PROBLEM SYMPTOMS TABLE

SFI SYSTEM

Symptom	Suspected area	See page
Engine does not crank (does not start)	1. Starter	ST-8
	2. ST Relay	ST-13
	3. Park/neutral position switch	AX-42
No initial combustion (does not start)	1. ECM power source circuit	ES-336
	2. Fuel pump control circuit	ES-341
	3. ECM	ES-388
No complete combustion (does not start)	Fuel pump control circuit	ES-341
Difficult to start (engine cranks normally)	1. Starter signal circuit	ES-236
	2. Fuel pump control circuit	ES-341
	3. Compression	EM-1
Difficult to start with cold engine	1. Starter signal circuit	ES-236
	2. Fuel pump control circuit	ES-341
Difficult to start with hot engine	1. Starter signal circuit	ES-236
	2. Fuel pump control circuit	ES-341
High engine idle speed (poor idling)	1. A/C signal circuit (Compressor circuit)	AC-108
	2. ECM power source circuit	ES-336
Low engine idle speed (poor idling)	1. A/C signal circuit (Compressor circuit)	AC-108
	2. Fuel pump control circuit	ES-341
Rough idling (poor idling)	1. Compression	EM-1
	2. Fuel pump control circuit	ES-341
Hunting (poor idling)	1. ECM power source circuit	ES-336
	2. Fuel pump control circuit	ES-341
Hesitation/Poor acceleration (poor driveability)	1. Fuel pump control circuit	ES-341
	2. A/T faulty	AX-38
Surging (poor driveability)	Fuel pump control circuit	ES-341
Engine stalls soon after starting	Fuel pump control circuit	ES-341
Engine stalls during A/C operation	1. A/C signal circuit (Compressor circuit)	AC-108
	2. ECM	ES-388
Unable to refuel/Difficult to refuel	ORVR system	-

ES

TERMINALS OF ECM

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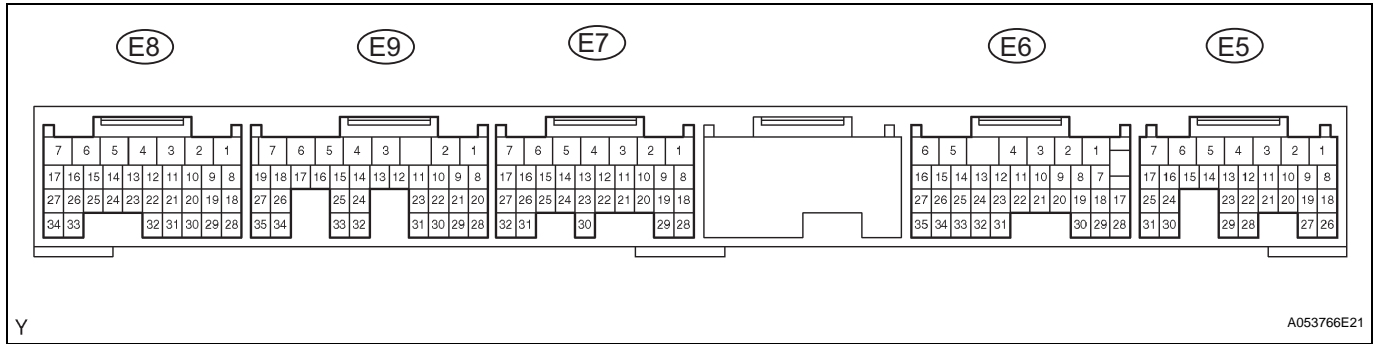
HINT:
Each ECM terminal's standard voltage is shown in the table below. In the table, first follow the information under "Condition". Next look under "Symbols (Terminal No.)" for the terminals to be inspected. The standard voltage between the terminals is shown under "Specific Condition". Use the illustration above as a reference for the ECM terminals.

ES

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	STD Voltage (V)
BATT (E5-3) - E1 (E7-1)	B - BR	Battery (for measuring the battery voltage and for the ECM memory)	Always	9 to 14
+BM (E6-6) - E1 (E7-1)	LG - BR	Power source of throttle motor	Always	9 to 14
IGSW (E5-9) - E1 (E7-1)	G - BR	Ignition switch	IG switch ON	9 to 14
+B (E5-1) - E1 (E7-1)	L-B - BR	Power source of ECM	IG switch ON	9 to 14
+B2 (E5-2) - E1 (E7-1)	L-B - BR	Power source of ECM	IG switch ON	9 to 14
OC1+ (E7-16) - OC1- (E7-15)	G-W - G-R	Camshaft timing oil control valve (OCV)	IG switch ON	Pulse generation (See page ES-57)
OC2+ (E7-14) - OC2- (E7-13)	L-R - G-B	Camshaft timing oil control valve (OCV)	IG switch ON	Pulse generation (See page ES-57)
MREL (E5-8) - E1 (E7-1)	LG - BR	EFI relay	IG switch ON	9 to 14
VC (E8-18) - E2 (E8-28)	Y - BR	Power source of sensor (a specific voltage)	IG switch ON	4.5 to 5.5
VG (E8-30) - E2G (E8-29)	R - L-W	Mass air flow sensor	Idling, shift lever position P or N position, A/C switch OFF	0.5 to 3.0
THA (E8-20) - E2 (E8-28)	L-B - BR	Intake air temperature sensor	Idling, Intake air temp. 20°C (68°F)	0.5 to 3.4
THW (E8-19) - E2 (E8-28)	G-B - BR	Engine coolant temperature sensor	Idling, Engine coolant temp. 80°C (176°F)	0.2 to 1.0
VTA1 (E8-21) - E2 (E8-28)	R-W - BR	Throttle position sensor (for the engine control)	IG switch ON, Accelerator pedal released	0.5 to 1.2
VTA1 (E8-21) - E2 (E8-28)	R-W - BR	Throttle position sensor (for the engine control)	IG switch ON, Accelerator pedal depressed	3.2 to 4.8
VTA2 (E8-31) - E2 (E8-28)	B-R - BR	Throttle position sensor (for the sensor malfunction detection)	IG switch ON, Accelerator pedal released	2.1 to 3.1
VTA2 (E8-31) - E2 (E8-28)	B-R - BR	Throttle position sensor (for the sensor malfunction detection)	IG switch ON, Accelerator pedal depressed	4.5 to 5.5
VPA (E5-22) - EPA (E5-28)	W - V	Accelerator pedal position sensor (for the engine control)	IG switch ON, Accelerator pedal released	0.5 to 1.1
VPA (E5-22) - EPA (E4-28)	W - V	Accelerator pedal position sensor (for the engine control)	IG switch ON, Accelerator pedal depressed	2.6 to 4.5
VPA2 (E5-23) - EPA2 (E5-29)	R - O	Accelerator pedal position sensor (for the sensor malfunction detection)	IG switch ON, Accelerator pedal released	1.2 to 2.0

ES

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	STD Voltage (V)
VPA2 (E5-23) - EPA2 (E5-29)	R - O	Accelerator pedal position sensor (for the sensor malfunction detection)	IG switch ON, Accelerator pedal depressed	3.4 to 5.3
VCPA (E5-26) - EPA (E5-28)	B - V	Power source of accelerator pedal position sensor (for VPA)	IG switch ON	4.5 to 5.5
VCP2 (E5-27) - EPA2 (E5-29)	SB - O	Power source of accelerator pedal position sensor (for VPA2)	IG switch ON	4.5 to 5.5
HA1A (E9-5) - E04 (E9-7) HA2A (E9-4) - E05 (E9-6)	B-W - W-B R-W - W-B	A/F sensor heater	Idling	Below 3.0
HA1A (E9-5) - E04 (E9-7) HA2A (E9-4) - E05 (E9-6)	B-W - W-B R-W - W-B	A/F sensor heater	IG switch ON	9 to 14
A1A+ (E9-22) - E1 (E7-1)	BR - BR	A/F sensor	IG switch ON	3.0 to 3.6
A2A+ (E9-23) - E1 (E7-1)	P - BR	A/F sensor	IG switch ON	3.0 to 3.6
A1A- (E9-30) - E1 (E7-1)	Y- BR	A/F sensor	IG switch ON	2.7 to 3.3
A2A- (E9-31) - E1 (E7-1)	L - BR	A/F sensor	IG switch ON	2.7 to 3.3
HT1B (E9-25) - E2 (E8-28) HT2B (E9-33) - E2 (E8-28)	R-Y - BR W-L - BR	Heated oxygen sensor heater	Idling	Below 3.0
HT1B (E9-25) - E2 (E8-28) HT2B (E9-33) - E2 (E8-28)	R-Y - BR W-L - BR	Heated oxygen sensor heater	IG switch ON	9 to 14
OX1B (E9-21) - E2 (E8-28) OX2B (E9-29) - E2 (E8-28)	W - BR B - BR	Heated oxygen sensor	Maintain engine speed at 2,500 rpm for 2 minutes after warming up	Pulse generation
#10 (E8-1) - E01 (E8-7) #20 (E8-2) - E01 (E8-7) #30 (E8-3) - E01 (E8-7) #40 (E8-4) - E01 (E8-7) #50 (E8-5) - E01 (E8-7) #60 (E9-3) - E01 (E8-7)	L - W-B Y - W-B B - W-B W - W-B B-W - W-B G - W-B	Injector	IG switch ON	9 to 14
#10 (E8-1) - E01 (E8-7) #20 (E8-2) - E01 (E8-7) #30 (E8-3) - E01 (E8-7) #40 (E8-4) - E01 (E8-7) #50 (E8-5) - E01 (E8-7) #60 (E9-3) - E01 (E8-7)	L - W-B Y - W-B B - W-B W - W-B B-W - W-B G - W-B	Injector	Idling	Pulse generation (See page ES-152)
KNK1 (E9-1) - EKNK (E9-28)	B - W	Knock sensor	Maintain engine speed at 4,000 rpm after warming up	Pulse generation (See page ES-165)
KNK2 (E9-2) - EKN2 (E9-20)	R - G	Knock sensor	Maintain engine speed at 4,000 after warming up	Pulse generation (See page ES-165)
VV1+ (E7-27) - NE- (E7-24)	B-W - G	Variable valve timing (VVT) sensor	Idling	Pulse generation (See page ES-170)
VV2+ (E7-26) - NE- (E7-24)	L - G	Variable valve timing (VVT) sensor	Idling	Pulse generation (See page ES-170)
NE+ (E7-25) - NE- (E7-24)	R - G	Crankshaft position sensor	Idling	Pulse generation (See page ES-170)
IGT1 (E8-8) - E1 (E7-1) IGT2 (E8-9) - E1 (E7-1) IGT3 (E8-10) - E1 (E7-1) IGT4 (E8-11) - E1 (E7-1) IGT5 (E8-12) - E1 (E7-1) IGT6 (E8-13) - E1 (E7-1)	R-L - BR P - BR Y-B - BR L-Y - BR G-Y - BR L-R - BR	Ignition coil with igniter (ignition signal)	Idling	Pulse generation (See page ES-182)
IGF1 (E8-24) - E1 (E7-1)	W-R - BR	Ignition coil igniter (ignition confirmation signal)	IG switch ON	4.5 to 5.0
IGF1 (E8-24) - E1 (E7-1)	W-R - BR	Ignition coil igniter (ignition confirmation signal)	Idling	Pulse generation (See page ES-182)
PRG (E8-34) - E1 (E7-1)	G - BR	VSV for EVAP	IG switch ON	9 to 14
CCV (E8-27) - E1 (E7-1)	L - BR	VSV for CCV	IG switch ON	9 to 14
PTNK (E5-21) - E2 (E8-28)	V - BR	Vapor pressure sensor	Ignition switch ON	2.9 to 3.7

| Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	STD Voltage (V)
PTNK (E5-21) - E2 (E8-28)	V - BR	Vapor pressure sensor	Apply vacuum 4.0 kPa (30 mmHg, 1.18 in.Hg)	Below 0.5
SPD (E6-17) - E1 (E7-1)	LG - BR	Speed signal from combination meter	IG switch ON, Rotate driving wheel slowly	Pulse generation (See page ES-218)
STA (E8-17) - E1 (E7-1)	B - BR	Starter signal	Shift lever position P or N, Ignition switch START	9 to 14
STP (E6-19) - E1 (E7-1)	B - BR	Stop light switch	Brake pedal is depressed	7.5 to 14
STP (E6-19) - E1 (E7-1)	B - BR	Stop light switch	Brake pedal is released	Below 1.5
NSW (E8-16) - E1 (E7-1)	B-Y - BR	Park/neutral position switch	IG switch ON, Shift position in P, N	0 to 3.0
NSW (E8-16) - E1 (E7-1)	B-Y - BR	Park/neutral position switch	IG switch ON, Other shift position in P, N	9 to 14
M+ (E7-3) - ME01 (E7-4) M- (E7-2) - ME01 (E7-4)	B - W-B W - W-B	Throttle motor	Idling	Pulse generation
FC (E5-10) - E1 (E7-1)	O - BR	Fuel pump control	IG switch ON	9 to 14
W (E5-11) - E1 (E7-1)	BR - BR	MIL	IG switch ON	Below 3.0
W (E5-11) - E1 (E7-1)	BR - BR	MIL	Idling	9 to 14
ELS (E5-12) - E1 (E7-1)	SB- BR	Electric load	Power outlet OFF	0 to 1.5
ELS (E5-12) - E1 (E7-1)	SB - BR	Electric load	Power outlet ON	7.5 to 14
TC (E5-20) - E1 (E7-1)	BR - BR	Terminal TC of DLC3	IG switch ON	9 to 14
SIL (E5-18) - E1 (E7-1)	GR - BR	Terminal SIL of DLC3	During charge gears	Pulse generation
TACH (E5-5) - E1 (E7-1)	W - BR	Engine speed	Idling	Pulse generation
AICV (E8-33) - E1 (E7-1)	W - BR	VSV for AICV	IG switch ON	9 to 14
ACIS (E8-15) - E1 (E7-1)	R-Y - BR	VSV for ACIS	IG switch ON	9 to 14
ACM (E7-6) - E1 (E7-1)	Y-G - BR	VSV for ACM	IG switch ON	9 to 14
ENG+ (E5-24) - ENG- (E5-30)	LG - L	Electric load (from skid control ECU)	Idling	Pulse generation
TRC+ (E5-25) - TRC- (E5-31)	Y - G	Electric load (from skid control ECU)	Idling	Pulse generation
PSW (E7-10) - E1 (E7-1)	R-W - BR	P/S pressure switch	IG switch ON	9 to 14

CHECK

FI00534

DIAGNOSIS SYSTEM

1. DESCRIPTION

- When troubleshooting On-Board Diagnostic (OBD II) vehicles, the vehicle must be connected to the OBD II scan tool (in compliance with SAE J1978) or the intelligent tester. Various data output from the vehicle's ECM can then be read.
- OBD II regulations require that the vehicle's on-board computer illuminates the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in: 1) the emission control system/components, or 2) the powertrain control components (which affect vehicle emissions), or 3) the computer. In addition, the applicable Diagnostic Trouble Codes (DTCs) prescribed by SAE J2012 are recorded in the ECM memory (See page ES-37).

If the malfunction does not reoccur in 3 consecutive trips, the MIL turns off automatically but the DTCs remain recorded in the ECM memory.
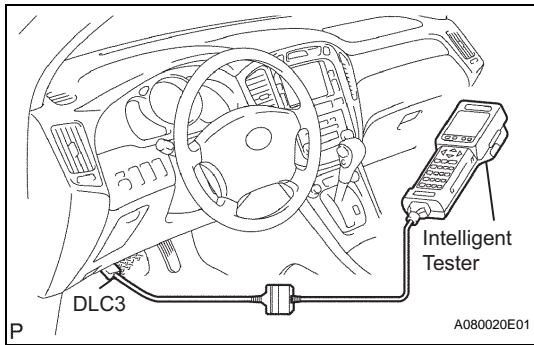
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- To check DTCs, connect the intelligent tester or OBD II scan tool to the Data Link Connector 3 (DLC3) of the vehicle. The intelligent tester or OBD II scan tool also enables you to erase the DTC and check freeze frame data and various forms of engine data (see the instruction manual for the OBD II scan tool or the intelligent tester). The DTC includes SAE controlled codes and manufacturer controlled codes. SAE controlled codes must be set according to the SAE, while manufacturer controlled codes can be set by a manufacturer with certain restrictions (See page ES-28).
- The diagnosis system operates in "normal mode" during normal vehicle use. In "normal mode", 2 trip detection logic* is used to ensure accurate detection of malfunctions. A "check mode" is also available to technicians as an option. In "check mode", 1 trip detection logic is used for simulating malfunction symptoms and increasing the system's ability to detect malfunctions, including intermittent malfunctions (intelligent tester only) (see page ES-29).
- *2 trip detection logic: When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory (1st trip). If the ignition switch is turned OFF and then ON again, and the same malfunction is detected again, the MIL will illuminate (2nd trip).
- Freeze frame data: The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air/fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

Priorities for troubleshooting: When multiple DTCs occur, find out the order in which the DTCs should be inspected by checking the component's DTC chart. If no instructions are written in the DTC chart, check DTCs in following order of priority:
- (a) DTCs other than fuel trim malfunction DTCs (P0171, P0172, P0174 and P0175) and misfire DTCs (P0300 to P0306).
- (b) Fuel trim malfunction DTCs (P0171, P0172, P0174 and P0175).
- (c) Misfire DTCs (P0300 to P0306).

DLC3

1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16

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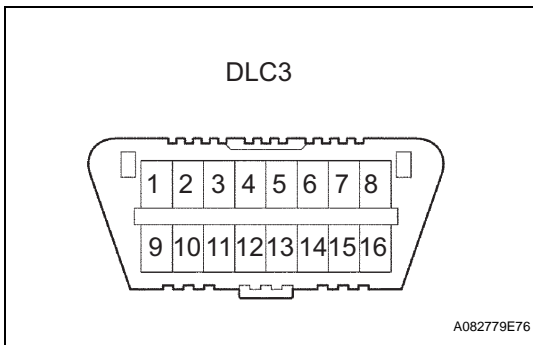
2. CHECK DLC3

The vehicle's ECM uses the ISO 9141-2 communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.

Symbols	Terminal No.	Names	Reference terminal	Results	Condition
SIL	7	Bus "+" line	5 - Signal ground	Pulse generation	During transmission
CG	4	Chassis ground	Body ground	1 Ω or less	Always
SG	5	Signal ground	Body ground	1 Ω or less	Always
BAT	16	Battery ground	Body ground	9 to 14 V	Always

HINT:

Connect the cable of the OBD II scan tool or the intelligent tester to the DLC3, turn the ignition switch ON and attempt to use the OBD II scan tool or the intelligent tester. If the screen displays UNABLE TO CONNECT TO VEHICLE, a problem exists in the vehicle side or the tester side.

• If the communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.

• If the communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself. Consult the Service Department listed in the tool's instruction manual.

3. CHECK BATTERY VOLTAGE
Battery Voltage:
11 to 14 V

If voltage is below 11 V, replace or recharge the battery before proceeding.

4. CHECK THE MIL

(a) The MIL turns ON when the ignition switch is turned ON and the engine is not running.
HINT:
If the MIL does not turn ON, troubleshoot the MIL circuit (See page).

(b) When the engine is started, the MIL should turn OFF. If the lamp remains ON, the diagnosis system has detected a malfunction or abnormality in the system.