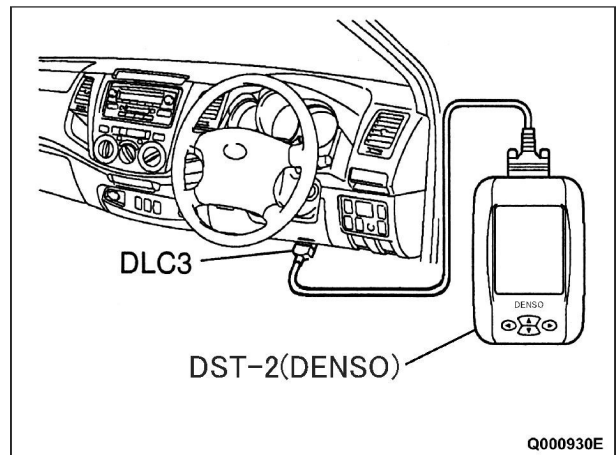
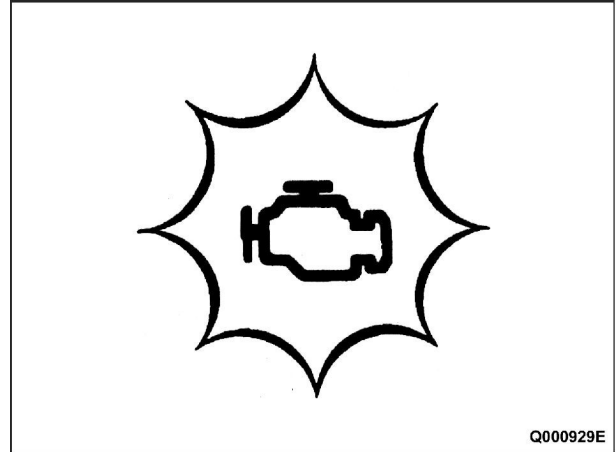


4 DIAGNOSIS SYSTEM

4-1. DESCRIPTION

- When troubleshooting Multiplex OBD (M-OBD) vehicles, the vehicle must be connected to the DST-2. Various data output from the vehicle's Engine Control Unit (ECU) can then be read.
- The vehicle's on-board computer illuminates the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in the computer itself or in drive system components. In addition, the applicable Diagnostic Trouble Codes (DTCs) are recorded in the ECU memory.
- If the malfunction does not reoccur, the MIL turns ON until the ignition switch is turned OFF, and then the MIL turns OFF when the ignition switch is turned ON but the DTCs remain recorded in the ECU memory.
- To check the DTCs, connect the DST-2 to the DLC3 (Data Link Connector 3) on the vehicle or connect terminals TC and CG on the DLC3 (DTCs will be displayed in the combination meter).



A. Normal Mode and Check Mode

- a. 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.

B. 2 Trip Detection Logic

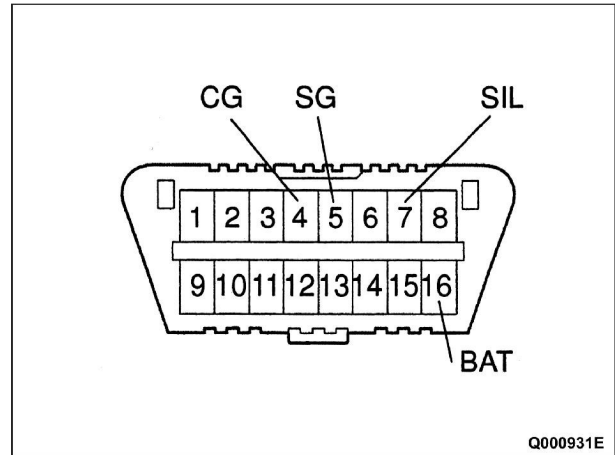
- a. When a malfunction is first detected, the malfunction is temporarily stored in the ECU memory (1st trip). If the same malfunction is detected during the next subsequent drive cycle, the MIL is illuminated (2nd trip).

C. Freeze Frame Data

- a. The freeze frame data records the engine conditions (fuel system, calculated engine load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc) when a malfunction is detected. When troubleshooting, the freeze frame data can help determine if the vehicle was running stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data, from the time the malfunction occurred.

D. DLC3

- a. The vehicle's ECU uses the ISO 14230 (M-OBD) communication protocol. The terminal arrangement of the DLC3 complies with ISO 15031-03 and matches the ISO 14230 format.



Q000931E

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1Ω
SG (5) - Body ground	Signal ground	Always	Below 1Ω
BAT (16) - Body ground	Battery positive	Always	9 to 14 V

< NOTE >

- Connect the cable of the DST-2 to the DLC3, turn the ignition switch ON and attempt to use the DST-2. If the display informs that a communication error has occurred, there is a problem either with the vehicle or with the tester.
- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still impossible when the tester is connected to another vehicle, the problem is probably in the tester itself. Consult the Service Department listed in the tester's instruction manual.

E. Inspect Battery Voltage

Battery voltage	11 to 14 V
-----------------	------------

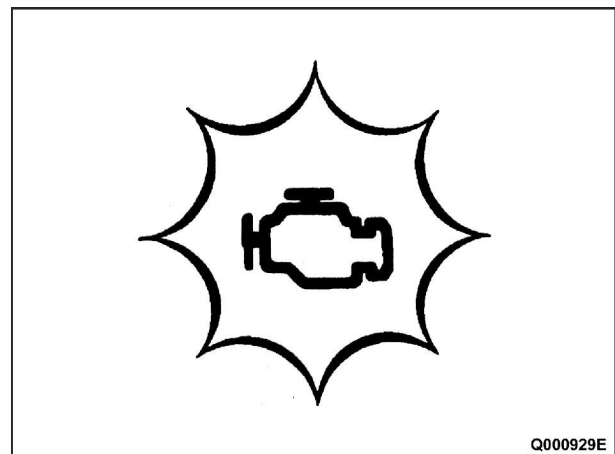
- a. If the voltage is below 11 V, recharge the battery before proceeding.

F. Check MIL

- a. The MIL illuminates when the ignition switch is turned ON and the engine is not running.

< NOTE >

- If the MIL is not illuminated, check the MIL circuit.
- 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.



Q000929E

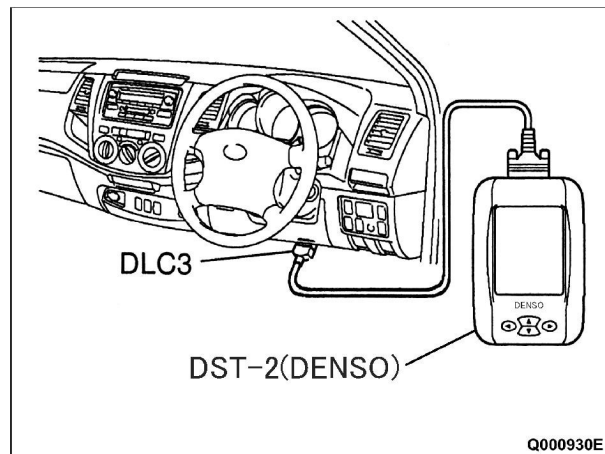
4-2. DTC CHECK/CLEAR

< CAUTION >

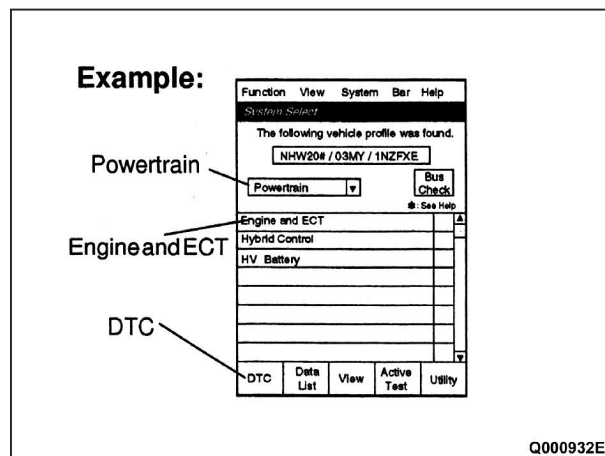
- DST-2 only: When the diagnosis system is changed from normal mode to check mode, or vice versa, all the DTCs and freeze frame data recorded in normal mode are erased. Before changing modes, always check and make a note of any DTCs and freeze frame data.

A. Check DTC (using the DST-2)

- Connect the DST-2 to the DLC3.
- Turn the ignition switch ON and turn the DST-2 ON.

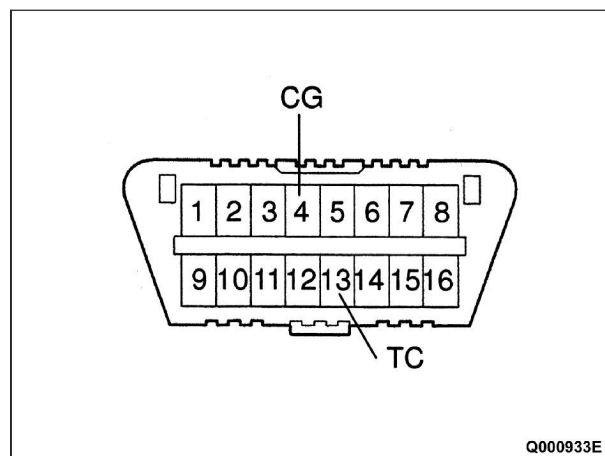


- Enter the following menus: Powertrain/Engine and ECT/ DTC.
- Check and make a note of DTCs and freeze frame data.
- See page 48 to confirm the details of the DTCs.

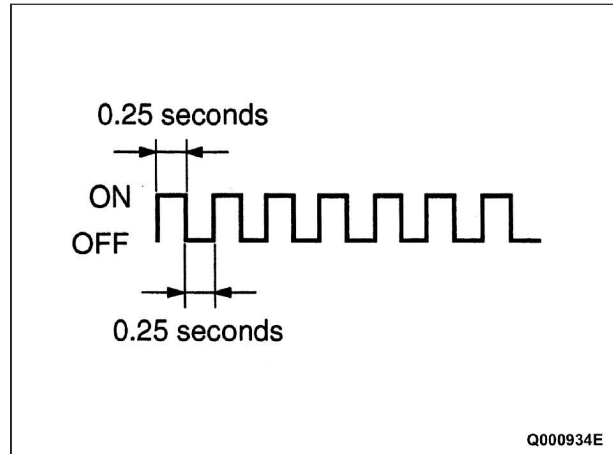


B. Check DTC (not using the DST-2)

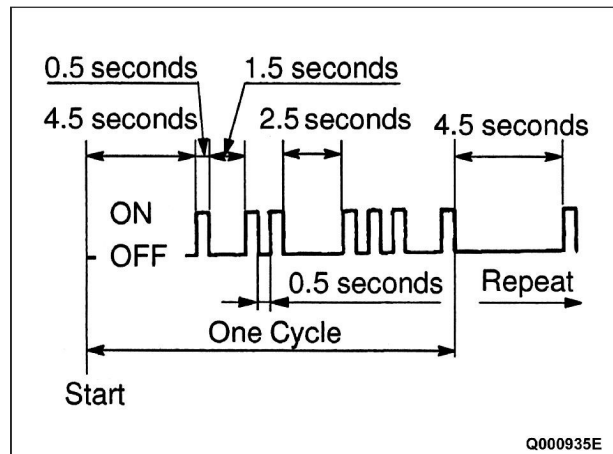
- Turn the ignition switch ON.
- Using SST (09843-18040), connect between terminals 13 (TC) and 4 (CG) of the DLC3.



- c. Read DTCs by observing the MIL. If any DTC is not detected, the MIL blinks as shown in the illustration.



- d. Example: If DTCs 12 and 31 are detected, the MIL flashes once (for 0.5 second) and flashes twice after the 1.5 second interval, then, flashes 3 times after a 2.5 second interval from the previous DTC and flashes once. If the interval between the previous DTC and the next DTC is 4.5 seconds, it means the previous DTC is the last one of the multiple string DTCs. The MIL repeats the indication of DTCs from the initial cycle (refer to the illustration on the left).



- e. Check the details of the malfunction using the DTC chart on page 48.
- f. After completing the check, disconnect terminals 13 (TC) and 4 (CG) and turn off the display.

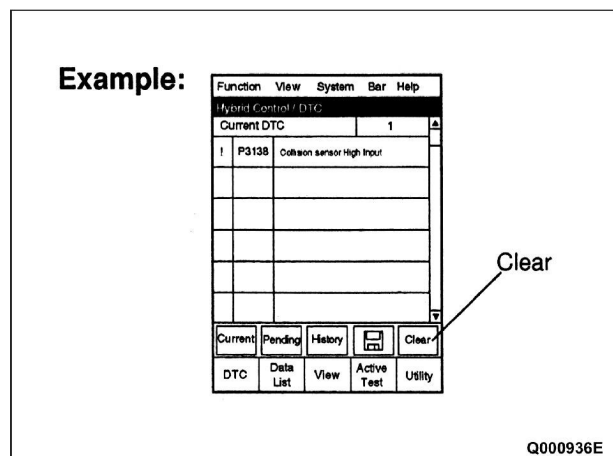
< NOTE >

- If 2 or more DTCs are detected, the MIL will indicate the smaller number DTC first.

- g. See page 48 to confirm the details of the DTCs.

C. Clear DTCs and Freeze Frame Data (using the DST-2)

- Connect the DST-2 to the DLC3.
- Turn the ignition switch ON (do not start the engine) and turn the DST-2 ON.
- Enter the following menus: Powertrain/Engine and ECT/ DTC/Clear.
- Erase DTCs and freeze frame data by pressing the YES button on the tester.



D. Clear DTCs and Freeze Frame Data (without using the DST-2)

a. Perform either one of the following operations.

- (1) Disconnect the battery negative (-) cable for more than 1 minute.
- (2) Remove the EFI fuse from the engine room R/B located inside the engine compartment for more than 1 minute.

< CAUTION >

- When disconnecting the battery cable, perform the INITIALIZE procedure.

4-3. CHECK MODE PROCEDURE

< NOTE >

- DST-2 only: Compared to normal mode, check mode is more sensitive to malfunctions. Therefore, check mode can detect the malfunctions that cannot be detected by normal mode. In check mode, the ECU sets DTCs using 1 trip detection logic.

< CAUTION >

- All the stored DTCs and freeze frame data are erased if: 1) the ECU is changed from normal mode to check mode or vice versa; 2) the ignition switch is turned from ON to ACC or OFF while in check mode. Before changing modes, always check and make a note of any DTCs and freeze frame data.

A. Check Mode Procedure

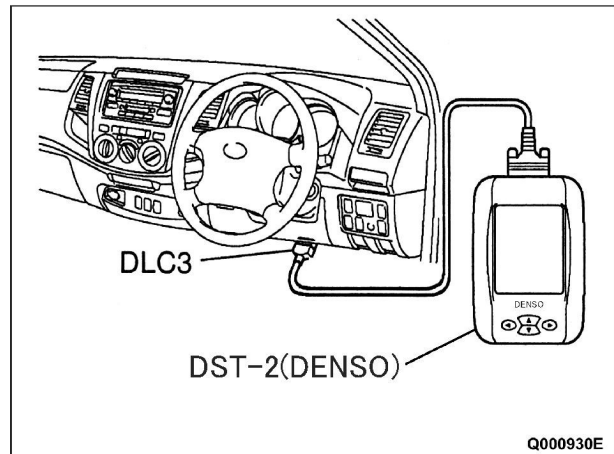
a. Make sure that the vehicle is in the following condition:

- (1) Battery voltage 11 V or more.
- (2) Throttle valve fully closed.
- (3) Shift lever in N position.
- (4) A/C switch turned OFF.

b. Turn the ignition switch OFF.

c. Connect the DST-2 to the DLC3.

d. Turn the ignition switch ON and turn the DST-2 ON.



e. Enter the following menus: Powertrain/Engine and ECT/ Check Mode.

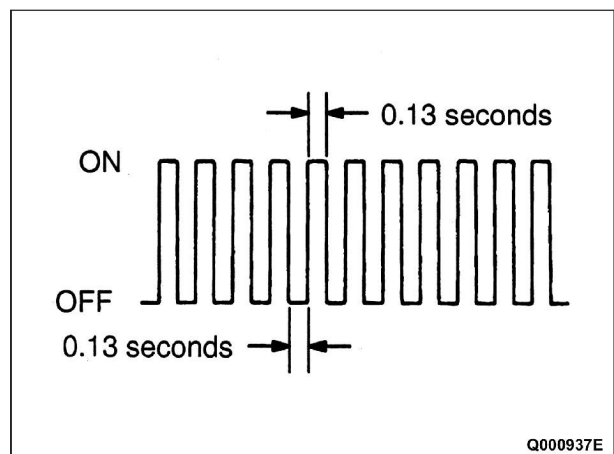
f. Make sure the MIL flashes as shown in the illustration.

g. Start the engine (the MIL should turn off).

h. Simulate the conditions of the malfunction described by the customer.

i. Check the DTC(s) and freeze frame data using the DST-2.

j. After checking the DTC, inspect the appropriate circuits.



4-4. DTC (DIAGNOSTIC TROUBLE CODE) CHART

< NOTE >

- The parameters listed in the chart are for reference only. Factors such as instrument type may cause readings to differ slightly from stated values.
- If any DTCs are displayed during a check mode DTC check, check the circuit for the DTCs listed in the table below.

DTC No.	Detection Item	Trouble Area	*1 MIL	*2 Memory
P0045*3	Turbo/Super Charger Boost Control Solenoid Circuit/Open [Turbocharger system malfunction]	- Turbo motor driver - Open or short in turbo motor driver circuit - ECU	O	O
P0087/49	Fuel Rail/System Pressure - Too Low [Fuel pressure sensor system malfunction]	- Open or short in fuel pressure sensor circuit - Fuel pressure sensor - ECU	O	O
P0088/78	Fuel Rail/System Pressure - Too High [Common rail system malfunction]	- Supply pump (suction control valve) - Pressure limiter - Short in supply pump (suction control valve) circuit - ECU	O	O
P0093/78	Fuel System Leak Detected - Large Leak [Fuel leaks in common rail system]	- Fuel line between supply pump and common rail - Fuel line between common rail and each injector - Supply pump - Common rail - Injectors - Pressure limiter - Open or short in EDU circuit (P0200 set simultaneously) - Open or short in injector circuit - EDU (P0200 set simultaneously) - ECU	O	O
P0095/23*3,*4	Intake Air Temperature Sensor 2 Circuit [Intake air temperature sensor (intake air connector)]	- Open or short in diesel turbo IAT sensor circuit - Diesel turbo IAT sensor - ECU	O	O
P0097/23*3,*4	Intake Air Temperature Sensor 2 Circuit Low [Intake air temperature sensor low input (intake air connector)]		O	O
P0098/23*3,*4	Intake Air Temperature Sensor 2 Circuit High [Intake air temperature sensor high input (intake air connector)]		O	O

DTC No.	Detection Item	Trouble Area	*1 MIL	*2 Memory
P0100/31 ^{*3}	Mass or Volume Air Flow Circuit [Mass air flow meter]	- Open or short in MAF meter circuit - MAF meter - ECU	O	O
P0102/31 ^{*3}	Mass or Volume Air Flow Meter Circuit Low Input [Mass air flow meter low input]	- Open or short in MAF meter circuit - MAF meter - ECU	O	O
P0103/31 ^{*3}	Mass or Volume Air Flow Meter Circuit High Input [Mass air flow meter high input]		O	O
P0105/31	Manifold Absolute Pressure/ Barometric Pressure Circuit [Intake air pressure sensor]	- Open or short in manifold absolute pressure sensor circuit - Manifold absolute pressure sensor - Turbocharger sub-assy - EGR valve assy - ECU	O	O
P0107/31	Manifold Absolute Pressure/ Barometric Pressure Circuit Low Input [Intake air pressure sensor low input]	- Open or short in manifold absolute pressure sensor circuit - Manifold absolute pressure sensor - Turbocharger sub-assy - EGR valve assy - ECU	O	O
P0108/31	Manifold Absolute Pressure/ Barometric Pressure Circuit High Input [Intake air pressure sensor high input]		O	O
P0110/24	Intake Air Temperature Circuit [Intake air temperature sensor (built into mass air flow meter)]	- Open or short in IAT sensor circuit - IAT sensor (built into MAF meter) ^{*1} - IAT sensor ^{*4,*5} - ECU	O	O
P0112/24	Intake Air Temperature Circuit Low Input [Intake air temperature sensor (built into mass air flow meter) low input]		O	O
P0113/24	Intake Air Temperature Circuit High Input [Intake air temperature sensor (built into mass air flow meter) high input]		O	O
P0115/22	Engine Coolant Temperature Circuit [Engine coolant temperature sensor]	- Open or short in ECT sensor circuit - ECT sensor - ECU	O	O

DTC No.	Detection Item	Trouble Area	*1 MIL	*2 Memory
P0117/22	Engine Coolant Temperature Circuit Low Input [Engine coolant temperature sensor low input]	- Open or short in ECT sensor circuit - ECT sensor - ECU	0	0
P0118/22	Engine Coolant Temperature Circuit High Input [Engine coolant temperature sensor high input]		0	0
P0120/41	Throttle/Pedal Position Sensor/Switch "A" Circuit[Intake shutter (throttle valve) position sensor]	- Open or short in throttle position sensor circuit - Throttle position sensor - ECU	0	0
P0122/41	Throttle/Pedal Position Sensor/Switch "A" Circuit Low Input[Intake shutter (throttle valve) position sensor low input]	- Throttle position sensor - Open or short in VLU circuit - Open in VC circuit - ECU	0	0
P0123/41	Throttle/Pedal Position Sensor/Switch "A" Circuit High Input[Intake shutter (throttle valve) position sensor high input]	- Throttle position sensor - Open in E2 circuit - VC and VTA circuits are short-circuited - ECU	0	0
P0168/39	Fuel Temperature Too High [Fuel temperature sensor rationality]	- Fuel temperature sensor	0	0
P0180/39	Fuel Temperature Sensor "A" Circuit [Fuel temperature sensor]	- Open or short in fuel temperature sensor circuit - Fuel temperature sensor - ECU	0	0
P0182/39	Fuel Temperature Sensor "A" Circuit Low Input [Fuel temperature sensor low input]		0	0
P0183/39	Fuel Temperature Sensor "A" Circuit High Input [Fuel temperature sensor high input]		0	0
P0190/49	Fuel Rail Pressure Sensor Circuit[Fuel pressure sensor]	- Open or short in fuel pressure sensor circuit - Fuel pressure sensor - ECU	0	0
P0192/49	Fuel Rail Pressure Sensor Circuit Low Input [Fuel pressure sensor low input]	- Open or short in fuel pressure sensor circuit - Fuel pressure sensor - ECU	0	0
P0193/49	Fuel Rail Pressure Sensor Circuit High Input [Fuel pressure sensor high input]		0	0

DTC No.	Detection Item	Trouble Area	*1 MIL	*2 Memory
P0200/97	Injector Circuit/Open[EDU system for injector malfunction]	- Open or short in EDU circuit - Injector - EDU - ECU	O	O
P0234*3	Turbo/Super Charger Overboost Condition [Turbocharger system malfunction]	- Turbocharger sub-assy - Turbo motor driver - Manifold absolute pressure sensor - ECU	O	O
P0299*3	Turbo/Super Charger Underboost Condition [Turbocharger system malfunction]		O	O
P0335/12	Crankshaft Position Sensor "A" Circuit [Crankshaft position sensor]	- Open or short in crankshaft position sensor circuit - Crankshaft position sensor - Sensor plate (crankshaft timing pulley) - ECU	O	O
P0339/13	Crankshaft Position Sensor "A" Circuit Intermittent [Crankshaft position sensor intermittent problem]		/	O
P0340/12	Camshaft Position Sensor "A" Circuit (Bank 1 or Single Sensor) [Camshaft position sensor]	- Open or short in camshaft position sensor circuit - Camshaft position sensor - Camshaft timing pulley - ECU	O	O
P0400*4,*5	Exhaust Gas Recirculation Flow [EGR system malfunction]	- EGR valve stuck - EGR valve does not move smoothly - Open or short in E-VRV for EGR circuit - Open or short in EGR valve position sensor circuit - EGR valve position sensor - ECU	O	O
P0405*4,*5	Exhaust Gas Recirculation Sensor "A" Circuit Low [EGR lift sensor malfunction]	- Open or short in EGR valve position sensor circuit - EGR valve position sensor - ECU	O	O
P0406*4,*5	Exhaust Gas Recirculation Sensor "A" Circuit High [EGR lift sensor malfunction]		O	O
P0488/15	Exhaust Gas Recirculation Throttle Position Control Range/Performance [Intake shutter]	- Open or short in diesel throttle control motor circuit - Open or short in diesel throttle valve fully opened switch circuit - Diesel throttle valve assy - ECU	O	O

DTC No.	Detection Item	Trouble Area	*1 MIL	*2 Memory
P0500/42	Vehicle Speed Sensor "A" [Vehicle speed sensor]	- Open or short in speed sensor circuit - Speed sensor - Combination meter - ECU - Skid control ECU	O	O
P0504/51	Brake Switch "A"/"B" Correlation [Stop lamp rationality]	- Short in stop lamp switch signal circuit - Stop lamp switch - ECU	/	O
P0606	ECU/PCM Processor [ECU]	- ECU	/	/
P0607	Control Module Performance [ECU]		O	O
P0627	Fuel Pump Control Circuit/Open [Common rail system malfunction]	- Open or short in suction control valve circuit - Suction control valve - ECU	O	O
P1229/78	Fuel Pump System[Common rail system malfunction]	- Short in supply pump (suction control valve) circuit - Supply pump (suction control valve) - ECU	O	O
P1251*3	Step Motor For Turbocharger Control Circuit (Intermittent) [Turbocharger system malfunction]	- Turbo motor driver - Open or short in turbo motor driver circuit - Turbocharger sub-assy - ECU	O	O
P1601/89	Injector Correction Circuit (EEPROM) [ECU]	- Injector compensation code - ECU	O	O
P1611/17	IC Circuit Malfunction [ECU]	- ECU	O	O
P2008*3	Intake Manifold Runner Control Circuit/Open (Bank 1) [Swirl control system malfunction]	- VSV for swirl control valve - Open or short in VSV for swirl control valve - Intake manifold (swirl control valve) - ECU	O	O
P2120/19	Throttle/Pedal Position Sensor/Switch "D" Circuit [Accelerator pedal position sensor (sensor 1)]	- Open or short in accelerator pedal position sensor circuit - Accelerator pedal position sensor - ECU	O	O
P2121/19	Throttle/Pedal Position Sensor/Switch "D" Circuit Range/Performance [Accelerator pedal position sensor rationality (sensor 1)]	- Accelerator pedal position sensor circuit - Accelerator pedal position sensor - ECU	O	O

DTC No.	Detection Item	Trouble Area	*1 MIL	*2 Memory
P2122/19	Throttle/Pedal Position Sensor/ Switch "D" Circuit Low Input [Accelerator pedal position sensor low input (sensor 1)]	- Open or short in accelerator pedal position sensor circuit - Accelerator pedal position sensor - ECU	O	O
P2123/19	Throttle/Pedal Position Sensor/ Switch "D" Circuit High Input [Accelerator pedal position sensor high input (sensor 1)]		O	O
P2125/19	Throttle/Pedal Position Sensor/ Switch "E" Circuit [Accelerator pedal position sensor (sensor 2)]		O	O
P2127/19	Throttle/Pedal Position Sensor/ Switch "E" Circuit Low Input [Accelerator pedal position sensor low input (sensor 2)]		O	O
P2128/19	Throttle/Pedal Position Sensor/ Switch "E" Circuit High Input [Accelerator pedal position sensor high input (sensor 2)]		O	O
P2138/19	Throttle/Pedal Position Sensor/ Switch "D"/"E" Voltage Correlation [Accelerator pedal position sensor malfunction]		O	O
P2226/A5*6	Barometric Pressure Circuit [ECU]	- ECU	O	O
P2228/A5*6	Barometric Pressure Circuit Low Input [ECU]		O	O
P2229/A5*6	Barometric Pressure Circuit High Input [ECU]		O	O
U0001/A2*6	High Speed CAN Communication Bus	- Open or short TCM and ECU circuit- TCM- ECU	/	O
B2799	Engine Immobilizer System Malfunction	- Immobilizer system	/	O

< NOTE >

- *1: "O": MIL (Malfunction Indicator Lamp) illuminates, "/": MIL does not illuminate.
- *2: "O": DTC is stored in the ECU, "/": DTC is not stored in the ECU.
- *3: Only for 1KD-FTV.
- *4: Only for 2KD-FTV (w/ CAC).
- *5: Only for 2KD-FTV (w/o CAC).
- *6: "A" in the above table indicates that the MIL flashes 10 times.

4-5. FAIL-SAFE CHART

A. Fail-Safe Chart

If any of the following DTCs are set, the ECU enters fail-safe mode to allow the vehicle to be driven temporarily.

DTC No.	Detection Item	Fail-Safe Operation	Fail-Safe Deactivation Conditions
P0045	Turbo/Super Charger Boost Control Solenoid Circuit/Open [Turbocharger system malfunction]	Limits engine power	Ignition switch OFF
P0087/49	Fuel Rail/System Pressure - Too Low [Fuel pressure sensor system malfunction]	Limits engine power	Ignition switch OFF
P0088/78	Fuel Rail/System Pressure - Too High [Common rail system malfunction]	Limits engine power	Ignition switch OFF
P0093/78	Fuel System Leak Detected - Large Leak [Fuel leaks in common rail system]	Limits engine power for 1 minute and then stalls the engine	Ignition switch OFF
P0095/23 ^{*1,*2}	Intake Air Temperature Sensor 2 Circuit [Intake air temperature sensor (intake air connector)]	Intake air (intake manifold) temperature fixed at 145°C (293°F)	Pass condition detected
P0097/23 ^{*1,*2}	Intake Air Temperature Sensor 2 Circuit Low [Intake air temperature sensor low input (intake air connector)]		
P0098/23 ^{*1,*2}	Intake Air Temperature Sensor 2 Circuit High [Intake air temperature sensor high input (intake air connector)]		
P0100/31 ^{*1}	Mass or Volume Air Flow Circuit [Mass air flow meter]	Limits engine power	Pass condition detected
P0102/31 ^{*1}	Mass or Volume Air Flow Meter Circuit Low Input [Mass air flow meter low input]		
P0103/31 ^{*1}	Mass or Volume Air Flow Meter Circuit High Input [Mass air flow meter high input]		

DTC No.	Detection Item	Fail-Safe Operation	Fail-Safe Deactivation Conditions
P0105/31	Manifold Absolute Pressure/Barometric Pressure Circuit [Intake air pressure sensor]	Turbo pressure fixed at specified value	Pass condition detected
P0107/31	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input [Intake air pressure sensor low input]		
P0108/31	Manifold Absolute Pressure/Barometric Pressure Circuit High Input [Intake air pressure sensor high input]		
P0110/24	Intake Air Temperature Circuit [Intake air temperature sensor (built into mass air flow meter)]	Intake air (mass air flow meter) temperature value fixed	Pass condition detected
P0112/24	Intake Air Temperature Circuit Low Input [Intake air temperature sensor (built into mass air flow meter) low input]		
P0113/24	Intake Air Temperature Circuit High Input [Intake air temperature sensor (built into mass air flow meter) high input]		
P0115/22	Engine Coolant Temperature Circuit [Engine coolant temperature sensor]	Fuel temperature sensor output fixed at specified value (fixed value varies depending on conditions)	Pass condition detected
P0117/22	Engine Coolant Temperature Circuit Low Input [Engine coolant temperature sensor low input]		
P0118/22	Engine Coolant Temperature Circuit High Input [Engine coolant temperature sensor high input]		
P0120/41	Throttle/Pedal Position Sensor/Switch "A" Circuit	Limits engine power	Ignition switch OFF
P0122/41	Throttle/Pedal Position Sensor/Switch "A" Circuit Low Input		
P0123/41	Throttle/Pedal Position Sensor/Switch "A" Circuit High Input		
P0168/39	Fuel Temperature Too High [Fuel temperature sensor rationality]	Limits engine power	Pass condition detected

DTC No.	Detection Item	Fail-Safe Operation	Fail-Safe Deactivation Conditions
P0180/39	Fuel Temperature Sensor "A" Circuit [Fuel temperature sensor]	Fuel temperature fixed at 40°C (104°F)	Pass condition detected
P0182/39	Fuel Temperature Sensor "A" Circuit Low Input [Fuel temperature sensor low input]		
P0183/39	Fuel Temperature Sensor "A" Circuit High Input [Fuel temperature sensor high input]		
P0190/49	Fuel Rail Pressure Sensor Circuit [Fuel pressure sensor]	Limits engine power	Ignition switch OFF
P0192/49	Fuel Rail Pressure Sensor Circuit Low Input [Fuel pressure sensor low input]		
P0193/49	Fuel Rail Pressure Sensor Circuit High Input [Fuel pressure sensor high input]		
P0200/97	Injector Circuit/Open [EDU system for injector malfunction]	Limits engine power	Ignition switch OFF
P0234*1	Turbo/Super Charger Excessive Boost [Turbocharger system malfunction]	Limits engine power	Ignition switch OFF
P0299*1	Turbo/Super Charger Insufficient Boost [Turbocharger system malfunction]	Limits engine power	Ignition switch OFF
P0335/12	Crankshaft Position Sensor "A" Circuit [Crankshaft position sensor]	Limits engine power	Pass condition detected
P0340/12	Camshaft Position Sensor "A" Circuit (Bank 1 or Single Sensor) [Camshaft position sensor]	Limits engine power	Pass condition detected
P0488/15	Exhaust Gas Recirculation Throttle Position Control Range/Performance [Intake shutter]	Limits engine power	Ignition switch OFF
P0500/42	Vehicle Speed Sensor "A" [Vehicle speed sensor]	Vehicle speed fixed at 0 km/h (0 mph)	Pass condition detected
P0627/78	Fuel Pump Control Circuit/Open [Common rail system malfunction]	Limits engine power	Pass condition detected
P1229/78	Fuel Pump System[Common rail sys- tem malfunction]	Limits engine power	Ignition switch OFF
P1251*1	Turbo/Super Charger Excessive Boost (Too High) [Turbocharger system malfunction]	Limits engine power	Ignition switch OFF
P1611/17	IC Circuit Malfunction[ECU]	Limits engine power	Ignition switch OFF

DTC No.	Detection Item	Fail-Safe Operation	Fail-Safe Deactivation Conditions
P2120/19	Throttle/Pedal Position Sensor/Switch "D" Circuit [Accelerator pedal position sensor (sensor 1)]	Limits engine power	Ignition switch OFF
P2121/19	Throttle/Pedal Position Sensor/Switch "D" Circuit Range/Performance [Accelerator pedal position sensor rationality (sensor 1)]		
P2122/19	Throttle/Pedal Position Sensor/Switch "D" Circuit Low Input [Accelerator pedal position sensor low input (sensor 1)]		
P2123/19	Throttle/Pedal Position Sensor/Switch "D" Circuit High Input [Accelerator pedal position sensor high input (sensor 1)]		
P2125/19	Throttle/Pedal Position Sensor/Switch "E" Circuit [Accelerator pedal position sensor (sensor 2)]		
P2127/19	Throttle/Pedal Position Sensor/Switch "E" Circuit Low Input [Accelerator pedal position sensor low input (sensor 2)]		
P2128/19	Throttle/Pedal Position Sensor/Switch "E" Circuit High Input [Accelerator pedal position sensor high input (sensor 2)]		
P2138/19	Throttle/Pedal Position Sensor/Switch "D"/"E" Voltage Correlation [Accelerator pedal position sensor malfunction]		
P2226/A5	Barometric Pressure Circuit [ECU]	Atmospheric pressure fixed	Pass condition detected
P2228/A5	Barometric Pressure Circuit Low Input [ECU]		
P2229/A5	Barometric Pressure Circuit High Input [ECU]		

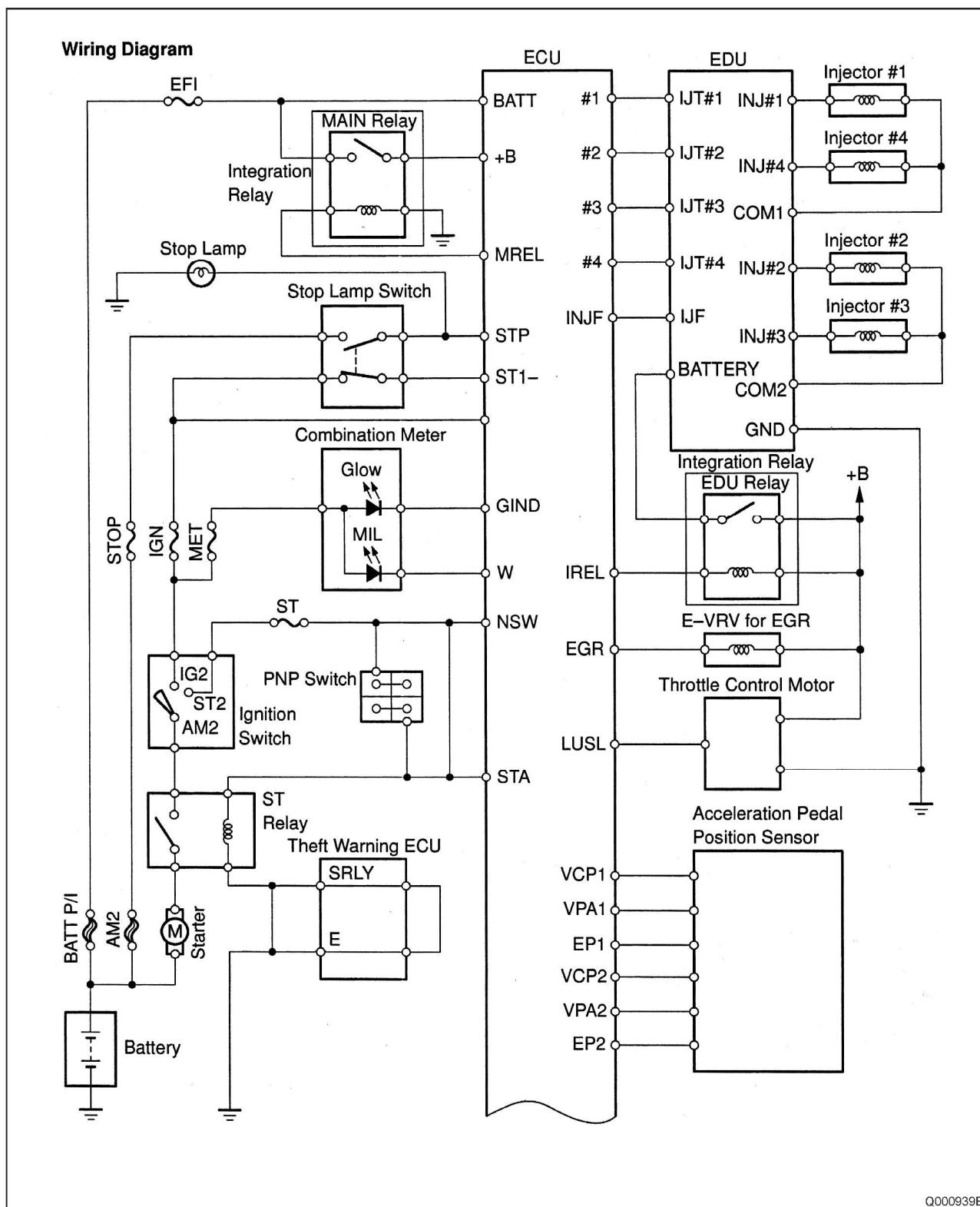
< NOTE >

- *1: Only for 1KD-FTV.
- *2: Only for 2KD-FTV (w/ CAC).
- *3: Only for 2KD-FTV (w/o CAC).

4-6. EXTERNAL WIRING DIAGRAM

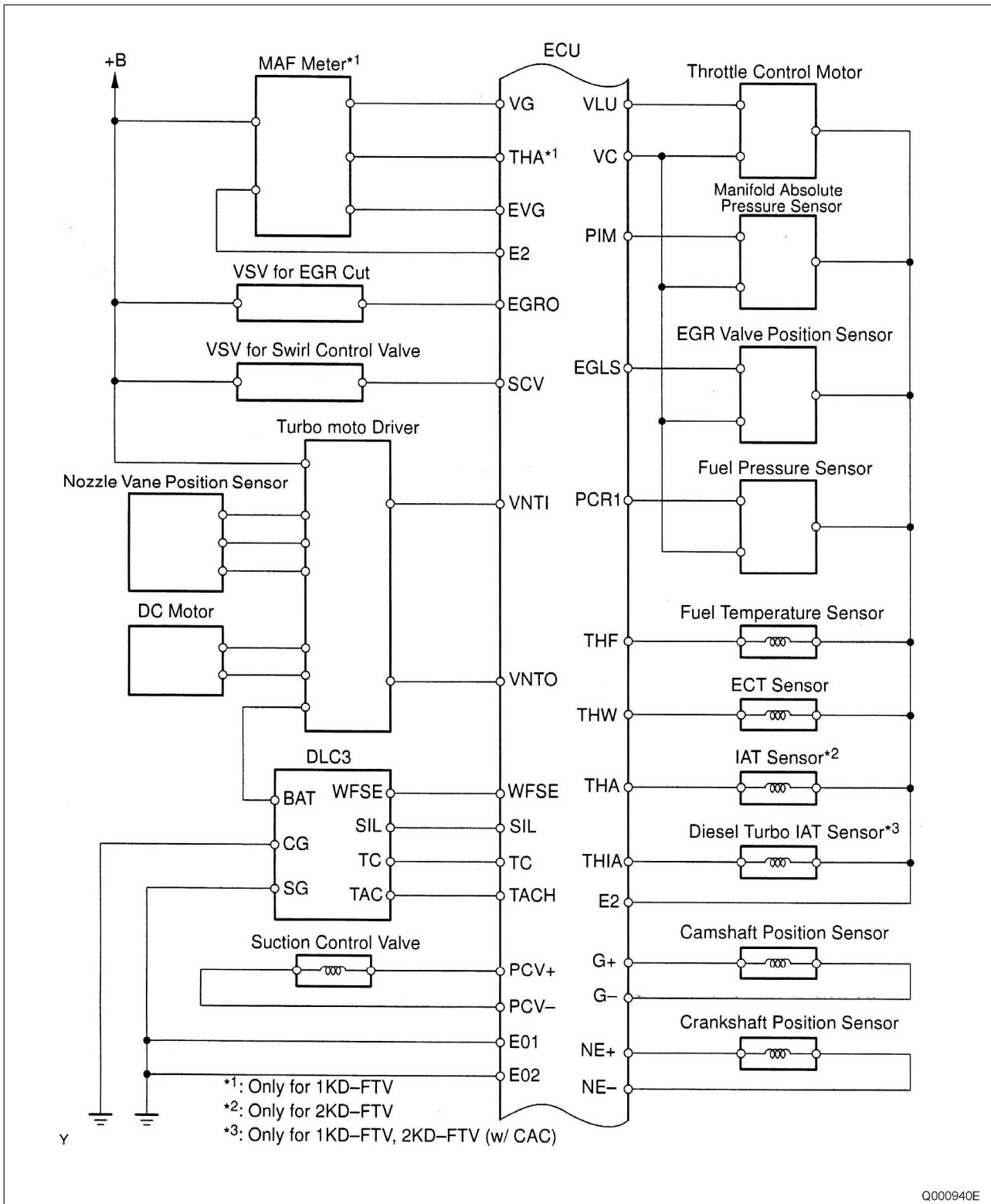
A. External ECU Wiring Diagram

a. Wiring Diagram (1)

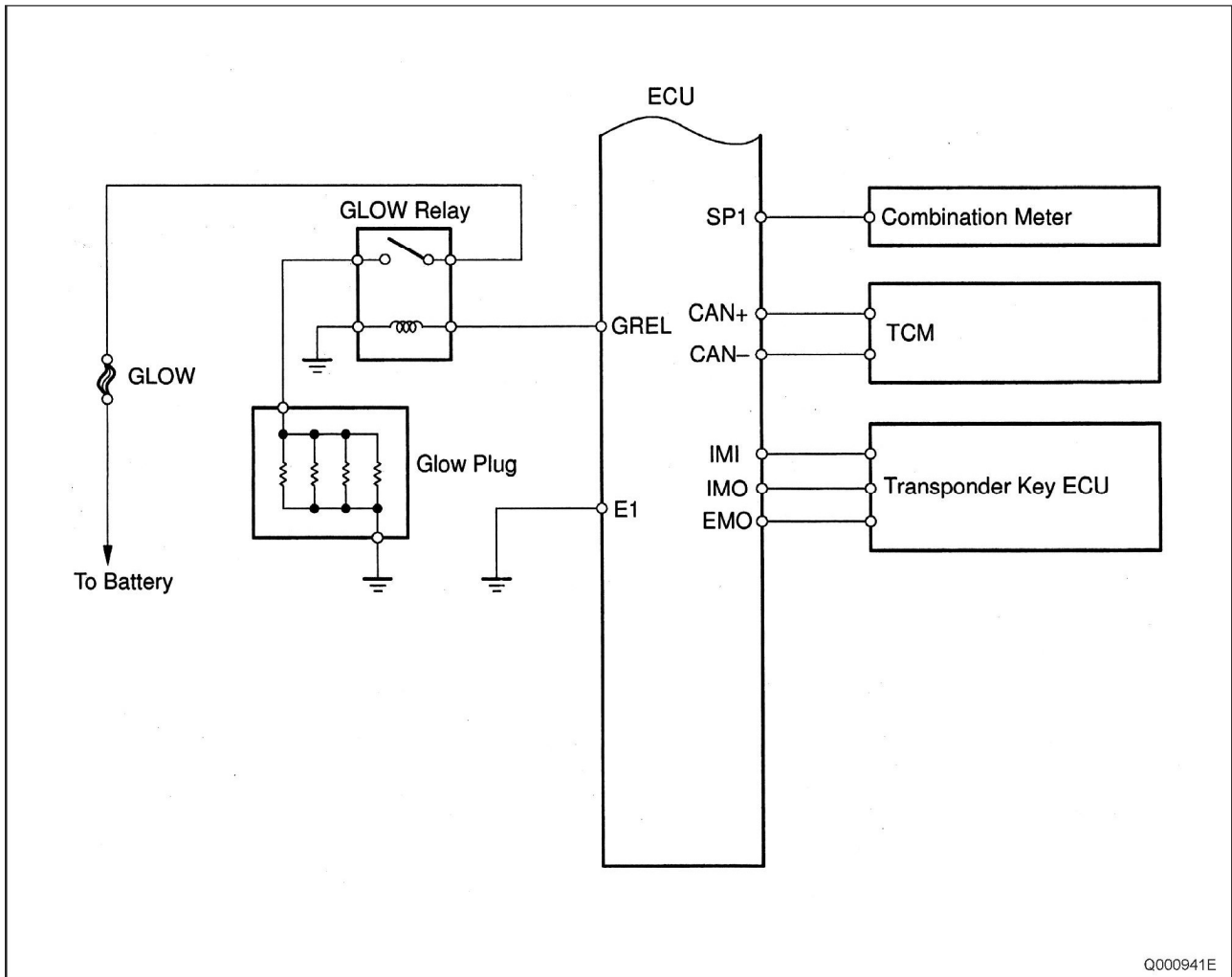


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b. Wiring Diagram (2)

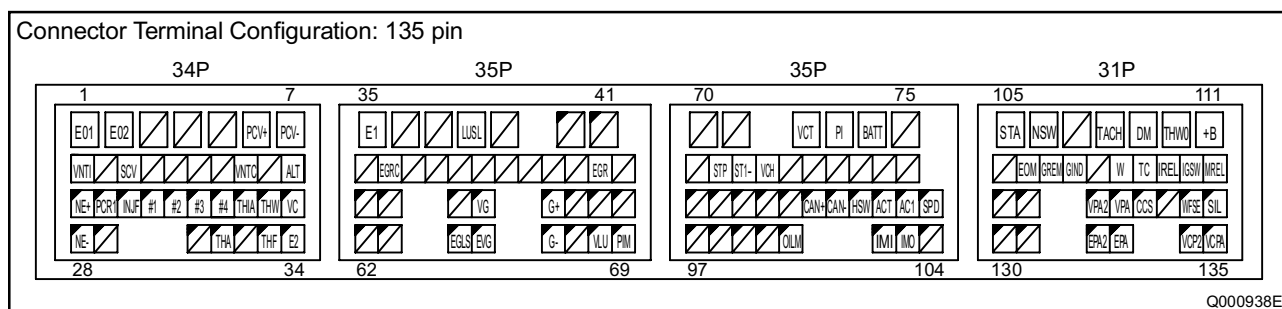


c. Wiring Diagram (3)



B. ECU Connector Diagram

a. Connector Terminal Layout



< NOTE >

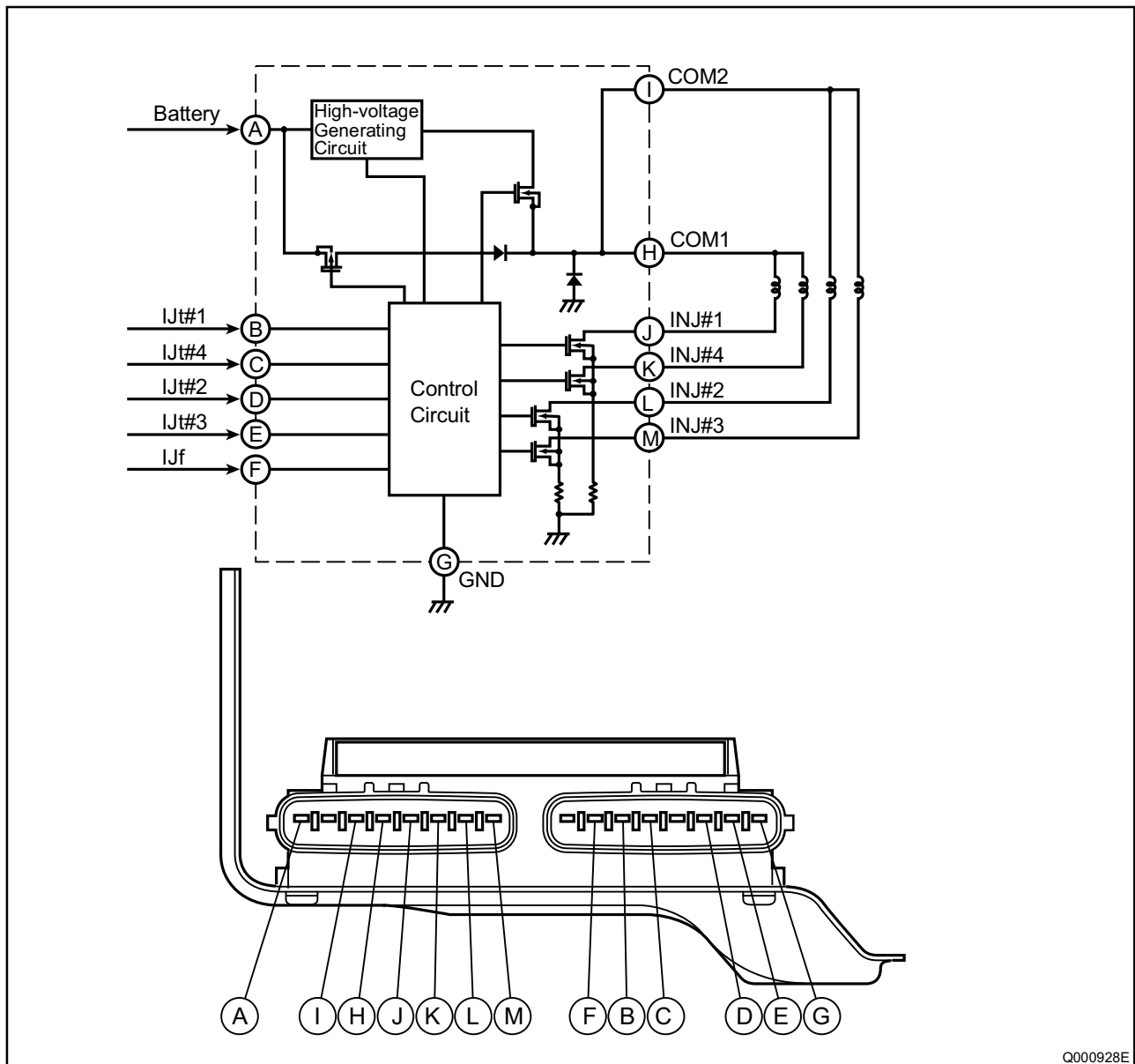
- The standard normal voltage between each pair of ECU terminals is shown in the table below. The appropriate conditions for checking each pair of terminals are also indicated.
- The result of checks should be compared with the standard normal voltage for that pair of terminals, displayed in the Specified Condition column.
- The illustration above can be used as a reference to identify the ECU terminal locations.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
BATT (E6-2) - E1 (E8-7)	L-BR	Battery (for measuring battery voltage and for ECU memory)	Always	9 to 14 V
IGSW (E5-9) - E1 (E8-7)	B-O-BR	Ignition switch	Ignition switch ON	9 to 14 V
+B (E5-1) - E1 (E8-7)	B-BR	Power source of ECU	Ignition switch ON	9 to 14 V
MREL (E5-8) - E1 (E8-7)	W-G-BR	MAIN Relay	Ignition switch ON	9 to 14 V
			Ignition switch OFF	0 to 1.5 V
VC (E7-18) - E1 (E8-7)	R-W-BR	Power source of sensor (a specific voltage)	Ignition switch ON	4.5 to 5.5 V
VPA1 (E5-22) - EP1 (E5-28)	W-L-BR-W	Accelerator pedal position sensor (for engine control)	Ignition switch ON, accelerator pedal fully released	0.5 to 11 V
			Ignition switch ON, accelerator pedal fully depressed	2.6 to 4.5 V
VPA2 (E5-23) - EP2 (E5-29)	GR-G-BR-Y	Accelerator pedal position sensor (for sensor malfunction detection)	Ignition switch ON, accelerator pedal fully released	1.2 to 2.0 V
			Ignition switch ON, accelerator pedal fully depressed	3.4 to 5.0 V
VCP1 (E5-26) - EP1 (E5-28)	LG-R-BR-W	Power source of accelerator pedal position sensor (for VPA)	Ignition switch ON	4.5 to 5.0 V
VCP2 (E5-27) - EP2 (E5-29)	BR-R-BR-Y	Power source of accelerator pedal position sensor (for VPA2)	Ignition switch ON	4.5 to 5.0 V
VG (E8-24) - EVG (E8-32)	W-R-B-W	MAF meter	Idling, A/C switch OFF	0.5 to 3.4 V
THA (E7-31) - E2 (E7-28)	Y-B-BR Y-G-BR	IAT sensor	Idling, intake air temperature at 20°C (68°F)	0.5 to 3.4 V
THIA (E7-20) - E2 (E7-28)	Y-G-BR	Diesel turbo IAT sensor	Atmospheric air temperature	0.5 to 3.4 V

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
THW (E7-19) - E2 (E7-28)	R-L-BR	ECT sensor	Idling, engine coolant temperature at 80°C (176°F)	0.2 to 1.0 V
STA (E5-7) - E1 (E8-7)	B-Y-BR L-Y-BR	Starter signal	Cranking	6.0 V or more
#1 (E7-24) - E1 (E8-7) #2 (E7-23) - E1 (E8-7) #3 (E7-22) - E1 (E8-7) #4 (E7-21) - E1 (E8-7)	B-W-BR R-BR V-BR Y-R-BR	Injector	Idling	Pulse generation
G + (E8-23) - G - (E8-31)	Y-L	Camshaft position sensor	Idling	Pulse generation
NE + (E7-27) - NE - (E7-34)	Y-L	Crankshaft position sensor	Idling	Pulse generation
STP (E6-15) - E1 (E8-7)	G-W-BR	Stop lamp switch	Ignition switch ON, brake pedal depressed	7.5 to 14 V
			Ignition switch ON, brake pedal released	0 to 1.5 V
ST1 - (E6-14) - E1 (E8-7)	R-L-BR	Stop lamp switch (opposite to STP)	Ignition switch ON, brake pedal depressed	0 to 1.5 V
			Ignition switch ON, brake pedal released	7.5 to 14 V
TC (E5-11) - E1 (E8-7)	P-W-BR	Terminal TC of DLC3	Ignition switch ON	9 to 14 V
W (E5-12) - E1 (E8-7)	R-B-BR	MIL	MIL illuminated	0 to 3 V
			MIL not illuminated	9 to 14 V
SP1 (E6-17) - E1 (E6-7)	V-R-BR	Speed signal from combination meter	Ignition switch ON, rotate driving wheel slowly	Pulse generation
SIL (E5-18) - E1 (E6-7)	R-Y-BR	Terminal SIL of DLC3	Connect the DST-2 to the DLC3	Pulse generation
PIM (E8-28) - E2 (E7-28)	L-B-BR	Manifold absolute pressure sensor	Apply negative pressure of 40 kPa (300 mmHg, 11.8 in.Hg)	1.2 to 1.6 V
			Same as atmospheric pressure	1.3 to 1.9 V
			Apply positive pressure of 69 kPa (518 mmHg, 20.4 in.Hg)	3.2 to 3.8 V
IREL (E5-10) - E1 (E8-7)	B-W-BR	EDU relay	Ignition switch OFF	9 to 14 V
			Idling	0 to 1.5 V
TACH (E5-4) - E1 (E8-7)	B-W-BR	Engine speed	Idling	Pulse generation
PCR1 (E7-26) - E2 (E7-28)	R-Y-BR	Common rail pressure sensor (main)	Idling	1.3 to 1.8 V
GREL (E5-15) - E1 (E8-7)	R-BR	GLOW relay	Cranking	9 to 14 V
			Idling	0 to 1.5 V

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
THF (E7-29) - E2 (E7-28)	G-B-BR	Fuel temperature sensor	Ignition switch ON	0.5 to 3.4 V
ALT (E7-8) - E1 (E6-7)	G-BR	Generator duty ratio	Idling	Pulse generation
PCV + (E7-2) - PCV - (E7-1)	G-W-G-Y	Suction control valve	Idling	Pulse generation
INJF (E7-25) - E1 (E8-7)	P-BR	EDU	Idling	Pulse generation
VNTO (E7-10) - E1 (E8-7)	B-O-BR	Turbo motor driver	Ignition switch ON	Pulse generation
VNTI (E7-17) - E1 (E8-7)	R-B-BR	Turbo motor driver	Ignition switch ON	Pulse generation
VLU (E8-29) - E2 (E7-28)	B-BR	Throttle position sensor	Ignition switch ON, intake shutter (throttle valve) fully opened	3.0 to 4.0 V
			Ignition switch ON, intake shutter (throttle valve) fully closed	0.4 to 1.0 V
LUSL (E8-4) - E2 (E7-28)	GR-BR	Diesel throttle duty signal	Engine warmed up, racing engine	Pulse generation
EGLS (E8-33) - E2 (E7-28)	L-Y-BR	EGR valve position sensor	Ignition switch ON	0.6 to 1.4 V

C. EDU External Wiring Diagram



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