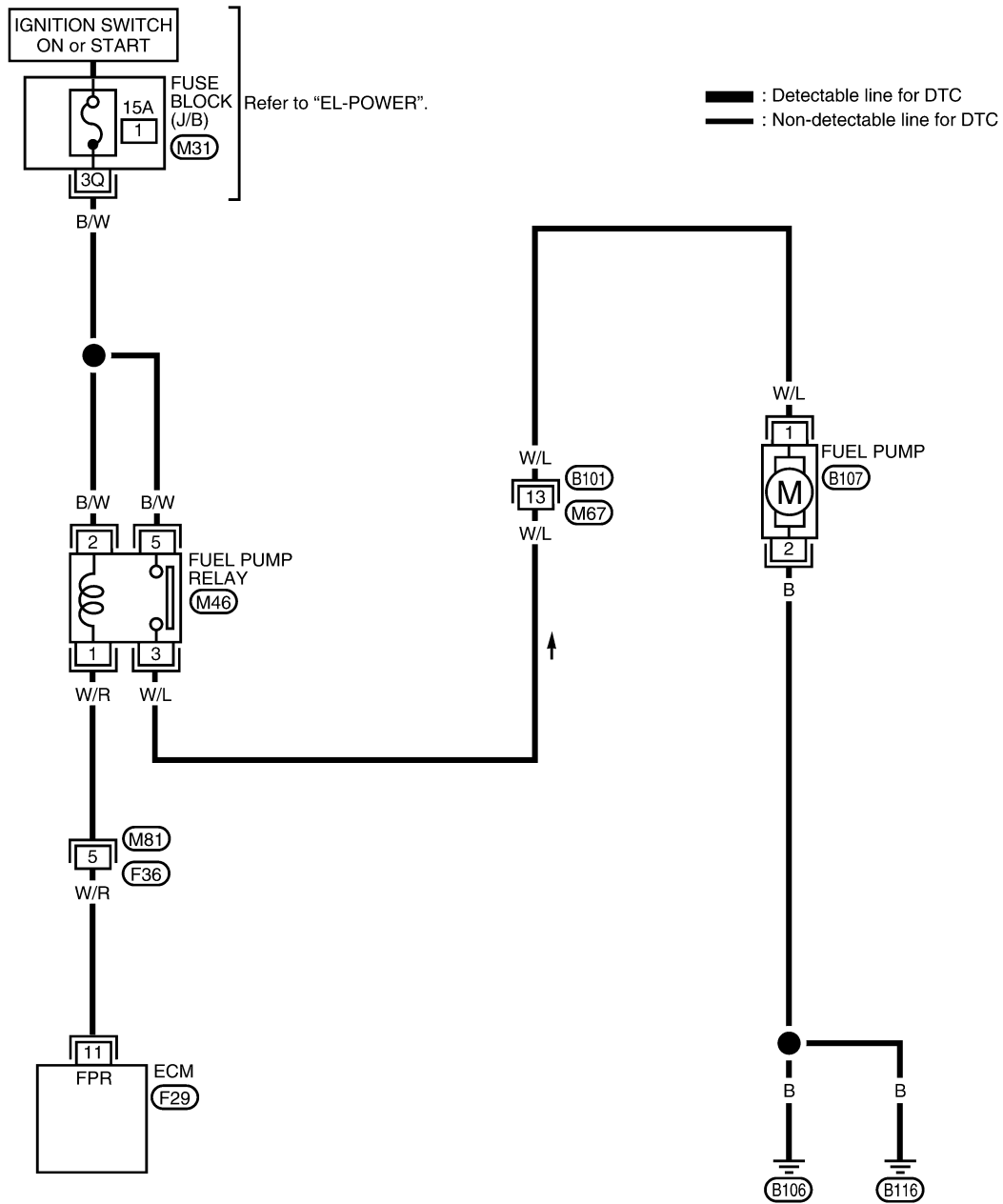
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	W/R	Fuel pump relay	[Ignition switch ON] ● For 5 seconds after turning ignition switch "ON" [Engine is running]	0 - 1V
			[Ignition switch ON] ● More than 5 seconds after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)

Wiring Diagram

NGENC0922

EC-F/PUMP-01

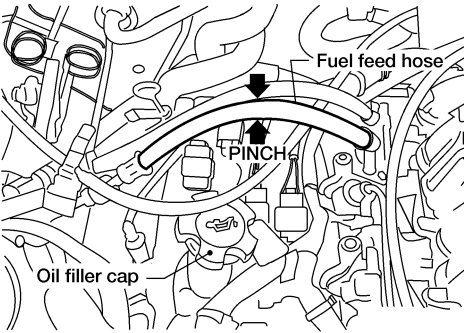


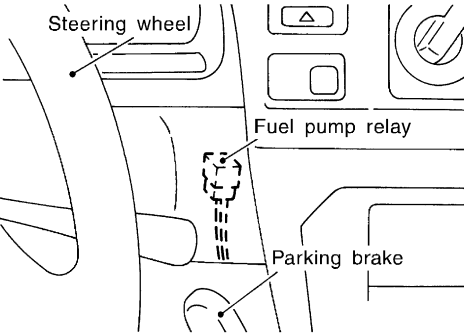
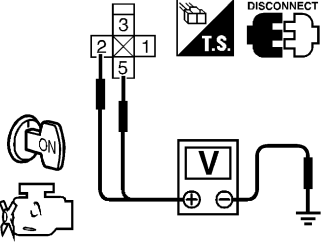
LEC509

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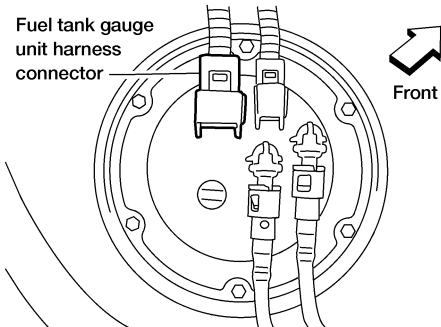
Diagnostic Procedure

NGEC0923

1	CHECK OVERALL FUNCTION		
<p>1. Turn ignition switch ON. 2. Pinch fuel feed hose with fingers.</p>			
			
AEC663A			
<p>Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned ON.</p> <p style="text-align: center;">OK or NG</p>			
OK	▶	INSPECTION END	
NG	▶	GO TO 2.	

2	CHECK FUEL PUMP RELAY POWER SUPPLY CIRCUIT		
<p>1. Turn ignition switch OFF. 2. Disconnect fuel pump relay.</p>			
			
SEF349V			
<p>3. Turn ignition switch ON. 4. Check voltage between terminals 2, 5 and ground with CONSULT-II or tester.</p>			
			
SEF674W			
<p>Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>			
OK	▶	GO TO 4.	
NG	▶	GO TO 3.	

3	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Fuse block (J/B) connector M31 ● 15A fuse ● Harness for open or short between fuse and fuel pump relay 	
▶	Repair harness or connectors.

4	CHECK FUEL PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch OFF. 2. Disconnect fuel pump harness connector.	
	
AEC933A	
3. Check harness continuity between fuel pump terminal 2 and body ground, fuel pump terminal 1 and fuel pump relay terminal 3. Refer to Wiring Diagram. Continuity should exist.	
4. Also check harness for short to ground and short to power.	
OK or NG	
OK	▶ GO TO 6.
NG	▶ GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors M67, B101 ● Harness for open or short between fuel pump and body ground ● Harness for open or short between fuel pump and fuel pump relay 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK FUEL PUMP RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 11 and fuel pump relay 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 8.
NG	▶ GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors M81, F36 ● Harness for open or short between ECM and fuel pump relay 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

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8 CHECK FUEL PUMP RELAY

With CONSULT-II

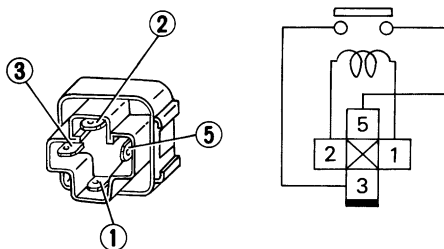
1. Reconnect fuel pump relay, fuel pump harness connector and ECM harness connector.
2. Turn ignition switch ON.
3. Turn fuel pump relay "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT-II and check operating sound.

ACTIVE TEST	
FUEL PUMP RELAY	ON
MONITOR	
ENG SPEED	XXX rpm

SEF073Y

Without CONSULT-II

Check continuity between terminals 3 and 5.



SEF511P

12V direct current supply between terminals 1 and 2

Continuity exists

No current supply

Continuity does not exist

OK or NG

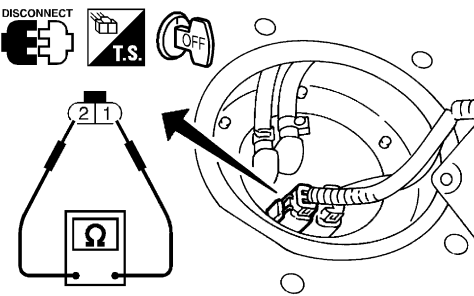
OK	▶	GO TO 9.
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NG	▶	Replace fuel pump relay.
----	---	--------------------------

FUEL PUMP

VG33E

Diagnostic Procedure (Cont'd)

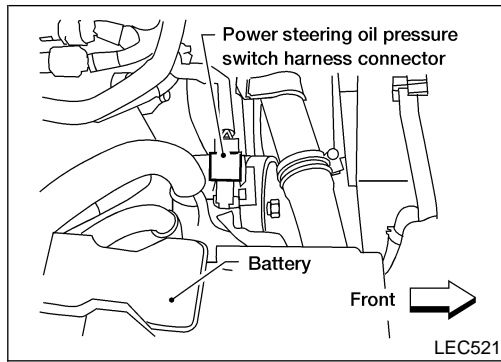
9	CHECK FUEL PUMP	<p>1. Disconnect fuel pump harness connector. 2. Check resistance between terminals 1 and 2.</p> <div style="text-align: center;">  </div> <p style="color: blue;">Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]</p> <p style="text-align: center;">OK or NG</p>		<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white; text-align: center;">EC</p> <p>FE</p> <p>CL</p>
	OK	▶	GO TO 10.	
	NG	▶	Replace fuel pump.	

10	CHECK INTERMITTENT INCIDENT	<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.</p>		<p>MT</p>
		▶	INSPECTION END	<p>AT</p> <p>TF</p> <p>PD</p> <p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>

POWER STEERING OIL PRESSURE SWITCH

VG33E

Component Description



Component Description

NGEC0924

The power steering oil pressure switch is attached to the power steering high-pressure tube and detects a power steering load. When a power steering load is detected, it signals the ECM. The ECM adjusts the IACV-AAC valve to increase the idle speed and adjust for the increased load.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0925

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	<ul style="list-style-type: none"> Engine: After warming up, idle the engine 	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is fully turned.	ON

ECM Terminals and Reference Value

NGEC0926

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
39	GY/R	Power steering oil pressure switch	[Engine is running] <ul style="list-style-type: none"> Steering wheel is being fully turned 	0V
			[Engine is running] <ul style="list-style-type: none"> Steering wheel is not being turned 	Approximately 5V

POWER STEERING OIL PRESSURE SWITCH

VG33E

Wiring Diagram

Wiring Diagram

NGEC0927

EC-PST/SW-01

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MA

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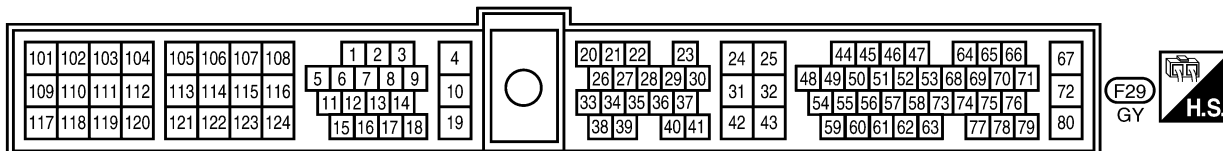
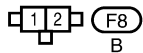
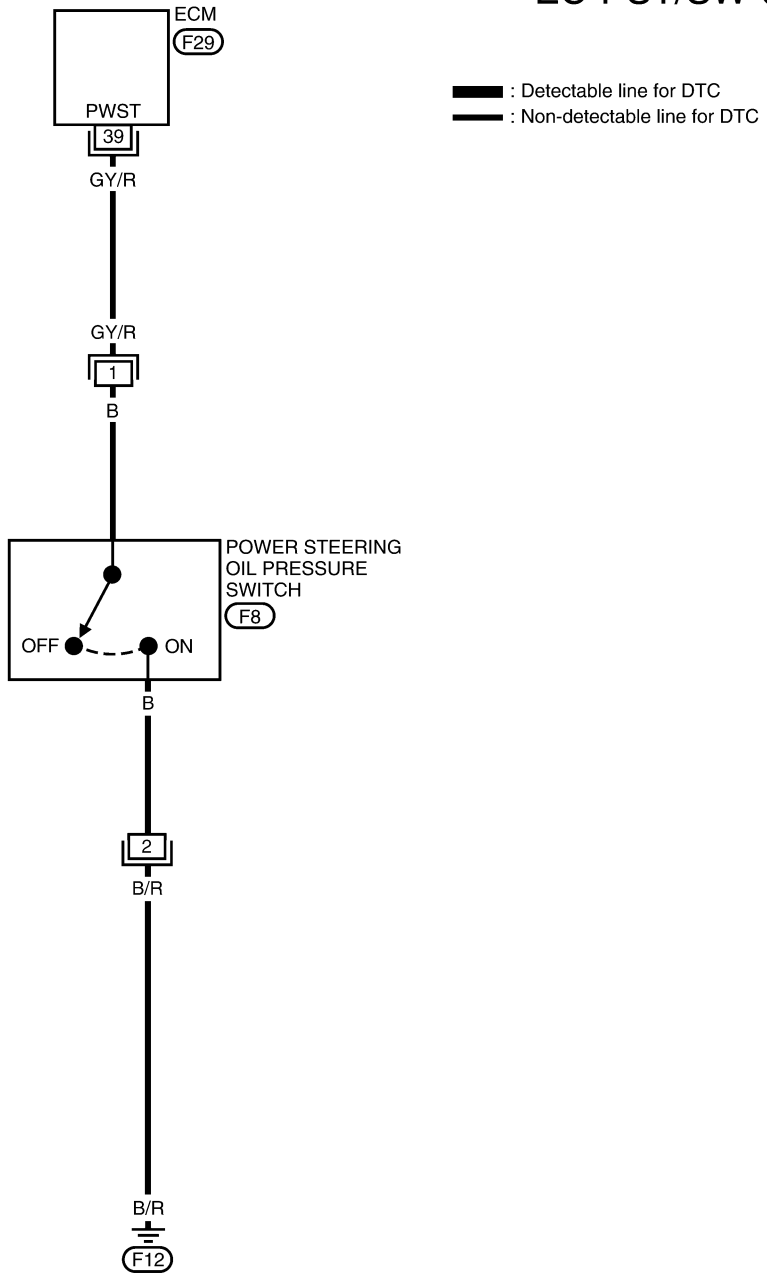
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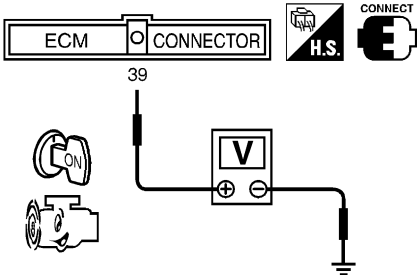
LEC677

Diagnostic Procedure

NGE0928

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK OVERALL FUNCTION									
ⓘ With CONSULT-II 1. Start engine. 2. Check "PW/ST SIGNAL" in "DATA MONITOR" mode with CONSULT-II.										
<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>PW/ST SIGNAL</td> <td>OFF</td> </tr> <tr> <td colspan="2" style="height: 100px;"> </td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	PW/ST SIGNAL	OFF		
DATA MONITOR										
MONITOR	NO DTC									
PW/ST SIGNAL	OFF									
<table border="1" style="margin: auto;"> <tr> <td style="width: 60%;">Steering is in neutral position</td> <td style="text-align: center;">OFF</td> </tr> <tr> <td>Steering is turned</td> <td style="text-align: center;">ON</td> </tr> </table>			Steering is in neutral position	OFF	Steering is turned	ON				
Steering is in neutral position	OFF									
Steering is turned	ON									
SEF228Y										
OK or NG										
OK	▶	INSPECTION END								
NG	▶	GO TO 4.								

3	CHECK OVERALL FUNCTION							
ⓘ Without CONSULT-II 1. Start engine. 2. Check voltage between ECM terminal 39 and ground.								
								
<table border="1" style="margin: auto;"> <thead> <tr> <th>Condition</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>Steering is neutral position</td> <td>Approximately 5V</td> </tr> <tr> <td>Steering is turned to full position</td> <td>Approximately 0V</td> </tr> </tbody> </table>			Condition	Voltage	Steering is neutral position	Approximately 5V	Steering is turned to full position	Approximately 0V
Condition	Voltage							
Steering is neutral position	Approximately 5V							
Steering is turned to full position	Approximately 0V							
SEF739U								
OK or NG								
OK	▶	INSPECTION END						
NG	▶	GO TO 4.						
MTBL0145								

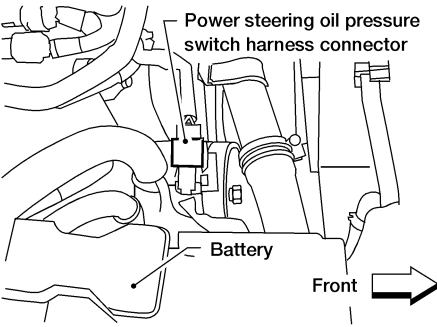
POWER STEERING OIL PRESSURE SWITCH

VG33E

Diagnostic Procedure (Cont'd)

4 CHECK POWER STEERING OIL PRESSURE SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect power steering oil pressure switch harness connector.



3. Check harness continuity between switch terminal 2 and engine ground. 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.

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5 CHECK POWER STEERING OIL PRESSURE SWITCH INPUT SIGNAL CIRCUIT

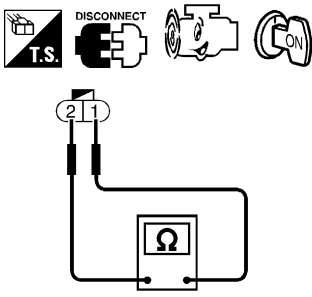
- Disconnect ECM harness connector.
- Check harness continuity between ECM terminal 39 and switch terminal 1. Refer to Wiring Diagram.
Continuity should exist.
- Also check harness for short to ground and short to power.

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 POWER STEERING OIL PRESSURE SWITCH

- Disconnect power steering oil pressure switch harness connector then start engine.
- Check continuity between terminals 1 and 2.



Conditions	Continuity
Steering wheel is being fully turned	Yes
Steering wheel is not being turned	No

OK or NG

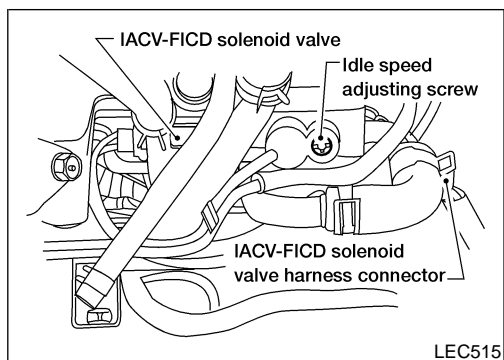
OK	▶	GO TO 7.
NG	▶	Replace power steering oil pressure switch.

POWER STEERING OIL PRESSURE SWITCH

VG33E

Diagnostic Procedure (Cont'd)

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.	
	▶ INSPECTION END



LEC515

Component Description

NGE0929

When the air conditioner is on, the IACV-FICD solenoid valve supplies additional air to adjust to the increased load. For more information, refer to "FAST IDLE CONTROL DEVICE (FICD)", **HA-84**.

ECM Terminals and Reference Value

NGE0930

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 the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
9	B/Y	Ambient air temperature switch	[Engine is running] <ul style="list-style-type: none"> ● Idle speed ● Ambient air temperature is above 25°C (77°F) ● Air conditioner is operating 	0V
			[Engine is running] <ul style="list-style-type: none"> ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is operating 	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] <ul style="list-style-type: none"> ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is not operating 	Approximately 5V
12	P	Air conditioner relay	[Engine is running] <ul style="list-style-type: none"> ● Both A/C switch and blower fan switch are "ON"* 	0 - 1V
			[Engine is running] <ul style="list-style-type: none"> ● A/C switch is "OFF" 	BATTERY VOLTAGE (11 - 14V)
21	G/R	Air conditioner switch	[Engine is running] <ul style="list-style-type: none"> ● Both A/C switch and blower fan switch are "ON" (Compressor operates)* 	Approximately 0V
			[Engine is running] <ul style="list-style-type: none"> ● Air conditioner switch is "OFF" 	Approximately 5V

*: Any mode except "OFF", ambient air temperature is above 25°C (77°F).

IACV-FICD SOLENOID VALVE

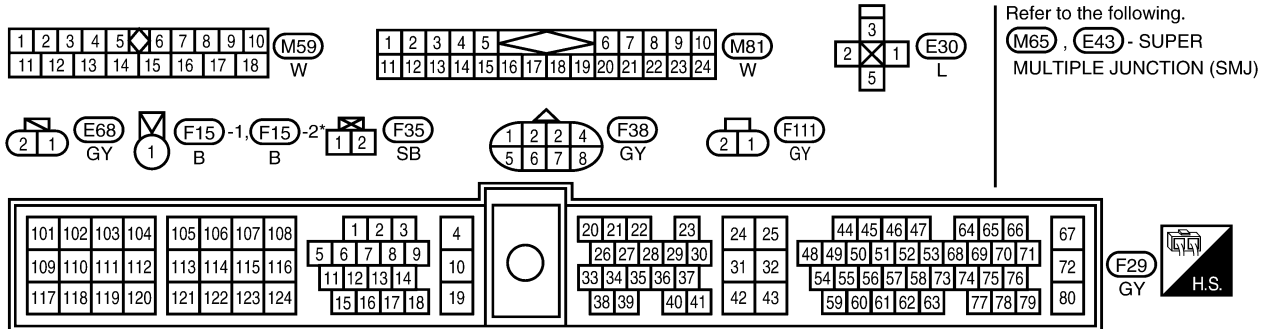
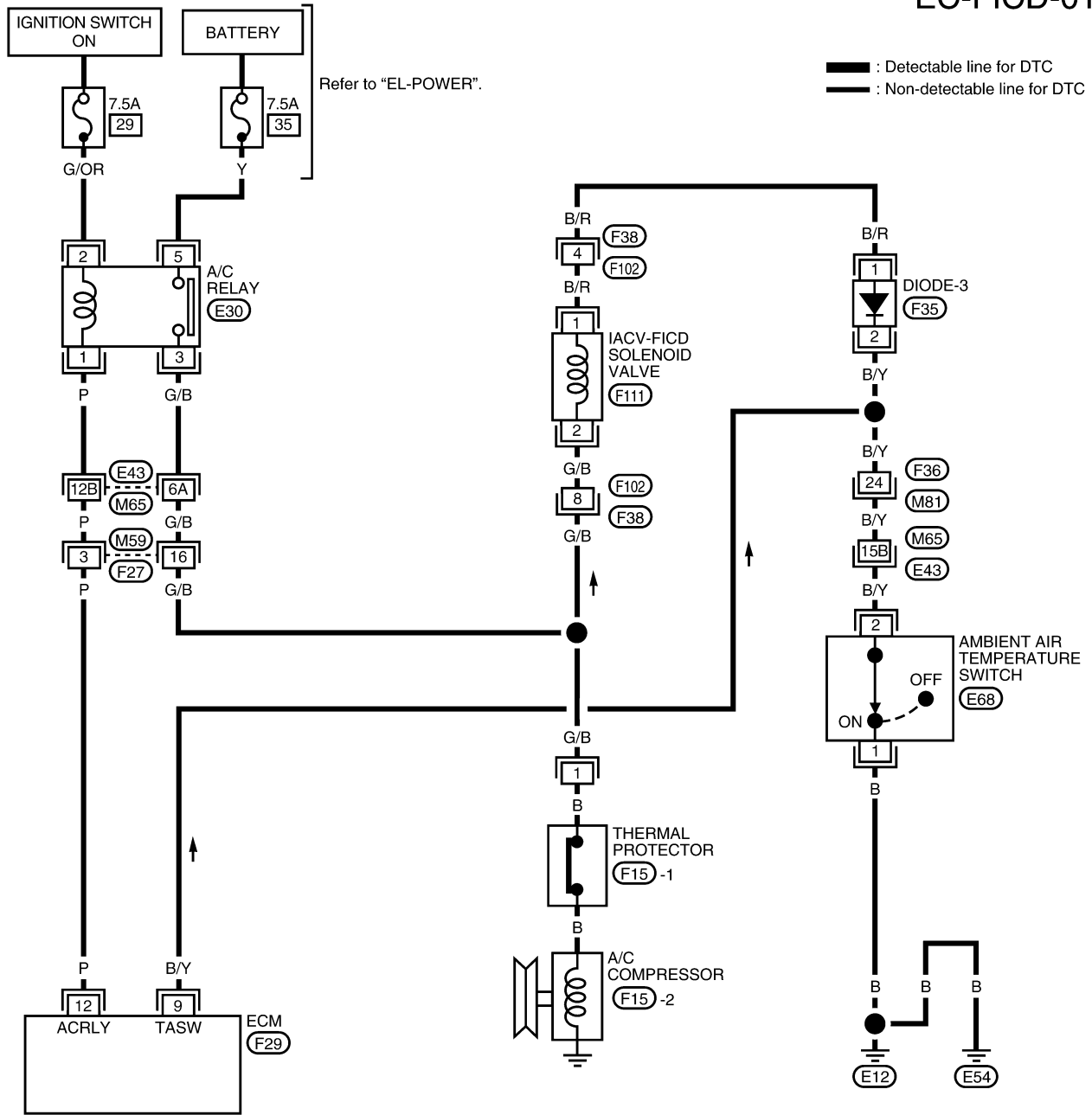
VG33E

Wiring Diagram

Wiring Diagram

NGEC0931

EC-FICD-01



*This connector is not shown in "HARNESS LAYOUT" of EL section.

LEC510

Diagnostic Procedure

NGENC0932

1	CHECK OVERALL FUNCTION	
	1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. 750±50 rpm (in "N" position) If NG, adjust idle speed. 3. Turn air conditioner switch and blower fan switch ON. 4. Recheck idle speed.	
	850 rpm or more (in "P" or "N" position)	
	OK or NG	
OK	▶	INSPECTION END
NG	▶	GO TO 2.

SEF742U

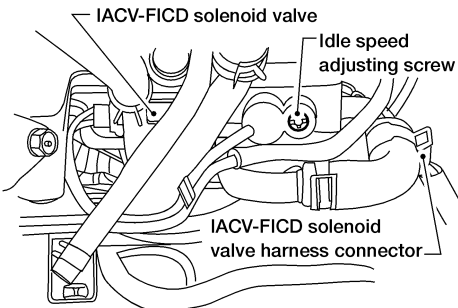
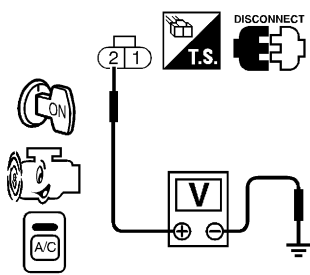
2	CHECK AIR CONDITIONER FUNCTION	
	Check if air conditioner compressor functions normally.	
	OK or NG	
OK	▶	GO TO 3.
NG	▶	Refer to "Symptom Table", "TROUBLE DIAGNOSES", HA-28 .

 GI
 MA
 EM
 LC
EC
 FE
 CL
 MT
 AT
 TF
 PD
 AX
 SU
 BR
 ST
 RS
 BT
 HA
 SC
 EL
 IDX

IACV-FICD SOLENOID VALVE

VG33E

Diagnostic Procedure (Cont'd)

3	CHECK IACV-FICD SOLENOID VALVE POWER SUPPLY CIRCUIT
<ol style="list-style-type: none"> 1. Turn air conditioner switch and blower fan switch OFF. 2. Stop engine. 3. Disconnect IACV-FICD solenoid valve harness connector. 	
	
LEC515	
<ol style="list-style-type: none"> 4. Start engine, then turn air conditioner switch and blower fan switch ON. 5. Check voltage between terminal 2 and ground with CONSULT-II or tester. 	
	
<p>Voltage: Battery voltage</p> <p>OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

4	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Harness for open or short between IACV-FICD solenoid valve and harness connector F27 	
▶	Repair harness or connectors.

5	CHECK IACV-FICD SOLENOID VALVE GROUND CIRCUIT
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect ambient air temperature switch harness connector. 3. Check harness continuity between switch terminal 1 and body ground. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to power. 	
OK or NG	
OK	▶ GO TO 6.
NG	▶ GO TO 7.

IACV-FICD SOLENOID VALVE

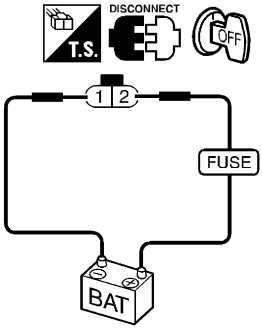
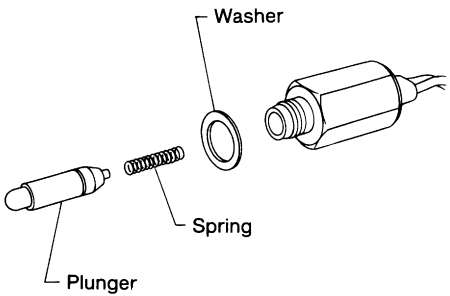
VG33E

Diagnostic Procedure (Cont'd)

6	CHECK IACV-FICD SOLENOID VALVE GROUND CIRCUIT WITH DIODE	
<p>1. Check harness continuity between switch terminal 2 and solenoid valve terminal 1.</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SEF160X</p> <p>Continuity should exist.</p> <p>2. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Harness connectors F36, M81 ● Harness connectors M65, E43 ● Diode F35 ● Harness for open or short between ambient air temperature switch and body ground ● Harness for open or short between IACV-FICD solenoid valve and ambient air temperature switch 		
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

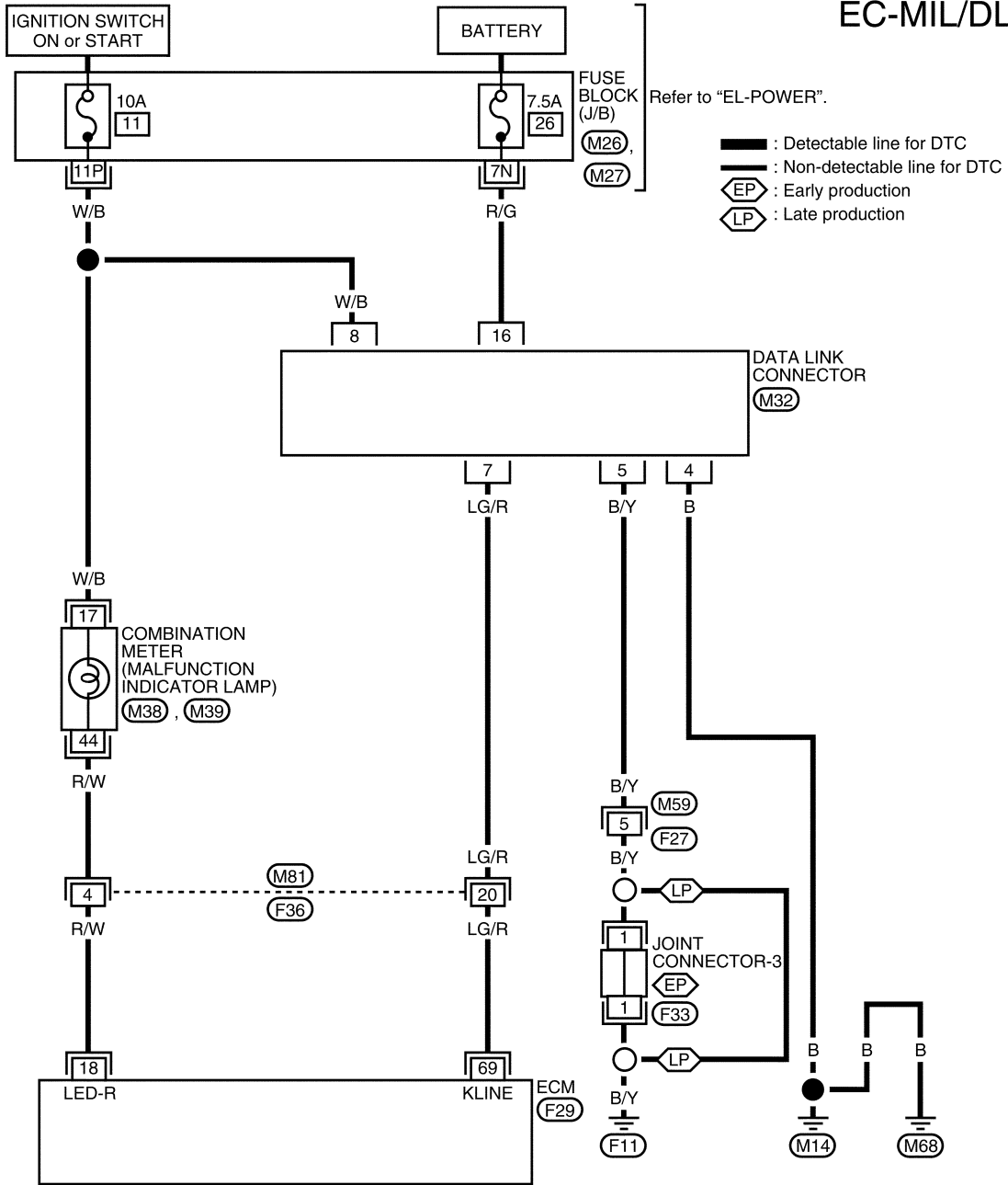
8	CHECK IACV-FICD SOLENOID VALVE		
Disconnect IACV-FICD solenoid valve harness connector.			
<ul style="list-style-type: none"> ● Check for clicking sound when applying 12V direct current to terminals. 			
			
<ul style="list-style-type: none"> ● Check plunger for seizing or sticking. ● Check for broken spring. 			
SEF682W			
			
SEF097K			
OK or NG			
OK	▶	GO TO 9.	
NG	▶	Replace IACV-FICD solenoid valve.	

9	CHECK INTERMITTENT INCIDENT		
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-739.			
		▶	INSPECTION END

Wiring Diagram

NGEC0933

EC-MIL/DL-01



GI

MA

EM

LC

EC

FE

CL

MT

AT

TF

PD

AX

SU

BR

ST

RS

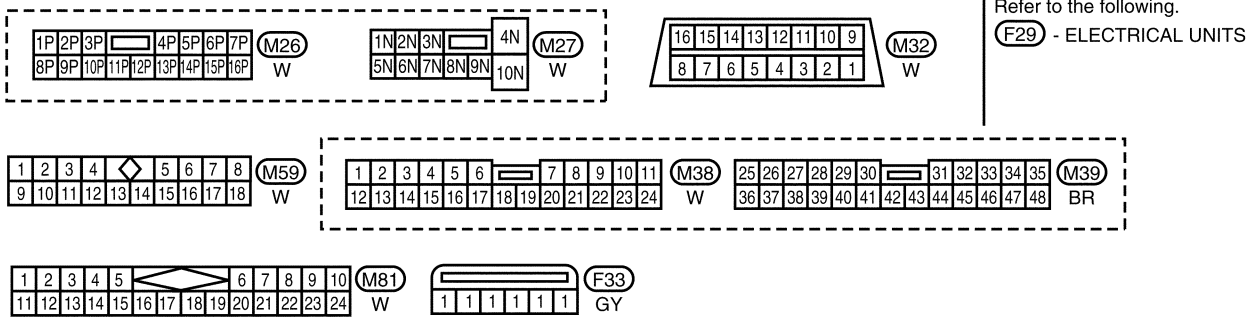
BT

HA

SC

EL

IDX



Fuel Pressure Regulator

NGEC0934

Fuel pressure at idling kPa (kg/cm ² , psi)		
Vacuum hose is connected		Approximately 235 (2.4, 34)
Vacuum hose is disconnected		Approximately 294 (3.0, 43)

Idle Speed and Ignition Timing

NGEC0935

Base idle speed*1	No-load*4 (in "P" or N" position)	700±50 rpm
Target idle speed*2	No-load*4 (in "P" or N" position)	750±50 rpm
Air conditioner: ON	In "P" or N" position	850 rpm or more
Ignition timing*3	In "P" or N" position	10°±2° BTDC
Throttle position sensor idle position		0.15 - 0.85V

*1: Throttle position sensor harness connector disconnected or using CONSULT-II "WORK SUPPORT" mode

*2: Throttle position sensor harness connector connected

*3: Throttle position sensor harness connector disconnected

*4: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Coil

NGEC0936

Primary voltage	12V
Primary resistance [at 20°C (68°F)]	Approximately 1.0Ω
Secondary resistance [at 20°C (68°F)]	Approximately 10 kΩ

Mass Air Flow Sensor

NGEC0937

Supply voltage	Battery voltage (11 - 14)V
Output voltage at idle	1.0 - 1.7V
Mass air flow (Using CONSULT-II or GST)	3.3 - 4.8 g-m/sec at idle* 12.0 - 14.9 g-m/sec at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no-load.

Engine Coolant Temperature Sensor

NGEC0938

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

Heated Oxygen Sensor 1 Heater

NGEC0940

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω
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Fuel Pump

NGEC0941

Resistance [at 25°C (77°F)]	0.2 - 5.0Ω
-----------------------------	------------

IACV-AAC Valve

NGEC0942

Resistance [at 20°C (68°F)]	Approximately 10.0Ω
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Injector

NGEC0943

Resistance [at 25°C (77°F)]	10 - 14Ω
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GI

Throttle Position Sensor

NGEC0945

Throttle valve conditions	Voltage [at normal operating temperature, engine off, ignition switch ON, (throttle opener disengaged, if so equipped)]
Completely closed (a)	0.15 - 0.85V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.7V

MA

EM

LC

EC

Calculated Load Value

NGEC0946

	Calculated load value % (Using CONSULT or GST)
At idle	18.0 - 26.0
At 2,500 rpm	18.0 - 21.0

FE

CL

Intake Air Temperature Sensor

NGEC0947

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38

MT

AT

Heated Oxygen Sensor 2 Heater

NGEC0948

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω
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TF

PD

Crankshaft Position Sensor (OBD)

NGEC0949

Resistance [at 20°C (68°F)]	512 - 632Ω
-----------------------------	------------

AX

Fuel Tank Temperature Sensor

NGEC0950

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

SU

BR

ST

RS

BT

HA

SC

EL

IDX

Alphabetical & P No. Index for DTC

NGEC1052

ALPHABETICAL INDEX FOR DTC

NGEC1052S01

Items (CONSULT-II screen terms)	DTC*1*2	Reference page
	CONSULT-II GST	
Unable to access ECM	—	EC-1289
A/T 1ST GR FNCTN	P0731	AT-125
A/T 2ND GR FNCTN	P0732	AT-131
A/T 3RD GR FNCTN	P0733	AT-137
A/T 4TH GR FNCTN	P0734	AT-143
A/T COMM LINE	P0600*4	EC-1599
A/T DIAG COMM LINE	P1605	EC-1706
A/T TCC S/V FNCTN	P0744	AT-157
ATF TEMP SEN/CIRC	P0710	AT-110
CKP SEN/CIRCUIT	P0335	EC-1475
CKP SENSOR (COG)	P1336	EC-1651
CLOSED LOOP-B1	P1148	EC-1644
CLOSED LOOP-B2	P1168	EC-1644
CLOSED TP SW/CIRC	P0510	EC-1592
CMP SEN/CIRCUIT	P0340	EC-1481
CYL1 MISFIRE	P0301	EC-1462
CYL2 MISFIRE	P0302	EC-1462
CYL3 MISFIRE	P0303	EC-1462
CYL4 MISFIRE	P0304	EC-1462
CYL5 MISFIRE	P0305	EC-1462
CYL6 MISFIRE	P0306	EC-1462
ECM	P0605	EC-1604
ECT SEN/CIRCUIT	P0117*3	EC-1348
ECT SEN/CIRCUIT	P0118*3	EC-1348
ECT SENSOR	P0125	EC-1366
ENG OVER TEMP	P0217	EC-1449
ENG OVER TEMP	P1217	EC-1646
ENGINE SPEED SIG	P0725	AT-121
EVAP GROSS LEAK	P0455	EC-1543
EVAP PURG FLOW/MON	P0441	EC-1493
EVAP SMALL LEAK	P0442	EC-1505
EVAP SMALL LEAK	P1442	EC-1658
EVAP SYS PRES SEN	P0452	EC-1532
EVAP SYS PRES SEN	P0453	EC-1532
EVAP VERY SML LEAK	P0456	EC-1556

TROUBLE DIAGNOSIS — INDEX

VG33ER

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

Items (CONSULT-II screen terms)	DTC*1*2	Reference page	
	CONSULT-II GST		
EVAP VERY SML LEAK	P1456	EC-1556	GI
FTT SEN/CIRCUIT	P0182	EC-1444	MA
FTT SEN/CIRCUIT	P0183	EC-1444	
FTT SENSOR	P0181	EC-1444	EM
FUEL LEV SEN SLOSH	P0460	EC-1570	
FUEL LEVEL SEN/CIRC	P1464	EC-1687	LC
FUEL LEVEL SENSOR	P0461	EC-1575	
FUEL LEVL SEN/CIRC	P0462	EC-1577	EC
FUEL LEVL SEN/CIRC	P0463	EC-1577	
FUEL SYS-LEAN-B1	P0171	EC-1427	FE
FUEL SYS-LEAN-B2	P0174	EC-1427	
FUEL SYS-RICH-B1	P0172	EC-1436	CL
FUEL SYS-RICH-B2	P0175	EC-1436	MT
HO2S1 (B1)	P0132	EC-1374	
HO2S1 (B1)	P0133	EC-1382	AT
HO2S1 (B1)	P0134	EC-1396	
HO2S1 (B1)	P1143	EC-1606	TF
HO2S1 (B1)	P1144	EC-1615	
HO2S1 (B2)	P0152	EC-1374	PD
HO2S1 (B2)	P0153	EC-1382	
HO2S1 (B2)	P0154	EC-1396	AX
HO2S1 (B2)	P1163	EC-1606	
HO2S1 (B2)	P1164	EC-1615	SU
HO2S1 HTR (B1)	P0031	EC-1319	
HO2S1 HTR (B1)	P0032	EC-1319	BR
HO2S1 HTR (B2)	P0051	EC-1319	
HO2S1 HTR (B2)	P0052	EC-1319	ST
HO2S2 HTR (B1)	P0037	EC-1326	
HO2S2 HTR (B1)	P0038	EC-1326	RS
HO2S2 HTR (B2)	P0057	EC-1326	
HO2S2 HTR (B2)	P0058	EC-1326	BT
HO2S2 (B1)	P0138	EC-1407	
HO2S2 (B1)	P0139	EC-1417	HA
HO2S2 (B1)	P1146	EC-1624	
HO2S2 (B1)	P1147	EC-1634	SC
HO2S2 (B2)	P0158	EC-1407	
HO2S2 (B2)	P0159	EC-1417	EL

TROUBLE DIAGNOSIS — INDEX

VG33ER

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

Items (CONSULT-II screen terms)	DTC*1*2	Reference page
	CONSULT-II GST	
HO2S2 (B2)	P1166	EC-1624
HO2S2 (B2)	P1167	EC-1634
IAT SEN/CIRCUIT	P0112	EC-1343
IAT SEN/CIRCUIT	P0113	EC-1343
IAT SENSOR	P0127	EC-1343
ISC SYSTEM/CIRC	P0505	EC-1586
KNOCK SEN/CIRC-B1	P0327	EC-1471
KNOCK SEN/CIRC-B1	P0328	EC-1471
L/PRESS SOL/CIRC	P0745	AT-188
MAF SEN/CIRCUIT	P0101	EC-1334
MAF SEN/CIRCUIT	P0102*3	EC-1334
MAF SEN/CIRCUIT	P0103*3	EC-1334
MULTI CYL MISFIRE	P0300	EC-1462
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	P0000	—
P-N POS SW/CIRCUIT	P1706	EC-1709
PNP SW/CIRC	P0705	AT-104
PURG VOLUME CONT/V	P0444	EC-1519
PURG VOLUME CONT/V	P0445	EC-1519
PURG VOLUME CONT/V	P1444	EC-1660
SCB/V CONT SOL/V	P0245	EC-1456
SFT SOL A/CIRC	P0750*3	AT-169
SFT SOL B/CIRC	P0755*3	AT-174
TCC SOLENOID/CIRC	P0740	AT-152
THERMSTAT FNCTN	P0128	EC-1372
TP SEN/CIRC A/T	P1705*5	AT-179
TP SEN/CIRCUIT	P0121	EC-1353
TP SEN/CIRCUIT	P0122*3	EC-1353
TP SEN/CIRCUIT	P0123*3	EC-1353
TW CATALYST SYS-B1	P0420	EC-1488
TW CATALYST SYS-B2	P0430	EC-1488
VC CUT/V BYPASS/V	P1491	EC-1697
VC/V BYPASS/V	P1490	EC-1691
VEH SPD SEN/CIR AT	P0720	AT-116
VEH SPEED SEN/CIRC	P0500*5	EC-1582
VENT CONTROL VALVE	P0447	EC-1526
VENT CONTROL VALVE	P1446	EC-1672

TROUBLE DIAGNOSIS — INDEX

VG33ER

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

Items (CONSULT-II screen terms)	DTC*1*2	Reference page
	CONSULT-II GST	
VENT CONTROL VALVE	P1448	EC-1679

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

*2: These numbers are prescribed by SAE J2012.

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

*4: This DTC is displayed with CONSULT-II only.

*5: The MIL illuminates when both the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

NOTE:

Regarding D22 models, "B1" indicates bank 1, "B2" indicates bank 2.

GI

MA

EM

LC

EC

FE

CL

MT

AT

TF

PD

AX

SU

BR

ST

RS

BT

HA

SC

EL

IDX

TROUBLE DIAGNOSIS — INDEX

VG33ER

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

P NO. INDEX FOR DTC

=NGEC1052S02

DTC*1*2 CONSULT-II GST	Items (CONSULT-II screen terms)	Reference page
—	Unable to access ECM	EC-1289
P0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	—
P0031	HO2S1 HTR (B1)	EC-1319
P0032	HO2S1 HTR (B1)	EC-1319
P0037	HO2S2 HTR (B1)	EC-1326
P0038	HO2S2 HTR (B1)	EC-1326
P0051	HO2S1 HTR (B2)	EC-1319
P0052	HO2S1 HTR (B2)	EC-1319
P0057	HO2S2 HTR (B2)	EC-1326
P0058	HO2S2 HTR (B2)	EC-1326
P0101	MAF SEN/CIRCUIT	EC-1334
P0102*3	MAF SEN/CIRCUIT	EC-1334
P0103*3	MAF SEN/CIRCUIT	EC-1334
P0112	IAT SEN/CIRCUIT	EC-1343
P0113	IAT SEN/CIRCUIT	EC-1343
P0117*3	ECT SEN/CIRCUIT	EC-1348
P0118*3	ECT SEN/CIRCUIT	EC-1348
P0121	TP SEN/CIRCUIT	EC-1353
P0122*3	TP SEN/CIRCUIT	EC-1353
P0123*3	TP SEN/CIRCUIT	EC-1353
P0125	ECT SENSOR	EC-1366
P0127	IAT SENSOR	EC-1343
P0128	THERMSTAT FNCTN	EC-1372
P0132	HO2S1 (B1)	EC-1374
P0133	HO2S1 (B1)	EC-1382
P0134	HO2S1 (B1)	EC-1396
P0138	HO2S2 (B1)	EC-1407
P0139	HO2S2 (B1)	EC-1417
P0152	HO2S1 (B2)	EC-1374
P0153	HO2S1 (B2)	EC-1382
P0154	HO2S1 (B2)	EC-1396
P0158	HO2S2 (B2)	EC-1407
P0159	HO2S2 (B2)	EC-1417
P0171	FUEL SYS-LEAN-B1	EC-1427
P0172	FUEL SYS-RICH-B1	EC-1436

TROUBLE DIAGNOSIS — INDEX

VG33ER

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

DTC*1*2	Items (CONSULT-II screen terms)	Reference page	
CONSULT-II GST			
P0174	FUEL SYS-LEAN-B2	EC-1427	GI
P0175	FUEL SYS-RICH-B2	EC-1436	MA
P0181	FTT SENSOR	EC-1444	
P0182	FTT SEN/CIRCUIT	EC-1444	EM
P0183	FTT SEN/CIRCUIT	EC-1444	
P0217	ENG OVER TEMP	EC-1449	LC
P0245	SCB/V CONT SOL/V	EC-1456	
P0300	MULTI CYL MISFIRE	EC-1462	EC
P0301	CYL1 MISFIRE	EC-1462	
P0302	CYL2 MISFIRE	EC-1462	FE
P0303	CYL3 MISFIRE	EC-1462	
P0304	CYL4 MISFIRE	EC-1462	CL
P0305	CYL5 MISFIRE	EC-1462	
P0306	CYL6 MISFIRE	EC-1462	MT
P0327	KNOCK SEN/CIRC-B1	EC-1471	
P0328	KNOCK SEN/CIRC-B1	EC-1471	AT
P0335	CKP SEN/CIRCUIT	EC-1475	
P0340	CMP SEN/CIRCUIT	EC-1481	TF
P0420	TW CATALYST SYS-B1	EC-1488	PD
P0430	TW CATALYST SYS-B2	EC-1488	
P0441	EVAP PURG FLOW/MON	EC-1493	AX
P0442	EVAP SMALL LEAK	EC-1505	
P0444	PURG VOLUME CONT/V	EC-1519	SU
P0445	PURG VOLUME CONT/V	EC-1519	
P0447	VENT CONTROL VALVE	EC-1526	BR
P0452	EVAP SYS PRES SEN	EC-1532	
P0453	EVAP SYS PRES SEN	EC-1532	ST
P0455	EVAP GROSS LEAK	EC-1543	
P0456	EVAP VERY SML LEAK	EC-1556	RS
P0460	FUEL LEV SEN SLOSH	EC-1570	
P0461	FUEL LEVEL SENSOR	EC-1575	BT
P0462	FUEL LEVL SEN/CIRC	EC-1577	
P0463	FUEL LEVL SEN/CIRC	EC-1577	HA
P0500*5	VEH SPEED SEN/CIRC	EC-1582	SC
P0505	ISC SYSTEM/CIRC	EC-1586	
P0510	CLOSED TP SW/CIRC	EC-1592	EL
P0600*4	A/T COMM LINE	EC-1599	

TROUBLE DIAGNOSIS — INDEX

VG33ER

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

DTC*1*2	Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST		
P0605	ECM	EC-1604
P0705	PNP SW/CIRC	AT-104
P0710	ATF TEMP SEN/CIRC	AT-110
P0720	VEH SPD SEN/CIR AT	AT-116
P0725	ENGINE SPEED SIG	AT-121
P0731	A/T 1ST GR FNCTN	AT-125
P0732	A/T 2ND GR FNCTN	AT-131
P0733	A/T 3RD GR FNCTN	AT-137
P0734	A/T 4TH GR FNCTN	AT-143
P0740	TCC SOLENOID/CIRC	AT-152
P0744	A/T TCC S/V FNCTN	AT-157
P0745	L/PRESS SOL/CIRC	AT-164
P0750*3	SFT SOL A/CIRC	AT-169
P0755*3	SFT SOL B/CIRC	AT-174
P1143	HO2S1 (B1)	EC-1606
P1144	HO2S1 (B1)	EC-1615
P1146	HO2S2 (B1)	EC-1624
P1147	HO2S2 (B1)	EC-1634
P1148	CLOSED LOOP-B1	EC-1644
P1163	HO2S1 (B2)	EC-1606
P1164	HO2S1 (B2)	EC-1615
P1166	HO2S2 (B2)	EC-1624
P1167	HO2S2 (B2)	EC-1634
P1168	CLOSED LOOP-B2	EC-1644
P1217	ENG OVER TEMP	EC-1646
P1336	CKP SENSOR (COG)	EC-1651
P1442	EVAP SMALL LEAK	EC-1658
P1444	PURG VOLUME CONT/V	EC-1660
P1446	VENT CONTROL VALVE	EC-1672
P1448	VENT CONTROL VALVE	EC-1679
P1456	EVAP VERY SML LEAK	EC-1556
P1464	FUEL LEVEL SEN/CIRK	EC-1687
P1490	VC/V BYPASS/V	EC-1691
P1491	VC CUT/V BYPASS/V	EC-1697
P1605	A/T DIAG COMM LINE	EC-1706
P1705*5	TP SEN/CIRC A/T	AT-179
P1706	P-N POS SW/CIRCUIT	EC-1709

TROUBLE DIAGNOSIS — INDEX

VG33ER

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

DTC*1*2	Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST		
P1760	O/R CLUTCH SOL/CIRC	AT-188

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

*2: These numbers are prescribed by SAE J2012.

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

*4: This DTC is displayed with CONSULT-II only.

*5: The MIL illuminates when both the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

NOTE:

Regarding D22 models, "B1" indicates bank 1, "B2" indicates bank 2.

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

NGEC1053

The Supplemental Restraint System "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a seat belt, help to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.

In addition to the supplemental air bag modules for a frontal collision, the supplemental side air bag used along with the seat belt helps to reduce the risk or severity of injury to the driver and front passenger in a side collision. The supplemental side air bag consists of air bag modules (located in the outer side of front seats), satellite sensor, diagnosis sensor unit (one of components of supplemental air bags for a frontal collision), wiring harness, warning lamp (one of components of supplemental air bags for a frontal collision). Information necessary to service the system safely is included in the **RS section** of this Service Manual.

WARNING:

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

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

NGEC1054

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

CAUTION:

- Be sure to turn the ignition switch OFF and disconnect the negative battery terminal before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.
- Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)
- Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to *EL-6* "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 EGR system or fuel injection system, etc.
- Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.

Engine Fuel & Emission Control System

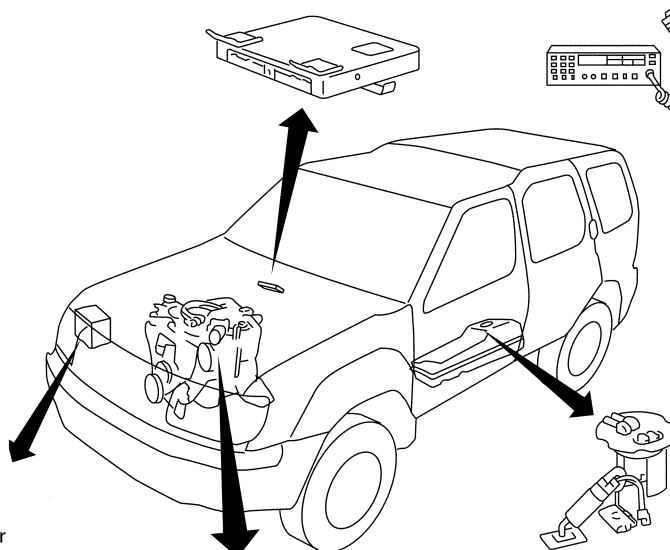
NGENC1055

ECM

- Do not disassemble ECM.
- Do not turn on board diagnostic test mode selector forcibly.
- If a battery terminal 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 problem. Do not replace parts because of a slight variation.

WIRELESS EQUIPMENT

- When installing CB ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on its installation location.
 - 1) Keep the antenna as far away as possible from the electronic control units.
 - 2) Keep the antenna feeder line more than 20 cm (7.9 in) away from the harness of electronic controls.
Do not let them run parallel for a long distance.
 - 3) Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
 - 4) Be sure to ground the radio to vehicle body.



BATTERY

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

WHEN STARTING

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

ECM PARTS HANDLING

- Handle mass air flow sensor carefully to avoid damage.
- Do not disassemble mass air flow sensor.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble IACV-AAC valve.
- Even a slight leak in the air intake system can cause serious problems.
- Do not shock or jar the camshaft position sensor or crankshaft position sensor (OBD).



FUEL PUMP

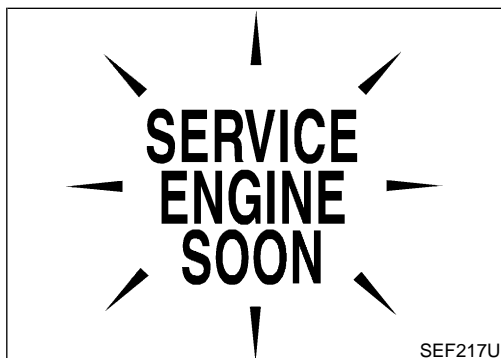
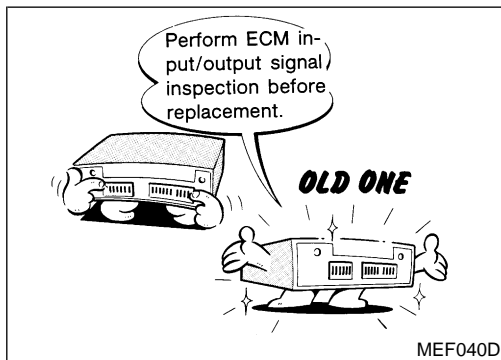
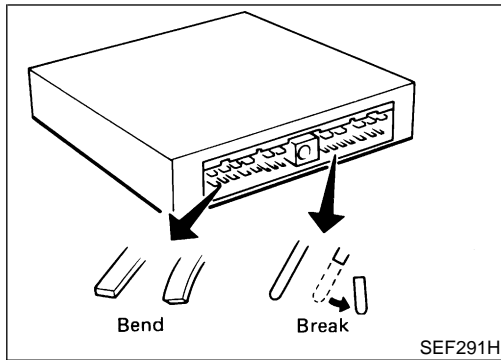
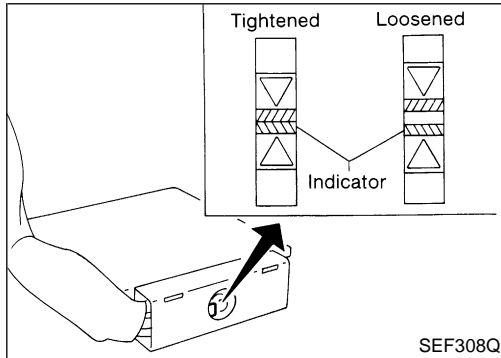
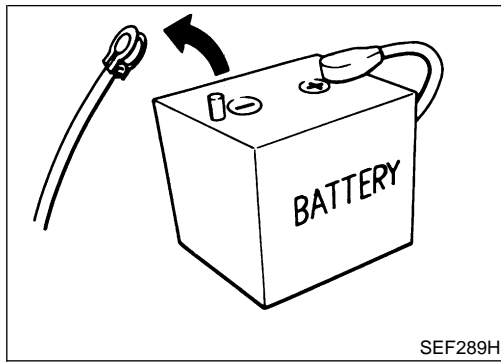
- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque. (Refer to MA section.)

ECM HARNESS HANDLING

- Securely connect ECM harness connectors.
A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep ECM harness at least 10 cm (3.9 in.) away from adjacent harnesses to prevent an ECM system malfunction due to receiving external noise, degraded operation of ICs, etc.
- Keep ECM parts and harnesses dry.
- Before removing parts, turn off ignition switch and then disconnect battery ground cable.


AEC045B

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Precautions

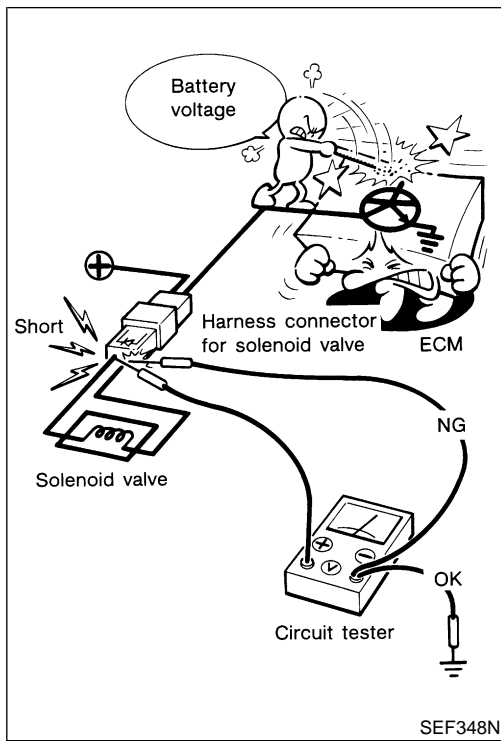
NGEC1056

- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery terminal. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned off.
- When connecting ECM harness connector, tighten securing bolt until the gap between orange indicators disappears.
 -  : 3 - 5 N·m (0.3 - 0.5 kg·m, 26 - 43 in·lb)
- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break). Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- Before replacing ECM, perform “ECM Terminals and Reference Value” inspection and make sure ECM functions properly. Refer to EC-1299.
- 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.

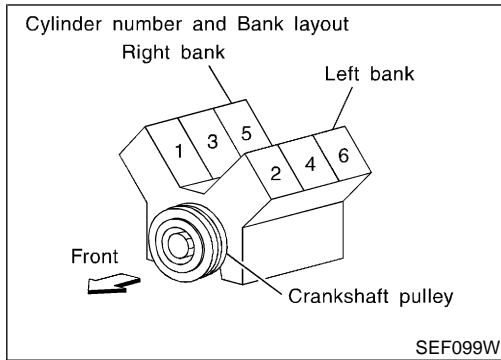
PRECAUTIONS

VG33ER

Precautions (Cont'd)



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



- Regarding model D22, “-B1” indicates the right bank and “-B2” indicates the left bank as shown in the figure.

Wiring Diagrams and Trouble Diagnosis

NGEC1057

When you read Wiring diagrams, refer to the following:

- **GI-10**, “HOW TO READ WIRING DIAGRAMS”
- **EL-10**, “POWER SUPPLY ROUTING”

When you perform trouble diagnosis, refer to the following:

- **GI-33**, “How to Follow Test Groups in Trouble Diagnoses”
- **GI-22**, “HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT”

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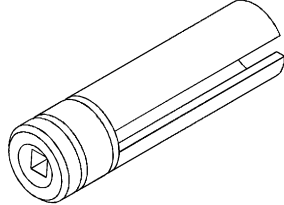
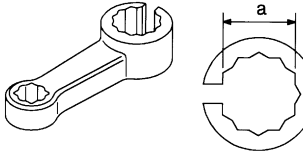
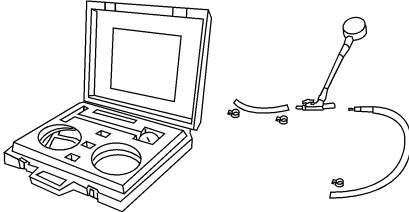
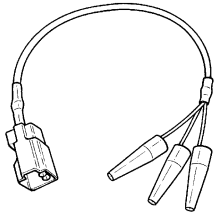
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Special Service Tools

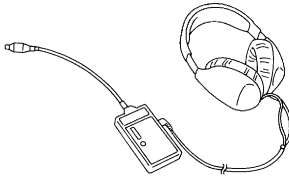
NGEC1058

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

Tool number (Kent-Moore No.) Tool name	Description	
KV10117100 (J36471-A) Heated oxygen sensor wrench		Loosening or tightening front heated oxygen sensor with 22 mm (0.87 in) hexagon nut
KV10114400 (J-38365) Heated oxygen sensor wrench		Loosening or tightening rear heated oxygen sensor a: 22 mm (0.87 in)
(J-44321) Fuel pressure gauge kit		Checking fuel pressure
(J-45178) TPS test connector		Used to test the throttle position sensor

Commercial Service Tools

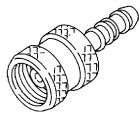
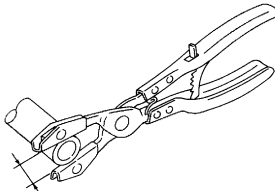
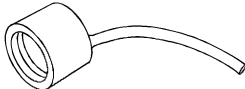
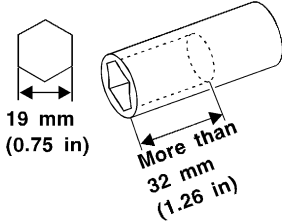
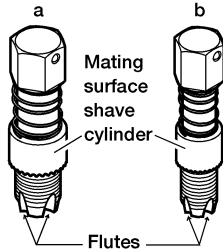
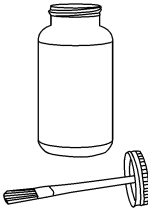
NGEC1059

Tool name (Kent-Moore No.)	Description	
Leak detector (J41416)		Locating the EVAP leak

PREPARATION

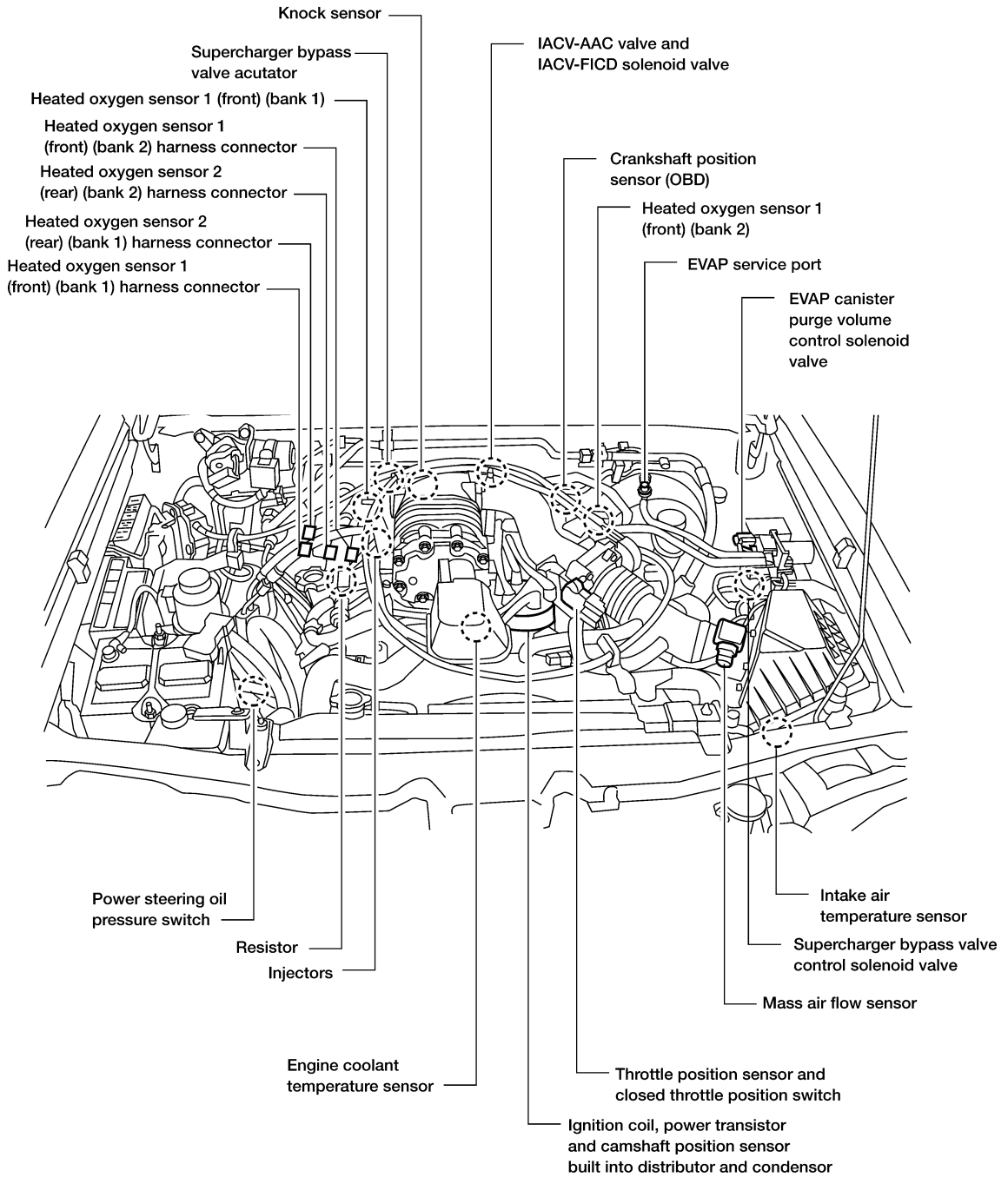
VG33ER

Commercial Service Tools (Cont'd)

Tool name (Kent-Moore No.)	Description	
EVAP service port adapter (J41413-OBID)	Applying positive pressure through EVAP service port  NT704	GI MA EM LC
Hose clipper	Clamping the EVAP purge hose between the fuel tank and EVAP canister applied to DTC P1442 [EVAP control system (small leak-positive pressure)]  Approx. 20 mm (0.79 in) NT720	EC FE CL
Fuel filler cap adapter	Checking fuel tank vacuum relief valve opening pressure  NT653	MT AT TF
Socket wrench	Removing and installing engine coolant temperature sensor  19 mm (0.75 in) More than 32 mm (1.26 in) NT705	PD AX SU
Oxygen sensor thread cleaner (J-43897-18) (J-43897-12)	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown in "Commercial Service Tools". a: J-43897-18 (18 mm diameter with pitch 1.5 mm) for Zirconia Oxygen Sensor b: J-43897-12 (12 mm diameter with pitch 1.25 mm) for Titania Oxygen Sensor  a b Mating surface shave cylinder Flutes AEM488	BR ST RS BT
Anti-seize lubricant (Permatex [®] 133AR or equivalent meeting MIL specification MIL-A-907)	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.  AEM489	HA SC EL

Engine Control Component Parts Location

NGEC1060



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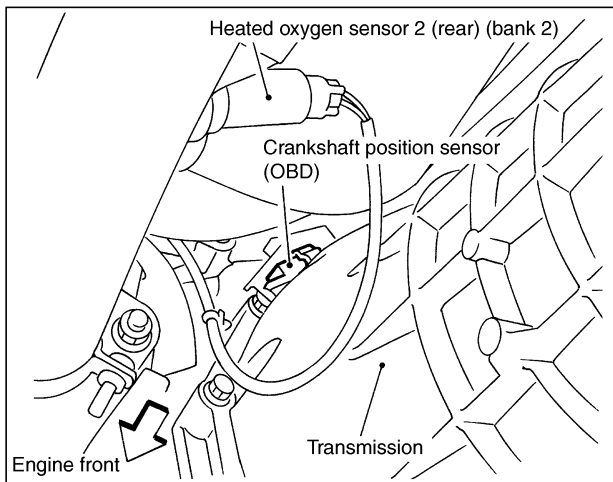
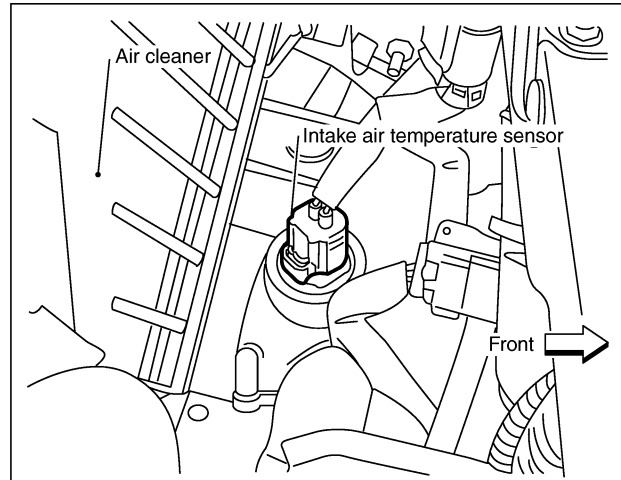
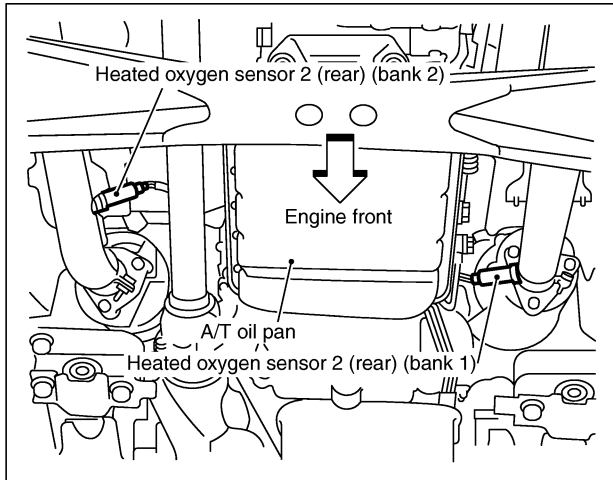
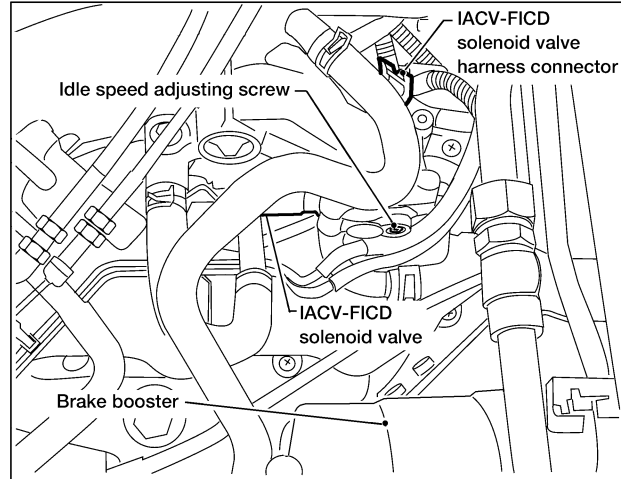
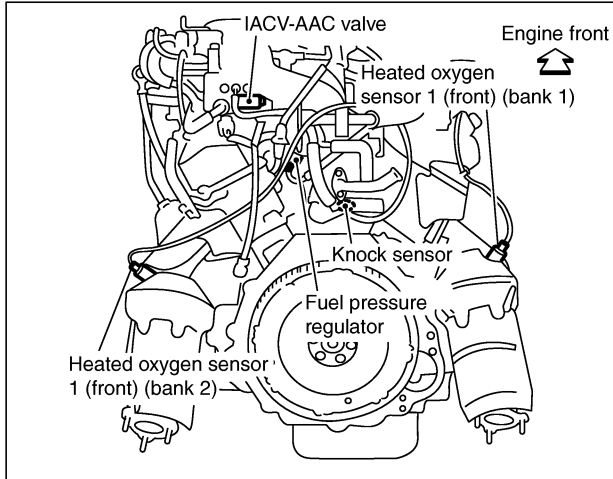
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ENGINE AND EMISSION CONTROL OVERALL SYSTEM

VG33ER

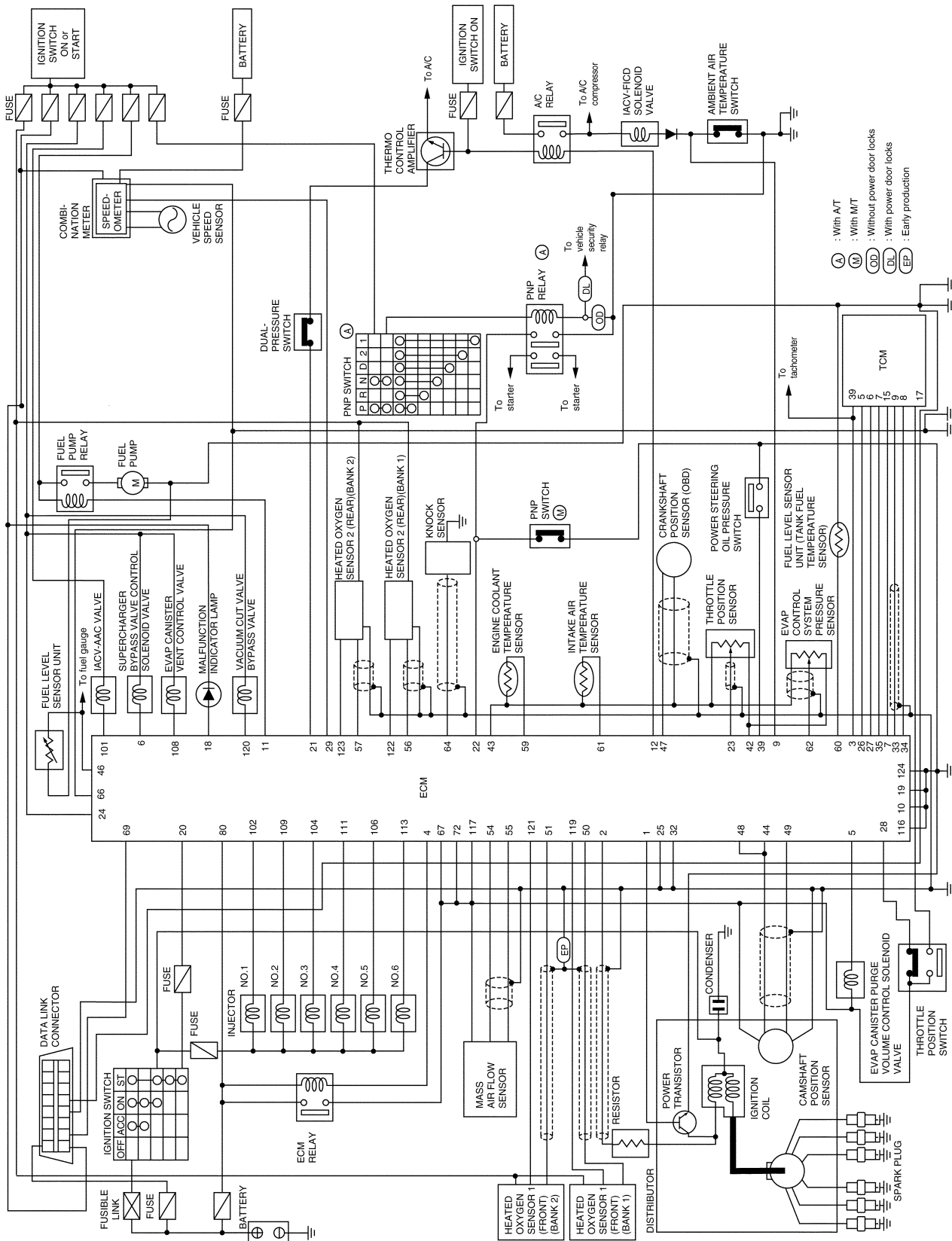
Engine Control Component Parts Location (Cont'd)



LEC762

Circuit Diagram

NGEC1061

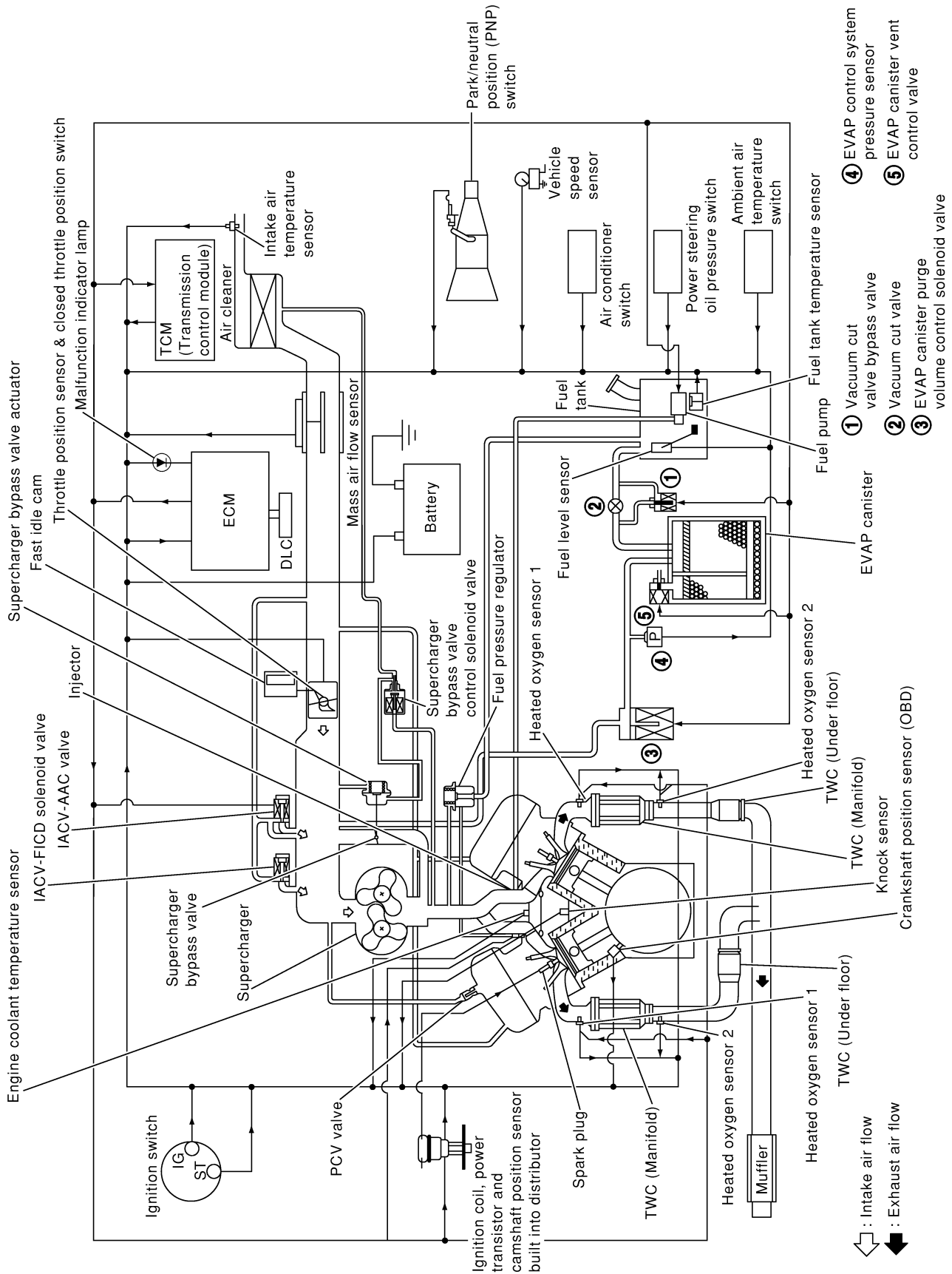


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WEC184A

System Diagram

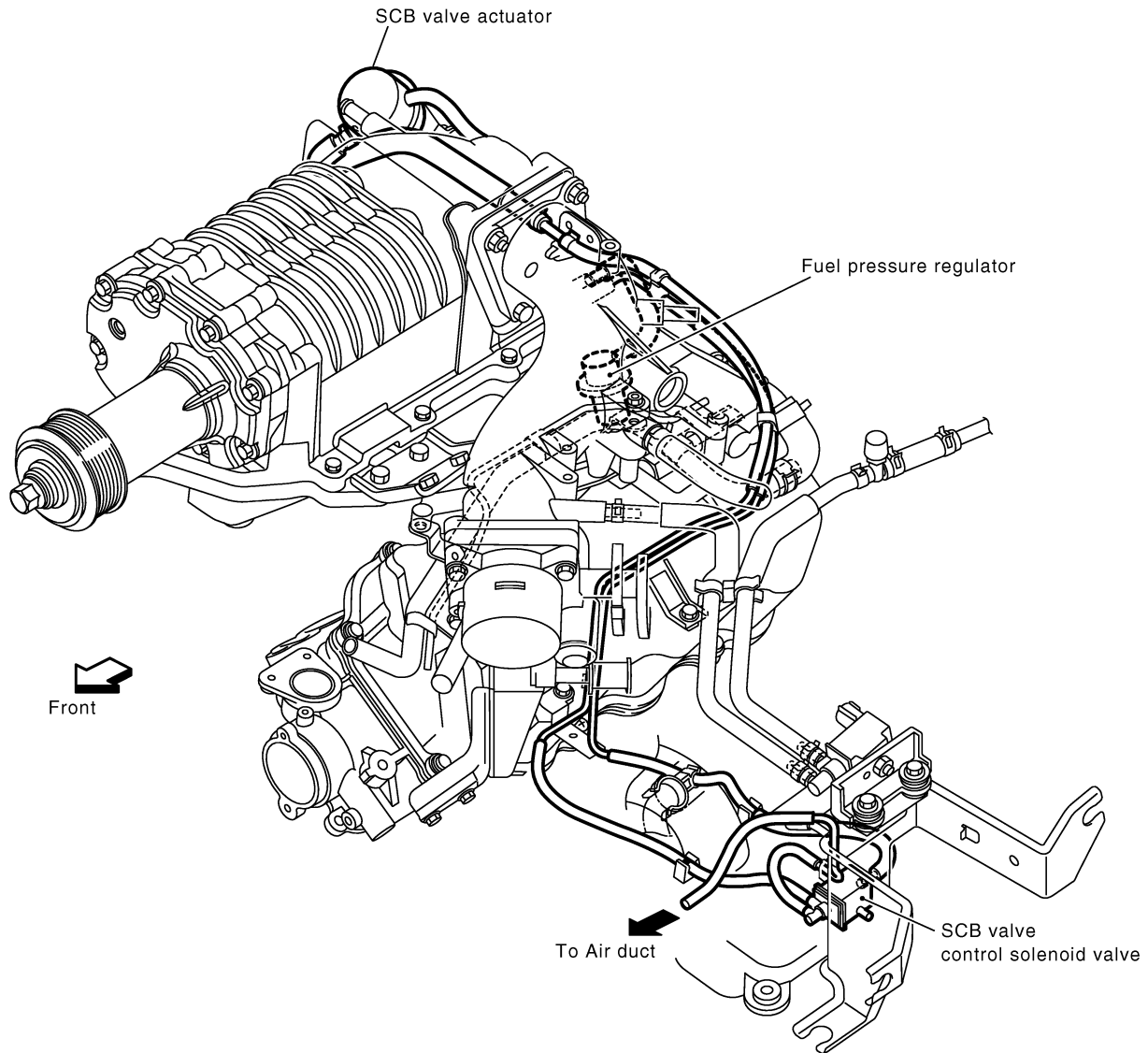
NGEC1062



Vacuum Hose Drawing

NGEC1063

Refer to "System Diagram", EC-1192 for Vacuum Control System.



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

SEC295C

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System Chart

NGEC1064

Input (Sensor)	ECM Function	Output (Actuator)
<ul style="list-style-type: none"> ● Camshaft position sensor ● Mass air flow sensor ● Engine coolant temperature sensor ● Heated oxygen sensor 1 ● Ignition switch ● Throttle position sensor ● Closed throttle position switch *4 ● Park/neutral position (PNP) switch ● Air conditioner switch ● Knock sensor ● Intake air temperature sensor ● EVAP control system pressure sensor *1 ● Battery voltage ● Power steering oil pressure switch ● Vehicle speed sensor ● Fuel tank temperature sensor *1 ● Crankshaft position sensor (OBD) *1 ● Rear heated oxygen sensor *3 ● TCM (Transmission control module) *2 ● Ambient air temperature switch 	Fuel injection & mixture ratio control	Injectors
	Distributor ignition system	Power transistor
	Idle air control system	IACV-AAC valve and IACV-FICD solenoid valve
	Fuel pump control	Fuel pump relay
	On board diagnostic system	MIL (On the instrument panel)
	Supercharged air control	SCB valve control solenoid valve
	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
	Air conditioning cut control	Air conditioner relay
	Cooling fan control	Cooling fan relays
	ON BOARD DIAGNOSIS for EVAP system	<ul style="list-style-type: none"> ● EVAP canister vent control valve ● Vacuum cut valve bypass valve

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

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

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

*4: This switch will operate in place of the throttle position sensor to control EVAP parts if the sensor malfunctions.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

Multiport Fuel Injection (MFI) System

Multiport Fuel Injection (MFI) System

DESCRIPTION

Input/Output Signal Chart

NGEC1065

NGEC1065S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed and piston position	Fuel injection & mixture ratio control	Injectors
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Heated oxygen sensor 1	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position Throttle valve idle position		
Park/neutral position (PNP) switch	Gear position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Air conditioner switch	Air conditioner operation		
Knock sensor	Engine knocking condition		
Battery	Battery voltage		
Power steering oil pressure switch	Power steering operation		
Heated oxygen sensor 2*	Density of oxygen in exhaust gas		

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

Basic Multiport Fuel Injection System

NGEC1065S02

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

Various Fuel Injection Increase/Decrease Compensation

NGEC1065S03

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

<Fuel increase>

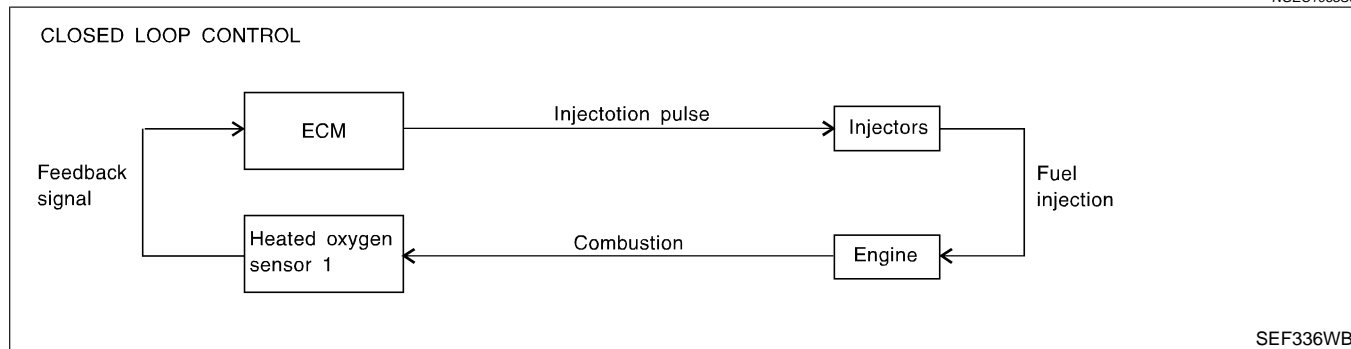
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from "N" to "D"
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

Mixture Ratio Feedback Control (Closed loop control)

NGEC1065S04



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The warm-up three way catalyst can then better reduce CO, HC and NOx emissions. This system uses a heated oxygen sensor 1 in the exhaust manifold to monitor if the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about the heated oxygen sensor 1, refer to EC-1396. 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 warm-up three way catalyst. Even if the switching characteristics of the heated oxygen sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from the heated oxygen sensor 2.

Open Loop Control

NGEC1065S05

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

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

Mixture Ratio Self-learning Control

NGEC1065S06

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

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

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

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

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

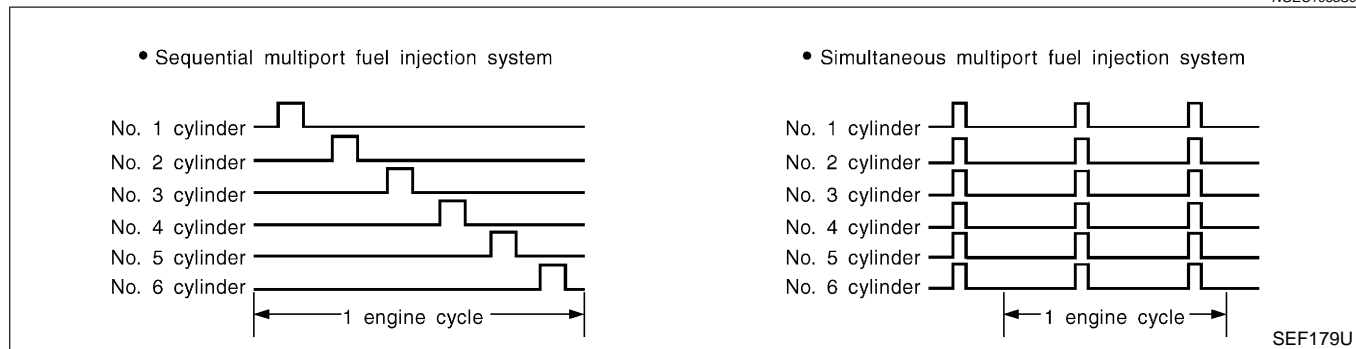
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

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

Fuel Injection Timing

NGEC1065S07



SEF179U

Two types of systems are used.

Sequential Multiport Fuel Injection System

NGEC1065S0701

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

NGEC1065S0702

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

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

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

Fuel Shut-off

NGEC1065S08

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

Distributor Ignition (DI) System

DESCRIPTION

Input/Output Signal Chart

NGEC1066

NGEC1066S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed and piston position	Ignition timing control	Power transistor
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position Throttle valve idle position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch	Gear position		
Battery	Battery voltage		

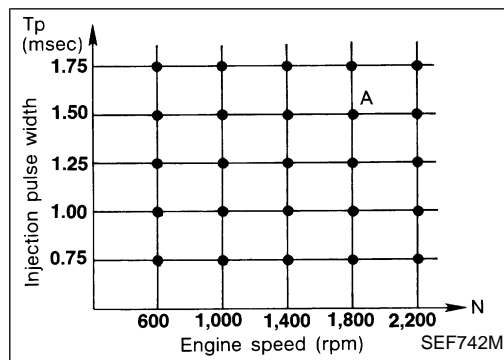
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

Distributor Ignition (DI) System (Cont'd)

System Description

NGEC1066S02



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

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

e.g., N: 1,800 rpm, Tp: 1.50 msec

A °BTDC

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

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

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

Air Conditioning Cut Control

DESCRIPTION

NGEC1067

Input/Output Signal Chart

NGEC1067S01

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner "ON" signal	Air conditioner cut control	Air conditioner relay
Throttle position sensor	Throttle valve opening angle		
Camshaft position sensor	Engine speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Vehicle speed sensor	Vehicle speed		
Power steering oil pressure switch	Power steering operation		

System Description

NGEC1067S02

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.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

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

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

DESCRIPTION

Input/Output Signal Chart

NGEC1068

NGEC1068S01

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Fuel cut control	Injectors
Park/neutral position (PNP) switch	Neutral position		
Throttle position sensor	Throttle position		
Engine coolant temperature sensor	Engine coolant temperature		
Camshaft position sensor	Engine speed		

If the engine speed is above 2,500 rpm with no load (for example, in neutral and engine speed over 2,500 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will operate until the engine speed reaches 2,000 rpm, then fuel cut is cancelled.

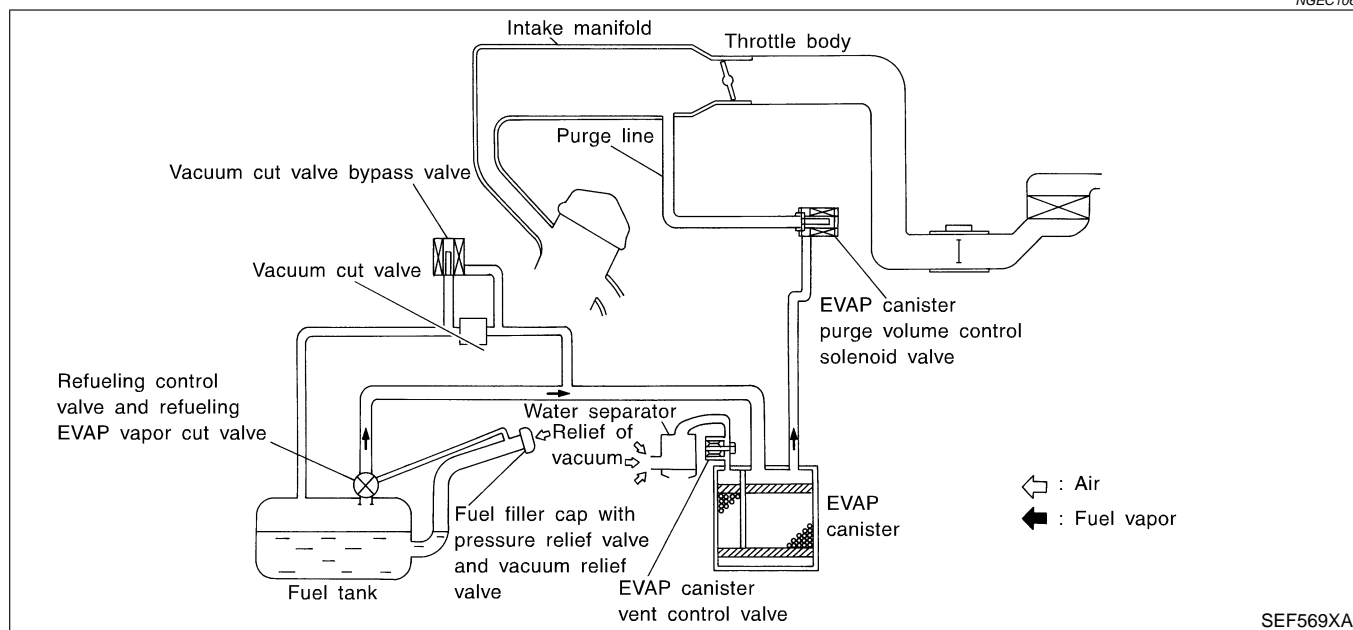
NOTE:

This function is different from deceleration control listed under "Multiport Fuel Injection (MFI) System", EC-1195.

Evaporative Emission System

DESCRIPTION

NGEC1069



SEF569XA

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.

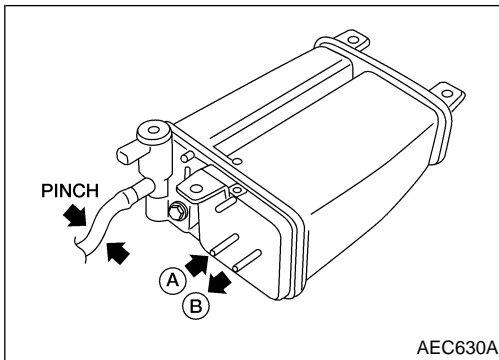
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid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

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

Evaporative Emission System (Cont'd)



INSPECTION

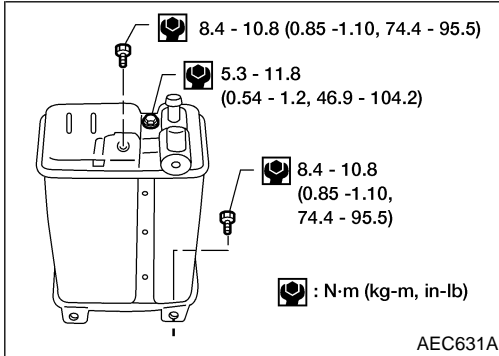
EVAP Canister

Check EVAP canister as follows:

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

NGEC1070

NGEC1070S01

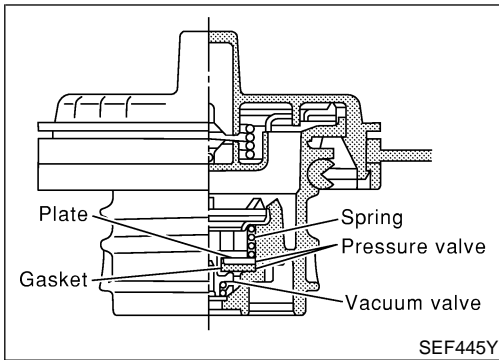


Tightening Torque

Tighten EVAP canister as shown in the figure.

Make sure new O-ring is installed properly between EVAP canister and EVAP canister vent control valve.

NGEC1070S02



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

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

Pressure:

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

Vacuum:

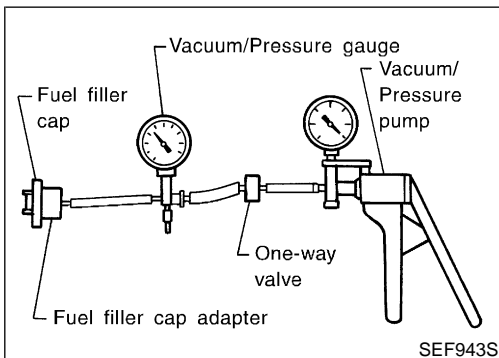
-6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm², -0.87 to -0.48 psi)

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

CAUTION:

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

NGEC1070S03



Vacuum Cut Valve and Vacuum Cut Valve Bypass Valve

Refer to EC-1697.

NGEC1070S04

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve

Refer to EC-1519.

NGEC1070S05

Fuel Tank Temperature Sensor

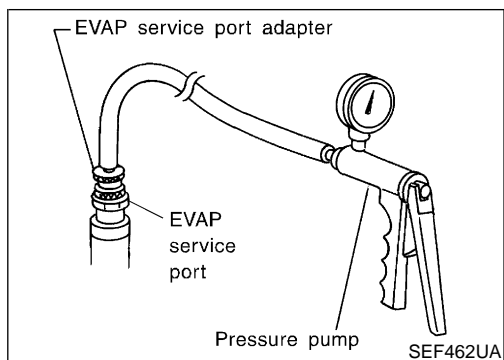
Refer to EC-1444.

NGEC1070S06

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

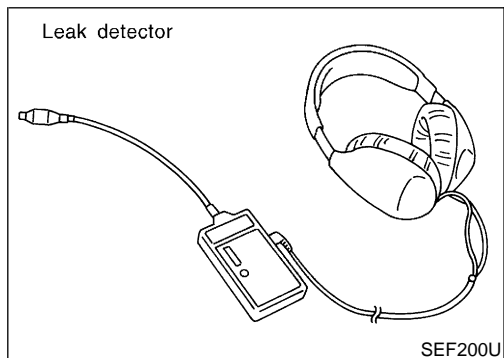
Evaporative Emission System (Cont'd)



Evap Service Port

NGEC1070S07

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



How to Detect Fuel Vapor Leakage

NGEC1070S08

CAUTION:

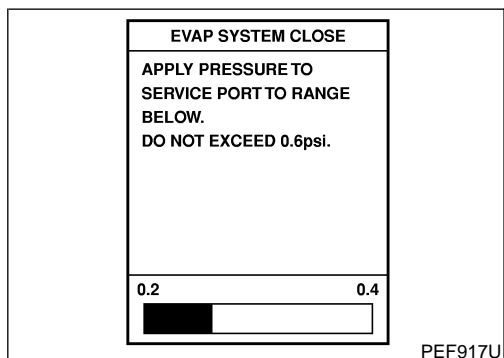
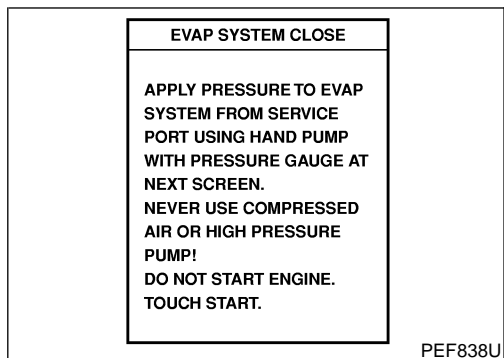
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in EVAP system.

NOTE:

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

Ⓜ With CONSULT-II

- 1) Attach the EVAP service port adapter securely to the EVAP service port.
- 2) Also attach the pressure pump and hose to the EVAP service port adapter.
- 3) Turn ignition switch ON.
- 4) Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT MODE" with CONSULT-II.
- 5) Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
- 6) Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
- 7) Remove EVAP service port adapter and hose with pressure pump.
- 8) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-1203.

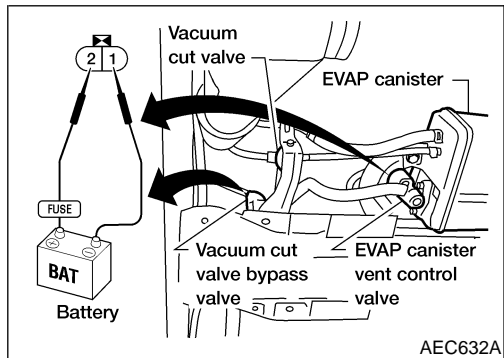
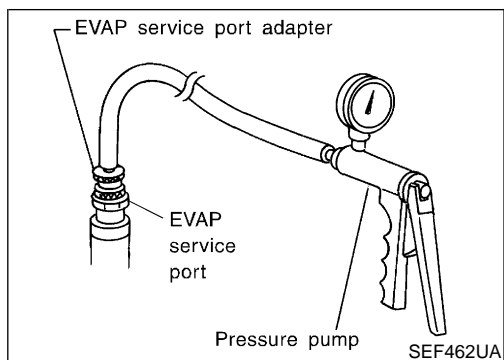


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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

Evaporative Emission System (Cont'd)



⊗ Without CONSULT-II

- 1) Attach the EVAP service port adapter securely to the EVAP service port.
- 2) Also attach the pressure pump with pressure gauge to the EVAP service port adapter.
- 3) Apply battery voltage to between the terminals of both EVAP canister vent control valve and vacuum cut valve bypass valve to make a closed EVAP system.
- 4) To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm², 0.2 to 0.4 psi).
- 5) Remove EVAP service port adapter and hose with pressure pump.
- 6) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-1203.

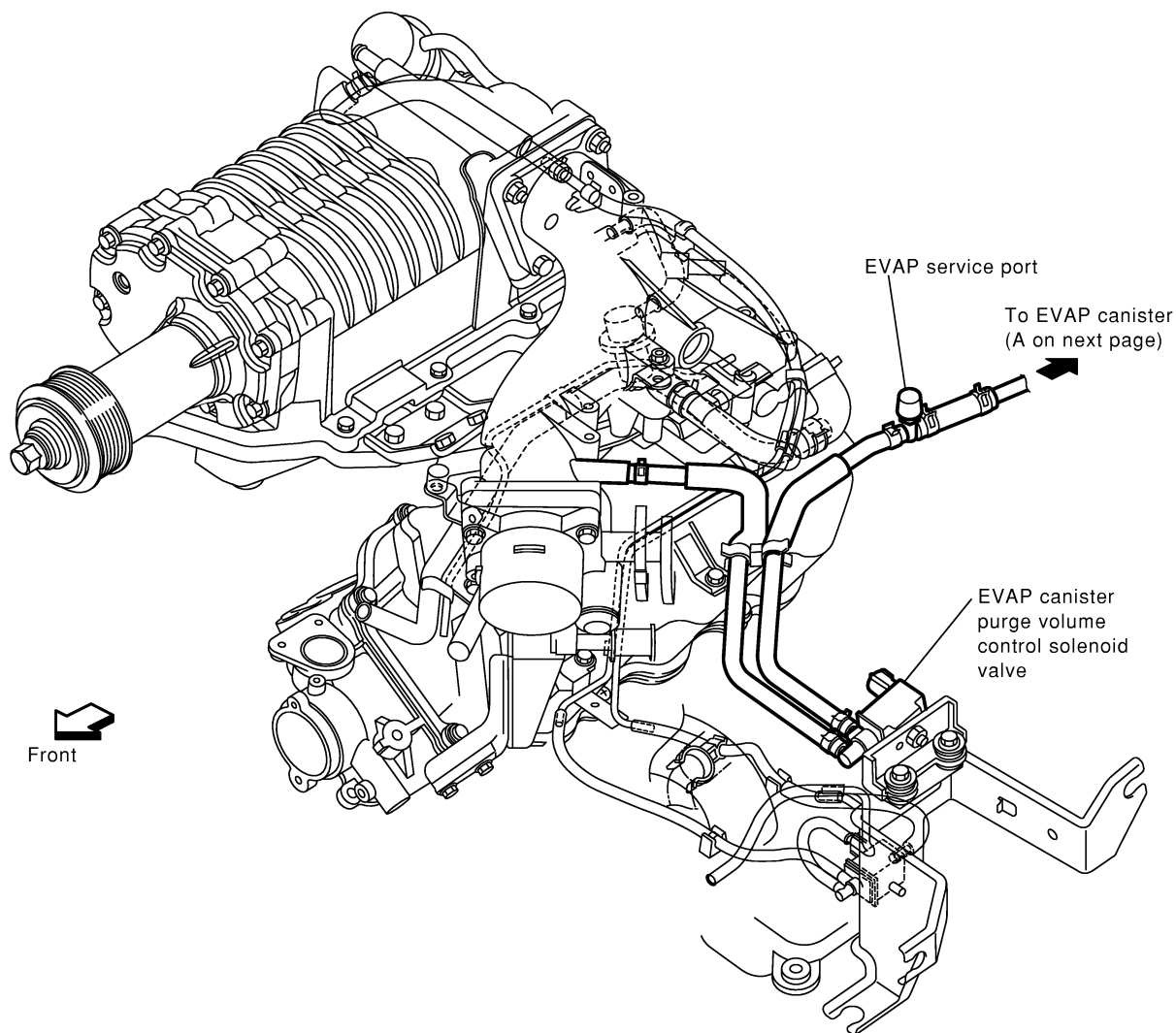
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

Evaporative Emission System (Cont'd)

EVAPORATIVE EMISSION LINE DRAWING

NGEC1071



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

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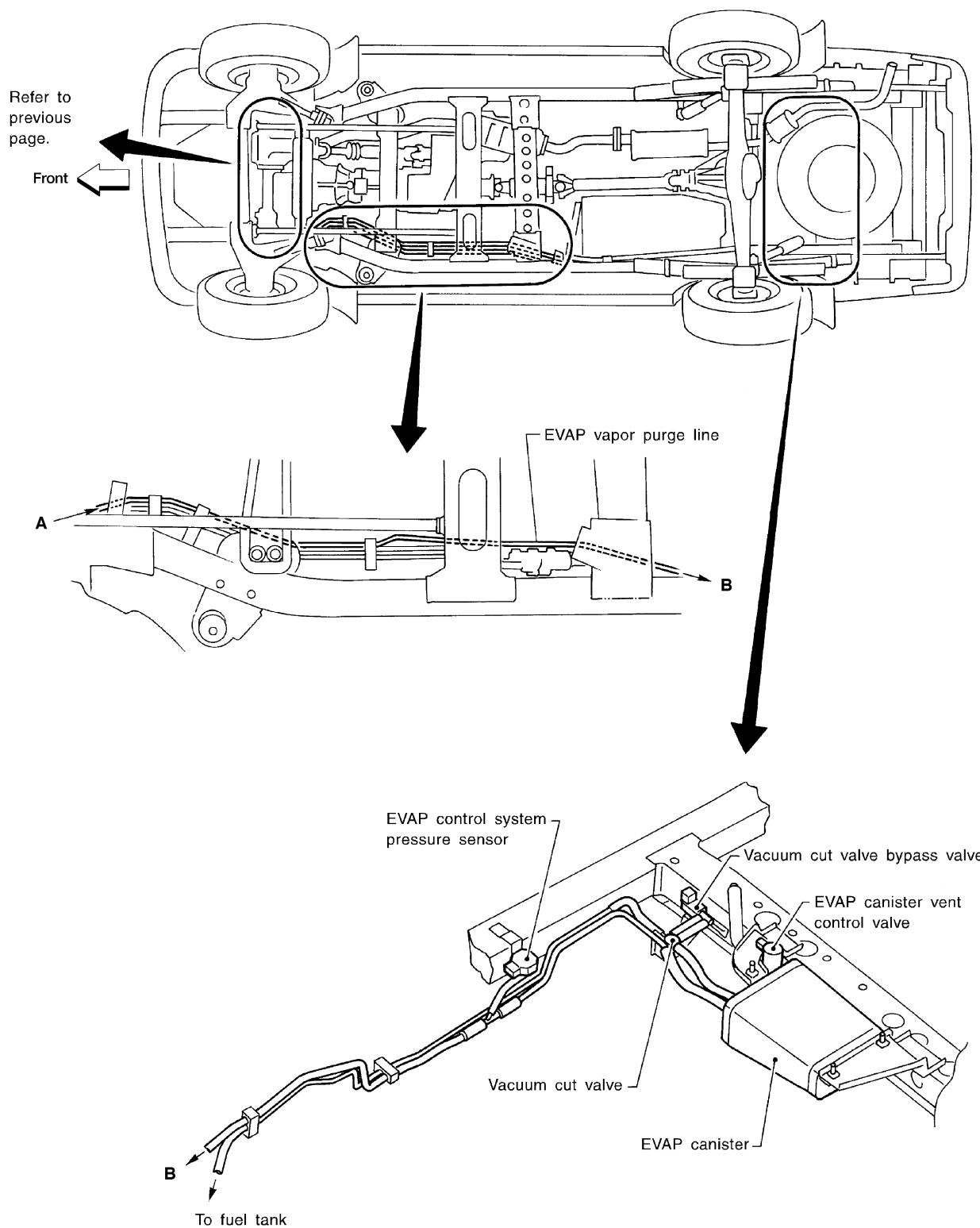
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SEC296C

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

Evaporative Emission System (Cont'd)



AEC886A

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

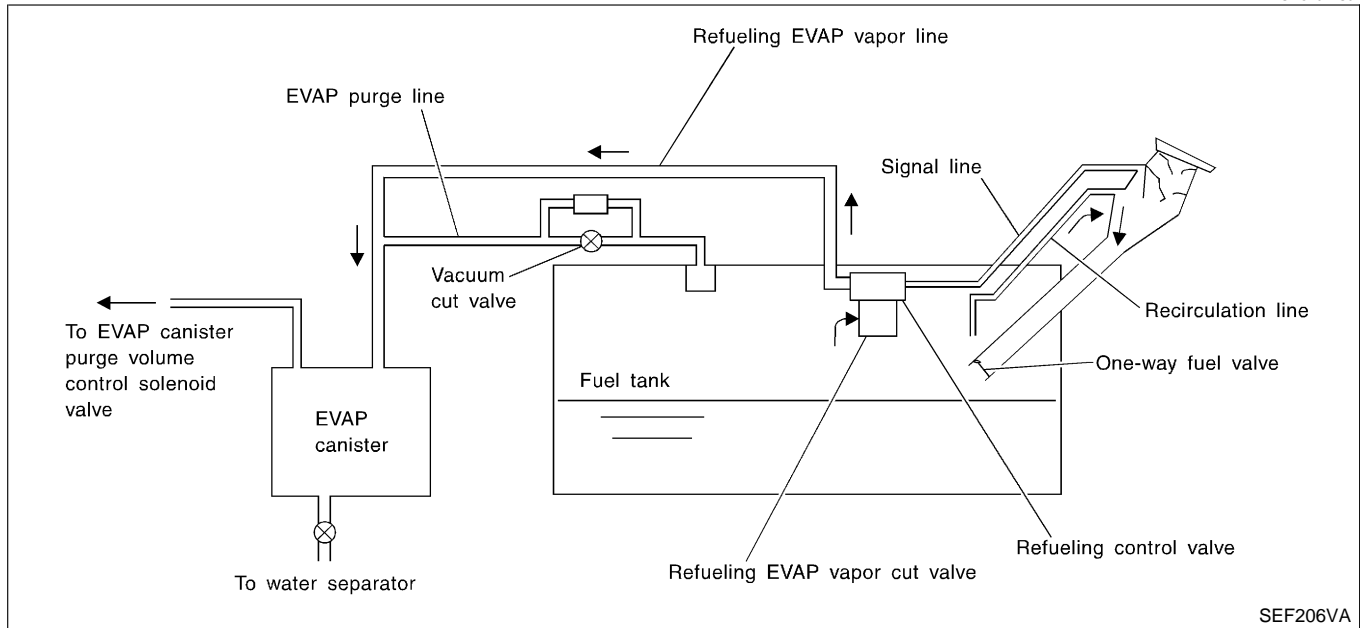
On Board Refueling Vapor Recovery (ORVR)

On Board Refueling Vapor Recovery (ORVR)

NGEC1072

SYSTEM DESCRIPTION

NGEC1072S01



From the beginning of refueling, the fuel tank pressure goes up. When the pressure reaches the setting value of the refueling control valve (RCV) opening pressure, the RCV is opened. After RCV opens, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve, RCV and refueling vapor line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.

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

The RCV is always closed during driving and the evaporative emission control system is operated the same as conventional system.

WARNING:

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

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

CAUTION:

- Before removing fuel line parts, carry out the following procedures:
 - a) Put drained fuel in an explosion-proof container and put lid on securely.
 - b) Release fuel pressure from fuel line. Refer to "Fuel Pressure Release", EC-1217.
 - c) Disconnect battery ground cable.
- Always replace O-ring when the fuel gauge retainer is removed.
- Do not kink or twist hose and tube when they are installed.
- Do not tighten hose and clamps excessively to avoid damaging hoses.
- After installation, run engine and check for fuel leaks at connection.
- Do not attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically. Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

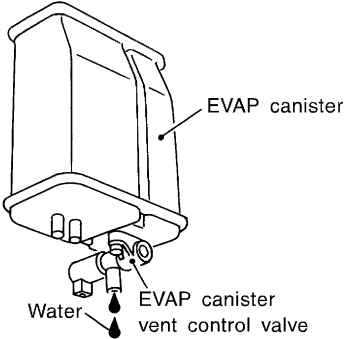
DIAGNOSTIC PROCEDURE

NGEC1072S02

Symptom: Fuel Odor from EVAP Canister Is Strong.

NGEC1072S0201

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

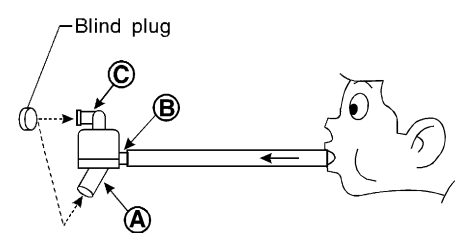
2	CHECK IF EVAP CANISTER SATURATED WITH WATER	
Does water drain from the EVAP canister?		
		
SEF596U		
Yes or No		
Yes	▶	GO TO 3.
No (With CONSULT-II)	▶	GO TO 6.
No (Without CONSULT-II)	▶	GO TO 7.

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

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

4	CHECK WATER SEPARATOR	<p>1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged.</p> <div style="text-align: center;">  <p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p> </div> <p style="text-align: right;">SEF829T</p> <p>5. In case of NG in items 2 - 4, replace the parts. NOTE: • Do not disassemble water separator.</p> <p style="text-align: center;">OK or NG</p>	GI MA EM LC EC FE CL MT	
	OK	▶	GO TO 5.	
	NG	▶	Replace water separator.	

5	DETECT MALFUNCTIONING PART	<p>Check the EVAP hose between EVAP canister and water separator for clogging or poor connection.</p> <p style="text-align: center;">▶</p> <p>Repair or replace EVAP hose.</p>	AT TF PD AX SU BR ST RS BT HA SC EL IDX
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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

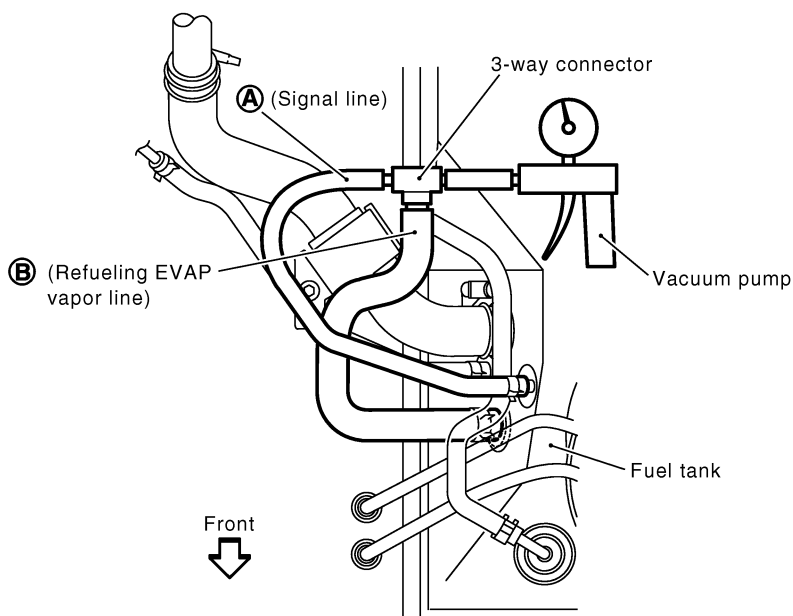
VG33ER

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

6 CHECK REFUELING EVAP VAPOR CUT VALVE

With CONSULT-II

1. Remove fuel tank. Refer to **FE-5**, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:
 - a. Remove fuel feed hose located on the fuel level sensor unit retainer.
 - b. Connect a spare fuel hose, one side to fuel level sensor unit retainer where the hose was removed and the other side to a fuel container.
 - c. Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-II.
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.
 - a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
 - b. Remove fuel level sensor unit retainer with fuel level sensor unit.
Always replace O-ring with new one.
 - c. Put fuel tank upside down.
 - d. Apply vacuum pressure to both hose ends A and B [-13.3 kPa (-100 mmHg, -3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable.



SEF707Z

OK or NG

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

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

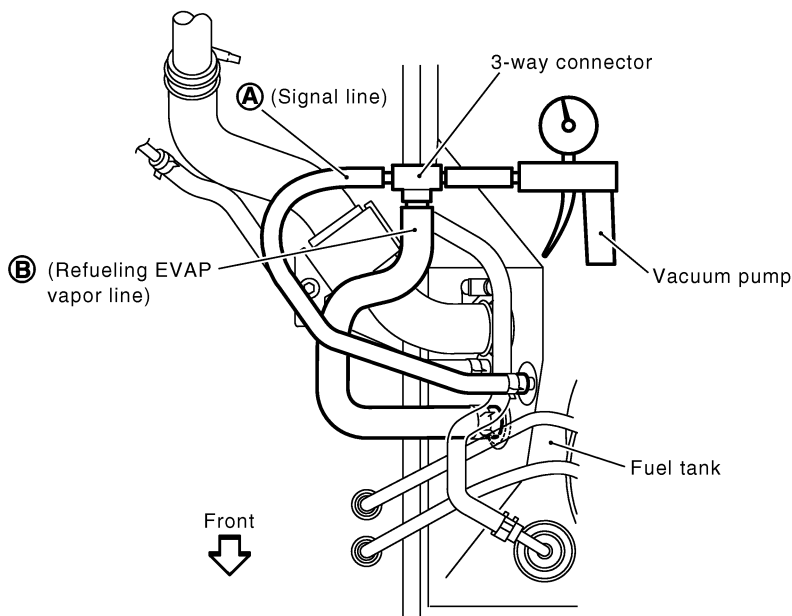
VG33ER

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

7 CHECK REFUELING EVAP VAPOR CUT VALVE

⊗ Without CONSULT-II

1. Remove fuel tank. Refer to **FE-5**, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:
 - a. Remove fuel level sensor unit retainer.
 - b. Drain fuel from the tank using a hand pump into a fuel container.
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.
 - a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
 - b. Remove fuel level sensor unit retainer with fuel level sensor unit.
Always replace O-ring with new one.
 - c. Put fuel tank upside down.
 - d. Apply vacuum pressure to both hose ends A and B [-13.3 kPa (-100 mmHg, -3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable.



OK or NG

SEF707Z

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

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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

8	CHECK REFUELING CONTROL VALVE	<ol style="list-style-type: none"> 1. Remove fuel filler cap. 2. Check air continuity between hose ends A and B. Blow air into the hose end B. Air should flow freely into the fuel tank. 3. Blow air into hose end A and check there is no leakage. 4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage.
OK or NG		
OK	▶	INSPECTION END
NG	▶	Replace refueling control valve with fuel tank.

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

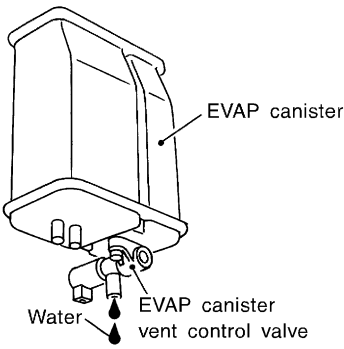
NGEC1072S0202

1	CHECK EVAP CANISTER	<ol style="list-style-type: none"> 1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Weigh the EVAP canister with EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).
OK or NG		
OK	▶	GO TO 2.
NG	▶	GO TO 3.

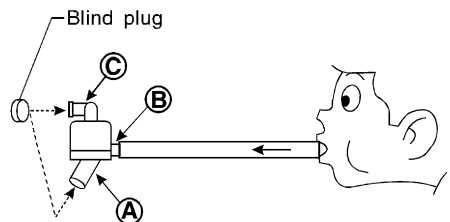
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

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

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

4	CHECK WATER SEPARATOR	
<ol style="list-style-type: none"> 1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged. 		
		
<p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p>		
SEF829T		
5. In case of NG in items 2 - 4, replace the parts.		
NOTE:		
● Do not disassemble water separator.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace water separator.

5	DETECT MALFUNCTIONING PART	
Check the EVAP hose between EVAP canister and water separator for clogging or poor connection.		
▶ Repair or replace EVAP hose.		

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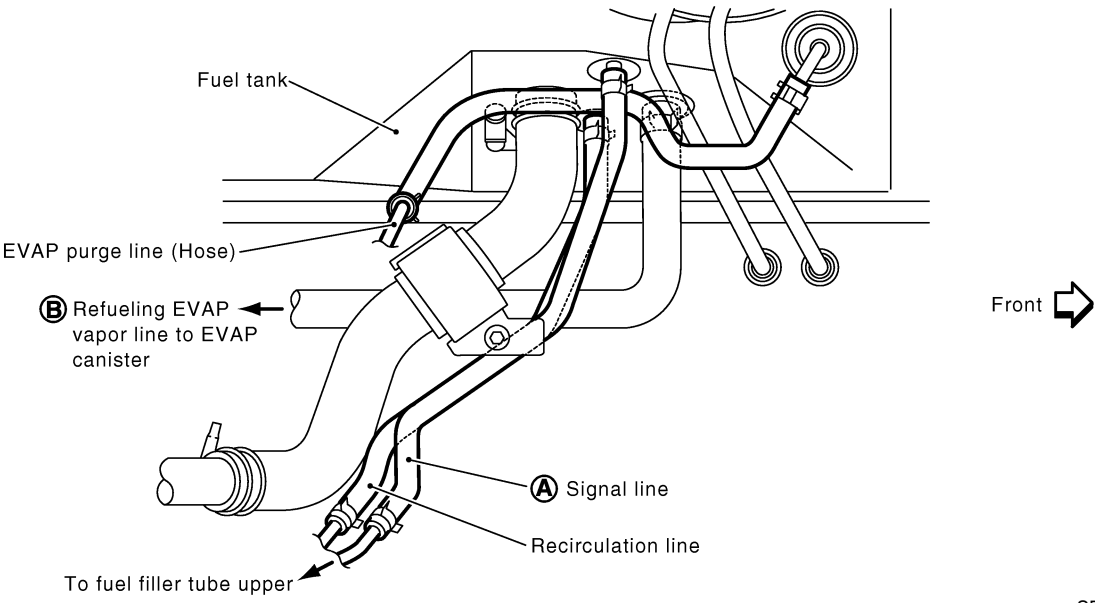
ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

6	CHECK VENT HOSES AND VENT TUBES	
Check hoses and tubes between EVAP canister and refueling control valve for clogging, kink, looseness and improper connection.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Repair or replace hoses and tubes.

7	CHECK FILLER NECK TUBE	
Check signal line and recirculation line for clogging, dents and cracks.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace filler neck tube.

8	CHECK REFUELING CONTROL VALVE	
<ol style="list-style-type: none"> 1. Remove fuel filler cap. 2. Check air continuity between hose ends A and B. Blow air into the hose end B. Air should flow freely into the fuel tank. 3. Blow air into hose end A and check there is no leakage. 4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage. 		
		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 9.
OK (Without CONSULT-II)	▶	GO TO 10.
NG	▶	Replace refueling control valve with fuel tank.

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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

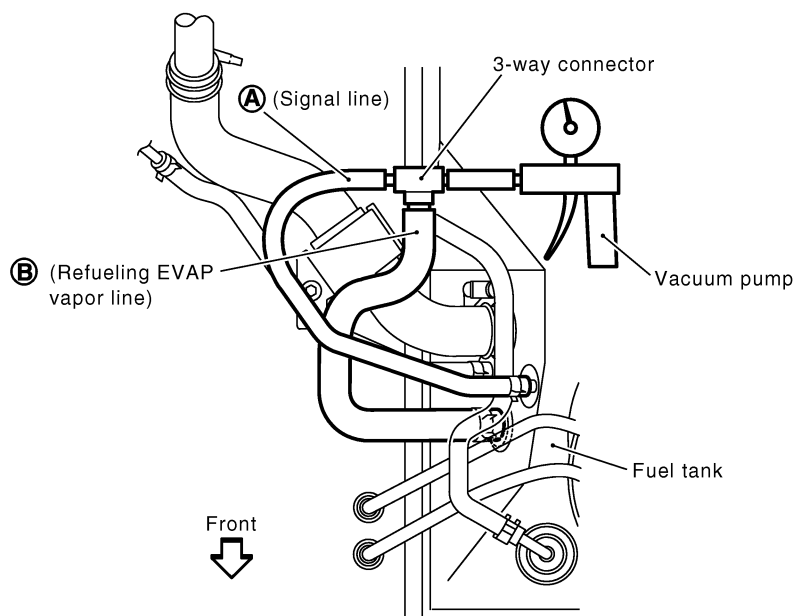
VG33ER

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

9 CHECK REFUELING EVAP VAPOR CUT VALVE

With CONSULT-II

1. Remove fuel tank. Refer to **FE-5**, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:
 - a. Remove fuel feed hose located on the fuel level sensor unit retainer.
 - b. Connect a spare fuel hose, one side to fuel level sensor unit retainer where the hose was removed and the other side to a fuel container.
 - c. Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-II.
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.
 - a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
 - b. Remove fuel level sensor unit retainer with fuel level sensor unit.
Always replace O-ring with new one.
 - c. Put fuel tank upside down.
 - d. Apply vacuum pressure to both hose ends A and B [-13.3 kPa (-100 mmHg, -3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable.



OK or NG

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

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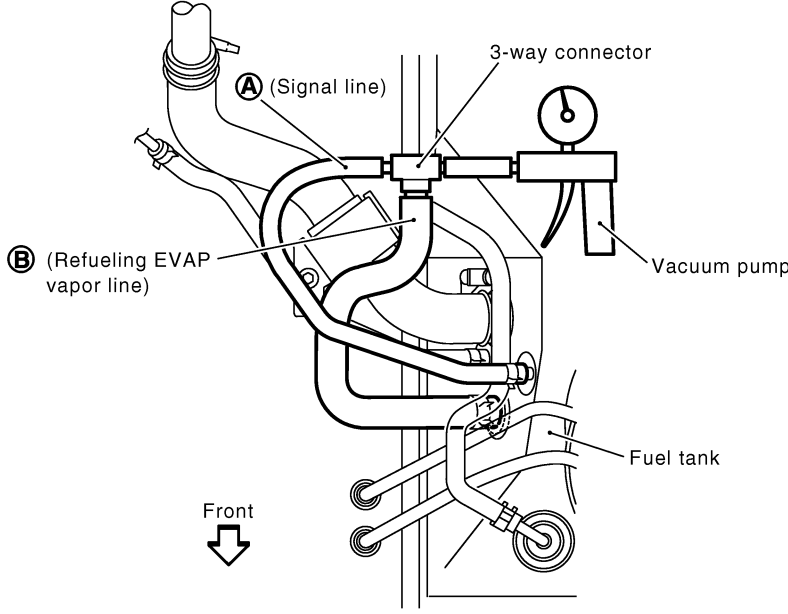
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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

10	CHECK REFUELING EVAP VAPOR CUT VALVE
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Remove fuel tank. Refer to FE-5, "FUEL SYSTEM". 2. Drain fuel from the tank as follows: <ol style="list-style-type: none"> a. Remove fuel level sensor unit retainer. b. Drain fuel from the tank using a hand pump into a fuel container. 3. Check refueling EVAP vapor cut valve for being stuck to close as follows. Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank. 4. Check EVAP vapor cut valve for being stuck to open as follows. <ol style="list-style-type: none"> a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector. b. Remove fuel level sensor unit retainer with fuel level sensor unit. Always replace O-ring with new one. c. Put fuel tank upside down. d. Apply vacuum pressure to both hose ends A and B [-13.3 kPa (-100 mmHg, -3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable. 	
	
OK or NG	
OK	▶ GO TO 11.
NG	▶ Replace refueling EVAP vapor cut valve with fuel tank.

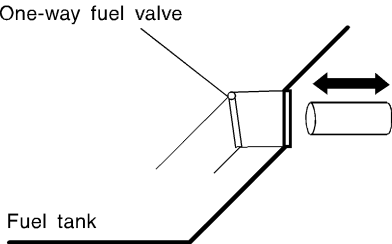
11	CHECK FUEL FILLER TUBE
Check filler neck tube and hose connected to the fuel tank for clogging, dents and cracks.	
OK or NG	
OK	▶ GO TO 12.
NG	▶ Replace fuel filler tube.

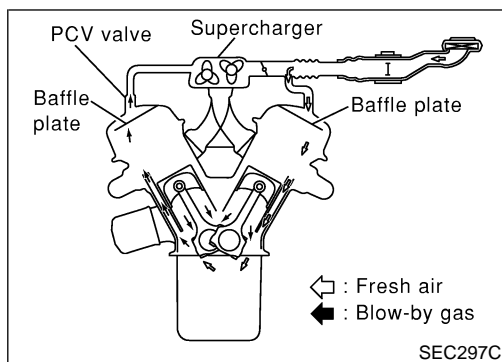
12	CHECK ONE-WAY FUEL VALVE-I
Check one-way valve for clogging.	
OK or NG	
OK	▶ GO TO 13.
NG	▶ Repair or replace one-way fuel valve with fuel tank.

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

On Board Refueling Vapor Recovery (ORVR) (Cont'd)

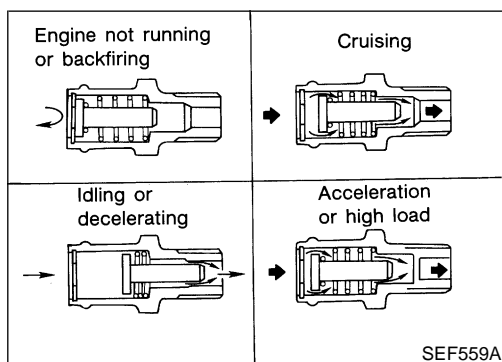
13	CHECK ONE-WAY FUEL VALVE-II
<p>1. Make sure that fuel is drained from the tank. 2. Remove fuel filler tube and hose. 3. Check one-way fuel valve for operation as follows. When a stick is inserted, the valve should open, when removing stick it should close.</p> <p style="text-align: center;">After removing filler tube</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF665U</p> <p>Do not drop any material into the tank.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ INSPECTION END
NG	▶ Replace fuel filler tube or replace one-way fuel valve with fuel tank.



Positive Crankcase Ventilation DESCRIPTION

NGEC1073

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



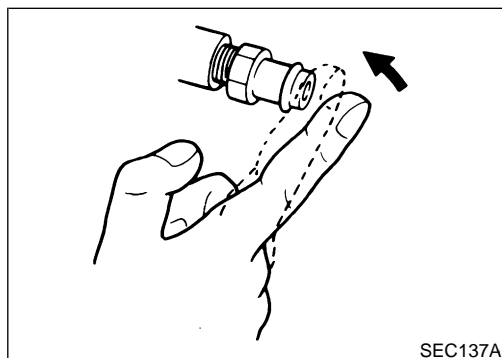
INSPECTION

NGEC1074

PCV (Positive Crankcase Ventilation) Valve

NGEC1074S01

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

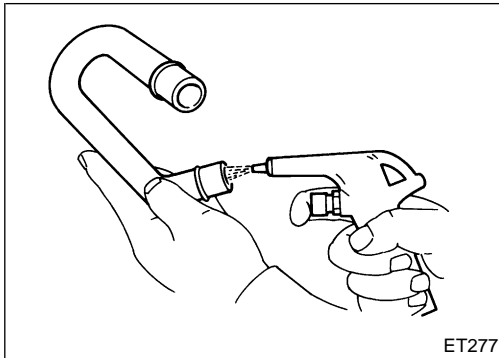


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ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION

VG33ER

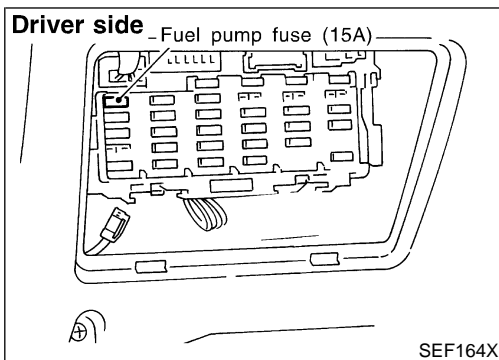
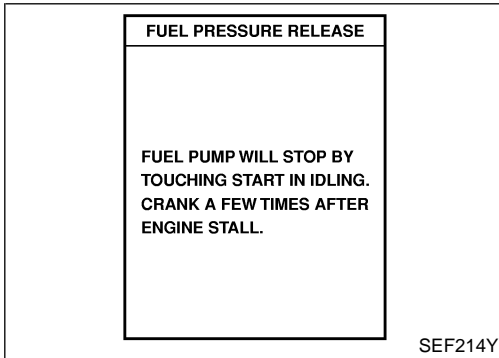
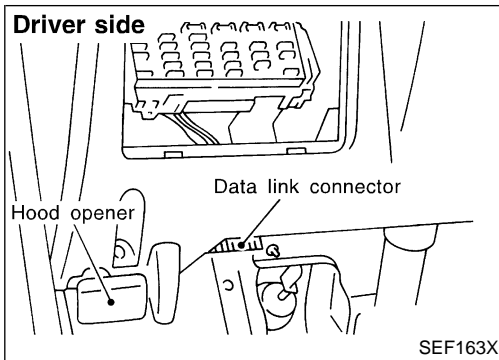
Positive Crankcase Ventilation (Cont'd)



PCV Valve Ventilation Hose

NGEC1074S02

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.



Fuel Pressure Release

Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger. NGEC1075

WITH CONSULT-II

NGEC1075S01

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

NGEC1075S02

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

Fuel Pressure Check

NGEC1076

- Use Fuel Pressure Gauge J-44321 to check fuel pressure.
- Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defog., A/C ect.). Fuel pressure gauge may indicate false readings due to varying engine loads and changes in manifold vacuum.

1. Release fuel pressure to zero.
2. Install the inline fuel quick disconnect fitting between the connection of the fuel feed hose (from tank) and the fuel hose (to engine).
3. Connect the fuel pressure test gauge (quick connect adapter hose) to quick disconnect fitting.
4. Start engine and check for fuel leakage.
5. Read the indication of fuel pressure gauge.

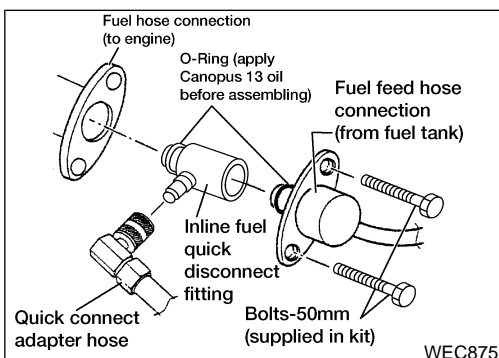
At idling:

With vacuum hose connected

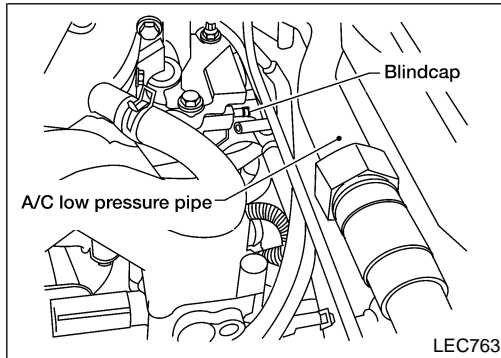
Approximately 235 kPa (2.4 kg/cm², 34 psi)

With vacuum hose disconnected

Approximately 294 kPa (3.0 kg/cm², 43 psi)



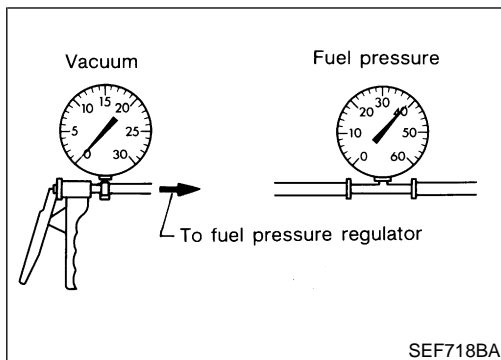
If results are unsatisfactory, perform Fuel Pressure Regulator Check.



Fuel Pressure Regulator Check

NGEC1077

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



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

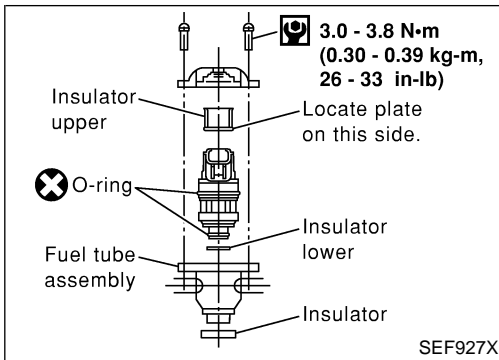
Fuel pressure should decrease as vacuum increases. If results are unsatisfactory, replace fuel pressure regulator.

Injector

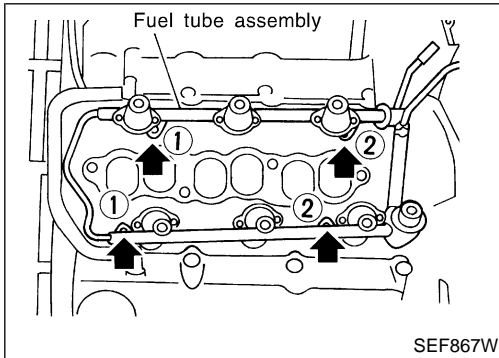
REMOVAL AND INSTALLATION

NGEC1078

1. Release fuel pressure to zero. Refer to EC-1217.
2. Remove supercharger. Refer to **EM-109**, "SUPERCHARGER".
3. Remove injector fuel tube assembly.
The following parts should be disconnected or removed.
 - Fuel feed and return hose
 - All injectors harness connectors
 - **Push injector tail piece.**
 - **Do not pull on connector.**
 - **Do not extract injector by pinching.**

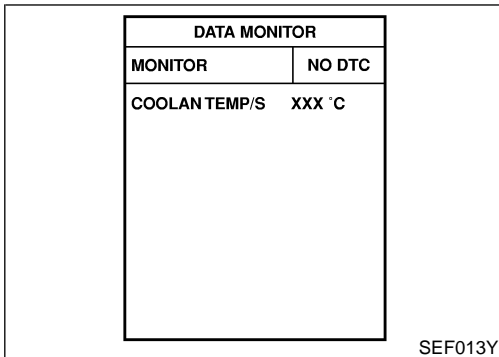


4. Push out any malfunctioning injector from injector fuel tube.
5. Replace or clean injector as necessary.
 - **Always replace O-rings with new ones.**
 - **Lubricate O-rings with engine oil.**
6. Install injector to injector fuel tube assembly.



7. Install injectors with fuel tube assembly to intake manifold. **Tighten in numerical order shown in the figure.**
 - a. First, tighten all bolts to 4.9 to 6.0 N·m (0.5 to 0.61 kg·m, 3.6 to 4.4 ft·lb).
 - b. Then, tighten all bolts to 10.8 to 14.7 N·m (1.1 to 1.5 kg·m, 8 to 11 ft·lb).
8. Reinstall any part removed in reverse order of removal.

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



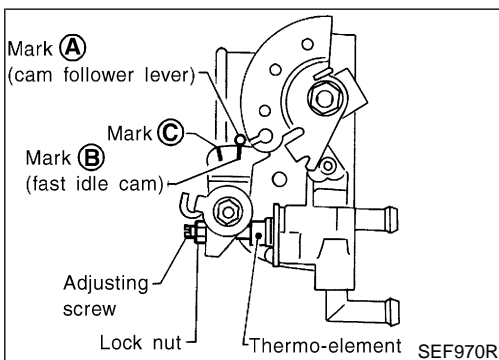
Fast Idle Cam (FIC) INSPECTION AND ADJUSTMENT

NGEC1079

With CONSULT-II

NGEC1079S01

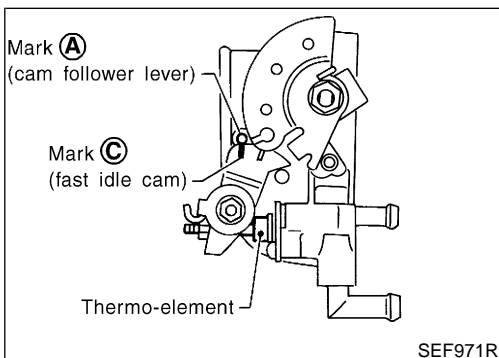
1. Turn ignition switch ON.
2. See "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
3. When engine coolant temperature is 20 to 30°C (68 to 86°F), make sure that the center of mark **A** is aligned with mark **B** as shown in the figure.



- If NG, adjust by turning adjusting screw.

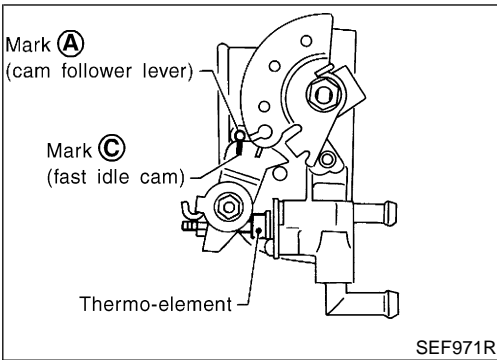
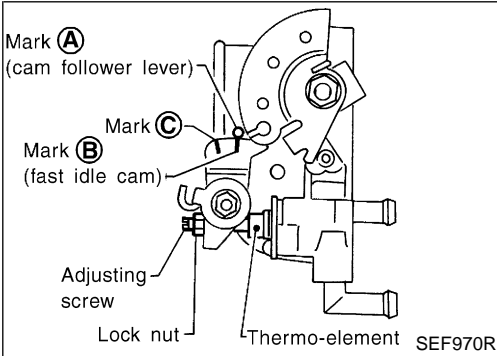
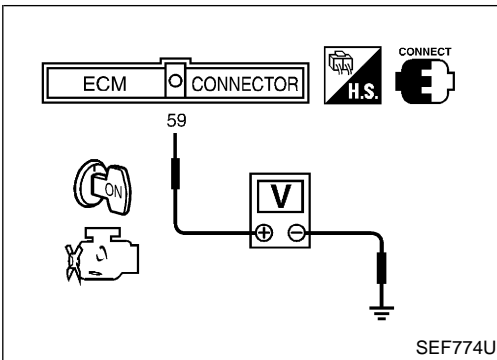
Lock nut:

0.98 - 1.96 N·m (10 - 20 kg·cm, 8.7 - 17.4 in·lb)



4. Start engine and warm it up.
5. When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following.
 - The center of mark **A** is aligned with mark **C**.
 - The cam follower lever's roller is not touching the fast idle cam.
 - If NG, replace thermo-element and perform the above inspection and adjustment again.

Fast Idle Cam (FIC) (Cont'd)



⊗ Without CONSULT-II

NGEC1079S02

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 59 (Engine coolant temperature sensor signal) and ground.
3. When the voltage is between 3.12 to 3.52V, make sure that the center of mark **A** is aligned with mark **B** as shown in the figure.

- If NG, adjust by turning adjusting screw.

Lock nut:

: 0.98 - 1.96 N·m (10 - 20 kg·cm, 8.7 - 17.4 in·lb)

4. Start engine and warm it up.
5. When the voltage is between 1.10 to 1.36V, check the following.
 - The center of mark **A** is aligned with mark **C**.
 - The cam follower lever's roller is not touching the fast idle cam.
 - If NG, replace thermo-element and perform the above inspection and adjustment again.

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

NGEC1080

NGEC1080S01

PREPARATION

- 1) Make sure that the following parts are in good order.
 - Battery
 - Ignition system
 - Engine oil and coolant levels
 - Fuses
 - ECM harness connector
 - Vacuum hoses
 - Air intake system (Oil filler cap, oil level gauge, etc.)
 - Fuel pressure
 - Engine compression
 - Throttle valve
 - Evaporative emission system
- 2) On air conditioner equipped models, checks should be carried out while the air conditioner is OFF.
- 3) On automatic transmission equipped models, when checking idle rpm, ignition timing and mixture ratio, checks should be carried out while shift lever is in "N" position.
- 4) When measuring "CO" percentage, insert probe more than 40 cm (15.7 in) into tail pipe.
- 5) Turn off headlamps, heater blower, rear defogger.

BASIC SERVICE PROCEDURE

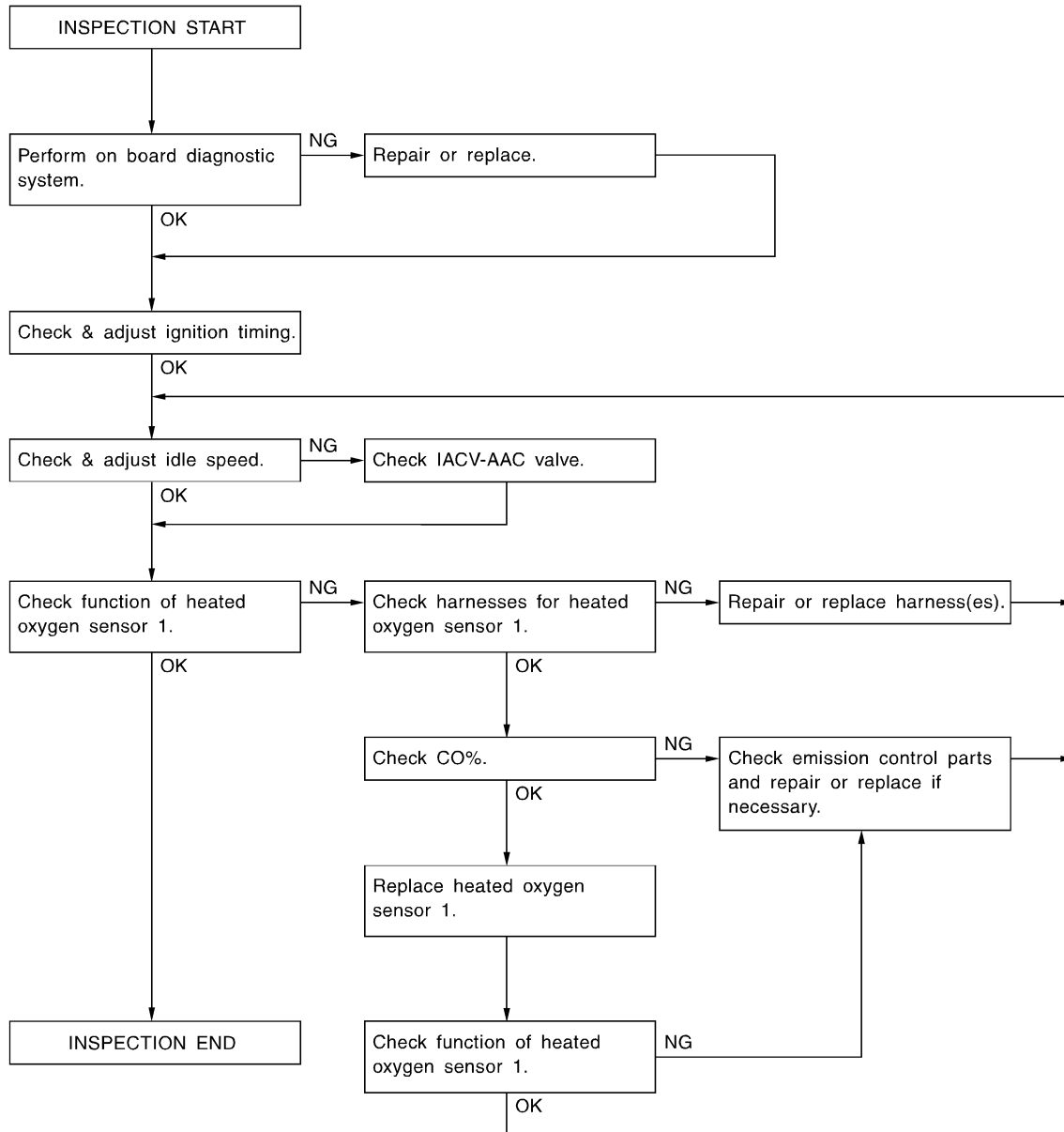
VG33ER

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

- 6) Keep front wheels pointed straight ahead.
- 7) Make the check after the cooling fan has stopped.

Overall Inspection Sequence

NGEC1080S0101



SEF554YA

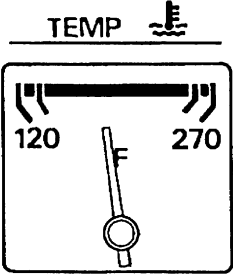
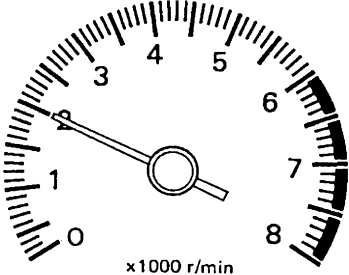
NOTE:

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

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INSPECTION PROCEDURE

=NGEC1080S02

1	INSPECTION START	<p>1. Visually check the following:</p> <ul style="list-style-type: none"> ● Air cleaner clogging ● Hoses and ducts for leaks ● Electrical connectors ● Gasket ● Throttle valve and throttle position sensor operation <p>2. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge. Ensure engine stays below 1,000 rpm.</p> <div style="text-align: center; margin: 10px 0;">  <p style="margin: 0;">TEMP </p> </div> <p>3. Open engine hood and run engine at about 2,000 rpm for about 2 minutes under no-load.</p> <div style="text-align: center; margin: 10px 0;">  <p style="margin: 0;">x 1000 r/min</p> </div> <p>4. Make sure that no DTC is displayed with CONSULT-II or GST.</p> <p style="text-align: center; margin: 5px 0;">OK or NG</p>	SEF976U
OK	▶	GO TO 2.	
NG	▶	<p>1. Repair or replace components as necessary.</p> <p>2. GO TO 2.</p>	SEF977U

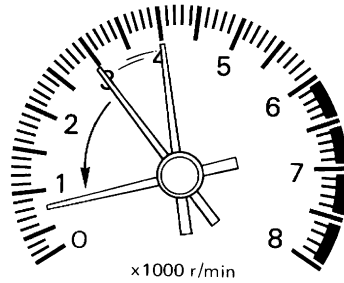
BASIC SERVICE PROCEDURE

VG33ER

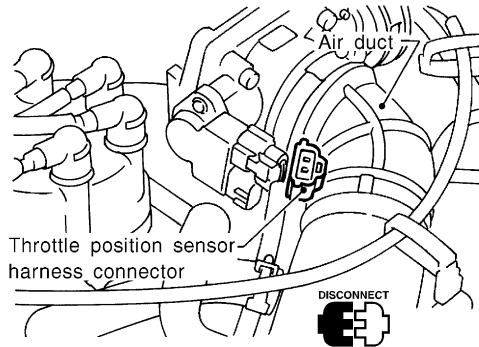
Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

2 CHECK IGNITION TIMING

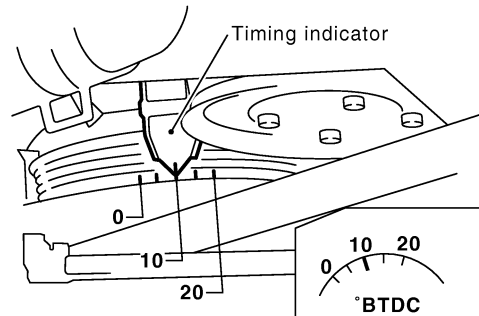
1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.



3. Turn off engine and disconnect throttle position sensor harness connector.



4. Start and rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run at idle speed.
5. Check ignition timing with a timing light.



M/T: 10°±1° BTDC

A/T: 10°±1° BTDC (in "P" or "N" position)

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

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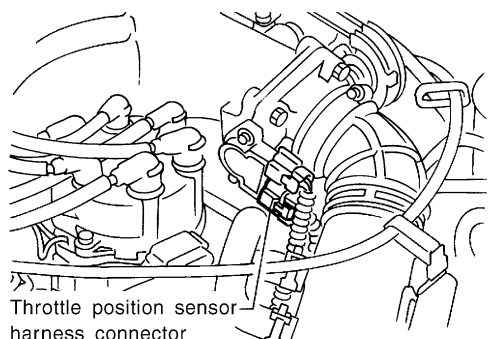
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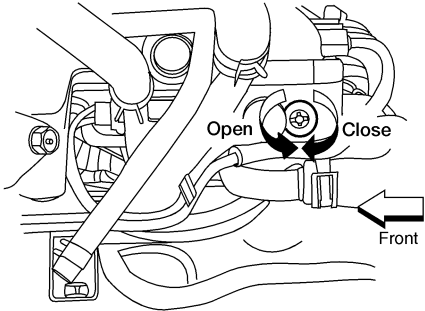
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3	ADJUST IGNITION TIMING
<p>1. Adjust ignition timing by turning distributor after loosening securing bolts. 2. Turn off engine and connect throttle position sensor harness connector to throttle position sensor.</p>	
 <p style="margin-left: 100px;">Throttle position sensor harness connector</p>	
SEF972R	
<p>▶ GO TO 2.</p>	

4	CHECK BASE IDLE SPEED						
<p> With CONSULT-II 1. Read idle speed in "DATA MONITOR" mode with CONSULT-II.</p>							
<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> </tbody> </table>		DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm
DATA MONITOR							
MONITOR	NO DTC						
ENG SPEED	XXX rpm						
SEF058Y							
<p> Without CONSULT-II 1. Check idle speed. M/T: 700±50 rpm A/T: 700±50 rpm (in "P" or "N" position)</p>							
OK or NG							
OK	▶ GO TO 6.						
NG	▶ GO TO 5.						

5	ADJUST BASE IDLE SPEED
<ol style="list-style-type: none"> 1. Rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load then run engine at idle speed. 2. Adjust idle speed by turning idle speed adjusting screw. 	
	
<p>M/T: 700±50 rpm A/T: 700±50 rpm (in "P" or "N" position)</p>	
LEC513	
▶ GO TO 6.	

6	CHECK TARGET IDLE SPEED									
<p>① With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn off engine and connect throttle position sensor harness connector. 2. Start and rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load then run at idle speed. 3. Read idle speed in "DATA MONITOR" mode with CONSULT-II. 										
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> </tbody> </table>		DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm			
DATA MONITOR										
MONITOR	NO DTC									
ENG SPEED	XXX rpm									
<p>M/T: 750±50 rpm A/T: 750±50 rpm (in "P" or "N" position)</p>										
SEF058Y										
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn off engine and connect throttle position sensor harness connector. 2. Start and rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load then run at idle speed. 3. Check idle speed. <p>M/T: 750±50 rpm A/T: 750±50 rpm (in "P" or "N" position)</p> <p style="text-align: center;">OK or NG</p>										
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; border-right: 1px solid black;">OK (With CONSULT-II)</td> <td style="border-right: 1px solid black; text-align: center;">▶</td> <td>GO TO 8.</td> </tr> <tr> <td style="border-right: 1px solid black;">OK (Without CONSULT-II)</td> <td style="border-right: 1px solid black; text-align: center;">▶</td> <td>GO TO 9.</td> </tr> <tr> <td style="border-right: 1px solid black;">NG</td> <td style="border-right: 1px solid black; text-align: center;">▶</td> <td>GO TO 7.</td> </tr> </table>		OK (With CONSULT-II)	▶	GO TO 8.	OK (Without CONSULT-II)	▶	GO TO 9.	NG	▶	GO TO 7.
OK (With CONSULT-II)	▶	GO TO 8.								
OK (Without CONSULT-II)	▶	GO TO 9.								
NG	▶	GO TO 7.								

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7	DETECT MALFUNCTIONING PART	
Check the following. 1. Check IACV-AAC valve and replace if necessary. Refer to EC-1586. 2. Check IACV-AAC valve harness and repair if necessary. Refer to EC-1586. 3. Check ECM function by substituting another known-good ECM. (ECM may be the cause of a problem, but this is rarely the case.)		
With CONSULT-II	▶	GO TO 8.
Without CONSULT-II	▶	GO TO 9.

8	CHECK HEATED OXYGEN SENSOR 1 (BANK 2) SIGNAL											
(P) With CONSULT-II 1. Run engine at about 2,000 rpm for about 2 minutes under no-load. 2. See "HO2S1 MNTR (B2)" in "DATA MONITOR" mode. 3. Running engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td>LEAN</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td>RICH</td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	RICH
DATA MONITOR												
MONITOR	NO DTC											
ENG SPEED	XXX rpm											
HO2S1 MNTR (B1)	LEAN											
HO2S1 MNTR (B2)	RICH											
1 time: RICH → LEAN → RICH 2 times: RICH → LEAN → RICH → LEAN → RICH												
SEF999Z												
OK or NG												
OK	▶	GO TO 12.										
NG (Monitor does not fluctuate.)	▶	GO TO 17.										
NG (Monitor fluctuates less than 5 times.)	▶	GO TO 10.										

9	CHECK HEATED OXYGEN SENSOR 1 (BANK 2) SIGNAL	
(X) Without CONSULT-II 1. Run engine at about 2,000 rpm for about 2 minutes under no-load. 2. Set voltmeter probe between ECM terminal 62 and ground. 3. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V		
OK or NG		
OK	▶	GO TO 12.
NG (Voltage does not fluctuate.)	▶	GO TO 17.
NG (Voltage fluctuates less than 5 times.)	▶	GO TO 10.

BASIC SERVICE PROCEDURE

VG33ER

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

10	CHECK HEATED OXYGEN SENSOR 1 (BANK 2) SIGNAL	
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Stop engine. 2. Replace heated oxygen sensor 1 (bank 2). 3. Start engine and warm it up to normal operating temperature. 4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load. 5. See "HO2S1 MNTR (B2)" in "DATA MONITOR" mode. 6. Running engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds. 1 time: RICH → LEAN → RICH 2 times: RICH → LEAN → RICH → LEAN → RICH 		
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Stop engine. 2. Replace heated oxygen sensor 1 (bank 2). 3. Start engine and warm it up to normal operating temperature. 4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load. 5. Set voltmeter probe between ECM terminal 62 and ground. 6. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V <p style="text-align: center;">OK or NG</p>		
	▶	GO TO 12.
	▶	GO TO 13.
	▶	GO TO 11.

11	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ol style="list-style-type: none"> 1. Check fuel pressure regulator. Refer to EC-1218. 2. Check mass air flow sensor and its circuit. Refer to EC-1334. 3. Check injector and its circuit. Refer to EC-1725. Clean or replace if necessary. 4. Check engine coolant temperature sensor and its circuit. Refer to EC-1366. 5. Check ECM function by substituting another known good ECM. (ECM may be the cause of a problem, but this is rarely the case.) 		
	▶	GO TO 2.

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12	CHECK HEATED OXYGEN SENSOR 1 (BANK 1) SIGNAL											
<p>Ⓜ With CONSULT-II</p> <p>1. See "HO2S1 (B1)" in "DATA MONITOR" mode.</p> <p>2. Maintaining engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.</p>												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">DATA MONITOR</th> </tr> <tr> <th style="text-align: center;">MONITOR</th> <th style="text-align: center;">NO DTC</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td style="text-align: center;">HO2S1 MNTR (B1)</td> <td style="text-align: center;">LEAN</td> </tr> <tr> <td style="text-align: center;">HO2S1 MNTR (B2)</td> <td style="text-align: center;">RICH</td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	RICH
DATA MONITOR												
MONITOR	NO DTC											
ENG SPEED	XXX rpm											
HO2S1 MNTR (B1)	LEAN											
HO2S1 MNTR (B2)	RICH											
<p>1 time: RICH → LEAN → RICH</p> <p>2 times: RICH → LEAN → RICH → LEAN → RICH</p>												
SEF999Z												
OK or NG												
OK	▶	INSPECTION END										
NG (Monitor does not fluctuate.)	▶	GO TO 16.										
NG (Monitor fluctuates less than 5 times.)	▶	GO TO 14.										

13	CHECK HEATED OXYGEN SENSOR 1 (BANK 1) SIGNAL	
<p>ⓧ Without CONSULT-II</p> <p>1. Set voltmeter probe between ECM terminal 63 and ground.</p> <p>2. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.</p> <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> <p>2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p>		
OK or NG		
OK	▶	INSPECTION END
NG (Voltage does not fluctuate.)	▶	GO TO 16.
NG (Voltage fluctuates less than 5 times.)	▶	GO TO 14.

BASIC SERVICE PROCEDURE

VG33ER

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

14	CHECK HEATED OXYGEN SENSOR 1 (BANK 1) SIGNAL	
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Stop engine. 2. Replace heated oxygen sensor 1 (bank 1). 3. Start engine and warm it up to normal operating temperature. 4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load. 5. See "HO2S1 MNTR (B1)" in "DATA MONITOR" mode. 6. Maintaining engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds. 1 time: RICH → LEAN → RICH 2 times: RICH → LEAN → RICH → LEAN → RICH 		
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Stop engine. 2. Replace heated oxygen sensor 1 (bank 1). 3. Start engine and warm it up to normal operating temperature. 4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load. 5. Set voltmeter probe between ECM terminal 63 and ground. 6. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V <p style="text-align: center;">OK or NG</p>		
OK		▶ INSPECTION END
NG		▶ GO TO 15.

15	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ol style="list-style-type: none"> 1. Check fuel pressure regulator. Refer to EC-1218. 2. Check mass air flow sensor and its circuit. Refer to EC-1334. 3. Check injector and its circuit. Refer to EC-1725. Clean or replace if necessary. 4. Check engine coolant temperature sensor and its circuit. Refer to EC-1366. 5. Check ECM function by substituting another known good ECM. (ECM may be the cause of a problem, but this is rarely the case.) 		
		▶ GO TO 2.

16	CHECK HEATED OXYGEN SENSOR 1 (BANK 1) HARNESS	
<ol style="list-style-type: none"> 1. Turn off engine and disconnect battery ground cable. 2. Disconnect ECM harness connector. 3. Disconnect heated oxygen sensor 1 (bank 1) harness connector. 4. Check harness continuity between ECM terminal 50 and heated oxygen sensor 1 (bank 1) harness connector. Continuity should exist. <p style="text-align: center;">OK or NG</p>		
OK		▶ 1. Connect ECM harness connector. 2. GO TO 18.
NG		▶ 1. Repair or replace harness. 2. GO TO 8. (With CONSULT-II) GO TO 9. (Without CONSULT-II)

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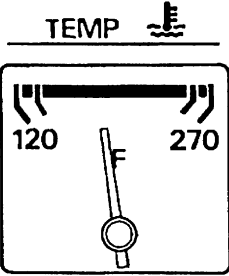
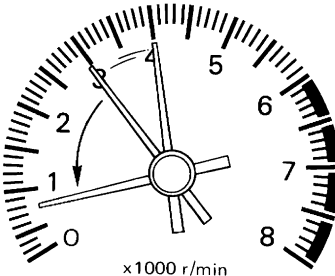
17	CHECK HEATED OXYGEN SENSOR 1 (BANK 2) HARNESS	
<ol style="list-style-type: none"> 1. Turn off engine and disconnect battery ground cable. 2. Disconnect ECM harness connector. 3. Disconnect heated oxygen sensor 1 (bank 2) harness connector. 4. Check harness continuity between ECM terminal 51 and heated oxygen sensor 1 (bank 2) harness connector. Continuity should exist. <p style="text-align: center;">OK or NG</p>		
OK	▶	<ol style="list-style-type: none"> 1. Connect ECM harness connector. 2. GO TO 18.
NG	▶	<ol style="list-style-type: none"> 1. Repair or replace harness. 2. GO TO 8. (With CONSULT-II) GO TO 9. (Without CONSULT-II)

18	PREPARATION FOR "CO" % CHECK																					
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Select "ENG COOLANT TEMP" in "ACTIVE TEST" mode. 2. Set "ENG COOLANT TEMP" to 5°C (41°F) by touching "DWN" and "Qd". 																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">ENG COOLANT TEMP</td> <td style="text-align: center;">XXX °C</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td style="text-align: center;">INJ PULSE-B1</td> <td style="text-align: center;">XXX msec</td> </tr> <tr> <td style="text-align: center;">IGN TIMING</td> <td style="text-align: center;">XXX BTDC</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>			ACTIVE TEST		ENG COOLANT TEMP	XXX °C	MONITOR		ENG SPEED	XXX rpm	INJ PULSE-B1	XXX msec	IGN TIMING	XXX BTDC								
ACTIVE TEST																						
ENG COOLANT TEMP	XXX °C																					
MONITOR																						
ENG SPEED	XXX rpm																					
INJ PULSE-B1	XXX msec																					
IGN TIMING	XXX BTDC																					
SEF172Y																						
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Disconnect engine coolant temperature sensor harness connector. 2. Connect a resistor (4.4 kΩ) between terminals of engine coolant temperature sensor harness connector. 																						
<p style="text-align: center;">Engine coolant temperature sensor harness connector (F9)</p> <p style="text-align: center;">4.4 kΩ resistor</p>																						
AEC036B																						
▶		GO TO 19.																				

BASIC SERVICE PROCEDURE

VG33ER

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

19	CHECK "CO" %
<p>1. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge.</p> <div style="text-align: center;">  <p>TEMP </p> </div> <p style="text-align: right;">SEF976U</p>	
<p>2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.</p> <div style="text-align: center;">  <p>x1000 r/min</p> </div> <p style="text-align: right;">SEF978U</p>	
<p>3. Check "CO" %. Idle CO: 1.5 - 9.5%</p> <p>4. Without CONSULT-II After checking CO%,</p> <p>a. Disconnect the resistor from terminals of engine coolant temperature sensor.</p> <p>b. Connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 10.
NG	▶ GO TO 20.

20	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ol style="list-style-type: none"> 1. Connect heated oxygen sensor 1 harness connectors to heated oxygen sensors 1. 2. Check fuel pressure regulator. Refer to EC-1218. 3. Check mass air flow sensor and its circuit. Refer to EC-1334. 4. Check injector and its circuit. Refer to EC-1725. Clean or replace if necessary. 5. Check engine coolant temperature sensor and its circuit. Refer to EC-1366. 6. Check ECM function by substituting another known good ECM. (ECM may be the cause of a problem, but this is rarely the case.) 	
▶	GO TO 2.

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Introduction

NGEC1081

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

Emission-related diagnostic information	SAE Mode
Diagnostic Trouble Code (DTC)	Mode 3 of SAE J1979
Freeze Frame data	Mode 2 of SAE J1979
System Readiness Test (SRT) code	Mode 1 of SAE J1979
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Mode 7 of SAE J1979
1st Trip Freeze Frame data	
Test values and Test limits	Mode 6 of SAE J1979

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

X: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data	SRT code	Test value
CONSULT-II	X	X	X	X	X	—
GST	X	X*1	X	—	X	X

*1: 1st trip DTCs for self-diagnoses concerning SRT items cannot be shown on the GST display.

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-1289.)

Two Trip Detection Logic

NGEC1082

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.

X: 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				
Coolant overtemperature enrichment protection — DTC: P0217	—	X	—	—	X	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	X	—	—	—	—	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	—	—	X	—	—	X	—	—
Closed loop control — DTC: P1148, P1168	—	X	—	—	X	—	X	—
Fail-safe items (Refer to EC-1289.)	—	X	—	—	X*1	—	X*1	—
Except above	—	—	—	X	—	X	X	—

*1: Except “ECM”

Emission-related Diagnostic Information

NGEC1083

DTC AND 1ST TRIP DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed.

If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.

Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-1246.

For malfunctions in which 1st trip DTCs are displayed, refer to EC-1242. These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-II.

1st trip DTC is specified in Mode 7 of SAE J1979. 1st trip DTC detection occurs without lighting up the MIL and therefore does not warn the driver of a problem. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in "Work Flow" procedure Step II, refer to EC-1271. Then perform "DTC Confirmation Procedure" or "Overall Function Check" to try to duplicate the problem. If the malfunction is duplicated, the item requires repair.

How to Read DTC and 1st Trip DTC

DTC and 1st trip DTC can be read by the following methods.

With CONSULT-II

With GST

CONSULT-II or GST (Generic Scan Tool) Examples: P0340, P0705, P0750, etc.

These DTCs are prescribed by SAE J2012.

(CONSULT-II also displays the malfunctioning component or system.)

- 1st trip DTC No. is the same as DTC No.
- Output of a DTC indicates a malfunction. However, GST do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-II can identify malfunction status as shown below. Therefore, using CONSULT-II (if available) is recommended.

A sample of CONSULT-II display for DTC and 1st trip DTC is shown below. DTC or 1st trip DTC of a malfunction is displayed in SELF-DIAGNOSTIC RESULTS mode of CONSULT-II. Time data indicates how many times the vehicle was driven after the last detection of a DTC.

If the DTC is being detected currently, the time data will be "0".

If a 1st trip DTC is stored in the ECM, the time data will be "[1t]".

DTC display	SELF DIAG RESULTS		1st trip DTC display	SELF DIAG RESULTS	
	DTC RESULTS			DTC RESULTS	
	MAF SEN/CIRCUIT [P0101]	0		MAF SEN/CIRCUIT [P0101]	1t

SEC652C

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 and absolute pressure at the moment a malfunction is detected.

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data.

Emission-related Diagnostic Information (Cont'd)

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-1258.

Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0306 Fuel Injection System Function — DTC: P0171, P0172, P0174, P0175
2		Except the above items (Includes A/T related items)
3	1st trip freeze frame data	

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-1246.

SYSTEM READINESS TEST (SRT) CODE

NGEC1083S03

System Readiness Test (SRT) code is specified in Mode 1 of SAE J1979.

As part of enhanced emissions test for Inspection and Maintenance (I/M), certain states require that 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 and 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.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

Emission-related Diagnostic Information (Cont'd)

SRT Item

=NGEC1083S0301

The following table 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	3	Three way catalyst function	P0420, P0430
EVAP SYSTEM	2	EVAP control system (small leak) (negative pressure)	P0442
	3	EVAP control system (very small leak) (negative pressure)/ (positive pressure)	P0456, P1456
	3	EVAP control system purge flow monitoring	P0441
HO2S	3	Heated oxygen sensor 1 (circuit)	P0134, P0154
		Heated oxygen sensor 1 (lean shift monitoring)	P1143, P1163
		Heated oxygen sensor 1 (rich shift monitoring)	P1144, P1164
		Heated oxygen sensor 1 (response monitoring)	P0133, P0153
		Heated oxygen sensor 1 (high voltage)	P0132, P0152
		Heated oxygen sensor 2 (min. voltage monitoring)	P1146, P1166
		Heated oxygen sensor 2 (max. voltage monitoring)	P1147, P1167
		Heated oxygen sensor 2 (response monitoring)	P0139, P0159
		Heated oxygen sensor 2 (high voltage)	P0138, P0158
HO2S HEATER	3	Heated oxygen sensor 1 heater	P0031, P0032, P0051, P0052
		Heated oxygen sensor 2 heater	P0037, P0038, P0057, P0058

*: If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure) one by one based on the priority for models with CONSULT-II.

SRT Set Timing

NGEC1083S0302

SRT is set as "CMPLT" after self-diagnosis has been performed one or more times. Completion of SRT will occur if the result is OK or NG. The set timing is different between them and is shown in the following table.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

Emission-related Diagnostic Information (Cont'd)

Self-diagnosis result		Example				
		Diagnosis	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF
All OK	Case 1	P0400	OK (1)	– (1)	OK (2)	– (2)
		P0402	OK (1)	– (1)	– (1)	OK (2)
		P1402	OK (1)	OK (2)	– (2)	– (2)
		SRT of EGR	“CMPLT”	“CMPLT”	“CMPLT”	“CMPLT”
	Case 2	P0400	OK (1)	– (1)	– (1)	– (1)
		P0402	– (0)	– (0)	OK (1)	– (1)
		P1402	OK (1)	OK (2)	– (2)	– (2)
		SRT of EGR	“INCMP”	“INCMP”	“CMPLT”	“CMPLT”
NG exists	Case 3	P0400	OK	OK	–	–
		P0402	–	–	–	–
		P1402	NG	–	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	–	1st trip DTC	DTC (=MIL “ON”)
		SRT of EGR	“INCMP”	“INCMP”	“INCMP”	“CMPLT”

OK: Self-diagnosis is carried out and the result is OK.

NG: Self-diagnosis is carried out and the result is OK.

–: Self-diagnosis is not carried out.

When all SRT related self-diagnoses showed OK results in a same cycle (Ignition OFF – ON – OFF), the SRT will indicate “CMPLT”.

→ Case 1 above

When all SRT related self-diagnoses show 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 previous table shows that the minimum number of cycles for setting SRT as “INCMP” is one (1) for each self-diagnosis (Case 1 and 2) or two (2) for one self-diagnosis (Case 3). However, in preparation for the State emissions inspection, it is unnecessary of each self-diagnosis to be executed twice (Case 3) because of 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 result.
- 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”.

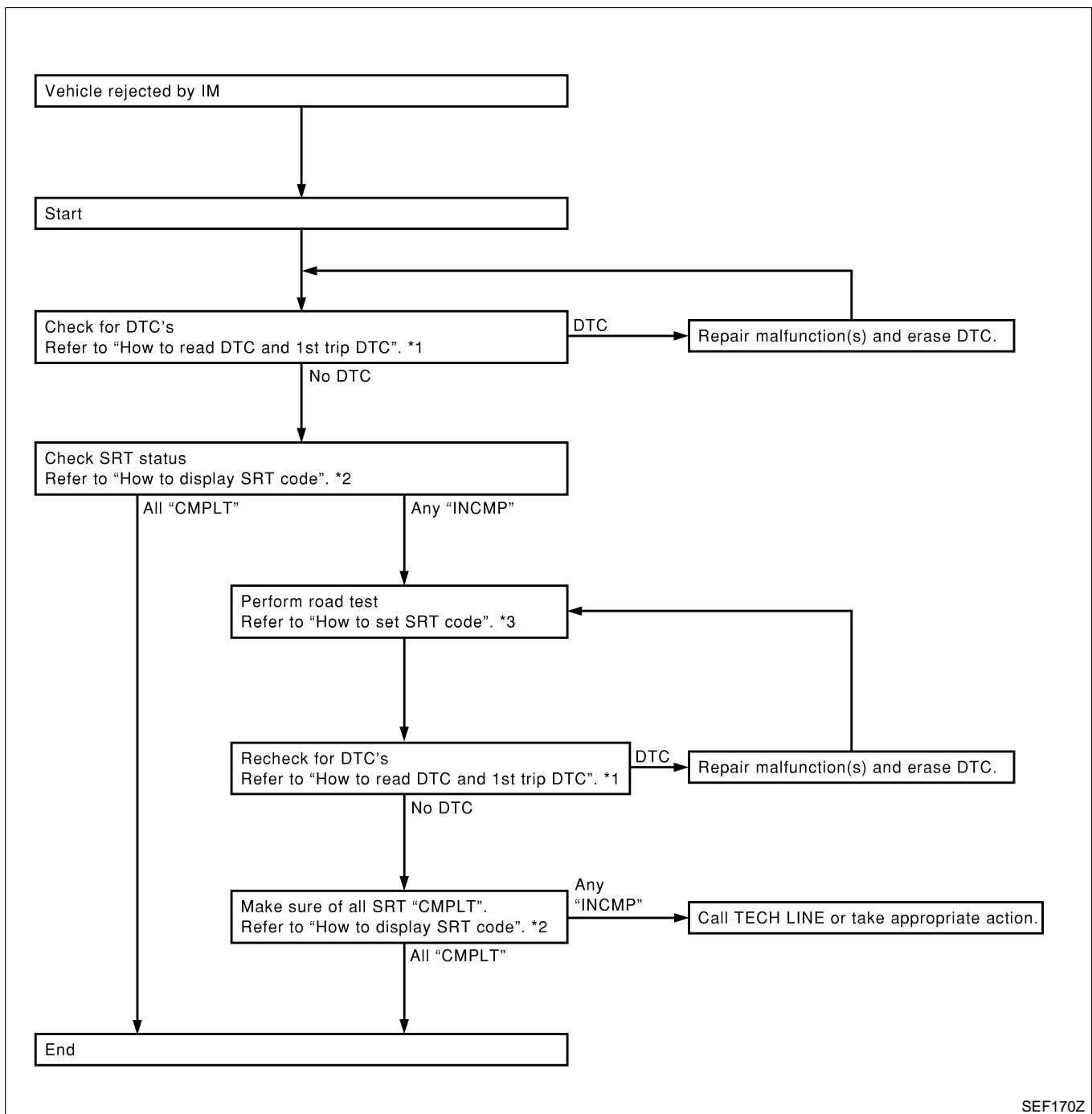
NOTE:

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 been rejected for the State emissions inspection due to one or more SRT items indicating “INCMP”, review the following flowchart diagnostic sequence on the next page.

NGEC1083S0303



SEF170Z

*1 EC-1233

*2 EC-1237

*3 EC-1238

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.

NGEC1083S0304

- With GST**
 Selecting Mode 1 with GST (Generic Scan Tool)

A sample of CONSULT-II display for SRT code is shown below.
 "INCMP" means the self-diagnosis is incomplete and SRT is not set. "CMPLT" means the self-diagnosis is complete and SRT is set.

GI
 MA
 EM
 LC
 EC
 FE
 CL
 MT
 AT
 TF
 PD
 AX
 SU
 BR
 ST
 RS
 BT
 HA
 SC
 EL
 IDX

SRT STATUS	
CATALYST	CMPLT
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	CMPLT

SEF949Z

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. NGEC1083S0305

With CONSULT-II

Perform corresponding DTC confirmation procedure one by one based on "Performance Priority" in the table on EC-1233.

Without CONSULT-II

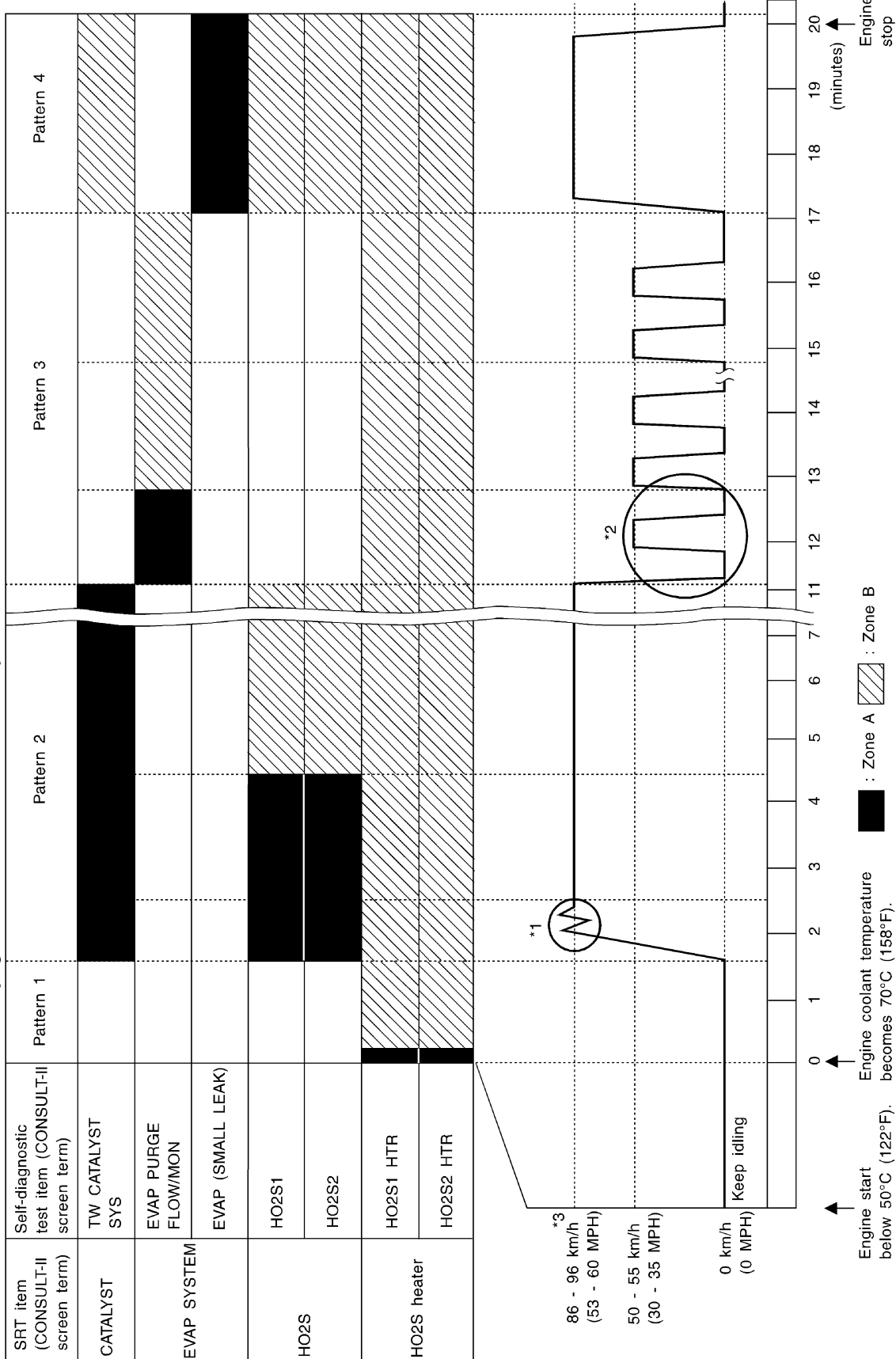
The most efficient driving pattern in which SRT codes can be properly set is explained on EC-1239. The driving pattern should be performed one or more times to set all SRT codes.

Driving Pattern

NGEC1083S0306

Note: Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. Refer to next page for more information and explanation of chart.

Driving pattern



GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

SEF947YA

Emission-related Diagnostic Information (Cont'd)

- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.
Zone A refers to the range where the time required, for the diagnosis under normal conditions*, 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 59 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 59 and ground is lower than 1.4V).**
- **The engine is started at the tank fuel temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 60 and ground is less than 4.1V).**

Pattern 2:

- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

Pattern 3:

- The driving pattern outlined in *2 must be repeated at least 3 times.

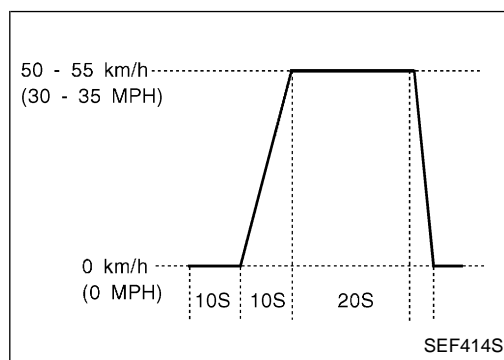
Pattern 4:

- Tests are performed after the engine has been operated for at least 17 minutes.
- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted all over again.

*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.

*2: Operate the vehicle in the following driving pattern.

- 1) Decelerate vehicle to 0 km/h (0 MPH) and let engine idle.
 - 2) Repeat driving pattern shown below at least 10 times.
- **During acceleration, hold the accelerator pedal as steady as possible.**



*3: Checking the vehicle speed with CONSULT-II or GST is advised.

Suggested Transmission Gear Position for A/T Models

Set the selector lever in the "D" position with the overdrive switch turned ON.

Suggested upshift speeds for M/T models

Shown below are suggested vehicle speeds for shifting into a higher gear. These suggestions relate to fuel economy and vehicle performance. Actual upshift speeds will vary according to road conditions, the weather and individual driving habits.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

Emission-related Diagnostic Information (Cont'd)

	For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:	For quick acceleration in low altitude areas and high altitude areas [over 1,219 m (4,000 ft)]:
Gear change	ACCEL shift point km/h (MPH)	km/h (MPH)
1st to 2nd	24 (15)	24 (15)
2nd to 3rd	40 (25)	40 (25)
3rd to 4th	64 (40)	64 (40)
4th to 5th	72 (45)	72 (45)

Suggested Maximum Speed in Each Gear

Downshift to a lower gear if the engine is not running smoothly, or if you need to accelerate.

Do not exceed the maximum suggested speed (shown below) in any gear. For level road driving, use the highest gear suggested for that speed. Always observe posted speed limits and drive according to the road conditions to ensure safe operation. Do not over-rev the engine when shifting to a lower gear as it may cause engine damage or loss of vehicle control.

Gear	km/h (MPH) 2WD (AUTO mode)
1st	50 (30)
2nd	95 (60)

TEST VALUE AND TEST LIMIT (GST ONLY — NOT APPLICABLE TO CONSULT-II)

NGEC1083S04

The following is the information specified in Mode 6 of SAE J1979.

The test value is a parameter used to determine whether a system/circuit diagnostic test is "OK" or "NG" while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.

Items for which these data (test value and test limit) are displayed are the same as SRT code items (30 test items).

These data (test value and test limit) are specified by Test ID (TID) and Component ID (CID) and can be displayed on the GST screen.

X: Applicable —: Not applicable

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
CATALYST	Three way catalyst function (Right bank)	01H	01H	Max.	X
	Three way catalyst function (Left bank)	03H	02H	Max.	X
EVAP SYSTEM	EVAP control system (Small leak)	05H	03H	Max.	X
	EVAP control system purge flow monitoring	06H	83H	Min.	X

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

Emission-related Diagnostic Information (Cont'd)

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
HO2S	Heated oxygen sensor 1 (bank 1)	09H	04H	Max.	X
		0AH	84H	Min.	X
		0BH	04H	Max.	X
		0CH	04H	Max.	X
		0DH	04H	Max.	X
	Heated oxygen sensor 1 (bank 2)	11H	05H	Max.	X
		12H	85H	Min.	X
		13H	05H	Max.	X
		14H	05H	Max.	X
		15H	05H	Max.	X
	Heated oxygen sensor 2 (bank 1)	19H	86H	Min.	X
		1AH	86H	Min.	X
		1BH	06H	Max.	X
		1CH	06H	Max.	X
	Heated oxygen sensor 2 (bank 2)	21H	87H	Min.	X
		22H	87H	Min.	X
23H		07H	Max.	X	
24H		07H	Max.	X	
HO2S HEATER	Heated oxygen sensor 1 (bank 1)	29H	08H	Max.	X
		2AH	88H	Min.	X
	Heated oxygen sensor 1 (bank 2)	2BH	09H	Max.	X
		2CH	89H	Min.	X
	Heated oxygen sensor 2 (bank 1)	2DH	0AH	Max.	X
		2EH	8AH	Min.	X
	Heated oxygen sensor 2 (bank 2)	2FH	0BH	Max.	X
		30H	8BH	Min.	X

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

X: Applicable —: Not applicable NGEC1083S05

Items (CONSULT-II screen terms)	DTC*1*2	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
	CONSULT-II GST				
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	P0000	—	—	—	—
HO2S1 HTR (B1)	P0031	X	X	X*5	EC-1319
HO2S1 HTR (B1)	P0032	X	X	X*5	EC-1319
HO2S2 HTR (B1)	P0037	X	X	X*5	EC-1326
HO2S2 HTR (B1)	P0038	X	X	X*5	EC-1326

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

Emission-related Diagnostic Information (Cont'd)

Items (CONSULT-II screen terms)	DTC*1*2	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page	
	CONSULT-II GST					
HO2S1 HTR (B2)	P0051	X	X	X*5	EC-1319	GI
HO2S1 HTR (B2)	P0052	X	X	X*5	EC-1319	MA
HO2S2 HTR (B2)	P0057	X	X	X*5	EC-1326	EM
HO2S2 HTR (B2)	P0058	X	X	X*5	EC-1326	
MAF SEN/CIRCUIT	P0101	—	—	X	EC-1330	LC
MAF SEN/CIRCUIT	P0102*3	—	—	—	EC-1330	
MAF SEN/CIRCUIT	P0103*3	—	—	—	EC-1330	EC
IAT SEN/CIRCUIT	P0112	—	—	—	EC-1343	
IAT SEN/CIRCUIT	P0113	—	—	—	EC-1343	FE
ECT SEN/CIRCUIT	P0117*3	—	—	—	EC-1348	
ECT SEN/CIRCUIT	P0118*3	—	—	—	EC-1348	CL
TP SEN/CIRCUIT	P0121	—	—	X	EC-1353	
TP SEN/CIRCUIT	P0122*3	—	—	—	EC-1353	MT
TP SEN/CIRCUIT	P0123*3	—	—	—	EC-1353	
ECT SENSOR	P0125	—	—	X	EC-1366	AT
IAT SENSOR	P0127	—	—	X	EC-1343	TF
THERMSTAT FNCTN	P0128	—	—	X	EC-1372	
HO2S1 (B1)	P0132	X	X	X*5	EC-1374	PD
HO2S1 (B1)	P0133	X	X	X*5	EC-1382	
HO2S1 (B1)	P0134	X	X	X*5	EC-1396	AX
HO2S2 (B1)	P0138	X	X	X*5	EC-1407	
HO2S2 (B1)	P0139	X	X	X*5	EC-1417	SU
HO2S1 (B2)	P0152	X	X	X*5	EC-1374	
HO2S1 (B2)	P0153	X	X	X*5	EC-1382	BR
HO2S1 (B2)	P0154	X	X	X*5	EC-1396	
HO2S2 (B2)	P0158	X	X	X*5	EC-1407	ST
HO2S2 (B2)	P0159	X	X	X*5	EC-1417	
FUEL SYS-LEAN-B1	P0171	—	—	X	EC-1427	RS
FUEL SYS-RICH-B1	P0172	—	—	X	EC-1436	
FUEL SYS-LEAN-B2	P0174	—	—	X	EC-1427	BT
FUEL SYS-RICH-B2	P0175	—	—	X	EC-1436	
FTT SENSOR	P0181	—	—	X	EC-1444	HA
FTT SEN/CIRCUIT	P0182	—	—	X	EC-1444	
FTT SEN/CIRCUIT	P0183	—	—	X	EC-1444	SC
ENG OVER TEMP	P0217	—	—	X	EC-1449	
SCB/V CONT SOL/V	P0245	—	—	X	EC-1456	EL

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

Emission-related Diagnostic Information (Cont'd)

Items (CONSULT-II screen terms)	DTC*1*2	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
	CONSULT-II GST				
MULTI CYL MISFIRE	P0300	—	—	X	EC-1462
CYL1 MISFIRE	P0301	—	—	X	EC-1462
CYL2 MISFIRE	P0302	—	—	X	EC-1462
CYL3 MISFIRE	P0303	—	—	X	EC-1462
CYL4 MISFIRE	P0304	—	—	X	EC-1462
CYL5 MISFIRE	P0305	—	—	X	EC-1462
CYL6 MISFIRE	P0306	—	—	X	EC-1462
KNOCK SEN/CIRC-B1	P0327	—	—	—	EC-1471
KNOCK SEN/CIRC-B1	P0328	—	—	—	EC-1471
CKP SEN/CIRCUIT	P0335	—	—	X	EC-1475
CMP SEN/CIRCUIT	P0340	—	—	X	EC-1481
TW CATALYST SYS-B1	P0420	X	X	X*5	EC-1488
TW CATALYST SYS-B2	P0430	X	X	X*5	EC-1488
EVAP PURG FLOW/MON	P0441	X	X	X*5	EC-1493
EVAP SMALL LEAK	P0442	X	X	X*5	EC-1505
PURG VOLUME CONT/V	P0444	—	—	X	EC-1519
PURG VOLUME CONT/V	P0445	—	—	X	EC-1519
VENT CONTROL VALVE	P0447	—	—	X	EC-1526
EVAP SYS PRES SEN	P0452	—	—	X	EC-1532
EVAP SYS PRES SEN	P0453	—	—	X	EC-1532
EVAP GROSS LEAK	P0455	X	X	X*5	EC-1543
EVAP VERY SML LEAK	P0456	X*4	X	X*5	EC-1556
FUEL LEV SEN SLOSH	P0460	—	—	X	EC-1570
FUEL LEVEL SENSOR	P0461	—	—	X	EC-1575
FUEL LEVL SEN/CIRC	P0462	—	—	X	EC-1577
FUEL LEVL SEN/CIRC	P0463	—	—	X	EC-1577
VEH SPEED SEN/CIRC	P0500*5	—	—	X	EC-1582
ISC SYSTEM/CIRC	P0505	—	—	X	EC-1586
CLOSED TP SW/CIRC	P0510	—	—	X	EC-1592
A/T COMM LINE	P0600*4	—	—	—	EC-1599
ECM	P0605	—	—	X	EC-1604
PNP SW/CIRC	P0705	—	—	X	AT-104
ATF TEMP SEN/CIRC	P0710	—	—	X	AT-110
VEH SPD SEN/CIR AT	P0720	—	—	X	AT-116
ENGINE SPEED SIG	P0725	—	—	X	AT-121
A/T 1ST GR FNCTN	P0731	—	—	X	AT-125

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

Emission-related Diagnostic Information (Cont'd)

Items (CONSULT-II screen terms)	DTC*1*2	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page	GI
	CONSULT-II GST					MA
A/T 2ND GR FNCTN	P0732	—	—	X	AT-131	EM
A/T 3RD GR FNCTN	P0733	—	—	X	AT-137	LC
A/T 4TH GR FNCTN	P0734	—	—	X	AT-143	EC
TCC SOLENOID/CIRC	P0740	—	—	X	AT-152	FE
A/T TCC S/V FNCTN	P0744	—	—	X	AT-157	CL
L/PRESS SOL/CIRC	P0745	—	—	X	AT-164	MT
SFT SOL A/CIRC	P0750*3	—	—	X	AT-169	AT
SFT SOL B/CIRC	P0755*3	—	—	X	AT-174	TF
HO2S1 (B1)	P1143	X	X	X*5	EC-1606	PD
HO2S1 (B1)	P1144	X	X	X*5	EC-1615	AX
HO2S2 (B1)	P1146	X	X	X*5	EC-1624	SU
HO2S2 (B1)	P1147	X	X	X*5	EC-1634	BR
CLOSED LOOP-B1	P1148	—	—	X*5	EC-1644	ST
HO2S1 (B2)	P1163	X	X	X*5	EC-1606	RS
HO2S1 (B2)	P1164	X	X	X*5	EC-1615	BT
HO2S2 (B2)	P1166	X	X	X*5	EC-1624	HA
HO2S2 (B2)	P1167	X	X	X*5	EC-1634	SC
CLOSED LOOP-B2	P1168	—	—	X	EC-1644	EL
ENG OVER TEMP	P1217	—	—	X	EC-1646	IDX
CKP SENSOR (COG)	P1336	—	—	X	EC-1651	
EVAP SMALL LEAK	P1442	X	X	X*5	EC-1658	
PURG VOLUME CONT/V	P1444	—	—	X	EC-1660	
VENT CONTROL VALVE	P1446	—	—	X	EC-1672	
VENT CONTROL VALVE	P1448	—	—	X	EC-1679	
EVAP VERY SML LEAK	P1456	X*4	X	X*5	EC-1556	
FUEL LEVEL SEN/CIRC	P1464	—	—	X	EC-1687	
VC/V BYPASS/V	P1490	—	—	X	EC-1691	
VC CUT/V BYPASS/V	P1491	—	—	X	EC-1697	
A/T DIAG COMM LINE	P1605	—	—	X	EC-1706	
TP SEN/CIRC A/T	P1705*5	—	—	X	AT-179	
P-N POS SW/CIRCUIT	P1706	—	—	X	EC-1709	
O/R CLTCH SOL/CIRC	P1760	—	—	X	AT-188	

*1: 1st trip DTC No. 1 is the same as DTC No.

*2: These numbers are prescribed by SAE J2012.

*3: When the fail-safe operation occurs, the MIL illuminates.

*4: SRT code will not be set if the self-diagnostic result is NG.

*5: These are not displayed with GST.

NOTE:

Regarding D22 models, "B1" indicates bank 1, "B2" indicates bank 2.

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

NGEC1083S06

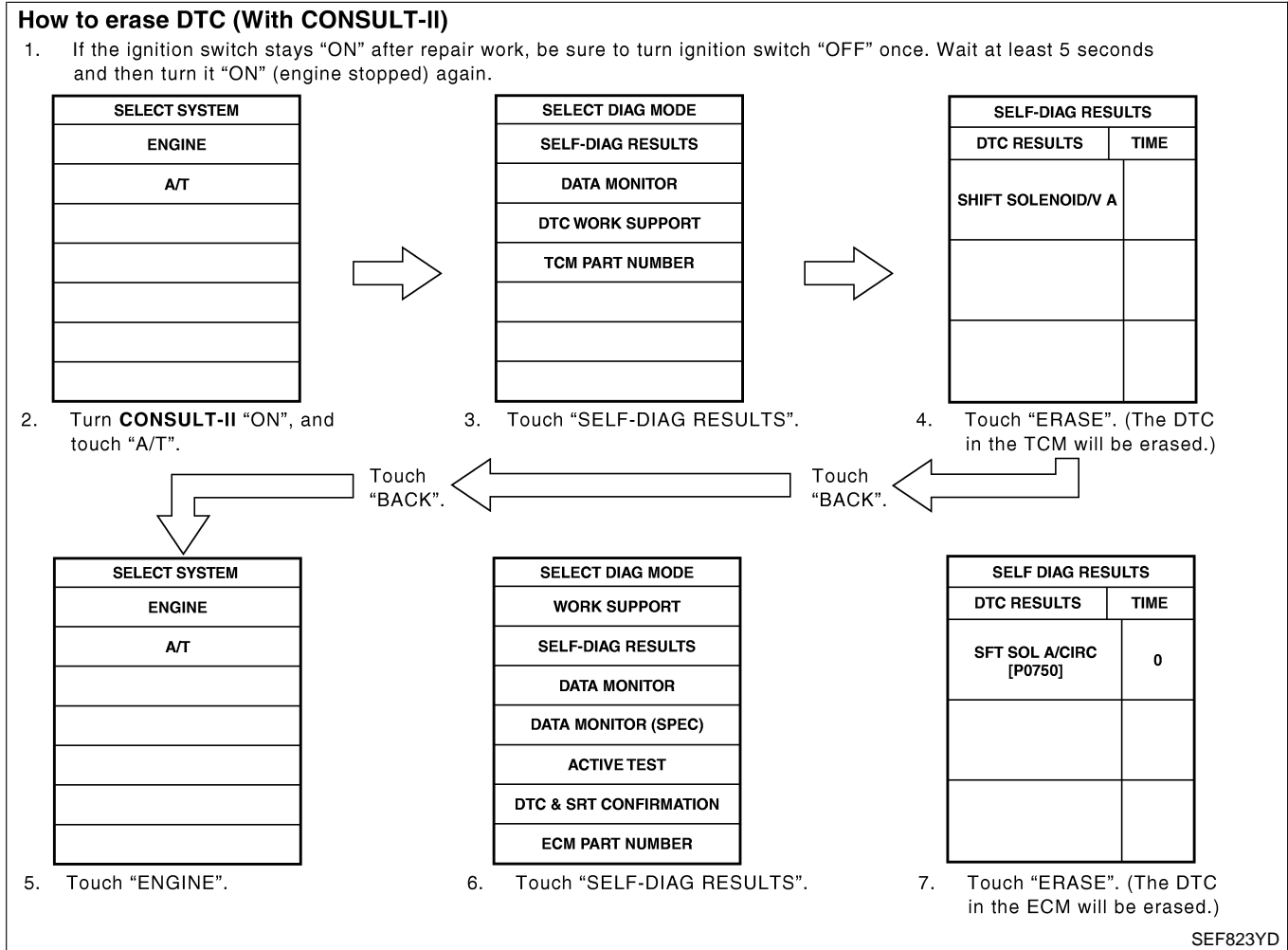
How to Erase DTC (📱 With CONSULT-II)

NGEC1083S0601

NOTE:

If the DTC is not for A/T related items (see EC-1174), skip steps 2 through 4.

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 5 seconds and then turn it ON (engine stopped) again.
 2. Turn CONSULT-II "ON" and touch "A/T".
 3. Touch "SELF-DIAG RESULTS".
 4. Touch "ERASE". [The DTC in the TCM (Transmission control module) will be erased.] Then touch "BACK" twice.
 5. Touch "ENGINE".
 6. Touch "SELF-DIAG RESULTS".
 7. Touch "ERASE". (The DTC in the ECM will be erased.)
- If DTCs are displayed for both ECM and TCM (Transmission control module), they need to be erased individually from the ECM and TCM (Transmission control module).



The emission related diagnostic information in the ECM can be erased by selecting "ERASE" in the "SELF-DIAG RESULTS" mode with CONSULT-II.

How to Erase DTC (📱 With GST)

NGEC1083S0602

NOTE:

If the DTC is not for A/T related items (see EC-1174), skip step 2.

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. Perform "SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II)" in AT section titled "TROUBLE

DIAGNOSIS", "Self-diagnosis". (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)

3. Select Mode 4 with GST (Generic Scan Tool).

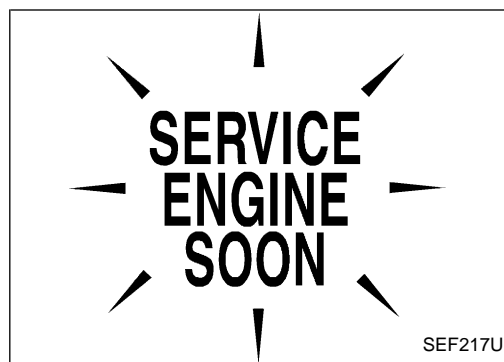
The emission related diagnostic information in the ECM can be erased by selecting Mode 4 with GST.

- **If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 24 hours.**
- **Erasing the emission-related diagnostic information using CONSULT-II or GST is easier and quicker than switching the mode selector on the ECM.**
- **The following data are cleared when the ECM memory is erased.**
 - 1) Diagnostic trouble codes
 - 2) 1st trip diagnostic trouble codes
 - 3) Freeze frame data
 - 4) 1st trip freeze frame data
 - 5) System readiness test (SRT) codes
 - 6) Test values
 - 7) Others

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

Malfunction Indicator Lamp (MIL)

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 EL section ("WARNING LAMPS") or see EC-1751.
2. When the engine is started, the MIL should go OFF.
 - If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.

On Board Diagnostic System Function

The on board diagnostic system has the following two functions.

GI
 MA
 EM
 LC
 EC
 FE
 CL
 MT
 AT
 TF
 PD
 AX
 SU
 BR
 ST
 RS
 BT
 HA
 SC
 EL
 IDX




NGEC1084

NGEC1084S01

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

Malfunction Indicator Lamp (MIL) (Cont'd)

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-1751.)
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MIL in the 1st trip. <ul style="list-style-type: none"> ● Coolant overtemperature enrichment protection ● "Misfire (Possible three way catalyst damage)" ● "Closed loop control" ● Fail-safe mode

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 **EL-94**, "WARNING LAMPS" or see EC-1751. NGEC1084S02

Diagnostic Test Mode I — Malfunction Warning

MIL	Condition
ON	When the malfunction is detected or the ECM's CPU is malfunctioning.
OFF	No malfunction.

OBD System Operation Chart

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. NGEC1085
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on. For details, refer to "Two Trip Detection Logic" on EC-1232. NGEC1085S01
- 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)

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

OBD System Operation Chart (Cont'd)

Items	Fuel Injection System	Misfire	Other
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-1251.

For details about patterns "A" and "B" under "Other", see EC-1253.

*1: Clear timing is at the moment OK is detected.

*2: Clear timing is when the same malfunction is detected in the 2nd trip.

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EXPLANATION FOR DRIVING PATTERNS FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM”

<Driving Pattern B>

NGEC1085S04

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NGEC1085S0401

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”)

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<Driving Pattern C>

NGEC1085S0402

LC

Driving pattern C means the vehicle operation as follows:

1) The following conditions should be satisfied at the same time:

Engine speed: (Engine speed in the freeze frame data) ± 375 rpm

Calculated load value: (Calculated load value in the freeze frame data) $\times (1 \pm 0.1)$ [%]

Engine coolant temperature (T) condition:

- When the freeze frame data shows lower than 70°C (158°F), “T” should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), “T” should be higher than or equal to 70°C (158°F).

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Example:

If the stored freeze frame data is as follows:

Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)

To be satisfied with driving pattern C, the vehicle should run under the following conditions:

Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F)

- The C counter will be cleared when the malfunction is detected regardless of (1).
- The C counter will be counted up when (1) is satisfied without the same malfunction.
- The DTC will not be displayed after C counter reaches 80.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

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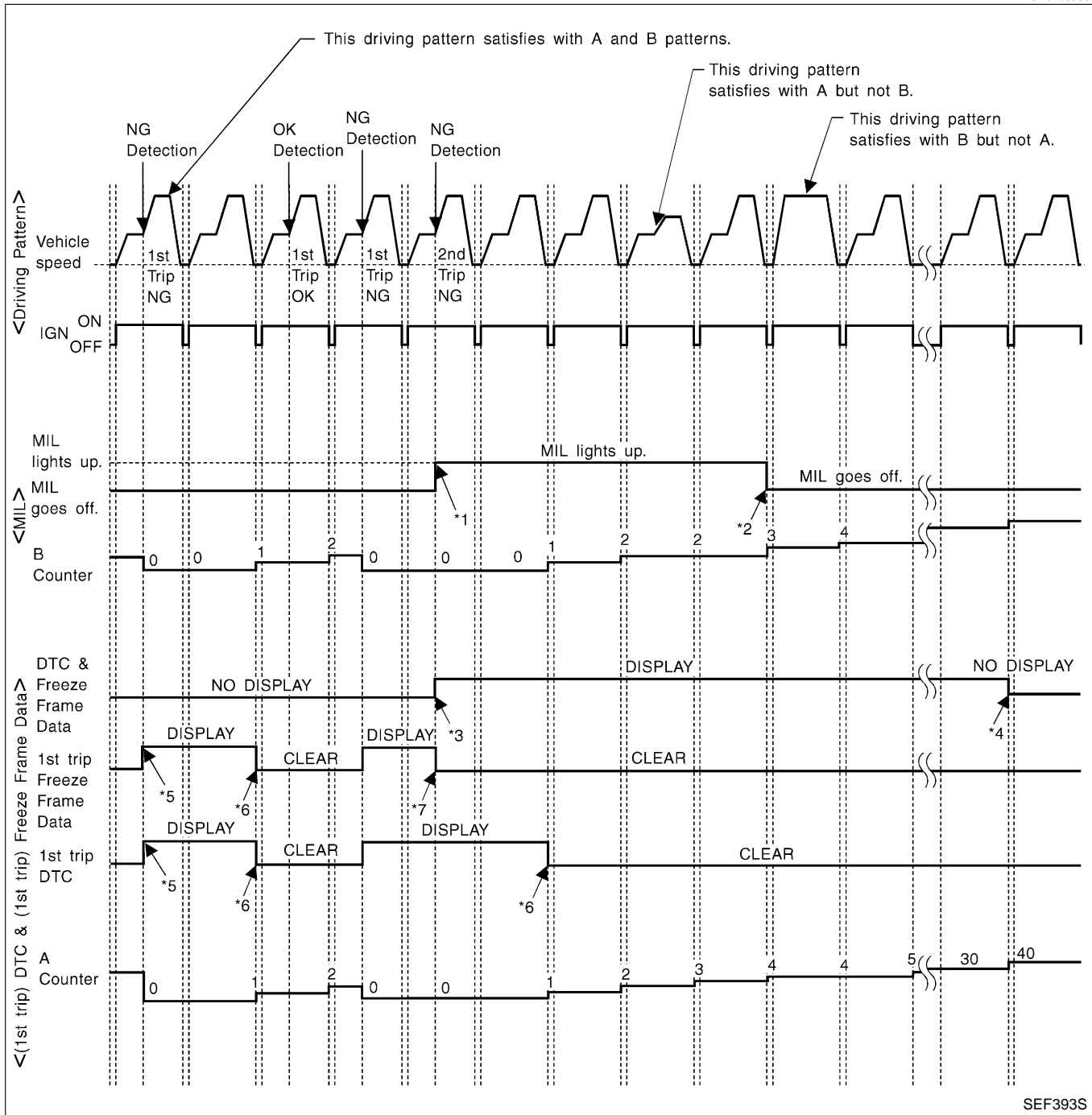
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RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

NGEC1085S05



- *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

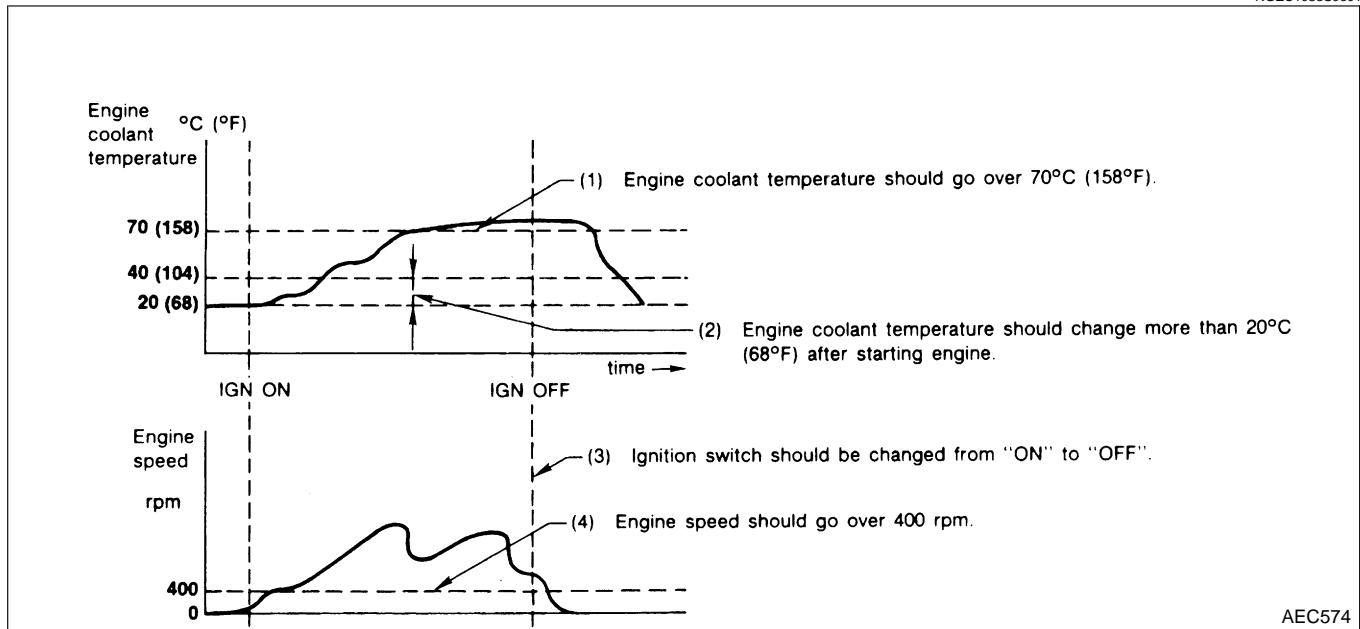
- and the 1st trip freeze frame data will be stored in ECM.
- *6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.
- *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

EXPLANATION FOR DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

<Driving Pattern A>

NGEC1085S06

NGEC1085S0601



- 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>

NGEC1085S0602

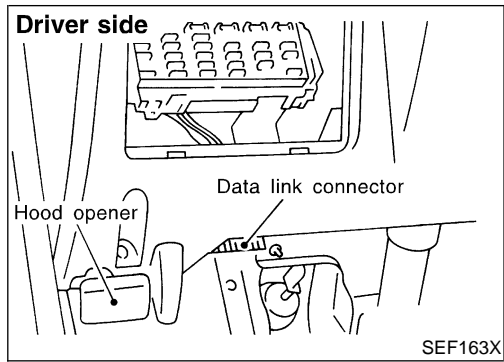
Driving pattern B means the vehicle operation as follows:

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").

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CONSULT-II



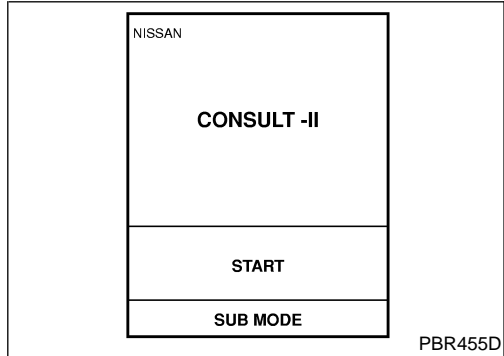
CONSULT-II

CONSULT-II INSPECTION PROCEDURE

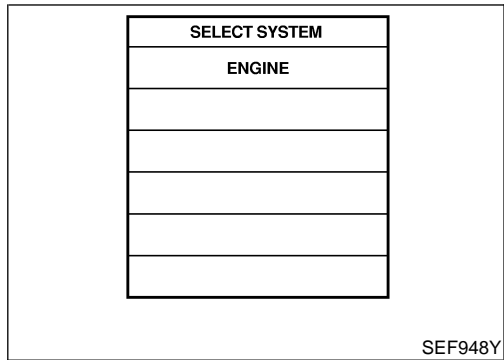
=NGEC1086

NGEC1086S01

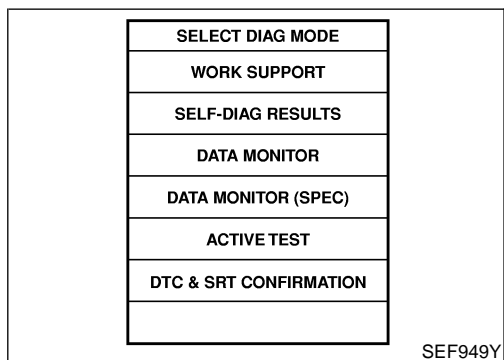
1. Turn ignition switch OFF.
2. Connect "CONSULT-II" to data link connector which is located under LH dash panel near the fuse box cover.



3. Turn ignition switch ON.
4. Touch "START".



5. Touch "ENGINE".



6. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT-II Operation Manual.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

CONSULT-II (Cont'd)

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

NGEC1086S02

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 STA-TUS	DTC WORK SUP-PORT	
ENGINE CONTROL COMPONENT PARTS	INPUT	Camshaft position sensor	X	X	X	X				GI
	Mass air flow sensor	X		X	X					MA
	Engine coolant temperature sensor	X	X	X	X	X				EM
	Heated oxygen sensor 1	X		X	X		X	X		LC
	Heated oxygen sensor 2	X		X	X		X	X		EC
	Vehicle speed sensor	X	X	X	X					FE
	Throttle position sensor	X		X	X					CL
	Fuel tank temperature sensor	X		X	X	X				MT
	EVAP control system pressure sensor	X		X	X					AT
	Intake air temperature sensor	X		X	X					TF
	Crankshaft position sensor (OBD)	X								PD
	Knock sensor	X								AX
	Ignition switch (start signal)				X	X				SU
	Closed throttle position switch	X			X	X				BR
	Closed throttle position switch (throttle position sensor signal)				X	X				ST
	Air conditioner switch				X	X				RS
	Park/neutral position (PNP) switch	X			X	X				BT
	Power steering oil pressure switch				X	X				HA
	Battery voltage				X	X				SC
	Ambient air temperature switch				X	X				EL

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

CONSULT-II (Cont'd)

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 STA-TUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	OUTPUT								
	Injectors				X	X	X		
	Power transistor (Ignition timing)				X	X	X		
	IACV-AAC valve	X	X		X	X	X		
	EVAP canister purge volume control solenoid valve		X		X	X	X		X
	Air conditioner relay				X	X			
	Fuel pump relay	X			X	X	X		
	Cooling fan		X		X	X	X		
	Heated oxygen sensor 1 heater		X		X	X		X	
	Heated oxygen sensor 2 heater		X		X	X		X	
	EVAP canister vent control valve		X		X	X	X		
	Vacuum cut valve bypass valve		X		X	X	X		X
SCB valve control solenoid valve		X		X	X	X			
Calculated load value			X	X	X				

X: Applicable

*1: This item includes 1st trip DTCs.

*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-1233.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

CONSULT-II (Cont'd)

FUNCTION

—NGEC1086S03

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-II unit.
Self-diagnostic results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*1
Data monitor	Input/Output data in the ECM can be read.
Data monitor (SPEC)	Input/Output specification of the basic fuel schedule, AFM, A/F feedback control value and the other data monitor items can be read.
Active test	Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
DTC confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
ECM part number	ECM part number can be read.

*1 The following emission-related diagnostic information is cleared when the ECM memory is erased.

- 1) Diagnostic trouble codes
- 2) 1st trip diagnostic trouble codes
- 3) Freeze frame data
- 4) 1st trip freeze frame data
- 5) System readiness test (SRT) codes
- 6) Test values
- 7) Others

WORK SUPPORT MODE

—NGEC1086S04

WORK ITEM	CONDITION	USAGE
TP SW/TP SEN IDLE POSI ADJ	● FOLLOW THE BASIC INSPECTION INSTRUCTION IN THE SERVICE MANUAL.	When adjusting the idle throttle position
IGNITION TIMING ADJ	● IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING "START". AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CAMSHAFT POSITION SENSOR.	When adjusting target ignition timing After adjustment, confirm target ignition timing with a timing light by turning the distributor.
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
SELF-LEARNING CONT	● THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clean the coefficient of self-learning control valve

WORK ITEM	CONDITION	USAGE
EVAP SYSTEM CLOSE	OPEN THE VACUUM CUT VALVE BYPASS VALVE AND CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS. <ul style="list-style-type: none"> ● IGN SW ON ● ENGINE NOT RUNNING ● AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). ● NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM ● FUEL TANK TEMP. IS MORE THAN 0°C (32°F). ● WITHIN 10 MINUTES AFTER STARTING “EVAP SYSTEM CLOSE” ● WHEN TRYING TO EXECUTE “EVAP SYSTEM CLOSE” UNDER THE CONDITION EXCEPT ABOVE, CONSULT-II WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION. NOTE: WHEN STARTING ENGINE, CONSULT-II MAY DISPLAY “BATTERY VOLTAGE IS LOW. CHARGE BATTERY”, EVEN IN USING CHARGED BATTERY.	When detecting EVAP vapor leak point of EVAP system
TARGET IDLE RPM ADJ*	SET ENGINE SPEED AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITIONS. <ul style="list-style-type: none"> ● ENGINE WARMED UP ● NO-LOAD 	When adjusting initial ignition timing and idle speed

*: This function is not necessary in the usual service procedure.

SELF-DIAGNOSTIC MODE

DTC and 1st Trip DTC

NGEC1086S05

Regarding items of “DTC and 1st trip DTC”, refer to “TROUBLE DIAGNOSIS — INDEX” (See EC-1174.)

NGEC1086S0501

Freeze Frame Data and 1st Trip Freeze Frame Data

NGEC1086S0502

Freeze frame data item *1	Description
DIAG TROUBLE CODE [PXXXX]	<ul style="list-style-type: none"> ● The engine control component part/control system has a trouble code, it is displayed as “PXXXX”. (Refer to “TROUBLE DIAGNOSIS — INDEX”, EC-1174.)
FUEL SYS-B1 *2	<ul style="list-style-type: none"> ● “Fuel injection system status” at the moment a malfunction is detected is displayed. ● One mode in the following is displayed. “MODE 2”: Open loop due to detected system malfunction “MODE 3”: Open loop due to driving conditions (power enrichment, deceleration enrichment) “MODE 4”: Closed loop - using oxygen sensor(s) as feedback for fuel control “MODE 5”: Open loop - has not yet satisfied condition to go to closed loop
FUEL SYS-B2 *2	<ul style="list-style-type: none"> ● The engine control component part/control system has a trouble code, it is displayed as “PXXXX”. (Refer to “TROUBLE DIAGNOSIS — INDEX”, EC-1174.)
CAL/LD VALUE [%]	<ul style="list-style-type: none"> ● The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	<ul style="list-style-type: none"> ● The engine coolant temperature at the moment a malfunction is detected is displayed.
S-FUEL TRIM-B1 [%]	<ul style="list-style-type: none"> ● “Short-term fuel trim” at the moment a malfunction is detected is displayed.
S-FUEL TRIM-B2 [%]	<ul style="list-style-type: none"> ● The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
L-FUEL TRIM-B1 [%]	<ul style="list-style-type: none"> ● “Long-term fuel trim” at the moment a malfunction is detected is displayed.
L-FUEL TRIM-B2 [%]	<ul style="list-style-type: none"> ● The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
ENGINE SPEED [rpm]	<ul style="list-style-type: none"> ● The engine speed at the moment a malfunction is detected is displayed.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

CONSULT-II (Cont'd)

Freeze frame data item *1	Description	
VHCL SPEED [km/h] or [mph]	<ul style="list-style-type: none"> The vehicle speed at the moment a malfunction is detected is displayed. 	GI
ABSOL TH-P/S [%]	<ul style="list-style-type: none"> The throttle valve opening angle at the moment a malfunction is detected is displayed. 	MA
B/FUEL SCHDL [msec]	<ul style="list-style-type: none"> The base fuel schedule at the moment a malfunction is detected is displayed. 	EM
INT/A TEMP SE [°C] or [°F]	<ul style="list-style-type: none"> The intake air temperature at the moment a malfunction is detected is displayed. 	LC

*1: The items are the same as those of 1st trip freeze frame data.

*2: Regarding D22 model, "-B1" indicates right bank and "-B2" indicates left bank.

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DATA MONITOR MODE

=NGEC1086S06

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	○	○	<ul style="list-style-type: none"> Indicates the engine speed computed from the REF signal (120° signal) of the camshaft position sensor. 	
MAS A/F SE-B1 [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the mass air flow sensor is displayed. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated.
B/FUEL SCHDL [msec]		○	<ul style="list-style-type: none"> "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction. 	
A/F ALPHA-B1 [%]		○	<ul style="list-style-type: none"> The mean value of the air-fuel ratio feedback correction factor per cycle is indicated. 	<ul style="list-style-type: none"> 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]	○	○	<ul style="list-style-type: none"> The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed. 	<ul style="list-style-type: none"> When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
HO2S1 (B1) [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the heated oxygen sensor 1 (front) is displayed. 	
HO2S1 (B2) [V]	○	○		
HO2S2 (B1) [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the heated oxygen sensor 2 (rear) is displayed. 	
HO2S2 (B2) [V]	○	○		
HO2S1 MNTR (B1) [RICH/LEAN]	○		<ul style="list-style-type: none"> Display of heated oxygen sensor 1 (front) signal during air-fuel ratio feedback control: RICH ... means the mixture became "rich", and control is being affected toward a leaner mixture. LEAN ... means the mixture became "lean", and control is being affected toward a rich mixture. 	<ul style="list-style-type: none"> After turning ON the ignition switch, "RICH" is displayed until air-fuel mixture ratio feedback control begins. When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
HO2S1 MNTR (B2) [RICH/LEAN]	○			
HO2S2 MNTR (B1) [RICH/LEAN]	○		<ul style="list-style-type: none"> Display of heated oxygen sensor 2 (rear) signal: RICH ... means the amount of oxygen after three way catalyst is relatively small. LEAN ... means the amount of oxygen after three way catalyst is relatively large. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated.
HO2S2 MNTR (B2) [RICH/LEAN]	○			
VHCL SPEED SE [km/h] or [mph]	○	○	<ul style="list-style-type: none"> The vehicle speed computed from the vehicle speed sensor signal is displayed. 	
BATTERY VOLT [V]	○	○	<ul style="list-style-type: none"> The power supply voltage of ECM is displayed. 	
THRTL POS SEN [V]	○	○	<ul style="list-style-type: none"> The throttle position sensor signal voltage is displayed. 	
FUEL T/TMP SE [°C] or [°F]	○		<ul style="list-style-type: none"> The fuel temperature judged from the fuel tank temperature sensor signal voltage is displayed. 	

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
INT/A TEMP SE [°C] or [°F]	○	○	<ul style="list-style-type: none"> The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated. 	
EVAP SYS PRES [V]			<ul style="list-style-type: none"> The signal voltage of EVAP control system pressure sensor is displayed. 	
FUEL LEVEL SE [V]	○		<ul style="list-style-type: none"> The signal voltage of the fuel level sensor is displayed. 	
START SIGNAL [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the starter signal. 	<ul style="list-style-type: none"> After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates idle position [ON/OFF] computed by ECM according to the throttle position sensor signal. 	
CLSD THL/P SW [ON/OFF]	○		<ul style="list-style-type: none"> Indicates mechanical contact [ON/OFF] condition of the closed throttle position switch. 	
AIR COND SIG [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal. 	
P/N POSI SW [ON/OFF]	○	○	<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal. 	
PW/ST SIGNAL [ON/OFF]	○	○	<ul style="list-style-type: none"> [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure signal is indicated. 	
AMB TEMP SW [ON/OFF]	○		<ul style="list-style-type: none"> Indicates [ON/OFF] condition from the ambient air temperature switch signal. 	
IGNITION SW [ON/OFF]	○		<ul style="list-style-type: none"> Indicates [ON/OFF] condition from ignition switch. 	
INJ PULSE-B1 [msec]		○	<ul style="list-style-type: none"> Indicates the actual fuel injection pulse width compensated by ECM according to the input signals. 	<ul style="list-style-type: none"> When the engine is stopped, a certain computed value is indicated.
INJ PULSE-B2 [msec]				
IGN TIMING [BTDC]		○	<ul style="list-style-type: none"> Indicates the ignition timing computed by ECM according to the input signals. 	<ul style="list-style-type: none"> When the engine is stopped, a certain value is indicated.
CAL/LD VALUE [%]			<ul style="list-style-type: none"> "Calculated load value" indicates the value of the current airflow divided by peak airflow. 	
ABSOL TH-P/S [%]			<ul style="list-style-type: none"> "Absolute throttle position sensor" indicates the throttle opening computed by ECM according to the signal voltage of the throttle position sensor. 	
MASS AIRFLOW [g·m/s]			<ul style="list-style-type: none"> Indicates the mass airflow computed by ECM according to the signal voltage of the mass airflow sensor. 	
IACV-AAC/V [%]		○	<ul style="list-style-type: none"> Indicates the IACV-AAC valve control value computed by ECM according to the input signals. 	

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
PURG VOL C/V [%]			<ul style="list-style-type: none"> 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. 	
AIR COND RLY [ON/OFF]		○	<ul style="list-style-type: none"> The air conditioner relay control condition (determined by ECM according to the input signal) is indicated. 	
FUEL PUMP RLY [ON/OFF]		○	<ul style="list-style-type: none"> Indicates the fuel pump relay control condition determined by ECM according to the input signals. 	
VENT CONT/V [ON/OFF]			<ul style="list-style-type: none"> The control condition of the EVAP canister vent control valve (determined by ECM according to the input signal) is indicated. ON ... Closed OFF ... Open 	
VC/V BYPASS/V [ON/OFF]			<ul style="list-style-type: none"> The control condition of the vacuum cut valve bypass valve (determined by ECM according to the input signal) is indicated. ON ... Open OFF ... Closed 	
COOLING FAN [ON/OFF]		○	<ul style="list-style-type: none"> Indicates the control condition of the cooling fan (determined by ECM according to the input signal). ON ... Operation OFF ... Stop 	
HO2S1 HTR (B1) [ON/OFF]			<ul style="list-style-type: none"> Indicates [ON/OFF] condition of front heated oxygen sensor heater determined by ECM according to the input signals. 	
HO2S1 HTR (B1) [ON/OFF]				
HO2S2 HTR (B1) [ON/OFF]			<ul style="list-style-type: none"> Indicates [ON/OFF] condition of rear heated oxygen sensor heater determined by ECM according to the input signals. 	
HO2S2 HTR (B2) [ON/OFF]				
SCB/V CON S/V			<ul style="list-style-type: none"> The control condition of the SCB valve control solenoid valve (determined by ECM according to the input signals) is indicated. ON ... SCB valve is closed. OFF ... SCB valve is opened. 	
VOLTAGE [V]			<ul style="list-style-type: none"> Voltage measured by the voltage probe. 	
FREQUENCY [msec] or [Hz] or [%]			<ul style="list-style-type: none"> Pulse width, frequency or duty cycle measured by the pulse probe. 	<ul style="list-style-type: none"> 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.

NOTE:

- Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.
- Regarding D22 model, “-B1” indicates right bank and “-B2” indicates left bank.

DATA MONITOR (SPEC) MODE

NGEC1086S07

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
MAS A/F SE-B1 [V]	○	○	<ul style="list-style-type: none"> The signal voltage of the mass air flow sensor specification is displayed. 	<ul style="list-style-type: none"> When the engine is running, specification range is indicated.
B/FUEL SCHDL [msec]		○	<ul style="list-style-type: none"> "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction. 	<ul style="list-style-type: none"> When the engine is running, specification range is indicated.
A/F ALPHA-B1 [%]		○	<ul style="list-style-type: none"> Indicates the mean value of the air-fuel ratio feedback correction factor per cycle. 	<ul style="list-style-type: none"> When the engine is running, specification range is indicated. This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B2 [%]		○		

NOTE:

- Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.
- Regarding D22 model, "B1" indicates bank 1 and "B2" indicates bank 2.

ACTIVE TEST MODE

NGEC1086S08

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Change the amount of fuel injection using CONSULT-II. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Harness and connector Fuel injectors Front heated oxygen sensor
IGNITION TIMING	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Timing light: Set Retard the ignition timing using CONSULT-II. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Adjust initial ignition timing
IACV-AAC/V OPENING	<ul style="list-style-type: none"> Engine: After warming up, idle the engine. Change the IACV-AAC valve opening percent using CONSULT-II. 	Engine speed changes according to the opening percent.	<ul style="list-style-type: none"> Harness and connector IACV-AAC valve
POWER BALANCE	<ul style="list-style-type: none"> Engine: After warming up, idle the engine. A/C switch "OFF" Shift lever "N" Cut off each injector signal one at a time using CONSULT-II. 	Engine runs rough or dies.	<ul style="list-style-type: none"> Harness and connector Compression Injectors Power transistor Spark plugs Ignition coils
COOLING FAN	<ul style="list-style-type: none"> Ignition switch: ON Turn the cooling fan "ON" and "OFF" using CONSULT-II. 	Cooling fan moves and stops.	<ul style="list-style-type: none"> Harness and connector Cooling fan motor Cooling fan relay
ENG COOLANT TEMP	<ul style="list-style-type: none"> Engine: Return to the original trouble condition Change the engine coolant temperature using CONSULT-II. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> Harness and connector Engine coolant temperature sensor Fuel injectors
FUEL PUMP RELAY	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> Harness and connector Fuel pump relay

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

VG33ER

CONSULT-II (Cont'd)

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
PURG VOL CONT/V	<ul style="list-style-type: none"> ● 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.	<ul style="list-style-type: none"> ● Harness and connector ● Solenoid valve
FUEL/T TEMP SEN	<ul style="list-style-type: none"> ● Change the fuel tank temperature using CONSULT-II. 		
VENT CONTROL/V	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Turn solenoid valve "ON" and "OFF" with the CONSULT-II and listen to operating sound. 	Solenoid valve makes an operating sound.	<ul style="list-style-type: none"> ● Harness and connector ● Solenoid valve
VC/V BYPASS/V	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Turn solenoid valve "ON" and "OFF" with the CONSULT-II and listen to operating sound. 	Solenoid valve makes an operating sound.	<ul style="list-style-type: none"> ● Harness and connector ● Solenoid valve

DTC CONFIRMATION MODE

NGEC1086S09

SRT STATUS Mode

For details, refer to "SYSTEM READINESS TEST (SRT) CODE", EC-1234.

NGEC1086S0901

SRT WORK SUPPORT Mode

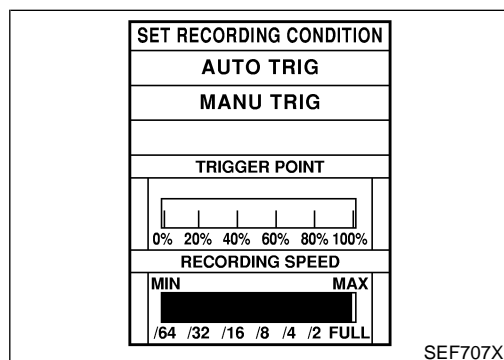
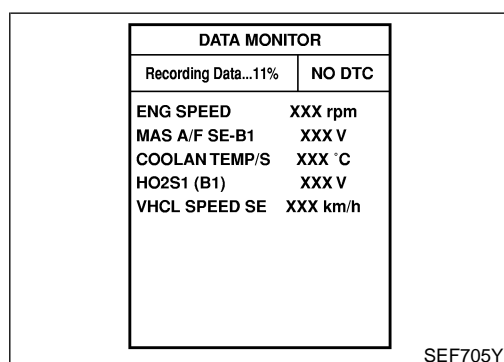
SRT status and some of the data monitor item can be read.

NGEC1086S0902

DTC Work Support Mode

NGEC1086S0903

Test mode	Test item	Condition	Reference page
EVAPORATIVE SYSTEM	EVAP SML LEAK P0442/P1442	Refer to corresponding trouble diagnosis for DTC.	EC-1505
	EVAP V/S LEAK P0456/P1456		EC-1556
	PURG VOL CN/V P1444		EC-1660
	PURGE FLOW P1441		EC-1493
	VC CUT/V BP/V P1491		EC-1697
HO2S1	HO2S1 (B1) P0134		EC-1396
	HO2S1 (B1) P1143		EC-1606
	HO2S1 (B1) P1144		EC-1615
	HO2S1 (B1) P0133		EC-1382
	HO2S1 (B2) P0154		EC-1396
	HO2S1 (B2) P1163	EC-1606	
	HO2S1 (B2) P1164	EC-1615	
	HO2S1 (B2) P0153	EC-1382	
HO2S2	HO2S2 (B1) P1146	EC-1624	
	HO2S2 (B1) P1147	EC-1634	
	HO2S2 (B1) P0139	EC-1417	
	HO2S2 (B2) P1166	EC-1624	
	HO2S2 (B2) P1167	EC-1634	
	HO2S2 (B2) P0159	EC-1417	



REAL TIME DIAGNOSIS IN DATA MONITOR MODE (RECORDING VEHICLE DATA)

NGEC1086S10

CONSULT-II has two kinds of triggers and they can be selected by touching "SETTING" in "DATA MONITOR" mode.

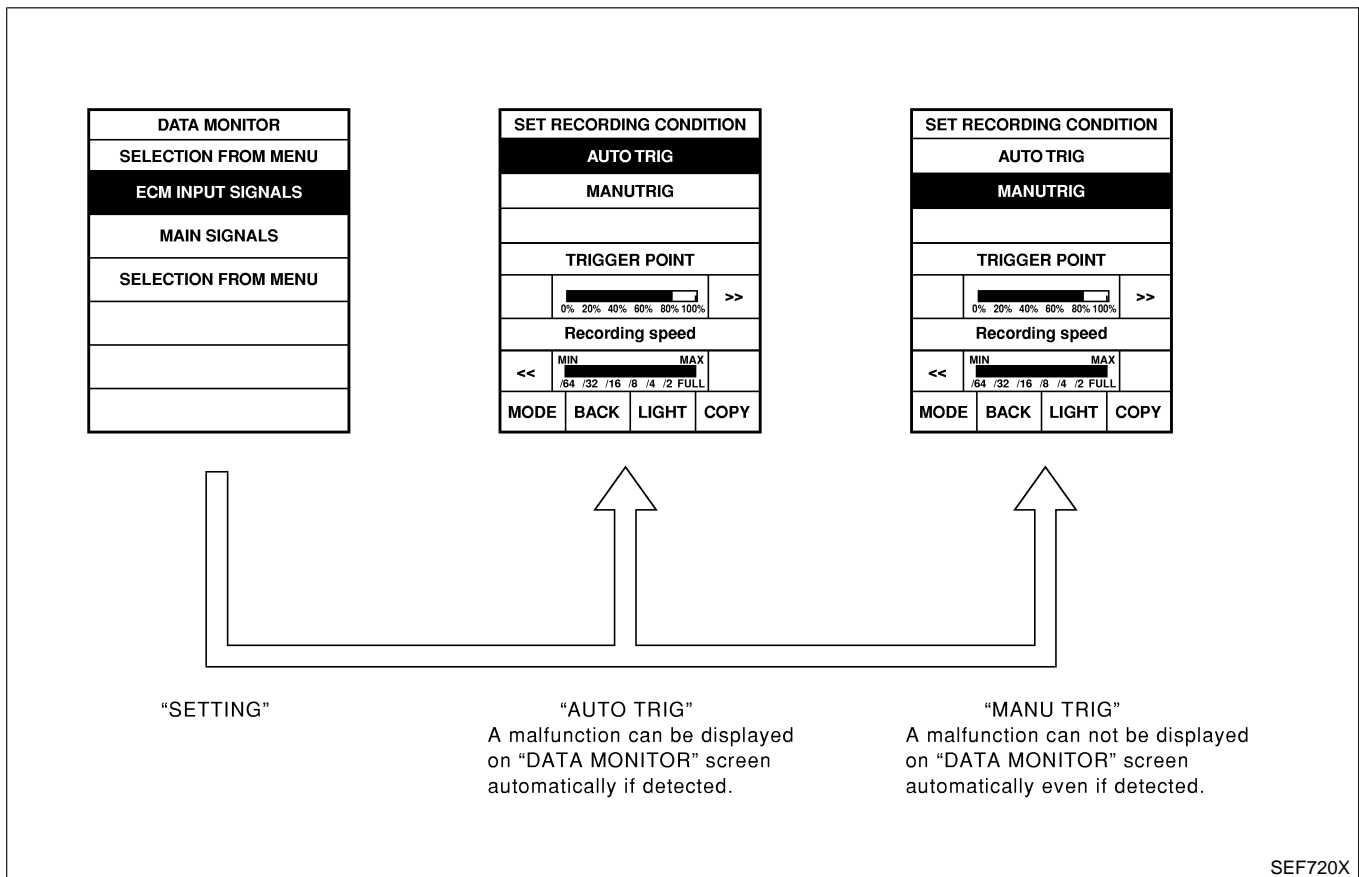
- 1) "AUTO TRIG" (Automatic trigger):
 - The malfunction will be identified on the CONSULT-II screen in real time. In other words, DTC/1st trip DTC and malfunction item will be displayed if the malfunction is detected by ECM. At the moment a malfunction is detected by ECM, "MONITOR" in "DATA MONITOR" screen is changed to "Recording Data ... xx%" as shown at left, and the data after the malfunction detection is recorded. Then when the percentage reached 100%, "REAL-TIME DIAG" screen is displayed. If "STOP" is touched on the screen during "Recording Data ... xx%", "REAL-TIME DIAG" screen is also displayed. The recording time after the malfunction detection and the recording speed can be changed by "TRIGGER POINT" and "Recording Speed". Refer to CONSULT-II OPERATION MANUAL.
- 2) "MANU TRIG" (Manual trigger):
 - DTC/1st trip DTC and malfunction item will not be displayed

automatically on CONSULT-II screen even though a malfunction is detected by ECM.

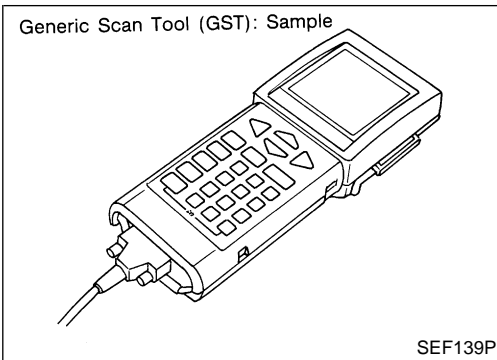
DATA MONITOR can be performed continuously even though a malfunction is detected.

Use these triggers as follows:

- 1) "AUTO TRIG"
 - While trying to detect the DTC/1st trip DTC by performing the "DTC Confirmation Procedure", be sure to select to "DATA MONITOR (AUTO TRIG)" mode. You can confirm the malfunction at the moment it is detected.
 - While narrowing down the possible causes, CONSULT-II should be set in "DATA MONITOR (AUTO TRIG)" mode, especially in case the incident is intermittent. When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the "DTC Confirmation Procedure", the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to **GI-23**, "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.



SEF720X



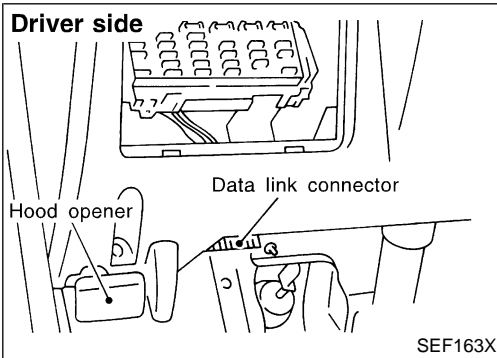
Generic Scan Tool (GST)

=NGEC1087

DESCRIPTION

NGEC1087S01

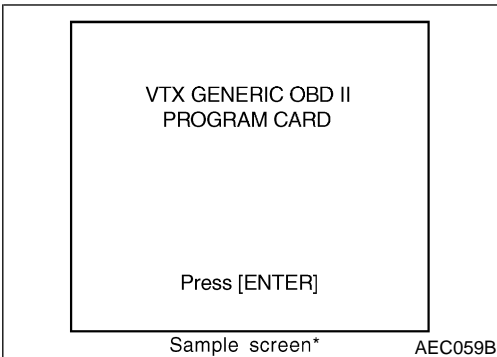
Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 7 different functions explained on the next page. ISO9141 is used as the protocol. The name "GST" or "Generic Scan Tool" is used in this service manual.



GST INSPECTION PROCEDURE

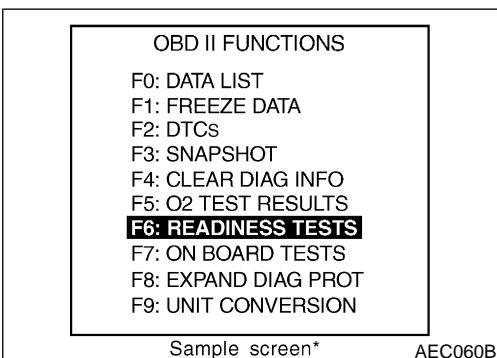
NGEC1087S02

1. Turn ignition switch OFF.
2. Connect "GST" to data link connector for GST which is located under LH dash panel near the fuse box cover.



3. Turn ignition switch ON.
4. Enter the program according to instruction on the screen or in the operation manual.

(*: Regarding GST screens in this section, sample screens are shown.)



5. Perform each diagnostic mode according to each service procedure.

For further information, see the GST Operation Manual of the tool maker.

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ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

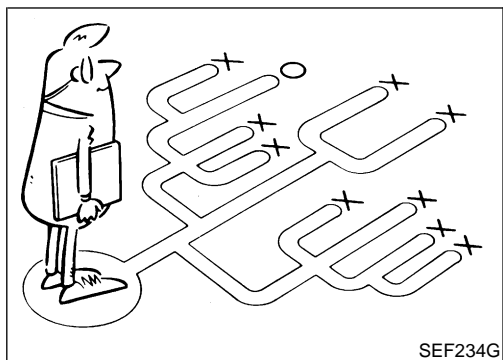
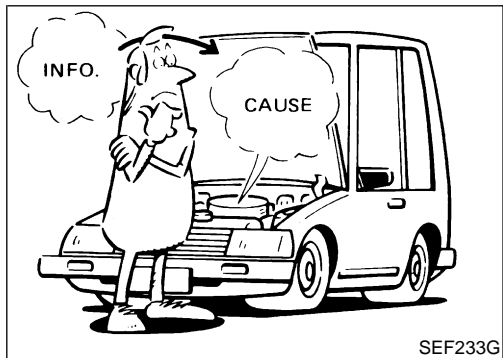
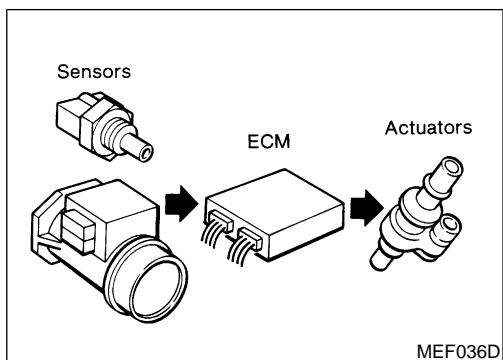
VG33ER

Generic Scan Tool (GST) (Cont'd)

FUNCTION

NGEC1087S03

Diagnostic test mode		Function
MODE 1	READINESS TESTS	This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode gains access to emission-related data value which were stored by ECM during the freeze frame. [For details, refer to "Freeze Frame Data" (EC-1258).]
MODE 3	DTCs	This mode gains access to emission-related power train trouble codes which were stored by ECM.
MODE 4	CLEAR DIAG INFO	This mode can clear all emission-related diagnostic information. This includes: <ul style="list-style-type: none"> ● Clear number of diagnostic trouble codes (MODE 1) ● Clear diagnostic trouble codes (MODE 3) ● Clear trouble code for freeze frame data (MODE 1) ● Clear freeze frame data (MODE 2) ● Reset status of system monitoring test (MODE 1) ● Clear on board monitoring test results (MODE 6 and 7)
MODE 6	(ON BOARD TESTS)	This mode accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
MODE 7	(ON BOARD TESTS)	This mode enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
MODE 8	—	This mode can close EVAP system in ignition switch "ON" position (Engine stopped). When this mode is performed, the following parts can be opened or closed. <ul style="list-style-type: none"> ● EVAP canister vent control valve open ● Vacuum cut valve bypass valve closed In the following conditions, this mode cannot function. <ul style="list-style-type: none"> ● Low ambient temperature ● Low battery voltage ● Engine running ● Ignition switch OFF ● Low fuel temperature ● Too much pressure is applied to EVAP system
MODE 9	CALIBRATION ID	This mode is to enable the off-board to request vehicle specific vehicle information such as Vehicle Identification Number (VIN) and calibration IDs.



KEY POINTS	
WHAT Vehicle & engine model
WHEN Date, Frequencies
WHERE Road conditions
HOW Operating conditions, Weather conditions, Symptoms

SEF907L

Introduction

NGEC1088

The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no problems such as vacuum leaks, fouled spark plugs, or other problems with the engine.

It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.

A visual check only may not find the cause of the problems. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the "Work Flow" on EC-1271.

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such problems, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A "Diagnostic Worksheet" like the example on next page should be used.

Start your diagnosis by looking for "conventional" problems first. This will help troubleshoot driveability problems on an electronically controlled engine vehicle.

DIAGNOSTIC WORKSHEET

NGEC1088S01

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make trouble-shooting faster and more accurate.

In general, each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint.

Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.

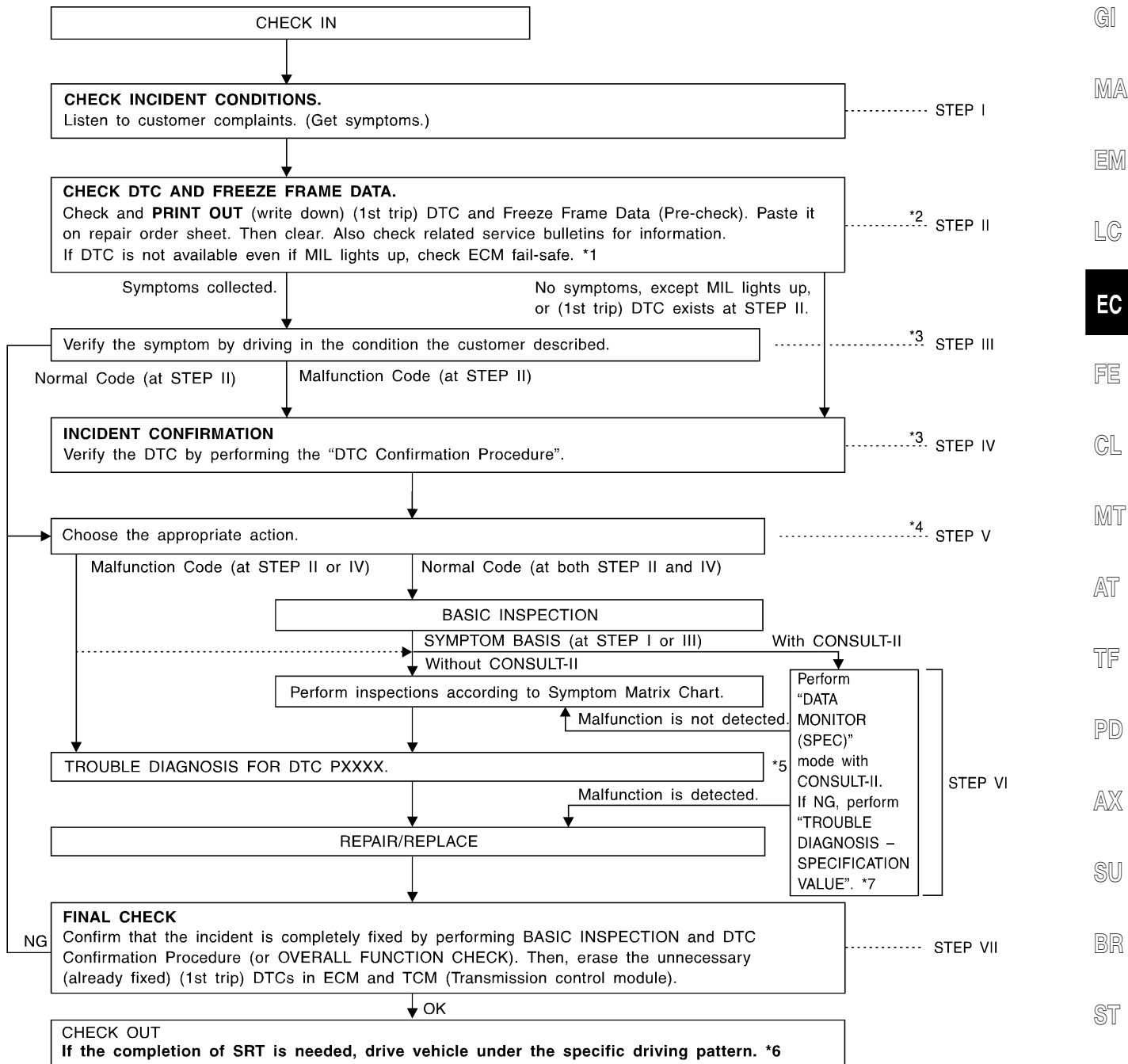
Some conditions may cause the MIL to come on steady or blink and DTC to be detected. Examples:

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere [for the models with EVAP (SMALL LEAK) diagnosis].

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Work Flow

NGEC1089



*1 EC-1289

*2 If time data of "SELF-DIAG RESULTS" is other than "0" or "[1t]", perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.

*3 If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.

*4 If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to "TROUBLE DIAGNOSIS FOR POWER SUPPLY", EC-1313.

*5 If malfunctioning part cannot be

detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.

*6 EC-1239

*7 EC-1308

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DESCRIPTION FOR WORK FLOW

NGEN1089S01

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET", EC-1270.
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II or GST) the (1st trip) DTC and the (1st trip) freeze frame data, then erase the DTC and the data. (Refer to EC-1246.) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312. Study the relationship between the cause, specified by (1st trip) DTC, and the symptom described by the customer. (The "Symptom Matrix Chart" will be useful. See EC-1290.) Also check related service bulletins for information.
STEP III	Try to confirm the symptom and under what conditions the incident occurs. The "DIAGNOSTIC WORK SHEET" and the freeze frame data are useful to verify the incident. Connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312. If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the (1st trip) DTC by driving in (or performing) the "DTC Confirmation Procedure". Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT-II or GST. During the (1st trip) DTC verification, be sure to connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312. In case the "DTC Confirmation Procedure" is not available, perform the "Overall Function Check" instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified "check" is an effective alternative. The "NG" result of the "Overall Function Check" is the same as the (1st trip) DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-1273.) If CONSULT-II is available, perform "DATA MONITOR (SPEC)" mode with CONSULT-II and proceed to the "TROUBLE DIAGNOSIS — SPECIFICATION VALUE", EC-1308. (If malfunction is detected, proceed to "REPAIR/REPLACE".) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-1290.)
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-1294, EC-1299. 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-25 , "Circuit Inspection". Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the "DTC Confirmation Procedure" and confirm the normal code [DTC No. P0000 or 0505] is detected. If the incident is still detected in the final check, perform STEP VI by using a different method from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM and TCM (Transmission control module). (Refer to EC-1246.)

Basic Inspection

NGEC1090

Precaution:

Perform Basic Inspection without electrical or mechanical loads applied;

- Headlamp switch is OFF,
- Air conditioner switch is OFF,
- Rear window defogger switch is OFF,
- Steering wheel is in the straight-ahead position, etc.

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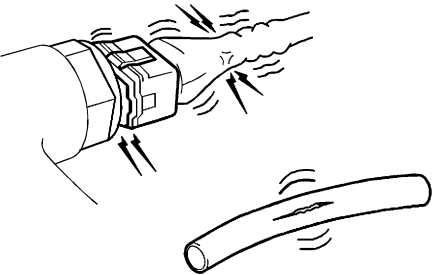
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1	INSPECTION START	
<p>1. Check service records for any recent repairs that may indicate a related problem, or the current need for scheduled maintenance.</p> <p>2. Open engine hood and check the following:</p> <ul style="list-style-type: none"> ● Harness connectors for improper connections ● Vacuum hoses for splits, kinks, or improper connections ● Wiring for improper connections, pinches, or cuts 		
		
<small>SEF983U</small>		
Models with CONSULT-II	▶	GO TO 2.
Models with GST	▶	GO TO 2.
Models with No Tools	▶	GO TO 15.

2	CONNECT CONSULT-II OR GST TO THE VEHICLE	
<p> With CONSULT-II Connect "CONSULT-II" to the data link connector for CONSULT-II and select "ENGINE" from the menu. Refer to EC-1254.</p>		
<p> With GST Connect "GST" to the data link connector for GST. Refer to EC-1267.</p>		
Models with CONSULT-II	▶	GO TO 3.
Models with GST	▶	GO TO 14.

3 CHECK FI CAM FUNCTION

④ With CONSULT-II

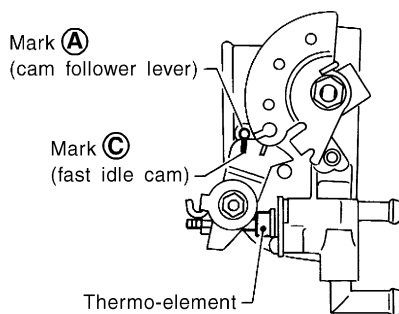
1. Turn ignition switch ON.
2. Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
3. Start engine and warm it up.

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C

SEF013Y

4. When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following.

- The center of mark **A** is aligned with mark **C**.
- The cam follower lever's roller is not touching the fast idle cam.



SEF971R

OK or NG

OK



GO TO 4.

NG



1. Check FI cam. Refer to "Fast Idle Cam (FIC)", EC-1219.
2. GO TO 4.

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4 CHECK IGNITION TIMING

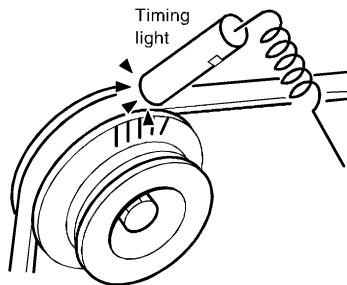
With CONSULT-II

1. Warm up engine to normal operating temperature.
2. Select "IGNITION TIMING ADJ" in "WORK SUPPORT" mode and touch "START".

IGNITION TIMING ADJ
<p>IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING START. AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CAMSHAFT POSITION SENSOR.</p>

PEF546N

3. Check ignition timing at idle using a timing light.



SEF984U

Ignition timing: 10°±2° BTDC

OK or NG

OK ► GO TO 5.

NG ► 1. Adjust ignition timing by turning distributor. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-1220.
2. GO TO 5.

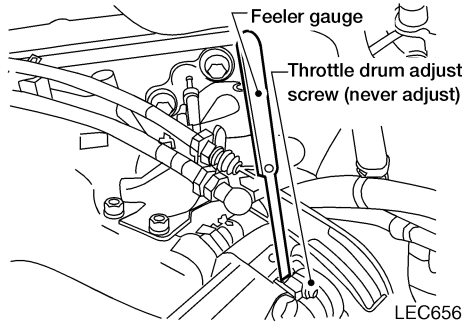
5	CHECK BASE IDLE SPEED	
<p> With CONSULT-II 1. Select "IGNITION TIMING ADJ" in "WORK SUPPORT" mode and touch "START". </p> <div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: 60%; text-align: center;"> <p>IGNITION TIMING ADJ</p> <p>IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING START. AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CAMSHAFT POSITION SENSOR.</p> </div> <p style="text-align: right; margin-top: 20px;">PEF546N</p> <p>2. Check idle speed. 700±50 rpm (in "P" or "N" position)</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	1. Adjust engine speed by turning idle speed adjusting screw. Refer to "Idle Speed/ Ignition Timing/Idle Mixture Ratio Adjustment", EC-1220. 2. GO TO 6.

6	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION-I	
<p> With CONSULT-II NOTE: Always check ignition timing and base idle speed before performing the following. </p> <ol style="list-style-type: none"> 1. Warm up engine to normal operating temperature. 2. Check FI cam, refer to procedure 3. 3. Stop engine. 		
	▶	GO TO 7.

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7 CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION-II

1. Turn ignition switch ON.
2. Select "TP SW/TP SEN IDLE POSI ADJ" in "WORK SUPPORT" mode.
3. Read "CLSD THL/P SW" signal under the following conditions.
 - Insert a 0.3 mm (0.012 in) and 0.4 mm (0.016 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure and check the signal.



LEC656

TP SW/TP SEN IDLE POSI ADJ	
MONITOR	
COOLAN TEMP/S	91 °C
CLSD THL POS	ON
CLSD THL/P SW	ON

SEF715Y

"CLSD THL/P SW" signal should remain "ON" while inserting 0.3 mm (0.012 in) feeler gauge.
 "CLSD THL/P SW" signal should remain "OFF" while inserting 0.4 mm (0.016 in) feeler gauge.

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 8.

8 ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION

Ⓜ With CONSULT-II

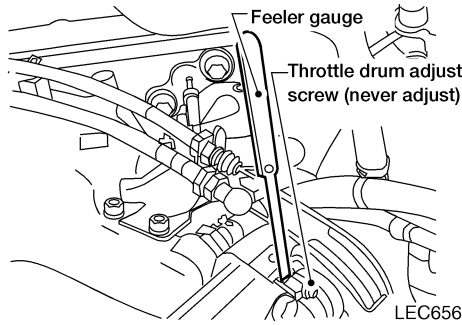
NOTE:

- Never adjust throttle adjust screw (TAS).
 - Do not touch throttle drum when checking "CLSD THL/P SW" signal, doing so may cause an incorrect adjustment.
1. Warm up engine to normal operating temperature.
 2. Check FI cam. Refer to procedure 3.
 3. Stop engine.
 4. Loosen throttle position sensor fixing bolts.

▶	GO TO 9.
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9 ADJUSTMENT CLOSED THROTTLE POSITION SWITCH IDLE POSITION-II

1. Turn ignition switch ON.
2. Select "TP SW/TP SEN IDLE POSI ADJ" in "WORK SUPPORT" mode.
3. Insert 0.35 mm (0.0138 in) feeler gauge between throttle adjust screw and throttle drum as shown in the figure.



LEC656

4. Open throttle valve and then close.
5. Check "CLSD THL/P SW" signal.

TP SW/TP SEN IDLE POSI ADJ	
MONITOR	
COOLAN TEMP/S	91 °C
CLSD THL POS	ON
CLSD THL/P SW	ON

SEF715Y

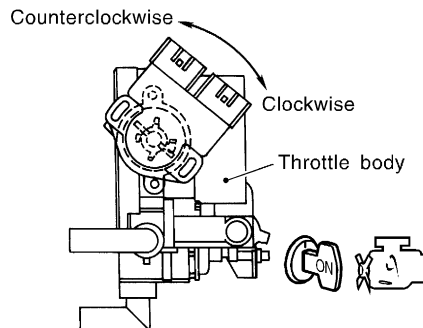
"CLSD THL/P SW" signal should remain "OFF" when the throttle valve is closed.

OK or NG

- | | | |
|----|---|-----------|
| OK | ▶ | GO TO 11. |
| NG | ▶ | GO TO 10. |

10 ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-III

- ④ With CONSULT-II
 Turn throttle position sensor body counterclockwise until "CLSD THL/P SW" signal switches to "OFF".



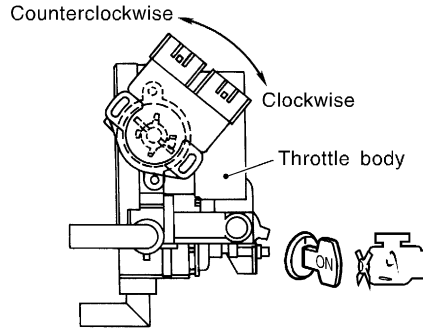
SEF689W

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|---|-----------|
| ▶ | GO TO 11. |
|---|-----------|

11 ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-IV

With CONSULT-II

1. Remove 0.35 mm (0.0138 in) feeler gauge then insert 0.3 mm (0.012 in) feeler gauge.
2. Temporarily tighten sensor body fixing bolts as follows.
- Gradually move the sensor body clockwise and stop it when "CLSD THL/P SW" signal switches from "OFF" to "ON", then temporarily tighten sensor body fixing bolts.



SEF689W


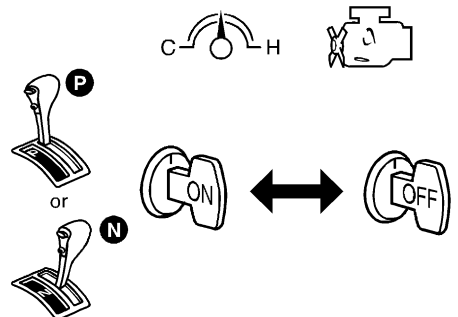
3. Make sure two or three times that the signal is "ON" when the throttle valve is closed and "OFF" when it is opened.
4. Remove 0.3 mm (0.012 in) feeler gauge then insert 0.4 mm (0.016 in) feeler gauge.
5. Make sure two or three times that the signal remains "OFF" when the throttle valve is closed.
6. Tighten throttle position sensor.
7. Check the "CLSD THL/P SW" signal again.


The signal remains "OFF" while closing throttle valve.

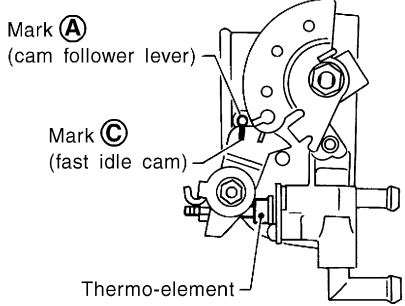
OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 8.

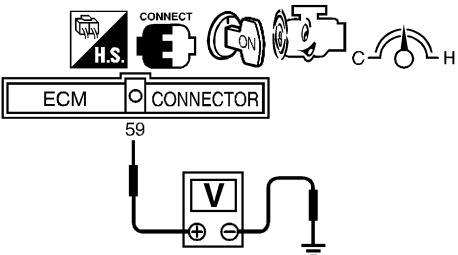
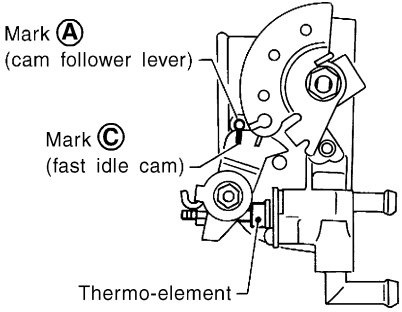
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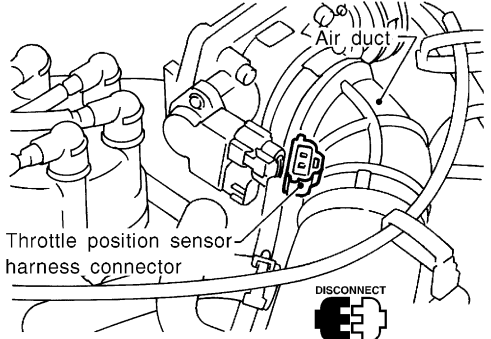
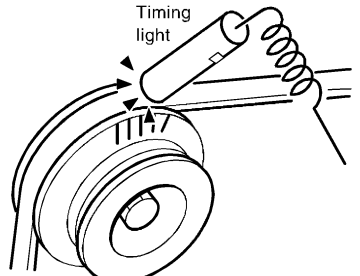
12	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY																						
<p> With CONSULT-II</p> <p>NOTE: Always warm up engine to normal operating temperature. If engine is cool, the throttle position sensor idle position memory will not be reset correctly.</p> <ol style="list-style-type: none"> 1. Remove feeler gauge. 2. Start engine. 3. Warm up engine to normal operating temperature. 4. Select "TP SW/TP SEN IDLE POSI ADJ" in "WORK SUPPORT" mode. 5. Stop engine. (Turn ignition switch OFF.) 6. Turn ignition switch ON and wait at least 5 seconds. <div style="text-align: center; margin: 10px 0;">  </div> <ol style="list-style-type: none"> 7. Turn ignition switch OFF and wait at least 5 seconds. 8. Repeat steps 5 and 6 until "CLSD THL POS" signal changes to "ON". <div style="text-align: center; margin: 10px 0;"> <table border="1" style="border-collapse: collapse; width: 150px;"> <thead> <tr> <th colspan="2">TP SW/TP SEN IDLE POSI ADJ MONITOR</th> </tr> </thead> <tbody> <tr> <td>COOLAN TEMP/S</td> <td style="text-align: center;">91 °C</td> </tr> <tr> <td>CLSD THL POS</td> <td style="text-align: center;">ON</td> </tr> <tr> <td>CLSD THL/P SW</td> <td style="text-align: center;">ON</td> </tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table> </div>		TP SW/TP SEN IDLE POSI ADJ MONITOR		COOLAN TEMP/S	91 °C	CLSD THL POS	ON	CLSD THL/P SW	ON														
TP SW/TP SEN IDLE POSI ADJ MONITOR																							
COOLAN TEMP/S	91 °C																						
CLSD THL POS	ON																						
CLSD THL/P SW	ON																						
SEF864V																							
SEF715Y																							
▶	GO TO 13.																						

13	CHECK TARGET IDLE SPEED
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Select "ENG SPEED" in "DATA MONITOR" mode. 3. Check idle speed. 750±50 rpm (in "P" or "N" position) <p style="text-align: center; margin: 10px 0;">OK or NG</p>	
OK	▶ INSPECTION END
NG	▶ <ol style="list-style-type: none"> 1. Adjust idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-1220. 2. GO TO 27.

14		CHECK FI CAM FUNCTION	
<p>With GST</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select "MODE 1" with GST. 3. Start engine and warm it up. 4. When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following. <ul style="list-style-type: none"> ● The center of mark A is aligned with mark C. ● The cam follower lever's roller is not touching the fast idle cam. <div style="text-align: center; margin: 20px 0;">  <p style="margin: 0;">Mark A (cam follower lever)</p> <p style="margin: 0;">Mark C (fast idle cam)</p> <p style="margin: 0;">Thermo-element</p> </div> <p style="text-align: right; margin-right: 20px;">SEF971R</p> <p style="text-align: center; margin: 10px 0;">OK or NG</p>			
OK	▶	GO TO 16.	
NG	▶	<ol style="list-style-type: none"> 1. Check FI cam. Refer to "Fast Idle Cam (FIC)", EC-1219. 2. GO TO 16. 	

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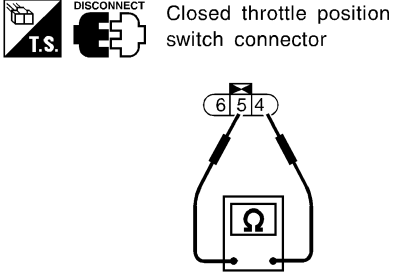
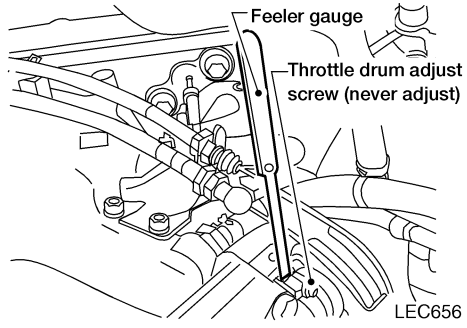
15	CHECK FI CAM FUNCTION
<p>No Tools</p> <ol style="list-style-type: none"> 1. Set the voltmeter between ECM terminal 59 (Engine coolant temperature sensor signal) and ground. 2. Start engine and warm it up. 	
	
SEF119W	
<ol style="list-style-type: none"> 3. When the voltage is between 1.10 to 1.36V, check the following. <ul style="list-style-type: none"> ● The center of mark A is aligned with mark C. ● The cam follower lever's roller is not touching the fast idle cam. 	
	
SEF971R	
OK or NG	
OK	▶ GO TO 16.
NG	▶ 1. Check FI cam. Refer to "Fast Idle Cam (FIC)", EC-1219. 2. GO TO 16.

16	CHECK IGNITION TIMING	
<p>⊗ Without CONSULT-II</p> <p>1. Warm up engine to normal operating temperature. 2. Stop engine and disconnect throttle position sensor harness connector.</p> <div style="text-align: center;">  <p>Throttle position sensor harness connector</p> <p>Air duct</p> <p>DISCONNECT</p> </div> <p>3. Start engine. 4. Check ignition timing at idle using a timing light.</p> <div style="text-align: center;">  <p>Timing light</p> </div> <p style="color: blue;">Ignition timing: 10°±2° BTDC</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 17.
NG	▶	1. Adjust ignition timing by turning distributor. Refer to "Idle Speed/ Ignition Timing/ Idle Mixture Ratio Adjustment", EC-1220. 2. GO TO 17.

17	CHECK BASE IDLE SPEED	
<p>⊗ Without CONSULT-II</p> <p>1. Make sure that throttle position sensor harness connector remain disconnected. 2. Does engine speed fall to the following speed? 700±50 rpm (in "P" or "N" position)</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 18.
NG	▶	1. Adjust engine speed by turning idle speed adjusting screw. Refer to "Idle Speed/ Ignition Timing/ Idle Mixture Ratio Adjustment", EC-1220. 2. GO TO 18.

18	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION	
<p>⊗ Without CONSULT-II</p> <p>NOTE: Always check ignition timing and base idle speed before performing the following.</p> <p>1. Warm up engine to normal operating temperature. 2. Check FI cam, refer to procedure 14 or 15. 3. Stop engine.</p>		
	▶	GO TO 19.

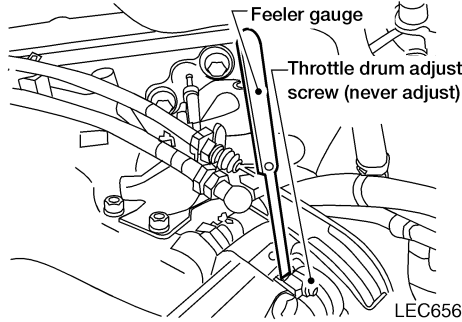
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19	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION-I
<p>1. Disconnect closed throttle position switch harness connector.</p> <p>2. Check continuity between closed throttle position switch terminals 4 and 5 under the following conditions.</p>	
 <p style="text-align: center;">Closed throttle position switch connector</p>	
<p style="text-align: right;">SEC298C</p> <ul style="list-style-type: none"> ● Insert the 0.3 mm (0.012 in) and 0.4 mm (0.016 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure. 	
 <p style="text-align: right;">LEC656</p>	
<p>“Continuity should exist” while inserting 0.3 mm (0.012 in) feeler gauge. “Continuity should not exist” while inserting 0.4 mm (0.016 in) feeler gauge.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 24.
NG	▶ GO TO 20.

20	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION
<p> Without CONSULT-II</p> <p>NOTE:</p> <ul style="list-style-type: none"> ● Never adjust throttle adjust screw (TAS). ● Do not touch throttle drum when checking “continuity”, doing so may cause an incorrect adjustment. <ol style="list-style-type: none"> 1. Warm up engine to normal operating temperature. 2. Check FI cam. Refer to procedure 12 or 13. 3. Stop engine. 4. Loosen throttle position sensor fixing bolts. 	
▶	GO TO 21.

21 ADJUSTMENT CLOSED THROTTLE POSITION SWITCH IDLE POSITION-II

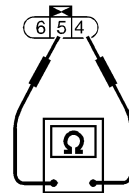
1. Disconnect closed throttle position switch harness connector.
2. Insert 0.35 mm (0.0138 in) feeler gauge between the throttle adjust screw and throttle drum as shown in the figure.



3. Open throttle valve then close.
4. Check continuity between closed throttle position switch terminals 4 and 5.



Closed throttle position switch connector



Continuity should not exist while closing the throttle position sensor.

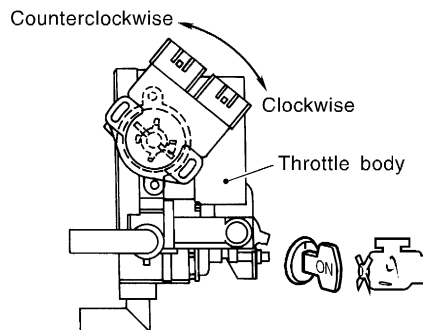
OK or NG

OK	▶	GO TO 23.
NG	▶	GO TO 22.

22 ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-III

Without CONSULT-II

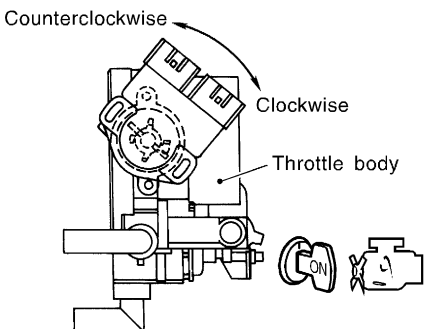
Turn throttle position sensor body counterclockwise until continuity does not exist.

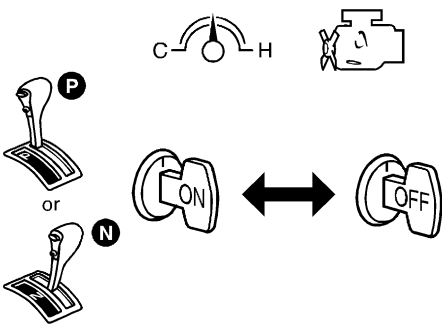


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▶	GO TO 23.
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23	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-IV						
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Remove 0.35 mm (0.0138 in) feeler gauge then insert 0.3 mm (0.012 in) feeler gauge. 2. Temporarily tighten sensor body fixing bolts as follows. <ul style="list-style-type: none"> ● Gradually move the sensor body clockwise and stop it when the continuity comes to exist, then temporarily tighten sensor body fixing bolts. <div style="text-align: center; margin: 10px 0;">  </div> <p style="text-align: right; margin-right: 50px;">SEF689W</p> <ol style="list-style-type: none"> 3. Make sure two or three times that the continuity exists when the throttle valve is closed and continuity does not exist when it is opened. 4. Remove 0.3 mm (0.012 in) feeler gauge then insert 0.4 mm (0.016 in) feeler gauge. 5. Make sure two or three times that the continuity does not exist when the throttle valve is closed. 6. Tighten throttle position sensor. 7. Check the continuity again. <p style="margin-left: 20px; color: blue;">Continuity does not exist while closing the throttle valve.</p> <p style="text-align: center; margin: 10px 0;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 20%; padding: 2px;">OK</td> <td style="width: 10%; text-align: center; padding: 2px;">▶</td> <td style="padding: 2px;">GO TO 24.</td> </tr> <tr> <td style="padding: 2px;">NG</td> <td style="text-align: center; padding: 2px;">▶</td> <td style="padding: 2px;">GO TO 20.</td> </tr> </table>		OK	▶	GO TO 24.	NG	▶	GO TO 20.
OK	▶	GO TO 24.					
NG	▶	GO TO 20.					

24	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY			
<p>⊗ Without CONSULT-II</p> <p>NOTE: Always warm up engine to normal operating temperature. If engine is cool, the throttle position sensor idle position memory will not be reset correctly.</p> <ol style="list-style-type: none"> 1. Remove feeler gauge. 2. Start engine. 3. Warm up engine to normal operating temperature. 4. Stop engine. (Turn ignition switch OFF.) 5. Turn ignition switch ON and wait at least 5 seconds. <div style="text-align: center; margin: 10px 0;">  </div> <p style="text-align: right; margin-right: 50px;">SEF864V</p> <ol style="list-style-type: none"> 6. Turn ignition switch OFF and wait at least 5 seconds. 7. Repeat steps 4 and 5, 20 times. <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 20%;"></td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 25.</td> </tr> </table>			▶	GO TO 25.
	▶	GO TO 25.		

25	REINSTALLATION	
<p>⊗ Without CONSULT-II</p> <p>1. Reconnect throttle position sensor harness connector and closed throttle position switch harness connector.</p> <p>2. Start engine and rev it (2,000 to 3,000 rpm) two or three times under no-load and then run engine at idle speed.</p>		
		▶ GO TO 26.
26	CHECK TARGET IDLE SPEED	
<p>⊗ Without CONSULT-II</p> <p>1. Start engine and warm it up to normal operating temperature.</p> <p>2. Check idle speed.</p> <p style="text-align: center;">750±50 rpm (in "P" or "N" position)</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 27.
NG	▶	1. Adjust idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-1220. 2. GO TO 27.
27	ERASE UNNECESSARY DTC	
<p>After this inspection, unnecessary DTC No. might be displayed.</p> <p>Erase the stored memory in ECM and TCM (Transmission control module).</p> <p>Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-1246 and AT-35, "HOW TO ERASE DTC".</p>		
		▶ INSPECTION END

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DTC Inspection Priority Chart

NGEC1091

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	Detected items (DTC)
1	<ul style="list-style-type: none"> ● P0101, P0102, P0103 Mass air flow sensor ● P0112, P0113, P0127 Intake air temperature sensor ● P0117, P0118, P0125 Engine coolant temperature sensor ● P0121, P0122, P0123 Throttle position sensor ● P0181, P0182, P0183 Fuel tank temperature sensor ● P0327, P0328 Knock sensor ● P0335 P1336 Crankshaft position sensor (OBD) ● P0340 Camshaft position sensor ● P0460 P0461 P1464 Fuel level sensor ● P0500 Vehicle speed sensor ● P0600 A/T communication line ● P0605 ECM ● P1605 A/T diagnosis communication line ● P1706 Park/Neutral position (PNP) switch
2	<ul style="list-style-type: none"> ● P0132-P0134, P1143, P1144/P0152-P0154, P1163, P1164 Heated oxygen sensor 1 ● P0131, P0032/P0051, P0052 Heated oxygen sensor 1 heater ● P0138, P0139, P1146, P1147/P0158, P0159, P1166, P1167 Heated oxygen sensor 2 ● P0037, P0038/P0057, P0058 Heated oxygen sensor 2 heater ● P0217 Engine coolant overtemperature enrichment protection ● P0444, P0445, P1444 EVAP canister purge volume control solenoid valve ● P0447 P1446 P1448 EVAP canister vent control valve ● P0452, P0453 EVAP control system pressure sensor ● P0510 Closed throttle position switch ● P0705-P0755 P1705 P1760 A/T related sensors, solenoid valves and switches ● P0456, P1456 EVAP control system (VERY SMALL LEAK) ● P1447 EVAP control system purge flow monitoring ● P1490 P1491 Vacuum cut valve bypass valve
3	<ul style="list-style-type: none"> ● P0171 P0172 P0174 P0175 Fuel injection system function ● P0306 - P0300 Misfire ● P0420 P0430 Three way catalyst function ● P0442/P1442 EVAP control system (SMALL LEAK) ● P0455 EVAP control system (GROSS LEAK) ● P0505 IACV-AAC valve ● P0731-P0734 P0744 A/T function ● P1148 P1168 Closed loop control

Fail-safe Chart

=NGEC1092

The ECM enters fail-safe mode, if any of the following malfunctions is detected due to the open or short circuit. When the ECM enters the fail-safe mode, the MIL illuminates.

DTC No.	Detected items	Engine operating condition in fail-safe mode												
CONSULT-II GST														
P0101 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.												
		<table border="1"> <thead> <tr> <th>Condition</th> <th>Engine coolant temperature decided (CONSULT-II display)</th> </tr> </thead> <tbody> <tr> <td>Just as ignition switch is turned ON or Start</td> <td>40°C (104°F)</td> </tr> <tr> <td>More than approx. 4 minutes after ignition ON or Start</td> <td>80°C (176°F)</td> </tr> <tr> <td>Except as shown above</td> <td>40 - 80°C (104 - 176°F) (Depends on the time)</td> </tr> </tbody> </table>	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)				
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)													
P0121 P0122 P0123	Throttle position sensor circuit	Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.												
		<table border="1"> <thead> <tr> <th>Condition</th> <th>Driving condition</th> </tr> </thead> <tbody> <tr> <td>When engine is idling</td> <td>Normal</td> </tr> <tr> <td>When accelerating</td> <td>Poor acceleration</td> </tr> </tbody> </table>	Condition	Driving condition	When engine is idling	Normal	When accelerating	Poor acceleration						
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When engine is idling	Normal													
When accelerating	Poor acceleration													
Unable to access ECM	ECM	<p>ECM fail-safe activating condition The computing function of the ECM was judged to be malfunctioning. When the fail-safe system activates (i.e., if the ECM detects a malfunction condition in the CPU of ECM), the MIL on the instrument panel lights to warn the driver. However it is not possible to access ECM and DTC cannot be confirmed.</p> <p>Engine control with fail-safe When ECM fail-safe is operating, fuel injection, ignition timing, fuel pump operation, and IACV-AAC valve operation are controlled under certain limitations.</p> <table border="1"> <thead> <tr> <th colspan="2">ECM fail-safe operation</th> </tr> </thead> <tbody> <tr> <td>Engine speed</td> <td>Engine speed will not rise more than 3,000 rpm</td> </tr> <tr> <td>Fuel injection</td> <td>Simultaneous multiport fuel injection system</td> </tr> <tr> <td>Ignition timing</td> <td>Ignition timing is fixed at the preset value</td> </tr> <tr> <td>Fuel pump</td> <td>Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls</td> </tr> <tr> <td>IACV-AAC valve</td> <td>Full open</td> </tr> </tbody> </table> <p>Replace ECM, if ECM fail-safe condition is confirmed.</p>	ECM fail-safe operation		Engine speed	Engine speed will not rise more than 3,000 rpm	Fuel injection	Simultaneous multiport fuel injection system	Ignition timing	Ignition timing is fixed at the preset value	Fuel pump	Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls	IACV-AAC valve	Full open
ECM fail-safe operation														
Engine speed	Engine speed will not rise more than 3,000 rpm													
Fuel injection	Simultaneous multiport fuel injection system													
Ignition timing	Ignition timing is fixed at the preset value													
Fuel pump	Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls													
IACV-AAC valve	Full open													

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

Symptom Matrix Chart

Symptom Matrix Chart SYSTEM — BASIC ENGINE CONTROL SYSTEM

NGEC1093

NGEC1093S01

		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	OVERHEAT/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		3	2						1	EC-1733	
	Injector circuit							2								EC-1725	
	Fuel pressure regulator system	4	4	4	4	4	4	4	3	3							EC-1218
	Evaporative emission system																4
Air	Positive crankcase ventilation system	3	3				1	1	1	1							EC-1215
	Incorrect idle speed adjustment																1
	IACV-AAC valve circuit	2	1	3	3	3	2	2	2	2							EC-1586
	IACV-FICD solenoid valve circuit		2														EC-1746
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1								EC-1220
	Ignition circuit							2									EC-1718
Main power supply and ground circuit		1	2	3	3	3		3	2		1	3				1	EC-1313
Air conditioner circuit																	2

1 - 6: The numbers refer to the order of inspection.
(continued on next page)

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

Symptom Matrix Chart (Cont'd)

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Camshaft position sensor circuit	1			2				2						EC-1481
Mass air flow sensor circuit		1	2			2						2		
Heated oxygen sensor 1 (front) circuit				3			2							EC-1396
Engine coolant temperature sensor circuit	1	2	3		3	3			2		3			EC-1348, 1366
Throttle position sensor circuit		1	2		2	2					2			EC-1353
Incorrect throttle position sensor adjustment		3	1		1	1	1	1	1		1			EC-1273
Vehicle speed sensor circuit		2												EC-1582
Knock sensor circuit			3		3						3			EC-1471
ECM	2	2		3		3	3	2	2	1				EC-1604, 1289
Start signal circuit	1													EC-1730
Park/neutral position (PNP) switch circuit			3		3						3			EC-1709
Power steering oil pressure switch circuit		2					3	2						EC-1741

1 - 6: The numbers refer to the order of inspection.
(continued on next page)

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

Symptom Matrix Chart (Cont'd)

SYSTEM — ENGINE MECHANICAL & OTHER

NGEC1093S02

		SYMPTOM												Reference section		
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA		
Fuel	Fuel tank	5	5												FE-4	
	Fuel piping			5	5	5		5	4		5					
	Vapor lock															
	Valve deposit															
	Poor fuel (Heavy weight gasoline, Low octane)	5		5	5	5		5	4			5			—	
Air	Air duct															
	Air cleaner															
	Air leakage from air duct (Mass air flow sensor — throttle body)		5	5	5	5		5	4			5				
	Throttle body, Throttle wire	5					5			4					FE-3	
	Air leakage from intake manifold/Collector/Gasket				5										—	
Cranking	Battery		1	1		1		1	1			1		1	SC-4	
	Generator circuit	1														
	Starter circuit															
	Park/neutral position (PNP) switch														AT-104	
	Drive plate/Flywheel	6													EM-124	

1 - 6: The numbers refer to the order of inspection.
(continued on next page)

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

Symptom Matrix Chart (Cont'd)

		SYMPTOM												Reference section	
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION		BATTERY DEAD (UNDER CHARGE)
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Engine	Cylinder head														EM-92, EM-82 and EM-115
	Cylinder head gasket	5	5	5	5	5		5	5		2	5	2		
	Cylinder block														
	Piston												3		
	Piston ring														
	Connecting rod	6	6	6	6	6		6	6			6			
	Bearing														
	Crankshaft														
Valve mechanism	Timing chain														
	Camshaft														
	Intake valve	6	6	6	6	6		6	6		6	2			
	Exhaust valve														
	Hydraulic lash adjuster														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	6	6	6	6	6		6	6		6			FE-9	
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	6	6	6	6	6		6	6		6	2		MA-32, EM-79 and LC-20	
	Oil level (Low/Filthy) oil													MA-32	
Cooling	Radiator/Hose/Radiator filler cap														LC-27
	Thermostat						5			5					
	Water pump														
	Water gallery	6	6	6	6	6		6	6		2	6			
	Cooling fan						5			5					
	Coolant level (low)/Contaminated coolant														

1 - 6: The numbers refer to the order of inspection.

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CONSULT-II Reference Value in Data Monitor Mode

NGEC1094

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.

- If the real-time diagnosis results are NG and the on board diagnostic system results are OK when diagnosing the mass air flow sensor, first check to see if the fuel pump control circuit is normal.

MONITOR ITEM	CONDITION		SPECIFICATION
ENG SPEED	<ul style="list-style-type: none"> ● Tachometer: Connect ● Run engine and compare tachometer indication with the CONSULT-II value. 		Almost the same speed as the CONSULT-II value.
MAS A/F SE-B1	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle	1.0 - 1.7V
		2,500 rpm	1.7 - 2.3V
COOLAN TEMP/S	<ul style="list-style-type: none"> ● Engine: After warming up 		More than 70°C (158°F)
HO2S1 (B1) HO2S1 (B2)	<ul style="list-style-type: none"> ● Engine: After warming up 	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ↔ RICH Changes more than 5 times during 10 seconds.
HO2S2 (B1) HO2S2 (B2)	<ul style="list-style-type: none"> ● Engine: After warming up 	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ↔ RICH
VHCL SPEED SE	<ul style="list-style-type: none"> ● Turn drive wheels and compare speedometer indication with the CONSULT-II value 		Almost the same speed as the CONSULT-II value
BATTERY VOLT	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) 		11 - 14V
THRTL POS SEN	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine 	Throttle valve: fully closed (a)	0.15 - 0.85V
	<ul style="list-style-type: none"> ● Engine: After warming up ● Ignition switch: ON (Engine stopped) 	Throttle valve: Partially open	Between (a) and (b)
		Throttle valve: fully open (b)	3.5 - 4.7V
START SIGNAL	<ul style="list-style-type: none"> ● Ignition switch: ON → START → ON 		OFF → ON → OFF
CLSD THL POS CLSD THL/P SW	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine 	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF
AIR COND SIG	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine 	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
P/N POSI SW	<ul style="list-style-type: none"> ● Ignition switch: ON 	Shift lever: "P" or "N"	ON
		Except above	OFF
PW/ST SIGNAL	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine 	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is turned	ON

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

CONSULT-II Reference Value in Data Monitor Mode (Cont'd)

MONITOR ITEM	CONDITION	SPECIFICATION
AMB TEMP SW	<ul style="list-style-type: none"> ● Ignition switch: ON ● Compare ambient air temperature with the following: 	Below 19°C (66°F)
		Above 25°C (77°F)
IGNITION SW	<ul style="list-style-type: none"> ● Ignition switch: ON → OFF → ON 	ON → OFF → ON
INJ PULSE-B1 INJ PULSE-B2	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,000 rpm
B/FUEL SCHDL	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,000 rpm
IGN TIMING	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,000 rpm
IACV-AAC/V	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,000 rpm
PURG VOL C/V	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle
		2,000 rpm
A/F ALPHA-B1 A/F ALPHA-B2	<ul style="list-style-type: none"> ● Engine: After warming up 	Maintaining engine speed at 2,000 rpm
EVAP SYS PRES	<ul style="list-style-type: none"> ● Ignition switch: ON 	Approx. 1.8 - 4.8V
AIR COND RLY	<ul style="list-style-type: none"> ● Air conditioner switch: OFF → ON 	OFF → ON
FUEL PUMP RLY	<ul style="list-style-type: none"> ● Ignition switch is turned to ON (Operates for 5 seconds) ● Engine running and cranking 	ON
	Except as shown above	OFF
COOLING FAN	<ul style="list-style-type: none"> ● After warming up engine, idle the engine. ● Air conditioner switch: OFF 	Engine coolant temperature is 94°C (201°F) or less
		Engine coolant temperature is between 95°C (203°F) and 100°C (212°F)
		Engine coolant temperature is 100°C (212°F) or more
VENT CONT/V	<ul style="list-style-type: none"> ● Ignition switch: ON 	OFF
HO2S1 HTR (B1) HO2S1 HTR (B2)	<ul style="list-style-type: none"> ● Engine speed: Below 2,800 rpm 	ON
	<ul style="list-style-type: none"> ● Engine speed: Above 2,800 rpm 	OFF
HO2S2 HTR (B1) HO2S2 HTR (B2)	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Engine speed: Above 2,800 rpm 	OFF
	<ul style="list-style-type: none"> ● Engine speed: Below 2,800 rpm [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more] 	ON
SCB/V CON S/V	<ul style="list-style-type: none"> ● More than 5 seconds after turning ignition switch ON (Engine stopped) 	OFF
	<ul style="list-style-type: none"> ● Engine speed: Idle 	ON
VC/V BYPASS/V	<ul style="list-style-type: none"> ● Ignition switch: ON 	OFF

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

CONSULT-II Reference Value in Data Monitor Mode (Cont'd)

MONITOR ITEM	CONDITION	SPECIFICATION
CAL/LD VALUE	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle 18.5 - 26.0%
		2,500 rpm 18.0 - 21.0%
ABSOL TH-P/S	<ul style="list-style-type: none"> ● Engine: After warming up ● Ignition switch: ON 	Throttle valve: fully closed 0.0%
	<ul style="list-style-type: none"> ● Engine: After warming up ● Ignition switch: ON (Engine stopped) 	Throttle valve: fully open Approx. 80%
MASS AIRFLOW	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load 	Idle 3.3 - 4.8 g-m/s
		2,500 rpm 12.0 - 14.9 g-m/s

Major Sensor Reference Graph in Data Monitor Mode

NGEC1095

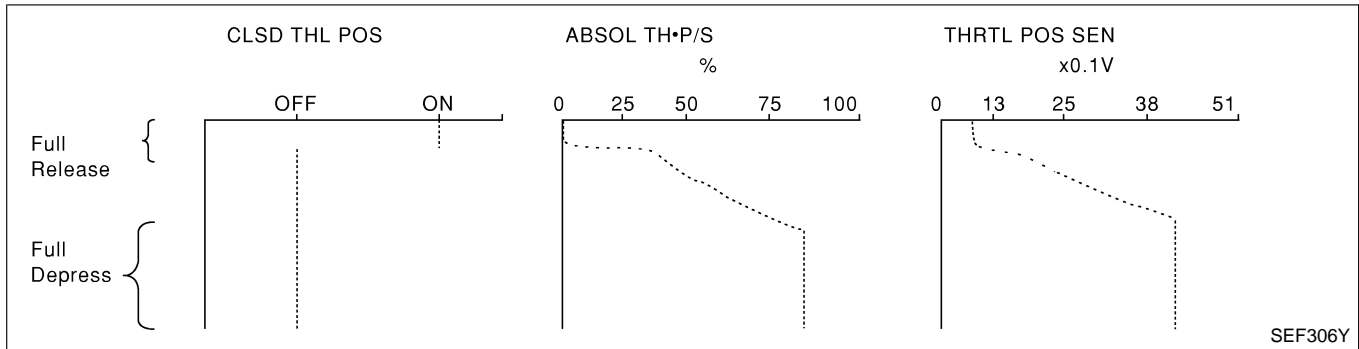
The following are the major sensor reference graphs in "DATA MONITOR" mode.
(Select "HI SPEED" in "DATA MONITOR" with CONSULT-II.)

THRTL POS SEN, ABSOL TH-P/S, CLSD THL POS

NGEC1095S01

Below is the data for "THRTL POS SEN", "ABSOL TH-P/S" and "CLSD THL POS" when depressing the accelerator pedal with the ignition switch ON.

The signal of "THRTL POS SEN" and "ABSOL TH-P/S" should rise gradually without any intermittent drop or rise after "CLSD THL POS" is changed from "ON" to "OFF".



SEF306Y

ENG SPEED, MAS A/F SE-B1, THRTL POS SEN, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1

NGEC1095S02

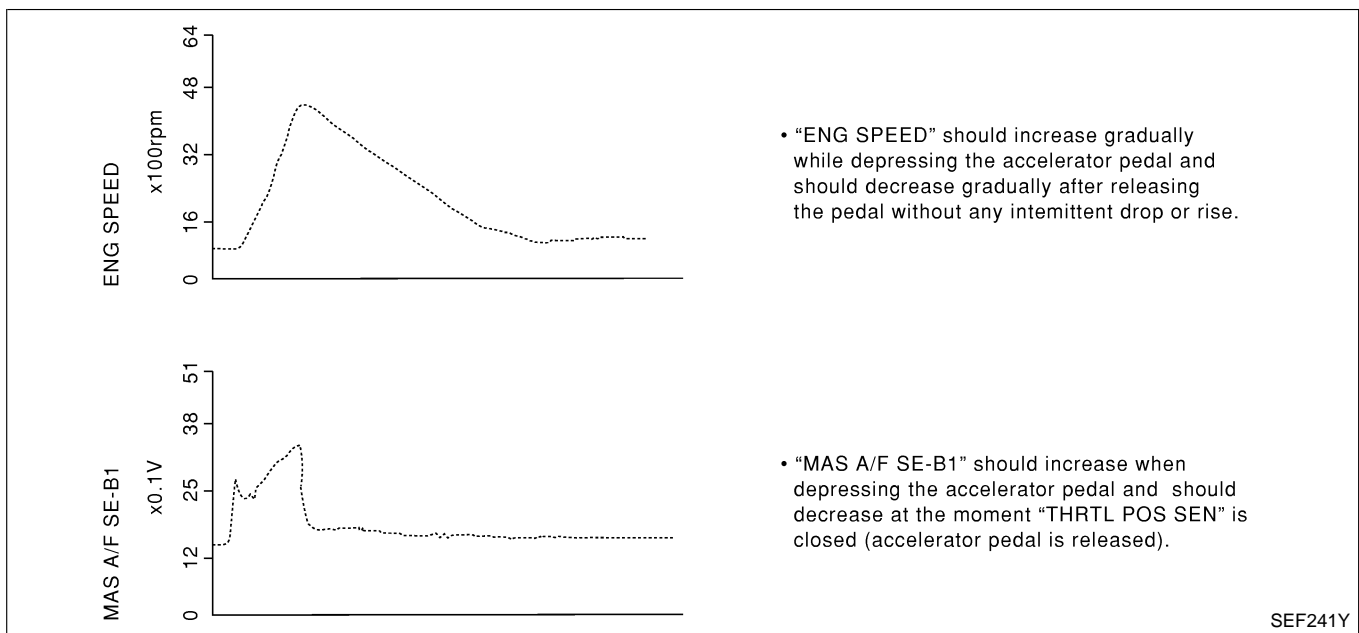
Below is the data for "ENG SPEED", "MAS A/F SE-B1", "THRTL POS SEN", "HO2S2 (B1)", "HO2S1 (B1)" and "INJ PULSE-B1" when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.

Each value is for reference, the exact value may vary.

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

Major Sensor Reference Graph in Data Monitor Mode (Cont'd)



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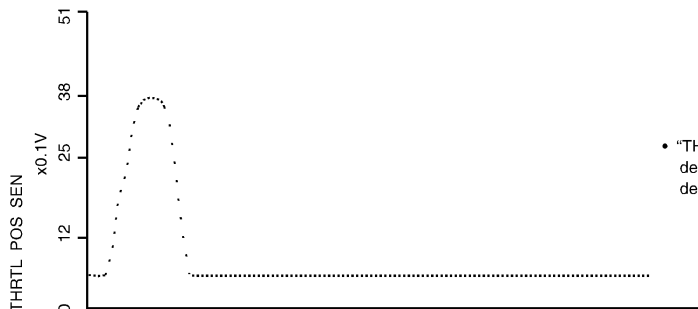
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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

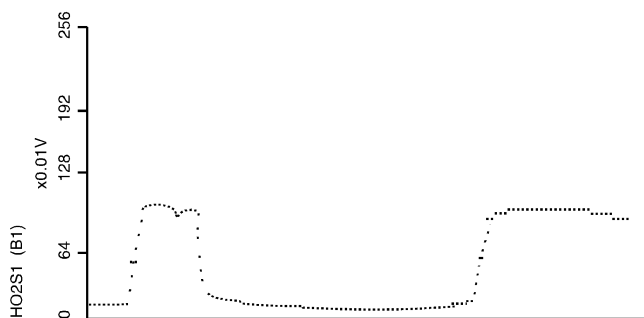
Major Sensor Reference Graph in Data Monitor Mode (Cont'd)



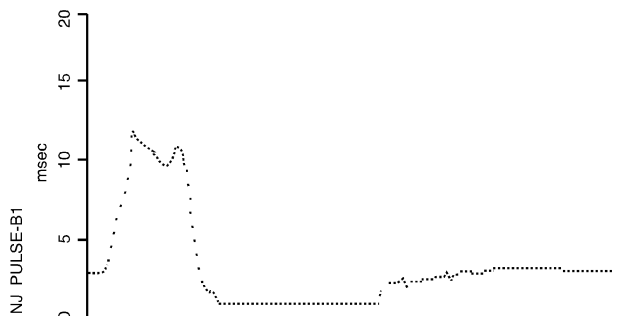
- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



- "HO2S2 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.

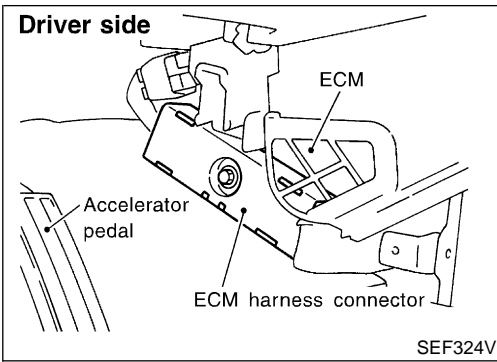


- "HO2S1 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "INJ PULSE-B1" should increase when depressing the accelerator pedal and should decrease when the pedal is released.

SEF242YD



ECM Terminals and Reference Value

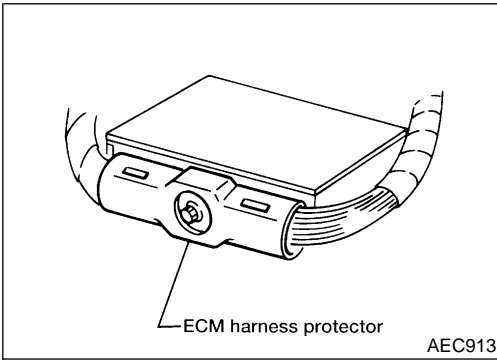
NGEC1096

PREPARATION

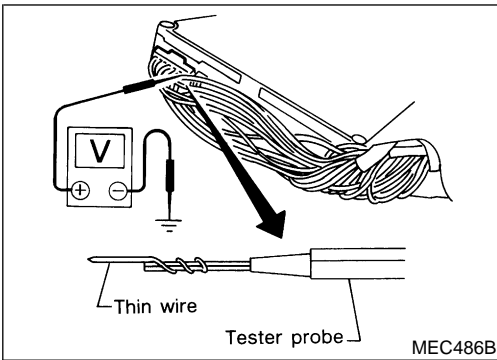
NGEC1096S01

1. ECM is located behind the instrument lower cover. For this inspection:

- Remove instrument lower cover.



2. Remove ECM harness protector.

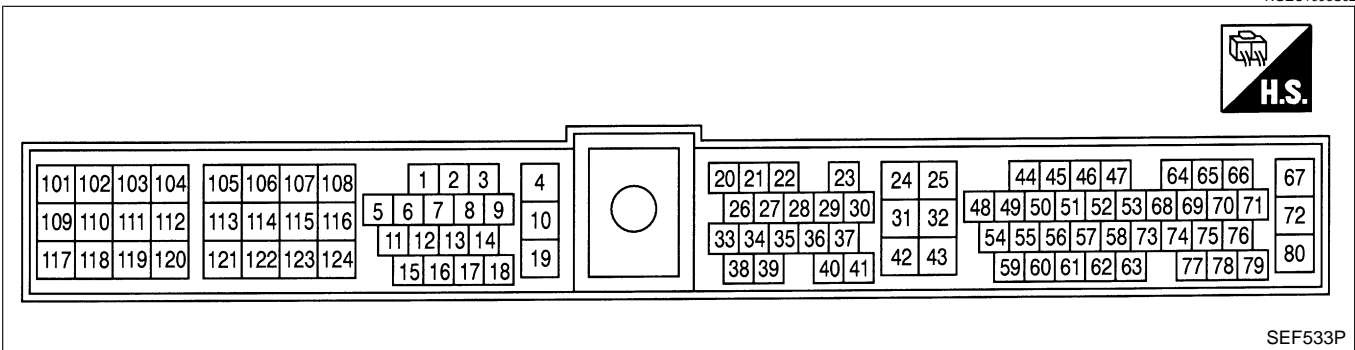


3. Perform all voltage measurements with the connector connected. Extend tester probe as shown to perform tests easily.

- Open harness securing clip to make testing easier.
- Use extreme care not to touch 2 pins at one time.
- Data is for comparison and may not be exact.

ECM HARNESS CONNECTOR TERMINAL LAYOUT

NGEC1096S02



ECM INSPECTION TABLE

NGEC1096S03

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

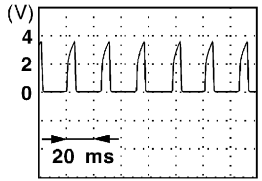
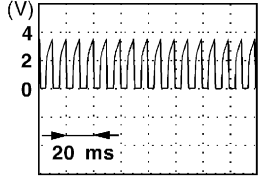
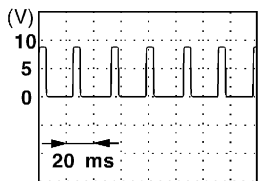
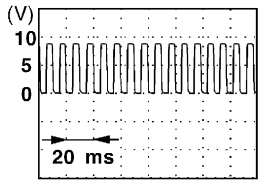
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

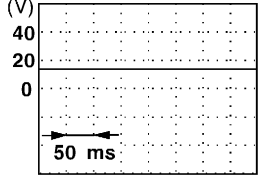
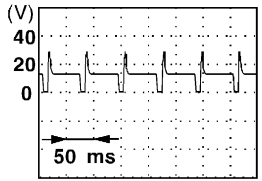
ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	PU/W	Ignition signal	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	<p>Approximately 0.7V</p>  <p style="text-align: right; font-size: small;">SEF988U</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	<p>1.1 - 1.5V</p>  <p style="text-align: right; font-size: small;">SEF989U</p>
3	P/L	Tachometer	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>1 - 2V</p>  <p style="text-align: right; font-size: small;">SEF992U</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	<p>3 - 5V</p>  <p style="text-align: right; font-size: small;">SEF993U</p>
4	OR/B	ECM relay (Self shut-off)	<p>[Engine is running] [Ignition switch OFF]</p> <ul style="list-style-type: none"> ● For a few seconds after turning ignition switch OFF 	<p>0 - 1.5V</p>
			<p>[Ignition switch OFF]</p> <ul style="list-style-type: none"> ● A few seconds passed after turning ignition switch OFF 	<p>BATTERY VOLTAGE (11 - 14V)</p>

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	R/Y	EVAP canister purge volume control solenoid valve	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V)  SEF994U
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm (More than 100 seconds after starting engine) 	BATTERY VOLTAGE (11 - 14V)  SEF995U
6	G/W	SCB valve control solenoid valve	[Ignition switch ON] <ul style="list-style-type: none"> ● Engine stopped 	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	Approximately 0V
7	Y/G	A/T check signal	[Ignition switch ON] [Engine is running]	0 - 3.0V
9	B/Y	Ambient air temperature switch	[Engine is running] <ul style="list-style-type: none"> ● Idle speed ● Ambient air temperature is above 25°C (77°F) ● Air conditioner is operating 	0V
			[Engine is running] <ul style="list-style-type: none"> ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is operating 	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] <ul style="list-style-type: none"> ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is not operating 	Approximately 5V
10	B/R	ECM ground	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	Engine ground
11	W/R	Fuel pump relay	[Ignition switch ON] <ul style="list-style-type: none"> ● For 5 seconds after turning ignition switch ON [Engine is running]	0 - 1V
			[Ignition switch ON] <ul style="list-style-type: none"> ● More than 5 seconds after turning ignition switch ON 	BATTERY VOLTAGE (11 - 14V)
12	P	Air conditioner relay	[Engine is running] <ul style="list-style-type: none"> ● Both A/C switch and blower switch are ON* 	0 - 1V
			[Engine is running] <ul style="list-style-type: none"> ● A/C switch is OFF 	BATTERY VOLTAGE (11 - 14V)

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

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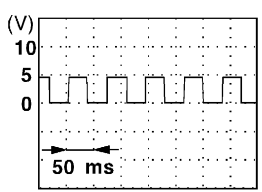
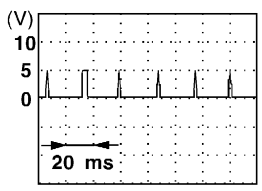
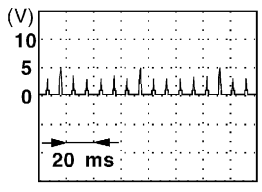
ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
18	R/W	Malfunction indicator lamp	[Ignition switch ON]	0 - 1V
			[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)
19	B/R	ECM ground	[Engine is running] ● Idle speed	Engine ground
20	L/OR	Start signal	[Ignition switch ON]	Approximately 0V
			[Ignition switch START]	9 - 12V
21	G/R	Air conditioner switch	[Engine is running] ● Both A/C switch and blower switch are ON (Compressor operates)*	Approximately 0V
			[Engine is running] ● A/C switch is OFF	BATTERY VOLTAGE (11 - 14V)
22	L/B	Park/neutral position (PNP) switch	[Ignition switch ON] ● Gear position is "N" or "P"	Approximately 0V
			[Ignition switch ON] ● Except the above gear position	Approximately 5V
23	L	Throttle position sensor	[Engine is running] ● Warm-up condition ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump. ● Accelerator pedal fully released	0.15 - 0.85V
			[Ignition switch ON] ● Accelerator pedal fully depressed	3.5 - 4.7V
24	W/L	Ignition switch	[Ignition switch OFF]	0V
			[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
25	B/Y	ECM ground	[Engine is running] ● Idle speed	Engine ground
26	PU/W	A/T signal No. 1	[Engine is running] ● Idle speed	Approximately 0 - 1.0V
27	P/B	A/T signal No. 2	[Engine is running] ● Idle speed	Approximately 0 - 1.0V
28	BR/W	Throttle position switch (Closed position)	[Engine is running] ● Warm-up condition ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump. ● Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch ON] ● Accelerator pedal depressed	Approximately 0V

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

ECM Terminals and Reference Value (Cont'd)

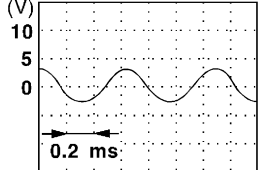
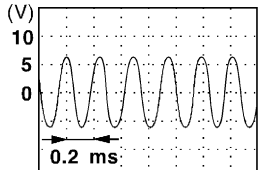
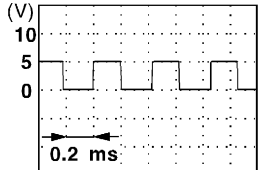
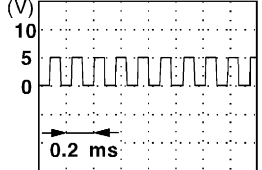
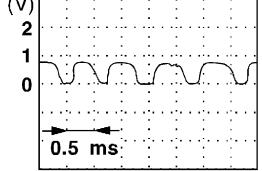
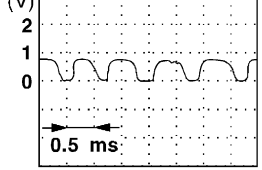
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	G/B	Vehicle speed sensor	[Engine is running] <ul style="list-style-type: none"> ● Lift up the vehicle. ● In 2nd gear position ● Vehicle speed is 40 km/h (25 MPH) 	2 - 3V 
32	B/Y	ECM ground	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	Engine ground
33	W/G	A/T signal No. 4	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	Approximately 0 - 1.0V
34	R/Y	A/T signal No. 5	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	Approximately 8V
35	G/R	A/T signal No. 3	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	Approximately 0 - 1.0V
39	GY/R	Power steering oil pressure switch	[Engine is running] <ul style="list-style-type: none"> ● Steering wheel is being turned 	Approximately 0V
			[Engine is running] <ul style="list-style-type: none"> ● Steering wheel is not being turned 	Approximately 5V
42	B/W	Sensors' power supply	[Ignition switch ON]	Approximately 5V
43	BR	Sensors' ground	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	Approximately 0V
44	PU	Camshaft position sensor (Reference signal)	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	0.3 - 0.5V 
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	0.3 - 0.5V 
46	OR/B	Fuel level sensor	[Ignition switch ON]	Approximately 0 - 4.8V Output voltage varies with fuel level.

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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	L	Crankshaft position sensor (OBD)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>1 - 2V (AC range)</p>  <p style="text-align: right; font-size: small;">SEF690W</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	<p>3 - 4V (AC range)</p>  <p style="text-align: right; font-size: small;">SEF691W</p>
49	LG	Camshaft position sen- sor (Position signal)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>Approximately 2.5V</p>  <p style="text-align: right; font-size: small;">SEF999U</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	<p>Approximately 2.5V</p>  <p style="text-align: right; font-size: small;">SEF001V</p>
50	B	Heated oxygen sensor 1 (bank 1)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	<p>0 - Approximately 1.0V</p>  <p style="text-align: right; font-size: small;">SEF002V</p>
51	G	Heated oxygen sensor 1 (bank 2)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	<p>0 - Approximately 1.0V</p>  <p style="text-align: right; font-size: small;">SEF002V</p>

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
54	R	Mass air flow sensor	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	1.0 - 1.7V
			[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,500 rpm 	1.7 - 2.3V
55	G	Mass air flow sensor ground	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	Approximately 0V
56	OR	Heated oxygen sensor 2 (bank 1)	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	0 - Approximately 1.0V
57	Y	Heated oxygen sensor 2 (bank 2)	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	0 - Approximately 1.0V
59	LG/R	Engine coolant temperature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature
60	Y/B	Fuel tank temperature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with fuel temperature
61	PU/R	Intake air temperature sensor	[Engine is running]	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
62	Y	EVAP control system pressure sensor	[Ignition switch ON]	Approximately 1.8 - 4.8V
64	W	Knock sensor	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	Approximately 2.5V
66	B	Fuel level sensor ground	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	Approximately 0V
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
69	LG/R	Data link connector	[Engine is running] <ul style="list-style-type: none"> ● Idle speed (CONSULT-II or GST is disconnected) 	6 - 10V
72	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
80	SB	Power supply (Back-up)	[Ignition switch OFF]	BATTERY VOLTAGE (11 - 14V)

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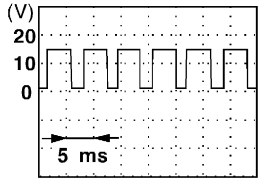
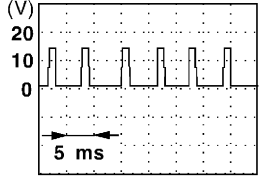
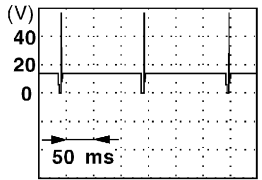
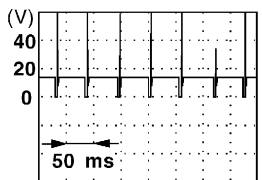
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TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	OR/L	IACV-AAC valve	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>8 - 11V</p>  <p style="text-align: right;">SEF005V</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 3,000 rpm 	<p>7 - 10V</p>  <p style="text-align: right;">SEF692W</p>
102 104 106 109 111 113	W/B W/R W/G W/L W/PU W	Injector No. 1 Injector No. 3 Injector No. 5 Injector No. 2 Injector No. 4 Injector No. 6	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>BATTERY VOLTAGE (11 - 14V)</p>  <p style="text-align: right;">SEF007V</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 2,000 rpm 	<p>BATTERY VOLTAGE (11 - 14V)</p>  <p style="text-align: right;">SEF008V</p>
108	R/G	EVAP canister vent control valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
116	B/R	ECM ground	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	Engine ground
117	B/P	Current return	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V)
119	BR/Y	Heated oxygen sensor 1 heater (front) (bank 1)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is below 2,800 rpm 	Approximately 0.4V
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is above 2,800 rpm 	BATTERY VOLTAGE (11 - 14V)
120	P/B	Vacuum cut valve bypass valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
121	BR	Heated oxygen sensor 1 heater (front) (bank 2)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is below 2,800 rpm 	Approximately 0.4V
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is above 2,800 rpm 	BATTERY VOLTAGE (11 - 14V)

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

VG33ER

ECM Terminals and Reference Value (Cont'd)

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
122	R/B	Heated oxygen sensor 2 heater (bank 1)	[Engine is running] <ul style="list-style-type: none"> ● Engine speed is below 2,800 rpm ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more. 	Approximately 0.4V
			[Ignition switch ON] <ul style="list-style-type: none"> ● Engine stopped [Engine is running] <ul style="list-style-type: none"> ● Engine speed is above 2,800 rpm 	BATTERY VOLTAGE (11 - 14V)
123	R/Y	Heated oxygen sensor 2 heater (bank 2)	[Engine is running] <ul style="list-style-type: none"> ● Engine speed is below 2,800 rpm ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more. 	Approximately 0.4V
			[Ignition switch ON] <ul style="list-style-type: none"> ● Engine stopped [Engine is running] <ul style="list-style-type: none"> ● Engine speed is above 2,800 rpm 	BATTERY VOLTAGE (11 - 14V)
124	B/R	ECM ground	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	Engine ground

*: Any mode except OFF, ambient air temperature is above 25°C (77°F).

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Description

The specification (SP) value indicates the tolerance of the value that is displayed in “DATA MONITOR (SPEC)” mode of CONSULT-II during normal operation of the Engine Control System. When the value in “DATA 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:

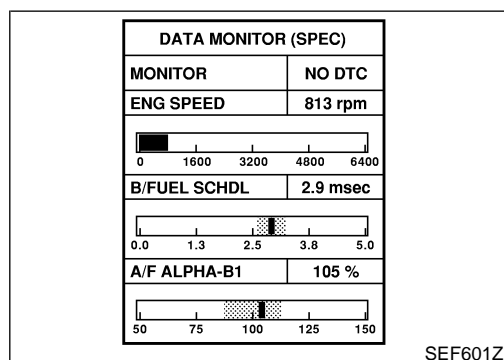
- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1/B2 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Testing Condition

- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 101.3 kPa (760.0 mmHg, 29.92 inHg)±3 kPa (22.5 mmHg, 0.89 inHg)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up*1
- Electrical load: Not applied*2
- Engine speed: Idle

*1: For A/T models, after the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T fluid temperature sensor signal) indicates less than 0.9V. For M/T models, drive vehicle for 5 minutes after the engine is warmed up to normal operating temperature.

*2: Rear window defogger switch, air conditioner switch, lighting switch are “OFF”. Cooling fans are not operating. Steering wheel is straight ahead.



Inspection Procedure

NOTE:

Perform “DATA MONITOR (SPEC)” mode in maximum scale display.

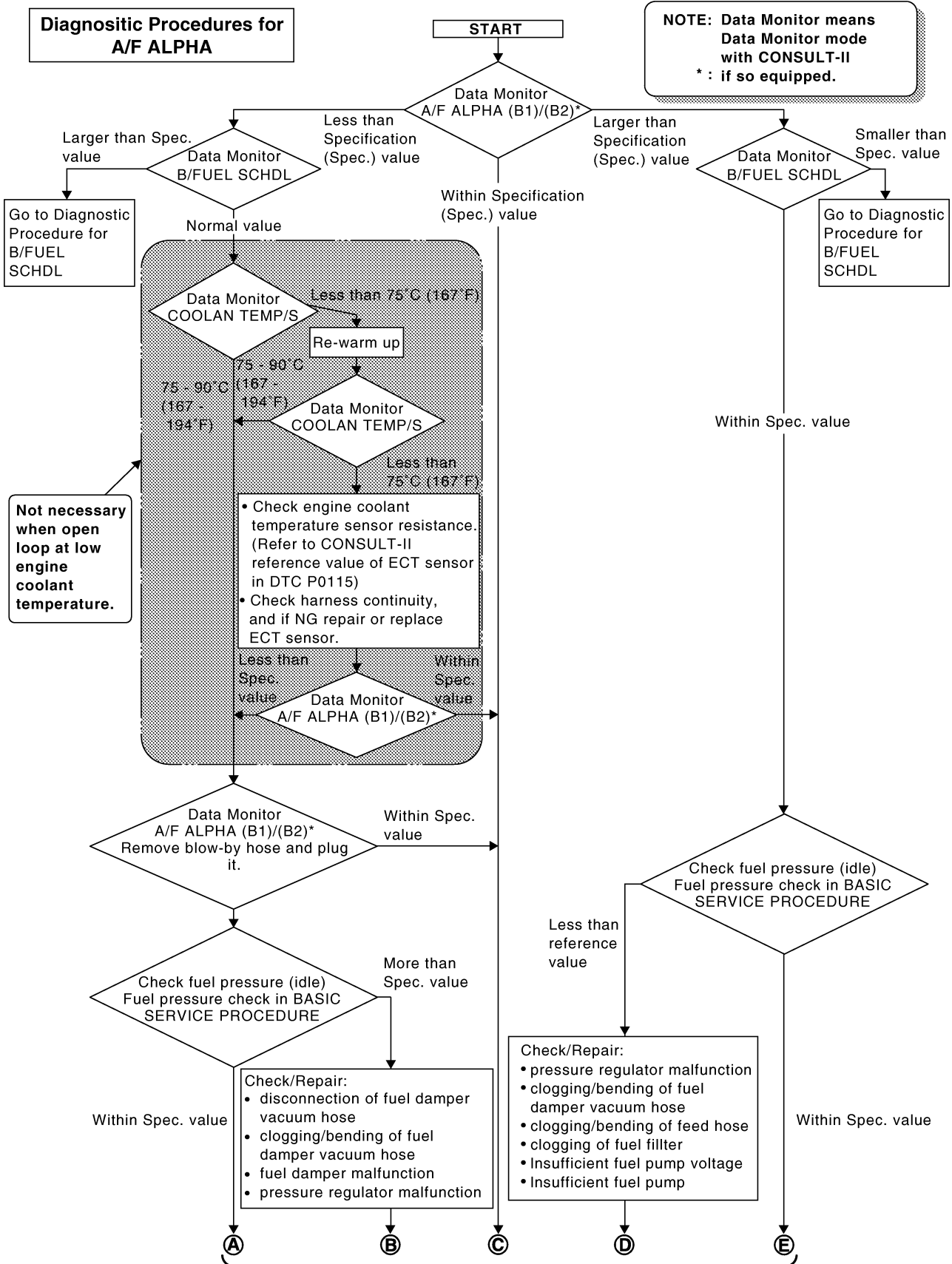
1. Perform “Basic Inspection”, EC-1273.
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1”, “A/F ALPHA-B2” and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to “Diagnostic Procedure”, EC-1309.

Diagnostic Procedure

NGEC1100

Diagnostic Procedures for A/F ALPHA

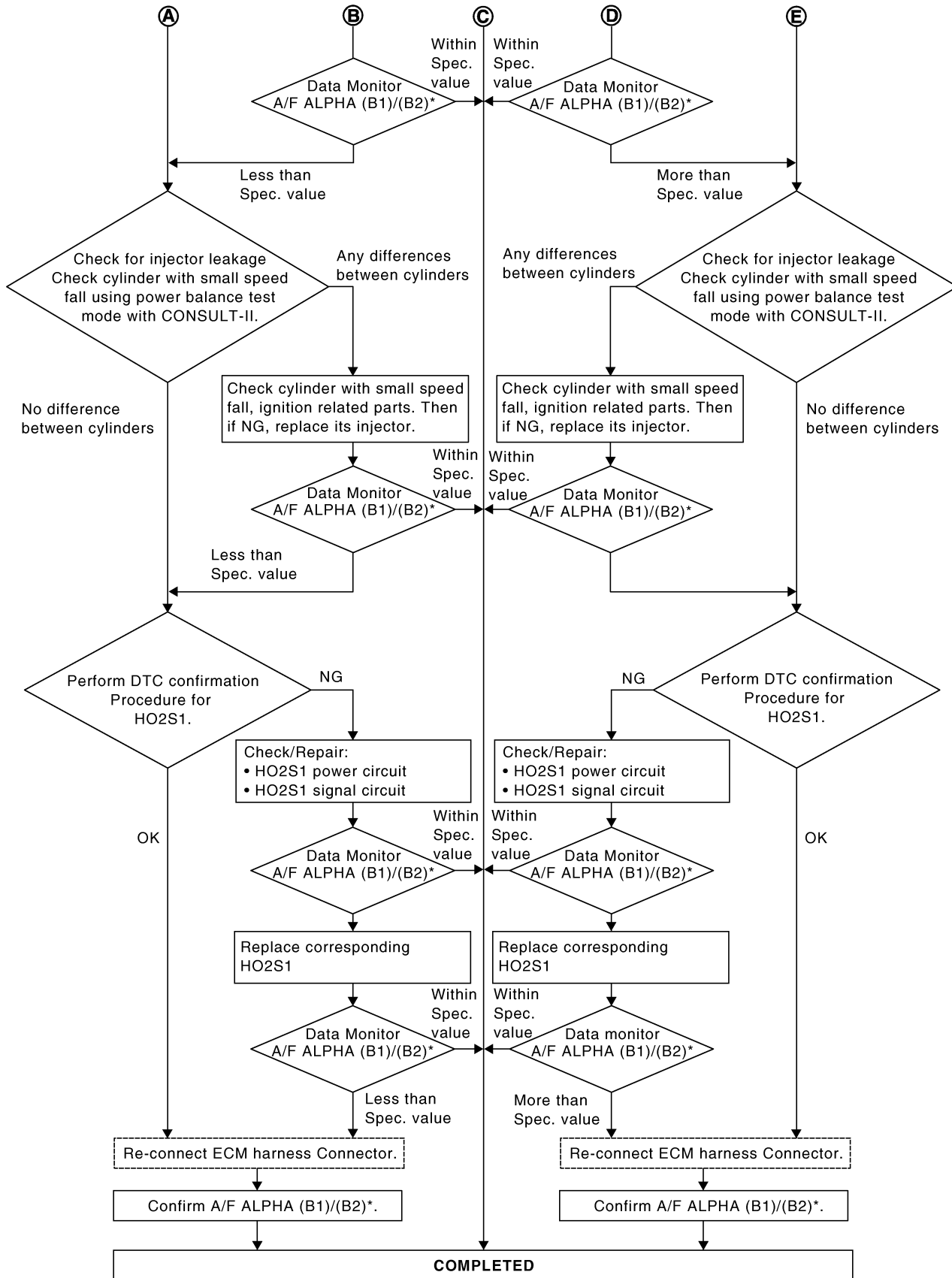
NOTE: Data Monitor means Data Monitor mode with CONSULT-II * : if so equipped.

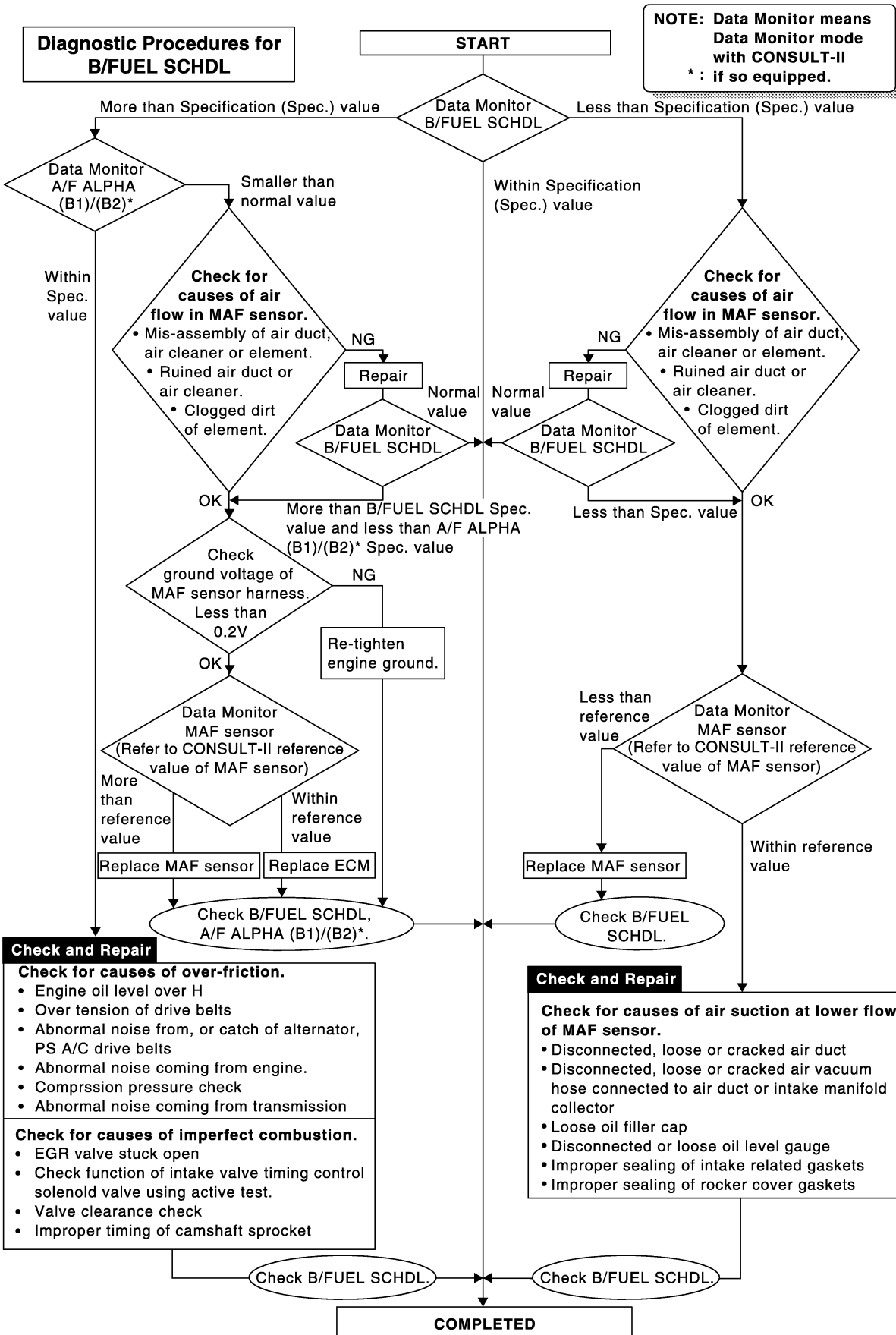


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Check and Repair

Check for causes of over-friction.

- Engine oil level over H
- Over tension of drive belts
- Abnormal noise from, or catch of alternator, PS A/C drive belts
- Abnormal noise coming from engine.
- Compression pressure check
- Abnormal noise coming from transmission

Check for causes of imperfect combustion.

- EGR valve stuck open
- Check function of intake valve timing control solenoid valve using active test.
- Valve clearance check
- Improper timing of camshaft sprocket

Check and Repair

Check for causes of air suction at lower flow of MAF sensor.

- Disconnected, loose or cracked air duct
- Disconnected, loose or cracked air vacuum hose connected to air duct or intake manifold collector
- Loose oil filler cap
- Disconnected or loose oil level gauge
- Improper sealing of intake related gaskets
- Improper sealing of rocker cover gaskets

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Description

Description

NGEC1101

Intermittent incidents (I/I) may occur. In many cases, the problem resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st trip) DTC visits. Realize also that the most frequent cause of I/I occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific problem area.

COMMON I/I REPORT SITUATIONS

NGEC1101S01

STEP in Work Flow	Situation
II	The CONSULT-II is used. The SELF-DIAG RESULTS screen shows time data other than "0" or "[1t]".
III	The symptom described by the customer does not recur.
IV	(1st trip) DTC does not appear during the DTC Confirmation Procedure.
VI	The Diagnostic Procedure for PXXXX does not indicate the problem area.

Diagnostic Procedure

NGEC1102

1	INSPECTION START
Erase (1st trip) DTCs. Refer to "HOW TO ERASE EMISSION — RELATED INFORMATION", EC-1246.	
	▶ GO TO 2.

2	CHECK GROUND TERMINALS
Check ground terminals for corroding or loose connection. Refer to "Circuit Inspection", "GROUND INSPECTION", GI-28 .	
OK or NG	
OK	▶ GO TO 3.
NG	▶ Repair or replace.

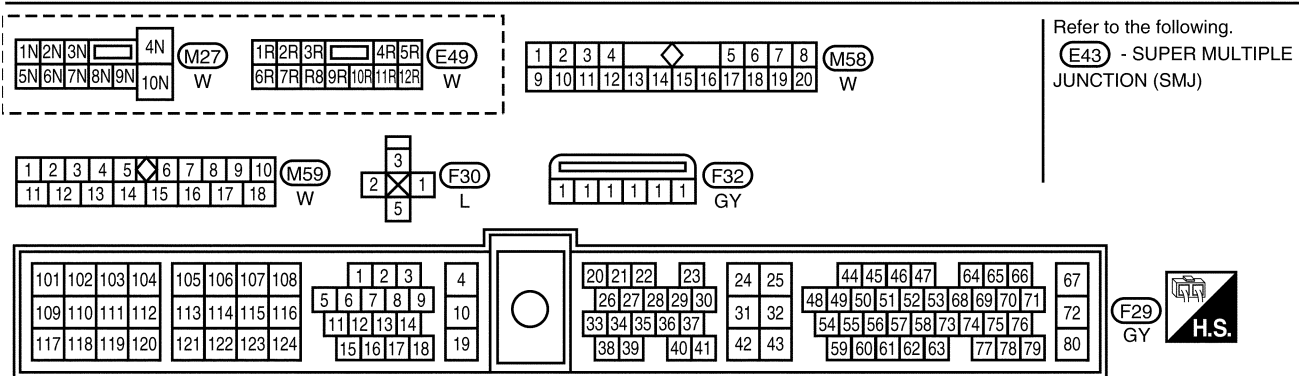
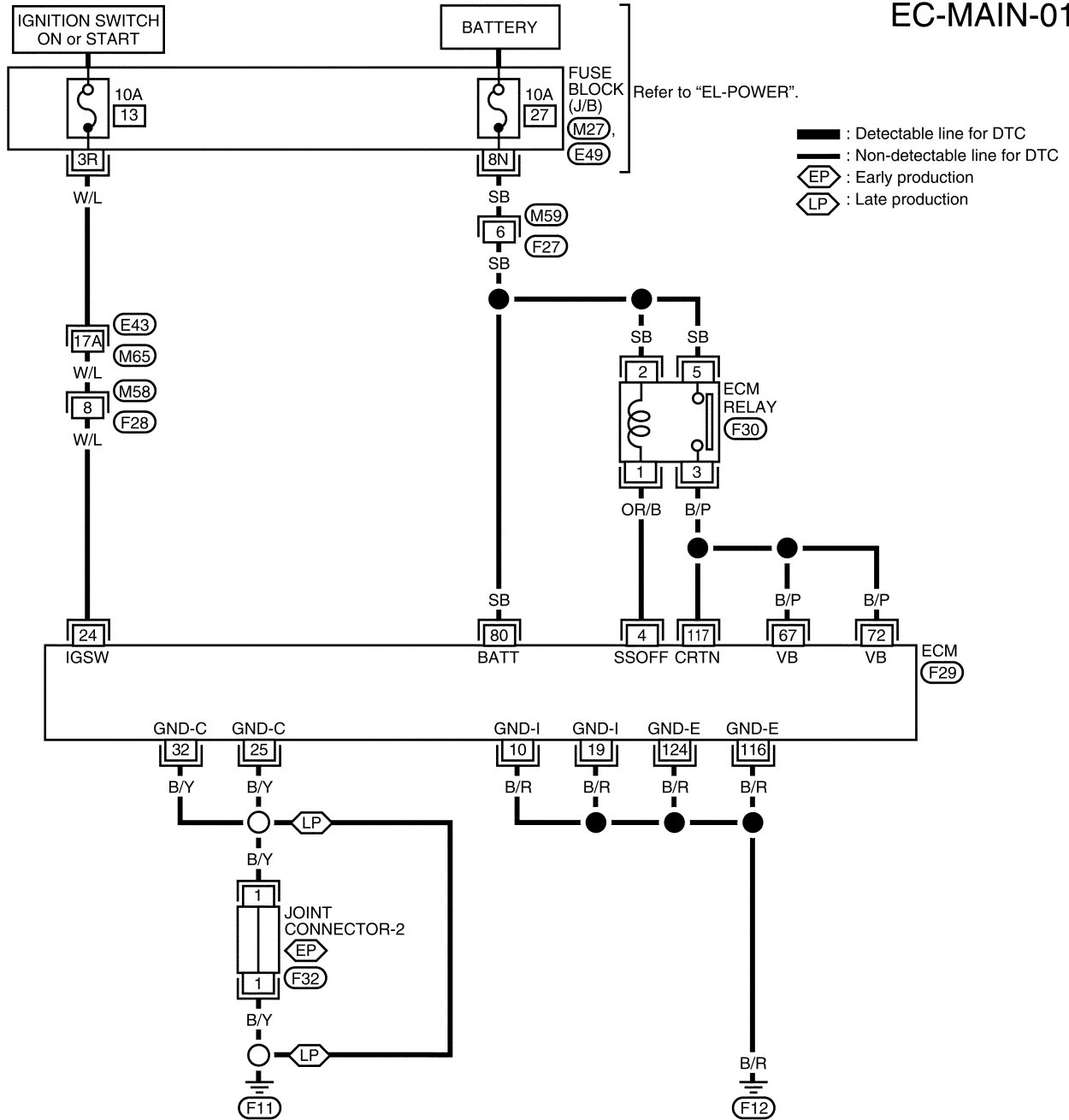
3	SEARCH FOR ELECTRICAL INCIDENT
Perform "Incident Simulation Tests", GI-23 .	
OK or NG	
OK	▶ GO TO 4.
NG	▶ Repair or replace.

4	CHECK CONNECTOR TERMINALS
Refer to "How to Check Enlarged Contact Spring of Terminal", GI-20 .	
OK or NG	
OK	▶ INSPECTION END
NG	▶ Repair or replace connector.

Main Power Supply and Ground Circuit WIRING DIAGRAM

NGEC1103

EC-MAIN-01



GI
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TROUBLE DIAGNOSIS FOR POWER SUPPLY

VG33ER

Main Power Supply and Ground Circuit (Cont'd)

ECM TERMINALS AND REFERENCE VALUE

NGEC1104

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

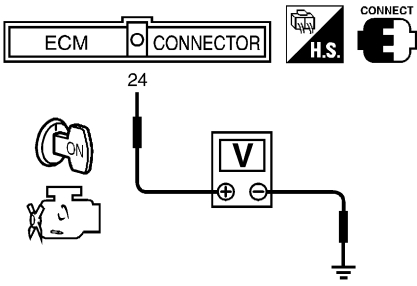
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self-shutoff)	[Engine is running] [Ignition switch OFF] ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch OFF] ● A few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
10	B/R	ECM ground	[Engine is running] ● Idle speed	Engine ground
19	B/R	ECM ground	[Engine is running] ● Idle speed	Engine ground
24	W/L	Ignition switch	[Ignition switch OFF]	0V
			[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
25	B/Y	ECM ground	[Engine is running] ● Idle speed	Engine ground
32	B/Y	ECM ground	[Engine is running] ● Idle speed	Engine ground
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
72	B/P			
80	SB	Power supply (Back-up)	[Ignition switch OFF]	BATTERY VOLTAGE (11 - 14V)
116	B/R	ECM ground	[Engine is running] ● Idle speed	Engine ground
117	B/P	Current return	[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)
124	B/R	ECM ground	[Engine is running] ● Idle speed	Engine ground

DIAGNOSTIC PROCEDURE

NGEC1105

1	INSPECTION START		
Start engine.			
Is engine running?			
Yes or No			
Yes	▶	GO TO 6.	
No	▶	GO TO 2.	

2	CHECK ECM POWER SUPPLY CIRCUIT-I	<p>1. Turn ignition switch OFF and then ON. 2. Check voltage between ECM terminal 24 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="color: blue; margin-top: 10px;">Voltage: Battery voltage</p> <p style="text-align: right; margin-top: 10px;">SEF674U</p>	GI MA EM LC EC
		OK or NG	
OK	▶	GO TO 4.	FE
NG	▶	GO TO 3.	

3	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E74, M82 ● Harness connectors M58, F28 ● Fuse block (J/B) connector E49 ● 10A fuse ● Harness for open or short between ECM and fuse 	CL MT AT TF
		▶ Repair harness or connectors.	

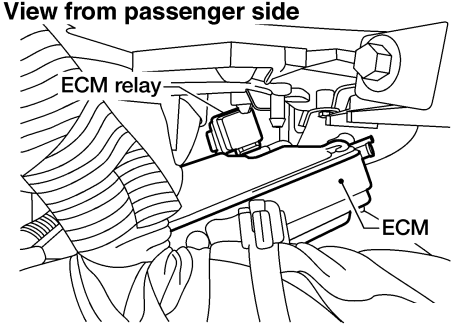
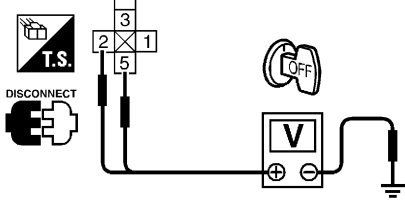
4	CHECK ECM GROUND CIRCUIT-I FOR OPEN AND SHORT	<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminals 10, 19, 25, 32, 116, 124 and engine ground. Refer to WIRING DIAGRAM. Continuity should exist. 4. Also check harness for short to power.</p>	PD AX SU BR
		OK or NG	
OK	▶	GO TO 15.	ST
NG	▶	GO TO 5.	RS

5	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Joint connector-2 (if equipped) ● Harness for open between ECM and engine ground 	BT HA SC EL IDX
		▶ Repair open circuit or short to power in harness or connectors.	

6	CHECK ECM POWER SUPPLY CIRCUIT-II	
<p>1. Stop engine. 2. Check voltage between ECM terminal 80 and ground with CONSULT-II or tester.</p>		
<p>Voltage: Battery voltage</p> <p style="text-align: right;">SEF678U</p>		
OK or NG		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M59, F27 ● Fuse block (J/B) connector M27 ● 10A fuse ● Harness for open or short between ECM and fuse 		
▶ Repair harness or connectors.		

8	CHECK ECM POWER SUPPLY CIRCUIT-III	
<p>1. Turn ignition switch ON and then OFF. 2. Check voltage between ECM terminals 67, 72, 117 and ground with CONSULT-II or tester.</p>		
<p>Voltage: After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop to approximately 0V.</p> <p style="text-align: right;">SEF679U</p>		
OK or NG		
OK	▶	GO TO 14.
NG (Battery voltage does not exist.)	▶	GO TO 9.
NG (Battery voltage exists for more than a few seconds.)	▶	GO TO 13.

9	CHECK ECM POWER SUPPLY CIRCUIT-IV	<p>1. Disconnect ECM relay.</p> <div style="text-align: center;"> <p>View from passenger side</p>  </div> <p>2. Check voltage between terminals 2, 5 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="color: blue;">Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	<p>AEC927A</p> <p>SEF625W</p>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white;">EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p> <p>TF</p>
OK	▶	GO TO 11.		TF
NG	▶	GO TO 10.		

10	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness for open or short between ECM relay and harness connectors M59, F27 		
	▶	Repair open circuit or short to ground or short to power in harness or connectors.		AX

11	CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	<p>1. Disconnect ECM harness connector.</p> <p>2. Check harness continuity between ECM terminal 4 and ECM relay terminal 1. Refer to WIRING DIAGRAM. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 12.		BR
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.		ST

12	CHECK HARNESS CONTINUITY BETWEEN ECM RELAY AND ECM FOR OPEN AND SHORT	<p>1. Check harness continuity between ECM terminals 67, 72, 117 and ECM relay terminal 3. Refer to WIRING DIAGRAM. Continuity should exist.</p> <p>2. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 13.		HA
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.		SC

TROUBLE DIAGNOSIS FOR POWER SUPPLY

VG33ER

Main Power Supply and Ground Circuit (Cont'd)

13	CHECK ECM RELAY
<p>1. Apply 12V direct current between relay terminals 1 and 2. 2. Check continuity between relay terminals 3 and 5.</p> <div style="text-align: center;"> </div> <p style="text-align: center;">12V (1 - 2) applied: Continuity exists. No voltage applied: No continuity</p> <p style="text-align: right;">SEF039W</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 14.
NG	▶ Replace ECM relay.

14	CHECK ECM GROUND CIRCUIT-II FOR OPEN AND SHORT
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminals 10, 19, 25, 32, 116, 124 and engine ground. Refer to WIRING DIAGRAM. Continuity should exist. 4. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 15.
NG	▶ GO TO 5.

15	CHECK INTERMITTENT INCIDENT
<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.</p>	
▶	INSPECTION END

Description

SYSTEM DESCRIPTION

NGEC1177

NGEC1177S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heaters

The ECM performs ON/OFF control of the heated oxygen sensor 1 heaters corresponding to the engine speed.

OPERATION

NGEC1177S02

Engine speed rpm	Heated oxygen sensor 1 heaters
Above 2,800	OFF
Below 2,800	ON

CONSULT-II Reference Value in Data Monitor Mode

NGEC1178

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1)	● Engine speed: Below 2,800 rpm	ON
HO2S1 HTR (B2)	● Engine speed: Above 2,800 rpm	OFF

ECM Terminals and Reference Value

NGEC1179

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 the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
119 (B1)	BR/Y	Heated oxygen sensor 1 heater	[Engine is running] ● Engine speed is below 2,800 rpm	Approximately 0.4V
121 (B2)	BR		[Engine is running] ● Engine speed is above 2,800 rpm	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC1180

Malfunction is detected when the current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range. [An excessively low (P0031) (B1)/(P0051) (B1) or high (P0032) (B2)/(P0052) (B2) voltage signal is sent to ECM through the heated oxygen sensor 1 heater.]

POSSIBLE CAUSE

NGEC1180S01

- Harness or connectors [The heated oxygen sensor 1 heater circuit is open or shorted.]
- Heated oxygen sensor 1 heater

2	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NGEC1181

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 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 run it for at least 6 seconds at idle speed.
- 3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1323.

With GST

- 1) Start engine and run it for at least 6 seconds at idle speed.
- 2) Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
- 3) Start engine and run it for at 6 seconds at idle speed.
- 4) Select "MODE 3" with GST.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1323.

- **When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

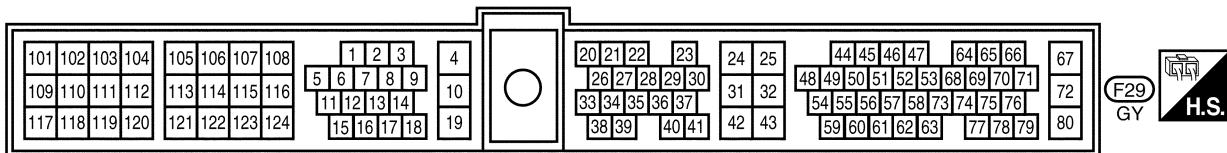
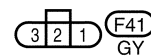
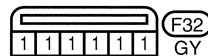
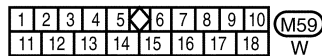
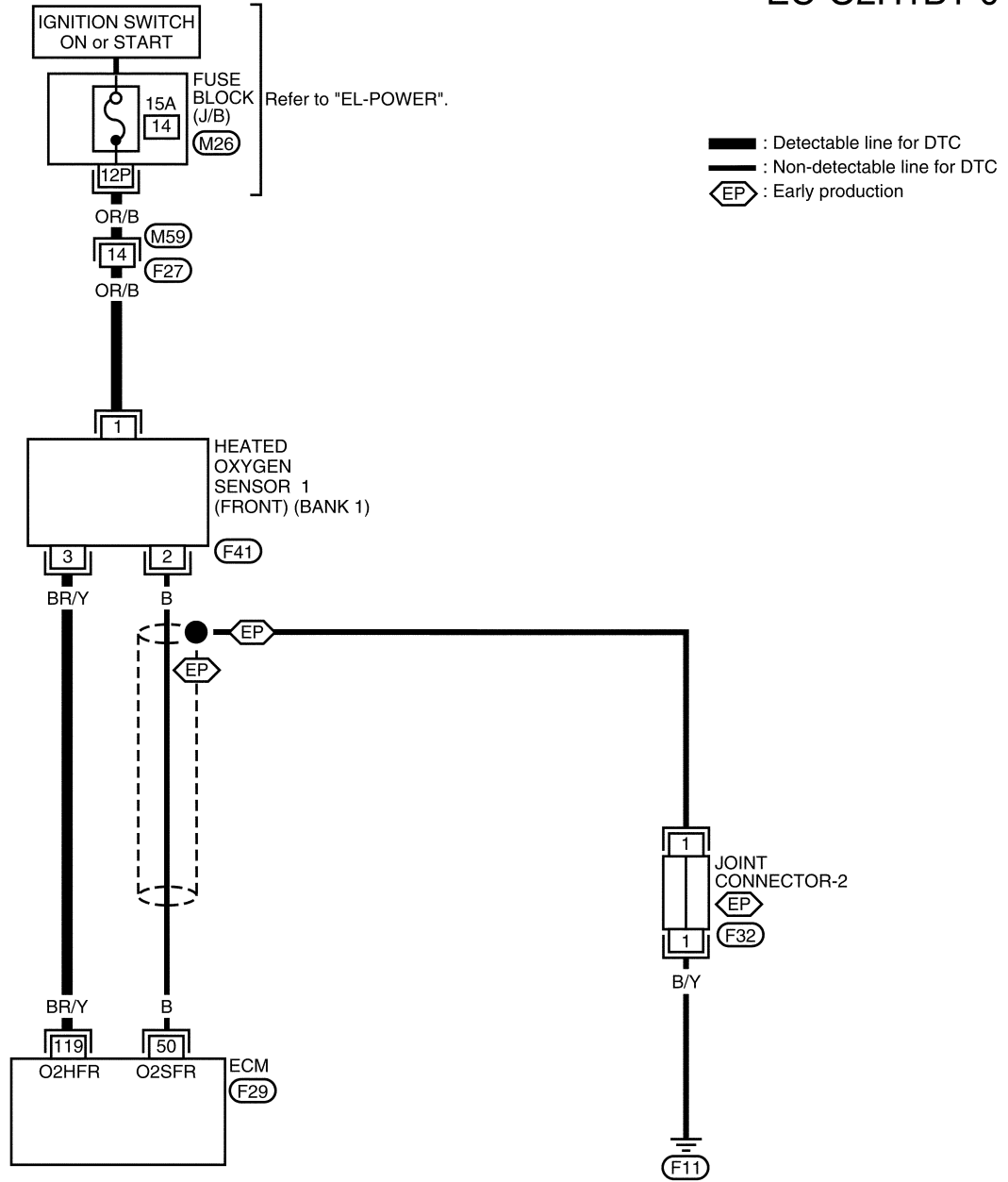
Wiring Diagram

NGEC1182

NGEC1182S01

RIGHT BANK

EC-O2H1B1-01



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DTC P0031, P0032, P0051, P0052 HO2S1 HEATER

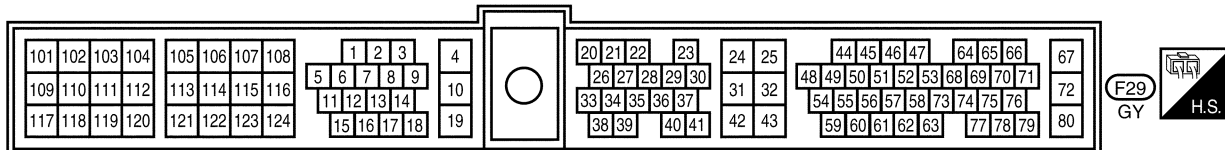
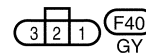
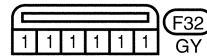
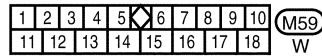
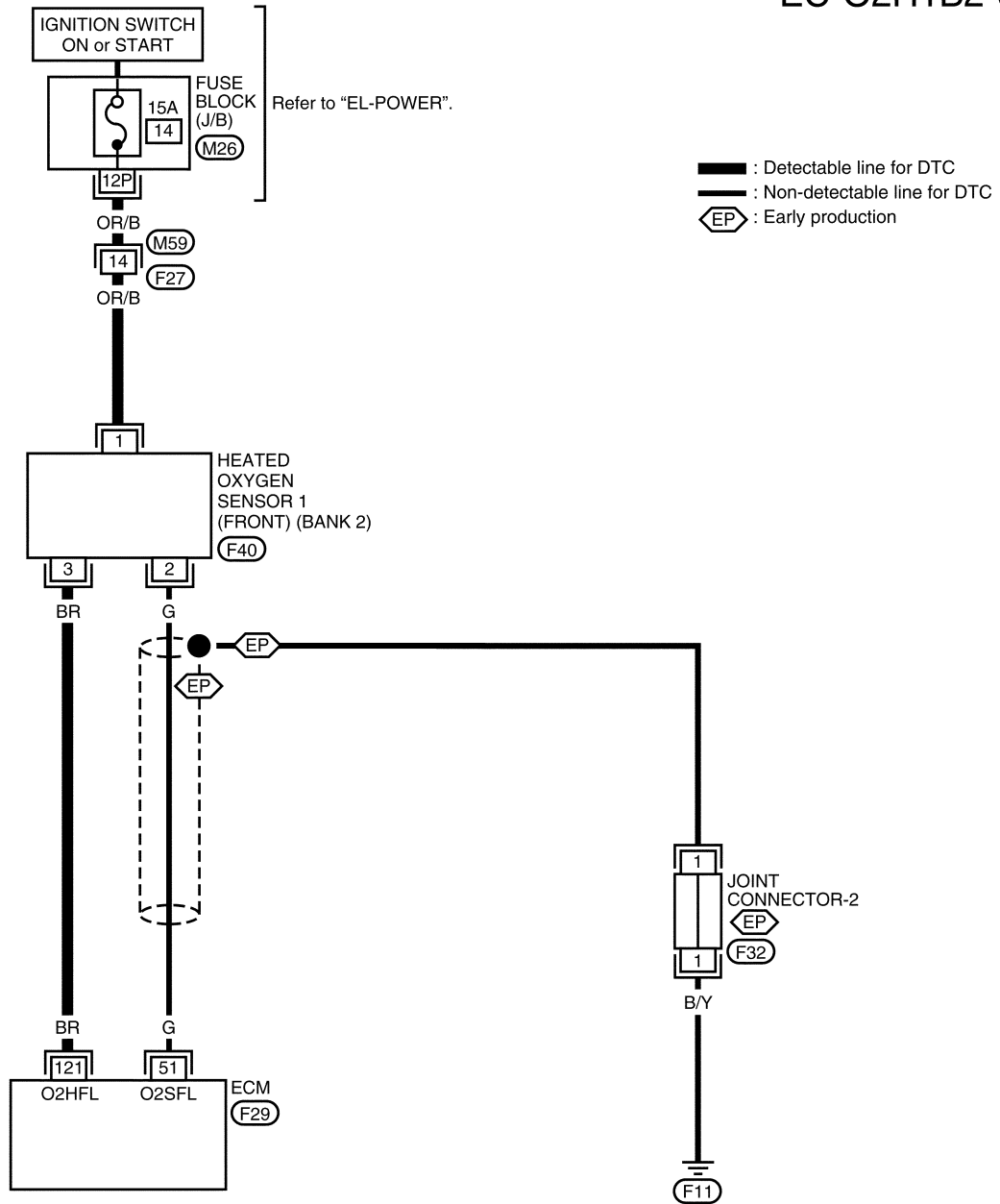
VG33ER

Wiring Diagram (Cont'd)

NGEC1182S02

LEFT BANK

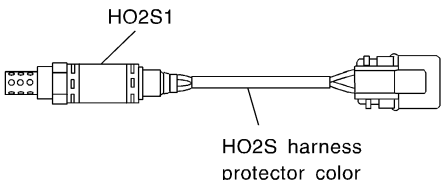
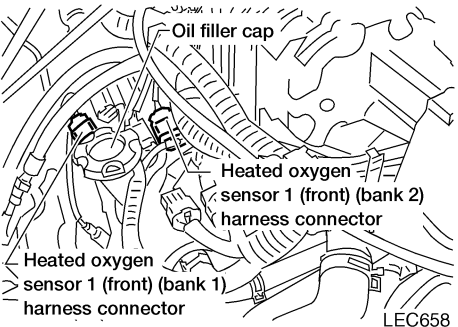
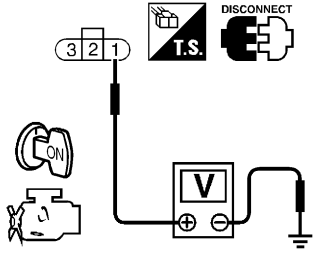
EC-O2H1B2-01



WEC165A

Diagnostic Procedure

NGEC1183

1	CHECK HO2S1 POWER SUPPLY CIRCUIT
<p>1. Turn ignition switch OFF. 2. Check heated oxygen sensor 1 harness protector.</p> <div style="text-align: center;">  <p>HO2S1 (bank 1): Black HO2S1 (bank 2): Blue</p> </div> <p>3. Disconnect corresponding heated oxygen sensor 1 harness connector.</p> <div style="text-align: center;">  </div> <p>4. Turn ignition switch ON. 5. Check voltage between HO2S1 terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p>Voltage: Battery voltage</p> <p>OK or NG</p> </div>	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

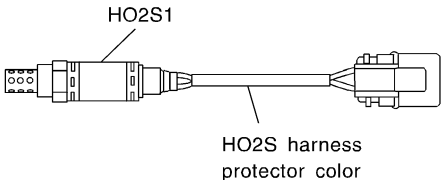
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2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M59, F27 ● Fuse block (J/B) connector M26 ● 10A fuse ● Harness for open or short between heated oxygen sensor 1 and fuse 	
▶	Repair harness or connectors.

BT
 HA
 SC
 EL
 IDX

3	CHECK HO2S1 HEATER OUTPUT CIRCUIT FOR OPEN AND SHORT															
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0031, P0032</td> <td style="text-align: center;">119</td> <td style="text-align: center;">3</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0051, P0052</td> <td style="text-align: center;">121</td> <td style="text-align: center;">3</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM	Sensor	P0031, P0032	119	3	Bank 1 (Right)	P0051, P0052	121	3	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM	Sensor														
P0031, P0032	119	3	Bank 1 (Right)													
P0051, P0052	121	3	Bank 2 (Left)													
SEC658C																
<p style="text-align: center;">Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>																
OK	▶	GO TO 4.														
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.														

4	CHECK HEATED OXYGEN SENSOR 1 HEATER	
<p>Check resistance between HO2S1 terminals 3 and 1.</p>		
AEC158A		
<p style="text-align: center;">Resistance: 2.3 - 4.3Ω at 25°C (77°F)</p> <p>Check continuity between HO2S1 terminals 2 and 1, 3 and 2.</p> <p style="text-align: center;">Continuity should not exist.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	REPLACE HEATED OXYGEN SENSOR 1	<p>1. Turn ignition switch "OFF". 2. Check heated oxygen sensor 1 harness protector color.</p> <div style="text-align: center;">  </div> <p style="text-align: center;">HO2S1 (bank 1): Black HO2S1 (bank 2): Blue</p> <p style="text-align: right;">SEF505YB</p> <p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	GI MA EM LC EC FE CL
▶		Replace malfunctioning heated oxygen sensor 1.	

6	CHECK INTERMITTENT INCIDENT	<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.</p>	MT AT
▶		INSPECTION END	

TF

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 IDX

Description

Description

NGEC1216

SYSTEM DESCRIPTION

NGEC1216S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heaters

The ECM performs ON/OFF control of the heated oxygen sensor 2 heaters corresponding to the engine speed.

OPERATION

NGEC1216S02

Engine speed rpm	Heated oxygen sensor 2 heaters
Above 2,800	OFF
Below 2,800	ON

CONSULT-II Reference Value in Data Monitor Mode

NGEC1217

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1) HO2S2 HTR (B2)	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) Engine is running above 2,800 rpm. 	OFF
	<ul style="list-style-type: none"> Engine is running below 2,800 rpm after driving for 2 minutes at a speed of 70 km/h (43 MPH) or more. 	ON

ECM Terminals and Reference Value

NGEC1218

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
122	R/B	Heated oxygen sensor 2 heater (bank 1)	[Ignition switch "ON"] <ul style="list-style-type: none"> Engine stopped [Engine is running] <ul style="list-style-type: none"> Engine speed is above 2,800 rpm 	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] <ul style="list-style-type: none"> Engine speed is below 2,800 rpm After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more 	Approximately 0.4V
123	R/Y	Heated oxygen sensor 2 heater (bank 2)	[Ignition switch "ON"] <ul style="list-style-type: none"> Engine stopped [Engine is running] <ul style="list-style-type: none"> Engine speed is above 2,800 rpm 	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] <ul style="list-style-type: none"> Engine speed is below 2,800 rpm After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more 	Approximately 0.4V

On Board Diagnosis Logic

Malfunction is detected when the current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. [An excessively low (P0037) (B1)/(P0057) (B2) or high (P0038) (B1)/(P0058) (B2) voltage signal is sent to ECM through the heated oxygen sensor 2 heater.]

POSSIBLE CAUSE

- Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.)
- Heated oxygen sensor 2 heater

DTC Confirmation Procedure

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 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.
- 3) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 4) Stop vehicle and let engine idle for at least 6 seconds.
- 5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1330.

Ⓜ With GST

Follow the procedure “With CONSULT-II”.

4	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

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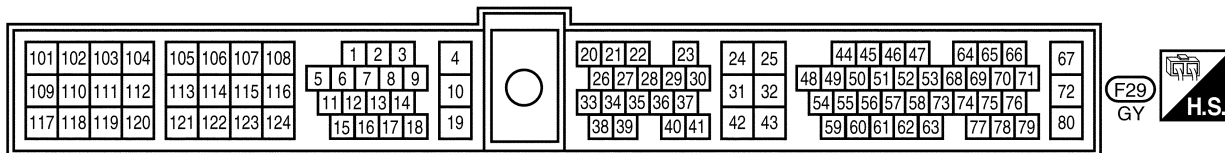
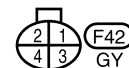
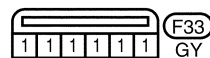
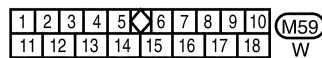
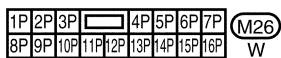
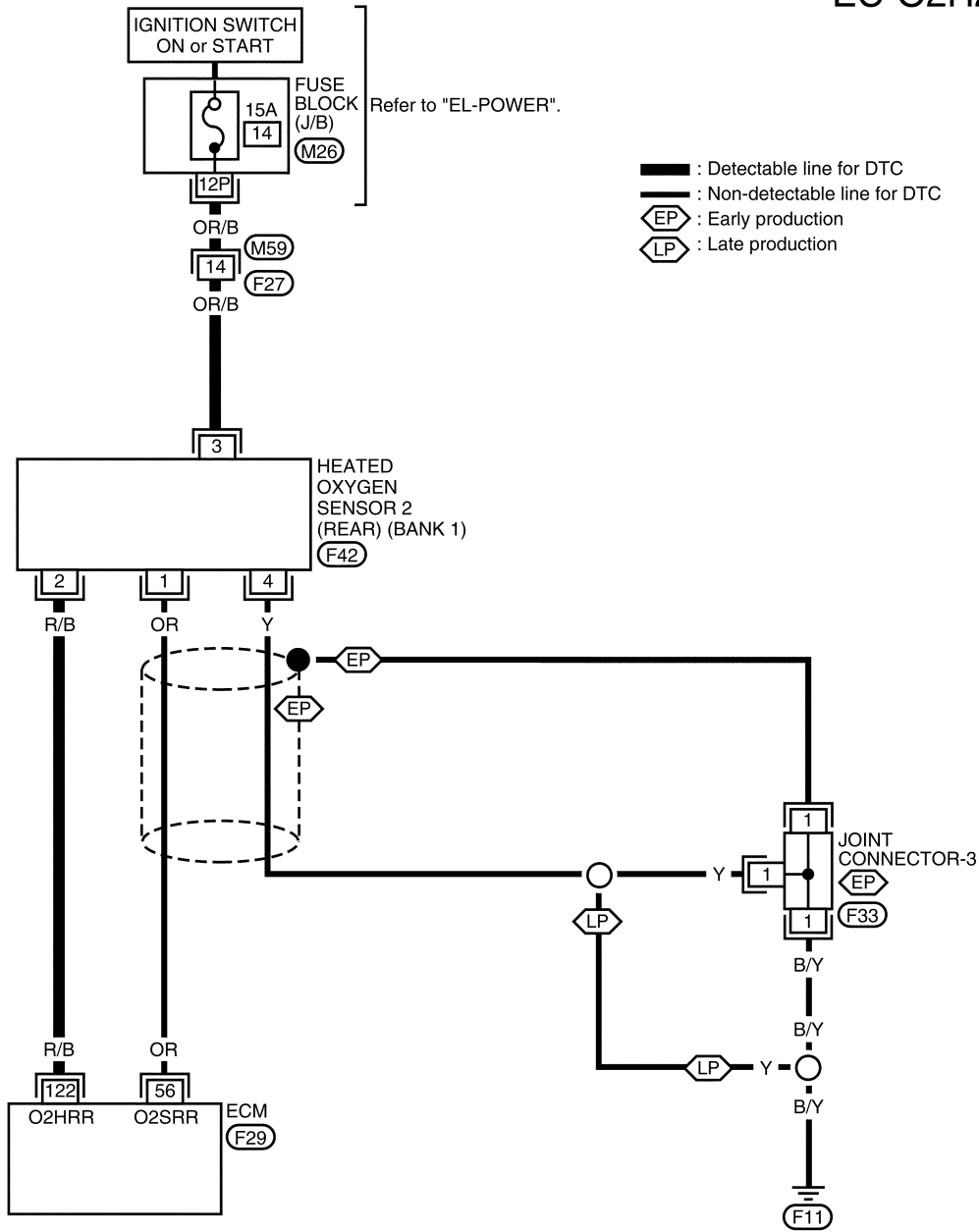
Wiring Diagram

NGEC1221

NGEC1221S01

RIGHT BANK

EC-O2H2B1-01



DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

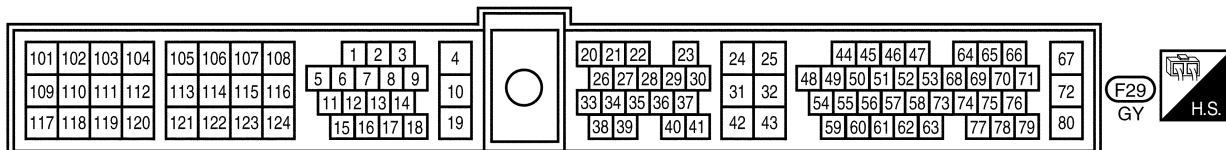
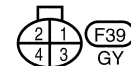
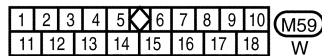
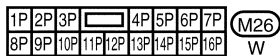
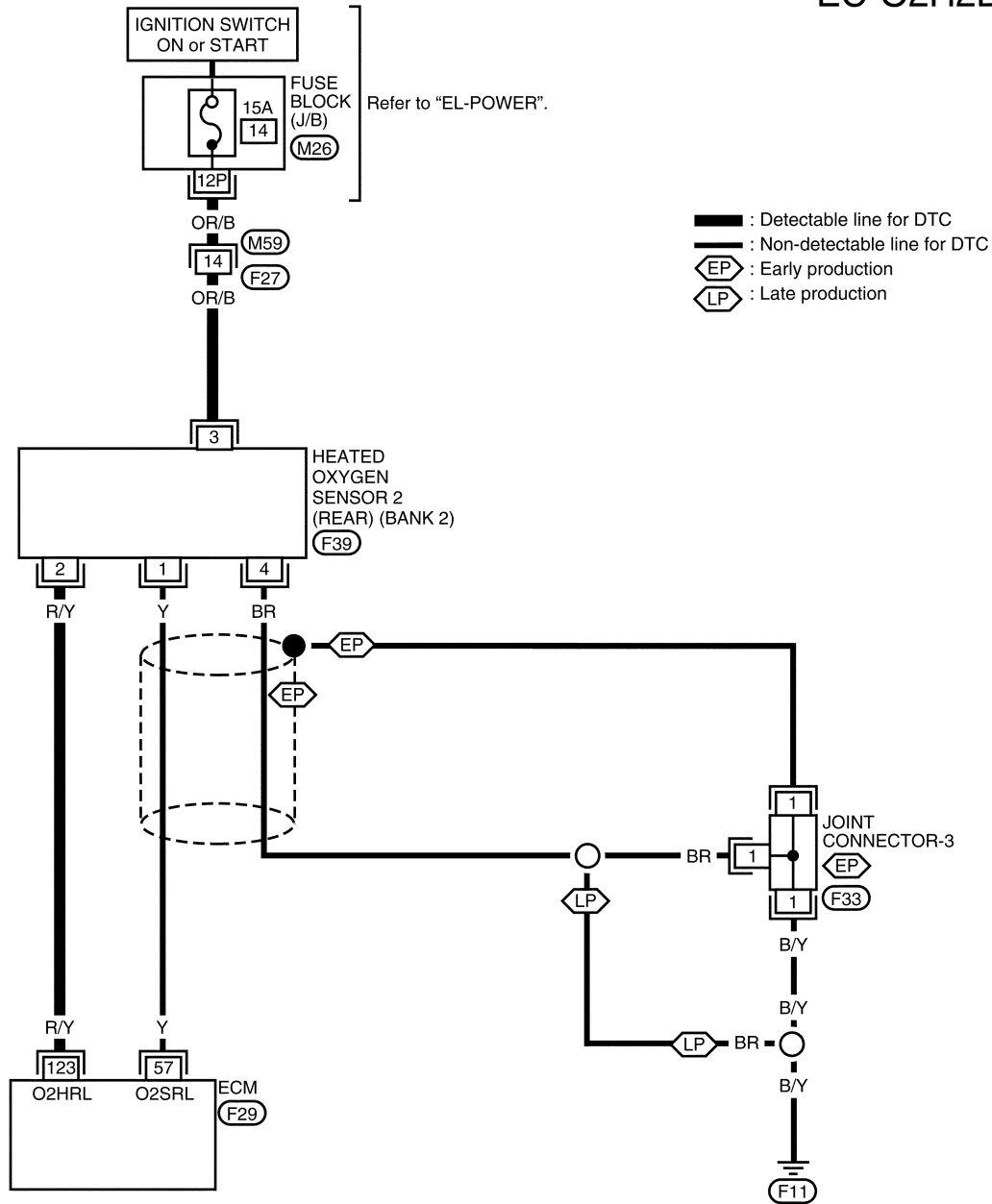
VG33ER

Wiring Diagram (Cont'd)

LEFT BANK

NGEC1221S02

EC-O2H2B2-01

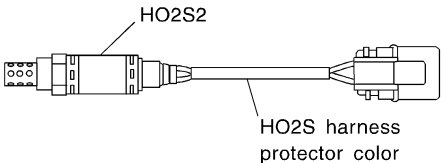
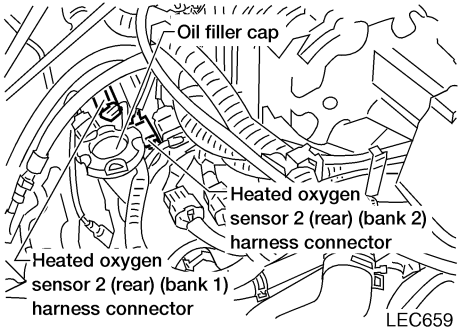
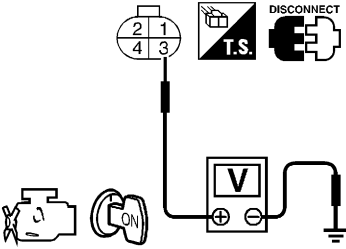


WEC167A

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Diagnostic Procedure

NGEC1222

1	CHECK HO2S2 POWER SUPPLY CIRCUIT
<p>1. Turn ignition switch "OFF". 2. Check heated oxygen sensor 2 harness protector color.</p> <div style="text-align: center;">  <p>HO2S2 (bank 1): Gray HO2S2 (bank 2): Red Brown</p> </div> <p style="text-align: right;">SEC301CA</p> <p>3. Disconnect corresponding heated oxygen sensor 2 harness connector.</p> <div style="text-align: center;">  <p style="text-align: right;">LEC659</p> </div> <p style="text-align: right;">LEC659</p> <p>4. Turn ignition switch ON. 5. Check voltage between HO2S2 terminal 3 and ground.</p> <div style="text-align: center;">  <p style="text-align: right;">SEF637W</p> </div> <p style="text-align: center;">Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M59, F27 ● Fuse block (J/B) connector M26 ● 10A fuse ● Harness for open or short between heated oxygen sensor 2 and fuse 	
▶	Repair harness or connectors.

3	CHECK HO2S2 HEATER OUTPUT CIRCUIT FOR OPEN AND SHORT															
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect ECM harness connector.</p> <p>3. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0037, P0038</td> <td style="text-align: center;">122</td> <td style="text-align: center;">2</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0057, P0058</td> <td style="text-align: center;">123</td> <td style="text-align: center;">2</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM	Sensor	P0037, P0038	122	2	Bank 1 (Right)	P0057, P0058	123	2	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM	Sensor														
P0037, P0038	122	2	Bank 1 (Right)													
P0057, P0058	123	2	Bank 2 (Left)													
SEC665C																
<p>Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>																
OK	▶	GO TO 5.														
NG	▶	GO TO 4.														

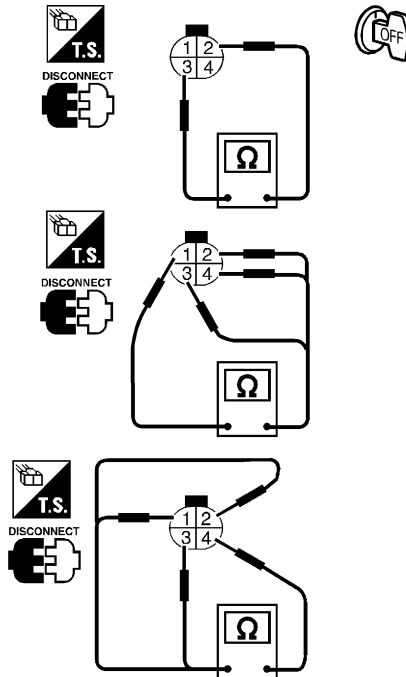
4	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Joint connector-3 (if equipped) ● Harness for open or short between heated oxygen sensor 2 and engine ground. 		
<p>▶ Repair open circuit or short to ground or short to power in harness or connectors.</p>		

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5 CHECK HEATED OXYGEN SENSOR 2 HEATER

Check the following.

1. Check resistance between HO2S2 terminals 2 and 3.



Resistance: 2.3 - 4.3Ω at 25°C (77°F)

SEF716W

2. Check continuity.

Terminal No.	Continuity
1 and 2, 3, 4	No
4 and 1, 2, 3	

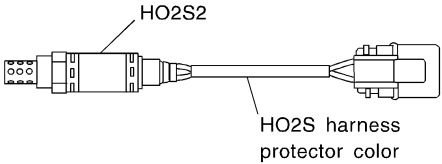
MTBL0233

CAUTION:

Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	REPLACE HEATED OXYGEN SENSOR 2
<p>Check heated oxygen sensor 2 harness protector color.</p> <div style="text-align: center;">  </div> <p style="margin-left: 100px;">HO2S2 (bank 1): Gray HO2S2 (bank 2): Red Brown</p> <p style="text-align: right;">SEC301CA</p> <p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 2.

7	CHECK INTERMITTENT INCIDENT
<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.</p>	
▶	INSPECTION END

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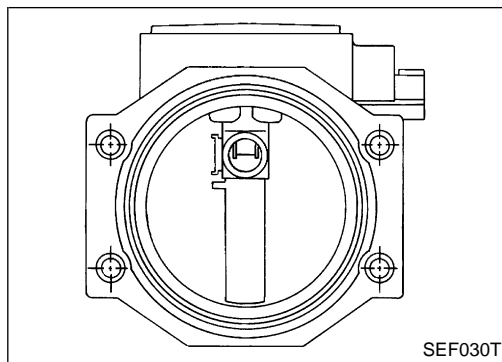
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Component Description



Component Description

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. It consists of a hot wire that is supplied with electric current from the ECM. The temperature of the hot wire is controlled by the ECM a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss. Therefore, the ECM must supply more electric current to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
MAS A/F SE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: "N" ● No-load Idle	1.0 - 1.7V
	2,500 rpm	1.7 - 2.3V
CAL/LD VALUE	ditto Idle	18.5 - 26.0%
	2,500 rpm	18.0 - 21.0%
MASS AIRFLOW	ditto Idle	3.3 - 4.8 g·m/s
	2,500 rpm	12.0 - 14.9 g·m/s

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
54	R	Mass air flow sensor	[Engine is running] ● Warm-up condition ● Idle speed	1.0 - 1.7V
			[Engine is running] ● Warm-up condition ● Engine speed is 2,500 rpm	1.7 - 2.3V
55	G	Mass air flow sensor ground	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V

On Board Diagnosis Logic

Malfunction is detected when
 (Malfunction A, P0103) an excessively high voltage from the sensor is sent to ECM when engine is not running,
 (Malfunction B, P0102) an excessively low voltage from the sensor is sent to ECM when engine is running,
 (Malfunction C, P0101) a high voltage from the sensor is sent to ECM under light load driving condition,
 (Malfunction D, P0101) a low voltage from the sensor is sent to ECM under heavy load driving condition.

DTC P0101, P0102, P0103 MAF SENSOR

VG33ER

On Board Diagnosis Logic (Cont'd)

POSSIBLE CAUSE

Malfunction A or C

NGEC1109S01

NGEC1109S0101

- Harness or connectors
(The sensor circuit is open or shorted.)
- Mass air flow sensor

GI

MA

Malfunction B or D

NGEC1109S0102

- Harness or connectors
(The sensor circuit is open or shorted.)
- Intake air leaks
- Mass air flow sensor

EM

LC

FAIL-SAFE MODE

NGEC1109S02

When the malfunction B is detected, the ECM enters fail-safe mode and the MIL lights up.

EC

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.

FE

CL

MT

DTC Confirmation Procedure

NGEC1110

Perform "PROCEDURE FOR MALFUNCTION A" first.
 If the 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B".
 If there is no problem on "PROCEDURE FOR MALFUNCTION B", perform "PROCEDURE FOR MALFUNCTION C".
 If there is no problem on "PROCEDURE FOR MALFUNCTION C", perform "PROCEDURE FOR MALFUNCTION D".

AT

TF

PD

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

AX

SU

BR

ST

RS

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

NGEC1110S01

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 6 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1339.
If 1st DTC is not detected, go to next step.
- 5) Start engine and let it idle for at least 6 seconds.
- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1339.

BT


HA

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EC-1335

 **With GST**
Follow the procedure "With CONSULT-II".

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm


SEF058Y

PROCEDURE FOR MALFUNCTION B

NGEC1110S02

 **With CONSULT-II**

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait 5 seconds at most.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1339.

 **With GST**
Follow the procedure "With CONSULT-II".

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

PROCEDURE FOR MALFUNCTION C


NGEC1110S03

NOTE:

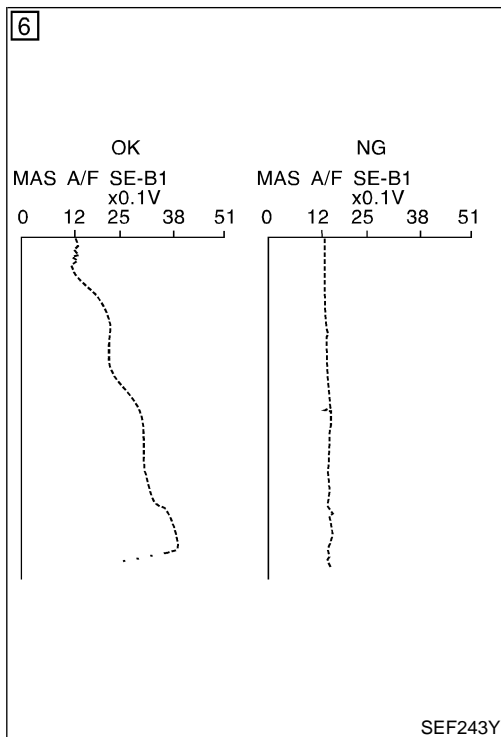
If engine will not start or stops soon, wait at least 10 seconds with engine stopped (Ignition switch ON) instead of running engine at idle speed.

 **With CONSULT-II**

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and warm it up to normal operating temperature.
- 4) Run engine for at least 10 seconds at idle speed.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1339.

 **With GST**
Follow the procedure "With CONSULT-II".

NGEC1110S04



PROCEDURE FOR MALFUNCTION D

CAUTION:

Always drive vehicle at a safe speed.

Ⓜ With CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Start engine and warm it up to normal operating temperature. **If engine cannot be started, go to "Diagnostic Procedure", EC-1339.**
- 3) Select "DATA MONITOR" mode with CONSULT-II.
- 4) Check the voltage of MAS AIR/FL SE with "DATA MONITOR".
- 5) Increases engine speed to about 4,000 rpm.
- 6) Monitor the linear voltage rise in response to engine speed increases.
If NG, go to "Diagnostic Procedure", EC-1339.
If OK, go to following step.
- 7) Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm
THRTL POS SEN	More than 3V
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

- 8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1339.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
THRTL POS SEN	XXX V

SEF175Y

CALC LOAD	20%
COOLANT TEMP	95°C
SHORT FT #1	2%
LONG FT #1	0%
SHORT FT #2	4%
LONG FT #2	0%
ENGINE SPD	2637RPM
VEHICLE SPD	0MPH
IGN ADVANCE	41.0°
INTAKE AIR	41°C
MAF	14.1gm/sec
THROTTLE POS	3%

SEF534P

Overall Function Check

PROCEDURE FOR MALFUNCTION D

Use this procedure to check the overall function of the mass air flow sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Ⓜ With GST

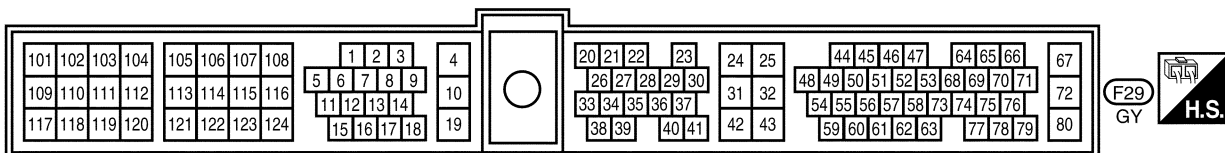
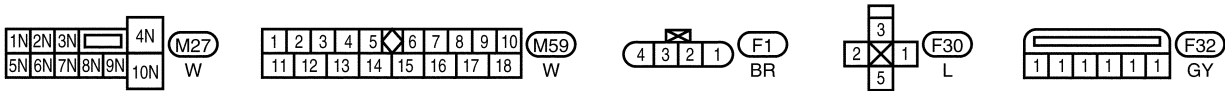
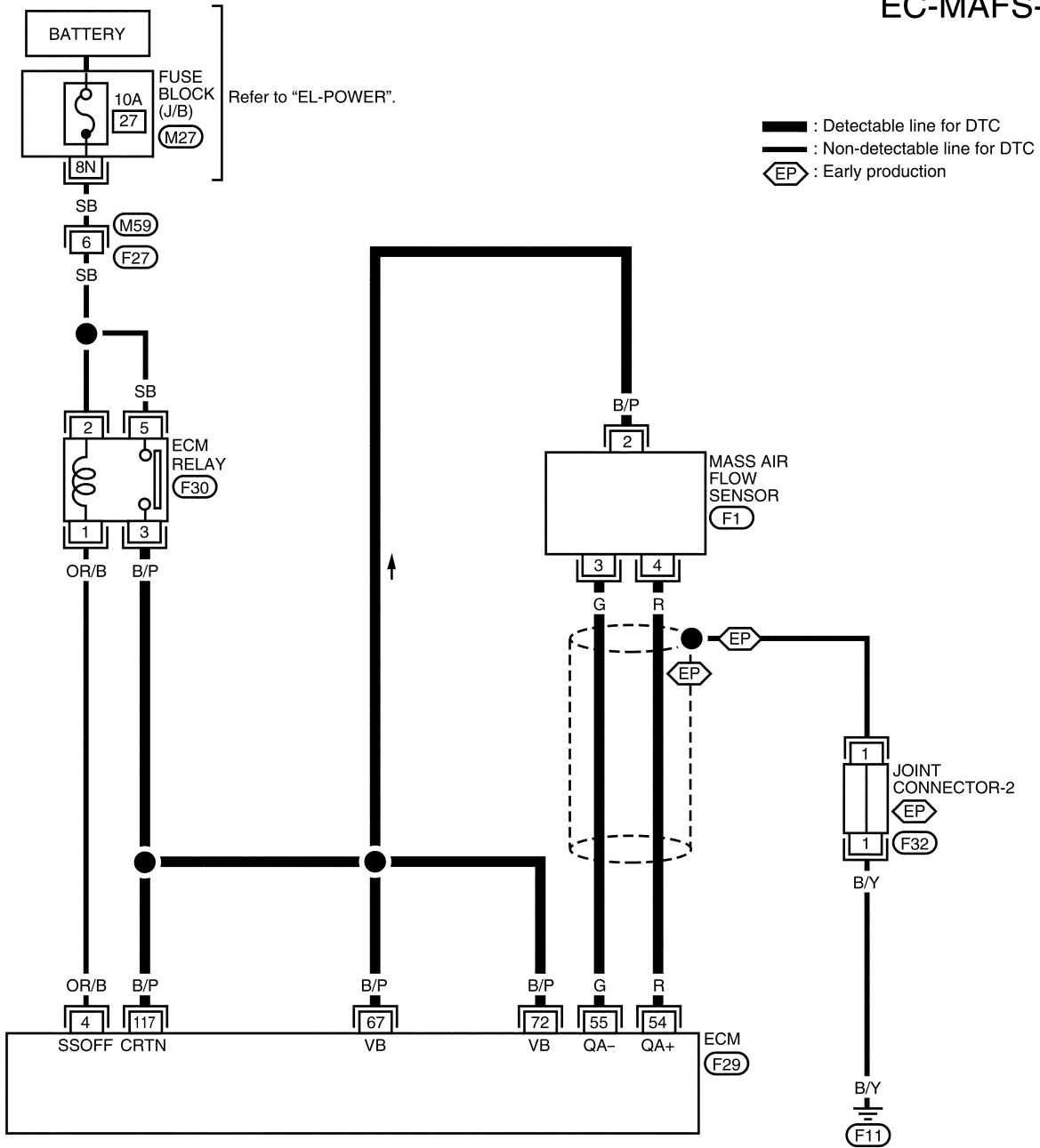
- 1) Start engine and warm it up to normal operating temperature.
- 2) Select "MODE 1" with GST.
- 3) Check the mass air flow sensor signal with "MODE 1".
- 4) Check for linear mass air flow sensor signal value rise in response to increases to about 4,000 rpm in engine speed.
- 5) If NG, go to "Diagnostic Procedure", EC-1339.

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Wiring Diagram

NGEC1112

EC-MAFS-01

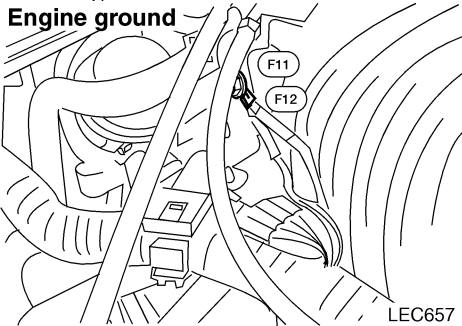


Diagnostic Procedure

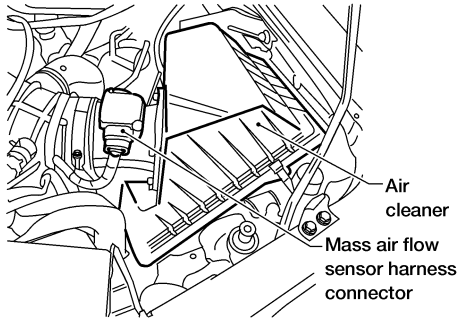
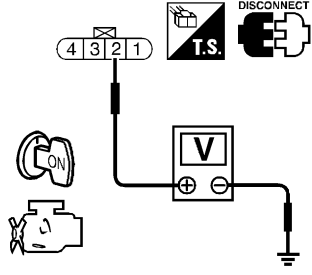
NGEN1113

1	INSPECTION START							
Which malfunction (A, B, C or D) is duplicated?								
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">MALFUNCTION</th> <th style="width: 50%;">Type</th> </tr> </thead> <tbody> <tr> <td>A and/or C</td> <td style="text-align: center;">I</td> </tr> <tr> <td>B and/or D</td> <td style="text-align: center;">II</td> </tr> </tbody> </table>			MALFUNCTION	Type	A and/or C	I	B and/or D	II
MALFUNCTION	Type							
A and/or C	I							
B and/or D	II							
MTBL0063								
Type I or Type II								
Type I	▶	GO TO 3.						
Type II	▶	GO TO 2.						

2	CHECK INTAKE SYSTEM	
Check the following for connection.		
<ul style="list-style-type: none"> ● Air duct ● Vacuum hoses ● Intake air passage between air duct to intake manifold collector 		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Reconnect the parts.

3	RETIGHTEN GROUND SCREWS	
1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.		
 <p style="text-align: center;">Engine ground</p> <p style="text-align: right;">LEC657</p>		
LEC657		
▶		GO TO 4.

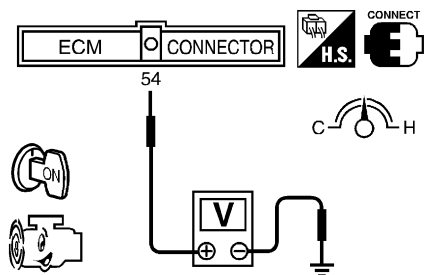
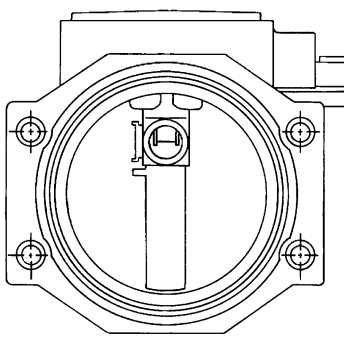
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4	CHECK MAFS POWER SUPPLY CIRCUIT	
<p>1. Disconnect mass air flow sensor harness connector.</p> <div style="text-align: right; margin-right: 50px;">  <p>Air cleaner Mass air flow sensor harness connector</p> </div>		
AEC641A		
<p>2. Turn ignition switch ON. 3. Check voltage between terminal 2 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p>DISCONNECT I.S.</p> <p>V</p> </div>		
SEF627W		
<p>Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness for open or short between ECM relay and mass air flow sensor ● Harness for open or short between mass air flow sensor and ECM 		
▶		Repair harness or connectors.

6	CHECK MAFS GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between MAFS terminal 3 and ECM terminal 55. Refer to Wiring Diagram. Continuity should exist.</p>		
<p>4. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 7.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK MAFS INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Check harness continuity between MAFS terminal 4 and ECM terminal 54. Refer to Wiring Diagram. Continuity should exist.</p> <p>2. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
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											
<p>1. Reconnect harness connectors disconnected.</p> <p>2. Start engine and warm it up to normal operating temperature.</p> <p>3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.</p>												
												
SEF747U												
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Condition</th> <th style="width: 50%;">Voltage V</th> </tr> </thead> <tbody> <tr> <td>Ignition switch "ON" (Engine stopped.)</td> <td style="text-align: center;">Less than 1.0</td> </tr> <tr> <td>Idle (Engine is warmed-up to normal operating temperature.)</td> <td style="text-align: center;">1.0 - 1.7</td> </tr> <tr> <td>2,500 rpm (Engine is warmed-up to normal operating temperature.)</td> <td style="text-align: center;">1.7 - 2.3</td> </tr> <tr> <td>Idle to about 4,000 rpm*</td> <td style="text-align: center;">1.0 - 1.7 to Approx. 4.0</td> </tr> </tbody> </table>			Condition	Voltage V	Ignition switch "ON" (Engine stopped.)	Less than 1.0	Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.3	Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0
Condition	Voltage V											
Ignition switch "ON" (Engine stopped.)	Less than 1.0											
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7											
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.3											
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0											
<p>*Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.</p>												
LEC102A												
<p>4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Then repeat above check.</p> <p>5. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.</p>												
												
SEF030T												
OK or NG												
OK	▶	GO TO 9.										
NG	▶	Replace mass air flow sensor.										

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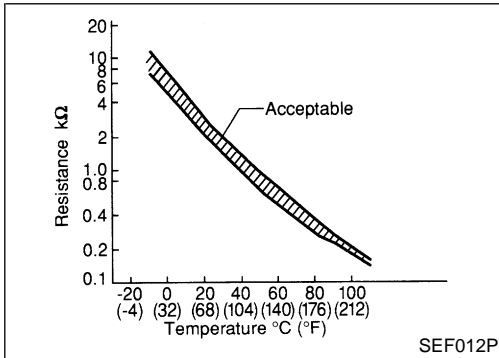
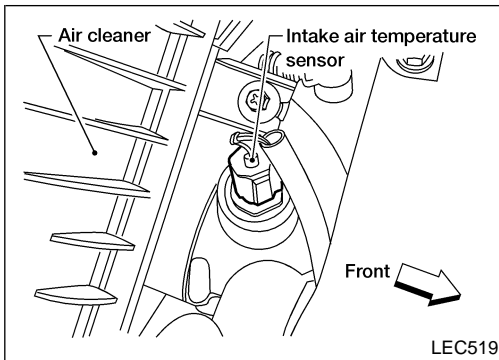
DTC P0101, P0102, P0103 MAF SENSOR

VG33ER

Diagnostic Procedure (Cont'd)

9	CHECK MAFS SHIELD CIRCUIT FOR OPEN AND SHORT (IF EQUIPPED)
<p>1. Turn ignition switch OFF. 2. Disconnect joint connector-2. 3. Check the following.</p> <ul style="list-style-type: none">● Continuity between joint connector-2 terminal 1 and ground Refer to Wiring Diagram.● Joint connector-2 (Refer to EL-250, "HARNESS LAYOUT".) Continuity should exist. <p>4. Also check harness for short to power. 5. Then reconnect joint connector-2.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 10.
NG	▶ Repair open circuit or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.	
	▶ INSPECTION END



Component Description

NGEC1118

The intake air temperature sensor is mounted to the air duct housing. The sensor detects intake air temperature and transmits a signal to the ECM.

The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.

<Reference data>

Intake air temperature °C (°F)	Voltage* (V)	Resistance kΩ
20 (68)	3.5	2.1 - 2.9
80 (176)	1.23	0.27 - 0.38

*: These data are reference values and are measured between ECM terminal 61 (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 the ECM terminals, such as the ground.

On Board Diagnosis Logic

NGEC1119

Malfunction is detected when (Malfunction A) an excessively low (P0112) or high (P0113) voltage from the sensor is sent to ECM, (Malfunction B, P0127) rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.

POSSIBLE CAUSE

NGEC1119S01

- Harness or connectors (The sensor circuit is open or shorted.)
- Intake air temperature sensor

DTC Confirmation Procedure

NGEC1120

Perform "PROCEDURE FOR MALFUNCTION A" first. If 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B".

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

GI
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IDX

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

NGEC1120S01

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1346.

With GST

Follow the procedure "With CONSULT-II".

5

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

SEF176Y

PROCEDURE FOR MALFUNCTION B

NGEC1120S02

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

With CONSULT-II

- 1) Wait until engine coolant temperature is less than 90°C (194°F).
- a) Turn ignition switch ON.
- b) Select "DATA MONITOR" mode with CONSULT-II.
- c) Check the engine coolant temperature.
- d) If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch OFF and cool down engine.
 - Perform the following steps before engine coolant temperature is above 90°C (194°F).
- 2) Turn ignition switch ON.
- 3) Select "DATA MONITOR" mode with CONSULT-II.
- 4) Start engine.
- 5) Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds.
- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1346.

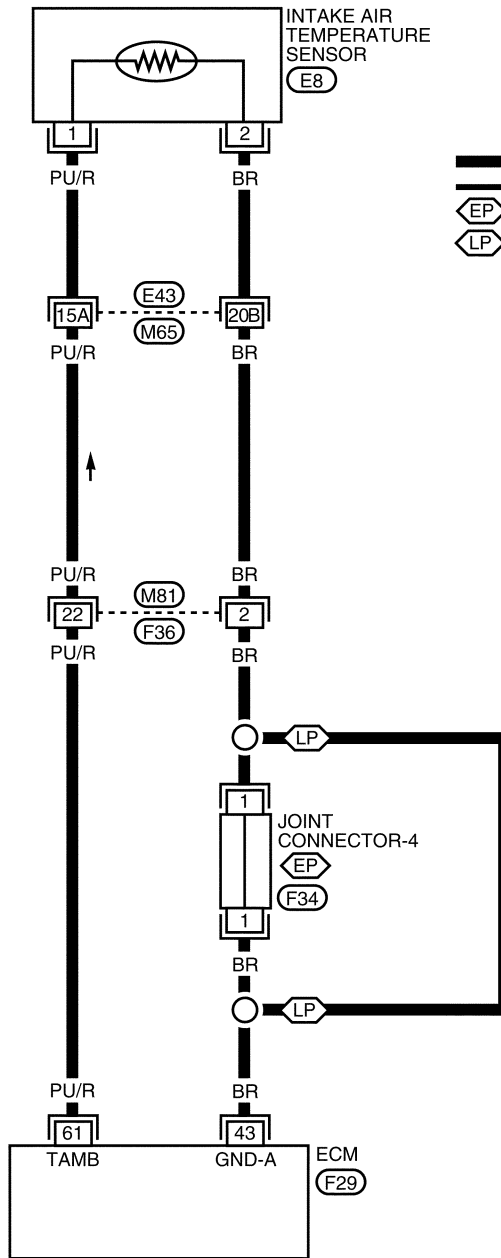
With GST

Follow the procedure "With CONSULT-II".

Wiring Diagram

NGEC1121

EC-IATS-01



- : Detectable line for DTC
- : Non-detectable line for DTC
- : Early production
- : Late production

GI

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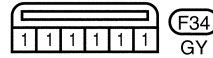
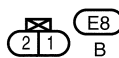
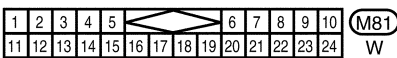
BT

HA

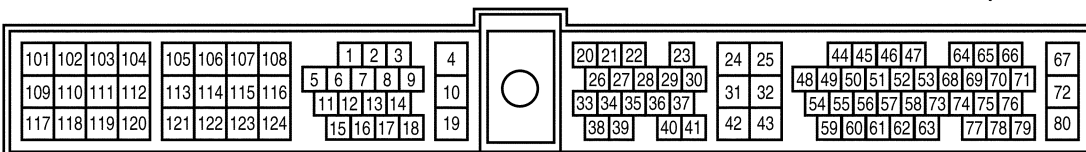
SC

EL

IDX



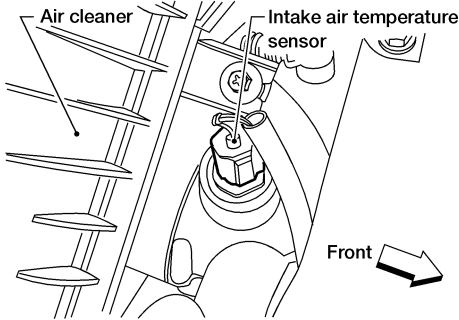
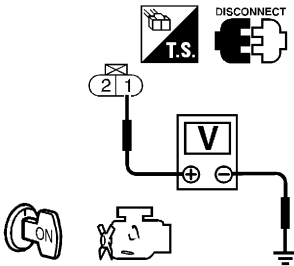
Refer to the following.
(E43) - SUPER MULTIPLE JUNCTION (SMJ)



WEC169A

Diagnostic Procedure

NGEC1122

1	CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT
<p>1. Turn ignition switch OFF. 2. Disconnect intake air temperature sensor harness connector.</p> <div style="text-align: center;">  </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 1 and ground.</p> <div style="text-align: center;">  </div> <p style="color: blue; text-align: center;">Voltage: Approximately 5V</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

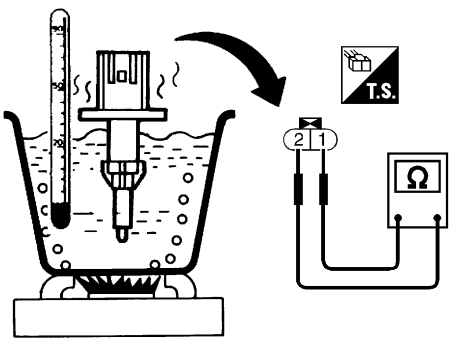
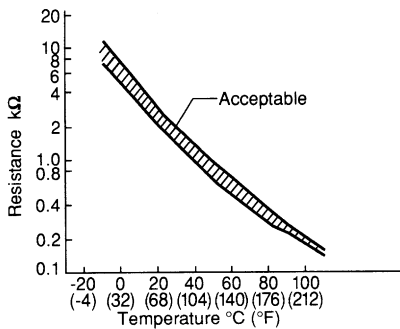
LEC519

SEF203W

2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M81, F36 ● Harness for open or short between ECM and intake air temperature sensor 	
▶	Repair harness or connectors.

3	CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch OFF. 2. Check harness continuity between intake air temperature sensor terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

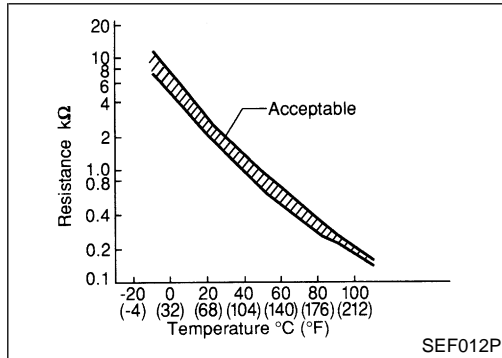
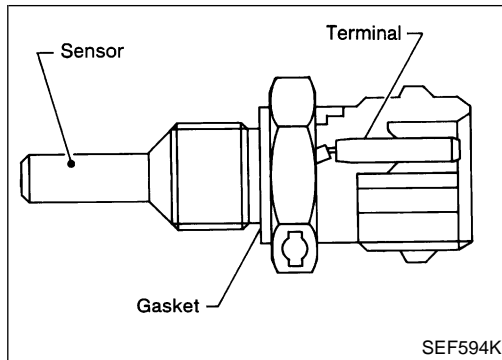
4	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M81, F36 ● Joint connector-4 (if equipped) ● Harness for open or short between ECM and intake air temperature sensor 	
▶	Repair open circuit or short to power in harness or connectors.

5	CHECK INTAKE AIR TEMPERATURE SENSOR						
Check resistance as shown in the figure.							
							
<p><Reference data></p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Intake air temperature °C (°F)</th> <th style="text-align: center;">Resistance kΩ</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">20 (68)</td> <td style="text-align: center;">2.1 - 2.9</td> </tr> <tr> <td style="text-align: center;">80 (176)</td> <td style="text-align: center;">0.27 - 0.38</td> </tr> </tbody> </table>		Intake air temperature °C (°F)	Resistance kΩ	20 (68)	2.1 - 2.9	80 (176)	0.27 - 0.38
Intake air temperature °C (°F)	Resistance kΩ						
20 (68)	2.1 - 2.9						
80 (176)	0.27 - 0.38						
							
OK or NG							
OK	▶ GO TO 6.						
NG	▶ Replace intake air temperature sensor.						

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.	
▶	INSPECTION END

GI
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Component Description



Component Description

NGEC1123

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

<Reference data>

Engine coolant temperature °C (°F)	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 59 (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 the ECM terminals, such as the ground.

On Board Diagnosis Logic

NGEC1124

Malfunction is detected when an excessively high (P0118) or low (P0117) voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

NGEC1124S01

- Harness or connectors
(The sensor circuit is open or shorted.)
- Engine coolant temperature sensor

FAIL-SAFE MODE

NGEC1124S02

When this malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

DTC P0117, P0118 ECT SENSOR

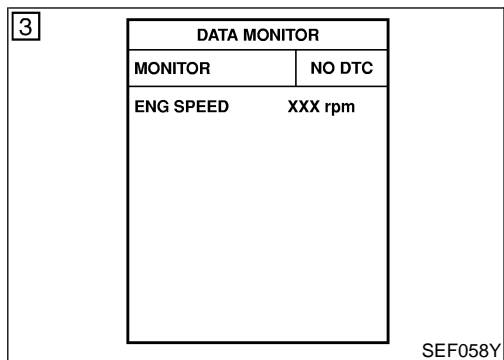
VG33ER

On Board Diagnosis Logic (Cont'd)

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)

GI
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EM
LC
EC

FE
CL
MT



DTC Confirmation Procedure

NGEC1125

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

Ⓜ With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1351.

Ⓜ With GST

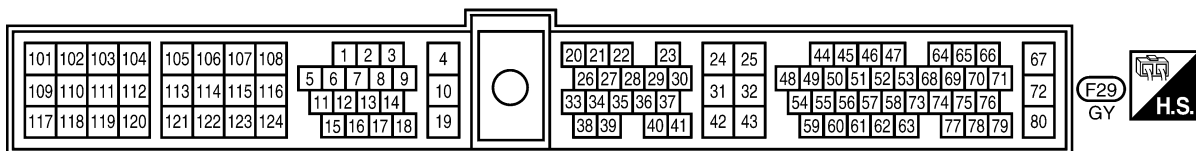
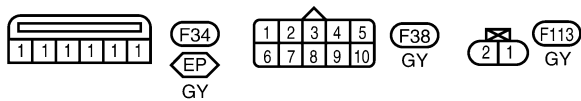
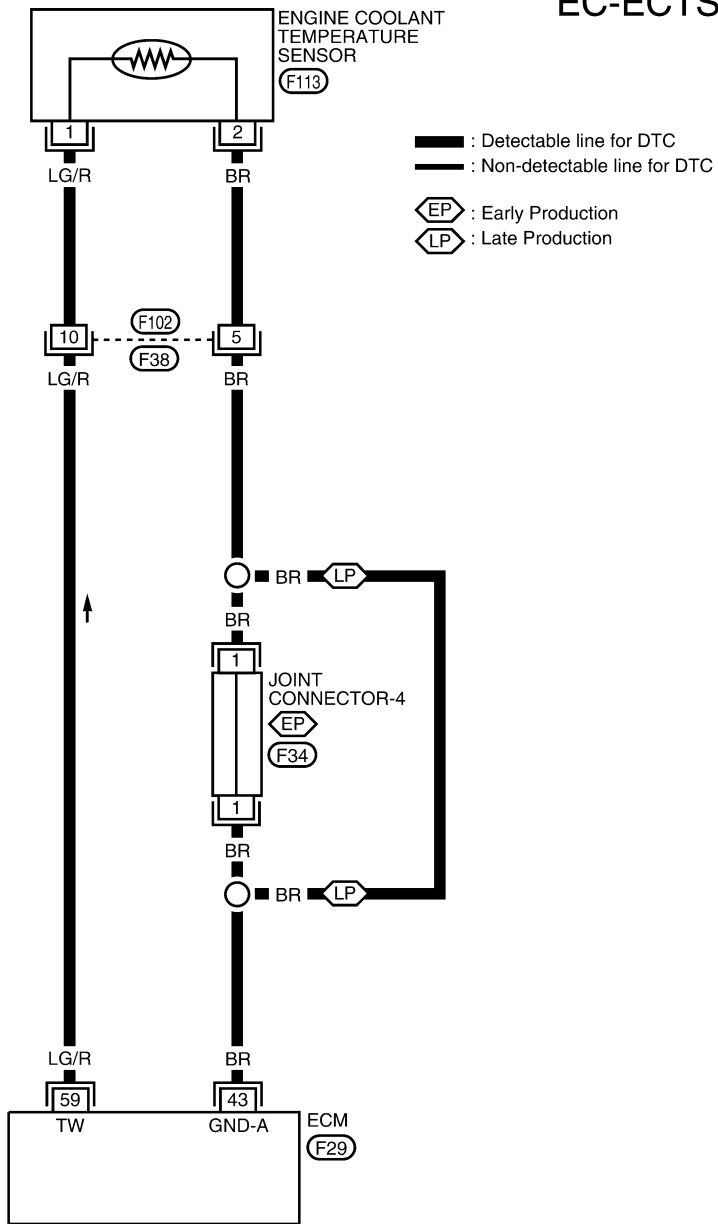
Follow the procedure "With CONSULT-II".

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IDX

Wiring Diagram

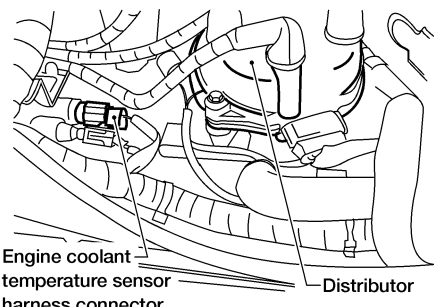
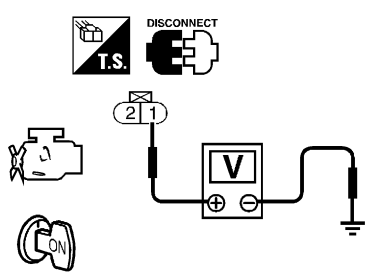
NGEC1126

EC-ECTS-01



Diagnostic Procedure

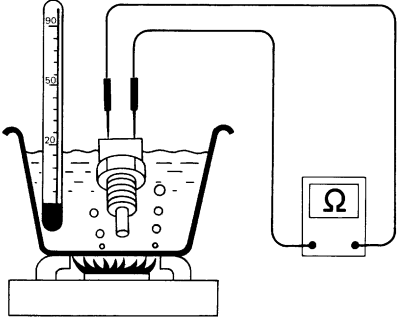
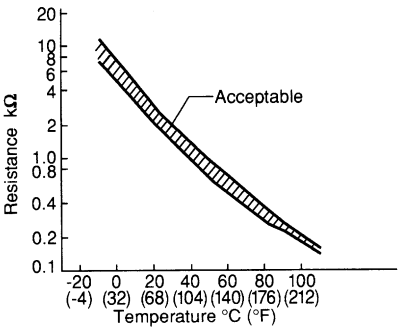
NGEC1127

1	CHECK ECTS POWER SUPPLY CIRCUIT	<p>1. Turn ignition switch OFF. 2. Disconnect engine coolant temperature sensor harness connector.</p> <div style="text-align: center;">  <p style="font-size: small;">Engine coolant temperature sensor harness connector Distributor</p> </div> <p style="text-align: right; font-size: small;">AEC643A</p> <p>3. Turn ignition switch ON. 4. Check voltage between ECTS terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p style="font-size: small;">DISCONNECT T.S. ON</p> </div> <p style="text-align: right; font-size: small;">SEF206W</p> <p style="text-align: center; color: blue; font-weight: bold;">Voltage: Approximately 5V</p> <p style="text-align: center; font-weight: bold;">OK or NG</p>	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p style="background-color: black; color: white; padding: 5px;">EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p> <p>TF</p> <p>PD</p> <p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p> <p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>
OK	▶	GO TO 3.	
NG	▶	GO TO 2.	

2	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Harness for open or short between ECM and engine coolant temperature sensor <p style="text-align: right;">▶ Repair open circuit or short to ground or short to power in harness or connectors.</p>	
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3	CHECK ECTS GROUND CIRCUIT FOR OPEN AND SHORT	<p>1. Turn ignition switch OFF. 2. Check harness continuity between ECTS terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p> <p style="text-align: center; font-weight: bold;">OK or NG</p>	
OK	▶	GO TO 5.	
NG	▶	GO TO 4.	

4	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Joint connector-4 (if equipped) ● Harness for open or short between ECM and engine coolant temperature sensor 	
▶	Repair open circuit or short to power in harness or connectors.

5	CHECK ENGINE COOLANT TEMPERATURE SENSOR								
Check resistance as shown in the figure.									
									
SEF152P									
<Reference data>									
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 5px;">Temperature °C (°F)</th> <th style="padding: 5px;">Resistance kΩ</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 5px;">20 (68)</td> <td style="text-align: center; padding: 5px;">2.1 - 2.9</td> </tr> <tr> <td style="text-align: center; padding: 5px;">50 (122)</td> <td style="text-align: center; padding: 5px;">0.68 - 1.00</td> </tr> <tr> <td style="text-align: center; padding: 5px;">90 (194)</td> <td style="text-align: center; padding: 5px;">0.236 - 0.260</td> </tr> </tbody> </table>		Temperature °C (°F)	Resistance kΩ	20 (68)	2.1 - 2.9	50 (122)	0.68 - 1.00	90 (194)	0.236 - 0.260
Temperature °C (°F)	Resistance kΩ								
20 (68)	2.1 - 2.9								
50 (122)	0.68 - 1.00								
90 (194)	0.236 - 0.260								
MTBL0229									
									
SEF012P									
OK or NG									
OK	▶ GO TO 6.								
NG	▶ Replace engine coolant temperature sensor.								

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.	
▶	INSPECTION END

Description

NGEC1128

NOTE:

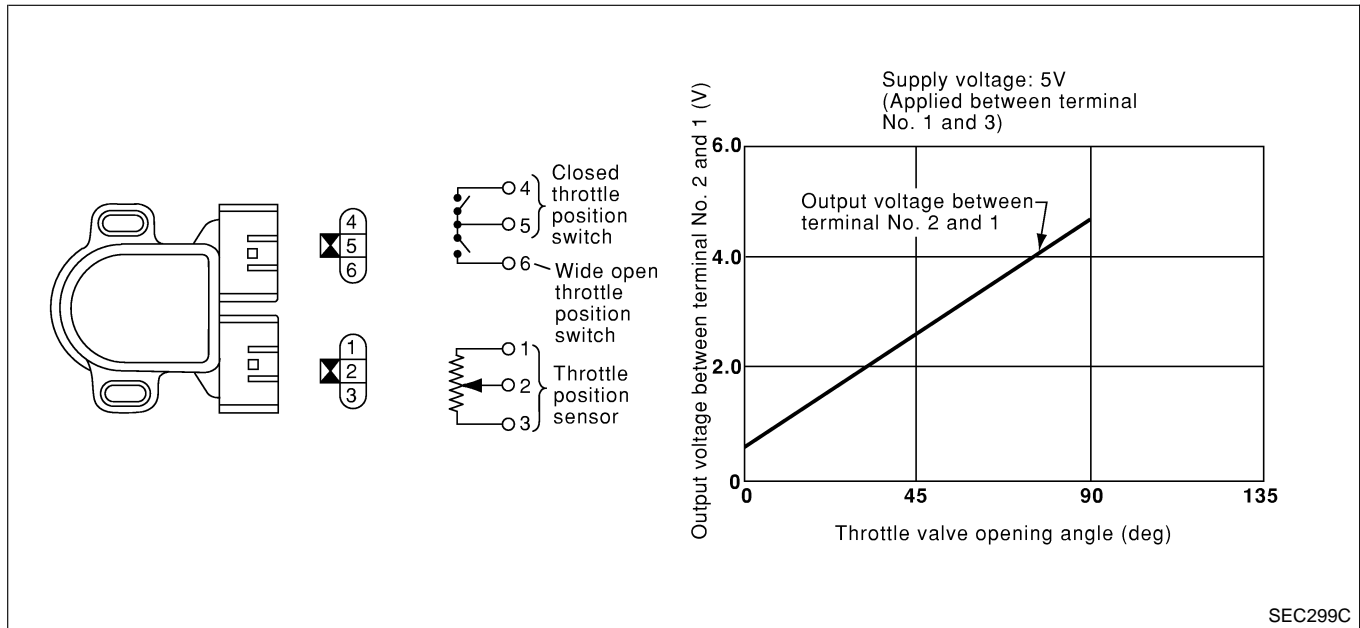
If DTC P0120 is displayed with DTC P0510, first perform the trouble diagnosis for DTC P0510. Refer to EC-1592.

COMPONENT DESCRIPTION

NGEC1128S01

The throttle position sensor responds to the accelerator pedal movement. This sensor is a kind of potentiometer which transforms the throttle position into output voltage, and emits the voltage signal to the ECM. In addition, the sensor detects the opening and closing speed of the throttle valve and feeds the voltage signal to the ECM.

Idle position of the throttle valve is determined by the ECM receiving the signal from the throttle position sensor. This sensor controls engine operation such as fuel cut. On the other hand, the "Wide open and closed throttle position switch", which is built into the throttle position sensor unit, is not used for engine control.



CONSULT-II Reference Value in Data Monitor Mode

NGEC1129

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL POS SEN	<ul style="list-style-type: none"> Engine: After warming up, idle the engine Throttle valve: fully closed (a)	0.15 - 0.85V
	<ul style="list-style-type: none"> Engine: After warming up Ignition switch: ON (Engine stopped) Throttle valve: Partially open	Between (a) and (b)
		Throttle valve: fully opened (b)
ABSOL TH-P/S	<ul style="list-style-type: none"> Engine: After warming up Ignition switch: ON More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump. Throttle valve: fully closed	0.0%
	<ul style="list-style-type: none"> Engine: After warming up Ignition switch: ON (Engine stopped) Throttle valve: fully opened	Approx. 80%

ECM Terminals and Reference Value

=NGEC1130

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 the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
23	L	Throttle position sensor	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Accelerator pedal fully released 	0.15 - 0.85V
			[Ignition switch ON] <ul style="list-style-type: none"> ● Accelerator pedal fully depressed 	3.5 - 4.7V
42	B/W	Sensors' power supply	[Ignition switch ON]	Approximately 5V
43	BR	Sensors' ground	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	Approximately 0V

On Board Diagnosis Logic

NGEC1131

Malfunction is detected when (Malfunction A) an excessively low (P0122) or high (P0123) voltage from the sensor is sent to ECM, (Malfunction B, P0121) a high voltage from the sensor is sent to ECM under light load driving conditions, (Malfunction C, P0121) a low voltage from the sensor is sent to ECM under heavy load driving conditions.

POSSIBLE CAUSE

NGEC1131S01

Malfunction A

NGEC1131S0101

- Harness or connectors
(The throttle position sensor circuit is open or shorted.)
- Throttle position sensor

Malfunction B

NGEC1131S0102

- Harness or connectors
(The throttle position sensor circuit is open or shorted.)
- Throttle position sensor
- Fuel injector
- Camshaft position sensor
- Mass air flow sensor

Malfunction C

NGEC1131S0103

- Harness or connectors
(The throttle position sensor circuit is open or shorted.)
- Intake air leaks
- Throttle position sensor

FAIL-SAFE MODE

NGEC1131S02

When the malfunction A is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode	
Throttle position sensor circuit	Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.	
	Condition	Driving condition
	When engine is idling	Normal
	When accelerating	Poor acceleration

DTC Confirmation Procedure

NGEC1132

NOTE:

- Perform “PROCEDURE FOR MALFUNCTION A” first. If the 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B”.
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

NGEC1132S01

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is more than 10V at idle.
- This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
P/N POSI SW	OFF

SEF065Y

With CONSULT-II

- 1) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
- 2) Start engine and maintain the following conditions for at least 5 consecutive seconds.

Vehicle speed	More than 5 km/h (3 MPH)
Selector lever	Suitable position except “P” or “N” position

- 3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1359.

With GST

Follow the procedure “With CONSULT-II”.

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B

NGEC1132S02

Ⓜ With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and let it idle for at least 10 seconds.
If idle speed is over 1,000 rpm, maintain the following conditions for at least 10 seconds to keep engine speed below 1,000 rpm.

Selector lever	Suitable position except "P" or "N"
Brake pedal	Depressed
Vehicle speed	0 km/h (0 MPH)

- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1359.

Ⓜ With GST

Follow the procedure "With CONSULT-II".

6	DATA MONITOR	
	MONITOR	NO DTC
	THRTL POS SEN	XXX V
	ABSOL TH-P/S	XXX %

SEF177Y

PROCEDURE FOR MALFUNCTION C

NGEC1132S03

CAUTION:

Always drive vehicle at a safe speed.

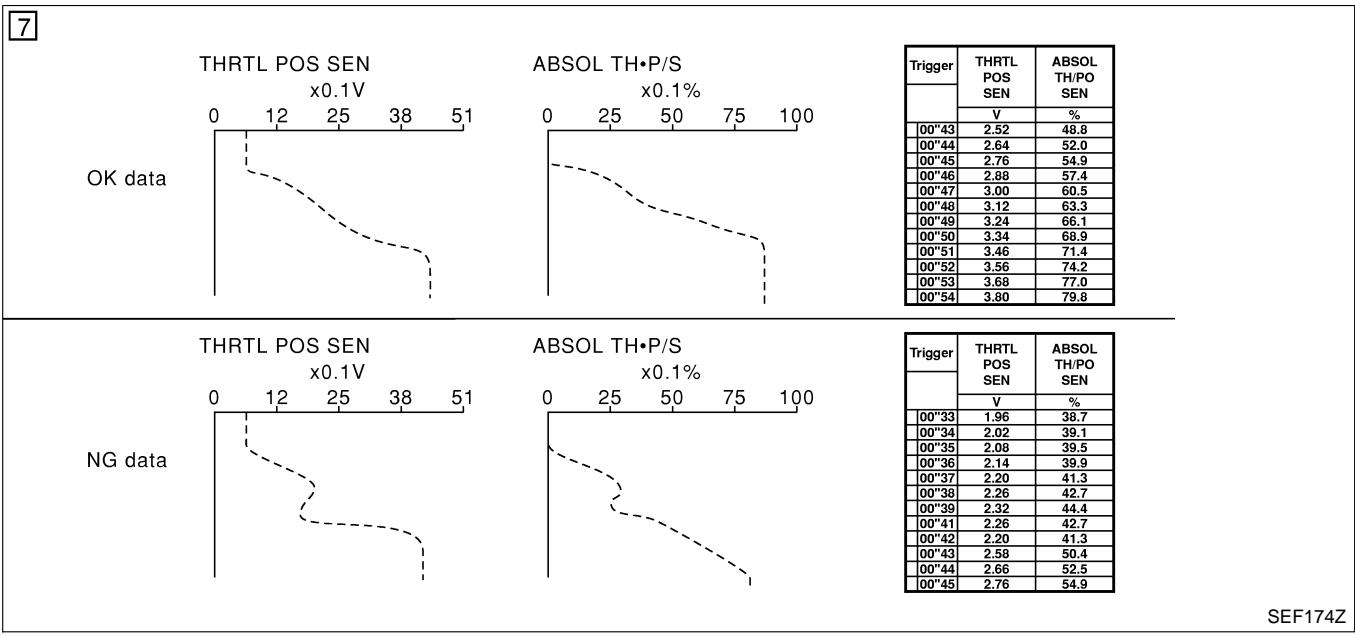
Ⓜ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
 - 2) Turn ignition switch OFF and wait at least 5 seconds.
 - 3) Turn ignition switch ON.
 - 4) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II.
 - 5) Select "THRTL POS SEN" and "ABSOL TH-P/S" in "DATA MONITOR" mode with CONSULT-II.
 - 6) Press RECORD on CONSULT-II SCREEN at the same time accelerator pedal is depressed.
 - 7) Print out the recorded graph and check the following:
 - The voltage rise is linear in response to accelerator pedal depression.
 - The voltage when accelerator pedal is fully depressed is approximately 4V.
- If NG, go to "Diagnostic Procedure", EC-1359.
If OK, go to following step.

DTC P0121, P0122, P0123 TP SENSOR

VG33ER

DTC Confirmation Procedure (Cont'd)



9

DATA MONITOR	
MONITORING	NO DTC
ENG SPEED	XXX rpm
MAS AIR/FL SE	XXX V
COOLAN TEMP/S	XXX °C
IACV-AAC/V	XXX %

SEF805Z

- 8) Select "AUTO TRIG" in "DATA MONITOR" mode with CONSULT-II.
- 9) Maintain the following conditions for at least 10 consecutive seconds.

CMPS-RPM (REF)	More than 2,000 rpm
MAS AIR/FL SE	More than 3V
COOLAN TEMP/S	More than 70°C (158°F)
IACV-AAC/V	Less than 80%
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

- 10) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1359.

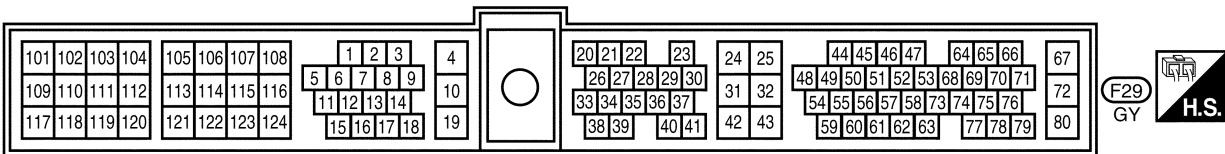
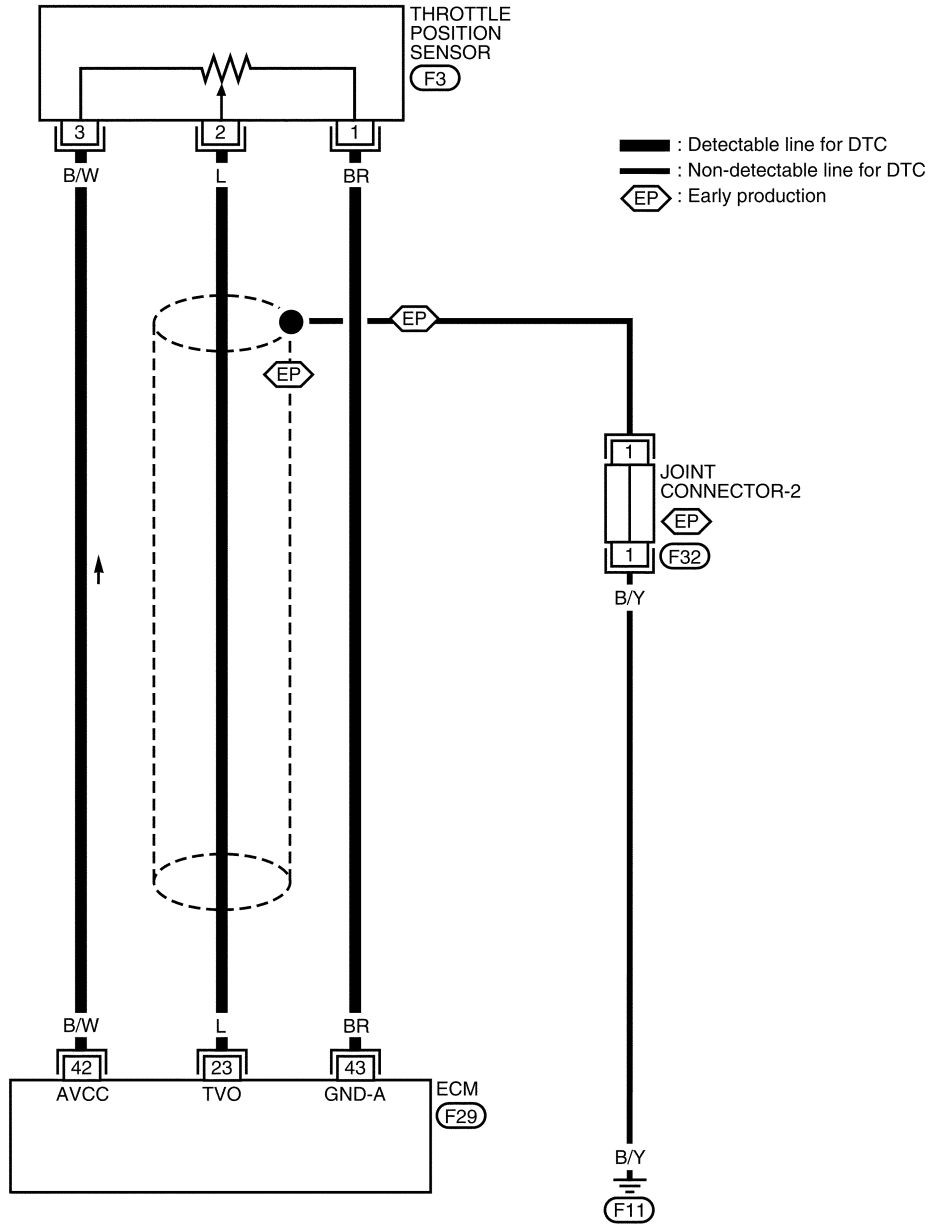
With GST
Follow the procedure "With CONSULT-II".

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 EL
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Wiring Diagram

NGEC1133

EC-TPS-01



Diagnostic Procedure

NGENC1134

1	INSPECTION START									
Which malfunction A, B or C is duplicated?										
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">MALFUNCTION</th> <th style="width: 50%;">Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">A</td> <td style="text-align: center;">A</td> </tr> <tr> <td style="text-align: center;">B</td> <td style="text-align: center;">B</td> </tr> <tr> <td style="text-align: center;">C</td> <td style="text-align: center;">C</td> </tr> </tbody> </table>			MALFUNCTION	Type	A	A	B	B	C	C
MALFUNCTION	Type									
A	A									
B	B									
C	C									
MTBL0066										
Type A, B or C										
Type A or B	▶	GO TO 4.								
Type C	▶	GO TO 2.								

 GI
MA
EM
LC
EC

2	ADJUST THROTTLE POSITION SENSOR											
Check the following items. Refer to "Basic Inspection", EC-1273.												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Items</th> <th style="width: 50%;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>10° ± 2° BTDC</td> </tr> <tr> <td>Base idle speed</td> <td>700 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table>			Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
Items	Specifications											
Ignition timing	10° ± 2° BTDC											
Base idle speed	700 ± 50 rpm (in "P" or "N" position)											
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF											
Target idle speed	750 ± 50 rpm (in "P" or "N" position)											
MTBL0576												
▶		GO TO 3.										

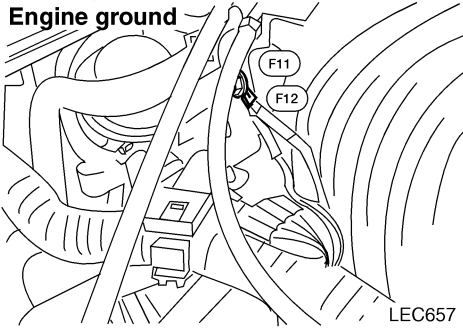
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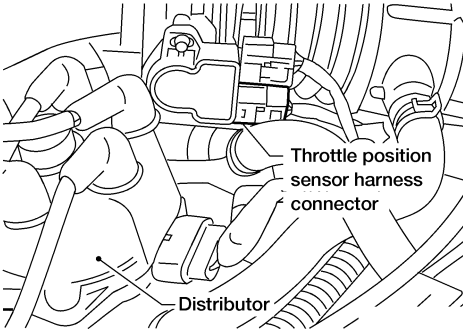
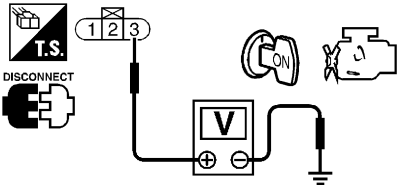
3	CHECK INTAKE SYSTEM.	
1. Turn ignition switch OFF. 2. Check the following for connection. <ul style="list-style-type: none"> ● Air duct ● Vacuum hoses ● Intake air passage between air duct to intake manifold collector 		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Reconnect the parts.

 PD
AX
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RS
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HA
SC
EL

IDX

4	RETIGHTEN GROUND SCREWS
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws. 	
 <p style="text-align: right;">LEC657</p>	
<p>▶ GO TO 5.</p>	

5	CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT
<ol style="list-style-type: none"> 1. Disconnect throttle position sensor harness connector. 	
 <p style="text-align: right;">AEC638A</p>	
<ol style="list-style-type: none"> 2. Turn ignition switch ON. 3. Check voltage between sensor terminal 3 and ground with CONSULT-II or tester. 	
	
<p>Voltage: Approximately 5V</p> <p>OK or NG</p>	
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 GROUND CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch OFF. 2. Check harness continuity between throttle position sensor terminal 1 and engine ground. Refer to Wiring Diagram. <b style="color: blue;">Continuity should exist. 3. Also check harness for short to power.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART	
Check the harness for open or short between ECM and throttle position sensor.		
▶ Repair open circuit or short to power in harness or connectors.		

8	CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 23 and throttle position sensor terminal 2. Refer to Wiring Diagram. <b style="color: blue;">Continuity should exist. 3. Also check harness for short to ground and short to power.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 9.
OK (Without CONSULT-II)	▶	GO TO 10.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK THROTTLE POSITION SENSOR											
ⓘ With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Stop engine (ignition switch OFF). 3. Turn ignition switch ON. 4. Select "DATA MONITOR" mode with CONSULT-II. 5. Check voltage of "THRTL POS SEN" under the following conditions. Voltage measurement must be made with throttle position sensor installed in vehicle.												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">DATA MONITOR</th> </tr> <tr> <th style="text-align: center;">MONITOR</th> <th style="text-align: center;">NO DTC</th> </tr> </thead> <tbody> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>COOLAN TEMP/S</td> <td>XXX °C</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm	COOLAN TEMP/S	XXX °C	THRTL POS SEN	XXX V
DATA MONITOR												
MONITOR	NO DTC											
ENG SPEED	XXX rpm											
COOLAN TEMP/S	XXX °C											
THRTL POS SEN	XXX V											
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Throttle valve conditions</th> <th style="text-align: center;">THRTL POS SEN</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Completely closed (a)</td> <td style="text-align: center;">0.15 - 0.85V</td> </tr> <tr> <td style="text-align: center;">Partially open</td> <td style="text-align: center;">Between (a) and (b)</td> </tr> <tr> <td style="text-align: center;">Completely open (b)</td> <td style="text-align: center;">3.5 - 4.7V</td> </tr> </tbody> </table>			Throttle valve conditions	THRTL POS SEN	Completely closed (a)	0.15 - 0.85V	Partially open	Between (a) and (b)	Completely open (b)	3.5 - 4.7V		
Throttle valve conditions	THRTL POS SEN											
Completely closed (a)	0.15 - 0.85V											
Partially open	Between (a) and (b)											
Completely open (b)	3.5 - 4.7V											
SEF062Y												
OK or NG												
OK	▶	GO TO 12.										
NG	▶	GO TO 11.										

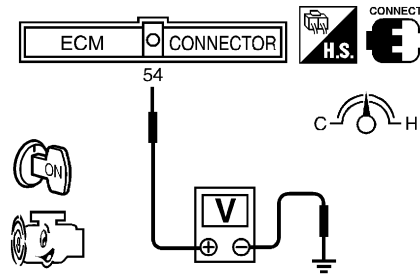
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10	CHECK THROTTLE POSITION SENSOR									
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine (ignition switch OFF). 3. Turn ignition switch ON. 4. Check voltage between ECM terminal 23 (Throttle position sensor signal) and ground. <p style="text-align: center;">Voltage measurement must be made with throttle position sensor installed in vehicle.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Throttle valve conditions</th> <th style="text-align: center;">Voltage</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Completely closed (a)</td> <td style="text-align: center;">0.15 - 0.85V</td> </tr> <tr> <td style="text-align: center;">Partially open</td> <td style="text-align: center;">Between (a) and (b)</td> </tr> <tr> <td style="text-align: center;">Completely open (b)</td> <td style="text-align: center;">3.5 - 4.7V</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">MTBL0231</p> <p style="text-align: center;">OK or NG</p>			Throttle valve conditions	Voltage	Completely closed (a)	0.15 - 0.85V	Partially open	Between (a) and (b)	Completely open (b)	3.5 - 4.7V
Throttle valve conditions	Voltage									
Completely closed (a)	0.15 - 0.85V									
Partially open	Between (a) and (b)									
Completely open (b)	3.5 - 4.7V									
OK	▶	GO TO 12.								
NG	▶	GO TO 11.								

11	ADJUST CLOSED THROTTLE POSITION SWITCH											
<p>Adjust closed throttle position switch. Refer to "Basic Inspection", EC-1273.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Items</th> <th style="text-align: center;">Specifications</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Ignition timing</td> <td style="text-align: center;">10° ± 2° BTDC</td> </tr> <tr> <td style="text-align: center;">Base idle speed</td> <td style="text-align: center;">700 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td style="text-align: center;">Closed throttle position switch idle position adjustment</td> <td style="text-align: center;">Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF</td> </tr> <tr> <td style="text-align: center;">Target idle speed</td> <td style="text-align: center;">750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">MTBL0576</p> <p style="text-align: center;">OK or NG</p>			Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
Items	Specifications											
Ignition timing	10° ± 2° BTDC											
Base idle speed	700 ± 50 rpm (in "P" or "N" position)											
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF											
Target idle speed	750 ± 50 rpm (in "P" or "N" position)											
OK	▶	GO TO 12.										
NG	▶	Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-1273.										

12 CHECK MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.



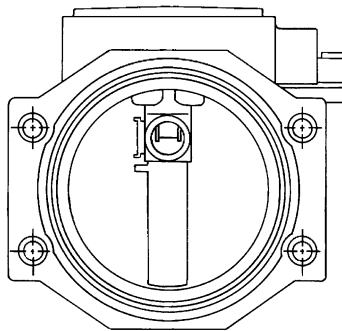
SEF747U

Condition	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.3
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0

*Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.

LEC102A

4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Then repeat above check.
5. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.


OK or NG

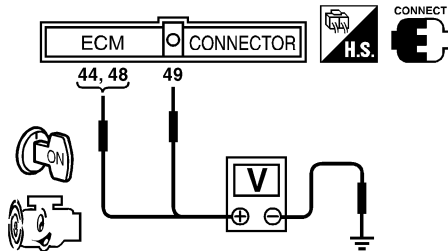
SEF030T

OK	▶	GO TO 13.
NG	▶	Replace mass air flow sensor.

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13 CHECK CAMSHAFT POSITION SENSOR

1. Install any parts removed.
2. Start engine.
3. Check voltage between ECM terminals 44, 48 and ground, ECM terminal 49 and ground with DC range.



Terminal 44 or 48 and engine ground

Condition	Idle	2,000 rpm
Voltage	0.3 - 0.5V	0.3 - 0.5V
Pulse signal		

Terminal 49 and engine ground

Condition	Idle	2,000 rpm
Voltage	Approximately 2.5V	Approximately 2.5V
Pulse signal		

AEC072B

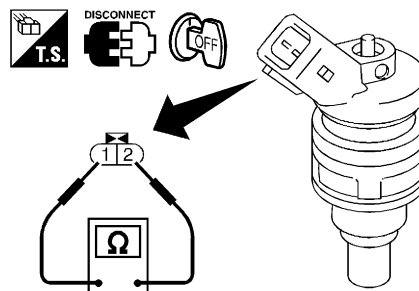
OK or NG

OK ► GO TO 14.

NG ► Replace distributor assembly with camshaft position sensor.

14 CHECK FUEL INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.



Resistance: 10 - 14Ω [at 25°C (77°F)]

SEF625V

OK or NG

OK ► GO TO 15.

NG ► Replace fuel injector.

DTC P0121, P0122, P0123 TP SENSOR

VG33ER

Diagnostic Procedure (Cont'd)

15	CHECK THROTTLE POSITION SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT (IF EQUIPPED)	
	<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect joint connector-2.</p> <p>3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector-2 terminal 1 and ground ● Joint connector-2 (Refer to EL-250, "HARNESS LAYOUT".) Continuity should exist. <p>4. Also check harness for short to power.</p> <p>5. Then reconnect joint connector-2.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶	GO TO 16.
NG	▶	Repair open circuit or short to power in harness or connectors.

16	CHECK INTERMITTENT INCIDENT	
	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.	
	▶	INSPECTION END

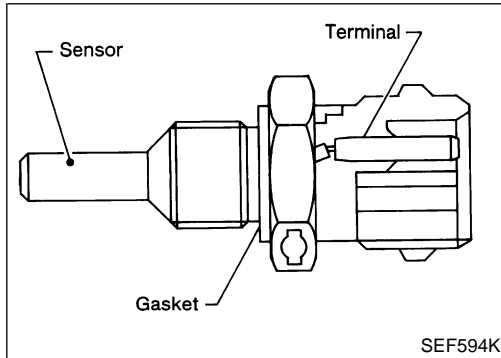
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Description

NGEC1135

NOTE:

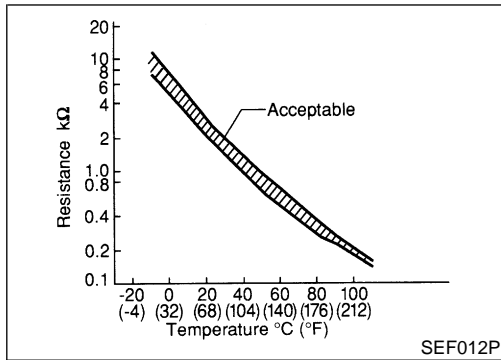
If DTC P0125 is displayed with P0117, P0118, first perform the trouble diagnosis for DTC P0117, P0118. Refer to EC-1348.



COMPONENT DESCRIPTION

NGEC1135S01

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	9.2
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 59 (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 the ECM terminals, such as the ground.

On Board Diagnosis Logic

NGEC1136

Malfunction is detected when voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine, or engine coolant temperature is insufficient for closed loop fuel control.

POSSIBLE CAUSE

NGEC1136S01

- Harness or connectors (High resistance in the circuit)
- Engine coolant temperature sensor
- Thermostat

4	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C

SEF174Y

DTC Confirmation Procedure

CAUTION:

Be careful not to overheat engine.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Check that "COOLAN TEMP/S" is above 10°C (50°F).
If it is above 10°C (50°F), the test result will be OK.
If it is below 10°C (50°F), go to following step.
- 4) Start engine and run it for 65 minutes at idle speed.
If "COOLAN TEMP/S" increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1369.

With GST

Follow the procedure "With CONSULT-II".

GI

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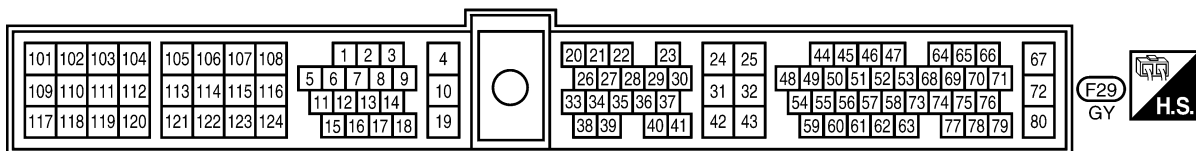
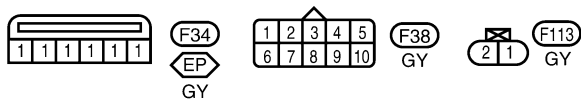
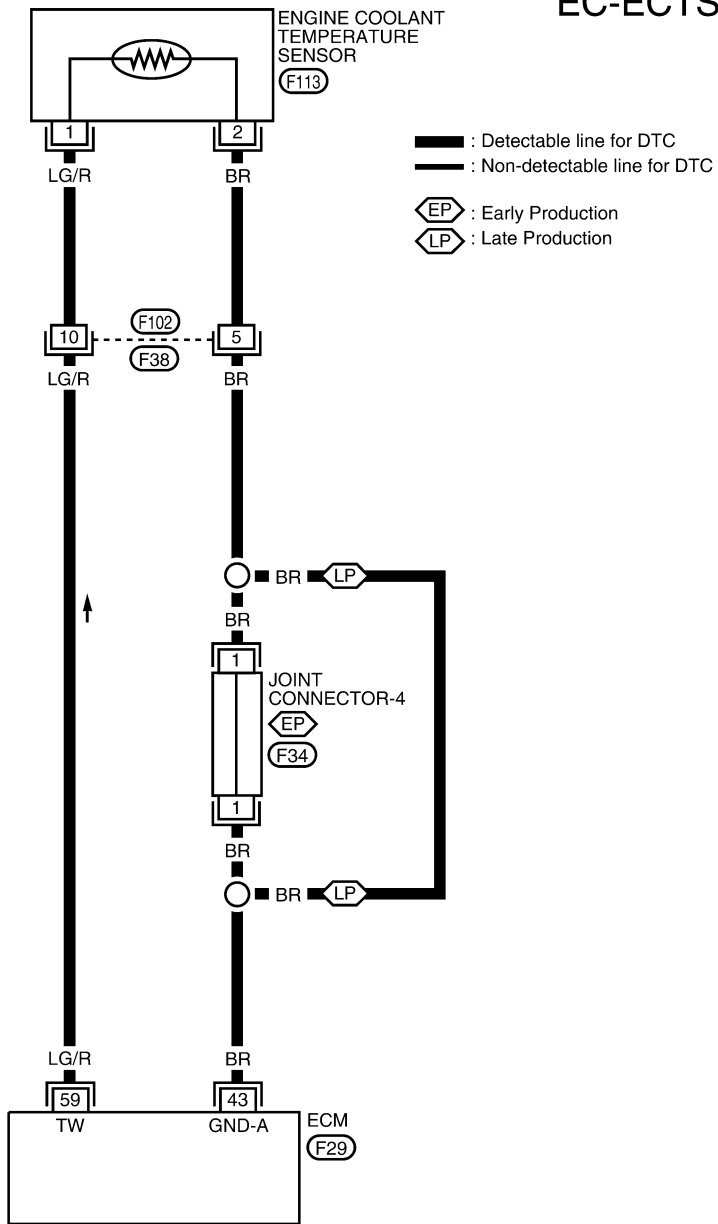
EL

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Wiring Diagram

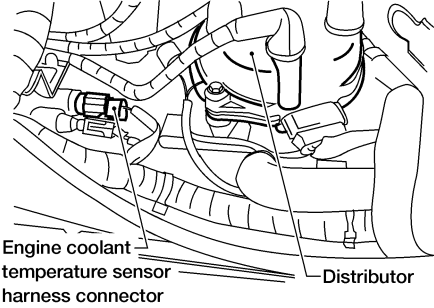
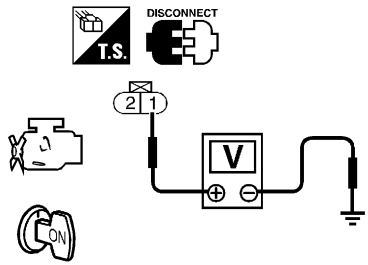
NGEC1138

EC-ECTS-01



Diagnostic Procedure

NGE1139

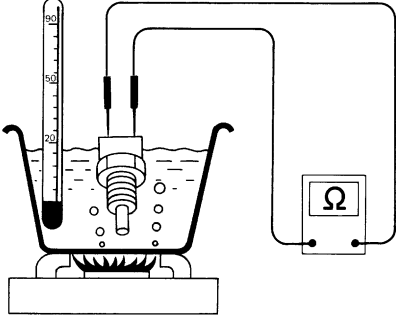
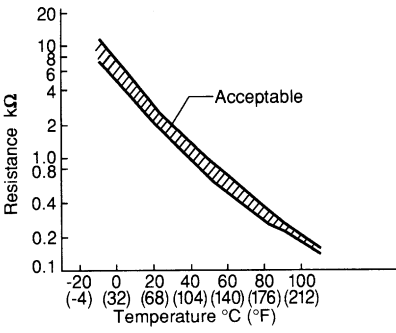
1	CHECK ECTS POWER SUPPLY CIRCUIT		
		1. Turn ignition switch OFF. 2. Disconnect engine coolant temperature sensor harness connector.	
		 <p>Engine coolant temperature sensor harness connector Distributor</p>	
		3. Turn ignition switch ON. 4. Check voltage between ECTS terminal 1 and ground with CONSULT-II or tester.	AEC643A
			SEF206W
		Voltage: Approximately 5V	
		OK or NG	
	OK	▶	GO TO 3.
	NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART		
		Check the following. <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Harness for open or short between ECM and engine coolant temperature sensor 	
		▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK ECTS GROUND CIRCUIT FOR OPEN AND SHORT		
		1. Turn ignition switch OFF. 2. Check harness continuity between ECTS terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist.	
		3. Also check harness for short to power.	
		OK or NG	
	OK	▶	GO TO 5.
	NG	▶	GO TO 4.

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4	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Joint connector-4 (if equipped) ● Harness for open or short between ECM and engine coolant temperature sensor 	
▶	Repair open circuit or short to power in harness or connectors.

5	CHECK ENGINE COOLANT TEMPERATURE SENSOR								
Check resistance as shown in the figure.									
									
<p><Reference data></p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Temperature °C (°F)</th> <th style="text-align: center;">Resistance kΩ</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">20 (68)</td> <td style="text-align: center;">2.1 - 2.9</td> </tr> <tr> <td style="text-align: center;">50 (122)</td> <td style="text-align: center;">0.68 - 1.00</td> </tr> <tr> <td style="text-align: center;">90 (194)</td> <td style="text-align: center;">0.236 - 0.260</td> </tr> </tbody> </table>		Temperature °C (°F)	Resistance kΩ	20 (68)	2.1 - 2.9	50 (122)	0.68 - 1.00	90 (194)	0.236 - 0.260
Temperature °C (°F)	Resistance kΩ								
20 (68)	2.1 - 2.9								
50 (122)	0.68 - 1.00								
90 (194)	0.236 - 0.260								
SEF152P									
MTBL0229									
									
SEF012P									
OK or NG									
OK	▶ GO TO 6.								
NG	▶ Replace engine coolant temperature sensor.								

6	CHECK THERMOSTAT OPERATION
When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine coolant does not flow.	
OK or NG	
OK	▶ GO TO 7.
NG	▶ Repair or replace thermostat. Refer to LC-13 , "Thermostat".

DTC P0125 ECT SENSOR

VG33ER

Diagnostic Procedure (Cont'd)

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.	
▶	INSPECTION END

GI

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EM

LC

EC

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MT

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PD

AX

SU

BR

ST

RS

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HA

SC

EL

IDX

On Board Diagnosis Logic

Engine coolant temperature has not risen enough to open the thermostat even though the engine has run long enough. NGEC1344

This is due to a leak in the seal or the thermostat open stuck. Malfunction is detected when the engine coolant temperature does not reach to specified temperature even though the engine has run long enough.

POSSIBLE CAUSE

- Thermostat function
- Leakage from sealing portion of thermostat
- Engine coolant temperature sensor

NGEC1344S01

DTC Confirmation Procedure

NGEC1345

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- For best results, perform at ambient temperature of -10°C (14°F) or higher.
- For best results, perform at engine coolant temperature of -10°C (14°F) to 70°C (158°F).

WITH CONSULT-II

- 1) Replace thermostat with new one. Refer to **LC-13**, "Thermostat". Use only a genuine NISSAN thermostat as a replacement. If an incorrect thermostat is used, the MIL may come on. NGEC1345S01
- 2) Turn ignition switch "ON".
- 3) Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
- 4) Check that the "COOLAN TEMP/S" is above 70°C (158°F).
If it is below 70°C (158°F), go to following step.
If it is above 70°C (158°F), stop engine and cool down the engine to less than 70°C (158°F), then retry from step 1.
- 5) Drive vehicle for 10 consecutive minutes under the following conditions.

VHCL SPEED SE	80 - 120 km/h (50 - 75 MPH)
---------------	-----------------------------

If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1373.

WITH GST

- 1) Follow the procedure "WITH CONSULT-II" above.

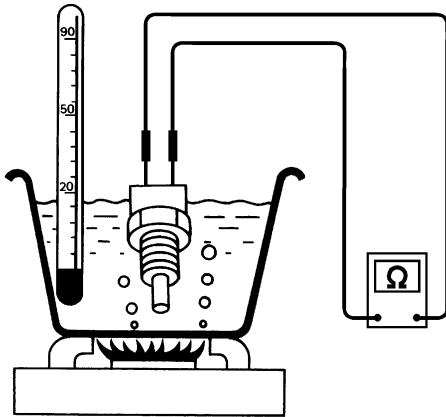
NGEC1345S02

Diagnostic Procedure

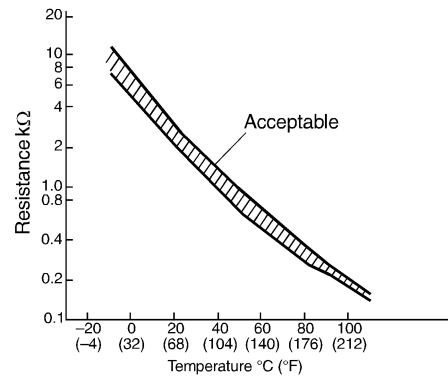
NGE1346

1 CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Remove engine coolant temperature sensor.
3. Check resistance between engine coolant temperature sensor terminals under the following conditions.


<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



SEF304X

OK or NG

OK


INSPECTION END

NG



Replace engine coolant temperature sensor.

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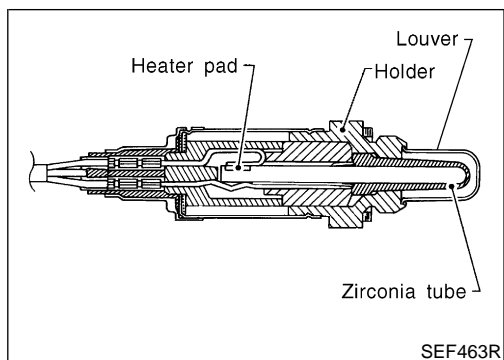
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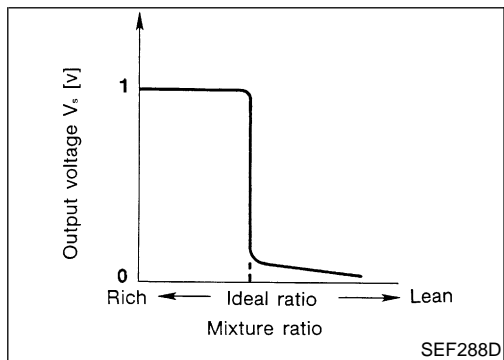
Component Description



Component Description

The heated oxygen sensor 1 is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

NGEC1170



CONSULT-II Reference Value in Data Monitor Mode

NGEC1171

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)	<ul style="list-style-type: none"> Engine: After warming up 	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

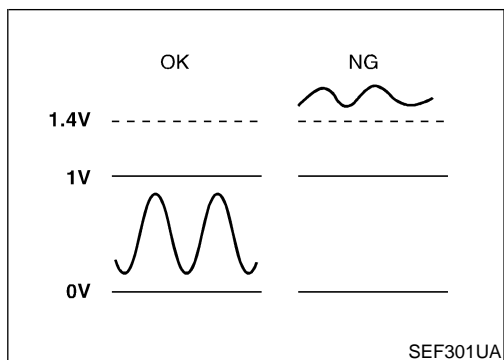
NGEC1172

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 the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (Bank 1)	[Engine is running] <ul style="list-style-type: none"> After warming up to normal operating temperature and engine speed is 2,000 rpm 	0 - Approximately 1.0V
51	G	Heated oxygen sensor 1 (Bank 2)		



On Board Diagnosis Logic

NGEC1173

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 output is not inordinately high. Malfunction is detected when an excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

NGEC1173S01

- Harness or connectors (The sensor circuit is open or shorted.)
- Heated oxygen sensor 1

5

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

SEF174Y

DTC Confirmation Procedure

NGEC1174

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 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 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Restart engine and let it idle for 25 seconds.
- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1378.

With GST

Follow the procedure "With CONSULT-II".

- **When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

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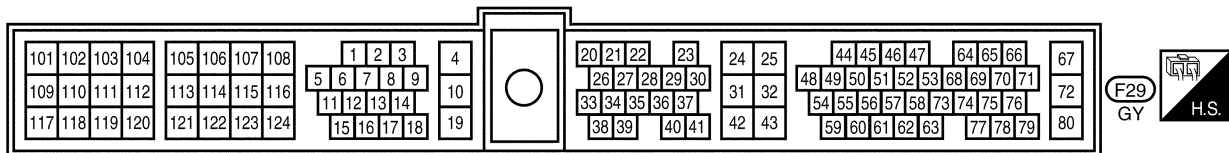
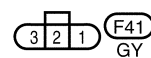
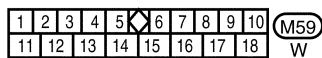
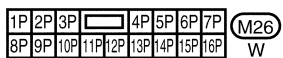
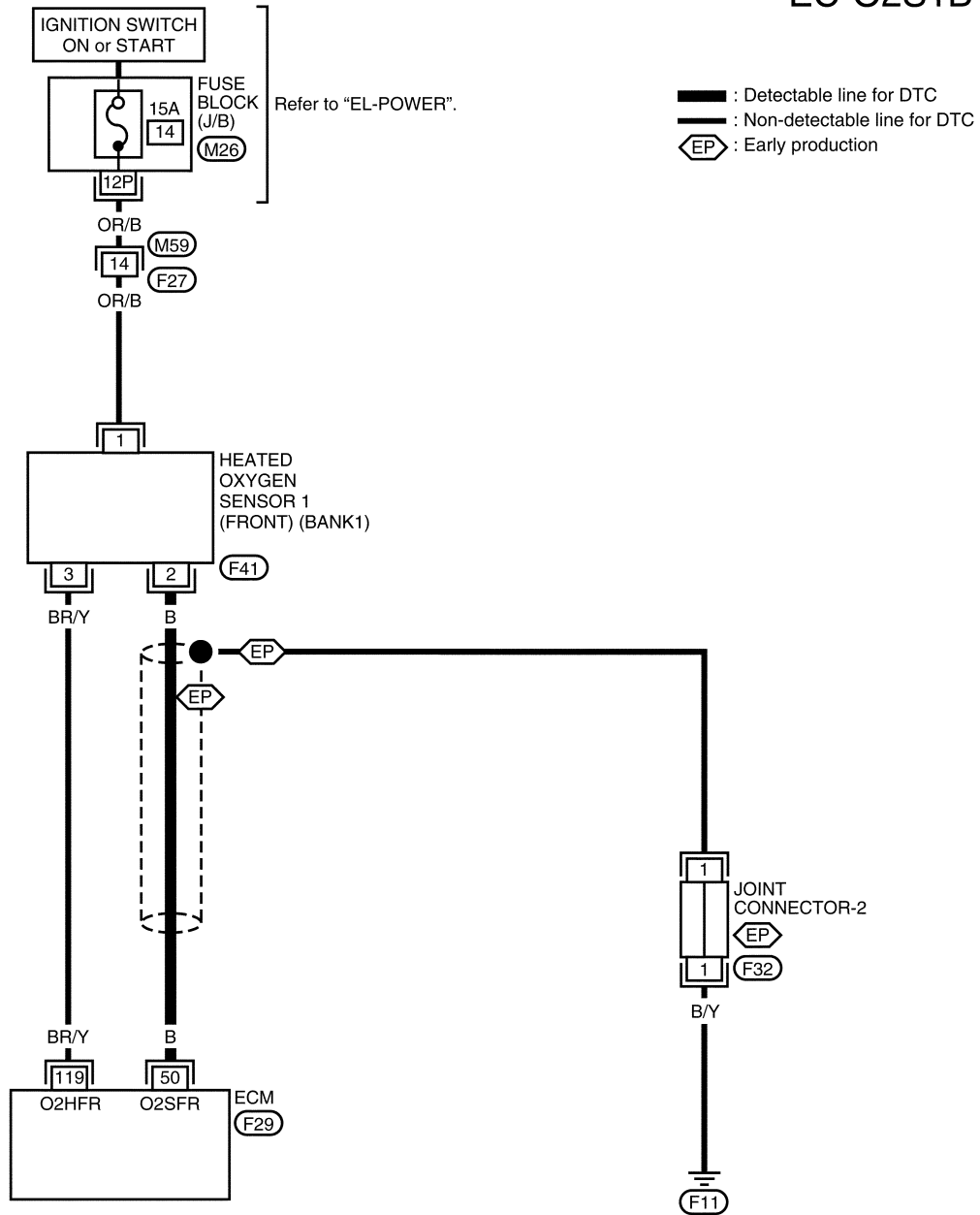
Wiring Diagram

NGEC1175

NGEC1175S01

RIGHT BANK

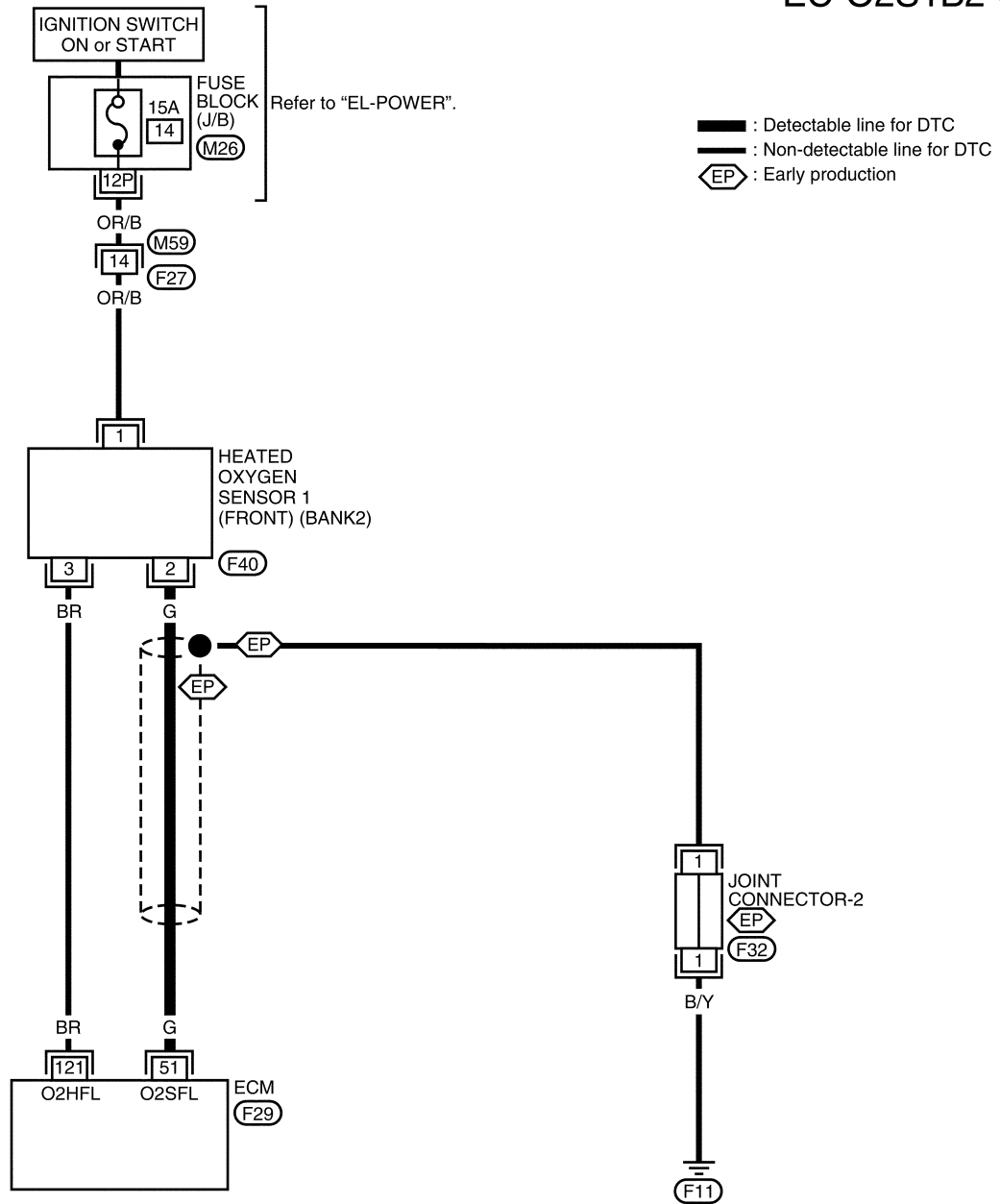
EC-O2S1B1-01



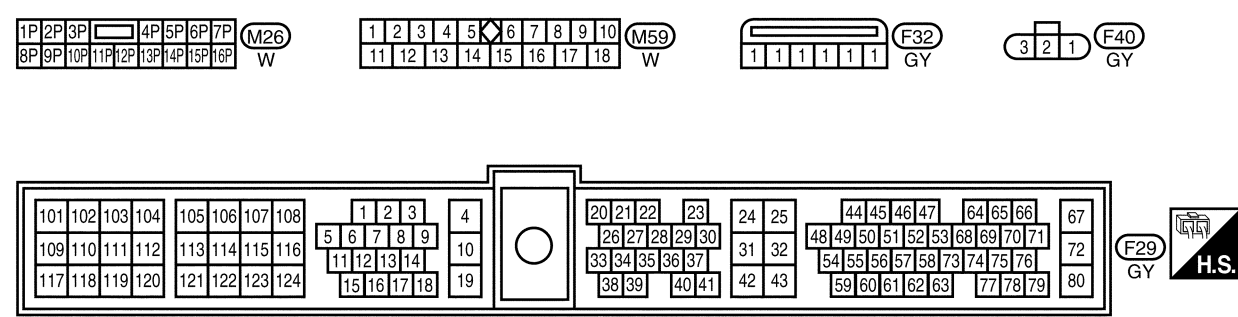
NGEC1175S02

LEFT BANK

EC-O2S1B2-01



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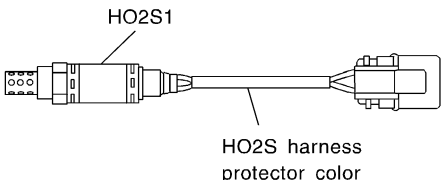
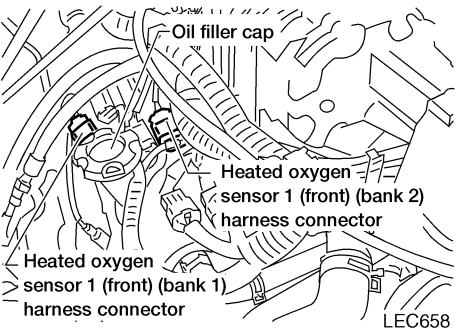


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WEC173A

Diagnostic Procedure

NGEC1176

1	INSPECTION START
<p>1. Turn ignition switch OFF. 2. Check heated oxygen sensor 1 harness protector.</p> <div style="text-align: center;">  <p>HO2S1 (bank 1): Black HO2S1 (bank 2): Blue</p> </div> <p>3. Disconnect corresponding heated oxygen sensor 1 harness connector.</p> <div style="text-align: center;">  <p>Oil filler cap Heated oxygen sensor 1 (front) (bank 2) harness connector Heated oxygen sensor 1 (front) (bank 1) harness connector</p> </div>	
SEF505YB	
LEC658	
▶	GO TO 2.

2	RETIGHTEN HEATED OXYGEN SENSOR 1
<p>1. Loosen and retighten corresponding heated oxygen sensor 1. Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg·m, 30 - 44 ft·lb)</p>	
▶	GO TO 3.

3	CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT															
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0132</td> <td style="text-align: center;">50</td> <td style="text-align: center;">2</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0152</td> <td style="text-align: center;">51</td> <td style="text-align: center;">2</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM	Sensor	P0132	50	2	Bank 1 (Right)	P0152	51	2	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM	Sensor														
P0132	50	2	Bank 1 (Right)													
P0152	51	2	Bank 2 (Left)													
SEC656C																
<p>Continuity should exist.</p> <p>3. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM or sensor</th> <th>Ground</th> </tr> </thead> <tbody> <tr> <td>P0132</td> <td style="text-align: center;">50 or 2</td> <td style="text-align: center;">Ground</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0152</td> <td style="text-align: center;">51 or 2</td> <td style="text-align: center;">Ground</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM or sensor	Ground	P0132	50 or 2	Ground	Bank 1 (Right)	P0152	51 or 2	Ground	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM or sensor	Ground														
P0132	50 or 2	Ground	Bank 1 (Right)													
P0152	51 or 2	Ground	Bank 2 (Left)													
SEC657C																
<p>Continuity should not exist.</p> <p>4. Also check harness for short to power.</p>																
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 FRONT HO2S1 CONNECTOR FOR WATER	
<p>1. Disconnect heated oxygen sensor 1 harness connector. 2. Check connectors for water. Water should not exist.</p>		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Repair or replace harness or connectors.

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5 CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode with CONSULT-II, and select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

5. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown left:

Bank 1
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

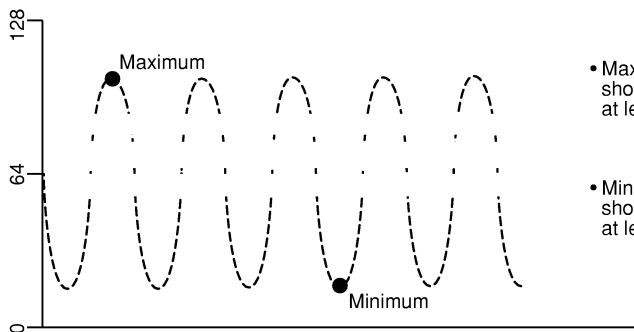
Bank 2
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

R means HO2S1
 MNTR (B1)/(B2) indicates RICH
 L means HO2S1
 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
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	XXX	XXX
	XXX	XXX
	XXX	XXX



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

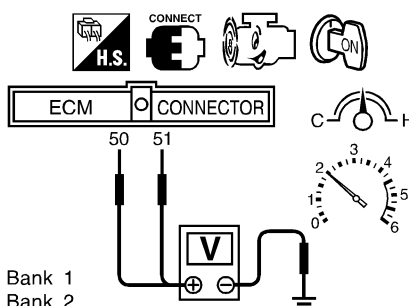
SEF648Y

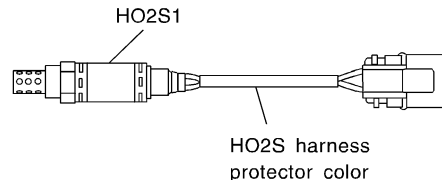
CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

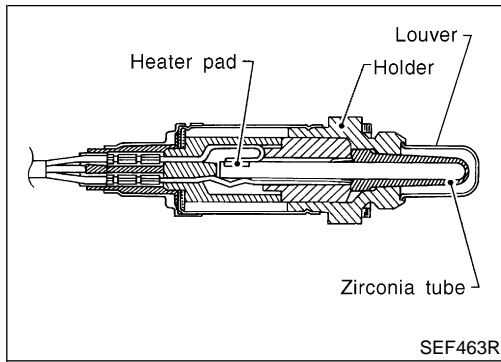
6	CHECK HEATED OXYGEN SENSOR 1
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground. Check the following with engine speed held at 2,000 rpm constant under no load. 	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  </div> <div style="width: 50%;"> <ul style="list-style-type: none"> • The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least one time. • The minimum voltage is below 0.3V at least one time. • The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>	
SEF796Z	
<p>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.</p>	
OK or NG	
OK	▶ GO TO 8.
NG	▶ GO TO 7.

7	REPLACE HEATED OXYGEN SENSOR 1
<ol style="list-style-type: none"> Turn ignition switch "OFF". Check heated oxygen sensor 1 harness protector color. 	
	
<p>HO2S1 (bank 1): Black HO2S1 (bank 2): Blue</p>	
SEF505YB	
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 1.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.	
▶	INSPECTION END

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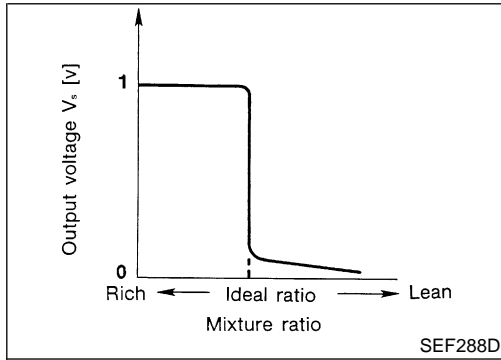
Component Description



Component Description

The heated oxygen sensor 1 is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

NGEC1162



CONSULT-II Reference Value in Data Monitor Mode

NGEC1163

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)	<ul style="list-style-type: none"> Engine: After warming up 	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

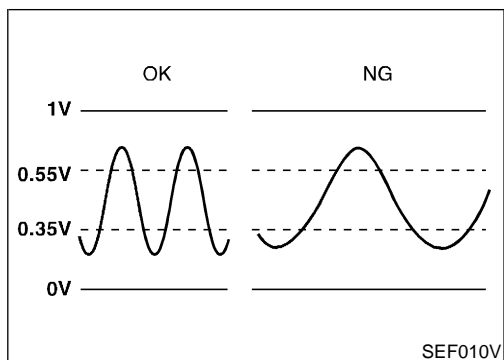
NGEC1164

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 the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (Bank 1)	[Engine is running] <ul style="list-style-type: none"> After warming up to normal operating temperature and engine speed is 2,000 rpm 	0 - Approximately 1.0V
51	G	Heated oxygen sensor 1 (Bank 2)		



On Board Diagnosis Logic

NGEC1165

To judge the malfunction of heated oxygen sensor 1, this diagnosis measures response time of heated oxygen sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and heated oxygen sensor 1 temperature index. Judgment is based on whether the compensated time (heated oxygen sensor 1 cycling time index) is inordinately long or not.

Malfunction is detected when the response of the voltage signal from the sensor takes more than the specified time.

POSSIBLE CAUSE

NGEC1165S01

- Harness or connectors
(The sensor circuit is open or shorted.)
- Heated oxygen sensor 1
- Heated oxygen sensor 1 heater
- Fuel pressure
- Injectors
- Intake air leaks
- Exhaust gas leaks
- PCV valve
- Mass air flow sensor

DTC Confirmation Procedure

NGEC1166

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 5 seconds before conducting the next test.

TESTING CONDITION:

- Always perform at a temperature above -10°C (14°F).
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

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HO2S1 (B1) P0133	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

SEF338Z

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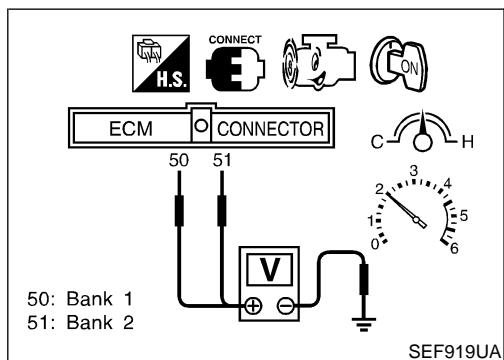
HO2S1 (B1) P0133	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

SEF339Z

6

HO2S1 (B1) P0133	
COMPLETED	

SEF658Y



With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Stop engine and wait at least 5 seconds.
- 3) Turn ignition switch ON and select "HO2S1 (B1)/(B2) P0133/P0153" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 4) Touch "START".
- 5) Start engine and let it idle for at least 3.5 minutes.

NOTE:

Never raise engine speed above 2,800 rpm after this step. If the engine speed limit is exceeded, return to step 5.

- 6) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 40 to 50 seconds.)

ENG SPEED	1,700 - 2,800 rpm
Vehicle speed	More than 80 km/h (50 MPH)
B/FUEL SCHDL	2.0 - 14.0 msec
Selector lever	Suitable position

If "TESTING" is not displayed after 5 minutes, retry from step 2.

- 7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-1387.

Overall Function Check

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
 - 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
 - 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
- 4) If NG, go to "Diagnostic Procedure", EC-1387.

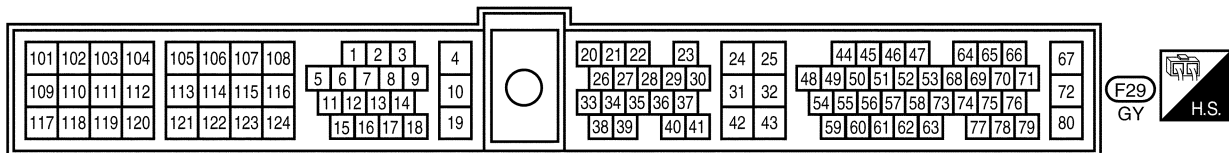
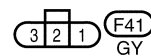
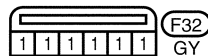
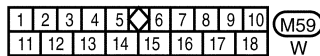
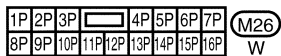
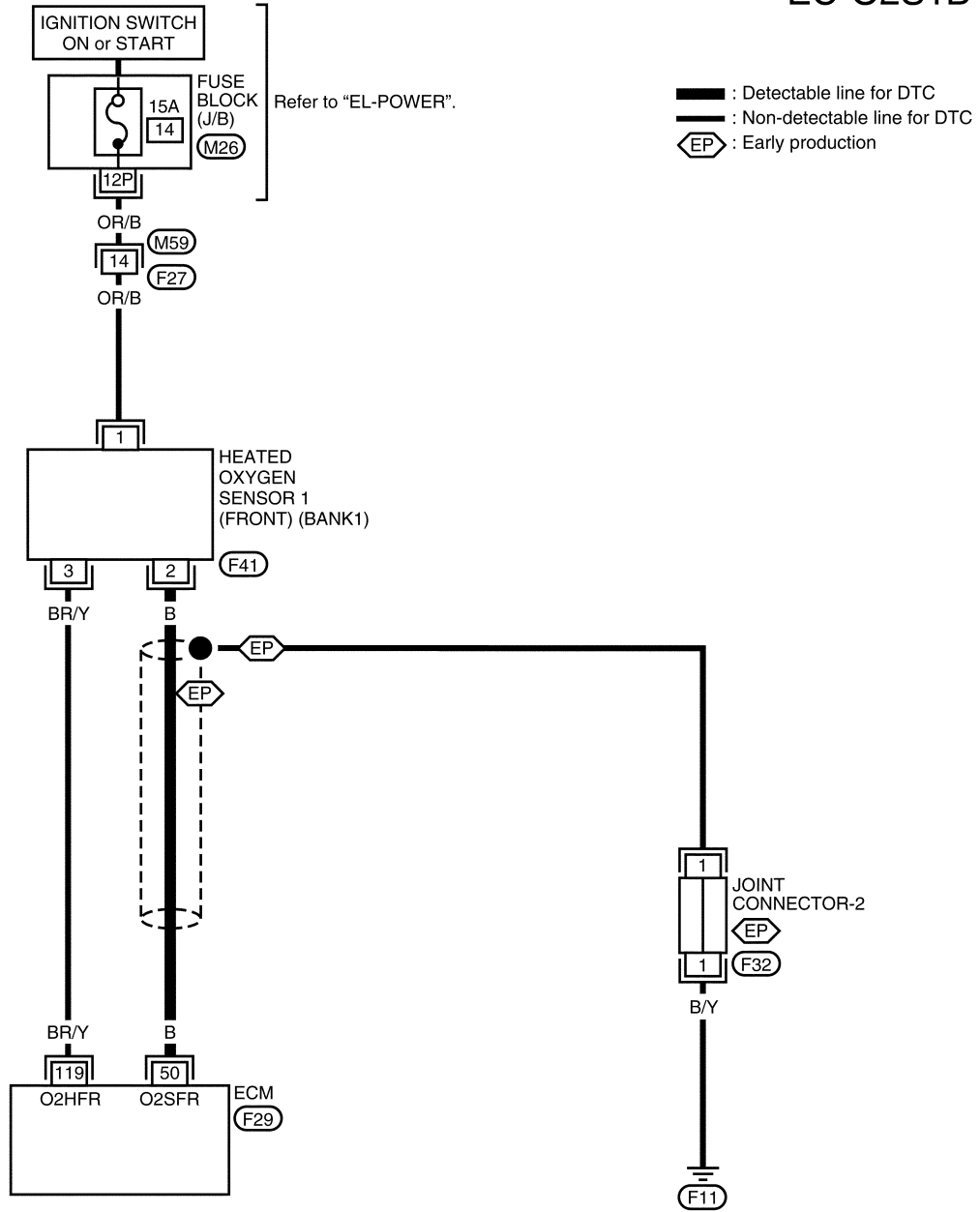
Wiring Diagram

NGEC1168

NGEC1168S01

RIGHT BANK

EC-O2S1B1-01



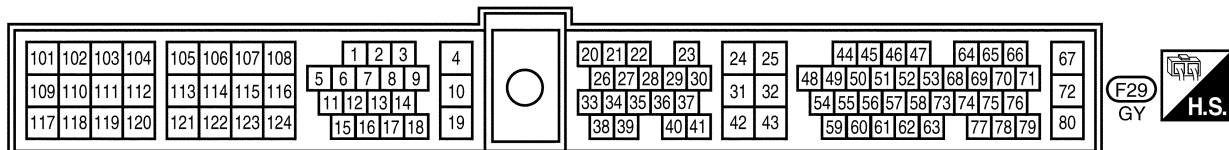
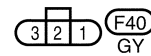
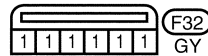
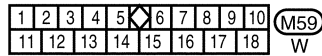
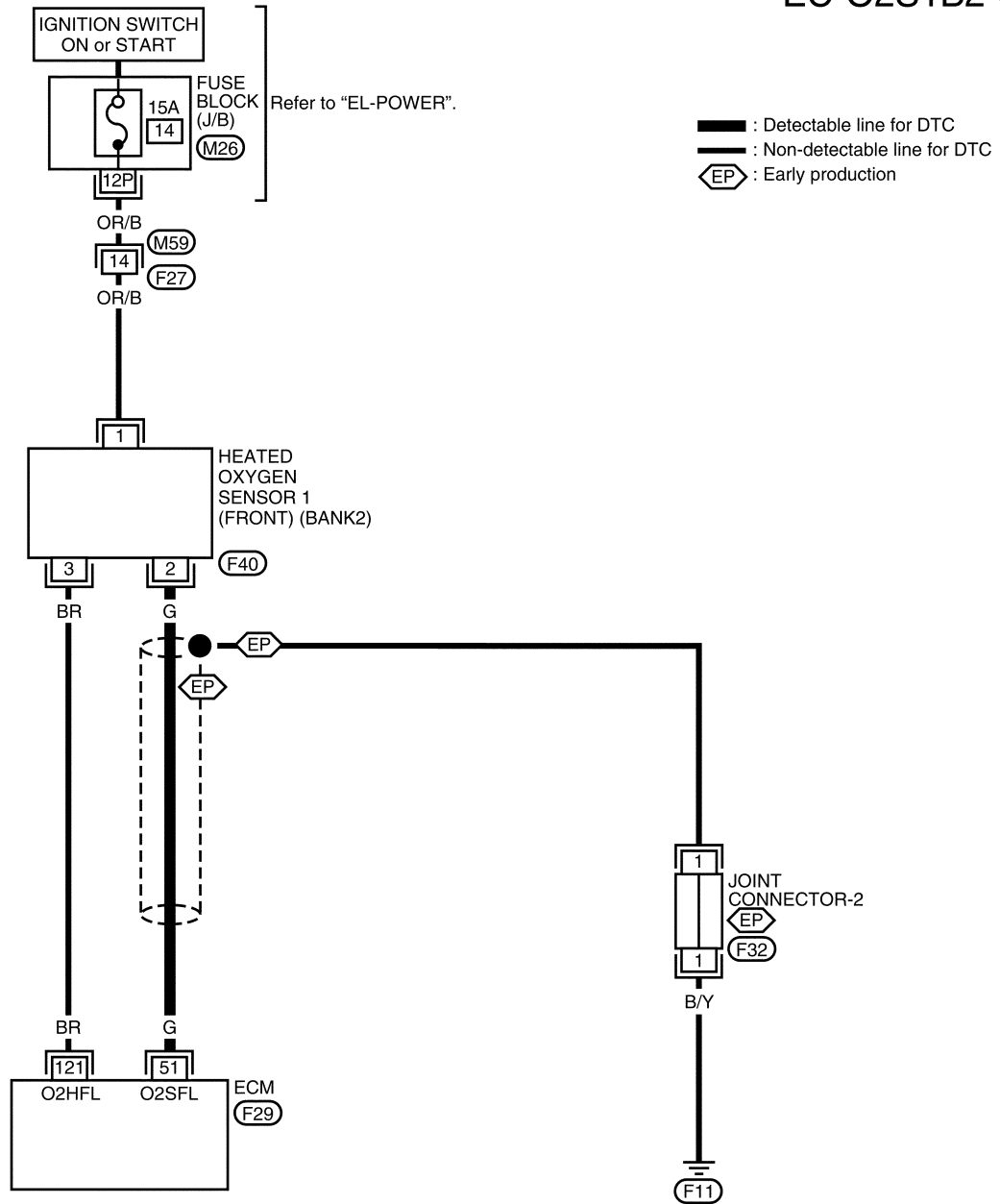
WEC172A

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LEFT BANK

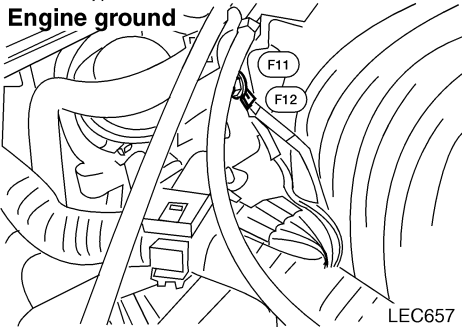
NGEC1168S02

EC-O2S1B2-01



Diagnostic Procedure

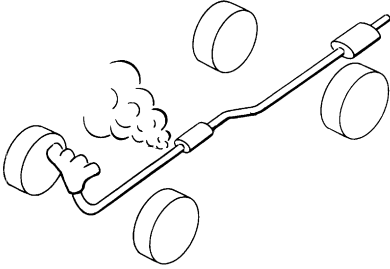
NGEC1169

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p>	
	
LEC657	
▶ GO TO 2.	

GI
MA
EM
LC
EC

2	RETIGHTEN HEATED OXYGEN SENSOR 1
<p>Loosen and retighten corresponding heated oxygen sensor 1. Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg·m, 30 - 44 ft·lb)</p>	
▶ GO TO 3.	

FE
CL
MT
AT

3	CHECK FOR EXHAUST AIR LEAK						
<p>1. Start engine and run it at idle. 2. Listen for an exhaust air leak before three way catalyst.</p>							
							
OK or NG							
<table border="0" style="width: 100%;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 4.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Repair or replace.</td> </tr> </table>		OK	▶	GO TO 4.	NG	▶	Repair or replace.
OK	▶	GO TO 4.					
NG	▶	Repair or replace.					

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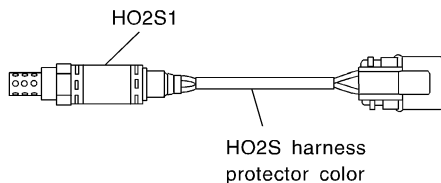
4	CHECK FOR INTAKE AIR LEAK						
<p>Listen for an intake air leak after the mass air flow sensor.</p>							
OK or NG							
<table border="0" style="width: 100%;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 5.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Repair or replace.</td> </tr> </table>		OK	▶	GO TO 5.	NG	▶	Repair or replace.
OK	▶	GO TO 5.					
NG	▶	Repair or replace.					

BT
HA
SC
EL

5	CLEAR THE SELF-LEARNING DATA									
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II. Clear the self-learning control coefficient by touching "CLEAR". <div style="text-align: center; margin: 10px 0;"> <table border="1" style="border-collapse: collapse;"> <tr> <th colspan="2" style="padding: 2px;">WORK SUPPORT</th> </tr> <tr> <td style="padding: 2px;">SELF-LEARNING CONT</td> <td style="padding: 2px;">CLEAR</td> </tr> <tr> <td style="padding: 2px;"></td> <td style="padding: 2px;">B1 100 %</td> </tr> <tr> <td style="padding: 2px;"></td> <td style="padding: 2px;">B2 100 %</td> </tr> </table> </div> <p style="text-align: right; margin-top: 10px;">SEF968Y</p> <ol style="list-style-type: none"> 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? 			WORK SUPPORT		SELF-LEARNING CONT	CLEAR		B1 100 %		B2 100 %
WORK SUPPORT										
SELF-LEARNING CONT	CLEAR									
	B1 100 %									
	B2 100 %									
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Turn ignition switch OFF. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed. Stop engine and reconnect mass air flow sensor harness connector. Make sure 1st trip DTC P0102 is displayed. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-1246. Make sure DTC P0000 is displayed. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine? <p style="text-align: center;">Yes or No</p>										
Yes	▶	Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-1427, 1436.								
No	▶	GO TO 6.								

6 CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

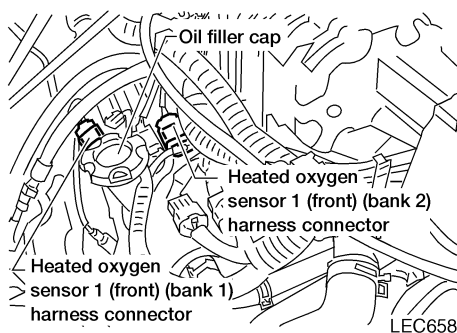
1. Turn ignition switch OFF.
2. Check heated oxygen sensor 1 harness protector.



HO2S1 (bank 1): Black
 HO2S1 (bank 2): Blue

SEF505YB

3. Disconnect corresponding heated oxygen sensor 1 harness connector.



LEC658

4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0133	50	2	Bank 1 (Right)
P0153	51	2	Bank 2 (Left)

MTBL0587

Continuity should exist.

6. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0133	50 or 2	Ground	Bank 1 (Right)
P0153	51 or 2	Ground	Bank 2 (Left)

MTBL0588




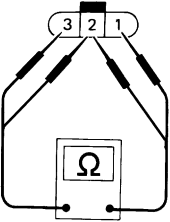
Continuity should not exist.

7. Also check harness for short to power.

OK or NG

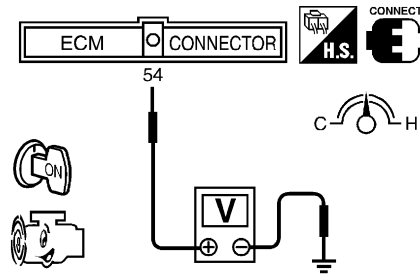
OK	▶	GO TO 7.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

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7	CHECK HEATED OXYGEN SENSOR 1 HEATER	
<p>Check resistance between HO2S1 terminals 3 and 1.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">    </div> <div style="text-align: center;">  </div> </div> <p style="text-align: right;">AEC158A</p> <p>Resistance: 2.3 - 4.3Ω at 25°C (77°F)</p> <p>Check continuity between HO2S1 terminals 2 and 1, 3 and 2.</p> <p>Continuity should not exist.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. ● Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant. <p style="text-align: center;">OK or NG</p>		
OK	▶▶	GO TO 8.
NG	▶▶	GO TO 12.

8 CHECK MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.

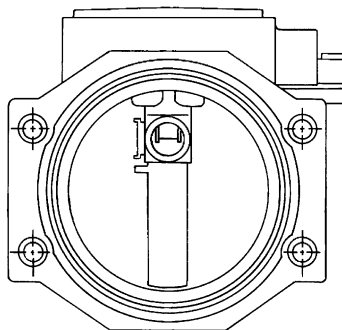


SEF747U

Condition	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.3
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0

MTBL0227

4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Then repeat above check.
5. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.



SEF030T

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace mass air flow sensor.

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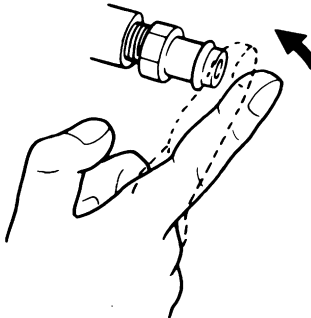
BT

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IDX

9	CHECK PCV VALVE	
<p>With engine running at idle, remove PCV valve from rocker cover; make sure that a hissing noise will be heard as air passes through it and a strong vacuum should be felt immediately when a finger is placed over valve inlet.</p>		
		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 10.
OK (Without CONSULT-II)	▶	GO TO 11.
NG	▶	Replace PCV valve.

SEC137A

10 CHECK FRONT HEATED OXYGEN SENSOR

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode with CONSULT-II, and select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

5. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below.

Bank 1
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

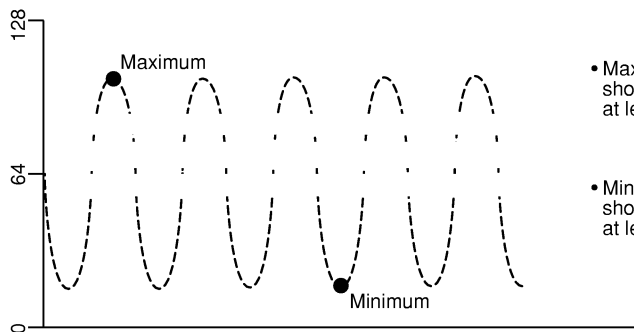
Bank 2
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

R means HO2S1
 MNTR (B1)/(B2) indicates RICH
 L means HO2S1
 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

SEF648Y

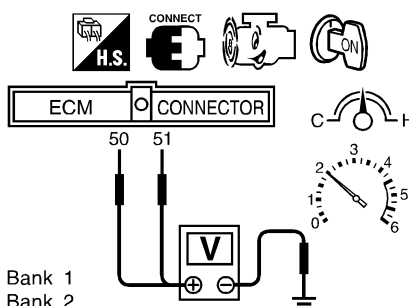
CAUTION:

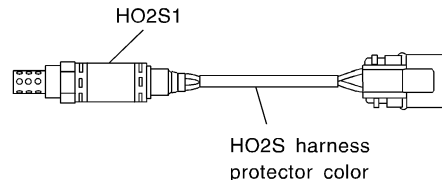
- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace malfunctioning heated oxygen sensor 1 (front).

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11	CHECK FRONT HEATED OXYGEN SENSOR 1
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground. Check the following with engine speed held at 2,000 rpm constant under no load. 	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  <p>50: Bank 1 51: Bank 2</p> </div> <div style="width: 50%;"> <ul style="list-style-type: none"> • The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least one time. • The minimum voltage is below 0.3V at least one time. • The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>	
SEF796Z	
<p>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.</p>	
OK or NG	
OK	▶ GO TO 13.
NG	▶ GO TO 12.

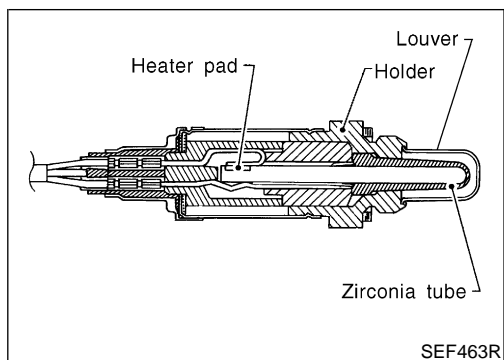
12	REPLACE HEATED OXYGEN SENSOR 1
<ol style="list-style-type: none"> Turn ignition switch "OFF". Check heated oxygen sensor 1 harness protector color. 	
	
<p>HO2S1 (bank 1): Black HO2S1 (bank 2): Blue</p>	
SEF505YB	
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 1.

13	CHECK HO2S1 SHIELD CIRCUIT FOR OPEN AND SHORT (IF EQUIPPED)	
<p>1. Turn ignition switch OFF. 2. Disconnect joint connector. 3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to EL-250, "HARNESS LAYOUT".) Continuity should exist. <p>4. Also check harness for short to power. 5. Then reconnect joint connector.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 14.
NG	▶	Repair open circuit or short to power in harness or connectors.

14	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.		
	▶	INSPECTION END

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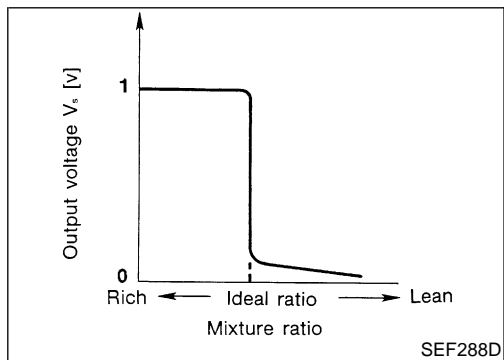
Component Description



Component Description

The heated oxygen sensor 1 is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

NGEC1140



CONSULT-II Reference Value in Data Monitor Mode

NGEC1141

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)	<ul style="list-style-type: none"> Engine: After warming up 	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NGEC1142

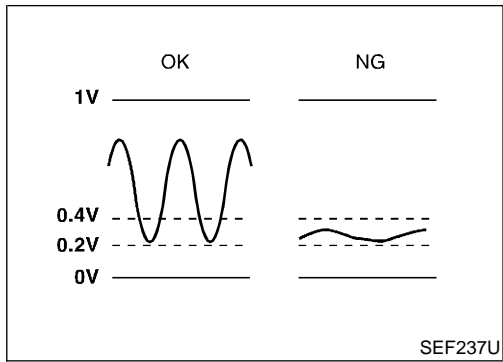
Specification data are reference values and are measured between each terminal and ground.

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 the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (bank 1)	[Engine is running] <ul style="list-style-type: none"> After warming up to normal operating temperature and engine speed is 2,000 rpm 	0 - Approximately 1.0V
51	G	Heated oxygen sensor 1 (bank 2)		

SEF002V



On Board Diagnosis Logic

NGEC1143

Under the condition in which the heated oxygen sensor 1 signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 mV range is monitored, and the diagnosis checks that this time is not inordinately long.

Malfunction is detected when the voltage from the sensor is constantly approx. 0.3V.

POSSIBLE CAUSE

NGEC1143S01

- Harness or connectors
(The sensor circuit is open or shorted.)
- Heated oxygen sensor 1

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5	HO2S1 (B1) P0134	
	OUT OF CONDITION	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SEN	XXX km/h

SEC701C

5	HO2S1 (B1) P0134	
	TESTING	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SEN	XXX km/h

SEC702C

5	HO2S1 (B1) P0134	
	COMPLETED	

SEC703C

DTC Confirmation Procedure

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 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

④ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Select “HO2S1 (B1)/(B2) P0134/P0154” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
- 3) Touch “START”.
- 4) Let it idle for at least 3.5 minutes.

NOTE:

Never raise engine speed above 2,800 rpm after this step. If the engine speed limit is exceeded, return to step 4.

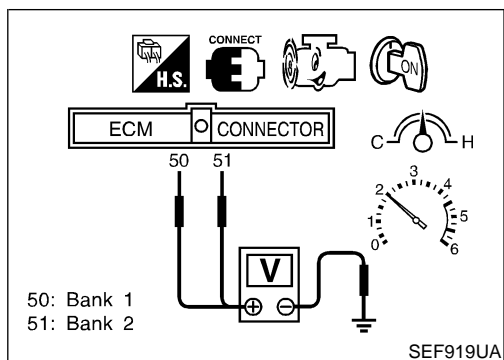
- 5) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 10 to 60 seconds.)

ENG SPEED	1,400 - 2,700 rpm
Vehicle speed	More than 65 km/h (40 MPH)
B/FUEL SCHDL	2.0 - 14.0 msec
Selector lever	Suitable position

If “TESTING” is not displayed after 5 minutes, retry from step 2.

- 6) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to “Diagnostic Procedure”, EC-1402.

During this test, P1148 and P1168 may be stored in ECM.



Overall Function Check

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed. =NGEC1145

⊗ Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no load.
 - The voltage does not remain in the range of 0.2 - 0.4V.
- 4) If NG, go to “Diagnostic Procedure”, EC-1402.

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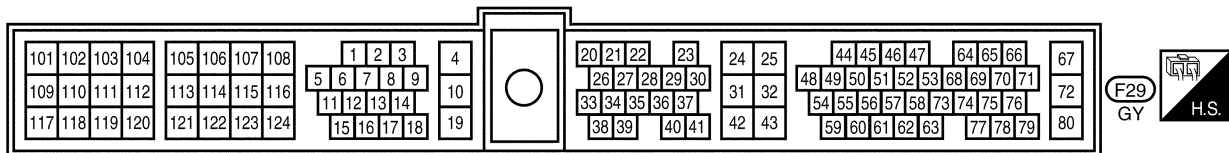
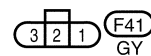
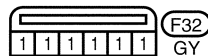
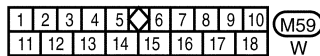
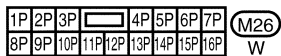
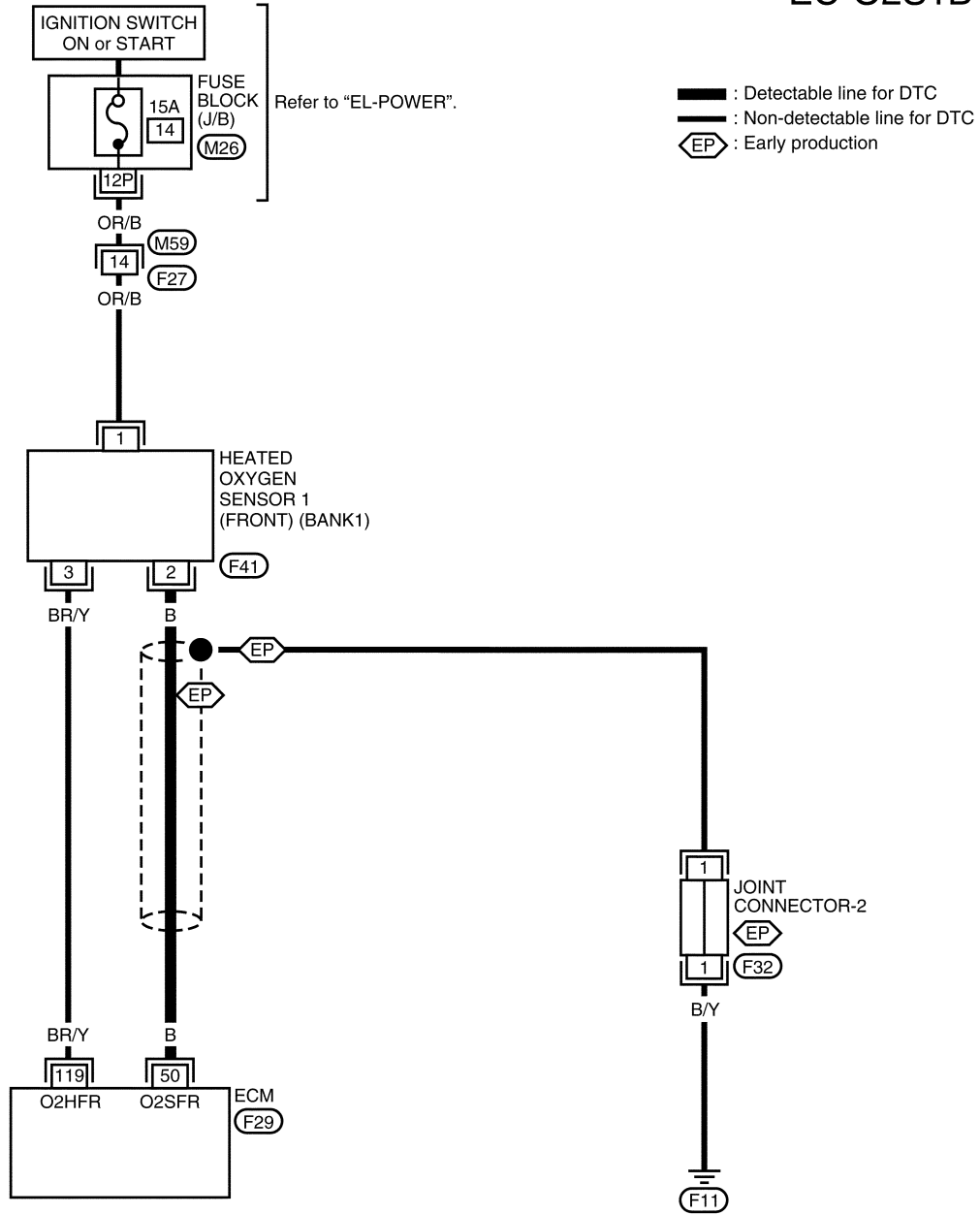
Wiring Diagram

NGEC1146

NGEC1146S01

RIGHT BANK

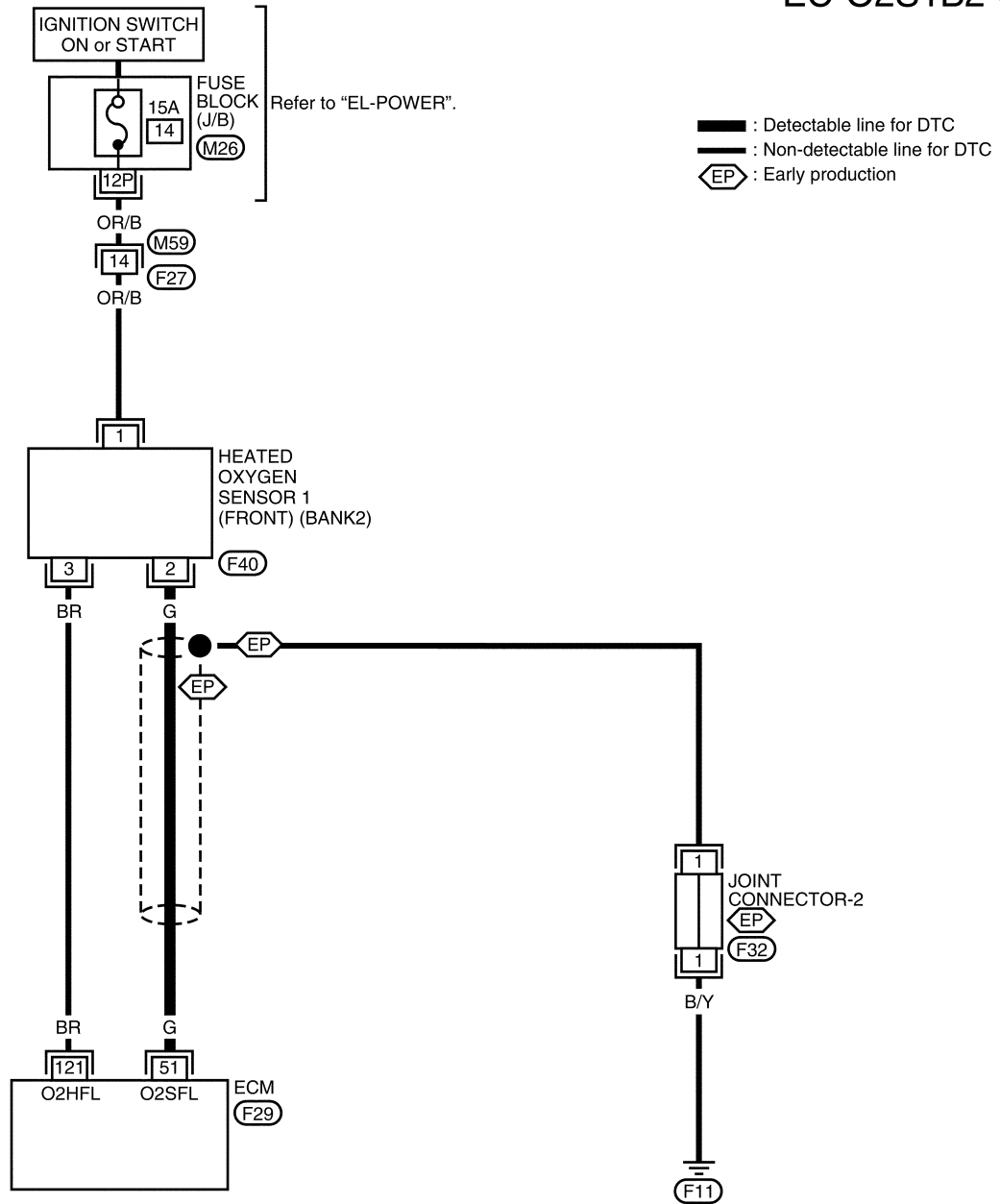
EC-O2S1B1-01



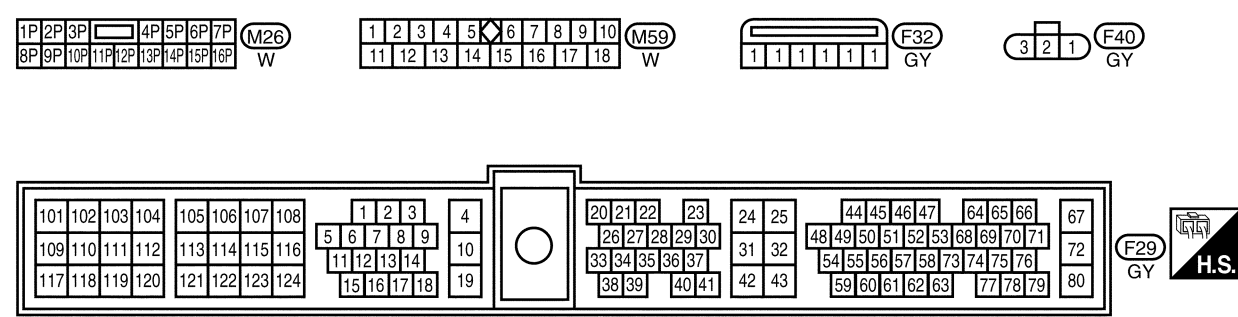
NGEC1146S02

LEFT BANK

EC-O2S1B2-01



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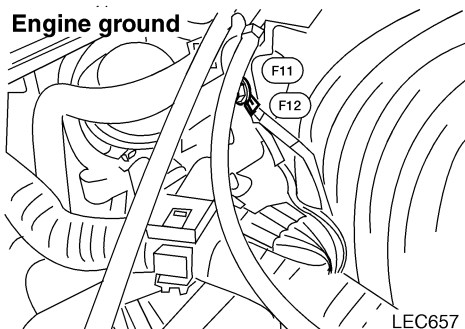
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Diagnostic Procedure

NGEC1147

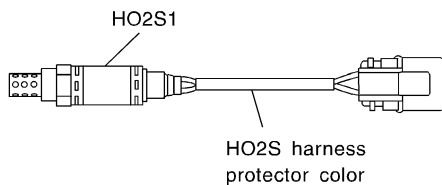
1 INSPECTION START

1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.



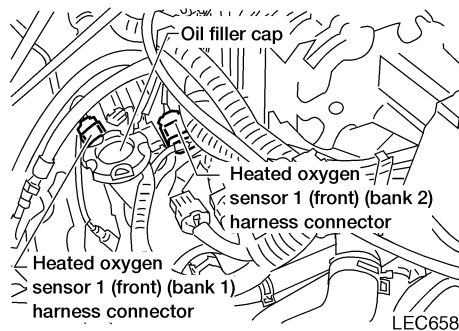
LEC657

3. Make sure HO2S 1 harness protector color, and disconnect corresponding heated oxygen sensor 1 harness connector.



HO2S1 (bank 1): Black
 HO2S1 (bank 2): Blue

SEF505YB



LEC658

▶ GO TO 2.

2 CHECK HO2S 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0134	50	2	Bank 1 (Right)
P0154	51	2	Bank 2 (Left)

SEC654C

Continuity should exist.

3. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0134	50 or 2	Ground	Bank 1 (Right)
P0154	51 or 2	Ground	Bank 2 (Left)

SEC655C

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

OK (With CONSULT-II) ▶	GO TO 3.
OK (Without CONSULT-II) ▶	GO TO 4.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

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3 CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode with CONSULT-II, and select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

5. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below.

Bank 1
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

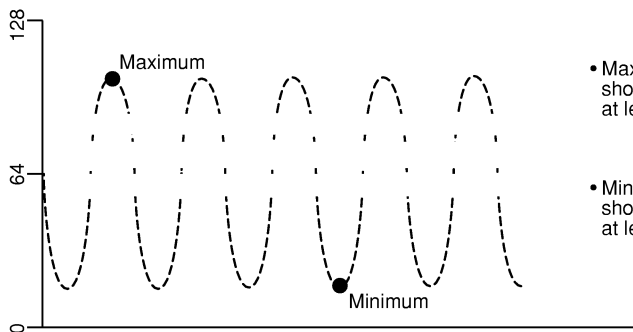
Bank 2
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

R means HO2S1
 MNTR (B1)/(B2) indicates RICH
 L means HO2S1
 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
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	XXX	XXX



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

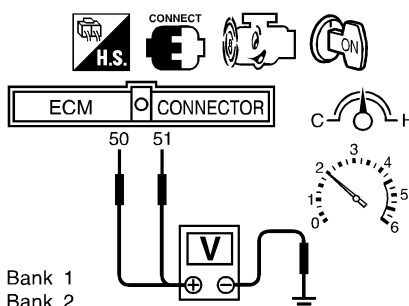
SEF648Y

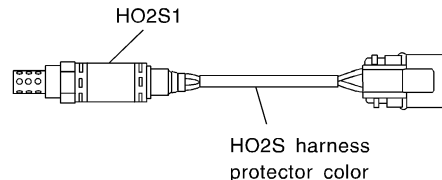
CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace malfunctioning heated oxygen sensor 1.

4	CHECK HEATED OXYGEN SENSOR 1
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground. Check the following with engine speed held at 2,000 rpm constant under no load. 	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  <p>50: Bank 1 51: Bank 2</p> </div> <div style="width: 50%;"> <ul style="list-style-type: none"> • The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least one time. • The minimum voltage is below 0.3V at least one time. • The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>	
SEF796Z	
<p>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.</p>	
OK or NG	
OK	▶ GO TO 6.
NG	▶ GO TO 5.

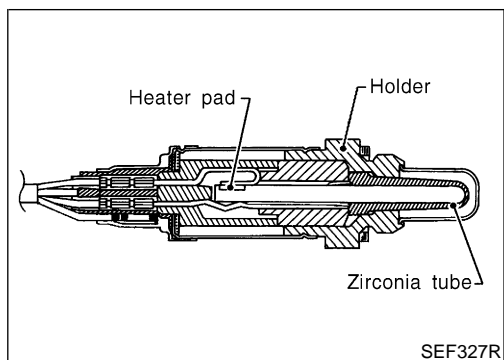
5	REPLACE HEATED OXYGEN SENSOR 1
<ol style="list-style-type: none"> Turn ignition switch "OFF". Check heated oxygen sensor 1 harness protector color. 	
	
<p>HO2S1 (bank 1): Black HO2S1 (bank 2): Blue</p>	
SEF505YB	
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 1.

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Diagnostic Procedure (Cont'd)

6	CHECK HO2S 1 SHIELD CIRCUIT FOR OPEN AND SHORT (IF EQUIPPED)	
1. Turn ignition switch OFF. 2. Disconnect joint connector-2. 3. Check the following. <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to EL-250, "HARNESS LAYOUT".) Continuity should exist. 4. Also check harness for short to power. 5. Then reconnect joint connector-2.		
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 INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.		
	▶	INSPECTION END



Component Description

NGEC1208

The heated oxygen sensor 2, after three way catalyst, monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NGEC1209

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	● Engine: After warming up	Revsing engine from idle up to 2,000 rpm	LEAN ↔ RICH

ECM Terminals and Reference Value

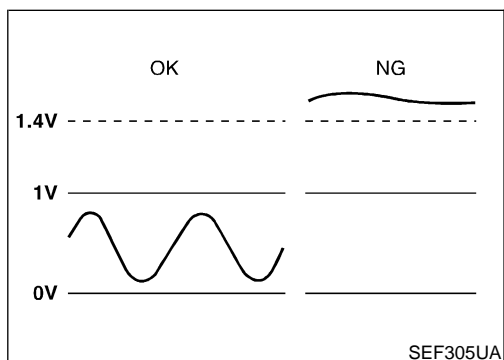
NGEC1210

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 the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (bank 1)	[Engine is running] ● Warm-up condition	0 - Approximately 1.0V
57	Y	Heated oxygen sensor 2 (bank 2)	● Revving engine from idle up to 2,000 rpm	



On Board Diagnosis Logic

NGEC1211

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst 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.

Malfunction is detected when an excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

NGEC1211S01

- Harness or connectors

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(The sensor circuit is open or shorted.)

- Heated oxygen sensor 2

5

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

SEF189Y

DTC Confirmation Procedure

NGEC1212

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

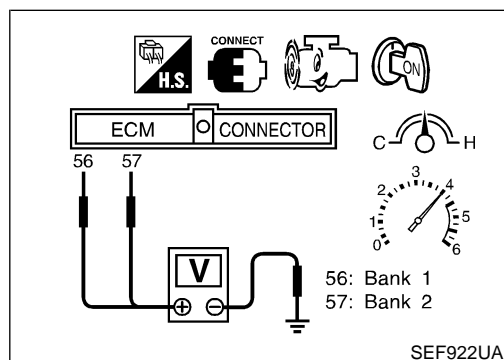
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

Ⓜ With CONSULT-II

- 1) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
- 2) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 3) Stop vehicle with engine running.
- 4) Let engine idle for 1 minute.
- 5) Maintain the following conditions for at least 5 consecutive seconds.

END SPEED	Less than 3,600 rpm
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	Suitable position

- 6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1412.



Overall Function Check

NGEC1213

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.

ⓧ Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground.
- 4) Check the voltage when racing up to 4,000 rpm under no load

at least 10 times.
(depress and release accelerator pedal as soon as possible)

The voltage should be below 1.4V during this procedure.

5) If NG, go to "Diagnostic Procedure", EC-1412.

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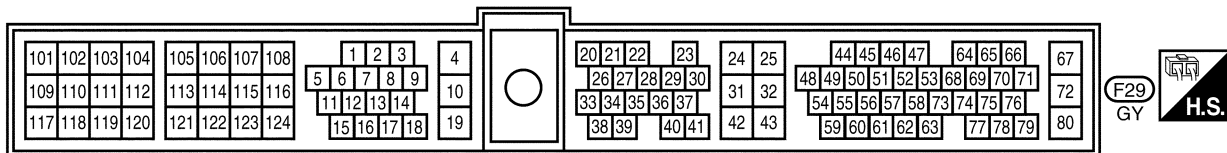
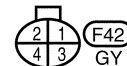
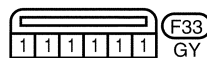
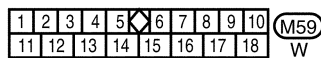
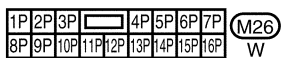
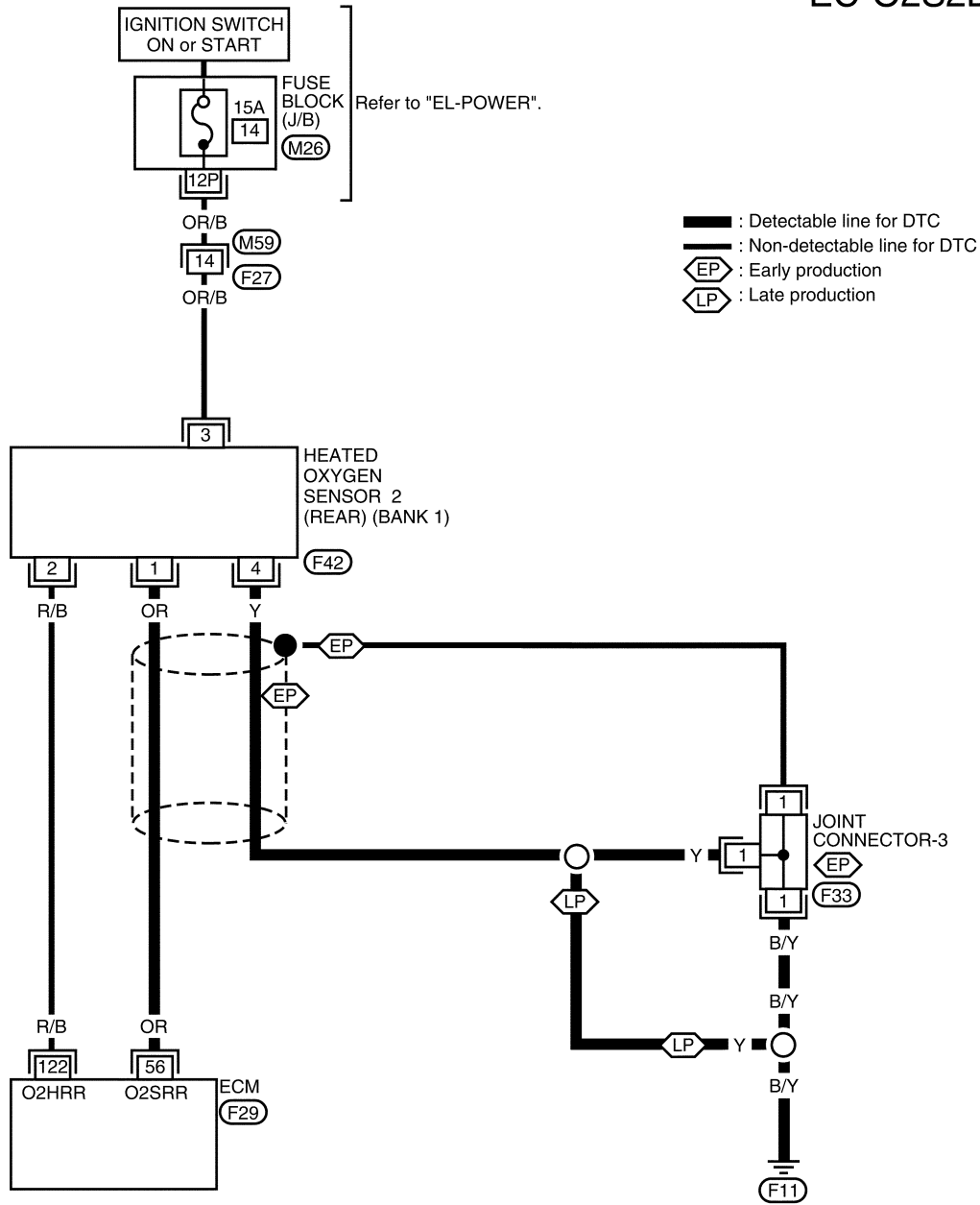
Wiring Diagram

NGEC1214

NGEC1214S01

RIGHT BANK

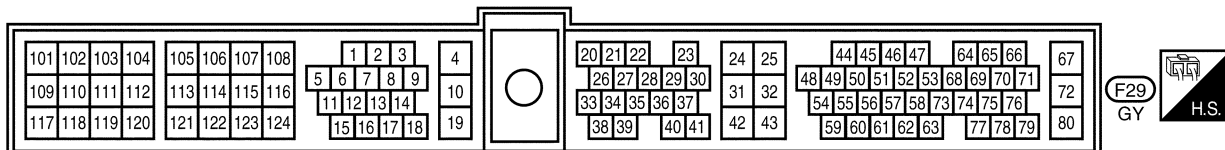
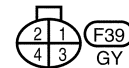
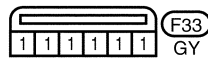
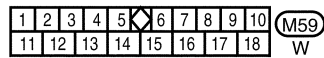
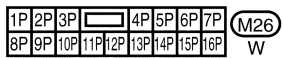
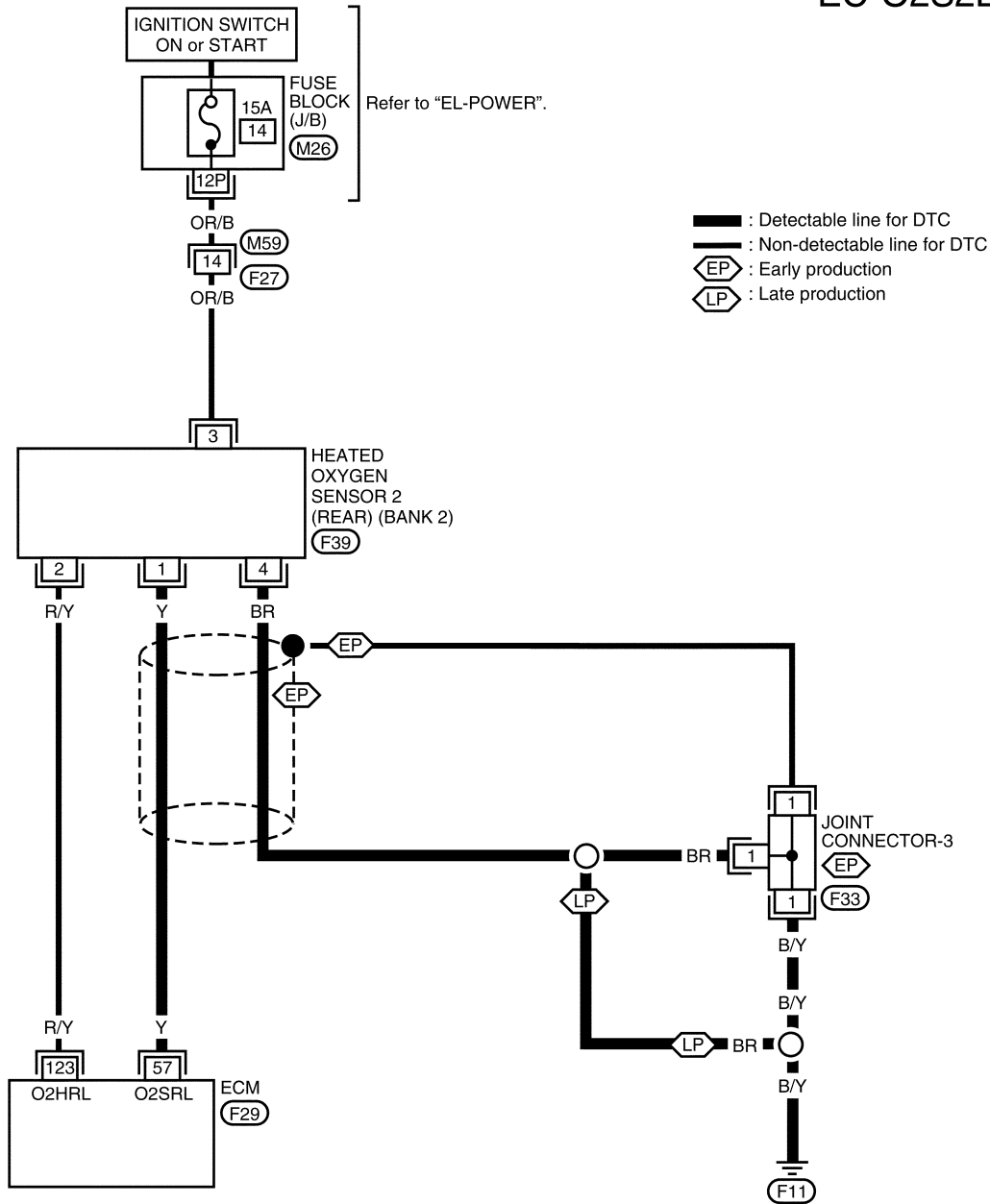
EC-O2S2B1-01



LEFT BANK

NGEC1214S02

EC-O2S2B2-01



WEC175A

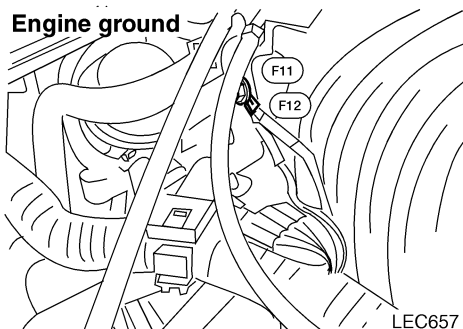
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Diagnostic Procedure

NGEC1215

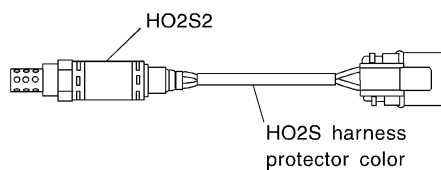
1 INSPECTION START

1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.



LEC657

3. Check heated oxygen sensor 2 harness protector color.



HO2S2 (bank 1): Gray
 HO2S2 (bank 2): Red Brown

SEC301CA

4. Disconnect corresponding heated oxygen sensor 2 harness connector.
5. Disconnect ECM harness connector.



GO TO 2.

2	CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT															
<p>1. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0138</td> <td style="text-align: center;">56</td> <td style="text-align: center;">1</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0158</td> <td style="text-align: center;">57</td> <td style="text-align: center;">1</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM	Sensor	P0138	56	1	Bank 1 (Right)	P0158	57	1	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM	Sensor														
P0138	56	1	Bank 1 (Right)													
P0158	57	1	Bank 2 (Left)													
SEC663C																
<p style="color: blue;">Continuity should exist.</p> <p>2. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM or sensor</th> <th>Ground</th> </tr> </thead> <tbody> <tr> <td>P0138</td> <td style="text-align: center;">56 or 1</td> <td style="text-align: center;">Ground</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0158</td> <td style="text-align: center;">57 or 1</td> <td style="text-align: center;">Ground</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM or sensor	Ground	P0138	56 or 1	Ground	Bank 1 (Right)	P0158	57 or 1	Ground	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM or sensor	Ground														
P0138	56 or 1	Ground	Bank 1 (Right)													
P0158	57 or 1	Ground	Bank 2 (Left)													
SEC664C																
<p style="color: blue;">Continuity should not exist.</p> <p>3. Also check harness for short to power.</p>																
OK or NG																
OK	▶	GO TO 3.														
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.														

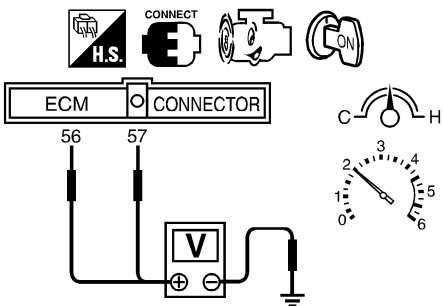
3	CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Check harness continuity between HO2S2 terminal 4 and engine ground. Refer to Wiring Diagram.</p> <p style="color: blue;">Continuity should exist.</p> <p>2. Also check harness for short to power.</p>		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

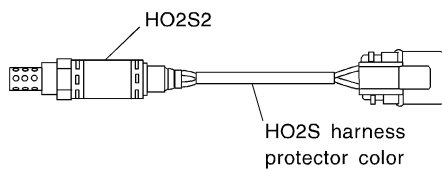
4	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Joint connector-3 (if equipped) ● Harness for open between heated oxygen sensor 2 and engine ground. 		
OK or NG		
▶ Repair open circuit to ground or short to power in harness or connectors.		

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5	CHECK HO2S2 CONNECTORS FOR WATER	
Check heated oxygen sensor 2 connector and harness connector for water. Water should not exist.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	Repair or replace harness or connectors.

6	CHECK HEATED OXYGEN SENSOR 2	
<p>With CONSULT-II</p> <ol style="list-style-type: none"> Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. Stop vehicle with engine running. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to $\pm 25\%$. 		
<p style="text-align: center;">(Reference data)</p>		
<p>"HO2S2 (B1)/(B2)" should be above 0.62V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)/(B2)" should be below 0.48V at least once when the "FUEL INJECTION" is -25%.</p> <p>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.</p>		
OK or NG		
OK	▶	GO TO 9.
NG	▶	GO TO 8.

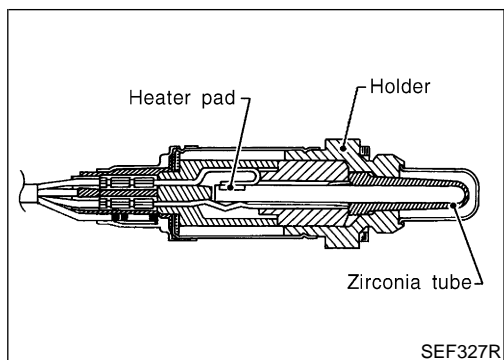
7	CHECK HEATED OXYGEN SENSOR 2						
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground. 4. Check the voltage when racing up to 4,000 rpm under no load at least 10 times. (depress and release accelerator pedal as soon as possible) <div style="display: flex; align-items: center; justify-content: center; margin: 10px 0;">  <div style="margin-left: 20px;"> <p>The voltage should be above 0.62V at least once during this procedure.</p> </div> </div> <p style="text-align: right; font-size: small;">SEF797ZB</p> <ol style="list-style-type: none"> 5. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T). The voltage should be below 0.48V at least once during this procedure. <p>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.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 9.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 8.</td> </tr> </table>		OK	▶	GO TO 9.	NG	▶	GO TO 8.
OK	▶	GO TO 9.					
NG	▶	GO TO 8.					

8	REPLACE HEATED OXYGEN SENSOR 2			
<ol style="list-style-type: none"> 1. Stop vehicle and turn ignition switch OFF. 2. Check heated oxygen sensor 2 harness protector color. <div style="text-align: center; margin: 10px 0;">  </div> <div style="margin-left: 100px; margin-top: 10px;"> <p>HO2S2 (bank 1): Gray HO2S2 (bank 2): Red Brown</p> <p style="text-align: right; font-size: small;">SEC301CA</p> </div> <p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%;"></td> <td style="width: 10%; text-align: center;">▶</td> <td>Replace malfunctioning heated oxygen sensor 2.</td> </tr> </table>			▶	Replace malfunctioning heated oxygen sensor 2.
	▶	Replace malfunctioning heated oxygen sensor 2.		

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9	CHECK HO2S2 SHIELD CIRCUIT FOR OPEN AND SHORT (IF EQUIPPED)	
<p>1. Turn ignition switch OFF. 2. Disconnect joint connector. 3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to EL-250, "HARNESS LAYOUT".) Continuity should exist. <p>4. Also check harness for short to power. 5. Then reconnect joint connector.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 10.
NG	▶	Repair open circuit or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.		
	▶	INSPECTION END



Component Description

The heated oxygen sensor 2, after three way catalyst, monitors the oxygen level in the exhaust gas on each bank. Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2. This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	● Engine: After warming up	Revsing engine from idle up to 2,000 rpm	LEAN ↔ RICH

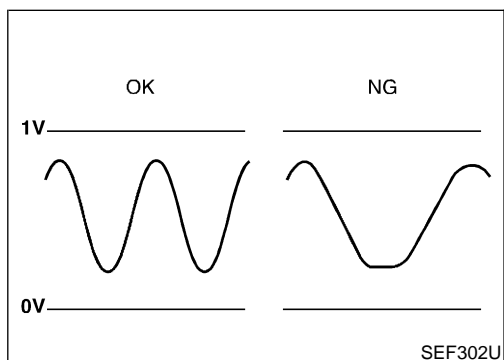
ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (bank 1)	[Engine is running] ● Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V
57	Y	Heated oxygen sensor 2 (bank 2)		



On Board Diagnosis Logic

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst 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. Malfunction is detected when it takes more time for the sensor to respond between rich and lean than the specified time.

POSSIBLE CAUSE

NGEC1203S01

- Harness or connectors
(The sensor circuit is open or shorted.)
- Heated oxygen sensor 2
- Fuel pressure
- Injectors
- Intake air leaks


6
HO2S2 (B1) P0139

WAIT
OPEN ENGINE HOOD.
KEEP ENGINE RUNNING AT
IDLE SPEED FOR MAXIMUM
OF 5 MINUTES.

SEF666Y

8
HO2S2 (B1) P0139

MAINTAIN
1800 - 2800 RPM UNTIL FINAL
RESULT APPEARS.



1800 rpm 2300 rpm 2800 rpm

SEF667Y

8
HO2S2 (B1) P0139

COMPLETED

SELF-DIAG RESULTS

SEF668Y

DTC Confirmation Procedure

NGEC1204

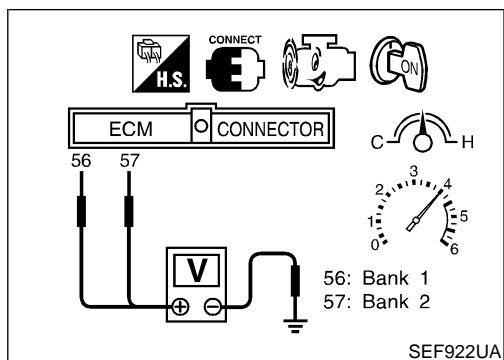
NOTE:

If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Open engine hood before conducting following procedure With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select “DATA MONITOR” mode with CONSULT-II.
- 5) Make sure that “COOLANT TEMP/S” is more than 70°C (158°F).
- 6) Select “HO2S2 (B1)/(B2) P0139/P0159” of “HO2S2” in DTC WORK SUPPORT” mode with CONSULT-II.
- 7) Start engine and follow the instructions of CONSULT-II.
- 8) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
If NG is displayed, refer to “DIAGNOSTIC PROCEDURE”, EC-1422.
If “CAN NOT BE DIAGNOSED” is displayed, perform the following.
 - a) Stop engine and cool down “COOLANT TEMP/SE” to less than 70°C (158°F).
 - b) Turn ignition switch ON.
 - c) Select “DATA MONITOR” mode with CONSULT-II.
 - d) Start engine.
 - e) Perform from step 6) again when the “COOLANT TEMP/S” reaches to 70°C (158°F)



Overall Function Check

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. =NGEC1205

CAUTION:

Always drive vehicle at a safe speed.

⊗ Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground.
- 4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
(depress and release accelerator pedal as soon as possible)
The voltage should change at more than 0.06V for 1 second during this procedure.
If the voltage can be confirmed in step 4, step 5 is not necessary.
- 5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T).
The voltage should change at more than 0.06V for 1 second during this procedure.
- 6) If NG, go to "Diagnostic Procedure", EC-1422.

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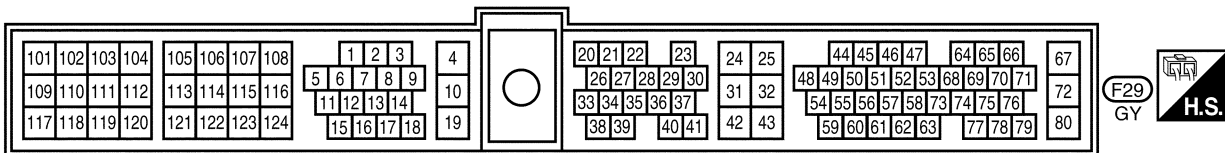
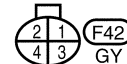
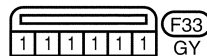
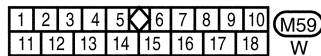
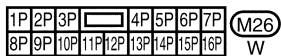
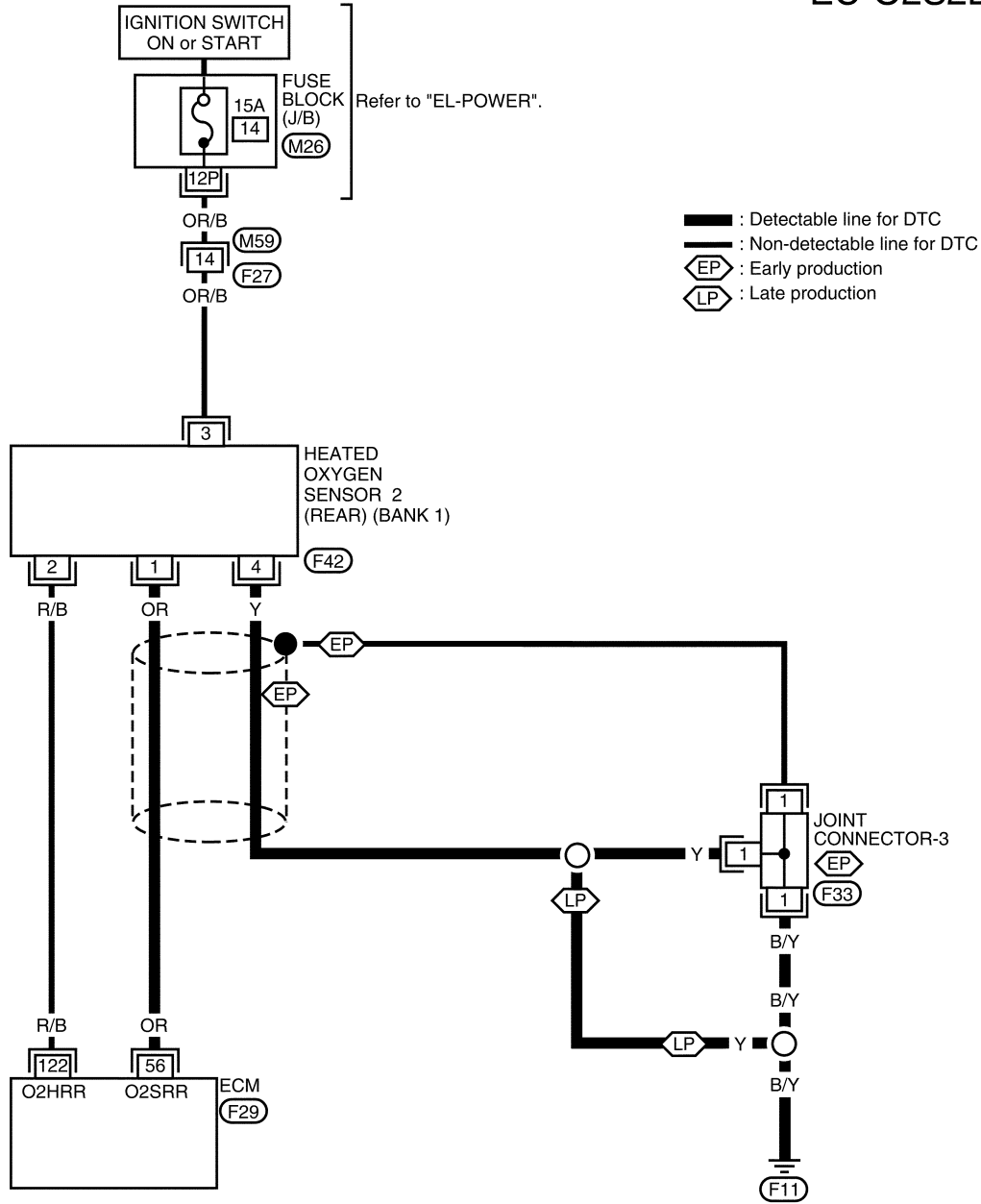
Wiring Diagram

NGEC1206

NGEC1206S01

RIGHT BANK

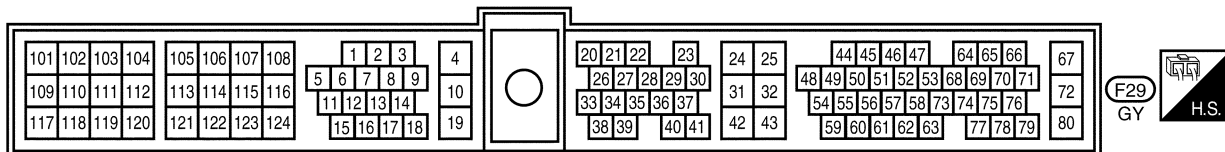
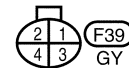
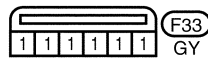
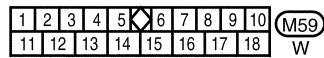
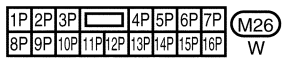
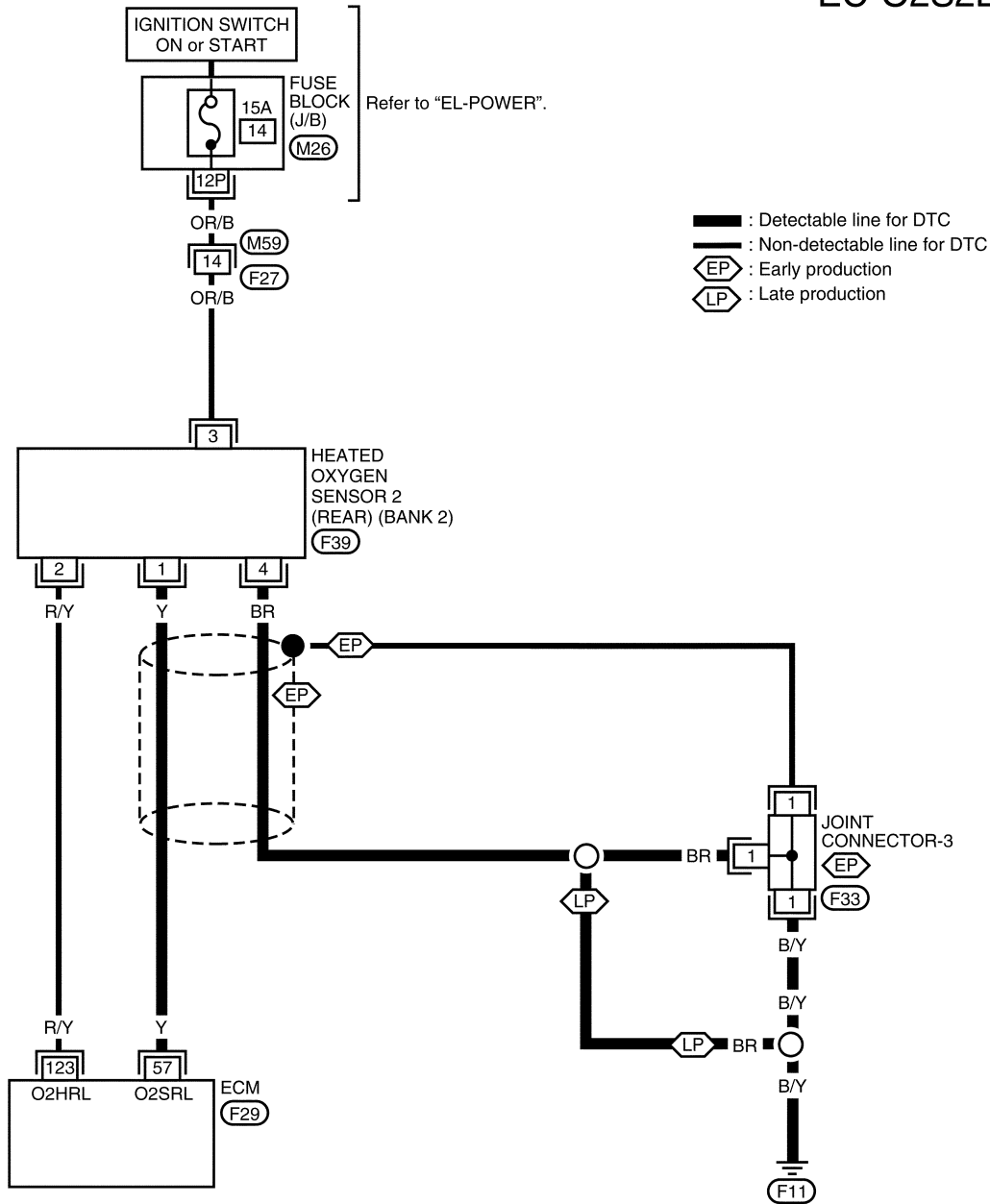
EC-O2S2B1-01



LEFT BANK

NGEC1206S02

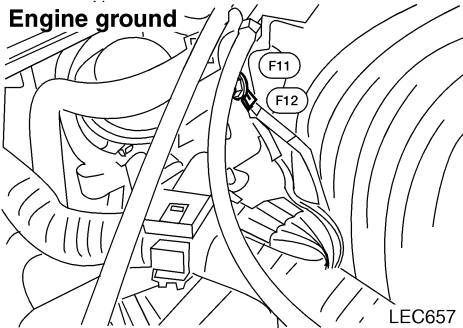
EC-O2S2B2-01



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Diagnostic Procedure

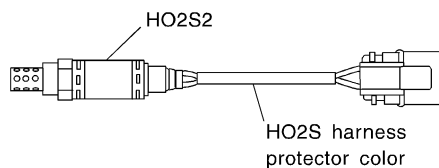
NGEC1207

1	RETIGHTEN GROUND SCREWS
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws. 	
	
LEC657	
▶ GO TO 2.	

2	CLEAR THE SELF-LEARNING DATA								
<p><input checked="" type="checkbox"/> With CONSULT-II</p> <ol style="list-style-type: none"> 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". 									
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2" style="padding: 2px;">WORK SUPPORT</th> </tr> <tr> <td style="padding: 2px;">SELF-LEARNING CONT</td> <td style="padding: 2px;">CLEAR</td> </tr> <tr> <td style="padding: 2px;"></td> <td style="padding: 2px;">B1 100 %</td> </tr> <tr> <td style="padding: 2px;"></td> <td style="padding: 2px;">B2 100 %</td> </tr> </table>		WORK SUPPORT		SELF-LEARNING CONT	CLEAR		B1 100 %		B2 100 %
WORK SUPPORT									
SELF-LEARNING CONT	CLEAR								
	B1 100 %								
	B2 100 %								
SEF968Y									
<ol style="list-style-type: none"> 4. Run engine for at least 10 minutes at idle speed. <p>Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine?</p>									
<p><input checked="" type="checkbox"/> Without CONSULT-II</p> <ol style="list-style-type: none"> 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 1st trip DTC P0102 is displayed. 6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-1246. 7. Make sure DTC P0000 is displayed. 8. Run engine for at least 10 minutes at idle speed. <p>Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine?</p>									
Yes or No									
Yes	▶ Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-1427, 1436.								
No	▶ GO TO 3.								

3 CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

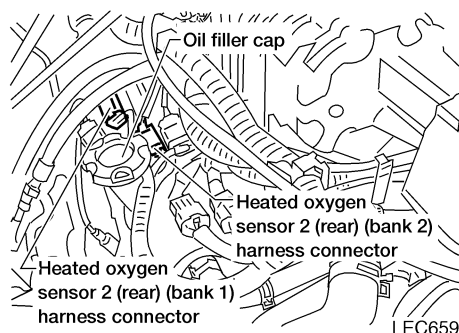
1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 harness protector color.



HO2S2 (bank 1): Gray
 HO2S2 (bank 2): Red Brown

SEC301CA

3. Disconnect corresponding heated oxygen sensor 2 harness connector.



LEC659

4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0139	56	1	Bank 1 (Right)
P0159	57	1	Bank 2 (Left)

MTBL0591

Continuity should exist.

6. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0139	56 or 1	Ground	Bank 1 (Right)
P0159	57 or 1	Ground	Bank 2 (Left)

MTBL0592

Continuity should not exist.

7. 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.

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4	CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT	
1. Check harness continuity between HO2S2 terminal 4 and engine ground. Refer to Wiring Diagram. Continuity should exist.		
2. Also check harness for short to power.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	GO TO 5.

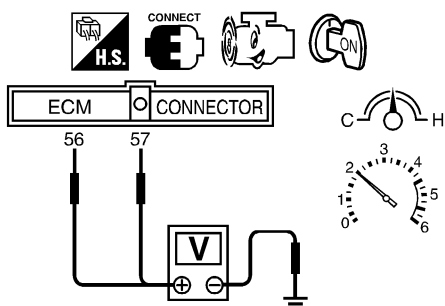
5	DETECT MALFUNCTIONING PART	
Check the following.		
<ul style="list-style-type: none"> ● Joint connector-3 (if equipped) ● Harness for open between heated oxygen sensor 2 and engine ground. 		
	▶	Repair open circuit or short to power in harness or connectors.

6	CHECK HEATED OXYGEN SENSOR 2 (REAR)	
(P) With CONSULT-II		
1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.		
2. Stop vehicle with engine running.		
3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II.		
4. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.		
(Reference data)		
SEF989RD		
"HO2S2 (B1)/(B2)" should be above 0.62V at least once when the "FUEL INJECTION" is +25%.		
"HO2S2 (B1)/(B2)" should be below 0.48V at least once when the "FUEL INJECTION" is -25%.		
CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	GO TO 8.

7 CHECK HEATED OXYGEN SENSOR 2

⊗ Without CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground.
4. Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
(depress and release accelerator pedal as soon as possible)



SEF797ZB

5. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T).

The voltage should be below 0.48V at least once during this procedure.

CAUTION:

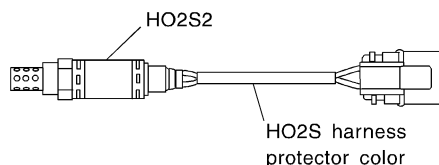
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8 REPLACE HEATED OXYGEN SENSOR 2

1. Stop vehicle and turn ignition switch OFF.
2. Check heated oxygen sensor 2 harness protector color.



HO2S2 (bank 1): Gray
HO2S2 (bank 2): Red Brown

SEC301CA

CAUTION:

Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

▶	Replace malfunctioning heated oxygen sensor 2.
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Diagnostic Procedure (Cont'd)

9	CHECK HO2S2 SHIELD CIRCUIT FOR OPEN AND SHORT (IF EQUIPPED)	
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect joint connector.</p> <p>3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to EL-250, "HARNES LAYOUT".) <p>Continuity should exist.</p> <p>4. Also check harness for short to power.</p> <p>5. Then reconnect joint connector.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 10.
NG	▶	Repair open circuit or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.		
	▶	INSPECTION END

On Board Diagnosis Logic

NGEC1223

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and light up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensors 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Injectors

Malfunction is detected when fuel injection system does not operate properly, the amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)

POSSIBLE CAUSE

NGEC1223S01

- Intake air leaks
- Heated oxygen sensor 1
- Injectors
- Exhaust gas leaks
- Incorrect fuel pressure
- Lack of fuel
- Mass air flow sensor
- PCV system (Loose or disconnected rubber tube)

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4	WORK SUPPORT		
	SELF-LEARNING CONT	CLEAR	B1 100 % B2 100 %
			SEF968Y

DTC Confirmation Procedure

=NGEC1224

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 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 5 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 "Diagnostic Procedure", EC-1431.
- 7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
- 8) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-1431. If engine does not start, check exhaust and intake air leak visually.

With GST

Follow the procedure "With CONSULT-II".

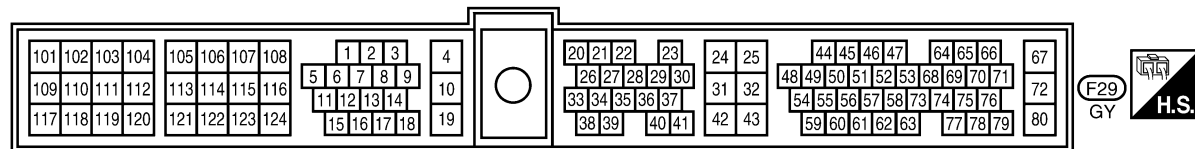
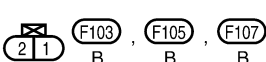
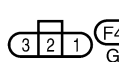
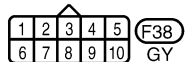
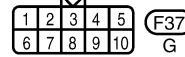
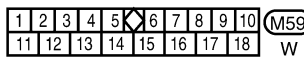
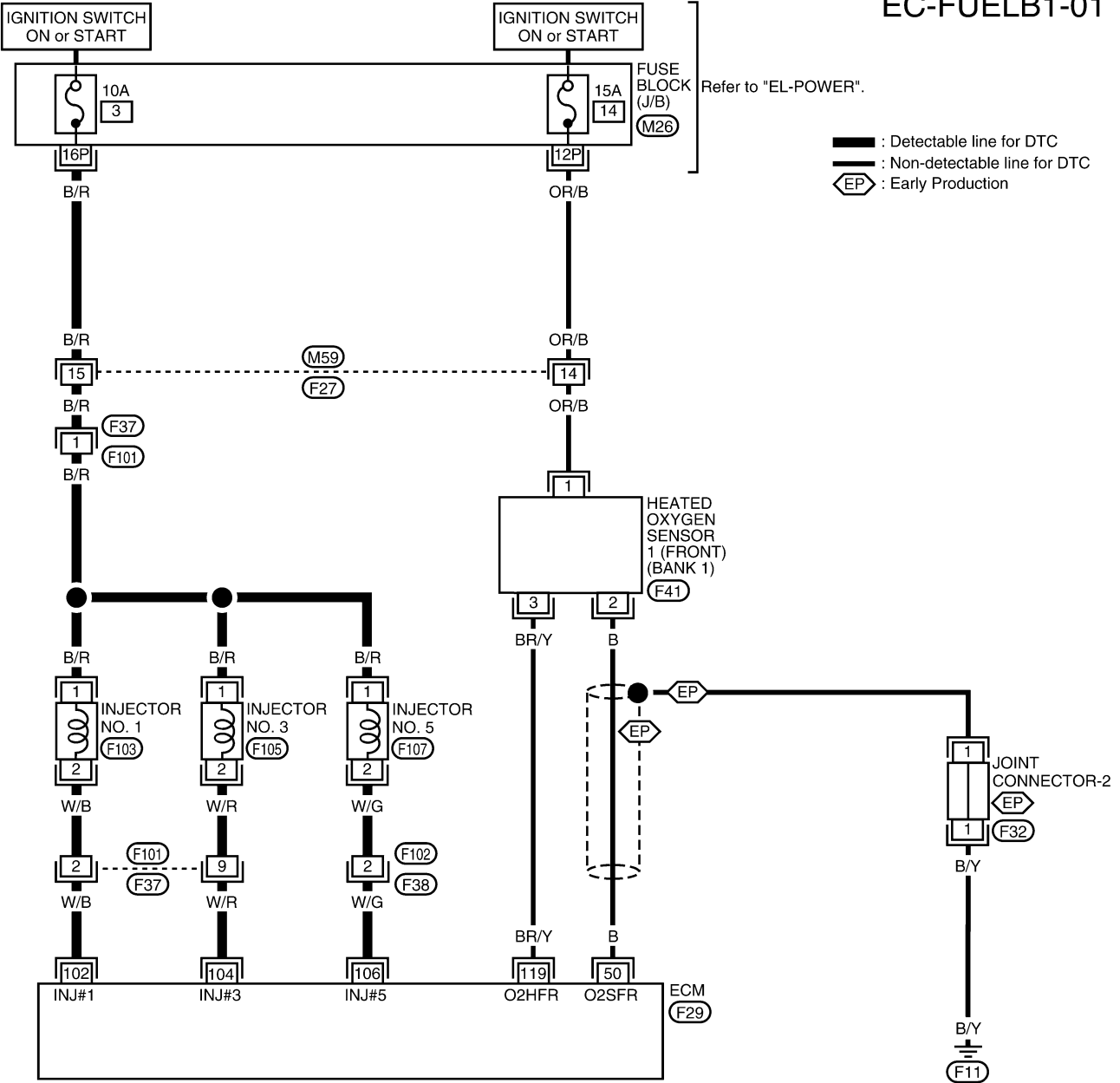
Wiring Diagram

NGEC1225

NGEC1225S01

RIGHT BANK

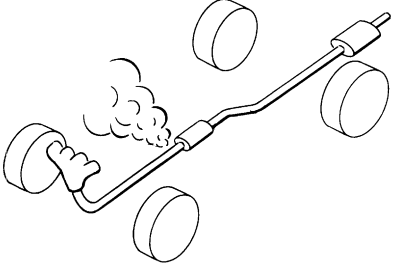
EC-FUELB1-01



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Diagnostic Procedure

NGEC1226

1	CHECK EXHAUST AIR LEAK	
<p>1. Start engine and run it at idle. 2. Listen for an exhaust air leak before three way catalyst.</p>		
		
SEF099P		
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 FOR PCV HOSE	
Check PCV hose for loose connection or disconnection.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace.

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4	CHECK HEATED OXYGEN SENSOR 1 CIRCUIT FOR OPEN AND SHORT															
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect corresponding heated oxygen sensor 1 harness connector.</p> <p>3. Disconnect ECM harness connector.</p> <p>4. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM</th> <th>Sensor</th> </tr> </thead> <tbody> <tr> <td>P0171</td> <td style="text-align: center;">50</td> <td style="text-align: center;">2</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0174</td> <td style="text-align: center;">51</td> <td style="text-align: center;">2</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM	Sensor	P0171	50	2	Bank 1 (Right)	P0174	51	2	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM	Sensor														
P0171	50	2	Bank 1 (Right)													
P0174	51	2	Bank 2 (Left)													
SEF831Z																
<p style="color: blue;">Continuity should exist.</p> <p>5. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows. Refer to Wiring Diagram.</p>																
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DTC</th> <th colspan="2">Terminals</th> <th rowspan="2">Bank</th> </tr> <tr> <th>ECM or sensor</th> <th>Ground</th> </tr> </thead> <tbody> <tr> <td>P0171</td> <td style="text-align: center;">50 or 2</td> <td style="text-align: center;">Ground</td> <td>Bank 1 (Right)</td> </tr> <tr> <td>P0174</td> <td style="text-align: center;">51 or 2</td> <td style="text-align: center;">Ground</td> <td>Bank 2 (Left)</td> </tr> </tbody> </table>			DTC	Terminals		Bank	ECM or sensor	Ground	P0171	50 or 2	Ground	Bank 1 (Right)	P0174	51 or 2	Ground	Bank 2 (Left)
DTC	Terminals			Bank												
	ECM or sensor	Ground														
P0171	50 or 2	Ground	Bank 1 (Right)													
P0174	51 or 2	Ground	Bank 2 (Left)													
SEF832Z																
<p style="color: blue;">Continuity should not exist.</p> <p>6. Also check harness for short to power.</p>																
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 PRESSURE	
<p>1. Release fuel pressure to zero. Refer to EC-1217.</p> <p>2. Install fuel pressure gauge and check fuel pressure.</p> <p style="color: blue;">At idling:</p> <p style="color: blue;">When fuel pressure regulator valve vacuum hose is connected. 235 kPa (2.4 kg/cm², 34 psi)</p> <p style="color: blue;">When fuel pressure regulator valve vacuum hose is disconnected. 294 kPa (3.0 kg/cm², 43 psi)</p>		
OK or NG		
OK	▶	GO TO 7.
NG	▶	GO TO 6.

DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

VG33ER

Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Fuel pump and circuit (Refer to EC-1733.) ● Fuel pressure regulator (Refer to EC-1218.) ● Fuel lines (Refer to "ENGINE MAINTENANCE", MA-26.) ● Fuel filter for clogging 		
▶		Repair or replace.
7	CHECK MASS AIR FLOW SENSOR	
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Install all parts removed. 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. 3.3 - 4.8 g-m/sec: at idling 12.0 - 14.9 g-m/sec: at 2,500 rpm 		
<p> With GST</p> <ol style="list-style-type: none"> 1. Install all parts removed. 2. Check mass air flow sensor signal in MODE 1 with GST. 3.3 - 4.8 g-m/sec: at idling 12.0 - 14.9 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 engine grounds. Refer to EC-1334.

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8 CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

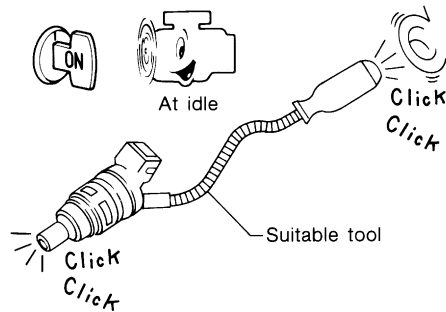
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS AIF SE-B1	XXX V
IACV-AAC/V	XXX step

SEF070Y

3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.



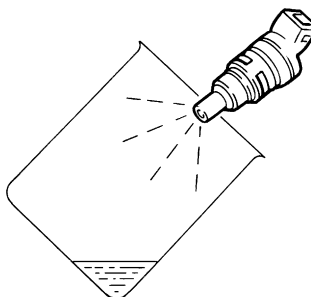
MEC703B

Clicking noise should be heard.

OK or NG

OK	▶	GO TO 9.
----	---	----------

NG	▶	Perform trouble diagnosis for "INJECTORS", EC-1725.
----	---	---

9	CHECK INJECTOR	
<ol style="list-style-type: none"> 1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle. 2. Turn ignition switch OFF. 3. Disconnect injector harness connectors on left bank (for DTC P0171), right bank (for DTC P0174). 4. Remove injector gallery assembly. Refer to EC-1218. Keep fuel hose and all injectors connected to injector gallery. The injector harness connectors on right bank (for DTC P0171), left bank (for DTC P0174) should remain connected. 5. Disconnect all ignition coil harness connectors. 6. Prepare pans or saucers under each injector. 7. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors. 		
		
<p style="color: blue;">Fuel should be sprayed evenly for each injector.</p>		
SEF595Q		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Replace injectors from which fuel does not spray out. Always replace O-ring with new ones.

10	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.		
▶		INSPECTION END

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On Board Diagnosis Logic

NGEC1227

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and light up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensors 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Injectors

Malfunction is detected when fuel injection system does not operate properly, the amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)

POSSIBLE CAUSE

NGEC1227S01

- Heated oxygen sensor 1
- Injectors
- Exhaust gas leaks
- Incorrect fuel pressure
- Mass air flow sensor

4	WORK SUPPORT		
	SELF-LEARNING CONT	CLEAR	B1 100 % B2 100 %
			SEF968Y

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

④ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 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 "Diagnostic Procedure", EC-1440.
- 7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
- 8) Crank engine while depressing accelerator pedal.
If engine starts, go to "Diagnostic Procedure", EC-1440. If engine does not start, remove ignition plugs and check for fouling, etc.

④ With GST

Follow the procedure "With CONSULT-II".

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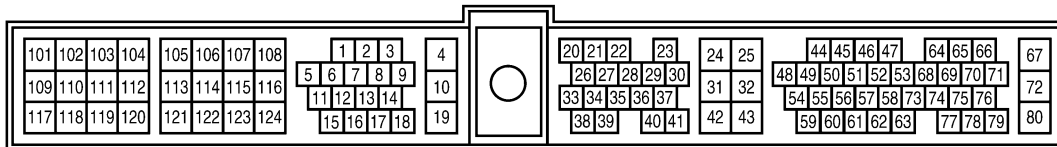
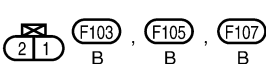
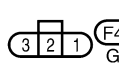
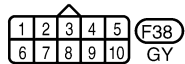
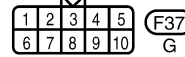
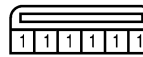
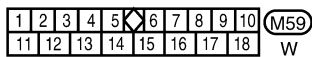
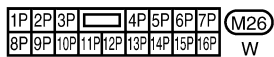
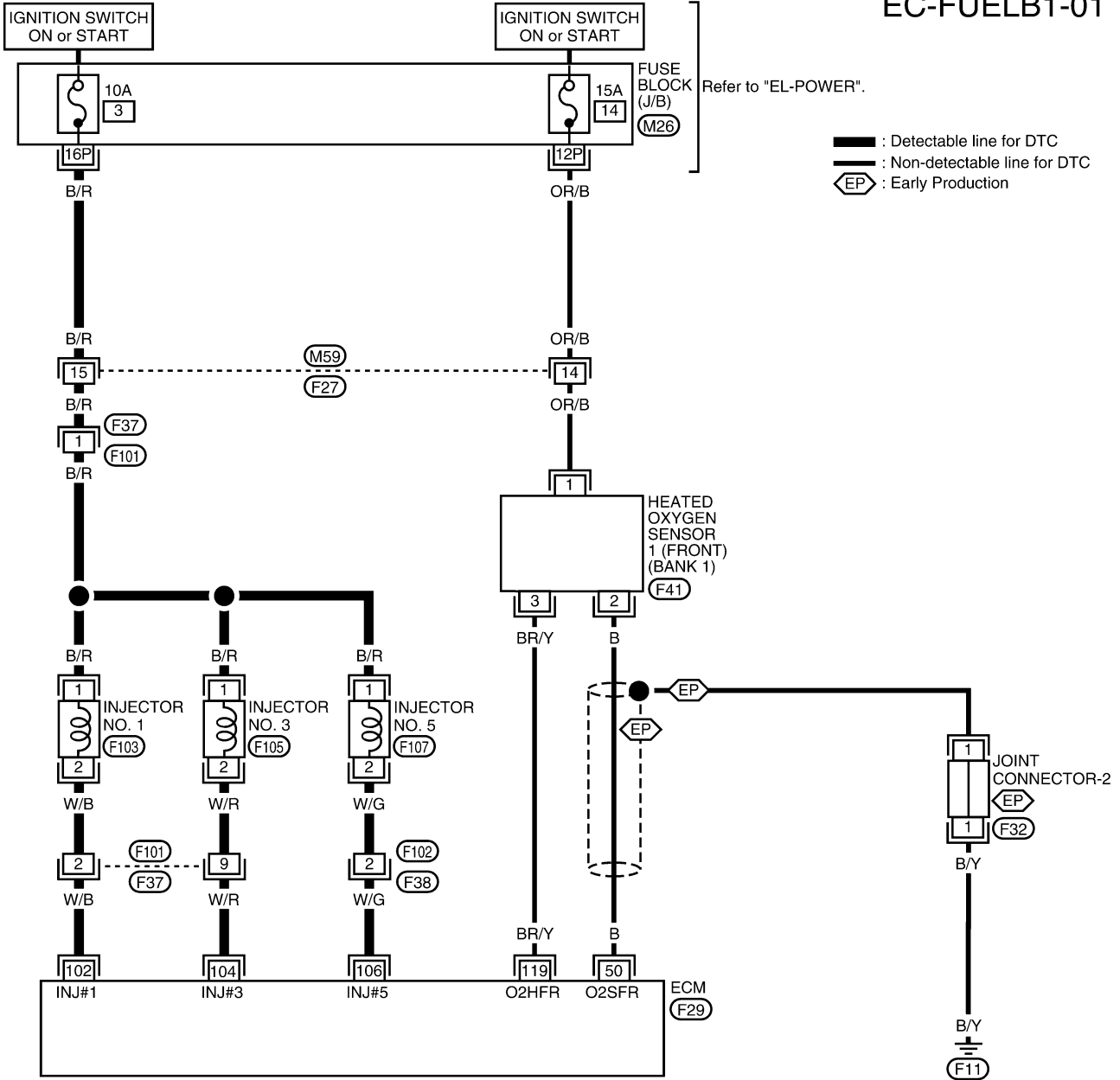
Wiring Diagram

NGEC1229

NGEC1229S01

RIGHT BANK

EC-FUELB1-01



DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

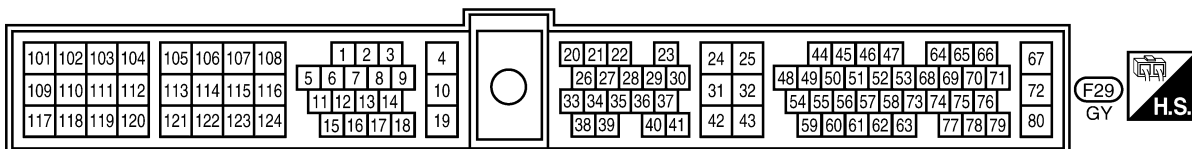
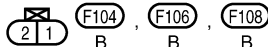
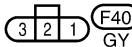
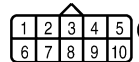
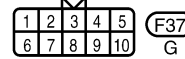
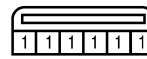
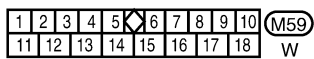
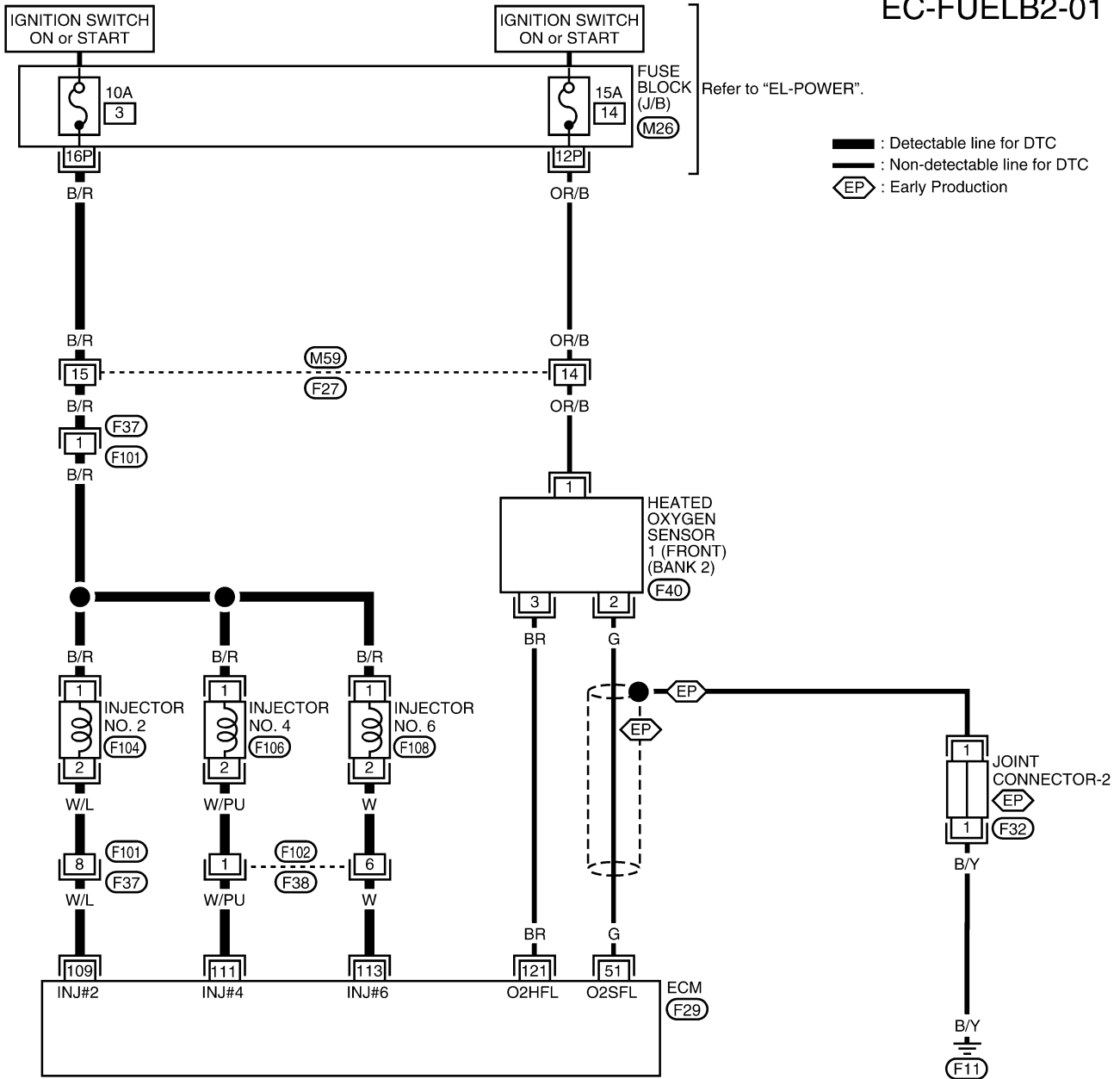
VG33ER

Wiring Diagram (Cont'd)

NGEC1229S02

LEFT BANK

EC-FUELB2-01

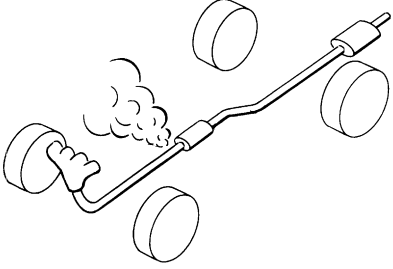


WEC188A

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Diagnostic Procedure

NGEC1230

1	CHECK EXHAUST AIR LEAK	
1. Start engine and run it at idle. 2. Listen for an exhaust air leak before three way catalyst.		
		
SEF099P		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair or replace.

2	CHECK FOR INTAKE AIR LEAK	
Listen for an intake air leak after the mass air flow sensor.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace.

3	CHECK HEATED OXYGEN SENSOR 1 CIRCUIT FOR OPEN AND SHORT															
<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect corresponding heated oxygen sensor 1 harness connector.</p> <p>3. Disconnect ECM harness connector.</p> <p>4. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.</p>																
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	ECM	Sensor														
P0172	50	2	Bank 1 (Right)													
P0175	51	2	Bank 2 (Left)													
SEF833Z																
<p style="color: blue;">Continuity should exist.</p> <p>5. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows. Refer to Wiring Diagram.</p>																
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	ECM or sensor	Ground														
P0172	50 or 2	Ground	Bank 1 (Right)													
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SEF834Z																
<p style="color: blue;">Continuity should not exist.</p> <p>6. Also check harness for short to power.</p>																
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	
<p>1. Release fuel pressure to zero. Refer to EC-1217.</p> <p>2. Install fuel pressure gauge and check fuel pressure.</p> <p style="color: blue;">At idling:</p> <p style="color: blue;">When fuel pressure regulator valve vacuum hose is connected. 235 kPa (2.4 kg/cm², 34 psi)</p> <p style="color: blue;">When fuel pressure regulator valve vacuum hose is disconnected. 294 kPa (3.0 kg/cm², 43 psi)</p>		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

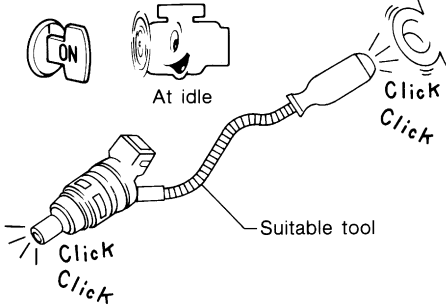
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DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

VG33ER

Diagnostic Procedure (Cont'd)

5	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Fuel pump and circuit (Refer to EC-1733.)● Fuel pressure regulator (Refer to EC-1218.)	
	▶ Repair or replace.
6	CHECK MASS AIR FLOW SENSOR
 With CONSULT-II <ol style="list-style-type: none">1. Install all parts removed.2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. 3.3 - 4.8 g-m/sec: at idling 12.0 - 14.9 g-m/sec: at 2,500 rpm	
 With GST <ol style="list-style-type: none">1. Install all parts removed.2. Check mass air flow sensor signal in MODE 1 with GST. 3.3 - 4.8 g-m/sec: at idling 12.0 - 14.9 g-m/sec: at 2,500 rpm	
OK or NG	
OK	▶ GO TO 7.
NG	▶ Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-1334.

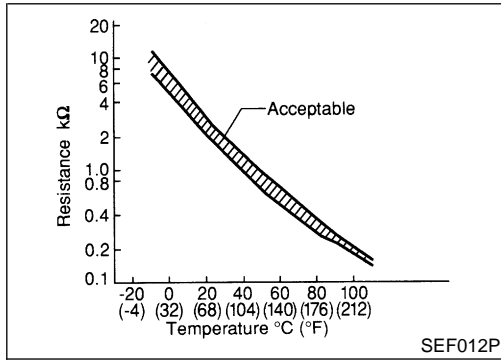
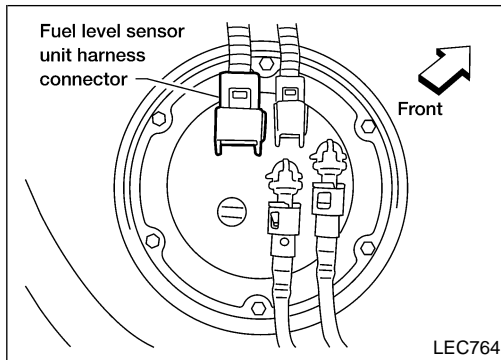
7	CHECK FUNCTION OF INJECTORS																				
<p>Ⓟ With CONSULT-II</p> <ol style="list-style-type: none"> Start engine. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II. 																					
<table border="1" style="margin: auto;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>POWER BALANCE</td><td></td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>MAS AIF SE-B1</td><td>XXX V</td></tr> <tr><td>IACV-AAC/V</td><td>XXX step</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>		ACTIVE TEST		POWER BALANCE		MONITOR		ENG SPEED	XXX rpm	MAS AIF SE-B1	XXX V	IACV-AAC/V	XXX step								
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IACV-AAC/V	XXX step																				
<p>3. Make sure that each circuit produces a momentary engine speed drop.</p>																					
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine. Listen to each injector operating sound. 																					
																					
<p>Clicking noise should be heard.</p>																					
<p>OK or NG</p>																					
OK	▶ GO TO 8.																				
NG	▶ Perform trouble diagnosis for "INJECTORS", EC-1725.																				

8	CHECK INJECTOR
<ol style="list-style-type: none"> Remove injector assembly. Refer to EC-1218. Keep fuel hose and all injectors connected to injector gallery. Confirm that the engine is cooled down and there are no fire hazards near the vehicle. Disconnect injector harness connectors left bank (for DTC P0172), right bank (for P0175). The injector harness connectors on right bank (for P0172), left bank (for P0175) should remain connected. Disconnect all ignition coil harness connectors. Prepare pans or saucers under each injectors. Crank engine for about 3 seconds. Make sure fuel does not drip from injector. 	
<p>OK or NG</p>	
OK (Does not drip)	▶ GO TO 9.
NG (Drips)	▶ Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.	
▶	INSPECTION END

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Component Description



Component Description

NGEC1231

The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

<Reference data>

Fluid temperature °C (°F)	Voltage* (V)	Resistance (kΩ)
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: These data are reference values and are measured between ECM terminal 60 (Fuel tank temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

On Board Diagnosis Logic

NGEC1232

Malfunction is detected when an excessively high (P0183) or low (P0182) voltage is sent to ECM, rationally incorrect voltage (P0181) from the sensor is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.

POSSIBLE CAUSE

NGEC1232S01

- Harness or connectors (The sensor circuit is open or shorted.)
- Fuel tank temperature sensor

DTC Confirmation Procedure

=NGEC1233

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

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3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C

SEF174Y

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 10 seconds.
If the result is NG, go to "Diagnostic Procedure", EC-1447.
If the result is OK, go to following step.
- 4) Check "COOLAN TEMP/S" value.
If "COOLAN TEMP/S" is less than 60°C (140°F), the result will be OK.
If "COOLAN TEMP/S" is above 60°C (140°F), go to the following step.
- 5) Cool engine down until "COOLAN TEMP/S" is less than 60°C (140°F).
- 6) Wait at least 10 seconds.
- 7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1447.

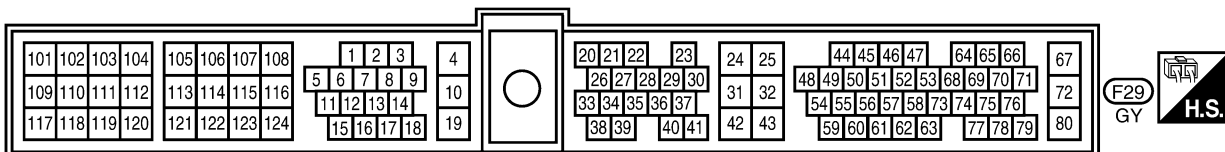
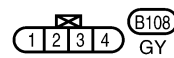
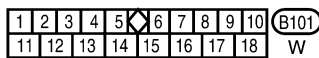
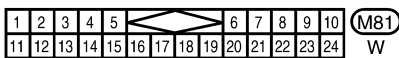
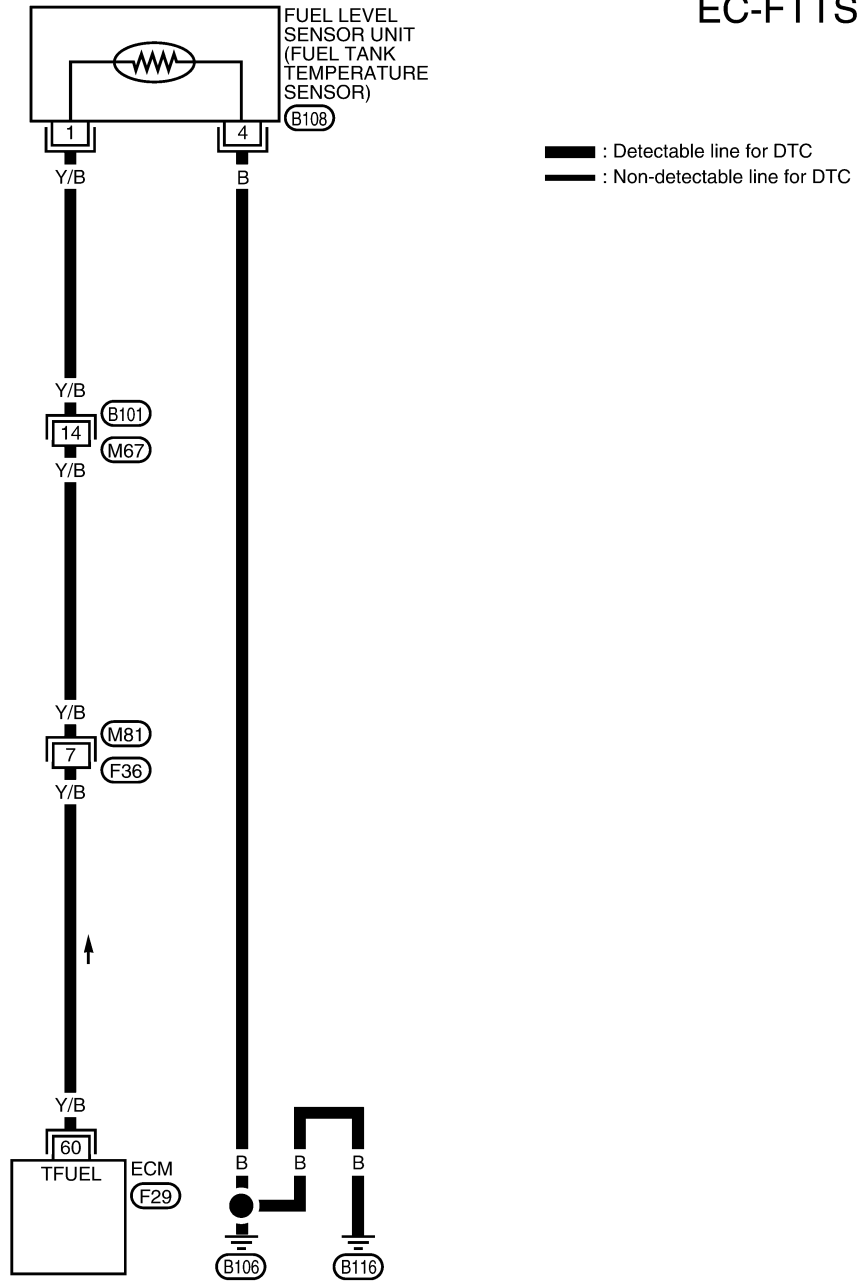
With GST

Follow the procedure "With CONSULT-II".

Wiring Diagram

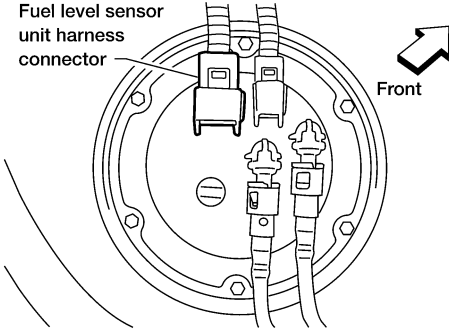
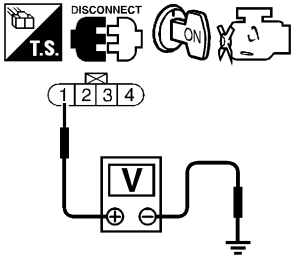
NGEC1234

EC-FTTS-01



Diagnostic Procedure

NGEC1235

1	CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT	
1. Turn ignition switch OFF. 2. Disconnect fuel level sensor unit harness connector.		
		
3. Turn ignition switch ON. 4. Check voltage between fuel level sensor unit terminal 1 and ground with CONSULT-II or tester.		
		
Voltage: Approximately 5V		
OK or NG		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

LEC764

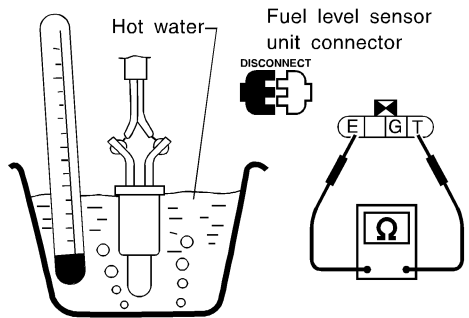
SEF639W

2	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Harness connectors B101, M67 ● Harness connectors M81, F36 ● Harness for open or short between ECM and fuel tank temperature sensor 		
▶		Repair harness or connector.

3	CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch OFF. 2. Check harness continuity between fuel level sensor unit terminal 4 and body ground. Refer to Wiring Diagram. Continuity should exist.		
3. Also check harness for short to power.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART	
Check harness for open between fuel tank temperature sensor and body ground.		
▶		Repair open circuit or short to power in harness or connectors.

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5	CHECK FUEL TANK TEMPERATURE SENSOR	
<p>1. Remove fuel level sensor unit.</p> <p>2. Check resistance fuel level sensor unit terminals T and E by heating with hot water or heat gun as shown in the figure.</p>		
		
SEC311C		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Replace fuel tank temperature sensor.

6	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.		
▶		INSPECTION END

On Board Diagnosis Logic

NGEC1239

This diagnosis checks whether the engine coolant temperature is extraordinary high, even when the load is not heavy. When malfunction is detected, the malfunction indicator lamp (MIL) will light up even in the first trip. Malfunction is detected when engine coolant temperature is excessively high under normal engine speed.

GI

MA

EM

LC

Possible Cause

NGEC1240

- Cooling fan (Crankshaft driven)
- Thermostat
- Improper ignition timing
- Engine coolant temperature sensor
- Blocked radiator
- Blocked front end (Improper fitting of nose mask)
- Crushed vehicle frontal area (Vehicle frontal is collided but not repaired)
- Blocked air passage by improper installation of front fog lamp or fog lamps.
- Improper mixture ratio of coolant
- Damaged bumper

EC

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For more information, refer to "MAIN 12 CAUSES OF OVERHEATING", EC-1455.

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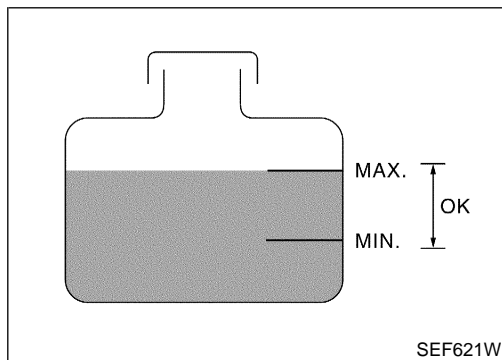
Overall Function Check

Use this procedure to check the overall function of the engine coolant over temperature enrichment protection check, a DTC might not be confirmed. =NGEC1241

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high-pressure fluid escaping from the radiator.

Wrap a thick cloth around the cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.



WITH CONSULT-II

1. Check the coolant level and mixture ratio (Using coolant tester) in the reservoir tank and radiator. NGEC1241S01

Allow engine to cool before checking coolant level and mixture ratio.

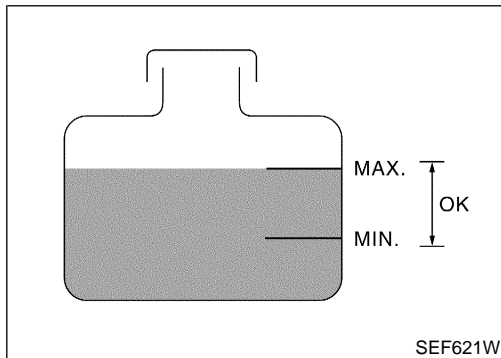
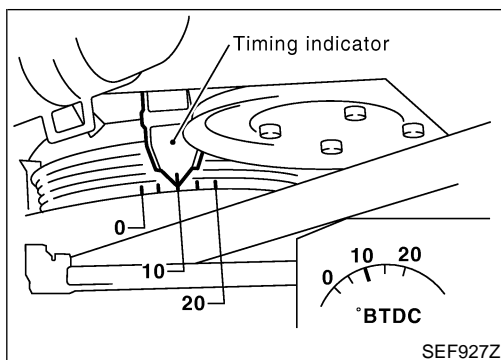
- If the coolant level in the reservoir and/or the radiator is below the proper range, skip following steps and go to “Diagnostic Procedure”, EC-1452.
- If the coolant mixture ratio is out of range between 45 to 55%, replace the coolant. Refer to “Changing Engine Coolant”, **MA-28**.

- a) Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to “Anti-freeze Coolant Mixture Ratio”, **MA-13**.
 - b) After refilling coolant, run engine to ensure that no water-flow noise is emitted. After checking or replacing coolant, go to step 3) below.
2. Confirm whether customer filled the engine coolant or not. If customer filled the engine coolant, skip following steps and go to “Diagnostic Procedure”, EC-1452.
 3. Start engine and make sure that cooling fan (crankshaft driven) operates. If NG, go to “Diagnostic Procedure”, EC-1489. After repair, go to next step.
 4. Check for blocked coolant passage.
Warm up engine to normal operating temperature, then grasp upper and lower radiator hoses and make sure that coolant flows.
If NG, go to step 4 of “Diagnostic Procedure”, EC-1452. After repair, go to next step.
Be extremely careful not to touch any moving or adjacent parts.
 5. Check radiator for blocked air passage
Check for blocked condenser or radiator (condenser or radiator fins damaged, condenser or radiator clogged), after market fog lamps ...etc. Check for condenser or radiator fin damage, shroud damage, vehicle front end for clogging of debris or insects ...etc.
Check for improper fitting of front end cover, damaged radiator grille or bumper, vehicle frontal area damaged by collision but not repaired.
If NG, take appropriate action and then go to next step.
 6. Check ECT sensor for proper operation. Refer to step 5 of “Diagnostic Procedure”, EC-1452. If NG, replace ECT sensor and go to next step.

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

VG33ER

Overall Function Check (Cont'd)



7. Check ignition timing. Refer to "Basic Inspection", EC-1273. Make sure that ignition timing is $10^\circ \pm 2^\circ$ at 700 ± 50 rpm. If NG, adjust ignition timing and then recheck.

GI

MA

EM

LC

⊗ WITHOUT CONSULT-II

NGEC1241S02

1. Check the coolant level and mixture ratio (Using coolant tester) in the reservoir tank and radiator.

Allow engine to cool before checking coolant level and mixture ratio.

- If the coolant level in the reservoir and/or radiator is below the proper range, skip the following steps and go to "Diagnostic Procedure", EC-1452.
- If the coolant mixture ratio is out of range between 45 to 55%, replace the coolant. Refer to "Changing Engine Coolant", **MA-28**.

EC

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- a) Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to "Anti-freeze Coolant Mixture Ratio", **MA-15**.

AT

- b) After refilling coolant, run engine to ensure that no water-flow noise is emitted. After checking or replacing coolant, go to step 3) below.

TF

2. Confirm whether customer filled the engine coolant or not. If customer filled engine coolant, skip following steps and go to "Diagnostic Procedure", EC-1452.

PD

3. Start engine and make sure that cooling fan operates.

AX

Be careful not to overheat engine.

If NG, go to step 1 of "Diagnostic Procedure", EC-1452. After repair, go to next step.

SU

4. Check for blocked coolant passage. Warm up engine to normal operating temperature, then grasp upper and lower radiator hoses and make sure that coolant flows.

BR

If NG, go to step 4 of "Diagnostic Procedure", EC-1452. After repair, go to next step.

ST

Be extremely careful not to touch any moving or adjacent parts.

RS

5. Check radiator for blocked air passage. Check for blocked condenser or radiator (condenser or radiator fins damaged, condenser or radiator clogged), after market fog lamps,...etc. Check for condenser or radiator fin damage, shroud damage, vehicle front end for clogging of debris or insects ...etc.

BT

HA

Check for improper fitting of front end cover, damaged radiator grille or bumper, vehicle frontal area damaged by collision but not repaired.

SC

If NG, take appropriate action and then go to next step.

6. Check ECT sensor for proper operation. Refer to step 5 of "Diagnostic Procedure", EC-1452. If NG, replace ECT sensor and go to next step.

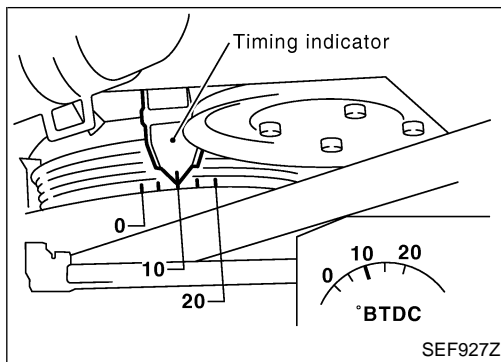
EL

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DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

VG33ER

Overall Function Check (Cont'd)



7. Check ignition timing. Refer to "Basic Inspection", EC-1273. Make sure that ignition timing is $10^\circ \pm 2^\circ$ at 700 ± 50 rpm. If NG, adjust ignition timing and then recheck.

Diagnostic Procedure

NGEC1243

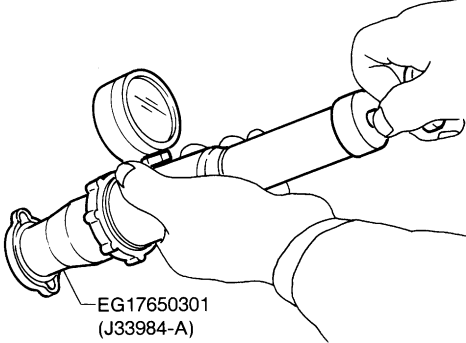
1	CHECK COOLING FAN (CRANKSHAFT DRIVEN) OPERATION	
Start engine and make sure that cooling fan (crankshaft driven) operates.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Check cooling fan (crankshaft driven). Refer to LC-34 , "Cooling Fan".

2	CHECK COOLING SYSTEM FOR LEAK	
Apply pressure to the cooling system with a tester, and check if the pressure drops.		
CAUTION: Higher than the specified pressure may cause radiator damage.		
Testing pressure: 157 kPa (1.6 kg/cm ² , 23 psi)		
Pressure should not drop.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Check the following for leak: <ul style="list-style-type: none"> ● Hose ● Radiator ● Water pump Refer to LC-29 , "Water Pump".

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

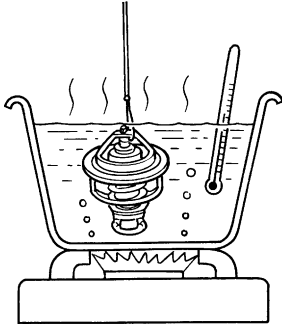
VG33ER

Diagnostic Procedure (Cont'd)

3	CHECK RADIATOR CAP		
Apply pressure to cap with a tester and check radiator cap relief pressure.			
			
SLC755A			
<p>Radiator cap relief pressure: 59 - 98 kPa (0.6 - 1.0 kg/cm², 9 - 14 psi)</p> <p style="text-align: center;">OK or NG</p>			
OK	▶	GO TO 4.	
NG	▶	Replace radiator cap.	

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4	CHECK THERMOSTAT		
<p>1. Check valve seating condition at normal room temperatures. It should seat tightly.</p> <p>2. Check valve opening temperature and valve lift.</p>			
			
SLC343			
<p>Valve opening temperature: 76.5°C (170°F) [standard]</p> <p>Valve lift: More than 10 mm/90°C (0.31 in/194°F)</p> <p>3. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to LC-31, "Thermostat".</p> <p style="text-align: center;">OK or NG</p>			
OK	▶	GO TO 5.	
NG	▶	Replace thermostat.	

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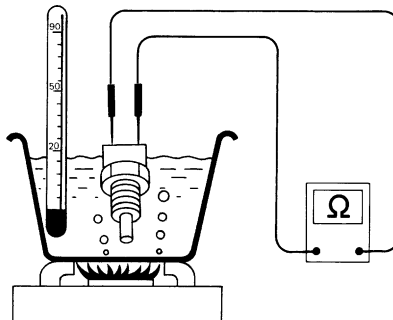
DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

VG33ER

Diagnostic Procedure (Cont'd)

5 CHECK ENGINE COOLANT TEMPERATURE SENSOR

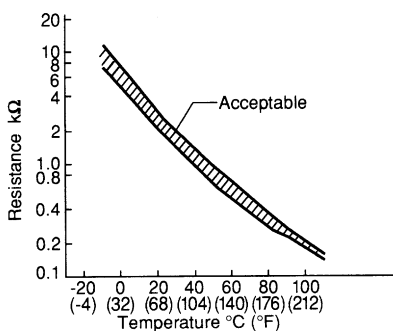
Check resistance as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

SEF152P



MTBL0229

SEF012P

OK or NG

OK ► GO TO 6.

NG ► Replace engine coolant temperature sensor.

6 CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-1455.

► **INSPECTION END**

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

VG33ER

Main 12 Causes of Overheating

Main 12 Causes of Overheating

NGEC1244

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	<ul style="list-style-type: none"> Blocked radiator Blocked condenser Blocked radiator grille Blocked bumper 	<ul style="list-style-type: none"> Visual 	No blocking	—
	2	<ul style="list-style-type: none"> Coolant mixture 	<ul style="list-style-type: none"> Coolant tester 	50 - 50% coolant mixture	See "RECOMMENDED FLUIDS AND LUBRICANTS" in MA-13 .
	3	<ul style="list-style-type: none"> Coolant level 	<ul style="list-style-type: none"> Visual 	Coolant up to MAX level in reservoir tank and radiator filler neck	See "Changing Engine Coolant", "ENGINE MAINTENANCE" in MA-28 .
	4	<ul style="list-style-type: none"> Radiator cap 	<ul style="list-style-type: none"> Pressure tester 	59 - 98 kPa (0.6 - 1.0 kg/cm ² , 9 - 14 psi) (Limit)	See "System Check" in LC-28 .
ON*1	5	<ul style="list-style-type: none"> Coolant leaks 	<ul style="list-style-type: none"> Visual 	No leaks	See "System Check" in LC-29 .
ON*1	6	<ul style="list-style-type: none"> Thermostat 	<ul style="list-style-type: none"> Touch the upper and lower radiator hoses 	Both hoses should be hot	See "Thermostat" and "Radiator" in LC-31, LC-32 .
ON*1	7	<ul style="list-style-type: none"> Cooling fan (Crankshaft driven) 	<ul style="list-style-type: none"> Visual 	Operating	See LC-34 , "Cooling Fan".
OFF	8	<ul style="list-style-type: none"> Combustion gas leak 	<ul style="list-style-type: none"> Color checker chemical tester 4 Gas analyzer 	Negative	—
ON*2	9	<ul style="list-style-type: none"> Coolant temperature gauge 	<ul style="list-style-type: none"> Visual 	Gauge less than 3/4 when driving	—
		<ul style="list-style-type: none"> Coolant overflow to reservoir tank 	<ul style="list-style-type: none"> Visual 	No overflow during driving and idling	See "Changing Engine Coolant", "ENGINE MAINTENANCE" in MA-28 .
OFF*3	10	<ul style="list-style-type: none"> Coolant return from reservoir tank to radiator 	<ul style="list-style-type: none"> Visual 	Should be initial level in reservoir tank	See "ENGINE MAINTENANCE" in MA-26 .
OFF	11	<ul style="list-style-type: none"> Cylinder head 	<ul style="list-style-type: none"> Straight gauge feeler gauge 	0.1 mm (0.004 in) Maximum distortion (warping)	See "Inspection", "CYLINDER HEAD" in EM-96 .
	12	<ul style="list-style-type: none"> Cylinder block and pistons 	<ul style="list-style-type: none"> Visual 	No scuffing on cylinder walls or piston	See "Inspection", "CYLINDER BLOCK" in EM-117 .

*1: Engine running at 3,000 rpm for 10 minutes.

*2: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*3: After 60 minutes of cool down time.

For more information, refer to "OVERHEATING CAUSE ANALYSIS", **LC-35**.

Description
SYSTEM DESCRIPTION

NGEC1359

NGEC1359S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Super-charged air control	SCB valve control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		

This system controls supercharged air according to the engine operating conditions.

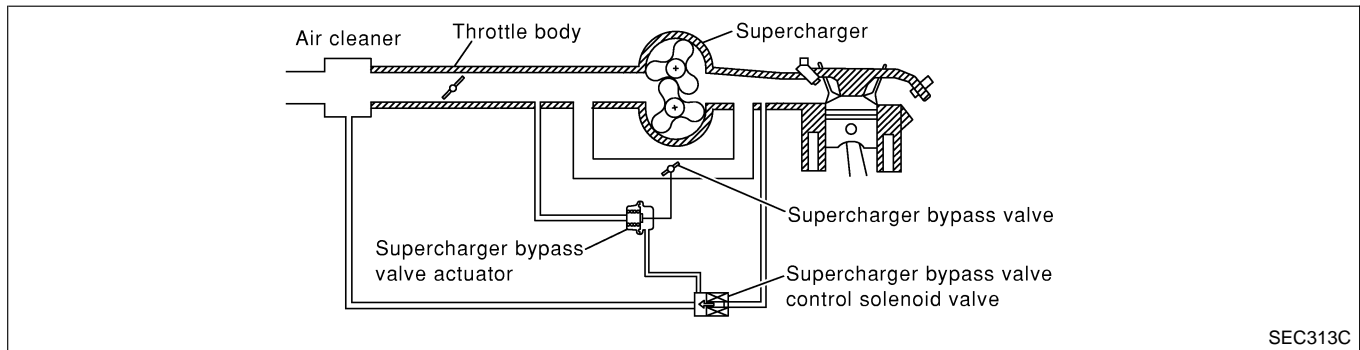
This control operation is accomplished through the ECM and the SCB valve control solenoid valve.

When the solenoid valve is ON, the SCB valve shuts. Then intake air is lead to supercharger, and supercharged air is sent to the cylinder.

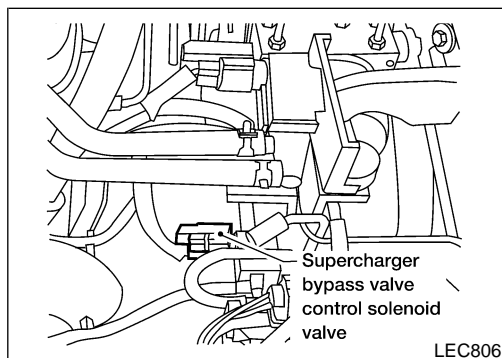
When the solenoid valve is OFF, the SCB valve opens. Then intake air is sent to the cylinder directly.

When the ECM detects any of the following conditions, current does not flow through the solenoid valve.

- Engine stopped
- Engine starting
- High-load, high-speed engine operation
- Excessively low engine coolant temperature
- Mass air flow sensor malfunction
- Engine coolant temperature sensor malfunction
- Throttle position sensor malfunction



SEC313C



LEC806

COMPONENT DESCRIPTION

SCB Valve Control Solenoid Valve

NGEC1359S02

NGEC1359S0201

The SCB valve control solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the solenoid valve is bypassed to apply intake manifold vacuum to the SCB valve actuator. This operation closes the SCB valve. When the ECM sends an OFF signal, the vacuum signal is cut and the SCB valve opens.

CONSULT-II Reference Value in Data Monitor Mode

NGEC1360

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
SCB/V CON S/V	More than 5 seconds after turning ignition switch ON (Engine stopped)	OFF
	Engine speed: Idle	ON

ECM Terminals and Reference Value

NGEC1361

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 the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6	G/W	SCB valve control solenoid valve	[Ignition switch ON] ● Engine stopped	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Idle speed	Approximately 0V

On Board Diagnosis Logic

NGEC1362

Malfunction is detected when the improper voltage signal is sent to ECM through SCB valve control solenoid valve.

Freeze frame data will not be stored in the ECM for the SCB valve control solenoid. The MIL will not light for SCB valve control solenoid malfunction.

POSSIBLE CAUSE

NGEC1362S01

- Harness or connectors (The SCB valve control solenoid valve circuit is open or shorted.)
- SCB valve control solenoid valve

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DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NGEC1363

With CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 10 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1460.

With GST

Follow the procedure "WITH CONSULT-II" above.

Wiring Diagram

NGEC1364

EC-S/CHGR-01

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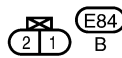
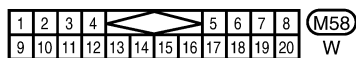
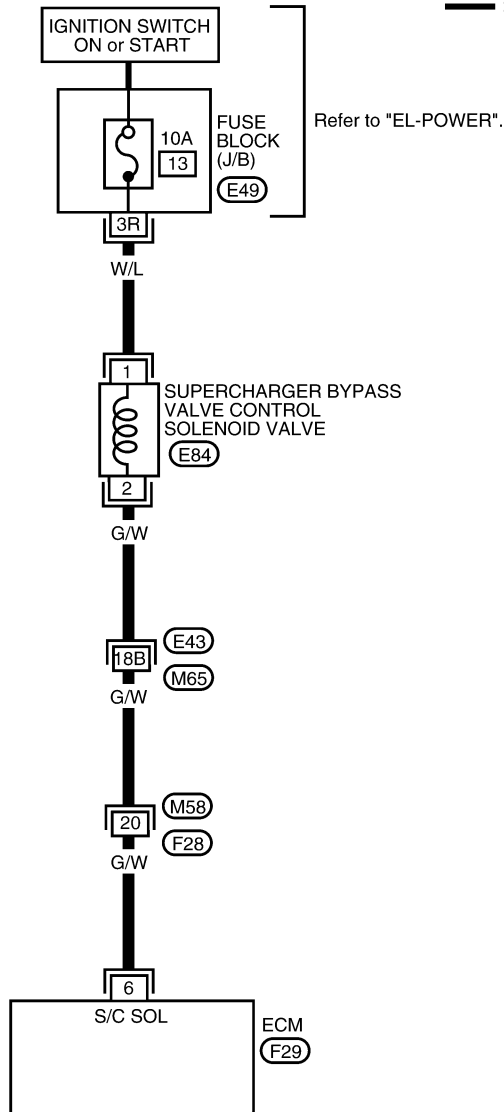
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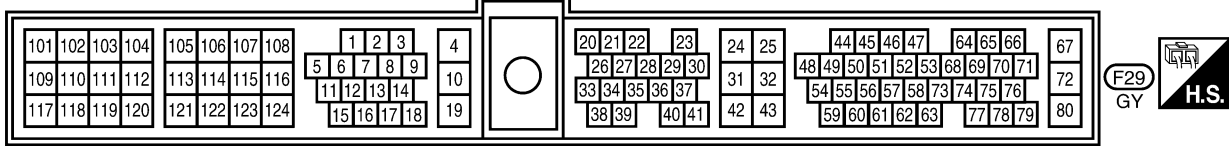
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— : Detectable line for DTC
 — : Non-detectable line for DTC

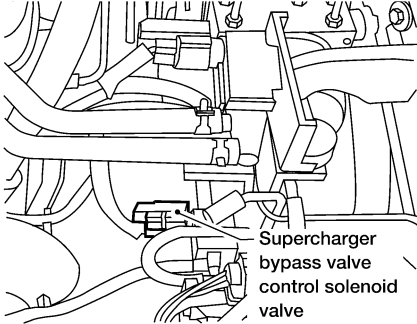
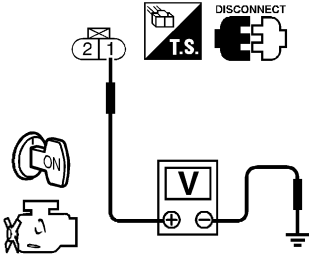


Refer to the following.
 (M65), (E43) - SUPER MULTIPLE JUNCTION (SMJ)



Diagnostic Procedure

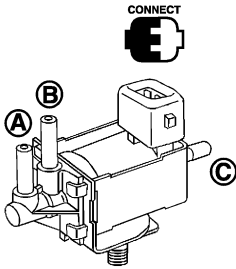
NGEC1365

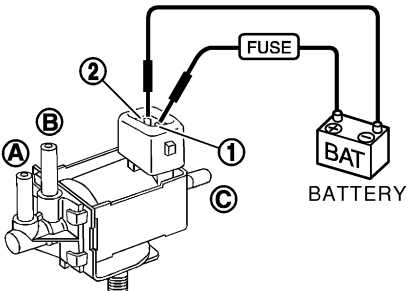
1	CHECK SCB VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT
<p>1. Turn ignition switch "OFF". 2. Disconnect SCB valve control solenoid valve harness connector.</p> <div style="text-align: center;">  <p style="text-align: right; margin-right: 50px;">Supercharger bypass valve control solenoid valve</p> </div> <p style="text-align: right; margin-right: 50px;"><small>LEC806</small></p> <p>3. Turn ignition switch "ON". 4. Check voltage between SCB valve control solenoid valve terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="text-align: right; margin-right: 50px;"><small>SEF657W</small></p> <p style="text-align: center; color: blue;">Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Fuse block (J/B) connector E49 ● 10A fuse ● Harness for open or short between SCB valve control solenoid valve and fuse 	
▶	Repair harness or connectors.

3	CHECK SCB VALVE CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 6 and SCB valve control solenoid valve terminal 2. Refer to Wiring Diagram. Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ Repair open circuit or short to ground or short to power in harness or connectors.

4	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors E74, M82 ● Harness connectors M58, F28 ● Harness for open or short between SCB valve control solenoid valve and ECM 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK SCB VALVE CONTROL SOLENOID VALVE																						
(E) With CONSULT-II 1. Perform "SCB/V CONT SOL/V" in "ACTIVE TEST" mode. 2. Check air passage continuity and operation delay time under the following conditions.																							
	<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>SCB/V CONT SOL/V</th> <th>ON</th> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <th>ENG SPEED</th> <th>XXXrpm</th> </tr> <tr> <th>IACV-AAC/V</th> <th>XXX%</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table>	ACTIVE TEST		SCB/V CONT SOL/V	ON	MONITOR		ENG SPEED	XXXrpm	IACV-AAC/V	XXX%												
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<table border="1" style="margin: auto;"> <thead> <tr> <th>Conditions</th> <th>Air passage continuity between A and B</th> <th>Air passage continuity between A and C</th> </tr> </thead> <tbody> <tr> <td>ON</td> <td>No</td> <td>Yes</td> </tr> <tr> <td>OFF</td> <td>Yes</td> <td>No</td> </tr> </tbody> </table>		Conditions	Air passage continuity between A and B	Air passage continuity between A and C	ON	No	Yes	OFF	Yes	No													
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ON	No	Yes																					
OFF	Yes	No																					
SEC314C																							

(X) Without CONSULT-II Check air passage continuity and operation delay time under the following conditions.										
	<table border="1" style="margin: auto;"> <thead> <tr> <th>Conditions</th> <th>Air passage continuity between A and B</th> <th>Air passage continuity between A and C</th> </tr> </thead> <tbody> <tr> <td>12V direct current supply between terminals 1 and 2</td> <td>No</td> <td>Yes</td> </tr> <tr> <td>No supply</td> <td>Yes</td> <td>No</td> </tr> </tbody> </table>	Conditions	Air passage continuity between A and B	Air passage continuity between A and C	12V direct current supply between terminals 1 and 2	No	Yes	No supply	Yes	No
Conditions	Air passage continuity between A and B	Air passage continuity between A and C								
12V direct current supply between terminals 1 and 2	No	Yes								
No supply	Yes	No								
SEC315C										
OK or NG										
OK	▶	GO TO 6.								
NG	▶	Replace SCB valve control solenoid valve.								

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.	
▶	INSPECTION END

GI
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DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33ER

On Board Diagnosis Logic

On Board Diagnosis Logic

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the CKP sensor signal to vary, ECM can determine that a misfire is occurring.

NGEC1245

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (OBD)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

- One Trip Detection Logic (Three Way Catalyst Damage)**
On the 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.
- 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.

Malfunction is detected when multiple cylinders misfire, No. 1 cylinder misfires, No. 2 cylinder misfires, No. 3 cylinder misfires, No. 4 cylinder misfires, No. 5 cylinder misfires and No. 6 cylinder misfires.

POSSIBLE CAUSE

NGEC1245S01

- Improper spark plug
- Insufficient compression
- Incorrect fuel pressure
- The injector circuit is open or shorted
- Injectors
- Intake air leak
- The ignition secondary circuit is open or shorted
- Lack of fuel
- Drive plate or flywheel
- Heated oxygen sensor 1
- Incorrect distributor rotor

DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33ER

DTC Confirmation Procedure

4	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SE	XXX km/h
	P/N POSI SW	OFF
	B/FUEL SCHDL	XXX msec

SEF213Y

DTC Confirmation Procedure

=NGEC1246

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 5 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 5 seconds.
- 4) Start engine again and drive at 1,500 to 3,000 rpm for at least 3 minutes.

Hold the accelerator pedal as steady as possible.

NOTE:

Refer to the freeze frame data for the test driving conditions.

- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1463.

With GST

Follow the procedure "With CONSULT-II".

Diagnostic Procedure

NGEC1247

1	CHECK FOR INTAKE AIR LEAK	
1. Start engine and run it at idle speed. 2. Listen for the sound of the intake air leak.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Discover air leak location and repair.

2	CHECK FOR EXHAUST SYSTEM CLOGGING	
Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace it.

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DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33ER

Diagnostic Procedure (Cont'd)

3 PERFORM POWER BALANCE TEST

With CONSULT-II

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.

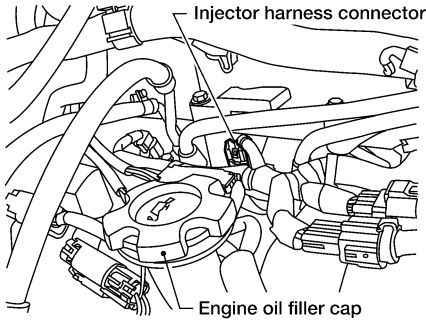
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS AIF SE-B1	XXX V
IACV-AAC/V	XXX step

SEF070Y

2. Is there any cylinder which does not produce a momentary engine speed drop?

Without CONSULT-II

When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?



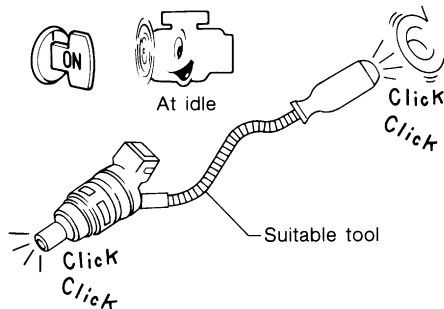
LEC809

Yes or No

- | | | |
|-----|---|----------|
| Yes | ▶ | GO TO 4. |
| No | ▶ | GO TO 7. |

4 CHECK INJECTOR

Does each injector make an operating sound at idle?



MEC703B

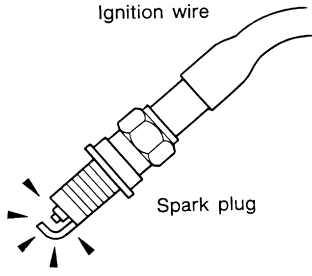
Yes or No

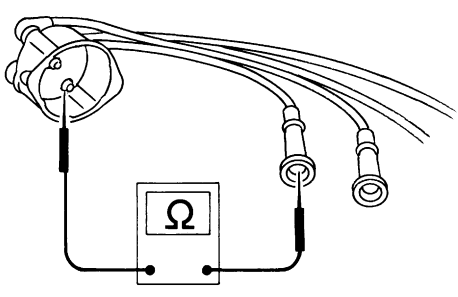
- | | | |
|-----|---|---|
| Yes | ▶ | GO TO 5. |
| No | ▶ | Check injector(s) and circuit(s). Refer to EC-1725. |

DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33ER

Diagnostic Procedure (Cont'd)

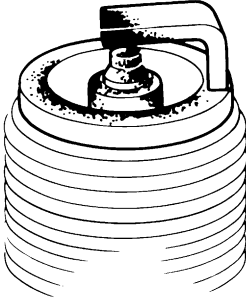
5	CHECK IGNITION SPARK	<ol style="list-style-type: none"> 1. Disconnect ignition wire from spark plug. 2. Connect a known good spark plug to the ignition wire. 3. Place end of spark plug against a suitable ground and crank engine. 4. Check for spark. <div style="text-align: center; margin: 20px 0;">  </div> <p style="text-align: right;">SEF282G</p> <p style="text-align: center;">OK or NG</p>	GI MA EM LC EC FE CL MT
OK	▶	GO TO 7.	
NG	▶	GO TO 6.	

6	CHECK IGNITION WIRES	<ol style="list-style-type: none"> 1. Inspect wires for cracks, damage, burned terminals and for improper fit. 2. Measure the resistance of wires to their distributor cap terminal. Move each wire while testing to check for intermittent breaks. <div style="text-align: center; margin: 20px 0;">  </div> <p style="text-align: right;">SEF174P</p> <p>Resistance:</p> <table border="1" style="margin: 20px auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 5px;">Cylinder No.</th> <th style="padding: 5px;">Resistance kΩ [at 25°C (77°F)]</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">1</td> <td style="padding: 5px;">Approximately 6.5</td> </tr> <tr> <td style="padding: 5px;">2</td> <td style="padding: 5px;">Approximately 10.0</td> </tr> <tr> <td style="padding: 5px;">3</td> <td style="padding: 5px;">Approximately 8.5</td> </tr> <tr> <td style="padding: 5px;">4</td> <td style="padding: 5px;">Approximately 12.5</td> </tr> <tr> <td style="padding: 5px;">5</td> <td style="padding: 5px;">Approximately 8.5</td> </tr> <tr> <td style="padding: 5px;">6</td> <td style="padding: 5px;">Approximately 11.0</td> </tr> </tbody> </table> <p style="text-align: right;">MTBL0235</p> <p>If the resistance exceeds the above specification, inspect ignition wire to distributor cap connection. Clean connection or replace the ignition wire with a new one.</p> <p style="text-align: center;">OK or NG</p>	Cylinder No.	Resistance kΩ [at 25°C (77°F)]	1	Approximately 6.5	2	Approximately 10.0	3	Approximately 8.5	4	Approximately 12.5	5	Approximately 8.5	6	Approximately 11.0	AT TF PD AX SU BR ST RS BT HA SC EL IDX
Cylinder No.	Resistance kΩ [at 25°C (77°F)]																
1	Approximately 6.5																
2	Approximately 10.0																
3	Approximately 8.5																
4	Approximately 12.5																
5	Approximately 8.5																
6	Approximately 11.0																
OK	▶	Check the following: <ul style="list-style-type: none"> ● Distributor rotor head for incorrect parts ● Ignition coil, power transistor and their circuits Refer to EC-1718.															
NG	▶	Replace.															

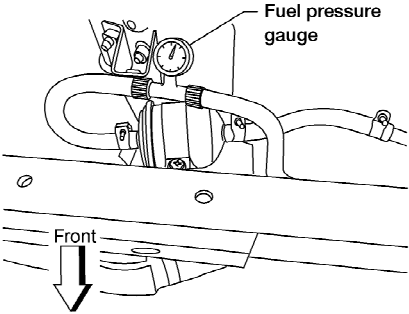
DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33ER

Diagnostic Procedure (Cont'd)

7	CHECK SPARK PLUGS	
Remove the spark plugs and check for fouling, etc.		
		
SEF156I		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Repair or replace spark plug(s) with standard type one(s). For spark plug type, refer to "ENGINE MAINTENANCE", MA-34 .

8	CHECK COMPRESSION PRESSURE	
Refer to EM-77 .		
<ul style="list-style-type: none"> ● Check compression pressure. 		
<ul style="list-style-type: none"> Standard: <li style="padding-left: 40px;">1,196 kPa (12.2 kg/cm², 173 psi)/300 rpm Minimum: <li style="padding-left: 40px;">883 kPa (9.0 kg/cm², 128 psi)/300 rpm Difference between each cylinder: <li style="padding-left: 40px;">98 kPa (1.0 kg/cm², 14 psi)/300 rpm 		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

9	CHECK FUEL PRESSURE	
<ol style="list-style-type: none"> 1. Install any parts removed. 2. Release fuel pressure to zero. Refer to EC-1217. 3. Install fuel pressure gauge and check fuel pressure. 		
		
AEC064B		
OK or NG		
OK	▶	GO TO 11.
NG	▶	GO TO 10.

At idle:
Approx. 235 kPa (2.4 kg/cm², 34 psi)

DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33ER

Diagnostic Procedure (Cont'd)

10	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Fuel pump and circuit (Refer to EC-1733.) ● Fuel pressure regulator (Refer to EC-1218.) ● Fuel lines (Refer to "ENGINE MAINTENANCE", MA-31.) ● Fuel filter for clogging 	
	Repair or replace.

GI
MA
EM

11	CHECK IGNITION TIMING										
<p>Check the following items. Refer to "Basic Inspection", EC-1273.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Items</th> <th style="text-align: center;">Specifications</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Ignition timing</td> <td style="text-align: center;">10° ± 2° BTDC</td> </tr> <tr> <td style="text-align: center;">Base idle speed</td> <td style="text-align: center;">700 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td style="text-align: center;">Closed throttle position switch idle position adjustment</td> <td style="text-align: center;">Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF</td> </tr> <tr> <td style="text-align: center;">Target idle speed</td> <td style="text-align: center;">750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">MTBL0576</p> <p style="text-align: center;">OK or NG</p>		Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
Items	Specifications										
Ignition timing	10° ± 2° BTDC										
Base idle speed	700 ± 50 rpm (in "P" or "N" position)										
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF										
Target idle speed	750 ± 50 rpm (in "P" or "N" position)										
OK (With CONSULT-II)	GO TO 12.										
OK (Without CONSULT-II)	GO TO 13.										
NG	Adjust ignition timing.										

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DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33ER

Diagnostic Procedure (Cont'd)

12 CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, and select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

5. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown left:

Bank 1
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

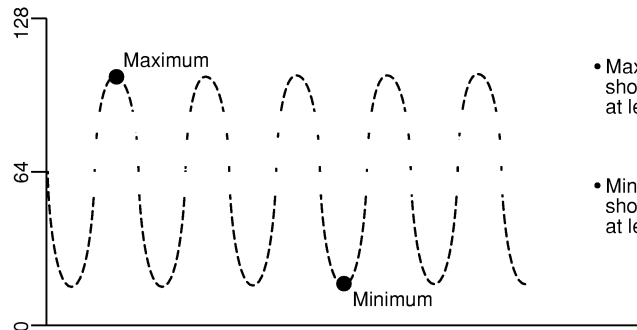
Bank 2
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

R means HO2S1
 MNTR (B1)/(B2) indicates RICH
 L means HO2S1
 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace heated oxygen sensor 1.

DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33ER

Diagnostic Procedure (Cont'd)

13	CHECK FRONT HEATED OXYGEN SENSOR LH/RH
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Set voltmeter probes between ECM terminal 50 (right bank sensor signal) or 51 (left bank sensor signal) and engine ground. Check the following with engine speed held at 2,000 rpm constant under no load. 	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> </div> <div style="width: 50%;"> <ul style="list-style-type: none"> The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. The maximum voltage is over 0.6V at least one time. The minimum voltage is below 0.3V at least one time. The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>	
SEF796Z	
<p>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.</p>	
OK or NG	
OK	▶ GO TO 15.
NG	▶ GO TO 14.



14	REPLACE HEATED OXYGEN SENSOR 2
<ol style="list-style-type: none"> Stop vehicle and turn ignition switch OFF. Check heated oxygen sensor 2 harness protector color. 	
<p>HO2S2 (bank 1): Gray HO2S2 (bank 2): Red Brown</p>	
SEC301CA	
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 2.

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DTC P0300 - P0306 NO. 6 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

VG33ER

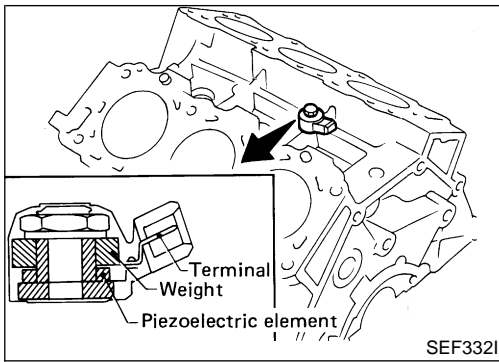
Diagnostic Procedure (Cont'd)

15	CHECK MASS AIR FLOW SENSOR	
<p> With CONSULT-II Check mass air flow sensor signal in "DATA MONITOR" mode with CONSULT-II. 3.3 - 4.8 g-m/sec: at idling 12.0 - 14.9 g-m/sec: at 2,500 rpm</p>		
<p> With GST Check mass air flow sensor signal in MODE 1 with GST. 3.3 - 4.8 g-m/sec: at idling 12.0 - 14.9 g-m/sec: at 2,500 rpm</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 16.
NG	▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-1334.

16	CHECK SYMPTOM MATRIX CHART	
Check items on the rough idle symptom in "Symptom Matrix Chart", EC-1290. <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 17.
NG	▶	Repair or replace.

17	ERASE THE 1ST TRIP DTC	
Some tests may cause a 1st trip DTC to be set. Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-1246.		
	▶	GO TO 18.

18	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.		
	▶	INSPECTION END



Component Description

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM. **Freeze frame data will not be stored in the ECM for the knock sensor. The MIL will not light for knock sensor malfunction. The knock sensor has one trip detection logic.**

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

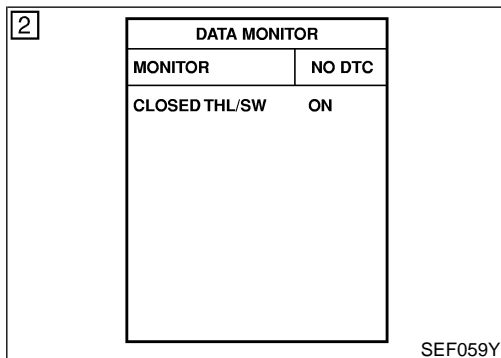
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
64	W	Knock sensor	[Engine is running] ● Idle speed	Approximately 2.5V

On Board Diagnosis Logic

Malfunction is detected when an excessively low (P0327) or high (P0328) voltage from the knock sensor is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors (The knock sensor circuit is open or shorted.)
- Knock sensor



DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

With CONSULT-II

- 1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and run it for at least 5 seconds at idle speed.
- 3) If DTC is detected, go to "Diagnostic Procedure", EC-1473.

With GST

Follow the procedure "With CONSULT-II".

Diagnostic Procedure

NGEC1253

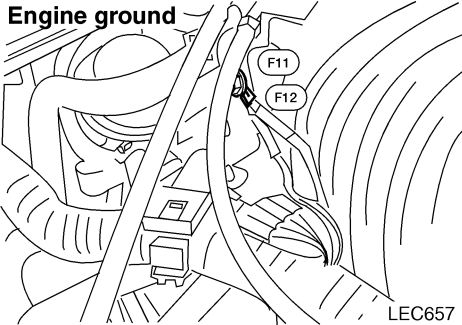
1	CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I	
	<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check resistance between ECM terminal 64 and engine ground. NOTE: It is necessary to use an ohmmeter which can measure more than 10 MΩ. Resistance: Approximately 500 - 620 kΩ [at 25°C (77°F)]</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶	GO TO 5.
NG	▶	GO TO 2.

2	CHECK INPUT SIGNAL CIRCUIT-II	
	<p>1. Disconnect knock sensor harness connector. 2. Check harness continuity between ECM terminal 64 and knock sensor terminal 1. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART	
	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connector F37, F101 ● Harness for open or short between ECM and knock sensor 	
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK KNOCK SENSOR	
	<ul style="list-style-type: none"> ● Use an ohmmeter which can measure more than 10 MΩ. <p>1. Disconnect knock sensor harness connector. 2. Check resistance between terminal 1 and ground.</p> <div style="display: flex; align-items: center;"> <div style="flex: 1;"> </div> <div style="flex: 1; text-align: center;"> <p>Resistance: 500 - 620 kΩ [at 25°C (77°F)]</p> </div> </div> <p style="text-align: right;"><small>SEF799Z</small></p> <p>CAUTION: Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶	GO TO 8.
NG	▶	Replace knock sensor.

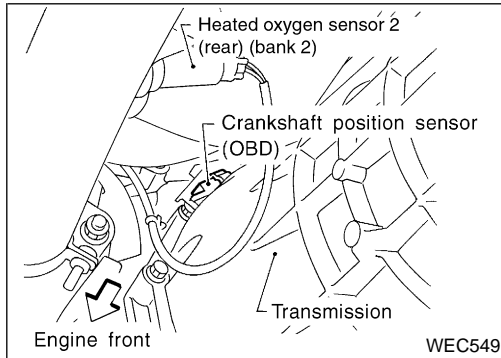
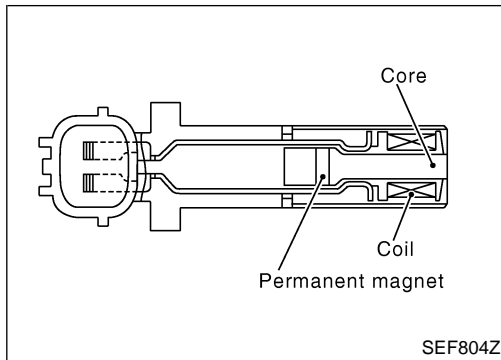
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5	RETIGHTEN GROUND SCREWS
<p>Loose and retighten engine ground screws.</p> <div style="text-align: center;">  <p>LEC657</p> </div>	
<p>▶ GO TO 6.</p>	

6	CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT
<p>1. Disconnect harness connectors F37, F101. 2. Check harness continuity between harness connector F37 terminal 7 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p>	
OK or NG	
OK	▶ GO TO 8.
NG	▶ GO TO 7.

7	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F37, F101 ● Joint connectors-1 (if equipped) ● Harness for open between harness connector F37 and engine ground 	
<p>▶ Repair open circuit or short to power in harness or connectors.</p>	

8	CHECK INTERMITTENT INCIDENT
<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.</p>	
<p>▶ INSPECTION END</p>	



Component Description

NGEC1254

The crankshaft position sensor (OBD) is located on the transaxle housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet, core and coil.

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.

This sensor is not used to control the engine system. It is used only for the on board diagnosis.

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ECM Terminals and Reference Value

NGEC1255

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 the ECM terminals, such as the ground.

AT

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TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
47	L	Crankshaft position sensor (OBD)	<p>[Engine is running]</p> <ul style="list-style-type: none"> Warm-up condition Idle speed 	<p>1 - 2V (AC range)</p> <p>SEF690W</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> Engine speed is 2,000 rpm 	<p>3 - 4V (AC range)</p> <p>SEF691W</p>

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On Board Diagnosis Logic

Malfunction is detected when the proper pulse signal from the crankshaft position sensor (OBD) is not sent to ECM while the engine is running at the specified engine speed. NGEC1256

POSSIBLE CAUSE

- Harness or connectors
[The crankshaft position sensor (OBD) circuit is open.]
- Crankshaft position sensor (OBD)

NGEC1256S01

2	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: center;">DATA MONITOR</th> </tr> <tr> <th style="text-align: center;">MONITOR</th> <th style="text-align: center;">NO DTC</th> </tr> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> </table>	DATA MONITOR		MONITOR	NO DTC	ENG SPEED	XXX rpm
DATA MONITOR							
MONITOR	NO DTC						
ENG SPEED	XXX rpm						

SEF058Y

DTC Confirmation Procedure

NGEC1257

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 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 run it for at least 15 seconds at idle speed.
- 3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1478.

With GST

Follow the procedure “With CONSULT-II”.

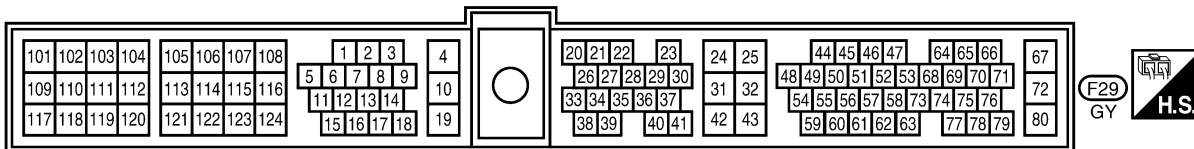
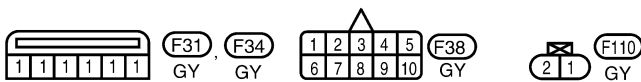
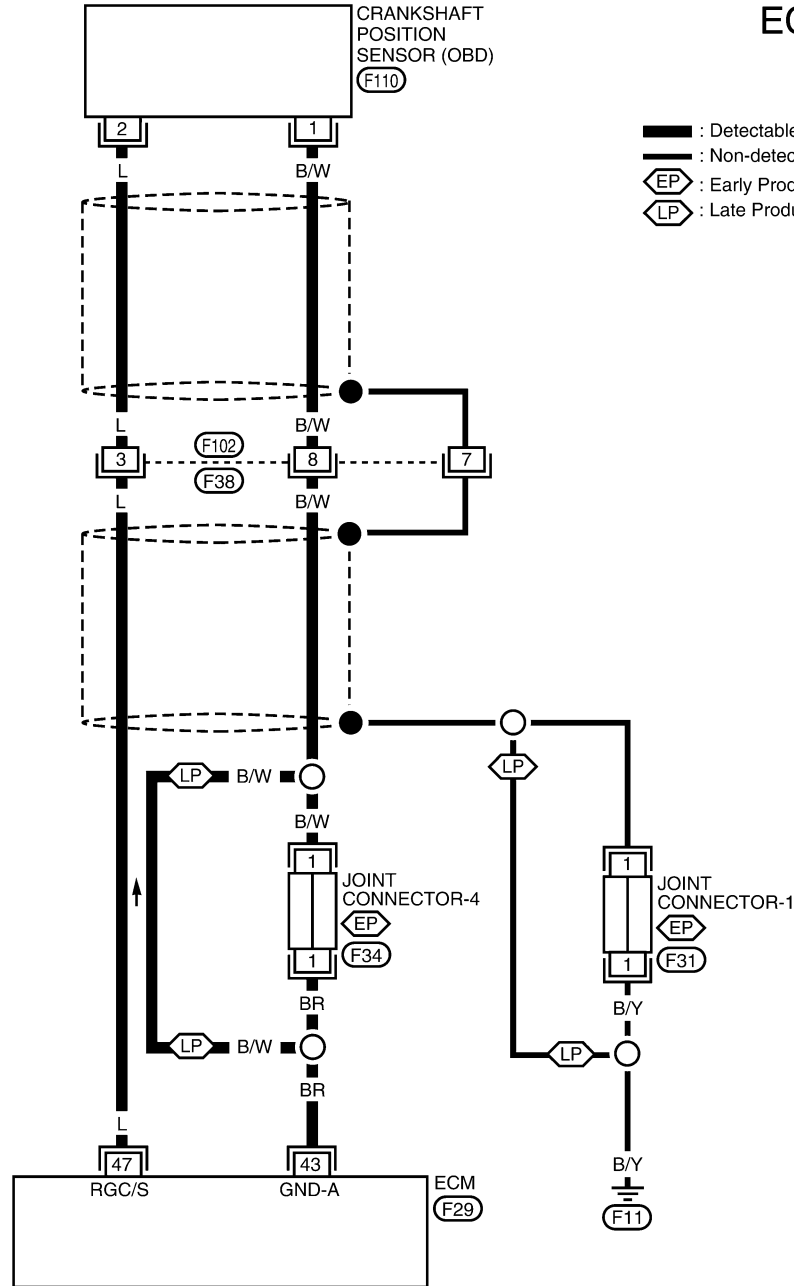
DTC P0335 CKP SENSOR (OBD)

VG33ER
Wiring Diagram

Wiring Diagram

NGEC1258

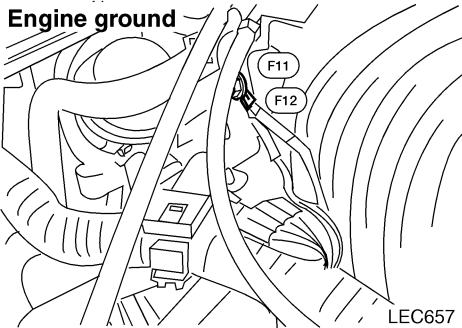
EC-CKPS-01

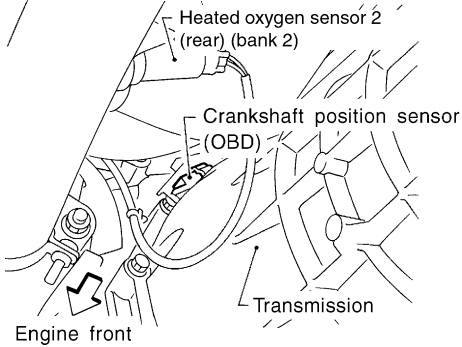


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Diagnostic Procedure

NGEC1259

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p> <div style="text-align: center;">  </div>	
<small>LEC657</small>	
▶ GO TO 2.	

2	CHECK CKPS (OBD) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT						
<p>1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.</p> <div style="text-align: center;">  </div>							
<small>WEC549</small>							
<p>2. Check continuity between ECM terminal 47 and sensor terminal 2. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>							
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%; border-right: 1px solid black;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 4.</td> </tr> <tr> <td style="border-right: 1px solid black;">NG</td> <td style="text-align: center;">▶</td> <td>GO TO 3.</td> </tr> </table>		OK	▶	GO TO 4.	NG	▶	GO TO 3.
OK	▶	GO TO 4.					
NG	▶	GO TO 3.					

3	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Harness for open or short between ECM and crankshaft position sensor (OBD) 	
▶ Repair open circuit or short to ground or short to power in harness or connectors.	

DTC P0335 CKP SENSOR (OBD)

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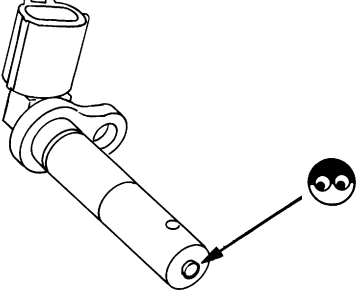
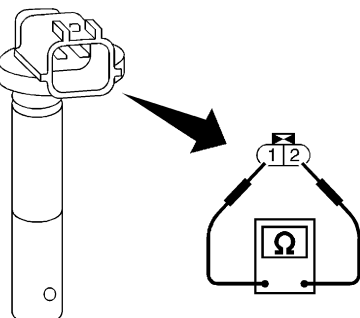
Diagnostic Procedure (Cont'd)

4	CHECK CKPS (OBD) GROUND CIRCUIT FOR OPEN AND SHORT	
<ol style="list-style-type: none"> 1. Reconnect ECM harness connector. 2. Check harness continuity between sensor terminal 1 and engine 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.

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5	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Joint connector-4 (if equipped) ● Harness for open or short between crankshaft position sensor (OBD) and ECM 		
▶ Repair open circuit or short to power in harness or connectors.		

EC
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6	CHECK CRANKSHAFT POSITION SENSOR (OBD)	
<ol style="list-style-type: none"> 1. Disconnect crankshaft position sensor (OBD) harness connector. 2. Loosen the fixing bolt of the sensor. 3. Remove the sensor. 4. Visually check the sensor for chipping. 		
		
<p>5. Check resistance as shown in the figure.</p>		
		
<p>Resistance: Approximately 512 - 632Ω [at 20°C (68°F)]</p>		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Replace crankshaft position sensor (OBD).

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DTC P0335 CKP SENSOR (OBD)

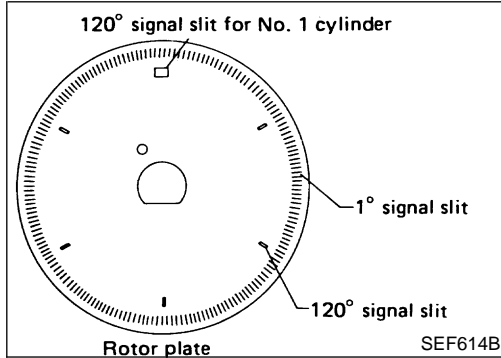
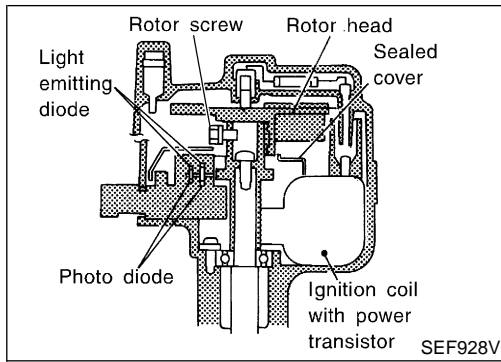
VG33ER

Diagnostic Procedure (Cont'd)

7	CHECK CKPS (OBD) SHIELD CIRCUIT FOR OPEN AND SHORT
1. Disconnect harness connectors F38, F102. 2. Check harness continuity between harness connector F38 terminal 7 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.	
OK or NG	
OK	▶ GO TO 9.
NG	▶ GO TO 8.

8	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness connectors F38, F102● Joint connector-1 (if equipped)● Harness for open between harness connector F38 and engine ground	
	▶ Repair open circuit or short to power in harness or connectors.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.	
	▶ INSPECTION END



Component Description

NGEC1260

The camshaft position sensor is a basic component of the engine control system. It monitors engine speed and piston position. These input signals to the ECM are used to control fuel injection, ignition timing and other functions.

The camshaft position sensor has a rotor plate and a wave-forming circuit. The rotor plate has 360 slits for a 1° (POS) signal and 6 slits for a 120° (REF) signal. The wave-forming circuit consists of Light Emitting Diodes (LED) and photo diodes.

The rotor plate is positioned between the LED and the photo diode. The LED transmits light to the photo diode. As the rotor plate turns, the slits cut the light to generate rough-shaped pulses. These pulses are converted into on-off signals by the wave-forming circuit and sent to the ECM.

The distributor is not repairable and must be replaced as an assembly except distributor cap and rotor head.

NOTE:

The rotor screw which secures the distributor rotor head to the distributor shaft must be torqued properly.

: 3.6±0.3 N·m (37±3 kg-cm, 32±3 in-lb)

ECM Terminals and Reference Value

NGEC1261

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

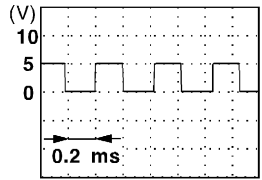
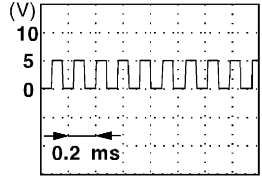
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self shut-off)	[Engine is running] [Ignition switch OFF] ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch OFF] ● A few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
44	PU	Camshaft position sensor (Reference signal)	[Engine is running] ● Idle speed	0.3 - 0.5V
48	PU		[Engine is running] ● Engine speed is 2,000 rpm	0.3 - 0.5V

DTC P0340 CMP SENSOR

VG33ER

ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	LG	Camshaft position sensor (Position signal)	[Engine is running] <ul style="list-style-type: none"> • Warm-up condition • Idle speed 	Approximately 2.5V 
			[Engine is running] <ul style="list-style-type: none"> • Engine speed is 2,000 rpm 	Approximately 2.5V 
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	[Engine is running] <ul style="list-style-type: none"> • Idle speed 	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC1262

Malfunction is detected when

(Malfunction A) either 1° or 120° signal is not sent to ECM for the first few seconds during engine cranking,

(Malfunction B) either 1° or 120° signal is not sent to ECM often enough while the engine speed is higher than the specified engine speed,

(Malfunction C) the relation between 1° and 120° signal is not in the normal range during the specified engine speed.

POSSIBLE CAUSE

NGEC1262S01

- Harness or connectors
(The camshaft position sensor circuit is open or shorted.)
- Camshaft position sensor
- Starter motor (Refer to **SC-11**.)
- Starting system circuit (Refer to **SC-14**.)
- Dead (Weak) battery

DTC Confirmation Procedure

NGEC1263

NOTE:

- Perform “PROCEDURE FOR MALFUNCTION A” first. If DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B AND C”.
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

PROCEDURE FOR MALFUNCTION A

NGEC1263S01

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Crank engine for at least 2 seconds.
- 4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1485.

With GST

Follow the procedure “With CONSULT-II”.

2

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C

SEF013Y

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B AND C

NGEC1263S02

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select “DATA MONITOR” mode with CONSULT-II.
- 3) Start engine and run it for at least 2 seconds at idle speed.
- 4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1485.

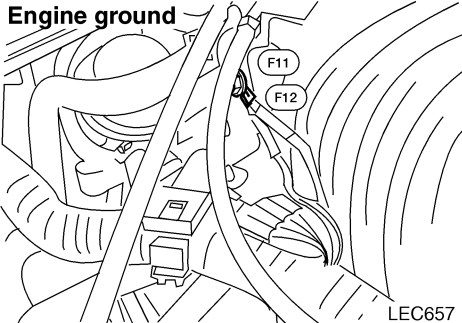
With GST

Follow the procedure “With CONSULT-II”.

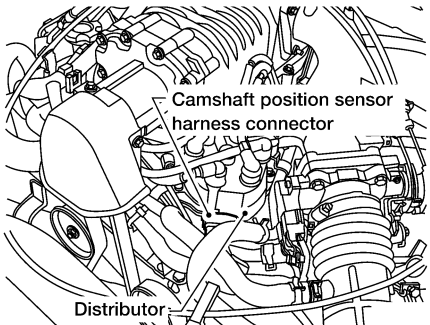
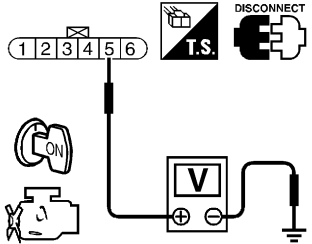
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Diagnostic Procedure

NGEC1265

1	RETIGHTEN GROUND SCREWS
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws. 	
 <p style="text-align: right;">LEC657</p>	
LEC657	
▶ GO TO 2.	

 GI
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2	CHECK CMPS POWER SUPPLY CIRCUIT
<ol style="list-style-type: none"> 1. Disconnect camshaft position sensor harness connector. 	
 <p style="text-align: right;">LEC810</p>	
<ol style="list-style-type: none"> 2. Turn ignition switch ON. 3. Check voltage between CMPS terminal 5 and ground with CONSULT-II or tester. 	
	
<p>Voltage: Battery voltage</p> <p>OK or NG</p>	
SEF708U	
OK	▶ GO TO 4.
NG	▶ GO TO 3.

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DTC P0340 CMP SENSOR

VG33ER

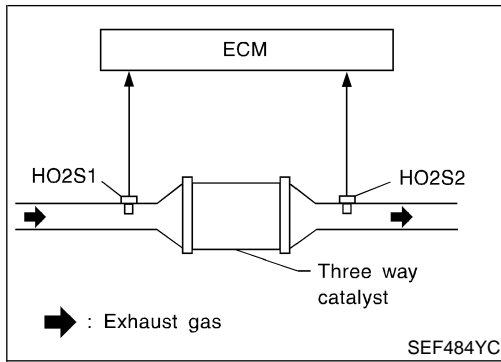
Diagnostic Procedure (Cont'd)

3	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness for open or short between camshaft position sensor and ECM relay● Harness for open or short between camshaft position sensor and ECM	
	▶ Repair harness or connectors.

4	CHECK CMPS INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between CMPS terminal 4 and ECM terminal 49, CMPS terminal 3 and ECM terminals 44, 48. 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 CMPS GROUND CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch OFF. 2. Check harness continuity between CMPS terminal 6 and engine 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. <ul style="list-style-type: none">● Joint connector-2 (if equipped)● Harness for open between camshaft position sensor and engine ground	
	▶ Repair open circuit or short to power in harness or connector.



On Board Diagnosis Logic

NGEC1266

The ECM monitors the switching frequency ratio of heated oxygen sensors 1 and 2.

A warm-up three way catalyst with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.

When the frequency ratio of heated oxygen sensors 1 and 2 approaches a specified limit value, the warm-up three way catalyst malfunction is diagnosed.

Malfunction is detected when warm-up three way catalyst does not operate properly, warm-up three way catalyst does not have enough oxygen storage capacity.

POSSIBLE CAUSE

NGEC1266S01

- Warm-up three way catalyst
- Exhaust tube
- Intake air leaks
- Injectors
- Injector leaks
- Spark plug
- Improper ignition timing

SRT WORK SUPPORT	
CATALYST	INCMP
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
THRTL POS SEN	XXX V

SEF344Z

SRT WORK SUPPORT	
CATALYST	CMPLT
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
THRTL POS SEN	XXX V

SEF345Z

SELF DIAG RESULTS	
DTC RESULTS	TIME
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	

SEF560X

DTC Confirmation Procedure

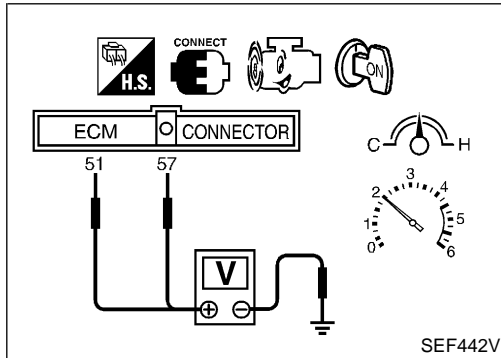
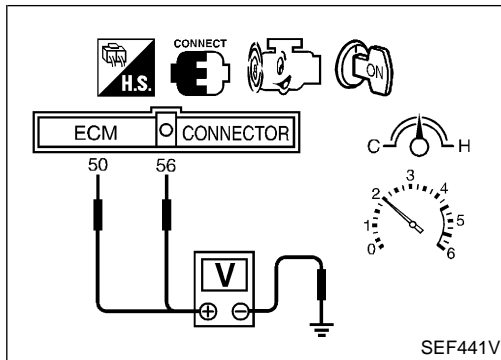
NGEC1267

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II TESTING CONDITION

- **Open engine hood before conducting the following procedure.**
- **Do not hold engine speed for more than the specified minutes below.**
 - 1) Turn ignition switch ON.
 - 2) Select "DTC & SRT CONFIRMATION" the SRT WORK SUPPORT" mode with CONSULT-II.
 - 3) Start engine.
 - 4) Rev engine up to 2,500 to 3,500 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
 - 5) Wait 5 seconds at idle.
 - 6) Rev engine up to 2,000 to 3,000 rpm and maintain it until "INCMP" of "CATALYST" changes to "CMPLT" (It will take maximum of approximately 5 minute.).
 - 7) Select "SELF-DIAG RESULTS" mode with CONSULT-II. If the 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-1490. If not "CMPLT", stop engine and cool down "COOLANT TEMP/SE" to less than 70°C (158°F) and retest from step 1).



Overall Function Check

NGEC1268

Use this procedure to check the overall function of the warm-up three way catalyst. During this check, a 1st trip DTC might not be confirmed.

CAUTION:

Always drive vehicle at a safe speed.

Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeters probes between ECM terminals 50 [heated oxygen sensor 1 (bank 1) signal], 51 [heated oxygen sensor 1 (bank 2) signal] and engine ground, and ECM terminals 56 [heated oxygen sensor 2 (bank 1) signal], 57 [heated oxygen sensor 2 (bank 2) signal] and engine ground.
- 4) Keep engine speed at 2,000 rpm constant under no load.
- 5) Make sure that the voltage switching frequency (high & low) between ECM terminals 56 and engine ground, or 57 and engine ground is very less than that of ECM terminals 50 and engine ground, or 51 and engine ground.

Switching frequency ratio = A/B

A: Heated oxygen sensor 2 voltage switching frequency

B: Heated oxygen sensor 1 voltage switching frequency

This ratio should be less than 0.75.

If the ratio is greater than above, it means warm-up three way catalyst does not operate properly. Go to "Diagnostic Procedure", EC-1490.

NOTE:

If the voltage at terminal 50 or 51 does not switch periodically more than 5 times within 10 seconds at step 5, perform trouble diagnosis for "DTC P0133, P0153" first. (See EC-1382.)

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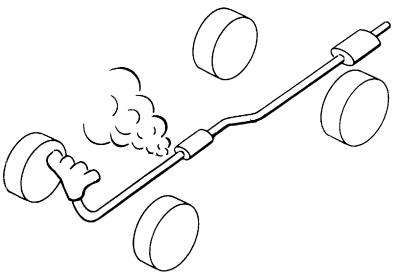
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Diagnostic Procedure

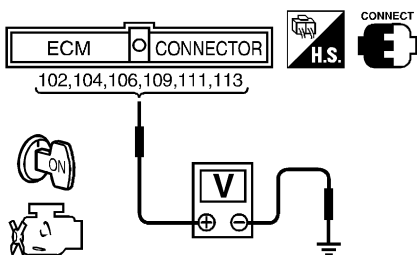
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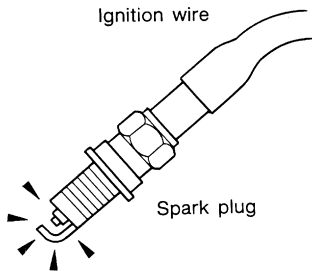
1	CHECK EXHAUST SYSTEM	
Visually check exhaust tubes and muffler for dent.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair or replace it.

2	CHECK EXHAUST AIR LEAK	
1. Start engine and run it at idle. 2. Listen for an exhaust air leak before the warm-up three way catalyst.		
		
SEF099P		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace.

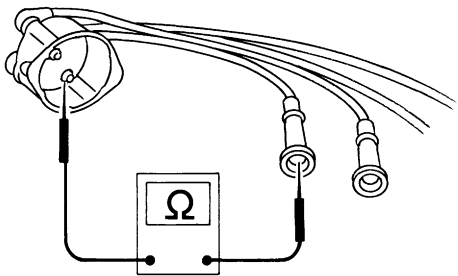
3	CHECK INTAKE AIR LEAK	
Listen for an intake air leak after the mass air flow sensor.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace.

4	CHECK IGNITION TIMING											
Check the following items. Refer to "Basic Inspection", EC-1273.												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Items</th> <th style="width: 50%;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>10° ± 2° BTDC</td> </tr> <tr> <td>Base idle speed</td> <td>700 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table>			Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
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Target idle speed	750 ± 50 rpm (in "P" or "N" position)											
MTBL0576												
OK or NG												
OK	▶	GO TO 5.										
NG	▶	Adjust ignition timing.										

5	CHECK INJECTOR CIRCUITS	<ol style="list-style-type: none"> 1. Refer to WIRING DIAGRAM for Injectors, EC-1725. 2. Stop engine and then turn ignition switch ON. 3. Check voltage between ECM terminals 102, 104, 106, 109, 111 and 113 and ground with CONSULT-II or tester. <div style="text-align: center; margin: 10px 0;">  </div> <p style="color: blue; font-weight: bold;">Battery voltage should exist.</p> <p style="text-align: center; font-weight: bold;">OK or NG</p>	SEF711U
OK	▶	GO TO 6.	
NG	▶	Perform "Diagnostic Procedure", "INJECTOR", EC-1726.	

6	CHECK IGNITION SPARK	<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect ignition wire from spark plug. 3. Connect a known good spark plug to the ignition wire. 4. Place end of spark plug against a suitable ground and crank engine. 5. Check for spark. <div style="text-align: center; margin: 10px 0;">  </div> <p style="text-align: center; font-weight: bold;">OK or NG</p>	SEF282G
OK	▶	GO TO 8.	
NG	▶	GO TO 7.	

GI
 MA
 EM
 LC
 EC
 FE
 CL
 MT
 AT
 TF
 PD
 AX
 SU
 BR
 ST
 RS
 BT
 HA
 SC
 EL
 IDX

7	CHECK IGNITION WIRES														
<ol style="list-style-type: none"> 1. Inspect wires for cracks, damage, burned terminals and for improper fit. 2. Measure the resistance of wires to their distributor cap terminal. Move each wire while testing to check for intermittent breaks. 															
															
<p>Resistance:</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Cylinder No.</th> <th style="text-align: center;">Resistance kΩ [at 25°C (77°F)]</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">Approximately 6.5</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">Approximately 10.0</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">Approximately 8.5</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">Approximately 12.5</td> </tr> <tr> <td style="text-align: center;">5</td> <td style="text-align: center;">Approximately 8.5</td> </tr> <tr> <td style="text-align: center;">6</td> <td style="text-align: center;">Approximately 11.0</td> </tr> </tbody> </table>		Cylinder No.	Resistance kΩ [at 25°C (77°F)]	1	Approximately 6.5	2	Approximately 10.0	3	Approximately 8.5	4	Approximately 12.5	5	Approximately 8.5	6	Approximately 11.0
Cylinder No.	Resistance kΩ [at 25°C (77°F)]														
1	Approximately 6.5														
2	Approximately 10.0														
3	Approximately 8.5														
4	Approximately 12.5														
5	Approximately 8.5														
6	Approximately 11.0														
SEF174P															
MTBL0235															
<p>If the resistance exceeds the above specification, inspect ignition wire to distributor cap connection. Clean connection or replace the ignition wire with a new one.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>Check ignition coil, power transistor and their circuits. Refer to EC-1718.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace.</td> </tr> </table>		OK	▶	Check ignition coil, power transistor and their circuits. Refer to EC-1718.	NG	▶	Replace.								
OK	▶	Check ignition coil, power transistor and their circuits. Refer to EC-1718.													
NG	▶	Replace.													

8	CHECK INJECTOR	
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Remove injector assembly. Refer to EC-1218. Keep fuel hose and all injectors connected to injector gallery. 3. Disconnect all ignition coil harness connectors. 4. Turn ignition switch ON. Make sure fuel does not drip from injector. 		
OK or NG		
OK (Does not drip)	▶	GO TO 9.
NG (Drips)	▶	Replace the injector(s) from which fuel is dripping.

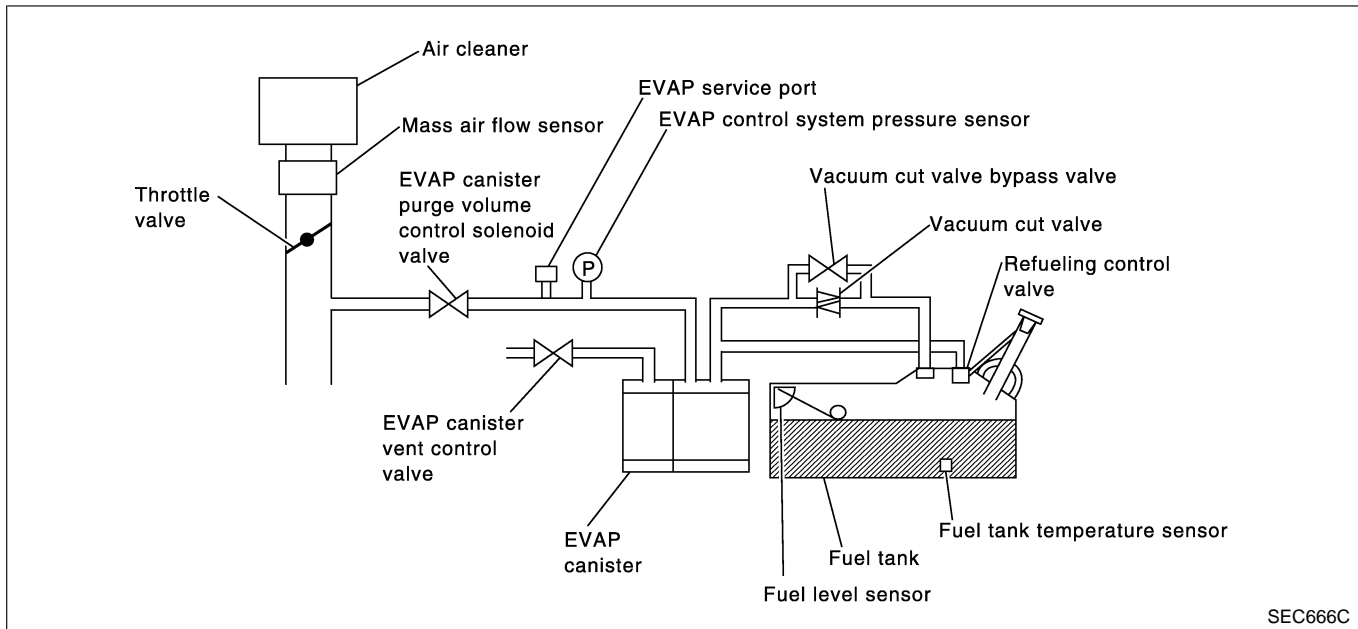
9	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.		
Trouble is fixed	▶	INSPECTION END
Trouble is not fixed	▶	Replace warm-up three way catalyst.

System Description

NGE1393

NOTE:

If DTC P0441 is displayed with P0510, perform trouble diagnosis for DTC P0510 first. (See EC-1592.)



SEC666C

In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

On Board Diagnosis Logic

NGE1394

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a fault is determined.

Malfunction is detected when EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.

POSSIBLE CAUSE

NGE1394S01

- EVAP canister purge volume control solenoid valve stuck closed
- EVAP control system pressure sensor and the circuit
- Loose, disconnected or improper connection of rubber tube
- Blocked rubber tube
- Blocked or bent rubber tube to MAP/BARO switch solenoid valve
- Cracked EVAP canister
- EVAP canister purge volume control solenoid valve circuit
- Closed throttle position switch
- Blocked purge port
- EVAP canister vent control valve

5	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">PURG FLOW P0441</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">OUT OF CONDITION</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">MONITOR</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td>B/FUEL SCHDL</td> <td>XXX msec</td> </tr> </table>	ENG SPEED	XXX rpm	THRTL POS SEN	XXX V	B/FUEL SCHDL	XXX msec	SEC723C
ENG SPEED	XXX rpm							
THRTL POS SEN	XXX V							
B/FUEL SCHDL	XXX msec							

6	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">PURG FLOW P0441</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">TESTING</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">MONITOR</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td>B/FUEL SCHDL</td> <td>XXX msec</td> </tr> </table>	ENG SPEED	XXX rpm	THRTL POS SEN	XXX V	B/FUEL SCHDL	XXX msec	SEC724C
ENG SPEED	XXX rpm							
THRTL POS SEN	XXX V							
B/FUEL SCHDL	XXX msec							

6	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">PURG FLOW P0441</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">COMPLETED</div>	SEC725C
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DTC Confirmation Procedure

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 5 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

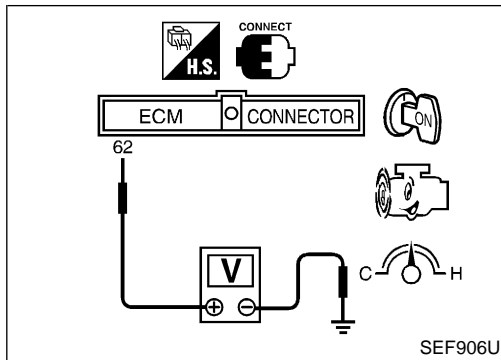
With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Start engine and let it idle for at least 70 seconds.
- 4) Select "PURG FLOW P0441" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 5) Touch "START".
If "COMPLETED" is displayed, go to step 7.
- 6) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 35 seconds.)

Selector lever	Suitable position
Vehicle speed	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,400 rpm
B/FUEL SCHDL	1.0 - 11.0 msec
Engine coolant temperature	70 - 100°C (158 - 212°F)

If "TESTING" is not changed for a long time, retry from step 2.

- 7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-1496.



Overall Function Check

=NGEC1396

Use this procedure to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Lift up drive wheels.
- 2) Start engine and warm it up to normal operating temperature.
- 3) Turn ignition switch OFF, wait at least 5 seconds.
- 4) Start engine and wait at least 70 seconds.
- 5) Set voltmeter probes to ECM terminals 62 (EVAP control system pressure sensor signal) and ground.
- 6) Check EVAP control system pressure sensor value at idle speed and note it.
- 7) Establish and maintain the following conditions for at least 1 minute.

Air conditioner switch	ON
Steering wheel	Fully turned
Headlamp switch	ON
Rear window defogger switch	ON
Engine speed	Approx. 3,000 rpm
Gear position	Any position other than "P", "N" or "R"

- 8) Verify that EVAP control system pressure sensor value stays 0.1V less than the value at idle speed (measured at step 6) for at least 1 second.
- 9) If NG, go to "Diagnostic Procedure", EC-1496.

GI

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EM

LC

EC

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CL

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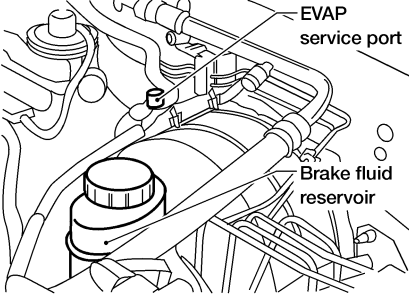
EL

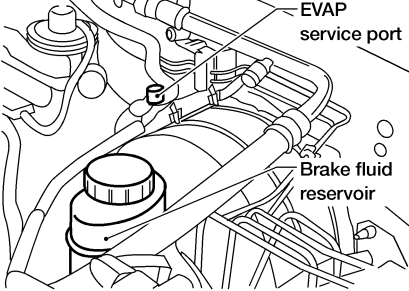
IDX

Diagnostic Procedure

=NGEC1397

1	CHECK EVAP CANISTER	
1. Turn ignition switch OFF. 2. Check EVAP canister for cracks.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 2.
OK (Without CONSULT-II)	▶	GO TO 3.
NG	▶	Replace EVAP canister.

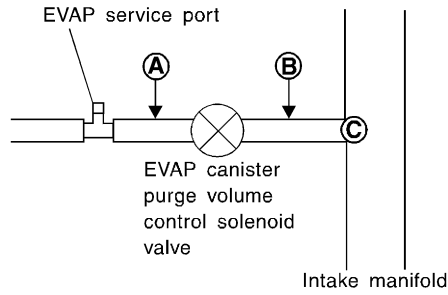
2	CHECK PURGE FLOW																									
(P) With CONSULT-II 1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.																										
																										
AEC649A																										
2. Start engine and let it idle. 3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. 4. Rev engine up to 2,000 rpm. 5. Touch "Qd" and "Qu" on CONSULT-II screen to adjust "PURG VOL CONT/V" opening.																										
<table border="1" style="display: inline-table; margin-right: 20px;"> <thead> <tr><th colspan="2">ACTIVE TEST</th></tr> </thead> <tbody> <tr><td>PURG VOL CONT/V</td><td>XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>HO2S1 MNTR (B2)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> </tbody> </table> <table border="1" style="display: inline-table;"> <thead> <tr><th>PURG VOL CONT/V</th><th>VACUUM</th></tr> </thead> <tbody> <tr><td>100.0%</td><td>Should exist</td></tr> <tr><td>0.0%</td><td>Should not exist</td></tr> </tbody> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V	PURG VOL CONT/V	VACUUM	100.0%	Should exist	0.0%	Should not exist
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THRTL POS SEN	XXX V																									
PURG VOL CONT/V	VACUUM																									
100.0%	Should exist																									
0.0%	Should not exist																									
SEF012Z																										
OK or NG																										
OK	▶	GO TO 7.																								
NG	▶	GO TO 4.																								

3	CHECK PURGE FLOW	<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. <div style="text-align: center; margin: 10px 0;">  </div> <ol style="list-style-type: none"> 4. Start engine and let it idle for at least 80 seconds. 5. Check vacuum gauge indication when revving engine up to 2,000 rpm. Vacuum should exist. 6. Release the accelerator pedal fully and let idle. Vacuum should not exist. <p style="text-align: right; margin-right: 20px;">AEC649A</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 7.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 4.</td> </tr> </table>	OK	▶	GO TO 7.	NG	▶	GO TO 4.	GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX
OK	▶	GO TO 7.							
NG	▶	GO TO 4.							

4	CHECK EVAP PURGE LINE	<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Check EVAP purge line for improper connection or disconnection. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-1203. <p style="text-align: center; margin-top: 10px;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 5.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Repair it.</td> </tr> </table>	OK	▶	GO TO 5.	NG	▶	Repair it.	
OK	▶	GO TO 5.							
NG	▶	Repair it.							

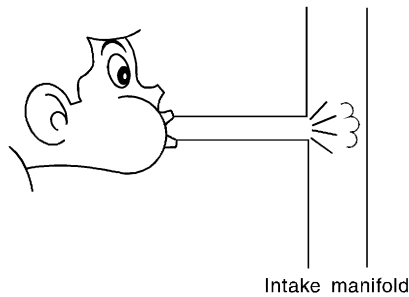
5 CHECK EVAP PURGE HOSE AND PURGE PORT

1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B**.



SEF367U

2. Blow air into each hose and EVAP purge port **C**.
3. Check that air flows freely.



SEF368U

OK or NG

OK (with CONSULT-II)	▶	GO TO 6.
OK (without CONSULT-II)	▶	GO TO 7.
NG	▶	Repair or clean hoses and/or purge port.

6 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

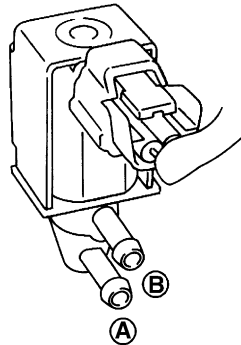
With CONSULT-II

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

If OK, inspection end. If NG, go to following step.

3. Check air passage continuity.



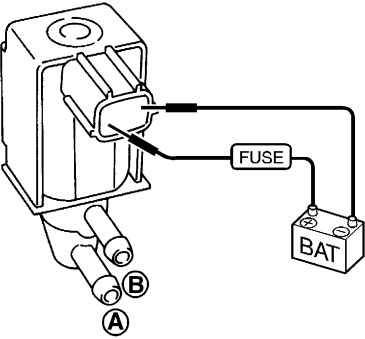
Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

If NG, replace the EVAP canister purge volume control solenoid valve.

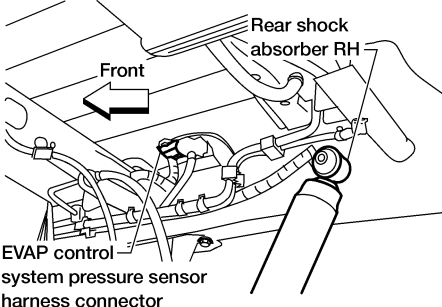
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

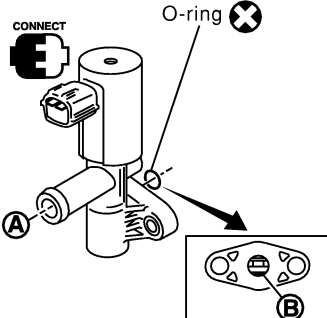
GI
 MA
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7	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE							
<p>⊗ Without CONSULT-II Check air passage continuity.</p>								
								
SEF661U								
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Condition</th> <th style="width: 50%;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td>12V direct current supply between terminals 1 and 2</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td>No supply</td> <td style="text-align: center;">No</td> </tr> </tbody> </table>			Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	Yes	No supply	No
Condition	Air passage continuity between A and B							
12V direct current supply between terminals 1 and 2	Yes							
No supply	No							
MTBL0242								
If NG, replace the EVAP canister purge volume control solenoid valve.								
OK or NG								
OK	▶	GO TO 8.						
NG	▶	Replace EVAP canister purge volume control solenoid valve.						

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	
<p>1. Turn ignition switch OFF. 2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.</p>		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Repair it.

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR	
1. Disconnect EVAP control system pressure sensor harness connector.		
		
AEC651A		
2. Check connectors for water. Water should not exist.		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor.

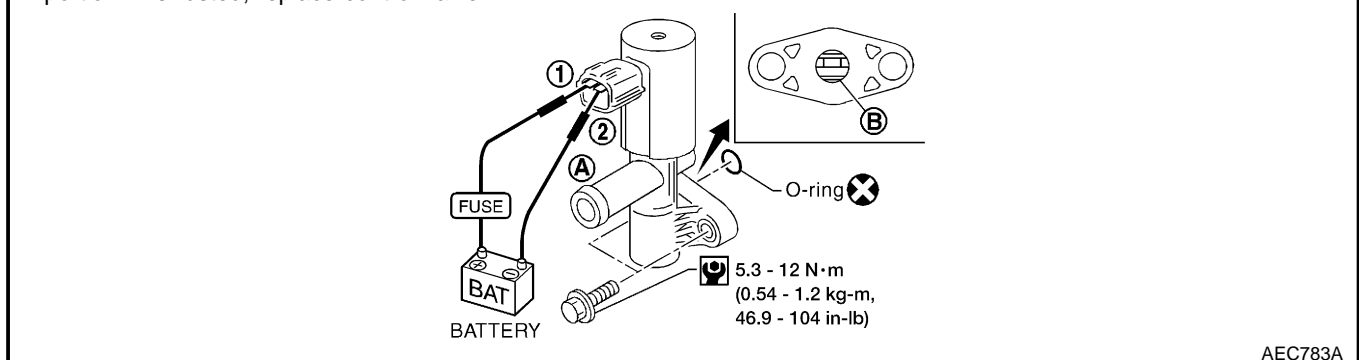
10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION	
Refer to "DTC Confirmation Procedure" for DTC P0452, P0453, EC-1533.		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

11	CHECK EVAP CANISTER VENT CONTROL VALVE																									
Check air passage continuity.																										
E With CONSULT-II Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.																										
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">ACTIVE TEST</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">VENT CONTROL/V</td> <td style="text-align: center;">OFF</td> </tr> <tr> <th colspan="2" style="text-align: center;">MONITOR</th> </tr> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td style="text-align: center;">A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td style="text-align: center;">A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td style="text-align: center;">HO2S1 (B1)</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td style="text-align: center;">HO2S1 (B2)</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td style="text-align: center;">THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> </tbody> </table>	ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 (B1)	XXX V	HO2S1 (B2)	XXX V	THRTL POS SEN	XXX V	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Condition VENT CONTROL/V</th> <th style="text-align: center;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">ON</td> <td style="text-align: center;">No</td> </tr> <tr> <td style="text-align: center;">OFF</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table> <p style="text-align: center;">Operation takes less than 1 second.</p>	Condition VENT CONTROL/V	Air passage continuity between A and B	ON	No	OFF	Yes
	ACTIVE TEST																									
VENT CONTROL/V	OFF																									
MONITOR																										
ENG SPEED	XXX rpm																									
A/F ALPHA-B1	XXX %																									
A/F ALPHA-B2	XXX %																									
HO2S1 (B1)	XXX V																									
HO2S1 (B2)	XXX V																									
THRTL POS SEN	XXX V																									
Condition VENT CONTROL/V	Air passage continuity between A and B																									
ON	No																									
OFF	Yes																									
SEF991Y																										

X Without CONSULT-II								
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Condition</th> <th style="text-align: center;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">12V direct current supply between terminals 1 and 2</td> <td style="text-align: center;">No</td> </tr> <tr> <td style="text-align: center;">OFF</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table>		Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	No	OFF	Yes	
Condition	Air passage continuity between A and B							
12V direct current supply between terminals 1 and 2	No							
OFF	Yes							

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
 If portion **B** is rusted, replace control valve.



AEC783A

Make sure new O-ring is installed properly.

OK or NG

OK (With CONSULT-II)	▶	GO TO 12.
OK (Without CONSULT-II)	▶	GO TO 13.
NG	▶	Replace EVAP canister vent control valve.

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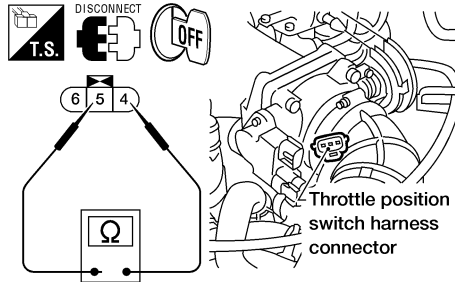
12	CHECK CLOSED THROTTLE POSITION SWITCH																
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch OFF. 3. Turn ignition switch ON. 4. Select "DATA MONITOR" mode with CONSULT-II. 5. Check indication of "CLSD THL/P SW". <p>Measurement must be made with closed throttle position switch installed in vehicle.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Throttle valve conditions</th> <th style="text-align: center;">CLSD THL/P SW</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Completely closed</td> <td style="text-align: center;">ON</td> </tr> <tr> <td style="text-align: center;">Partially open or completely open</td> <td style="text-align: center;">OFF</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">MTBL0355</p> <p>If NG, adjust closed throttle position switch. Check the following items. Refer to "Basic Inspection", EC-1273.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Items</th> <th style="text-align: center;">Specifications</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Ignition timing</td> <td style="text-align: center;">10° ± 2° BTDC</td> </tr> <tr> <td style="text-align: center;">Base idle speed</td> <td style="text-align: center;">700 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td style="text-align: center;">Closed throttle position switch idle position adjustment</td> <td style="text-align: center;">Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF</td> </tr> <tr> <td style="text-align: center;">Target idle speed</td> <td style="text-align: center;">750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 20px;">MTBL0576</p> <p>6. If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace closed throttle position switch.</p> <p style="text-align: center;">OK or NG</p>		Throttle valve conditions	CLSD THL/P SW	Completely closed	ON	Partially open or completely open	OFF	Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
Throttle valve conditions	CLSD THL/P SW																
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Target idle speed	750 ± 50 rpm (in "P" or "N" position)																
OK	▶ GO TO 14.																
NG	▶ Replace throttle position switch with throttle position sensor.																

13 CHECK CLOSED THROTTLE POSITION SWITCH



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect closed throttle position switch harness connector.
4. Check continuity between closed throttle position switch terminals 4 and 5.
Resistance measurement must be made with closed throttle position switch installed in vehicle.



AEC654A

Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No

MTBL0247

If NG, adjust closed throttle position switch.
Check the following items. Refer to "Basic Inspection", EC-1273.

Items	Specifications
Ignition timing	10° ± 2° BTDC
Base idle speed	700 ± 50 rpm (in "P" or "N" position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	750 ± 50 rpm (in "P" or "N" position)

MTBL0576

5. If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace closed throttle position switch.

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace throttle position switch with throttle position sensor.

14 CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.
Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-1203.

OK or NG

OK	▶	GO TO 15.
NG	▶	Replace it.

15 CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

	▶	GO TO 16.
--	---	-----------

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DTC P0441 EVAP CONTROL SYSTEM

VG33ER

Diagnostic Procedure (Cont'd)

16	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.	
	▶ INSPECTION END

On Board Diagnosis Logic

NGEC1270

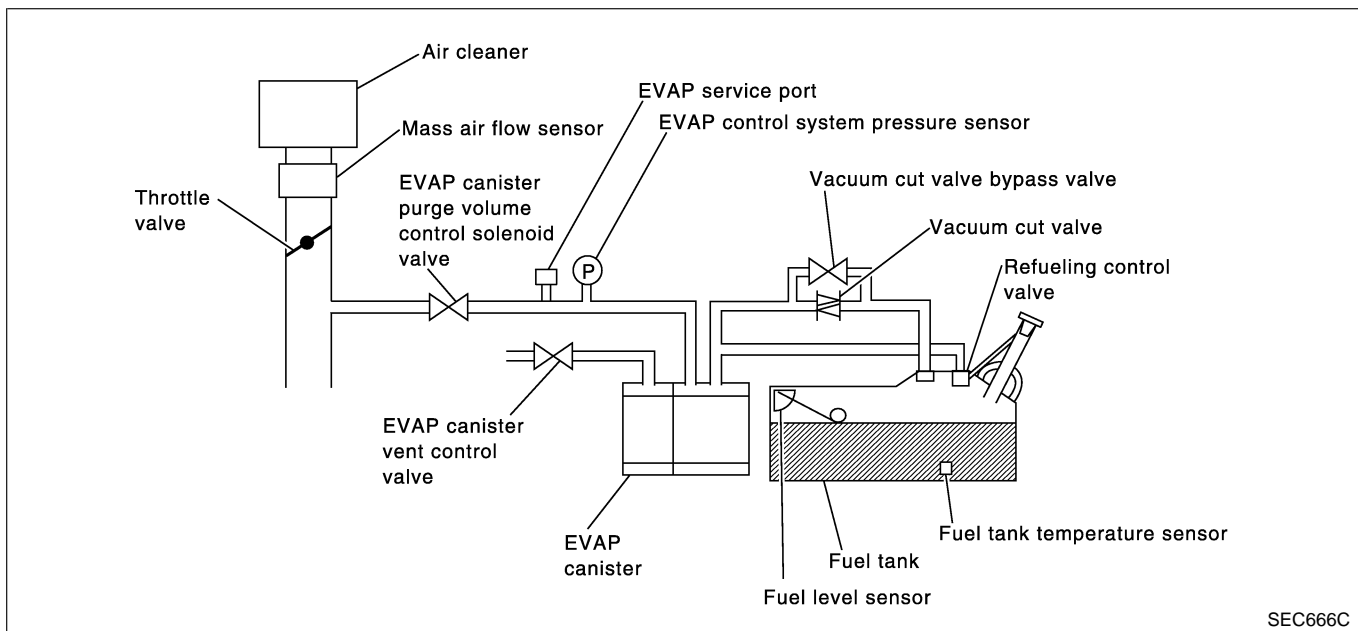
NOTE:

If DTC P0442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1679.)

This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.

If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following "Vacuum test" conditions.

The vacuum cut valve bypass valve is opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP canister vent control valve will then be closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve is opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.



SEC666C

Malfunction is detected when EVAP control system has a leak, EVAP control system does not operate properly.

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

POSSIBLE CAUSE

NGEC1270S01

- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close.
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent.

DTC P0442 EVAP CONTROL SYSTEM

VG33ER

On Board Diagnosis Logic (Cont'd)

- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve and the circuit
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- Water separator
- EVAP canister is saturated with water.
- EVAP control system pressure sensor
- Fuel level sensor and the circuit.
- Refueling EVAP vapor cut
- ORVR system leaks

NGEC1271

5

EVAP SML LEAK P0442/P1442

1)FOR BEST RSLT,PERFORM AT FOLLOWING CONDITIONS.
 -FUEL LEVEL: 1/4-3/4
 -AMBIENT TEMP: 0-30 C(32-86F)
 -OPEN ENGINE HOOD.
 2)START ENG WITH VHCL STOPPED. IF ENG IS ON,STOP FOR 5 SEC.THEN RESTART.
 3)TOUCH START.

SEC716C

5

EVAP SML LEAK P0442/P1442

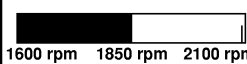
WAIT
2 TO 10 MINUTES.
KEEP ENGINE RUNNING AT IDLE SPEED.

SEC717C

5

EVAP SML LEAK P0442/P1442

MAINTAIN
1600 - 2100 RPM UNTIL FINAL RESULT APPEARS.
(APPROX. 3 MINUTES)



SEC718C

5

EVAP SML LEAK P0442/P1442

OK

SELF-DIAG RESULTS

NO DTC DETECTED.
FURTHER TESTING
MAY BE REQUIRED.

SEC719C

DTC Confirmation Procedure

NOTE:

- If DTC P0442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1679.)
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.
- Open engine hood before conducting the following procedure.

Ⓜ With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
- 4) Make sure that the following conditions are met.
COOLAN TEMP/S: 0 - 32°C (32 - 90°F)
INT/A TEMP SE: More than 0°C (32°F)
- 5) Select “EVAP SML LEAK P0442” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II. Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to “Basic Inspection”, EC-1273.

- 6) Make sure that “OK” is displayed.
If “NG” is displayed, refer to “Diagnostic Procedure”, EC-1508.

NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

Ⓜ With GST

NOTE:

Be sure to read the explanation of “Driving Pattern” on EC-1239 before driving vehicle.

- 1) Start engine.
- 2) Drive vehicle according to “Driving Pattern”, EC-1239.
- 3) Stop vehicle.
- 4) Select “MODE 1” with GST.
 - If SRT of EVAP system is not set yet, go to the following step.
 - If SRT of EVAP system is set, the result will be OK.
- 5) Turn ignition switch OFF and wait at least 5 seconds.
- 6) Start engine.
It is not necessary to cool engine down before driving.
- 7) Drive vehicle again according to the “Driving Pattern”, EC-1239.
- 8) Stop vehicle.
- 9) Select “MODE 3” with GST.
 - If P0442 is displayed on the screen, go to “Diagnostic Procedure”, EC-1508.
 - If P0441 is displayed on the screen, go to “Diagnostic Procedure” for “DTC P0441”, EC-1496.

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DTC P0442 EVAP CONTROL SYSTEM

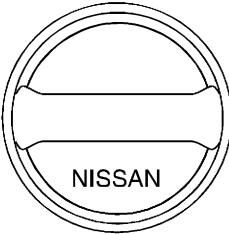
VG33ER

DTC Confirmation Procedure (Cont'd)

- If P0442 and P0441 are not displayed on the screen, go to the following step.
- 10) Select "MODE 1" with GST.
- If SRT of EVAP system is set, the result will be OK.
 - If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

NGEC1272

1	CHECK FUEL FILLER CAP DESIGN
1. Turn ignition switch "OFF". 2. Check for genuine NISSAN fuel filler cap design.	
	
OK or NG	
OK	▶ GO TO 2.
NG	▶ Replace with genuine NISSAN fuel filler cap.

SEF915U

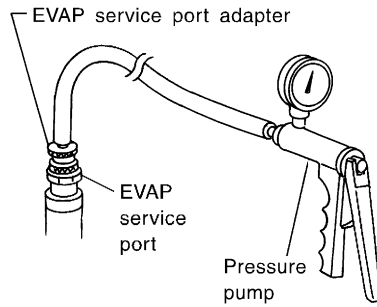
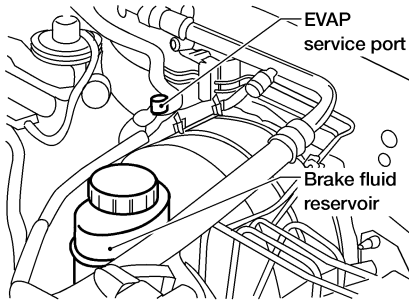
2	CHECK FUEL FILLER CAP INSTALLATION
Check that the cap is tightened properly by rotating the cap clockwise.	
OK or NG	
OK	▶ GO TO 3.
NG	▶ <ul style="list-style-type: none">● Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.● Retighten until ratcheting sound is heard.

3	CHECK FUEL FILLER CAP FUNCTION
Check for air releasing sound while opening the fuel filler cap.	
OK or NG	
OK	▶ GO TO 6.
NG	▶ GO TO 4.

4	CHECK FUEL TANK VACUUM RELIEF VALVE
Refer to "Evaporative Emission System", EC-1199.	
OK or NG	
OK	▶ GO TO 5.
NG	▶ Replace fuel filler cap with a genuine one.

5 INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



AEC649A

SEF916U

NOTE:

Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II	▶▶	GO TO 6.
Models without CONSULT-II	▶▶	GO TO 7.

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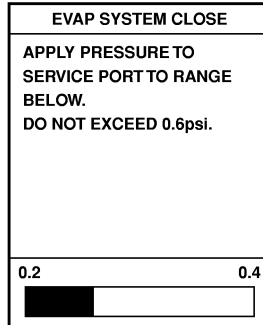
6 CHECK FOR EVAP LEAK

④ With CONSULT-II

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

NOTE:

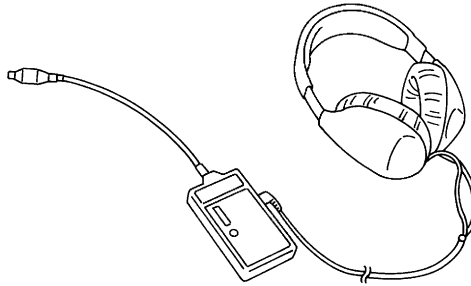
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-1203.

Leak detector



SEF200U

OK or NG

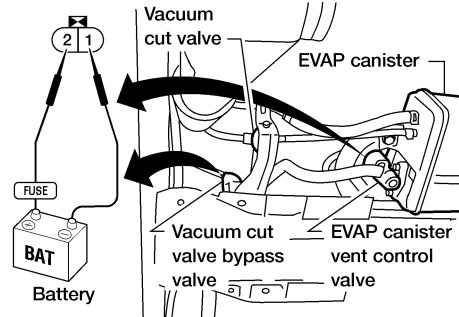
OK	▶	GO TO 8.
NG	▶	Repair or replace.

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7 CHECK FOR EVAP LEAK

⊗ **Without CONSULT-II**

1. Turn ignition switch "OFF".
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



AEC632A

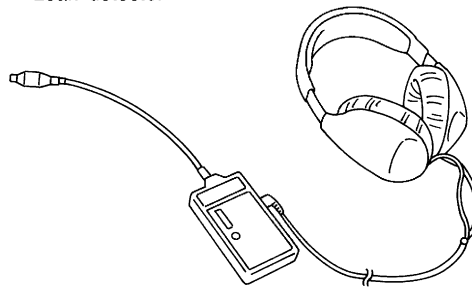
4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

NOTE:

- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.

5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-1203.

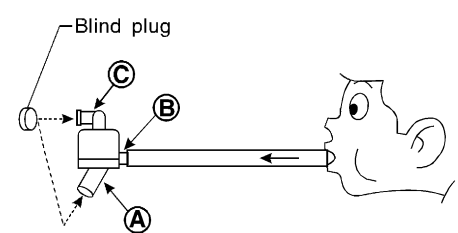
Leak detector



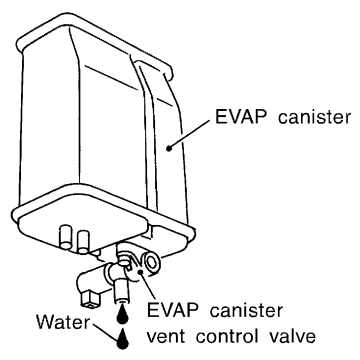
SEF200U

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

8	CHECK WATER SEPARATOR
<ol style="list-style-type: none"> 1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged. <div style="text-align: center; margin: 10px 0;">  <p style="margin: 0;">* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p> </div> <p style="text-align: right; margin-right: 20px;">SEF829T</p>	
5. In case of NG in items 2 - 4, replace the parts.	
NOTE:	
<ul style="list-style-type: none"> ● Do not disassemble water separator. 	
OK or NG	
OK	▶ GO TO 9.
NG	▶ Replace water separator.

9	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT
Refer to "DTC Confirmation Procedure", EC-1527.	
OK or NG	
OK	▶ GO TO 10.
NG	▶ Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

10	CHECK IF EVAP CANISTER SATURATED WITH WATER
<ol style="list-style-type: none"> 1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister. <div style="text-align: center; margin: 10px 0;">  </div> <p style="text-align: right; margin-right: 20px;">SEF596U</p>	
Yes or No	
Yes	▶ GO TO 11.
No (With CONSULT-II)	▶ GO TO 13.
No (Without CONSULT-II)	▶ GO TO 14.

DTC P0442 EVAP CONTROL SYSTEM

VG33ER

Diagnostic Procedure (Cont'd)

11	CHECK EVAP CANISTER	
Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 13.
OK (Without CONSULT-II)	▶	GO TO 14.
NG	▶	GO TO 12.

12	DETECT MALFUNCTIONING PART	
Check the following.		
<ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 		
▶		Repair hose or replace EVAP canister.

13	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION																					
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 2. Start engine. 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode. 4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. 																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td>XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>HO2S1 MNTR (B2)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V		
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MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
HO2S1 MNTR (B2)	LEAN																					
THRTL POS SEN	XXX V																					
Vacuum should exist.																						
SEF984Y																						
OK or NG																						
OK	▶	GO TO 17.																				
NG	▶	GO TO 15.																				

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION	
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 4. Start engine and let it idle for at least 80 seconds. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. <p>Vacuum should exist.</p>		
OK or NG		
OK	▶	GO TO 17.
NG	▶	GO TO 15.

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DTC P0442 EVAP CONTROL SYSTEM

VG33ER

Diagnostic Procedure (Cont'd)

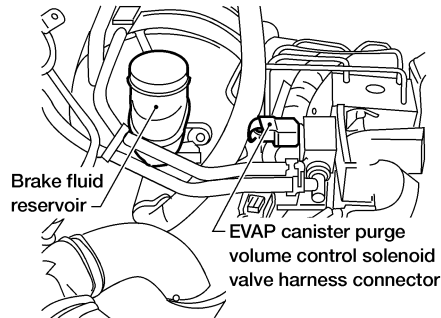
15	CHECK VACUUM HOSE	
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-1193.		
OK or NG		
OK	▶	GO TO 16.
NG	▶	Repair or reconnect the hose.

16	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																					
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine. 2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening. 																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td>PURG VOL CONT/V</td> <td style="text-align: center;">0.0%</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>			ACTIVE TEST		PURG VOL CONT/V	0.0%	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	RICH	HO2S1 MNTR (B2)	RICH	THRTL POS SEN	XXX V		
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ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	RICH																					
HO2S1 MNTR (B2)	RICH																					
THRTL POS SEN	XXX V																					
SEF985Y																						
OK or NG																						
OK	▶	GO TO 18.																				
NG	▶	GO TO 17.																				

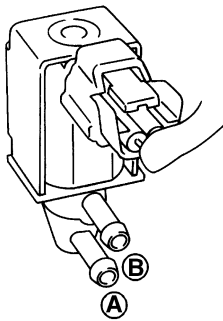
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17 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
④ With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



AEC652A

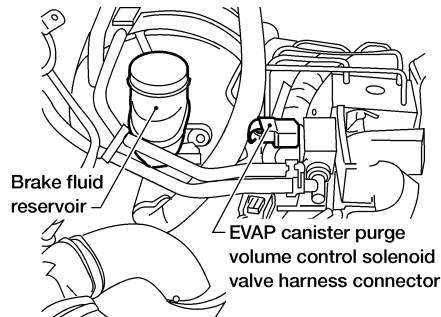


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

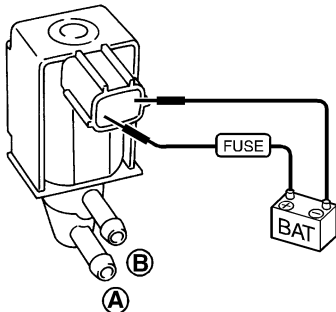
SEF334X

⊗ Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



AEC652A

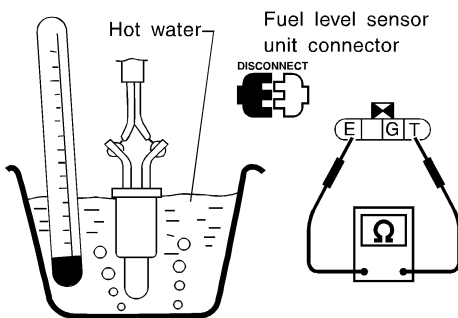


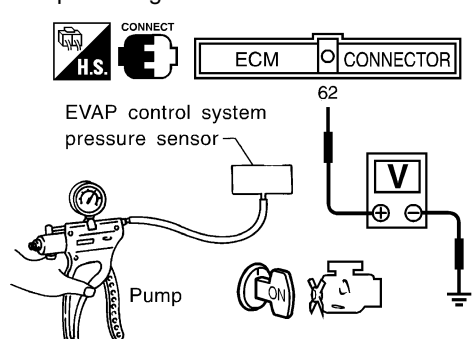
Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

18	CHECK FUEL TANK TEMPERATURE SENSOR	<p>1. Remove fuel level sensor unit.</p> <p>2. Check resistance between fuel level sensor unit and fuel pump terminals 1 and 2 by heating with hot water or heat gun as shown in the figure.</p>							
		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Temperature °C (°F)</th> <th style="text-align: center;">Resistance kΩ</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">20 (68)</td> <td style="text-align: center;">2.3 - 2.7</td> </tr> <tr> <td style="text-align: center;">50 (122)</td> <td style="text-align: center;">0.79 - 0.90</td> </tr> </tbody> </table>		Temperature °C (°F)	Resistance kΩ	20 (68)	2.3 - 2.7	50 (122)	0.79 - 0.90
Temperature °C (°F)	Resistance kΩ								
20 (68)	2.3 - 2.7								
50 (122)	0.79 - 0.90								
SEC311C									
OK or NG									
OK		▶	GO TO 19.						
NG		▶	Replace fuel tank temperature sensor.						

19	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	<p>1. Remove EVAP control system pressure sensor with its harness connector connected.</p> <p>2. Remove hose from EVAP control system pressure sensor.</p> <p>3. Turn ignition switch "ON".</p> <p>4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● Always calibrate the vacuum pump gauge when using it. ● Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure. <p>5. Check input voltage between ECM terminal 62 and ground.</p>							
		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Applied vacuum</th> <th style="text-align: center;">Voltage V</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Not applied</td> <td style="text-align: center;">1.8 - 4.8</td> </tr> <tr> <td style="text-align: center;">-26.7 kPa (-200 mmHg, -7.87 inHg)</td> <td style="text-align: center;">1.0 to 1.4V lower than above value</td> </tr> </tbody> </table>		Applied vacuum	Voltage V	Not applied	1.8 - 4.8	-26.7 kPa (-200 mmHg, -7.87 inHg)	1.0 to 1.4V lower than above value
Applied vacuum	Voltage V								
Not applied	1.8 - 4.8								
-26.7 kPa (-200 mmHg, -7.87 inHg)	1.0 to 1.4V lower than above value								
SEC649C									
CAUTION:									
<ul style="list-style-type: none"> ● Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. 									
OK or NG									
OK		▶	GO TO 20.						
NG		▶	Replace EVAP control system pressure sensor.						

20	CHECK EVAP PURGE LINE	<p>Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to "Evaporative Emission System", EC-1199.</p>	
OK or NG			
OK		▶	GO TO 21.
NG		▶	Repair or reconnect the hose.

DTC P0442 EVAP CONTROL SYSTEM

VG33ER

Diagnostic Procedure (Cont'd)

21	CLEAN EVAP PURGE LINE
Clean EVAP purge line (pipe and rubber tube) using air blower.	
▶	GO TO 22.

22	CHECK REFUELING EVAP VAPOR LINE
Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to "ON BOARD REFUELING VAPOR RECOVERY (ORVR)", EC-1205.	
OK or NG	
OK	▶ GO TO 23.
NG	▶ Repair or replace hoses and tubes.

23	CHECK SIGNAL LINE AND RECIRCULATION LINE
Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.	
OK or NG	
OK	▶ GO TO 24.
NG	▶ Repair or replace hoses, tubes or filler neck tube.

24	CHECK REFUELING CONTROL VALVE
<ol style="list-style-type: none"> Remove fuel filler cap. Check air continuity between hose ends A and B. Blow air into the hose end B. Air should flow freely into the fuel tank. Blow air into hose end A and check there is no leakage. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage. 	
SEF706Z	
OK or NG	
OK	▶ GO TO 25.
NG	▶ Replace refueling control valve with fuel tank.

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DTC P0442 EVAP CONTROL SYSTEM

VG33ER

Diagnostic Procedure (Cont'd)

25	CHECK FUEL LEVEL SENSOR
Refer to EL-89 , "FUEL LEVEL SENSOR UNIT CHECK".	
OK or NG	
OK	▶ GO TO 26.
NG	▶ Replace fuel level sensor unit.

26	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.	
	▶ INSPECTION END

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33ER

Description

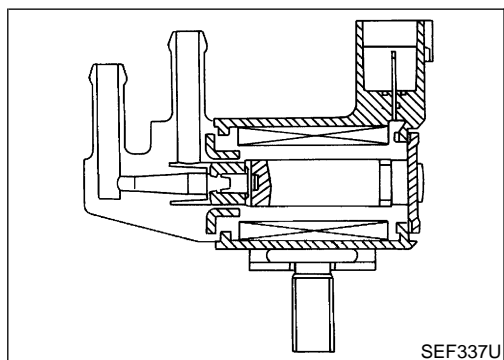
Description SYSTEM DESCRIPTION

NGEC1273

NGEC1273S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	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		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Throttle position switch	Closed throttle position		
Heated oxygen sensors 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.



COMPONENT DESCRIPTION

NGEC1273S02

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

NGEC1274

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch OFF ● Shift lever: "N" ● No-load Idle (Vehicle stopped)	0%
	2,000 rpm	—

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33ER

ECM Terminals and Reference Value

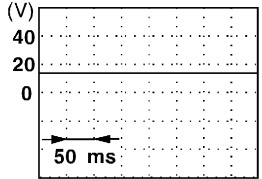
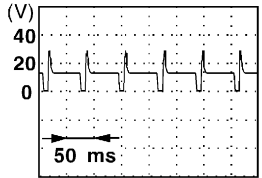
ECM Terminals and Reference Value

NGEC1275

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 the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self shut-off)	[Engine is running] [Ignition switch OFF] <ul style="list-style-type: none"> ● For a few seconds after turning ignition switch OFF 	0 - 1.5V
			[Ignition switch OFF] <ul style="list-style-type: none"> ● A few seconds passed after turning ignition switch OFF 	BATTERY VOLTAGE (11 - 14V)
5	R/Y	EVAP canister purge volume control solenoid valve	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V) <div style="text-align: right; margin-top: 5px;">  <p style="margin: 0;">SEF994U</p> </div>
			[Engine is running] <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm (More than 100 seconds after starting engine) 	BATTERY VOLTAGE (11 - 14V) <div style="text-align: right; margin-top: 5px;">  <p style="margin: 0;">SEF995U</p> </div>
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	[Engine is running] <ul style="list-style-type: none"> ● Idle speed 	BATTERY VOLTAGE (11 - 14V)

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33ER

On Board Diagnosis Logic

On Board Diagnosis Logic

Malfunction is detected when an excessively low (P0444) or high (P0445) voltage signal is sent to ECM through the valve. =NGEC1276

POSSIBLE CAUSE

- Harness or connectors (The valve circuit is open or shorted.)
- EVAP canister purge volume control solenoid valve

NGEC1276S01

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NGEC1277

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 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 "Diagnostic Procedure", EC-1523.

Ⓜ With GST

Follow the procedure "With CONSULT-II".

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DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

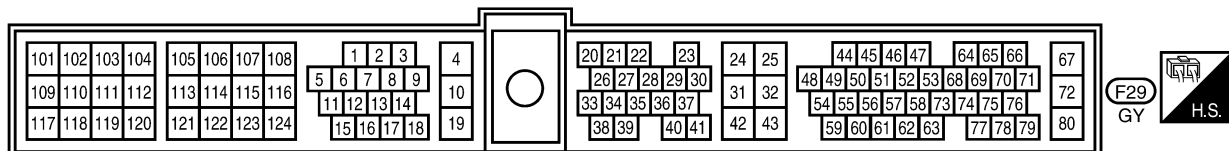
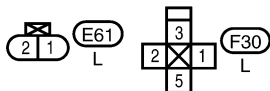
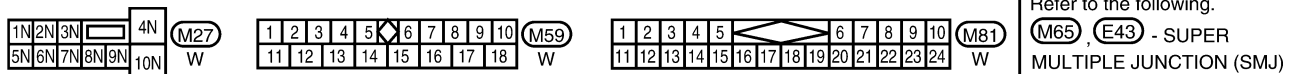
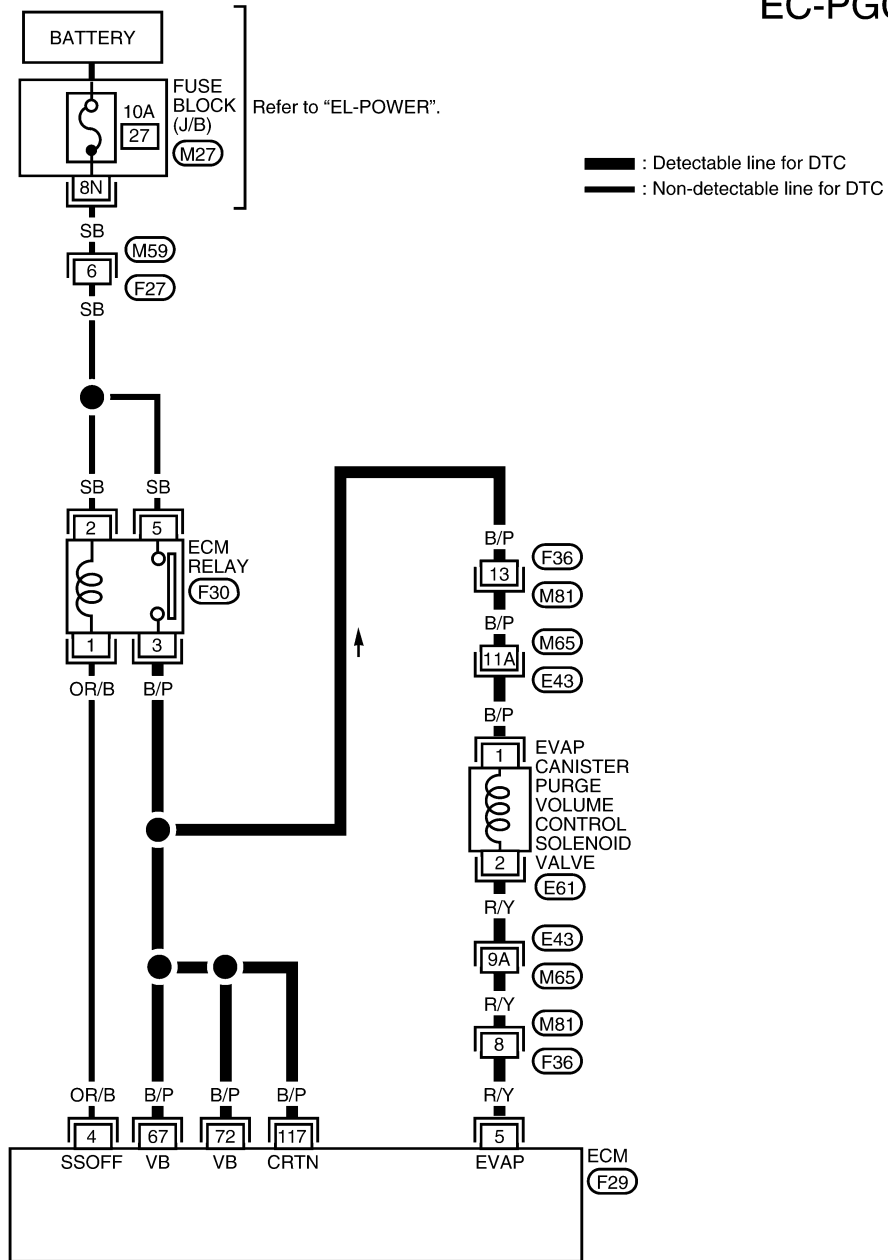
VG33ER

Wiring Diagram

Wiring Diagram

NGEC1278

EC-PGC/V-01



LEC813

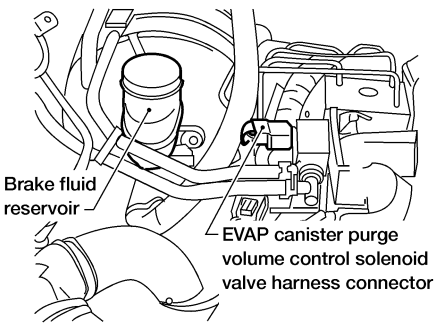
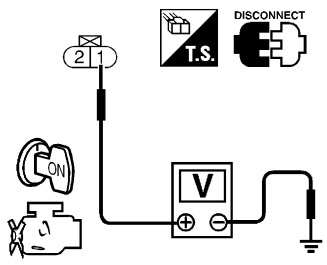
DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33ER

Diagnostic Procedure

Diagnostic Procedure

NGEC1279

1	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT
<p>1. Turn ignition switch OFF. 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.</p> <div style="text-align: center;">  <p>Brake fluid reservoir</p> <p>EVAP canister purge volume control solenoid valve harness connector</p> </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p>Voltage: Battery voltage</p> <p>OK or NG</p> </div>	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

AEC652A

SEF646W

2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F36, M81 ● Harness connectors M82, E74 ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay 	
	▶ Repair harness or connectors.

3	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 5 and solenoid terminal 2. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK (With CONSULT-II)	▶ GO TO 5.
OK (Without CONSULT-II)	▶ GO TO 6.
NG	▶ GO TO 4.

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DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33ER

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E74, M82 ● Harness connectors M81, F36 ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION																				
<p>Ⓜ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine. 2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening. 																					
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td>PURG VOL CONT/V</td> <td style="text-align: center;">0.0%</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>		ACTIVE TEST		PURG VOL CONT/V	0.0%	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	RICH	HO2S1 MNTR (B2)	RICH	THRTL POS SEN	XXX V		
ACTIVE TEST																					
PURG VOL CONT/V	0.0%																				
MONITOR																					
ENG SPEED	XXX rpm																				
A/F ALPHA-B1	XXX %																				
A/F ALPHA-B2	XXX %																				
HO2S1 MNTR (B1)	RICH																				
HO2S1 MNTR (B2)	RICH																				
THRTL POS SEN	XXX V																				
SEF985Y																					
OK or NG																					
OK	▶ GO TO 7.																				
NG	▶ GO TO 6.																				

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

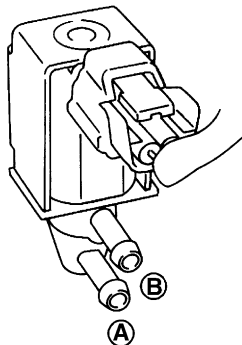
VG33ER

Diagnostic Procedure (Cont'd)

6 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Check air passage continuity under the following conditions.



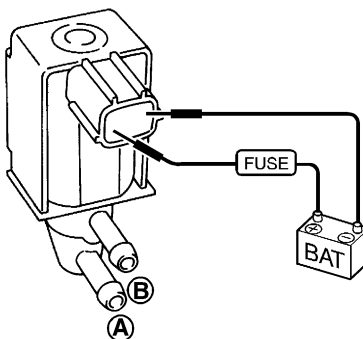
SEF660U

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

MTBL0241

Without CONSULT-II

1. Check air passage continuity under the following conditions.



SEF661U

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

MTBL0242

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

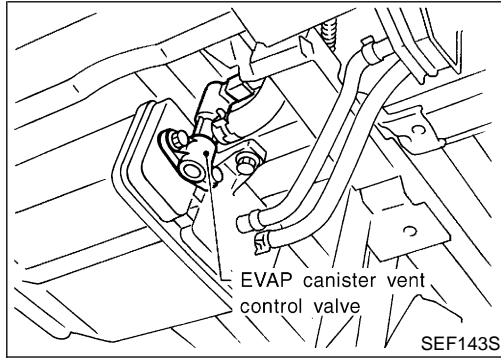
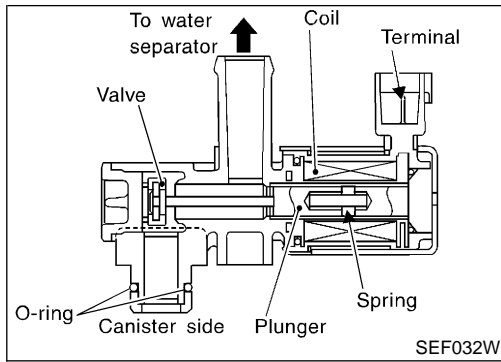
7 CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.

▶ **INSPECTION END**

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Component Description



Component Description

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent. NGEC1280

This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

NGEC1281

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

NGEC1282

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

Malfunction is detected when an improper voltage signal is sent to ECM through EVAP canister vent control valve. =NGEC1283

POSSIBLE CAUSE

- Harness or connectors
(The valve circuit is open or shorted.)
- EVAP canister vent control valve

NGEC1283S01

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DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11V at idle.

NGEC1284

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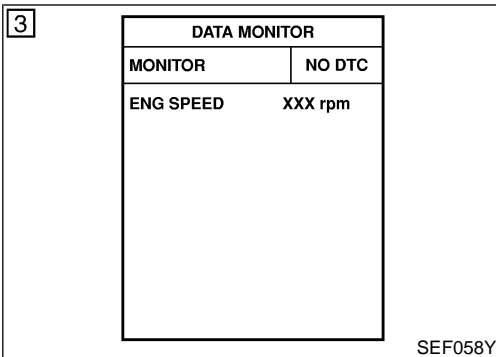
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With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait at least 8 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1529.

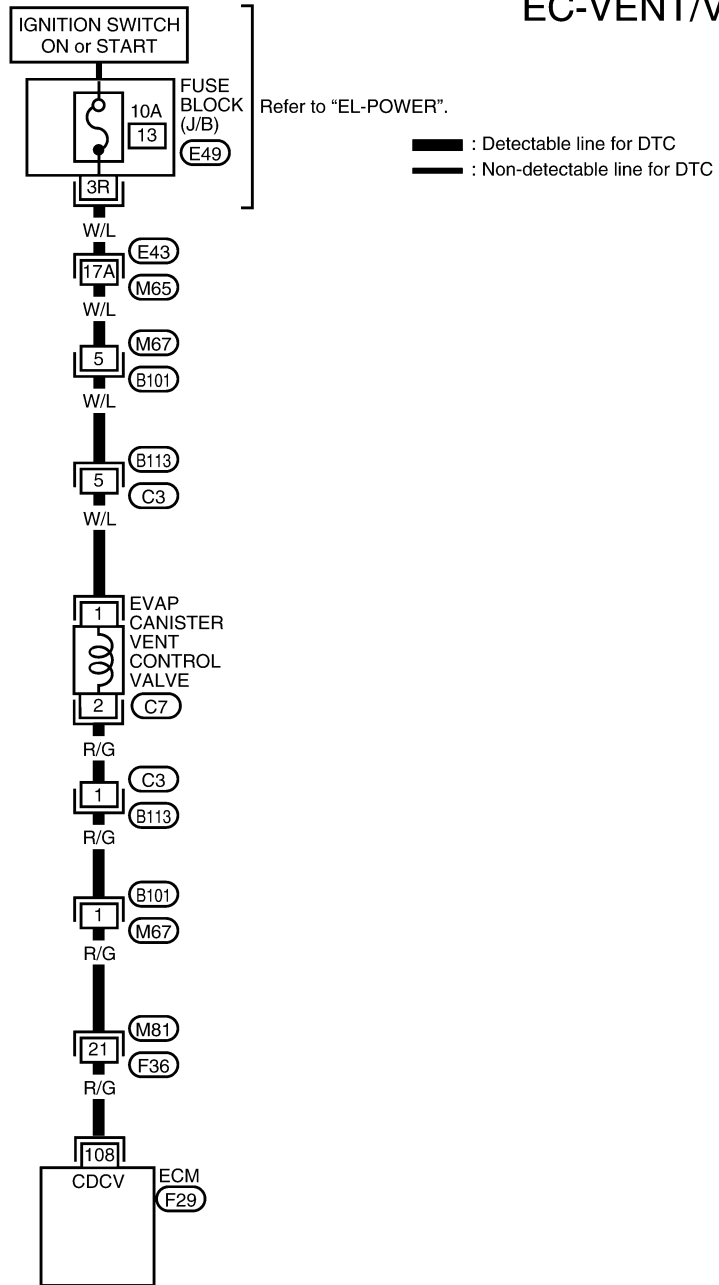
With GST

Follow the procedure "With CONSULT-II".

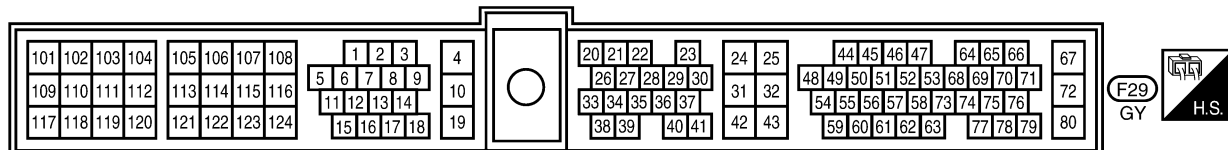
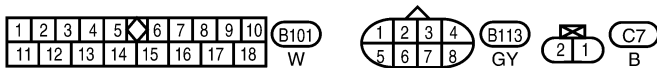
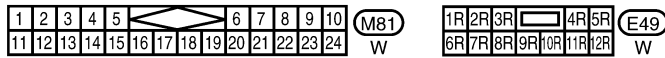
Wiring Diagram

NGEC1285

EC-VENT/V-01



Refer to "EL-POWER".
 — : Detectable line for DTC
 — : Non-detectable line for DTC



Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)

Diagnostic Procedure

NGEC1286

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

GI
MA
EM

2	CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT																					
<p>1. Turn ignition switch "OFF" and then turn "ON".</p> <p>2. Select "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-II.</p> <p>3. Touch "ON/OFF" on CONSULT-II screen.</p>																						
<table border="1" style="margin: auto;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>VENT CONTROL/V</td><td>OFF</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr> <tr><td>HO2S1 (B1)</td><td>XXX V</td></tr> <tr><td>HO2S1 (B2)</td><td>XXX V</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 (B1)	XXX V	HO2S1 (B2)	XXX V	THRTL POS SEN	XXX V		
ACTIVE TEST																						
VENT CONTROL/V	OFF																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 (B1)	XXX V																					
HO2S1 (B2)	XXX V																					
THRTL POS SEN	XXX V																					
<p>4. Check for operating sound of the valve. Clicking noise should be heard.</p>																						
OK or NG																						
OK	▶	GO TO 7.																				
NG	▶	GO TO 3.																				

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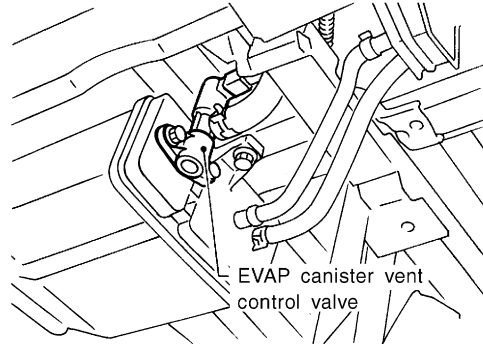
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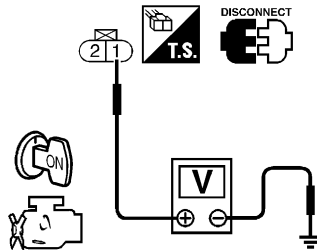
3 CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect EVAP canister vent control valve harness connector.



SEF143S

3. Turn ignition switch "ON".
4. Check voltage between terminal 1 and ground with CONSULT-II or tester.



SEF648W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4 DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E43, M65
- Harness connectors M67, B101 and B113, C3
- Fuse block (J/B) connector E49
- 10A fuse
- Harness for open or short between EVAP canister vent control valve and fuse

▶ Repair harness or connectors.

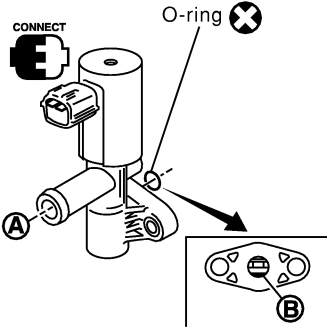
5 CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

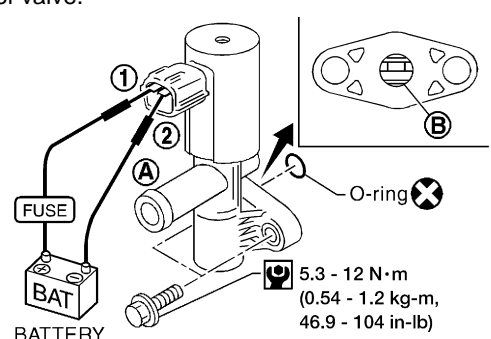
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and EVAP canister vent control valve terminal 2.
Refer to Wiring Diagram.
Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors C3, B113 and B101, M67 ● Harness connectors M81, F36 ● Harness for open or short between EVAP canister vent control valve and ECM 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK EVAP CANISTER VENT CONTROL VALVE																								
(P) With CONSULT-II <ol style="list-style-type: none"> 1. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode. 2. Check air passage continuity and operation delay time. 																									
	<table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <thead> <tr> <th colspan="2" style="text-align: center;">ACTIVE TEST</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">VENT CONTROL/V</td> <td style="text-align: center;">OFF</td> </tr> <tr> <th colspan="2" style="text-align: center;">MONITOR</th> </tr> <tr> <td style="text-align: center;">ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td style="text-align: center;">A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td style="text-align: center;">A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td style="text-align: center;">HO2S1 (B1)</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td style="text-align: center;">HO2S1 (B2)</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td style="text-align: center;">THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Condition VENT CONTROL/V</th> <th style="text-align: center;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">ON</td> <td style="text-align: center;">No</td> </tr> <tr> <td style="text-align: center;">OFF</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table> <p>Operation takes less than 1 second.</p>	ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 (B1)	XXX V	HO2S1 (B2)	XXX V	THRTL POS SEN	XXX V	Condition VENT CONTROL/V	Air passage continuity between A and B	ON	No	OFF	Yes
ACTIVE TEST																									
VENT CONTROL/V	OFF																								
MONITOR																									
ENG SPEED	XXX rpm																								
A/F ALPHA-B1	XXX %																								
A/F ALPHA-B2	XXX %																								
HO2S1 (B1)	XXX V																								
HO2S1 (B2)	XXX V																								
THRTL POS SEN	XXX V																								
Condition VENT CONTROL/V	Air passage continuity between A and B																								
ON	No																								
OFF	Yes																								
SEF991Y																									

(X) Without CONSULT-II <ol style="list-style-type: none"> 1. Check air passage continuity and operation delay time under the following conditions. 							
<table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <thead> <tr> <th style="text-align: center;">Condition</th> <th style="text-align: center;">Air passage continuity between A and B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">12V direct current supply between terminals 1 and 2</td> <td style="text-align: center;">No</td> </tr> <tr> <td style="text-align: center;">OFF</td> <td style="text-align: center;">Yes</td> </tr> </tbody> </table>	Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	No	OFF	Yes	
Condition	Air passage continuity between A and B						
12V direct current supply between terminals 1 and 2	No						
OFF	Yes						
If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary. If portion B is rusted, replace control valve.							
MTBL0240							
<p>Make sure new O-ring is installed properly.</p> <p>OK or NG</p>							
OK	▶ GO TO 8.						
NG	▶ Replace EVAP canister vent control valve.						

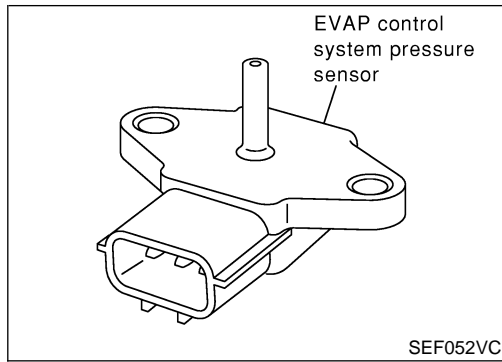
8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.	
▶	INSPECTION END

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DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

VG33ER

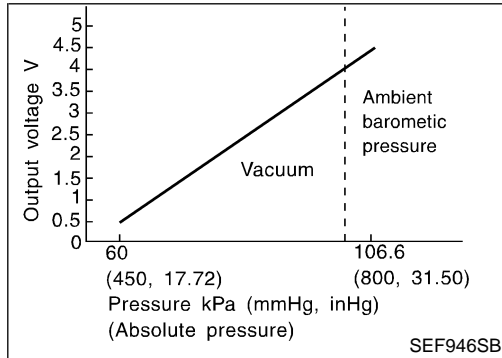
Component Description



Component Description

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases. The EVAP control system pressure sensor is not used to control the engine system. It is used only for on board diagnosis.

NGEC1287



CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

NGEC1288

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	● Ignition switch: ON	Approx. 1.8 - 4.8V

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

NGEC1289

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	B/W	Sensors' power supply	[Ignition switch ON]	Approximately 5V
43	BR	Sensors' ground	[Engine is running] ● Warm-up condition ● Idle speed	Approximately 0V
62	Y	EVAP control system pressure sensor	[Ignition switch ON]	Approximately 1.8 - 4.8V

DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

VG33ER

On Board Diagnosis Logic

On Board Diagnosis Logic

Malfunction is detected when an excessively low (P0452) or high (P0453) voltage signal from EVAP control system pressure sensor is sent to ECM. =NGEC1290

POSSIBLE CAUSE

- Harness or connectors (The EVAP control system pressure sensor circuit is open or shorted.) NGEC1290S01
- Rubber hose to EVAP control system pressure sensor is clogged, vent, kinked, disconnected or improper connection.
- EVAP control system pressure sensor
- EVAP canister vent control valve
- EVAP canister purge volume control solenoid valve
- EVAP canister
- Rubber hose from EVAP canister vent control valve to water separator

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
FUEL T/TMP SE	XXX °C

SEF194Y

With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Make sure that "FUEL T/TMP SE" is more than 0°C (32°F).
- 6) Start engine and wait at least 20 seconds.
- 7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1535.

With GST

Follow the procedure "With CONSULT-II".

DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

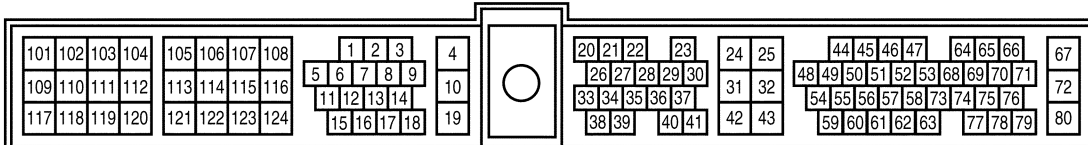
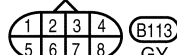
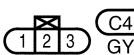
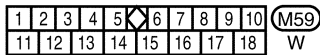
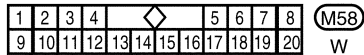
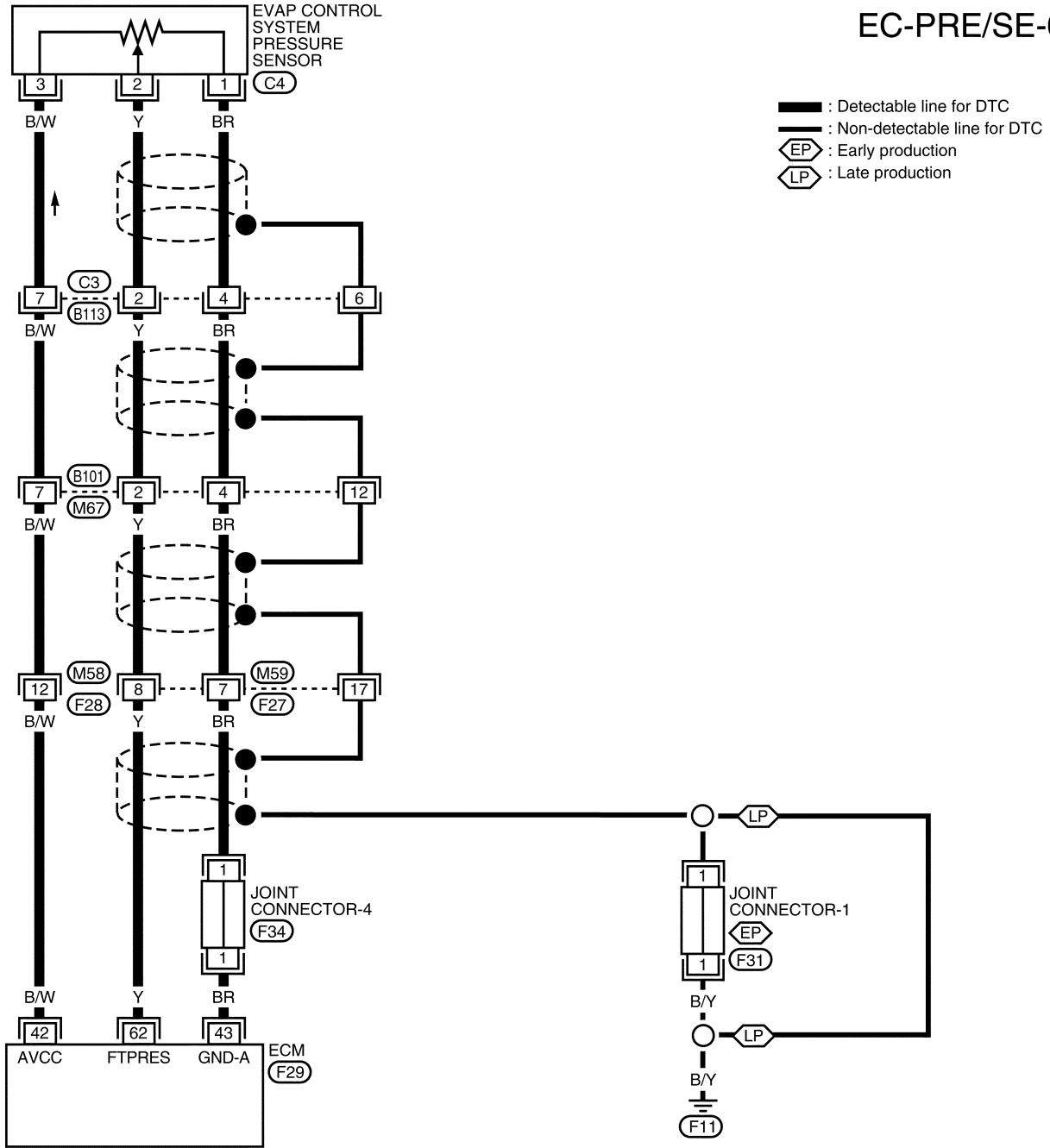
VG33ER

Wiring Diagram

Wiring Diagram

NGEC1292

EC-PRE/SE-01



WEC181A

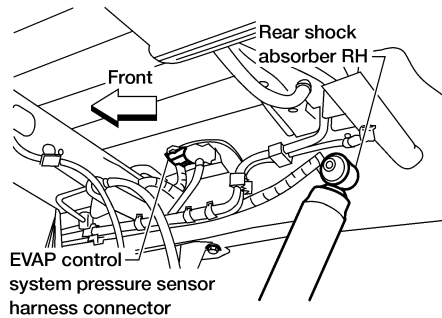
DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

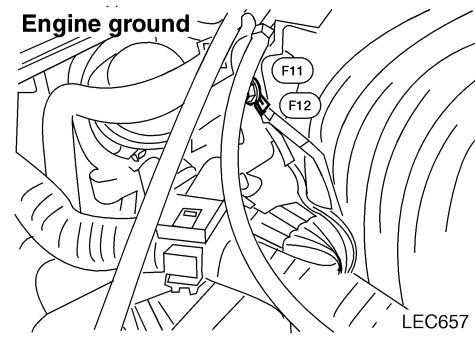
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Diagnostic Procedure

Diagnostic Procedure

NGEC1293

1	CHECK RUBBER TUBE	<p>1. Turn ignition switch "OFF".</p> <p>2. Check rubber tube connected to the sensor for clogging, vent, kink, disconnection or improper connection.</p> <div style="text-align: center;">  <p>EVAP control system pressure sensor harness connector</p> <p>Rear shock absorber RH</p> <p>Front</p> </div> <p style="text-align: right;">AEC651A</p> <p style="text-align: center;">OK or NG</p>	
	OK	▶	GO TO 2.
	NG	▶	Reconnect, repair or replace.

2	RETIGHTEN GROUND SCREWS	<p>1. Loosen and retighten engine ground screws.</p> <div style="text-align: center;">  <p>Engine ground</p> <p>F11</p> <p>F12</p> <p style="text-align: right;">LEC657</p> </div> <p style="text-align: right;">LEC657</p>	
		▶	GO TO 3.

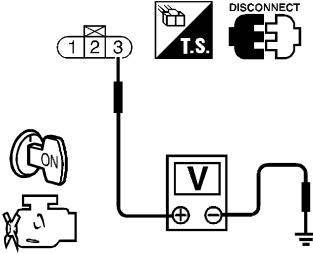
3	CHECK CONNECTOR	<p>1. Disconnect EVAP control system pressure sensor harness connector.</p> <p>2. Check sensor harness connector for water.</p> <p>Water should not exist.</p> <p style="text-align: center;">OK or NG</p>	
	OK	▶	GO TO 4.
	NG	▶	Repair or replace harness connector.

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DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

VG33ER

Diagnostic Procedure (Cont'd)

4	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT	
<p>1. Turn ignition switch "ON". 2. Check voltage between terminal 3 and ground with CONSULT-II or tester.</p>		
		
<p>Voltage: Approximately 5V</p> <p>OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

SEF889U

5	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors C3, B113 and B101, M67 ● Harness connectors M58, F28 ● Harness for open or short between EVAP control system pressure sensor and ECM 		
▶		Repair harness or connectors.

6	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch "OFF". 2. Check harness continuity between EVAP control system pressure sensor terminal 1 and engine ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to power.</p>		
<p>OK or NG</p>		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors C3, B113 and B101, M67 ● Harness connectors M59, F27 ● Joint connector-4 (if equipped) ● Harness for open or short between EVAP control system pressure sensor and ECM 		
▶		Repair open circuit or short to power in harness or connectors.

DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

VG33ER

Diagnostic Procedure (Cont'd)

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Disconnect ECM harness connector.</p> <p>2. Check harness continuity between ECM terminal 62 and EVAP control system pressure sensor terminal 2. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK (With CONSULT-II) ▶		GO TO 10.
OK (Without CONSULT-II) ▶		GO TO 11.
NG ▶		GO TO 9.

9	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors C3, B113 and B101, M67 ● Harness connectors M59, F27 ● Harness for open or short between ECM and EVAP control system pressure sensor 		
▶		Repair open circuit or short to ground or short to power in harness or connectors.

10	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																					
<p> With CONSULT-II</p> <p>1. Start engine.</p> <p>2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.</p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td>PURG VOL CONT/V</td> <td style="text-align: center;">0.0%</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td>FR O2 MNTR-B1</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>FR O2 MNTR-B2</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>			ACTIVE TEST		PURG VOL CONT/V	0.0%	MONITOR		ENG SPEED	XXX rpm	FR O2 MNTR-B1	RICH	FR O2 MNTR-B2	RICH	THRTL POS SEN	XXX V	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %		
ACTIVE TEST																						
PURG VOL CONT/V	0.0%																					
MONITOR																						
ENG SPEED	XXX rpm																					
FR O2 MNTR-B1	RICH																					
FR O2 MNTR-B2	RICH																					
THRTL POS SEN	XXX V																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
OK or NG																						
OK ▶		GO TO 12.																				
NG ▶		GO TO 11.																				

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DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

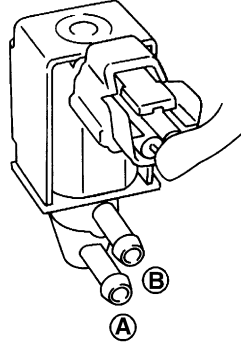
VG33ER

Diagnostic Procedure (Cont'd)

11 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Check air passage continuity under the following conditions.



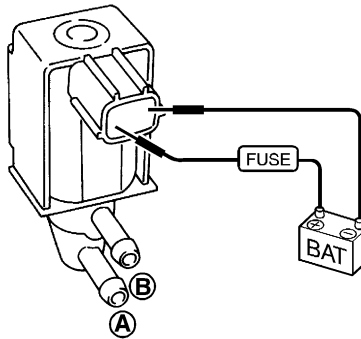
Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

SEF660U

MTBL0241

Without CONSULT-II

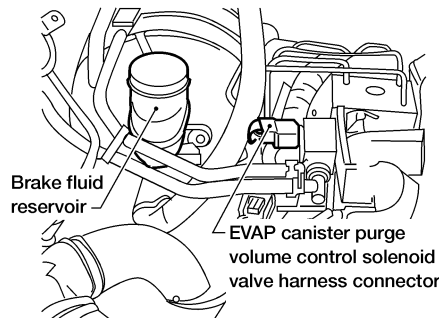
1. Check air passage continuity under the following conditions.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF661U

MTBL0242



AEC652A

OK or NG

OK



GO TO 12.

NG

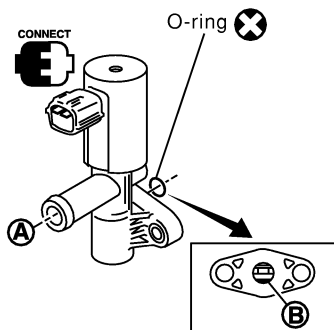


Replace EVAP canister purge volume control solenoid valve.

12 CHECK EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

1. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
2. Check air passage continuity and operation delay time under the following conditions.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

SEF991Y

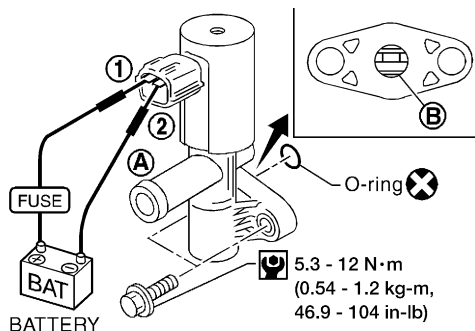
Without CONSULT-II

1. Check air passage continuity and operation delay time under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.



AEC783A

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace EVAP canister vent control valve.

13 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to "Component Inspection, EC-1541.

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace EVAP control system pressure sensor.

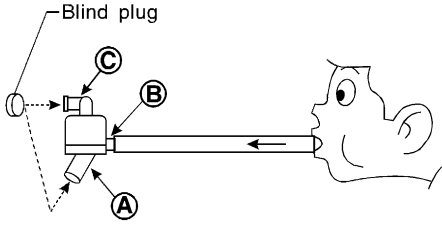
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DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

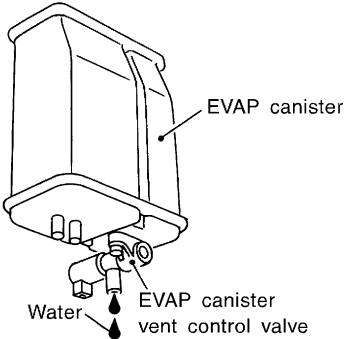
VG33ER

Diagnostic Procedure (Cont'd)

14	CHECK RUBBER TUBE	
Check obstructed rubber tube connected to EVAP canister vent control valve.		
OK or NG		
OK	▶	GO TO 15.
NG	▶	Clean, repair or replace rubber tube.

15	CHECK WATER SEPARATOR	
<ol style="list-style-type: none"> 1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged. 		
 <p style="text-align: center;">* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p>		
5. In case of NG in items 2 - 4, replace the parts.		
NOTE:		
<ul style="list-style-type: none"> ● Do not disassemble water separator. 		
OK or NG		
OK	▶	GO TO 16.
NG	▶	Replace water separator.

SEF829T

16	CHECK IF EVAP CANISTER SATURATED WITH WATER	
<ol style="list-style-type: none"> 1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister. 		
		
Yes or No		
Yes	▶	GO TO 17.
No	▶	GO TO 19.

SEF596U

DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

VG33ER

Diagnostic Procedure (Cont'd)

17	CHECK EVAP CANISTER	
Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).		
OK or NG		
OK	▶	GO TO 19.
NG	▶	GO TO 18.

GI
MA
EM

18	DETECT MALFUNCTIONING PART	
Check the following.		
<ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 		
▶		Repair hose or replace EVAP canister.

LC
EC

19	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT	
<ol style="list-style-type: none"> 1. Reconnect harness connectors disconnected. 2. Disconnect harness connectors C3, B113. 3. Check harness continuity between harness connector B113 terminal 6 and engine ground. Continuity should exist. 4. Also check harness for short to power. 		
OK or NG		
OK	▶	GO TO 21.
NG	▶	GO TO 20.

FE
CL
MT

20	DETECT MALFUNCTIONING PART	
Check the following.		
<ul style="list-style-type: none"> ● Harness connector B113 and B101, M67 ● Harness connectors M59, F27 ● Joint connector-1 (if equipped) ● Harness for open between harness connector M67 and engine ground 		
▶		Repair open circuit or short to power in harness or connectors.

TF
PD
AX

21	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.		
▶		INSPECTION END

SU
BR
ST

Component Inspection

EVAP CONTROL SYSTEM PRESSURE SENSOR

NGEC1501

1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Install a vacuum pump to EVAP control system pressure sensor.

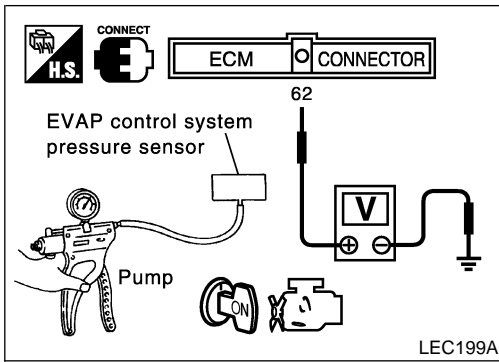
RS
BT
HA

SC
EL

DTC P0452, P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

VG33ER

Component Inspection (Cont'd)



- Turn ignition switch ON and check output voltage between ECM terminal 62 and ground under the following conditions.

Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 – 4.8
-26.7 (-200, -7.87)	2.1 to 2.5V lower than above value

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
 - Do not apply vacuum below -93.3 kPa (-700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).
- If NG, replace EVAP control system pressure sensor.

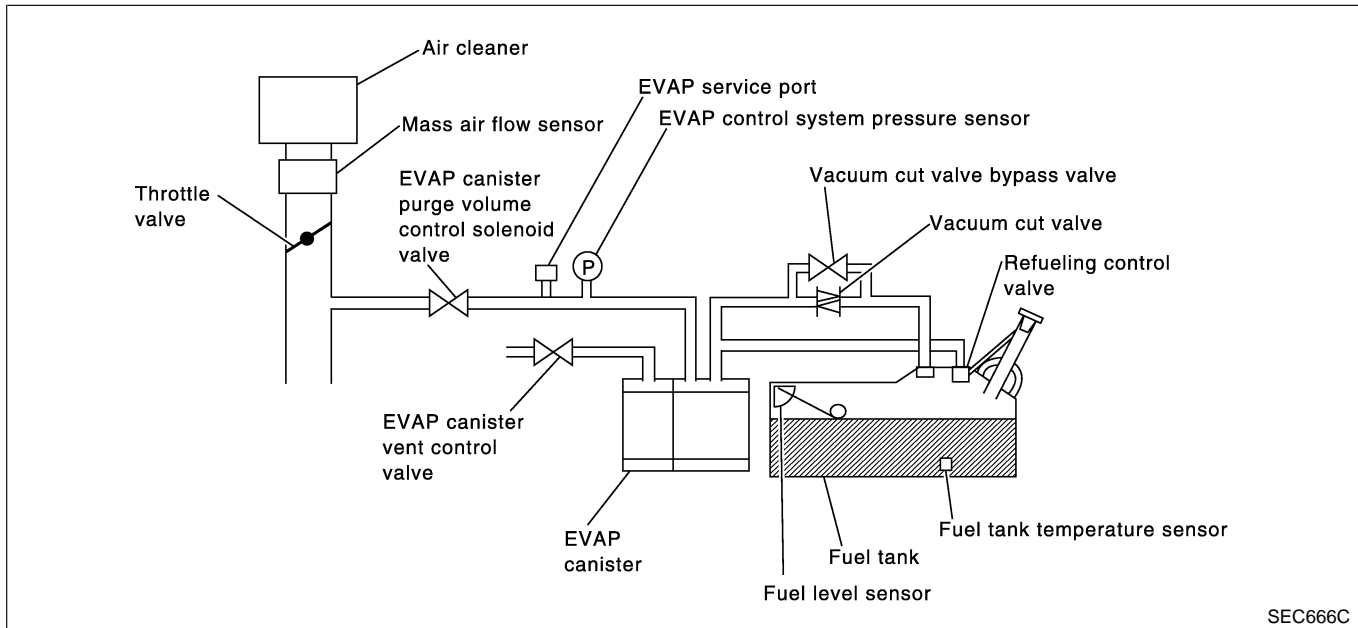
On Board Diagnosis Logic

NGEC1294

NOTE:

If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1683.)

This diagnosis detects a very large leak (fuel filler cap fell off etc.) in the EVAP system between the fuel tank and the EVAP canister purge volume control solenoid valve.



SEC666C

Malfunction is detected when EVAP control system has a very large leak, such as fuel filler cap fell off, EVAP control system does not operate properly.

CAUTION:

- Fuel filler cap remains open or fails to close.
- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

POSSIBLE CAUSE

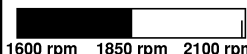
NGEC1294S01

- Fuel filler cap remains open or fails to close.
- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent.
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve and the circuit
- Fuel tank temperature sensor

- O-ring of EVAP canister vent control valve is missing or damaged.
- EVAP control system pressure sensor
- Refueling control valve
- ORVR system leaks

6	<p>EVAP SML LEAK P0442/P1442</p> <p>1)FOR BEST RSLT,PERFORM AT FOLLOWING CONDITIONS. -FUEL LEVEL: 1/4-3/4 -AMBIENT TEMP: 0-30 C(32-86F) -OPEN ENGINE HOOD. 2)START ENG WITH VHCL STOPPED. IF ENG IS ON,STOP FOR 5 SEC. THEN RESTART. 3)TOUCH START.</p>	SEC716C
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6	<p>EVAP SML LEAK P0442/P1442</p> <p>WAIT 2 TO 10 MINUTES. KEEP ENGINE RUNNING AT IDLE SPEED.</p>	SEC717C
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6	<p>EVAP SML LEAK P0442/P1442</p> <p>MAINTAIN 1600 - 2100 RPM UNTIL FINAL RESULT APPEARS. (APPROX. 3 MINUTES)</p>  <p>1600 rpm 1850 rpm 2100 rpm</p>	SEC718C
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6	<p>EVAP SML LEAK P0442/P1442</p> <p style="text-align: center;">OK</p> <hr/> <p>SELF-DIAG RESULTS</p> <hr/> <p>NO DTC DETECTED. FURTHER TESTING MAY BE REQUIRED.</p>	SEC719C
---	--	---------

DTC Confirmation Procedure

NGEC1295

CAUTION:

Never remove fuel filter cap during the DTC confirmation procedure.

NOTE:

- If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1683.)
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.
- Open engine hood before conducting the following procedure.

With CONSULT-II

- 1) Tighten fuel filter cap securely until ratcheting sound is heard.
- 2) Turn ignition switch ON.
- 3) Turn ignition switch OFF and wait at least 5 seconds.
- 4) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
- 5) Make sure that the following conditions are met.
COOLAN TEMP/S: 0 - 32°C (32 - 90°F)
INT/A TEMP SE: More than 0°C (32°F)
- 6) Select “EVAP SML LEAK P0442” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II. Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to “Basic Inspection”, EC-1273.

- 7) Make sure that “OK” is displayed.
 If “NG” is displayed, select “SELF-DIAG RESULTS” mode with CONSULT-II and make sure that “EVAP GROSS LEAK [P0455] is displayed, refer to “Diagnostic Procedure”, EC-1546.
 If P0442 is displayed, perform “Diagnostic Procedure” for DTC P0442.

With GST

NOTE:

Be sure to read the explanation of “Driving Pattern” on EC-1239 before driving vehicle.

DTC P0455 EVAP CONTROL SYSTEM

VG33ER

DTC Confirmation Procedure (Cont'd)

- 1) Start engine.
- 2) Drive vehicle according to "Driving Pattern", EC-1239.
- 3) Stop vehicle. GI
- 4) Select "MODE 1" with GST.
 - If SRT of EVAP system is not set yet, go to the following step. MA
 - If SRT of EVAP system is set, the result will be OK.
- 5) Turn ignition switch "OFF" and wait at least 5 seconds. EM
- 6) Start engine. EM
- It is not necessary to cool engine down before driving.**
- 7) Drive vehicle again according to the "Driving Pattern", EC-1239. LC
- 8) Stop vehicle.
- 9) Select "MODE 3" with GST. EC
- If P0455 is displayed on the screen, go to "Diagnostic Procedure", EC-1546.
- If P0442 is displayed on the screen, go to "Diagnostic Procedure", EC-1508. FE
- If P0441 is displayed on the screen, go to "Diagnostic Procedure" for "DTC P0441", EC-1496. CL
- If P0442, P0455 and P0441 are not displayed on the screen, go to the following step. MT
- 10) Select "MODE 1" with GST.
 - If SRT of EVAP system is set, the result will be OK. AT
 - If SRT of EVAP system is not set, go to step 6. AT

TF

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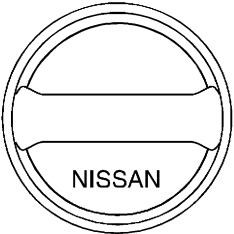
SC

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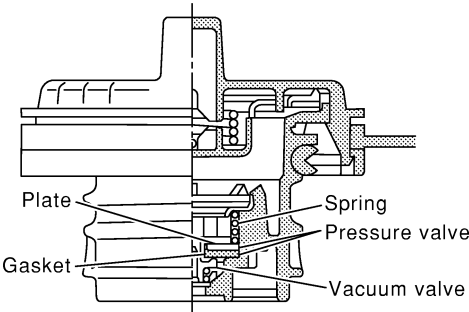
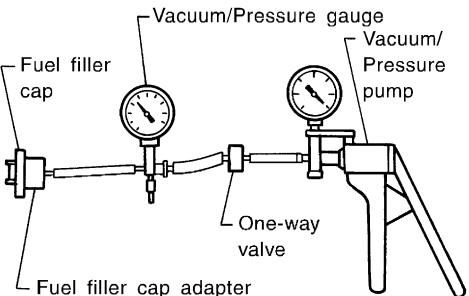
Diagnostic Procedure

=NGEC1296

1	CHECK FUEL FILLER CAP DESIGN	
1. Turn ignition switch OFF. 2. Check for genuine NISSAN fuel filler cap design.		
		
SEF915U		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

2	CHECK FUEL FILLER CAP INSTALLATION	
Check that the cap is tightened properly by rotating the cap clockwise.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	<ul style="list-style-type: none"> ● Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. ● Retighten until ratcheting sound is heard.

3	CHECK FUEL FILLER CAP FUNCTION	
Check for air releasing sound while opening the fuel filler cap.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	CHECK FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)	<p>1. Wipe clean valve housing. 2. Check valve opening pressure and vacuum.</p> <div style="text-align: center;">  </div> <div style="text-align: center; margin-top: 20px;">  </div> <p style="text-align: right; margin-right: 20px;">SEF445Y</p> <p>Pressure: 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22 - 2.90 psi)</p> <p>Vacuum: -6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm², -0.87 to -0.48 psi)</p> <p>CAUTION: Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.</p> <p style="text-align: center;">OK or NG</p> <p style="text-align: right; margin-right: 20px;">SEF943S</p>	GI MA EM LC EC FE CL MT AT TF PD AX SU
OK	▶	GO TO 5.	
NG	▶	Replace fuel filler cap with a genuine one.	

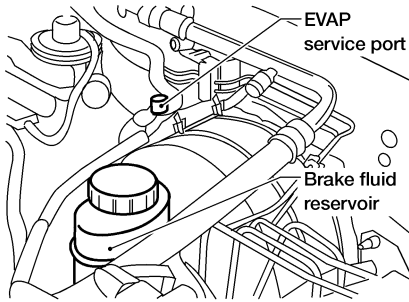
5	CHECK EVAP PURGE LINE	<p>Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection. Refer to "Evaporative Emission System", EC-1200.</p> <p style="text-align: center;">OK or NG</p>	BR ST RS
OK	▶	GO TO 6.	
NG	▶	Repair or reconnect the hose.	

6	CLEAN EVAP PURGE LINE	<p>Clean EVAP purge line (pipe and rubber tube) using air blower.</p> <p style="text-align: center;">▶ GO TO 7.</p>	BT HA
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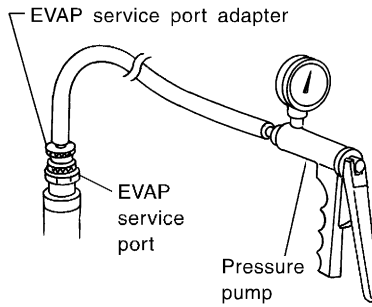
7	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT	<p>Refer to "DTC Confirmation Procedure", EC-1527.</p> <p style="text-align: center;">OK or NG</p>	SC EL
OK	▶	GO TO 8.	
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.	

8 INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



AEC649A



SEF916U

NOTE:

Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II ▶	GO TO 9.
Models without CON- SULT-II ▶	GO TO 10.

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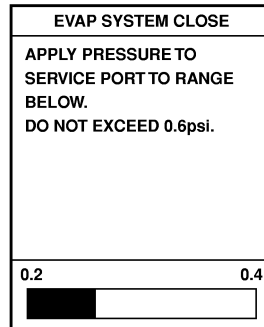
9 CHECK FOR EVAP LEAK

Ⓜ With CONSULT-II

1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

NOTE:

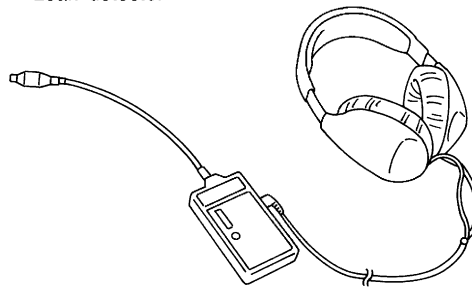
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-1203.

Leak detector



SEF200U

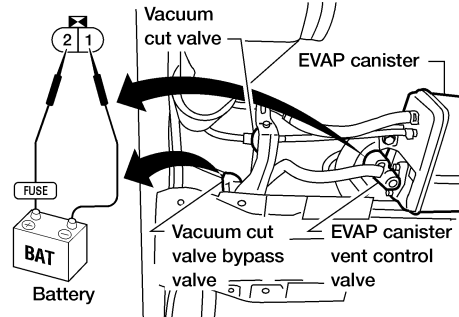
OK or NG

OK	▶	GO TO 11.
NG	▶	Repair or replace.

10 CHECK FOR EVAP LEAK

⊗ Without CONSULT-II

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



AEC632A

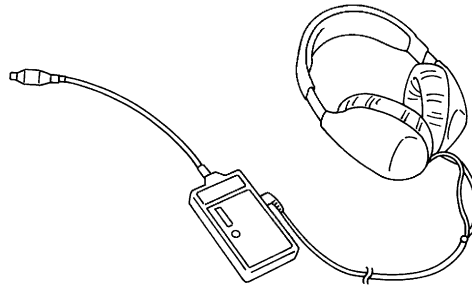
4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

NOTE:

- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.

5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-1203.

Leak detector



SEF200U

OK or NG

OK	▶	GO TO 12.
NG	▶	Repair or replace.

11	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION																					
<p>Ⓟ With CONSULT-II</p> <ol style="list-style-type: none"> 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 2. Start engine. 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode. 4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. 																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td>XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>HO2S1 MNTR (B2)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V		
ACTIVE TEST																						
PURG VOL CONT/V	XXX %																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
HO2S1 MNTR (B2)	LEAN																					
THRTL POS SEN	XXX V																					
<p>Vacuum should exist.</p>																						
SEF984Y																						
Vacuum should exist.																						
OK or NG																						
OK	▶	GO TO 14.																				
NG	▶	GO TO 13.																				

12	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION	
<p>ⓧ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 4. Start engine and let it idle for at least 80 seconds. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. <p>Vacuum should exist.</p>		
OK or NG		
OK	▶	GO TO 15.
NG	▶	GO TO 13.

13	CHECK VACUUM HOSE	
<p>Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-1193.</p>		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 14.
OK (Without CONSULT-II)	▶	GO TO 15.
NG	▶	Repair or reconnect the hose.

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14 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

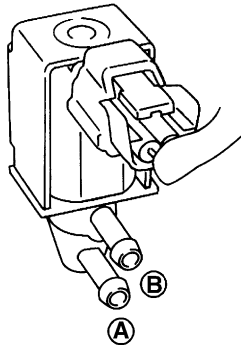
1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

If OK, inspection end. If NG, go to following step.

3. Check air passage continuity.



SEF660U

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

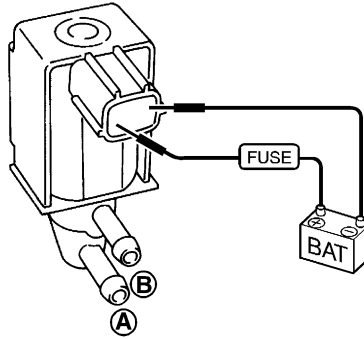
MTBL0241

OK or NG

- | | | |
|----|---|--|
| OK | ▶ | GO TO 16. |
| NG | ▶ | Replace EVAP canister purge volume control solenoid valve. |

15 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

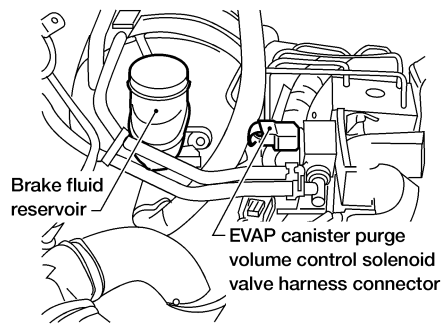
⊗ Without CONSULT-II
Check air passage continuity.



SEF661U

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

MTBL0242



AEC652A

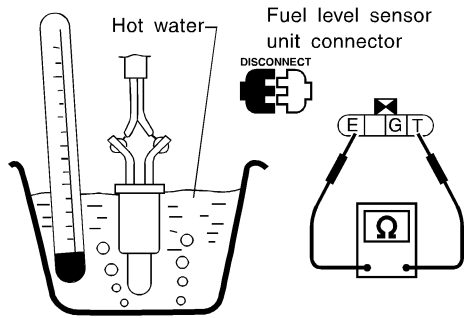
OK or NG

OK	▶	GO TO 16.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

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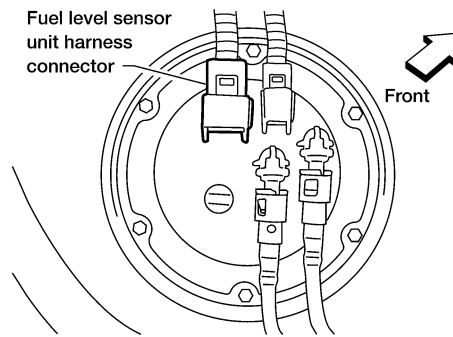
16 CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit terminals T and E by heating with hot water or heat gun as shown in the figure.



Temperature °C (°F)	Resistance k Ω
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

SEC311C



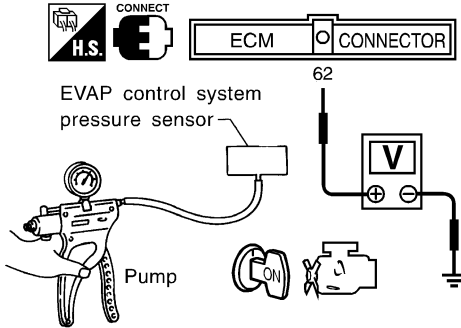
LEC764

OK or NG

OK	▶	GO TO 17.
NG	▶	Replace fuel tank temperature sensor.

17 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch ON.
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
5. Check input voltage between ECM terminal 62 and ground.

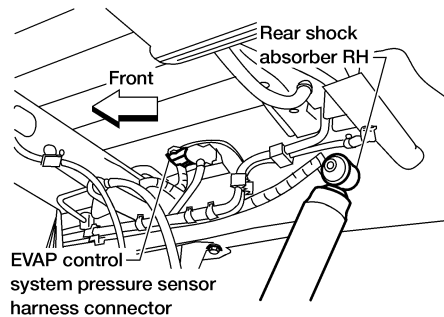


Applied vacuum	Voltage V
Not applied	1.8 - 4.8
-26.7 kPa (-200 mmHg, -7.87 inHg)	1.0 to 1.4V lower than above value

SEC649C

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.
- Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.



AEC651A

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP control system pressure sensor.

18 CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.

▶ **INSPECTION END**

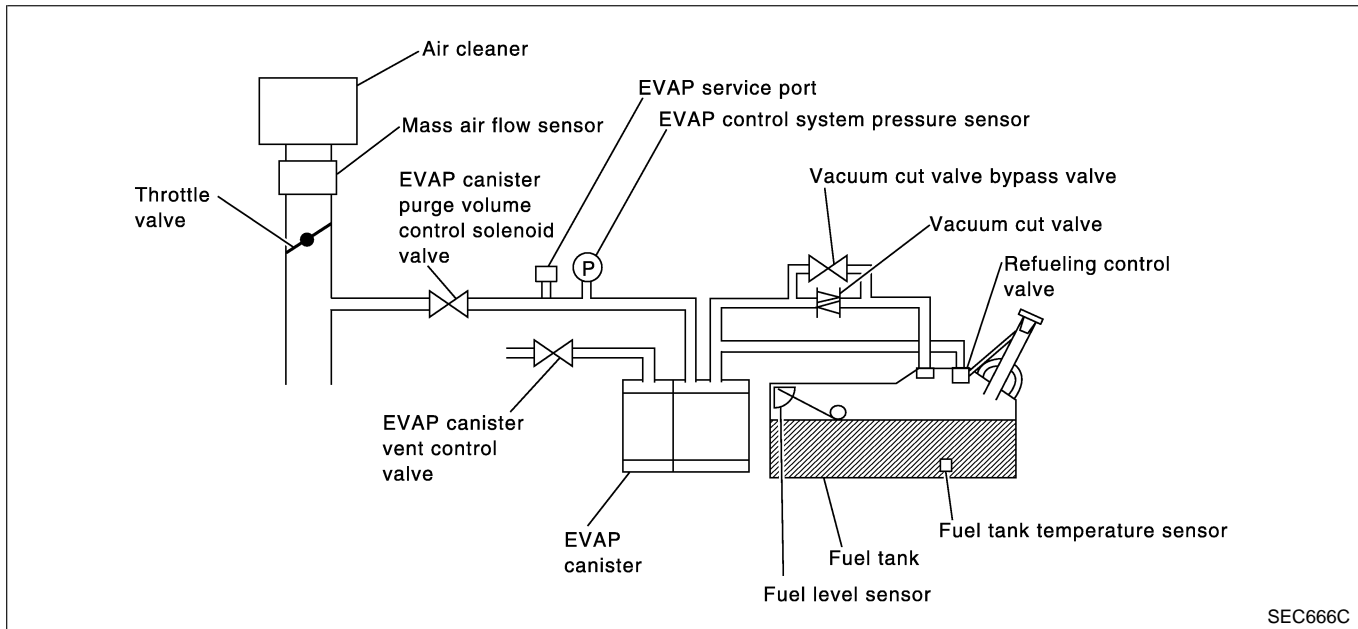
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On Board Diagnosis Logic

This diagnosis detects very small leaks in the EVAP line between the fuel tank and the EVAP canister purge volume control solenoid valve using intake manifold vacuum (negative pressure when P0456) or fuel tank vapor pressure (positive pressure when P1456) in the same way as conventional EVAP small leak diagnosis.

If the ECM judges a leak equivalent to a very small leak, the very small leak DTC P0456 or P1456 will be detected. If the ECM judges a leak equivalent to a small leak, the EVAP small leak DTC P0442 or P1442 will be detected. Correspondingly, if the ECM judges there is no leak, the diagnosis result is OK.

NGEC1375



SEC666C

Malfunction is detected when EVAP control system has a very small leak, EVAP control system does not operate properly.

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

POSSIBLE CAUSE

NGEC1375S01

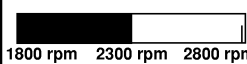
- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close.
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent.
- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit

- EVAP canister purge volume control solenoid valve
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- Water separator
- EVAP canister is saturated with water.
- Fuel level sensor and the circuit
- EVAP control system pressure sensor
- Refueling control valve
- ORVR system leaks

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EVAP V/S LEAK P0456/P1456	
CHECK FUEL LEVEL SENSOR(V). SEE SERVICE MANUAL FOR SPECIFICATION. IS THE VOLTAGE WITHIN THE SPECIFICATION?	
MONITOR	
FUEL LEVEL SE	XXX V

SEC720C

EVAP V/S LEAK P0456/P1456	
MAINTAIN 1800-2800 RPM UNTIL FINAL RESULT APPEARS.	
	

SEC721C

EVAP V/S LEAK P0456/P1456	
OK	

SEC722C

DTC Confirmation Procedure

NGEC1376

CAUTION:

Never remove fuel filler cap during the DTC confirmation procedure.

NOTE:

- If DTC P0456 or P1456 is displayed with P0442, perform TROUBLE DIAGNOSIS FOR DTC P0456 or P1456 first.
- If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.
- After repair, make sure that the hoses and clips are installed properly.

TESTING CONDITION:

- Open engine hood before conducting following procedure.
- If any of following condition is met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.
 - a) Fuel filler cap is removed.
 - b) Refilled or drained the fuel.
 - c) EVAP component parts is/are removed.
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

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With CONSULT-II

- 1) Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
- 2) Make sure the following conditions are met.
 - FUEL LEVEL SE: 1.08 - 0.2V**
 - COOLAN TEMP/S: 0 - 32°C (32 - 90°F)**
 - FUEL T/TMP SE: 0 - 35°C (32 - 95°F)**
 - INT A/TEMP SE: More than 0°C (32°F)**
 If NG, turn ignition switch “OFF” and leave the vehicle in a cool place (soak the vehicle) or refilling/draining fuel until the output voltage condition of the “FUEL LEVEL SE” meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1).
- 3) Turn ignition switch “OFF” and wait at least 5 seconds.
- 4) Turn ignition switch “ON”.
- 5) Select “EVAP VERY/SML LEAK P0456 or P1456” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II. Follow the instruction displayed.
- 6) Make sure that “OK” is displayed. If “NG” is displayed, refer to “Diagnostic Procedure”, EC-1559.

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NOTE:

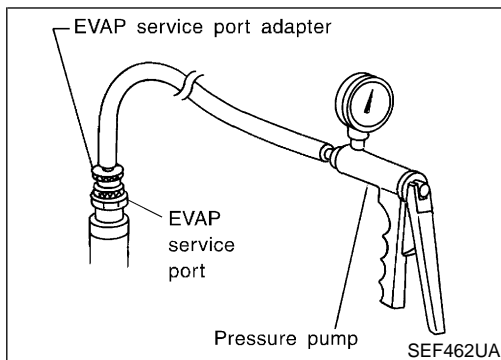
- If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to “Basic inspection”, EC-1273.
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

Overall Function Check

NGEC1377

With GST

Use this procedure to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.

**CAUTION:**

- **Never use compressed air, doing so may damage the EVAP system.**
 - **Do not start engine.**
 - **Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi).**
- 1) Attach the EVAP service port adapter securely to the EVAP service port.
 - 2) Set the pressure pump and a hose.
 - 3) Also set a vacuum gauge via 3-way connector and a hose.
 - 4) Turn ignition switch “ON”.
 - 5) Connect GST and select mode 8.
 - 6) Using mode 8 control the EVAP canister vent control valve (close) and vacuum cut valve bypass valve (open).
 - 7) Apply pressure and make sure the following conditions are satisfied.

Pressure to be applied: 2.7 kPa (20 mmHg, 0.79 inHg)

Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (3 mmHg, 0.12 inHg)

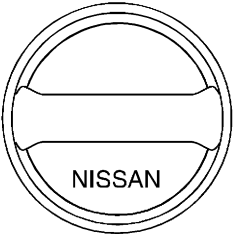
If NG, go to diagnostic procedure, EC-1559.

NOTE:

For more information, refer to GST instruction manual.

Diagnostic Procedure

NGEC1378

1	CHECK FUEL FILLER CAP DESIGN	
1. Turn ignition switch "OFF". 2. Check for genuine NISSAN fuel filler cap design.		
		
SEF915U		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

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2	CHECK FUEL FILLER CAP INSTALLATION	
Check that the cap is tightened properly by rotating the cap clockwise.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	<ul style="list-style-type: none"> ● Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. ● Retighten until ratcheting sound is heard.

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3	CHECK FUEL FILLER CAP FUNCTION	
Check for air releasing sound while opening the fuel filler cap.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

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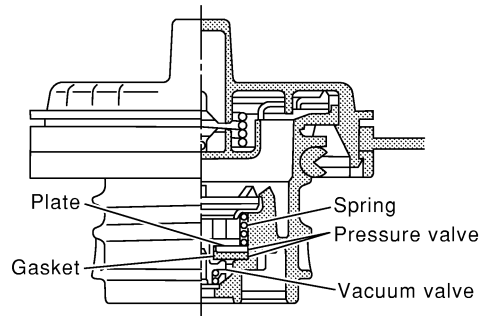
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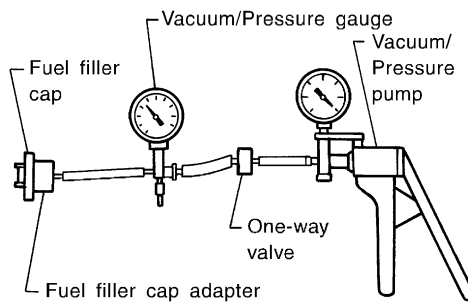
IDX

4 CHECK FUEL TANK VACUUM RELIEF VALVE

1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.



SEF445Y



SEF943S

Pressure:

15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22 - 2.90 psi)

Vacuum:

-6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm², -0.87 to -0.48 psi)

CAUTION:

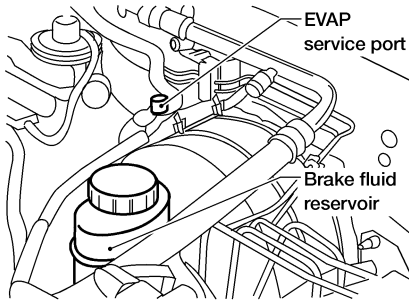
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

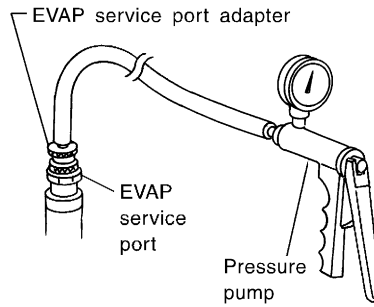
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

5 INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



AEC649A



SEF916U

NOTE:

Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II ► GO TO 6.

Models without CON-
SULT-II ► GO TO 7.

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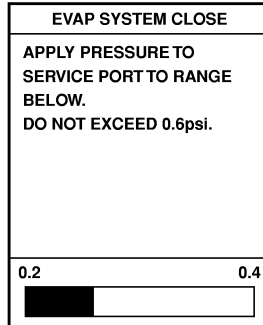
6 CHECK FOR EVAP LEAK

Ⓜ With CONSULT-II

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

NOTE:

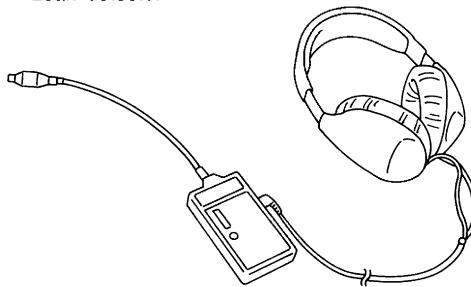
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-1203.

Leak detector



SEF200U

OK or NG

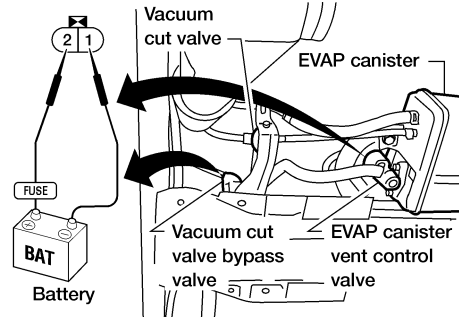
OK	▶	GO TO 8.
NG	▶	Repair or replace.

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7 CHECK FOR EVAP LEAK

⊗ Without CONSULT-II

1. Turn ignition switch "OFF".
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



AEC632A

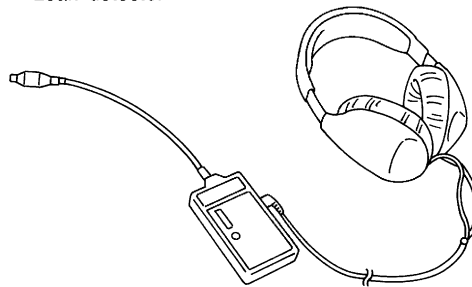
4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

NOTE:

- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in the system.

5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-1203.

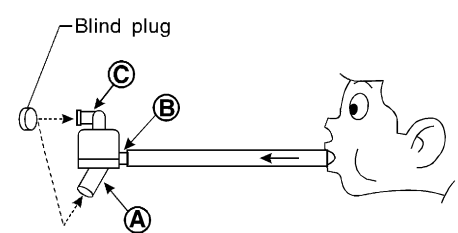
Leak detector



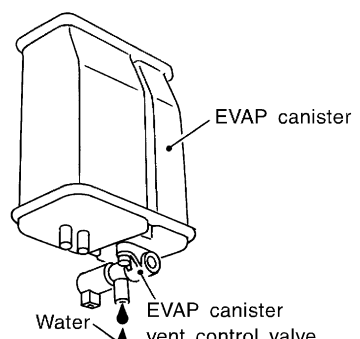
SEF200U

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.


8	CHECK WATER SEPARATOR
<ol style="list-style-type: none"> 1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged. 	
 <p style="text-align: center;">* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p>	
SEF829T	
<p>5. In case of NG in items 2 - 4, replace the parts.</p> <p>NOTE:</p> <ul style="list-style-type: none"> ● Do not disassemble water separator. <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 9.
NG	▶ Replace water separator.


9	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT
Refer to "DTC Confirmation Procedure", EC-1527.	
OK or NG	
OK	▶ GO TO 10.
NG	▶ Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

10	CHECK IF EVAP CANISTER SATURATED WITH WATER
<ol style="list-style-type: none"> 1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Does water drain from the EVAP canister? 	
 <p style="text-align: center;">Yes or No</p>	
SEF596U	
Yes	▶ GO TO 11.
No (With CONSULT-II)	▶ GO TO 13.
No (Without CONSULT-II)	▶ GO TO 14.

11	CHECK EVAP CANISTER	
Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 13.
OK (Without CONSULT-II)	▶	GO TO 14.
NG	▶	GO TO 12.

12	DETECT MALFUNCTIONING PART	
Check the following.		
<ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 		
	▶	Repair hose or replace EVAP canister.

13	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION																					
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 2. Start engine. 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode. 4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. 																						
<table border="1" style="margin: auto;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>PURG VOL CONT/V</td><td>XXX %</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr> <tr><td>HO2S1 MNTR (B1)</td><td>LEAN</td></tr> <tr><td>HO2S1 MNTR (B2)</td><td>LEAN</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		PURG VOL CONT/V	XXX %	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V		
ACTIVE TEST																						
PURG VOL CONT/V	XXX %																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
HO2S1 MNTR (B2)	LEAN																					
THRTL POS SEN	XXX V																					
Vacuum should exist.																						
SEF984Y																						
OK or NG																						
OK	▶	GO TO 16.																				
NG	▶	GO TO 15.																				

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION	
<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Stop engine. 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. 4. Start engine and let it idle for at least 80 seconds. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. <p style="color: blue;">Vacuum should exist.</p>		
OK or NG		
OK	▶	GO TO 17.
NG	▶	GO TO 15.

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DTC P0456, P1456 EVAP CONTROL SYSTEM

VG33ER

Diagnostic Procedure (Cont'd)

15	CHECK VACUUM HOSE	
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-1193.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 16.
OK (Without CONSULT-II)	▶	GO TO 17.
NG	▶	Repair or reconnect the hose.

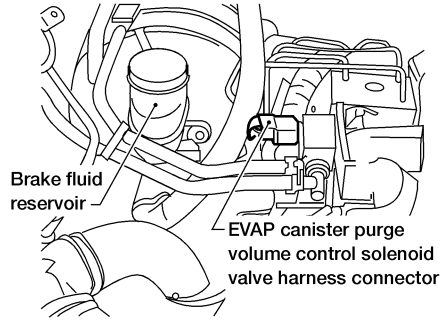
16	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE																					
<p>ⓘ With CONSULT-II</p> <p>1. Start engine.</p> <p>2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.</p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td>PURG VOL CONT/V</td> <td style="text-align: center;">0.0%</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td>ENG SPEED</td> <td style="text-align: center;">XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td style="text-align: center;">XXX %</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td style="text-align: center;">RICH</td> </tr> <tr> <td>THRTL POS SEN</td> <td style="text-align: center;">XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>			ACTIVE TEST		PURG VOL CONT/V	0.0%	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	RICH	HO2S1 MNTR (B2)	RICH	THRTL POS SEN	XXX V		
ACTIVE TEST																						
PURG VOL CONT/V	0.0%																					
MONITOR																						
ENG SPEED	XXX rpm																					
A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	RICH																					
HO2S1 MNTR (B2)	RICH																					
THRTL POS SEN	XXX V																					
SEF985Y																						
OK or NG																						
OK	▶	GO TO 18.																				
NG	▶	GO TO 17.																				

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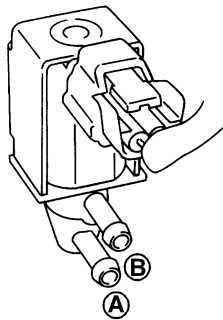
17 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



WEC547

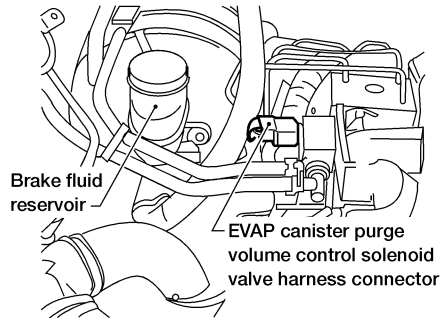


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

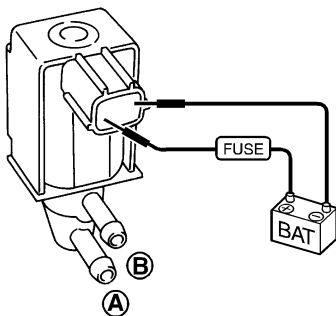
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



WEC547

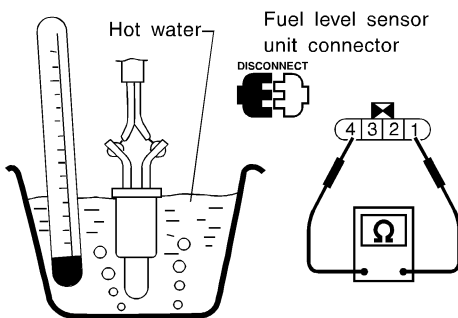


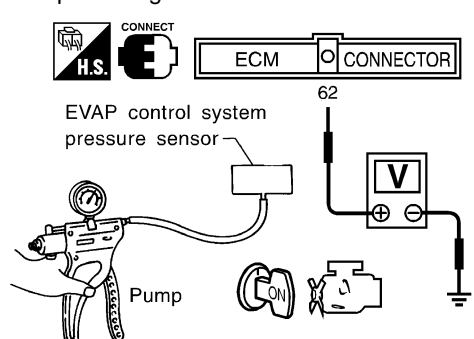
Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

SEF335X

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

18	CHECK FUEL TANK TEMPERATURE SENSOR	<p>1. Remove fuel level sensor unit.</p> <p>2. Check resistance between fuel level sensor unit terminals T and E by heating with hot water or heat gun as shown in the figure.</p>							
		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Temperature °C (°F)</th> <th style="text-align: center;">Resistance kΩ</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">20 (68)</td> <td style="text-align: center;">2.3 - 2.7</td> </tr> <tr> <td style="text-align: center;">50 (122)</td> <td style="text-align: center;">0.79 - 0.90</td> </tr> </tbody> </table>		Temperature °C (°F)	Resistance kΩ	20 (68)	2.3 - 2.7	50 (122)	0.79 - 0.90
Temperature °C (°F)	Resistance kΩ								
20 (68)	2.3 - 2.7								
50 (122)	0.79 - 0.90								
SEC668C									
OK or NG									
OK		▶	GO TO 19.						
NG		▶	Replace fuel level sensor unit.						

19	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	<p>1. Remove EVAP control system pressure sensor with its harness connector connected.</p> <p>2. Remove hose from EVAP control system pressure sensor.</p> <p>3. Turn ignition switch "ON".</p> <p>4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.</p> <p>CAUTION:</p> <ul style="list-style-type: none"> ● Always calibrate the vacuum pump gauge when using it. ● Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure. <p>5. Check input voltage between ECM terminal 62 and ground.</p>							
		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Applied vacuum</th> <th style="text-align: center;">Voltage V</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Not applied</td> <td style="text-align: center;">1.8 - 4.8</td> </tr> <tr> <td style="text-align: center;">-26.7 kPa (-200 mmHg, -7.87 inHg)</td> <td style="text-align: center;">1.0 to 1.4V lower than above value</td> </tr> </tbody> </table>		Applied vacuum	Voltage V	Not applied	1.8 - 4.8	-26.7 kPa (-200 mmHg, -7.87 inHg)	1.0 to 1.4V lower than above value
Applied vacuum	Voltage V								
Not applied	1.8 - 4.8								
-26.7 kPa (-200 mmHg, -7.87 inHg)	1.0 to 1.4V lower than above value								
SEC649C									
CAUTION:									
<ul style="list-style-type: none"> ● Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. 									
OK or NG									
OK		▶	GO TO 20.						
NG		▶	Replace EVAP control system pressure sensor.						

20	CHECK EVAP PURGE LINE	<p>Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to "Evaporative Emission System", EC-1199.</p>	
OK or NG			
OK		▶	GO TO 21.
NG		▶	Repair or reconnect the hose.

DTC P0456, P1456 EVAP CONTROL SYSTEM

VG33ER*Diagnostic Procedure (Cont'd)*

21	CLEAN EVAP PURGE LINE
Clean EVAP purge line (pipe and rubber tube) using air blower.	
▶	GO TO 22.

GI

MA

22	CHECK FUEL LEVEL SENSOR
Refer to EL-89 , "FUEL LEVEL SENSOR UNIT CHECK".	
OK or NG	
OK	▶ GO TO 23.
NG	▶ Replace fuel level sensor unit.

EM

LC

23	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.	
▶	INSPECTION END

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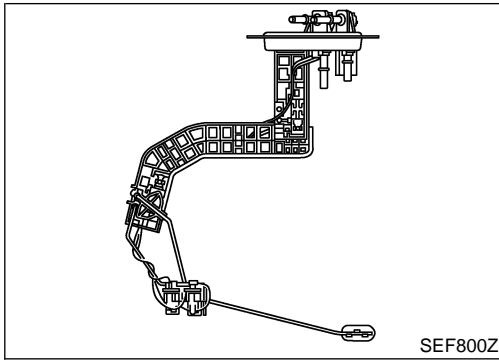
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Component Description



Component Description

The fuel level sensor is mounted in the fuel level sensor unit. ^{NGEC1297} The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. ^{NGEC1298}

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	OR/B	Fuel level sensor	[Ignition switch "ON"]	Approximately 0 - 4.8V Output voltage varies with fuel level.
66	B	Fuel level sensor ground	[Engine is running] ● Idle speed	Approximately 0V

On Board Diagnosis Logic

When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected. ^{NGEC1299}

Malfunction is detected when even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.

POSSIBLE CAUSE

- Fuel level sensor circuit
(The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

^{NGEC1299S01}

3	DATA MONITOR	
	MONITOR	NO DTC
	FUEL T/TMP SE	XXX °C
	FUEL LEVEL SE	XXX V

SEF195Y

DTC Confirmation Procedure

NGEC1300
NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

WITH CONSULT-II
NGEC1300S01

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait maximum of 2 consecutive minutes.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1573.

WITH GST
NGEC1300S02

Follow the procedure "WITH CONSULT-II" above.

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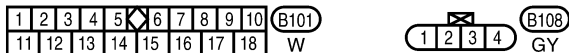
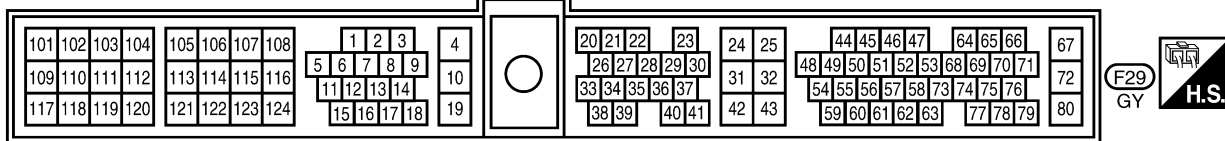
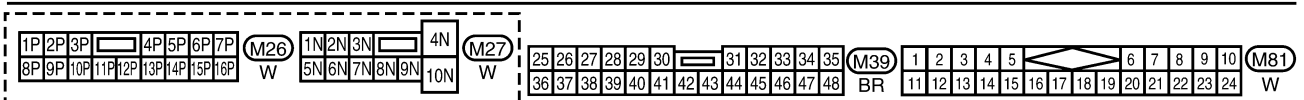
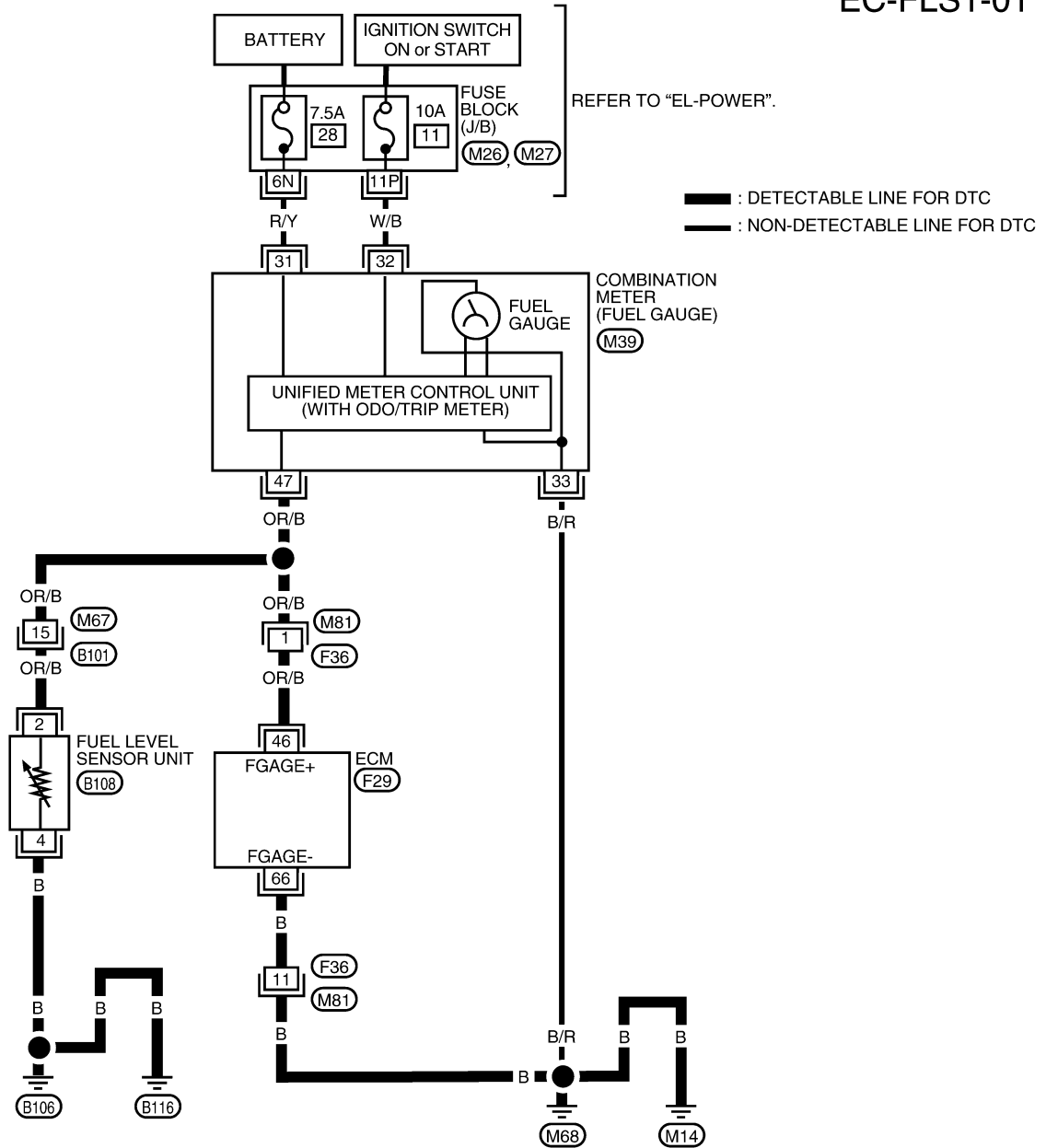
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Wiring Diagram

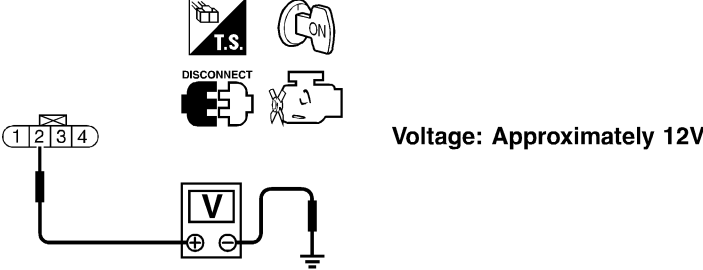
NGEC1301

EC-FLS1-01



Diagnostic Procedure

=NGEC1302

1	CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT	
1. Turn ignition switch "OFF". 2. Disconnect fuel level sensor unit harness connector. 3. Turn ignition switch "ON". 4. Check voltage between fuel level sensor unit terminal 2 and ground with CONSULT-II or a tester.		
		
SEC650C		
OK or NG		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Harness connectors M67, C101 ● Harness for open or short between combination meter and fuel level sensor unit 		
▶ Repair or replace harness or connectors.		

3	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch "OFF". 2. Check harness continuity between fuel level sensor unit terminal 4 and body ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART	
Check the harness connectors C101, M67.		
▶ Repair or replace harness or connectors.		

5	CHECK FUEL LEVEL SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 46 and fuel level sensor unit terminal 2, ECM terminal 66 and fuel level sensor unit terminal 4. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	GO TO 6.

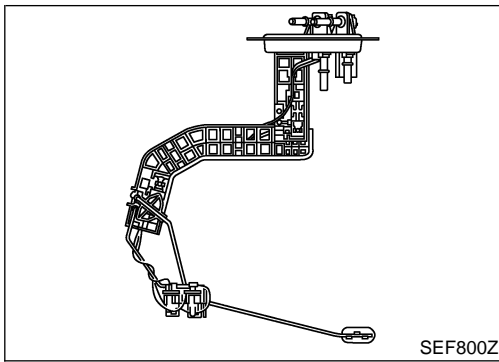
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DTC P0460 FUEL LEVEL SENSOR

VG33ER

Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness connectors M67, C101● Harness connectors M81, F36● Harness for open or short between ECM and fuel level sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.
7	CHECK FUEL LEVEL SENSOR
Refer to EL-89 , "FUEL LEVEL SENSOR UNIT CHECK".	
OK or NG	
OK	▶ GO TO 7.
NG	▶ Replace fuel level sensor unit.
8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.	
▶	INSPECTION END



Component Description

The fuel level sensor is mounted in the fuel level sensor unit. ^{=NGEC1303} The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM. GI

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float. MA

On Board Diagnosis Logic

Driving long distances naturally affect fuel gauge level. ^{NGEC1304} This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven. EC

Malfunction is detected when the output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance. FE

POSSIBLE CAUSE

- Harness or connectors (The level sensor circuit is open or shorted.)
- Fuel level sensor

^{NGEC1304S01}

Overall Function Check

Use this procedure to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed. ^{NGEC1305} SU

WARNING:

When performing following procedure, be sure to observe the handling of the fuel. Refer to *FE-5*, "FUEL TANK". BR

TESTING CONDITION:

Before starting overall function check, preparation of draining fuel and refilling fuel is required. ST

7	DATA MONITOR	
	MONITOR	NO DTC
	FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V	

SEF195Y

Ⓜ WITH CONSULT-II

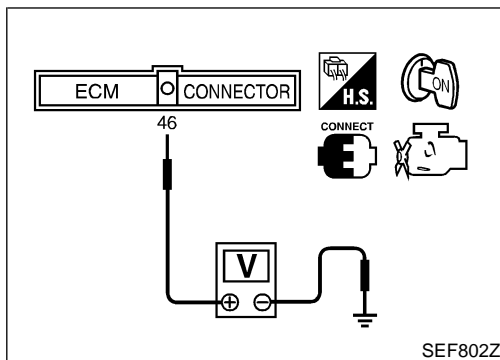
^{NGEC1305S01}

NOTE:

Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance. HA

- 1) Prepare a fuel container and a spare hose. SC
- 2) Release fuel pressure from fuel line, refer to "Fuel Pressure Release", EC-1217.
- 3) Remove the fuel feed hose on the fuel level sensor unit. EL
- 4) Connect a spare fuel hose where the fuel feed hose was removed. IDX

- 5) Turn ignition switch "OFF" and wait at least 5 seconds then turn "ON".
- 6) Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT-II.
- 7) Check "FUEL LEVEL SE" output voltage and note it.
- 8) Select "FUEL PUMP" in "ACTIVE TEST" mode with CONSULT-II.
- 9) Touch "ON" and drain fuel approximately 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
- 10) Fill fuel into the fuel tank for 30ℓ (7-7/8 US gal, 6-5/8 Imp gal).
- 11) Check "FUEL LEVEL SE" output voltage and note it.
- 12) Check "FUEL LEVEL SE" output voltage and confirm whether the voltage changes more than 0.03V during step 7 to 11.
If NG, check the fuel level sensor, refer to **EL-89**, "FUEL LEVEL SENSOR UNIT CHECK".



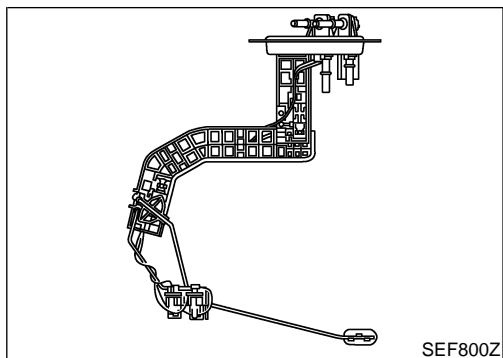
WITH GST

NGEC1305S02

NOTE:

Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

- 1) Prepare a fuel container and a spare hose.
- 2) Release fuel pressure from fuel line, refer to "Fuel Pressure Release", EC-1217.
- 3) Remove the fuel feed hose on the fuel level sensor unit.
- 4) Connect a spare fuel hose where the fuel feed hose was removed.
- 5) Turn ignition switch "OFF".
- 6) Set voltmeters probe between ECM terminal 46 (fuel level sensor signal) and ground.
- 7) Turn ignition switch "ON".
- 8) Check voltage between ECM terminal 46 and ground and note it.
- 9) Drain fuel by 30ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
- 10) Fill fuel into the fuel tank for 30ℓ (7-7/8 US gal, 6-5/8 Imp gal).
- 11) Confirm that the voltage between ECM terminal 46 and ground changes more than 0.03V during step 8 - 10.
If NG, check component of fuel level sensor, refer to **EL-89**, "FUEL LEVEL SENSOR UNIT CHECK".



Component Description

The fuel level sensor is mounted in the fuel level sensor unit. ^{NGEC1306} The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. ^{NGEC1307}

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	OR/B	Fuel level sensor	[Ignition switch "ON"]	Approximately 0 - 4.8V Output voltage varies with fuel level.
66	B	Fuel level sensor ground	[Engine is running] ● Idle speed	Approximately 0V

On Board Diagnosis Logic

ECM receives two signals from the fuel level sensor circuit. ^{NGEC1308} One is fuel level sensor power supply circuit, and the other is fuel level sensor ground circuit.

This diagnosis indicates the former, to detect open or short circuit malfunction.

Malfunction is detected when an excessively low (P0462) or high (P0463) voltage is sent from the sensor is sent to ECM.

POSSIBLE CAUSE

- Fuel level sensor circuit (The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

DTC Confirmation Procedure

NGEC1309

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at ignition switch "ON".

2	DATA MONITOR	
	MONITOR	NO DTC
	FUEL T/TMP SE	XXX °C
	FUEL LEVEL SE	XXX V

SEF195Y

 **WITH CONSULT-II**

NGEC1309S01

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1580.

 **WITH GST**

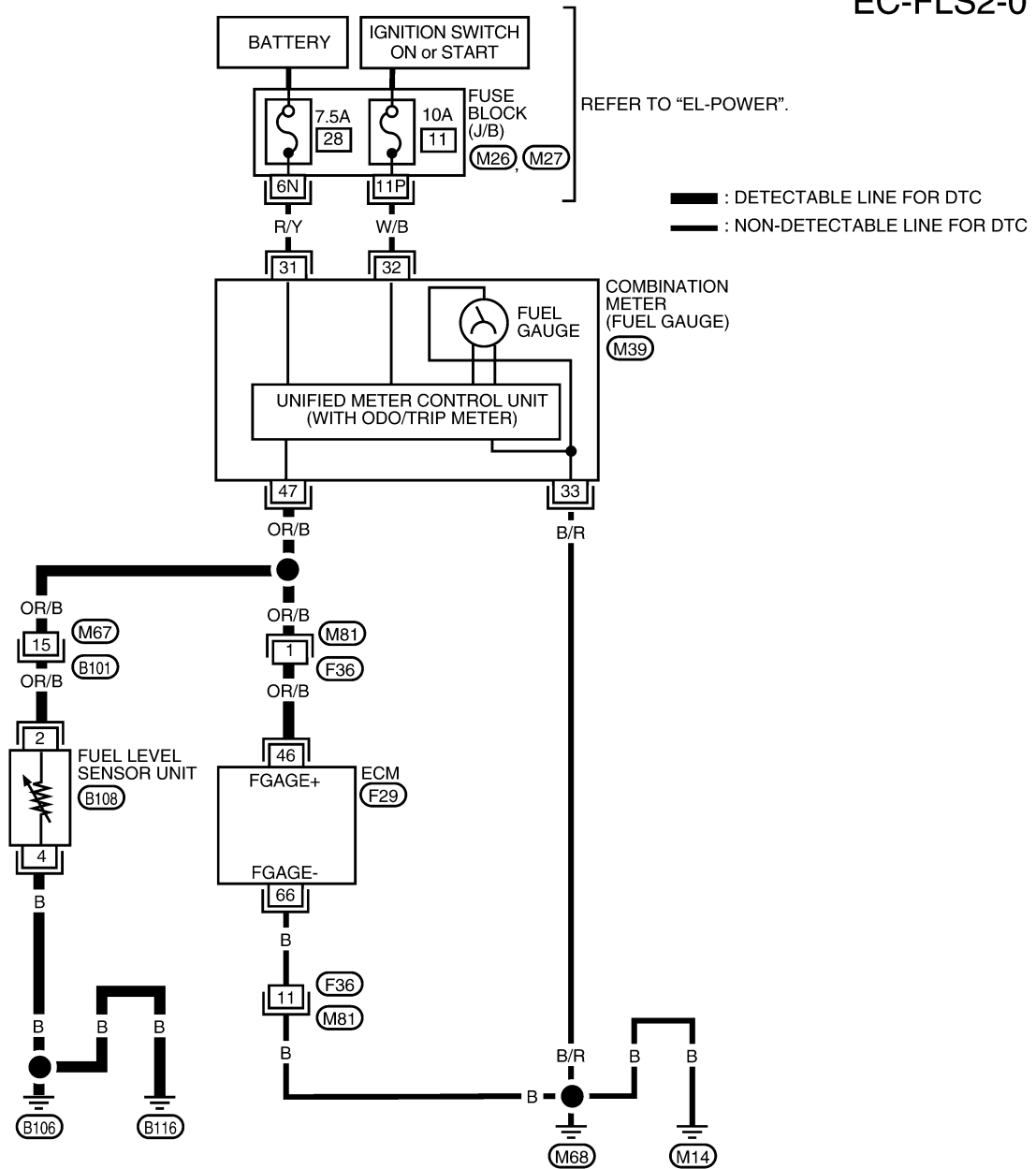
NGEC1309S02

Follow the procedure "WITH CONSULT-II" above.

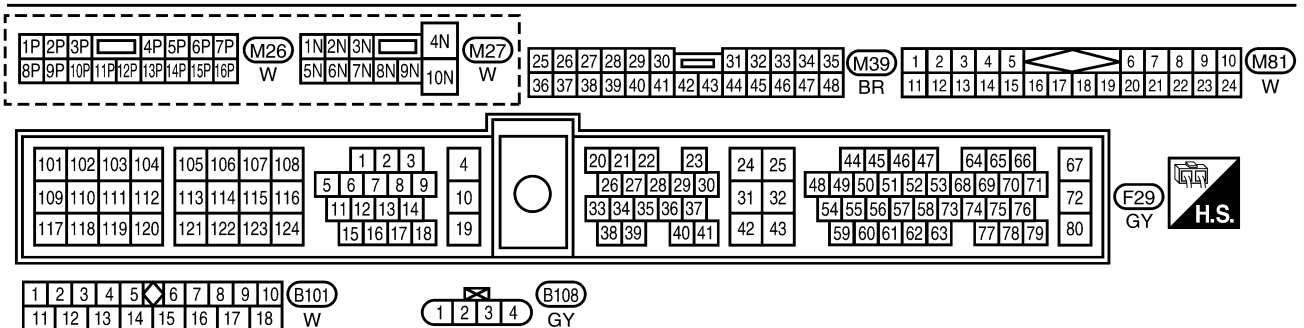
Wiring Diagram

NGEC1310

EC-FLS2-01

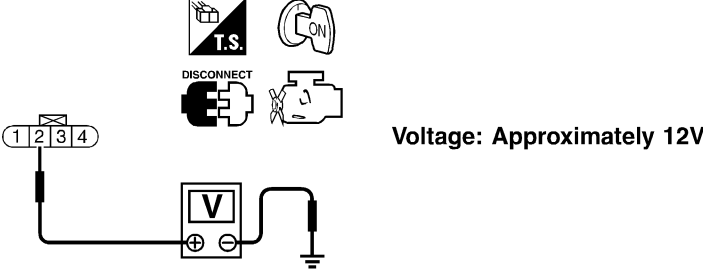


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Diagnostic Procedure

=NGEC1311

1	CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT	
<p>1. Turn ignition switch "OFF". 2. Disconnect fuel level sensor unit harness connector. 3. Turn ignition switch "ON". 4. Check voltage between fuel level sensor unit terminal G and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p>Voltage: Approximately 12V</p> </div> <p style="text-align: right;">SEC650C</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M67, C101 ● Harness for open or short between combination meter and fuel level sensor unit 		
▶		Repair or replace harness or connectors.

3	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch "OFF". 2. Check harness continuity between fuel level sensor unit terminal 4 and body ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 4.
NG	▶	Repair or replace harness or connectors.

4	CHECK FUEL LEVEL SENSOR INPUT CIRCUIT FOR OPEN AND SHORT	
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 46 and fuel level sensor unit terminal 2. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

DTC P0462, P0463 FUEL LEVEL SENSOR

VG33ER

Diagnostic Procedure (Cont'd)

5	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Harness connectors M67, C101 ● Harness connectors M81, F36 ● Harness for open or short between ECM and fuel level sensor 		
▶		Repair open circuit or short to ground or short to power in harness on connectors.

GI

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EM

6	CHECK FUEL LEVEL SENSOR	
Refer to EL-89 , "Fuel Level Sensor Unit Check".		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Replace fuel level sensor unit.

LC

EC

7	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.		
▶		INSPECTION END

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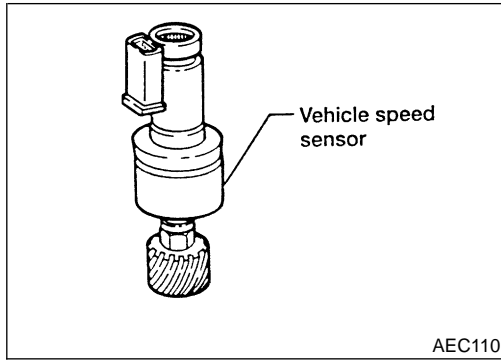
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Component Description



Component Description

The vehicle speed sensor is installed in the transaxle. It contains a pulse generator which provides a vehicle speed signal to the speedometer. The speedometer then sends a signal to the ECM. NGEC1312

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. NGEC1313

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	G/B	Vehicle speed sensor	<p>[Engine is running]</p> <ul style="list-style-type: none"> • Lift up the vehicle • In 1st gear position • Vehicle speed is 40 km/h (25 MPH) 	<p>2 - 3V</p> <p style="text-align: right;">SEF996U</p>

On Board Diagnosis Logic

Malfunction is detected when the almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven. NGEC1314

POSSIBLE CAUSE

- Harness or connector (The vehicle speed sensor circuit is open or shorted.)
 - Vehicle speed sensor
- NGEC1314S01

DTC Confirmation Procedure

CAUTION:

Always drive vehicle at a safe speed. NGEC1315

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 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.

5	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C
	B/FUEL SCHDL	XXX msec
	PW/ST SIGNAL	OFF
	VHCL SPEED SE	XXX km/h

SEF196Y

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 "Diagnostic Procedure", EC-1585.
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.

END SPEED	More than 1,800 rpm (A/T models) More than 1,900 rpm (M/T models)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	5.5 - 16.0 msec
Selector lever	Suitable position
PW/ST SIGNAL	OFF

- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1585.

Overall Function Check

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

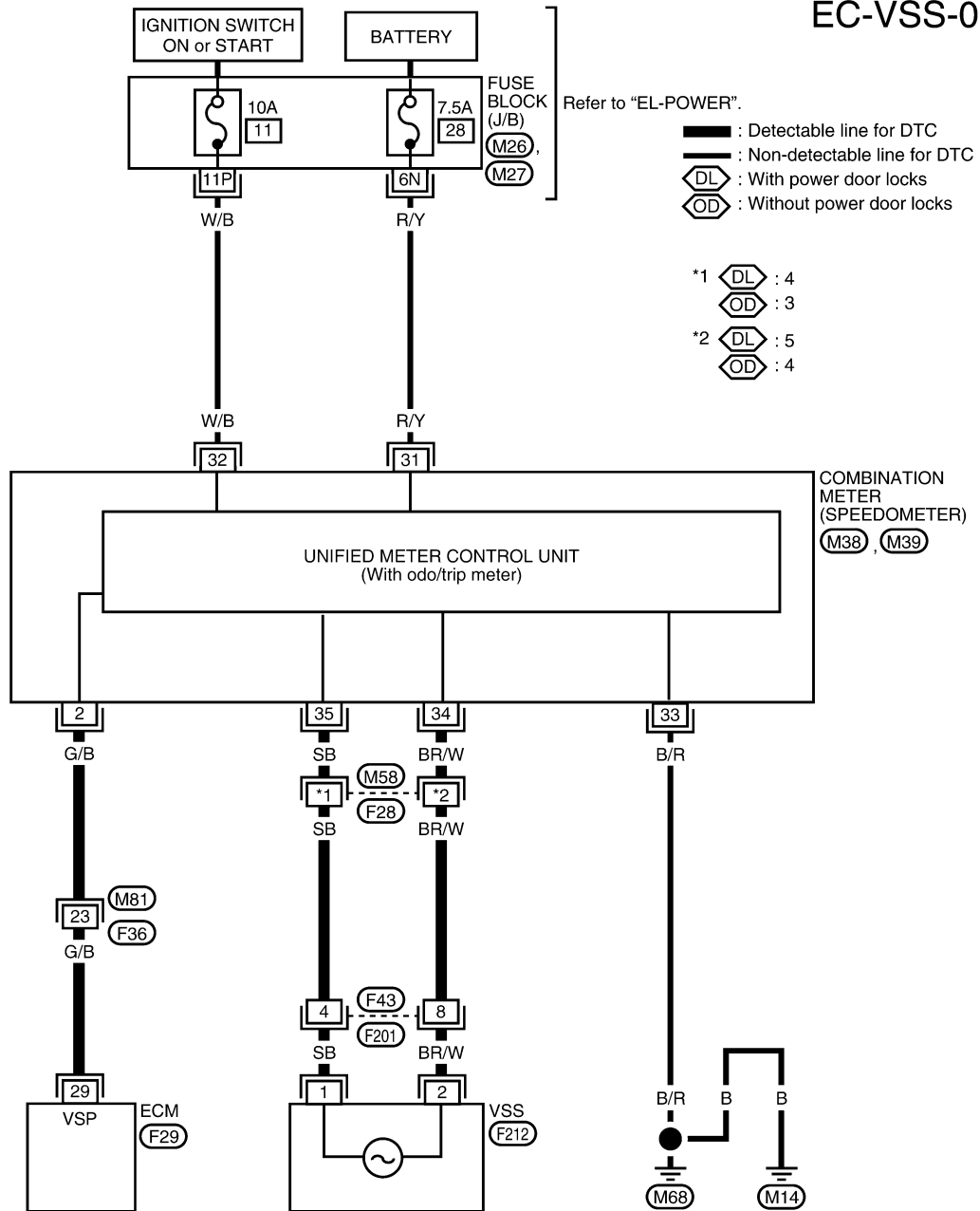
- 1) Lift up drive wheels.
- 2) Start engine.
- 3) Read vehicle speed sensor signal in "MODE 1" with GST.
The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
- 4) If NG, go to "Diagnostic Procedure", EC-1585.

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Wiring Diagram

NGEC1317

EC-VSS-01

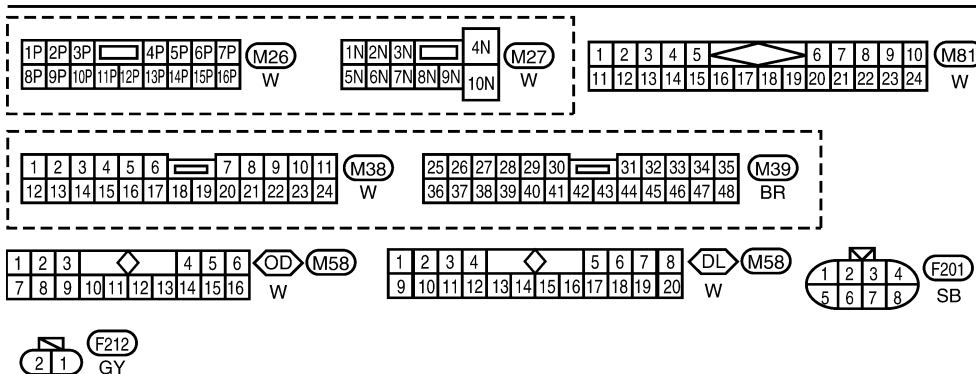


Refer to "EL-POWER".

- : Detectable line for DTC
- : Non-detectable line for DTC
- : With power door locks
- : Without power door locks

- *1 : 4
- : 3
- *2 : 5
- : 4

COMBINATION METER (SPEEDOMETER)
M38, M39



Refer to the following.
F29 - ELECTRICAL UNITS

Diagnostic Procedure

NGEC1318

1	CHECK VEHICLE SPEED SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
	1. Turn ignition switch OFF. 2. Disconnect ECM harness connector and combination meter harness connector. 3. Check harness continuity between ECM terminal 29 and combination meter terminal 2. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. <div style="text-align: center;">OK or NG</div>	
OK	▶	GO TO 3.
NG	▶	GO TO 2.

GI
MA
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LC

2	DETECT MALFUNCTIONING PART	
	Check the following. <ul style="list-style-type: none"> ● Harness connectors M81, F36 ● 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.

EC
FE
CL

3	CHECK SPEEDOMETER FUNCTION	
	Make sure that speedometer functions properly. <div style="text-align: center;">OK or NG</div>	
OK	▶	GO TO 5.
NG	▶	GO TO 4.

MT
AT
TF

4	CHECK SPEEDOMETER CIRCUIT FOR OPEN AND SHORT	
	Check the following. <ul style="list-style-type: none"> ● Harness connectors M58, F28 ● Harness connectors F43, F201 ● Harness for open or short between combination meter and vehicle speed sensor <div style="text-align: center;">OK or NG</div>	
OK	▶	Check combination meter and vehicle speed sensor. Refer to EL-75 , "METERS AND GAUGES".
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

PD
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5	CHECK INTERMITTENT INCIDENT	
	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312. <div style="text-align: center;">INSPECTION END</div>	

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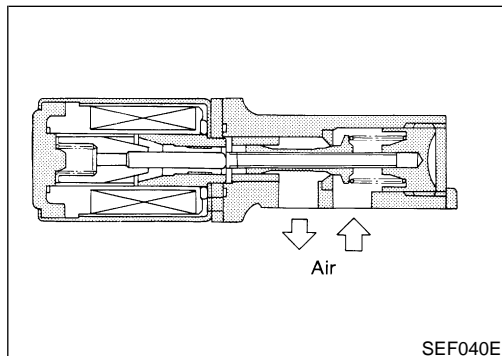
Description
SYSTEM DESCRIPTION

NGEC1319

NGEC1319S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Idle air control	IACV-AAC valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Park/neutral position (PNP) switch	Park/neutral position		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Battery	Battery voltage		
Vehicle speed sensor	Vehicle speed		
Ambient air temperature switch	Ambient air temperature		
Intake air temperature sensor	Intake air temperature		

This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which bypasses the throttle valve via IACV-AAC valve. The IACV-AAC valve repeats ON/OFF operation according to the signal sent from the ECM. The camshaft position sensor detects the actual engine speed and sends a signal to the ECM. The ECM then controls the ON/OFF time of the IACV-AAC valve so that engine speed coincides with the target value memorized in ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warm up, deceleration, and engine load (air conditioner and power steering).



COMPONENT DESCRIPTION
IACV-AAC Valve

NGEC1319S02

NGEC1319S0201

The IACV-AAC valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of air that will flow through the valve. The more air that flows through the valve, the higher the idle speed.

CONSULT-II Reference Value in Data Monitor Mode

NGEC1320

Specification data are reference values.

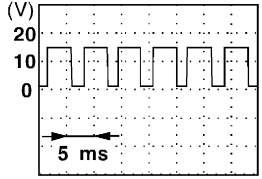
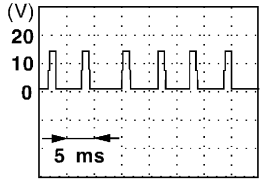
MONITOR ITEM	CONDITION	SPECIFICATION
IACV-AAC/V	<ul style="list-style-type: none"> ● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load 	Idle
		2,000 rpm
		10 - 20%
		—

ECM Terminals and Reference Value

NGEC1321

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 the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	OR/L	IACV-AAC valve	[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	8 - 11V  <div style="text-align: right; font-size: small;">SEF005V</div>
			[Engine is running] <ul style="list-style-type: none"> ● Warm-up condition ● Engine speed is 3,000 rpm 	7 - 10V  <div style="text-align: right; font-size: small;">SEF692W</div>

On Board Diagnosis Logic

NGEC1322

 Malfunction is detected when
 (Malfunction A) the IACV-AAC valve does not operate properly,
 (Malfunction B) the IACV-AAC valve does not operate properly.

POSSIBLE CAUSE

NGEC1322S01

- Harness or connectors
(The IACV-AAC valve circuit is open.)
- Harness or connectors
(The IACV-AAC valve circuit is shorted.)
- IACV-AAC valve

DTC Confirmation Procedure

NGEC1323

NOTE:

- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.
- Perform “PROCEDURE FOR MALFUNCTION A” first. If 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B”.

2	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

NGEC1323S01

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) Wait at least 2 seconds.
- 4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1590.

 **With GST**

Follow the procedure “With CONSULT-II”.

4	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C	

SEF174Y

PROCEDURE FOR MALFUNCTION B

NGEC1323S02

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 5 seconds.
- 3) Turn ignition switch ON again and select “DATA MONITOR” mode with CONSULT-II.
- 4) Start engine and run it for at least 1 minute at idle speed.
- 5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1590.

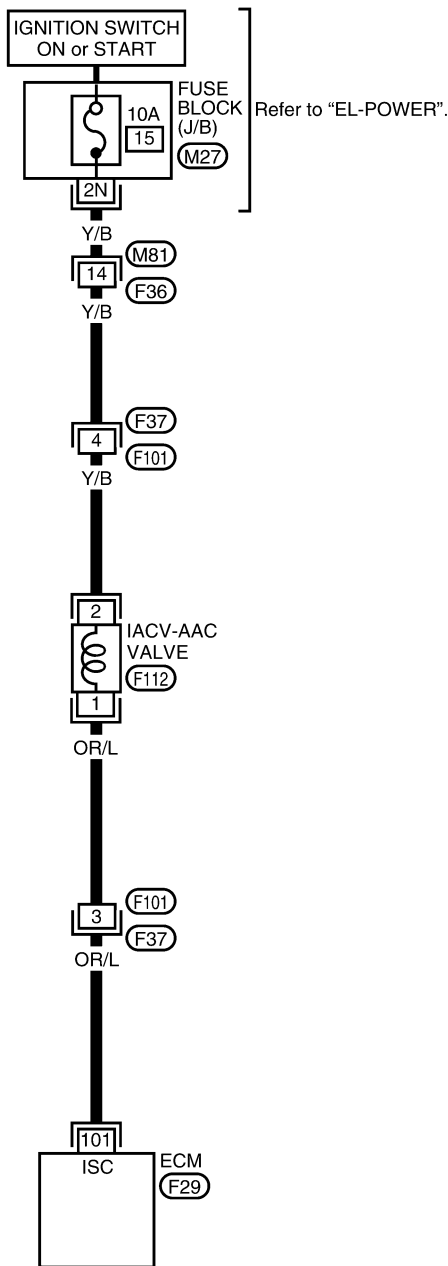
 **With GST**

Follow the procedure “With CONSULT-II”.

Wiring Diagram

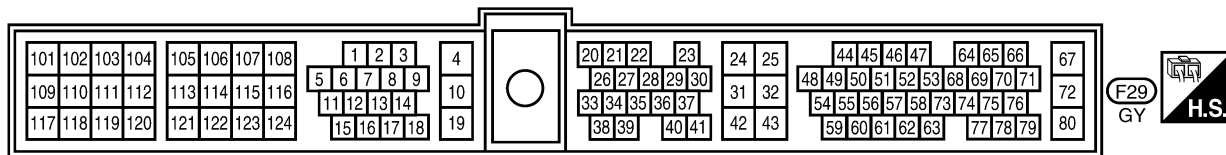
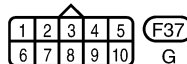
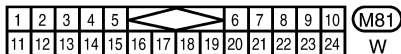
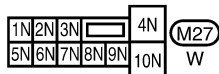
NGEC1324

EC-AAC/V-01



Refer to "EL-POWER".
 — : Detectable line for DTC
 — : Non-detectable line for DTC

- GI
- MA
- EM
- LC
- EC**
- FE
- CL
- MT
- AT
- TF
- PD
- AX
- SU
- BR
- ST

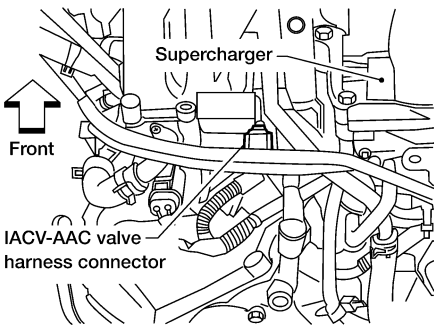
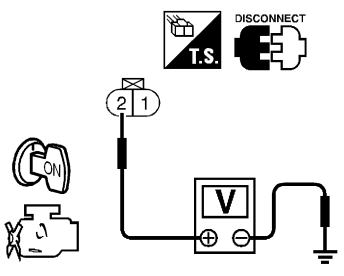


- RS
- BT
- HA
- SC

LEC672

Diagnostic Procedure

NGEC1325

1	CHECK IACV-AAC VALVE POWER SUPPLY CIRCUIT							
<p>1. Stop engine. 2. Disconnect IACV-AAC valve harness connector.</p> <div style="text-align: center;">  </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 2 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p>Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>								
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; border-right: 1px solid black;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 3.</td> </tr> <tr> <td style="border-right: 1px solid black;">NG</td> <td style="text-align: center;">▶</td> <td>GO TO 2.</td> </tr> </table>			OK	▶	GO TO 3.	NG	▶	GO TO 2.
OK	▶	GO TO 3.						
NG	▶	GO TO 2.						

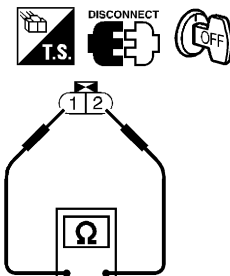
LEC766

SEF651W

2	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M81, F36 ● Harness connectors F37, F101 ● Fuse block (J/B) connector M27 ● 10A fuse ● Harness for open or short between IACV-AAC valve and fuse 		
▶		Repair harness or connectors.

3	CHECK IACV-AAC VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT							
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 101 and IACV-AAC valve terminal 1. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>								
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; border-right: 1px solid black;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 5.</td> </tr> <tr> <td style="border-right: 1px solid black;">NG</td> <td style="text-align: center;">▶</td> <td>GO TO 4.</td> </tr> </table>			OK	▶	GO TO 5.	NG	▶	GO TO 4.
OK	▶	GO TO 5.						
NG	▶	GO TO 4.						

4	DETECT MALFUNCTIONING PART		
		Check the following. <ul style="list-style-type: none"> ● Harness connectors F101, F37 ● Harness for open or short between IACV-AAC valve and ECM 	GI
		▶ Repair open circuit or short to ground or short to power in harness or connectors.	MA

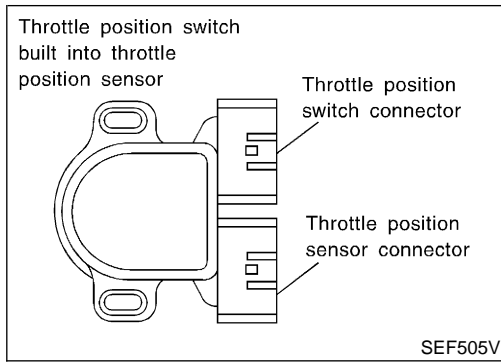
5	CHECK IACV-AAC VALVE		
		1. Disconnect IACV-AAC valve harness connector. 2. Remove IACV-AAC valve. <ul style="list-style-type: none"> ● Check IACV-AAC valve resistance. 	EM
			LC
		<p>Resistance: Approximately 10Ω [at 20°C (68°F)]</p> <ul style="list-style-type: none"> ● Check plunger for seizing or sticking. ● Check for broken spring. 3. Supply battery voltage between IACV-AAC valve connector terminals. Plunger should move.	FE
		OK or NG	CL
		OK ▶ GO TO 6.	MT
		NG ▶ Replace IACV-AAC valve.	AT

SEF202V

6	CHECK INTERMITTENT INCIDENT		
		Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.	EC
		▶ INSPECTION END	TF

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Component Description



Component Description

NGEC1326

A closed throttle position switch and wide open throttle position switch are built into the throttle position sensor unit. The wide open throttle position switch is used only for A/T control.

When the throttle valve is in the closed position, the closed throttle position switch sends a voltage signal to the ECM. The ECM only uses this signal to open or close the EVAP canister purge volume control solenoid valve when the throttle position sensor is malfunctioning.

CONSULT-II Reference Value in Data Monitor Mode

NGEC1327

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
CLSD THL/P SW	● Engine: After warming up, idle the engine	Throttle valve: Idle position ON
		Throttle valve: Slightly open OFF

ECM Terminals and Reference Value

NGEC1328

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 the ECM terminals, such as the ground.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
28	BR/W	Throttle position switch (Closed position)	[Engine is running] ● Warm-up condition ● Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"] ● Accelerator pedal depressed	Approximately 0V

On Board Diagnosis Logic

NGEC1329

Malfunction is detected when battery voltage from the closed throttle position switch is sent to ECM with the throttle valve opened.

POSSIBLE CAUSE

NGEC1329S01

- Harness or connectors (The closed throttle position switch circuit is shorted.)
- Closed throttle position switch
- Throttle position sensor

NGEC1330

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
CLSD THL/P SW	ON

SEF197Y

6

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
THRTL POS SEN	XXX V

SEF198Y

DTC Confirmation Procedure

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 5 seconds before conducting the next test.

With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF, wait at least 5 seconds and then start engine.
- 3) Select “CLSD THL/P SW” in “DATA MONITOR” mode.
- 4) Check the signal under the following conditions.

Condition	Signal indication
Throttle valve: Idle position	ON
Throttle valve: Slightly open	OFF

If the result is NG, go to “Diagnostic Procedure”, EC-1595.
If OK, go to following step.

- 5) Select “DATA MONITOR” mode with CONSULT-II.
- 6) Drive the vehicle for at least 5 consecutive seconds under the following condition.

THRTL POS SEN	More than 2.5V
VHCL SPEED SE	More than 5 km/h (3 MPH)
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

- 7) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1595.

Overall Function Check

NGEC1331

Use this procedure to check the overall function of the closed throttle position switch circuit. During this check, a 1st trip DTC might not be confirmed.

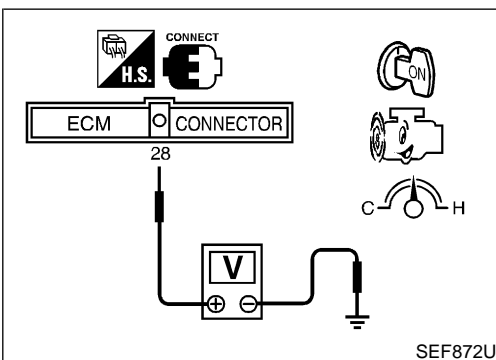
Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Check the voltage between ECM terminal 28 (Closed throttle position switch signal) and ground under the following conditions.

At idle: Battery voltage

At 2,000 rpm: Approximately 0V

- 3) If NG, go to “Diagnostic Procedure”, EC-1595.

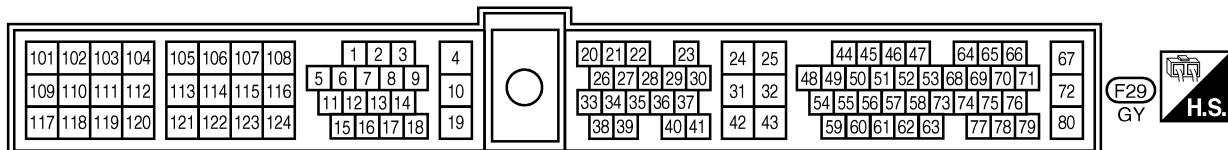
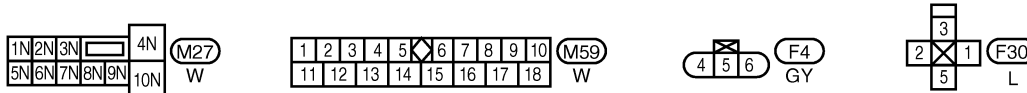
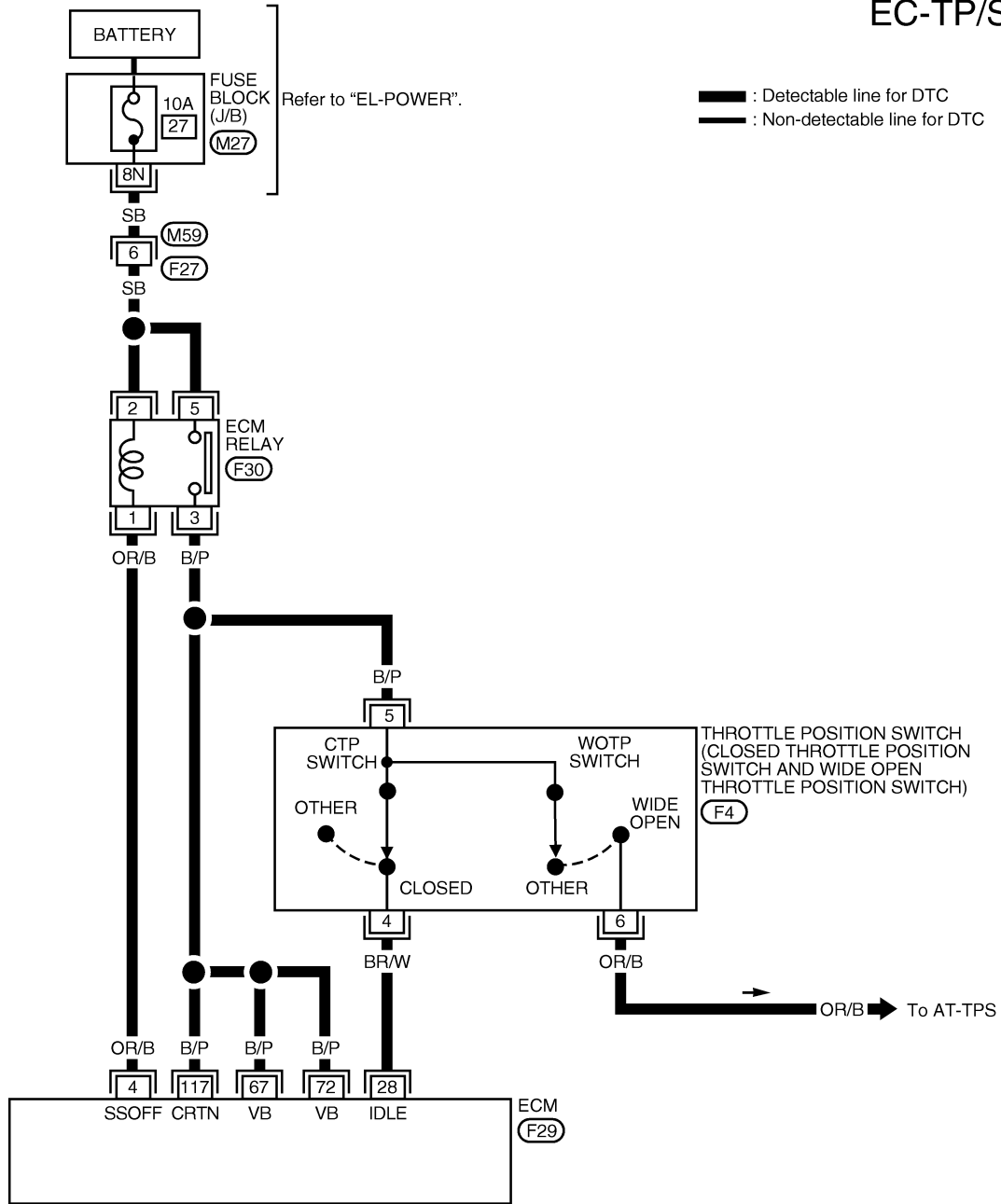


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Wiring Diagram

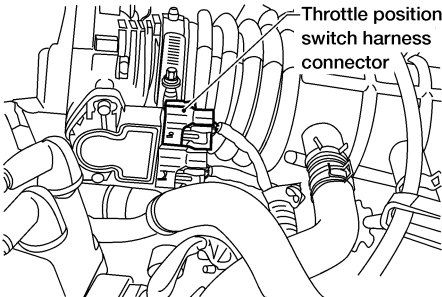
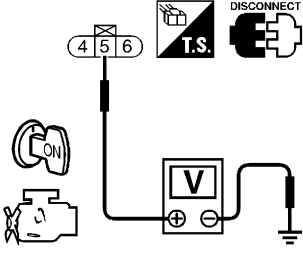
NGEC1332

EC-TP/SW-01



Diagnostic Procedure

NGEN1333

1	CHECK CLOSED THROTTLE POSITION SWITCH POWER SUPPLY CIRCUIT	
1. Turn ignition switch OFF. 2. Disconnect throttle position switch harness connector.		
 <p style="text-align: right; margin-right: 50px;">Throttle position switch harness connector</p>		
3. Turn ignition switch ON. 4. Check voltage between terminal 5 and engine ground with CONSULT-II or tester.		
AEC653A		
		
SEF715U		
Voltage: Battery voltage		
OK or NG		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

GI

MA

EM

LC

EC

FE

CL

MT

AT

TF

PD

AX

2	DETECT MALFUNCTIONING PART	
Check the following.		
<ul style="list-style-type: none"> ● Harness for open or short between throttle position switch and ECM relay ● Harness for open or short between throttle position switch and ECM 		
▶		Repair harness or connectors.

SU

BR

3	CHECK CLOSED THROTTLE POSITION SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 28 and throttle position switch terminal 4. Refer to Wiring Diagram. Continuity should exist.		
4. Also check harness for short to ground and short to power.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

ST

RS

BT

HA

SC

EL

IDX

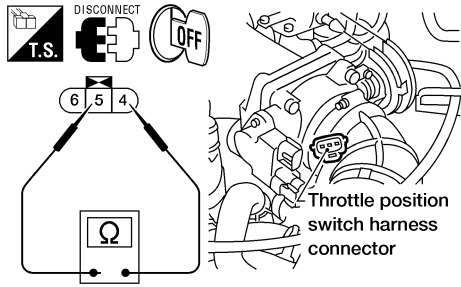
DTC P0510 CTP SWITCH

VG33ER

Diagnostic Procedure (Cont'd)

4		CHECK IGNITION TIMING AND ENGINE IDLE SPEED									
Check the following items. Refer to "Basic Inspection", EC-1273.											
		<table border="1"><thead><tr><th>Items</th><th>Specifications</th></tr></thead><tbody><tr><td>Ignition timing</td><td>10° ± 2° BTDC</td></tr><tr><td>Base idle speed</td><td>700 ± 50 rpm (in "P" or "N" position)</td></tr><tr><td>Target idle speed</td><td>750 ± 50 rpm (in "P" or "N" position)</td></tr></tbody></table>	Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Target idle speed	750 ± 50 rpm (in "P" or "N" position)	
Items	Specifications										
Ignition timing	10° ± 2° BTDC										
Base idle speed	700 ± 50 rpm (in "P" or "N" position)										
Target idle speed	750 ± 50 rpm (in "P" or "N" position)										
MTBL0632											
with CONSULT-II	▶	GO TO 5.									
without CONSULT-II	▶	GO TO 6.									

5		CHECK CLOSED THROTTLE POSITION SWITCH							
Ⓜ With CONSULT-II									
1. Start engine and warm it up to normal operating temperature.									
2. Turn ignition switch OFF.									
3. Turn ignition switch ON.									
4. Select "DATA MONITOR" mode with CONSULT-II.									
5. Check indication of "CLSD THL/P SW".									
Measurement must be made with closed throttle position switch installed in vehicle.									
		<table border="1"><thead><tr><th>Throttle valve conditions</th><th>CLSD THL/P SW</th></tr></thead><tbody><tr><td>Completely closed</td><td>ON</td></tr><tr><td>Partially open or completely open</td><td>OFF</td></tr></tbody></table>	Throttle valve conditions	CLSD THL/P SW	Completely closed	ON	Partially open or completely open	OFF	
Throttle valve conditions	CLSD THL/P SW								
Completely closed	ON								
Partially open or completely open	OFF								
MTBL0355									
OK or NG									
OK	▶	GO TO 8.							
NG	▶	GO TO 7.							

6	CHECK CLOSED THROTTLE POSITION SWITCH							
<p>Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch OFF. 3. Disconnect closed throttle position switch harness connector. 4. Check continuity between closed throttle position switch terminals 4 and 5. Resistance measurement must be made with closed throttle position switch installed in vehicle. 								
								
AEC654A								
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;">Throttle valve conditions</th> <th style="width: 40%;">Continuity</th> </tr> </thead> <tbody> <tr> <td>Completely closed</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td>Partially open or completely open</td> <td style="text-align: center;">No</td> </tr> </tbody> </table>			Throttle valve conditions	Continuity	Completely closed	Yes	Partially open or completely open	No
Throttle valve conditions	Continuity							
Completely closed	Yes							
Partially open or completely open	No							
MTBL0247								
OK or NG								
OK	▶	GO TO 9.						
NG	▶	GO TO 7.						

7	ADJUST THROTTLE POSITION SWITCH											
<p>Check the following items. Refer to "Basic Inspection", EC-1273.</p>												
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 40%;">Items</th> <th style="width: 60%;">Specifications</th> </tr> </thead> <tbody> <tr> <td>Ignition timing</td> <td>10° ± 2° BTDC</td> </tr> <tr> <td>Base idle speed</td> <td>700 ± 50 rpm (in "P" or "N" position)</td> </tr> <tr> <td>Closed throttle position switch idle position adjustment</td> <td>Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF</td> </tr> <tr> <td>Target idle speed</td> <td>750 ± 50 rpm (in "P" or "N" position)</td> </tr> </tbody> </table>			Items	Specifications	Ignition timing	10° ± 2° BTDC	Base idle speed	700 ± 50 rpm (in "P" or "N" position)	Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF	Target idle speed	750 ± 50 rpm (in "P" or "N" position)
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Ignition timing	10° ± 2° BTDC											
Base idle speed	700 ± 50 rpm (in "P" or "N" position)											
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF											
Target idle speed	750 ± 50 rpm (in "P" or "N" position)											
MTBL0576												
<p>If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace closed throttle position switch.</p>												
OK or NG												
OK (with CONSULT-II)	▶	GO TO 8.										
OK (without CONSULT-II)	▶	GO TO 9.										
NG	▶	Replace throttle position switch.										

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DTC P0510 CTP SWITCH

VG33ER

Diagnostic Procedure (Cont'd)

8	CHECK THROTTLE POSITION SENSOR								
<p>④ With CONSULT-II</p> <ol style="list-style-type: none">1. Start engine and warm it up to normal operating temperature.2. Stop engine (ignition switch OFF).3. Turn ignition switch ON.4. Select "DATA MONITOR" mode with CONSULT-II.5. Check voltage of "THRTL POS SEN".									
<table border="1"><thead><tr><th>Throttle valve conditions</th><th>THRTL POS SEN</th></tr></thead><tbody><tr><td>Completely closed (a)</td><td>0.15 - 0.85V</td></tr><tr><td>Partially open</td><td>Between (a) and (b)</td></tr><tr><td>Completely open (b)</td><td>3.5 - 4.7V</td></tr></tbody></table>		Throttle valve conditions	THRTL POS SEN	Completely closed (a)	0.15 - 0.85V	Partially open	Between (a) and (b)	Completely open (b)	3.5 - 4.7V
Throttle valve conditions	THRTL POS SEN								
Completely closed (a)	0.15 - 0.85V								
Partially open	Between (a) and (b)								
Completely open (b)	3.5 - 4.7V								
<p>Voltage measurement must be made with throttle position sensor installed in vehicle. If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-1273.</p>									
<p style="text-align: right;">MTBL0230</p>									
<p style="text-align: center;">OK or NG</p>									
OK	▶ GO TO 10.								
NG	▶ Replace throttle position sensor.								

9	CHECK THROTTLE POSITION SENSOR								
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none">1. Start engine and warm it up to normal operating temperature.2. Stop engine (ignition switch OFF).3. Turn ignition switch ON.4. Check voltage between ECM terminal 23 (Throttle position sensor signal) and ground.									
<p>Voltage measurement must be made with throttle position sensor installed in vehicle.</p>									
<table border="1"><thead><tr><th>Throttle valve conditions</th><th>Voltage</th></tr></thead><tbody><tr><td>Completely closed (a)</td><td>0.15 - 0.85V</td></tr><tr><td>Partially open</td><td>Between (a) and (b)</td></tr><tr><td>Completely open (b)</td><td>3.5 - 4.7V</td></tr></tbody></table>		Throttle valve conditions	Voltage	Completely closed (a)	0.15 - 0.85V	Partially open	Between (a) and (b)	Completely open (b)	3.5 - 4.7V
Throttle valve conditions	Voltage								
Completely closed (a)	0.15 - 0.85V								
Partially open	Between (a) and (b)								
Completely open (b)	3.5 - 4.7V								
<p>If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-1273.</p>									
<p style="text-align: right;">MTBL0231</p>									
<p style="text-align: center;">OK or NG</p>									
OK	▶ GO TO 10.								
NG	▶ Replace throttle position sensor.								

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.	
	▶ INSPECTION END

System Description

NGEC1334

These circuit lines are used to control the smooth shifting up and down of A/T during the hard acceleration/ deceleration.

Voltage signals are exchanged between ECM and TCM (Transmission Control Module).

ECM Terminals and Reference Value

NGEC1335

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 the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
26	PU/W	A/T signal No. 1	[Engine is running] ● Idle speed	Approximately 0 - 1.0V
27	P/B	A/T signal No. 2	[Engine is running] ● Idle speed	Approximately 0 - 1.0V
33	W/G	A/T signal No. 4	[Engine is running] ● Idle speed	Approximately 0 - 1.0V
34	R/Y	A/T signal No. 5	[Engine is running] ● Idle speed	Approximately 8V
35	G/R	A/T signal No. 3	[Engine is running] ● Idle speed	Approximately 0 - 1.0V

On Board Diagnosis Logic

NGEC1336

Malfunction is detected when ECM receives incorrect voltage from TCM (Transmission Control Module) continuously.

POSSIBLE CAUSE

NGEC1336S01

- Harness or connectors
[The circuit between ECM and TCM (Transmission Control Module) is open or shorted.]

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

=NGEC1337

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

④ With CONSULT-II

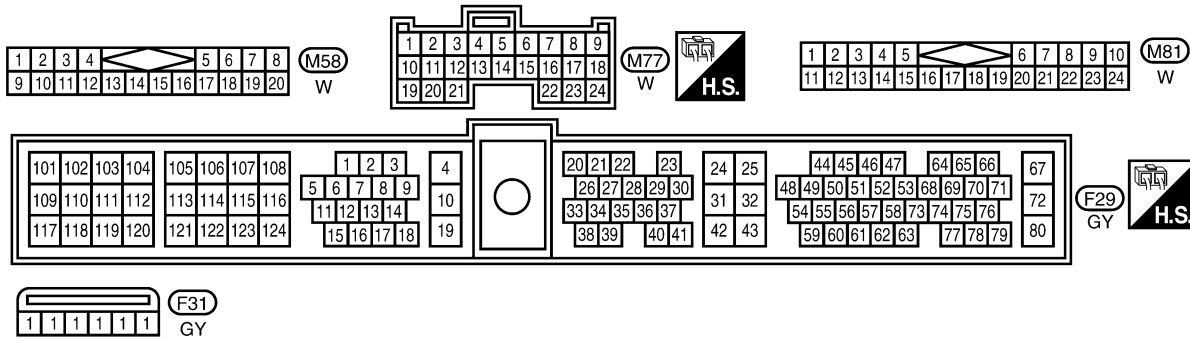
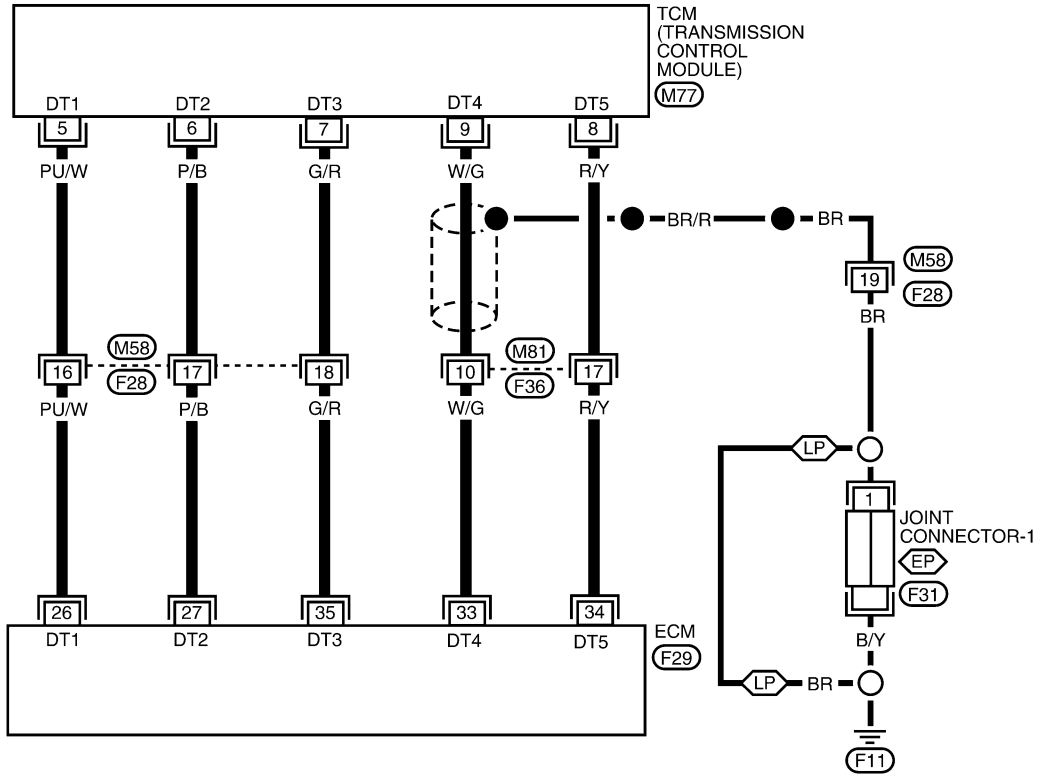
- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine, and rev engine more than 1,000 rpm once, then let it idle for more than 40 seconds.
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-1602.

Wiring Diagram

NGEC1338

EC-AT/C-01

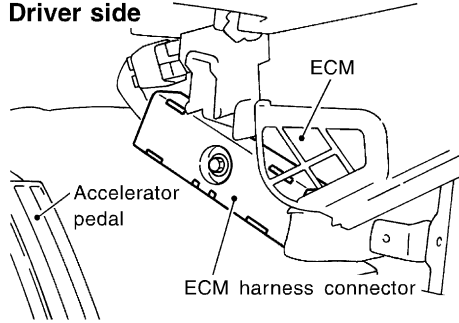
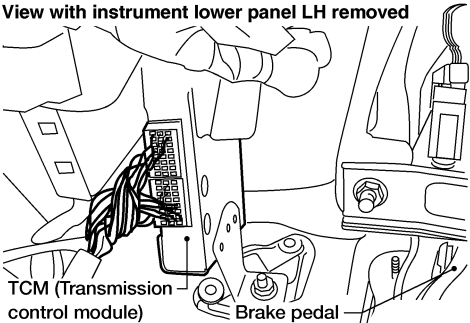
- : Detectable line for DTC
- : Non-detectable line for DTC
- EP** : Early Production
- LP** : Late Production



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Diagnostic Procedure

NGEC1339

1	CHECK A/T CONTROL INPUT SIGNAL CIRCUIT FOR OPEN
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector and TCM (Transmission Control Module) harness connector.</p>	
<p>Driver side</p>  <p>SEF324V</p>	
<p>View with instrument lower panel LH removed</p>  <p>AEC655A</p>	
<p>3. Check harness continuity between ECM terminal 26 and TCM terminal 5, ECM terminal 27 and TCM terminal 6, ECM terminal 33 and TCM terminal 9, ECM terminal 34 and TCM terminal 8, ECM terminal 35 and TCM terminal 7. Refer to Wiring Diagram. Continuity should exist.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 3.
NG	▶ GO TO 2.

2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M58, F28 ● Harness connectors M81, F36 ● Harness for open or short between ECM and TCM (Transmission Control Module) 	
▶	Repair harness or connectors.

3	CHECK A/T CONTROL INPUT SIGNAL CIRCUIT FOR SHORT
<p>1. Check harness continuity between ECM terminal 26 and ground, ECM terminal 27 and ground, ECM terminal 33 and ground, ECM terminal 34 and ground, ECM terminal 35 and ground. Refer to Wiring Diagram. Continuity should not exist.</p> <p>2. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

DTC P0600 A/T CONTROL

VG33ER

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
Check the harness for open or short between ECM and TCM (Transmission Control Module).	
▶	Repair open circuit or short to ground or short to power in harness.

GI

MA

5	CHECK A/T CONTROL SHIELD CIRCUIT FOR OPEN AND SHORT
1. Disconnect harness connectors M58, F28. 2. Check harness continuity between harness connector F28 terminal 19 and engine 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.

EM

LC

EC

6	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors M58, F28 ● Joint connectors-1 (if equipped) ● Harness for open between harness connector F28 and engine ground 	
▶	Repair open circuit or short to power in harness or connectors.

FE

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MT

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.	
▶	INSPECTION END

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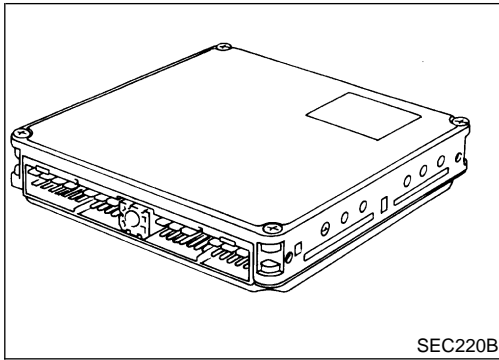
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Component Description



Component Description

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the engine. ^{NGEC1340}

On Board Diagnosis Logic

Malfunction is detected when ECM calculation function is malfunctioning. ^{NGEC1341}

POSSIBLE CAUSE

- ECM

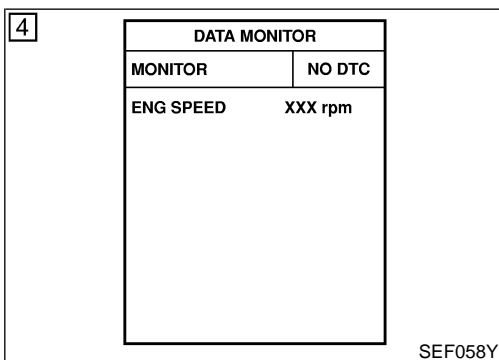
^{NGEC1341S01}

DTC Confirmation Procedure

^{NGEC1342}

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 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.
- 4) Run engine for at least 2 seconds at idle speed.
- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1605.

 With GST

Follow the procedure "With CONSULT-II".

Diagnostic Procedure

NGEC1343

1	INSPECTION START	
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select "SELF DIAG RESULTS" mode with CONSULT-II. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure". See EC-1604. 5. Is the 1st trip DTC P0605 displayed again? 		
<p> With GST</p> <ol style="list-style-type: none"> 1. Turn ignition switch ON. 2. Select MODE 4 with GST. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure". See EC-1604. 5. Is the 1st trip DTC P0605 displayed again? 		
Yes or No		
Yes	▶	Replace ECM.
No	▶	INSPECTION END

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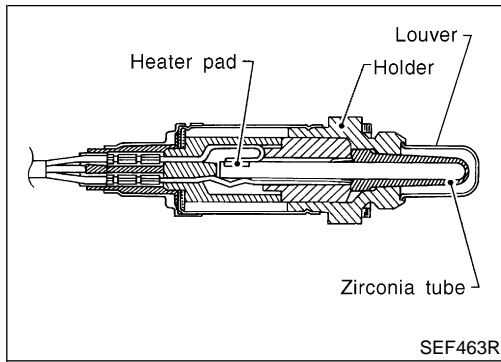
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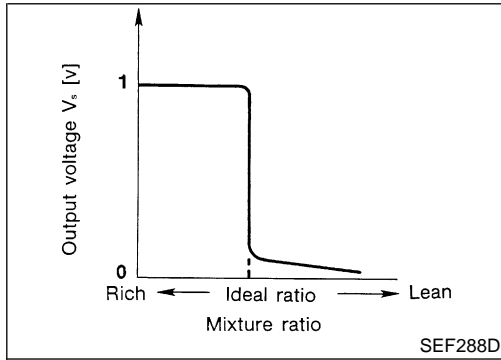
Component Description



Component Description

NGEC1148

The heated oxygen sensor 1 is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



CONSULT-II Reference Value in Data Monitor Mode

NGEC1149

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)	<ul style="list-style-type: none"> Engine: After warming up 	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NGEC1150

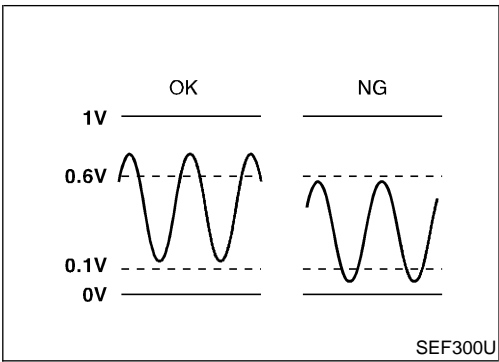
Specification data are reference values and are measured between each terminal and ground.

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 the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor (bank 1)	[Engine is running] <ul style="list-style-type: none"> After warming up to normal operating temperature and engine speed is 2,000 rpm 	0 - Approximately 1.0V
51	G	Heated oxygen sensor (bank 2)		

SEF002V



On Board Diagnosis Logic

NGEC1151

To judge the malfunction, the output from the heated oxygen sensor is monitored to determine whether the “rich” output is sufficiently high and whether the “lean” output is sufficiently low. When both the outputs are shifting to the lean side, the malfunction will be detected.

Malfunction is detected when the maximum and minimum voltage from the sensor are not reached to the specified voltages.

POSSIBLE CAUSE

NGEC1151S01

- Heated oxygen sensor 1
- Heated oxygen sensor 1 heater
- Fuel pressure
- Injectors
- Intake air leaks

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DTC Confirmation Procedure

=NGEC1152

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 5 seconds before conducting the next test.

TESTING CONDITION:

- Always perform at a temperature above -10°C (14°F).
- Before performing following procedure, confirm that battery voltage is more than 11V at idle.

6	HO2S1 (B1) P1143	
	TESTING	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SEN	XXX km/h

SEC704C

Ⓜ **With CONSULT-II**

- 1) Start engine and warm it up to normal operating temperature.
- 2) Stop engine and wait at least 5 seconds.
- 3) Turn ignition switch “ON” and select “HO2S1 (B1)/(B2) P1143/ P1163” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
- 4) Touch “START”.
- 5) Start engine and let it idle for at least 3.5 minutes.

NOTE:

Never raise engine speed above 2,800 rpm after this step. If the engine speed limit is exceeded, return to step 5.

- 6) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)

EGN SPEED	1,200 - 2,700 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	2.0 - 14.0 msec
Selector lever	Suitable position

6	HO2S1 (B1) P1143	
	TESTING	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SE	XXX km/h

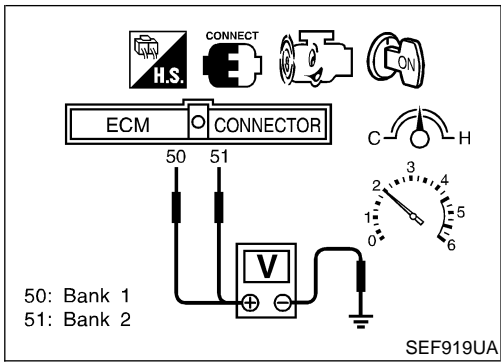
SEC705C

If “TESTING” is not displayed after 5 minutes, retry from step 2.

- 7) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to “Diagnostic Procedure”, EC-1609.

6	HO2S1 (B1) P1143	
	COMPLETED	

SEC706C



Overall Function Check

NGEC1153

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground.
- 3) Check one of the following with engine speed held at 2,000 rpm constant under no load.
 - The maximum voltage is over 0.6V at least one time.
 - The minimum voltage is over 0.1V at least one time.
- 4) If NG, go to "Diagnostic Procedure", EC-1609.

Diagnostic Procedure

NGEC1154

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p>	
<p>Engine ground</p> <p>LEC657</p>	
LEC657	
▶ GO TO 2.	

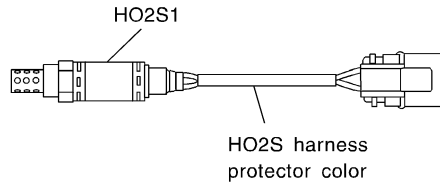
2	RETIGHTEN HEATED OXYGEN SENSOR 1
<p>Loosen and retighten corresponding heated oxygen sensor 1.</p> <p>Tightening torque: 40 - 60 N-m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)</p>	
▶ GO TO 3.	

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3	CLEAR THE SELF-LEARNING DATA										
<p>With CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II. Clear the self-learning control coefficient by touching "CLEAR". <div style="text-align: center; margin: 10px 0;"> <table border="1" style="border-collapse: collapse;"> <tr> <th colspan="3">WORK SUPPORT</th> </tr> <tr> <td style="padding: 2px;">SELF-LEARNING CONT</td> <td style="padding: 2px;">CLEAR</td> <td style="padding: 2px;">B1 100 %</td> </tr> <tr> <td colspan="2"></td> <td style="padding: 2px;">B2 100 %</td> </tr> </table> </div> <p style="text-align: right; margin-top: 20px;">SEF968Y</p> <ol style="list-style-type: none"> 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? 			WORK SUPPORT			SELF-LEARNING CONT	CLEAR	B1 100 %			B2 100 %
WORK SUPPORT											
SELF-LEARNING CONT	CLEAR	B1 100 %									
		B2 100 %									
<p>Without CONSULT-II</p> <ol style="list-style-type: none"> Start engine and warm it up to normal operating temperature. Turn ignition switch OFF. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed. Stop engine and reconnect mass air flow sensor harness connector. Make sure 1st trip DTC P0102 is displayed. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-1246. Make sure DTC P0000 is displayed. 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? <p style="text-align: center;">Yes or No</p>											
Yes	▶	Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-1427.									
No	▶	GO TO 4.									

4 CHECK HEATED OXYGEN SENSOR 1 HEATER

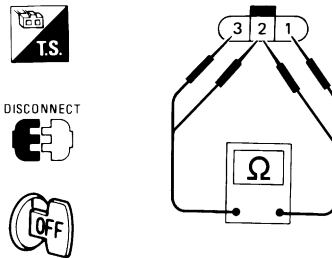
1. Stop engine.
2. Check heated oxygen sensor 1 harness protector color.



HO2S1 (bank 1): Black
 HO2S1 (bank 2): Blue

SEF505YB

3. Check resistance between HO2S1 terminals 3 and 1.



AEC158A

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

4. Check continuity between HO2S1 (front) terminals 2 and 1, 3 and 2.

Continuity should not exist.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

OK or NG

OK (With CONSULT-II) ▶	GO TO 5.
OK (Without CONSULT-II) ▶	GO TO 6.
NG ▶	Replace malfunctioning heated oxygen sensor 1.

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5 CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode with CONSULT-II, and select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

5. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below.

Bank 1
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

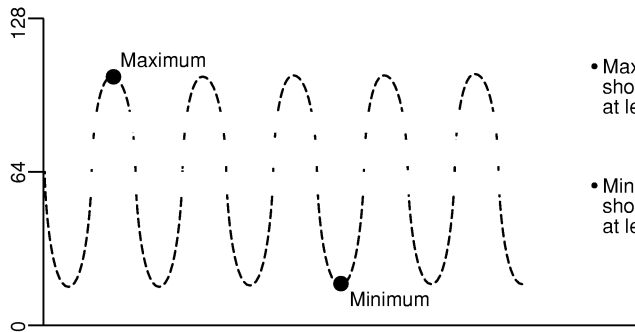
Bank 2
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

R means HO2S1
 MNTR (B1)/(B2) indicates RICH
 L means HO2S1
 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

OK or NG

OK ► GO TO 7.

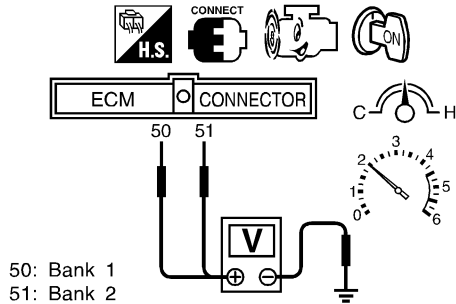
NG ► Replace malfunctioning heated oxygen sensor 1.

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6 CHECK FRONT HEATED OXYGEN SENSOR 1

⊗ **Without CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.



- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

SEF796Z

CAUTION:

Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

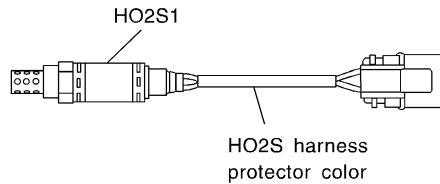
OK or NG

OK ► GO TO 8.

NG ► GO TO 7.

7 REPLACE HEATED OXYGEN SENSOR 1

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 1 harness protector color.



HO2S1 (bank 1): Black
 HO2S1 (bank 2): Blue

SEF505YB

CAUTION:

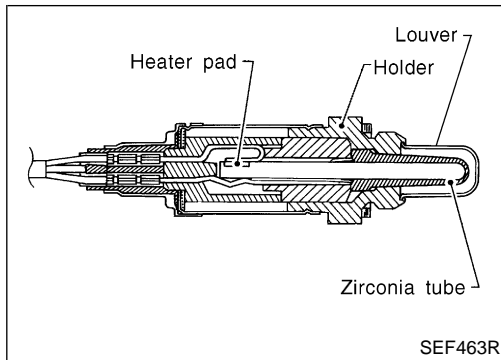
Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

► Replace malfunctioning heated oxygen sensor 1.

Diagnostic Procedure (Cont'd)

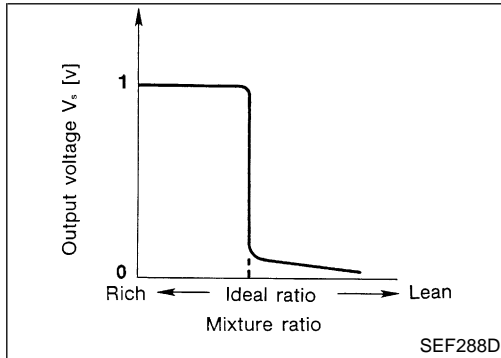
8	CHECK HO2S1 SHIELD CIRCUIT FOR OPEN AND SHORT (IF EQUIPPED)	
1. Turn ignition switch OFF. 2. Disconnect joint connector. 3. For circuit, refer to "DTC P0134, P0154 HEATED OXYGEN SENSOR 1 (BANK 1)/(BANK 2) (CIRCUIT)", EC-1396. 4. Check the following. <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to EL-250, "HARNESS LAYOUT".) Continuity should exist. 5. Also check harness for short to power. 6. Then reconnect joint connector.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Repair open circuit or short to power in harness or connectors.

9	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312. For circuit, refer to "DTC P0134, P0154 HEATED OXYGEN SENSOR (BANK 1)/(BANK 2) (CIRCUIT)", EC-1396.		
	▶	INSPECTION END



Component Description

The heated oxygen sensor 1 is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ↔ RICH Changes more than 5 times during 10 seconds.

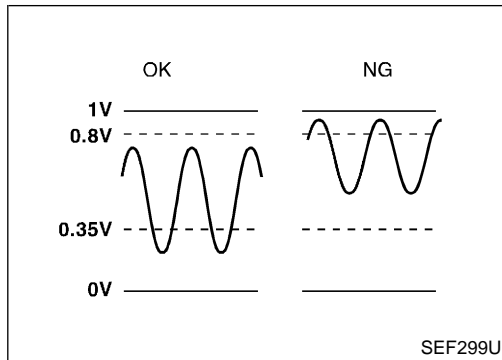
ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (Bank 1)	[Engine is running] ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V
51	G	Heated oxygen sensor 1 (Bank 2)		



On Board Diagnosis Logic

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the "rich" output is sufficiently high. The "lean" output is sufficiently low. When both the outputs are shifting to the rich side, the malfunction will be detected.

Malfunction is detected when the maximum and minimum voltages from the sensor are beyond the specified voltages.

POSSIBLE CAUSE

- Heated oxygen sensor 1
- Fuel pressure
- Injectors
- Heated oxygen sensor 1 heater

NGEC1158S01

DTC Confirmation Procedure

=NGEC1159

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 5 seconds before conducting the next test.

TESTING CONDITION:

- Always perform at a temperature above -10°C (14°F).
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

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6	HO2S1 (B1) P1144	
	OUT OF CONDITION	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SE	XXX km/h

SEC707C

Ⓜ With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Stop engine and wait at least 5 seconds.
- 3) Turn ignition switch ON and select “HO2S1 (B1)/(B2) P1144/P1164” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
- 4) Touch “START”.
- 5) Start engine and let it idle for at least 3.5 minutes.

NOTE:

Never raise engine speed above 2,800 rpm after this step. If the engine speed limit is exceeded, return to step 5.

- 6) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)

ENG SPEED	1,200 - 2,700 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	2.0 - 14.0 msec
Selector lever	Suitable position

If “TESTING” is not displayed after 5 minutes, retry from step 2.

- 7) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to “Diagnostic Procedure”, EC-1618.

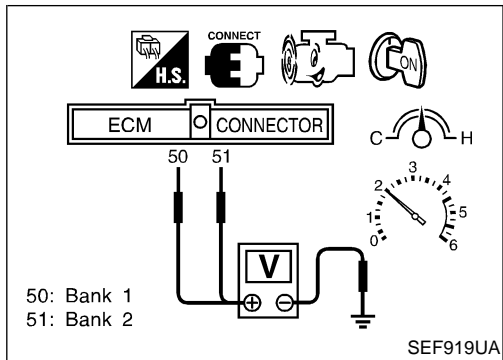
6	HO2S1 (B1) P1144	
	TESTING	
	MONITOR	
	ENG SPEED	XXX rpm
	B/FUEL SCHDL	XXX msec
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SE	XXX km/h

SEC708C

6	HO2S1 (B1) P1144	
	COMPLETED	

SEC709C

Overall Function Check



Overall Function Check

NGEC1160

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground.
- 3) Check one of the following with engine speed held at 2,000 rpm constant under no load.
 - The maximum voltage is below 0.8V at least one time.
 - The minimum voltage is below 0.35V at least one time.
- 4) If NG, go to "Diagnostic Procedure", EC-1618.

Diagnostic Procedure

NGEC1161

1	RETIGHTEN GROUND SCREWS
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws. 	
<p>Engine ground</p> <p>LEC657</p>	
▶ GO TO 2.	

LEC657

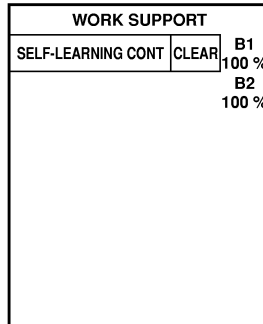
2	RETIGHTEN HEATED OXYGEN SENSOR 1
Loosen and retighten corresponding heated oxygen sensor 1.	
Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg·m, 30 - 44 ft·lb)	
▶ GO TO 3.	

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3 CLEAR THE SELF-LEARNING DATA

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".



SEF968Y

4. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 or P0175 detected?

Is it difficult to start engine?

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0102 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-1246.
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?

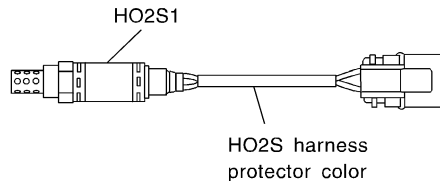
Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-1436.
No	▶	GO TO 4.

4 CHECK HO2S 1 CONNECTOR FOR WATER

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 1 harness protector color.



HO2S1 (bank 1): Black
HO2S1 (bank 2): Blue

SEF505YB

3. Disconnect heated oxygen sensor 1 harness connector.
4. Check connectors for water.

Water should not exist.

OK or NG

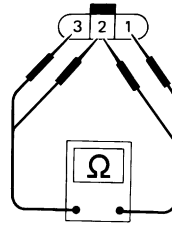
OK	▶	GO TO 5.
NG	▶	Repair or replace harness or connectors.

5 CHECK HEATED OXYGEN SENSOR 1 HEATER

Check resistance between HO2S1 terminals 3 and 1.



DISCONNECT



AEC158A

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

Check continuity between HO2S1 terminals 2 and 1, 3 and 2.

Continuity should not exist.

CAUTION:

Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK (With CONSULT-II) ▶	GO TO 6.
OK (Without CONSULT-II) ▶	GO TO 7.
NG ▶	GO TO 8.

6 CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode with CONSULT-II, and select "HO2S1 (B1)/(B2)" and "HO2S1 MNTR (B1)/(B2)".
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch "RECORD" on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

5. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown below.

Bank 1
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B1) R-L-R-L-R-L-R-L-R-L-R

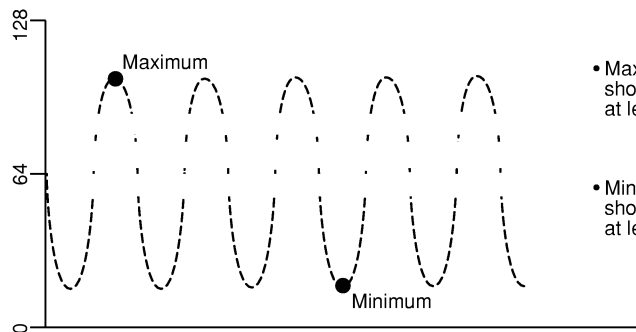
Bank 2
 cycle | 1 | 2 | 3 | 4 | 5 |
 HO2S1 MNTR (B2) R-L-R-L-R-L-R-L-R-L-R

R means HO2S1
 MNTR (B1)/(B2) indicates RICH
 L means HO2S1
 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "HO2S1 (B1)/(B2)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)/(B2)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)/(B2)" voltage never exceeds 1.0V.

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX
	XXX	XXX



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

SEF648Y

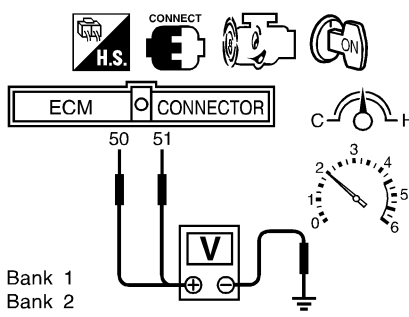
CAUTION:

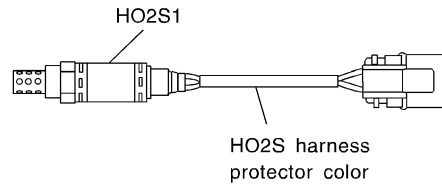
- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

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7	CHECK HEATED OXYGEN SENSOR 1
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and warm it up to normal operating temperature. 2. Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground. 3. Check the following with engine speed held at 2,000 rpm constant under no load. 	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  </div> <div style="width: 50%;"> <ul style="list-style-type: none"> • The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least one time. • The minimum voltage is below 0.3V at least one time. • The voltage never exceeds 1.0V. <p>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</p> </div> </div>	
SEF796Z	
<p>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.</p>	
OK or NG	
OK	▶ GO TO 8.
NG	▶ GO TO 8.

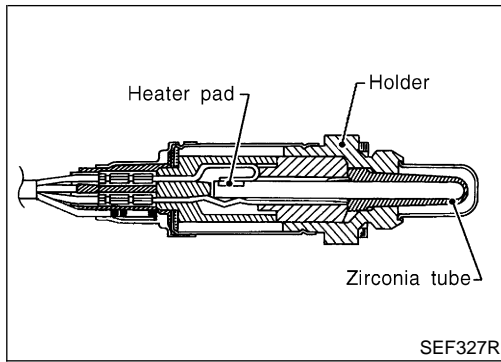
8	REPLACE HEATED OXYGEN SENSOR 1
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Check heated oxygen sensor 1 harness protector color. 	
	
<p>HO2S1 (bank 1): Black HO2S1 (bank 2): Blue</p>	
SEF505YB	
<p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p>	
▶	Replace malfunctioning heated oxygen sensor 1.

9	CHECK HO2S1 SHIELD CIRCUIT FOR OPEN AND SHORT (IF EQUIPPED)	
	<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect joint connector. For circuit, refer to "DTC P0134, P0154 HEATED OXYGEN SENSOR (BANK 1)/(BANK 2) (CIRCUIT)", EC-1396.</p> <p>3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to EL-250, "HARNESS LAYOUT".) Continuity should exist. <p>4. Also check harness for short to power.</p> <p>5. Then reconnect joint connector.</p> <p style="text-align: center;">OK or NG</p>	
	OK	▶ GO TO 10.
	NG	▶ Repair open circuit or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT	
	<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312. For circuit, refer to "DTC P0134, P0154 FRONT HEATED OXYGEN SENSOR (BANK 1)/(BANK 2) (CIRCUIT)", EC-1396.</p>	
	▶	INSPECTION END

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Component Description



Component Description

NGEC1184

The heated oxygen sensor 2, after three way catalyst, monitors the oxygen level in the exhaust gas on each bank. Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2. This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NGEC1185

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	● Engine: After warming up	Revsing engine from idle up to 2,000 rpm	LEAN ↔ RICH

ECM Terminals and Reference Value

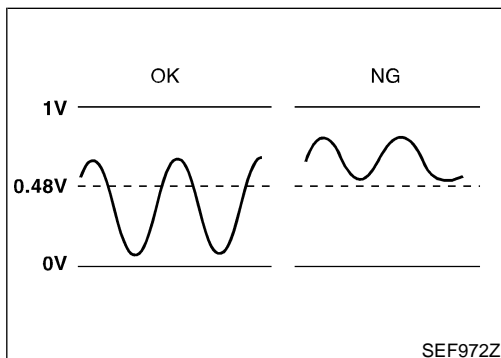
NGEC1186

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 the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (bank 1)	[Engine is running] ● Warm-up condition ● Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V
57	Y	Heated oxygen sensor 2 (bank 2)		



On Board Diagnosis Logic

NGEC1187

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst 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. Malfunction is detected when the minimum voltage from the sensor is not reached to the specified voltage.

POSSIBLE CAUSE

NGEC1187S01

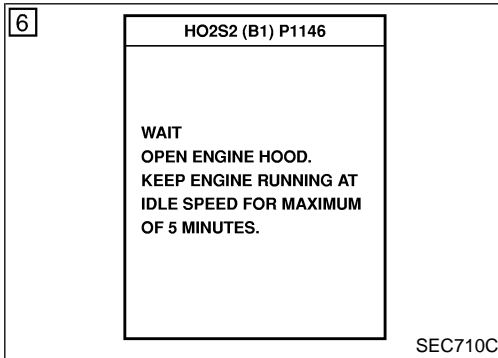
- Harness or connectors
(The sensor circuit is open or shorted.)
- Heated oxygen sensor 2
- Fuel pressure
- Injectors

GI

MA

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DTC Confirmation Procedure

NGEC1188

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Open engine hood before conducting following procedure With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select "DATA MONITOR" mode with CONSULT-II.
- 5) Make sure that "COOLANT TEMP/S" is more than 70°C (158°F).
- 6) Select "HO2S2 (B1)/(B2) P1146/P1166" of "HO2S2" in DTC WORK SUPPORT" mode with CONSULT.
- 7) Start engine and follow the instructions of CONSULT-II.
- 8) Make sure that "OK" is displayed after touching "SELF_DIAG RESULTS".

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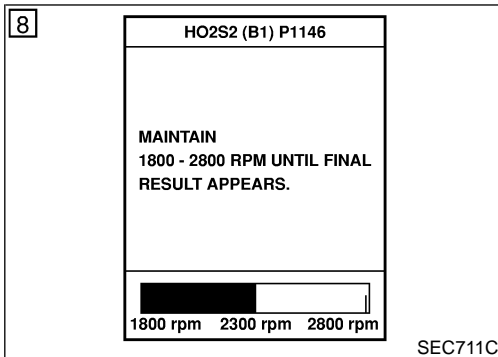
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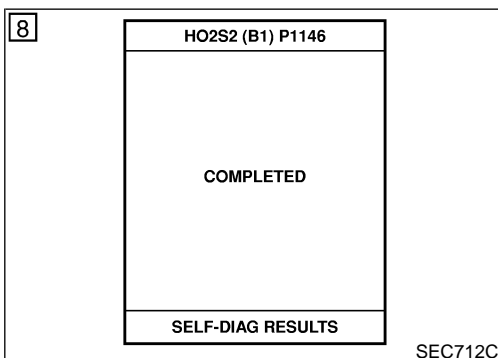
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If NG is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-1629.
If "CAN NOT BE DIAGNOSED" is displayed, perform the following.

AX

SU



- a) Stop engine and cool down "COOLANT TEMP/SE" to less than 70°C (158°F).
- b) Turn ignition switch ON.
- c) Select "DATA MONITOR" mode with CONSULT-II.
- d) Start engine.
- e) Perform from step 6) again when the "COOLANT TEMP/S" reaches to 70°C (158°F)

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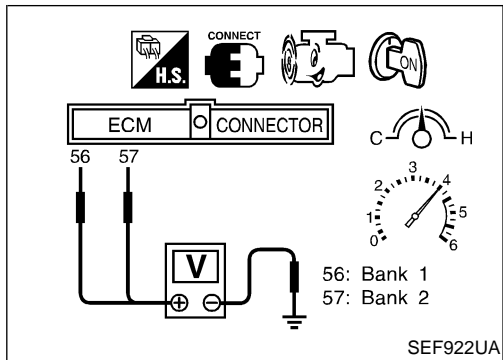
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Overall Function Check



Overall Function Check

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. =NGEC1189

CAUTION:

Always drive vehicle at a safe speed.

⊗ Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground.
- 4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
(depress and release accelerator pedal as soon as possible)
The voltage should be below 0.48V at least once during this procedure.
If the voltage can be confirmed in step 4, step 5 is not necessary.
- 5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T).
The voltage should be below 0.48V at least once during this procedure.
- 6) If NG, go to "Diagnostic Procedure", EC-1629.

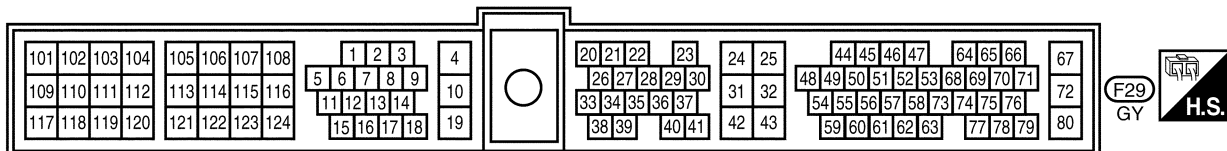
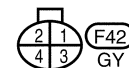
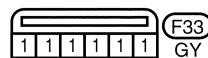
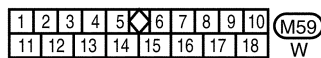
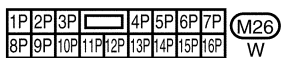
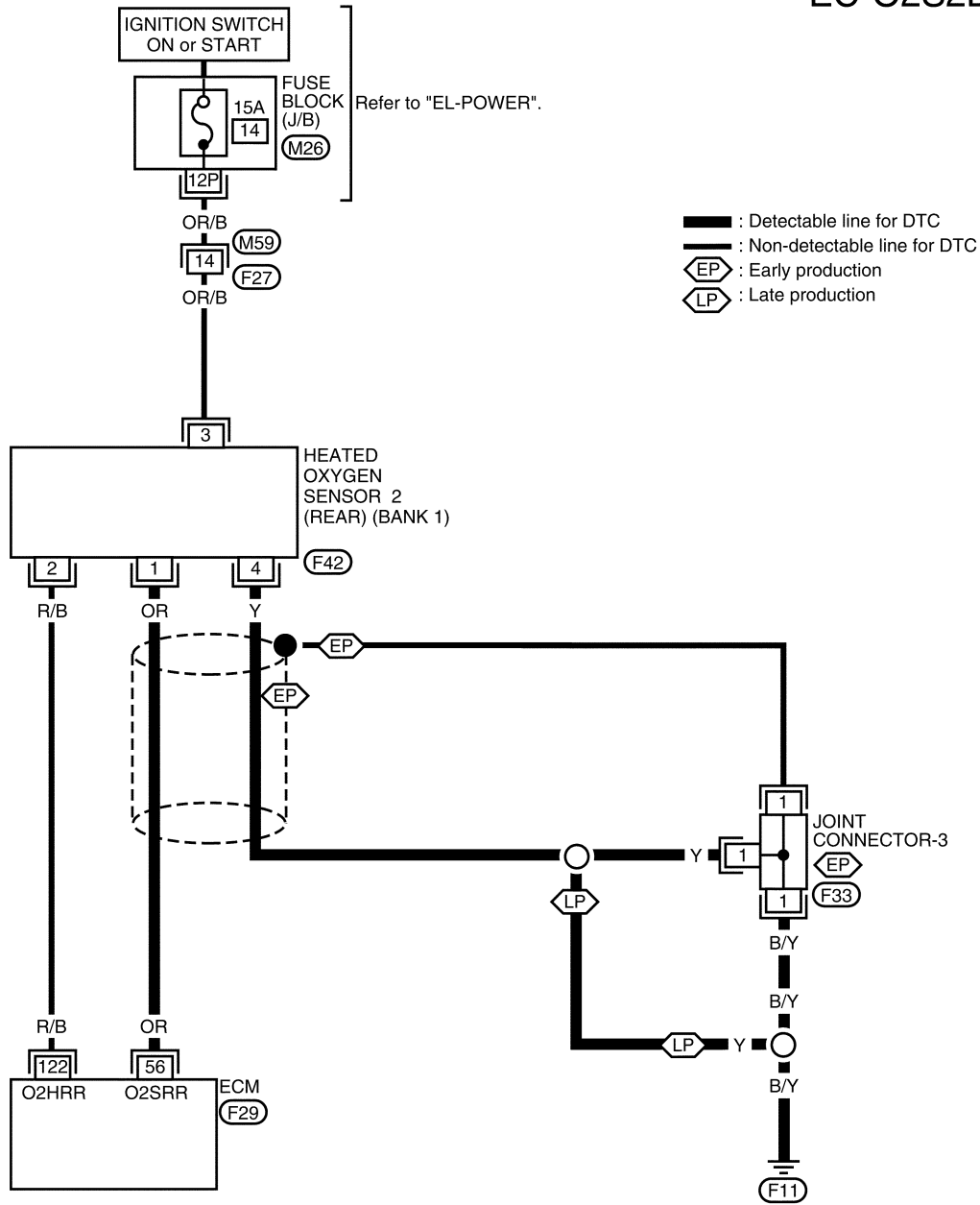
Wiring Diagram

RIGHT BANK

NGEC1190

NGEC1190S01

EC-O2S2B1-01

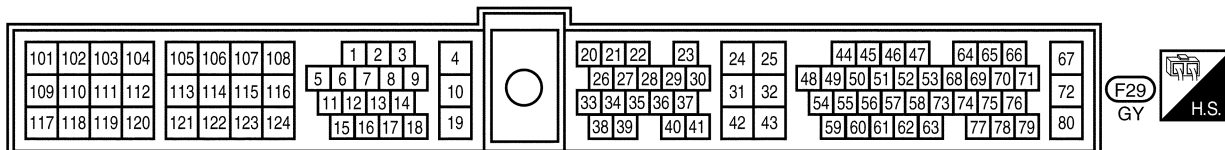
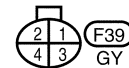
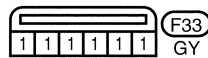
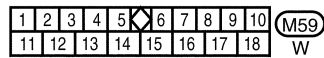
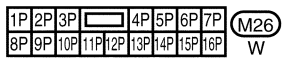
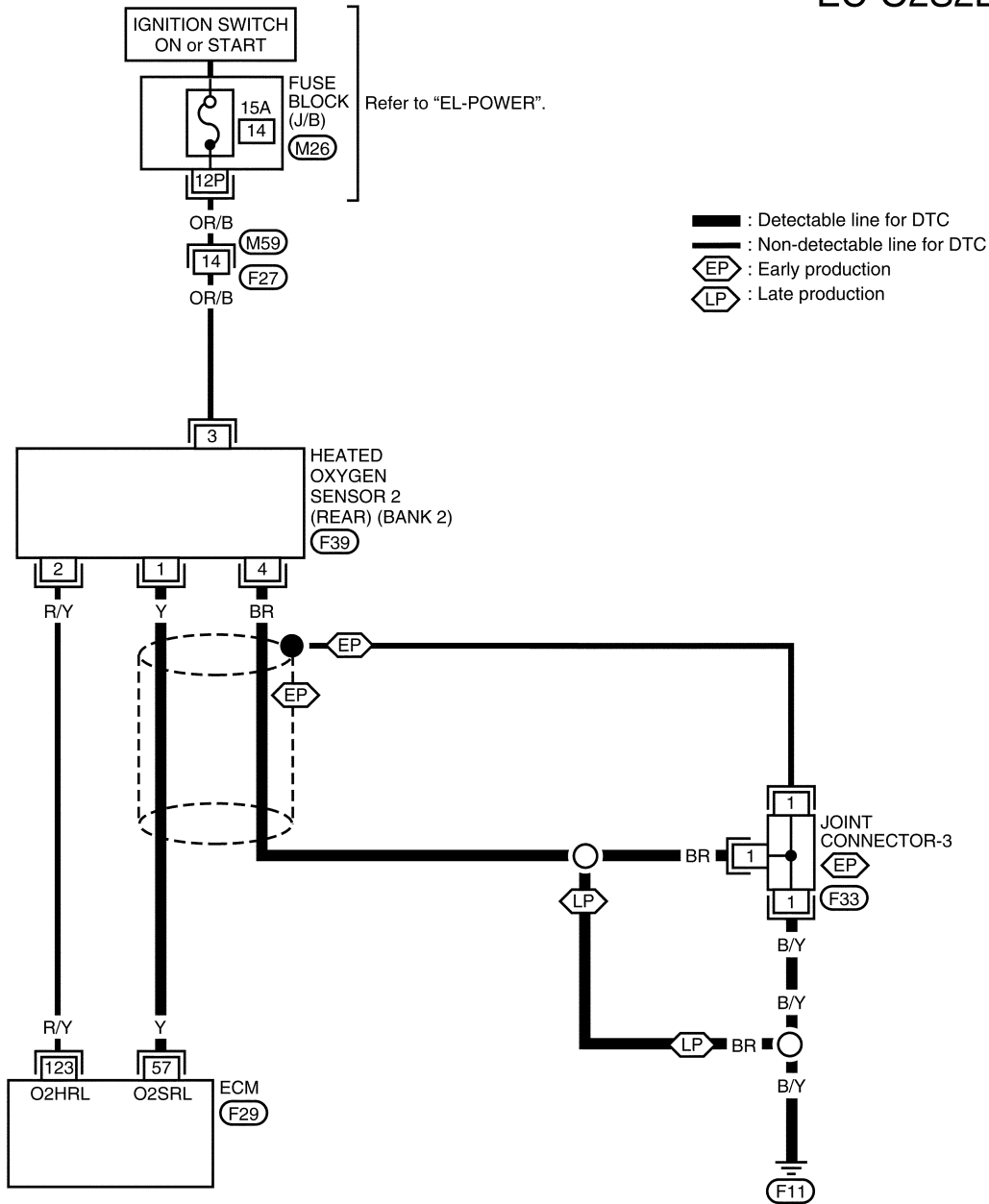


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LEFT BANK

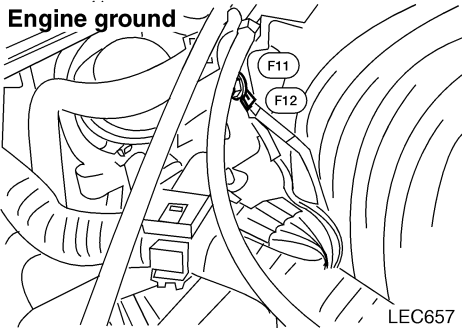
NGEC1190S02

EC-O2S2B2-01

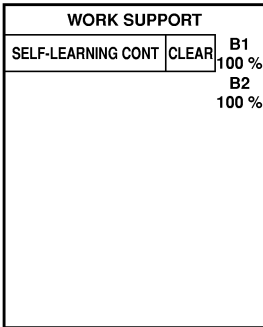


Diagnostic Procedure

NGEC1191

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p> <div style="text-align: center;">  <p>Engine ground</p> <p>LEC657</p> </div>	
LEC657	
▶ GO TO 2.	

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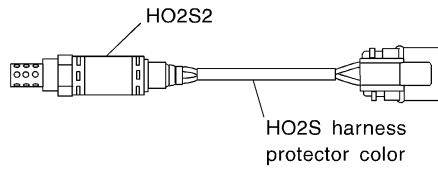
2	CLEAR THE SELF-LEARNING DATA						
<p><input checked="" type="checkbox"/> With CONSULT-II</p> <p>1. Start engine and warm it up to normal operating temperature. 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II. 3. Clear the self-learning control coefficient by touching "CLEAR".</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF968Y</p> <p>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?</p>							
<p><input type="checkbox"/> Without CONSULT-II</p> <p>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 1st trip DTC P0102 is displayed. 6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-1246. 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?</p> <p style="text-align: center;">Yes or No</p>							
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Yes</td> <td style="width: 5%; text-align: center;">▶</td> <td>Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-1437.</td> </tr> <tr> <td>No</td> <td style="text-align: center;">▶</td> <td>GO TO 3.</td> </tr> </table>		Yes	▶	Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-1437.	No	▶	GO TO 3.
Yes	▶	Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-1437.					
No	▶	GO TO 3.					

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3 CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

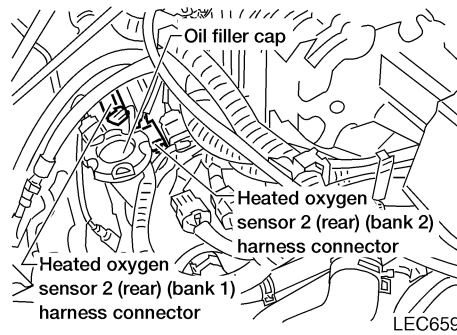
1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 harness protector color.



HO2S2 (bank 1): Gray
 HO2S2 (bank 2): Red Brown

SEC301CA

3. Disconnect corresponding heated oxygen sensor 2 harness connector.



LEC659

4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P1146	56	1	Bank 1 (Right)
P1166	57	1	Bank 2 (Left)

MTBL0951

Continuity should exist.

6. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or Sensor	Ground	
P1146	56 or 1	Ground	Bank 1 (Right)
P1166	57 or 1	Ground	Bank 2 (Left)

MTBL0952

Continuity should not exist.

7. 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 HO2S GROUND CIRCUIT FOR OPEN AND SHORT	
1. Check harness continuity between HO2S2 terminal 4 and engine ground. Refer to Wiring Diagram. Continuity should exist.		
2. Also check harness for short to power.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	GO TO 5.

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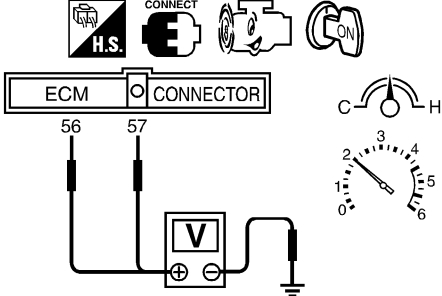
5	DETECT MALFUNCTIONING PART	
Check the following.		
<ul style="list-style-type: none"> ● Joint connector-3 (if equipped) ● Harness for open between heated oxygen sensor 2 and engine ground. 		
	▶	Repair open circuit or short to power in harness or connectors.

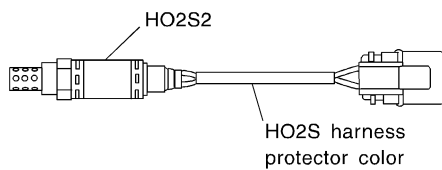
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6	CHECK HEATED OXYGEN SENSOR 2	
(P) With CONSULT-II		
1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.		
2. Stop vehicle with engine running.		
3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II.		
4. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.		
<div style="text-align: center;"> (Reference data) </div> <p>The voltage should be above 0.62V at least one time.</p> <p>The voltage should be below 0.48V at least one time.</p> <p style="text-align: right;">SEF989RD</p>		

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7	CHECK HEATED OXYGEN SENSOR 2						
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground. 4. Check the voltage when racing up to 4,000 rpm under no load at least 10 times. (depress and release accelerator pedal as soon as possible) <div style="display: flex; align-items: center; justify-content: center; margin: 10px 0;">  <div style="margin-left: 20px;"> <p>The voltage should be above 0.62V at least once during this procedure.</p> </div> </div> <p style="text-align: right; font-size: small;">SEF797ZB</p> <ol style="list-style-type: none"> 5. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T). The voltage should be below 0.48V at least once during this procedure. <p>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.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 150px;">OK</td> <td style="text-align: center;">▶</td> <td>GO TO 9.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 8.</td> </tr> </table>		OK	▶	GO TO 9.	NG	▶	GO TO 8.
OK	▶	GO TO 9.					
NG	▶	GO TO 8.					

8	REPLACE HEATED OXYGEN SENSOR 2			
<ol style="list-style-type: none"> 1. Stop vehicle and turn ignition switch OFF. 2. Check heated oxygen sensor 2 harness protector color. <div style="text-align: center; margin: 20px 0;">  </div> <div style="margin-left: 150px; margin-top: 10px;"> <p>HO2S2 (bank 1): Gray HO2S2 (bank 2): Red Brown</p> </div> <p style="text-align: right; font-size: small;">SEC301CA</p> <p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 150px;"></td> <td style="text-align: center;">▶</td> <td>Replace malfunctioning heated oxygen sensor 2.</td> </tr> </table>			▶	Replace malfunctioning heated oxygen sensor 2.
	▶	Replace malfunctioning heated oxygen sensor 2.		

9	CHECK HO2S2 SHIELD CIRCUIT FOR OPEN AND SHORT (IF EQUIPPED)	
	<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect joint connector-3.</p> <p>3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to EL-250, "HARNESS LAYOUT".) <p>Continuity should exist.</p> <p>4. Also check harness for short to power.</p> <p>5. Then reconnect joint connector-3.</p> <p style="text-align: center;">OK or NG</p>	
	OK	▶ GO TO 10.
	NG	▶ Repair open circuit or short to power in harness or connectors.

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10	CHECK INTERMITTENT INCIDENT	
	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.	
	▶	INSPECTION END

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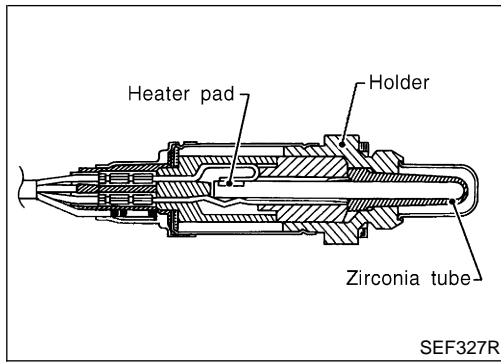
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Component Description



Component Description

NGEC1192

The heated oxygen sensor 2, after three way catalyst, monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NGEC1193

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)			0 - 0.3V ↔ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	● Engine: After warming up	Revving engine from idle up to 2,000 rpm	LEAN ↔ RICH

ECM Terminals and Reference Value

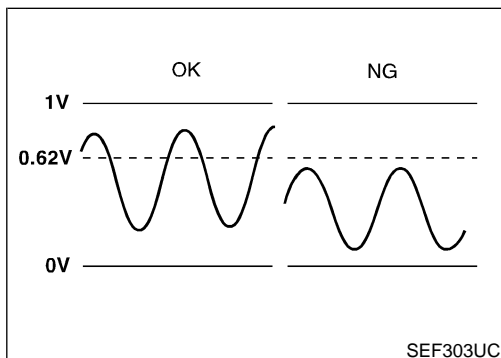
NGEC1194

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 the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (bank 1)	[Engine is running] ● Warm-up condition ● Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V
57	Y	Heated oxygen sensor 2 (bank 2)		



On Board Diagnosis Logic

NGEC1195

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst 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.

Malfunction is detected when the maximum voltage from the sensor is not reached to the specified voltage.

POSSIBLE CAUSE

NGEC1195S01

- Harness or connectors
(The sensor circuit is open or shorted.)
- Heated oxygen sensor 2
- Fuel pressure
- Injectors
- Intake air leaks

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6
HO2S2 (B1) P1147

WAIT
OPEN ENGINE HOOD.
KEEP ENGINE RUNNING AT
IDLE SPEED FOR MAXIMUM
OF 5 MINUTES.

SEC713C

8
HO2S2 (B1) P1147

MAINTAIN
1800 - 2800 RPM UNTIL FINAL
RESULT APPEARS.



1800 rpm 2300 rpm 2800 rpm

SEC714C

8
HO2S2 (B1) P1147

COMPLETED

SELF-DIAG RESULTS

SEC715C

DTC Confirmation Procedure

NGEC1196

NOTE:

If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Open engine hood before conducting following procedure With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select “DATA MONITOR” mode with CONSULT-II.
- 5) Make sure that “COOLANT TEMP/S” is more than 70°C (158°F).
- 6) Select “HO2S2 (B1)/(B2), P1147/P1167” of “HO2S2” in DTC WORK SUPPORT” mode with CONSULT-II.
- 7) Start engine and follow the instructions of CONSULT-II.
- 8) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
If NG is displayed, refer to “DIAGNOSTIC PROCEDURE”, EC-1639.
If “CAN NOT BE DIAGNOSED” is displayed, perform the following.
 - a) Stop engine and cool down “COOLANT TEMP/SE” to less than 70°C (158°F).
 - b) Turn ignition switch ON.
 - c) Select “DATA MONITOR” mode with CONSULT-II.
 - d) Start engine.
 - e) Perform from step 6) again when the “COOLANT TEMP/S” reaches to 70°C (158°F)

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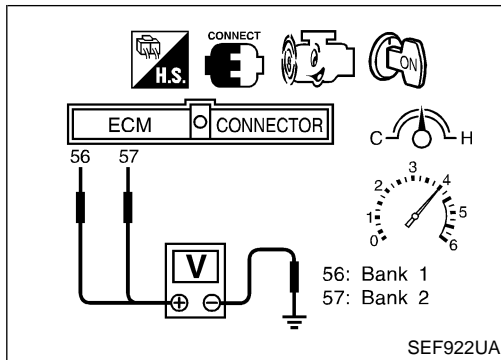
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Overall Function Check



Overall Function Check

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. =NGEC1197

CAUTION:

Always drive vehicle at a safe speed.

⊗ Without CONSULT-II

- 1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
- 2) Stop vehicle with engine running.
- 3) Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground.
- 4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
(depress and release accelerator pedal as soon as possible)
The voltage should be above 0.62V at least once during this procedure.
If the voltage can be confirmed in step 4, step 5 is not necessary.
- 5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T).
The voltage should be above 0.62V at least once during this procedure.
- 6) If NG, go to "Diagnostic Procedure", EC-1639.

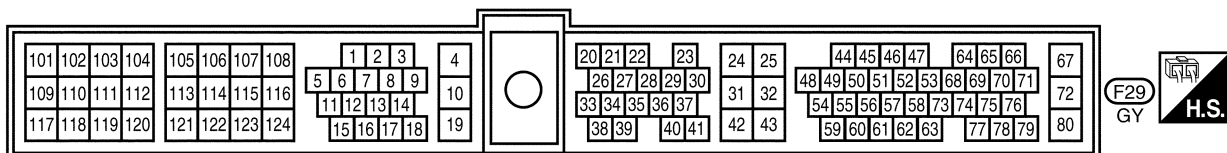
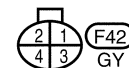
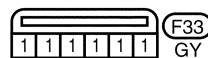
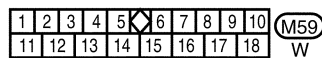
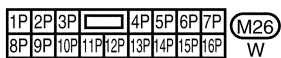
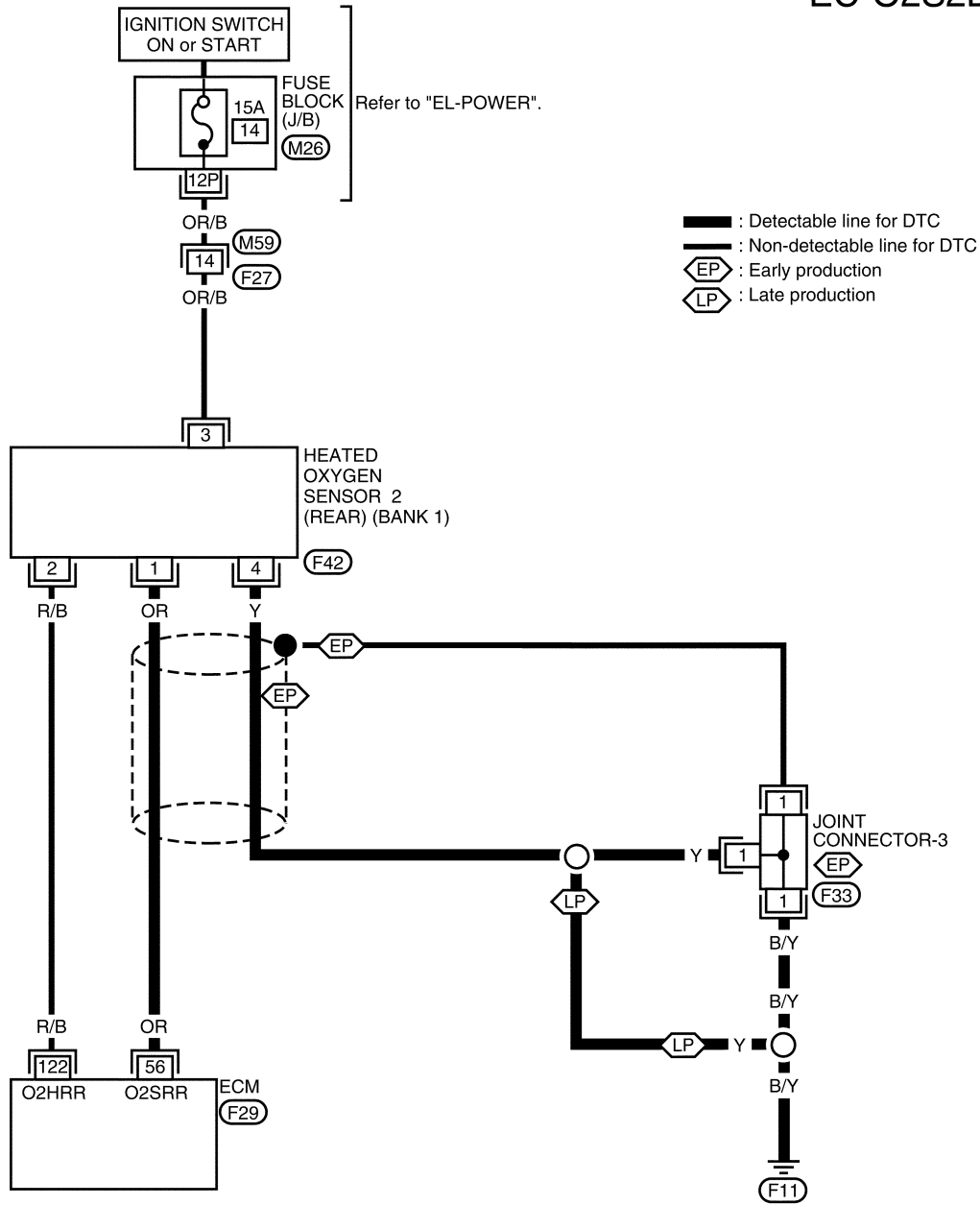
Wiring Diagram

RIGHT BANK

NGEC1198

NGEC1198S01

EC-O2S2B1-01

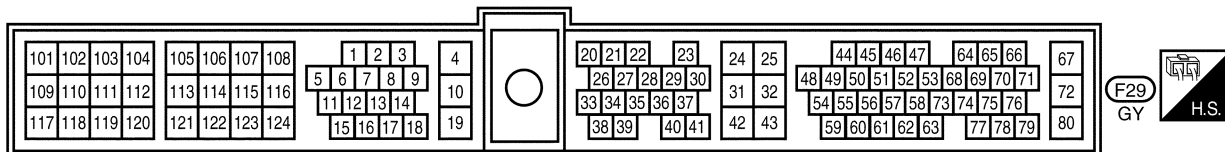
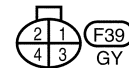
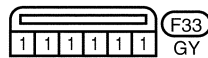
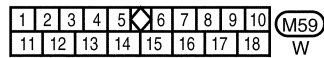
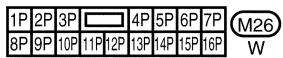
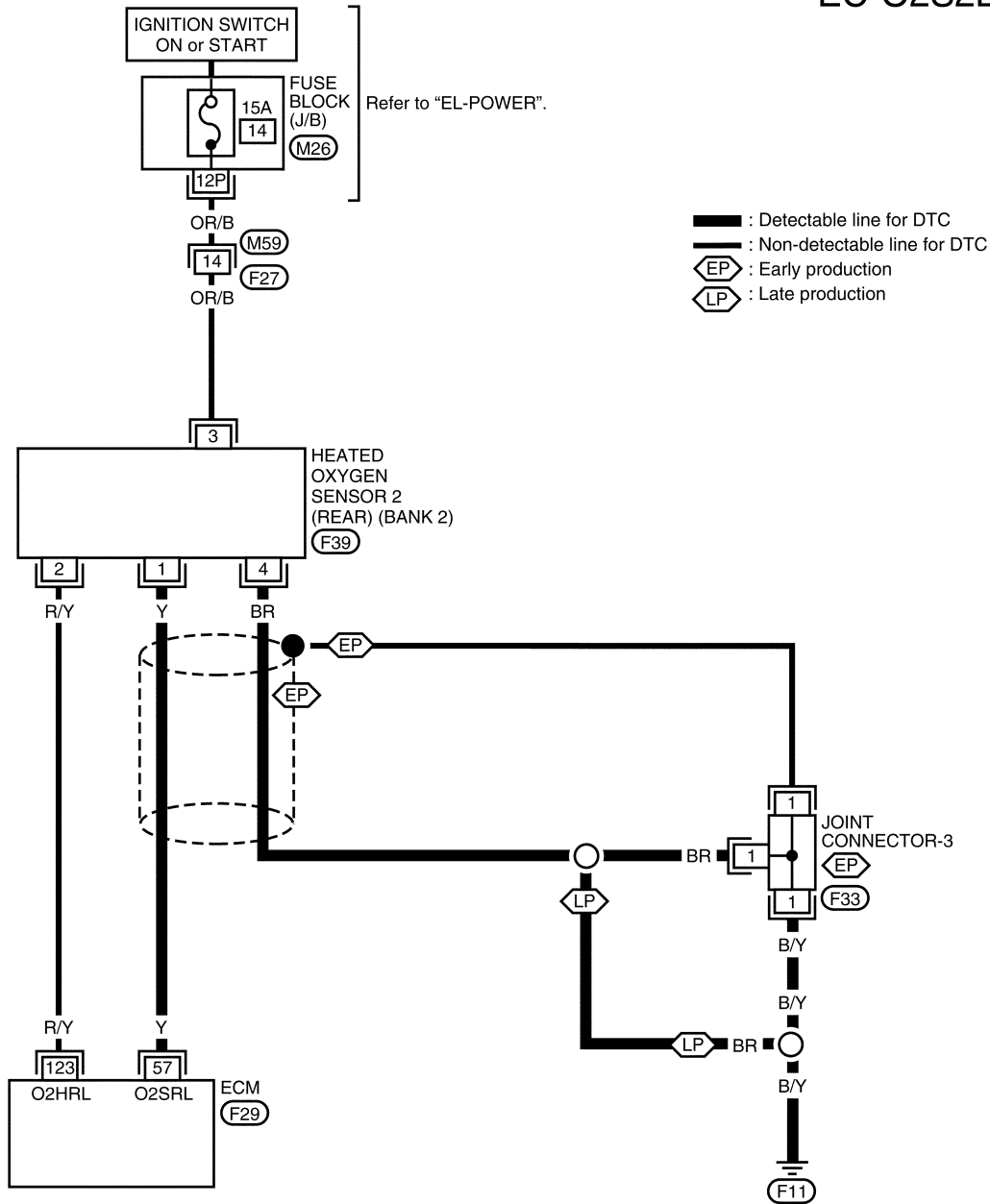


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LEFT BANK

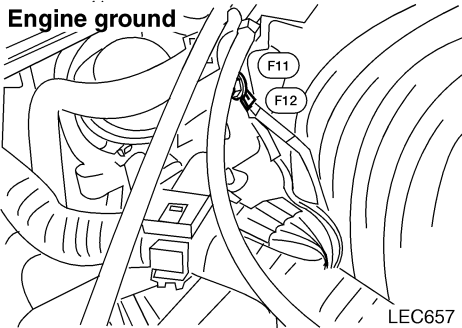
NGEC1198S02

EC-O2S2B2-01

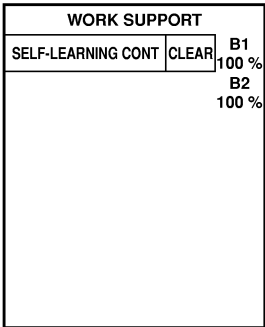


Diagnostic Procedure

NGEC1199

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p> <div style="text-align: center;">  <p>Engine ground</p> <p>LEC657</p> </div>	
LEC657	
▶ GO TO 2.	

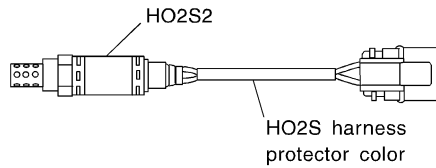
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2	CLEAR THE SELF-LEARNING DATA						
<p><input checked="" type="checkbox"/> With CONSULT-II</p> <p>1. Start engine and warm it up to normal operating temperature. 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II. 3. Clear the self-learning control coefficient by touching "CLEAR".</p> <div style="text-align: center;">  </div> <p style="text-align: right;">SEF968Y</p> <p>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?</p>							
<p><input type="checkbox"/> Without CONSULT-II</p> <p>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 1st trip DTC P0102 is displayed. 6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-1246. 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?</p> <p style="text-align: center;">Yes or No</p>							
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Yes</td> <td style="width: 5%; text-align: center;">▶</td> <td>Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-1428.</td> </tr> <tr> <td>No</td> <td style="text-align: center;">▶</td> <td>GO TO 3.</td> </tr> </table>		Yes	▶	Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-1428.	No	▶	GO TO 3.
Yes	▶	Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-1428.					
No	▶	GO TO 3.					

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3 CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 harness protector color.



HO2S2 (bank 1): Gray
 HO2S2 (bank 2): Red Brown

SEC301CA

3. Disconnect corresponding heated oxygen sensor 2 harness connector.
4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P1147	56	1	Bank 1 (Right)
P1167	57	1	Bank 2 (Left)

SEC661C

Continuity should exist.

6. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or sensor	Ground	
P1147	56 or 1	Ground	Bank 1 (Right)
P1167	57 or 1	Ground	Bank 2 (Left)

SEC662C

Continuity should not exist.

7. Also check harness for short to power.

OK or NG

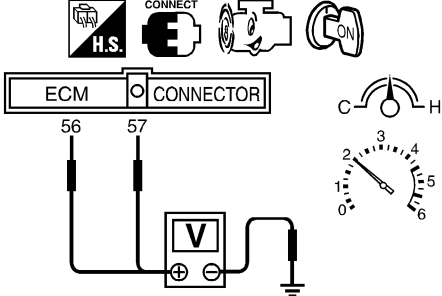
OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

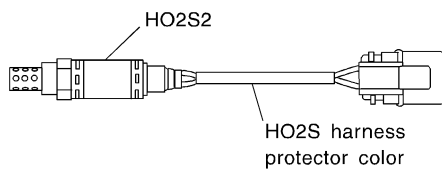
4	CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT	
1. Check harness continuity between HO2S2 terminal 4 and engine ground. Refer to Wiring Diagram. Continuity should exist.		
2. Also check harness for short to power.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART	
Check the following.		
<ul style="list-style-type: none"> ● Joint connector-3 (if equipped) ● Harness for open between heated oxygen sensor 2 and engine ground. 		
	▶	Repair open circuit or short to power in harness or connectors.

6	CHECK HEATED OXYGEN SENSOR 2	
(P) With CONSULT-II		
1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.		
2. Stop vehicle with engine running.		
3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-II.		
4. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.		
<div style="text-align: center;"> (Reference data) </div> <p>The voltage should be above 0.62V at least one time.</p> <p>The voltage should be below 0.48V at least one time.</p>		

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7	CHECK HEATED OXYGEN SENSOR 2						
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes. 2. Stop vehicle with engine running. 3. Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground. 4. Check the voltage when racing up to 4,000 rpm under no load at least 10 times. (depress and release accelerator pedal as soon as possible) <div style="display: flex; align-items: center; justify-content: center; margin: 10px 0;">  <div style="margin-left: 20px;"> <p>The voltage should be above 0.62V at least once during this procedure.</p> </div> </div> <p style="text-align: right; font-size: small;">SEF797ZB</p> <ol style="list-style-type: none"> 5. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "O/D" OFF (A/T). The voltage should be below 0.48V at least once during this procedure. <p>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.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%; padding: 5px;">OK</td> <td style="width: 10%; text-align: center; padding: 5px;">▶</td> <td style="padding: 5px;">GO TO 9.</td> </tr> <tr> <td style="padding: 5px;">NG</td> <td style="text-align: center; padding: 5px;">▶</td> <td style="padding: 5px;">GO TO 8.</td> </tr> </table>		OK	▶	GO TO 9.	NG	▶	GO TO 8.
OK	▶	GO TO 9.					
NG	▶	GO TO 8.					

8	REPLACE HEATED OXYGEN SENSOR 2			
<ol style="list-style-type: none"> 1. Stop vehicle and turn ignition switch OFF. 2. Check heated oxygen sensor 2 harness protector color. <div style="text-align: center; margin: 10px 0;">  </div> <div style="margin: 10px 0;"> <p>HO2S2 (bank 1): Gray HO2S2 (bank 2): Red Brown</p> <p style="text-align: right; font-size: small;">SEC301CA</p> </div> <p>CAUTION: Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 20%;"></td> <td style="width: 10%; text-align: center;">▶</td> <td>Replace malfunctioning heated oxygen sensor 2.</td> </tr> </table>			▶	Replace malfunctioning heated oxygen sensor 2.
	▶	Replace malfunctioning heated oxygen sensor 2.		

9	CHECK HO2S2 SHIELD CIRCUIT FOR OPEN AND SHORT(IF EQUIPPED)	
	<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect joint connector.</p> <p>3. Check the following.</p> <ul style="list-style-type: none"> ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to EL-250, "HARNES LAYOUT".) Continuity should exist. <p>4. Also check harness for short to power.</p> <p>5. Then reconnect joint connector.</p> <p style="text-align: center;">OK or NG</p>	
	OK	▶ GO TO 10.
	NG	▶ Repair open circuit or short to power in harness or connectors.

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10	CHECK INTERMITTENT INCIDENT	
	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.	
	▶	INSPECTION END

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On Board Diagnosis Logic

★ **The closed loop control has the one trip detection logic.** NGEC1347
 Malfunction is detected when the closed loop control function for right bank does not operate even when vehicle is driving in the specified condition, the closed loop control function for left bank does not operate even when vehicle is driving in the specified condition.

POSSIBLE CAUSE

- The heated oxygen sensor 1 circuit is open or shorted. NGEC1347S01
- Heated oxygen sensor 1
- Heated oxygen sensor 1 heater

DTC Confirmation Procedure

NGEC1348

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 5 seconds before conducting the next test.

- TESTING CONDITION:**
- Never raise engine speed above 2,800 rpm during the “DTC Confirmation Procedure”. If the engine speed limit is exceeded, retry the procedure from step 2.
 - Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

3	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C
	HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V	

SEF967Y

- Ⓜ **With CONSULT-II**
- 1) Start engine and warm it up to normal operating temperature.
 - 2) Select “DATA MONITOR” mode with CONSULT-II.
 - 3) Hold engine speed at 2,000 rpm and check one of the following.
 - “HO2S1 (B1)/(B2)” voltage should go above 0.70V at least once.
 - “HO2S1 (B1)/(B2)” voltage should go below 0.21V at least once.
 If the check result is NG, perform “Diagnosis Procedure”, EC-1645.

If the check result is OK, perform the following step.

- 4) Let engine idle at least 5 minutes.
- 5) Maintain the following condition at least 50 consecutive seconds.

B/FUEL SCHDL	2.0 msec or more
ENG SPEED	1,500 rpm or more
Selector lever	Suitable position
VHCL SPEED SE	More than 71 km/h (44 MPH)

During this test, P0134 and/or P0154 may be displayed on CONSULT-II screen.

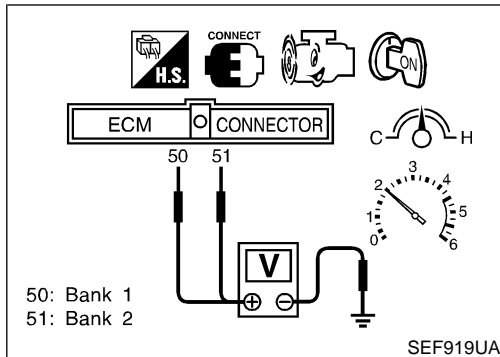
- 6) If DTC is detected, go to "Diagnostic Procedure", EC-1645.

Overall Function Check

Use this procedure to check the overall function of the closed loop control. During this check, a DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Set voltmeter probes between ECM terminal 50 [heated oxygen sensor 1 (bank 1) signal] or 51 [heated oxygen sensor 1 (bank 2) signal] and engine ground.
- 3) Check the following with engine speed held at 2,000 rpm constant under no-load.
 - The voltage should go above 0.70V at least once.
 - The voltage should go below 0.21V at least once.
- 4) If NG, go to "Diagnostic Procedure", EC-1645.



Diagnostic Procedure

Perform trouble diagnosis for "DTC P0133, P0153", EC-1382.

On Board Diagnosis Logic

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise. When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated. NGEC1354

Malfunction is detected when engine coolant temperature reaches an abnormally high temperature.

CAUTION:

When a malfunction is indicated be sure to replace the coolant, follow the procedure in “Changing Engine Coolant”, “ENGINE MAINTENANCE”, MA-28. Also, replace the engine oil.

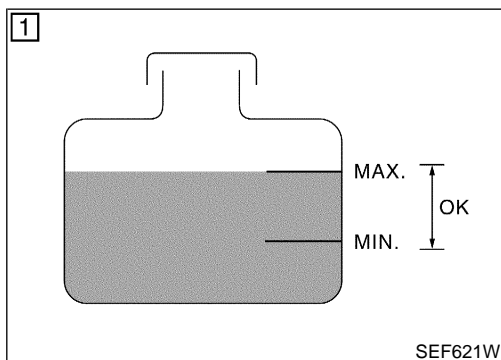
- 1) Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to “Anti-freeze Coolant Mixture Ratio”, “RECOMMENDED FLUIDS AND LUBRICANTS”, MA-15.
- 2) After refilling coolant, run engine to ensure that no water-flow noise is emitted.

POSSIBLE CAUSE

- Cooling fan (Crankshaft driven)
- Radiator hose
- Radiator
- Radiator cap
- Water pump
- Thermostat

NGEC1354S01

For more information, refer to “MAIN 12 CAUSES OF OVERHEATING”, EC-1650.



Overall Function Check

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed. NGEC1355

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

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 “Diagnostic Procedure”, EC-1647.
- 2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to “Diagnostic Procedure”, EC-1647.
- 3) Start engine.
- 4) Make sure that cooling fan (crankshaft driven) operates.
- 5) If NG, go to “Diagnostic Procedure”, EC-1647.

⊗ 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 "Diagnostic Procedure", EC-1647.
- 2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "Diagnostic Procedure", EC-1647.
- 3) Start engine and make sure that cooling fan (crankshaft driven) operates.
Be careful not to overheat engine.
- 4) If NG, go to "Diagnostic Procedure", EC-1647.

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Diagnostic Procedure

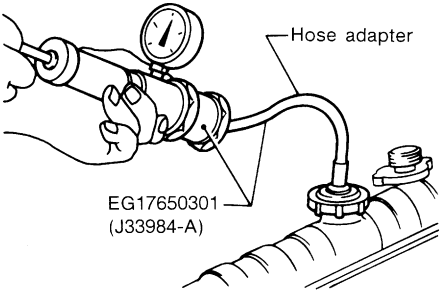
NGEN1357

1	CHECK COOLING FAN (CRANKSHAFT DRIVEN) OPERATION	
Start engine and make sure that cooling fan (crankshaft driven) operates.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Check cooling fan (crankshaft driven). Refer to LC-16 , "Cooling Fan".

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2	CHECK COOLING SYSTEM FOR LEAK	
Apply pressure to the cooling system with a tester, and check if the pressure drops.		
CAUTION: Higher than the specified pressure may cause radiator damage.		
Testing pressure: 157 kPa (1.6 kg/cm ² , 23 psi)		
		
Pressure should not drop.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Check the following for leak <ul style="list-style-type: none"> ● Hose ● Radiator ● Water pump Refer to "Water Pump", LC-29 .

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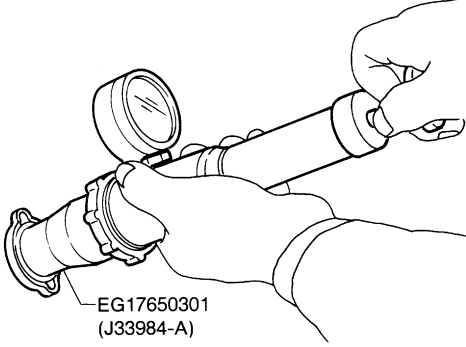
SLC754A

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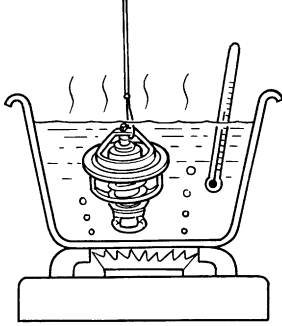
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3	CHECK RADIATOR CAP		
Apply pressure to cap with a tester and check radiator cap relief pressure.			
			
<p>Radiator cap relief pressure: 59 - 98 kPa (0.6 - 1.0 kg/cm², 9 - 14 psi)</p>			
OK or NG			
OK	▶	GO TO 4.	
NG	▶	Replace radiator cap.	

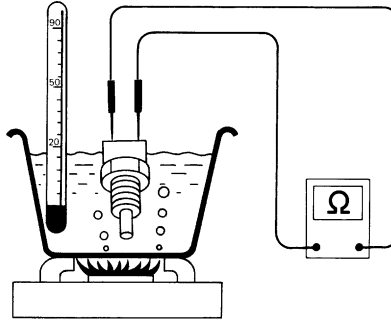
SLC755A

4	CHECK THERMOSTAT		
1. Check valve seating condition at normal room temperatures. It should seat tightly. 2. Check valve opening temperature and valve lift.			
			
<p>Valve opening temperature: 76.5°C (170°F) [standard] Valve lift: More than 10 mm/90°C (0.39 in/194°F)</p>			
3. Check if valve is closed at 5°C (9°F) below valve opening temperature. For details, refer to "Thermostat", LC-13 .			
OK or NG			
OK	▶	GO TO 5.	
NG	▶	Replace thermostat	

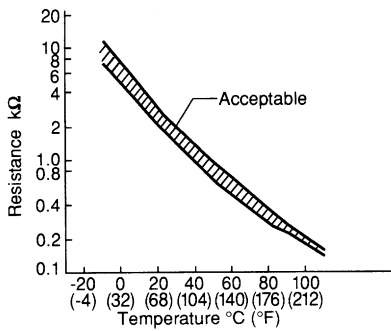
SLC343

5 CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.


<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260


OK or NG

OK	▶	GO TO 6.
NG	▶	Replace engine coolant temperature sensor.

6 CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-1650.

 ▶ **INSPECTION END**

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DTC P1217 ENGINE OVER TEMPERATURE

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Main 12 Causes of Overheating

Main 12 Causes of Overheating

NGEC1358

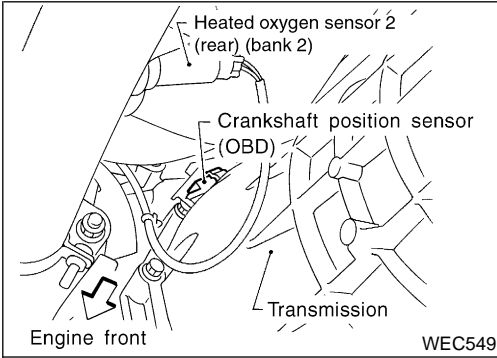
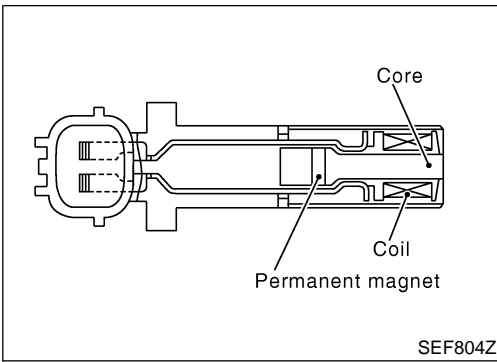
Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	<ul style="list-style-type: none"> ● Blocked radiator ● Blocked condenser ● Blocked radiator grille ● Blocked bumper 	<ul style="list-style-type: none"> ● Visual 	No blocking	—
	2	<ul style="list-style-type: none"> ● Coolant mixture 	<ul style="list-style-type: none"> ● Coolant tester 	50 - 50% coolant mixture	See "RECOMMENDED FLUIDS AND LUBRICANTS", MA-13 .
	3	<ul style="list-style-type: none"> ● Coolant level 	<ul style="list-style-type: none"> ● Visual 	Coolant up to MAX level in reservoir tank and radiator filler neck	See "Changing Engine Coolant", "ENGINE MAINTENANCE", MA-28 .
	4	<ul style="list-style-type: none"> ● Radiator cap 	<ul style="list-style-type: none"> ● Pressure tester 	59 - 98 kPa (0.6 - 1.0 kg/cm ² , 9 - 14 psi) (Limit)	See "System Check", "ENGINE COOLING SYSTEM", LC-28 .
ON*1	5	<ul style="list-style-type: none"> ● Coolant leaks 	<ul style="list-style-type: none"> ● Visual 	No leaks	See "System Check", "ENGINE COOLING SYSTEM", LC-29 .
ON*1	6	<ul style="list-style-type: none"> ● Thermostat 	<ul style="list-style-type: none"> ● Touch the upper and lower radiator hoses 	Both hoses should be hot	See "Thermostat" and "Radiator", "ENGINE COOLING SYSTEM", LC-31, LC-32 .
ON*1	7	<ul style="list-style-type: none"> ● Cooling fan (Crankshaft driven) 	<ul style="list-style-type: none"> ● Visual 	Operating	See LC-34 , "Cooling Fan".
OFF	8	<ul style="list-style-type: none"> ● Combustion gas leak 	<ul style="list-style-type: none"> ● Color checker chemical tester 4 Gas analyzer 	Negative	—
ON*2	9	<ul style="list-style-type: none"> ● Coolant temperature gauge 	<ul style="list-style-type: none"> ● Visual 	Gauge less than 3/4 when driving	—
		<ul style="list-style-type: none"> ● Coolant overflow to reservoir tank 	<ul style="list-style-type: none"> ● Visual 	No overflow during driving and idling	See "Changing Engine Coolant", "ENGINE MAINTENANCE", MA-28 .
OFF*3	10	<ul style="list-style-type: none"> ● Coolant return from reservoir tank to radiator 	<ul style="list-style-type: none"> ● Visual 	Should be initial level in reservoir tank	See "ENGINE MAINTENANCE", MA-26 .
OFF	11	<ul style="list-style-type: none"> ● Cylinder head 	<ul style="list-style-type: none"> ● Straight gauge feeler gauge 	0.1 mm (0.004 in) Maximum distortion (warping)	See "Inspection", "CYLINDER HEAD DISTORTION", EM-96 .
	12	<ul style="list-style-type: none"> ● Cylinder block and pistons 	<ul style="list-style-type: none"> ● Visual 	No scuffing on cylinder walls or piston	See "Inspection", "CYLINDER BLOCK DISTORTION AND WEAR", EM-117 .

*1: Engine running at 3,000 rpm for 10 minutes.

*2: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*3: After 60 minutes of cool down time.

For more information, refer to "Engine Cooling System", "OVERHEATING CAUSE ANALYSIS", **LC-35**.



Component Description

NGEC1366

The crankshaft position sensor (OBD) is located on the transmission housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet, core and coil.

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.

This sensor is not used to control the engine system.

It is used only for the on board diagnosis.

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ECM Terminals and Reference Value

NGEC1367

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 the ECM terminals, such as the ground.

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TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
47	L	Crankshaft position sensor (OBD)	<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Warm-up condition ● Idle speed 	<p>1 - 2V (AC range)</p> <p>SEF690W</p>
			<p>[Engine is running]</p> <ul style="list-style-type: none"> ● Engine speed is 2,000 rpm 	<p>3 - 4V (AC range)</p> <p>SEF691W</p>

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On Board Diagnosis Logic

Malfunction is detected when a chipping of the flywheel or drive plate gear tooth (cog) is detected by the ECM. NGEC1368

POSSIBLE CAUSE

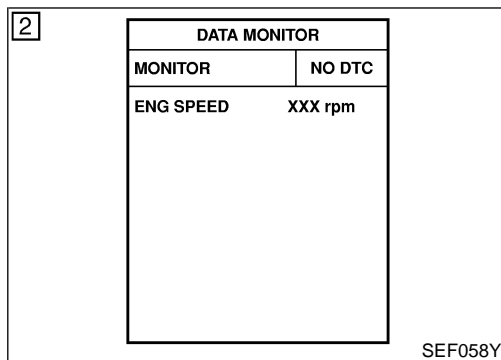
- Harness or connectors
- Crankshaft position sensor (OBD)
- Drive plate/Flywheel

NGEC1368S01

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test. NGEC1369



④ With CONSULT-II

- 1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- 2) Start engine and run it for at least 2 minutes at idle speed.
- 3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1654.

④ With GST

Follow the procedure "With CONSULT-II".

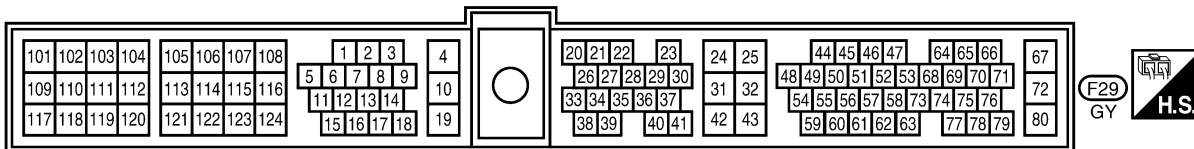
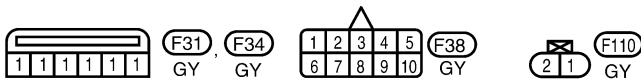
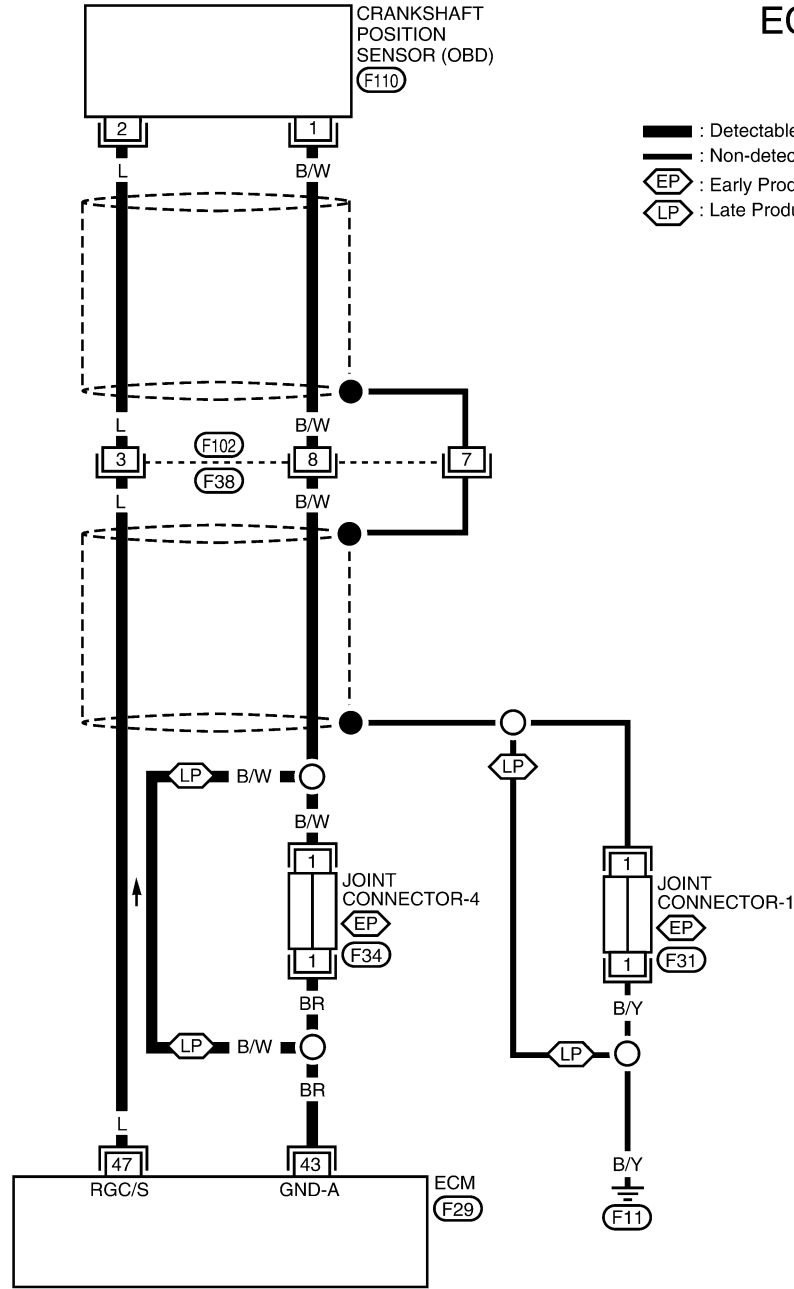
DTC P1336 CKP SENSOR (OBD)

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Wiring Diagram

Wiring Diagram

NGEC1370

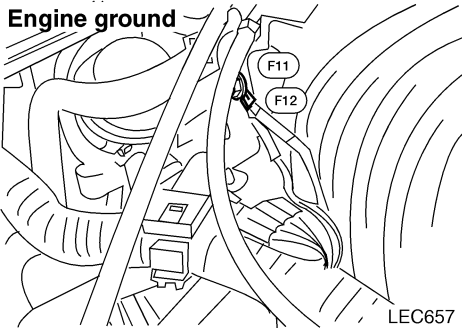
EC-CKPS-01

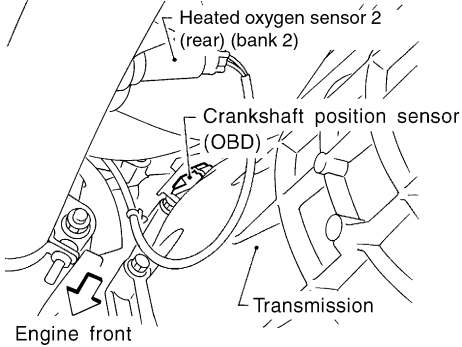


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Diagnostic Procedure

NGEC1371

1	RETIGHTEN GROUND SCREWS
<p>1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.</p> <div style="text-align: center;">  </div>	
<small>LEC657</small>	
▶ GO TO 2.	

2	CHECK CKPS (OBD) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT						
<p>1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.</p> <div style="text-align: center;">  </div>							
<small>WEC549</small>							
<p>2. Check continuity between ECM terminal 47 and CKPS (OBD) terminal 2. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>							
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; border-right: 1px solid black;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 4.</td> </tr> <tr> <td style="border-right: 1px solid black;">NG</td> <td style="text-align: center;">▶</td> <td>GO TO 3.</td> </tr> </table>		OK	▶	GO TO 4.	NG	▶	GO TO 3.
OK	▶	GO TO 4.					
NG	▶	GO TO 3.					

3	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Harness for open or short between ECM and crankshaft position sensor (OBD) 	
▶ Repair open circuit or short to ground or short to power in harness or connectors.	

DTC P1336 CKP SENSOR (OBD)

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Diagnostic Procedure (Cont'd)

4	CHECK CKPS (OBD) GROUND CIRCUIT FOR OPEN AND SHORT	
1. Reconnect ECM harness connectors. 2. Check harness continuity between CKPS (OBD) terminal 1 and engine ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power. <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Joint connector-4 (if equipped) ● Harness for open between crankshaft position sensor (OBD) and ECM 		
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK IMPROPER INSTALLATION	
1. Loosen and retighten the fixing bolt of the crankshaft position sensor (OBD). 2. Perform "DTC Confirmation Procedure", EC-1652 again. <p style="text-align: center;">Is a 1st trip DTC P1336 detected?</p>		
Yes	▶	GO TO 7.
No	▶	INSPECTION END

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DTC P1336 CKP SENSOR (OBD)

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Diagnostic Procedure (Cont'd)

10	CHECK GEAR TOOTH	
Visually check for chipping flywheel or drive plate gear tooth (cog).		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace the flywheel or drive plate.

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11	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.		
	▶	INSPECTION END

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On Board Diagnosis Logic

NGEC1372

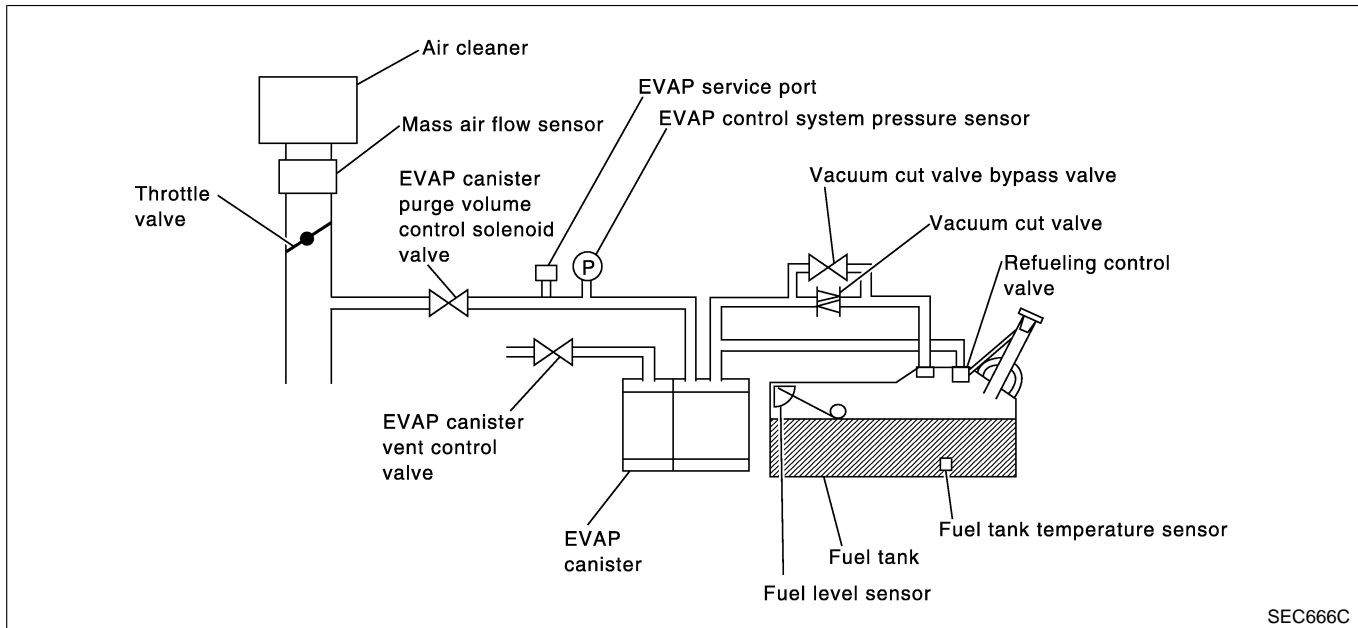
NOTE:

If DTC P1442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1679.)

This diagnosis detects leaks in the EVAP purge line using of vapor pressure in the fuel tank.

The EVAP canister vent control valve is closed to shut the EVAP purge line. The vacuum cut valve bypass valve will then be opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP control system pressure sensor can now monitor the pressure inside the fuel tank.

If pressure increases, the PCM will check for leaks in the line between the vacuum cut valve and EVAP canister purge volume control solenoid valve.



SEC666C

Malfunction is detected when EVAP control system has a leak, EVAP control system does not operate properly.

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

POSSIBLE CAUSE

NGEC1372S01

- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close
- Foreign matter caught in fuel filler cap
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve
- Foreign matter caught in EVAP canister vent control valve
- EVAP canister
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent

DTC P1442 EVAP CONTROL SYSTEM

VG33ER

On Board Diagnosis Logic (Cont'd)

- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve
- Absolute pressure sensor
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged
- Water separator
- EVAP canister is saturated with water
- Fuel level sensor and the circuit
- EVAP control system pressure sensor
- Refueling control valve
- ORVR system leaks
- Foreign matter caught in EVAP canister purge volume control solenoid valve

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DTC Confirmation Procedure

Refer to "P0456, P1456 EVAP CONTROL SYSTEM (VERY SMALL LEAK) (NEGATIVE PRESSURE)", EC-1556.

NGEC1373

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Diagnostic Procedure

Refer to "P0456, P1456 EVAP CONTROL SYSTEM (VERY SMALL LEAK) (NEGATIVE PRESSURE)", EC-1556.

NGEC1374

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DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

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Description

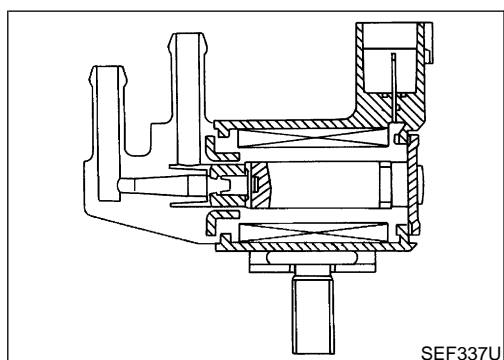
Description SYSTEM DESCRIPTION

NGEC1379

NGEC1379S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	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		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Throttle position switch	Closed throttle position		
Heated oxygen sensors 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.



COMPONENT DESCRIPTION

NGEC1379S02

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

NGEC1380

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch OFF ● Shift lever: "N" ● No-load	Idle (Vehicle stopped)
		2,000 rpm
		0%
		—

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

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ECM Terminals and Reference Value

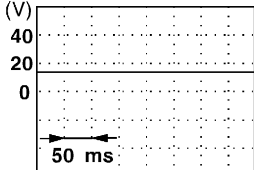
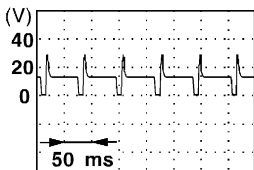
ECM Terminals and Reference Value

NGEC1381

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 the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self shut-off)	[Engine is running] [Ignition switch OFF] ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch OFF] ● A few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
5	R/Y	EVAP canister purge volume control solenoid valve	[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF994U
			[Engine is running] ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  SEF995U
67	B/P	Power supply for ECM	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC1382

Malfunction is detected when the canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.

POSSIBLE CAUSE

NGEC1382S01

- EVAP control system pressure sensor
- EVAP canister purge volume control solenoid valve (The valve is stuck open.)
- EVAP canister vent control valve
- EVAP canister

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33ER

DTC Confirmation Procedure

- Hoses
(Hoses are connected incorrectly or clogged.)

DTC Confirmation Procedure

NGEC1383

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

6	PURG VOL CN/V P1444	
	OUT OF CONDITION	
	MONITOR	
	ENG SPEED	XXX rpm
	THRTL POS SEN	XXX V
	B/FUEL SCHDL	XXX msec

SEF205Y

6	PURG VOL CN/V P1444	
	TESTING	
	MONITOR	
	ENG SPEED	XXX rpm
	THRTL POS SEN	XXX V
	B/FUEL SCHDL	XXX msec

SEF206Y

6	PURG VOL CN/V P1444	
	COMPLETED	

SEF237Y

With CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Turn ignition switch ON.
- 4) Select “PURG VOL CN/V P1444” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
- 5) Touch “START”.
- 6) Start engine and let it idle until “TESTING” on CONSULT-II changes to “COMPLETED”. (It will take for approximately 10 seconds.)

If “TESTING” is not displayed after 5 minutes, retry from step 2.

- 7) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to “Diagnostic Procedure”, EC-1664.

With GST

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch OFF and wait at least 5 seconds.
- 3) Start engine and let it idle for at least 20 seconds.
- 4) Select “MODE 7” with GST.
- 5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1664.

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

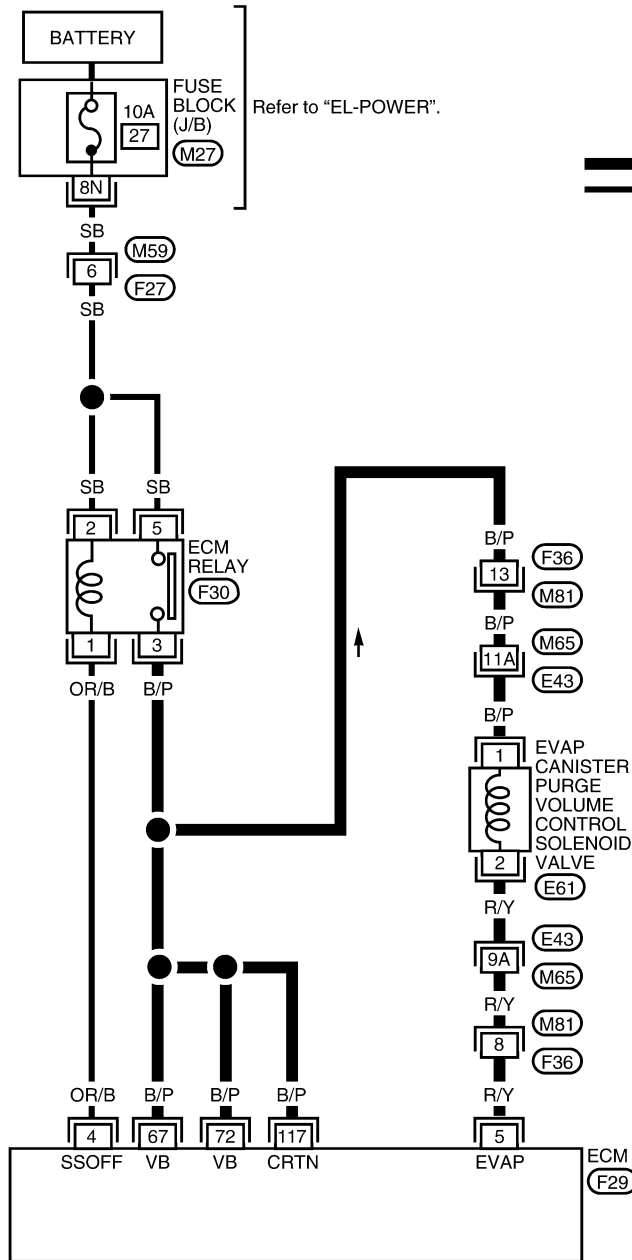
VG33ER

Wiring Diagram

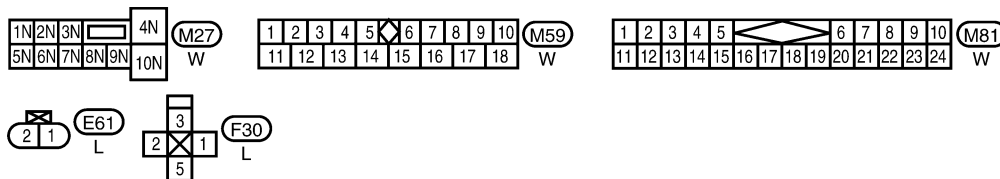
Wiring Diagram

NGEC1384

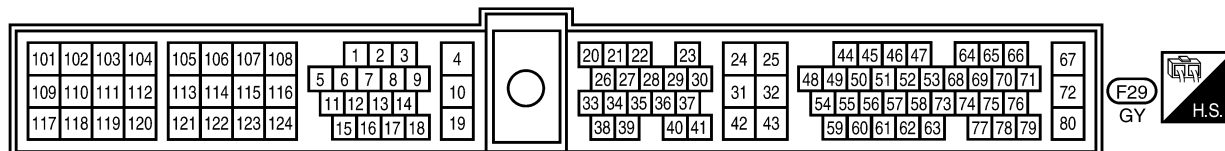
EC-PGC/V-01



: Detectable line for DTC
 : Non-detectable line for DTC



Refer to the following.
 M65, E43 - SUPER
 MULTIPLE JUNCTION (SMJ)



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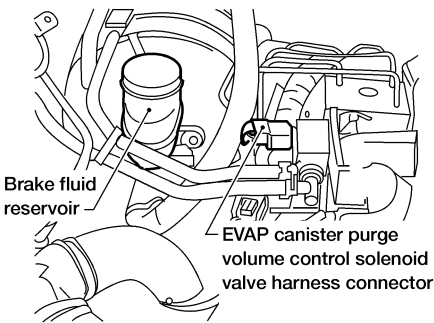
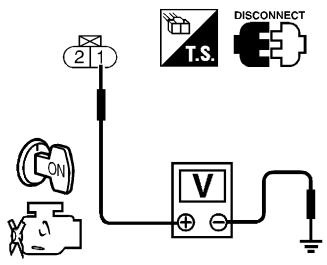
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33ER

Diagnostic Procedure

Diagnostic Procedure

NGEC1385

1	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT						
<p>1. Turn ignition switch OFF. 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.</p> <div style="text-align: center;">  <p>Brake fluid reservoir</p> <p>EVAP canister purge volume control solenoid valve harness connector</p> </div> <p>3. Turn ignition switch ON. 4. Check voltage between terminal 1 and engine ground with CONSULT-II or tester.</p> <div style="text-align: center;">  <p>Voltage: Battery voltage</p> <p>OK or NG</p> </div>							
<table border="1" style="width: 100%;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 3.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 2.</td> </tr> </table>		OK	▶	GO TO 3.	NG	▶	GO TO 2.
OK	▶	GO TO 3.					
NG	▶	GO TO 2.					

AEC652A

SEF646W

2	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F36, M81 ● Harness connectors M65, E43 ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay ● 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						
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 5 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>							
<table border="1" style="width: 100%;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 5.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 4.</td> </tr> </table>		OK	▶	GO TO 5.	NG	▶	GO TO 4.
OK	▶	GO TO 5.					
NG	▶	GO TO 4.					

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33ER

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M81, F36 ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM 		
▶	Repair open circuit or short to ground or short to power in harness or connectors.	

GI

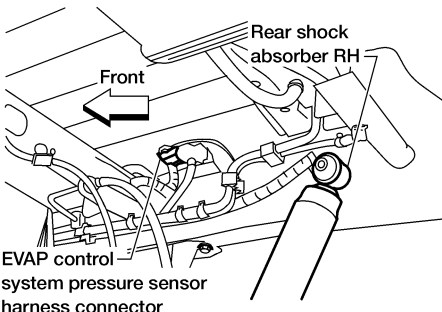
MA

EM

5	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Repair it.

LC

EC

6	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR	
1. Disconnect EVAP control system pressure sensor harness connector.		
 <p style="text-align: center;">Rear shock absorber RH Front EVAP control system pressure sensor harness connector</p>		
AEC651A		
2. Check connectors for water. Water should not exist.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Replace EVAP control system pressure sensor.

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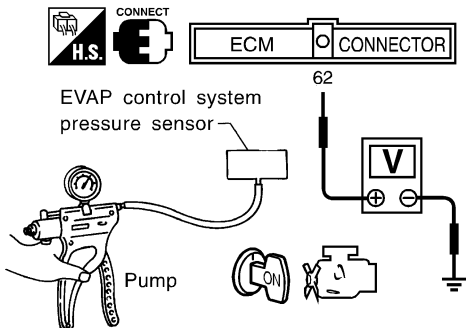
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33ER

Diagnostic Procedure (Cont'd)

7 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch ON.
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
5. Check input voltage between ECM terminal 62 and ground.



Applied vacuum	Voltage V
Not applied	1.8 - 4.8
-26.7 kPa (-200 mmHg, -7.87 inHg)	1.0 to 1.4V lower than above value

SEC649C

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.
- Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK (with CONSULT-II) ▶	GO TO 8.
OK (without CONSULT-II) ▶	GO TO 9.
NG ▶	Replace EVAP control system pressure sensor.

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33ER

Diagnostic Procedure (Cont'd)

8 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

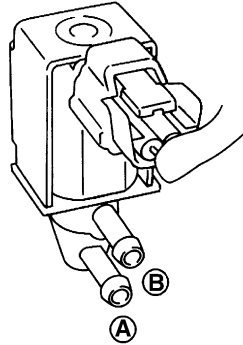
With CONSULT-II

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

If OK, inspection end. If NG, go to following step.

3. Check air passage continuity.



Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

If NG, replace the EVAP canister purge volume control solenoid valve.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP canister purge volume control solenoid valve.


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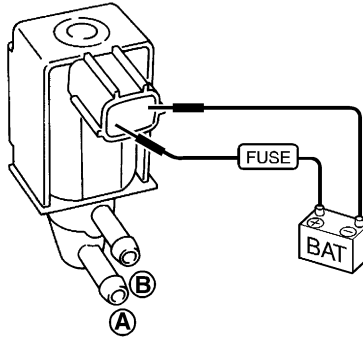
DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33ER

Diagnostic Procedure (Cont'd)

9 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

 **Without CONSULT-II**
Check air passage continuity.



SEF661U

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

MTBL0242

If NG, replace the EVAP canister purge volume control solenoid valve.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33ER

Diagnostic Procedure (Cont'd)

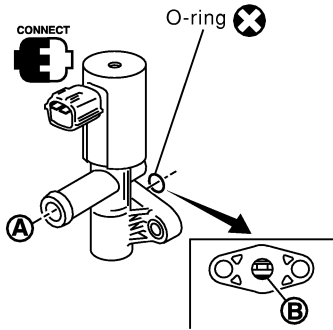
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10 CHECK EVAP CANISTER VENT CONTROL VALVE

Check air passage continuity.

With CONSULT-II

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

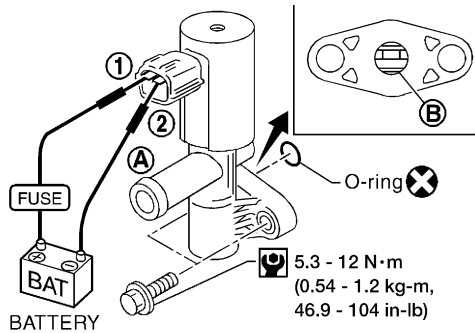
SEF991Y

Without CONSULT-II

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.



AEC783A

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP canister vent control valve.

11 CHECK RUBBER TUBE

Check for obstructed rubber tube connected to EVAP canister vent control valve.

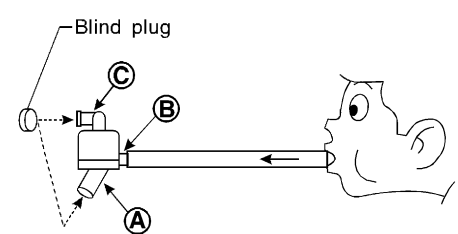
OK or NG

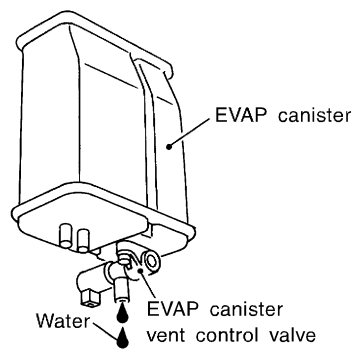
OK	▶	GO TO 12.
NG	▶	Clean, repair or replace rubber tube.

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33ER

Diagnostic Procedure (Cont'd)

12	CHECK WATER SEPARATOR						
<p>1. Check visually for insect nests in the water separator air inlet. 2. Check visually for cracks or flaws in the appearance. 3. Check visually for cracks or flaws in the hose. 4. Check that A and C are not clogged by blowing air into B with A, and then C plugged.</p> <div style="text-align: center;">  <p>* (A) : Bottom hole (To atmosphere) * (B) : Emergency tube (From EVAP canister) * (C) : Inlet port (To member)</p> </div> <p style="text-align: right;">SEF829T</p> <p>5. In case of NG in items 2 - 4, replace the parts. NOTE: • Do not disassemble water separator.</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 13.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace water separator.</td> </tr> </table>		OK	▶	GO TO 13.	NG	▶	Replace water separator.
OK	▶	GO TO 13.					
NG	▶	Replace water separator.					

13	CHECK IF EVAP CANISTER SATURATED WITH WATER						
<p>1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister.</p> <div style="text-align: center;">  <p style="text-align: right;">SEF596U</p> <p style="text-align: center;">Yes or No</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Yes</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 14.</td> </tr> <tr> <td>No</td> <td style="text-align: center;">▶</td> <td>GO TO 16.</td> </tr> </table> </div>		Yes	▶	GO TO 14.	No	▶	GO TO 16.
Yes	▶	GO TO 14.					
No	▶	GO TO 16.					

14	CHECK EVAP CANISTER						
<p>Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 16.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 15.</td> </tr> </table>		OK	▶	GO TO 16.	NG	▶	GO TO 15.
OK	▶	GO TO 16.					
NG	▶	GO TO 15.					

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

VG33ER

Diagnostic Procedure (Cont'd)

15	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● EVAP canister for damage● EVAP hose between EVAP canister and water separator for clogging or poor connection	
▶	Repair hose or replace EVAP canister.

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16	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.	
▶	INSPECTION END

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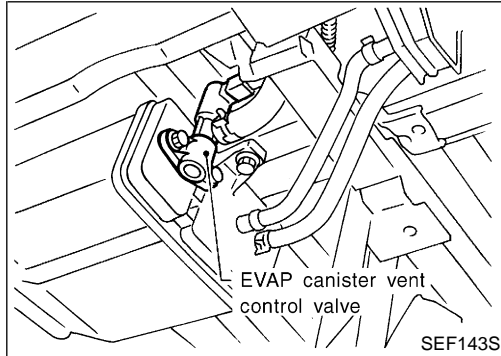
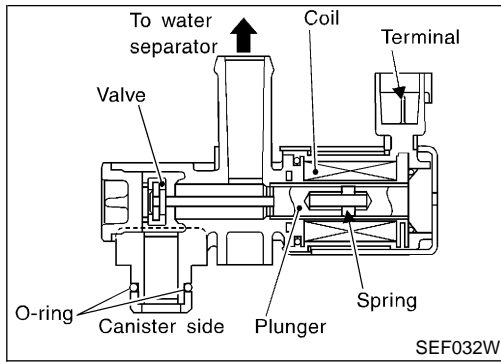
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Component Description



Component Description

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent. NGEC1386

This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values. NGEC1387

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. NGEC1388

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

Malfunction is detected when EVAP canister vent control valve remains closed under specified driving conditions. =NGEC1389

POSSIBLE CAUSE

- EVAP canister vent control valve NGEC1389S01
- EVAP control system pressure sensor and the circuit
- Blocked rubber tube to EVAP canister vent control valve
- Water separator
- EVAP canister is saturated with water.

4	DATA MONITOR	
	MONITOR	NO DTC
	ENG SPEED	XXX rpm
	COOLAN TEMP/S	XXX °C
	VHCL SPEED SE	XXX km/h
	THRTL POS SEN	XXX V
	B/FUEL SCHDL	XXX msec

SEF201Y

DTC Confirmation Procedure

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 5 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.
- 4) Drive vehicle at a speed of approximately 80 km/h (50 MPH) for a maximum of 15 minutes.

NOTE:

If a malfunction exists, NG result may be displayed quicker.

- 5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1675.

Ⓜ With GST

Follow the procedure "With CONSULT-II".

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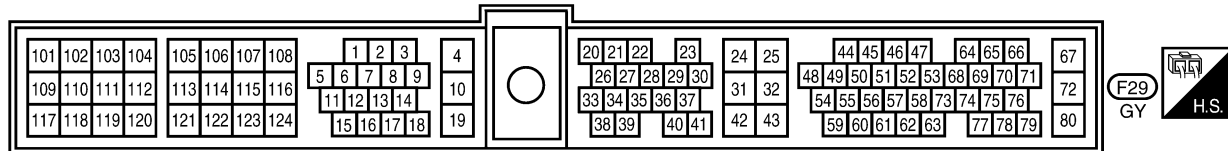
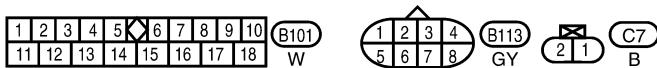
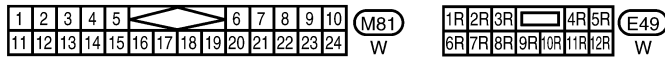
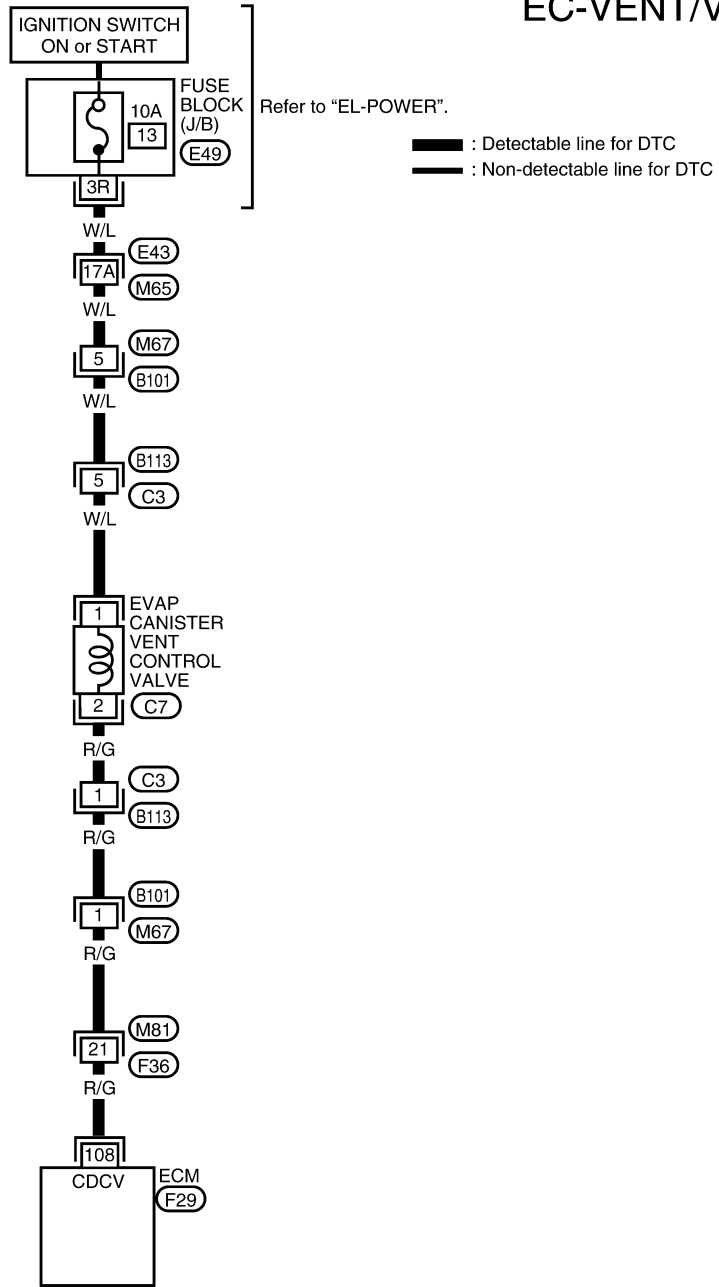
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Wiring Diagram

NGEC1391

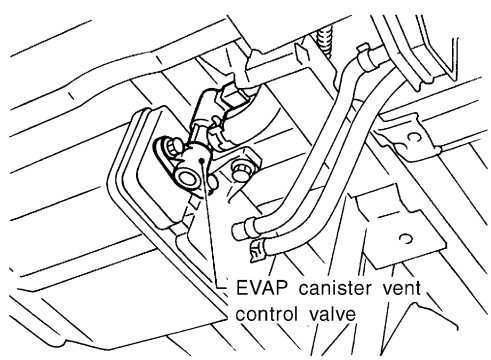
EC-VENT/V-01



Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)

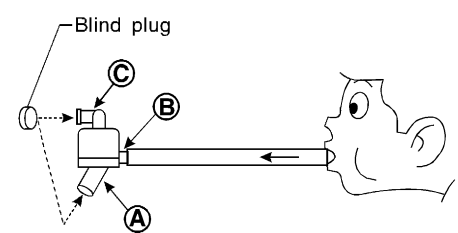
Diagnostic Procedure

NGEC1392

1	CHECK RUBBER TUBE	<p>1. Turn ignition switch OFF.</p> <p>2. Check obstructed rubber tube connected to EVAP canister vent control valve.</p> <div style="text-align: center;">  <p>EVAP canister vent control valve</p> </div> <p style="text-align: right;">SEF143S</p> <p style="text-align: center;">OK or NG</p>	
OK	▶	GO TO 2.	
NG	▶	Clean, repair or replace rubber tube.	

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2	CHECK WATER SEPARATOR	<p>1. Check visually for insect nests in the water separator air inlet.</p> <p>2. Check visually for cracks or flaws in the appearance.</p> <p>3. Check visually for cracks or flaws in the hose.</p> <p>4. Check that A and C are not clogged by blowing air into B with A, and then C plugged.</p> <div style="text-align: center;">  <p>Blind plug</p> </div> <p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p> <p style="text-align: right;">SEF829T</p> <p>5. In case of NG in items 2 - 4, replace the parts.</p> <p>NOTE:</p> <ul style="list-style-type: none"> Do not disassemble water separator. <p style="text-align: center;">OK or NG</p>	
OK	▶	GO TO 3.	
NG	▶	Replace water separator.	

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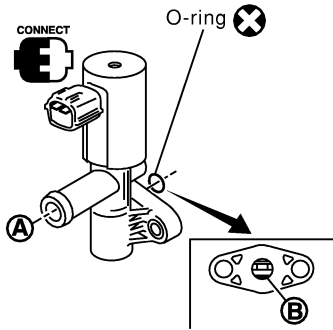
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3 CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

Check air passage continuity.

With CONSULT-II

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

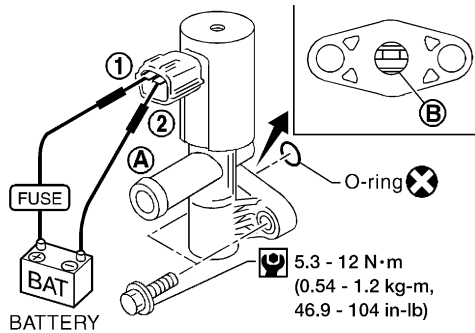
SEF991Y

Without CONSULT-II

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.

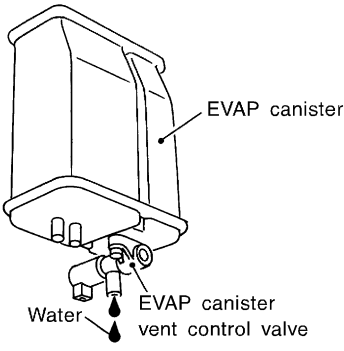


AEC783A

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace EVAP canister vent control valve and O-ring.

4	CHECK IF EVAP CANISTER SATURATED WITH WATER	
<p>1. Remove EVAP canister with EVAP canister vent control valve attached.</p> <p>2. Check if water will drain from the EVAP canister.</p>		
		
SEF596U		
Yes or No		
Yes	▶	GO TO 5.
No	▶	GO TO 7.

GI
MA
EM
LC
EC

FE
CL

5	CHECK EVAP CANISTER	
<p>Weigh the EVAP canister with the EVAP canister vent control valve attached.</p> <p>The weight should be less than 1.8 kg (4.0 lb).</p>		
OK or NG		
OK	▶	GO TO 7.
NG	▶	GO TO 6.

MT
AT

TF

6	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 		
▶		Repair hose or replace EVAP canister.

PD
AX

SU

7	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	
<p>Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.</p>		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Repair it.

BR
ST

RS

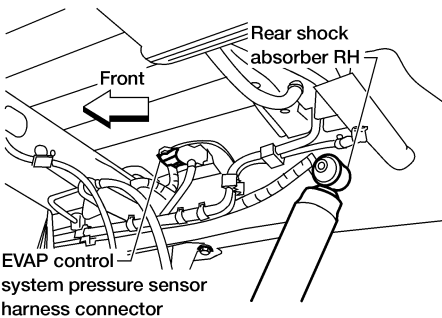
BT

HA

SC

EL

IDX

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR	
<p>1. Disconnect EVAP control system pressure sensor harness connector.</p> <div style="text-align: center;">  </div>		
<p>2. Check connectors for water. Water should not exist.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 9.
NG	▶	Replace EVAP control system pressure sensor.

AEC651A

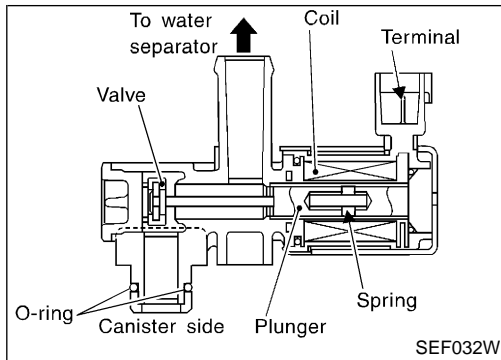
9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION	
<p>Refer to "DTC Confirmation Procedure" for DTC P0452, or P0453, EC-1533.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor.

10	CHECK INTERMITTENT INCIDENT	
<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.</p>		
	▶	INSPECTION END

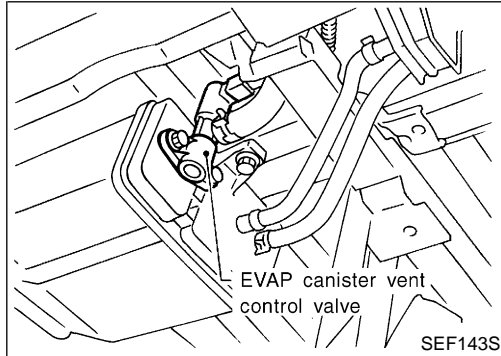
DTC P1448 EVAP CANISTER VENT CONTROL VALVE

VG33ER

Component Description



SEF032W



SEF143S

Component Description

NGEC1398

NOTE:

If DTC P1448 is displayed with P0442, perform trouble diagnosis for DTC P1448 first.

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

GI
MA
EM
LC
EC
FE
CL
MT

CONSULT-II Reference Value in Data Monitor Mode

NGEC1399

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

TF
PD

ECM Terminals and Reference Value

NGEC1400

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 the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)

AX
SU
BR
ST

On Board Diagnosis Logic

NGEC1401

Malfunction is detected when EVAP canister vent control valve remains opened under specified driving conditions.

POSSIBLE CAUSE

NGEC1401S01

- EVAP canister vent control valve
- EVAP control system pressure sensor and circuit
- Blocked rubber tube to EVAP canister vent control valve
- Water separator
- EVAP canister is saturated with water.
- Vacuum cut valve

RS
BT
HA
SC
EL
IDX

DTC Confirmation Procedure

NGEC1402

NOTE:

- If DTC P1448 is displayed with P0442, perform trouble diagnosis for DTC P1448 first.
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

EVAP SML LEAK P0442/P1442

1)FOR BEST RSLT,PERFORM AT FOLLOWING CONDITIONS.
 -FUEL LEVEL: 1/4-3/4
 -AMBIENT TEMP: 0-30 C(32-86F)
 -OPEN ENGINE HOOD.
 2)START ENG WITH VHCL STOPPED. IF ENG IS ON,STOP FOR 5 SEC. THEN RESTART.
 3)TOUCH START.

SEC716C

EVAP SML LEAK P0442/P1442

WAIT
2 TO 10 MINUTES.
KEEP ENGINE RUNNING
AT IDLE SPEED.

SEC717C

EVAP SML LEAK P0442/P1442

OK

SELF-DIAG RESULTS

NO DTC DETECTED.
FURTHER TESTING
MAY BE REQUIRED.

SEC719C

ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

CONNECT O-ring

SEF013Z

With CONSULT-II

TESTING CONDITION:

- Perform “DTC WORK SUPPORT” when the fuel level is less than 3/4 full and vehicle is placed on flat level surface.
 - Always perform test at a temperature of 0 to 30°C (32 to 86°F).
 - It is better that the fuel level is low.
- 1) Turn ignition switch ON.
 - 2) Turn ignition switch OFF and wait at least 5 seconds.
 - 3) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
 - 4) Make sure that the following conditions are met.

COOLAN TEMP/S	0 - 32°C (32 - 90°F)
INT/A TEMP SE	More than 0°C (32°F)

- 5) Select “EVAP SML LEAK P0442” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II. Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to “Basic Inspection”, EC-1273.

- 6) Make sure that “OK” is displayed.
If “NG” is displayed, go to the following step.

NOTE:

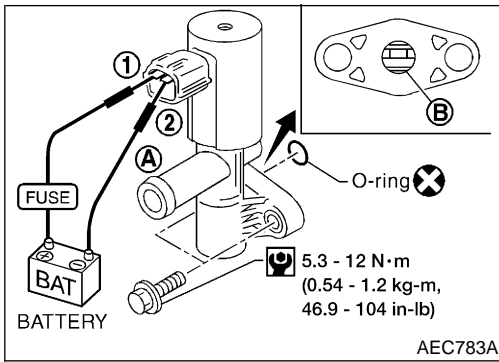
Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

- 7) Stop engine and wait at least 5 seconds, then turn ON.
- 8) Disconnect hose from water separator.
- 9) Select “VENT CONTROL/V” of “ACTIVE TEST” mode with CONSULT-II.
- 10) Touch ON and OFF alternately.

- 11) Make sure the following.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

If the result is NG, go to “Diagnostic Procedure”, EC-1683.
If the result is OK, go to “Diagnostic Procedure” for DTC P0442, EC-1505.



Overall Function Check

NGEC1403

Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Disconnect hose from water separator.
- 2) Disconnect EVAP canister vent control valve harness connector.
- 3) Verify the following.

Condition	Air passage continuity
12V direct current supply between terminals 1 and 2	No
No supply	Yes

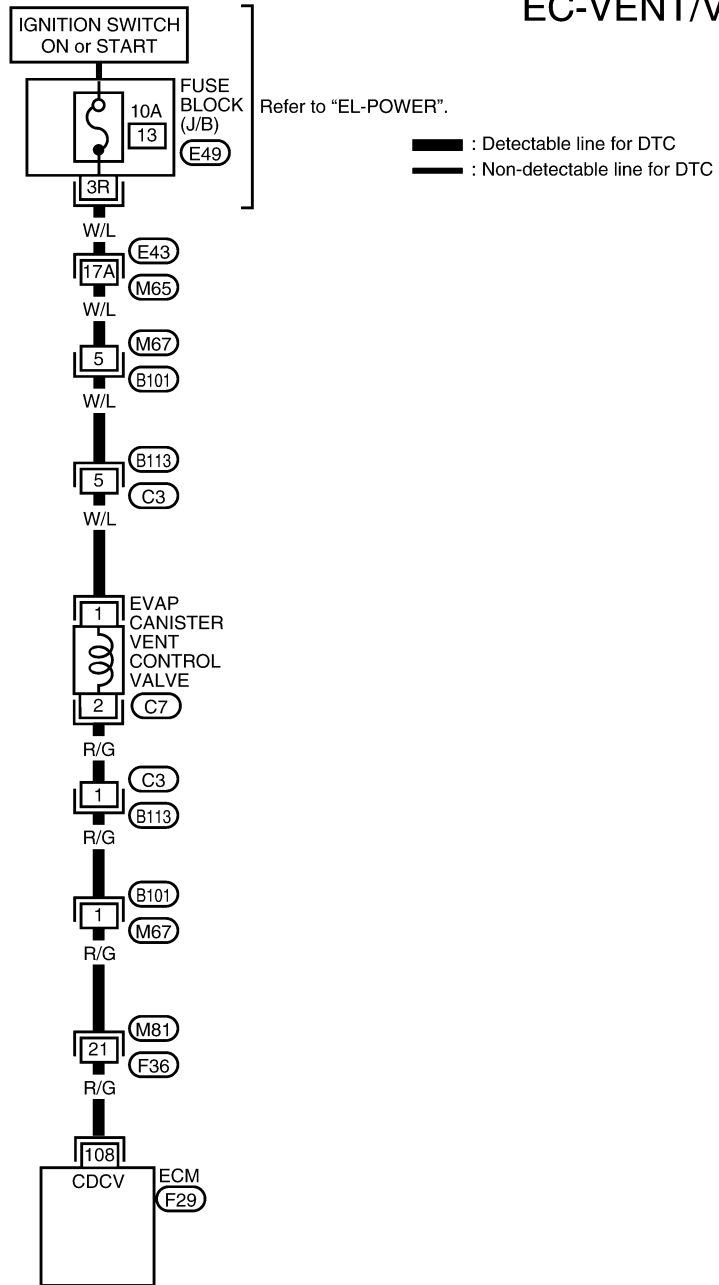
If the result is NG, go to "Diagnostic Procedure", EC-1683.
 If the result is OK, go to "Diagnostic Procedure" for DTC P0442, EC-1505.

GI
 MA
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 RS
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 HA
 SC
 EL
 IDX

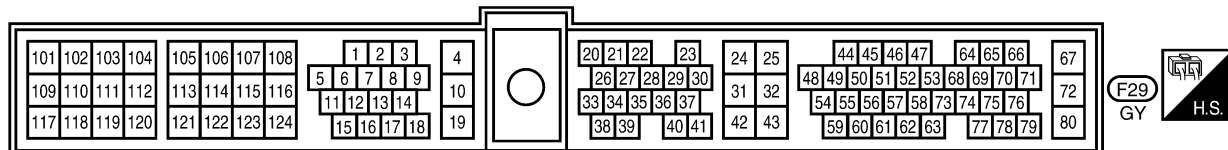
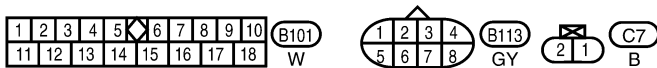
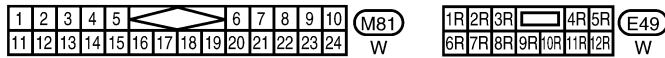
Wiring Diagram

NGEC1404

EC-VENT/V-01



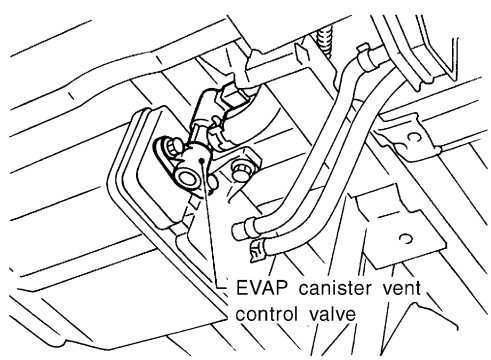
Refer to "EL-POWER".
 — : Detectable line for DTC
 — : Non-detectable line for DTC



Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)

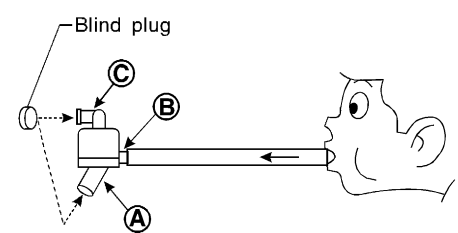
Diagnostic Procedure

NGEC1405

1	CHECK RUBBER TUBE	<p>1. Turn ignition switch OFF.</p> <p>2. Check obstructed rubber tube connected to EVAP canister vent control valve.</p> <div style="text-align: center;">  <p>EVAP canister vent control valve</p> </div> <p style="text-align: right;">SEF143S</p>	
OK or NG			
OK	▶	GO TO 2.	
NG	▶	Clean, repair or replace rubber tube.	

GI
MA
EM
LC
EC

FE
CL

2	CHECK WATER SEPARATOR	<p>1. Check visually for insect nests in the water separator air inlet.</p> <p>2. Check visually for cracks or flaws in the appearance.</p> <p>3. Check visually for cracks or flaws in the hose.</p> <p>4. Check that A and C are not clogged by blowing air into B with A, and then C plugged.</p> <div style="text-align: center;">  <p>Blind plug</p> </div> <p>* (A) : Bottom hole (To atmosphere) (B) : Emergency tube (From EVAP canister) (C) : Inlet port (To member)</p> <p style="text-align: right;">SEF829T</p>	
OK or NG			
OK	▶	GO TO 3.	
NG	▶	Replace water separator.	

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RS

BT

HA

SC

EL

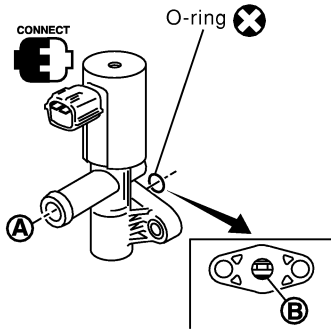
IDX

3 CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

Check air passage continuity.

With CONSULT-II

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

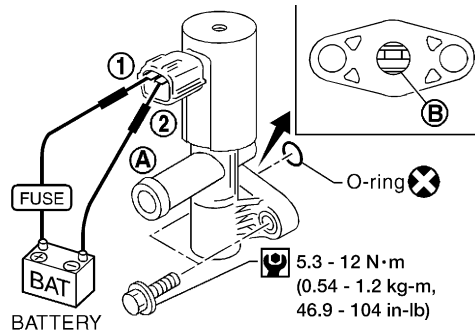
SEF991Y

Without CONSULT-II

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.

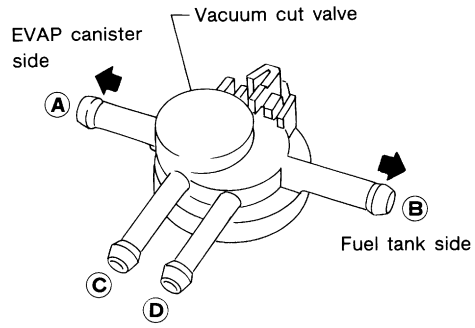


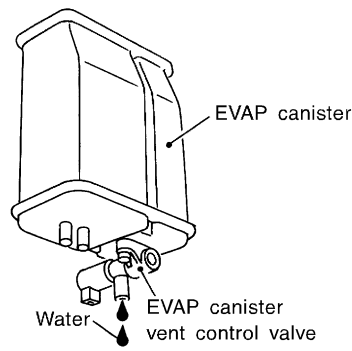
AEC783A

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace EVAP canister vent control valve and O-ring.

4	CHECK VACUUM CUT VALVE	<p>Check vacuum cut valve as follows:</p> <div style="text-align: center;">  </div> <ol style="list-style-type: none"> 1. Plug port C and D with fingers. 2. Apply vacuum to port A and check that there is no suction from port B. 3. Apply vacuum to port B and check that there is suction from port A. 4. Blow air in port B and check that there is a resistance to flow out of port A. 5. Open port C and D. 6. Blow air in port A check that air flows freely out of port C. 7. Blow air in port B check that air flows freely out of port D. <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 5.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace vacuum cut valve.</td> </tr> </table>	OK	▶	GO TO 5.	NG	▶	Replace vacuum cut valve.	<p>GI</p> <p>MA</p> <p>EM</p> <p>LC</p> <p>EC</p> <p>FE</p> <p>CL</p> <p>MT</p> <p>AT</p>
OK	▶	GO TO 5.							
NG	▶	Replace vacuum cut valve.							

5	CHECK IF EVAP CANISTER SATURATED WITH WATER	<ol style="list-style-type: none"> 1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister. <div style="text-align: center;">  </div> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 6.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>GO TO 8.</td> </tr> </table>	OK	▶	GO TO 6.	NG	▶	GO TO 8.	<p>TF</p> <p>PD</p> <p>AX</p> <p>SU</p> <p>BR</p> <p>ST</p> <p>RS</p>
OK	▶	GO TO 6.							
NG	▶	GO TO 8.							

6	CHECK EVAP CANISTER	<p>Weigh the EVAP canister with the EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).</p> <p style="text-align: center;">OK or NG</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">OK</td> <td style="width: 10%; text-align: center;">▶</td> <td>GO TO 8.</td> </tr> <tr> <td>NG</td> <td style="text-align: center;">▶</td> <td>Replace the EVAP canister.</td> </tr> </table>	OK	▶	GO TO 8.	NG	▶	Replace the EVAP canister.	<p>BT</p> <p>HA</p> <p>SC</p> <p>EL</p> <p>IDX</p>
OK	▶	GO TO 8.							
NG	▶	Replace the EVAP canister.							

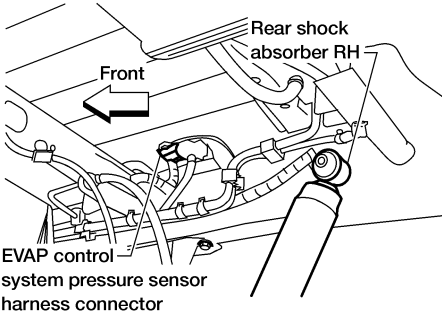
DTC P1448 EVAP CANISTER VENT CONTROL VALVE

VG33ER

Diagnostic Procedure (Cont'd)

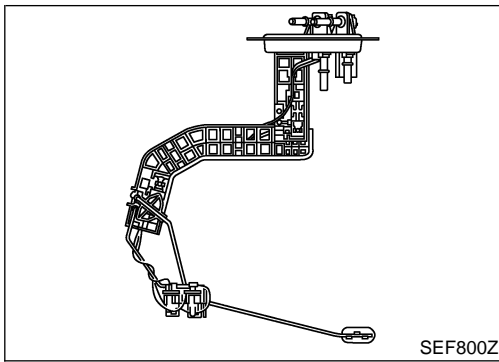
7	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection 	
▶	Repair hose or replace EVAP canister.

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.	
OK or NG	
OK	▶ GO TO 9.
NG	▶ Repair it.

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR
1. Disconnect EVAP control system pressure sensor harness connector.	
 <p style="text-align: center;">EVAP control system pressure sensor harness connector</p>	
AEC651A	
2. Check connectors for water. Water should not exist.	
OK or NG	
OK	▶ GO TO 10.
NG	▶ Replace EVAP control system pressure sensor.

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION
Refer to "DTC Confirmation Procedure" for DTC P0452, P0453, EC-1533.	
OK or NG	
OK	▶ GO TO 11.
NG	▶ Replace EVAP control system pressure sensor.

11	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.	
▶	INSPECTION END



Component Description

The fuel level sensor is mounted in the fuel level sensor unit. ^{NGEC1406} The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM. GI

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float. MA

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. EM

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground. LC

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	OR/B	Fuel level sensor	[Ignition switch "ON"]	Approximately 0 - 4.8V Output voltage varies with fuel level.
66	B	Fuel level sensor ground	[Engine is running] ● Idle speed	Approximately 0V

On Board Diagnosis Logic

ECM receives two signals from the fuel level sensor. ^{NGEC1408} One is fuel level sensor power supply circuit, and the other is fuel level sensor ground circuit. SU

This diagnosis indicates the latter to detect open circuit malfunction. Malfunction is detected when a high voltage from the sensor is sent to ECM. BR

POSSIBLE CAUSE

- Fuel level sensor circuit (The fuel level sensor circuit is open or shorted.) ST

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test. RS

DTC P1464 FUEL LEVEL SENSOR

VG33ER

DTC Confirmation Procedure (Cont'd)

3	DATA MONITOR	
	MONITOR	NO DTC
	FUEL T/TMP SE	XXX °C
	FUEL LEVEL SE	XXX V

SEF195Y

WITH CONSULT-II

NGEC1409S01

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1690.

WITH GST

NGEC1409S02

Follow the procedure "WITH CONSULT-II" above.

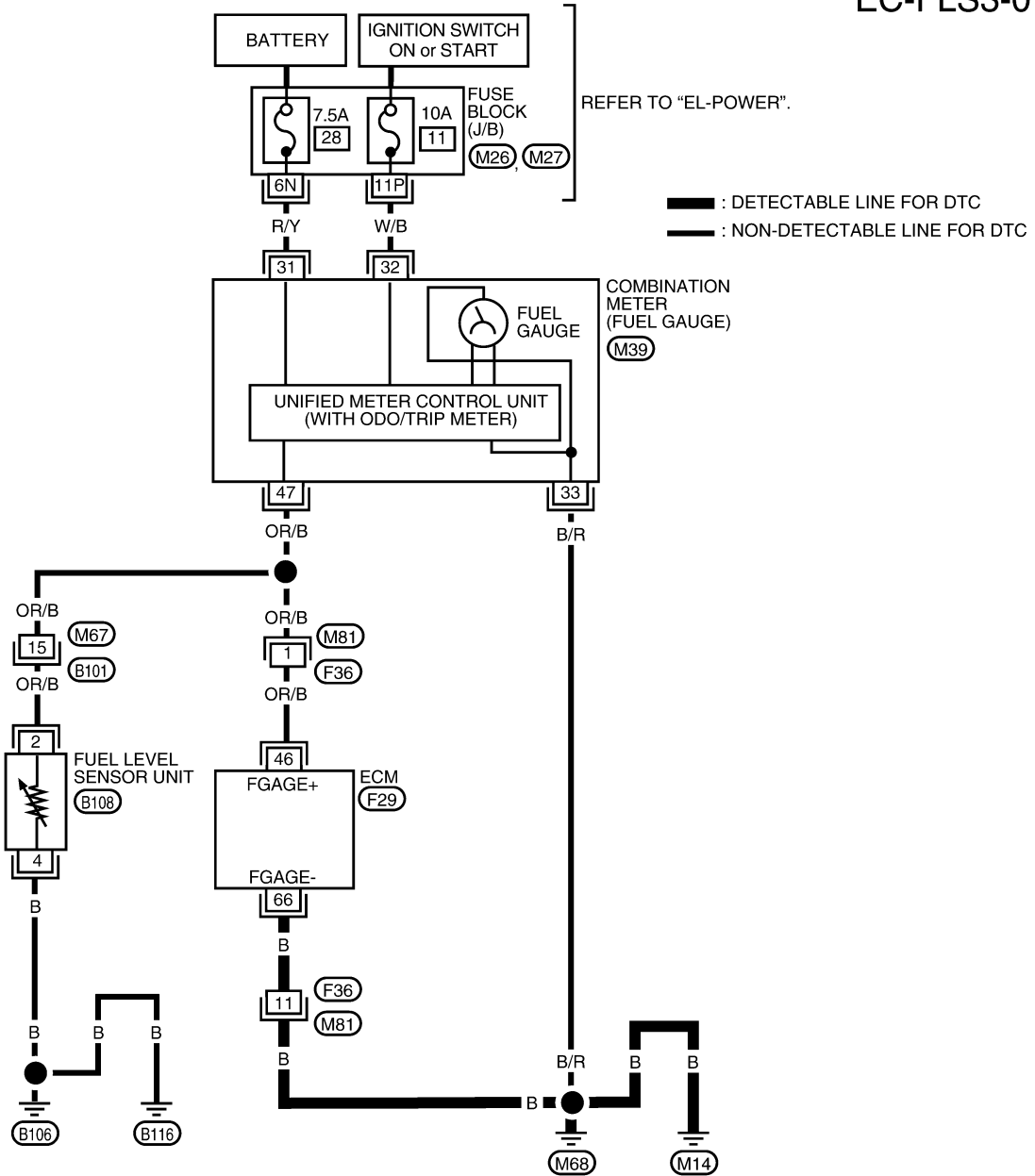
DTC P1464 FUEL LEVEL SENSOR

VG33ER
Wiring Diagram

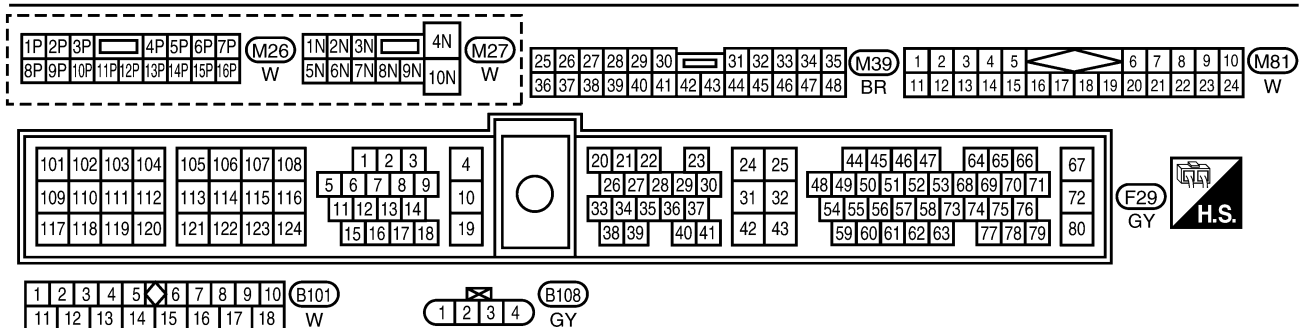
Wiring Diagram

NGEC1410

EC-FLS3-01



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WEC998

Diagnostic Procedure

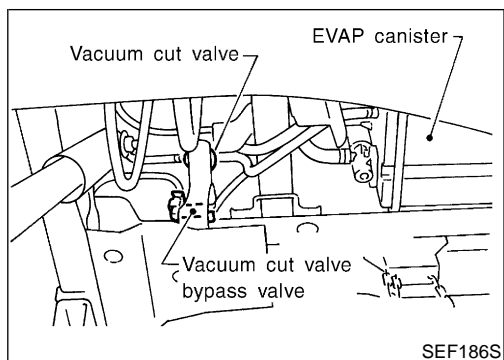
=NGEC1411

1	CHECK FUEL LEVEL 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 body 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	
	1. Check the following. <ul style="list-style-type: none"> ● Harness connectors F36, M81 ● Harness for open and short between ECM and body ground 	
	▶	Replace open circuit or short to power in harness or connectors.

3	CHECK FUEL LEVEL SENSOR	
	Refer to EL-89 , "FUEL LEVEL SENSOR UNIT CHECK".	
	OK or NG	
	OK ▶	GO TO 4.
	NG ▶	Replace fuel level sensor unit.

4	CHECK INTERMITTENT INCIDENT	
	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312	
	OK or NG	
	▶	INSPECTION END



Description

COMPONENT DESCRIPTION

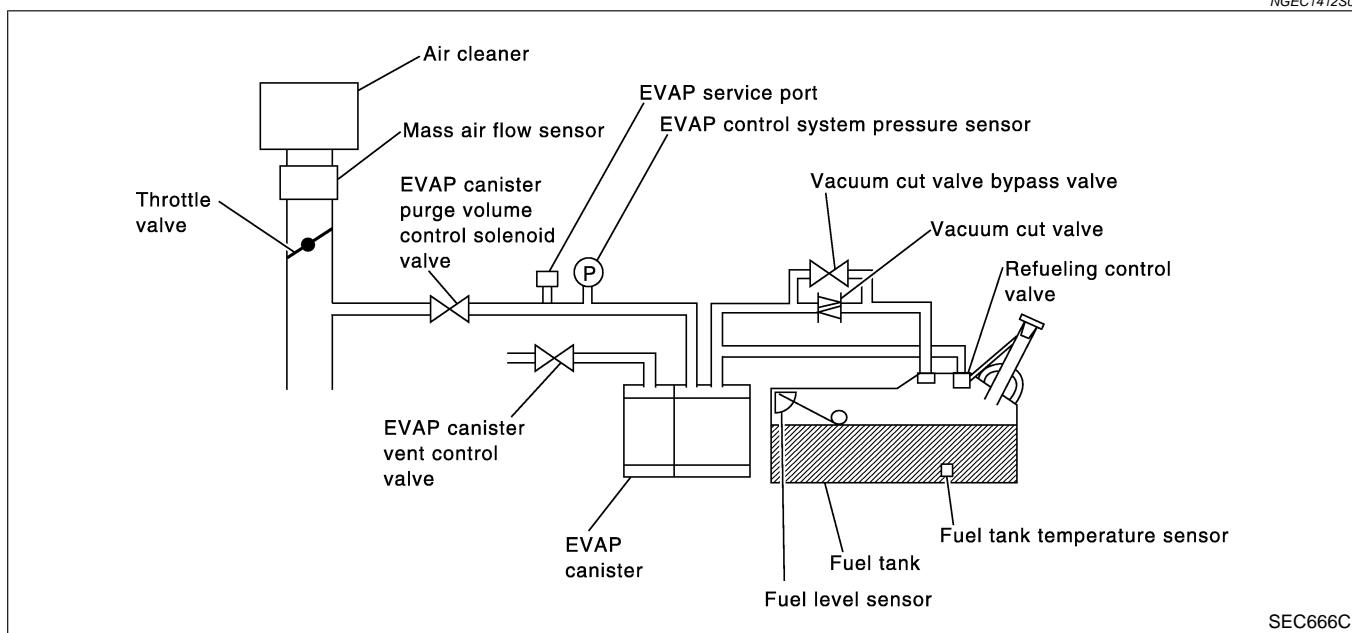
The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.

The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.

The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened. The vacuum cut valve is then bypassed to apply intake manifold vacuum to the fuel tank.

EVAPORATIVE EMISSION SYSTEM DIAGRAM



CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	● Ignition switch: ON	OFF

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
120	P/B	Vacuum cut valve bypass valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

Malfunction is detected when an improper voltage signal is sent to ECM through vacuum cut valve bypass valve. NGEC1415

POSSIBLE CAUSE

- Harness or connectors
(The vacuum cut valve bypass valve circuit is open or shorted.)
- Vacuum cut valve bypass valve

NGEC1415S01

DTC Confirmation Procedure

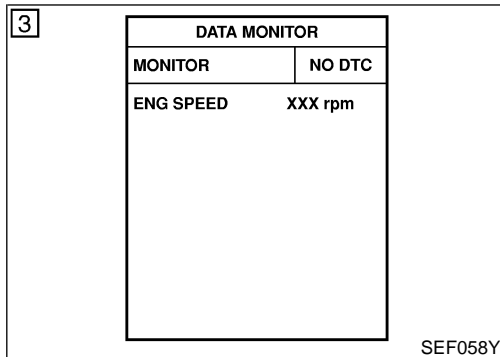
NGEC1416

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle speed.



④ 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 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1694.

⑤ With GST

Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC1417

EC-BYPS/V-01

GI

MA

EM

LC

EC

FE

CL

MT

AT

TF

PD

AX

SU

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RS

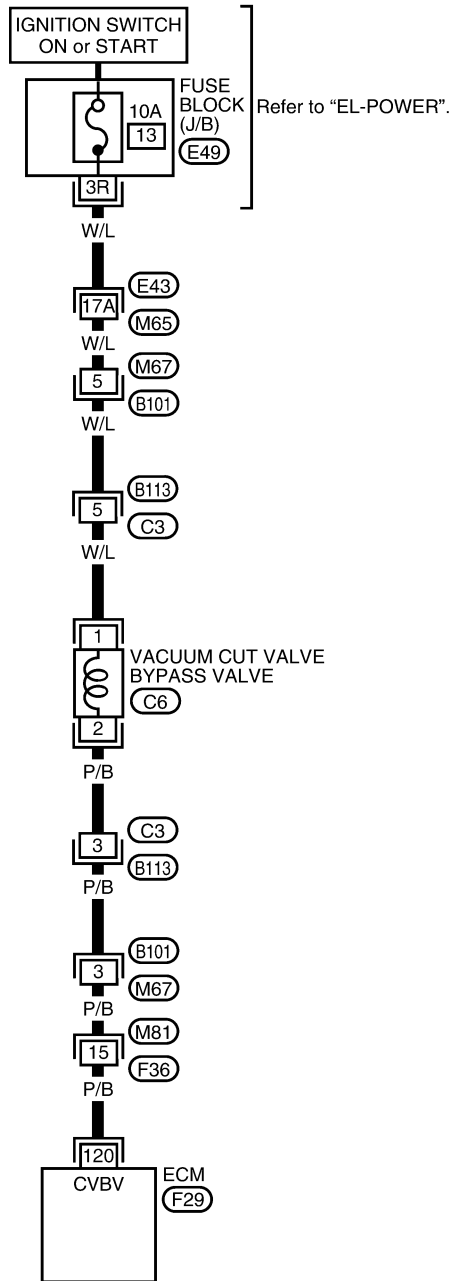
BT

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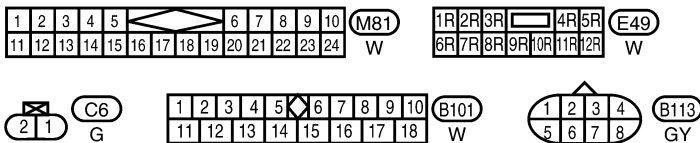
SC

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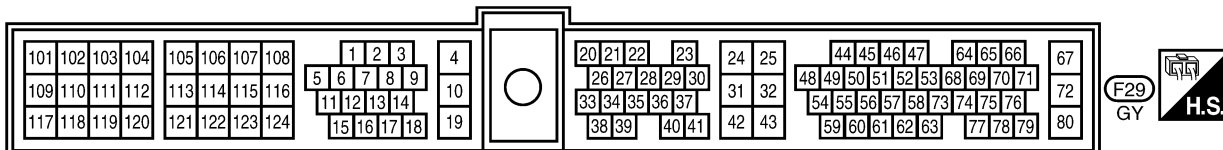
IDX



Refer to "EL-POWER".
 — : Detectable line for DTC
 — : Non-detectable line for DTC



Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



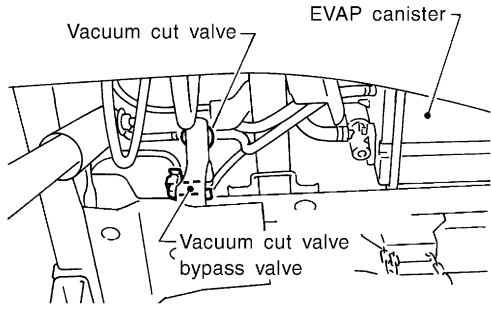
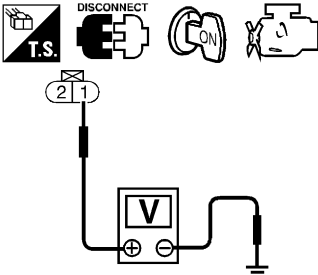
Diagnostic Procedure

NGEC1418

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK VACUUM CUT VALVE BYPASS VALVE CIRCUIT																					
<p> With CONSULT-II 1. Turn ignition switch "OFF" and then "ON". 2. Select "VC/V BYPASS/V" in "ACTIVE TEST" mode with CONSULT-II. 3. Touch "ON/OFF" on CONSULT-II screen. </p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <td style="font-size: small;">VC/V BYPASS/V</td> <td style="font-size: small;">OFF</td> </tr> <tr> <th colspan="2">MONITOR</th> </tr> <tr> <td style="font-size: small;">ENG SPEED</td> <td style="font-size: small;">XXX rpm</td> </tr> <tr> <td style="font-size: small;">A/F ALPHA-B1</td> <td style="font-size: small;">XXX %</td> </tr> <tr> <td style="font-size: small;">A/F ALPHA-B2</td> <td style="font-size: small;">XXX %</td> </tr> <tr> <td style="font-size: small;">HO2S1 MNTR (B1)</td> <td style="font-size: small;">LEAN</td> </tr> <tr> <td style="font-size: small;">HO2S1 MNTR (B2)</td> <td style="font-size: small;">LEAN</td> </tr> <tr> <td style="font-size: small;">THRTL POS SEN</td> <td style="font-size: small;">XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>			ACTIVE TEST		VC/V BYPASS/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V		
ACTIVE TEST																						
VC/V BYPASS/V	OFF																					
MONITOR																						
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A/F ALPHA-B1	XXX %																					
A/F ALPHA-B2	XXX %																					
HO2S1 MNTR (B1)	LEAN																					
HO2S1 MNTR (B2)	LEAN																					
THRTL POS SEN	XXX V																					
<p>4. Make sure that clicking sound is heard from the vacuum cut valve bypass valve.</p>																						
OK or NG																						
OK	▶	GO TO 7.																				
NG	▶	GO TO 3.																				

SEF014Z

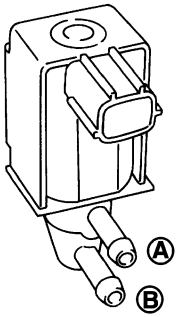
3	CHECK VACUUM CUT VALVE BYPASS VALVE POWER SUPPLY CIRCUIT
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Disconnect vacuum cut valve bypass valve harness connector. 	
	
SEF186S	
<ol style="list-style-type: none"> 3. Turn ignition switch "ON". 4. Check voltage between terminal 1 and ground with CONSULT-II or tester. 	
	
<p>Voltage: Battery voltage</p> <p>OK or NG</p>	
SEF659W	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

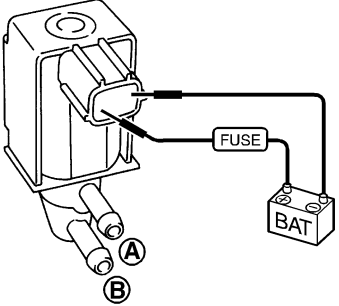
4	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M67, C101 and B113, C3 ● Fuse block (J/B) connector E49 ● 10A fuse ● Harness for open or short between vacuum cut valve bypass valve and fuse 	
▶ Repair harness or connectors.	

5	CHECK VACUUM CUT VALVE BYPASS VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
<ol style="list-style-type: none"> 1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 120 and vacuum cut valve bypass valve terminal 2. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to ground and short to power. 	
OK or NG	
OK	▶ GO TO 7.
NG	▶ GO TO 6.

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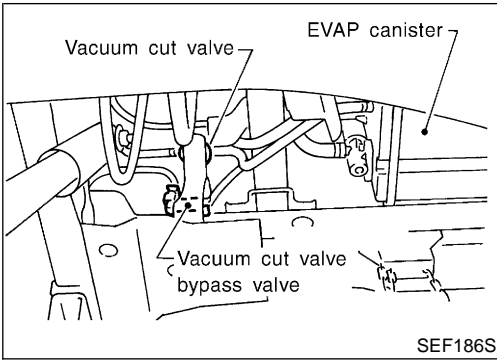
6	DETECT MALFUNCTIONING PART
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors C3, B113 and B101, M67 ● Harness connectors M81, F36 ● Harness for open or short between vacuum cut valve bypass valve and ECM 	
	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK VACUUM CUT VALVE BYPASS VALVE																								
<p> With CONSULT-II</p> <ol style="list-style-type: none"> 1. Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode. 2. Check air passage continuity and operation delay time under the following conditions. 																									
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Condition VC/V BYPASS/V	Air passage continuity between A and B																								
ON	Yes																								
OFF	No																								
SEF016Z																									

<p> Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Check air passage continuity and operation delay time under the following conditions. 							
	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <th>Condition</th> <th>Air passage continuity between A and B</th> </tr> <tr> <td>12V direct current supply between terminals 1 and 2</td> <td>Yes</td> </tr> <tr> <td>No supply</td> <td>No</td> </tr> </table> <p style="text-align: center;">Operation takes less than 1 second.</p>	Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	Yes	No supply	No
Condition	Air passage continuity between A and B						
12V direct current supply between terminals 1 and 2	Yes						
No supply	No						
OK or NG							
SEF557Y							

OK		GO TO 8.
NG		Replace vacuum cut valve bypass valve.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.	
	INSPECTION END



Description

COMPONENT DESCRIPTION

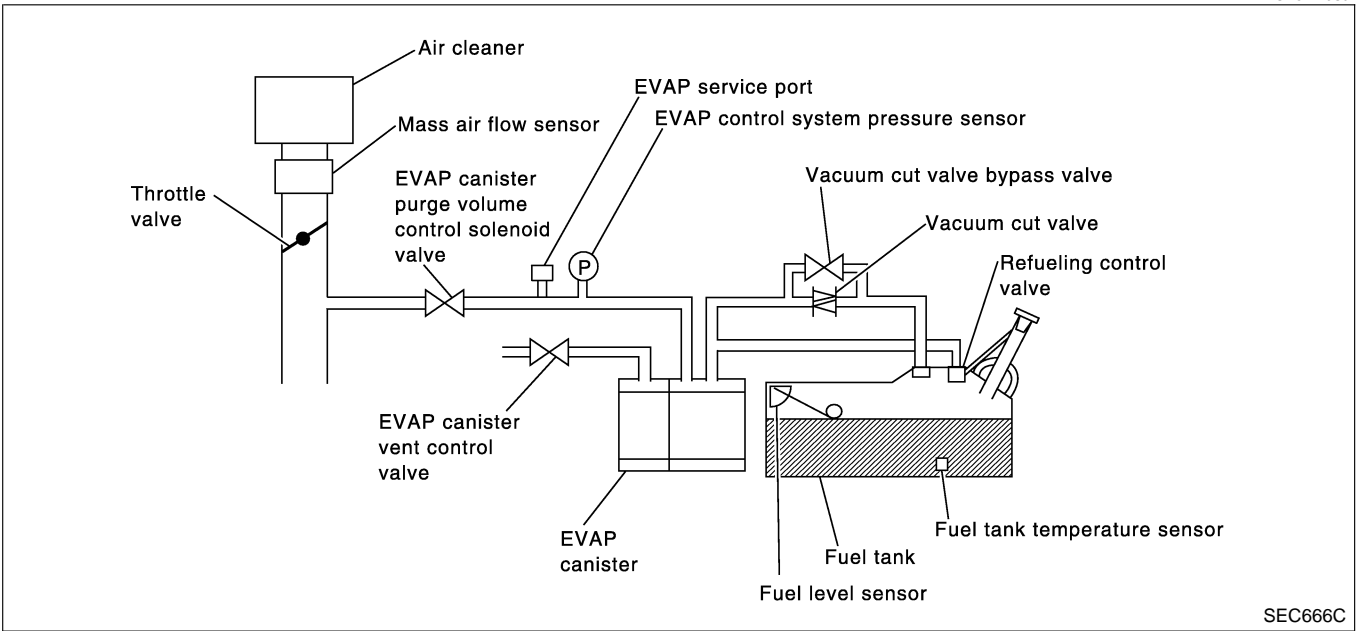
The vacuum cut valve and vacuum cut valve bypass valve are installed in parallel on the EVAP purge line between the fuel tank and the EVAP canister.

The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

The vacuum cut valve bypass valve is a solenoid type valve and generally remains closed. It opens only for on board diagnosis.

The vacuum cut valve bypass valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the valve is opened. The vacuum cut valve is then bypassed to apply intake manifold vacuum to the fuel tank.

EVAPORATIVE EMISSION SYSTEM DIAGRAM



CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	● Ignition switch: ON	OFF

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
120	P/B	Vacuum cut valve bypass valve	[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

Malfunction is detected when vacuum cut valve bypass valve does not operate properly. NGEC1422

POSSIBLE CAUSE

- Vacuum cut valve bypass valve NGEC1422S01
- Vacuum cut valve
- Bypass hoses for clogging
- EVAP control system pressure sensor and circuit
- EVAP canister vent control valve
- Hose between fuel tank and vacuum cut valve clogged
- Hose between vacuum cut valve and EVAP canister clogged
- EVAP canister
- EVAP purge port of fuel tank for clogging

7	VC CUT/V BP/V P1491
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

SEF210Y

7	VC CUT/V BP/V P1491
TESTING	
MONITOR	
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

SEF211Y

7	VC CUT/V BP/V P1491
COMPLETED	

SEF239Y

DTC Confirmation Procedure

CAUTION:
Always drive vehicle at a safe speed. NGEC1423

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
Always perform test at a temperature of 5 to 30°C (41 to 86°F).

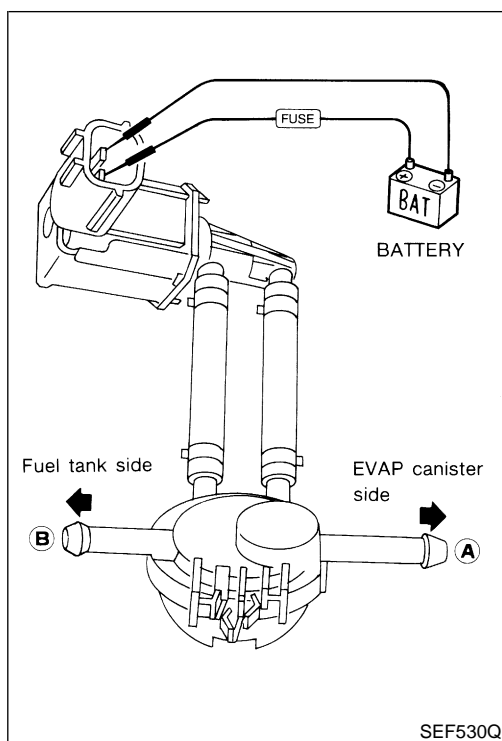
With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Start engine and warm it up to normal operating temperature.
- 3) Turn ignition switch OFF and wait at least 5 seconds.
- 4) Start engine and let it idle for at least 70 seconds.
- 5) Select "VC CUT/V BP/V P1491" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
- 6) Touch "START".
- 7) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 30 seconds.)

CMPS-RPM (POS)	More than 500 rpm
Selector lever	Suitable position
Vehicle speed	More than 37 km/h (23 MPH)
B/FUEL SCHDL	1.0 - 11.0 msec

If "TESTING" is not displayed after 5 minutes, retry from step 3.

- 8) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-1701.



Overall Function Check

NGEC1424

Use this procedure to check the overall function of vacuum cut valve bypass valve. During this check, the 1st trip DTC might not be confirmed.

⊗ Without CONSULT-II

- 1) Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
- 2) Apply vacuum to port **A** and check that there is no suction from port **B**.
- 3) Apply vacuum to port **B** and check that there is suction from port **A**.
- 4) Blow air in port **B** and check that there is a resistance to flow out of port **A**.
- 5) Supply battery voltage to the terminal.
- 6) Blow air in port **A** and check that air flows freely out of port **B**.
- 7) Blow air in port **B** and check that air flows freely out of port **A**.
- 8) If NG, go to "Diagnostic Procedure", EC-1701.

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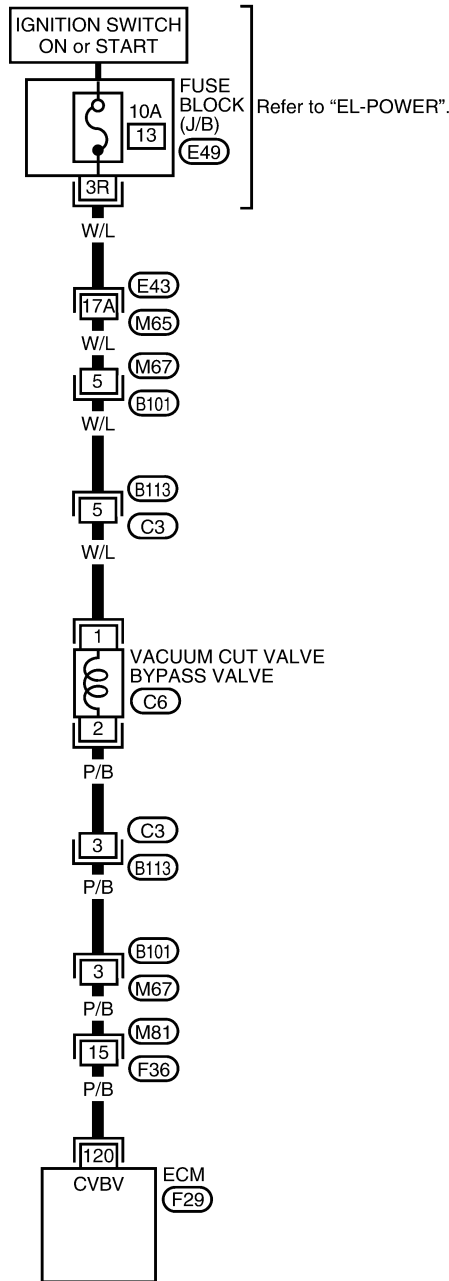
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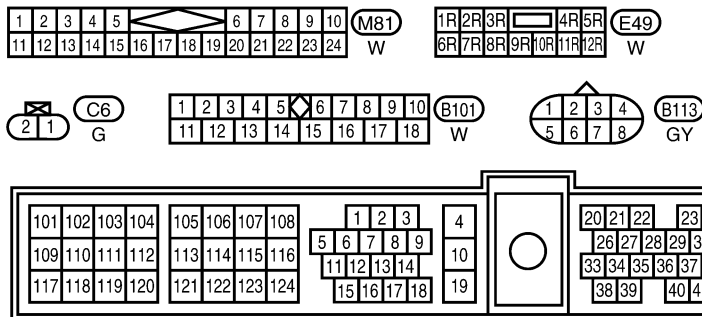
Wiring Diagram

NGEC1425

EC-BYPS/V-01



: Detectable line for DTC
 : Non-detectable line for DTC



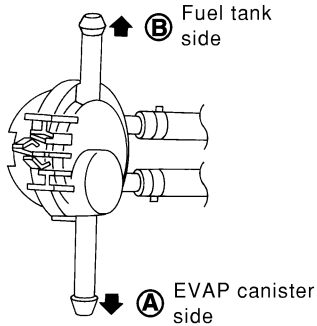
Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



Diagnostic Procedure

NGEC1426

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION																					
<p>With CONSULT-II</p> <ol style="list-style-type: none"> Turn ignition switch OFF. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly. Apply vacuum to port A and check that there is no suction from port B. Apply vacuum to port B and check that there is suction from port A. Blow air in port B and check that there is a resistance to flow out of port A. Turn ignition switch ON. Select "VC/V BYPASS/V" in "ACTIVE TEST" mode with CONSULT-II and touch "ON". Blow air in port A and check that air flows freely out of port B. Blow air in port B and check that air flows freely out of port A. 																						
																						
<table border="1"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>VC/V BYPASS/V</th> <th>OFF</th> </tr> </thead> <tbody> <tr> <td colspan="2" style="text-align: center;">MONITOR</td> </tr> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>A/F ALPHA-B1</td> <td>XXX %</td> </tr> <tr> <td>A/F ALPHA-B2</td> <td>XXX %</td> </tr> <tr> <td>HO2S1 MNTR (B1)</td> <td>LEAN</td> </tr> <tr> <td>HO2S1 MNTR (B2)</td> <td>LEAN</td> </tr> <tr> <td>THRTL POS SEN</td> <td>XXX V</td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>			ACTIVE TEST		VC/V BYPASS/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 MNTR (B1)	LEAN	HO2S1 MNTR (B2)	LEAN	THRTL POS SEN	XXX V		
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HO2S1 MNTR (B1)	LEAN																					
HO2S1 MNTR (B2)	LEAN																					
THRTL POS SEN	XXX V																					
OK or NG																						
OK	▶	GO TO 4.																				
NG	▶	GO TO 5.																				

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3	CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION
<p>⊗ Without CONSULT-II</p> <ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly. 3. Apply vacuum to port A and check that there is no suction from port B. 4. Apply vacuum to port B and check that there is suction from port A. 5. Blow air in port B and check that there is a resistance to flow out of port A. 6. Disconnect vacuum cut valve bypass valve harness connector. 7. Supply battery voltage to the terminal. 8. Blow air in port A and check that air flows freely out of port B. 9. Blow air in port B and check that air flows freely out of port A. 	
OK or NG	
OK	▶ GO TO 4.
NG	▶ GO TO 5.

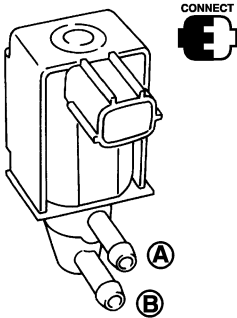
SEF914U

4	CHECK EVAP PURGE LINE
<ol style="list-style-type: none"> 1. Check EVAP purge line between EVAP canister and fuel tank for clogging or disconnection. 2. Check EVAP purge port of fuel tank for clogging. 3. Check EVAP canister. Refer to EC-1200. 	
OK or NG	
OK	▶ GO TO 8.
NG (Step 1)	▶ Repair it.
NG (Step 2)	▶ Clean EVAP purge port.
NG (Step 3)	▶ Replace EVAP canister.

5	CHECK BYPASS HOSE
Check bypass hoses for clogging.	
OK or NG	
OK	▶ GO TO 6.
NG	▶ Repair or replace hoses.

6 CHECK VACUUM CUT VALVE BYPASS VALVE
With CONSULT-II

1. Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.
2. Check air passage continuity and operation delay time under the following conditions.



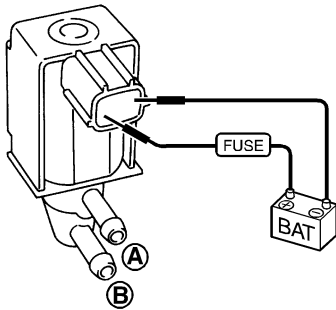
ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V

Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEF016Z

1. Check air passage continuity and operation delay time under the following conditions.

Without CONSULT-II


Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

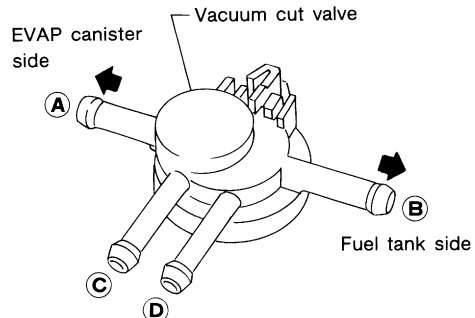
Operation takes less than 1 second.

SEF557Y

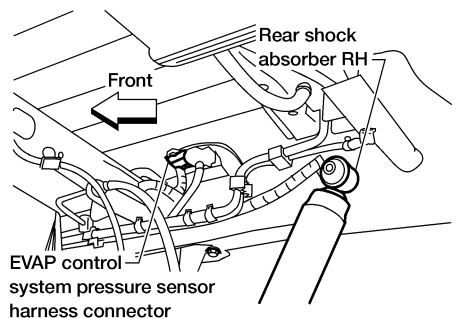
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace vacuum cut valve bypass valve.

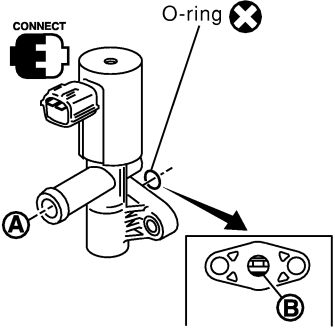
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7	CHECK VACUUM CUT VALVE
<p>Check vacuum cut valve as follows:</p> <div style="text-align: center;">  </div>	
SEF379Q	
<ol style="list-style-type: none"> 1. Plug port C and D with fingers. 2. Apply vacuum to port A and check that there is no suction from port B. 3. Apply vacuum to port B and check that there is suction from port A. 4. Blow air in port B and check that there is a resistance to flow out of port A. 5. Open port C and D. 6. Blow air in port A check that air flows freely out of port C. 7. Blow air in port B check that air flows freely out of port D. 	
OK or NG	
OK	▶ GO TO 8.
NG	▶ Replace vacuum cut valve.

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor. 	
OK or NG	
OK	▶ GO TO 9.
NG	▶ Repair it

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR
<ol style="list-style-type: none"> 1. Disconnect EVAP control system pressure sensor harness connector. <div style="text-align: center;">  </div>	
AEC651A	
<ol style="list-style-type: none"> 2. Check connectors for water. Water should not exist. 	
OK or NG	
OK	▶ GO TO 10.
NG	▶ Replace EVAP control system pressure sensor.

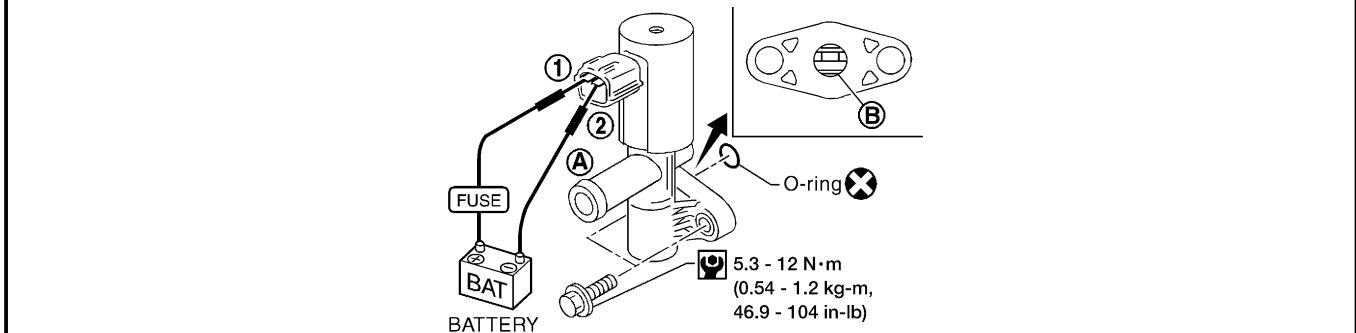
10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION	
Refer to "DTC Confirmation Procedure" for DTC P0452, P0453, EC-1533.		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

11	CHECK EVAP CANISTER VENT CONTROL VALVE																									
Check air passage continuity.																										
E With CONSULT-II Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.																										
	<table border="1" style="margin: auto;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>VENT CONTROL/V</td><td>OFF</td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>A/F ALPHA-B1</td><td>XXX %</td></tr> <tr><td>A/F ALPHA-B2</td><td>XXX %</td></tr> <tr><td>HO2S1 (B1)</td><td>XXX V</td></tr> <tr><td>HO2S1 (B2)</td><td>XXX V</td></tr> <tr><td>THRTL POS SEN</td><td>XXX V</td></tr> </table>	ACTIVE TEST		VENT CONTROL/V	OFF	MONITOR		ENG SPEED	XXX rpm	A/F ALPHA-B1	XXX %	A/F ALPHA-B2	XXX %	HO2S1 (B1)	XXX V	HO2S1 (B2)	XXX V	THRTL POS SEN	XXX V	<table border="1" style="margin: auto;"> <tr> <th>Condition VENT CONTROL/V</th> <th>Air passage continuity between A and B</th> </tr> <tr> <td>ON</td> <td>No</td> </tr> <tr> <td>OFF</td> <td>Yes</td> </tr> </table> <p style="text-align: center;">Operation takes less than 1 second.</p>	Condition VENT CONTROL/V	Air passage continuity between A and B	ON	No	OFF	Yes
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VENT CONTROL/V	OFF																									
MONITOR																										
ENG SPEED	XXX rpm																									
A/F ALPHA-B1	XXX %																									
A/F ALPHA-B2	XXX %																									
HO2S1 (B1)	XXX V																									
HO2S1 (B2)	XXX V																									
THRTL POS SEN	XXX V																									
Condition VENT CONTROL/V	Air passage continuity between A and B																									
ON	No																									
OFF	Yes																									
SEF991Y																										

X Without CONSULT-II								
<table border="1" style="margin: auto;"> <tr> <th>Condition</th> <th>Air passage continuity between A and B</th> </tr> <tr> <td>12V direct current supply between terminals 1 and 2</td> <td>No</td> </tr> <tr> <td>OFF</td> <td>Yes</td> </tr> </table>		Condition	Air passage continuity between A and B	12V direct current supply between terminals 1 and 2	No	OFF	Yes	
Condition	Air passage continuity between A and B							
12V direct current supply between terminals 1 and 2	No							
OFF	Yes							

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
 If portion **B** is rusted, replace control valve.



Make sure new O-ring is installed properly.		
OK or NG		
OK	▶	GO TO 12.
NG	▶	Replace EVAP canister vent control valve.

12	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.		
▶		INSPECTION END

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Component Description

The malfunction information related to A/T (Automatic Transmission) is transferred through the line (circuit) from TCM (Transmission control module) to ECM. Therefore, be sure to erase the malfunction information such as DTC not only in TCM (Transmission control module) but also ECM after the A/T related repair.

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
7	G/B	A/T check signal	[Ignition switch ON] [Engine is running]	0 - 3.0V

On Board Diagnosis Logic

Malfunction is detected when an incorrect signal from TCM (Transmission control module) is sent to ECM.

POSSIBLE CAUSE

- Harness or connectors
[The communication line circuit between ECM and TCM (Transmission control module) is open or shorted.]
- Dead (Weak) battery
- TCM (Transmission control module)

DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait at least 40 seconds.
- 4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1708.

With GST

Follow the procedure "With CONSULT-II".

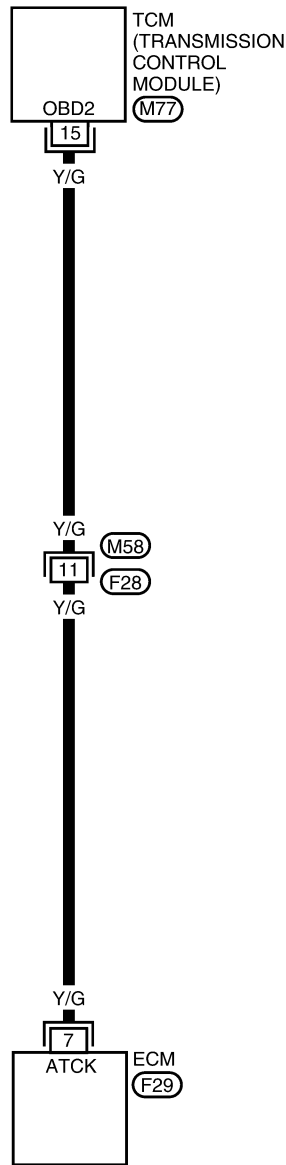
3	ACTIVE TEST	
	PURG VOL CONT/V	0.0%
	MONITOR	
	ENG SPEED	XXX rpm
	A/F ALPHA-B1	XXX %
	A/F ALPHA-B2	XXX %
	HO2S1 MNTR (B1)	RICH
	HO2S1 MNTR (B2)	RICH
	THRTL POS SEN	XXX V

SEF985Y

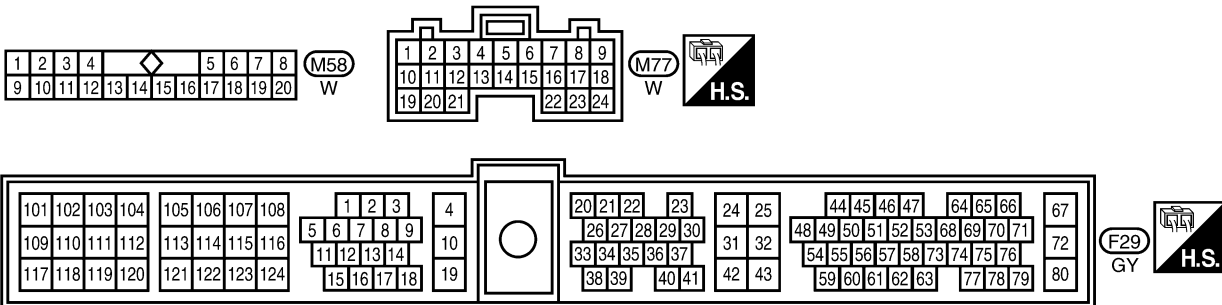
Wiring Diagram

NGEC1431

EC-ATDIAG-01



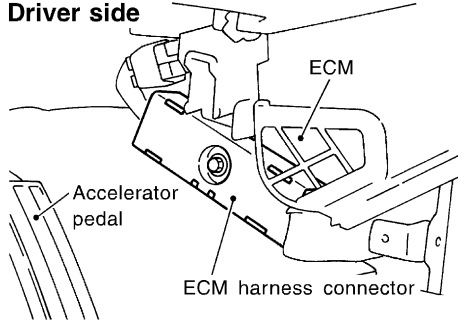
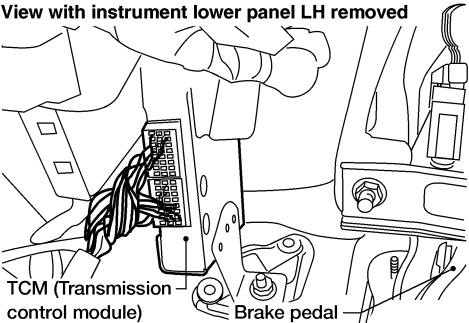
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LEC674

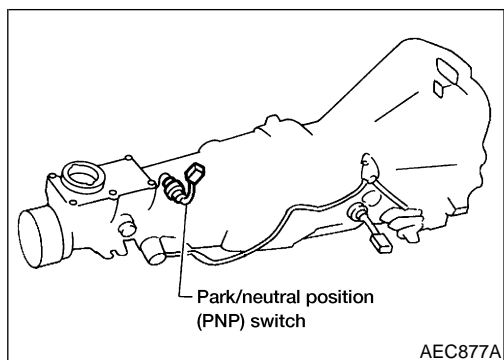
Diagnostic Procedure

NGEC1432

1	CHECK A/T DIAGNOSIS COMMUNICATION LINE INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch OFF. 2. Disconnect ECM harness connector and TCM (Transmission Control Module) harness connector.</p> <div style="text-align: center;"> <p>Driver side</p>  </div> <div style="text-align: center;"> <p>View with instrument lower panel LH removed</p>  </div> <p style="text-align: right;"><small>SEF324V</small></p> <p style="text-align: right;"><small>AEC655A</small></p> <p>3. Check harness continuity between ECM terminal 7 and TCM terminal 15. Refer to Wiring Diagram. Continuity should exist.</p> <p>4. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶▶	GO TO 3.
NG	▶▶	GO TO 2.

2	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M58, F28 ● Harness for open or short between ECM and TCM (Transmission Control Module) 		
▶▶		Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.		
▶▶		INSPECTION END



Component Description

When the gear position is "P" (A/T models only) or "N", park/neutral position (PNP) switch is "ON". NGEC1433

ECM detects the position because the continuity of the line (the "ON" signal) exists.

For A/T models, the park/neutral position (PNP) switch assembly also includes a transmission range switch to detect selector lever position.

CONSULT-II Reference Value in Data Monitor Mode

NGEC1434

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: "P" or "N" ON
		Except above OFF

ECM Terminals and Reference Value

NGEC1435

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22	L/B	Park/neutral position (PNP) switch	[Ignition switch ON] ● Gear position is "N" or "P" (A/T models) ● Gear position is neutral (M/T models)	Approximately 0V
			[Ignition switch ON] ● Except the above gear position	Approximately 5V

On Board Diagnosis Logic

NGEC1436

Malfunction is detected when the signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.

POSSIBLE CAUSE

NGEC1436S01

- Harness or connectors
[The park/neutral position (PNP) switch circuit is open or shorted.]
- Park/neutral position (PNP) switch

DTC Confirmation Procedure

NGEC1437

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 5 seconds before conducting the next test.

2

DATA MONITOR	
MONITOR	NO DTC
P/N POSI SW	ON

SEF212Y

5

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
P/N POSI SW	OFF
B/FUEL SCHDL	XXX msec

SEF213Y

With CONSULT-II

- 1) Turn ignition switch ON.
- 2) Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-II. Then check the "P/N POSI SW" signal under the following conditions.

Position (Selector lever)	Known good signal
"N" and "P" position	ON
Except the above position	OFF

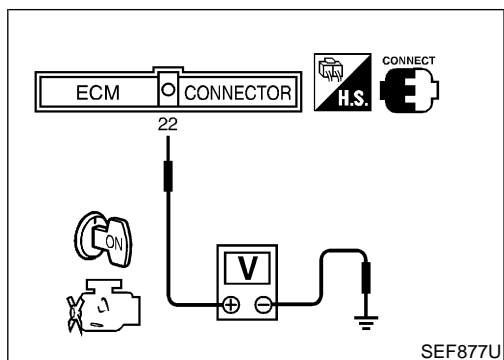
If NG, go to "Diagnostic Procedure", EC-1713.

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 - 2,700 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	2.0 - 14.0 msec
VHCL SPEED SE	More than 64 km/h (40 MPH)
Selector lever	Suitable position

- 6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1713.



Overall Function Check

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. =NGEC1438

⊗ **Without CONSULT-II**

- 1) Turn ignition switch ON.
- 2) Check voltage between ECM terminal 22 and body ground under the following conditions.

Condition (Gear position)	Voltage (V) (Known good data)
"P" and "N" position	Approx. 0
Except the above position	Approx. 5

- 3) If NG, go to "Diagnostic Procedure", EC-1713.

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Wiring Diagram

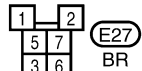
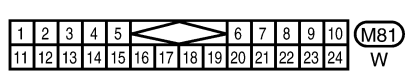
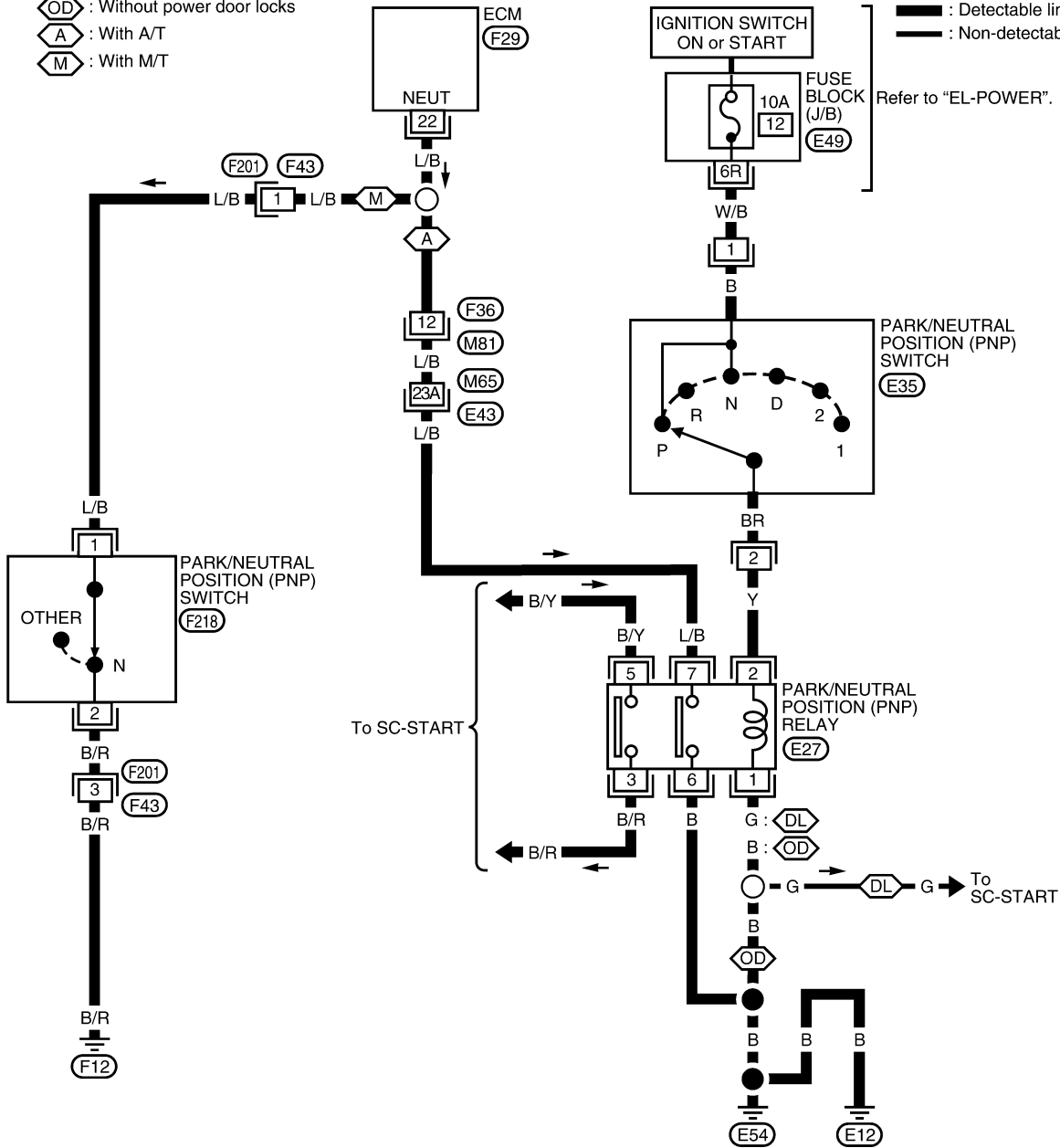
NGEC1439

EC-PNP/SW-01

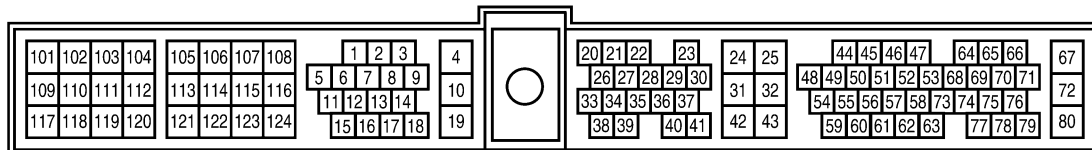
- : With power door locks
- : Without power door locks
- : With A/T
- : With M/T

: Detectable line for DTC
 : Non-detectable line for DTC

Refer to "EL-POWER".



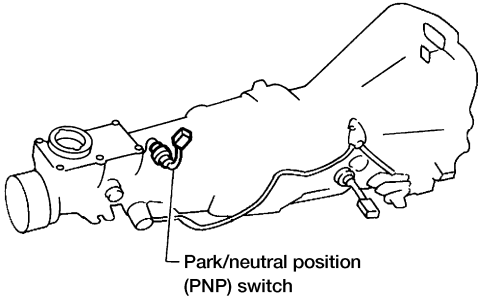
Refer to the following.
 (M65), (E43) - SUPER
 MULTIPLE JUNCTION (SMJ)



Diagnostic Procedure FOR M/T MODELS

NGEC1440

NGEC1440S01

1	CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT	
<p>1. Turn ignition switch OFF. 2. Disconnect park/neutral position (PNP) switch harness connector.</p> <div style="text-align: center;">  <p>Park/neutral position (PNP) switch</p> </div> <p>3. Check harness continuity between PNP switch terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist. 4. Also check harness for short to power.</p> <p style="text-align: center;">OK or NG</p>		
AEC877A		
OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F201, F43 ● Harness for open between park/neutral position (PNP) switch and engine ground 		
▶ Repair open circuit or short to power in harness or connectors.		

3	CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 22 and PNP switch terminal 1. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F43, F201 ● Harness for open or short between ECM and park/neutral position (PNP) switch 		
▶ Repair open circuit or short to ground or short to power in harness or connectors.		

5	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH	
<p>Refer to MT-8, "Position Switch Check".</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 6.
NG	▶	Replace park/neutral position (PNP) switch.

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DTC P1706 PNP SWITCH

VG33ER

Diagnostic Procedure (Cont'd)

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.	
	▶ INSPECTION END

FOR A/T MODELS

=NGEC1440S02

1	CHECK PNP SWITCH POWER SUPPLY CIRCUIT-I	
1. Turn ignition switch OFF. 2. Disconnect park/neutral position (PNP) relay. 3. Turn ignition switch ON. 4. Shift selector lever to "P" or "N" position. 5. Check voltage between PNP relay terminal 2 and ground with CONSULT-II or tester.		
Voltage: Battery voltage		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 2.

SEF661W

2	CHECK PNP SWITCH POWER SUPPLY CIRCUIT-II	
1. Turn ignition switch OFF. 2. Disconnect park/neutral position (PNP) switch harness connector.		
3. Check harness continuity between PNP switch terminal 2 and PNP relay 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 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

AEC662A

3	CHECK PNP SWITCH POWER SUPPLY CIRCUIT-III	
1. Turn ignition switch ON. 2. Check voltage between PNP switch terminal 1 and ground with CONSULT-II or tester. Refer to Wiring Diagram. Voltage: Battery voltage		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

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DTC P1706 PNP SWITCH

VG33ER

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Fuse block (J/B) connector E49 ● 7.5A fuse ● Harness for open or short between PNP switch and fuse 		
▶	Repair open circuit or short to ground or short to power in harness or connectors.	

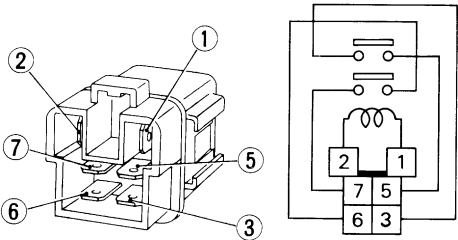
5	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH	
Refer to AT-312 , "Component Inspection".		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace park/neutral position (PNP) switch.

6	CHECK PNP RELAY GROUND CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch OFF. 2. Check harness continuity between PNP relay terminals 1, 6 and body ground. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to power.		
OK or NG		
OK	▶	GO TO 8.
NG (With power door locks system)	▶	GO TO 7.
NG (Without power door locks system)	▶	Repair open circuit or short to power in harness or connectors.

7	DETECT MALFUNCTIONING PART	
Check the circuit between PNP relay and body ground. Refer to "STARTING SYSTEM", SC-10 .		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Repair or replace.

8	CHECK PNP RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 22 and PNP relay 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 10.
NG	▶	GO TO 9.

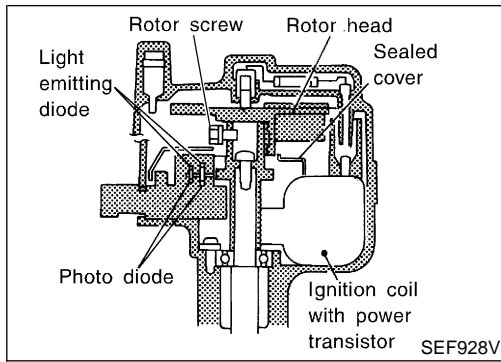
9	DETECT MALFUNCTIONING PART	
Check the following. <ul style="list-style-type: none"> ● Harness connectors F36, M81 ● Harness connectors M65, E43 ● Harness for open or short between ECM and park/neutral position (PNP) relay 		
▶	Repair open circuit or short to ground or short to power in harness or connectors.	

10	CHECK PARK/NEUTRAL POSITION (PNP) RELAY	
<p>1. Apply 12V direct current between park/neutral position (PNP) relay terminals 1 and 2. 2. Check continuity between park/neutral position (PNP) relay terminals 3 and 5, 6 and 7.</p>		
		
<p>12V (1 and 2) applied: Continuity should exist. No voltage applied: Continuity should not exist.</p>		
SEC202B		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace park/neutral position (PNP) relay.

11	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.		
▶		INSPECTION END

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Component Description



Component Description

IGNITION COIL & POWER TRANSISTOR

NGEC1441

NGEC1441S01

The power transistor switches on and off the ignition coil primary circuit according to the ECM signal. As the primary circuit is turned on and off, the proper high voltage is induced in the secondary circuit. The distributor is not repairable except for the distributor cap and rotor head.

NOTE:

The rotor screw which secures the distributor rotor head to the distributor shaft must be torqued properly.

: $3.6 \pm 0.3 \text{ N}\cdot\text{m}$ ($37 \pm 3 \text{ kg}\cdot\text{cm}$, $32 \pm 3 \text{ in}\cdot\text{lb}$)

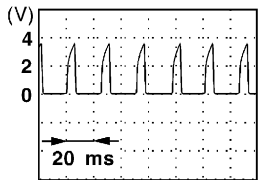
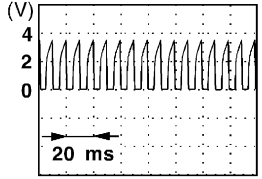
ECM Terminals and Reference Value

NGEC1442

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 the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	PU/W	Ignition signal	[Engine is running] ● Idle speed	Approximately 0.7V  SEF988U
			[Engine is running] ● Engine speed is 2,000 rpm	1.1 - 1.5V  SEF989U

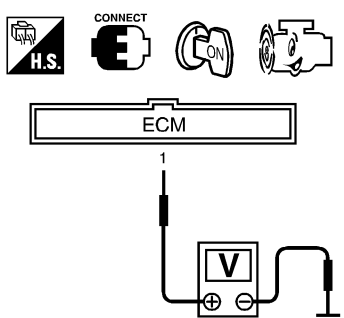
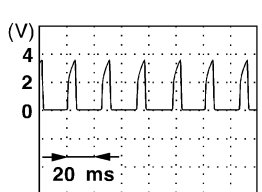
Diagnostic Procedure

NGENC1444

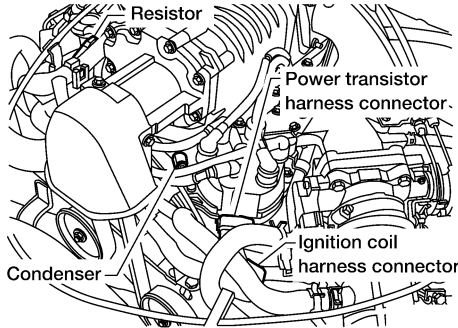
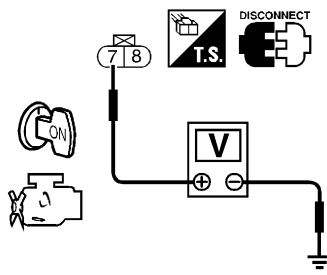
1	INSPECTION START	
Turn ignition switch "OFF", and restart engine. Is engine running?		
Yes or No		
Yes (With CONSULT-II)	▶	GO TO 2.
Yes (Without CONSULT-II)	▶	GO TO 3.
No	▶	GO TO 4.

2	CHECK OVERALL FUNCTION																					
Ⓜ With CONSULT-II 1. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II. 2. Make sure that all circuits do not produce a momentary engine speed drop.																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">ACTIVE TEST</th> </tr> <tr> <th>POWER BALANCE</th> <th></th> </tr> <tr> <th colspan="2">MONITOR</th> </tr> </thead> <tbody> <tr> <td>ENG SPEED</td> <td>XXX rpm</td> </tr> <tr> <td>MAS AIF SE-B1</td> <td>XXX V</td> </tr> <tr> <td>IACV-AAC/V</td> <td>XXX step</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>			ACTIVE TEST		POWER BALANCE		MONITOR		ENG SPEED	XXX rpm	MAS AIF SE-B1	XXX V	IACV-AAC/V	XXX step								
ACTIVE TEST																						
POWER BALANCE																						
MONITOR																						
ENG SPEED	XXX rpm																					
MAS AIF SE-B1	XXX V																					
IACV-AAC/V	XXX step																					
OK or NG																						
OK	▶	INSPECTION END																				
NG	▶	GO TO 4.																				

SEF070Y

3	CHECK OVERALL FUNCTION	
⊗ Without CONSULT-II 1. Let engine idle. 2. Read the voltage signal between ECM terminal 1 and ground with an oscilloscope. 3. Verify that the oscilloscope screen shows the signal wave as shown below.		
		
		
OK or NG		
OK	▶	INSPECTION END
NG	▶	GO TO 4.

SEC073C

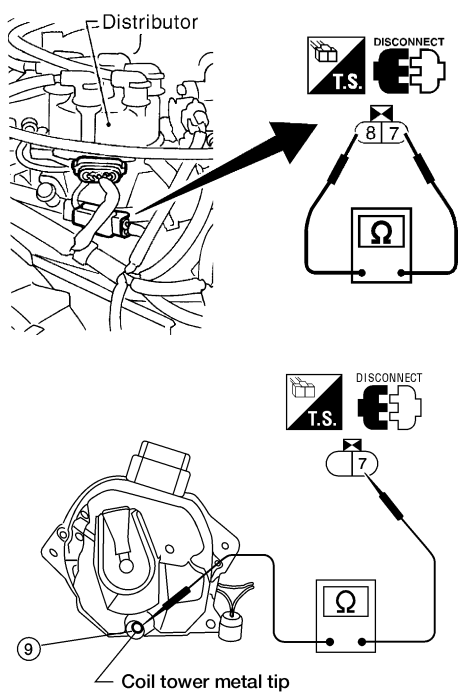
4	CHECK IGNITION COIL POWER SUPPLY CIRCUIT	<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect ignition coil harness connector.</p> <div style="text-align: center; margin: 10px 0;">  </div> <p>3. Turn ignition switch ON.</p> <p>4. Check voltage between terminal 7 and ground with CONSULT-II or tester.</p> <div style="text-align: center; margin: 10px 0;">  </div> <p style="color: blue; margin-top: 10px;">Voltage: Battery voltage</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>	<p style="text-align: center;">LEC811</p> <p style="text-align: center;">SEF721U</p>
OK	▶	GO TO 6.	
NG	▶	GO TO 5.	

5	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors E43, M65 ● Harness connectors M59, F27 ● Harness for open or short between ignition coil and ignition switch <p style="text-align: right; margin-top: 10px;">▶ Repair harness or connectors.</p>	
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6	CHECK POWER TRANSISTOR GROUND CIRCUIT FOR OPEN AND SHORT	<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect power transistor harness connector.</p> <p>3. Check harness continuity between power transistor terminal 2 and engine ground. Refer to Wiring Diagram.</p> <p style="color: blue; margin-left: 20px;">Continuity should exist.</p> <p>4. Also check harness for short to power.</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>	
OK	▶	GO TO 7.	
NG	▶	Repair open circuit or short to power in harness or connectors.	

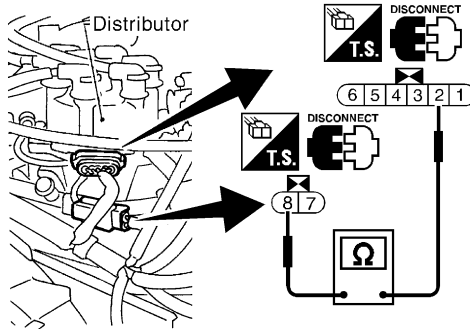
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7	CHECK POWER TRANSISTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 1 and power transistor terminal 1. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK IGNITION COIL							
1. Disconnect ignition coil harness connector. 2. Check resistance as shown in the figure.								
 <p style="text-align: right; margin-right: 50px;">SEF013S</p> <p style="text-align: right; margin-right: 50px;">AEC657A</p>								
<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 5px;">Terminal</th> <th style="padding: 5px;">Resistance [at 20°C (68°F)]</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">7 - 8 (Primary coil)</td> <td style="padding: 5px;">Approximately 1.0Ω</td> </tr> <tr> <td style="padding: 5px;">7 - 9 (Secondary coil)</td> <td style="padding: 5px;">Approximately 10 kΩ</td> </tr> </tbody> </table>			Terminal	Resistance [at 20°C (68°F)]	7 - 8 (Primary coil)	Approximately 1.0Ω	7 - 9 (Secondary coil)	Approximately 10 kΩ
Terminal	Resistance [at 20°C (68°F)]							
7 - 8 (Primary coil)	Approximately 1.0Ω							
7 - 9 (Secondary coil)	Approximately 10 kΩ							
MTBL0638								
For checking secondary coil, remove distributor cap and measure resistance between coil tower metal tip 9 and terminal 7.								
OK or NG								
OK	▶	GO TO 9.						
NG	▶	Replace distributor assembly.						

9 CHECK POWER TRANSISTOR

1. Disconnect camshaft position sensor & power transistor harness connector and ignition coil harness connector.
2. Check power transistor resistance between terminals 2 and 8.



SEF015S

Terminals	Resistance	Result
2 and 8	Except 0Ω	OK
	0Ω	NG

MTBL0249

OK or NG

- | | | |
|----|---|-------------------------------|
| OK | ▶ | GO TO 10. |
| NG | ▶ | Replace distributor assembly. |

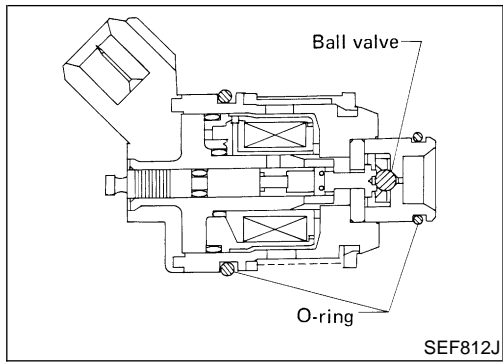
10 CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.

▶ **INSPECTION END**

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Component Description



Component Description

The fuel injector is a small, precise solenoid valve. When the ECM^{NGEC1445} supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

NGEC1446

MONITOR ITEM	CONDITION	SPECIFICATION
INJ PULSE-B1 INJ PULSE-B2	● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load Idle	2.4 - 3.7 msec
	2,000 rpm	1.9 - 3.3 msec
B/FUEL SCHDL	ditto Idle	1.0 - 1.6 msec
	2,000 rpm	0.7 - 1.4 msec

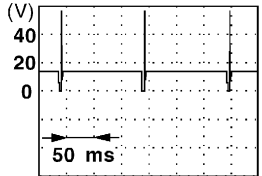
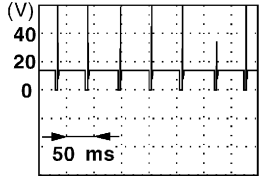
ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground.

NGEC1447

CAUTION:

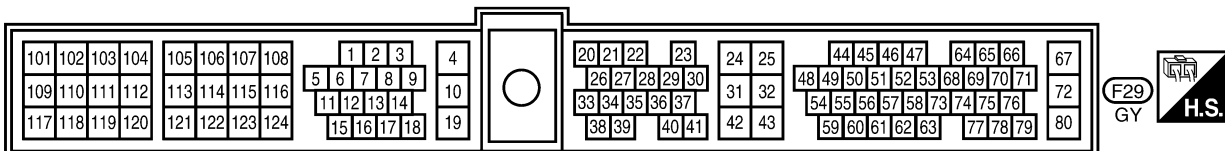
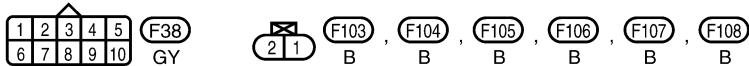
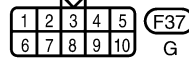
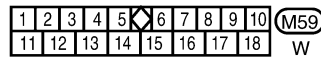
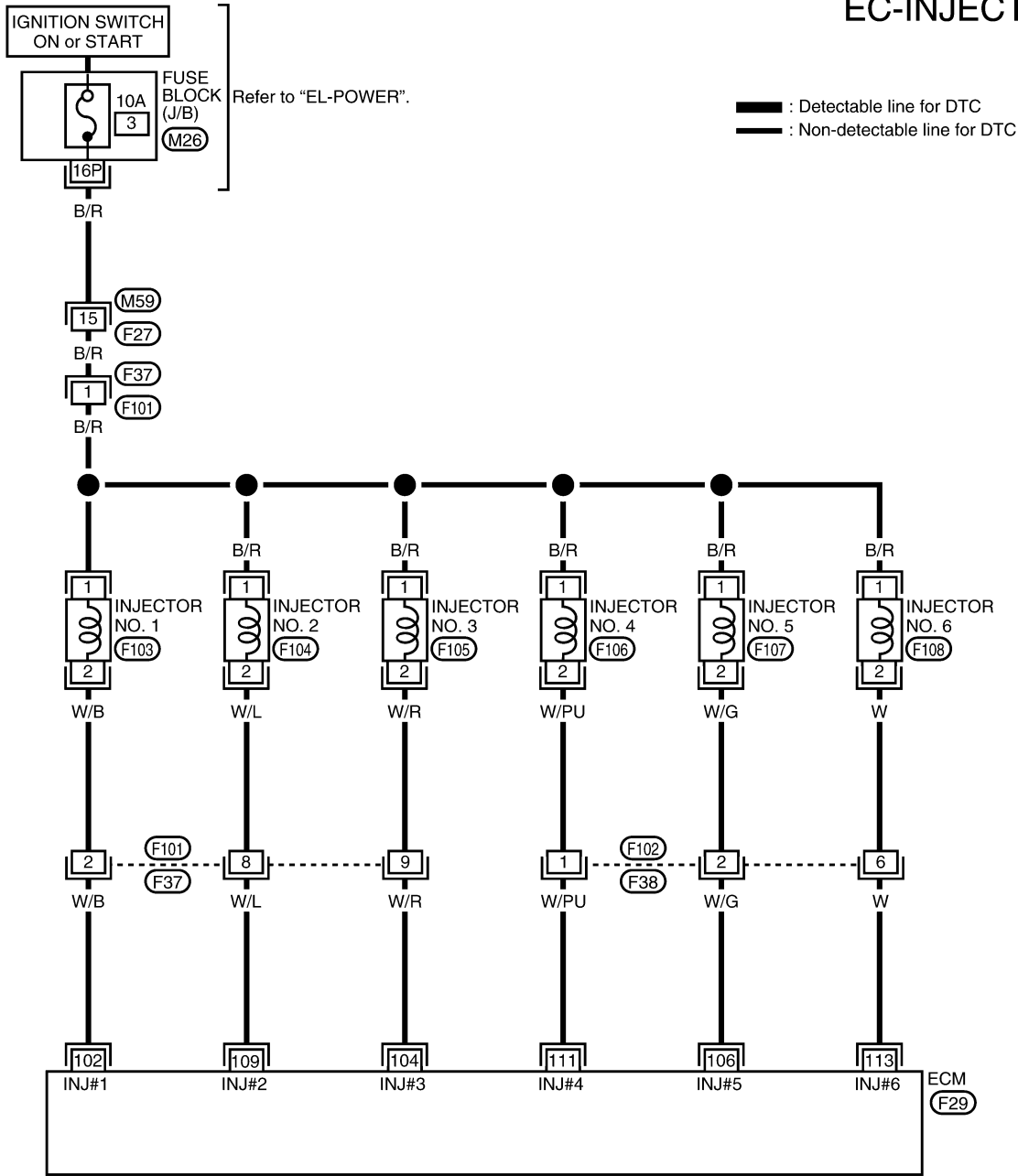
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)		
102 104 106 109 111 113	W/B W/R W/G W/L W/PU W	Injector No. 1 Injector No. 3 Injector No. 5	[Engine is running] ● Warm-up condition ● Idle speed	BATTERY VOLTAGE (11 - 14V) 		
				Injector No. 2 Injector No. 4 Injector No. 6	[Engine is running] ● Warm-up condition ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V) 

Wiring Diagram

NGEC1448

EC-INJECT-01



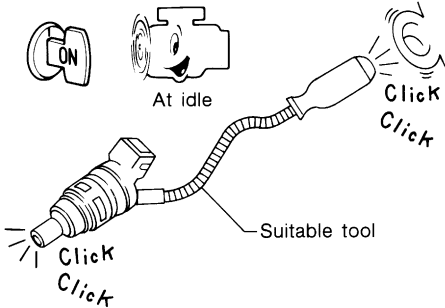


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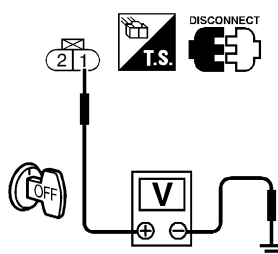
Diagnostic Procedure

NGE1449

1	INSPECTION START	
Turn ignition switch to START. Is any cylinder ignited?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK OVERALL FUNCTION																					
<p> With CONSULT-II</p> <p>1. Start engine. 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.</p>																						
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><th colspan="2">ACTIVE TEST</th></tr> <tr><td>POWER BALANCE</td><td></td></tr> <tr><th colspan="2">MONITOR</th></tr> <tr><td>ENG SPEED</td><td>XXX rpm</td></tr> <tr><td>MAS AIF SE-B1</td><td>XXX V</td></tr> <tr><td>IACV-AAC/V</td><td>XXX step</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </table>			ACTIVE TEST		POWER BALANCE		MONITOR		ENG SPEED	XXX rpm	MAS AIF SE-B1	XXX V	IACV-AAC/V	XXX step								
ACTIVE TEST																						
POWER BALANCE																						
MONITOR																						
ENG SPEED	XXX rpm																					
MAS AIF SE-B1	XXX V																					
IACV-AAC/V	XXX step																					
SEF070Y																						
3. Make sure that each circuit produces a momentary engine speed drop.																						
<p> Without CONSULT-II</p> <p>1. Start engine. 2. Listen to each injector operating sound.</p>																						
																						
Clicking noise should be heard.																						
OK or NG																						
OK	▶	INSPECTION END																				
NG	▶	GO TO 3.																				

MEC703B

3	CHECK INJECTOR POWER SUPPLY CIRCUIT	<p>1. Turn ignition switch OFF.</p> <p>2. Disconnect injector harness connector.</p> <p>3. Check voltage between terminal 1 and ground with CONSULT-II or tester.</p> <div style="text-align: center;">  </div> <p style="color: blue; margin-top: 10px;">Voltage: Battery voltage</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>	GI MA EM LC <div style="background-color: black; color: white; padding: 5px;">EC</div> FE CL	
	OK	▶	GO TO 5.	
	NG	▶	GO TO 4.	

4	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors M59, F27 ● Harness connectors F37, F101 ● Fuse block (J/B) connector M26 ● 10A fuse ● Harness for open or short between injector and fuse 		
		▶	Repair harness or connectors.	

5	CHECK INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	<p>1. Disconnect ECM harness connector.</p> <p>2. Check harness continuity between injector terminal 2 and ECM terminals 102, 104, 106, 109, 111, 113. Refer to Wiring Diagram.</p> <p style="color: blue; margin-left: 20px;">Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p> <p style="text-align: center; margin-top: 10px;">OK or NG</p>	PD AX SU BR	
	OK	▶	GO TO 7.	
	NG	▶	GO TO 6.	

6	DETECT MALFUNCTIONING PART	<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F37, F101 ● Harness connectors F38, F102 ● Harness for open or short between ECM and injector 		
		▶	Repair open circuit or short to ground or short to power in harness or connectors.	

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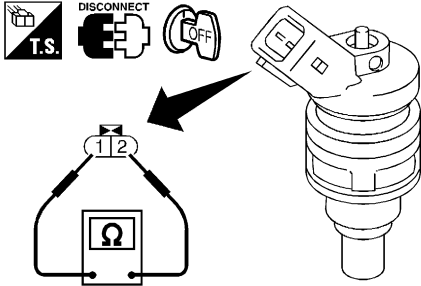
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INJECTOR

VG33ER

Diagnostic Procedure (Cont'd)

7	CHECK INJECTOR
<p>1. Disconnect injector harness connector. 2. Check resistance between terminals as shown in the figure.</p>  <p>Resistance: 10 - 14Ω [at 25°C (77°F)]</p> <p>SEF625V</p> <p>OK or NG</p>	
OK	▶ GO TO 8.
NG	▶ Replace injector.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.	
▶	INSPECTION END

START SIGNAL

VG33ER

CONSULT-II Reference Value in Data Monitor Mode

CONSULT-II Reference Value in Data Monitor Mode

NGEC1450

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
START SIGNAL	● Ignition switch: ON → START → ON	OFF → ON → OFF

ECM Terminals and Reference Value

NGEC1451

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 the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
20	L/OR	Start signal	[Ignition switch ON]	Approximately 0V
			[Ignition switch START]	BATTERY VOLTAGE (11 - 14V)

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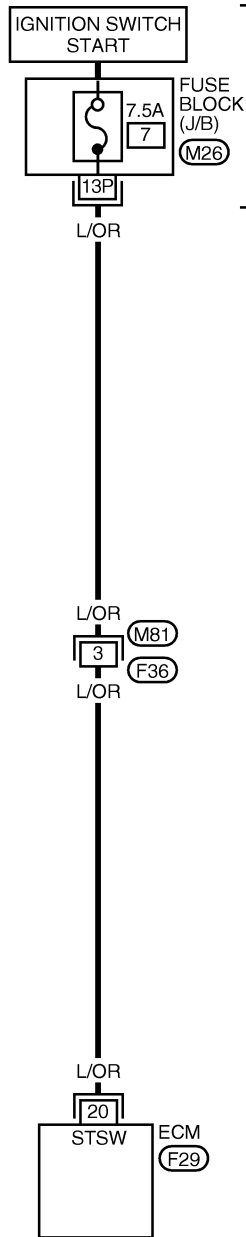
EL

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Wiring Diagram

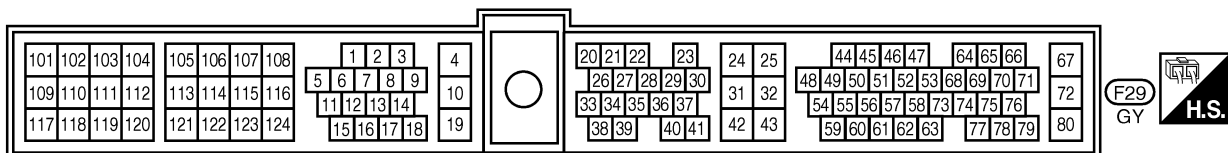
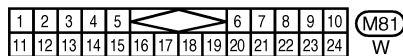
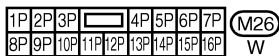
NGEC1452

EC-S/SIG-01



Refer to "EL-POWER".

— : Detectable line for DTC
 — : Non-detectable line for DTC



START SIGNAL

VG33ER


Diagnostic Procedure

Diagnostic Procedure


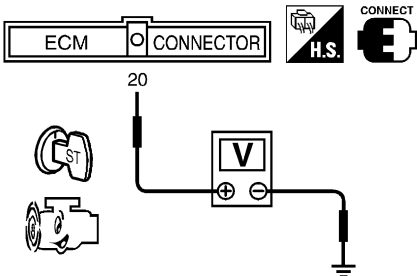
NGEC1453

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

GI
MA
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2	CHECK OVERALL FUNCTION													
<p> With CONSULT-II</p> <p>1. Turn ignition switch ON.</p> <p>2. Check "START SIGNAL" in "DATA MONITOR" mode with CONSULT-II under the following conditions.</p>														
<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>START SIGNAL</td> <td>OFF</td> </tr> <tr> <td>CLSD THL POS</td> <td>ON</td> </tr> <tr> <td>AIR COND SIG</td> <td>OFF</td> </tr> <tr> <td>P/N POSI SW</td> <td>ON</td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	START SIGNAL	OFF	CLSD THL POS	ON	AIR COND SIG	OFF	P/N POSI SW	ON
DATA MONITOR														
MONITOR	NO DTC													
START SIGNAL	OFF													
CLSD THL POS	ON													
AIR COND SIG	OFF													
P/N POSI SW	ON													
<table border="1" style="margin: auto;"> <thead> <tr> <th>Condition</th> <th>"START SIGNAL"</th> </tr> </thead> <tbody> <tr> <td>Ignition switch "ON"</td> <td>OFF</td> </tr> <tr> <td>Ignition switch "START"</td> <td>ON</td> </tr> </tbody> </table>			Condition	"START SIGNAL"	Ignition switch "ON"	OFF	Ignition switch "START"	ON						
Condition	"START SIGNAL"													
Ignition switch "ON"	OFF													
Ignition switch "START"	ON													
SEF072Y														
OK or NG														
OK	▶	INSPECTION END												
NG	▶	GO TO 4.												

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3	CHECK OVERALL FUNCTION							
<p> Without CONSULT-II</p> <p>Check voltage between ECM terminal 20 and ground under the following conditions.</p>								
								
<table border="1" style="margin: auto;"> <thead> <tr> <th>Condition</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>Ignition switch "START"</td> <td>Battery voltage</td> </tr> <tr> <td>Other positions</td> <td>Approximately 0V</td> </tr> </tbody> </table>			Condition	Voltage	Ignition switch "START"	Battery voltage	Other positions	Approximately 0V
Condition	Voltage							
Ignition switch "START"	Battery voltage							
Other positions	Approximately 0V							
SEF733U								
OK or NG								
OK	▶	INSPECTION END						
NG	▶	GO TO 4.						

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START SIGNAL

VG33ER

Diagnostic Procedure (Cont'd)

4	CHECK STARTING SYSTEM
Turn ignition switch OFF, then turn it to START. Does starter motor operate?	
Yes or No	
Yes	▶ GO TO 5.
No	▶ Refer to "STARTING SYSTEM", SC-10 .

5	CHECK FUSE
1. Turn ignition switch OFF. 2. Disconnect 7.5A fuse. 3. Check if 7.5A fuse is OK.	
OK or NG	
OK	▶ GO TO 6.
NG	▶ Replace 7.5A fuse.

6	CHECK START SIGNAL INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 20 and fuse block. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power.	
OK or NG	
OK	▶ GO TO 8.
NG	▶ GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none">● Harness connectors M81, F36● Harness for open or short between ECM and fuse	
	▶ Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.	
	▶ INSPECTION END

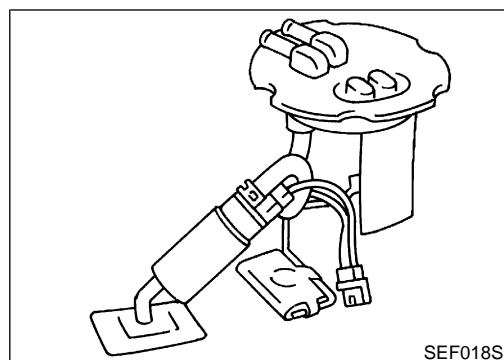
System Description

NGEC1454

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Fuel pump control	Fuel pump relay
Ignition switch	Start signal		

The ECM activates the fuel pump for several seconds after the ignition switch is turned on to improve engine startability. If the ECM receives a 120° signal from the camshaft position sensor, it knows that the engine is rotating, and causes the pump to operate. If the 120° signal is not received when the ignition switch is on, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 5 seconds
Engine running and cranking	Operates
When engine is stopped	Stops in 1.5 seconds
Except as shown above	Stops



Component Description

NGEC1455

The fuel pump with a fuel damper is an in-tank type (the pump and damper are located in the fuel tank).

CONSULT-II Reference Value in Data Monitor Mode

NGEC1456

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	<ul style="list-style-type: none"> Ignition switch is turned to ON. (Operates for 5 seconds.) Engine running and cranking 	ON
	Except as shown above	OFF

FUEL PUMP

VG33ER

ECM Terminals and Reference Value

ECM Terminals and Reference Value

=NGEC1457

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 the ECM terminals, such as the ground.

TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	W/R	Fuel pump relay	[Ignition switch ON] <ul style="list-style-type: none">• For 5 seconds after turning ignition switch "ON" [Engine is running]	0 - 1V
			[Ignition switch ON] <ul style="list-style-type: none">• More than 5 seconds after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)

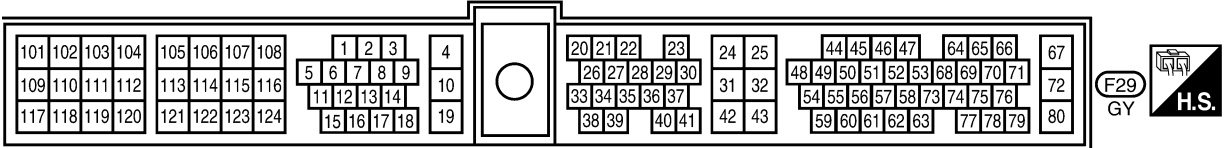
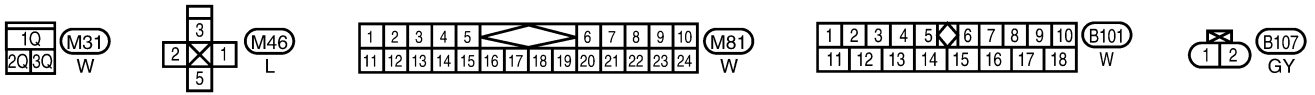
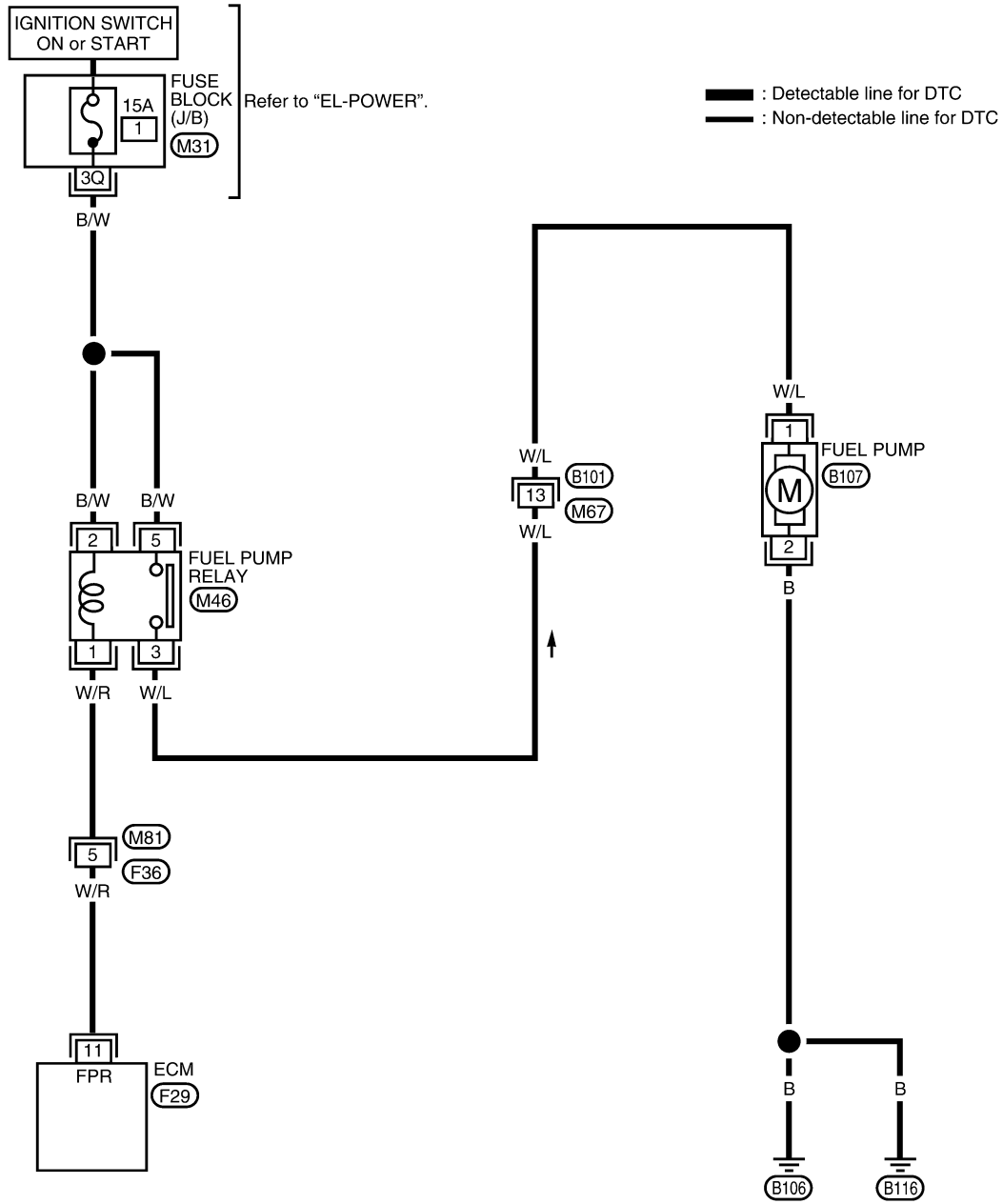
FUEL PUMP

VG33ER
Wiring Diagram

Wiring Diagram

NGEC1458

EC-F/PUMP-01

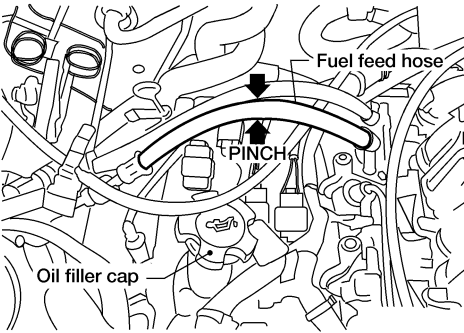


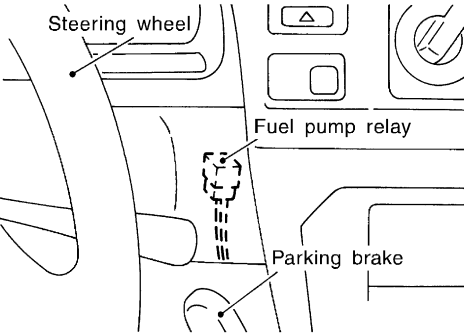
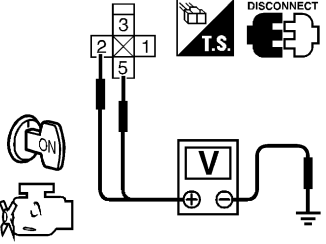
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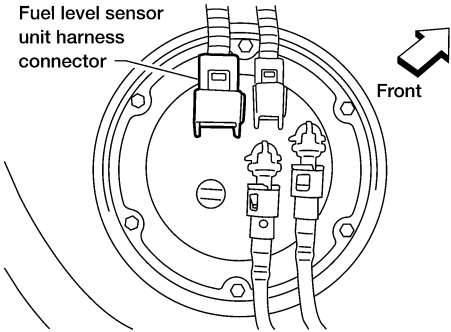
Diagnostic Procedure

NGE1459

1	CHECK OVERALL FUNCTION
<ol style="list-style-type: none"> Turn ignition switch "ON". Pinch fuel feed hose with fingers. 	
	
AEC663A	
<p>Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned "ON".</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ INSPECTION END
NG	▶ GO TO 2.

2	CHECK FUEL PUMP RELAY POWER SUPPLY CIRCUIT
<ol style="list-style-type: none"> Turn ignition switch "OFF". Disconnect fuel pump relay. 	
	
SEF349V	
<ol style="list-style-type: none"> Turn ignition switch "ON". Check voltage between terminals 2, 5 and ground with CONSULT-II or tester. 	
	
SEF674W	
<p>Voltage: Battery voltage</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 4.
NG	▶ GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Fuse block (J/B) connector M31 ● 15A fuse ● Harness for open or short between fuse and fuel pump relay 	
▶	Repair harness or connectors.

4	CHECK FUEL PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch "OFF". 2. Disconnect fuel pump harness connector.	
 <p style="text-align: right;">LEC764</p>	
3. Check harness continuity between fuel pump terminal 2 and body ground, fuel pump terminal 1 and fuel pump relay terminal 3. Refer to Wiring Diagram. Continuity should exist.	
4. Also check harness for short to ground and short to power.	
OK or NG	
OK	▶ GO TO 6.
NG	▶ GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors M67, B101 ● Harness for open between fuel pump and body ground ● Harness for open or short between fuel pump and fuel pump relay 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK FUEL PUMP RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 11 and fuel pump relay 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 8.
NG	▶ GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors M81, F36 ● Harness for open or short between ECM and fuel pump relay 	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

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8 CHECK FUEL PUMP RELAY
With CONSULT-II

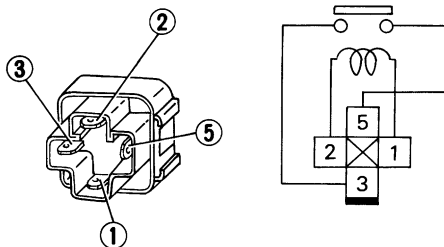
1. Reconnect fuel pump relay, fuel pump harness connector and ECM harness connector.
2. Turn ignition switch "ON".
3. Turn fuel pump relay "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT-II and check operating sound.

ACTIVE TEST	
FUEL PUMP RELAY	ON
MONITOR	
ENG SPEED	XXX rpm

SEF073Y

Without CONSULT-II

Check continuity between terminals 3 and 5.



SEF511P

12V direct current supply between terminals 1 and 2
Continuity exists
No current supply
Continuity does not exist
OK or NG

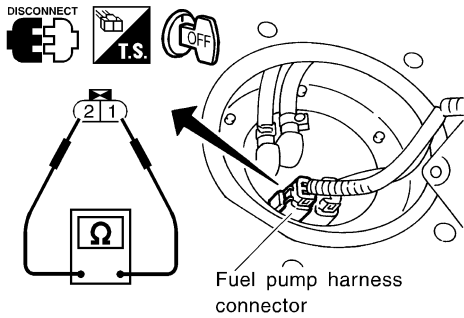
OK ► GO TO 9.

NG ► Replace fuel pump relay.

FUEL PUMP

VG33ER

Diagnostic Procedure (Cont'd)

9	CHECK FUEL PUMP	<p>1. Disconnect fuel pump harness connector. 2. Check resistance between terminals 1 and 2.</p> <div style="text-align: center;">  <p>Fuel pump harness connector</p> </div> <p style="text-align: right;">SEC316C</p> <p style="text-align: center;">Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]</p> <p style="text-align: center;">OK or NG</p>	
	OK	▶	GO TO 10.
	NG	▶	Replace fuel pump.

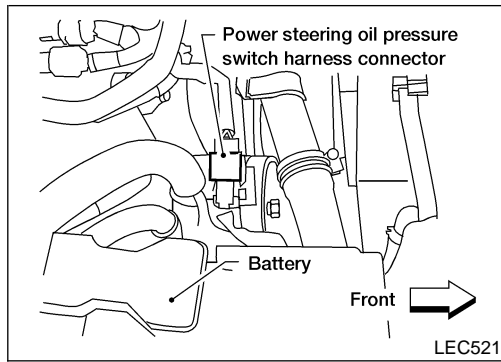
10	CHECK INTERMITTENT INCIDENT	<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.</p>	
		▶	INSPECTION END

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POWER STEERING OIL PRESSURE SWITCH

VG33ER

Component Description



Component Description

NGEC1460

The power steering oil pressure switch is attached to the power steering high-pressure tube and detects a power steering load. When a power steering load is detected, it signals the ECM. The ECM adjusts the IACV-AAC valve to increase the idle speed and adjust for the increased load.

CONSULT-II Reference Value in Data Monitor Mode

NGEC1461

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
PW/ST SIGNAL	<ul style="list-style-type: none"> Engine: After warming up, idle the engine Steering wheel in neutral position (forward direction)	OFF
	The steering wheel is fully turned.	ON

ECM Terminals and Reference Value

NGEC1462

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
39	GY/R	Power steering oil pressure switch	[Engine is running] <ul style="list-style-type: none"> Steering wheel is being fully turned 	0V
			[Engine is running] <ul style="list-style-type: none"> Steering wheel is not being turned 	Approximately 5V

POWER STEERING OIL PRESSURE SWITCH

VG33ER
Wiring Diagram

Wiring Diagram

NGEC1463

EC-PST/SW-01

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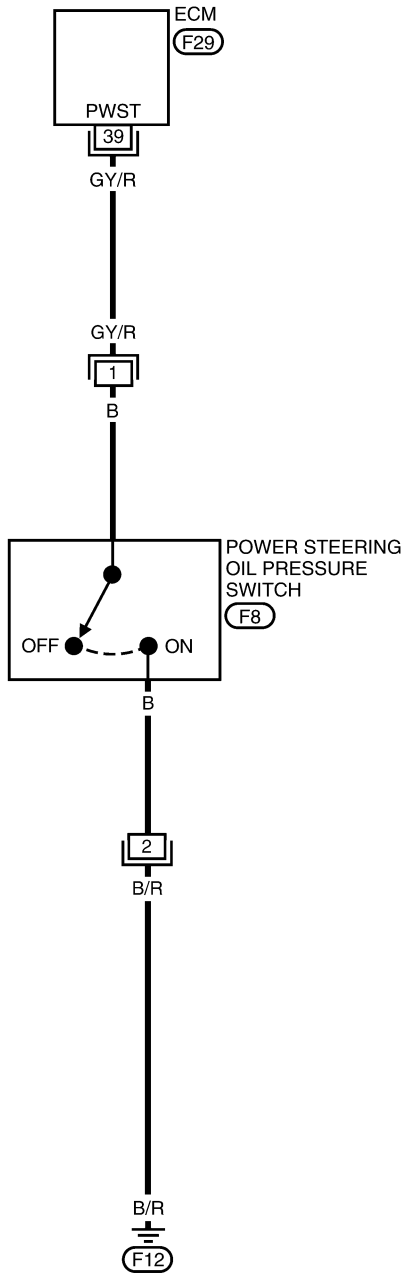
BT

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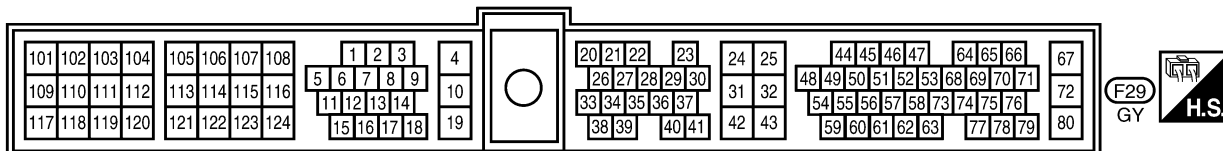
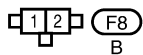
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— : Detectable line for DTC
— : Non-detectable line for DTC



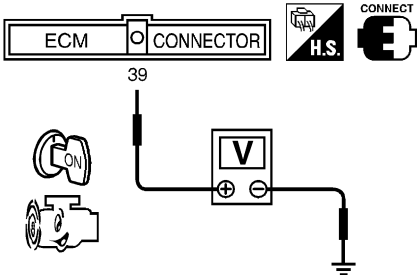
LEC677

Diagnostic Procedure

NGE1464

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

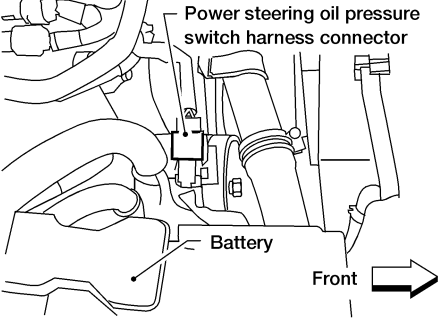
2	CHECK OVERALL FUNCTION							
ⓘ With CONSULT-II 1. Start engine. 2. Check "PW/ST SIGNAL" in "DATA MONITOR" mode with CONSULT-II.								
<table border="1" style="margin: auto;"> <thead> <tr> <th colspan="2">DATA MONITOR</th> </tr> <tr> <th>MONITOR</th> <th>NO DTC</th> </tr> </thead> <tbody> <tr> <td>PW/ST SIGNAL</td> <td>OFF</td> </tr> </tbody> </table>			DATA MONITOR		MONITOR	NO DTC	PW/ST SIGNAL	OFF
DATA MONITOR								
MONITOR	NO DTC							
PW/ST SIGNAL	OFF							
<table border="1" style="margin: auto;"> <tbody> <tr> <td>Steering is in neutral position</td> <td>OFF</td> </tr> <tr> <td>Steering is turned</td> <td>ON</td> </tr> </tbody> </table>			Steering is in neutral position	OFF	Steering is turned	ON		
Steering is in neutral position	OFF							
Steering is turned	ON							
SEF228Y								
OK or NG								
OK	▶	INSPECTION END						
NG	▶	GO TO 4.						

3	CHECK OVERALL FUNCTION							
ⓘ Without CONSULT-II 1. Start engine. 2. Check voltage between ECM terminal 39 and ground.								
								
<table border="1" style="margin: auto;"> <thead> <tr> <th>Condition</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>Steering is neutral position</td> <td>Approximately 5V</td> </tr> <tr> <td>Steering is turned to full position</td> <td>Approximately 0V</td> </tr> </tbody> </table>			Condition	Voltage	Steering is neutral position	Approximately 5V	Steering is turned to full position	Approximately 0V
Condition	Voltage							
Steering is neutral position	Approximately 5V							
Steering is turned to full position	Approximately 0V							
SEF739U								
OK or NG								
OK	▶	INSPECTION END						
NG	▶	GO TO 4.						
MTBL0145								

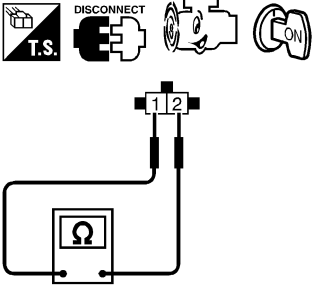
POWER STEERING OIL PRESSURE SWITCH

VG33ER

Diagnostic Procedure (Cont'd)

4	CHECK POWER STEERING OIL PRESSURE SWITCH GROUND CIRCUIT FOR OPEN AND SHORT
<p>1. Turn ignition switch OFF. 2. Disconnect power steering oil pressure switch harness connector.</p>	
	
<p>3. Check harness continuity between switch terminal 2 and engine ground. Refer to Wiring Diagram. Continuity should exist.</p> <p>4. Also check harness for short to power.</p>	
OK or NG	
OK	▶ GO TO 5.
NG	▶ Repair open circuit or short to power in harness or connectors.

5	CHECK POWER STEERING OIL PRESSURE SWITCH INPUT SIGNAL CIRCUIT
<p>1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 39 and switch terminal 1. Refer to Wiring Diagram. Continuity should exist.</p> <p>3. Also check harness for short to ground and short to power.</p>	
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 POWER STEERING OIL PRESSURE SWITCH						
<p>1. Disconnect power steering oil pressure switch harness connector then start engine. 2. Check continuity between terminals 1 and 2.</p>							
							
SEC312C							
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="width: 50%;">Conditions</th> <th style="width: 50%;">Continuity</th> </tr> </thead> <tbody> <tr> <td>Steering wheel is being fully turned</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td>Steering wheel is not being turned</td> <td style="text-align: center;">No</td> </tr> </tbody> </table>		Conditions	Continuity	Steering wheel is being fully turned	Yes	Steering wheel is not being turned	No
Conditions	Continuity						
Steering wheel is being fully turned	Yes						
Steering wheel is not being turned	No						
MTBL0254							
OK or NG							
OK	▶ GO TO 7.						
NG	▶ Replace power steering oil pressure switch.						

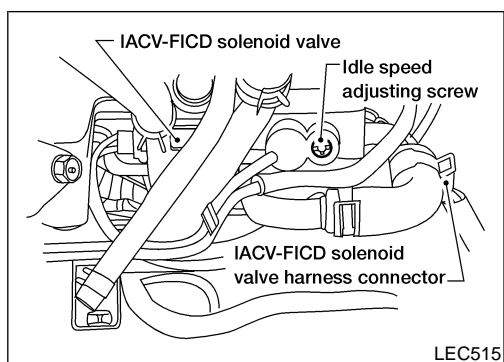
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POWER STEERING OIL PRESSURE SWITCH

VG33ER

Diagnostic Procedure (Cont'd)

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.	
	▶ INSPECTION END



LEC515

Component Description

When the air conditioner is on, the IACV-FICD solenoid valve supplies additional air to adjust to the increased load.

NGE1465

ECM Terminals and Reference Value

NGE1466

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 the ECM terminals, such as the ground.

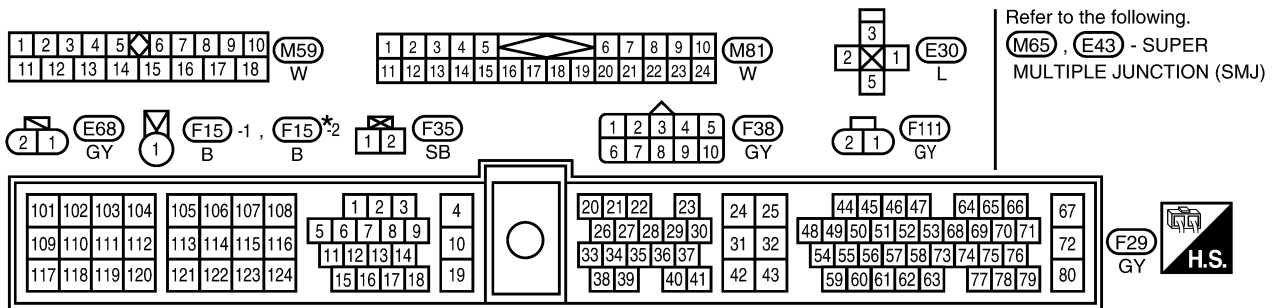
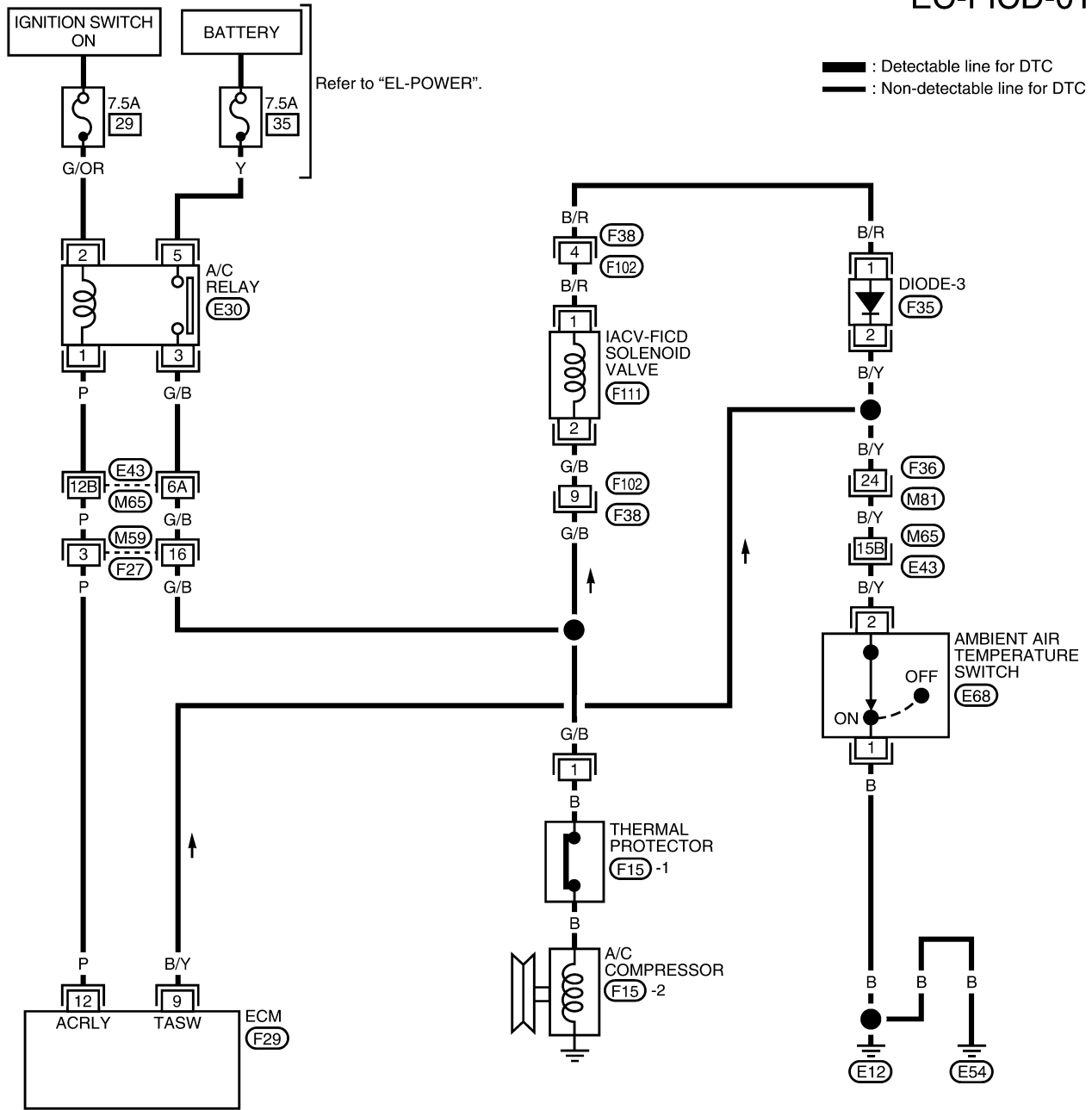
TERMI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
9	B/Y	Ambient air temperature switch	[Engine is running] ● Idle speed ● Ambient air temperature is above 25°C (77°F) ● Air conditioner is operating	0V
			[Engine is running] ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is not operating	Approximately 5V
12	P	Air conditioner relay	[Engine is running] ● Both A/C switch and blower fan switch are "ON"*	0 - 1V
			[Engine is running] ● A/C switch is "OFF"	BATTERY VOLTAGE (11 - 14V)
21	G/R	Air conditioner switch	[Engine is running] ● Both A/C switch and blower fan switch are "ON" (Compressor operates)*	Approximately 0V
			[Engine is running] ● Air conditioner switch is "OFF"	Approximately 5V

*: Any mode except "OFF", ambient air temperature is above 25°C (77°F).

Wiring Diagram

NGEC1467

EC-FICD-01



*: This connector is not shown in "HARNESS LAYOUT" of EL section.

Diagnostic Procedure

NGE1468

1	CHECK OVERALL FUNCTION	
	1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. 750±50 rpm (in "P" or "N" position) If NG, adjust idle speed. 3. Turn air conditioner switch and blower fan switch ON. 4. Recheck idle speed.	
	850 rpm or more (in "P" or "N" position)	
	OK or NG	
OK	▶	INSPECTION END
NG	▶	GO TO 2.

SEF742U

2	CHECK AIR CONDITIONER FUNCTION	
	Check if air conditioner compressor functions normally.	
	OK or NG	
OK	▶	GO TO 3.
NG	▶	Refer to "Symptom Table", "TROUBLE DIAGNOSES", HA-28 .

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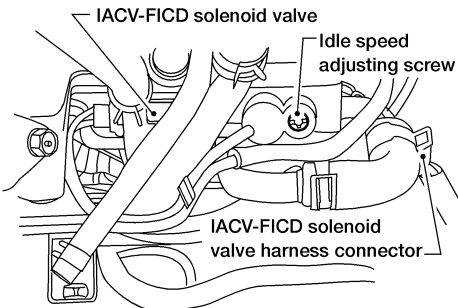
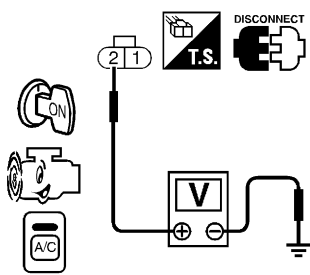
BT

HA

SC

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IDX

3	CHECK IACV-FICD SOLENOID VALVE POWER SUPPLY CIRCUIT
<ol style="list-style-type: none"> 1. Turn air conditioner switch and blower fan switch OFF. 2. Stop engine. 3. Disconnect IACV-FICD solenoid valve harness connector. 	
	
LEC515	
<ol style="list-style-type: none"> 4. Start engine, then turn air conditioner switch and blower fan switch ON. 5. Check voltage between terminal 2 and ground with CONSULT-II or tester. 	
	
<p style="color: blue;">Voltage: Battery voltage</p> <p>OK or NG</p>	
OK	▶ GO TO 5.
NG	▶ GO TO 4.

4	DETECT MALFUNCTIONING PART
Check the following. <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Harness for open or short between IACV-FICD solenoid valve and harness connector F27 	
▶	Repair harness or connectors.

5	CHECK IACV-FICD SOLENOID VALVE GROUND CIRCUIT-I
<ol style="list-style-type: none"> 1. Turn ignition switch OFF. 2. Disconnect ambient air temperature switch harness connector. 3. Check harness continuity between ambient air temperature switch terminal 1 and body ground. Refer to Wiring Diagram. Continuity should exist. 4. 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.

IACV-FICD SOLENOID VALVE

VG33ER

Diagnostic Procedure (Cont'd)

6	CHECK IACV-FICD SOLENOID VALVE GROUND CIRCUIT-II	
1. Check harness continuity between ambient air temperature switch terminal 2 and IACV-FICD solenoid valve terminal 1.		
<p>Continuity should exist.</p> <p>2. Also check harness for short to ground and short to power.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

SEF160X

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7	DETECT MALFUNCTIONING PART	
<p>Check the following.</p> <ul style="list-style-type: none"> ● Harness connectors F38, F102 ● Harness connectors F36, M81 ● Harness connectors M65, E43 ● Diode-3 ● Harness for open or short between IACV-FICD solenoid valve and ambient air temperature switch 		
▶		Repair open circuit or short to ground or short to power in harness or connectors.

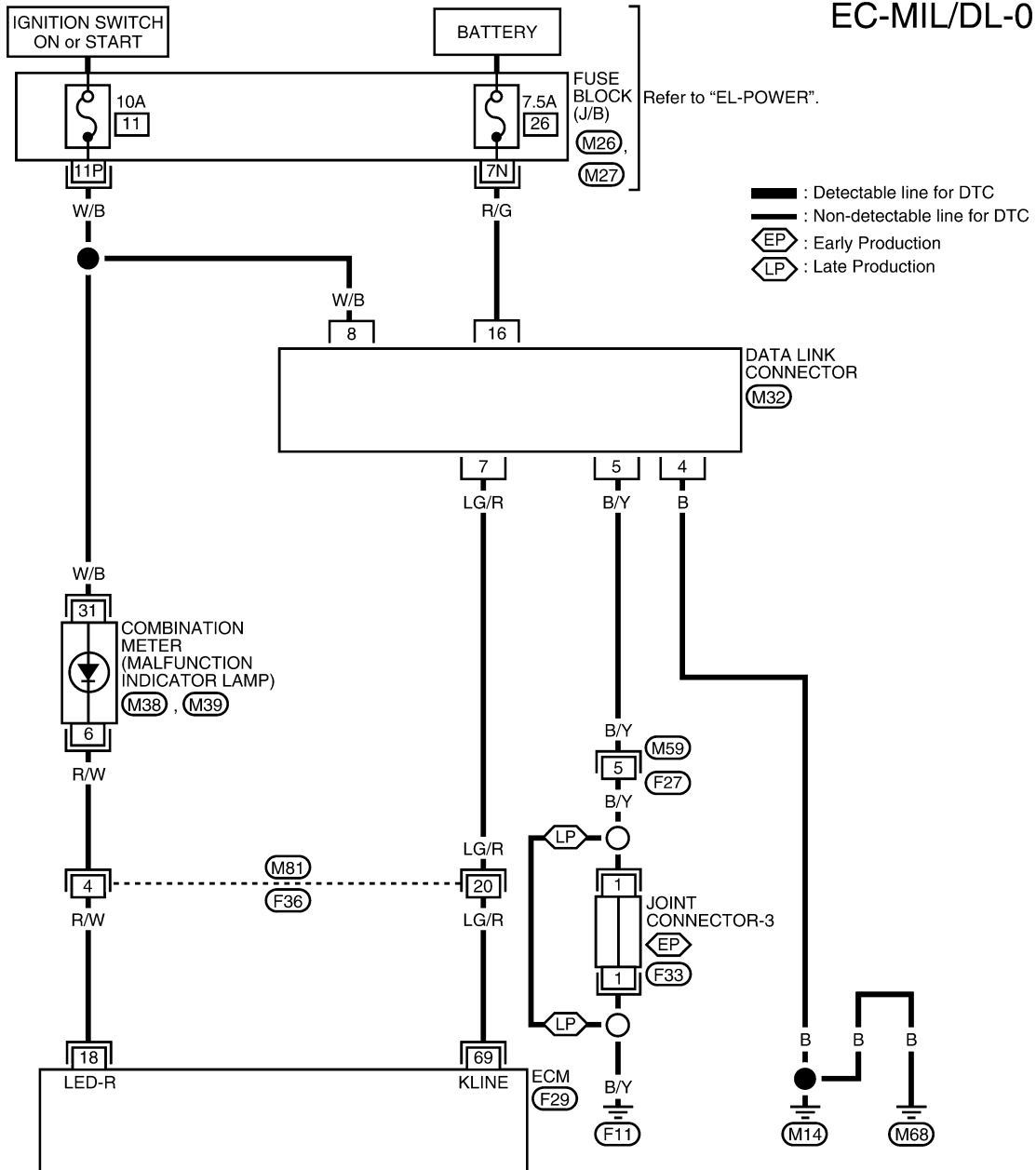
8	CHECK IACV-FICD SOLENOID VALVE	<p>Disconnect IACV-FICD solenoid valve harness connector.</p> <ul style="list-style-type: none"> ● Check for clicking sound when applying 12V direct current to terminals. <div style="text-align: center;"> </div> <ul style="list-style-type: none"> ● Check plunger for seizing or sticking. ● Check for broken spring. <div style="text-align: center;"> </div> <p style="text-align: right;">SEF682W</p> <p style="text-align: right;">SEF097K</p> <p style="text-align: center;">OK or NG</p>	
OK	▶	GO TO 9.	
NG	▶	Replace IACV-FICD solenoid valve.	

9	CHECK INTERMITTENT INCIDENT	<p>Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1312.</p>	
	▶	INSPECTION END	

Wiring Diagram

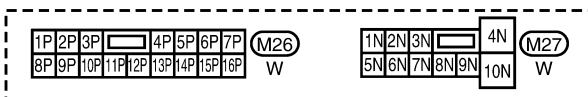
NGEC1469

EC-MIL/DL-01

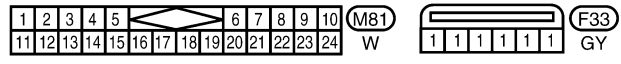
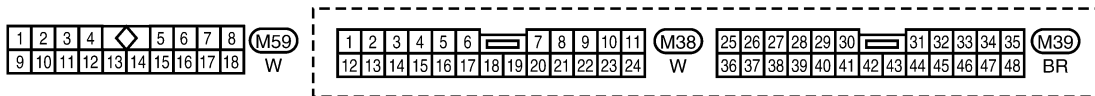


: Detectable line for DTC
 : Non-detectable line for DTC
EP : Early Production
LP : Late Production

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Refer to the following.
F29 - ELECTRICAL UNITS



Fuel Pressure Regulator

NGEC1470

Fuel pressure at idling kPa (kg/cm ² , psi)		
Vacuum hose is connected		Approximately 235 (2.4, 34)
Vacuum hose is disconnected		Approximately 294 (3.0, 43)

Idle Speed and Ignition Timing

NGEC1471

Base idle speed*1	No-load*4 (in "P" or N" position)	700±50 rpm
Target idle speed*2	No-load*4 (in "P" or N" position)	750±50 rpm
Air conditioner: ON	In "P" or N" position	850 rpm or more
Ignition timing*3	In "P" or N" position	10°±1° BTDC
Throttle position sensor idle position		0.15 - 0.85V

*1: Throttle position sensor harness connector disconnected or using CONSULT-II "WORK SUPPORT" mode

*2: Throttle position sensor harness connector connected

*3: Throttle position sensor harness connector disconnected

*4: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Coil

NGEC1472

Primary voltage	12V
Primary resistance [at 20°C (68°F)]	Approximately 1.0Ω
Secondary resistance [at 20°C (68°F)]	Approximately 10 kΩ

Mass Air Flow Sensor

NGEC1473

Supply voltage	Battery voltage (11 - 14)V
Output voltage at idle	1.0 - 1.7V
Mass air flow (Using CONSULT-II or GST)	3.3 - 4.8 g-m/sec at idle* 12.0 - 14.9 g-m/sec at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no-load.

Engine Coolant Temperature Sensor

NGEC1474

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

Heated Oxygen Sensor 1 Heater

NGEC1475

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω
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Fuel Pump

NGEC1476

Resistance [at 25°C (77°F)]	0.2 - 5.0Ω
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IACV-AAC Valve

NGEC1477

Resistance [at 20°C (68°F)]	Approximately 10.0Ω
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Injector

NGEC1478

Resistance [at 25°C (77°F)]	10 - 14Ω
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GI

Throttle Position Sensor

NGEC1479

Throttle valve conditions	Voltage [at normal operating temperature, engine off, ignition switch ON, (throttle opener disengaged, if so equipped)]
Completely closed (a)	0.15 - 0.85V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.7V

MA

EM

LC

EC

Calculated Load Value

NGEC1480

	Calculated load value % (Using CONSULT or GST)
At idle	18.0 - 26.0
At 2,500 rpm	18.0 - 21.0

FE

CL

Intake Air Temperature Sensor

NGEC1481

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38

MT

AT

Heated Oxygen Sensor 2 Heater

NGEC1482

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω
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TF

PD

Crankshaft Position Sensor (OBD)

NGEC1483

Resistance [at 20°C (68°F)]	512 - 632Ω
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AX

Fuel Tank Temperature Sensor

NGEC1484

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

SU

BR

ST

RS

BT

HA

SC

EL

IDX

NOTES