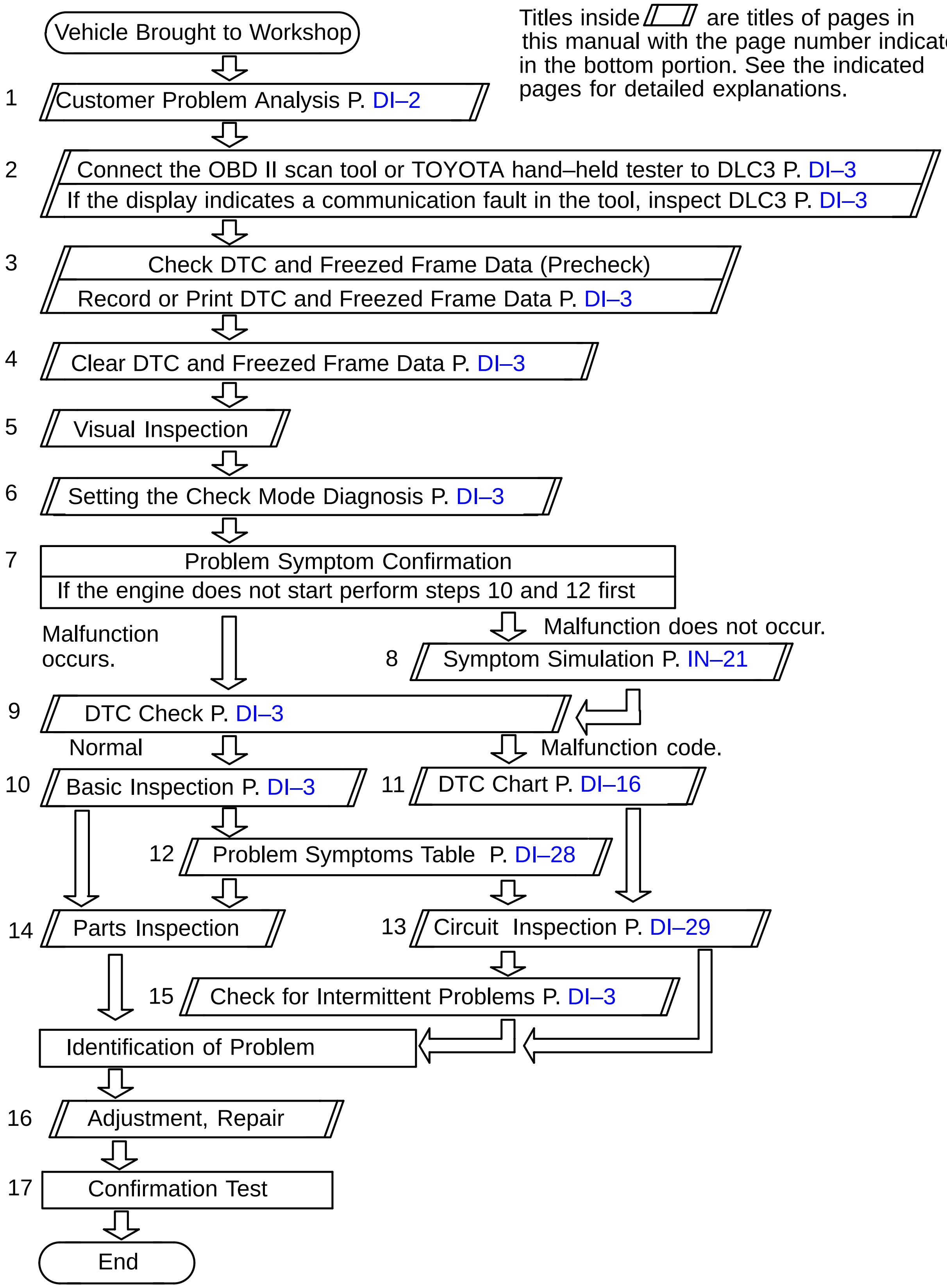
ENGINE (5S–FE)

DI00F–08

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot in accordance with the procedure on the following page.

Titles inside ▱ are titles of pages in this manual with the page number indicated in the bottom portion. See the indicated pages for detailed explanations.



DI00G–05

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE CONTROL SYSTEM Check Sheet	Inspector's Name

Customer's Name		Model and Model Year	
Driver's Name		Frame No.	
Data Vehicle Brought in		Engine Model	
License No.		Odometer Reading	km miles

Problem Symptoms	☐ Engine does not Start	☐ Engine does not crank ☐ No initial combustion ☐ No complete combustion
	☐ Difficult to Start	☐ Engine cranks slowly ☐ Other
	☐ Poor Idling	☐ Incorrect first idle ☐ Idling rpm is abnormal ☐ High (rpm) ☐ Low (rpm) ☐ Rough idling ☐ Other
	☐ Poor Driveaability	☐ Hesitation ☐ Back fire ☐ Muffler explosion (after–fire) ☐ Surging ☐ Knocking ☐ Other
	☐ Engine Stall	☐ Soon after starting ☐ After accelerator pedal depressed ☐ After accelerator pedal released ☐ During A/C operation ☐ Shifting from N to D ☐ Other
	☐ Others	

Datas Problem Occurred		
Problem Frequency		☐ Constant ☐ Sometimes (times per day/month) ☐ Once only ☐ Other
Condition When Problem Occurs	Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Other
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (approx. ____˚F/____˚C)
	Place	☐ Highway ☐ Suburbs ☐ Inner city ☐ Uphill ☐ Downhill ☐ Rough road ☐ Other
	Engine Temperature	☐ Cold ☐ Warming up ☐ After warming up ☐ Any temperature ☐ Other
	Engine Operation	☐ Starting ☐ Just after starting (min.) ☐ Idling ☐ Racing ☐ Driving ☐ Constant speed ☐ Acceleration ☐ Deceleration ☐ A/C switch ON/OFF ☐ Other

Condition of MIL		☐ Remains on ☐ Sometimes light up ☐ Does not light up	
DTC Inspection	Normal Mode (Precheck)	☐ Normal	☐ Malfunction code(s) (code) ☐ Freezed frame data ( )
	Check Mode	☐ Normal	☐ Malfunction code(s) (code) ☐ Freezed frame data ( )

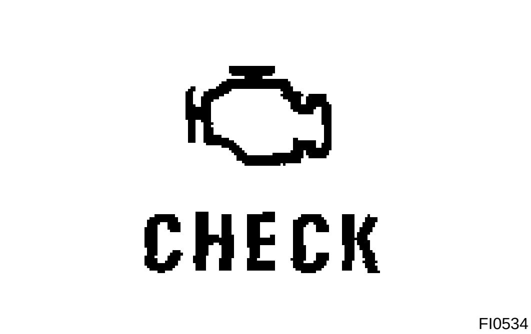
DI00H–08

PRE–CHECK

1. DIAGNOSIS SYSTEM

(a) Description

- When troubleshooting OBD II vehicles, the only difference from the usual troubleshooting procedure is that you connect to the vehicle the OBD II scan tool complying with SAE J1978 or TOYOTA hand–held tester, and read off various data output from the vehicle's ECM.



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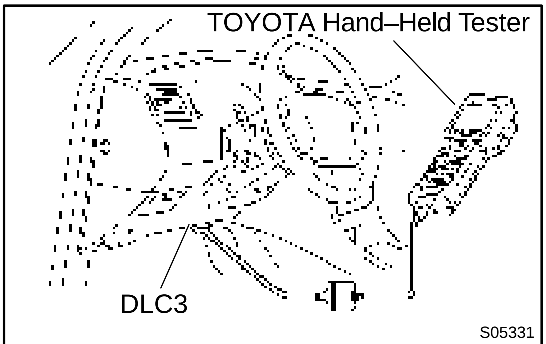
- OBD II regulations require that the vehicle's on–board computer lights up the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in the emission control system / components or in the powertrain control components which affect vehicle emissions, or a malfunction in the computer. In addition to the MIL lighting up when a malfunction is detected, the applicable Diagnostic Trouble Code (DTC) prescribed by SAE J2012 are recorded in the ECM memory. (See page DI–16)

If the malfunction does not reoccur in 3 consecutive trips, the MIL goes off automarially but the DTCs remain recorded in the ECM memory.



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- To check the DTCs, connect the OBD II scan tool or TOYOTA hand–held tester to Data Link Connector 3 (DLC3) on the vehicle. The OBD II scan tool or TOYOTA hand–held tester also enables you to erase the DTCs and check freezed frame data and various forms of engine data (For operating instructions, see the OBD II scan tool's instruction book.) DTCs include SAE controlled codes and manufacturer controlled codes. SAE controlled codes must be set as prescribed by the SAE, while manufacturer controlled codes can be set freely by the manufacturer within the prescribed limits. (See DTC chart on page DI–16)

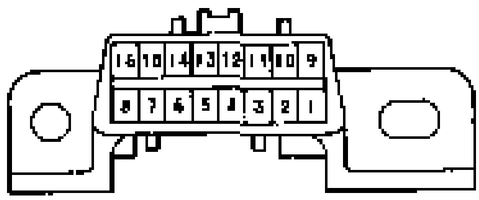
- The diagnosis system operates in normal mode during normal vehicle use. It also has a check mode for technicians to simulate malfunction symptoms and troubleshoot. Most DTCs use 2 trip detection logic* to prevent erroneous detection, and ensure thorough malfunction detection. By switching the ECM to check mode when troubleshooting, the technician can cause the MIL to light up for a malfunction that is only detected once or momentarily. (TOYOTA hand–held tester only)
(See page DI–3)
- *2 trip detection logic: When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory.(1st trip)

If the same malfunction is detected again during the second drive test, this second detection causes the MIL to light up.(2nd trip) (However, the IG switch must be turned OFF between the 1st trip and the 2nd trip.)

- Freeze frame data:
Freeze frame data records the engine condition when a misfire (DTCs P0300 ~ P0304) or fuel trim malfunction (DTCs P0171, P0172) or other malfunction (first malfunction only), is detected.
Because freeze frame data records the engine conditions (fuel system, calculated load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.
- Priorities for troubleshooting:

If troubleshooting priorities for multiple DTCs are given in the applicable DTC chart, these should be followed.
If no instructions are given troubleshoot DTCs according to the following priorities.

(1) DTCs other than fuel trim malfunction (DTCs P0171, P0172), EGR (DTCs P0401, P0402), and misfire (DTCs P0300 ~ P0304).
(2) Fuel trim malfunction (DTCs P0171, P0172), and EGR (DTCs P0401, P0402).
(3) Misfire (DTCs P0300 ~ P0304).



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(b) Check the DLC3

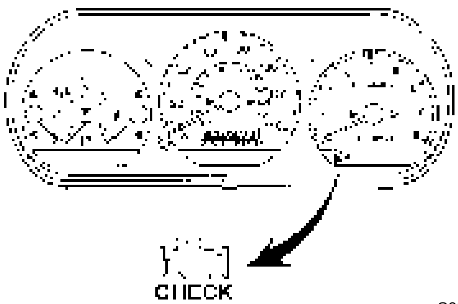
The vehicle's ECM uses ISO 9141–2 for communication. The terminal arrangement of DLC3 complies with SAE J1962 and matches the ISO 9141–2 format.

Terminal No.	Connection / Voltage or Resistance	Condition
7	Bus ⊕ Line / Pulse generation	During transmission
4	Chassis Ground ↔ Body Ground /1 Ω or less	Always
5	Signal Ground ↔ Body Ground /1 Ω or less	Always
16	Battery Positive ↔ Body Ground /9 ~ 14 V	Always

HINT:

If your display shows "UNABLE TO CONNECT TO VEHICLE" when you have connected the cable of the OBD II scan tool or TOYOTA hand–held tester to DLC3, turned the ignition switch ON and operated the scan tool, there is a problem on the vehicle side or tool side.

- If communication is normal when the tool is connected to another vehicle, inspect DLC3 on the original vehicle.
- If communication is still not possible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.



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2. INSPECT DIAGNOSIS (Normal Mode)

(a) Check the MIL.

(1) The MIL comes on when the ignition switch is turned ON and the engine is not running.

HINT:

If the MIL does not light up, troubleshoot the combination meter (See page BE–2).

(2) When the engine started, the MIL should go off. If the lamp remains on, the diagnosis system has detected a malfunction or abnormality in the system.

(b) Check the DTC.

NOTICE:

TOYOTA hand–held tester only: When the diagnosis system is switched from normal mode to check mode, it erases all DTCs and freezed frame data recorded in normal mode. So before switching modes, always check the DTCs and freezed frame data, and note them down.

(1) Prepare the OBD II scan tool (complying with SAE J1978) or TOYOTA hand–held tester.

(2) Connect the OBD II scan tool or TOYOTA hand–held tester to DLC3 under the instrument panel lower pad.

(3) Turn the ignition switch ON and turn the OBD II scan tool or TOYOTA hand–held tester switch ON.

(4) Use the OBD II scan tool or TOYOTA hand–held tester to check the DTCs and freezed frame data and note them down. (For operating instructions, see the OBD II scan tool's instruction book.)

(5) See page DI–3 to confirm the details of the DTCs.

NOTICE:

- **When simulating symptoms with an OBD II scan tool (excluding TOYOTA hand–held tester) to check the DTCs, use normal mode. For code on the DTC chart subject to "2 trip detection logic", perform the following either action.**
- **Turn the ignition switch OFF after the symptom is simulated the first time. Then repeat the simulation process again. When the problem has been simulated twice, the MIL lights up and the DTCs are recorded in the ECM.**
- **Check the 1st trip DTC using Mode 7 (Continuous Test Results) for SAE J1979.**

(c) Clear the DTC.

The DTCs and freezed frame data will be erased by either action.

(1) Operating the OBD II scan tool (complying with SAE J1978) or TOYOTA hand–held tester to erase the codes. (See the OBD II scan tool's instruction book for operating instructions.)

(2) Disconnecting the battery terminals or EFI fuse.

NOTICE:

If the TOYOTA hand–held tester switches the ECM from normal mode to check mode or vice–versa, or if the ignition switch is turned from ON to ACC or OFF during check mode, the DTCs and freezed frame data will be erased.

3. INSPECT DIAGNOSIS (Check Mode)

HINT:

TOYOTA hand–held tester only:

Compared to the normal mode, the check mode has an increased sensitivity to detect malfunctions.

Furthermore, the same diagnostic items which are detected in the normal mode can also be detected in the check mode.

(a) Check the DTC.

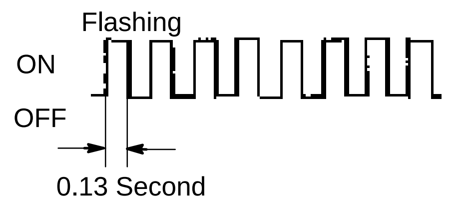
(1) Initial conditions
- Battery positive voltage 11 V or more
- Throttle valve fully closed
- Transmission in P or N position
- Air conditioning switched OFF

(2) Turn ignition switch OFF.

(3) Prepare the TOYOTA hand–held tester.

(4) Connect the TOYOTA hand–held tester to the DLC3 under the instrument panel lower pad.

(5) Turn the ignition switch ON and switch the TOYOTA hand–held tester ON.



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(6) Switch the TOYOTA hand–held tester normal mode to check mode. (Check that the MIL flashes.)

NOTICE:

If the TOYOTA hand–held tester switches the ECM from normal mode to check mode or vice–versa, or if the ignition switch is turned from ON to ACC or LOCK during check mode, the DTCs and freezed frame data will be erased.

(7) Start the engine. (The MIL goes out after the engine start.)

(8) Simulate the conditions of the malfunction described by the customer.

NOTICE:

Leave the ignition switch ON until you have checked the DTC, etc.

(9) After simulating the malfunction conditions, use the TOYOTA hand–held tester diagnosis selector to check the DTCs and freezed frame data, etc.

HINT:

Take care not to turn the ignition switch OFF. Turning the ignition switch OFF switches the diagnosis system from check mode to normal mode. So all DTCs, etc. are erased.

(10) After checking the DTC, inspect the applicable circuit.

4. FAIL–SAFE CHART

If any of the following codes is recorded, the ECM enters fail–safe mode.

DTC No.	Fail–Safe Operation	Fail–Safe Deactivation Conditions
P0105	Ignition timing fixed at 5° BTDC	Returned to normal condition
P0110	Intake air temperature is fixed at 20°C (68°F)	Returned to normal condition
P0115	Engine coolant temperature is fixed at 80°(176°F)	Returned to normal condition
P0120	VTA is fixed at 0°	The following condition must be repeated at least 2 times consecutively VTA ≧ 0.1 V and > 0.95 V
P0135 P0141	The heater circuit in witch an abnormality is detected is turned off	Ignition switch OFF
P0325	Max. timing retardation	Ignition switch OFF
P0336	Fuel cut	Returned to normal condition
P1135	The heater circuit in which an abnormality is detected is turned off	Ignition switch OFF
P1300 P1310	Fuel cut	IGF signal is detected for 2 consecutive ignitions

5. CHECK FOR INTERMITTENT PROBLEMS

TOYOTA HAND–HELD TESTER only:

By putting the vehicle's ECM in check mode, 1 trip detection logic is possible instead of 2 trip detection logic and sensitivity to detect open circuits is increased. This makes it easier to detect intermittent problems.

(1) Clear the DTC (See page DI–3).
(2) Set the check mode (See page DI–3).
(3) Perform a simulation test (See page IN–21).
(4) Check the connector and terminal (See page IN–31).
(5) Handle the connector (See page IN–31).

6. BASIC INSPECTION

When the malfunction code is not confirmed in the DTC check, troubleshooting should be performed in the order for all possible circuits to be considered as the causes of the problems. In many cases, by carrying out the basic engine check shown in the following flow chart, the location causing the problem can be found quickly and efficiently. Therefore, use of this check is essential in engine troubleshooting.

1	**Is battery positive voltage 11 V or more when engine is stopped?**

NO — **Charge or replace battery.**

YES

2	**Is engine cranked?**

NO → **Proceed to page ST–2 and continue to troubleshoot.**

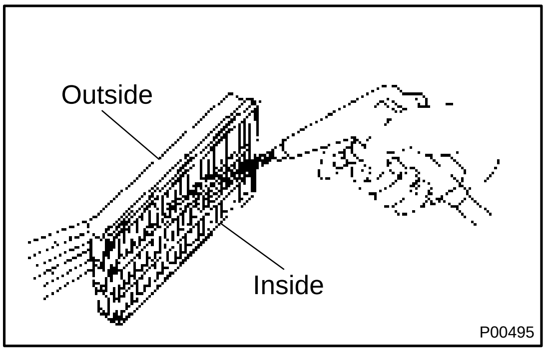
YES

3	**Does engine start?**

NO → **Go to step 7.**

YES

4	**Check air filter.**



PREPARATION:
Remove the air filter.

CHECK:
Visually check that the air filter is not dirty or excessive oily.

HINT:
If necessary, clean the filter with compressed air. First blow from inside thoroughly, then blow from outside of the filter.

NG → **Repair or replace.**

OK

5	**Check idle speed.**

PREPARATION:

(a) Warm up the engine to normal operating temperature.
(b) Switch off all the accessories.
(c) Switch off the air conditioning.
(d) Shift the transmission into the N position.
(e) Connect the OBD II scan tool or TOYOTA hand–held tester to DLC3 on the vehicle.

CHECK:

Use the CURRENT DATA to check the idle speed.

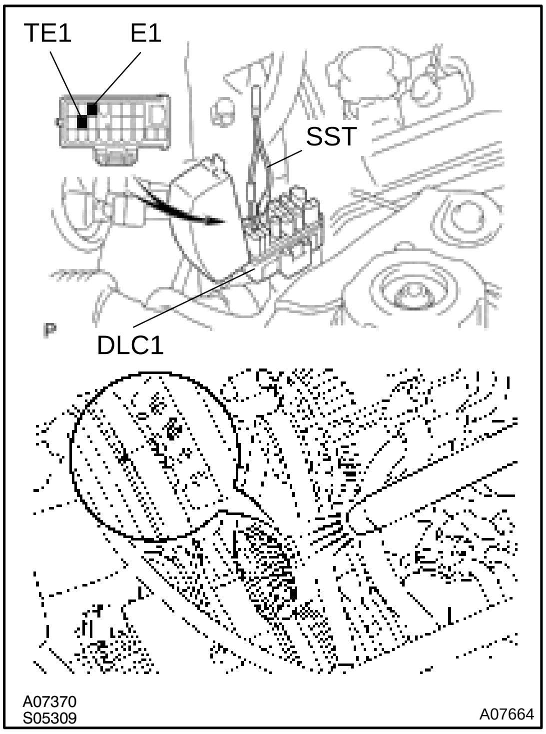
OK:

Idle speed: 650 ~ 750 rpm

NG → **Proceed to problem symptoms table on page DI–28.**

OK

6	**Check ignition timing.**



PREPARATION:

(a) Warm up the engine to normal operating temperature.
(b) Shift the transmission into the N position.
(c) Keep the engine speed at idle.
(d) Using SST, connect terminals TE1 and E1 of the DLC1.
SST 09843–18020
(e) Using a timing light, connect the tester to the No.1 high–tension cord.

CHECK:

Check the ignition timing.

OK:

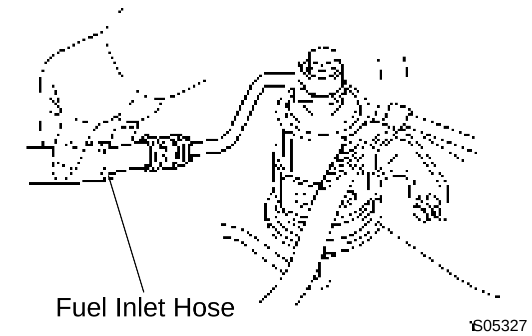
Ignition timing: 10° BTDC at idle

NG	**Proceed to page IG–1 and continue to trouble-shoot.**

OK

Proceed to problem symptoms table on page DI–28.

7	**Check fuel pressure.**



PREPARATION:

(a) Be sure that enough fuel is in the tank.
(b) Connect the TOYOTA hand–held tester to the DLC3.
(c) Turn the ignition switch ON and push TOYOTA hand–held tester main switch ON.
(d) Use the ACTIVE TEST mode to operate the fuel pump.
(e) Please refer to the TOYOTA hand–held tester operator's manual for further details.
(f) If you have no TOYOTA hand–held tester, connect the positive (+) and negative (–) leads from the battery to the fuel pump connector (See page SF–6).

CHECK:

Check for fuel pressure in the fuel inlet hose when it is pinched off.

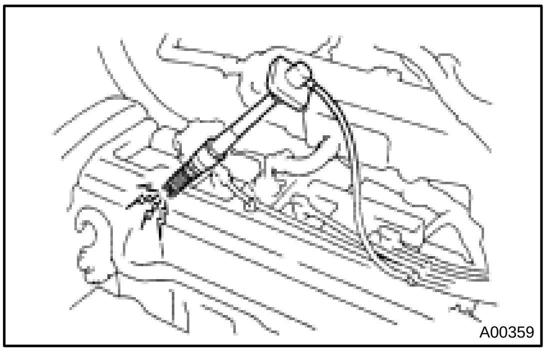
HINT:

At this time, you will hear a fuel flowing noise.

NG	**Proceed to page SF–6 and continue to trouble-shoot.**

OK

8	**Check for spark.**



PREPARATION:
(a) Disconnect the high–tension cord from the spark plug.
(b) Remove the spark plug.
(c) Install the spark plug to the high–tension cord.
(d) Disconnect the injector connector.
(e) Ground the spark plug.

CHECK:
Check if spark occurs while the engine is being cranked.

NOTICE:
To prevent excess fuel being injected from the injectors during this test, don't crank the engine for more than 5 ~ 10 seconds at a time.

NG → **Proceed to page IG–1 and continue to trouble-shoot.**

OK

Proceed to problem symptoms table on page DI–28.

7. ENGINE OPERATING CONDITION

NOTICE:

The values given below for ”Normal Condition” are representative values, so a vehicle may still be normal even if its value varies from those listed here. So do not decide whether a part is faulty or not solely according to the ”Normal Condition” here.

(a) CARB mandated signals.

TOYOTA hand–held tester display	Measurement Item	Normal Condition*1
FUEL SYS #1	Fuel System Bank 1 OPEN: Air–fuel ratio feedback stopped CLOSED: Air–fuel ratio feedback operating	Idling after warming up: CLOSED
CALC LOAD	Calculator Load: Current intake air volume as a proportion of max. intake air volume	Idling: 19.7 ~ 50.4 % Racing without load (2,500rpm): 16.8 ~ 47.4 %
COOLANT TEMP.	Engine Coolant Temp. Sensor Value	After warming up: 80 ~ 95°C (176 ~ 203°F)
SHORT FT #1	Short–term Fuel Trim Bank 1	0 ± 20 %
LONG FT #1	Long–term Fuel Trim Bank 1	0 ± 20 %
ENGINE SPD	Engine Speed	Idling: 650 ~ 750 rpm
VEHICLE SPD	Vehicle Speed	Vehicle Stopped: 0 km/h (0 mph)
IGN ADVANCE	Ignition Advance: Ignition Timing of Cylinder No. 1	Idling: BTDC 0 ~ 10°
INTAKE AIR	Intake Air Temp. Sensor Value	Equivalent to Ambient Temp.
MAP	Absolute Pressure inside Intake Manifold	Idling: 20 ~ 51 kPa Racing without load (2,500 rpm): 17 ~ 48 kPa
THROTTLE POS	Voltage Output of Throttle Position Sensor Calculated as a percentage: 0 V → 0%, 5 V → 100 %	Throttle Fully Closed: 6 ~ 16 % Throttle Fully Open: 64 ~ 98 %
O2S B1, S1	Voltage Output of Heated Oxygen Sensor Bank 1 Sensor 1	Idling: 0.1 ~ 0.9 V (0.56 ~ 0.76 V *2)
O2FT B1, S1	Heated Oxygen Sensor Fuel Trim Bank 1 Sensor 1 (Same as SHORT FT #1)	0 ± 20 %
A/FS B1, S1 *3	Voltage Output of A/F Sensor	Idling: 2.8 ~ 3.8 V
A/FFT B1, S1 *3	A/F Sensor Fuel Trim (Same as SHORT FT #1)	0 ± 20 %
O2S B1, S2	Voltage Output of Heated Oxygen Sensor Bank 1 Sensor 2	Driving at 50 km/h (31 mph): 0.05 ~ 0.95 V

*1: If no conditions are specifically stated for ”Idling”, it means the shift lever is at N or P position, the A/C switch is OFF and all accessory switches are OFF.

*2: Only for California Specification vehicles, when you use the OBD II scan tool (excluding TOYOTA hand–held tester).

*3: Only for California Specification vehicles, when you use the TOYOTA hand–held tester.

(b) TOYOTA Enhanced Signals.

TOYOTA hand–held tester display	Measurement Item	Normal Condition*1
MISFIRE RPM	Engine RPM for first misfire range	Misfire 0: 0 rpm
MISFIRE LOAD	Engine load for first misfire range	Misfire 0: 0 g/r
INJECTOR	Fuel injection time for cylinder No.1	Idling: 2.9 ~ 5.1 ms
IAC DUTY RATIO	Intake Air Control Valve Duty Ratio Opening ratio rotary solenoid type IAC valve	Idling: 25 ~ 62 %
STARTER SIG	Starter Signal	Cranking: ON
CTP SIG	Closed Throttle Position Signal	Throttle fully closed: ON
A/C SIG	A/C Switch Signal	A/C ON: ON
PNP SIG	Park/Neutral Position Switch Signal	P or N position: ON
ELECTCL LOAD SIG	Electrical Load Signal	Defogger S/W ON: ON
STOP LIGHT SW	Stop Light Switch Signal	Stop light switch ON: ON
PS OIL PRESS SW	Power Steering Oil Pressure Switch Signal	Turn steering wheel: ON
FC IDL	Fuel Cut Idle: Fuel cut when throttle valve fully closed, during deceleration	Fuel cut operating: ON
FC TAU	Fuel Cut TAU: Fuel cut during very light load	Fuel cut operating: ON
CYL#1, CYL#2, CYL#3, CYL#4	Abnormal revolution variation for each cylinder	0 %
IGNITION	Total number of ignition for every 1,000 revolu- tions	0 ~ 2,000 rpm
EGR SYSTEM	EGR system operating condition	Idling: OFF
FUEL PUMP	Fuel Pump Signal	Idling: ON
A/C CUT SIG	A/C Cut Signal	A/C S/W OFF: ON
A/C MAG CLUTCH	A/C Switch Signal	A/C ON: ON
EVAP (PURGE) VSV	EVAP VSV Signal	VSV operating: Avove 30 %
VAPOR PRESS VSV	Vapor Pressure VSV Signal	VSV operating: ON
TOTAL FT B1	Total Fuel Trim Bank 1: Average value for fuel trim system of bank 1	Idling: 0.8 ~ 1.2 V
O2 LR B1, S1 *2	Heated Oxygen Sensor Lean Rich Bank 1 Sen- sor 1: Response time for oxygen sensor output to switch from lean to rich	Idling after warming up: 0 ~ 1,000 msec.
O2 RL B1, S1 *2	Heated Oxygen Sensor Rich Lean Bank 1 Sen- sor 1: Response time for oxygen sensor output to switch from rich to lean	Idling after warming up: 0 ~ 1,000 msec.

*1: If no conditions are specifically stated for ”Idling”, it means the shift lever is at N or P position, the A/C switch is OFF and all accessory switches are OFF.
*2: Except California Specification vehicles.

DI00I–09

DIAGNOSTIC TROUBLE CODE CHART

HINT:

Parameters listed in the chart may not be exactly the same as your reading due to the type of instrument or other factors.

If a malfunction code is displayed during the DTC check in check mode, check the circuit for that code listed in the table below. For details of each code, turn to the page referred to under the "See Page " for the respective "DTC No." in the DTC chart.

SAE Controlled:

DTC No. (See Page)	Detection Item	Trouble Area	MIL*1	Memory
P0105 (DI–29)	Manifold Absolute Pressure/Barometric Pressure Circuit Malfunction	□Open or short in manifold absolute pressure sensor circuit □Manifold absolute pressure sensor □ECM	○	○
P0106 (DI–33)	Manifold Absolute Pressure Circuit Range/Performance Problem	□Manifold absolute pressure sensor □Vacuum line	○	○
P0110 (DI–35)	Intake Air Temp. Circuit Malfunction	□Open or short in intake air temp. sensor circuit □Intake air temp. sensor (built into mass air flow meter) □ECM	○	○
P0115 (DI–41)	Engine Coolant Temp. Circuit Malfunction	□Open or short in engine coolant temp. sensor circuit □Engine coolant temp. sensor □ECM	○	○
P0116 (DI–47)	Engine Coolant Temp. Circuit Range/Performance Problem	□Engine coolant temp. sensor □Cooling system	○	○
P0120 (DI–49)	Throttle/Pedal Position Sensor/Switch "A" Circuit Malfunction	□Open or short in throttle position sensor circuit □Throttle position sensor □ECM	○	○
P0121 (DI–54)	Throttle/Pedal Position Sensor/Switch "A" Circuit Range/Performance Problem	□Throttle position sensor	○	○
*2 P0125 (DI–61)	Insufficient Coolant Temp. for Closed Loop Fuel Control (Except California Spec.)	□Open or short in heated oxygen sensor (bank 1 sensor 1) circuit □Heated oxygen sensor (bank 1 sensor 1) □ECM	○	○
*3 P0125 (DI–55)	Insufficient Coolant Temp. for Closed Loop Fuel Control (Only for California Spec.)	□Open or short in A/F sensor circuit □A/F sensor □ECM	○	○
*2 P0130 (DI–66)	Heated Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 1)	□Heated oxygen sensor □Fuel trim malfunction	○	○
*2 P0133 (DI–71)	Heated Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 1)	□Heated oxygen sensor □Fuel trim malfunction	○	○
*2 P0135 (DI–75)	Heated Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 1)	□Open or short in heater circuit of heated oxygen sensor □Heated oxygen sensor heater □ECM	○	○

*1: ○ ~~~MIL lights up

*2: Except California specification vehicles

*3: Only for California specification vehicles

DTC No. (See Page)	Detection Item	Trouble Area	MIL*1	Memory
P0136 (DI–77)	Heated Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)	□Heated oxygen sensor	○	○
P0141 (DI–75)	Heated Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)	□Same as DTC P0135	○	○
*3 P0171 (DI–84)	System too Lean (Fuel Trim) (Except California Spec.)	□Air intake (hose loose) □Fuel line pressure □Injector blockage □Heated oxygen sensor (bank 1 sensor 1) □Manifold absolute pressure sensor □Engine coolant temp. sensor	○*1	○
*3 P0172 (DI–84)	System too Rich (Fuel Trim) (Except California Spec.)	□Fuel line pressure □Injector leak, blockage □Heated oxygen sensor (bank 1 sensor 1) □Manifold absolute pressure sensor □Engine coolant temp. sensor	○*1	○
*4 P0171 (DI–79)	System too Lean (Fuel Trim) (Only for California Spec.)	□Air intake (hose loose) □Fuel line pressure □Injector blockage □Manifold absolute pressure sensor □Engine coolant temp. sensor □A/F sensor	○*1	○
*4 P0172 (DI–79)	System too Rich (Fuel Trim) (Only for California Spec.)	□Fuel line pressure □Injector leak, blockage □Manifold absolute pressure sensor □Engine coolant temp. sensor □A/F sensor	○*1	○
P0300 (DI–89)	Random/Multiple Cylinder Misfire Detected	□Ignition system □Injector □Fuel line pressure □EGR □Compression pressure □Valve clearance not to specification □Valve timing □Manifold absolute pressure sensor □Engine coolant temp. sensor □Open or short engine wire □Connector connection □ECM	○*2	○
P0301 P0302 P0303 P0304 (DI–89)	Misfire Detected – Cylinder 1 – Cylinder 2 – Cylinder 3 – Cylinder 4			
P0325 (DI–97)	Knock Sensor 1 Circuit Malfunction	□Open or short in knock sensor 1 circuit □Knock sensor 1 (looseness) □ECM	○*1	○
P0335 (DI–100)	Crankshaft Position Sensor "A" Circuit Malfunction	□Open or short in crankshaft position sensor circuit □Crankshaft position sensor □Starter □ECM	○*1	○

*1: MIL lights up
*2: MIL lights up or blinking
*3: Except California Specification vehicles
*4: Only for California Specification vehicles

DTC No. (See Page)	Detection Item	Trouble Area	MIL*1	Memory
P0340 (DI–103)	Camshaft Position Sensor Circuit Malfunction	• Open or short in camshaft position sensor circuit • Camshaft position sensor • Distributor • Starter • ECM	○	○
P0401 (DI–105)	Exhaust Gas Recirculation Flow Insufficient Detected	• EGR valve stuck closed • Open or short in VSV circuit for EGR • Vacuum or EGR hose disconnected • Manifold absolute pressure sensor • EGR VSV open or close malfunction • ECM	○	○
P0402 (DI–113)	Exhaust Gas Recirculation Flow Excessive Detected	• EGR valve stuck open • Vacuum or EGR hose is connected to wrong post • Manifold absolute pressure sensor • ECM	○	○
*2 P0420 (DI–116)	Catalyst System Efficiency Below Threshold (Except California Spec.)	• Three–way catalytic converter • Open or short in heated oxygen sensor circuit • Heated oxygen sensor	○	○
*3 P0420 (DI–119)	Catalyst System Efficiency Below Threshold (Only for California Spec.)	• Three–way catalytic converter • Open short in heated oxygen sensor (bank 1 sensor 2) circuit • Heated oxygen sensor (bank 1 sensor 2) • Open or short in A/F sensor circuit • A/F sensor	○	○
P0440 (DI–122)	Evaporative Emission Control System Malfunction	• Vapor pressure sensor • Fuel tank cap incorrectly installed • Fuel tank cap cracked or damaged • Vacuum hose cracked, holed, blocked, damaged or disconnected ((1) or (2) in fig. 1) • Hose or tube cracked, holed, damaged or loose seal ((3) in fig. 1) • Fuel tank cracked, holed or damaged • Charcoal canister cracked, holed or damaged • Fuel tank over fill check valve cracked or damaged	○	○
P0441 (DI–129)	Evaporative Emission Control System Incorrect Purge Flow	• Open or short in VSV circuit for vapor pressure sensor • VSV for vapor pressure sensor • Open or short in vapor pressure sensor circuit • Vapor pressure sensor • Open or short in VSV circuit for EVAP • VSV for EVAP • Vacuum hose cracks, hole, blocked, damaged or disconnected ((1), (4), (5) holed (6) and (7) in fig. 1) • Charcoal canister cracked, holed or damaged • Fuel tank over fill check valve cracked or damaged	○	○
P0446 (DI–129)	Evaporative Emission Control System Vent Control Malfunction		○	○
P0450 (DI–142)	Evaporative Emission Control System Pressure Sensor Malfunction	• Open or short in vapor pressure sensor circuit • Vapor pressure sensor • ECM	○	○
P0451 (DI–142)	Evaporative Emission Control System Pressure Sensor (Range/performance)		○	○

*1: ○ ~~~MIL lights up
*2: Except California Specification vehicles
*3: Only for California Specification vehicles

DTC No. (See Page)	Detection Item	Trouble Area	MIL*1	Memory
P0500 (DI–145)	Vehicle Speed Sensor Malfunction	Combination meter Open or short in No.1 vehicle speed sensor circuit No.1 vehicle speed sensor ECM	○	○
P0505 (DI–148)	Idle Control System Malfunction	IAC valve is stuck or closed Open or short in IAC valve circuit Open or short in A/C switch circuit Air intake (hose loose) ECM	○	○

*1: ○ ~~~MIL lights up

2. MANUFACTURER CONTROLLED

DTC No. (See Page)	Detection Item	Trouble Area	MIL*1	Memory
*2 P1130 (DI–152)	A/F Sensor Circuit Range/Performance Malfunction	Open or short in A/F sensor circuit A/F sensor ECM	○	○
*2 P1133 (DI–157)	A/F Sensor Circuit Response Malfunction	A/F sensor	○	○
*2 P1135 (DI–161)	A/F Sensor Heater Circuit Malfunction	Open or short in heater circuit of A/F sensor A/F sensor heater ECM	○	○
P1300 (DI–163)	Igniter Circuit Malfunction (No.1)	Open or short in IGF or IGT circuit from igniter to ECM Ignition coil (No.1) ECM	○	○
P1310 (DI–163)	Igniter Circuit Malfunction (No.2)	Open or short in IGF or IGT circuit from igniter to ECM Ignition coil (No.2) ECM	○	○
P1335 (DI–169)	Crankshaft Position Sensor Circuit Malfunction (During engine running)	Open short in crankshaft position sensor circuit Crankshaft position sensor ECM	–	○
*3 P1520 (DI–170)	Stop Light Switch Signal Malfunction	Short in stop light switch signal circuit Stop light switch ECM	○	○
P1600 (DI–173)	ECM BATT Malfunction	Open in back up power source circuit ECM	○	○
*3 P1780 (DI–175)	Park/Neutral Position Switch Malfunction	Short in park/neutral position switch circuit Park/neutral position switch ECM	○	○

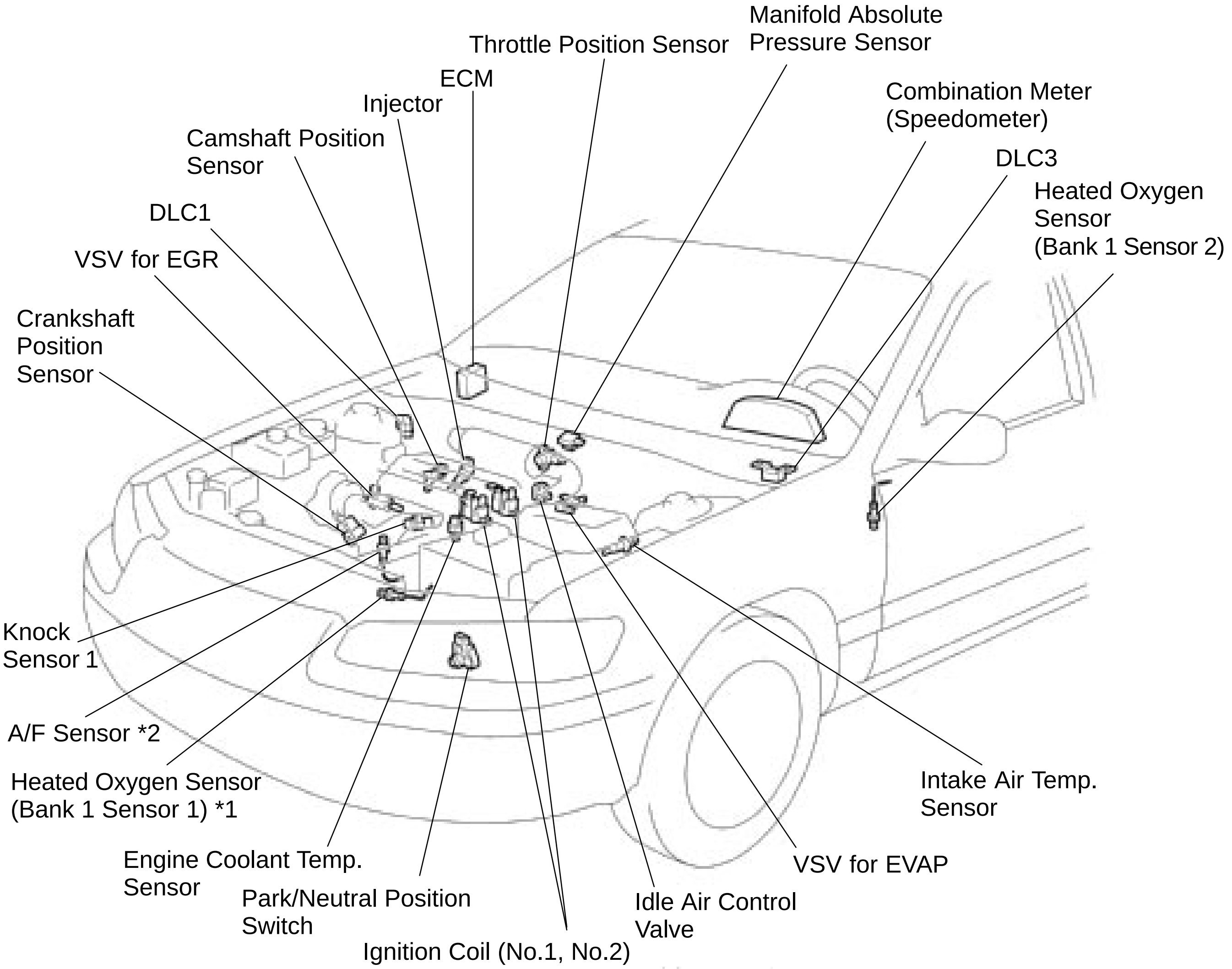
*1: ○ ~~~MIL lights up
*2: Only for California Specification vehicles
*3: Only for A/T models

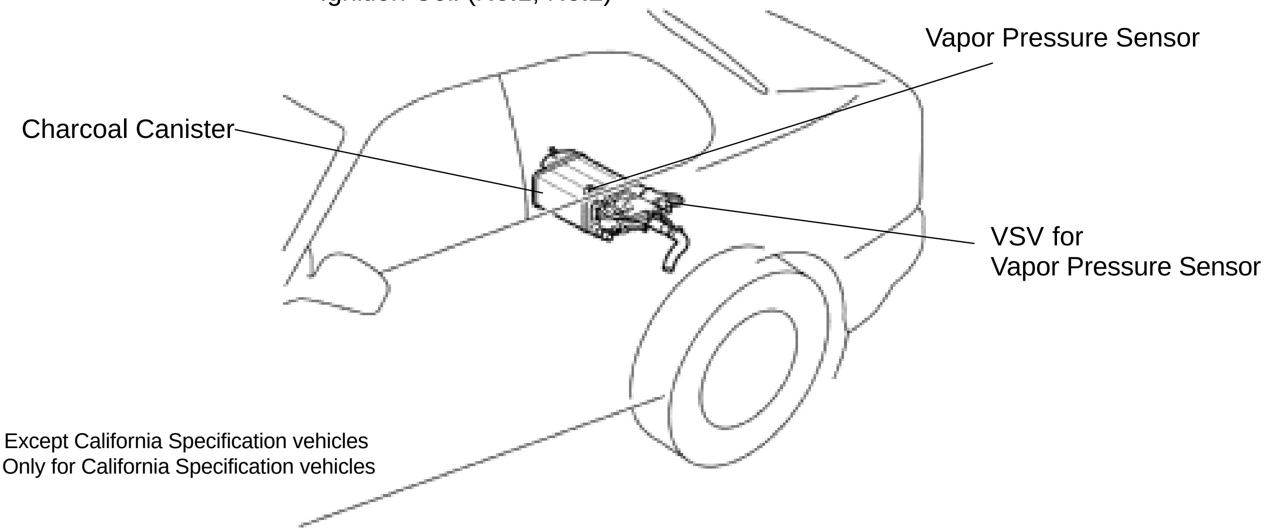
DTC No. (See Page)	Detection Item	Trouble Area	MIL*1	Memory
*2 B2795 (DI–928)	Unmatched key Code	❑Immobiliser system	–	○
*2 B2796 (DI–929)	No Communnication in Immobiliser system	❑Immobiliser system	–	○
*2 B2797 (DI–932)	Communication Malfunction No.1	❑Immobiliser system	–	○
*2 B2798 (DI–935)	Communication Malfunction No.2	❑Immobiliser system	–	○

*1: –~~~MIL does not light up
*2: Only for w/ engine immobiliser system models

DI1JS–03

PARTS LOCATION





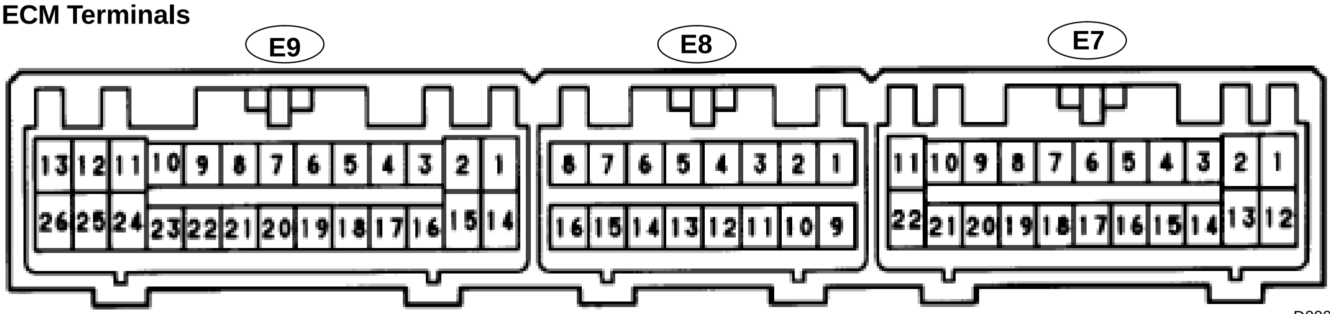
*1: Except California Specification vehicles
*2: Only for California Specification vehicles

DI1JT–03

TERMINALS OF ECM

Without engine immobiliser system

ECM Terminals



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
BATT (E7 – 1) – E1 (E9 – 14)	B – Y ↔ BR	Always	9 ~ 14
+ B (E7 – 12) – E1 (E9 – 14)	B – Y ↔ BR	IG switch ON	9 ~ 14
VC (E8 – 1) – E2 (E8 – 9)	Y ↔ BR	IG switch ON	4.5 ~ 5.5
VTA (E8 – 11) – E2 (E8 – 9)	LG ↔ BR	IG switch ON Throttle valve fully closed	0.3 ~ 1.0
		IG switch ON Throttle valve fully open	3.2 ~ 4.9
PIM (E8 – 2) – E2 (E8 – 9)	B – Y ↔ BR	IG switch ON	3.3 ~ 3.9
		Apply vacuum 26.7 kPa (200 mmHg, 7.9 in.Hg)	2.5 ~ 3.1
THA (E8 – 3) – E2 (E8 – 9)	Y – B ↔ BR	Idling, Intake air temp. 20°C (68° F)	0.5 ~ 3.4
THW (E8 – 4) – E2 (E8 – 9)	G – B ↔ BR	Idling, Engine coolant temp. 80°C (176°F)	0.2 ~ 1.0
STA (E7 – 11) – E1 (E9 – 14)	*1 GR ↔ BR	Cranking	6.0 or more
	*2 B – O ↔ BR	Cranking	6.0 or more
#10 (E9 – 12) – E01 (E9 – 13)	L ↔ BR	IG switch ON	9 ~ 14
		Idling	Pulse generation (See page DI–89)
#20 (E9 – 11) – E01 (E9 – 13)	R ↔ BR	IG switch ON	9 ~ 14
		Idling	Pulse generation (See page DI–89)
#30 (E9 – 25) – E01 (E9 – 13)	Y ↔ BR	IG switch ON	9 ~ 14
		Idling	Pulse generation (See page DI–89)
#40 (E9 – 24) – E01 (E9 – 13)	W ↔ BR	IG switch ON	9 ~ 14
		Idling	Pulse generation (See page DI–89)
IGT1 (E9 – 20) – E1 (E9 – 14)	B ↔ BR	Idling	Pulse generation (See page DI–163)
IGT2 (E9 – 19) – E1 (E9 – 14)	Y – R ↔ BR	Idling	Pulse generation (See page DI–163)
IGF (E9 – 3) – E1 (E9 – 14)	W – R ↔ BR	IG switch ON, Disconnect ignition coil connector	4.5 ~ 5.5
		Idling	Pulse generation (See page DI–163)

*1: TMC made

*2: TMMK made

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
G～(E9 – 5) – NE＞(E9 – 17)	B – W ↔ L	Idling	Pulse generation (See page DI–100)
NE～(E9 – 4) – NE＞(E9 – 17)	B – R ↔ L	Idling	Pulse generation (See page DI–100)
FC (E7 – 14) – E01 (E9 – 13)	G – R ↔ BR	IG switch ON	9 ~ 14
EGR (E9 – 23) – E01(E9 – 13)	P – B ↔ BR	IG switch ON	0 ~ 3
ISCC (E9 – 9) – E01 (E9 – 13)	B – O ↔ BR	IG switch ON Disconnect E9 connector of ECM	9 ~ 4
ISCO (E9 –10) – E01(E9 – 13)	W ↔ BR	IG switch ON Disconnect E9 connector of ECM	Below 3.0
*1 OX1 (E8 – 6) – E1 (E9 – 14)	W ↔ BR	Maintain engine speed at 2,500 rpm for 2 min. after warming up	Pulse generation (See page DI–66)
OX2 (E8 – 5) – E1 (E9 – 14)	B ↔ BR	Maintain engine speed at 2,500 rpm for 2 min. after warming up	Pulse generation
*1 HT1 (E9 – 8) – E1 (E9 – 14)	L – Y ↔ BR	Idling	Below 3.0
		IG switch ON	9 ~ 14
HT2 (E9 – 21) – E1 (E9 – 14)	P – B ↔ BR	Idling	Below 3.0
		IG switch ON	9 ~ 14
KNK (E8 – 13) – E1 (E9 – 14)	W ↔ BR	Idling	Pulse generation (See page DI–97)
*3 NSW (E7 – 22) – E1 (E9 – 14)	B – W ↔ BR	IG switch ON Other shift position in P or N position	9 ~ 14
		IG switch ON Shift position in P or N position	0 ~ 3.0
SPD (E7 – 9) – E1 (E9 – 14)	V – W ↔ BR	IG switch ON Rotate driving wheel slowly	Pulse generation (See page DI–145)
TE1 (E8 – 15) – E1 (E9 – 14)	L – W ↔ BR	IG switch ON	9 ~ 14
W (E7 – 5) – E1 (E9 – 14)	G – R ↔ BR	Idling	9 ~ 14
		IG switch ON	Below 3.0
EVP (E9 – 22) – E1 (E9 – 14)	V – W ↔ BR	IG switch ON	9 ~ 14
TPC (E8 – 8) – E1 (E9 – 14)	V ↔ BR	IG switch ON	9 ~ 14
PTNK (E8 – 7) – E2 (E8 – 9)	P ↔ BR	IG switch ON, Disconnect vacuum hose from vapor pressure sensor	2.9 ~ 3.7
		Apply vacuum (less than 66.7 kPa (500 mmHg, 19.7 in.Hg))	Below 0.5
*2 AF～ (E8 – 6) – E1 (E9 – 14)	W ↔ BR	Always (IG switch ON)	3.3 fixed*4
*2 AF＞ (E8 – 14) – E1 (E9 – 14)	O ↔ BR	Always (IG switch ON)	3.0 fixed*4

*1: Except California Specification vehicles
*2: Only for California Specification vehicles
*3: Only for A/T models
*4: The ECM terminal voltage is fixed regardless of the output voltage from the sensor.

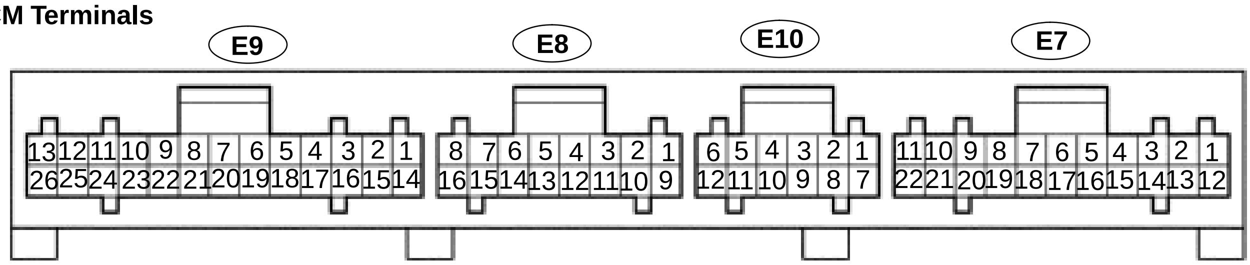
Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
*1 HTAF (E9 – 2) – E04 (E9 – 15)	G ↔ BR	Idling	Below 3.0
		IG switch ON	9 ~ 14
LOCK IN (E9 – 18) – E1 (E9 – 14)	W – L ↔ BR	A/C compressor is operating	Pulse generation (See page DI–190)
LOCK (E7 – 15) – E1(E9 – 14)	R – W ↔ BR	A/C indicator light lights up	Below 4.0
		A/C indicator light does not lights up	Below 1.0
A/C SW (E7 – 10) – E1 (E9 – 14)	R – B ↔ BR	A/C switch ON	9 ~ 14
		A/C switch OFF	Below 1.0
PRS (E7 – 13) – E1 (E9 – 14)	G ↔ BR	A/C pressure is normally	Below 1.0
THR (E8 – 10) – E2 (E8 – 9)	L – R ↔ BR	IG switch ON, A/C evaporator temp. 0°C (32°F)	2.2 ~ 2.6
		IG switch ON, A/C evaporator temp. 15°C (59°F)	1.4 ~ 1.8
MGC (E7 – 21) – E01(E9 – 14)	L – Y ↔ BR	A/C magnetic clutch ON	Below 1.0
		A/C magnetic clutch OFF	9 ~ 14
* STP (E7 – 4) – E1 (E9 – 14)	G – W ↔ BR	IG switch ON, Brake pedal depressed	7.5 ~ 14
		IG switch ON, Brake pedal released	Below 1.5
ELS (E7 – 2) – E1 (E9 – 14)	B – R ↔ BR	Defogger switch and taillight switch ON	7.5 ~ 14
		Defogger switch and taillight switch OFF	Below 1.5
PSSW (E8 – 12) – E1 (E9 – 14)	B – L ↔ BR	IG switch ON	9 ~ 14
		At idling, Turn steering wheel to lock position	Below 3.0
SIL (E7 – 16) – E1 (E9 – 14)	W ↔ BR	During transmission	Pulse generation

*: Only for A/T models

*1: Only for California Specification vehicles

With engine immobiliser system

ECM Terminals



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
BATT (E7 – 2) – E1 (E9 – 24)	B – Y ↔ BR	Always	9 ~ 14
+ B (E7 – 12) – E1 (E9 – 24)	B – Y ↔ BR	IG switch ON	9 ~ 14
VC (E8 – 1) – E2 (E8 – 9)	Y ↔ BR	IG switch ON	4.5 ~ 5.5
VTA (E8 – 10) – E2 (E8 – 9)	LG ↔ BR	IG switch ON Throttle valve fully closed	0.3 ~ 1.0
		IG switch ON Throttle valve fully open	3.2 ~ 4.9
PIM (E8 – 2) – E2 (E8 – 9)	B – Y ↔ BR	IG switch ON	3.3 ~ 3.9
		Apply vacuum 26.7 kPa (200 mmHg, 7.9 in.Hg)	2.5 ~ 3.1
THA (E8 – 3) – E2 (E8 – 9)	Y – B ↔ BR	Idling, Intake air temp. 20°C (68° F)	0.5 ~ 3.4
THW (E8 – 4) – E2 (E8 – 9)	G – B ↔ BR	Idling, Engine coolant temp. 80°C (176°F)	0.2 ~ 1.0
STA (E7 – 11) – E1 (E9 – 24)	*1 GR ↔ BR	Cranking	6.0 or more
	*2 B – O ↔ BR	Cranking	6.0 or more
#10 (E9 – 12) – E01 (E9 – 13)	L ↔ BR	IG switch ON	9 ~ 14
		Idling	Pulse generation (See page DI–89)
#20 (E9 – 11) – E01 (E9 – 13)	R ↔ BR	IG switch ON	9 ~ 14
		Idling	Pulse generation (See page DI–89)
#30 (E9 – 10) – E01 (E9 – 13)	Y ↔ BR	IG switch ON	9 ~ 14
		Idling	Pulse generation (See page DI–89)
#40 (E9 – 9) – E01 (E9 – 13)	W ↔ BR	IG switch ON	9 ~ 14
		Idling	Pulse generation (See page DI–89)
IGT1 (E9 – 23) – E1 (E9 – 24)	B ↔ BR	Idling	Pulse generation (See page DI–163)
IGT2 (E9 – 22) – E1 (E9 – 24)	Y – R ↔ BR	Idling	Pulse generation (See page DI–163)
IGF (E9 – 17) – E1 (E9 – 24)	W – R ↔ BR	IG switch ON, Disconnect ignition coil connector	4.5 ~ 5.5
		Idling	Pulse generation (See page DI–163)

*1: TMC made
*2: TMMK made

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
G ~ (E10 – 11) – NE > (E10 – 6)	B – W ↔ L	Idling	Pulse generation (See page DI–100)
NE ~ (E10 – 12) – NE > (E10 – 6)	B – R ↔ L	Idling	Pulse generation (See page DI–100)
FC (E7 – 14) – E01 (E9 – 13)	G – R ↔ BR	IG switch ON	9 ~ 14
EGR (E8 – 15) – E01(E9 – 13)	P – B ↔ BR	IG switch ON	0 ~ 3
ISCC (E9 – 6) – E01 (E9 – 13)	B – O ↔ BR	IG switch ON Disconnect E9 connector of ECM	9 ~ 4
ISCO (E9 –7) – E01(E9 – 13)	W ↔ BR	IG switch ON Disconnect E9 connector of ECM	Below 3.0
*1 OX1 (E8 – 5) – E1 (E9 – 24)	W ↔ BR	Maintain engine speed at 2,500 rpm for 2 min. after warming up	Pulse generation (See page DI–66)
OX2 (E8 – 13) – E1 (E9 – 24)	B ↔ BR	Maintain engine speed at 2,500 rpm for 2 min. after warming up	Pulse generation
*1 HT1 (E9 – 1) – E1 (E9 – 24)	L – Y ↔ BR	Idling	Below 3.0
		IG switch ON	9 ~ 14
HT2 (E9 – 14) – E1 (E9 – 24)	P – B ↔ BR	Idling	Below 3.0
		IG switch ON	9 ~ 14
KNK (E8 – 12) – E1 (E9 – 24)	W ↔ BR	Idling	Pulse generation (See page DI–97)
*3 NSW (E7 – 22) – E1 (E9 – 24)	B – W ↔ BR	IG switch ON Other shift position in P or N position	9 ~ 14
		IG switch ON Shift position in P or N position	0 ~ 3.0
SPD (E7 – 8) – E1 (E9 – 24)	V – W ↔ BR	IG switch ON Rotate driving wheel slowly	Pulse generation (See page DI–145)
TE1 (E8 – 7) – E1 (E9 – 24)	L – W ↔ BR	IG switch ON	9 ~ 14
W (E7 – 4) – E1 (E9 – 24)	G – R ↔ BR	Idling	9 ~ 14
		IG switch ON	Below 3.0
EVP (E9 – 3) – E1 (E9 – 24)	V – W ↔ BR	IG switch ON	9 ~ 14
TPC (E8 – 16) – E1 (E9 – 24)	V ↔ BR	IG switch ON	9 ~ 14
PTNK (E8 – 8) – E2 (E8 – 9)	P ↔ BR	IG switch ON, Disconnect vacuum hose from vapor pressure sensor	2.9 ~ 3.7
		Apply vacuum (less than 66.7 kPa (500 mmHg, 19.7 in.Hg))	Below 0.5
*2 AF ~ (E8 – 6) – E1 (E9 – 24)	W ↔ BR	Always (IG switch ON)	3.3 fixed*4
*2 AF > (E8 – 14) – E1 (E9 – 24)	O ↔ BR	Always (IG switch ON)	3.0 fixed*4

*1: Except California Specification vehicles
*2: Only for California Specification vehicles
*3: Only for A/T models
*4: The ECM terminal voltage is fixed regardless of the output voltage from the sensor.

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
*1 HTAF (E9 – 2) – E04 (E9 – 15)	G ↔ BR	Idling	Below 3.0
		IG switch ON	9 ~ 14
LOCK IN (E9 – 19) – E1 (E9 – 24)	W – L ↔ BR	A/C compressor is operating	Pulse generation (See page DI–190)
LOCK (E7 – 20) – E1 (E9 – 24)	R – W ↔ BR	A/C indicator light lights up	Below 4.0
		A/C indicator light does not lights up	Below 1.0
A/C SW (E7 – 10) – E1 (E9 – 24)	R – B ↔ BR	A/C switch ON	9 ~ 14
		A/C switch OFF	Below 1.0
PRS (E7 – 19) – E1 (E9 – 24)	G ↔ BR	A/C pressure is normally	Below 1.0
THR (E8 – 11) – E2 (E8 – 9)	L – R ↔ BR	IG switch ON, A/C evaporator temp. 0˚C (32˚F)	2.2 ~ 2.6
		IG switch ON, A/C evaporator temp. 15˚C (59˚F)	1.4 ~ 1.8
MGC (E7 – 21) – E01 (E9 – 13)	L – Y ↔ BR	A/C magnetic clutch ON	Below 1.0
		A/C magnetic clutch OFF	9 ~ 14
* STP (E7 – 9) – E1 (E9 – 24)	G – W ↔ BR	IG switch ON, Brake pedal depressed	7.5 ~ 14
		IG switch ON, Brake pedal released	Below 1.5
ELS (E7 – 13) – E1 (E9 – 24)	B – R ↔ BR	Defogger switch and taillight switch ON	7.5 ~ 14
		Defogger switch and taillight switch OFF	Below 1.5
PSSW (E9 – 4) – E1 (E9 – 24)	B – L ↔ BR	IG switch ON	9 ~ 14
		At idling, Turn steering wheel to lock position	Below 3.0
SIL (E7 – 6) – E1 (E9 – 24)	W ↔ BR	During transmission	Pulse generation
TACH (E7 – 7) – E1 (E9 – 24)	B – O ↔ BR	Idling	Pulse generation
KSW (E10 – 4) – E1 (E9 – 24)	L – B ↔ BR	At the time of inserting key	Below 1.5
		In the condition without key inserted	Pulse generation
RXCK (E10 – 3) – E1 (E9 – 24)	R – L ↔ BR	At the time of inserting key	Pulse generation
CODE (E10 – 8) – E1 (E9 – 24)	G – W ↔ BR	At the time of inserting key	Pulse generation
TXCT (E10 – 1) – E1 (E9 – 24)	L – Y ↔ BR	At the time of inserting key	Pulse generation
IMLD (E10 – 1) – E1 (E9 – 24)	R – Y ↔ BR	In the condition without key inserted	Pulse generation
MREL (E10 – 7) – E1 (E9 – 24)	B – W ↔ BR	IG switch ON	9 ~ 14
IGSW (E7 – 1) – E1 (E9 – 24)	B – R ↔ BR	IG switch ON	9 ~ 14

*: Only for A/T models
*1: Only for California Specification vehicles

DI00L–03

PROBLEM SYMPTOMS TABLE

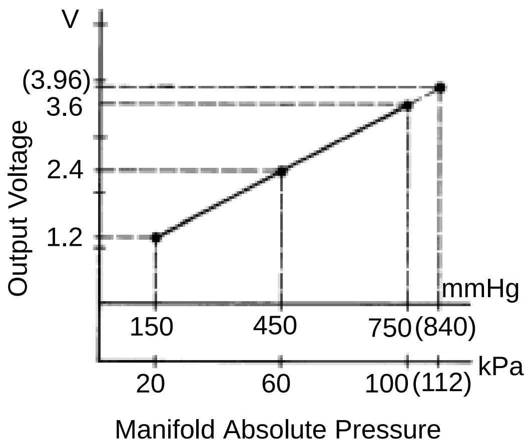
Symptom	Suspect Area	See page
Engine does not crank (Does not start)	1. Starter 2. starter relay	ST–2 ST–20
No initial combustion (Does not start)	1. ECM power source circuit 2. Fuel pump control circuit 3. Engine control module (ECM)	DI–179 DI–183 IN–31
No complete combustion (Does not start)	1. Fuel pump control circuit	DI–183
Engine cranks normally (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit 3. Compression	DI–176 DI–183 EM–3
Cold engine (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit	DI–176 DI–183
Hot engine (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit	DI–176 DI–183
High engine idle speed (Poor idling)	1. A/C switch circuit 2. ECM power source circuit	AC–84 DI–179
Low engine idle speed (Poor idling)	1. A/C switch circuit 2. Fuel pump control circuit	AC–84 DI–183
Rough idling (Poor idling)	1. Compression 2. Fuel pump control circuit	EM–3 DI–183
Hunting (Poor idling)	1. ECM power source circuit 2. Fuel pump control circuit	DI–179 DI–183
Hesitation/Poor acceleration (Poor driveability)	1. Fuel pump control circuit 2. A/T faulty	DI–183 DI–405
Surging (Poor driveability)	1. Fuel pump control circuit	DI–183
Soon after starting (Engine stall)	1. Fuel pump control circuit	DI–183
During A/C operation (Engine stall)	1. A/C switch circuit 2. Engine control module (ECM)	AC–84 IN–31
A/C switch indicatior blinking	1. A/C Compressor lock sensor circuit 2. A/C Evaporator temp. sensor circuit	DI–190 DI–192
Unable to refuel/ Difficult to refuel	1. ORVR system	EC–6

DI00M–05

CIRCUIT INSPECTION

DTC	P0105	Manifold Absolute Pressure/Barometric Pressure Circuit Malfunction

CIRCUIT DESCRIPTION



P01242

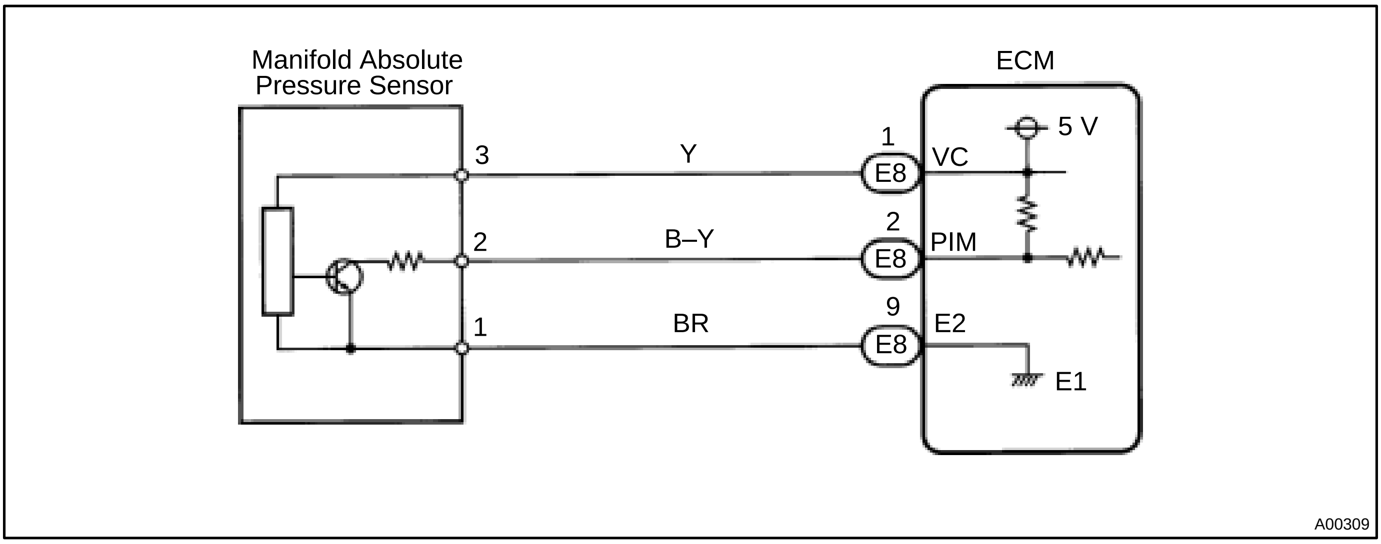
By a built–in sensor unit, the manifold absolute pressure sensor detects the intake manifold pressure as a voltage. The ECM then determines the basic injection duration and basic injection advance angle based on this voltage. Since the manifold absolute pressure sensor does not use the atmospheric pressure as a criterion, but senses the absolute pressure inside the intake manifold (the pressure in proportion to the present absolute vacuum 0), it is not influenced by fluctuations in the atmospheric pressure due to high altitude and other factors. This permits it to control the air–fuel ratio at the proper lever under all conditions.

DTC No.	DTC Detecting Condition	Trouble Area
P0105	Open or short in manifold absolute pressure sensor circuit	●Open or short in manifold absolute pressure sensor circuit ●Manifold absolute pressure sensor ●ECM

HINT:
After confirming DTC P0105, use the OBD II scan tool or TOYOTA hand–held tester to confirm the manifold absolute pressure from the CURRENT DATA.

Manifold Absolute Pressure (kPa)	Malfunction
Approx. 0	●PIM circuit short
130 or more	●VC circuit open or short ●PIM circuit open ●E2 circuit open

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTC P0105 (Manifold Absolute Pressure/Barometric Pressure Circuit Malfunction), P0106 (Manifold Absolute Pressure /Barometric Pressure Circuit Range/Performance Problem) and P0110 (Intake Air Temp. Circuit Malfunction), P0115 (Engine Coolant Temp. Circuit Malfunction), P0120 (Throttle/Pedal Position Sensor/Switch ”A” Circuit Malfunction) are output simultaneously, E2 (sensor ground) may be open.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

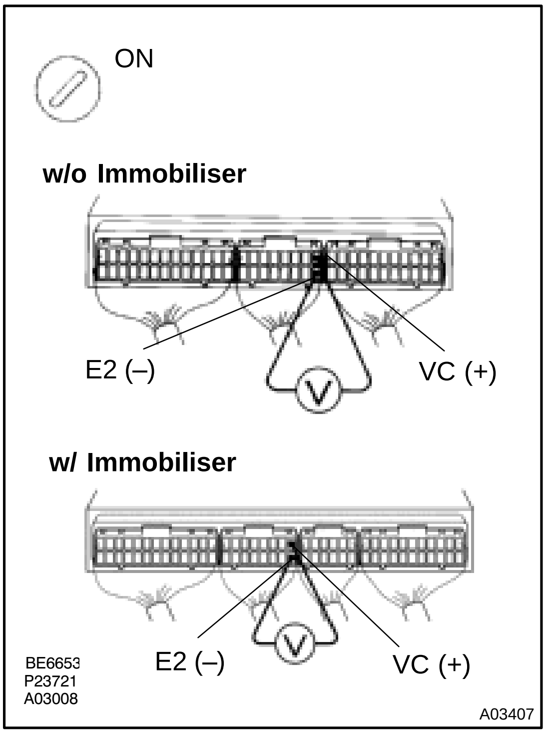
1	**Connect OBD II scan tool or TOYOTA hand–held tester, and read value of manifold absolute pressure.**

PREPARATION:
(a) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the OBD II scan tool or TOYOTA hand–held tester main switch ON.
CHECK:
Read value of the manifold absolute pressure on the OBD II scan tool or TOYOTA hand–held tester.
OK:
Same as atmospheric pressure.

OK → **Check for intermittent problems (See page DI–3).**

NG

2	**Check voltage between terminals VC and E2 of ECM connector.**

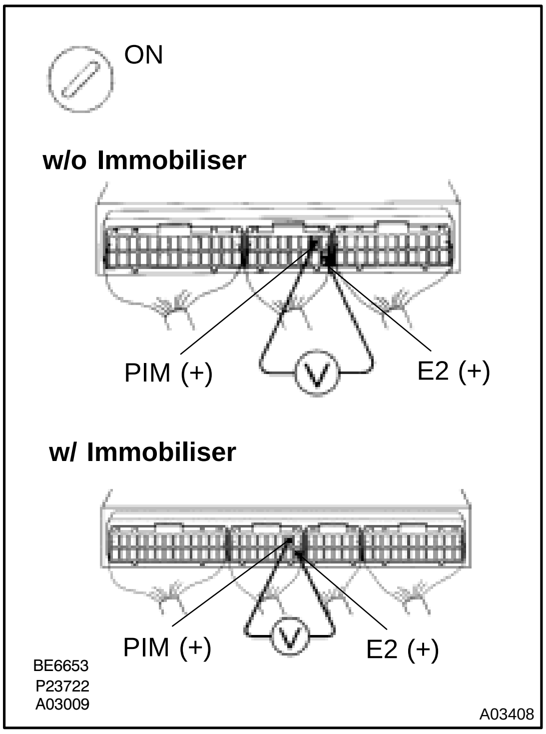


PREPARATION:
(a) Remove the glove compartment (See page SF–64).
(b) Turn the ignition switch ON.
CHECK:
Measure voltage between terminals VC and E2 of the ECM connector.
OK:
Voltage: 4.5 – 5.5 V

NG → **Check and replace ECM (See page IN–31).**

OK

3	Check voltage between terminals PIM and E2 of ECM connector.



PREPARATION:
(a) Remove the glove compartment (See page SF–64).
(b) Turn the ignition switch ON.

CHECK:
Measure voltage between terminals PIM and E2 of the ECM connector.

OK:
Voltage: 3.3 – 3.9 V

OK → **Check and replace ECM (See page IN–31).**

NG

4	Check for open and short in harness and connector between manifold absolute pressure sensor and ECM.

NG → **Repair or replace harness or connector.**

OK

Replace manifold absolute pressure sensor (See page SF–52).

DI00N–04

DTC	P0106	Manifold Absolute Pressure Circuit Range/Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0105 (Manifold Absolute Pressure/Barometric Pressure Circuit Malfunction) on page DI–29.

DTC No.	DTC Detecting Condition	Trouble Area
P0106	After engine is warmed up, conditions (a) and (b) continue with engine speed 400 ~ 1,000 rpm (2 trip detection logic) (a) Throttle valve fully closed (b) Manifold absolute pressure sensor output > 3.0 V	●Manifold absolute pressure sensor ●Vacuum line
	Condition (c) and (d) continue with engine speed 2,500 rpm or less (2 trip detection logic) (c) VTA > 1.85 (d) Manifold absolute pressure sensor output < 1.0 V	

WIRING DIAGRAM

Refer to DTC P0105 (Manifold Absolute Pressure/Barometric Pressure Circuit Malfunction) on page DI–29.

INSPECTION PROCEDURE

HINT:

- If DTC P0105 (Manifold Absolute Pressure/Barometric Pressure Circuit Malfunction) and P0106 (Manifold Absolute Pressure /Barometric Pressure Circuit Range/Performance Problem) are output simultaneously, manifold absolute pressure sensor circuit may be open. Perform troubleshooting of DTC P0105 first.
- If DTC P0105 (Manifold Absolute Pressure/Barometric Pressure Circuit Malfunction), P0106 (Manifold Absolute Pressure /Barometric Pressure Circuit Range/Performance Problem), P0110 (Intake Air Temp. Circuit Malfunction), P0115 (Engine Coolant Temp. Circuit Malfunction) and P0120 (Throttle/ Pedal Position Sensor/Switch ”A” Circuit Malfunction) are output simultaneously, E2 (sensor ground) may be open.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	Are there any other codes (besides DTC P0106) being output?

YES → **Go to relevant DTC chart.**

NO

2	Check manifold absolute pressure sensor operation (See page SF–52).

OK → **Check vacuum line between intake air chamber and manifold absolute pressure sensor.**

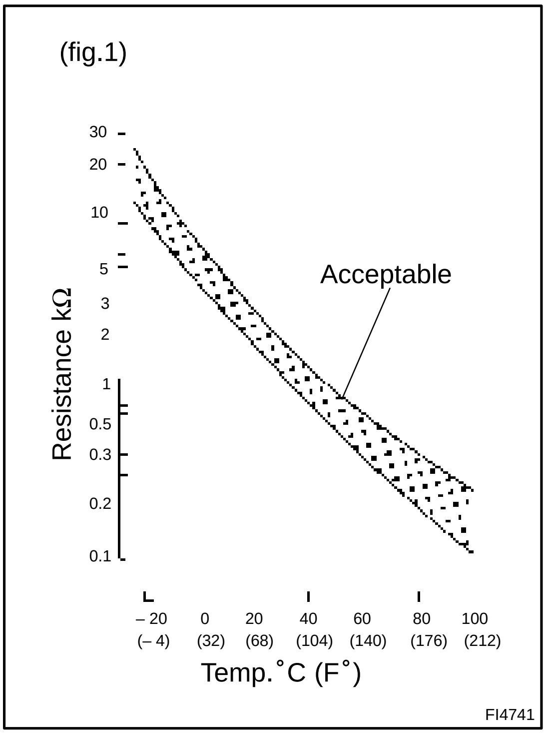
NG ↓

Replace manifold absolute pressure sensor.

DI00O–05

DTC	P0110	Intake Air Temp. Circuit Malfunction

CIRCUIT DESCRIPTION



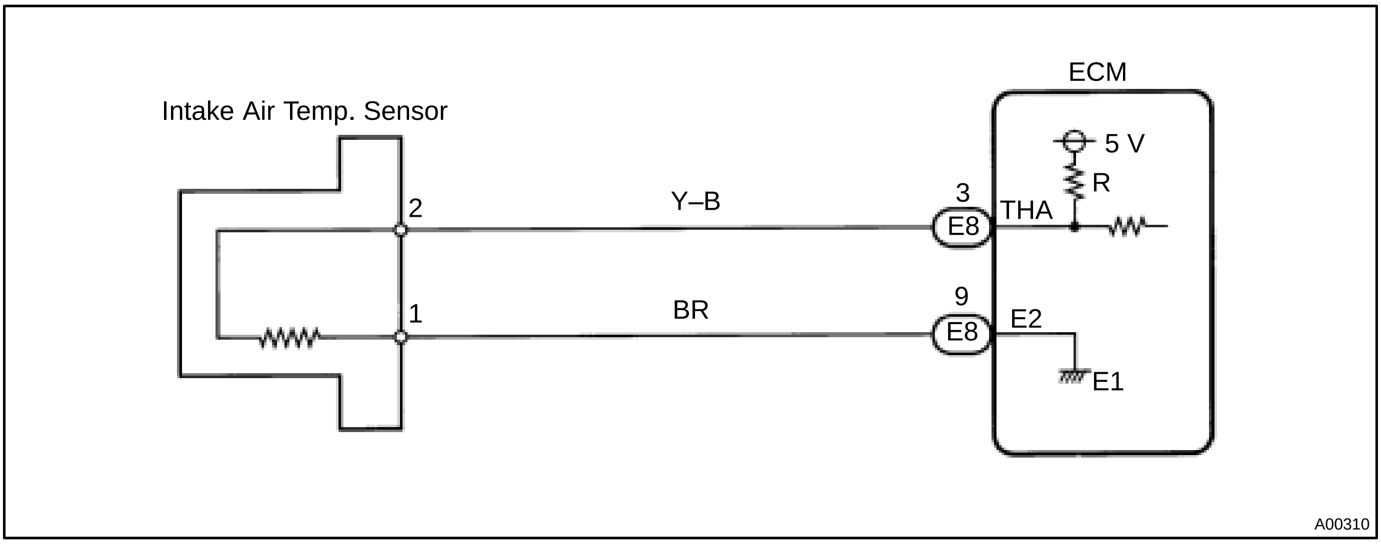
The intake air temp. sensor is built into the air cleaner cap and senses the intake air temperature.
A thermistor built in the sensor changes the resistance value according to the intake air temperature, the lower the intake air temperature, the greater the thermistor resistance value, and the higher the intake air temperature, the lower the thermistor resistance value (See fig.1).
The air intake temperature sensor is connected to the ECM (See below). The 5 V power source voltage in the ECM is applied to the intake air temp. sensor from the terminal THA via a resistor R.
That is, the resistor R and the intake air temp. sensor are connected in series. When the resistance value of the intake air temp. sensor changes in accordance with changes in the intake air temperature, the potential at terminal THA also changes. Based on this signal, the ECM increases the fuel injection volume to improve driveability during cold engine operation.
If the ECM detects the DTC P0110, it operates the fail safe function in which the intake air temperature is assumed to be 20˚C (68˚F).

DTC No.	DTC Detecting Condition	Trouble Area
P0110	Open or short in intake air temp. sensor circuit	•Open or short in intake air temp. sensor circuit •Intake air temp. sensor •ECM

HINT:
After confirming DTC P0110, use the OBD II scan tool or TOYOTA hand–held tester to confirm the intake air temperature from the CURRENT DATA.

Temperature Displayed	Malfunction
–40˚C (–40˚F)	Open circuit
140˚C (284˚F) or more	Short circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTCs P0105 (Manifold Absolute Pressure/Barometric Pressure Circuit Malfunction), P0106 (Manifold Absolute Pressure /Barometric Pressure Circuit Range/Performance Problem), P0110 (Intake Air Temp. Circuit Malfunction), P0115 (Engine Coolant Temp. Circuit Malfunction) and P0120 (Throttle/ Pedal Position Sensor/Switch "A" Circuit Malfunction) are output simultaneously, E2 (sensor ground) may be open.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Connect OBD II scan tool or TOYOTA hand–held tester, and read value of intake air temperature.**

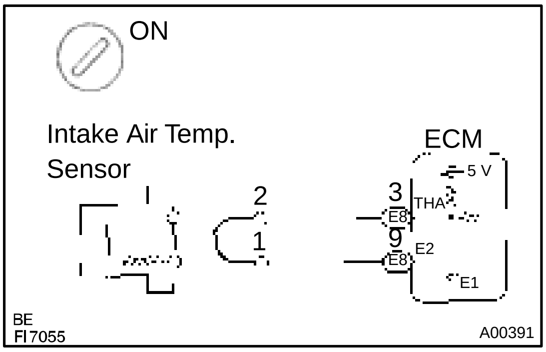
PREPARATION:
(a) Connect the OBD II scan tool or TOYOTA hand–held tester to DLC3.
(b) Turn the ignition switch ON and push the OBD II scan tool or TOYOTA hand–held tester main switch ON.
CHECK:
Read temperature value on the OBD II scan tool or TOYOTA hand–held tester.
OK:
Same as actual air intake temperature.
HINT:
- If there is open circuit, OBD II scan tool or TOYOTA hand–held tester indicates – 40°C (– 40°F).
- If there is short circuit, OBD II scan tool or TOYOTA hand–held tester indicates 140°C (284°F) or more.

NG	**–40°C (–40°F) .... Go to step 2. 140°C (284°F) or more .... Go to step 4.**

OK

Check for intermittent problems (See page DI–3).

2	**Check for open in harness or ECM.**

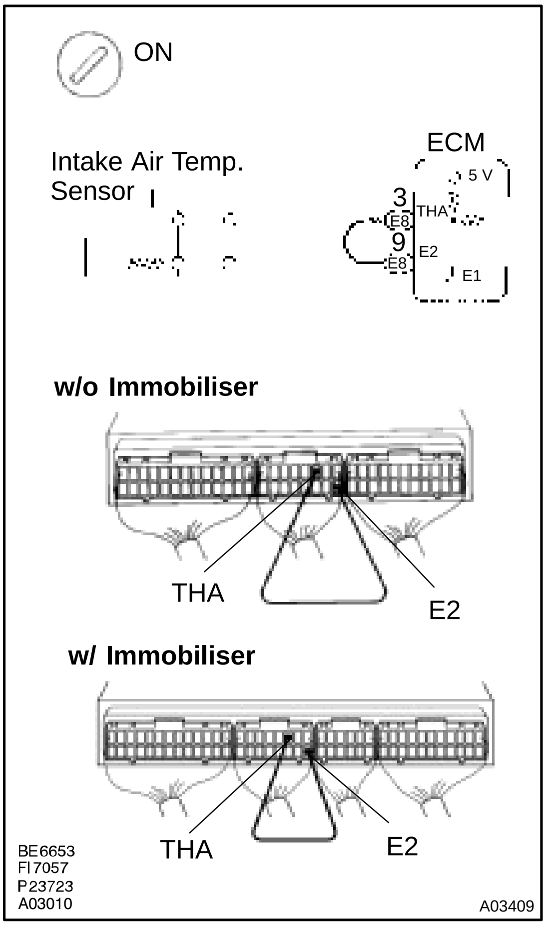


PREPARATION:
(a) Disconnect the intake air temp. sensor connector.
(b) Connect the sensor wire harness terminals together.
(c) Turn the ignition switch ON.
CHECK:
Read temp. value on the OBD II scan tool or TOYOTA hand–held tester.
OK:
Temp. value: 140°C (284°F) or more

OK	**Confirm good connection at sensor. If OK, replace intake air temp. sensor.**

NG

3	Check for open in harness or ECM.



PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Connect between terminals THA and E2 of the ECM connector.

HINT:
The intake air temp. sensor connector is disconnected.
Before checking, do a visual and contact pressure check for the ECM connector (See page IN–31).

(c) Turn the ignition switch ON.

CHECK:

Read temperature value on the OBD II scan tool or TOYOTA hand–held tester.

OK:

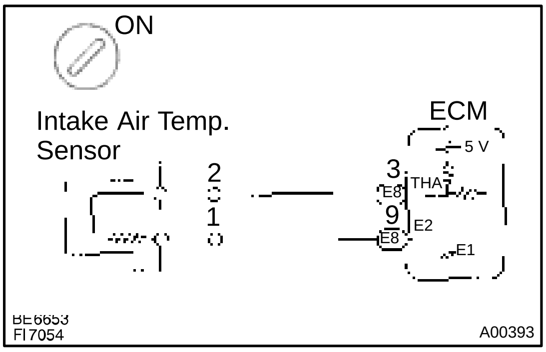
Temperature value: 140°C (284°F) or more

OK	Open in harness between terminals E2 or THA, repair or replace harness.

NG

Confirm good connection at ECM. If OK, check and replace ECM (See page IN–31).

4	Check for short in harness and ECM.



PREPARATION:
(a) Disconnect the intake air temp. sensor connector.
(b) Turn the ignition switch ON.

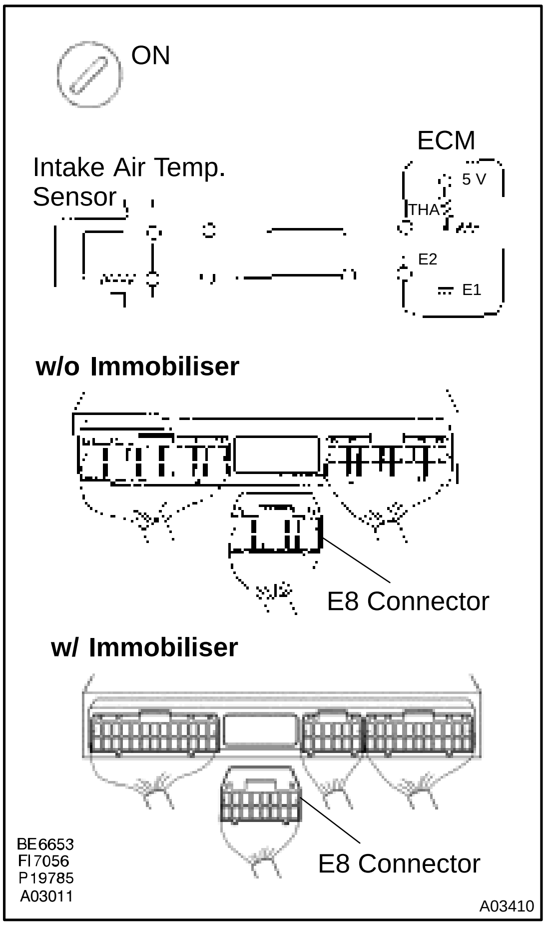
CHECK:
Read temperature value on the OBD II scan tool or TOYOTA hand–held tester.

OK:
Temperature value: –40°C (–40°F)

OK → **Replace intake air temp. sensor.**

NG

5	Check for short in harness or ECM.



PREPARATION:
(a) Remove the glove compartment (See page SF–64).
(b) Disconnect the E8 connector from the ECM.
HINT:
The intake air temp. sensor connector is disconnected.
(c) Turn the ignition switch ON.
CHECK:
Read temperature value on the OBD II scan tool or TOYOTA hand–held tester.
OK:
Temperature value: –40°C (–40°F)

OK → **Repair or replace harness or connector.**

NG

Check and replace ECM (See page IN–31).

DI00P–05

DTC	P0115	Engine Coolant Temp. Circuit Malfunction

CIRCUIT DESCRIPTION

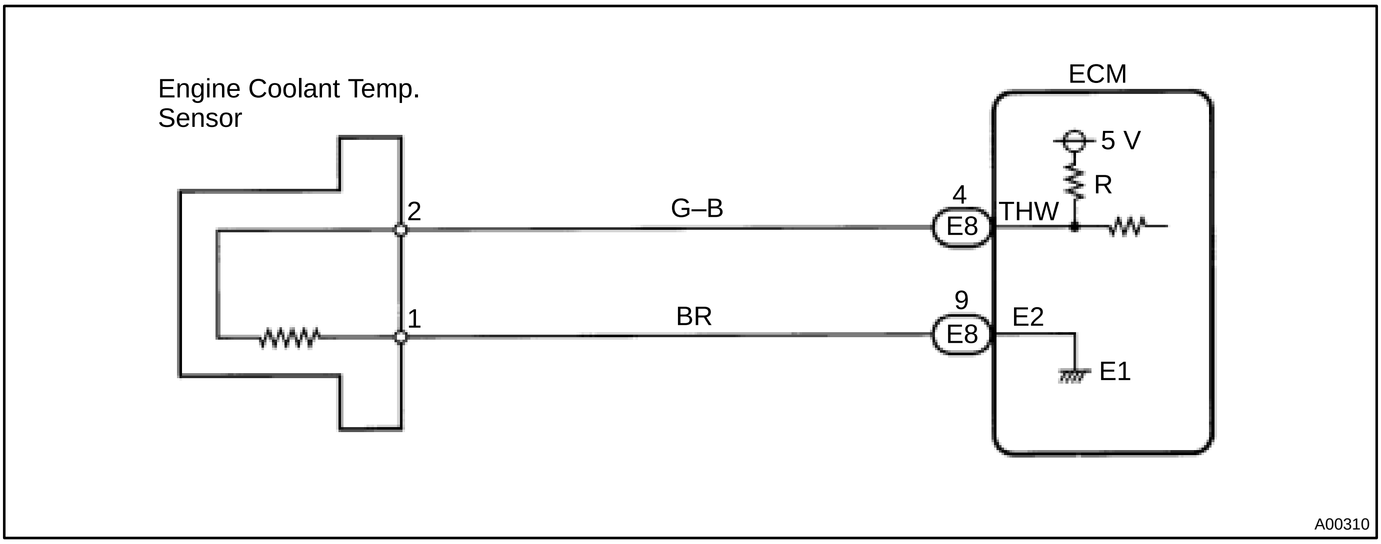
A thermistor built into the engine coolant temp. sensor changes the resistance value according to the engine coolant temp.
The structure of the sensor and connection to the ECM is the same as in the intake air temp. circuit malfunction shown on page DI–35.
If the ECM detects the DTC P0115, it operates fail safe function in which the engine coolant temperature is assumed to be 80°C (176°F).

DTC No.	Detection Item	Trouble Area
P0115	Open or short in engine coolant temp. sensor circuit	●Open or short in engine coolant temp. sensor circuit ●Engine coolant temp. sensor ●ECM

HINT:
After confirming DTC P0115, use the OBD II scan tool or TOYOTA hand–held tester to confirm the engine coolant temp. from the CURRENT DATA.

Temp. Displayed	Malfunction
–40°C (–40°F)	Open circuit
140°C (284°F) or more	Short circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTCs P0105 (Manifold Absolute Pressure/Barometric Pressure Circuit Malfunction), P0106 (Manifold Absolute Pressure /Barometric Pressure Circuit Range/Performance Problem), P0110 (Intake Air Temp. Circuit Malfunction), P0115 (Engine Coolant Temp. Circuit Malfunction) and P0120 (Throttle/ Pedal Position Sensor/Switch ”A” Circuit Malfunction) are output simultaneously, E2 (sensor ground) may be open.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Connect OBD II scan tool or TOYOTA hand–held tester, and read value of engine coolant temperature.**

PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.

(b) Turn the ignition switch ON and push the OBD II scan tool or TOYOTA hand–held tester main switch ON.

CHECK:

Read temperature value on the OBD II scan tool or TOYOTA hand–held tester.

OK:

Same as actual engine coolant temperature

HINT:

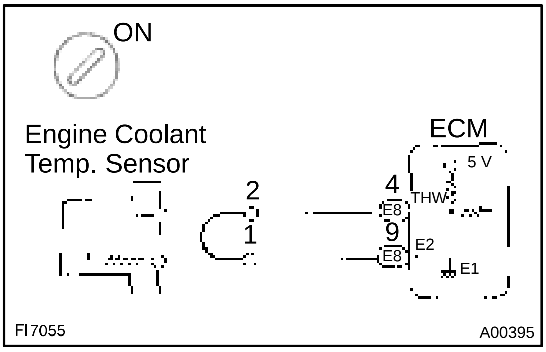
- If there is open circuit, OBD II scan tool or TOYOTA hand–held tester indicates –40°C (–40°F).
- If there is open circuit, OBD II scan tool or TOYOTA hand–held tester indicates 140°C (284°F) or more.

NG	**–40°C (–40°F) ... Go to step 2.** **140°C (284°F) or more ... Go to step 4.**

OK

Check for intermittent problems (See page DI–3).

2	**Check for open in harness or ECM.**



PREPARATION:

(a) Disconnect the engine coolant temp. sensor connector.

(b) Connect the sensor wire harness terminals together.

(c) Turn the ignition switch ON.

CHECK:

Read temperature value on the OBD II scan tool or TOYOTA hand–held tester.

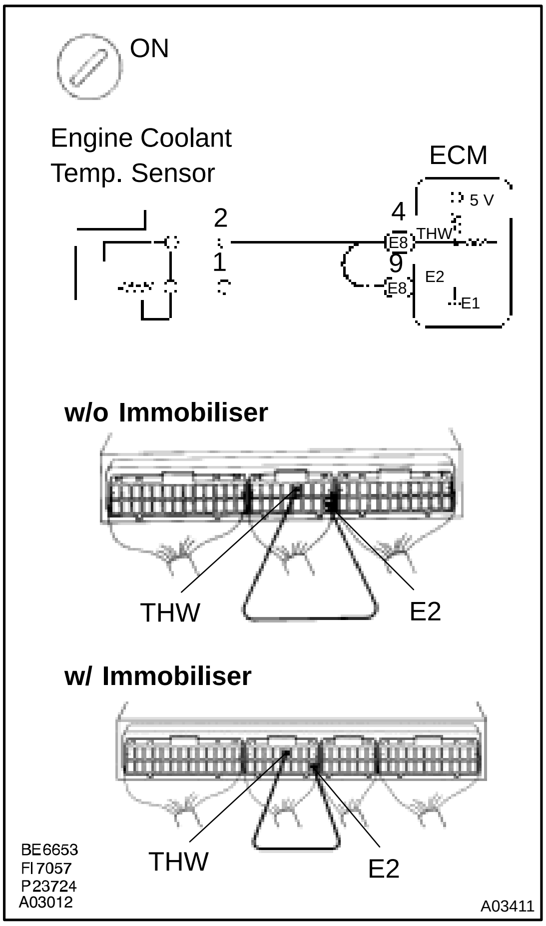
OK:

Temperature value: 140°C (284°F) or more

OK	**Confirm good connection at sensor. If OK, replace engine coolant temp. sensor.**

NG

3	Check for open in harness or ECM.



PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Connect between terminals THW and E2 of the ECM connector.

HINT:

The engine coolant temp. sensor connector is disconnected. Before checking, do a visual and contact pressure check for the ECM connector (See page IN–31).

(c) Turn the ignition switch ON.

CHECK:

Read temperature value on the OBD II scan tool or TOYOTA hand–held tester.

OK:

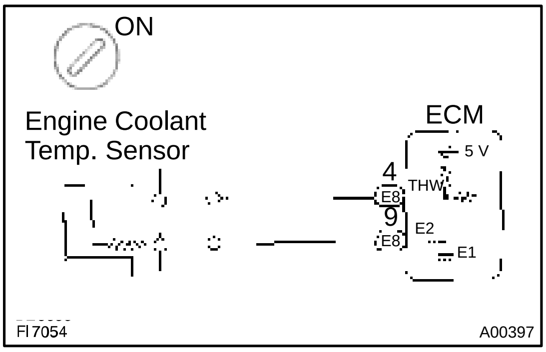
Temperature value: 140°C (284°F) or more

OK	Open in harness between terminals E2 or THW, repair or replace harness.

NG

Confirm good connection at ECM. If OK, check and replace ECM (See page IN–31).

4	Check for short in harness and ECM.



PREPARATION:

(a) Disconnect the engine coolant temp. sensor connector.

(b) Turn the ignition switch ON.

CHECK:

Read temperature value on the OBD II scan tool or TOYOTA hand–held tester.

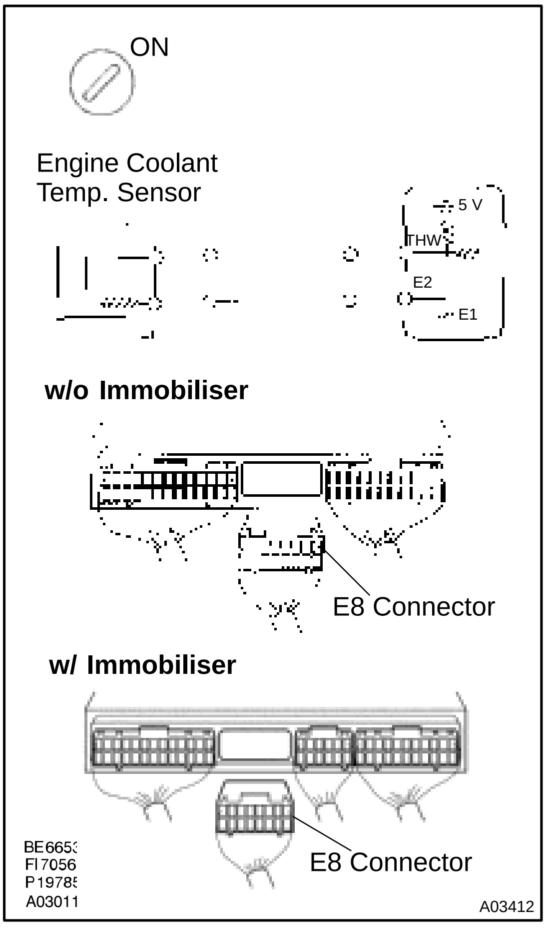
OK:

Temperature value: – 40°C (– 40°F)

OK	Replace engine coolant temp. sensor.

NG

5	Check for short in harness or ECM.



PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Disconnect the E8 connector from the ECM.

HINT:

The engine coolant temp. sensor connector is disconnected.

(c) Turn the ignition switch ON.

CHECK:

Read temperature value on the OBD II scan tool or TOYOTA hand–held tester.

OK:

Temperature value: –40°C (–40°F)

OK → **Repair or replace harness or connector.**

NG

Check and replace ECM (See page IN–31).

DI00Q–05

DTC	P0116	Engine Coolant Temp. Circuit Range/ Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0115 (Engine Coolant Temp. Circuit Malfunction) on page DI–41.

DTC No.	DTC Detecting Condition	Trouble Area
P0116	If THW < –7°C (19.4°F) or THA < –7°C (19.4°F) 20 min. or more after starting engine, engine coolant temp. sensor value is 30°C (86°F)*1 20°C (48°F)*2 or less (2 trip detection logic)	●Engine coolant temp. sensor ●Cooling system
	If THW ¿ –7°C (19.4°F) and THA ~ –7°C (19.4°F) and 10°C (50°F) at engine start, 5 min. or more after starting engine, engine coolant temp. sensor value is 30°C (86°F)*1 20°C (48°F)*2 or less (2 trip detection logic)	
	If THW ~ 10°C (50°F) and THA ~ 10°C (50°F) at engine start, 2 min. or more after starting engine, engine coolant temp. sensor value is 30°C (86°F)*1 20°C (48°F)*2 or less (2 trip detection logic)	
	When THW ¿ 35°C (95°F) and 60°C (140°F), THA ~ –6.7°C (19.9°F) when starting the engine, condition (a) and (b) continues: (a) Vehicle speed is changing (Not stable) (b) Water temperature change is lower than 3°C (37.4°F) from the water temperature since when sterting the engine (2 trip detection logic)	

*1: Except California Specification vehicles.
*2: Only for California Specification vehicles.

INSPECTION PROCEDURE

HINT:

- If DTCs P0115 (Engine Coolant Temp. Circuit Malfunction) and P0116 (Engine Coolant Temp. Circuit Range/Performance Problem) are output simultaneously, engine coolant temp. sensor circuit may be open. Perform troubleshooting of DTC P0115 first.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	Are there any other codes (besides DTC P0116) being output?

YES → **Go to relevant DTC chart.**

NO

2	Check thermostat (See page CO–10).

NG → **Replace thermostat.**

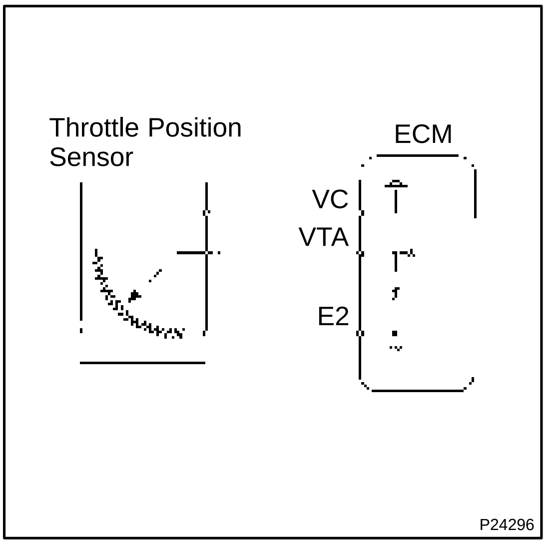
OK

Replace engine coolant temp. sensor.

DI00R–05

DTC	P0120	Throttle/Pedal Position Sensor/Switch ”A” Circuit Malfunction

CIRCUIT DESCRIPTION



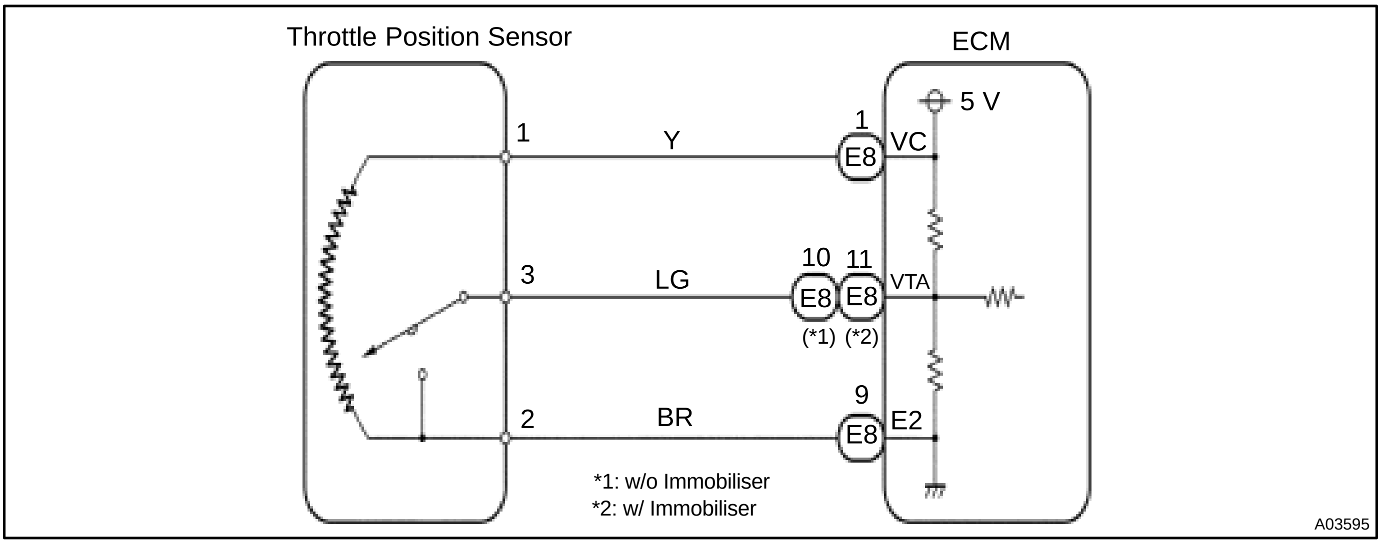
The throttle position sensor is mounted in the throttle body and detects the throttle valve opening angle. When the throttle valve is fully closed, a voltage of approximately 0.3 ~ 0.8 V is applied to terminal VTA of the ECM. The voltage applied to the terminals VTA of the ECM increases in proportion to the opening angle of the throttle valve and becomes approximately 3.2 ~ 4.9 V when the throttle valve is fully opened. The ECM judges the vehicle driving conditions from this signal input from terminal VTA, and uses it as one of the conditions for deciding the air–fuel ratio correction, power increase correction and fuel–cut control etc.

DTC No.	DTC Detecting Condition	Trouble Area
P0120	Condition (a) or (b) continues with more than 5 sec.: (a) VTA < 0.1 V (b) VTA > 4.9 V	●Open or short in throttle position sensor circuit ●Throttle position sensor ●ECM

HINT:
After confirming DTC P0120, use the OBD II scan tool or TOYOTA hand–held tester to confirm the throttle valve opening percentage.

Throttle valve opening position expressed as percentage		Trouble Area
Throttle valve fully closed	Throttle valve fully open	
0 %	0 %	VC line open VTA line open or short
Approx. 100 %	Approx. 100 %	E2 line open

WIRING DIAGRAM

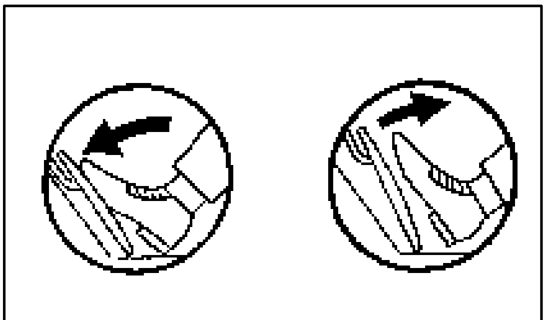


INSPECTION PROCEDURE

HINT:

- If DTCs P0105 (Manifold Absolute Pressure/Barometric Pressure Circuit Malfunction), P0106 (Manifold Absolute Pressure /Barometric Pressure Circuit Range/Performance Problem), P0110 (Intake Air Temp. Circuit Malfunction), P0115 (Engine Coolant Temp. Circuit Malfunction) and P0120 (Throttle/Pedal Position Sensor/Switch ”A” Circuit Malfunction) are output simultaneously, E2 (sensor ground) may be open.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Connect OBD II scan tool or TOYOTA hand–held tester, read the throttle valve opening percentage.**


FI7052

PREPARATION:
(a) Connect the OBD II scan tool or TOYOTA hand–held tester to DLC3.
(b) Turn the ignition switch ON and push the OBD II scan tool or TOYOTA hand–held tester main switch ON.

CHECK:
Read the throttle valve opening percentage.

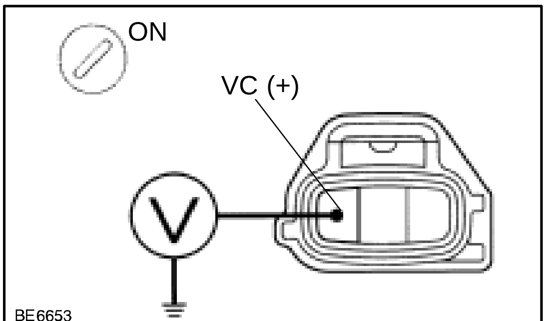
OK:

Throttle valve	Throttle valve opening position expressed as percentage
Fully open	Approx. 70 %
Fully closed	Approx. 10 %

OK → **Check for intermittent problems (See page DI–3).**

NG

2	**Check voltage between terminal VC of throttle position sensor connector and body ground.**



BE6653
S05338
A00369

PREPARATION:
(a) Disconnect the throttle position sensor connector.
(b) Turn the ignition switch ON.

CHECK:
Measure voltage between terminal VC of the throttle position connector and body ground.

OK:
Voltage: 4.5 ~ 5.5 V

NG → **Go to step 5.**

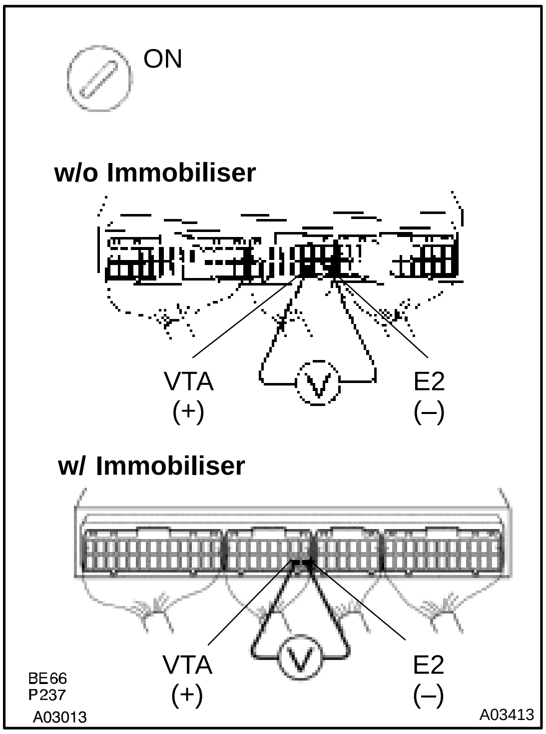
OK

3	**Check throttle position sensor (See page SF–29).**

NG → **Replace throttle position sensor.**

OK

4	**Check voltage between terminals VTA and E2 of ECM connector.**



PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals VTA and E2 of the ECM connector.

OK:

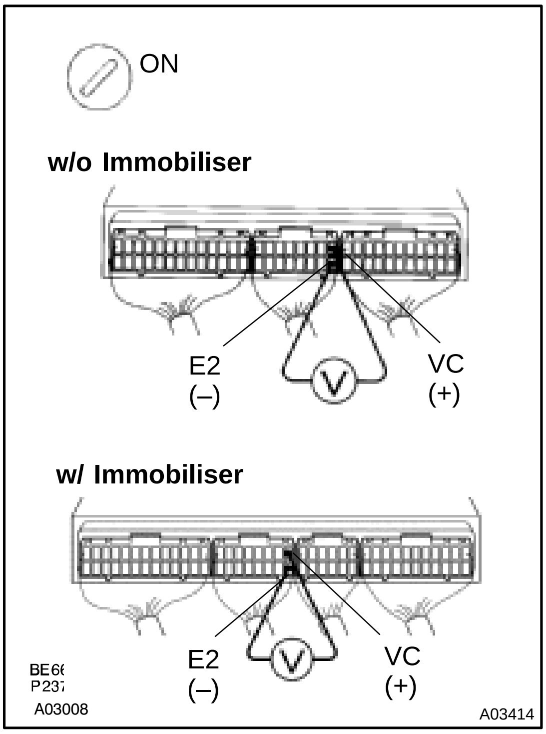
Throttle valve	Voltage
Fully closed	0.3 ~ 1.0 V
Fully open	3.2 ~ 4.9 V

NG → **Check for open and short in harness and connector between ECM and throttle position sensor (VTA or E2 line) (See page IN–31).**

OK

Check and replace ECM (See page IN–31).

5	Check voltage between terminals VC and E2 of ECM connector.



PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminals VC and E2 of the ECM connector.

OK:

Voltage: 4.5 ~ 5.5 V

NG → **Check and replace ECM (See page IN–31).**

OK

Check for open in harness and connector between ECM and sensor (VC line) (See page IN–31).

DI00S–04

DTC	P0121	Throttle/Pedal Position Sensor/Switch ”A” Circuit Range/Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0120 (Throttle/Pedal Position Sensor/Switch ”A” Circuit Malfunction) on page DI–49.

DTC No.	Detection Item	Trouble Area
P0121	After vehicle speed has been exceeded 30 km/h (19 mph) even once, output value of throttle position sensor is out of applicable range while vehicle speed between 30 km/h (19 mph) and 0 km/h (0 mph) (2 trip detection logic)	●Throttle position sensor

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Are there any other codes (besides DTC P0121) being output?**

YES → **Go to relevant DTC chart.**

NO

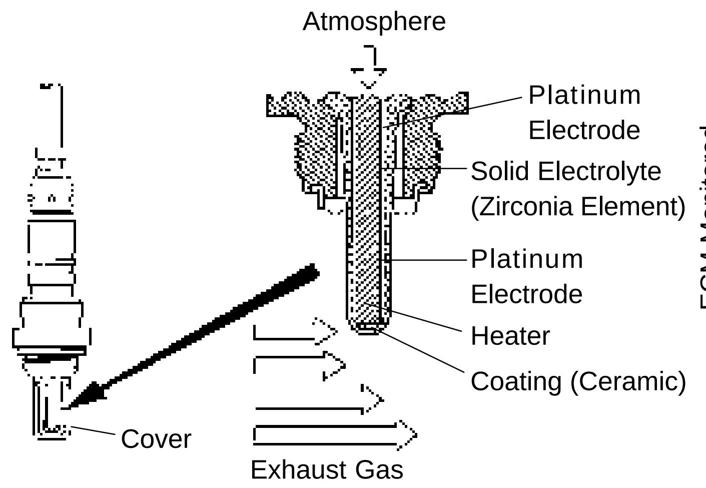
Replace throttle position sensor.

DI1JU–03

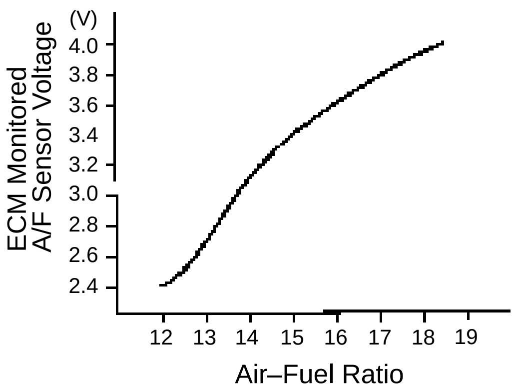
DTC	P0125	Insufficient Coolant Temp. for Closed Loop Fuel Control (Only for California Spec.)

CIRCUIT DESCRIPTION

To obtain a high purification rate for the CO, HC and NOx components of the exhaust gas, a three–way catalytic converter is used, but for the most efficient use of the three–way catalytic converter, the air–fuel ratio must be precisely controlled so that it is always close to the stoichiometric air–fuel ratio.
The A/F sensor has the characteristic that provides output voltage* approximately proportional to the existing air–fuel ratio. The A/F sensor output voltage* is used to provide feedback for the ECM to control the air–fuel ratio.
By the A/F sensor output, the ECM can determine the deviation amount from the stoichiometric air–fuel ratio and control the proper injection time immediately. If the A/F sensor is malfunctioning, ECM is unable to perform accurate air–fuel ratio control.
The A/F sensor is equipped with a heater which heats the zirconia element. The heater is controlled by the ECM. When the intake air volume is low (the temp. of the exhaust gas is low), current flows to the heater to heat the sensor for accurate oxygen concentration detection.
*: The voltage value changes at the inside of the ECM only.



A00475
A00476



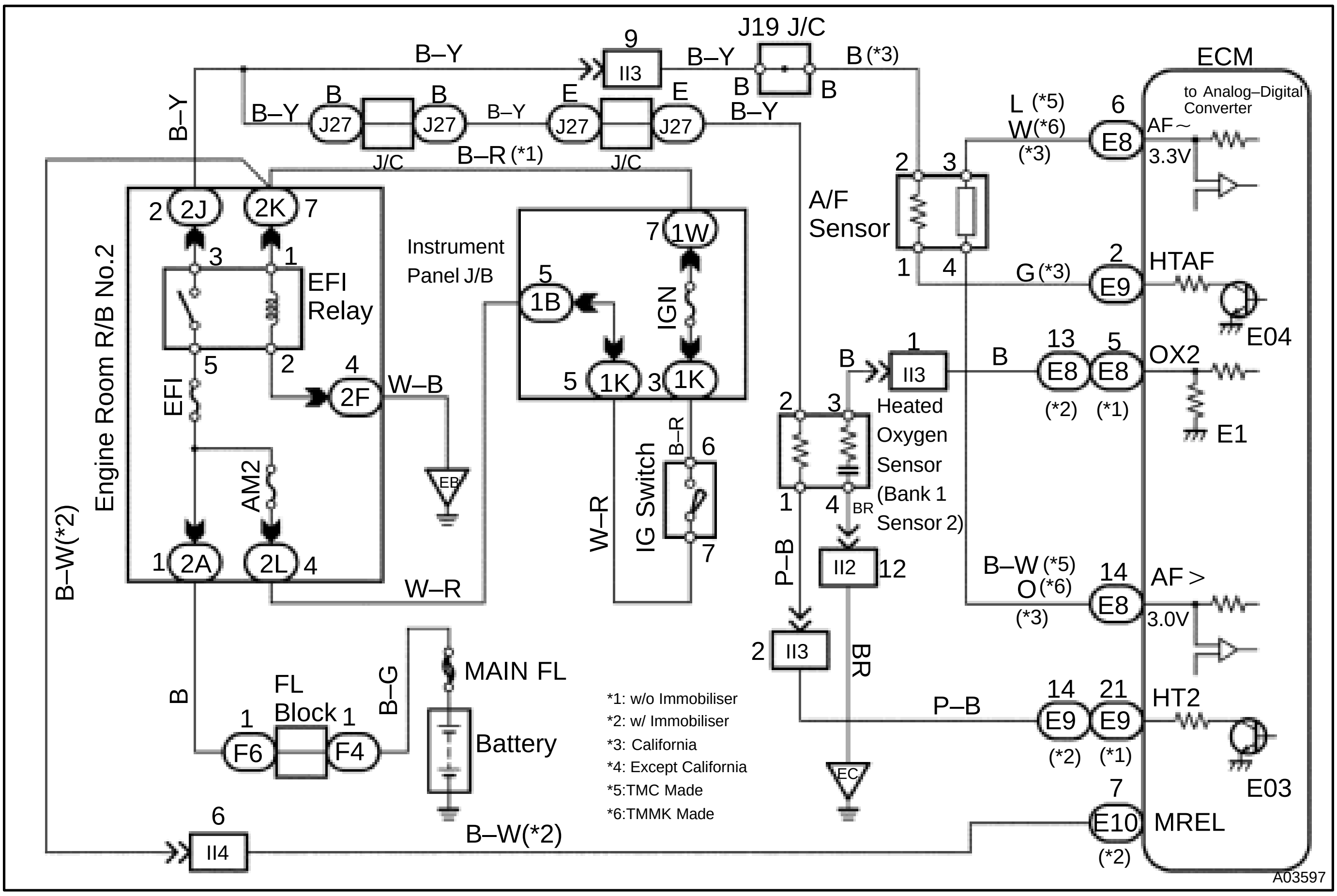
A00477

DTC No.	DTC Detecting Condition	Trouble Area
P0125	After engine is warmed up, A/F sensor output* does not change when conditions (a), (b), and (c) continue for at least 1.5 min.: *: Output value changes at inside of ECM only (a) Engine speed: 1,500 rpm or more (b) Vehicle speed: 40 ~ 100 km/h (25 ~ 62 mph) (c) Throttle valve is not fully closed	●Fuel system ●Injector ●Ignition system ●Gas leakage on exhaust system ●Open or short in A/F sensor circuit ●A/F sensor ●ECM

HINT:

- After confirming DTC P0125, use the OBD II scan tool or TOYOTA hand–held tester to confirm voltage output of A/F sensor from the CURRENT DATA.
- The ECM controls the voltage of AF～ and AF＞ terminals of ECM to the fixed voltage. Therefore, it is impossible to confirm the A/F sensor output voltage without OBD II scan tool or TOYOTA hand–held tester.
- OBD II scan tool (excluding TOYOTA hand–held tester) displays the one fifth of the A/F sensor output voltage which is displayed on the TOYOTA hand–held tester.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If the vehicle run out fuel, the air–fuel ratio is LEAN and DTC P0125 will be recorded.
  The MIL then comes on.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	Are there any other codes (besides DTC P0125) being output?

YES → **Go to relevant DTC chart.**

NO

2	Connect OBD II scan tool or TOYOTA hand–held tester, and read value for voltage output of A/F sensor.

PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.

(b) Warm up the A/F sensor with the engine at 2,500 rpm for approx. 90 sec.

CHECK:

Read voltage value of the A/F sensor on the screen of OBD II scan tool or TOYOTA hand–held tester when you perform all the following conditions.

HINT:

The voltage of AF～ terminal of ECM is 3.3 V fixed and the A/F＞ terminal is 3.0 V fixed. Therefore, it is impossible to check the A/F sensor output voltage at the terminals (AF～/AF＞) of ECM.

OK:

Condition	A/F Sensor Voltage Value
Engine idling	● Not remains at 3.30 V (* 0.660 V) ● Not remains at 3.8 V (* 0.76 V) or more ● Not remains at 2.8 V (* 0.56 V) or less *: When you use the OBD II scan tool (excluding TOYOTA hand–held tester)
Engine racing	
Driving at engine speed 1,500 rpm or more and vehicle speed 40 km/h (25 mph) or more, and operate throttle valve open and close	

HINT:

- During fuel enrichment, there is a case that the output voltage of the A/F sensor is below 2.8 V (* 0.56 V), it is normal.
- During fuel cut, there is a case that the output voltage of the A/F sensor is above 3.8 V (* 0.76 V), it is normal.
- If output voltage of the A/F sensor remains at 3.30 V (* 0.660 V) even after performing all the above conditions, A/F the sensor circuit may be open.
- If output voltage of A/F sensor remains at 3.8 V (* 0.76 V) or more, or 2.8 V (* 0.56 V) or less even after performing all the above conditions, A/F sensor circuit may be short.

*: When you use the OBD II scan tool (excluding TOYOTA hand–held tester).

OK → **Go to step 10.**

NG

3	Check for open and short in harness and connector between ECM and A/F sensor (See page IN–31).

NG → Repair or replace harness or connector.

OK

4	Check resistance of A/F sensor heater (See page SF–59).

NG → Replace A/F sensor.

OK

5	Check air induction system (See page SF–1).

NG → Replace or replace.

OK

6	Check EGR system (See page EC–12).

NG → Repair EGR system.

OK

7	Check fuel pressure (See page SF–6).

NG → Check and repair fuel pump, fuel pipe line and filter (See page SF–1).

OK

8	Check injector injection (See page SF–23).

NG → Replace injector.

OK

9	Check gas leakage on exhaust system.

NG → Repair or replace.

OK

Replace A/F sensor.

10	Perform confirmation driving pattern (See page DI–152).

Go

11	Is there DTC P0125 being output again?

YES → Check and replace ECM.

NO

12	Did vehicle runs out of fuel in the past?

NO → Check for intermittent problems.

YES

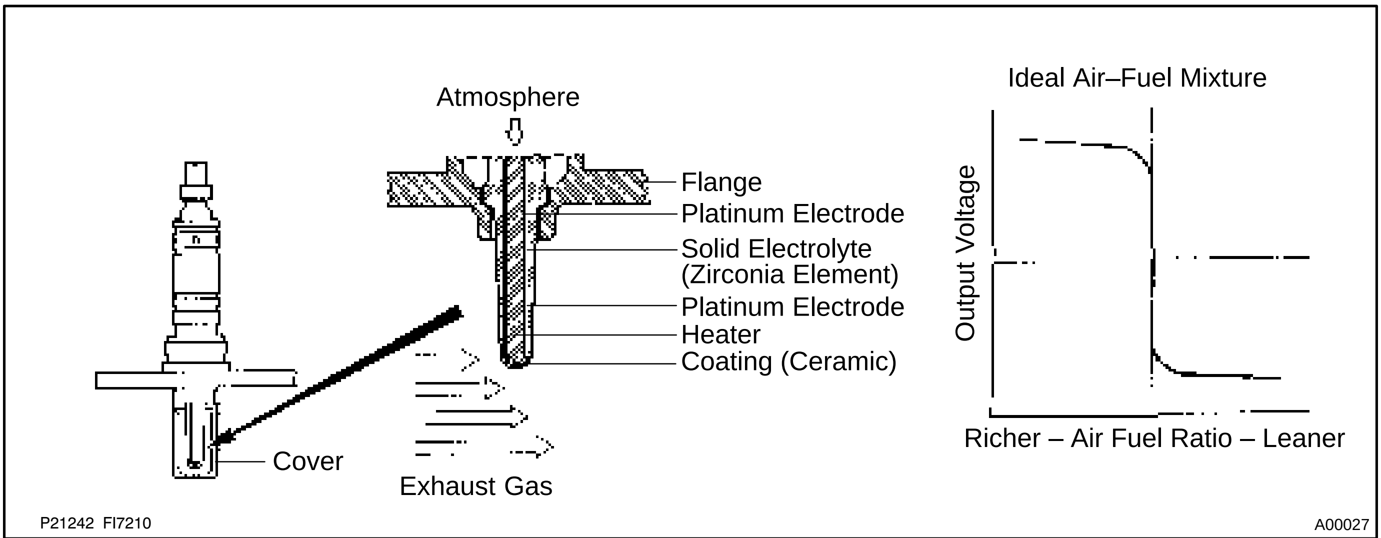
DTC P0125 is caused by running out of fuel.

DI00T–05

DTC	P0125	Insufficient Coolant Temp. for Closed Loop Fuel Control (Except California Spec.)

CIRCUIT DESCRIPTION

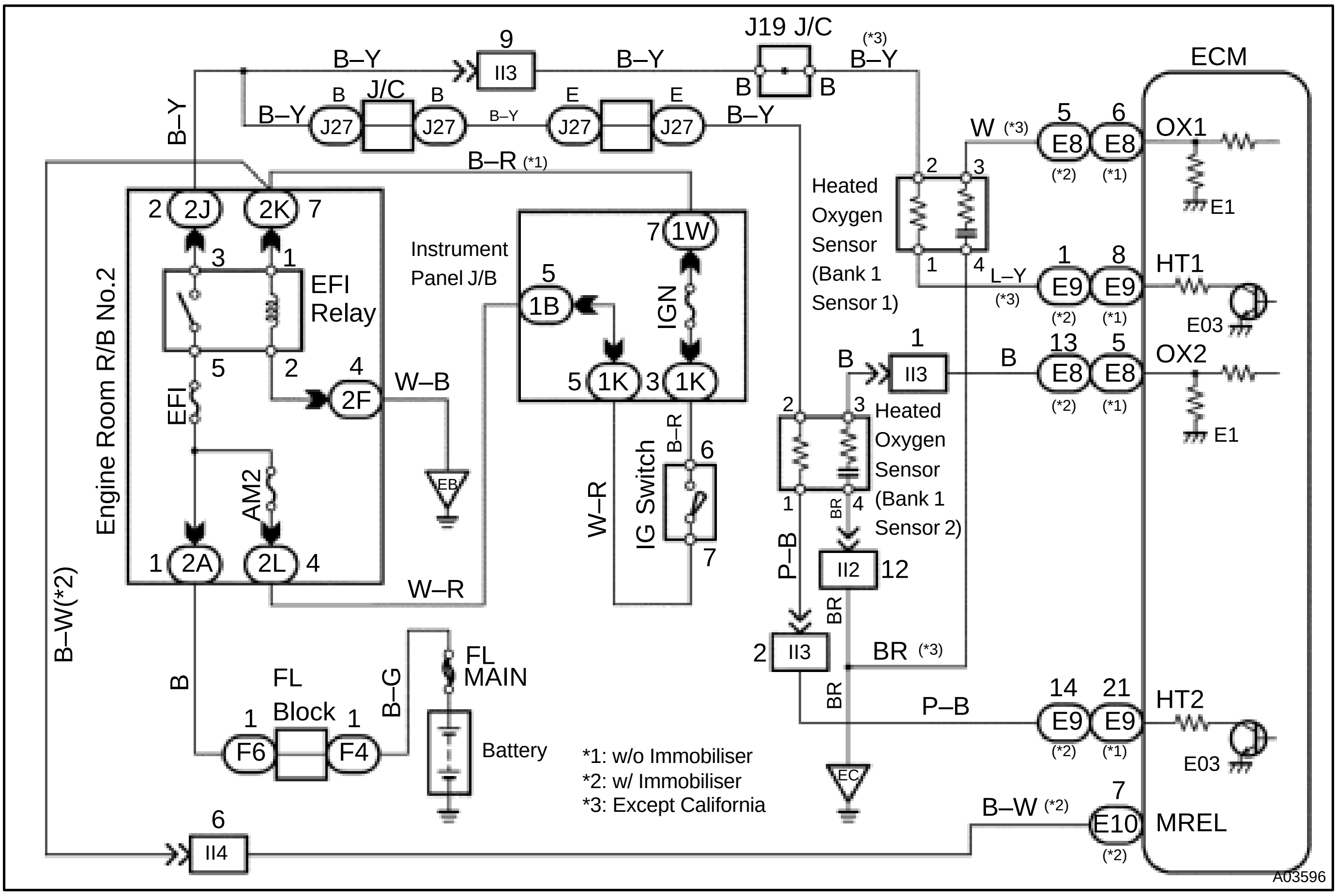
To obtain a high purification rate for the CO, HC and NOx components of the exhaust gas, a three–way catalytic converter is used, but for the most efficient use of the three–way catalytic converter, the air–fuel ratio must be precisely controlled so that it is always close to the stoichiometric air–fuel ratio.
The heated oxygen sensor has the characteristic where by its output voltage changes suddenly in the vicinity of the stoichiometric air–fuel ratio. This is used to detect the oxygen concentration in the exhaust gas and provide feedback to the computer for control of the air–fuel ratio.
When the air–fuel ratio becomes LEAN, the oxygen concentration in the exhaust increases and the heated oxygen sensor informs the ECM of the LEAN condition (small electromotive force: 0 V).
When the air–fuel ratio is RICHER than the stoichiometric air–fuel ratio the oxygen concentration in the exhaust gas is reduced and the heated oxygen sensor informs the ECM of the RICH condition (large electromotive force: 1 V).
The ECM judges by the electromotive force from the heated oxygen sensor whether the air–fuel ratio is RICH or LEAN and controls the injection time accordingly. However, if malfunction of the heated oxygen sensor causes output of abnormal electromotive force, the ECM is unable to perform accurate air–fuel ratio control.
The heated oxygen sensors include a heater which heats the zirconia element. The heater is controlled by the ECM. When the intake air volume is low (the temperature of the exhaust gas is low) current flows to the heater to heat the sensor for accurate oxygen concentration detection.



DTC No.	DTC Detecting Condition	Trouble Area
P0125	After engine is warmed up, heated oxygen sensor (bank 1 sensor 1) output does not indicate RICH even once when conditions (a), (b) and (c) continue for at least 1.5 min.: (a) Engine speed: 1,500 rpm or more (b) Vehicle speed: 40 ~ 100 km/h (25 ~ 62 mph) (c) Throttle valve does not fully closed	•Fuel system •Injector •Ignition system •Gas leakage on exhaust system •Open or short in heated oxygen sensor (bank 1 sensor 1) circuit •Heated oxygen sensor (bank 1 sensor 1) •ECM

HINT:
After confirming DTC P0125, use the OBD II scan tool or TOYOTA hand–held tester to confirm voltage output of the heated oxygen sensor (bank 1 sensor 1) from the CURRENT DATA.
If voltage output of the heated oxygen sensor (bank 1 sensor 1) is 0 V, heated oxygen sensor (bank 1 sensor 1) circuit may be open or short.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If the vehicle run out fuel, the air–fuel ratio is LEAN and DTC P0125 will be recorded.
  The MIL then comes on.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	Are there any other codes (besides DTC P0125) being output?

YES → **Go to relevant DTC chart.**

NO

2	Connect OBD II scan tool or TOYOTA hand–held tester, and read value for voltage output of heated oxygen sensor (bank 1 sensor 1).

PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.

(b) Warm up the engine to normal operating temp. (above 75˚C (169˚F)).

CHECK:

Read voltage output of the heated oxygen sensor (bank 1 sensor 1) when the engine is suddenly raced.

HINT:

Perform quick racing to 4,000 rpm 3 times using the accelerator pedal.

OK:

Heated oxygen sensor (bank 1 sensor 1) output a RICH signal (0.45 V or more) at least once.

OK → **Go to step 10.**

NG

3	Check for open and short in harness and connector between ECM and heated oxygen sensor (bank 1 sensor 1) (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

4	Check whether misfire is occurred or not by monitoring DTC and data list.

NG → **Perform troubleshooting for misfire (See page DI–163).**

OK

5	Check air induction system (See page SF–1).

NG → **Repair or replace.**

OK

6	Check EGR system (See page EC–12).

NG → **Repair EGR system.**

OK

7	Check fuel pressure (See page SF–6).

NG → **Check and repair fuel pump, fuel pipe line and filter (See page SF–1).**

OK

8	Check injector injection (See page SF–23)

NG → **Replace injector.**

OK

9	Check gas leakage on exhaust system.

NG → Repair or replace.

OK

Replace oxygen sensor
(bank 1 sensor 1).

10	Perform confirmation driving pattern (See page DI–152).

Go

11	Is there DTC P0125 being output again?

YES → Check and replace ECM.

NO

12	Did vehicle runs out of fuel in the past?

NO → Check for intermittent problems.

YES

DTC P0125 is caused by running out of fuel.

DI00V–05

DTC	P0130	Heated Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 1) (Except California Spec.)

CIRCUIT DESCRIPTION

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control (Except California Spec.)) on page DI–55.

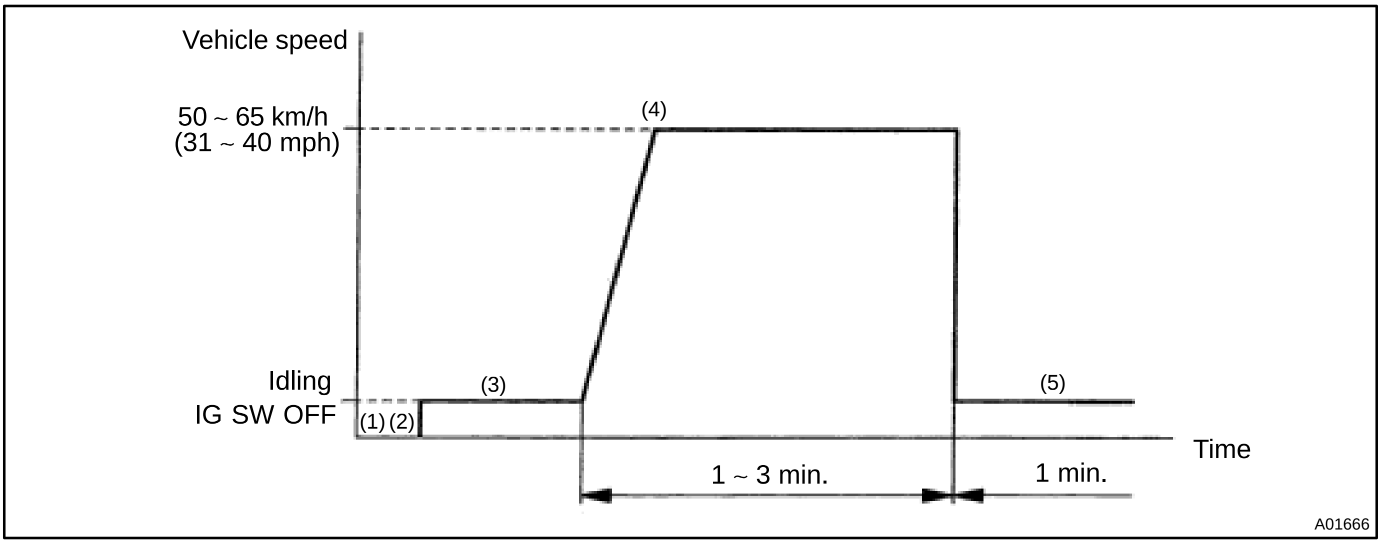
DTC No.	DTC Detecting Condition	Trouble Area
P0130	Voltage output of heated oxygen sensor remains at 0.4 V or more, or 0.55 V or less, during idling after engine is warmed up (2 trip detection logic)	●Heated oxygen sensor ●Fuel trim malfunction

HINT:
Sensor 1 refers to the sensor closer to the engine body.
The heated oxygen sensor's output voltage and the short–term fuel trim value can be read using the OBD II scan tool or TOYOTA hand–held tester.

WIRING DIAGRAM

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control (Except California Spec.)) on page DI–55.

CONFIRMATION DRIVING PATTERN



(1) Connect the TOYOTA hand–held tester to the DLC3.
(2) Switch the TOYOTA hand–held tester from normal mode to check mode (See page DI–3).
(3) Start the engine and warm it up with all accessory switches OFF.
(4) Drive the vehicle at 50 ~ 65 km/h (31 ~ 40 mph) for 1 ~ 3 min. to warm up the heated oxygen sensor.
(5) Let the engine idle for 1 min.
(6) Perform steps (3) to (5) three times.
HINT:
If a malfunction exists, the MIL will light up during step (6).
NOTICE:
If the conditions in this test are not strictly followed, detection of the malfunction will not be possible. If you do not have a TOYOTA hand–held tester, turn the ignition switch OFF after performing steps (3) to (6), then perform steps (3) to (6) again.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Are there any other codes (besides DTC P0130) being output?**

YES → **Go to relevant DTC chart.**

NO

2	Check the output voltage of heated oxygen sensor during idling.

PREPARATION:

Warm up the heated oxygen sensor the engine at 2,500 rpm for approx. 90 sec.

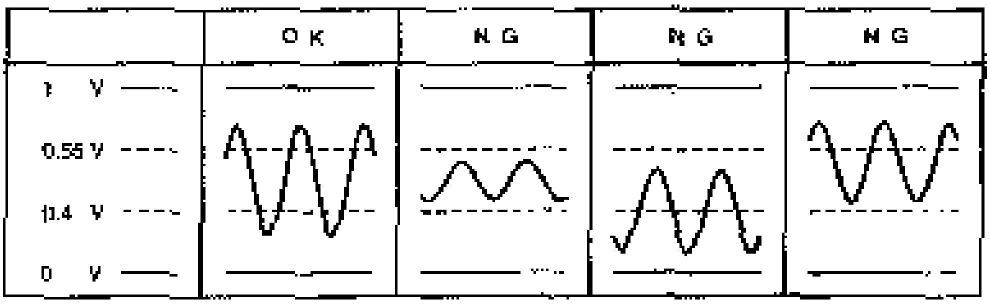
CHECK:

Use the OBD II scan tool or TOYOTA hand–held tester to read the output voltage of the heated oxygen sensor during idling.

OK:

Heated oxygen sensor output voltage:

Alternates repeatedly between less than 0.4 V and more than 0.55 V (See the following table).



P18349

OK → **Go to step 8.**

NG ↓

3	Check for open and short in harness and connector between ECM and oxygen sensor (See page IN–31).

NG → **Repair or replace harness or connector.**

OK ↓

4	Check air induction system (See page SF–1).

NG → Repair or replace.

OK ↓

5	Check EGR system (See page EC–12).

NG → Repair EGR system.

OK ↓

6	Check fuel pressure (See page SF–6).

NG → Check and repair fuel pump, fuel pipe line and filter (See page SF–1).

OK ↓

7	Check injector injection (See page SF–23).

NG → Replace injector.

OK ↓

Replace oxygen sensor
(bank 1 sensor 1).

8	**Perform confirmation driving pattern (See page DI–152).**

Go

9	**Is there DTC P0130 being output again?**

NO → **Check for intermittent problems (See page DI–3).**

YES

Check and Replace ECM (See page IN–31).

DI4NF–01

DTC	P0133	Heated Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 1) (Ex. CA Spec.)

CIRCUIT DESCRIPTION

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control (Except California Spec.)) on page DI–55.

DTC No.	DTC Detecting Condition	Trouble Area
P0133	Response time for heated oxygen sensor's voltage output to change from rich to lean, or from lean to rich, is 1 sec. or more during idling after engine is warmed up (2 trip detection logic)	●Heated oxygen sensor ●Fuel trim malfunction

HINT:
Sensor 1 refers to the sensor closer to the engine body.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scantool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

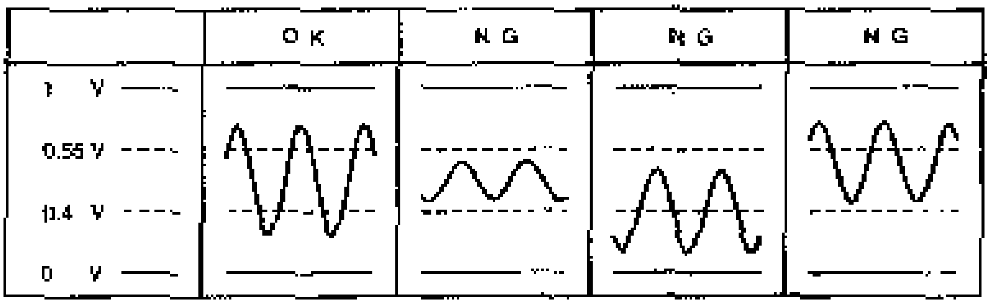
1	Are there any other codes (besides DTC P0133) being output?

YES → **Go to relevant DTC chart.**

NO

2	**Check output voltage of heated oxygen sensor during idling.**

PREPARATION:
Warm up the heated oxygen sensor the engine at 2,500 rpm for approx. 90 sec.
CHECK:
Use the OBD II scan tool or TOYOTA hand–held tester to read the output voltage of the heated oxygen sensor during idling.
OK:
Heated oxygen sensor output voltage:
Alternates repeatedly between less than 0.4 V and more than 0.55 V (See the following table).



P18349

OK → **Go to step 8.**

NG

3	**Check for open and short in harness and connector between ECM and oxygen sensor (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

4	Check air induction system (See page SF–1).

NG → Repair or replace.

OK ↓

5	Check EGR system (See page EC–12).

NG → Replace EGR system.

OK ↓

6	Check fuel pressure (See page SF–6).

NG → Check and repair fuel pump, fuel pipe line and filter (See page SF–1).

OK ↓

7	Check injector injection (See page SF–23).

NG → Replace injector.

OK ↓

Replace oxygen sensor (bank 1 sensor 1).

8	Perform confirmation driving pattern (See page DI–152).

Go

9	Is there DTC P0133 being output again?

NG → **Check for intermittent problems (See page DI–3).**

YES

Check and replace ECM (See page IN–31).

DI00X–04

DTC	P0135	Heated Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 1) (Ex. CA Spec.)

DTC	P0141	Heated Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)

CIRCUIT DESCRIPTION

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control (Except California Spec.)) on page DI–55.

DTC No.	DTC Detecting Condition	Trouble Area
P0135 P0141	When heater operates, heater current exceeds 2 A (2 trip detection logic)	●Open or short in heater circuit of heated oxygen sensor ●Heated oxygen sensor heater ●ECM
P0135 P0141	Heater current of 0.2 A or less when heater operates (2 trip detection logic)	

HINT:
- Sensor 1 refers to the sensor closer to the engine body.
- Sensor 2 refers to the sensor farther away from the engine body.

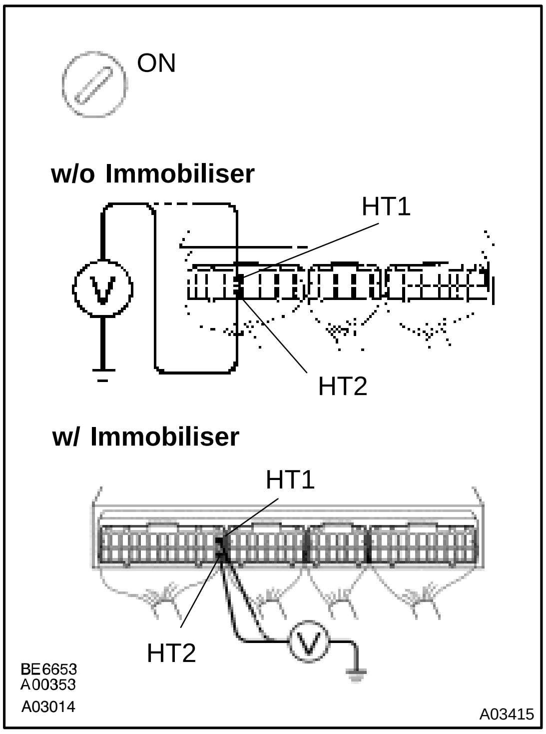
WIRING DIAGRAM

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control (Except California Spec.)) on page DI–55.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	Check voltage between terminals HT1, HT2 of ECM connector and body ground.



PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals HT1, HT2 of the ECM connector and body ground.

HINT:

- Connect terminal HT1 to bank 1 sensor 1.
- Connect terminal HT2 to bank 1 sensor 2.

OK:

Voltage: 9 ~ 14 V

OK	Check and replace ECM (See page IN–31).

NG

2	Check resistance of heated oxygen sensor heaters (See pages SF–61, SF–63).

NG	Replace heated oxygen sensor.

OK

Check and repair harness or connector between EFI main relay (Marking: EFI) and heated oxygen sensor, and heated oxygen sensor and ECM. (See page IN–31).

DI00Y–08

DTC	P0136	Heated Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)

CIRCUIT DESCRIPTION

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control (Except California Spec.)) on page DI–55.

DTC No.	DTC Detecting Condition	Trouble Area
P0136	Voltage output of heated oxygen sensor remains at 0.45*1/0.40*2 V or more, or 0.60*1/0.50*2 V or less when vehicle is driven at 40 km/h (25 mph) or more after engine is warmed up *1: for California Spec. *2: except California Spec. (2 trip detection logic).	●Heated oxygen sensor

HINT:
Sensor 2 refers to the sensor farther away from the engine body.

WIRING DIAGRAM

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control (Except California Spec.)) on page DI–55.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	Are there any other codes (besides DTC P0136) being output?

YES → **Go to relevant DTC chart.**

NO

2	**Check for open and short in harness and connector between ECM and heated oxygen sensor (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

3	**Check output voltage of heated oxygen sensor.**

PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.

(b) Warm up the engine to normal operating temp.

CHECK:

Read voltage output of the heated oxygen sensor when the engine suddenly raced.

HINT:

Perform quick racing to 4,000 rpm 3 min. using the accelerator pedal.

OK:

Heated oxygen sensor output voltage:
Alternates from 0.45*1/0.40*2 V or less to 0.60*1/0.50*2 V or more.

*1: for California Spec.

*2: except California Spec.

OK → **Check that each connector is properly connected.**

NG

Replace heated oxygen sensor.

DI1JW–03

DTC	P0171	System too Lean (Fuel Trim) (Only for California Spec.)

DTC	P0172	System too Rich (Fuel Trim) (Only for California Spec.)

CIRCUIT DESCRIPTION

Fuel trim refers to the feedback compensation value compared against the basic injection time. 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 air–fuel ratio at its ideal theoretical value.
The signal from the A/F sensor is approximately proportional to the existing air–fuel ratio, and ECM comparing it with the ideal theoretical value, the ECM reduces fuel volume immediately if the air–fuel ratio is rich and increases fuel volume if it is lean.
Long–term fuel trim compensates the deviation from the central value of the short–term fuel trim stored up by each engine tolerance, and the deviation from the central value due to the passage of time and changes of using environment.
If both the short–term fuel trim and long–term fuel trim exceed a certain value, it is detected as a malfunction and the MIL lights up.

DTC No.	DTC Detecting Condition	Trouble Area
P0171	When air–fuel ratio feedback is stable after engine warming up, fuel trim is considerably in error on rich side (2 trip detection logic)	●Gas leakage on exhaust system ●Air intake (loose hoses) ●Fuel line pressure ●Injector blockage ●Manifold absolute pressure sensor ●Engine coolant temp. sensor ●A/F sensor
P0172	When air–fuel ratio feedback is stable after engine warming up, fuel trim is considerably in error on lean side (2 trip detection logic)	●Gas leakage on exhaust system ●Fuel line pressure ●Injector leak, blockage ●Manifold absolute pressure sensor ●Engine coolant temp. sensor ●A/F sensor

HINT:

- When the DTC P0171 is recorded, the actual air–fuel ratio is on the lean side. When DTC P0172 is recorded, the actual air–fuel ratio is on the rich side.
- If the vehicle runs out of fuel, the air–fuel ratio is lean and DTC P0171 is recorded. The MIL then comes on.
- If the total of the short–term fuel trim value and long–term fuel trim value is within ± 38 %, the system is functioning normally.
- The A/F sensor output voltage and the short–term fuel trim value can be read using the OBD II scan tool or TOYOTA hand–held tester.
- The ECM controls the voltage of AF～ and AF＞ terminals of ECM to the fixed voltage. Therefore, it is impossible to confirm the A/F sensor output voltage without OBD II scan tool or TOYOTA hand–held tester.

- OBD II scan tool (excluding TOYOTA hand–held tester) displays the one fifth of the A/F sensor output voltage which is displayed on the TOYOTA hand–held tester.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air¯fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Check air induction system (See page SF–1).**

NG → **Repair or replace.**

OK

2	**Check injector injection (See page SF–23).**

NG → **Replace injector.**

OK

3	**Check manifold absolute pressure sensor and engine coolant temp. sensor (See pages SF–53 and SF–49).**

NG → **Repair or replace.**

OK

4	**Check for spark and ignition (See page IG–1).**

NG → **Repair or replace.**

OK

5	Check fuel pressure (See page SF–6).

NG → Check and repair fuel pump, pressure regulator, fuel pipe line and filter.

OK

6	Check gas leakage on exhaust system.

NG → Repair or replace.

OK

Check and replace ECM (See page IN–31).

7	**Check output voltage of A/F sensor.**

PREPARATION:
(a) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.
(b) Warm up the A/F sensor with the engine at 2,500 rpm for approx. 90 sec.
CHECK:
Read voltage value of A/F sensor on the screen of OBD II scan tool or TOYOTA hand–held tester when you perform all the following conditions.
HINT:
The voltage of AF～ terminal of ECM is 3.3 V fixed and AF＞ terminal is 3.0 V fixed. Therefore, it is impossible to check the A/F sensor output voltage at the terminals (AF～/AF＞) of ECM.
OK:

Condition	A/F Sensor Voltage value
Engine idling	●Not remains at 3.30 V (* 0.660 V) ●Not remains at 3.8 V (* 0.76 V) or more ●Not remains at 2.8 V (* 0.56 V) or less *: When you use OBD II scan tool (excluding TOYOTA hand–held tester)
Engine racing	
Driving at engine speed 1,500 rpm or more and vehicle speed 40 km/h (25 mph) or more, and operate throttle valve open and close	

HINT:
- During fuel enrichment, there is a case that the output voltage of A/F sensor is below 2.8 V (* 0.56 V), it is normal.
- During fuel cut, there is a case that the output voltage of A/F sensor is above 3.8 V (* 0.76 V), it is normally.
- If output voltage of A/F sensor remains at 3.30 V (* 0.660 V) even after performing all the above conditions, A/F sensor circuit may be open.
- If output voltage of A/F sensor remains at 3.8 V (* 0.76 V) or more, or 2.8 V (* 0.56 V) or less even after performing all the above conditions, A/F sensor circuit may be short.

*: When you use the OBD II scan tool (excluding TOYOTA hand–held tester).

OK → **Go to step 9.**

NG

8	Check for open and short in harness and connector between ECM and oxygen sensor (See page IN–31).

NG → Repair or replace harness or connector.

OK ↓

Replace A/F sensor.

9	Perform confirmation driving pattern (See page DI–152).

Go ↓

10	Is there DTC P0171 or P0172 being output again?

YES → Check and replace ECM.

NO ↓

11	Did vehicle runs out of fuel in the past?

NO → Check for intermittent problems.

YES ↓

DTC P0171 or P0172 is caused by running out of fuel.

DI4NG–01

DTC	P0171	System too Lean (Fuel Trim) (Except California Spec.)

DTC	P0172	System too Rich (Fuel Trim) (Except California Spec.)

CIRCUIT DESCRIPTION

Fuel trim refers to the feedback compensation value compared against the basic injection time. 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 air–fuel ratio at its ideal theoretical value. The signal from the heated oxygen sensor indicates whether the air–fuel ratio is RICH or LEAN compared to the ideal theoretical value, triggering a reduction in fuel volume if the air–fuel 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 due to individual engine differences, wear over time and changes in the usage environment.
If both the short–term fuel trim and long–term fuel trim are LEAN or RICH beyond a certain value, it is detected as a malfunction and the MIL lights up.

DTC No.	DTC Detecting Condition	Trouble Area
P0171	When air–fuel ratio feedback is stable after engine warming up, fuel trim is considerably in error on RICH side (2 trip detection logic)	●Gas leakage on exhaust system ●Air intake (hose loose) ●Fuel line pressure ●Injector blockage ●Heated oxygen sensor (bank 1 sensor 1) ●Manifold absolute pressure sensor ●Engine coolant temp. sensor
P0172	When air–fuel ratio feedback is stable after engine warming up, fuel trim is considerably in error on LEAN side (2 trip detection logic)	●Gas leakage on exhaust system ●Fuel line pressure ●Injector leak, blockage ●Heated oxygen sensor (bank 1 sensor 1) ●Manifold absolute pressure sensor ●Engine coolant temp. sensor

HINT:

- When the DTC P0171 is recorded, the actual air–fuel ratio is on the LEAN side. When DTC P0172 is recorded, the actual air–fuel ratio is on the RICH side.
- If the vehicle runs out of fuel, the air–fuel ratio is LEAN and DTC P0171 is recorded. The MIL then comes on.
- If the total of the short–term fuel trim value and long–term fuel trim value is within ± 38 %, the system is functioning normally.
- The heated oxygen sensor (bank 1 sensor 1) output voltage and the short–term fuel trim value can be read using the OBD II scan tool or TOYOTA hand–held tester.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Check air induction system (See page SF–1).**

NG → **Repair or replace.**

OK

2	**Check injector injection (See page SF–23).**

NG → **Replace injector.**

OK

3	**Check manifold absolute pressure sensor and engine coolant temp. sensor (See pages SF–53 and SF–49).**

NG → **Repair or replace.**

OK

4	**Check for spark and ignition (See page IG–1).**

NG → **Repair or replace.**

OK

5	Check fuel pressure (See page SF–6).

NG → Check and repair fuel pump, pressure regulator, fuel pipe line and filter.

OK

6	Check gas leakage on exhaust system.

NG → Repair or replace.

OK

Check and replace ECM (See page IN–31).

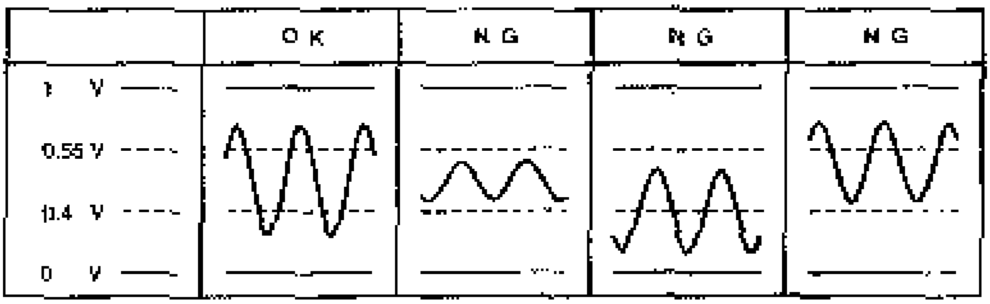
7	**Check the output voltage of heated oxygen sensor during idling.**

PREPARATION:
Warm up the heated oxygen sensor the engine at 2,500 rpm for approx. 90 sec.

CHECK:
Use the OBD II scan tool or TOYOTA hand–held tester to read the output voltage of the heated oxygen sensor during idling.

OK:

Heated oxygen sensor output voltage:
Alternates repeatedly between less than 0.4 V and more than 0.55 V (See the following table).



P18349

OK → **Go to step 9.**

NG ↓

8	**Check for open and short in harness and connector between ECM and oxygen sensor (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK ↓

Replace oxygen sensor.

9	Perform confirmation driving pattern (See page DI–66).

Go

10	Is there DTC P0171 or P0172 being output again?

YES → Check and replace ECM.

NO

11	Did vehicle runs out of fuel in the past?

NO → Check for intermittent problems.

YES

DTC P0171 or P0172 is caused by running out of fuel.

DI011–07

DTC	P0300	Random/Multiple Cylinder Misfire Detected

DTC	P0301	Cylinder 1 Misfire Detected

DTC	P0302	Cylinder 2 Misfire Detected

DTC	P0303	Cylinder 3 Misfire Detected

DTC	P0304	Cylinder 4 Misfire Detected

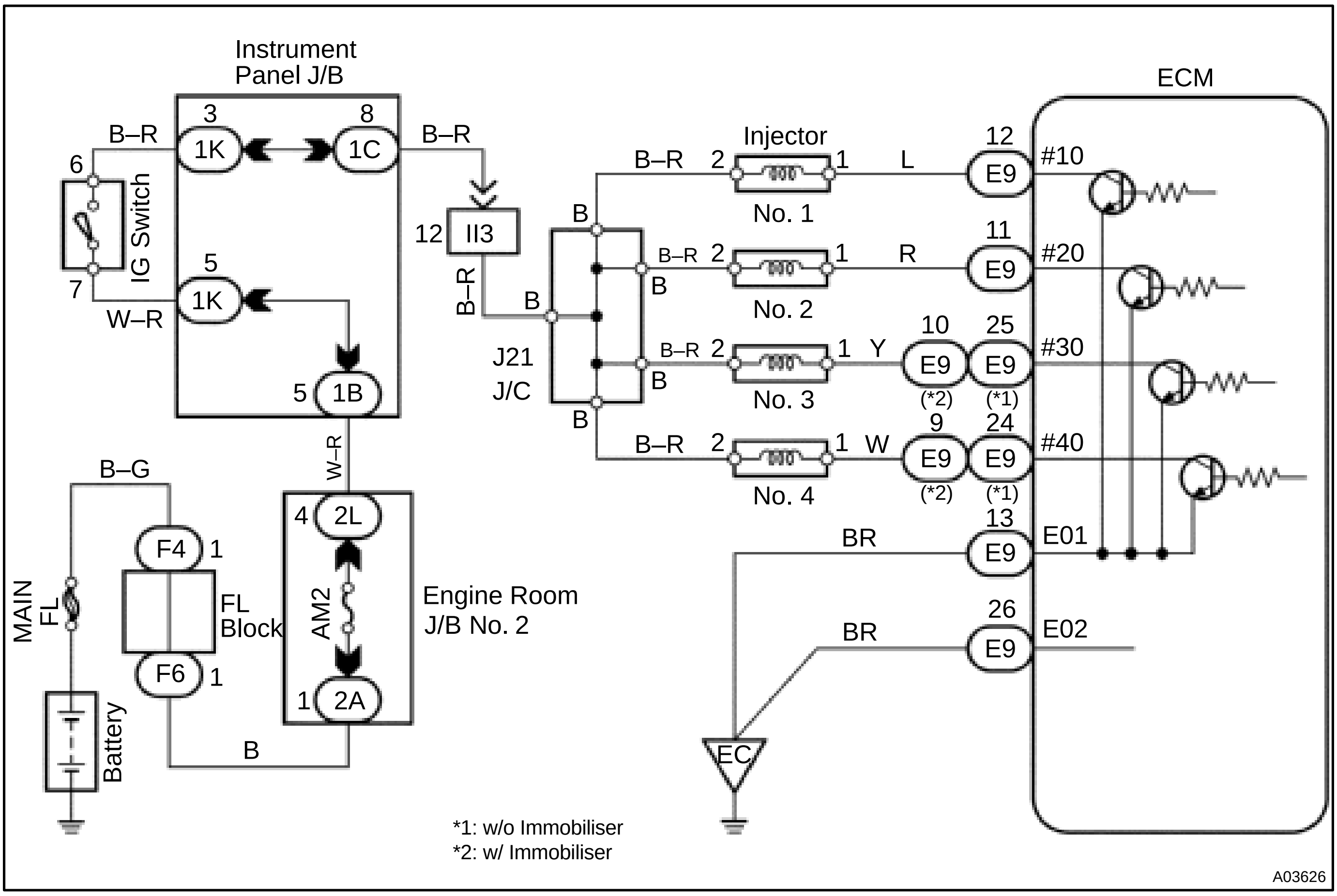
CIRCUIT DESCRIPTION

Misfire: The ECM uses the crankshaft position sensor and camshaft position sensor to monitor changes in the crankshaft rotation for each cylinder.
The ECM counts the number of times the engine speed change rate indicates that misfire has occurred. And when the misfire rate equals or exceeds the count indicating that the engine condition has deteriorated, the MIL lights up.
If the misfire rate is high enough and the driving conditions will cause catalyst overheating, the MIL blinks when misfiring occurs.

DTC No.	DTC Detecting Condition	Trouble Area
P0300 P0301 P0302 P0303 P0304	Misfiring of random cylinders is detected during any particular 200 or 1,000 revolutions For any particular 200 revolutions for engine, misfiring is detected which can cause catalyst overheating (This causes MIL to blink)	●Ignition system ●Injector ●Fuel line pressure ●EGR ●Compression pressure ●Valve clearance not to specification ●Valve timing ●Manifold absolute pressure sensor ●Engine coolant temp. sensor ●Open or short in engine wire ●Connector connection ●ECM

HINT:
When the 2 or more codes for a misfiring cylinder are recorded repeatedly but no random misfire code is recorded, it indicates that the misfires were detected and recorded at different times.

WIRING DIAGRAM



CONFIRMATION DRIVING PATTERN

(1) Connect the TOYOTA hand–held tester or OBD II scan tool.
(2) Record DTC and the freeze frame data.
(3) Use the TOYOTA hand–held tester to set to Check Mode. (See page DI–3)
(4) Drive the vehicle several times with the engine speed, load and its surrounding range shown with ENGINE SPD, CALC LOAD in the freeze frame data or MISFIRE RPM, MISFIRE LOAD in the data list.
If you have no TOYOTA hand–held tester, turn the ignition switch OFF after the symptom is simulated the first time. Then repeat the simulation process again.

HINT:
In order to memorize DTC of misfire, it is necessary to drive around MISFIRE RPM, MISFIRE LOAD in the data list for the following period of time.

Engine Speed	Time
Idling	3 minutes 30 seconds or more
1000 rpm	3 minutes or more
2000 rpm	1 minutes 30 seconds or more
3000 rpm	1 minutes or more

(5) Check whether there is misfire or not by monitoring DTC and the freeze frame data. After that, record them.
(6) Turn the ignition switch OFF and wait at least 5 seconds.

INSPECTION PROCEDURE

HINT:

- If is the case that DTC besides misfire is memorized simultaneously, first perform the troubleshooting for them.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame data records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.
- When the vehicle is brought to the workshop and the misfire is not occurred, misfire can be confirmed by reproducing the condition or freeze frame data. Also, after finishing the repair, confirm that there is no misfire. (See the confirmation driving pattern)
- When either of SHORT FT #1, LONG FT #1, SHORT FT #2 or LONG FT #2 in the freeze frame data is besides the range of ±20%, there is a possibility that the air–fuel ratio is inclining either to ”rich” (–20% or less) or ”lean” (+20% or more).
- When COOLANT TEMP in the freeze frame data is less than 80°C (176°F), there is a possibility or misfire only during warming up.
- In the case that misfire cannot be reproduced, the reason may be because of the driving with lack or fuel, the use of improper fuel, a stain of ignition plug, and etc.

1	**Check wire harness, connector and vacuum hose in engine room.**

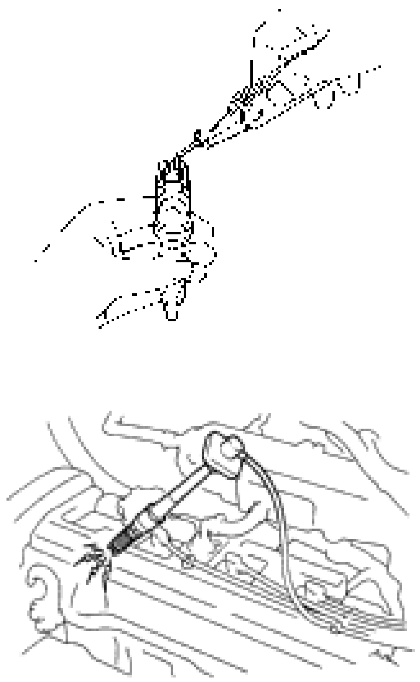
CHECK:

(a) Check the connection conditions of the wire harness and connector.
(b) Check the disconnection, piping and break of the vacuum hose.

NG → **Repair or replace, then confirm that there is no misfire (See the confirmation driving pattern).**

OK

2	Check spark plug and spark of misfiring cylinder.



P25779
A00359
A00434

PREPARATION:

(a) Disconnect the high–tension cord from the spark plug.
(b) Remove the spark plug.

CHECK:

(a) Check the plug type.
(b) Check the electrode for carbon deposits.
(c) Check the electrode gap.

OK:

(a) Platinum–tipped spark plugs with twin ground electrodes.
Recommended spark plug:
ND made: PK20TR11
NGK made: BKR6EKPB–11
(b) No large carbon deposit present.
Not wet with gasoline or oil.
(c) Electrode gap: 1.1 mm (0.043 in.)

PREPARATION:

(a) Install the spark plug to the high–tension code.
(b) Disconnect the injector connector.
(c) Ground the spark plug.

CHECK:

Check if spark occurs while the engine is being cracked.

NOTICE: To prevent excess fuel being injected from the injectors during this test, don't crank the engine for more than 5 ~ 10 seconds at a time.

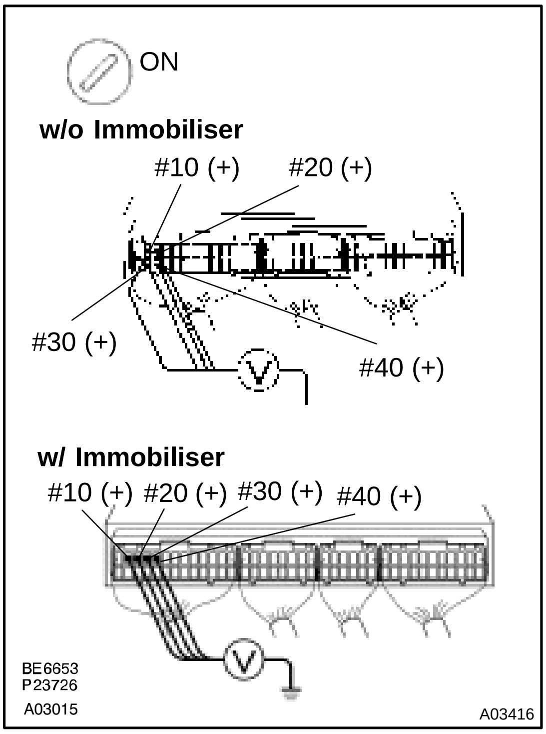
OK:

Spark jumps across electrode gap.

NG	Replace or check ignition system (See page IG–1).

OK

3	Check voltage of ECM terminal for injector of failed cylinder.



PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between applicable terminal of the ECM connector and body ground.

OK:

Voltage: 9 ~ 14 V

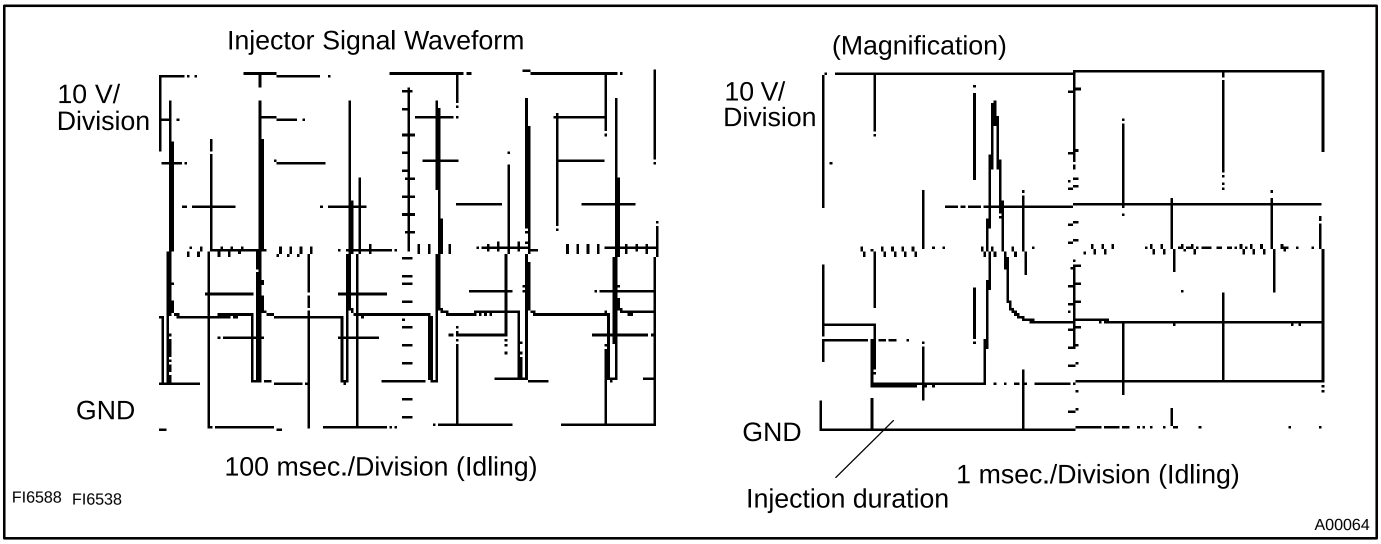
Reference: INSPECTION USING OSCILLOSCOPE

INJECTOR SIGNAL WAVEFORM

With the engine idling, measure between terminals #10 ~ #40 and E01 of the ECM connector.

HINT:

The correct waveforms are shown.



OK	Go to step 4.

NG

4	Check resistance of injector of misfiring cylinder (See page SF–20).

NG → Replace injector.

OK

Check for open and short in harness and connector between injector and ECM (See page IN–31).

5	Check fuel pressure (See page SF–6).

NG → Check and repair fuel pump, pressure regulator, fuel pipe line and filter.

OK

6	Check injector injection (See page SF–23).

NG → Replace injector.

OK

7	Check EGR system (See page EC–12).

NG → Repair EGR system.

OK

8	Check manifold absolute pressure sensor and engine coolant temp. sensor (See pages SF–53 AND SF–49).

NG — Repair or replace.

OK

Check compression pressure, valve clearance and valve timing
(See pages EM–3, EM–4 AND EM–23).

DI012–10

DTC	P0325	Knock Sensor 1 Circuit Malfunction

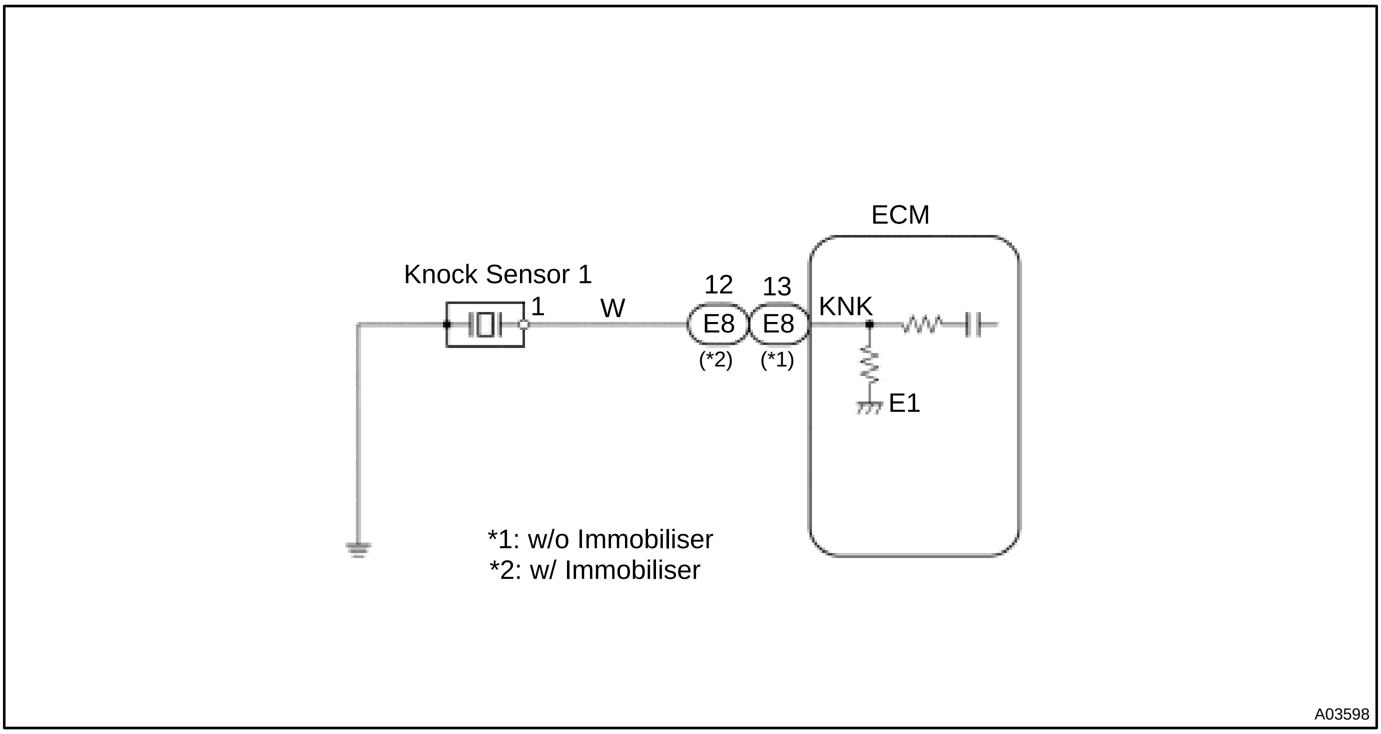
CIRCUIT DESCRIPTION

The knock sensor is fitted to the cylinder block to detect engine knocking. This sensor contains a piezoelectric element which generates a voltage when it becomes deformed, which occurs when the cylinder block vibrates due to knocking. If engine knocking occurs, ignition timing is retarded to suppress it.

DTC No.	DTC Detecting Condition	Trouble Area
P0325	No knock sensor 1 signal to ECM with engine speed, 1,200 rpm or more (2 trip detection logic)	●Open or short in knock sensor 1 circuit ●Knock sensor 1 (looseness) ●ECM

HINT:
If the ECM detects above diagnosis conditions, it operates the fail safe function in which the corrective retard angle value is set to the maximum value.

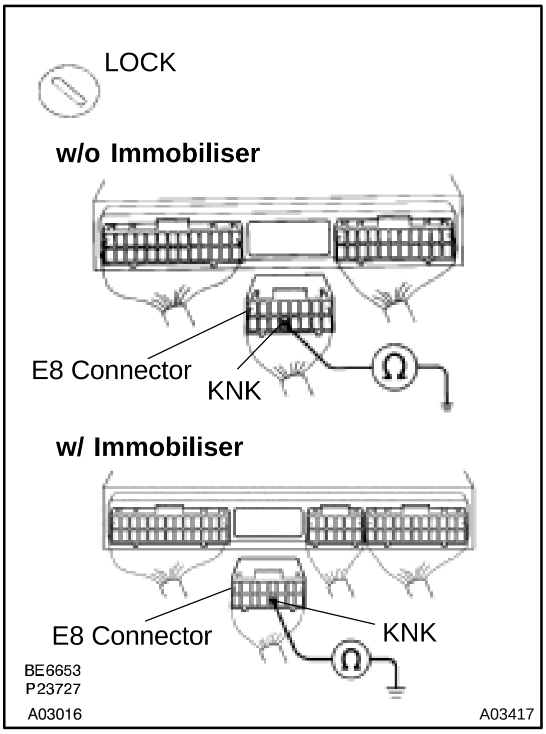
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Check continuity between terminal KNK of ECM connector and body ground.**



PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Disconnect the E8 connector from the ECM.

CHECK:

Measure resistance between terminal KNK of the ECM connector and body ground.

OK:

Resistance: 1 MΩ or higher

OK	**Go to step 3.**

NG

2	**Check knock sensor 1 (See page SF–57).**

NG	**Replace knock sensor 1.**

OK

3	**Check for open and short in harness and connector between ECM and knock sensor 1 (See page IN–31).**

NG	**Repair or replace harness or connector.**

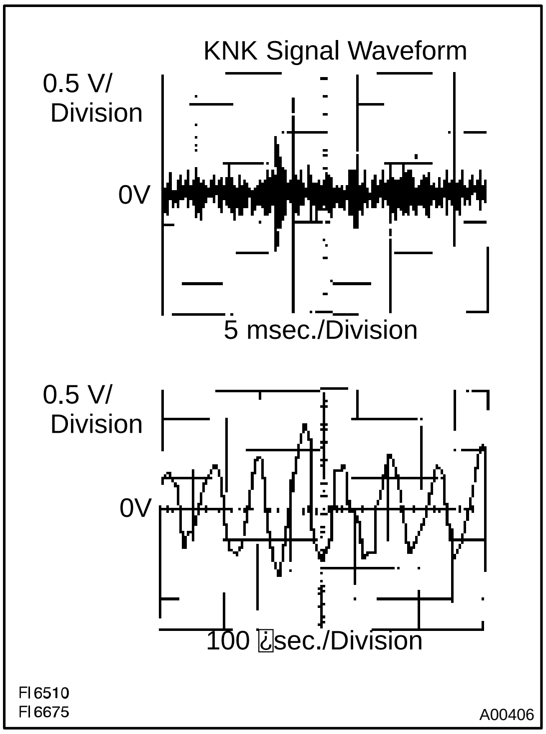
OK

4	**Does malfunction disappear when good knock sensor 1 is installed?**

YES → **Replace knock sensor 1.**

NO

Check and replace ECM (See page IN–31).



Reference: INSPECTION USING OSCILLOSCOPE

With the engine racing (4,000 rpm), measure between terminal KNK of the ECM connector and body ground.

HINT:

The correct waveforms are as shown.

Spread the time on the horizontal axis, and confirm that period of the wave is 132 µsec.

(Normal mode vibration frequency of knock sensor: 7.6 kHz)

HINT:

If normal mode vibration frequency is not 7.6 kHz the sensor is malfunctioning.

DI013–10

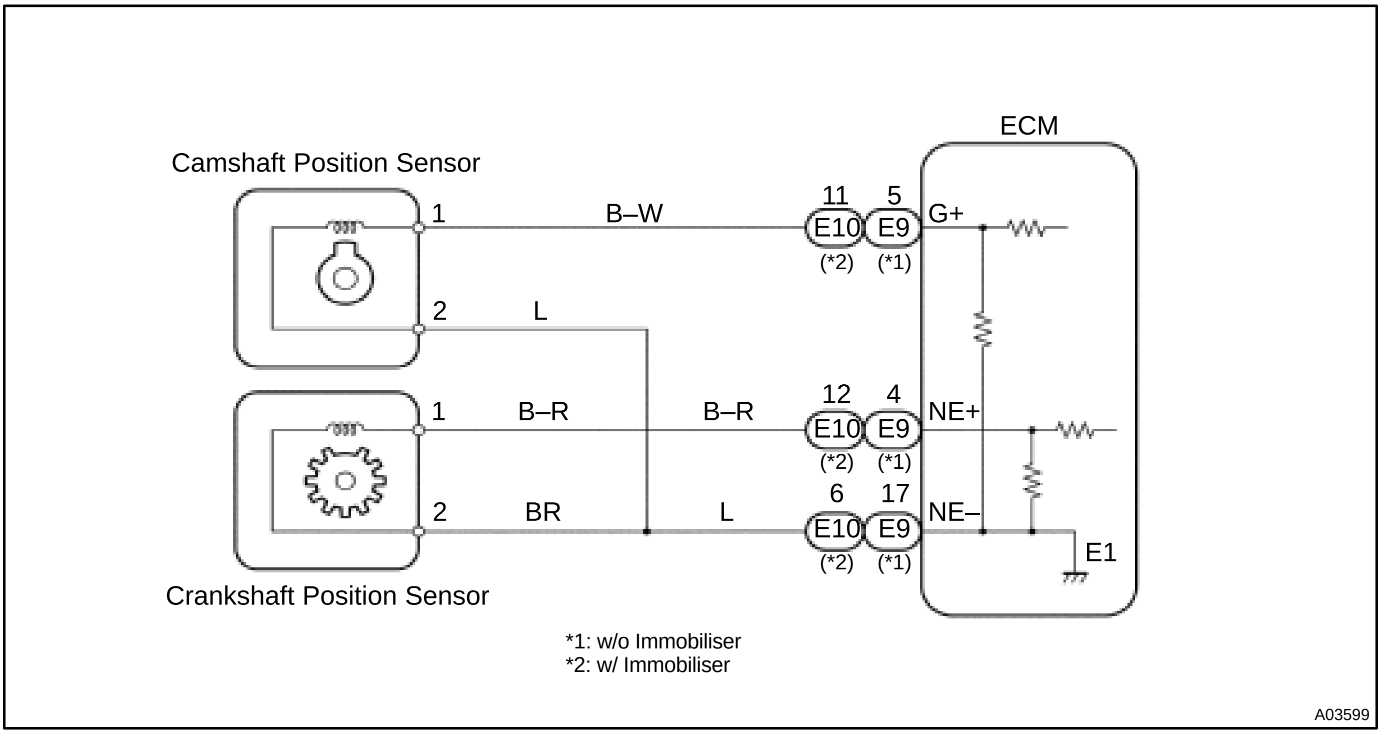
DTC	P0335	Crankshaft Position Sensor ”A” Circuit Malfunction

CIRCUIT DESCRIPTION

Crankshaft position sensor (NE signal) consist of a signal plate and pickup coil.
The NE signal plate has 34 teeth and is mounted on the crankshaft. The NE signal sensor generates 34 signals of every engine revolution. The ECM detects the standard crankshaft angle based on the G signals, and the actual crankshaft angle the engine speed by the NE signals.

DTC No.	DTC Detecting Condition	Trouble Area
P0335	No crankshaft position sensor signal to ECM during cranking (2 trip detection logic)	●Open or short in crankshaft position sensor circuit. ●Crankshaft position sensor ●Starter ●ECM
	No crankshaft position sensor signal to ECM with engine speed 600 rpm or more (2 trip detection logic)	

WIRING DIAGRAM

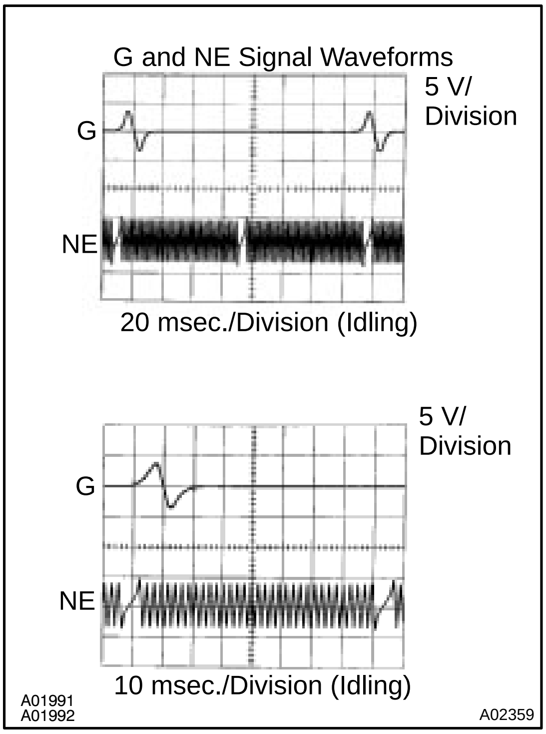


INSPECTION PROCEDURE

HINT:

- Perform troubleshooting of DTC 335 first. If notrouble is found, troubleshoot the following mechanical system.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Check resistance of crankshaft position sensor (See page IG–1).**



Reference: INSPECTION USING OSCILLOSCOPE

During cranking or idling, check between terminals G and G–, NE and NE– of the ECM

HINT:

The correct waveforms are as shown.

NG → **Replace crankshaft position sensor.**

OK

2	**Check for open and short in harness and connector between ECM and crankshaft position sensor (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

3	Inspect sensor installation and teeth of crankshaft timing pulley (See pages IG–10 and EM–15).

NG → **Tighten the sensor. Replace crankshaft timing pulley.**

OK

Check and replace ECM (See page IN–31).

DI014–09

DTC	P0340	Camshaft Position Sensor Circuit Malfunction

CIRCUIT DESCRIPTION

Camshaft position sensor (G signal) consist of signal plate and pickup coil.
The G signal plate has one tooth on its outer circumference and is mounted on the exhaust camshaft.
When the camshafts rotate, the protrusion on the signal plate and the air gap on the pickup coil change, causing fluctuations in the magnetic field and generating an electromotive force in the pickup coil.
The NE signal plate has 34 teeth and is mounted on the crankshaft. The NE signal sensor generates 34 signals for every engine revolution. The ECM detects the standard crankshaft angle based on the G signals and the actual crankshaft angle and the engine speed by the NE signals.

DTC No.	DTC Detecting Condition	Trouble Area
P0340	No camshaft position sensor signal to ECM during cranking (2 trip detection logic)	●Open or short in camshaft position sensor circuit ●Camshaft position sensor ●Distributor ●Starter ●ECM
	No camshaft position sensor signal to ECM with engine speed 600 rpm or more	

WIRING DIAGRAM

Refer to DTC P0335 (Crankshaft Position Sensor ”A” Circuit Malfunction) on page DI–100.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Check resistance of camshaft position sensor (signal generator) (See page IG–1).**

Reference: INSPECTION USING OSCILLOSCOPE
Refer to DTC P0335 (Crankshaft Position Sensor "A" Circuit Malfunction) on page DI–100.

NG → **Replace camshaft position sensor.**

OK

2	**Check for open and short in harness and connector between ECM and camshaft position sensor (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

3	**Inspect sensor installation and tooth of camshaft timing pulley (See pages IG–9 and EM–17).**

NG → **Tighten the sensor. Replace camshaft timing pulley.**

OK

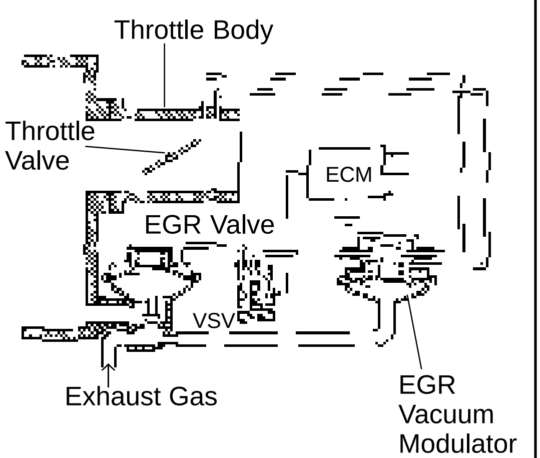
Check and replace ECM (See page IN–31).

DI015–05

DTC	P0401	Exhaust Gas Recirculation Flow Insufficient Detected

CIRCUIT DESCRIPTION

The EGR system recirculates exhaust gas, which is controlled to the proper quantity to suit the driving conditions, into the intake air mixture to slow down combustion, reduce the combustion temperature and reduce NOx emissions. The amount of EGR is regulated by the EGR vacuum modulator according to the engine load.



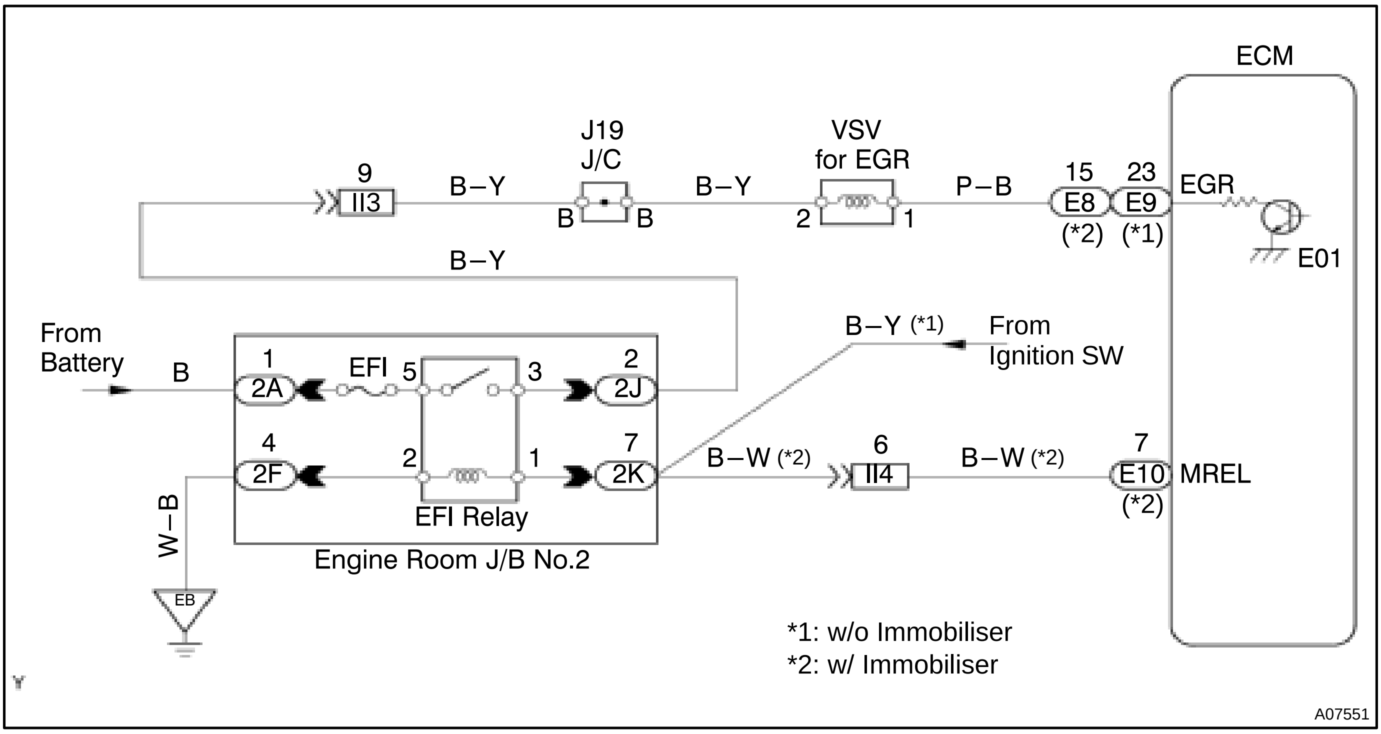
P25430

If even one of the following conditions is fulfilled, the VSV is turned ON by a signal from the ECM.
This results in atmospheric air acting on the EGR valve, closing the EGR valve and shutting off the exhaust gas (EGR cut–off).
Under the following conditions, EGR is cut to maintain driveability.

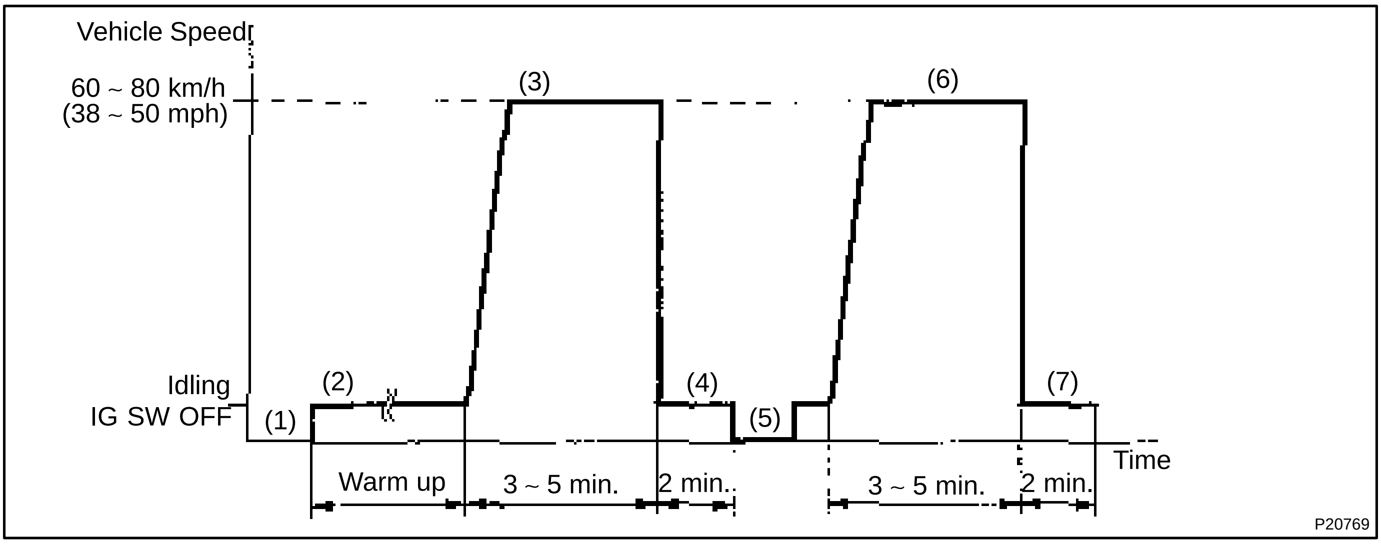
- Before engine is warmed up.
- During deceleration (throttle valve closed).
- Light engine load (amount of intake air very small).
- Engine idling.
- Engine speed over 4,400 rpm.
- High engine load (amount of intake air very large).

DTC No.	DTC Detecting Condition	Trouble Area
P0401	After engine is warmed up, intake manifold absolute pressure is larger than value calculated by ECM while EGR system is ON (2 trip detection logic)	●EGR valve stuck closed ●Open or short in VSV circuit for EGR ●Vacuum or EGR hose disconnected ●Manifold absolute pressure sensor ●VSV for EGR open or close malfunction ●ECM

WIRING DIAGRAM



SYSTEM CHECK DRIVING PATTERN



(1) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.
(2) Start and warm up the engine with all accessories switched OFF.
(3) Run the vehicle at 60 ~ 80 km/h (38 ~ 50 mph) for 3 min. or more.
(4) Idle the engine for about 2 min.
(5) Do steps (3) and (4) again.
(6) Stop at safe place and turn the ignition switch OFF.
(7) Do steps (2) to (5) again.
(8) Check the READINESS TESTS mode on the OBD II scan tool or TOYOTA hand–held tester.
If COMPL is displayed and the MIL does not light up, the system is normal.
If INCMPL is displayed and the MIL does not light up, run the vehicle again and check it.
HINT:
INCMPL is displayed when either condition (a) or (b) exists.
(a) The system check is incomplete.
(b) There is a malfunction in the system.
If there is a malfunction in the system, the MIL will light up after steps (2) to (5) above are done.
(2 trip detection logic)

INSPECTION PROCEDURE

HINT:

- If DTC P0105 (Manifold Absolute Pressure/Barometric Pressure Circuit Malfunction), P0106 (Manifold Absolute Pressure/Barometric Pressure Circuit Range/Performance Problem) and P0401 (Exhaust Gas Recirculation Flow Insufficient Detected) are output simultaneously, perform troubleshooting of DTC P0105 first.
- If DTC P0401 (Exhaust Gas Recirculation Flow Insufficient Detected) and P0402 (Exhaust Gas Recirculation Flow Excessive Detected) are output simultaneously, perform troubleshooting of DTC P0402 first.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

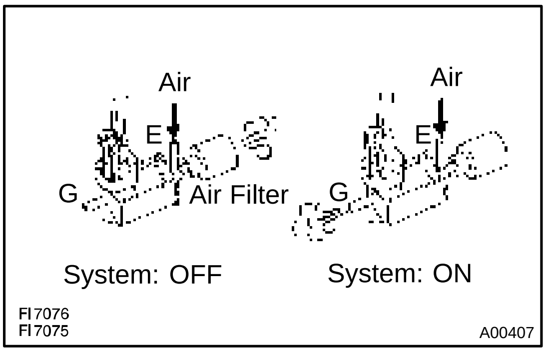
TOYOTA hand–held tester:

1	**Check connection of the vacuum hose and EGR hose (See page EC–12).**

NG → **Repair or replace.**

OK

2	**Check VSV for EGR.**



PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3.

(b) Turn the ignition switch ON and push the TOYOTA hand–held tester main switch ON.

(c) Select the ACTIVE TEST mode on the TOYOTA hand–held tester.

CHECK:

Check operation of the VSV when it is operated by the TOYOTA hand–held tester.

OK:

EGR system is OFF:
Air from port E is flowing out through the air filter.
EGR system is ON:
Air from port E is flowing out port G.

OK → **Go to step 4.**

NG

3	**Check operation of the VSV for EGR (See page SF–43).**

NG → **Replace VSV for EGR.**

OK

Check for open and short in harness and connector between engine room J/B No.2 and ECM (See page IN–31).

4	Check EGR system (See page EC–12).

NG → Repair or replace.

OK

5	Check EGR vacuum modulator (See page EC–12).

NG → Repair or replace.

OK

6	Check EGR valve (See page EC–12).

NG → Repair or replace.

OK

7	Check manifold absolute pressure sensor (See page SF–53).

NG → Repair or replace.

OK

Check and replace ECM (See page IN–31).

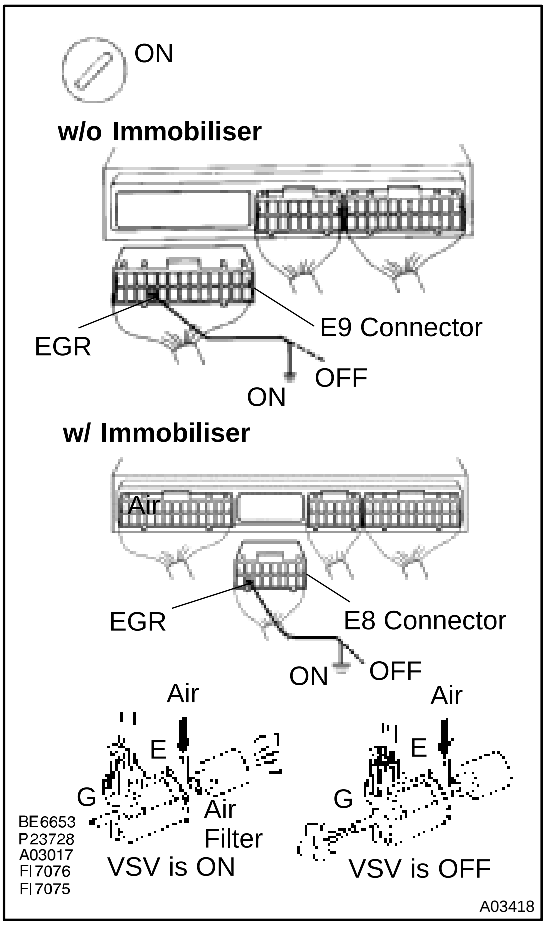
OBD II scan tool (excluding TOYOTA hand–held tester):

1	**Check connection of vacuum hose and EGR hose (See page EC–12).**

NG → **Repair or replace.**

OK

2	**Check VSV for EGR.**



PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Disconnect the E9 connector (w/o immobilizer) or E8 connector (w/ immobilizer) the ECM.

(c) Turn the ignition switch ON.

CHECK:

Check VSV function

(1) Connect between terminal EGR of the ECM connector and body ground (ON).

(2) Disconnect between terminal EGR of the ECM connector and body ground (ON).

OK:

(1) VSV is ON:
Air from port E is flowing out through the air filter.
(2) VSV is OFF:
Air from port E is flowing out port G.

OK → **Go to step 4.**

NG

3	Check operation of VSV for EGR (See page SF–43).

NG → Replace VSV for EGR.

OK

Check for open and short in harness and connector between engine room J/B No.2 and ECM (See page IN–31).

4	Check EGR system (See page EC–12).

NG → Repair or replace.

OK

5	Check EGR vacuum modulator (See page EC–12).

NG → Repair or replace.

OK

6	Check EGR valve (See page EC–12).

NG → Repair or replace.

OK

7	Check manifold absolute pressure sensor (See page SF–53).

NG → **Repair and replace.**

OK ↓

Check and replace ECM (See page IN–31).

DI016–04

DTC	P0402	Exhaust Gas Recirculation Flow Excessive Detected

CIRCUIT DESCRIPTION

Refer to DTC P0401 (Exhaust Gas Recirculation Flow Insufficient Detected) on page DI–105.

DTC No.	DTC Detecting Condition	Trouble Area
P0402	After engine is warmed up, conditions (a) and (b) continue: (a) Intake manifold absolute pressure is larger than value calculated by ECM while EGR system is ON (b) Misfiring is detected during idling (2 trip detection logic)	●EGR valve stuck open ●Vacuum or EGR hose is connected to wrong post ●Manifold absolute pressure sensor ●ECM

WIRING DIAGRAM

Refer to DTC P0401 (Exhaust Gas Recirculation Flow Insufficient Detected) on DI–105.

SYSTEM CHECK DRIVING PATTEM

Refer to DTC P0401 (Exhaust Gas Recirculation Flow Insufficient Detected) on DI–105.

INSPECTION PROCEDURE

HINT:

- If DTC P0105 (Manifold Absolute Pressure/Barometric Pressure Circuit Malfunction), P0106 (Manifold Absolute Pressure/Barometric Pressure Circuit Range/Performance Problem) and P0402 (Exhaust Gas Recirculation Flow Excessive Detected) are output simultaneously, perform troubleshooting of DTC P0105 first.
- If DTC P0401 (Exhaust Gas Recirculation Flow Insufficient Detected) and P0402 (Exhaust Gas Recirculation Flow Excessive Detected) are output simultaneously, perform troubleshooting of DTC P0402 first.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Check connection of vacuum hose and EGR hose (See page EC–12).**

NG → **Repair or replace.**

OK

2	**Check EGR valve (See page EC–12).**

NG → **Repair or replace.**

OK ↓

3	**Check VSV for EGR*.**

*: If you have TOYOTA hand–held tester, see page DI–105, step 2.
If you have no TOYOTA hand–held tester, see page DI–105, step 2.

OK → **Go to step 4.**

NG ↓

4	**Check operation of VSV for EGR (See page SF–43).**

NG → **Replace VSV for EGR.**

OK ↓

Check for open and short in harness and connector between engine room J/B No.2 and ECM (See page IN–31).

5	**Check EGR system (See page EC–12.)**

NG → **Repair or replace.**

OK ↓

6	Check EGR vacuum modulator (See page EC–12).

NG → Repair or replace.

OK

7	Check manifold absolute pressure sensor (See page SF–53).

NG → Repair or replace.

OK

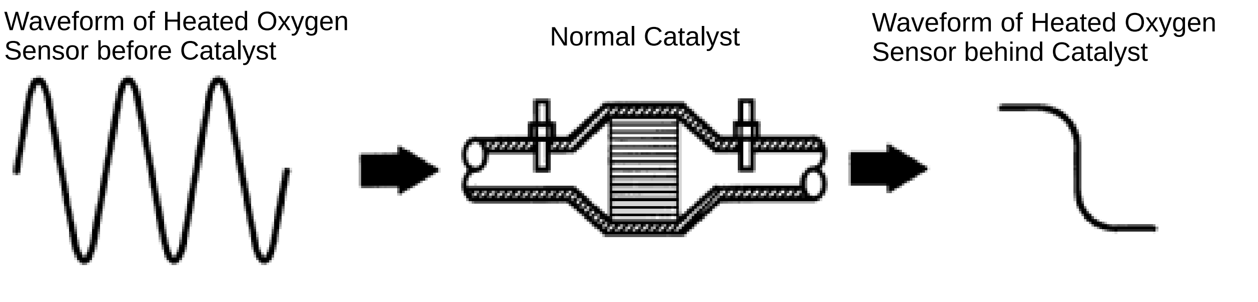
Check and replace ECM (See page IN–31).

DI1JX–03

DTC	P0420	Catalyst System Efficiency Below Threshold (Except California Spec.)

CIRCUIT DESCRIPTION

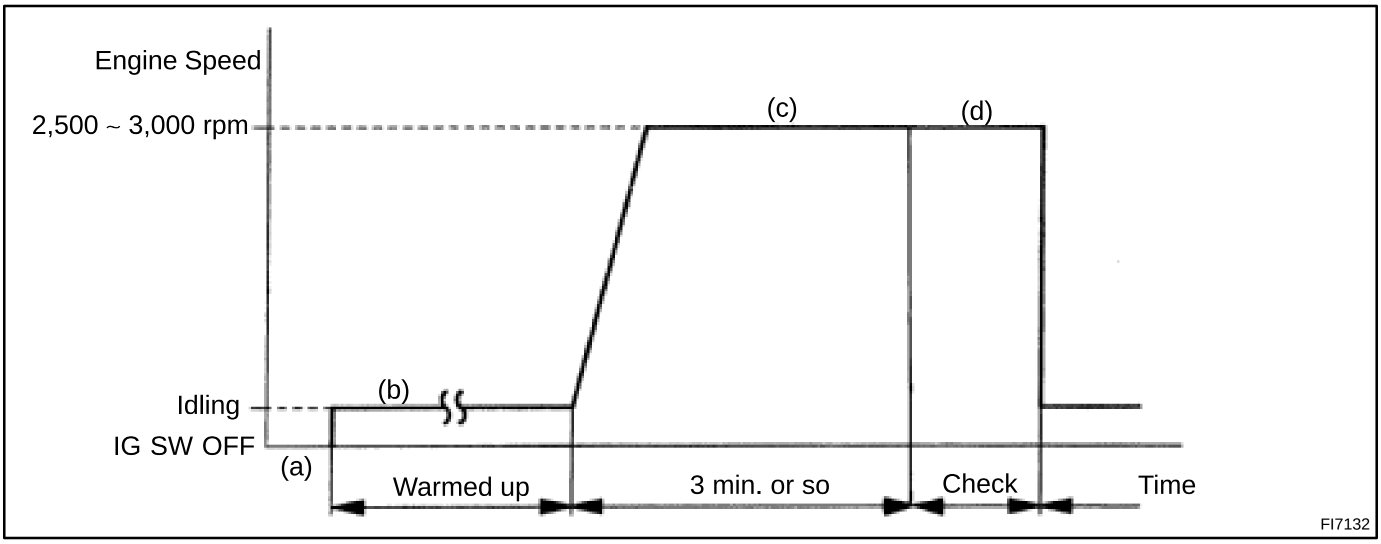
The ECM compares the waveform of the heated oxygen sensor located before the catalyst with the waveform of the heated oxygen sensor located behind the catalyst to determine whether or not catalyst performance has deteriorated.
Air–fuel ratio feedback compensation keeps the waveform of the heated oxygen sensor before the catalyst repeatedly changing back and forth from rich to lean.
If the catalyst is functioning normally, the waveform of the heated oxygen sensor behind the catalyst switches back and forth between rich and lean much more slowly than the waveform of the heated oxygen sensor before the catalyst.
But when both waveforms change at a similar rate, it indicates that catalyst performance has deteriorated.



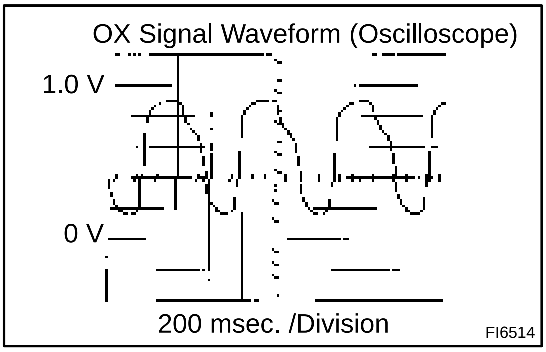
FI7081

DTC No.	DTC Detecting Condition	Trouble Area
P0420	After engine and catalyst are warmed up, and while vehicle is driven within set vehicle and engine speed range, waveforms of heated oxygen sensors (bank 1 sensor 1, 2) have same amplitude (2 trip detection logic)	●Three–way catalytic converter ●Open or short in heated oxygen sensor circuit ●Heated oxygen sensor

CONFIRMATION ENGINE RACING PATTERN



(a) Connect the TOYOTA hand–held tester to the DLC3, or connect the probe of the oscilloscope between terminals OX1, OX2 and E1 of the ECM connector.
(b) Start engine and warm it up with all accessories switched OFF until water temp. is stable.
(c) Race the engine at 2,500 ~ 3,000 rpm for about 3 min.
(d) After confirming that the waveforms of the heated oxygen sensor (bank 1 sensor 1 (OX1)), oscillate around 0.5 V during feedback to the ECM, check the waveform of the heated oxygen sensor (bank 1 sensor 2 (OX2)).



HINT:
- If there is a malfunction in the system, the waveform of the heated oxygen sensor (bank 1 sensor 2 (OX2)) is almost the same as that of the heated oxygen sensor (bank 1 sensor 1 (OX1)) on the left.
- There are some cases where, even though a malfunction exists, the MIL may either light up or not light up.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Are there any other codes (besides DTC P0420) being output?**

YES → **Go to relevant DTC chart.**

NO

2	**Check gas leakage on exhaust system.**

NG → **Repair or replace.**

OK

3	**Check heated oxygen sensor (bank 1 sensor 1) (See page DI–66).**

NG → **Repair or replace.**

OK

4	**Check heated oxygen sensor (bank 1 sensor 2) (See page DI–77).**

NG → **Repair or replace.**

OK

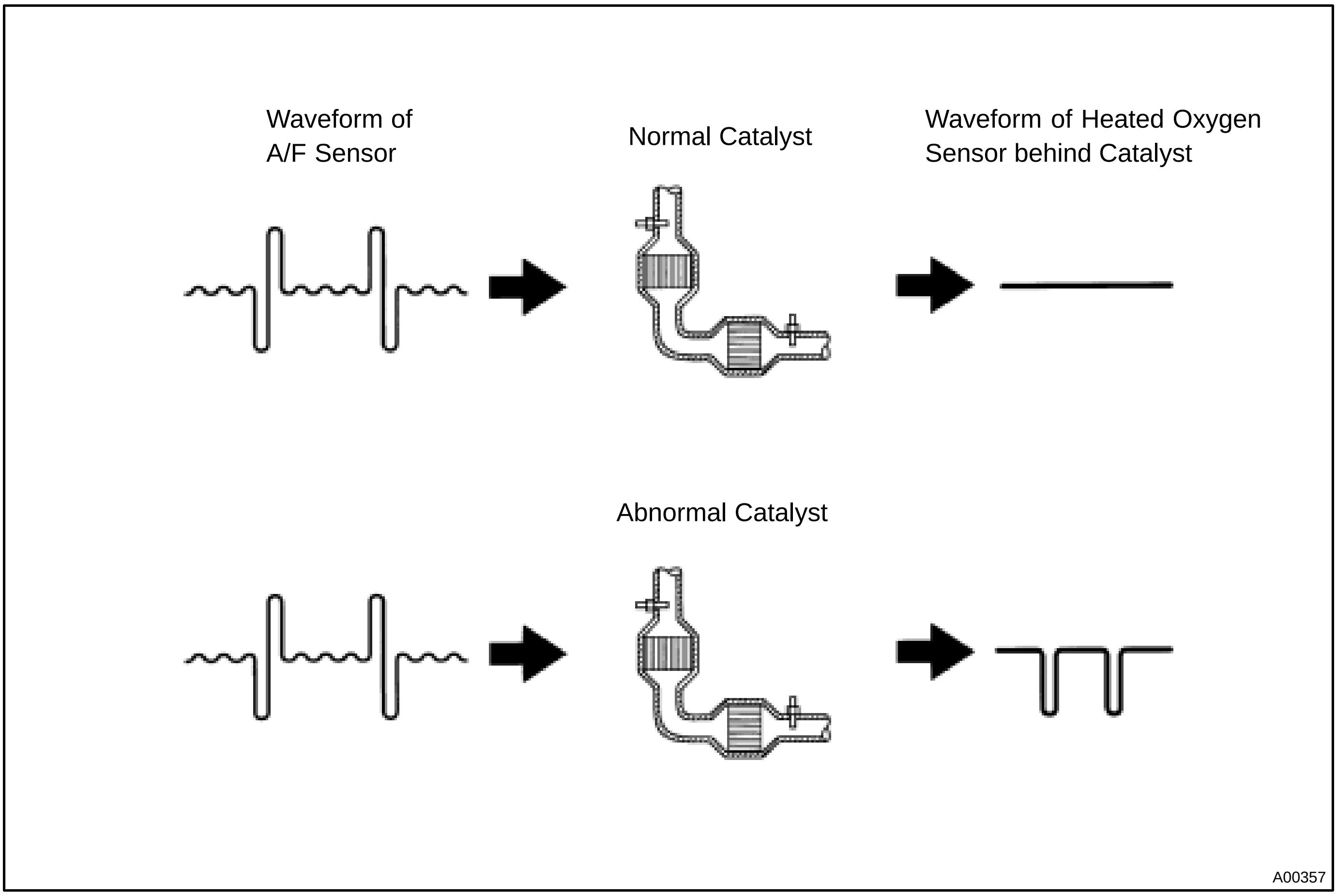
Replace three–way catalytic converter.

DI1JY–03

DTC	P0420	Catalyst System Efficiency Below Threshold (Only for California Spec.)

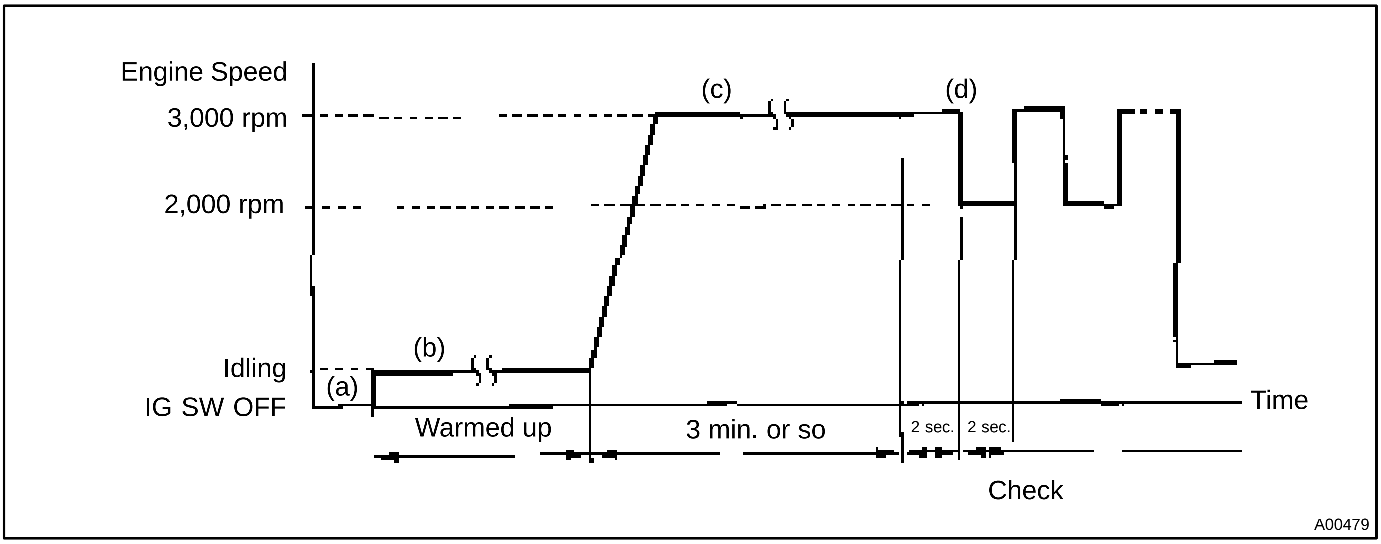
CIRCUIT DESCRIPTION

The ECM observes the waveform of the heated oxygen sensor located behind the catalyst to determine whether the catalyst performance has deteriorated.
If the catalyst is functioning normally, the waveform of the heated oxygen sensor located behind the catalyst switches back and forth between rich and lean much more slowly.
When the waveform of the heated oxygen sensor located behind the catalyst alternates flutteringly between rich and lean, it indicates that catalyst performance has deteriorated.



DTC No.	DTC Detecting Condition	Trouble Area
P0420	After engine and catalyst are warmed up, and while vehicle is driven within set vehicle and engine speed range, waveform of heated oxygen sensor (bank 1 sensor 2) alternates flutteringly between rich and lean (2 trip detection logic)	●Three–way catalytic converter ●Open or short in heated oxygen sensor (bank 1 sensor 2) circuit ●Heated oxygen sensor (bank 1 sensor 2) ●Open or short in A/F sensor circuit ●A/F sensor

CONFIRMATION ENGINE RACING PATTERN



(a) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.
(b) Start the engine and warm it up with all accessories switched OFF until water temp. is stable.
(c) Race the engine at 2,500 ~ 3,000 rpm for about 3 min.
(d) When racing the engine at 3,000 rpm for 2 sec. and 2,000 rpm for 2 sec. alternately, check the waveform of the heated oxygen sensor (bank 1 sensor 2).

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Are there any other codes (besides DTC P0420) being output?**

YES → **Go to relevant DTC chart.**

NO

2	**Check gas leakage on exhaust system.**

NG → **Repair or replace.**

OK

3	Check A/F sensor (See page DI–66).

NG → **Repair or replace.**

OK

4	Check heated oxygen sensor (bank 1 sensor 2) (See page DI–77).

NG → **Repair or replace.**

OK

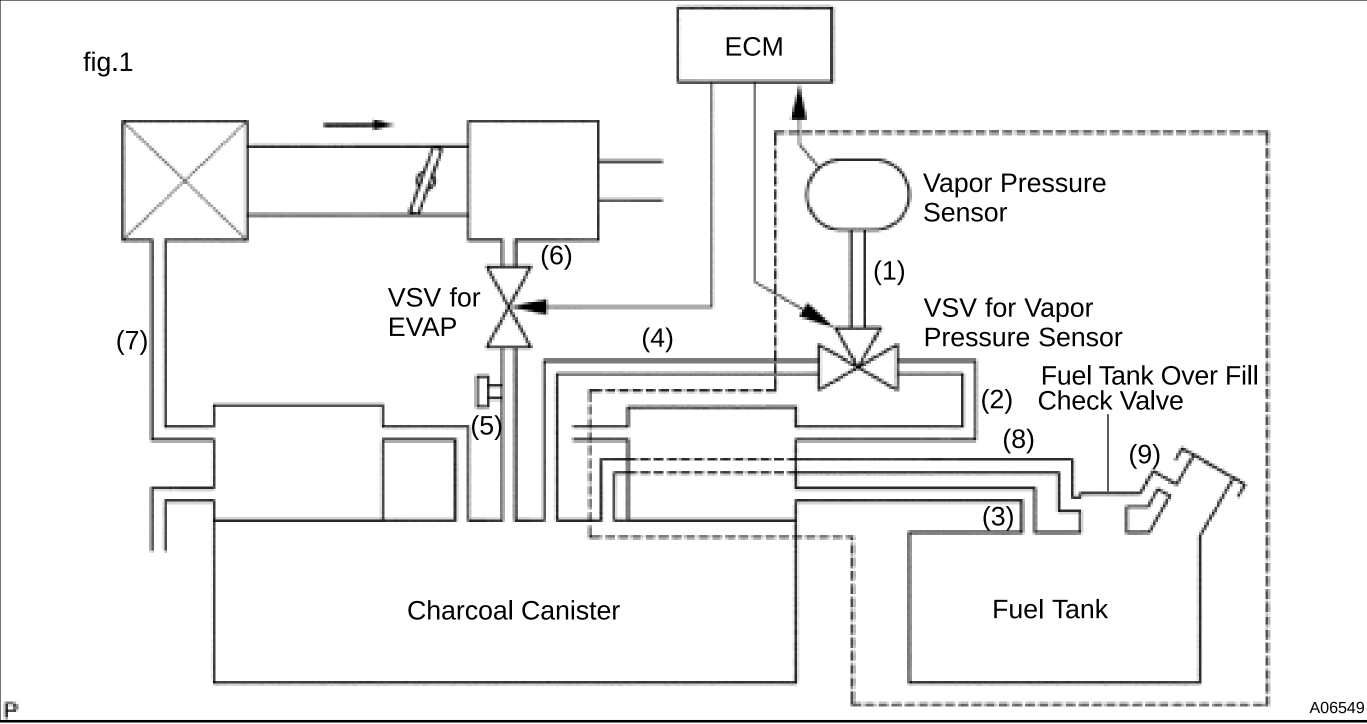
Replace three–way catalytic converter.

DI1JZ–04

DTC	P0440	Evaporative Emission Control System Malfunction

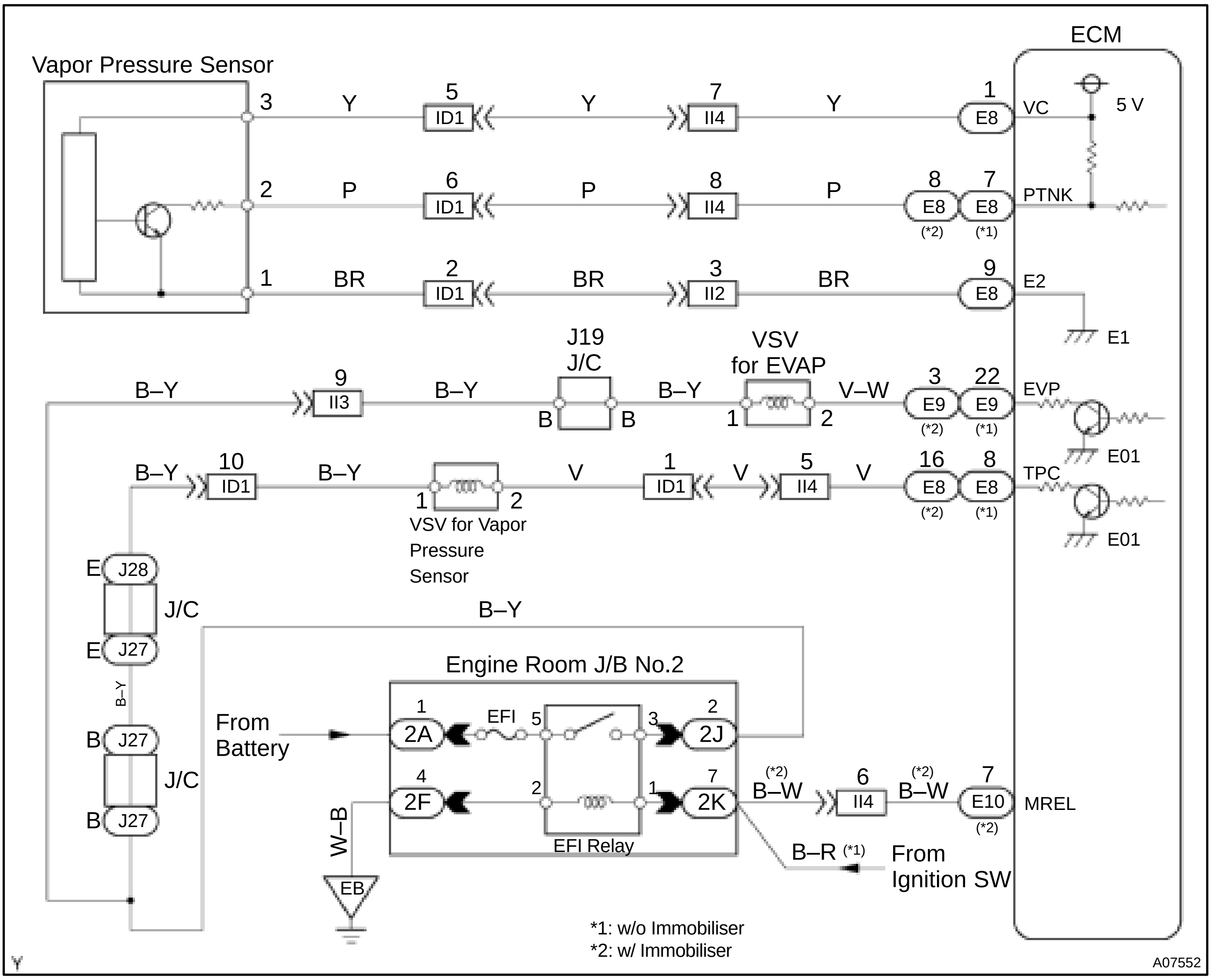
CIRCUIT DESCRIPTION

The vapor pressure sensor and VSV for vapor pressure sensor are used to detect abnormalities in the evaporative emission control system.
The ECM decides whether there is an abnormality in the evaporative emission control system based on the vapor pressure sensor signal.
DTC P0440 is recorded by the ECM when evaporative emissions leak from the components within the dotted line in fig. 1 below, or when the vapor pressure sensor malfunctions.



DTC No.	DTC Detecting Condition	Trouble Area
P0440	Fuel tank pressure is atmospheric pressure after vehicle is driven for 20 min. (2 trip detection logic)	●Vapor pressure sensor ●Fuel tank cap incorrectly installed ●Fuel tank cap cracked or damaged ●Vacuum hose cracked, holed, blocked, damaged or disconnected ((1) or (2) in fig. 1) ●Hose or tube cracked, holed, damaged or loose seal ((3) in fig. 1) ●Fuel tank cracked, holed or damaged ●Charcoal canister cracked, holed or damaged ●Fuel tank over fill check valve cracked or damaged

WIRING DIAGRAM

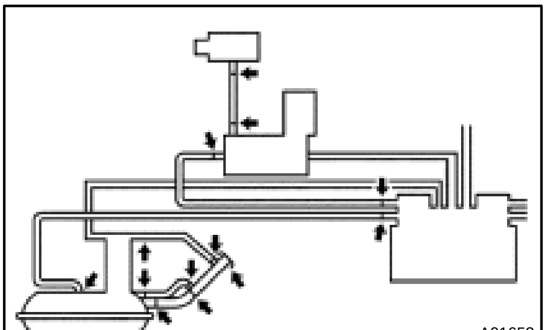


INSPECTION PROCEDURE

HINT:

- If DTC P0441 (Evaporative Emission Control System Incorrect Purge Flow), P0446 (Evaporative Emission Control System Vent Control Malfunction), P0450 (Evaporative Emission Control System Pressure Sensor Malfunction) or P0451 is output after DTC P0440 (Evaporative Emission Control System Malfunction), first troubleshoot DTC P0441, P0446, P0450 or P0451. If no malfunction is detected, troubleshoot DTC P0440 next.
- Ask the customer whether, after the MIL came on, the customer found the fuel tank cap loose and tightened it. Also ask the customer whether the fuel tank cap was loose when refuelling. If the fuel tank cap was not loose, it was the cause of the DTC. If the fuel tank cap was not loose or if the customer was not sure if it was loose, troubleshoot according to the following procedure.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.
- When the ENGINE RUN TIME in the freeze frame data is less than 200 seconds, carefully check the VSV for EVAP, charcoal canister and vapor pressure sensor.

1	**Check whether hose close to fuel tank have been modified, and check whether there are signs of any accident near the fuel tank or charcoal canister.**


A01653

CHECK:
Check for cracks, deformation and loose connection of the following parts.

- Fuel tank
- Charcoal canister
- Fuel tank filler pipe
- Hoses and tubes around fuel tank and charcoal canister

NG → **Repair or replace.**

OK

2	**Check that fuel tank cap is TOYOTA genuine parts.**

NG → **Replace to TOYOTA genuine parts.**

OK

3	**Check that fuel tank cap is correctly installed.**

NG → **Correctly install fuel tank cap.**

OK

4	**Check fuel tank cap (See page EC–6).**

NG → **Replace fuel tank cap.**

OK

5	**Check filler neck for damage.**

PREPARATION:
Remove the fuel tank cap.
CHECK:
Visually check the filler neck for damage.

NG → **Replace filler neck.**

OK

6	**Check vacuum hoses between vapor pressure sensor and VSV for vapor pressure sensor, and VSV for vapor pressure sensor and charcoal canister.**

CHECK:
(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole and damage.

NG → **Repair or replace.**

OK

7	**Check hose and tube between fuel tank and charcoal canister.**

CHECK:
(a) Check for proper connection of the fuel tank and fuel evap pipe, fuel evap pipe and fuel tube under the floor, fuel tube under the floor and charcoal canister.
(b) Check the hose and tube for cracks, hole and damage.

NG → **Repair or replace.**

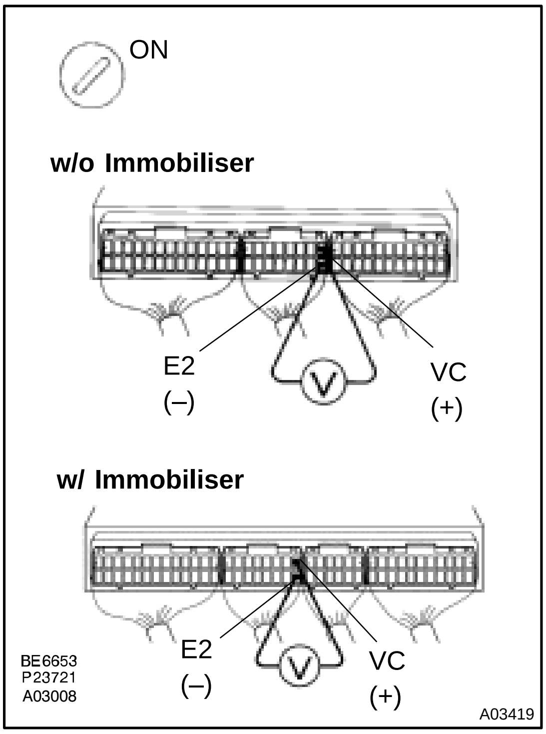
OK

8	Check charcoal canister (See page EC–6).

NG → **Replace charcoal canister.**

OK

9	Check voltage between terminals VC and E2 of ECM connector.



CHECK:

(a) Remove the glove compartment (See page SF–64).

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals VC and E2 of the ECM connector.

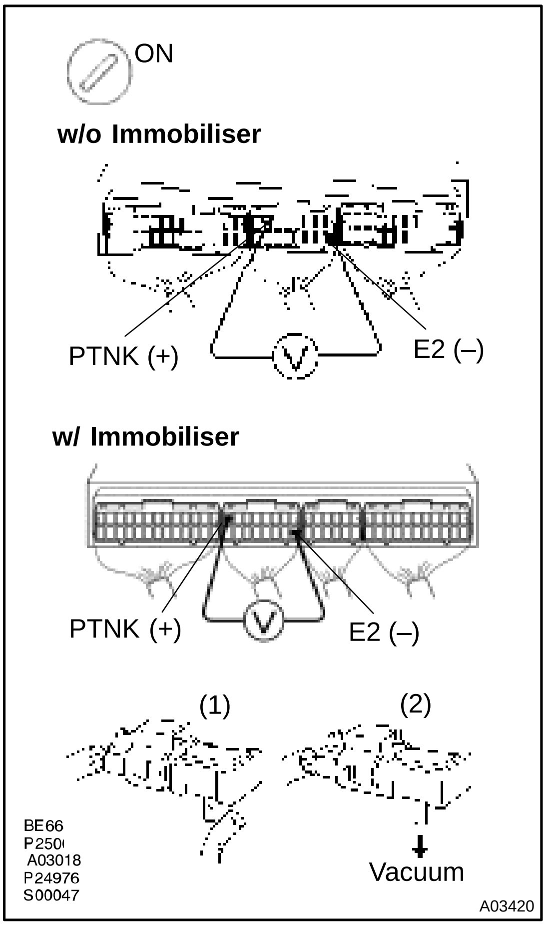
OK:

Voltage: 4.5 ~ 5.5 V

NG → **Check and replace ECM (See page IN–31).**

OK

10	Check voltage between terminals PTNK and E2 of ECM connector.



PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals PTNK and E2 of the ECM connector.

(1) Disconnect the vacuum hose from the vapor pressure sensor.

(2) Using the MITYVAC (Hand–Held Vacuum Pump), apply vacuum 4.0 kPa (30 mmHg, 1.18 in.Hg) to the vapor pressure sensor.

NOTICE:

The vacuum applied to the vapor pressure sensor must be less than 66.7 kPa (500 mmHg, 19.7 in.Hg).

OK:

(1) Voltage: 2.9 ~ 3.7 V

(2) Voltage: 0.5 V or less

OK	Go to step 12.

NG

11	Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN–31).

NG	Repair or replace harness or connector.

OK

Replace vapor pressure sensor.

12	Check fuel tank and fuel tank over fill check valve for cracks and damage (See page EC–6).

NG → **Replace fuel tank or fuel tank over fill check valve.**

OK

It is likely that vehicle user did not properly close fuel tank cap. Please explain to customer how to properly install fuel tank cap.

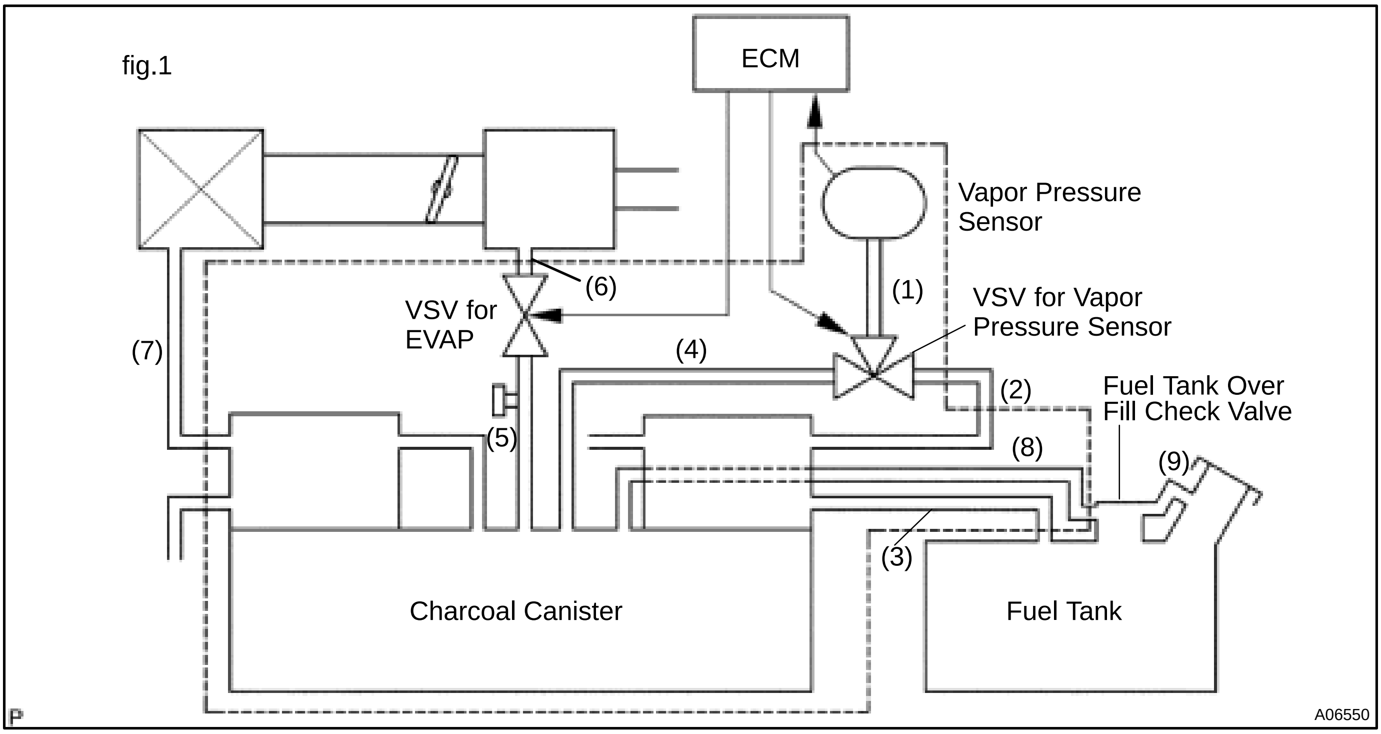
DI019–10

DTC	P0441	Evaporative Emission Control System Incorrect Purge Flow

DTC	P0446	Evaporative Emission Control System Vent Control Malfunction

CIRCUIT DESCRIPTION

The vapor pressure sensor and VSV for vapor pressure sensor are used to detect abnormalities in the evaporative emission control system.
The ECM decides whether there is an abnormality in the evaporative emission control system based on the vapor pressure sensor signal.
DTCs P0441 and P0446 are recorded by the ECM when evaporative emissions leak from the components within the dotted line in fig. 1 below, or when there is a malfunction in either the VSV for EVAP, the VSV for vapor pressure sensor, or in the vapor pressure sensor itself.



DTC No.	DTC Detecting Condition	Trouble Area
P0441	Pressure in the charcoal canister does not drop during purge control (2 trip detection logic)	●Open or short in VSV circuit for vapor pressure sensor ●VSV for vapor pressure sensor ●Open or short in vapor pressure sensor circuit ●Vapor pressure sensor ●Open or short in VSV circuit for EVAP ●VSV for EVAP ●Vacuum hose cracks, hole, blocked, damaged or disconnected ((1), (4), (5) holed (6) and (7) in fig. 1) ●Charcoal canister cracked, holed or damaged ●Fuel tank over fill check valve cracked or damaged
	During purge cut–off, pressure in charcoal canister is very low compared with atmospheric pressure (2 trip detection logic)	
P0446	When VSV for vapor pressure sensor is OFF, ECM judges that there is no continuity between vapor pressure sensor and charcoal canister (2 trip detection logic)	
	When VSV for vapor pressure sensor is ON, ECM judges that there is no continuity between vapor pressure sensor and fuel tank (2 trip detection logic)	
	After purge cut off operates, pressure in charcoal canister is maintained at atmospheric pressure (2 trip detection logic)	

WIRING DIAGRAM

Refer to DTC P0440 (Evaporative Emission Control System Malfunction) on page DI–122.

INSPECTION PROCEDURE

TOYOTA hand–held tester:

HINT:

- If DTC P0441 (Evaporative Emission Control System Incorrect Purge Flow), P0446 (Evaporative Emission Control System Vent Control Malfunction), P0450 (Evaporative Emission Control System Pressure Sensor Malfunction) or P0451 is output after DTC P0440 (Evaporative Emission Control System Malfunction), first troubleshoot DTC P0441, P0446, P0450 or P0451. If no malfunction is detected, troubleshoot DTC P0440 next.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.
- When the ENGINE RUN TIME in the freeze frame data is less than 200 seconds, carefully check the VSV for EVAP, charcoal canister and vapor pressure sensor.

1	Check VSV connector for EVAP, VSV connector for vapor pressure sensor and vapor pressure sensor connector for looseness and disconnection.

NG → **Repair or connect VSV or sensor connector.**

OK

2	Check vacuum hoses (1), (4), (5), (6), (7), (8) and (9) on page DI–122).

CHECK:
(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole, damage and blockage.

NG → **Repair or replace.**

OK

3	Check voltage between terminals VC and E2 of ECM connector (See page DI–122, step 9).

NG → **Check and replace ECM (See page IN–31).**

OK

4	Check voltage between terminals PTNK and E2 of ECM connector (See page DI–122, step 10).

OK → **Go to step 6.**

NG

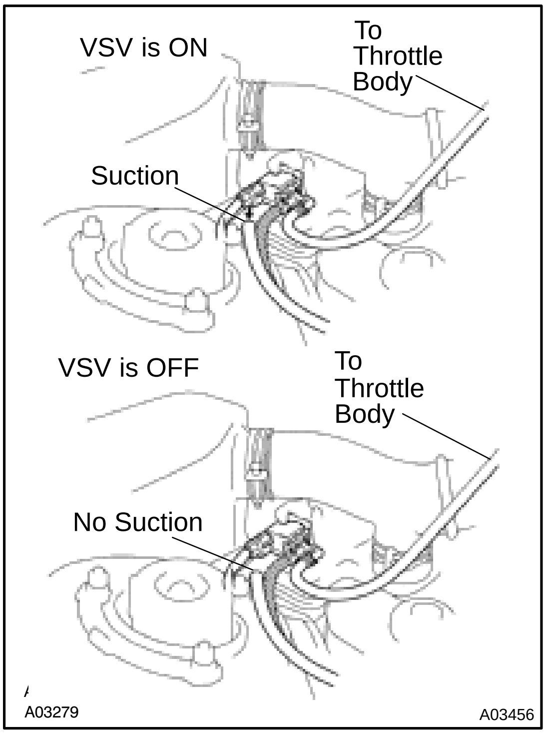
5	Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Replace vapor pressure sensor.

6	Check purge flow.



PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3.

(b) Select the ACTIVE TEST mode on the TOYOTA hand–held tester.

(c) Disconnect the vacuum hose for the VSV for EVAP from the charcoal canister.

(d) Start the engine.

CHECK:

When the VSV for EVAP is operated by the TOYOTA hand–held tester, check whether the disconnected hose applies suction to your finger.

OK:

VSV is ON:
Disconnected hose applies suction to your finger.
VSV is OFF:
Disconnected hose applies no suction to your finger.

OK → **Go to step 10.**

NG

7	Check vacuum hose between intake manifold and VSV for EVAP, and VSV for EVAP and charcoal canister.

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole, damage and blockage.

NG → **Repair or replace.**

OK ↓

8	Check operation of VSV for EVAP (See page SF–45).

OK → **Go to step 9.**

NG ↓

Replace VSV, charcoal canister and then clean the vacuum hose between throttle body and VSV for EVAP, and VSV for EVAP and charcoal canister.

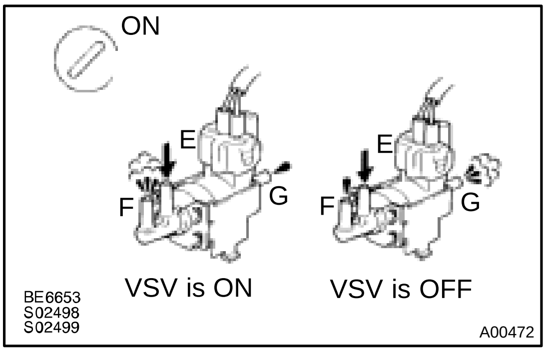
9	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for EVAP, and VSV for EVAP and ECM (See page IN–31).

NG → **Repair or replace harness or connector.**

OK ↓

Check and replace ECM (See page IN–31).

10	Check the VSV for vapor pressure sensor.



PREPARATION:
(a) Connect the TOYOTA hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the OBD II scan tool or TOYOTA hand–held tester main switch ON.
(c) Select the ACTIVE TEST mode on the TOYOTA hand–held tester.

CHECK:
Check the VSV operation when it is operated by TOYOTA hand–held tester.

OK:
(1) VSV is ON:
Air from port E is flowing out through port F.
(2) VSV is OFF:
Air from port E is flowing out through port G.

OK	Go to step 13.

NG

11	Check operation of VSV for vapor pressure sensor (See page SF–47).

OK	Gp to step 12.

NG

Replace VSV charcoal canister, and then clean the vacuum hoses between charcoal canister and VSV for vapor pressure sensor, and VSV for vapor pressure sensor and vapor pressure sensor.

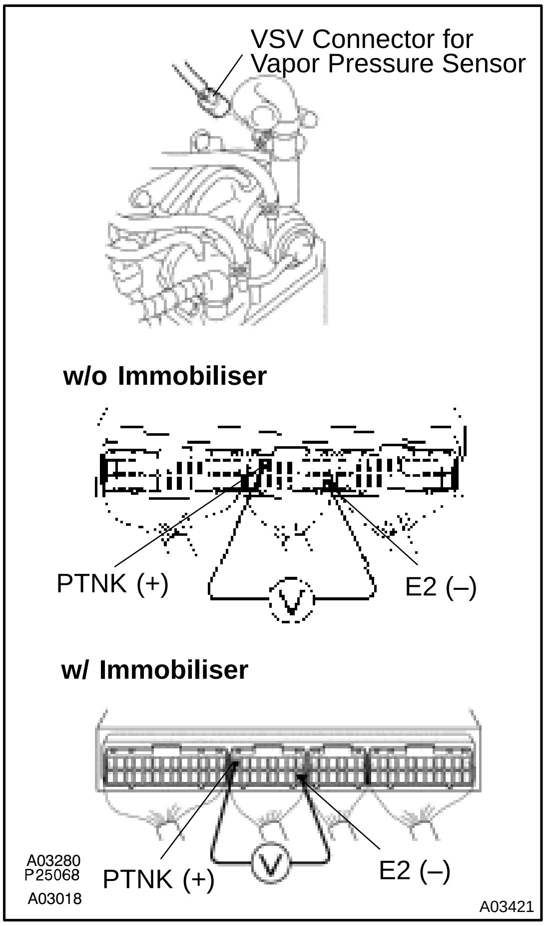
12	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for vapor pressure sensor, and VSV for vapor pressure sensor and ECM (See page IN–31).

NG — **Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–31).

13	When VSV connector for vapor pressure sensor is disconnected and VSV for EVAP is ON, measure voltage between terminals PTNK and E2 of ECM connector.



PREPARATION:
(a) Remove the glove compartment (See page SF–64).
(b) Connect the TOYOTA hand–held tester to the DLC3.
(c) Disconnect the VSV connector for the vapor pressure sensor.
(d) Select the ACTIVE TEST mode on the TOYOTA hand–held tester.
(e) Start the engine.

CHECK:
Measure voltage between terminals PTNK and E2 of the ECM connector using the TOYOTA hand–held tester when the VSV for the EVAP is ON.

OK:
Voltage: 2.0 V or less

OK — **Go to step 15.**

NG

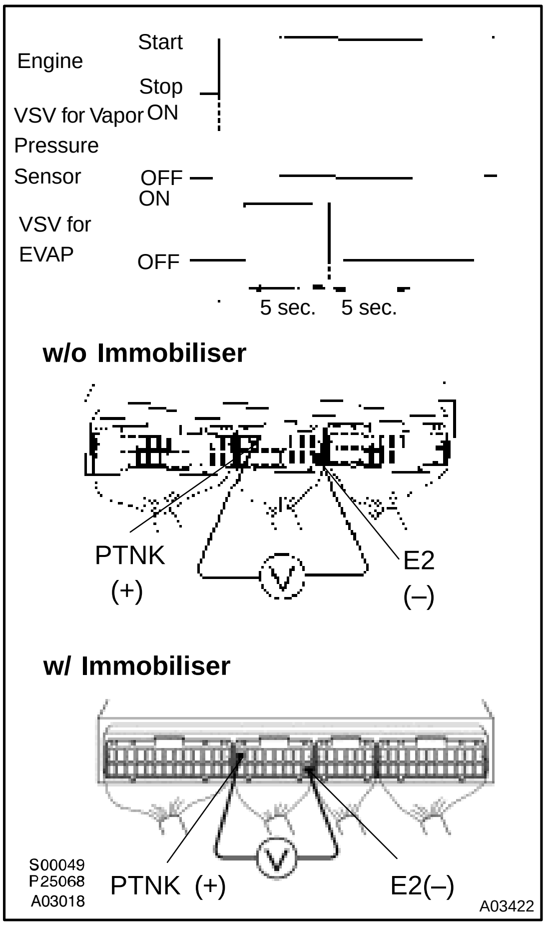
14	**Check vacuum hoses between charcoal canister and VSV for vapor pressure sensor, and vapor pressure sensor and VSV for vapor pressure sensor.**

CHECK:
(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole, damage and blockage.

NG → **Repair or replace.**

OK

15	**Check the charcoal canister.**



PREPARATION:
(a) Remove the glove compartment (See page SF–64).
(b) Connect the TOYOTA hand–held tester to the DLC3.
(c) Remove the fuel tank cap.
(d) Disconnect the VSV connector for the vapor pressure sensor.
(e) Select the ACTIVE TEST mode on the TOYOTA hand–held tester.
(f) Start the engine.
(g) The VSV for the EVAP is ON by the TOYOTA hand–held tester and remains on for 5 sec.

CHECK:
Measure voltage between terminals PTNK and E2 of the ECM connector 5 sec. after switching the VSV for the EVAP from ON to OFF.

OK:
Voltage: 2.5 V or less

NG → **Replace charcoal canister.**

OK

16	Remove charcoal canister and check it (See page EC–5)

NG → **Replace charcoal canister.**

OK ↓

17	Check fuel tank over fill check valve (See page EC–6).

NG → **Replace fuel tank over fill check valve or fuel tank.**

OK ↓

Check and replace ECM (See page IN–31).

OBD II scan tool (excluding TOYOTA hand–held tester):

HINT:
If DTC P0441 (Evaporative Emission Control System Incorrect Purge Flow), P0446 (Evaporative Emission Control System Vent Control Malfunction) or P0450 (Evaporative Emission Control System Pressure Sensor Malfunction) is output after DTC P0440 (Evaporative Emission Control System Malfunction), first trouble-shoot DTC P0441, P0446 or P0450. If no malfunction is detected, troubleshoot DTC P0440 next.

1	Check VSV connector for EVAP, VSV connector for vapor pressure sensor and vapor pressure sensor connector for looseness and disconnection.

NG → **Repair or connect VSV or sensor connector.**

OK ↓

2	Check vacuum hoses ((1), (4), (5), (6), (7), (8) and (9) on page DI–122).

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole, damage and blockage.

NG → **Repair or replace.**

OK

3	Check voltage between terminals VC and E2 of ECM connector (See page DI–122, step 9).

NG → **Check and replace ECM (See page IN–31).**

OK

4	Check voltage between terminals PTNK and E2 of ECM connector (See page DI–122, step 10).

OK → **Go to step 6.**

NG

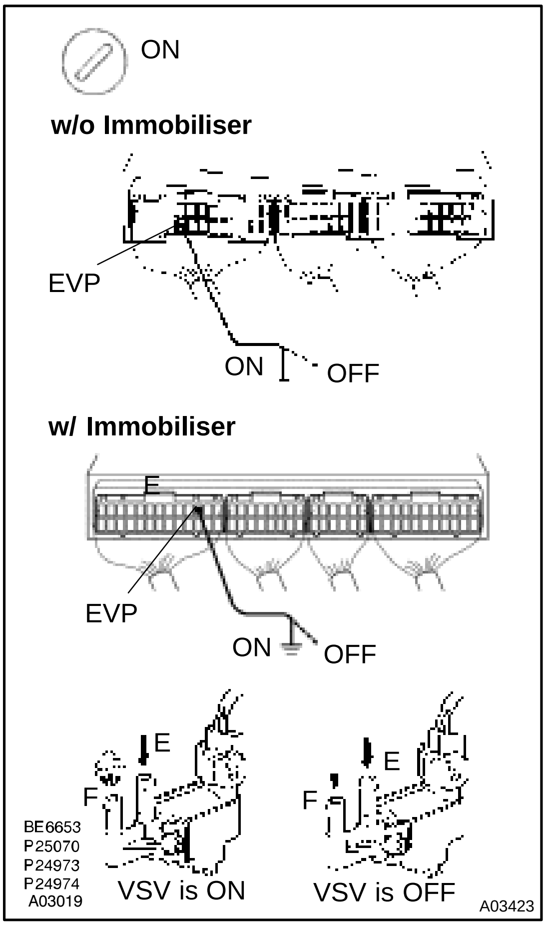
5	Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Replace vapor pressure sensor.

6	**Check VSV for EVAP.**



PREPARATION:
(a) Remove the glove compartment (See page SF–64).
(b) Turn the ignition switch ON.

CHECK:
Check VSV function.
(1) Connect between terminal EVP of the ECM connector and body ground (ON).
(2) Disconnect between terminal EVP of the ECM connector and body ground (OFF).

OK:
(1) VSV is ON:
Air from port E is flowing out through port F.
(2) VSV is OFF:
Air does not flow from port E to port F.

OK	**Go to step 8.**

NG

7	**Check operator of VSV for EVAP (See page SF–45).**

NG	**Go to step 9.**

OK

Replace VSV and clean vacuum hoses between throttle body and VSV for EVAP, and VSV for EVAP and charcoal canister, and then check charcoal canister.

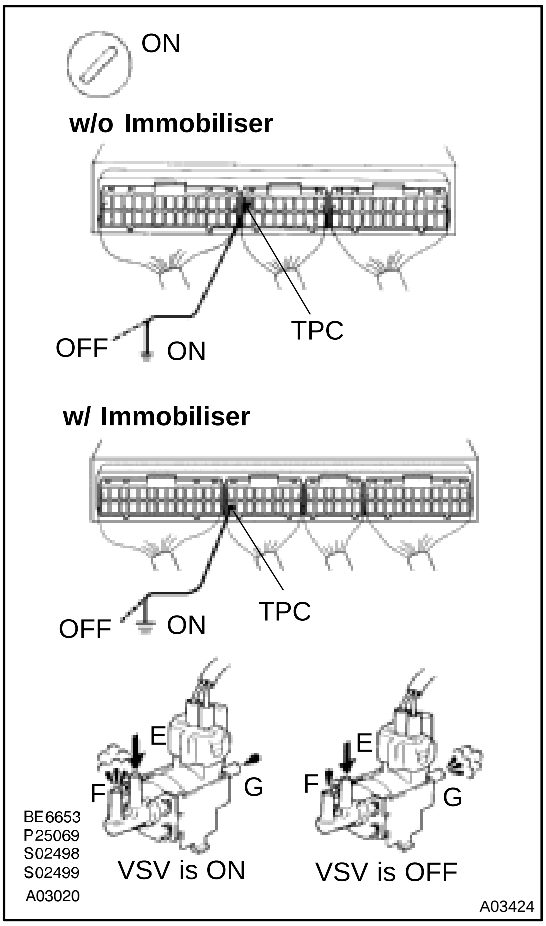
8	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for EVAP, and VSV for EVAP and ECM (See page IN–31)

NG → **Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–31).

9	Check VSV for vapor pressure sensor.



PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Turn the ignition switch ON.

CHECK:

(a) Connect between terminal TPC of the ECM connector and body ground (ON).

(b) Disconnect between terminal TPC of the ECM connector and body ground (OFF).

OK:

(1) VSV is ON:
Air from port E is flowing out through port F.
(2) VSV is OFF:
Air from port E is flowing out through port G.

OK → **Check and replace charcoal canister (See page EC–6).**

NG

10	Check operation of VSV for vapor pressure sensor (See page SF–47).

NG → Go to step 11.

OK

Replace VSV and clean vacuum hoses between charcoal canister and VSV for vapor pressure sensor, and VSV for vapor pressure sensor and vapor pressure sensor, and then check the charcoal canister.

11	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for vapor pressure sensor, and VSV for vapor pressure sensor and ECM (See page IN–31).

NG → Repair or replace harness or connector.

OK

Check and replace ECM (See page IN–31).

12	Check fuel tank over fill check valve (See page EC–6).

NG → Replace fuel tank over fill check valve or fuel tank.

OK

Check and replace charcoal canister (See page EC–6).

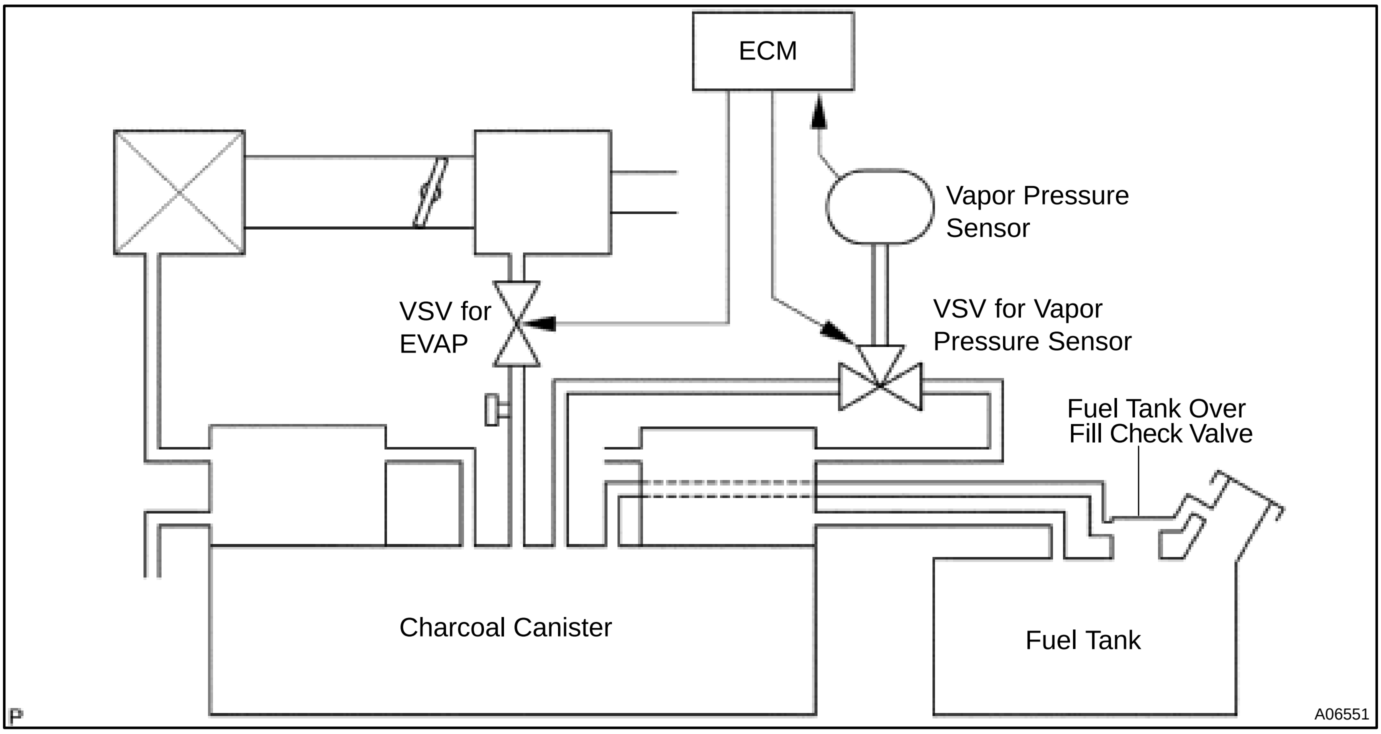
DI1K0–04

DTC	P0450	Evaporative Emission Control System Pressure Sensor Malfunction

DTC	P0451	Evaporative Emission Control System Pressure Sensor Range/Performance

CIRCUIT DESCRIPTION

The vapor pressure sensor and VSV for vapor pressure sensor are used to detect abnormalities in the evaporative emission control system.
The ECM decides whether there is an abnormality in the evaporative emission control system based on the vapor pressure sensor signal.
DTC P0450 is recorded by the ECM when the vapor pressure sensor malfunction.



DTC No.	DTC Detecting Condition	Trouble Area
P0450	10 seconds or more after engine starting codition (a) or (b) continues for 7 seconds or more: (2 trip detection logic) (a) vapor pressure sensor value < –4 kpa (–30 mmHg, –1.0 in.Hg) (b) Vapor pressure sensor value ~ 2.1 kpa (–15 mmHg, 0.4 in.Hg)	●Open or short in vapor pressure sensor circuit ●Vapor pressure sensor ●ECM ●Fuel tank over fill check valve cracked or damaged.
P0451	Vapor pressure sensor output extremely changes under conditions of (a), (b) and (c): (2 trip detection logic) (a) Vehicle speed: 0 km/h (0 mph) (b) Engine speed: idling (c) VSV for vapor pressure sensor is ON	

WIRING DIAGRAM

Refer to DTC P0440 (Evaporative Emission Control System Malfunction) on page DI–122.

INSPECTION PROCEDURE

HINT:

- If DTC P0441 (Evaporative Emission Control System Incorrect Purge Flow), P0446 (Evaporative Emission Control System Vent Control Malfunction), P0450 (Evaporative Emission Control System Pressure Sensor Malfunction) or P0451 is output after DTC P0440 (Evaporative Emission Control System Malfunction), first troubleshoot DTC P0441, P0446, P0450 or P0451. If no malfunction is detected, troubleshoot DTC P0440 next.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.
- When the ENGINE RUN TIME in the freeze frame data is less than 200 seconds, carefully check the VSV for EVAP, charcoal canister and vapor pressure sensor.

1	**Check voltage between terminals VC and E2 of ECM connector (See page DI–122, step 9).**

NG → **Check and replace ECM (See page IN–31).**

OK

2	Check voltage between terminals PTNK and E2 of ECM connector (See page DI–122, step 10).

OK → Check and replace ECM (See page IN–31).

NG ↓

3	Check for open and short in harness and connector between the vapor pressure sensor and ECM (See page IN–31).

NG → Repair or replace harness or connector.

OK ↓

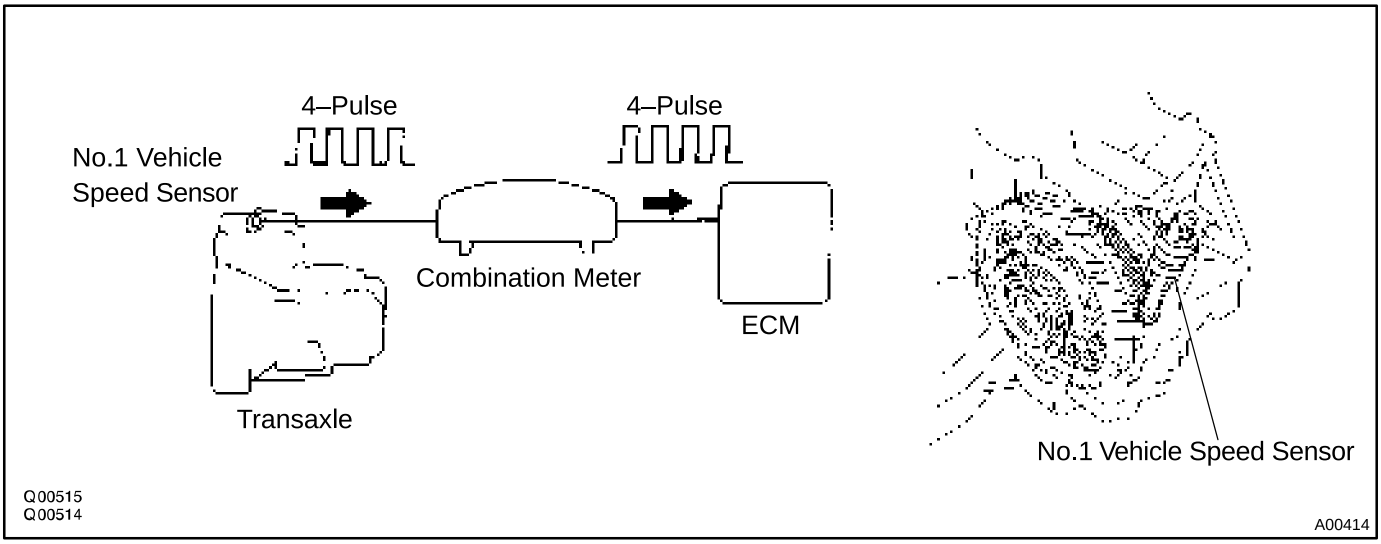
Replace vapor pressure sensor.

DI01B–10

DTC	P0500	Vehicle Speed Sensor Malfunction

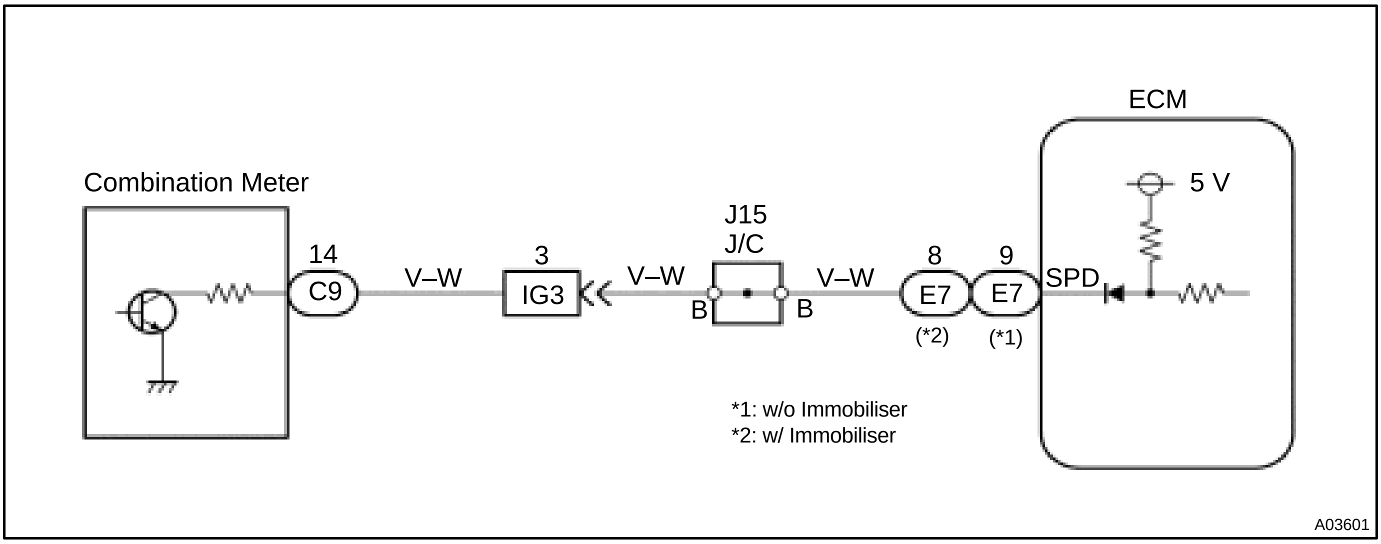
CIRCUIT DESCRIPTION

The No.1 vehicle speed sensor outputs a 4–pulse signal for every revolution of the rotor shaft, which is rotated by the transmission output shaft via the driven gear. After this signal is converted into a more precise rectangular waveform by the waveform shaping circuit inside the combination meter, it is then transmitted to the ECM. The ECM determines the vehicle speed based on the frequency of these pluse signals.



DTC No.	DTC Detecting Condition	Trouble Area
P0500	During vehicle is being driven, no vehicle speed sensor signal to ECM (2 trip detection logic)	●Combination meter ●Open or short in No.1 vehicle speed sensor circuit ●No.1 vehicle speed sensor ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Check operation of speedometer.**

CHECK:

Drive the vehicle and check if the operation of the speedmeter in the combination meter is normal.

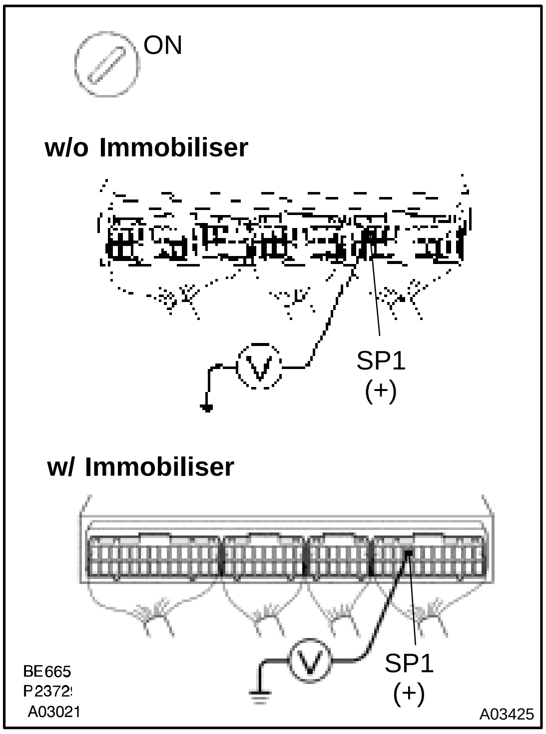
HINT:

The vehicle speed sensor is operating normally if the speedometer display is normal.

NG → **Check speedometer circuit. See combination meter troubleshooting (See page BE–2).**

OK

2	Check voltage between terminal SPD of ECM connector and body ground.



PREPARATION:

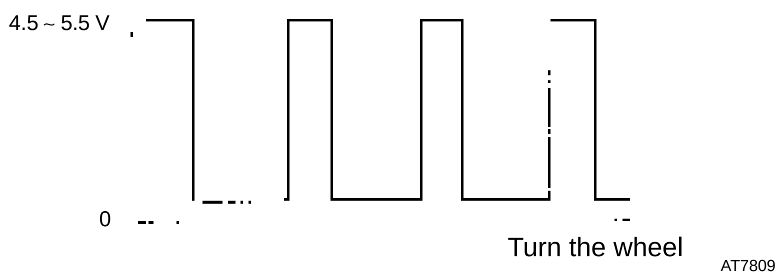
(a) Remove the glove compartment (See page SF–64).
(b) Shift the shift lever to neutral.
(c) Jack up one of the front wheels.
(d) Turn the ignition switch ON.

CHECK:

Measure voltage between terminal SPD of ECM connector and body ground when the wheel is turned slowly.

OK:

Voltage is generated intermittently.



NG → **Check and repair harness and connector between combination meter and ECM.**

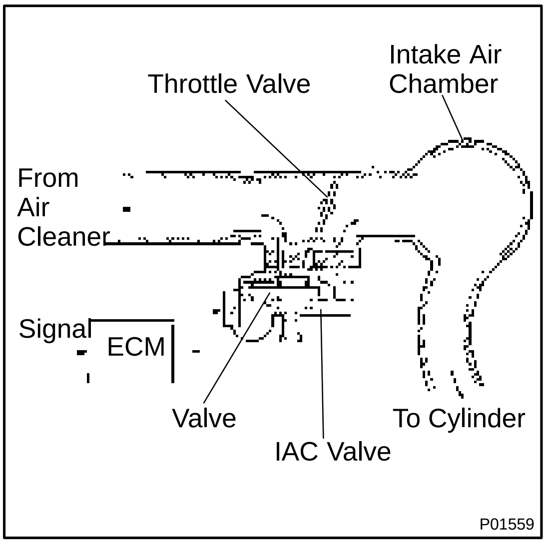
OK

Check and replace ECM (See page IN–31).

DI01C–05

DTC	P0505	Idle Control System Malfunction

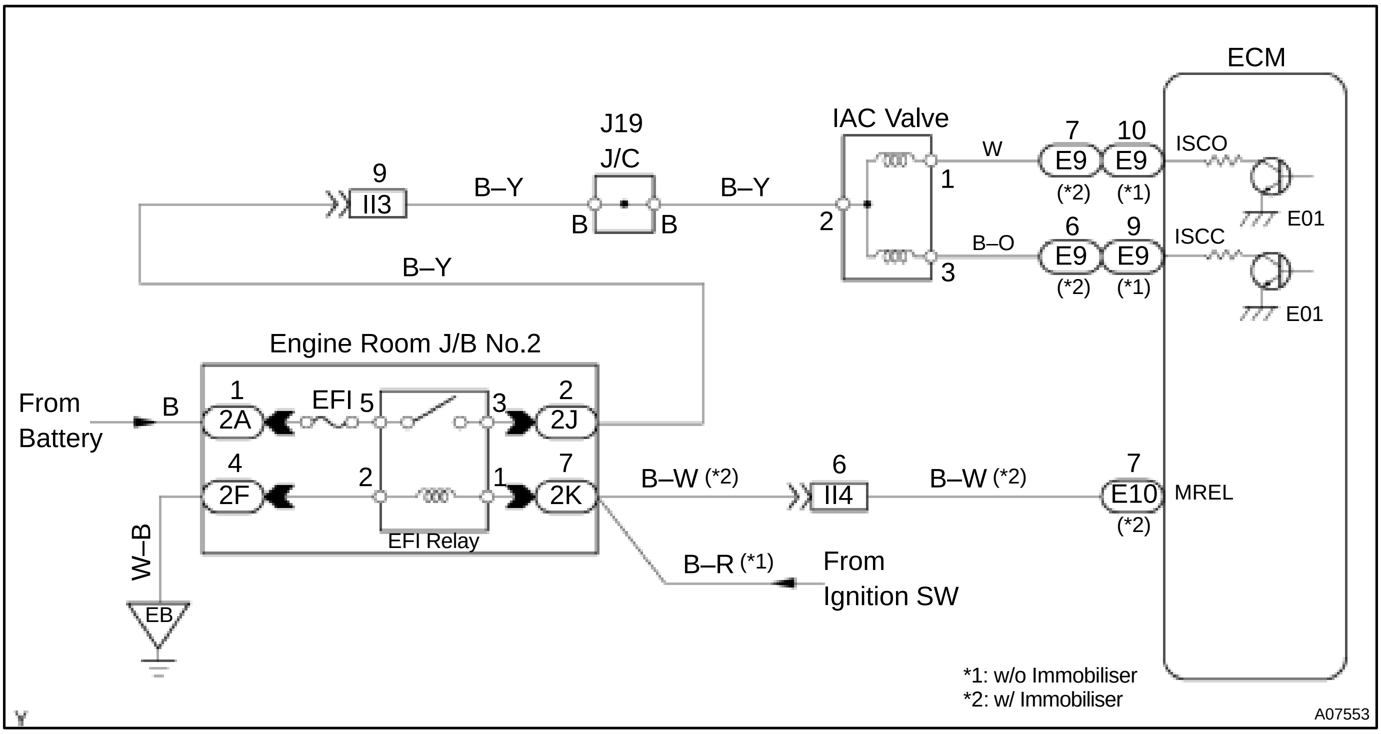
CIRCUIT DESCRIPTION



The rotary solenoid type IAC valve is located on the throttle body and intake air bypassing the throttle valve is directed to the IAC valve through a passage.
In this way the intake air volume bypassing the throttle valve is regulated, controlling the engine speed.
The ECM operates only the IAC valve to perform idle–up and provide feedback for the target idling speed.

DTC No.	DTC Detecting Condition	Trouble AreaTrouble Area
P0505	Idle speed continues to vary greatly from the target speed (2 trip detection logic)	●IAC valve is stuck or closed ●Open or short in IAC valve circuit ●Open or short in A/C switch circuit ●Air intake (hose loose) ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Check idle speed.**

PREPARATION:

(a) Warm up the engine to normal operating temperature.
(b) Switch off all the accessories.
(c) Switch off the air conditioning.
(d) Shift the transmission into N or neutral position.
(e) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3 on the vehicle.
(f) Using SST, connect terminals TE1 and E1 of the DLC1.

CHECK:

Check the difference of engine speed between the ones less than 5 sec. and more than 5 sec. after connecting terminals TE1 and E1 of the DLC1.

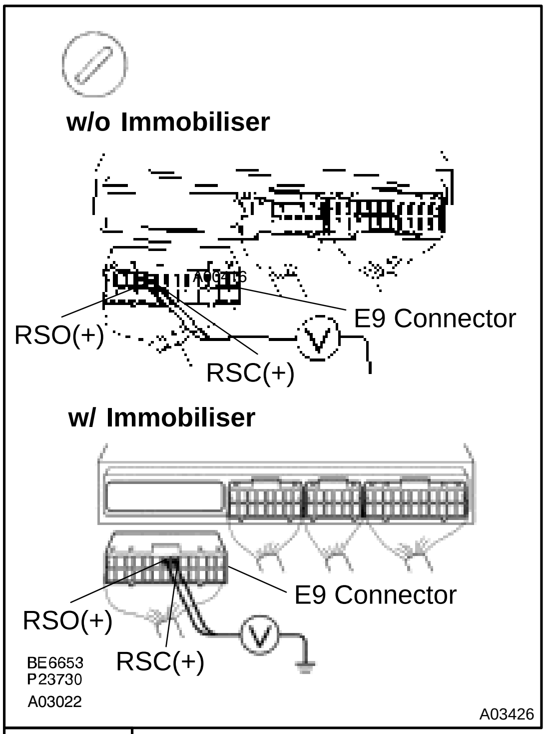
OK:

Difference of engine speed: More than 100 rpm

OK	**Go to step 6.**

NG

2	Check voltage between terminals RSO, RSC of ECM connector and body ground.



PREPARATION:

(a) Remove the glove compartment (See page SF–64).
(b) Disconnect the E9 connector of the ECM.
(c) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals RSO, RSC of the ECM connector and body ground,

OK:

Voltage: 9 ~ 14 V

OK → **Go to step 4.**

NG

3	Check IAC valve (See page SF–35).

NG → **Replace IAC valve.**

OK

Check for open and short in harness and connector between engine room J/B No.2 and IAC valve, and IAC valve and ECM (See page IN–31).

4	Check operation of IAC valve (See page SF–35).

NG → Repair or replace IAC valve.

OK

5	Check blockage of IAC valve and passage to bypass throttle valve.

NG → Repair or replace IAC valve.

OK

Check and replace ECM (See page IN–31).

6	Check for A/C signal circuit (See page AC–84).

NG → Repair or replace.

OK

Check air induction system
(See page SF–1).

DI01D–06

DTC	P1130	A/F Sensor Circuit Range/Performance Malfunction (Only for California Spec.)

CIRCUIT DESCRIPTION

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control (Only for California Spec.)) on page DI–61.

DTC No.	DTC Detecting Condition	Trouble Area
P1130	Voltage output* of A/F sensor remains at 3.8 V or more, or 2.8 V or less, during engine running after engine is warmed up (2 trip detection logic) *: Output value changes at the inside of ECM only	●Open or short in A/F sensor circuit ●A/F sensor ●ECM
	Voltage output* of A/F sensor does not change from 3.30 V, during engine running after engine is warmed up (2 trip detection logic) *: Output value changes at inside of ECM only	
	Open or short in A/F sensor circuit (2 trip detection logic)	

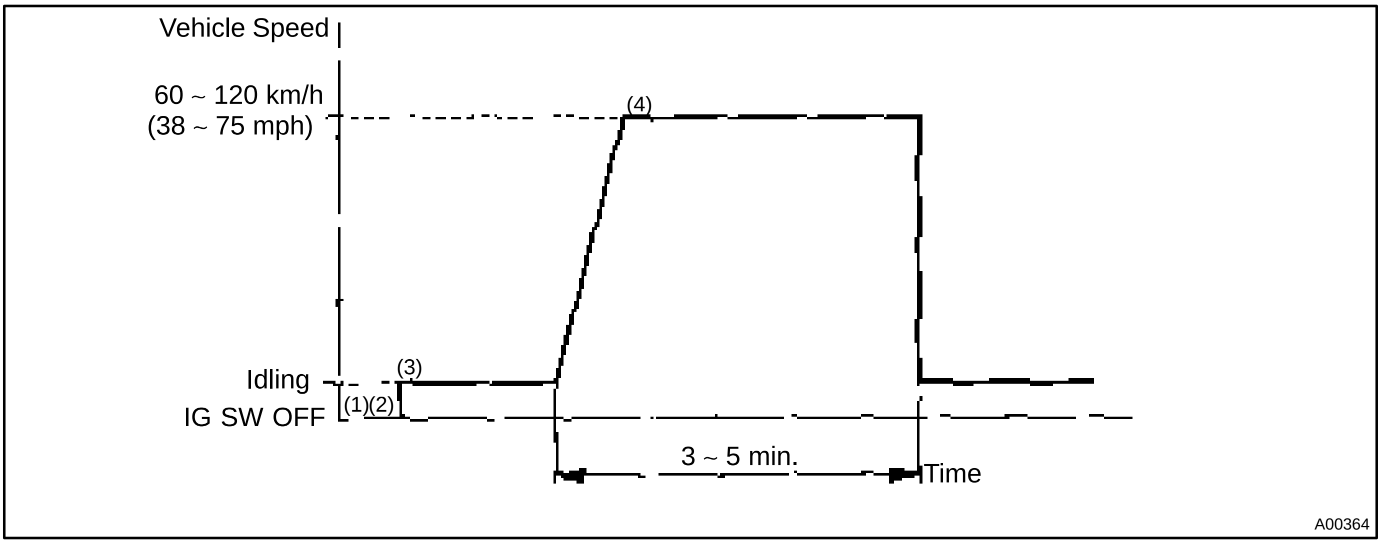
HINT:

- After confirming DTC P1130, use the OBD II scan tool or TOYOTA hand–held tester to confirm voltage output of A/F sensor (AFS B1 S1 / O2S B1 S1) from the CURRENT DATA.
- The A/F sensor's output voltage and the short–term fuel trim value can be read using the OBD II scan tool or TOYOTA hand–held tester.
- The ECM controls the voltage of AF∼ and AF> terminals of ECM to the fixed voltage. Therefore, it is impossible to confirm the A/F sensor output voltage without OBD II scan tool or TOYOTA hand–held tester.
- OBD II scan tool (excluding TOYOTA hand–held tester) displays the one fifth of the A/F sensor output voltage which is displayed on the TOYOTA hand–held tester.

WIRING DIAGRAM

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control (Only for California Spec.)) on page DI–61.

CONFIRMATION DRIVING PATTERN



(1) Connect the TOYOTA hand–held tester to the DLC3.
(2) Switch the TOYOTA hand–held tester from normal mode to check mode (See page DI–3).
(3) Start the engine and warm it up with all accessory switches OFF.
(4) Drive the vehicle at 60 ~ 120 km/h (38 ~ 75 mph) and engine speed at 1,600 ~ 3,200 rpm for 3 ~ 5 min.

HINT:
If a malfunction exists, the MIL will light up during step (4).

NOTICE:
If the conditions in this test are not strictly followed, detection of the malfunction will not be possible. If you do not have a TOYOTA hand–held tester, turn the ignition switch OFF after performing steps (3) and (4), then perform steps (3) and (4) again.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Are there any other codes (besides DTC P1130) being output?**

YES → **Go to relevant DTC chart.**

NO

2	**Connect OBD II scan tool or TOYOTA hand–held tester, and read value for voltage output of A/F sensor.**

PREPARATION:
(a) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.
(b) Warm up the A/F sensor with the engine at 2,500 rpm for approx. 90 sec.
CHECK:
Read voltage value of the A/F sensor on the screen of OBD II scan tool or TOYOTA hand–held tester when you perform all the following conditions.
HINT:
The voltage of AF～ terminal of ECM is 3.3 V fixed and AF＞ terminal is 3.0 V fixed. Therefore, it is impossible to check the A/F sensor output voltage at the terminals (AF～/AF＞) of ECM.
OK:

Condition	A/F Sensor Voltage Value
Engine idling	●Not remains at 3.30 V (* 0.660 V) ●Not remains at 3.8 V (* 0.76 V) or more ●Not remains at 2.8 V (* 0.56 V) or less *: When you use the OBD II scan tool (excluding TOYOTA hand–held tester)
Engine racing	
Driving at engine speed 1,500 rpm or more and vehicle speed 40 km/h (25 mph) or more, and operate throttle valve open and close	

HINT:
- During fuel enrichment, there is a case that the output voltage of the A/F sensor is below 2.8 V (* 0.56 V), it is normal.
- During fuel cut, there is a case that the output voltage of the A/F sensor is above 3.8 V (* 0.76 V), it is normally.
- If output voltage of the A/F sensor remains at 3.30 V (* 0.660 V) even after performing all the above conditions, A/F sensor circuit may be open.
- If output voltage of the A/F sensor remains at 3.8 V (* 0.76 V) or more, or 2.8 V (* 0.56 V) or less even after performing all the above conditions, A/F sensor circuit may be short.

*: When you use the OBD II scan tool (excluding TOYOTA hand–held tester).

OK → **Go to step 9.**

NG

3	**Check for open and short in harness and connector between ECM and A/F sensor (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

4	Check resistance of A/F sensor heater (See page SF–59).

NG → Replace A/F sensor.

OK

5	Check air induction system (See page SF–1).

NG → Repair or replace.

OK

6	Check EGR system (See page EC–12).

NG → Repair EGR system.

OK

7	Check fuel pressure (See page SF–6).

NG → Check and repair fuel pump, fuel pipe line and filter (See page SF–1).

OK

8	Check injector injection (See page SF–23).

NG → Replace injector.

OK ↓

Replace A/F sensor.

9	Perform confirmation driving pattern (See page DI–152).

Go ↓

10	Is there DTC P1130 being output again?

YES → Check and replace ECM.

NO ↓

11	Did vehicle runs out of fuel in the past?

NO → Check for intermittent problems.

YES ↓

DTC P0125 is caused by running out of fuel.

DI01E–06

DTC	P1133	A/F Sensor Circuit Response Malfunction (Only for California Spec.)

CIRCUIT DESCRIPTION

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control (Only for California Spec.)) on page DI–61.

DTC No.	DTC Detecting Condition	Trouble Area
P1133	After engine is warmed up, and during vehicle driving at engine speed 1,600 rpm or more and vehicle speed 60 km/h (38 mph) or more, if response characteristic of A/F sensor becomes deteriorated (2 trip detection logic)	●A/F sensor

INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the, malfunction.

1	Are there any other codes (besides DTC P1133) being output?

YES → **Go to relevant DTC chart.**

NO

2	**Connect OBD II scan tool or TOYOTA nand–held teter, and read value for voltage output of A/F sensor.**

PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.
(b) Warm up the A/F sensor with the engine at 2,500 rpm for approx. 90 sec.

CHECK:

Read voltage value of the A/F sensor on the screen of OBD II scan tool or TOYOTA hand–held tester when you perform all the following conditions.

HINT:

The voltage of AF∼ terminal of ECM is 3.3 V fixed and AF> terminal is 3.0 V fixed. Therefore, it is impossible to check the A/F sensor output voltage at the terminals (AF∼/AF>) of ECM.

OK:

Condition	A/F Sensor Voltage Value
Engine idling	●Not remains at 3.30 V (* 0.660 V) ●Not remains at 3.8 V (* 0.76 V) or more ●Not remains at 2.8 V (* 0.56 V) or less *: When you use the OBD II scan tool (excluding TOYOTA hand–held tester)
Engine racing	
Driving at engine speed 1,500 rpm or more and vehicle speed 40 km/h (25 mph) or more, and operate throttle valve open and close	

HINT:

- During fuel enrichment, there is a case that the output voltage of the A/F sensor is below 2.8 V (* 0.56 V), it is normal.
- During fuel cut, there is a case that the output voltage of the A/F sensor is above 3.8 V (* 0.76 V), it is normally.
- If output voltage of the A/F sensor remains at 3.30 V (* 0.660 V) even after performing all the above conditions, A/F sensor circuit may be open.
- If output voltage of the A/F sensor remains at 3.8 V (* 0.76 V) or more, or 2.8 V (* 0.56 V) or less even after performing all the above conditions, A/F sensor circuit may be short.

*: When you use the OBD II scan tool (excluding TOYOTA hand–held tester).

OK	**Go to step 9.**

NG

3	**Check for open and short in harness and connector between ECM and A/F sensor (See page IN–31).**

NG	**Repair or replace harness or connector.**

OK

4	Check resistance of A/F sensor heater (See page SF–59).

NG → Replace A/F sensor.

OK

5	Check air induction system (See page SF–1).

NG → Repair or replace.

OK

6	Check EGR system (See page EC–12).

NG → Repair EGR system.

OK

7	Check fuel pressure (See page SF–6).

NG → Check and repair fuel pump, fuel pipe line and filter (See page SF–1).

OK

8	Check injector injection (See page SF–23).

NG → Replace injector.

OK

Replace A/F sensor.

9	Perform confirmation driving pattern (See page DI–152).

Go

10	Is there DTC P1133 being output again?

YES → Check and replace ECM.

NO

11	Did vehicle runs out of fuel in the past?

NO → Check for intermittent problems.

YES

DTC P1133 is caused by running out of fuel.

DI01F–05

DTC	P1135	A/F Sensor Heater Circuit Malfunction (Only for California Spec.)

CIRCUIT DESCRIPTION

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control (Only for California Spec.)) on page DI–61.

DTC No.	DTC Detecting Condition	Trouble Area
P1135	When heater operates, heater current exceeds 8 A (2 trip detection logic)	●Open or short in heater circuit of A/F sensor ●A/F sensor heater ●ECM
	Heater current of 0.25 A or less when heater operates (2 trip detection logic)	

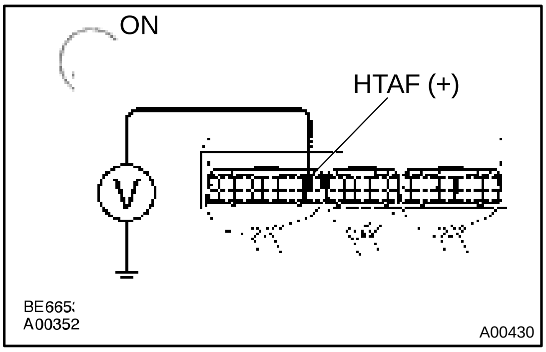
WIRING DIAGRAM

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control (Only for California Spec.)) on page DI–61.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	Check voltage between terminal HTAF of ECM connector and body ground.



PREPARATION:
(a) Remove the glove compartment (See page SF–64).
(b) Turn the ignition switch ON.

CHECK:
Measure voltage between terminals HTAF of the ECM connector and body ground.

OK:
Voltage: 9 ~ 14 V

OK → **Check and replace ECM (See page IN–31).**

NG

2	**Check resistance of A/F sensor heater (See page SF–59).**

NG → **Replace A/F sensor.**

OK

Check and repair harness or connector between EFI main relay (Marking: EFI) and A/F sensor, and A/F sensor and ECM (See page IN–31).

DI01G–06

DTC	P1300	Igniter Circuit Malfunction No.1

DTC	P1310	Igniter Circuit Malfunction No.2

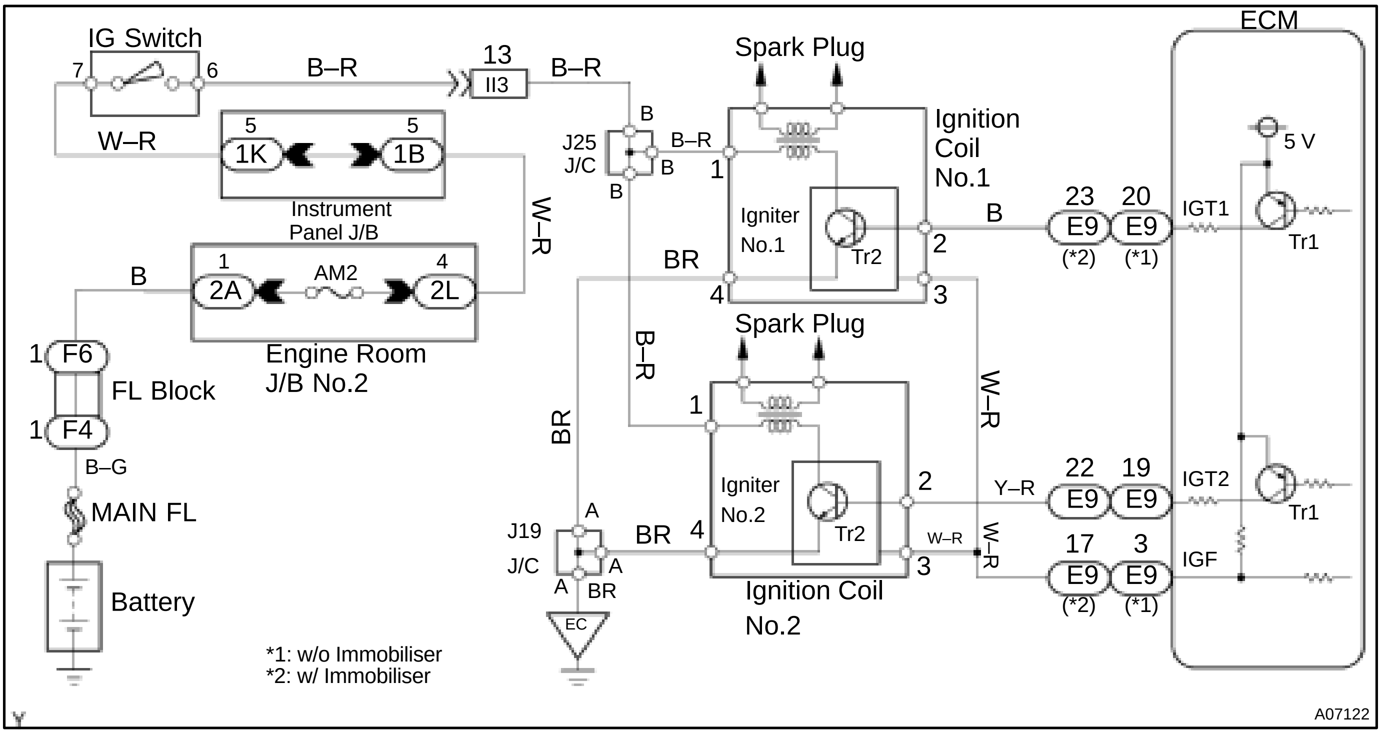
CIRCUIT DESCRIPTION

The ECM determines the ignition timing, turns on Tr1 at a predetermined angle (°CA) before the desired ignition timing and outputs and ignition signal (IGT) 1 to the igniter.
Since the width of the IGT signal is constant, the dwell angle control circuit in the igniter determines the time the control circuit starts primary current flow to the ignition coil based on the engine rpm and ignition timing one revolution ago, that is, the time the Tr2 turns on.
When it reaches the ignition timing, the ECM turns Tr1 off and outputs the IGT signal O.
This turns Tr2 off, interrupting the primary current flow and generating a high voltage in the secondary coil which causes the spark plug to spark. Also, by the counter electromotive force generated when the primary current is interrupted, the igniter sends an ignition confirmation signal (IGF) to the ECM. The ECM stops fuel injection as a fail safe function when the IGF signal is not input to the ECM.

DTC No.	DTC Detecting Condition	Trouble Area
P1300	No IGF signal to ECM for 4 consecutive IGT1 signals during engine running	●Open or short in IGF or IGT circuit from igniter to ECM ●Ignition coil No.1 (Igniter No.1) ●ECM
P1310	No IGF signal to ECM for 4 consecutive IGT2 signals during engine running	●Open or short in IGF or IGT circuit from igniter to ECM ●Ignition coil No.2 (Igniter No.2) ●ECM

HINT:
Ignition coil No.1 is for cylinder No.1 and No.4, and ignition coil No.2 is for cylinder No.2 and No.3.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTC P1300 is displayed, check ignition coil No.1 circuit.
- If DTC P1300 is displayed, check ignition coil No.2 circuit.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Check for spark plug and spark of misifining cylinder (See page DI–89).**

NG	**Go to step 4.**

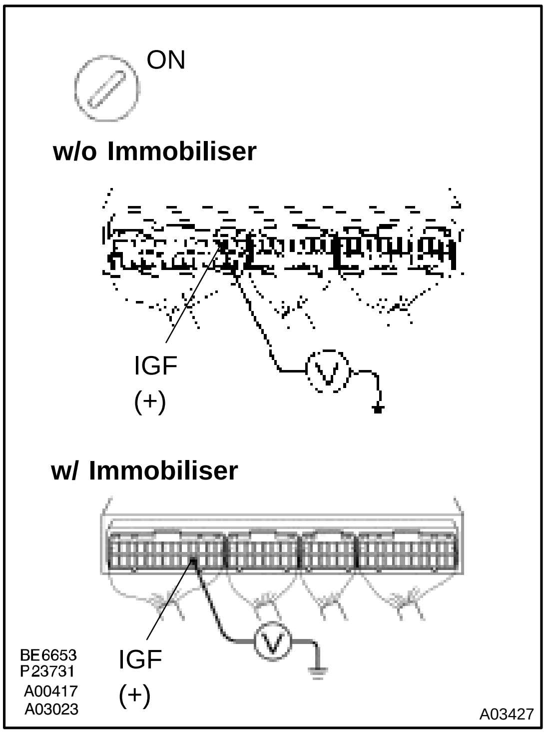
OK

2	**Check for open and short in harness and connector in IGF signal circuit between ECM and ignition coils (See page IN–31).**

NG	**Repair or replace harness or connector.**

OK

3	**Disconnect ignition coil connectors, and check voltage between terminal IGF of ECM connector and body ground.**



PREPARATION:
(a) Disconnect the ignition coil connector.
(b) Remove the glove compartment (See page SF–64).
(c) Turn the ignition switch ON.

CHECK:
Measure voltage between terminal IGF of the ECM connector and body ground.

OK:
Voltage: 4.5 ~ 5.5 V

OK → **Replace ignition coil.**

NG

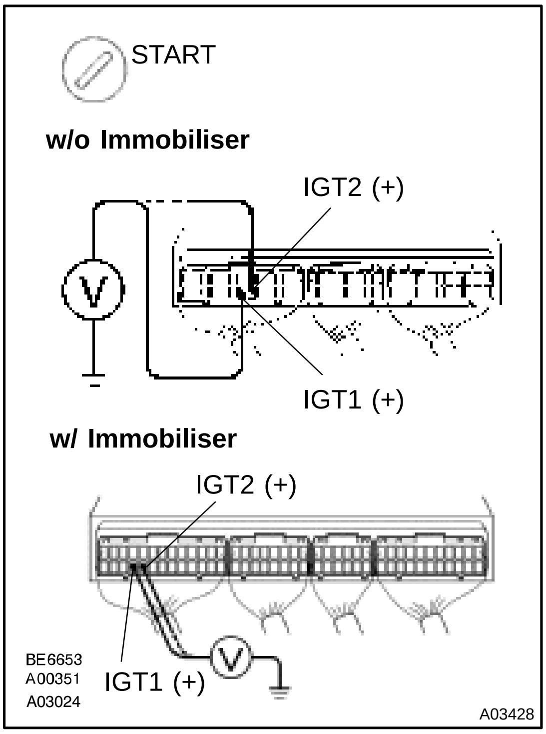
Check and replace ECM (See page IN–31).

4	**Check for open and short in harness and connector in IGT1, 2 signal circuit between ECM and ignition coils (See page IN–31).**

NG → **Repair or replace harness or connector.**

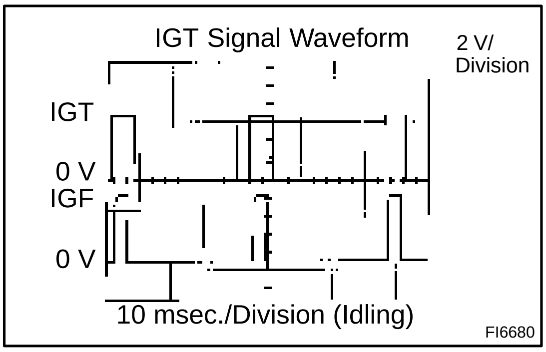
OK

5	Check voltage between terminals IGT1, 2 of ECM connector and body ground.



PREPARATION:
Remove the glove compartment (See page SF–64).
CHECK:
Measure voltage between terminal IGT1, 2 of the ECM connector and body ground when the engine is cranked.
OK:
Voltage: More than 0.1 V and less than 4.5 V

Reference: INSPECTION USING OSCILLOSCOPE

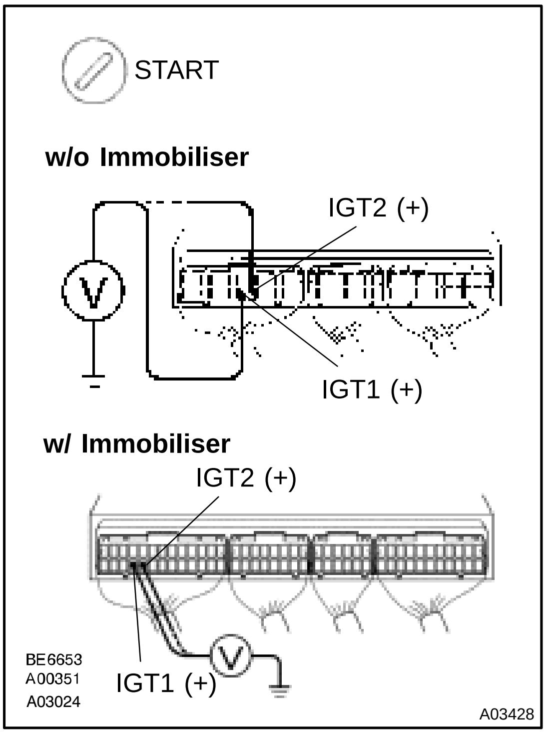


During idling, check waveform between terminals IGT1, 2 and E1 of the ECM.
HINT:
The correct waveforms are as shown.

NG	Check and replace ECM (See page IN–31).

NG

6	**Disconnect ignition coil connectors, and check voltage between terminals IGT1, 2 of ECM connector and body ground.**



PREPARATION:
(a) Disconnect the ignition coil connectors.
(b) Remove the glove compartment (See page SF–64).

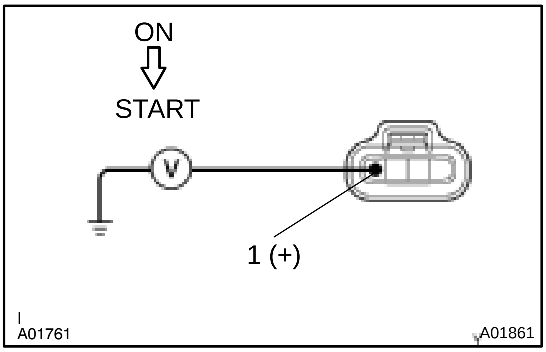
CHECK:
Measure voltage between terminals IGT1, 2 of the ECM connector and body ground when the engine is cranked.

OK:
Voltage: More than 0.1 V and less than 5 V

OK	**Replace ignition coil.**

NG

7	**Check ignition coil with igniter power source circuit.**



PREPARATION:
Disconnect the ignition coil connector.

CHECK:
Measure voltage between terminal 1 of the ignition coil with the igniter connector and body ground when the ignition switch is turned to ON and STA position.

OK:
Voltage: 9 ~ 14 V

NG	**Repair ignition coil with igniter power source circuit.**

OK

8	Check for open and short in harness and connector between ignition switch and ignition coils (See page IN–31).

NG → Repair or replace harness or connector.

OK

9	Check ignition coil (See page IG–5).

NG → Replace ignition coil.

OK

10	Check EFI main relay (Marking: EFI) (See page SF–40).

NG → Replace EFI main relay.

OK

Replace igniter.

DI1K1–02

DTC	P1335	Crankshaft Position Sensor Circuit Malfunction (During engine running)

CIRCUIT DESCRIPTION

Refer to DTC P0335 (Crankshaft Position ”A” Circuit Malfunction) on page DI–100.

DTC No.	DTC Detecting Condition	Trouble Area
P1335	If conditions (a) through (c) are met: (a) NE ~ 1,000 rpm (b) NE signal is not detected for over 50 m sec. (c) Not during cranking	●Open or short in crankshaft position sensor circuit ●Crankshaft position sensor ●ECM

WIRING DIAGRAM

Refer to DTC P0335 (Crankshaft Position ”A” Circuit Malfunction) on page DI–100.

INSPECTION PROCEDURE

Refer to DTC P0335 (Crankshaft Position ”A” Circuit Malfunction) on page DI–100.

DI01H–07

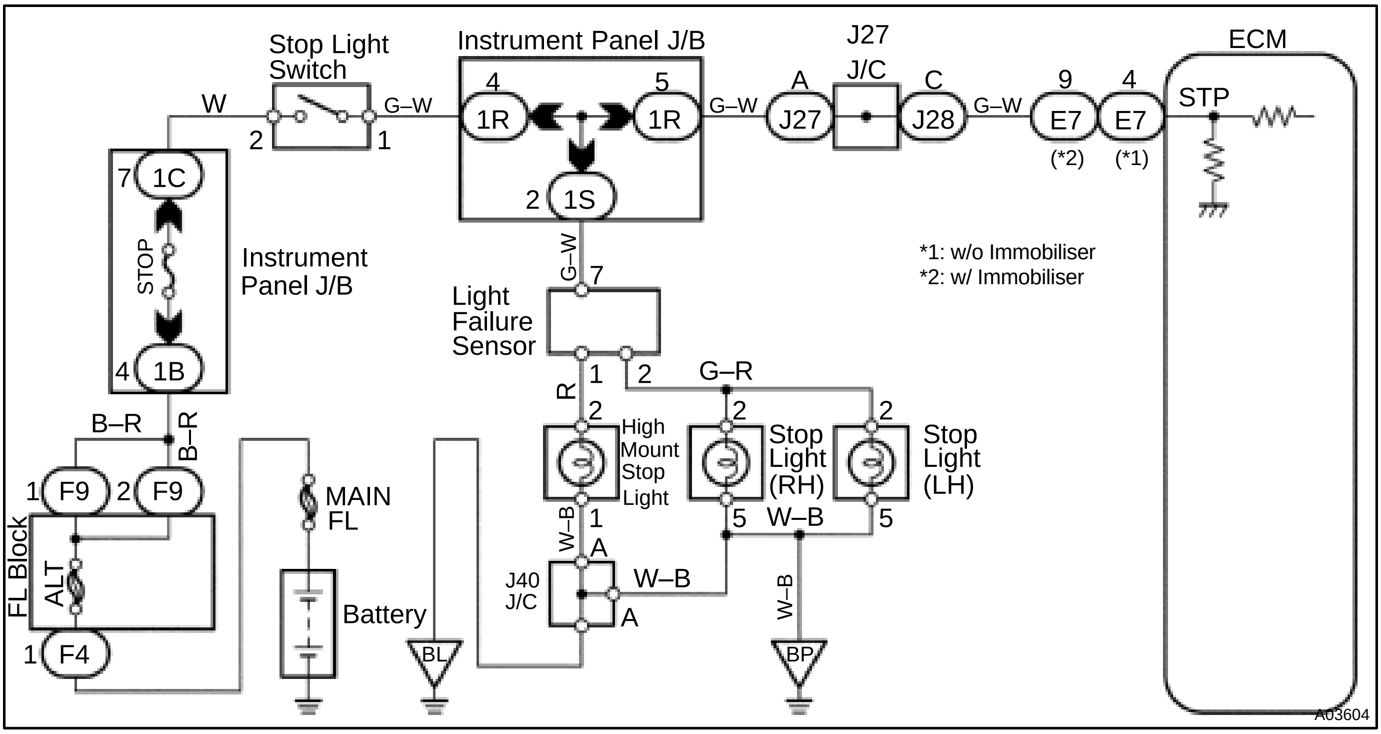
DTC	P1520	Stop Light Switch Signal Malfunction (Only for A/T)

CIRCUIT DESCRIPTION

This signal is used to detect when the brakes have been applied. The STP signal voltage is the same as the voltage supplied to the stop lights.
The STP signal is used mainly to control the fuel cut–off engine speed. (The fuel cut–off engine speed is reduced slightly when the vehicle is braking.)

DTC No.	DTC Detecting Condition	Trouble Area
P1520	Stop light switch does not turn off even once vehicle is driven (2 trip detection logic)	●Short in stop light switch signal circuit ●Stop light switch ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

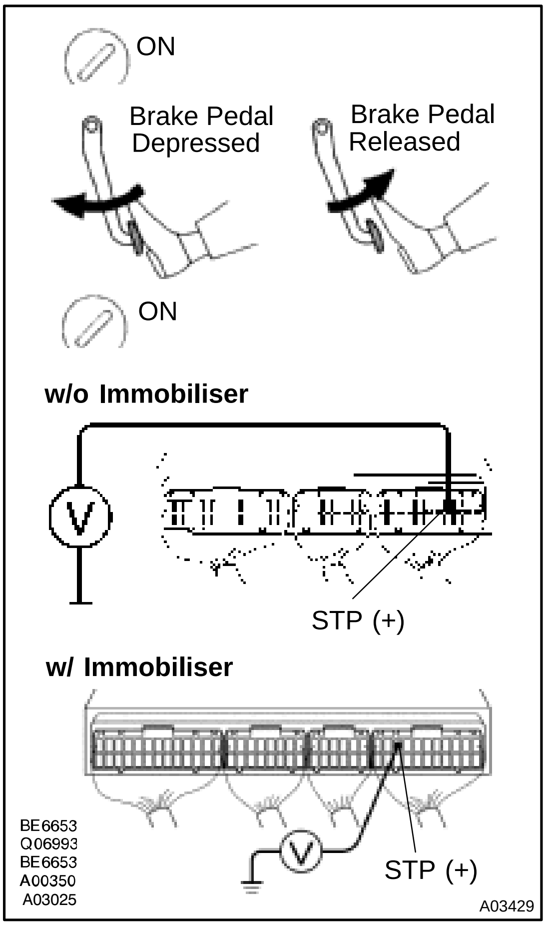
1	**Check operation of stop light.**

PREPARATION:
Check if the stop lights go on and off normally when the brake pedal is operated and released.

NG → **Check and repair stop light circuit (See page BE–37).**

OK

2	Check STP signal.



When using TOYOTA hand–held tester:

PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3.

(b) Turn the ignition switch ON and push the TOYOTA hand–held tester main switch ON.

CHECK:

Read the STP signal on the TOYOTA hand–held tester.

OK:

Brake pedal is depressed: STP ... ON
Brake pedal is released: STP ... OFF

When not using TOYOTA hand–held tester:

PREPARATION:

Turn the ignition switch ON.

CHECK:

Check voltage between terminal STP of the ECM connector and body ground.

OK:

Brake pedal	Voltage
Depressed	7.5 ~ 14 V
Released	Below 1.5 V

OK	Check for intermittent problems (See page DI–3).

NG

3	Check harness and connector between ECM and stop light switch (See page IN–31).

NG	Repair or replace harness or connector.

OK

Check and replace ECM (See page IN–31).

DI01I–10

DTC	P1600	ECM BATT Malfunction

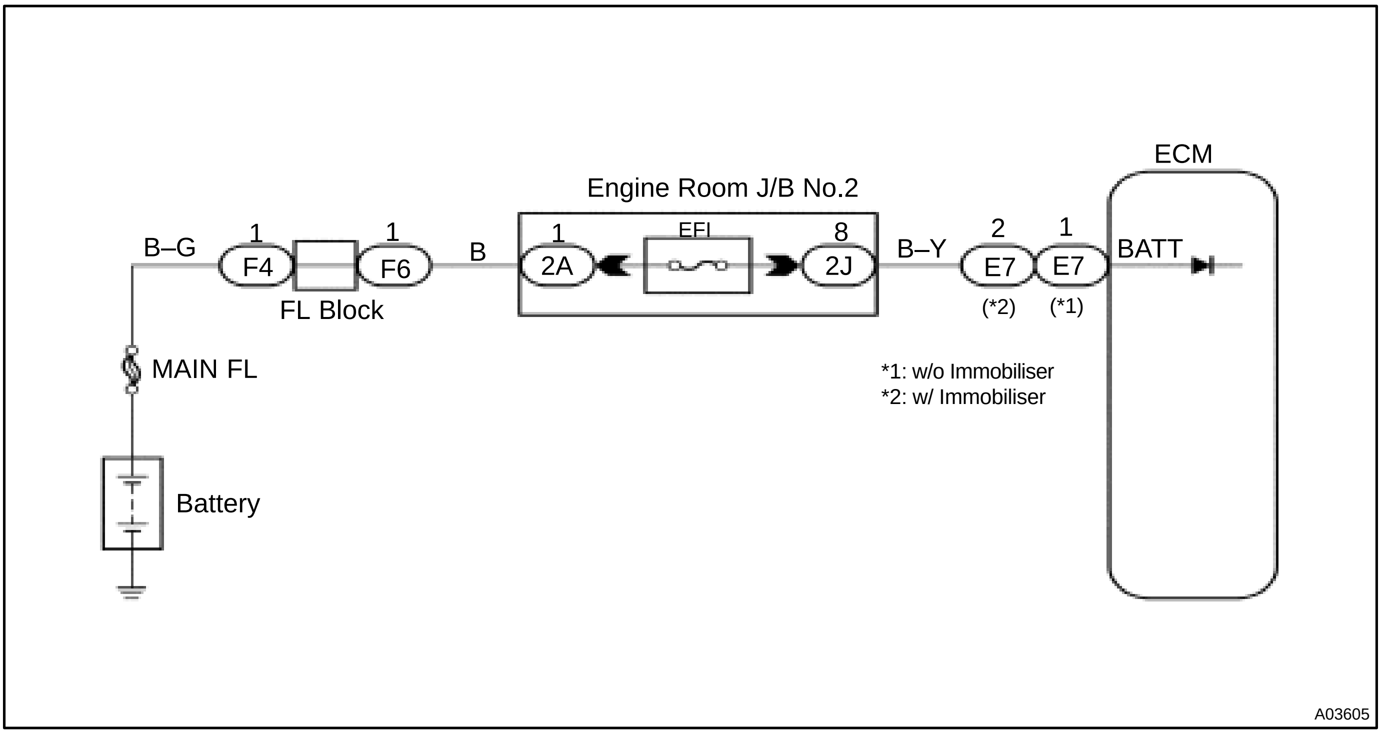
CIRCUIT DESCRIPTION

Battery positive voltage is supplied to terminal BATT of the ECM even when the ignition switch is OFF for use by the DTC memory and air–fuel ratio adaptive control value memory, etc.

DTC No.	DTC Detecting Condition	Trouble Area
P1600	Open in back up power source circuit	•Open in back up power source circuit •ECM

HINT:
If DTC P1600 appear, the ECM does not store another DTC.

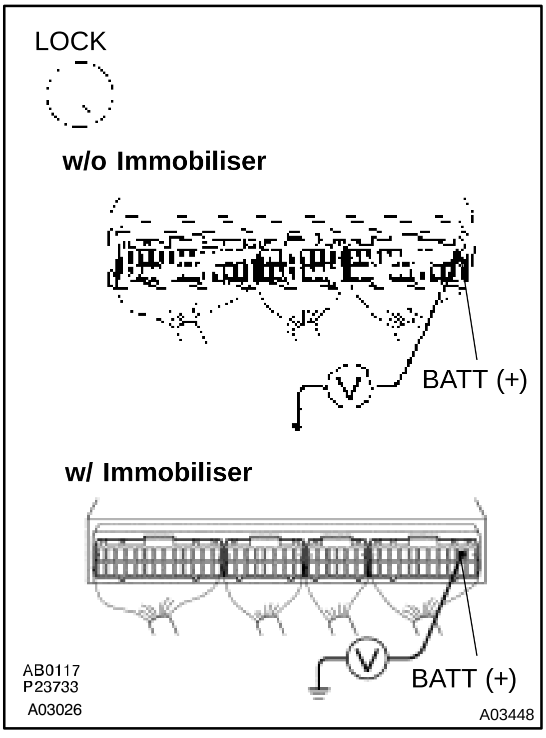
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	Check voltage between terminal BATT of ECM connector and body ground.



PREPARATION:
Remove the glove compartment (See page SF–64).

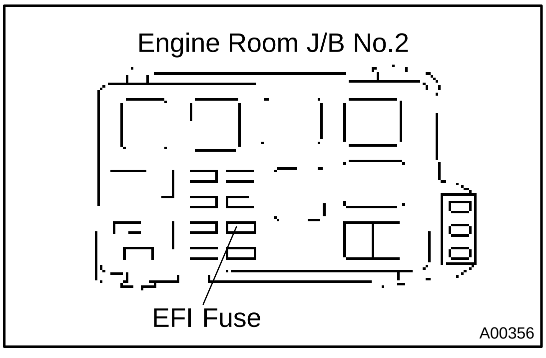
CHECK:
Measure voltage between terminal BATT of the ECM connector and body ground.

OK:
Voltage 9 ~ 14 V

OK → **Check and replace ECM (See page IN–31).**

NG ↓

2	Check EFI fuse.



PREPARATION:
Remove the EFI fuse from the engine room J/B No.2.

CHECK:
Check continuity of the EFI fuse.

OK:
Continuity

NG → **Check for short in all harness and components connected to EFI fuse.**

OK ↓

Check and repair harness or connector between battery and EFI fuse, and EFI fuse and ECM (See page IN–31).

DI01J–05

DTC	P1780	Park/Neutral Position Switch Malfunction (Only for A/T)

CIRCUIT DESCRIPTION

The park/neutral position switch goes on when the shift lever is in the N or P shift position. When it goes on terminal NSW of the ECM is grounded to body ground via the starter relay thus the terminal NSW voltage becomes 0V. When the shift lever is in the D, 2, L or R position, the park/neutral position switch goes off, so the voltage of ECM. Terminal NSW becomes battery positive voltage, the voltage of the ECM internal power source.
If the shift lever is moved from the N position to the D position, this signal is used for air–fuel ratio correction and for idle speed control (estimated control), etc.

DTC No.	DTC Detecting Condition	Trouble Area
P1780	2 or more switches are ON simultaneously for P, R, N, D, 2 and L positions (2 trip detection logic)	●Short in park/neutral position switch circuit ●Park/neutral position switch ●ECM
	When driving under conditions (a) and (b) for 30 sec. or more park/neutral position switch is ON (N position): (2 trip detection logic) (a) Vehicle speed: 80 km/h (50 mph) or more (b) Engine speed: 2,000 ~ 5,000 rpm	

HINT:
After confirming DTC P1780, use the TOYOTA hand–held tester to confirm the PNP switch signal from the CURRENT DATA.

WIRING DIAGRAM

Refer to DTC P1780 on page DI–424.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.
Refer to DTC P1780 on DI–424.

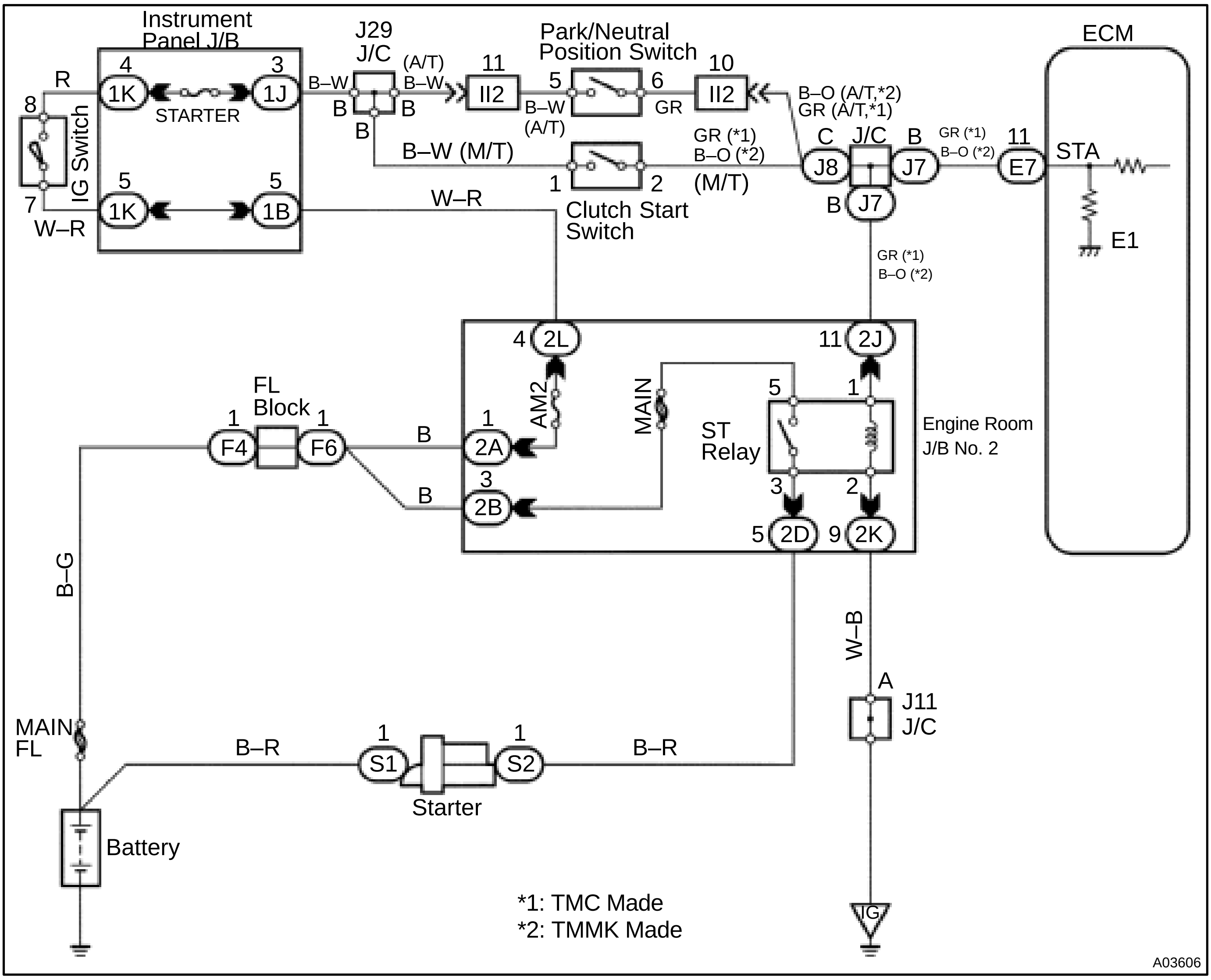
DI01K–10

Starter Signal Circuit

CIRCUIT DESCRIPTION

When the engine is cranked, the intake air flow is slow, so fuel vaporization is poor. A rich mixture is therefore necessary in order to achieve good startability. While the engine is being cranked, the battery positive voltage is applied to terminal STA of the ECM. The starter signal is mainly used to increase the fuel injection volume for the starting injection control and after–start injection control.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
This diagnostic chart is based on the premise that the engine is cranked normally. If the engine is not cranked, proceed to the problem symptoms table on page DI–28.

TOYOTA hand–held tester:

1	**Connect TOYOTA hand–held tester, and check STA signal.**

PREPARATION:
(a) Connect the TOYOTA hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the TOYOTA hand–held tester main switch ON.
CHECK:
Read STA signal on the TOYOTA hand–held tester while the starter operates.
OK:

Ignition Switch Position	ON	START
STA signal	OFF	ON

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–28).**

NG

2	**Check for open in harness and connector between ECM and starter relay (Marking: ST) (See page IN–31).**

NG → **Repair or replace harness or connector.**

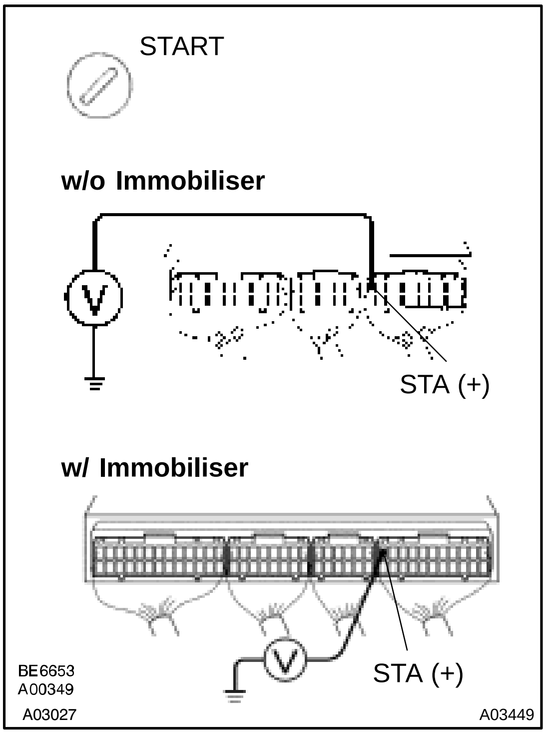
OK

Check and replace ECM (See page IN–31).

OBD II scan tool (excluding TOYOTA hand–held tester):

HINT:
This diagnostic chart is based on the premise that the engine is cranked normally. If the engine is not cranked, proceed to the problem symptoms table on page DI–28.

1	**Check voltage between terminal STA of ECM connector and body ground.**



PREPARATION:
(a) Remove the glove compartment (See page SF–64).
(b) Turn the ignition switch ON.

CHECK:
Measure voltage between terminal STA of the ECM connector and body ground, during the engine cranking.

OK:
Voltage: 6 V or more

OK	**Proceed to next circuit inspection shown on problem symptoms table (See page DI–28).**

NG

2	**Check for open in harness and connector between ECM and starter relay (Marking: ST) (See page IN–31).**

NG	**Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–31).

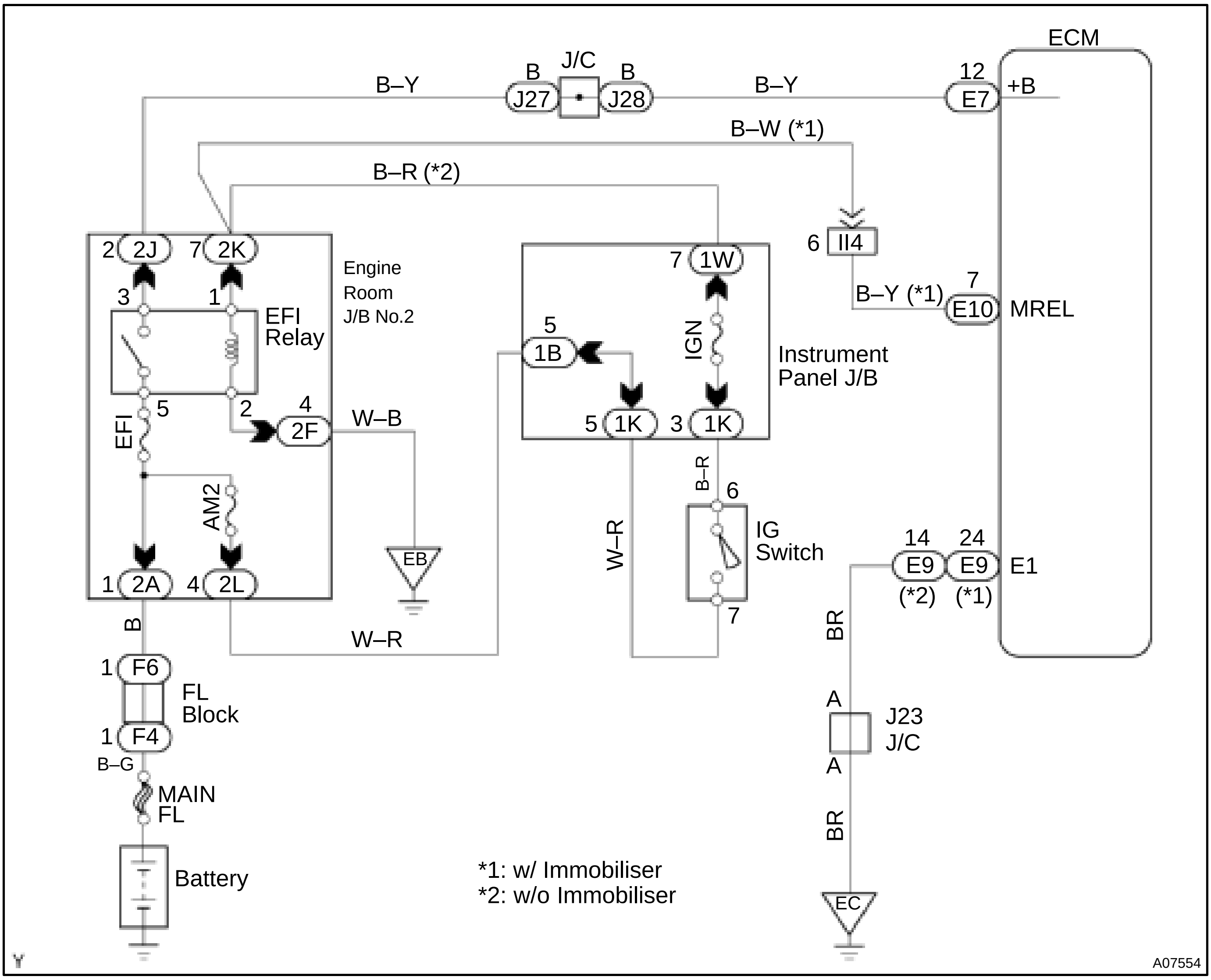
DI01L–05

ECM Power Source Circuit

CIRCUIT DESCRIPTION

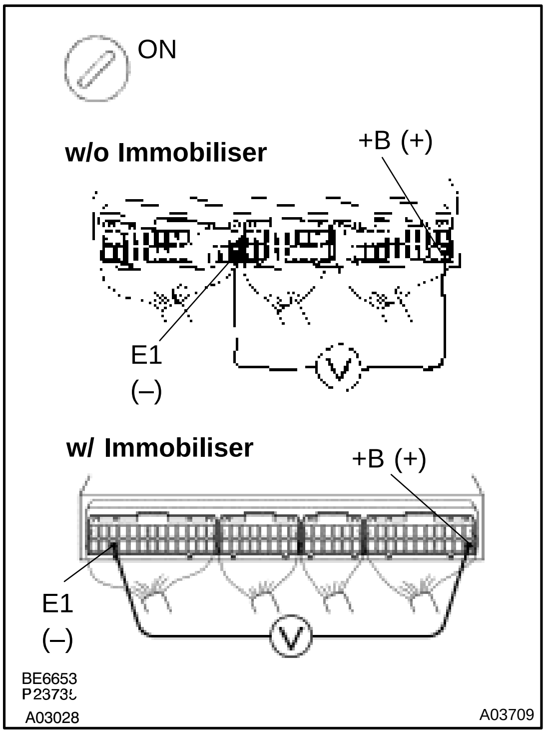
When the ignition switch is turned ON, battery positive voltage is applied to the coil, closing the contacts of the EFI main relay (Marking: EFI) and supplying power to terminal +B of the ECM.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals + B and E1 of ECM connector.**



PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals + B and E1 of the ECM connector.

OK:

Voltage: 9 ~ 14 V

OK	**Proceed to next circuit inspection shown on Problem symptoms table (See page DI–28).**

NG

2	**Check for open in harness and connector between terminal E1 of ECM and body ground (See page IN–31).**

NG	**Repair or replace harness or connector.**

OK

3	**Check EFI main relay (Marking: EFI) (See page SF–40).**

NG	**Replace EFI main relay.**

OK

4	Check EFI fuse (See page DI–173, step 2).

NG → Check for short in all harness and components connected to EFI fuse.

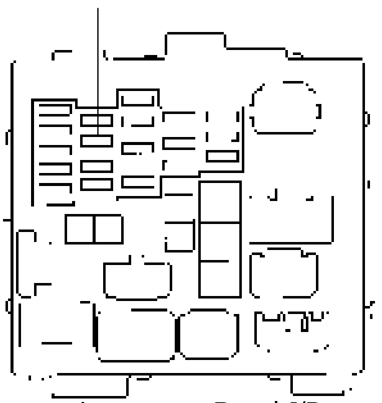
OK

5	Check for open in harness and connector between EFI main relay (Marking: EFI) and battery, and EFI main relay and ECM (See page IN–31).

NG → Repair or replace harness or connector.

OK

6	Check IGN fuse.



PREPARATION:
Remove the IGN fuse from the instrument panel J/B.
CHECK:
Check continuity of the IGN fuse.
OK:
Continuity

NG → Check for short in all harness and components connected to IGN fuse.

OK

7	Check ignition switch (See page BE–14).

NG → **Replace ignition switch.**

OK

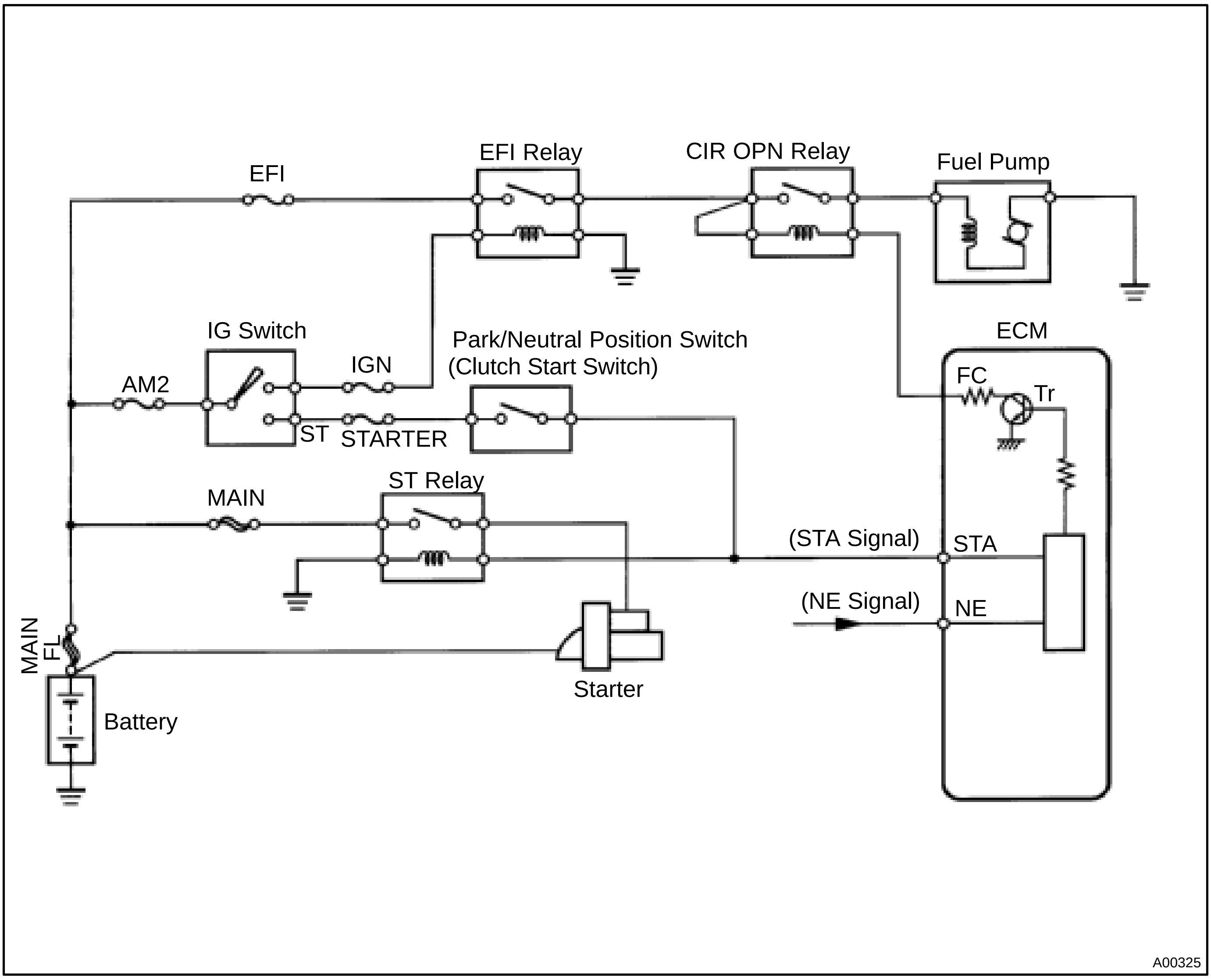
Check for open in harness and connector between IG switch and EFI main relay, and EFI main relay and body ground (See page IN–31).

DI01M–05

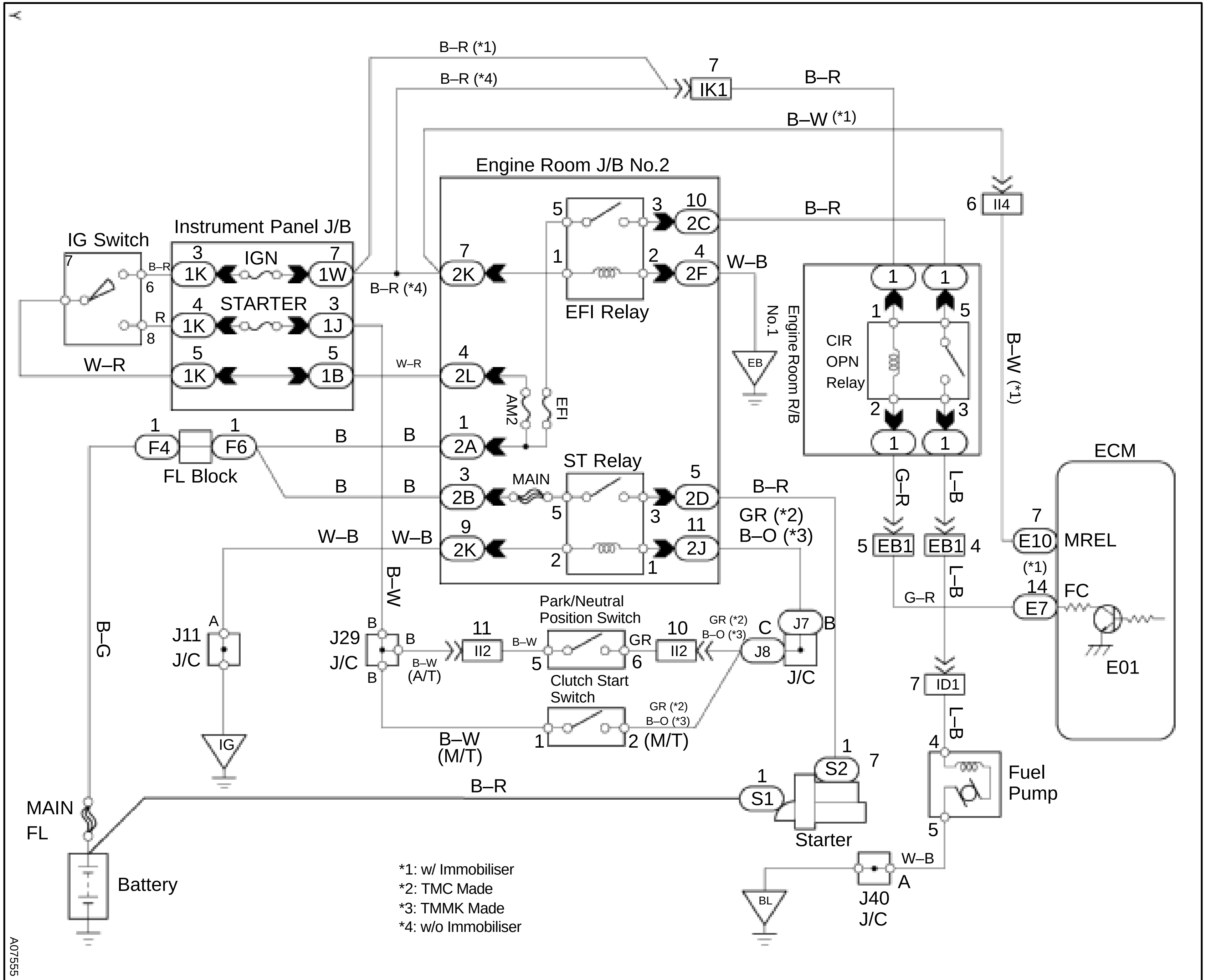
Fuel Pump Control Circuit

CIRCUIT DESCRIPTION

In the diagram below, when the engine is cranked, current flows from terminal ST of the ignition switch to the starter relay coil and also current flows to terminal STA of ECM (STA signal).
When the STA signal and NE signal are input to the ECM, Tr is turned ON, current flows to coil of the circuit opening relay, the relay switches on, power is supplied to the fuel pump and the fuel pump operates.
While the NE signal is generated (engine running), the ECM keeps Tr ON (circuit opening relay ON) and the fuel pump also keeps operating.



WIRING DIAGRAM



INSPECTION PROCEDURE

TOYOTA hand–held tester:

1	Connect TOYOTA hand–held tester, and check operation of fuel pump (See page DI–3).

OK → Proceed to next circuit inspection shown on problem symptoms table (See page DI–28).

NG

2	Check for ECM power source circuit (See page DI–179).

NG → Repair or replace.

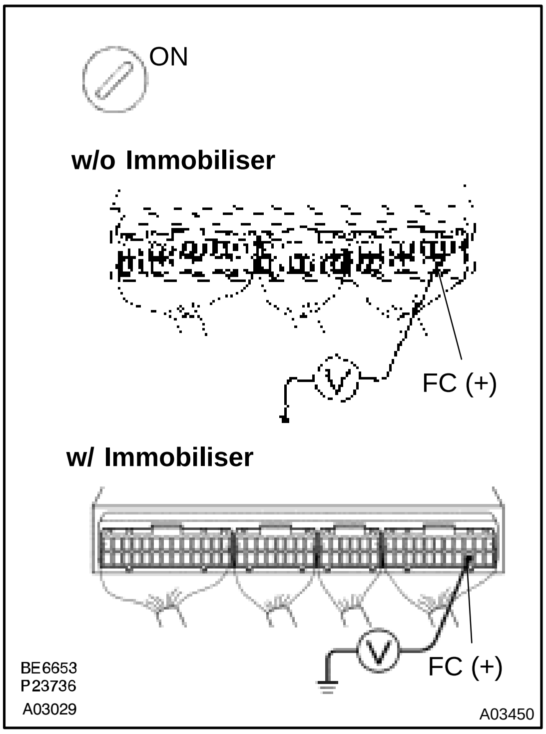
OK

3	Check circuit opening relay (Marking: CIR OPN) (See page SF–41).

NG → Replace circuit opening relay.

OK

4	Check voltage between terminal FC of ECM connector and body ground.



PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminal FC of the ECM connector and body ground.

OK:

Voltage 9 ~ 14 V

OK — **Go to step 5.**

NG

Check for open in harness and connector between EFI main relay, and circuit opening relay and circuit opening relay and ECM (See page IN–31).

5	Check fuel pump (See page SF–6).

NG — **Repair or replace fuel pump.**

OK

6	Check for open in harness and connector between circuit opening relay (Marking: CIR OPN) and fuel pump, and fuel pump and body ground (See page IN–31).

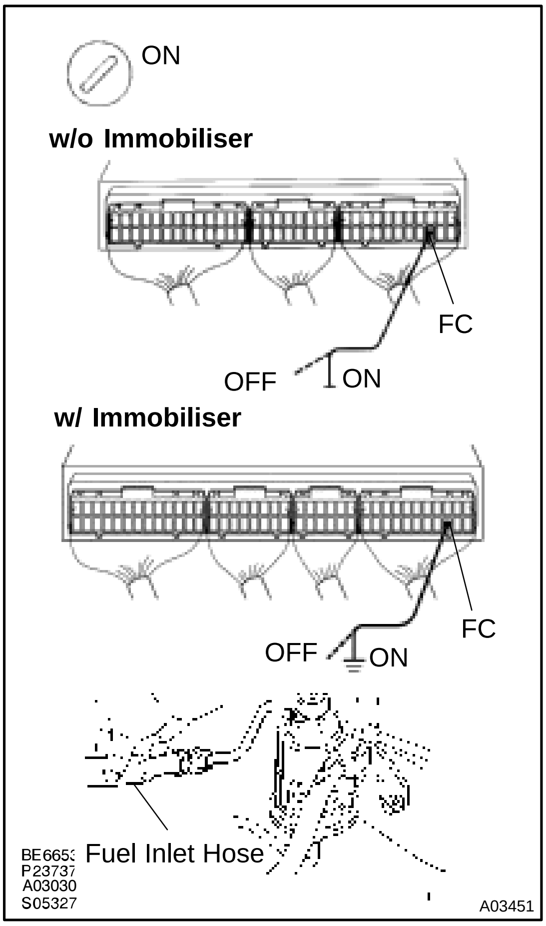
NG → **Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–31).

OBD II scan tool (excluding TOYOTA hand–held tester):

1	Check operation of fuel pump.



PREPARATION:

(a) Remove the glove compartment (See page SF–64).

(b) Turn the ignition switch ON.

CHECK:

(a) Connect between terminal FC of the ECM connector and body ground.

(b) Check for fuel pressure in the fuel inlet hose when it is pinched off.

OK:

There is pressure in fuel inlet hose.

HINT:
At this time, you will hear a fuel return flowing noise.

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–28).**

NG

2	Check for ECM power source circuit (See page DI–179).

NG → Repair or replace.

OK ↓

3	Check circuit opening relay (Marking: CIR OPN) (See page SF–41).

NG → Replace circuit opening relay.

OK ↓

4	Check voltage between terminal FC of ECM connector and body ground (See page DI–183, step 4).

OK → Go to step 5.

NG ↓

Check for open in harness and connector between EFI main relay and circuit opening relay, and circuit opening relay and ECM (See page IN–31).

5	Check fuel pump (See page SF–6).

NG → Repair or replace fuel pump.

OK ↓

6	**Check for open in harness and connector between circuit opening relay (Marking: CIR OPN) and fuel pump, and fuel pump and body ground (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–31).

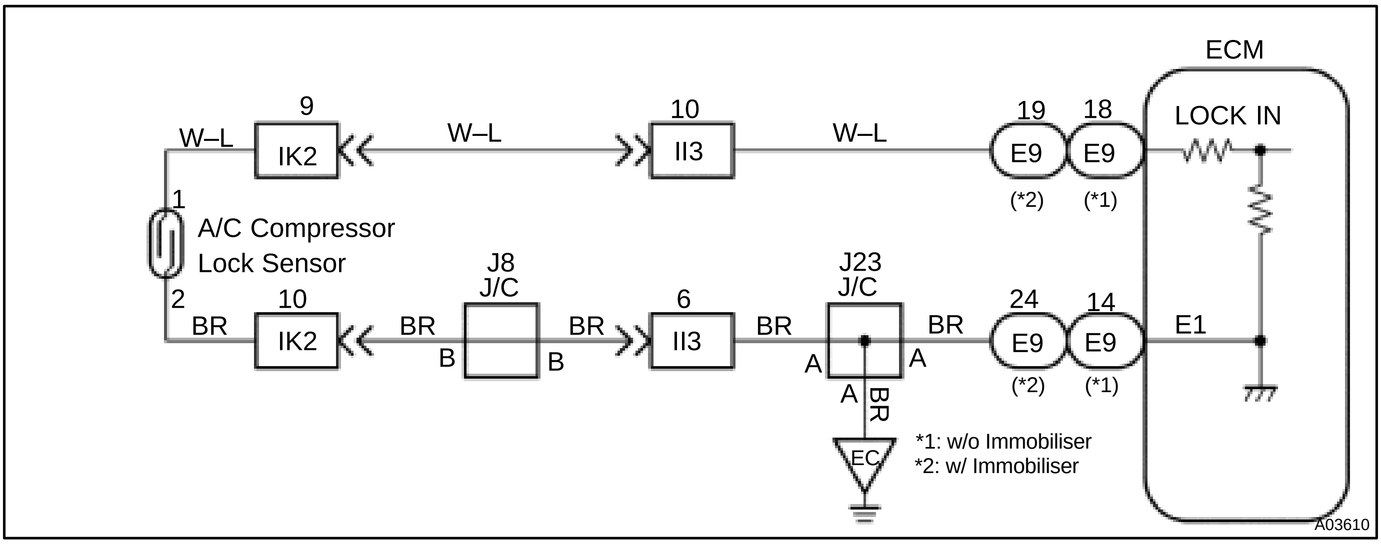
DI01N–04

A/C Compressor Lock Sencor Circuit

CIRCUIT DESCRIPTION

This sensor sends 1 pulse par engine revolution to the ECM. If the number ratio of the compressor speed divided by the engine speed is smaller than a predetermined value, the ECM turns the compressor off. And, the indicator flashes at about 1 second intervals.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check compressor.

PREPARATION:

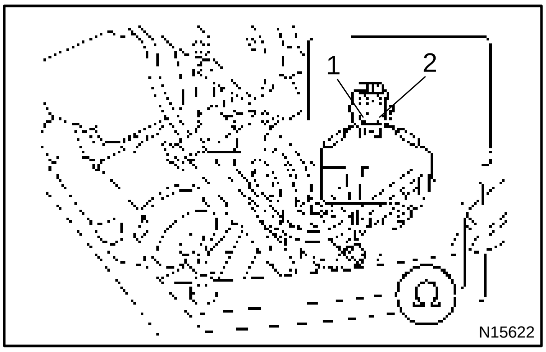
(a) Check the compressor drive belt tension (See page AC–16).

(b) Check if the compressor does not lock during operation with the engine started and blower switch and A/C switch ON.

NG	Adjust drive belt tension or repair compressor (See page AC–17).

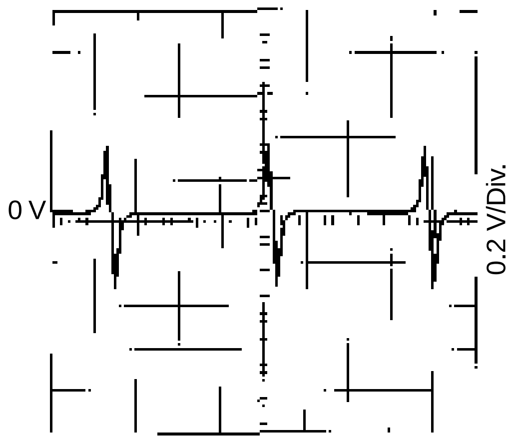
OK

2	Check compressor lock sensor.



PREPARATION:
Disconnect the compressor lock sensor connector.
CHECK:
Measure resistance between terminals 1 and 2 of the compressor lock sensor connector.
OK:
Resistance: 65 – 125 Ω at 20°C (68°F)

Reference: Inspection using oscilloscope



During cranking or idling, measure voltage between terminals LOCK IN and E1 of the ECM.
HINT:
The correct waveform appears as shown in the illustration on the left.

NG → **Replace compressor lock sensor (See page AC–40).**

OK

3	Check harness and connector between A/C compressor lock sensor and ECM (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–31).

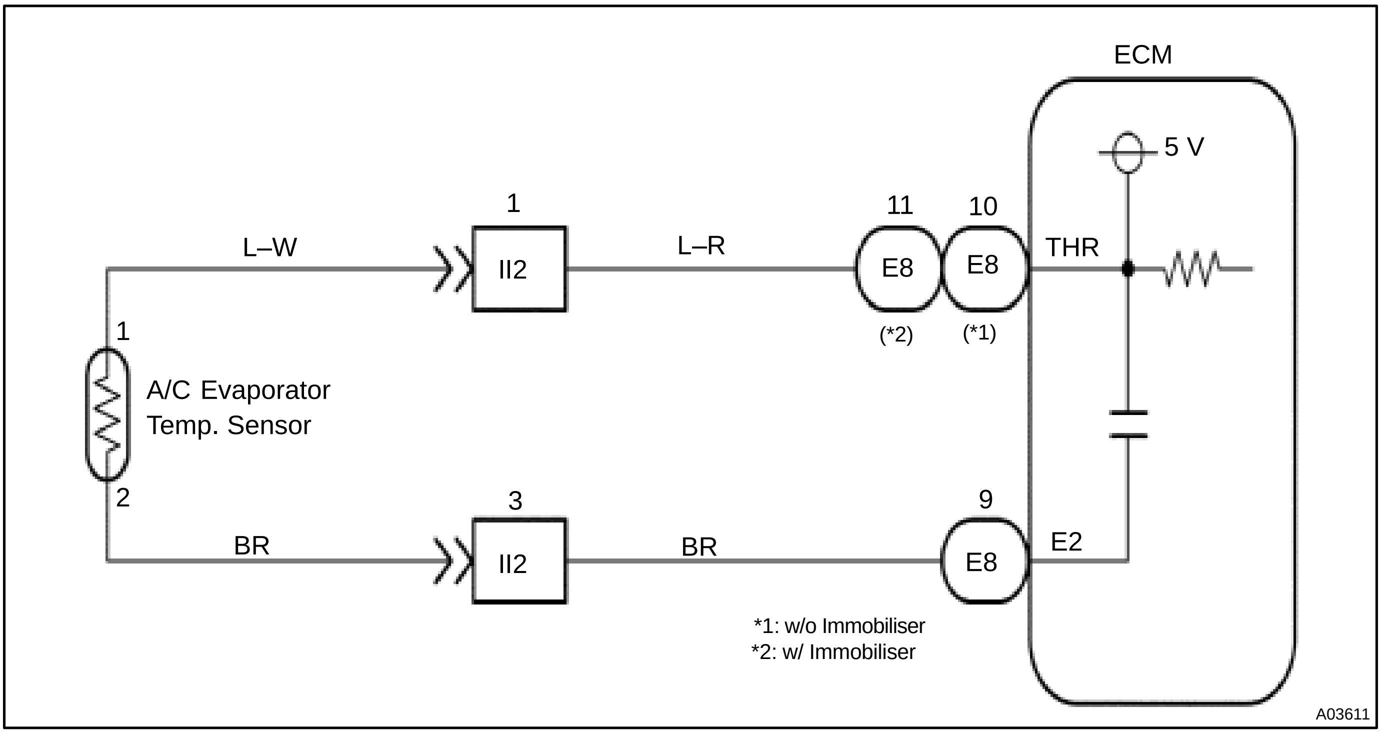
DI01O–04

A/C Evaporator Temp. Sensor Circuit

CIRCUIT DESCRIPTION

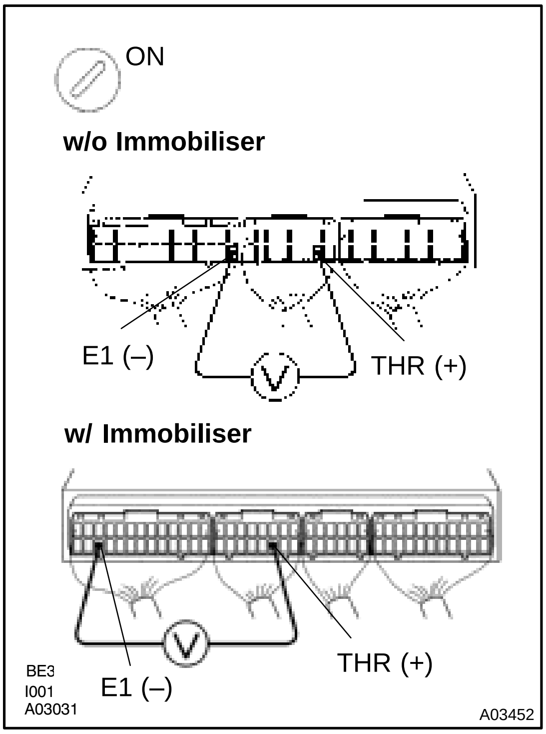
This sensor detects the temperature inside the cooling unit and sends the appropriate signals to the ECM.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals THR and E2 of ECM connector.**



PREPARATION:
(a) Remove the glove compartment (See page SF–64).
(b) Turn the ignition switch ON.

CHECK:
Measure voltage between terminals THR and E1 of the ECM connector at each temperature.

OK:

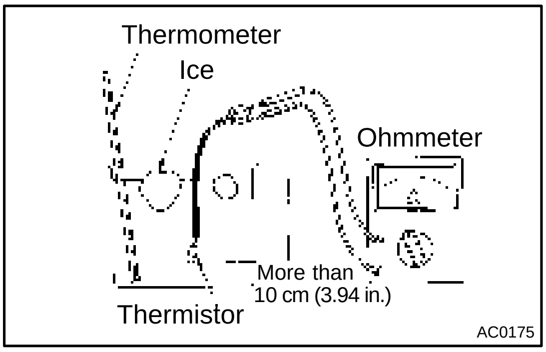
Voltage
at 0°C (32 F): 2.2 – 2.6 V
at 15°C (59°F): 1.4 – 1.8 V

HINT:
As the temperature increases, the voltage decreases.

OK	**Check and replace ECM (See page IN–31).**

NG

2	**Check A/C evaporator temp. sensor.**



PREPARATION:
Remove the A/C evaporator temp. sensor (See page AC–30).

CHECK:
Check resistance between terminals 1 and 2 of the A/C evaporator temp. sensor connector at each temperature.

OK:

Resistance
at 0°C (32°F): 4.6 – 5.1 Ω
at 15°C (59°F): 2.1 – 2.6 Ω

HINT:
As the temperature increases, the voltage decreases.

NG	**Replace A/C evaporator temp. sensor.**

OK

3	Check harness and connector between A/C evaporator temp. sensor and ECM (See page IN–31).

NG → **Repair or replace harness or connector.**

OK ↓

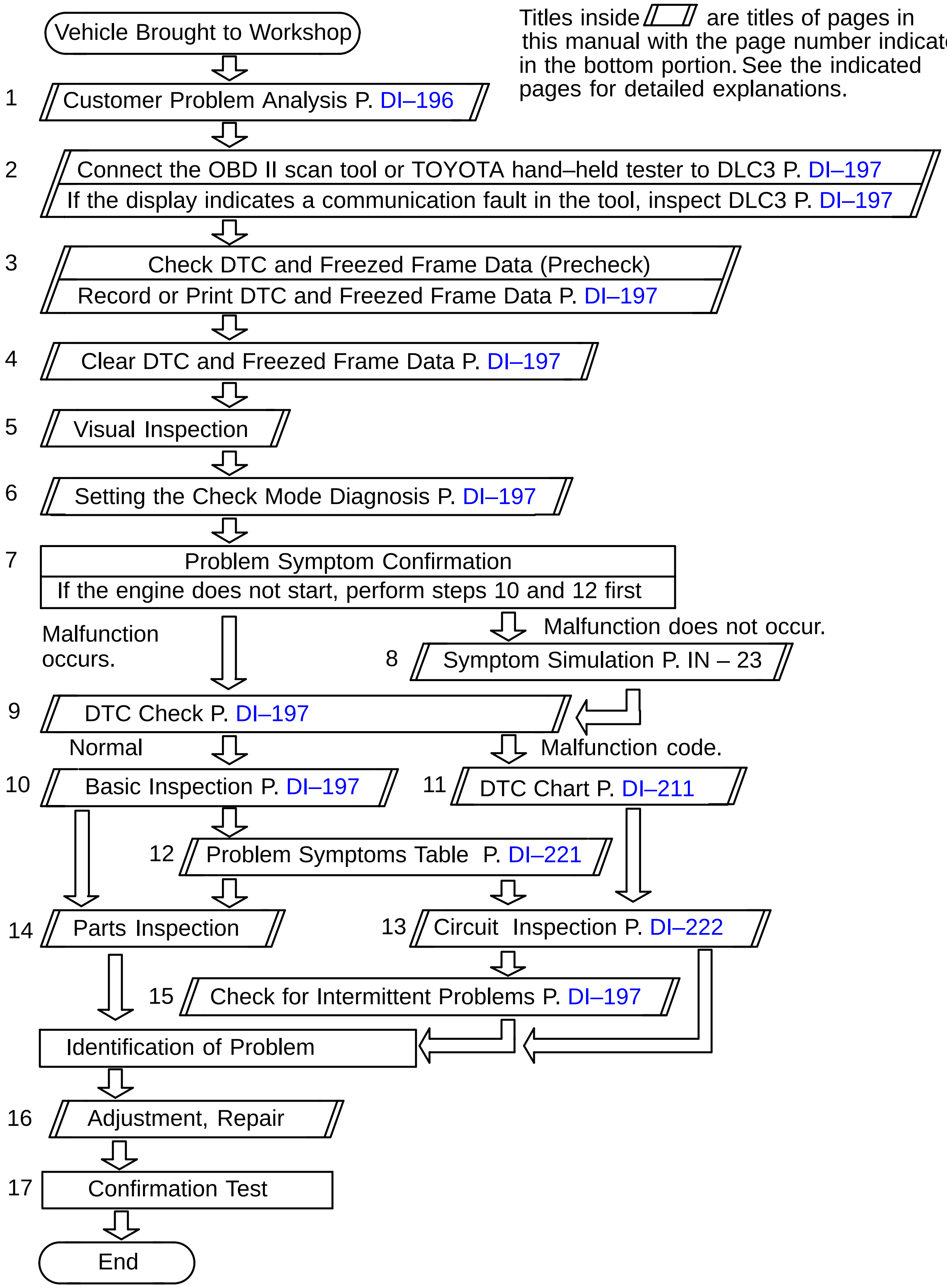
Check and replace ECM (See page IN–31).

ENGINE (1MZ–FE)

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot in accordance with the procedure on the following page.

Titles inside ▱ are titles of pages in this manual with the page number indicated in the bottom portion. See the indicated pages for detailed explanations.



DI079–02

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE CONTROL SYSTEM Check Sheet

Inspector's Name ____________________

Customer's Name		Model and Model Year	
Driver's Name		Frame No.	
Date Vehicle Brought in		Engine Model	
License No.		Odometer Reading	km miles

Problem Symptoms	☐ Engine does not Start	☐ Engine does not crank ☐ No initial combustion ☐ No complete combustion
	☐ Difficult to Start	☐ Engine cranks slowly ☐ Other ____________________
	☐ Poor Idling	☐ Incorrect first idle ☐ Idling rpm is abnormal ☐ High (rpm) ☐ Low (rpm) ☐ Rough idling ☐ Other ____________________
	☐ Poor Driveability	☐ Hesitation ☐ Back fire ☐ Muffler explosion (after–fire) ☐ Surging ☐ Knocking ☐ Other ____________________
	☐ Engine Stall	☐ Soon after starting ☐ After accelerator pedal depressed ☐ After accelerator pedal released ☐ During A/C operation ☐ Shifting from N to D ☐ Other ____________________
	☐ Others	

Dates Problem Occurred		
Problem Frequency		☐ Constant ☐ Sometimes (times per day/month) ☐ Once only ☐ Other ____________________
Condition When Problem Occurs	Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Other ____________________
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (approx. _____°F/_____°C)
	Place	☐ Highway ☐ Suburbs ☐ Inner city ☐ Uphill ☐ Downhill ☐ Rough road ☐ Other ____________________
	Engine Temperature	☐ Cold ☐ Warming up ☐ After warming up ☐ Any temperature ☐ Other ____________
	Engine Operation	☐ Starting ☐ Just after starting (min.) ☐ Idling ☐ Racing ☐ Driving ☐ Constant speed ☐ Acceleration ☐ Deceleration ☐ A/C switch ON/OFF ☐ Other ____________________

Condition of MIL		☐ Remains on ☐ Sometimes light up ☐ Does not light up
DTC Inspection	Normal Mode (Precheck)	☐ Normal ☐ Malfunction code(s) (code) ☐ Freezed frame data ( )
	Check Mode	☐ Normal ☐ Malfunction code(s) (code) ☐ Freezed frame data ( )

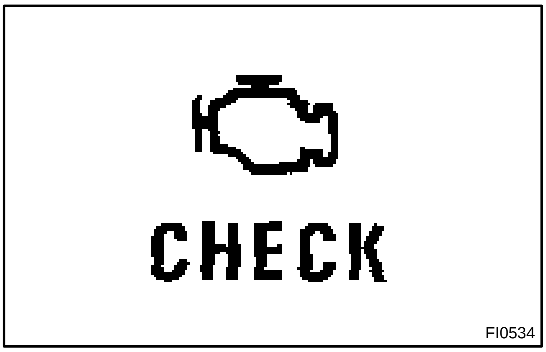
DI07A–06

PRE–CHECK

1. DIAGNOSIS SYSTEM

(a) Description

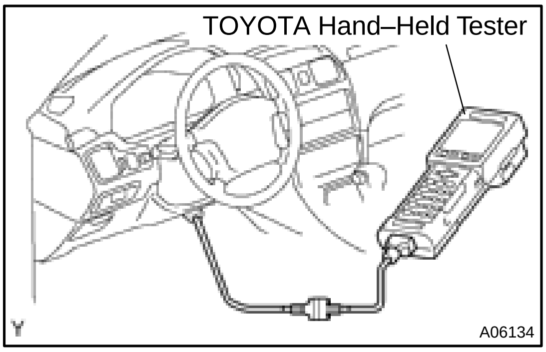
- When troubleshooting OBD II vehicles, the only difference from the usual troubleshooting procedure is that you connect to the vehicle the OBD II scan tool complying with SAE J1978 or TOYOTA hand–held tester, and read off various data output from the vehicle's ECM.



FI0534

- OBD II regulations require that the vehicle's on–board computer lights up the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in the emission control system/components or in the powertrain control components which affect vehicle emissions, or a malfunction in the computer. In addition to the MIL lighting up when a malfunction is detected, the applicable Diagnostic Trouble Codes (DTC) prescribed by SAE J2012 are recorded in the ECM memory (See page DI–211).

If the malfunction does not reoccur in 3 consecutive trips, the MIL goes off but the DTCs remain recorded in the ECM memory.



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- To check the DTC, connect the OBD II scan tool or TOYOTA hand–held tester to Data Link Connector 3 (DLC3) on the vehicle. The OBD II scan tool or TOYOTA hand–held tester also enables you to erase the DTC and check freezed frame data and various forms of engine data (For operating instructions, see the OBD II scan tool's instruction book.). DTC include SAE controlled codes and manufacturer controlled codes. SAE controlled codes must be set as prescribed by the SAE, while manufacturer controlled codes can be set freely by the manufacturer within the prescribed limits (See DTC chart on page DI–211).

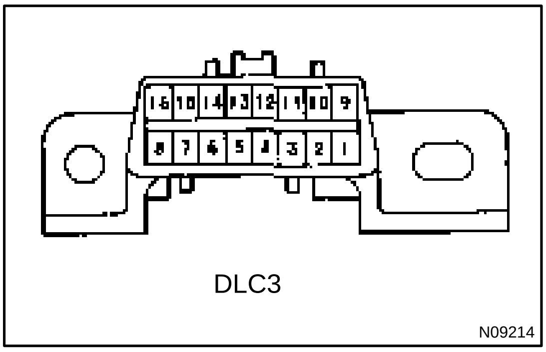
- The diagnosis system operates in normal mode during normal vehicle use. It also has a check mode for technicians to simulate malfunction symptoms and troubleshoot. Most DTC use 2 trip detection logic* to prevent erroneous detection, and ensure thorough malfunction detection. By switching the ECM to check mode when troubleshooting, the technician can cause the MIL to light up for a malfunction that is only detected once or momentarily (TOYOTA hand–held tester only). (See page DI–197)
- *2 trip detection logic:
  When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory. (1st trip)

If the same malfunction is detected again during the second drive test, this second detection causes the MIL to light up. (2nd trip) (However, the IG switch must be turned OFF between the 1st trip and the 2nd trip.).

- Freeze frame data:
  Freeze frame data records the engine condition when a misfire (DTCs P0300 ~ P0306) or fuel trim malfunction (DTCs P0171, P0172) or other malfunction (first malfunction only), is detected.
  Because freeze frame data records the engine conditions (fuel system, calculated load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.
- Priorities for troubleshooting:

If troubleshooting priorities for multiple DTC are given in the applicable DTC chart, these should be followed.
If no instructions are given troubleshoot DTC according to the following priorities.

(1) DTC other than fuel trim malfunction (DTCs P0171, P0172), EGR (DTCs P0401, P0402) and misfire (DTCs P0300 ~ P0306).
(2) Fuel trim malfunction (DTCs P0171, P0172) and EGR (DTCs P0401, P0402).
(3) Misfire (DTCs P0300 ~ P0306).

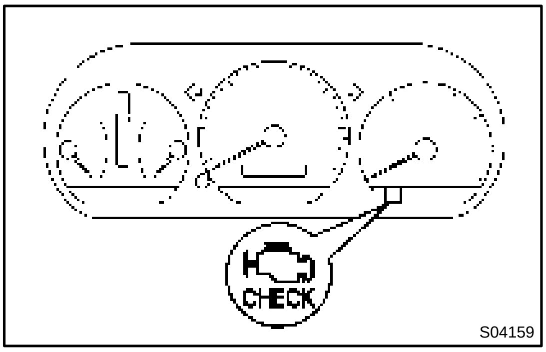


(b) Check the DLC3.
The vehicle's ECM uses ISO 9141–2 for communication. The terminal arrangement of DLC3 complies with SAE J1962 and matches the ISO 9141–2 format.

Terminal No.	Connection / Voltage or Resistance	Condition
7	Bus ⊕ Line / Pulse generation	During transmission
4	Chassis Ground ↔ Body Ground /1 Ω or less	Always
5	Signal Ground ↔ Body Ground /1 Ω or less	Always
16	Battery Positive ↔ Body Ground /9 ~ 14 V	Always

HINT:
If your display shows "UNABLE TO CONNECT TO VEHICLE" when you have connected the cable of the OBD II scan tool or TOYOTA hand–held tester to DLC3, turned the ignition switch ON and operated the scan tool, there is a problem on the vehicle side or tool side.

- If communication is normal when the tool is connected to another vehicle, inspect DLC3 on the original vehicle.
- If communication is still not possible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.



2. INSPECT DIAGNOSIS (Normal Mode)

(a) Check the MIL.

(1) The MIL comes on when the ignition switch is turned ON and the engine is not running.

HINT:
If the MIL does not light up, troubleshoot the combination meter (See page BE–46).

(2) When the engine started, the MIL should go off. If the lamp remains on, the diagnosis system has detected a malfunction or abnormality in the system.

(b) Check the DTC.

NOTICE:
TOYOTA hand–held tester only: When the diagnosis system is switched from normal mode to check mode, it erases all DTC and freezed frame data recorded in normal mode. So before switching modes, always check the DTC and freezed frame data, and note them down.

(1) Prepare the OBD II scan tool (complying with SAE J1978) or TOYOTA hand–held tester.

(2) Connect the OBD II scan tool or TOYOTA hand–held tester to DLC3 at the lower center of the instrument panel.

(3) Turn the ignition switch ON and push the OBD II scan tool or TOYOTA hand–held tester switch ON.

(4) Use the OBD II scan tool or TOYOTA hand–held tester to check the DTC and freezed frame data and note them down (For operating instructions, see the OBD II scan tool's instruction book.).

(5) See page DI–197 to confirm the details of the DTC.

NOTICE:

- **When simulating symptoms with an OBD II scan tool (excluding TOYOTA hand–held tester) to check the DTC, use normal mode. For code on the DTC chart subject to "2 trip detection logic", performe the following either action.**
- **Turn the ignition switch OFF after the symptom is simulated the first time. Then repeat the simulation process again. When the problem has been simulated twice, the MIL lights up and the DTCs are recorded in the ECM.**
- **Check the 1st trip DTC using Mode 7 (Continuous Test Results) for SAE J1979.**

(c) Clear the DTC.

The DTCs and freezed frame data will be erased by either action.

- Operating the OBD II scan tool (complying with SAE J1978) or TOYOTA hand–held tester to erase the codes. (See the OBD II scan tool's instruction book for operating instructions.)
- Disconnecting the battery terminals or EFI fuse.

NOTICE:

If the TOYOTA hand–held tester switches the ECM from normal mode to check mode or vice–versa, or if the ignition switch is turned from ON to ACC or OFF during check mode, the DTCs and freezed frame data will be erased.

3. INSPECT DIAGNOSIS (Check Mode)

HINT:

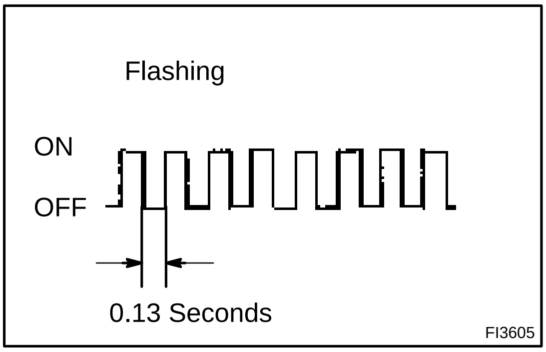
TOYOTA hand–held tester only:

Compared to the normal mode, the check mode has an increased sensitivity to detect malfunctions.

Furthermore, the same diagnostic items which are detected in the normal mode can also be detected in the check mode.

(a) Check the DTC.
(1) Initial conditions.
- Battery positive voltage 11 V or more
- Throttle valve fully closed
- Transmission in ”P” or ”N” position
- Air conditioning switched OFF

(2) Turn ignition switch OFF.
(3) Prepare the TOYOTA hand–held tester.
(4) Connect the TOYOTA hand–held tester to the DLC3 at the lower center of the instrument panel.
(5) Turn the ignition switch ON and push the TOYOTA hand–held tester switch ON.



(6) Switch the TOYOTA hand–held tester normal mode to check mode (Check that the MIL flashes.).

NOTICE:
If the TOYOTA hand–held tester switches the ECM from normal mode to check mode or vice–versa, or if the ignition switch is turned from ON to ACC or OFF during check mode, the DTC and freezed frame data will be erased.

(7) Start the engine (The MIL goes out after the engine start.).
(8) Simulate the conditions of the malfunction described by the customer.

NOTICE:
Leave the ignition switch ON until you have checked the DTC, etc.

(9) After simulating the malfunction conditions, use the TOYOTA hand–held tester diagnosis selector to check the DTC and freezed frame data, etc.

HINT:
Take care not to turn the ignition switch OFF. Turning the ignition switch OFF switches the diagnosis system from check mode to normal mode. So all DTC, etc. are erased.

(10) After checking the DTC, inspect the applicable circuit.

4. FAIL–SAFE CHART

If any of the following codes is recorded, the ECM enters fail–safe mode.

DTC No.	Fail–Safe Operation	Fail–Safe Deactivation Conditions
P0100	Ignition timing fixed at 10° BTDC	Returned to normal condition
P0110	Intake air temperature is fixed at 20°C (68°F)	Returned to normal condition
P0115	Engine coolant temperature is fixed at 80°C (176°F)	Returned to normal condition
P0120	VTA is fixed at 0°	The following condition must be repeated at least 2 times consecutively (a) Vehicle speed: 0km/h (0mph) (b) VTA ≧ 0.1 V and > 0.95 V
P0135 P0141 P0155	The heater circuit in which an abnormality is detected is turned off	Ignition switch OFF
P0325 P0330	Max. timing retardation	Ignition switch OFF
P1300	Fuel cut	IGF signal is detected for 6 consecutive ignition

5. CHECK FOR INTERMITTENT PROBLEMS

TOYOTA HAND–HELD TESTER only:

By putting the vehicle's ECM in check mode, 1 trip detection logic is possible instead of 2 trip detection logic and sensitivity to detect open circuits is increased. This makes it easier to detect intermittent problems.

(1) Clear the DTC (See page DI–197).
(2) Set the check mode (See page DI–197).
(3) Perform a simulation test (See page IN–21).
(4) Check the connector and terminal (See page IN–31).
(5) Handle the connector (See page IN–31).

6. BASIC INSPECTION

When the malfunction code is not confirmed in the DTC check, troubleshooting should be performed in the order for all possible circuits to be considered as the causes of the problems. In many cases, by carrying out the basic engine check shown in the following flow chart, the location causing the problem can be found quickly and efficiently. Therefore, use of this check is essential in engine troubleshooting.

1	**Is battery positive voltage 11 V or more when engine is stopped ?**

NO → **Charge or replace battery.**

YES

2	Is engine cranked?

NO → Proceed to page ST–18 and continue to trouble-shoot.

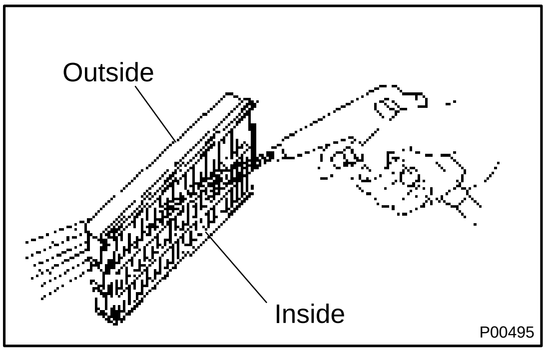
YES

3	Does engine start?

NO → Go to step 7.

YES

4	Check air filter.



PREPARATION:
Remove the air filter.
CHECK:
Visually check that the air filter is not dirty or excessive oily.
HINT:
If necessary, clean the filter with compressed air. First blow from inside thoroughly, then blow from outside of the filter.

NG → Repair or replace.

OK

5	**Check idle speed.**

PREPARATION:
(a) Warm up the engine to normal operating temperature.
(b) Switch off all accessories.
(c) Switch off air conditioning.
(d) Shift transmission into ”N” position.
(e) Connect the OBD II scan tool or TOYOTA hand–held tester to DLC3 on the vehicle.

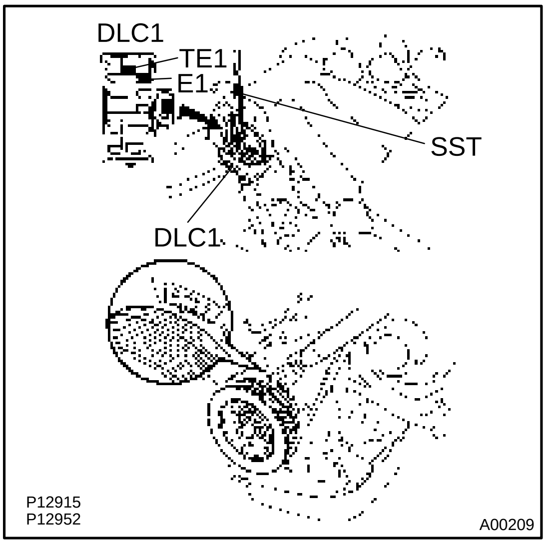
CHECK:
Use CURRENT DATA to check the idle speed.

OK:
Idle speed: 650 ~ 750 rpm

NG → **Proceed to problem symptoms table on page DI–221.**

OK

6	**Check ignition timing.**



PREPARATION:
(a) Warm up the engine to normal operating temperature.
(b) Switch off all accessories.
(c) Switch off air conditioning.
(d) Shift transmission into ”N” position.
(e) Keep the engine speed at idle.
(f) Using SST, connect terminals TE1 and E1 of the DLC1.
SST 09843–18020
(g) Using a timing light, connect the tester to check wire.

CHECK:
Check ignition timing.

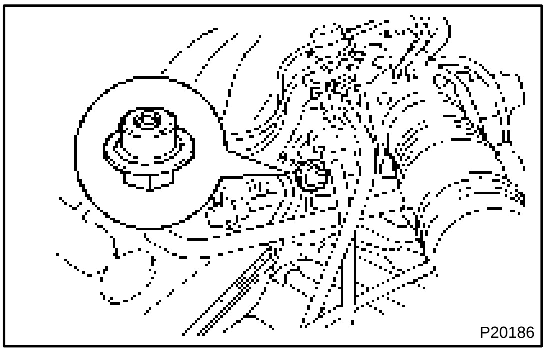
OK:
Ignition timing: 10° BTDC at idle

NG → **Proceed to page IG–1 and continue to troubleshoot.**

OK

Proceed to problem symptoms table on page DI–221.

7	Check fuel pressure.


P20186

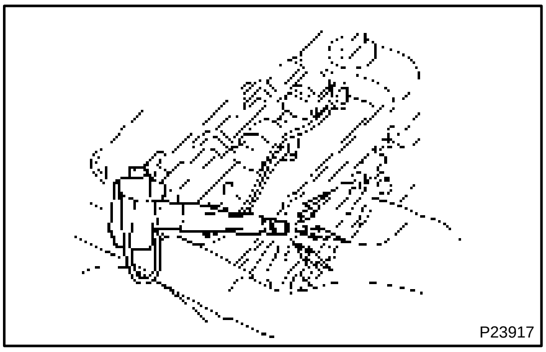
PREPARATION:
(a) Be sure that enough fuel is in the tank.
(b) Connect the TOYOTA hand–held tester to the DLC3.
(c) Turn the ignition switch ON and push the TOYOTA hand–held tester main switch ON.
(d) Use ACTIVE TEST mode to operate the fuel pump.
(e) If you have no TOYOTA hand–held tester, connect the positive (+) and negative (–) leads from the battery to the fuel pump connector (See page SF–6).

CHECK:
Check that the pulsation damper screw rises up when the fuel pump operates.

NG	Proceed to page SF–6 and continue to troubleshoot.

OK

8	**Check for spark.**


P23917

PREPARATION:

(a) Remove the ignition coil or disconnect the high–tension cord from the spark plug.
(b) Remove the spark plug.
(c) Install the spark plug to the ignition coil or high–tension cord.
(d) Disconnect the injector connector.
(e) Hold the end about 12.5 mm (0.5 in.) from the ground.

CHECK:

Check if spark occurs while engine is being cranked.

NOTICE:

To prevent excess fuel being injected from the injectors during this test, don't crank the engine for more than 5 ~ 10 seconds at a time.

OK:

Spark jumps across electrode gap.

NG → **Proceed to page IG–1 and continue to troubleshoot.**

OK ↓

Proceed to problem symptoms table on page DI–221.

7. ENGINE OPERATING CONDITION

NOTICE:

The values given below for ”Normal Condition” are representative values, so a vehicle may still be normal even if its value varies from those listed here. So do not decide whether a part is faulty or not solely according to the ”Normal Condition” here.

(a) CARB mandated signals.

TOYOTA hand–held tester display	Measurement Item	Normal Condition*
FUEL SYS #1	Fuel System Bank 1 OPEN: Air–fuel ratio feedback stopped CLOSED: Air–fuel ratio feedback operating	Idling after warming up: CLOSED
FUEL SYS #2	Fuel System Bank 2 OPEN: Air–fuel ratio feedback stopped CLOSED: Air–fuel ratio feedback operating	Idling after warming up: CLOSED
CALC LOAD	Calculator Load: Current intake air volume as a proportion of max. intake air volume	Idling: 13.1 ~ 18.7% Racing without load (2,500rpm): 11.7 ~ 17.3%
COOLANT TEMP.	Engine Coolant Temp. Sensor Value	After warming up: 80 ~ 95°C (176 ~ 203°F)
SHORT FT #1	Short–term Fuel Trim Bank 1	0 ± 20%
LONG FT #1	Long–term Fuel Trim Bank 1	0 ± 20%
SHORT FT #2	Short–term Fuel Trim Bank 2	0 ± 20%
LONG FT #2	Long–term Fuel Trim Bank 2	0 ± 20%
ENGINE SPD	Engine Speed	Idling: 650 ~ 750 rpm
VEHICLE SPD	Vehicle Speed	Vehicle stopped: 0 km/h (0 mph)
IGN ADVANCE	Ignition Advance: Ignition Timing of Cylinder No. 1	Idling: BTDC 10 ~ 25.0°
INTAKE AIR	Intake Air Temp. Sensor Value	Equivalent to Ambient Temp.
MAF	Air Flow Rate Through Mass Air Flow Meter	Idling: 3.3 ~ 4.7 gm/sec. Racing without load (2,500 rpm): 10.4 ~ 15.4 gm/sec.
THROTTLE POS	Voltage Output of Throttle Position Sensor Calculated as a percentage: 0 V → 0%, 5 V → 100%	Throttle valve fully closed: 7 ~ 11% Throttle valve fully open: 65 ~ 75%

*: If no conditions are specifically stated for ”Idling”, it means the shift lever is at N or P position, the A/C switch is OFF and all accessory switches are OFF.

TOYOTA hand–held tester display	Measurement Item	Normal Condition*1
O2S B1, S1	Voltage Output of Oxygen Sensor Bank 1 Sensor 1	Idling: 0.1 ~ 0.9 V (0.56 ~ 0.76 V*2)
O2FT B1, S1	Oxygen Sensor Fuel Trim Bank 1 Sensor 1 (Same as SHORT FT #1)	0 ± 20%
O2S B1, S2	Voltage Output of Oxygen Sensor Bank 1 Sensor 2	Driving 50 km/h (31 mph): 0.1 ~ 0.9 V
O2S B2, S1	Voltage Output of Oxygen Sensor Bank 2 Sensor 1	Idling: 0.1 ~ 0.9 V (0.56 ~ 0.76 V*2)
O2FT B2, S1	Oxygen Sensor Fuel Trim Bank 2 Sensor 1 (Same as SHORT FT #2)	0 ± 20%
A/FS B1, S1 *3	Voltage Output of A/F Sensor Bank 1 Sensor 1	Idling: 2.8 ~ 3.8 V
A/FS B2, S1 *3	Voltage Output of A/F Sensor Bank 2 Sensor 1	Idling: 2.8 ~ 3.8 V
A/FFT B1, S1 *3	A/F Sensor Fuel Trim Bank 1 Sensor 1 (Same as SHORT FT #1)	O ± 20%
A/FFT B2, S1 *3	A/F Sensor Fuel Trim Bank 2 Sensor 1 (Same as SHORT FT #1)	O ± 20%

*1: If no conditions are specifically stated for ”Idling”, it means the shift lever is shift lever is at N or P position, the A/C switch is OFF and all accessory switches are OFF.
*2: Only for California Specification vehicles, when you use the OBD II scan tool (excluding TOYOTA hand–held tester).
*3: Only for California Specification vehicles, when you use the TOYOTA hand–held tester.

(b) TOYOTA Enhanced Signals.

TOYOTA hand–held tester display	Measurement Item	Normal Condition*
MISFIRE RPM	Engine RPM for first misfire range	Misfire 0: 0 rpm
MISFIRE LOAD	Engine load for first misfire range	Misfire 0: 0 g/r
INJECTOR	Fuel injection time for cylinder No.1	Idling: 1.6 ~ 2.9 ms
IAC DUTY RATIO	Intake Air Control Valve Duty Ratio Opening ratio rotary solenoid type IAC valve	Idling: 27 ~ 47 %
STARTER SIG	Starter Signal	Cranking: ON
CTP SIG	Closed Throttle Position Signal	Throttle Fully Closed: ON
A/C SIG	A/C Switch Signal	A/C ON: ON
PNP SW	Park/Neutral Position Switch Signal	P or N position: ON
ELCTRCL LOAD SIG	Electrical Load Signal	Defogger switch ON: ON
STOP LIGHT SW	Stop Light Switch Signal	Stop light switch ON: ON
PS OIL PRESS SW	Power Steering Oil Pressure Switch Signal	Turn steering wheel: ON
FC IDL	Fuel Cut Idle: Fuel cut when throttle valve fully closed, during deceleration	Fuel cut operating: ON
FC TAU	Fuel Cut TAU: Fuel cut during very light load	Fuel cut operating: ON
CYL#1 ~ CYL#6	Abnormal revolution variation for each cylinder	0%
IGNITION	Total number of ignition for every 1,000 revolu- tions	0 ~ 3,000
EGRT GAS	EGR Gas Temperature Sensor Value	EGR not operating: Temperature between intake air temp. and engine coolant temp.
INTAKE CTRL VSV	Intake Air Control Valve VSV Signal	VSV operating: ON
EGR SYSTEM	EGR system operating condition	Idling: OFF
A/C CUT SIG	A/C Cut Signal	A/C S/W OFF: ON
FUEL PUMP	Fuel Pump Signal	Idling: ON
EVAP (PURGE) VSV	EVAP VSV Signal	VSV operating: Above 30%
VAPOR PRESS VSV	Vapor Pressure VSV Signal	VSV operating: ON (TANK)

*: If no conditions are specifically stated for ”Idling”, it means the shift lever is at N or P position, the A/C switch is OFF and all accessory switches are OFF.

TOYOTA hand–held tester display	Measurement Item	Normal Condition*1
TOTAL FT B1	Total Fuel Trim Bank 1: Average value for fuel trim system of bank 1	Idling: 0.8 ~ 1.2
TOTAL FT B2	Total Fuel Trim Bank 1: Average value for fuel trim system of bank 2	Idling: 0.8 ~ 1.2
O2 LR B1, S1 *2	Oxygen Sensor Lean Rich Bank 2 Sensor 1 Response time for oxygen sensor output to switch from lean to rich	Idling after warmed up: 0 ~ 1,000 msec.
O2 LR B2, S1 *2	Oxygen Sensor Lean Rich Bank 2 Sensor 1 Response time for oxygen sensor output to switch from lean to rich	Idling after warmed up: 0 ~ 1,000 msec.
O2 RL B1, S1 *2	Oxygen Sensor Rich Lean Bank 1 Sensor 1 Response time for oxygen sensor output to switch from rich to lean	Idling after warmed up: 0 ~ 1,000 msec.
O2 RL B2, S1 *2	Oxygen Sensor Rich Lean Bank 2 Sensor 1 Response time for oxygen sensor output to switch from rich to lean	Idling after warmed up: 0 ~ 1,000 msec.

*1: If no conditions are specifically stated for ”Idling”, it means the shift lever is at N or P position, the A/C switch is OFF and all accessory switches are OFF.
*2: Except California Specification vehicles.

DI07B–07

DIAGNOSTIC TROUBLE CODE CHART

1. SAE CONTROLLED

HINT:

Parameters listed in the chart may not be exactly the same as your reading due to the type of instrument or other factors.

If a malfunction code is displayed during the DTC check in check mode, check the circuit for that code listed in the table below. For details of each code, turn to the page referred to under the "See page " for the respective "DTC No." in the DTC chart.

DTC No. (See Page)	Detection Item	Trouble Area	MIL*1	Memory
P0100 (DI–222)	Mass Air Flow Circuit Malfunction	Open or short in mass air flow meter circuit Mass air flow meter ECM	○	○
P0101 (DI–227)	Mass Air Flow Circuit Range/Performance Problem	Mass air flow meter	○	○
P0110 (DI–228)	Intake Air Temp. Circuit Malfunction	Open or short in intake air temp. sensor circuit Intake air temp. sensor (built into mass air flow meter) ECM	○	○
P0115 (DI–233)	Engine Coolant Temp. Circuit Malfunction	Open or short in engine coolant temp. sensor circuit Engine coolant temp. sensor ECM	○	○
P0116 (DI–237)	Engine Coolant Temp. Circuit Range/Performance Problem	Engine coolant temp. sensor Cooling system	○	○
P0120 (DI–239)	Throttle/Pedal Position Sensor/Switch "A" Circuit Malfunction	Open or short in throttle position sensor circuit Throttle position sensor ECM	○	○
P0121 (DI–243)	Throttle/Pedal Position Sensor/Switch "A" Circuit Range/Performance Problem	Throttle position sensor	○	○
*2 P0125 (DI–244)	Insufficient Coolant Temp. for Closed Loop Fuel Control (Except California Spec.)	Fuel system Injector Ignition system Gas leakage on exhaust system Open or short in heated oxygen sensor circuit (bank 1, 2 sensor 1) Heated oxygen sensor (bank 1, 2 sensor 1) ECM	○	○
*3 P0125 (DI–249)	Insufficient Coolant Temp. for Closed Loop Fuel Control (Only for California Spec.)	Fuel system Injector Ignition system Gas leakage on exhaust system Open or short in A/F sensor circuit (bank 1, 2 sensor 1) A/F sensor (bank 1, 2 sensor 1) ECM	○	○
*2 P0130 (DI–255)	Heated Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 1)	Heated oxygen sensor Fuel trim malfunction	○	○

*1: ○ ~~~MIL lights up

*2: Except California specification vehicles

*3: Only for California specification vehicle

DTC No. (See Page)	Detection Item	Trouble Area	MIL	Memory
*2 P0133 (DI–259)	Heated Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 1)	□Heated oxygen sensor □Fuel trim malfunction	○	○
*2 P0135 (DI–263)	Heated Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 1)	□Open or short in heater circuit of heated oxygen sensor □Heated oxygen sensor heater □ECM	○	○
P0136 (DI–265)	Heated Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)	□Heated oxygen sensor	○	○
P0141 (DI–263)	Heated Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)	□Same as DTC No. P0135	○*1	○
*3 P0150 (DI–255)	Heated Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 1)	□Same as DTC No. P0130	○*1	○
*3 P0153 (DI–259)	Heated Oxygen Sensor Circuit Slow Response (Bank 2 Sensor 1)	□Same as DTC No. P0133 □Fuel trim malfunction	○*1	○
*3 P0155 (DI–263)	Heated Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 1)	□Same as DTC No. P0135	○*1	○
*3 P0171 (DI–272)	System too Lean (Fuel Trim) (Except California Spec.)	□Air intake (hose loose) □Fuel line pressure □Injector blockage □Heated oxygen sensor (bank 1, 2 sensor 1) malfunction □Mass air flow meter □Engine coolant temp. sensor □Gas leakage on exhaust system	○*1	○
*3 P0172 (DI–272)	System too Rich (Fuel Trim) (Except California Spec.)	□Fuel line pressure □Injector leak, blockage □Heated oxygen sensor (bank 1, 2 sensor 1) malfunction □Mass air flow meter □Engine coolant temp. sensor □Gas leakage on exhaust system	○*1	○
*4 P0171 (DI–267)	System too Lean (Fuel Trim) (Only for California Spec.)	□Air intake (hose loose) □Fuel line pressure □Injector blockage □Mass air flow meter □Engine coolant temp. sensor □A/F sensor (bank 1, 2 sensor 1) □Gas leakage on exhaust system	○*1	○
*4 P0172 (DI–267)	System too rich (Fuel Trim) (Only for California Spec.)	□Fuel line pressure □Injector leak, blockage □Heated oxygen sensor malfunction □Mass air flow meter □Engine coolant temp. sensor □A/F sensor (bank 1, 2 sensor 1) □Gas leakage on exhaust system	○*1	○

*1: MIL lights up
*2: MIL light up or blinking
*3: Except California specification vehicles
*4: Only for California specification vehicle

DTC No. (See Page)	Detection Item	Trouble Area	MIL	Memory
P0300 (DI–276)	Random/Multiple Cylinder Misfire Detected	☐Ignition system ☐Injector ☐Fuel line pressure ☐EGR ☐Compression pressure ☐Valve clearance not to specification ☐Valve timing ☐Mass air flow meter ☐Engine coolant temp. sensor ☐Open or short engine wire ☐Connector connection ☐ECM	○*2	○
P0301 P0302 P0303 P0304 P0305 P0306 (DI–276)	Misfire Detected – Cylinder 1 – Cylinder 2 – Cylinder 3 – Cylinder 4 – Cylinder 5 – Cylinder 6			
P0325 (DI–283)	Knock Sensor 1 Circuit Malfunction	☐Open or short in knock sensor 1 circuit ☐Knock sensor 1 (looseness) ☐ECM	○*1	○
P0330 (DI–283)	Knock Sensor 2 Circuit Malfunction	☐Open or short in knock sensor 2 circuit ☐Knock sensor 2 (looseness) ☐ECM	○*1	○
P0335 (DI–287)	Crankshaft Position Sensor ”A” Circuit Malfunction	☐Open or short in crankshaft position sensor circuit ☐Crankshaft position sensor ☐Starter ☐ECM	○*1	○
P0340 (DI–290)	Camshaft Position Sensor Circuit Malfunction	☐Open or short in camshaft position sensor circuit ☐Camshaft position sensor ☐Starter ☐ECM	○*1	○
P0401 (DI–292)	Exhaust Gas Recirculation Flow Insufficient Detected	☐EGR valve (stuck closed) ☐Open or short in EGR gas temp. sensor circuit ☐EGR gas temp. sensor ☐Open in VSV circuit for EGR ☐VSV for EGR ☐Vacuum control valve ☐Vacuum hose disconnected or blocked ☐ECM	○*1	○
P0402 (DI–302)	Exhaust Gas Recirculation Flow Excessive Detected	☐EGR valve stuck open ☐VSV for EGR open malfunction ☐Short in VSV circuit for EGR ☐Open or short in EGR valve position sensor circuit ☐EGR valve position sensor ☐ECM	○*1	○
*3 P0420 (DI–305)	Catalyst System Efficiency Below Threshold (Except California Spec.)	☐Three–way catalytic converter ☐Open or short in heated oxygen sensor circuit ☐Heated oxygen sensor	○*2	○
*4 P0420 (DI–308)	Catalyst System Efficiency Below Threshold (Only for California Spec.)	☐Three–way catalytic converter ☐Open or short in heated oxygen sensor (bank 1, sensor 2) circuit ☐Heated oxygen sensor (bank 1, sensor 2) ☐Open or short in A/F sensor (bank 1, 2 sensor 1) circuit ☐A/F sensor (bank 1, 2 sensor 1)	○*2	○

*1: MIL lights up
*2: MIL lights up on U.S.A and Canadian specification vehicles
*3: Except California specification vehicles
*4: Only for California specification vehicle

DTC No. (See Page)	Detection Item	Trouble Area	MIL*	Memory
P0440 (DI–311)	Evaporative Emission Control System Malfunction	□Vapor pressure sensor □Fuel tank cap incorrectly installed □Fuel tank cap cracked or damaged □Vacuum hose cracked, holed, blocked, damaged or disconnected ((1) or (2) in fig. 1) □Hose or tube cracked, holed, damaged or loose seal ((3) in fig. 1) □Fuel tank cracked, holed or damaged □Charcoal canister cracked, holed or damaged □Fuel tank over fill check valve cracked or damaged	○*1	○
P0441 (DI–318)	Evaporative Emission Control System Incorrect Purge Flow	□Open or short in VSV circuit for EVAP □Open or short in VSV circuit for vapor pressure sensor □Open or short in vapor pressure sensor circuit □VSV for EVAP □VSV for vapor pressure sensor □Vapor pressure sensor □Vacuum hose cracks, holed blocked, damaged or disconnected ((1), (4), (5), (6) and (7) in fig.1) □Charcoal canister cracks, holed or damaged □Fuel tank over fill check valve cracked or damaged	○	○
P0446 (DI–318)	Evaporative Emission Control System Vent Control Malfunction	□Open or short in VSV circuit for EVAP □Open or short in VSV circuit for vapor pressure sensor □Open or short in vapor pressure sensor circuit □VSV for EVAP □VSV for vapor pressure sensor □Vapor pressure sensor □Vacuum hose cracks, holed blocked, damaged or disconnected ((1), (4), (5), (6) and (7) in fig.1) □Charcoal canister cracks, holed or damaged □Fuel tank over fill check valve cracked or damaged	○	○
P0450 (DI–331)	Evaporative Emission Control System Pressure Sensor Malfunction	□Open or short in vapor pressure sensor circuit □Vapor pressure sensor □ECM	○	○
P0451 (DI–331)	Evaporative Emission Control System Pressure Sensor Range/Performance	□Open or short in vapor pressure sensor circuit □Vapor pressure sensor □ECM	○	○
P0500 (DI–333)	Vehicle Speed Sensor Malfunction	□Open or short in speed sensor circuit □Vehicle speed sensor □Combination meter □ECM	○	○
P0505 (DI–336)	Idle Control System Malfunction	□IAC valve is stuck or closed □Open or short in IAC valve circuit □Open or short in A/C signal circuit □Air intake (hose loose)	○	○

*: ○ ~~~MIL lights up

2. MANUFACTURER CONTROLLED

DTC No. (See Page)	Detection Item	Trouble Area	MIL*1	Memory
*2 P1130 (DI–340)	A/F Sensor Circuit Range/Performance Malfunction (Bank 1 Sensor 1)	Open or short in A/F sensor circuit A/F sensor (bank 1 sensor 2) ECM	○	○
*2 P1133 (DI–345)	A/F Sensor Circuit Response Malfunction (Bank 1 Sensor 1)	A/F sensor (bank 1 sensor 2)	○	○
*2 P1135 (DI–349)	A/F Sensor Heater Circuit Malfunction (Bank1 Sensor 1)	Open or short in A/F sensor (bank 1 sensor 2) A/F sensor (bank 1 sensor 2) heater ECM	○	○
*2 P1150 (DI–340)	A/F Sensor Circuit Range/Performance Malfunction (Bank2 Sensor 1)	Same as DTC No. P1130	○	○
*2 P1153 (DI–345)	A/F Sensor Circuit Response Malfunction (Bank 2 Sensor 1)	Same as DTC No. P1133	○	○
*2 P1155 (DI–349)	A/F Sensor Heater Circuit Malfunction (Bank 2 Sensor 1)	Same as DTC No. P1135	○	○
P1300 (DI–351)	Igniter Circuit Malfunction	Open or short in IGF or IGT circuit from igniter to ECM Igniter ECM	○	○
P1335 (DI–357)	Crankshaft Position Sensor Circuit Malfunction (during engine running)	Open or short in crankshaft position sensor circuit Crankshaft position sensor Starter ECM	–	○
P1410 (DI–358)	EGR Valve Position Sensor Circuit Malfunction	Open or short in EGR valve position sensor circuit EGR valve position sensor ECM	○	○
P1411 (DI–362)	EGR Valve Position Sensor Circuit Range/Performance Problem	EGR valve position sensor	○	○
P1520 (DI–363)	Stop Light Switch Signal Malfunction	Short in stop light switch signal circuit Stop light switch ECM	○	○
P1600 (DI–366)	ECM BATT Malfunction	Open in back up power source circuit ECM	○	○
P1780 (DI–368)	Park/Neutral Position Switch Malfunction	Short in park/neutral position switch circuit Park/neutral position switch ECM	○	○

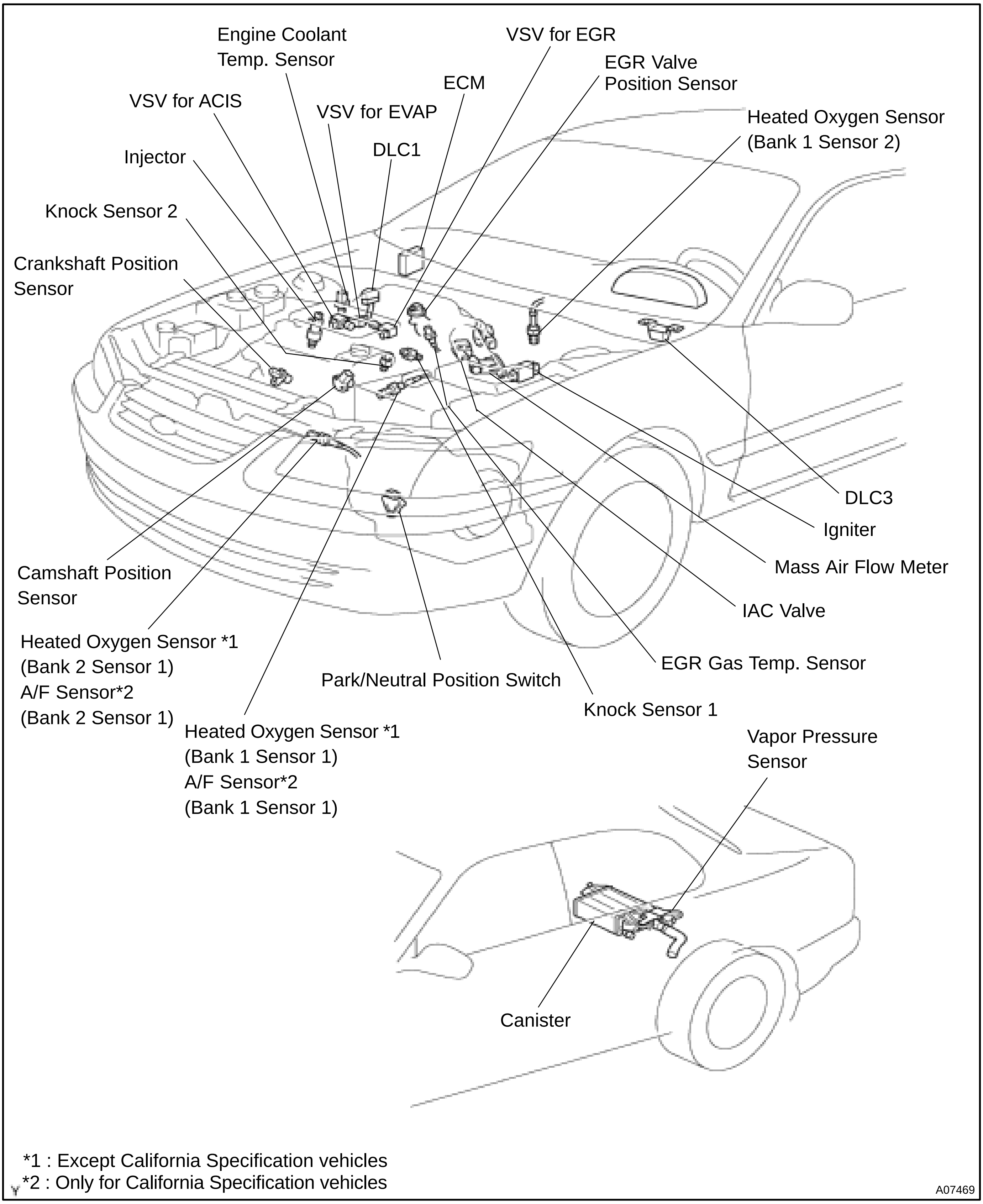
*1: ○ ~~~MIL lights up, – ~~~MIL does not light up
*2: Only for California specification vehicles

DTC No. (See Page)	Detection Item	Trouble Area	MIL*	Memory
B2795 (DI–928)	Unmatched key Code	Immobiliser system	–	○
B2796 (DI–929)	No Communication in Immobiliser System	Immobiliser system	–	○
B2797 (DI–932)	Communication Malfunction No.1	Immobiliser system	–	○
B2798 (DI–935)	Communication Malfunction No.2	Immobiliser system	–	○

*:– ~~~MIL does not light up

DI07C–06

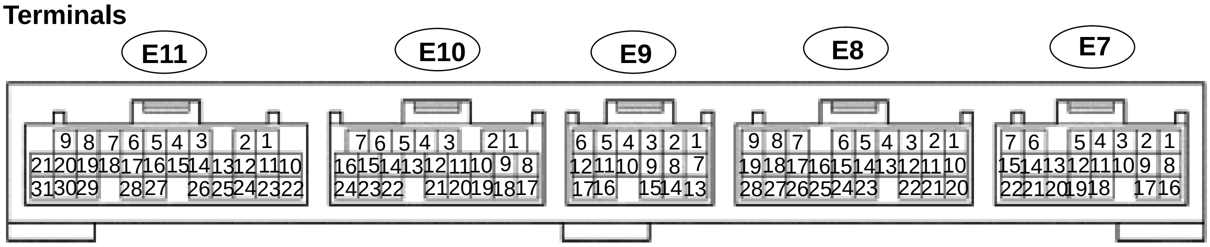
PARTS LOCATION



DI4DP–01

TERMINALS OF ECM

ECM Terminals



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Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
BATT (E7 – 1) – E1 (E10 – 17)	B–Y ↔ BR	Always	9 ~ 14
+B (E7 – 16) – E1 (E10 – 17)	R ↔ BR	IG switch ON	9 ~ 14
VC (E10 – 2) – E2 (E10 – 18)	Y ↔ BR	IG switch ON	4.5 ~ 5.5
VTA1 (E10 – 23) – E2 (E10 – 18)	L ↔ BR	IG switch ON Throttle valve fully closed	0.3 ~ 1.0
		IG switch ON Throttle valve fully open	3.2 ~ 4.9
VG (E10 – 10) – E2G (E10 – 19)	P ↔ R–B	Idling , A/C switch OFF	1.1 ~ 1.5
THA (E10 – 22) – E2 (E10 – 18)	L–Y ↔ BR	Idling, Intake air temp. 20˚C (68˚F)	0.5 ~ 3.4
THW (E10 –14) – E2 (E10 – 18)	G–B ↔ BR	Idling, Engine coolant temp. 80˚C (176˚F)	0.2 ~ 1.0
STA (E7 – 7) – E1 (E10 – 17)	GR ↔ BR	Cranking	6.0 or more
#10 (E10 – 5) – E01 (E11 – 21)	L ↔ BR	IG switch ON	9 ~ 14
		Idling	Pulse generation (See page DI–276)
#20 (E10 – 6) – E01 (E11 – 21)	R ↔ BR	IG switch ON	9 ~ 14
		Idling	Pulse generation (See page DI–276)
#30 (E11 – 1) – E01 (E11 – 21)	Y ↔ BR	IG switch ON	9 ~ 14
		Idling	Pulse generation (See page DI–276)
#40 (E11 – 2) – E01 (E11 – 21)	W ↔ BR	IG switch ON	9 ~ 14
		Idling	Pulse generation (See page DI–276)
#50 (E11 – 3) – E01 (E11 – 21)	R–L ↔ BR	IG switch ON	9 ~ 14
		Idling	Pulse generation (See page DI–276)
#60 (E11 – 4) – E01 (E11 – 21)	G ↔ BR	IG switch ON	9 ~ 14
		Idling	Pulse generation (See page DI–276)
IGT1 (E11 – 11) – E1 (E10– 17)	GR ↔ BR	Idling	Pulse generation (See page DI–351)
IGT2 (E11 – 12) – E1 (E10 – 17)	BR–Y ↔ BR	Idling	Pulse generation (See page DI–351)
IGT3 (E11 – 13) – E1 (E10 – 17)	LG–B ↔ BR	Idling	Pulse generation (See page DI–351)

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
IGF (E11 – 25) – E1 (E10 – 17)	W–R ↔ BR	IG switch ON	4.5 ~ 5.5
		Idling	Pulse generation (See page DI–351)
THG (E10 – 13) – E2 (E10 – 18)	G–Y ↔ BR	IG switch ON	4.5 ~ 5.5
G22+ (E11 – 10) – NE– (E10 – 24)	B–W ↔ L	Idling	Pulse generation (See page DI–287)
NE+ (E10 – 16) – NE– (E10 – 24)	B–R ↔ L	Idling	Pulse generation (See page DI–287)
ELS (E7 – 19) – E1 (E10 – 17)	G–O ↔ BR	Taillight switch ON	7.5 ~ 14
		Taillight switch OFF	0 ~ 1.5
ELS2 (E7 – 18) – E1 (E10 – 17)	B–Y ↔ BR	Defogger switch ON	7.5 ~ 14
		Defogger switch OFF	0 ~ 1.5
EGR (E11 – 18) – E01 (E11 –21)	Y–G ↔ BR	IG switch ON	9 ~ 14
ACIS (E11 – 17) – E01 (E11 – 21)	R–Y ↔ BR	IG switch ON	9 ~ 14
FC (E7 – 3) – E01 (E11 – 21)	G–R ↔ BR	IG switch ON	9 ~ 14
		Idling	0 ~ 3.0
EVP1 (E10 – 7) – E01 (E11 – 21)	LG ↔ BR	IG switch ON	9 ~ 14
RSC (E11 – 15) – E01 (E11 – 21)	Y–B ↔ BR	IG switch ON Disconnect E11 of ECM connector	9 ~ 14
RSO (E11 – 16) – E01 (E11 – 21)	R–W ↔ BR	IG switch ON Disconnect E11 of ECM connector	9 ~ 14
*OXR1 (E10 – 11) – E1 (E10 – 17)	W ↔ BR	Maintain engine speed at 2,500 rpm for 2 min. after warming up	Pulse generation (See page DI–305)
*OXL1 (E10 – 12) – E1 (E10 – 17)	B ↔ BR	Maintain engine speed at 2,500 rpm for 2 min. after warming up	Pulse generation (See page DI–305)
OXS (E8 – 8) – E1 (E10 – 17)	B ↔ BR	Maintain engine speed at 2,500 rpm for 2 min. after warming up	Pulse generation (See page DI–305)
*HTL (E10– 4) – E03 (E11 – 30)	Y–R ↔ BR	Idling	9 ~ 14
		IG switch ON	Below 3.0
*HTR (E10 – 3) – E03 (E11 – 30)	L–B ↔ BR	Idling	9 ~ 14
		IG switch ON	Below 3.0
HTS (E8 – 9) – E03 (E11 –30)	P–G ↔ BR	Idling	9 ~ 14
		IG switch ON	Below 3.0
KNKR (E11 – 27) – E1 (E10 – 17)	W ↔ BR	Idling	Pulse generation (See page DI–283)
KNKL (E11 – 28)– E1 (E10 – 17)	W ↔ BR	Idling	Pulse generation (See page DI–283)
NSW (E7 – 20) – E1 (E10 – 17)	B–W ↔ BR	IG switch ON Other shift position in ”P” ,”N” position	9 ~ 14
		IG switch ON Shift position in ”P” ,”N” position	0 ~ 3.0
SPD (E8 – 22) – E1 (E10 – 17)	V–W ↔ BR	IG switch ON Rotate driving wheel slowly	Pulse generation

*: Only for except California specification vehicles

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
TC (E11 – 6) – E1 (E10 – 17)	L–W ↔ BR	IG switch ON	9 ~ 14
W (E7 – 6) – E01 (E11 – 21)	G–R ↔ BR	IG switch ON	Below 3.0
PS (E10 – 9) – E1 (E10 – 17)	B–L ↔ BR	IG switch ON	9 ~ 14
ACT (E8 – 13) – E1 (E10 – 17)	LG–B ↔ BR	A/C switch OFF	Below 2.0
		A/C switch ON at idling	9 ~ 14
A/C (E8 – 25) – E1 (E10 – 17)	B–Y ↔ BR	A/C switch ON at idling	Below 2.0
		A/C switch OFF	9 ~ 14
CF (E11 – 29) – E1 (E10 – 17)	G–W ↔ BR	Electric cooling fan is operating on high speed	9 ~ 14
		Electric cooling fan is operating on low speed or OFF	0 ~ 2
TACH (E8– 27) – E1 (E10 – 17)	B–O ↔ BR	Idling	Pulse generation
TPC (E7 – 9) – E01 (E11 – 21)	W–R ↔ BR	IG switch ON Disconnect the vacuum hose from the vapor pressure sensor	9 ~ 14
PTNK (E7 – 17) – E1 (E10 – 17)	L–R ↔ BR	IG switch ON	3.0 ~ 3.6
		IG switch ON Apply vacuum 2.0 kPa (15 mmHg, 0.6 in.Hg)	1.3 ~ 2.1
SIL (E7 – 11) – E1 (E10 – 17)	W ↔ BR	During transmission	Pulse generation
STP (E7 – 15) – E1 (E10 – 17)	G–W ↔ BR	IG switch ON Brake pedal depressed	7.5 ~ 14
		IG switch ON Brake pedal released	Below 1.5
EGLS (E11 – 22) – E1 (E10 – 17)	W–G ↔ BR	IG switch ON Apply vacuum (0 kPa, 0 mmHg, 0 in.Hg) to EGR valve	0.4 ~ 1.6
		IG switch ON Apply vacuum (17.3 kPa, 130 mmHg, 5.12 in.Hg) to EGR valve	3.2 ~ 5.1
*1 AFR+ (E10 – 11 – E1 (E10 – 17)	BR ↔ BR	IG switch ON	3.3*
*1 AFR– (E10 – 20) – E1 (E10 – 17)	B–R ↔ BR	IG switch ON	3.0*
*1 AFL+ (E10 – 12) – E1 (E10 – 17)	B–W ↔ BR	IG switch ON	3.3*
*1 AFL– (E10 – 21) – E1 (E10 – 17)	L ↔ BR	IG switch ON	3.0*
*1 HAFR (E10 – 3) – E04 (E10 – 1)	B–R ↔ BR	IG switch ON	Below 3.0
		Idling (warm up the engine)	Pulse generation
*1 HAFL (E10 – 4) – E05 (E10 – 8)	B–W ↔ BR	IG switch ON	Below 3.0
		Idling (warm up the engine)	Pulse generation
KSW (E8 – 11) – E1 (E10 – 17)	L–B ↔ BR	At time of inserting the key	Below 1.5
		In condition without the key inserted	4 ~ 5
RXCK (E9 – 5) – E1 (E10 – 17)	R–L ↔ BR	At time of inserting the key	Pulse generation
CODE (E9 – 4) – E1 (E10 – 17)	G–W ↔ BR	At time of inserting the key	Pulse generation
IGSW (E7 – 2) – E1 (E10 – 17)	B–R ↔ BR	IG switch ON	9 ~ 14
TXCT (E9– 10) – E1 (E10 – 17)	L–Y ↔ BR	At time of inserting the key	Pulse
IMLD (E9 – 16) – E1 (E10 – 17)	R–Y ↔ BR	In condition without the key inserted	Pulse
MREL (E7 – 8) – E1 (E10 – 17)	B–R ↔ BR	IG switch ON	9 ~ 14

*: The ECM terminal voltage is fixed regardless of the output voltage from the sensor.
*1: Only for California specification vehicles

DI07E–06

PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
Engine does not crank (Does not start)	1. Starter 2. Starter relay	ST–18 ST–20
No initial combustion (Does not start)	1. ECM power source circuit 2. Fuel pump control circuit 3. Engine control module (ECM)	DI–369 DI–374 IN–31
No complete combustion (Does not start)	1. Fuel pump control circuit	DI–374
Engine cranks normally (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit 3. Compression	DI–384 DI–374 EM–3
Cold engine (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit	DI–384 DI–374
Hot engine (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit	DI–384 DI–374
High engine idle speed (Poor idling)	1. A/C signal circuit (Compressor Circuit) 2. ECM power source circuit	AC–88 DI–369
Low engine idle speed (Poor idling)	1. A/C signal circuit (Compressor Circuit) 2. Fuel pump control circuit	AC–88 DI–374
Rough idling (Poor idling)	1. Compression 2. Fuel pump control circuit	EM–3 DI–374
Hunting (Poor idling)	1. ECM power source circuit 2. Fuel pump control circuit	DI–369 DI–374
Hesitation/Poor acceleration (Poor driveability)	1. Fuel pump control circuit 2. A/T faulty	DI–374 DI–453
Surging (Poor driveability)	1. Fuel pump control circuit	DI–374
Soon after starting (Engine stall)	1. Fuel pump control circuit	DI–374
During A/C operation (Engine stall)	1. A/C signal circuit (Compressor Circuit) 2. Engine control module (ECM)	AC–88 IN–31
Unable to refuel/Difficult to refuel	1. ORVR system	EC–6

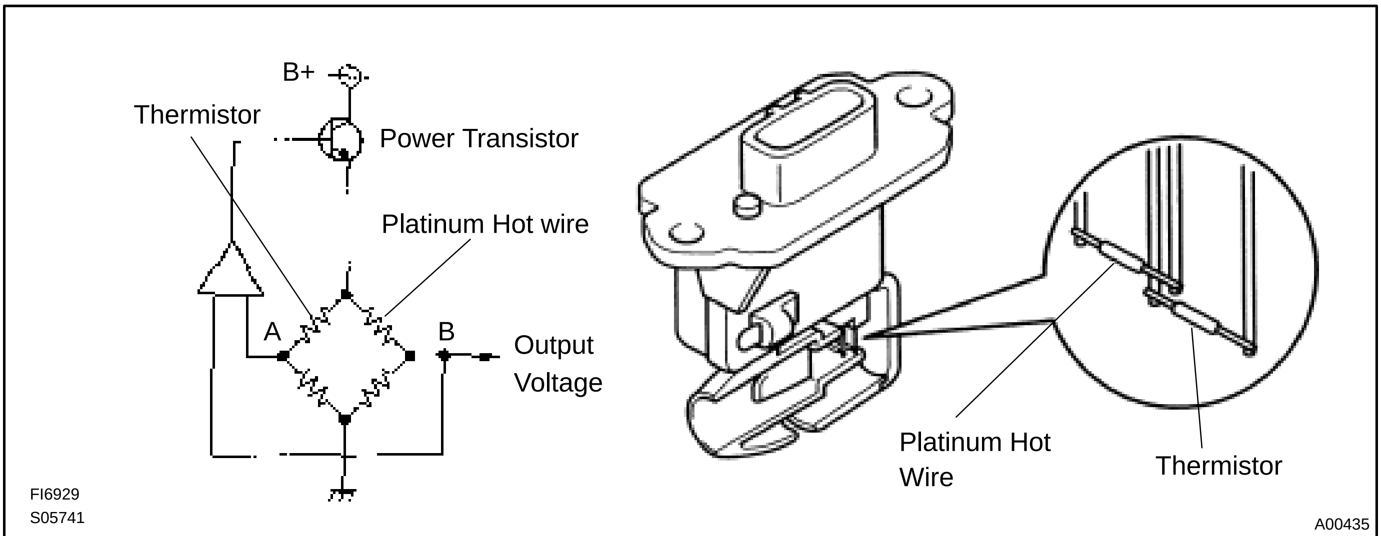
DI07F–06

CIRCUIT INSPECTION

DTC	P0100	Mass Air Flow Circuit Malfunction

CIRCUIT DESCRIPTION

The mass air flow meter uses a platinum hot wire. The hot wire air flow meter consists of a platinum hot wire, thermistor and a control circuit installed in a plastic housing. The hot wire air flow meter works on the principle that the hot wire and thermistor located in the intake air bypass of the housing detect any changes in the intake air temperature.
The hot wire is maintained at the set temperature by controlling the current flow through the hot wire. This current flow is then measured as the output voltage of the mass air flow meter.
The circuit is constructed so that the platinum hot wire and thermistor provide a bridge circuit, with the power transistor controlled so that the potential of A and B remains equal to maintain the set temperature.

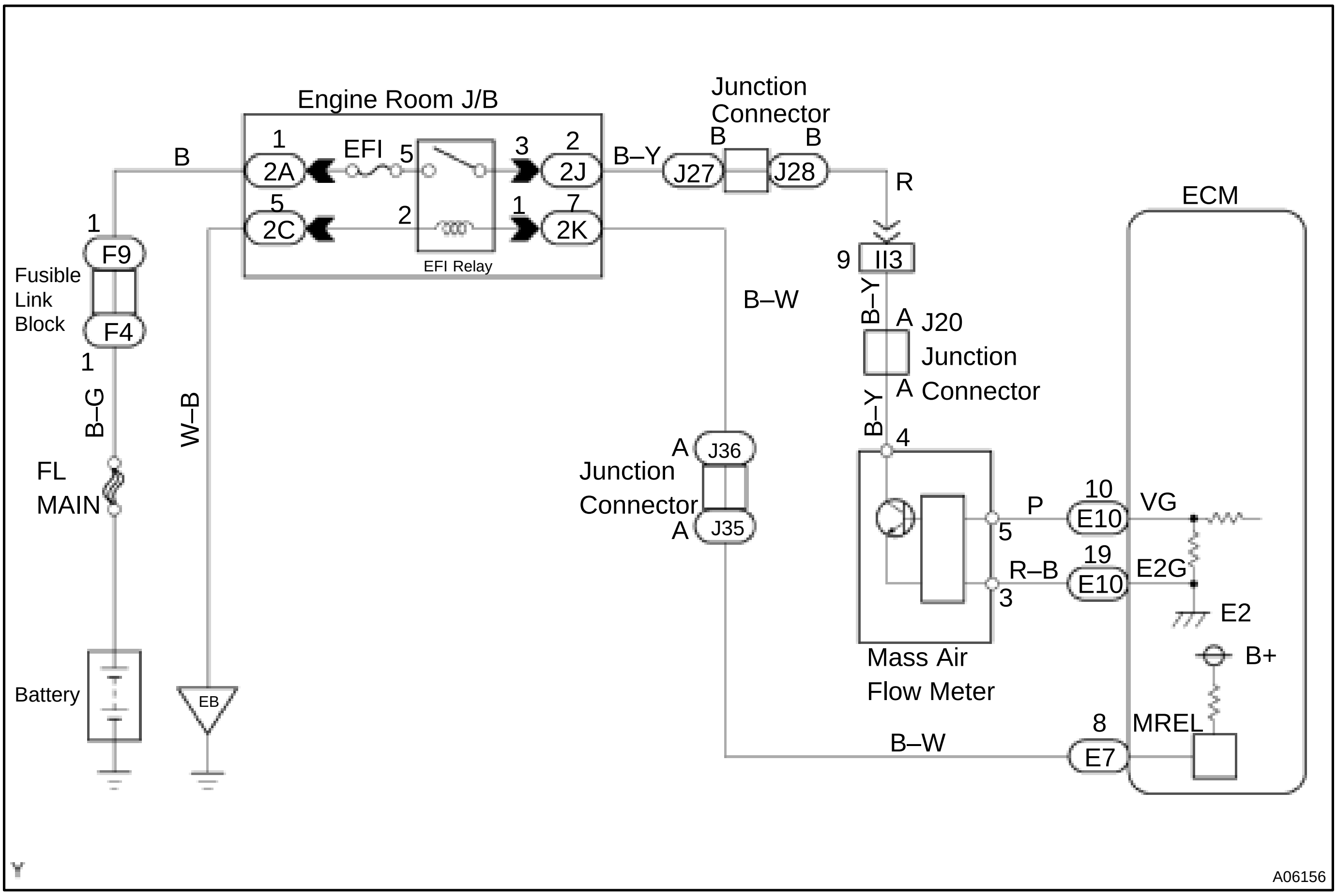


DTC No.	DTC Detecting Condition	Trouble Area
P0100	Open or short in mass air flow meter circuit with more than 3 sec. engine speed 4,000 rpm or less	●Open or short in mass air flow meter circuit ●Mass air flow meter ●ECM

If the ECM detects DTC 0100 it operates the fail–safe function, keeping the ignition timing and injection volume constant and making it possible to drive the vehicle.
HINT:
After confirming DTC P0100, use the OBD II scan tool or TOYOTA hand–held tester to confirm the mass air flow ratio from "CURRENT DATA".

Mass Air Flow Value (gm/sec.)	Malfunction
0.0	●Mass air flow meter power source circuit open ●VG circuit open or short
271.0 or more	●E2G circuit open

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	Connect OBD II scan tool or TOYOTA hand–held tester, and read value of mass air flow rate.

PREPARATION:
(a) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the OBD II scan tool or TOYOTA hand–held tester main switch ON.
(c) Start the engine.

CHECK:
Read mass air flow rate on the OBD II scan tool or TOYOTA hand–held tester.

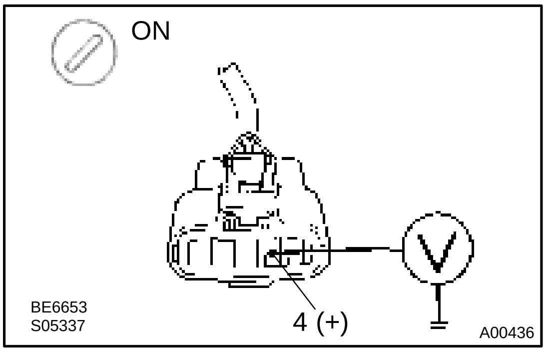
RESULT:

	Type I	Type II
Mass air flow rate (gm/sec.)	0.0	271.0 or more

Type I → **Go to step 2.**

Type II → **Go to step 5.**

2	Check voltage of mass air flow meter power source.



PREPARATION:
(a) Disconnect the mass air flow meter connector.
(b) Turn the ignition switch ON.

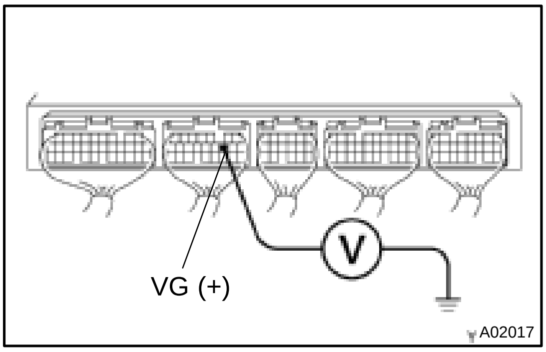
CHECK:
Measure voltage between terminal 4 of mass air flow meter connector and body ground.

OK:
Voltage: 9 ~ 14 V

NG → **Check for open in harness and connector between EFI main relay (Marking: EFI) and mass air flow meter (See page IN–31).**

OK

3	**Check voltage between terminal VG of ECM connector and body ground.**



PREPARATION:
(a) Remove the glove compartment (See page SF–73).
(b) Start the engine.

CHECK:
Measure voltage between terminal VG of the ECM connector and body ground while engine is idling.

OK:
Voltage:
1.1 ~ 1.5 V (P or N position and A/C switch OFF)

OK → **Check and replace ECM (See page IN–31).**

NG

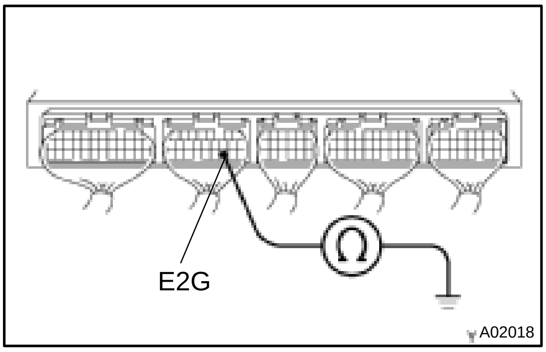
4	**Check for open and short in harness and connector between mass air flow meter and ECM (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Replace mass air flow meter.

5	Check continuity between terminal E2G of ECM and body ground.



PREPARATION:
Remove the glove compartment (See page SF–73).

CHECK:
Check continuity between terminal E2G of the ECM connector and body ground.

OK:
Continuity (1 Ω or less)

NG → **Check and replace ECM (See page IN–31).**

OK ↓

6	Check for open in harness and connector between mass air flow meter and ECM (See page IN–31).

NG → **Repair or replace harness or connector.**

OK ↓

Replace mass air flow meter.

DI07G–06

DTC	P0101	Mass Air Flow Circuit Range/Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0100 (Mass Air Flow Circuit Malfunction) on page DI–222.

DTC No.	DTC Detecting Condition	Trouble Area
P0101	Conditions (a), (b) and (c) continue 10 sec. or more with engine speed NE < 900: (2 trip detection logic) (a) Throttle valve fully closed (b) Mass air flow meter output > 2.2 V (c) THW ≧ 70°C	•Mass air flow meter
	Conditions (a) and (b) continue 10 sec. or more with engine speed 1,500 rpm or more: (2 trip detection logic) (a) VTA ≧ 0.63 V (b) Mass air flow meter output ~ 1.06 V	

WIRING DIAGRAM

Refer to DTC P0100 (Mass Air Flow Circuit Malfunction) on page DI–222.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Are there any other codes (besides DTC P0101) being output?**

NO → **Replace mass air flow meter.**

YES

Go to relevant DTC chart.

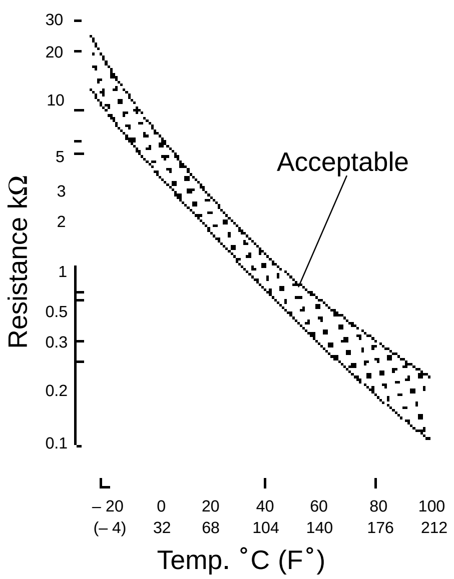
DI07H–07

DTC	P0110	Intake Air Temp. Circuit Malfunction

CIRCUIT DESCRIPTION

The intake air temp. sensor is built into the air flow meter and senses the intake air temperature.
A thermistor built in the sensor changes the resistance value according to the intake air temperature.
The lower the intake air temperature, the greater the thermistor resistance value, and the higher the intake air temperature, the lower the thermistor resistance value (See Fig. 1).
The intake air temperature sensor is connected to the ECM. The 5 V power source voltage in the ECM is applied to the intake air temperature sensor from the terminal THA via resistor R.
That is, the resistor R and the intake air temperature sensor are connected in series. When the resistance value of the intake air temperature sensor changes in accordance with changes in the intake air temperature, the potential at terminal THA also changes. Based on this signal, the ECM increases the fuel injection volume to improve driveability during cold engine operation.
If the ECM detects the DTC P0110, it operates the fail–safe function in which the intake air temperature is assumed to be 20˚C (68˚F).

(fig. 1)



FI4741

<Reference>

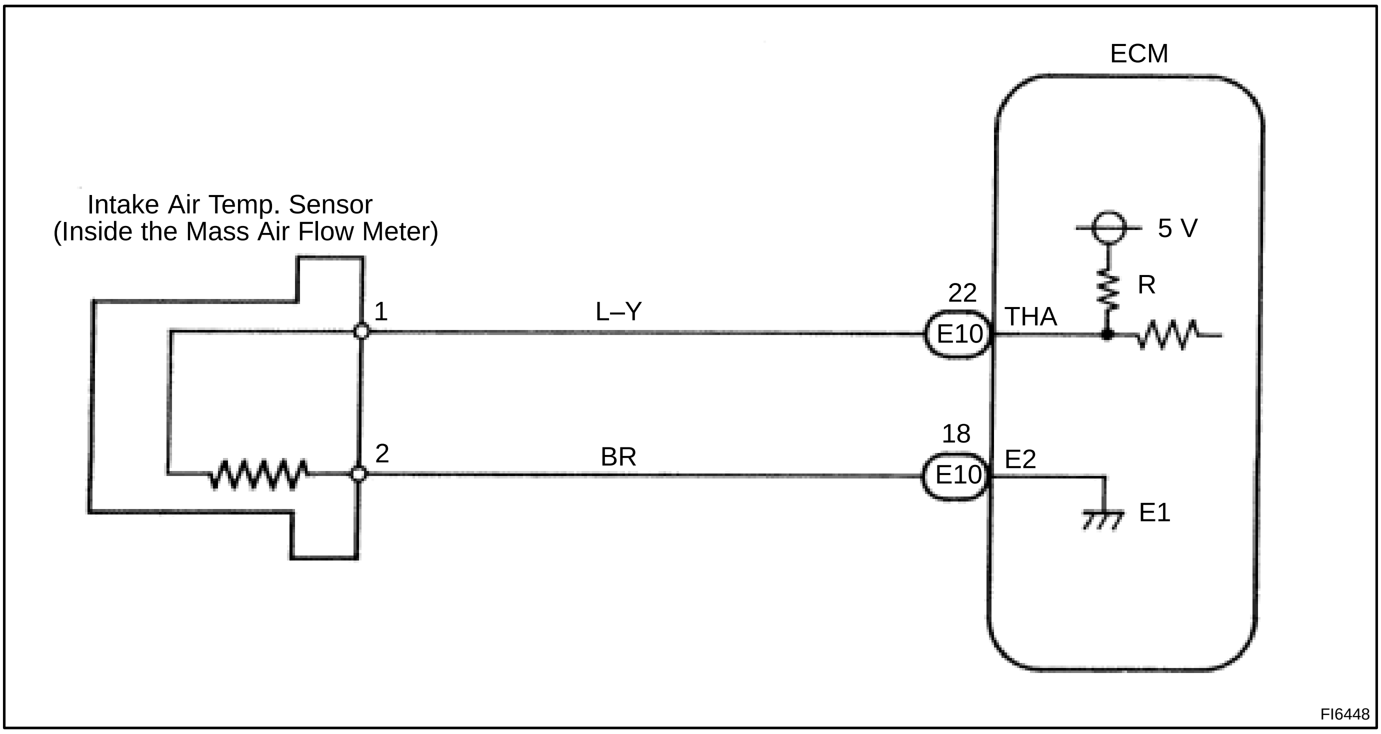
Intake air temp. ˚C (˚F)	Resistance (kΩ)	Voltage (V)
–20 (–4)	16.0	4.3
0 (32)	5.9	3.4
20 (68)	2.5	2.4
40 (104)	1.1	1.4
60 (140)	0.6	0.9
80 (176)	0.3	0.5
100 (212)	0.1	0.2

DTC No.	DTC Detecting Condition	Trouble Area
P0110	Open or short in intake air temp. sensor circuit	●Open or short in intake air temp. sensor circuit ●Intake air temp. sensor (built into mass air flow meter) ●ECM

HINT:
After confirming DTC P0110, use the OBD II scan tool or TOYOTA hand–held tester to confirm the intake air temp. from ”CURRENT DATA”.

Temp. Displayed	Malfunction
–40˚C (–40˚F)	Open circuit
140˚C (284˚F) or more	Short circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTCs P0110 (Intake Air Temp. Circuit Malfunction), P0115 (Engine Coolant Temp. Circuit Malfunction), P0120 (Throttle/Pedal Position Sensor/Switch "A" Circuit Malfunction) and P1410 (EGR Valve Position Sensor Circuit Malfunction) are output simultaneously, E2 (Sensor Ground) may be open.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	Connect OBD II scan tool or TOYOTA hand–held tester, and read value of intake air temp.

PREPARATION:
(a) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the OBD II scan tool or TOYOTA hand–held tester main switch ON.

CHECK:
Read temp. value on the OBD II scan tool or TOYOTA hand–held tester.

OK:
Same as actual intake air temp.

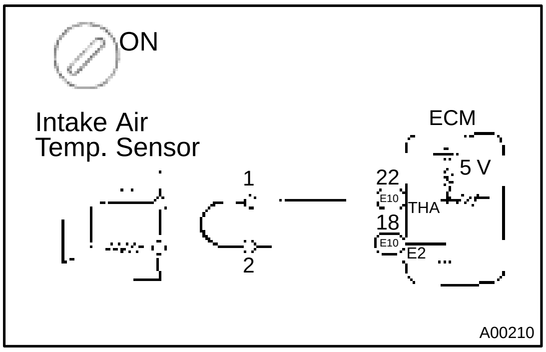
HINT:
- If there is open circuit, OBD II scan tool or TOYOTA hand–held tester indicates –40˚C (–40˚F).
- If there is short circuit, OBD II scan tool or TOYOTA hand–held tester indicates 140˚C (284˚F) or more.

NG → **–40˚C (–40˚F) ... Go to step 2.**
140˚C (284˚F) or more ... Go to step 4.

OK

Check for intermittent problems (See page DI–197).

2	Check for open in harness or ECM.



PREPARATION:
(a) Disconnect the mass air flow meter connector.
(b) Connect sensor wire harness terminals together.
(c) Turn the ignition switch ON.

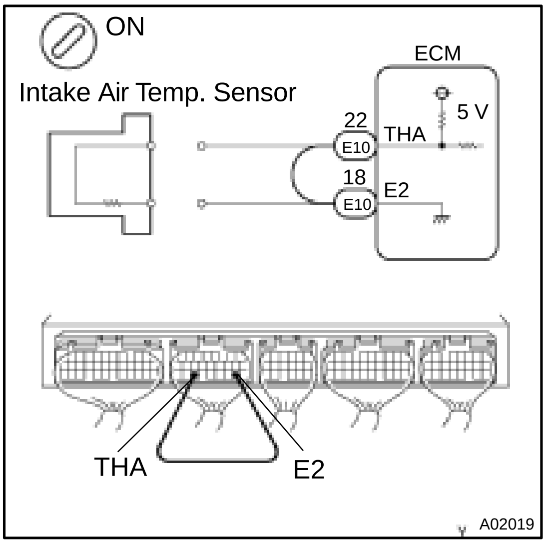
CHECK:
Read temp. value on the OBD II scan tool or TOYOTA hand–held tester.

OK:
Temp. value: 140°C (284°F) or more

OK → **Confirm good connection at sensor. If OK, replace mass air flow meter.**

NG

3	**Check for open in harness or ECM.**



PREPARATION:

(a) Remove the glove compartment (See page SF–73).

(b) Connect between terminals THA and E2 of ECM connector.

HINT:

Mass air flow meter connector is disconnected.

Before checking, do a visual and contact pressure check for the ECM connector (See page IN–31).

CHECK:

Read temp. value on the OBD II scan tool or TOYOTA hand–held tester.

OK:

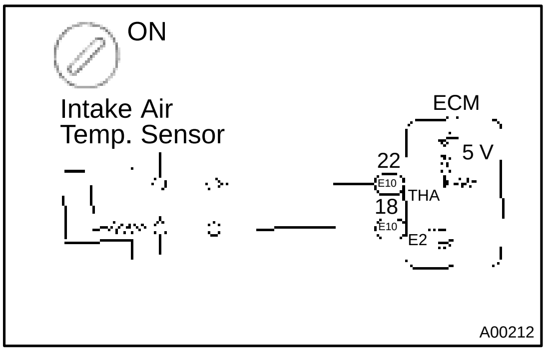
Temp. value: 140°C (284°F) or more

OK → **Open in harness between terminal E2 or THA, repair or replace harness.**

NG

Confirm good connection at ECM.
If OK, check and replace ECM.

4	**Check for short in harness and ECM.**



PREPARATION:

(a) Disconnect the mass air flow meter connector.

(b) Turn the ignition switch ON.

CHECK:

Read temp. value on the OBD II scan tool or TOYOTA hand–held tester.

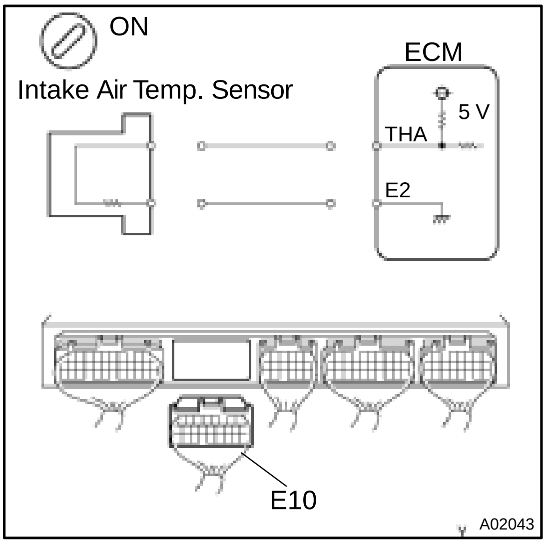
OK:

Temp. value: –40°C (–40°F)

OK → **Replace mass air flow meter.**

NG

5	Check for short in harness or ECM.



PREPARATION:

(a) Remove the glove compartment (See page SF–73).

(b) Disconnect the E10 connector of ECM.

HINT:

Mass air flow meter connector is disconnected.

(c) Turn the ignition switch ON.

CHECK:

Read temp. value on the OBD II scan tool or TOYOTA hand–held tester.

OK:

Temp. value: – 40°C (– 40°F)

OK → **Repair or replace harness or connector.**

NG

Check and replace ECM (See page IN–31).

DI07I–06

DTC	P0115	Engine Coolant Temp. Circuit Malfunction

CIRCUIT DESCRIPTION

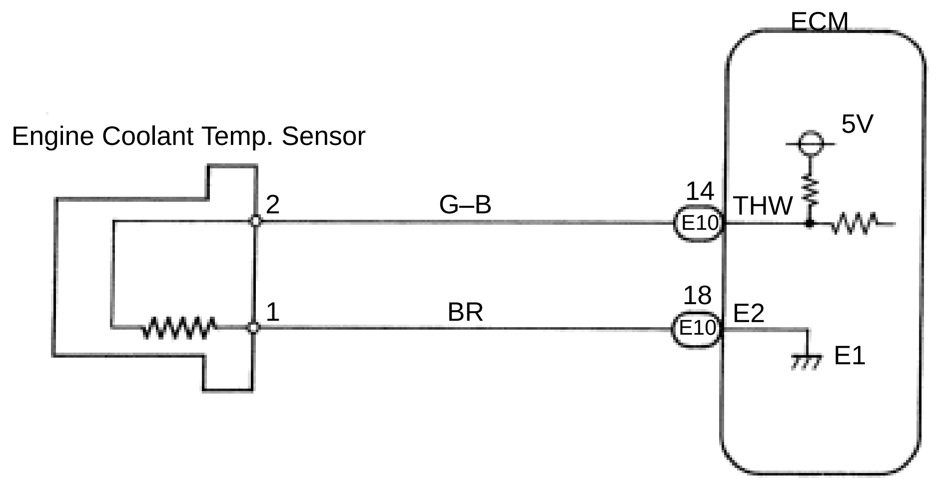
A thermistor built into the engine coolant temp. sensor changes the resistance value according to the engine coolant temp.
The structure of the sensor and connection to the ECM is the same as in the intake air temp. circuit malfunction shown on page DI–228.
If the ECM detects the DTC P0115, it operates fail–safe function in which the engine coolant temperature is assumed to be 80°C (176°F).

DTC No.	Detection Item	Trouble Area
P0115	Open or short in engine coolant temp. sensor circuit	●Open or short in engine coolant temp. sensor circuit ●Engine coolant temp. sensor ●ECM

HINT:
After confirming DTC P0115, use the OBD II scan tool or TOYOTA hand–held tester to confirm the engine coolant temp. from CURRENT DATA.

Temperature Displayed	Malfunction
–40°C (–40°F)	Open circuit
140°C (284°F) or more	Short circuit

WIRING DIAGRAM



FI6448

INSPECTION PROCEDURE

HINT:

- If DTCs P0110 (Intake Air Temp. Circuit Malfunction), P0115 (Engine Coolant Temp. Circuit Malfunction), P0120 (Throttle/Pedal/Position Sensor/Switch ”A” Circuit Malfunction) and P1410 (EGR Valve Position Sensor Circuit Malfunction) are output simultaneously, E2 (Sensor Ground) may be open.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Connect OBD II scan tool or TOYOTA hand–held tester, and read value of engine coolant temperature.**

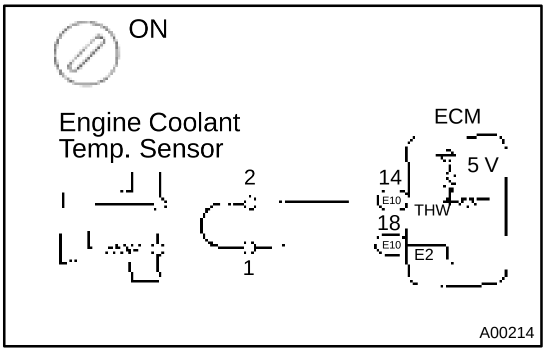
PREPARATION:
(a) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the OBD II scan tool or TOYOTA hand–held tester main switch ON.
CHECK:
Read temperature value on the OBD II scan tool or TOYOTA hand–held tester.
OK:
Same as actual engine coolant temperature.
HINT:
- If there is open circuit, OBD II scan tool or TOYOTA hand–held tester indicates –40°C (–40°F).
- If there is open circuit, OBD II scan tool or TOYOTA hand–held tester indicates 140°C (284°F) or more.

NG → **–40°C (–40°F) ... Go to step 2.**
140°C (284°F) or more ... Go to step 4.

OK ↓

Check for intermittent problems (See page **DI–197****).**

2	**Check for open in harness or ECM.**

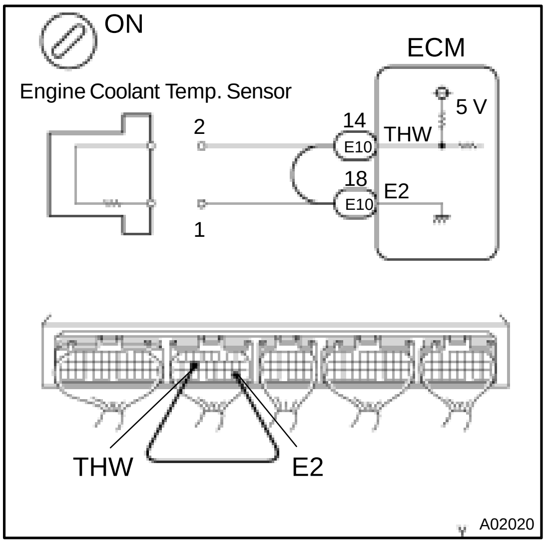


PREPARATION:
(a) Disconnect the engine coolant temp. sensor connector.
(b) Connect the sensor wire harness terminals together.
(c) Turn the ignition switch ON.
CHECK:
Read temp. value on the OBD II scan tool or TOYOTA hand–held tester.
OK:
Temperature value: 140°C (284°F) or more

OK → **Confirm good connection at sensor. If OK, replace engine coolant temp. sensor.**

NG ↓

3	Check for open in harness or ECM.



PREPARATION:

(a) Remove the glove compartment (See page SF–73).

(b) Connect between terminals THW and E2 of the ECM connector.

HINT:

Engine coolant temp. sensor connector is disconnected. Before checking, do a visual and contact pressure check for the ECM connector (See page IN–31).

(c) Turn the ignition switch ON.

CHECK:

Read temperature. value on the OBD II scan tool or TOYOTA hand–held tester.

OK:

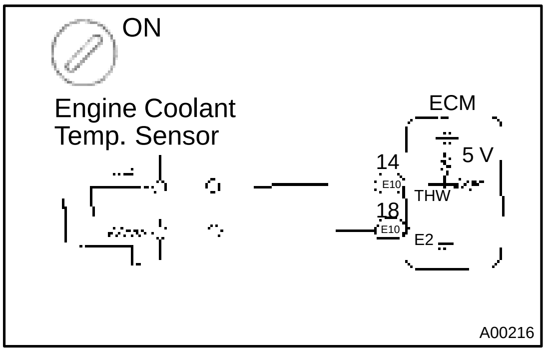
Temperature value: 140°C (284°F) or more

OK → **Open in harness between terminal E2 or THW, repair or replace harness.**

NG

Confirm good connection at ECM.
If OK, check and replace ECM.

4	Check for short in harness and ECM.



PREPARATION:

(a) Disconnect the engine coolant temp. sensor connector.

(b) Turn the ignition switch ON.

CHECK:

Read temperature value on the OBD II scan tool or TOYOTA hand–held tester.

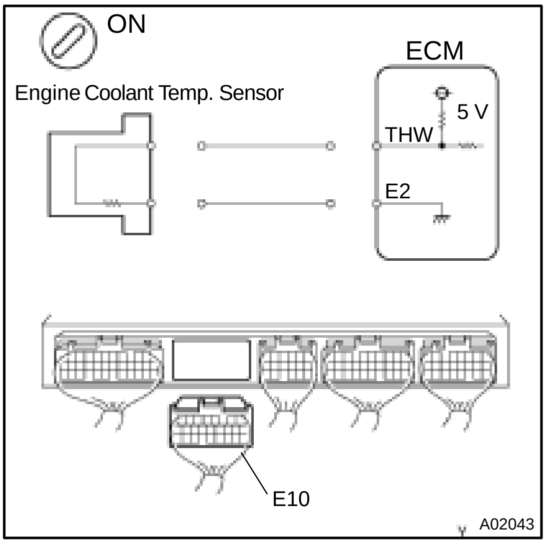
OK:

Temperature value: –40°C (–40°F)

OK → **Replace engine coolant temp. sensor.**

NG

5	Check for short in harness or ECM.



PREPARATION:

(a) Remove the glove compartment (See page SF–73).

(b) Disconnect the E10 connector of the ECM.

HINT:

Engine coolant temp. sensor connector is disconnected.

(c) Turn the ignition switch ON.

CHECK:

Read temperature value on the OBD II scan tool or TOYOTA hand–held tester.

OK:

Temperature value: –40°C (–40°F)

OK	Repair or replace harness or connector.

NG

Check and replace ECM (See page IN–31).

DI07J–06

DTC	P0116	Engine Coolant Temp. Circuit Range/ Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0115 (Engine Coolant Temp. Circuit Malfunction) on page DI–233.

<table>
<tr><th>DTC No.</th><th>DTC Detecting Condition</th><th>Trouble Area</th></tr>
<tr><td rowspan="4">P0116</td><td>If THW ¿ –7°C (19.4°F), 20 min. or more after starting engine, engine coolant temp. sensor value is 20°C (68°F) or less
(2 trip detection logic)</td><td rowspan="4">●Engine coolant temp. sensor
●Cooling system</td></tr>
<tr><td>If THW ~ –7°C (19.4°F) and ¿ 10°C (50°F), 5 min. or more after starting engine,
engine coolant temp. sensor value is 20°C (68°F) or less
(2 trip detection logic)</td></tr>
<tr><td>If THW ~ 10°C (50 °F), 2 min. or more after starting engine, engine coolant temp. sensor value is 30°C (86°F)
(2 trip detection logic)</td></tr>
<tr><td>When THW ~ 35°C (95°F) or more and less than 60°C (140°F), THA ~ – 6.7°C (19.9°F) or more, when starting engine , condition (a) and (b) continues:
(a) Vehicle speed is changing (Not stable)
(b) When starting engine, THW< 3°C (37.4°F)
(2 trip detection logic)</td></tr>
</table>

INSPECTION PROCEDURE

HINT:

- If DTCs P0115 (Engine Coolant Temp. Circuit Malfunction) and P0116 (Engine Coolant Temp. Circuit Range/Performance) are output simultaneously, engine coolant temp. sensor circuit may be open. Perform troubleshooting of DTC P0115 first.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	Are there any other codes (besides DTC P0116) being output?

YES → **Go to relevant DTC chart.**

NO

2	Check thermostat (See page CO–9).

NG → **Replace thermostat.**

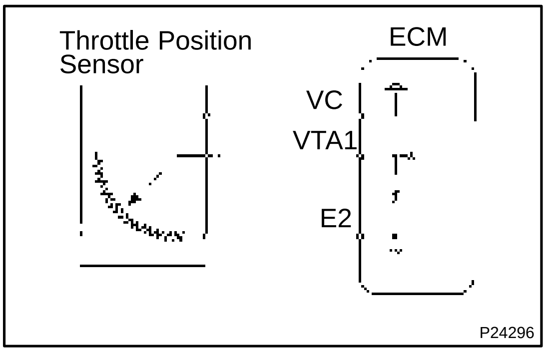
OK

Replace engine coolant temp. sensor.

DI07K–06

DTC	P0120	Throttle/Pedal Position Sensor/Switch ”A” Circuit Malfunction

CIRCUIT DESCRIPTION



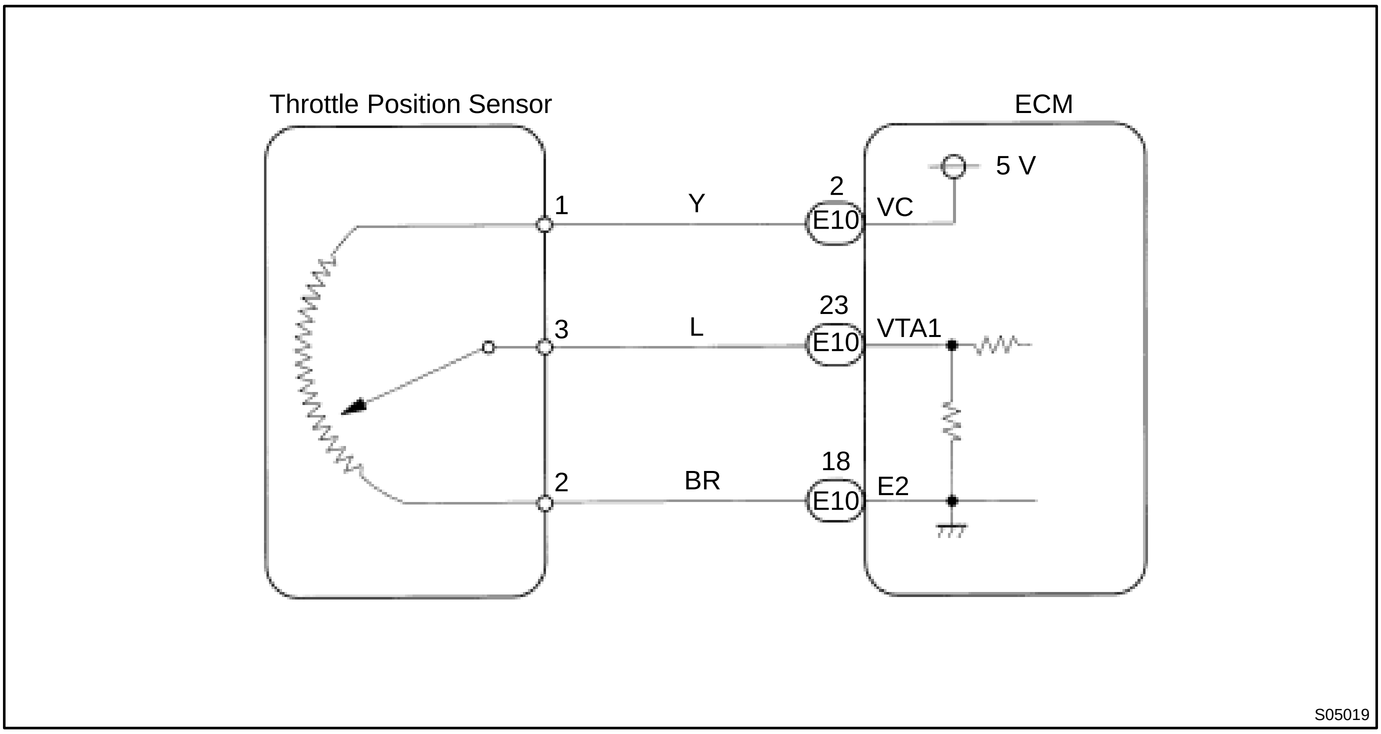
The throttle position sensor is mounted in the throttle body and detects the throttle valve opening angle. When the throttle valve is fully closed, a voltage of approximately 0.7 V is applied to terminal VTA of the ECM. The voltage applied to the terminals VTA of the ECM increases in proportion to the opening angle of the throttle valve and becomes approximately 2.7 ~ 5.2 V when the throttle valve is fully opened. the ECM judges the vehicle driving conditions from these signals input from terminals VTA and uses them as one of the conditions for deciding the air–fuel ratio correction, power increase correction and fuel–cut control etc.

DTC No.	DTC Detecting Condition	Trouble Area
P0120	Condition (a) or (b) continues: (a) VTA ≦ 0.1 V (b) VTA ≧ 4.9 V	●Open or short in throttle position sensor circuit ●Throttle position sensor ●ECM

HINT:
After confirming DTC P0120, use the OBD II scan tool or TOYOTA hand–held tester to confirm the throttle valve opening percentage and closed throttle position switch condition.

Throttle valve opening position expressed as percentage		Trouble Area
Throttle valve fully closed	Throttle valve fully open	
0 %	0 %	VC line open VTA line open or short
Approx. 100 %	Approx. 100 %	E2 line open

WIRING DIAGRAM

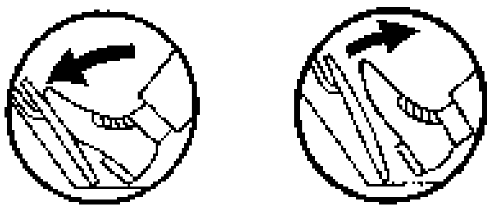


INSPECTION PROCEDURE

HINT:

- If DTCs P0110(Intake Air temp. Circuit Malfunction), P0115(Engine Coolant Temp. Circuit Malfunction), P0120(Throttle/Pedal Position Sensor/Switch ”A” Circuit Malfunction) and P1410 are output simultaneously, E2 (Sensor Ground) may be open.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	Connect OBD II scan tool or TOYOTA hand–held tester, and read throttle valve opening percentage.


FI7052

PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA hand–held tester to DLC3.

(b) Turn the ignition switch ON and push the OBD II scan tool or TOYOTA hand–held tester main switch ON.

CHECK:

Read the throttle valve opening percentage.

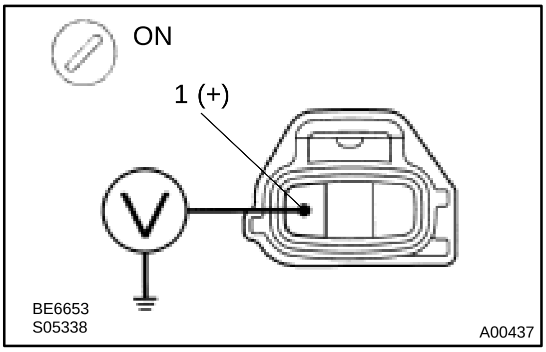
OK:

Throttle valve	Throttle valve opening position expressed as percentage
Fully open	Approx. 75 %
Fully closed	Approx. 10 %

OK → **Check for intermittent problems (See page DI–197).**

NG

2	Check voltage between terminal 1 of wire harness side connector and body ground.



PREPARATION:
(a) Disconnect the throttle position sensor connector.
(b) Turn the ignition switch ON.

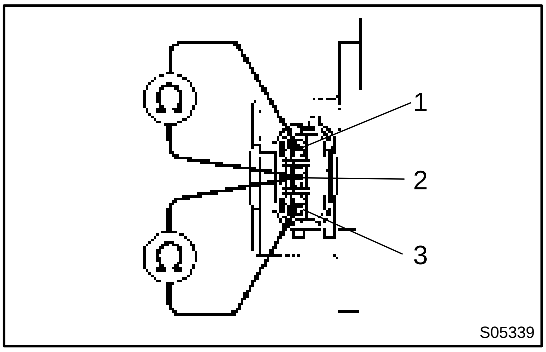
CHECK:
Measure voltage between terminal 1 of wire harness side connector and body ground.

OK:
Voltage: 4.5 ~ 5.5 V

NG → **Go to step 5.**

OK

3	Check throttle position sensor.



PREPARATION:
Disconnect the throttle position sensor connector.

CHECK:
Measure voltage between terminals 1, 3 and 2 of throttle position sensor.

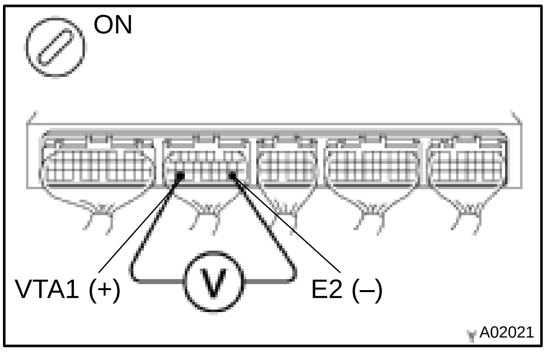
OK:

Terminals	Throttle valve	Resistance
1 ~ 2	—	2.5 ~ 5.9 kΩ
3 ~ 2	Fully closed	0.2 ~ 6.3 kΩ
3 ~ 2	Fully open	2.0 ~ 10.2 kΩ

NG → **Replace throttle position sensor.**

OK

4	Check voltage between terminals VTA1 and E2 of ECM.



PREPARATION:

(a) Remove the glove compartment (See page SF–73).

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals VTA1 and E2 of the ECM connector.

OK:

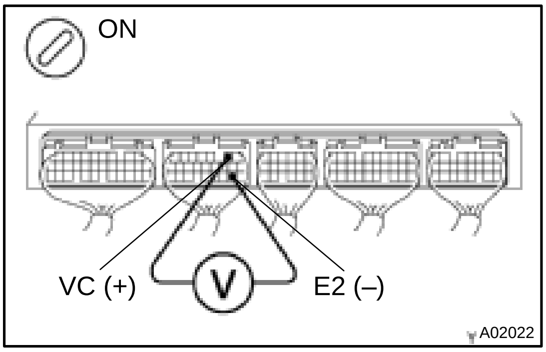
Throttle valve	Voltage
Fully closed	0.3 ~ 1.0 V
Fully open	2.7 ~ 5.2 V

NG → **Check for open and short in harness and connector between ECM and throttle position sensor (VTA line) (See page IN–31).**

OK ↓

Check and replace ECM (See page IN–31).

5	Check voltage between terminals VC and E2 of ECM.



PREPARATION:

(a) Remove the glove compartment (See page SF–73).

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals VC and E2 of the ECM connector.

OK:

Voltage: 4.5 ~ 5.5 V

NG → **Check and replace ECM (See page IN–31).**

OK ↓

Check for open in harness and connector between ECM and sensor (VC line) (See page IN–31).

DI07L–06

DTC	P0121	Throttle/Pedal Position Sensor/Switch ”A” Circuit Range/Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0120 (Throttle/Pedal Position Sensor/Switch ”A” Circuit Malfunction) on page DI–239.

DTC No.	DTC Detecting Condition	Trouble Area
P0121	After vehicle speed has been exceeded 30 km/h (19 mph) even once, output value of throttle position sensor is out of applicable range while vehicle speed between 30 km/h (19 mph) and 0 km/h (0 mph) (2 trip detection logic)	•Throttle position sensor

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	Are there any other codes (besides DTC P0121) being output?

YES → **Go to relevant DTC chart.**

NO

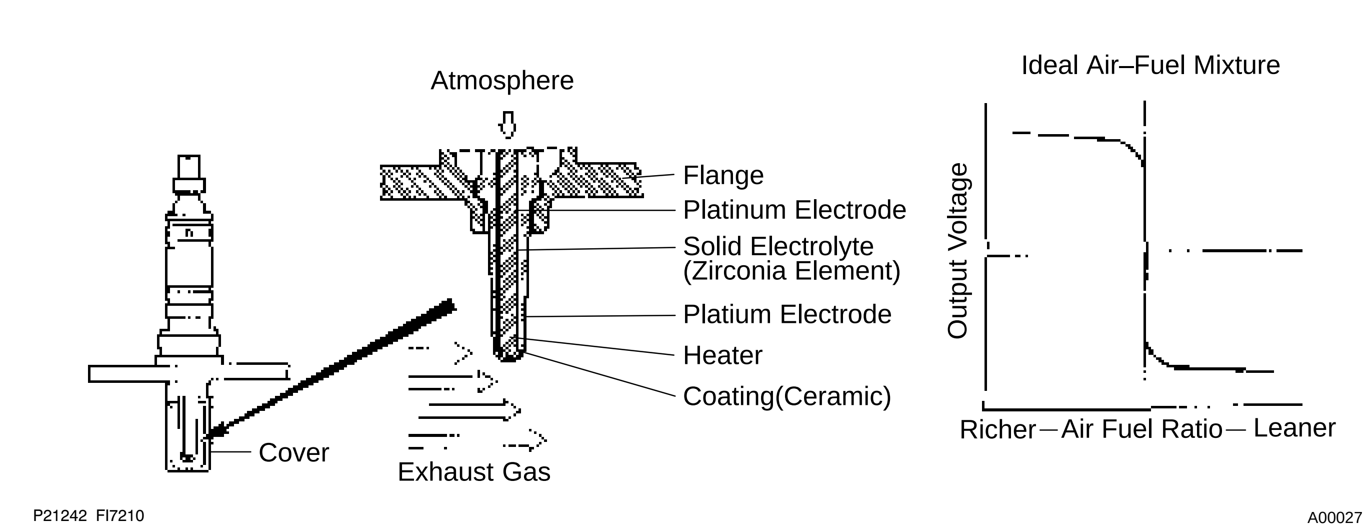
Replace throttle position sensor.

DI07M–08

DTC	P0125	Insufficient Coolant Temp. for Closed Loop Fuel Control (Except California Spec.)

CIRCUIT DESCRIPTION

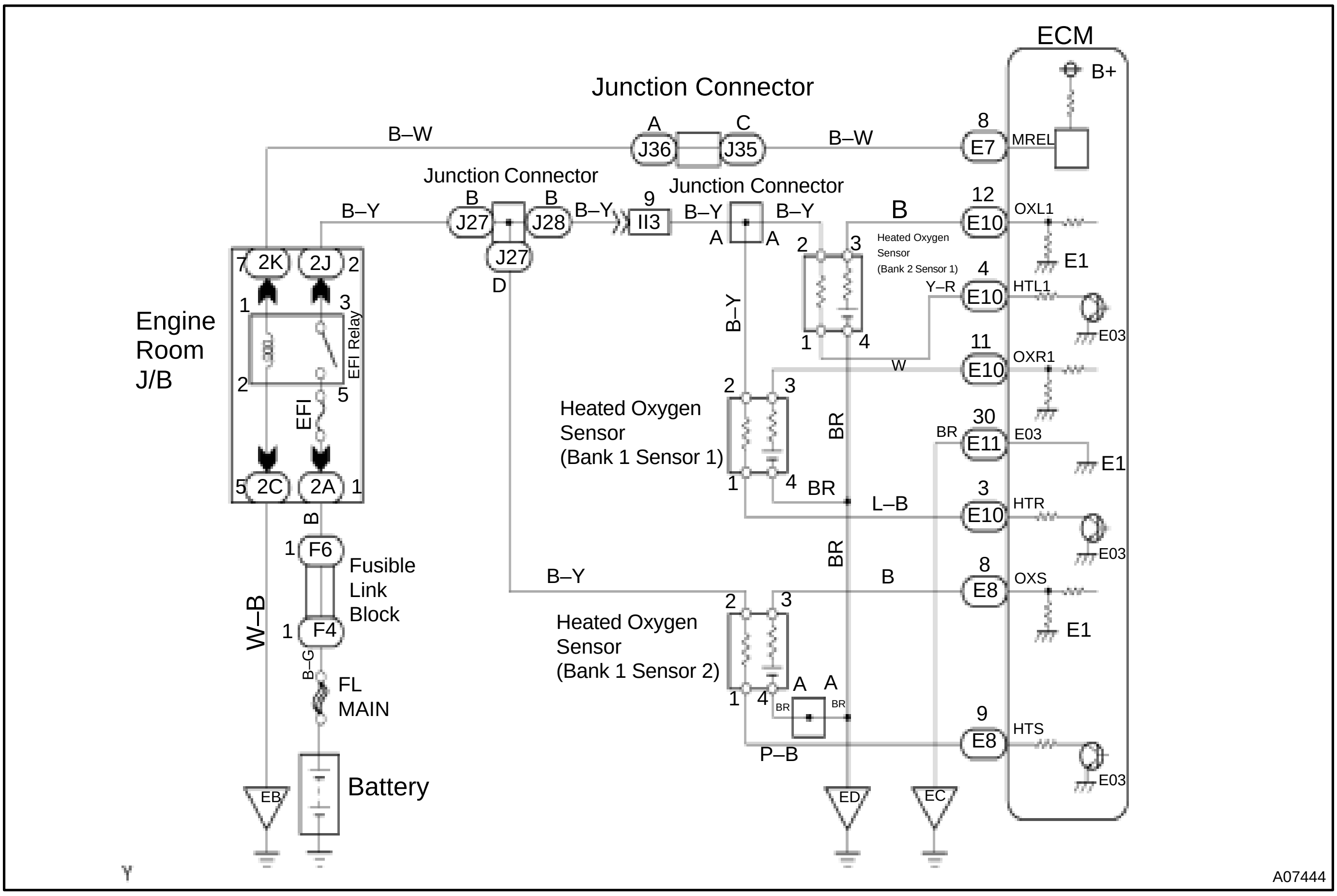
To obtain a high purification rate for the CO, HC and NOx components of the exhaust gas, a three–way catalytic converter is used, but for the most efficient use of the three–way catalytic converter, the air–fuel ratio must be precisely controlled so that it is always close to the stoichiometric air–fuel ratio.
The oxygen sensor has the characteristic whereby its output voltage changes suddenly in the vicinity of the stoichiometric air–fuel ratio. This characteristic is used to detect the oxygen concentration in the exhaust gas and provide feedback to the computer for control of the air–fuel ratio.
When the air–fuel ratio becomes LEAN, the oxygen concentration in the exhaust increases and the oxygen sensor informs the ECM of the LEAN condition (small electromotive force: < 0.45 V).
When the air–fuel ratio is RICHER than the stoichiometric air–fuel ratio the oxygen concentration in the exhaust gas is reduced and the oxygen sensor informs the ECM of the RICH condition (large electromotive force: > 0.45 V). The ECM judges by the electromotive force from the oxygen sensor whether the air–fuel ratio is RICH or LEAN and controls the injection time accordingly. However, if malfunction of the oxygen sensor causes output of abnormal electromotive force, the ECM is unable to perform accurate air–fuel ratio control.
The heated oxygen sensors include a heater which heats the zirconia element. The heater is controlled by the ECM. When the intake air volume is low (the temperature of the exhaust gas is low) current flows to the heater to heat the sensor for accurate oxygen concentration detection.



DTC No.	DTC Detecting Condition	Trouble Area
P0125	After engine is warmed up, heated oxygen sensor (bank 1, 2 sensor 1) output does not indicate RICH (> 0.45 V) even once when conditions (a), (b), (c) and (d) continue for at least 2 min.: (a) Engine speed: 1,500 rpm or more (b) Vehicle speed: 40 ∼ SPD and 100 km/h (25 ∼ SPD and 62 mph) (c) Throttle valve does not fully closed (d) 140 sec. or more after starting engine	●Fuel system ●Injector ●Ignition system ●Gas leakage on exhaust system ●Open or short in heated oxygen sensors (bank 1, 2 sensor 1) circuit ●Heated oxygen sensors (bank 1, 2 sensor 1) ●ECM

HINT:
After confirming DTC P0125, use the OBD II scan tool or TOYOTA hand–held tester to confirm voltage output of the heated oxygen sensors (bank 1, 2 sensor 1) from CURRENT DATA.
If voltage output of the heated oxygen sensors (bank 1, 2 sensor 1) is less than 0.1 V, heated oxygen sensors (bank 1, 2 sensor 1) circuit may be open or short.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If the vehicle run out fuel, the air–fuel ratio is LEAN and DTC P0125 will be recorded.
  The MIL then comes on.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	Are there any other codes (besides DTC P0125) being output ?

YES → **Go to relevant DTC chart.**

NO

2	Connect OBD II scan tool or TOYOTA hand–held tester, and read value for voltage output of heated oxygen sensors (bank 1, 2 sensor 1).

PREPARATION:
(a) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.
(b) Warm up the engine to normal operating temp.(above 75°C (169°F)).
CHECK:
Read voltage output of the heated oxygen sensors (bank 1,2 sensor 1) when engine is suddenly raced.
HINT:
Perform quick racing to 4,000 rpm 3 times using accelerator pedal.
OK:
Heated oxygen sensors (bank 1, 2 sensor 1) output a RICH signal (0.45 V or more) at least once.

OK → **Go to step 10.**

NG

3	Check for open and short in harness and connector between ECM and heated oxygen sensors (bank 1, 2 sensor 1) (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

4	Check whether misfire is occurred or not by monitoring DTC and data list.

NG → Perform troubleshooting for misfire (See page DI–351).

OK

5	Check air induction system (See page SF–1).

NG → Repair or replace.

OK

6	Check EGR system (See page EC–11).

NG → Replace EGR system.

OK

7	Check fuel pressure (See page SF–6).

NG → Check and repair fuel pump, fuel pipe line and filter (See page SF–1).

OK

8	Check injector injection (See page SF–25)

NG → Replace injector.

OK

9	**Check gas leakage on exhaust system.**

NG → **Repair or replace.**

OK

Replace heated oxygen sensors (bank 1, 2 sensor 1).

10	**Perform confirmation driving pattern (See page DI–255).**

Go

11	**Is there DTC P0125 being output again ?**

YES → **Check and replace ECM (See page IN–31).**

NO

12	**Did vehicle runs out of fuel in the past ?**

NO → **Check for intermittent problems (See page DI–197).**

NO

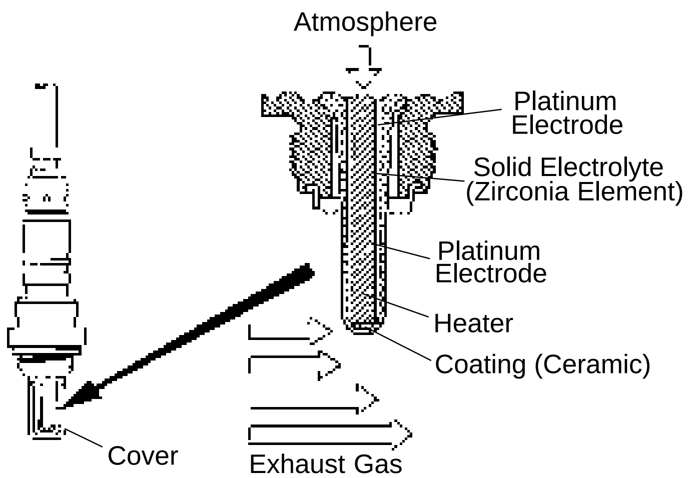
DTC P0125 is caused by running out of fuel.

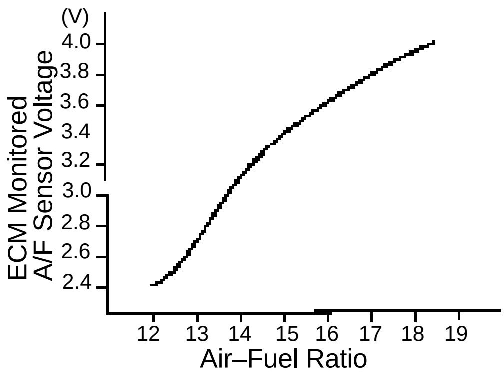
DI07M–09

DTC	P0125	Insufficient Coolant Temp. for Closed Loop Fuel Control (Only for California Spec.)

CIRCUIT DESCRIPTION

To obtain a high purification rate for the CO, HC and NOx components of the exhaust gas, a three–way catalytic converter is used, but for the most efficient use of the three–way catalytic converter, the air–fuel ratio must be precisely controlled so that it is always close to the stoichiometric air–fuel ratio.
The A/F sensor has the characteristic that provides output voltage* approximately proportional to the existing air–fuel ratio. The A/F sensor output voltage* is used to provide feedback for the ECM to control the air–fuel ratio.
By the A/F sensor output, the ECM can determine the deviation amount from the stoichiometric air–fuel ratio and control the proper injection time immediately. If the A/F sensor is malfunctioning, ECM is unable to perform accurate air–fuel ratio control.
The A/F sensor is equipped with a heater which heats the zirconia element. The heater is controlled by the ECM. When the intake air volume is low (the temp. of the exhaust gas is low), current flows to the heater to heat the sensor for accurate oxygen concentration detection.
*: The voltage value changes at the inside of the ECM only.



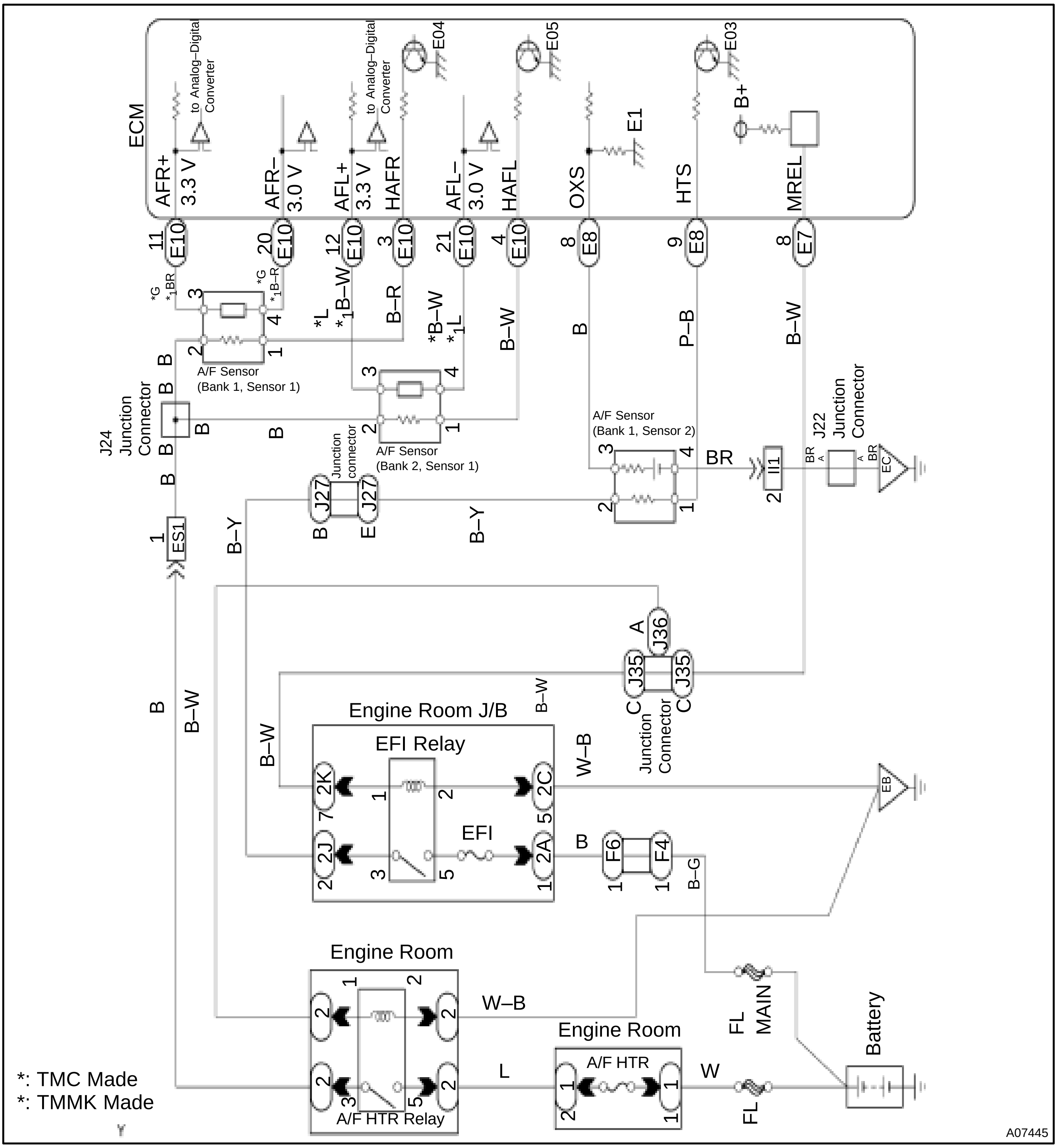


DTC No.	DTC Detecting Condition	Trouble Area
P0125	After engine is warmed up, A/F sensor output* does not change when conditions (a), (b) and (c) continue for at least 1.5 min. *: Output value changes at inside of ECM only. (a) Engine speed: 1,500 rpm or more (b) Vehicle speed: 40 ~ 100 km/h (25 ~ 62 mph) (c) Throttle valve does not fully closed (d) After starting engine ∼ 140 sec	●Fuel system ●Injector ●Ignition system ●Gas leakage on exhaust system ●Open or short in A/F sensor circuit (bank 1, 2 sensor 1) ●A/F sensors (bank 1, 2 sensor 1) ●ECM

HINT:

- After confirming DTC P0125, use the OBD II scan tool or TOYOTA hand−held tester to confirm voltage output of heated oxygen sensors (bank 1, 2 sensor 1) from CURRENT DATA.
- The ECM controls the voltage of AFR＞, AFL＞, AFR≧ and AFL≧ terminals of ECM to the fixed voltage. Therefore, it is impossible to confirm the A/F sensor output voltage without OBD II scan tool or TOYOTA hand–held tester.
- OBD II scan tool (excluding TOYOTA hand–held tester) displays the one fifth of the A/F sensor output voltage which is displayed on the TOYOTA hand–held tester.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Are there any other codes (besides DTC P0125) being output ?**

YES → **Go to relevant DTC chart.**

NO

2 Connect the OBD II scan tool or TOYOTA hand–held tester, and read value for voltage output of A/F sensors (bank 1, 2 sensor 1).

PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.

(b) Warm up the A/F sensors (bank 1, 2 sensor 1) with the engine at 2,500 rpm for approx. 90 sec.

CHECK:

Read voltage value of A/F sensors (bank 1, 2 sensor 1) on the screen of OBD II scan tool or TOYOTA hand–held tester, when you perform all the following conditions.

HINT:

The voltage of AFR＞,AFL＞ terminal of ECM is 3.3 fixed and the AFR≧,AFL≧ terminal is 3.0 V fixed. Therefore, it is impossible to check the A/F sensor output voltage at the terminals (AFR＞,AFL＞/ AFR≧,AFL≧) of ECM.

OK:

<table>
<tr><th>Condition</th><th>A/F Sensor Voltage value</th></tr>
<tr><td>Engine idling</td><td rowspan="3">●Not remains at 3.3. V (*0.660 V)
●Not remains at 3.8 V (*0.76 V) or more
●Not remains at 2.8 V (*0.56 V) or less
*: When you use the OBD II scan tool (excluding TOYOTA hand–held tester)</td></tr>
<tr><td>Engine idling</td></tr>
<tr><td>Driving at engine speed 1,500 rpm or more and vehicle speed 40 km/h (25 mph) or move, and operate throttle valve open and close</td></tr>
</table>

HINT:

- During fuel enrichment, there is a case that the output voltage of A/F sensors (bank 1, 2 sensor 1) is below 2.8 V (* 0.56 V), it is normal.
- During fuel cut, there is a case that the output voltage of A/F sensors (bank 1, 2 sensor 1) is above 3.8 V (* 0.76 V), it is normal.
- If output voltage of A/F sensors (bank 1, 2 sensor 1) remains at 3.30 V (* 0.660 V) even after performing all the above conditions, A/F sensors (bank 1, 2 sensor 1) circuit may be open.
- If output voltage of A/F sensor remains at 3.8 V (* 0.76 V) or more, or 2.8 V (* 0.56 V) or less even after performing all the above conditions, A/F sensors (bank 1, 2 sensor 1) circuit may be short.

*: When you use the OBD II scan tool (excluding TOYOTA hand–held tester).

OK → **Go to step 10.**

NG

3 Check for open and short in harness and connector between ECM and A/F sensors (bank1, 2 sensor1) (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

4	Check resistance of A/F sensor heaters (bank1, 2 sensor1) (See page SF–68).

NG → Replace A/F sensor.

OK

5	Check air induction system (See page SF–1).

NG → Repair or replace.

OK

6	Check EGR system (See page EC–11).

NG → Replace EGR system.

OK

7	Check fuel pressure (See page SF–21).

NG → Check and repair fuel pump, fuel pipe line and filter (See page SF–1).

OK

8	Check injector injection (See page SF–25).

NG → Replace injector.

OK

9	Check gas leakage on exhaust system.

NG → Repair or replace

OK ↓

Replace A/F sensors (bank1, 2 sensor1).

10	Perform confirmation driving pattern (See page DI–340).

Go ↓

11	Is there DTC P0125 being output again ?

YES → Check and replace ECM (See page IN–31).

NO ↓

12	Did vehicle runs out of fuel in the past ?

NO → Check for intermittent problems (See page DI–197).

YES ↓

DTC P0125 is caused by running out of fuel.

DI07N–07

DTC	P0130	Heated Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 1) (Except California Spec.)

DTC	P0150	Heated Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 1) (Except California Spec.)

CIRCUIT DESCRIPTION

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control) on page DI–244.

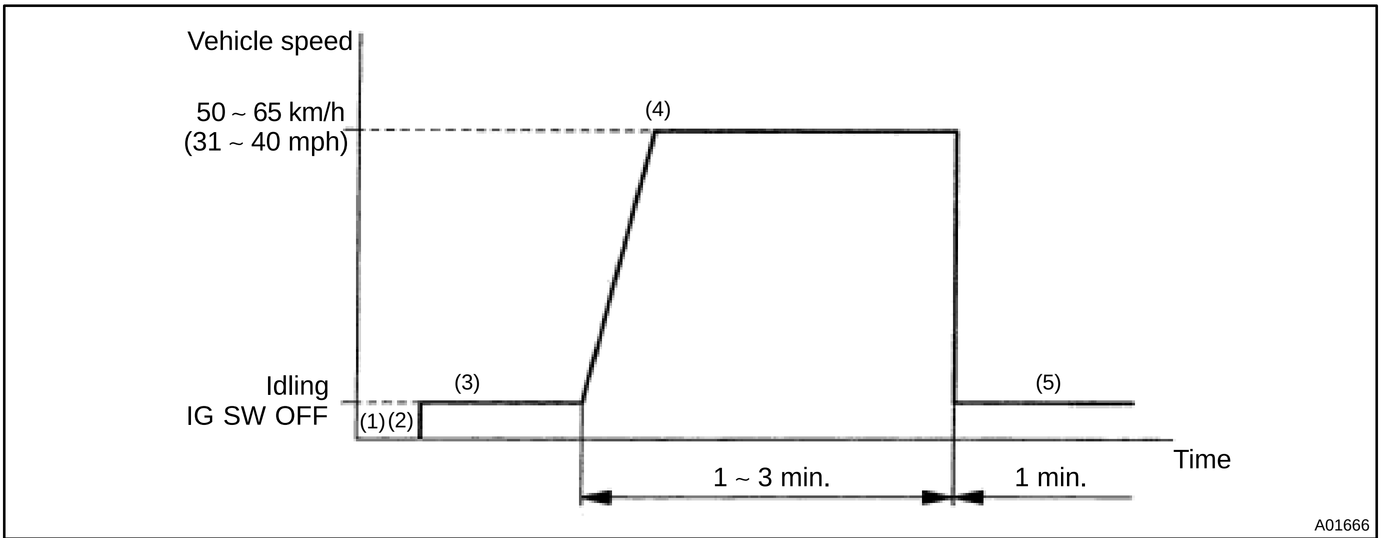
DTC No.	DTC Detecting Condition	Trouble Area
P0130 P0150	Voltage output of heated oxygen sensor remains at 0.4 V or more, or 0.55 V or less, during idling after engine is warmed up (2 trip detection logic)	•Heated oxygen sensor •Fuel trim malfunction

HINT:
Bank 1 refers to the bank that includes cylinder No.1. Bank 2 refers to the bank that does not include cylinder No.1. Sensor 1 refers to the sensor closer to the engine body.
The heated oxygen sensor's output voltage and the short–term fuel trim value can be read using the OBD II scan tool or TOYOTA hand–held tester.

WIRING DIAGRAM

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control) on page DI–244.

CONFIRMATION DRIVING PATTERN



(1) Connect the TOYOTA hand–held tester to the DLC3.
(2) Switch the TOYOTA hand–held tester from normal mode to check mode (See page DI–197).
(3) Start the engine and warm it up with all accessory switches OFF.
(4) Drive the vehicle at 50 ~ 65 km/h (31 ~ 40 mph) for 1 ~ 3 min. to warm up the heated oxygen sensor.
(5) Let the engine idle for 1 min.
(6) Perform steps (3) to (5) three times.

HINT:
If a malfunction exists, the MIL will light up during step (6).

NOTICE:

If the conditions in this test are not strictly followed, detection of the malfunction will not be possible. If you do not have a TOYOTA hand–held tester, turn the ignition switch OFF after performing steps (3) to (6), then perform steps (3) to (6) again.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Are there any other codes (besides DTC P0130, P0150) being output ?**

YES → **Go to relevant DTC chart.**

NO

2	**Check the output voltage of heated oxygen sensors (bank1, 2 sensor1) during idling.**

PREPARATION:

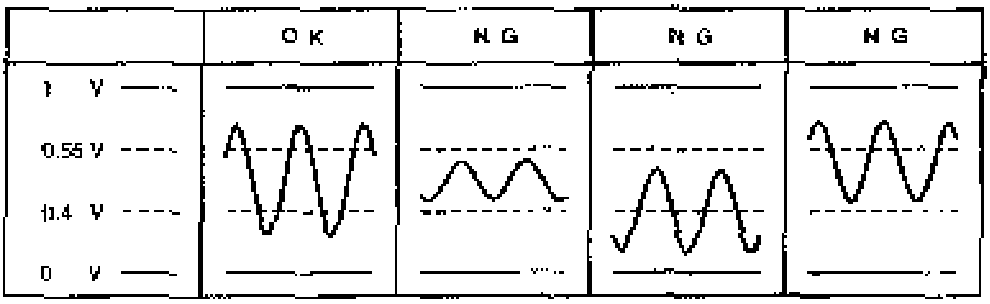
Warm up the heated oxygen sensors (bank1, 2 sensor1) with the engine at 2,500 rpm for approx. 90 sec.

CHECK:

Use the OBD II scan tool or TOYOTA hand–held tester to read the output voltage of the heated oxygen sensors (bank1, 2 sensor1) during idling.

OK:

Heated oxygen sensors (bank1, 2 sensor1) output voltage:
Alternates repeatedly between less than 0.4 V and more than 0.55 V (See the following table).



P18349

OK → **Go to step 8.**

NG

3	Check for open and short in harness and connector between ECM and heated oxygen sensors (bank1, 2 sensor1) (See page IN–31).

NG → Repair or replace harness or connector.

OK

4	Check air induction system (See page SF–1).

NG → Repair or replace.

OK

5	Check EGR system (See page EC–11).

NG → Replace EGR system.

OK

6	Check fuel pressure (See page SF–6).

NG → Check and repair fuel pump, fuel pipe line and filter (See page SF–1).

OK

7	Check injector injection (See page SF–25).

NG → Replace injector.

OK ↓

Replace heated oxygen sensors (bank1, 2 sensor1).

8	Perform confirmation driving pattern.

Go ↓

9	Are there DTC P0130 and/or P0150 being output again ?

NO → Check for intermittent problems (see page DI–197).

YES ↓

Check and replace ECM (See page IN–31).

DI4DQ–01

DTC	P0133	Heated Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 1) (Ex. CA Spec.)

DTC	P0153	Heated Oxygen Sensor Circuit Slow Response (Bank 2 Sensor 1) (Ex. CA Spec.)

CIRCUIT DESCRIPTION

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control) on page DI–244.

DTC No.	DTC Detecting Condition	Trouble Area
P0133 P0153	Response time for heated oxygen sensor's voltage output to change from rich to lean, or from lean to rich, is 1 sec. or more during idling after engine is warmed up (2 trip detection logic)	•Heated oxygen sensor •Fuel trim malfunction

HINT:
Bank 1 refers to the bank that includes cylinder No.1. Bank 2 refers to the bank that does not include cylinder No.1. Sensor 1 refers to the sensor closer to the engine body.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	Are there any other codes (besides DTC P0133, P0153) being output ?

YES → **Go to relevant DTC chart.**

NO

2	**Check the output voltage of heated oxygen sensors (bank1, 2 sensor1) during idling.**

PREPARATION:

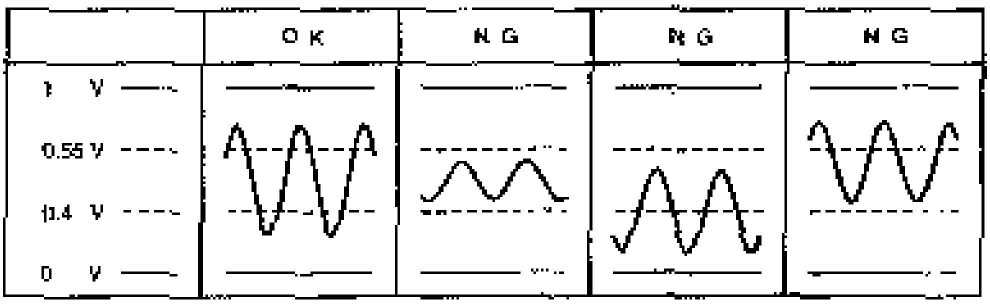
Warm up the heated oxygen sensors (bank1, 2 sensor1) with the engine at 2,500 rpm for approx. 90 sec.

CHECK:

Use the OBD II scan tool or TOYOTA hand–held tester to read the output voltage of the heated oxygen sensors (bank1, 2 sensor1) during idling.

OK:

Heated oxygen sensors (bank1, 2 sensor1) output voltage:
Alternates repeatedly between less than 0.4 V and more than 0.55 V (See the following table).



P18349

OK → **Go to step 8.**

NG ↓

3	**Check for open and short in harness and connector between ECM and heated oxygen sensors (bank1, 2 sensor1) (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK ↓

4	**Check air induction system (See page SF–1).**

NG → **Repair or replace.**

OK ↓

5	Check EGR system (See page EC–11).

NG → Replace EGR system.

OK

6	Check fuel pressure (See page SF–1).

NG → Check and repair fuel pump, fuel pipe line and filter (See page SF–1).

OK

7	Check injector injection (See page SF–25).

NG → Replace injector.

OK

Replace heated oxygen sensors (bank1, 2 sensor1).

8	Perform confirmation driving pattern (See page DI–255).

Go

9	Are there DTC P0133 and/or P0153 being output again ?

NO → **Check for intermittent problems (see page DI–197).**

YES ↓

Check and Replace ECM (See page IN–31).

DI07P–06

DTC	P0135	Heated Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 1) (EX. CA Spec.)

DTC	P0141	Heated Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)

DTC	P0155	Heated Oxygen Sensor Heater Circuit Malfunction (Bank 2 Sensor 1) (EX. CA Spec.)

CIRCUIT DESCRIPTION

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control (Except California Spec.)) on page DI–244.

DTC No.	DTC Detecting Condition	Trouble Area
P0135 P0141 P0155	When heater operates, heater current exceeds 2.35 A (2 trip detection logic)	●Open or short in heater circuit of heated oxygen sensor ●Heated oxygen sensor heater ●ECM
	Heater current of 0.2 A or less when heater operates (2 trip detection logic)	

HINT:

- Bank 1 refers to the bank that includes cylinder No.1.
- Bank 2 refers to the bank that does not include cylinder No.1.
- Sensor 1 refers to the sensor closer to the engine body.
- Sensor 2 refers to the sensor farther away from the engine body.

WIRING DIAGRAM

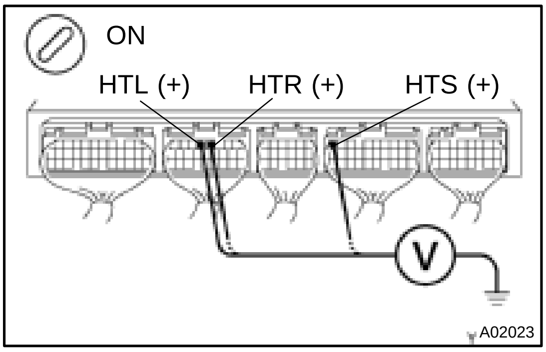
Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control (Except California Spec.)) on page DI–244.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Check voltage between terminals HTR, HTS, HTL of ECM connectors and body ground.**



PREPARATION:

(a) Remove the glove compartment (See page SF–73).

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals HTR, HTS, HTL of the ECM connectors and body ground.

HINT:

- Connect terminal HTR to bank 1 sensor 1.
- Connect terminal HTS to bank 1 sensor 2.
- Connect terminal HTL to bank 2 sensor 1.

OK:

Voltage: 9 ~ 14 V

OK	**Check and replace ECM (See page IN–31).**

NG

2	**Check resistance of heated oxygen sensor heater (See page SF–71).**

NG	**Replace heated oxygen sensor.**

OK

Check and repair harness or connector between EFI main relay (Marking: EFI) and heated oxygen sensor, and heated oxygen sensor and ECM (See page IN–31).

DI07Q–06

DTC	P0136	Heated Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)

CIRCUIT DESCRIPTION

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control) on page DI–244.

DTC No.	DTC Detecting Condition	Trouble Area
P0136	Voltage output of heated oxygen sensor (bank 1 sensor 2) remains at 0.4 V or more or 0.6*1 0.5*2 V or less when vehicle is driven at 50 km/h (31 mph) or more after engine is warmed up *1: for California Spec. *2: except California Spec. (2 trip detection logic)	●Heated oxygen sensor

HINT:

Bank 1 refers to the bank that includes cylinder No.1. Sensor 2 refers to the sensor farther away from the engine body.

WIRING DIAGRAM

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control) on page DI–244.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air fuel ratio lean or rich, etc. at the time of the malfunction.

1	Are there any other codes (besides DTC P0136) being output ?

YES → **Go to relevant DTC chart.**

NO

2	Check for open and short in harness and connector between ECM and heated oxygen sensor (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

3	Check output voltage of heated oxygen sensor (bank 1 sensor 2).

PREPARATION:
(a) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.
(b) Warm up the engine to normal operating temp.

CHECK:
Read voltage output of heated oxygen sensor (bank 1 sensor 2) when engine suddenly raced.
HINT:
Perform quick racing to 4,000 rpm 3 min. using accelerator pedal.

OK:
Heated oxygen sensor output voltage: Alternates from 0.4 V or less to 0.6*1/0.5*2 V or more.
***1: for California Spec.**
***2: except California Spec.**

OK → **Check that each connector is properly connected.**

NG ↓

Replace heated oxygen sensor (bank 1 sensor 2).

DI07R–05

DTC	P0171	System too Lean (Fuel Trim) (Only for California Spec.)

DTC	P0172	System too Rich (Fuel Trim) (Only for California Spec.)

CIRCUIT DESCRIPTION

Fuel trim refers to the feedback compensation value compared against the basic injection time. 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 air–fuel ratio at its ideal theoretical value.
The signal from the A/F sensor is approximately proportional to the existing air–fuel ratio, and ECM comparing it with the ideal theoretical value, the ECM reduces fuel volume immediately if the air–fuel ratio is rich and increases fuel volume if it is lean.
Long–term fuel trim compensates the deviation from the central value of the short–term fuel trim stored up by each engine tolerance, and the deviation from the central value due to the passage of time and changes of using environment.
If both the short–term fuel trim and long–term fuel trim exceed a certain value, it is detected as a malfunction and the MIL lights up.

DTC No.	DTC Detecting Condition	Trouble Area
P0171	When air fuel ratio feedback is stable after engine warming up, fuel trim is considerably in error on RICH side (2 trip detection logic)	●Gas leakage on exhaust system ●Air intake (hose loose) ●Fuel line pressure ●Injector blockage ●Mass air flow meter ●Engine coolant temp. sensor ●A/F sensors (bank 1, 2 sensor 1)
P0172	When air fuel ratio feedback is stable after engine warming up, fuel trim is considerably in error on LEAN side (2 trip detection logic)	●Gas leakage on exhaust system ●Fuel line pressure ●Injector leak, blockage ●Mass air flow meter ●Engine coolant temp. sensor ●A/F sensors (bank 1, 2 sensor 1)

HINT:

- When the DTC P0171 is recorded, the actual air–fuel ratio is on the lean side. When DTC P0172 is recorded, the actual air–fuel ratio is on the rich side.
- If the vehicle runs out of fuel, the air–fuel ratio is lean and DTC P0171 is recorded. The MIL then comes on.
- If the total of the short–term fuel trim value and long–term fuel trim value is within ± 35 % (80˚C (176˚F) or more), the system is functioning normally.
- The A/F sensors (bank 1, 2 sensor 1) output voltage and the short–term fuel trim value can be read using the OBD II scan tool or TOYOTA hand–held tester.
- The ECM controls the voltage of AFR～, AFL～, AFR＞ and AFL＞ terminals of ECM to the fixed voltage. Therefore, it is impossible to confirm the A/F sensor output voltage without OBD II scan tool or TOYOTA hand–held tester.
- OBD II scan tool (excluding TOYOTA hand–held tester) displays the one fifth of the A/F sensors (bank 1, 2 sensor 1) output voltage which is displayed on the TOYOTA hand–held tester.

INSPECTION PROCEDURE

Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Check air induction system (See page SF–1).**

NG → **Repair or replace.**

OK

2	**Check injector injection (See page SF–25).**

NG → **Replace injector.**

OK

3	**Check mass air flow meter and engine coolant temp. sensor (See pages SF–35 and SF–63).**

NG → **Repair or replace.**

OK

4	Check for spark and ignition (See page IG–1).

NG → Repair or replace.

OK

5	Check fuel pressure (See page SF–21).

NG → Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF–1).

OK

6	Check gas leakage on exhaust system.

NG → Repair or replace.

OK

7	**Check the output voltage A/F sensors (bank1, 2 sensor1).**

PREPARATION:

(a) Connect the OBDII scan tool or TOYOTA hand–held tester to the DLC3.

(b) Warm up the A/F sensors (bank1, 2 sensor1) with the engine at 2,500 rpm for approx. 90 sec.

CHECK:

Read voltage value of A/F sensors (bank1, 2 sensor1) on the screen of OBDII scan tool or TOYOTA hand–held tester when you perform all the following conditions.

HINT:

The voltage of AFR～, AFL～ terminal of ECM is 3.3 fixed AFR＞, AFL＞ terminal is 3.0 V fixed. Therefore, it is impossible to check the A/F sensors (bank1, 2 sensor1) output voltage at the terminals (AFR～, AFL～/ AFR＞, AFL＞) of ECM.

OK:

Condition	A/F Sensor Voltage value
Engine idling	● Not remains at 3.30 V (*0.660 V) ● Not remains at 3.8 V (*0.76 V) or more ● Not remains at 2.8 V (*0.56 V) or less *: When you use the OBDII scan tool (excluding TOYOTA hand–held tester)
Engine racing	
Driving at engine speed 1,500 rpm or more and vehicle speed 40 km/h (25mph) or more, and operate throttle valve open and close	

HINT:

- During fuel enrichment, there is a case that the output voltage of A/F sensors (bank1, 2 sensor1) is below 2.8 V (*0.56 V), it is normal.
- During fuel cut, there is case that the output voltage of A/F sensors (bank1, 2 sensor1) is above 3.8 V (*0.76 V), it is normal.
- If output voltage of A/F sensors (bank1, 2 sensor1) remains at 3.30 V (*0.660 V) even after performing all the above conditions, A/F sensors (bank1, 2 sensor1) circuit may be open.
- If output voltage of A/F sensors (bank1, 2 sensor1) remains at 3.8 V (*0.76 V) or more, or 2.8 V (*0.56 V) or less even after performing all the above conditions, A/F sensors (bank1, 2 sensor1) circuit may be short.

*: When you use the OBDII scan tool (excluding TOYOTA hand–held tester).

OK → **Go to step 9.**

NG

8	Check for open and short in harness and connector between ECM and A/F sensors (bank1, 2 sensor1) (See page IN–31).

NG → Repair or replace harness or connector.

OK ↓

Replace A/F sensors (bank1, 2 sensor1).

9	perform confirmation driving pattern (See page DI–340).

Go ↓

10	Is there DTC P0171 or P0172 being output again ?

YES → Check and replace ECM (See page IN–31).

NO ↓

11	Did vehicle runs out of fuel in the past ?

NO → Check for intermittent problems (See page DI–197).

YES ↓

DTC P0171 or P0172 is caused by running out of fuel.

DI4DR–01

DTC	P0171	System too Lean (Fuel Trim) (Except California Spec.)

DTC	P0172	System too Rich (Fuel Trim) (Except California Spec.)

CIRCUIT DESCRIPTION

Fuel trim refers to the feedback compensation value compared against the basic injection time. 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 air–fuel ratio at its ideal theoretical value. The signal from the heated oxygen sensor indicates whether the air–fuel ratio is RICH or LEAN compared to the ideal theoretical value, triggering a reduction in fuel volume if the air–fuel 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 due to individual engine differences, wear over time and changes in the usage environment.
If both the short–term fuel trim and long–term fuel trim are LEAN or RICH beyond a certain value, it is detected as a malfunction and the MIL lights up.

DTC No.	DTC Detecting Condition	Trouble Area
P0171	When air fuel ratio feedback is stable after engine warming up, fuel trim is considerably in error on RICH side (2 trip detection logic)	●Air intake (hose loose) ●Fuel line pressure ●Injector blockage ●Heated oxygen sensors (bank 1, 2 sensor 1) malfunction ●Mass air flow meter ●Engine coolant temp. sensor ●Gas leakage on exhaust system
P0172	When air fuel ratio feedback is stable after engine warming up, fuel trim is considerably in error on LEAN side (2 trip detection logic)	●Fuel line pressure ●Injector leak, blockage ●Heated oxygen sensors (bank 1, 2 sensor 1) malfunction ●Mass air flow meter ●Engine coolant temp. sensor ●Gas leakage on exhaust system

HINT:
- When DTC P0171 is recorded, the actual air–fuel ratio is on the LEAN side. When DTC P0172 is recorded, the actual air–fuel ratio is on the RICH side.
- If the vehicle runs out of fuel, the air–fuel ratio is LEAN and DTC P0171 is recorded. The MIL then comes on.
- If the total of the short–term fuel trim value and long–term fuel trim value is within ± 35 % (80˚C (176˚F) or more), the system is functioning normally.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	Check air induction system (See page SF–1).

NG → Repair or replace.

OK

2	Check injector injection (See page SF–21).

NG → Replace injector.

OK

3	Check mass air flow meter and engine coolant temp. sensor (See pages SF–35 and SF–63).

NG → Repair or replace.

OK

4	Check for spark and ignition (See page IG–1).

NG → Repair or replace.

OK

5	Check fuel pressure (See page SF–6).

NG → Check and repair fuel pump, pressure regulator, fuel pipe line and filter.

OK

6 Check gas leakage on exhaust system.

NG → **Repair or replace.**

OK

7 Check the output voltage of heated oxygen sensors (bank1, 2 sensor1) during idling.

PREPARATION:

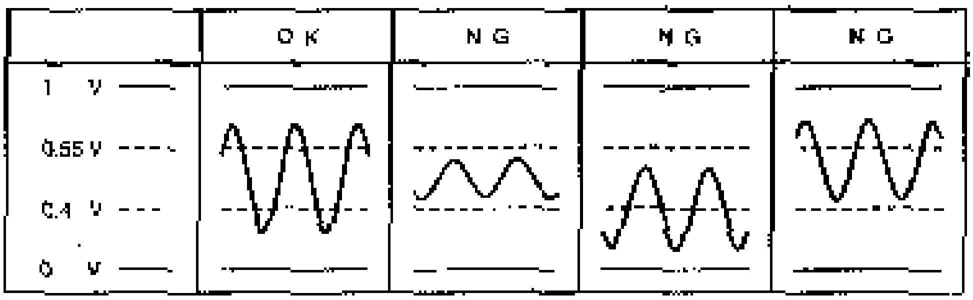
Warm up the heated oxygen sensors (bank1, 2 sensor1) the engine at 2,500 rpm for approx. 90 sec.

CHECK:

Use the OBDII scan tool or TOYOTA hand–held tester to read the output voltage of the heated oxygen sensors (bank1, 2 sensor1) during idling.

OK:

Heated oxygen sensors (bank1, 2 sensor1) output voltage:
Alternates repeatedly between less than 0.4 V and more than 0.55 V (See the Following table).



P18349

OK → **Go to step 9.**

NG

8	Check for open and short in harness and connector between ECM and heated oxygen sensors (bank1, 2 sensor1) (See page SF–71).

NG → **Repair or replace harness or connector.**

OK

Replace heated oxygen sensors (bank1, 2 sensor1).

9	Perform confirmation driving pattern (See page DI–255).

Go

10	Is there DTC P0171 or P0172 being output again ?

YES → **Check and replace ECM.**

NO

11	Did vehicle runs out of fuel in the past ?

NO → **Check for intermittent problems.**

YES

DTC P0171 or P0172 is caused by running out of fuel.

DI07S–07

DTC	P0300	Random/Multiple Cylinder Misfire Detected

DTC	P0301	Cylinder 1 Misfire Detected

DTC	P0302	Cylinder 2 Misfire Detected

DTC	P0303	Cylinder 3 Misfire Detected

DTC	P0304	Cylinder 4 Misfire Detected

DTC	P0305	Cylinder 5 Misfire Detected

DTC	P0306	Cylinder 6 Misfire Detected

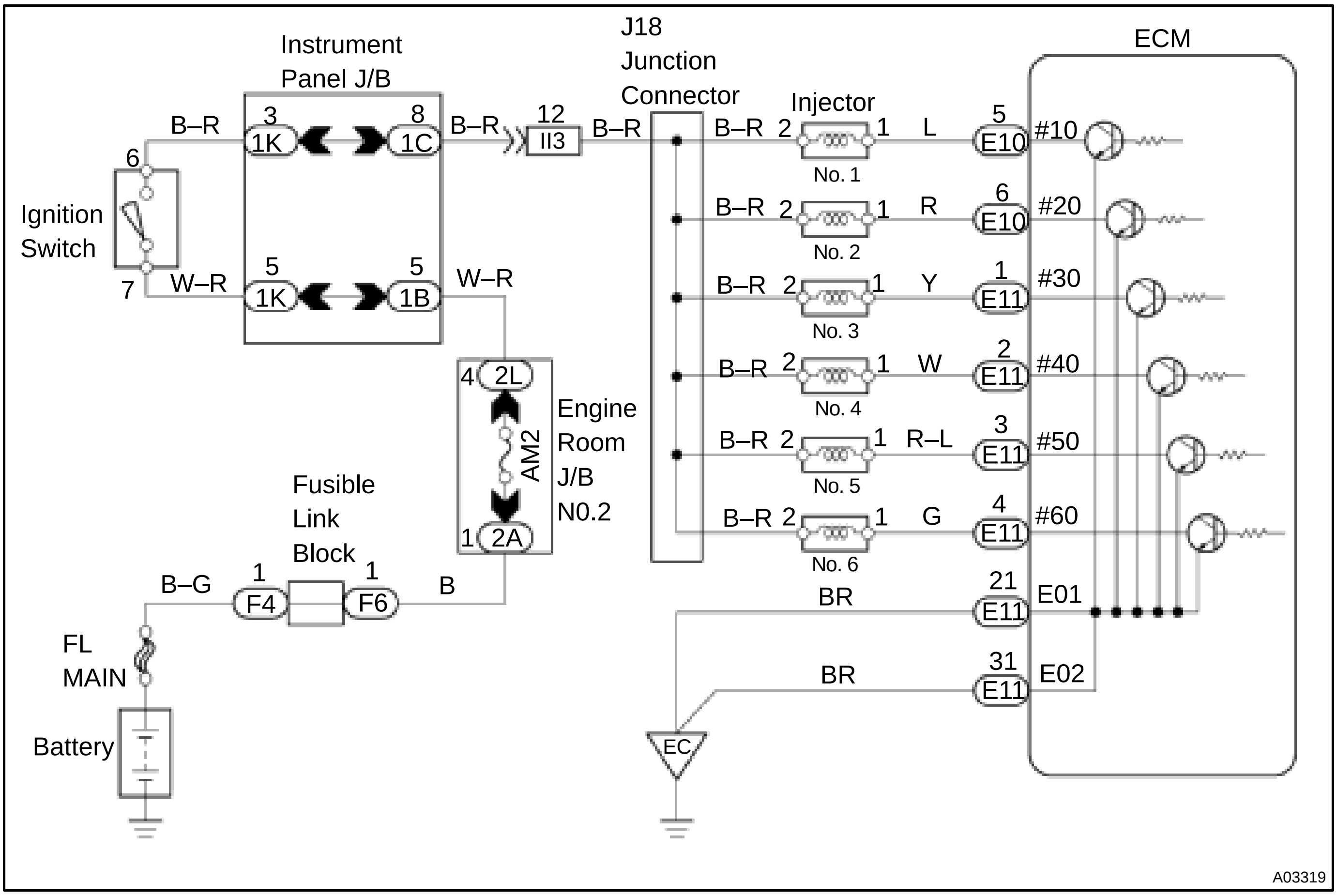
CIRCUIT DESCRIPTION

Misfire: The ECM uses the crankshaft position sensor and camshaft position sensor to monitor changes in the crankshaft rotation for each cylinder.
The ECM counts the number of times the engine speed change rate indicates that misfire has occurred. When the misfire rate equals or exceeds the count indicating that the engine condition has deteriorated, the MIL lights up.
If the misfire rate is high enough and the driving conditions will cause catalyst overheating, the MIL blinks when misfiring occurs.

DTC No.	DTC Detecting Condition	Trouble Area
P0300	Misfiring of random cylinders is detected during any particular 200 or 1,000 revolutions	●Ignition system ●Injector ●Fuel line pressure ●EGR ●Compression pressure ●Valve clearance not to specification ●Valve timing ●Mass air flow meter ●Engine coolant temp. sensor ●Open or short in engine wire ●Connector connection ●ECM
P0301 P0302 P0303 P0304 P0305 P0306	For any particular 200 revolutions for engine, misfiring is detected which can cause catalyst overheating (This causes MIL to blink)	
	For any particular 1,000 revolutions of engine, misfiring is detected which causes a deterioration in emission (2 trip detection logic)	

HINT:
When the 2 or more codes for a misfiring cylinder are recorded repeatedly but no Random Misfire code is recorded, it indicates that the misfires were detected and recorded at different times.

WIRING DIAGRAM



CONFIRMATION DRIVING PATTERN

(1) Connect the TOYOTA hand–held tester or OBD II scan tool.
(2) Record DTC and the freeze frame data.
(3) Use the TOYOTA hand–held tester to set to Check Mode. (See page DI–197)
(4) Drive the vehicle several times with the engine speed, load and its surrounding range shown with ENGINE SPD, CALC LOAD in the freeze frame data or MISFIRE RPM, MISFIRE LOAD in the data list. If you have no TOYOTA hand–held tester, turn the ignition switch OFF after the symptom is simulated the first time. Then repeat the simulation process again.

HINT:
In order to memorize DTC of misfire, it is necessary to drive around MISFIRE RPM, MISFIRE LOAD in the data list for the following period of time.

Engine Speed	Time
Idling	3 minutes 30 seconds or more
1000 rpm	3 minutes or more
2000 rpm	1 minute 30 seconds or more
3000 rpm	1 minute or more

(5) Check whether there is misfire or not by monitoring DTC and the freeze frame data. After that, record them.
(6) Turn ignition switch OFF and wait at least 5 seconds.

INSPECTION PROCEDURE

HINT:

- If is the case that DTC besides misfire is memorized simultaneously, first perform the troubleshooting for them.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame data records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.
- When the vehicle is brought to the workshop and the misfire is not occurred, misfire can be confirmed by reproducing the condition or freeze frame data. Also, after finishing the repair, confirm that there is no misfire. (See the confirmation driving pattern)
- When either of SHORT FT #1, LONG FT #1, SHORT FT #2 or LONG FT #2 in the freeze frame data is besides the range of ±20%, there is a possibility that the air–fuel ratio is inclining either to ”rich” (–20% or less) or ”lean” (+20% or more).
- When COOLANT TEMP in the freeze frame data is less than 80˚C (176˚F), there is a possibility or misfire only during warming up.
- In the case that misfire cannot be reproduced, the reason may be because of the driving with lack or fuel, the use of improper fuel, a stain of ignition plug, and etc.

1	**Check wire harness, connector and vacuum hose in engine room.**

CHECK:

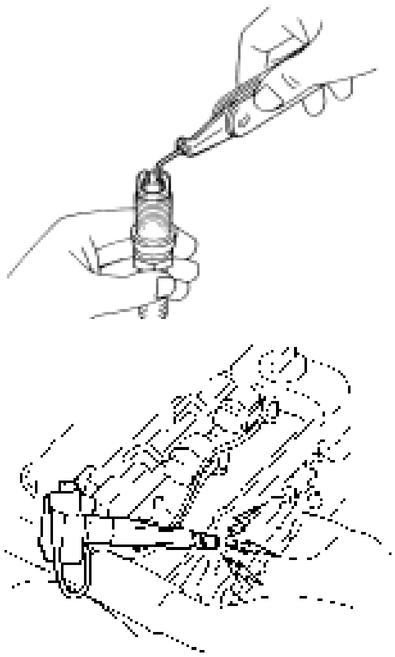
(a) Check the connection conditions of wire harness and connector.

(b) Check the disconnection, piping and break of vacuum hose.

NG	**Repair or replace, then confirm that there is no misfire (See the confirmation driving pattern).**

OK

2	Check spark plug and spark of misfiring cylinder.

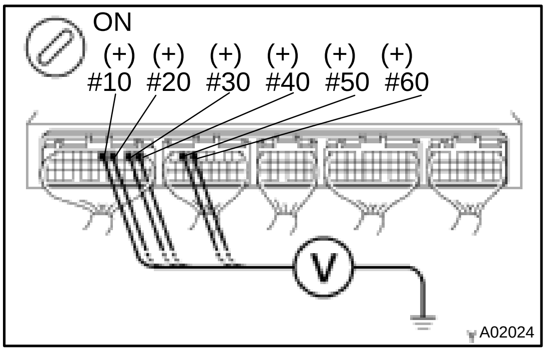


PREPARATION:
(a) Remove the ignition coil (See page IG–7).
(b) Remove the spark plug.
CHECK:
(a) Check spark plug type.
(b) Check for carbon deposits on electrode.
(c) Check electrode gap.
OK:
(a) Twin ground electrodes type.
Recommended spark plug:
ND PK20TR11
NGK BKR6EKPB–11
(b) No large carbon deposit present.
Not wet with gasoline or oil.
(c) Electrode gap:
Standerd: 1.0 – 1.1 mm (0.03937 – 0.043 in.).
Maximum: 1.3 mm (0.051 in.).
PREPARATION:
(a) Install the spark plug to the ignition coil, and connect the ignition coil the connector.
(b) Disconnect injector connector.
(c) Hold the end about 12.5 mm (0.5 in.) from the ground.
CHECK:
Check if spark occurs while engine is being cranked.
NOTICE:
To prevent excess fuel being injected from the injectors during this test, don't crank the engine for more than 5 ~ 10 sec. at a time.
OK:
Spark jumps across electrode gap.

NG	Replace or check ignition system (See page IG–1).

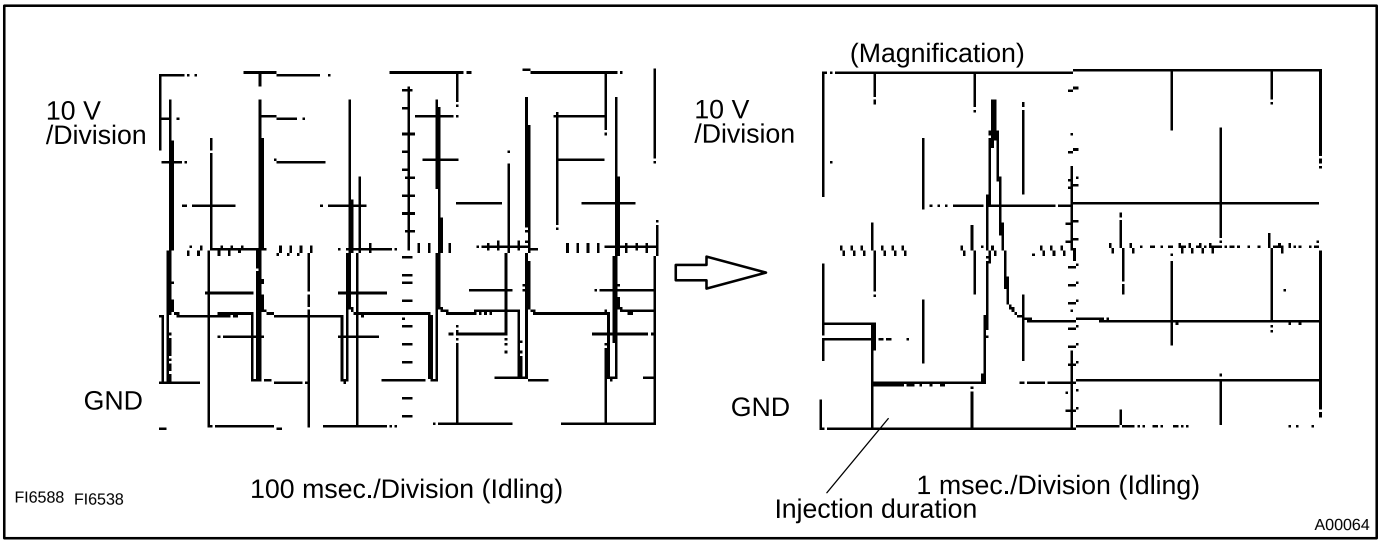
OK

3	**Check voltage of ECM terminal for injector of failed cylinder.**



PREPARATION:
(a) Remove the glove compartment (See page SF–73).
(b) Turn the ignition switch ON.
CHECK:
Measure voltage between applicable terminal of the ECM connector and body ground.
OK:
Voltage: 9 ~ 14 V

Reference INSPECTION USING OSCILLOSCOPE
INJECTOR SIGNAL WAVEFORM
With the engine idling, measure between terminals #10 ~ #60 and E01 of ECM.
HINT:
The correct waveform is as shown.



OK → **Go to step 5.**

NG

4	Check resistance of injector of misfiring cylinder (See page SF–21).

NG → Replace injector.

OK

Check for open and short in harness and connector between injector and ECM (See page IN–31).

5	Check fuel pressure (See page SF–6).

NG → Check and repair fuel pump, fuel pipe line and filter (See page SF–1).

OK

6	Check injector injection (See page SF–25).

NG → Replace injector.

OK

7	Check EGR system (See page EC–11).

NG → Replace EGR system.

OK

8	**Check mass air flow meter and engine coolant temp. sensor (See pages SF–35, SF–63).**

NG → **Repair or replace.**

OK

Check compression pressure, valve clearance and valve timing.

DI07T–06

DTC	P0325	Knock Sensor 1 Circuit Malfunction

DTC	P0330	Knock Sensor 2 Circuit Malfunction

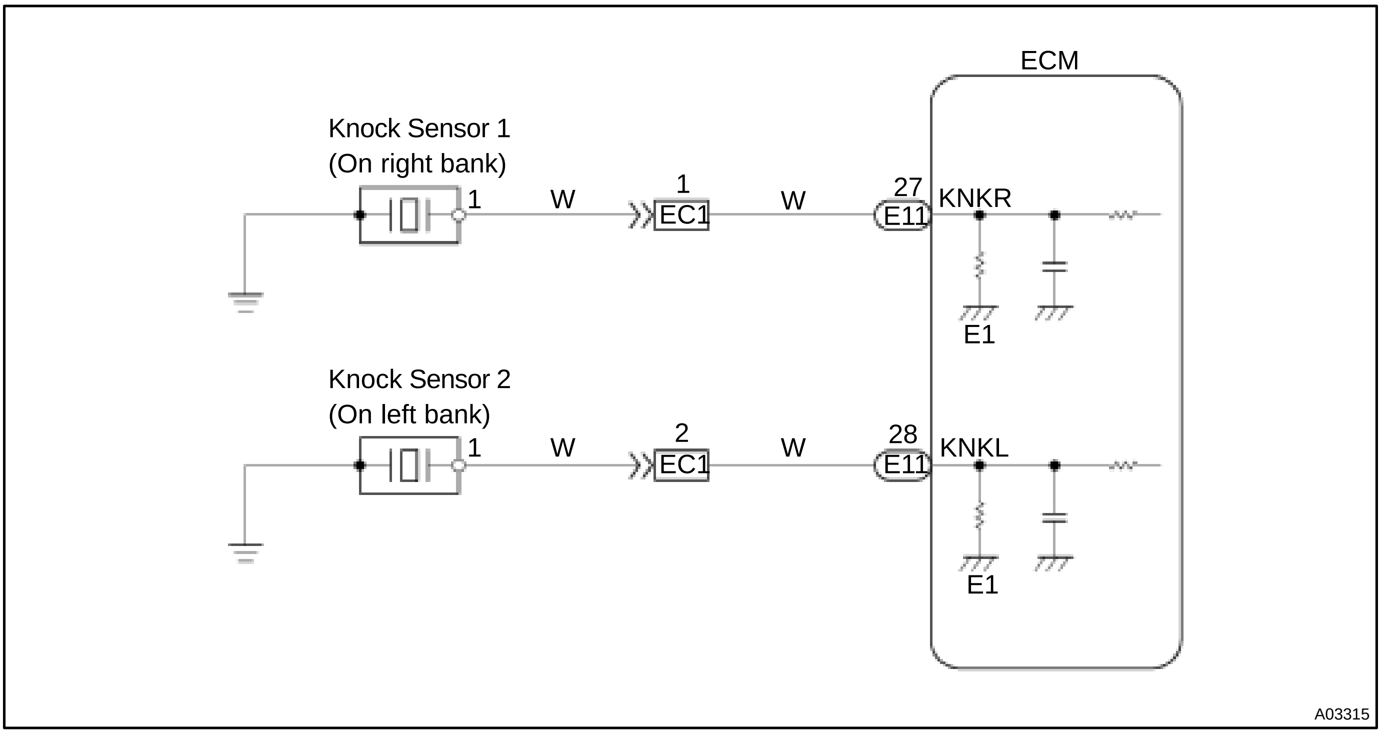
CIRCUIT DESCRIPTION

Knock sensors are fitted one to the right bank and left bank of the cylinder block to detect engine knocking. This sensor contains a piezoelectric element which generates a voltage when it becomes deformed, which occurs when the cylinder block vibrates due to knocking. If engine knocking occurs, ignition timing is retarded to suppress it.

DTC No.	DTC Detecting Condition	Trouble Area
P0325	No knock sensor 1 signal to ECM with engine speed between 2,000 rpm and 5,600 rpm.	●Open or short in knock sensor 1 circuit ●Knock sensor 1 (looseness) ●ECM
P0330	No knock sensor 2 signal to ECM with engine speed between 2,000 rpm and 5,600 rpm.	●Open or short in knock sensor 2 circuit ●Knock sensor 2 (looseness) ●ECM

If the ECM detects the above diagnosis conditions, it operates the fail–safe function in which the corrective retard angle value is set to the maximum value.

WIRING DIAGRAM

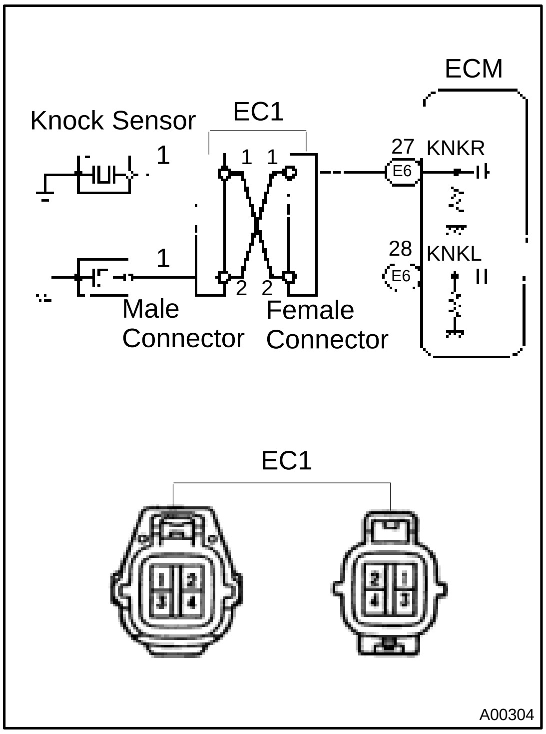


INSPECTION PROCEDURE

HINT:

- DTC P0325 is for the right bank knock sensor circuit. DTC P0330 is for the left bank knock sensor circuit.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Connect OBD II scan tool or TOYOTA hand–held tester, and check knock sensor circuit.**



PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.
(b) Disconnect the wire to wire connector EC1.
(c) Connect the terminals of the disconnected EC1 male connector and EC1 female as follows.

Male connector ↔ Female connector
Terminal 1 ↔ Terminal 2
Terminal 2 ↔ Terminal 1

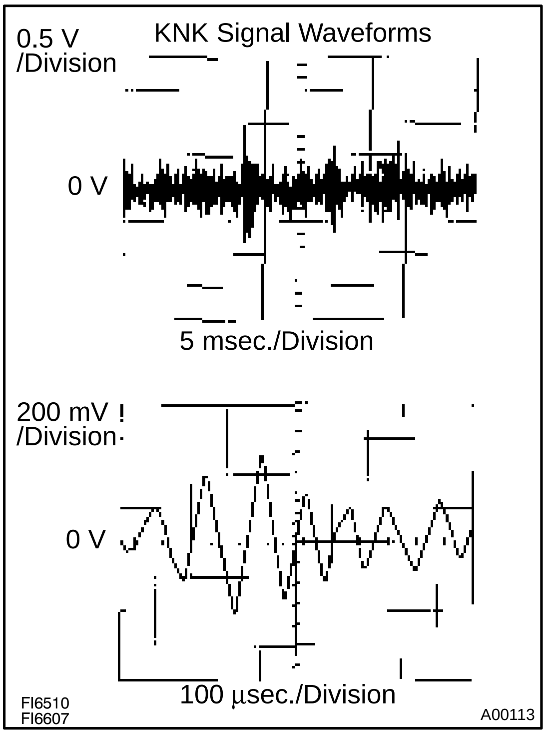
(d) Turn the ignition switch ON and push the OBD II scan tool or TOYOTA hand–held tester main switch ON.
(e) After the engine is warmed up, perform quick racing to 4,000 rpm three times.

CHECK:

Check the DTC.

RESULT:

Type I	DTC same as when vehicle brought in. P0325 → P0325 or P0330 → P0330
Type II	DTC different to when vehicle brought in. P0325 → P0330 or P0330 → P0325



Reference INSPECTION USING OSCILLOSCOPE

- With the engine racing (4,000 rpm), measure between terminals KNKR, KNKL of the ECM connector and body ground.

HINT:
The correct waveforms are as shown.

- Spread the time on the horizontal axis, and confirm that period of the wave is 141 µsec.
  (Normal mode vibration frequency of knock sensor: 7.1 kHz)

HINT:
If normal mode vibration frequency is not 7.1 kHz, the sensor is malfunctioning.

Type II	**Go to step 3 .**

Type I

2	**Check for open and short in harness and connector between EC1 connector and ECM (See page IN–31).**

NG	**Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–31).

3	**Check for open and short in harness and connector between EC1 connector and knock sensor (See page IN–31).**

HINT:

- If DTC P0325 has changed to P0330, check the knock sensor circuit on the right bank side.
- If DTC P0330 has changed to P0325, check the knock sensor circuit on the left bank side.

NG → **Repair or replace harness or connector.**

OK

Replace knock sensor.

DI07U–06

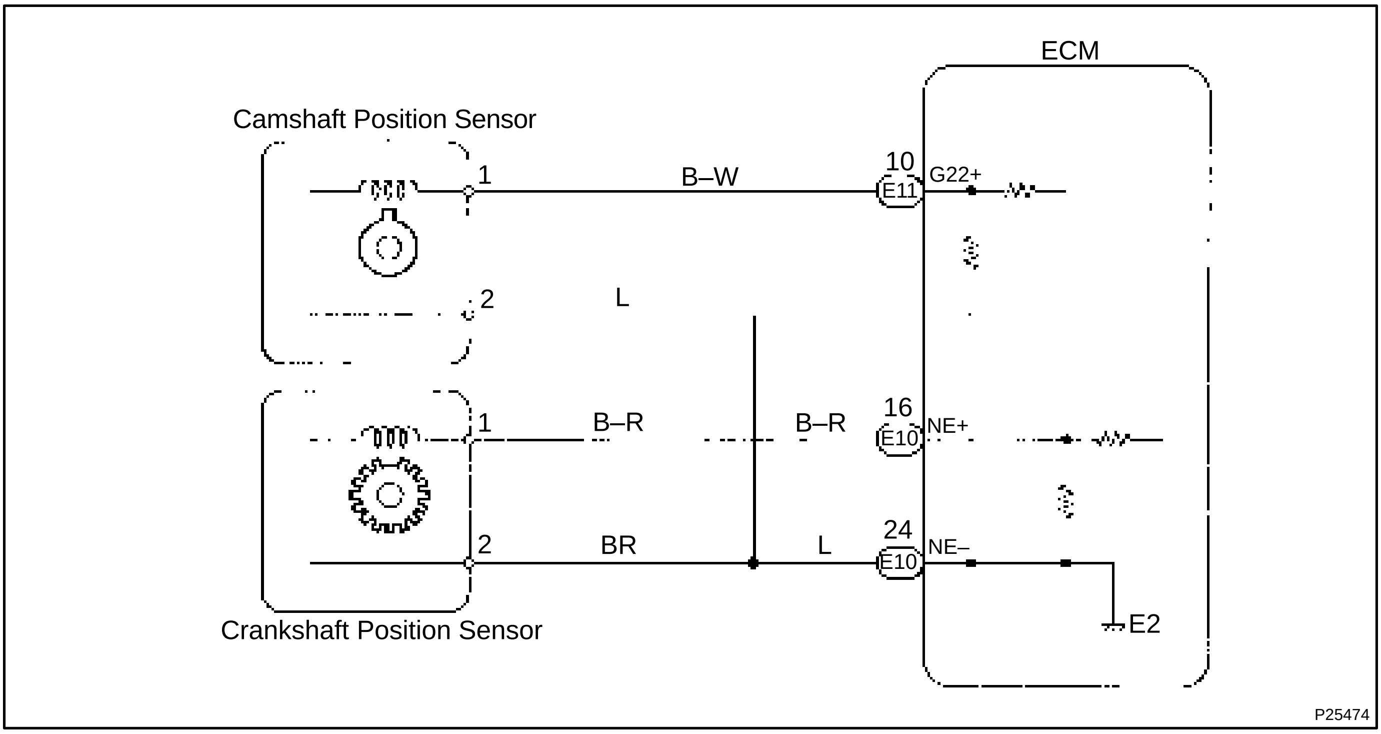
DTC	P0335	Crankshaft Position Sensor ”A” Circuit Malfunction

CIRCUIT DESCRIPTION

Crankshaft position sensor (NE signal) consists of a signal plate and pickup coil.
The NE signal plate has 34 teeth and is mounted on the crankshaft. The NE signal sensor generates 34 signals for every engine revolution. The ECM detects the standard crankshaft angle based on the G22 signals, and the actual crankshaft angle and the engine speed by the NE signals.

DTC No.	DTC Detecting Condition	Trouble Area
P0335	No crankshaft position sensor signal to ECM during cranking (2 trip detection logic)	●Open or short in crankshaft position sensor circuit ●Crankshaft position sensor ●Starter ●ECM
	No crankshaft position sensor signal to ECM with engine speed 600 rpm or more (2 trip detection logic)	

WIRING DIAGRAM

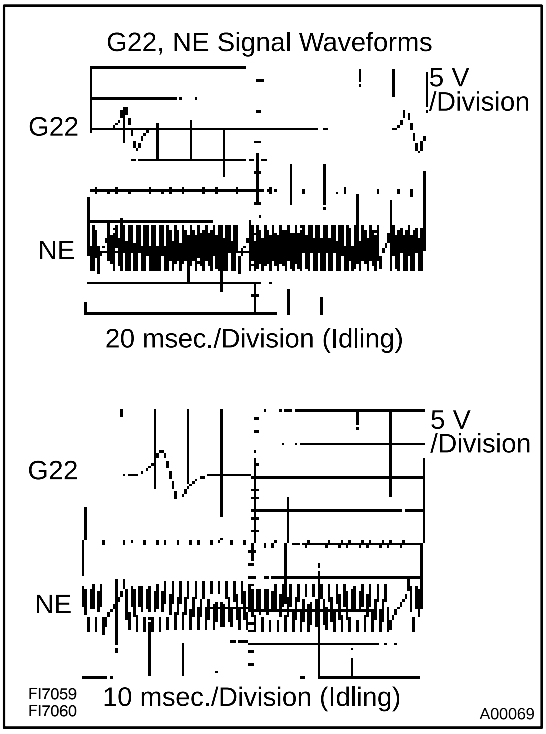


INSPECTION PROCEDURE

HINT:

- Perform troubleshooting of DTC P0335 first. If no trouble is found, troubleshoot the following mechanical systems.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Check resistance of crankshaft position sensor (See page IG–12).**



Reference INSPECTION USING OSCILLOSCOPE

During cranking or idling, check between terminals G22+ and NE–, NE and NE– of the ECM connector.

HINT:

The correct waveforms are as shown.

NG → **Replace crankshaft position sensor.**

OK

2	**Check for open and short in harness and connector between ECM and crankshaft position sensor (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

3	Inspect sensor installation and teeth of crankshaft timing pulley.

NG → **Tighten the sensor.**
Replace crankshaft timing pulley.

OK

Check and replace ECM
(See page IN–31).

DI07V–06

DTC	P0340	Camshaft Position Sensor Circuit Malfunction

CIRCUIT DESCRIPTION

Camshaft position sensor (G22 signal) consist of a signal plate and pickup coil.
The G22 signal plate has one tooth, on its outer circumference and is mounted on the left bank camshafts. When the camshafts rotate, the protrusion on the signal plate and the air gap on the pickup coil change, causing fluctuations in the magnetic field and generating an electromotive force in the pickup coil.
The NE signal plate has 34 teeth and is mounted on the crankshaft. The NE signal sensor generates 34 signals for every engine revolution. The ECM detects the standard crankshaft angle based on the G22 signal and the actual crankshaft angle and the engine speed by the NE signals.

DTC No.	DTC Detecting Condition	Trouble Area
P0340	No camshaft position sensor signal to ECM during cranking (2 trip detection logic)	●Open or short in camshaft position sensor circuit ●Camshaft position sensor ●Starter ●ECM
	No camshaft position sensor signal to ECM with engine speed 600 rpm or more	

WIRING DIAGRAM

Refer to DTC P0335 (Crankshaft Position Sensor "A" Circuit Malfunction) on page DI–287 .

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	Check resistance of camshaft position sensor (See page IG–1).

Reference INSPECTION USING OSCILLOSCOPE
Refer to DTC P0335 on page DI–287.

NG → **Replace camshaft position sensor.**

OK

2	Check for open and short in harness and connector between ECM and camshaft position sensor (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

3	Inspect sensor installation and tooth of left bank camshaft timing pulley.

NG → **Tighten the sensor.**
Replace left bank camshaft timing pulley.

OK

Check and replace ECM (See page IN–31).

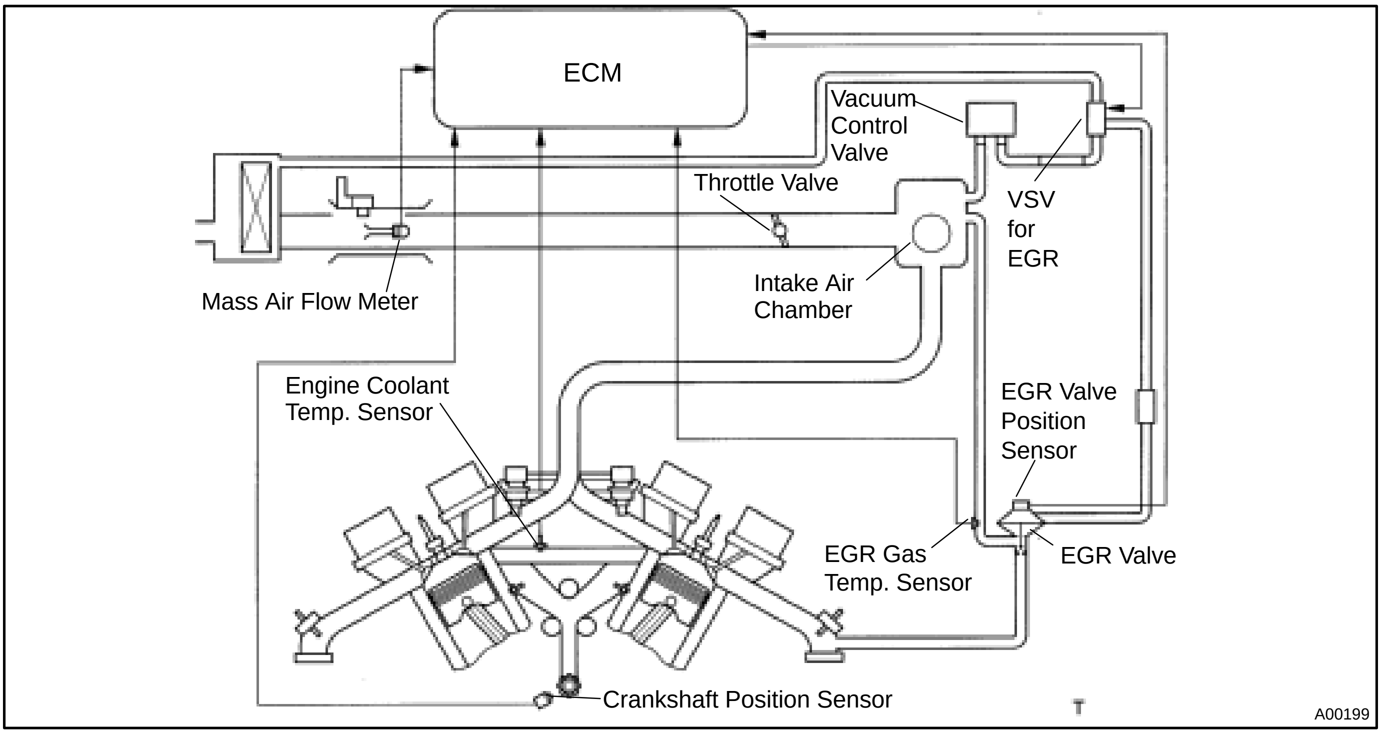
DI4DS–01

DTC	P0401	Exhaust Gas Recirculation Flow Insufficient Detected (Ex CA Spec.)

CIRCUIT DESCRIPTION

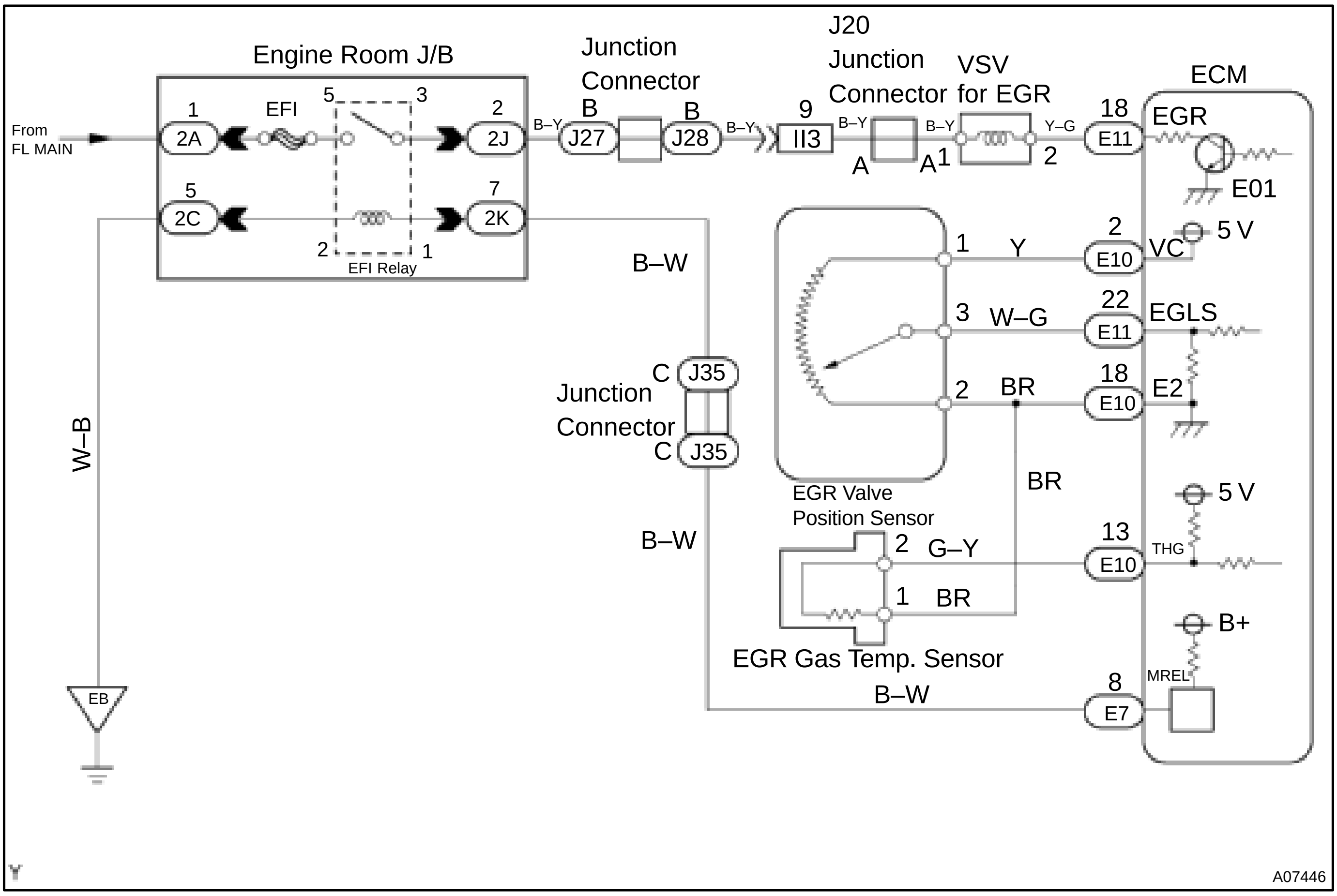
The EGR system recirculates exhaust gas, which is controlled to the proper quantity to suit the driving conditions, into the intake air mixture to slow down combustion, reduce the combustion temperature and reduce NOx emissions.
The lift amount of EGR valve is controlled by the vacuum which is regulated by the Duty–VSV operated by the ECM. The lift amount of EGR valve is detected by the EGR valve position sensor which is mounted on the EGR valve and it provides feedback to the ECM to control the lift amount of EGR valve in response to engine operating conditions.
Under the following conditions, EGR is cut to maintain driveability.

- Before the engine is warmed up
- During deceleration (throttle valve closed)
- Light engine load (amount of intake air very small)
- Engine speed over 4,000 rpm
- Engine idling

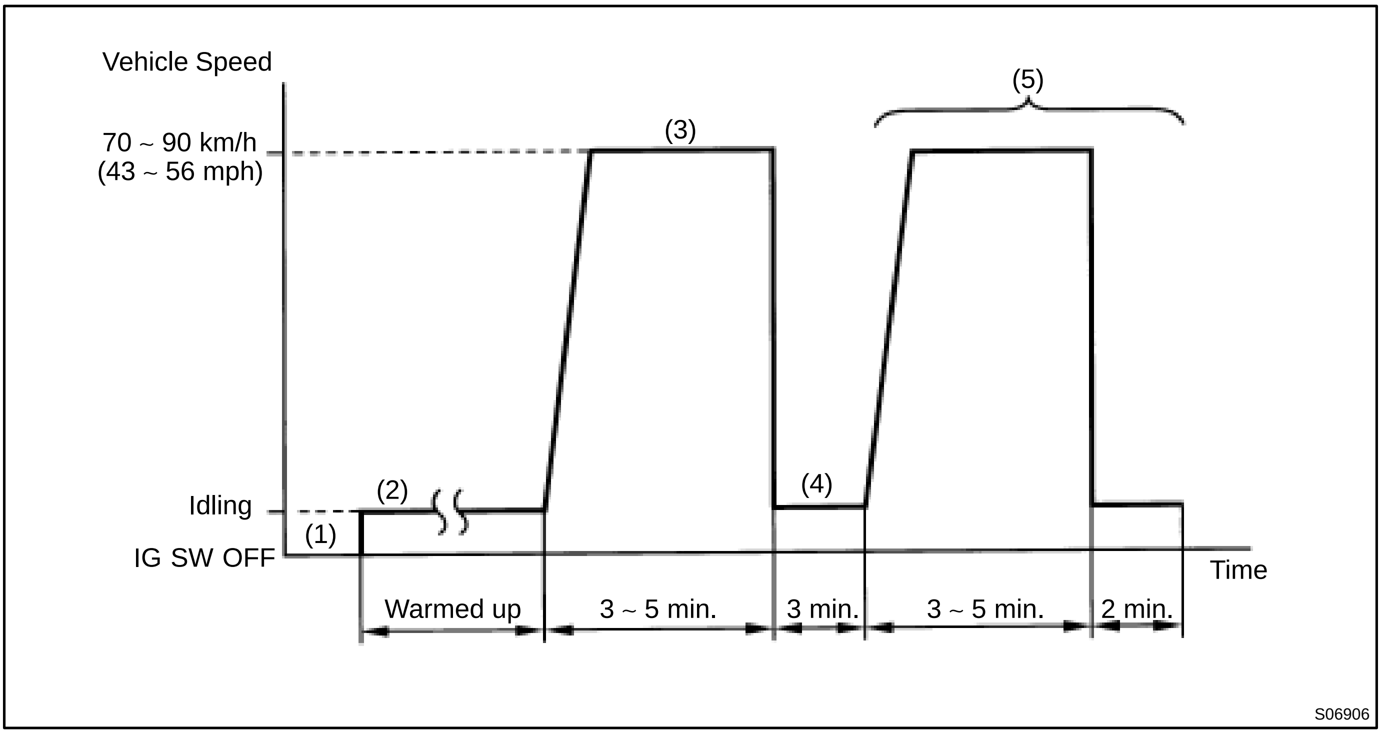


DTC No.	DTC Detecting Condition	Trouble Area
P0401	After engine is warmed up and run at 80 km/h (50 mph) for 3 to 5 min. EGR gas temperature sensor valve does not exceed 35˚C (95˚F) above ambient air temperature (2 trip detection logic)	●EGR valve (stuck closed) ●Open or short in EGR gas temp. sensor circuit ●EGR gas temp. sensor ●Open in VSV circuit for EGR ●VSV for EGR ●Vacuum control valve ●Vacuum hose disconnected or blocked ●ECM

WIRING DIAGRAM



SYSTEM CHECK DRIVING PATTERN



(1) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.
(2) Start and warm up the engine with all accessories switched OFF.
(3) Run the vehicle at 70 ~ 90 km/h (43 ~ 56 mph) for 3 min. or more.
(4) Idle the engine for about 2 min.
(5) Do steps (3) and (4) again.
(6) Stop at safe place and turn the ignition switch OFF.
(7) Do step (2) to (5) again.
(8) Check the READINESS TESTS mode on the OBD II scan tool or TOYOTA hand–held tester.
If COMPL is displayed and the MIL does not light up, the system is normal.
If INCMPL is displayed and the MIL does not light up, run the vehicle steps (2) to (6) from some times and check it.
HINT:
INCMPL is displayed when either condition (a) or (b) exists.
(a) The system check is incomplete.
(b) There is a malfunction in the system.
If there is a malfunction in the system, the MIL light up after step (7) above is done.
(2trip detection logic)

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

TOYOTA hand–held tester

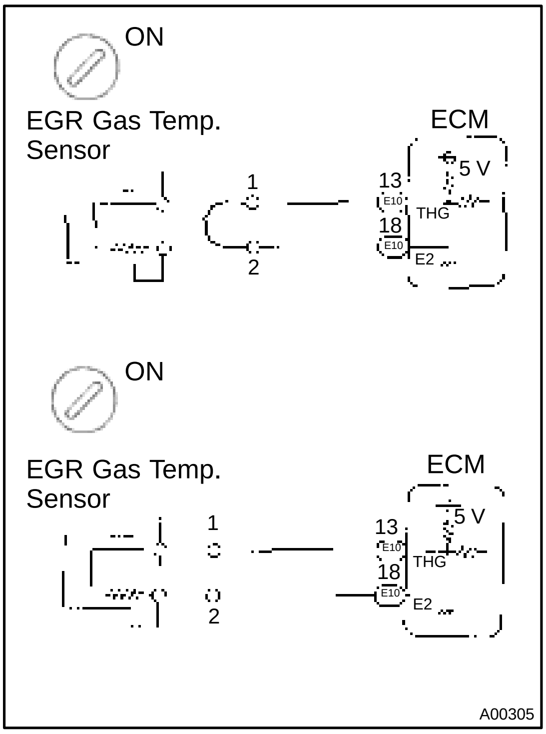
1	**Connect TOYOTA hand–held tester, and read value of EGR gas temperature.**

PREPARATION:
(a) Connect the TOYOTA hand–held tester to the DLC3.
(b) Warm up the engine.
CHECK:
Read EGR gas temperature on TOYOTA hand–held tester during idling.
OK:
EGR gas temperature : 5°C (41°F) ~ 150°C (302°F) (Not immediately after driving)
HINT:
If there is an open circuit, TOYOTA hand–held tester indicates 3.1°C (37.6°F).
If there is an short circuit, TOYOTA hand–held tester indicates 159.3°C (318.7°F).

OK → **Go to step 4.**

NG

2	Check for open or short in harness or ECM.



For open circuit

PREPARATION:

(a) Disconnect the EGR gas temp. sensor connector.

(b) Connect the sensor wire harness terminals together.

(c) Turn the ignition switch ON.

CHECK:

Read EGR gas temperature on the TOYOTA hand–held tester.

OK:

EGR gas temperature : 159.3°C (318.7°F)

For short circuit

PREPARATION:

Disconnect the EGR gas temp. sensor connector.

CHECK:

Read EGR gas temperature on the TOYOTA hand–held tester.

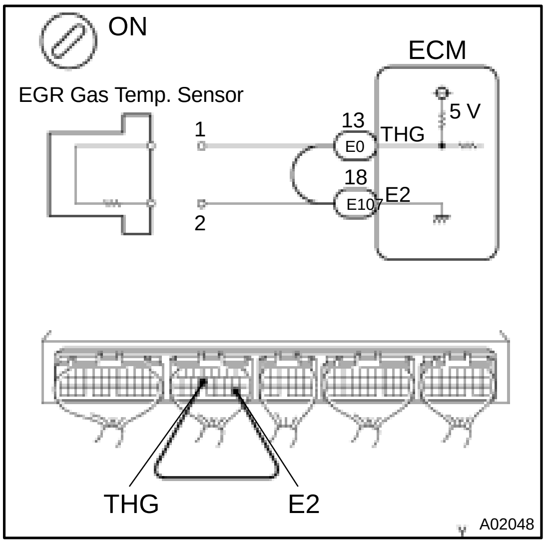
OK:

EGR gas temp. : 3.1°C (37.6°F)

OK	Confirm good connection at sensor. If OK, check and replace EGR gas temp. sensor.

NG

3	Check for open or short in harness or ECM.



For open circuit

PREPARATION:

(a) Remove the glove compartment (See page SF–73).

(b) Connect between terminals THG and E2 of the ECM connectors.

HINT:

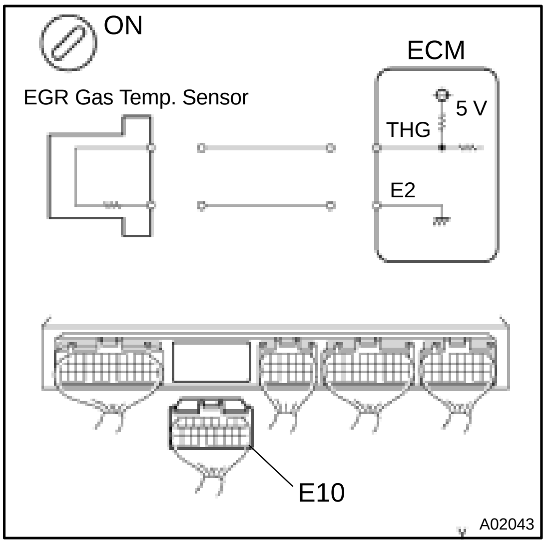
EGR gas temp. sensor connector is disconnected. Before checking, do a visual check and contact pressure check for the ECM connector (See page IN–31).

CHECK:

Read EGR gas temperature on the TOYOTA hand–held tester.

OK:

EGR gas temperature : 159.3°C (318.7°F)



For short circuit

PREPARATION:

(a) Remove the glove compartment (See page SF–73).

(b) Disconnect the E10 connector of ECM.

CHECK:

Read EGR gas temperature on the TOYOTA hand–held tester.

OK:

EGR gas temperature: 3.1°C (37.6°F)

OK → **Repair or replace harness.**

NG

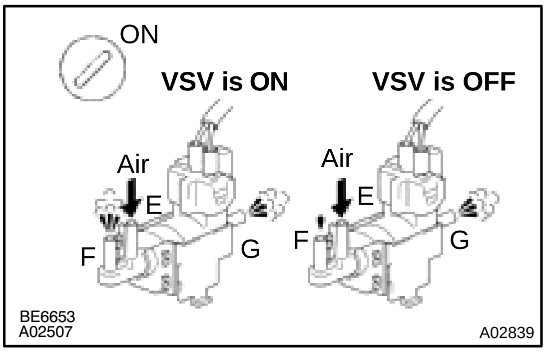
Confirm connection at ECM.
If OK, check and replace ECM.

4	Check connection and blockage of vacuum hose (See page EC–2).

NG — **Repair or replace vacuum hose.**

OK

5	Check VSV for EGR.



PREPARATION:
Select the ACTIVE TEST mode on the TOYOTA hand–held tester.

CHECK:
Check operation VSV, when it is operated by the TOYOTA hand–held tester.

OK:

VSV is ON:
Air from pipe E is flowing out through pipe F and G.
VSV is OFF:
Air from pipe E is flowing out through pipe G.

OK — **Go to step 8.**

NG

6	Check operation of VSV for EGR (See page SF–56).

NG — **Replace VSV for EGR.**

OK

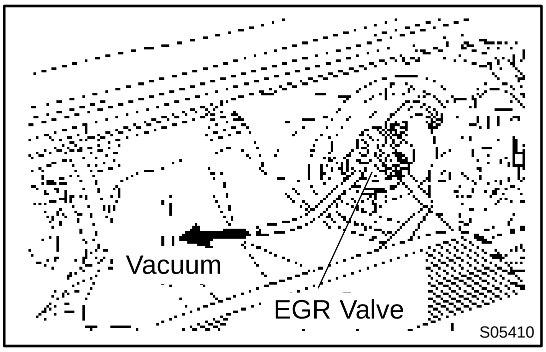
Check for open in harness and connector between engine room J/B and ECM.

7	**Check EGR system (See page EC–11).**

NG → **Repair or replace.**

OK

8	**Check EGR valve.**



PREPARATION:

(a) Disconnect the vacuum hose from EGR valve.

(b) Start the engine.

CHECK:

Check whether the engine stall when apply vacuum to EGR valve.

OK:

Engine runs rough or stall.

NG → **Repair or replace EGR valve.**

OK

9	**Check vacuum control valve (See page EC–11).**

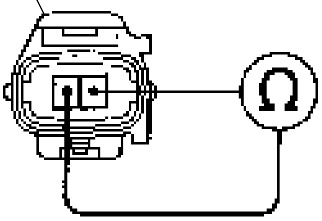
NG → **Replace vacuum control valve.**

OK

Check and replace ECM (See page IN–31).

OBDII scan tool (excluding TOYOTA hand–held tester)

1	**Check resistance of EGR gas temp. sensor.**



PREPARATION:
Disconnect the EGR gas temp. sensor connector.
CHECK:
Measure resistance between terminals of the EGR gas temp. sensor connector.
OK:
Resistance: 2.5 kΩ ~ 600 kΩ
(Not immediately after driving)
HINT:
If there is open circuit, ohmmeter indicates 720 kΩ or more.
If there is short circuit, ohmmeter indicates 200 Ω or less.

NG	**Replace EGR gas temp. sensor.**

OK

2	**Check for open and short in harness and connector between EGR gas temp. sensor and ECM (See page IN–31).**

NG	**Repair or replace harness or connector.**

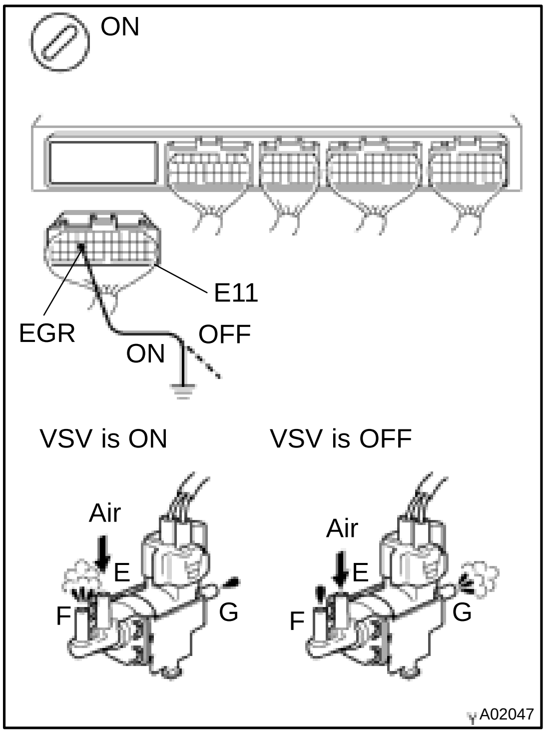
OK

3	**Check connection and blockage of vacuum hose (See page EC–2).**

NG	**Repair or replace vacuum hose.**

OK

4	Check VSV for EGR.



PREPARATION:

(a) Remove the glove compartment (See page SF–73).
(b) Disconnect the E11 connector of ECM.
(c) Turn the ignition switch ON.

CHECK:

Check VSV function.

(1) Connect between terminal EGR of the ECM and body ground (VSV is ON).
(2) Disconnect between terminal EGR of the ECM and body ground (VSV is OFF).

OK:

(1) VSV is ON:
Air from pipe E flows out through pipe F.
(2) VSV is OFF:
Air from pipe E flows out through pipe G.

OK	Go to step 7.

NG

5	Check operation of VSV for EGR (See page SF–56).

NG	Replace VSV for EGR.

OK

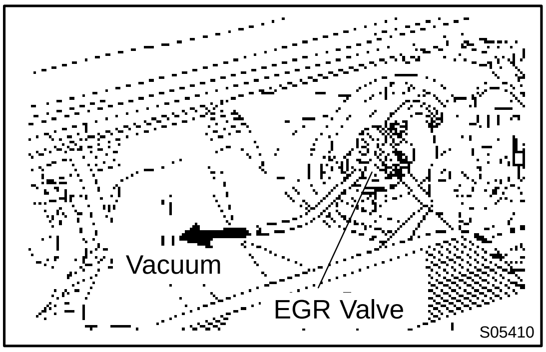
Check for open in harness and connector between engine room J/B and ECM (See page IN–31).

6	Check EGR system (See page EC–11).

NG	Repair or replace.

OK

7	**Check EGR valve.**



PREPARATION:
(a) Disconnect the vacuum hose from EGR valve.
(b) Start the engine.

CHECK:
Check whether the engine stall when apply vacuum to EGR valve.

OK:
Engine runs rough or stall.

NG → **Repair or replace EGR valve.**

OK

8	**Check vacuum control valve (See page EC–11).**

NG → **Replace vacuum control valve.**

OK

Check and replace ECM (See page IN–31).

DI07X–06

DTC	P0402	Exhaust Gas Recirculation Flow Excessive Detected (Ex CA Spec.)

CIRCUIT DESCRIPTION

Refer to DTC P0401 (Exhaust Gas Recirculation Flow Insufficient Detected) on page DI–292.

DTC No.	DTC Detecting Condition	Trouble Area
P0402	When EGR cut–off, lift amount of EGR valve is 2.6 mm (0.1 in.) or more (2 trip detection logic)	●EGR valve stuck open ●VSV for EGR open malfunction ●Short in VSV circuit for EGR ●Open or short in EGR valve position sensor circuit ●EGR valve position sensor ●ECM

See DTC P0401 (Exhaust Gas Recirculation Flow Insufficient Detected) on See page DI–292 for SYSTEM CHECK DRIVING PATTERN and WIRING DIAGRAM.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

TOYOTA hand–held tester

1	**Check connection and blockage of vacuum hose.**

NG → **Repair or replace vacuum hose.**

OK

2	**Check VSV for EGR (See page DI–292, step 5).**

OK → **Go to step 4.**

NG

3	Check operation of VSV for EGR (See page SF–56).

NG → Replace VSV for EGR.

OK

Check for short in harness between VSV for EGR and ECM (See page IN–31).

4	Check EGR valve (See page EC–11).

NG → Repair or replace EGR valve.

OK

5	Check EGR valve position sensor (See page DI–358).

NG → Repair or replace EGR valve position sensor or harness.

OK

Check and replace ECM (See page IN–31).

OBDII scan tool (excluding TOYOTA hand–held tester)

1	Check connection and blockage of vacuum hose.

NG → Repair or replace vacuum hose.

OK

2	Check VSV for EGR (See page DI–292, step 5).

OK → Go to step 4.

NG ↓

3	Check operation of VSV for EGR (See page SF–56).

NG → Replace VSV for EGR.

OK ↓

Check for short in harness between VSV for EGR and ECM (See page IN–31).

4	Check EGR valve (See page EC–11).

NG → Repair or replace EGR valve.

OK ↓

5	Check EGR valve position sensor (See page DI–358).

NG → Repair or replace EGR valve position sensor or harness.

OK ↓

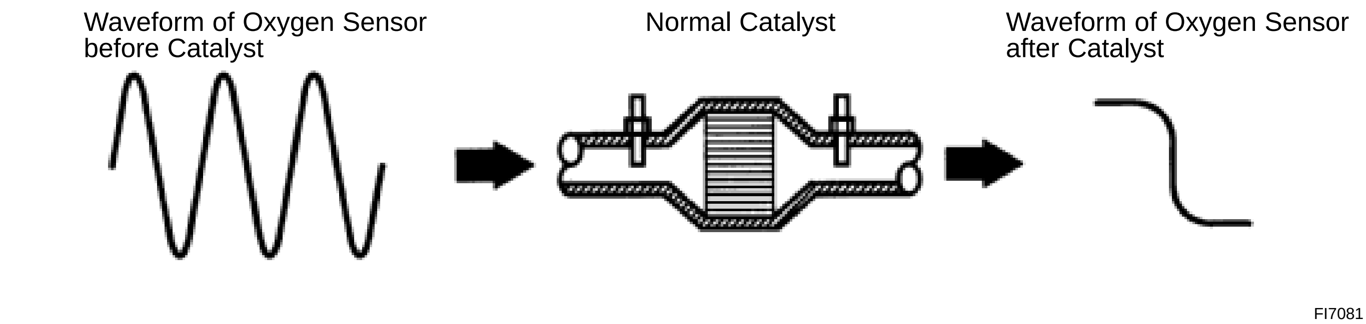
Check and replace ECM (See page IN–31).

DI07Y–06

DTC	P0420	Catalyst System Efficiency Below Threshold (Except California Spec.)

CIRCUIT DESCRIPTION

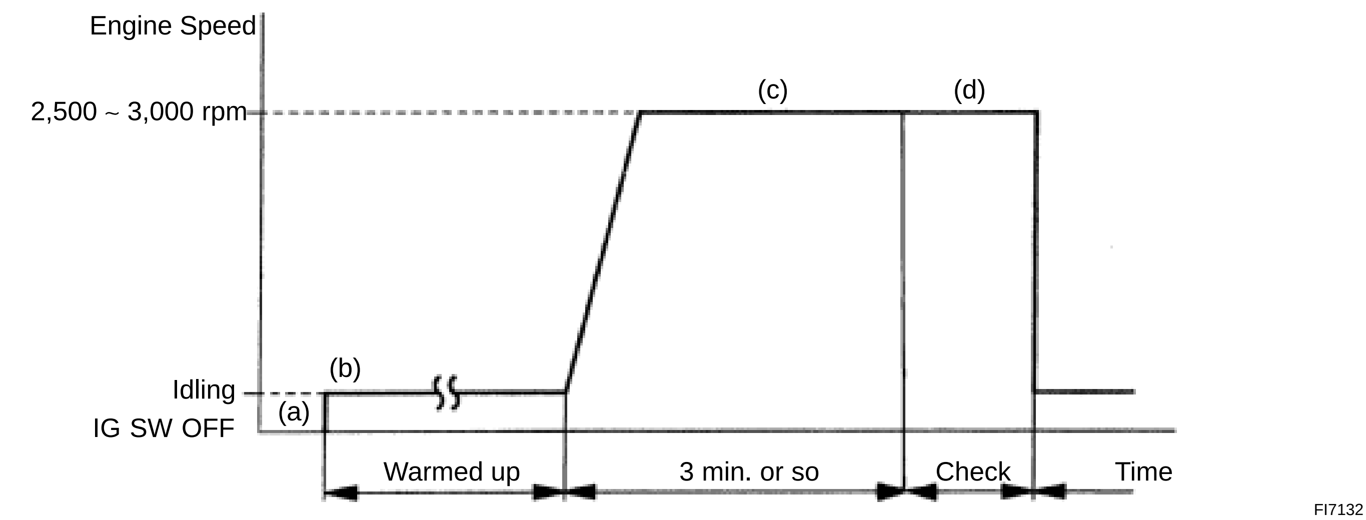
The ECM compares the waveform of the oxygen sensor located before the catalyst with the waveform of the oxygen sensor located after the catalyst to determine whether or not catalyst performance has deteriorated.
Air–fuel ratio feedback compensation keeps the waveform of the oxygen sensor before the catalyst repeatedly changing back and forth from rich to lean.
If the catalyst is functioning normally, the waveform of the oxygen sensor after the catalyst switches back and forth between rich and lean much more slowly than the waveform of the oxygen sensor before the catalyst.
But when both waveforms change at a similar rate, it indicates that catalyst performance has deteriorated.



FI7081

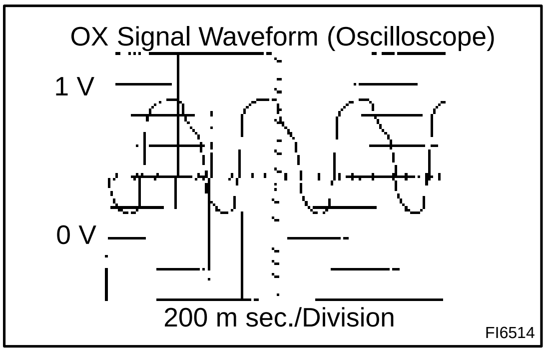
DTC No.	DTC Detecting Condition	Trouble Area
P0420	After engine and catalyst are warmed up, and while vehicle is driven within set vehicle and engine speed range, waveforms of heated oxygen sensors (bank 1 sensor 1, 2) have the same amplitude (2 trip detection logic)	•Three–way catalytic converter •Open or short in heated oxygen sensor circuit •Heated oxygen sensor

CONFIRMATION ENGINE RACING PATTERN



FI7132

(a) Connect the TOYOTA hand–held tester to the DLC3, or connect the probe of the oscilloscope between terminals OXR1, OXL1, OXS and E1 of the ECM connector.
(b) Start engine and warm it up with all accessories switched OFF until water temp. is stable.
(c) Race the engine at 2,500 ~ 3,000 rpm for about 3 min.
(d) After confirming that the waveform of the heated oxygen sensor, bank 1, 2 sensor 1 (OXR1, OXL1), oscillate around 0.5 V during feedback to the ECM, check the waveform of the heated oxygen sensor, bank 1 sensor 2 (OXS).



HINT:
If there is a malfunction in the system, the waveform of the heated oxygen sensor, bank 1 sensor 2 (OXS), is almost the same as that of the heated oxygen sensor, bank 1, 2 sensor 1 (OXR1, OXL1), on the left.
There are some cases where, even though a malfunction exists, the MIL may either light up or not light up.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held theater or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Are there any other codes (besides DTC P0420) being output?**

YES → **Go to relevant DTC chart.**

NO

2	**Check gas leakage on exhaust system.**

NG → **Repair or replace.**

OK

3	Check heated oxygen sensor (bank 1, sensor 1) (See page DI–255).

NG → Repair or replace.

OK

4	Check heated oxygen sensors (bank 1, 2 sensor 2) (See page DI–265).

NG → Repair or replace.

OK

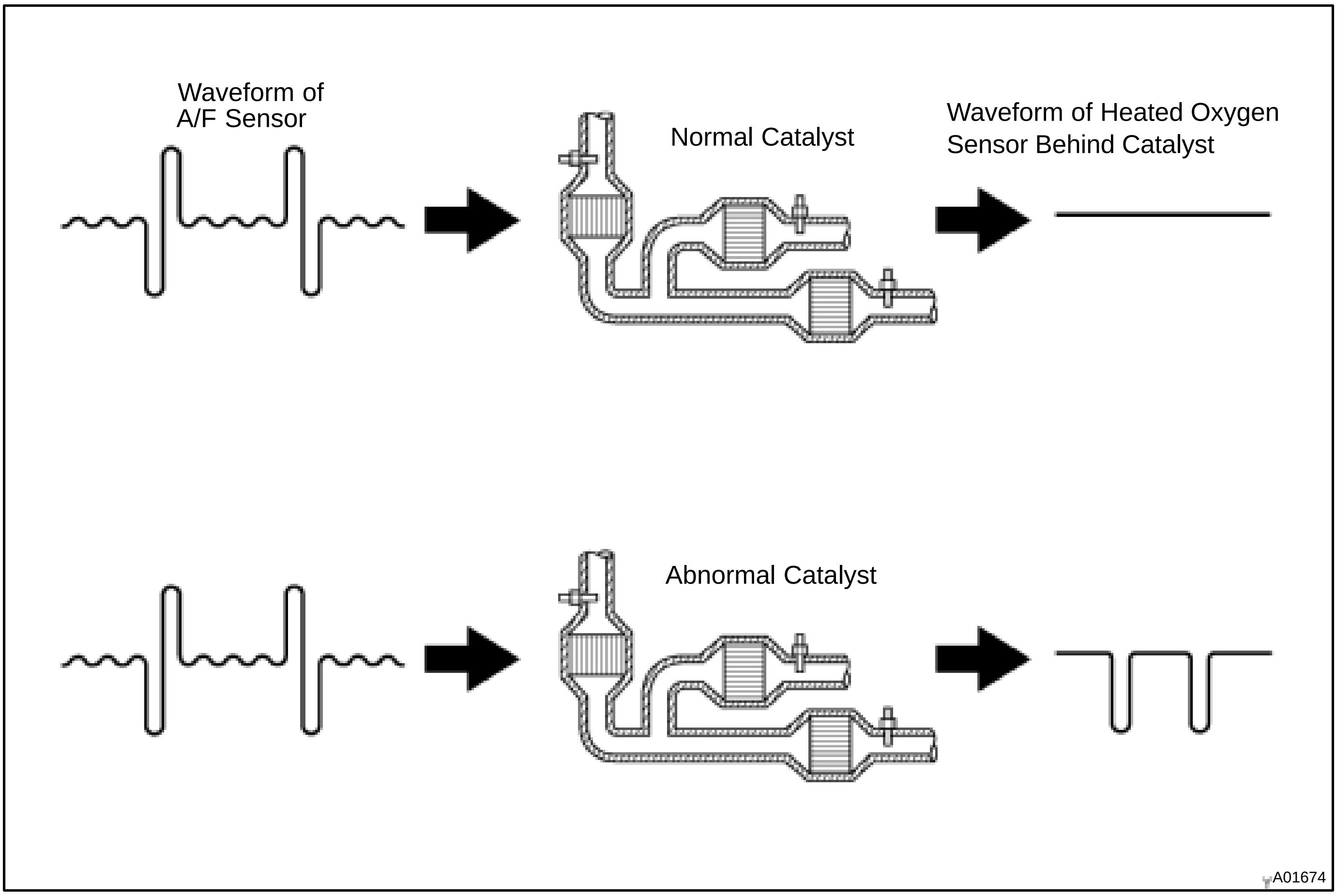
Replace three–way catalytic converter.

DI1K4–03

DTC	P0420	Catalyst System Efficiency Below Threshold (Only for California Spec.)

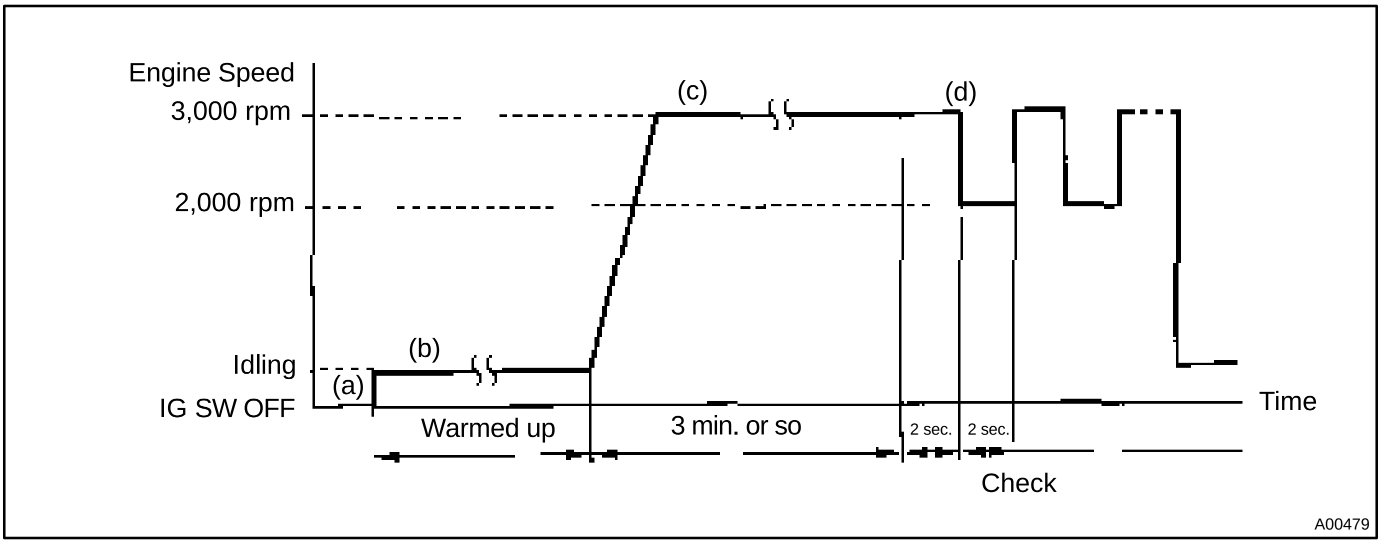
CIRCUIT DESCRIPTION

The ECM observes the waveform of the heated oxygen sensor located behind the catalyst to determine whether the catalyst is performance has deteriorated.
If the catalyst is functioning normally, the waveform of the heated oxygen sensor located behind the catalyst switches back and forth between rich and lean much more slowly.
When the waveform of the heated oxygen sensor located behind the catalyst alternates flatteringly between rich and lean, it indicates that catalyst performance has deteriorated.



DTC No.	DTC Detecting Condition	Trouble Area
P0420	After engine and catalyst are warmed up, and while vehicle is driven within set vehicle and engine speed range, waveform of heated oxygen sensor (bank 1 sensor 2) alternates flatteringly between rich and lean (2 trip detection logic)	●Three–way catalytic converter ●Open or short in heated oxygen sensor (bank 1 sensor 2) circuit ●Heated oxygen sensor (bank 1 sensor 2) ●Open or short in A/F sensors (bank 1, 2 sensor 1) circuit ●A/F sensors (bank 1, 2 sensor 1)

CONFIRMATION ENGINE RACING PATTERN



(a) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.
(b) Start engine and warm it up with all accessories switched OFF until water temp. is stable.
(c) Race the engine at 2,500 ~ 3,000 rpm for about 3 min.
(d) When racing the engine at 3,000 rpm for 2 sec. and 2,000 rpm for 2 sec. alternately, check the waveform of the heated oxygen sensor (bank 1 sensor 2).

INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Are there any other codes (besides DTC P0420) being output ?**

YES → **Go to relevant DTC chart.**

NO

2	**Check gas leakage on exhaust system.**

NG → **Repair or replace.**

OK

3	Check A/F sensors (bank 1, 2 sensor 1) (See page DI–255).

NG → Repair or replace.

OK

4	Check heated oxygen sensor (bank 1 sensor 2) (See page DI–265).

NG → Repair or replace.

OK

Replace three–way catalytic converter.

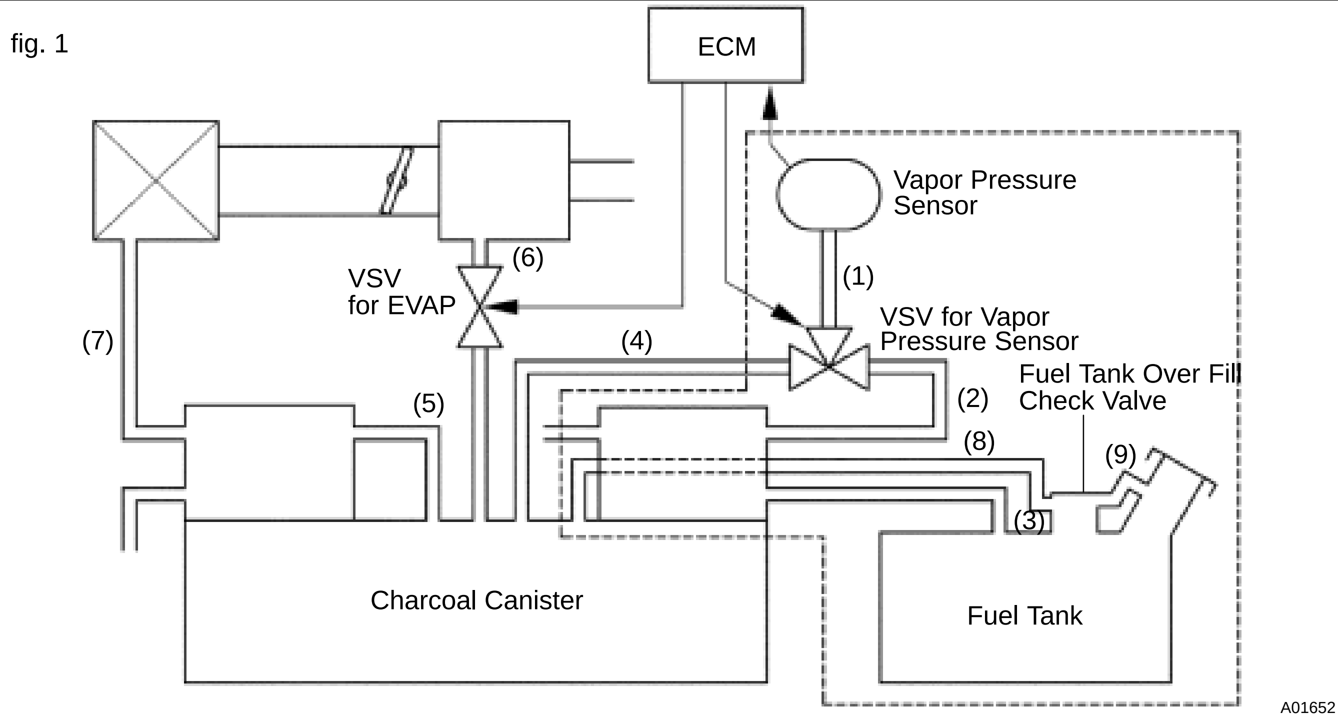
DI4DT–01

DTC	P0440	Evaporative Emission Control System Malfunction

CIRCUIT DESCRIPTION

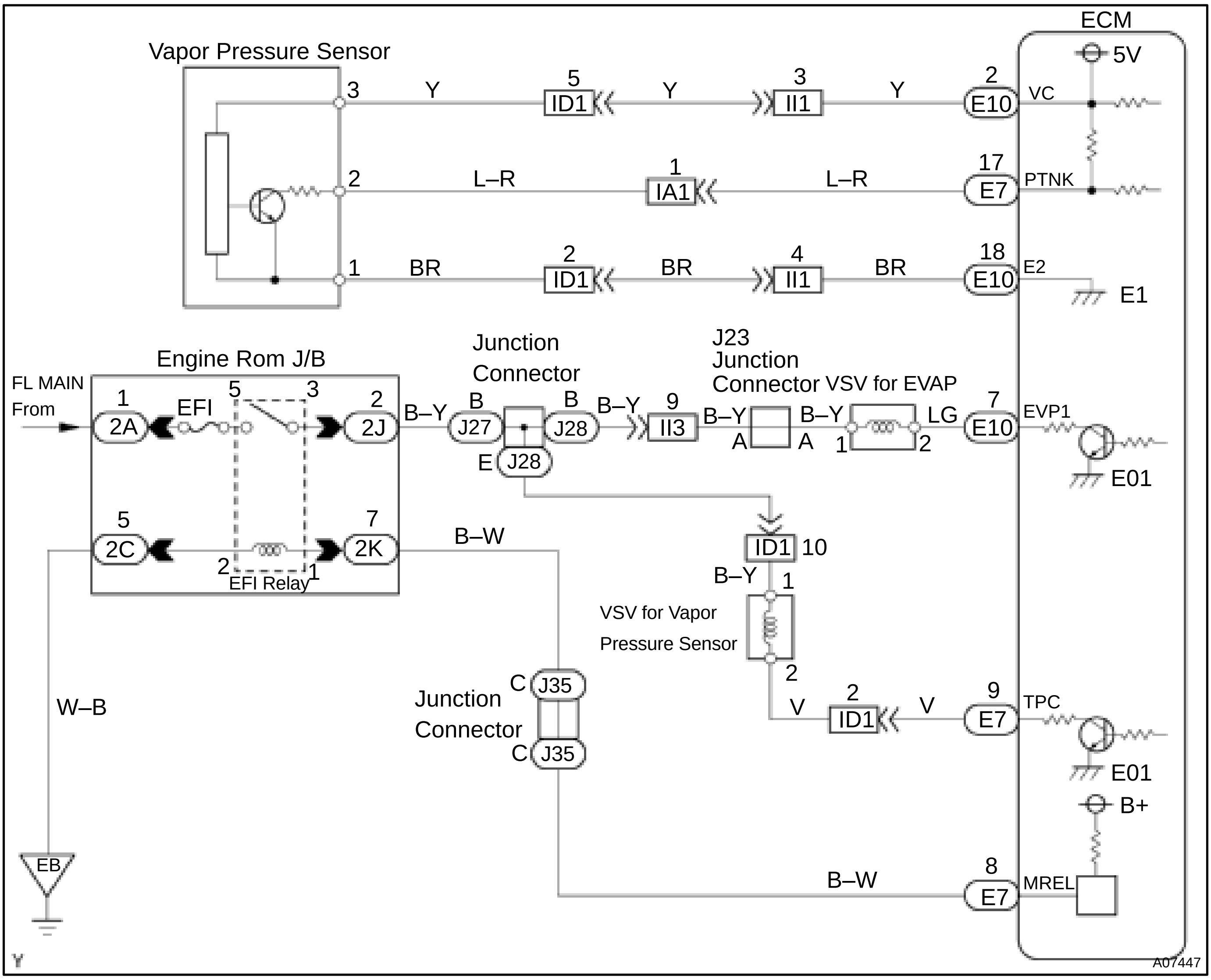
The vapor pressure sensor and VSV for vapor pressure sensor are used to detect abnormalities in the evaporative emission control system.
The ECM decides whether there is an abnormality in the evaporative emission control system based on the vapor pressure sensor signal.
DTC P0440 is recorded by the ECM when evaporative emissions leak from the components within the dotted line in fig. 1 below, or when the vapor pressure sensor malfunctions.

fig. 1



DTC No.	DTC Detecting Condition	Trouble Area
P0440	Fuel tank pressure is atmospheric pressure after vehicle is driven for 20 min. (2 trip detection logic)	●Vapor pressure sensor ●Fuel tank cap incorrectly installed ●Fuel tank cap cracked or damaged ●Vacuum hose cracked, holed, blocked, damaged or disconnected ((1) or (2) in fig. 1) ●Hose or tube cracked, holed, damaged or loose seal ((3) in fig. 1) ●Fuel tank cracked, holed or damaged ●Charcoal canister cracked, holed or damaged ●Fuel tank over fill check valve cracked or damaged

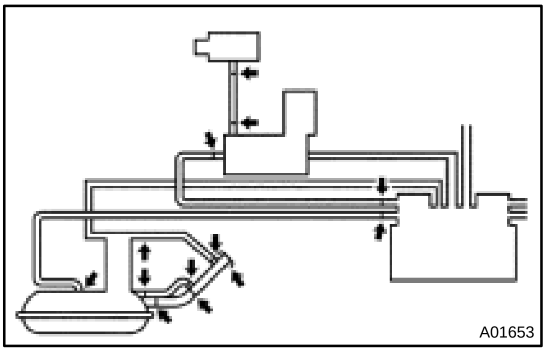
WIRING DIAGRAM



INSPECTION PROCEDURE

- If DTCs P0441, P0446, P0450 or P0451 is output after DTC P0440, first troubleshoot DTCs P0441, P0446, P0450 or P0451. If no malfunction is detected, troubleshoot DTC P0440 next.
- Ask the customer whether, after the MIL came on, the customer found the fuel tank cap loose and tightened it. Also ask the customer whether the fuel tank cap was loose when refuelling. If the fuel tank cap was not loose, it was the cause of the DTC. If the fuel tank cap was not loose or if the customer was not sure if it was loose, troubleshoot according to the following procedure.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.
- When the ENGINE RUN TIME in the freeze frame data is less than 200 seconds, carefully check the VSV for EVAP, charcoal canister and vapor pressure sensor.

1	**Check whether hose close to fuel tank have been modified, and check whether there are signs of any accident near fuel tank or charcoal canister.**



CHECK:
Check for cracks, deformation and loose connection of these parts:

- Fuel tank
- Charcoal canister
- Fuel tank filler pipe
- Hoses and tubes around fuel tank and charcoal canister

NG → **Repair or replace.**

OK

2	**Check that fuel tank cap is TOYOTA genuine parts.**

NG → **Replace to TOYOTA genuine parts.**

OK

3	**Check that fuel tank cap is correctly installed.**

NG → **Correctly install fuel tank cap.**

OK

4	**Check fuel tank cap (See page EC–6).**

NG → **Replace fuel tank cap.**

OK

5	**Check filler neck for damage.**

PREPARATION:
Remove the fuel tank cap.
CHECK:
Visually inspect the filler neck for damage.

NG → **Replace filler pipe.**

OK

6	**Check vacuum hoses between vapor pressure sensor and VSV for vapor pressure sensor, and VSV for vapor pressure sensor and charcoal canister (See page EC–3 , SF–62 and EC–6).**

CHECK:
(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole and damage.

NG → **Repair or replace.**

OK

7	**Check hose and tube between fuel tank and charcoal canister.**

CHECK:
(a) Check for proper connection of the fuel tank and fuel evap pipe (See page SF–1), fuel evap pipe and fuel tube under the floor, fuel tube under the floor and charcoal canister.
(b) Check the hose and tube for cracks, hole and damage.

NG → **Repair or replace.**

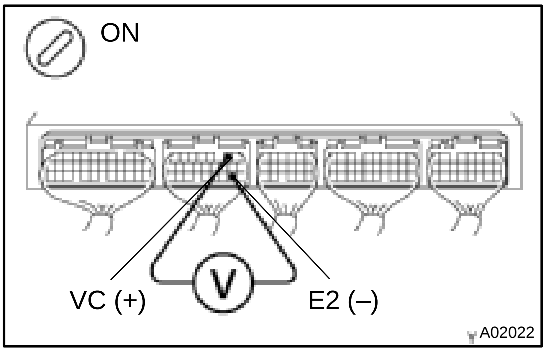
OK

8	**Check charcoal canister for cracks, hole and damage (See page EC–6).**

NG → **Replace charcoal canister.**

OK

9	**Check voltage between terminals VC and E2 of ECM connector.**



CHECK:

(a) Remove the glove compartment (See page SF–73).

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals VC and E2 of the ECM connector.

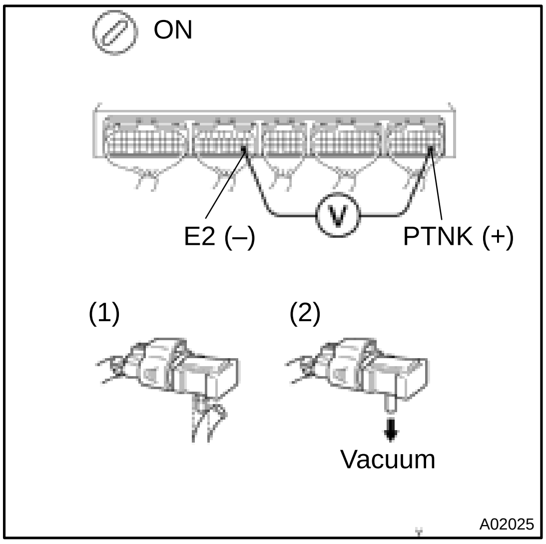
OK:

Voltage: 4.5 ~ 5.5 V

NG → **Check and replace ECM (See page IN–31).**

OK

10	Check voltage between terminals PTNK and E2 of ECM connectors.



PREPARATION:

(a) Remove the glove compartment (See page SF–73).

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals PTNK and E2 of the ECM connectors.

(1) Disconnect the vacuum hose from the vapor pressure sensor.

(2) Using the MITYVAC (Hand–Held Vacuum Pump), apply a vacuum of 4.0 kPa (30 mmHg, 1.18 in.Hg) to the vapor pressure sensor.

NOTICE:

The vacuum applied to the vapor pressure sensor must be less than 66.7 kPa (500 mmHg, 19.7 in.Hg).

OK:

(1) Voltage: 2.9 ~ 3.7 V

(2) Voltage: 0.5 V or less

OK	Go to step 12.

NG

11	Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN–31).

NG	Repair or replace harness or connector.

OK

Replace vapor pressure sensor.

12	Check fuell tank and fuel tank over fill check valve for cracks and damage. (See page EC–2)

NG → **Replace fuel tank or fuel tank over fill check valve.**

OK

It is likely that vehicle user did not properly close fuel tank cap.
Please explain to customer how to properly install fuel tank cap.

DI080–07

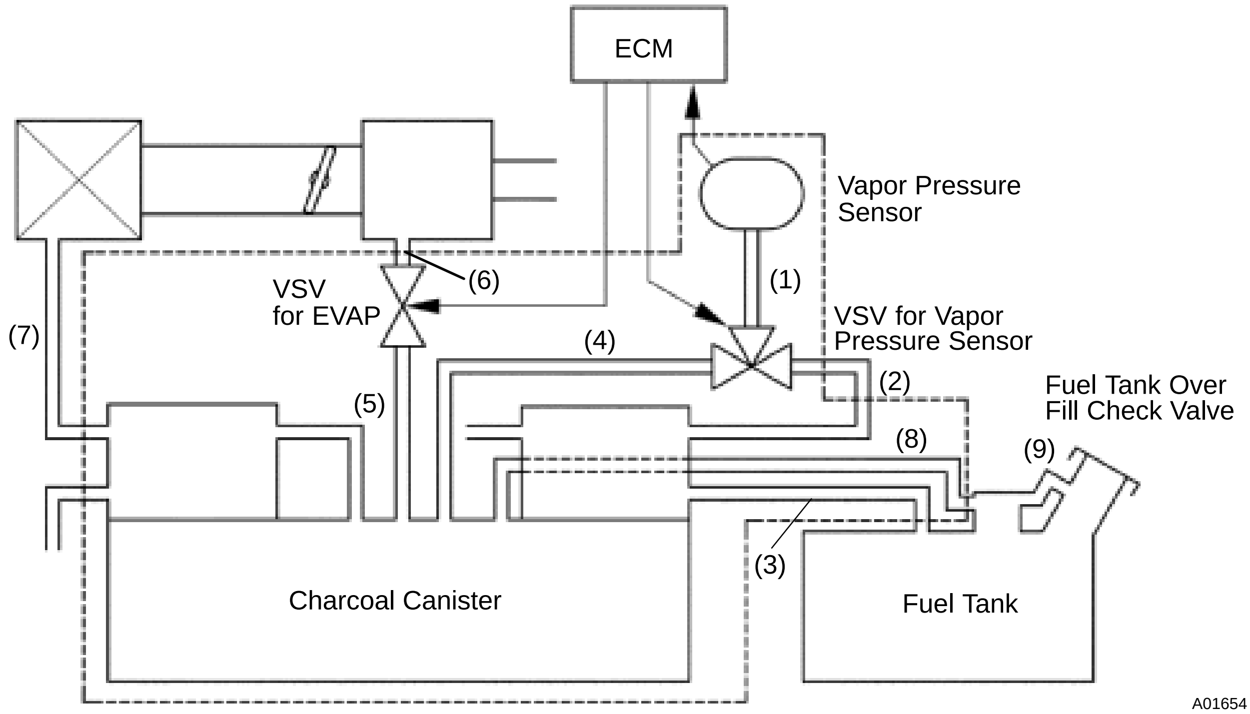
DTC	P0441	Evaporative Emission Control System Incorrect Purge Flow

DTC	P0446	Evaporative Emission Control System Vent Control Malfunction

CIRCUIT DESCRIPTION

The vapor pressure sensor and VSV for vapor pressure sensor are used to detect abnormalities in the evaporative emission control system.
The ECM decides whether there is an abnormality in the evaporative emission control system based on the vapor pressure sensor signal.
DTCs P0441 and P0446 are recorded by the ECM when evaporative emissions leak from the components within the dotted line in fig. 1 below, or when there is a malfunction in either the VSV for EVAP, the VSV for vapor pressure sensor, or in the vapor pressure sensor itself.

fig. 1



DTC No.	DTC Detecting Condition	Trouble Area
P0441	Pressure in charcoal canister does not drop during purge control (2 trip detection logic)	●Open or short in VSV circuit for EVAP ●Open or short in VSV circuit for vapor pressure sensor ●Open or short in vapor pressure sensor circuit ●VSV for EVAP ●VSV for vapor pressure sensor ●Vapor pressure sensor ●Vacuum hose cracks, holed blocked, damaged or disconnected ((1), (4), (5),(6) and (7) in fig. 1) ●Charcoal canister cracks, holed or damaged ●Fuel tank over fill check valve cracked or damaged
	During purge cut–off, pressure in charcoal canister is very low compared with atmospheric pressure (2 trip detection logic)	
P0446	When VSV for vapor pressure sensor is OFF, ECM judges that there is no continuity between vapor pressure sensor and charcoal canister (2 trip detection logic)	
	When VSV for vapor pressure sensor is ON, ECM judges that there is no continuity between vapor pressure sensor and fuel tank (2 trip detection logic)	
	After purge cut off operates, pressure in charcoal canister is maintained at atmospheric pressure (2 trip detection logic)	

WIRING DIAGRAM

Refer to DTC P0440 (Evaporative Emission Control System Malfunction) on page DI–311 for the WIRING DIAGRAM.

INSPECTION PROCEDURE

HINT:

- If DTCs P0441, P0446, P0450 or P0451 is output after DTC P0440, first troubleshoot DTCs P0441, P0446, P0450 or P0451. If no malfunction is detected, troubleshoot DTC P0440 next.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.
- When the ENGINE RUN TIME in the freeze frame data is less than 200 seconds, carefully check the VSV for EVAP, charcoal canister and vapor pressure sensor.

TOYOTA hand–held tester

1	**Check VSV connector for EVAP, VSV connector for vapor pressure sensor and vapor pressure sensor connector for looseness and disconnection.**

NG → **Repair or connect VSV or sensor connector.**

OK

2	Check vacuum hoses (1), (4), (5), (6), (7) and (8) on page DI–311).

CHECK:
(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole, damage and blockage.

NG → **Repair or replace.**

OK

3	Check voltage between terminals VC and E2 of ECM connector (See page DI–311, step 9).

NG → **Check and replace ECM (See page IN–31).**

OK

4	Check voltage between terminals PTNK and E2 of ECM connectors (See page DI–311, step 10).

OK → **Go to step 6.**

NG

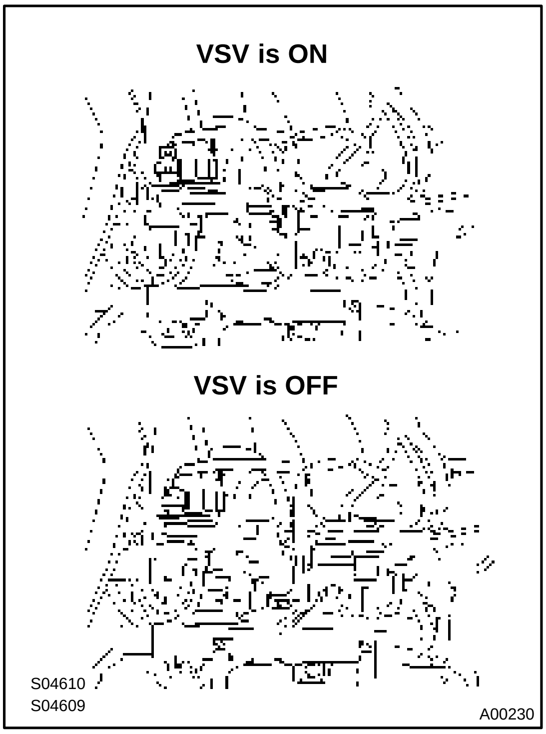
5	Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Replace vapor pressure sensor.

6	Check purge flow.



PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3.
(b) Select the ACTIVE TEST mode on the TOYOTA hand–held tester.
(c) Disconnect from the charcoal canister the vacuum hose to the VSV for EVAP.
(d) Start the engine.

CHECK:

When the VSV for EVAP is operated by the TOYOTA hand–held tester, check whether the disconnected hose applies suction to your finger.

OK:

VSV is ON:
Disconnected hose applies suction to your finger.
VSV is OFF:
Disconnected hose applies no suction to your finger.

OK	Go to step 10.

NG

7	Check vacuum hoses between intake manifold and VSV for EVAP, and VSV for EVAP and charcoal canister.

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole, damage and blockage.

NG	Repair or replace.

OK

8	Check operation of VSV for EVAP (See page SF–58).

OK → Go to step 9.

NG

Replace VSV and charcoal canister, and then clean the vacuum hoses between throttle body and VSV for EVAP, and VSV for EVAP and charcoal canister.

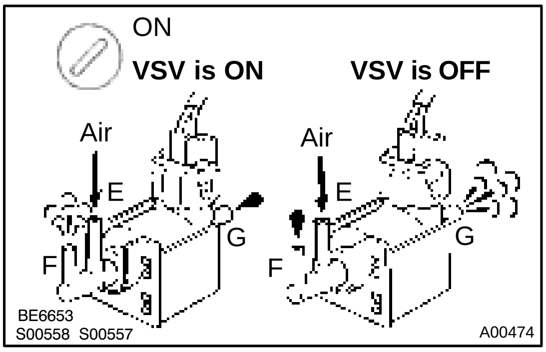
9	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for EVAP, VSV for EVAP and ECM (See page IN–31).

NG → Repair or replace harness or connector.

OK

Check and replace ECM (See page IN–31).

10	Check VSV for vapor pressure sensor.



PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3.

(b) Turn the ignition switch ON and push the OBD II scan tool or TOYOTA hand–held tester main switch ON.

(c) Select the ACTIVE TEST mode on the TOYOTA hand–held tester.

CHECK:

Check the VSV operation when it is operated by TOYOTA hand–held tester.

OK:

VSV is ON:
Air from pipe E is flowing out through pipe F.
VSV is OFF:
Air from pipe E is flowing out through pipe G.

OK	Go to step 13.

NG

11	Check operation of VSV for vapor pressure sensor (See page SF–62).

OK	Go to step 12.

NG

Replace VSV and charcoal canister, and then clean the vacuum hoses between charcoal canister and VSV for vapor pressure sensor, and VSV for vapor pressure sensor and vapor pressure sensor.

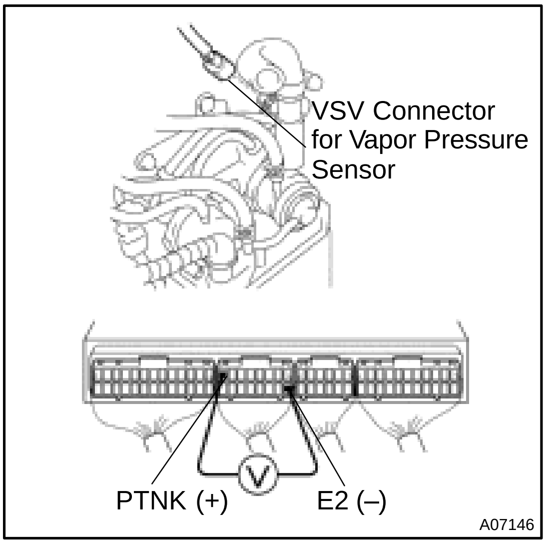
12	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for vapor pressure sensor, and VSV for vapor pressure sensor and ECM (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–31).

13	When VSV connector for vapor pressure sensor is disconnected and VSV for EVAP is ON, measure voltage between terminals PTNK and E2 of ECM connectors.



PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3.
(b) Disconnect the VSV connector for vapor pressure sensor.
(c) Select the ACTIVE TEST mode on the TOYOTA hand–held tester.
(d) Start the engine.

CHECK:

Measure voltage between terminals PTNK and E2 of ECM connectors. Using the TOYOTA hand–held tester when VSV for EVAP is ON, .

OK:

Voltage: 2.0 V or less

OK → **Go to step 15.**

NG

14	**Check vacuum hoses between charcoal canister and VSV for vapor pressure sensor, and vapor pressure sensor and VSV for vapor pressure sensor.**

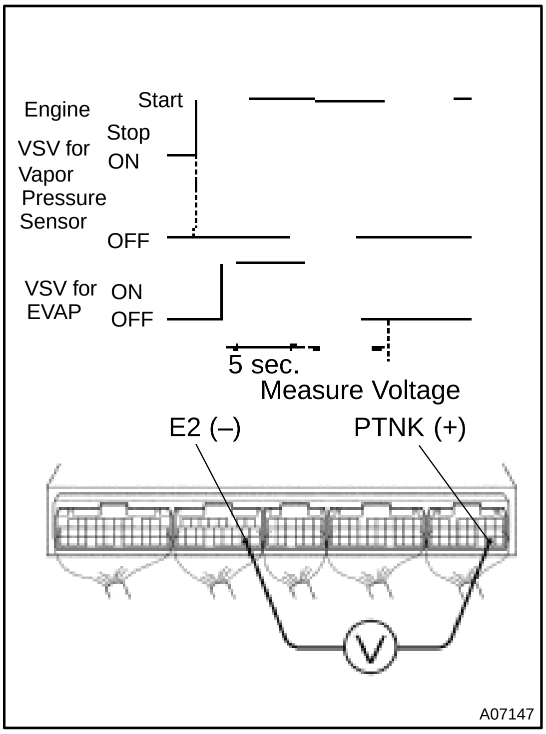
CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole, damage and blockage.

NG → **Repair or replace.**

OK

15	**Check charcoal canister.**



PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3.
(b) Remove the fuel tank cap.
(c) Disconnect the VSV connector for vapor pressure sensor.
(d) Select the ACTIVE TEST mode on the TOYOTA hand–held tester.
(e) Start the engine.
(f) VSV for EVAP is ON by the TOYOTA hand–held tester and remains on for 5 sec.

CHECK:

Measure voltage between terminals PTNK and E2 of ECM connectors 5 sec. after switching VSV for EVAP from ON to OFF.

OK:

Voltage: 2.5 V or less

NG → **Replace charcoal canister.**

OK

16	Remove charcoal canister and check it (See page EC–6).

NG → Replace charcoal canister.

OK ↓

17	Check fuel tank over fill check valve (See page EC–2).

NG → Replace fuel tank over fill check valve or fuel tank.

OK ↓

Check and replace ECM (See page IN–31).

OBD II scan tool (excluding TOYOTA hand–held tester)

1	Check VSV connector for EVAP, VSV connector for vapor pressure sensor and vapor pressure sensor connector for looseness and disconnection.

NG → Repair or connect VSV or sensor connector.

OK ↓

2	Check vacuum hoses (1), (4), (5), (6) (7) and (8) on Page DI–311).

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole, damage and blockage.

NG → Repair or replace.

OK ↓

3	**Check voltage between terminals VC and E2 of ECM connector (See page DI–311, step 9).**

NG → **Check and replace ECM (See page IN–31).**

OK

4	**Check voltage between terminals PTNK and E2 of ECM connectors (See page DI–311, step 10).**

OK → **Go to step 6.**

NG

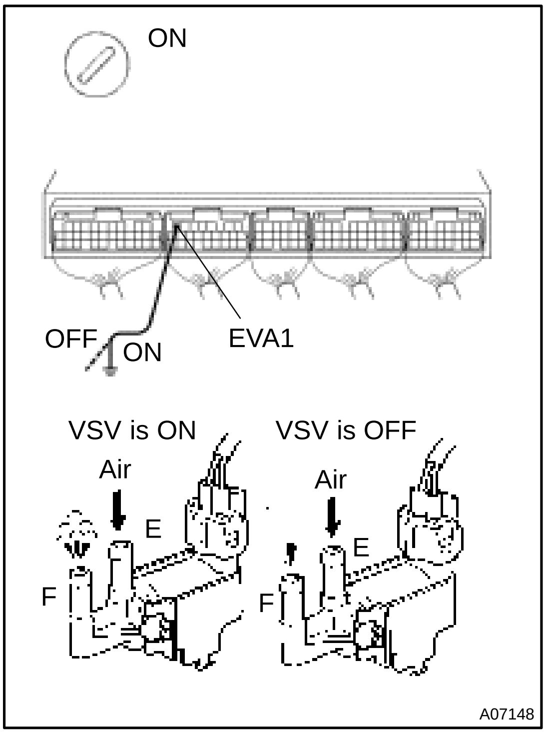
5	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Replace vapor pressure sensor.

6	**Check VSV for EVAP.**



PREPARATION:
(a) Remove the glove compartment (See page SF–73).
(b) Turn the ignition switch ON.

CHECK:
Check VSV function.
(1) Connect between terminal EVA1 of the ECM connector and body ground (ON).
(2) Disconnect between terminal EVP of the ECM connector and body ground (OFF).

OK:
(1) VSV is ON:
Air from pipe E is flowing out through pipe F.
(2) VSV is OFF:
Air does not flow from pipe E to pipe F.

OK → **Go to step 9.**

NG

7	**Check operation of VSV for EVAP (See page SF–58).**

OK → **Go to step 9.**

NG

Replace VSV and charcoal canister, and then clean the vacuum hoses between throttle body and VSV for EVAP, and VSV for EVAP and charcoal canister.

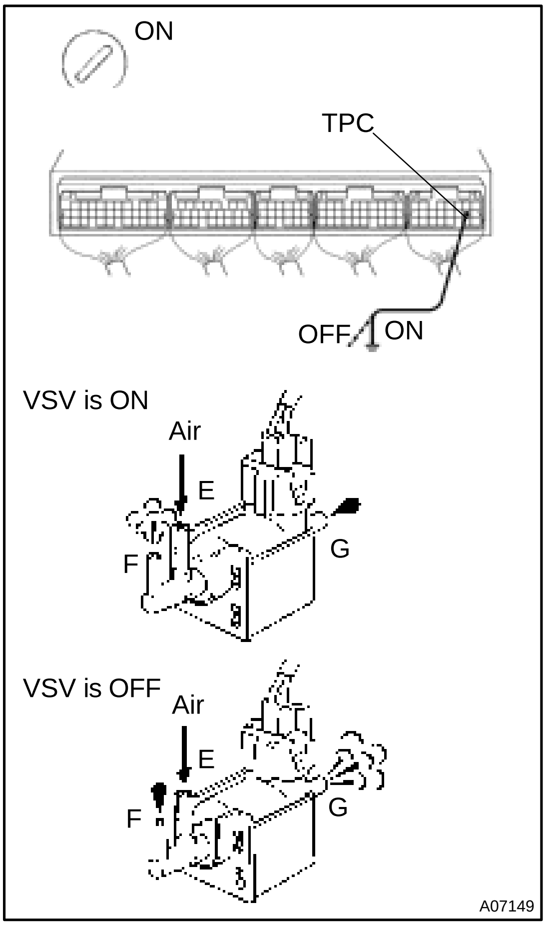
8	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for EVAP and ECM (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–31).

9	Check VSV for vapor pressure sensor.



PREPARATION:

(a) Remove the glove compartment (See page SF–73).

(b) Turn the ignition switch ON.

CHECK:

Check VSV function.

(1) Connect between terminal TPC of the ECM connector and body ground (ON).

(2) Disconnect between terminal TPC of the ECM connector and body ground (OFF).

OK:

(1) VSV is ON:
Air from pipe E is flowing out through pipe F.
(2) VSV is OFF:
Air from pipe E flows out through pipe G.

OK → **Check and replace charcoal canister (See page EC–6).**

NG

10	Check operation of VSV for vapor pressure sensor (See page SF–62).

OK → Go to step 11.

NG ↓

Replace VSV and clean the vacuum hoses between charcoal canister and VSV for vapor pressure sensor, and VSV for vapor pressure sensor and vapor pressure sensor, and then check the charcoal canister.

11	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for vapor pressure sensor, and VSV for vapor pressure sensor and ECM (See page IN–31).

NG → Repair or replace harness or connector.

OK ↓

Check and replace ECM (See page IN–31).

12	Check the fuel tank over fill check valve (See page EC–6).

NG → Replace fuel tank over fill check valve or fuel tank.

OK ↓

Check and replace charcoal canister (See page EC–6).

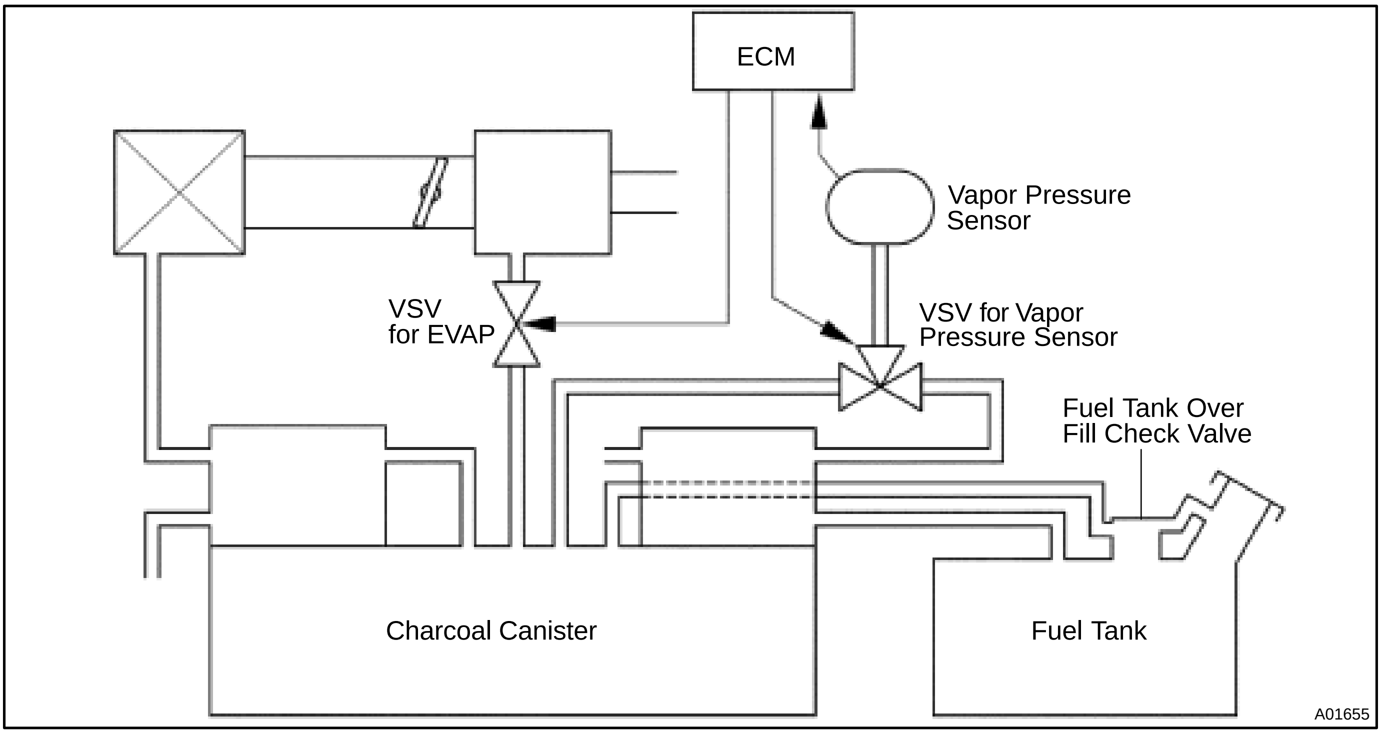
DI1K5–03

DTC	P0450	Evaporative Emission Control System Pressure Sensor Malfunction

DTC	P0451	Evaporative Emission Control System Pressure Sensor Range/Performance

CIRCUIT DESCRIPTION

The vapor pressure sensor and VSV for vapor pressure sensor are used to detect abnormalities in the evaporative emission control system.
The ECM decides whether there is an abnormality in the evaporative emission control system based on the vapor pressure sensor signal.
DTC P0450 or p0451 is recorded by the ECM when the vapor pressure sensor malfunction.



DTC No.	DTC Detecting Condition	Trouble Area
P0450	10 seconds or more after engine starting condition (a) or (b) continues for 7 seconds or more: (2 trip detection logic) (a) Vapor Pressure Sensor Value $<$ –3.5 kPa (–26 mmHg, –1.0 in.Hg) (b) Vapor Pressure Sensor Value ～ 1.5 kPa (15 mmHg, 0.4 in.Hg)	●Open or short in vapor pressure sensor circuit ●Vapor pressure sensor ●ECM
P451	Vapor pressure sensor output extremely changes under conditions of (a), (b) and (c): (2 trip detection logic) (a) Vehicle speed: 0 km/h (0 mph) (b) Engine speed: Idling (c) VSV for vapor pressure sensor is ON.	

WIRING DIAGRAM

Refer to DTC P0440 (Evaporative Emission Control Malfunction) on page DI–311.

INSPECTION PROCEDURE

HINT:

- If DTCs P0441, P0446, P0450 or P0451 is output after DTC P0440, first troubleshoot DTCs P0441, P0446 ,P0450 or P0451. If no malfunction is detected, troubleshoot DTC P0440 next.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.
- When the ENGINE RUN TIME in the freeze frame data is less than 200 seconds, carefully check the VSV for EVAP, charcoal canister and vapor pressure sensor.

1	**Check voltage between terminals VC and E2 of ECM connector (See page DI–311, step 9).**

NG → **Check and replace ECM (See page IN–31).**

OK

2	**Check voltage between terminals PTNK and E2 of ECM connectors (See page DI–311, step 10).**

OK → **Check and replace ECM (See page IN–31).**

NG

3	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

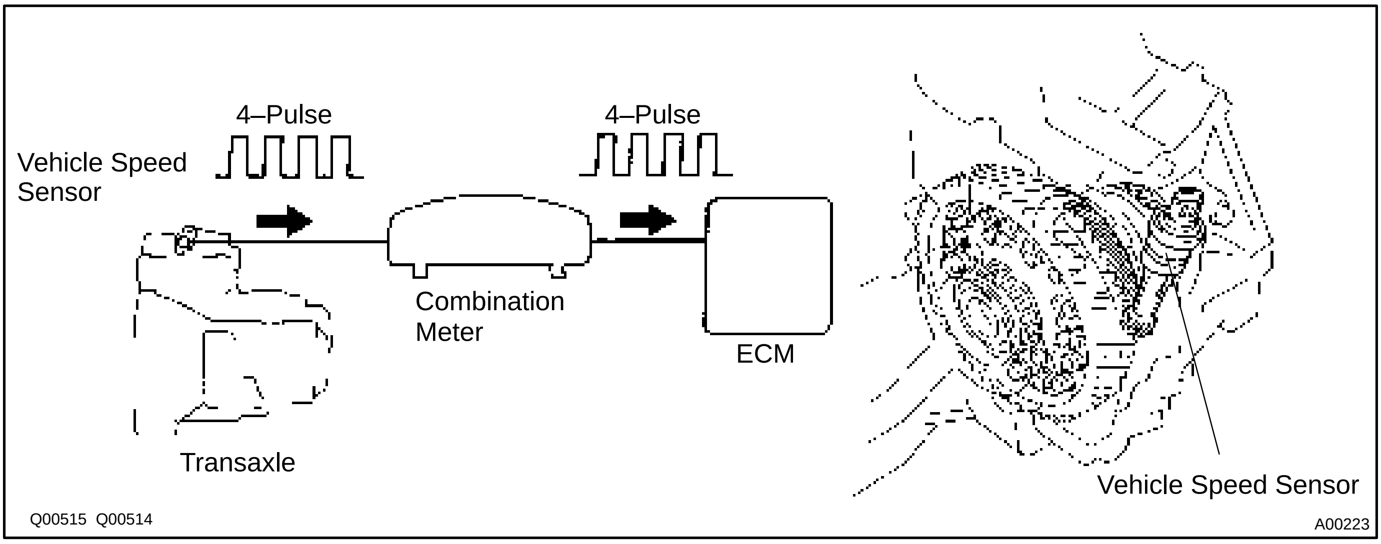
Replace vapor pressure sensor.

DI082–06

DTC	P0500	Vehicle Speed Sensor Malfunction

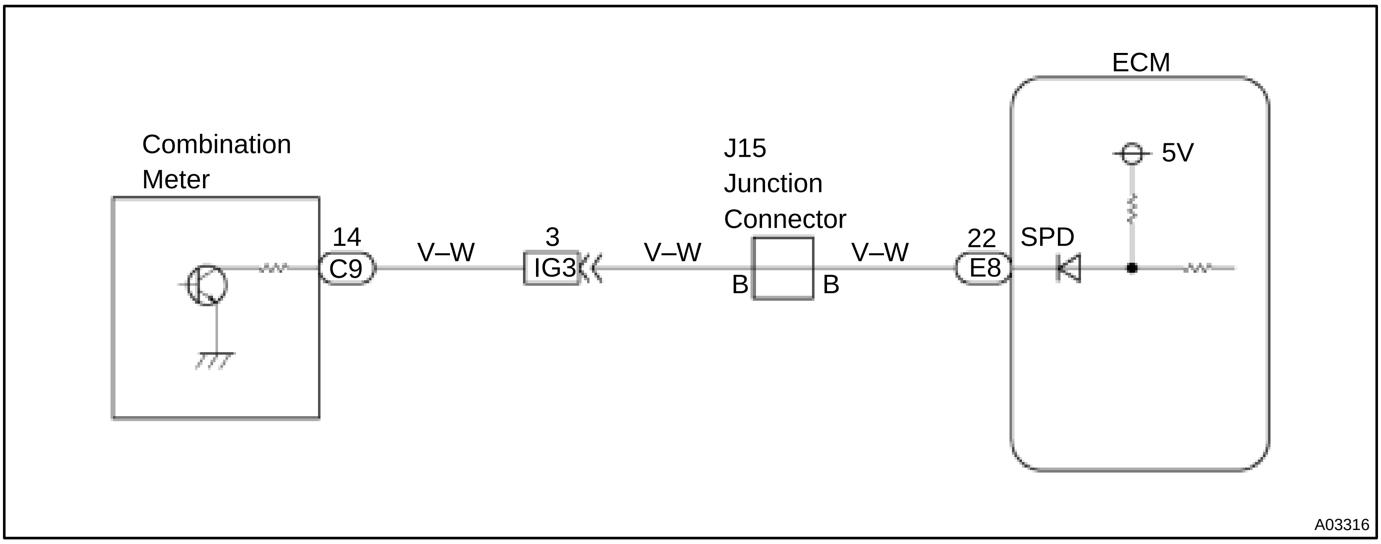
CIRCUIT DESCRIPTION

The vehicle speed sensor outputs a 4–pulse signal for every revolution of the rotor shaft, which is rotated by the transmission output shaft via the driven gear. After this signal is converted into a more precise rectangular waveform by the waveform shaping circuit inside the combination meter, it is then transmitted to the ECM. The ECM determines the vehicle speed based on the frequency of these pulse signals.



DTC No.	DTC Detecting Condition	Trouble Area
P0500	No vehicle speed sensor signal to ECM under conditions (a) and (b): (2 trip detection logic) (a) Park/neutral position switch is OFF (b) Vehicle is being driven	●Open or short in vehicle speed sensor circuit ●Vehicle speed sensor ●Combination meter ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

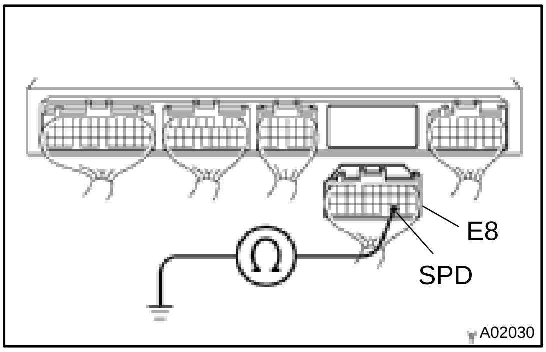
1	**Check operation of speedometer.**

CHECK:
Drive the vehicle and check if the operation of the speedometer in the combination meter is normal.
HINT:
The vehicle speed sensor is operating normally if the speedmeter display is normal.

NG → **Check speedmeter circuit.**

OK

2	**Check for short in harness and connector between terminal SPD of ECM and body ground (See page IN–31).**



PREPARATION:
(a) Remove the glove compartment (See page SF–73).
(b) Disconnect the E8 connector of ECM.

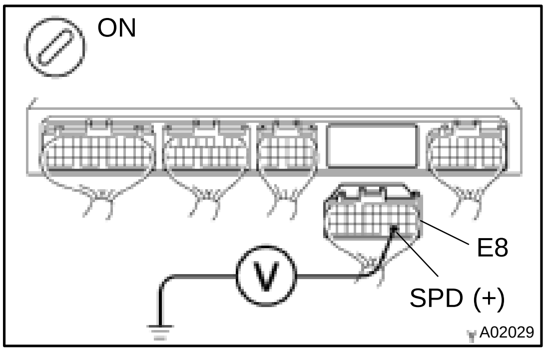
CHECK:
Check continuity between terminal SPD of ECM and body ground.

OK:
No continuity (1 MΩ or higher)

NG → **Repair or replace harness or connector.**

OK

3	Check voltage between terminal SPD of ECM connector and body ground.



PREPARATION:
(a) Turn the ignition switch ON.
(b) Disconnect the E8 connector of ECM.
CHECK:
Measure voltage between terminal SPD of the ECM connector and body ground.
OK:
Voltage: 9 ~ 14 V

NG → **Check for open in harness and connector between junction connector (J15) and ECM (See page IN–31).**

OK

4	Check for open in harness and connector between junction connector (J14) and combination meter (See page IN–31).

NG → **Repair or replace harness or connector.**

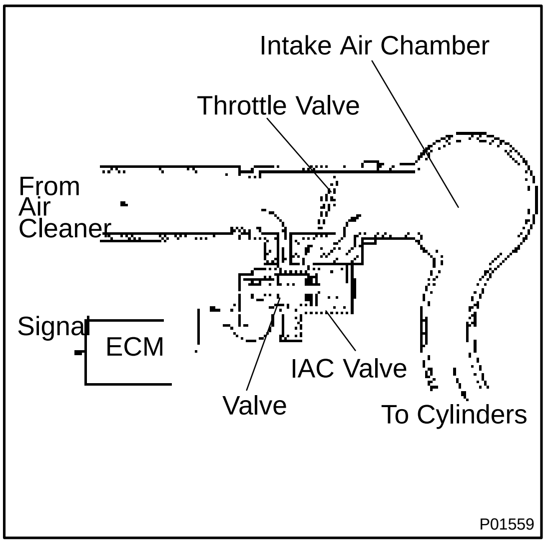
OK

Check and replace ECM (See page IN–31).

DI083–06

DTC	P0505	Idle Control System Malfunction

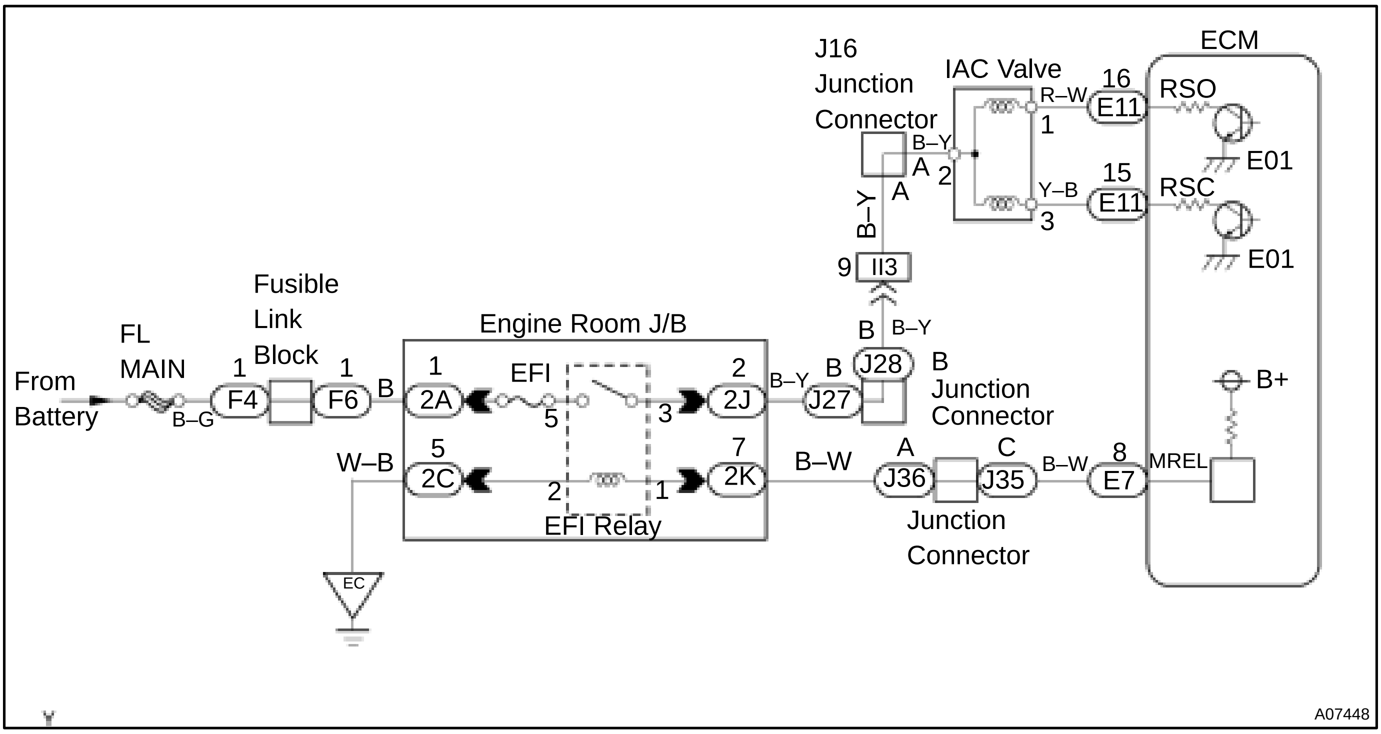
CIRCUIT DESCRIPTION



The rotary solenoid type IAC valve is located in front of the intake air chamber and intake air bypassing the throttle valve is directed to the IAC valve through a passage.
In this way the intake air volume bypassing the throttle valve is regulated, controlling the engine speed.
The ECM operates only the IAC valve to perform idle–up and provide feedback for the target idling speed.

DTC No.	DTC Detecting Condition	Trouble Area
P0505	Idle speed continues to vary greatly from target speed (2 trip detection logic)	●IAC valve is stuck or closed ●Open or short in IAC valve circuit ●Open or short in A/C signal circuit ●Air intake (hose loose) ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Check engine idle speed.**

PREPARATION:
(a) Warm up engine to normal operating temperature.
(b) Switch off all accessories.
(c) Switch off air conditioning.
(d) Shift transmission into "N" or neutral position.
(e) Connect the OBD II scan tool or TOYOTA hand–held tester to DLC3 on the vehicle.
(f) Using SST, connect terminals TE1 and E1 of the DLC3.

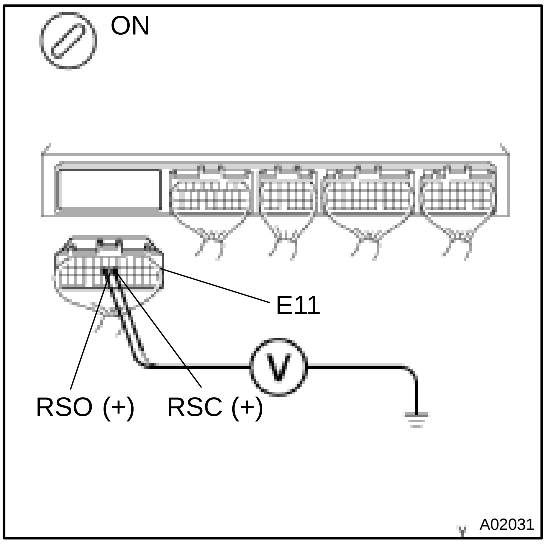
CHECK:
Check the difference of engine speed between the ones less than 5 sec. and more than 5 sec. after connecting terminals TE1 and E1 of the DLC1.

OK:
Difference of engine speed: More than 100 rpm

OK	**Go to step 6.**

NG

2	Check voltage between terminals RSO, RSC of ECM connector and body ground.



PREPARATION:

(a) Remove the glove compartment (See page SF–73).

(b) Disconnect the E11 connector of ECM.

(c) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals RSO, RSC of the ECM connector and body ground.

OK:

Voltage: 9 ~ 14 V

OK	Go to step 4.

NG

3	Check IAC valve (See page SF–46).

NG	Replace IAC valve.

OK

Check for open and short in harness and connector between engine room J/B and IAC valve, IAC valve and ECM (See page IN–31).

4	Check operation of IAC valve (See page SF–42).

NG	Repair or replace IAC valve.

OK

5	Check the blockage of IAC valve and the passage to bypass the throttle valve.

NG — Repair or replace IAC valve.

OK

Check and replace ECM (See page IN–31).

6	Check for A/C signal circuit (See page AC–88).

NG — Repair or replace.

OK

Check air induction system
(See page SF–1).

DI1K6–03

DTC	P1130	A/F Sensor Circuit Range/Performance Malfunction (Only for California Spec.)

DTC	P1150	A/F Sensor Circuit Range/Performance Malfunction (Only for California Spec.)

CIRCUIT DESCRIPTION

Refer to DTC P0125 (Insufficient Temp. for Closed Loop Fuel Control (Only for California Spec.)) on Page DI–249.

DTC No.	DTC Detecting Condition	Trouble Area
P1130 P1150	Voltage output* of A/F sensor remains at 3.8 V or more, or 2.8 V or less, during engine running after engine is warmed up (2 trip detection logic) *: Output value changes at inside of ECM only.	●Open or short in A/F sensor (bank 1, 2 sensor 1) circuit ●A/F sensor (bank 1, 2 sensor 1) ●ECM
	Voltage output* of A/F sensor does not change from 3.30 V, during engine running after engine is warmed up (2 trip detection logic) *: Output value changes at inside of ECM only.	
	Open or short in A/F sensor circuit (2 trip detection logic)	

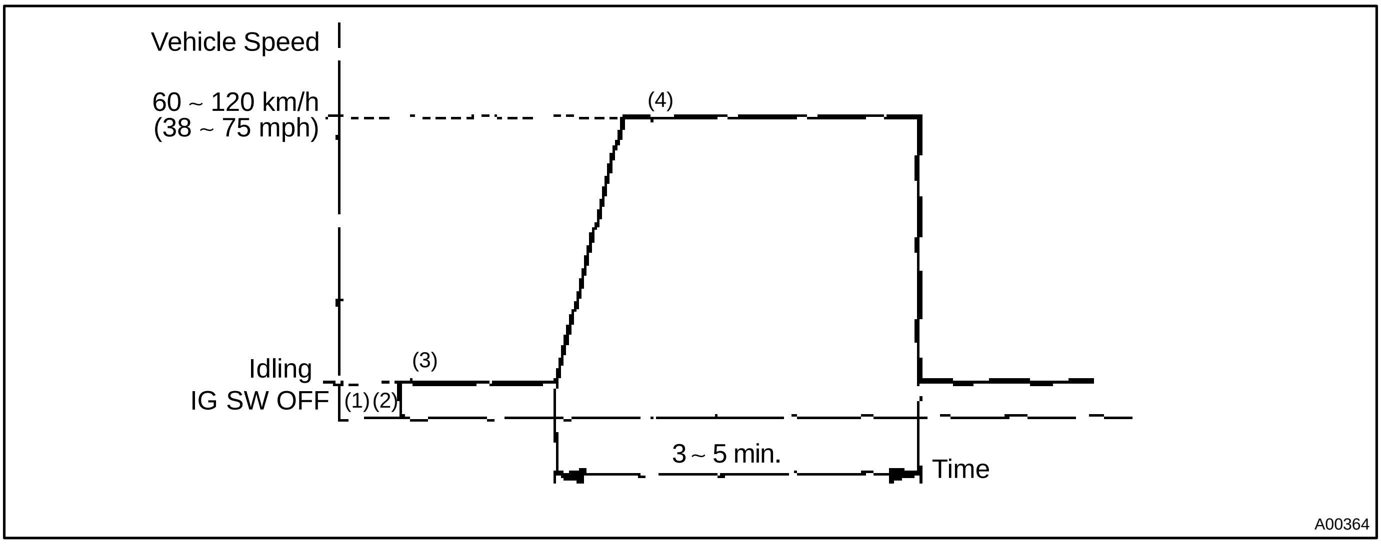
HINT:

- After confirming DTC P1130 or P01150, use the OBD II scan tool or TOYOTA hand–held tester to confirm voltage output of A/F sensor (AFS B1 S1/O2S B1 S1) from ”CURRENT DATA”.
- The A/F sensor’s output voltage and the short–term fuel value can be read using the OBD II scan tool or TOYOTA hand–held tester.
- The ECM controls the voltage of AFR/AFL～ and AFR/AFL＞ terminals of ECM to the fixed voltage. Therefore, it is impossible to confirm the A/F sensor output voltage without OBD II scan tool or TOYOTA hand–held tester.
- OBD II scan tool (excluding TOYOTA hand–held tester) displays the one fifth of the A/F sensor output voltage which is displayed on the TOYOTA hand–held tester.

WIRING DIAGRAM

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control (Only for California Spec.)) on page DI–249.

CONFIRMATION DRIVING PATTERN



(a) Connect the TOYOTA hand–held tester to the DLC3.
(b) Switch the TOYOTA hand–held tester from normal mode to check mode (See page DI–197).
(c) Start the engine and warm it up with all accessory switches OFF.
(d) Drive the vehicle at 60 ~ 120 km/h (38 ~ 75 mph) and engine speed at 1,600 ~ 3,200 rpm for 3 ~ 5 min.

HINT:
If a malfunction exists, the MIL will light up during step (4).

NOTICE:
If the conditions in this test are not strictly followed, detection of the malfunction will not be possible.
If you do not have a TOYOTA hand–held tester, turn the ignition switch OFF after performing steps (3) and (4), then perform steps (3) and (4) again.

INSPECTION PROCEDURE

HINT:
- If DTC P1130 is displayed, check Bank 1 Sensor 1 circuit.
- If DTC P1150 is displayed, check Bank 2 Sensor 1 circuit.
- Read frame freeze data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Are there any other codes (besides DTC P1130, P1150) being output?**

YES → **Go to relevant DTC chart.**

NO

2	Connect the OBDII scan tool or TOYOTA hand–held tester and read value for voltage output of A/F sensors (bank1, 2 sensor1).

PREPARATION:
(a) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.
(b) Warm up the A/F sensors (bank1, 2 sensor1) with the engine at 2,500 rpm for approx. 90 sec.
CHECK:
Read voltage of A/F sensors (bank 1, 2 sensor 1) on the screen of OBD II scan tool or TOYOTA hand–held tester when you perform all the following conditions.
HINT:
The voltage of AFR～ and AFL～ terminals of ECM is fixed at 3.3 V and the voltage of AFR＞ and AFL＞ terminals is fixed at 3.0 V. Therefore, it is impossible to check the A/F sensors (bank1, 2 sensor1) output voltage at the terminals (AFR～, AFL～/AFR＞, AFL＞) of ECM.
OK:

Condition	A/F Sensor Voltage value
Engine idling	●Not remains at 3.30 V (*0.660 V) ●Not remains at 3.8 V (*0.76 V) or more ●Not remains at 2.8 V (*0.56 V) or less *: When you use the OBD II scan tool (excluding TOYOTA hand–held tester)
Engine racing	
Driving at engine speed 1,500 rpm or more and vehicle speed 40 km/h (25 mph) or more, and operate throttle valve open and close.	

HINT:
- During fuel enrichment, there is a case that the output voltage of A/F sensors (bank1, 2 sensor1) is below 2.8 V (* 0.56 V), it is normal.
- During fuel cut, there is a case that the output voltage of A/F sensors (bank1, 2 sensor1) is above 3.8 V (* 0.76 V), it is normal.
- If output voltage of A/F sensors (bank1, 2 sensor1) remains at 3.30 V (* 0.660 V) even after performing all the above conditions, A/F sensors (bank1, 2 sensor1) circuit may be open.
- If output voltage of A/F sensors (bank1, 2 sensor1) remains at 3.8 V (* 0.76V) or more, or 2.8 V (*0.56 V) or less even after performing all the above conditions, A/F sensors (bank1, 2 sensor1) circuit may be short.

*: When you use the OBD II scan tool (excluding TOYOTA hand–held tester).

OK → **Go to step 9.**

NG

3	Check for open and short in harness and connector between ECM and A/F sensors (bank 1, 2 sensor 1) (See page IN–31).

NG → Repair or replace harness or connector.

OK

4	Check resistance of A/F sensor heater (See page SF–68).

NG → Replace A/F sensor.

OK

5	Check air induction system (See page SF–1).

NG → Repair or replace.

OK

6	Check EGR system (See page EC–11).

NG → Replace EGR system.

OK

7	Check fuel pressure (See page SF–21).

NG → Check and repair fuel pump, fuel pipe line and filter (See page SF–1).

OK

8 Check injector injection (See page SF–25).

NG → Replace injector.

OK ↓

Replace A/F sensors (bank1, 2 sensor1).

9 Perform confirmation driving pattern.

Go ↓

10 Are there DTC P1130 and/or P1150 being output again ?

YES → Check and replace ECM
(See page IN–31.).

NO ↓

11 Did vehicle runs out of fuel in the past ?

NO → Check for intermittent problems
(See page DI–197).

YES ↓

DTC P1130 and /or P1150 is caused by running out of fuel.

DI1K7–03

DTC	P1133	A/F Sensor Circuit Response Malfunction (Bank 1 Sensor 1) (Only for California Spec.)

DTC	P1153	A/F Sensor Circuit Response Malfunction (Bank 2 Sensor 1) (Only for California Spec.)

CIRCUIT DESCRIPTION

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control (Only for California Spec.)) on page DI–249.

DTC No.	DTC Detecting Condition	Trouble Area
P1133 P1155	After engine is warmed up and during vehicle driving at engine speed 1,400 rpm or more and vehicle speed 60 km/h (38 mph) or more, if response characteristic of A/F sensor becomes deteriorated (2 trip detection logic)	●A/F sensors (bank 1, 2 sensor 1)

INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	Are there any other codes (besides DTC P1133, P1153) being output?

YES → **Go to relevant DTC chart.**

NO

2	Connect the OBDII scan tool or TOYOTA hand–held tester and read value for voltage output of A/F sensors (bank1, 2 sensor1).

PREPARATION:

(a) Connect the OBD II scan tool or TOYOTA hand–held tester to the DLC3.
(b) Warm up the A/F sensors (bank1, 2 sensor1) with the engine at 2,500 rpm for approx. 90 sec.

CHECK:

Read voltage of A/F sensors (bank 1, 2 sensor 1) on the screen of OBD II scan tool or TOYOTA hand–held tester when you perform all the following conditions.

HINT:

The voltage of AFR～ and AFL～ terminals of ECM is fixed at 3.3 V and the voltage of AFR＞ and AFL＞ terminals is fixed at 3.0 V. Therefore, it is impossible to check the A/F sensors (bank1, 2 sensor1) output voltage at the terminals (AFR～, AFL～/AFR＞, AFL＞) of ECM.

OK:

Condition	A/F Sensor Voltage value
Engine idling	●Not remains at 3.30 V (*0.660 V) ●Not remains at 3.8 V (*0.76 V) or more ●Not remains at 2.8 V (*0.56 V) or less *: When you use the OBD II scan tool (excluding TOYOTA hand–held tester)
Engine racing	
Driving at engine speed 1,500 rpm or more and vehicle speed 40 km/h (25 mph) or more, and operate throttle valve open and close.	

HINT:

- During fuel enrichment, there is a case that the output voltage of A/F sensors (bank1, 2 sensor1) is below 2.8 V (* 0.56 V), it is normal.
- During fuel cut, there is a case that the output voltage of A/F sensors (bank1, 2 sensor1) is above 3.8 V (* 0.76 V), it is normal.
- If output voltage of A/F sensors (bank1, 2 sensor1) remains at 3.30 V (* 0.660 V) even after performing all the above conditions, A/F sensors (bank1, 2 sensor1) circuit may be open.
- If output voltage of A/F sensors (bank1, 2 sensor1) remains at 3.8 V (* 0.76V) or more, or 2.8 V (*0.56 V) or less even after performing all the above conditions, A/F sensors (bank1, 2 sensor1) circuit may be short.

*: When you use the OBD II scan tool (excluding TOYOTA hand–held tester).

OK → **Go to step 9.**

NG

3	Check for open and short in harness and connector between ECM and A/F sensors (bank 1, 2 sensor 1) (See page IN–31).

NG → Repair or replace harness or connector.

OK

4	Check resistance of A/F sensor heater (See page SF–68).

NG → Replace A/F sensor.

OK

5	Check air induction system (See page SF–1).

NG → Repair or replace.

OK

6	Check EGR system (See page EC–11).

NG → Replace EGR system.

OK

7	Check fuel pressure (See page SF–21).

NG → Check and repair fuel pump, fuel pipe line and filter (See page SF–1).

OK

8	Check injector injection (See page SF–25).

NG → Replace injector.

OK ↓

Replace A/F sensors (bank1, 2 sensor1).

9	Perform confirmation driving pattern (See page DI–197).

Go ↓

10	Are there DTC P1133 and/or P1153 being output again ?

YES → Check and replace ECM (See page IN–31).

NO ↓

11	Did vehicle runs out of fuel in the past ?

NO → Check for intermittent problems (See page DI–197).

YES ↓

DTC P1133 and /or P1153 is caused by running out of fuel.

DI1K8–04

DTC	P1135	A/F Sensor Heater Circuit Malfunction (Bank 1 Sensor 1) (Only for California Spec.)

DTC	P1155	A/F Sensor Heater Circuit Malfunction (Bank 2 Sensor 1) (Only for California Spec.)

CIRCUIT DESCRIPTION

Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control (Only for California Spec.)) on page DI–249.

DTC No.	DTC Detecting Condition	Trouble Area
P1135 P1155	When heater operates, heater current exceeds 8 A (2 trip detection logic)	●Open or in heater circuit of A/F sensors (bank 1, 2 sensor 1) ●A/F sensors (bank 1, 2 sensor 1) heater ●ECM
	Heater current of 0.25 A or less when heater operates (2 trip detection logic)	

WIRING DIAGRAM

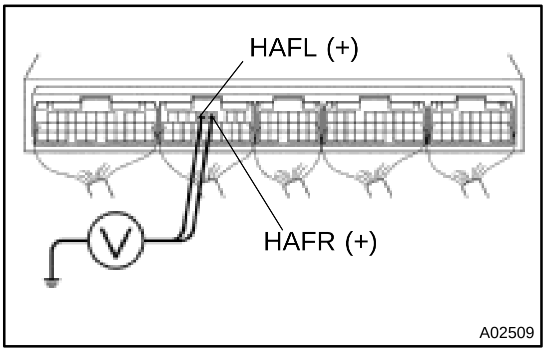
Refer to DTC P0125 (Insufficient Coolant Temp. for Closed Loop Fuel Control (Only for California Spec.)) on page DI–249.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	Check voltage between terminal HAFR, HAFL of ECM connector and body ground.



PREPARATION:

(a) Remove glove compartment (See page SF–73).

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals HAFR, HAFL of the ECM connector and body ground.

OK:

Voltage: 9 ~ 14 V

OK	Check and replace ECM (See page IN–31).

NG

2	**Check resistance of A/F sensor heaters (bank 1, 2 sensor 1) (See page SF–68).**

NG → **Replace A/F sensors (bank 1, 2 sensor 1).**

OK

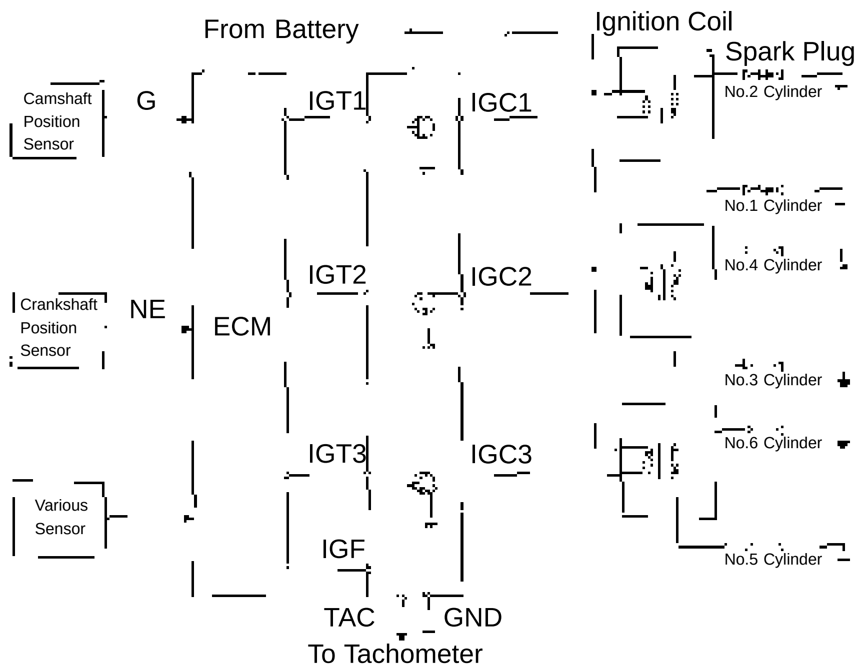
Check and repair harness or connector between EFI main relay (Marking: EFI) and A/F sensors (bank 1, 2 sensor 1), and A/F sensors (bank 1, 2 sensor 1) and ECM (See page IN–31).

DI084–06

DTC	P1300	Igniter Circuit Malfunction

CIRCUIT DESCRIPTION

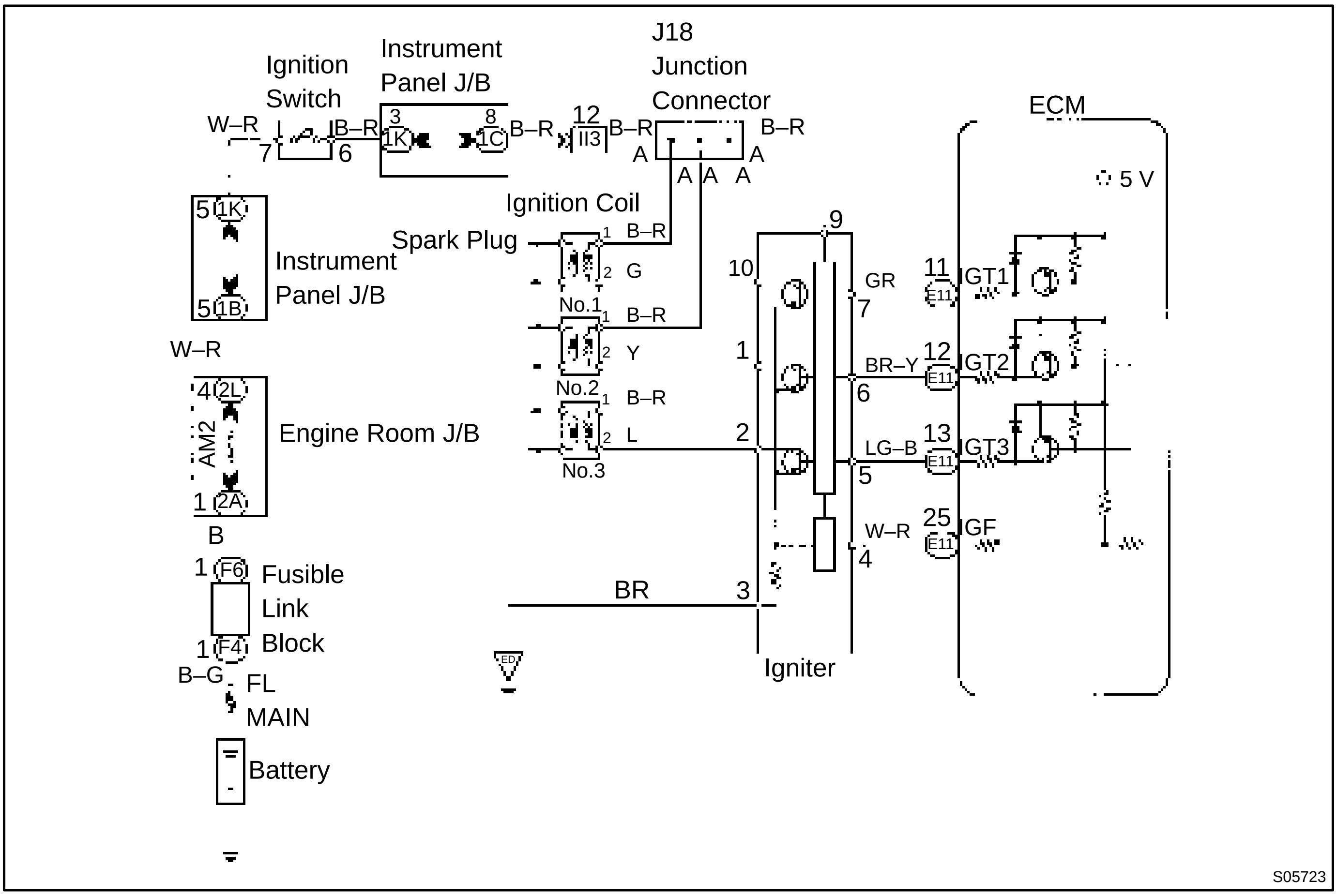
A DIS (Direct Ignition System) has been adopted. The DIS improves the ignition timing accuracy, reduces high–voltage loss, and enhances the overall reliability of the ignition system by eliminating the distributor. The DIS is a 2–cylinder simultaneous ignition system which ignites 2 cylinders simultaneously with one ignition coil. In the 2–cylinder simultaneous ignition system, each of the 2 spark plugs is connected to the end of the secondary winding. High voltage generated in the secondary winding is applied directly to the spark plugs. The sparks of the 2 spark plugs pass simultaneously from the center electrode to the ground electrode.
The ECM determines ignition timing and outputs the ignition signals (IGT) for each cylinder. Based on IGT signals, the igniter controls the primary ignition signals (IGC) for all ignition coils. At the same time, the igniter also sends an ignition confirmation signal (IGF) as a fail–safe measure to the ECM.



S00251

DTC No.	DTC Detecting Condition	Trouble Area
P1300	Condition (a) is repeated 3 times consecutively during 6 consecutively IGT signals while engine is running (a) IGF signal is not input to ECM for 2 or more ignitions	●Open or short in IGF or IGT circuit from igniter to ECM ●Igniter ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Check spark plug and spark of misfiring cylinder (See page DI–276).**

NG → **Go to step 4.**

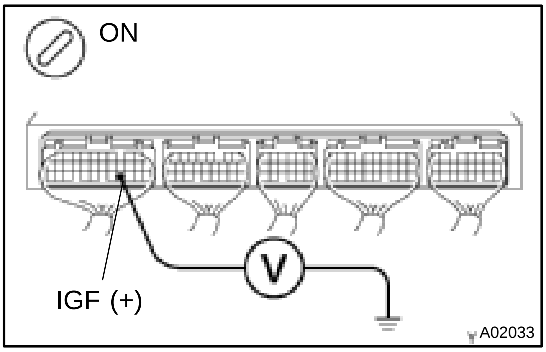
OK

2	**Check for open and short in harness and connector in IGF signal circuit between ECM and igniter (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

3	**Disconnect igniter connector and check voltage between terminal IGF of ECM connector and body ground.**



PREPARATION:

(a) Disconnect the igniter connector.
(b) Remove the glove compartment (See page SF–73).
(c) Turn the ignition switch ON.

CHECK:

Measure voltage between terminal IGF of the ECM connector and body ground.

OK:

Voltage: 4.5 ~ 5.5 V

OK → **Replace igniter.**

NG

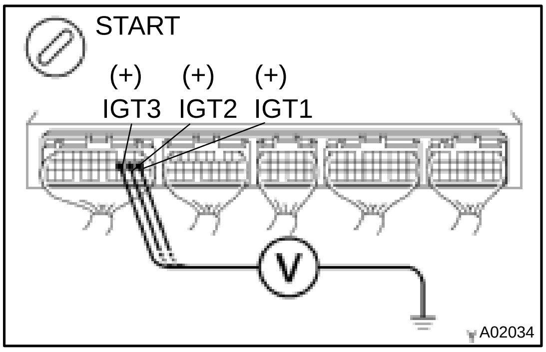
Check and replace ECM (See page IN–31).

4	**Check for open and short in harness and connector in IGT 1 ~ 3 signal circuits between ECM and igniter (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

5	Check voltage between terminals IGT 1 ~ 3 of ECM connector and body ground.



PREPARATION:

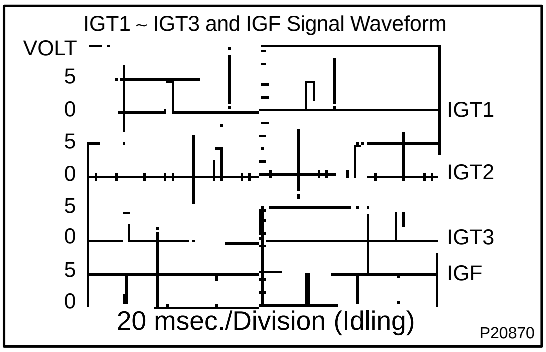
Remove the glove compartment (See page SF–73).

CHECK:

Measure voltage between terminals IGT 1 ~ 3 of the ECM connector and body ground when engine is cranked.

OK:

Voltage: More than 0.1 V and less than 4.5 V



Reference INSPECTION USING OSCILLOSCOPE

During idling, check waveform between terminals IGT 1 ~ 3, IGF and E1 of ECM.

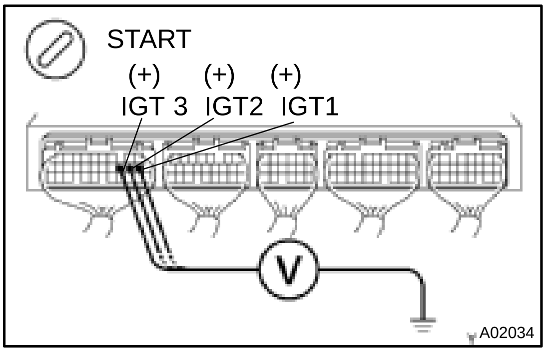
HINT:

The correct waveforms are as shown.

NG — **Check and replace ECM (See page IN–31).**

OK

6	Disconnect igniter connector and check voltage between terminals IGT 1 ~ 3 of ECM connector and body ground.



PREPARATION:

(a) Disconnect the igniter connector.

(b) Remove the glove compartment (See page SF–73).

CHECK:

Measure voltage between terminals IGT 1 ~ 3 of the ECM connector and body ground when engine is cranked.

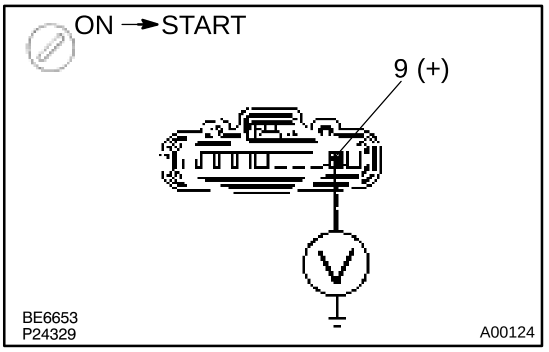
OK:

Voltage: More than 0.1 V and less than 4.5 V

NG — **Check and replace ECM (See page IN–31).**

OK

7	Check voltage between terminal 9 of igniter connector and body ground.



PREPARATION:
Disconnect the igniter connector.
CHECK:
Measure voltage between terminal 9 of igniter connector and body ground when ignition switch is turned to ”ON” and ”START” position.
OK:
Voltage: 9 ~ 14 V

NG → **Check and repair igniter power source circuit (See page IG–1).**

OK

8	Check for open and short in harness and connector between ignition switch and ignition coil, and ignition coil and igniter (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

9	Check ignition coil (See page IG–1).

NG → **Replace ignition coil.**

OK

10	Check EFI main relay (Marking: EFI) (See page SF–53).

NG → **Replace EFI main relay (Marking: EFI).**

OK

Replace igniter.

DI085–06

DTC	P1335	Crankshaft Position Sensor Circuit Malfunction (during engine running)

CIRCUIT DESCRIPTION

Refer to DTC P0335 (Crankshaft Position Sensor "A" Circuit Malfunction) on page DI–287.

DTC No.	DTC Detecting Condition	Trouble Area
P1335	No crankshaft position sensor signal to ECM with engine speed 1,000 rpm or more	●Open or short in crankshaft position sensor circuit ●Crankshaft position sensor ●Starter ●ECM

WIRING DIAGRAM

Refer to DTC P0335 (Crankshaft Position Sensor "A" Circuit Malfunction) on page DI–287.

INSPECTION PROCEDURE

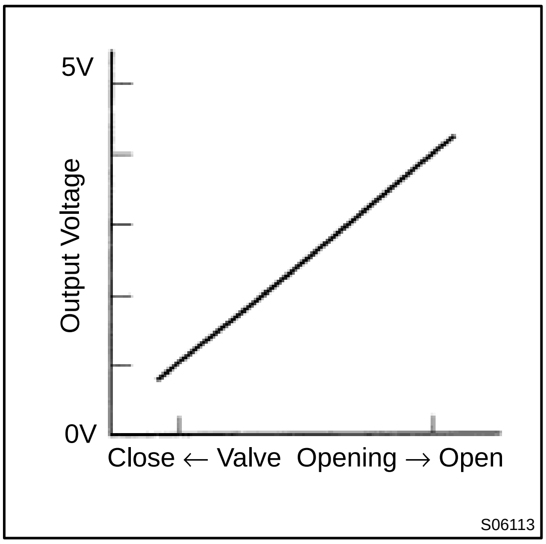
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

Refer to DTC P0335 (Crankshaft Position Sensor "A" Circuit Malfunction) on page DI–287.

DI086–06

DTC	P1410	EGR Valve Position Sensor Circuit Malfunction

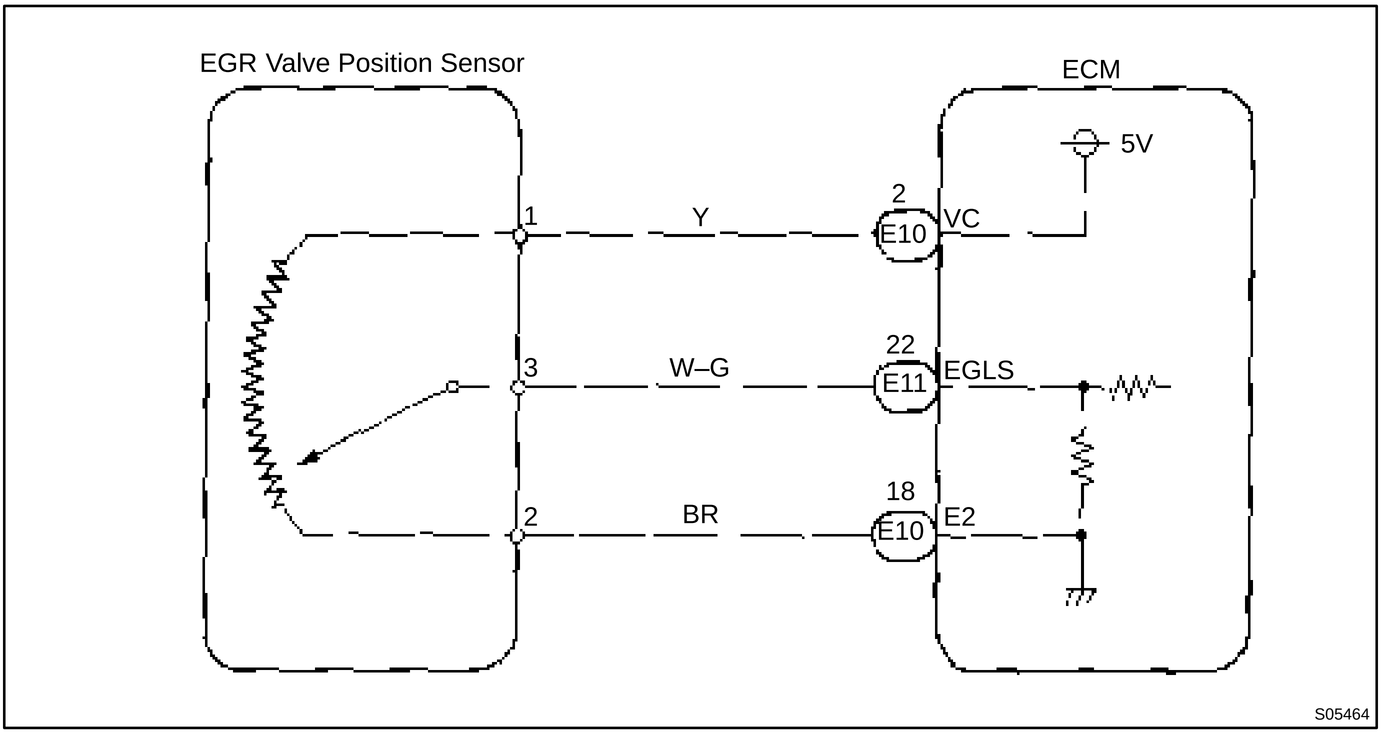
CIRCUIT DESCRIPTION



The EGR valve position sensor is mounted on the EGR valve and detects the lift amount of EGR valve. The lift amount of EGR valve which is detected by the EGR valve position sensor provides feedback to the ECM to control the lift amount of EGR valve in response to engine operating conditions.

DTC No.	DTC Detecting Condition	Trouble Area
P1410	Open or short in EGR valve position sensor circuit (2 trip detection logic)	●Open or short in EGR valve position sensor circuit ●EGR valve position sensor ●ECM

WIRING DIAGRAM

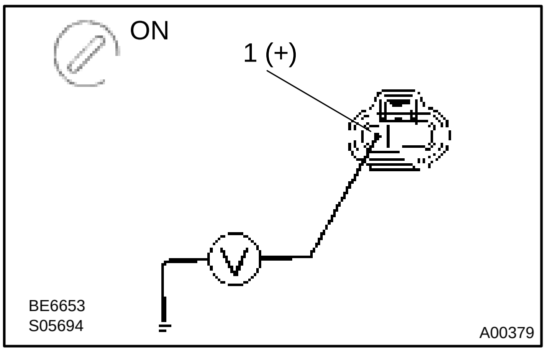


INSPECTION PROCEDURE

HINT:

- If DTCs ”P0110” (Intake Air Temp. Circuit Malfunction), ”P0115” (Engine Coolant Temp. Circuit Malfunction), ”P0120” (Throttle/Pedal Position/Switch ”A” Circuit Malfunction), ”P1410” (EGR Valve Position Sensor Circuit Malfunction) are output simultaneously, E2 (Sensor Ground) may be open.
- Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Check voltage between terminal VC of wire harness side connector and body ground.**



PREPARATION:

(a) Disconnect the vacuum hose from EGR valve.
(b) Disconnect the EGR valve position sensor connector.
(c) Turn the ignition switch ON.

CHECK:

Measure voltage between terminal 1 of wire harness side connector and body ground.

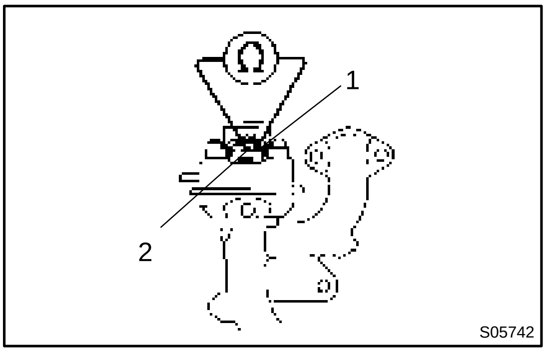
OK:

Voltage: 4.5 ~ 5.5 V

NG → **Go to step 4.**

OK

2	**Check EGR valve position sensor.**



PREPARATION:

Disconnect the EGR valve position sensor connector.

CHECK:

Measure resistance between terminals 1 (VC) and 2 (E2) of EGR valve position sensor.

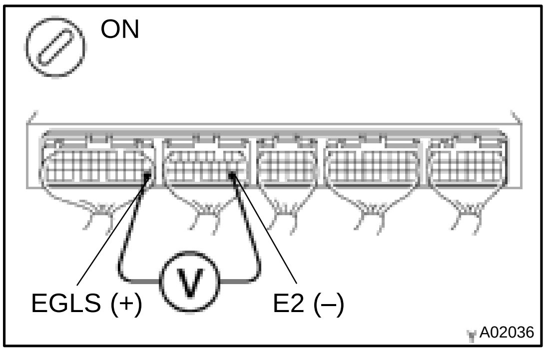
OK:

Resistance: 1.5 ~ 4.3 kΩ

NG → **Replace EGR valve position sensor.**

OK

3	**Check voltage between terminals EGLS and E2 of ECM connectors.**



PREPARATION:

(a) Disconnect the vacuum hose from EGR valve.

(b) Connect the hand–held vacuum pump to EGR valve.

(c) Remove the glove compartment (See page SF–73).

(d) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals EGLS and E2 of the ECM connectors.

OK:

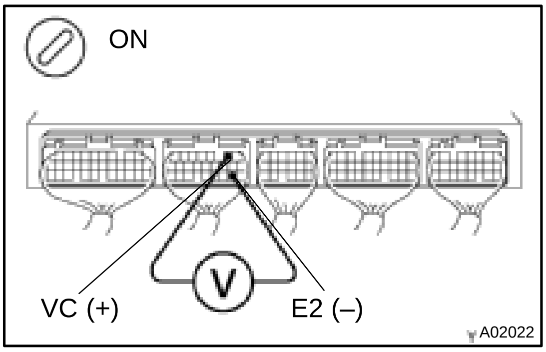
Condition		Voltage
EGR valve	Vacuum	
Fully closed	0 kPa (0 mmHg, 0 in.Hg)	0.4 ~ 1.6 V
Fully open	17.3 kPa (130 mmHg, 5.12 in.Hg)	3.2 ~ 5.1 V

NG → **Check for open and short in harness and connector between ECM and EGR valve position sensor (EGLS or E2 line).**

OK

Check and replace ECM (See page IN–31).

4	Check voltage between terminals VC and E2 of ECM connector.



PREPARATION:

(a) Remove the glove compartment (See page SF–73).

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals VC and E2 of the ECM connector.

OK:

Voltage: 4.5 ~ 5.5 V

NG → **Check and replace ECM (See page IN–31).¿¿¿¿¿¿**

OK

Check for open and short in harness and connector between ECM and EGR valve position sensor (VC line).

DI087–06

DTC	P1411	EGR Valve Position Sensor Circuit Range/Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P1410 (EGR Valve Position Sensor Circuit Malfunction) on page DI–358.

DTC No.	DTC Detecting Condition	Trouble Area
P1411	Conditions (a) and (b) continue for 500 msec. or more: (2 trip detection logic) (a) Engine Coolant Temp. < 5°C (41°F) (b) EGLS ~ 1.65 V or EGLS < 0.35 V	•EGR valve position sensor

INSPECTION PROCEDURE

HINT:

Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Are there any other codes (besides DTC P1411) being output?**

YES → **Go to relevant DTC chart.**

NO

Replace EGR valve position sensor.

DI088–06

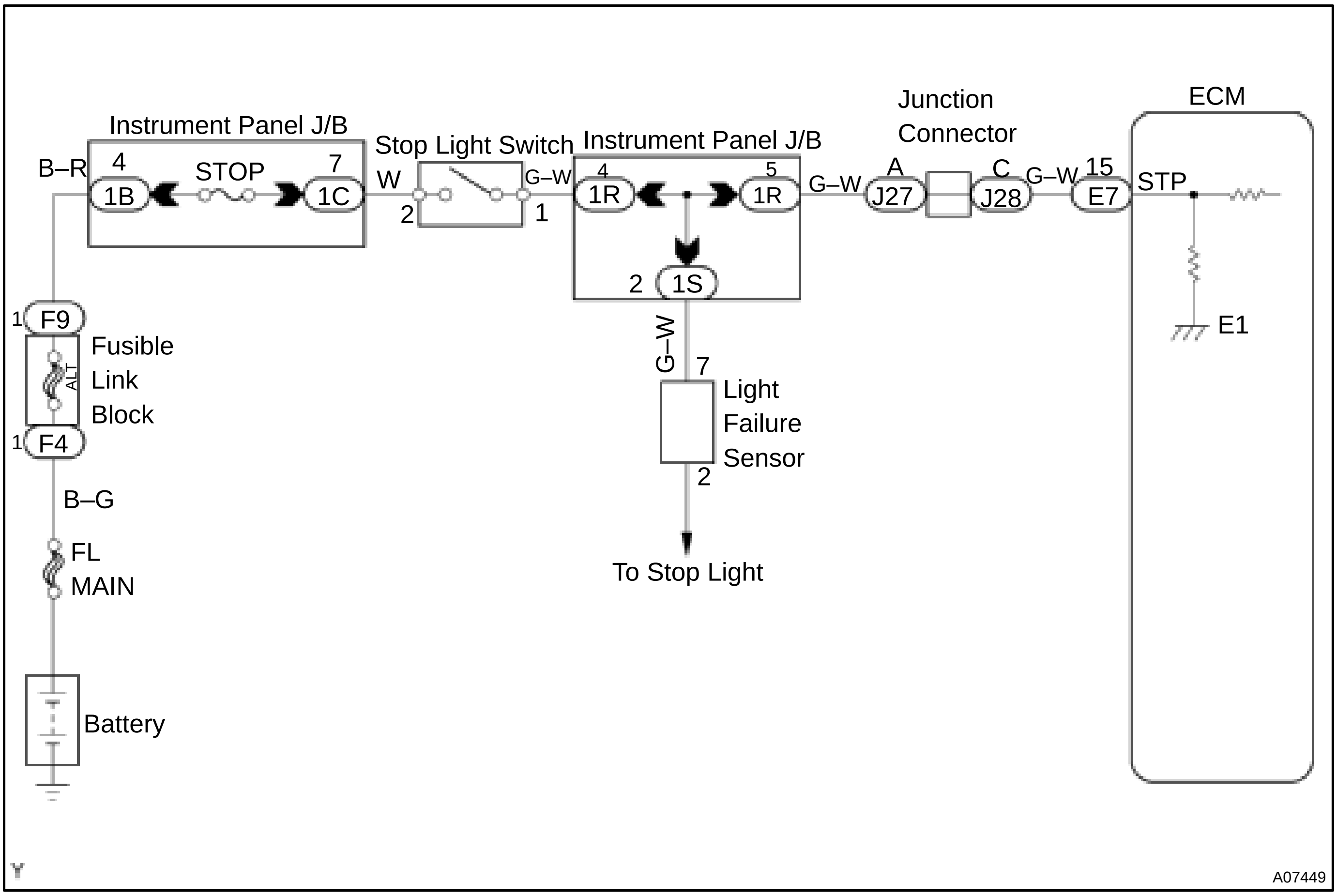
DTC	P1520	Stop Light Switch Signal Malfunction (Only for A/T)

CIRCUIT DESCRIPTION

This signal is used to detect when the brakes have been applied. The STP signal voltage is the same as the voltage supplied to the stop lights.
The STP signal is used mainly to control the fuel cut–off engine speed (The fuel cut–off engine speed is reduced slightly when the vehicle is braking.).

DTC No.	DTC Detecting Condition	Trouble Area
P1520	Stop light switch does not turn off when repeating the driving at 30 km or more 10 times or more after depressing brake (2 trip detection logic)	●Short in stop light switch signal circuit ●Stop light switch ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

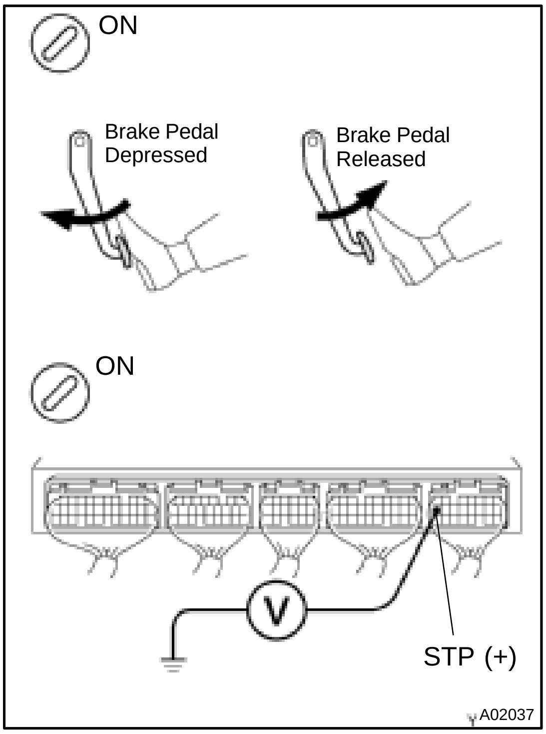
1	**Check operation of stop light.**

CHECK:
Check if the stop lights go on and off normally when the brake pedal is operated and released.

NG → **Check and repair stop light circuit.**

OK

2	**Check STP signal.**



When using TOYOTA hand–held tester:
PREPARATION:
(a) Connect the TOYOTA hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the TOYOTA hand–held tester main switch ON.

CHECK:
Read the STP signal on the TOYOTA hand–held tester.

OK:
Brake pedal is depressed: STP ...... ON
Brake pedal is released: STP ...... OFF

When not using TOYOTA hand–held tester:
PREPARATION:
Turn the ignition switch ON.

CHECK:
Check voltage between terminal STP of the ECM connector and body ground.

OK:

Brake pedal	Voltage
Depressed	7.5 ~ 14 V
Released	Below 1.5 V

OK → **Check for intermittent problems (See page DI–197).**

NG

3	Check harness and connector between ECM and stop light switch (See page IN–31).

NG → Repair or replace harness or connector.

OK

Check and replace ECM (See page IN–31).

DI089–06

DTC	P1600	ECM BATT Malfunction

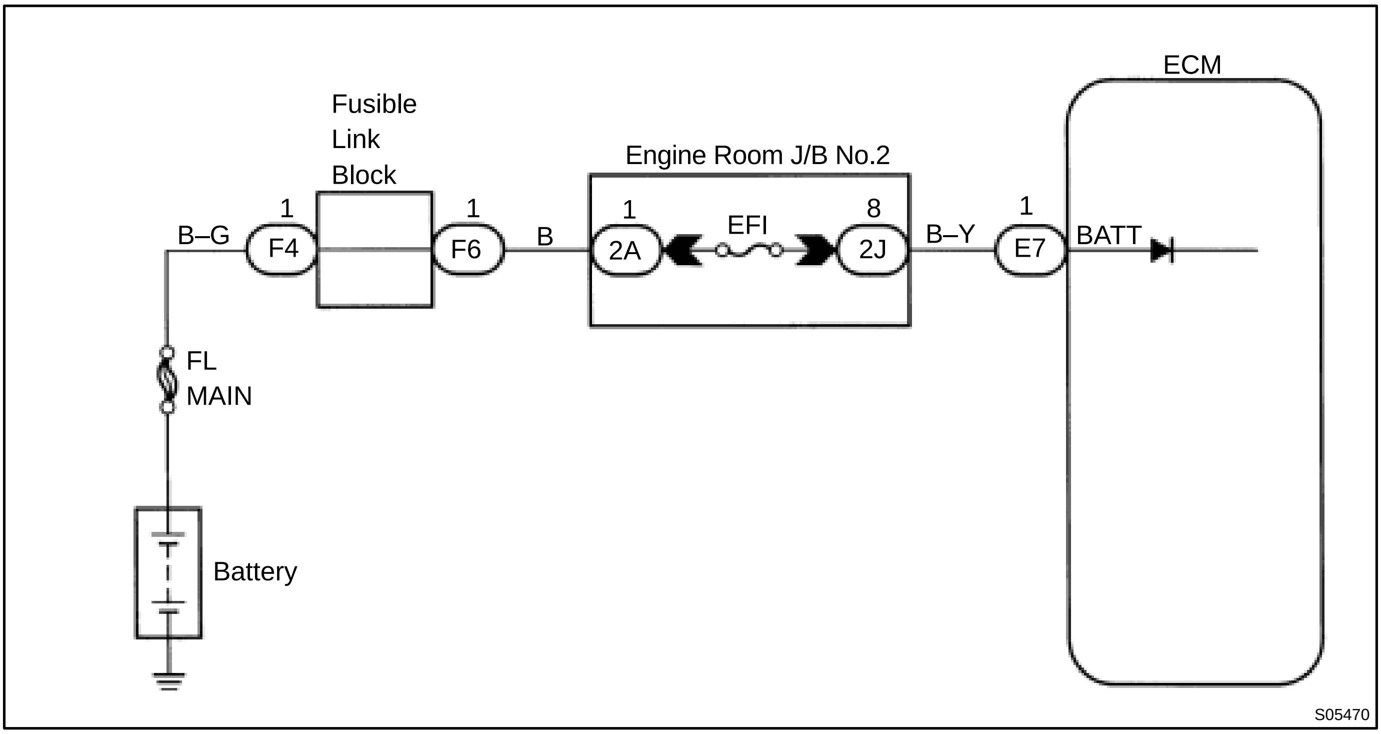
CIRCUIT DESCRIPTION

Battery positive voltage is supplied to terminal BATT of the ECM even when the ignition switch is OFF for use by the DTC memory and air–fuel ratio adaptive control value memory, etc.

DTC No.	DTC Detecting Condition	Trouble Area
P1600	Open in back up power source circuit	•Open in back up power source circuit •ECM

HINT:
If DTC P1600 appear, the ECM does not store another DTC.

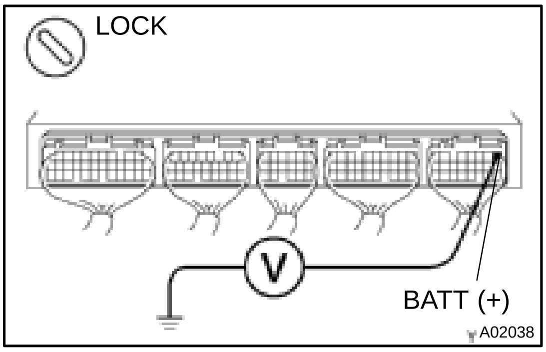
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. Because free frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

1	Check voltage between terminal BATT of ECM connector and body ground.

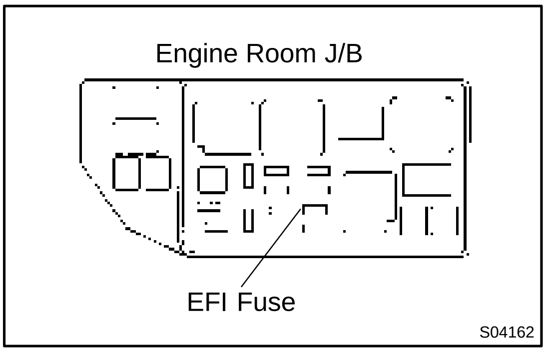


PREPARATION:
Remove the glove compartment (See page SF–73).
CHECK:
Measure voltage between terminal BATT of the ECM connector and body ground.
OK:
Voltage: 9 ~ 14 V

OK → **Check and replace ECM (See page IN–31).**

NG

2	Check EFI fuse.



PREPARATION:
Remove the EFI fuse from the engine room J/B.
CHECK:
Check continuity of EFI fuse.
OK:
Continuity

NG → **Check for short in all harness and components connected to EFI fuse.**

OK

Check and repair harness or connector between battery and EFI fuse, and EFI fuse and ECM (See page IN–31).

DI08A–06

DTC	P1780	Park/Neutral Position Switch Malfunction

CIRCUIT DESCRIPTION

The park/neutral position switch go on when the shift lever is in the N or P shift position. When it goes on terminal NSW of the ECM is grounded to body ground via the starter relay, thus the terminal NSW voltage becomes 0V. When the shift lever is in the D, 2, L or R position, the park/neutral position switch goes off, so the voltage of ECM. Terminal NSW becomes battery voltage, the voltage of the ECM internal power source. If the shift lever is moved from the N position to the D position, this signal is used for air–fuel ratio correction and for idle speed control (estimated control), etc.

DTC No.	DTC Detecting Condition	Trouble Area
P1780	2 or more switches are ON simultaneously for ”N”, ”2”, ”L” and ”R” positions (2 trip detection logic)	●Short in park/neutral position switch circuit ●Park/neutral position switch ●ECM
	When driving under conditions (a) and (b) for 30 sec. or more the park/neutral position switch is ON (N position): (2 trip detection logic) (a) Vehicle speed: 70 km/h (44 mph) or more (b) Engine speed: 1,500 ~ NE and 2,500 rpm	

HINT:
After confirming DTC P1780, use the TOYOTA hand–held tester to confirm the PNP switch signal from ”CURRENT DATA”.

WIRING DIAGRAM

Refer to DTC P1780 on page DI–479.

INSPECTION PROCEDURE

Refer to DTC P1780 (Park/Neutral Position Switch Malfunction) on page DI–479.
HINT:
Read freeze frame data using TOYOTA hand–held tester or OBD II scan tool. because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.

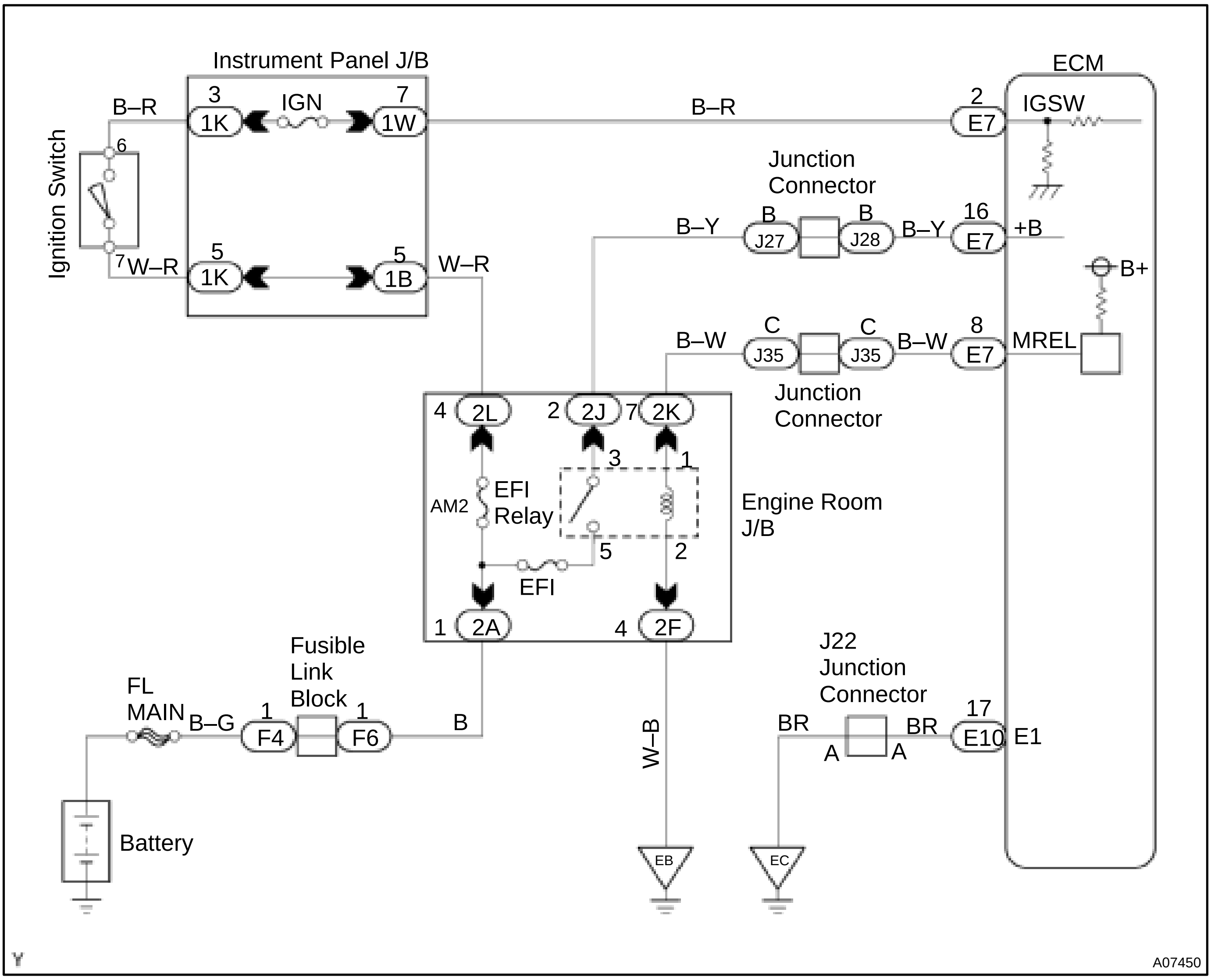
DI4DU–01

ECM Power Source Circuit

CIRCUIT INSPECTION

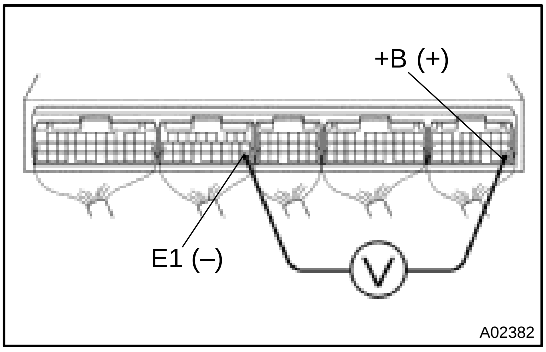
When the ignition switch is turned on, battery positive voltage is applied to terminal IGSW of the ECM and the EFI main relay (Marking: EFI) control circuit in the ECM sends a signal to terminal MREL of the ECM switching on the EFI main relay.
This signal causes current to flow to the coil, closing the contacts of the EFI, main relay and supplying power to terminals +B of the ECM.
If the ignition switch is turned off, the ECM continues to switch on the EFI main relay for a maximum of 2 seconds for the initial setting of the IAC valve.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminals +B and E1 or ECM connectors.



PREPARATION:
(a) Remove the glove compartment (See page SF–73).
(b) Turn the ignition switch ON.
CHECK:
Measure voltage between terminals +B and E1 of the ECM connectors.
OK:
Voltage: 9 ~ 14 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–221).**

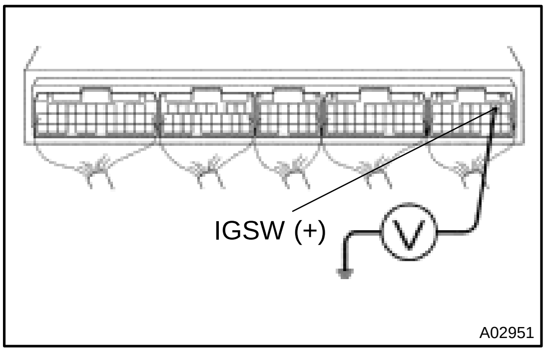
NG

2	Check for open in harness and connector between terminals E1 of ECM and body ground (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

3	Check voltage between terminal IGSW of ECM and body ground.

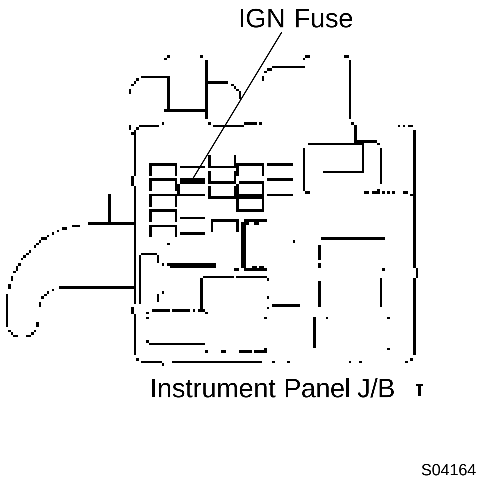


PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure voltage between terminal IGSW of ECM connectors and body ground.
OK:
Voltage: 9 ~ 14 V

OK → **Go to step 6.**

NG

4	Check EFI fuse.



PREPARATION:
Remove IGN fuse from instrument panel J/B.
CHECK:
Check continuity of IGN fuse.
OK:
Continuity

NG → **Check for short in all the harness and components connected to IGN fuse (See attached wiring diagram).**

OK

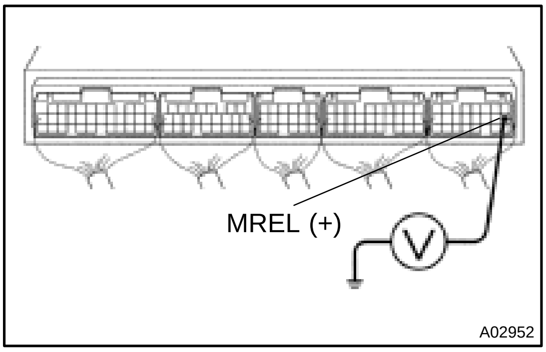
5	Check ignition switch (See page BE–13).

NG → **Replace ignition switch.**

OK

Check and repair harness and connector between battery and ignition switch, and ignition switch and ECM.

6	Check voltage between terminal MREL of ECM and body ground.



PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure voltage between terminal MREL of the ECM connectors and body ground.
OK:
Voltage: 9 ~ 14 V

NG	Check and replace ECM (See page DI–197).

OK

7	Check EFI No.1 fuse of engine room J/B.

NG	Check for short in all the harness and components connected to EFI No.1 fuse (See attached wiring diagram).

OK

8	Check EFI main relay (Marking: EFI) (See page SF–53).

NG	Replace EFI main relay (Marking: EFI).

OK

9	Check for open and short in harness and connector between terminal MREL of ECM and body ground (See page IN–31).

NG → **Repair or harness or connector.**

OK

Check and repair harness or connector between EFI No.1 fuse and battery (See page IN–31).

DI4DV–01

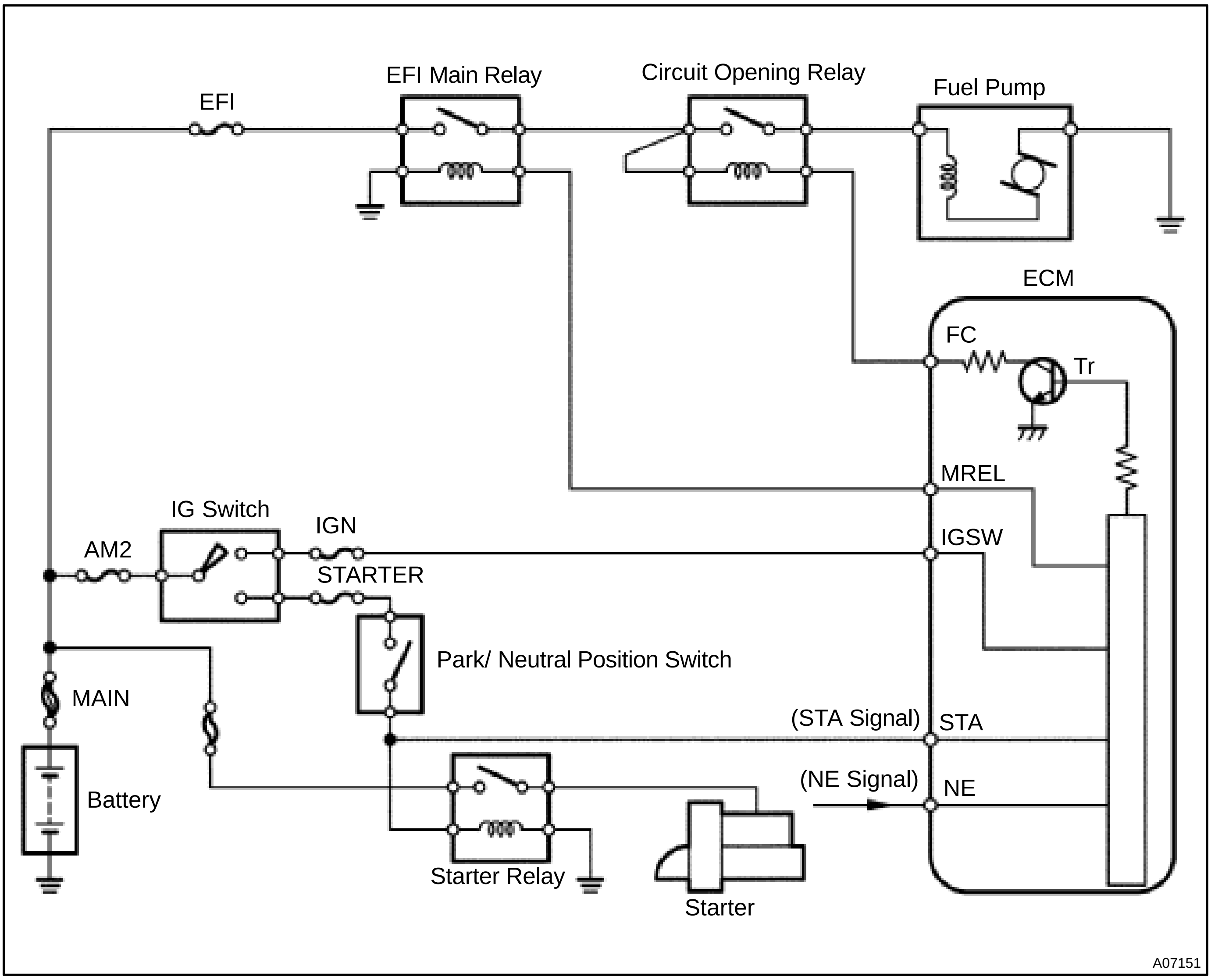
Fuel Pump Control Circuit

CIRCUIT DESCRIPTION

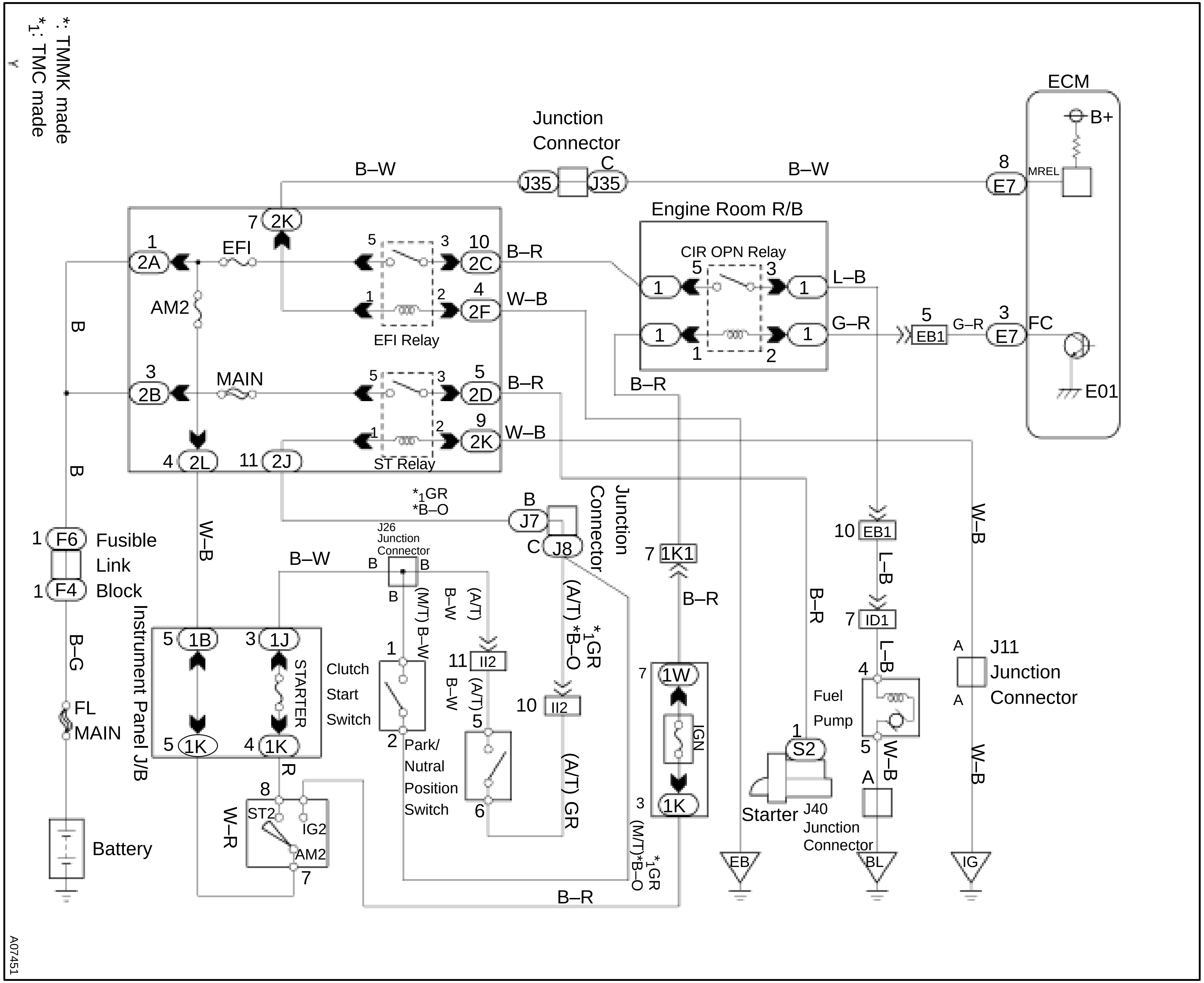
In the diagram below, when the engine is cranked, current flows from terminal ST of the ignition switch to the starter relay coil and also current flows to terminal STA of ECM (STA signal).

When the STA signal and NE signal are input to the ECM, Tr is turned ON, current flows to coil of the circuit opening relay, the relay switches on, power is supplied to the fuel pump and the fuel pump operates.

While the NE signal is generated (engine running), the ECM keeps Tr ON (circuit opening relay ON) and the fuel pump also keeps operating.

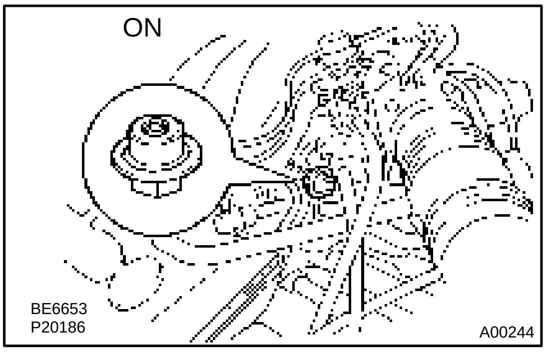


WIRING DIAGRAM



INSPECTION PROCEDURE
TOYOTA hand–held tester

1	**Connect TOYOTA hand–held tester and check operation of fuel pump.**



PREPARATION:
(a) Connect the TOYOTA hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the TOYOTA hand–held tester main switch ON.
(c) Use ACTIVE TEST mode to operate the fuel pump.

CHECK:
Check that pulsation damper screw rises up when fuel pump is on by TOYOTA hand–held tester.

OK:
The pulsation damper screw rises up.

OK → **Check for starter signal circuit (See page DI–384).**

NG ↓

2	**Check for ECM power source circuit (See page DI–369).**

NG → **Repair or replace.**

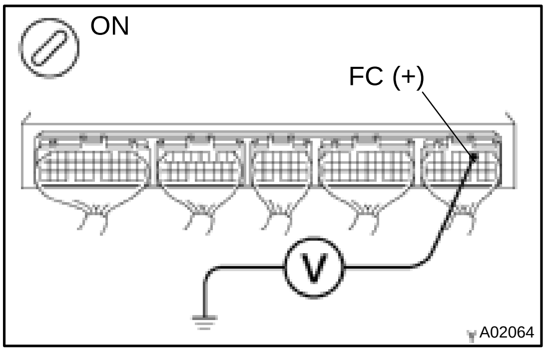
OK ↓

3	**Check circuit opening relay (See page SF–54).**

NG → **Replace circuit opening relay.**

OK ↓

4	**Check voltage between terminal FC of ECM and body ground.**



PREPARATION:
(a) Remove the glove compartment (See page SF–73).
(b) Turn ignition switch ON.
CHECK:
Measure voltage between terminal FC of ECM and body ground.
OK:
Voltage 9 – 14 V

NG → **Check for open in harness and connector between EFI main relay (Marking: EFI) and circuit opening relay, circuit opening relay and ECM.**

OK

5	**Check fuel pump (See page SF–6).**

NG → **Repair or replace fuel pump.**

OK

6	**Check for open in harness and connector between circuit opening relay and fuel pump, and fuel pump and body ground (See page IN–31).**

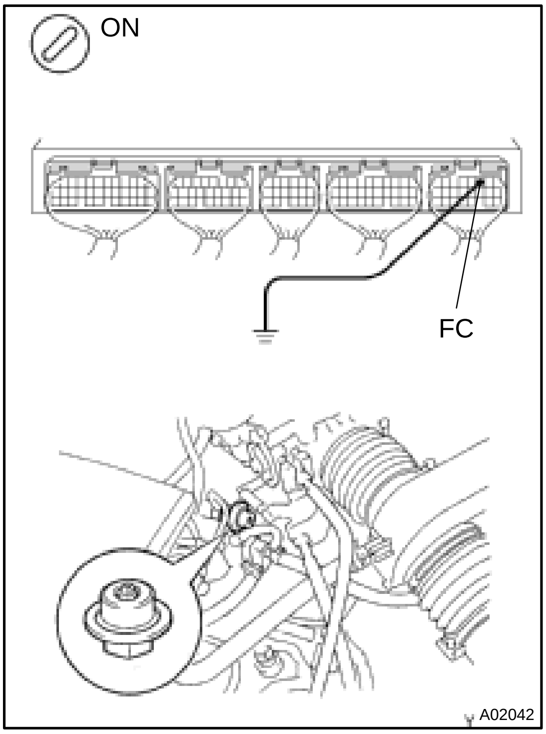
NG → **Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–31).

OBD II scan tool (excluding TOYOTA hand–held tester)

1	**Check operation of fuel pump.**



PREPARATION:

(a) Remove the glove compartment (See page SF–73).

(b) Turn the ignition switch ON.

CHECK:

(a) Connect between terminal FC of the ECM connector and body ground.

(b) Check that pulsation damper screw rises up when connect between terminal FC of the ECM and body ground.

OK:

The pulsation damper screw rises up.

OK → **Check for starter signal circuit (See page DI–384).**

NG ↓

2	**Check for ECM power source circuit (See page DI–369).**

NG → **Repair or replace.**

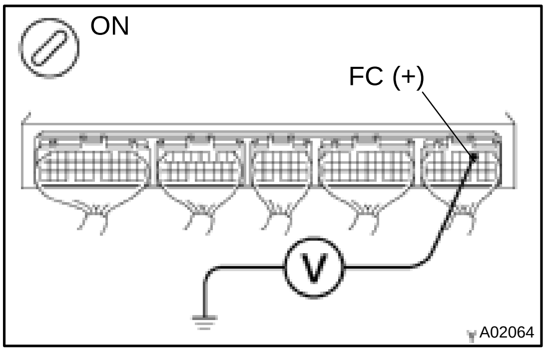
OK ↓

3	**Check circuit opening relay (See page SF–54).**

NG → **Replace circuit opening relay.**

OK ↓

4	Check voltage between terminal FC of ECM and body ground.



PREPARATION:
(a) Remove the glove compartment (See page SF–73).
(b) Turn ignition switch ON.

CHECK:
Measure voltage between terminal FC of ECM and body ground.

OK:
Voltage 9 – 14 V

NG → **Check for open in harness and connector between EFI main relay (Marking: EFI) and circuit opening relay, circuit opening relay and ECM.**

OK

5	Check fuel pump (See page SF–6).

NG → **Repair or replace fuel pump.**

OK

6	Check for open in harness and connector between circuit opening relay and fuel pump, and fuel pump and body ground (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

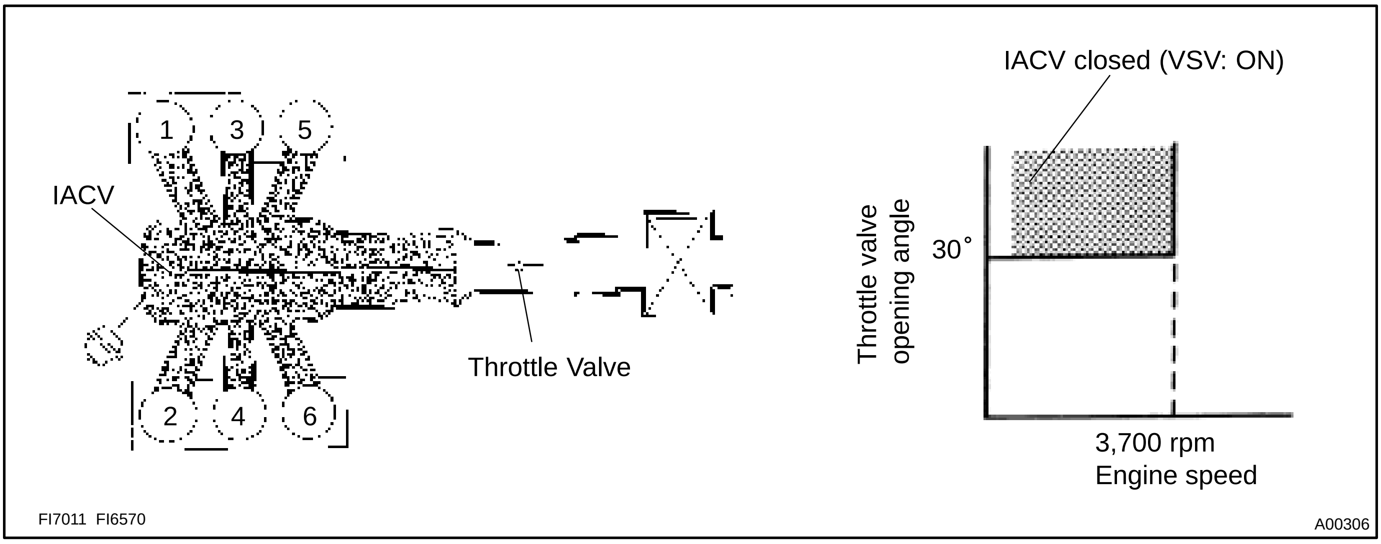
Check and replace ECM (See page IN–31).

DI08E–06

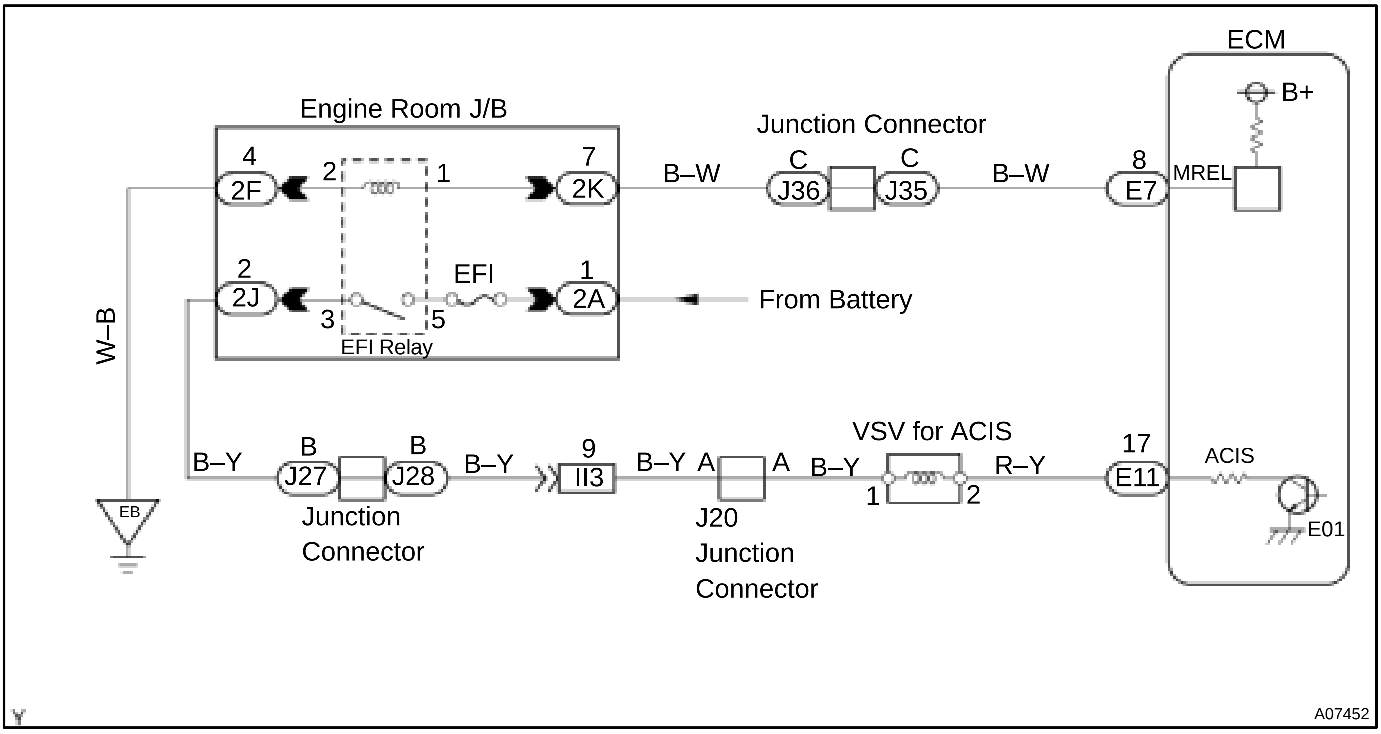
IACV Control VSV Circuit

CIRCUIT DESCRIPTION

This circuit opens and closes the IACV (Intake Air Control Valve) in response to the engine load in order to increase the intake efficiency (ACIS: Acoustic Control Induction System).
When the engine speed is 3,700 rpm or less and the throttle valve opening angle is 60˚ or more, the ECM turns the VSV ON and closes the IACV. At all other times, the VSV is OFF, so the IACV is open.

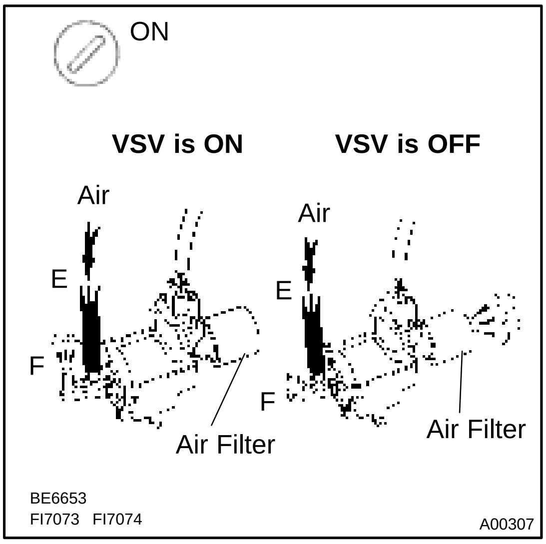


WIRING DIAGRAM



INSPECTION PROCEDURE
TOYOTA hand–held tester

1	**Connect TOYOTA hand–held tester and check operation of VSV for ACIS.**



PREPARATION:
(a) Remove the fuse cover on the instrument panel.
(b) Connect the TOYOTA hand–held tester to the DLC3.
(c) Turn the ignition switch ON and push the TOYOTA hand–held tester main switch ON.
(d) Select the ACTIVE TEST mode on the TOYOTA hand–held tester.

CHECK:
Check operation of VSV when VSV is operated by the TOYOTA hand–held tester.

OK:
VSV is ON:
Air from pipe E is flowing out through pipe F.
VSV is OFF:
Air from pipe E is flowing out through the air filter.

OK	**Check for vacuum tank (See page SF–51).**

NG

2	**Check VSV for ACIS (See page SF–60).**

NG	**Replace VSV for ACIS.**

OK

3	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and ECM (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–31).

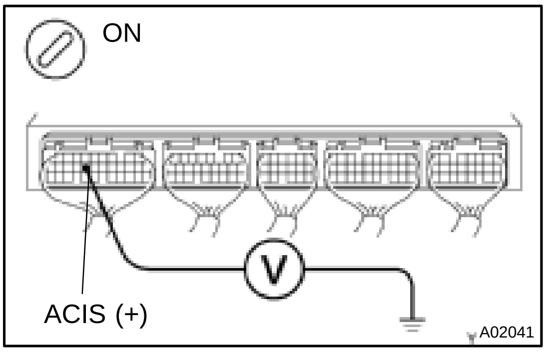
OBD II scan tool (excluding TOYOTA hand–held tester)

1	**Check VSV for ACIS (See page SF–60).**

NG → **Replace VSV for ACIS.**

OK

2	**Check voltage between terminal ACIS of ECM connector and body ground.**



PREPARATION:

(a) Remove the glove compartment (See page SF–73).

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminal ACIS of the ECM connector and body ground.

OK:

Voltage: 9 ~ 14 V

NG → **Check for open and short in harness and connector between EFI main relay (Marking: EFI) and ECM (See page IN–31).**

OK

3	Check for vacuum tank (See page SF–60).

NG → **Repair or replace.**

OK ↓

Check and replace ECM (See page IN–31).

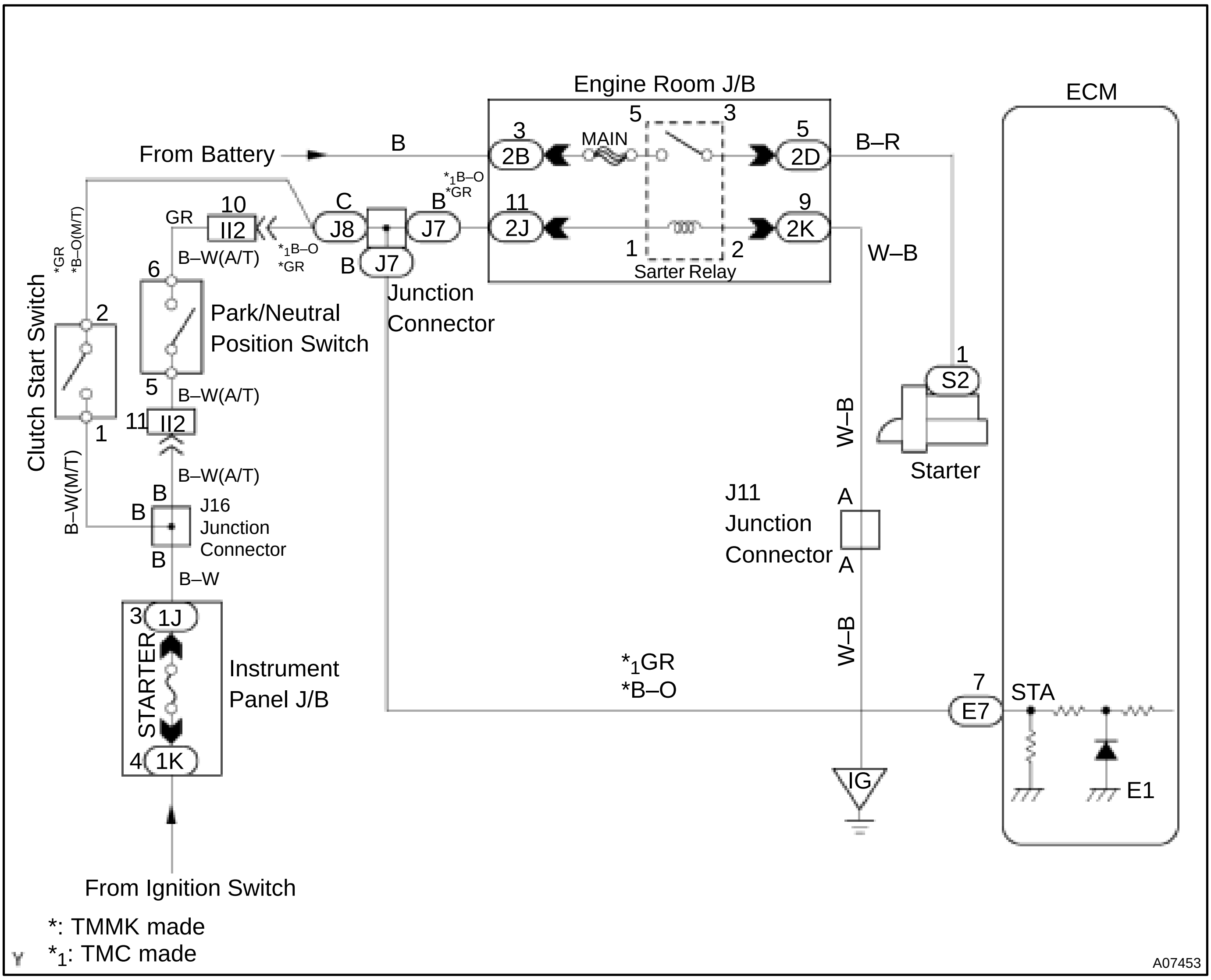
DI08B–06

Starter Signal Circuit

CIRCUIT DESCRIPTION

When the engine is cranked, the intake air flow is slow, so fuel vaporization is poor. A rich mixture is therefore necessary in order to achieve good startability. While the engine is being cranked, the battery positive voltage is applied to terminal STA of the ECM. The starter signal is mainly used to increase the fuel injection volume for the starting injection control and after–start injection control.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

This diagnostic chart is based on the premise that the engine is cranked normally. If the engine is not cranked, proceed to the problem symptoms table on page DI–221.

TOYOTA hand–held tester

1	**Connect TOYOTA hand–held tester, and check STA signal.**

PREPARATION:

(a) Connect the TOYOTA hand–held tester to the DLC3.

(b) Turn the ignition switch ON and push the TOYOTA hand–held tester main switch ON.

CHECK:

Read STA signal on the TOYOTA hand–held tester while starter operates.

OK:

Ignition switch position	ON	START
STA signal	OFF	ON

OK → **Proceed to next circuit inspection shown on problem symptom table (See page DI–221).**

NG

2	**Check for open in harness and connector between ECM and starter relay (See page IN–31).**

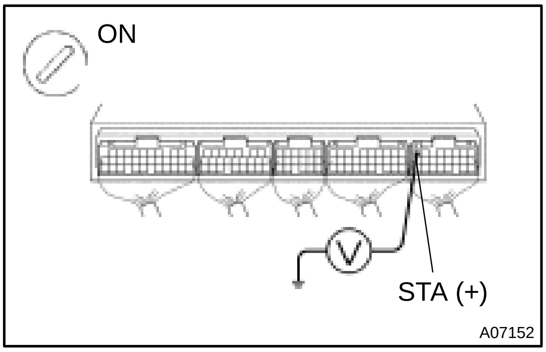
NG → **Repair or replace or connector.**

OK

Check and replace ECM (See page IN–31).

OBD II scan tool (excluding TOYOTA hand–held tester)

1	**Check voltage between terminal STA of ECM connector and body ground.**



PREPARATION:
Remove the glove compartment (See page SF–73).
CHECK:
Measure voltage between terminal STA of the ECM connector and body ground during engine cranking.
OK:
Voltage: 6 V or more

OK → **Proceed to next circuit inspection shown on problem symptom table (See page DI–221).**

NG

2	**Check for open in harness and connector between ECM and starter relay (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

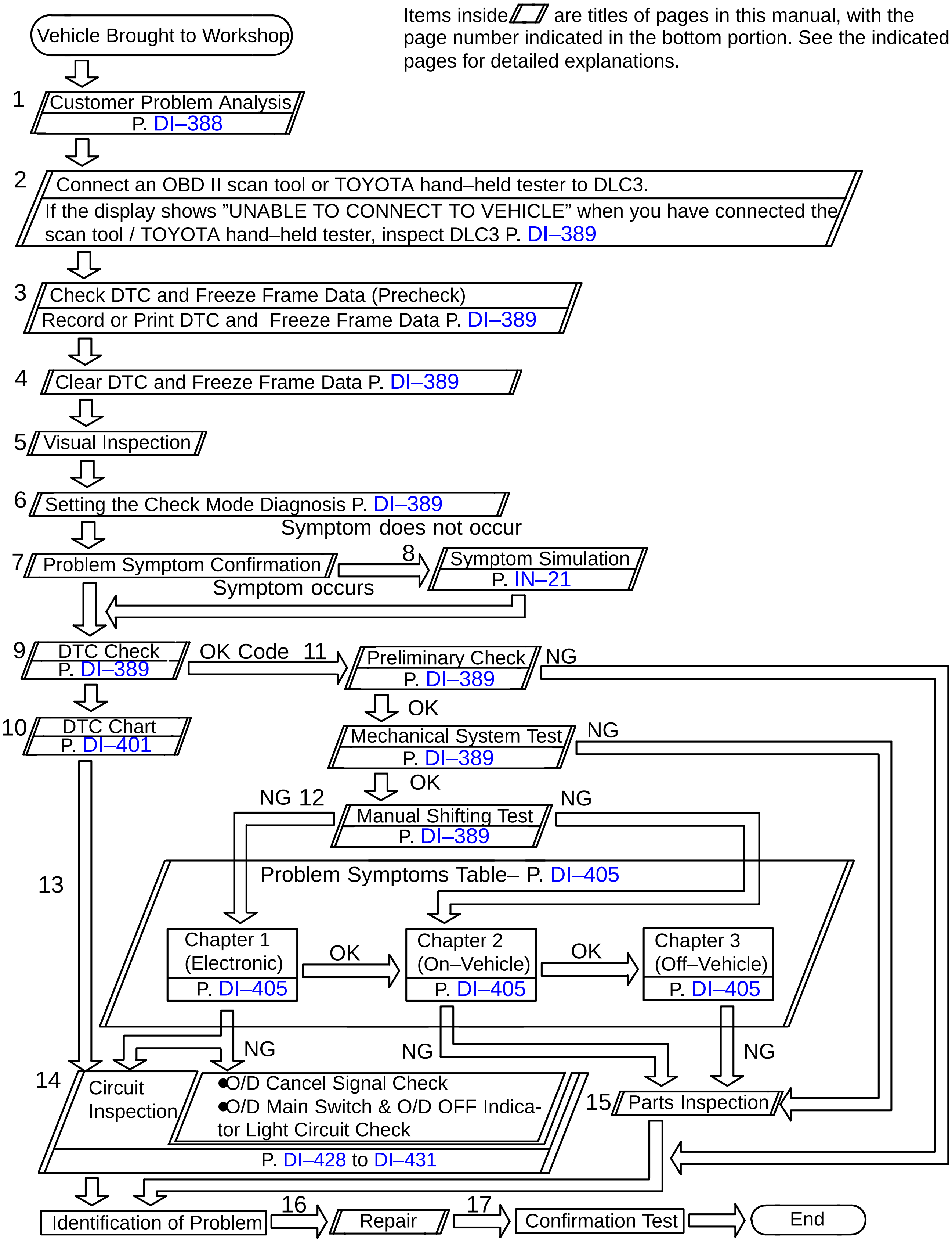
Check and replace ECM (See page IN–31).

AUTOMATIC TRANSAXLE (A140E)

HOW TO PROCEED WITH TROUBLESHOOTING

DI02U–02

Items inside ▱ are titles of pages in this manual, with the page number indicated in the bottom portion. See the indicated pages for detailed explanations.



DI02V–02

CUSTOMER PROBLEM ANALYSIS CHECK

Transaxle Control System Check Sheet	Inspector's Name :

Customer's Name		Registration No.	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	Odometer Reading	km mile

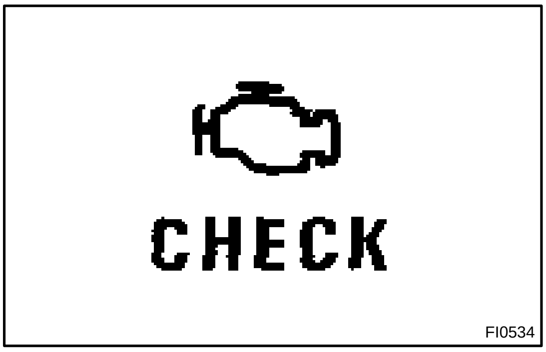
Date Problem Occurred	/ /
How Often Problem Occurs ?	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ Vehicle does not move (☐ Any position ☐ Particular position)
	☐ No up–shift (☐ 1st → 2nd ☐ 2nd → 3rd ☐ 3rd → O/D)
	☐ No down–shift (☐ O/D → 3rd ☐ 3rd → 2nd ☐ 2nd → 1st)
	☐ Lock–up malfunction
	☐ Shift point too high or too low
	☐ Harsh engagement (☐ N → D ☐ Lock–up ☐ Any drive position)
	☐ Slip or shudder
	☐ No kick–down
	☐ Others ( )

Check Item	Malfunction Indicator Lamp	☐ Normal	☐ Remains ON

DTC Check	1st Time	☐ Normal code	☐ Malfunction code (Code)
	2nd Time	☐ Normal code	☐ Malfunction code (Code)

DI02W–02



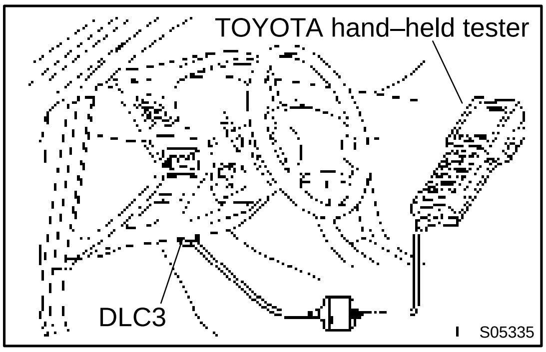
FI0534

PRE–CHECK

1. DIAGNOSIS SYSTEM

(a) Description

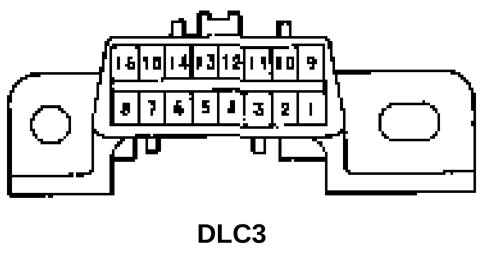
- When troubleshooting OBD II vehicles, the only difference from the usual troubleshooting procedure is that you connect an OBD II scan tool complying with SAE J1987 or TOYOTA hand–held tester to the vehicle, and read off various data output from the vehicle's ECM.
  OBD II regulations require that the vehicle's on–board computer lights up the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in the computer itself or in drive system components which affect vehicle emissions. In addition to the MIL lighting up when a malfunction is detected, the applicable DTCs prescribed by SAE J2012 are recorded in the ECM memory (See page DI–16).
  If the malfunction only occurs in 3 trips, the MIL goes off but the DTCs remain recorded in the ECM memory.



S05335

- To check the DTCs, connect an OBD II scan tool or TOYOTA hand–held tester to DLC3 on the vehicle. The OBD II scan tool or TOYOTA hand–held tester also enables you to erase the DTCs and check freeze frame data and various forms of engine data (For instruction book).
  DTCs include SAE controlled codes and Manufacturer controlled codes.
  SAE controlled codes must be set as the codes prescribed by the SAE, while Manufacturer controlled codes can be set freely by the manufacturer within the prescribed limits.
  (See DTC chart on page DI–401)

- The diagnosis system operates in normal mode during normal vehicle use, and also has a check mode for technicians to simulate malfunction symptoms and perform troubleshooting. Most DTCs use 2 trip detection logic(*) to prevent erroneous detection. By switching the ECM to check mode when troubleshooting, the technician can cause the MIL to light up and for a malfunction that is only detected once or momentarily.
  (TOYOTA hand–held tester) (See page DI–401)
- *2 trip detection logic:
  When a logic malfunction is first detected, the malfunction is temporarily stored in the ECM memory. If the same malfunction is detected again during the 2nd test drive, this 2nd detection causes the MIL to light up.



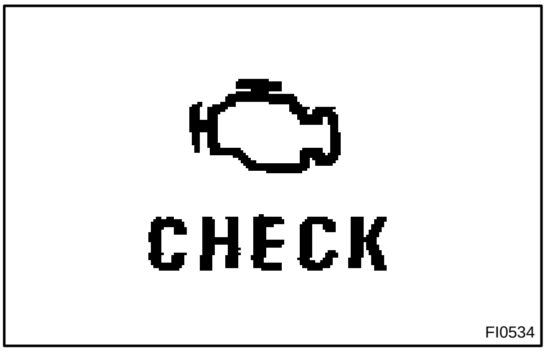
N09214

(b) Inspect the DLC3.
The vehicle's ECM uses V.P.W. (Variable Pulse Width) for communication to comply with SAE J1850. The terminal arrangement of DLC3 complies with SAE J1962 and matches the V.P.W. format.

Tester connection	Condition	Specified condition
2 (Bus ~ Line) – 5 (Signal ground)	During communication	Pulse generation
4 (Chassis Ground) – Body	Always	1 Ω or less
5 (Signal Ground) – Body	Always	1 Ω or less
16 (B+) – Body	Always	9 – 14 V

HINT:
If your display shows "UNABLE TO CONNECT TO VEHICLE" when you have connected the cable of OBD II scan tool or TOYOTA hand–held tester to DLC3, turned the ignition switch ON and operated the scan tool, there is a problem on the vehicle side or tool side.

- If communication is normal when the tool is connected to another vehicle, inspect DLC3 on the original vehicle.
- If communication is still not possible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.



FI0534

2. INSPECT DIAGNOSIS (NORMAL MODE)

(a) Check the MIL.

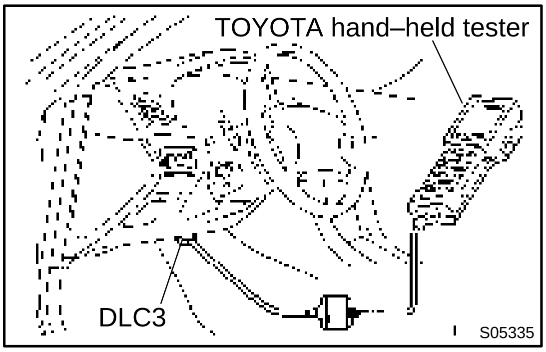
(1) The MIL comes on when the ignition switch is turned ON and the engine is not running.

HINT:
If the MIL does not light up, troubleshoot the combination meter (See page BE–47).

(2) When the engine is started, the MIL should go off. If the lamp remains on, the diagnosis system has detected a malfunction or abnormality in the system.

(b) Check the DTC.

NOTICE:
(TOYOTA hand–held tester only): When the diagnostic system is switched from normal mode to check mode, it erases all DTCs and freeze frame data recorded in normal mode. So before switching modes, always check the DTCs and freeze frame data, and note them down.



S05335

(1) Prepare an OBD II scan tool (complying with SAE J1978) or TOYOTA hand–held tester.

(2) Connect the OBD II scan tool or TOYOTA hand–held tester to DLC3 at the lower portion of the instrument panel.

(3) Turn the ignition switch ON and turn the OBD II scan tool or TOYOTA hand–held tester switch ON.

(4) Use the OBD II scan tool or TOYOTA hand–held tester to check the DTCs and freeze frame data and note them down (For operating instructions, see the OBD II scan tool's instruction book).

(5) See page DI–401 to confirm the details of the DTCs.

NOTICE:
When simulating symptoms with an OBD II scan tool (excluding TOYOTA hand–held tester) to check the DTCs, use normal mode. For codes on the DTCs chart subject to "2 trip detection logic", turn the ignition switch off after the symptoms have been simulated the 1st time. Then repeat the simulation process again. When the program has DTCs, the DTCs are recorded in the ECM.

3. INSPECT DIAGNOSIS (CHECK MODE)

HINT:

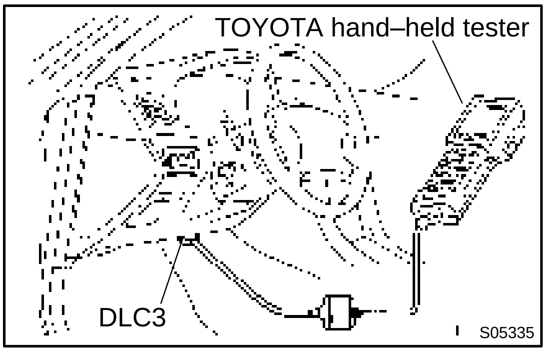
TOYOTA hand–held tester only: Compared to the Normal mode, the Check mode has high sensing ability to detect malfunctions. Furthermore, the same diagnostic items which are detected in Normal mode can also be detected in Check mode.

(a) Check the DTC.

(1) Check the initial conditions.
- Battery positive voltage 11 V or more
- Throttle valve fully closed
- Transaxle in P position
- Air conditioning switched off

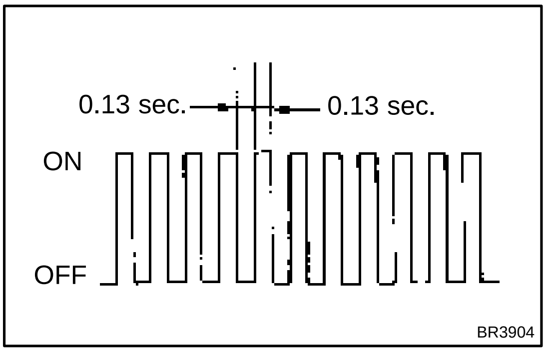
(2) Turn the ignition switch OFF.

(3) Prepare a TOYOTA hand–held tester.



(4) Connect the TOYOTA hand–held tester to DLC3 at the lower side of the instrument panel.

(5) Turn the ignition switch ON and switch the TOYOTA hand–held tester ON.



(6) Switch the TOYOTA hand–held tester from Normal mode to Check mode (Check that the MIL flashes).

(7) Start the engine (MIL goes out after the engine starts).

(8) Simulate the conditions of the malfunction described by the customer.

NOTICE:

Leave the ignition switch ON until you have checked the DTCs, etc.

(9) After simulating the malfunction conditions, use the TOYOTA hand–held tester diagnosis selector to check the DTCs and freeze frame data, etc.

HINT:

Take care not to turn the ignition switch OFF, as turning it off the diagnosis system switches from Check mode to Normal mode, so all DTCs, etc. are erased.

(10) After checking the DTC, inspect the applicable circuit.

(b) Clearance the DTC.
The following actions will erase the DTC and freeze frame data. Operating an OBD II scan tool (complying with SAE J1978) or TOYOTA hand–held tester to erase the codes. (See the OBD II scan tool's instruction book for operating instructions.)

4. ROAD TEST

NOTICE:

Perform the test at normal operating ATF temperature 50 – 80 °C (122 – 176 °F).

(a) D position test
Shift into the D position and fully depress the accelerator pedal and and check the following points:
(1) Check up–shift operation.
1 → 2, 2 → 3 and 3 → O/D up–shifts take place, at the shift point shown in the automatic shift schedule (See page SS–54).

HINT:

- O/D Gear Up–shift Prohibition Control (1. Coolant temp. is 50 °C (122 °C) or less. 2. If there is a 10 km/h (6 mph) difference between the set cruise control speed and vehicle speed.)
- O/D Gear Lock–up Prohibition Control (1. Brake pedal is depressed. 2. Coolant temp. is 50 °C (122 °C) or less.)

(2) Check for shift shock and slip.
Check for shock and slip at the 1 → 2, 2 → 3 and 3 → O/D up–shifts.
(3) Check for abnormal noises and vibration.
Run at the D position lock–up or O/D gear and check for abnormal noises and vibration.

HINT:
The check for the cause of abnormal noises and vibration must be done very thoroughly as it could also be due to loss of balance in the differential or torque converter clutch, etc.

(4) Check kick–down operation.
While running in the D position, 2nd, 3rd and O/D gears, check to see that the possible kick–down vehicle speed limits for 2 → 1, 3 → 2 and O/D → 3 kick–downs conform to those indicated on the automatic shift schedule (See page SS–54).
(5) Check abnormal shock and slip at kick–down.
(6) Check the lock–up mechanism.
- Drive in D position, O/D gear, at a steady speed (lock–up ON) of about 75 km/h (47 mph).
- Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

If there is a big jump in engine speed, there is no lock–up.

(b) 2 position test
Shift into the 2 position and fully depress the accelerator pedal and check the following points:
(1) Check up–shift operation.
Check to see that the 1 → 2 up–shift takes place and that the shift point conforms to the automatic shift schedule (See page SS–54).

HINT:
There is no O/D up–shift and lock–up in the 2 position.

(2) Check engine braking.
While running in the 2 position and 2nd gear, release the accelerator pedal and check the engine braking effect.

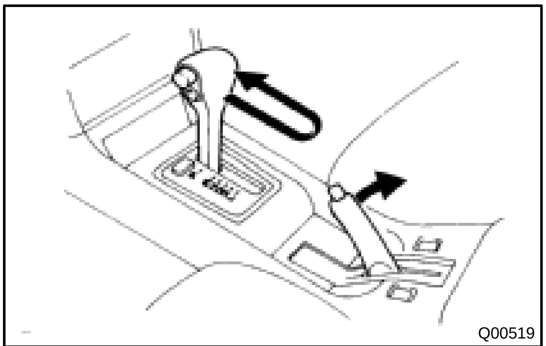
(3) Check for abnormal noises during acceleration and deceleration, and for shock at up–shift and down–shift.

(c) L position test
Shift into the 2 position and fully depress the accelerator pedal and check the following points:
(1) Check no up–shift.
While running in the L position, check that there is no up–shift to 2nd gear.
(2) Check engine braking.
While running in the L position, release the accelerator pedal and check the engine braking effect.
(3) Check for abnormal noises during acceleration and deceleration.

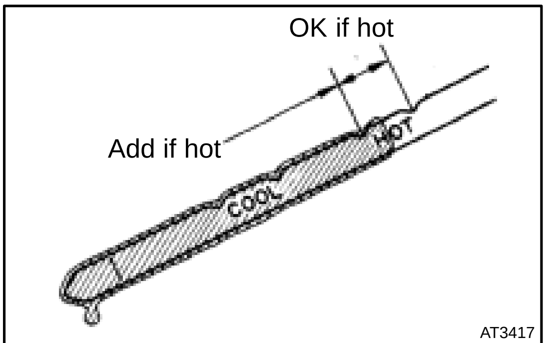
(d) R position test
Shift into the R position and fully depress the accelerator pedal and check for slipping.

CAUTION:
Before conducting this test ensure that the test area is free from people and obstruction.

(e) P position test
Stop the vehicle on a grade (more than 5˚) and after shifting into the P position, release the parking brake. Then, check to see that the parking lock pawl holds the vehicle in place.



Q00519



AT3417

5. BASIC INSPECTION

(a) Check the fluid level.

HINT:
- Drive the vehicle so that the engine and transaxle are at normal operating temperature.
  Fluid temp.: 70 – 80 ˚C (158 – 176 ˚F)
- Only use the COOL range on the dipstick as a rough reference when the fluid is replaced or the engine does not run.

(1) Park the vehicle on a level surface and set the parking brake.
(2) With the engine idling and the brake pedal depressed, shift the shift lever into all positions from P to L position and return to P position.
(3) Pull out the dipstick and wipe it clean.
(4) Push it back fully into the pipe.
(5) Pull it out and check that the fluid level is in the HOT range.

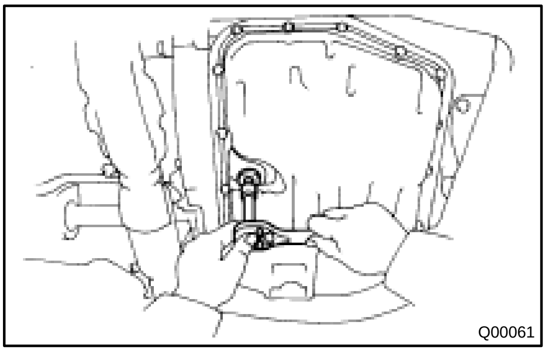
If the level is not within the range, add new fluid.

Fluid type: ATF D–II or DEXRON®III (DEXRON®II)

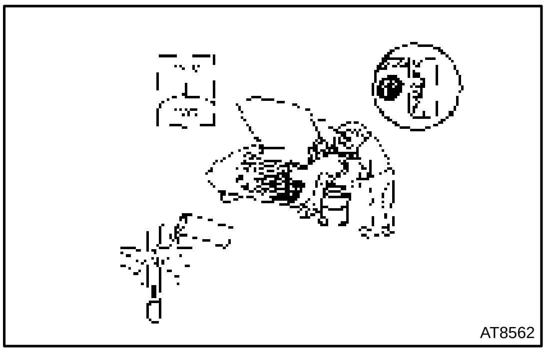
NOTICE:
Do not overfill.

(b) Check the fluid condition.

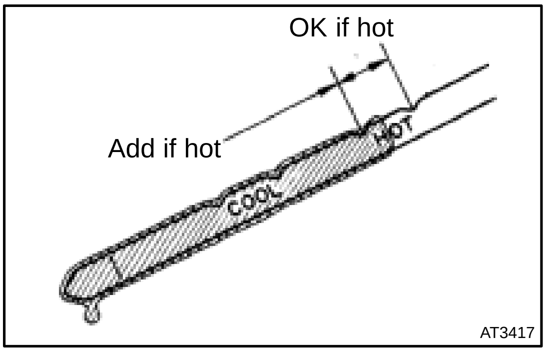
If the level is not within the hot range.


Q00061

(c) Replace the ATF.
(1) Remove the drain plug and drain the fluid.
(2) Reinstall the drain plug securely.


AT8562

(3) With the engine OFF add new fluid through the oil filler pipe.
Fluid type: ATF D–II or DEXRON®III (DEXRON®II)
Capacity: 2.5 liters (2.6 US qts, 2.1 Imp. qts)
(4) Start the engine and shift the shift lever into all positions from P to L position and then shift into P position.

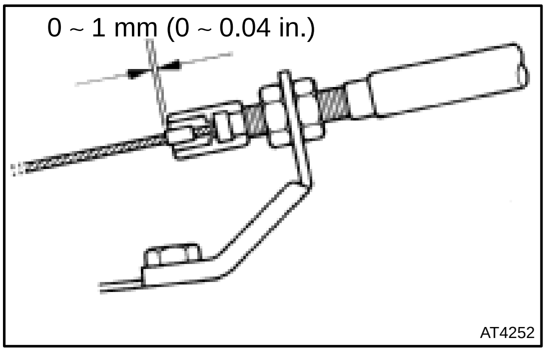


AT3417

(5) With the engine idling, check the fluid level. Add fluid up to the COOL level on the dipstick.
(6) Check the fluid level is at the normal operating temperature, 70 – 80 °C (158 – 176 °F), and add as necessary.

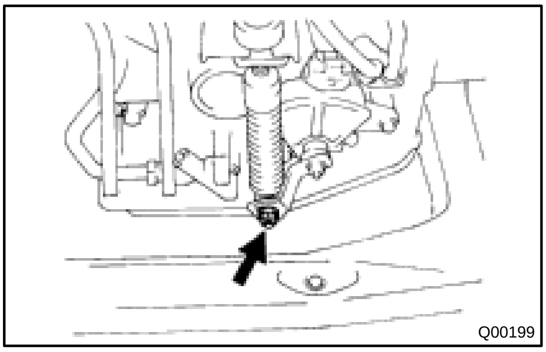
NOTICE:
Do not overfill.

(d) Check the fluid leaks.
Check for leaks in the transaxle.
If there are leaks, it is necessary to repair or replace O–rings, gasket, oil seals, plugs or other parts.



AT4252

(e) Inspect and adjust the throttle cable.
(1) Check that the accelerator pedal is fully released.
(2) Check that the inner cable is not slack.
(3) Measure the distance between the outer cable end and stopper on the cable.
Standard distance: 0 – 1 mm (0 – 0.04 in.)
If the distance is not standard, adjust the cable by the adjusting nuts.

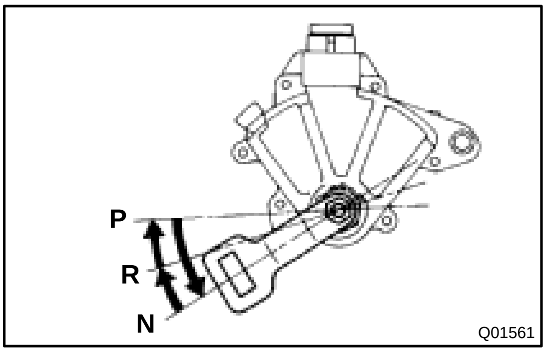


(f) Inspect and adjust the shift lever position.
When shifting the shift lever from the N position to other positions, check that the lever can be shifted smoothly and accurately to each position and that the position indicator is aligned with the correct position.

If the indicator is not aligned with the correct position, carry out the following adjustment procedures.

(1) Loosen the nut on the shift lever.

(2) Push the control shaft fully rearward.



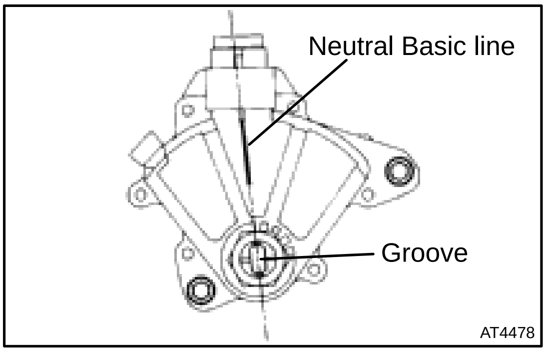
(3) Return the control shaft lever 2 notches to N position.

(4) Set the shift lever to N position.

(5) While holding the shift lever lightly toward the R position side, tighten the shift lever nut.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

(6) Start the engine and make sure that the vehicle moves forward when shifting the lever from the N to D position and reverses when shifting it to the R position.



(g) Inspect and adjust the park/neutral position.
Check that the engine can be started with the shift lever only in the N or P position, but not in other positions.

If it is not as stated above, carry out the following adjustment procedures.

(1) Loosen the park/neutral position switch bolt and set the shift lever to the N position.

(2) Align the groove and neutral basic line.

(3) Hold the switch in position and tighten the bolt.

Torque: 5.4 N·m (55 kgf·cm, 48 in·lbf)

For continuity inspection of the park/neutral position switch, see page DI–424.

(h) Check the idle speed.

Idle speed : 750 ± 50 rpm
(In N position and air conditioner OFF)

6. MECHANICAL SYSTEM TESTS

(a) Measure the stall speed.

The object of this test is to check the overall performance of the transaxle and engine by measuring the stall speeds in the D and R positions.

NOTICE:

- **Do the test at normal operating fluid temperature 50 – 80 °C (122 – 176 °F).**
- **Do not continuously run this test for longer than 5 seconds.**
- **To ensure safety, conduct this test in a wide, clear level area which provides good traction.**
- **The stall test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is doing the test.**

(1) Chock the 4 wheels.
(2) Connect an OBD II scan tool or TOYOTA hand–held tester to DLC3.
(3) Fully apply the parking brake.
(4) Keep your left foot depressing firmly on the brake pedal.
(5) Start the engine.
(6) Shift into the D position. Press all the way down on the accelerator pedal with your right foot. Quickly read the stall speed at this time.

Stall speed: 2,450 ± 150 rpm

(7) Do the same test in R position.

Stall speed: 2,450 ± 150 rpm

Evaluation:

Problem	Possible cause
(a) Stall speed low in D and R positions	●Engine output may be insufficient ●Stator one–way clutch is operating properly ●HINT: If more than 600 rpm below the specified value, the torque converter clutch could be faulty.
(b) Stall speed high in D position	●Line pressure too low ●Forward clutch slipping ●No.2 one–way clutch not operating properly ●O/D clutch slipping
(c) Stall speed high in R position	●Line pressure too low ●Direct clutch slipping ●1st & reverse brake slipping ●O/D clutch slipping
(d) Stall speed high in D and R positions	●Line pressure too low ●Improper fluid level ●O/D one–way clutch not operating properly

(b) Measure the time lag.
When the shift lever is shifted while the engine is idling, there will be a certain time lapse or lag before the shock can be felt. This is used for checking the condition of the O/D direct clutch, forward clutch, and 1st & reverse brake.

NOTICE:

- **Do the test at normal operating fluid temperature 50 – 80 °C (122 – 176 °F).**
- **Be sure to allow 1 minute interval between tests.**
- **Take 3 measurements and take the average value.**

(1) Connect an OBD II scan tool or TOYOTA hand–held tester to DLC3.
(2) Fully apply the parking brake.
(3) Start the engine and check idle speed.

Idle speed : 750 ± 50 rpm (In N position and air conditioner OFF)

(4) Shift the shift lever from N to D position. Using a stop watch, measure the time from when the lever is shifted until the shock is felt.

Time lag: N → D Less than 1.2 seconds

(5) In the same manner, measure the time lag for N → R.

Time lag: N → R Less than 1.5 seconds

Evaluation (If N → D time or N → R time lag is longer than the specified):

Problem	Possible cause
N → D time lag is longer	●Line pressure too low ●Forward clutch worn ●O/D one–way clutch not operating
N → R time lag is longer	●Line pressure too low ●Direct clutch worn ●1st & reverse brake worn ●O/D one–way clutch not operating properly

7. HYDRAULIC TEST

Measure the line pressure.

NOTICE:

- **Do the test at normal operation fluid temperature 50 – 80 °C (122 – 176 °F).**
- **The line pressure test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is doing the test.**
- **Be careful to prevent SST's hose from interfering with the exhaust pipe.**

(1) Warm up the ATF.

(2) Remove the test plug on the transaxle case front left side and connect SST.
(See page AX–17 for the location to connect SST)

SST 09992–00095 (09992–00231, 09992–00271)

(3) Fully apply the parking brake and chock the 4 wheels.

(4) Connect an OBD II scan tool or TOYOTA hand–held tester to DLC3.

(5) Start the engine and check idling speed.

(6) Keep your left foot pressing firmly on the brake pedal and shift into D position.

(7) Measure the line pressure when the engine is idling.

(8) Depress the accelerator pedal all the way down. Quickly read the highest line pressure when engine speed reaches stall speed.

(9) In the same manner, do the test in R position.

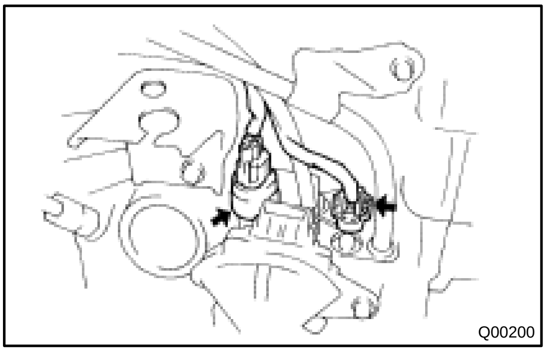
Specified line pressure:

Condition	D position kPa (kgf/cm^2, psi)	R position kPa (kgf/cm^2, psi)
Idling	362 – 422 (3.7 – 4.3, 53 – 61)	618 – 794 (6.3 – 8.1, 90 – 115)
Stall	735 – 862 (7.5 – 8.8, 107 – 125)	1,373 – 1,608 (14.0 – 16.4, 199 – 233)

If the measured pressure is not up to the specified value, recheck the throttle cable adjustment and retest.

Evaluation

Problem	Possible cause
If the measured values at all positions are higher	●Throttle cable out of adjustment ●Throttle valve defective ●Regulator valve defective
If the measured values at all positions are lower	●Throttle cable out of adjustment ●Throttle valve defective ●Regulator valve defective ●Oil pump defective ●O/D direct clutch defective
If pressure is low in the D position only	●D position circuit fluid leakage ●Forward clutch defective
If pressure is low in the R position only	●R position circuit fluid leakage ●Direct clutch defective ●1st & reverse brake defective


Q00200

8. MANUAL SHIFTING TEST

HINT:

By this test, it can be determined whether the trouble is within the electrical circuit or is a mechanical problem in the transaxle.

(a) Disconnect the solenoid wire.

(b) Inspect the manual driving operation.

Check that the shift and gear positions correspond to the table below.

While driving, shift through the L, 2 and D positions. Check that the gear change corresponds to the shift position.

Shift Position	Gear Position
D	O/D
2	3rd
L	1st
R	Reverse
P	Pawl Lock

HINT:

If the L, 2 and D gear positions are difficult to distinguish, do the above test.

If any abnormality is found in the above test, the problem is in the transaxle itself.

(c) Connect the solenoid wire.

(d) Clear out the DTC (See page DI–389).

DI02X–02

DIAGNOSTIC TROUBLE CODE CHART

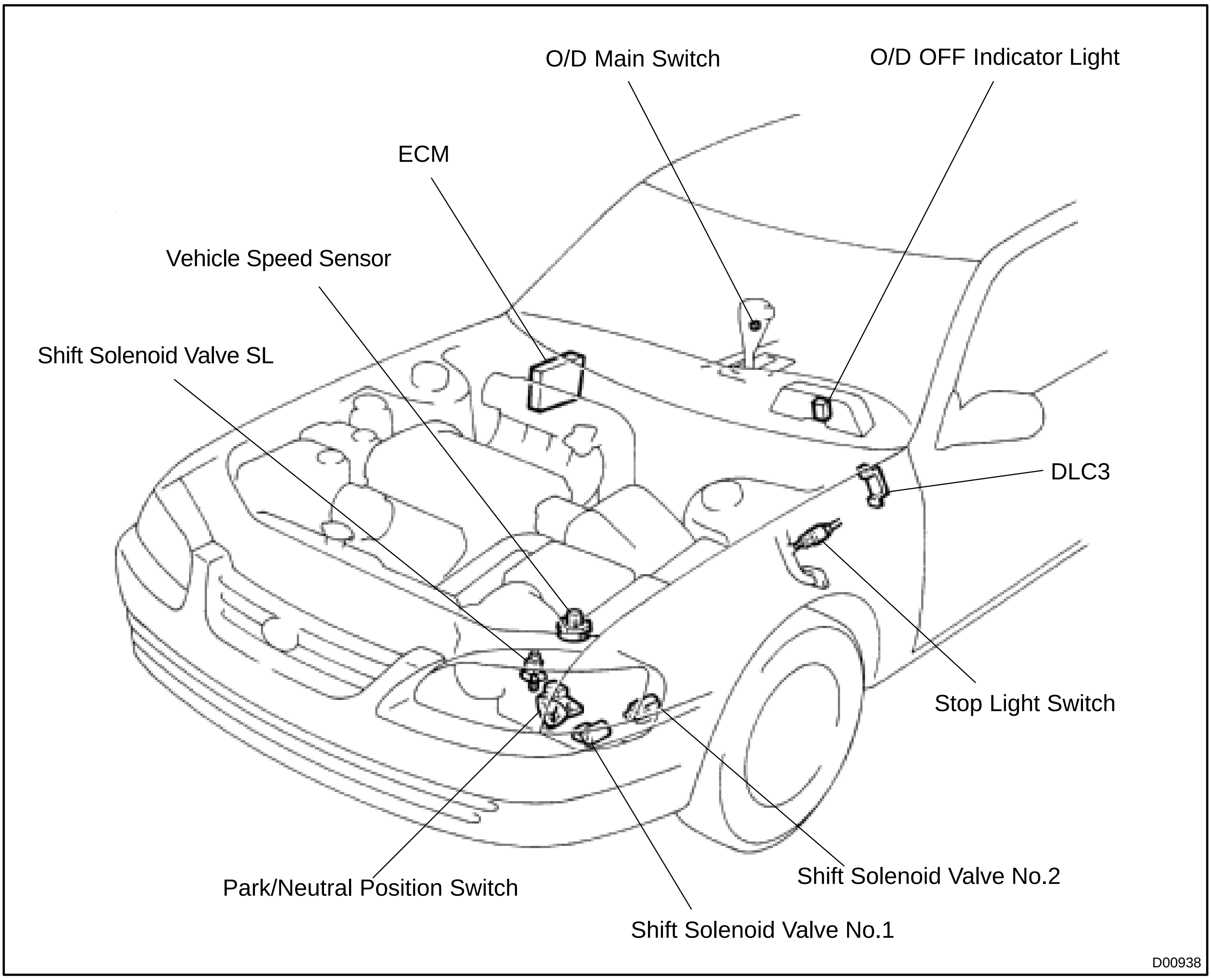
If a DTC is displayed during the DTC check, check the circuit listed for that code in the table below and proceed to the page given.

* : ● ...MIL light up

DTC No. (See Page)	Detection Item	Trouble Area	MIL *	Memory
P0500 (DI–408)	Vehicle Speed Sensor Malfunction (No.1 Vehicle Speed Sensor)	□Open or short in No.1 vehicle speed sensor circuit □No.1 vehicle speed sensor □Combination meter □ECM □Automatic transaxle (clutch, brake or gear etc.)	●	○
P0750 (DI–411)	Shift Solenoid A Malfunction (Shift Solenoid Valve No.1)	□Shift solenoid valve No.1 is stuck open or closed □Valve body is blocked up or stuck □Automatic transaxle (clutch, brake or gear etc.)	●	○
P0753 (DI–413)	Shift Solenoid A Electrical Malfunction (Shift Solenoid Valve No.1)	□Open or short in shift solenoid valve No.1 circuit □Shift solenoid valve No.1 □ECM	●	○
P0755 (DI–411)	Shift Solenoid B Malfunction (Shift Solenoid Valve No.2)	□Shift solenoid valve No.2 is stuck open or closed □Valve body is blocked up or stuck □Automatic transaxle (clutch, brake or gear etc.)	●	○
P0758 (DI–413)	Shift Solenoid B Electrical Malfunction (Shift Solenoid Valve No.2)	□Open or short in shift solenoid valve No.2 circuit □Shift solenoid valve No.2 □ECM	●	○
P0770 (DI–417)	Shift Solenoid E Malfunction (Shift Solenoid Valve SL)	□Shift solenoid valve SL is stuck open or closed □Valve body is blocked up or stuck □Lock–up clutch □Automatic transaxle (clutch, brake or gear etc.)	●	○
P0773 (DI–419)	Shift Solenoid E Electrical Malfunction (Shift Solenoid Valve SL)	□Open or short in shift solenoid valve SL circuit □Shift solenoid valve SL □ECM	●	○
P1520 (DI–170)	Stop Light Switch Signal Malfunction	□Open or short in stop light switch circuit □Stop light switch □ECM	●	○
P1780 (DI–424)	Park/Neutral Position Switch Malfunction	□Short in park/neutral position switch circuit □Park/neutral position switch □ECM	●	○

DI02Y–02

PARTS LOCATION

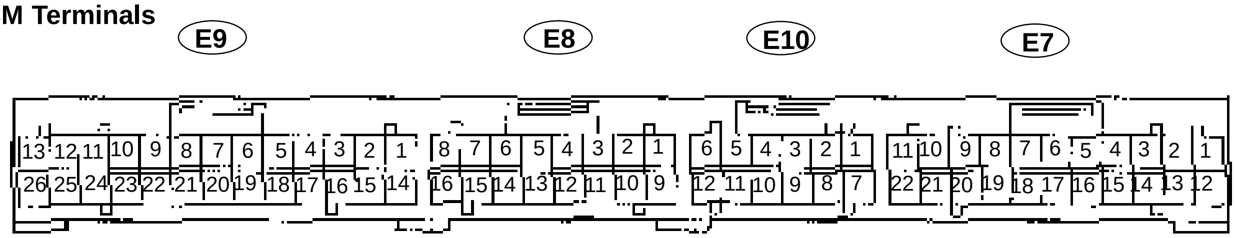


DI1IZ–01

TERMINALS OF ECM

w/ Engine Immobiliser System

ECM Terminals



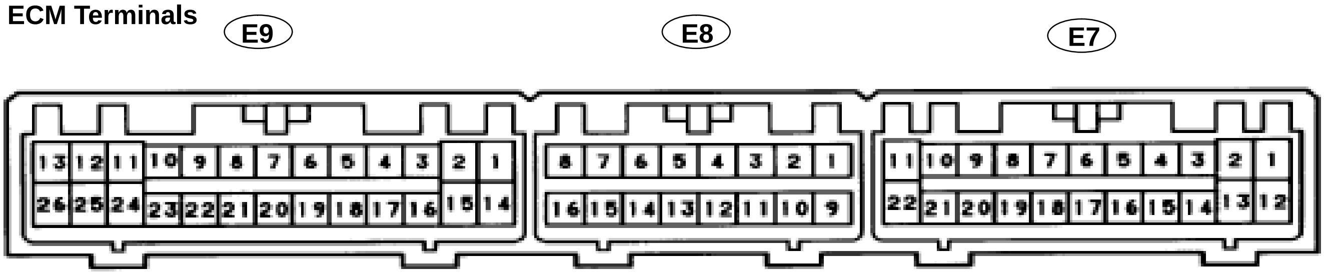
FI6526

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
S1 ↔ E1 (E9–8 ↔ E9–24)	V ↔ BR	IG ON	9 ~ 14
		1st or 2nd gear	9 ~ 14
		3rd or O/D gear	Below 1
S2 ↔ E1 (E9–21 ↔ E9–24)	L–B ↔ BR	IG ON	Below 1
		1st or 2nd gear	9 ~ 14
		3rd or O/D gear	Below 1
SL ↔ E1 (E9–20 ↔ E9–24)	P ↔ BR	IG ON	Below 1
		Vehicle driving under lock–up position	9 ~ 14
OD1 ↔ E1 (E7–18 ↔ E9–24)	Y–B ↔ BR	IG ON	9 ~ 14
OD2 ↔ E1 (E7–5 ↔ E9–24)	G–O ↔ BR	O/D main switch ON	9 ~ 14
		O/D main switch OFF	Below 1
L ↔ E1 (E7–15 ↔ E9–24)	Y ↔ BR	IG ON and Shift lever L position	9 ~ 14
		IG ON and Shift lever other than L position	Below 1
2 ↔ E1 (E7–16 ↔ E9–24)	*1L–W ↔ BR *2O ↔ BR	IG ON and Shift lever 2 position	9 ~ 14
		IG ON and Shift lever other than 2 position	Below 1
R ↔ E1 (E7–17 – E9–24)	R–B ↔ BR	IG ON and Shift lever R position	9 ~ 14
		IG ON and Shift lever other than R position	Below 1
NSW ↔ E1 (E7–22 ↔ E9–24)	B–W ↔ BR	IG ON and Shift lever P or N position	9 ~ 14
		IG ON and Shift lever other than P or N position	Below 1

*1: TMC made
*2: TMMK made

w/o Engine Immobiliser System

ECM Terminals



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
S1 ↔ E1 (E9–7 ↔ E9–14)	V ↔ BR	IG ON	9 ~ 14
		1st or 2nd gear	9 ~ 14
		3rd or O/D gear	Below 1
S2 ↔ E1 (E9–6 ↔ E9–14)	L–B ↔ BR	IG ON	Below 1
		1st or 2nd gear	9 ~ 14
		3rd or O/D gear	Below 1
SL ↔ E1 (E9–1 ↔ E9–14)	P ↔ BR	IG ON	Below 1
		Vehicle driving under lock–up position	9 ~ 14
OD1 ↔ E1 (E7–20 ↔ E9–14)	Y–B ↔ BR	IG ON	9 ~ 14
OD2 ↔ E1 (E7–7 ↔ E9–14)	G–O ↔ BR	O/D main switch ON	9 ~ 14
		O/D main switch OFF	Below 1
L ↔ E1 (E7–19 ↔ E9–14)	Y ↔ BR	IG ON and Shift lever L position	9 ~ 14
		IG ON and Shift lever other than L position	Below 1
2 ↔ E1 (E7–18 ↔ E9–14)	*1L–W ↔ BR *2O ↔ BR	IG ON and Shift lever 2 position	9 ~ 14
		IG ON and Shift lever other than 2 position	Below 1
R ↔ E1 (E7–17 – E9–14)	R–B ↔ BR	IG ON and Shift lever R position	9 ~ 14
		IG ON and Shift lever other than R position	Below 1
NSW ↔ E1 (E7–22 ↔ E9–14)	B–W ↔ BR	IG ON and Shift lever P or N position	9 ~ 14
		IG ON and Shift lever other than P or N position	Below 1

*1: TMC made
*2: TMMK made

DI030–02

PROBLEM SYMPTOMS TABLE

If a normal code is displayed during the DTC check but the trouble still occurs, check the circuits for each symptom in the order given in the charts on the following pages and proceed to the page given for trouble-shooting.

The Matrix Chart is divided into 3 chapters.

Chapter 1: Electronic Circuit Matrix Chart

Chapter 2: On–vehicle Repair Matrix Chart

Chapter 3: Off–vehicle repair Matrix Chart

- ☐ If the instruction "Proceed to next circuit inspection shown on matrix chart" is given in the flow chart for each circuit, proceed to the circuit with the next highest number in the table to continue the check.
- ☐ If the trouble still occurs even though there are no abnormalities in any of the other circuits, then check and replace the ECM.

1. Chapter 1: Electronic Circuit Matrix Chart

Symptom	Suspect Area	See page
No up–shift (A particular gear, from 1st to 3rd gear, is not up–shifted)	1. ECM	IN–31
No up–shift (3rd → O/D)	1. O/D main switch & O/D OFF indicator light circuit 2. O/D cancel signal circuit 3. ECM	DI–431 DI–428 IN–31
No down–shift (O/D → 3rd)	1. ECM	IN–31
No down–shift (A particular gear, from 3rd to 1st gear, is not down–shifted)	1. ECM	IN–31
No lock–up or No lock–up off	1. Stop light switch circuit 2. ECM	DI–423 IN–31
Shift point too high or too low	1. ECM	IN–31
Up–shift to O/D from 3rd while O/D main switch is OFF	1. O/D main switch & O/D OFF indicator light circuit 2. ECM	DI–431 IN–31
Up–shift to O/D from 3rd while engine is cold	1. ECM	IN–31
Poor acceleration	1. ECM	IN–31
No kick–down	1. ECM	IN–31
Engine stalls when starting off or stopping	1. ECM	IN–31

2. Chapter 2: On–Vehicle Repair (● : A140E AUTOMATIC TRANSAXLE Repair Manual Pub. No. RM385U)

Symptom	Suspect Area	See page
Vehicle does not move in any forward positions and reverse position	1. Manual valve 2. Throttle valve 3. Primary regulator valve 4. Off–vehicle repair matrix chart	● ● ● –
Vehicle does not move in R position	1. Off–vehicle repair matrix chart	–
No up–shift (1st → 2nd)	1. 1–2 shift valve 2. Off–vehicle repair matrix chart	● –
No up–shift (2nd → 3rd)	1. 2–3 shift valve 2. Off–vehicle repair matrix chart	● –
No up–shift (3rd → O/D)	1. 3–4 shift valve 2. Off–vehicle repair matrix chart	● –
No down–shift (O/D → 3rd)	1. 3–4 shift valve	●
No down–shift (3rd → 2nd)	1. 2–3 shift valve	●
No down–shift (2nd → 1st)	1. 1–2 shift valve	●
No lock–up or No lock–up off	1. Lock–up relay valve 2. Off–vehicle repair matrix chart	● –
Harsh engagement (N → D)	1. C_1 accumulator 2. Off–vehicle repair matrix chart	● –
Harsh engagement (N → R)	1. C_2 accumulator 2. Off–vehicle repair matrix chart	● –
Harsh engagement (N → L)	1. Low coast modulator valve	●
Harsh engagement (Lock–up)	1. Lock–up relay valve 2. Off–vehicle repair matrix chart	● –
Harsh engagement (1st → 2nd → 3rd → O/D)	1. Throttle modulator valve 2. Cut back valve 3. Throttle valve	● ● ●
Harsh engagement (2nd → 3rd)	1. C_2 accumulator	●
Harsh engagement (3rd → O/D)	1. B_0 accumulator	●
Harsh engagement (O/D → 3rd)	1. C_0 accumulator 2. B_0 accumulator	● ●
Slip or shudder (Forward and reverse)	1. Throttle valve 2. Oil strainer 3. Off–vehicle repair matrix chart	● ● –
No engine braking (1st: L position)	1. Low coast modulator valve 2. Off–vehicle repair matrix chart	● –
No engine braking (2nd: 2 position)	1. 2nd coast modulator valve 2. Off–vehicle repair matrix chart	● –
No kick–down	1. 1–2 shift valve 2. 2–3 shift valve 3. 3–4 shift valve	● ● ●

3. Chapter 3: Off–Vehicle Repair (● : A140E AUTOMATIC TRANSAXLE Repair Manual Pub. No. RM385U)

Symptom	Suspect Area	See page
Vehicle does not move in any forward positions and reverse position	1. Front and rear planetary gear 2. O/D planetary gear 3. O/D one–way clutch (F_0) 4. O/D direct clutch (C_0) 5. O/D brake (B_0) 6. Forward clutch (C_1)	● ● ● ● ● ●
Vehicle does not move in R position	1. Front and rear planetary gear unit 2. Direct clutch (C_2) 3. O/D direct clutch (C_0) 4. 1st & reverse brake (B_3)	● ● ● ●
No up–shift (1st → 2nd)	1. No. 1 one–way clutch (F_1) 2. 2nd brake (B_2)	● ●
No up–shift (2nd → 3rd)	1. Direct clutch (C_2)	●
No up–shift (3rd → O/D)	1. O/D brake (B_0)	●
No lock–up or No lock–up off	1. Torque converter clutch	AX–26
Harsh engagement (N → D)	1. Forward clutch (C_1) 2. O/D one–way clutch (F_0) 3. No. 2 one–way clutch (F_2)	● ● ●
Harsh engagement (N → R)	1. Direct clutch (C_2) 2. 1st & reverse brake (B_3)	● ●
Harsh engagement (Lock–up)	1. Torque converter clutch	AX–26
Slip or shudder (Forward position: After warm–up)	1. Torque converter clutch 2. O/D direct clutch (C_0) 3. Forward clutch (C_1) 4. O/D one–way clutch (F_0)	AX–26 ● ● ●
Slip or shudder (R position)	1. Direct clutch (C_2) 2. 1st & reverse brake (B_3) 3. O/D direct clutch (C_0)	● ● ●
Slip or shudder (1st)	1. No. 2 one–way clutch (F_2)	●
Slip or shudder (2nd)	1. No. 1 one–way clutch (F_1) 2. 2nd brake (B_2)	● ●
Slip or shudder (3rd)	1. Direct clutch (C_2)	●
Slip or shudder (O/D)	1. O/D brake (B_0)	●
No engine braking (1st ~ 3rd: D position)	1. 2nd brake (B_2)	●
No engine braking (1st: L position)	1. 1st & reverse brake (B_3)	●
No engine braking (2nd: 2 position)	1. 2nd coast brake (B_1)	●
Poor acceleration (All positions)	1. Torque converter clutch 2. O/D planetary gear	AX–26 ●
Poor acceleration (O/D)	1. O/D direct clutch (C_0) 2. O/D planetary gear	● ●
Large shift shock or engine stalls when starting off or stopping	1. Torque converter clutch	AX–26

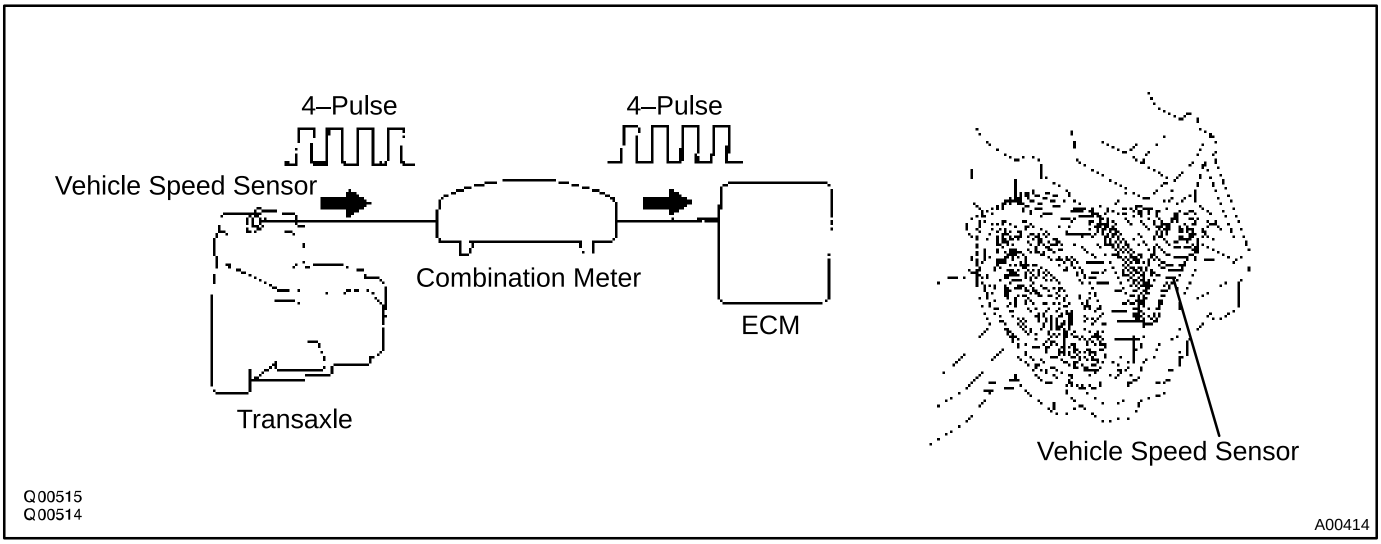
DI1J0–01

CIRCUIT INSPECTION

DTC	P0500	Vehicle Speed Sensor Malfunction

CIRCUIT DESCRIPTION

The vehicle speed sensor outputs a 4–pulse signal for every revolution of the rotor shaft, which is rotated by the transmission output shaft via the driven gear. After this signal is converted into a more precise rectangular wave form by the wave form shaping circuit inside the combination meter, it is then transmitted to the ECM. The ECM determines the vehicle speed based on the frequency of these pluse signals.



DTC No.	DTC Detecting Condition	Trouble Area
P0500	During vehicle is being driven, no vehicle speed sensor signal to ECM (2 trip detection logic)	●Combination meter ●Open or short in vehicle speed sensor circuit ●Vehicle speed sensor ●ECM ●Automatic transaxle (clutch, brake or gear etc.)
	Clutch or brake slips or gear is broken	

WIRING DIAGRAM

See page DI–145.

INSPECTION PROCEDURE

1	**Check operation of speedometer.**

CHECK:

Drive the vehicle and check if the operation of the speedmeter in the combination meter is normal.

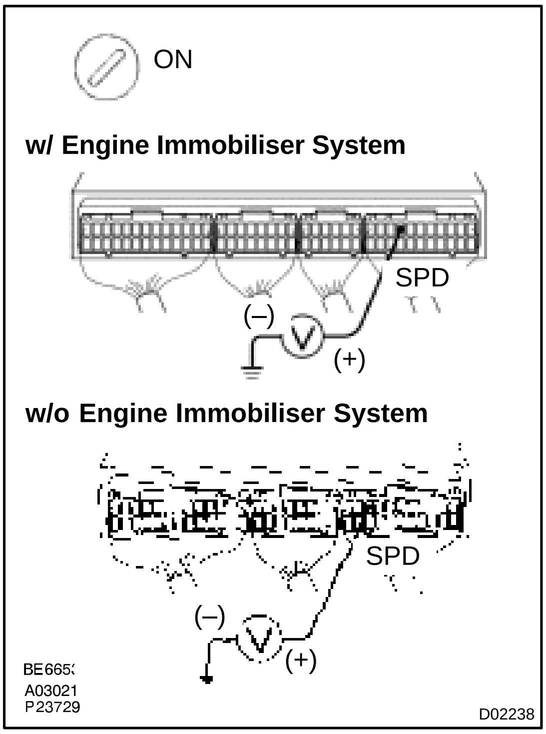
HINT:

The vehicle speed sensor is operating normally if the speedometer display is normal.

NG → **Check speedometer circuit. See combination meter troubleshooting (See page BE–47).**

OK

2	**Check voltage between terminal SPD of ECM connector and body ground.**



PREPARATION:

(a) Remove glove compartment (See page BO–75).

(b) Shift the shift lever to neutral.

(c) Jack up one of the front wheels.

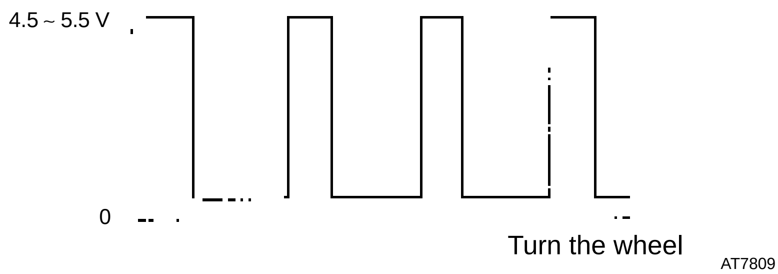
(d) Turn ignition switch ON.

CHECK:

Measure voltage between terminal SPD of ECM connector and body ground when the wheel is turned slowly.

OK:

Voltage is generated intermittently.



NG → **Check and repair harness and connector between combination meter and ECM (See page IN–31).**

OK

3	Check the ECM (See page IN–31).

NG — Replace the ECM.

OK

Check and repair the transaxle (clutch, brake or gear etc.).

DI032–02

DTC	P0750, P0755	Shift Solenoid A/B Malfunction (Shift Solenoid Valve No.1/No.2)

SYSTEM DESCRIPTION

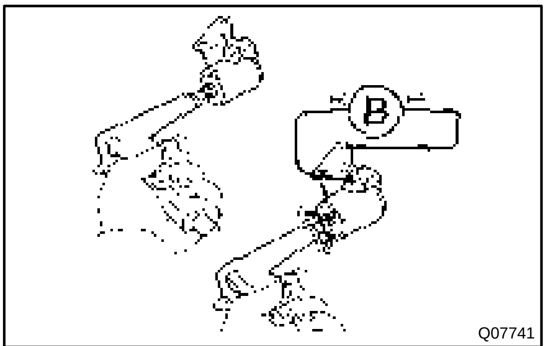
The ECM uses signals from the vehicle speed sensor and crankshaft position sensor to detect the actual gear position (1st, 2nd, 3rd or O/D gear).
Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical trouble of the shift solenoid valves, valve body or automatic transaxle (clutch, brake or gear etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P0750 P0755	During normal driving, the gear required by the ECM does not match the actual gear (2 trip detection logic)	●Shift solenoid valve No.1/No.2 is stuck open or closed ●Valve body is blocked up or stuck ●Automatic transaxle (clutch, brake or gear etc.)

Check the shift solenoid valve No.1 when DTC P0750 is output and check the shift solenoid valve No.2 when DTC P0755 is output.

INSPECTION PROCEDURE

1	Check shift solenoid valve No.1 or No.2 operation.



Q07741

PREPARATION:
(a) Remove the oil pan.
(b) Remove the shift solenoid valve No.1 or No.2.

CHECK:
(a) By applying 490 kPa (5 kgf/cm^2, 71 psi) of compressed air, check that the solenoid valve does not leak air.
(b) When battery positive voltage is supplied to the shift solenoid valve, check that the valve opens.

OK:
(a) Solenoid valve does not leak air.
(b) Solenoid valve opens.

NG → **Replace the shift solenoid valve No.1 or No.2.**

OK

2	**Check the valve body (See page DI–405).**

NG → **Repair or replace the valve body.**

OK ↓

Repair or replace the transaxle.

DI033–02

DTC	P0753, P0758	Shift Solenoid A/B Electrical Malfunction (Shift Solenoid Valve No.1/No.2)

CIRCUIT DESCRIPTION

Shifting from 1st to O/D is performed in combination with ON and OFF of the shift solenoid valves No.1 and No.2 controlled by ECM. If an open or short circuit occurs in either of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valve to allow the vehicle to be operated smoothly (Fail safe function).
Fail Safe Function:
If either of the shift solenoid valve circuits develops an open or short, the ECM turns the other shift solenoid ON and OFF to shift to the gear positions shown in the table below. The ECM also turns the shift solenoid valve SL OFF at the same time. If both solenoids are malfunction, hydraulic control cannot be performed electronically and must be done manually.
Manual shifting as shown in the following table must be done (In the case of a short circuit, the ECM stops sending current to the short circuited solenoid).

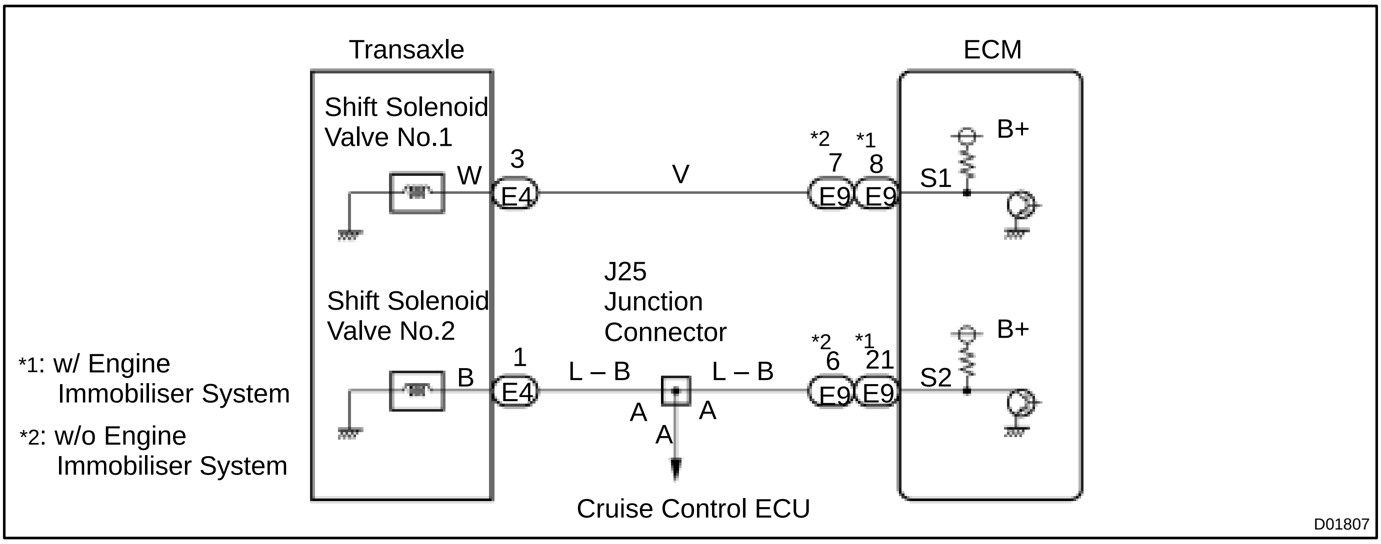
Position	NORMAL			SHIFT SOLENOID NO.1 MALFUNCTIONING			SHIFT SOLENOID NO.2 MALFUNCTIONING			BOTH SOLENOIDS MALFUNCTIONING
	Solenoid valve		Gear	Solenoid valve		Gear	Solenoid valve		Gear	Gear when shift selector is manually operated
	No.1	No.2		No.1	No.2		No.1	No.2		
D	ON	OFF	1st	X	ON	3rd	ON	X	1st	O/D
	ON	ON	2nd	X	ON	3rd	OFF	X	O/D	O/D
	OFF	ON	3rd	X	ON	3rd	OFF	X	O/D	O/D
	OFF	OFF	O/D	X	OFF	O/D	OFF	X	O/D	O/D
2	ON	OFF	1st	X	ON	3rd	ON	X	1st	3rd
	ON	ON	2nd	X	ON	3rd	OFF	X	3rd	3rd
	OFF	ON	3rd	X	ON	3rd	OFF	X	3rd	3rd
L	ON	OFF	1st	X	OFF	1st	ON	X	1st	1st
	ON	ON	2nd	X	ON	2nd	ON	X	1st	1st

X: Malfunctions

Check the shift solenoid valve No.1 when DTC P0753 is output and check the shift solenoid valve No.2 when DTC P0758 is output.

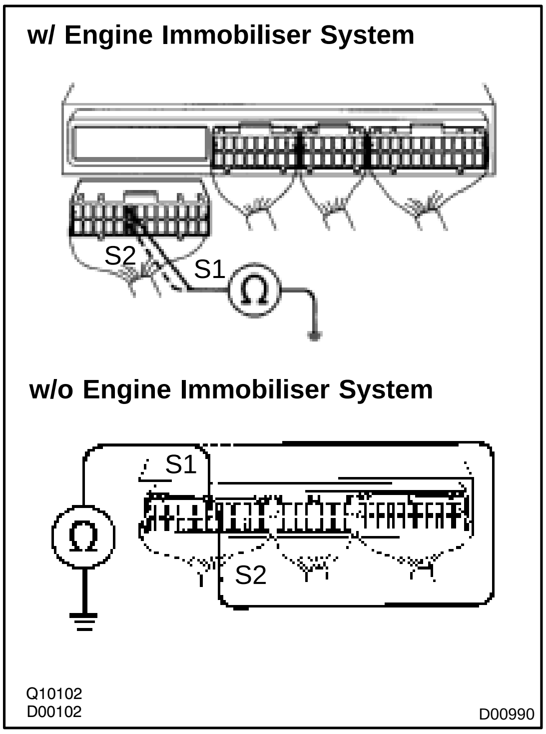
DTC No.	DTC Detecting Condition	Trouble Area
P0753 P0758	The ECM checks for an open or short circuit in the shift solenoid valves No.1 and No.2 circuit when it changes gear position. The ECM records DTC P0753 or P0758 if condition (a) or (b) is detected once, but it does not light up MIL. After 1 sec. ECM detects condition (a) or (b) in a trip again, it causes the MIL to light up. (a) When the solenoid is energized, the solenoid resistance is 8 Ω or less and is counted. (b) When the solenoid is not energized, the solenoid resistance is 100 kΩ or more and is counted.	●Open or short in shift solenoid valve No.1/No.2 circuit ●Shift solenoid valve No.1/No.2 ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Measure resistance between terminal S1 or S2 of ECM and body ground.**



PREPARATION:
Disconnect the connector from ECM.

CHECK:
Measure resistance between terminal S1 or S2 of ECM and body ground.

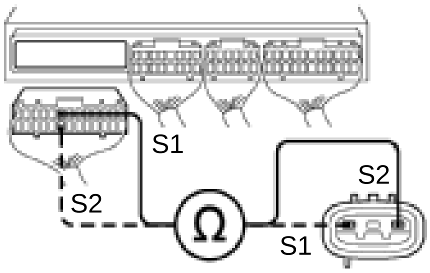
OK:
Resistance: 11 ~ 15 Ω

OK	**Check and replace the ECM.**

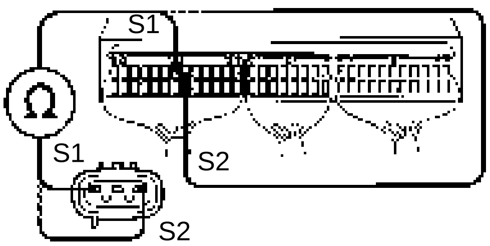
NG

2	**Check harness and connector between ECM and automatic transaxle solenoid connector.**

w/ Engine Immobiliser System



w/o Engine Immobiliser System



D00958
D00104
D00991

PREPARATION:

Disconnect the solenoid connector from the automatic transaxle.

CHECK:

Check the harness and connector between terminal S1 or S2 of ECM and terminal S1 or S2 of solenoid connector.

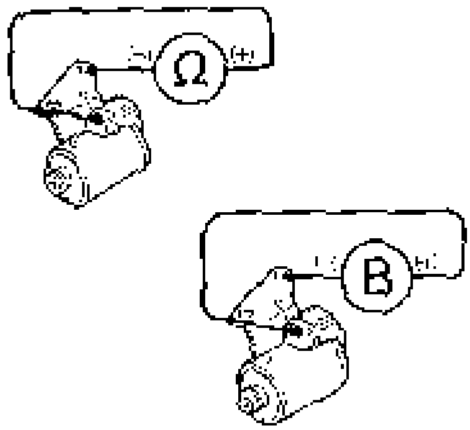
OK:

There is no open and no short circuit.

NG	**Repair or replace the harness or connector.**

OK

3	**Check shift solenoid valve No.1 or No.2.**



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Disconnect the solenoid connector.
(d) Remove the shift solenoid valve No.1 or No.2.

CHECK:

(a) Measure resistance between solenoid connector and body ground.
(b) Connect the positive ∼ lead to terminal of solenoid connector, negative > lead to solenoid body.

OK:

(a) Resistance: 11 ~ 15 Ω
(b) The solenoid makes an operating noise.

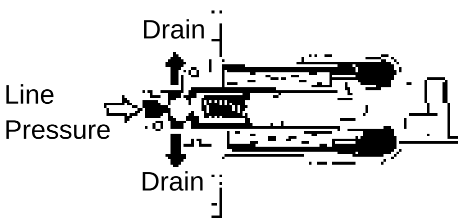
NG → **Replace the shift solenoid valve.**

OK ↓

Repair or replace the solenoid wire.

DI034–02

DTC	P0770	Shift Solenoid E Malfunction (Shift Solenoid Valve SL)



Q07745

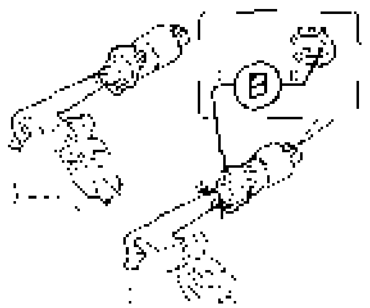
SYSTEM DESCRIPTION

The ECM uses the signals from the Throttle position sensor, Air–flow meter and Crankshaft position sensor to monitor the engagement condition of the lock–up clutch.
Then the ECM compares the engagement condition of the lock–up clutch with the lock–up schedule in the ECM memory to detect mechanical trouble of the shift solenoid valve SL, valve body, torque converter clutch or automatic transaxle (clutch, brake or gear etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P0770	●Lock–up does not occur when driving in the lock–up range (normal driving at 80 km/h [50 mph]), or lock–up remains ON in the lock–up OFF range. (2 trip detection logic) ●When lock–up is ON, clutch or brake slips or gear is broken.	●Shift solenoid valve SL is stuck open or closed ●Valve body blocked up or stuck ●Lock–up clutch ●Automatic transaxle (clutch, brake or gear etc.)

INSPECTION PROCEDURE

1	Check solenoid valve SL operation.


Q07746

PREPARATION:
(a) Remove the oil pan.
(b) Remove the shift solenoid valve SL.
CHECK:
(a) By applying 490 kPa (5 kgf/cm^2, 71 psi) of compressed air, check that the solenoid valve does not leak air.
(b) When battery positive voltage is supplied to the shift solenoid valve, check that the solenoid valve opens.
OK:
(a) Solenoid valve does not leak air.
(b) Solenoid valve opens.

NG	Replace the solenoid valve SL.

OK

2	**Check valve body (See page DI–405).**

NG → **Repair or replace the valve body.**

OK

3	**Check the torque converter clutch (See page AX–26).**

NG → **Replace the torque converter clutch.**

OK

Repair or replace the transaxle.

DI035–02

DTC	P0773	Shift Solenoid E Electrical Malfunction (Shift Solenoid Valve SL)

CIRCUIT DESCRIPTION

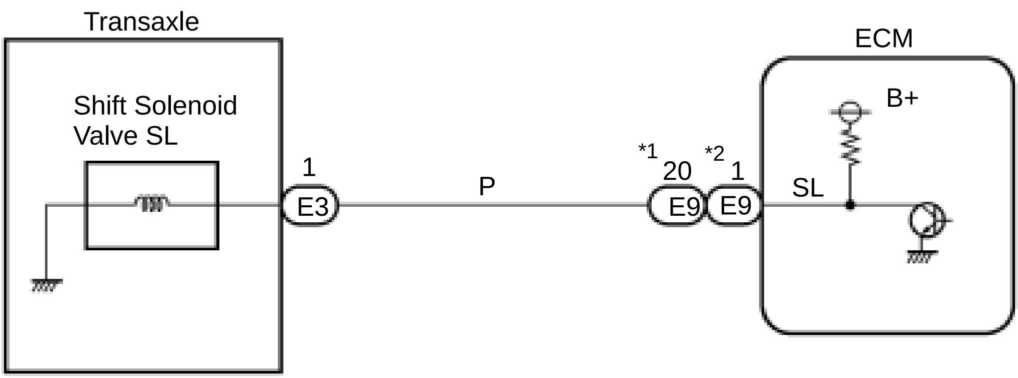
The shift solenoid valve SL is turned ON and OFF by signals from the ECM to control the hydraulic pressure acting on the lock–up relay valve, which then controls operation of the lock–up clutch.

Fail safe function

If the ECM detects a malfunction, it turns the shift solenoid valve SL OFF.

DTC No.	DTC Detecting Condition	Trouble Area
P0773	Either (a) or (b) is detected for 1 time.(2 trip detection logic) (a) Solenoid resistance is 8 Ω or less short circuit when solenoid is energized. (b) Solenoid resistance is 100 kΩ or more open circuit when solenoid is not energized.	●Open or short in shift solenoid valve SL circuit ●Shift solenoid valve SL ●ECM

WIRING DIAGRAM

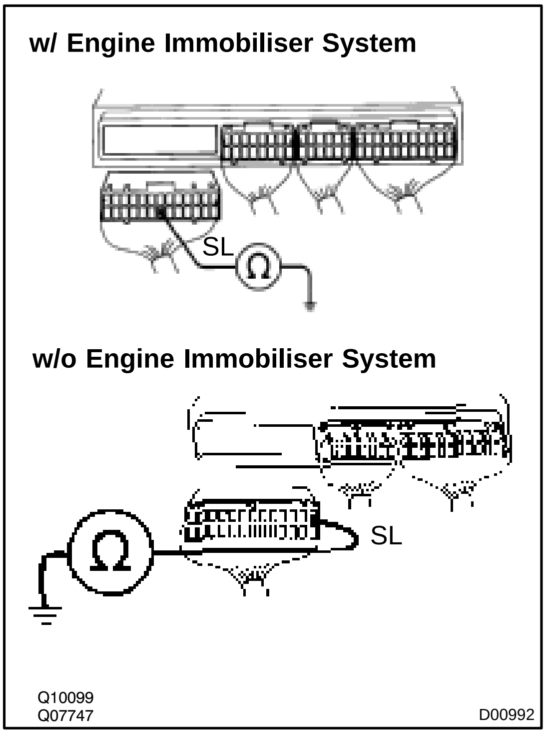


*1 : w/ Engine Immobiliser System
*2 : w/o Engine Immobiliser System

D01808

INSPECTION PROCEDURE

1	Measure resistance between terminal SL of ECM and body ground.



PREPARATION:
Disconnect the connector from ECM.

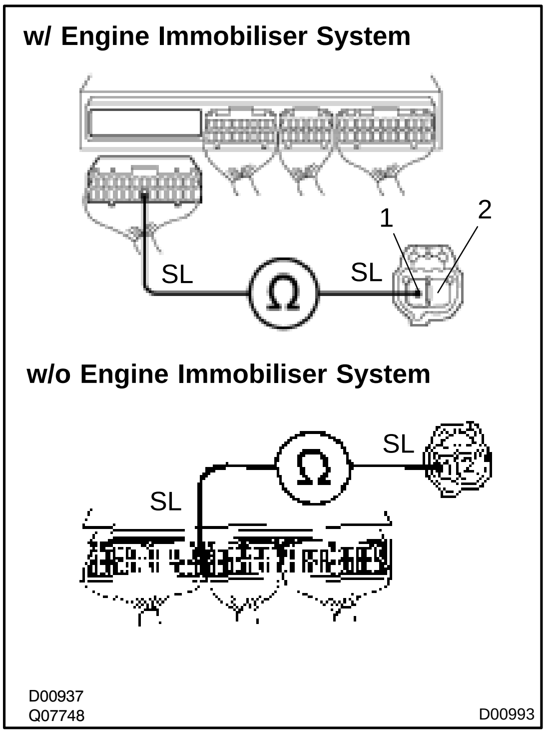
CHECK:
Measure resistance between terminal SL of ECM and body ground.

OK:
Resistance: 11 ~ 15 Ω

OK	Check and replace the ECM.

NG

2	**Check harness and connector between ECM and automatic transaxle solenoid connector.**

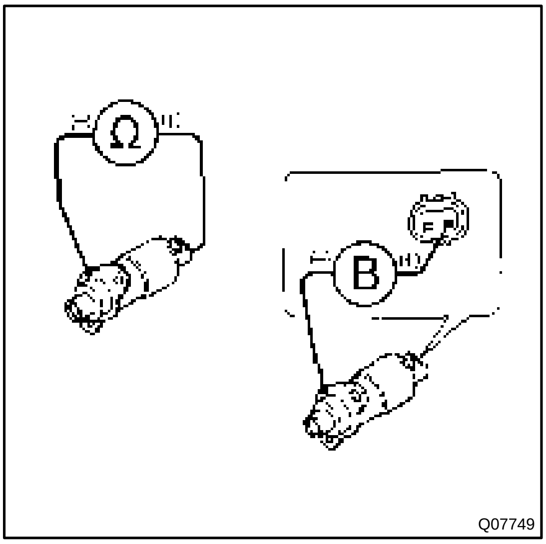


PREPARATION:
Disconnect the solenoid connector from the transaxle.
CHECK:
Check the harness and connector between terminal SL of ECM and terminal SL of solenoid connector.
OK:
There is no open or short circuit.

NG	**Repair or replace the harness or connector.**

OK

3	Check shift solenoid valve SL.



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Disconnect the shift solenoid valve SL connector.
(d) Remove the shift solenoid valve SL.

CHECK:

(a) Measure resistance between terminal SL of shift solenoid valve and solenoid body.
(b) Connect positive ⊕ lead to terminal of solenoid connector, negative ⊖ lead to solenoid body.

OK:

(a) Resistance: 11 ~ 15 Ω
(b) The shift solenoid valve SL makes operation noise.

NG	Replace the shift solenoid valve SL.

OK

Check and replace or repair the solenoid wire.

DI036–02

DTC	P1520	Stop Light Switch Signal Malfunction

CIRCUIT DESCRIPTION

The purpose of this circuit is to prevent the engine from stalling, while driving in lock–up condition, when brakes are suddenly applied.
When the brake pedal is depressed, this switch sends a signal to ECM. Then the ECM cancels operation of the lock–up clutch while braking is in progress.

DTC No.	DTC Detecting Condition	Trouble Area
P1520	No stop light switch signal to ECM during driving. (2 trip detection logic)	●Open or short in stop light switch circuit ●Stop light switch ●ECM

WIRING DIAGRAM

See page DI–170.

INSPECTION PROCEDURE

See page DI–170.

DI037–02

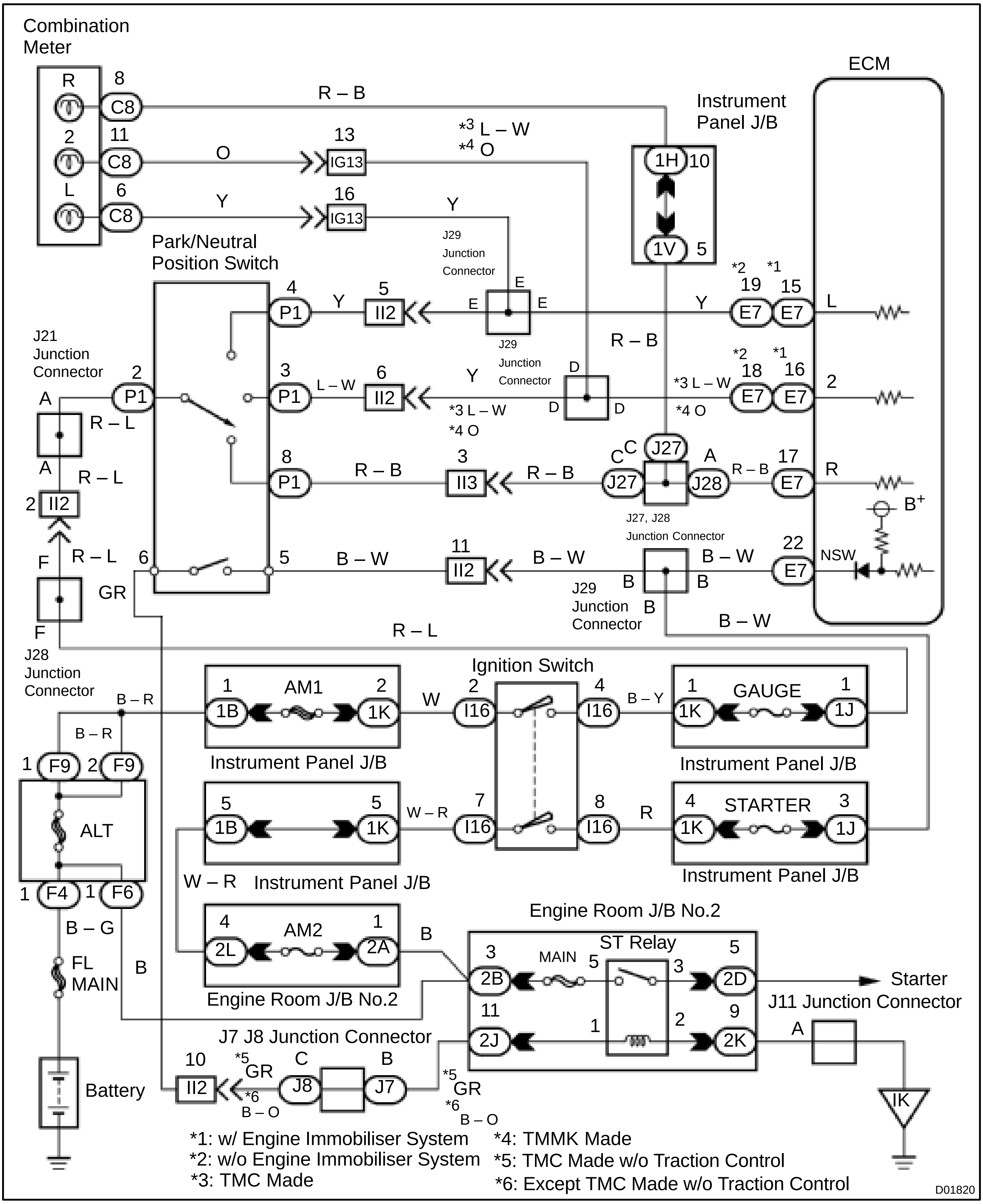
DTC	P1780	Park/Neutral Position Switch Malfunction

CIRCUIT DESCRIPTION

The park/neutral position switch detects the shift lever position and sends signals to the ECM.
The ECM receives signals (NSW, R, 2 and L) from the park/neutral position switch. When the signal is not sent to the ECM from the park/neutral position switch, the ECM judges that the shift lever is in D position.

DTC No.	DTC Detection Condition	Trouble Area
P1780	When driving under conditions (a) and (b) for 30 seconds or more, the park/neutral position switch is ON (N position). (2 trip detection logic) (a) Vehicle speed: 80 km/h (50 mph) or more (b) Engine speed: 2,000 ~ 5,000 rpm	●Short in park/neutral position switch circuit ●Park/neutral position switch ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Read PNP, REVERSE, 2ND and LOW signals.

When using TOYOTA hand–held tester:

PREPARATION:

(a) Remove the DLC3 cover.

(b) Connect a TOYOTA hand–held tester to the DLC3.

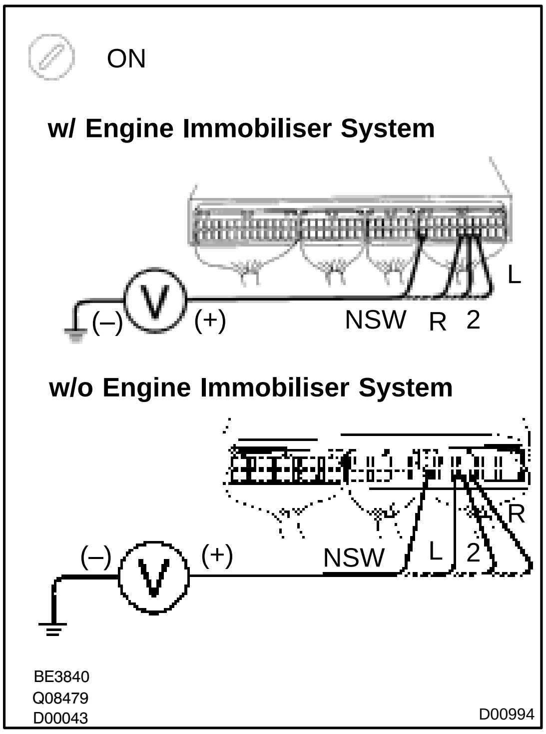
(c) Turn the ignition switch ON and TOYOTA hand–held tester main switch ON.

CHECK:

Shift the shift lever into the P, R, N, 2 and L positions, and read the PNP, REVERSE, 2ND and LOW signals on the TOYOTA hand–held tester.

OK:

Shift position	Signal
2	2ND OFF → ON
L	LOW OFF → ON
R	REVERSE OFF → ON
P, N	PNP OFF → ON



When not using TOYOTA hand–held tester:

PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure voltage between terminals NSW, 2, L and R of ECM and body ground when the shift lever is shifted in the following positions.

OK:

Position	NSW–Body ground	R–Body ground	2–Body ground	L–Body ground
P, N	0 V	0 V	0 V	0 V
R	9 ~ 14 V*	9 ~ 14 V*	0 V	0 V
D	9 ~ 14 V	0 V	0 V	0 V
2	9 ~ 14 V	0 V	9 ~ 14 V	0 V
L	9 ~ 14 V	0 V	0 V	9 ~ 14 V

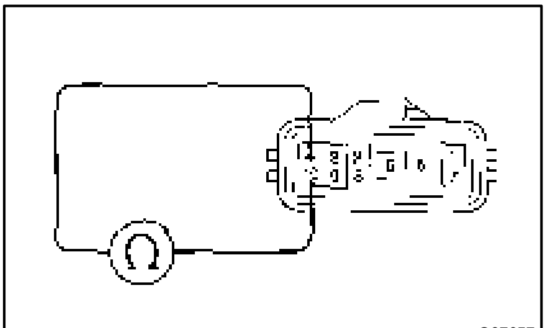
HINT:

The voltage will drop slightly due to lighting up of the back up light.

OK	Proceed to next circuit inspection shown on matrix chart (See page DI–405).

NG

2	Check park/neutral position switch.


Q07657

PREPARATION:
(a) Jack up the vehicle.
(b) Remove the park/neutral position switch.

CHECK:
Check continuity between each terminal shown below when the shift lever is moved to each position.

Shift Position	Terminal No. to continuity	Terminal No. to continuity
P	4 – 7	5 – 6
R	4 – 8	–
N	4 – 10	5 – 6
D	4 – 9	–
2	2 – 4	–
L	2 – 3	–

OK:
There is continuity.

NG → **Replace the park/neutral position switch.**

OK

3	Check harness and connector between battery and park/neutral position switch, park/neutral position switch and ECM (See page IN–31).

NG → **Repair or replace the harness and connector.**

OK

Check and replace the ECM.

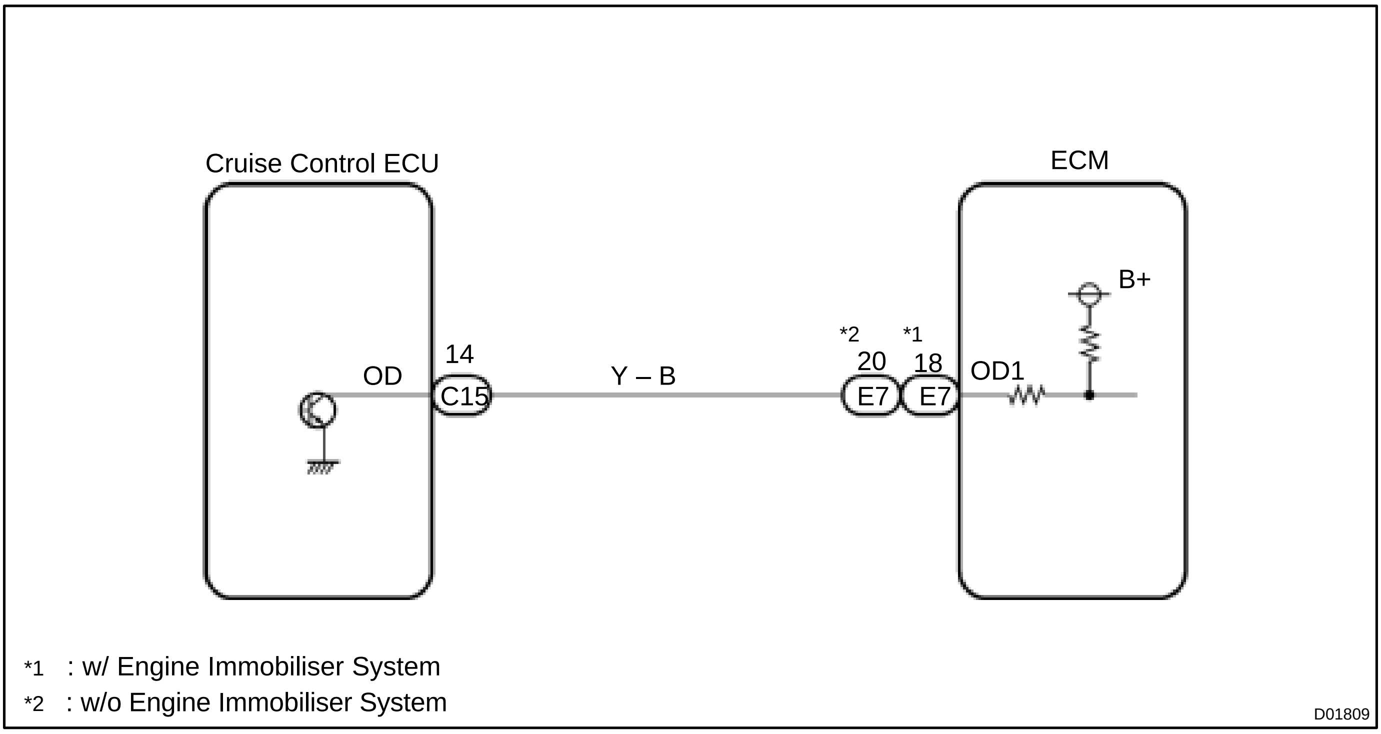
DI038–02

O/D Cancel Signal Circuit

CIRCUIT DESCRIPTION

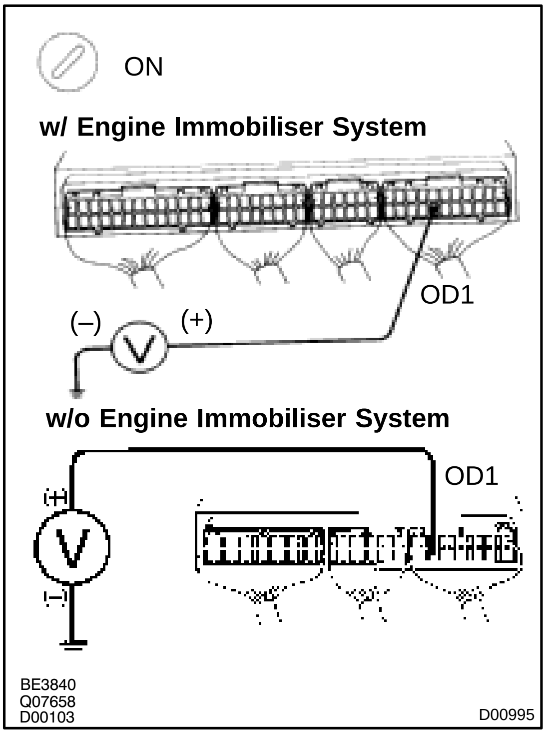
While driving uphill with cruise control activated, in order to minimize gear shifting and provide smooth cruising overdrive may be prohibited temporarily under some conditions.
The cruise control ECU sends O/D cut signals to the ECM as necessary and the ECM cancels overdrive shifting until these signals are discontinued.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal OD1 of ECM and body ground.**



PREPARATION:
Turn the ignition switch ON.

CHECK:
Measure voltage between terminal OD1 of ECM and body ground.

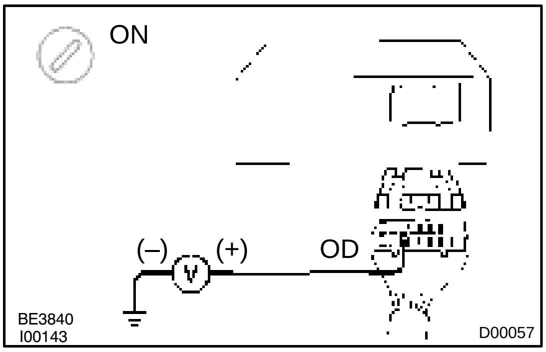
OK:

Voltage: 9 ~ 14 V

OK	**Proceed to next circuit inspection shown on matrix chart (See page DI–405).**

NG

2	**Check voltage between terminal OD of cruise control ECU harness side connector and body ground.**



PREPARATION:
(a) Disconnect the cruise control ECU connector.
(b) Turn the ignition switch ON.

CHECK:
Measure voltage between terminal OD of cruise control ECU harness side connector and body ground.

OK:

Voltage: 9 ~ 14 V

OK	**Check and replace the cruise control ECU.**

NG

3	Check harness and connector between cruise control ECU and ECM.

NG → **Repair or replace the harness or connector.**

OK ↓

Check and replace the ECM.

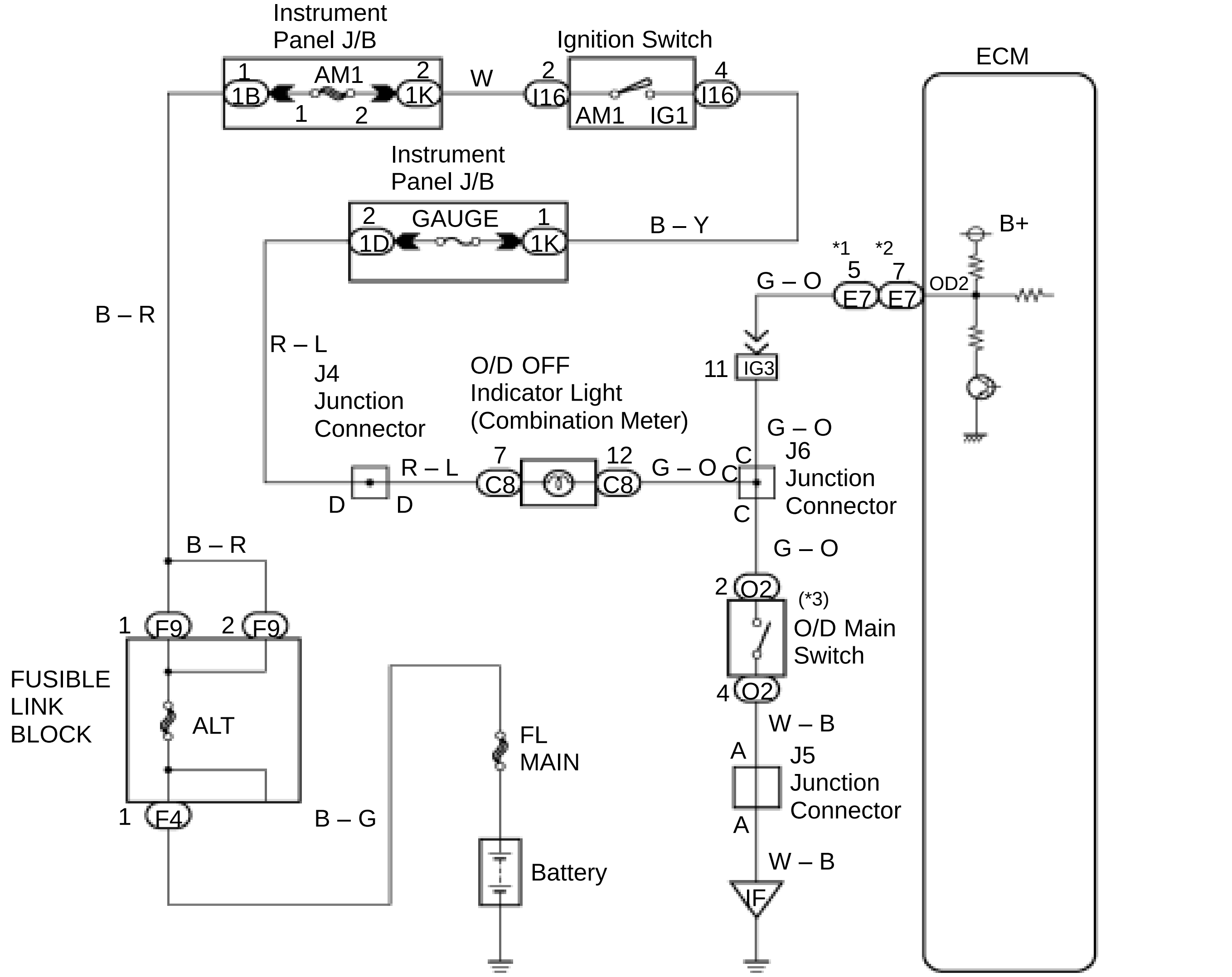
DI1J1–01

O/D Main Switch & O/D OFF Indictor Light Circuit

CIRCUIT DESCRIPTION

The O/D main switch contacts go open when the switch is pushed in and go closed when it is pushed out. In O/D main switch in OFF position, the O/D OFF indicator light lights up, and the ECM prohibits shifting overdrive.

WIRING DIAGRAM



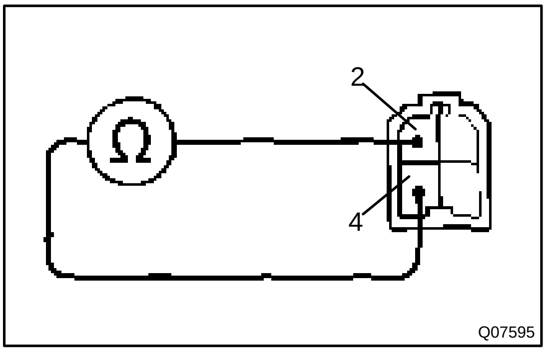
*1 : w/ Engine Immobiliser System
*2 : w/o Engine Immobiliser System
*3 : O/D Main Switch
Contacts go open with switch pushed in
Contacts go closed with switch pushed once again

D01810

INSPECTION PROCEDURE

O/D OFF indicator light does not light up

1	Check O/D main switch.



PREPARATION:

Disconnect the O/D main switch connector.

CHECK:

Check continuity at each terminal 2 and 4 of O/D main switch connector.

OK:

O/D main switch	Specified condition
ON	No continuity
OFF	Continuity

NG → **Replace the O/D main switch.**

OK ↓

2	Check and replace combination meter (See page BE–47).

NG → **Replace the combination meter.**

OK ↓

3	**Check OVRDRIVE CUT SW2 signal.**

When using TOYOTA hand–held tester:

PREPARATION:

(a) Remove the DLC3 cover.

(b) Connect TOYOTA hand–held tester to the DLC3.

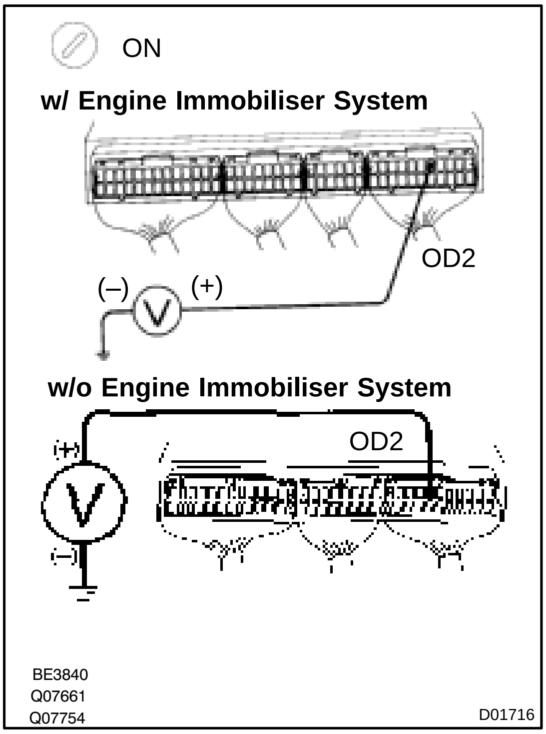
(c) Turn the ignition switch ON and TOYOTA hand–held tester main switch ON.

CHECK:

Read the OVRDRIVE CUT SW2 signal on the TOYOTA hand–held tester.

OK:

O/D main switch condition	OVRDRIVE CUT SW2 signal
O/D ON (Pushed in)	OFF
O/D OFF (Pushed once again)	ON



When not using TOYOTA hand–held tester:

PREPARATION:

Turn the ignition switch ON.

CHECK:

Check voltage between terminal OD2 of ECM and body ground.

OK:

O/D main switch condition	Voltage
O/D ON (Pushed in)	9 ~ 14
O/D OFF (Pushed once again)	Below 1.5 V

OK	**Check and replace the ECM (See page IN–31).**

NG

4	**Check harness and connector between O/D OFF indicator light and ECM (See page IN–31).**

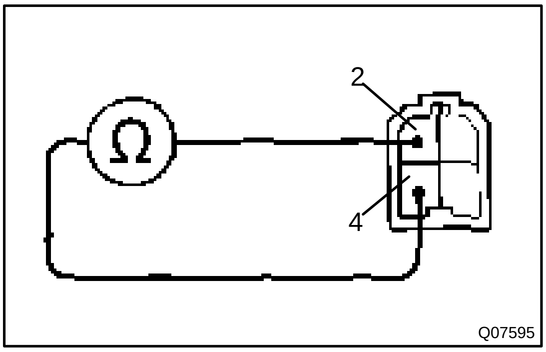
NG → **Repair or replace the harness or connector.**

OK

Check and replace the ECM (See page IN–31).

O/D OFF indicator light remains ON

1	Check O/D main switch.



PREPARATION:
Disconnect the O/D main switch connector.
CHECK:
Check continuity at each terminal 2 and 4 of O/D main switch connector.
OK:

O/D main switch	Specified condition
ON	No continuity
OFF	Continuity

NG → **Replace the O/D main switch.**

OK

2	Check harness and connector between O/D OFF indicator light and O/D main switch, O/D OFF indicator light and ECM (See page IN–31).

NG → **Repair or replace the harness or connector.**

OK

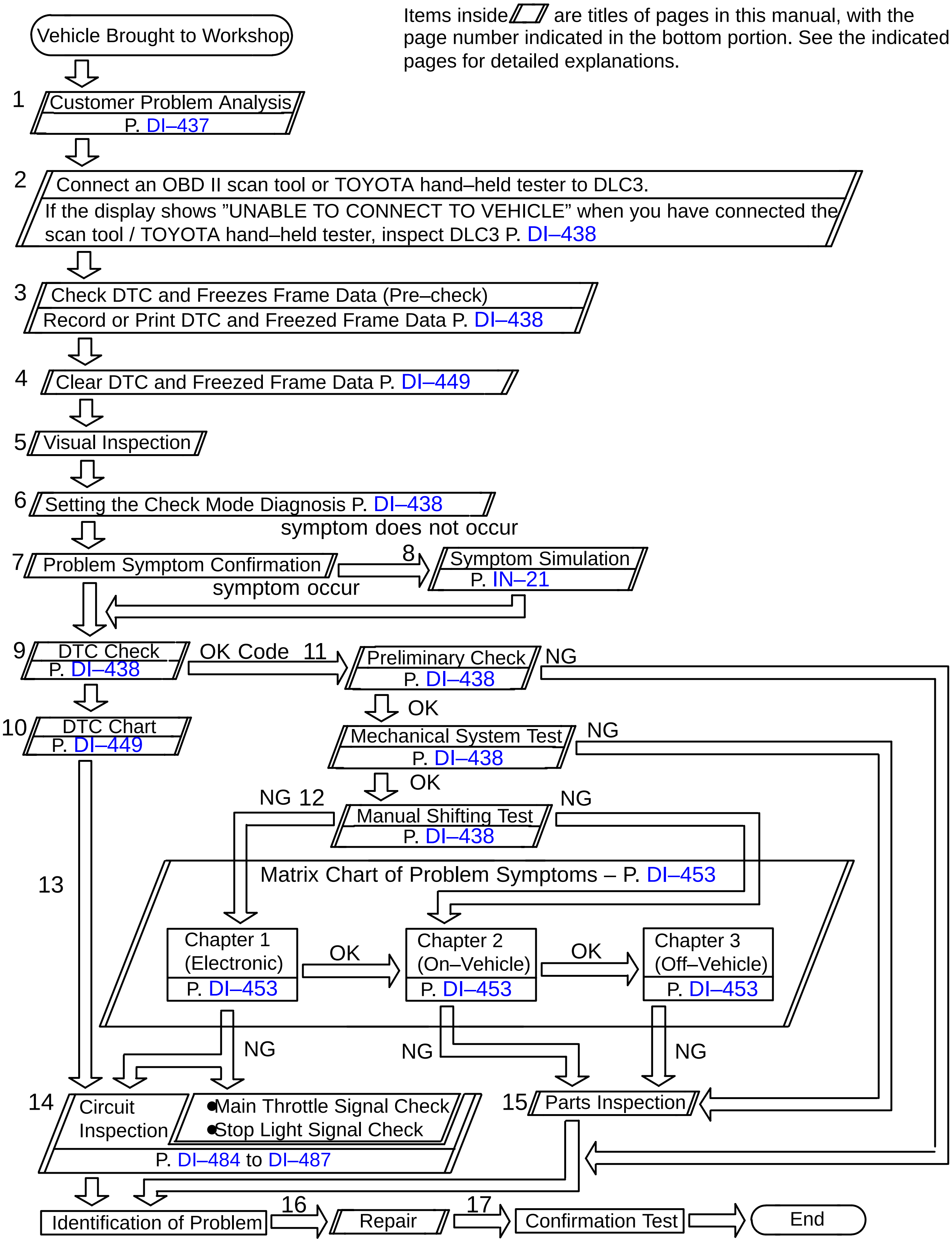
Check and replace the ECM (See page IN–31).

AUTOMATIC TRANSAXLE (A541E)

DI02C–02

HOW TO PROCEED WITH TROUBLESHOOTING

Items inside ▱ are titles of pages in this manual, with the page number indicated in the bottom portion. See the indicated pages for detailed explanations.



DI02D–01

CUSTOMER PROBLEM ANALYSIS CHECK

Transaxle Control System Check Sheet	Inspector's Name :

Customer's Name		Registration No.	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	Odometer Reading	km mile

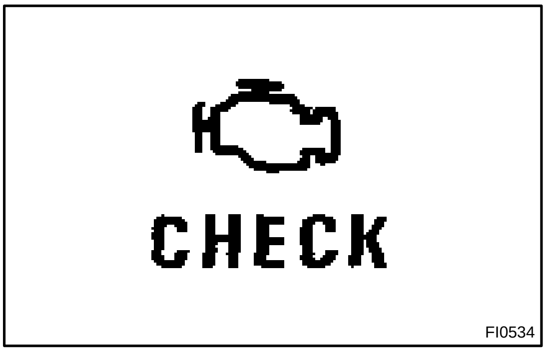
Date Problem Occurred	/ /
How Often Does Problem Occur?	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ Vehicle does not move (☐ Any position ☐ Particular position)
	☐ No up–shift (☐ 1st → 2nd ☐ 2nd → 3rd ☐ 3rd → O/D)
	☐ No down–shift (☐ O/D → 3rd ☐ 3rd → 2nd ☐ 2nd → 1st)
	☐ Lock–up malfunction
	☐ Shift point too high or too low
	☐ Harsh engagement (☐ N → D ☐ Lock–up ☐ Any drive position)
	☐ Slip or shudder
	☐ No kick–down
	☐ Others ( )

Check Item	Malfunction Indicator Lamp	☐ Normal ☐ Remains ON

DTC Check	1st Time	☐ Normal code ☐ Malfunction code (Code)
	2nd Time	☐ Normal code ☐ Malfunction code (Code)

DI02E–02



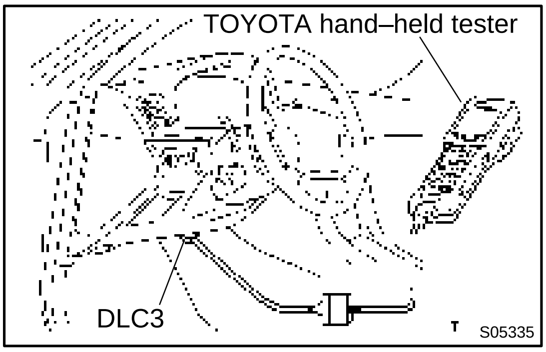
FI0534

PRE–CHECK

1. DIAGNOSIS SYSTEM

(a) Description

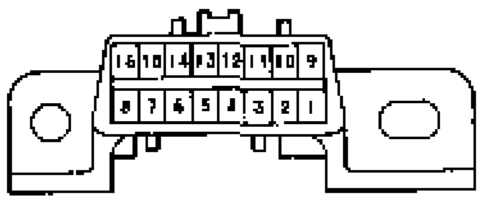
- When troubleshooting OBD II vehicles, the only difference from the usual troubleshooting procedure is that you connect to the vehicle an OBD II scan tool complying with SAE J1987 or TOYOTA hand–held tester, and read off various data output from the vehicle's ECM.
  OBD II regulations require that the vehicle's on–board computer lights up the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in the computer itself or in drive system components which affect vehicle emissions. In addition to the MIL lighting up when a malfunction is detected, the applicable DTCs prescribed by SAE J2012 are recorded in the ECM memory. (See page DI–211)
  If the malfunction only occurs in 3 trips, the MIL goes off but the DTCs remain recorded in the ECM memory.



S05335

- To check the DTCs, connect an OBD II scan tool or TOYOTA hand–held tester to DLC3 on the vehicle. The OBD II scan tool or TOYOTA hand–held tester also enables you to erase the DTCs and check freeze frame data and various forms of engine data (For instruction book).
  DTCs include SAE controlled codes and Manufacturer controlled codes.
  SAE controlled codes must be set as prescribed by the SAE, while Manufacturer controlled codes can be set freely by the manufacturer within the prescribed limits (See DTC chart on page DI–449).

- The diagnosis system operates in normal mode during normal vehicle use, and also has a check mode for technicians to simulate malfunction symptoms and perform troubleshooting. Most DTCs use 2 trip detection logic(*) to prevent erroneous detection. By switching the ECM to check mode when troubleshooting, the technician can cause the MIL to light up and for a malfunction that is only detected once or momentarily.
  (TOYOTA hand–held tester) (See page DI–438)
- *2 trip detection logic:
  When a logic malfunction is first detected, the malfunction is temporarily stored in the ECM memory. If the same malfunction is detected again during the 2nd test drive, this 2nd detection causes the MIL to light up.



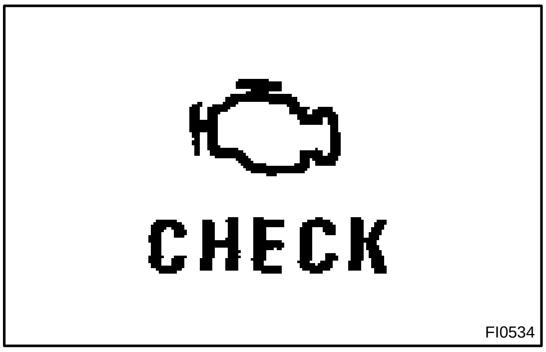
N09214

(b) Inspect the DLC3.
The vehicle's ECM uses ISO 9141–2 for communication. The terminal arrangement of DLC3 complies with SAE J1962 and matches the ISO 9141–2 format.

Tester connection	Condition	Specified condition
7 (Bus ∼ Line) – 5 (Signal ground)	During communication	Pulse generation
4 (Chassis Ground) – Body	Always	1 Ω or less
5 (Signal Ground) – Body	Always	1 Ω or less
16 (B+) – Body	Always	9 – 14 V

HINT:
If your display shows "UNABLE TO CONNECT TO VEHICLE" when you have connected the cable of OBD II scan tool or TOYOTA hand–held tester to DLC3, turned the ignition switch ON and operated the scan tool, there is a problem on the vehicle side or tool side.

(1) If communication is normal when the tool is connected to another vehicle, inspect DLC3 on the original vehicle.
(2) If communication is still not possible when the tool is connected connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.



2. INSPECT DIAGNOSIS (NORMAL MODE)

(a) Check the MIL.

(1) The MIL comes on when the ignition switch is turned ON and the engine is not running.

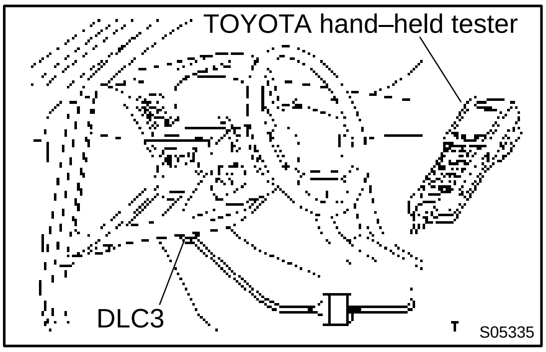
HINT:
If the MIL does not light up, troubleshoot the combination meter (See page BE–2).

(2) When the engine is started, the MIL should go off. If the lamp remains on, the diagnosis system has detected a malfunction or abnormality in the system.

(b) Check the DTC.

NOTICE:
TOYOTA hand–held tester only:
When the diagnostic system is switched from normal mode to check mode, it erases all DTCs and freeze frame data recorded in normal mode. So before switching modes, always check the DTCs and freeze frame data, and note them down.

(1) Prepare an OBD II scan tool (complying with SAE J1978) or TOYOTA hand–held tester.



(2) Connect the OBD II scan tool or TOYOTA hand–held tester to DLC3 at the lower of the instrument panel.

(3) Turn the ignition switch ON and turn the OBD II scan tool or TOYOTA hand–held tester switch ON.

(4) Use the OBD II scan tool or TOYOTA hand–held tester to check the DTCs and freeze frame data and note them down (For operating instructions, see the OBD II scan tool's instruction book).

(5) See page DI–449 to confirm the details of the DTCs.

NOTICE:
When simulating symptoms with an OBD II scan tool (excluding TOYOTA hand–held tester) to check the DTCs, use normal mode. For codes on the DTCs chart subject to "2 trip detection logic", turn the ignition switch off after the symptoms have been simulated the 1st time. Them repeat the simulation process again. When the program has DTCs are recorded in the ECM.

3. INSPECT DIAGNOSIS (CHECK MODE)

HINT:

TOYOTA hand–held tester only: Compared to the normal mode, the check mode has high sensing ability to detect malfunctions. Furthermore, the same diagnostic items which are detected in Normal mode can also be detected in Check mode.

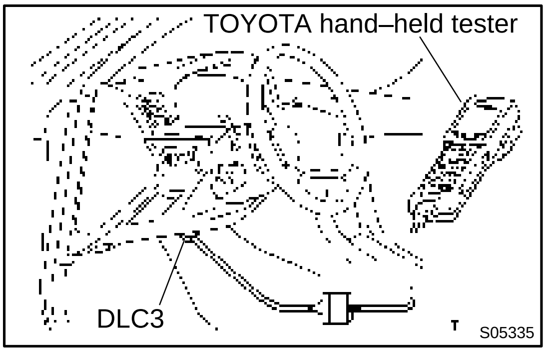
(a) Check the DTC.

(1) Check the initial conditions.

- Battery positive voltage 11 V or more.
- Throttle valve fully closed.
- Transaxle in P position.
- Air conditioning switched off.

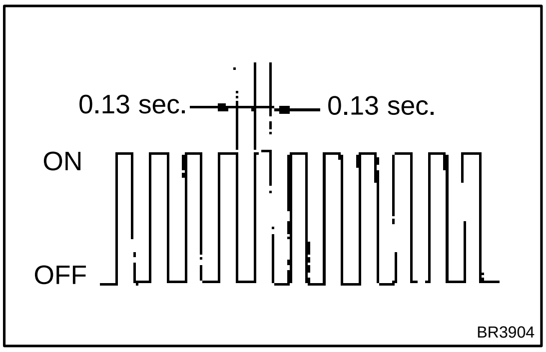
(2) Turn the ignition switch OFF.

(3) Prepare a TOYOTA hand–held tester.



(4) Connect the TOYOTA hand–held tester to DLC3 at the lower of the instrument panel.

(5) Turn the ignition switch ON and switch the TOYOTA hand–held tester ON.



(6) Switch the TOYOTA hand–held tester from Normal mode to Check mode (Check that the MIL flashes).

(7) Start the engine (MIL goes out after the engine starts).

(8) Simulate the conditions of the malfunction described by the customer.

NOTICE:

Leave the ignition switch ON until you have checked the DTCs, etc..

(9) After simulating the malfunction conditions, use the TOYOTA hand–held tester diagnosis selector to check the DTCs and freeze frame data, etc..

HINT:

Take care not to turn the ignition switch OFF, as turning it off switches the diagnosis system from Check mode to Normal mode, so all DTCs, etc. are erased.

(10) After checking the DTC, inspect the applicable circuit.

(b) Clearance the DTC.
The following actions will erase the DTC and freezed frame data. Operating an OBD II scan tool (complying with SAE J1978) or TOYOTA hand–held tester to erase the codes.
(See the OBD II scan tool's instruction book for operating instructions.)

4. ROAD TEST

NOTICE:
Perform the test at normal operating ATF temperature 50 – 80 °C (122 – 176 °F).

(a) D POSITION TEST
Shift into the D position and fully depress the accelerator pedal and and check the following points:
(1) Check up–shift operation.
$1 \rightarrow 2$, $2 \rightarrow 3$ and $3 \rightarrow$ O/D up–shift takes place, at the shift point shown in the automatic shift schedule (See page SS–56).

HINT:
- O/D Gear Up–shift Prohibition Control (1. Coolant temp. is 60 °C (140 °F) or less. 2. If there is a 10 km/h (6 mph) difference between the set cruise control speed and vehicle speed.)
- O/D Gear Lock–up Prohibition Control (1. Brake pedal is depressed. 2. Coolant temp. is 60 °C (140 °F) or less.)

(2) Check for shift shock and slip.
Check for shock and slip at the $1 \rightarrow 2$, $2 \rightarrow 3$ and $3 \rightarrow$ O/D up–shifts.
(3) Check for abnormal noises and vibration.
Run at the D position lock–up or O/D gear and check for abnormal noises and vibration.

HINT:
The check for the cause of abnormal noises and vibration must be done very thoroughly as it could also be due to loss of balance in the differential torque converter clutch, etc..

(4) Check kick–down operation.
While running in the D position, 2nd, 3rd and O/D gears, check to see that the possible kick–down vehicle speed limits for $2 \rightarrow 1$, $3 \rightarrow 2$ and O/D $\rightarrow 3$ kick–downs conform to those indicated on the automatic shift schedule (See page SS–56).
(5) Check abnormal shock and slip at kick–down.
(6) Check the lock–up mechanism.
- Drive in D position, O/D gear, at a steady speed (lock–up ON) of about 60 km/h (37 mph).
- Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

If there is a big jump in engine speed, there is no lock–up.

(b) 2 POSITION TEST
Shift into the 2 position and fully depress the accelerator pedal and check the following points:
(1) Check up–shift operation.
Check to see that the $1 \rightarrow 2$ up–shift takes place and that the shift point conforms to the automatic shift schedule (See page SS–56).

HINT:
There is no O/D up–shift and lock–up in the 2 position.

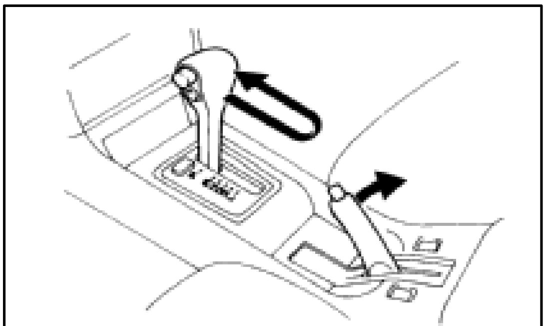
(2) Check engine braking.
While running in the 2 position and 2nd gear, release the accelerator pedal and check the engine braking effect.
(3) Check for abnormal noises during acceleration and deceleration, and for shock at up–shift and down–shift.

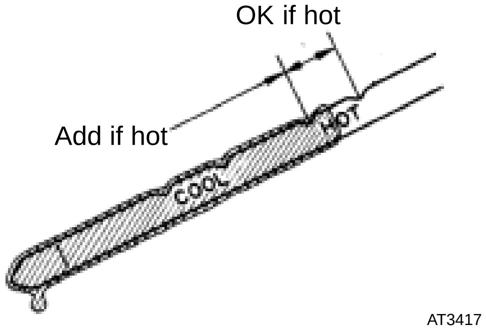
(c) L POSITION TEST
Shift into the 2 position and fully depress the accelerator pedal and check the following points:
(1) Check no up–shift.
While running in the L position, check that there is no up–shift to 2nd gear.
(2) Check engine braking.
While running in the L position, release the accelerator pedal and check the engine braking effect.
(3) Check for abnormal noises during acceleration and deceleration.

(d) R POSITION TEST
Shift into the R position and fully depress the accelerator pedal and check for slipping.

CAUTION:
Before conducting this test ensure that the test area is free from people and obstruction.

(e) P POSITION TEST
Stop the vehicle on a grade (more than 5°) and after shifting into the P position, release the parking brake. Then, check to see that the parking lock pawl holds the vehicle in place.


Q00519



AT3417

5. BASIC INSPECTION

(a) Check the fluid level.

HINT:
- Drive the vehicle so that the engine and transaxle are at normal operating temperature.
  Fluid temp.: 70 – 80 °C (158 – 176 °F)
- Only use the COOL range on the dipstick as a rough reference when the fluid is replaced or the engine does not run.

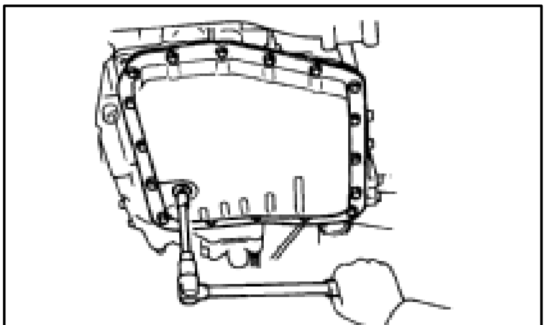
(1) Park the vehicle on a level surface and set the parking brake.
(2) With the engine idling and the brake pedal depressed, shift the shift lever into all positions from P to L position and return to P position.
(3) Pull out the dipstick and wipe it clean.
(4) Push it back fully into the pipe.
(5) Pull it out and check that the fluid level is in the HOT range.

If the level is at the low side, add new fluid.

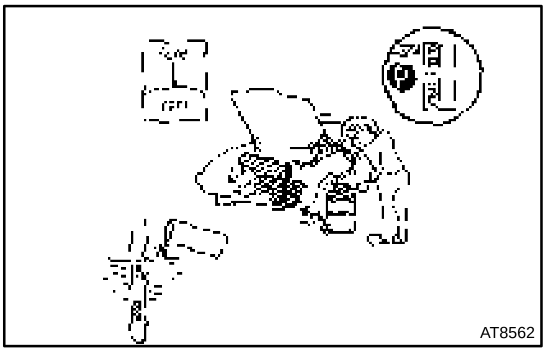
Fluid type: ATF D–II or DEXRON®III (DEXRON®II)

NOTICE:
Do not overfill.

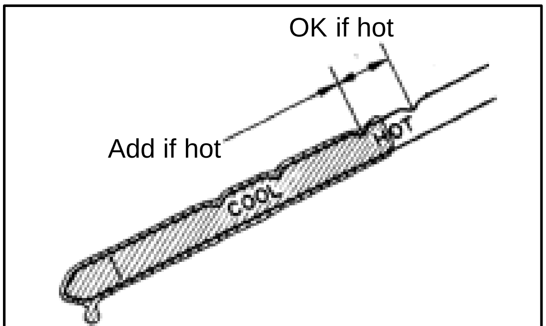
(b) Check the fluid condition.
If the level is at the low side, add new fluid.


AT4657

(c) Replace the ATF.
(1) Remove the drain plug and drain the fluid.
(2) Reinstall the drain plug securely.


AT8562

(3) With the engine OFF add new fluid through the oil filler pipe.
Fluid type: ATF D–II or DEXRON®III (DEXRON®II)
Capacity: 3.9 liters (4.1 US qts, 3.4 Imp. qts)
(4) Start the engine and shift the shift lever into all positions from P to L position and then shift into P position.

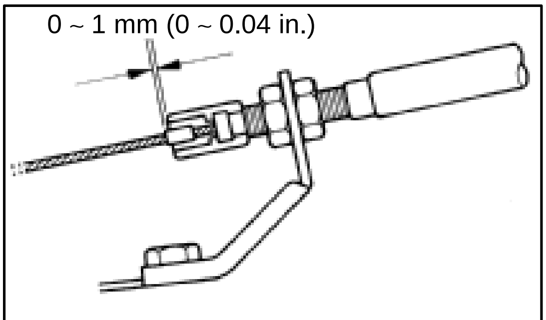


AT3417

(5) With the engine idling, check the fluid level. Add fluid up to the COOL level on the dipstick.
(6) Check the fluid level at the normal operating temperature, 70 – 80 °C (158 – 176 °F), and add as necessary.

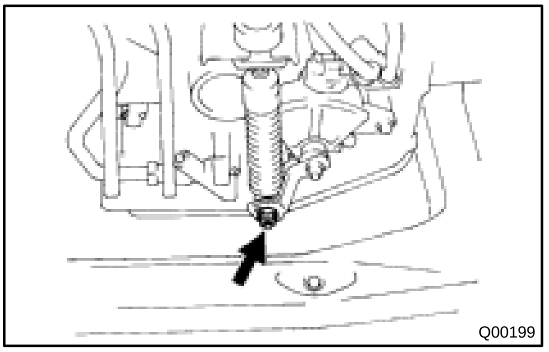
NOTICE:
Do not overfill.

(d) Check the fluid leaks.
Check for leaks in the transaxle.
If there are leaks, it is necessary to repair or replace O–rings, gasket, oil seals, plugs or other parts.



AT4252

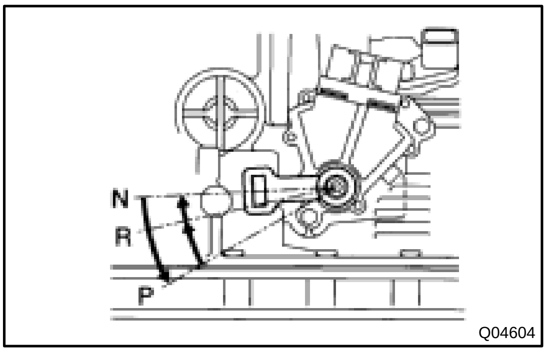
(e) Inspect and adjust the throttle cable.
(1) Check that the accelerator pedal is fully released.
(2) Check that the inner cable is not slack.
(3) Measure the distance between the outer cable end and stopper on the cable.
Standard distance: 0 – 1 mm (0 – 0.04 in.)
If the distance is not the standard, adjust the cable by the adjusting nuts.


Q00199

(f) Inspect and adjust the shift lever position.
When shifting the shift lever from the N position to other positions, check that the lever can be shifted smoothly and accurately to each position and that the position indicator is not aligned with the correct position.

If the indicator is not aligned with the correct position, carry out the following adjustment procedures.

(1) Loosen the nut on the shift lever.
(2) Push the control shaft fully rearward.

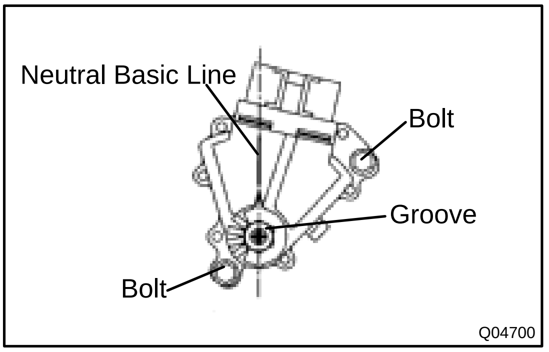


Q04604

(3) Return the control shaft lever 2 notches to N position.
(4) Set the shift lever to N position.
(5) While holding the shift lever lightly toward the R position side, tighten the shift lever nut.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

(6) Start the engine and make sure that the vehicle moves forward when shifting the lever from the N to D position and reverses when shifting it to the R position.



Q04700

(g) Inspect and adjust the park/neutral position.
Check that the engine can be started with the shift lever only in the N or P position, but not in other positions.

If it is not as stated above, carry out the following adjustment procedures.

(1) Loosen the park/neutral position switch bolt and set the shift lever to the N position.
(2) Align the groove and neutral basic line.
(3) Hold in position and tighten the bolt.

Torque: 5.4 N·m (55 kgf·cm, 48 in·lbf)

For continuity inspection of the park/neutral position switch, see page DI–479.

(h) Check the idle speed.

Idle speed: 700 ± 50 rpm
(In N position and air conditioner OFF)

6. MECHANICAL SYSTEM TESTS

(a) Measure the stall speed.
The object of this test is to check the overall performance of the transaxle and engine by measuring the stall speeds in the D and R positions.

NOTICE:

- **Do the test at normal operating fluid temperature 50 – 80 °C (122 – 176 °F).**
- **Do not continuously run this test longer than 5 seconds.**
- **To ensure safety, conduct this test in a wide, clear level area which provides good traction.**
- **The stall test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is doing the test.**

(1) Chock the 4 wheels.
(2) Connect an OBD II scan tool or TOYOTA hand–held tester to DLC3.
(3) Fully apply the parking brake.
(4) Keep your left foot pressed firmly on the brake pedal.
(5) Start the engine.

(6) Shift into the D position. Press all the way down on the accelerator pedal with your right foot. Quickly read the stall speed at this time.

Stall speed: 2,600 ± 150 rpm

(7) Do the same test in R position.

Stall speed: 2,600 ± 150 rpm

Evaluation:

Problem	Possible cause
(a) Stall speed low in D and R positions	●Engine output may be insufficient ●Stator one–way clutch is operating properly HINT: If more than 600 rpm below the specified value, the torque converter could be faulty.
(b) Stall speed high in D position	●Line pressure too low ●Forward clutch slipping ●No.2 one–way clutch not operating properly ●O/D clutch slipping
(c) Stall speed high in R position	●Line pressure too low ●Direct clutch slipping ●1st and reverse brake slipping ●O/D clutch slipping
(d) Stall speed high in D and R positions	●Line pressure too low ●Improper fluid level ●O/D one–way clutch not operating properly

(b) Measure the time lag.
When the shift lever is shifted while the engine is idling, there will be a certain time lapse or lag before the shock can be felt. This is used for checking the condition of the O/D direct clutch, forward clutch, and 1st and reverse brake.

NOTICE:

- **Do the test at normal operating fluid temperature 50 – 80 °C (122 – 176 °F).**
- **Be sure to allow 1 minute interval between tests.**
- **Take 3 measurements and take the average value.**

(1) Connect an OBD II scan tool or TOYOTA hand–held tester to DLC3.

(2) Fully apply the parking brake.

(3) Start the engine and check idle speed.

Idle speed: 700 ± 50 rpm (In N position and air conditioner OFF)

(4) Shift the shift lever from N to D position. Using a stop watch, measure the time from when the lever is shifted until the shock is felt.
In the same manner, measure the time lag for N → R.

Time lag:

N → D Less than 1.2 seconds

N → R Less than 1.5 seconds

Evaluation (If N → D time or N → R time lag is longer than specified):

Problem	Possible cause
N → D time lag is longer	●Line pressure too low ●Forward clutch worn ●O/D one–way clutch not operating
N → R time lag is longer	●Line pressure too low ●Direct clutch worn ●1st and reverse brake worn ●O/D one–way clutch not operating properly

7. HYDRAULIC TEST

Measure the line pressure

NOTICE:

- **Do the test at normal operation fluid temperature 50 – 80 °C (122 – 176 °F).**
- **The line pressure test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is doing the test.**
- **Be careful to prevent SST's hose from interfering with the exhaust pipe.**

(1) Warm up the ATF.

(2) Remove the test plug on the transaxle case front left side and connect SST.
(See page AX–21 for the location to connect SST)

SST 09992–00095 (09992–00231, 09992–00271)

(3) Fully apply the parking brake and chock the 4 wheels.

(4) Connect an OBD II scan tool or TOYOTA hand–held tester to DLC3.

(5) Start the engine and check idling speed.

(6) Keep your left foot pressed firmly on the brake pedal and shift into D position.

(7) Measure the line pressure when the engine is idling.

(8) Depress the accelerator pedal all the way down. Quickly read the highest line pressure when engine speed reaches stall speed.

(9) In the same manner, do the test in R position.

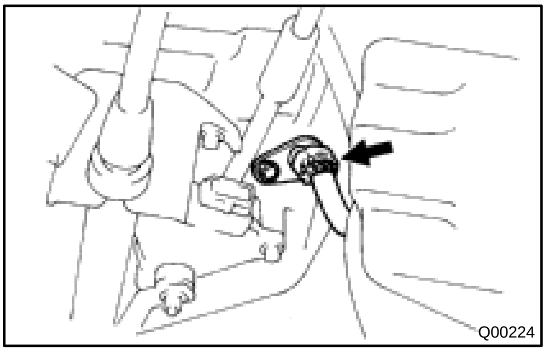
Specified line pressure:

Condition	D position kPa (kgf/cm^2, psi)	R position kPa (kgf/cm^2, psi)
Idling	401 – 461 (4.1 – 4.7, 58 – 66)	804 – 882 (8.2 – 9.0, 117 – 128)
Stall	1,138 – 1,236 (11.6 – 12.6, 165 – 179)	1,716 – 1,854 (17.5 – 18.9, 249 – 269)

If the measured pressure is not up to specified value, recheck the throttle cable adjustment and retest.

Evaluation

Problem	Possible cause
If the measured values at all position are higher	●Throttle cable out of adjustment ●Throttle valve defective ●Regulator valve defective
If the measured values at all position are lower	●Throttle cable out of adjustment ●Throttle valve defective ●Regulator valve defective ●Oil pump defective ●O/D direct clutch defective
If pressure is low in the D position only	●D position circuit fluid leakage ●Forward clutch defective
If pressure is low in the R position only	●R position circuit fluid leakage ●Direct clutch defective ●1st and reverse brake defective


Q00224

8. MANUAL SHIFTING TEST

HINT:

With this test, it can be determined whether the trouble is within the electrical circuit or is a mechanical problem in the transaxle.

(a) Disconnect the solenoid wire.

(b) Inspect the manual driving operation.

Check that the shift and gear positions correspond with the table below.

While driving, shift through the L, 2 and D positions. Check that the gear change corresponds to the shift position.

Shift Position	Gear Position
D	O/D
2	O/D
L	1st
R	Reverse
P	Pawl Lock

HINT:

If the L, 2 and D position gear positions are difficult to positions are difficult to distinguish, do the following read test.

If any abnormality is found in the above test, the problem is in the transaxle itself.

(c) Connect the solenoid wire.

(d) Cancel out the DTC (See page DI–438).

DI02F–02

DIAGNOSTIC TROUBLE CODE CHART

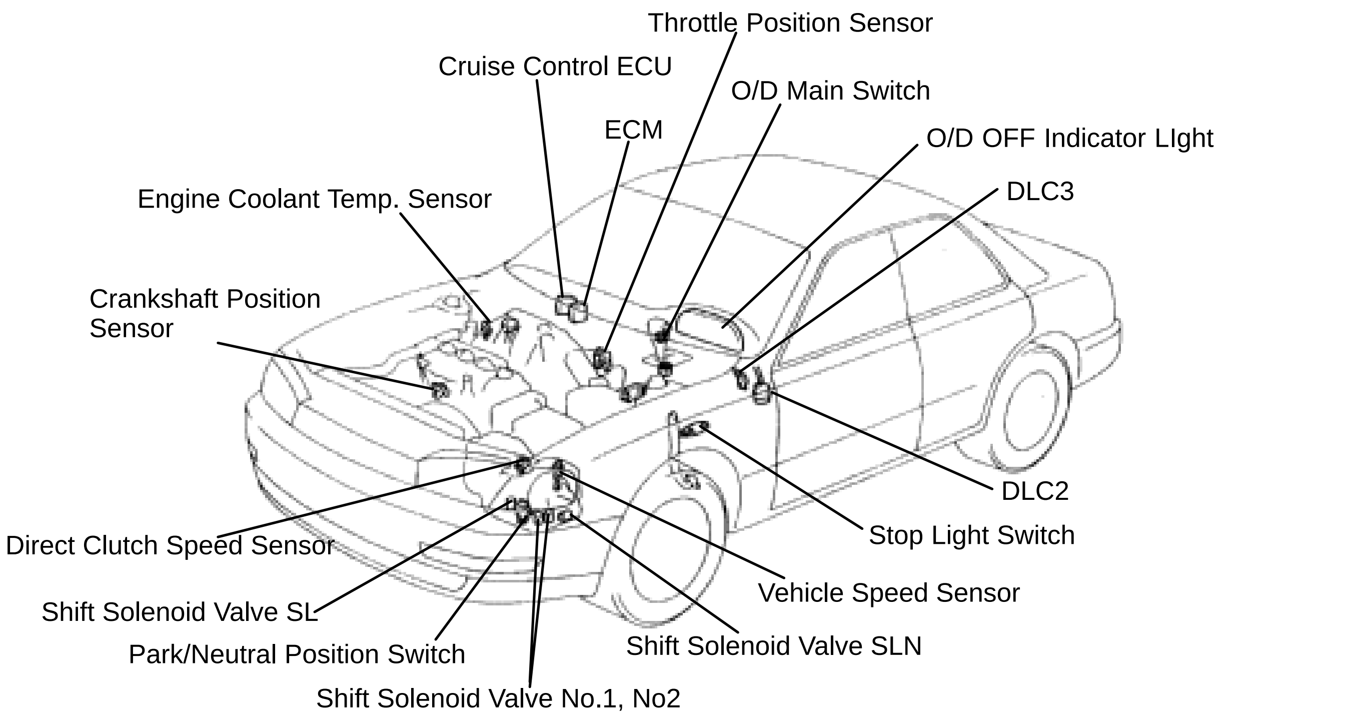
If a DTC is displayed during the DTC check, check the circuit listed for that code in the table below and proceed to the page given.

* : –...MIL does not light /● ...MIL light up

DTC No. (See Page)	Detection Item	Trouble Area	MIL *	Memory
P0500 (DI–456)	Vehicle Speed Sensor Malfunction (No.1 Vehicle Speed Sensor)	□Open or short in No.1 vehicle speed sensor circuit □No.1 vehicle speed sensor □Combination meter □ECM □Automatic transaxle (clutch, brake or gear etc.)	●	○
P0750 (DI–460)	Shift Solenoid A Malfunction (Shift Solenoid Valve No.1)	□Shift solenoid valve No.1 is stuck open or closed □Valve body is blocked up or stuck □Automatic transaxle (clutch, brake or gear etc.)	●	○
P0753 (DI–462)	Shift Solenoid A Electrical Malfunction (Shift Solenoid Valve No.1)	□Open or short in shift solenoid valve No.1 circuit □Shift solenoid valve No.1 □ECM	●	○
P0755 (DI–460)	Shift Solenoid B Malfunction (Shift Solenoid Valve No.2)	□Shift solenoid valve No.2 is stuck open or closed □Valve body is blocked up or stuck □Automatic transaxle (clutch, brake or gear etc.)	●	○
P0758 (DI–462)	Shift Solenoid B Electrical Malfunction (Shift Solenoid Valve No.2)	□Open or short in shift solenoid valve No.2 circuit □Shift solenoid valve No.2 □ECM	●	○
P0770 (DI–466)	Shift Solenoid E Malfunction (Shift Solenoid Valve SL)	□Shift solenoid valve SL is stuck open or closed □Valve body is blocked up or stuck □Lock–up clutch □Automatic transaxle (clutch, brake or gear etc.)	●	○
P0773 (DI–468)	Shift Solenoid E Electrical Malfunction (Shift Solenoid Valve SL)	□Open or short in shift solenoid valve SL circuit □Shift solenoid valve SL □ECM	●	○
P1520 (DI–472)	Stop Light Switch Signal Malfunction	□Open or short in stop light switch circuit □Stop light switch □ECM	●	○
P1705 (DI–473)	NC2 Revolution Sensor Circuit Malfunction (Direct Clutch Speed Sensor)	□Open or short in direct clutch speed sensor circuit □Direct clutch speed sensor □ECM	●	○
P1765 (DI–476)	Linear Solenoid for Accumulator Pressure Control Circuit Malfunction (Shift Solenoid Valve SLN)	□Open or short in shift solenoid valve SLN circuit □Shift solenoid valve SLN □ECM	●	○
P1780 (DI–479)	Park/Neutral Position Switch Malfunction	□Short in park/neutral position switch circuit □Park/neutral position switch □ECM	●	○

DI02G–02

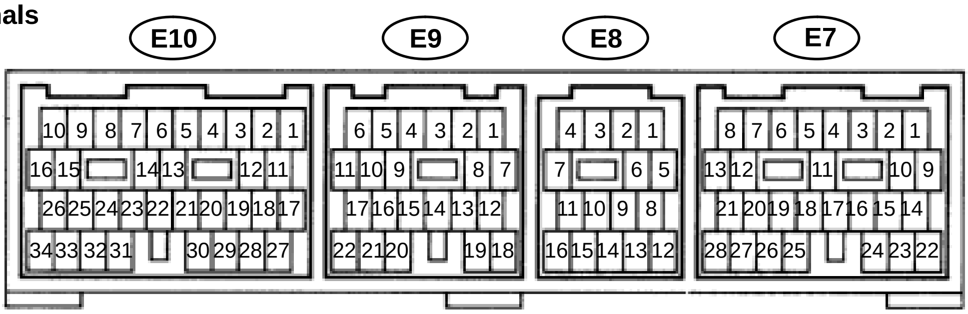
PARTS LOCATION



DI1KA–01

TERMINALS OF ECM

Except California, w/ Engine Immobilizer and / or TRAC:

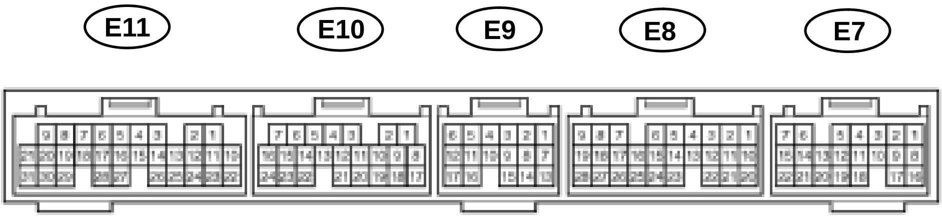


Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
S1 ↔ E1 (E10–11 ↔ E8–16)	V ↔ BR	IG ON	10 ~ 14
		1st or 2nd gear	10 ~ 14
		3rd or O/D gear	Below 1
S2 ↔ E1 (E10–17 ↔ E8–16)	L–B ↔ BR	IG ON	Below 1
		1st or 2nd gear	10 ~ 14
		3rd or O/D gear	Below 1
SL ↔ E1 (E10–27 ↔ E8–16)	P–L ↔ BR	IG ON	Below 1
		Vehicle driving under lock–up position	10 ~ 14
$NC2^+$ ↔ $NC2^-$ (E9–9 ↔ E9–4)	R ↔ G	Engine is running	Pulse signal is output Below 1 ↔ 4 ~ 5
SLN^+ ↔ SLN^- (E10–2 ↔ E 8–2)	W–L ↔ B–Y	IG ON	10 ~ 14
OD1 ↔ E1 (E7–7 ↔ E8–16)	Y–B ↔ BR	IG ON	5 ~ 6
OD2 ↔ E1 (E7–6 ↔ E8–16)	G–O ↔ BR	O/D main switch ON	10 ~ 14
		O/D main switch OFF	Below 1
L ↔ E1 (E7–1 ↔ E8–16)	Y ↔ BR	IG ON and Shift lever L position	10 ~ 14
		IG ON and Shift lever other than L position	Below 1
2 ↔ E1 (E7–10 ↔ E8–16)	*1, *3 L–W ↔ BR *2, *4 O ↔ BR	IG ON and Shift lever 2 position	10 ~ 14
		IG ON and Shift lever other than 2 position	Below 1
R ↔ E1 (E7–15 ↔ E8–16)	R–B ↔ BR	IG ON and Shift lever R position	10 ~ 14
		IG ON and Shift lever other than R position	Below 1
NSW ↔ E1 (E10–14 ↔ E8–16)	B–W ↔ BR	IG ON and Shift lever P or N position	10 ~ 14
		IG ON and Shift lever other than P or N position	Below 1

*1: w/ Engine immobilizer system
*2: w/o Engine immobilizer system
*3 TMC made ex. USA w/ TRAC
*4: TMMK made, TMC made USA w/ TRAC

California, w/ Engine Immobilizer and / or TRAC:

ECM Terminals



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Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
S1 ↔ E1 (E11–7 ↔ E10–17)	V ↔ BR	IG ON	10 ~ 14
		1st or 2nd gear	10 ~ 14
		3rd or O/D gear	Below 1
S2 ↔ E1 (E11–8 ↔ E10–17)	L–B ↔ BR	IG ON	Below 1
		1st or 2nd gear	10 ~ 14
		3rd or O/D gear	Below 1
SL ↔ E1 (E11–9 ↔ E10–17)	P–L ↔ BR	IG ON	Below 1
		Vehicle driving under lock–up position	10 ~ 14
$NC2^+$ ↔ $NC2^-$ (E11–14 ↔ E11–26)	R ↔ G	Engine is running	Pulse signal is output Below 1 ↔ 4 ~ 5
SLN^+ ↔ SLN^- (E11–20 ↔ E11–19)	W–L ↔ B–Y	IG ON	10 ~ 14
OD1 ↔ E1 (E8–24 ↔ E10–17)	Y–B ↔ BR	IG ON	5 ~ 6
OD2 ↔ E1 (E8–10 ↔ E10–17)	G–O ↔ BR	O/D main switch ON	10 ~ 14
		O/D main switch OFF	Below 1
L ↔ E1 (E8–12 ↔ E10–17)	Y ↔ BR	IG ON and Shift lever L position	10 ~ 14
		IG ON and Shift lever other than L position	Below 1
2 ↔ E1 (E8–3 ↔ E10–17)	*1, *3 L–W ↔ BR *2, *4 O ↔ BR	IG ON and Shift lever 2 position	10 ~ 14
		IG ON and Shift lever other than 2 position	Below 1
R ↔ E1 (E8–2 ↔ E10–17)	R–B ↔ BR	IG ON and Shift lever R position	10 ~ 14
		IG ON and Shift lever other than R position	Below 1
NSW ↔ E1 (E8–20 ↔ E10–17)	B–W ↔ BR	IG ON and Shift lever P or N position	10 ~ 14
		IG ON and Shift lever other than P or N position	Below 1

*1: w/ Engine immobilizer system
*2: w/o Engine immobilizer system
*3 TMC made ex. USA w/ TRAC
*4: TMMK made, TMC made USA w/ TRAC

DI02I–02

PROBLEM SYMPTOMS TABLE

If a normal code is displayed during the diagnostic trouble code check but the trouble still occurs, check the circuits for each symptom in the order given in the charts on the following pages and proceed to the page given for troubleshooting.

The Matrix Chart is divided into 3 chapters.

Chapter 1: Electronic Circuit Matrix Chart
Chapter 2: On–vehicle Repair Matrix Chart
Chapter 3: Off–vehicle repair Matrix Chart

- ☐ If the instruction "Proceed to next circuit inspection shown on matrix chart" is given in the flow chart for each circuit, proceed to the circuit with the next highest number in the table to continue the check.
- ☐ If the trouble still occurs even though there are no abnormalities in any of the other circuits, then check and replace the ECM.

1. Chapter 1: Electronic Circuit Matrix Chart

Symptom	Suspect Area	See page
No up–shift (1st → 2nd)	ECM	IN–31
No up–shift (2nd → 3rd)	ECM	IN–31
No up–shift (3rd → O/D)	1. O/D main switch circuit 2. O/D cancel signal circuit 3. ECM	DI–487 DI–484 IN–31
No down–shift (O/D → 3rd)	ECM	IN–31
No down–shift (3rd → 2nd)	ECM	IN–31
No down–shift (2nd → 1st)	ECM	IN–31
No lock–up or No lock–up off	ECM	IN–31
Shift point too high or too low	ECM	IN–31
Up–shift to 2nd while in L position	ECM	IN–31
Up–shift to 3rd while in L position	ECM	IN–31
Up–shift to O/D from 3rd	1. O/D main switch circuit 2. ECM	DI–487 IN–31
Up–shift to O/D from 3rd while engine is cold	ECM	IN–31
Harsh engagement (N → D)	ECM	IN–31
Harsh engagement (Lock–up)	ECM	IN–31
Harsh engagement (Any driving position)	ECM	IN–31
Poor acceleration	ECM	IN–31
Large shift shock or engine stalls when starting off or stopping	ECM	IN–31

2. Chapter 2: On–Vehicle Repair (● : A541E AUTOMATIC TRANSAXLE Repair Manual Pub. No. RM530U)

Symptom	Suspect Area	See page
Vehicle does not move in any forward position and reverse position	1. Manual valve 2. Throttle valve 3. Primary regulator valve 4. Off–vehicle repair matrix chart	● ● ● DI–453
Vehicle does not move in R position	Off–vehicle repair matrix chart	DI–453
No up–shift (1st → 2nd)	1. 1–2 shift valve 2. Off–vehicle repair matrix chart	● DI–453
No up–shift (2nd → 3rd)	1. 2–3 shift valve 2. Off–vehicle repair matrix chart	● DI–453
No up–shift (3rd → O/D)	1. 3–4 shift valve 2. Off–vehicle repair matrix chart	● DI–453
No down–shift (O/D → 3rd)	3–4 shift valve	●
No down–shift (3rd → 2nd)	2–3 shift valve	●
No down–shift (2nd → 1st)	1–2 shift valve	●
No lock–up or No lock–up off	1. Lock–up relay valve 2. Off–vehicle repair matrix chart	● DI–453
Harsh engagement (N → D)	1. C_1 accumulator 2. Off–vehicle repair matrix chart	● DI–453
Harsh engagement (N → R)	1. C_2 accumulator 2. No.1 accumulator control valve 3. Off–vehicle repair matrix chart	● ● DI–453
Harsh engagement (N → L)	Low coast modulator valve	●
Harsh engagement (Lock–up)	1. Lock–up relay valve 2. Off–vehicle repair matrix chart	● DI–453
Harsh engagement (1st → 2nd → 3rd → O/D)	1. Throttle modulator valve 2. Cut back valve 3. Throttle valve	● ● ●
Harsh engagement (2nd → 3rd)	C_2 accumulator	●
Harsh engagement (3rd → O/D)	B_0 accumulator	●
Harsh engagement (O/D → 3rd)	1. C_0 accumulator 2. B_0 accumulator	● ●
Slip or shudder (Forward and reverse)	1. Throttle valve 2. Oil strainer 3. Off–vehicle repair matrix chart	● ● DI–453
No engine braking (1st: L position)	1. Low coast modulator valve 2. Off–vehicle repair matrix chart	● DI–453
No engine braking (2nd: 2 position)	1. 2nd coast modulator valve 2. Off–vehicle repair matrix chart	● DI–453
No kick–down	1. 1–2 shift valve 2. 2–3 shift valve 3. 3–4 shift valve	● ● ●

3. Chapter 3: Off–Vehicle Repair (● : A541E AUTOMATIC TRANSAXLE Repair Manual Pub. No. RM530U)

Symptom	Suspect Area	See page
Vehicle does not move in any forward position and reverse position	1. Front and rear planetary gear 2. O/D planetary gear 3. O/D one–way clutch (F_0) 4. O/D direct clutch (C_0) 5. Forward clutch (C_1) 6. O/D brake (B_0)	● ● ● ● ● ●
Vehicle does not move in R position	1. Front and rear planetary gear unit 2. Direct clutch (C_2) 3. O/D direct clutch (C_0) 4. 1st and reverse brake (B_3)	● ● ● ●
No up–shift (1st → 2nd)	1. No. 1 one–way clutch (F_1) 2. 2nd brake (B_2)	● ●
No up–shift (2nd → 3rd)	Direct clutch (C_2)	●
No up–shift (3rd → O/D)	O/D brake (B_0)	●
No lock–up or No lock–up off	Torque converter clutch	●
Harsh engagement (N → D)	1. Forward clutch (C_1) 2. O/D one–way clutch (F_0) 3. No. 2 one–way clutch (F_2)	● ● ●
Harsh engagement (N → R)	1. Direct clutch (C_2) 2. 1st and reverse brake (B_3)	● ●
Harsh engagement (Lock–up)	Torque converter clutch	●
Slip or shudder (Forward position: After warm–up)	1. Torque converter clutch 2. O/D direct clutch (C_0) 3. Forward clutch (C_1) 4. O/D one–way clutch (F_0)	● ● ● ●
Slip or shudder (R position)	1. Direct clutch (C_2) 2. 1st and reverse brake (B_3) 3. O/D direct clutch (C_0)	● ● ●
Slip or shudder (1st)	No. 2 one–way clutch (F_2)	●
Slip or shudder (2nd)	1. No. 1 one–way clutch (F_1) 2. 2nd brake (B_2)	● ●
Slip or shudder (3rd)	Direct clutch (C_2)	●
Slip or shudder (O/D)	O/D brake (B_0)	●
No engine braking (1st ~ 3rd: D position)	2nd brake (B_2)	●
No engine braking (1st: L position)	1st and reverse brake (B_3)	●
No engine braking (2nd: 2 position)	2nd coast brake (B_1)	●
Poor acceleration (All position)	1. Torque converter clutch 2. O/D planetary gear	● ●
Poor acceleration (O/D)	1. O/D direct clutch (C_0) 2. O/D planetary gear	● ●
Large shift shock or engine stalls when starting off or stopping	Torque converter clutch	●

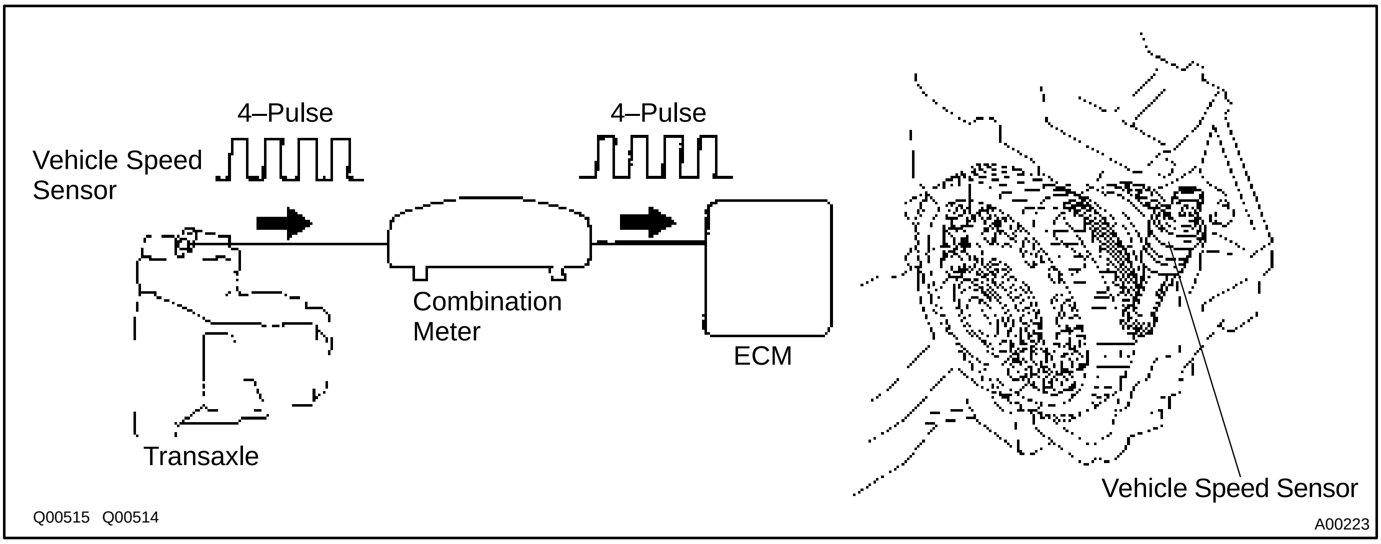
DI1KB–01

CIRCUIT INSPECTION

DTC	P0500	Vehicle Speed Sensor Malfunction

CIRCUIT DESCRIPTION

The vehicle speed sensor outputs a 4–pulse signal for every revolution of the rotor shaft, which is rotated by the transmission output shaft via the driven gear. After this signal is converted into a more precise rectangular waveform by the waveform shaping circuit inside the combination meter, it is then transmitted to the ECM. The ECM determines the vehicle speed based on the frequency of these pulse signals.



DTC No.	DTC Detecting Condition	Trouble Area
P0500	No vehicle speed sensor signal to ECM under conditions (a) and (b) (2 trip detection logic) (a) Park/neutral position switch is OFF (b) Vehicle is being driven	●Open or short in vehicle speed sensor circuit ●Vehicle speed sensor ●Combination meter ●ECM ●Automatic transaxle (clutch, brake or gear etc.)
	Clutch or brake slips or gear is broken	

WIRING DIAGRAM

See page DI–333.

INSPECTION PROCEDURE

1	**Check operation of speedometer.**

CHECK:
Drive the vehicle and check if the operation of the speedometer in the combination meter is normal.
HINT:
The vehicle speed sensor is operating normally if the speedometer display is normal.

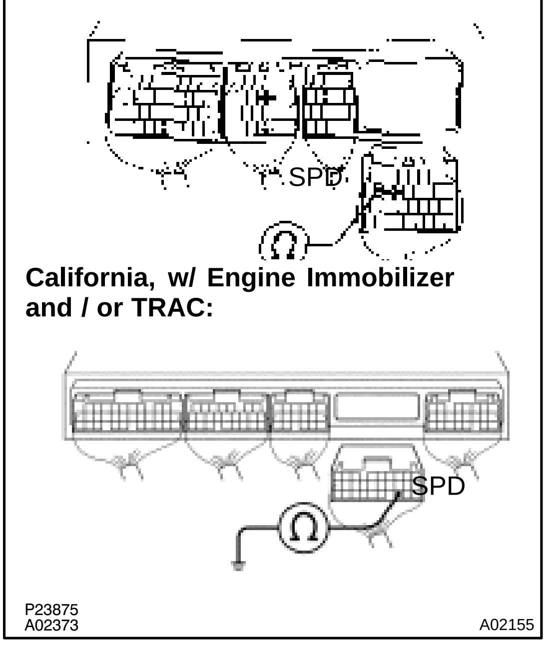
NG → **Check speedometer circuit.**

OK

2	**Check for short in harness and connector between terminal SPD of ECM and body ground.**

Except California, w/ Engine Immobilizer and / or TRAC:

California, w/ Engine Immobilizer and / or TRAC:

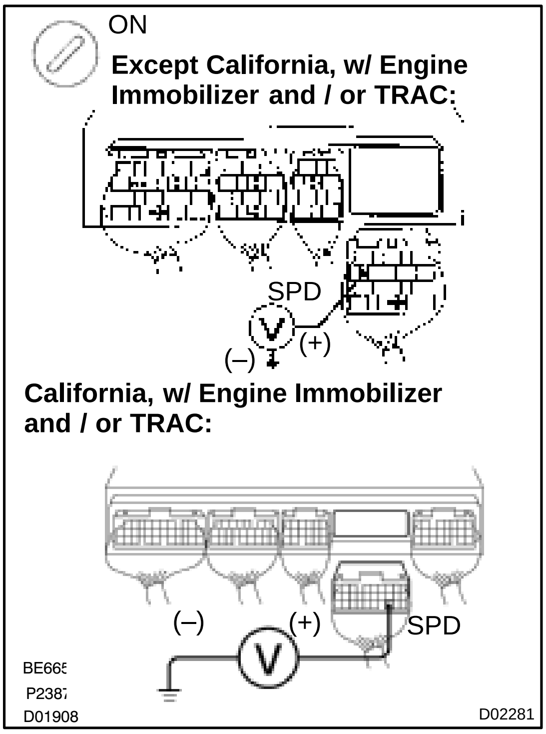


PREPARATION:
(a) Remove the glove compartment (See page SF–73).
(b) Disconnect the connector from ECM.
CHECK:
Check continuity between terminal SPD of ECM and body ground.
OK:
No continuity (1 M Ω or higher)

NG → **Repair or replace harness or connector.**

OK

3	Check voltage between terminal SPD of ECM connector and body ground.



PREPARATION:

Turn ignition switch ON.

CHECK:

Measure voltage between terminal SPD of ECM connector and body ground.

OK:

Voltage: 9 ~ 14 V

NG	Check for open in harness and connector between junction connector (J15) and ECM (See page IN–31).

OK

4	Check for open in harness and connector between junction connector (J15) and combination meter (See page IN–31).

NG	Repair or replace harness or connector.

OK

5	**Check ECM (See page IN–31).**

NG → **Replace ECM.**

OK

Check and repair the transaxle (clutch, brake or gear etc.).

DI02K–02

DTC	P0750, P0755	Shift Solenoid A/B Malfunction (Shift Solenoid Valve No.1/No.2)

SYSTEM DESCRIPTION

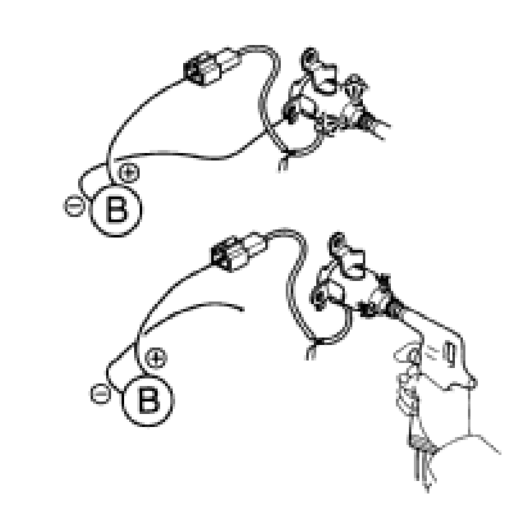
The ECM uses signals from the vehicle speed sensor and direct clutch speed sensor to detect the actual gear position (1st, 2nd, 3rd or O/D gear).
Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical trouble of the shift solenoid valves, valve body or automatic transaxle (clutch, brake or gear etc.)

DTC No.	DTC Detecting Condition	Trouble Area
P0750 P0755	During normal driving, the gear required by the ECM does not match the actual gear (2 trip detection logic)	●Shift solenoid valve No.1/No.2 is stuck open or closed ●Valve body is blocked up or stuck ●Automatic transaxle (clutch, brake or gear etc.)

Check the shift solenoid valve No.1 when DTC P0750 is output and check the shift solenoid valve No.2 when DTC P0755 is output.

INSPECTION PROCEDURE

1	**Check shift solenoid valve No.1 or No.2 operation.**



Q07781

PREPARATION:

(a) Remove the oil pan.

(b) Remove the shift solenoid valve No.1 or No.2.

CHECK:

(a) Applying 490 kPa (5 kgf/cm^2, 71 psi) of compressed air, check that the solenoid valve does not leak air.

(b) When battery positive voltage is supplied to the shift solenoid valve, check that the valve opens.

NG → **Replace the shift solenoid valve No.1 or No.2.**

OK

Check the valve body (See page DI–453).

NG → **Repair or replace the valve body.**

OK

Repair the transaxle.

DI02L–02

DTC	P0753, P0758	Shift Solenoid A/B Electrical Malfunction (Shift Solenoid Valve No.1/No.2)

CIRCUIT DESCRIPTION

Shifting from 1st to O/D is performed in combination with ON and OFF of the shift solenoid valves No.1 and No.2 controlled by ECM. If an open or short circuit occurs in either of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valve to allow the vehicle to be operated smoothly (Fail safe function).

Fail Safe Function:

If either of the shift solenoid valve circuits develops an open or short, the ECM turns the other shift solenoid ON and OFF to shift to the gear positions shown in the table below. The ECM also turns the shift solenoid valve SL OFF at the same time. If both solenoids are malfunction, hydraulic control cannot be performed electronically and must be done manually.

Manual shifting as shown in the following table must be done (In the case of a short circuit, the ECM stops sending current to the short circuited solenoid).

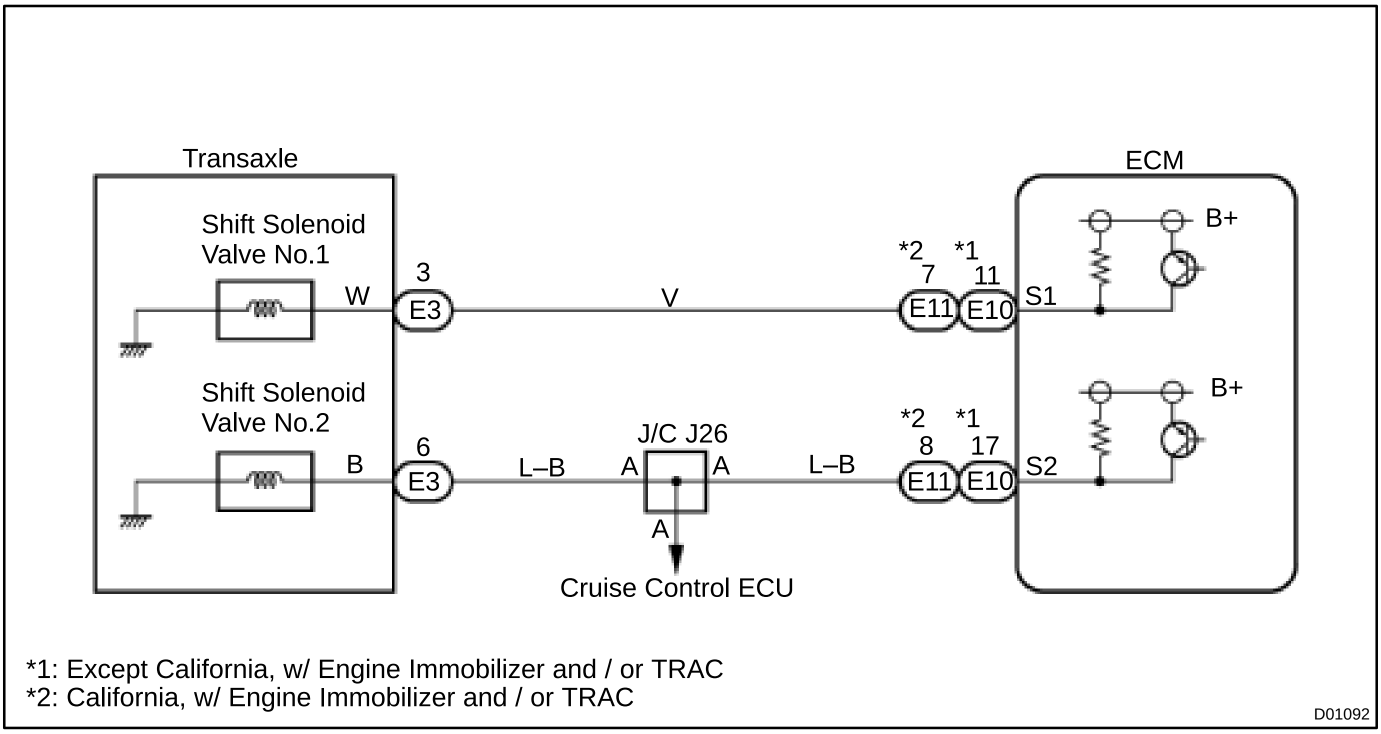
Position	NORMAL			SHIFT SOLENOID NO.1 MALFUNCTIONING			SHIFT SOLENOID NO.2 MALFUNCTIONING			BOTH SOLENOIDS MALFUNCTIONING
	Solenoid valve		Gear	Solenoid valve		Gear	Solenoid valve		Gear	Gear when shift selector is manually operated
	No.1	No.2		No.1	No.2		No.1	No.2		
D	ON	OFF	1st	X	ON	3rd	ON	X	1st	O/D
	ON	ON	2nd	X	ON	3rd	OFF	X	O/D	O/D
	OFF	ON	3rd	X	ON	3rd	OFF	X	O/D	O/D
	OFF	OFF	O/D	X	OFF	O/D	OFF	X	O/D	O/D
2	ON	OFF	1st	X	ON	3rd	ON	X	1st	O/D
	ON	ON	2nd	X	ON	3rd	OFF	X	O/D	O/D
	OFF	ON	3rd	X	ON	3rd	OFF	X	O/D	O/D
L	ON	OFF	1st	X	OFF	1st	ON	X	1st	1st
	ON	ON	2nd	X	ON	2nd	ON	X	1st	1st

X: Malfunctions

Check the shift solenoid valve No.1 when DTC P0753 is output and check the shift solenoid valve No.2 when DTC P0758 is output.

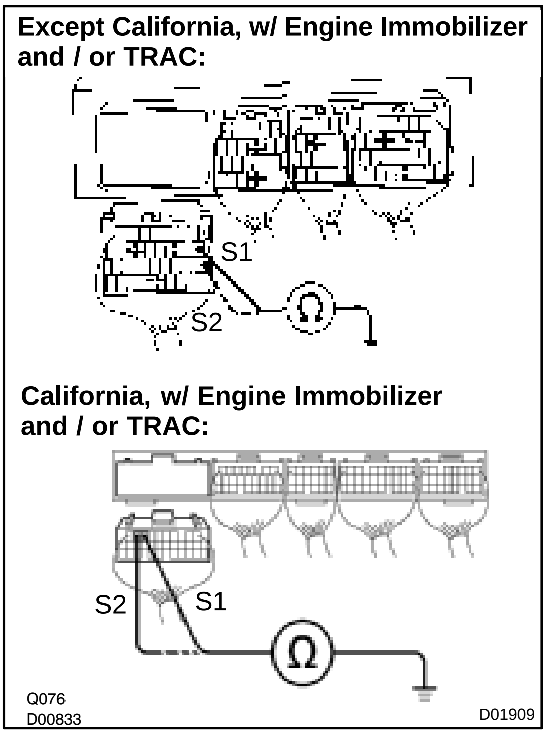
DTC No.	DTC Detecting Condition	Trouble Area
P0753 P0758	The ECM checks for an open or short circuit in the shift solenoid valves No.1 and No.2 circuit when it changes. The ECM records DTC P0753 or P0758 if condition (a) or (b) is detected once, but it does not light up MIL. After ECM detects condition (a) or (b) continuously 8 times or more in a trip and the MIL light up. (a) When the solenoid is energized, the solenoid resistance is 8 Ω or less and is counted. (b) When the solenoid is not energized, the solenoid resistance is 100 kΩ or more and is counted.	●Open or short in shift solenoid valve No.1/No.2 circuit ●Shift solenoid valve No.1/No.2 ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Measure resistance between terminal S1 or S2 of ECM and body ground.**



PREPARATION:

Disconnect the connector from ECM.

CHECK:

Measure resistance between terminal S1 or S2 of ECM and body ground.

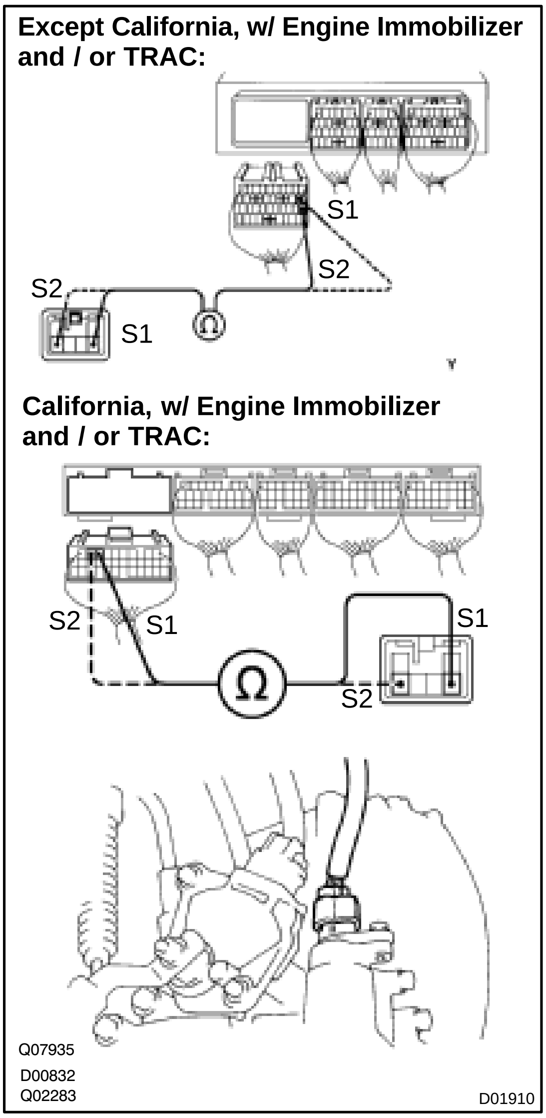
OK:

Resistance: 11 ~ 15 Ω

OK → **Check and replace the ECM.**

NG

2	**Check harness and connector between ECM and automatic transaxle solenoid connector.**



PREPARATION:

Disconnect the solenoid connector from the automatic transaxle.

CHECK:

Check the harness and connector between terminal S1 or S2 of ECM and terminal S1 or S2 of solenoid connector.

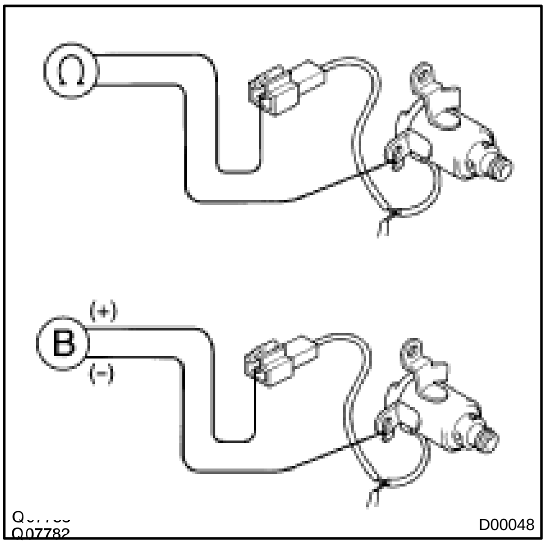
OK:

There is no open and no short circuit.

NG → **Repair or replace the harness or connector.**

OK

3	**Check shift solenoid valve No.1 or No.2.**



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Disconnect the solenoid connector.
(d) Remove the shift solenoid valve No.1 or No.2.

CHECK:

(a) Measure resistance between solenoid connector and body ground.
(b) Connect the positive ∼ lead to terminal of solenoid connector, negative > lead to solenoid body.

OK:

(a) Resistance: 11 ~ 15 Ω
(b) The solenoid makes an operating noise.

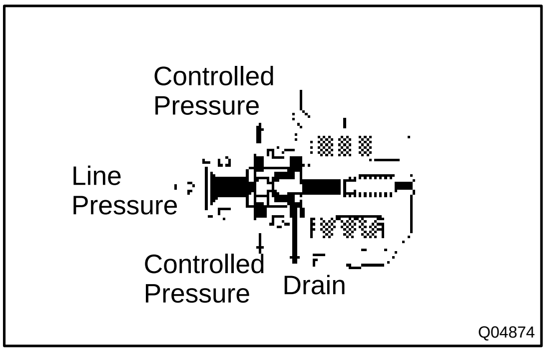
NG → **Replace the solenoid valve.**

OK ↓

Repair or replace the solenoid wire.

DI02M–02

DTC	P0770	Shift Solenoid E Malfunction (Shift Solenoid Valve SL)



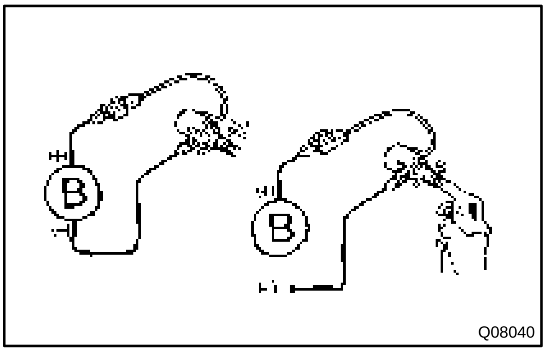
SYSTEM DESCRIPTION

The ECM uses the signals from the throttle position sensor, air–flow meter and crankshaft position sensor to monitor the engagement condition of the lock–up clutch.
Then the ECM compares the engagement condition of the lock–up clutch with the lock–up schedule in the ECM memory to detect mechanical trouble of the shift solenoid valve SL, valve body, torque converter clutch or automatic transaxle (clutch, brake or gear etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P0770	●Lock–up does not occur when driving in the lock–up range (normal driving at 80 km/h [50 mph]), or lock–up remains ON in the lock–up OFF range. (2 trip detection logic) ●When lock–up is ON, clutch or brake slips or gear is broken.	●Shift solenoid valve SL is stuck open or closed ●Valve body blocked up or stuck ●Lock–up clutch ●Automatic transaxle (clutch, brake or gear etc.)

INSPECTION PROCEDURE

1	Check solenoid valve SL operation.



PREPARATION:
(a) Remove the oil pan.
(b) Remove the shift solenoid valve SL.
CHECK:
(a) Applying 490 kPa (5 kgf/cm^2, 71 psi) of compressed air, check that the solenoid valve does not leak air.
(b) When battery positive voltage is supplied to the shift solenoid valve, check that the solenoid valve opens.

NG → **Replace the solenoid valve SL.**

OK

2	Check valve body (See page DI–453).

NG → Repair or replace the valve body.

OK

Check the torque converter clutch (See page AX–21).

NG → Replace the torque converter clutch.

OK

Repair the transaxle.

DI02N–02

DTC	P0773	Shift Solenoid E Electrical Malfunction (Shift Solenoid Valve SL)

CIRCUIT DESCRIPTION

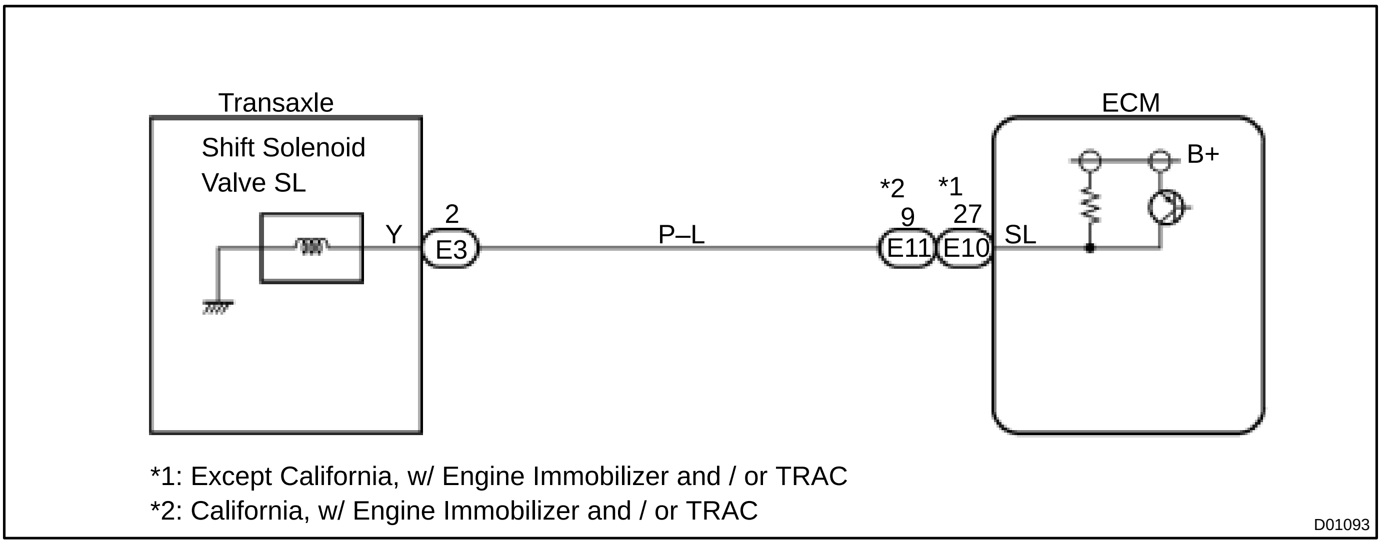
The shift solenoid valve SL is turned ON and OFF by signals from the ECM to control the hydraulic pressure acting on the lock–up relay valve, which then controls operation of the lock–up clutch.

Fail safe function

If the ECM detects a malfunction, it turns the shift solenoid valve SL OFF.

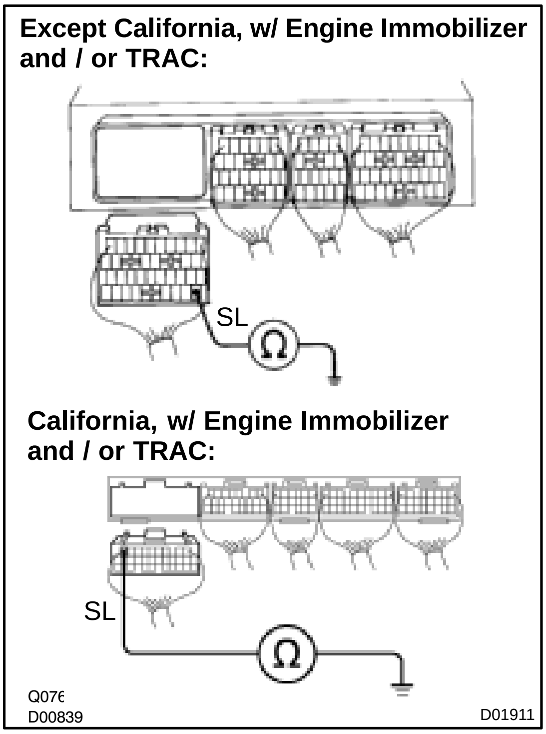
DTC No.	DTC Detecting Condition	Trouble Area
P0773	Either (a) or (b) are detected for 1 time. (2 trip detection logic) (a) Solenoid resistance is 8 Ω or less short circuit when solenoid is energized. (b) Solenoid resistance is 100 kΩ or more open circuit when solenoid is not energized.	●Open or short in shift solenoid valve SL circuit ●Shift solenoid valve SL ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Measure resistance between terminal SL of ECM and body ground.**

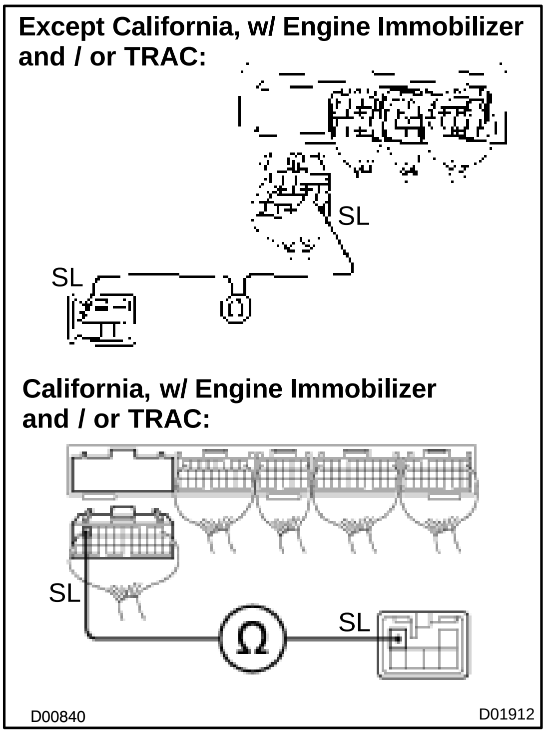


PREPARATION:
Disconnect the connector from ECM.
CHECK:
Measure resistance between terminal SL of ECM and body ground.
OK:
Resistance: 8 ~ 100,000 Ω

OK	**Check and replace the ECM.**

NG

2	**Check harness and connector between ECM and automatic transaxle solenoid connector (See page IN–31).**



PREPARATION:
Disconnect the solenoid connector from the transaxle.

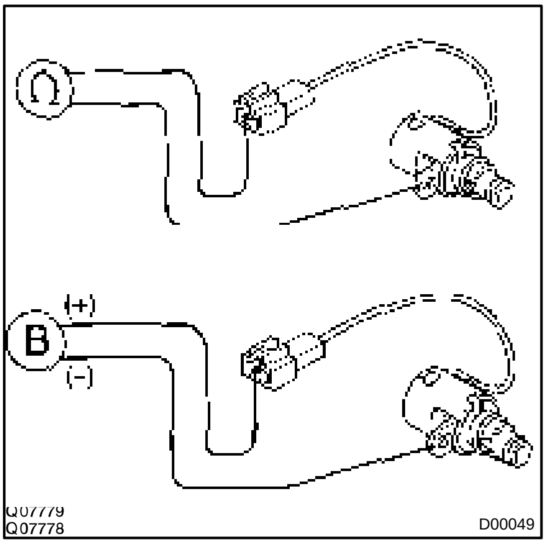
CHECK:
Check the harness and connector between terminal SL of ECM and terminal SL of solenoid connector.

OK:
There is no open or short circuit.

NG	Repair or replace the harness or connector.

OK

3	Check shift solenoid valve SL.



PREPARATION:

(a) Jack up the vehicle.

(b) Remove the oil pan.

(c) Disconnect the shift solenoid valve SL connector.

(d) Remove the shift solenoid valve SL.

CHECK:

(a) Measure resistance between terminal SL of shift solenoid valve and solenoid body.

(b) Connect positive ⊕ lead to terminal of solenoid connector, negative ⊖ lead to solenoid body.

OK:

(a) Resistance: 11 ~ 15 Ω

(b) The shift solenoid valve SL makes operation noise.

NG	Replace the shift solenoid valve SL.

OK

Check and replace or repair the solenoid wire.

DI02O–02

DTC	P1520	Stop Light Switch Signal Malfunction

CIRCUIT DESCRIPTION

The purpose of this circuit is to prevent the engine from stalling, while driving in lock–up condition, when brakes are suddenly applied.
When the brake pedal is operated, this switch sends a signals to ECM. Then the ECM cancels operation of the lock–up clutch while braking is in progress.

DTC No.	DTC Detecting Condition	Trouble Area
P1520	No stop light switch signal to ECM during driving. (2 trip detection logic)	●Open or short in stop light switch circuit ●Stop light switch ●ECM

WIRING DIAGRAM

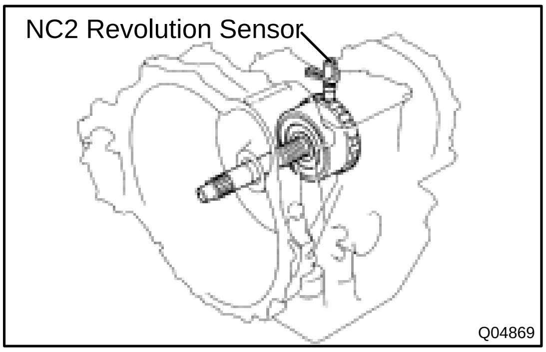
See page DI–363.

INSPECTION PROCEDURE

See page DI–363.

DTC	P1705	NC2 Revolution Sensor Circuit Malfunction (Direct Clutch Speed Sensor)

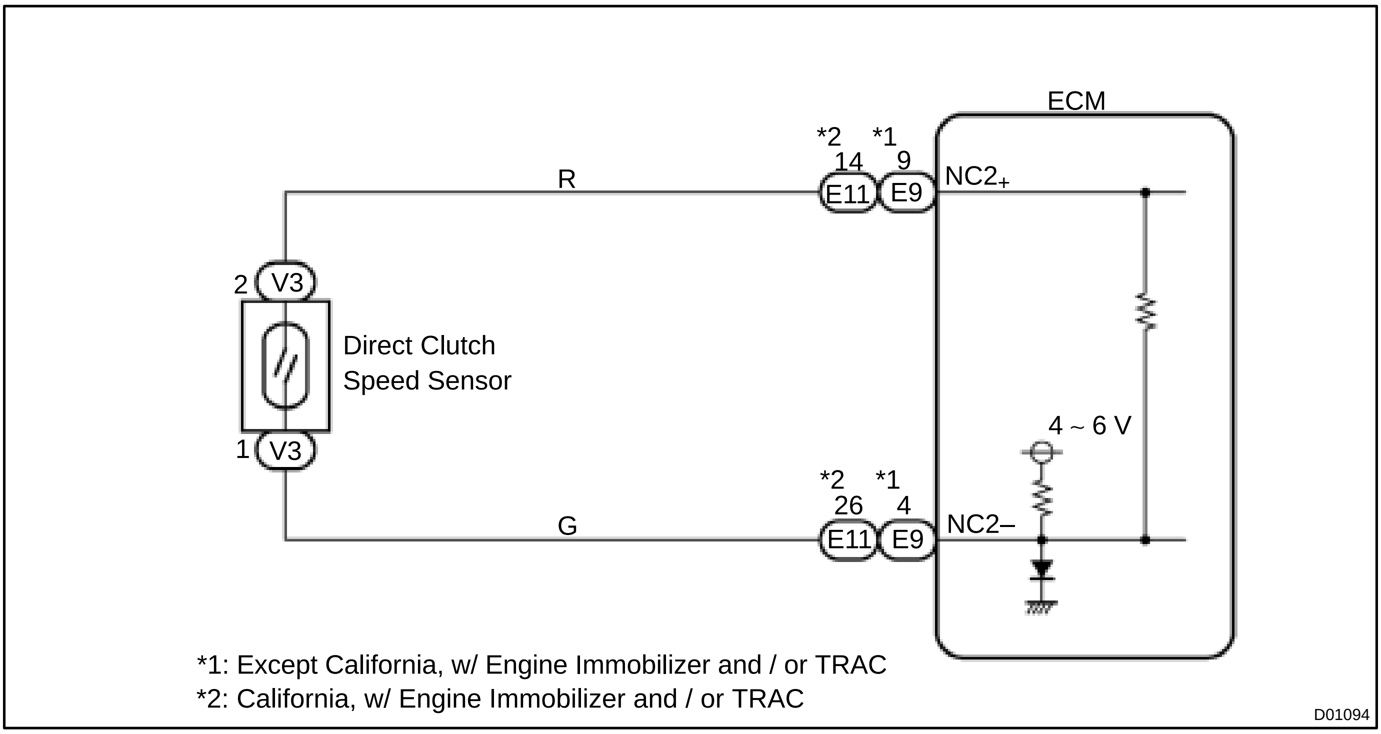
CIRCUIT DESCRIPTION



This sensor detects the rotation speed of the direct clutch drum. By comparing the direct clutch speed signal and the vehicle speed sensor signal, the ECM detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure in response to various conditions, thus performing smooth gear shifting.

DTC No.	DTC Detecting Condition	Trouble Area
P1705	The ECM detects conditions (a), (b), (c), (d), (e) and (f) continuity for 4 sec or more. (2 trip detection logic) (a) Vehicle speed : 32 km/h (20 mph) or more (b) 3rd or 4th gear (c) NC2 < 300 rpm (d) Park/neutral position switch: OFF (e) Solenoid valves and vehicle speed sensor are normal (f) L position: OFF	●Open or short in direct clutch speed sensor circuit ●Direct clutch speed sensor ●ECM

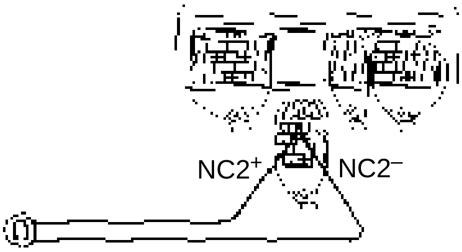
WIRING DIAGRAM



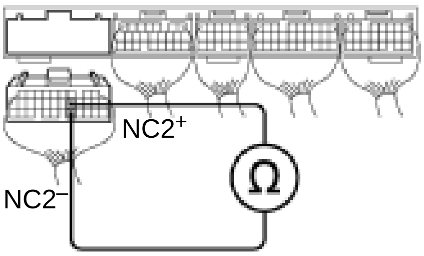
INSPECTION PROCEDURE

1	**Check resistance between terminals NC2$^+$ and NC2$^-$ of ECM.**

Except California, w/ Engine Immobilizer and / or TRAC:



California, w/ Engine Immobilizer and / or TRAC:



D00834 D01913

PREPARATION:
Disconnect the connector from ECM.

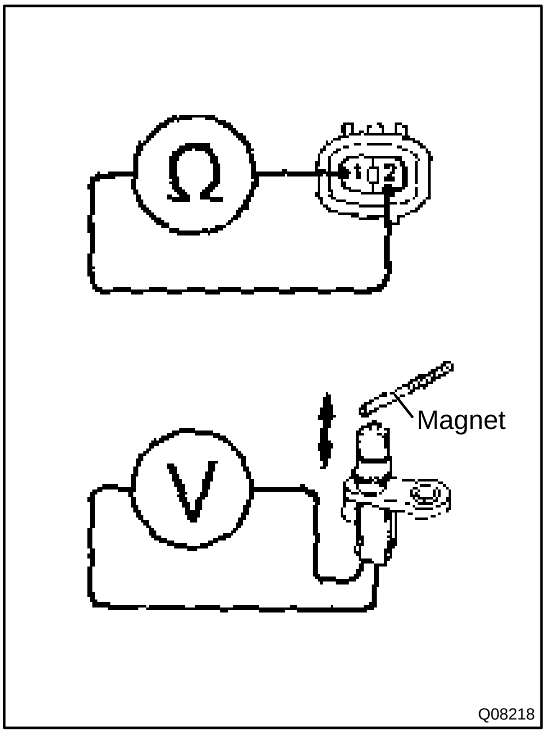
CHECK:
Check resistance between terminals NC2$^+$ and NC2$^-$ of ECM.

OK:
Resistance: 560 ~ 680 Ω

OK	**Check and replace the ECM.**

NG

2	Check No.2 vehicle speed sensor.



PREPARATION:
Remove the Direct clutch speed sensor from transaxle.

CHECK:
(a) Measure resistance between terminals 1 and 2 of speed sensor.
(b) Check voltage between terminals 1 and 2 of the speed sensor when a magnet is put close to the front end of the speed sensor then taken away quickly.

OK:
(a) Resistance: 560 ~ 680 Ω
(b) Voltage is generated intermittently.

HINT:
The voltage generated is extremely low.

NG → **Replace the Direct clutch speed sensor.**

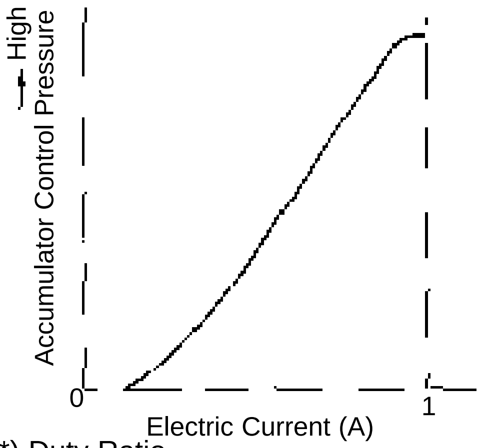
OK ↓

Check and repair the harness and connector between ECM and Direct clutch speed sensor (See page IN–31).

DI02Q–02

DTC	P1765	Linear Solenoid for Accumulator Pressure Control Circuit Malfunction (Shift Solenoid Valve SLN)

CIRCUIT DESCRIPTION

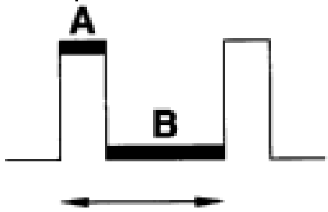


AT5608

The shift solenoid valve SLN controls the hydraulic pressure acting on the accumulator control valve when gears are shifted and performs smooth gear shifting.
The ECM determines optimum operating pressure according to the signals from the throttle position sensor, vehicle speed sensor and direct clutch speed sensor and controls the volume of current flow to the solenoid valve.
The amount of current to the solenoid is controlled by the (*) duty ratio of ECM output signals, causing a momentary change to the hydraulic pressure acting on the clutches during gear shifting.
When the duty ratio is high, the hydraulic pressure acting on the clutches is low.

(*) Duty Ratio
The duty ratio is the ratio of the period of continuity in one cycle.
For example, if A is the period of continuity in one cycle, and B is the period of non–continuity, then

$$\text{Duty Ratio} = \frac{A}{A+B} \times 100\ (\%)$$

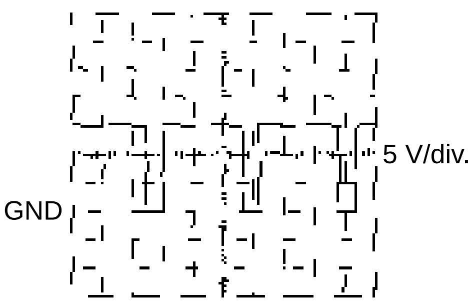


D00061 BE4056 D00060

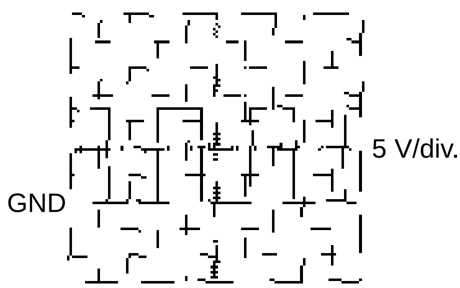
DTC No.	DTC Detecting Condition	Trouble Area
P1765	After the engine is warmed up, the current flow to the shift solenoid valve SLN for 1 sec or more under condition (a) or (b): (a) Engine speed: 500 rpm or more (b) Park/neutral position switch: ON (P or N position)	●Open or short in shift solenoid valve SLN circuit ●Shift solenoid valve SLN ●ECM

Reference

Waveform between terminals SLN^+ and SLN^- when engine is idling.

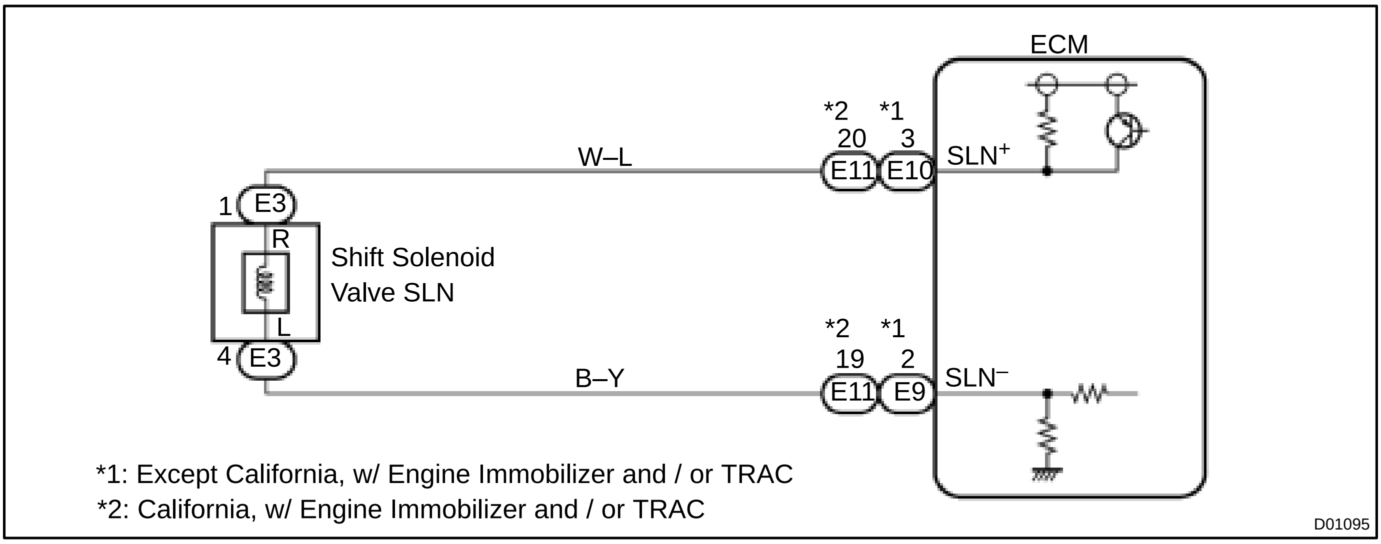


Waveform between terminals SLN^+ and SLN^- when during shift change.



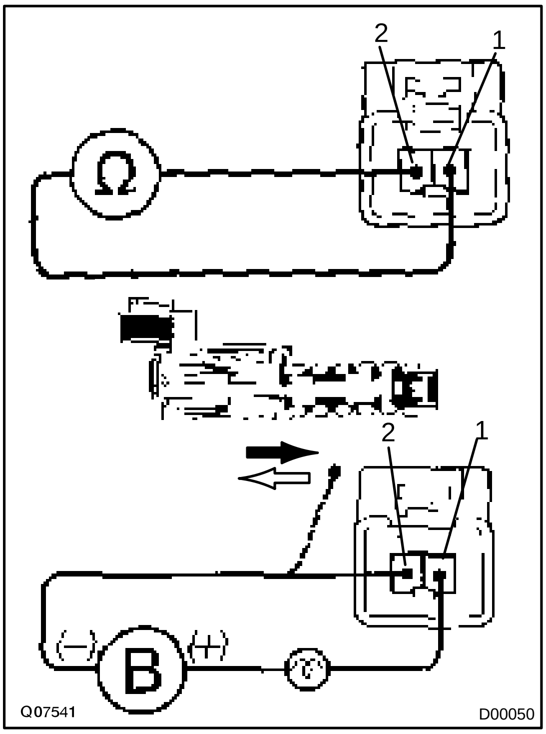
AT8764 AT8766 D00062

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check shift solenoid valve SLN.**



PREPARATION:

Disconnect the shift solenoid valve SLN connector.

CHECK:

(a) Measure resistance between terminals 1 and 2 of solenoid connector.

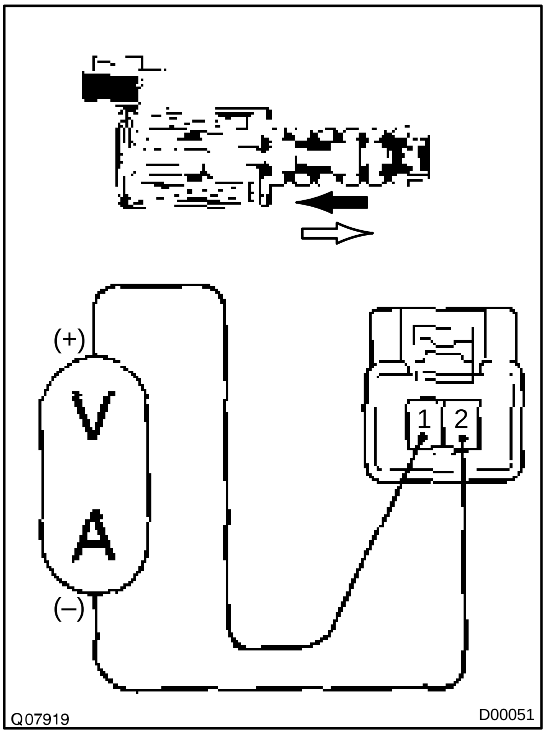
(b) Connect positive ⊕ lead with an 8 ~10 W bulb to terminal 1 of solenoid connector and negative ⊖ lead to terminal 2, then check the movement of the valve.

OK:

(a) Resistance: 5.1 ~ 5.5 Ω

(b)

When battery positive voltage is applied.	Valve move in direction in illustration. (on the left)
When battery positive voltage is cut off.	Valve move in direction in illustration. (on the right)



Reference

PREPARATION:

Connect positive ⊕ lead of the variable power supply to terminal 1 of solenoid connector and negative ⊖ lead to terminal 2.

CHECK:

(a) Check the movement of the valve when the voltage is gradually increased.
(A current greater than 1A should not be supplied.)

(b) Check the movement of the valve when the voltage is cut off.

OK:

(a) As the voltage is increased, the valve should move slowly in the ◀ direction.
(b) The valve should return in the ⇨ direction.

NG → **Replace the shift solenoid valve SLN.**

OK

2	**Check harness and connector between battery and shift solenoid valve SLN, shift solenoid valve SLN and ECM (See page IN–31).**

NG → **Repair or replace the harness or connector.**

OK

Check and replace the ECM.

DI1KC–01

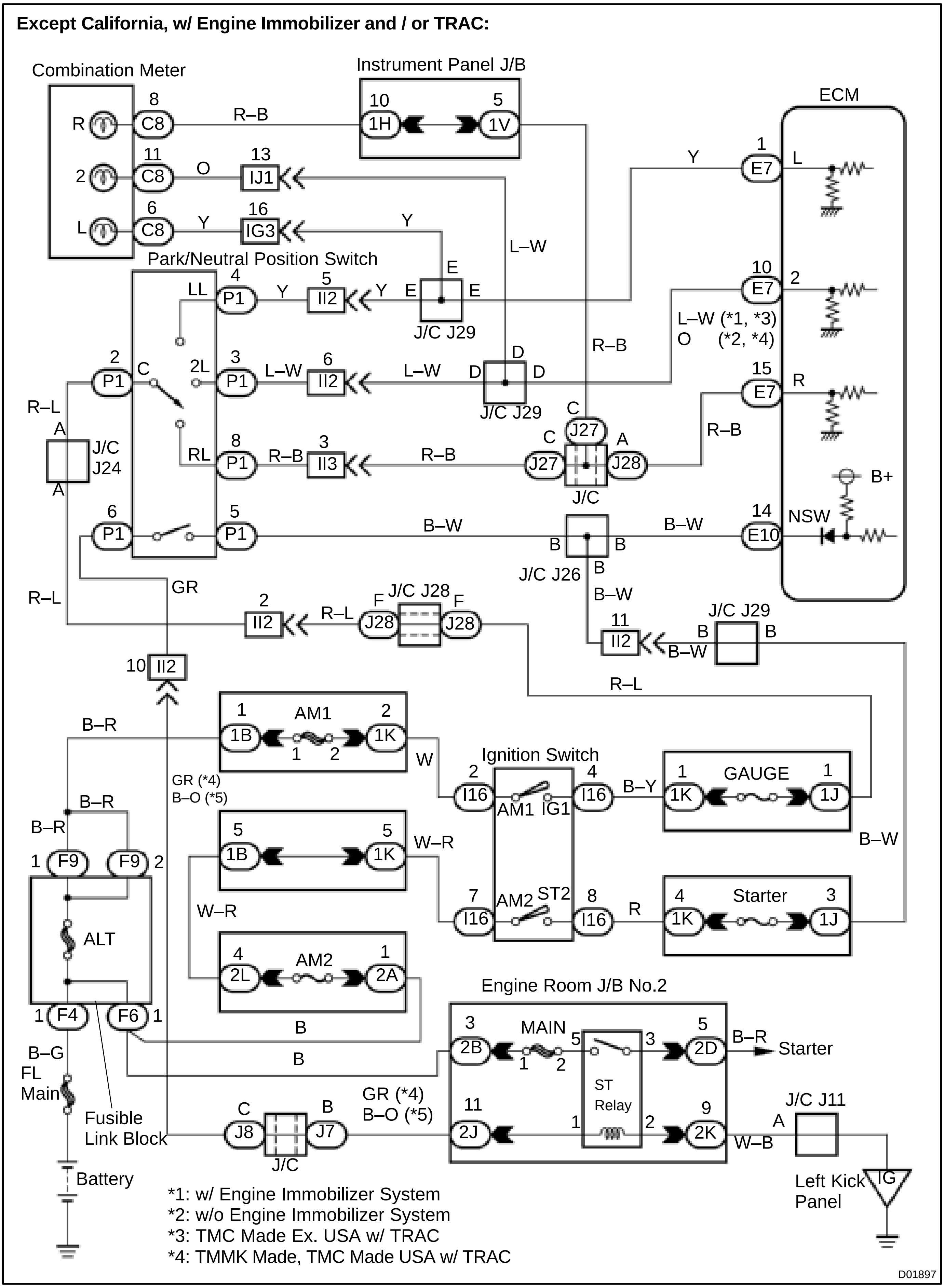
DTC	P1780	Park/Neutral Position Switch Malfunction

CIRCUIT DESCRIPTION

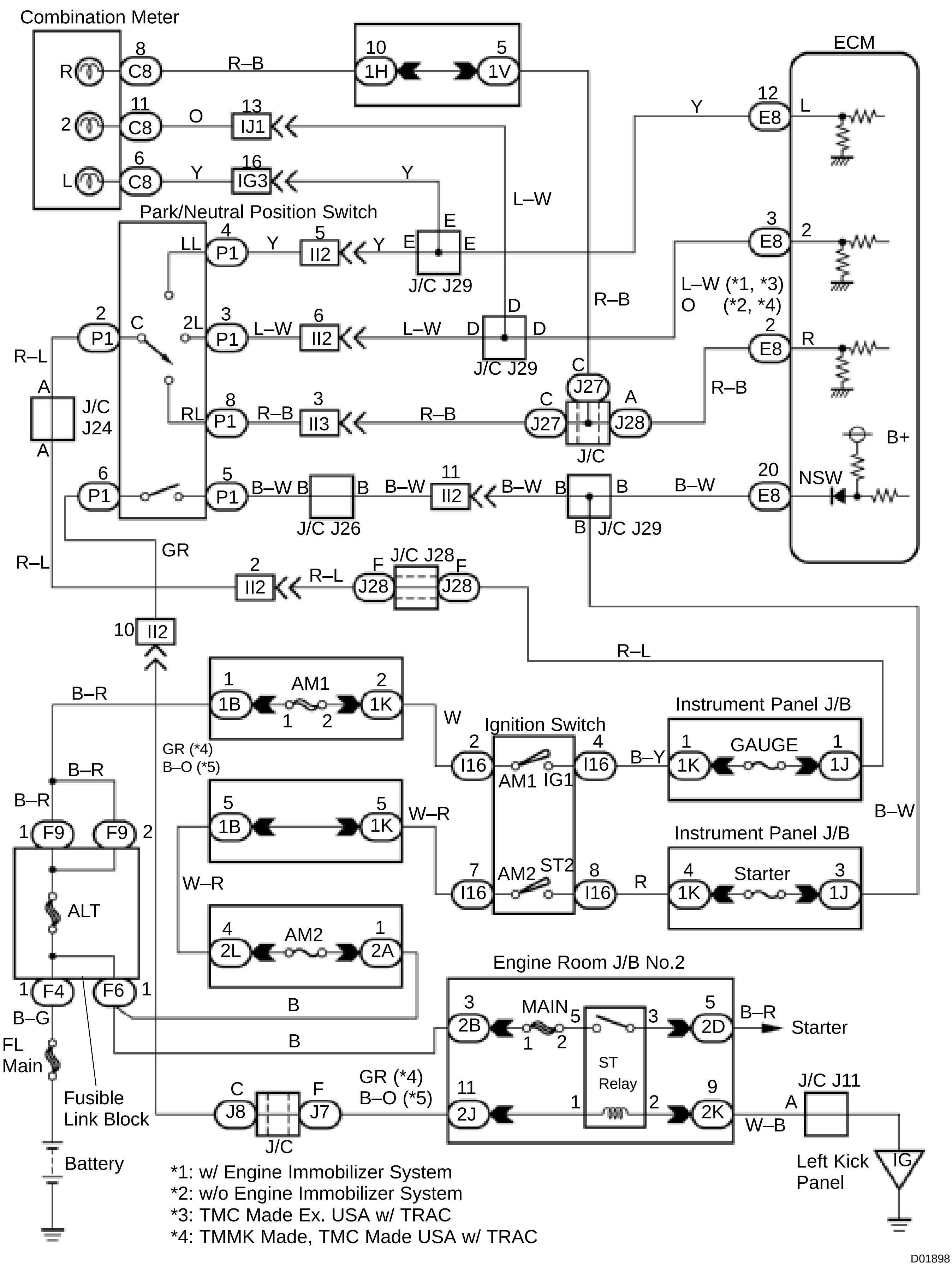
The park/neutral position switch detects the shift lever position and sends signals to the ECM.
The ECM receives signals (NSW, R, 2 and L) from the park/neutral position switch. When the signal is not sent to the ECM from the park/neutral position switch, the ECM judges that the shift lever is in D position.

DTC No.	DTC Detection Condition	Trouble Area
P1780	When driving under conditions (a) and (b) for 30 seconds or more, the park/neutral position switch is ON (N position). (2 trip detection logic) (a) Vehicle speed: 70 km/h (44 mph) or more (b) Engine speed: 1,500 ~ 2,500 rpm	●Short in park/neutral position switch circuit ●Park/neutral position switch ●ECM

WIRING DIAGRAM



California, w/ Engine Immobilizer and / or TRAC:



INSPECTION PROCEDURE

1	**Read PNP, REVERSE, 2ND and LOW signals.**

When using TOYOTA hand–held tester.

PREPARATION:

(a) Remove the DLC3 cover.

(b) Connect a TOYOTA hand–held tester to the DLC3.

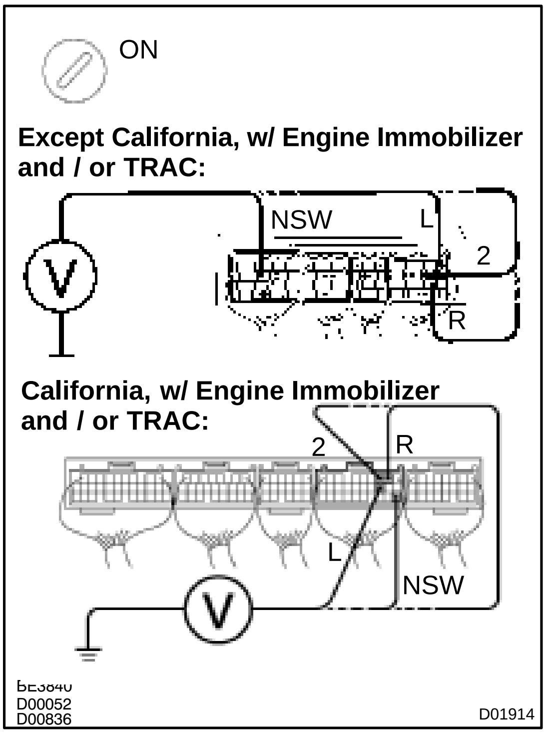
(c) Turn the ignition switch ON and TOYOTA hand–held tester main switch ON.

CHECK:

Shift lever into the P, R, N, 2 and L positions, and read the PNP, REVERSE, 2ND and LOW signals on the TOYOTA hand–held tester.

OK:

Shift position	Signal
2	2ND OFF → ON
L	LOW OFF → ON
R	REVERSE OFF → ON
P, N	NSW OFF → ON



When not using TOYOTA hand–held tester.

PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure voltage between terminals NSW, 2, L and R of ECM and body ground when the shift lever is shifted to the following positions.

OK:

Position	NSW–Body ground	R–Body ground	2–Body ground	L–Body ground
P, N	0 V	0 V	0 V	0 V
R	9 ~ 14 V*	9 ~ 14 V*	0 V	0 V
D	9 ~ 14 V	0 V	0 V	0 V
2	9 ~ 14 V	0 V	9 ~ 14 V	0 V
L	9 ~ 14 V	0 V	0 V	9 ~ 14 V

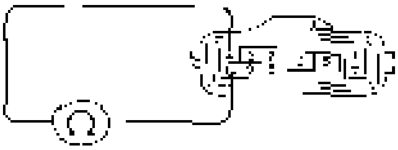
HINT:

*: The voltage will drop slightly due to lighting up of the back up light.

OK → **Proceed to next circuit inspection shown on matrix chart (See page DI–453).**

NG

2 Check park/neutral position switch.


Q07657

PREPARATION:

(a) Jack up the vehicle.

(b) Remove the park/neutral position switch.

CHECK:

Check continuity between each terminal shown below when the shift lever is moved to each position.

Shift Position	Terminal No. to continuity	
P	2 – 7	5 – 6
R	2 – 8	–
N	2 – 9	5 – 6
D	2 – 10	–
2	2 – 3	–
L	2 – 4	–

OK:

There is continuity.

NG → **Replace the park/neutral position switch.**

OK

3 Check harness and connector between battery and park/neutral position switch, park/neutral position switch and ECM (See page IN–31).

NG → **Repair or replace the harness and connector.**

OK

Check and replace the ECM.

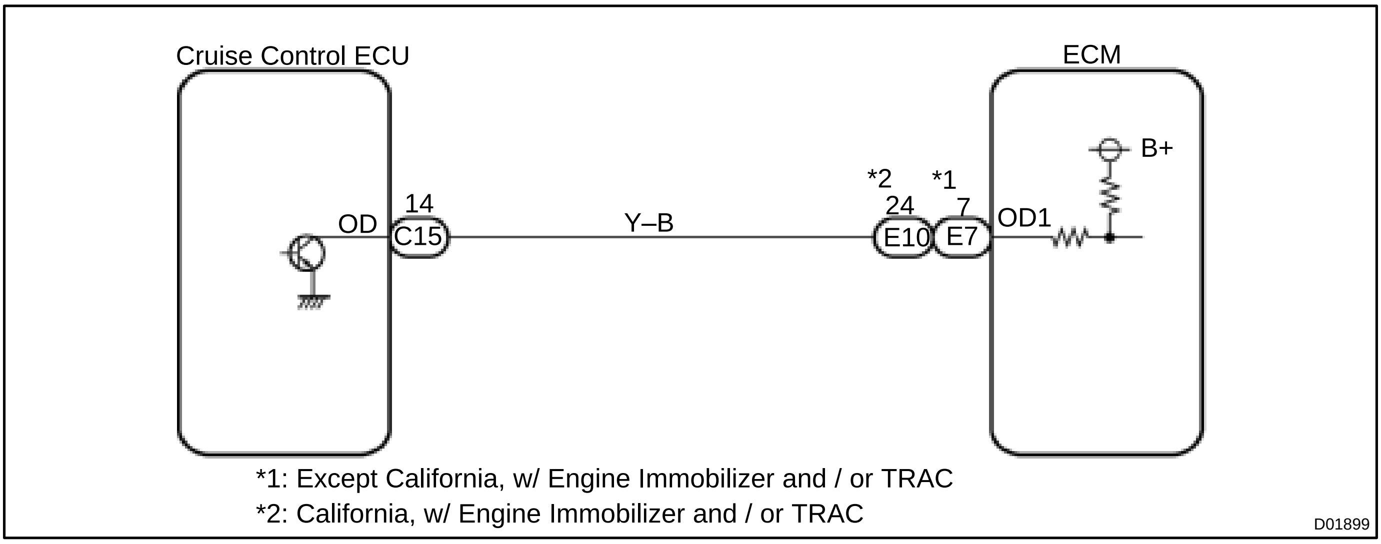
DI02S–02

O/D Cancel Signal Circuit

CIRCUIT DESCRIPTION

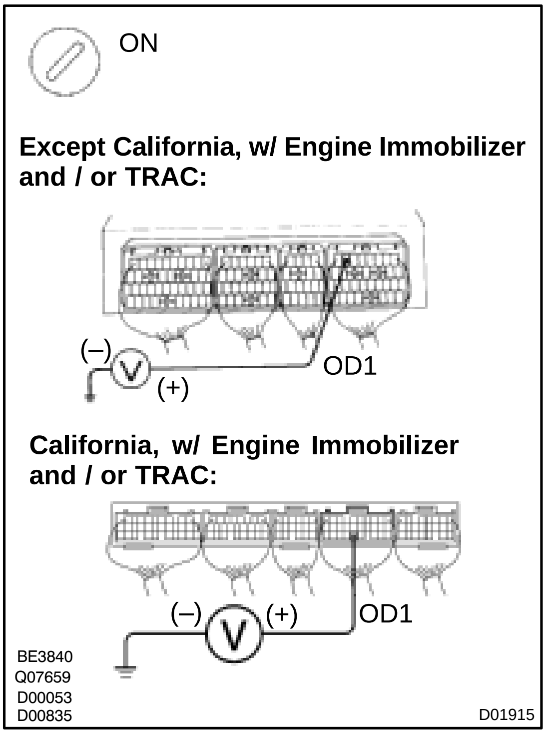
While driving uphill with cruise control activated, in order to minimize gear shifting and provide smooth cruising overdrive may be prohibited temporarily under some condition.
The cruise control ECU sends O/D cut signals to the ECM as necessary and the ECM cancels overdrive shifting until these signals are discontinued.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal OD1 of ECM and body ground.**



PREPARATION:
Turn the ignition switch ON.

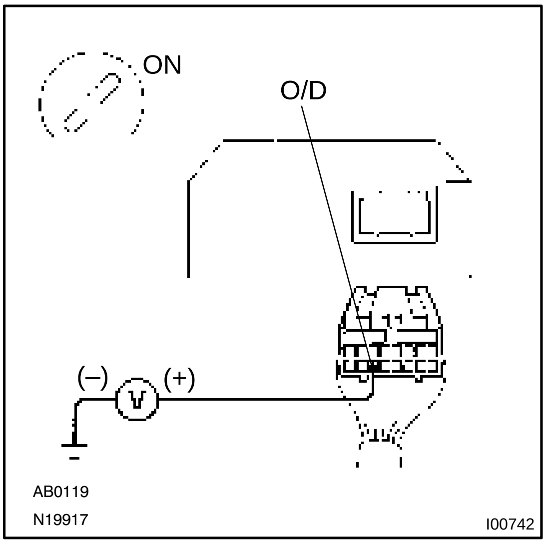
CHECK:
Measure voltage between terminal OD1 of ECM and body ground.

OK:
Voltage: 10 ~ 14 V

OK	**Proceed to next circuit inspection shown on matrix chart (See page DI–453).**

NG

2	Check voltage between terminal OD of cruise control ECU harness side connector and body ground.



PREPARATION:
(a) Disconnect the cruise control ECU connector.
(b) Turn the ignition switch ON.

CHECK:
Measure voltage between terminal OD of cruise control ECU harness side connector and body ground.

OK:
Voltage: 10 ~ 14 V

OK → **Check and replace the cruise control ECU.**

NG ↓

3	Check harness and connector between cruise control ECU and ECM.

NG → **Repair or replace the harness or connector.**

OK ↓

Check and replace the ECM.

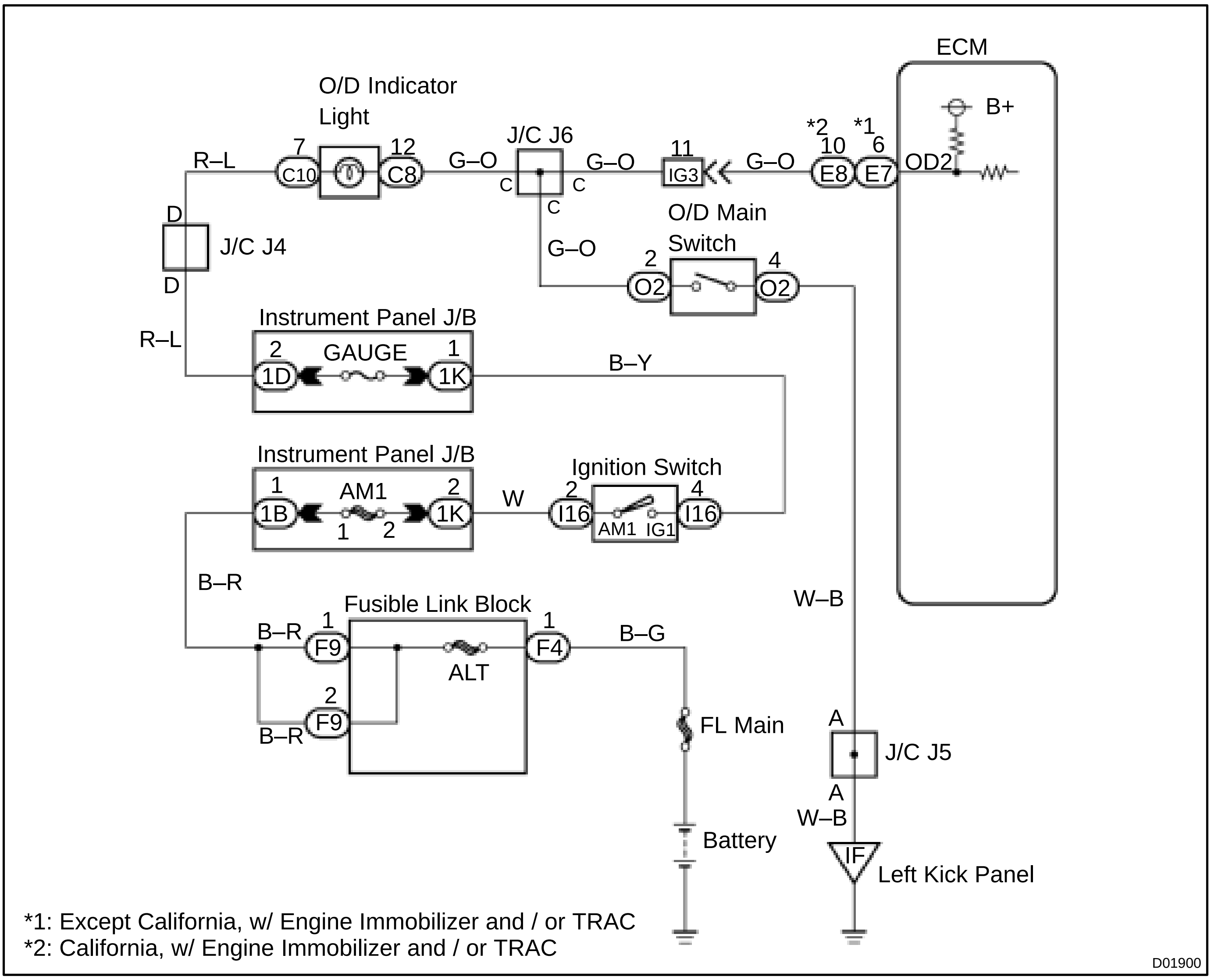
DI1KD–01

O/D Main Switch & O/D OFF Indictor Light Circuit

CIRCUIT DESCRIPTION

The O/D main switch contacts go open when the switch is pushed in and go closed when it is pushed out. In O/D main switch at OFF position, the O/D OFF indicator light lights up, and the ECM prohibits shifting over-drive.

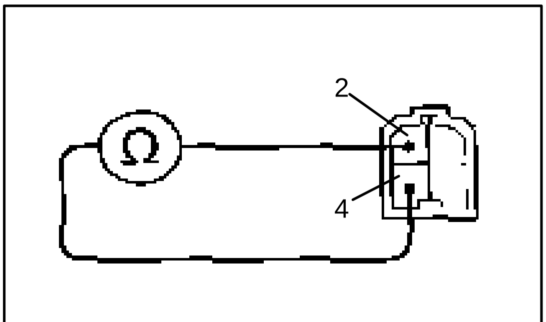
WIRING DIAGRAM



INSPECTION PROCEDURE

O/D OFF indicator light does not light up

1	**Check O/D main switch.**



Q07595

PREPARATION:
Disconnect the O/D main switch connector.
CHECK:
Check continuity between terminals 2 and 4 of O/D main switch connector.
OK:

O/D main switch	Resistance
ON	∞ Ω (open)
OFF	0 Ω (continuity)

NG → **Replace the O/D main switch.**

OK

2	**Check and replace the combination meter (See page BE–2).**

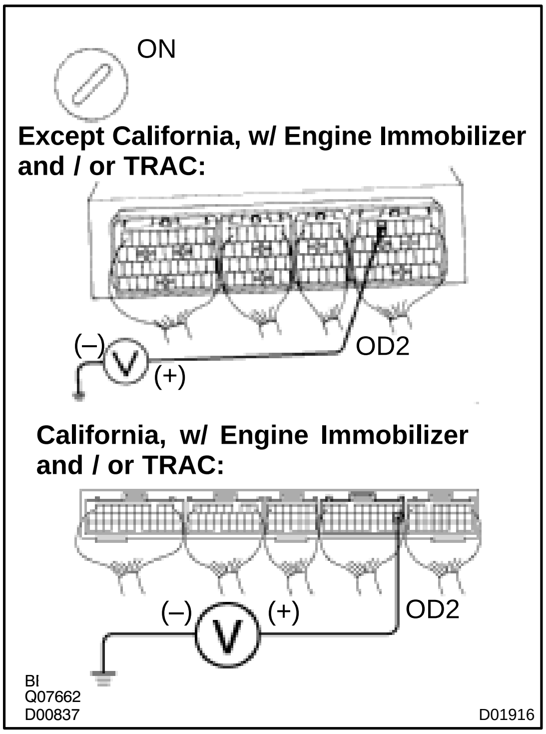
NG → **Replace the combination meter.**

OK

3	**Check OVRDRIVE CUT SW2 signal.**

When using TOYOTA hand–held tester
PREPARATION:
(a) Connect a TOYOTA hand–held tester to the DLC3.
(b) Turn the ignition switch ON and TOYOTA hand–held tester main switch ON.
CHECK:
Read the OVRDRIVE CUT SW2 signal on the TOYOTA hand–held tester.
OK:

O/D main switch condition	OVRDRIVE CUT SW2 signal
Pushed in	OFF
Pushed out	ON



When not using TOYOTA hand–held tester

PREPARATION:

Turn the ignition switch ON.

CHECK:

Check voltage between terminal OD2 of ECM and body ground.

OK:

O/D main switch	Voltage
OFF	Below 1 V
ON	10 ~ 14 V

NG → **Check and replace the ECM.**

NG

4	Check harness and connector between O/D OFF indicator light and ECM (See page IN–31).

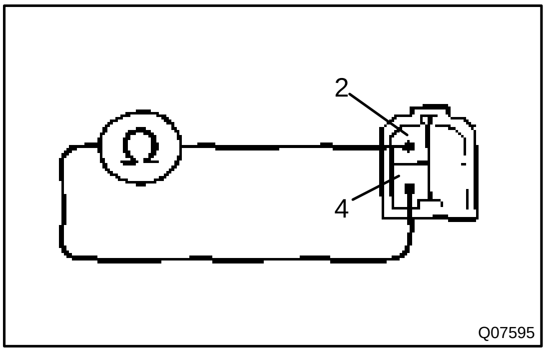
NG → **Repair or replace the harness or connector.**

OK

Check and replace the ECM.

O/D OFF indicator light remains on

1	Check O/D main switch.



PREPARATION:
Disconnect the O/D main switch connector.
CHECK:
Check continuity between terminals 2 and 4 of O/D main switch connector.
OK:

O/D main switch	Resistance
ON	∞ Ω (open)
OFF	0 Ω (continuity)

NG → **Replace the O/D main switch.**

OK

2	Check harness and connector between O/D OFF indicator light and O/D main switch, O/D OFF indicator light and ECM (See page IN–31).

NG → **Repair or replace the harness or connector.**

OK

Check and replace the ECM.

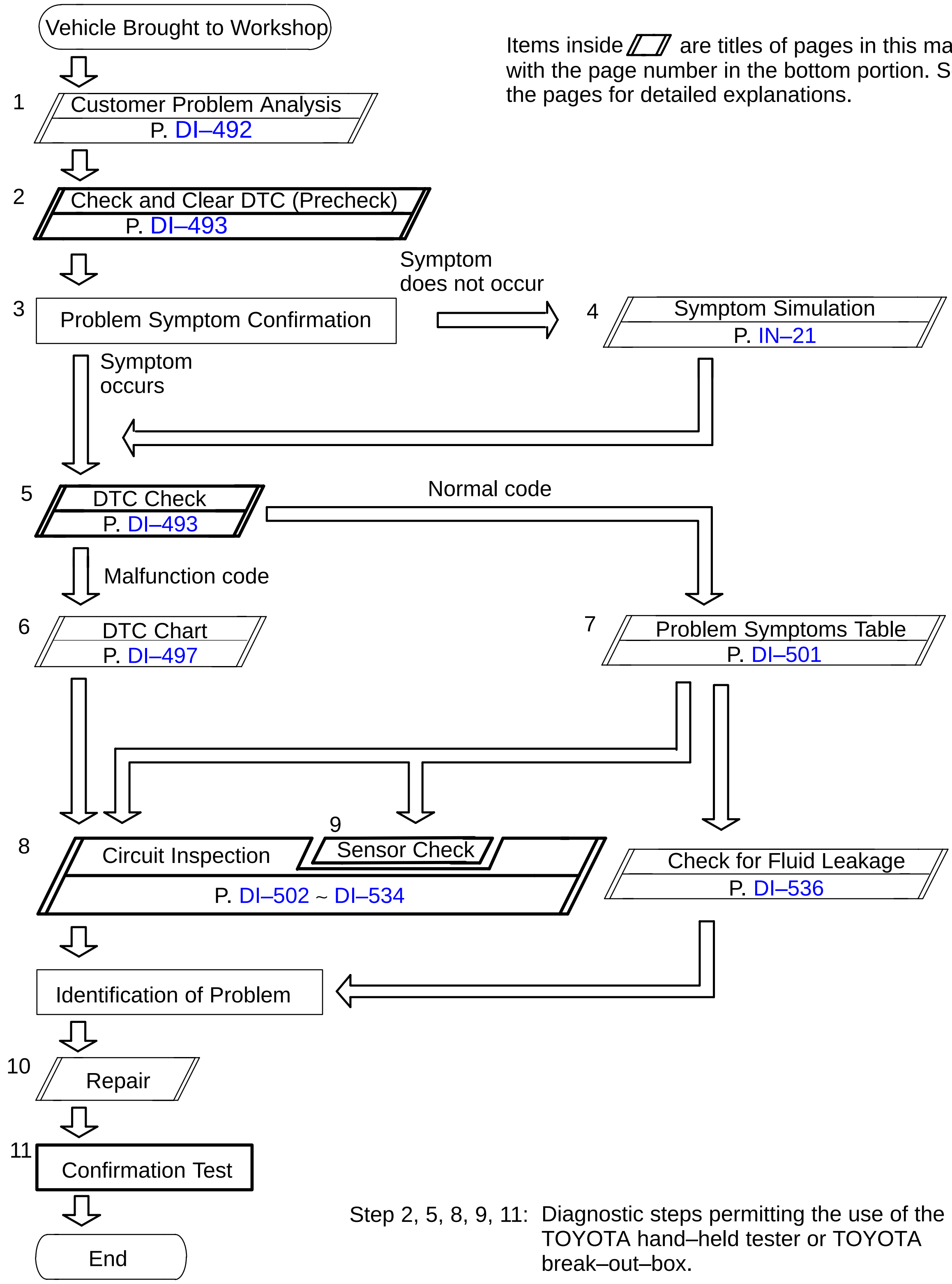
ANTI–LOCK BRAKE SYSTEM (DENSO Made)

DI03A–02

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot in accordance with the procedure on the following pages.

Items inside ▱ are titles of pages in this manual, with the page number in the bottom portion. See the pages for detailed explanations.



Step 2, 5, 8, 9, 11: Diagnostic steps permitting the use of the TOYOTA hand–held tester or TOYOTA break–out–box.

DI03B–02

CUSTOMER PROBLEM ANALYSIS CHECK

ABS Check Sheet

Inspector's Name :

Customer's Name		**Registration No.**	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

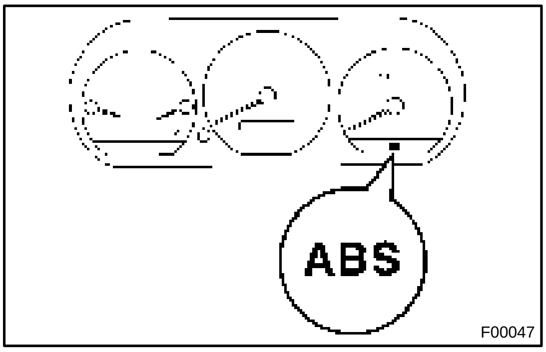
Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ ABS does not operate.	
	☐ ABS does not operate efficiently.	
	ABS Warning Light Abnormal	☐ Remains ON ☐ Does not Light Up

DTC Check	**1st Time**	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)

DI03C–03

PRE–CHECK



F00047

1. DIAGNOSIS SYSTEM

(a) Check the indicator.

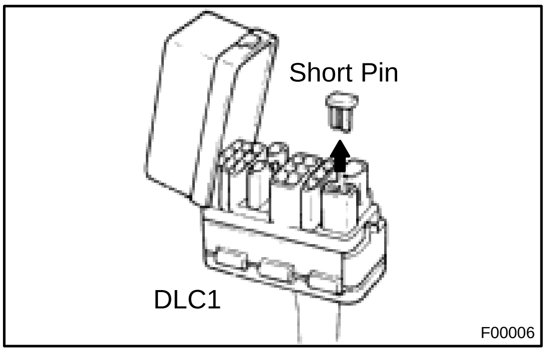
When the ignition switch is turned ON, check that the ABS warning light goes on for 3 seconds.

HINT:

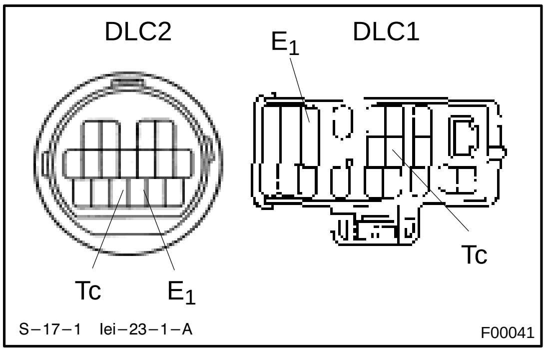
If the indicator check result is not normal, proceed to troubleshooting for the ABS warning light circuit (See page DI–529).

(b) Check the DTC.

(1) Disconnect the short pin from DLC1.



F00006



F00041

(2) Using SST, connect terminals Tc and E_1 of DLC2 or DLC1.

SST 09843 – 18020

(3) Turn the ignition switch ON.

(4) Read the DTC from the ABS warning light on the combination meter.

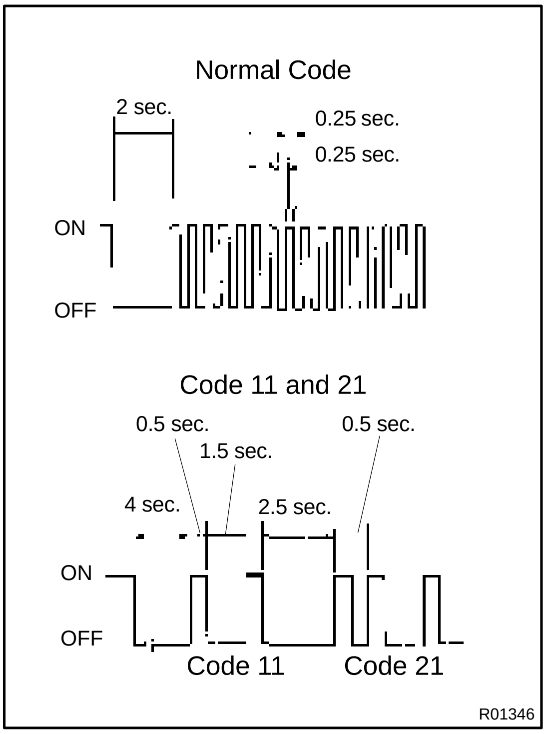
HINT:

- If no code appears, inspect the diagnostic circuit or ABS warning light circuit (See page DI–532 or DI–529).
- As an example, the blinking patterns for normal code and codes 11 and 21 are shown on the left.

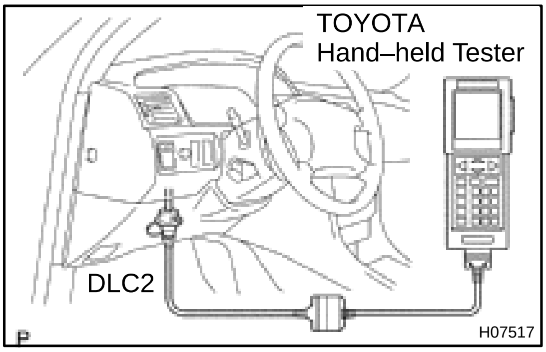
(5) Codes are explained in the code table on page DI–497.

(6) After completing the check, disconnect terminals Tc and E_1, and turn off the display.

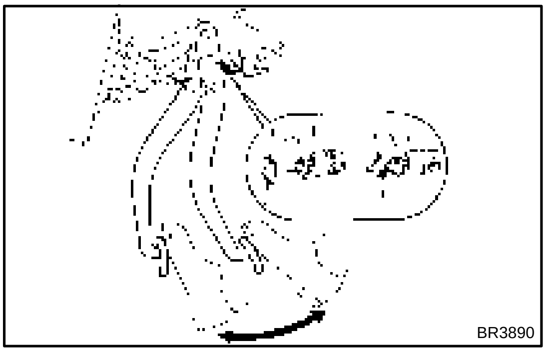
If 2 or more malfunctions are indicated at the same time the lowest numbered DTC will be displayed 1st.



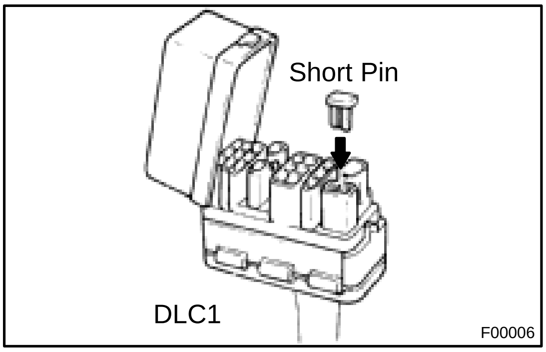
R01346



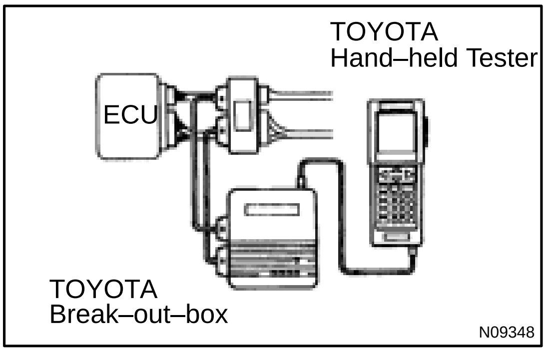
(c) Using TOYOTA hand–held tester, check the DTC.
(1) Hook up the TOYOTA hand–held tester to the DLC2.
(2) Read the DTC by following the prompts on the tester screen.
Please refer to the TOYOTA hand–held tester operator's manual for further details.



(d) Clear the DTC.
(1) Using SST, connect terminals Tc and E_1 of DLC2 or DLC1 and remove the short pin from DLC1.
SST 09843 – 18020
(2) Turn the ignition switch ON.
(3) Clear the DTC stored in ECU by depressing the brake pedal 8 or more times within 5 seconds.

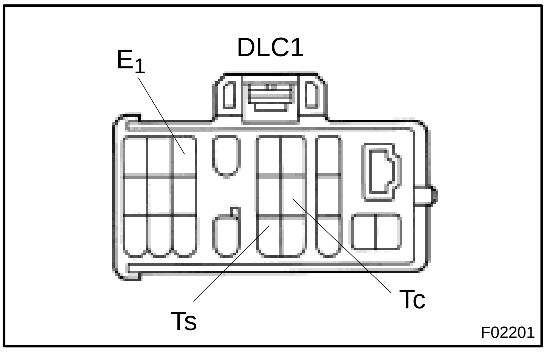


(4) Check that the warning light shows the normal code.
(5) Remove the SST from the terminals of DLC2 or DLC1.
SST 09843 – 18020
(6) Connect the short pin to DLC1.



(e) Using TOYOTA break–out–box and TOYOTA hand–held tester, measure the ECU terminal values.
(1) Hook up the TOYOTA hand–held tester and TOYOTA break–out–box to the vehicle.
(2) Read the ECU input/output values by following the prompts on the tester screen.

HINT:
TOYOTA hand–held tester has a "Snapshot" function. This records the measured values and is effective in the diagnosis of intermittent problems.
Please refer to the TOYOTA hand–held tester/TOYOTA break–out–box operator's manual for further details.



2. SPEED SENSOR SIGNAL

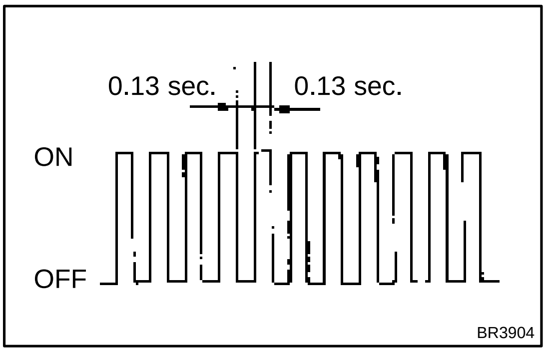
(a) Check the speed sensor signal.

(1) Turn the ignition switch OFF.

(2) Using SST, connect terminals Ts and E_1 of DLC1.

SST 09843 – 18020

(3) Start the engine.



(4) Check that the ABS warning light blinks.

HINT:

If the ABS warning light does not blink, inspect the ABS warning light circuit (See page DI–529).

(5) Drive vehicle straight forward.

HINT:

Drive vehicle faster than 45 km/h (28 mph) for several seconds.

(6) Stop the vehicle.

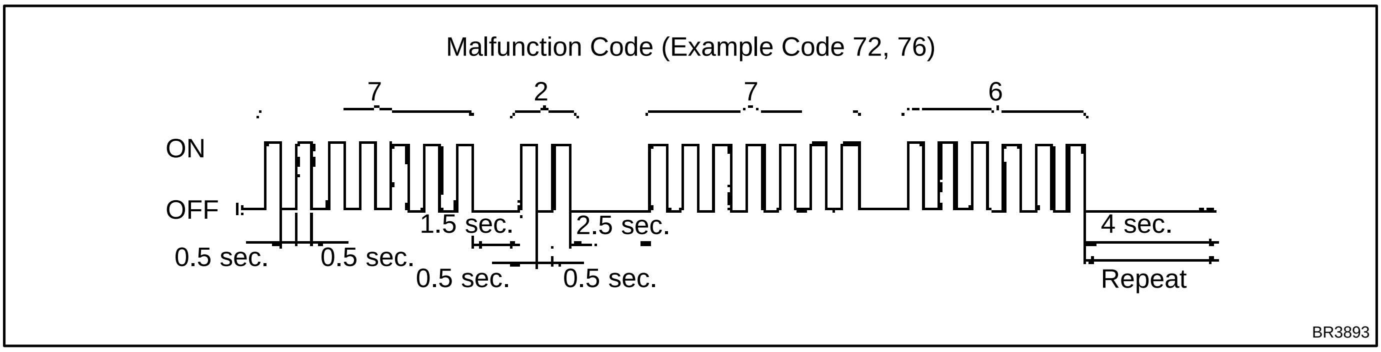
(7) Using SST, connect terminals Tc and E_1 of DLC1.

SST 09843 – 18020

(8) Read the number of blinks of the ABS warning light.

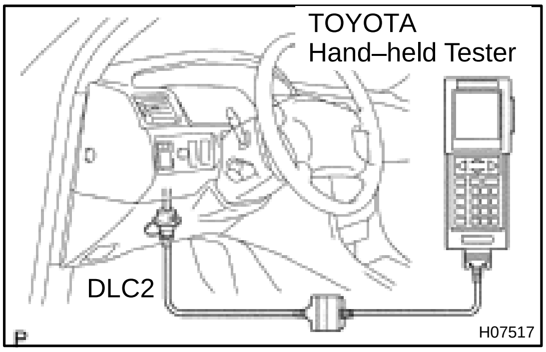
HINT:

- See the list of DTC shown on the next page.
- If every sensor is normal, a normal code is output (A cycle of 0.25 sec. ON and 0.25 sec. OFF is repeated).
- If 2 or more malfunctions are indicated at the same time, the lowest numbered code will be displayed 1st.



(9) After doing the check, disconnect the SST from terminals Ts and E_1, Tc and E_1 of DLC1, and turn ignition switch OFF.

SST 09843 – 18020



(b) Using TOYOTA hand–held tester, check the DTC.
(1) Do step 1. ~ 6. on the previous page.
(2) Hook up the TOYOTA hand–held tester to the DLC2.
(3) Read the DTC by following the prompts on the tester screen.
Please refer to the TOYOTA hand–held tester operator's manual for further details.

DTC of speed sensor check function:

Code No.	Diagnosis	Trouble Area
71	Low output voltage of right front speed sensor	●Right front speed sensor ●Sensor installation ●Right front speed sensor rotor
72	Low output voltage of left front speed sensor	●Left front speed sensor ●Sensor installation ●Left front speed sensor rotor
73	Low output voltage of right rear speed sensor	●Right rear speed sensor ●Sensor installation ●Right rear speed sensor rotor
74	Low output voltage of left rear speed sensor	●Left rear speed sensor ●Sensor installation ●Left rear speed sensor rotor
75	Abnormal change in output voltage of right front speed sensor	●Right front speed sensor rotor
76	Abnormal change in output voltage of left front speed sensor	●Left front speed sensor rotor
77	Abnormal change in output voltage of right rear speed sensor	●Right rear speed sensor rotor
78	Abnormal change in output voltage of left rear speed sensor	●Left rear speed sensor rotor

DI03D–03

DIAGNOSTIC TROUBLE CODE CHART

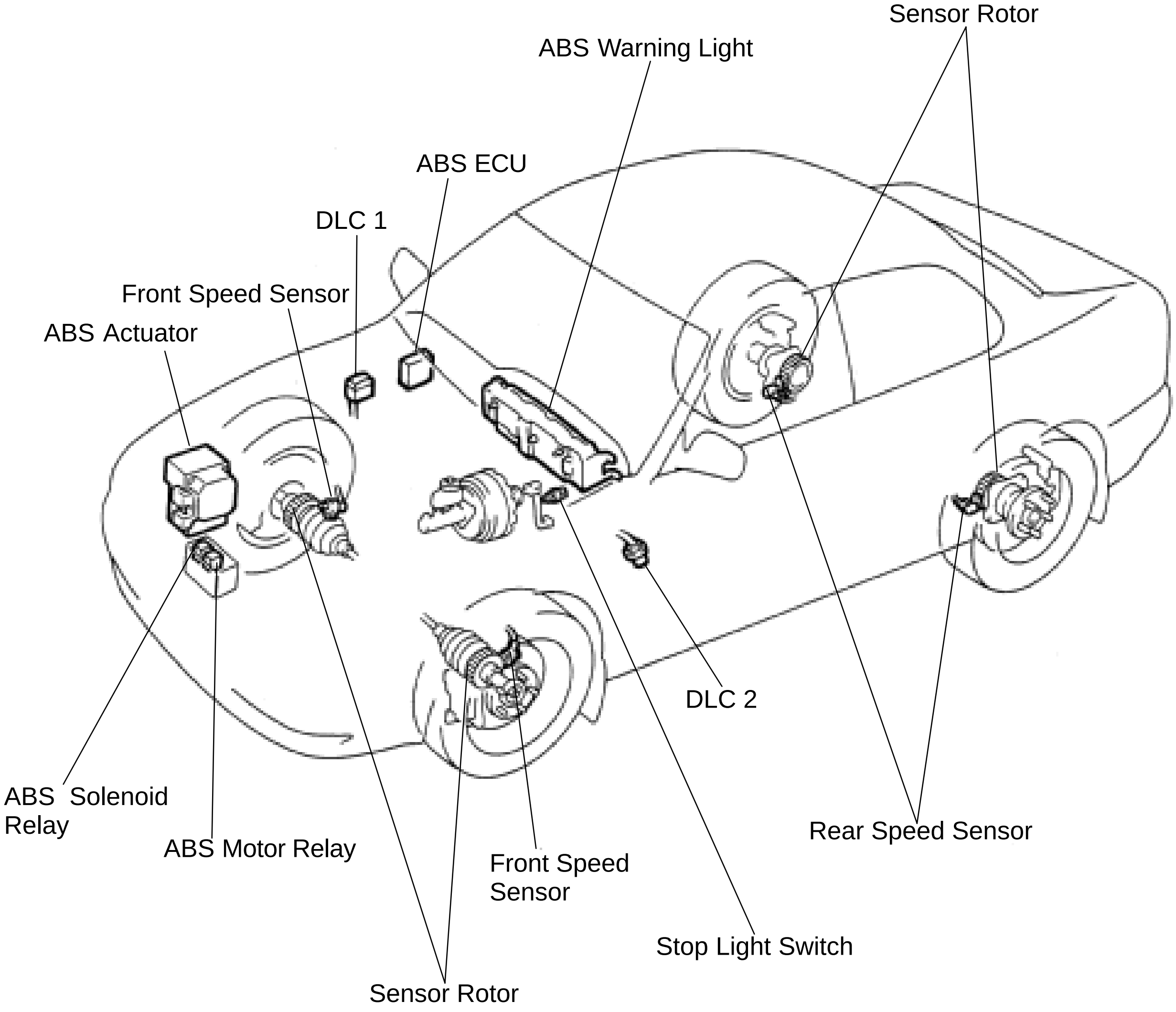
HINT:

- Using SST 09843 –18020, connect the terminals Tc and E_1, and remove the short pin.
- If any abnormality is not found when inspection parts, inspect the ECU.
- If a malfunction code is displayed during the DTC check, check the circuit listed for the code. For details of each code, turn to the page referred to under the ”See page” for respective ”DTC No.” in the DTC chart.

DTC No. (See Page)	Detection Item	Trouble Area
11 (DI–502)	Open circuit in ABS solenoid relay circuit	●ABS solenoid relay ●ABS solenoid relay circuit
12 (DI–502)	Short circuit in ABS solenoid relay circuit	
13 (DI–507)	Open circuit in ABS motor relay circuit	●ABS motor relay ●ABS motor relay circuit
14 (DI–507)	Short circuit in ABS motor relay circuit	
21 (DI–511)	Open or short circuit in 2–position solenoid circuit for right front wheel	●ABS actuator ●SFRR or SFRH circuit
22 (DI–511)	Open or short circuit in 2–position solenoid circuit for left front wheel	●ABS actuator ●SFLR or SFLH circuit
23 (DI–511)	Open or short circuit in 2–position solenoid circuit for right rear wheel	●ABS actuator ●SRRR or SRRH circuit
24 (DI–511)	Open or short circuit in 2–position solenoid circuit for left rear wheel	●ABS actuator ●SRLR or SRLH circuit
31 (DI–514)	Right front wheel speed sensor signal malfunction	●Right front, left front, right rear and left rear speed sensor ●Each speed sensor circuit ●Speed sensor rotor
32 (DI–514)	Left front wheel speed sensor signal malfunction	
33 (DI–514)	Right rear wheel speed sensor signal malfunction	
34 (DI–514)	Left rear wheel speed sensor signal malfunction	
33, 34 (DI–519)	Rear speed sensor rotor faulty	●Rear axle hub ●Right rear, left rear speed sensor ●Rear speed sensor circuit
41 (DI–520)	Power source voltage down	●Battery ●Charging system ●Power source circuit
49 (DI–523)	Open circuit in stop light switch circuit	●Stop light switch ●Stop light switch circuit
51 (DI–525)	Pump motor is locked	●ABS pump motor
Always ON (DI–527)	Malfunction in ECU	●ECU ●Battery

DI03E–03

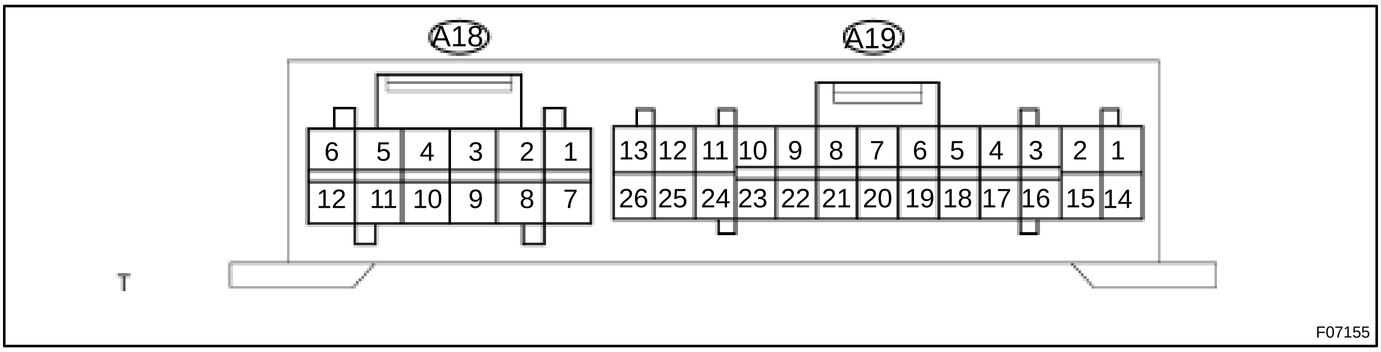
PARTS LOCATION



F01172

DI1JL–02

TERMINALS OF ECU



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
IG1 (A19 – 13) – GND (A19 – 12, 25)	B–R ↔ W–B	IG switch ON	10 – 14
R+ (A19 – 26) – SR (A18 – 7)	GR–R ↔ GR	IG switch ON, ABS warning light OFF	9 – 14
R+ (A19 – 26) – MR (A18 – 1)	GR–R ↔ GR–L	IG switch ON	Below 1.0
SFRR (A19 – 1) – GND (A19 – 12, 25)	W–R ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SFRH (A19 – 2) – GND (A19 – 12, 25)	R–B ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SFLR (A18 – 6) – GND (A19 – 12, 25)	W–L ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SFLH (A18 – 5) – GND (A19 – 12, 25)	L–B ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SRRR (A18 – 12) – GND (A19 – 12, 25)	R–G ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SRRH (A18 – 11) – GND (A19 – 12, 25)	W–R ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SRLR (A19 – 14) – GND (A19 – 12, 25)	LG–B ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SRLH (A19 – 15) – GND (A19 – 12, 25)	G–Y ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
WA (A19 – 11) – GND (A19 – 12, 25)	G–B ↔ W–B	IG switch ON, ABS warning light ON	Below 2.0
		IG switch ON, ABS warning light OFF	10 – 14
STP (A19 – 5) – GND (A19 – 12, 25)	G–W ↔ W–B	Stop light switch OFF	Below 1.5
		Stop light switch ON	8 – 14
D/G (A19 – 24) – GND (A19 – 12, 25)	R–L ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
Tc (A19 – 8) – GND (A19 – 12, 25)	LG–R ↔ W–B	IG switch ON	8 – 14
Ts (A19 – 21) – GND (A19 – 12, 25)	R–Y ↔ W–B	IG switch ON	8 – 14
FR+ (A18 – 3) – FR– (A18 – 9)	W ↔ B	IG switch ON, slowly turn right front wheel	AC generation
FL+ (A18 – 8) – FL– (A18 – 2)	R ↔ G	IG switch ON, slowly turn left front wheel	AC generation
RR+ (A19 – 10) – RR– (A19 – 23)	W ↔ B	IG switch ON, slowly turn right rear wheel	AC generation

RL+ (A19 – 22) – RL– (A19 – 9)	R ↔ G	IG switch ON, slowly turn left rear wheel	AC generation
MT (A18 – 10) – GND (A18 – 12, 25)	R–W ↔ W–B	IG switch ON	Below 1.5

DI03G–04

PROBLEM SYMPTOMS TABLE

If a normal code is displayed during the DTC check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

Symptom	Suspect Area	See page
ABS does not operate	Only when 1. to 4. are all normal and the problem is still occurring, replace the ABS ECU. 13.Check the DTC reconfirming that the normal code is output. 14.IG power source circuit. 15.Speed sensor circuit. 16.Check the ABS actuator with a checker. If abnormal, check the hydraulic circuit for leakage (See page DI–536).	DI–493 DI–520 DI–514 BR–50
ABS does not operate efficiently	Only when 1. τo 4. are all normal and the problem is still occurring, replace the ABS ECU. 1. Check the DTC reconfirming that the normal code is output. 2. Speed sensor circuit 3. Stop light switch circuit 4. Check the ABS actuator with a checker. If abnormal, check the hydraulic circuit for leakage (See page DI–536).	DI–493 DI–514 DI–523 BR–50
ABS warning light abnormal	1. ABS warning light circuit 2. ABS ECU	DI–529 DI–527
DTC check cannot be done	Only when 1. and 2. are all normal and the problem is still occurring, replace the ABS ECU. 1. ABS warning light circuit 2. Tc terminal circuit	DI–529 DI–532
Speed sensor signal check cannot be done	1. Ts terminal circuit 2. ABS ECU	DI–534 DI–527

CIRCUIT INSPECTION

DTC	11, 12	ABS Solenoid Relay Circuit

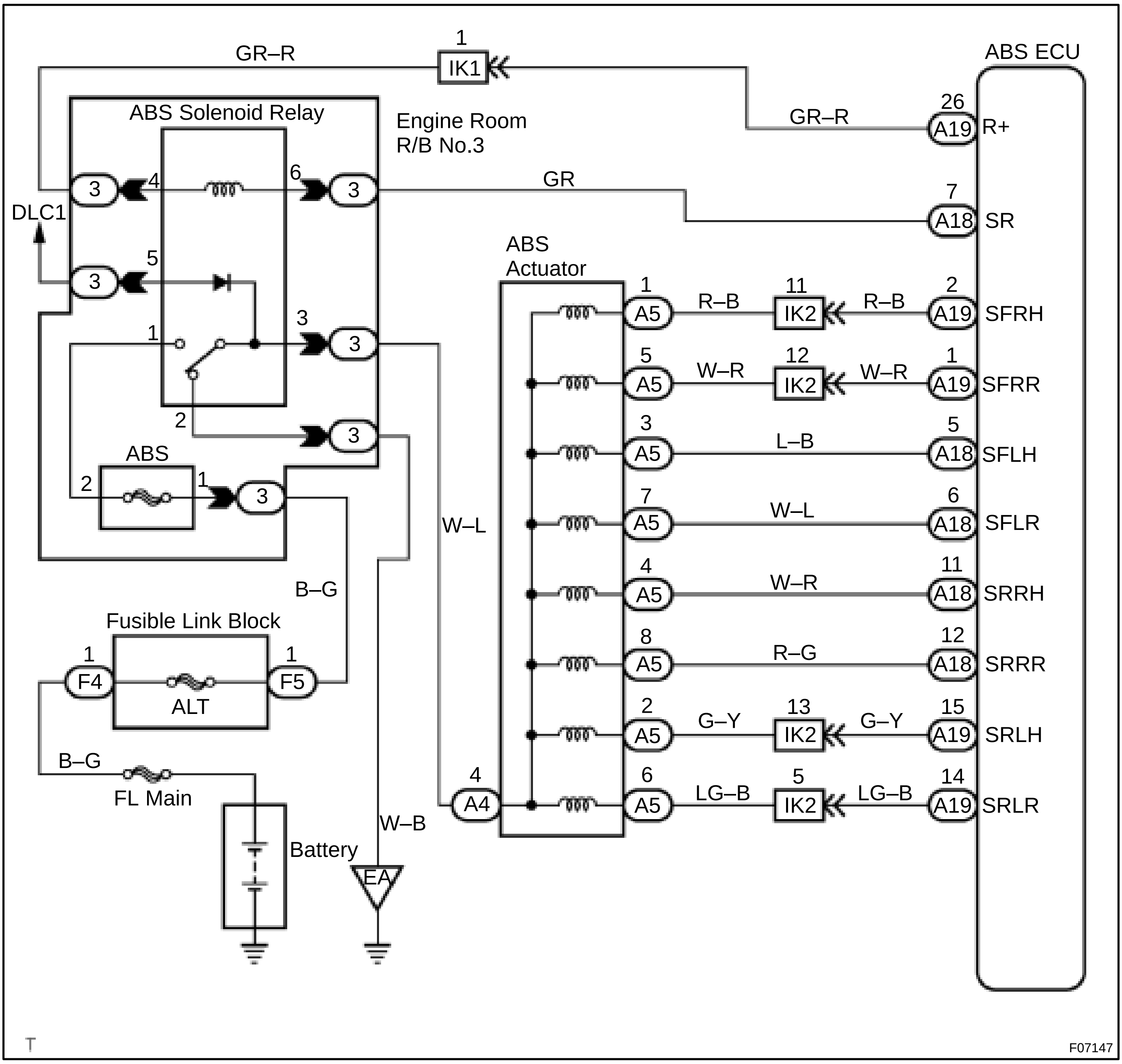
CIRCUIT DESCRIPTION

This relay supplies power to each ABS solenoid. After the ignition switch is turned ON, if the initial check is OK, the relay goes on.

DTC No.	DTC Detecting Condition	Trouble Area
11	Condition 1. or 2. continues for 0.2 sec. or more: 1. IG1 terminal voltage of ABS ECU is 9.5 – 18.5 V, and when the solenoid relay is ON.*1 2. With solenoid relay ON driving, when IG1 terminal of ABS ECU is less than 9.5 V.*1	●ABS solenoid relay ●ABS solenoid relay circuit ●ECU
12	Immediately after IG switch has been turned ON, when the solenoid relay is OFF.*2	

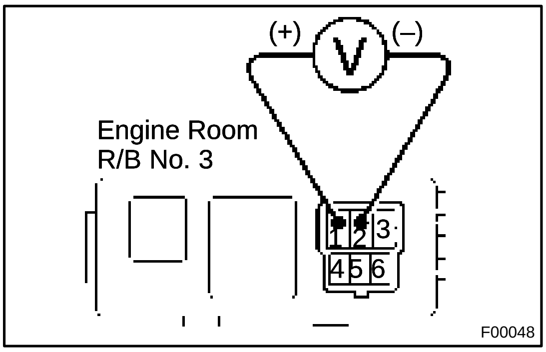
*1 Solenoid relay contact OFF condition:
All of solenoid terminal voltage is half of IG1 terminal voltage or less than.
*2 Solenoid relay contact ON condition:
All of solenoid terminal voltage is half of IG 1 terminal voltage or more.
Fail safe function:
If trouble occurs in the ABS solenoid relay circuit, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals 1 and 2 of Engine Room R/B No. 3 (for ABS solenoid relay).**



PREPARATION:
Remove ABS solenoid relay from Engine Room R/B No. 3.

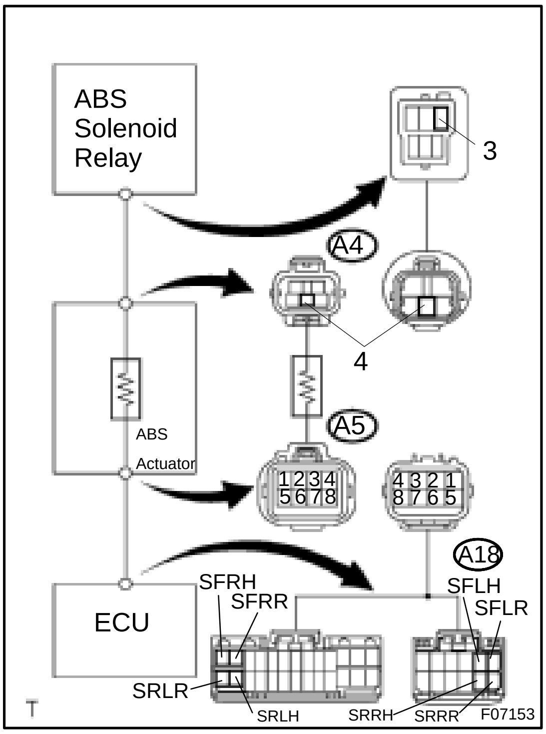
CHECK:
Measure the voltage between terminals 1 and 2 of Engine Room R/B No. 3 (for ABS solenoid relay).

OK:
Voltage: 10 – 14 V

NG → **Check and repair harness or connector.**

OK

2	**Check continuity between terminal 3 of ABS solenoid relay and terminal SRLR, SRLH, SRRR, SRRH, SFLR, SFLH, SFRR or SFRH of ABS ECU.**



CHECK:
Check continuity between terminal 3 of Engine Room R/B No.3 (for ABS solenoid relay) and terminal SRLR, SRLH, SRRR, SRRH, SFLR, SRLH, SFRR or SFRH of ABS ECU.

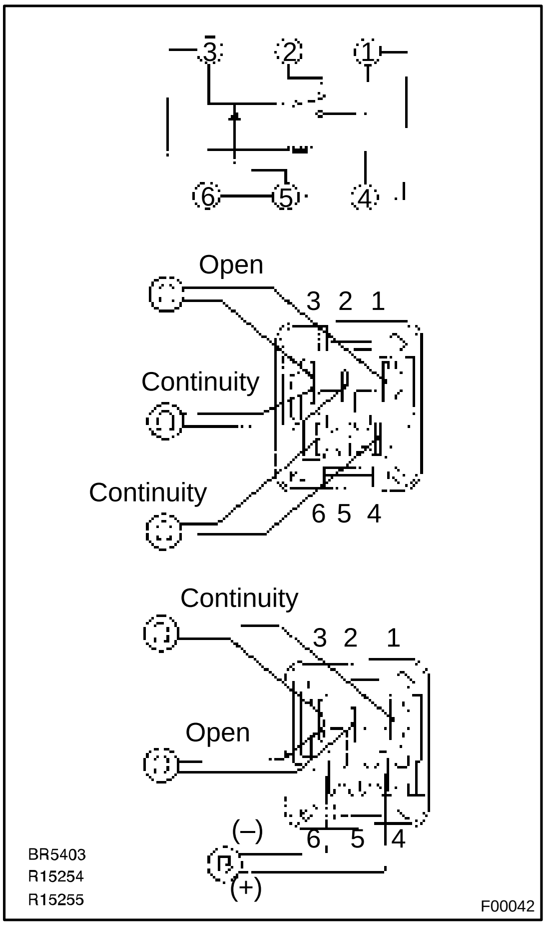
OK:
Continuity

HINT:
Resistance of each solenoid coil
SRLR, SRRR, SFLR, SFRR: 4.3 Ω
SRLH, SRRH, SFLH, SFRH: 8.8 Ω

NG → **Repair or replace harness or ABS actuator.**

OK

3	Check ABS solenoid relay.



CHECK:

Check continuity between each terminal of ABS solenoid relay.

OK:

Terminals 4 and 6	Continuity (Reference value 80 Ω)
Terminals 2 and 3	Continuity
Terminals 1 and 3	Open

CHECK:

(a) Apply battery positive voltage between terminals 4 and 6.

(b) Check continuity between each terminal of ABS solenoid relay.

OK:

Terminals 2 and 3	Open
Terminals 1 and 3	Continuity

NG → **Replace ABS solenoid relay.**

OK

4	Check for open and short circuit in harness and connector between ABS solenoid relay and ABS ECU (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

DI03I–03

DTC	13, 14	ABS Motor Relay Circuit

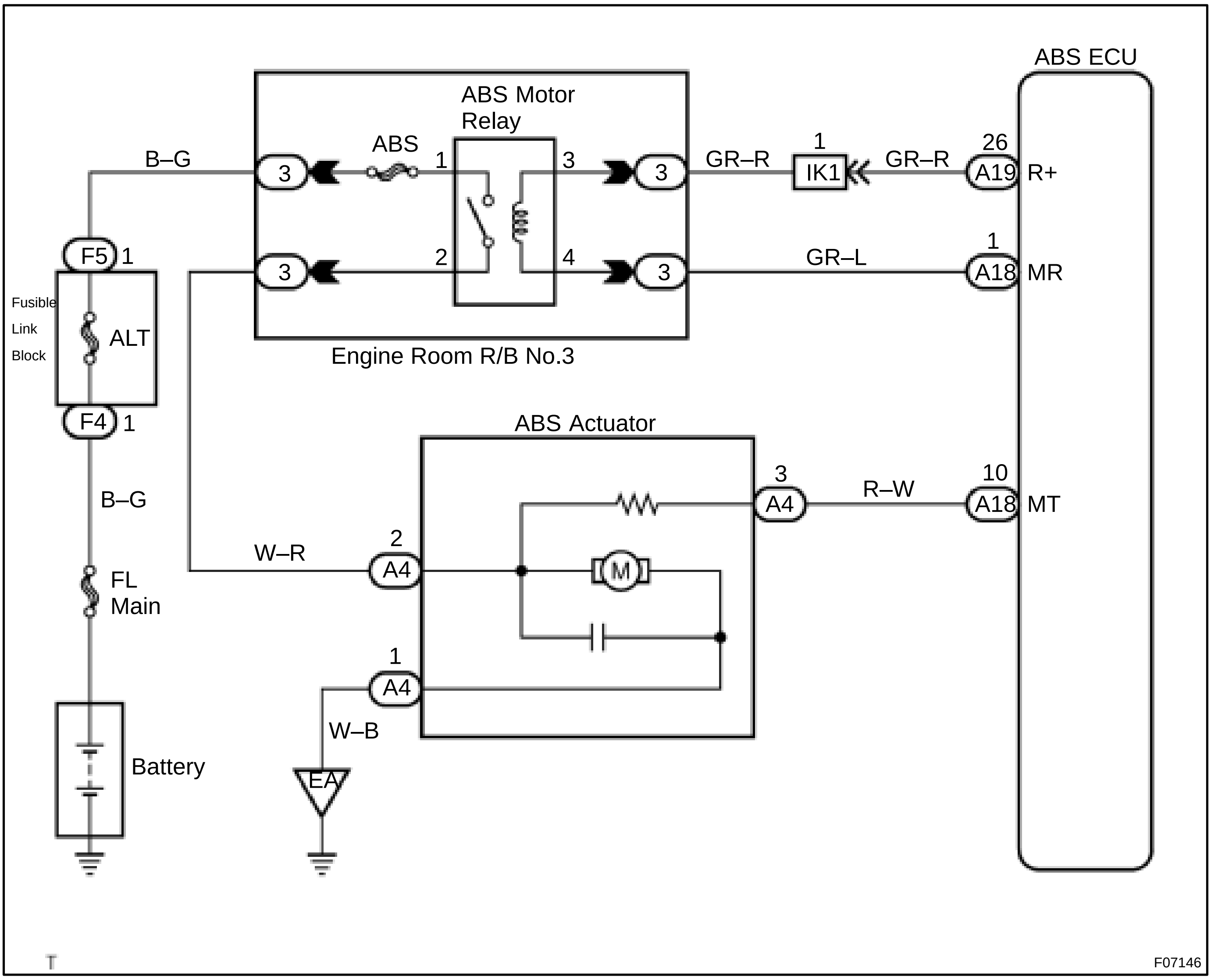
CIRCUIT DESCRIPTION

The ABS motor relay supplies power to the ABS pump motor. While the ABS is activated, the ECU switches the ABS motor relay ON and operates the ABS pump motor.

DTC No.	DTC Detecting Condition	Trouble Area
13	Condition 1. or 2. continues for 0.2 sec. or more: 1. ABS ECU terminal IG1 voltage is 9.5 V to 18.5 V, and when motor relay is ON in the midst of initial check or in operation of ABS control.*1 2. Motor relay is ON driving in the midst of initial check or in operation of ABS control, ABS ECU terminal IG1 voltage becomes 9.5 V or less.*2	●ABS motor relay ●ABS motor relay circuit ●ECU
14	Condition below continues for 4 sec. or more: When the motor relay is OFF, there is open circuit in MT terminal of ABS ECU.	

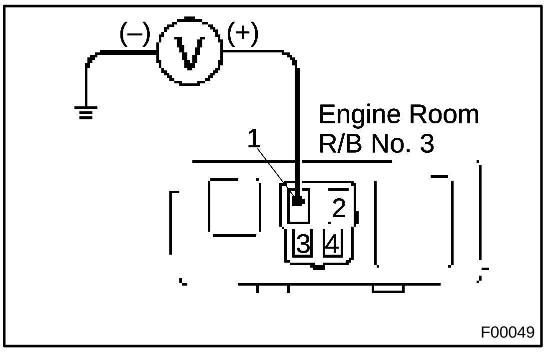
*1 Relay contact OFF condition: MT terminal voltage is below 3.6 V.
*2 Relay contact ON condition: MT terminal voltage is 3.6 V or above.
Fail safe function:
If trouble occurs in the ABS motor relay circuit, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminal 1 of Engine Room R/B No. 3 (for ABS motor relay) and body ground.

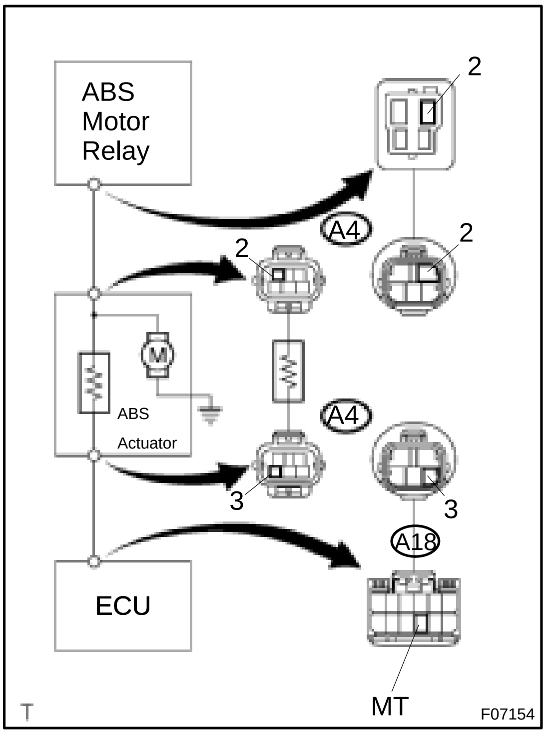


PREPARATION:
Remove ABS motor relay from Engine Room R/B No. 3.
CHECK:
Measure voltage between terminal 1 of Engine Room R/B No. 3 (for ABS motor relay) and body ground.
OK:
Voltage: 10 – 14 V

NG → **Check and repair harness or connector.**

OK

2	Check continuity between terminal 2 of ABS motor relay and terminal MT of ABS ECU.

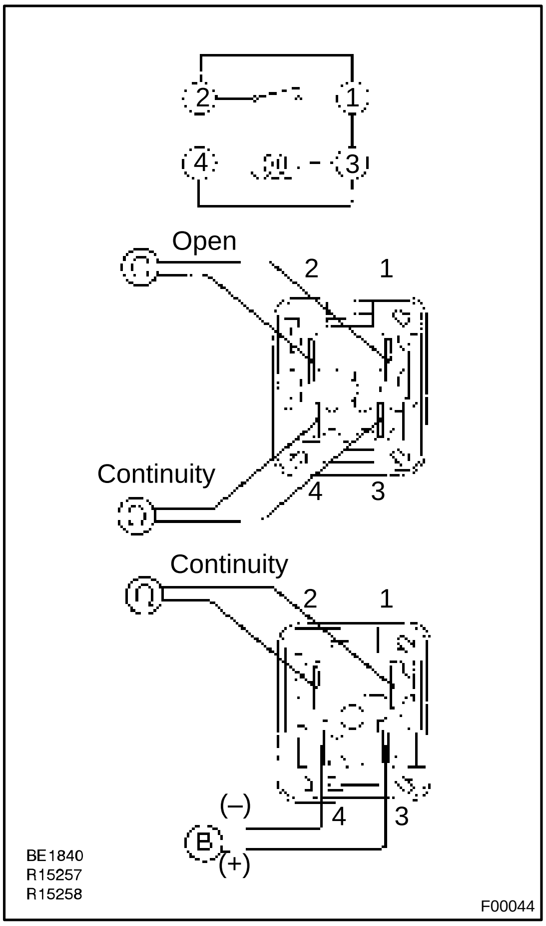


CHECK:
Check continuity between terminal 2 of Engine Room R/B No.3 (for ABS motor relay) and terminal MT of ABS ECU.
OK:
Continuity
HINT:
There is a resistance of 4 ~ 6 Ω between terminals A4 – 2 and A4 – 3 of ABS actuator.

NG → **Repair or replace harness or ABS actuator.**

OK

3	Check ABS motor relay.



CHECK:

Check continuity between each terminal of ABS motor relay.

OK:

Terminals 3 and 4	Continuity (Reference value 62 Ω)
Terminals 1 and 2	Open

CHECK:

(a) Apply battery positive voltage between terminals 3 and 4.

(b) Check continuity between terminals of ABS motor relay.

OK:

Terminals 1 and 2	Continuity

NG → **Replace ABS motor relay.**

OK

4	Check for open and short circuit in harness and connector between ABS motor relay and ABS ECU (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection.
If the connections are normal, the ECU may be defective.

DI03J–03

DTC	21, 22, 23, 24	ABS Actuator Solenoid Circuit

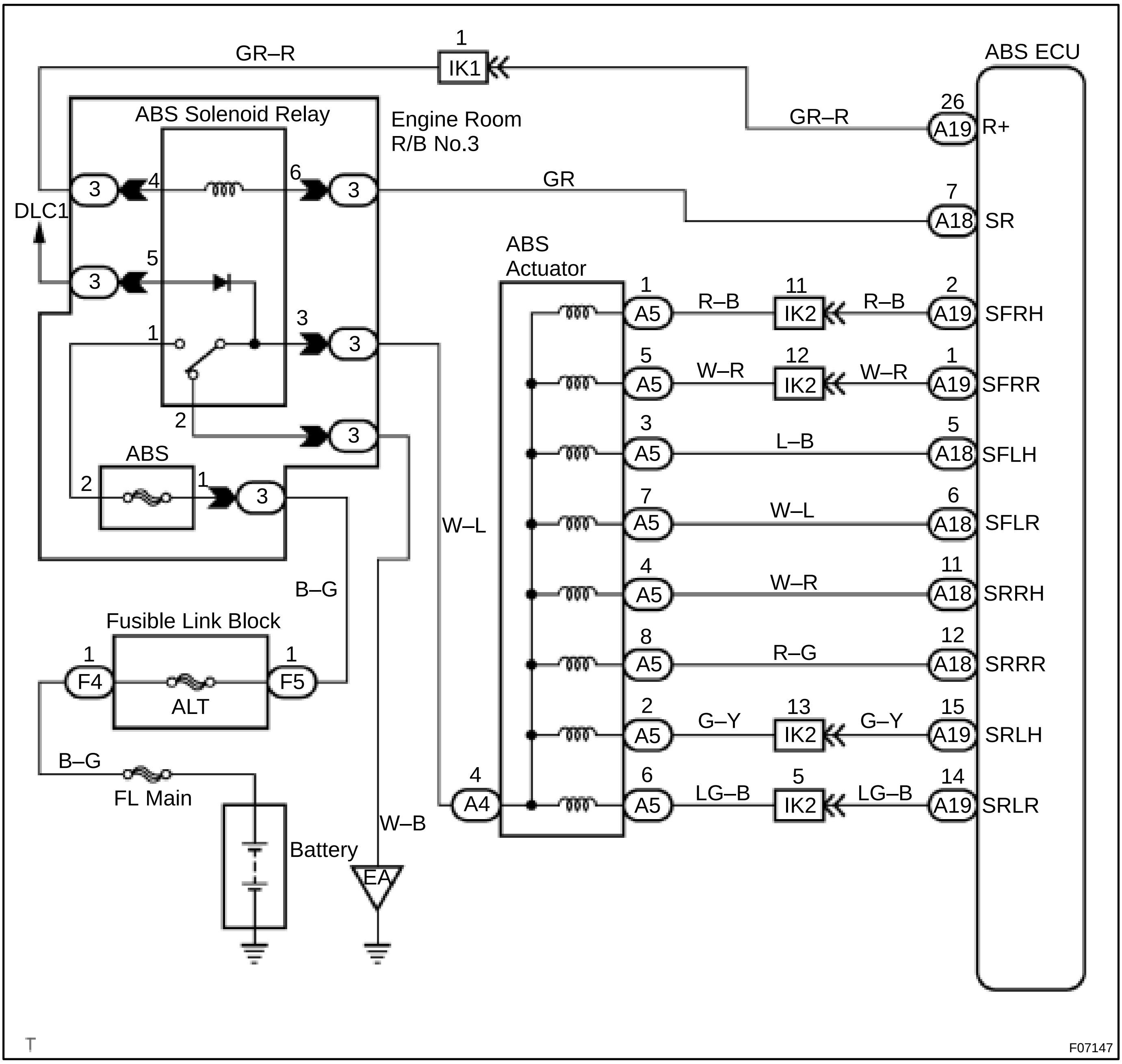
CIRCUIT DESCRIPTION

This solenoid goes on when signals are received from the ECU and controls the pressure acting on the wheel cylinders thus controlling the braking force.

DTC No.	DTC Detecting Condition	Trouble Area
21	Condition 1. or 2. continues for 0.05 sec. or more: 1. IG1 terminal voltage of ABS ECU is 9.5 – 18.5 V, there is open or short circuit in actuator solenoid SFRR or SFRH. 2. IG1 terminal voltage of ABS ECU is 9.5 – 18.5 V, and while ABS is control in operation.*1	●ABS actuator ●SFRR or SFRH circuit
22	Condition 1. or 2. continues for 0.05 sec. or more: 1. IG1 terminal voltage of ABS ECU is 9.5 – 18.5 V, there is open or short circuit in actuator solenoid SFLR or SFLH. 2. IG1 terminal voltage of ABS ECU is 9.5 – 18.5 V, and while ABS is control in operation.*1	●ABS actuator ●SFLR or SFLH circuit
23	Condition 1. or 2. continues for 0.05 sec. or more: 1. IG1 terminal voltage of ABS ECU is 9.5 – 18.5 V, there is open or short circuit in actuator solenoid SRRR or SRRH. 2. IG1 terminal voltage of ABS ECU is 9.5 – 18.5 V, and while ABS is control in operation.*1	●ABS actuator ●SRRR or SRRH circuit
24	Condition 1. or 2. continues for 0.05 sec. or more: 1. IG1 terminal voltage of ABS ECU is 9.5 – 18.5 V, there is open or short circuit in actuator solenoid SRLR or SRLH. 2. IG1 terminal voltage of ABS ECU is 9.5 – 18.5 V, and while ABS is control in operation.*1	●ABS actuator ●SRLR or SRLH circuit

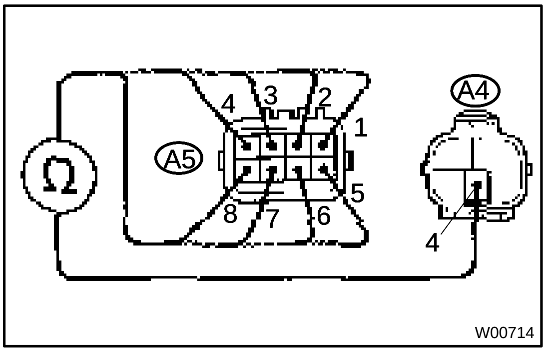
*1 Solenoid relay contact ON condition:
All of solenoid terminal voltage is half of IG1 terminal voltage or less than.
Fail safe function:
If trouble occurs in the actuator solenoid circuit, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check ABS actuator solenoid.**



PREPARATION:
Disconnect the 2 connectors from ABS actuator.
CHECK:
Check continuity between terminals A4 – 4 and A5 – 1, 2, 3, 4, 5, 6, 7, 8 of ABS actuator connector.
OK:
Continuity
HINT:
Resistance of each solenoid coil is 1.2 Ω.

NG → **Replace ABS actuator.**

OK

2	**Check for open and short circuit in harness and connector between ABS ECU and actuator (See page IN–31).**

NG → **Repair or replace harness or connector.**

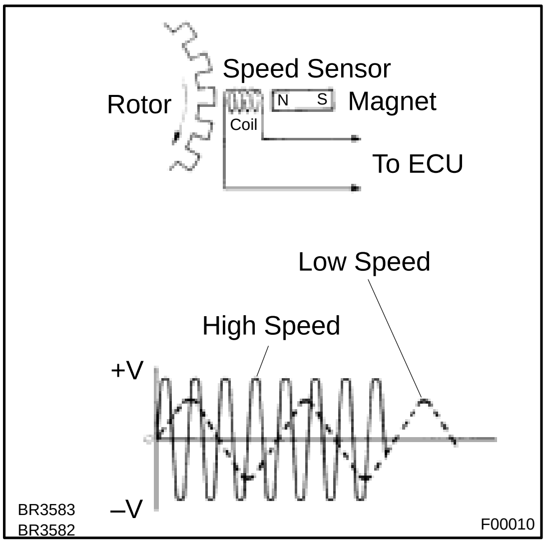
OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection.
If the connections are normal, the ECU may be defective.

DI1JM–02

DTC	31, 32, 33, 34	Speed Sensor Circuit

CIRCUIT DESCRIPTION



The speed sensor detects wheel speed and sends the appropriate signals to the ECU. These signals are used to control the ABS system. The front and rear rotors each have 48 serrations.

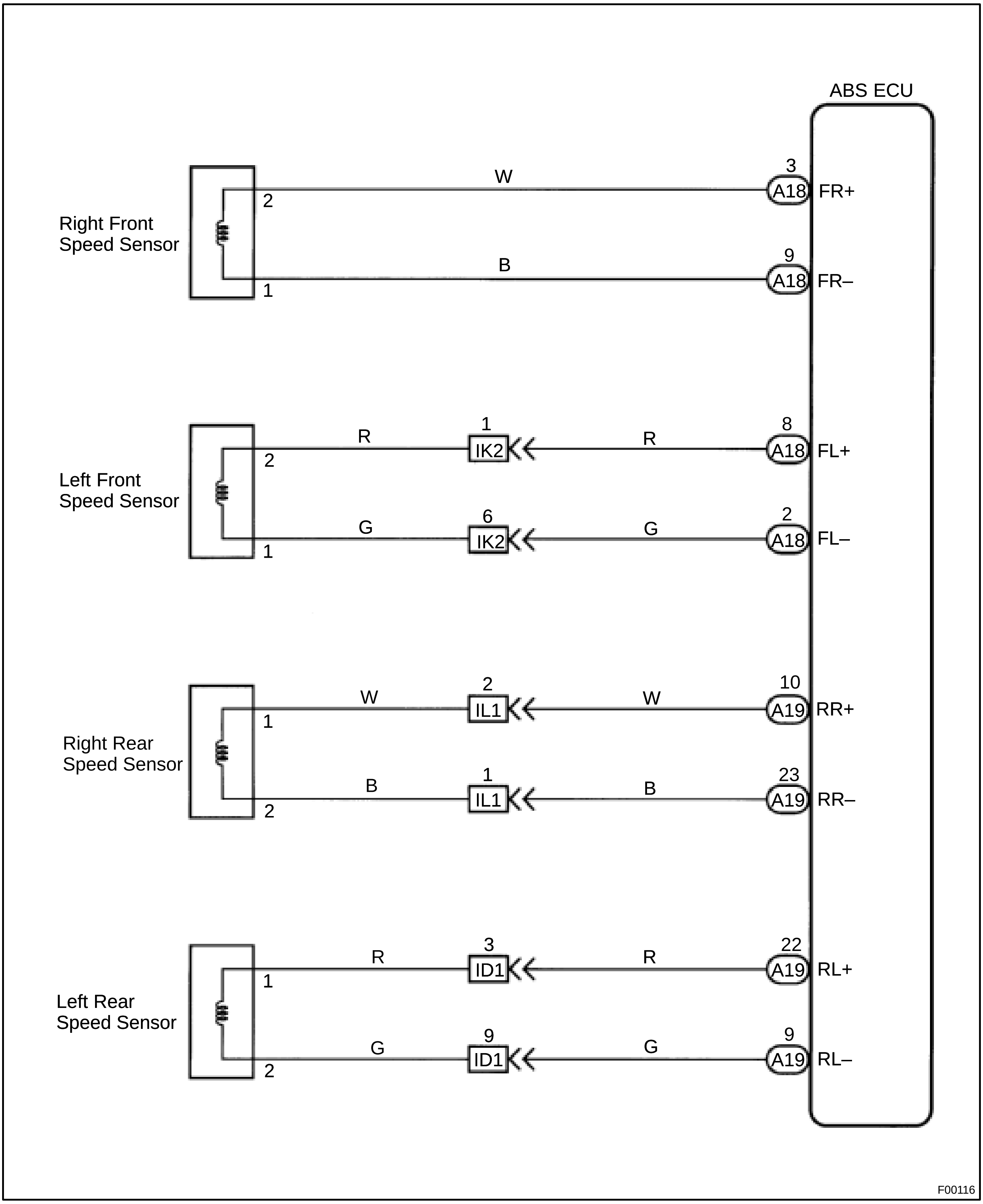
When the rotors rotate, the magnetic field emitted by the permanent magnet in the speed sensor generates an AC voltage. Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.

DTC No.	DTC Detecting Condition	Trouble Area
31, 32, 33, 34	Detection of any of conditions from 1. through 4.: 1. Vehicle speed is at 10 km/h (6 mph) or more and the speed sensor signal circuit is open or short circuit continues for 15 sec. or more. 2. Momentary interruption of the speed sensor signal occurs 7 times or more. 3. Vehicle speed is at 20 km/h (12mph) or more and interference on the speed sensor signal continues for 5 sec. or more. 4. Open circuit condition of the speed sensor signal circuit continues for 0.5 sec. or more.	●Right front, left front, right rear, left rear speed sensor ●Each speed sensor circuit ●Speed sensor rotor

HINT:
- DTC No. 31 is for the right front speed sensor.
- DTC No. 32 is for the left front speed sensor.
- DTC No. 33 is for the right rear speed sensor.
- DTC No. 34 is for the left rear speed sensor.

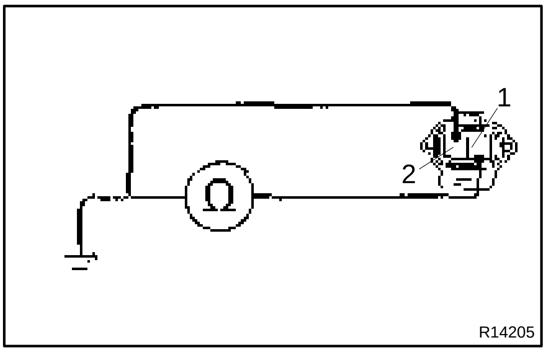
Fail safe function:
If trouble occurs in the speed sensor circuit, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check speed sensor.**



Front:

PREPARATION:

(a) Remove the front fender liner.

(b) Disconnect the speed sensor connector.

CHECK:

Measure resistance between terminals 1 and 2 of speed sensor connector.

OK:

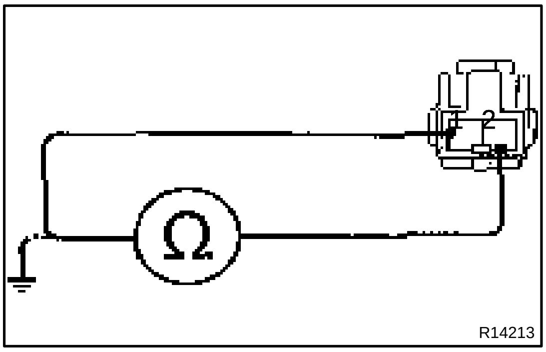
Resistance: 0.6 – 2.5 kΩ

CHECK:

Measure resistance between terminals 1 and 2 of speed sensor connector and body ground.

OK:

Resistance: 1 MΩ or higher



Rear:

PREPARATION:

(a) Remove the seat cushion and side seatback.

(b) Disconnect the speed sensor connector.

CHECK:

Measure resistance between terminals 1 and 2 of speed sensor connector.

OK:

Resistance: 1.2 – 2.3 kΩ

CHECK:

Measure resistance between terminals 1 and 2 of speed sensor connector and body ground.

OK:

Resistance: 1 MΩ or higher

NG	**Replace speed sensor.**

NOTICE:

Check the speed sensor signal last (See page DI–493).

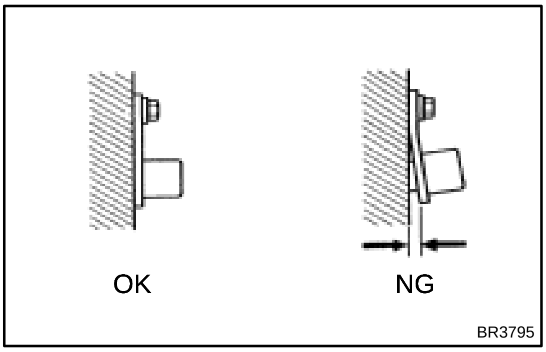
OK

2	Check for open and short circuit in harness and connector between each speed sensor and ECU (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

3	Check speed sensor installation.



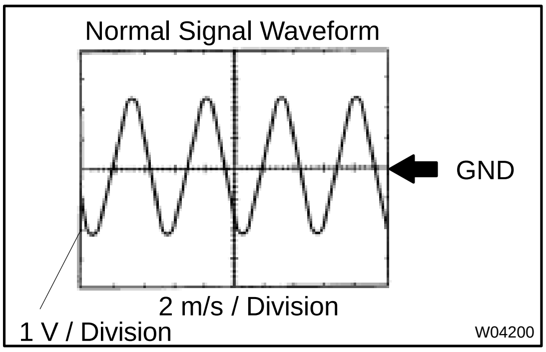
CHECK:
Check the speed sensor installation.
OK:
The installation bolt is tightened properly and there is no clearance between the sensor and steering knuckle or rear axle carrier.

NG → **Replace speed sensor.**

NOTICE:
Check the speed sensor signal last (See page DI–493).

OK

4	Check speed sensor and sensor rotor serrations.

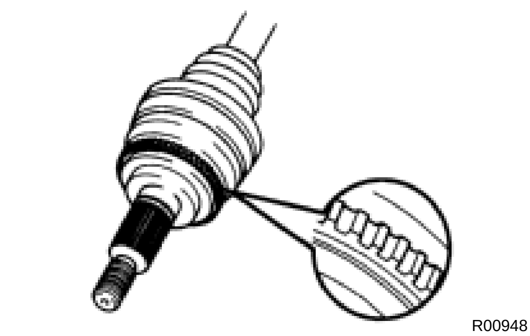


REFERENCE: INSPECTION USING OSCILLOSCOPE
PREPARATION:
(a) Remove the ABS ECU.
(b) Connect the oscilloscope to the terminals FR+, FL+, RR+ or RL+ and GND of the ABS ECU.
CHECK:
Drive the vehicle with about 30 km/h (19 mph), and check the signal waveform.

OK → **Check and replace ABS ECU.**

NG

5	**Check sensor rotor and sensor tip.**


R00948

Front:

PREPARATION:

Remove the front drive shaft (See page SA–17 or SA–26).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches or missing teeth or foreign objects.

PREPARATION:

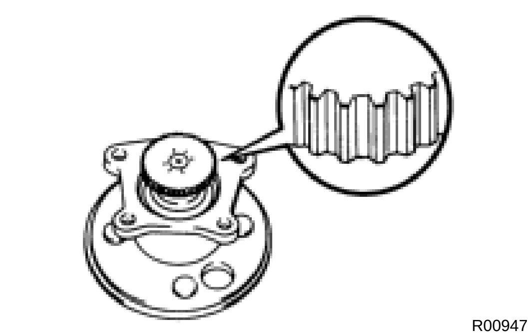
Remove the front speed sensor (See page BR–68).

CHECK:

Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.


R00947

Rear:

PREPARATION:

Remove the axle hub (See page SA–52).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches or missing teeth or foreign objects.

PREPARATION:

Remove the rear speed sensor (See page BR–71).

CHECK:

Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.

NG	**Replace sensor rotor or speed sensor.**

NOTICE:
Check the speed sensor signal last (See page DI–493).

OK

Check and replace ABS ECU.

DI03L–03

DTC	33, 34	Rear Speed Sensor Rotor Faulty

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
33, 34	The condition that the both rear side wheels' speed is lower than the front wheels' speed at 20 km/h (12 mph) or more for 20 sec. or more when the IG switch turns ON and OFF , which is repeated in a sequence more than 8 times.	●Rear axle hub ●Right rear, left rear speed sensor ●Rear speed sensor circuit

INSPECTION PROCEDURE

1	Check rear axle hub (See page SA–9).

NG → Replace rear axle hub.

OK

2	Check rear speed sensor (See page DI–514).

NG → Replace rear speed sensor.

OK

3	Check for open and short circuit in harness and connector between rear speed sensor and ECU (See page IN–31).

NG → Repair or replace harness and connector.

OK

Check and replace ABS ECU.

DI03M–03

DTC	41	IG Power Source Circuit

CIRCUIT DESCRIPTION

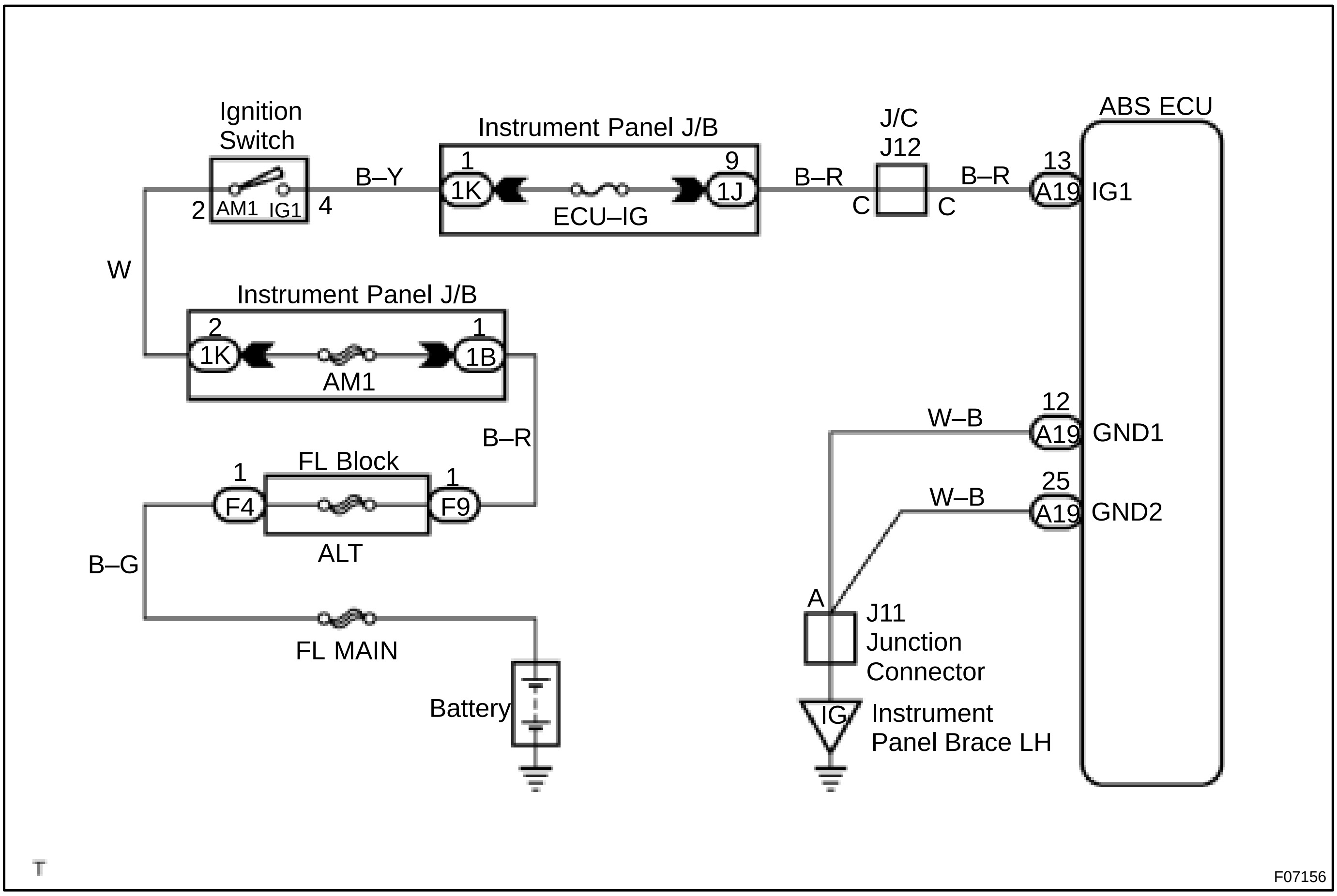
This is the power source for the ECU, hence the actuators.

DTC No.	DTC Detecting Condition	Trouble Area
41	Condition 1. or 2. is detected: 1. Vehicle speed is at 3 km/h (1.9 mph) or more and ECU terminal IG1 voltage is 9.5 V or less , which continues for 10 sec. or more. 2. When IG1 terminal voltage is less than 9.5 V, there is open circuit in the motor relay or in the solenoid relay, or the solenoid circuit malfunction.	●Battery ●Charging system ●Power source circuit

Fail safe function:

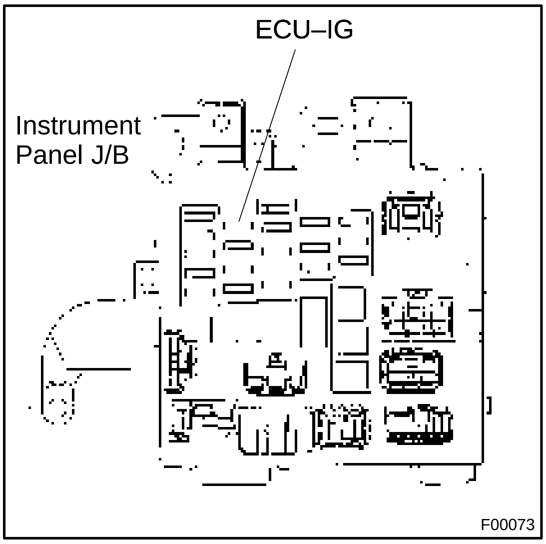
If trouble occurs in the power source circuit, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check ECU–IG fuse.**



PREPARATION:
Remove ECU–IG fuse from Instrument Panel J/B.

CHECK:
Check continuity of ECU–IG fuse.

OK:
Continuity

NG → **Check for short circuit in all the harness and components connected to ECU–IG fuse (See attached wiring diagram).**

OK

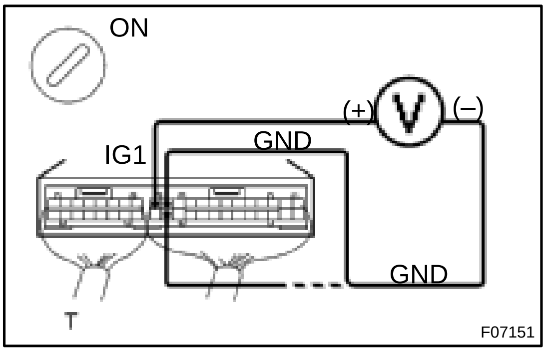
2	**Check battery positive voltage.**

OK:
Voltage: 10 – 14 V

NG → **Check and repair the charging system**
5S–FE engine: (See page CH–1)
1MZ–FE engIne: (See page CH–1).

OK

3	**Check voltage between terminals IG1 and GND of ABS ECU connector.**



PREPARATION:
Remove ABS ECU with connectors still connected.

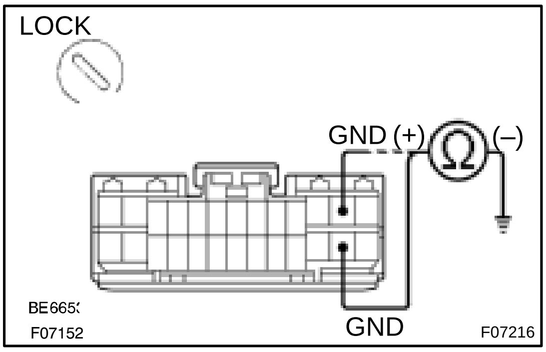
CHECK:
(a) Turn the ignition switch ON.
(b) Measure voltage between terminals IG1 and GND of ABS ECU connector.

OK:
Voltage: 10 – 14 V

OK → **Check and replace ABS ECU.**

NG

4	**Check continuity between terminals GND of ABS ECU connector and body ground.**



PREPARATION:
Disconnect the connector from the ABS ECU.

CHECK:
Measure resistance between terminal GND of ABS ECU connector and body ground.

OK:
Resistance: 1 Ω or less

NG → **Repair or replace harness or connector.**

OK

Check for open circuit in harness and connector between ABS ECU and ECU–IG fuse (See page IN–31).

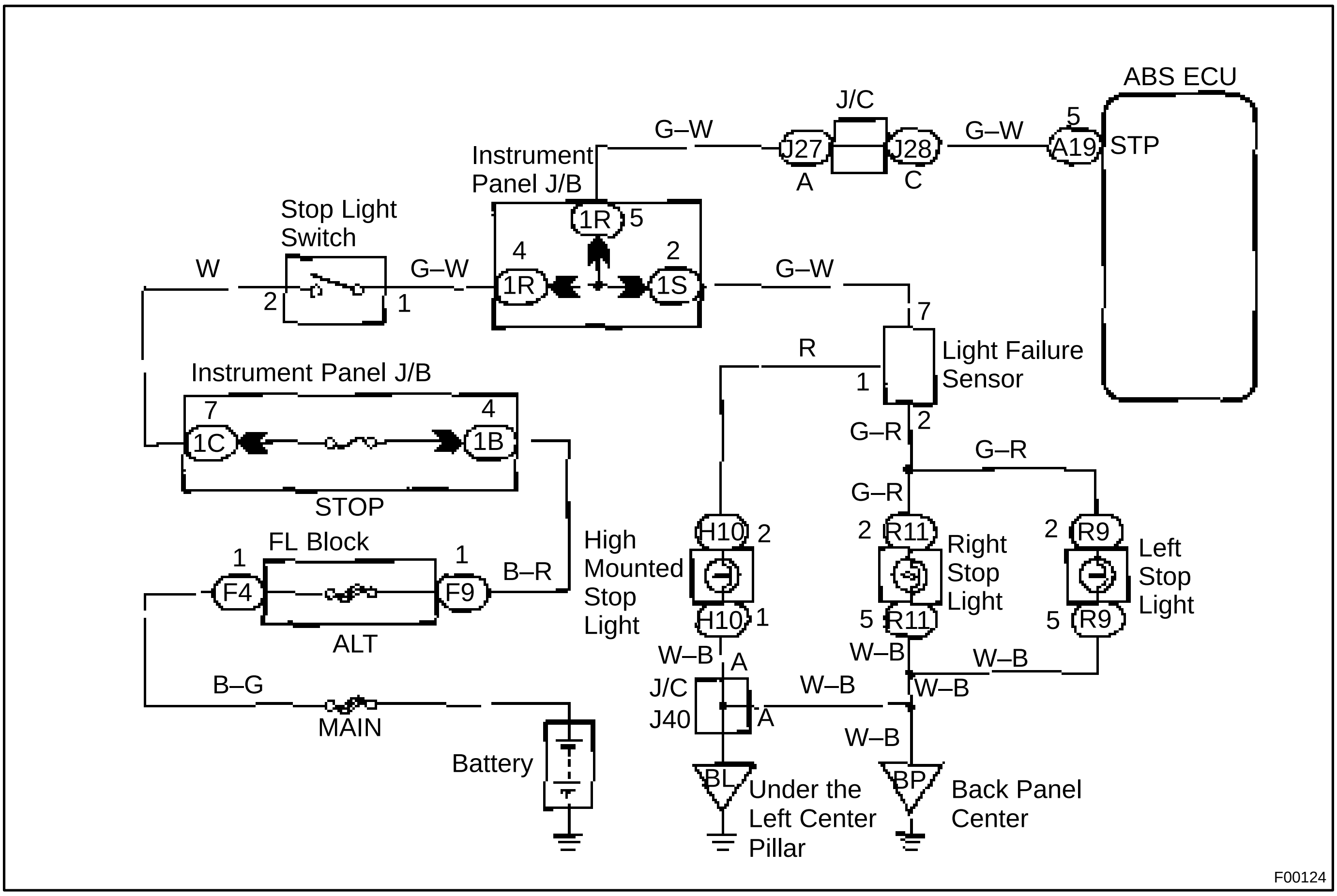
DI03N–03

DTC	49	Stop Light Switch Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
49	ABS ECU terminal IG1 voltage is 9.5 V to 18.5 V and ABS is in non–operation, the open circuit of the stop light switch circuit continues for 0.3 sec. or more.	●Stop light switch ●Stop light switch circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

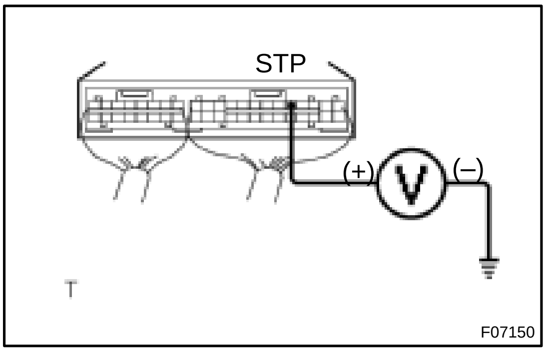
1	Check operation of stop light.

CHECK:
Check that stop light lights up when brake pedal is depressed and turns off when brake pedal is released.

NG → **Repair stop light circuit (See page BE–37).**

OK

2	**Check voltage between terminal STP of ABS ECU and body ground.**



PREPARATION:
Remove ABS ECU with connectors still connected.
CHECK:
Measure voltage between terminal STP of ABS ECU and body ground when brake pedal is depressed.
OK:
Voltage: 8 – 14 V

OK → **Check and replace ABS ECU.**

NG ↓

3	**Check for open circuit in harness and connector between ABS ECU and stop light switch (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK ↓

Proceed to next circuit inspection shown on problem symptoms table (See page DI–501).

DI4KW–01

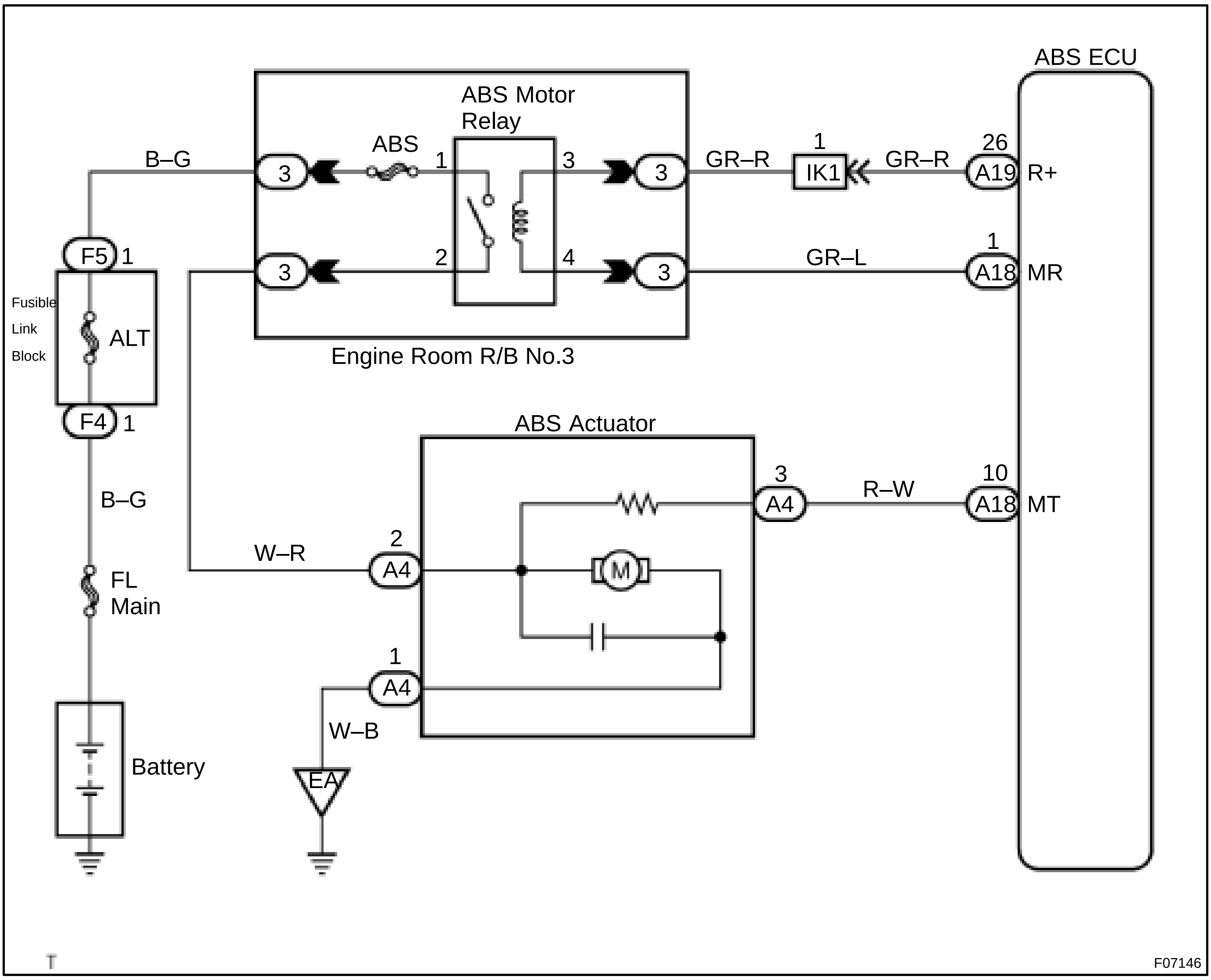
DTC	51	ABS Pump Motor Lock

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
51	ABS actuator pump motor is not operating normally.	•ABS pump motor

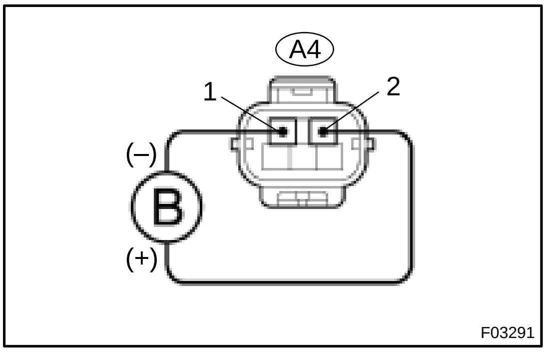
Fail safe function:
If trouble occurs in the ABS pump motor, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of ABS & TRAC pump motor.**



PREPARATION:

Disconnect the ABS actuator connector.

CHECK:

Connect positive ~ lead to terminal A4–2 and negative > lead to terminal A4 – 1 of the ABS actuator connector, check that the pump motor is operates.

OK:

The running sound of the pump motor should be heard.

OK → **Check for open circuit in harness and connector between ABS motor relay, ABS actuator and ABS ECU (See page IN–31).**

NG ↓

Replace ABS actuator.

DI03P–04

DTC	Always ON	ABS ECU Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
Always ON	ABS ECU internal malfunction is detected.	•ECU •Battery

Fail safe function:
If trouble occurs in the power source circuit, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control.

INSPECTION PROCEDURE

1	Is DTC output?

Check DTC on page DI–493.

YES → **Repair circuit indicated by the code output.**

NO

2	Is normal code displayed?

YES → **Check ABS solenoid relay. Check for short circuit in harness and connector between ABS solenoid relay and DLC1 (See page IN–31).**

NO

3	Is ABS warning light go off?

YES → **Check for open or short circuit in harness and connector between ECU–IG fuse and ABS ECU (See page IN–31).**

NO

4	**Check battery positive voltage.**

CHECK:
Check the battery positive voltage.
OK:
10 – 14 V

NG	**Check and repair the charging system 5S–FE engine: (See page CH–1) 1MZ–FE engine: (See page CH–1).**

OK

5	**Check ABS warning light.**

PREPARATION:
(a) Disconnect the connector from the ABS ECU.
(b) Turn the ignition switch ON.
CHECK:
Check the ABS warning light goes off.

OK	**Check and replace ABS ECU.**

NG

Check for short circuit in harness and connector between ABS warning light, DLC1, DLC2, and ABS ECU (See page IN–31).

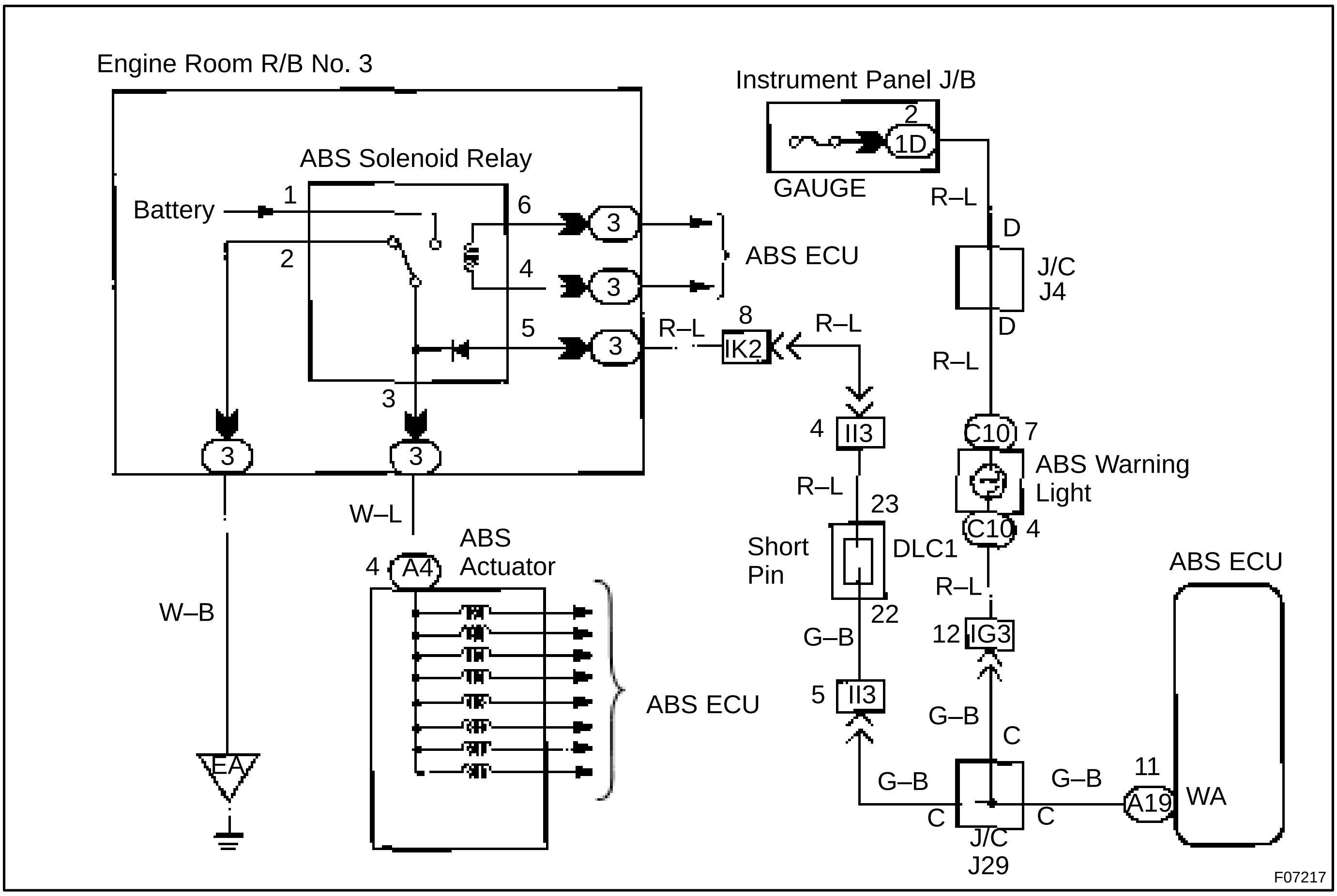
DI03Q–03

ABS Warning Light Circuit

CIRCUIT DESCRIPTION

If the ECU detects trouble, it lights the ABS warning light while at the same time prohibiting ABS control. At this time, the ECU records a DTC in memory.
After removing the short pin of the DLC1, connect terminals Tc and E_1 of the DLC1 or DLC2 to make the ABS warning light blink and output the DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

Troubleshooting in accordance with the chart below for each trouble symptom.

ABS warning light does not light up	Go to step 1
ABS warning light remains on	Go to step 3

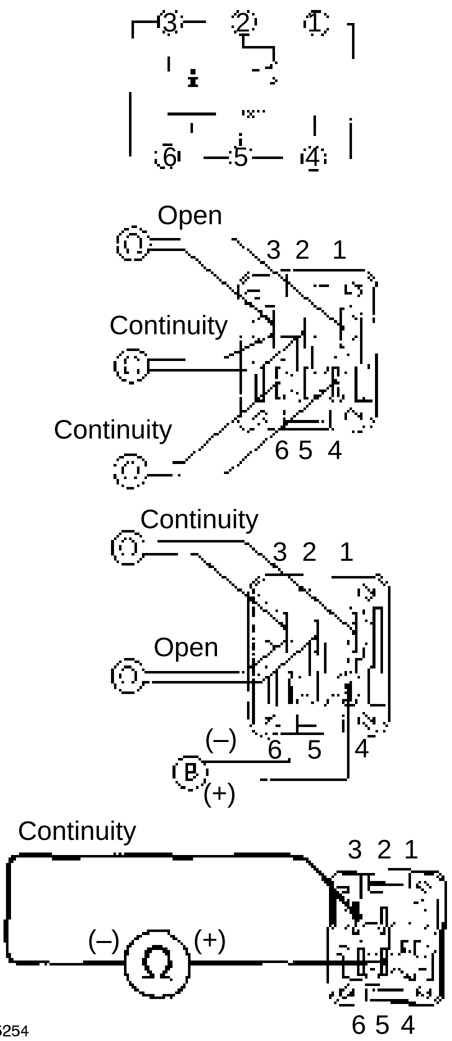
1	**Check ABS warning light.**

See combination meter troubleshooting on page BE–2.

NG → **Repair bulb or combination meter assembly.**

OK

2	**Check ABS solenoid relay.**



BR15254
R15255
R15964
F00043

PREPARATION:

Remove ABS solenoid relay from Engine Room R/B No. 3.

CHECK:

Check continuity between each terminal of ABS solenoid relay.

OK:

Terminals 4 and 6	Continuity (Reference value 80 Ω)
Terminals 2 and 3	Continuity
Terminals 1 and 3	Open

CHECK:

(a) Apply battery positive voltage between terminals 4 and 6.

(b) Check continuity between each terminal of ABS solenoid relay.

OK:

Terminals 2 and 3	Open
Terminals 1 and 3	Continuity

CHECK:

Connect the ~ test lead to terminal 5 and the > lead to terminal 3. Check continuity between the terminals.

OK:

Continuity

If there is no continuity, connect the > test lead to terminal 5 and the ~ lead to terminal 3. Recheck continuity between terminals.

NG	**Replace ABS solenoid relay.**

OK

Check for open circuit in harness and connector between DLC1, ABS solenoid relay and body ground (See page IN–31).

3	Is DTC output?

Check DTC on page DI–493.

YES → **Repair circuit indicated by the code output.**

NO ↓

4	Does ABS warning light go off if short pin is removed?

NO → **Check for short circuit in harness and connector between ABS warning light, DLC1 and ABS ECU (See page IN–31).**

YES ↓

5	Check ABS solenoid relay (See step 2).

NG → **Replace ABS solenoid relay.**

OK ↓

Check for short circuit in harness and connector between DLC1 and ABS solenoid relay (See page IN–31).

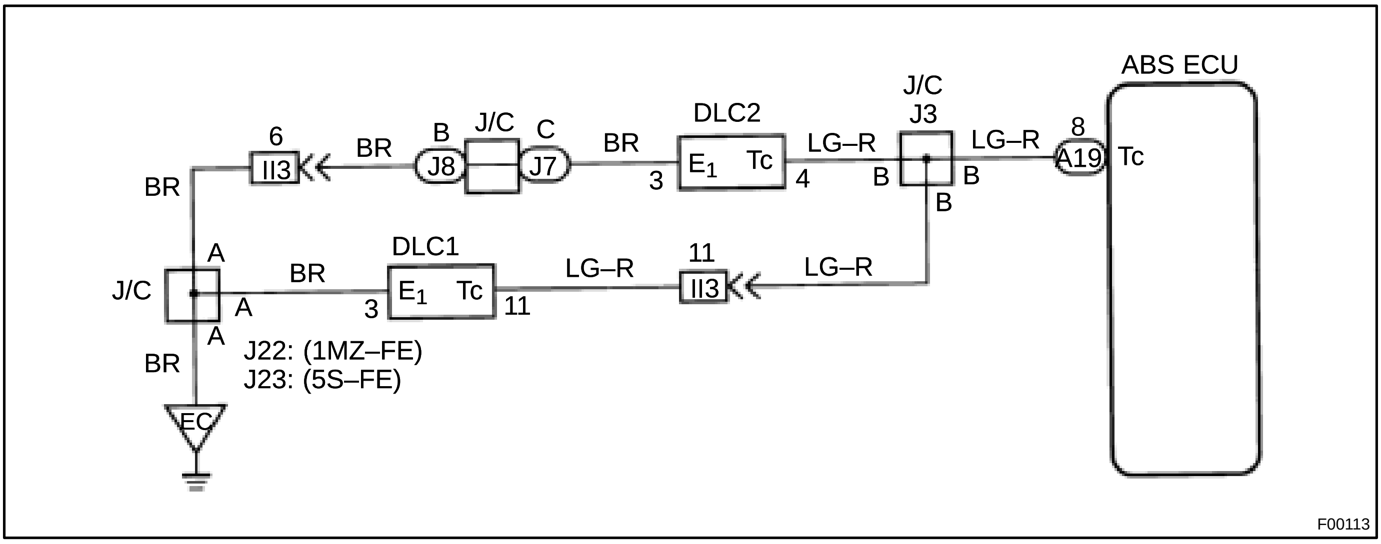
DI03R–03

Tc Terminal Circuit

CIRCUIT DESCRIPTION

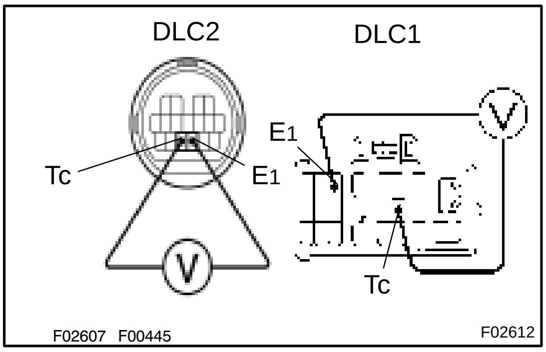
Connecting between terminals Tc and E_1 of the DLC1 or the DLC2 causes the ECU to display the DTC by flashing the ABS warning light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Tc and E_1 of DLC2 or DLC1.**



CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals Tc and E_1 of DLC2 or DLC1.

OK:

Voltage: 10 – 14 V

OK	**If ABS warning light does not blink even after Tc and E_1 are connected, the ECU may be defective.**

NG

2	**Check for open and short circuit in harness and connector between ABS ECU and DLC2 or DLC1, DLC2 or DLC1 and body ground (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ABS ECU.

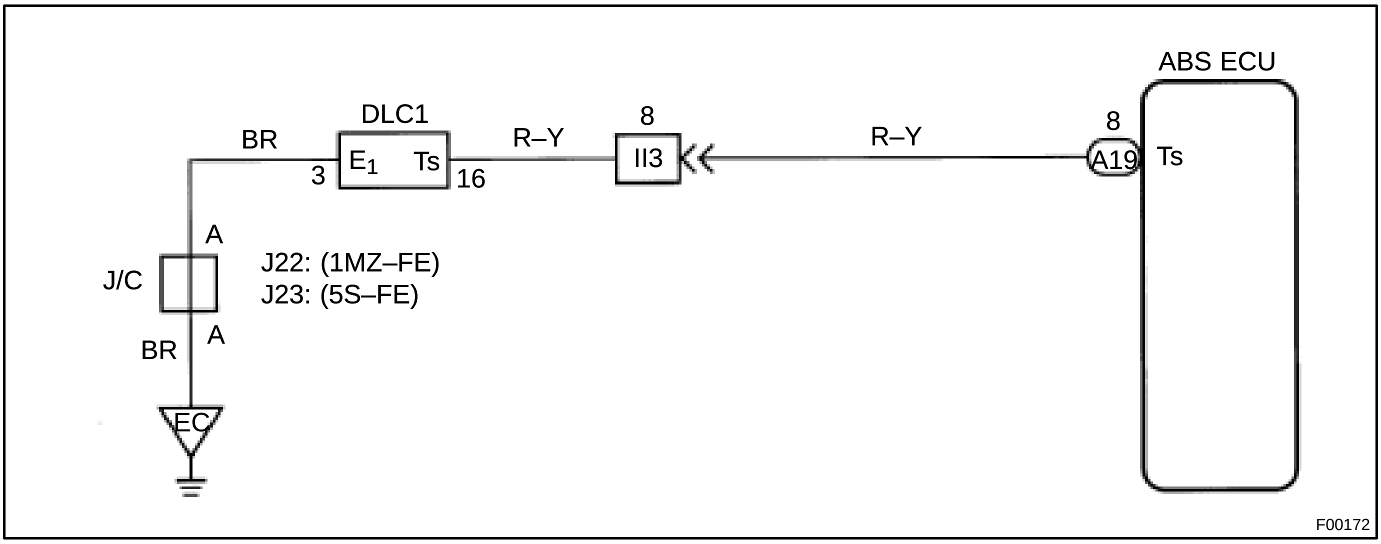
DI03S–03

Ts Terminal Circuit

CIRCUIT DESCRIPTION

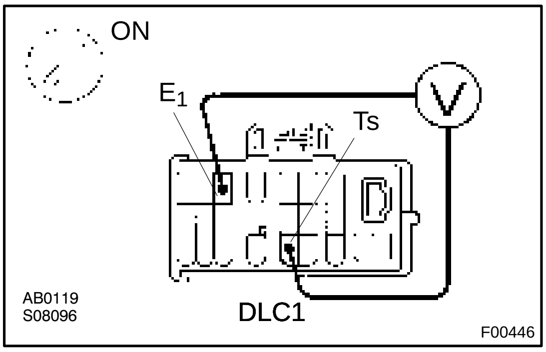
The sensor check circuit detects abnormalities in the speed sensor signal which cannot be detected with the DTC check.
Connecting terminals Ts and E_1 of the DLC1 in the engine compartment starts the check.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminals Ts and E_1 of DLC1.



CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals Ts and E_1 of DLC1.

OK:

Voltage: 10 – 14 V

OK → **If ABS warning light does not blink even after Ts and E_1 are connected, the ECU may be defective.**

NG

2	Check for open and short circuit in harness and connector between ABS ECU and DLC1, DLC1 and body ground (See page IN–31).

NG → **Repair or replace harness or connector.**

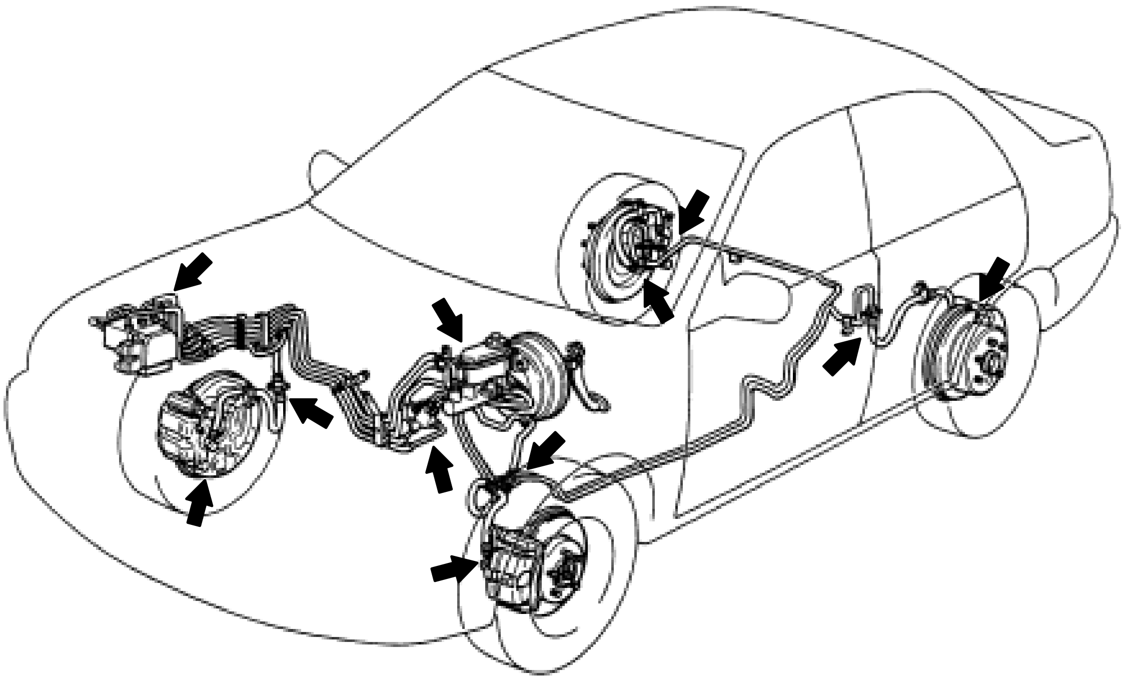
OK

Check and replace ABS ECU.

DI03T–03

Check for Fluid Leakage

Check for fluid leakage from actuator or hydraulic lines.



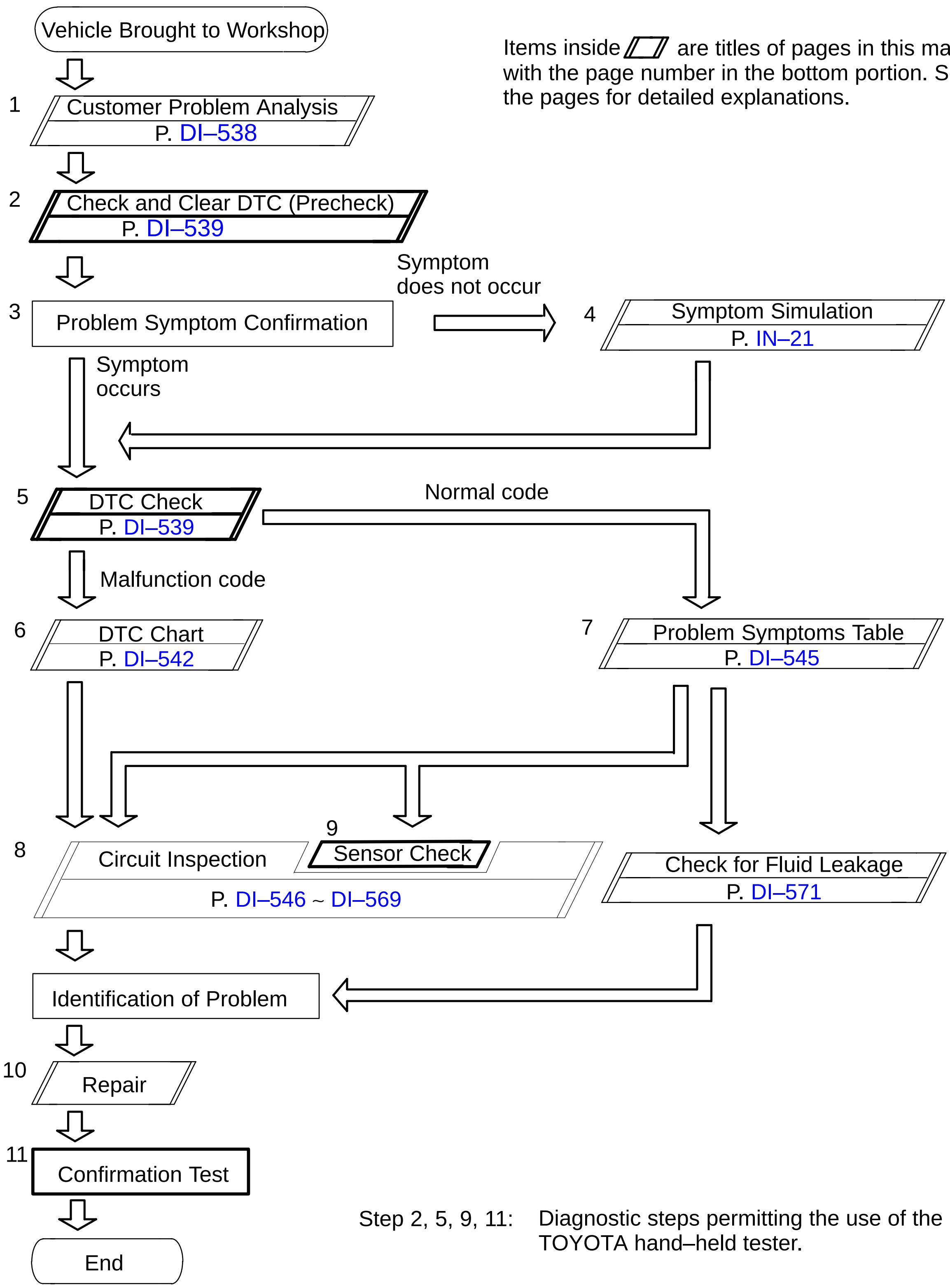
F00071

ANTI–LOCK BRAKE SYSTEM (BOSCH Made)

HOW TO PROCEED WITH TROUBLESHOOTING

DI051–04

Troubleshoot in accordance with the procedure on the following pages.



Items inside ▱ are titles of pages in this manual, with the page number in the bottom portion. See the pages for detailed explanations.

Step 2, 5, 9, 11: Diagnostic steps permitting the use of the TOYOTA hand–held tester.

DI03U–04

CUSTOMER PROBLEM ANALYSIS CHECK

ABS Check Sheet

Inspector's Name :

Customer's Name		**Registration No.**	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

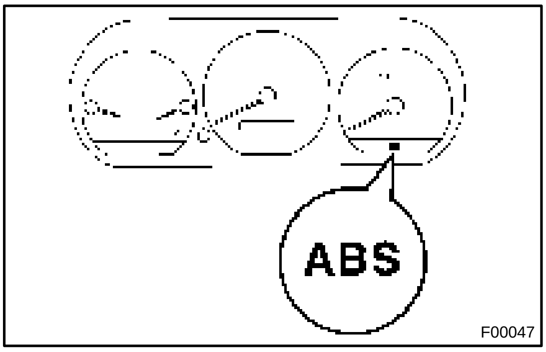
Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ ABS does not operate.	
	☐ ABS does not operate intermittently.	
	ABS Warning Light Abnormal	☐ Remains ON ☐ Does not Light Up

DTC Check	**1st Time**	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)

DI03V–04

PRE–CHECK



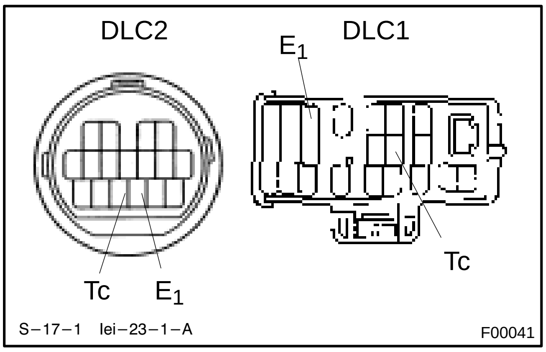
1. DIAGNOSIS SYSTEM

(a) Check the indicator.

When the ignition switch is turned ON, check that the ABS warning light goes on for 2 seconds.

HINT:

If the indicator check result is not normal, proceed to troubleshooting for the ABS warning light circuit (See page DI–565).



(b) Check the DTC.

(1) Using SST, connect terminals Tc and E_1 of DLC2 or DLC1.

SST 09843 – 18020

(2) Turn the ignition switch ON.

(3) Read the DTC from the ABS warning light on the combination meter.

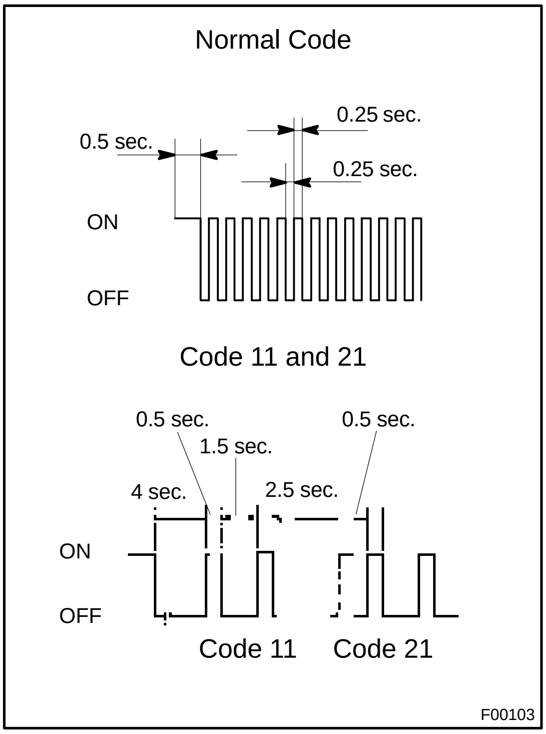
HINT:

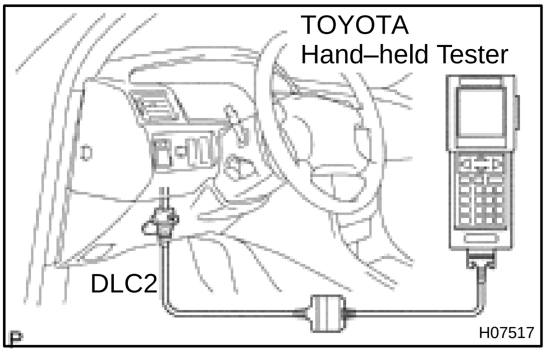
- If no code appears, inspect the diagnostic circuit or ABS warning light circuit (See page DI–567 or DI–565).
- As an example, the blinking patterns for normal code and codes 11 and 21 are shown on the left.

(4) Codes are explained in the code table on page DI–542.

(5) After completing the check, disconnect terminals Tc and E_1, and turn off the display.

If 2 or more malfunctions are indicated at the same time the lowest numbered DTC will be displayed 1st.



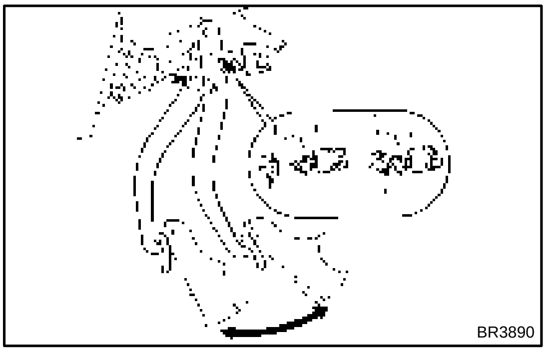


(c) Using TOYOTA hand–held tester, check the DTC.

(1) Hook up the TOYOTA hand–held tester to the DLC2.

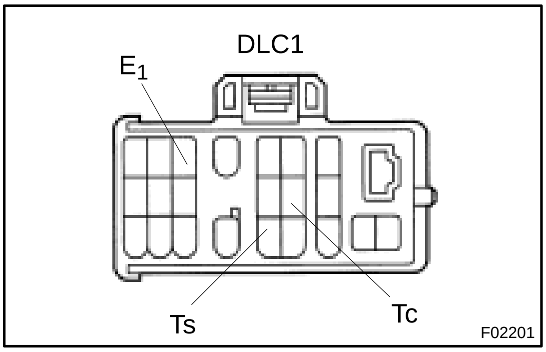
(2) Read the DTC by following the prompts on the tester screen.

Please refer to the TOYOTA hand–held tester operator's manual for further details.



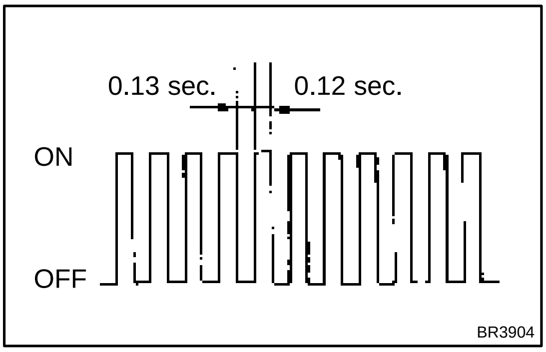
(d) Clear the DTC.
(1) Using SST, connect terminals Tc and E_1 of DLC2 or DLC1.
SST 09843 – 18020
(2) Turn the ignition switch ON.
(3) Clear the DTC stored in ECU by depressing the brake pedal 8 or more times within 3 seconds.
(4) Check that the warning light shows the normal code.
(5) Remove the SST from the terminals of DLC2 or DLC1.
SST 09843 – 18020

HINT:
Cancellation cannot be done by removing the battery cable or ECU–B fuse.



2. SPEED SENSOR SIGNAL

(a) Check the speed sensor signal.
(1) When the ignition switch is turned ON, check that the ABS warning light goes on for 2 seconds.
(2) Turn the ignition switch OFF.
(3) Using SST, connect terminals Ts and E_1 of DLC1.
SST 09843 – 18020
(4) Start the engine.

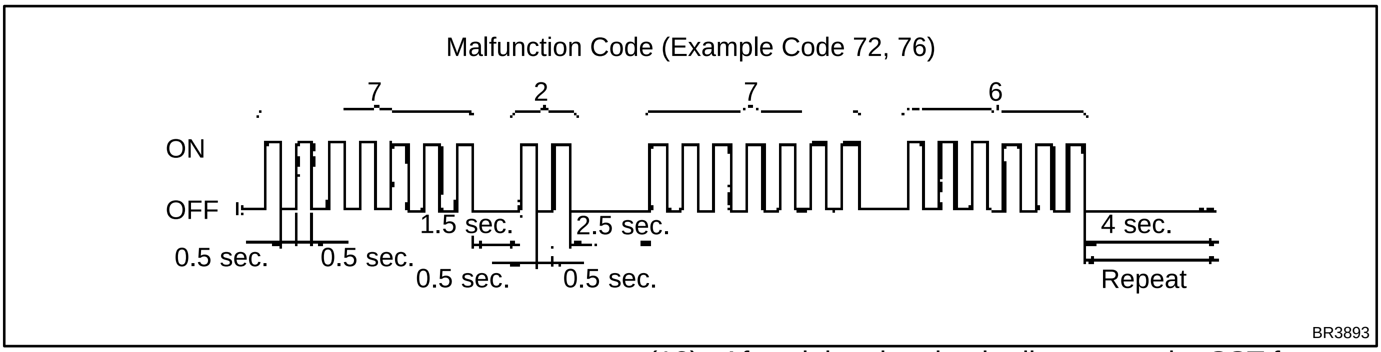


(5) Check that the ABS warning light blinks.

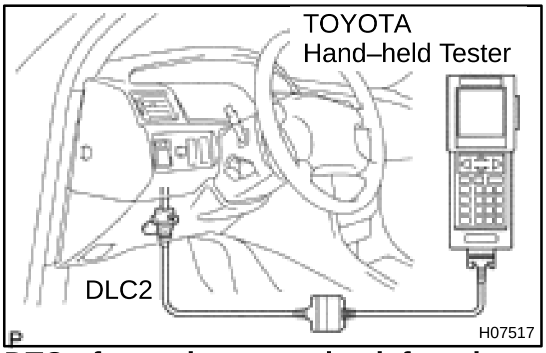
HINT:
If the ABS warning light does not blink, inspect the ABS warning light circuit (See page DI–565).
(6) Drive vehicle straight forward.

HINT:
Drive vehicle at 45 – 55 km/h (28 – 34 mph) for several seconds.
If the brake is applied during the check, the check routine must be started again.
(7) Stop the vehicle.
(8) Turn the ignition switch OFF.
(9) Disconnect the SST from terminals Ts and E_1 and, connect the SST to terminals Tc and E_1 of DLC1.
SST 09843 – 18020
(10) Turn the ignition switch ON.
(11) Read the number of blinks of the ABS warning light.

HINT:
- See the list of DTC shown at the bottom of this page.
- If every sensor is normal, a normal code is output (A cycle of 0.25 sec. ON and 0.25 sec. OFF is repeated).
- If 2 or more malfunctions are indicated at the same time, the lowest numbered code will be displayed 1st.



(12) After doing the check, disconnect the SST from terminals Tc and E_1 of DLC1, and turn ignition switch OFF.
SST 09843 – 18020



(b) Using TOYOTA hand–held tester, check the DTC.
(1) Do step 1. ~ 6. on the previous page.
(2) Hook up the TOYOTA hand–held tester to the DLC2.
(3) Read the DTC by following the prompts on the tester screen.
Please refer to the TOYOTA hand–held tester operator's manual for further details.

DTC of speed sensor check function:

Code No.	Diagnosis	Trouble Area
71	Low output voltage of right front speed sensor	●Right front speed sensor ●Sensor installation ●Right front speed sensor rotor
72	Low output voltage of left front speed sensor	●Left front speed sensor ●Sensor installation ●Left front speed sensor rotor
73	Low output voltage of right rear speed sensor	Right rear speed sensor Sensor installation Right rear speed sensor rotor
74	Low output voltage of left rear speed sensor	●Left rear speed sensor ●Sensor installation ●Left rear speed sensor rotor
75	Abnormal change in output voltage of right front speed sensor	●Right front speed sensor rotor
76	Abnormal change in output voltage of left front speed sensor	●Left front speed sensor rotor
77	Abnormal change in output voltage of right rear speed sensor	●Right rear speed sensor rotor
78	Abnormal change in output voltage of left rear speed sensor	●Left rear speed sensor rotor

DI03W–11

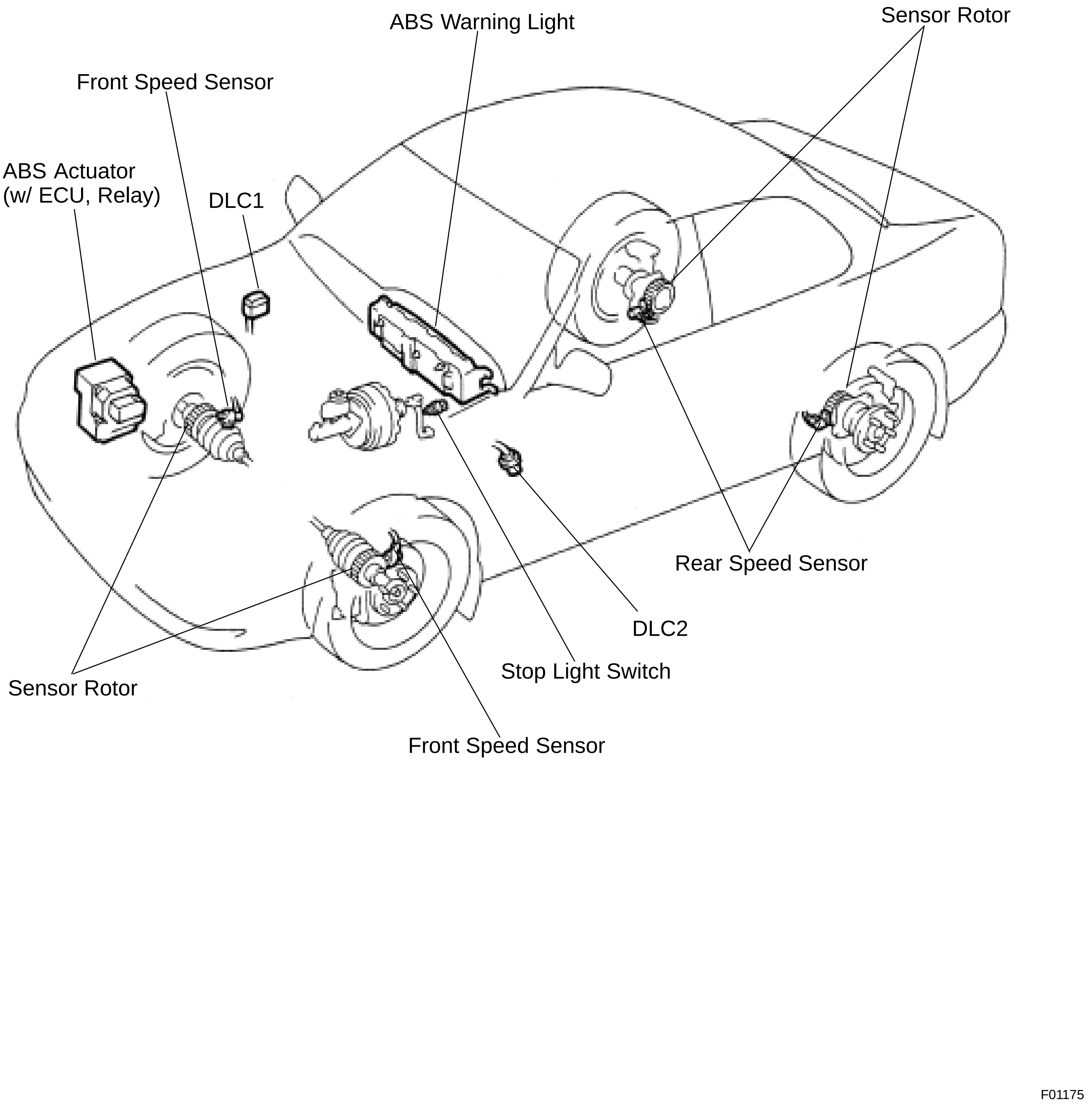
DIAGNOSTIC TROUBLE CODE CHART

HINT:

- Using SST 09843 –18020, connect the terminals Tc and E_1.
- If a malfunction code is displayed during the DTC check, check the circuit listed for the code. For details of each code, turn to the page referred to under the ”See page” for respective ”DTC No.” in the DTC chart.

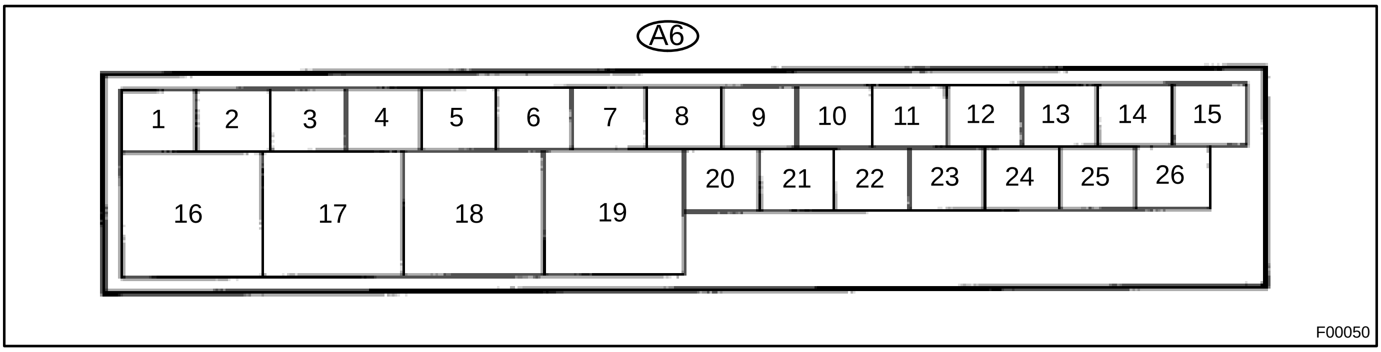
DTC No. (See Page)	Detection Item	Trouble Area
11 (DI–546)	ABS solenoid valve relay faulty	●ABS solenoid valve relay ●Valve supply voltage ●ECU
13 (DI–548)	ABS pump motor faulty	●ABS motor relay ●Pump motor voltage ●Pump motor lead disconnected ●ECU
21 (DI–550)	Right front solenoid valves faulty	●ABS actuator (right front inlet or outlet solenoid valve)
22 (DI–550)	Left front solenoid valves faulty	●ABS actuator (left front inlet or outlet solenoid valve)
23 (DI–550)	Right rear solenoid valves faulty	●ABS actuator (right rear inlet or outlet solenoid valve)
24 (DI–550)	Left rear solenoid valves faulty	●ABS actuator (left rear inlet or outlet solenoid valve)
31 (DI–552)	Right front wheel speed sensor signal malfunction	●Right front, left front, right rear and left rear speed sensor ●Each speed sensor circuit ●Sensor installation ●ECU
32 (DI–552)	Left front wheel speed sensor signal malfunction	
33 (DI–552)	Right rear wheel speed sensor signal malfunction	
34 (DI–552)	Left rear wheel speed sensor signal malfunction	
35 (DI–552)	Open circuit in right front wheel speed sensor circuit	●Right front, left front speed sensor ●Each speed sensor circuit ●ECU
36 (DI–552)	Open circuit in left front wheel speed sensor circuit	
37 (DI–557)	Speed sensor rotor is wrong number of teeth on one of the 4 wheels	●Speed sensor ●Sensor rotor ●ECU
38 (DI–552)	Open circuit in right rear wheel speed sensor circuit	●Right rear, left rear speed sensor ●Each speed sensor circuit ●ECU
39 (DI–552)	Open circuit in left rear wheel speed sensor circuit	
41 (DI–558)	Low battery positive voltage	●Battery ●Charging system regulator ●Power source circuit ●ECU
58 (DI–561)	Open circuit in stop light switch circuit	●Stop light switch ●Stop light switch circuit ●ECU
62 (DI–563)	Malfunction in ECU	●ECU

PARTS LOCATION



DI1JN–03

TERMINALS OF ECU



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
+B (A6 – 17, 18) – GND (A6 – 16, 19)	L ↔ W–B	Always	10 – 14
IG1 (A6 – 15) – GND (A6 – 16, 19)	B–R ↔ W–B	IG switch ON	10 – 14
WA (A6 – 21) – GND (A6 – 16, 26)	R–L ↔ W–B	IG switch ON, ABS warning light ON	Below 2.6
		IG switch ON, ABS warning light OFF	10 – 14
STP (A6 – 14) – GND (A6 – 16, 19)	G–W ↔ W–B	Stop light switch OFF	Below 1.5
		Stop light switch ON	5 – 14
Tc (A6 – 12) – GND (A6 – 16, 19)	LG–R ↔ W–B	IG switch ON	5.7 – 8.1
Ts (A6 – 11) – GND (A6 – 16, 19)	R–Y ↔ W–B	IG switch ON	5.7 – 8.1
FR+ (A6 – 5) – FR– (A6 – 4)	W ↔ B	IG switch ON, slowly turn right front wheel	AC generation
FL+ (A6 – 7) – FL– (A6 – 6)	R ↔ G	IG switch ON, slowly turn left front wheel	AC generation
RR+ (A6 – 3) – RR– (A6 – 1)	P ↔ L	IG switch ON, slowly turn right rear wheel	AC generation
RL+ (A6 – 9) RL– (A6 – 8)	Y ↔ BR	IG switch ON, slowly turn left rear wheel	AC generation

DI03Z–10

PROBLEM SYMPTOMS TABLE

If a normal code is displayed during the DTC check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

Symptom	Suspect Area	See page
ABS does not operate	Only when 1. to 4. are all normal and the problem is still occurring, replace the ABS ECU. 1. Check the DTC reconfirming that the normal code is output. 2. Power source circuit 3. Speed sensor circuit 4. Check the hydraulic circuit for leakage.	DI–539 DI–558 DI–552 DI–571
ABS does not operate intermittently	Only when 1. τo 4. are all normal and the problem is still occurring, replace the ABS ECU. 1. Check the DTC reconfirming that the normal code is output. 2. Speed sensor circuit 3. Stop light switch circuit 4. Check the hydraulic circuit for leakage.	DI–539 DI–552 DI–561 DI–571
ABS warning light abnormal	1. ABS warning light circuit 2. ABS ECU	DI–565 DI–563
DTC check cannot be done	Only when 1. and 2. are all normal and the problem is still occurring, replace the ABS ECU. 1. ABS warning light circuit 2. Tc terminal circuit	DI–565 DI–567
Speed sensor signal check cannot be done	1. Ts terminal circuit 2. ABS ECU	DI–569 DI–563

DI040–08

CIRCUIT INSPECTION

DTC	11	ABS Solenoid Valve Relay Circuit

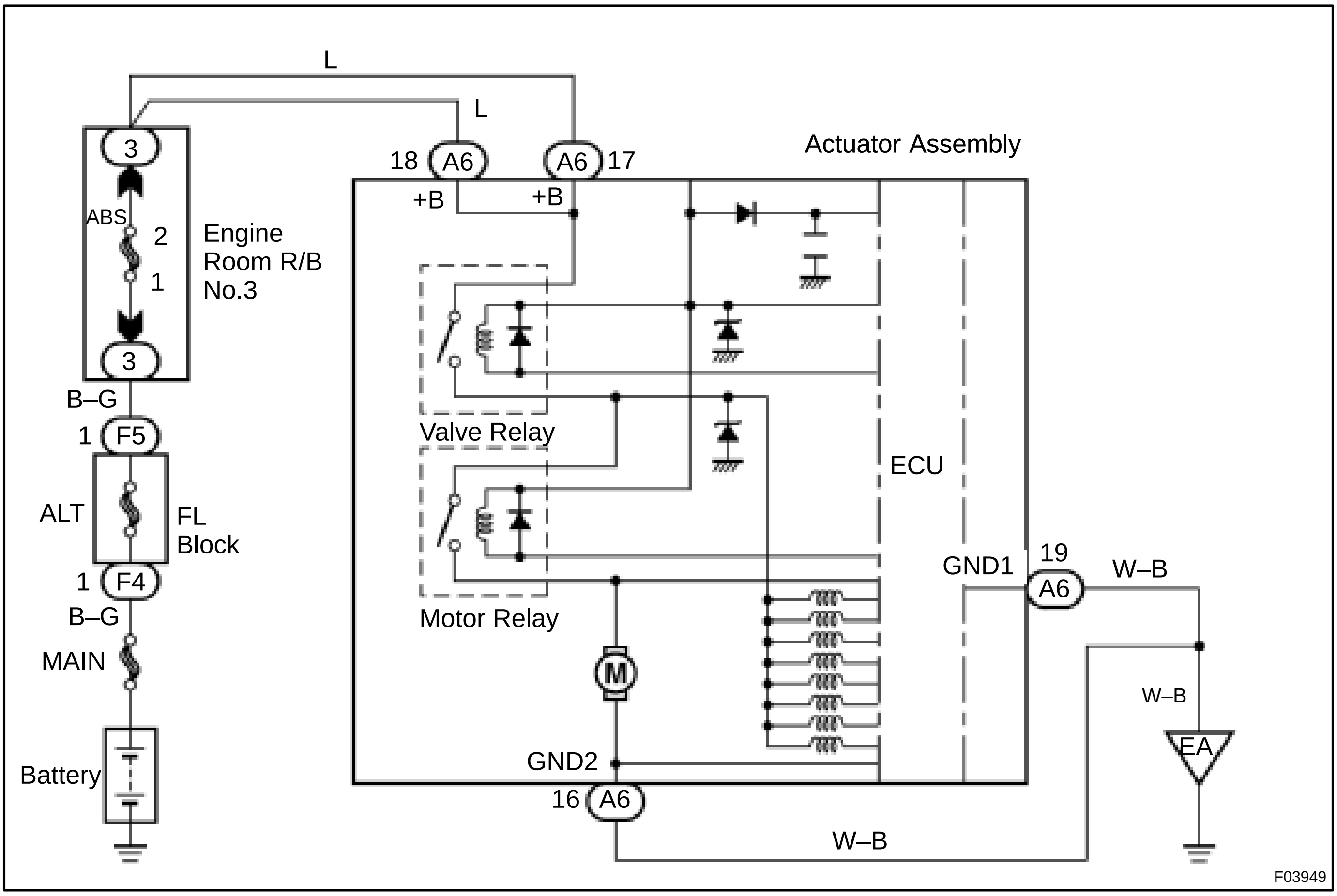
CIRCUIT DESCRIPTION

This relay supplies power to each ABS solenoid. After the ignition switch is turned ON, if the initial check is OK, the relay goes on.

DTC No.	DTC Detecting Condition	Trouble Area
11	Detection of any conditions from 1. through 3.: 1. 3 or more solenoid valves are shown faulty in response and simultaneously valve supply voltage is detected faulty. 2. Solenoid valve relay will not be switched OFF. 3. Valve relay is frozen in spite of its high valve relay supply voltage.	●ABS solenoid valve relay ●Valve supply voltage ●ECU

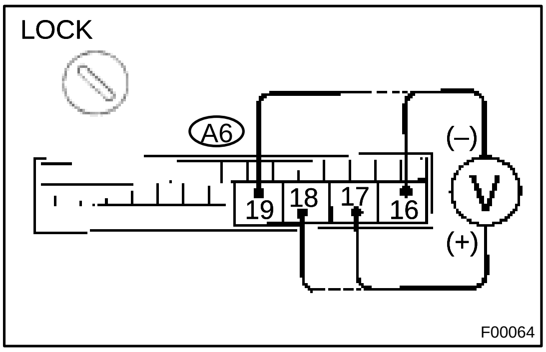
Fail safe function:
If trouble occurs in the ABS solenoid valve relay circuit, the ECU cuts off current to the ABS solenoid valve relay and prohibits ABS control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals A6 – 17, 18 and A6 – 16, 19 of ABS actuator connector.**



PREPARATION:
Disconnect the ABS actuator connector.
CHECK:
Measure the voltage between terminals A6 – 17, 18 and A6 – 16, 19 of ABS actuator harness side connector.
OK:
Voltage: 10 – 14 V

NG	**Check and replace fuses. Check and repair harness or connector.**

OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection.
If the connections are normal, the ECU may be defective.

DTC	13	Pump Motor Circuit

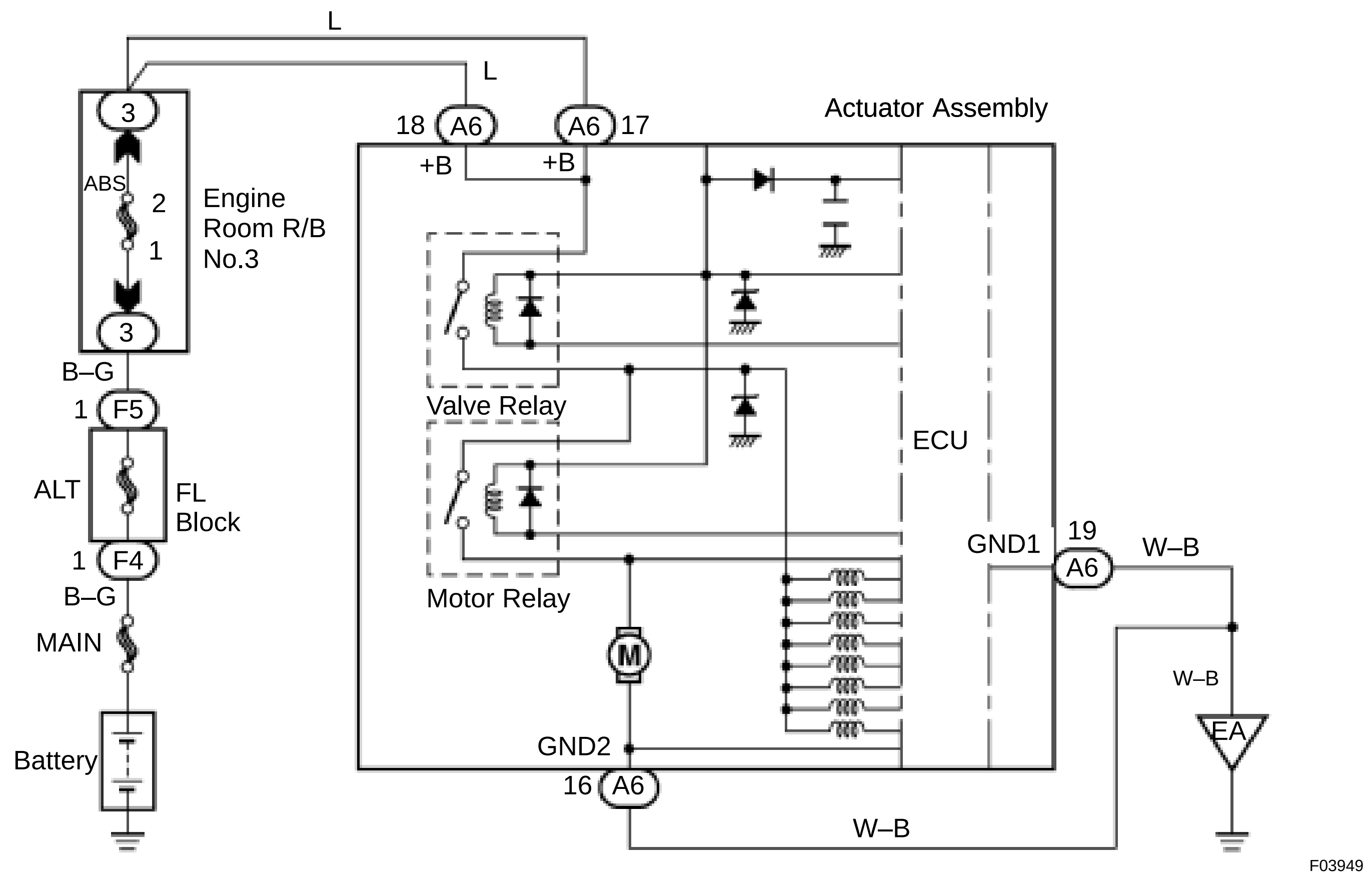
CIRCUIT DESCRIPTION

The ABS motor relay supplies power to the ABS pump motor. While the ABS is activated, the ECU switches the ABS motor relay ON and operates the ABS pump motor.

DTC No.	DTC Detecting Condition	Trouble Area
13	Detection of any conditions from (1) through (3): 1. After actuation of the motor relay, pump motor voltage will not be supplied within 0.4 sec. 2. Pump motor voltage is at a high level, motor relay will not actuate for 2.5 sec. or more. 3. Pump motor voltage keeps low level for longer than 0.4 sec. and the pump repeats activating for 7 sec. 3 times maximally. since the last activation, the pump motor has been gone dead because of short circuit.	●ABS motor relay ●Pump motor voltage ●Pump motor lead disconnected ●ECU

Fail safe function:
If trouble occurs in the ABS motor relay circuit, the ECU cuts off current to the ABS solenoid relay and prohibits ABS control.

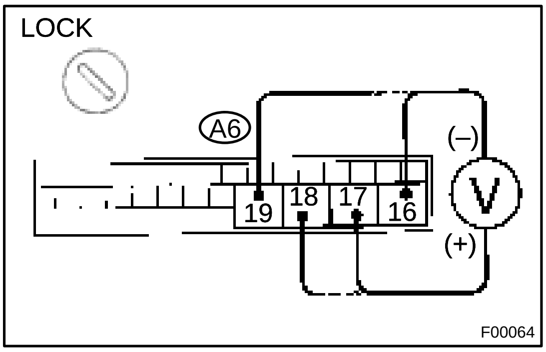
WIRING DIAGRAM



F03949

INSPECTION PROCEDURE

1	**Check voltage between terminals A6 – 17, 18 and A6 – 16, 19 of ABS actuator connector.**



PREPARATION:
Disconnect the ABS actuator connector.
CHECK:
Measure the voltage between terminals A6 – 17, 18 and A6 – 16, 19 of ABS actuator harness side connector.
OK:
Voltage: 10 – 14 V

NG	**Check and replace fuses.** **Check and repair harness or connector.**

OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection.
If the connections are normal, the ECU may be defective.

DI042–08

DTC	21, 22, 23, 24	ABS Solenoid Valve Circuit

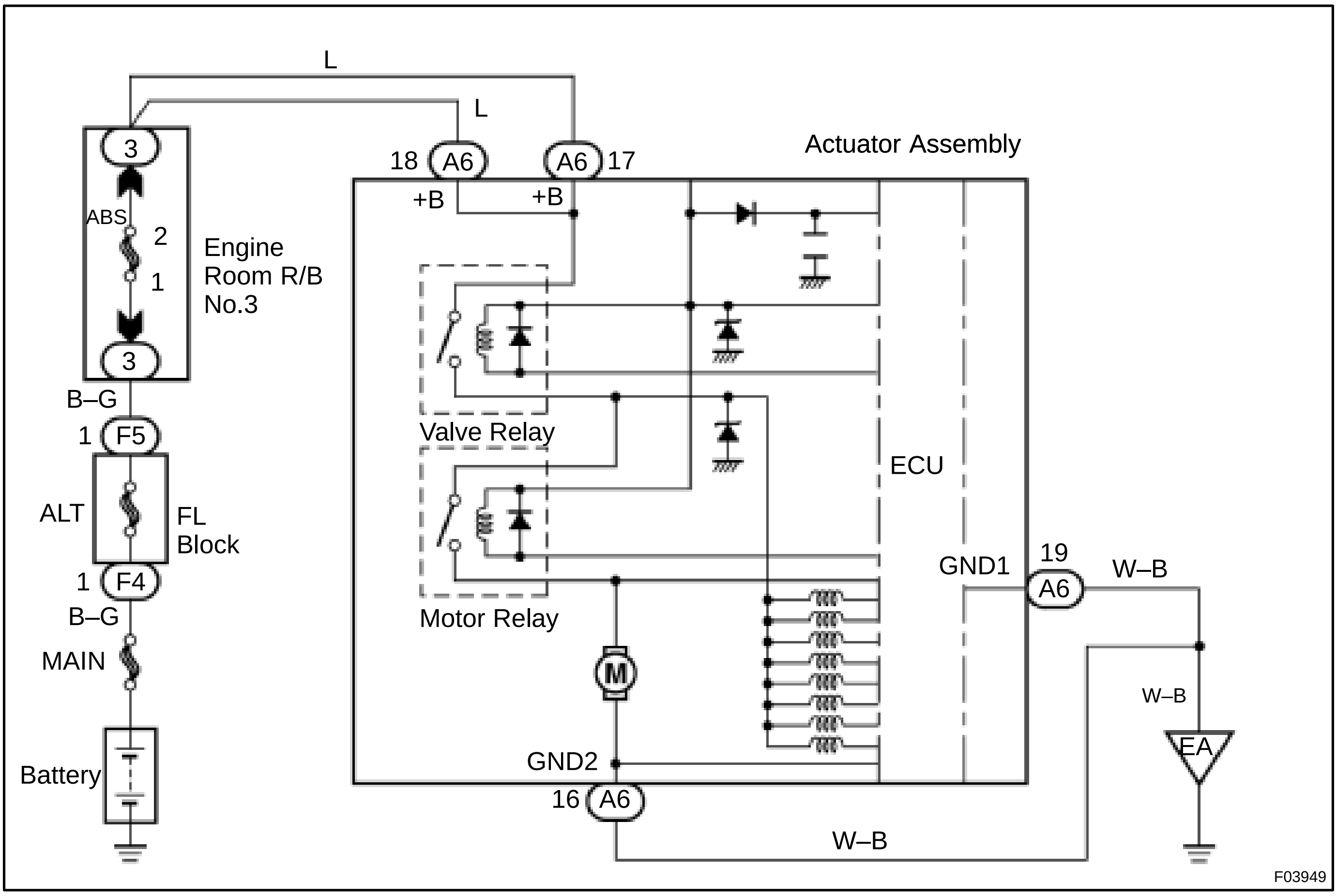
CIRCUIT DESCRIPTION

This solenoid goes on when signals are received from the ECU and controls the pressure acting on the wheel cylinders thus controlling the braking force.

DTC No.	DTC Detecting Condition	Trouble Area
21, 22, 23, 24	Solenoid valve signal does not match to the check result.	•Each solenoid valve

Fail safe function:
If trouble occurs in the actuator solenoid valve circuit, the ECU cuts off current to the ABS solenoid valve relay and prohibits ABS control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check the DTC once more.**

PREPARATION:

(a) Clear the DTC (See page DI–539).

(b) Turn the ignition switch OFF.

CHECK:

Turn the ignition switch ON, and check if the same DTC is stored in the memory.

NO → **No problem.**

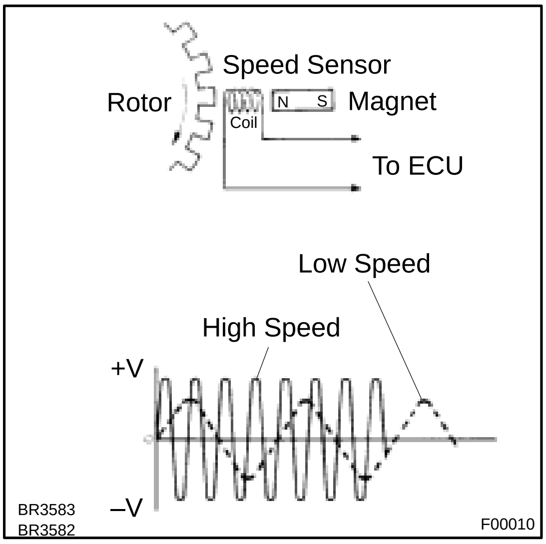
YES

Replace ABS ECU.

DI043–04

DTC	31, 32, 33, 34, 35, 36, 38, 39	Speed Sensor Circuit

CIRCUIT DESCRIPTION



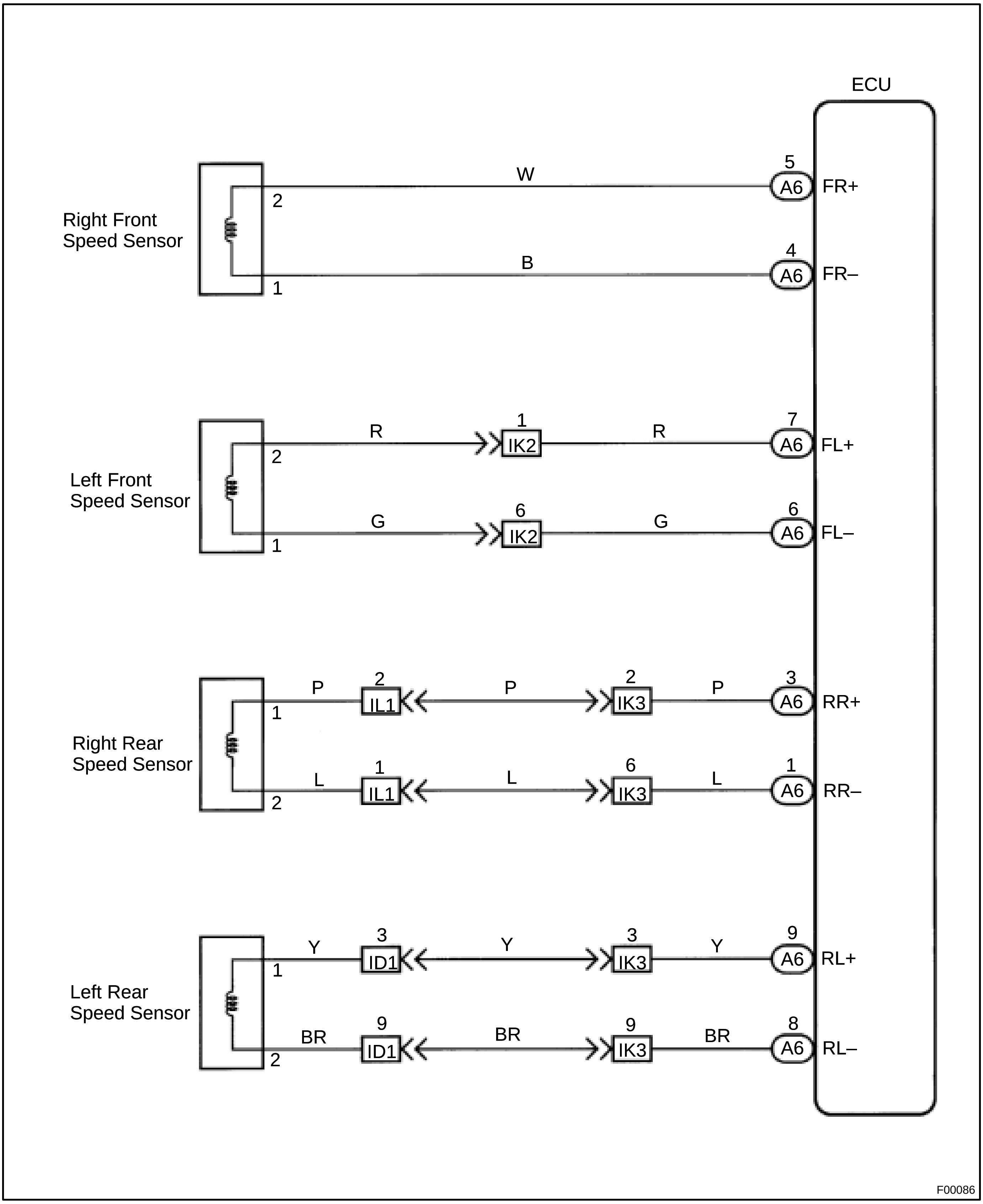
The speed sensor detects wheel speed and sends the appropriate signals to the ECU. These signals are used to control the ABS system. The front and rear rotors each have 48 serrations.
When the rotors rotate, the magnetic field emitted by the permanent magnet in the speed sensor generates an AC voltage. Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.

DTC No.	DTC Detecting Condition	Trouble Area
31, 32, 33, 34	Detection of any of conditions from 1. through 3.: 1. Vehicle speed is more than 40 km/h (25 mph), pulses are not input for 0.01 sec. 2. After the initial start or restart and when the vehicle speed has reached 12 km/h (7 mph), the wheel with 0 km/h (0 mph) of wheel speed is detected. 3. After the initial start or restart and when the vehicle speed has reached 70 km/h (44 mph), front wheel with 0 km/h (0 mph) of wheel speed is detected.	●Right front, left front, right rear, left rear speed sensor ●Each speed sensor circuit ●Sensor installation ●ECU
35, 36, 38, 39	Detecting abnormality in the resistance value of each speed sensor.	●Right front, left front, right rear, left rear speed sensor ●Each speed sensor circuit ●ECU

HINT:
- DTC No. 31 and 35 are for the right front speed sensor.
- DTC No. 32 and 36 are for the left front speed sensor.
- DTC No. 33 and 38 are for the right rear speed sensor.
- DTC No. 34 and 39 are for the left rear speed sensor.

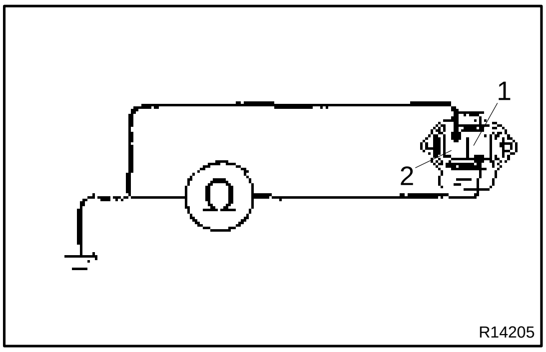
Fail safe function:
If trouble occurs in the speed sensor circuit, the ECU cuts off current to the ABS solenoid valve relay and prohibits ABS control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check speed sensor.



Front:

PREPARATION:

(a) Remove the front fender liner.

(b) Disconnect the speed sensor connector.

CHECK:

Measure resistance between terminals 1 and 2 of speed sensor connector.

OK:

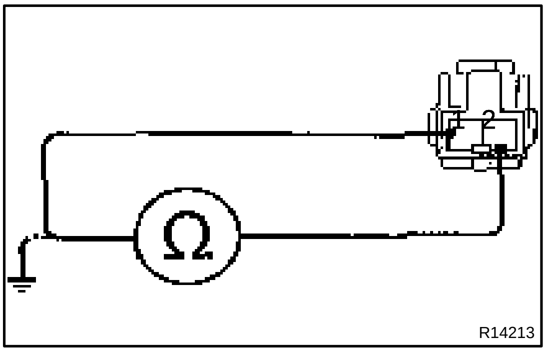
Resistance: 0.6 – 2.5 kΩ

CHECK:

Measure resistance between terminals 1 and 2 of speed sensor connector and body ground.

OK:

Resistance: 1 MΩ or higher



Rear:

PREPARATION:

(a) Remove the seat cushion and side seatback.

(b) Disconnect the speed sensor connector.

CHECK:

Measure resistance between terminals 1 and 2 of speed sensor connector.

OK:

Resistance: 1.2 – 2.3 kΩ

CHECK:

Measure resistance between terminals 1 and 2 of speed sensor connector and body ground.

OK:

Resistance: 1 MΩ or higher

NG	Replace speed sensor.

NOTICE:

Check the speed sensor signal last (See page DI–539).

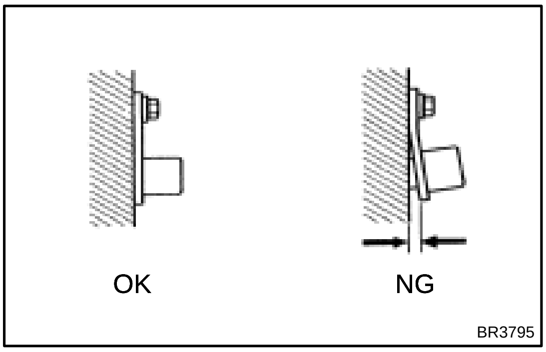
OK

2	Check for open and short circuit in harness and connector between each speed sensor and ECU (See page IN–31).

NG **Repair or replace harness or connector.**

OK

3	Check speed sensor installation.



CHECK:

Check the speed sensor installation.

OK:

The installation bolt is tightened properly and there is no clearance between the sensor and steering knuckle or rear axle carrier.

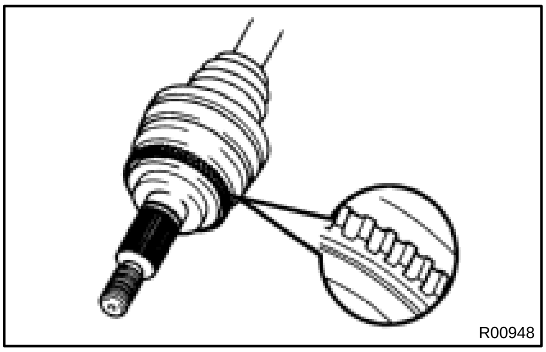
NG **Replace speed sensor.**

NOTICE:

Check the speed sensor signal last (See page DI–539).

OK

4	Check sensor rotor and sensor tip.



Front:

PREPARATION:

Remove the front drive shaft (See page SA–17 or SA–26).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches or missing teeth or foreign objects.

PREPARATION:

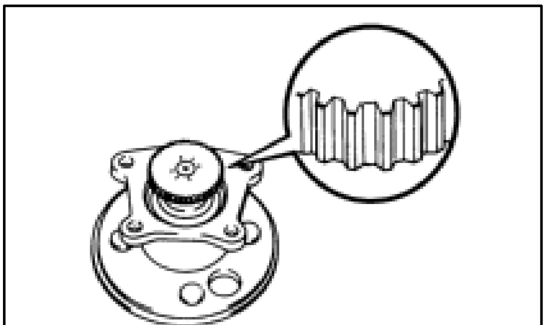
Remove the front speed sensor (See page BR–68).

CHECK:

Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.


R00947

Rear:

PREPARATION:

Remove the axle hub (See page SA–52).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches or missing teeth or foreign objects.

PREPARATION:

Remove the rear speed sensor (See page BR–70).

CHECK:

Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.

NG → **Replace sensor rotor or speed sensor.**

NOTICE:

Check the speed sensor signal last (See page DI–539).

OK

Check and replace ABS ECU.

DI044–04

DTC	37	Speed Sensor Rotor Faulty

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
37	Detection of any of conditions from 1. through 3.: 1. Occurrence of differential to some degree in the wheel speed between the front and rear wheels of either left or right side of the vehicle and the front left and right wheels. (Detection of differential in mini tire size, spinning wheel and decelerating wheel.) 2. Continuous ABS control for 60 sec. or more. 3. Interference on 1 or more wheels for 20 sec. with the brake pedal depressed, or for 5 sec. when the brake pedal is not depressed.	●Speed sensor ●Sensor rotor ●ECU

INSPECTION PROCEDURE

1	Check sensor rotor (See page DI–552).

NG → **Replace sensor rotor.**

OK

2	Check speed sensor (See page DI–552).

NG → **Replace speed sensor.**

OK

3	Check for open and short circuit in harness and connector between speed sensor and ECU (See page IN–31).

NG → **Repair or replace harness and connector.**

OK

Check and replace ABS ECU.

DI045–08

DTC	41	Power Source Circuit

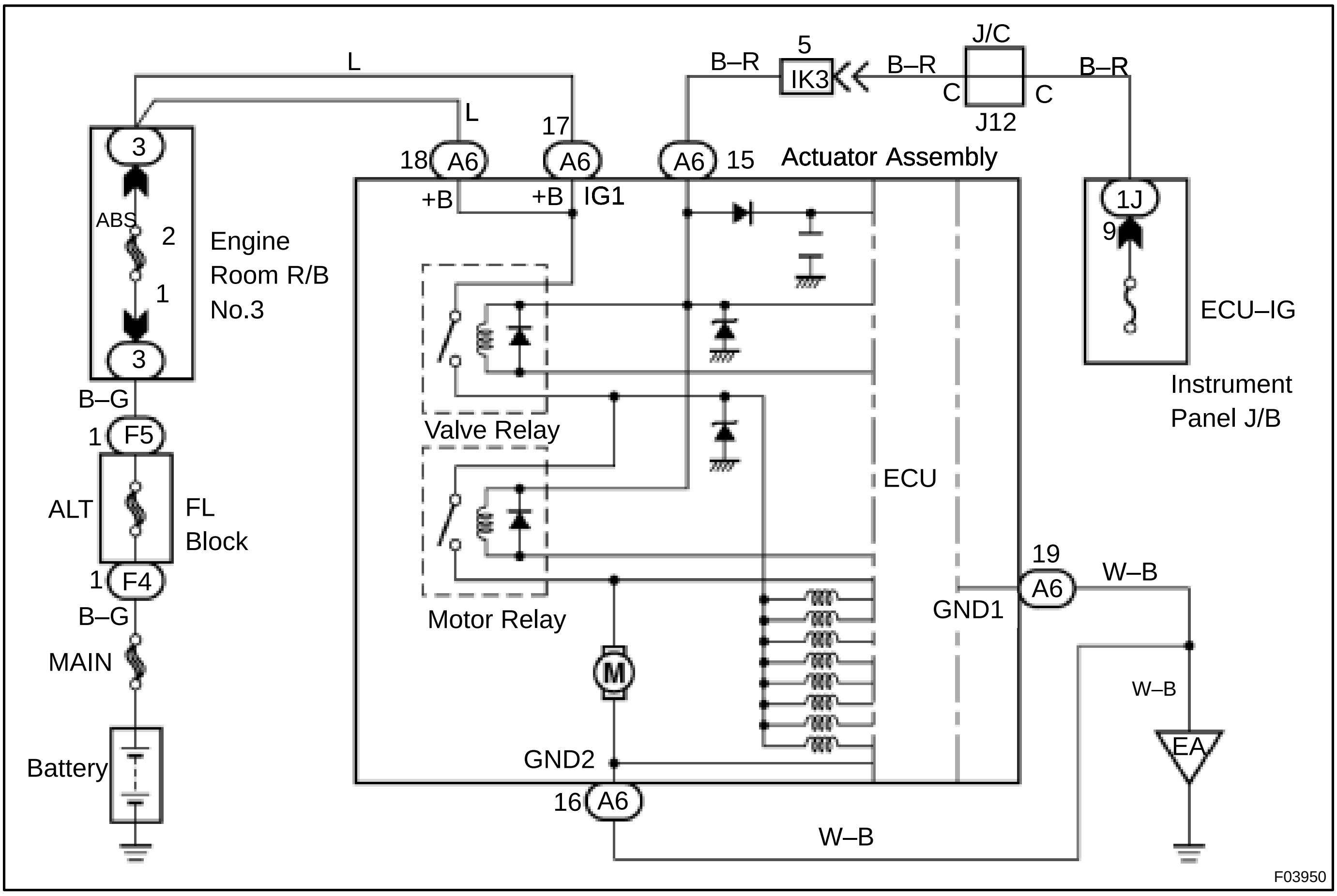
CIRCUIT DESCRIPTION

This is the power source for the ECU, hence the actuators.

DTC No.	DTC Detecting Condition	Trouble Area
41	Vehicle speed at about 6 km/h (4 mph), low battery voltage is less than 9.4 V at the time of non–operation of ABS control or less than 8.8 V at the time of operation of ABS control, and high battery voltage is more than 17.4 V.	●Battery ●Charging system ●Power source circuit ●ECU

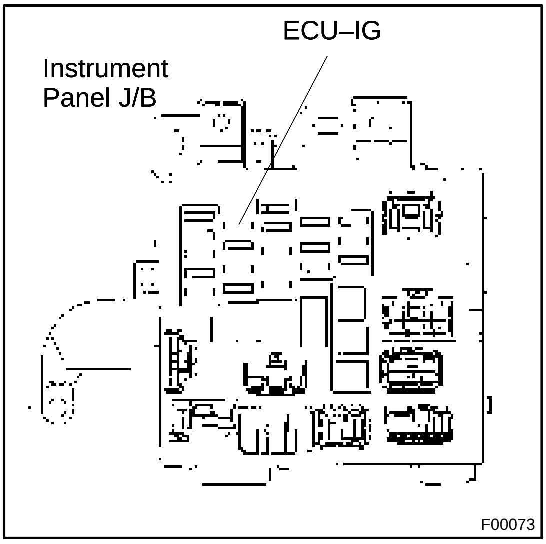
Fail safe function:
If trouble occurs in the power source circuit, the ECU cuts off current to the ABS solenoid valve relay and prohibits ABS control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check ECU–IG fuse.**



PREPARATION:
Remove ECU–IG fuse from Instrument Panel J/B.
CHECK:
Check continuity of ECU–IG fuse.
OK:
Continuity

NG	**Check for short circuit in all the harness and components connected to ECU–IG fuse (See the attached wiring diagram.)**

OK

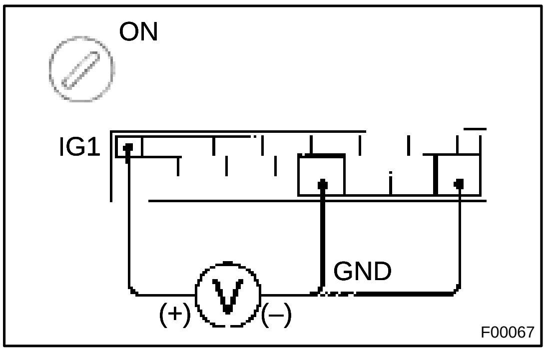
2	**Check battery positive voltage.**

OK:
Voltage: 10 – 14 V

NG	**Check and repair the charging system** **5S–FE engine: (See page CH–1)** **1MZ–FE engine: (See page CH–1).**

OK

3	**Check voltage between terminals IG1 and GND of ABS actuator connector.**

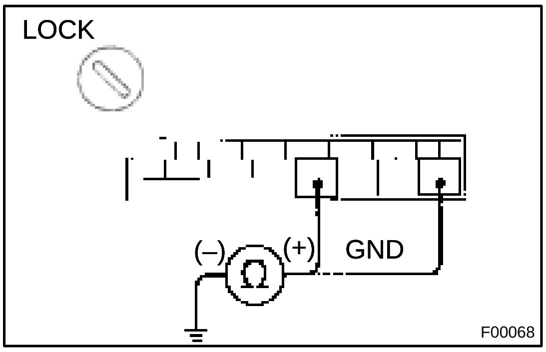


PREPARATION:
Disconnect ABS actuator connector.
CHECK:
(a) Turn the ignition switch ON.
(b) Measure voltage between terminals IG1 and GND of ABS actuator harness side connector.
OK:
Voltage: 10 – 14 V

OK → **Check and replace ABS ECU.**

NG

4	**Check continuity between terminals GND of ABS actuator connector and body ground.**



CHECK:
Measure resistance between terminal GND of ABS actuator harness side connector and body ground.
OK:
Resistance: 1 Ω or less

NG → **Repair or replace harness or connector.**

OK

Check for open circuit in harness and connector between ABS ECU and ECU–IG (See page IN–31).

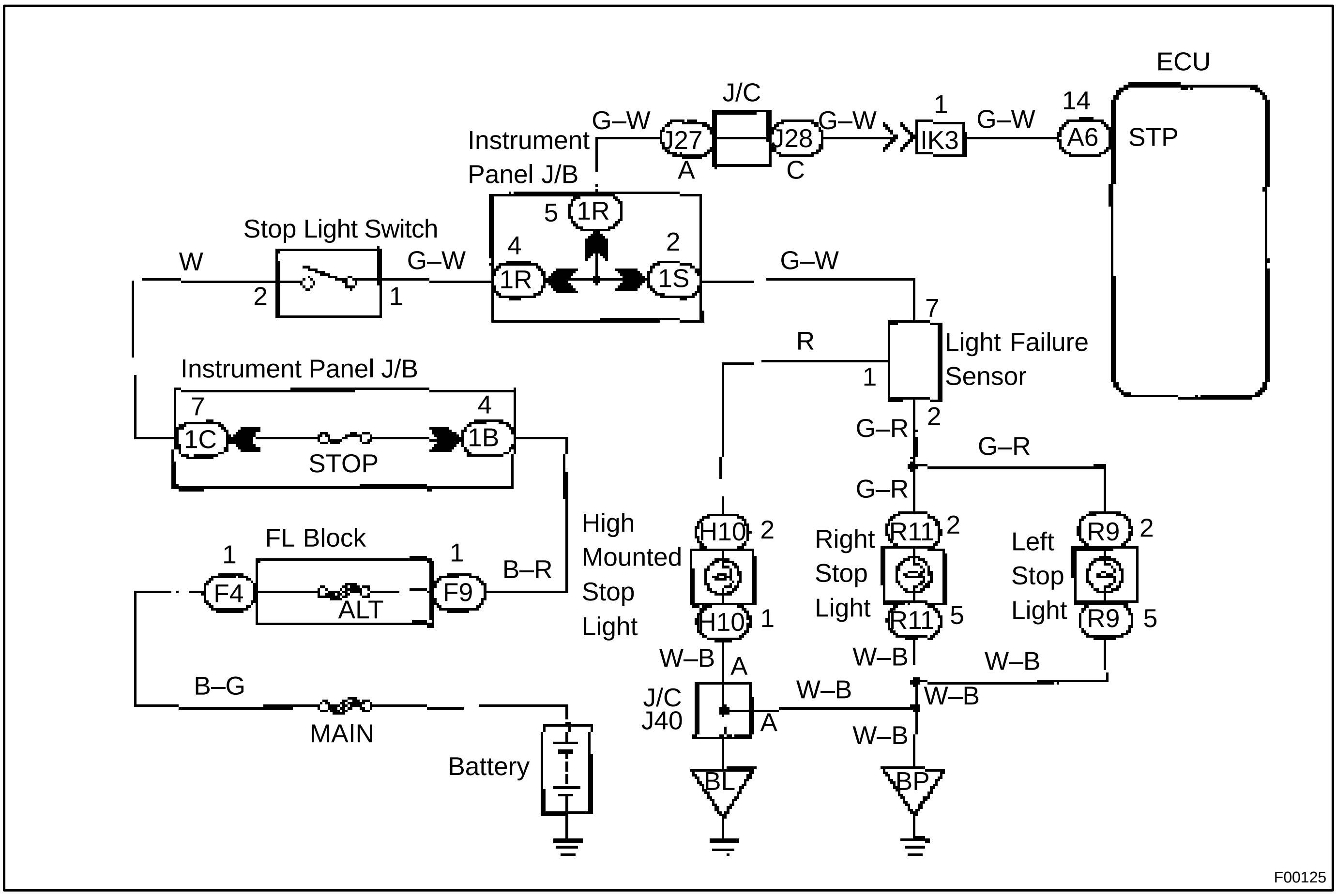
DI046–09

DTC	58	Stop Light Switch Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
49	Stop light switch circuit is open, and stop light switch voltage is in the level between 65 % or more and less than 93 % of the battery voltage.	●Stop light switch ●Stop light switch circuit ●ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check operation of stop light.

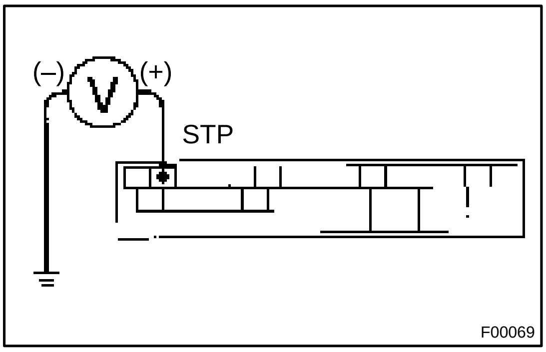
CHECK:

Check that stop light lights up when brake pedal is depressed and turns off when brake pedal is released.

NG → **Repair stop light circuit (See page BE–36).**

OK

2	Check voltage between terminal STP of ABS actuator and body ground.



PREPARATION:
Disconnect ABS actuator connector.

CHECK:
Measure voltage between terminal STP of ABS actuator harness side connector and body ground when brake pedal is depressed.

OK:
Voltage: 8 – 14 V

OK → **Check and replace ABS ECU.**

NG ↓

3	Check for open circuit in harness and connector between ABS ECU and stop light switch (See page IN–31).

NG → **Repair or replace harness or connector.**

OK ↓

Proceed to next circuit inspection shown on problem symptoms table (See page DI–545).

DI047–06

DTC	62	ABS ECU Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
62	ABS ECU continuously detects the proper operation of ABS.	●Battery ●ECU

Fail safe function:
If trouble occurs in the power source circuit, the ECU cuts off current to the ABS solenoid valve relay and prohibits ABS control.

INSPECTION PROCEDURE

1	**Is DTC output?**

Check DTC on page DI–539.

YES → **Repair circuit indicated by the code output.**

NO

2	**Is normal code displayed?**

YES → **Check for short circuit in harness and connector between DLC1 or DLC2 and ABS ECU (See page IN–31).**

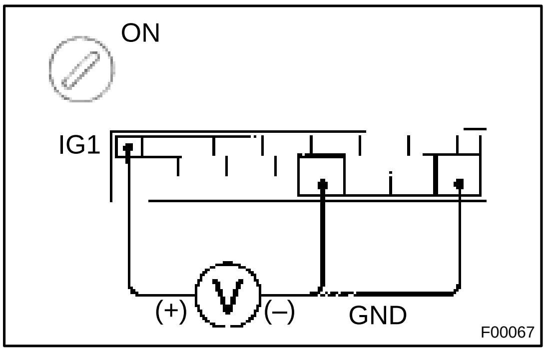
NO

3	**Does ABS warning light go off?**

YES → **Check for open and short circuit in harness and connector of Tc circuit between ECU and DLC2 or DLC1.**

NO

4	**Check voltage between terminals IG1 and GND of ABS actuator connector.**



PREPARATION:

Disconnect ABS actuator connector.

CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals IG1 and GND of ABS actuator harness side connector.

OK:

Voltage: 10 – 14 V

NG → **Check for open and short circuit in harness and connector between ECU–IG fuse and ABS actuator (See page IN–31).**

OK

5	**Check connection of ABS actuator connector.**

CHECK:

Check the connection of the ABS actuator connector and check the ABS warning light goes off.

OK → **Repair or replace harness or connector.**

NG

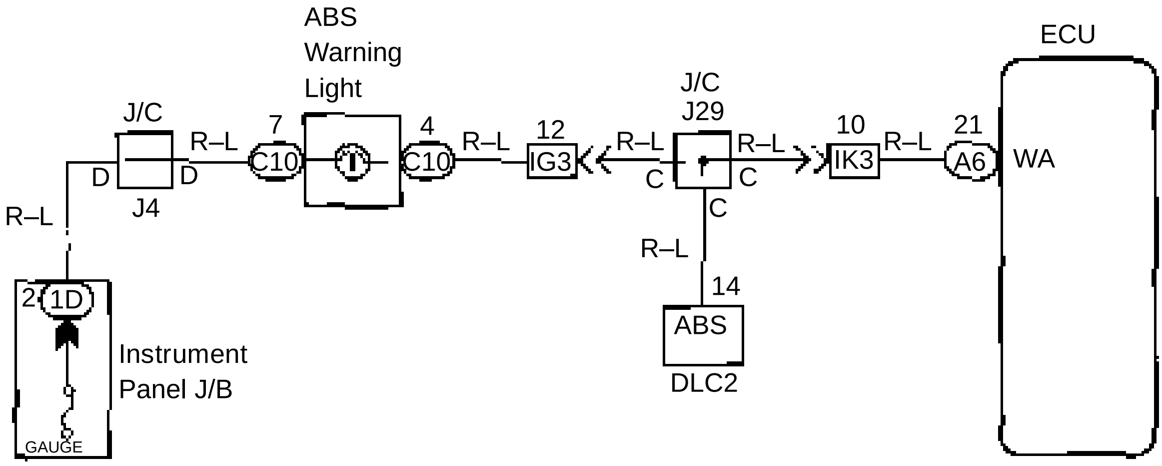
Check and replace ABS ECU.

ABS Warning Light Circuit

CIRCUIT DESCRIPTION

If the ECU detects any trouble, it lights the ABS warning light while at the same time prohibiting ABS control. At this time, the ECU records a DTC in memory.
Connect terminals Tc and E_1 of the DLC1 or DLC2 to make the ABS warning light blink and output the DTC.

WIRING DIAGRAM



F00096

INSPECTION PROCEDURE

Troubleshoot in accordance with the chart below for each trouble symptom

ABS warning light does not light up	Go to step 1
ABS warning light remains on	Go to step 2

1	**Check ABS warning light.**

See combination meter troubleshooting on page BE–2.

NG → **Repair bulb or combination meter assembly.**

OK

Check for open circuit in harness and connector between GAUGE fuse, DLC2 and ABS ECU (See page IN–31).

2	**Is DTC output?**

Check DTC on page DI–539.

YES → **Repair circuit indicated by the code output.**

NO

Check for short circuit in harness and connector between ABS warning light, DLC1, DLC2, and ECU (See page IN–31).

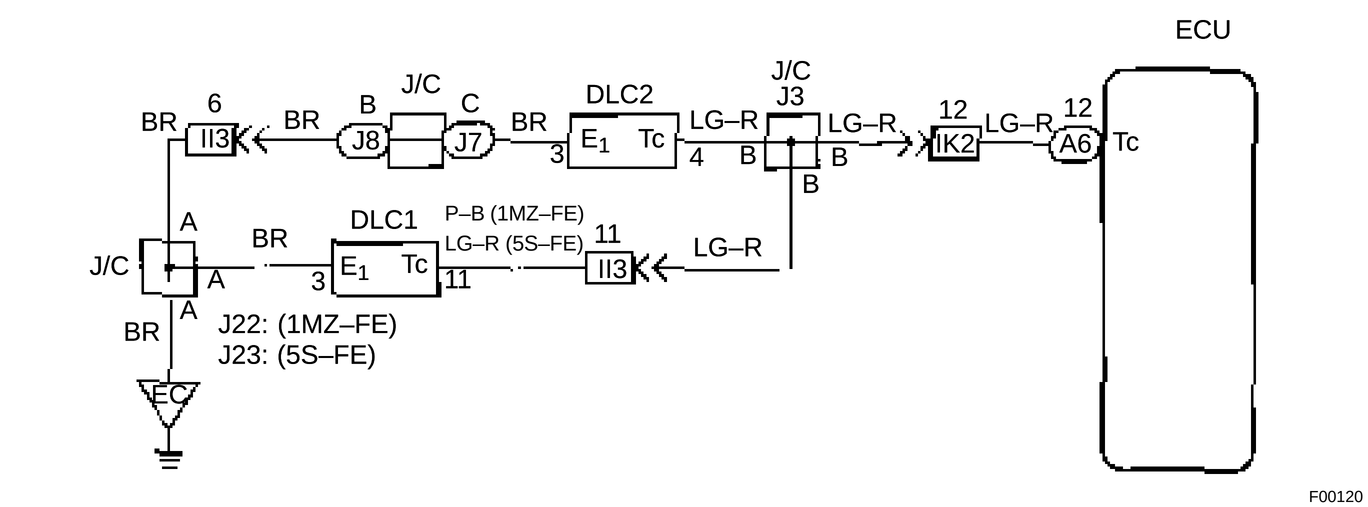
DI049–08

Tc Terminal Circuit

CIRCUIT DESCRIPTION

Connecting between terminals Tc and E_1 of the DLC1 or the DLC2 causes the ECU to display the DTC by flashing the ABS warning light.

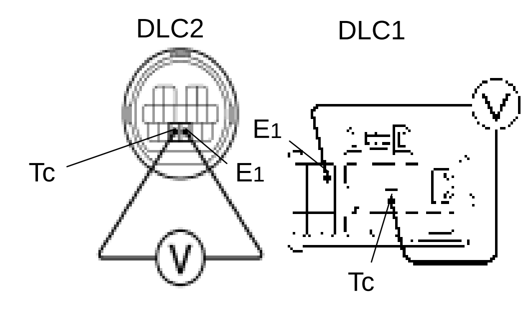
WIRING DIAGRAM



F00120

INSPECTION PROCEDURE

1	**Check voltage between terminals Tc and E_1 of DLC2 or DLC1.**



F02607 F00445 F02612

CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals Tc and E_1 of DLC2 or DLC1.

OK:

Voltage: 10 – 14 V

OK → **If ABS warning light does not blink even after Tc and E_1 are connected, the ECU may be defective.**

NG

2	Check for open and short circuit in harness and connector between ABS ECU and DLC2 or DLC1, DLC2 or DLC1 and body ground (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and replace ABS ECU.

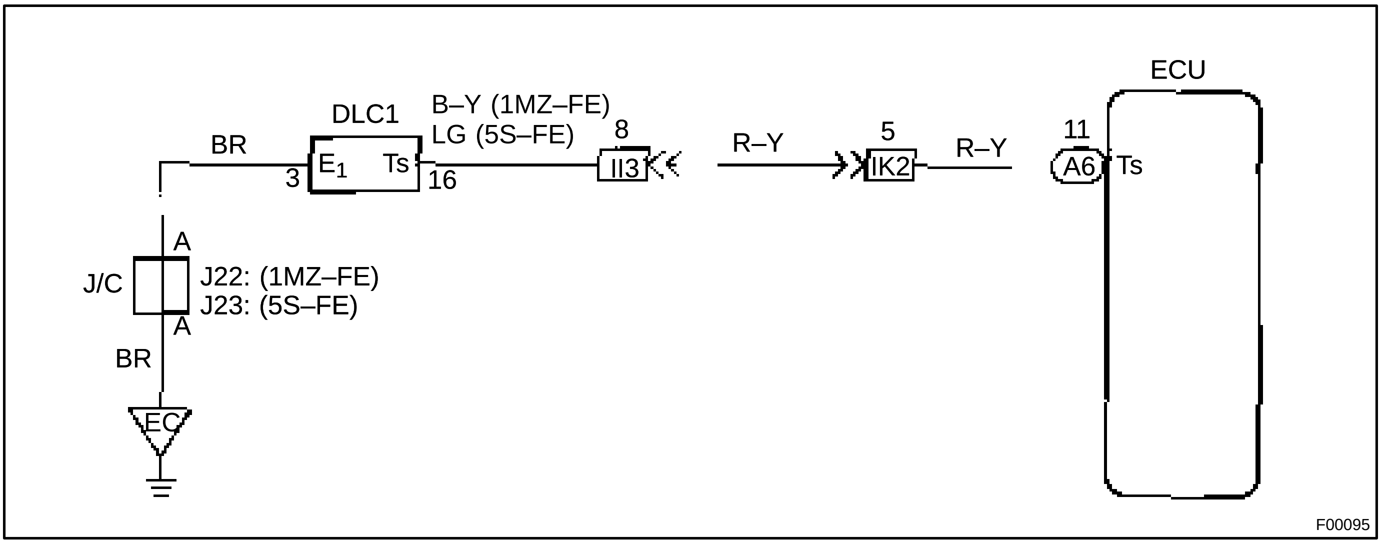
DI04A–08

Ts Terminal Circuit

CIRCUIT DESCRIPTION

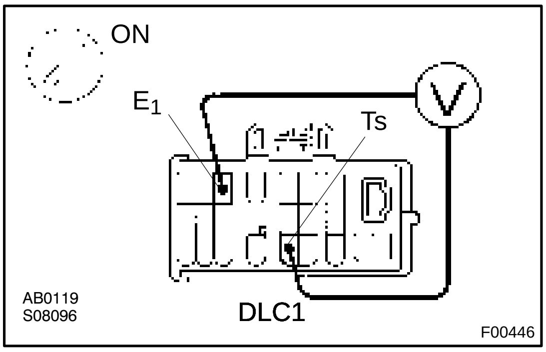
The sensor check circuit detects abnormalities in the speed sensor signal which cannot be detected with the DTC check.
Connecting terminals Ts and E_1 of the DLC1 in the engine compartment starts the check.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Ts and E_1 of DLC1.**



CHECK:
(a) Turn the ignition switch ON.
(b) Measure voltage between terminals Ts and E_1 of DLC1.
OK:
Voltage: 10 – 14 V

OK	**If ABS warning light does not blink even after Ts and E_1 are connected, the ECU may be defective.**

NG

2	**Check for open and short circuit in harness and connector between ABS ECU and DLC1, DLC1 and body ground (See page IN–31).**

NG → **Repair or replace harness or connector.**

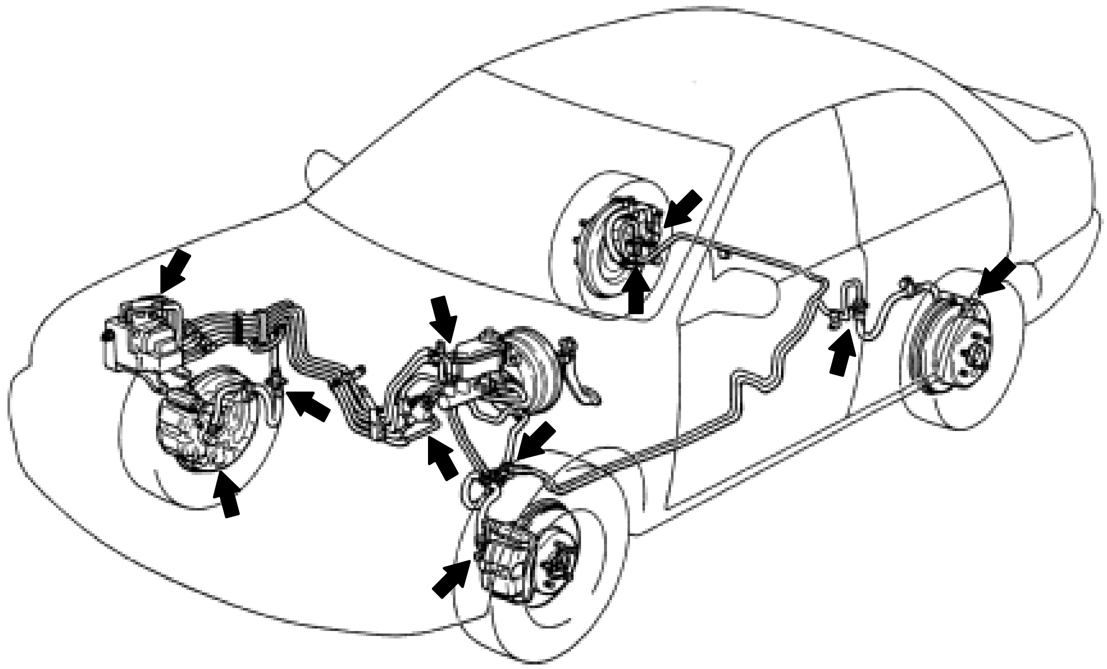
OK

Check and replace ABS ECU.

DI04B–10

Check for Fluid Leakage

Check for fluid leakage from actuator or hydraulic lines.



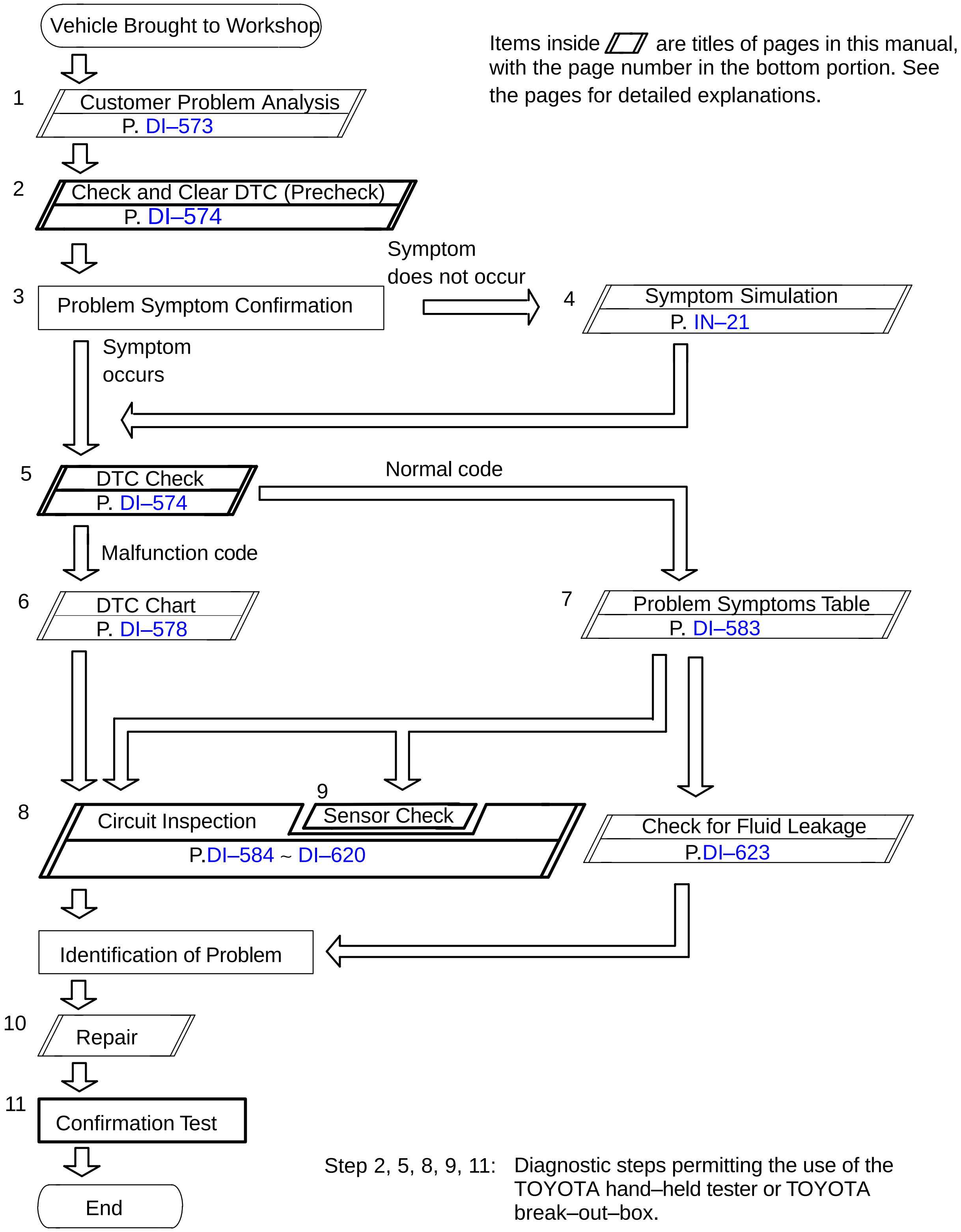
F00072

ABS & TRACTION CONTROL SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

DI04C–02

Troubleshoot in accordance with the procedure on the following pages.



Items inside ▱ are titles of pages in this manual, with the page number in the bottom portion. See the pages for detailed explanations.

Step 2, 5, 8, 9, 11: Diagnostic steps permitting the use of the TOYOTA hand–held tester or TOYOTA break–out–box.

DI04D–02

CUSTOMER PROBLEM ANALYSIS CHECK

ABS & TRAC Check Sheet

Inspector's Name :

Customer's Name		**Registration No.**	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

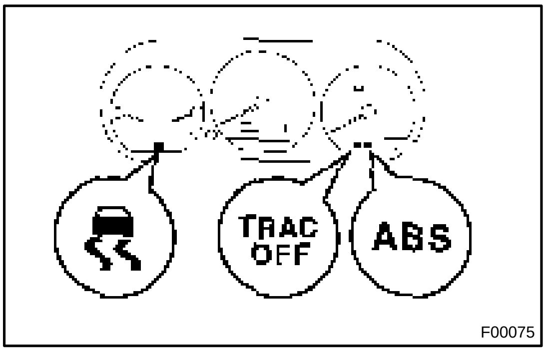
Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ ABS does not operate.	
	☐ ABS does not operate efficiently.	
	☐ TRAC does not operate. (Wheels spin when starting rapidly.)	
	ABS Warning Light Abnormal	☐ Remains ON ☐ Does not Light Up
	TRAC OFF Indicator Light Abnormal	☐ Remains ON ☐ Blinks ☐ Does not Light Up
	SLIP Indicator Light Abnormal	☐ Remains ON ☐ Does not Light Up

Check Item	**Malfunction Indicator Light**	☐ Normal ☐ Malfunction Code (Code)

DTC Check	**1st Time**	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)

DI04E–04



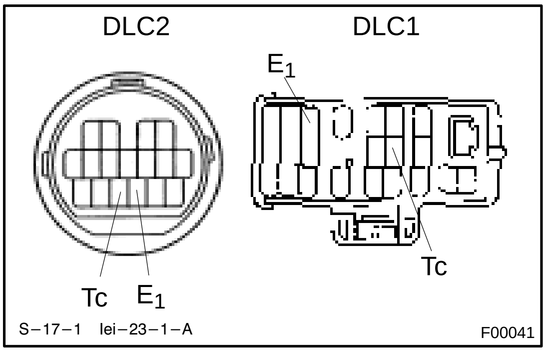
F00075

PRE–CHECK

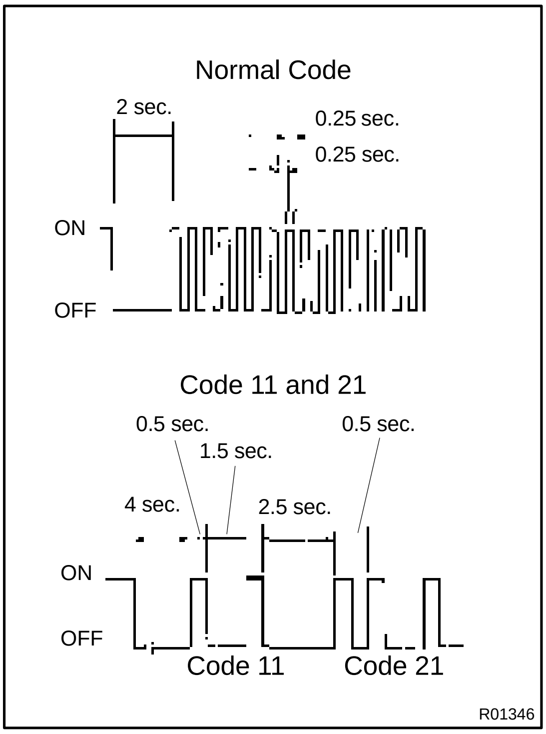
1. DIAGNOSIS SYSTEM

(a) Check the indicator.
When the ignition switch is turned ON, check that the ABS warning light, TRAC OFF indicator light and SLIP indicator light go on for 3 seconds.

HINT:
If the indicator check result is not normal, proceed to troubleshooting for the ABS warning light circuit, TRAC OFF indicator light circuit and SLIP indicator light circuit
(See page DI–612, DI–617, DI–620).



F00041

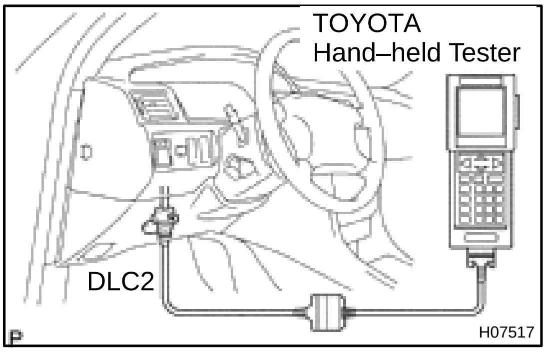


R01346

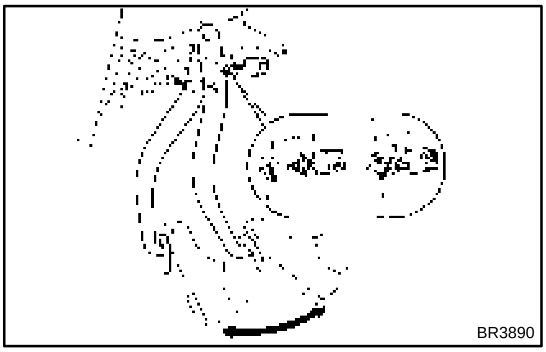
(b) Check the DTC.
(1) Using SST, connect terminals Tc and E_1 of DLC2 or DLC1.
SST 09843 – 18020
(2) Turn the ignition switch ON.
(3) Read the DTC from the ABS warning light and TRAC OFF indicator light on the combination meter.

HINT:
If no code appears, inspect the diagnostic circuit or ABS warning light circuit, TRAC OFF indicator light circuit
(See page DI–621 or DI–612, DI–617).
As an example, the blinking patterns for normal code and codes 11 and 21 are shown on the left.
(4) Codes are explained in the code table on page DI–578.
(5) After completing the check, disconnect terminals Tc and E_1, and turn off the display.

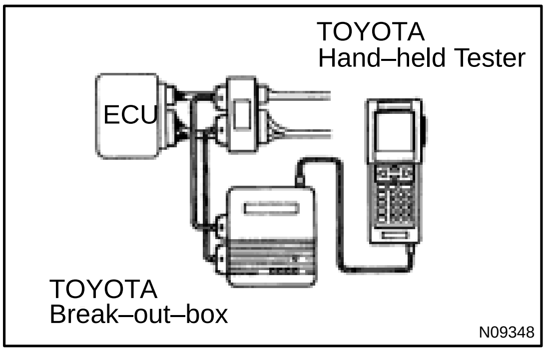
If 2 or more malfunctions are indicated at the same time the lowest numbered DTC will be displayed 1st.



(c) Using TOYOTA hand–held tester, check the DTC.
 (1) Hook up the TOYOTA hand–held tester to the DLC2.
 (2) Read the DTC by following the prompts on the tester screen.
 Please refer to the TOYOTA hand–held tester operator's manual for further details.

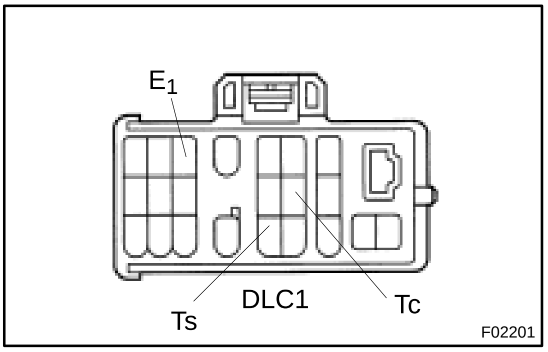


(d) Clear the DTC.
 (1) Using SST, connect terminals Tc and E_1 of DLC2 or DLC1.
 SST 09843 – 18020
 (2) Turn the ignition switch ON.
 (3) Clear the DTC stored in ECU by depressing the brake pedal 8 or more times within 5 seconds.
 (4) Check that the warning light shows the normal code.
 (5) Remove the SST from the terminals of DLC2 or DLC1.
 SST 09843 – 18020



(e) Using TOYOTA break–out–box and TOYOTA hand–held tester, measure the ECU terminal values.
 (1) Hook up the TOYOTA hand–held tester and TOYOTA break–out–box to the vehicle.
 (2) Read the ECU input/output values by following the prompts on the tester screen.

HINT:
TOYOTA hand–held tester has a "Snapshot" function. This records the measured values and is effective in the diagnosis of intermittent problems.
Please refer to the TOYOTA hand–held tester/TOYOTA break–out–box operator's manual for further details.



F02201

2. SPEED SENSOR SIGNAL

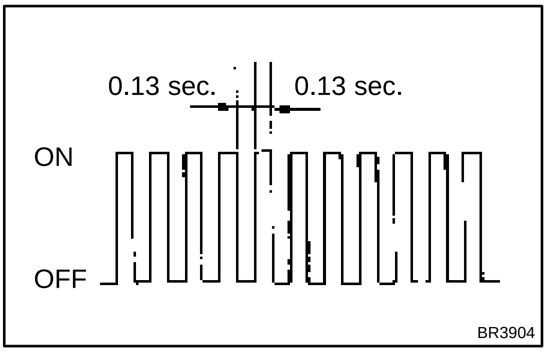
(a) Check the speed sensor signal.

(1) Turn the ignition switch OFF.

(2) Using SST, connect terminals Ts and E_1 of DLC1.

SST 09843 – 18020

(3) Start the engine.



BR3904

(4) Check that the ABS warning light blinks.

HINT:

If the ABS warning light does not blink, inspect the ABS warning light circuit (See page DI–612).

(5) Drive vehicle straight forward.

HINT:

Drive vehicle faster than 45 km/h (28 mph) for several seconds.

(6) Stop the vehicle.

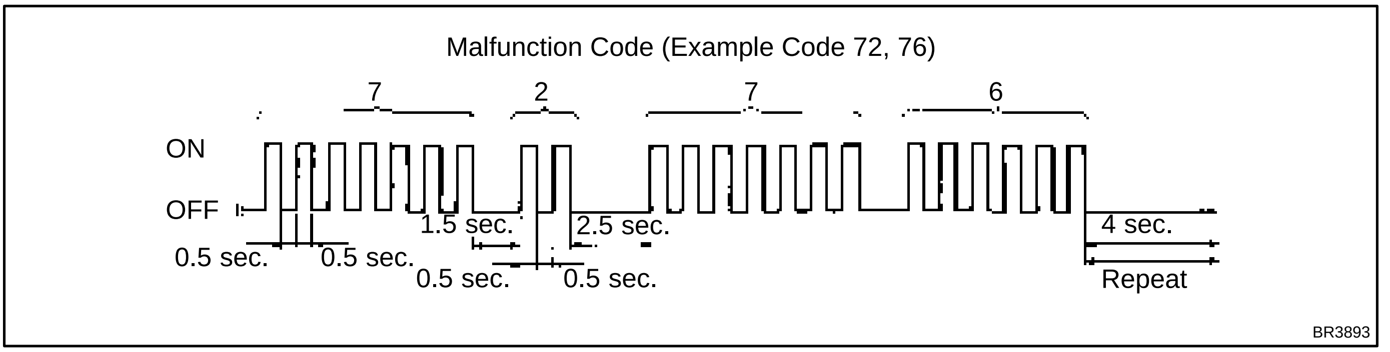
(7) Using SST, connect terminals Tc and E_1 of DLC1.

SST 09843 – 18020

(8) Read the number of blinks of the ABS warning light.

HINT:

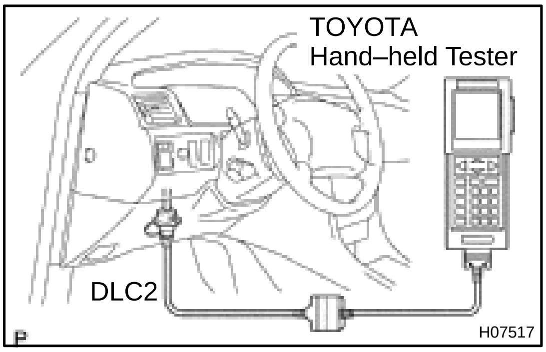
- See the list of DTC shown on the next page.
- If 2 or more malfunctions are indicated at the same time, the lowest numbered code will be displayed 1st.
- If every sensor is normal, a normal code is output (A cycle of 0.25 sec. ON and 0.25 sec. OFF is repeated).



BR3893

(9) After doing the check, disconnect the SST from terminals Ts and E_1, Tc and E_1 of DLC1, and turn ignition switch OFF.

SST 09843 – 18020



(b) Using TOYOTA hand–held tester, check the DTC.
(1) Do step 1. ~ 6. on the previous page.
(2) Hook up the TOYOTA hand–held tester to the DLC2.
(3) Read the DTC by following the prompts on the tester screen.
Please refer to the TOYOTA hand–held tester operator's manual for further details.

DTC of speed sensor check function:

Code No.	Diagnosis	Trouble Area
71	Low output voltage of right front speed sensor	●Right front speed sensor ●Sensor installation ●Right front speed sensor rotor
72	Low output voltage of left front speed sensor	●Left front speed sensor ●Sensor installation ●Left front speed sensor rotor
73	Low output voltage of right rear speed sensor	●Right rear speed sensor ●Sensor installation ●Right rear speed sensor rotor
74	Low output voltage of left rear speed sensor	●Left rear speed sensor ●Sensor installation ●Left rear speed sensor rotor
75	Abnormal change in output voltage of right front speed sensor	●Right front speed sensor rotor
76	Abnormal change in output voltage of left front speed sensor	●Left front speed sensor rotor
77	Abnormal change in output voltage of right rear speed sensor	●Right rear speed sensor rotor
78	Abnormal change in output voltage of left rear speed sensor	●Left rear speed sensor rotor

DI04F–04

DIAGNOSTIC TROUBLE CODE CHART

HINT:

- Using SST 09843 –18020, connect the terminals Tc and E_1.
- If a malfunction code is displayed during the DTC check, check the circuit listed for the code. For details of each code, turn to the page referred to under the ”See page” for respective ”DTC No.” in the DTC chart.

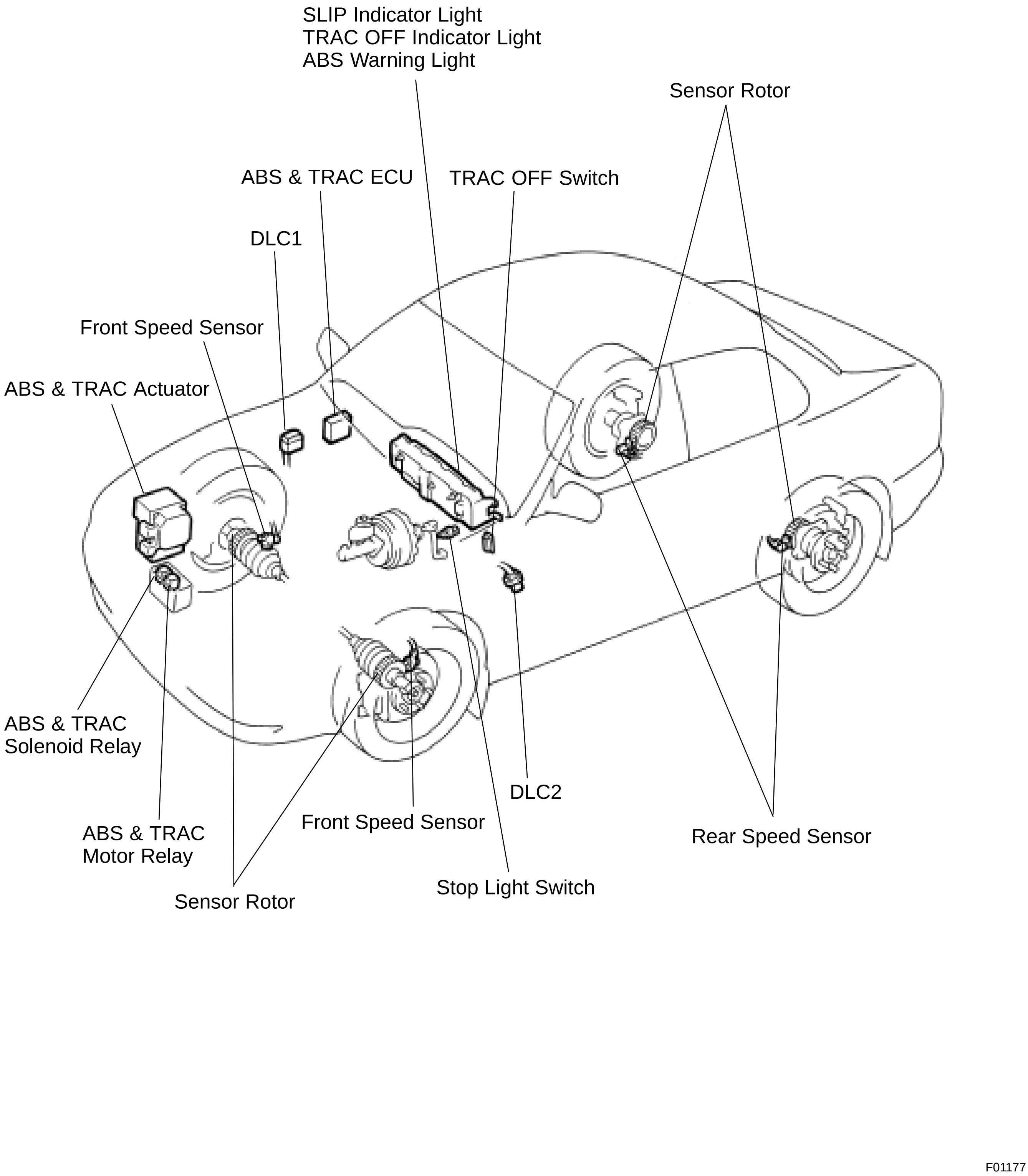
DTC No. (See Page)	Detection Item	Trouble Area
11 (DI–584)	Open circuit in ABS & TRAC solenoid relay circuit	●ABS & TRAC solenoid relay ●ABS & TRAC solenoid relay circuit ●ECU
12 (DI–584)	Short circuit in ABS & TRAC solenoid relay circuit	
13 (DI–587)	Open circuit in ABS & TRAC motor relay circuit	●ABS & TRAC motor relay ●ABS & TRAC motor relay circuit ●ECU
14 (DI–587)	Short circuit in ABS & TRAC motor relay circuit	
21 (DI–590)	Open or short circuit in right front solenoid circuit	●ABS & TRAC actuator ●SFRR or SFRH circuit ●ECU
22 (DI–590)	Open or short circuit in left front solenoid circuit	●ABS & TRAC actuator ●SFLR or SFLH circuit ●ECU
23 (DI–590)	Open or short circuit in right rear solenoid circuit	●ABS & TRAC actuator ●SRRR or SRRH circuit ●ECU
24 (DI–590)	Open or short circuit in left rear solenoid circuit	●ABS & TRAC actuator ●SRLR or SRLH circuit ●ECU
25 (DI–590)	Open or short circuit in SMC1 circuit	●ABS & TRAC actuator ●SMC1 circuit ●ECU
26 (DI–590)	Open or short circuit in SMC2 circuit	●ABS & TRAC actuator ●SMC2 circuit ●ECU
27 (DI–590)	Open or short circuit in SRC1 circuit	●ABS & TRAC actuator ●SRC1 circuit ●ECU
28 (DI–590)	Open or short circuit in SRC2 circuit	●ABS & TRAC actuator ●SRC2 circuit ●ECU
31 (DI–593)	Right front wheel speed sensor signal malfunction	●Right front, left front, right rear and left rear speed sensor ●Each speed sensor circuit ●Speed sensor rotor ●ECU
32 (DI–593)	Left front wheel speed sensor signal malfunction	
33 (DI–593)	Right rear wheel speed sensor signal malfunction	
34 (DI–593)	Left rear wheel speed sensor signal malfunction	
41 (DI–598)	Low battery positive voltage or abnormally high battery positive voltage	●Battery ●Charging system ●Power source circuit ●ECU

43* (DI–601)	Malfunction in ABS control system	●ABS control system
44* (DI–602)	Open or short circuit in NE signal circuit	●NEO circuit ●ECM ●ECU
49 (DI–604)	Open circuit in stop light switch circuit	●Stop light switch ●Stop light switch circuit ●ECU
51 (DI–606)	Pump motor is locked	●ABS pump motor
53* (DI–608)	Malfunction in ECM communication circuit	●TRC+ or TRC – circuit ●EFI+ or EFI– circuit ●ECM ●ECU
61* (DI–609)	Malfunction in engine control system	●Engine control system
Always ON (DI–610)	Malfunction in ECU	●ECU

*: TRAC OFF indicator light blinking

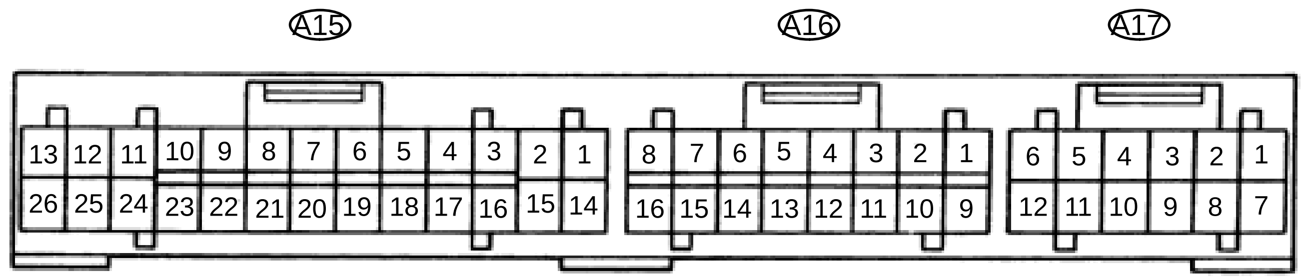
DI04G–04

PARTS LOCATION



DI1JO–03

TERMINALS OF ECU



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
IG1 (A16 – 8) – GND (A15 – 15, A17 – 9, 10)	B–R ↔ W–B	IG switch ON	10 – 14
R+ (A15 – 1) – SR (A15 – 11)	GR–R ↔ GR	IG switch ON, ABS warning light OFF	9 – 14
R+ (A15 – 1) – MR (A15 – 24)	GR–R ↔ GR–L	IG switch ON	Below 1.0
SFRR (A15 – 26) – GND (A15 – 15, A17 – 9, 10)	W–R ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SFRH (A15 – 13) – GND (A15 – 15, A17 – 9, 10)	R–B ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SFLR (A17 – 1) – GND (A15 – 15, A17 – 9, 10)	W–L ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SFLH (A17 – 2) – GND (A15 – 15, A17 – 9, 10)	L–B ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SRRR (A17 – 7) – GND (A15 – 15, A17 – 9, 10)	R–G ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SRRH (A17 – 8) – GND (A15 – 15, A17 – 9, 10)	W–R ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SRLR (A15 – 12) – GND (A15 – 15, A17 – 9, 10)	LG–B ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
SRLH (A15 – 25) – GND (A15 – 15, A17 – 9, 10)	G–Y ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
AST (A15 – 10) – GND (A15 – 15, A17 – 9, 10)	R ↔ W–B	IG switch ON, ABS warning light OFF	10 – 14
WA (A16 – 4) – GND (A15 – 15, A17 – 9, 10)	G–B ↔ W–B	IG switch ON, ABS warning light ON	Below 2.0
		IG switch ON, ABS warning light OFF	10 – 14
STP (A16 – 16) – GND (A15 – 15, A17 – 9, 10)	G–W ↔ W–B	Stop light switch OFF	Below 1.5
		Stop light switch ON	8 – 14
D/G (A15 – 22) – GND (A15 – 15, A17 – 9, 10)	R–L ↔ W–B	IG switch ON, ABS warning light ON	10 – 14
Tc (A15 – 9) – GND (A15 – 15, A17 – 9, 10)	LG–R ↔ W–B	IG switch ON	8 – 14
Ts (A15 – 23) – GND (A15 – 15, A17 – 9, 10)	R–Y ↔ W–B	IG switch ON	8 – 14
FR+ (A15 – 17) – FR– (A15 – 18)	W ↔ B	IG switch ON, slowly turn right front wheel	AC generation
FL+ (A15 – 5) – FL– (A15 – 4)	R ↔ G	IG switch ON, slowly turn left front wheel	AC generation
RR+ (A16 – 9) – RR– (A16 – 10)	W ↔ B	IG switch ON, slowly turn right rear wheel	AC generation
RL+ (A16 – 2) – RL– (A16 – 1)	R ↔ G	IG switch ON, slowly turn left rear wheel	AC generation

MT (A15 – 14) – GND (A15 – 15, A17 – 9, 10)	R–W ↔ W–B	IG switch ON	Below 1.5
SRC1 (A17 – 5) – GND (A15 – 15, A17 – 9, 10)	B–R ↔ W–B	IG switch ON, TRAC OFF indicator light OFF	10 – 14
SRC2 (A17 – 6) – GND (A15 – 15, A17 – 9, 10)	B–Y ↔ W–B	IG switch ON, TRAC OFF indicator light OFF	10 – 14
SMC1 (A17 – 12) – GND (A15 – 15, A17 – 9, 10)	Y–R ↔ W–B	IG switch ON, TRAC OFF indicator light OFF	10 – 14
SMC2 (A17 – 6) – GND (A15 – 15, A17 – 9, 10)	Y–B ↔ W–B	IG switch ON, TRAC OFF indicator light OFF	10 – 14
NEO (A16 – 15) – GND (A15 – 15, A17 – 9, 10)	BR–W ↔ W–B	Idling	Pulse generation
EFI+ (A16 – 6) – GND (A15 – 15, A17 – 9, 10)	W ↔ W–B	IG switch ON	Pulse generation
EFI– (A16 – 14) – GND (A15 – 15, A17 – 9, 10)	B ↔ W–B	IG switch ON	Pulse generation
TRC+ (A16 – 13) – GND (A15 – 15, A17 – 9, 10)	G ↔ W–B	TRAC control active	Pulse generation
TRC– (A16 – 5) – GND (A15 – 15, A17 – 9, 10)	L ↔ W–B	TRAC control active	Pulse generation
IND (A16 – 3) – GND (A15 – 15, A17 – 9, 10)	LG ↔ W–B	IG switch ON, SLIP indicator light ON	Below 2.0
		IG switch ON, SLIP indicator light OFF	10 – 14
WT (A16 – 12) – GND (A15 – 15, A17 – 9, 10)	L ↔ W–B	IG switch ON, TRAC OFF indicator light ON	Below 2.0
		IG switch ON, TRAC OFF indicator light OFF	10 – 14
CSW (A16 – 11) – GND (A15 – 15, A17 – 9, 10)	LG ↔ W–B	IG switch ON, TRAC cut switch pushed in	Below 2.0
		IG switch ON, TRAC cut switch released	8 – 14

DI04I–04

PROBLEM SYMPTOMS TABLE

If a normal code is displayed during the DTC check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

Symptom	Suspect Area	See page
ABS does not operate.	Only when 1. to 4. are all normal and the problem is still occurring, replace the ABS & TRAC ECU. 1. Check the DTC reconfirming that the normal code is output. 2. IG power source circuit 3. Speed sensor circuit 4. Check the ABS & TRAC actuator with a checker. If abnormal, check the hydraulic circuit for leakage (See page DI–623).	 DI–574 DI–598 DI–593 BR–61
ABS does not operate efficiently.	Only when 1. to 4. are all normal and the problem is still occurring, replace the ABS & TRAC ECU. 1. Check the DTC reconfirming that the normal code is output. 2. Speed sensor circuit. 3. Stop light switch circuit. 4. Check the ABS & TRAC actuator with a checker. If abnormal, check the hydraulic circuit for leakage (See page DI–623).	 DI–574 DI–593 DI–604 BR–61
ABS warning light abnormal.	1. ABS warning light circuit 2. ABS & TRAC ECU	DI–612 DI–610
DTC check cannot be done.	Only when 1. and 2. are all normal and the problem is still occurring, replace the ABS & TRAC ECU. 1. ABS warning light circuit 2. TRAC OFF indicator light circuit 3. Tc terminal circuit	 DI–612 DI–617 DI–621
Speed sensor signal check cannot be done.	1. Ts terminal circuit 2. ABS & TRAC ECU	DI–615 DI–610
TRAC does not operate.	Only when inspection circuits for each problem symptom are all normal and the problem is still occurring, replace the ABS & TRAC ECU. 1. Check the DTC, reconfirming that the normal code is output. 2. IG power source circuit 3. Check the hydraulic circuit for leakage 4. Speed sensor circuit	 DI–574 DI–598 DI–623 DI–593
SLIP indicator light abnormal.	SLIP indicator light circuit	DI–620
TRAC OFF indicator light abnormal.	Only when inspection circuits for each problem symptom are all normal and the problem is still occurring, replace the ABS & TRAC ECU. 1. TRAC OFF indicator light circuit 2. TRAC cut switch circuit	 DI–617 DI–617

DI04J–04

CIRCUIT INSPECTION

DTC	11, 12	ABS & TRAC Solenoid Relay Circuit

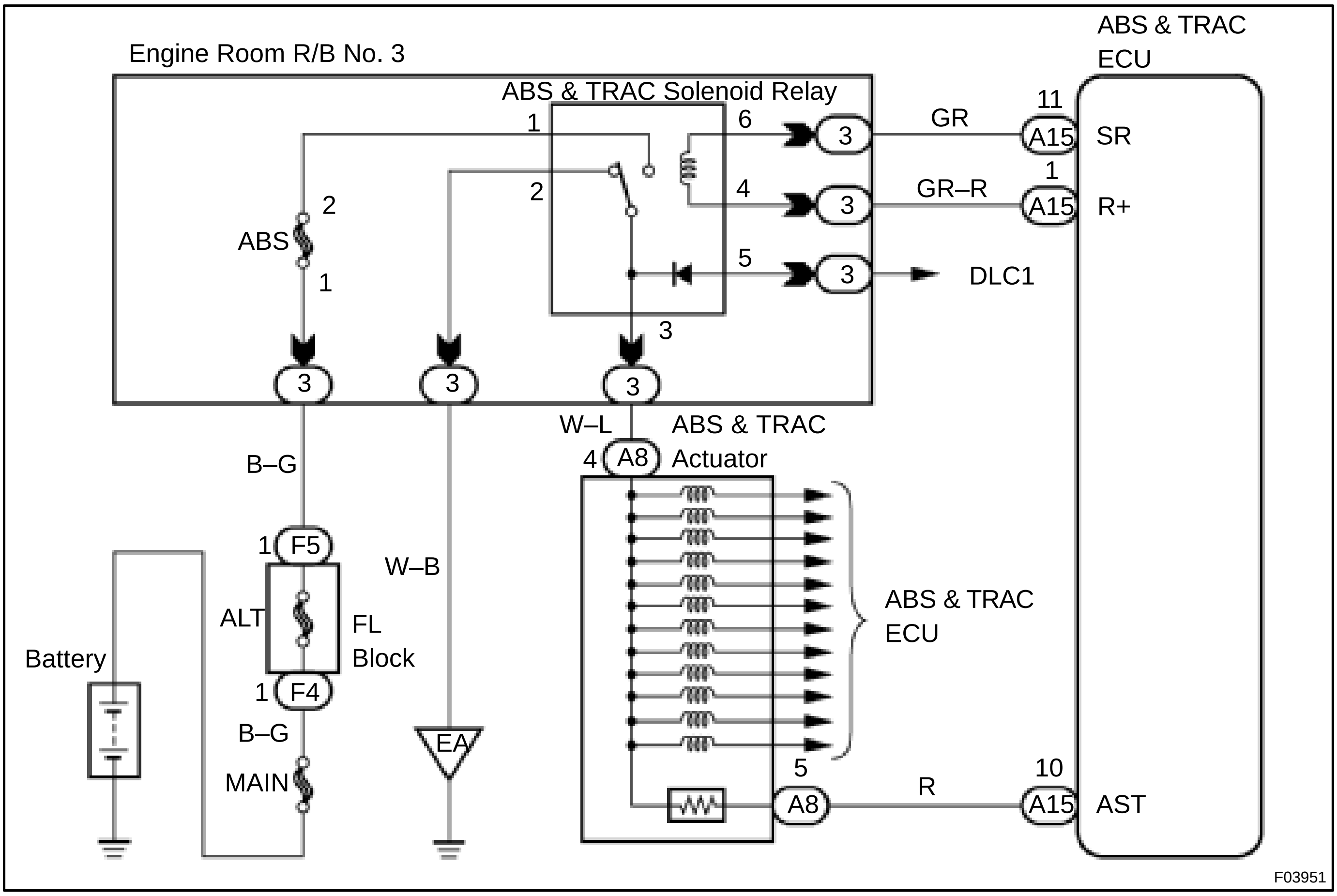
CIRCUIT DESCRIPTION

This relay supplies power to each ABS & TRAC solenoid. After the ignition switch is turned ON, if the initial check is OK, the relay goes on.

DTC No.	DTC Detecting Condition	Trouble Area
11	Condition 1. to 3. are detected: 1. Malfunction of solenoid relay monitor 2. Battery voltage will not exceed more than 17.0 V within 2.16 sec. 3. Battery voltage will not become less than 9.5 V within 2.16 sec., or after the solenoid relay is ON and AST voltage of ECU terminal does not become 8.0 V or more.	●ABS & TRAC solenoid relay ●ABS & TRAC solenoid relay circuit ●ECU
12	Solenoid relay is OFF in the midst of premain routine, and AST voltage of ECU terminal is 8.0 V or more, which continues for 2.04 sec. or more.	

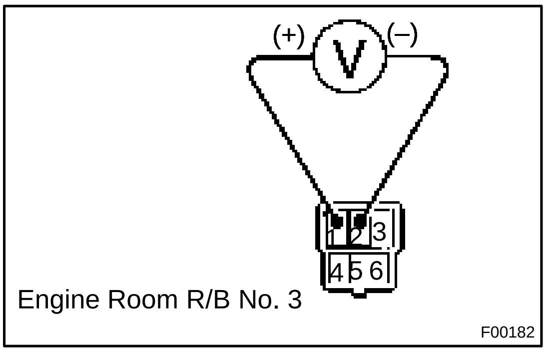
Fail safe function:
If any trouble occurs in the ABS & TRAC solenoid relay circuit, the ECU cuts off current to the ABS & TRAC solenoid relay and prohibits ABS control and TRAC control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals 1 and 2 of Engine Room R/B No. 3 (for ABS & TRAC solenoid relay).**



PREPARATION:
Remove ABS & TRAC solenoid relay from Engine Room R/B No. 3.

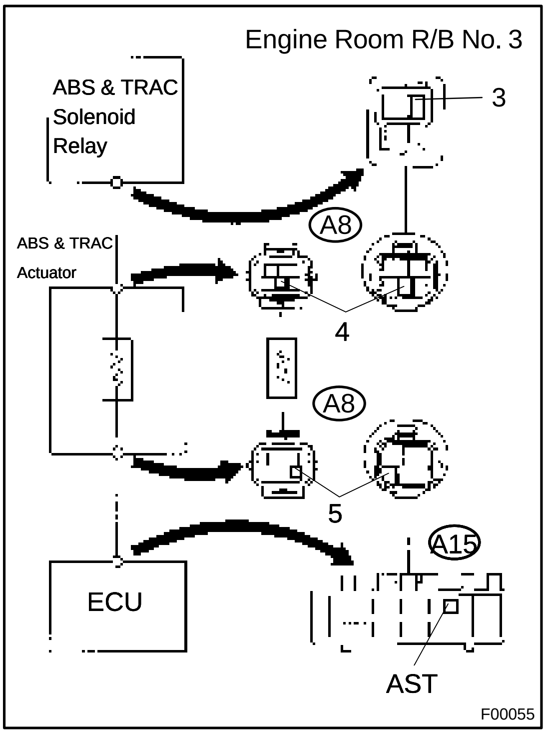
CHECK:
Measure the voltage between terminals 1 and 2 of Engine Room R/B No. 3 (for ABS & TRAC solenoid relay).

OK:
Voltage: 10 – 14 V

NG → **Check and repair harness or connector.**

OK

2	**Check continuity between terminal 3 of ABS & TRAC solenoid relay and terminal AST of ABS & TRAC ECU.**



CHECK:
Check continuity between terminal 3 of Engine Room R/B No. 3 (for ABS solenoid relay) and terminal AST of ABS & TRAC ECU.

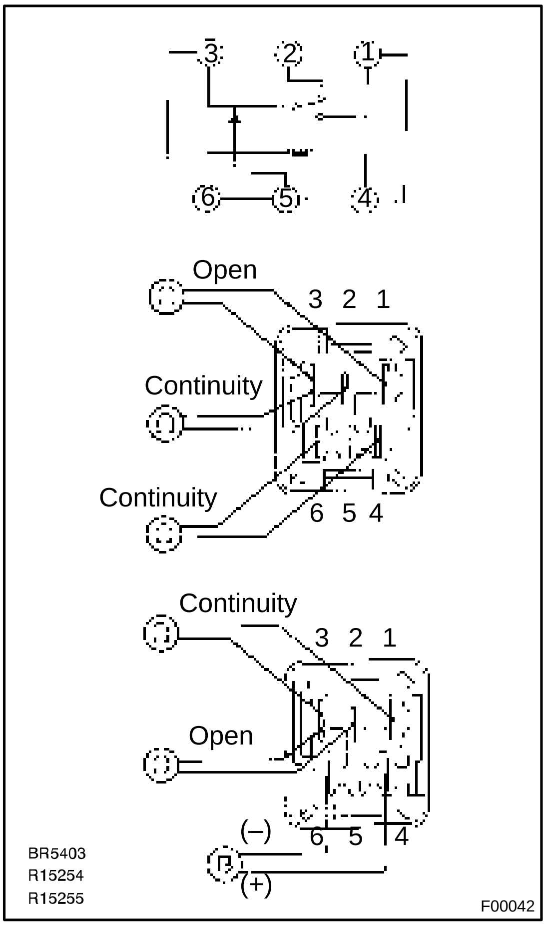
OK:
Continuity

HINT:
There is a resistance of 4 ~ 6 Ω between terminals A8 – 4 and A8 – 5 of ABS actuator.

NG → **Repair or replace harness or ABS & TRAC actuator.**

OK

3	Check ABS & TRAC solenoid relay.



CHECK:

Check continuity between each terminal of ABS & TRAC solenoid relay.

OK:

Terminals 4 and 6	Continuity (Reference value 80 Ω)
Terminals 2 and 3	Continuity
Terminals 1 and 3	Open

CHECK:

(a) Apply battery positive voltage between terminals 4 and 6.
(b) Check continuity between each terminal of ABS & TRAC solenoid relay.

OK:

Terminals 2 and 3	Open
Terminals 1 and 3	Continuity

NG → **Replace ABS & TRAC solenoid relay.**

OK

4	Check for open and short circuit in harness and connector between ABS & TRAC solenoid relay and ABS & TRAC ECU (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection.
If the connections are normal, the ECU may be defective.

DI04K–04

DTC	13, 14	ABS & TRAC Motor Relay Circuit

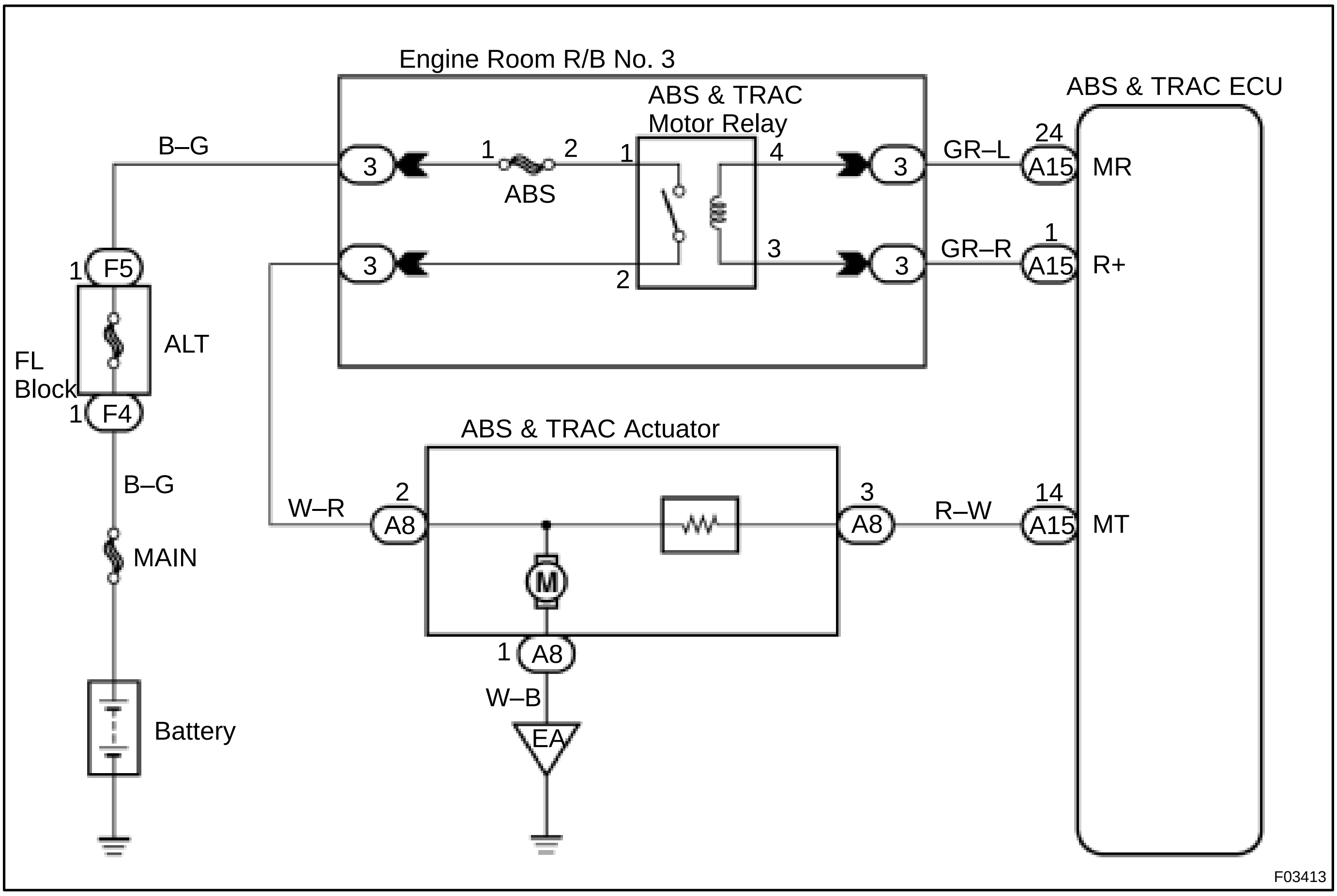
CIRCUIT DESCRIPTION

The ABS & TRAC motor relay supplies power to the ABS & TRAC pump motor. While the ABS is activated, the ECU switches the ABS & TRAC motor relay ON and operates the ABS & TRAC pump motor.

DTC No.	DTC Detecting Condition	Trouble Area
13	Conditions 1. to 3. are detected: 1. Malfunction of motor relay monitor 2. Battery voltage will not exceed more than 17.0 V within 2.16 sec. 3. Battery voltage will not become less than 9.5 V within 2.16 sec., or after the motor relay is ON and motor relay monitor does not ON.	●ABS & TRAC motor relay ●ABS & TRAC motor relay circuit ●ECU
14	Motor relay is OFF, and motor relay monitor is ON , which continues for 20.16 sec. or more.	

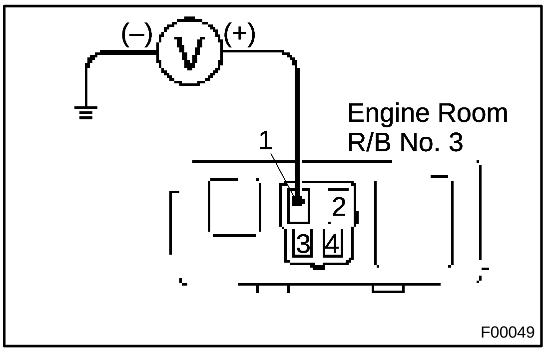
Fail safe function:
If any trouble occurs in the ABS & TRAC motor relay circuit, the ECU cuts off current to the ABS & TRAC solenoid relay and prohibits ABS control and TRAC control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal 1 of Engine Room R/B No. 3 (for ABS & TRAC motor relay) and body ground.**

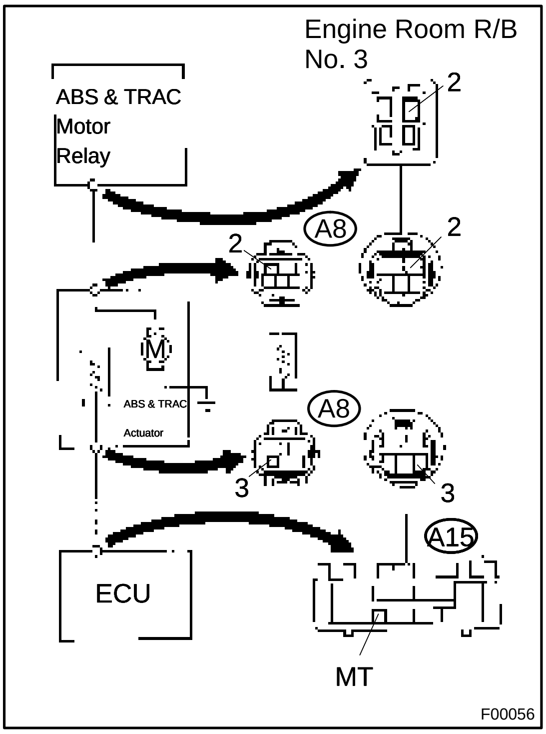


PREPARATION:
Remove ABS & TRAC motor relay from Engine Room R/B No. 3.
CHECK:
Measure voltage between terminal 1 of Engine Room R/B No. 3 (for ABS & TRAC motor relay) and body ground.
OK:
Voltage: 10 – 14 V

NG	**Check and repair harness or connector.**

OK

2	**Check continuity between terminal 2 of ABS & TRAC motor relay and terminal MT of ABS & TRAC ECU.**

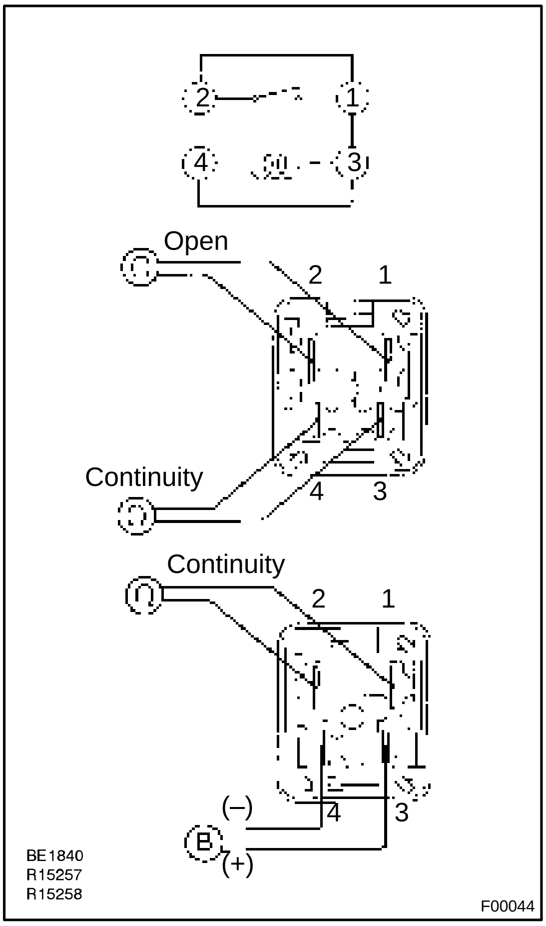


CHECK:
Check continuity between terminal 2 of Engine Room R/B No. 3 (for ABS & TRAC motor relay) and terminal MT of ABS & TRAC ECU.
OK:
Continuity
HINT:
There is a resistance of 4 ~ 6 Ω between terminals A8 – 2 and A8 – 3 of ABS & TRAC actuator.

NG	**Repair or replace harness or ABS & TRAC actuator.**

OK

3	**Check ABS & TRAC motor relay.**



CHECK:

Check continuity between each terminal of ABS & TRAC motor relay.

OK:

Terminals 3 and 4	Continuity (Reference value 62 Ω)
Terminals 1 and 2	Open

CHECK:

(a) Apply battery positive voltage between terminals 3 and 4.

(b) Check continuity between terminals of ABS & TRAC motor relay.

OK:

Terminals 1 and 2	Continuity

NG → **Replace ABS & TRAC motor relay.**

OK

4	**Check for open and short circuit in harness and connector between ABS & TRAC motor relay and ABS & TRAC ECU (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection.
If the connections are normal, the ECU may be defective.

DI04L–04

DTC	21 to 28	ABS & TRAC Actuator Solenoid Circuit

CIRCUIT DESCRIPTION

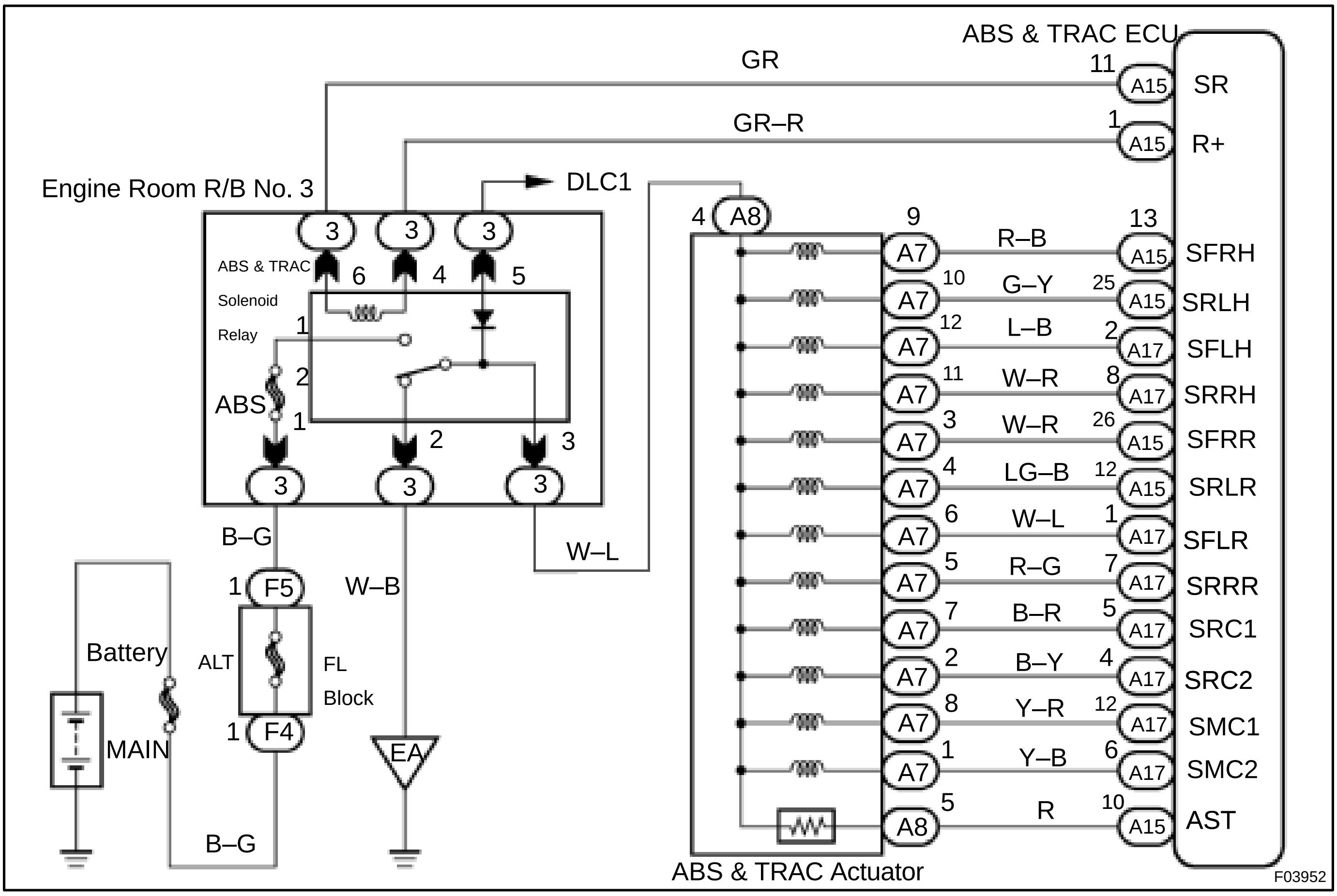
This solenoid goes on when signals are received from the ECU and controls the pressure acting on the wheel cylinders thus controlling the braking force.

DTC No.	DTC Detecting Condition	Trouble Area
21	Conditions 1. and 2. or 3. continue for 0.48 sec. or more: 1. Recovery prohibit run pulse is not output, solenoid relay is ON, AST voltage of ECU terminal is 8.0 V or more, and solenoid output has no change between the last time and this time. 2. Solenoid output is ON, pressure holding solenoid monitor voltage is more than 1.0 V or pressure eduction solenoid monitor voltage is more than 1.5 V. 3. Solenoid output is OFF, solenoid monitor voltage is more than –1.0 V AST voltage of ECU.	●ABS actuator ●SFRR or SFRH circuit ●ECU
22		●ABS actuator ●SFLR or SFLH circuit ●ECU
23		●ABS actuator ●SRRR or SRRH circuit ●ECU
24		●ABS actuator ●SRLR or SRLH circuit ●ECU
25		●ABS actuator ●SMC1 circuit ●ECU
26		●ABS actuator ●SMC2 circuit ●ECU
27		●ABS actuator ●SRC1 circuit ●ECU
28		●ABS actuator ●SRC2 circuit ●ECU

Fail safe function:

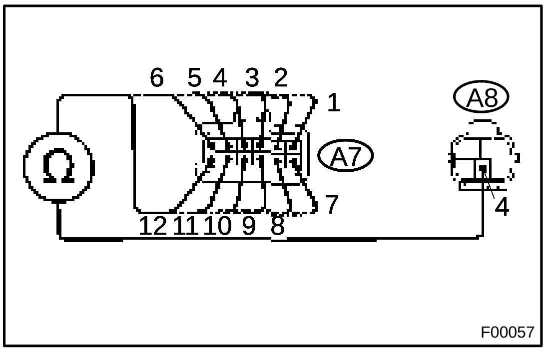
If any trouble occurs in the actuator solenoid circuit, the ECU cuts off current to the ABS & TRAC solenoid relay and prohibits ABS control and TRAC control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check ABS & TRAC actuator solenoid.**



PREPARATION:
Disconnect the 2 connectors from ABS & TRAC actuator.

CHECK:
Check continuity between terminals A8 – 4 and A7 – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 of ABS & TRAC actuator connector.

OK:

Continuity

HINT:
Resistance of each solenoid coil is 1.2 Ω.

NG	**Replace ABS & TRAC actuator.**

OK

2	Check for open and short circuit in harness and connector between ABS & TRAC ECU and actuator (See page IN–31).

NG → **Repair or replace harness or connector.**

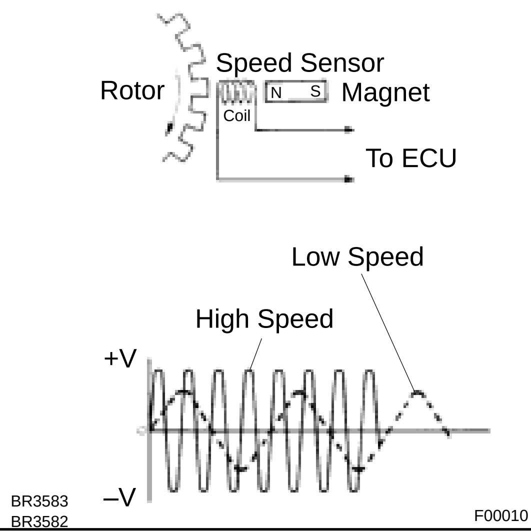
OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection.
If the connections are normal, the ECU may be defective.

DI1JP–03

DTC	31, 32, 33, 34	Speed Sensor Circuit

CIRCUIT DESCRIPTION



The speed sensor detects wheel speed and sends the appropriate signals to the ECU. These signals are used to control the ABS and TRAC system. The front and rear rotors each have 48 serrations.

When the rotors rotate, the magnetic field emitted by the permanent magnet in the speed sensor generates an AC voltage. Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.

DTC No.	DTC Detecting Condition	Trouble Area
31, 32, 33, 34	Detection of any of conditions from 1. through 3.: 1. ABS is in non–operation, wheel speed is 10 km/h or more, one eighth of maximum wheel speed is greater than the minimum wheel speed, one eighth of maximum wheel speed is smaller than the rear maximum wheel speed or momentary interruption of both the rear wheels are shown in the 15 sec. or more continuously. 2. ABS is in non–operation, momentary interruption of speed sensor occurs 7 times or more in the mean time of switching the ignition switch ON and OFF or vehicle speed is 20 km/h (12 mph) or more and the condition of noise interference or non–noise interference occurs 75 times or more within 5 sec. 3. Vehicle is at a stop, malfunction signal of vehicle speed sensor hardware open circuit is ON for 1.02 sec. continuously since starting the checking of a certain vehicle.	•Right front, left front, right rear, left rear speed sensor •Each speed sensor circuit •Speed sensor rotor •ECU

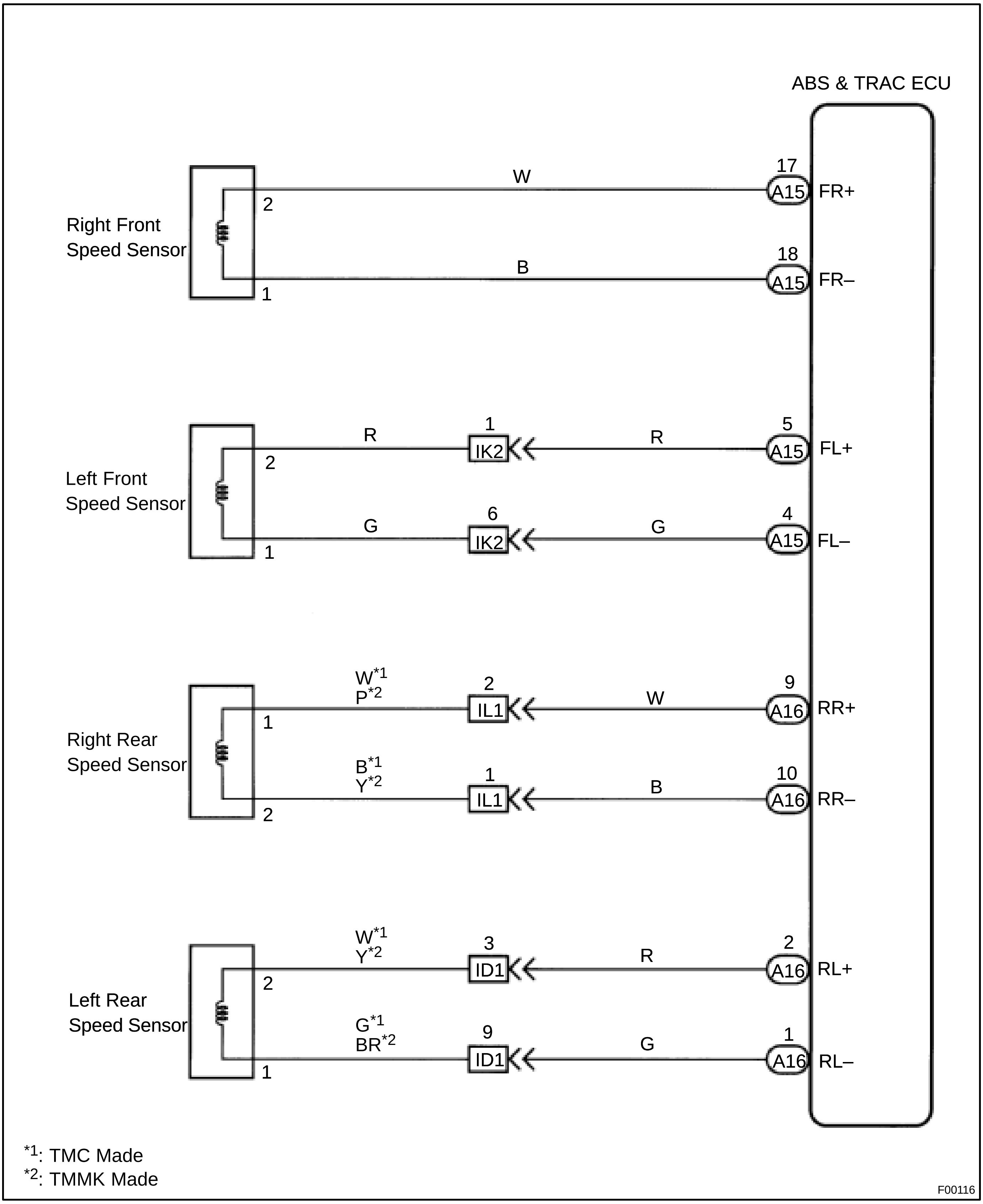
HINT:

- DTC No. 31 is for the right front speed sensor.
- DTC No. 32 is for the left front speed sensor.
- DTC No. 33 is for the right rear speed sensor.
- DTC No. 34 is for the left rear speed sensor.

Fail safe function:

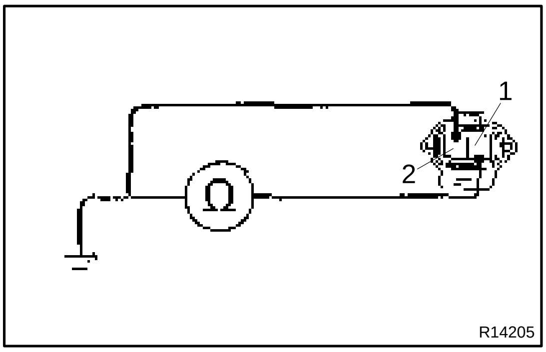
If any trouble occurs in the speed sensor circuit, the ECU cuts off current to the ABS & TRAC solenoid relay and prohibits ABS control and TRAC control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check speed sensor.**



Front:

<u>PREPARATION:</u>

(a) Remove the front fender liner.

(b) Disconnect the speed sensor connector.

<u>CHECK:</u>

Measure resistance between terminals 1 and 2 of speed sensor connector.

<u>OK:</u>

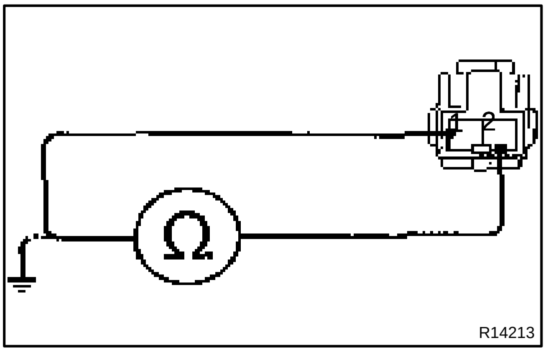
Resistance: 0.6 – 2.5 kΩ

<u>CHECK:</u>

Measure resistance between terminals 1 and 2 of speed sensor connector and body ground.

<u>OK:</u>

Resistance: 1 MΩ or higher



Rear:

<u>PREPARATION:</u>

(a) Remove the seat cushion and side seatback.

(b) Disconnect the speed sensor connector.

<u>CHECK:</u>

Measure resistance between terminals 1 and 2 of speed sensor connector.

<u>OK:</u>

Resistance: 1.2 – 2.3 kΩ

<u>CHECK:</u>

Measure resistance between terminals 1 and 2 of speed sensor connector and body ground.

<u>OK:</u>

Resistance: 1 MΩ or higher

NG	**Replace speed sensor.**

NOTICE:

Check the speed sensor signal last (See page DI–574).

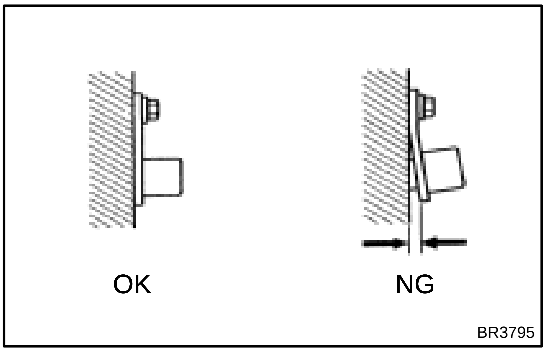
OK

2	Check for open and short circuit in harness and connector between each speed sensor and ECU (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

3	Check sensor installation.



CHECK:

Check the speed sensor installation.

OK:

The installation bolt is tightened properly and there is no clearance between the sensor and steering knuckle or rear axle carrier.

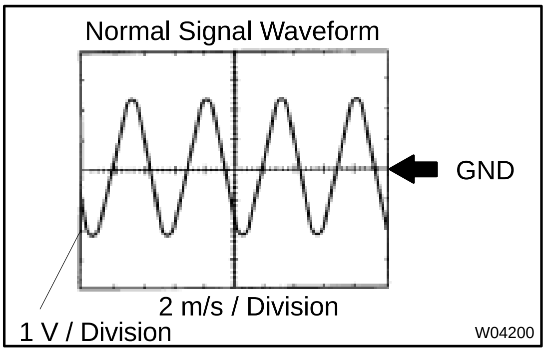
NG → **Replace speed sensor.**

NOTICE:

Check the speed sensor signal last (See page DI–574).

OK

4	Check speed sensor and sensor rotor serrations.



REFERENCE: INSPECTION USING OSCILLOSCOPE

PREPARATION:

(a) Remove the ABS & TRAC ECU.

(b) Connect the oscilloscope to the terminals FR+, FL+, RR+ or RL+ and GND of the ABS & TRAC ECU.

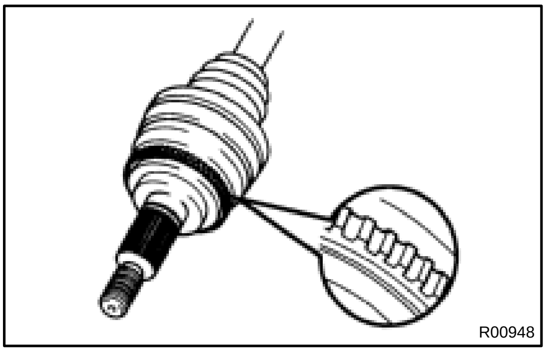
CHECK:

Drive the vehicle with about 30 km/h (19 mph), and check the signal waveform.

OK → **Check and replace ABS & TRAC ECU.**

NG

5	Check sensor rotor and sensor tip.



Front:

PREPARATION:

Remove front drive shaft (See page SA–26).

CHECK:

Check sensor rotor serrations.

OK:

No scratches , missing teeth or foreign objects.

PREPARATION:

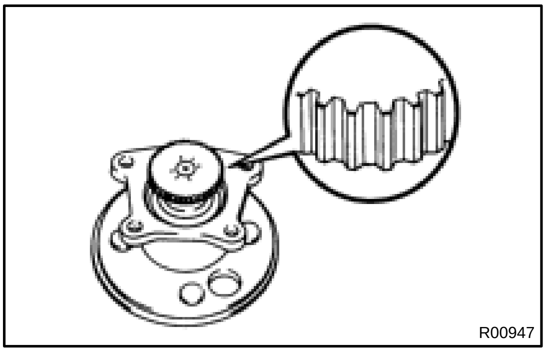
Remove the front speed sensor (See page BR–68).

CHECK:

Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.



Rear:

PREPARATION:

Remove the axle hub (See page SA–52).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches , missing teeth or foreign objects.

PREPARATION:

Remove the rear speed sensor (See page BR–71).

CHECK:

Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.

NG	Replace sensor rotor or speed sensor.

NOTICE:

Check the speed sensor signal last. (See page DI–574).

OK

Check and replace ABS & TRAC ECU.

DI04N–04

DTC	41	IG Power Source Circuit

CIRCUIT DESCRIPTION

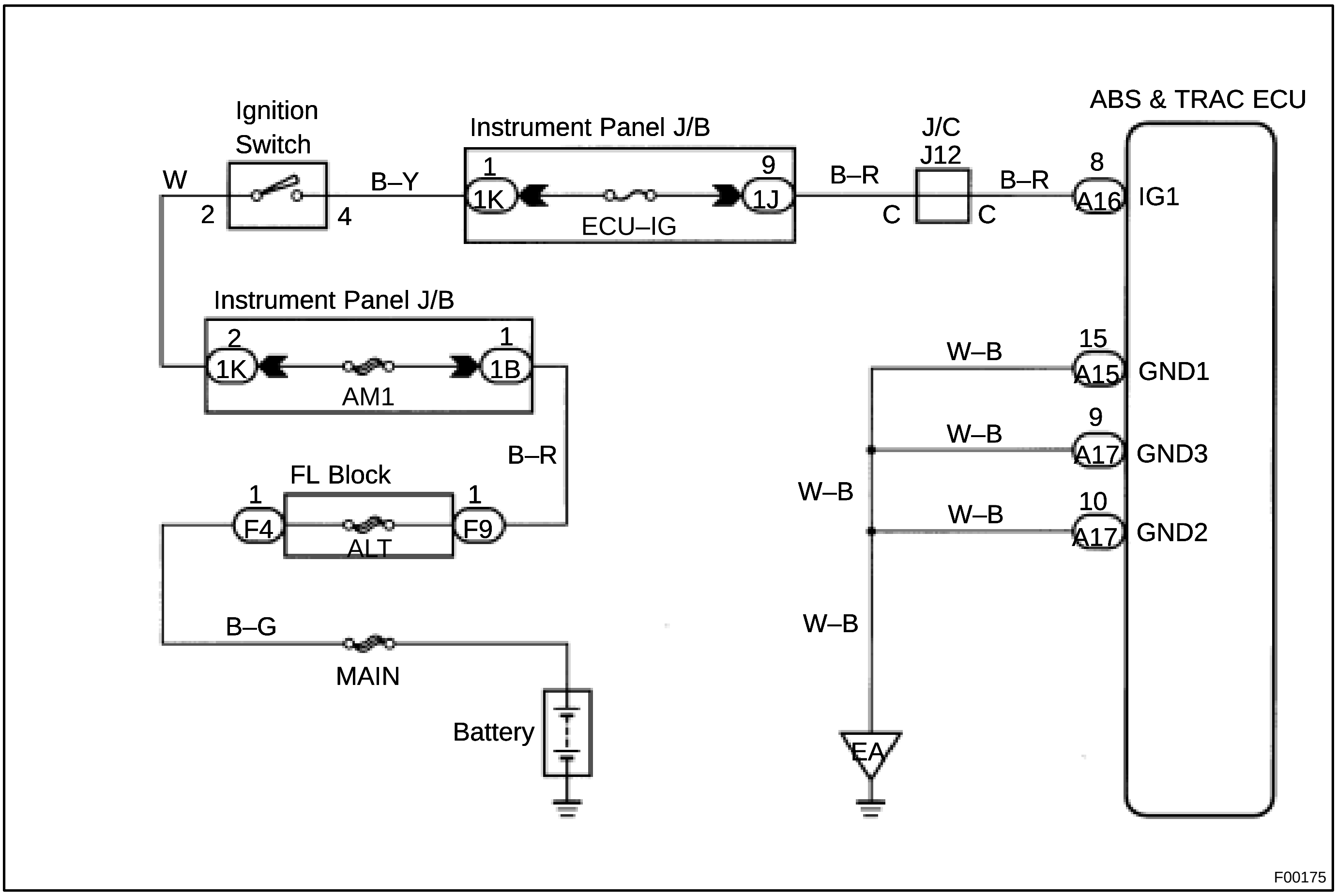
This is the power source for the ECU, hence the actuators.

DTC No.	DTC Detecting Condition	Trouble Area
41	Detection of any conditions from 1. through 3.: 1. Vehicle speed is 3 km/h (1.9 mph) or more and battery voltage is less than 9.5 V continues for 10 sec. or more. 2. Battery voltage has never exceeded more than 17.0 V and has become less than 9.5 V within 2.16 sec., under malfunction of solenoid relay monitor after the solenoid relay is ON, at ECU AST terminal voltage of ECU has become 8.0 V or more or under malfunction of motor relay monitor and after the motor relay is ON, motor relay monitor has become ON. 3. Battery voltage is more than 17.0 V , which continues for 1.2 sec. or more or battery voltage has become more than 17.0 V within 2.16 sec. and solenoid or motor relay monitor is under malfunction condition.	●Battery ●Charging system ●Power source circuit ●ECU

Fail safe function:

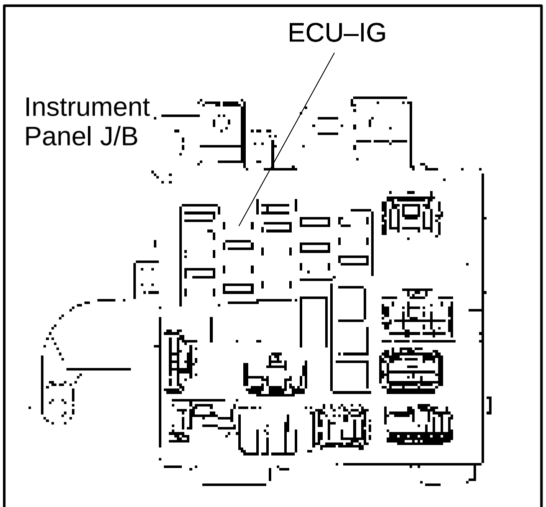
If any trouble occurs in the power source circuit, the ECU cuts off current to the ABS & TRAC solenoid relay and prohibits ABS control and TRAC control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check ECU–IG fuse.**



F00073

PREPARATION:

Remove ECU–IG fuse from Instrument Panel J/B.

CHECK:

Check continuity of ECU–IG fuse.

OK:

Continuity

NG → **Check for short in all the harness and components connected to ECU–IG fuse (See attached wiring diagram).**

OK

2	**Check battery positive voltage.**

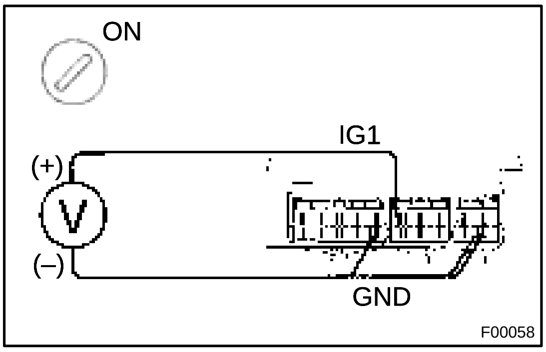
OK:

Voltage: 10 – 14 V

NG → **Check and repair the charging system**
5S–FE engine: (See page CH–1)
1MZ–FE engine: (See page CH–1).

OK

3	Check voltage between terminals IG1 and GND of ABS & TRAC ECU connector.

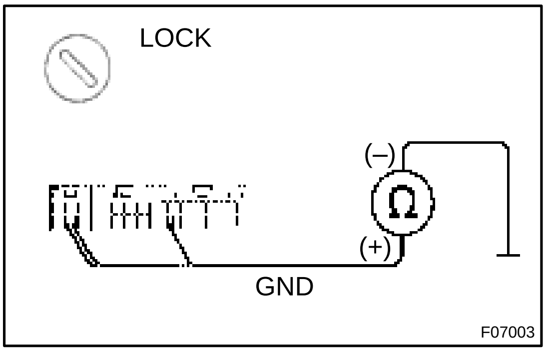


PREPARATION:
Remove ABS & TRAC ECU with connectors still connected.
CHECK:
(a) Turn the ignition switch ON.
(b) Measure voltage between terminals IG1 and GND of ABS & TRAC ECU connector.
OK:
Voltage: 10 – 14 V

OK → **Check and replace ABS & TRAC ECU.**

NG

4	Check continuity between terminals GND of ABS & TRAC ECU connector and body ground.



PREPARATION:
Disconnect the connector from the ABS & TRAC ECU.
CHECK:
Measure resistance between terminal GND of ABS & TRAC ECU connector and body ground.
OK:
Resistance: 1 Ω or less

NG → **Repair or replace harness or connector.**

OK

Check for open circuit in harness and connector between ABS & TRAC ECU and battery (See page IN–31).

DI04O–04

DTC	43	ABS Control System Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
43	Detection of any conditions from 1. through 8.: 1. During TRAC is in non–operation and DTC of ABS is output, but TRAC is not during initial lamp checking, terminal WA of ECU is ON and engine speed is 500 rpm or more , which continues for 1 sec. or more. 2. Solenoid relay circuit is open or short. 3. Motor relay circuit is open or short. 4. ABS solenoid circuit is open or short. 5. TRAC solenoid circuit is open or short. 6. Speed sensor is under malfunction condition. 7. IG power source is down or raised. 8. Pump motor is locked.	●ABS control system

INSPECTION PROCEDURE

1	Check the DTC for the ABS (See page DI–574).

*1 → **Repair ABS control system according to the code output.**

*2 ↓

Check for ECU connected to malfunction indicator lamp.

*1: Output NG code
*2: Malfunction indicator lamp remains ON.

DI04P–04

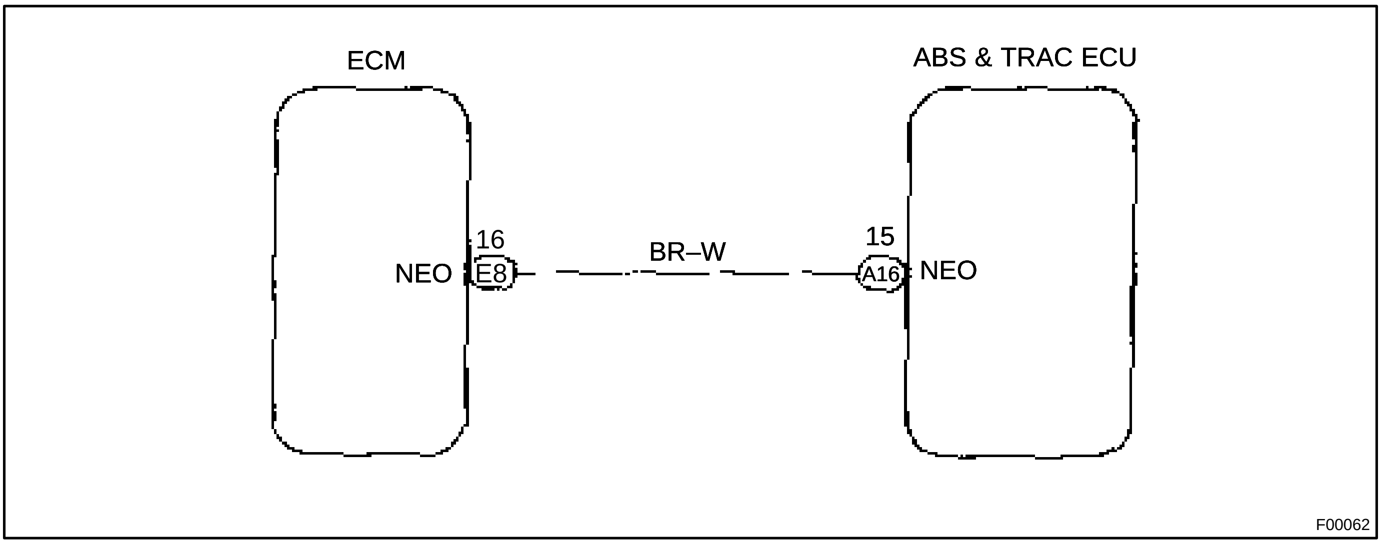
DTC	44	NE Signal Circuit

CIRCUIT DESCRIPTION

The ABS & TRAC ECU receives engine speed signals (NE signals) from the ECM.

DTC No.	DTC Detecting Condition	Trouble Area
44	Condition 1. or 2. is detected: 1. TRAC is in operation and engine speed is 0 rpm continues for 2.4 sec. or more. 2. TRAC is in non–operation, sift lever is not in P or N position, both the front right and left wheels' speed is 30 km/h (19 mph) or more, engine speed is 0 rpm and does not have communication malfunction, and malfunction information of engine system is OFF.	●NEO circuit ●ECM ●ECU

WIRING DIAGRAM



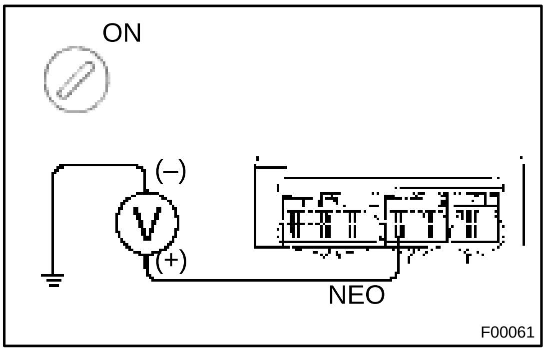
INSPECTION PROCEDURE

1	Check for open and short circuit in harness and connector between terminal NEO of ABS & TRAC ECU and terminal NEO of ECM (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

2	**Check voltage between terminal NEO of ABS & TRAC ECU and body ground.**



PREPARATION:

(a) Remove ABS & TRAC ECU with connectors still connected.

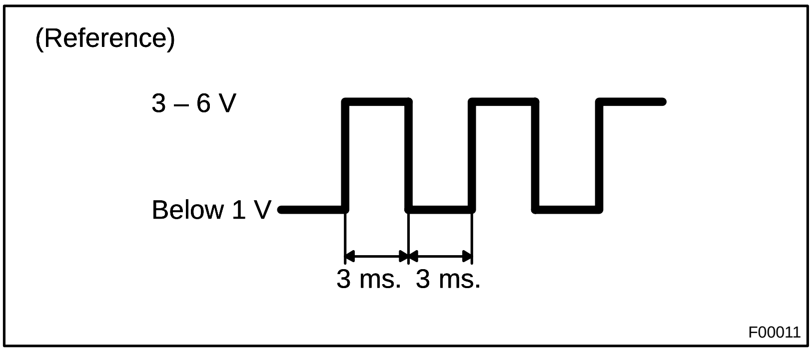
(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminal NEO of ABS & TRAC ECU and body ground for the engine conditions below.

OK:

Engine condition	Voltage
OFF (IG ON)	3 – 6 V or below 1 V
ON (Idling)	2 – 3 V (Pulse)



NG — **Check and replace ABS & TRAC ECU or ECM.**

OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection.

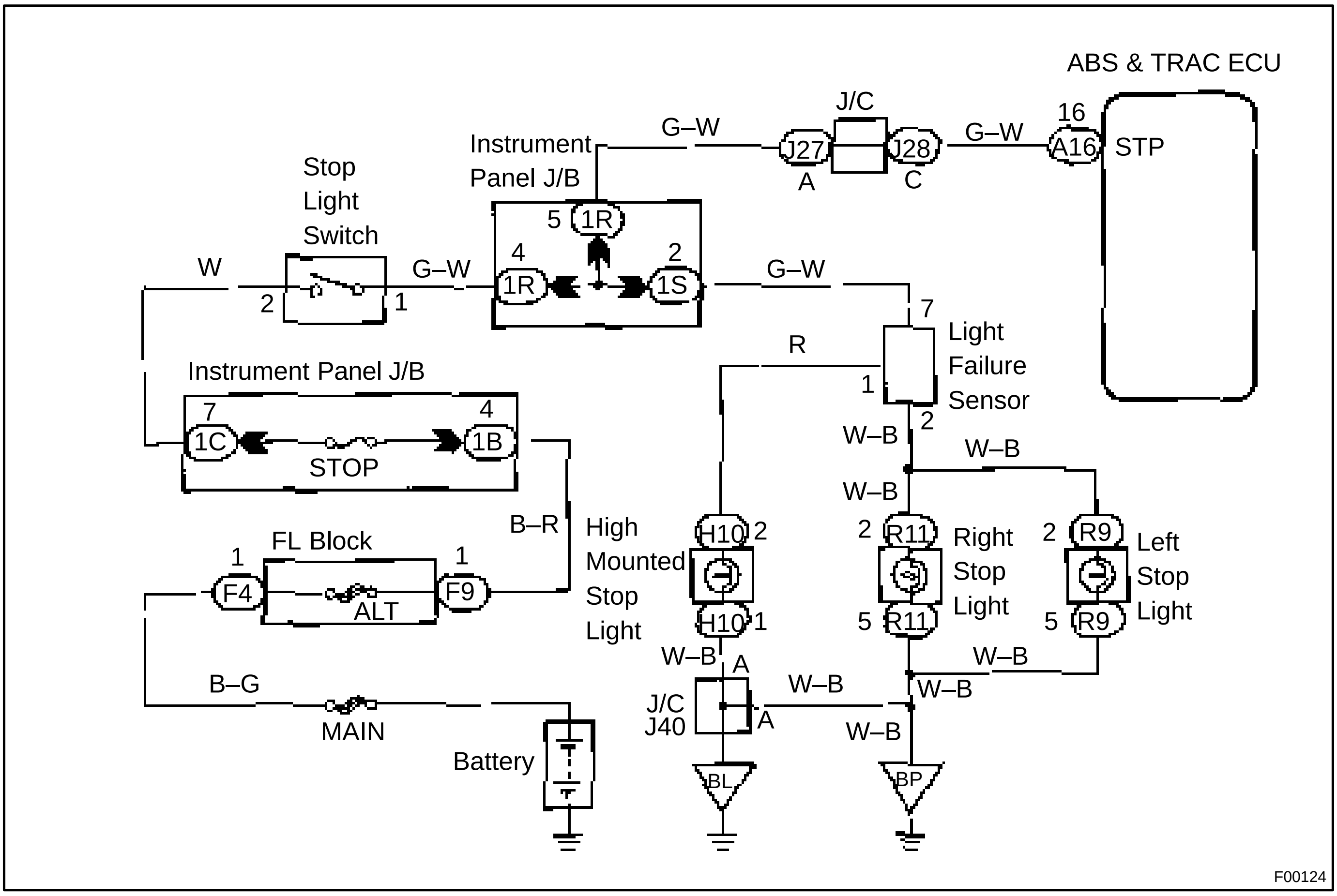
DI04Q–04

DTC	49	Stop Light Switch Circuit

CIRCUIT DESCRIPTION

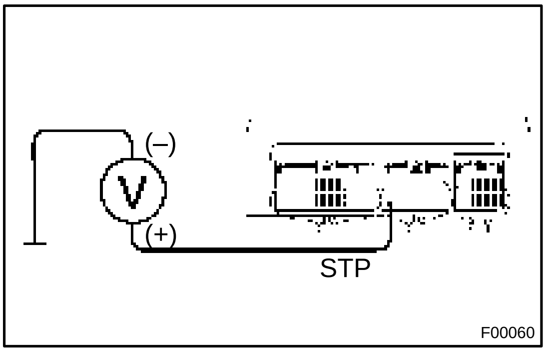
DTC No.	DTC Detecting Condition	Trouble Area
49	Battery voltage has never exceeded more than 17.0 V and become less than 9.5 V within 2.16 sec. and the STP terminal voltage of ECU is under open circuit detecting limits continues for 3 sec. or more.	●Stop light switch ●Stop light switch circuit ●ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal STP of ABS & TRAC ECU and body ground.**



PREPARATION:
Remove ABS & TRAC ECU with connectors still connected.
CHECK:
Measure voltage between terminal STP of ABS & TRAC ECU and body ground when brake pedal is depressed.
OK:
Voltage: 8 – 14 V

OK → **Check and replace ABS & TRAC ECU.**

NG ↓

2	**Check for open circuit in harness and connector between ABS & TRAC ECU and stop light switch (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK ↓

Proceed to next circuit inspection shown on problem symptoms table (See page DI–583).

DI4KX–01

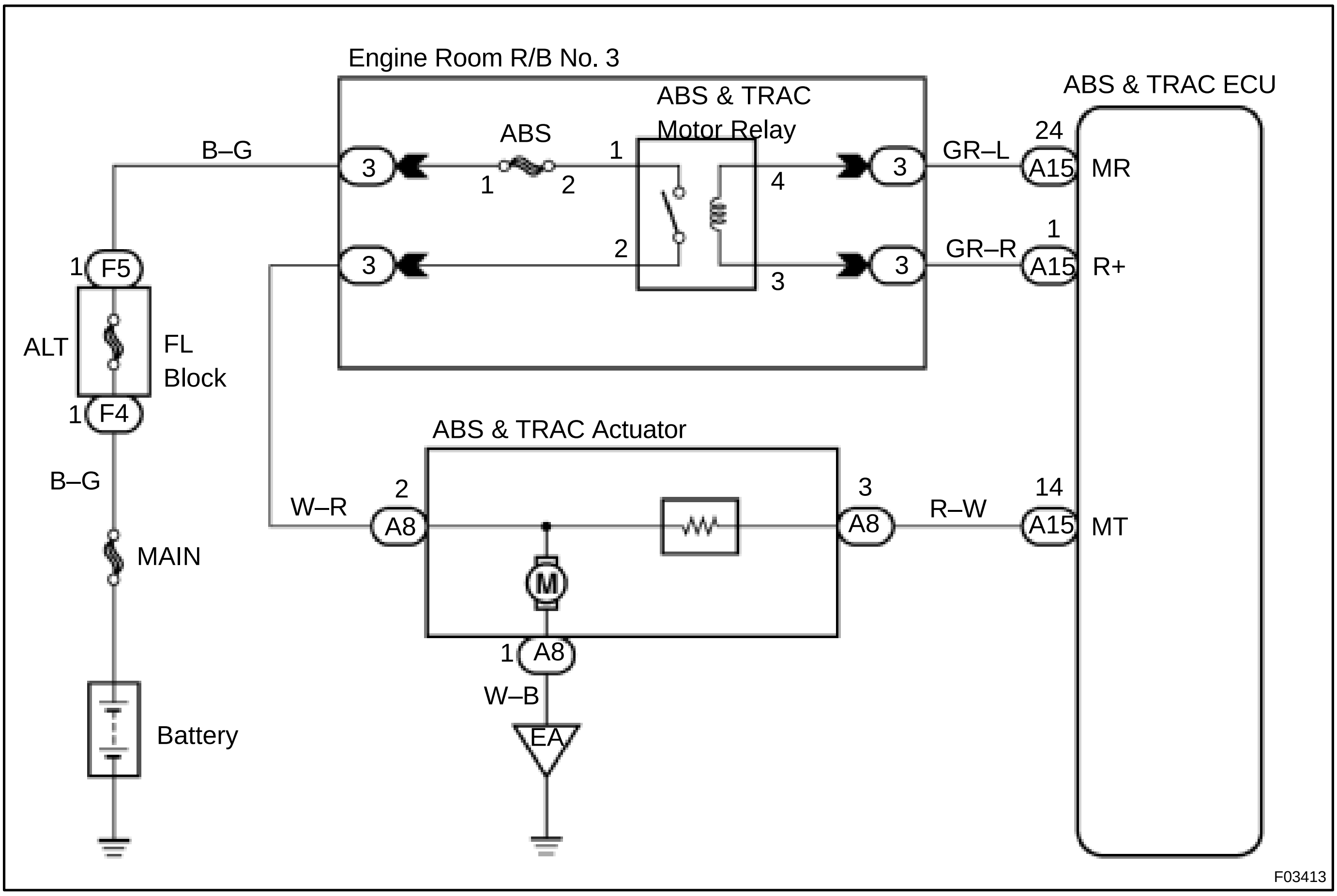
DTC	51	ABS Pump Motor Lock

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
51	In the midst of initial check, after the current flows to the motor for 3 sec. and motor relay is turned OFF , then within 0.66 sec., the condition that the motor relay monitor is OFF continues for 0.24 sec. or more.	●ABS pump motor

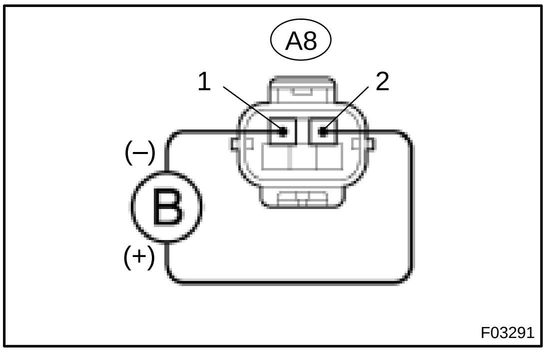
Fail safe function:
If any trouble occurs in the ABS & TRAC pump motor, the ECU cuts off current to the ABS & TRAC solenoid relay and prohibits ABS control and TRAC control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of ABS & TRAC pump motor.**



PREPARATION:

Disconnect the ABS & TRAC actuator connector.

CHECK:

Connect positive ~ lead to terminal A8 – 2 and negative > lead to terminal A8 – 1 of the ABS & TRAC actuator connector, check that the pump motor is operates.

OK → **Check for open circuit in harness and connector between ABS & TRAC motor relay, ABS & TRAC actuator and ECU (See page IN–31).**

NG

Replace ABS & TRAC actuator.

DI04S–04

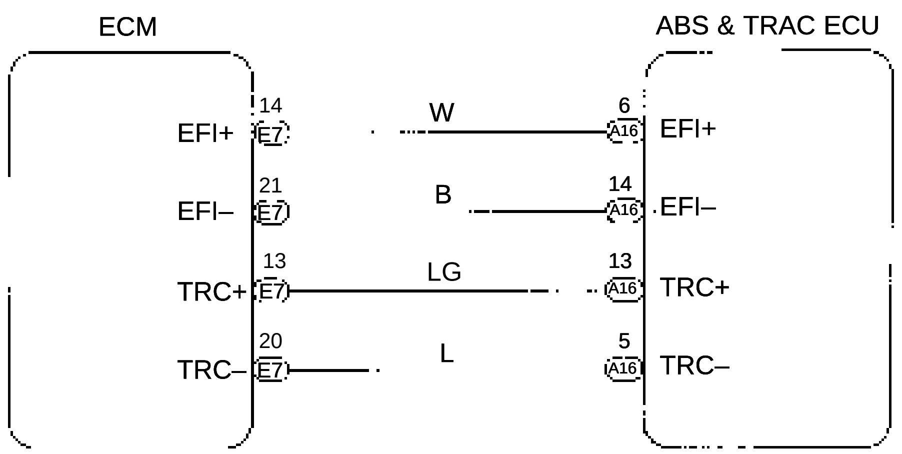
DTC	53	ECM Communication Circuit Malfunction

CIRCUIT DESCRIPTION

This circuit is used to send TRAC control information from the ABS & TRAC ECU to the ECM (TRC+, TRC–), and engine control information from the ECM to the ABS & TRAC ECU (EFI+, EFI–).

DTC No.	DTC Detecting Condition	Trouble Area
53	ECM communication data malfunction is detected.	●TRC+ or TRC– circuit ●EFI+ or EFI– circuit ●ECM ●ECU

WIRING DIAGRAM



F00063

INSPECTION PROCEDURE

1	**Check for open and short circuit in harness and connector between terminals EFI+, EFI–, TRC+, TRC– of ABS & TRAC ECU and ECM (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ECM or ABS & TRAC ECU.

DI04T–04

DTC	61	Engine Control System Malfunction

CIRCUIT DESCRIPTION

If any trouble occurs in the engine control system, the ECU prohibits TRAC control.

DTC No.	DTC Detection Condition	Trouble Area
61	Conditions 1. and 2. are detected: 1. ECM communication is normal, malfunction information of engine system is ON, and engine speed is 500 rpm or more , which continues for 0.48 sec. or more, and TRAC operation start condition is concluded. 2. ECM communication is normal, malfunction information of engine system is ON, engine speed is 500 rpm and more which continues for 1 sec. or more, and the engine system memorizes DTC.	●Engine control system

INSPECTION PROCEDURE

1	Check the DTC for the engine (See page DI–197).

*1 → **Repair engine control system according to the code output.**

*2 ↓

Check for ECU connected to malfunction indicator light.

*1: Output NG code
*2: Malfunction indicator light remains ON.

DI1JQ–03

DTC	Always ON	ABS & TRAC ECU Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
Always ON	ABS & TRAC ECU internal malfunction is detected.	•ECU

Fail safe function:
If any trouble occurs in the power source circuit, the ECU cuts off current to the ABS & TRAC solenoid relay and prohibits ABS control and TRAC control.

INSPECTION PROCEDURE

1	Is DTC output?

Check DTC on page DI–574.

YES → **Repair circuit indicated by the code output.**

NO

2	Is normal code displayed?

YES → **Check solenoid relay. Check for short circuit in harness and connector between solenoid relay and DLC1 (See page IN–31).**

NO

3	Does ABS warning light go off?

YES → **Check for open and short circuit in harness and connector between ECU–IG fuse and ABS & TRAC ECU (See page IN–31).**

NO

4	**Check battery positive voltage.**

CHECK:

Check the battery positive voltage.

OK:

10 – 14 V

NG	**Check and repair the charging system 5S–FE engine: (See page CH–1) 1MZ–FE engine: (See page CH–1).**

OK

5	**Check ABS warning light.**

PREPARATION:

(a) Disconnect the connector from the ABS & TRAC ECU.

(b) Turn the ignition switch ON.

CHECK:

Check the ABS warning light goes off.

OK	**Check and replace ABS & TRAC ECU.**

NG

Check for short circuit in harness and connector between ABS warning light, DLC1, DLC2, and ABS & TRAC ECU (See page IN–31)

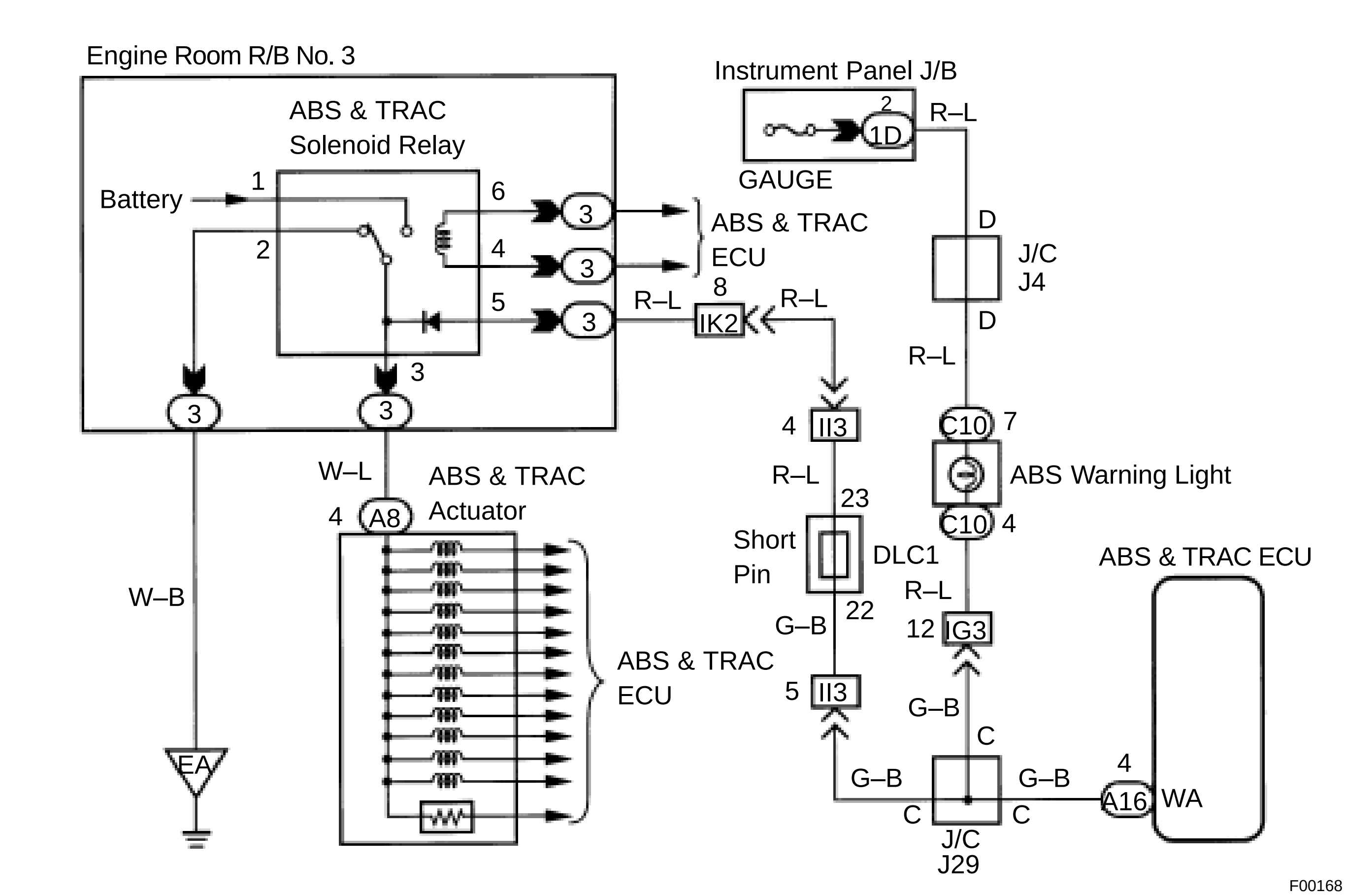
DI04V–04

ABS Warning Light Circuit

CIRCUIT DESCRIPTION

If the ECU detects a trouble, it lights the ABS warning light while at the same time prohibiting ABS control. At this time, the ECU records a DTC in memory.
Connect terminals Tc and E_1 of the DLC1 or DLC2 to make the ABS warning light blink and output the DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

Troubleshoot in accordance with the chart below for each trouble symptom.

ABS warning light does not light up	Go to step 1
ABS warning light remains on	Go to step 3

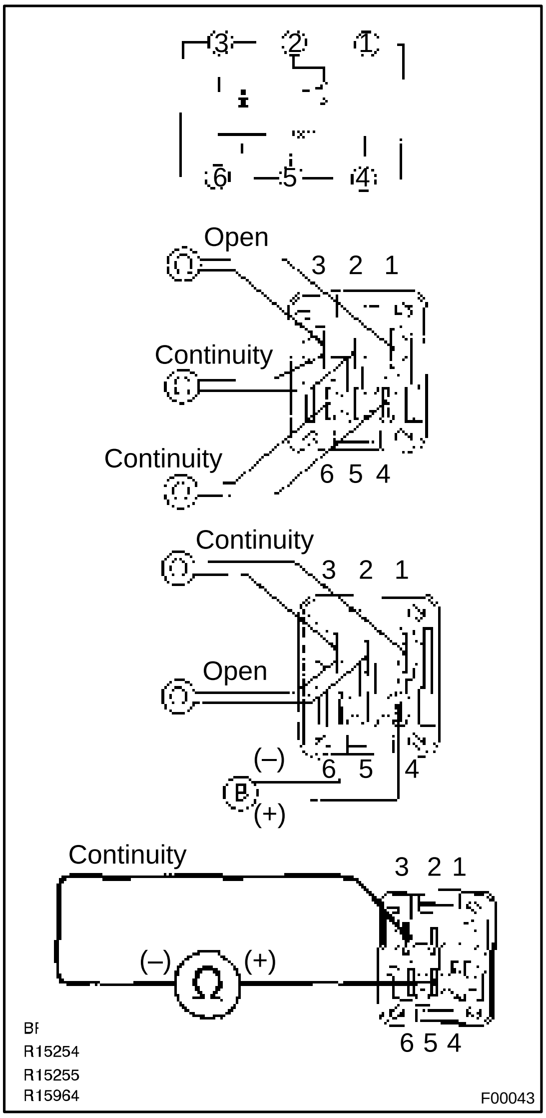
1	**Check ABS warning light.**

See combination meter troubleshooting on page BE–2.

NG **Repair bulb or combination meter assembly.**

OK

2	**Check ABS & TRAC solenoid relay.**



PREPARATION:

Remove ABS & TRAC solenoid relay from Engine Room R/B No. 3.

CHECK:

Check continuity between each terminal of ABS & TRAC solenoid relay.

OK:

Terminals 4 and 6	Continuity (Reference value 80 Ω)
Terminals 2 and 3	Continuity
Terminals 1 and 3	Open

CHECK:

(a) Apply battery positive voltage between terminals 4 and 6.

(b) Check continuity between each terminal of ABS & TRAC solenoid relay.

OK:

Terminals 2 and 3	Open
Terminals 1 and 3	Continuity

CHECK:

Connect the ~ test lead to terminal 5 and the > lead to terminal 3. Check continuity between the terminals.

OK:

Continuity

If there is no continuity, connect the > test lead to terminal 5 and the ~ lead to terminal 3. Recheck continuity between terminals.

NG	**Replace ABS & TRAC solenoid relay.**

OK

Check for open circuit in harness and connector between DLC1, ABS & TRAC solenoid relay and body ground (See page IN–31).

3	**Is DTC output?**

Check DTC on page DI–574.

YES → **Repair circuit indicated by the code output.**

NO ↓

4	**Does ABS warning light go off?**

NO → **Check for short circuit in harness and connector between ABS warning light, DLC1 and ABS & TRAC ECU (See page IN–31).**

YES ↓

5	**Check ABS & TRAC solenoid relay (See step 2).**

NG → **Replace ABS & TRAC solenoid relay.**

OK ↓

Check for short circuit in harness and connector between DLC1 and ABS & TRAC solenoid relay (See page IN–31).

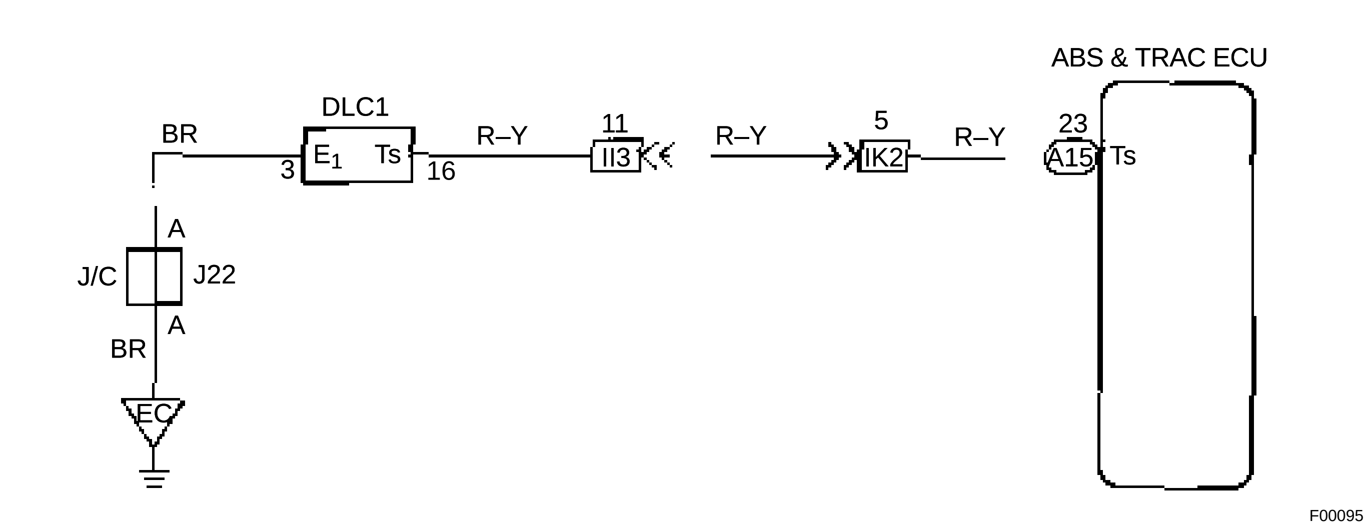
DI04X–04

Ts Terminal Circuit

CIRCUIT DESCRIPTION

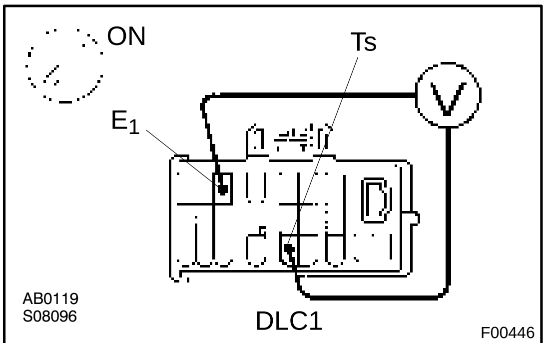
The sensor check circuit detects abnormalities in the speed sensor signal which cannot be detected with the DTC check.
Connecting terminals Ts and E_1 of the DLC1 in the engine compartment starts the check.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Ts and E_1 of DLC1.**



CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals Ts and E_1 of DLC1.

OK:

Voltage: 10 – 14 V

OK	If ABS warning light does not blink even after Ts and E_1 are connected, the ECU may be defective.

NG

2	Check for open and short circuit in harness and connector between ABS & TRAC ECU and DLC1, DLC1 and body ground (See page IN–31).

NG → **Repair or replace harness or connector.**

OK ↓

Check and replace ABS & TRAC ECU.

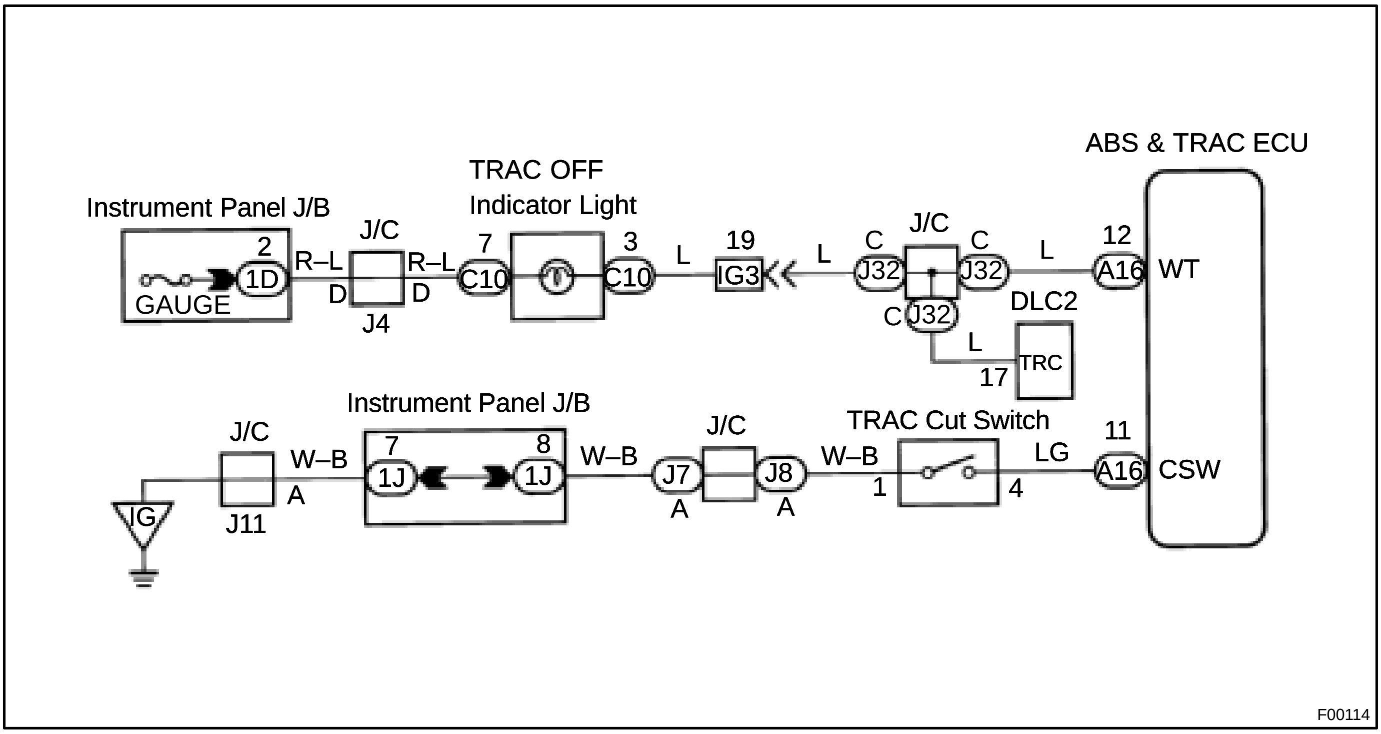
DI04Y–04

TRAC OFF Indicator, TRAC Cut Switch Circuit

CIRCUIT DESCRIPTION

This is the TRAC control main switch. When the TRAC cut switch is pushed on, TRAC control goes off and the TRAC OFF indicator lights up. This indicator blinks for warnings when the trouble occurs and for displaying DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

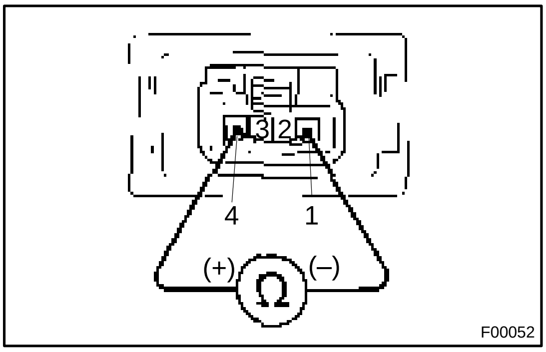
1	**Check DTC.**

Check DTC on page DI–574.

YES → **Repair circuit indicated by the code output.**

NO

2	Check TRAC cut switch.



PREPARATION:
(a) Remove TRAC cut switch.
(b) Disconnect TRAC cut switch connector.

CHECK:
Measure resistance between terminals 1 and 4 of TRAC cut switch when TRAC cut switch is ON and OFF.

OK:

TRAC cut switch	Resistance
Pushed in	Continuity
Released	1 MΩ or higher

NG → **Replace TRAC cut switch.**

OK

3	Check for open and short circuit in harness and connector between terminal CSW of ABS & TRAC ECU and TRAC cut switch and body ground (See page IN–29).

NG → **Repair or replace harness or connector.**

OK

4	Check TRAC OFF indicator light.

See combination meter troubleshooting on page BE–2.

NG → **Repair or replace combination meter.**

OK

5	Check for open and short circuit in harness and connector between terminal WT of ABS & TRAC ECU and TRAC OFF indicator light (See page IN–31).

NG → Repair or replace harness or connector.

OK

Check and replace ABS & TRAC ECU.

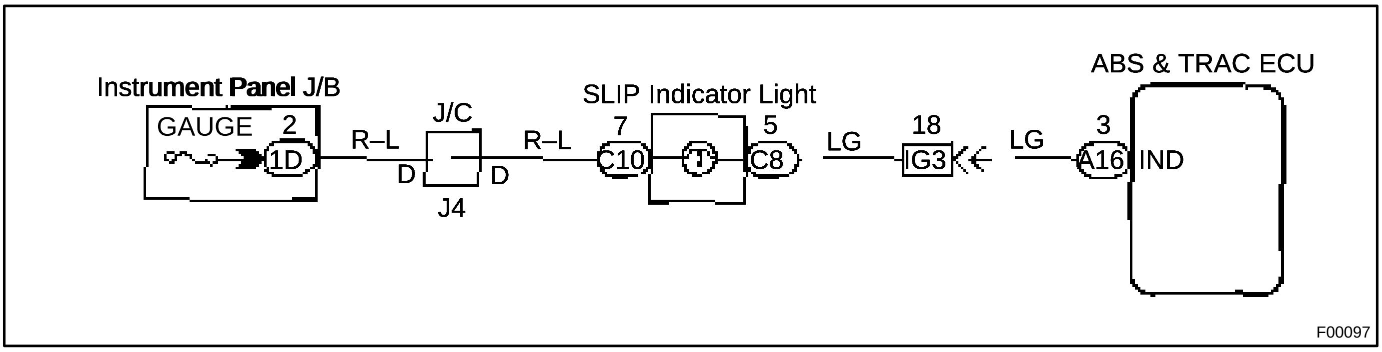
DI04Z–04

SLIP Indicator Light Circuit

CIRCUIT DESCRIPTION

The SLIP indicator blinks during TRAC operation.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check SLIP indicator light.

See combination meter troubleshooting on page BE–2.

NG → **Repair or replace combination meter.**

OK

2	Check for short circuit in harness and connector between ABS & TRAC ECU and SLIP indicator light (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and replace ABS & TRAC ECU.

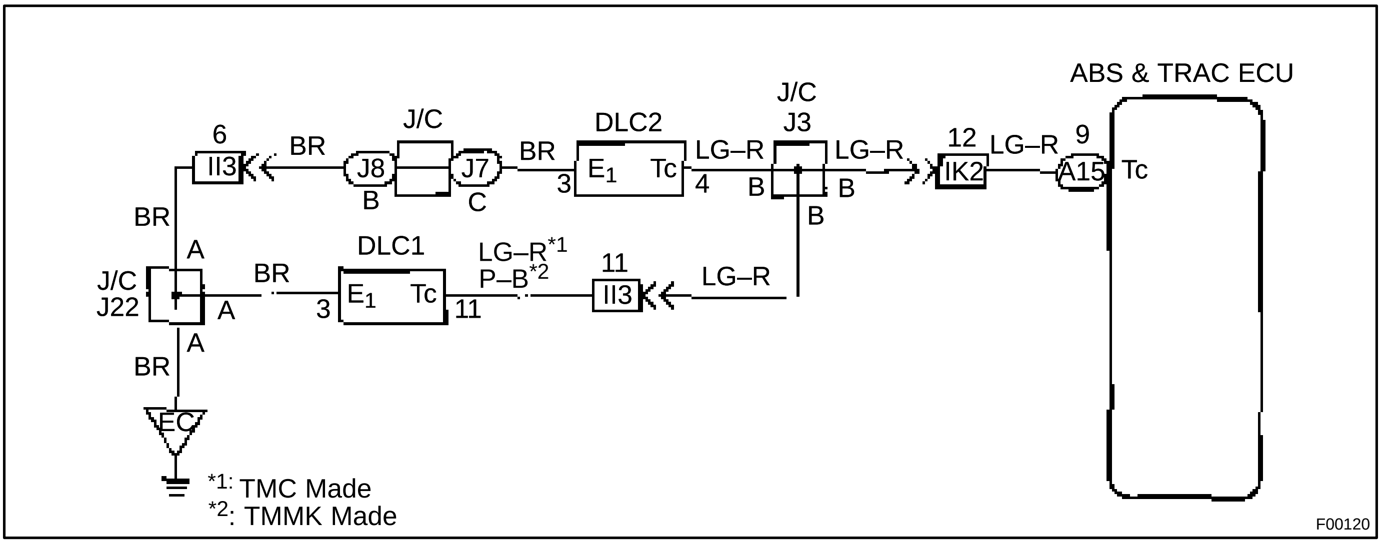
DI4KY–01

Tc Terminal Circuit

CIRCUIT DESCRIPTION

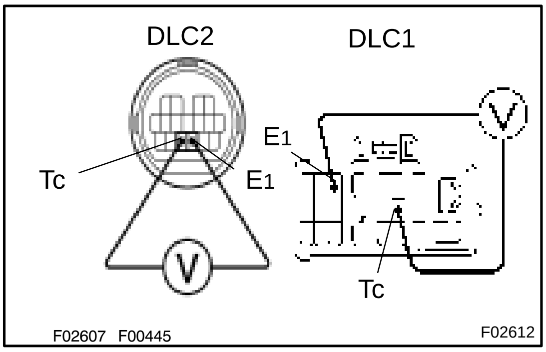
Connecting between terminals Tc and E_1 of the DLC1 or the DLC2 causes the ECU to display the DTC by blinking the ABS warning light and TRAC OFF indicator light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Tc and E_1 of DLC2 or DLC1.**



CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals Tc and E_1 of DLC2 or DLC1.

OK:

Voltage: 10 – 14 V

OK → **If ABS warning light does not blink even after Tc and E_1 are connected, the ECU may be defective.**

NG

2	Check for open and short circuit in harness and connector between ABS & TRAC ECU and DLC2 or DLC1, DLC2 or DLC1 and body ground (See page IN–31).

NG → **Repair or replace harness or connector.**

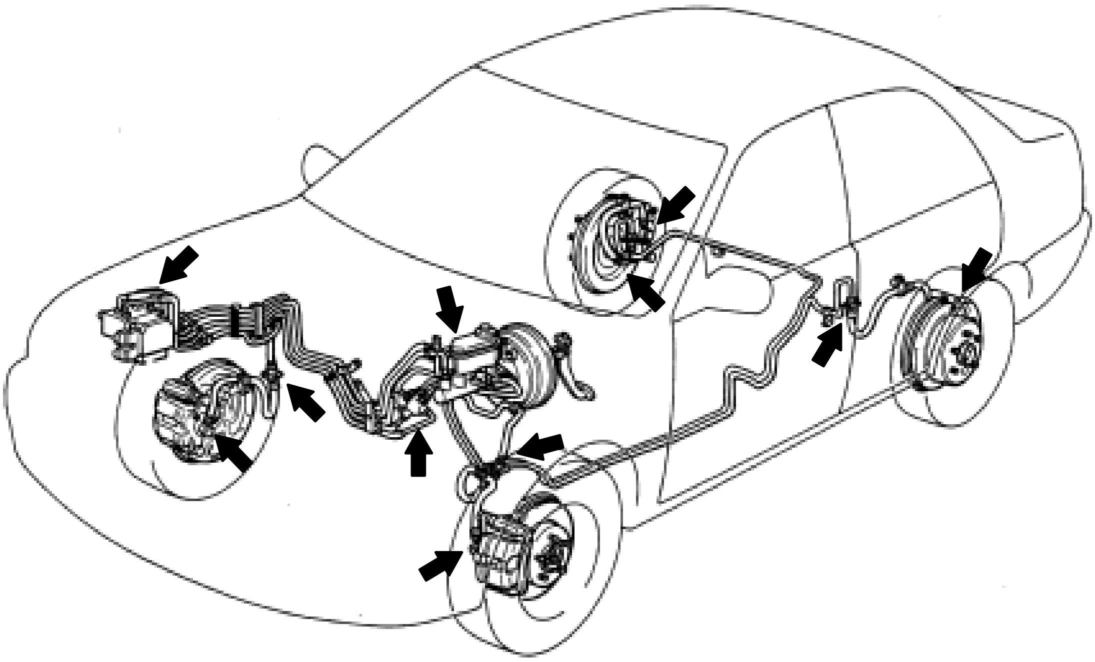
OK

Check and replace ABS & TRAC ECU.

DI050–03

Check for Fluid Leakage

Check for fluid leakage from actuator or hydraulic lines.

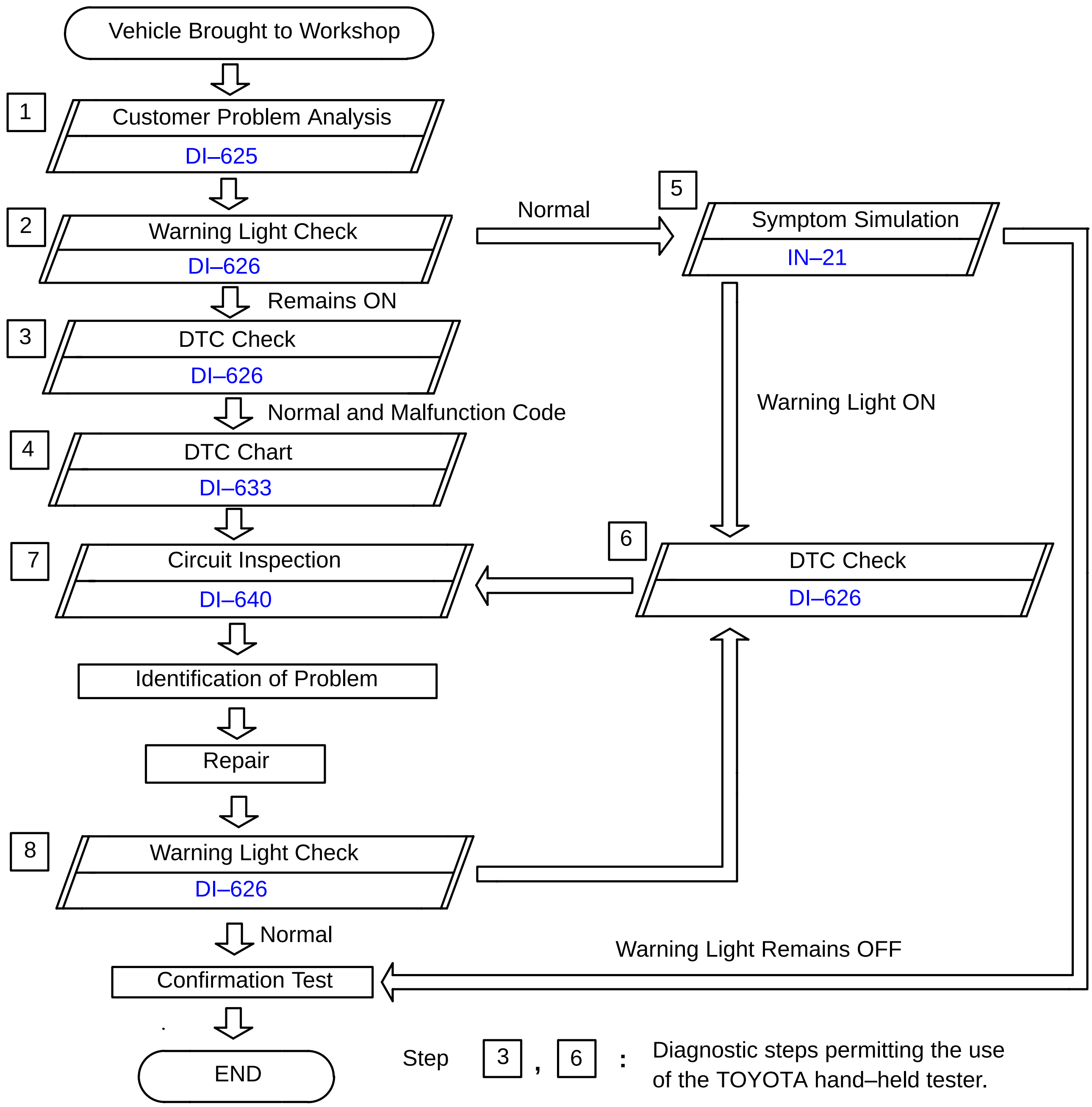


F00070

SUPPLEMENTAL RESTRAINT SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

DI1AX–04



Step 3 , 6 : Diagnostic steps permitting the use of the TOYOTA hand–held tester.

DI15Z–07

CUSTOMER PROBLEM ANALYSIS CHECK

Supplemental Restraint System Check Sheet

Inspector's Name

Customer's Name		Registration No.	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	Odometer Reading	km Miles

Date Problem Occurred	/ /
Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Other
Temperature	Approx.

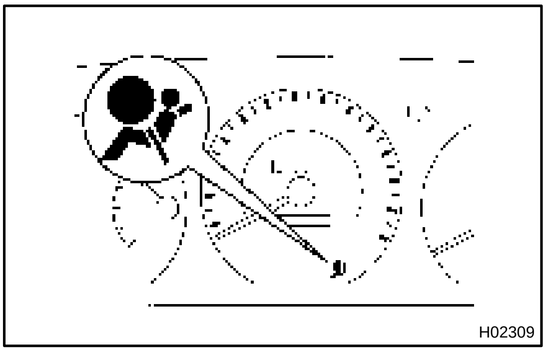
Vehicle Operation	☐ Starting ☐ Idling ☐ Driving [☐ Constant speed ☐ Acceleration ☐ Deceleration ☐ Other]
Road Conditions	
Details Of Problem	

Vehicle Inspection, Repair History Prior to Occurrence of Malfunction (Including Supplemental Restraint System)	

Diagnosis System Inspection

SRS Warning Light Inspection	1st Time	☐ Remains ON ☐ Sometimes Light Up ☐ Does Not Light Up
	2nd Time	☐ Remains ON ☐ Sometimes Light Up ☐ Does Not Light Up
DTC Inspection	1st Time	☐ Normal Code ☐ Malfunction Code [Code.]
	2nd Time	☐ Normal Code ☐ Malfunction Code [Code.]

DI4L1–01



PRE–CHECK

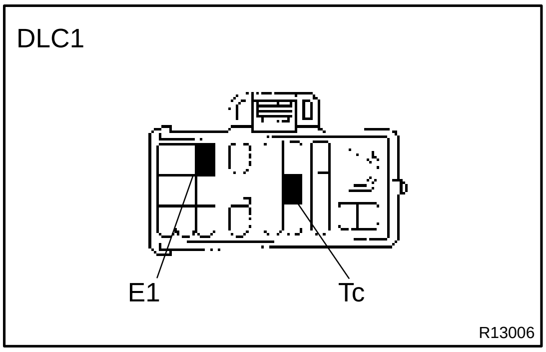
1. SRS WARNING LIGHT CHECK

(a) Turn the ignition switch to the ACC or ON position and check that the SRS warning light lights up.

(b) Check that the SRS warning light goes out after approx. 6 seconds.

HINT:

- When the ignition switch is at ACC or ON and the SRS warning light remains on or flashes, the airbag sensor assembly has detected a malfunction code.
- If, after approx. 6 seconds have elapsed, the SRS warning light sometimes lights up or the SRS warning light lights up even when the ignition switch is OFF, a short in the SRS warning light circuit can be considered likely. Proceed to "SRS warning light circuit malfunction" on page DI–790, DI–792.



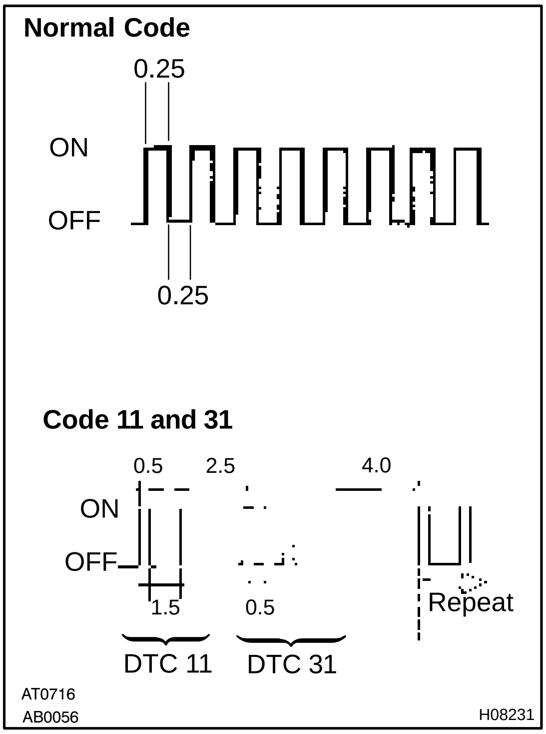
2. DTC CHECK (Using diagnosis check wire)

(a) Present troubles codes:
Output the DTC.
(1) Turn the ignition switch to the ACC or ON position and wait for approx. 20 seconds.
(2) Using SST, connect terminals Tc and E1 of the DLC1.
SST 09843–18020

NOTICE:
Pay due attention to the terminal connecting position to avoid a malfunction.

(b) Past troubles codes:
Output the DTC.
(1) Using service wire, connect Terminals Tc and E1 of the DLC1.
SST 09843–18020
(2) Turn the ignition switch to the ACC or ON position and wait for approx. 20 seconds.

NOTICE:
Pay due attention to the terminal connecting position to avoid a malfunction.

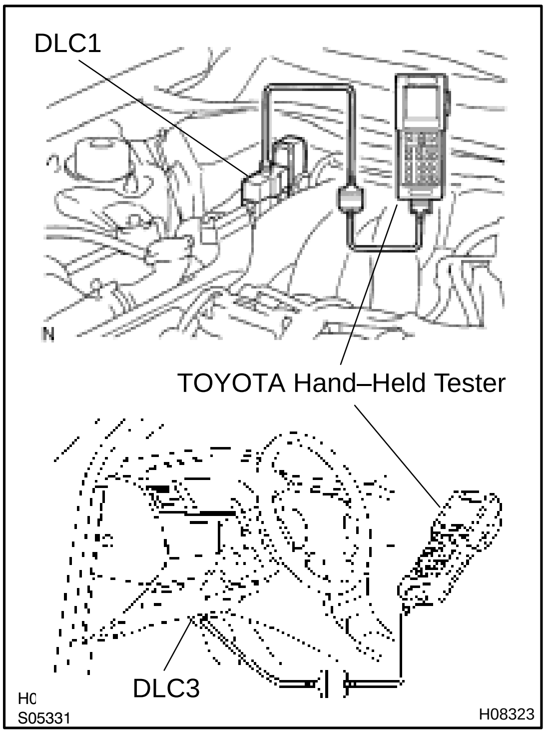


(c) Read the DTC.
Read the 2–digit DTC as indicated by the number of times the SRS warning light blinks. As an example, the blinking patterns, normal, 11 and 31 are shown in the illustration.

- Normal code indication
  The light will blink 2 times per second.
- Malfunction code indication
  The first blinking output indicates the first digit of a 2–digit DTC. After a 1.5–second pause, the second blinking output will indicate the second digit.

If there are 2 or more codes, there will be a 2.5–second pause between each code. After all the codes have been output, there will be a 4.0–second pause and they will all be repeated.
HINT:

- In the event of a number of trouble codes, indication will start from the smallest numbered code.
- If a DTC is not output or a DTC is output without terminal connection, proceed to the Tc terminal circuit inspection on page DI–796.



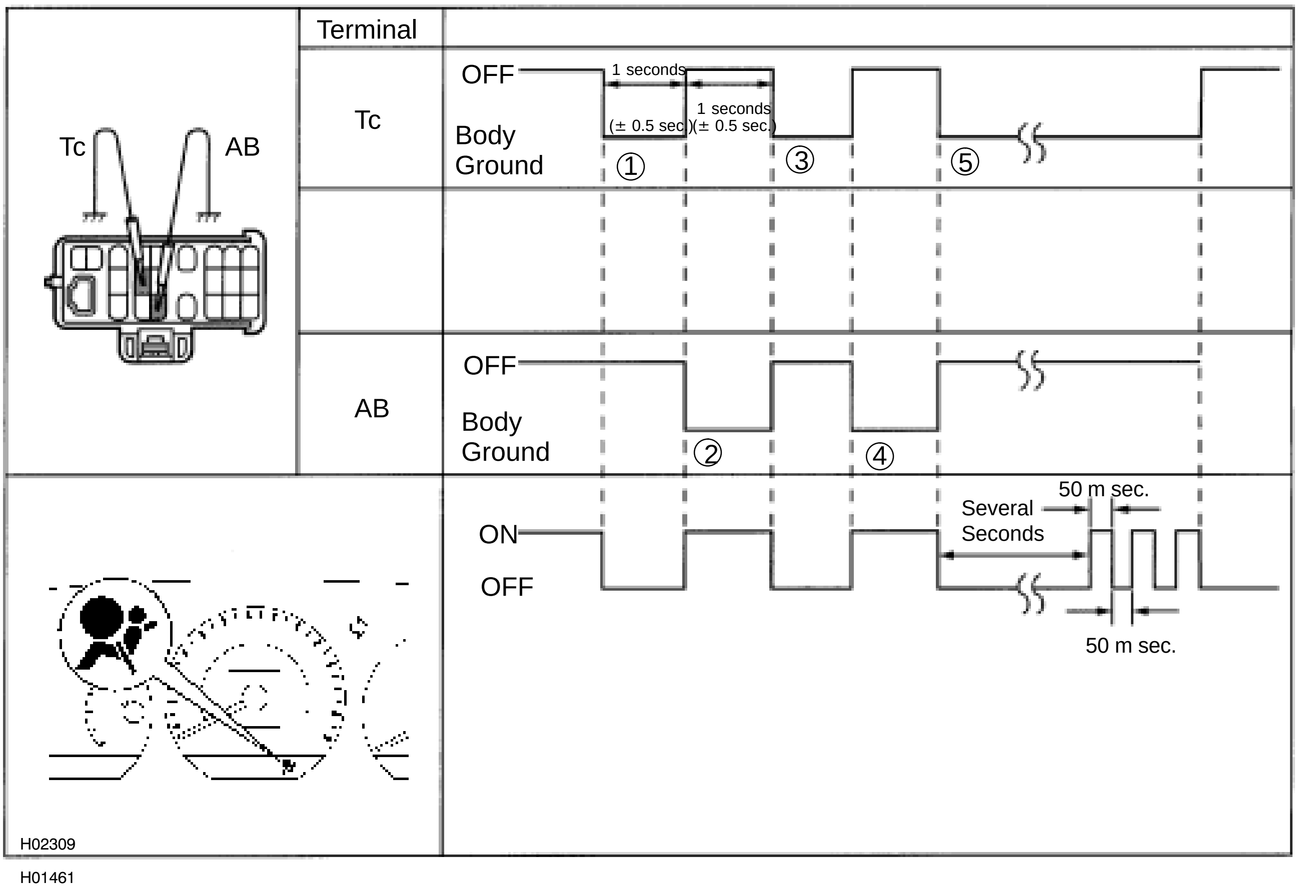
3. DTC CHECK (Using TOYOTA hand–held tester)
(a) Hook up the TOYOTA hand–held tester to the DLC1 or the DLC3.
(b) Read the DTCs by following the prompts on the tester screen.
HINT:
Please refer to the TOYOTA hand–held tester operator's manual for further details.

4. DTC CLEARANCE (Not using service wire)
When the ignition switch is turned off, the diagnostic trouble code is cleared.
HINT:
DTC might not be cleared by turning the ignition switch OFF. In this case, proceed to the next step.

5. DTC CLEARANCE (Using service wire)
(a) Connect the 2 service wires to terminals Tc and AB of DLC1.
(b) Turn the ignition switch to ACC or ON and wait for approx. 6 seconds.

(c) Starting with the Tc terminal, ground alternately terminal Tc and terminal AB twice each in cycles of 1.0 seconds. Make sure that the terminals are grounded. Ensure the terminal Tc remain grounded.

HINT:
When alternately grounding terminals Tc and AB, release ground from one terminal and immediately ground the other terminal within an interval of 0.2 seconds.
If DTCs are not cleared, repeat the above procedure until the codes are cleared.



H02271

(d) Several seconds after doing the clearing procedure, the SRS warning light will blink in a 50 m sec. cycle to indicate the codes which have been cleared.

6. Past troubles codes:
DTC CLEARANCE
(See step 5.)

7. RELEASE METHOD OF AIRBAG ACTIVATION PREVENTION MECHANISM

An airbag activation prevention mechanism is built into the connector for the squib circuit of the SRS.

When release of the airbag activation prevention mechanism is directed in the troubleshooting procedure, as shown in the illustration of the connectors on the next pages, insert paper which is the same thickness as the male terminal, between the terminal and the short spring.

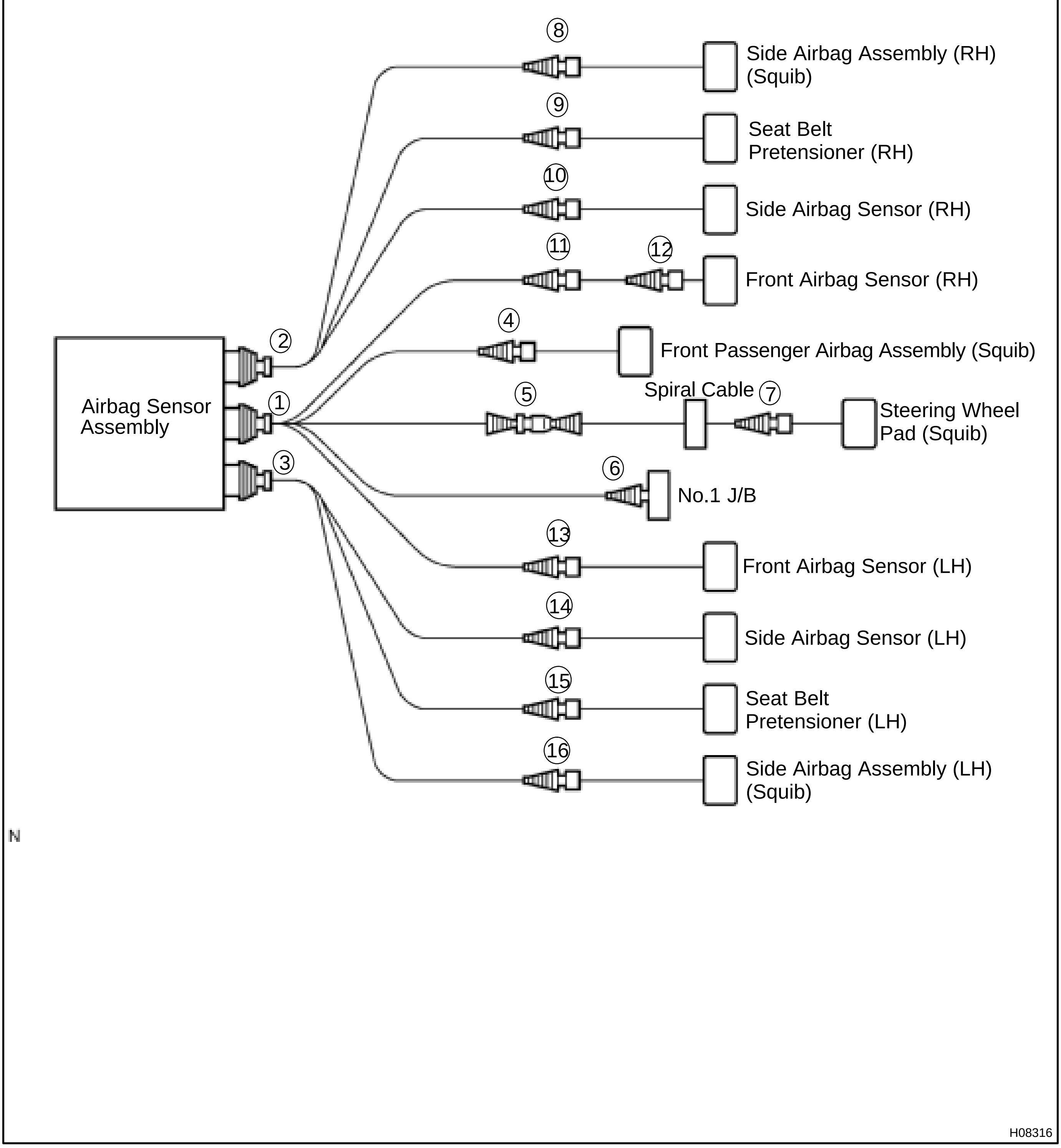
CAUTION:

Never release the airbag activation prevention mechanism on the steering wheel pad connector.

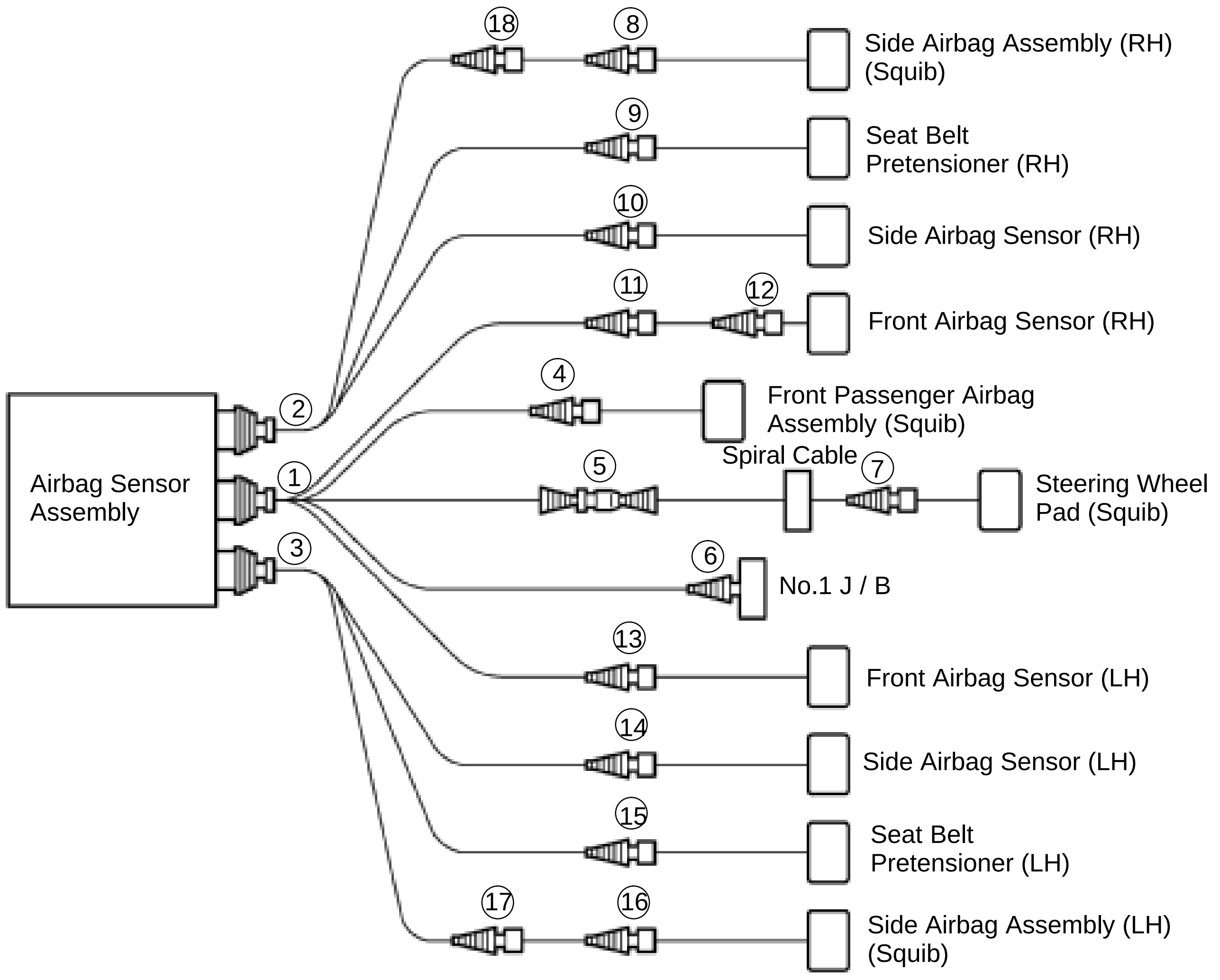
NOTICE:

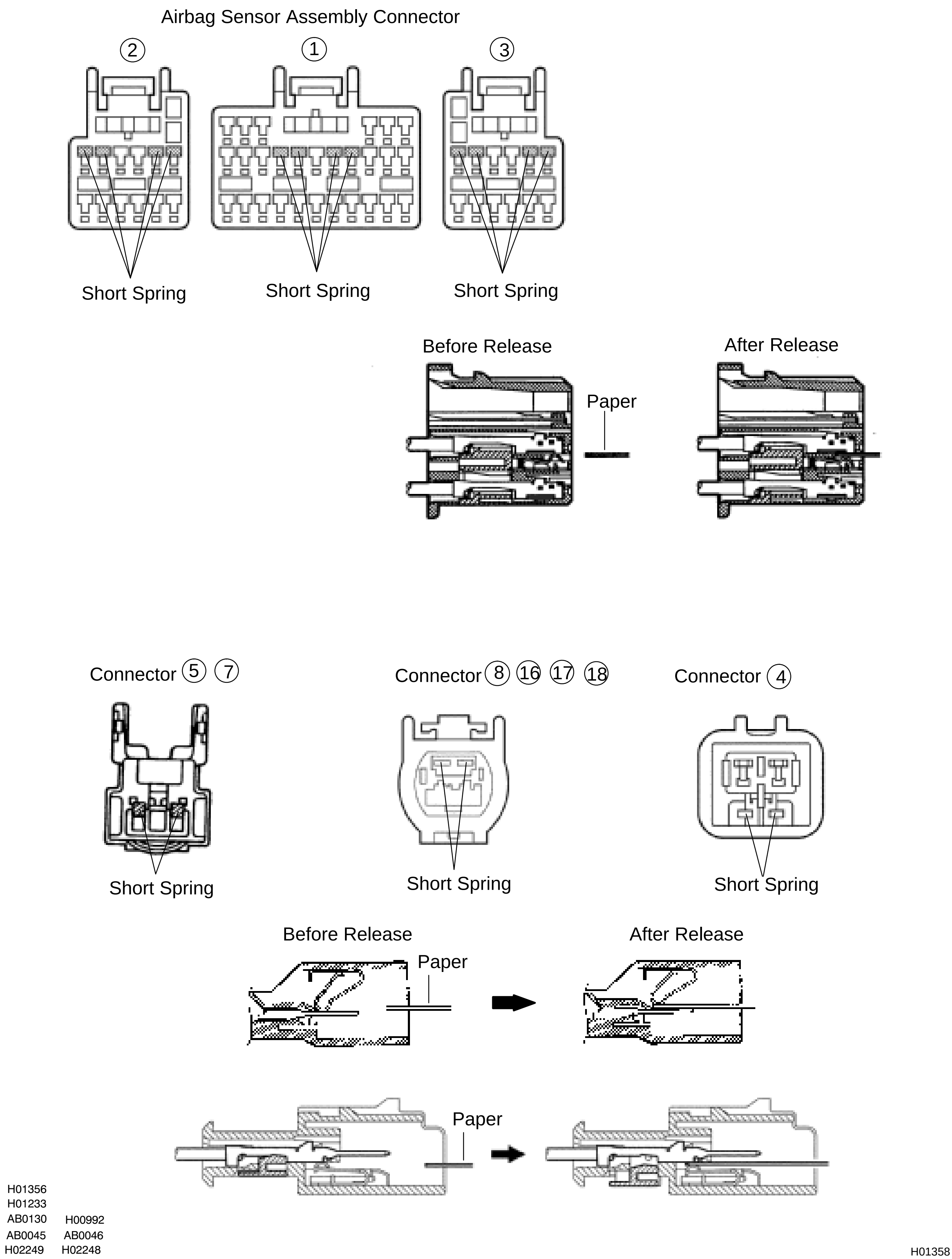
- **Do not release the airbag activation prevention mechanism unless specifically directed by the troubleshooting procedure.**
- **If the inserted paper is too thick the terminal and short spring may be damaged, so always use paper with the same thickness as the male terminal.**

TMC made :


8
Side Airbag Assembly (RH)
(Squib)
9
Seat Belt
Pretensioner (RH)
10
Side Airbag Sensor (RH)
11
12
Front Airbag Sensor (RH)
2
4
Front Passenger Airbag Assembly (Squib)
Airbag Sensor
Assembly
1
5
Spiral Cable
7
Steering Wheel
Pad (Squib)
3
6
No.1 J/B
13
Front Airbag Sensor (LH)
14
Side Airbag Sensor (LH)
15
Seat Belt
Pretensioner (LH)
16
Side Airbag Assembly (LH)
(Squib)
N
H08316

TMMK made :


18
8
Side Airbag Assembly (RH)
(Squib)
9
Seat Belt
Pretensioner (RH)
10
Side Airbag Sensor (RH)
11
12
Front Airbag Sensor (RH)
4
Front Passenger Airbag
Assembly (Squib)
2
Spiral Cable
5
7
Airbag Sensor
Assembly
1
Steering Wheel
Pad (Squib)
3
6
No.1 J / B
13
Front Airbag Sensor (LH)
14
Side Airbag Sensor (LH)
15
Seat Belt
Pretensioner (LH)
17
16
Side Airbag Assembly (LH)
(Squib)
H08247


Airbag Sensor Assembly Connector
2
1
3
Short Spring
Short Spring
Short Spring
Before Release
After Release
Paper
Connector 5 7
Connector 8 16 17 18
Connector 4
Short Spring
Short Spring
Short Spring
Before Release
After Release
Paper
Paper
H01356
H01233
AB0130 H00992
AB0045 AB0046
H02249 H02248
H01358

DI1AZ–04

DIAGNOSTIC TROUBLE CODE CHART

If a malfunction code is displayed during the DTC check, check the circuit listed for that code in the table below (Proceed to the page given for that circuit.).

DTC No. (See Page)	Detection Item	Trouble Area	SRS Warning Light
B0100/13 (DI–640)	●Short in D squib circuit	●Steering wheel pad (squib) ●Spiral cable ●Airbag sensor assembly ●Wire harness	ON
B0101/14 (DI–645)	●Open in D squib circuit	●Steering wheel pad (squib) ●Spiral cable ●Airbag sensor assembly ●Wire harness	ON
B0102/11 (DI–649)	●Short in D squib circuit (to Ground)	●Steering wheel pad (squib) ●Spiral cable ●Airbag sensor assembly ●Wire harness	ON
B0103/12 (DI–653)	●Short in D squib circuit (to B+)	●Steering wheel pad (squib) ●Spiral cable ●Airbag sensor assembly ●Wire harness	ON
B0105/53 (DI–657)	●Short in P squib circuit	●Front passenger airbag assembly (squib) ●Airbag sensor assembly ●Wire harness	ON
B0106/54 (DI–661)	●Open in P squib circuit	●Front passenger airbag assembly (squib) ●Airbag sensor assembly ●Wire harness	ON
B0107/51 (DI–664)	●Short in P squib circuit (to Ground)	●Front passenger airbag assembly (squib) ●Airbag sensor assembly ●Wire harness	ON
B0108/52 (DI–667)	●Short in P squib circuit (to B+)	●Front passenger airbag assembly (squib) ●Airbag sensor assembly ●Wire harness	ON
TMC made: B0110/43 (DI–670)	●Short in side squib (RH) circuit	●Side airbag assembly RH (squib) ●Airbag sensor assembly ●Wire harness	Blink
TMMK made: B0110/43 (DI–674)	●Short in side squib (RH) circuit	●Side airbag assembly RH (squib) ●Airbag sensor assembly ●Wire harness ●Sub wire harness	Blink
TMC made: B0111/44 (DI–679)	●Open in side squib (RH) circuit	●Side airbag assembly RH (squib) ●Airbag sensor assembly ●Wire harness	Blink
TMMK made: B0111/44 (DI–682)	●Open in side squib (RH) circuit	●Side airbag assembly RH (squib) ●Airbag sensor assembly ●Wire harness ●Sub wire harness	Blink
TMC made: B0112/41 (DI–686)	●Short in side squib (RH) circuit (to Ground)	●Side airbag assembly RH (squib) ●Airbag sensor assembly ●Wire harness	Blink

DTC No. (See Page)	Detection Item	Trouble Area	SRS Warning Light
TMMK made: B0112/41 (DI–689)	●Short in side squib (RH) circuit (to Ground)	●Side airbag assembly RH (squib) ●Airbag sensor assembly ●Wire harness ●Sub wire harness	Blink
TMC made: B0113/42 (DI–693)	●Short in side squib (RH) circuit (to B+)	●Side airbag assembly RH (squib) ●Airbag sensor assembly ●Wire harness	Blink
TMMK made: B0113/42 (DI–696)	●Short in side squib (RH) circuit (to B+)	●Side airbag assembly RH (squib) ●Airbag sensor assembly ●Wire harness ●Sub wire harness	Blink
TMC made: B0115/47 (DI–700)	●Short in side squib (LH) circuit	●Side airbag assembly LH (squib) ●Airbag sensor assembly ●Wire harness	Blink
TMMK made: B0115/47 (DI–704)	●Short in side squib (LH) circuit	●Side airbag assembly LH (squib) ●Airbag sensor assembly ●Wire harness ●Sub wire harness	Blink
TMC made: B0116/48 (DI–709)	●Open in side squib (LH) circuit	●Side airbag assembly LH (squib) ●Airbag sensor assembly ●Wire harness	Blink
TMMK made: B0116/48 (DI–712)	●Open in side squib (LH) circuit	●Side airbag assembly LH (squib) ●Airbag sensor assembly ●Wire harness ●Sub wire harness	Blink
TMC made: B0117/45 (DI–716)	●Short in side squib (LH) circuit (to Ground)	●Side airbag assembly LH (squib) ●Airbag sensor assembly ●Wire harness	Blink
TMMK made: B0117/45 (DI–719)	●Short in side squib (LH) circuit (to Ground)	●Side airbag assembly LH (squib) ●Airbag sensor assembly ●Wire harness ●Sub wire harness	Blink
TMC made: B0118/46 (DI–723)	●Short in side squib (LH) circuit (to B+)	●Side airbag assembly LH (squib) ●Airbag sensor assembly ●Wire harness	Blink
TMMK made: B0118/46 (DI–726)	●Short in side squib (LH) circuit (to B+)	●Side airbag assembly LH (squib) ●Airbag sensor assembly ●Wire harness ●Sub wire harness	Blink
B0130/63 (DI–730)	●Short in P/T squib (RH) circuit	●Seat belt pretensioner RH (squib) ●Airbag sensor assembly ●Wire harness	Blink
B0131/64 (DI–734)	●Open in P/T squib (RH) circuit	●Seat belt pretensioner RH (squib) ●Airbag sensor assembly ●Wire harness	Blink
B0132/61 (DI–737)	●Short in P/T squib (RH) circuit (to Ground)	●Seat belt pretensioner RH (squib) ●Airbag sensor assembly ●Wire harness	Blink
B0133/62 (DI–740)	●Short in P/T squib (RH) circuit (to B+)	●Seat belt pretensioner RH (squib) ●Airbag sensor assembly ●Wire harness	Blink

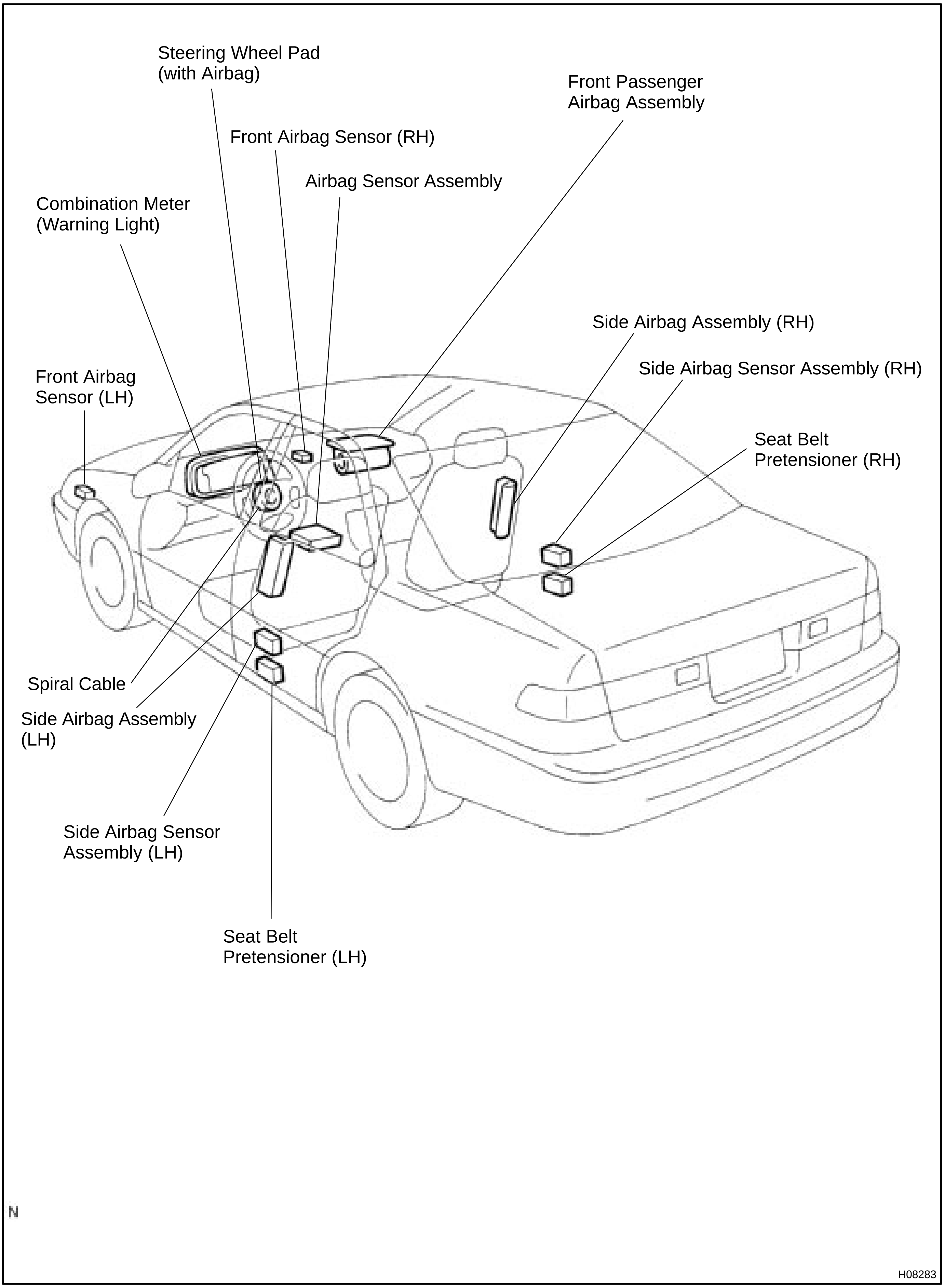
DTC No. (See Page)	Detection Item	Trouble Area	SRS Warning Light
B0135/73 (DI–743)	●Short in P/T squib (LH) circuit	●Seat belt pretensioner LH (squib) ●Airbag sensor assembly ●Wire harness	Blink
B0136/74 (DI–747)	●Open in P/T squib (LH) circuit	●Seat belt pretensioner LH (squib) ●Airbag sensor assembly ●Wire harness	Blink
B0137/71 (DI–750)	●Short in P/T squib (LH) circuit (to Ground)	●Seat belt pretensioner LH (squib) ●Airbag sensor assembly ●Wire harness	Blink
B0138/72 (DI–753)	●Short in P/T squib (LH) circuit (to B+)	●Seat belt pretensioner LH (squib) ●Airbag sensor assembly ●Wire harness	Blink
B1100/31 (DI–756)	●Airbag sensor assembly malfunction	●Airbag sensor assembly	ON
B1140/32 (DI–758)	●Side airbag sensor assembly (RH) malfunction	●Side airbag sensor assembly (RH) ●Wire harness	Blink
B1141/33 (DI–766)	●Side airbag sensor assembly (LH) malfunction	●Side airbag sensor assembly (LH) ●Wire harness	Blink
B1156/B1157/ 15 (DI–774)	●Front airbag sensor (RH) malfunction	●Front airbag sensor (RH) ●Wire harness ●Engine room main wire harness	ON
B1158/B1159/ 16 (DI–782)	●Front airbag sensor (LH) malfunction	●Front airbag sensor (LH) ●Wire harness	ON
Normal (DI–787)	●System normal	–	OFF
	●Voltage source drop	●Battery ●Airbag sensor assembly	ON

HINT:

- When the SRS warning light remains lit up and the DTC is the normal code, this means a voltage source drops.
  This malfunction is not stored in memory by the airbag sensor assembly and if the power source voltage returns to normal, the SRS warning light will automatically go out.
- When 2 or more codes are indicated, the codes will be displayed in numeral order starting from the lowest numbered code.
- If a code not listed on the chart is displayed, the airbag sensor assembly is faulty.

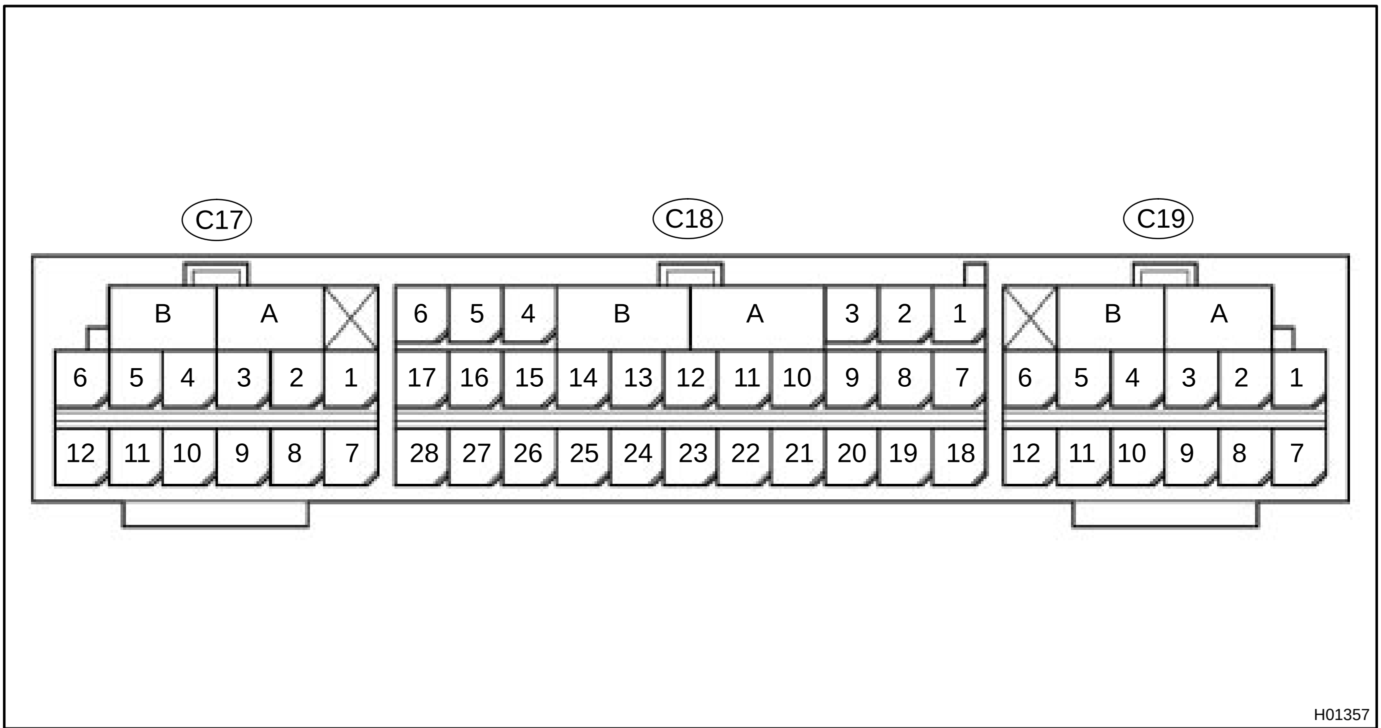
DI1B0–04

PARTS LOCATION



DI1B1–08

TERMINALS OF ECU



No.	Symbol	Terminal Name
A	–	Electrical Connector Check Mechanism
B	–	Electrical Connector Check Mechanism
C18 – 3	LA	SRS Warning Light
C18 – 5	IG2	Power Source (IGN Fuse)
C18 – 6	ACC	Power Source (CIG Fuse)
C18 – 9	SR+	Front Airbag Sensor (RH)
C18 – 10	P+	Squib (Passenger)
C18 – 11	P–	Squib (Passenger)
C18 – 12	SIL	Diagnosis
C18 – 13	D–	Squib (Driver)
C18 – 14	D+	Squib (Driver)
C18 – 15	SL+	Front Airbag Sensor (LH)
C18 – 19	Tc	Diagnosis
C18 – 20	SR–	Front Airbag Sensor (RH)
C18 – 26	SL–	Front Airbag Sensor (LH)
C18 – 27	E1	Ground
C18 – 28	E2	Ground
C17 – 1	PL–	Squib (Seat Belt Pretensioner, LH)
C17 – 2	PL+	Squib (Seat Belt Pretensioner, LH)
C17 – 5	SFL+	Squib (Side, LH)
C17 – 6	SFL–	Squib (Side, LH)
C17 – 7	VUPL	Side Airbag Sensor (LH)
C17 – 9	SSL+	Side Airbag Sensor (LH)
C17 – 10	FSL	Side Airbag Sensor (LH)
C17 – 12	ESL	Side Airbag Sensor (LH)

No.	Symbol	Terminal Name
C19 – 1	SFR–	Squib (Side, RH)
C19 – 2	SFR+	Squib (Side, RH)
C19 – 5	PR+	Squib (Pretensioner, RH)
C19 – 6	PR–	Squib (Pretensioner, RH)
C19 – 7	ESR	Side Airbag Sensor (RH)
C19 – 9	FSR	Side Airbag Sensor (RH)
C19 – 10	SSR+	Side Airbag Sensor (RH)
C19 – 12	VUPR	Side Airbag Sensor (RH)

DI164–18

PROBLEM SYMPTOMS TABLE

Proceed with troubleshooting of each circuit in the table below.

Symptom	Suspect Area	See page
●With the ignition switch in ACC or ON position, the SRS warning light sometimes lights up after approx. 6 seconds have elapsed.	●SRS warning light circuit (Always lights up when ignition switch is in LOCK position.)	DI–790
●SRS warning light is always lit up even when ignition switch is in the LOCK position.		
●With the ignition switch in ACC or ON position, the SRS warning light does not light up.	●SRS warning light circuit (Does not light up when ignition switch is turned to ACC or ON.)	DI–792
●DTC is not displayed.	●Tc terminal circuit	DI–796
●SRS warning light is always lit up at the time of DTC check procedure.		
●DTC is displayed without Tc and E1 terminal connection.		

DI18Q–09

CIRCUIT INSPECTION

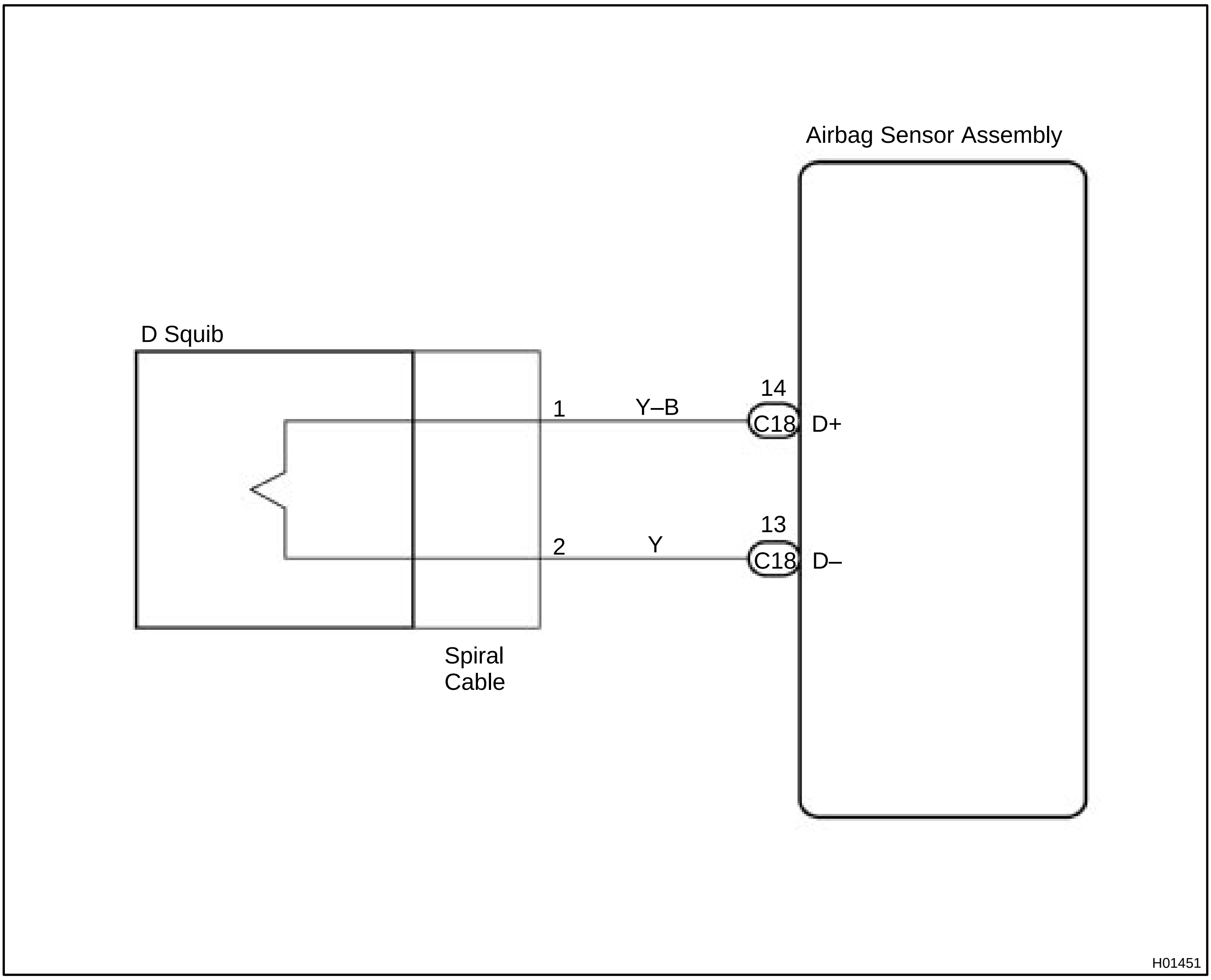
DTC	B0100/13	Short in D Squib Circuit

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag sensor assembly, spiral cable and steering wheel pad.
It causes the airbag to deploy when the airbag deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0100/13 is recorded when a short is detected in the D squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0100/13	●Short circuit between D+ wire harness and D– wire harness of squib ●D squib malfunction ●Spiral cable malfunction ●Airbag sensor assembly malfunction	●Steering wheel pad (D squib) ●Spiral cable ●Airbag sensor assembly ●Wire harness

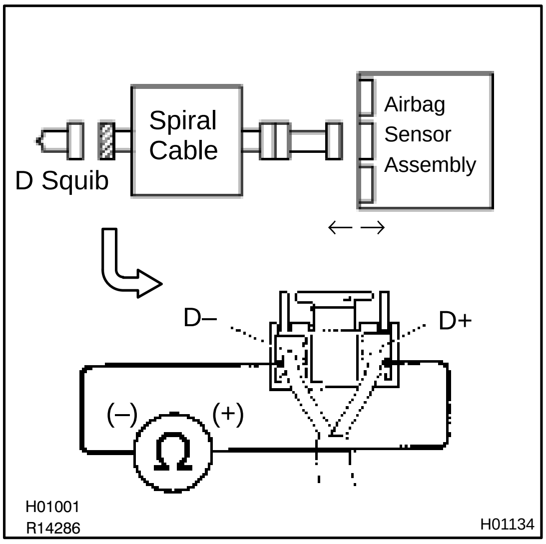
WIRING DIAGRAM



INSPECTION PROCEDURE

1	Prepare for inspection. (See step 1 on page DI–787)

2	Check D squib circuit.



PREPARATION:
Release the airbag activation prevention mechanism of the connector (on the airbag sensor assembly side) between the airbag sensor assembly and the spiral cable.
(See page DI–626)

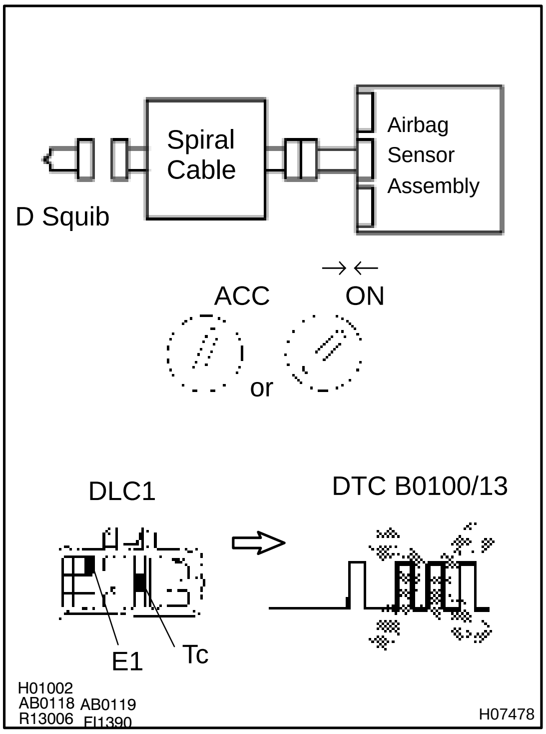
CHECK:
For the connector (on the spiral cable side) between the spiral cable and the steering wheel pad, measure the resistance between D+ and D–.

OK:
Resistance: 1 MΩ or Higher

NG	Go to step 5.

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

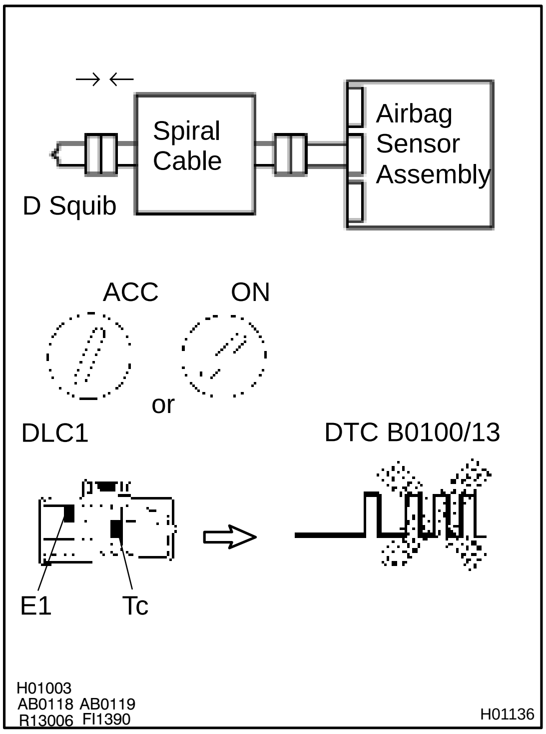
DTC B0100/13 is not output.

HINT:
Codes other than code B0100/13 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check D squib.**



PREPARATION:

(a) Turn ignition switch to LOCK.

(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the steering wheel pad connector.

(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(b) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(c) Clear DTC stored in memory.
(See page DI–626)

(d) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(e) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(f) Check DTC.
(See page DI–626)

OK:

DTC B0100/13 is not output.

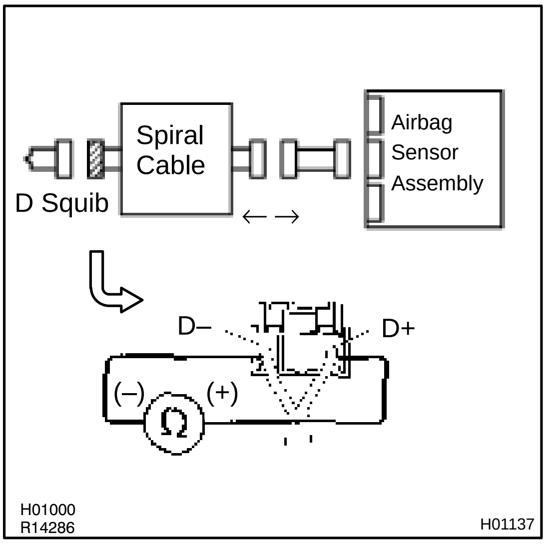
HINT:
Codes other than code B0100/13 may be output at this time, but they are not relevant to this check.

NG	**Replace steering wheel pad.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

5	Check spiral cable.



PREPARATION:

(a) Disconnect the connector between the airbag sensor assembly and the spiral cable.

(b) Release the airbag activation prevention mechanism of the spiral cable connector on the airbag sensor assembly side. (See page DI–626)

CHECK:

For the connector (on the spiral cable side) between the spiral cable and the steering wheel pad, measure the resistance between D+ and D–.

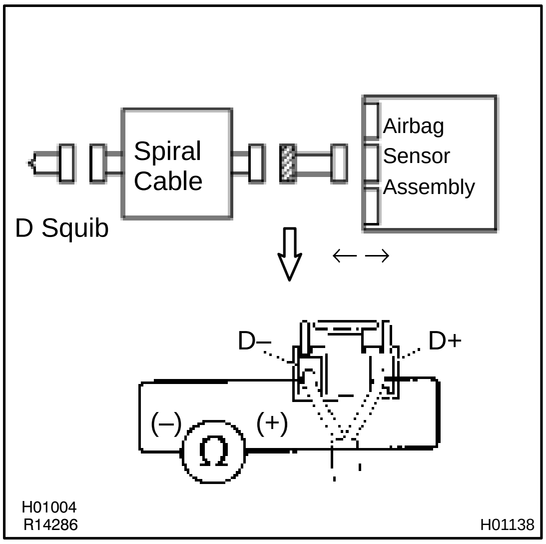
OK:

Resistance: 1 MΩ or Higher

NG	Repair or replace spiral cable.

OK

6	Check harness between airbag sensor assembly and spiral cable.



PREPARATION:

Release the airbag activation prevention mechanism of the connector (on the airbag sensor assembly side) between the airbag sensor assembly and the spiral cable. (See page DI–626)

CHECK:

For the connector (on the spiral cable side) between the airbag sensor assembly and the spiral cable, measure the resistance between D+ and D–.

OK:

Resistance: 1 MΩ or Higher

NG	Repair or replace harness or connector between airbag sensor assembly and spiral cable.

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI18R–16

DTC	B0101/14	Open in D Squib Circuit

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag sensor assembly, spiral cable and steering wheel pad.
It causes the airbag to deploy when the airbag deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0101/14 is recorded when an open is detected in the D squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0101/14	●Open circuit in D+ wire harness or D– wire harness of squib ●D squib malfunction ●Spiral cable malfunction ●Airbag sensor assembly malfunction	●Steering wheel pad (D squib) ●Spiral cable ●Airbag sensor assembly ●Wire harness

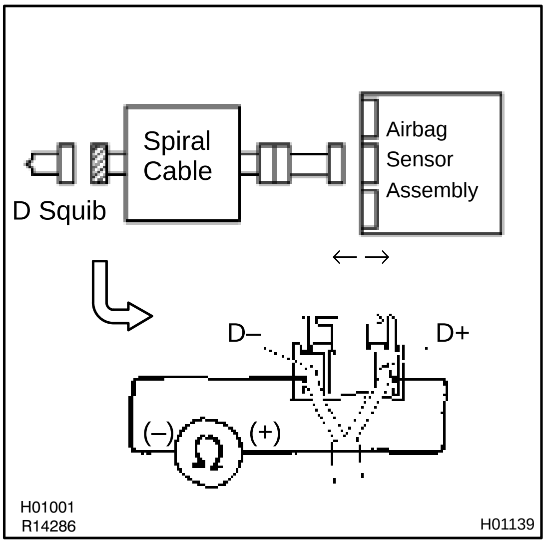
WIRING DIAGRAM

See page DI–640.

INSPECTION PROCEDURE

1	Prepare for inspection. (See step 1 on page DI–787)

2	Check D squib circuit.

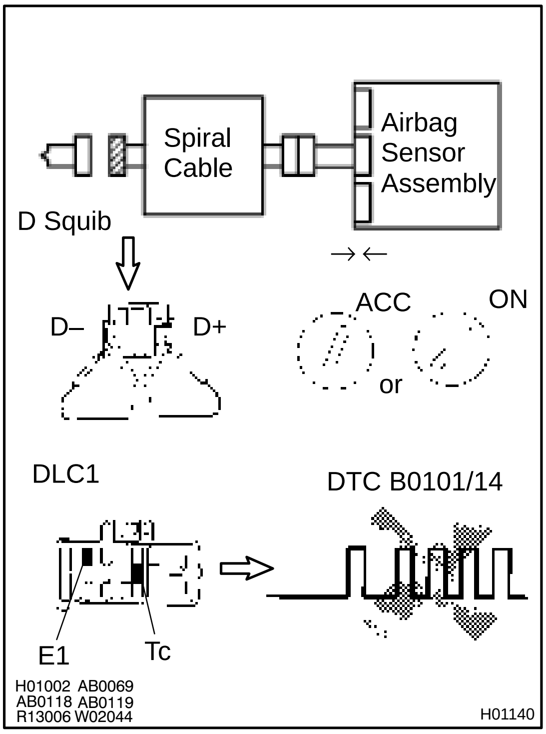


CHECK:
For the connector (on the spiral cable side) between the spiral cable and the steering wheel pad, measure the resistance between D+ and D–.
OK:
Resistance: Below 1 Ω

NG	Go to step 5.

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect D+ and D– of the connector (on the spiral cable side) between the spiral cable and the steering wheel pad.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

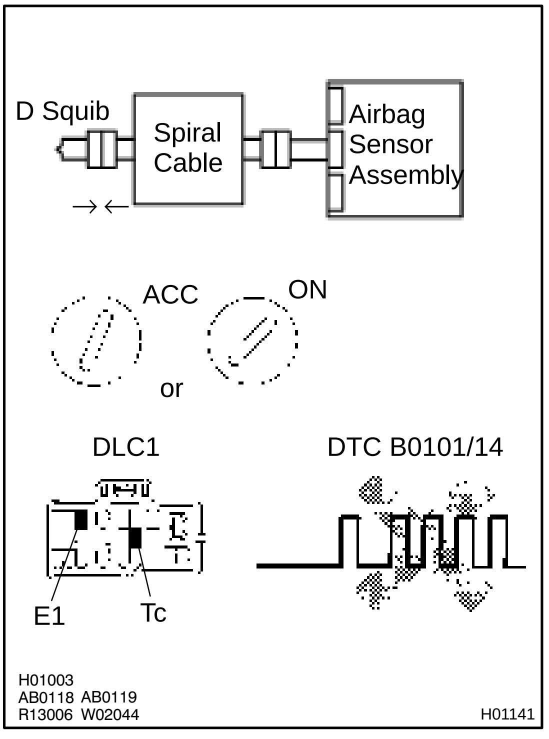
DTC B0101/14 is not output.

HINT:
Codes other than code B0101/14 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check D squib.



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the steering wheel pad connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See page DI–626)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–626)

OK:

DTC B0101/14 is not output.

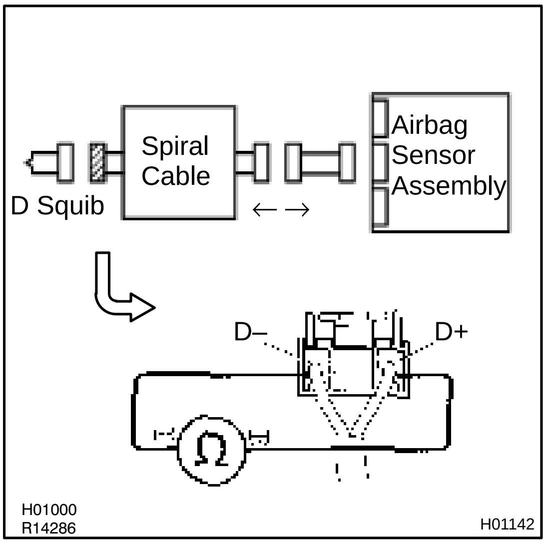
HINT:
Codes other than code B0101/14 may be output at this time, but they are not relevant to this check.

NG	Replace steering wheel pad.

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

5	**Check spiral cable.**



PREPARATION:

Disconnect the connector between the airbag sensor assembly and the spiral cable.

CHECK:

For the connector (on the spiral cable side) between the spiral cable and the steering wheel pad, measure the resistance between D+ and D–.

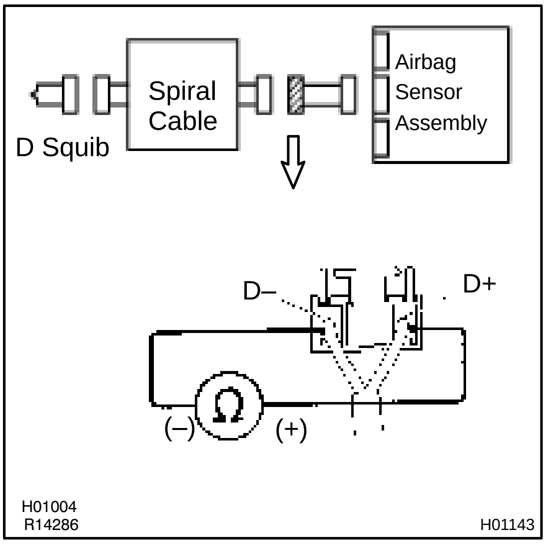
OK:

Resistance: Below 1 Ω

NG → **Repair or replace spiral cable.**

OK

6	**Check harness between airbag sensor assembly and spiral cable.**



CHECK:

For the connector (on the spiral cable side) between the airbag sensor assembly and the spiral cable, measure the resistance between D+ and D–.

OK:

Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between airbag sensor assembly and spiral cable.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI4L2–01

DTC	B0102/11	Short in D Squib Circuit (to Ground)

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag sensor assembly, spiral cable and steering wheel pad.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0102/11 is recorded when a ground short is detected in the D squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0102/11	●Short circuit in D squib wire harness (to ground) ●D squib malfunction ●Spiral cable malfunction ●Airbag sensor assembly malfunction	●Steering wheel pad (D squib) ●Spiral cable ●Airbag sensor assembly ●Wire harness

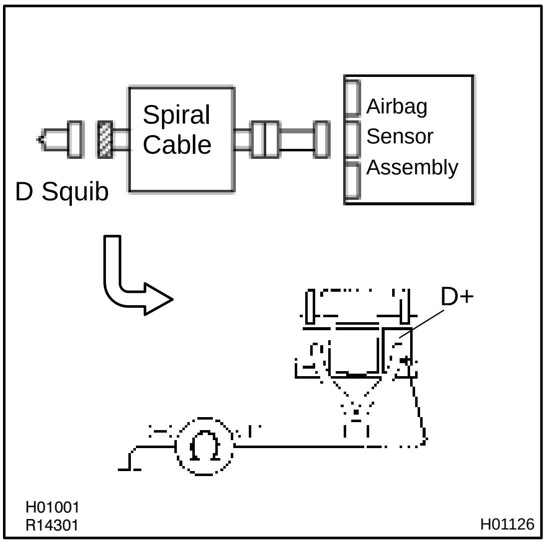
WIRING DIAGRAM

See page DI–640.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–787)**

2	**Check D squib circuit.**

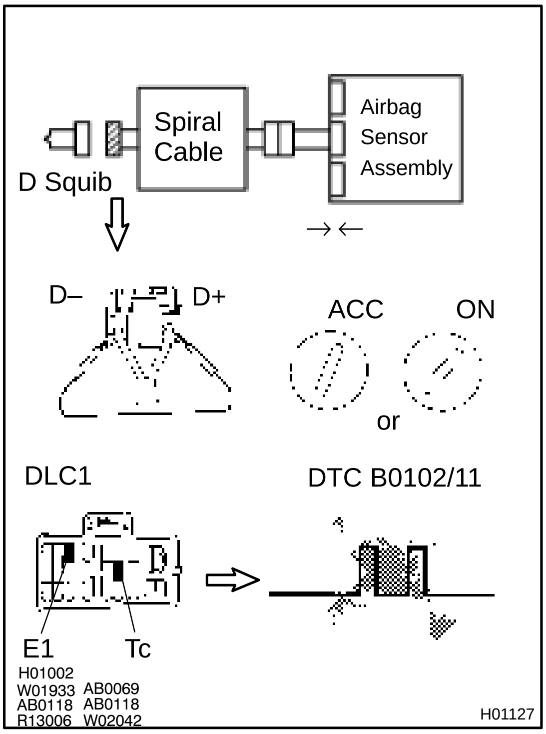


CHECK:
For the connector (on the spiral cable side) between the spiral cable and the steering wheel pad, measure the resistance between D+ and body ground.
OK:
Resistance: 1 MΩ or Higher

NG	Go to step 5.

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect D+ and D– of the connector (on the spiral cable side) between the spiral cable and the steering wheel pad.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

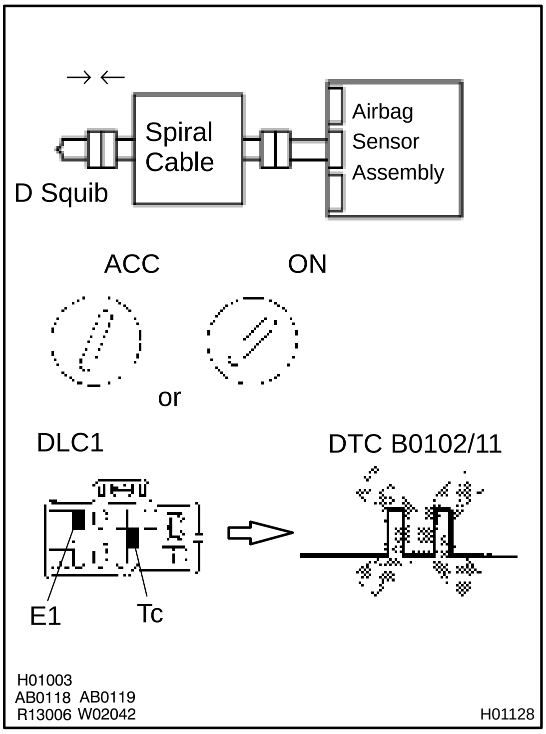
DTC B0102/11 is not output.

HINT:
Codes other than code B0102/11 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	Check D squib.



PREPARATION:

(a) Turn ignition switch to LOCK.

(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the steering wheel pad connector.

(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

DTC B0102/11 is not output.

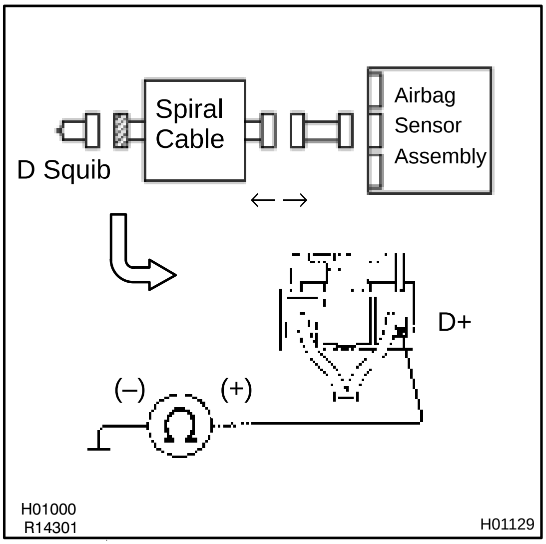
HINT:
Codes other than code B0102/11 may be output at this time, but they are not relevant to this check.

NG	Replace steering wheel pad.

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

5	Check spiral cable.



PREPARATION:
Disconnect the connector between the airbag sensor assembly and the spiral cable.

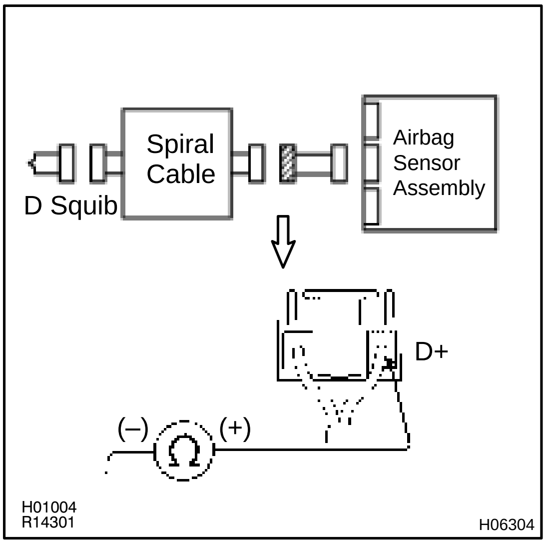
CHECK:
For the connector (on the spiral cable side) between the steering wheel pad and the spiral cable, measure the resistance between D+ and body ground.

OK:
Resistance: 1 MΩ or Higher

NG → **Repair or replace spiral cable.**

OK

6	Check harness between airbag sensor assembly and spiral cable.



CHECK:
For the connector (on the spiral cable side) between the spiral cable and airbag sensor assembly, measure the resistance between D+ and body ground.

OK:
Resistance: 1 MΩ or Higher

NG → **Repair or replace harness between airbag sensor assembly and spiral cable.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI4L3–01

DTC	B0103/12	Short in D Squib Circuit (to B+)

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag sensor assembly, spiral cable and steering wheel pad.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0103/12 is recorded when a B+ short is detected in the D squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0103/12	●Short circuit in D squib wire harness (to B+) ●D squib malfunction ●Spiral cable malfunction ●Airbag sensor assembly malfunction	●Steering wheel pad (D squib) ●Spiral cable ●Airbag sensor assembly ●Wire harness

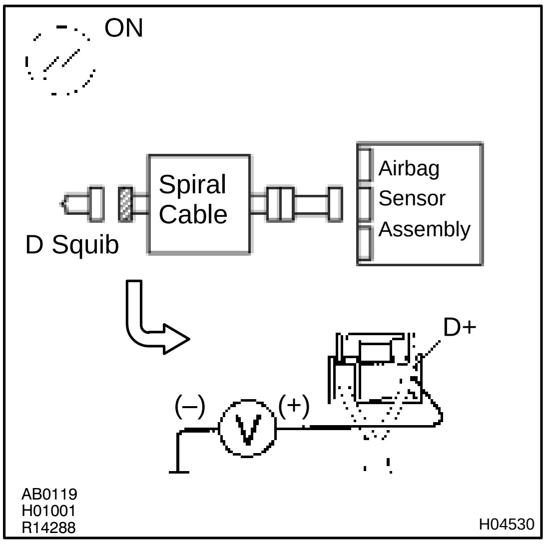
WIRING DIAGRAM

See page DI–640.

INSPECTION PROCEDURE

1	Prepare for inspection. (See step 1 on page DI–787)

2	Check D squib circuit.



CHECK:

(a) Turn ignition switch to ON.

(b) For the connector (on the spiral cable side) between the spiral cable and the steering wheel pad, measure the voltage between D+ and body ground.

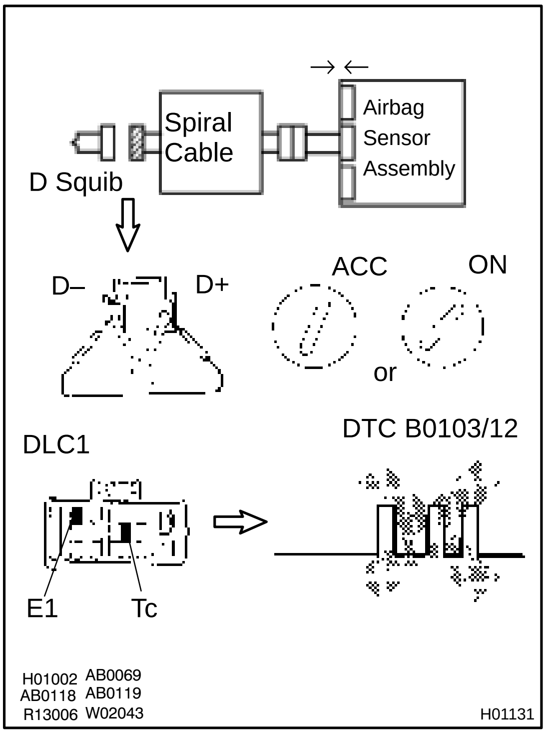
OK:

Voltage: 0 V

NG	Go to step 5.

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect D+ and D– of the connector (on the spiral cable side) between the spiral cable and the steering wheel pad.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

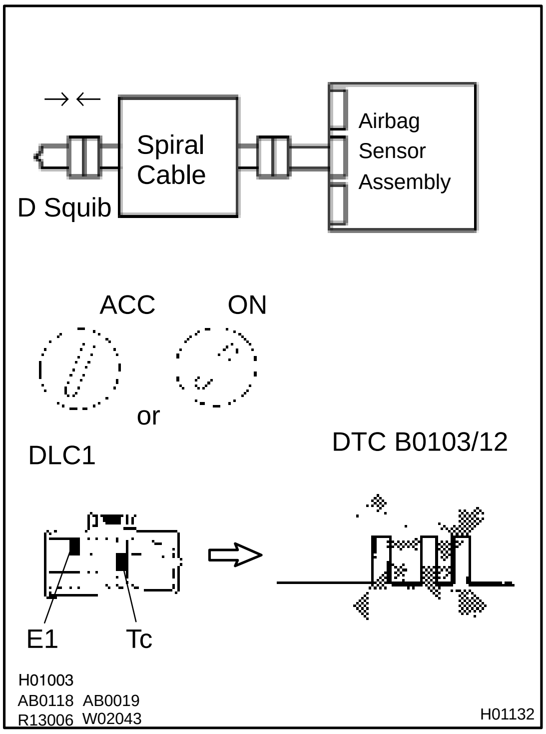
DTC B0103/12 is not output.

HINT:
Codes other than code B0103/12 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check D squib.**



PREPARATION:

(a) Turn ignition switch to LOCK.

(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the steering wheel pad connector.

(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

DTC B0103/12 is not output.

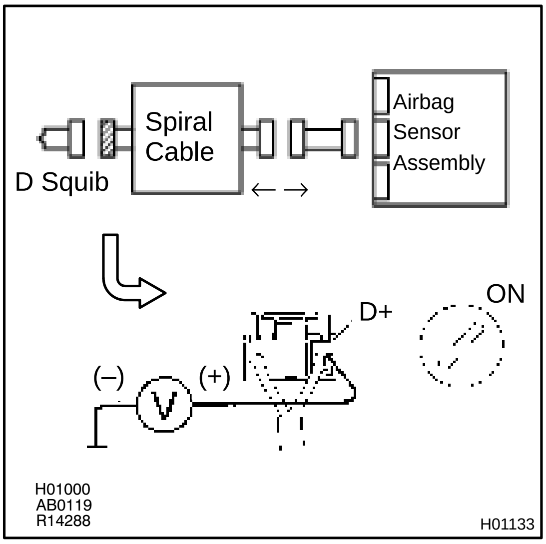
HINT:
Codes other than code B0103/12 may be output at this time, but they are not relevant to this check.

NG	**Replace steering wheel pad.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

5	Check spiral cable.



PREPARATION:
(a) Turn ignition switch to LOCK.
(b) Disconnect the connector between the airbag sensor assembly and the spiral cable.

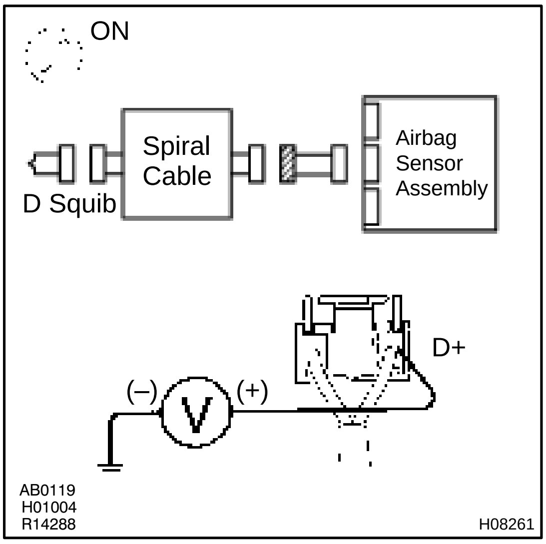
CHECK:
(a) Turn ignition switch to ON.
(b) For the connector (on the spiral cable side) between the spiral cable and the steering wheel pad, measure the voltage between D+ and body ground.

OK:
Voltage: 0 V

NG → **Repair or replace spiral cable.**

OK

6	Check harness between airbag sensor assembly and spiral cable.



CHECK:
(a) Turn ignition switch to ON.
(b) For the connector (on the spiral cable side) between the spiral cable and airbag sensor assembly, measure the voltage between D+ and body ground.

OK:
Voltage: 0 V

NG → **Repair or replace harness between airbag sensor assembly and spiral cable.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI1B6–12

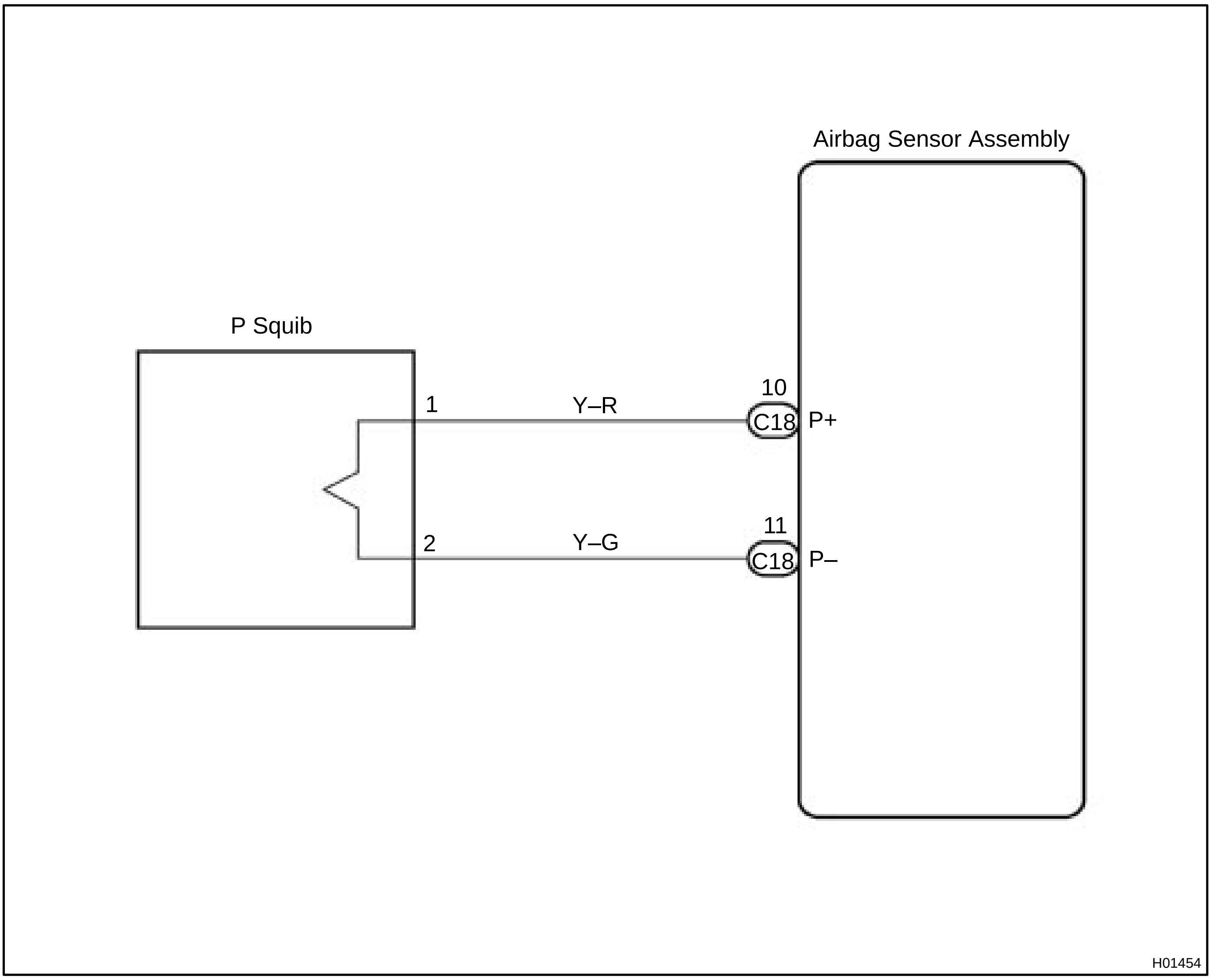
DTC	B0105/53	Short in P Squib Circuit

CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag sensor assembly and front passenger airbag assembly.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0105/53 is recorded when a short is detected in the P squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0105/53	●Short circuit in P squib wire harness ●P squib malfunction ●Airbag sensor assembly malfunction	●Front passenger airbag assembly (P squib) ●Airbag sensor assembly ●Wire harness

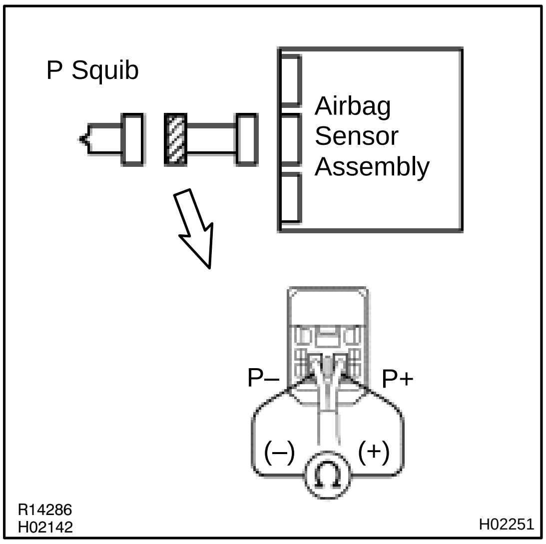
WIRING DIAGRAM



INSPECTION PROCEDURE

1	Prepare for inspection. (See step 1 on page DI–787)

2	Check P squib circuit.



PREPARATION:

Release airbag activation prevention mechanism of the connector (on the airbag sensor assembly side) between the front passenger airbag assembly and the airbag sensor assembly. (See page DI–626)

CHECK:

For the connector (on the front passenger airbag assembly side) between the front passenger airbag assembly and the airbag sensor assembly, measure the resistance between P+ and P–.

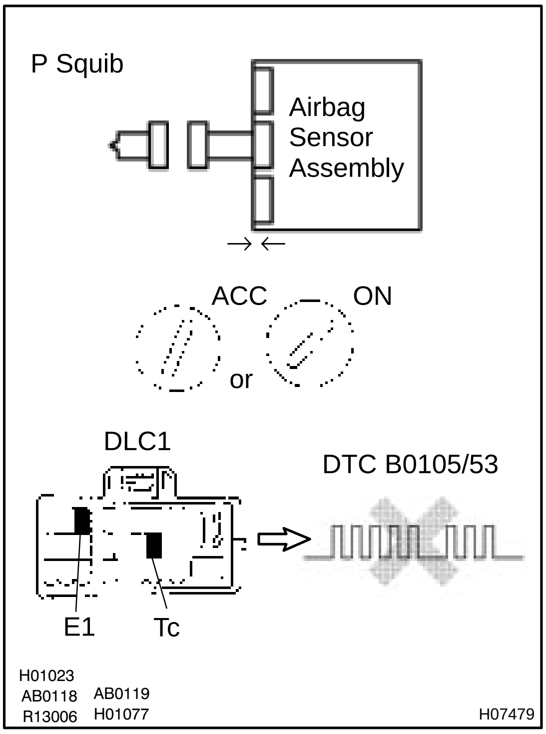
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between front passenger airbag assembly and airbag sensor assembly.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

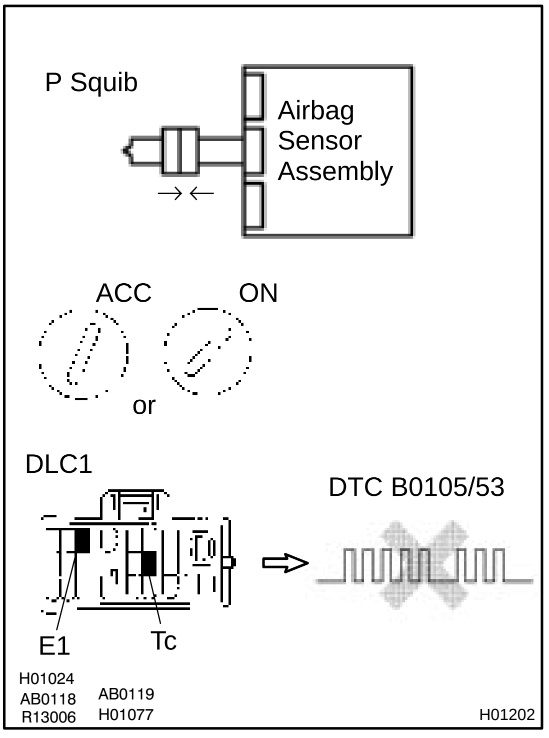
DTC B0105/53 is not output.

HINT:
Codes other than code B0105/53 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check P squib.**



PREPARATION:

(a) Turn ignition switch to LOCK.

(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the front passenger airbag assembly connector.

(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to LOOK, and wait at least for 20 seconds.

(b) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(c) Clear DTC stored in memory.
(See page DI–626)

(d) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(e) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(f) Check DTC.
(See page DI–626)

OK:

DTC B0105/53 is not output.

HINT:

Codes other than code B0105/53 may be output at this time, but they are not relevant to this check.

NG	**Replace front passenger airbag assembly.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI1B7–17

DTC	B0106/54	Open in P Squib Circuit

CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag sensor assembly and front passenger airbag assembly.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0106/54 is recorded when an open is detected in the P squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0106/54	●Open circuit in P+ wire harness or P– wire harness of squib ●P squib malfunction ●Airbag sensor assembly malfunction	●Front passenger airbag assembly (P squib) ●Airbag sensor assembly ●Wire harness

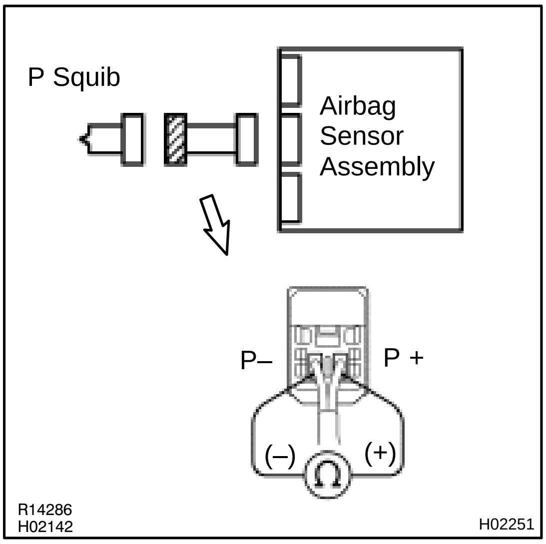
WIRING DIAGRAM

See page DI–657.

INSPECTION PROCEDURE

1	Prepare for inspection. (See step 1 on page DI–787)

2	Check P squib circuit.



CHECK:

For the connector (on the front passenger airbag assembly side) between the front passenger airbag assembly and the airbag sensor assembly, measure the resistance between P+ and P–.

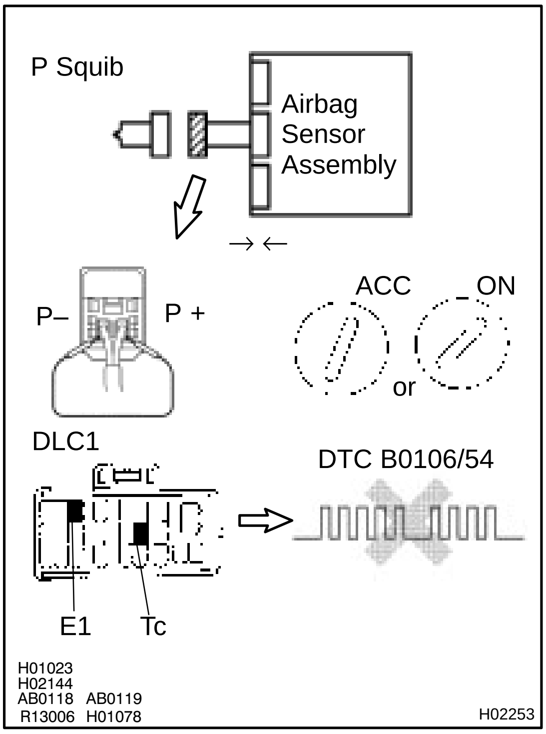
OK:

Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between front passenger airbag assembly and airbag sensor assembly.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect P+ and P– of the connector (on the front passenger airbag assembly side) between the front passenger airbag assembly and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

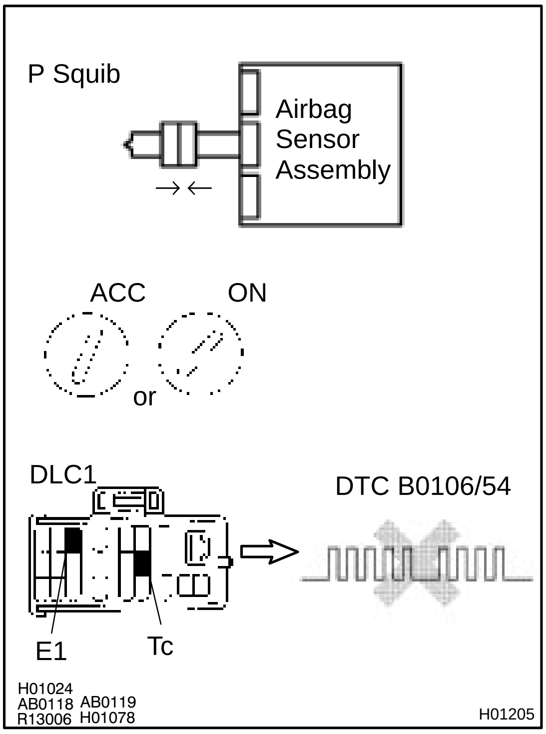
DTC B0106/54 is not output.

HINT:
Codes other than code B0106/54 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check P squib.**



PREPARATION:

(a) Turn ignition switch to LOCK.

(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the front passenger airbag assembly connector.

(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

DTC B0106/54 is not output.

HINT:
Codes other than code B0106/54 may be output at this time, but they are not relevant to this check.

NG	**Replace front passenger airbag assembly.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI1B8–11

DTC	B0107/51	Short in P Squib Circuit (to Ground)

CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag sensor assembly and front passenger airbag assembly.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0107/51 is recorded when ground short is detected in the P squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0107/51	●Short circuit in P squib wire harness (to ground) ●P squib malfunction ●Airbag sensor assembly malfunction	●Front passenger airbag assembly (P squib) ●Airbag sensor assembly ●Wire harness

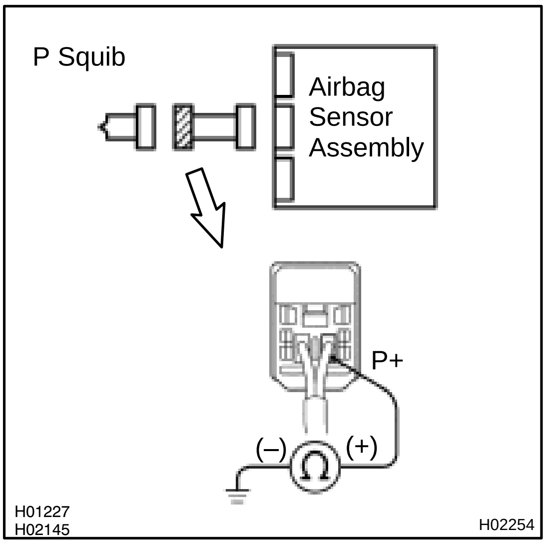
WIRING DIAGRAM

See page DI–657.

INSPECTION PROCEDURE

1	Prepare for inspection. (See step 1 on page DI–787)

2	Check P squib circuit.



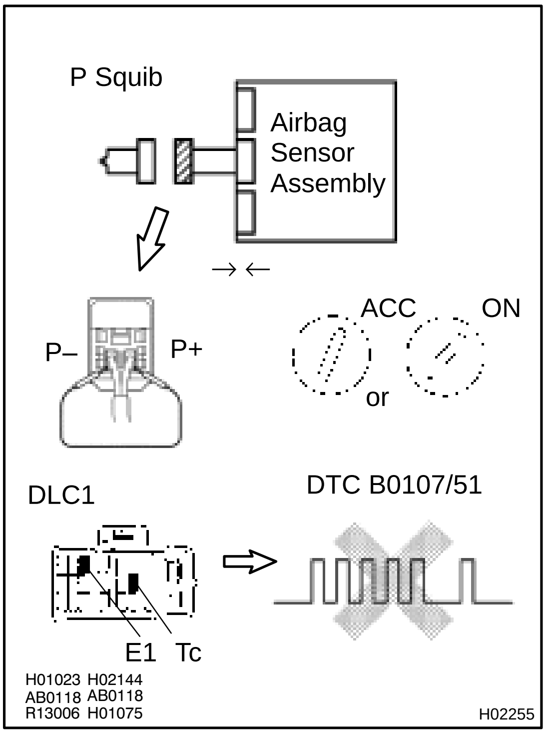
CHECK:
For the connector (on the front passenger airbag assembly side) between the front passenger airbag assembly and the airbag sensor assembly, measure the resistance between P+ and body ground.

OK:
Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between front passenger airbag assembly and airbag sensor assembly.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect P+ and P– of the connector (on the front passenger airbag assembly side) between the front passenger airbag assembly and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

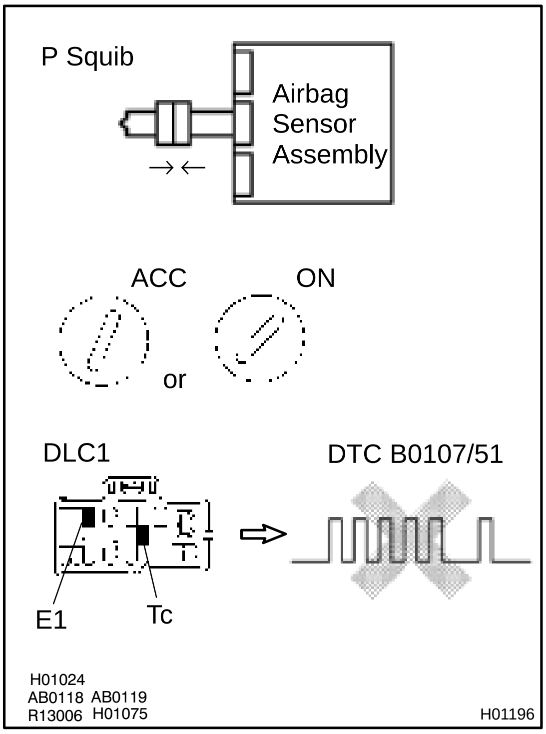
DTC B0107/51 is not output.

HINT:
Codes other than code B0107/51 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	Check P squib.



PREPARATION:

(a) Turn ignition switch to LOCK.

(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the front passenger airbag assembly connector.

(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See stpe 5 on page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

DTC B0107/51 is not output.

HINT:
Codes other than code B0107/51 may be output at this time, but they are not relevant to this check.

NG	Replace front passenger airbag assembly.

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI1B9–16

DTC	B0108/52	Short in P Squib Circuit (to B+)

CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag sensor assembly and front passenger airbag assembly.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0108/52 is recorded when a B+ short is detected in the P squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0108/52	●Short circuit in P squib wire harness (to B+) ●P squib malfunction ●Airbag sensor assembly malfunction	●Front passenger airbag assembly (P squib) ●Airbag sensor assembly ●Wire harness

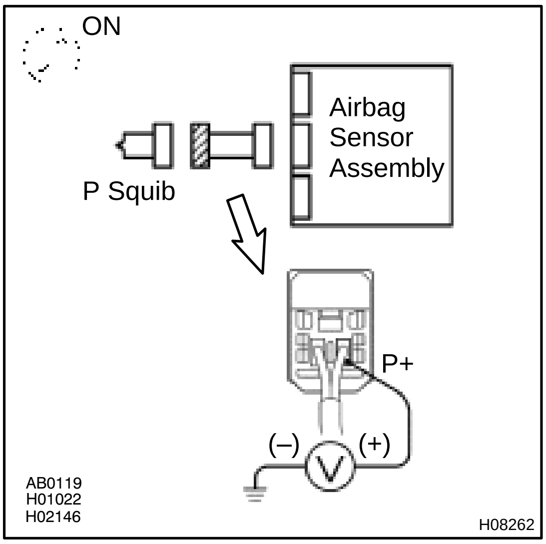
WIRING DIAGRAM

See page DI–657.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–787)**

2	**Check P squib circuit.**



CHECK:

(a) Turn ignition switch to ON.

(b) For the connector (on the front passenger airbag assembly side) between the front passenger airbag assembly and the airbag sensor assembly, measure the voltage between the P+ and body ground.

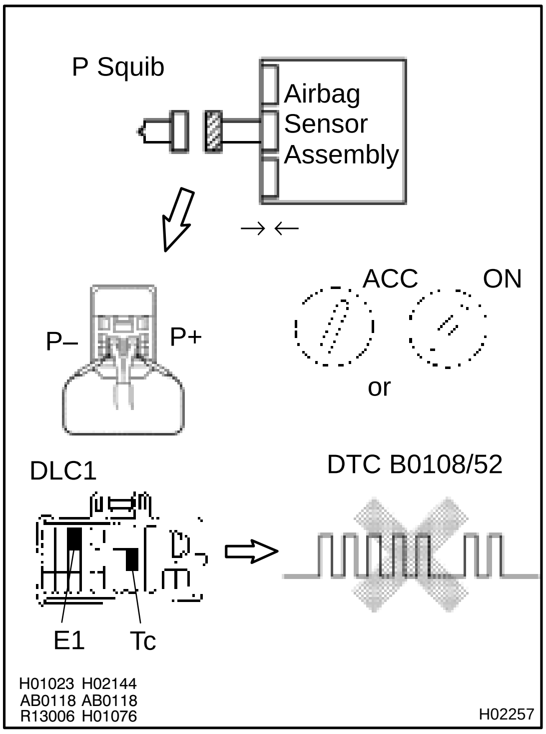
OK:

Voltage: 0 V

NG → **Repair or replace harness or connector between front passenger airbag assembly and airbag sensor assembly.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect P+ and P– of the connector (on the front passenger airbag assembly side) between the front passenger airbag assembly and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

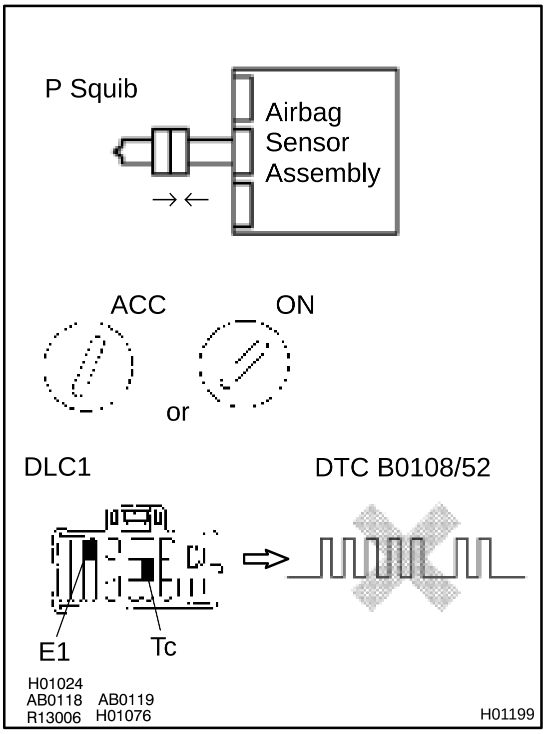
DTC B0108/52 is not output.

HINT:
Codes other than code B0108/52 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check P squib.**



PREPARATION:

(a) Turn ignition switch to LOCK.

(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the front passenger airbag assembly connector.

(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

DTC B0108/52 is not output.

HINT:
Codes other than code B0108/52 may be output at this time, but they are not relevant to this check.

NG → **Replace front passenger airbag assembly.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI16G–08

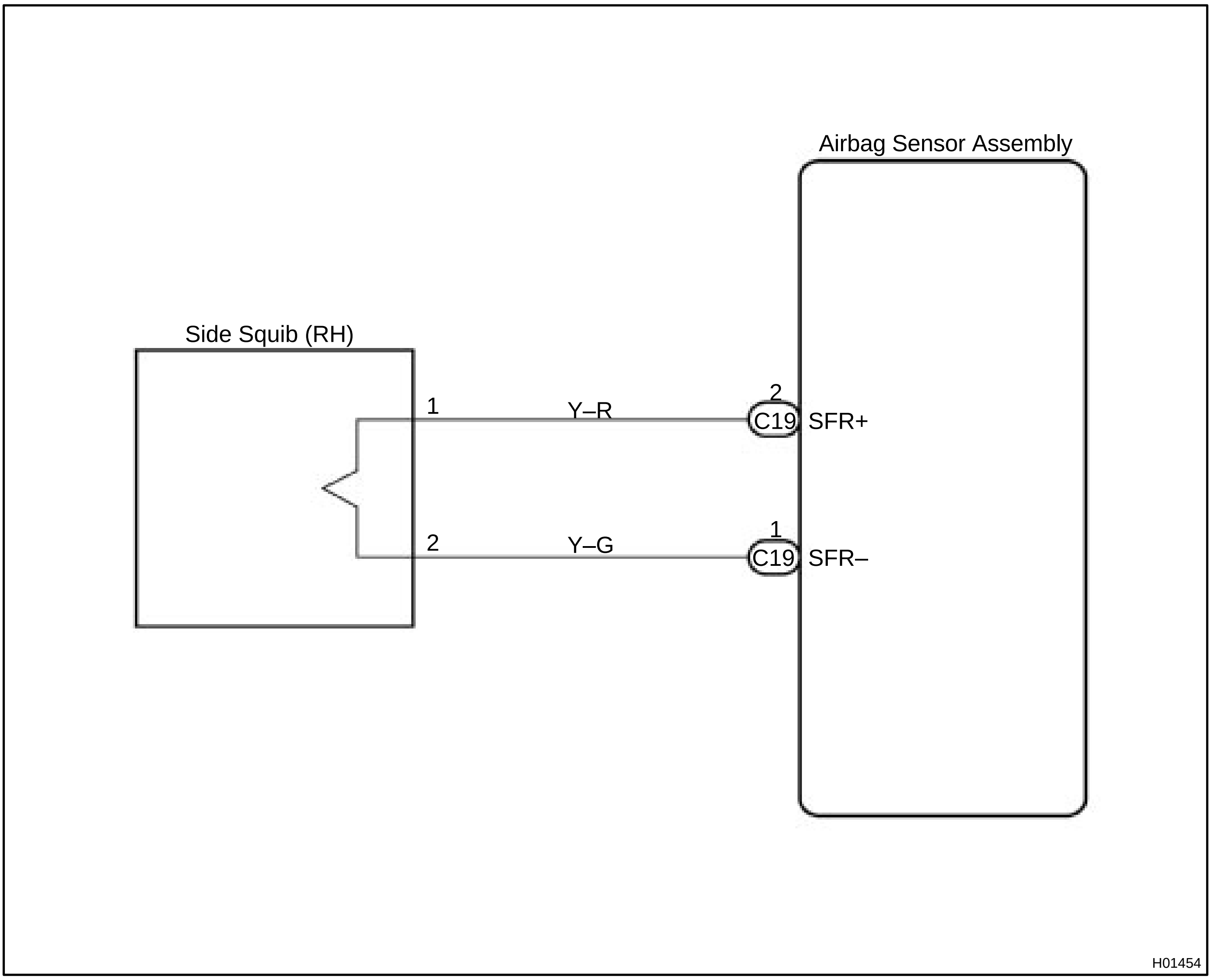
DTC	B0110/43	Short in Side Squib (RH) Circuit (TMC Made)

CIRCUIT DESCRIPTION

The side squib (RH) circuit consists of the airbag sensor assembly and side airbag assembly (RH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0110/43 is recorded when a short is detected in the side squib (RH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0110/43	●Short circuit between SFR+ wire harness and SFR– wire harness of squib ●Side squib (RH) malfunction ●Airbag sensor assembly malfunction	●Side airbag assembly (RH) ●Airbag sensor assembly ●Wire harness

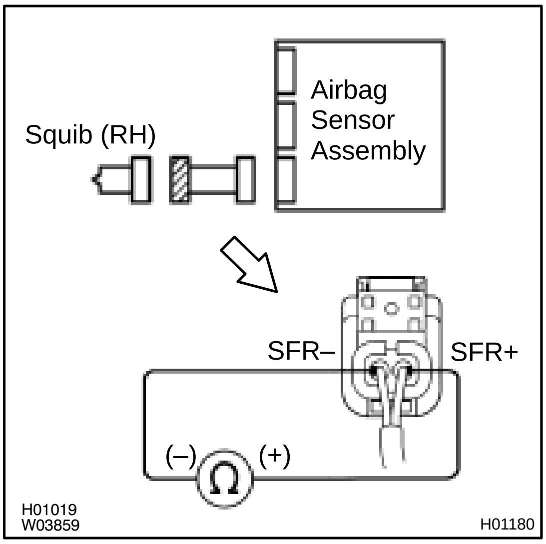
WIRING DIAGRAM



INSPECTION PROCEDURE

1	Prepare for inspection. (See step 1 on page DI–787)

2	Check side squib (RH) circuit.



PREPARATION:

Release the airbag activation prevention mechanism of the connector (on the airbag sensor assembly side) between the airbag sensor assembly and the side airbag assembly (RH).
(See page DI–626)

CHECK:

For the connector (on the side airbag assembly side) between the side airbag assembly (RH) and the airbag sensor assembly, measure the resistance between SFR+ and SFR–.

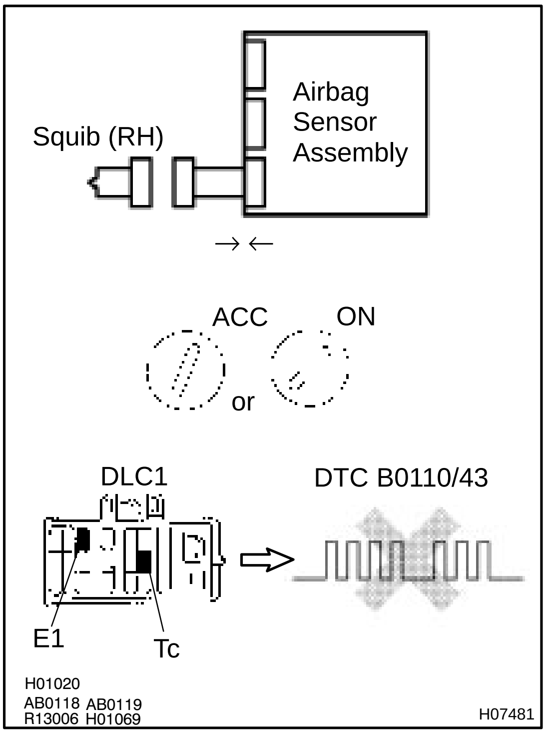
OK:

Resistance: 1 MΩ or Higher

NG	Repair or replace harness or connector between side airbag assembly (RH) and airbag sensor assembly.

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

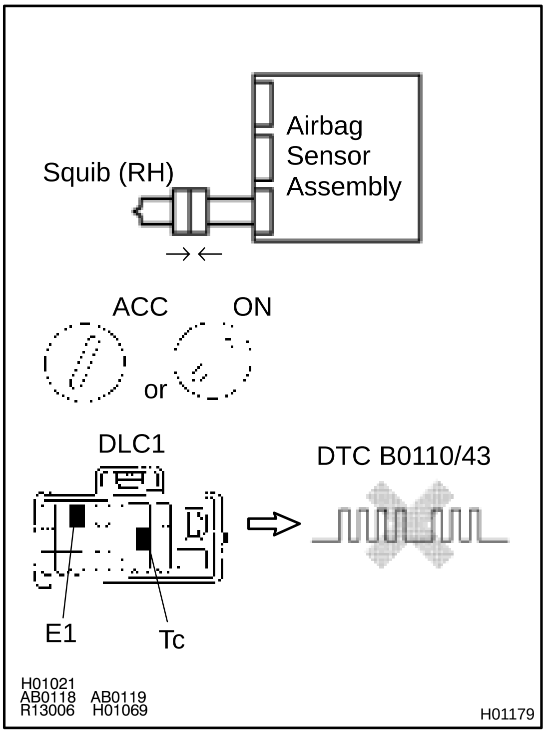
DTC B0110/43 is not output.

HINT:
Codes other than code B0110/43 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check side squib (RH).**



PREPARATION:

(a) Turn ignition switch to LOCK.

(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the side airbag assembly (RH) connector.

(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to LOOK, and wait at least for 20 second.

(b) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(c) Clear DTC stored in memory.
(See page DI–626)

(d) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(e) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(f) Check DTC.
(See page DI–626)

OK:

DTC B0110/43 is not output.

HINT:

Codes other than code B0110/43 may be output at this time, but they are not relevant to this check.

NG	**Replace side airbag assembly (RH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI1KY–02

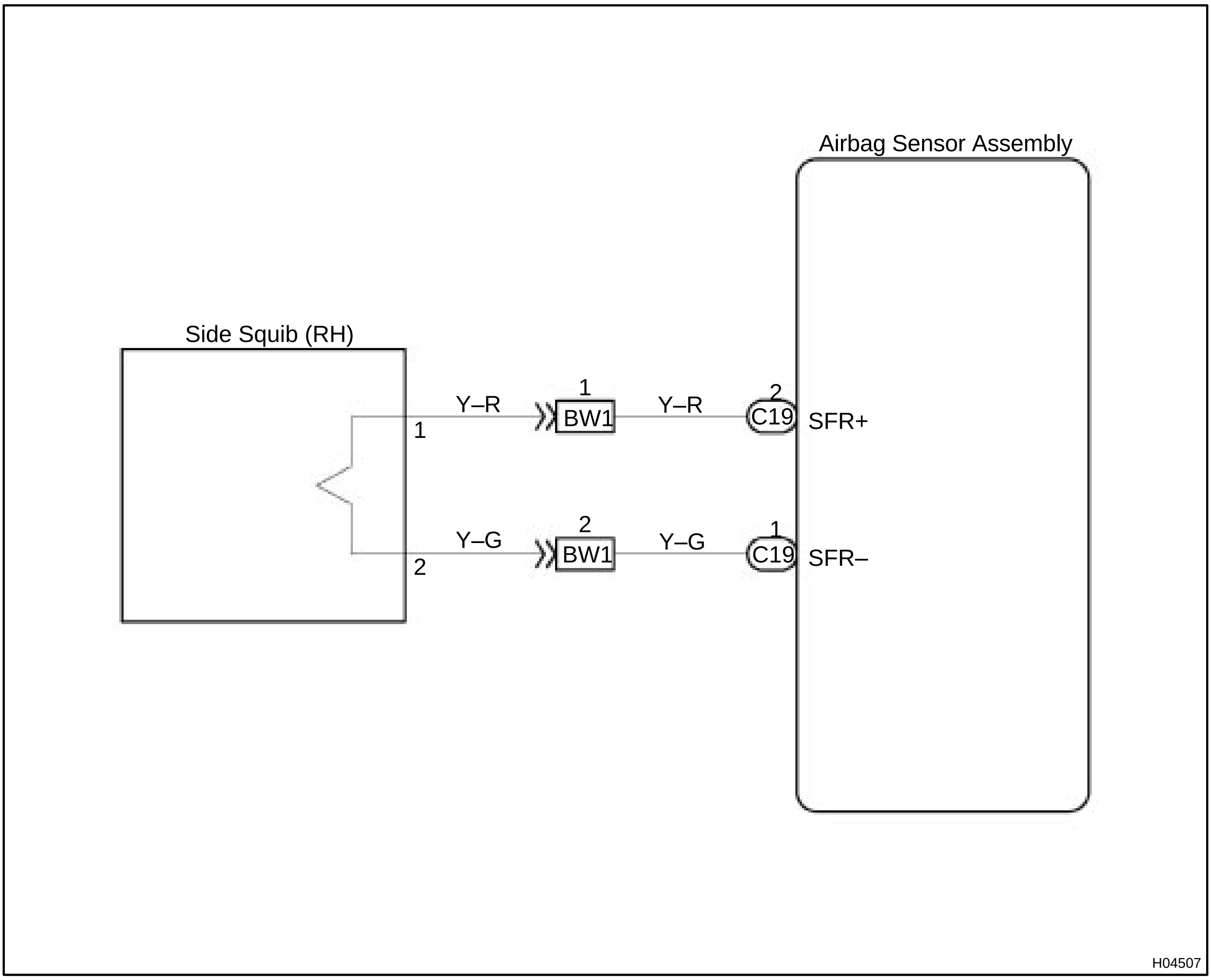
DTC	B0110/43	Short in Side Squib (RH) Circuit (TMMK Made)

CIRCUIT DESCRIPTION

The side squib (RH) circuit consists of the airbag sensor assembly and side airbag assembly (RH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0110/43 is recorded when a short is detected in the side squib (RH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0110/43	●Short circuit between SFR+ wire harness and SFR– wire harness of squib ●Side squib (RH) malfunction ●Airbag sensor assembly malfunction	●Side airbag assembly (RH) ●Airbag sensor assembly ●Wire harness ●Sub wire harness

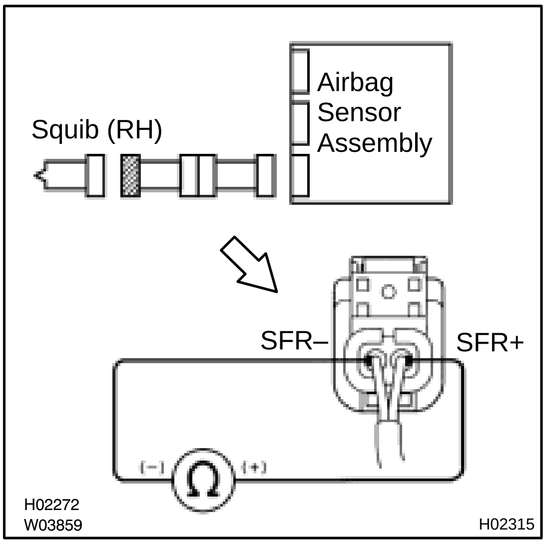
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–787)**

2	**Check side squib (RH) circuit.**

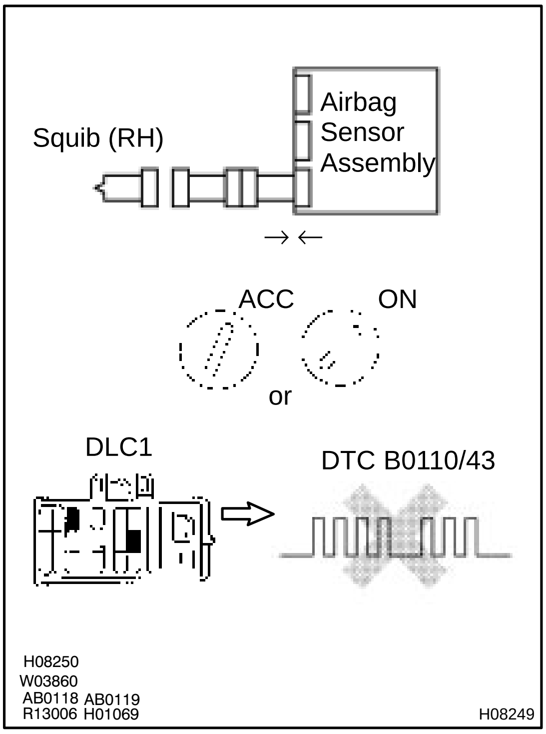


PREPARATION:
Release airbag activation prevention mechanism of the connector (on the airbag sensor assembly side) between the airbag sensor assembly and the side airbag assembly (RH).
(See page DI–626)
CHECK:
For the connector (on the side airbag assembly side) between the side airbag assembly (RH) and the airbag sensor assembly, measure the resistance between SFR+ and SFR–.
OK:
Resistance: 1 MΩ or Higher

NG	**Go to step 5.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

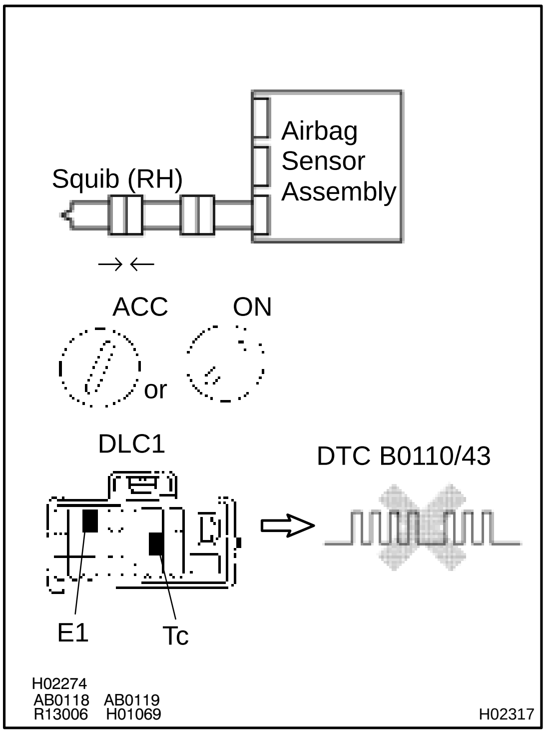
DTC B0110/43 is not output.

HINT:
Codes other than code B0110/43 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check side squib (RH).**



PREPARATION:

(a) Turn ignition switch to LOCK.

(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the side airbag assembly (RH) connector.

(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to LOOK, and wait at least for 20 second.

(b) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(c) Clear DTC stored in memory.
(See page DI–626)

(d) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(e) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(f) Check DTC.
(See page DI–626)

OK:

DTC B0110/43 is not output.

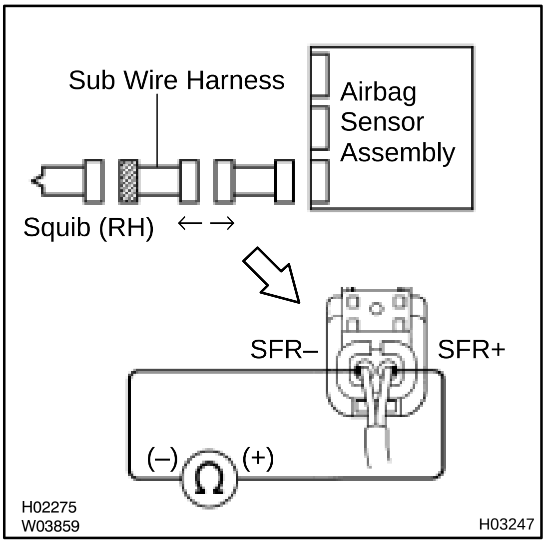
HINT:
Codes other than code B0110/43 may be output at this time, but they are not relevant to this check.

NG	**Replace side airbag assembly (RH).**

OK

For the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

5	**Check sub wire harness.**



PREPARATION:

(a) Disconnect sub wire harness connector on the airbag sensor assembly side.

(b) Release the airbag activation prevention mechanism of the sub wire harness connector on the airbag sensor assembly side. (See page DI–626)

CHECK:

For the connector (on the sub wire harness side) between the side airbag assembly and the sub wire harness, measure the resistance between SFR+ and SFR–.

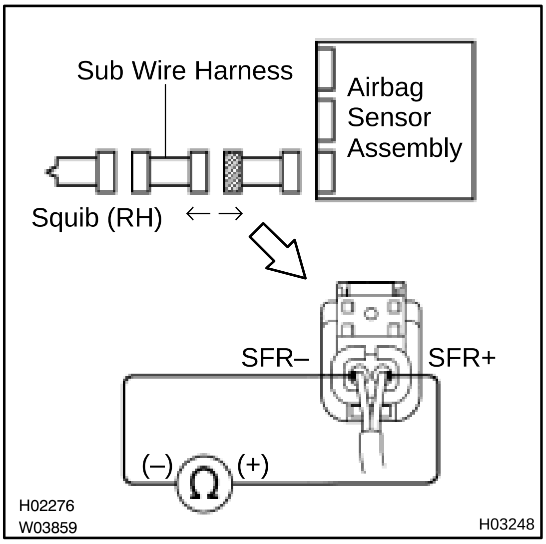
OK:

Resistance: 1 MΩ or Higher

NG	**Repair or replace sub wire harness.**

OK

6	**Check harness between airbag sensor assembly and sub wire harness.**



PREPARATION:

Release the airbag activation prevention mechanism of the airbag sensor assembly connector. (See page DI–626)

CHECK:

For the connector (on the sub wire harness side) between the airbag sensor assembly and sub wire harness, measure the resistance between SFR+ and SFR–.

OK:

Resistance: 1 MΩ or Higher

NG	**Repair or replace harness or connector between airbag sensor assembly and sub wire harness.**

OK

For the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI1BA–03

DTC	B0111/44	Open in Side Squib (RH) Circuit (TMC Made)

CIRCUIT DESCRIPTION

The side squib circuit consists of the airbag sensor assembly and side airbag assembly (RH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0111/44 is recorded when an open is detected in the side squib (RH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0111/44	●Open circuit in SFR+ wire harness or SFR– wire harness of squib ●Side squib (RH) malfunction ●Airbag sensor assembly malfunction	●Side airbag assembly (RH) ●Airbag sensor assembly ●Wire harness

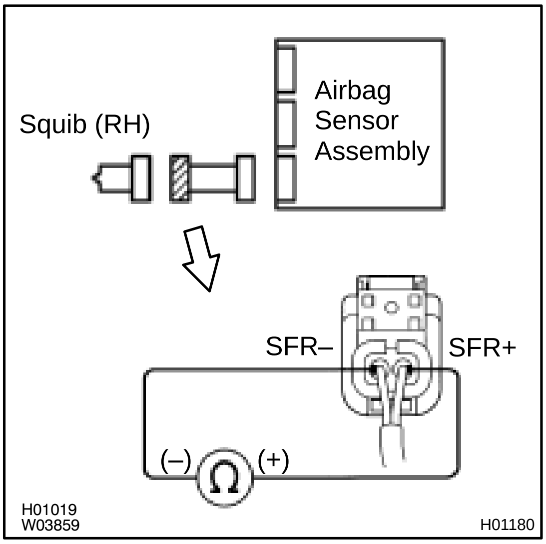
WIRING DIAGRAM

See page DI–670.

INSPECTION PROCEDURE

1	Prepare for inspection. (See step 1 on page DI–787)

2	Check side squib (RH) circuit.



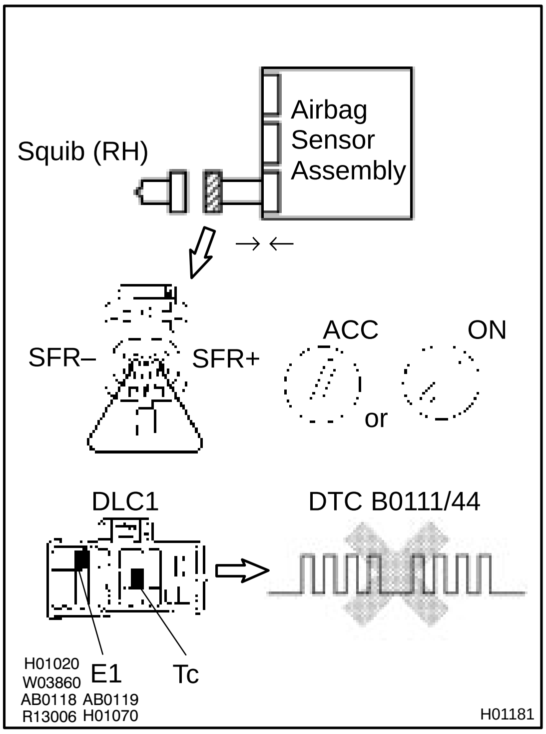
CHECK:
For the connector (on the side airbag assembly side) between the side airbag assembly (RH) and the airbag sensor assembly, measure the resistance between SFR+ and SFR–.

OK:
Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between side airbag assembly (RH) and airbag sensor assembly.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect SFR+ and SFR– of the connector (on the side airbag assembly side) between the side airbag assembly (RH) and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

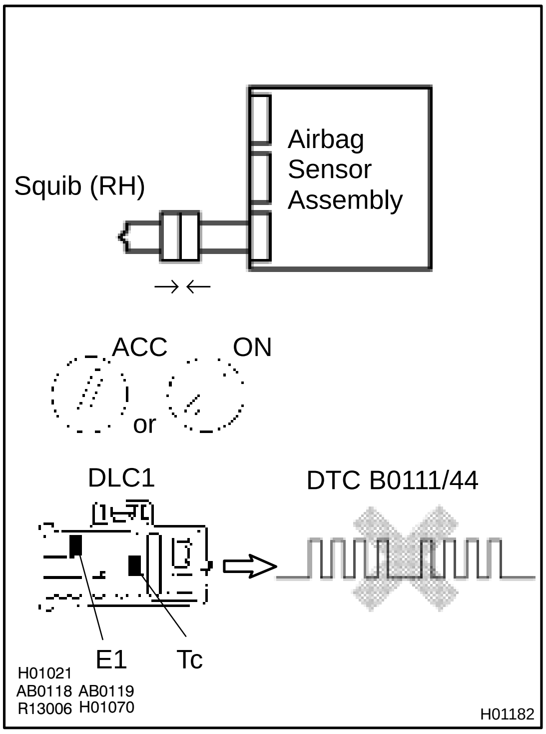
DTC B0111/44 is not output.

HINT:
Codes other than code B0111/44 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check side squib (RH).**



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the side airbag assembly (RH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See page DI–626)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–626)

OK:

DTC B0111/44 is not output.

HINT:
Codes other than code B0111/44 may be output at this time, but they are not relevant to this check.

NG	**Replace side airbag assembly (RH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI1L0–02

DTC	B0111/44	Open in Side Squib (RH) Circuit (TMMK Made)

CIRCUIT DESCRIPTION

The side squib circuit consists of the airbag sensor assembly and side airbag assembly (RH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0111/44 is recorded when an open is detected in the side squib (RH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0111/44	●Open circuit in SFR+ wire harness or SFR– wire harness of squib ●Side squib (RH) malfunction ●Airbag sensor assembly malfunction	●Side airbag assembly (RH) ●Airbag sensor assembly ●Wire harness ●Sub wire harness

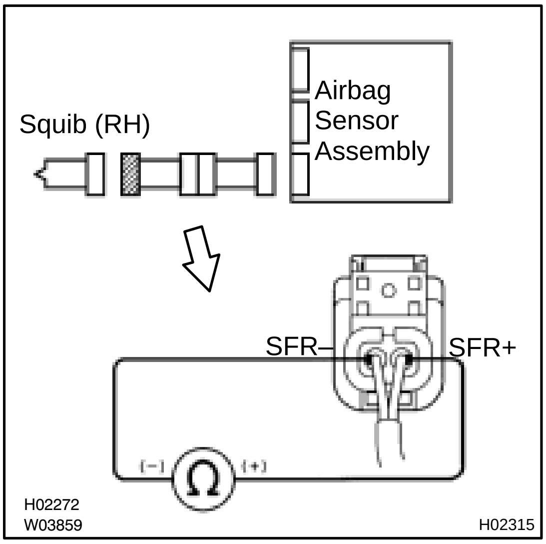
WIRING DIAGRAM

See page DI–674.

INSPECTION PROCEDURE

1	Prepare for inspection. (See step 1 on page DI–787)

2	Check side squib (RH) circuit.



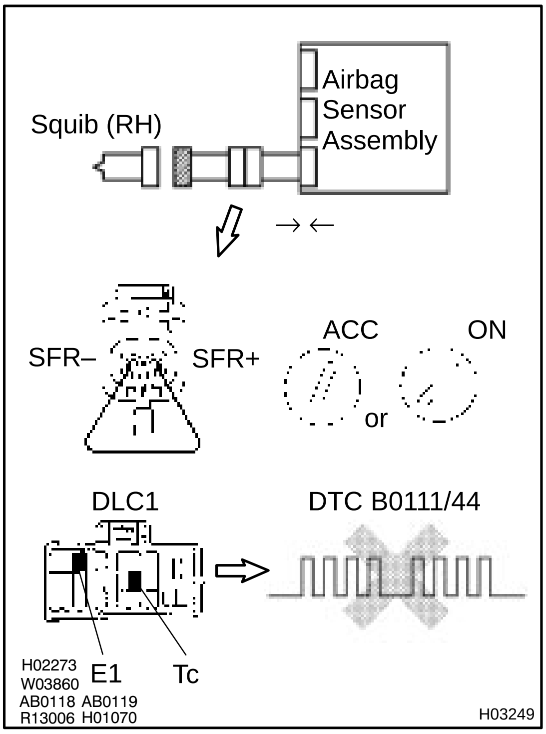
CHECK:
For the connector (on the side airbag assembly side) between the side airbag assembly (RH) and the airbag sensor assembly, measure the resistance between SFR+ and SFR–.

OK:
Resistance: Below 1 Ω

NG	Go to step 5.

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect SFR+ and SFR– of the connector (on the side airbag assembly side) between the side airbag assembly (RH) and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

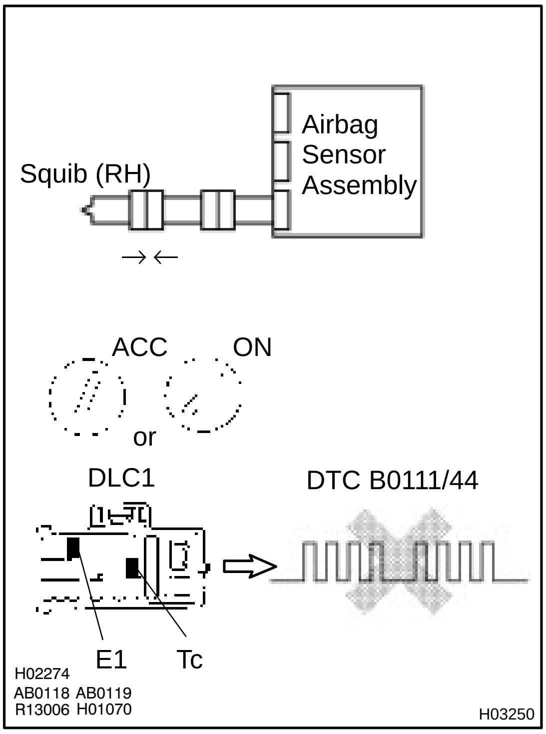
DTC B0111/44 is not output.

HINT:
Codes other than code B0111/44 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	**Check side squib (RH).**



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the side airbag assembly (RH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See page DI–626)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–626)

OK:

DTC B0111/44 is not output.

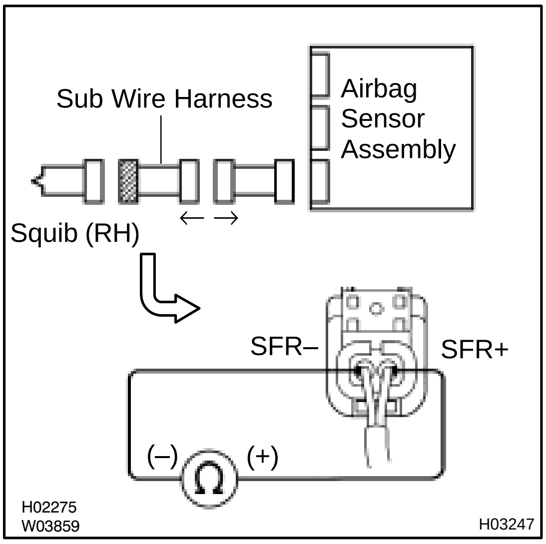
HINT:
Codes other than code B0111/44 may be output at this time, but they are not relevant to this check.

NG	**Replace side airbag assembly (RH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

5	Check sub wire harness.



PREPARATION:
Disconnect the sub wire harness connector on the airbag sensor assembly side.

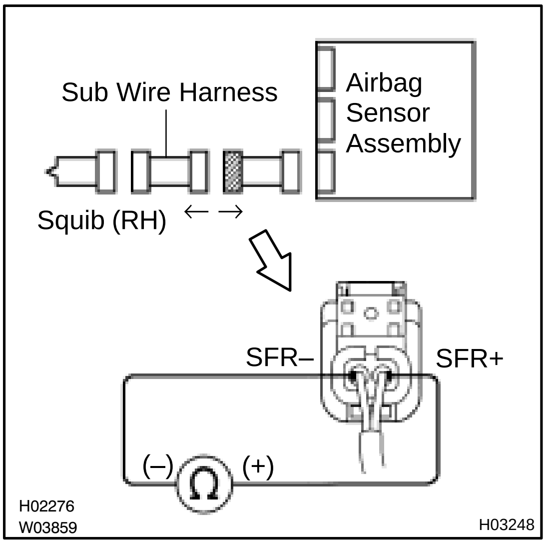
CHECK:
For the connector (on the sub wire harness side) between the side airbag assembly and the sub wire harness, measure the resistance between SFR+ and SFR–.

OK:
Resistance: Below 1 Ω

NG	Repair or replace sub wire harness.

OK

6	Check harness between airbag sensor assembly and sub wire harness.



CHECK:
For the connector (on the airbag sensor assembly side) between the airbag sensor assembly and the sub wire harness, measure the resistance SFR+ and SFR–.

OK:
Resistance: Below 1 Ω

NG	Repair or replace harness or connector between airbag sensor assembly and sub wire harness.

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI1BB–03

DTC	B0112/41	Short in Side Squib (RH) Circuit (to Ground) (TMC Made)

CIRCUIT DESCRIPTION

The side squib circuit consists of the airbag sensor assembly and side airbag assembly (RH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0112/41 is recorded when ground short is detected in the side squib (RH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0112/41	●Short circuit in side squib (RH) wire harness (to ground) ●Side squib (RH) malfunction ●Airbag sensor assembly malfunction	●Side airbag assembly (RH) ●Airbag sensor assembly ●Wire harness

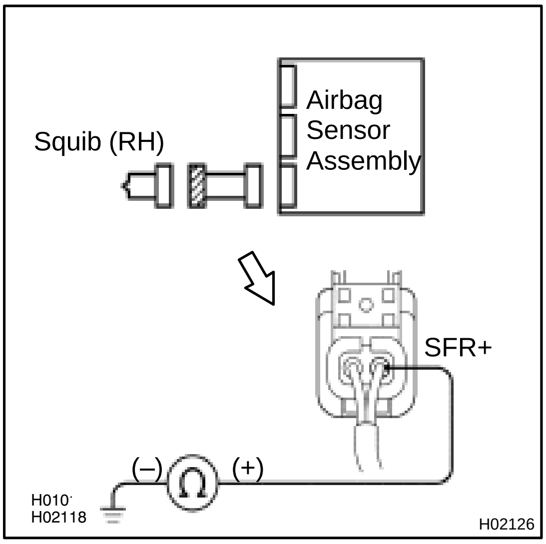
WIRING DIAGRAM

See page DI–670.

INSPECTION PROCEDURE

1	Prepare for inspection. (See step 1 on page DI–787)

2	Check side squib (RH) circuit.



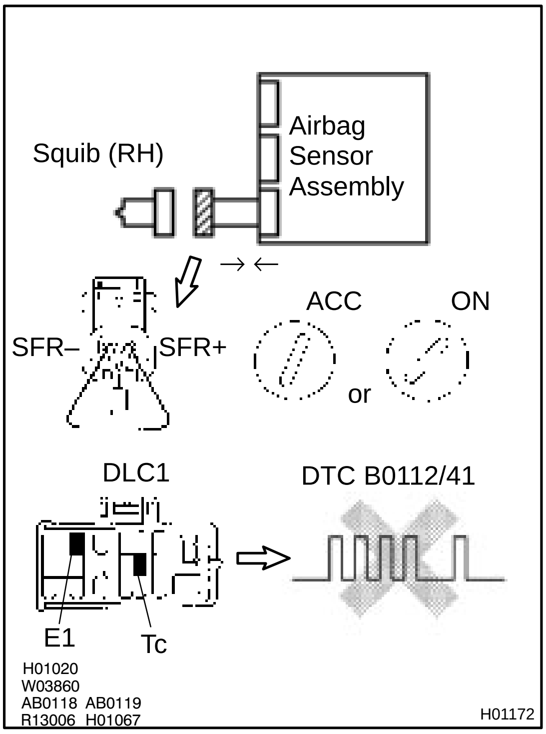
CHECK:
For the connector (on the side airbag assembly side) between the side airbag assembly (RH) and the airbag sensor assembly, measure the resistance between SFR+ and body ground.

OK:
Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between side airbag assembly (RH) and airbag sensor assembly.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect SFR+ and SFR– of the connector (on the side airbag assembly side) between the side airbag assembly (RH) and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

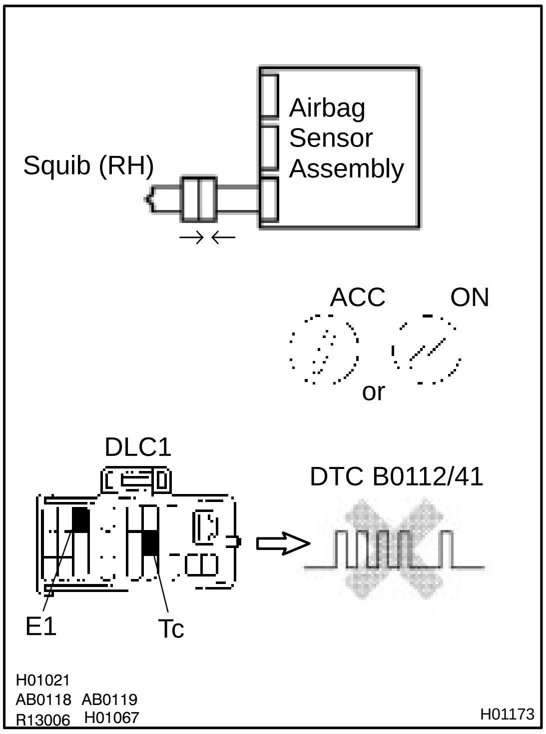
DTC B0112/41 is not output.

HINT:
Codes other than code B0112/41 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check side squib (RH).**



PREPARATION:

(a) Turn ignition switch to LOCK.

(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the side airbag assembly (RH) connector.

(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

DTC B0112/41 is not output.

HINT:
Codes other than code B0112/41 may be output at this time, but they are not relevant to this check.

NG	**Replace side airbag assembly (RH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI4L4–01

DTC	B0112/41	Short in Side Squib (RH) Circuit (to Ground) (TMMK Made)

CIRCUIT DESCRIPTION

The side squib circuit consists of the airbag sensor assembly and side airbag assembly (RH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0112/41 is recorded when ground short is detected in the side squib (RH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0112/41	●Short circuit in side squib (RH) wire harness (to ground) ●Side squib (RH) malfunction ●Airbag sensor assembly malfunction	●Side airbag assembly (RH) ●Airbag sensor assembly ●Wire harness ●Sub wire harness

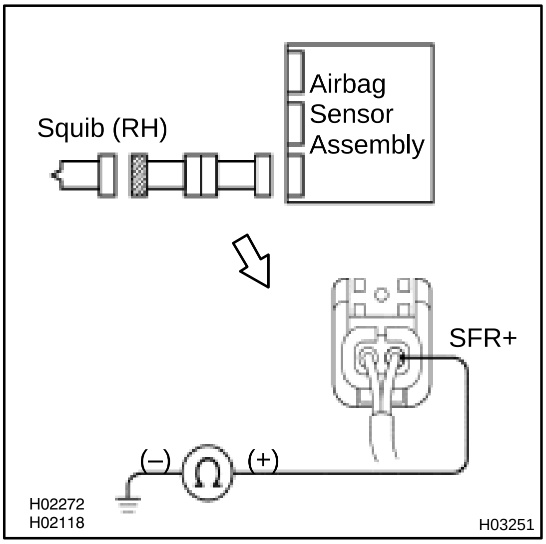
WIRING DIAGRAM

See page DI–674.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–787)**

2	**Check side squib (RH) circuit.**



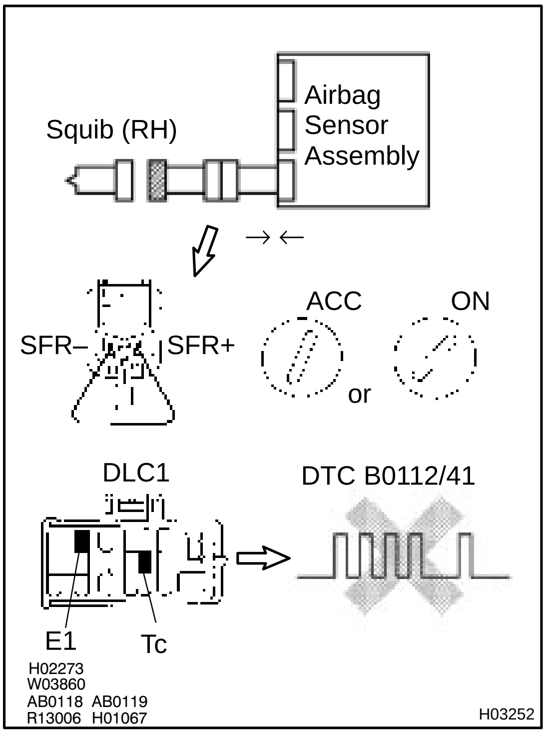
CHECK:
For the connector (on the side airbag assembly side) between the side airbag assembly (RH) and the airbag sensor assembly, measure the resistance between SFR+ and body ground.

OK:
Resistance: 1 MΩ or Higher

NG	Go to step 5.

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect SFR+ and SFR– of the connector (on the side airbag assembly side) between the side airbag assembly (RH) and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

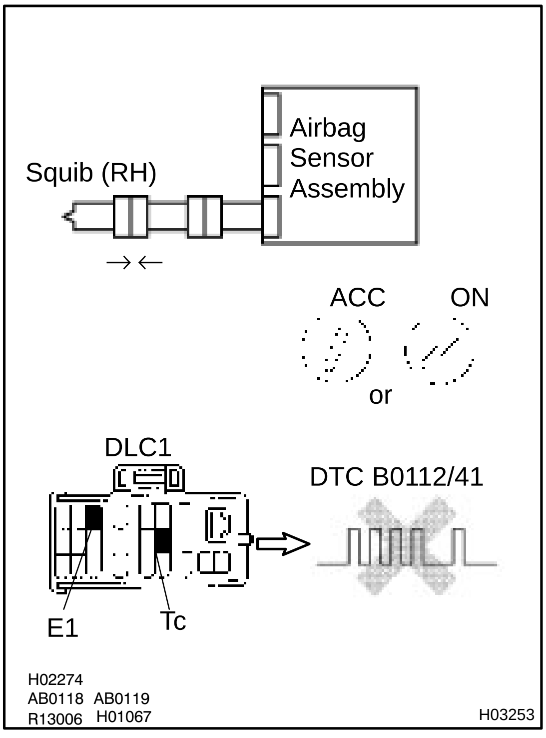
DTC B0112/41 is not output.

HINT:
Codes other than code B0112/41 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check side squib (RH).**



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the side airbag assembly (RH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See step 5 on page DI–626)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–626)

OK:

DTC B0112/41 is not output.

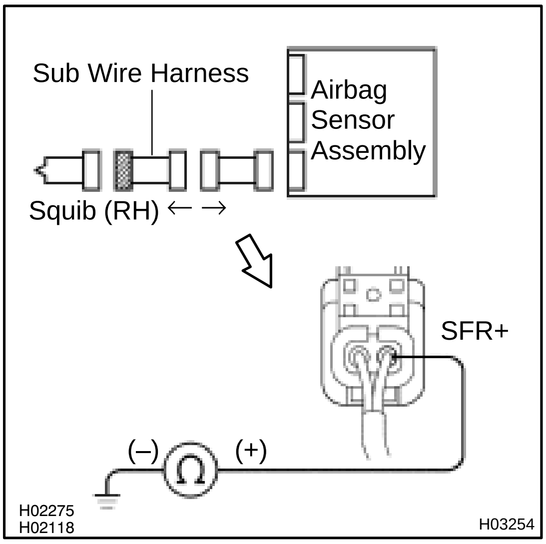
HINT:
Codes other than code B0112/41 may be output at this time, but they are not relevant to this check.

NG	**Replace side airbag assembly (RH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

5	**Check sub wire harness.**



PREPARATION:

Disconnect the sub wire harness connector on the airbag sensor assembly side.

CHECK:

For the connector (on the sub wire harness side) between the side airbag assembly and the sub wire harness, measure the resistance between SFR+ and body ground.

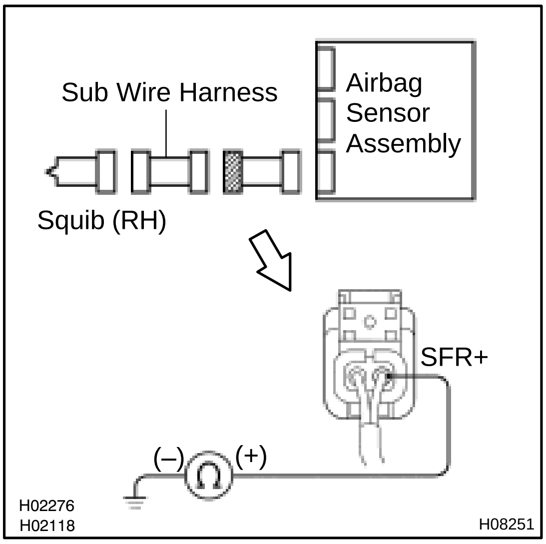
OK:

Resistance: 1MΩ or Higher

NG	**Repair or replace sub wire harness.**

OK

6	**Check harness between airbag sensor assembly and sub wire harness.**



CHECK:

For the connector (on the sub wire harness side) between the sub wire harness and the airbag sensor assembly, measure the resistance between SFR+ and body ground.

OK:

Resistance: 1MΩ or Higher

NG	**Repair or replace harness or connector between airbag sensor assembly and sub wire harness.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI1BC–03

DTC	B0113/42	Short in Side Squib (RH) Circuit (to B+) (TMC Made)

CIRCUIT DESCRIPTION

The side squib circuit consists of the airbag sensor assembly and side airbag assembly (RH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0113/42 is recorded when a B+ short is detected in the side squib (RH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0113/42	●Short circuit in side squib (RH) wire harness (to B+) ●Side squib (RH) malfunction ●Airbag sensor assembly malfunction	●Side airbag assembly (RH) ●Airbag sensor assembly ●Wire harness

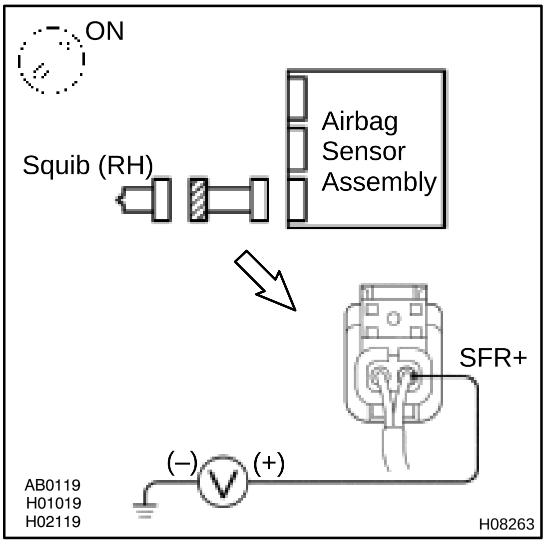
WIRING DIAGRAM

See page DI–670.

INSPECTION PROCEDURE

1	Prepare for inspection. (See step 1 on page DI–626)

2	Check side squib (RH) circuit.



CHECK:

(a) Turn ignition switch to ON.

(b) For the connector (on the airbag sensor assembly side) between the side airbag assembly (RH) and the airbag sensor assembly, measure the voltage between SFR+ and body ground.

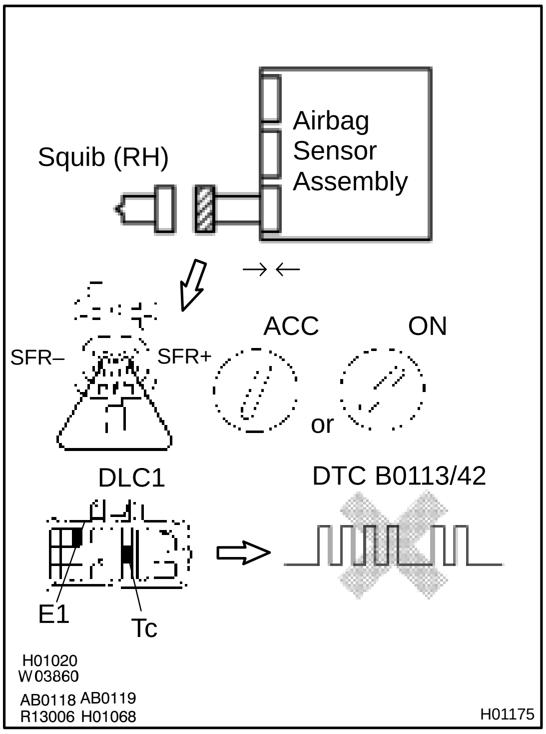
OK:

Voltage: 0 V

NG → **Repair or replace harness or connector between side airbag assembly (RH) and airbag sensor assembly.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect SFR+ and SFR– of the connector (on the side airbag assembly side) between the side airbag assembly (RH) and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

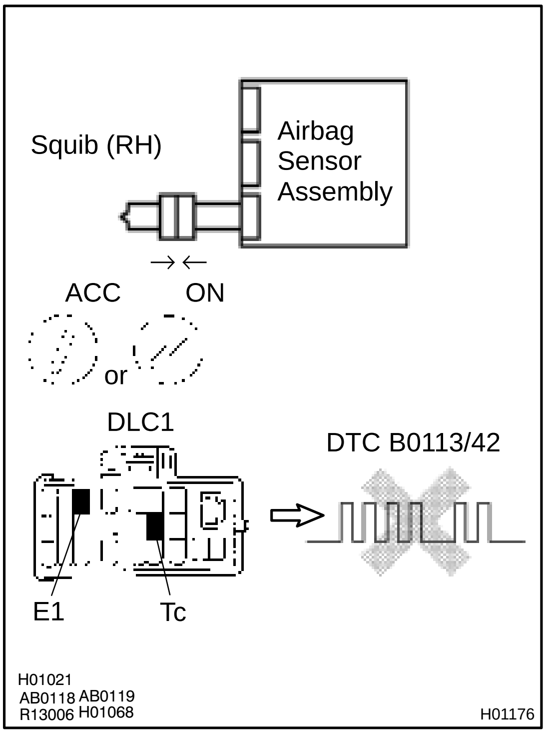
DTC B0113/42 is not output.

HINT:
Codes other than code B0113/42 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check side squib (RH).**



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the side airbag assembly (RH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See step 5 on page DI–626)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–626)

OK:

DTC B0113/42 is not output.

HINT:
Codes other than code B0113/42 may be output at this time, but they are not relevant to this check.

NG	**Replace side airbag assembly (RH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI4L5–01

DTC	B0113/42	Short in Side Squib (RH) Circuit (to B+) (TMMK Made)

CIRCUIT DESCRIPTION

The side squib circuit consists of the airbag sensor assembly and side airbag assembly (RH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0113/42 is recorded when a B+ short is detected in the side squib (RH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0113/42	●Short circuit in side squib (RH) wire harness (to B+) ●Side squib (RH) malfunction ●Airbag sensor assembly malfunction	●Side airbag assembly (RH) ●Airbag sensor assembly ●Wire harness ●Sub wire harness

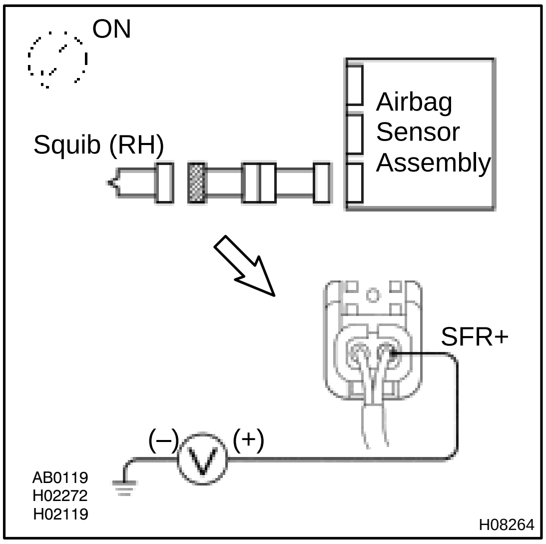
WIRING DIAGRAM

See page DI–674.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–787)**

2	**Check side squib (RH) circuit.**



CHECK:

(a) Turn ignition switch to ON.

(b) For the connector (on the airbag sensor assembly side) between the side airbag assembly (RH) and the airbag sensor assembly, measure the voltage between the SFR+ and body ground.

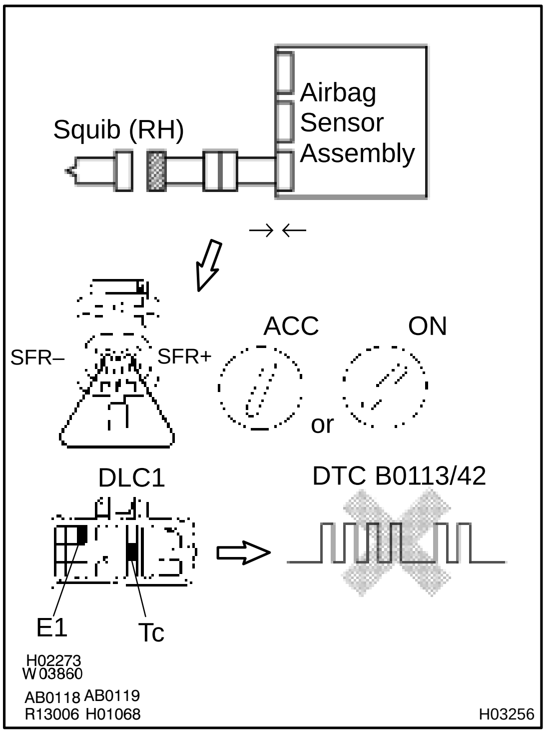
OK:

Voltage: 0 V

NG	**Go to step 5.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect SFR+ and SFR– of the connector (on the side airbag assembly side) between the side airbag assembly (RH) and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

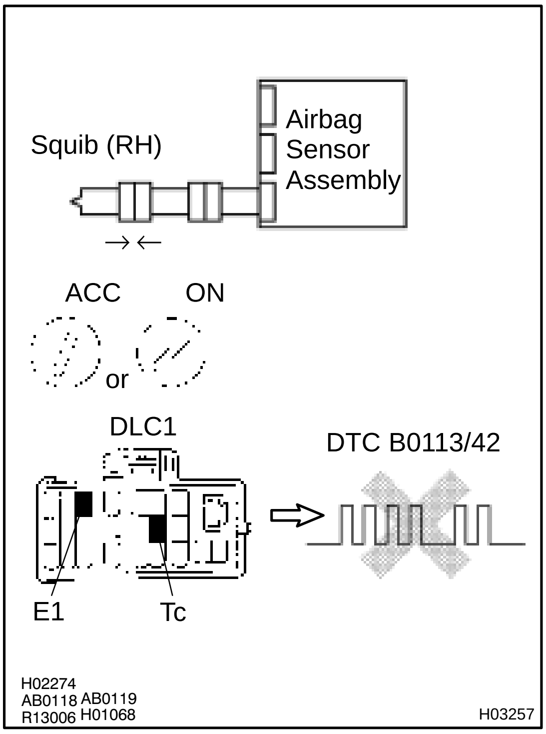
DTC B0113/42 is not output.

HINT:
Codes other than code B0113/42 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check side squib (RH).**



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the side airbag assembly (RH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See step 5 on page DI–626)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–626)

OK:

DTC B0113/42 is not output.

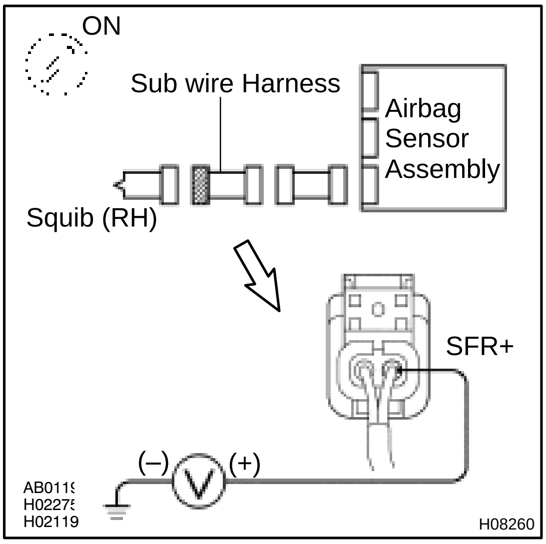
HINT:
Codes other than code B0113/42 may be output at this time, but they are not relevant to this check.

NG	**Replace side airbag assembly (RH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

5	**Check sub wire harness.**



PREPARATION:
Disconnect the sub wire harness connector on the airbag sensor assembly side.

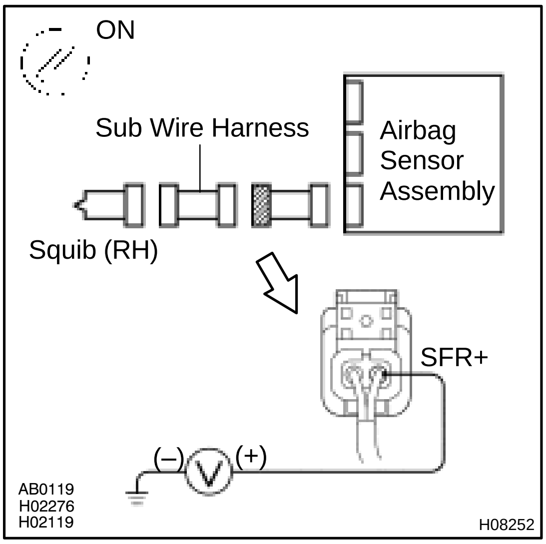
CHECK:
(a) Turn ignition switch to ON.
(b) For the connector (on the sub wire harness side) between the side airbag assembly and the sub wire harness, measure the voltage between SFR+ and body ground.

OK:
Voltage: 0 V

NG	**Repair or replace sub wire harness.**

OK

6	**Check harness between airbag sensor assembly and sub wire harness.**



CHECK:
(a) Turn ignition switch to ON.
(b) For the connector (on the sub wire harness side) between the sub wire harness and the airbag sensor assembly, measure the voltage between SFR+ and body ground.

OK:
Voltage: 0 V

NG	**Repair or replace harness or connector between airbag sensor assembly and sub wire harness.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI16K–08

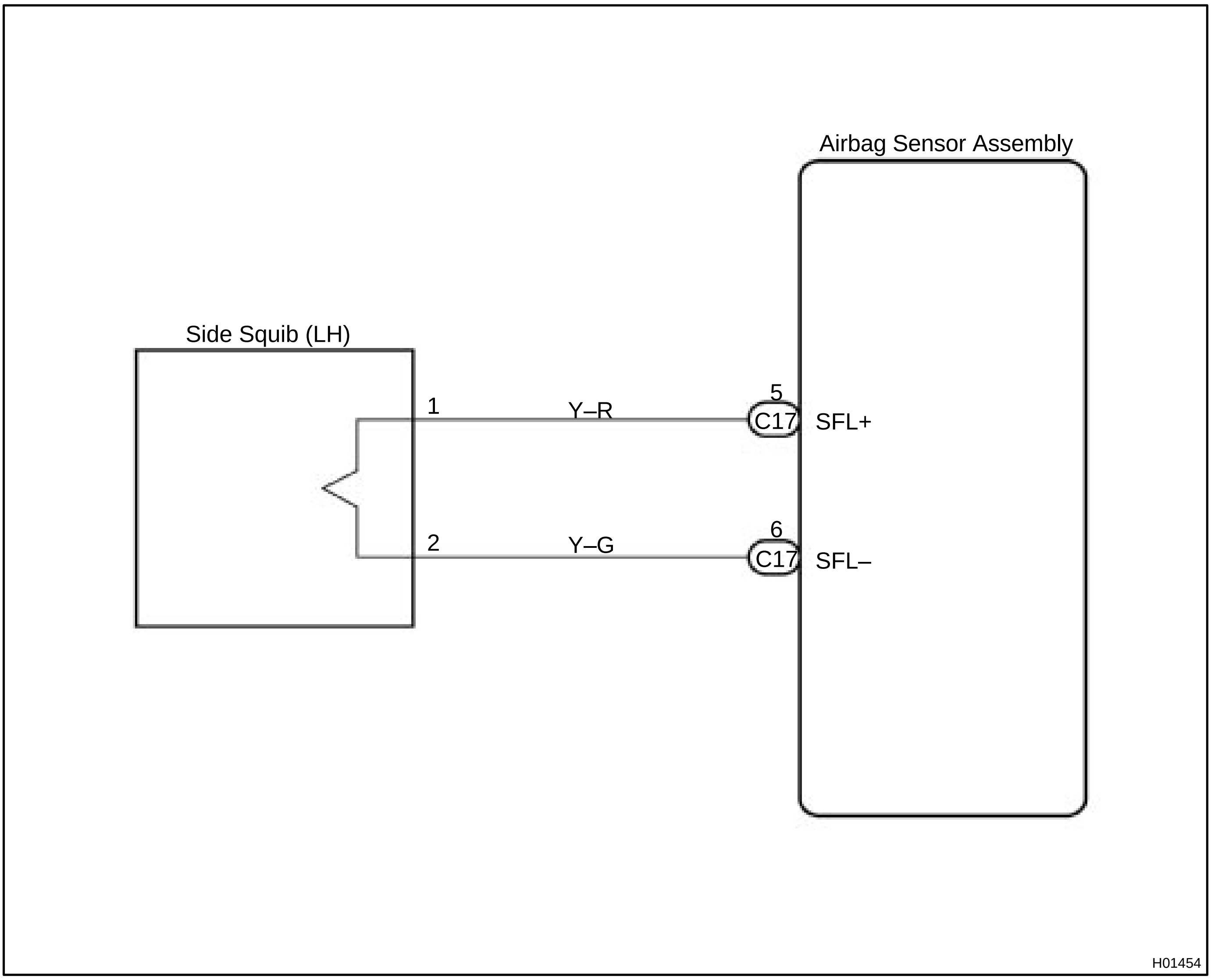
DTC	B0115/47	Short in Side Squib (LH) Circuit (TMC Made)

CIRCUIT DESCRIPTION

The side squib (LH) circuit consists of the airbag sensor assembly and side airbag assembly (LH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0115/47 is recorded when a short is detected in the side squib (LH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0115/47	●Short circuit between SFL+ wire harness and SFL– wire harness of squib ●Side squib (LH) malfunction ●Airbag sensor assembly malfunction	●Side airbag assembly (LH) ●Airbag sensor assembly ●Wire harness

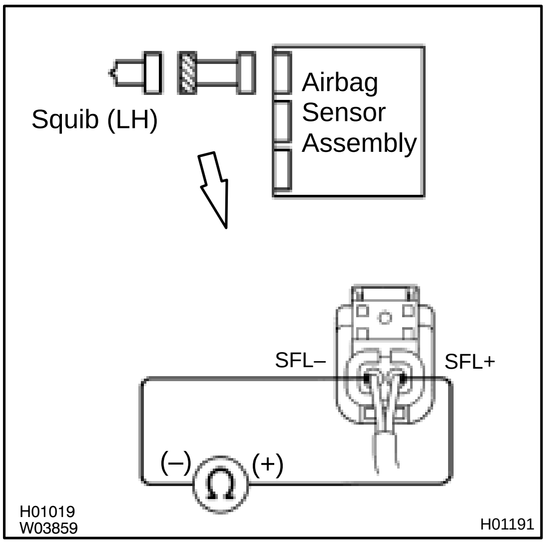
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–787)**

2	**Check side squib (LH) circuit.**

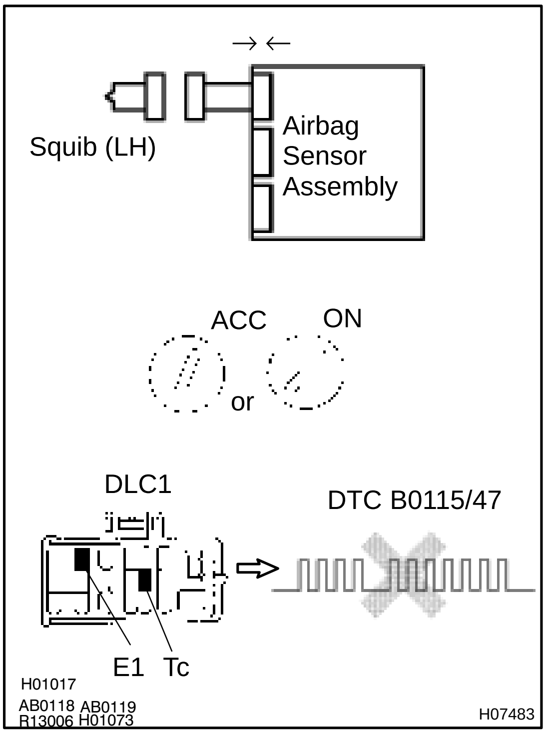


PREPARATION:
Release the airbag activation prevention mechanism of the connector (on the airbag sensor assembly side) between the airbag sensor assembly and the side airbag assembly (LH).
(See page DI–626)
CHECK:
For the connector (on the side airbag assembly side) between the side airbag assembly (LH) and the airbag sensor assembly, measure the resistance between SFL+ and SFL–.
OK:
Resistance: 1 MΩ or Higher

NG	**Repair or replace harness or connector between side airbag assembly (LH) and airbag sensor assembly.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

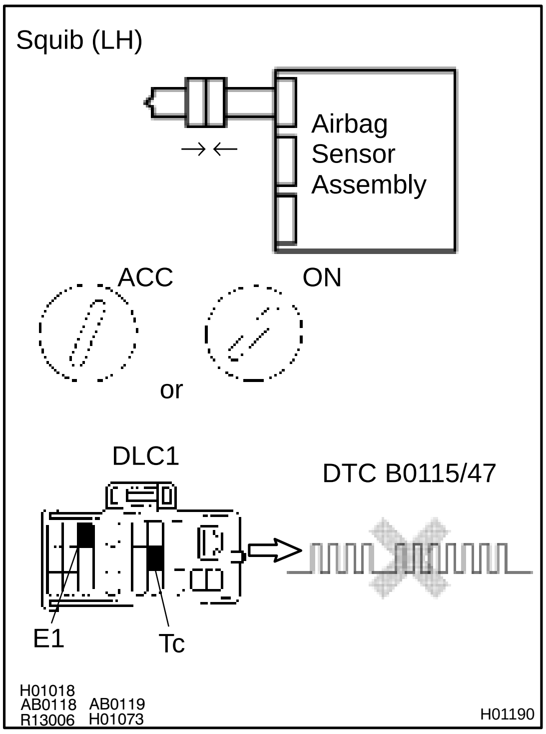
DTC B0115/47 is not output.

HINT:
Codes other than code B0115/47 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check side squib (LH).**



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the side airbag assembly (LH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to LOOK, and wait at least for 20 second.
(b) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(c) Clear DTC stored in memory.
(See page DI–626)
(d) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(e) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(f) Check DTC.
(See page DI–626)

OK:

DTC B0115/47 is not output.

HINT:
Codes other than code B0115/47 may be output at this time, but they are not relevant to this check.

NG	**Replace side airbag assembly (LH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI1L6–02

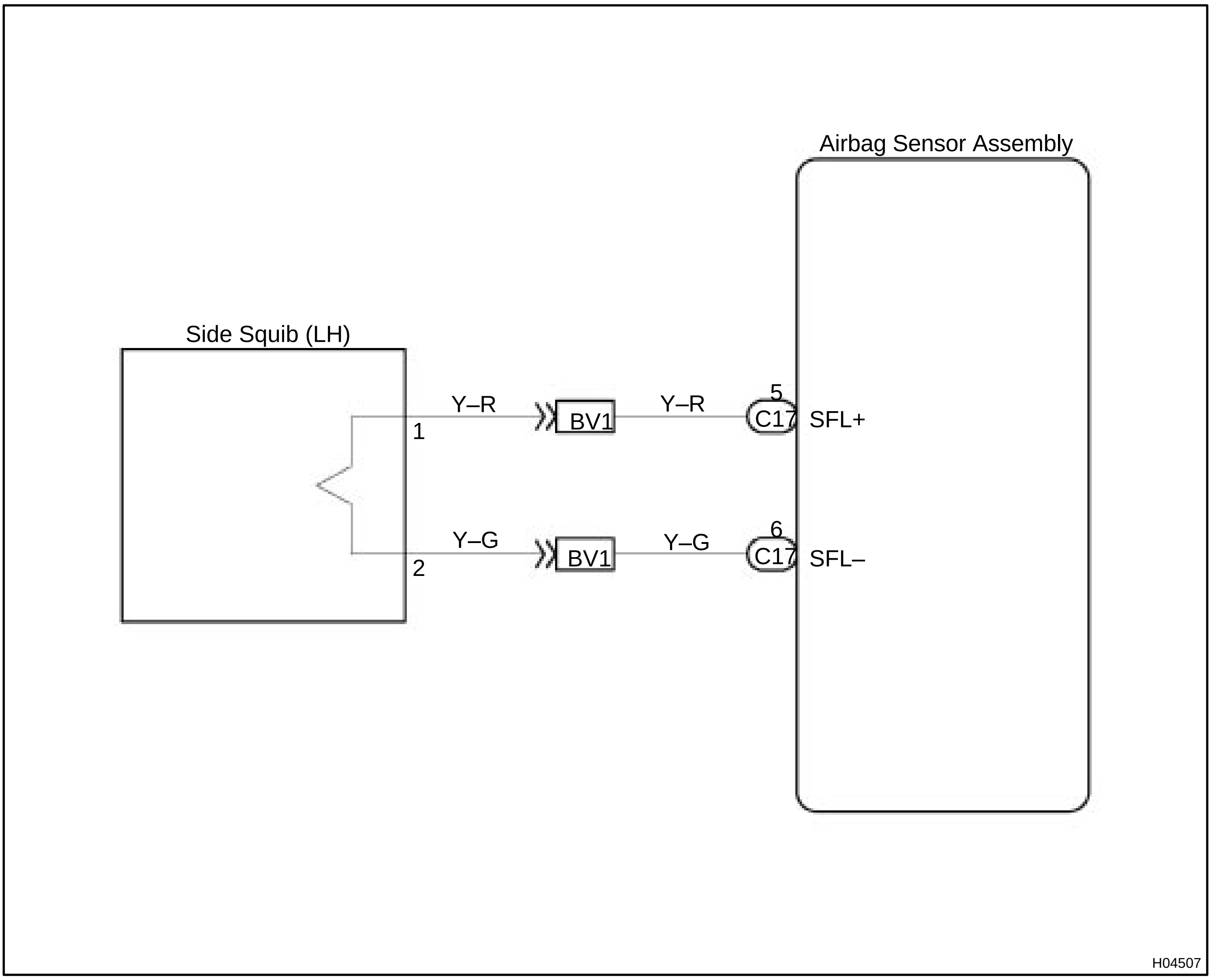
DTC	B0115/47	Short in Side Squib (LH) Circuit (TMMK Made)

CIRCUIT DESCRIPTION

The side squib (LH) circuit consists of the airbag sensor assembly and side airbag assembly (LH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0115/47 is recorded when a short is detected in the side squib (LH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0115/47	●Short circuit between SFL+ wire harness and SFL– wire harness of squib ●Side squib (LH) malfunction ●Airbag sensor assembly malfunction	●Side airbag assembly (LH) ●Airbag sensor assembly ●Wire harness ●Sub wire harness

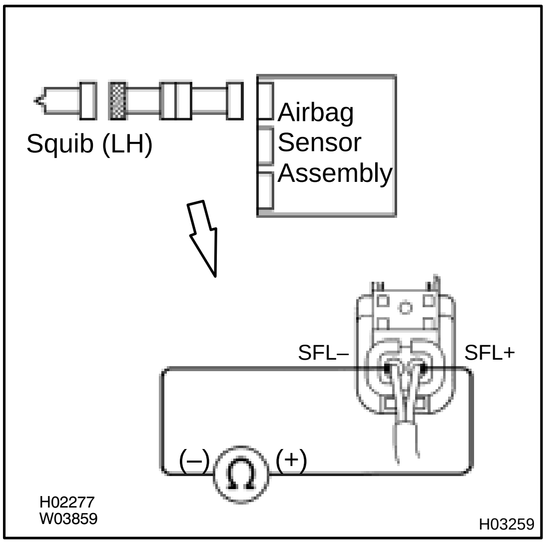
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–787)**

2	**Check side squib (LH) circuit.**



PREPARATION:

Release the airbag activation prevention mechanism of the connector (on the airbag sensor assembly side) between the airbag sensor assembly and the side airbag assembly (LH).
(See page DI–626)

CHECK:

For the connector (on the side airbag assembly side) between the side airbag assembly (LH) and the airbag sensor assembly, measure the resistance between SFL+ and SFL–.

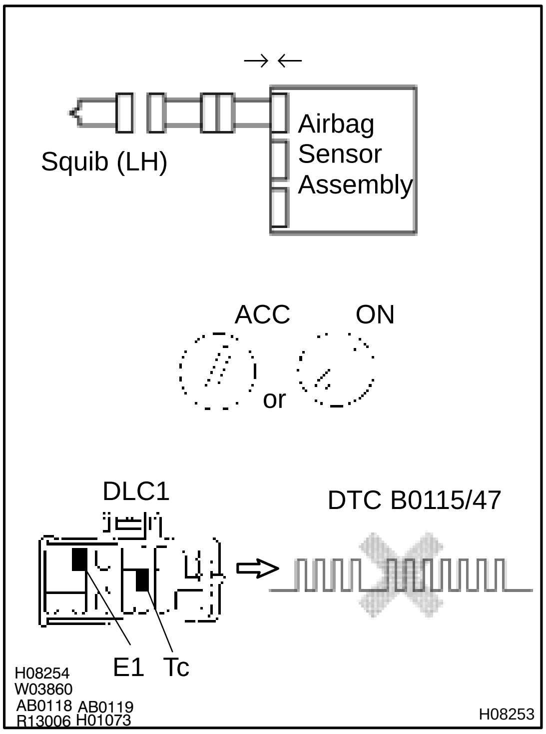
OK:

Resistance: 1 MΩ or Higher

NG	**Go to step 5.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

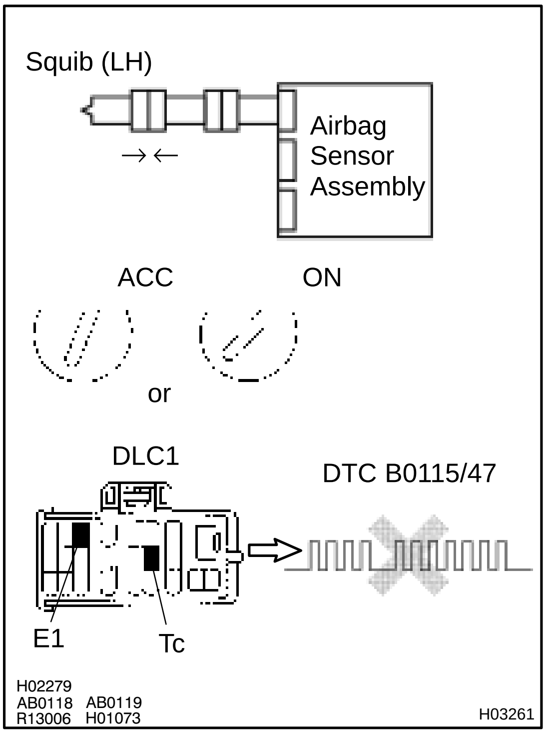
DTC B0115/47 is not output.

HINT:
Codes other than code B0115/47 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check side squib (LH).**



PREPARATION:

(a) Turn ignition switch to LOCK.

(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the side airbag assembly (LH) connector.

(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to LOOK, and wait at least for 20 second.

(b) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(c) Clear DTC stored in memory.
(See page DI–626)

(d) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(e) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(f) Check DTC.
(See page DI–626)

OK:

DTC B0115/47 is not output.

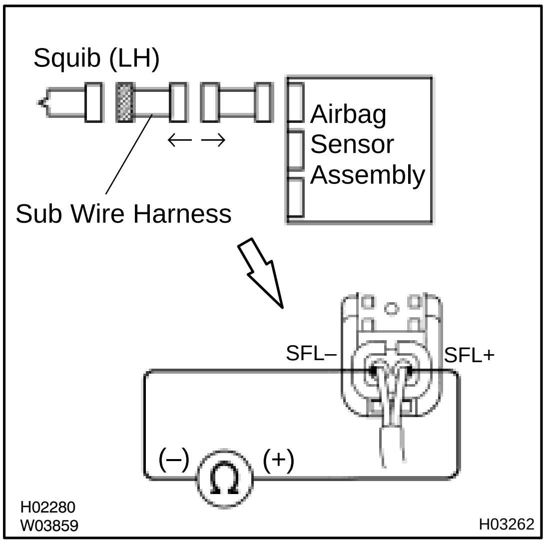
HINT:
Codes other than code B0115/47 may be output at this time, but they are not relevant to this check.

NG	**Replace side airbag assembly (LH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

5	Check sub wire harness.



PREPARATION:

(a) Disconnect sub wire harness connector on the airbag sensor assembly side.

(b) Release the airbag activation prevention mechanism of the sub wire harness connector on the airbag sensor assembly side. (See page DI–626)

CHECK:

For the connector (on the sub wire harness side) between the side airbag assembly and the sub wire harness, measure the resistance between SFL+ and SFL–.

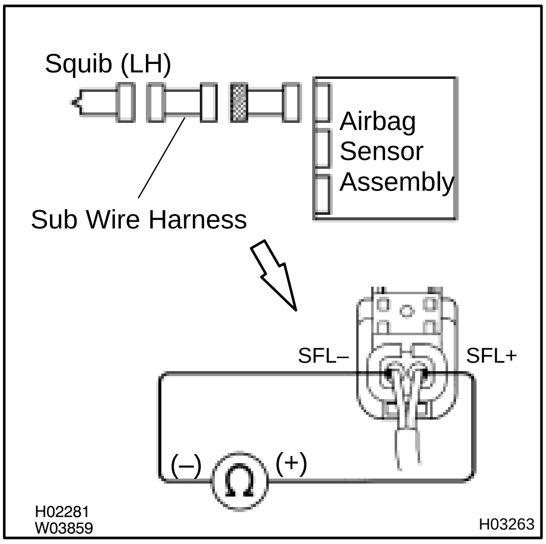
OK:

Resistance: 1 MΩ or Higher

NG	Repair or replace sub wire harness.

OK

6	Check harness between airbag sensor assembly and sub wire harness.



PREPARATION:

Release the airbag activation prevention mechanism of the airbag sensor assembly connector. (See page DI–626)

CHECK:

For the connector (on the sub wire harness side) between the airbag sensor assembly and sub wire harness, measure the resistance between SFL+ and SFL–.

OK:

Resistance: 1 MΩ or Higher

NG	Repair or replace harness or connector between airbag sensor assembly and sub wire harness.

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI1BD–03

DTC	B0116/48	Open in Side Squib (LH) Circuit (TMC Made)

CIRCUIT DESCRIPTION

The side squib circuit consists of the airbag sensor assembly and side airbag assembly (LH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0116/48 is recorded when an open is detected in the side squib (LH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0116/48	●Open circuit in SFL+ wire harness or SFL– wire harness of squib ●Side squib (LH) malfunction ●Airbag sensor assembly malfunction	●Side airbag assembly (LH) ●Airbag sensor assembly ●Wire harness

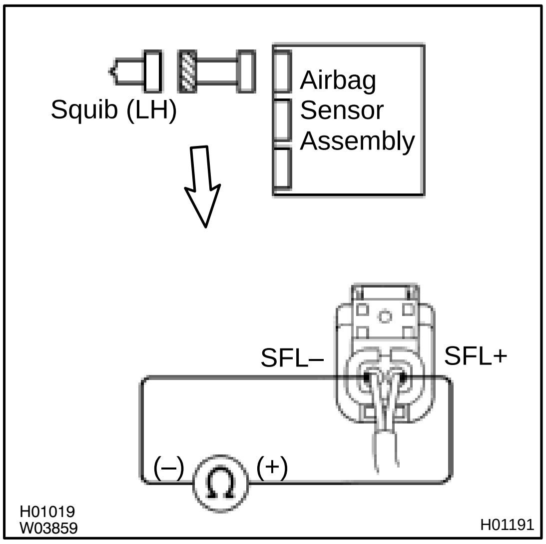
WIRING DIAGRAM

See page DI–700.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–787)**

2	**Check side squib (LH) circuit.**



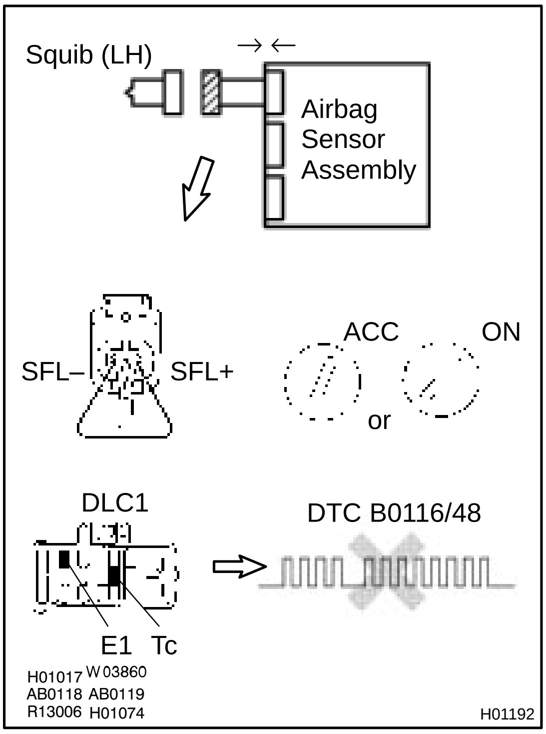
CHECK:
For the connector (on the side airbag assembly side) between the side airbag assembly (LH) and the airbag sensor assembly, measure the resistance between SFL+ and SFL–.

OK:
Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between side airbag assembly (LH) and airbag sensor assembly.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect SFL+ and SFL– of the connector (on the side airbag assembly side) between the side airbag assembly (LH) and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

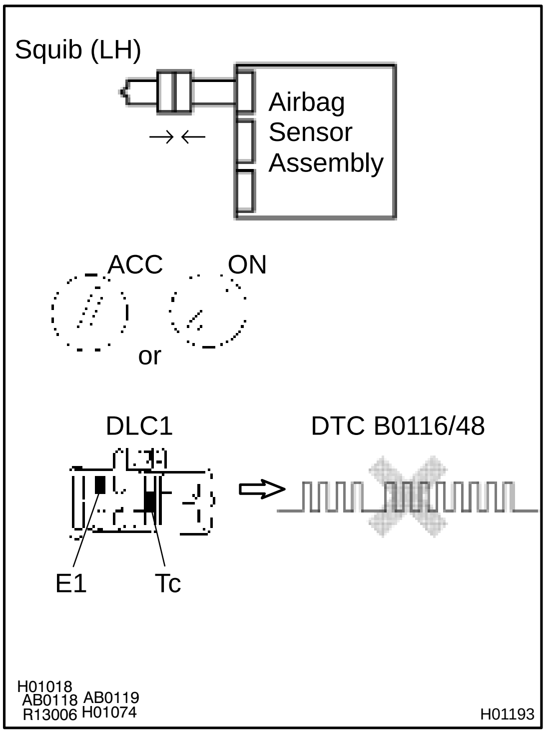
DTC B0116/48 is not output.

HINT:
Codes other than code B0116/48 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check side squib (LH).**



PREPARATION:

(a) Turn ignition switch to LOCK.

(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the side airbag assembly (LH) connector.

(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

DTC B0116/48 is not output.

HINT:
Codes other than code B0116/48 may be output at this time, but they are not relevant to this check.

NG	**Replace side airbag assembly (LH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI1L8–02

DTC	B0116/48	Open in Side Squib (LH) Circuit (TMMK Made)

CIRCUIT DESCRIPTION

The side squib circuit consists of the airbag sensor assembly and side airbag assembly (LH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0116/48 is recorded when an open short is detected in the side squib (LH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0116/48	●Open circuit in SFL+ wire harness or SFL– wire harness of squib ●Side squib (LH) malfunction ●Airbag sensor assembly malfunction	●Side airbag assembly (LH) ●Airbag sensor assembly ●Wire harness ●Sub wire harness

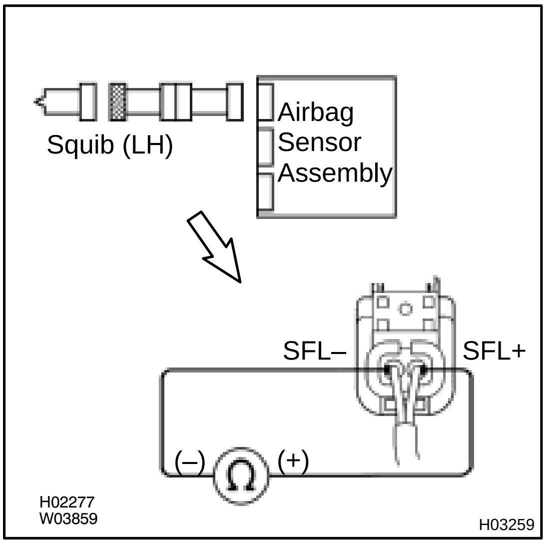
WIRING DIAGRAM

See page DI–704.

INSPECTION PROCEDURE

1	Prepare for inspection. (See step 1 on page DI–787)

2	Check side squib (LH) circuit.



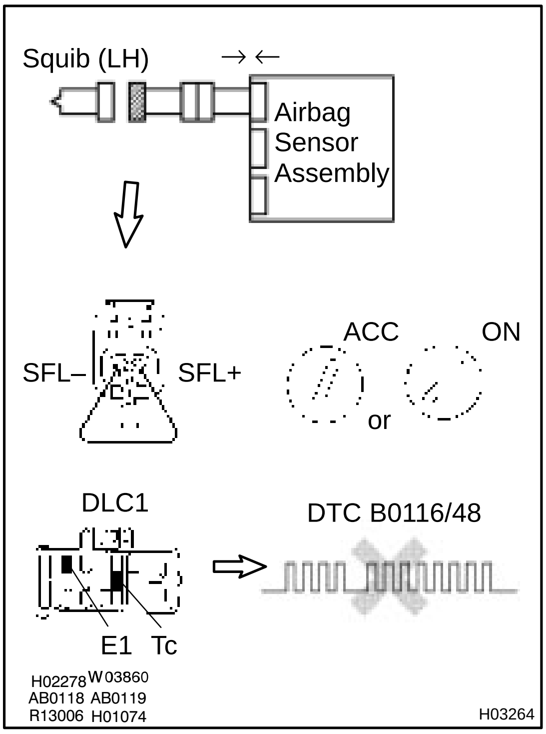
CHECK:
For the connector (on the side airbag assembly side) between the side airbag assembly (LH) and the airbag sensor assembly, measure the resistance between SFL+ and SFL–.

OK:
Resistance: Below 1 Ω

NG	Go to step 5.

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect SFL+ and SFL– of the connector (on the side airbag assembly side) between the side airbag assembly (LH) and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

DTC B0116/48 is not output.

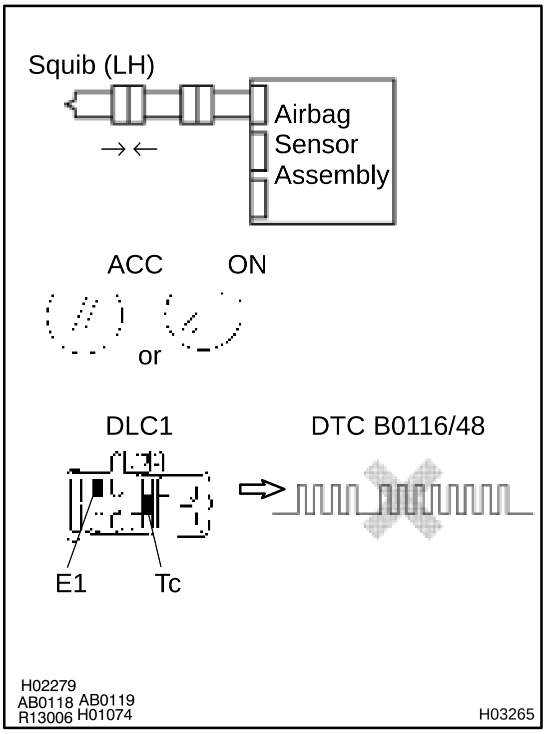
HINT:

Codes other than code B0116/48 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check side squib (LH).**



PREPARATION:

(a) Turn ignition switch to LOCK.

(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the side airbag assembly (LH) connector.

(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

DTC B0116/48 is not output.

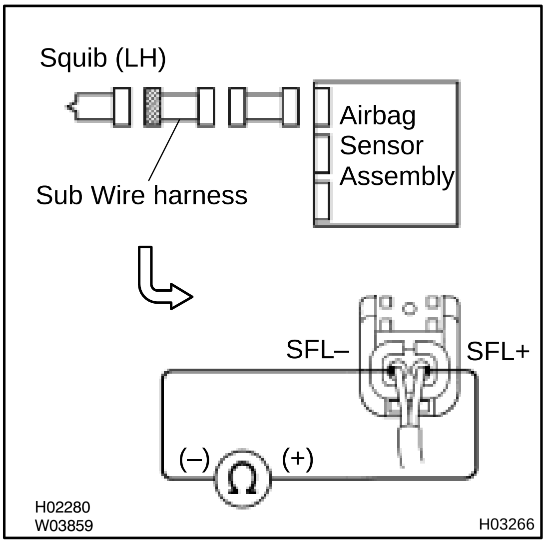
HINT:
Codes other than code B0116/48 may be output at this time, but they are not relevant to this check.

NG	**Replace side airbag assembly (LH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

5	**Check sub wire harness.**



PREPARATION:

Disconnect the sub wire harness connector on the airbag sensor assembly side.

CHECK:

For the connector (on the sub wire harness side) between the side airbag assembly and the sub wire harness, measure the resistance between SFL+ and SFL–.

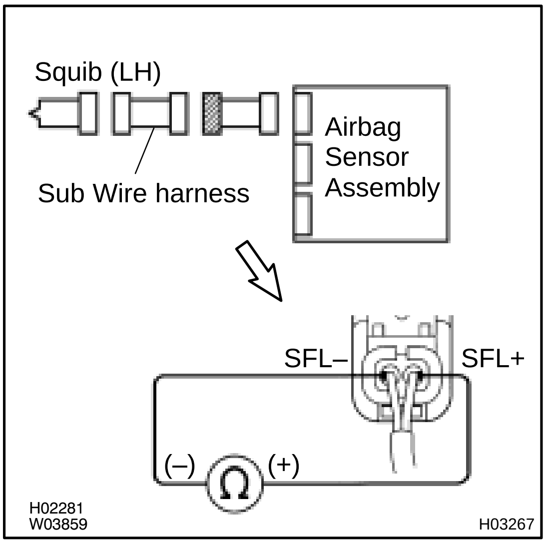
OK:

Resistance: Below 1 Ω

NG	**Repair or replace sub wire harness.**

OK

6	**Check harness between airbag sensor assembly and sub wire harness.**



CHECK:

For the connector (on the airbag sensor assembly side) between the airbag sensor assembly and the sub wire harness, measure the resistance between SFL+ and SFL–.

OK:

Resistance: Below 1 Ω

NG	**Repair or replace harness or connector between airbag sensor assembly and sub wire harness.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI1BE–03

DTC	B0117/45	Short in Side Squib (LH) Circuit (to Ground) (TMC Made)

CIRCUIT DESCRIPTION

The side squib circuit consists of the airbag sensor assembly and side airbag assembly (LH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0117/45 is recorded when ground short is detected in the side squib (LH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0117/45	●Short circuit in side squib (LH) wire harness (to ground) ●Side squib (LH) malfunction ●Airbag sensor assembly malfunction	●Side airbag assembly (LH) ●Airbag sensor assembly ●Wire harness

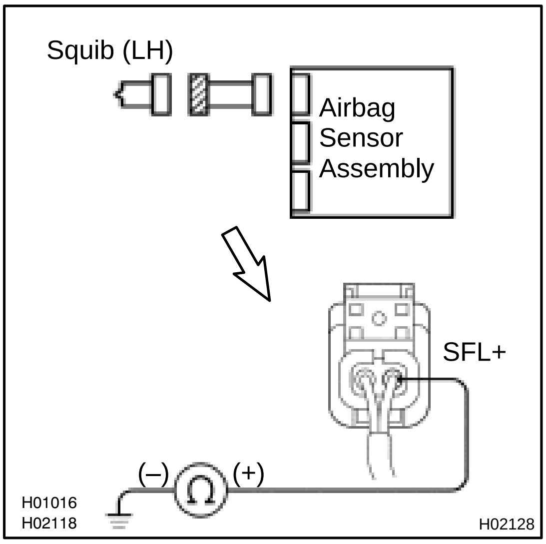
WIRING DIAGRAM

See page DI–700.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–787)**

2	**Check side squib (LH) circuit.**



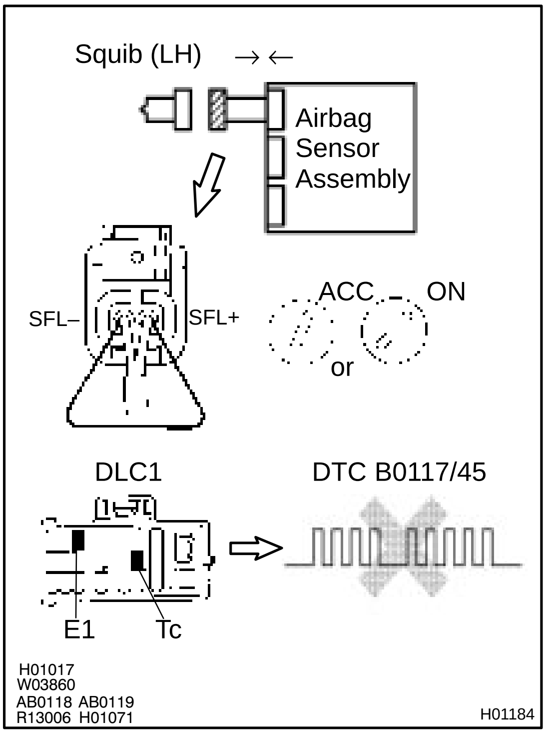
CHECK:
For the connector (on the side airbag assembly side) between the side airbag assembly (LH) and the airbag sensor assembly, measure the resistance between SFL+ and body ground.

OK:
Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between side airbag assembly (LH) and airbag sensor assembly.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect SFL+ and SFL– of the connector (on the side airbag assembly side) between the side airbag assembly (LH) and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

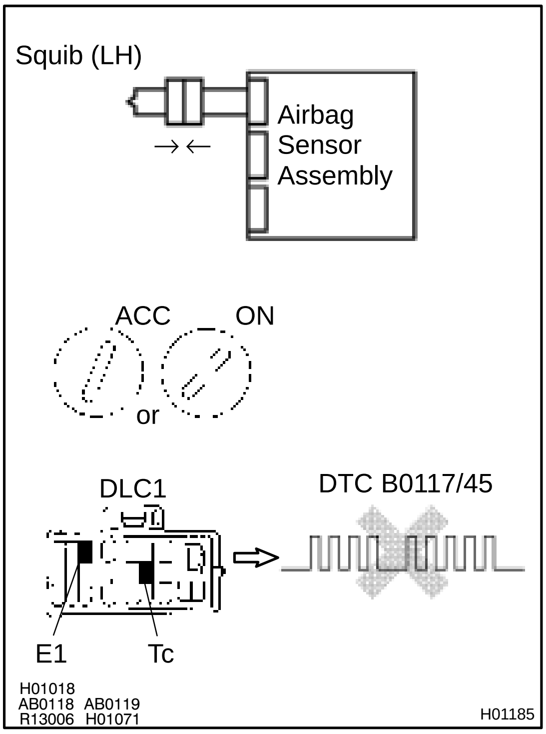
DTC B0117/45 is not output.

HINT:
Codes other than code B0117/45 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	**Check side squib (LH).**



PREPARATION:

(a) Turn ignition switch to LOCK.

(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the side airbag assembly (LH) connector.

(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

DTC B0117/45 is not output.

HINT:
Codes other than code B0117/45 may be output at this time, but they are not relevant to this check.

NG	**Replace side airbag assembly (LH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DTC	B0117/45	Short in Side Squib (LH) Circuit (to Ground) (TMMK Made)

CIRCUIT DESCRIPTION

The side squib circuit consists of the airbag sensor assembly and side airbag assembly (LH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0117/45 is recorded when a ground short is detected in the side squib (LH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0117/45	●Short circuit in side squib (LH) wire harness (to ground) ●Side squib (LH) malfunction ●Airbag sensor assembly malfunction	●Side airbag assembly (LH) ●Airbag sensor assembly ●Wire harness ●Sub wire harness

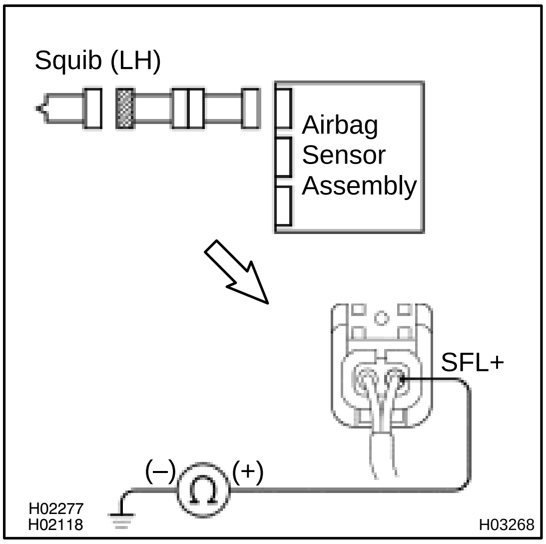
WIRING DIAGRAM

See page DI–704.

INSPECTION PROCEDURE

1	Prepare for inspection. (See step 1 on page DI–787)

2	Check side squib (LH) circuit.



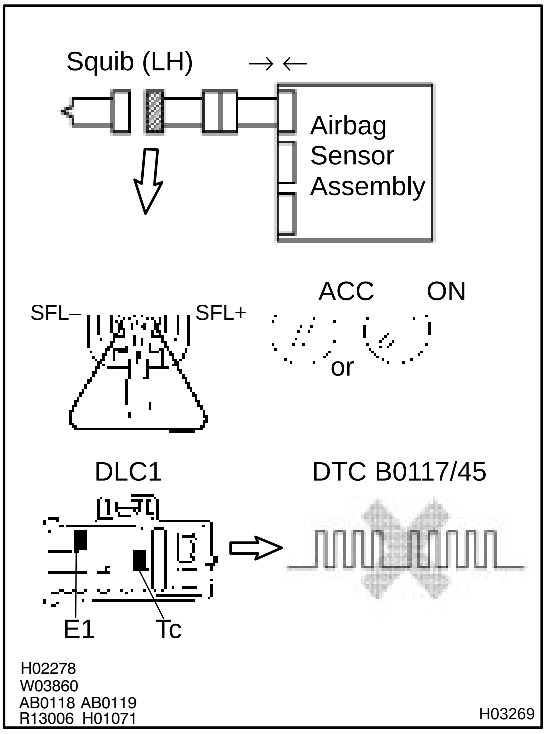
CHECK:
For the connector (on the side airbag assembly side) between the side airbag assembly (LH) and the airbag sensor assembly, measure the resistance between SFL+ and body ground.

OK:
Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between side airbag assembly (LH) and airbag sensor assembly.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect SFL+ and SFL– of the connector (on the side airbag assembly side) between the side airbag assembly (LH) and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

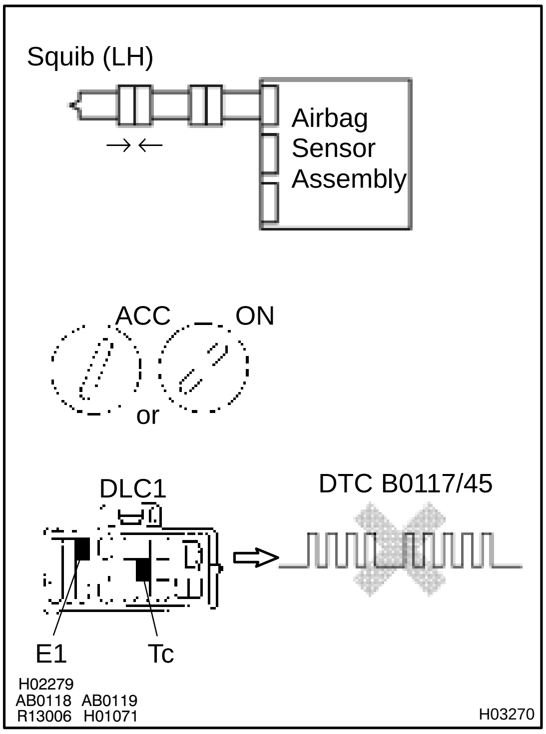
DTC B0117/45 is not output.

HINT:
Codes other than code B0117/45 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	**Check side squib (LH).**



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the side airbag assembly (LH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See step 5 on page DI–626)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–626)

OK:

DTC B0117/45 is not output.

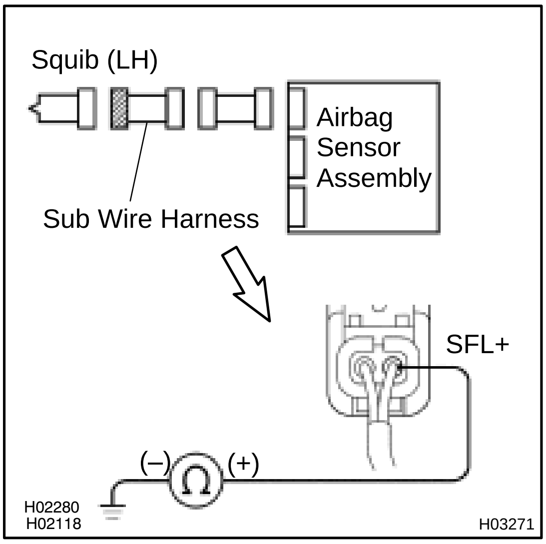
HINT:
Codes other than code B0117/45 may be output at this time, but they are not relevant to this check.

NG	**Replace side airbag assembly (LH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

5	**Check sub wire harness.**



PREPARATION:
Disconnect the sub wire harness connector on the airbag sensor assembly side.

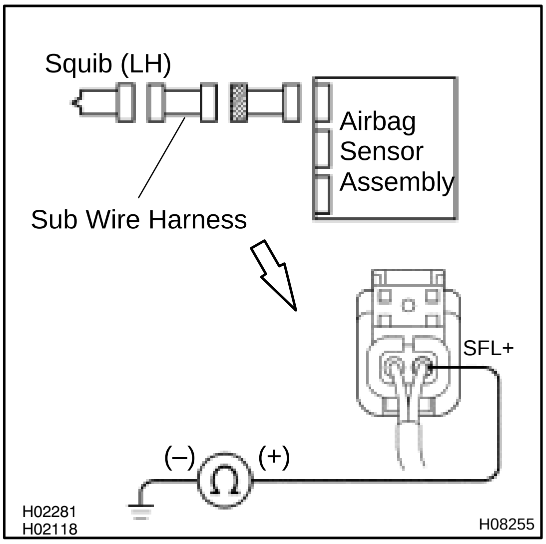
CHECK:
For the connector (on the sub wire harness side) between the side airbag assembly and the sub wire harness, measure the resistance between SFL+ and body ground.

OK:
Resistance: 1 MΩ or Higher

NG → **Repair or replace sub wire harness.**

OK ↓

6	**Check harness between airbag sensor assembly and sub wire harness.**



CHECK:
For the connector (on the sub wire harness side) between the airbag sensor assembly and sub wire harness, measure the resistance between SFL+ and body ground.

OK:
Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between airbag sensor assembly and sub wire harness.**

OK ↓

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI1BF–03

DTC	B0118/46	Short in Side Squib (LH) Circuit (to B+) (TMC Made)

CIRCUIT DESCRIPTION

The side squib circuit consists of the airbag sensor assembly and side airbag assembly (LH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0118/46 is recorded when a B+ short is detected in the side squib (LH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0118/46	●Short circuit in side squib (LH) wire harness (to B+) ●Side squib (LH) malfunction ●Airbag sensor assembly malfunction	●Side airbag assembly (LH) ●Airbag sensor assembly ●Wire harness

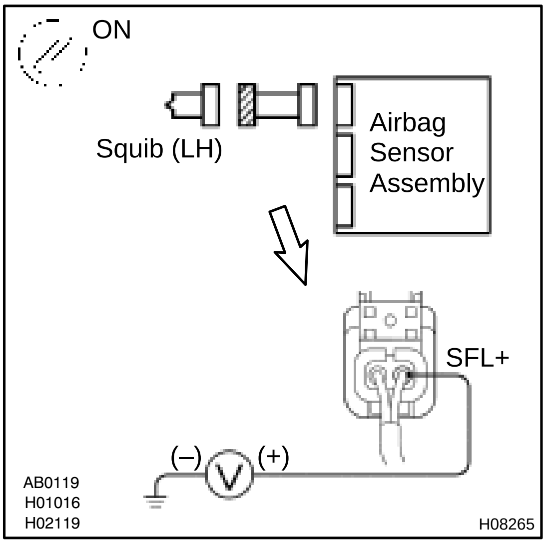
WIRING DIAGRAM

See page DI–700.

INSPECTION PROCEDURE

1	Prepare for inspection. (See step 1 on page DI–787)

2	Check side squib (LH) circuit.



CHECK:

(a) Turn ignition switch to ON.

(b) For the connector (on the side airbag assembly side) between the side airbag assembly (LH) and the airbag sensor assembly, measure the voltage between SFL+ and body ground.

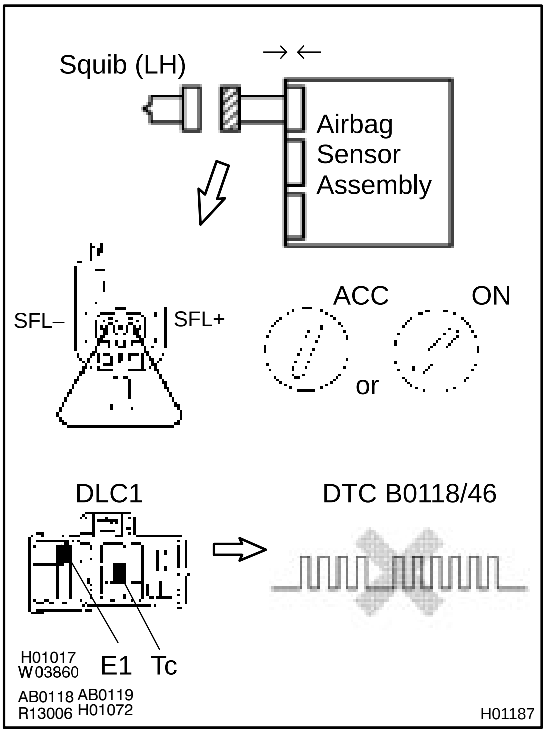
OK:

Voltage: 0 V

NG → **Repair or replace harness or connector between side airbag assembly (LH) and airbag sensor assembly.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect SFL+ and SFL– of the connector (on the side airbag assembly side) between the side airbag assembly (LH) and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

DTC B0118/46 is not output.

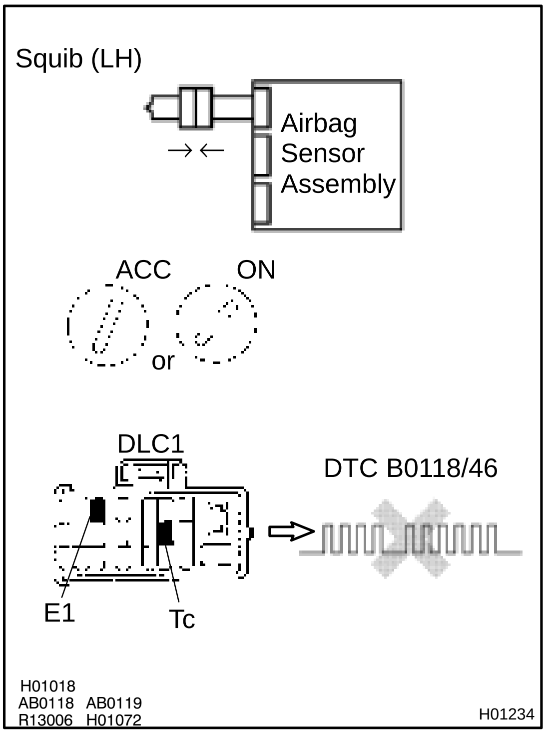
HINT:

Codes other than code B0118/46 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check side squib (LH).**



PREPARATION:

(a) Turn ignition switch to LOCK.

(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the side airbag assembly (LH) connector.

(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

DTC B0118/46 is not output.

HINT:
Codes other than code B0118/46 may be output at this time, but they are not relevant to this check.

NG	**Replace side airbag assembly (LH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI4L7–01

DTC	B0118/46	Short in Side Squib (LH) Circuit (to B+) (TMMK Made)

CIRCUIT DESCRIPTION

The side squib circuit consists of the airbag sensor assembly and side airbag assembly (LH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0118/46 is recorded when a B+ short is detected in the side squib (LH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0118/46	●Short circuit in side squib (LH) wire harness (to B+) ●Side squib (LH) malfunction ●Airbag sensor assembly malfunction	●Side airbag assembly (LH) ●Airbag sensor assembly ●Wire harness ●Sub wire harness

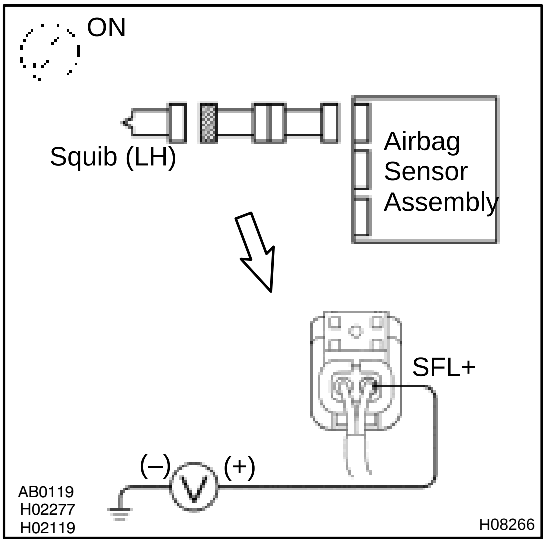
WIRING DIAGRAM

See page DI–704.

INSPECTION PROCEDURE

1	Prepare for inspection. (See step 1 on page DI–787)

2	Check side squib (LH) circuit.



CHECK:

(a) Turn ignition switch to ON.

(b) For the connector (on the side airbag assembly side) between the side airbag assembly (LH) and the airbag sensor assembly, measure the voltage between SFL+ and body ground.

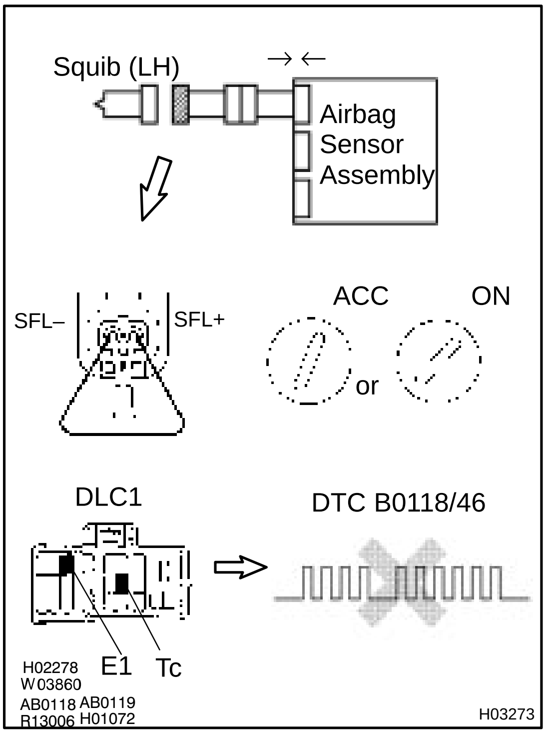
OK:

Voltage: 0 V

NG **Go to step 5.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect SFL+ and SFL– of the connector (on the side airbag assembly side) between the side airbag assembly (LH) and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

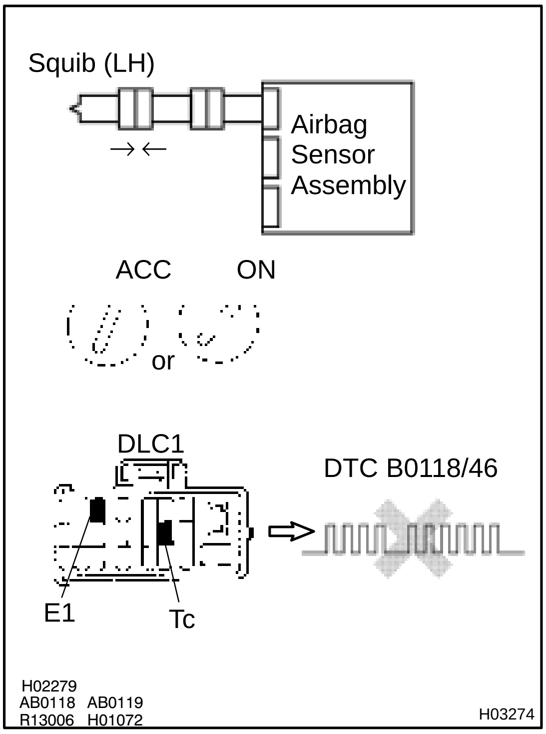
DTC B0118/46 is not output.

HINT:
Codes other than code B0118/46 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check side squib (LH).**



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the side airbag assembly (LH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See step 5 on page DI–626)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–626)

OK:

DTC B0118/46 is not output.

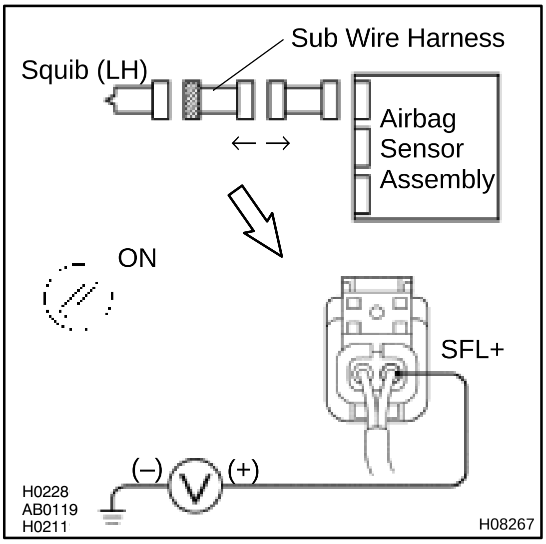
HINT:
Codes other than code B0118/46 may be output at this time, but they are not relevant to this check.

NG	**Replace side airbag assembly (LH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

5	**Check sub wire harness.**



PREPARATION:
Disconnect the sub wire harness connector on the airbag sensor assembly side.

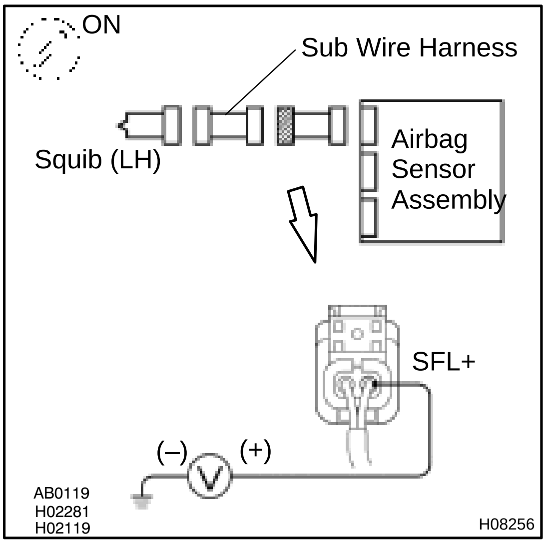
CHECK:
(a) Turn ignition switch to ON.
(b) For the connector (on the sub wire harness side) between the side airbag assembly and the sub wire harness, measure the resistance between SFL+ and body ground.

OK:
Voltage: 0 V

NG	**Repair or replace sub wire harness.**

OK

6	**Check harness between airbag sensor assembly and sub wire harness.**



CHECK:
(a) Turn ignition switch to ON.
(b) For the connector (on the sub wire harness side) between the airbag sensor assembly and sub wire harness, measure the voltage between SFL and body ground.

OK:
Voltage: 0 V

NG	**Repair or replace harness or connector between airbag sensor assembly and sub wire harness.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI16S–17

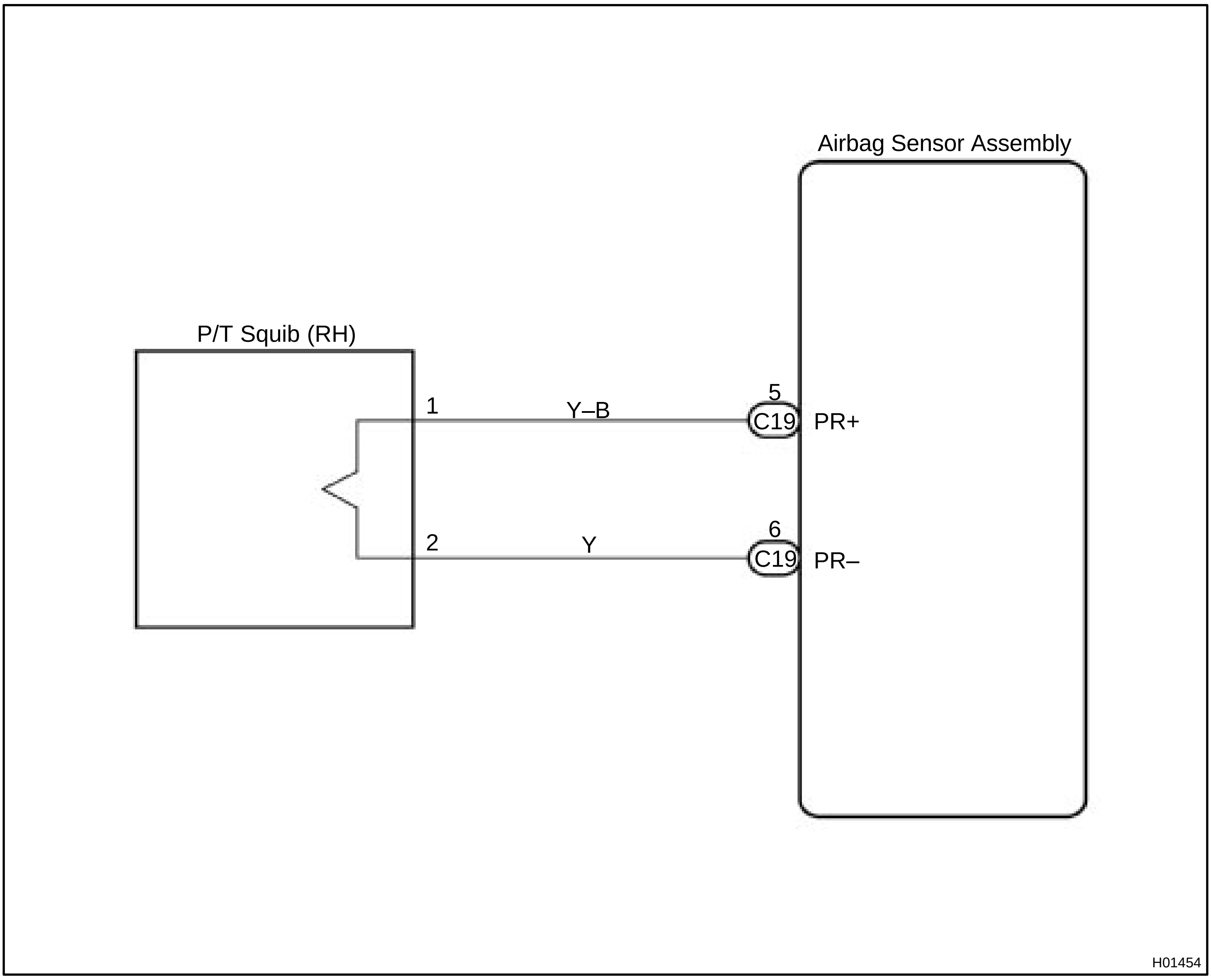
DTC	B0130/63	Short in P/T Squib (RH) Circuit

CIRCUIT DESCRIPTION

The P/T squib (RH) circuit consists of the airbag sensor assembly and seat belt pretensioner (RH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0130/63 is recorded when a short is detected in the P/T squib (RH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0130/63	●Short circuit between PR+ wire harness and PR– wire harness of squib ●P/T squib (RH) malfunction ●Airbag sensor assembly malfunction	●Seat belt pretensioner (RH) ●Airbag sensor assembly ●Wire harness

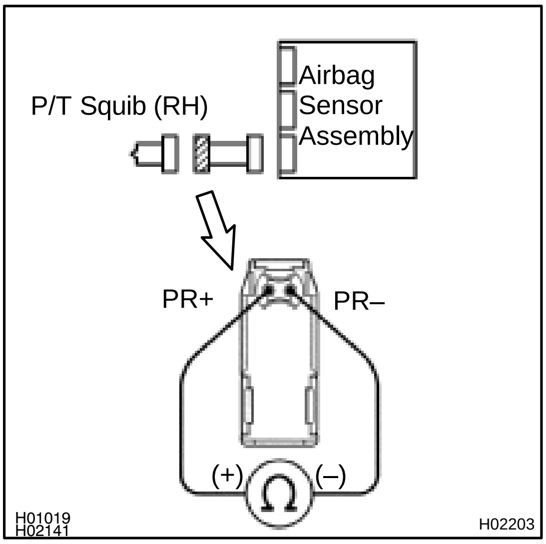
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–787)**

2	**Check P/T squib (RH) circuit.**



PREPARATION:
Release the airbag activation prevention mechanism of the connector (on the airbag sensor assembly side) between the airbag sensor assembly and the seat belt pretensioner (RH).
(See page DI–626).

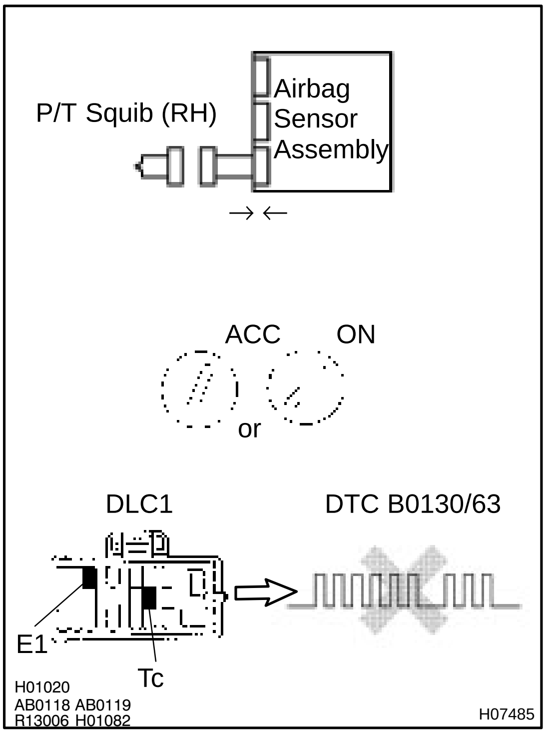
CHECK:
For the connector (on the seat belt pretensioner side) between the seat belt pretensioner (RH) and the airbag sensor assembly, measure the resistance between PR+ and PR–.

OK:
Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between seat belt pretensioner (RH) and airbag sensor assembly.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

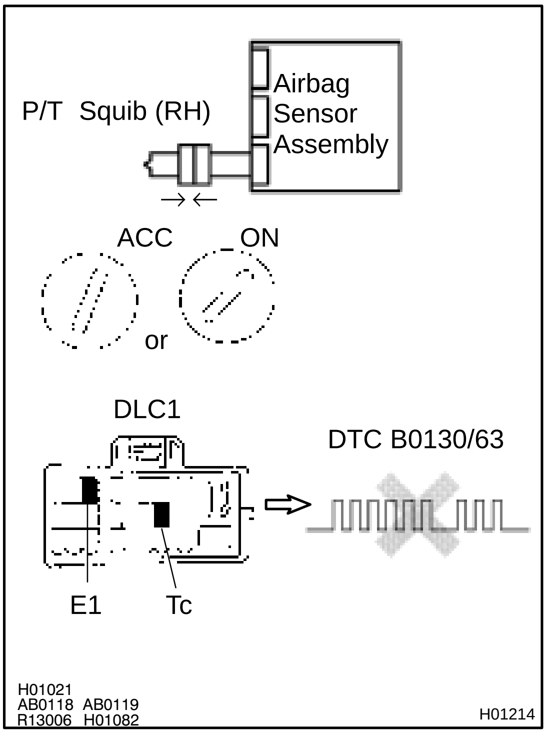
DTC B0130/63 is not output.

HINT:
Codes other than code B0130/63 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check P/T squib (RH).**



PREPARATION:

(a) Turn ignition switch to LOCK.

(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the seat belt pretensioner (RH) connector.

(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to LOOK, and wait at least for 20 second.

(b) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(c) Clear DTC stored in memory.
(See page DI–626)

(d) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(e) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(f) Check DTC.
(See page DI–626)

OK:

DTC B0130/63 is not output.

HINT:
Codes other than code B0130/63 may be output at this time, but they are not relevant to this check.

NG	**Replace seat belt pretensioner (RH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI1BG–13

DTC	B0131/64	Open in P/T Squib (RH) Circuit

CIRCUIT DESCRIPTION

The P/T squib circuit (RH) consists of the airbag sensor assembly and seat belt pretensioner (RH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0131/64 is recorded when an open is detected in the P/T squib (RH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0131/64	●Open circuit in PR+ wire harness or PR– wire harness of squib ●P/T squib (RH) malfunction ●Airbag sensor assembly malfunction	●Seat belt pretensioner (RH) ●Airbag sensor assembly ●Wire harness

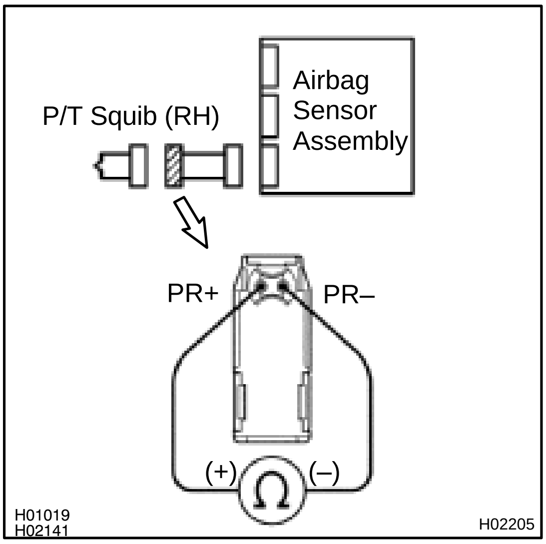
WIRING DIAGRAM

See page DI–730.

INSPECTION PROCEDURE

1	Prepare for inspection. (See step 1 on page DI–787)

2	Check P/T squib (RH) circuit.



CHECK:

For the connector (on the seat belt pretensioner side) between the seat belt pretensioner (RH) and the airbag sensor assembly, measure the resistance between PR+ and PR–.

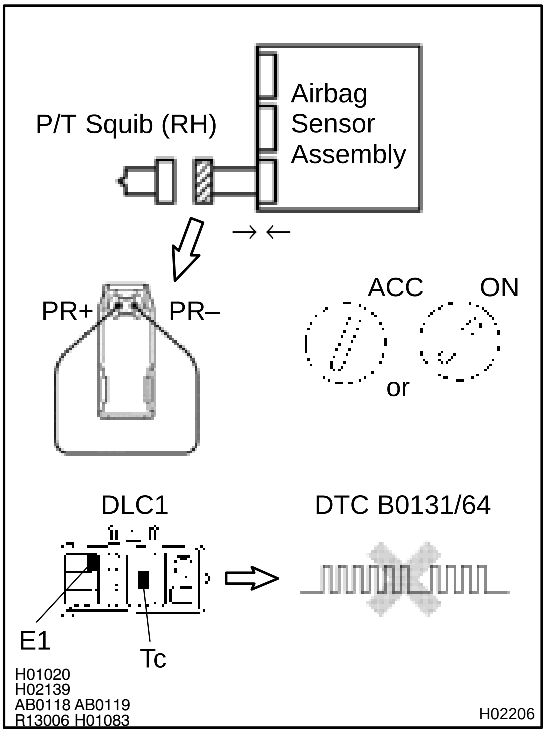
OK:

Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between seat belt pretensioner (RH) and airbag sensor assembly.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect PR+ and PR– of the connector (on the seat belt pretensioner side) between the seat belt pretensioner (RH) and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

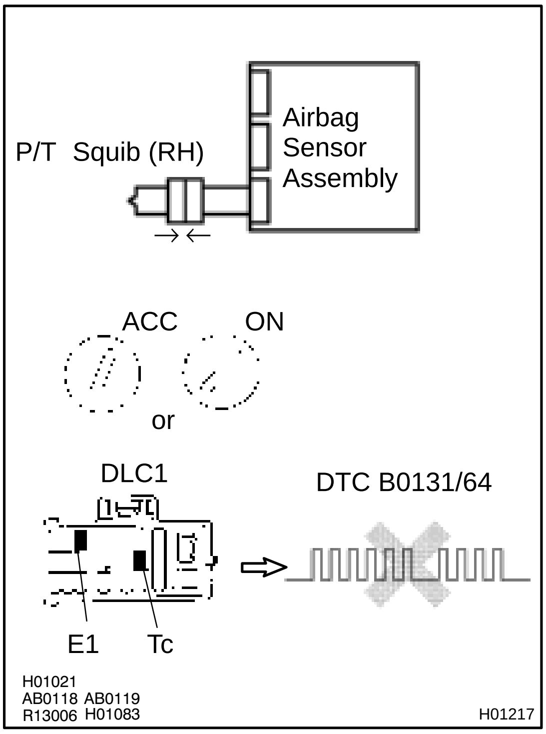
DTC B0131/64 is not output.

HINT:
Codes other than code B0131/64 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check P/T squib (RH).**



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the seat belt pretensioner (RH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See page DI–626)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–626)

OK:

DTC B0131/64 is not output.

HINT:
Codes other than code B0131/64 may be output at this time, but they are not relevant to this check.

NG	**Replace seat belt pretensioner (RH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DTC	B0132/61	Short in P/T Squib (RH) Circuit (to Ground)

CIRCUIT DESCRIPTION

The P/T squib (RH) circuit consists of the airbag sensor assembly and seat belt pretensioner (RH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0132/61 is recorded when a ground short is detected in the P/T squib (RH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0132/61	●Short circuit in P/T squib (RH) wire harness (to ground) ●P/T squib (RH) malfunction ●Airbag sensor assembly malfunction	●Seat belt pretensioner (RH) ●Airbag sensor assembly ●Wire harness

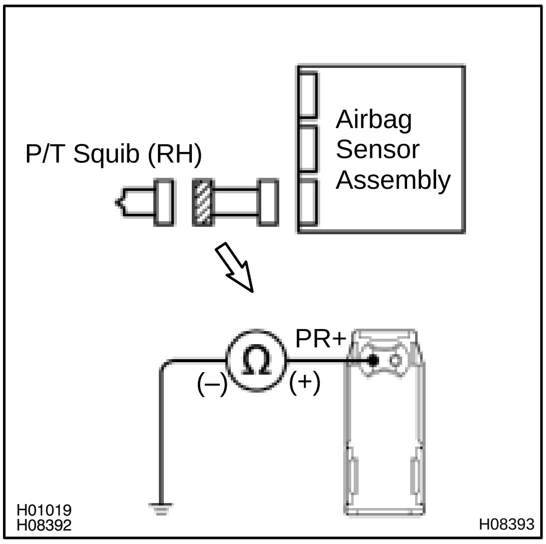
WIRING DIAGRAM

See page DI–730.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–787)**

2	**Check P/T squib (RH) circuit.**



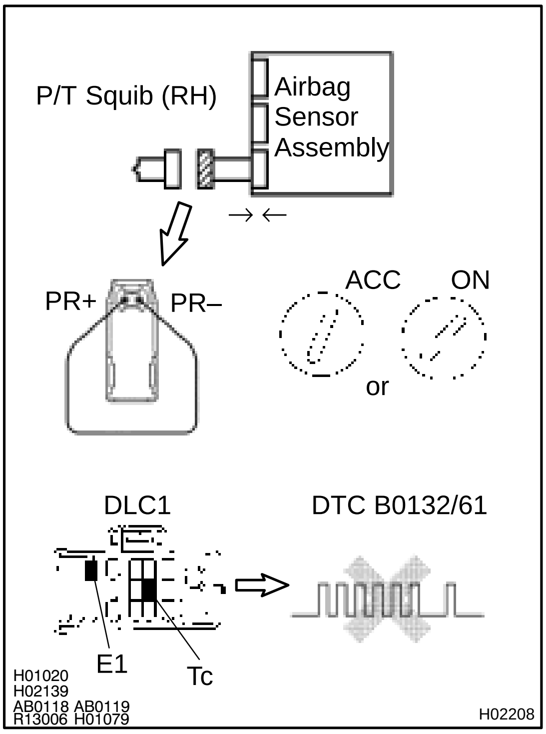
CHECK:
For the connector (on the seat belt pretensioner side) between the seat belt pretensioner (RH) and the airbag sensor assembly, measure the resistance between PR+ and body ground.

OK:
Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between seat belt pretensioner (RH) and airbag sensor assembly.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect PR+ and PR– of the connector (on the seat belt pretensioner side) between the seat belt pretensioner (RH) and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

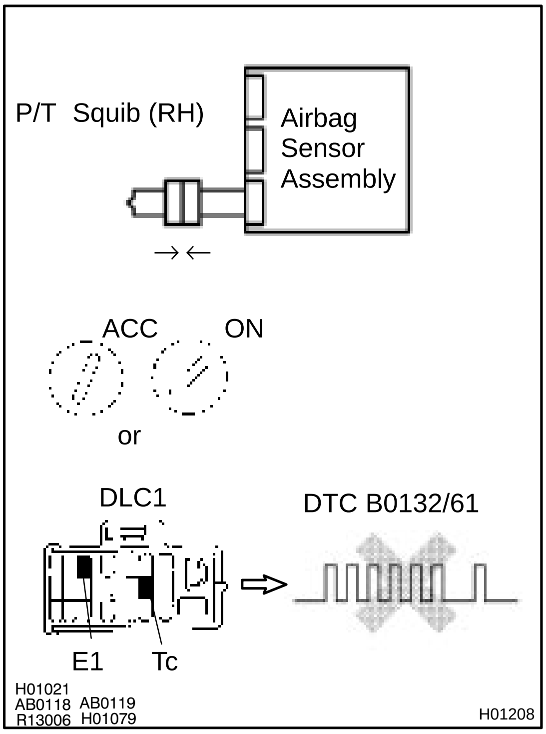
DTC B0132/61 is not output.

HINT:
Codes other than code B0132/61 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check P/T squib (RH).**



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the seat belt pretensioner (RH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See step 5 on page DI–626)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–626)

OK:

DTC B0132/61 is not output.

HINT:
Codes other than code B0132/61 may be output at this time, but they are not relevant to this check.

NG	**Replace seat belt pretensioner (RH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI1BI–13

DTC	B0133/62	Short in P/T Squib (RH) Circuit (to B+)

CIRCUIT DESCRIPTION

The P/T squib (RH) circuit consists of the airbag sensor assembly and seat belt pretensioner (RH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0133/62 is recorded when a B+ short is detected in the P/T squib (RH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0133/62	●Short circuit in seat belt pretensioner (RH) wire harness (to B+) ●P/T squib (RH) malfunction ●Airbag sensor assembly malfunction	●Seat belt pretensioner (RH) ●Airbag sensor assembly ●Wire harness

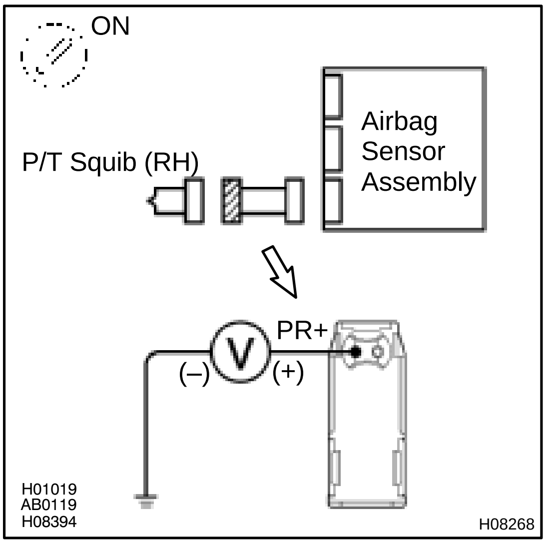
WIRING DIAGRAM

See page DI–730.

INSPECTION PROCEDURE

1	Prepare for inspection. (See step 1 on page DI–787)

2	Check P/T squib (RH) circuit.



CHECK:

(a) Turn ignition switch to ON.

(b) For the connector (on the seat belt pretensioner side) between the seat belt pretensioner (RH) and the airbag sensor assembly, measure the voltage between PR+ and body ground.

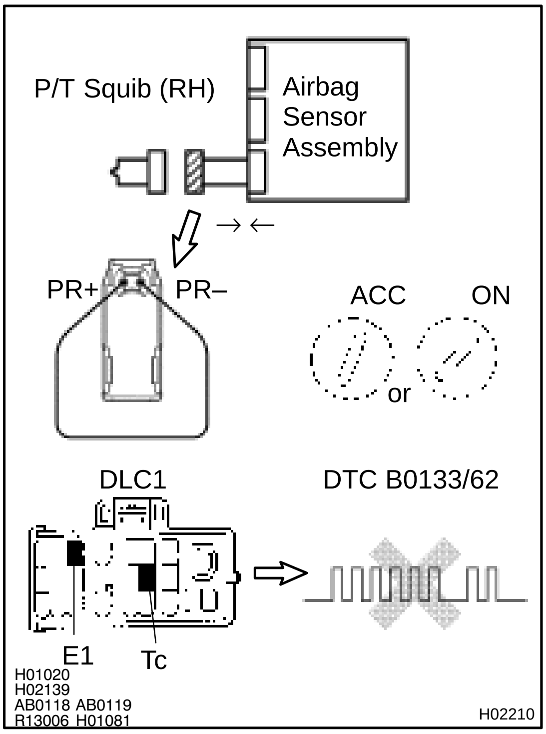
OK:

Voltage: 0 V

NG → **Repair or replace harness or connector between seat belt pretensioner (RH) and airbag sensor assembly.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect PR+ and PR– of the connector (on the seat belt pretensioner side) between the seat belt pretensioner (RH) and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

DTC B0133/62 is not output.

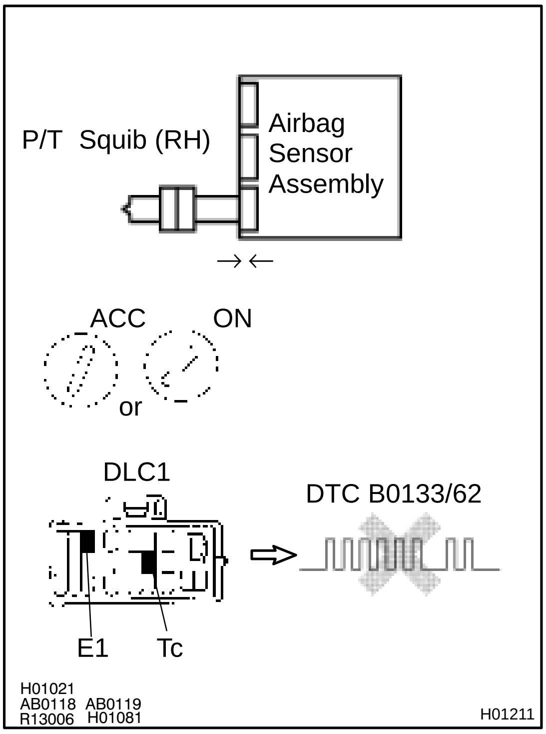
HINT:

Codes other than code B0133/62 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check P/T squib (RH).**



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the seat belt pretensioner (RH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See step 5 on page DI–626)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–626)

OK:

DTC B0133/62 is not output.

HINT:
Codes other than code B0133/62 may be output at this time, but they are not relevant to this check.

NG	**Replace seat belt pretensioner (RH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI16W–17

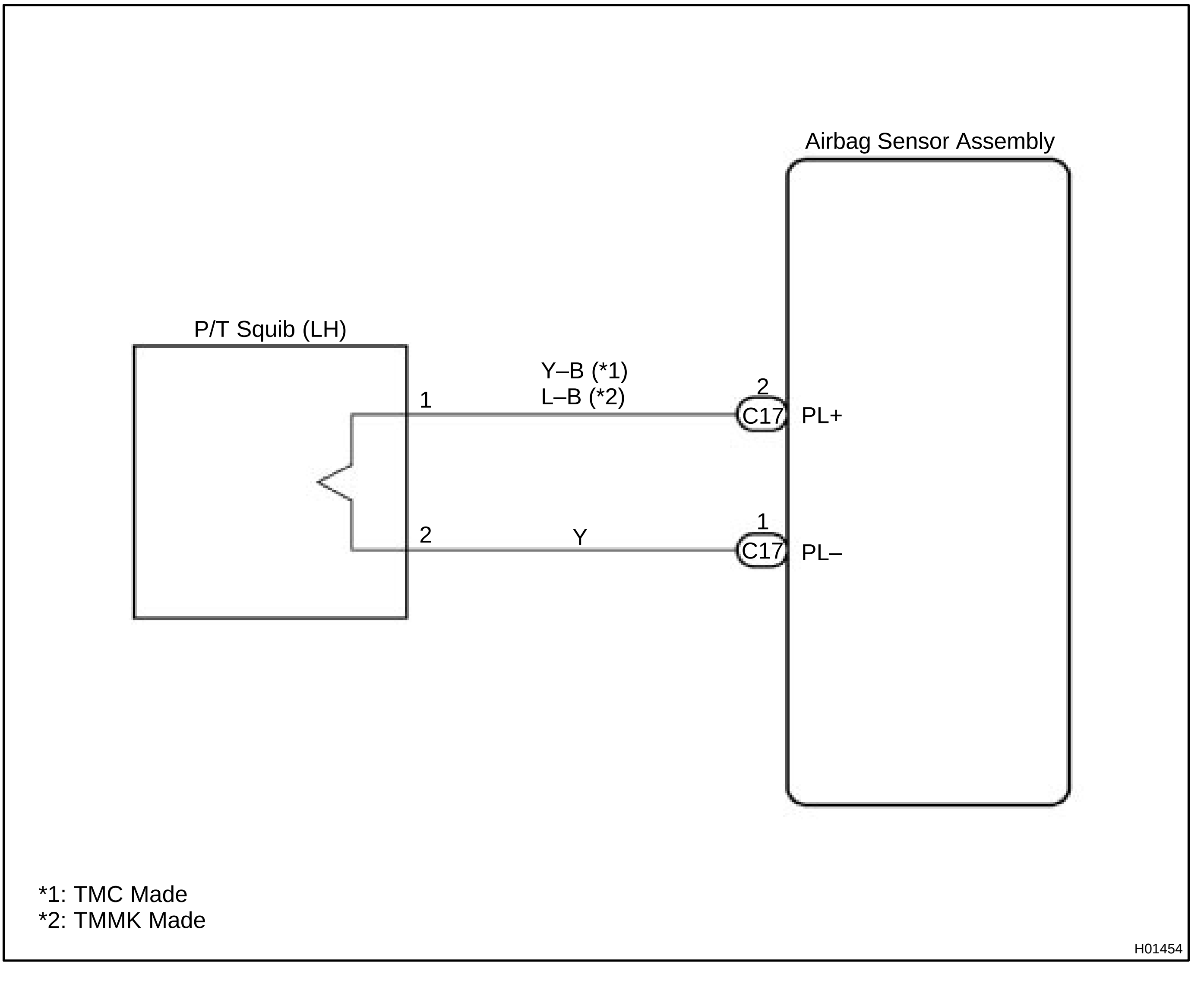
DTC	B0135/73	Short in P/T Squib (LH) Circuit

CIRCUIT DESCRIPTION

The P/T squib (LH) circuit consists of the airbag sensor assembly and seat belt pretensioner (LH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0135/73 is recorded when a short is detected in the P/T squib (LH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0135/73	●Short circuit between PL+ wire harness and PL– wire harness of squib ●P/T squib (LH) malfunction ●Airbag sensor assembly malfunction	●Seat belt pretensioner (LH) ●Airbag sensor assembly ●Wire harness

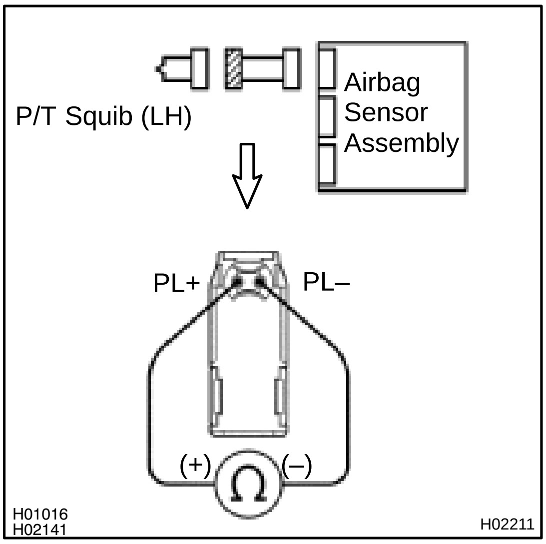
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–787)**

2	**Check P/T squib (LH) circuit.**



PREPARATION:
Release the airbag activation prevention mechanism of the connector (on the airbag sensor assembly side) between the airbag sensor assembly and the seat belt pretensioner (LH).
(See page DI–626)

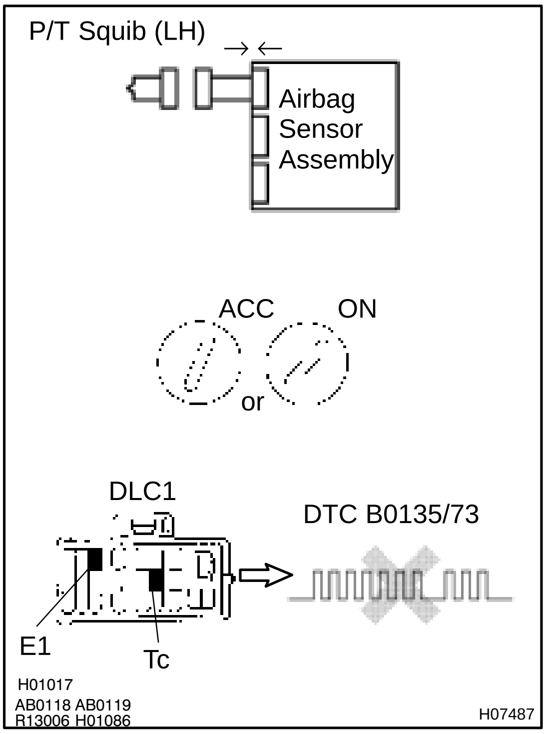
CHECK:
For the connector (on the seat belt pretensioner side) between the seat belt pretensioner (LH) and the airbag sensor assembly, measure the resistance between PL+ and PL–.

OK:
Resistance: 1 MΩ or Higher

NG	**Repair or replace harness or connector between seat belt pretensioner (LH) and airbag sensor assembly.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

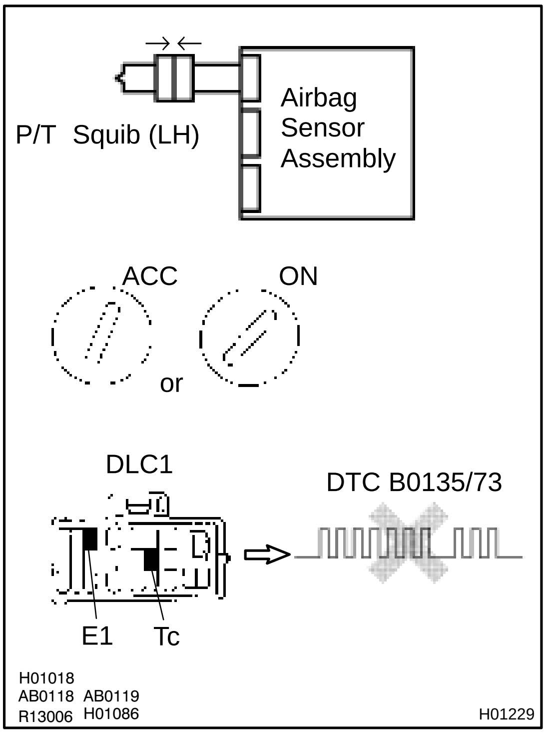
DTC B0135/73 is not output.

HINT:
Codes other than code B0135/73 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check P/T squib (LH).**



PREPARATION:

(a) Turn ignition switch to LOCK.

(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the seat belt pretensioner (LH) connector.

(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to LOOK, and wait at least for 20 second.

(b) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(c) Clear DTC stored in memory.
(See page DI–626)

(d) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(e) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(f) Check DTC.
(See page DI–626)

OK:

DTC B0135/73 is not output.

HINT:
Codes other than code B0135/73 may be output at this time, but they are not relevant to this check.

NG	**Replace seat belt pretensioner (LH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI1BJ–14

DTC	B0136/74	Open in P/T Squib (LH) Circuit

CIRCUIT DESCRIPTION

The P/T squib circuit (LH) consists of the airbag sensor assembly and seat belt pretensioner (LH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0136/74 is recorded when an open is detected in the P/T squib (LH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0136/74	●Open circuit in PL+ wire harness or PL– wire harness of squib ●P/T squib (LH) malfunction ●Airbag sensor assembly malfunction	●Seat belt pretensioner (LH) ●Airbag sensor assembly ●Wire harness

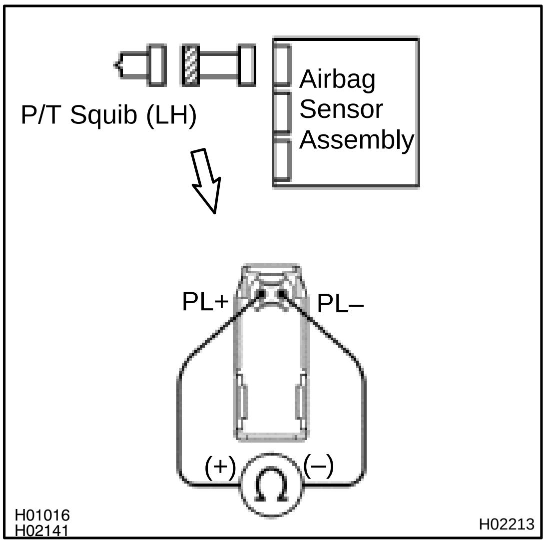
WIRING DIAGRAM

See page DI–743.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–787)**

2	**Check P/T squib (LH) circuit.**



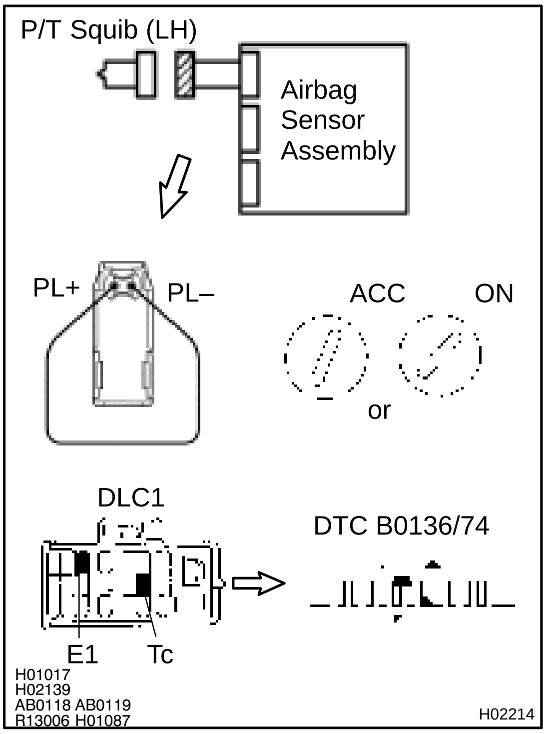
CHECK:
For the connector (on the seat belt pretensioner side) between the seat belt pretensioner (LH) and the airbag sensor assembly, measure the resistance between PL+ and PL–.

OK:
Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between seat belt pretensioner (LH) and airbag sensor assembly.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect PL+ and PL– of the connector (on the seat belt pretensioner side) between the seat belt pretensioner (LH) and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

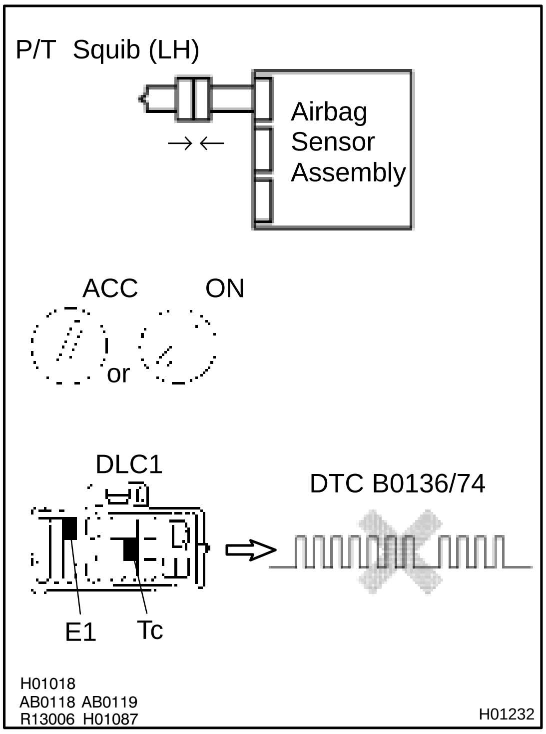
DTC B0136/74 is not output.

HINT:
Codes other than code B0136/74 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check P/T squib (LH).**



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the seat belt pretensioner (LH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See page DI–626)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–626)

OK:

DTC B0136/74 is not output.

HINT:
Codes other than code B0136/74 may be output at this time, but they are not relevant to this check.

NG	**Replace seat belt pretensioner (LH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI1BK–10

DTC	B0137/71	Short in P/T Squib (LH) Circuit (to Ground)

CIRCUIT DESCRIPTION

The P/T squib (LH) circuit consists of the airbag sensor assembly and seat belt pretensioner (LH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0137/71 is recorded when a ground short is detected in the P/T squib (LH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0137/71	●Short circuit in P/T squib (LH) wire harness (to ground) ●P/T squib (LH) malfunction ●Airbag sensor assembly malfunction	●Seat belt pretensioner (LH) ●Airbag sensor assembly ●Wire harness

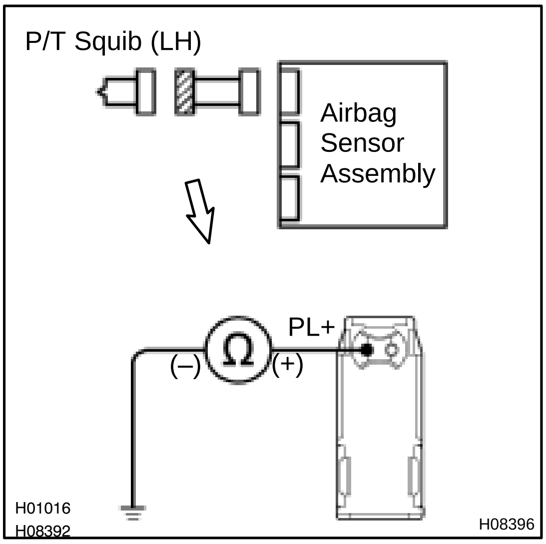
WIRING DIAGRAM

See page DI–743.

INSPECTION PROCEDURE

1	Prepare for inspection. (See step 1 on page DI–787)

2	Check P/T squib (LH) circuit.



CHECK:

For the connector (on the seat belt pretensioner side) between the seat belt pretensioner (LH) and the airbag sensor assembly, measure the resistance between PL+ and body ground.

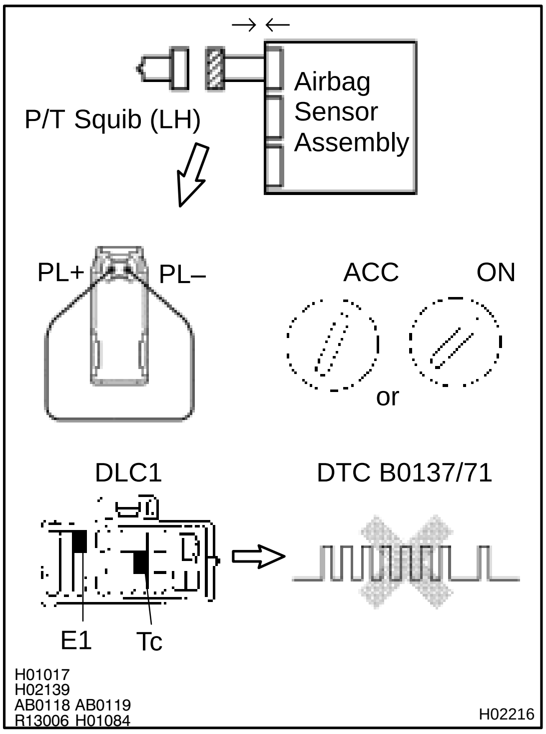
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between seat belt pretensioner (LH) and airbag sensor assembly.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect PL+ and PL– of the connector (on the seat belt pretensioner side) between the seat belt pretensioner (LH) and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

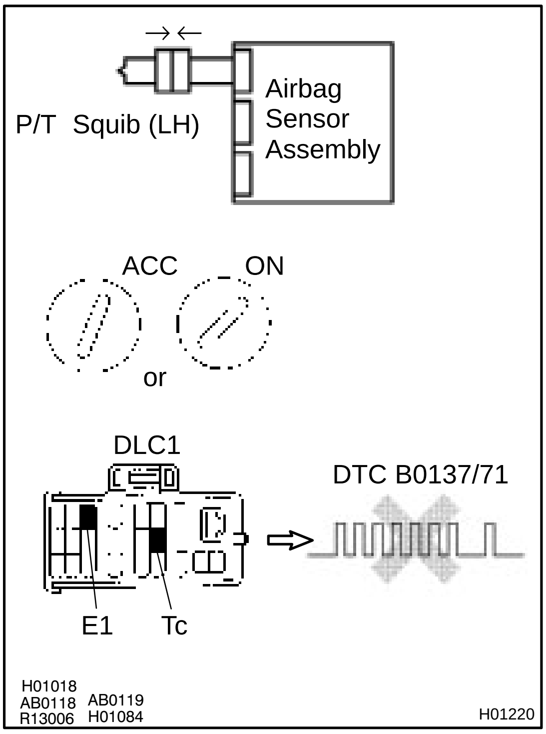
DTC B0137/71 is not output.

HINT:
Codes other than code B0137/71 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check P/T squib (LH).**



PREPARATION:

(a) Turn ignition switch to LOCK.

(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the seat belt pretensioner (LH) connector.

(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

DTC B0137/71 is not output.

HINT:
Codes other than code B0137/71 may be output at this time, but they are not relevant to this check.

NG	**Replace seat belt pretensioner (LH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI1BL–14

DTC	B0138/72	Short in P/T Squib (LH) Circuit (to B+)

CIRCUIT DESCRIPTION

The P/T squib (LH) circuit consists of the airbag sensor assembly and seat belt pretensioner (LH).
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS–2.
DTC B0138/72 is recorded when a B+ short is detected in the P/T squib (LH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0138/72	●Short circuit in seat belt pretensioner (LH) wire harness (to B+) ●P/T squib (LH) malfunction ●Airbag sensor assembly malfunction	●Seat belt pretensioner (LH) ●Airbag sensor assembly ●Wire harness

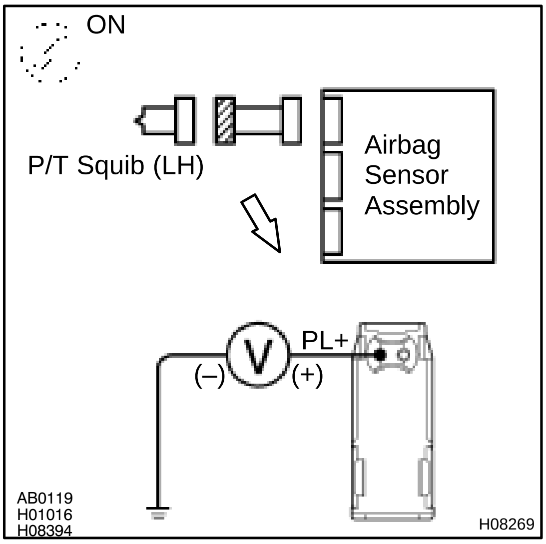
WIRING DIAGRAM

See page DI–743.

INSPECTION PROCEDURE

1	Prepare for inspection. (See step 1 on page DI–787)

2	Check P/T squib (LH) circuit.



CHECK:

(a) Turn ignition switch to ON.

(b) For the connector (on the seat belt pretensioner side) between the seat belt pretensioner (LH) and the airbag sensor assembly, measure the voltage between PL+ and body ground.

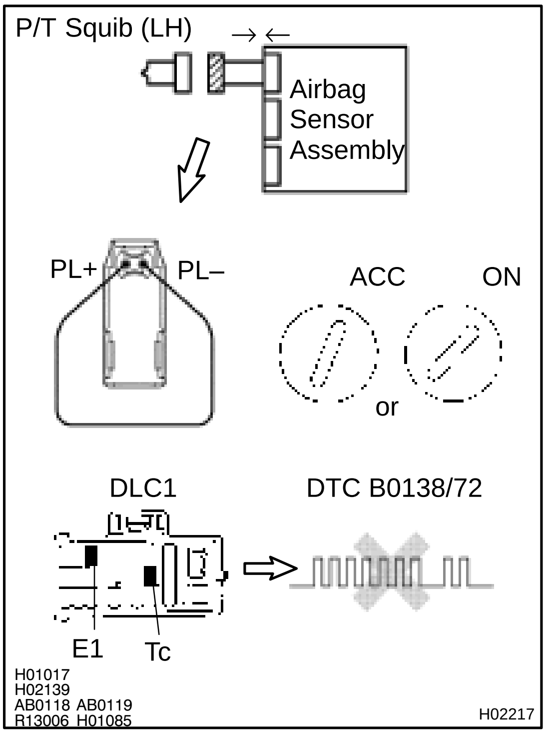
OK:

Voltage: 0 V

NG → **Repair or replace harness or connector between seat belt pretensioner (LH) and airbag sensor assembly.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect PL+ and PL– of the connector (on the seat belt pretensioner side) between the seat belt pretensioner (LH) and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

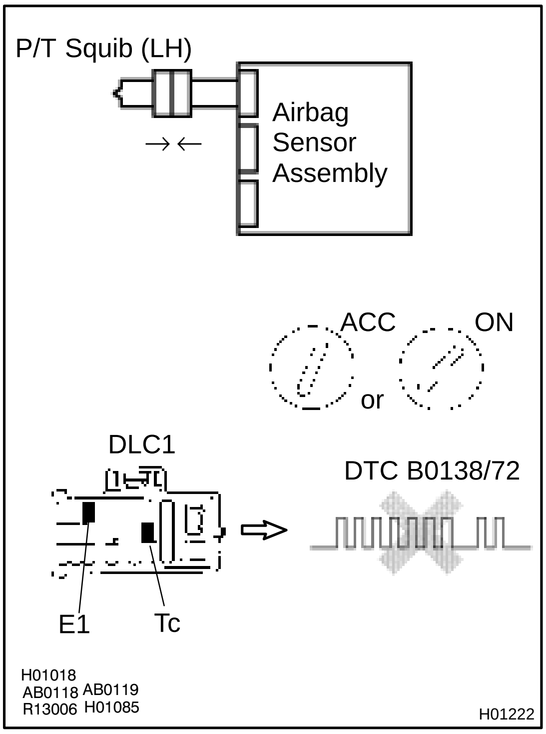
DTC B0138/72 is not output.

HINT:
Codes other than code B0138/72 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check P/T squib (LH).**



PREPARATION:

(a) Turn ignition switch to LOCK.

(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the seat belt pretensioner (LH) connector.

(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

DTC B0138/72 is not output.

HINT:
Codes other than code B0138/72 may be output at this time, but they are not relevant to this check.

NG	**Replace seat belt pretensioner (LH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI1BM–18

DTC	B1100/31	Airbag Sensor Assembly Malfunction

CIRCUIT DESCRIPTION

The airbag sensor assembly consists of a airbag sensor, safing sensor, drive circuit, diagnosis circuit and ignition control, etc.
It receives signals from the airbag sensor, judges whether or not the SRS must be activated, and detects diagnosis system malfunction.
DTC B1100/31 is recorded when occurrence of a malfunction in the airbag sensor assembly is detected.

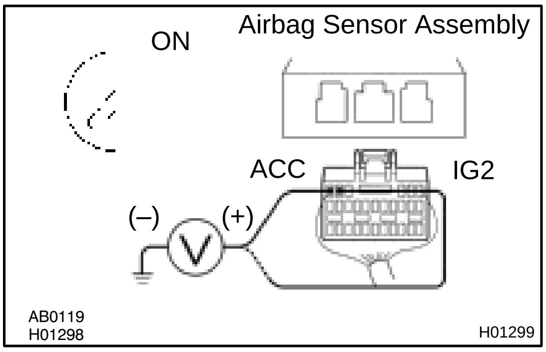
DTC No.	DTC Detecting Condition	Trouble Area
B1100/31	●Airbag sensor assembly malfunction	●Airbag sensor assembly

INSPECTION PROCEDURE

HINT:
When a malfunction code other than code B1100/31 is displayed at the same time, first repair the malfunction indicated by the malfunction code other than code B1100/31.

1	**Prepare for inspection. (See step 1 on page DI–787)**

2	**Check voltage at IG2 and ACC of airbag sensor assembly.**



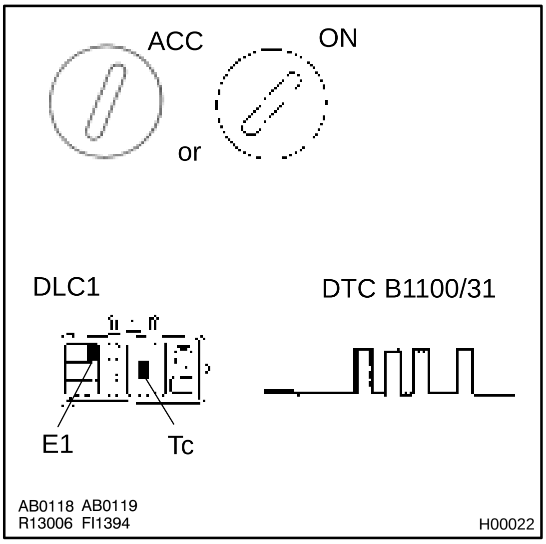
CHECK:
(a) Turn ignition switch to ON.
(b) Measure the voltage between body ground and terminals each of IG2 and ACC of the airbag sensor assembly connector.

OK:
Voltage: 10 – 14 V

NG → **Check that an abnormality occurs on the battery and charging system.**

OK

3	**Is DTC B1100/31 output again?**



PREPARATION:

Clear DTC.

(See step 5 on page DI–626)

CHECK:

(a) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(b) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(c) Repeat operation in step (a) and (b) at least 5 times.

(d) Check DTC.
(See page DI–626)

HINT:

Codes other than code B1100/31 may be output at this time, but they are not relevant to this check.

NO → **Using simulation method, reproduce malfunction symptoms. (See page IN–21)**

YES

Replace airbag sensor assembly.

DI4L8–01

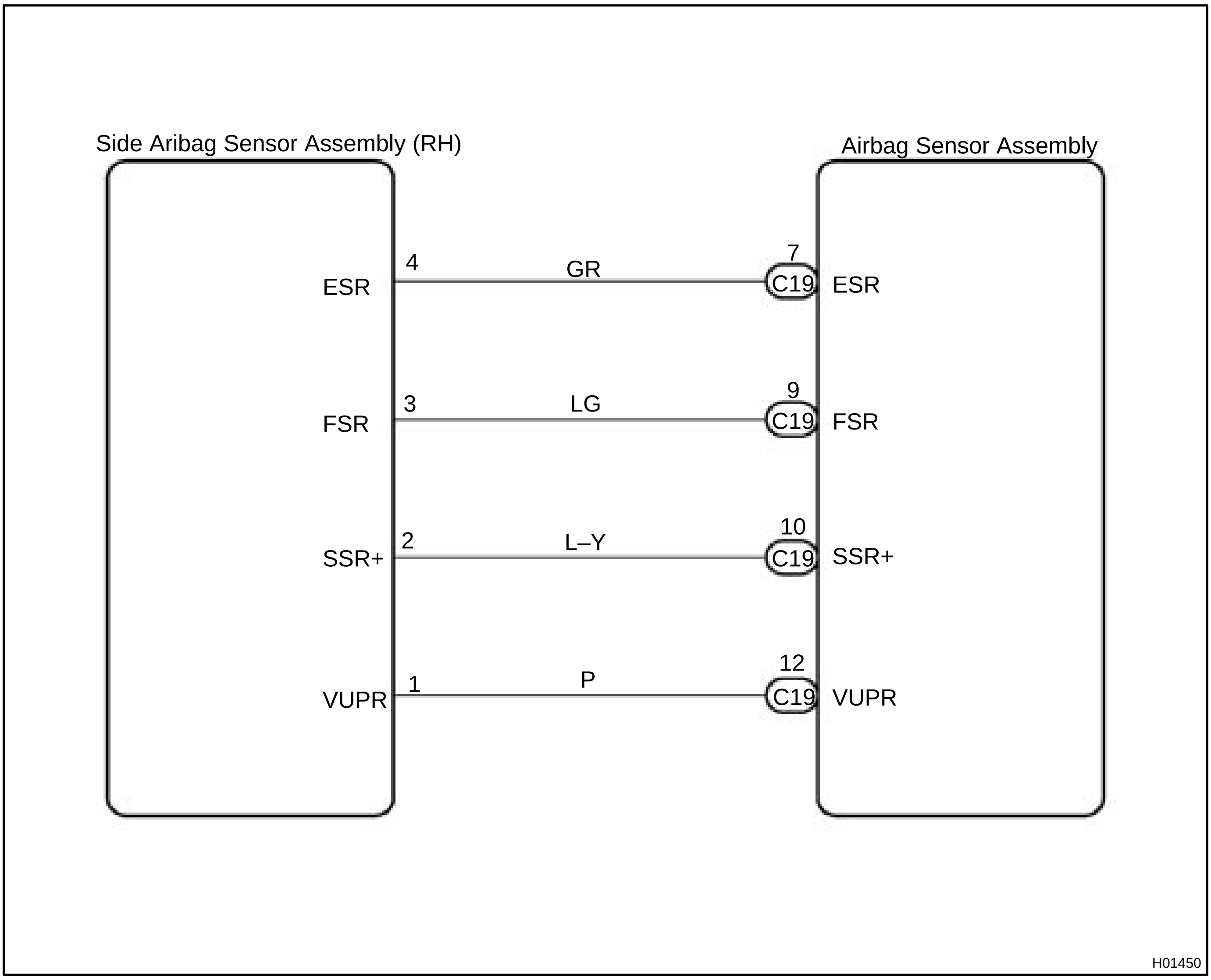
DTC	B1140/32	Side Airbag Sensor Assembly (RH) Malfunction

CIRCUIT DESCRIPTION

The side airbag sensor assembly (RH) consists of the safing sensor, diagnosis circuit and lateral deceleration sensor, etc.
It receives signals from the lateral deceleration sensor, judges whether or not the SRS must be activated, and diagnosis system malfunction.
DTC B1140/32 is recorded when occurrence of a malfunction in the side airbag sensor assembly (RH) is detected.

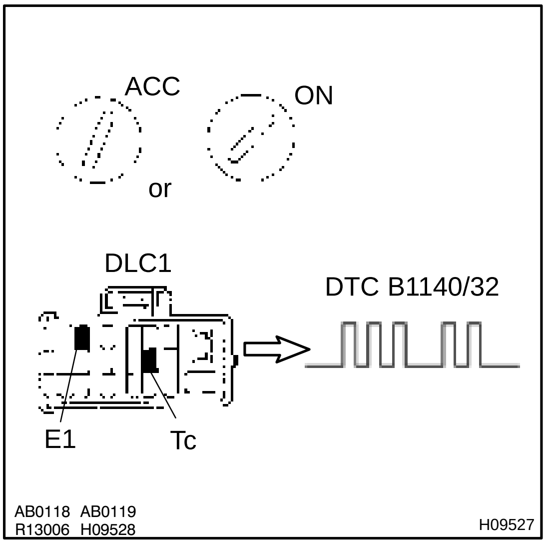
DTC No.	DTC Detecting Condition	Trouble Area
B1140/32	●Side airbag sensor assembly (RH) malfunction	●Side airbag sensor assembly (RH) ●Wire harness ●Airbag sensor assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Is DTC B1140/32 out put?



CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

HINT:
Codes other than code B1140/32 may be output at this time, but they are not relevant to this check.

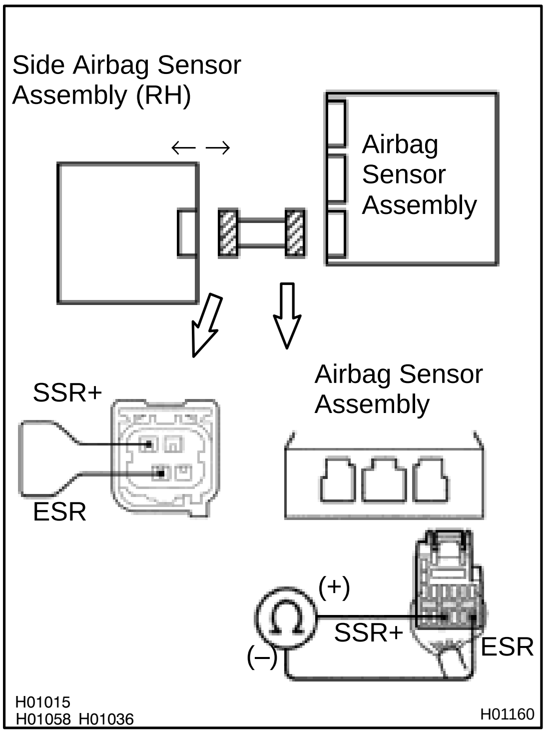
YES → **The malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.**

NO

2	Is connector of side airbag sensor assembly (RH) properly connected?

3	Prepare for inspection. (See step 1 on DI–787)

4	Check wire harness.



PREPARATION:

(a) Disconnect the side airbag sensor assembly (RH) connector.

(b) Using a service wire, connect SSR+ and ESR of the connector (on the side airbag sensor assembly side) between the side airbag sensor assembly (RH) and airbag sensor assembly.

CHECK:

For the connector (on the airbag sensor assembly side) between the side airbag sensor assembly (RH) and the airbag sensor assembly, measure the resistance between SSR+ and ESR.

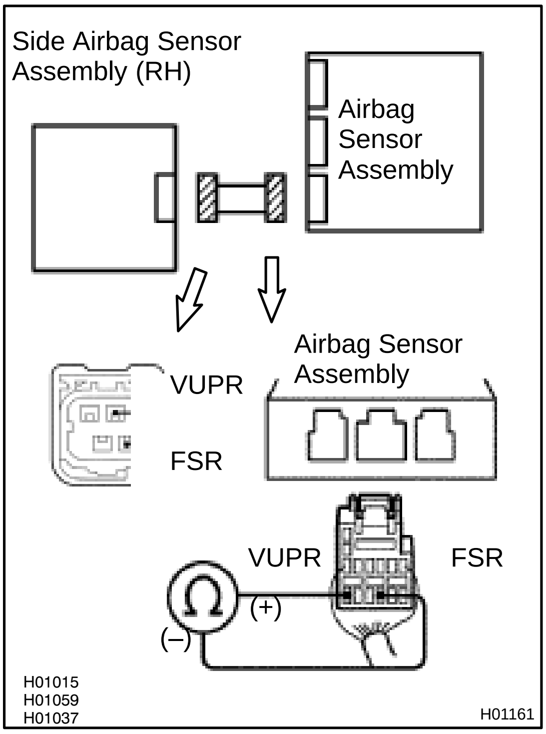
OK:

Resistance: Below 1 Ω

NG	Repair or replace harness or connector between side airbag sensor assembly (RH) and airbag sensor assembly.

OK

5	Check wire harness.



PREPARATION:

Using a service wire, connect VUPR and FSR of the connector (on the side airbag sensor assembly side) between the side airbag sensor assembly (RH) and airbag sensor assembly.

CHECK:

For the connector (on the airbag sensor assembly side) between the side airbag sensor assembly (RH) and the airbag sensor assembly, measure the resistance between VUPR and FSR.

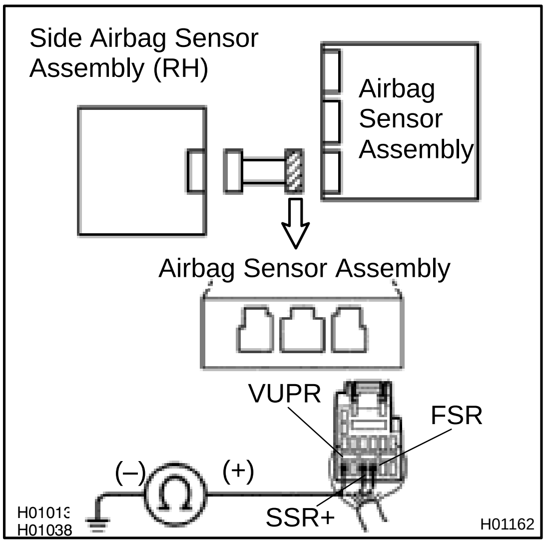
OK:

Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between side airbag sensor assembly (RH) and airbag sensor assembly.**

OK

6	Check wire harness (to ground).

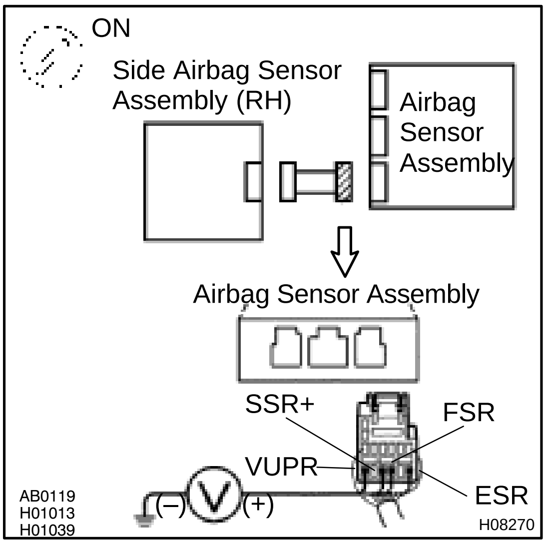


CHECK:
For the connector (on the airbag sensor assembly side) between the side airbag sensor assembly (RH) and the airbag sensor assembly, measure the resistance between body ground and each of SSR+, VUPR and FSR.
OK:
Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between side airbag sensor assembly (RH) and airbag sensor assembly.**

OK

7	Check wire harness (to B+).

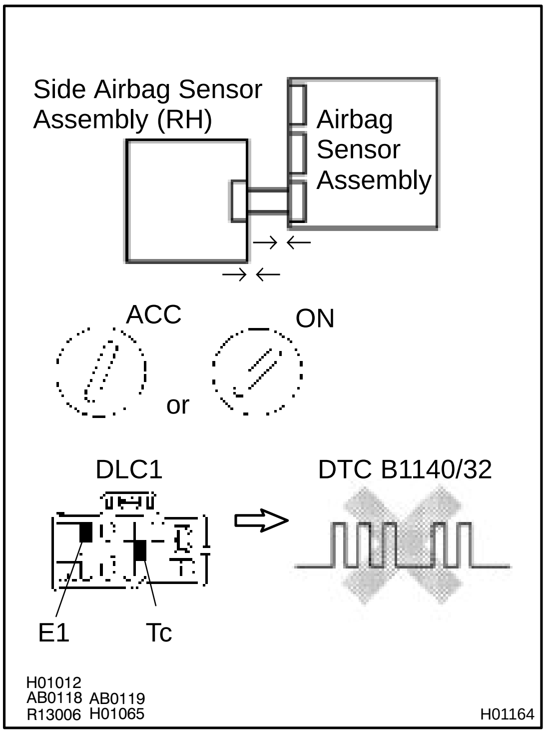


CHECK:
(a) Turn ignition switch to ON.
(b) For the connector (on the airbag sensor assembly side) between the side airbag sensor assembly (RH) and the airbag sensor assembly, measure the voltage between the body ground and each of SSR+, VUPR, ESR and FSR.
OK:
Voltage: 0 V

NG → **Repair or replace harness or connector between side airbag sensor assembly (RH) and airbag sensor assembly.**

OK

8	**Is DTC B1140/32 out put again?**



PREPARATION:

(a) Connect the connector to the side airbag sensor assembly (RH).

(b) Connect the connector to the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

DTC B1140/32 is not output.

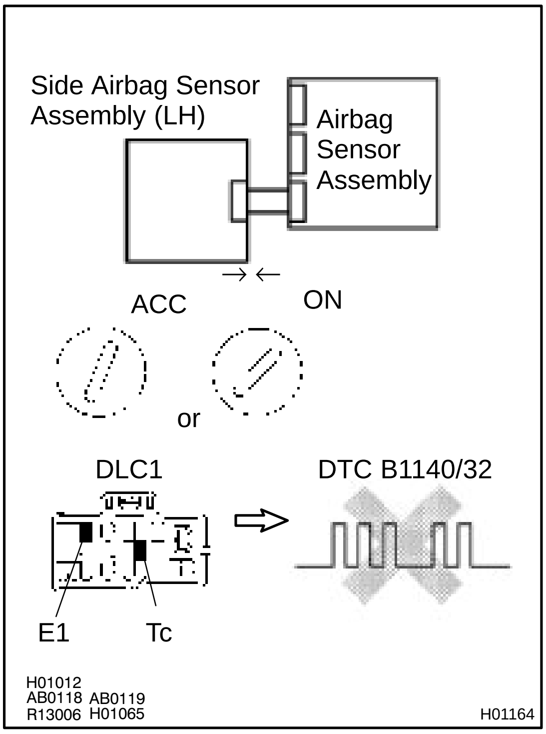
HINT:
Codes other than code B1140/32 may be output at this time, but they are not relevant to this check.

NG	**Go to step 9.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

9	Check airbag sensor assembly.



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the side airbag sensor (RH) from the connector and connect the side airbag sensor (LH) to the connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See step 5 on page DI–626)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–626)

OK:

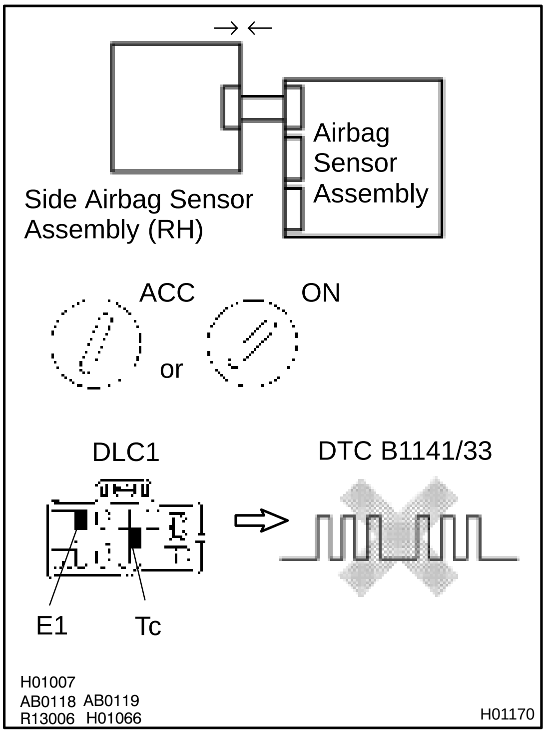
DTC B1140/32 is not output.

HINT:
Codes other than code B1140/32 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

10	**Check side airbag sensor assembly (RH).**



PREPARATION:

(a) Turn ignition switch to LOCK.

(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the side airbag sensor (RH) to the connector that the side airbag sensor (LH) was connected to.

(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

DTC B1141/33 is not output.

HINT:

Codes other than code B1141/33 may be output at this time, but they are not relevant to this check.

NG	**Replace side airbag sensor assembly (RH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI4L9–01

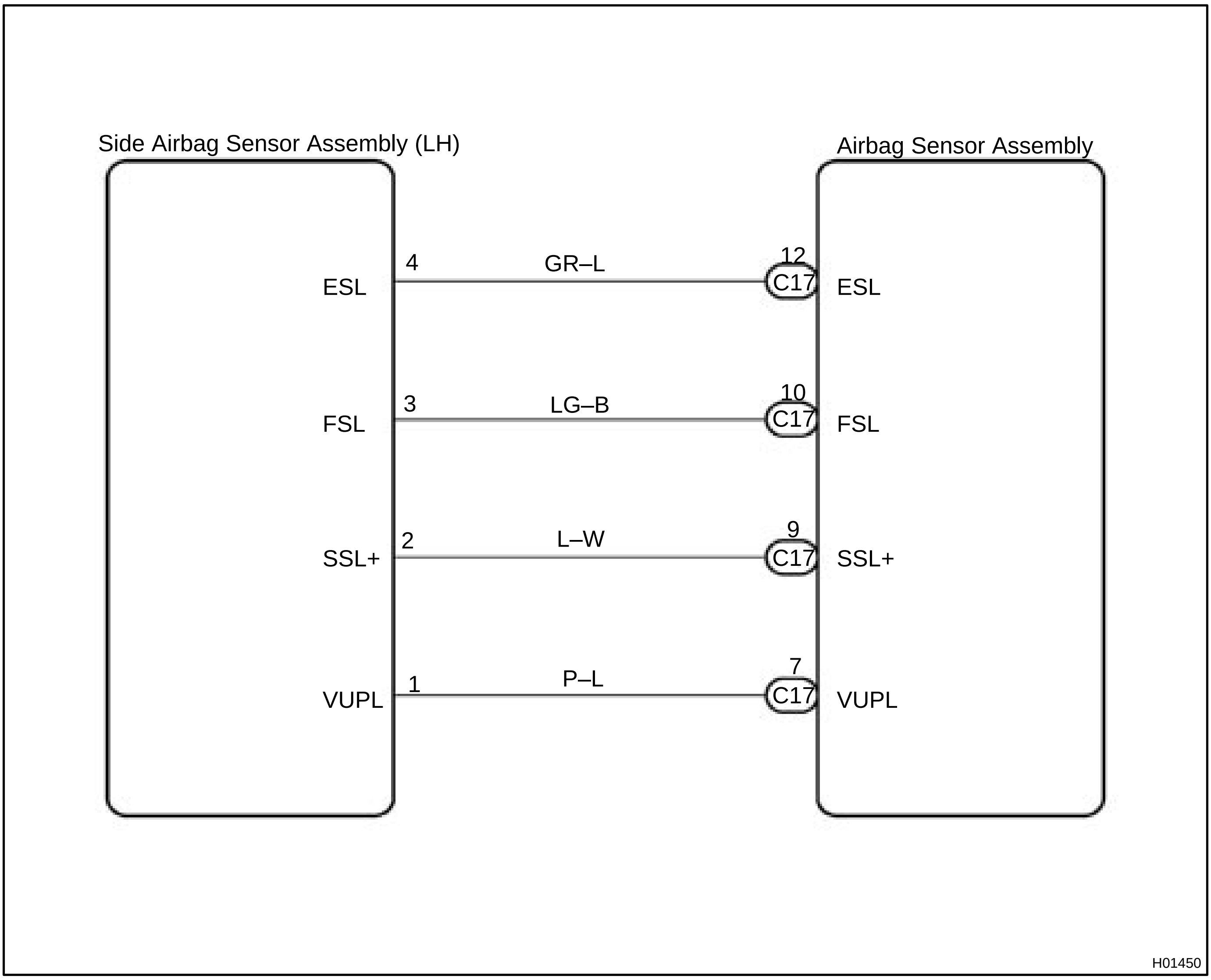
DTC	B1141/33	Side Airbag Sensor Assembly (LH) Malfunction

CIRCUIT DESCRIPTION

The side airbag sensor assembly (LH) consists of the safing sensor, diagnosis circuit and lateral deceleration sensor, etc.
It receives signals from the lateral deceleration sensor, judges whether or not the SRS must be activated, and diagnosis system malfunction.
DTC B1141/33 is recorded when occurrence of a malfunction in the side airbag sensor assembly (LH) is detected.

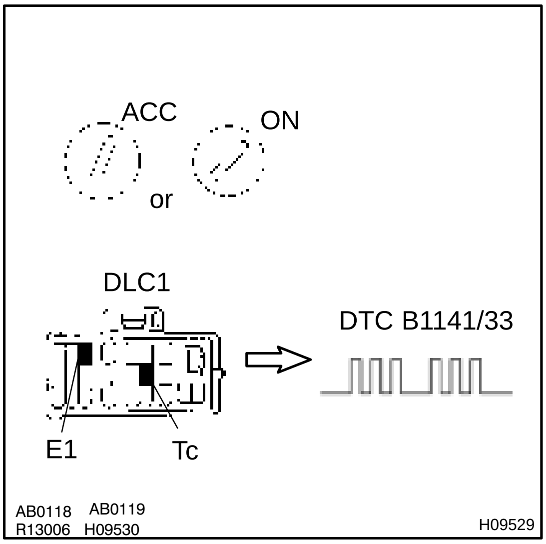
DTC No.	DTC Detecting Condition	Trouble Area
B1141/33	•Side airbag sensor assembly (LH) malfunction	•Side airbag sensor assembly (LH) •Wire harness •Airbag sensor assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Is DTC B1141/33 out put?**



CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

HINT:
Codes other than code B1141/33 may be output at this time, but they are not relevant to this check.

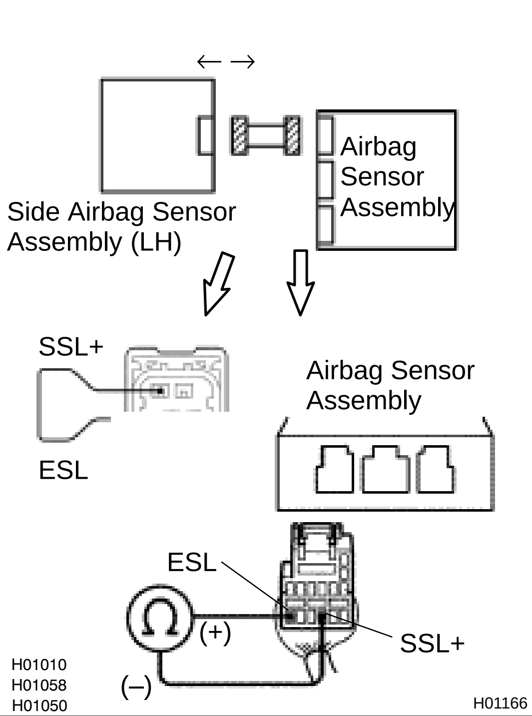
YES → **The malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.**

NO

2	**Is connector of side airbag sensor assembly (LH) properly connected?**

3	**Prepare for inspection. (See step 1 on page DI–787)**

4	**Check wire harness.**



PREPARATION:

(a) Disconnect the side airbag sensor assembly (LH).

(b) Using a service wire, connect SSL+ and ESL of the connector (on the side airbag sensor assembly side) between the side airbag sensor assembly (LH) and the airbag sensor assembly.

CHECK:

For the connector (on the airbag sensor assembly side) between the side airbag sensor assembly (LH) and the airbag sensor assembly, measure the resistance between SSL+ and ESL.

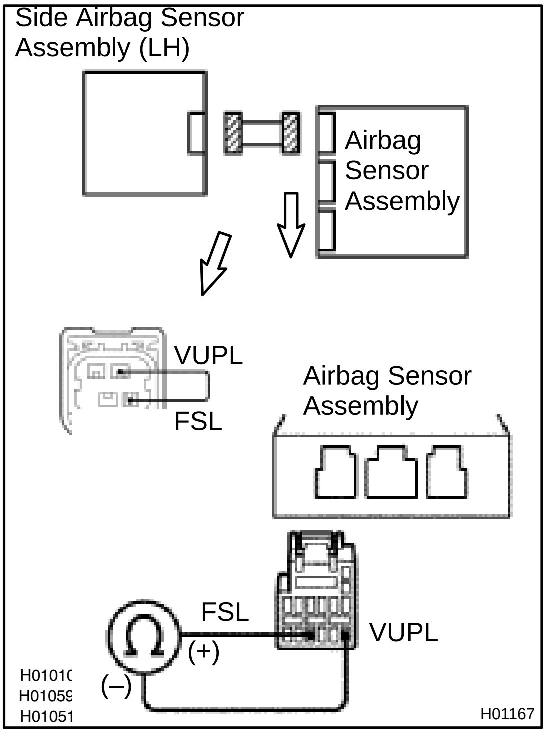
OK:

Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between side airbag sensor assembly (LH) and airbag sensor assembly.**

OK

5	Check wire harness.



PREPARATION:

Using a service wire, connect VUPL and FSL of the connector (on the side airbag sensor assembly side) between the side airbag sensor assembly (LH) and the airbag sensor assembly.

CHECK:

For the connector (on the airbag sensor assembly side) between the side airbag sensor assembly (LH) and the airbag sensor assembly, measure the resistance between VUPL and FSL.

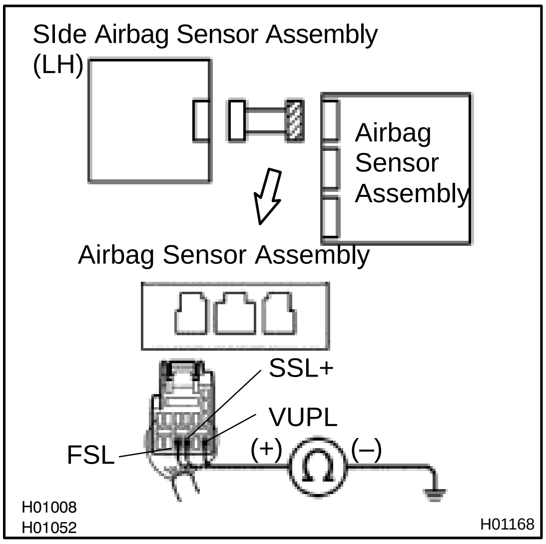
OK:

Resistance: Below 1 Ω

NG	Repair or replace harness or connector between side airbag sensor assembly (LH) and airbag sensor assembly.

OK

6	**Check wire harness (to ground).**



CHECK:

For the connector (on the airbag sensor assembly side) between the side airbag sensor assembly (LH) and the airbag sensor assembly, measure the resistance between body ground and each of SSL+, VUPL and FSL.

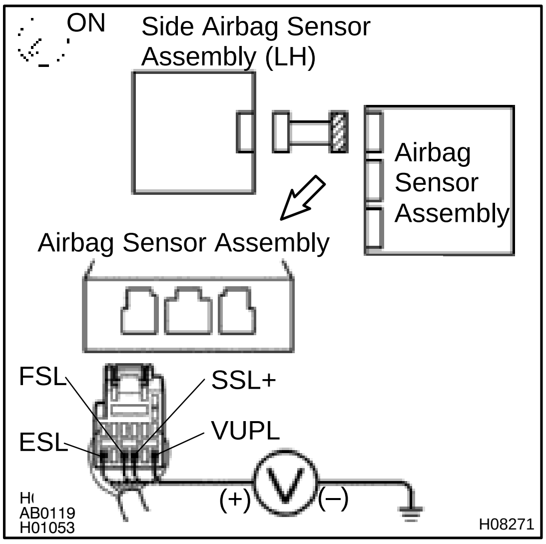
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between side airbag sensor assembly (LH) and airbag sensor assembly.**

OK

7	**Check wire harness (to B+).**



CHECK:

(a) Turn ignition switch to ON.

(b) For the connector (on the airbag sensor assembly side) between the side airbag sensor assembly (LH) and the airbag sensor assembly, measure the voltage between body ground and each of SSL+, ESL, VUPL and FSL.

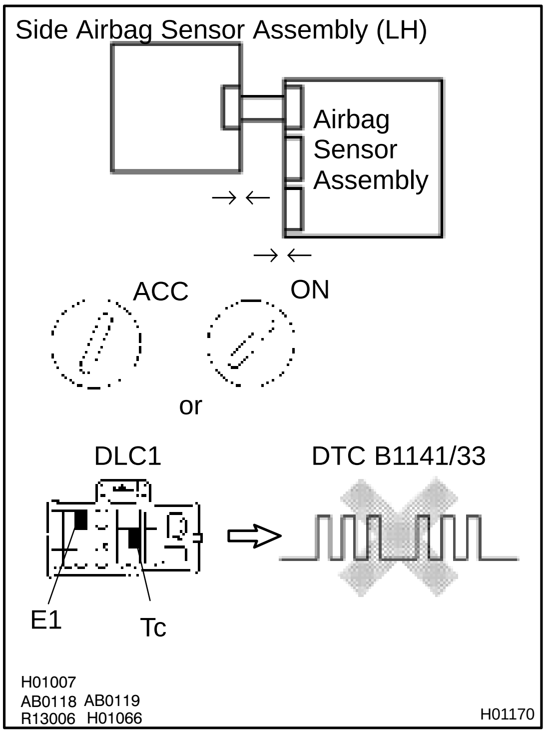
OK:

Voltage: 0 V

NG → **Repair or replace harness or connector between side airbag sensor assembly (LH) and airbag sensor assembly.**

OK

8	**Is DTC B1141/33 out put again?**



PREPARATION:
(a) Connect the connector to the side airbag sensor assembly (LH).
(b) Connect the connector to the airbag sensor assembly.
(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:
(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See step 5 on page DI–626)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–626)

OK:
DTC B1141/33 is not output.

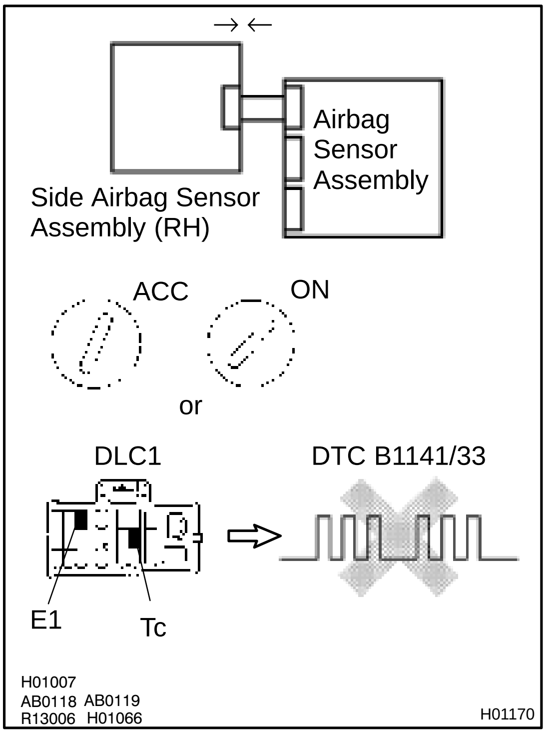
HINT:
Codes other than code B1141/33 may be output at this time, but they are not relevant to this check.

NO	**Go to step 9.**

YES

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

9	Check airbag sensor assembly.



PREPARATION:

(a) Turn ignition switch to LOCK.

(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(c) Disconnect the side airbag sensor (LH) from the connector and connect the side airbag sensor (RH) to the connector.

(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

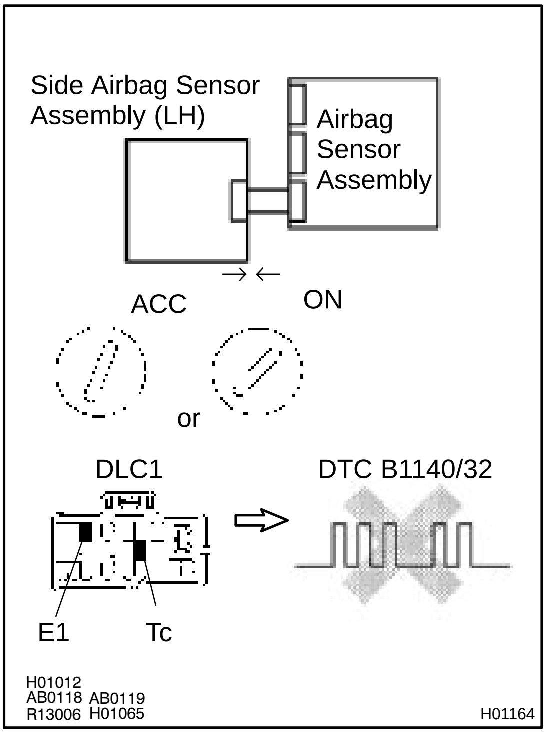
DTC B1141/33 is not output.

HINT:
Codes other than code B1141/33 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

10	**Check side airbag sensor assembly (LH).**



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the side airbag sensor (LH) to the connector that the side airbag sensor (RH) was connected to.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See page DI–626)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–626)

OK:

DTC B1140/32 is not output.

HINT:
Codes other than code B1140/32 may be output at this time, but they are not relevant to this check.

NG	**Replace side airbag sensor assembly (LH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI4LA–01

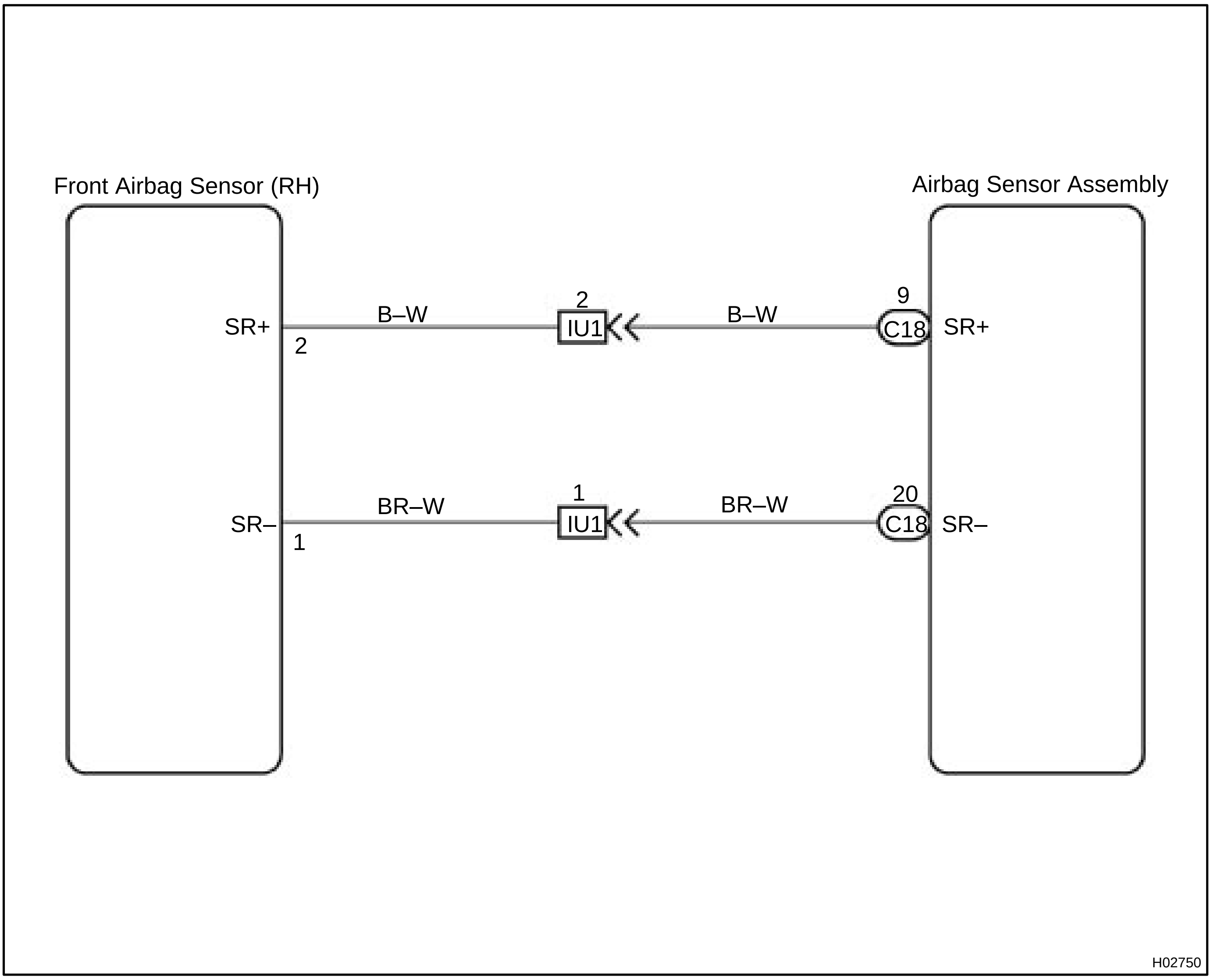
DTC	B1156/B1157/15	Front Airbag Sensor (RH) Malfunction

CIRCUIT DESCRIPTION

The front airbag sensor (RH) circuit consists of the airbag sensor assembly and front airbag sensor (RH).
For details of the function of each component, see OPERATION on page RS–2.
DTC B1156/B1157/15 is recorded when malfunction is detected in the front airbag sensor (RH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1156/B1157/15	●Front airbag sensor (RH) malfunction	●Front airbag sensor (RH) ●Wire harness ●Engine room main wire harness ●Airbag sensor assembly

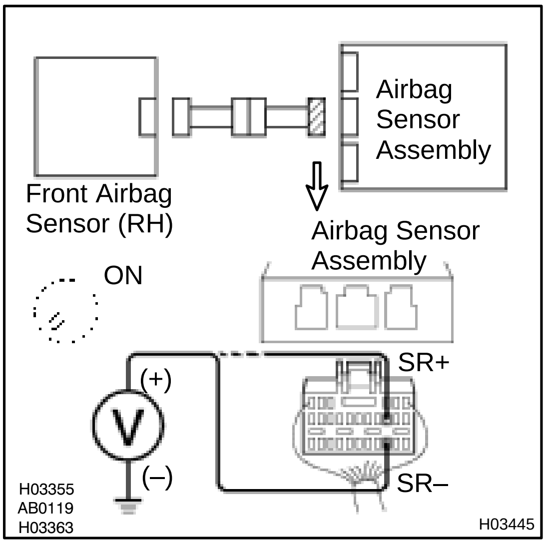
WIRING DIAGRAM



INSPECTION PROCEDURE

1	Prepare for inspection. (See step 1 on page DI–787)

2	Check wire harness (to B+).



CHECK:

(a) Turn ignition switch to ON.

(b) For the connector (on the airbag sensor assembly side) between the front airbag sensor (RH) and the airbag sensor assembly, measure the voltage between body ground and each of SR+ and SR–.

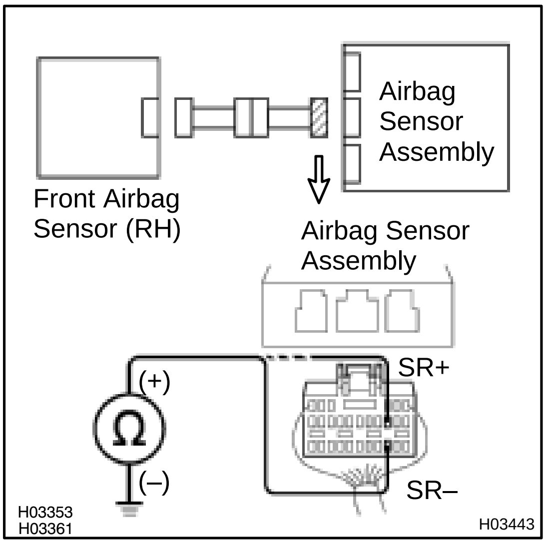
OK:

Voltage: Below 1 V

NG	Go to step 8.

OK

3	Check wire harness (to ground).



CHECK:

For the connector (on the airbag sensor assembly side) between the front airbag sensor (RH) and the airbag sensor assembly, measure the resistance between body ground and each of SR+ and SR–.

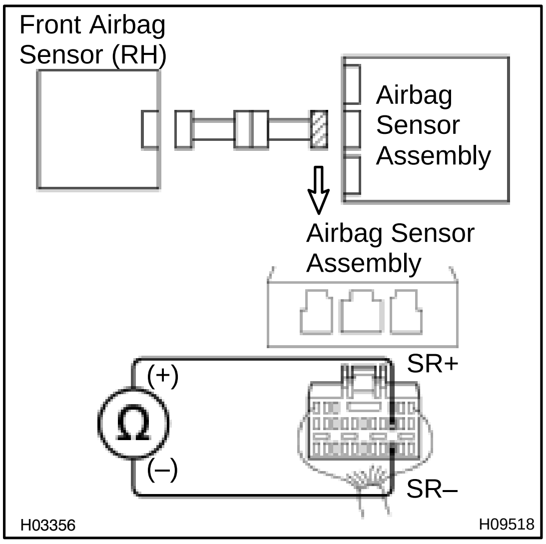
OK:

Resistance: 1 MΩ or Higher

NG	Go to step 9.

OK

4	**Check wire harness.**

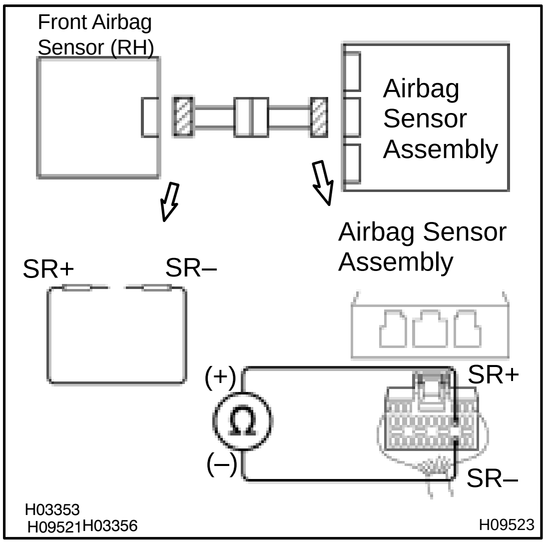


CHECK:
For the connector (on the airbag sensor assembly side) between the front airbag sensor (RH) and the airbag sensor assembly, measure the resistance between SR+ and SR–.
OK:
Resistance: 1 MΩ or Higher

NG	Go to step 10.

OK

5	**Check wire harness.**

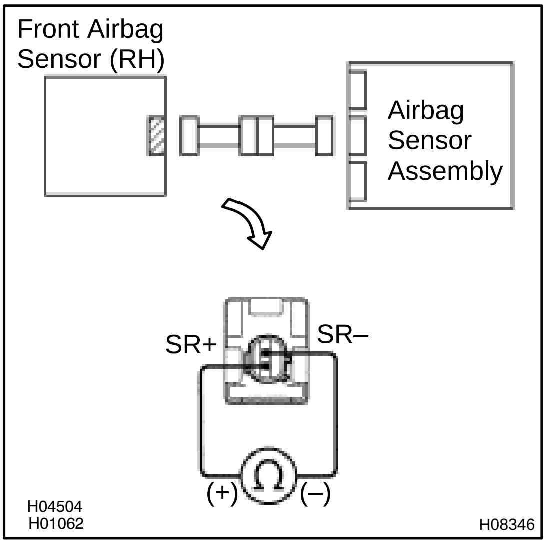


PREPARATION:
Using a service wire, connect SR+ and SR– of the connector (on the front airbag sensor (RH) side) between the airbag sensor assembly and the front airbag sensor (RH).
CHECK:
For the connector (on the airbag sensor assembly side) between the front airbag sensor (RH) and the airbag sensor assembly, measure the resistance between SR+ and SR–.
OK:
Resistance: Below 1 Ω

NG	Go to step 11.

OK

6	**Check front airbag sensor (RH).**



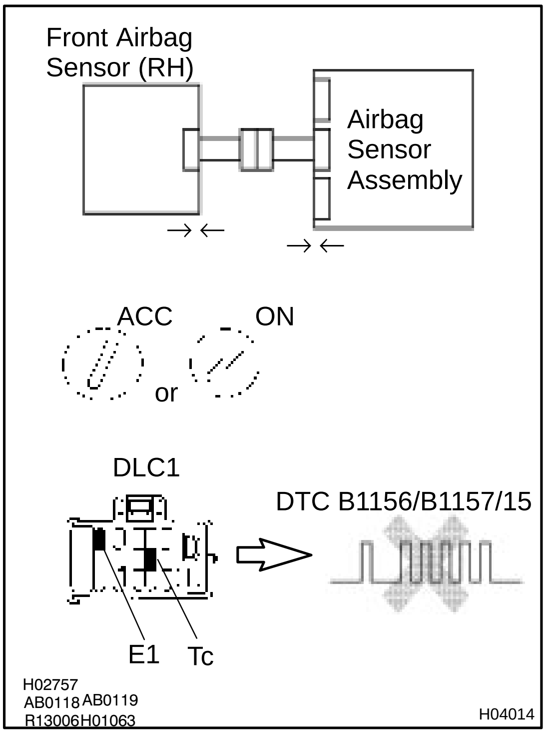
CHECK:
For the connector (on the front airbag sensor (RH)), measure the resistance between SR+ and SR–.

OK:
Resistance: 300 – 1500 Ω

NG → **Replace front airbag sensor (RH).**

OK

7	**Check airbag sensor assembly.**



PREPARATION:

(a) Turn ignition switch to LOCK.

(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the front airbag sensor (RH) connector and airbag sensor assembly connector.

(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See Pub. No. RM572E1 on page DI–95)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See Pub. No. RM572E1 on page DI–95)

OK:

DTC B1156/B1157/15 is not output.

HINT:

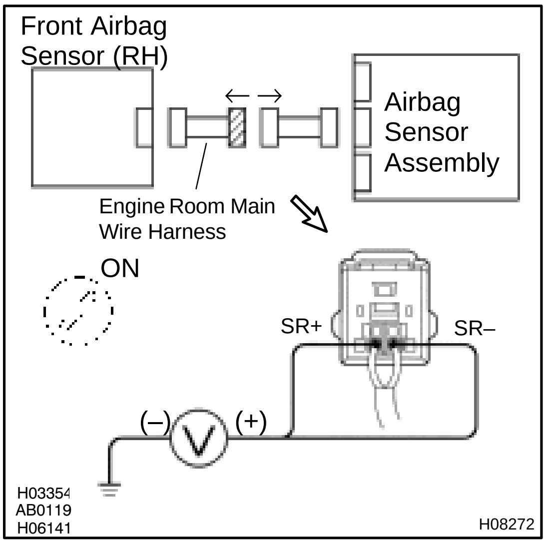
Codes other than code B1156/B1157/15 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

8	Check engine room main wire harness (to B+).



PREPARATION:

Disconnect the engine room main wire harness connector on the airbag sensor assembly side.

CHECK:

(a) Turn ignition switch to ON.

(b) For the connector (on the RH front door wire harness side) between the airbag sensor assembly and the engine room main wire harness, measure the voltage between body ground and each of SR+ and SR–.

OK:

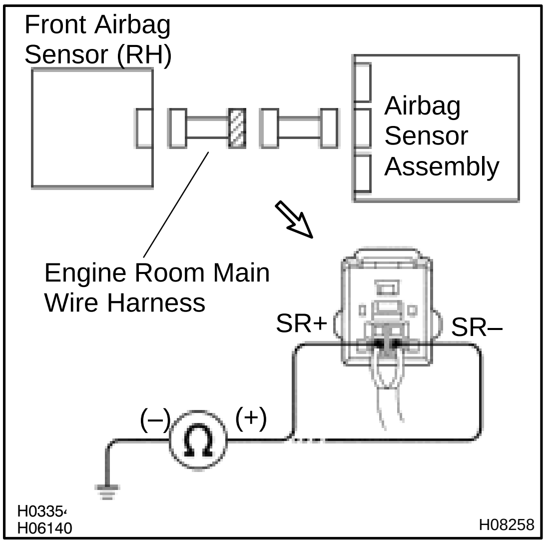
Voltage: Below 1 V

NG → **Repair or replace engine room main wire harness.**

OK

Repair or replace harness or connector between airbag sensor assembly and engine room main wire harness.

9	Check engine room main wire harness (to ground).



PREPARATION:

Disconnect the engine room main wire harness connector on the airbag sensor assembly side.

CHECK:

For the connector (on the engine room main wire harness side) between the airbag sensor assembly and the engine room main wire harness, measure the resistance between body ground and each of SR+ and SR–.

OK:

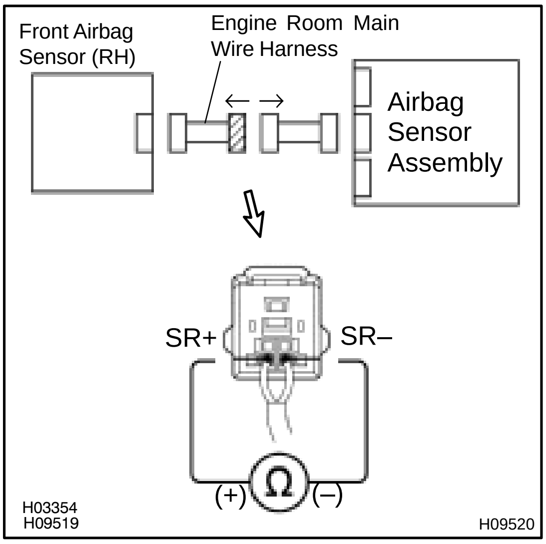
Resistance: 1 MΩ or Higher

NG → **Repair or replace engine room main wire harness.**

OK

Repair or replace harness or connector between airbag sensor assembly and engine room main wire harness.

10	Check engine room main wire harness.



PREPARATION:
Disconnect the engine room main wire harness connector on the airbag sensor assembly side.

CHECK:
For the connector (on the engine room main wire harness side) between the airbag sensor assembly and the engine room main wire harness, measure the resistance between SR+ and SR–.

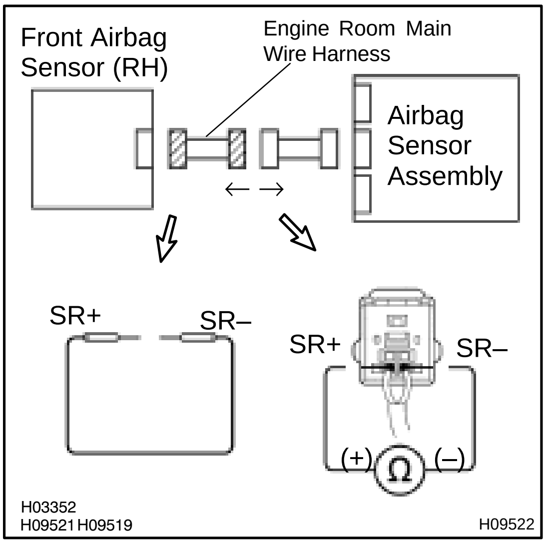
OK:
Resistance: 1 MΩ or Higher

NG → **Repair or replace engine room main wire harness.**

OK ↓

Repair or replace harness or connector between airbag sensor assembly and engine room main wire harness.

11	**Check engine room main wire harness.**



PREPARATION:

(a) Disconnect the engine room main wire harness connector on the airbag sensor assembly side.

(b) Using a service wire, connect SR+ and SR– of the connector (on the engine room main wire harness side) between the engine room main wire harness and the front airbag sensor (RH).

CHECK:

For the connector (on the engine room main wire harness side) between the airbag sensor assembly and the engine room main wire harness, measure the resistance between SR+ and SR–.

OK:

Resistance: Below 1 Ω

NG	**Repair or replace engine room main wire harness.**

OK

Repair or replace harness or connector between airbag sensor assembly and engine room main wire harness.

DI4LB–01

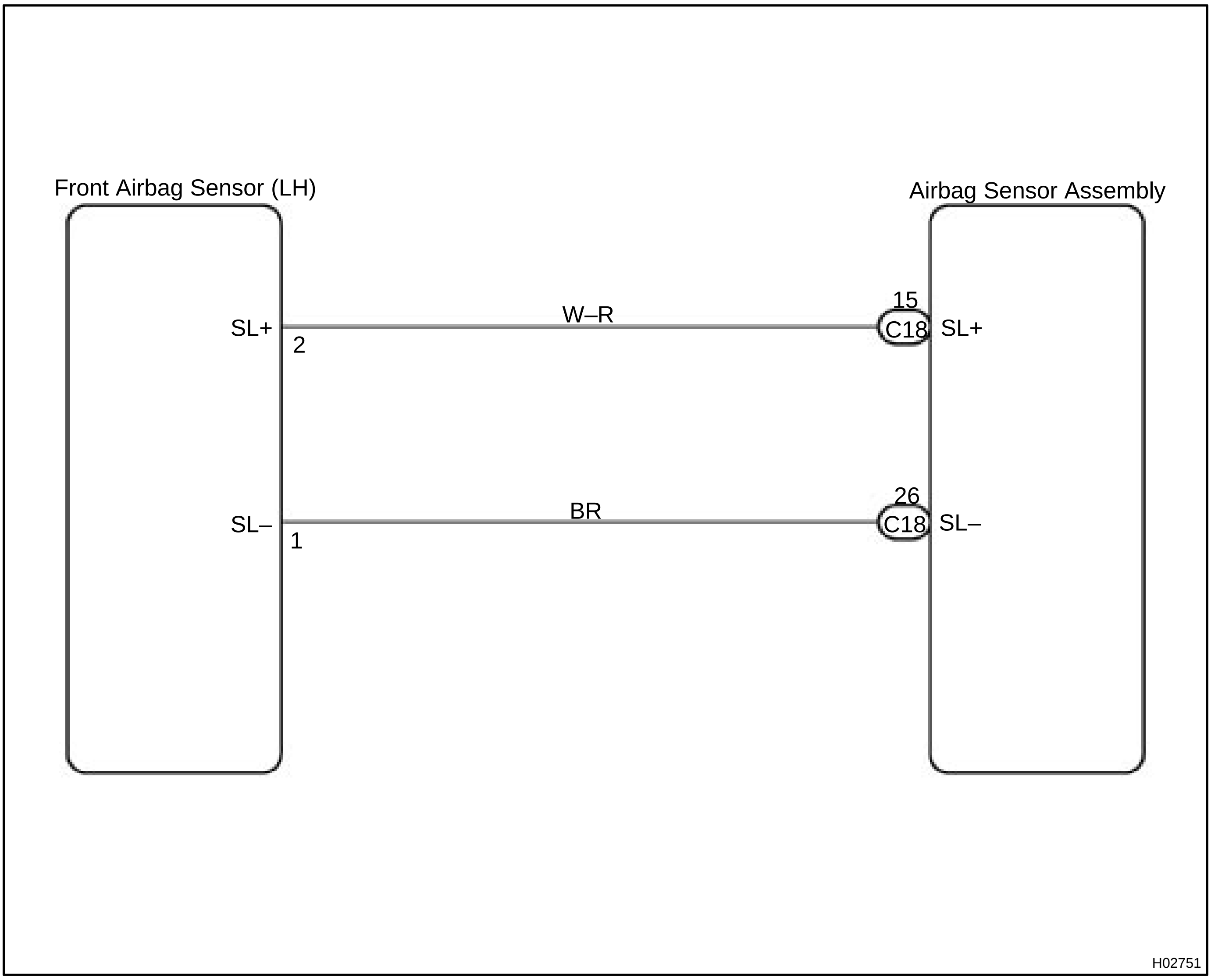
DTC	B1158/B1159/16	Front Airbag Sensor (LH) Malfunction

CIRCUIT DESCRIPTION

The front airbag sensor (LH) circuit consists of the airbag sensor assembly and front airbag sensor (LH).
For details of the function of each component, see OPERATION on page RS–2.
DTC B1158/B1159/16 is recorded when malfunction is detected in the front airbag sensor (LH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1158/B1159/16	●Front airbag sensor (LH) malfunction	●Front airbag sensor (LH) ●Wire harness ●Airbag sensor assembly

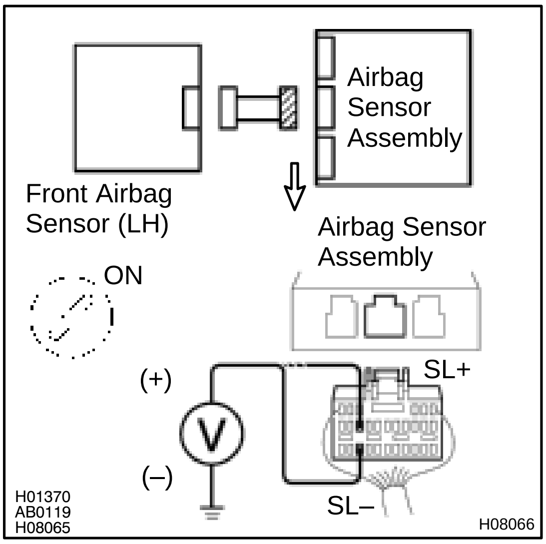
WIRING DIAGRAM



INSPECTION PROCEDURE

1	Prepare for inspection. (See step 1 on page DI–787)

2	Check wire harness (to B+).



CHECK:

(a) Turn ignition switch to ON.

(b) For the connector (on the airbag sensor assembly side) between the front airbag sensor (LH) and the airbag sensor assembly, measure the voltage between body ground and each of SL+ and SL–.

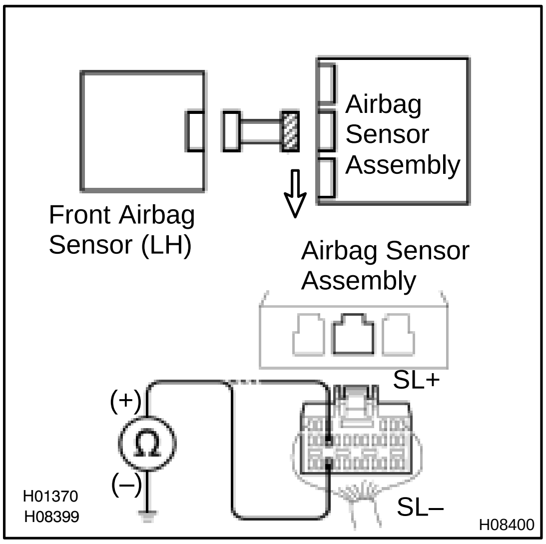
OK:

Voltage: Below 1 V

NG → **Repair or replace harness or connector between front airbag sensor (LH) and airbag sensor assembly.**

OK

3	Check wire harness (to ground).



CHECK:

For the connector (on the airbag sensor assembly side) between the front airbag sensor (LH) and the airbag sensor assembly, measure the resistance between body ground and each of SL+ and SL–.

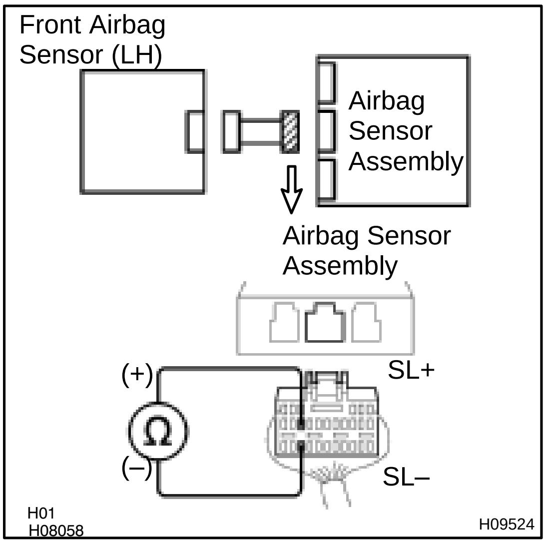
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between front airbag sensor (LH) and airbag sensor assembly.**

OK

4	Check wire harness.



CHECK:

For the connector (on the airbag sensor assembly side) between the front airbag sensor (LH) and the airbag sensor assembly, measure the resistance between SL+ and SL–.

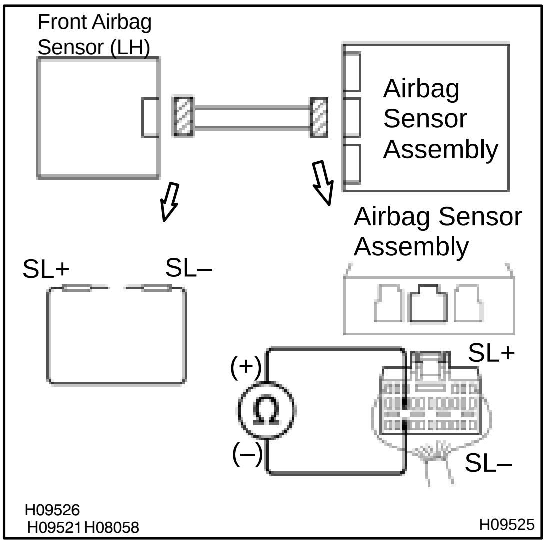
OK:

Resistance: 1 MΩ or Higher

NG	Repair or replace harness or connector between front airbag sensor (LH) and airbag sensor assembly.

OK

5	Check wire harness.



PREPARATION:

Using a service wire, connect SL+ and SL– of the connector (on the front airbag sensor (LH) side) between the airbag sensor assembly and the front airbag sensor (LH).

CHECK:

For the connector (on the airbag sensor assembly side) between the front airbag sensor (LH) and the airbag sensor assembly, measure the resistance between SL+ and SL–.

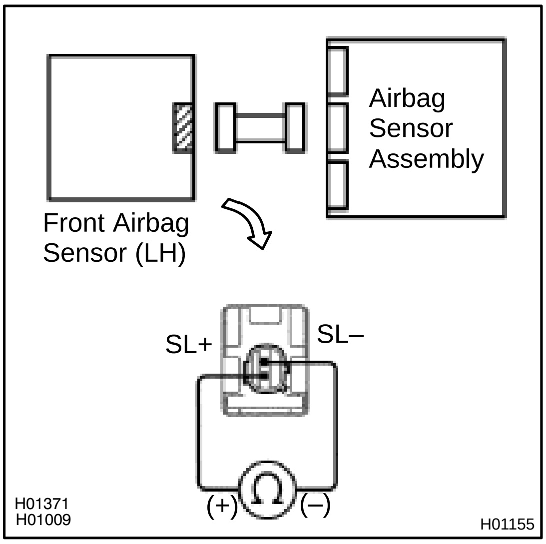
OK:

Resistance: Below 1 Ω

NG	Repair or replace harness or connector between front airbag sensor (LH) and airbag sensor assembly.

OK

6	**Check front airbag sensor (LH).**



CHECK:

For the connector (on the front airbag sensor (LH)), measure the resistance between SL+ and SL–.

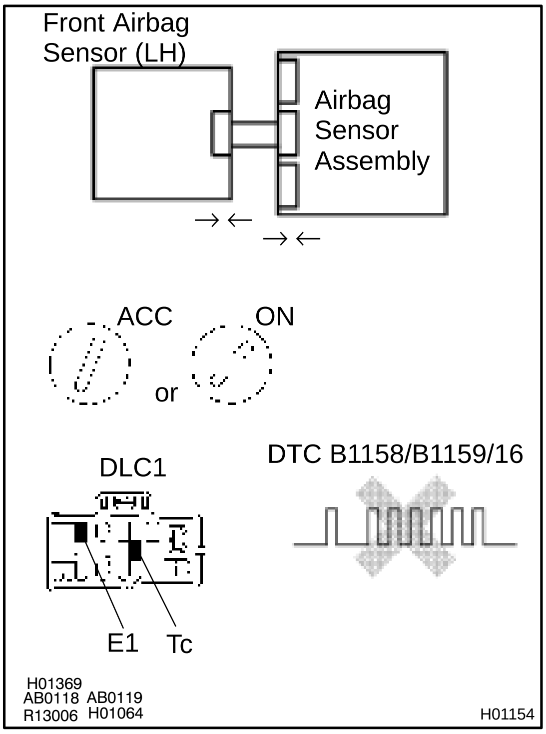
OK:

Resistance: 300 – 1500 Ω

NG	**Replace front airbag sensor (LH).**

OK

7	**Check airbag sensor assembly.**



PREPARATION:

(a) Turn ignition switch to LOCK.

(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the front airbag sensor (LH) connector and airbag sensor assembly connector.

(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–626)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–626)

OK:

DTC B1158/B1159/16 is not output.

HINT:
Codes other than code B1158/B1159/16 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI1BN–08

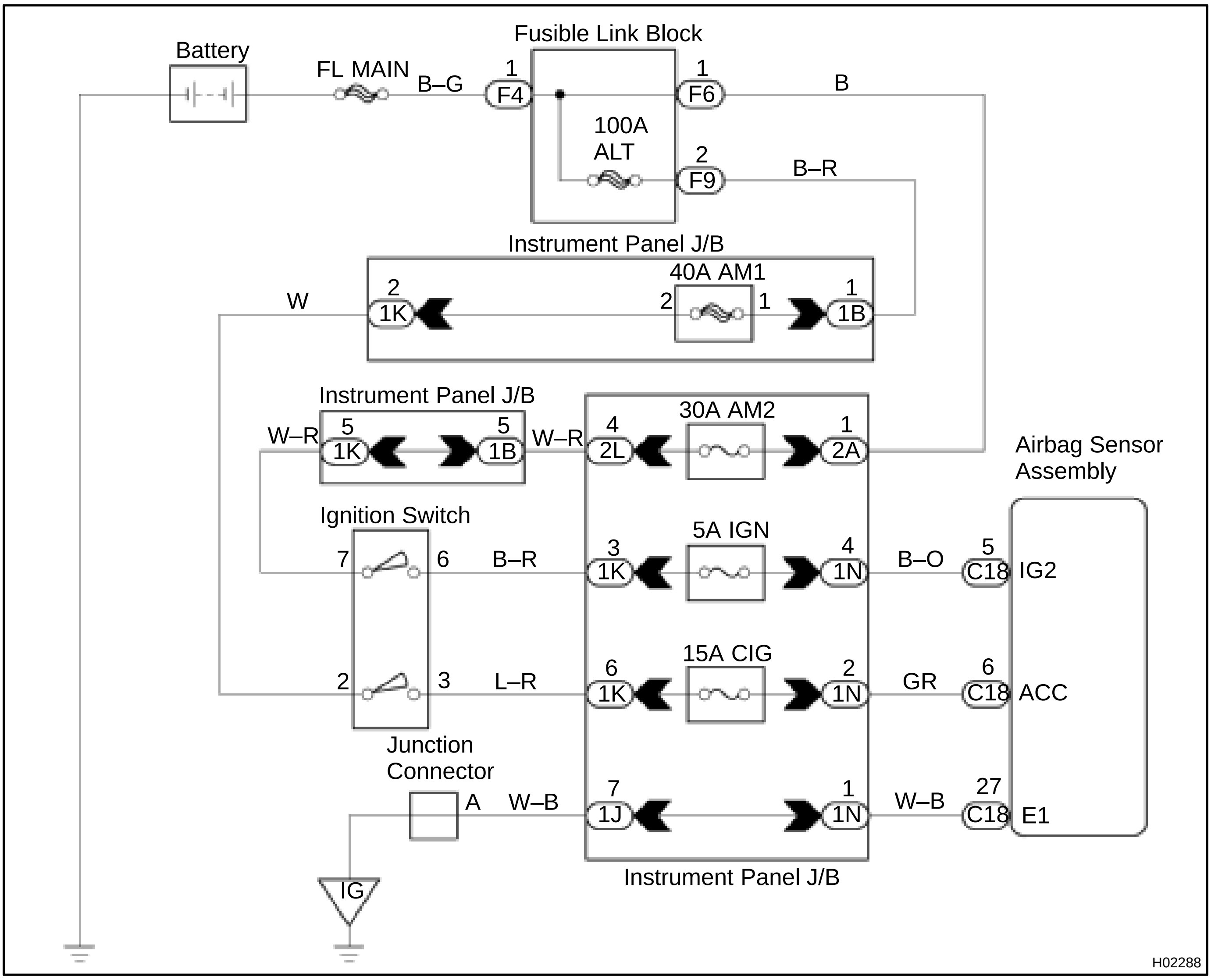
DTC	Normal	Source Voltage Drop

CIRCUIT DESCRIPTION

The SRS is equipped with a voltage–increase circuit (DC–DC converter) in the airbag sensor assembly in case the source voltage drops.
When the battery voltage drops, the voltage–increase circuit (DC–DC converter) functions to increase the voltage of the SRS to normal voltage.
The diagnosis system malfunction display for this circuit is different from other circuits that is when the SRS warning light remains lit up and the DTC is a normal code, source voltage drop is indicated.
Malfunction in this circuit is not recorded in the airbag sensor assembly, and the source voltage returns to normal, the SRS warning light automatically goes off.

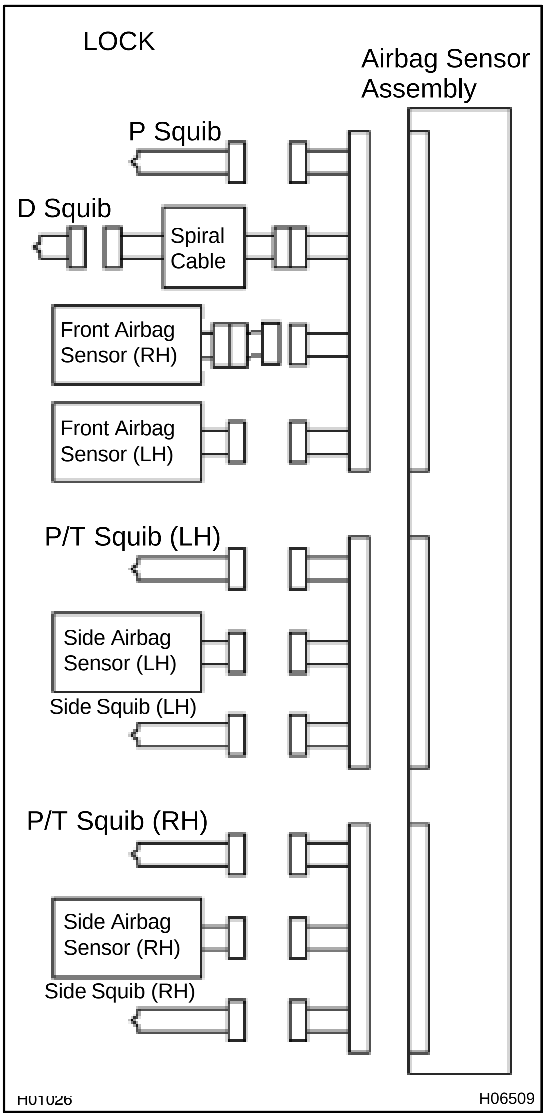
DTC No.	Diagnosis
(Normal)	Source voltage drop

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection.**

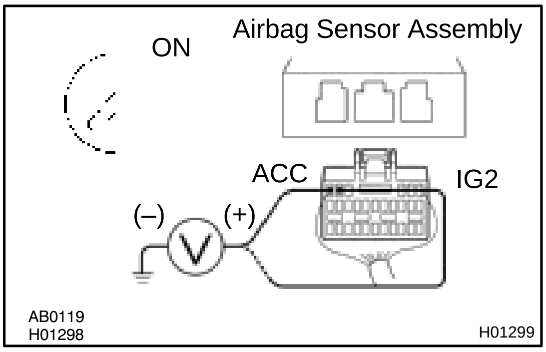


PREPARATION:

(a) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(b) Remove the steering wheel pad. (See page SR–11)
(c) Disconnect the connector of the front passenger airbag assembly. (See page RS–28)
(d) Disconnect the connector of the side airbag assembly RH and LH. (See page RS–40 and RS–52)
(e) Disconnect the connector of the seat belt pretensioner RH and LH. (See page BO–126)
(f) Disconnect the connectors of the airbag sensor assembly.
(See page RS–59)
(g) Disconnect the connector of the front airbag sensor LH and RH. (See page RS–64)
(h) Disconnect the connector of the side airbag sensor assembly RH and LH. (See page RS–69)

CAUTION:
Store the steering wheel pad with the front surface facing upward.

2	Check source voltage.



PREPARATION:

Connect negative (–) terminal cable to the battery.

CHECK:

(a) Turn ignition switch ON.

(b) Measure the voltage each of IG2 and ACC on the sensor and operate electric system. (defogger, wiper, headlight, heater blower, etc.)

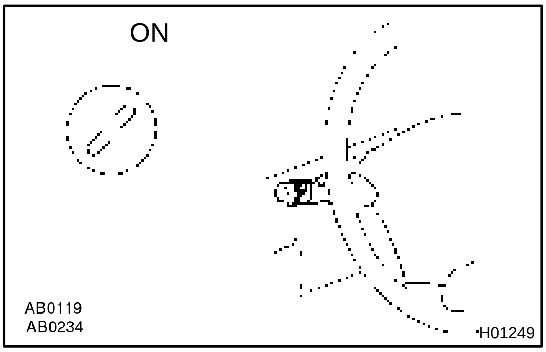
OK:

Voltage: 10 – 14 V

NG	Check harness between battery and airbag sensor assembly, and check battery and charging system.

OK

3	Does SRS warning light turn off?



PREPARATION:

(a) Turn ignition switch to LOCK.

(b) Connect the steering wheel pad connector.

(c) Connect the front passenger airbag assembly connector.

(d) Connect the airbag sensor assembly connectors.

(e) Connect the side airbag assembly connectors.

(f) Connect the seat belt pretensioner connectors.

(g) Connect the side airbag sensor assembly connectors.

(h) Connect the front airbag sensor connectors.

(i) Turn ignition switch to ON.

CHECK:

Operate electric system (defogger, wiper, headlight, heater blower, etc.) and check that SRS warning light goes off.

NO	Check for DTCs. If a DTC is output, perform troubleshooting for the DTC. If a normal code is output, replace airbag sensor assembly.

YES

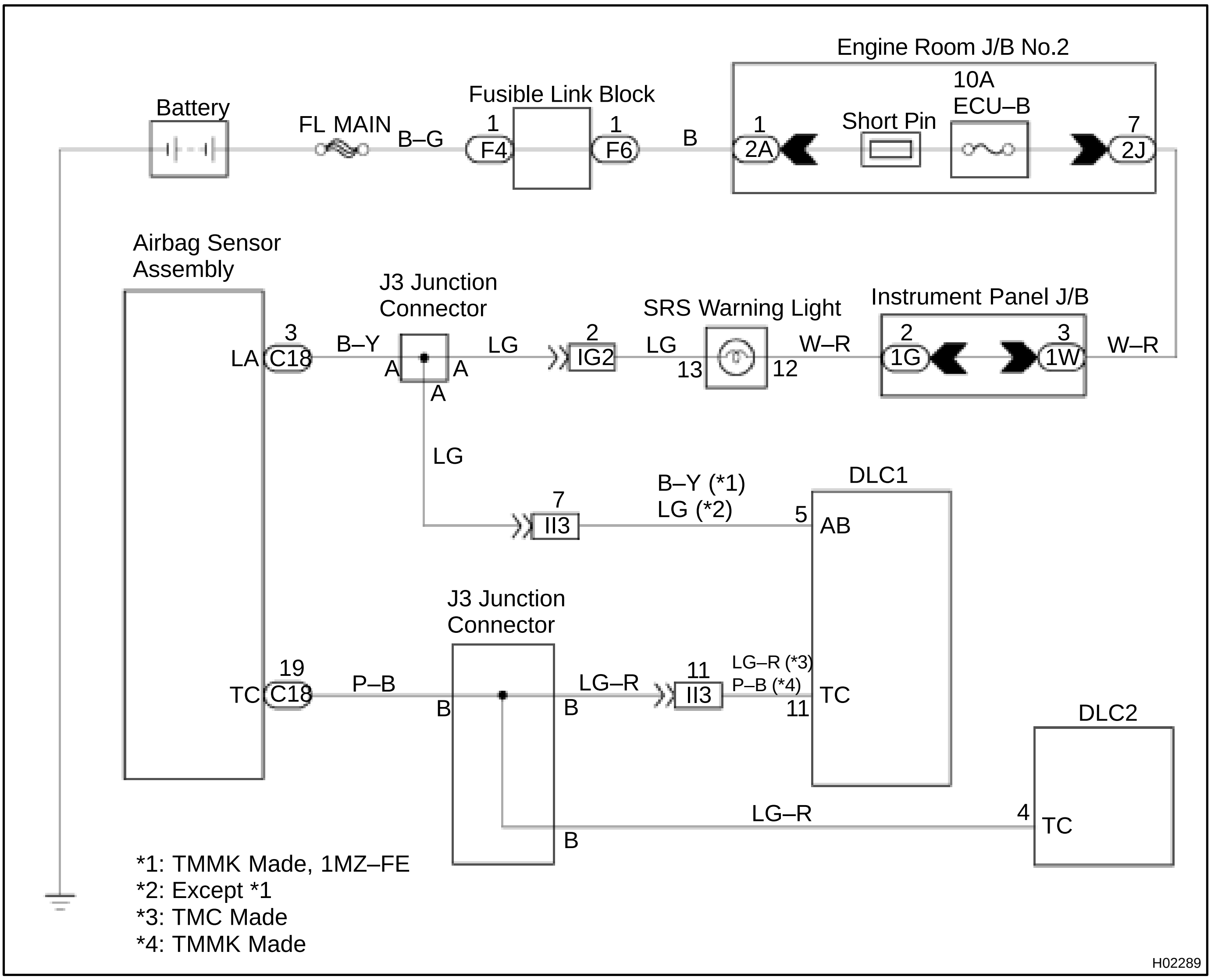
From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

SRS Warning Light Circuit Malfunction (Always lights up, when ignition switch is in LOCK position.)

CIRCUIT DESCRIPTION

The SRS warning light is located on the combination meter.
When the SRS is normal, the SRS warning light lights up for approx. 6 seconds after the ignition switch is turned from the LOCK position to ACC or ON position, and then turns off automatically.
If there is a malfunction in the SRS, the SRS warning light lights up to inform the driver of the abnormality.
When terminals Tc and E1 of the DLC1 are connected, the DTC is displayed by blinking the SRS warning light.

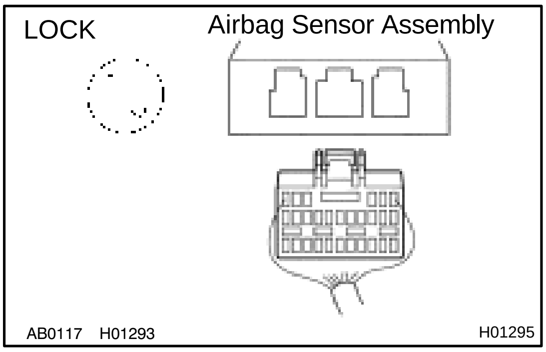
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–787)**

2	**Does SRS warning light turn off?**



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the airbag sensor assembly connector.
(d) Connect negative (–) terminal cable to the battery.

CHECK:

Check operation of SRS warning light.

NO → **Check SRS warning light circuit or terminal AB circuit of DLC1.**

YES

Replace airbag sensor assembly.

DI1BP–08

SRS Warning Light Circuit Malfunction (Does not light up, when ignition switch is turned to ACC or ON.)

CIRCUIT DESCRIPTION

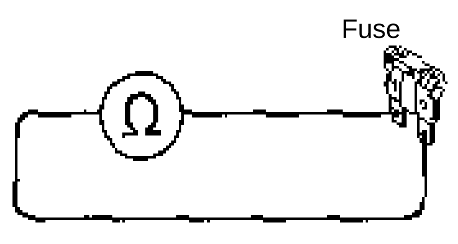
The SRS warning light is located on the combination meter.
When the SRS is normal, the SRS warning light lights up for approx. 6 seconds after the ignition switch is turned from LOCK position to ACC or ON position, and then turns off automatically.
If there is a malfunction in the SRS, the SRS warning light lights up to inform the driver of the abnormality.
When terminals Tc and E1 of the DLC1 are connected, the DTC is displayed by blinking the SRS warning light.

WIRING DIAGRAM

See page DI–790.

INSPECTION PROCEDURE

1	**Check ECU–B Fuse.**



N14677

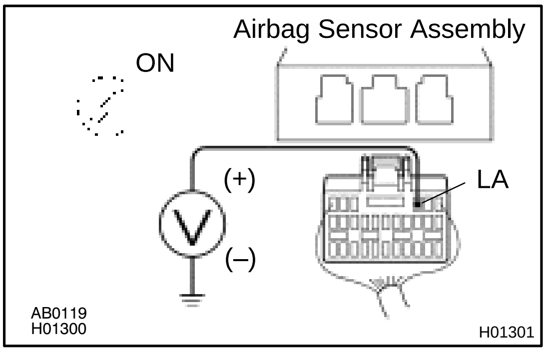
PREPARATION:
Remove ECU–B fuse.
CHECK:
Check continuity of ECU–B fuse.
OK:
Continuity
HINT:
- Fuse may be burnt out even if it appears to be OK during visual inspection.
- If fuse is OK, install it.

NG	**Go to step 5.**

OK

2	**Prepare for inspection. (See step 1 on page DI–787)**

3	**Check SRS warning light circuit.**



PREPARATION:

(a) Connect negative (–) terminal cable to the battery.

(b) Turn ignition switch to ACC or ON.

CHECK:

Measure the voltage LA terminal of the harness side connector of the airbag sensor assembly.

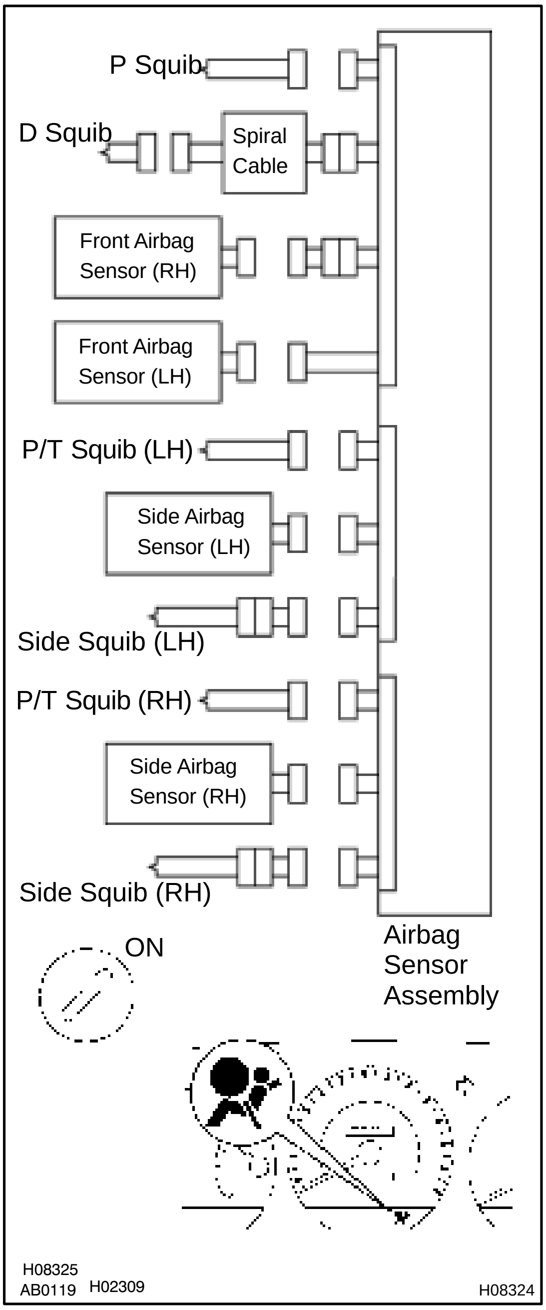
OK:

Voltage: 10 – 14 V

NG → **Check SRS warning light bulb or repair SRS warning light circuit.**

OK

4	Does SRS warning light come on?



PREPARATION:

(a) Disconnect negative (–) terminal cable from the battery.

(b) Connect the airbag sensor assembly connector.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

(d) Turn ignition switch to ACC or ON.

CHECK:

Check operation of SRS warning light.

NO → **Check terminal LA of airbag sensor assembly. If normal, replace airbag sensor assembly.**

YES

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use simulation method to check.

5	Is new ECU–B fuse burnt out again?

NO → **Using simulation method, reproduce malfunction symptoms. (See page IN–21)**

YES

Check harness between ECU–B fuse and SRS warning light.

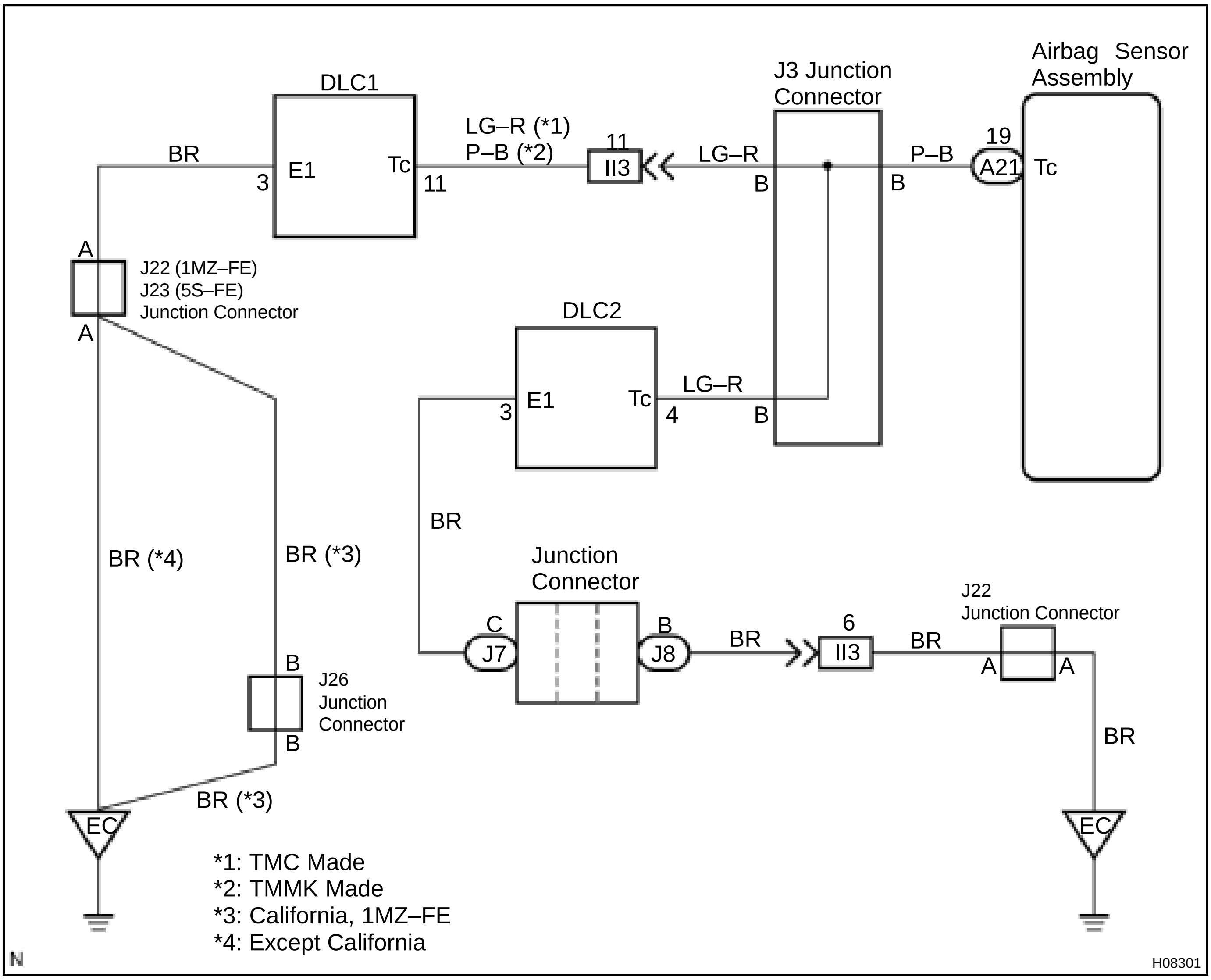
DI1BQ–08

Tc Terminal Circuit

CIRCUIT DESCRIPTION

By connecting terminals Tc and E1 of the DLC1 the airbag sensor assembly is set in the DTC output mode. The DTCs are displayed by blinking the SRS warning light.

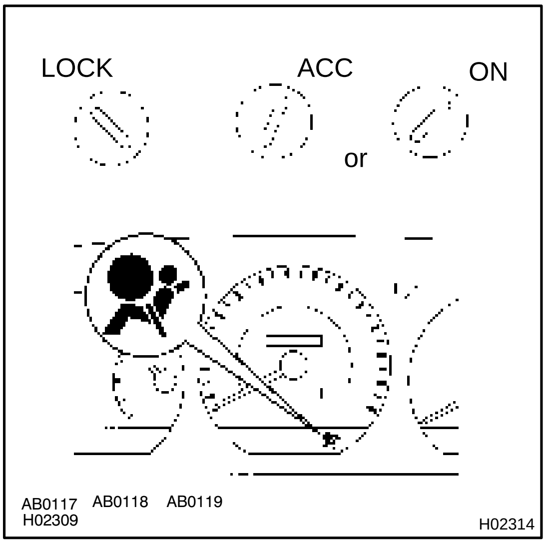
WIRING DIAGRAM



INSPECTION PROCEDURE

If the DTC is not displayed, do the following troubleshooting.

1	**Does SRS warning light up for approx. 6 seconds?**



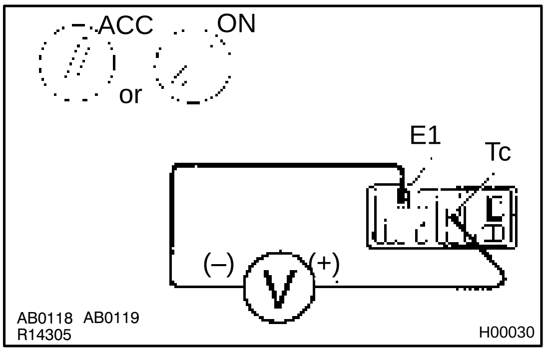
PREPARATION:

Check operation of the SRS warning light after ignition switch is turned from LOCK position to ACC or ON position.

NO → **Check SRS warning light system.** **(See page DI–626)**

YES

2	**Check voltage between terminals Tc and E1 of DLC1.**



PREPARATION:

Turn ignition switch to ACC or ON.

CHECK:

Measure the voltage between terminals Tc and E1 of DLC1.

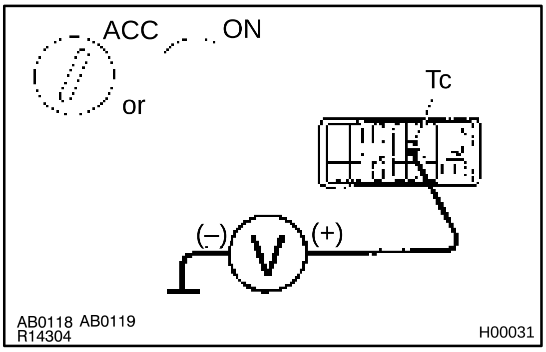
OK:

Voltage: 10 – 14 V

OK → **Go to step 4.**

NG

3	**Check voltage between terminal Tc of DLC1 and body ground.**

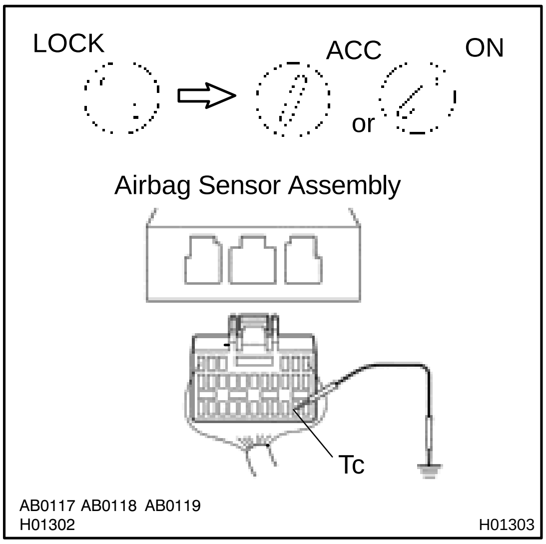


CHECK:
Measure the voltage between terminal Tc of DLC1 and body ground.
OK:
Voltage: 10 – 14 V

OK → **Check harness between terminal E1 of DLC1 and body ground.**

NG

4	**Check airbag sensor assembly.**



PREPARATION:
(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the airbag sensor assembly connector.
(d) Insert service wire into terminal Tc from back side as shown in the illustration.
(e) Connect the airbag sensor assembly connector with service wire.
(f) Connect negative (–) terminal cable to the battery.
(g) Turn ignition switch to ACC or ON and wait at least for 20 seconds.
(h) Connect service wire of terminal Tc to body ground.

CHECK:
Check operation of SRS warning light.
OK:
SRS waning light comes on.
NOTICE:
Pay due attention to the terminal connecting position to avoid a malfunction.

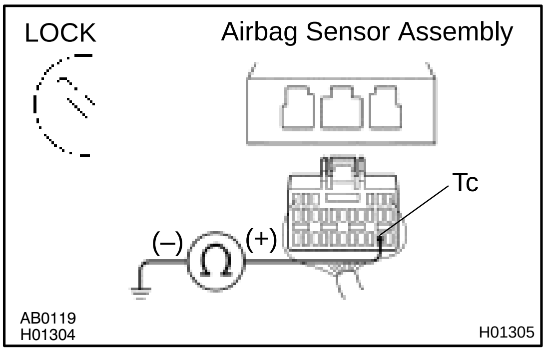
OK → **Check harness between the airbag sensor assembly and DLC1.**

NG

Replace airbag sensor assembly.

If the DTC is displayed without a DTC check procedure, perform the following troubleshooting.

1	**Check resistance between terminal Tc of airbag sensor assembly and body ground.**



PREPARATION:

(a) Turn ignition switch to LOCK.

(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(c) Disconnect the airbag sensor assembly connector.

CHECK:

Check resistance between terminal Tc of the airbag sensor assembly connector and body ground.

OK:

Resistance: 1 MΩ or Higher

NG	**Repair or replace harness or connector.**

OK

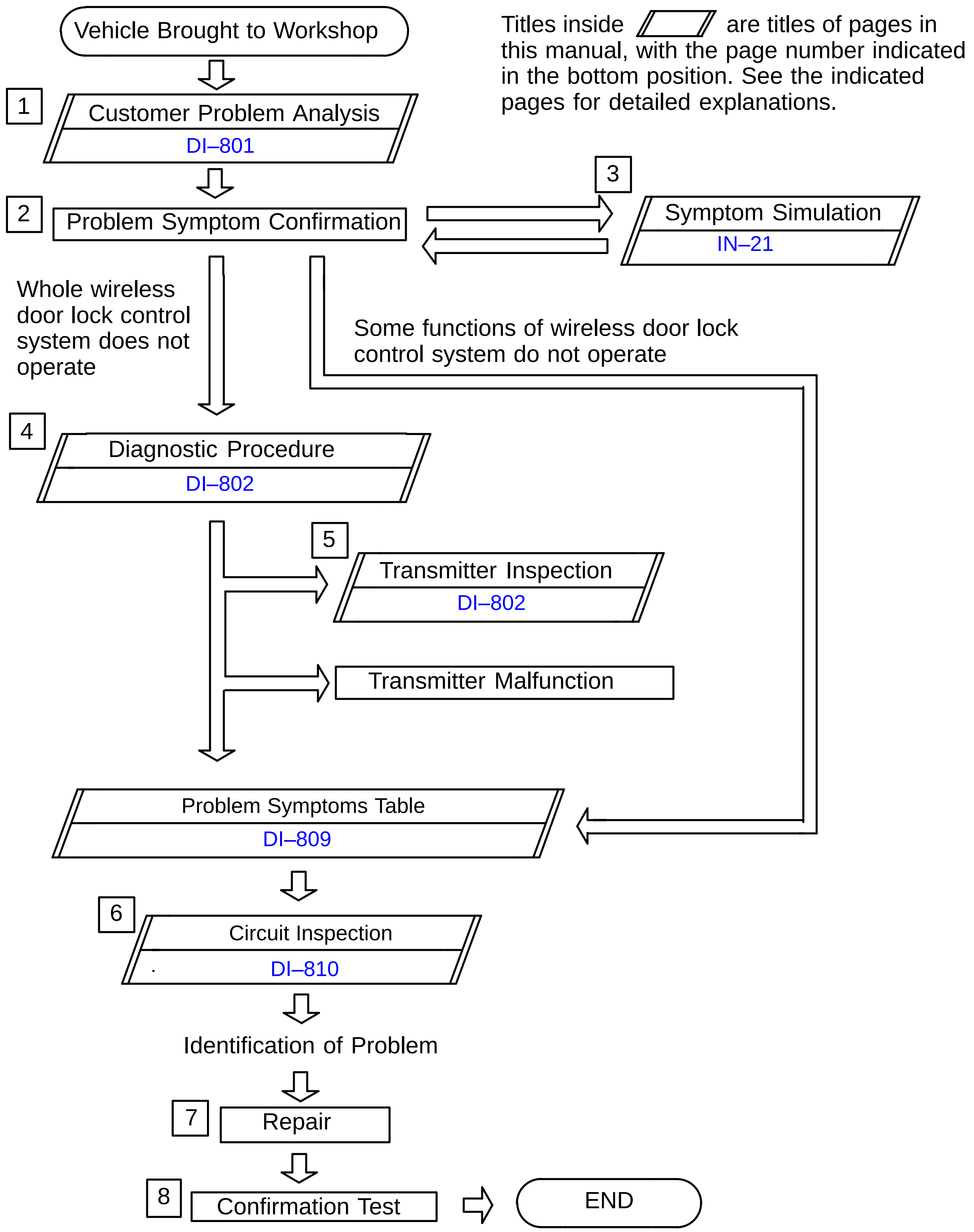
Replace airbag sensor assembly.

WIRELESS DOOR LOCK CONTROL SYSTEM

DI05L–03

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:
Troubleshooting of the wireless door lock control system is based on the premise that the door lock control system is operating normally. Accordingly, before troubleshooting the wireless door lock control system, first make certain that the door lock control system is operating normally.
Perform troubleshooting in accodnce with procedure on the following page.



DI05M–02

CUSTOMER PROBLEM ANALYSIS CHECK

WIRELESS DOOR LOCK CONTROL System Check Sheet

Inspector's Name ______________________

Customer's Name		**Registration No.**	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km Miles

Date Problem First Occurred		/ /
Frequency Problem Occurs		☐ Constant ☐ Sometimes (times per day, month) ☐ Once only
Weather Conditions When Problem Occurred	**Weather**	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Others
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (Approx. °F (°C))
	Place	☐ Everywhere ☐ Specific Locality( )
Date Transmitter Battery Last Replaced		/ /

Problem Symptom

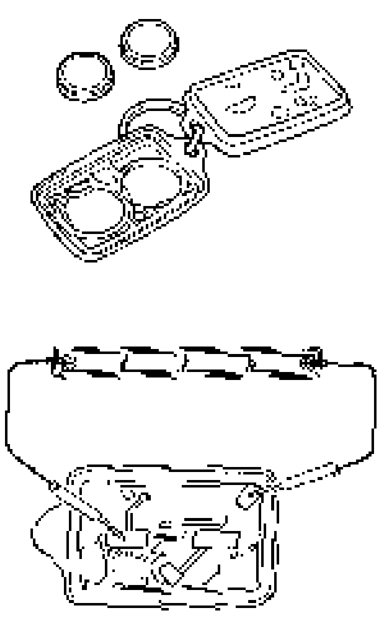
☐ Whole wireless door lock control system does not operate.	
☐ Only door unlock operation is not possible.	
☐ Only door lock operation is not possible.	
☐ Only key confinement prevention function is not possible.	
☐ Wireless door lock function operates even each door is opened.	
☐ Only PANIC operation is not possible.	
☐ Wireless door lock functions incorrectly. (Although one door is unlocked, when the transmitter switch is pressed, all doors become unlocked.)	☐ When Front RH door is unlocked ☐ When Front LH door is unlocked ☐ When Rear RH door is unlocked ☐ When Rear LH door is unlocked
☐ Others	

DI05N–03

PRE–CHECK

1. INSPECT TRANSMITTER

1	**Check the transmitter operation.**


N13160
N13161
I00239

HINT:
This inspection is not directly for the purpose of checking the capaciy of the transmitter battery, but is performed when remote control operation becomes difficult or impossible, in order to ascertain if this is caused by low battery capacity.

PREPARATION:

(a) Using a screwdriver, pry outward the cover.
(b) Remove the battery.

CHECK:

(a) Connect 4 new 1.5–V dry–cell batteries in series. Connect the battery ∼ terminal to the battery receptacle side terminal and the battery > terminal to the bottom terminal to provide 6 V to the transmitter.
(b) Push the wireless door lock remote control switch on the side of the transmitter body and operate the door lock by remote control.

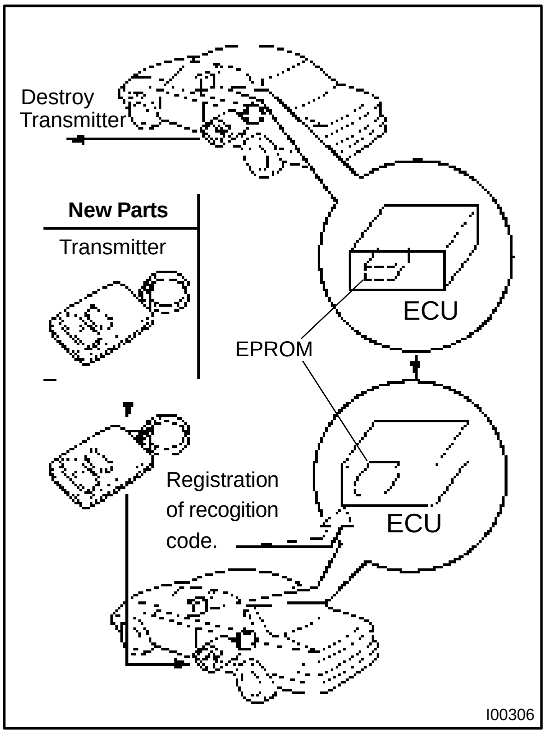
OK:

Remote control operation is possible.

OK	**Replace the battery for transmitter. (See page DI–802)**

NG

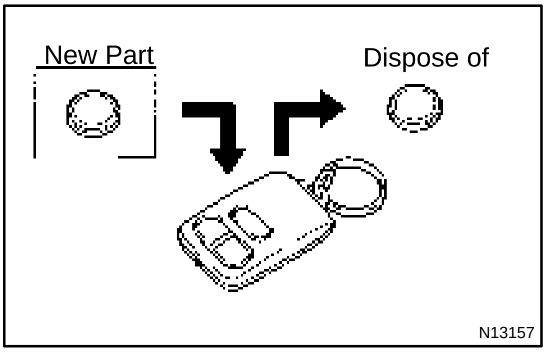
Replace transmitter and registration of recognition code. (See page DI–802)



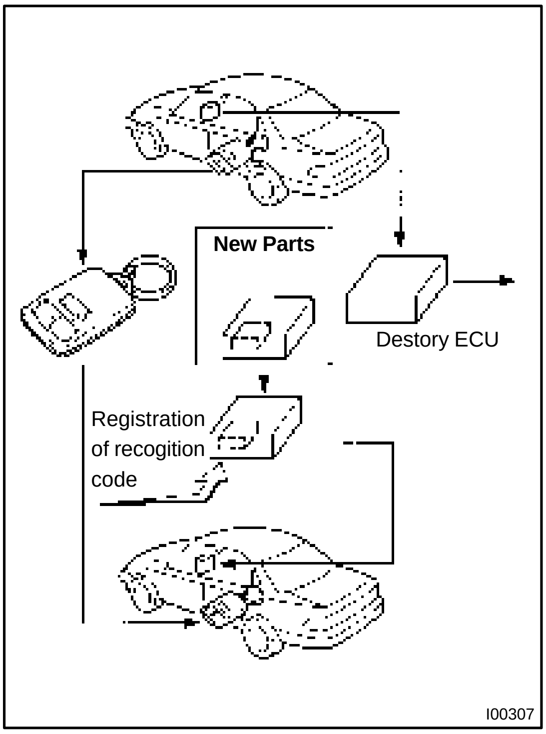
2. REPLACE WIRELESS DOOR LOCK ECU AND TRANSMITTER

HINT:
Disassembly and assembly of the transmitter includes details of spare parts and replacement procedure for detective parts found through troubleshooting.
Each part is a precision electronic component so handle with care.

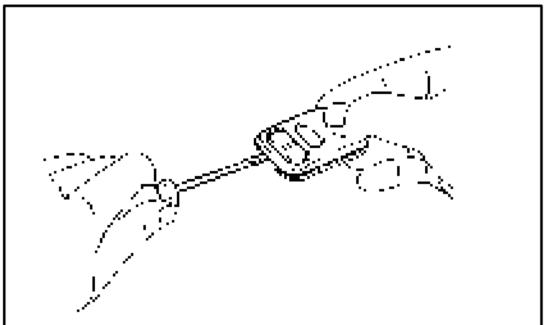
(a) Spare parts and replacement procedure for malfunctioning parts (transmitter malfunction):
  (1) Prepare a new transmitter.
  (2) Registration of recogition code.
  (3) Check that door lock remote control operation works.



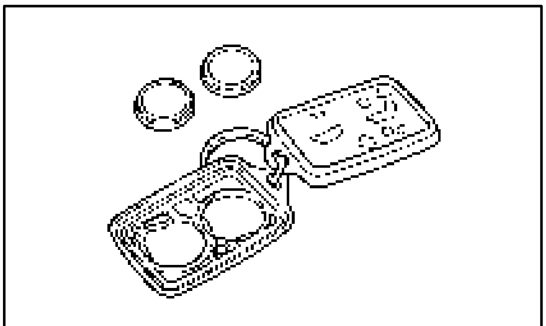
(b) Spare parts and replacement procedure for malfunctioning parts (battery malfunction):
  (1) Prepare a new battery.
  (2) Remove the battery from transmitter.
  (3) Install a new battery into transmitter.



(c) Spare parts and replacement procedure for malfunctioning parts (ECU malfunction):
  (1) Prepare a new ECU.
  (2) Remove the ECU from the vehicle.
  (3) Install a new ECU in the vehicle.
  (4) Registration of recogition code.


N13159

(d) Replace the battery for transmitter.
   (1) Using a screwdriver, pry outward the cover.

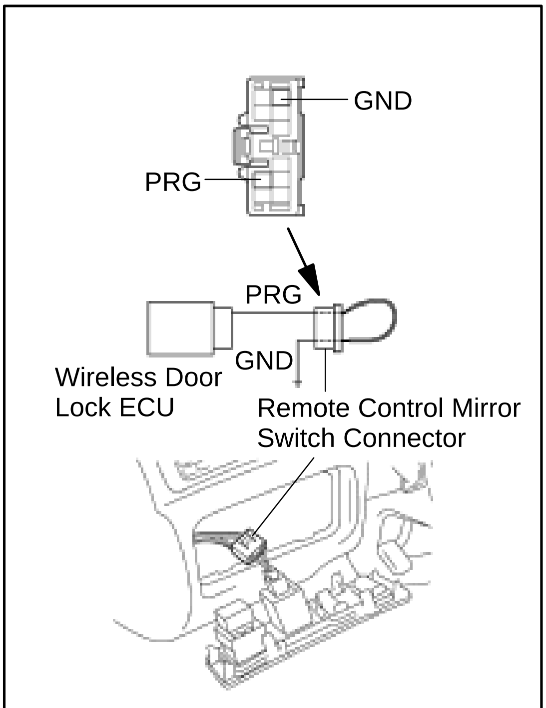

N13160

   (2) Remove the battery.
   (3) Set a new battery into the transmitter.
   (4) Install the cover to the transmitter.

3. REGISTRATION OF RECOGNITION CODE

The recognition code of the transmitter is electronically registered (written to and stored) in an EEPROM contained in the wireless door lock ECU. This makes it possible to register up to 2 different codes in the EEPROM.

New recognition codes can be registered after all previous codes have been erased. A transmitter code can be registered into the EEPROM by following the steps numbered (1) to (5).



I08491

   (1) The wireless door lock ECU and remote control mirror switch are connected to each other via a PRG terminal, and the GND terminal of the remote control mirror switch connector is grounded to body. Remove the connector from the remote control mirror switch, and use a test lead to short the PRG and GND connector together. As a result, the PRG terminal of the wireless door lock ECU will be grounded to body and will cause all transmitter recognition codes previously registered in the EEPROM to be erased. At the same time, the ECU will respond by operating once the lock and unlock functions of all the doors, and the open function of the trunk lid.

(2) A transmitter recognition code is registered by pressing any single button of the transmitter to be registered. Once the code is registered, the ECU responds again by operating once the lock and unlock functions of all the doors.

(3) To register the recognition code of an additional transmitter, follow the procedure shown in (2).

(4) After completing the registration of the codes, remove the test lead from the remote control mirror switch connector terminals to allow the system to revert to the normal operation.

(5) Using the registered transmitter, verify that the system operates properly.

4. DIAGNOSTIC PROCEDURE

HINT: Diagnostic mode may be exited at any time by ungrounding terminal 9

Start

↓

Unlock all doors manually
Insert key in ignition key cylinder and open driver's door

↓

Ground terminal 9 of the wireless door lock ECU and wait more 1 second.

↓

Remove key from ignition key cylinder and close driver's door within 10 seconds.

If not performing this operation within 10 seconds after the above operation, the mode will not change into the diagnostic mode.

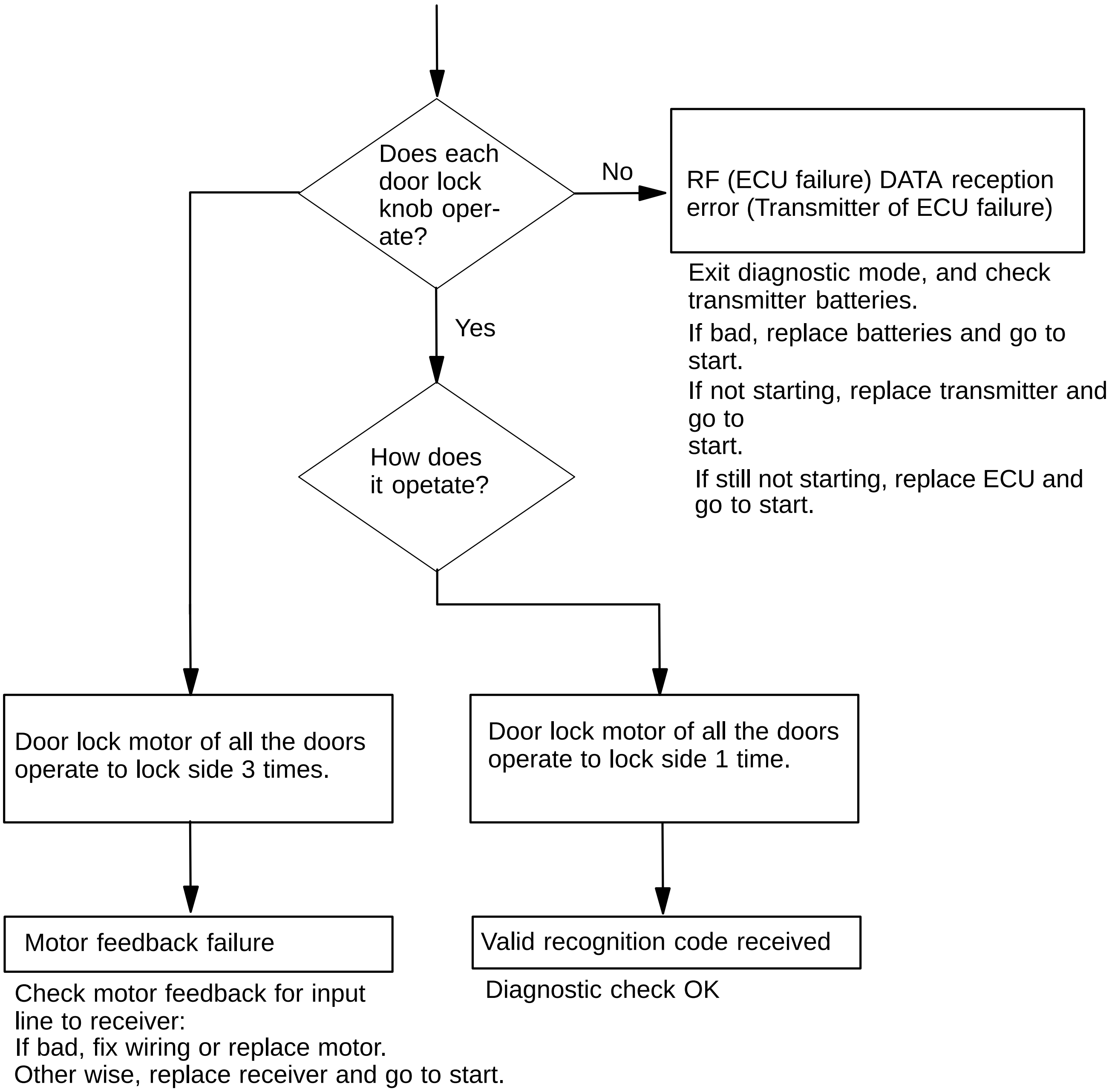
↓

Press any button on transmitter within 10 seconds.

If not performing this operation within 10 seconds after the above operation, the mode will not change into the diagnostic mode.

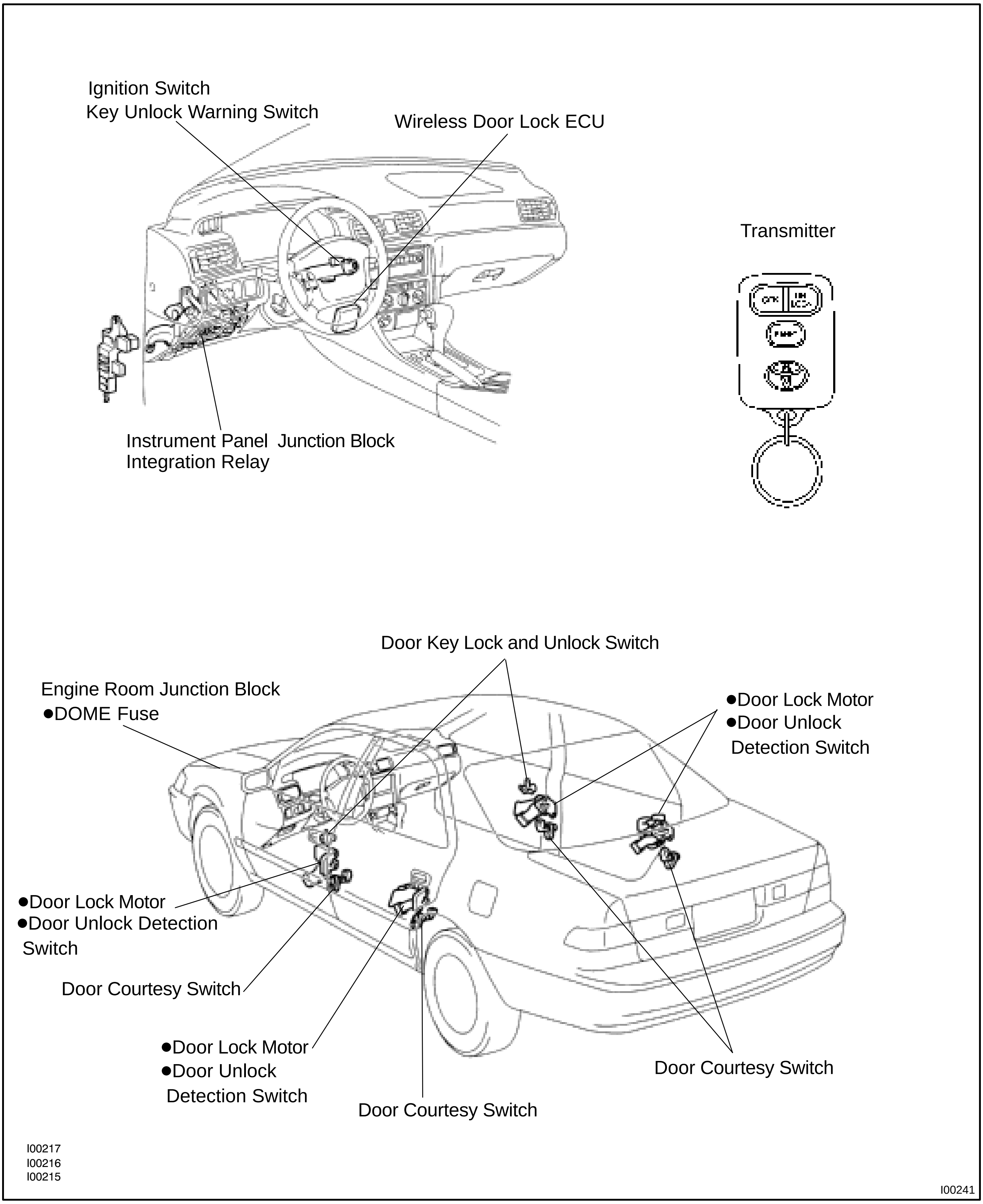
↓

CONTINUED ON NEXT PAGE


Does each door lock knob operate?
No
RF (ECU failure) DATA reception error (Transmitter of ECU failure)
Exit diagnostic mode, and check transmitter batteries.
If bad, replace batteries and go to start.
If not starting, replace transmitter and go to start.
If still not starting, replace ECU and go to start.
Yes
How does it opetate?
Door lock motor of all the doors operate to lock side 3 times.
Door lock motor of all the doors operate to lock side 1 time.
Motor feedback failure
Check motor feedback for input line to receiver:
If bad, fix wiring or replace motor.
Other wise, replace receiver and go to start.
Valid recognition code received
Diagnostic check OK

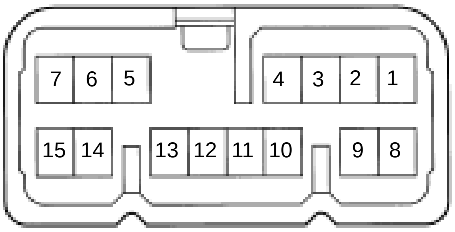
DI05O–03

PARTS LOCATION



DI1KR–03

TERMINALS OF ECU



I00227

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
1 – Ground (GND – Ground)	W – B	Always.	Below 1 V
4 – Ground (TAIL – Ground)	G – R	TAIL lamps ”ON”	Below 1 V
		TAIL lamps ”OFF”	10 – 14 V
5 – Ground (PINI – Ground)	LG	Always.	4 – 6 V
		Push the PANIC switch.	Below 1.5 V
7 – Ground (UL3 – Ground)	R – G	Door key lock and unlock switch ”UNLOCK”. (Driver's Door)	Below 1.5 V
		Door key lock and unlock switch ”OFF” or ”LOCK”. (Driver's Door)	8 – 10 V
8 – 1 (+B – E)	R	Always.	10 – 14 V
9 – Ground (PRG – Ground)	V	Ignition switch ”ON”	10 – 14 V
10 – Ground (KSW – Ground)	L – B	Key unlock warning switch ”ON”. (Key is inserted into key cylinder)	Below 1 V
		Key unlock warning switch ”OFF”.	10 – 14 V
11 – Ground (LSWD – Ground)	L – R	Door unlock detection switch ”ON”. (Driver's Door)	Below 1 V
		Door unlock detection switch ”OFF”. (Driver's Door)	10 – 14 V
12 – Ground (LSWP – Ground)	Y	Door unlock detection switch ”ON”. (Passenger's Door)	Below 1 V
		Door unlock detection switch ”OFF”. (Passenger's Door)	10 – 14 V
13 – Ground(LSWR – Ground)	L – Y	Door unlock detection switch ”ON”. (Either Rear Door)	Below 1 V
		Door unlock detection switch ”OFF”. (All Rear Doors)	10 – 14 V
14 – Ground (CTY – Ground)	R – W	Door courtesy switch ”ON”	Below 1 V
		Door courtesy switch ”OFF”	10 – 14 V
15 – Ground (L – Ground)	L – W	Door key lock and unlock switch ”LOCK”	Below 1 V
		Door key lock and unlock switch ”OFF” or ”UNLOCK”	8 – 10 V

DI05Q–03

PROBLEM SYMPTOMS TABLE

Perform troubleshooting of the circuit for the applicable problem symptom in the order given in the chart below. Proceed to the page located for each circuit.

HINT:

- Troubleshooting of the wireless door lock control system is based on the premise that the door lock control system and theft deterrent system are operating normally. Accordingly, before troubleshooting the wireless door lock control system, first make certain that the door lock control system and theft deterrent system are operating normally.
- If the instruction "Proceed to next circuit inspection shown on matrix chart" is given in the flow chart for each circuit, proceed to the circuit with the next highest number in the table to continue the check.
- If the trouble still reappears even through there are no abnormalities in any of the other circuits, check and replace the Wireless Door Lock ECU as the last step.

Symptom	Suspect Area	See page
All functions of wireless door lock control system do no operate.	3. ECU Power Source Circuit. 4. Door Courtesy Switch Circuit. 5. Door Key Lock and Unlock Switch Circuit. (Unlock Side) 6. Door Key Lock and Unlock Switch Circuit. (Lock Side) 7. Key Unlock Warning Switch Circuit. 8. Wireless Door Lock ECU.	DI–810 DI–821 DI–815 DI–817 DI–819 IN–31
Only door unlock operation is not possible (Lock operation is possible).	1. Door Key Lock and Unlock Switch Circuit (Unlock Side) 2. Door Unlock Detection Switch Circuit 3. Wireless Door Lock ECU.	DI–815 DI–819 IN–31
Only door lock operation is not possible (Unlock operation is possible).	1. Door Key Lock and Unlock Switch Circuit (Lock Side) 2. Wireless Door Lock ECU	DI–817 IN–31
Only key confinement prevention function is not possible.	1. Key Unlock Warning Switch Circuit 2. Wireless Door Lock ECU	DI–819 IN–31
●Wireless door lock function operates even when each door is opened. ●Automatic lock function operates even if any door is opened within 30 seconds after all doors are unlocked by wireless door lock control system.	1. Door Courtesy Switch Circuit 2. Wireless Door Lock ECU	DI–821 IN–31
Wireless door lock functions incorrectly. (Although one door is unlocked, when the transmitter switch is pressed, all doors are unlocked.)	1. Door Unlock Detection Switch Circuit 2. Wireless Door Lock ECU	DI–813 IN–31
Warning operation will not be performed even if the panic button is pressed.	1. Panic Circuit 2. Wireless Door Lock ECU	DI–823 IN–31

DI05R–03

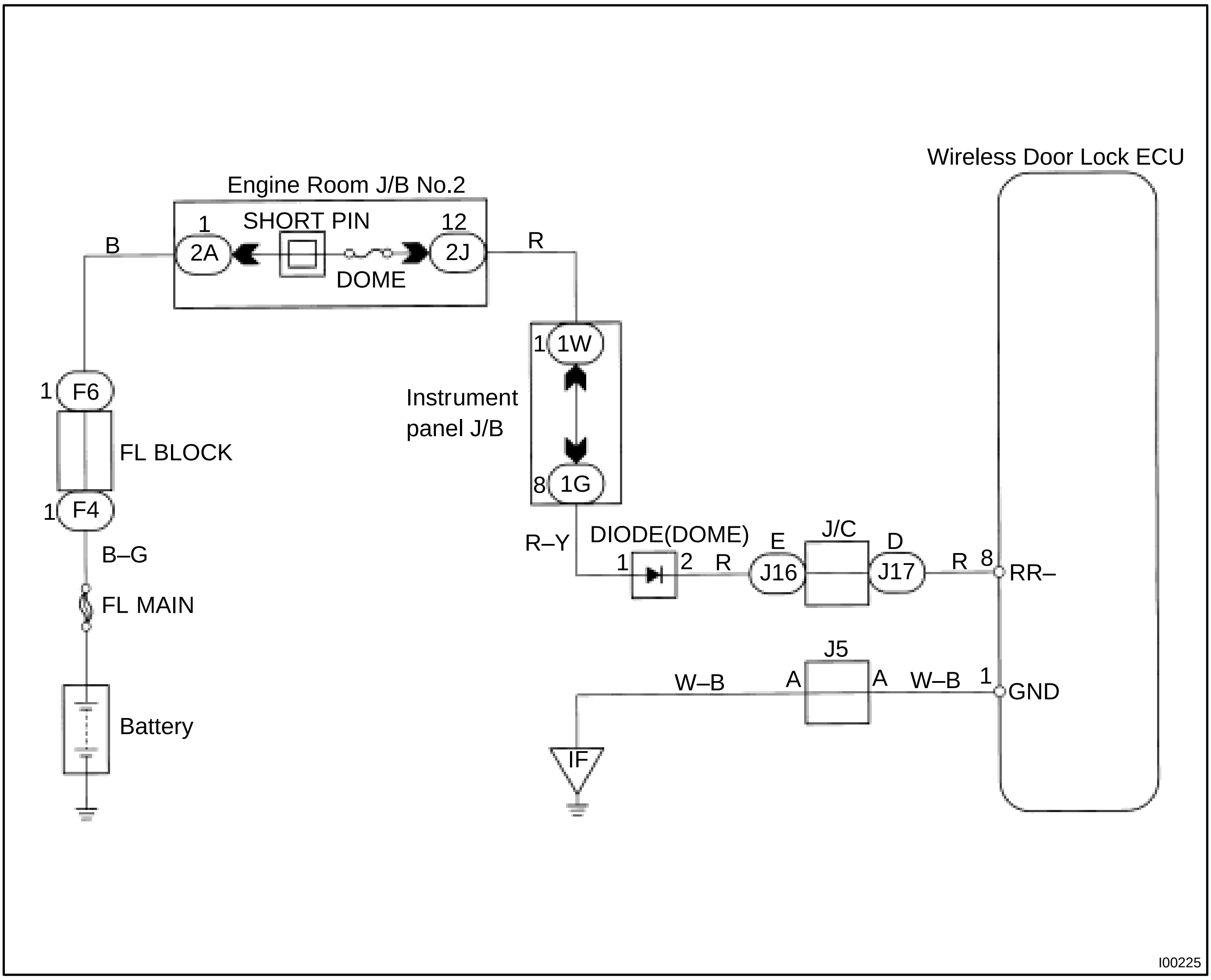
CIRCUIT INSPECTION

ECU Power Source Circuit

CIRCUIT DESCRIPTION

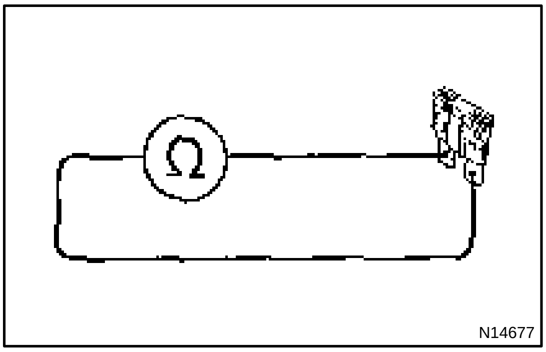
Battery positive voltage is always applied to the terminal +B of the wireless door lock ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check DOME fuse.**

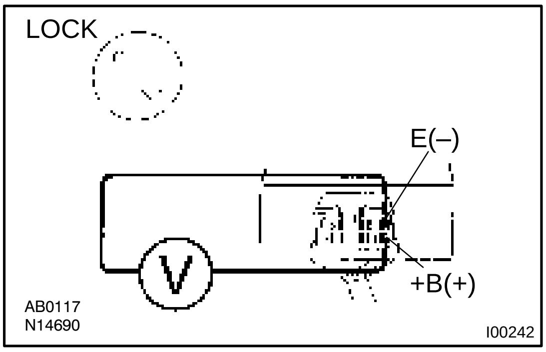


PREPARATION:
Remove DOME fuse from engine room junction block.
CHECK:
Check continuity of DOME fuse.
OK:
Below 1.0 Ω or continuity

NG → **Check for short in all the harness and components connected to DOME fuse. (See attached wiring diagram.)**

OK

2	**Check voltage between terminals +B and E of wireless door lock ECU connector.**



PREPARATION:
Remove the wireless door lock ECU from No.1 instrument panel brace.
CHECK:
Measure voltage between terminals +B and GND of wireless door lock ECU.
OK:
Voltage: 10 – 14 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–809).**

NG

3	Check for open in harness and connector between terminal GND of wireless door lock ECU and body ground (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and repair harness and connector between wireless door lock control ECU and battery.

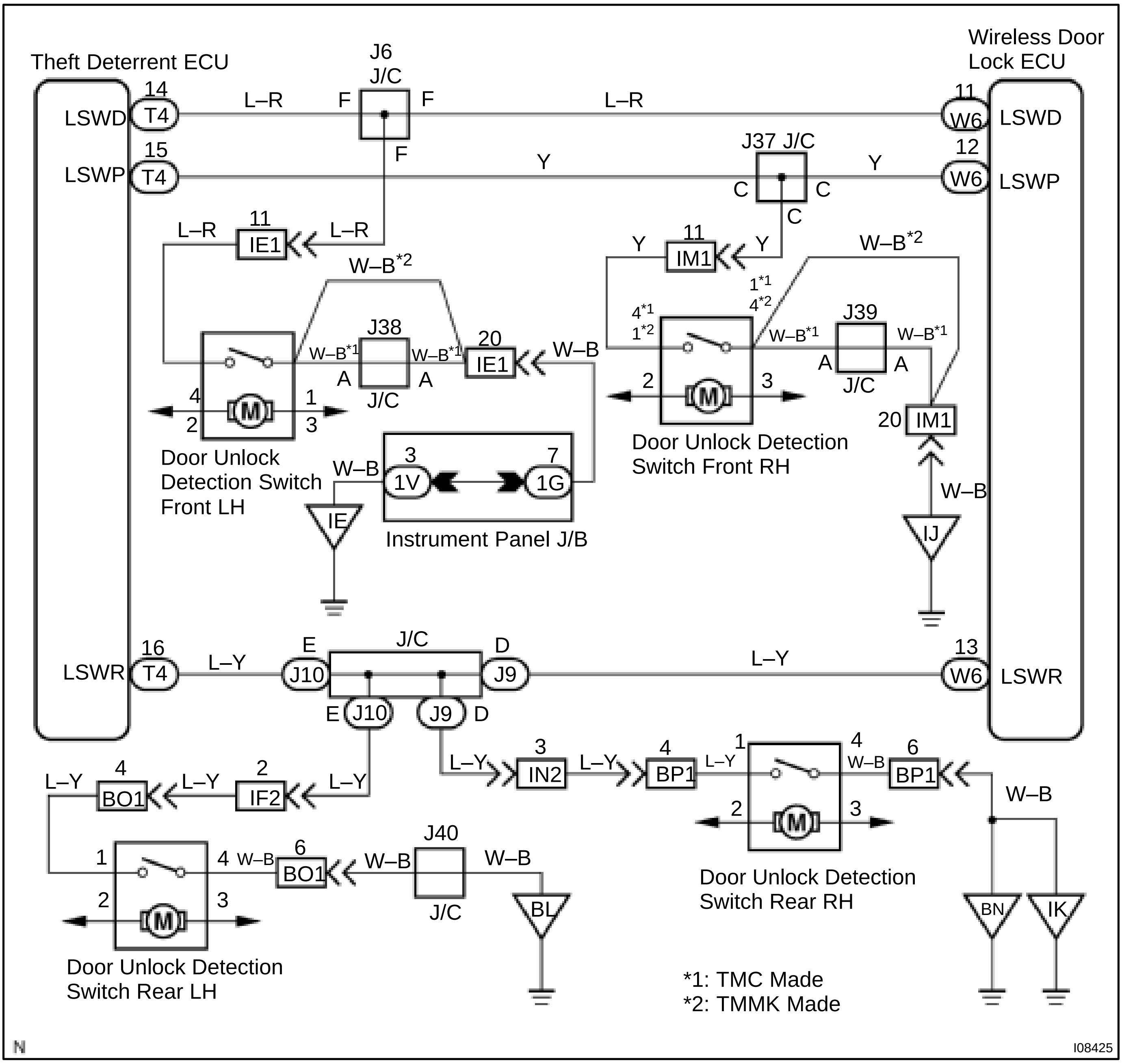
DI05S–03

Door Unlock Detection Switch Circuit

CIRCUIT DESCRIPTION

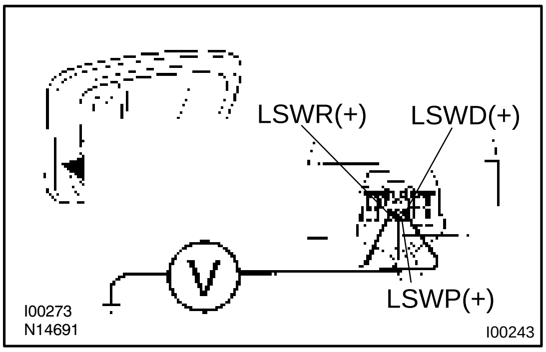
The door unlock detection switch is built into the door lock motor assembly. The switch is OFF when the door lock knob is in Lock position, and is ON When the Knob is in Unlock position.
Furthermore, the door unlock detection switch circuit has terminal +B connected inside the theft deterrent ECU, when the door unlock detection switch is OFF, battery positive voltage is applied to the terminal of the door unlock detection switch circuit of the wireless door lock ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminals LSWD, LSWP and LSWR of wireless door lock ECU connector and body ground.



PREPARATION:
Remove the wireless door lock ECU from No.1 instrument panel brace.
CHECK:
Measure voltage between each of terminals LSWD, LSWP and LSWR of wireless door lock ECU connector and body ground, when the respective door lock knobs involved are pushed to the lock side.
OK:
Voltage 10 – 14 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–809).**

NG

Check and repair harness and connector between wireless door lock ECU and door unlock detection switch.

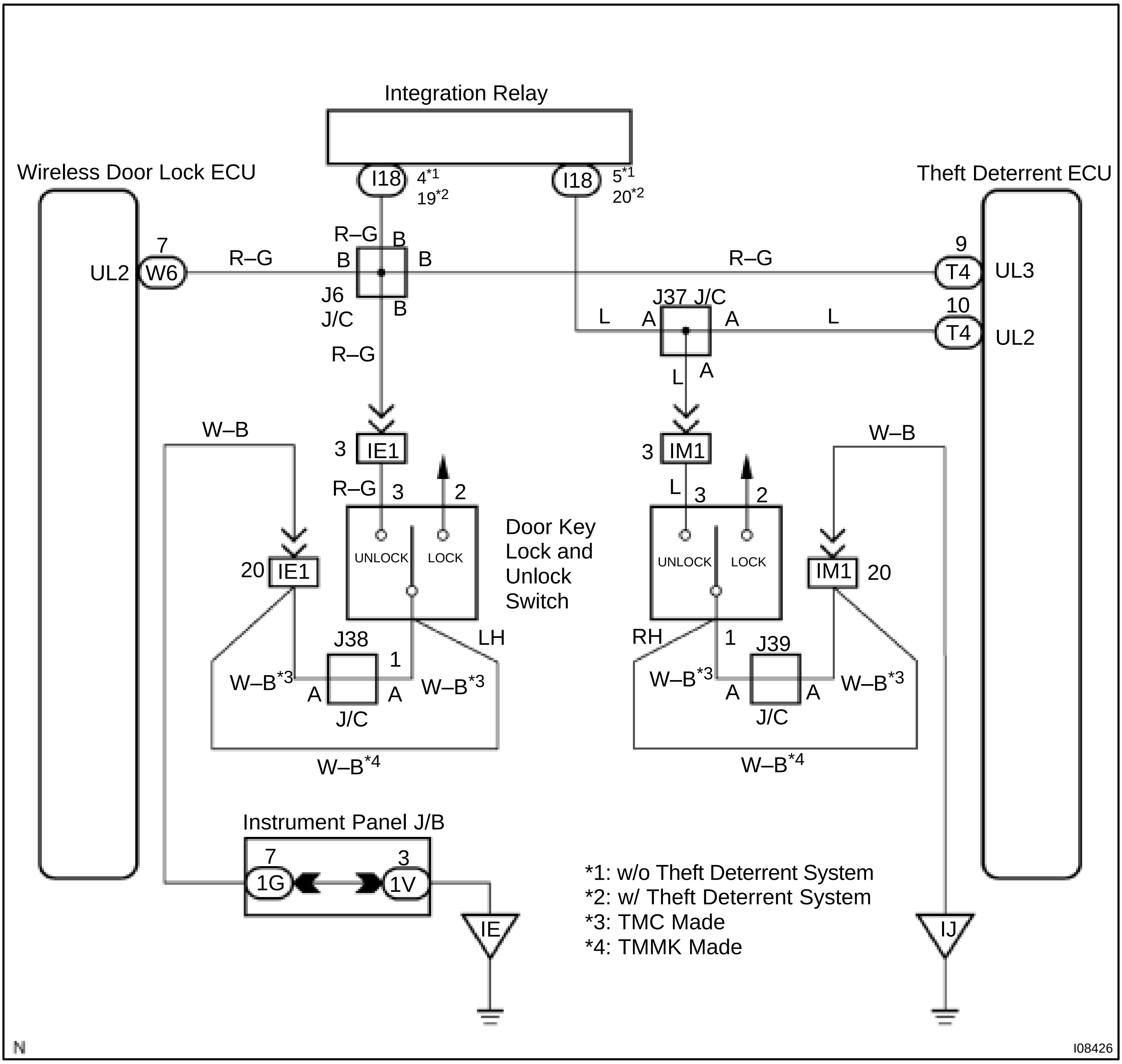
DI05T–03

Door Key Lock and Unlock Switch Circuit (Unlock Side)

CIRCUIT DESCRIPTION

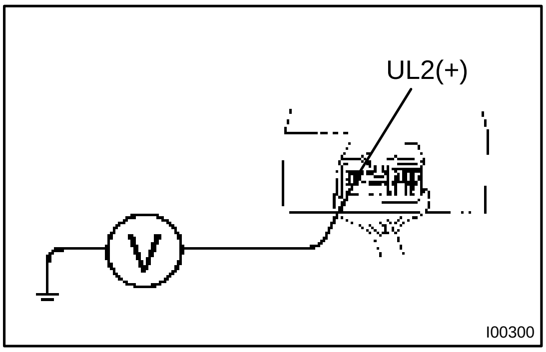
The Key–operated switch is built into the door key cylinder. When the key is turned to the lock side, the lock terminal of the switch is grounded, and when the key is turned to the unlock side the unlock terminal is grounded.
Furthermore, the door key lock and unlock switch circuit has terminal +B connected inside the theft deterrent ECU, when neither the lock nor unlock terminal of the key lock and unlock switch are grounded, battery positive voltage is applied to the door key lock and unlock switch circuit of the wireless door lock ECU.
(Tr inside the ECU coming ON causes the wireless door lock ECU to output a signal to unlock all the doors.)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals UL2 of wireless door lock ECU connector and body ground.**



PREPARATION:

Remove the wireless door lock ECU from No.1 instrument panel brace.

CHECK:

Measure voltage between terminal UL2 of wireless door lock ECU connector and body ground.

OK:

Voltage: 10 – 14 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–809).**

NG

Check and repair harness and connector between wireless door lock ECU and door key lock and unlock switch.

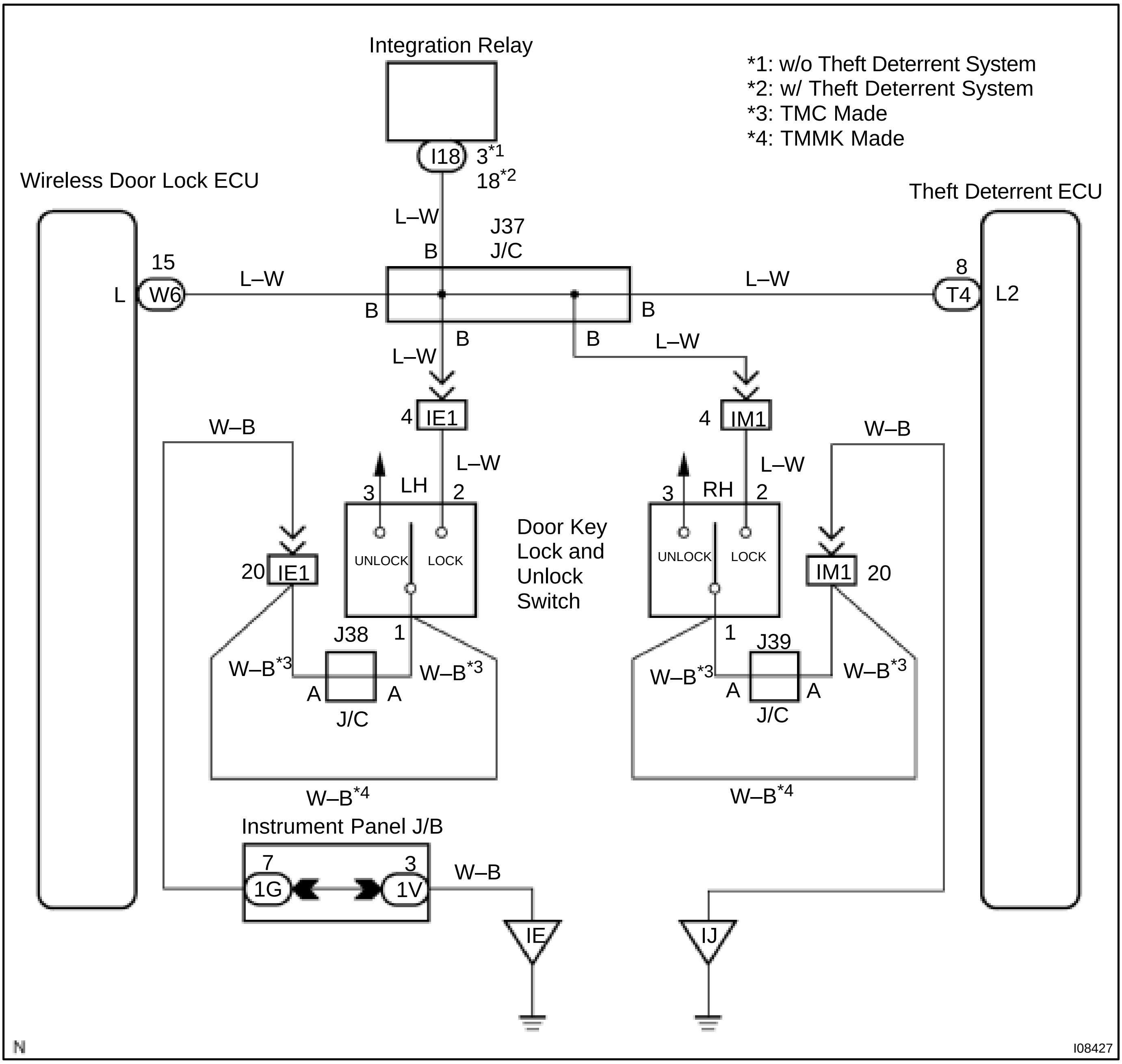
DI05U–03

Door Key Lock and Unlock Switch Circuit (Lock Side)

CIRCUIT DESCRIPTION

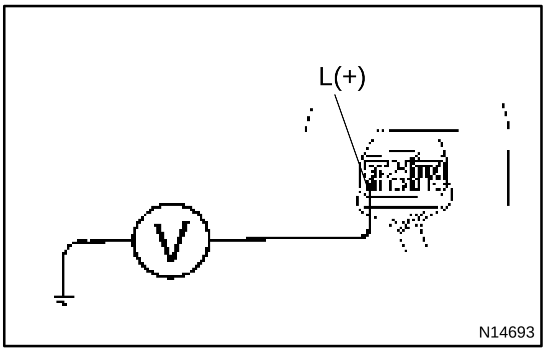
Refer to page DI–815.
Tr inside the wireless door lock ECU coming ON causes the theft deterrent ECU to output a signal to lock all the doors.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal L of wireless door lock ECU connector and body ground.**



PREPARATION:
Remove the wireless door lock ECU from No.1 instrument panel brace.

CHECK:
Measure voltage between terminal L of wireless door lock ECU connector and body ground.

OK:
Voltage 10 – 14 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–809).**

NG

Check and repair harness and connector between wireless door lock ECU and door key lock and unlock switch.

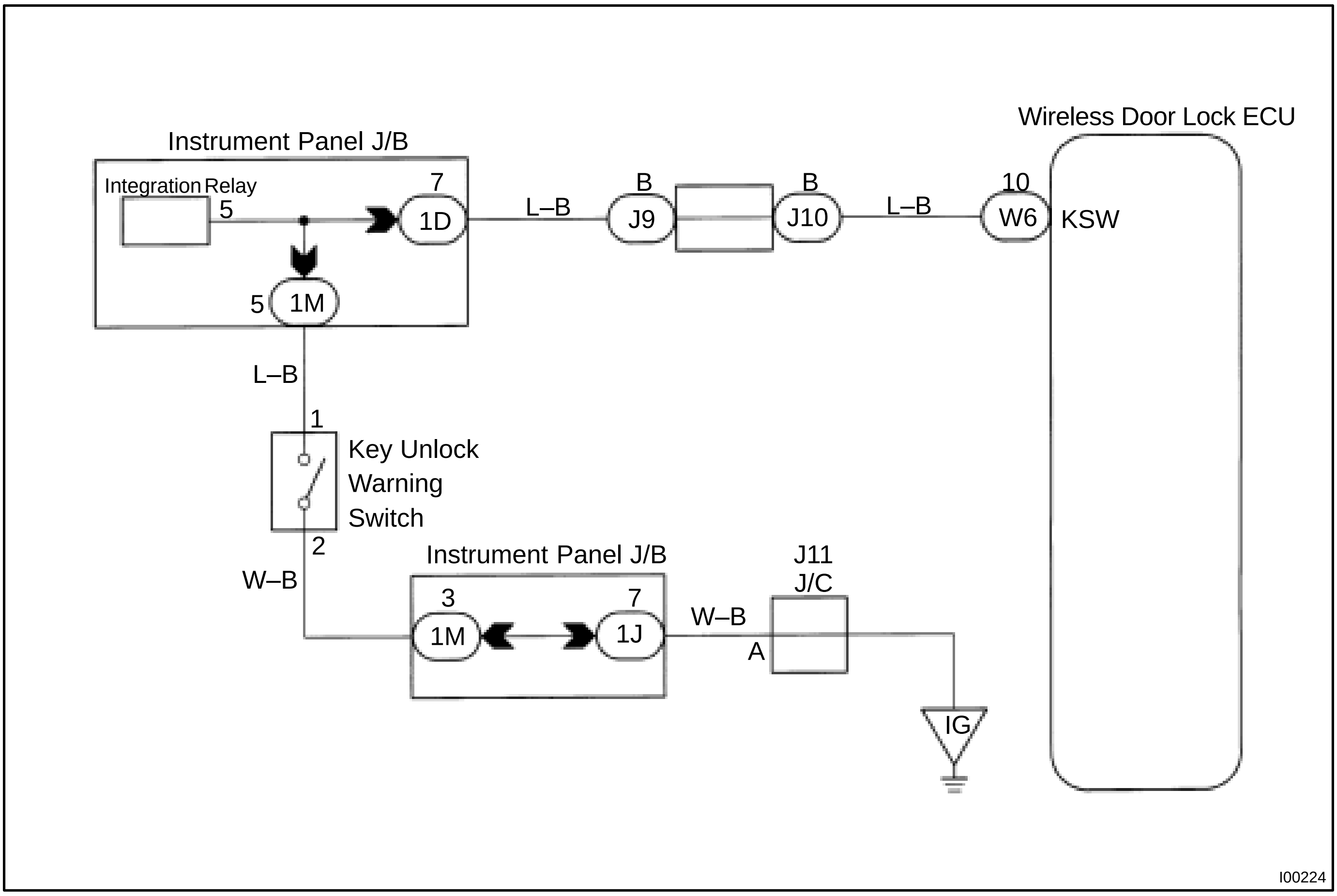
DI05V–03

Key Unlock Warning Switch Circuit

CIRCUIT DESCRIPTION

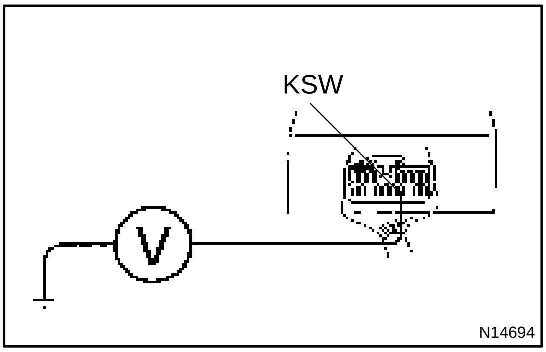
When the key is inserted in the ignition key cylinder, the key unlock warning switch comes ON, and when the key is not inserted the switch is OFF.
When the key unlock warning switch is ON, the ECU operates the key confinement prevention function.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal KSW of wireless door lock ECU connector and body ground.**



PREPARATION:
Remove the wireless door lock ECU from No.1 instrument panel brace.
CHECK:
Measure voltage between terminal KSW of wireless door lock ECU connector and body ground, when key plate is not inserted in the key cylinder.
OK:
Voltage: 10 – 14 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–809).**

NG

Check and repair harness and connector between wireless door lock ECU and key unlock warning switch.

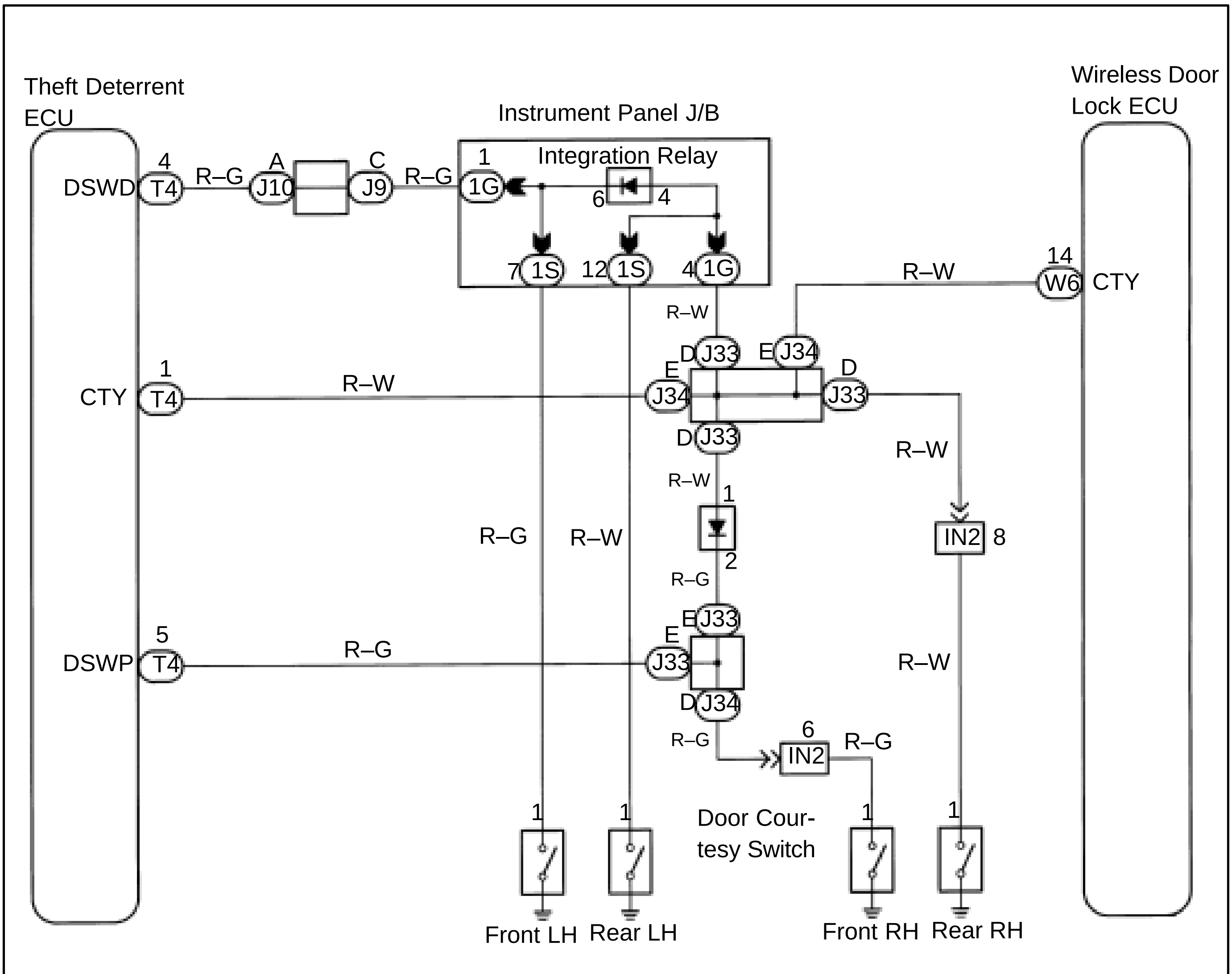
DI05W–03

Door Courtesy Switch Circuit

CIRCUIT DESCRIPTION

The door courtesy switch comes ON when the door is opened and goes OFF when door is closed. Furthermore. the door courtesy switch circuit has terminal +B connected inside the theft deterrent ECU . Battery positive voltage is applied to terminal DSWD of the theft deterrent ECU when all doors are closed, i.e., when the door courtesy switches of all doors are OFF.

WIRING DIAGRAM



I00223

INSPECTION PROCEDURE

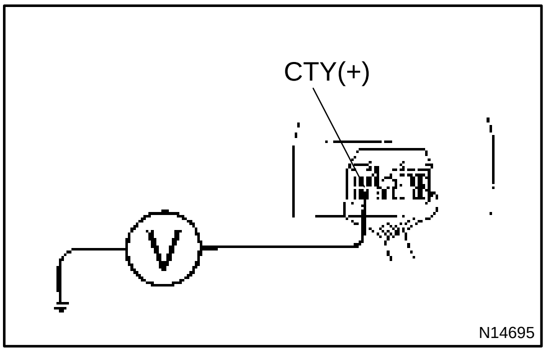
1	**Check operation of open door warning light.**

CHECK:
Check that open door warning light comes ON when each door is opened, and goes OFF when all doors are closed.

NG → **Check open door warning light circuit**

OK

2	**Check voltage between terminal CTY of wireless door lock ECU connector and body ground.**



PREPARATION:
Remove the wireless door lock ECU from No.1 instrument panel brace.
CHECK:
Measure voltage between terminal CTY of wireless door lock ECU connector and body ground, when all doors are closed.
OK:
Voltage: 10 – 14 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–809).**

NG

Check and repair harness and connector between wireless door lock ECU and door courtesy switch.

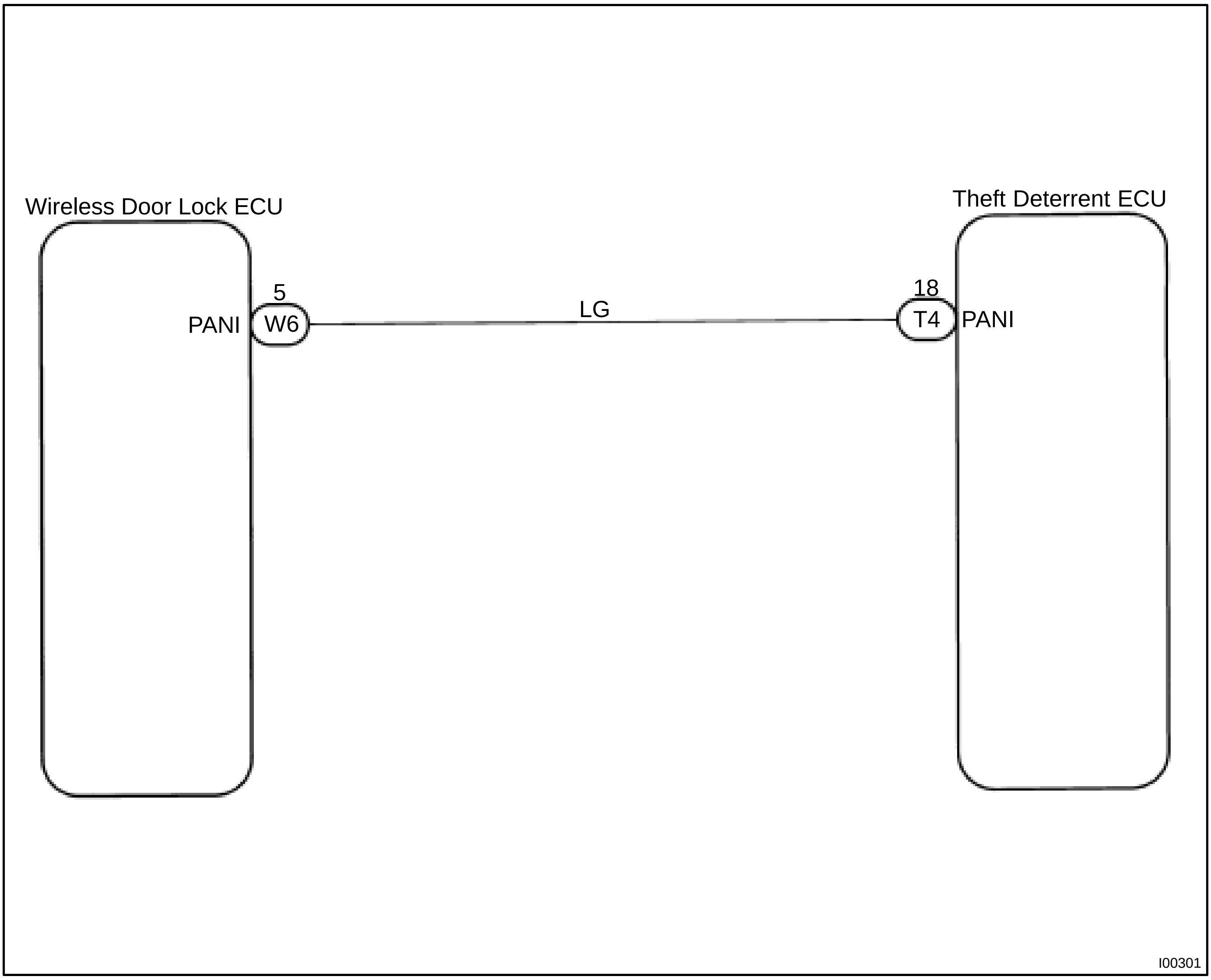
DI05X–04

Panic Circuit

CIRCUIT DESCRIPTION

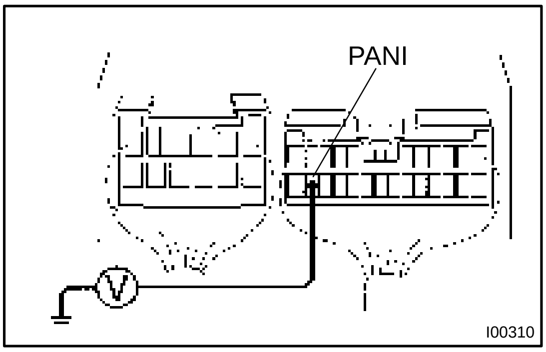
This circuit will transmit a panic signal from a wireless door lock ECU to a theft deterrent ECU.
When the key is not inserted in the ignition key cylinder and the theft deterrent ECU receives the panic signal from the wireless door lock ECU, warning operation will be performed.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal PANI of theft deterrent ECU connector and body ground.**



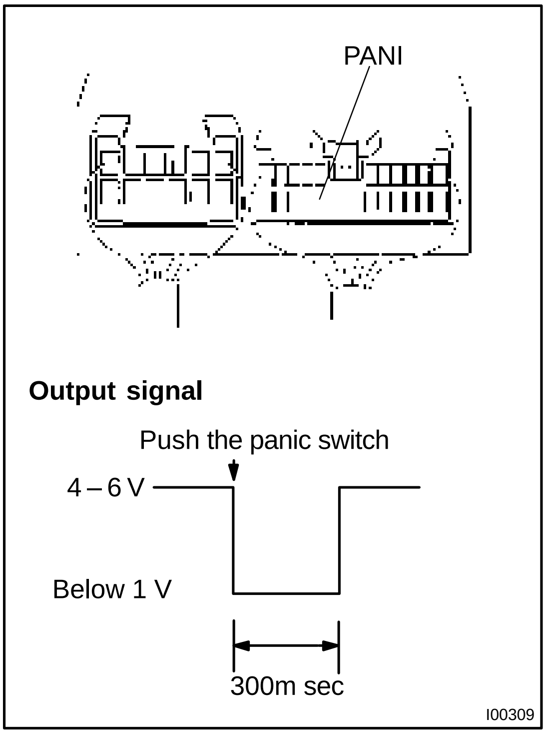
CHECK:
Measure voltage between terminal PANI of theft deterrent ECU connector and body ground.

OK:
Voltage: 4 – 6 V

OK → **Exchange theft deterrent ECU.**

NG

2	**Check the panic signal (Theft deterrent ECU side)**



CHECK:
Check the signal of the terminal PANI when pushing the PANIC switch of the transmitter.

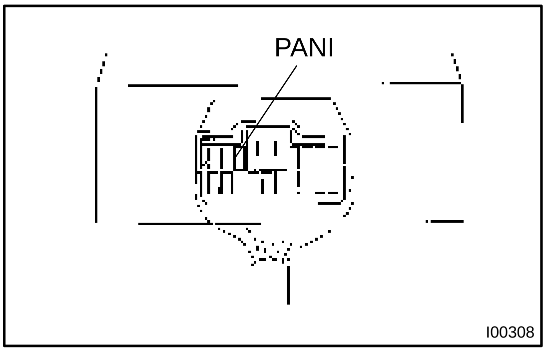
HINT:
Check the signal using the oscilloscope or oscilloscope function of TOYOTA hand–held tester.

OK:
Output the signal as shown in the illustration.

OK → **Exchange theft deterrent ECU.**

NG

3	**Check the panic signal (Wireless door lock ECU side)**



CHECK:

Check the signal of the terminal PANI when pressing the PANIC switch of the transmitter.

OK:

Output the signal shown on the previous page.

NG — **Proceed to next circuit inspection shown on problem symptoms table (See page DI–809).**

OK

Check and repair harness and connector between wireless door lock ECU and theft deterrent ECU.

THEFT DETERRENT SYSTEM

DI06M–04

HOW TO PROCEED WITH TROUBLESHOOTING

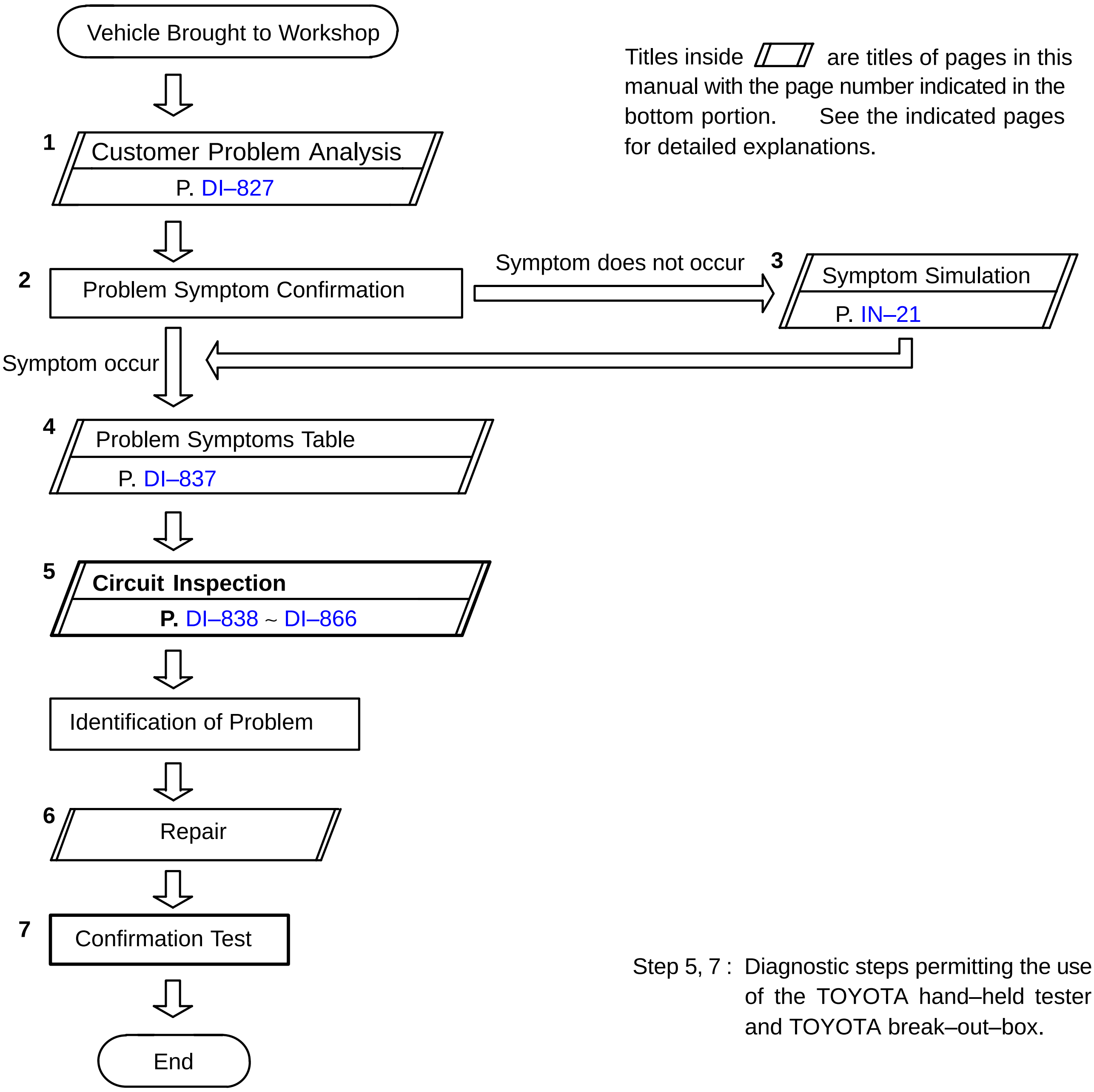
HINT:

Troubleshooting of the theft deterrent system is based on the premise that the door lock control system is operating normally. Accordingly, before troubleshooting the theft deterrent system, first make certain that the door lock control system is operating normally.

For troubleshooting use a volt/ohm meter.

Be sure to use troubleshooting procedure appropriate to the diagnostic tool being used.

Perform troubleshooting in accordance with the procedure on the following page.



DI06N–05

CUSTOMER PROBLEM ANALYSIS CHECK

THEFT DETERRENT SYSTEM Check Sheet

Inspector's name: ________________

Customer's Name		**Registration No.**	
		Registration Year	
		Frame No.	
Date of Vehicle Brought in	/ /	**Odometer Reading**	km Mile

Date Problem First Occurred		/ /
Frequency Problem Occurs		● Constant ● Sometimes (Times per day, month) ● Once only
Weather Conditions When Problem Occurred	**Weather**	● Fine ● Cloudy ● Rainy ● Snowy ● Various/Others
	Outdoor temperature	● Hot ● Warm ● Cool ● Cold (Approx. °F (°C))

Problem Symptom

● Theft deterrent system cannot be set.		
● Indicator light does not flash when the theft deterrent system is set. (It stays on or does not light at all.)		
● Theft deterrent system does not operate.	● When unlocked using the door lock knob. ● When the engine hood is opened.	Malfunction ● Horns only ● Theft deterrent horn only ● Headlights only ● Taillights only ● Starter cut only ● Door lock operation only
● System cannot be canceled once set.	● When door is unlocked using key or wireless door lock control system. ● When the key is inserted in the ignition key cylinder and turned to ACC or ON position. (However, only when the system has never operated) ● When the luggage compartment door is opened with the key.	
● System cannot be canceled during warning operation.	● When door is unlocked using key or wireless door lock control system. ● When the key is inserted in the ignition key cylinder and turned to ACC or ON position.	
● Warning operation starts when the system is set and the door or luggage compartment door is opened with the key.		
● Others.		

DI1KU–02

PRE–CHECK

1. Active arming mode:
SETTING THE THEFT DETERRENT MODE

The system will be automatically set to the theft deterrent mode about 30 seconds after the setting processes listed below are performed.

Setting Processes: (do processes (1)～(4) in the order)

(1) Remove the ignition key from the key cylinder.

(2) Close all entry points (door, hood and luggage compartment door).

(3) Use any one of the following methods to lock all the doors depending on a given condition.

- Use the key to lock the driver or passenger side door. (as a result, all the doors(including the engine hood and luggage compartment door) will be closed and locked), or
- Use the remote control to lock any door (as a result, all the doors(including the engine hood and luggage compartment door) will be closed and locked), or
- If the front right or left door is unlocked when both the rear doors are already locked, lock and close the remaining unlocked door by hand (as a result, all the doors(including the engine hood and luggage compartment door) will be closed and locked).
- Close all doors and lock with the engine hood or luggage compartment door opened, and close the engine hood or all the doors(including the engine hood and luggage compartment door).

(4) About 30 seconds after the above process (3), the theft deterrent mode will automatically start.

HINT:
The closing/locking of all the entry points (doors, hood and luggage) must remain unchanged for about 30 seconds, the system will start the theft deterrent mode.

2. Passive arming mode:
SETTING THE THEFT DETERRENT MODE

The system will be automatically set to the theft deterrent mode about 30 seconds after the setting processes listed below are performed.

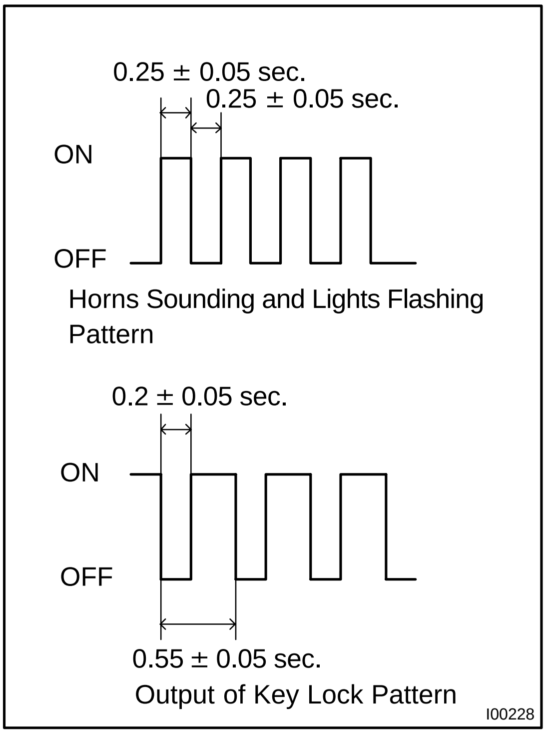
Setting Processes:

(1) Remove the ignition key from the key cylinder.

(2) Open and close any entry points (door, hood and luggage compartment door).
Now, all the entry points are closed.

(3) About 30 seconds after the process–(2), on the previous page the Theft Deterrent mode will automatically start.

HINT:
If, while following above steps, you use the key or the remote control to lock the door, the system will be set to ACTIVE ARMING MODE.



3. THEFT DETERRENT OPERATION

When the system is set to the theft deterrent mode and any of the following conditions are met, the system sounds the horns and flashes the headlights and the taillights for about 1 minute. At the same time locks all doors (If all doors are not locked at once, the system repeats door locking operation every 0.55 seconds during the one–minute alarm time).

Condition

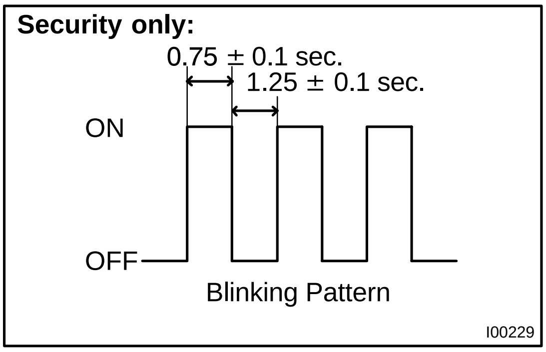
(1) Any of the doors (Including the engine hood and luggage compartment door) is unlocked or opened without the key. *1
(2) The battery terminal is disconnected and reconnected. *2
(3) The system receives panic signal from remote keyless entry. *3
*1: Only active arming mode.
*2: When the ignition key is not inserted in the key cylinder.

4. CANCELLATION OF THEFT DETERRENT OPERATION OR MODE

The theft deterrent operation of mode can be cancelled when any of the following conditions is met.

No.	Condition	Cancel of Operation	Cancel of Mode
1	Unlock front doors with the key	Effective	Effective
2	Unlock doors with remote keyless entry	Effective	Effective
3	Insert key into ignition key cylinder and turn it to ACC or ON position	Effective	Effective
4	About 1 minute passes after theft deterrent operation begins	Automatic stop *1	–
5	Unlock the luggage compartment door with the key or keyless entry.	Uneffective	Effective
6	Unlock the luggage compartment door with the keyless entry.	Uneffective	Effective
7	If the system receives panic signal again or unlock signal when the system is activated by panic signal	Effective *2	Uneffective
6	If the system receives unlock signal when the system is activated by panic signal	Effective	Effective

*1: The system is set to the theft deterrent mode again in about 2 seconds after the operation stops, if all doors are closed.
*2: The alarm caused by the panic signal malces the system in the previous condition.



5. INDICATOR LIGHT (LED)

The indicator light functions as shown below according to the system condition in the theft deterrent mode. It remains OFF in the initial state.

System Condition	Indicator Light
During set preparation time	ON
When the mode is set*	OFF
When alarm is activated	ON
When the system is temporally cancelled*	OFF

*: The indicator flashes with the output from the immobiliser.

6. KEEPING POWER SUPPLY FUNCTION IN CASE OF DOME FUSE OPEN

Even if the dome fuse blows open on the theft deterrent mode, the system will keep working on the theft deterrent mode.

7. CHANGING METHOD OF PASSIVE MODE (ON or OFF)

Input to the vehicle

Output from the vehicle

Remove the ignition key from key cylinder. All the doors, engine hood and luggage compartment door are closed and unlocked.

↓

Within 30 sec.:

Any of doors is locked and unlocked by turns 3 times by the key or remote control.

↓

Driver's side doors is opened.

↓

Driver's side knob for doorlock is locked and unlocked 3 times.

↓

The system starts force lock at once after 2 sec.

↓

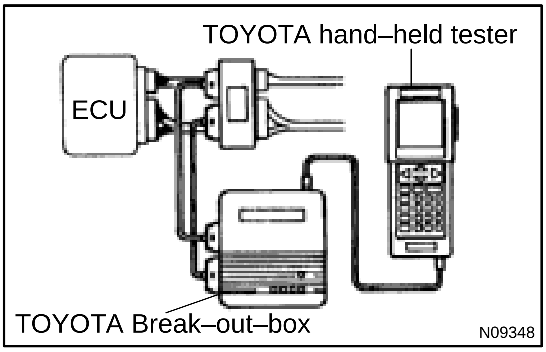
Within 20 sec.:

Driver's side knob for door lock is unlocked.

↓

Driver's side door is closed and opened 2 times	Driver's side door is closed and opened 4 times
↓	↓
Driver's side knob for door lock is locked and unlocked.	Driver's side knob for door lock is locked and unlocked.
↓	↓
The system starts force lock at once after 2 sec.	The system starts force lock at once after 2 sec.
↓	↓
PASSIVE MODE OFF	PASSIVE MODE ON

HINT:
- Initial mode is PASSIVE MODE OFF.
- If there is a different signal in the middle of changing, it is invalied.



8. ECU TERMINAL VALUES MEASUREMENT BY USING TOYOTA BREAK–OUT–BOX AND TOYOTA HAND–HELD TESTER

(a) Hook up the TOYOTA break–out–box and TOYOTA hand–held tester to the vehicle.

(b) Read the ECU input/ output values by following the prompts on the tester screen.

HINT:

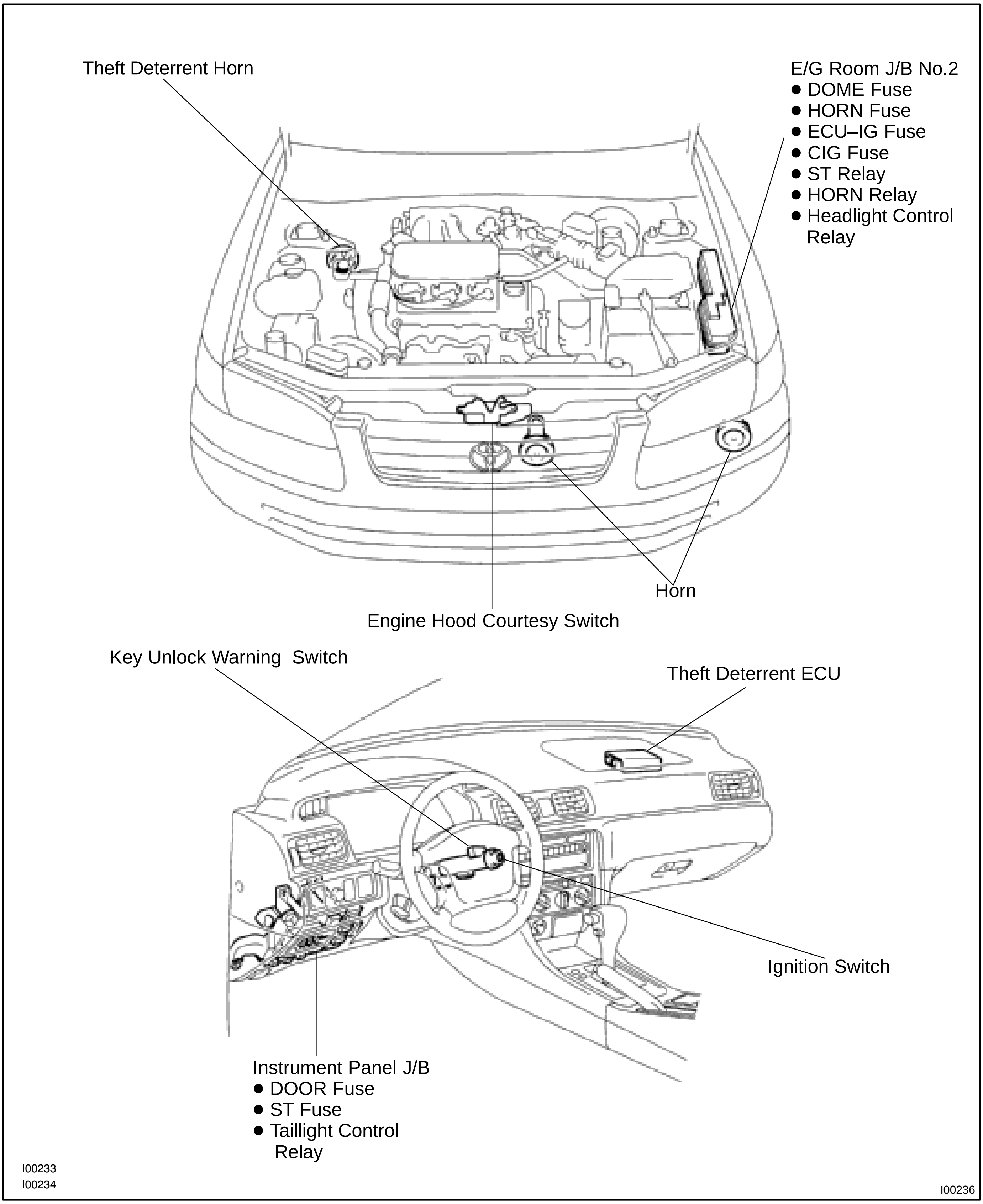
TOYOTA hand–held tester has a ”Snapshot” function.

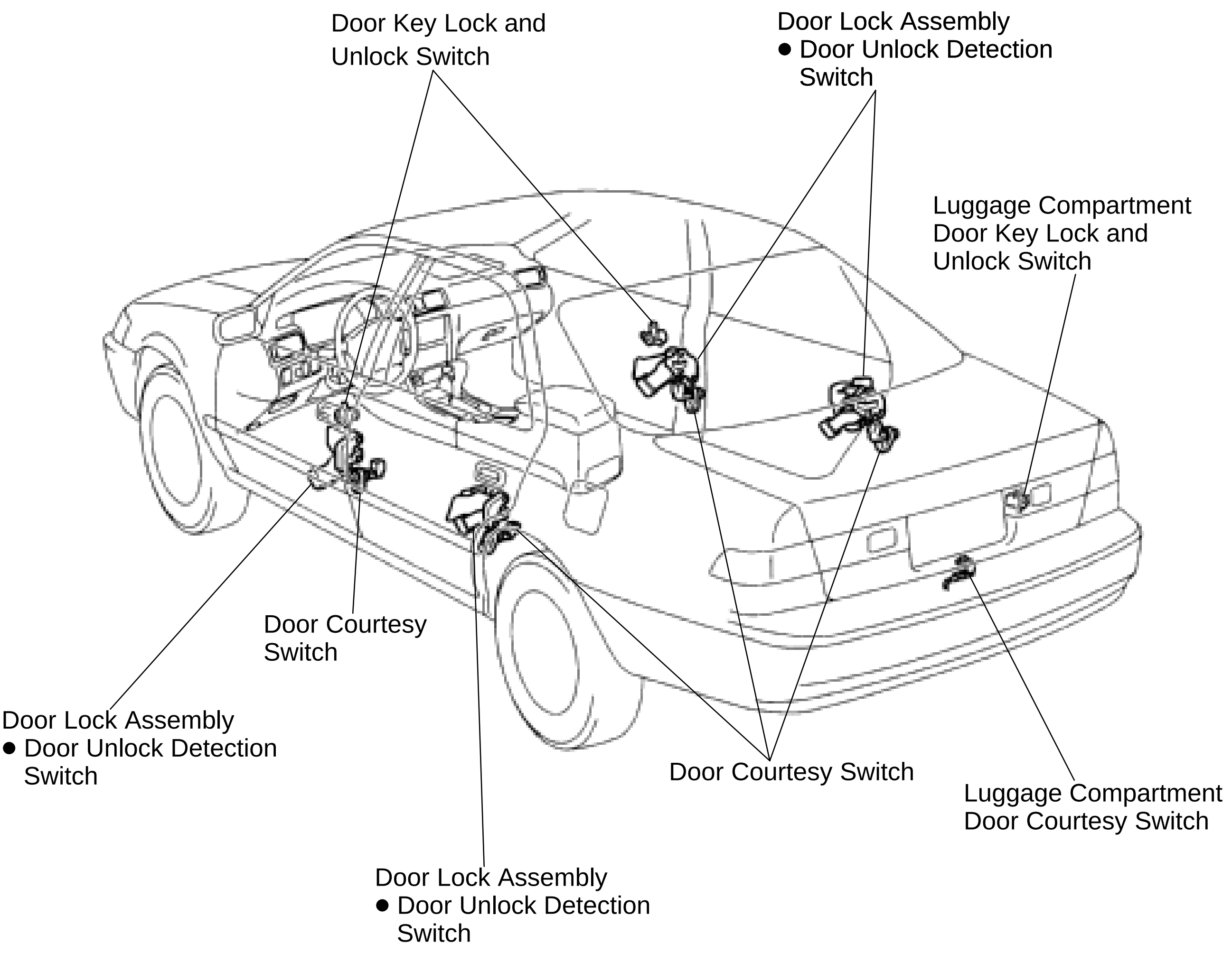
This records the measured values and is effective in the diagnosis of intermittent problems.

Please refer to the TOYOTA hand–held tester / TOYOTA break–out–box operator’s manual for further details.

DI06P–05

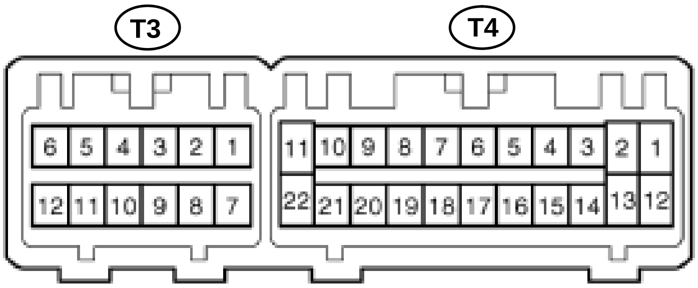
PARTS LOCATION




Door Key Lock and
Unlock Switch
Door Lock Assembly
● Door Unlock Detection
Switch
Luggage Compartment
Door Key Lock and
Unlock Switch
Door Courtesy
Switch
Door Lock Assembly
● Door Unlock Detection
Switch
Door Courtesy Switch
Luggage Compartment
Door Courtesy Switch
Door Lock Assembly
● Door Unlock Detection
Switch
I00235

DI1KV–03

TERMINALS OF ECU



Symbols (Terminals No.)	Wiring Color	Condition	STD Value
CTY ↔ E (T4–1 ↔ T3–7)	R–W ↔ W–B	Door courtesy switch ”ON” (Rear door opened)	Below 1 Ω
		Door courtesy switch ”OFF” (Rear door closed)	1 MΩ or higher
DSWL ↔ E (T4–2 ↔ T3–7)	R–Y ↔ W–B	Luggage compartment door courtesy switch ”ON” (Luggage compartment door opened)	Below 1 Ω
		Luggage compartment door courtesy switch ”OFF” (Luggage compartment door closed)	1 MΩ or higher
DSWH ↔ E (T4–3 ↔ T3–7)	B ↔ W–B	Engine hood courtesy switch ”ON” (Engine hood opened)	Below 1 Ω
		Engine hood courtesy switch ”OFF” (Engine hood closed)	1 MΩ or higher
DSWD ↔ E (T4–4 ↔ T3–7)	R–G ↔ W–B	Door courtesy switch ”ON” (Driver’s door opened)	Below 1 Ω
		Door courtesy switch ”OFF” (Driver’s door Closed)	1 MΩ or higher
DSWP ↔ E (T4–5 ↔ T3–7)	R–G ↔ W–B	Door courtesy switch ”ON” (Passenger’s door opened)	Below 1 Ω
		Door courtesy switch ”OFF” (Passenger’s door closed)	1 MΩ or higher
KSW ↔ E (T4–6 ↔ T3–7)	L–B ↔ W–B	Key unlock warning switch ”ON” (Key inserted)	Below 1 Ω
		Key unlock warning switch ”OFF” (Key removed)	1 MΩ or higher
LUG ↔ E (T4–7 ↔ T3–7)	G–W ↔ W–B	Luggage compartment door key lock and unlock switch ”ON”	Below 1 Ω
		Luggage compartment door key lock and unlock switch ”OFF”	1 MΩ or higher
L2 ↔ E (T4–8 ↔ T3–7)	L–W ↔ W–B	Door key lock and unlock switch ”LOCK” (Driver’s and passenger’s doors)	Below 1 Ω
		Door key lock and unlock switch ”UNLOCK” (Driver’s and passenger’s doors)	1 MΩ or higher
UL3 ↔ E (T4–9 ↔ T3–7)	R–G ↔ W–B	Door key lock and unlock switch ”UNLOCK” (Driver’s door)	Below 1 Ω
		Door key lock and unlock switch ”LOCK” (Driver’s door)	1 MΩ or higher
UL2 ↔ E (T4–10 ↔ T3–7)	L ↔ W–B	Door key lock and unlock switch ”UNLOCK” (passenger’s door)	Below 1 Ω
		Door key lock and unlock switch ”LOCK” (passenger’s door)	1 MΩ or higher

+B1 ↔ Body ground (T4–12 ↔ Body ground)	R ↔ W–B	Always	10 – 14 V
IG ↔ E (T4–13 ↔ T3–7)	B–R ↔ W–B	Ignition switch is turned to ”ON” position	10 – 14 V
LSWD ↔ E (T4–14 ↔ T3–7)	L–R ↔ W–B	Door unlock detection switch ”ON” (Driver’s door)	Below 1 Ω
		Door unlock detection switch ”OFF” (Driver’s door)	1 MΩ or higher
LSWP ↔ E (T4–15 ↔ T3–7)	Y ↔ W–B	Door unlock detection switch ”ON” (Passenger’s door)	Below 1 Ω
		Door unlock detection switch ”OFF” (Passenger’s door)	1 MΩ or higher
LSWR ↔ E (T4–16 ↔ T3–7)	L–Y ↔ W–B	Door unlock detection switch ”ON” (Rear door)	Below 1 Ω
		Door unlock detection switch ”OFF” (Rear door)	1 MΩ or higher
PANI ↔ E (T4–18 ↔ T3–7)	LG ↔ W–B	It is receiving panic signal from remote keyless entry	Below 1 Ω
		Except above mention	1 MΩ or hegher
+B2 ↔ Body ground (T3–1 ↔ Body ground)	L–W ↔ Body ground	Always	10 – 14 V
IND ↔ E (T3–6 ↔ T3–7)	R–Y ↔ W–B	During set preparation	3 – 5 V
E ↔ Body ground (T3–7 ↔ Body ground)	W–B ↔ Body ground	Always	10 – 14 V
SH ↔ E (T3–9 ↔ T3–7)	W–L ↔ W–B	Always	10 – 14 V
HEAD ↔ E (T3–10 ↔ T3–7)	R–B ↔ W–B	Light control switch ”HEAD”	10 – 14 V
TAIL ↔ E (T3–11 ↔ T3–7)	G–R ↔ W–B	Light control switch ”TAIL” or ”HEAD”	10 – 14 V
HORN ↔ E (T3–12 ↔ T3–7)	G–B ↔ W–B	Horn switch ”OFF”	10 – 14 V

DI06R–06

PROBLEM SYMPTOMS TABLE

Proceed to the reference page shown in the matrix chart below for each malfunction symptom and troubleshoot for each circuit.

HINT:

Troubleshooting of the theft deterrent system is based on the premise that the door lock control system is operating normally. Accordingly, before troubleshooting the theft deterrent system, first make certain that the door lock control system is operating normally.

Details of Problem			Inspecting Circuit*1	See page
The theft deterrent system cannot be set			1. Indicator light circuit	DI–838
			2. ECU power source circuit	DI–840
			3. Key unlock warning switch circuit	DI–853
			4. Luggage compartment door key lock and unlock switch circuit	DI–855
			5. Luggage compartment door courtesy switch circuit	DI–858
			6. Door key lock and unlock switch circuit	DI–855
			7. Door courtesy switch circuit	DI–864
			8. Door unlock detection switch circuit	DI–862
			9. Engine hood courtesy switch circuit	DI–866
The indicator light does not blink when system is set			Indicator light circuit	DI–838
When the system is set	When the rear doors are unlocked	The system does not operate	Door unlock detection switch circuit	DI–862
	When the luggage compartment door is opened by a method other than the key		Luggage compartment door courtesy switch circuit	DI–858
	When the engine hood is opened		Engine hood courtesy switch circuit	DI–866
While the system is in warning operation	Horns do not sound		Horn relay circuit	DI–845
	Theft deterrent horn does not sound		Theft deterrent horn circuit	DI–843
	Headlights do not flash		Headlight control relay circuit	DI–847
	Taillights do not flash		Taillight control relay circuit	DI–849
	The door lock is not locked in unlock condition		Door unlock detection switch circuit	DI–862
When the system is set	It is not canceled when the ignition key is turned to ACC or ON position		Ignition switch circuit	DI–851
	It still operates when the luggage compartment door is opened with the key		Luggage compartment door key lock and unlock switch circuit	DI–855
System is still set even when a rear door is open			Door courtesy switch circuit	DI–864
Even when the system is not set	Horns sound		Horn relay circuit	DI–845
	Theft deterrent horn sounds		Theft deterrent horn circuit	DI–843
	Headlights stay on		Headlight control relay circuit	DI–847
	Taillights stay on		Taillight control relay circuit	DI–849

*1: If numbers are given to the circuit proceed with troubleshooting in the order indicated by those numbers.

DI06S–04

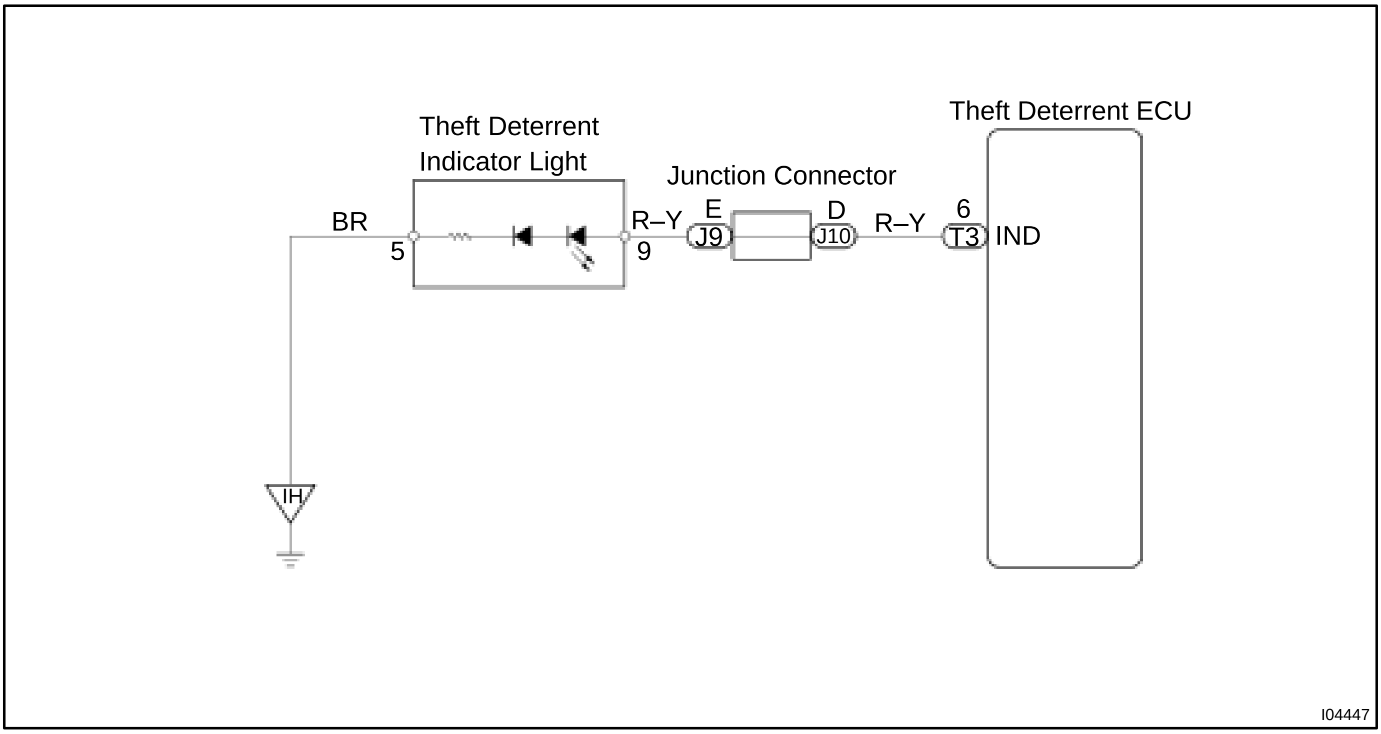
CIRCUIT INSPECTION

Indicator Light Circuit

CIRCUIT DESCRIPTION

When the theft deterrent system is preparing to set, this circuit lights up the indicator light. When the system has been set, it continuously turns the indicator light on for 1 second and turns it off for 1 second, thus blinking the indicator light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check indicator light.**

PREPARATION:
Remove combination meter.
CHECK:
Connect the positive (+) lead from the battery to terminal C9 and the negative (–) lead to terminal B16 of combination meter connector then check indicator light comes ON.
(See combination meter on page BE–46)

NG	**Replace combination meter.**

OK

2	**Check harness and connector between theft deterrent ECU and indicator light, indicator light and body ground (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace theft deterrent ECU.*1

*1: When there is a malfunction that the theft deterrent system cannot be set, proceed to the next numbered circuit inspection shown on problem symptoms table (See page DI–837).

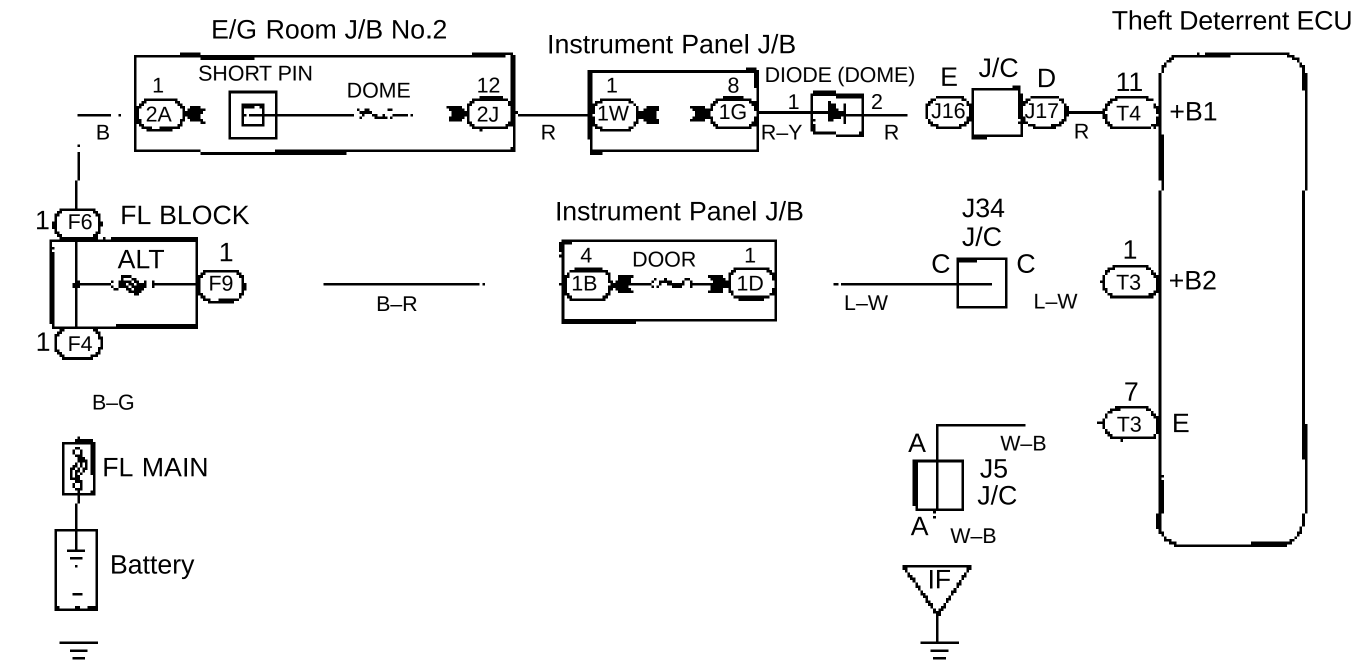
DI06T–06

ECU Power Source Circuit

CIRCUIT DESCRIPTION

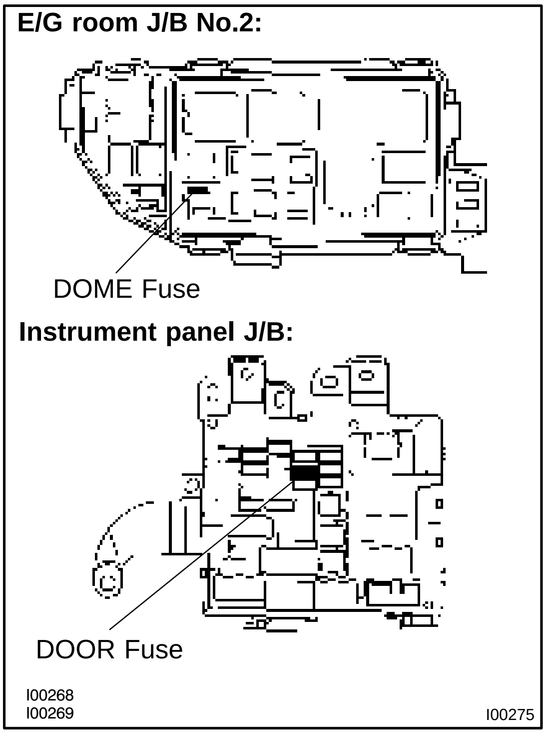
This circuit provides power to operate the theft deterrent ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check DOME and DOOR fuses.



PREPARATION:

(a) Remove DOME fuse from engine room junction block No.2.

(b) Remove DOOR fuse from instrument panel junction block No.1.

CHECK:

Check continuity of DOME and DOOR fuses.

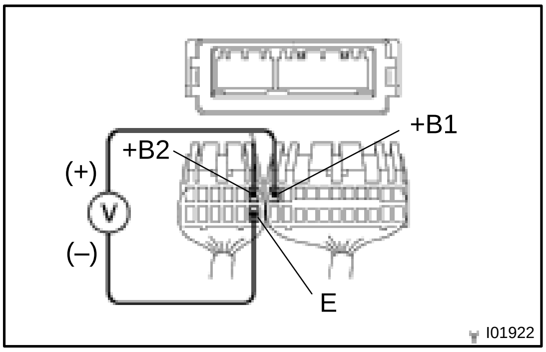
OK:

Continuity

NG	Check for short in all the harness and components connected to the DOME and DOOR fuses (See attached wiring diagram).

OK

2	Check voltage between terminals each of +B1 and +B2 and E of theft deterrent ECU connector.



PREPARATION:

Disconnect the theft deterrent ECU connector.

CHECK:

Measure voltage between terminals each of +B1 and +B2 and E of theft deterrent ECU connector.

OK:

Voltage: 10 – 14 V

OK	Proceed to next circuit inspection shown on problem symptoms table (See page DI–837).

NG

3	Check for open in harness and connector between ECU and body ground (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and repair harness and connector between ECU and battery.

DI06V–06

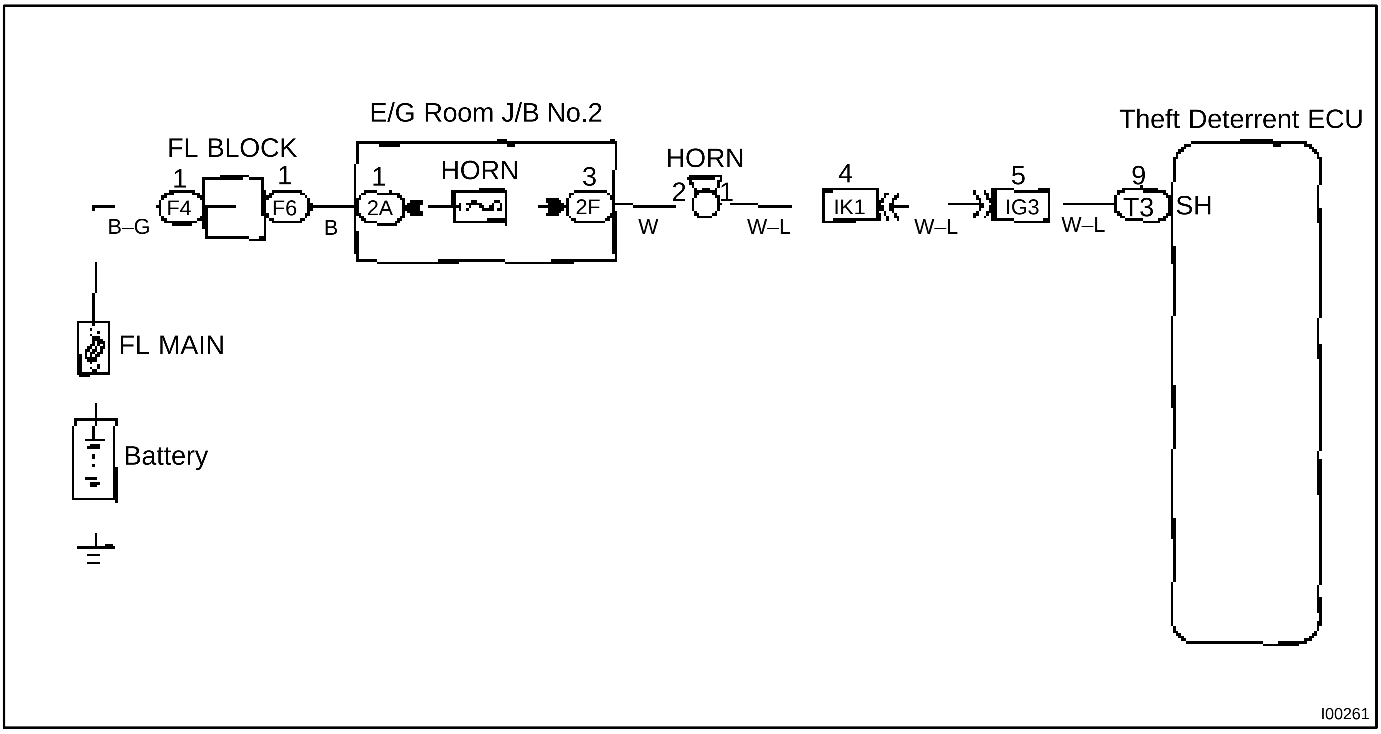
Theft Deterrent Horn Circuit

CIRCUIT DESCRIPTION

When the theft deterrent system is activated, the relay in the ECU turns ON and OFF cycles of approximately 0.2 sec., causing the theft deterrent horn to blow (See the wiring diagram below).
In this condition, if any of the following operations is done, the relay in the ECU turns OFF, thus stopping the theft deterrent horn from blowing:

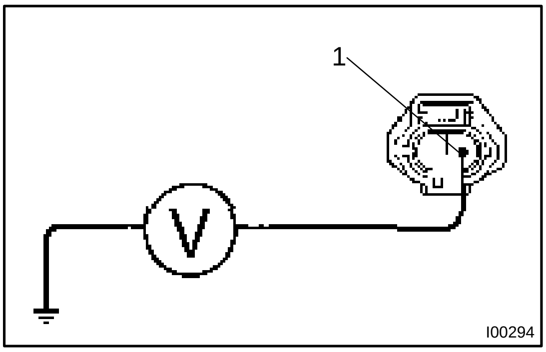
(1) Unlock the front LH or RH door with key.
(2) Turn the ignition switch to ACC or ON position.
(3) Unlock the doors with the wireless door lock control system.
(4) Wait for approximately 60 seconds.
(5) Push the panic switch of the wireless door lock control system.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminal 1 of theft deterrent horn connector and body ground.

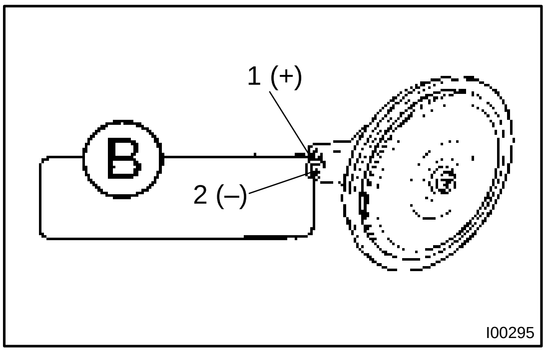


PREPARATION:
Remove the theft deterrent horn and disconnect the connector.
CHECK:
Measure voltage between terminal 1 of theft deterrent horn connector and body ground.
OK:
Voltage: 10 – 14 V

NG → **Check and repair harness and connector between HORN fuse and theft deterrent horn.**

OK

2	Check theft deterrent horn.



CHECK:
Connect positive (+) lead to terminal 1 and negative (–) lead to terminal 2 to theft deterrent horn connector.
OK:
Theft deterrent horn blows.

NG → **Replace theft deterrent horn.**

OK

3	Check harness and connector between theft deterrent ECU and theft deterrent horn (See page IN–29).

NG → **Check and repair harness or connector.**

OK

Check and replace theft deterrent ECU.

DI06W–06

Horn Relay Circuit

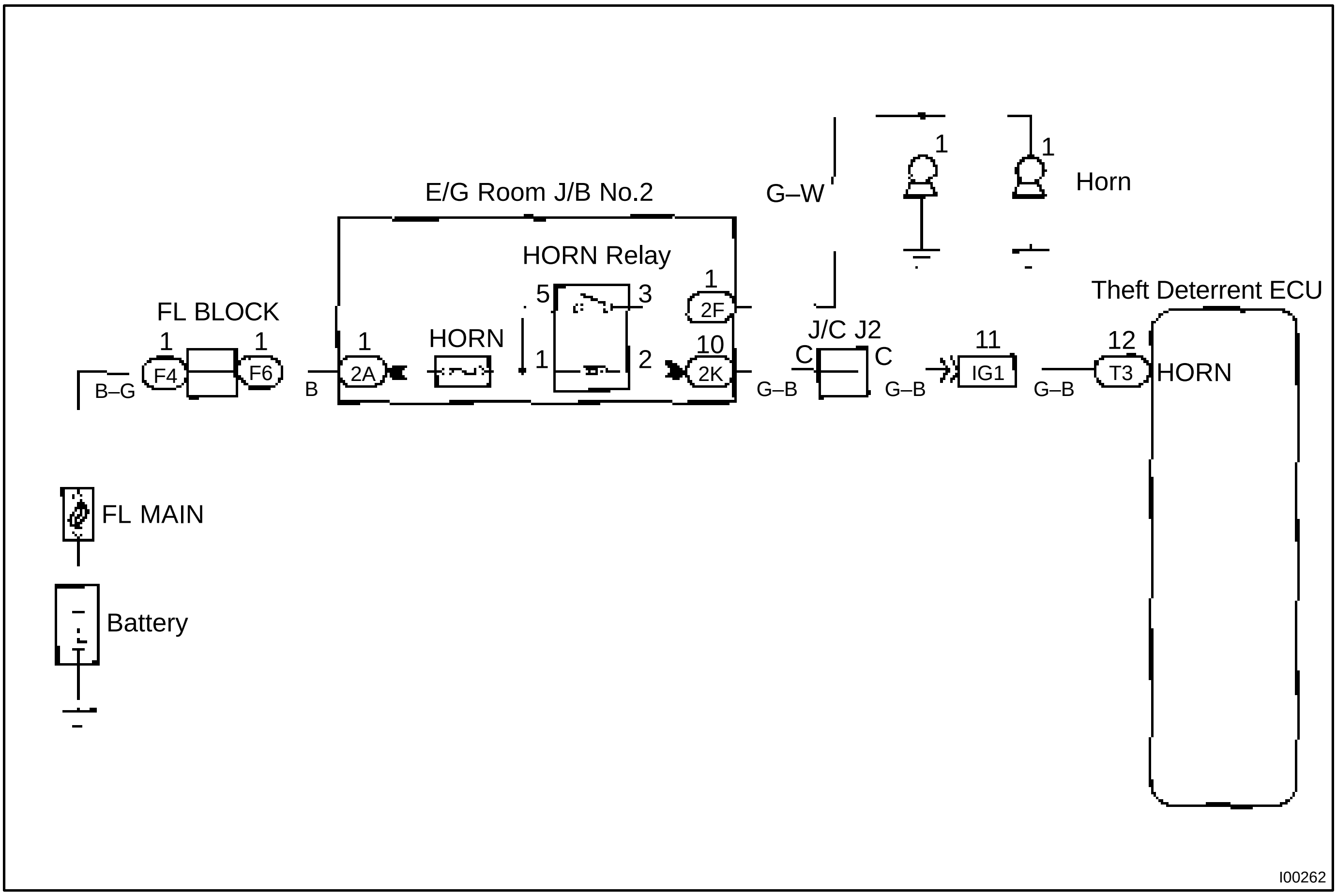
CIRCUIT DESCRIPTION

When the theft deterrent system is activated, it causes the Tr in the ECU to switch ON and OFF in approximately 0.4 sec. cycles. This switches the horn relay ON and OFF, thus the horns blow (See the wiring diagram below).

In this condition, if any of the following operations is done, the Tr in the ECU goes off and the horn relay switches off, thus stopping the horns from blowing:

(1) Unlock the front LH or RH door with key.
(2) Turn the ignition switch to ACC or ON position.
(3) Unlock the doors with the wireless door lock control system.
(4) Wait for approximately 60 seconds.
(5) Push the panic switch of the wireless door lock control system.

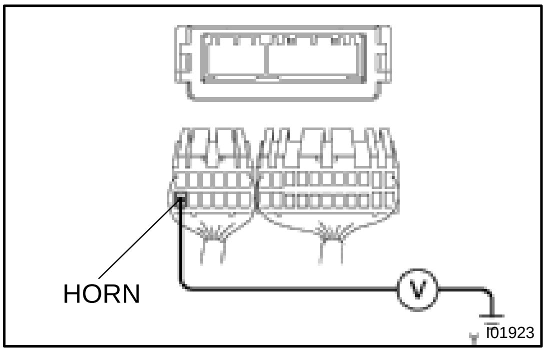
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
The flow chart below is based on the premise that the horns blow normally whenever the horn switch is operated. If horn operation is not normal when the horn switch is operated, check the horn switch.

1	**Check voltage between terminal HORN of theft deterrent ECU connector and body ground.**



PREPARATION:
Disconnect the theft deterrent ECU connectors.
CHECK:
Measure voltage between terminal HORN of theft deterrent ECU connector and body ground.
OK:
Voltage: 10 – 14 V

NG → **Check and repair harness and connector between theft deterrent ECU and horn relay.**

OK

Check and replace theft deterrent ECU.

DI06X–06

Headlight Control Relay Circuit

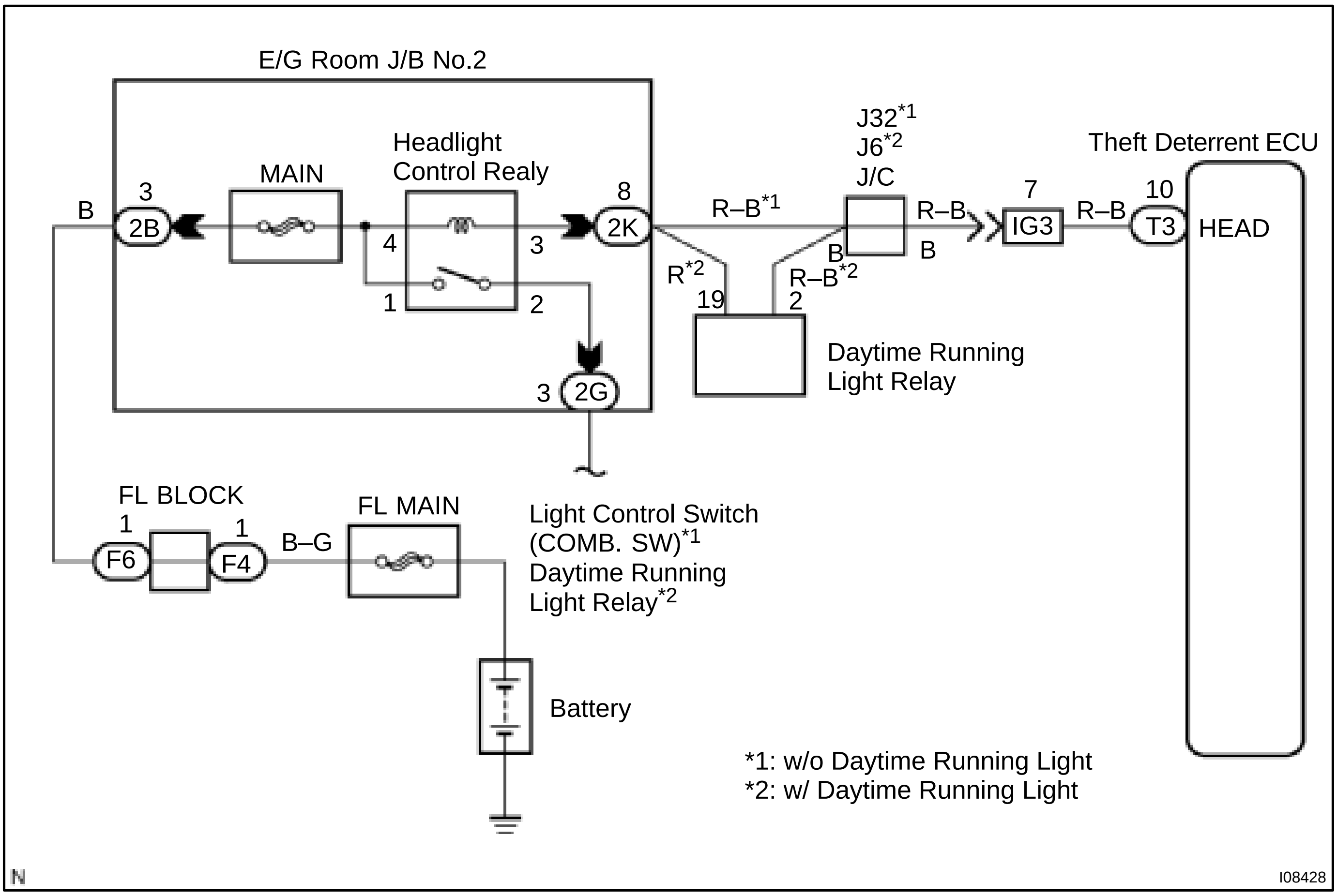
CIRCUIT DESCRIPTION

When the theft deterrent system is activated, it causes the Tr in the ECU to switch ON and OFF at approximately 0.4 sec. intervals. This switches the headlight control relay ON and OFF, thus flashing the headlights (See the wiring diagram below).

In this condition, if any of the following operations is done, the Tr in the ECU goes OFF and the headlight control relay switches OFF, thus stopping the headlights flashing:

(1) Unlock the front LH or RH door with key.
(2) Turn the ignition switch to ACC or ON position.
(3) Unlock the doors with the wireless door lock control system.
(4) Wait for approximately 60 seconds.
(5) Push the panic switch of the wireless door lock control system.

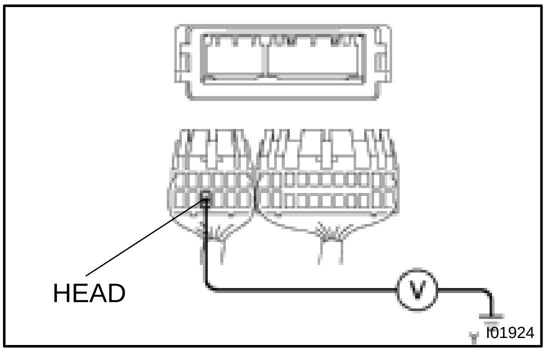
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:The flow chart below is based on the premise that the headlights light up normally whenever the light control switch is operated. If headlight operation is not normal when the light control switch is operated, proceed to troubleshooting on page BE–2.¿¿

1	**Check voltage between terminal HEAD of theft deterrent ECU connector and body ground.**



PREPARATION:
Disconnect the theft deterrent ECU connector.

CHECK:
Measure voltage between terminal HEAD of theft deterrent ECU connector and body ground.

OK:
Voltage: 10 – 14 V

NG → **Check and repair harness and connector between theft deterrent ECU and headlight control relay (See page IN–31).**

OK

Check and replace theft deterrent ECU.

DI06Y–06

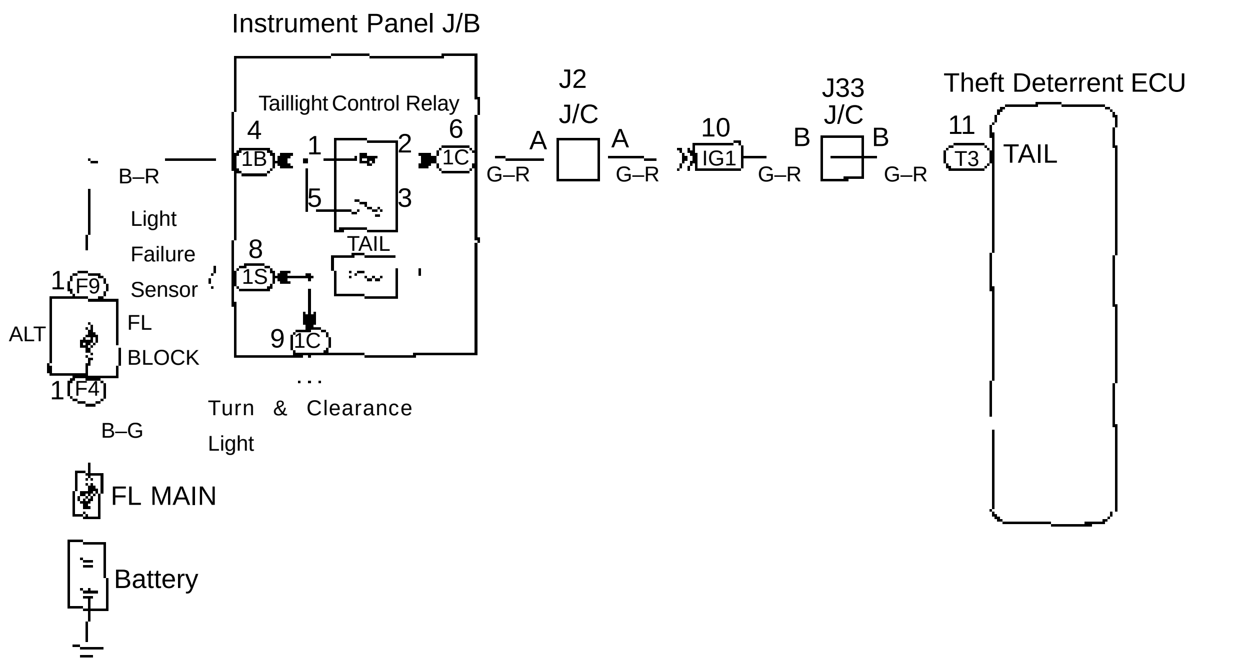
Taillight Control Relay Circuit

CIRCUIT DESCRIPTION

When the theft deterrent system is activated, it causes the Tr in the ECU to switch ON and OFF at approximately 0.4 sec. intervals. This switches the taillight control relay ON and OFF, thus flashing the taillights (See the wiring diagram below).
In this condition, if any of the following operations is done, the Tr in the ECU goes OFF and the taillight control relay switches OFF, thus stopping the taillights flashing:

(1) Unlock the front LH or RH door with key.
(2) Turn the ignition switch to ACC or ON position.
(3) Unlock the doors with the wireless door lock control system.
(4) Wait for approximately 60 seconds.
(5) Push the panic switch of the wireless door lock control system.

WIRING DIAGRAM

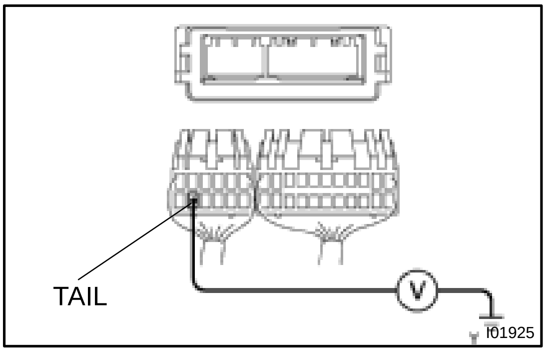


I00266

INSPECTION PROCEDURE

HINT:
The flow chart below is based on the premise that the taillights light up normally whenever the light control switch is operated. If taillight operation is not normal when the light control switch is operated, proceed to troubleshooting on page BE–2.

1	Check voltage between terminal TAIL of theft deterrent ECU connector and body ground.



PREPARATION:
Disconnect the theft deterrent ECU connector.
CHECK:
Measure voltage between terminal TAIL of theft deterrent ECU connector and body ground.
OK:
Voltage: 10 – 14 V

NG → **Check and repair harness and connector between theft deterrent ECU and taillight control relay (See page IN–31).**

OK

Check and replace theft deterrent ECU.

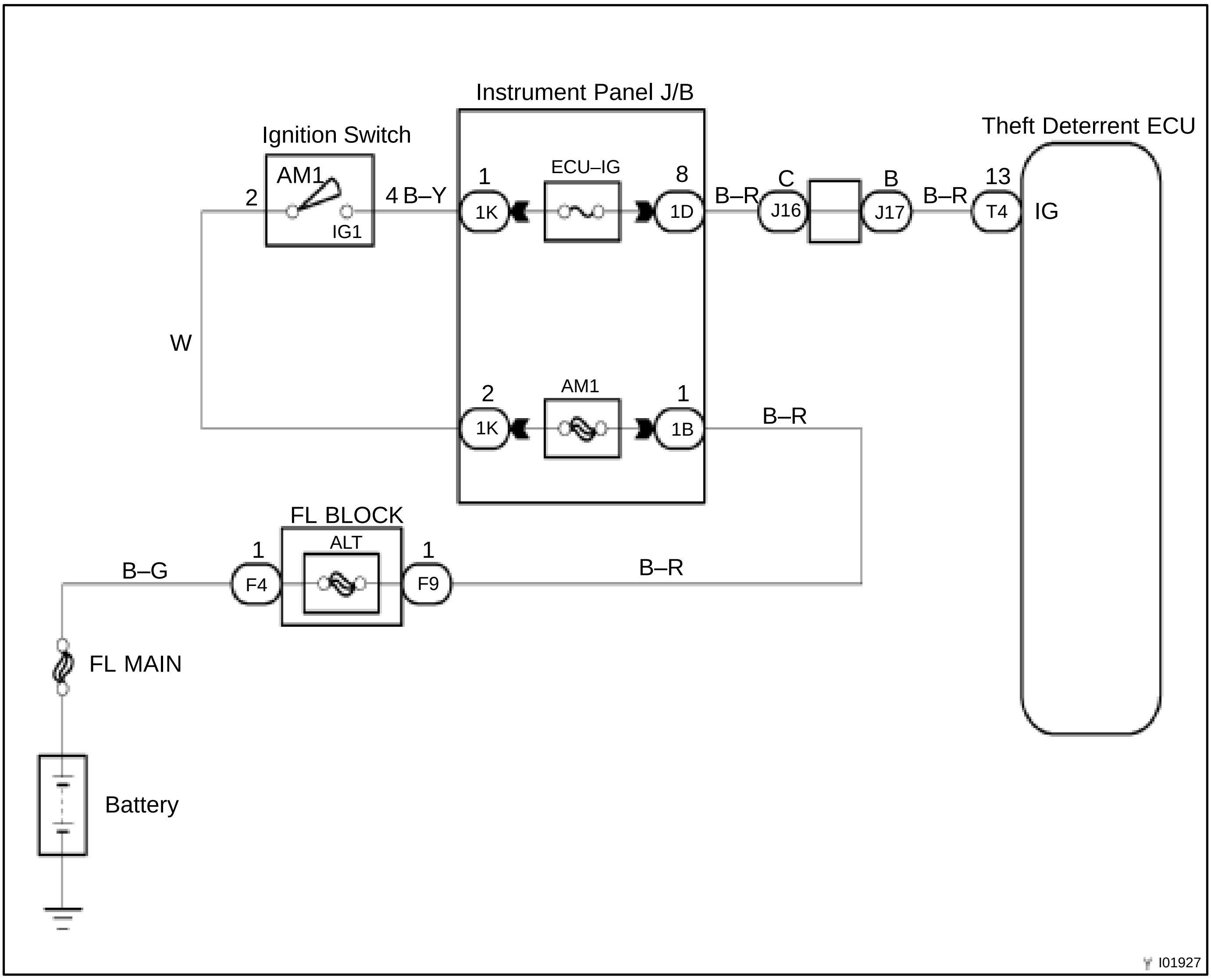
DI06Z–06

Ignition Switch Circuit

CIRCUIT DESCRIPTION

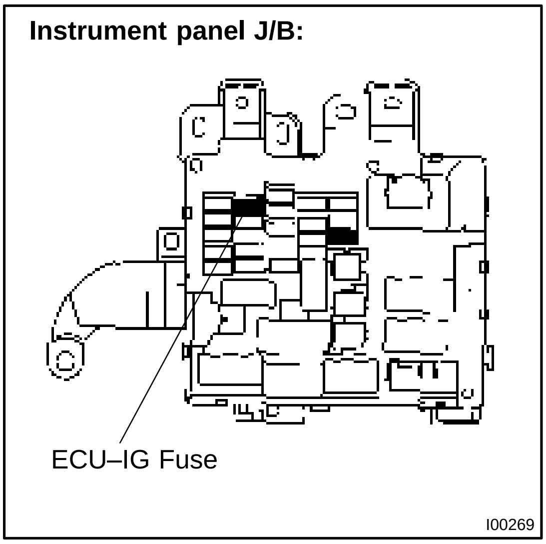
When the ignition switch is turned to the ACC position, battery positive voltage is applied to the terminal ACC of the ECU. Also, if the ignition switch is turned to the ON position, battery positive voltage is applied to the terminals ACC and IG of the ECU. When the battery positive voltage is applied to the terminal ACC of the ECU while the theft deterrent system is activated, the warning stops. Furthermore, power supplied from the terminals ACC and IG of the ECU is used as power for the door courtesy switch, and position switch, etc.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check CIG and ECU–IG fuses.



PREPARATION:

(a) Remove the fuse box opening cover.

(b) Remove ECU–IG fuses from instrument panel junction block No.1.

CHECK:

Check continuity of ECU–IG fuses.

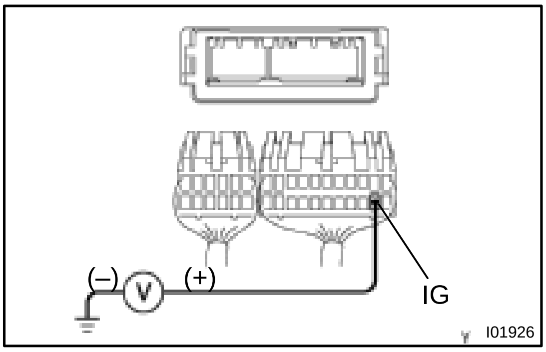
OK:

Continuity

NG → **Check for short in all the harness and components connected to the ECU–IG fuses (See attached wiring diagram).**

OK

2	Check voltage between terminal IG of theft deterrent ECU and body ground.



PREPARATION:

(a) Disconnect the theft deterrent ECU connectors.

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminal IG of theft deterrent ECU connector and body ground.

OK:

Voltage: 10 – 14 V

NG → **Check and repair harness and connector between theft deterrent ECU and battery (See page IN–31).**

OK

Check and replace theft deterrent ECU.

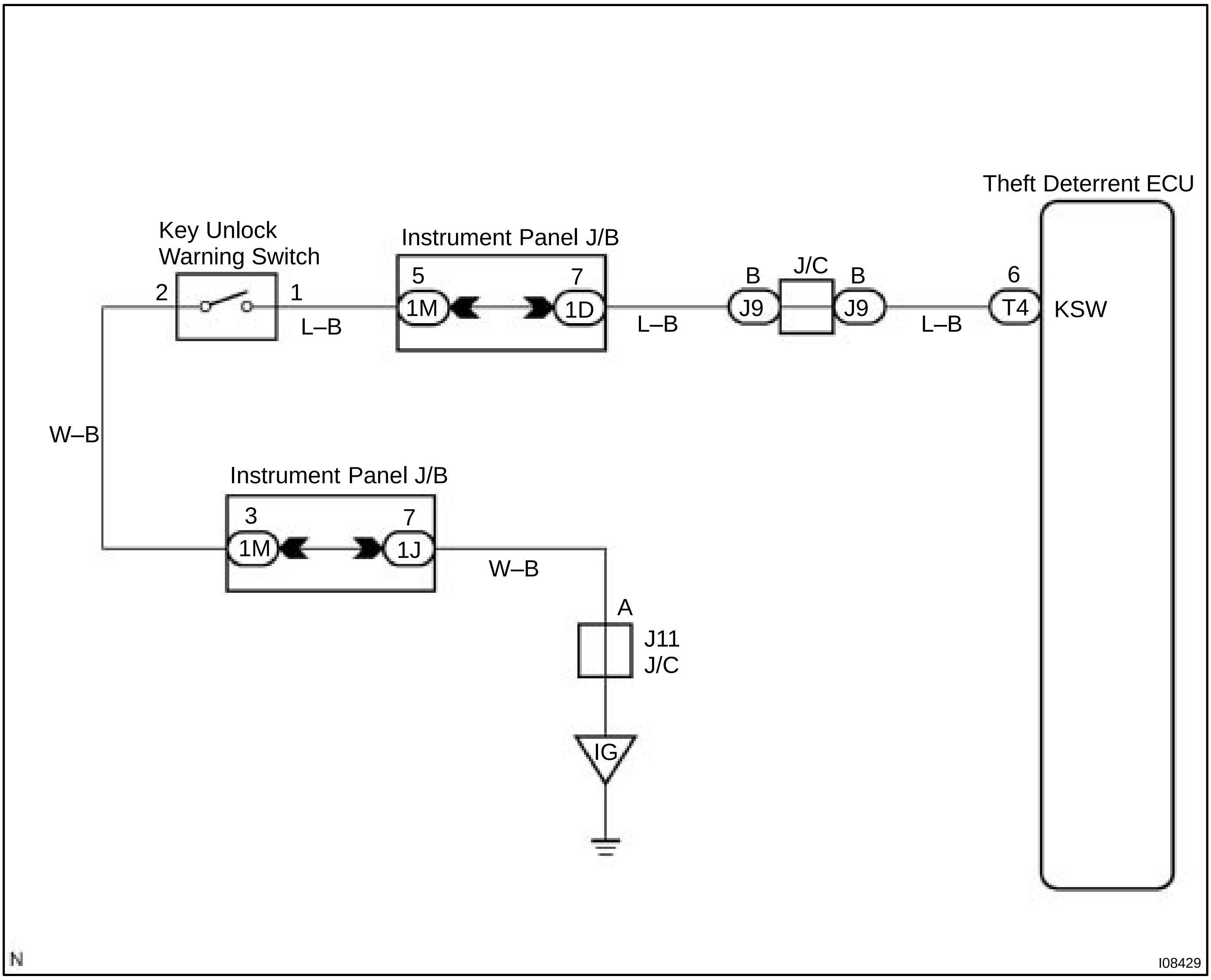
DI070–06

Key Unlock Warning Switch Circuit

CIRCUIT DESCRIPTION

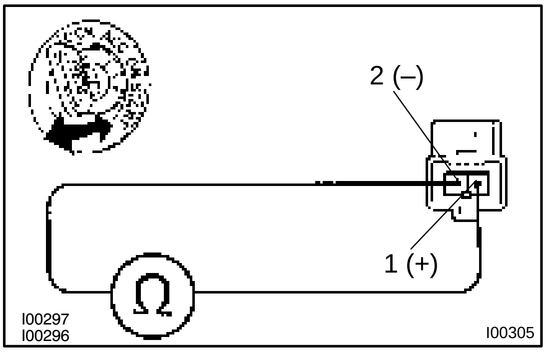
The key unlock warning switch goes ON when the ignition key is inserted in the key cylinder and goes OFF when the ignition key is removed.
The ECU operates the key confinement prevention function while the key unlock warning switch is ON.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check key unlock warning switch.



PREPARATION:
Disconnect key unlock warning switch connector.

CHECK:
Check continuity between terminal 1 and 2 of key unlock warning switch connector, when the key is inserted to the key cylinder or removed.

OK:

Switch position	Tester connection	Specified condition
ON (Key inserted)	1 – 2	Continuity
OFF (Key removed)	–	No continuity

NG → **Replace key unlock warning switch.**

OK

2	Check harness and connectors between ECU and key unlock warning switch, key unlock warning switch and body ground (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and replace theft deterrent ECU.*1

*1: When there is a malfunction that the theft deterrent system cannot be set, proceed to the next numbered circuit inspection shown on problem symptoms table (See page DI–837).

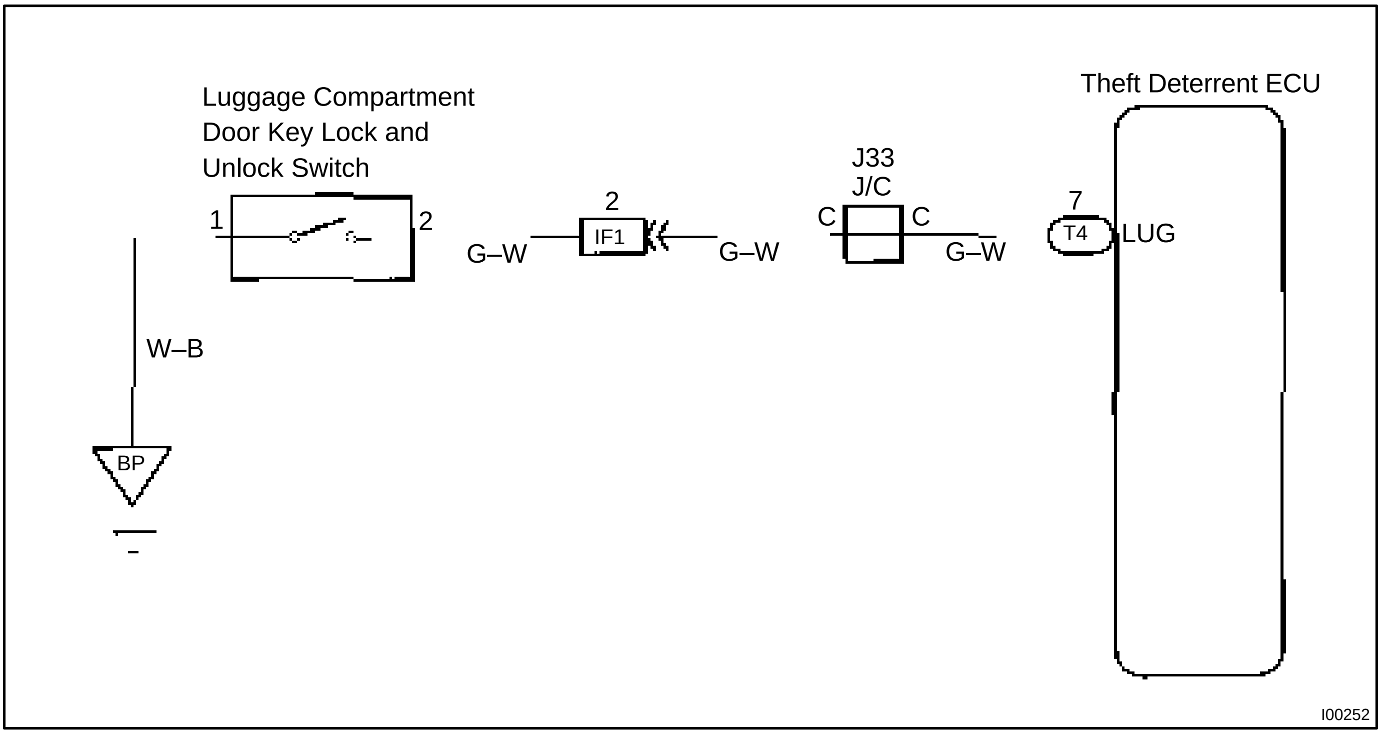
DI071–04

Luggage Compartment Door Key Lock and Unlock Switch Circuit

CIRCUIT DESCRIPTION

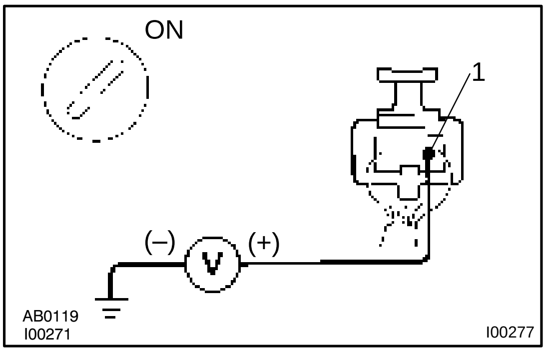
The luggage compartment door key lock and unlock switch goes ON when the luggage compartment door key cylinder is turned to the unlock side with the key.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminal 1 of luggage compartment door key lock and unlock switch connector and body ground.



PREPARATION:

(a) Remove luggage compartment door trim.

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminal 1 of luggage compartment door key lock and unlock switch connector and body ground, when the key is turned to the unlock side and not turned respectively.

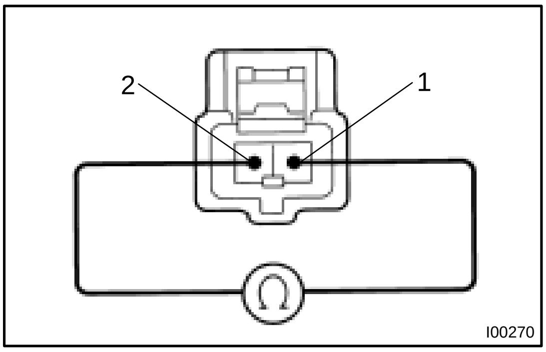
OK:

Key operation	Voltage
Turned to the unlock side	0 V
Not turned	Battery positive voltage

OK → **Check and replace theft deterrent ECU.*1**

NG

2	Check luggage compartment door key lock and unlock switch.



PREPARATION:

Disconnect luggage compartment door key lock and unlock switch connector.

CHECK:

Check continuity between terminals 1 and 2, when the key is turned to the unlock side and not turned respectively.

OK:

Key operation	Tester connection	Specified condition
Turned to unlock	1 – 2	Continuity
Not turned	–	No continuity

NG → **Repair or replace luggage compartment door key lock and unlock switch.**

OK

3	**Check harness and connector between theft deterrent ECU and key lock and unlock switch, key lock and unlock switch and body ground (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace theft deterrent ECU.

*1: When there is a malfunction that the theft deterrent system cannot be set, proceed to the next numbered circuit inspection shown on problem symptoms table (See page DI–837).

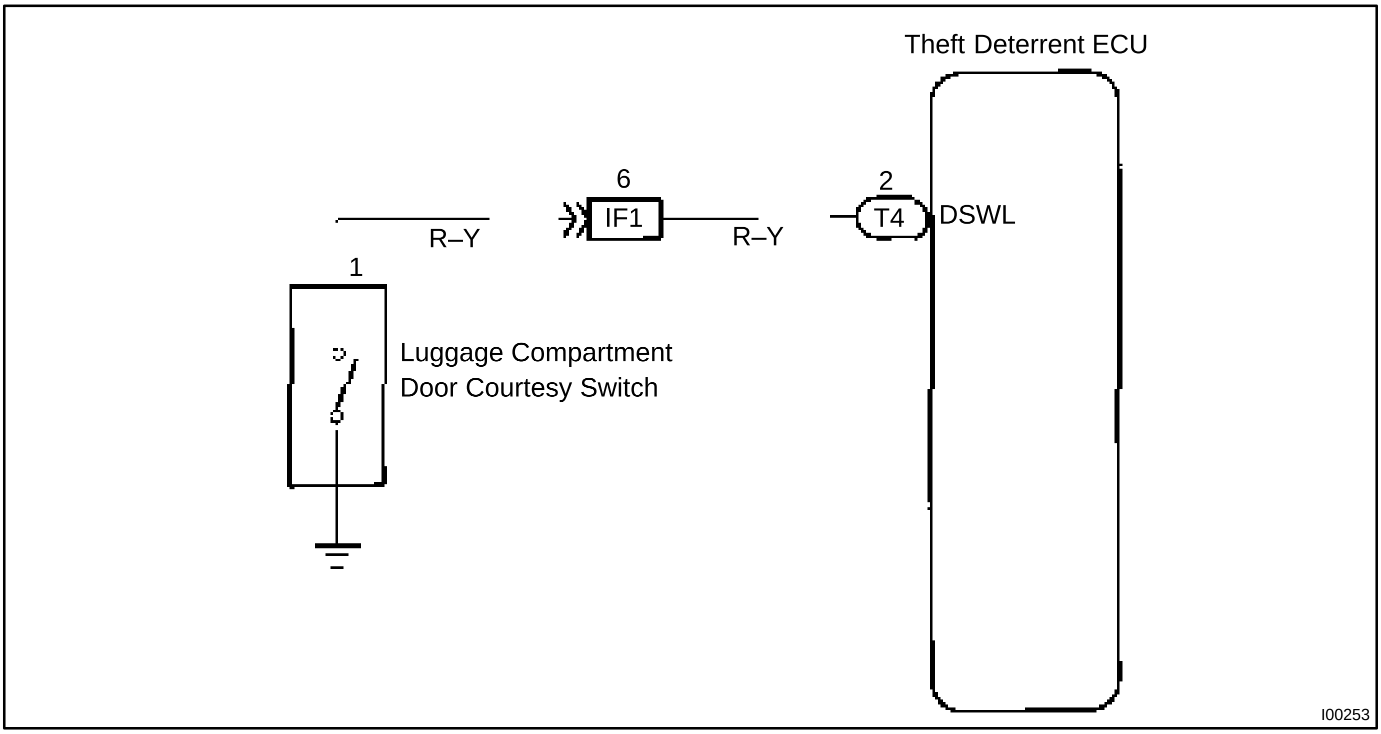
DI072–06

Luggage compartment Door Courtesy Switch Circuit

CIRCUIT DESCRIPTION

The luggage compartment door courtesy switch goes ON when luggage compartment door is opened and goes off when the luggage compartment door is closed.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of luggage compartment door courtesy light.**

CHECK:

Check that luggage compartment door courtesy light goes OFF when luggage compartment door courtesy switch is pushed, and comes ON when switch is not pushed.

NG → **Check and repair luggage compartment door courtesy light circuit (See page BE–32).**

OK

2	**Check for open in harness and connector between theft deterrent ECU and luggage compartment door courtesy switch (See page IN–31).**

NG → **Repair or replace harness or connectors.**

OK

Check and replace theft deterrent ECU.*1

*1: When there is a malfunction that the theft deterrent system cannot be set, proceed to the next numbered circuit inspection shown on problem symptoms table (See page DI–837).

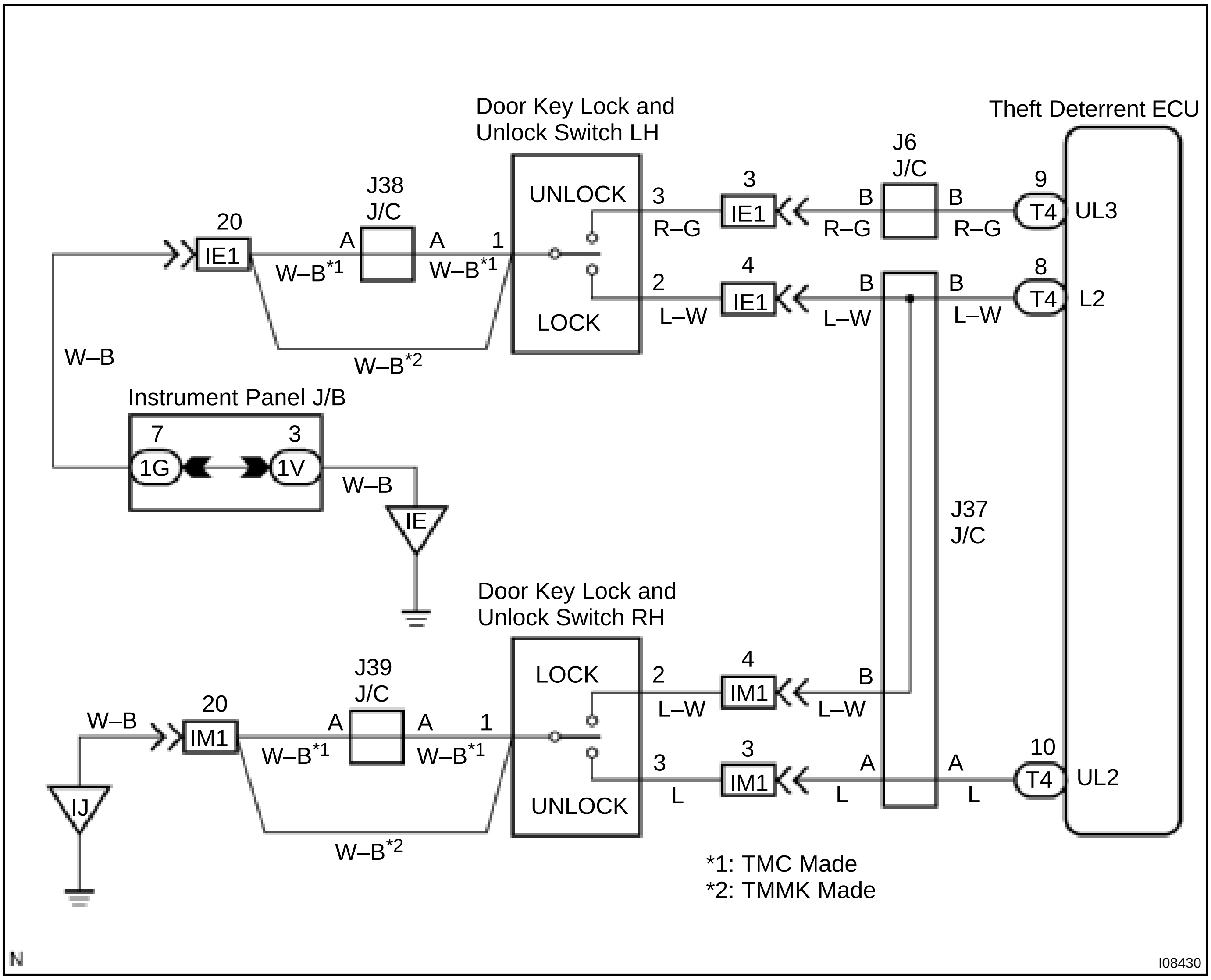
DI073–06

Door Key Lock and Unlock Switch Circuit

CIRCUIT DESCRIPTION

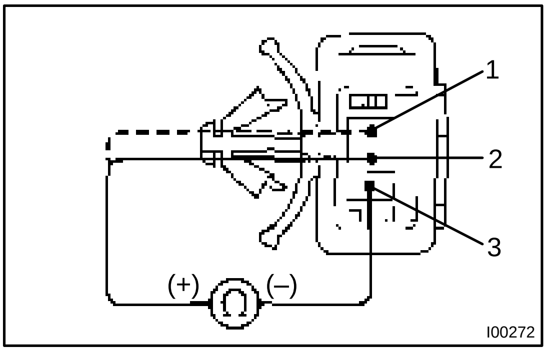
The door key lock and unlock switch is built in the door key cylinder. When the key is turned to the lock side, terminal 1 of the switch is grounded and when the key is turned to the unlock side, terminal 2 of the switch is grounded.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check door key lock and unlock switch.**



PREPARATION:

(a) Remove the door trim and service hole cover.

(b) Disconnect the door key lock and unlock switch connector.

CHECK:

Check continuity between terminals 1, 2 and 3 of door key lock and unlock switch connector, when each of door key lock and unlock switch is turned to the lock side, unlock side and not turned.

OK:

Switch position	Tester connection	Specified condition
Lock side	2 – 3	Continuity
Unlock side	1 – 3	Continuity
OFF	–	No continuity

NG → **Replace door key lock and unlock switch.**

OK

2	**Check harness and connectors between ECU and switch, switch and body ground (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace theft deterrent ECU.*1

*1: When there is a malfunction that the theft deterrent system cannot be set, proceed to the next numbered circuit inspection shown on problem symptoms table (See page DI–837).

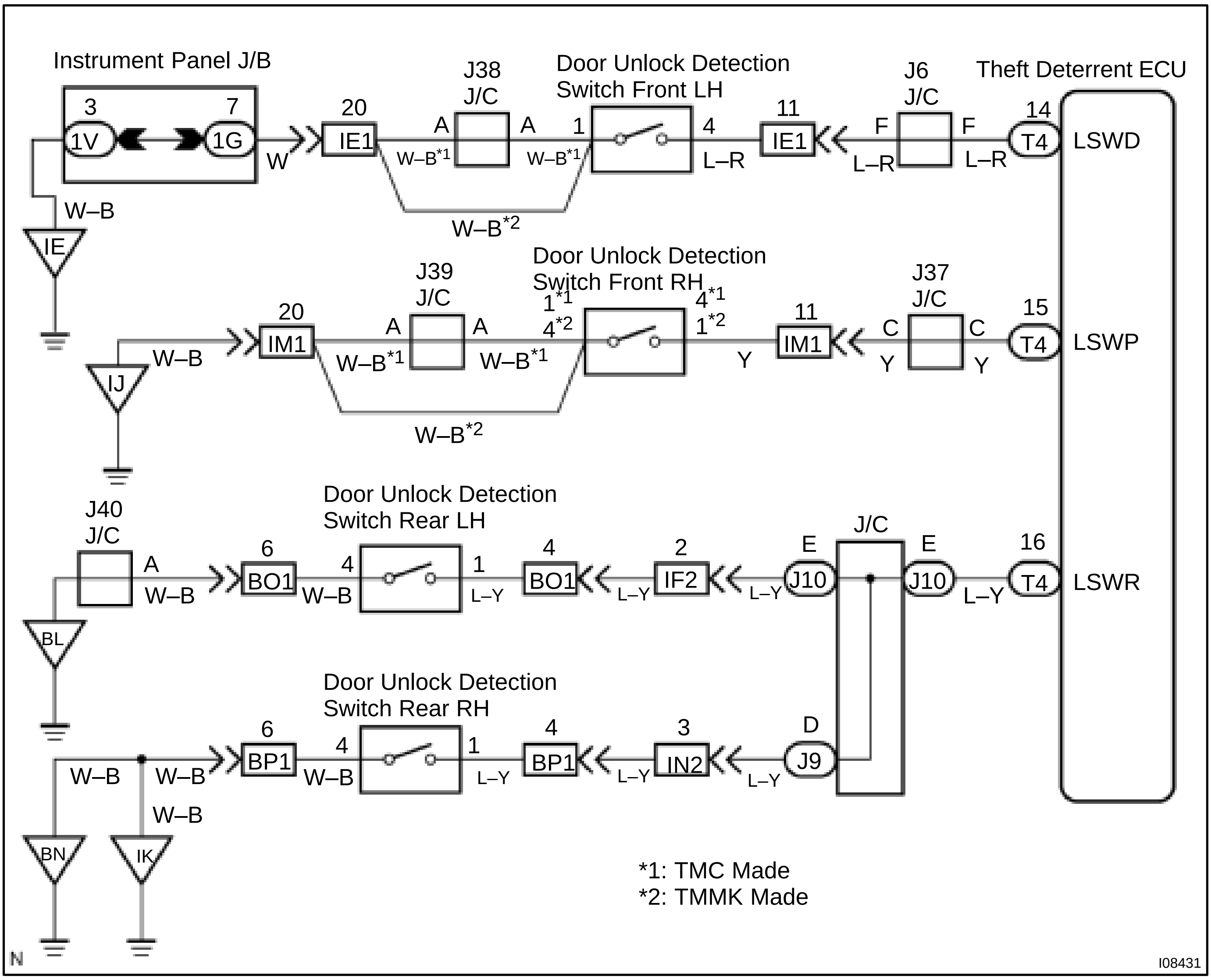
DI074–06

Door Unlock Detection Switch Circuit

CIRCUIT DESCRIPTION

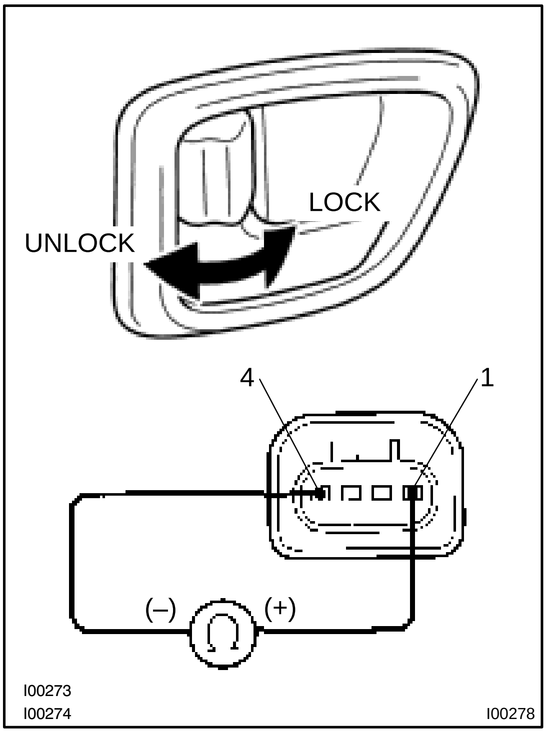
The door unlock detection switch is built in the door lock motor assembly. This switch is ON when the door lock knob is in the unlock position and OFF when the lock knob is in the lock position. The ECU detects the door lock knob conditions in this circuit. It is used as one of the operating conditions for the key confinement prevention function.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check Door Unlock Detection Switch.



PREPARATION:

(a) Remove the door trim and service hole cover.

(b) Disconnect door unlock detection switch connector.

CHECK:

Check continuity between terminals 1 and 4 of door unlock detection switch connector, when the door lock knob is operated to the lock side and unlock side.

OK:

Switch Condition	Tester connection	Specified condition
Door unlock	1 – 4	Continuity
Door lock	–	No continuity

NG → **Replace door unlock detection switch.**

OK

2	Check harness and connectors between ECU and door unlock detection switch, door unlock detection switch and body ground (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and replace theft deterrent ECU.*1

*1: When there is a malfunction that the theft deterrent system cannot be set, proceed to the next numbered circuit inspection shown on problem symptoms table (See page DI–837).

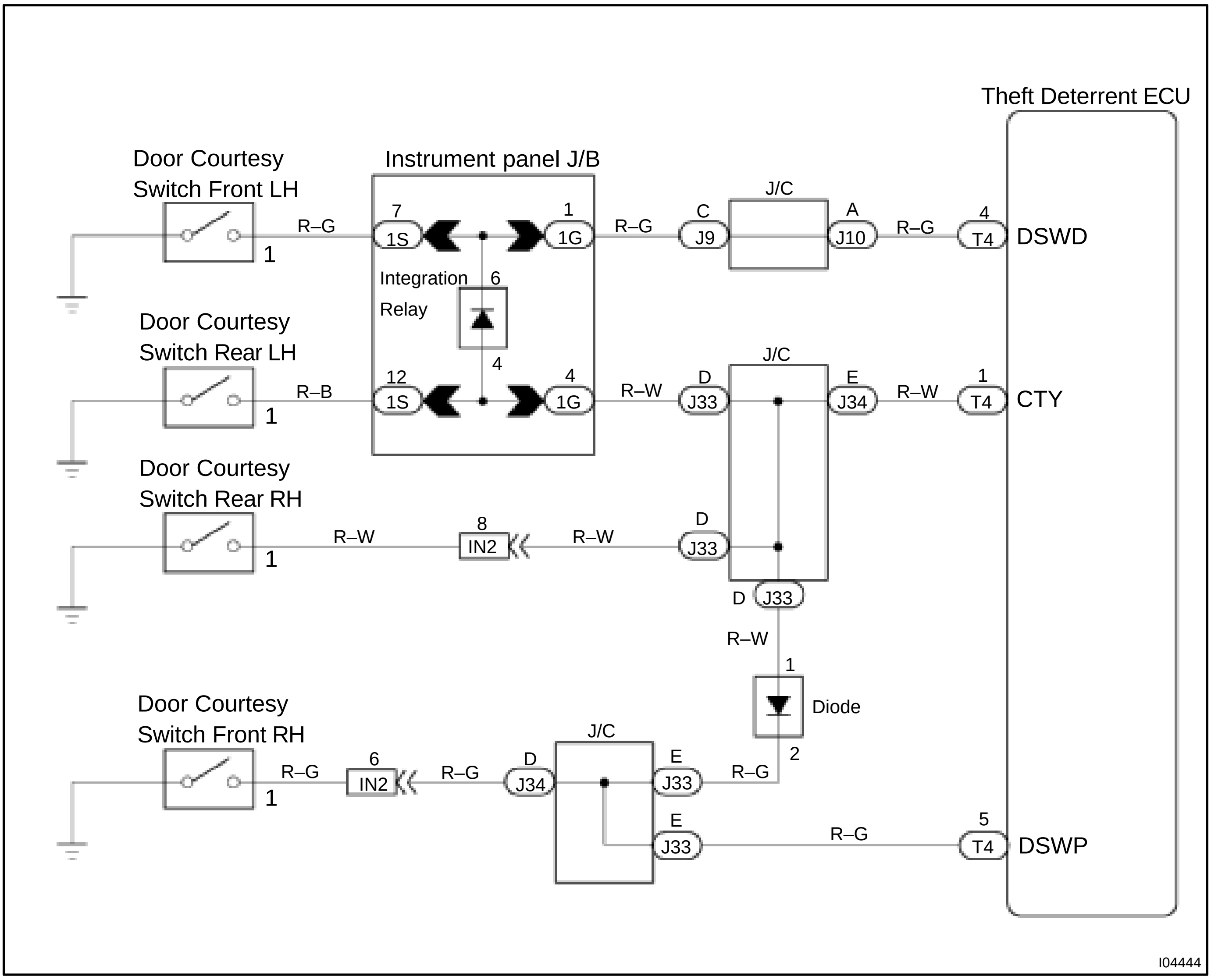
DI075–06

Door Courtesy Switch Circuit

CIRCUIT DESCRIPTION

The door courtesy switch goes ON when the door is opened and goes OFF when the door is closed.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of open door warning light.**

CHECK:

Check that open door warning light comes ON when each door is opened, and goes OFF when all doors are closed.

NG → **Check and repair open door warning light circuit.**

OK

2	**Check for open in harness and connector between theft deterrent ECU and door courtesy switch (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace theft deterrent ECU.*1

*1: When there is a malfunction that the theft deterrent system cannot be set, proceed to the next numbered circuit inspection shown on problem symptoms table (See page DI–837).

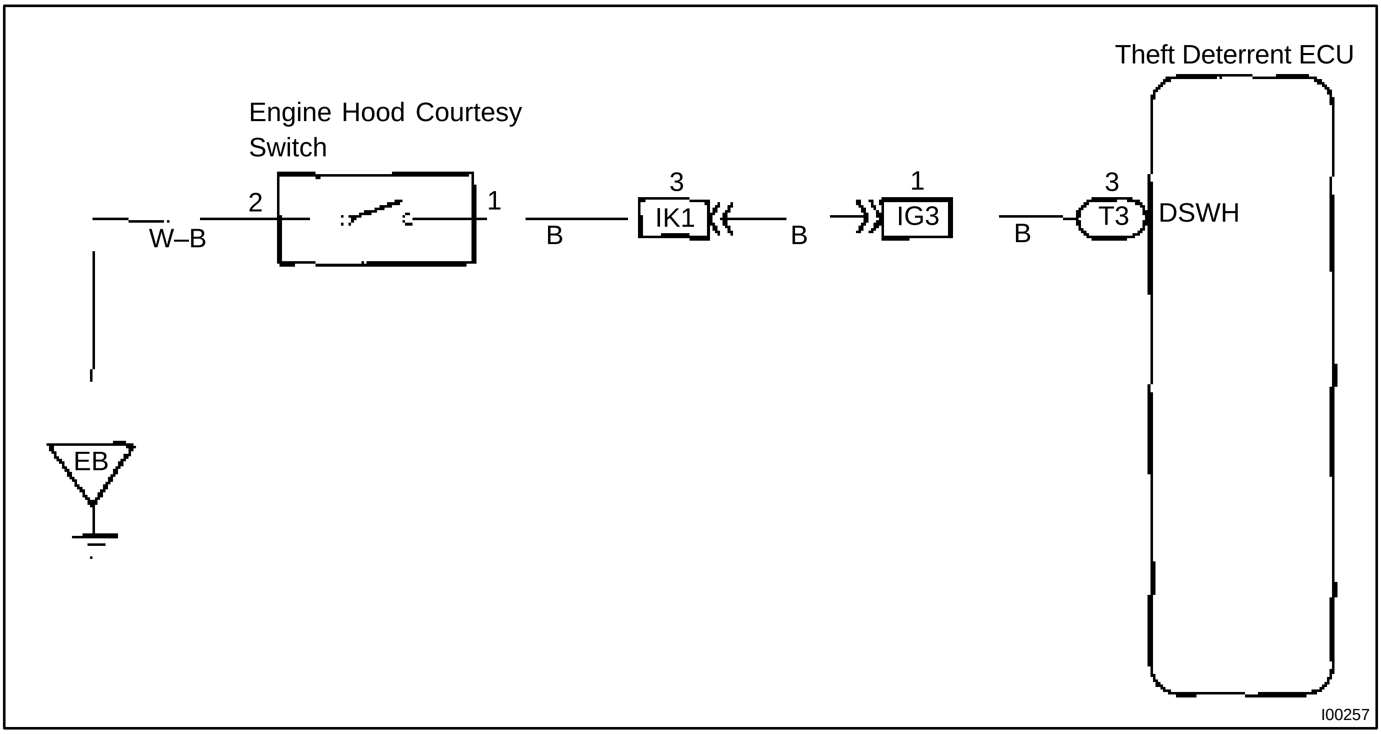
DI076–06

Engine Hood Courtesy Switch Circuit

CIRCUIT DESCRIPTION

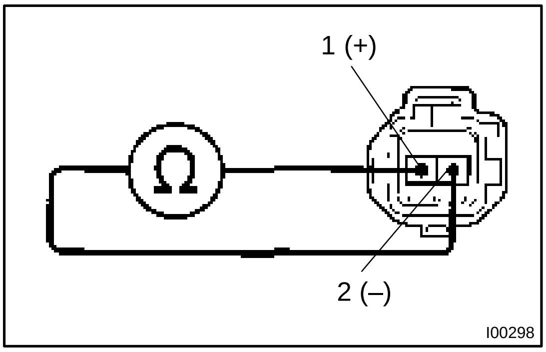
The engine hood courtesy switch is built into the engine hood lock assembly and goes ON when the engine hood is opened and goes OFF when the engine hood is closed.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check engine hood courtesy switch.



PREPARATION:

(a) Remove engine hood lock assembly.

(b) Disconnect engine hood courtesy switch connector.

CHECK:

Check continuity between terminals 1 and 2 when engine hood lock is locked and unlocked.

OK:

Engine hood lock	Tester connection	Specified condition
LOCK	–	No continuity
UNLOCK	1 – 2	Continuity

NG → **Replace engine hood courtesy switch.**

OK

2	Check harness and connector between theft deterrent ECU and switch, switch and body ground (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and replace theft deterrent ECU (See page IN–31).

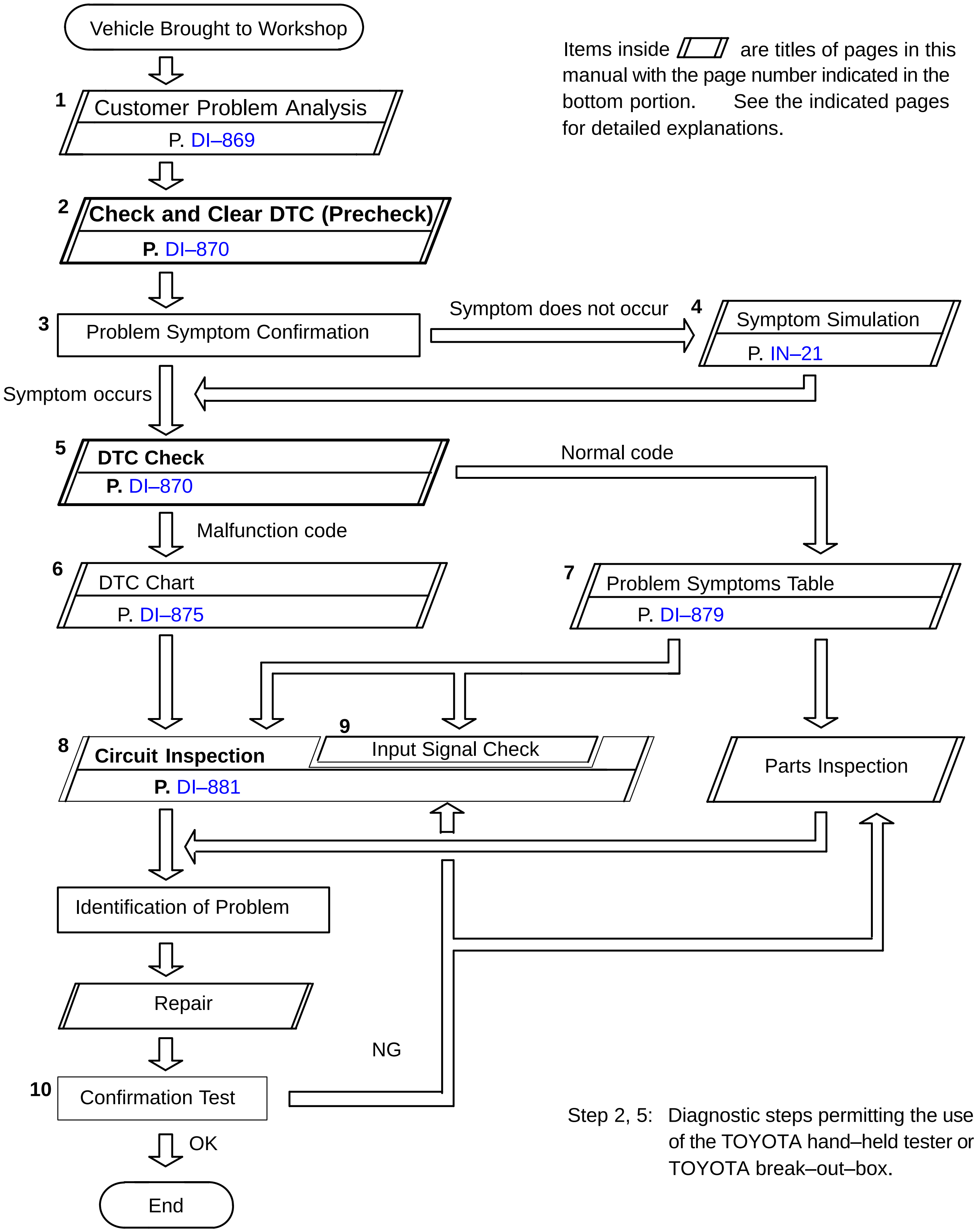
CRUISE CONTROL SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

DI08F–11

Troubleshoot in accordance with the procedure on the following page.

Items inside are titles of pages in this manual with the page number indicated in the bottom portion. See the indicated pages for detailed explanations.



Step 2, 5: Diagnostic steps permitting the use of the TOYOTA hand–held tester or TOYOTA break–out–box.

DI08G–08

CUSTOMER PROBLEM ANALYSIS CHECK

CRUISE CONTROL SYSTEM Check Sheet

Inspector’s name: ________________

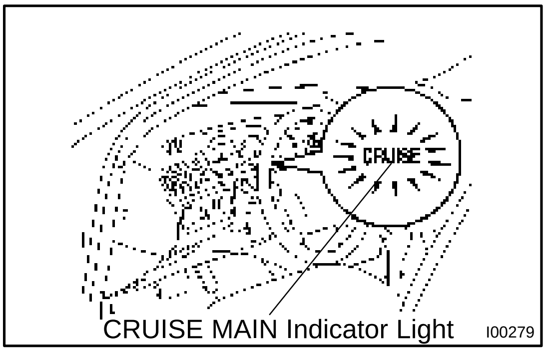
Customer’s Name		**Registration No.**	
		Registration Year	
		Frame No.	
Date Vehicle Brought in	/ /	**Odometer Reading**	**km** **Mile**

Condition of Problem Occurrence	**Date of Problem Occurrence**	/ /
	How Often does Problem Occurs	☐ Continuous ☐ Intermittent (Times a day)
	Vehicle Speed when Problem Occurred	**km** **Mile**

Symptoms	☐ Auto cancel occurs	● Driving condition ☐ City driving ☐ Freeway ☐ Up hill ☐ Down hill ● After cancel occurred, did the driver activate cruise control again? ☐ Yes ☐ No
	☐ Cancel does not occur	☐ With brake ON ☐ Except D position shift ☐ At 40 km/h (25 mph) or less ☐ When control SW turns to CANCEL position
	☐ Cruise control malfunction	☐ Slip to acceleration side ☐ Slip to deceleration side ☐ Hunting occurs ☐ O/D cut off does not occur ☐ O/D does not return
	☐ Switch malfunction	☐ SET ☐ ACCEL ☐ COAST ☐ RESUME ☐ CANCEL
	☐	☐ Remains ON ☐ Does not light up ☐ Blinking

DTC Check	**1st Time**	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)

DI1KS–03



PRE–CHECK

1. DIAGNOSIS SYSTEM

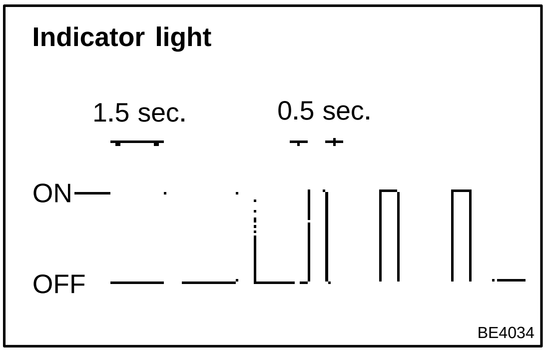
(a) Check the indicator.

(1) Turn the ignition switch ON.

(2) Check that the CRUISE MAIN indicator light comes ON when the cruise control main switch is turned ON, and that the indicator light goes OFF when the main switch is turned OFF.

HINT:

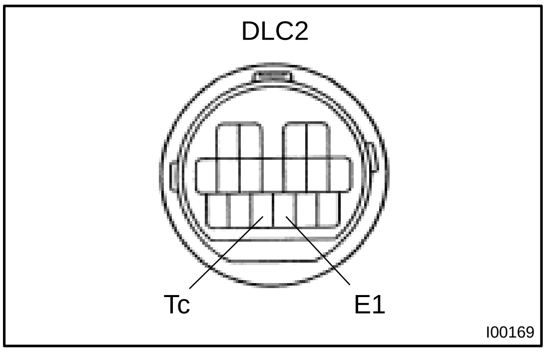
If the indicator check result is not normal, proceed to troubleshooting (See page BE–2) for the combination meter section.



(b) Check the DTC.

HINT:

If a malfunction occurs in the No. 1 vehicle speed sensor or actuator, etc. during cruise control driving, the ECU actuates AUTO CANCEL of the cruise control and turns on and off the CRUISE MAIN indicator light to inform the driver of a malfunction. At the same time, the malfunction is stored in memory as a DTC.



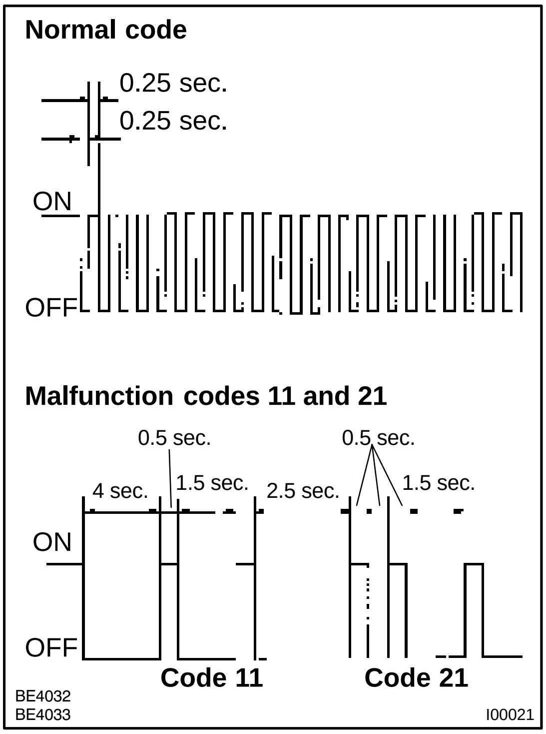
(c) Output of DTC using diagnosis check wire.

(1) Turn the ignition switch ON.

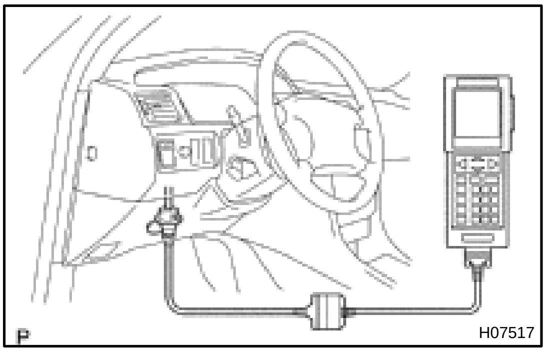
(2) Using SST, connect terminals Tc and E_1 of DLC2.

SST 09843–18020

(3) Read the DTC on the CRUISE MAIN indicator light.



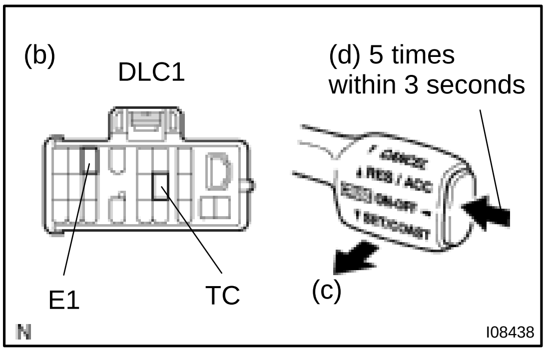
HINT:
If the DTC is not output, inspect the diagnosis circuit (See page DI–916).
As an example, the blinking patterns for codes; normal, 11 and 21 are shown in the illustration.



2. USING TOYOTA HAND–HELD TESTER

(a) Hook up the TOYOTA hand–held tester to the DLC2.
(b) Monitor the ECU data by following the prompts on the tester screen.

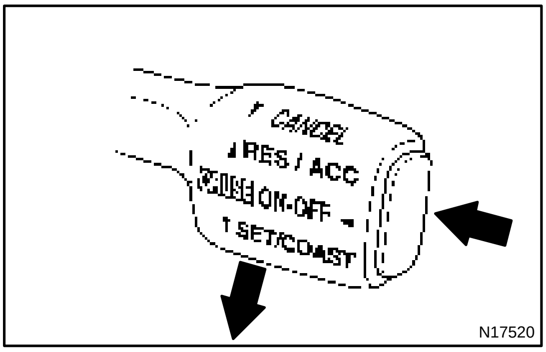
HINT:
TOYOTA hand–held tester has a "Snapshot" function which records the monitored data.
Please refer to the TOYOTA hand–held tester operator's manual for further details.



3. DTC CLEARANCE (ERASE MODE)

HINT:
During in the erase mode, diag detection does not work.

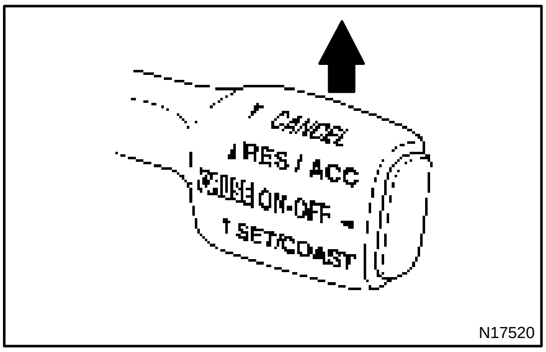
(a) Stop the vehicle.
(b) Using SST, connect terminals Tc and E_1 of DLC1.
SST 09843–18020
(c) Pull the cruise control switch to CANCEL.
(d) On the above metioned condition, turn on the cruise control main switch 5 times within 3 seconds.



N17520

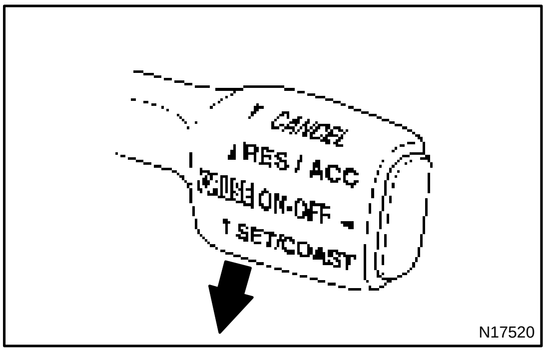
4. PROBLEM SYMPTOM CHECK (ROAD TEST)

(a) Inspect the SET switch.
  (1) Push the main switch ON.
  (2) Drive at a desired speed (40 km/h (25 mph) or higher).
  (3) Press the control switch to the SET/COAST.
  (4) After releasing the switch, check that the vehicle cruises at the desired speed.



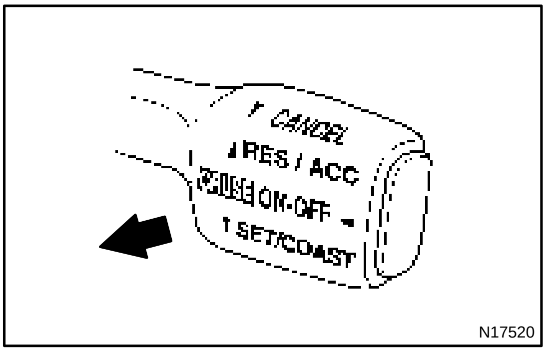
N17520

(b) Inspect the ACCEL switch.
  (1) Push the main switch ON.
  (2) Drive at a desired speed (40 km/h (25 mph) or higher).
  (3) Check that the vehicle speed increases while the control switch is turned to RES/ACC, and that the vehicle cruises at the set speed when the switch is released.
  (4) Momentarily raise the control switch upward to the RES/ACC position and then immediately release it. Check that the vehicle speed increases by approx. 1.5 km/h (Tap–up function).



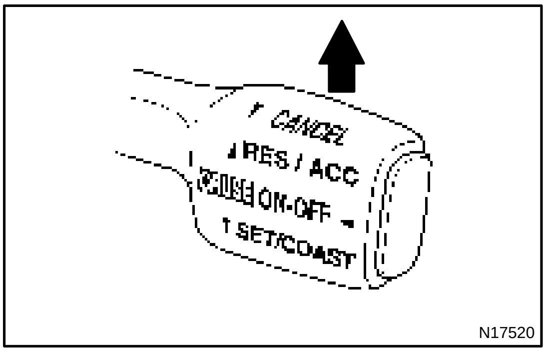
N17520

(c) Inspect the COAST switch.
  (1) Push the main switch ON.
  (2) Drive at a desired speed (40 km/h (25 mph) or higher).
  (3) Check that the vehicle speed decreases while the control switch is turned to SET/COAST, and the vehicle cruises at the set speed when the switch is released.
  (4) Momentarily pull the control switch down to SET/COAST, and then immediately release it. Check that the vehicle speed decreases by about 1.5 km/h (Tap–down function).



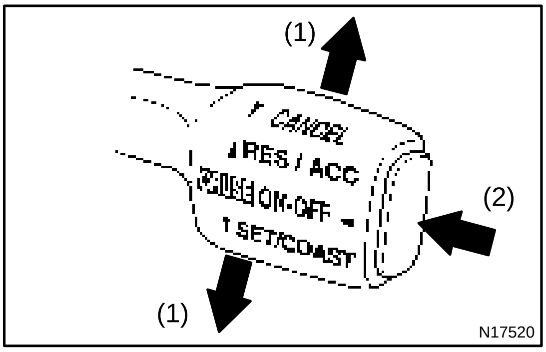
N17520

(d) Inspect the CANCEL switch.
 (1) Push the main switch ON.
 (2) Drive at a desired speed (40 km/h (25 mph) or higher).
 (3) When operating one of the following operations, check that the cruise control system is cancelled and that the normal driving mode is reset.
 - Depress the brake pedal
 - Depress the clutch pedal (M/T)
 - Shift to except D position (A/T)
 - Push the main switch OFF
 - Pull the cruise control switch to CANCEL



N17520

(e) Inspect the RESUME switch.
 (1) Push the main switch ON.
 (2) Drive at a desired speed (40 km/h (25 mph) or higher).
 (3) When operating one of the following operations check that the cruise control system is cancelled and that the normal driving mode is reset.
 - Depress the brake pedal
 - Depress the clutch pedal (M/T)
 - Shift to except D position (A/T)
 - Push the main switch OFF
 - Pull the cruise control switch to CANCEL
 (4) After the control switch is turned to RES/ACC at the driving speed of more than 40 km/h (25 mph), check that the vehicle restores the speed prior to the cancellation.



5. INPUT SIGNAL CHECK

HINT:

(1) For check No.1 ~ No.3

- Turn ignition switch ON.

(2) For check No.4

- Jack up the vehicle.
- Start the engine.
- Shift to D position.

(a) Pull the control switch to SET/COAST or RES/ACC position and hold it down or up (1).

(b) Push the main switch ON (2).

(c) Check that the CRUISE MAIN indicator light blinks twice or 3 times repeatedly after 3 seconds.

(d) Turn the SET/COAST or RES/ACC switch OFF.

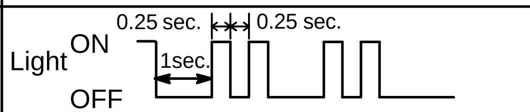
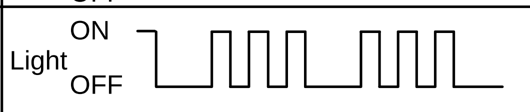
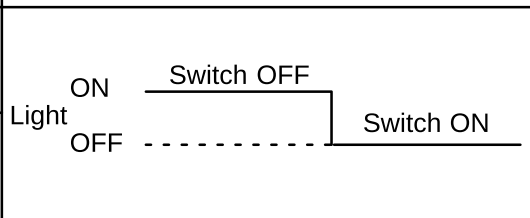
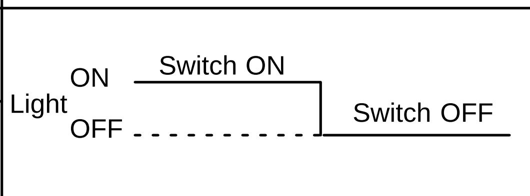
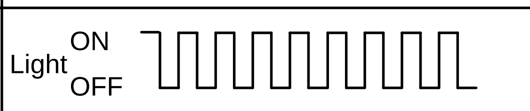
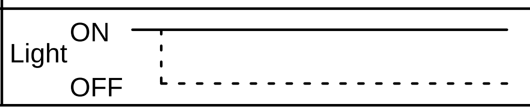
(e) Operate each switch as listed in the table below.

(f) Read the blinking pattern of the CRUISE MAIN indicator light.

(g) After performing the check, turn the main switch OFF.

HINT:

When 2 or more signals are input to the ECU, the lowest numbered code will be displayed first.

No.	Operation Method	CRUISE MAIN Indicator Light Blinking Pattern	Diagnosis
1	Turn SET/COAST switch ON		SET/COAST switch circuit is normal
2	Turn RES/ACC switch ON		RES/ACC switch circuit is normal
3	Turn CANCEL switch ON		CANCEL switch circuit is normal
	Turn stop light switch ON Depress brake pedal		Stop light switch circuit is normal
	Turn PNP switch OFF (Shift to except D position)		PNP switch circuit is normal
	Turn clutch switch OFF (Depress clutch pedal)		Clutch switch circuit is normal
4	Drive at about 40 km/h (25 mph)or higher		Vehicle Speed Sensor is normal
	Drive at about 40 km/h (25 mph) or below		

DI08I–08

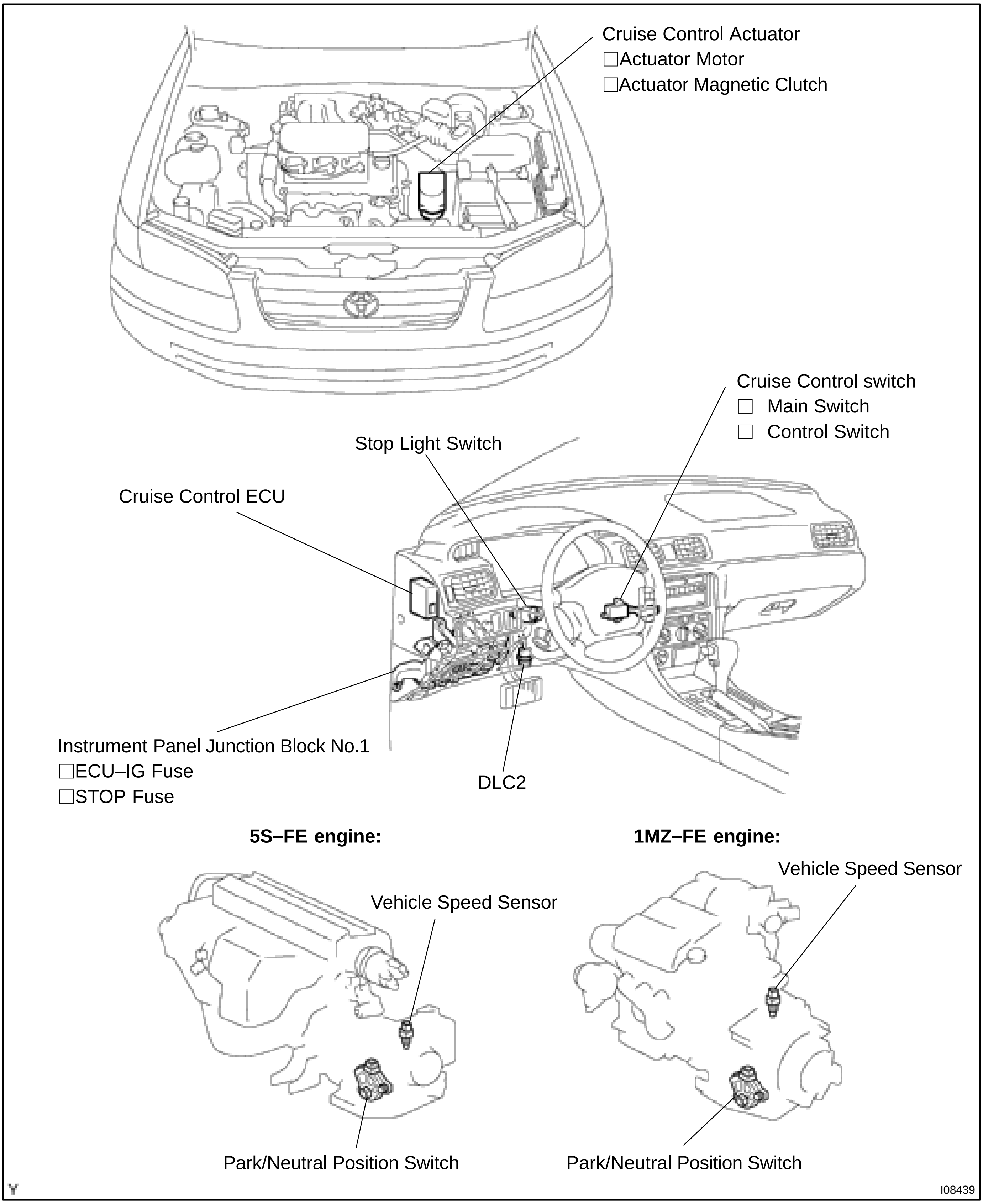
DIAGNOSTIC TROUBLE CODE CHART

If a malfunction code is displayed during the DTC check, check the circuit listed for that code in the table below and proceed to the appropriate page.

DTC No. (See Page)	Circuit Inspection	Trouble Area
11, 15 (DI–881)	Actuator Motor Circuit	●Actuator motor ●Harness or connector between cruise control ECU and actuator motor ●Cruise control ECU
12 (DI–883)	Actuator Magnetic Clutch Circuit	●STOP Fuse ●Stop light switch ●Actuator magnetic clutch ●Harness or connector between cruise control ECU and actuator magnetic clutch, actuator magnetic clutch and body ground ●Cruise control ECU
14 (DI–886)	Actuator Mechanical Malfunction	●Actuator motor (actuator lock: motor, arm) ●Cruise control ECU
21 (DI–888)	Open in Vehicle Speed Sensor Circuit	●Combination meter ●Harness or connector between cruise control ECU and combination meter, combination meter and vehicle speed sensor ●Vehicle speed sensor ●Cruise control ECU
23 (DI–891)	Vehicle Speed Signal Abnormal	●Vehicle speed sensor ●Cruise control ECU
32 (DI–892)	Control Switch Circuit	●Cruise control switch ●Harness or connector between cruise control ECU and cruise control switch, cruise control switch and body ground ●Cruise control ECU
41	Cruise control ECU	●Cruise control ECU
42	Source voltage drop	●Power source
51 (DI–895)	Idle Signal Circuit	●Throttle position sensor ●Harness or connector between ECM and throttle position sensor ●Harness or connector between cruise control ECU and ECM ●Cruise control ECU

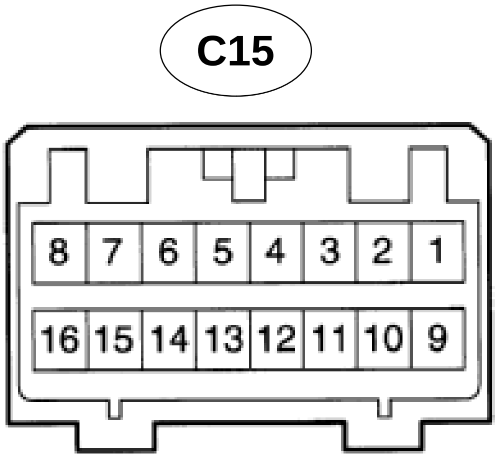
DI08J–08

PARTS LOCATION



DI1KT–06

TERMINALS OF ECU



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
STP– ↔ GND (C15–2 ↔ C15–16)	G–W ↔ W–B	Depress brake pedal	10 – 16 V
		Release brake pedal	Below 1 V
D ↔ GND (C15–3 ↔ C15–16)	B–R ↔ W–B	Shift to positions except D	Below 1 V
		Shift to D position	10 – 16 V
PI ↔ GND (C15–4 ↔ C15–16)	O ↔ W–B	Ignition switch ON Cruise control main switch ON	Below 1.2 V
		Ignition switch ON Cruise control main switch OFF	10 – 16 V
TC ↔ GND (C15–5 ↔ C15–16)	LG–R ↔ W–B	Ignition switch ON	10 – 16 V
		Ignition switch ON Connect terminals Tc and E1 of diagnostic check connector	Below 1 V
ECT ↔ GND (C15–6 ↔ C15–16)	L–B ↔ W–B	During driving Gear position 3rd	10 – 16 V
		During driving Gear position O/D	Below 1 V
MC ↔ GND (C15–7 ↔ C15–16)	R–B ↔ W–B	During cruise control driving COAST switch held ON	9 – 15 V
		During cruise control driving ACC switch held ON	Below 1 V
L ↔ GND (C15–8 ↔ C15–16)	G–B ↔ W–B	During cruise control driving	9 – 15 V
		Except during cruise control driving	Below 1 V
B ↔ GND (C15–9 ↔ C15–16)	B–R ↔ W–B	Ignition switch ON	10 – 16 V
CCS ↔ GND (C15–10 ↔ C15–16)	W ↔ W–B	Ignition switch ON	10 – 16 V
		Ignition switch ON CANCEL switch held ON	4.2 – 8.8 V
		Ignition switch ON SET/COAST switch held ON	2.5 – 6.3 V
		Ignition switch ON RES/ACC switch held ON	0.8 – 3.7 V

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
CMS ↔ GND (C15–11 ↔ C15–16)	W–L ↔ W–B	Ignition switch ON Main switch OFF	10 – 16 V
		Ignition switch ON Main switch ON	Below 0.5 V
SPD ↔ GND (C15–12 ↔ C15–16)	V–W ↔ W–B	Engine start Car stoppage.	Below 1.5 V or 4.7 – 16 V
		During driving (Pulse generated).	3 – 7 V
IDL ↔ GND (C15–13 ↔ C15–16)	L–R ↔ W–B	Ignition switch ON Throttle valve fully opened.	10 – 16 V
		Ignition switch ON Throttle valve fully closed.	Below 1.5 V
OD ↔ GND (C15–14 ↔ C15–16)	Y–B ↔ W–B	During cruise control driving OD switch ON.	10 – 16 V
		During cruise control driving OD switch OFF (3rd driving)	Below 1 V
MO ↔ GND (C15–15 ↔ C15–16)	R–G ↔ W–B	During cruise control driving ACC switch hold ON	9 – 15 V
		During cruise control driving COAST switch hold ON	Below 1 V
GND ↔ Body Ground (C15–16 ↔ Body Ground)	W–B ↔ Body Ground	Constant	Below 1 V

DI08L–13

PROBLEM SYMPTOMS TABLE

Symptom	Suspect AreaSuspect Area	See pageSee page
SET not occourring or CANCEL occurring. (DTC is Normal)	3. Main Switch Circuit (Cruise control switch) 4. Vehicle Speed Sensor 5. Control Switch Circuit (Cruise control switch) 6. Stop Light Switch Circuit 7. Park/Neutral Position Switch Circuit 8. Clutch Switch 9. Actuator Motor Circuit 10. Cruise Control Cable 11. Cruise Control ECU	 DI–912 DI–888 DI–892 DI–898 DI–904 DI–907 DI–881 DI–918 IN–31
SET not occurring or CANCEL occurring. (DTC dose not output)	1. ECU Power Source Circuit 2. Cruise Control ECU	DI–909 IN–31
Actual vehicle speed deviates above or below the set speed.	1. Cruise Control Cable 2. Vehicle Speed Signal Abnormal 3. Electronically Controlled Transmission Communication Circuit 4. Actuator Motor Circuit 5. Idle Signal Circuit (Main throttle position sensor) 6. Cruise Control ECU	DI–918 DI–891 DI–901 DI–881 DI–895 IN–31
Gear shifting frequent between 3rd O/D when driving on uphill road. (Hurting)	1. Electronically Controlled Transmission Communication Circuit 2. Cruise Control ECU	DI–901 IN–31
Cruise control not cancelled, even when brake pedal is depressed.	1. Cruise Control Cable 2. Stop Light Switch Circuit 3. Actuator Motor Circuit 4. Cruise Control ECU	DI–918 DI–898 DI–881 IN–31
Cruise control not cancelled, even when transmission is shifted to ”N” postion.	1. Cruise Control Cable 2. Park/Neutral Position Switch Circuit 3. Actuator Motor Circuit 4. Cruise Control ECU	DI–918 DI–904 DI–881 IN–31
Cruise control not cancelled, even when clutch pedal is depressed.	1. Cruise Control Cable 2. Clutch Switch Circuit 3. Actuator Motor Circuit 4. Cruise Control ECU	DI–918 DI–907 DI–881 IN–31
Control switch does not operate. (SET/COAST, ACC/RES, CANCEL not possible)	1. Cruise Control Cable 2. Control Switch Circuit 3. Actuator Motor Circuit 4. Cruise Control ECU	DI–918 DI–892 DI–881 IN–31
SET possible at 40 km/h (25 mph) or less, or CANCEL does not operate at 40 km/h (25 mph) or less.	1. Cruise Control Cable 2. Vehicle Speed Signal Abnormal 3. Actuator Motor Circuit 4. Cruise Control ECU	DI–918 DI–891 DI–881 IN–31
Poor response is in ACCEL and RESUME modes.	1. Cruise Control Cable 2. Electronically Controlled Transmission Communication Circuit 3. Actuator Motor Circuit 4. Cruise Control ECU	DI–918 DI–901 DI–881 IN–31
O/D does not resume, even though the road is not uphill.	1. Electronically Controlled Transmission Communication Circuit 2. Cruise Control ECU	DI–901 IN–31

DTC memory is erased.	1. Cruise Control ECU	IN–31
DTC is not output, or is output when should not be.	1. Diagnosis Circuit 2. Cruise Control ECU	DI–916 IN–31
Cruise MAIN indicator light remains ON or falls to light up.	1. Cruise MAIN Indicator Light Switch Circuit	DI–914

DI08M–12

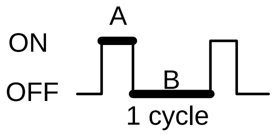
CIRCUIT INSPECTION

DTC	11, 15	Actuator Motor Circuit

CIRCUIT DESCRIPTION

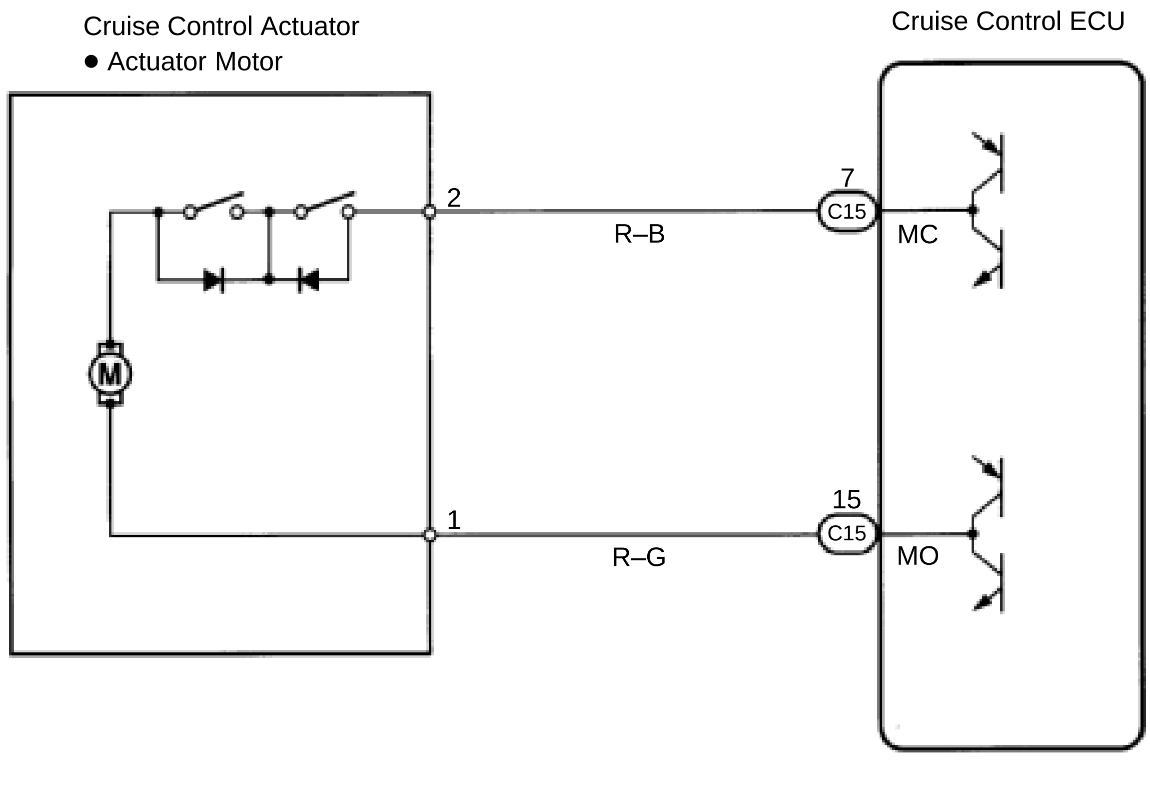
The actuator motor is operated by signals from the ECU. Acceleration and deceleration signals are transmitted according to changes in the Duty Ratio (See below).
Duty Ratio
The duty ratio is the ratio of the period of continuity in one cycle. For example, if A is the period of continuity in one cycle, and B is the period of non–continuity.

$$\text{Duty Ratio} = \frac{A}{A + B} \times 100\ (\%)$$



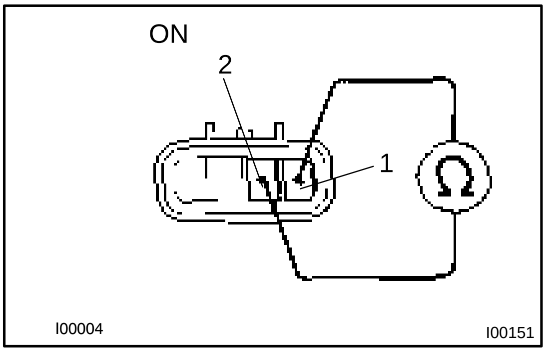
DTC No.	Detection Item	Trouble Area
11	Short in actuator motor circuit.	Actuator motor Harness or connector between cruise control ECU and actuator motor Cruise control ECU
15	Open in actuator motor circuit.	Actuator motor

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check resistance between terminals MO and MC of actuator motor.



PREPARATION:
(a) Turn ignition switch ON.
(b) Disconnect the actuator connector.

CHECK:
Measure resistance between terminals 1 and 2.

HINT:
If control plate is in fully opened or fully closed positions, resistance can not be measured.

OK:
Resistance: more than 4.2 Ω

NG → **Replace cruise control actuator.**

OK

2	Check for open and short in harness and connectors between cruise control ECU and actuator motor (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and replace cruise control ECU.
(See page IN–31).

DI08N–12

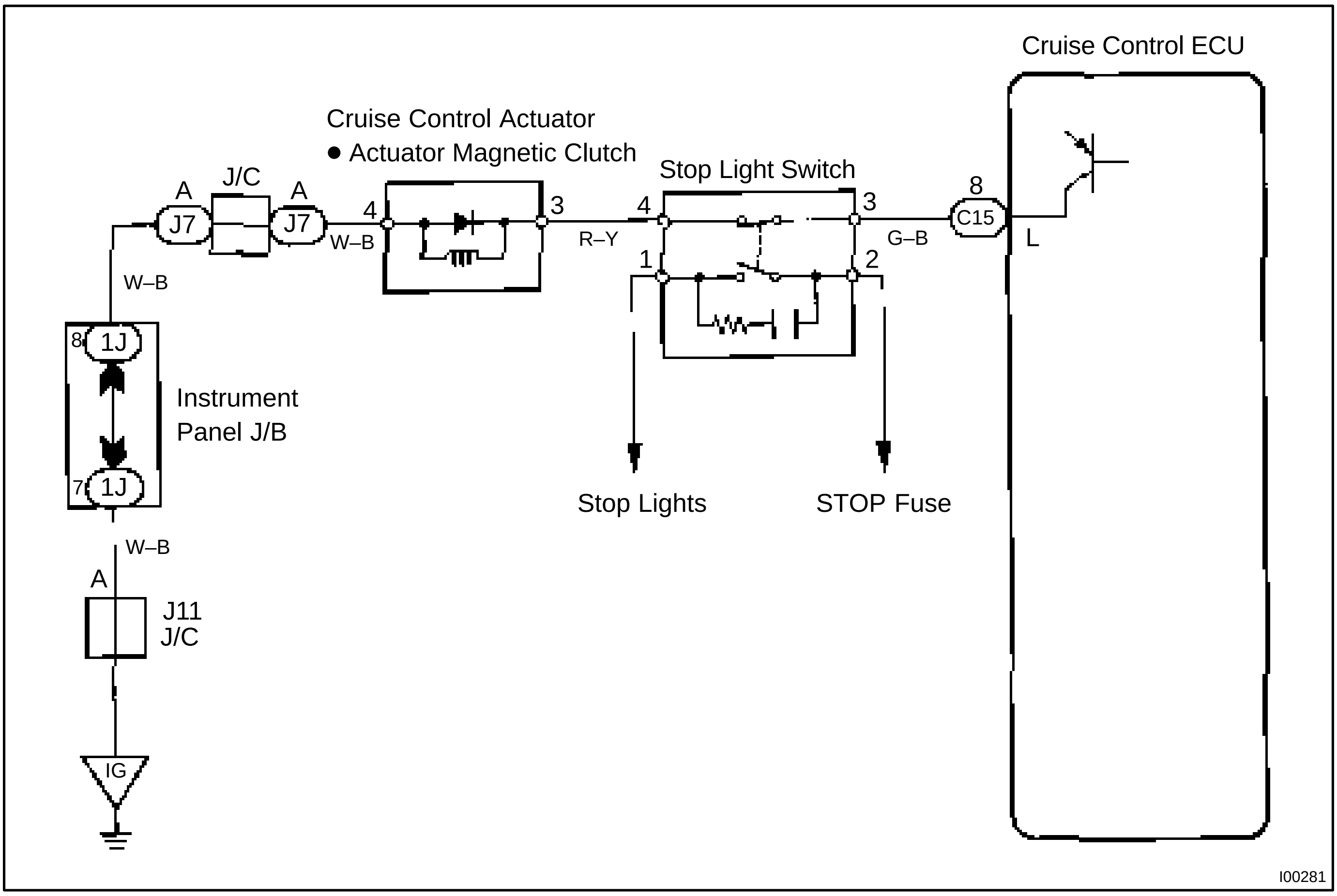
DTC	12	Actuator Magnetic Clutch Circuit

CIRCUIT DESCRIPTION

This circuit turns on the magnetic clutch inside the actuator during cruise control operation according to the signal from the ECU. If a malfunction occurs in the actuator or speed sensor, etc. during cruise control operation, the rotor shaft between the motor and control plate is released.
When the brake pedal is depressed, the stop light switch turns on, supplying electrical power to the stop light. Power supply to the magnetic clutch is mechanically cut and the magnetic clutch is turned OFF.
When driving downhill, if the vehicle speed exceeds the set speed by 15 km/h (9 mph), the ECU turns the safety magnet clutch OFF. If the vehicle speed later drops to within 10 km/h (6 mph), cruise control at the set speed is resumed.

DTC No.	Detection Item	Trouble Area
12	Short in actuator magnetic clutch circuit. Open (0.8 sec.) in actuator magnetic clutch circuit.	□STOP Fuse □Stop light switch □Actuator magnetic clutch □Harness or connector between cruise control ECU and actuator magnetic clutch, actuator magnetic clutch and body ground □Cruise control ECU

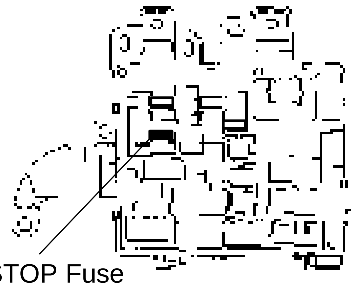
WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check STOP fuse.

Instrument panel junction block No.1:



PREPARATION:
(a) Turn ignition switch OFF.
(b) Remove the STOP fuse from instrument panel junction block No.1.

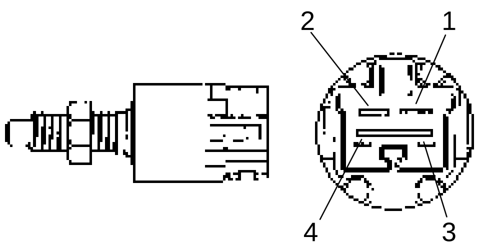
CHECK:
Check fuse continuity.

OK:
There is continuity.

NG — **Replace STOP fuse.**

OK

2	Check stop light switch.



PREPARATION:
Disconnect the stop light switch connector.

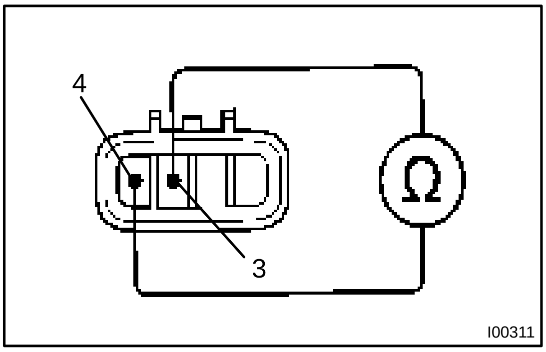
CHECK:
Check continuity between terminals.

Switch position	Continuity
Switch pin free (Brake pedal depressed)	1 – 2
Switch pin pushed in (Brake pedal released)	3 – 4

NG — **Replace stop light switch.**

OK

3	Check resistance between terminals L and GND of actuator magnetic clutch.



PREPARATION:
(a) Turn ignition switch OFF.
(b) Disconnect the actuator connector.

CHECK:
Measure resistance between terminals 3 and 4.

OK:
Resistance: 34.65 – 42.35 Ω.

NG → **Replace cruise control actuator.**

OK

4	Check for open and short in harness and connectors between cruise control ECU and actuator magnetic clutch, actuator magnetic clutch and body ground (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and replace cruise control ECU (See page IN–31).

DI08O–12

DTC	14	Actuator Mechanical Malfunction

CIRCUIT DESCRIPTION

The circuit detects the rotation position of the actuator control plate and sends a signal to the ECU.

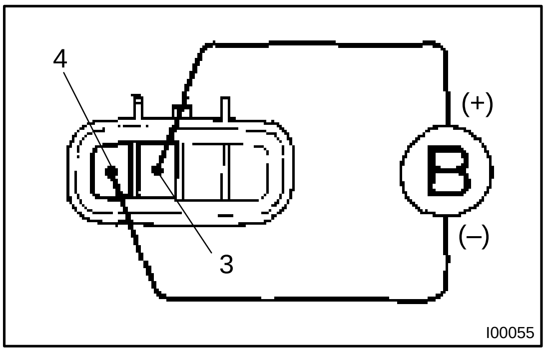
DTC No.	Detection Item	Trouble Area
14	Cruise control actuator mechanical malfunction.	●Actuator lock: (motor, arm) ●Actuator motor ●Cruise control ECU

WIRING DIAGRAM

See page DI–881.

INSPECTION PROCEDURE

1	Check cruise control actuator arm locking operation



PREPARATION:
(a) Turn ignition switch OFF.
(b) Disconnect the actuator connector.

CHECK:
Connect the positive (+) lead from the battery to the terminal 3 of actuator and the negative (–) lead to terminal 4.

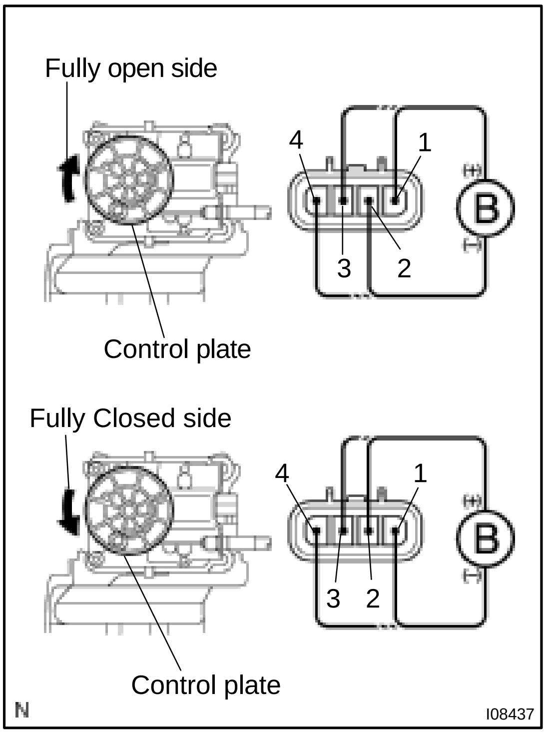
NOTICE:
Do not connect the high tension cables to the wrong battery terminal. The cruise control actuator will be damaged.
Move the control plate by hand.

OK:
Control plate doesn't move.

NG	Replace cruise control actuator.

OK

2	**Check cruise control actuator operation.**



PREPARATION:

(a) Turn ignition switch OFF.

(b) Disconnect the actuator connector.

CHECK:

Connect the positive (+) lead from the battery to terminals 1 and 3 of actuator, connect the negative (–) lead to terminals 2 and 4 of actuator.

OK:

Control arm moves to fully open side

CHECK:

Connect the positive (+) lead from the battery to terminals 2 and 3 of actuator, connect the negative (–) lead to terminals 1 and 4 of actuator.

OK:

Control arm moves to fully colsed side

NG → **Replace cruise control actuator.**

OK

3	**Check harness and connector between cruise control ECU and cruise control actuator (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

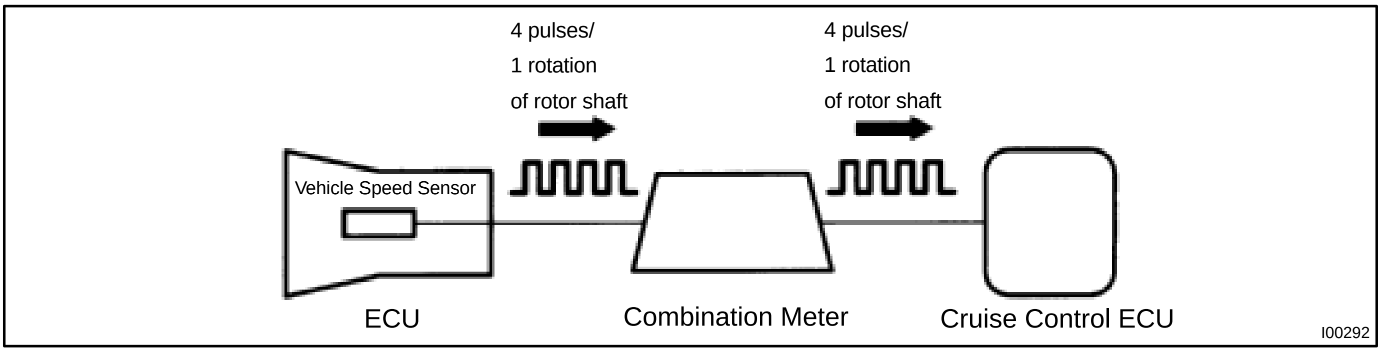
Check and replace cruise control ECU (See page IN–31).

DI08P–12

DTC	21	Open in Vehicle Speed Sensor Circuit

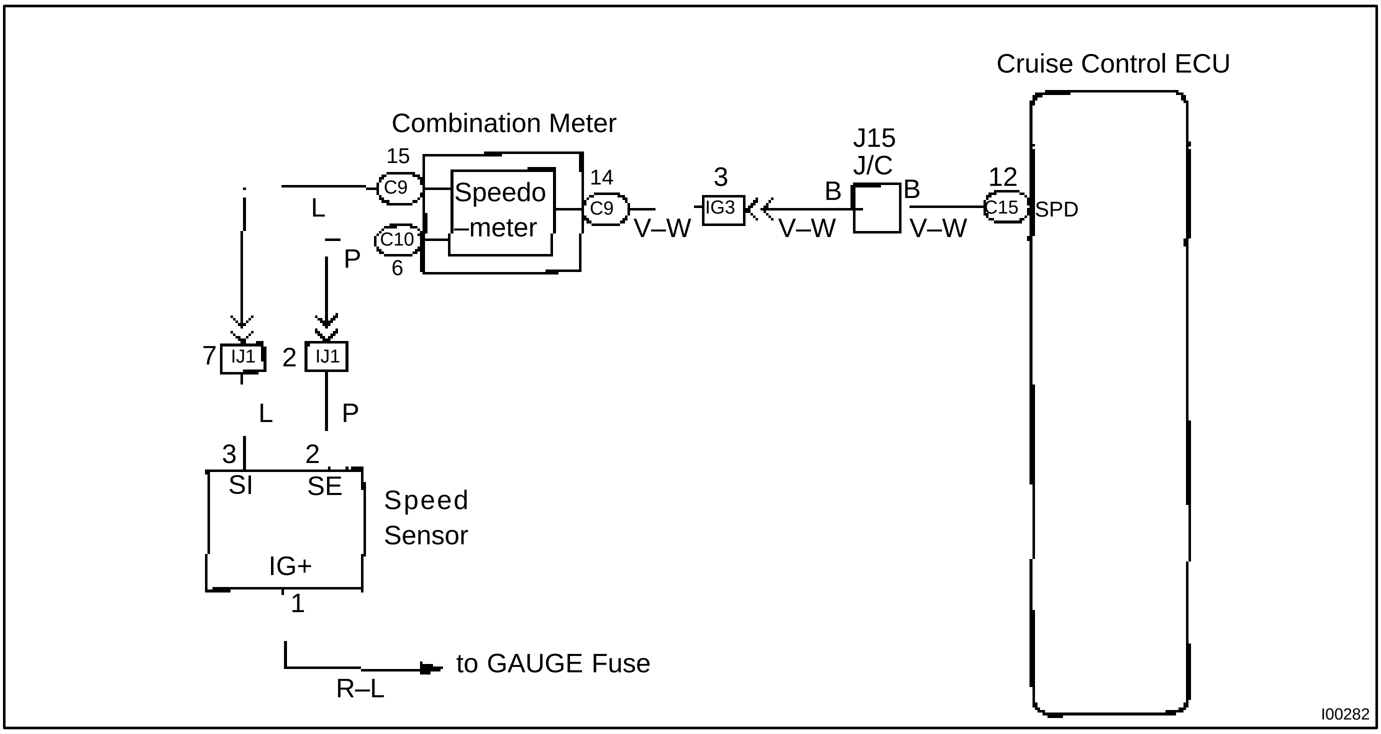
CIRCUIT DESCRIPTION

The signal from the vehicle speed sensor circuit is sent to cruise control ECU as vehicle speed signal.
The rotor shaft is driven by the gear of the transmission.
For each rotation of the shaft, the vehicle speed sensor sends a 4–pulse signal through the combination meter to the cruise control ECU (See the following installation).
This signal is converted inside the combination meter and sent as a 4–pulse signal to the cruise control ECU.
The ECU calculates the vehicle speed from this pulse frequency.



DTC No.	Detection Item	Trouble Area
21	Speed signal is not input to the cruise control ECU while cruise control is set.	●Combination meter ●Harness or connector between cruise control ECU and combination meter, combination meter and vehicle speed sensor ●Vehicle speed sensor ●Cruise control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Input signal check.**

Input Signal	Indicator Light Blinking Pattern
Drive at about 40 km/h (25 mph) or below	Light ON OFF
Drive at about 40 km/h (25 mph) or higher	Light ON OFF

CHECK:

(a) See input signal check on page DI–870.

(b) Check indicator light operation when driving with vehicle speed above 40 km/h (25 mph), and with vehicle speed below 40 km/h (25 mph).

OK:

Vehicle speed above 40 km/h (25 mph):
Indicator light blinks
Vehicle speed below 40 km/h (25 mph):
Indicator light stays on

OK → **Check and replace cruise control ECU (See page IN–31).**

NG

2	**Check speedometer circuit (See Combination meter troubleshooting on page BE–2).**

NG → **Repair or replace harness, connector or combination meter assembly.**

OK

3	**Check harness and connector between cruise control ECU and combination meter, combination meter and vehicle speed sensor (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

4	Check vehicle speed sensor (See page BE–47).

NG → **Replace vehicle speed sensor.**

OK ↓

Check and replace cruise control ECU (See page IN–31).

DI08Q–10

DTC	23	Vehicle Speed Signal Abnormal

CIRCUIT DESCRIPTION

See page DI–888.

DTC No.	Detection Item	Trouble Area
23	Vehicle speed sensor pulse is abnormal.	●Vehicle speed sensor ●Cruise control ECU

WIRING DIAGRAM

See page DI–888.

INSPECTION PROCEDURE

1	Check vehicle speed sensor (See page BE–47).

NG → **Replace vehicle speed sensor.**

OK ↓

Check and replace cruise control ECU (See page IN–31).

DI08R–12

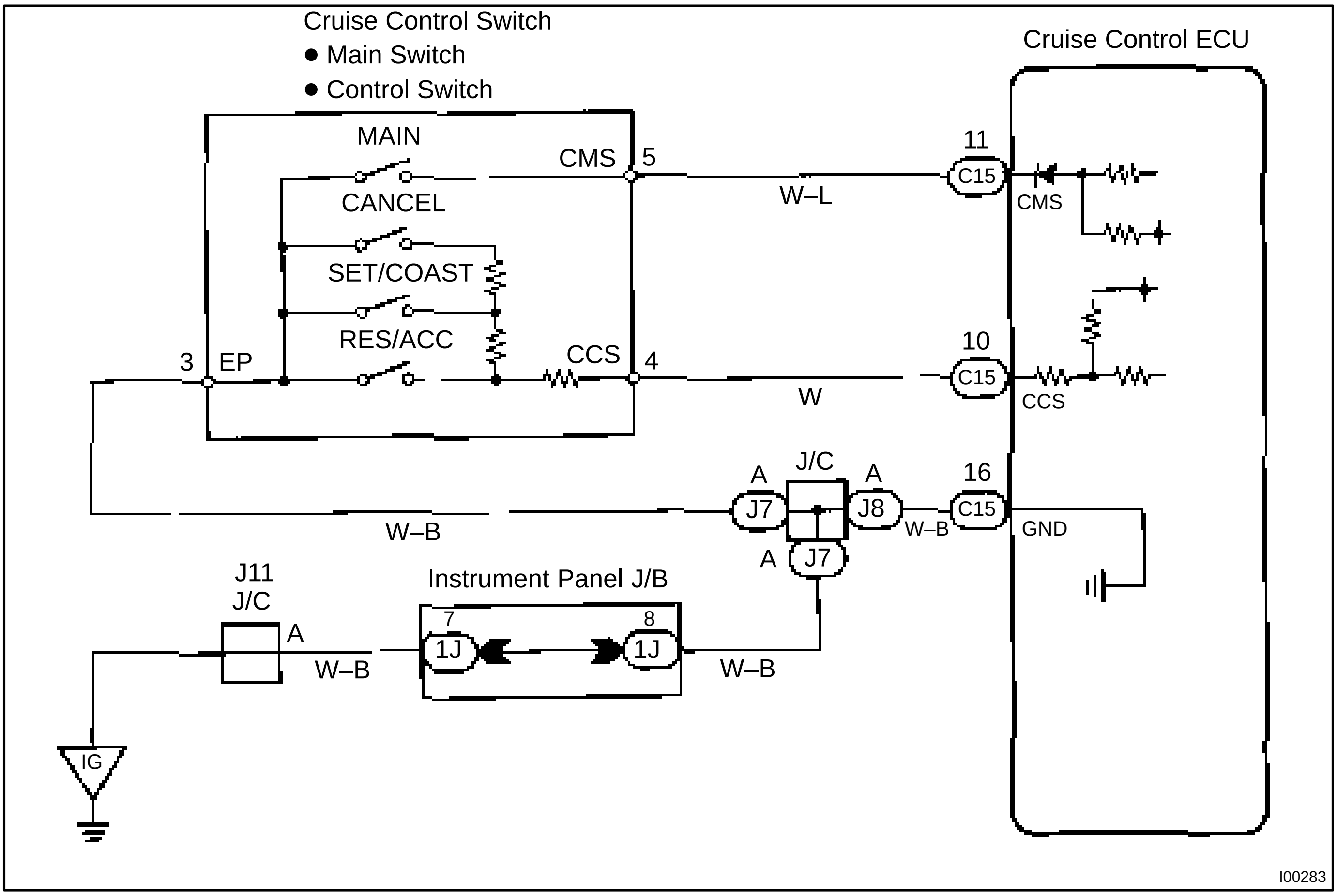
DTC	32	Control Switch Circuit (Cruise Control Switch)

CIRCUIT DESCRIPTION

This circuit carries the SET/COAST, RESUME/ACCEL and CANCEL signals (each voltage) to the ECU.

DTC No.	Detection Item	Trouble Area
32	Short in control switch circuit.	Cruise control switch Harness or connector between cruise control ECU and cruise control switch, cruise control switch and body ground Cruise control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Input signal check.

Input Signal	Indicator Light Blinking Pattern
SET/COAST switch	2 Pulses ON OFF
RESUME/ACCEL switch	3 Pulses ON OFF
CANCEL switch	SW OFF ON SW ON OFF

PREPARATION:

See input signal check on page DI–870.

CHECK:

Check the indicator light operation when each of the SET/COAST, RESUME/ACCEL and CANCEL is turned on.

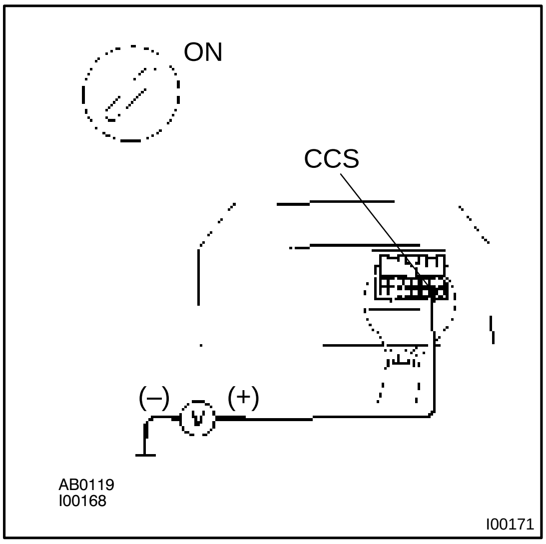
OK:

SET/COAST, RESUME/ACCEL switch
The signals shown in the table on the left should be output when each switch is ON. The signal should disappear when the switch is turned OFF.
CANCEL switch
The indicator light goes off when the cancel switch is turned ON.

OK → **Wait and see.**

NG

2	Check voltage between terminals CCS of cruise control ECU connector and body ground.



PREPARATION:

(a) Remove the ECU with connector still connected.
(b) Turn ignition switch ON.

CHECK:

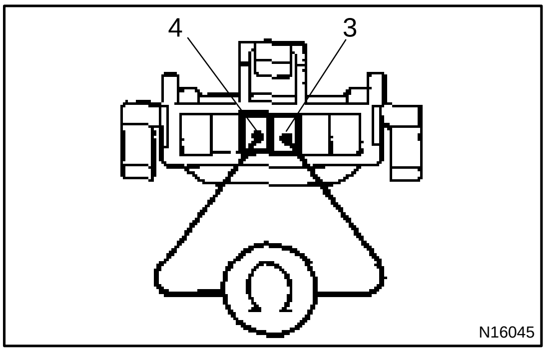
Measure voltage between terminals 18 of ECU connector and body ground, when each of the SET/COAST, RESUME/ACCEL and CANCEL is turned ON.

Switch position	Resistance (V)
Neutral	10 – 16 V
RES/ACC	0.8 – 3.7 V
SET/COAST	2.5 – 6.3 V
CANCEL	4.2 – 8.8 V

NG → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–879).**

OK

3	Check control switch.



PREPARATION:

(a) Remove steering wheel center pad.

(b) Disconnect the control switch connector.

CHECK:

Measure resistance between terminals 3 and 4 of control switch connector when control switch is operated.

Switch position	Resistance (Ω)
Neutral	∞ (No continuity)
RES/ACC	50 – 80
SET/COAST	180 – 220
CANCEL	400 – 440

NG → **Replace control switch.**

OK

4	Check harness and connector between cruise control ECU and cruise control switch, cruise control switch and body ground (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

5	Input signal check (See step 1).

OK → **Wait and see.**

NG

Check and replace cruise control ECU (See page IN–31).

DI08S–10

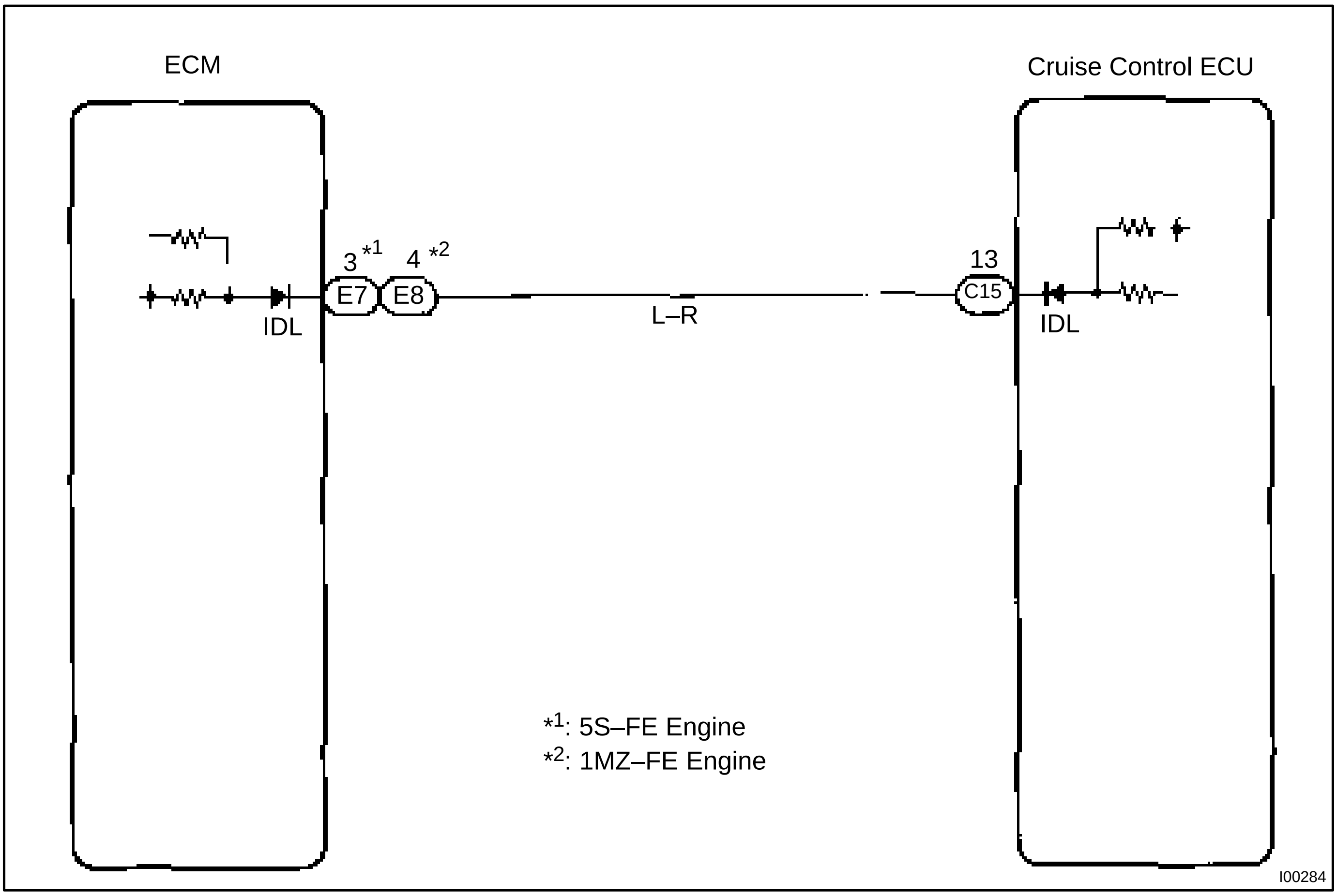
DTC	51	Idle Signal Circuit

CIRCUIT DESCRIPTION

When the idle switch is turned ON, a signal is sent to the ECU. The ECU uses this signal to correct the discrepancy between the throttle valve position and the actuator position sensor value to enable accurate cruise control at the set speed. If the idle switch is malfunctioning, problem symptoms also occur in the engine, so also inspect the engine.

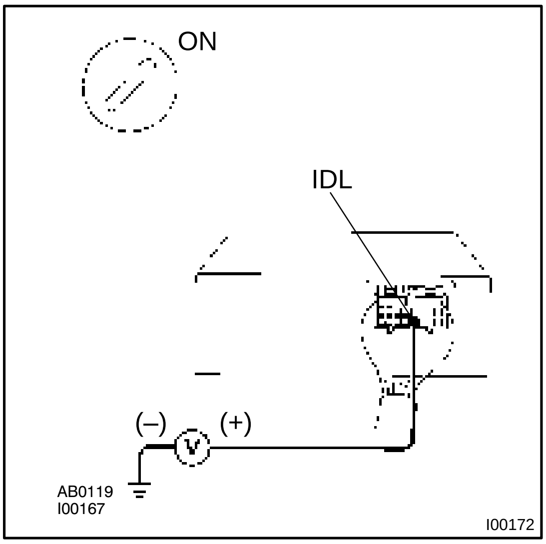
DTC No.	Detection Item	Trouble Area
51	Short in idle signal circuit.	●Harness or connector between ECM and throttle position sensor ●Throttle position sensor ●Harness or connector between cruise control ECU and ECM ●Cruise control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminal IDL of cruise control ECU connector and body ground.



PREPARATION:

(a) Remove the ECU with connector still connected.
(b) Disconnect the ECM connector.
(c) Turn ignition switch ON.

CHECK:

Measure voltage between terminal IDL of ECU connector and body ground when the throttle valve is fully closed and fully opened.

OK:

Throttle valve position	Voltage
Fully opened	10 – 14 V
Fully closed	Below 2 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–879).**

NG

2	Check harness and connector between ECM and throttle position sensor (See page IN–31).

NG → **Repair or replace harness or connector.**

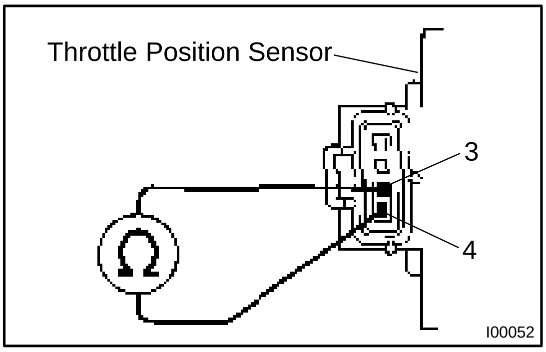
OK

3	Check throttle position sensor circuit (See page DI–243).

NG → **Replace throttle position sensor.**

OK

4	**Check throttle position sensor.**



PREPARATION:
Disconnect the throttle position sensor connector.
CHECK:
Measure resistance between terminals 3 and 4 of throttle position sensor connector when the throttle valve is fully closed and fully opened.
OK:

Throttle valve position	Resistance
Fully opened	1 MΩ or higher
Fully closed	Below 2.3 kΩ

NG — **Replace throttle position sensor.**

OK

5	**Check for open and short in harness and connector between cruise control ECU and ECM (See page IN–31).**

NG — **Repair or replace harness or connector.**

OK

Check and replace cruise control ECU (See page IN–31).

DI08T–11

Stop Light Switch Circuit

CIRCUIT DESCRIPTION

When the brake pedal is depressed, the stop light switch sends a signal to the ECU. When the ECU receives this signal, it cancels the cruise control.

A fail–safe function is provided so that the cancel functions normally, even if there is a malfunction in the stop light signal circuit.

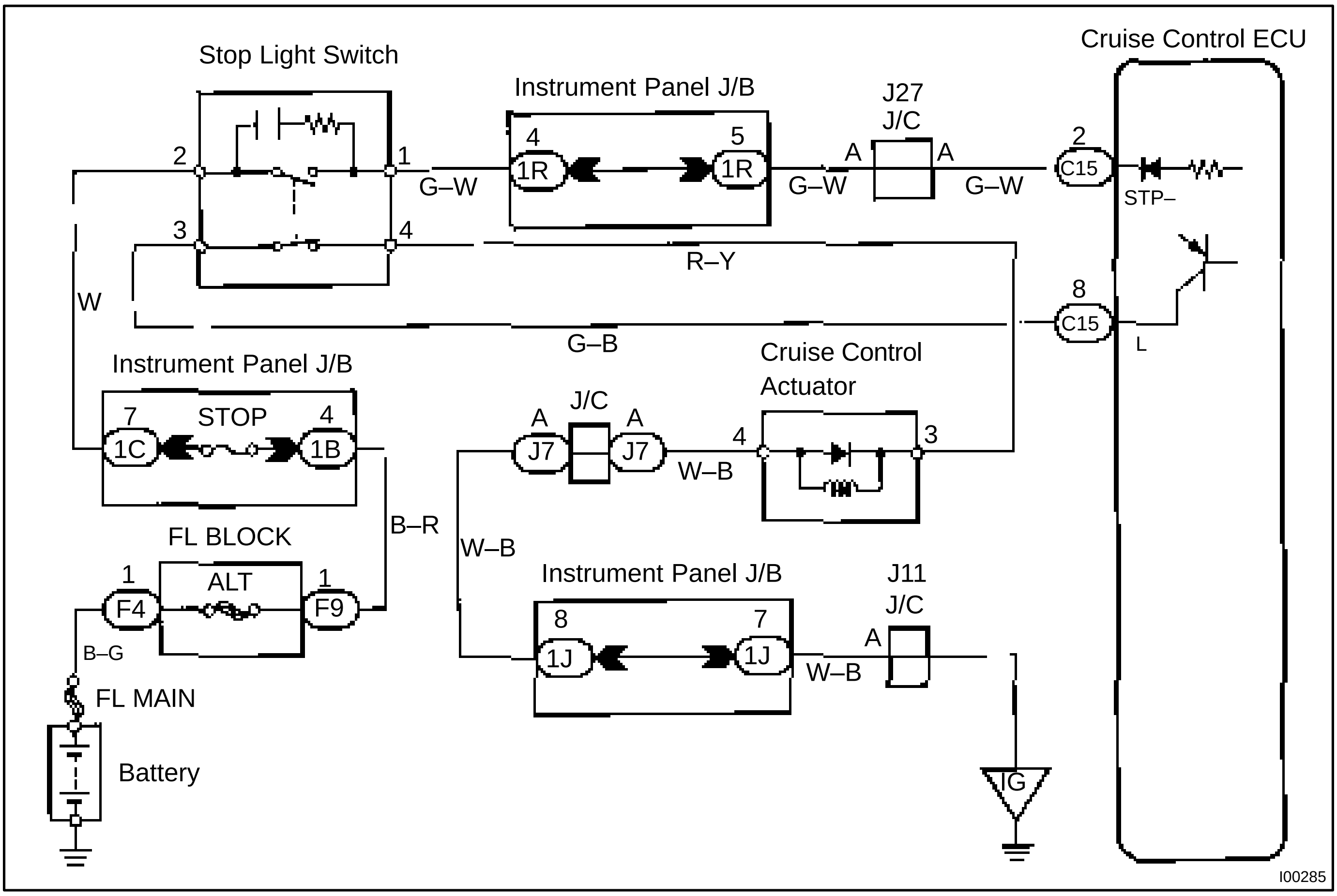
The cancel conditions are: Battery positive voltage at terminal STP–

When the brake is ON, battery positive voltage normally is applied through the STOP fuse and stop light switch to terminal STP– of the ECU, and the ECU turns the cruise control OFF.

If the harness connected to terminal STP– has an open circuit, terminal STP– will have battery positive voltage and the cruise control will be turned OFF.

Also, when the brake is ON, the magnetic clutch circuit is cut mechanically by the stop light switch, turning the cruise control OFF. (See page DI–883 for operation of the magnetic clutch)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of stop light.**

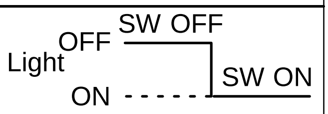
CHECK:

Check that stop light comes ON when brake pedal is depressed, and turns OFF when brake pedal is released.

NG → **Check stop light system (See page BE–2).**

OK

2	**Input signal check.**

Input Signal	Indicator Light Blinking Pattern
Stop Light switch ON	

CHECK:

(a) See input signal check on DI–870.

(b) Check the indicator light when the brake pedal is depressed.

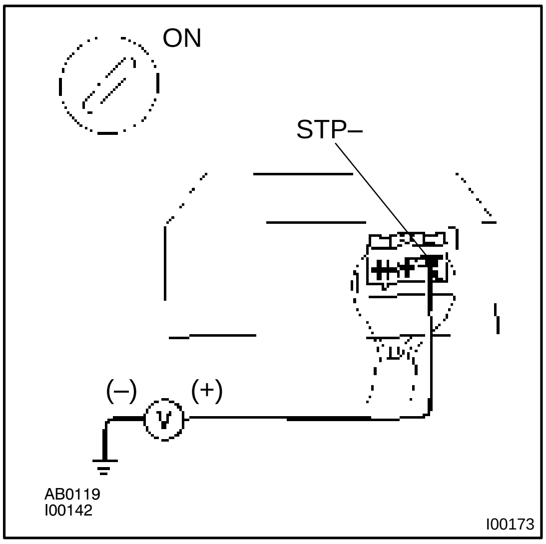
OK:

The indicator light goes OFF when the brake pedal is depressed.

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–879).**

NG

3	**Check voltage between terminal STP– of cruise control ECU connector and body ground.**



PREPARATION:

(a) Remove the ECU with connectors still connected.

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminal STP– of cruise control ECU connector and body ground, when the brake pedal is depressed and released.

OK:

Depressed	10 – 14 V
Released	Below 1 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–879).**

NG

4	**Check for open in harness and connectors between terminal STP– of cruise control ECU and stop light switch (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace cruise control ECU (See page IN–31).

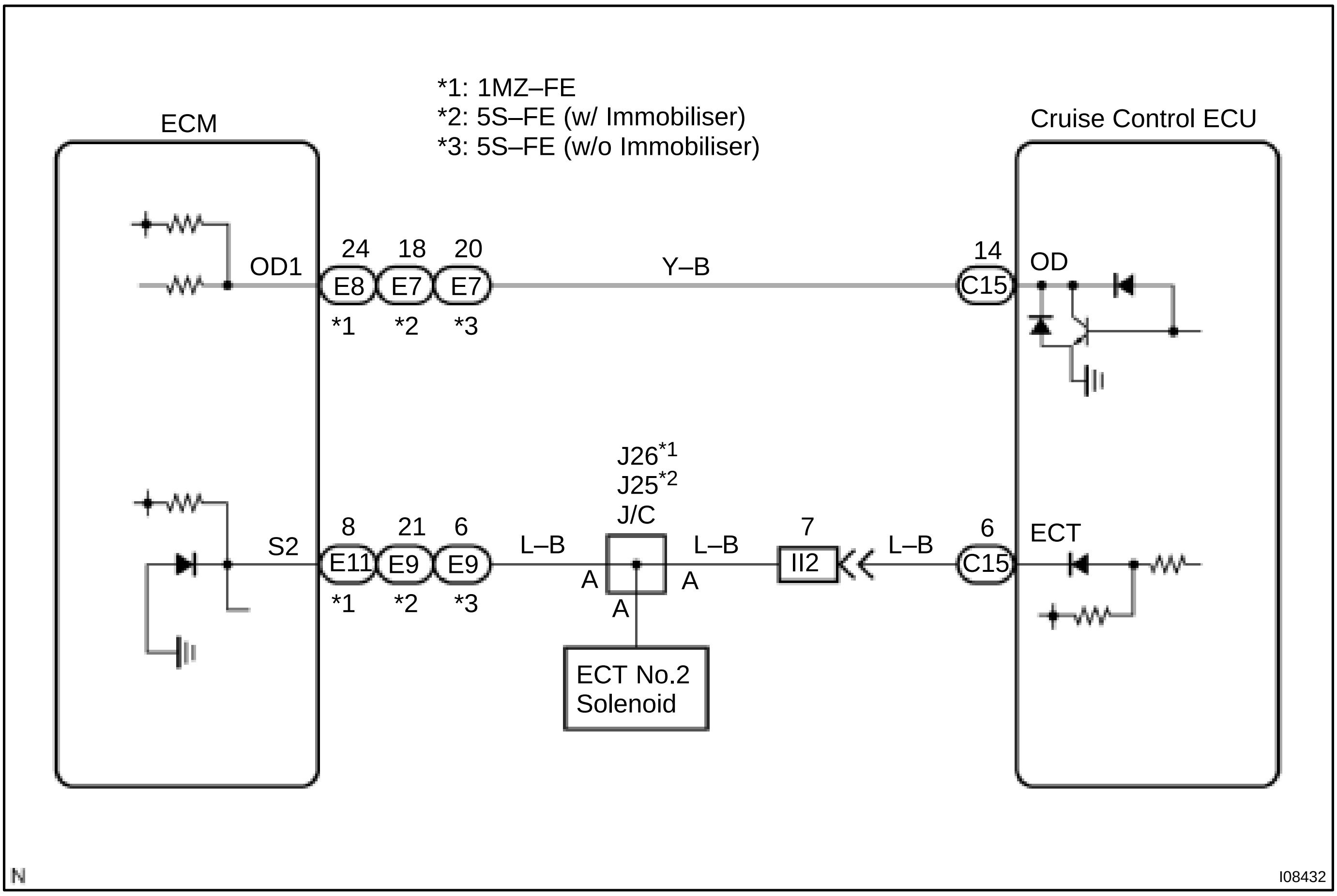
DI08U–11

Electronically Controlled Transmission Communication Circuit

CIRCUIT DESCRIPTION

When driving uphill under the cruise control, in order to reduce shifting due to ON–OFF overdrive operation and to provide smooth driving, when down shifting in the electronically controlled transmission occurs, a signal to prevent upshift until the end of the uphill slope is sent from the cruise control ECU to the electronically controlled transmission.
Terminal ECT of the cruise control ECU detects the shift change signal (output to electronically controlled transmission No. 2 solenoid) from the ECM.
If the vehicle speeds down, also when terminal ECT of the cruise control ECU receives down shifting signal, it sends a signal from terminal OD to ECM to cut overdrive until the end of the uphill slope, and the gear shifts are reduced and gear shift points in the electronically controlled transmission are changed.

WIRING DIAGRAM



INSPECTION PROCEDURE

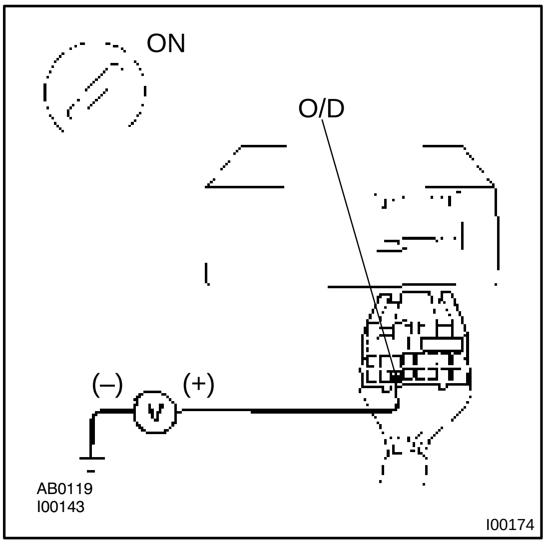
1	Check operation of overdrive.

PREPARATION:
Test drive after engine warms up.
CHECK:
Check that overdrive ON ↔ OFF occurs by operation of OD switch ON–OFF.

NG → **Check and repair electronically controlled transmission (See page DI–389).**

OK

2	Check voltage between terminal OD of harness side connector of cruise control ECU and body ground.

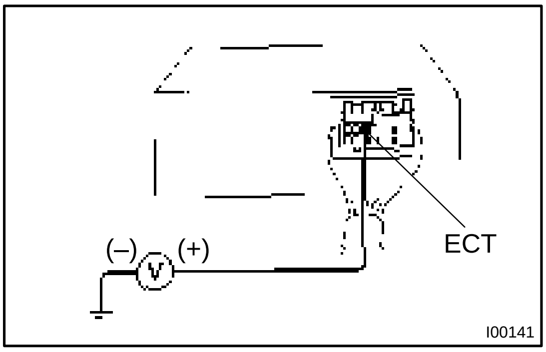


PREPARATION:
(a) Remove the ECU with connector still connected.
(b) Turn ignition switch ON.
(c) Disconnect the ECU connector.
CHECK:
Measure voltage between terminal OD of harness side connector of ECU and body ground.
OK:
Voltage: 10 – 14 V

NG → **Go to step 5.**

OK

3	Check voltage between terminal ECT of cruise control ECU connector and body ground (On test drive).



PREPARATION:
(a) Connect the ECU connector.
(b) Test drive after engine warms up.

CHECK:
Check voltage between terminal ECT of ECU connector and body ground when OD switch is ON and OFF.

OK:

OD switch position	Voltage
ON	8 – 14 V
OFF	Below 0.5 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–879).**

NG

4	Check harness and connector between terminal ECT of cruise control ECU and electronically controlled transmission solenoid (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and replace cruise control ECU.

5	Check harness and connector between terminal OD of cruise control ECU and terminal OD1 of ECM (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and replace cruise control ECU (See page IN–31).

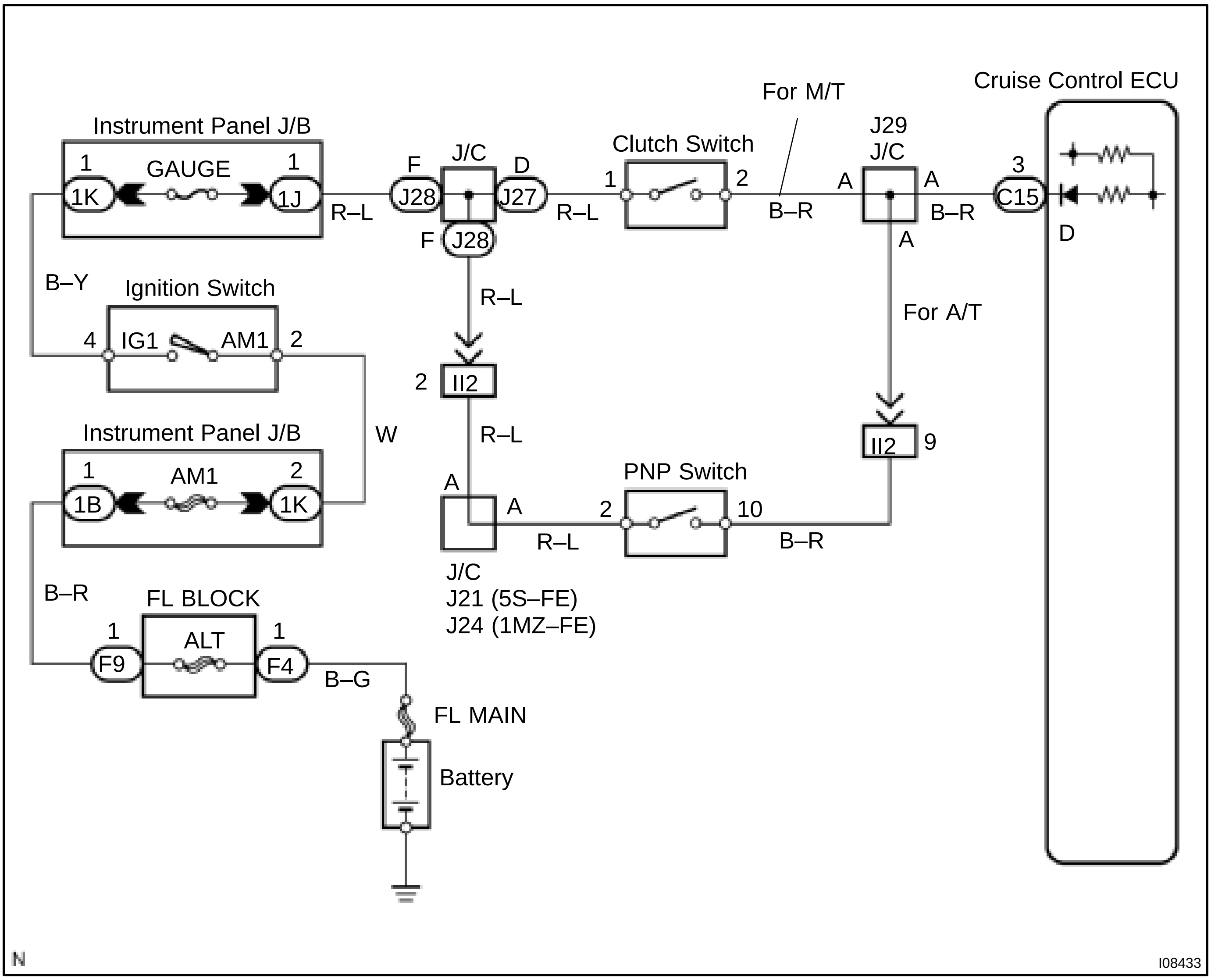
DI08V–11

Park/Neutral Position Switch Circuit

CIRCUIT DESCRIPTION

When the shift position is except D, a signal is sent from the park/neutral position switch to the ECU. When this signal is input during cruise control driving, the ECU cancels the cruise control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check starter operation.**

CHECK:

Check that the starter operates normally and that the engine starts.

NG → **Proceed to engine troubleshooting.
(5S–FE: See page ST–1)
(1MZ–FE: See page ST–1).**

OK ↓

2	**Input signal check.**

Input Signal	Indicator Light Blinking Pattern
Turn PNP switch OFF (Shift to positions except D)	Light ON SW ON / OFF SW OFF

PREPARATION:

See input signal check on page DI–870.

CHECK:

Check the indicator light when shifting into positions except D.

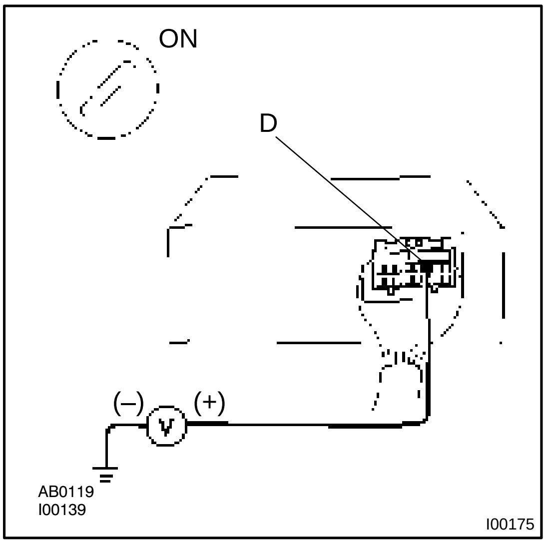
OK:

The indicator light goes off when shifting into positions except D.

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–879).**

NG ↓

3	Check voltage between terminal D of cruise control ECU connector and body ground.



PREPARATION:
Turn ignition switch ON.

CHECK:
Measure voltage between terminal D of ECU connector and body ground when shifting into D position and other positions.

OK:

Shift Position	Voltage
D position	10 – 14 V
Other positions	Below 1 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–879).**

NG

4	Check harness and connector between cruise control ECU and park/neutral position switch (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and replace cruise control ECU (See page IN–31).

DI08W–04

Clutch Switch Circuit

CIRCUIT DESCRIPTION

When the clutch pedal is depressed, the clutch switch sends a signal to the cruise control ECU. When the signal is input to the cruise control ECU during cruise control driving, the cruise control ECU cancels cruise control.

WIRING DIAGRAM

Refer to PNP switch circuit on page DI–904.

INSPECTION PROCEDURE

1	**Check starter operation.**

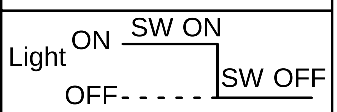
CHECK:

Check that the starter operates normally and that the engine starts.

NG → **Proceed to engine troubleshooting (5S–FE: See page ST–1) (1MZ–FE: See page ST–1).**

OK

2	**Input signal check.**

<table>
<tr><th>Input Signal</th><th>Indicator Light Blinking Pattern</th></tr>
<tr><td>Clutch switch OFF (Depress clutch pedal)</td><td>
</td></tr>
</table>

PREPARATION:

See input signal check on page DI–870.

CHECK:

Check the indicator lights when clutch pedal is depressed.

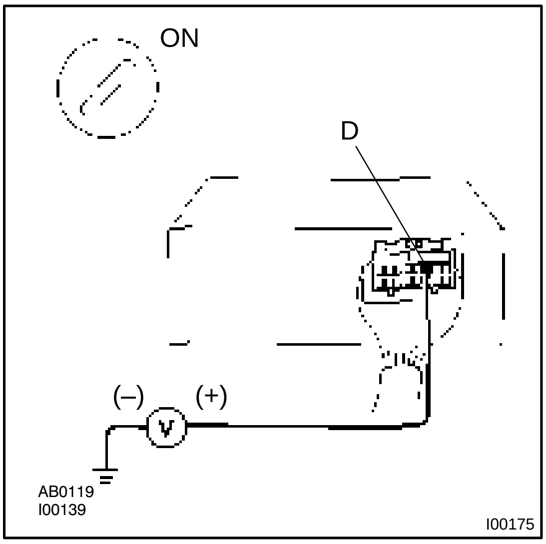
OK:

The indicator light goes off when shifting into clutch pedal is depressed.

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–879).**

NG

3	Check voltage between terminal D of cruise control ECU and body ground.



PREPARATION:
Turn ignition switch ON.
CHECK:
Measure voltage between terminal D of cruise control ECU connector and body ground when clutch pedal is depressed and pushed in.
OK:

Shift Position	Voltage
Clutch pedal depressed	10 – 14 V
Clutch pedal pushed in	Below 1 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–879).**

NG

4	Check for open in harness and connector between ECU and GAUGE fuse (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and replace cruise control ECU (See page IN–31).

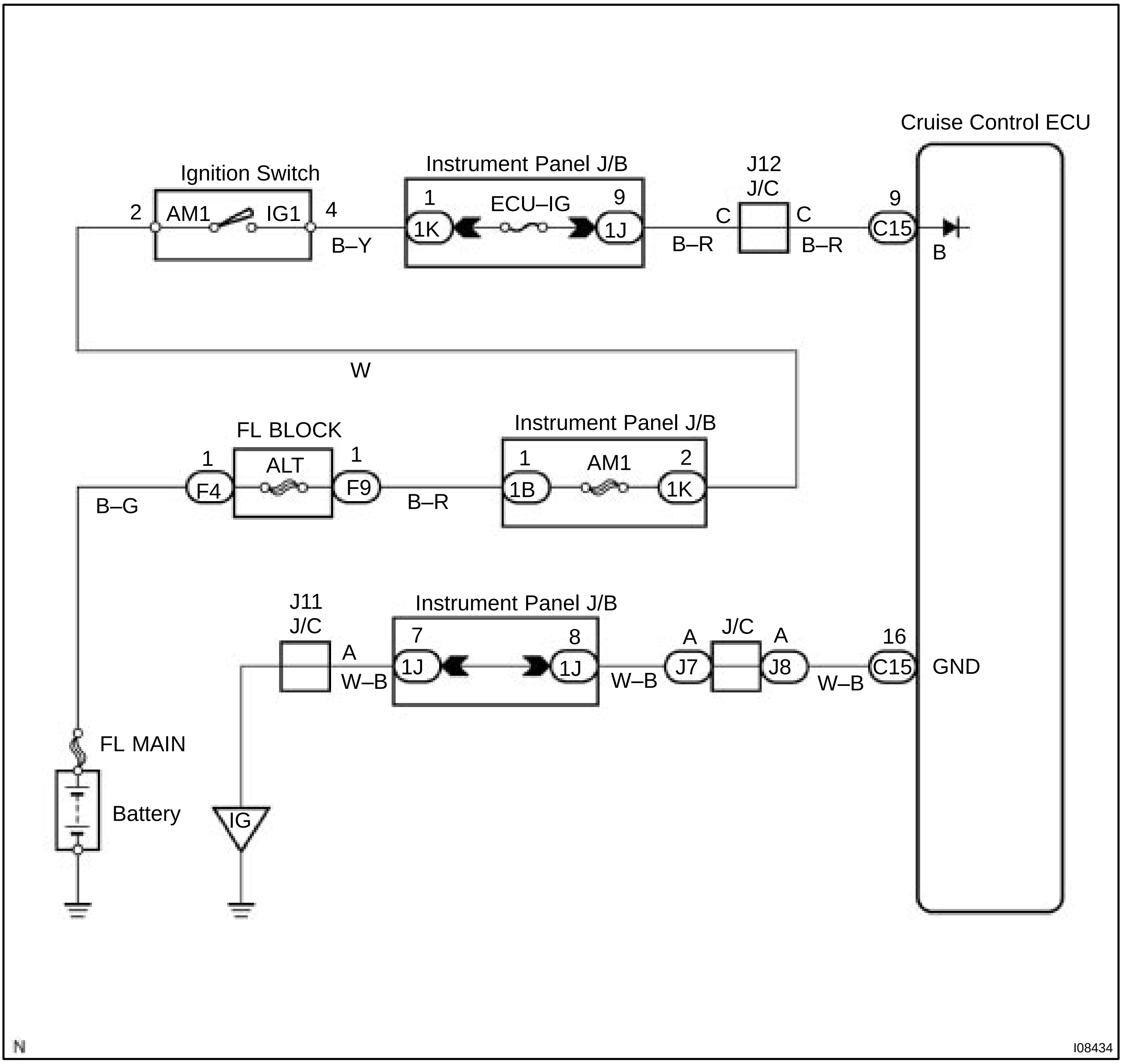
DI08X–11

ECU Power Source Circuit

CIRCUIT DESCRIPTION

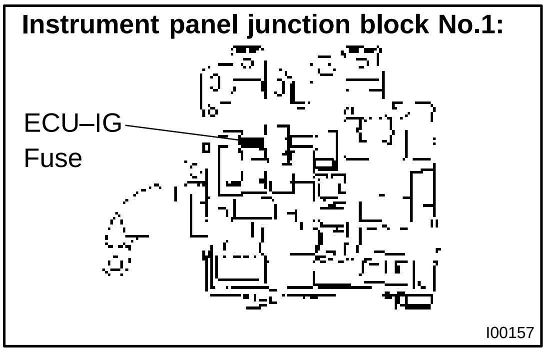
The ECU power source supplies power to the actuator and sensors, etc, when terminal GND and the cruise control ECU case are grounded.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check ECU–IG fuse.



PREPARATION:
Remove the ECU–IG fuse from instrument panel junction block No.1.

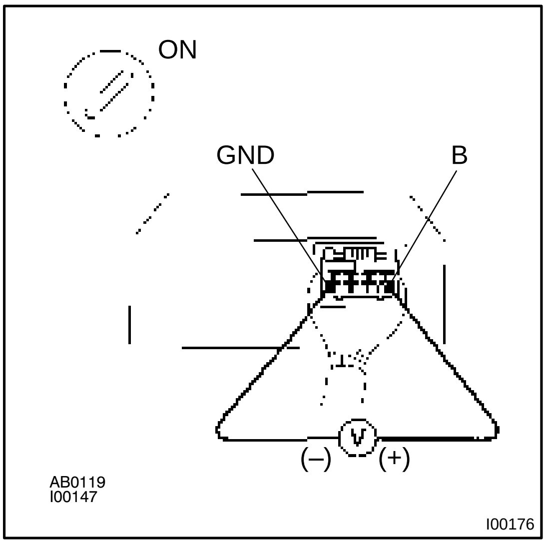
CHECK:
Check continuity of ECU–IG fuse.

OK:
Continuity

NG → **Check for short in all the harness and components connected to ECU–IG fuse.**

OK

2	Check voltage between terminals B and GND of cruise control ECU connector.



PREPARATION:
(a) Remove the ECU with connector still connected.
(b) Turn ignition switch ON.

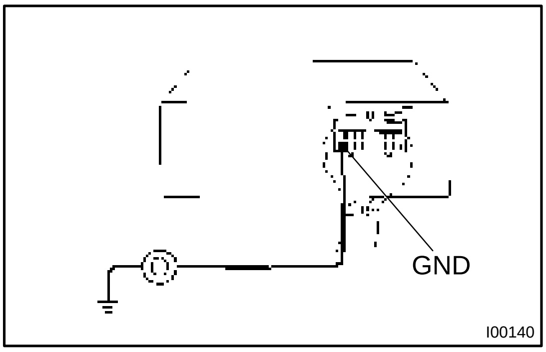
CHECK:
Measure voltage between terminals B and GND of ECU connector.

OK:
10 – 14 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–879).**

NG

3	**Check resistance between terminal GND of cruise control ECU connector and body ground.**



CHECK:
Measure resistance between terminal GND of ECU connector and body ground.

OK:

Resistance: Below 1 Ω

NG → **Repair or replace harness or connector.**

OK

Check and repair harness and connector between cruise control ECU and battery (See page IN–31).

DI08Z–16

Main Switch Circuit (Cruise Control Switch)

CIRCUIT DESCRIPTION

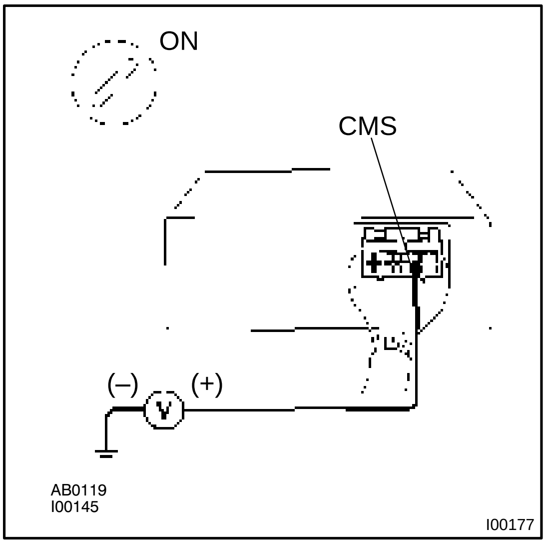
When the cruise control main switch is turned OFF, the cruise control does not operate.

WIRING DIAGRAM

See page DI–892.

INSPECTION PROCEDURE

1	Check voltage between terminal CMS of cruise control ECU connector and body ground.



PREPARATION:

(a) Remove the ECU with connector still connected.

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminal CMS of cruise control ECU connector when main switch is held ON and OFF.

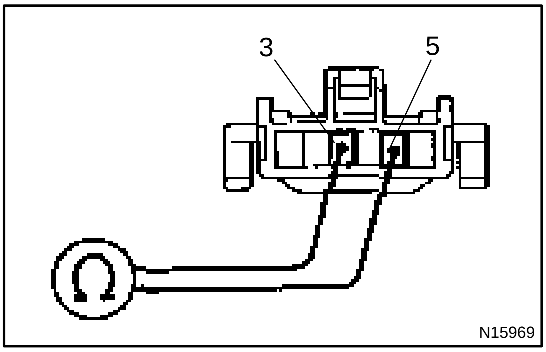
OK:

Main switch	Voltage
OFF	10 – 14 V
ON	Below 0.5 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–879).**

NG

2	**Check main switch continuity.**



PREPARATION:

(a) Remove steering wheel center pad. (See page SR–11)

(b) Disconnect the control switch connector.

CHECK:

Check continuity between terminals 3 and 5 of control switch connector when main switch is held ON and OFF.

OK:

Switch position	Tester connection	Specified condition
OFF	3 – 5	No continuity
Hold ON	3 – 5	Continuity

NG **Replace control switch.**

OK

3	**Check harness and connector between cruise control ECU and main switch (See page IN–31).**

NG **Repair or replace harness or connector.**

OK

Check and replace cruise control ECU (See page IN–31).

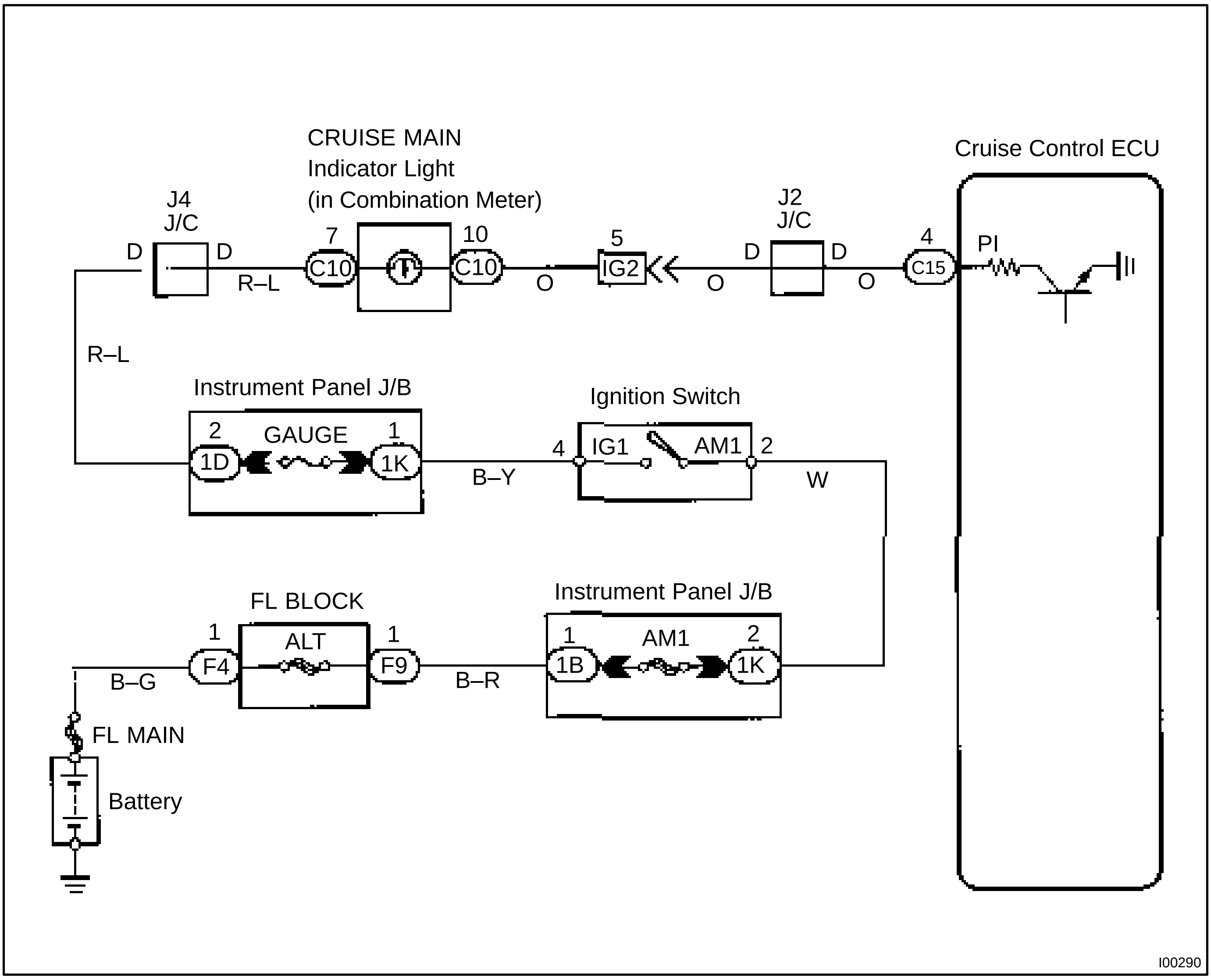
DI090–17

CRUISE MAIN Indicator Light Circuit

CIRCUIT DESCRIPTION

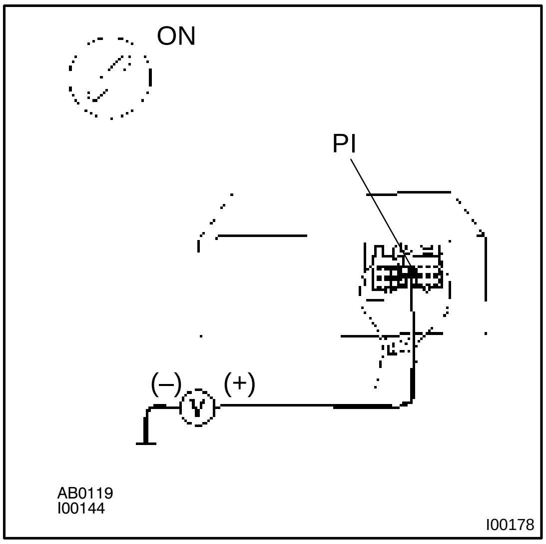
When the cruise control main switch is turned ON, CRUISE MAIN indicator light lights up.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals PI and GND of cruise control ECU connector.**



PREPARATION:
Tun ignition switch ON.
CHECK:
Measure voltage between terminals PI and GND of cruise control ECU connector when main switch is ON and OFF.
OK:

Switch position	Voltage
OFF	10 – 16 V
ON	Below 1.2 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–879).**

NG

2	**Check combination meter (See page BE–2).**

NG → **Replace combination meter.**

OK

Check and replace cruise control ECU (See page IN–31).

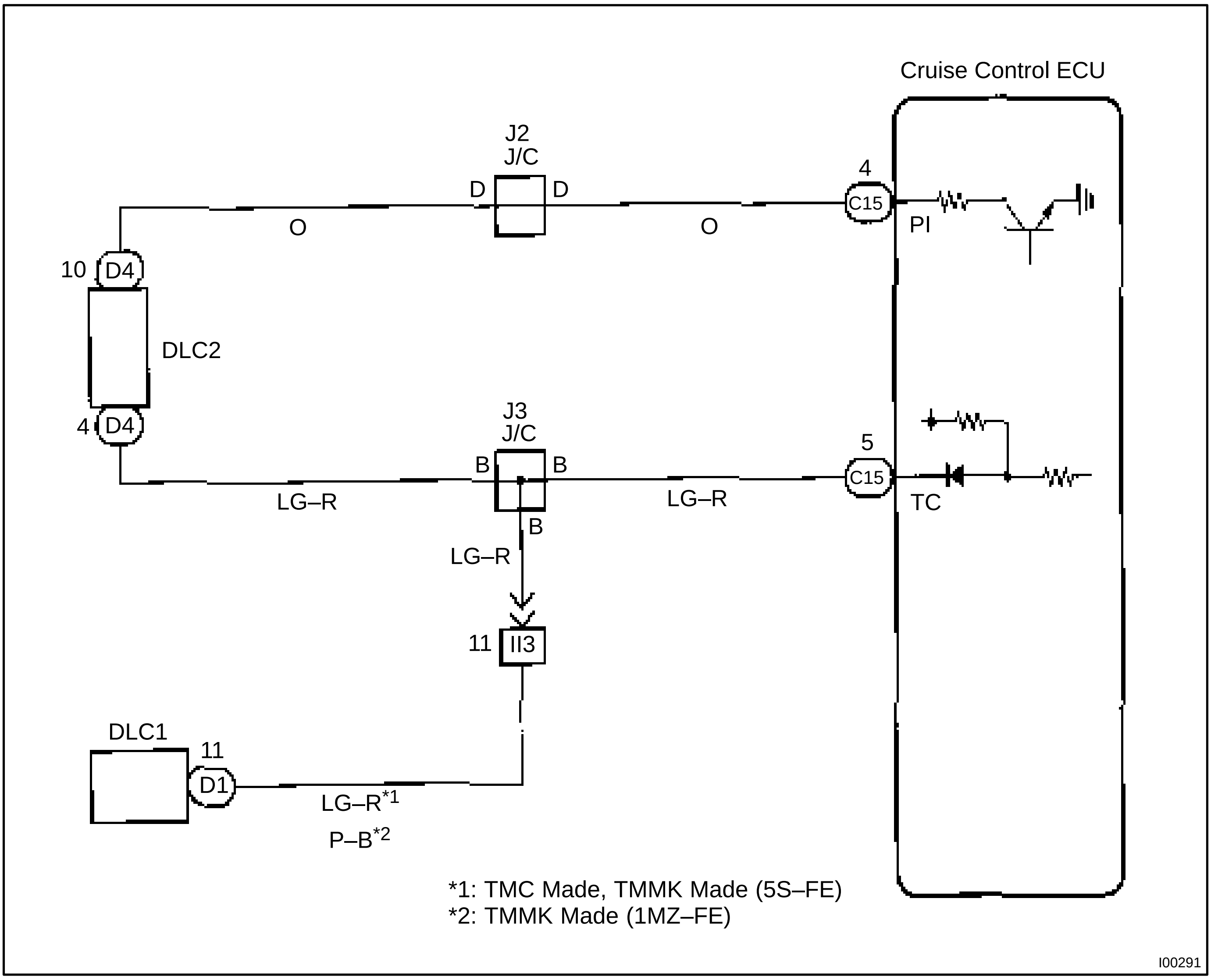
DI091–11

Diagnosis Circuit

CIRCUIT DESCRIPTION

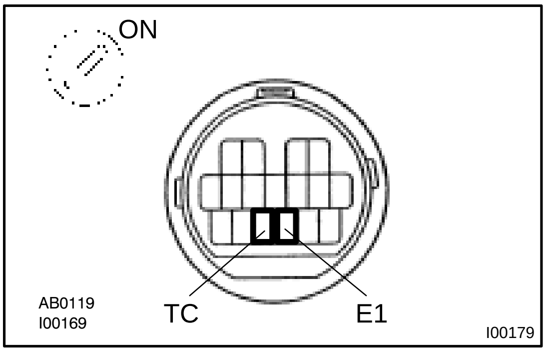
This circuit sends a signal to the ECU that outputs DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Tc and E_1 of DLC2.**



PREPARATION:
Turn ignition switch ON.
CHECK:
Measure voltage between terminals Tc and E_1 of DLC2.
OK:
Voltage: 10 – 14 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–879).**

NG

2	**Check harness and connector between cruise control ECU and DLC2, DLC2 and body ground (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace cruise control ECU (See page IN–31).

DI092–07

Actuator Control Cable

INSPECTION PROCEDURE

1	Actuator control cable inspection

OK:
(a) Check that the actuator and control cable throttle link are properly installed and that the cable and link are connected correctly.
(b) Check that the actuator and bell crank operate smoothly.
(c) Check that the cable is not loose or too tight.

OK:

Freeplay: less than 10 mm

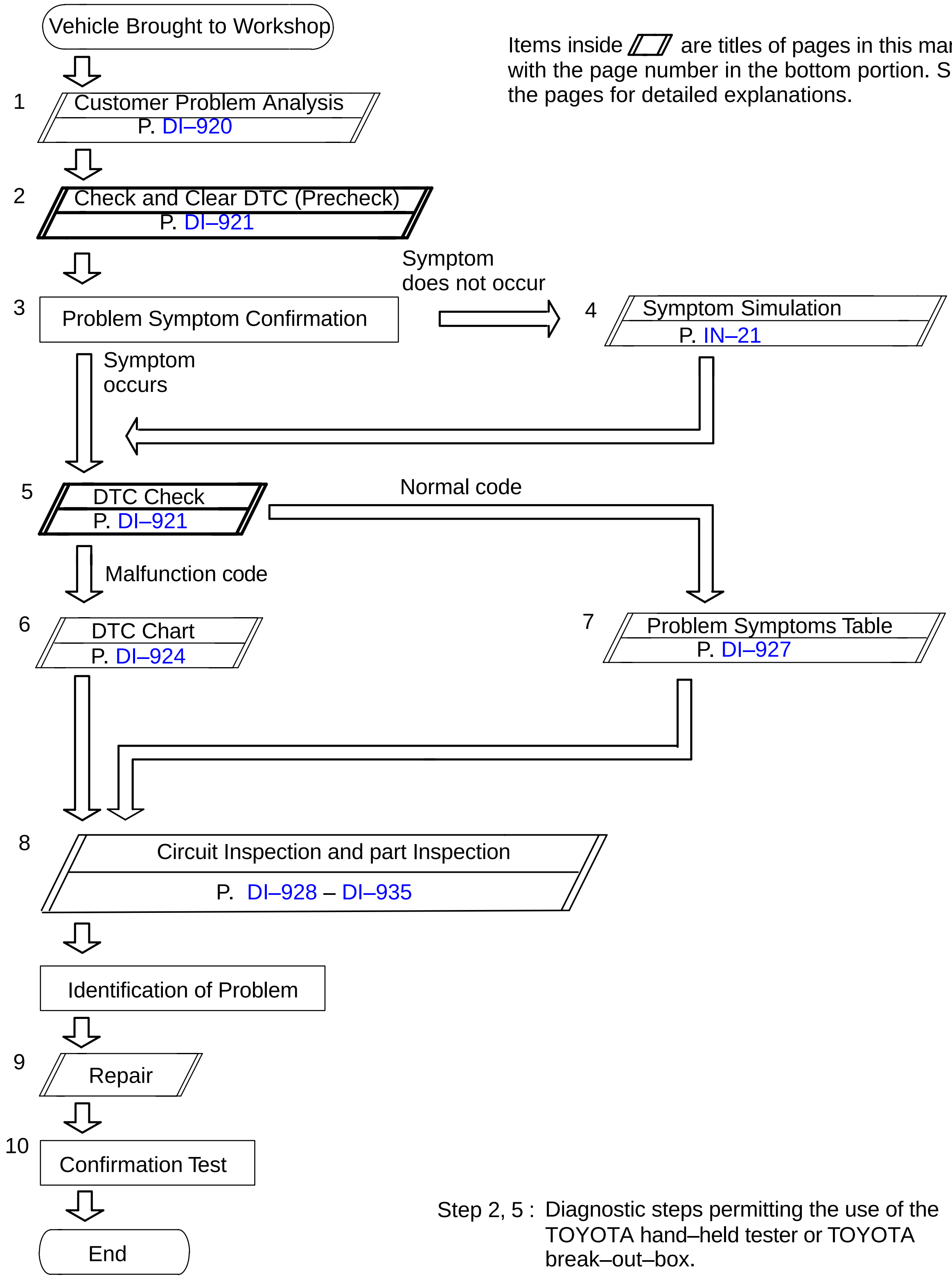
HINT:
- If the control cable is very loose, the vehicle's loss of speed going uphill will be large.
- If the control cable is too tight, the idle RPM will become high.

ENGINE IMMOBILISER SYSTEM

DI1KE–04

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshooting in accordance with the procedure on the following pages.



Items inside ▱ are titles of pages in this manual, with the page number in the bottom portion. See the pages for detailed explanations.

Step 2, 5 : Diagnostic steps permitting the use of the TOYOTA hand–held tester or TOYOTA break–out–box.

DI1KF–04

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE IMMOBLISER Check Sheet

Inspector's Name :

Customer's Name		**Registration No.**	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

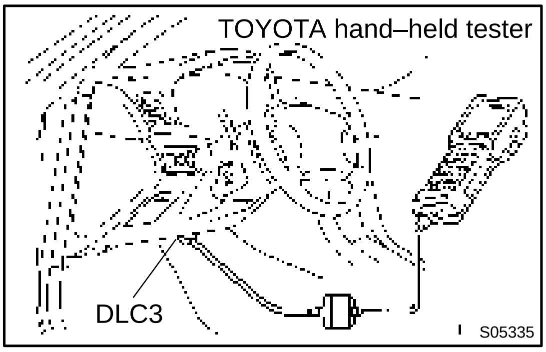
Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ Immobiliser is not set. (Engine starts with key codes other than the registered key code.)
	☐ Engine does not start.

Check Item	**Malfunction Indicator Lamp**	☐ Normal ☐ Remains ON ☐ Does not Light Up

DTC Check	**1st Time**	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)

DI1KG–04

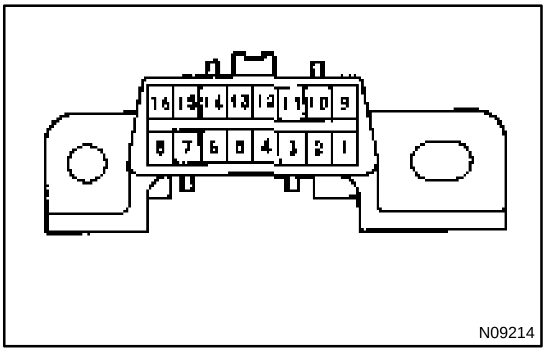


PRE–CHECK

1. DIAGNOSIS SYSTEM

(a) Description

ECM controls the function of immobiliser on this vehicle. Data of the immobiliser or DTC can be read form DLC3 of the vehicle. When a trouble occurs in immobiliser, MIL does not light ON but DTC inspection is performed. Therefore when there seems to be a trouble with immobiliser, use TOYOTA hand–held tester or SST to check and troubleshoot it.



(b) DLC3 INSPECTION

The vehicle's ECM uses ISO 9141–2 for communication. The terminal arrangement of DLC3 complies with SAEJ1962 and matches the ISO 9141–2 format.

Tester connection	condition	Specified condition
7 (Bus ∼ Line) – 5 (Signal ground)	During communication	Pulse generation
4 (chassis Ground) – Body	Always	1 Ω or less
5 (Signal Ground) – Body	Always	1 Ω or less
16 (B+) – Body	Always	9 – 14 V

HINT:

If your display shows "UNABLE TO CONNECT TO VEHICLE" when you have connected the cable of OBD II scan tool or TOYOTA hand–held tester to DLC3, turned the ignition switch ON and operated the scan tool, there is a problem on the vehicle side or tool side.

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

(2) If communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.

2. INSPECT DIAGNOSIS

(a) Check the DTC (Using TOYOTA hand–held tester)

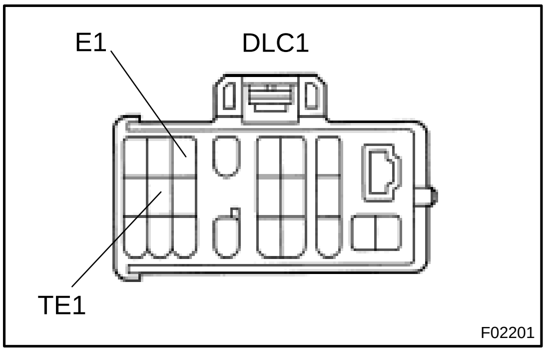
(1) Prepare the OBD II scan tool (complying with SAEJ 1978) or TOYOTA hand–held tester.

(2) Connect the OBD II scan tool or TOYOTA hand–held tester to DLC3 under the instrument panel lower pad.

(3) Turn the ignition switch ON and turn the OBD II scan tool or TOYOTA hand–held tester switch ON.

(4) Use the OBD II scan tool or TOYOTA hand–held tester to check the DTCs and freeze frame data; note them down. (For operating instructions, see the OBD II scan tool's instruction book.)

(5) See page DI–924 to confirm the details of the DTCs.



(b) Check the DTC (Using diagnosis check wire)

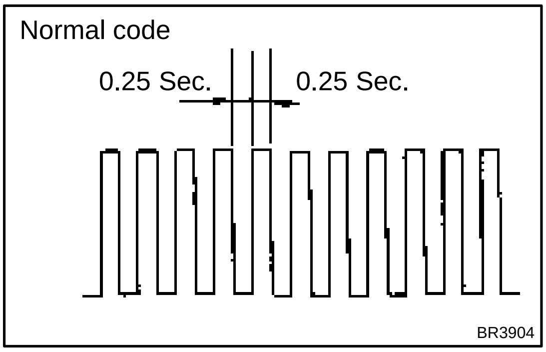
(1) Turn ignition switch ON.

(2) Using SST, connect between terminals 8 (TE1) and 3 (E1) of DLC1.
SST 09843–18040

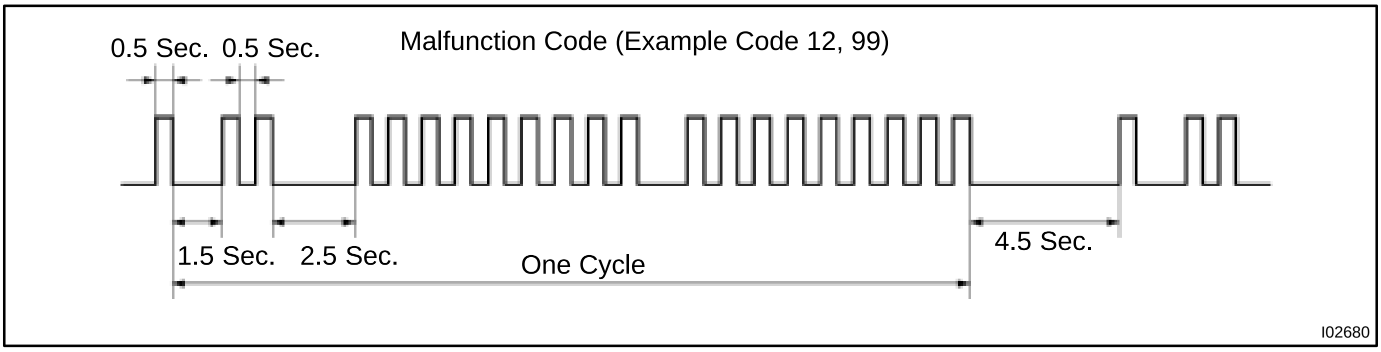
(3) Read the diagnostic trouble code from malfunction indicator lamp.

HINT:

- If a diagnostic trouble code is not output, check the Tc terminal circuit .
- ECM controls the immobiliser function on this vehicle, DTC is out put with DTC of engine.



As an example, the blinking patterns for codes; normal, 12 and 99 are as shown in the illustration.



(4) When DTC "99" is output, there is a trouble with immobiliser. Start troubleshooting referring to PROBLEM SYMPTOM TABLE.

(5) After completing the check, disconnect terminals 13 (TC) and 4 (CG) and turn OFF the display.

HINT:
In the event of 2 or more malfunction codes. indication will begin from the smaller numbered code and continue in order to the larger.

(c) Clear the DTC

The following procedures will erase the DTCs and freeze frame data.

(1) Operating the OBD II scam tool (complying with SAEJ1978) or TOYOTA hand–held tester to erase the codes. (See the OBD II scan tool's instruction book for operating instructions.)

(2) Disconnecting the battery terminals or EFI fuse.

DI1KH–03

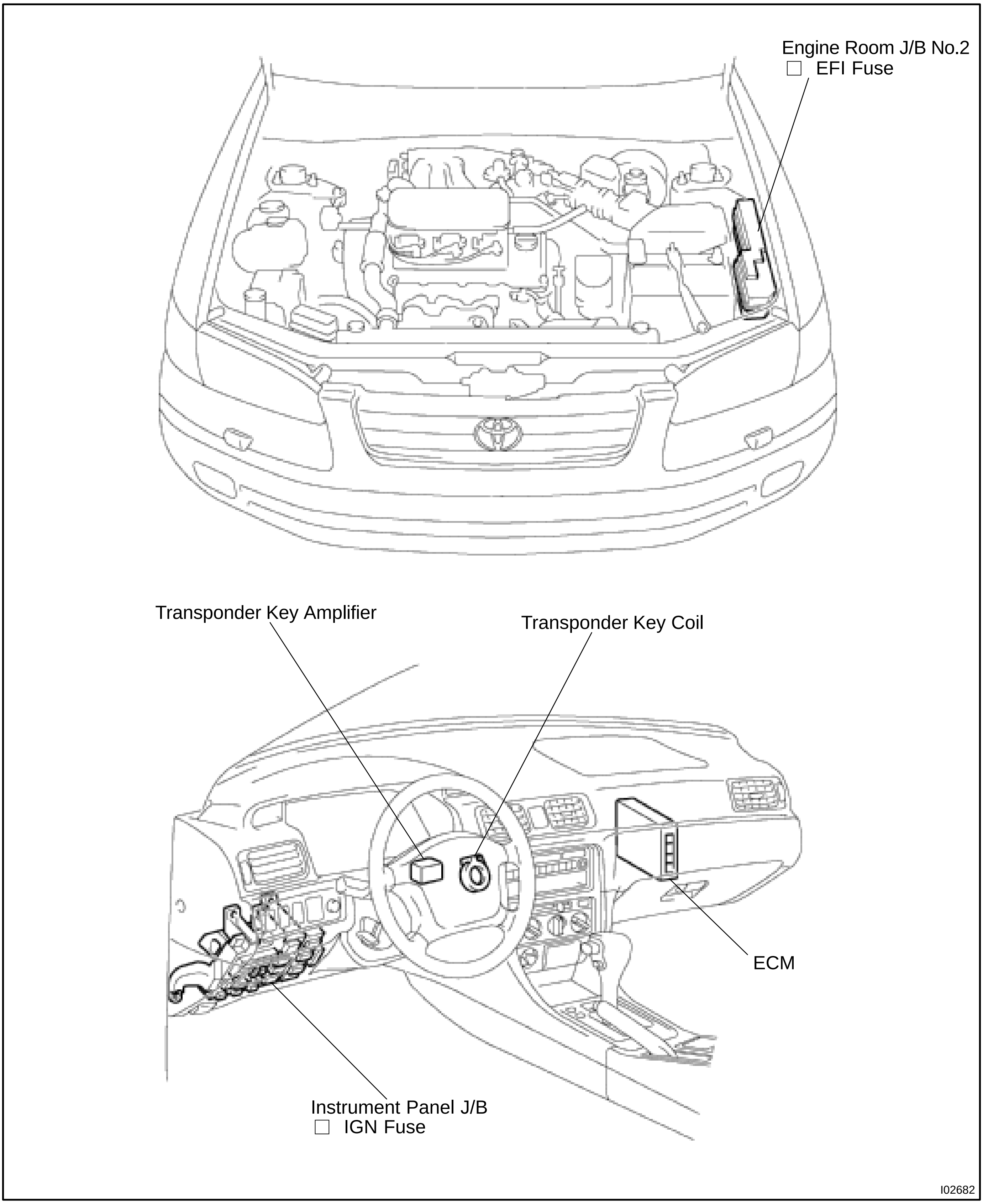
DIAGNOSTIC TROUBLE CODE CHART

DTC No. (See page)	Detection Item	Trouble Area
B2795 (DI–928)	Unmatched key code	●Key ●Unregistered key inserted before
B2796 (DI–929)	No communication in immobiliser system	●Key ●Transponder key coil ●Amplifier ●Wirehaness ●ECM
B2797 (DI–932)	Communication malfunction No.1	●Communication contests ●Unregistered key inserted before
B2798 (DI–935)	Communication malfunction No.2	●Key ●Transponder key coil ●Amplifier ●Wirehaness ●ECM

HINT:
To reduce the unnecessary exchange of ECM, check that a trouble occurs with the original ECM at the time of exchanging ECM and the trouble will disappear with a new ECM.

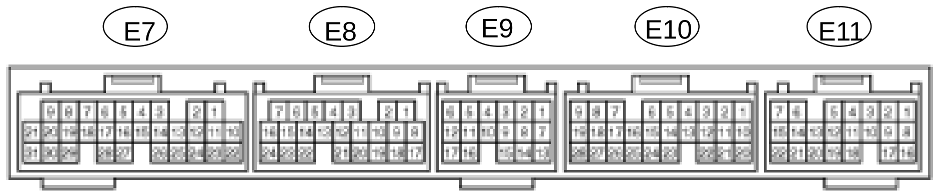
DI1KI–04

PARTS LOCATION



DI1KJ–04

TERMINALS OF ECM



5S–FE engine:

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
CODE – E1 (E10–8 ↔ E9–24)	G–W ↔ BR	Ignition Switch ON	10 – 14
TXCK – E1 (E10–9 ↔ E9–24)	L–Y ↔ BR	Ignition Switch ON	10 – 14
RXCK – E1 (E10–3 ↔ E9–24)	R–L ↔ BR	Ignition Switch ON	10 – 14

1MZ–FE engine:

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
CODE – E1 (E9–4 ↔ E10–17)	G–W ↔ BR	Ignition Switch ON	10 – 14
TXCK – E1 (E9–10 ↔ E10–17)	L–Y ↔ BR	Ignition Switch ON	10 – 14
RXCK – E1 (E9–5 ↔ E10–17)	R–L ↔ BR	Ignition Switch ON	10 – 14

DI1KK–03

PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
Immobiliser is not set. (Engine starts with key codes other than the registered key code.)	2. ECM	IN–31
Engine does not start.	1. Key 2. Wire harness 3. Transponder key coil 4. Amplifier 5. ECM	*1 IN–31 BE–128 IN–31
Security indicator is always ON.	1. Security indicator 2. Wire harness 3. ECM	*2 IN–31 IN–31
Security indicator is always ON. (Although code has been registered in the automatic registration mode, indicator is not OFF.)	1. Wire harness 2. Transponder key coil 3. Amplifier 4. ECM	IN–31 BE–128 IN–31
Security indicator is OFF (When DTC of immobiliser is output)	1. Wire harness 2. Transponder key coil 3. Amplifier 4. ECM	IN–31 BE–128 IN–31
Security indicator is OFF. (When DTC of immobiliser is not output)	1. Wire harness 2. ECM	IN–31 IN–31
Security indicator is abnormally brinking.	1. Wire harness 2. ECM	IN–31 IN–31

*1 : Check that the key which did not start the engine has been registered and that it is possible to start with other already registered key codes.

*2 : Finish the automatic registration mode because the mode might still remain.

DI1KN–02

CIRCUIT INSPECTION

DTC	B2795/99	Unmatched Key Code

This DTC is output when an unregistered key is inserted. When this DTC is output, delete DTC and insert the key that a customer keeps to check that B2795 is output.
When a key that outputs B2795 is found, register this key. When B2795 is not output, there is a possibility that the unregistered key has been inserted before. (ECM is normal.)
Inquire of a customer about the condition of using the system to find the cause of the trouble.
(Example: Another key has been inserted, etc.)

DI4FF–01

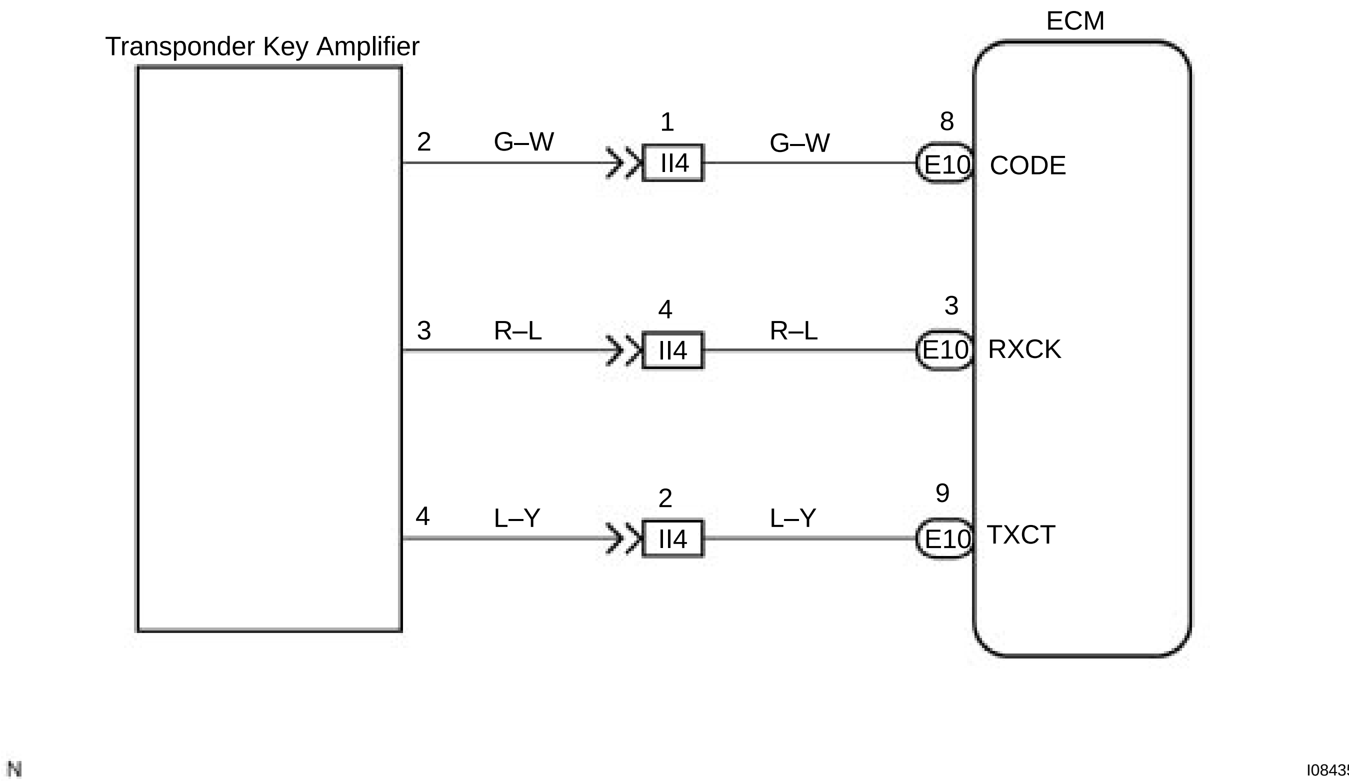
DTC	B2796/99	No Communication in Immobiliser system

CIRCUIT DESCRIPTION

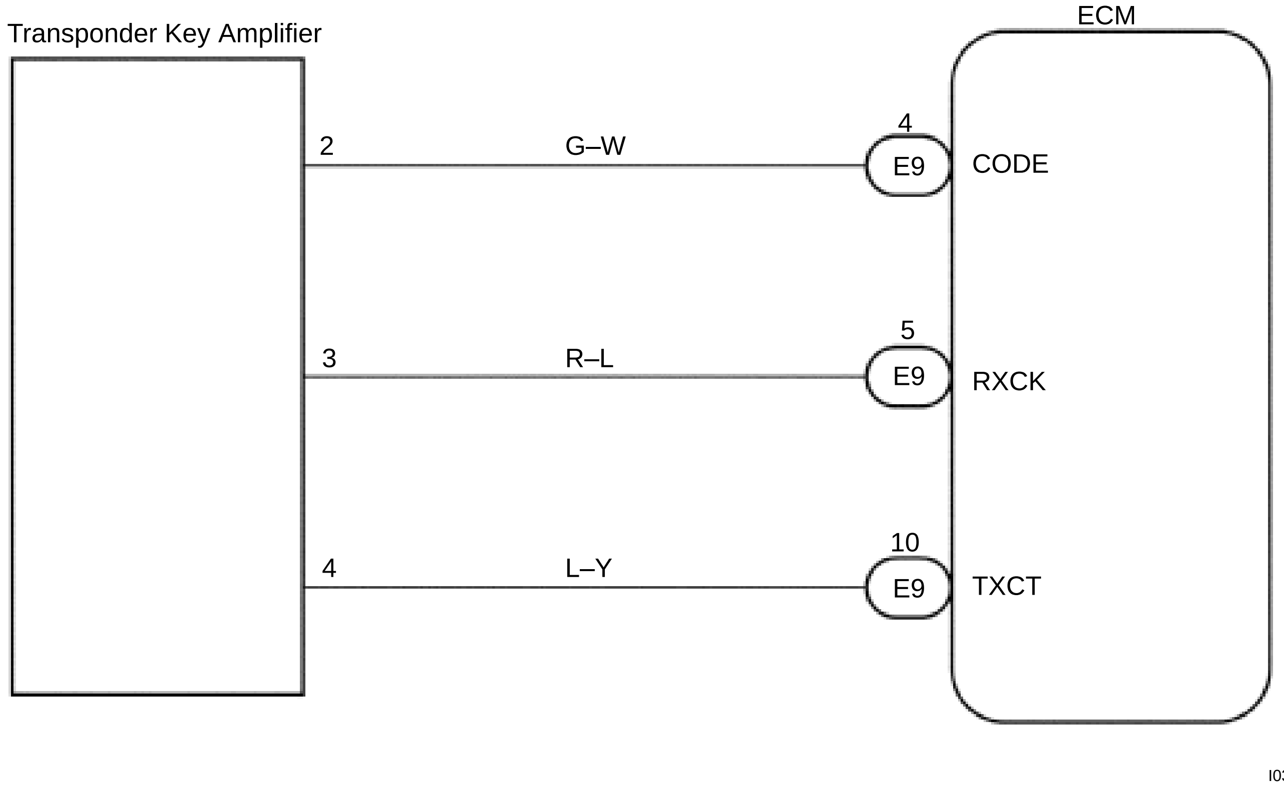
DTC No.	DTC Detecting Condition	Trouble Area
B2796/99	No communication	●Key ●Transponder Key Coil ●Transponder Key Amplifier ●Wireharness ●ECM

WIRING DIAGRAM

5S–FE engine:



1MZ–FE engine:



INSPECTION PROCEDURE

1	Check transponder key coil (See page BE–128).

NG → Replace transponder key coil.

OK ↓

2	Check harness and connector between transponder key amplifier and ECM.

NG → Repair or replace harness and connector.

OK ↓

3	Does it operate normally after replacement of transponder key amplifier?

Yes → Replace transponder key amplifier.

No ↓

Replace ECM.

DI4FG–01

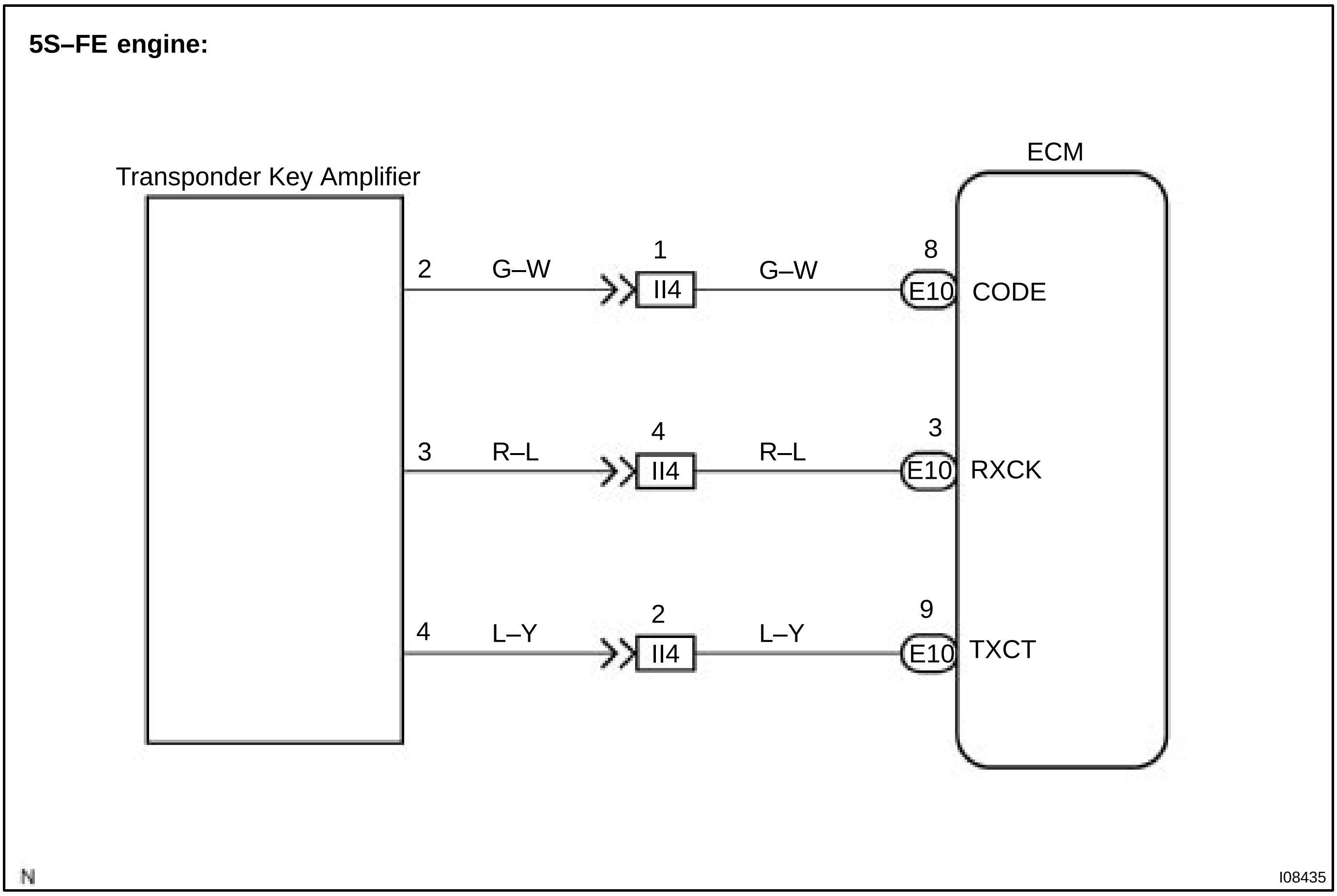
DTC	B2797/99	Communication Malfunction No.1

CIRCUIT DESCRIPTION

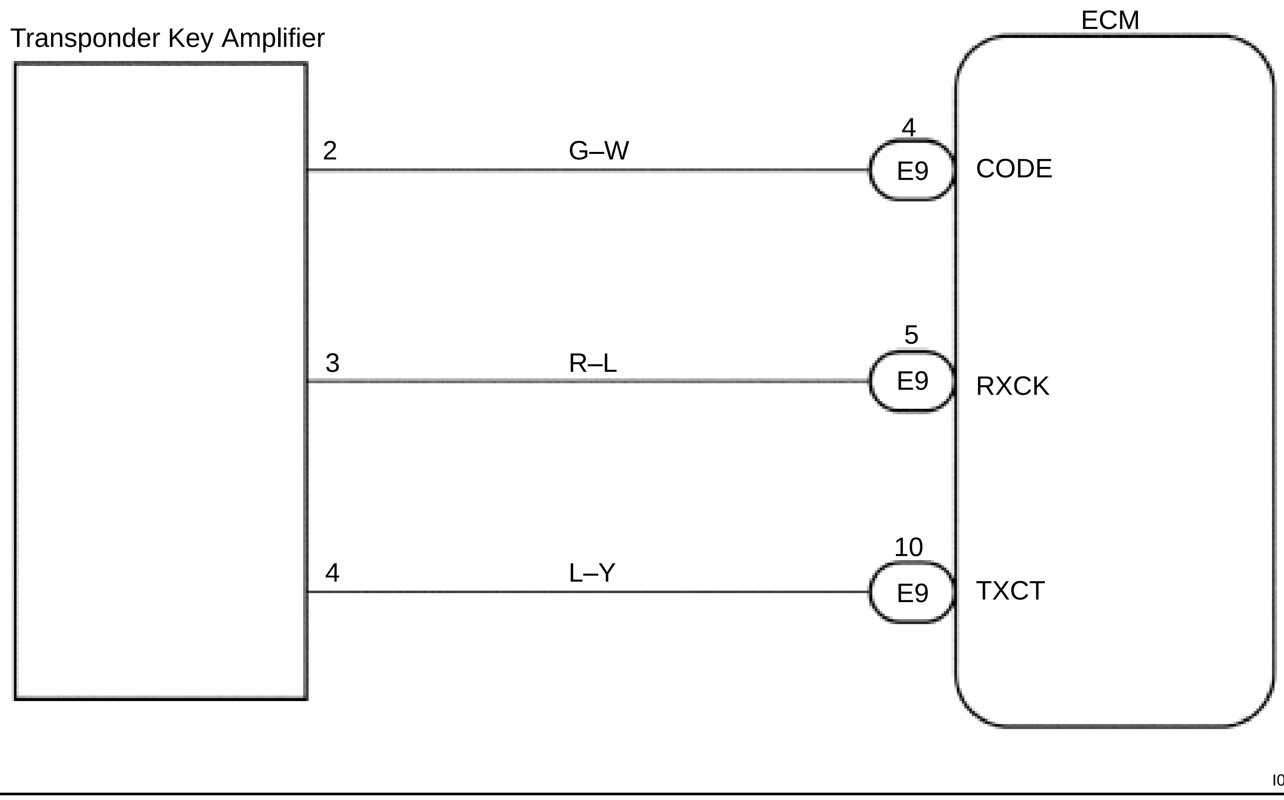
This code is detected when although the communication has been performed normally, an error occurs. (Example. Some noise is inclueded in communication line.)

DTC No.	DTC Detecting Condition	Trouble Area
B2797/99	Communication error	•Wire Harness •Transponder Key Amplifier •ECM

WIRING DIAGRAM

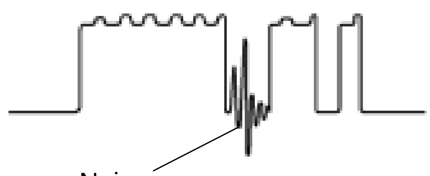


1MZ–FE engine:



INSPECTION PROCEDURE

1	**Noise check**



PREPARATION:

Insert already registered master key in the key cylinder.

CHECK:

Using an oscilloscope or TOYOTA hand–held tester, check that noise is included in the CODE terminal of ECM.

OK:

No noise is detected.

NG → **Try to find the cause of the noise and remove it.**

OK

2	**Does it operate normally after replacement of transponder key amplifier?**

Yes → **Replace transponder key amplifier.**

No

Replace ECM.

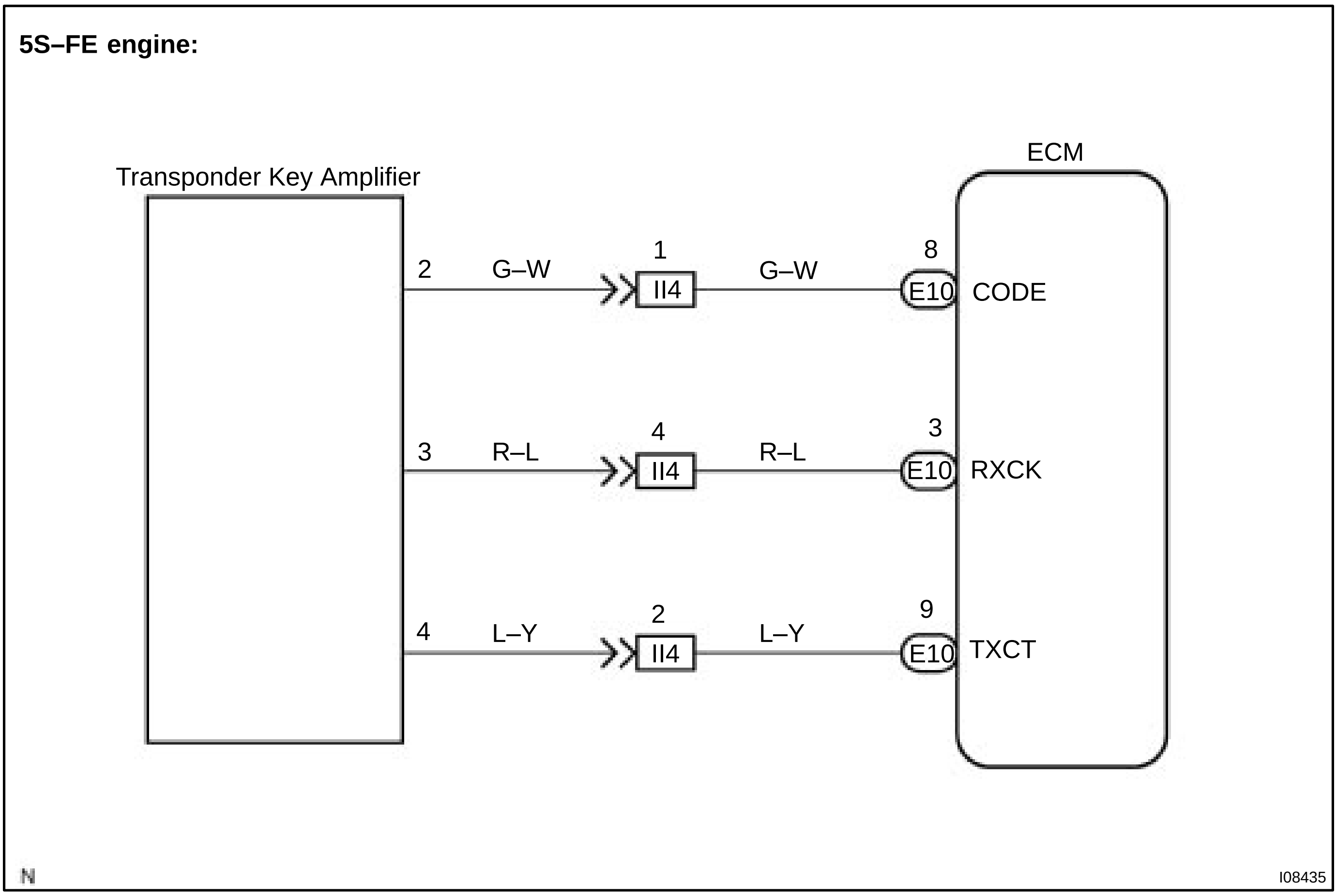
DI4FH–01

DTC	B2798/99	Communication malfunction No.2

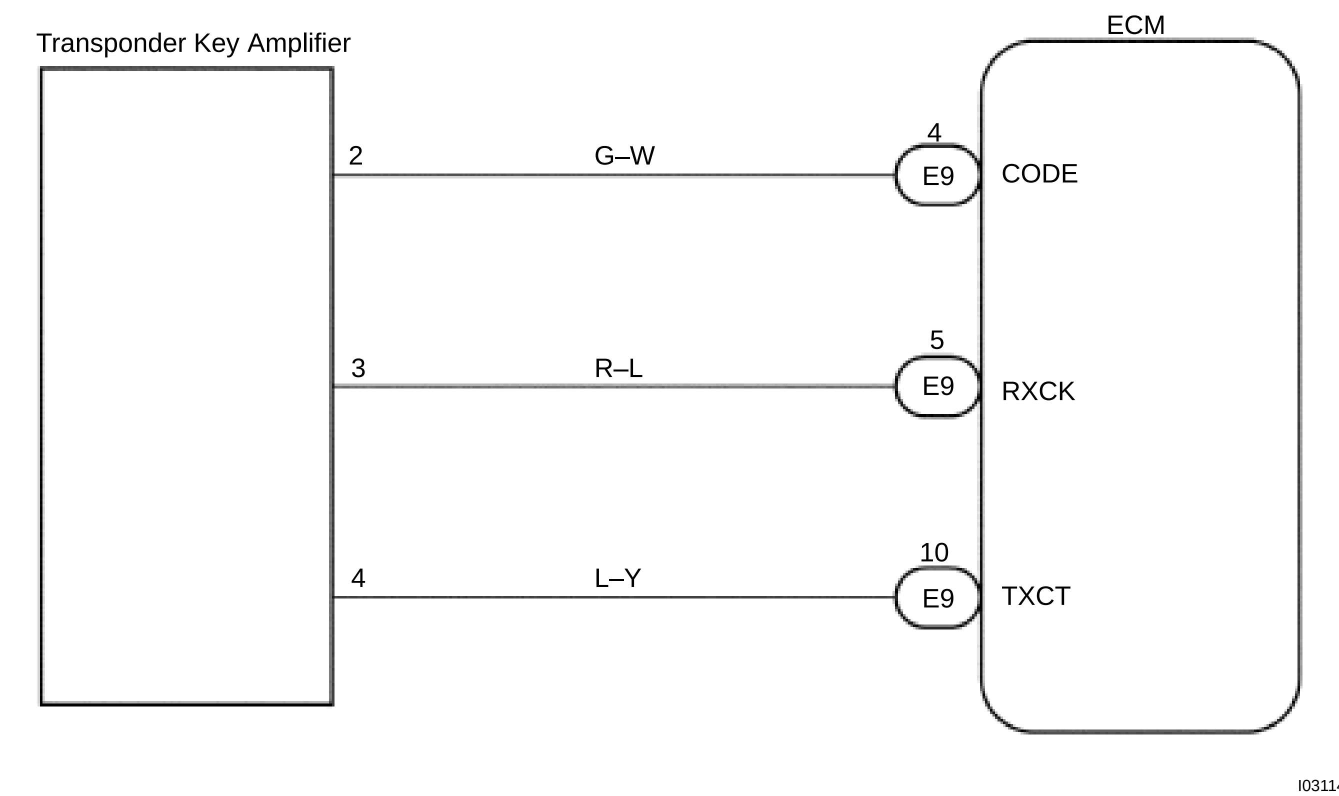
CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
B2798/99	Communication error	●Key ●Transponder Key Coil ●Transponder Key Amplifier ●Wireharness ●ECM

WIRING DIAGRAM



1MZ–FE engine:



INSPECTION PROCEDURE

1	Check transponder key coil (See page BE–128).

NG → Replace transponder key coil

OK

2	Check harness and connector between transponder key amplifier and ECM.

NG → Repair or replace harness and connector

OK

3	Does it operate normally after replacement of transponder key amplifier?

Yes → Replace transponder key amplifier.

No

Replace ECM.