DICA4-01

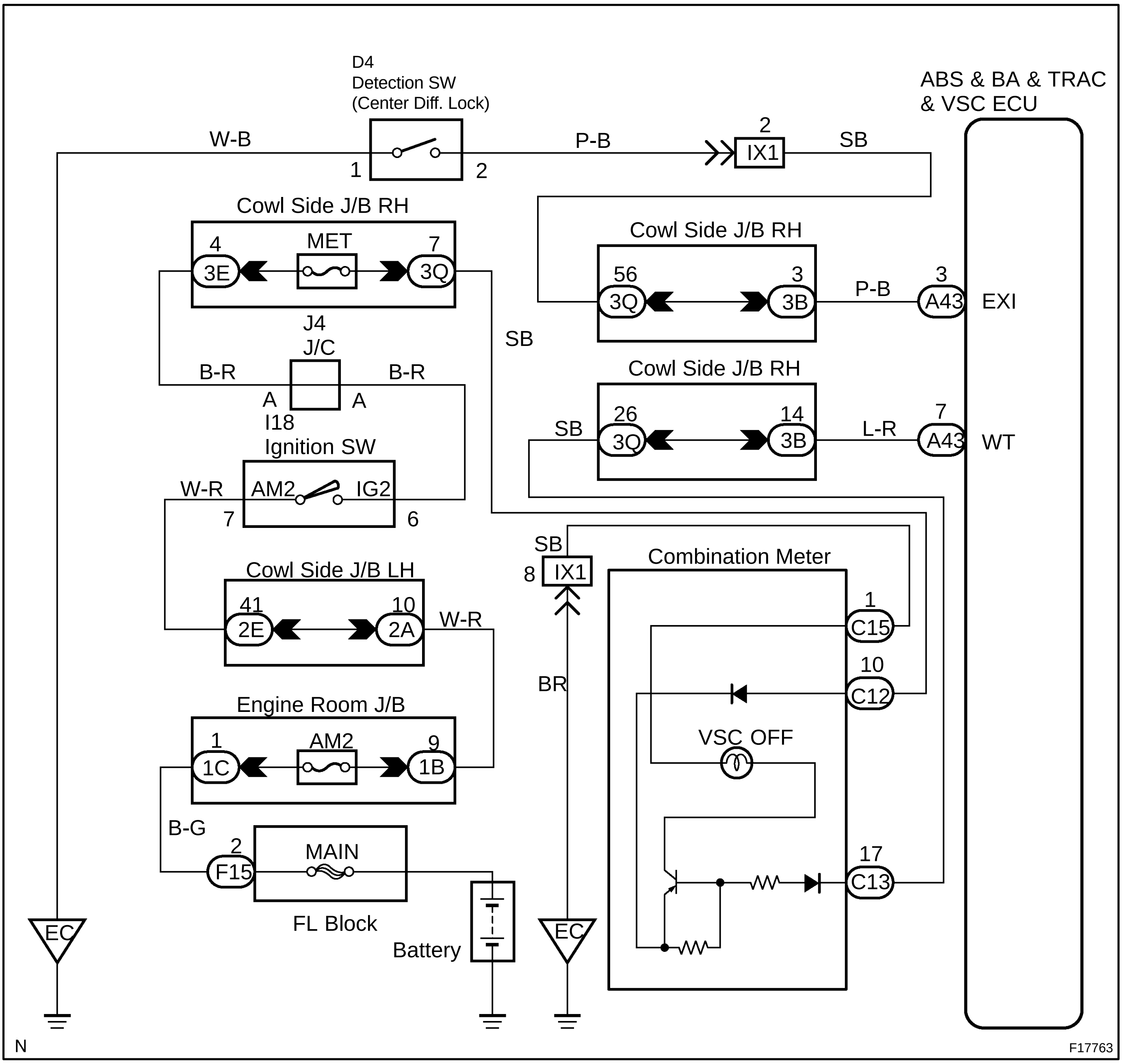
DTC	Always ON	Malfunction in ECU VSC TRAC Warning Light Circuit

CIRCUIT DESCRIPTION

Always ON	There is a malfunction in the ECU internal circuit.	★Power source circuit ★Skid control ECU ★VSC TRAC warning light circuit

HINT:
If the fail safe function is activated in the VSC system, ”VSC OFF” indicator light lights up.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check that the ECU connectors are securely connected to the ECU.**

NO → **Connect the connector to the ECU.**

YES

2	**Is DTC output for VSC?**

Check the DTC on page DI-505 .

YES → **Repair circuit indicated by the output code.**

NO

3	**Does VSC TRAC warning light go off?**

YES → **Check for open or short circuit in harness and connector between ECU-IG fuse and ECU (See page IN-36).**

NO

4	**Check battery positive voltage.**

PREPARATION:
Start the engine.
CHECK:
Check the battery positive voltage.
OK:
Voltage: 10 to 16 V

NG → **Check and repair the charging system.**

OK

5	Check operation of the VSC TRAC warning light.

In case of using the hand-held tester:

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand-held tester.

CHECK:

Check that ”ON” and ”OFF” of the VSC TRAC warning light can be shown on the combination meter on the hand-held tester.

In case of not using the hand-held tester:

PREPARATION:

(a) Turn the ignition switch OFF.
(b) Disconnect the connector from the skid control ECU.
(c) Turn the ignition switch ON.

CHECK:

Check that the VSC TRAC warning light goes off.

NG → **Check and replace combination meter (See page BE-2).**

OK

6	Check for short circuit in harness and connector between combination meter and skid control ECU, combination meter and DLC1 (See page IN-36).

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

OK

Check and replace skid control ECU.

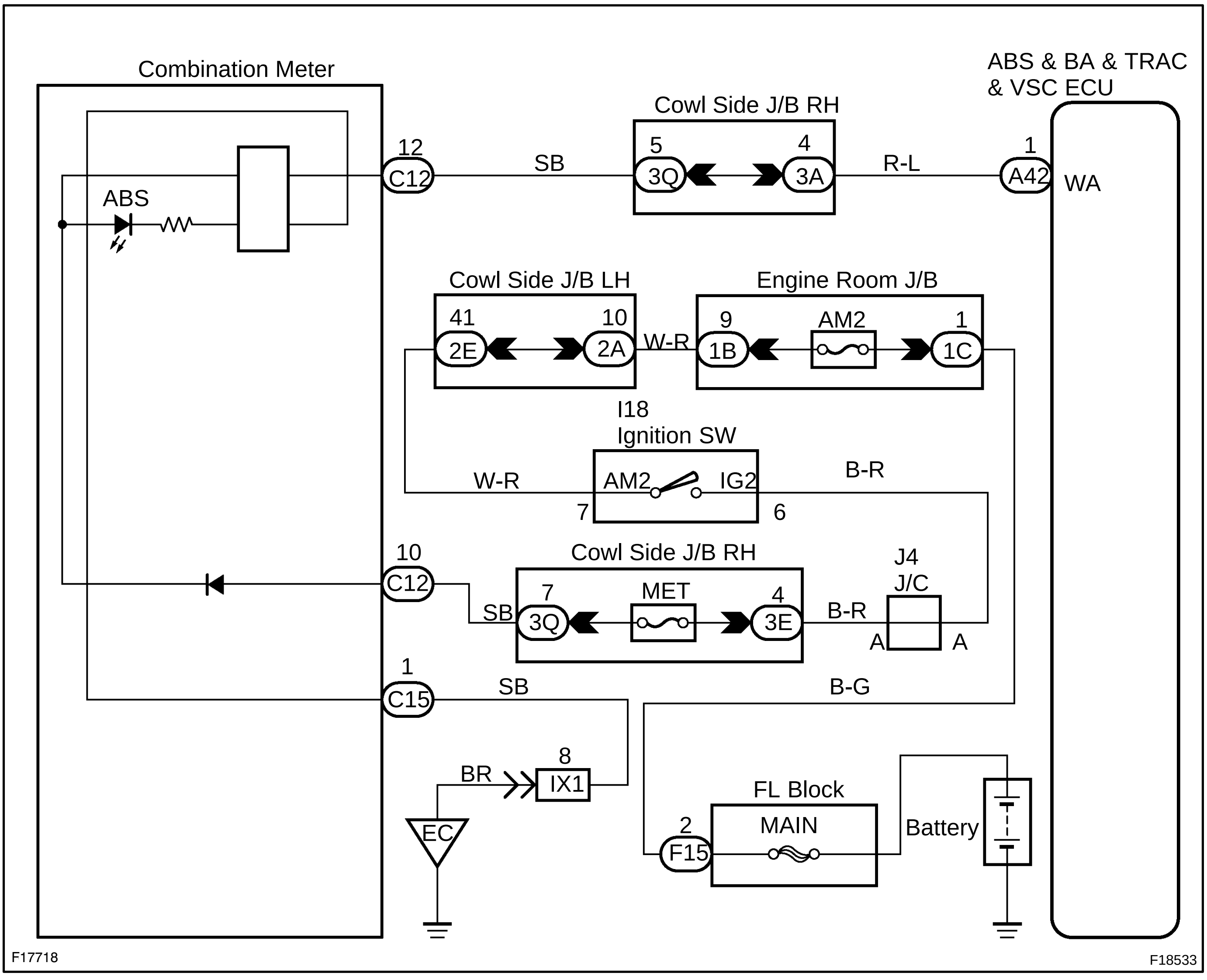
DICA5-02

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.
Connect terminals Tc and E_1 of the DLC1 or Tc and CG of DLC3 to make the ABS warning light blink and output the DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Troubleshoot in accordance with the table below for each trouble symptom.

ABS warning light does not light up	*1
ABS warning light remains on	*2

*1: Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

*2: After inspection with step 4, start the inspection from step 5 in case of using the hand-held tester and start from step 6 in case of not using hand-held tester.

1	Check operation of the ABS warning light.

PREPARATION:

(a) Connect the hand-held tester to the DLC3.

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

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

CHECK:

Check that "ON" and "OFF" of the ABS warning light can be shown on the combination meter on the hand-held tester.

OK → **Check and replace skid control ECU.**

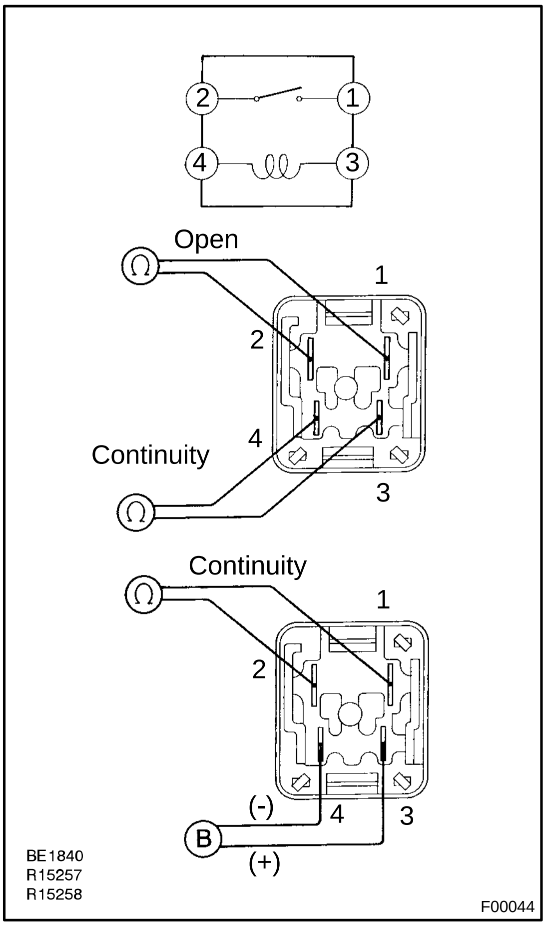
NG

2	Does the warning lights other than ABS warning light come on?

YES → **Repair ABS warning light bulb or combination meter assembly.**

NO

3	**Check IG1 No. 1 relay.**



PREPARATION:

Remove the IG1 No. 1 relay from the engine room J/B.

CHECK:

Check continuity between the IG1 No. 1 relay terminals listed in the table below.

OK:

Terminals 3 and 4	Continuity
Terminals 1 and 2	Open

CHECK:

(a) Apply battery positive voltage between terminals 3 and 4.

(b) Check continuity between terminals.

OK:

Terminals 1 and 2	Continuity

NG → **Replace IG1 No. 1 relay.**

OK

Check for open circuit in harness and connector between IG1 No. 1 relay and combination meter (See page IN-36).

4	Check that the ECU connectors are securely connected to the ECU.

NO → Connect the connector to the ECU.

YES

5	Check operation of the ABS warning light (See step 1).

OK → Check and replace skid control ECU.

NG

6	Is DTC output?

Check the DTC on page DI-505 .

YES → Repair circuit indicated by the output code.

NO

7	Check for short circuit in harness and connector between ABS warning light and skid control ECU (See page IN-36).

NG → Repair or replace harness or connector.

OK

Check and repair skid control ECU.

DICA3-01

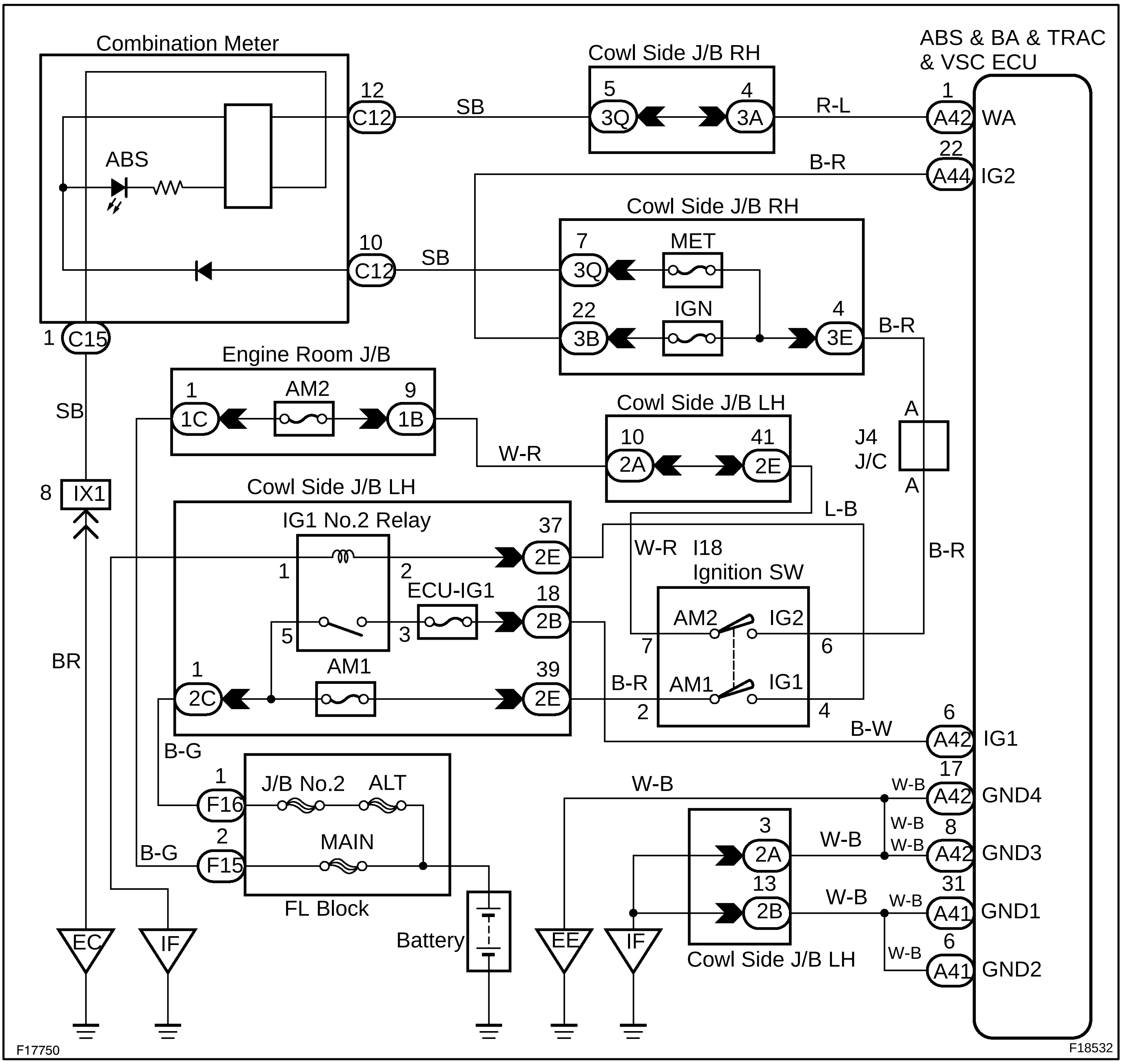
DTC	Always ON	Malfunction in ECU

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
Always ON	Either of the following 1. or 2. is detected: 1. The ECU connectors are disconnected from the ECU. 2. There is a malfunction in the ECU internal circuit.	★Battery ★IC regulator ★Power source circuit ★Skid control ECU

HINT:
The hand-held tester may not be used when the ECU is abnormal.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check that the ECU connectors are securely connected to the ECU.

NO → Connect the connector to the ECU.

YES ↓

2	Is DTC output?

Check the DTC on page DI-505 .

YES → Repair circuit indicated by the output code .

NO ↓

3	Does ABS warning light go off?

YES → Check for open or short circuit in harness and connector between ECU-IG fuse and ECU (See page IN-36).

NO ↓

4	Check battery positive voltage.

PREPARATION:
Start the engine.
CHECK:
Check the battery positive voltage.
OK:
Voltage: 10 to 14 V

NG → Check and repair the charging system.

OK ↓

5	**Check operation of the ABS warning light.**

In case of using the hand-held tester:

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand-held tester.

CHECK:

Check that ”ON” and ”OFF” of the ABS warning light can be shown on the combination meter by the hand-held tester.

In case of not using the hand-held tester:

PREPARATION:

(a) Turn the ignition switch OFF.
(b) Disconnect the connector from the skid control ECU.
(c) Using a service wire, connect terminal WA of the skid control ECU harness side connector and body ground.
(d) Turn the ignition switch ON.

CHECK:

Check that the ABS warning goes off.

OK → **Check and replace combination meter (See page BE-2).**

NG ↓

6	**Check for short circuit in harness and connector between combination meter and skid control ECU, combination meter and DLC1 (See page IN-36).**

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

OK ↓

Check and replace skid control ECU.

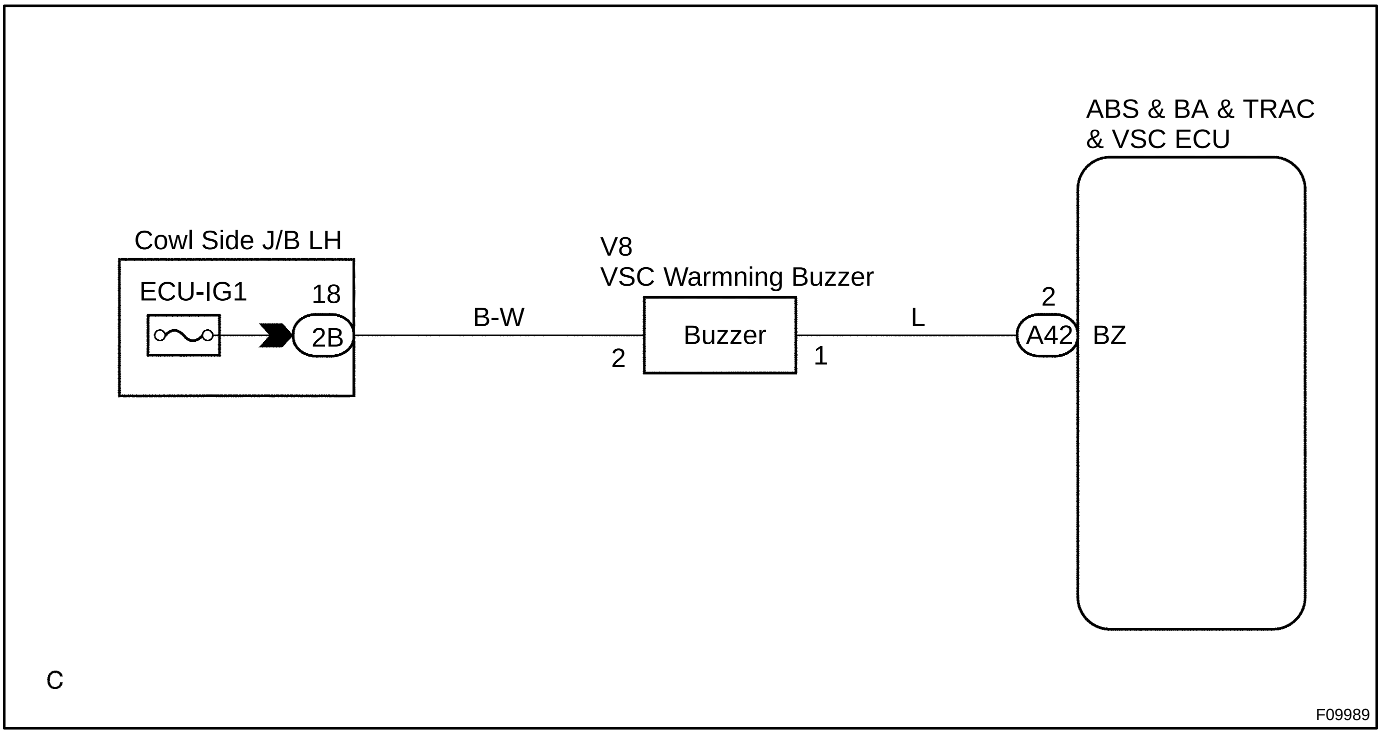
DICAB-01

Brake Warning and VSC Buzzer Circuit

CIRCUIT DESCRIPTION

The brake warning and VSC buzzer sounds while the accumulator pressure is abnormally low or an abnormality casing low fluid pressure occurs VSC is activated.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	**Check operation of the brake warning and VSC buzzer.**

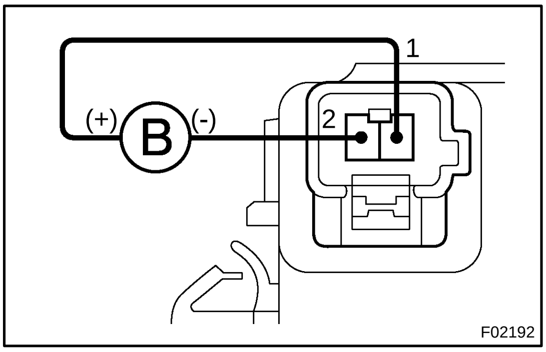
PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand-held tester.

CHECK:
Check that brake warning and VSC buzzer sounds "ON" and "OFF" with the hand-held tester.

OK	**Check and replace skid control ECU.**

NG

2	**Check brake warning and VSC buzzer.**



PREPARATION:

Disconnect the brake warning and VSC buzzer connector.

CHECK:

Apply battery positive voltage to terminals 1 and 2 of the brake warning and VSC buzzer connector. Check that the brake warning light comes on and the VSC buzzer sounds.

NG → **Replace brake warning and VSC buzzer.**

OK

3	**Check for open and short circuit in harness and connector between skid control ECU and brake warning and VSC buzzer (See page IN-36).**

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

OK

Check and replace skid control ECU.

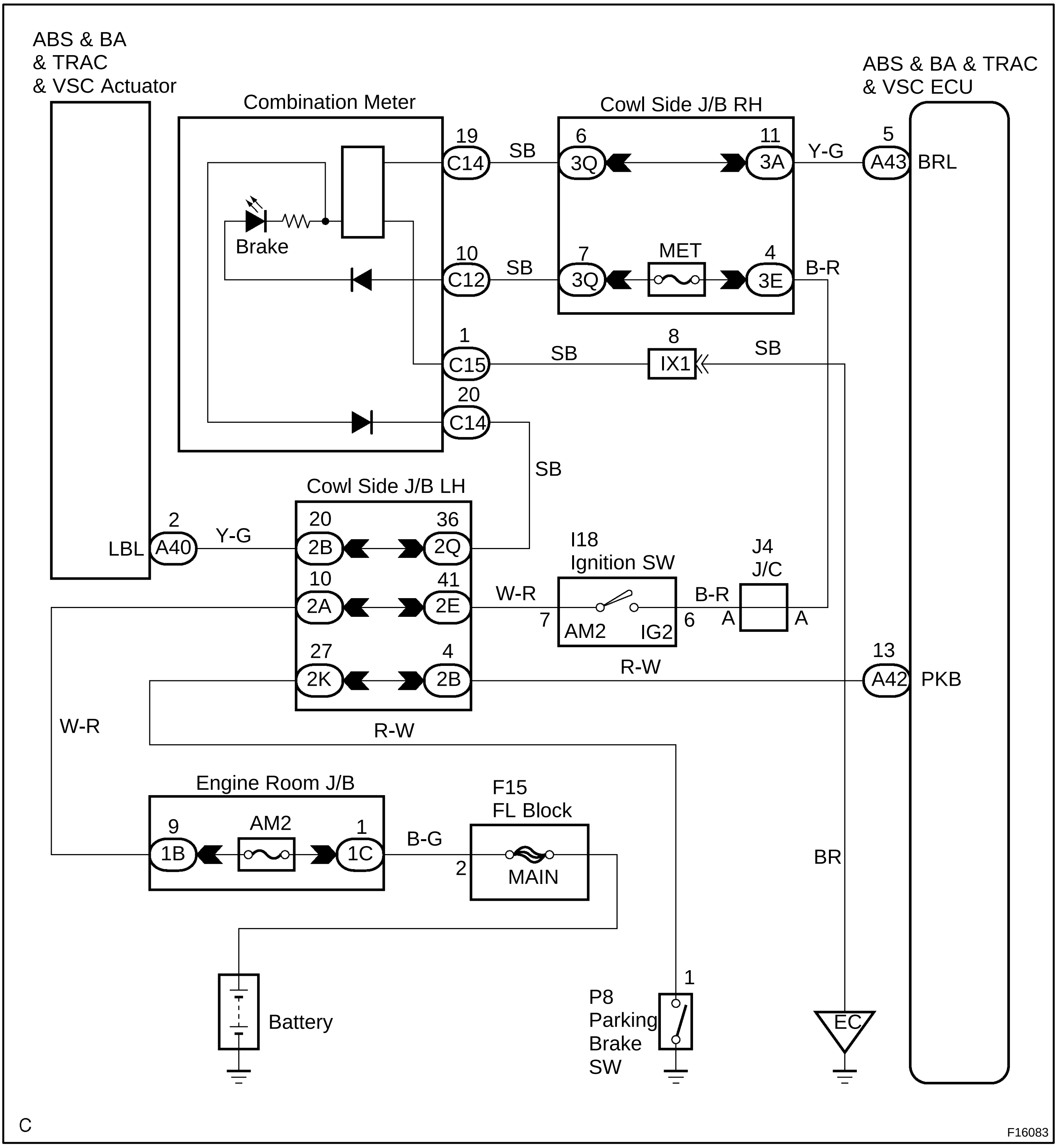
DICA7-02

BRAKE Warning Light Circuit

CIRCUIT DESCRIPTION

The BRAKE warning light lights up while the brake fluid is insufficient and EBD is abnormal.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check parking brake switch circuit (See page BE-63).

NG → Repair or replace parking brake switch circuit.

OK

2	Check brake fluid level warning switch circuit (See page BE-63).

NG → Repair or replace brake fluid level warning switch circuit.

OK

3	Is DTC output for ABS?

YES → Repair circuit indicated by the output code.

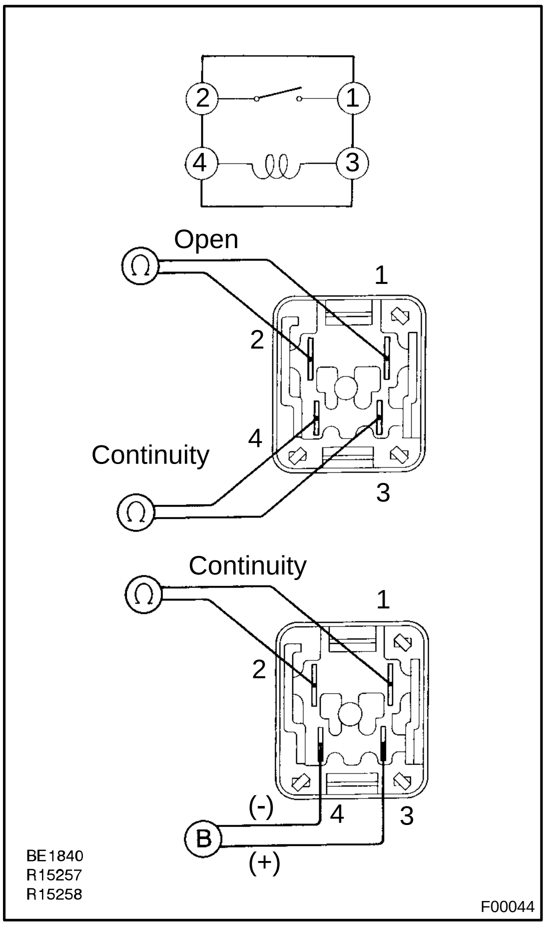
NO

4	Do the warning lights other than BRAKE warning light come on?

YES → Go to step 6.

NO

5	Check IG1 No. 1 relay.



PREPARATION:

Remove the IG1 No. 1 relay from the engine room J/B.

CHECK:

Check continuity between the IG1 No. 1 relay terminals listed in the table below.

OK:

Terminals 3 and 4	Continuity
Terminals 1 and 2	Open

CHECK:

(a) Apply battery positive voltage between terminals 3 and 4.

(b) Check continuity between terminals.

OK:

Terminals 1 and 2	Continuity

NG → **Replace IG1 No. 1 relay.**

OK

Check for open circuit in harness and connector between IG1 No. 1 relay and combination meter (See page IN-36).

6	Check that the ECU connectors are securely connected to the ECU.

NO → **Connect the connector to the ECU.**

YES

7	**Check BRAKE warning light.**

Check if that the open circuit in the combination meter circuit (See page BE-58).

NG → **Repair brake warning light bulb or combination meter assembly.**

OK ↓

8	**Check for short circuit in harness and connector between brake warning light and skid control ECU (See page IN-36).**

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

OK ↓

Check and repair skid control ECU.

DIC95-01

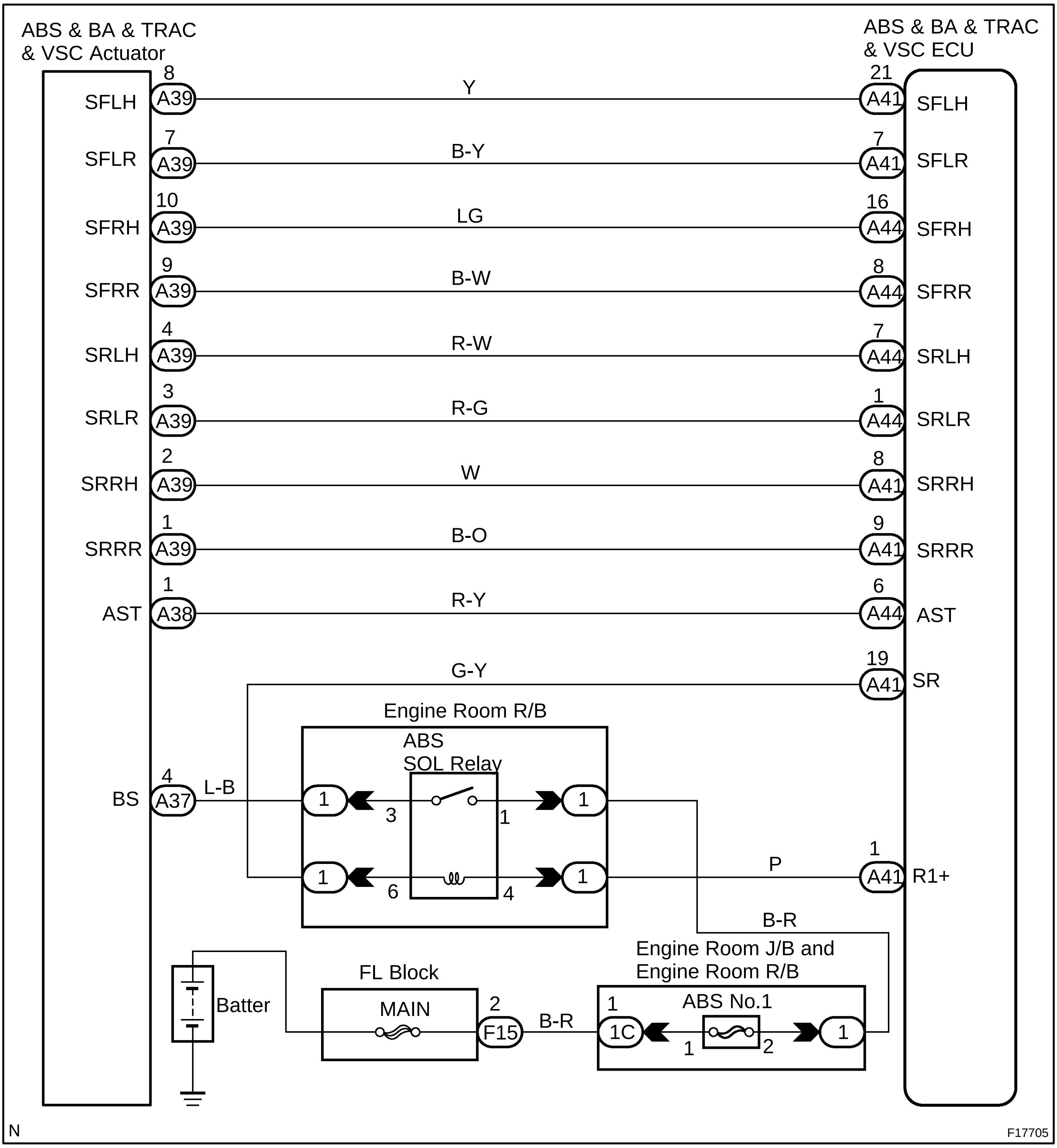
DTC	C0226 / 21 - C0256 / 24	ABS Solenoid Circuit

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.

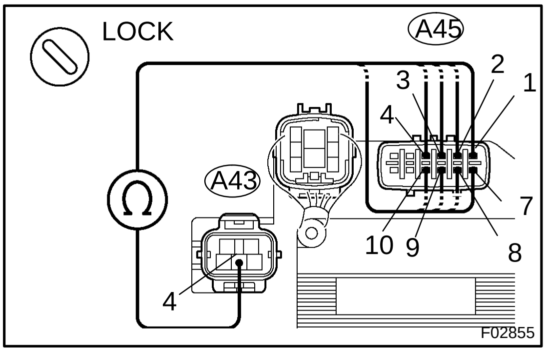
DTC No.	DTC Detecting Condition	Trouble Area
C0226 / 21	Open or short in SFRH or SFRR circuit continues for 0.015 sec. or more.	★Hydraulic brake booster ★SFRH or SFRR circuit
C0236 / 22	Open or short in SFLH or SFLR circuit continues for 0.015 sec. or more.	★Hydraulic brake booster ★SFLH or SFLR circuit
C0246 / 23	Open or short in SRRH or SRRR circuit continues for 0.015 sec. or more.	★Hydraulic brake booster ★SRRH or SRRR circuit
C0256 / 24	Open or short in SRLH or SRLR circuit continues for 0.015 sec. or more.	★Hydraulic brake booster ★SRLH or SRLR circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check hydraulic brake booster solenoid.



PREPARATION:
Disconnect the 2 connectors from the hydraulic brake booster.
CHECK:
Check continuity between terminals A43 - 4 and A45 - 1, 2, 3, 4, 7, 8, 9 and 10 of the hydraulic brake booster connector.
OK:
Continuity
HINT:
Resistance of each solenoid at 20 °C (68 °F):
SFRH, SFLH, SRRH, SRLH: 6.95 to 7.45 Ω
SFRR, SFLR, SRRR, SRLR: 2.00 to 2.40 Ω

NG	Replace hydraulic brake booster.

OK

2	Check for open and short circuit in harness and connector between skid control ECU and actuator (See page IN-36).

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.

DIC98-02

DTC	C0278 / 11, C0279 / 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
C0278 / 11	Conditions 1. and 2. continue for 0.2 sec. or more: 1. ECU terminal IG1 voltage is 9.5 V to 17.0 V and the solenoid relay is ON, however, the contact point of the solenoid relay is OFF. 2. With solenoid relay ON, ECU terminal IG1 voltage becomes 9.5 V or less and the contact point of the solenoid relay does not become ON.	★ABS solenoid relay ★ABS solenoid relay circuit
C0279 / 12	Immediately after ECU terminal IG1 becomes ON, and solenoid relay is OFF, however, when the condition that the solenoid relay due to the contact point is ON continues for 0.2 sec. or more.	

WIRING DIAGRAM

Refer to DTC C0226/21 on page DI-528 .

INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	Check ABS solenoid relay operation.

PREPARATION:

(a) Connect the hand-held tester to the DLC3.

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

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

CHECK:

Check the operation sound of the ABS solenoid relay when operating it with the hand-held tester.

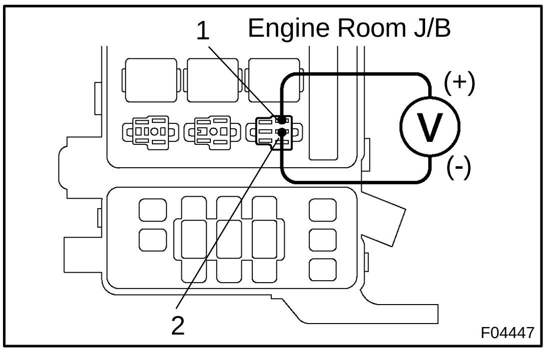
OK:

The operation sound of the ABS solenoid relay should be heard.

OK	Go to step 6.

NG

2	**Check voltage between terminals 1 and 2 of engine room J/B (for ABS solenoid relay).**



PREPARATION:

Remove the ABS solenoid relay from the engine room J/B.

CHECK:

Measure the voltage between terminals 1 and 2 of the engine room J/B (for ABS solenoid relay).

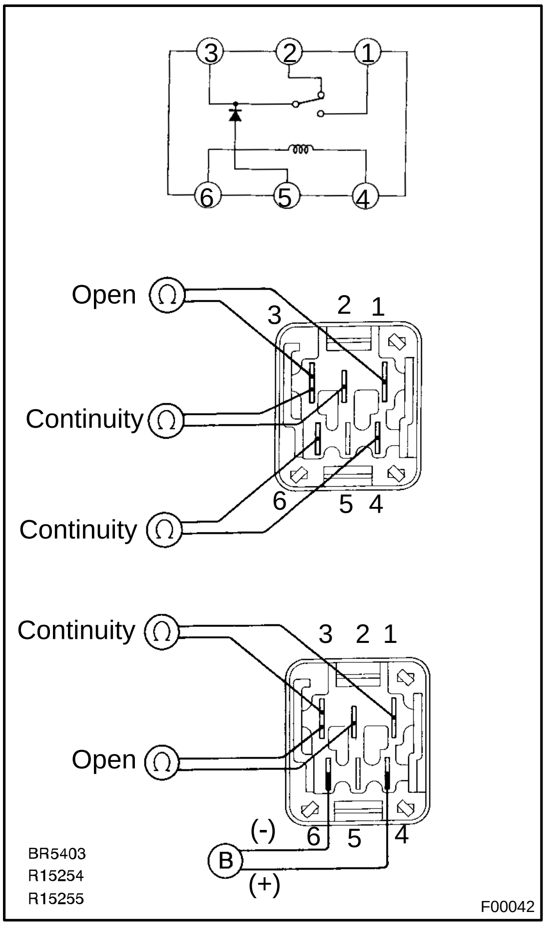
OK:

Voltage: 10 to 14 V

NG	**Check and repair harness or connector.**

OK

3	**Check ABS solenoid relay.**



CHECK:

Check continuity between each terminal of the 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 the ABS solenoid relay.

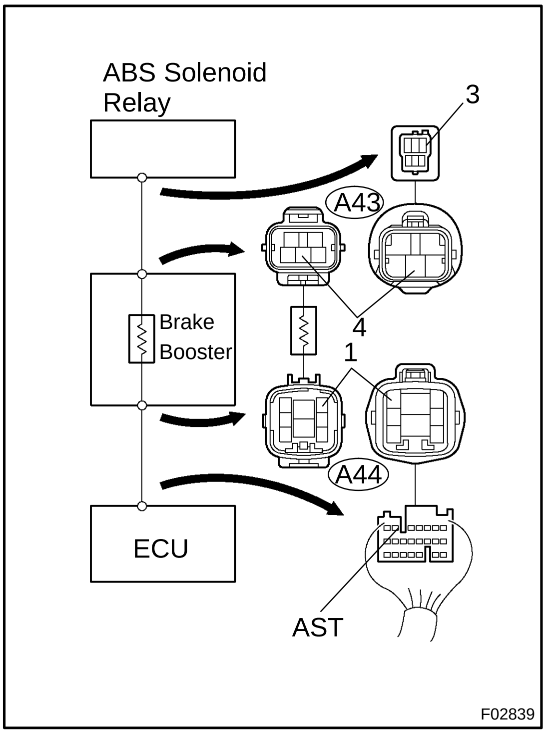
OK:

Terminals 2 and 3	Open
Terminals 1 and 3	Continuity

NG	**Replace ABS solenoid relay.**

OK

4	**Check continuity between terminals 3 of ABS solenoid relay and terminal AST of skid control ECU.**



CHECK:

Check continuity between terminal 3 of the ABS solenoid relay and terminal AST of the skid control ECU.

OK:

Continuity

HINT:

There is resistance of 33 ± 3 Ω between terminals 4 of connector A43 and terminal 1 of connector A44.

NG → **Repair or replace harness, connector or hydraulic brake booster.**

OK

5	**Check for open and short circuit in harness and connector between ABS solenoid relay and skid control ECU (See page IN-36).**

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.

6	**Check for open circuit in harness and connector between AST of hydraulic brake booster and AST of skid control ECU (See page IN-36).**

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

OK

Replace hydraulic brake booster or skid control ECU.

DIC99-01

DTC	C1201 / 51	Engine Control System Malfunction

CIRCUIT DESCRIPTION

If trouble occurs in the engine control system, the ECU prohibits TRAC and VSC control.

DTC No.	DTC Detecting Condition	Trouble Area
C1201 / 51	Conditions 1. and 2. continue for 5 sec.: 1. Engine speed: 500 rpm or more. 2. A trouble signal in the engine control system is input.	Engine control system

INSPECTION PROCEDURE

1	Check the DTC for the engine (See page DI-3).

*1 → **Repair engine control system according to the output code.**

*2 ↓

Check for ECM connected to malfunction indicator light.

*1: Output NG code
*2: Malfunction indicator light remains ON

DIC9A-01

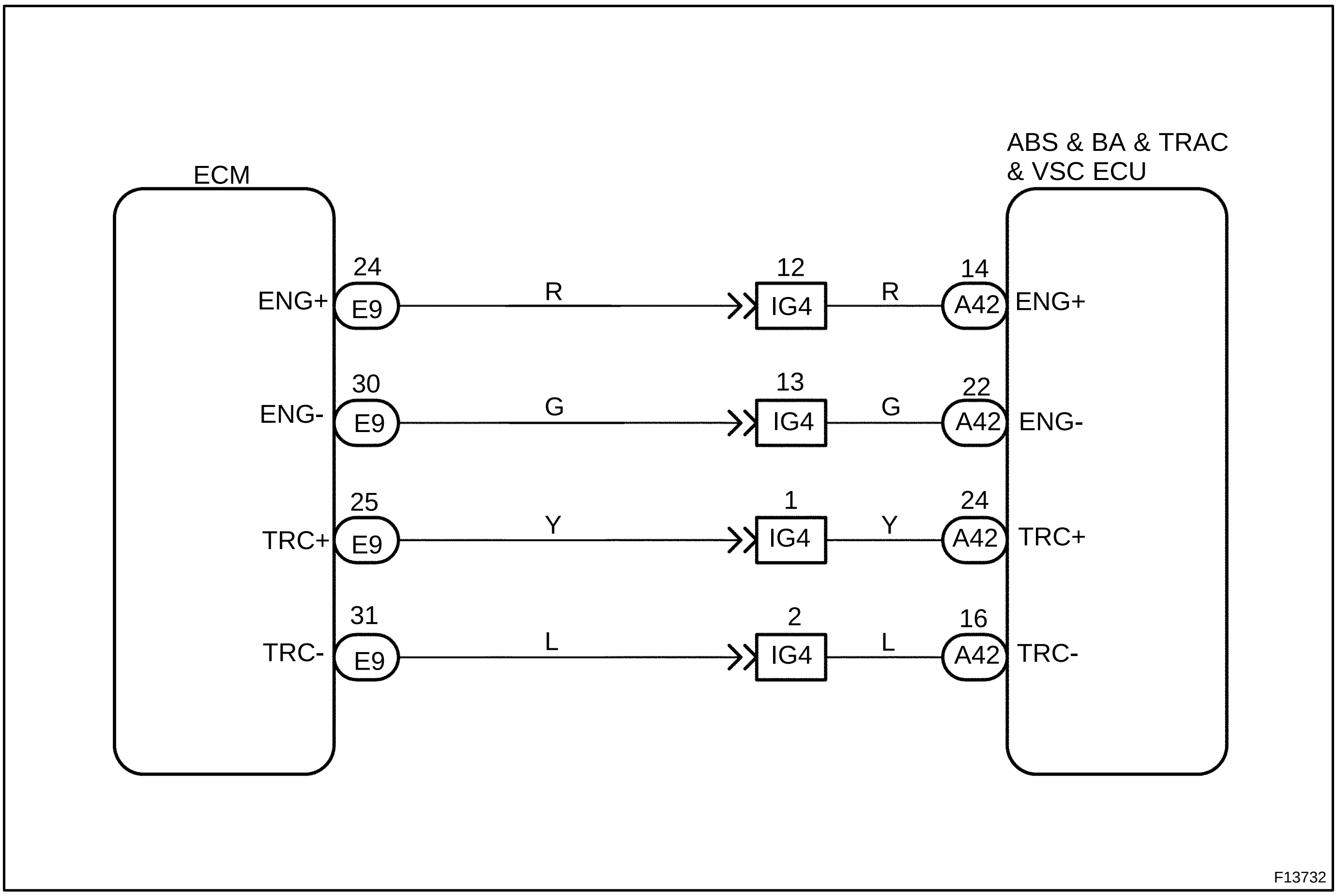
DTC	C1203 / 53	ECM Communication Circuit Malfunction

CIRCUIT DESCRIPTION

The circuit is used to send TRAC & VSC control information from the skid control ECU to the ECM (TRC+, TRC-), and engine control information from the ECM to the skid control ECU (ENG+, ENG-).

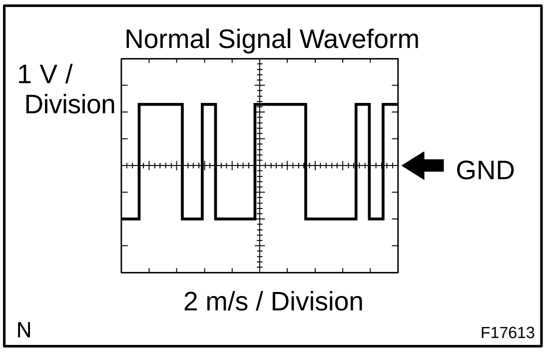
DTC No.	DTC Detecting Condition	Trouble Area
C1203 / 53	Either of the following 1. or 2. continues for 5 sec.: 1. ECU IG1 terminal voltage is 9.5 V to 17.0 V and data transmission to the ECM is impossible. 2. ECU IG1 terminal voltage is 9.5 V to 17.0 V, engine speed is 500 rpm or more or vehicle speed is 60 km/h (36 mph) or more and data receiving from the ECM is impossible.	★TRC+ or TRC- circuit ★ENG+ or ENG- circuit ★ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check skid control ECU communication.**



(REFERENCE) INSPECTION USING OSCILLOSCOPE

PREPARATION:

(a) Remove the skid control ECU.

(b) Connect the oscilloscope to each of terminal ENG+ or TRC+ and GND of the skid control ECU.

CHECK:

Start the engine, and check the signal waveform.

NG → **Check and replace skid control ECU.**

OK

2	**Check for open and short circuit in harness and connector between each of terminals ENG+, ENG-, TRC+, TRC- of skid control ECU and ECM (See page IN-36).**

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

OK

Check and replace ECM.

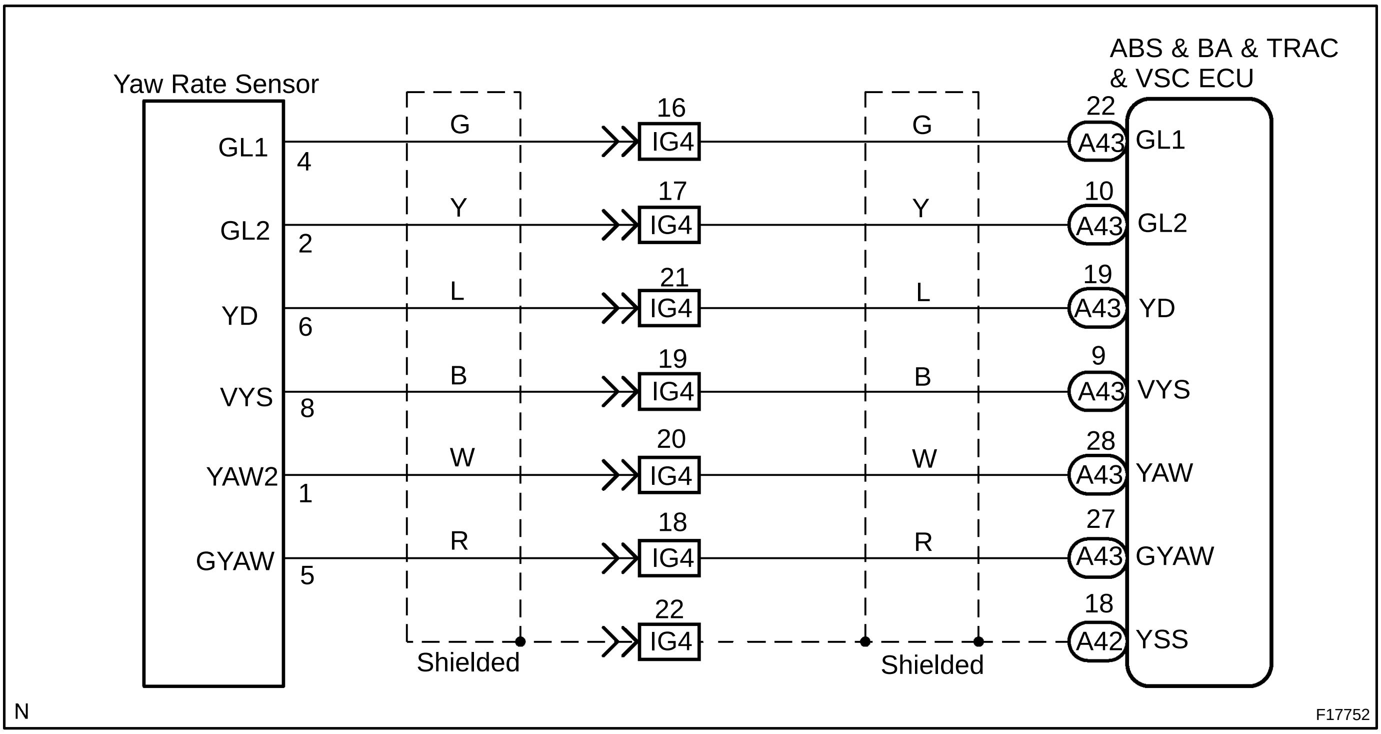
DIC9C-01

DTC	C1210 / 36	Zero Point Calibration of Yaw Rate Sensor Undone

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1210 / 36	When either of the following 1. or 2. is detected: 1. After battery terminal was connected, when the shift lever was moved to other than P position within 15 sec. soon after ECU terminal IG1 becomes ON for the first time. 2. When the yaw rate sensor zero point recorded in ECU is deleted.	★Yaw rate sensor ★Yaw rate sensor circuit ★PNP switch circuit (P position)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check whether zero point calibration of yaw rate sensor has been done or not.**

PREPARATION:

Shift the shift lever in the P position and turn the ignition switch ON. Repeat connecting and releasing Ts and E_1 terminals of the DLC1 4 times or more for 8 sec. After that do not move the vehicle for 15 sec. or more.

CHECK:

Check that the"VSC TRAC" warning light and "VSC OFF" indicator light light up for 15 sec.

OK → **No problem.**

NG

2	**Check for open and short circuit in harness and connector between PNP switch (P position) and skid control ECU and ECM (See page IN-36).**

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

OK

3	**Check for open and short circuit in harness and connector between yaw rate sensor and skid control ECU (See page IN-36).**

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

OK

4	**Check yaw rate sensor (See page DI-553).**

NG → **Replace yaw rate sensor.**

OK

Check and replace skid control ECU.

DIC9E-01

DTC	C1223 / 43	ABS Control System Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1223 / 43	ABS control system is abnormal.	ABS control system

INSPECTION PROCEDURE

1	**Check the DTC for the ABS (See page DI-505).**

*1 → **Repair ABS 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

DIC9G-01

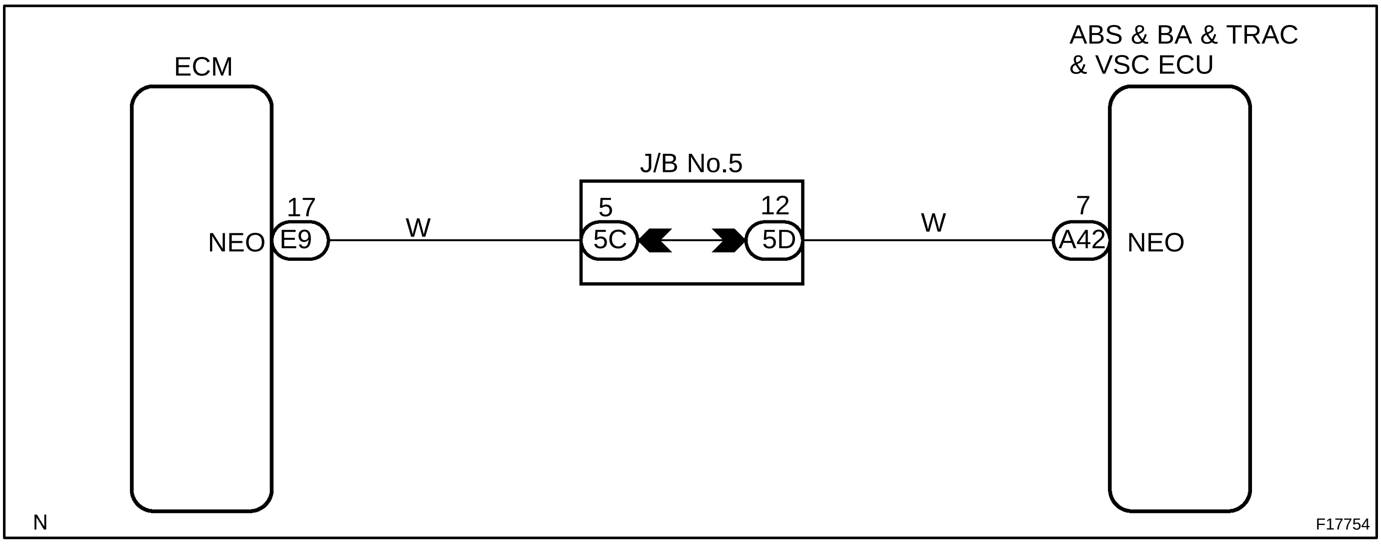
DTC	C1224 / 44	NE Signal Circuit

CIRCUIT DESCRIPTION

The skid control ECU receives engine revolution speed signals (NE signals) from the ECM.

DTC No.	DTC Detecting Condition	Trouble Area
C1224 / 44	When either of the following 1. or 2. is detected: 1. At vehicle speed of 19 mph (30 km/h) or more, and when data received from the ECM is in normal condition, and open or short circuit for engine revolution signal circuit continues for 10 sec. or more. 2. While TRAC is operating, the conditions that open or short circuit in engine revolution signal circuit is detected, main throttle opening degree is 0 and IDL switch is OFF continue for 0.24 sec. or more.	★NEO circuit ★ECM ★Skid control ECU

WIRING DIAGRAM



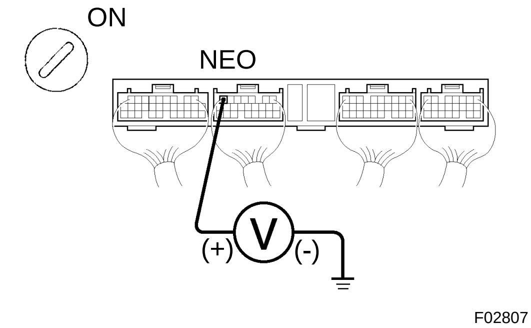
INSPECTION PROCEDURE

1	**Check for open and short circuit in harness and connector between terminal NEO of skid control ECU and terminal NEO of ECM (See page IN-36).**

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

OK

2	**Check voltage between terminal NEO of skid control ECU and body ground.**



F02807

PREPARATION:

Remove the skid control ECU with connectors still connected.

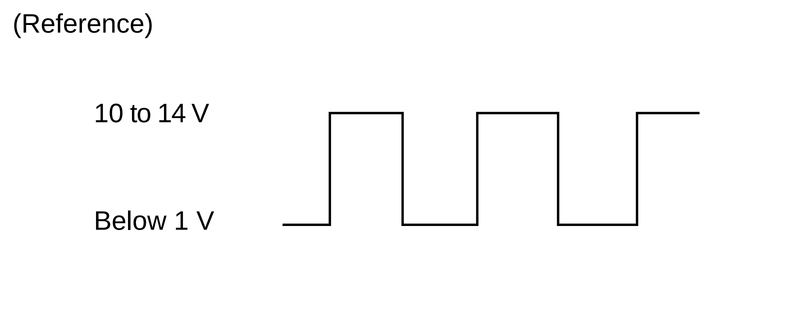
CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminal NEO of the skid control ECU and body ground for the engine conditions below.

OK:

Engine condition	Voltage
OFF (IG ON)	10 to 14 V or below 1 V
ON (Idling)	10 to 14 V ↔ below 1 V (Pulse)



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NG → **Check and replace skid control ECU or ECM.**

OK

If the same codes are still output after the DTC is deleted, check the contact condition of each connection.

DIC9H-02

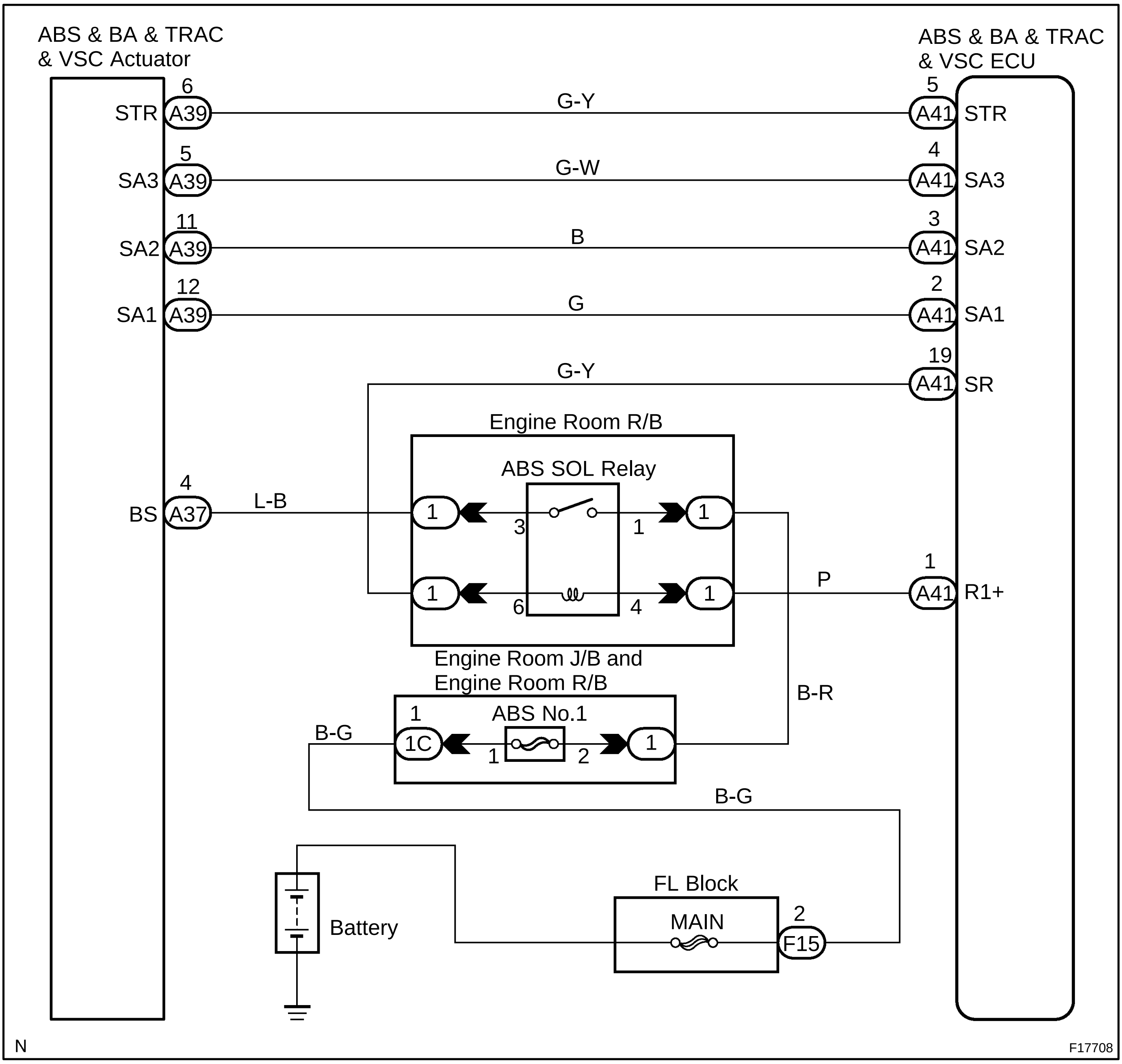
DTC	C1225 / 25 to C1228 / 28	TRAC & VSC Solenoid Circuit

CIRCUIT DESCRIPTION

The TRAC & VSC solenoid operates in accordance with signals from the ECU and raises the fluid pressure in and releases it from the brake cylinders.

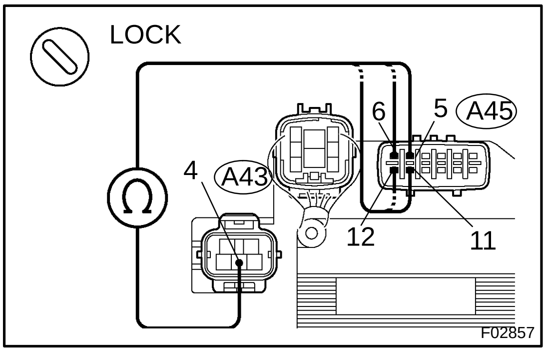
DTC No.	DTC Detecting Condition	Trouble Area
C1225 / 25	Open or short in SA1 circuit continues for 0.015 sec. or more.	★Hydraulic brake booster ★SA1 circuit
C1226 / 26	Open or short in SA2 circuit continues for 0.015 sec. or more.	★Hydraulic brake booster ★SA2 circuit
C1227 / 27	Open or short in SA3 circuit continues for 0.015 sec. or more.	★Hydraulic brake booster ★SA3 circuit
C1228 / 28	Open or short in STR circuit continues for 0.015 sec. or more.	★Hydraulic brake booster ★STR circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check TRAC & VSC solenoid.**



PREPARATION:
Disconnect the 2 connectors from the hydraulic brake booster.
CHECK:
Check continuity between terminals A43 - 4 and A45 - 5, 6, 11 and 12 of the hydraulic brake booster.
OK:
Continuity
HINT:
Resistance of each solenoid at 20 °C (68 °F):
SA1, SA2, STR: 4.05 to 4.55 Ω
SA3: 6.95 to 7.45 Ω

NG	**Replace hydraulic brake booster.**

OK

2	**Check for open and short circuit in harness and connector between skid control ECU and hydraulic brake booster (See page IN-36).**

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.

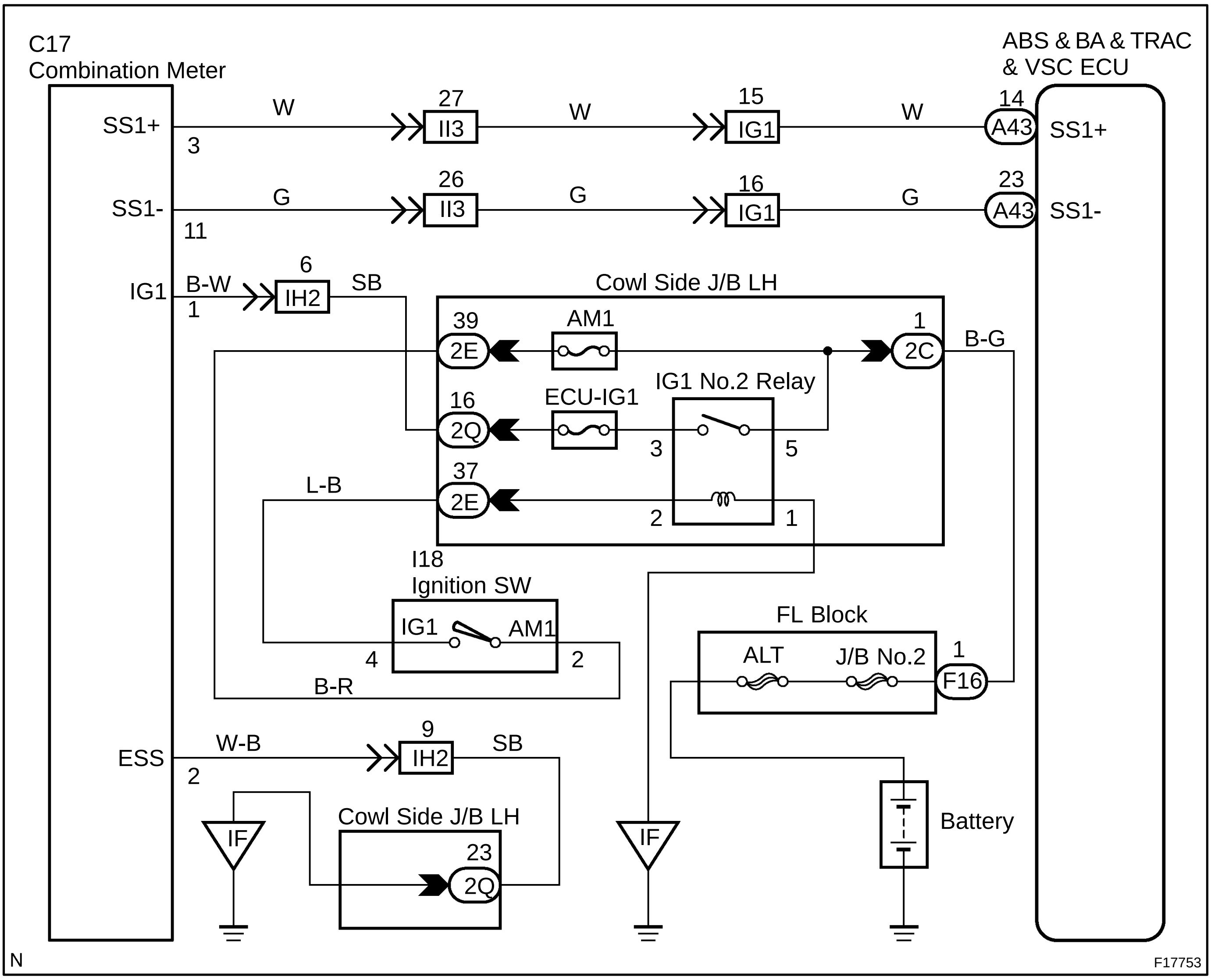
DIC9J-02

DTC	C1231 / 31, C1335 / 35	Steering Angle Sensor Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1231 / 31	Detection of any of the conditions 1. through 3.: 1. When the condition that ECU terminal IG1 voltage is 9.5 V or more, and does not receive data from steering angle sensor continues for 1 sec. or more. 2. When the steering angle sensor value changes by 360° or more with SSC signal from steering angle sensor remaining ON or OFF. 3. When the condition that difference between the steering angle value at edge occurring in SSC signal and the value at edge occurring in SSC signal after turning the steering wheel one-turn is out of the range from 355.5° - 364.5° occurs 10 times or more.	★Steering angle sensor ★Steering angle sensor circuit
C1335 / 35	When the ECU IG1 terminal voltage is 9.5 V or more, data transmission from the steering angle sensor is impossible for 1 sec. or more.	★Steering angle sensor ★Steering angle sensor circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	**Check output value of the steering angle sensor.**

PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the DATALIST mode on the hand-held tester.

CHECK:
Check that the steering wheel turning angle value of the steering angle position sensor displayed on the hand-held tester is changing when turning the steering wheel.

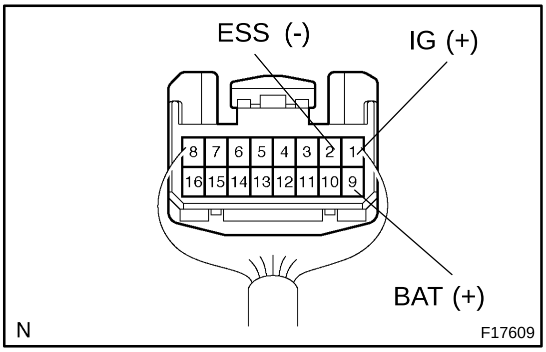
HINT:
After certifying "Zero" point calibration of the steering angle sensor (Speed: 21 mph (35 km/h), driving straight ahead for 10 sec. or more), the value will change.

OK:
Steering wheel turning angle value must be changing.

OK	**Go to step 5.**

NG

2	**Check input voltage of the steering angle sensor.**



PREPARATION:
Remove the column lower cover.

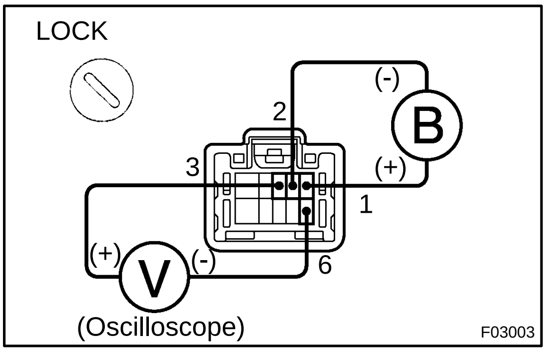
CHECK:
(a) Turn the ignition switch ON.
(b) Measure voltage between terminals 1 and 2, 2 and 9 of the combination switch wire harness side connector.

OK:
Voltage: 10 to 14 V

NG	**Check and replace harness and connector.**

OK

3	**Check steering angle sensor.**



PREPARATION:

(a) Remove the steering wheel lower No. 2 and No. 3 covers, steering wheel pad, steering wheel column upper and lower covers (See page SR-29).

(b) Disconnect the combination switch connector (for steering angle sensor).

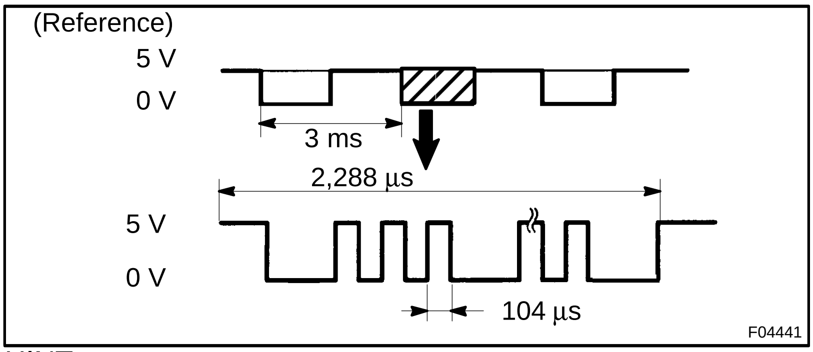
(c) Connect the oscilloscope to terminals 3 and 6 of the combination switch connector (for steering angle sensor).

(d) Apply battery positive voltage between terminals 1 and 2.

CHECK:

Turn the steering wheel slowly and check the signal waveform.

OK:



HINT:

The above signal waveform does not repeat ON and OFF regularly and this combination changes case by case according to the data.

NG	**Replace steering angle sensor.**

OK

4	**Check that slits of the steering sensor disc are clogged up.**

NG	**Repair or replace steering sensor disc.**

OK

5	**Check for open and short circuit in harness and connector between steering position sensor and ABS & BA & TRAC & VSC ECU (See page IN-36).**

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

OK

Check and replace ABS & BA & TRAC & VSC ECU.

DIC9K-02

DTC	C1232 / 32	Deceleration Sensor Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1232 / 32	Detection of either of the conditions 1. or 2.: 1. At a vehicle speed of 6 mph (10 km/h) or more, when the condition that ECU terminal GL1 signal change range is less than 20 mV, and ECU terminal GL2 signal change range swings by 468 mV or more occurs for 30 sec. or more. 2. At a vehicle speed of 6 mph (10 km/h) or more, when the condition that ECU terminal GL2 signal change range is less than 20 mV, and ECU terminal GL1 signal change range swings by 468 mV or more occurs for 30 sec. or more.	★Deceleration sensor ★Deceleration sensor circuit

INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	Check output value of the yaw rate (deceleration) sensor.

PREPARATION:

(a) Connect the hand-held tester to the DLC3.

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

(c) Select the DATALIST mode on the hand-held tester.

CHECK:

Check that the deceleration value of the deceleration sensor displayed on the hand-held tester is changing when tilting the vehicle.

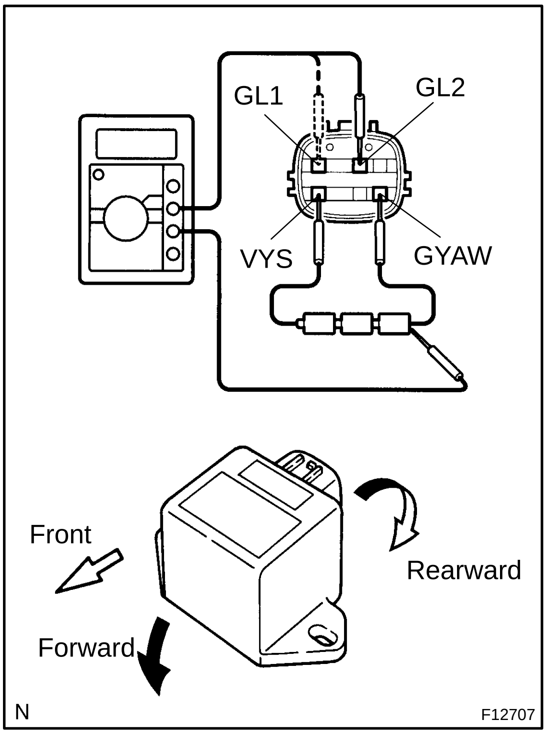
OK:

Deceleration value must be changing.

OK → **Check and replace ABS & BA & TRAC & VSC ECU.**

NG

2	Check yaw rate (deceleration) sensor.



PREPARATION:

(a) Connect 3 dry batteries of 1.5 V in series.

(b) Connect VYS terminal to the batteries' positive (+) terminal, and GYAW terminal to the batteries' negative (-) terminal. Apply about 4.5 V between VYS and GYAW terminals.

NOTICE:

Do not apply voltage of 6 V or more to terminals VYS and GYAW.

CHECK:

Check the output voltage of GL1 and GL2 terminals when the sensor is tilted forward and rearward.

OK:

Symbols	Condition	Standard Value
GL1	Horizontal	About 2.3 V
GL1	Lean rearward	1.0 V to about 2.3 V
GL1	Lean forward	About 2.3 V to 3.5 V
GL2	Horizontal	About 2.3 V
GL2	Lean rearward	About 2.3 V to 3.5 V
GL2	Lean forward	1.0 V to about 2.3 V

HINT:

★ If the sensor is tilted too much, it may show the wrong value.

★ If dropped, the sensor should be replaced with a new one.

★ The sensor removed from the vehicle should not be placed upside down.

NG — **Replace yaw rate sensor.**

OK

3	Check for open or short circuit in harness and connector between yaw rate (deceleration) sensor and ABS & BA & TRAC & BA & VSC ECU (See page IN-36).

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

OK

Check and replace ABS & BA & TRAC & VSC ECU.

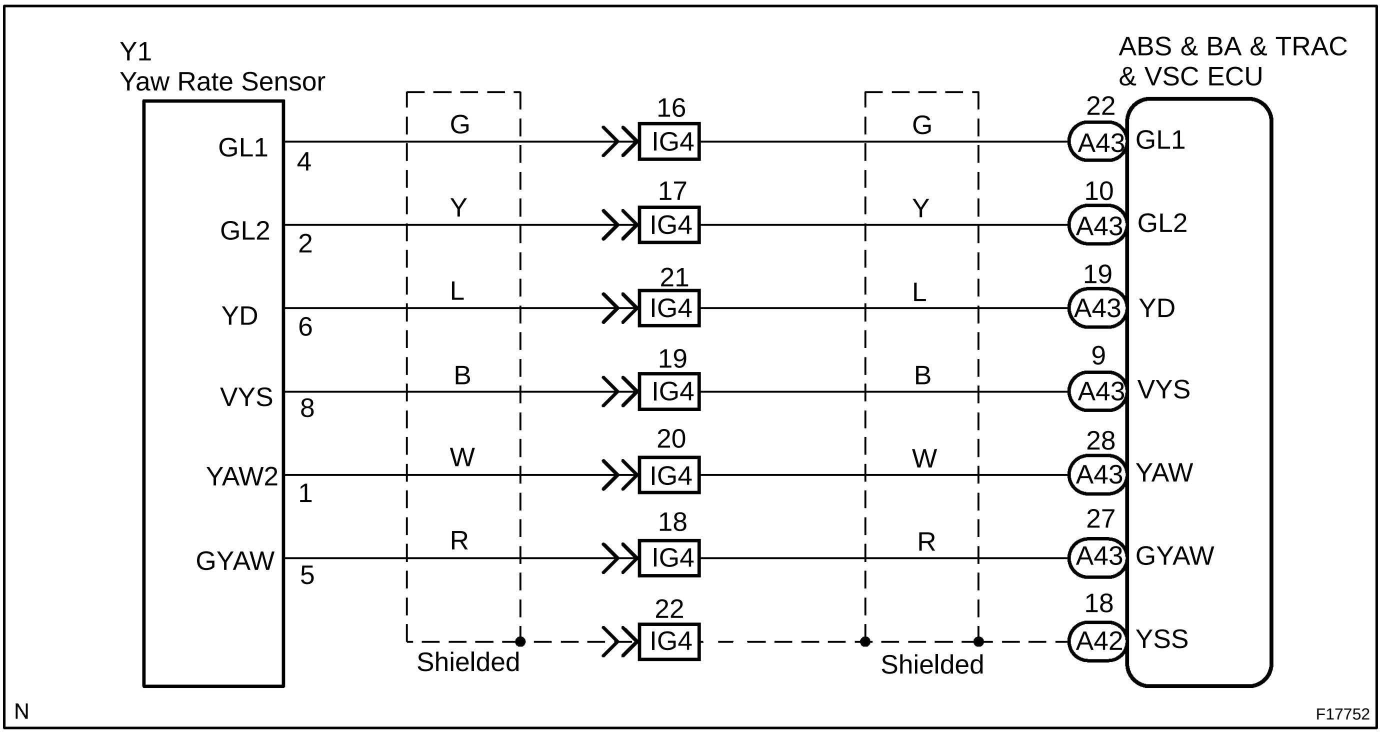
DIC9L-01

DTC	C1233 / 33, C1234 / 34	Yaw Rate Sensor Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1233 / 33	When any of the following 1. through 4. is detected: 1. ECU terminal IG1 voltage is 9.5 V to 17.0 V, and the condition that yaw rate sensor voltage is out of the range from 0.25 V to 4.75 V continues for 1 sec. or more. 2. The conditions that yaw rate sensor open detect circuit signal is ON and the voltage of ECU terminal IG1 is 9.5 V to 17 V continue for 1 sec. or more. 3. The conditions that yaw rate sensor power source voltage is out of the range from 4.4 V to 5.6 V and the voltage of ECU terminal IG1 is 9.5 V to 17 V continue for 1 sec. or more. 4. When the condition that yaw rate sensor signal is momentarily open occurs 10 times or more and the voltage of ECU terminal IG1 is 9.5 V to 17 V.	★Yaw rate sensor ★Yaw rate sensor circuit
C1234 / 34	Condition 1. or 2. is detected: 1. When the conditions that yaw rate sensor VYS terminal voltage is 4.75 V to 5.25 V and YD malfunction signal of yaw rate sensor is ON continue for 5 sec. or more. 2. Shift lever is in P position and output voltage of yaw rate sensor is out of the range from 2.4 V to 2.6 V or after the difference from zero point calibration voltage of yaw rate sensor becomes 0.08 V or more and when the condition that the vehicle speed exceeds more than 9 mph (15 km/h) while output condition of yaw rate sensor is repeated more than 3 times.	

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Perform zero point calibration of the yaw rate sensor (See page DI-505).**

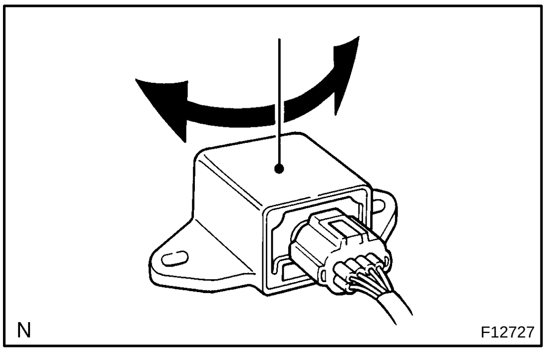
2	**Is DTC still output?**

Check the DTC on page DI-505 .

NO | **END.**

YES

3	**Check output value of the yaw rate sensor.**



In case of using the hand-held tester:

PREPARATION:

(a) Remove the 2 bolts and yaw rate sensor with connectors still connected.

(b) Connect the hand-held tester to the DLC3.

(c) Turn the ignition switch ON and push the hand-held tester main switch ON.

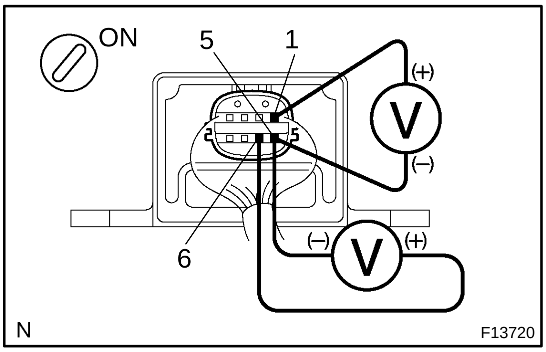
(d) Select the DATALIST mode on the hand-held tester.

CHECK:

Check that the yaw rate value of the yaw rate sensor displayed on the hand-held tester changes. Place the yaw rate sensor vertically to the ground and turn the sensor pivoted on its center.

OK:

Yaw rate value must be changing.



In case of not using the hand-held tester:

PREPARATION:

(a) Remove the yaw rate sensor with the connector still connected to it.

(b) Turn the ignition switch to ON.

CHECK:

Measure voltage between terminals YAW2 (1) - GYAW (5), and terminals YD (6) - GYAW (5) of the yaw rate sensor.

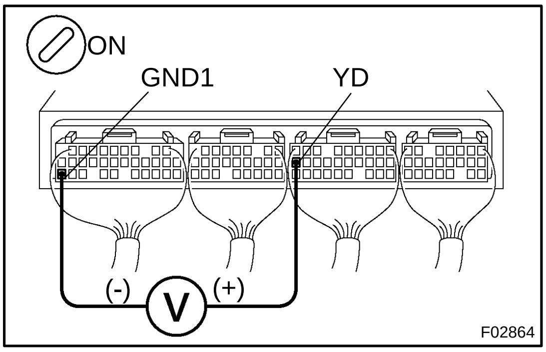
OK:

Terminals 1 and 5 (YAW2 - GYAW)	About 2.42 V to 2.58 V
Terminals 6 and 5 (YD - GYAW)	About 4.5 V to 5.3 V

NG	**Replace yaw rate sensor.**

OK

4	Check voltage between terminals YD and GND of ABS & BA & TRAC & VSC ECU.



PREPARATION:

Remove the ABS & BA & TRAC & VSC ECU with connectors still connected.

CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals YD and GND of the ABS & BA & TRAC & VSC ECU.

OK:

Voltage: 4.5 to 5.3 V

OK → **Check and replace ABS & BA & TRAC & VSC ECU.**

NG

5	Check for open and short circuit in harness and connector between yaw rate sensor and ABS & BA & TRAC & VSC ECU (See page IN-36).

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

OK

Check and replace ABS & BA & TRAC & VSC ECU.

DIC9M-01

DTC	C1237 / 37	Tires of Different Size

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1237 / 37	Driving at more than 19 mph (30 km/h) for more than 20 seconds with 1 or 2 tires of different size 3 times continuously.	★Tire size ★Skid control ECU

INSPECTION PROCEDURE

1	Check tire size.

CHECK:
Check the size and condition of all 4 wheels.

NG → **Replace tires so that all 4 tires are of the same size.**

OK

Check and replace skid control ECU.

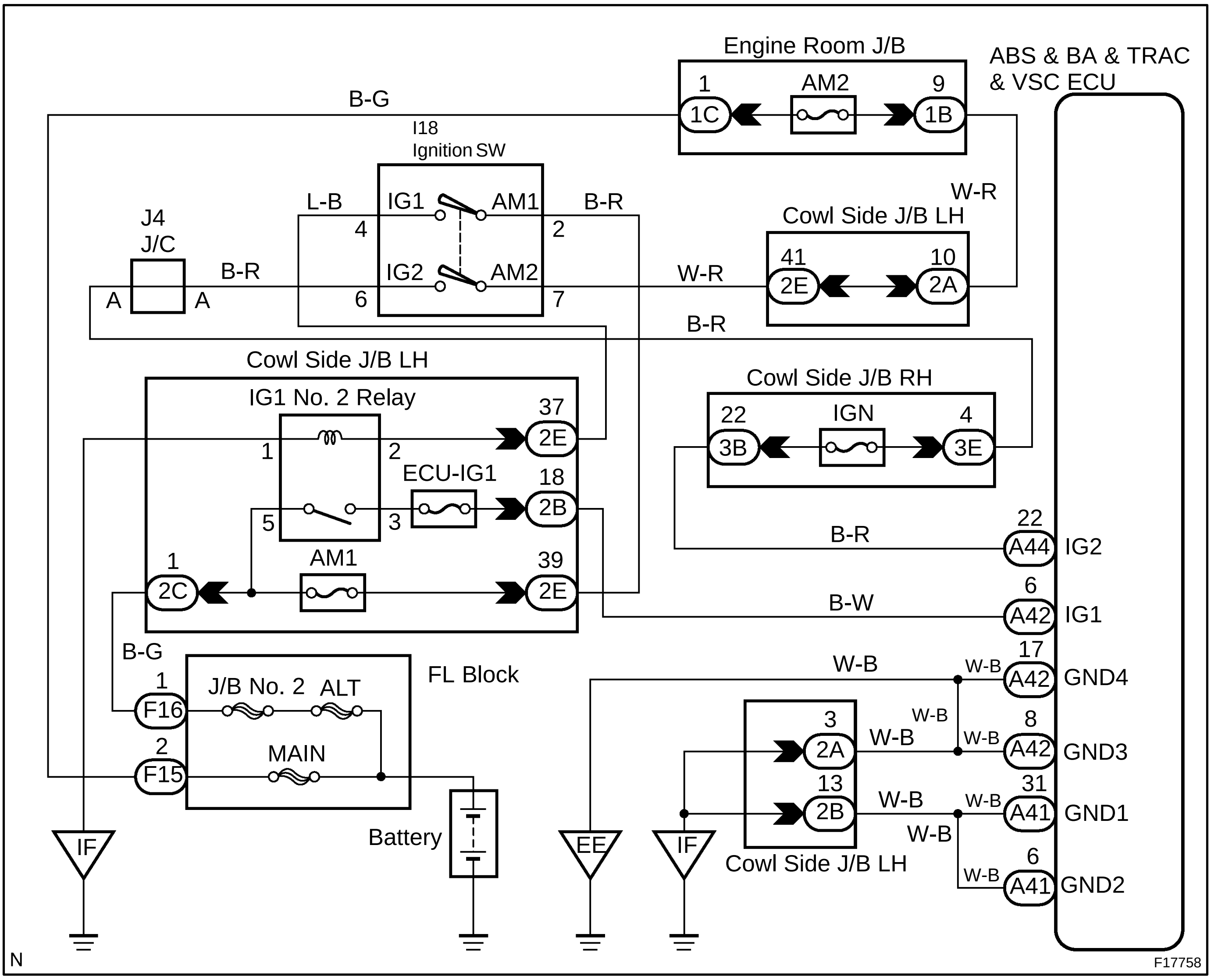
DIC9N-01

DTC	C1241 / 41	IG Power Source Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1241 / 41	Detection of any of the conditions 1. through 4.: 1. Vehicle speed is 1.9 mph (3 km/h) or more and voltage of ECU terminal IG remains below 9.5 V for more than 10 sec. 2. While the condition that the solenoid relay is ON continues, ECU terminal IG1 voltage becomes 9.5 V or less, and the condition that the contact point of the solenoid relay is OFF continues for 0.2 sec. or more. 3. The condition that ECU terminal IG1 voltage is more than 17.0 V continues for 1.2 sec. or more. 4. While the solenoid relay outputs ON signal, ECU terminal IG1 voltage becomes more than 17.0 V, and the condition that the contact point of the solenoid relay is OFF continues for 0.2 sec. or more.	★Battery ★IC regulator ★Power source circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check battery positive voltage.**

OK:

Voltage: 10 to 14 V

NG	**Check and repair the charging system.**

OK

2	**Check voltage of the ECU IG power source.**

In case of using the hand-held tester:

PREPARATION:

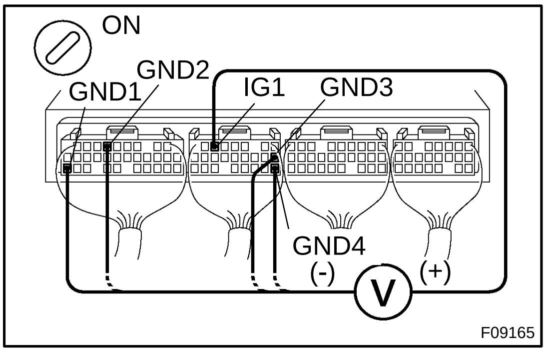
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the DATALIST mode on the hand-held tester.

CHECK:

Check the voltage condition output from the ECU displayed on the hand-held tester.

OK:

”Normal” is displayed.



In case of not using the hand-held tester:

PREPARATION:

Remove the skid control ECU with connectors still connected.

CHECK:

(a) Turn the ignition switch ON.
(b) Measure voltage between terminals IG1 and GND of the skid control ECU connector.

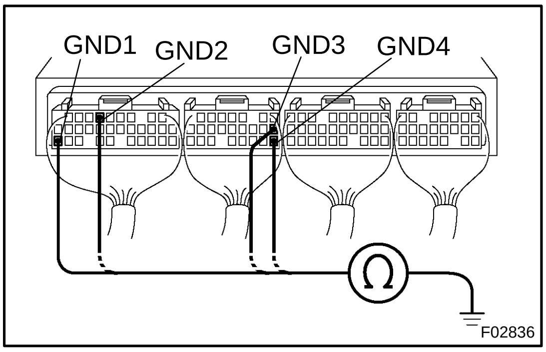
OK:

Voltage: 10 to 14 V

OK	**Turn ignition switch OFF, check and replace skid control ECU.**

NG

3	Check continuity between terminal GND of skid control ECU connector and body ground.

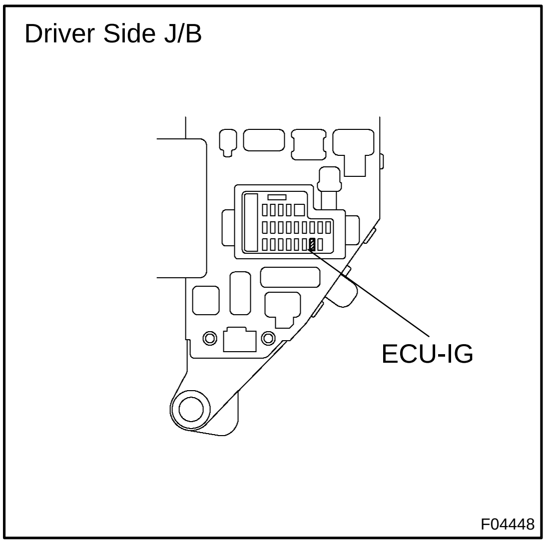


CHECK:
Measure resistance between terminal GND of the skid control ECU connector and body ground.
OK:
Resistance: 1 Ω or less

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

OK

4	Check ECU-IG fuse.



PREPARATION:
Remove the ECU-IG fuse from the driver side J/B.
CHECK:
Check continuity of the 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

Check for open circuit in harness and connector between skid control ECU and battery (See page IN-36).

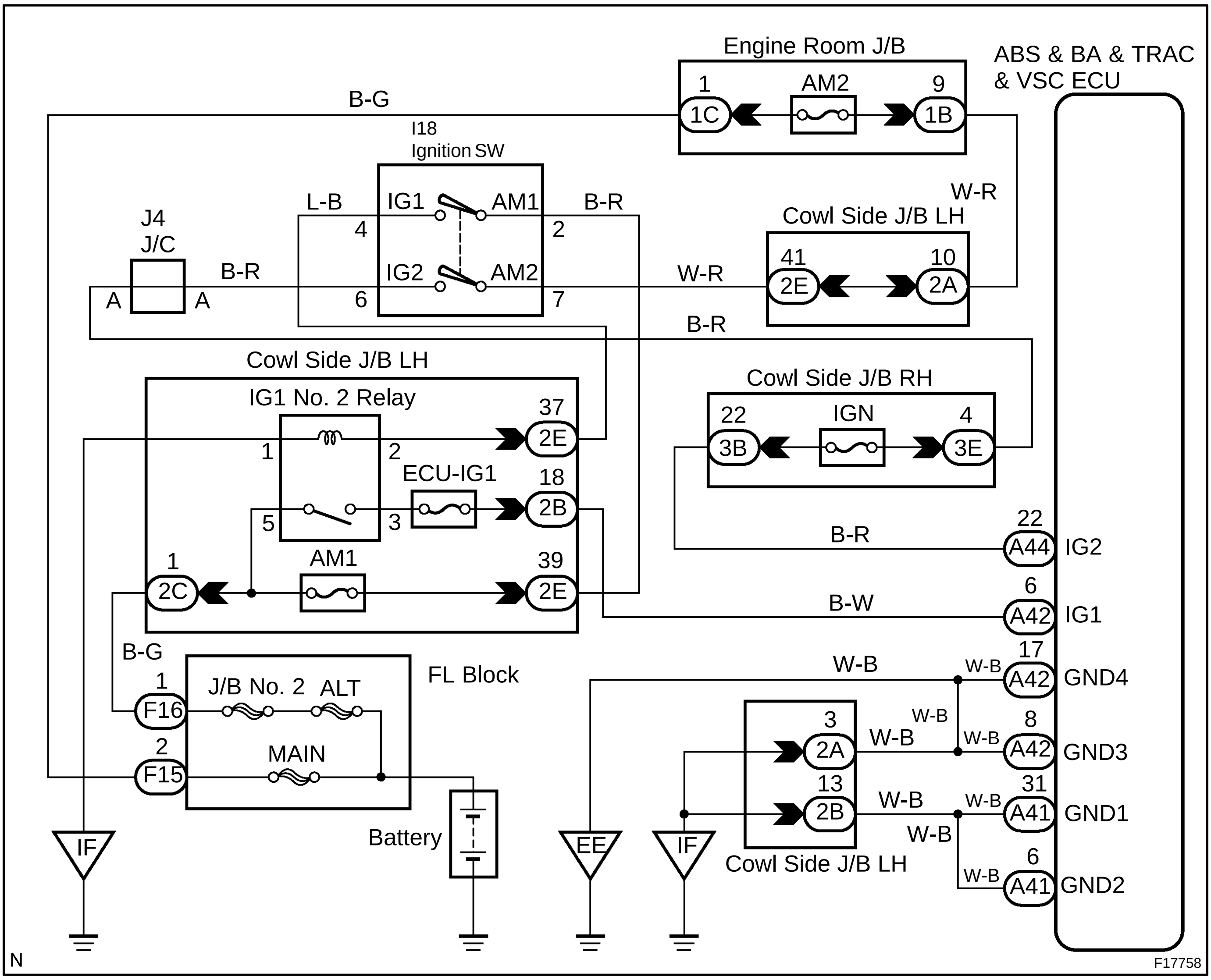
DIC9O-01

DTC	C1242 / 42	IG2 Power Source Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1242 / 42	With the vehicle running, open circuit in IG2 is detected for more than 7 sec.	★Battery ★IC regulator ★Power source circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check battery positive voltage.**

OK:

Voltage: 10 to 14 V

NG → **Check and repair the charging system.**

OK ↓

2	**Check voltage of the ECU IG power source.**

In case of using the hand-held tester:

PREPARATION:

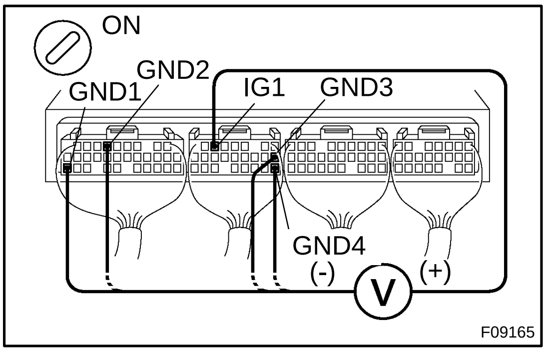
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the DATALIST mode on the hand-held tester.

CHECK:

Check the voltage condition output from the ECU displayed on the hand-held tester.

OK:

”Normal” is displayed.



In case of not using the hand-held tester:

PREPARATION:

Remove the skid control ECU with connectors still connected.

CHECK:

(a) Turn the ignition switch ON.
(b) Measure voltage between terminals IG2 and GND of the skid control ECU connector.

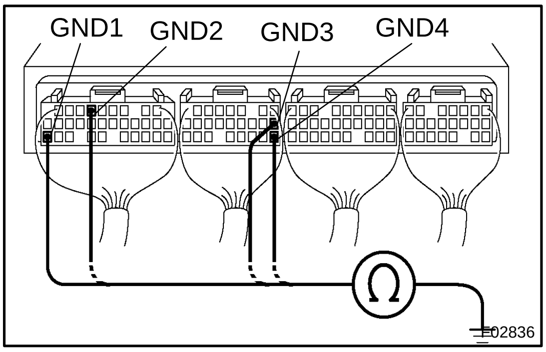
OK:

Voltage: 10 to 14 V

OK → **Turn ignition switch OFF, check and replace skid control ECU.**

NG ↓

3	**Check continuity between terminal GND of skid control ECU connector and body ground.**



CHECK:

Measure resistance between terminal GND of the skid control 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 skid control ECU and battery (See page IN-36).

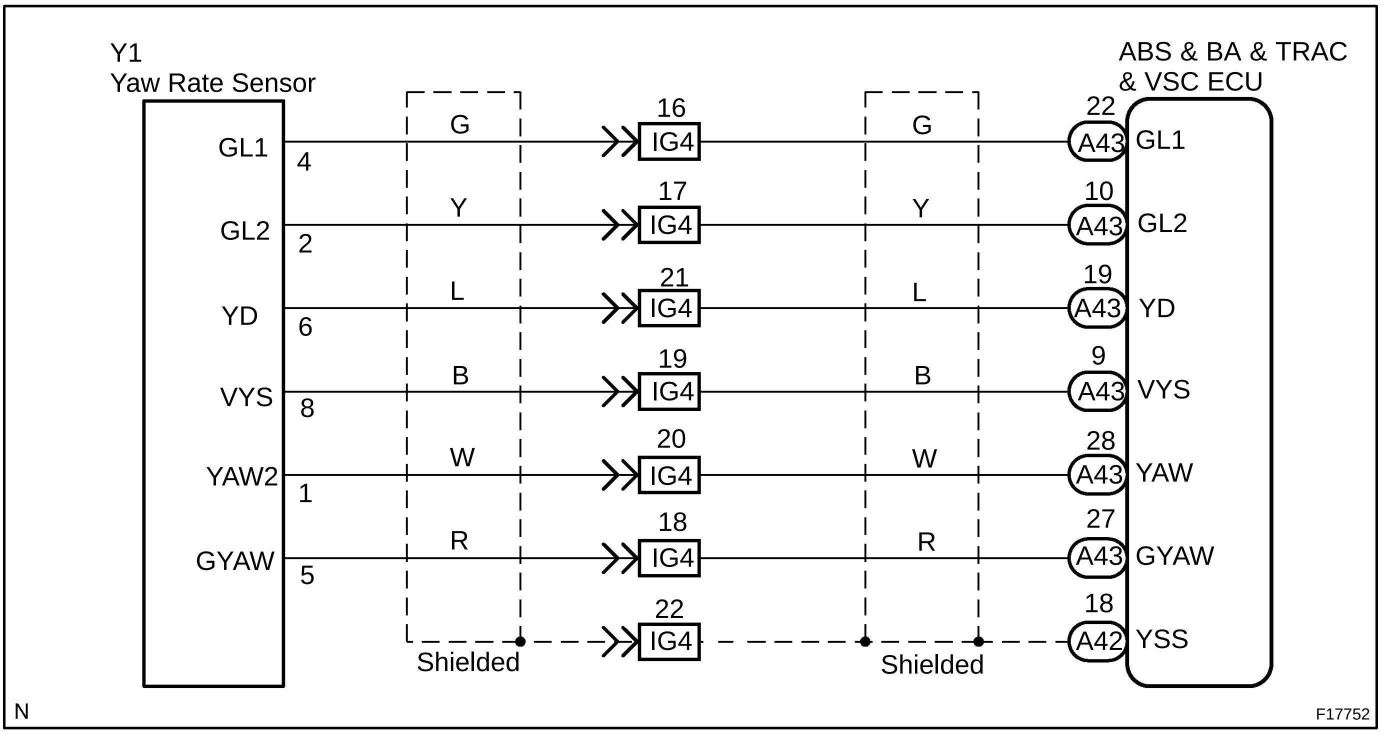
DIC9P-01

DTC	C1243 / 43, C1245 / 45	Malfunction in Deceleration Sensor

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1243 / 43	While vehicle speed becomes 0 mph (0 km/h) from 30 km/h (18 mph), and the condition that GL1 and GL2 signals of ECU terminals did not change 40 mV or less continued in a sequence 16 times.	★Deceleration sensor ★Wire harness for deceleration sensor system
C1245 / 45	At the vehicle speed of 18 mph (30 km/h) or more, and the condition that the difference between acceleration and deceleration values of computation from deceleration sensor and vehicle speed becomes more than 0.35 G continues for 60 sec. or more.	

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Start the inspection from step1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	**Check output value of the yaw rate (deceleration) sensor.**

PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the DATALIST mode on the hand-held tester.

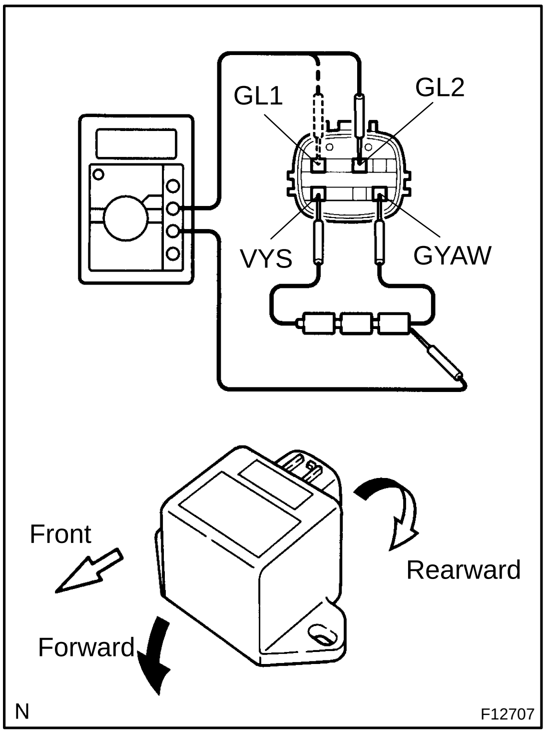
CHECK:
Check that the deceleration value of the deceleration sensor displayed on the hand-held tester is changing when tilting the vehicle.

OK:
Deceleration value must be changing.

OK → **Check and replace skid control ECU.**

NG

2	Check yaw rate (deceleration) sensor.



PREPARATION:

(a) Connect 3 dry batteries of 1.5 V in series.

(b) Connect VYS terminal to the batteries' positive (+) terminal, and GYAW terminal to the batteries' negative (-) terminal. Apply about 4.5 V between VYS and GYAW terminals.

NOTICE:

Do not apply voltage of 6 V or more to terminals VYS and GYAW.

CHECK:

Check the output voltage of GL1 and GL2 terminals when the sensor is tilted forward and rearward.

OK:

Symbols	Condition	Standard Value
GL1	Horizontal	About 2.3 V
GL1	Lean rearward	1.0 V to about 2.3 V
GL1	Lean forward	About 2.3 V to 3.5 V
GL2	Horizontal	About 2.3 V
GL2	Lean rearward	About 2.3 V to 3.5 V
GL2	Lean forward	1.0 V to about 2.3 V

HINT:

★ If the sensor is tilted too much, it may show the wrong value.

★ If dropped, the sensor should be replaced with a new one.

★ The sensor removed from the vehicle should not be placed upside down.

NG	Replace yaw rate sensor.

OK

3	Check for open or short circuit in harness and connector between yaw rate (deceleration) sensor and skid control ECU (See page IN-36).

NG	Repair or replace harness or connector.

OK

Check and replace skid control ECU.

DIC9Q-01

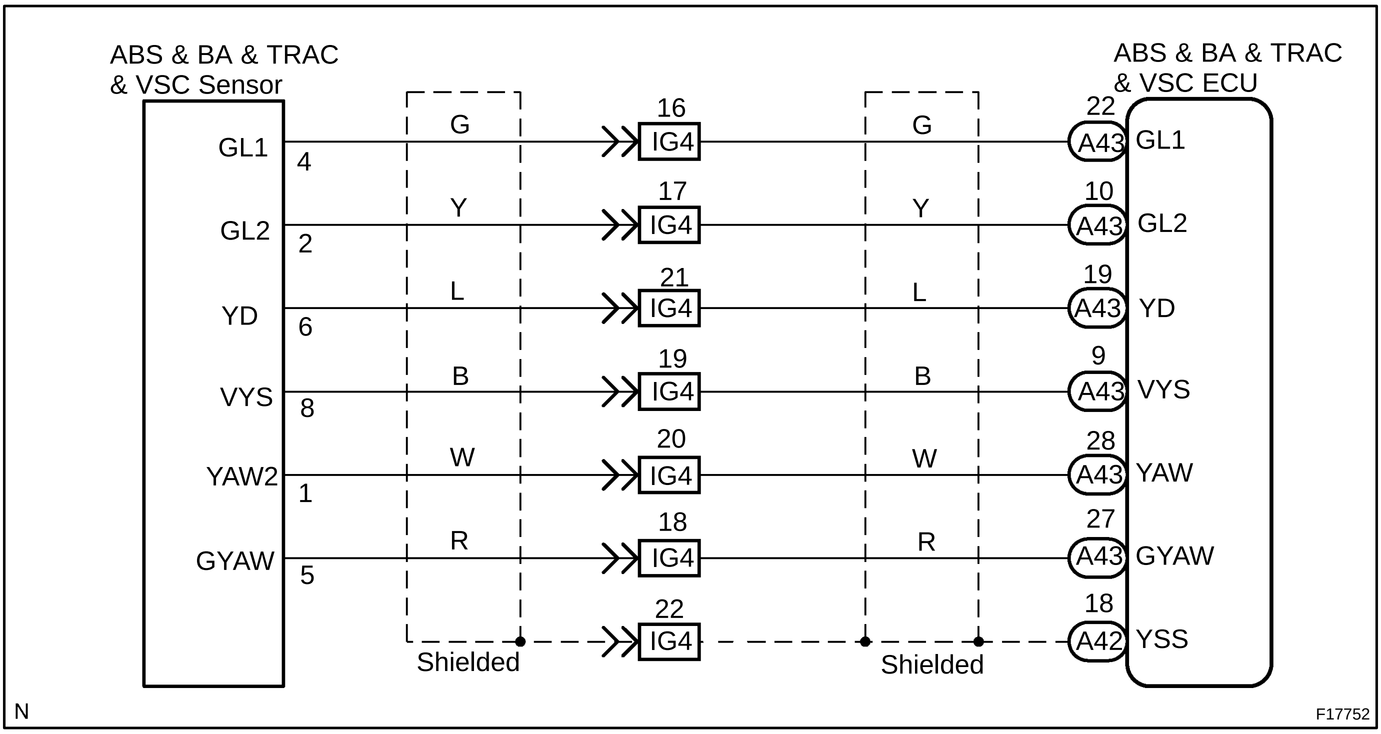
DTC	C1244 / 44	Deceleration Sensor Circuit

CIRCUIT DESCRIPTION

This sensor detects vehicle deceleration. The sensor signal is used in ABS & BA & TRAC & VSC control. If the sensor functions abnormally, the ABS warning light comes on.

DTC No.	DTC Detecting Condition	Trouble Area
C1244 / 44	Either of the following 1., 2., 3. or 4. is detected: 1. The condition that ECU terminals GL1 and GL2 values are -1.5 G or less or 1.5 G or more continues for 1.2 sec. or more. 2. The condition that the deceleration sensor terminal VGS voltage is 4.4 V or less or 5.6 V or more continues for 1.2 sec. or more. 3. At a vehicle speed of 0 mph (0 km/h), after the difference of output value between deceleration sensor terminals GL1 and GL2 becomes 0.6 G or more, and the condition that does not become 0.4 G or less continues for 60 sec. or more. 4. Deceleration sensor signal momentary open occurs for 7 times or more.	★Deceleration sensor ★Deceleration sensor circuit

WIRING DIAGRAM



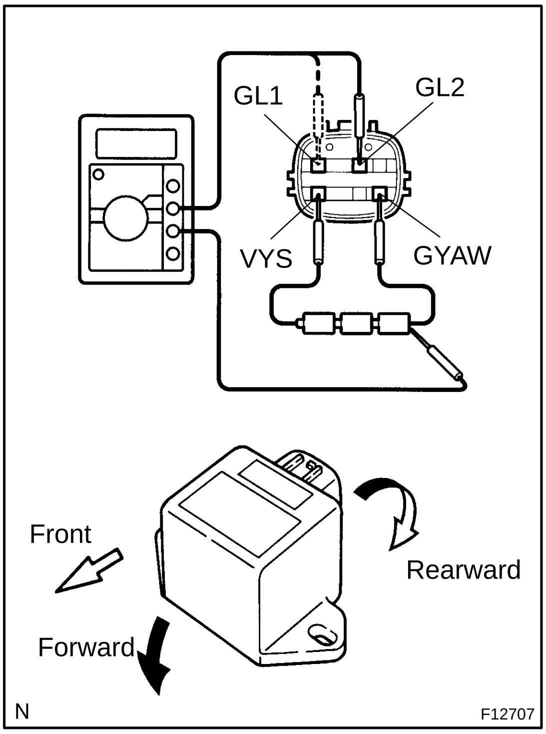
INSPECTION PROCEDURE

1	**Check for open and short circuit in harness and connector between yaw rate (deceleration) sensor and skid control ECU (See page IN-36).**

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

OK

2	**Check yaw rate (deceleration) sensor.**



PREPARATION:

(a) Connect 3 dry batteries of 1.5 V in series.

(b) Connect VYS terminal to the batteries' positive (+) terminal, and GYAW terminal to the batteries' negative (-) terminal. Apply about 4.5 V between VYS and GYAW terminals.

NOTICE:

Do not apply voltage of 6 V or more to terminals VYS and GYAW.

CHECK:

Check the output voltage of GL1 and GL2 terminals when the sensor is tilted forward and rearward.

OK:

Symbols	Condition	Standard Value
GL1	Horizontal	About 2.3 V
GL1	Lean rearward	1.0 V to about 2.3 V
GL1	Lean forward	About 2.3 V to 3.5 V
GL2	Horizontal	About 2.3 V
GL2	Lean rearward	About 2.3 V to 3.5 V
GL2	Lean forward	1.0 V to about 2.3 V

HINT:

★ If the sensor is tilted too much, it may show the wrong value.

★ If dropped, the sensor should be replaced with a new one.

★ The sensor removed from the vehicle should not be placed upside down.

NG	**Replace yaw rate sensor.**

OK

Check and replace skid control ECU.

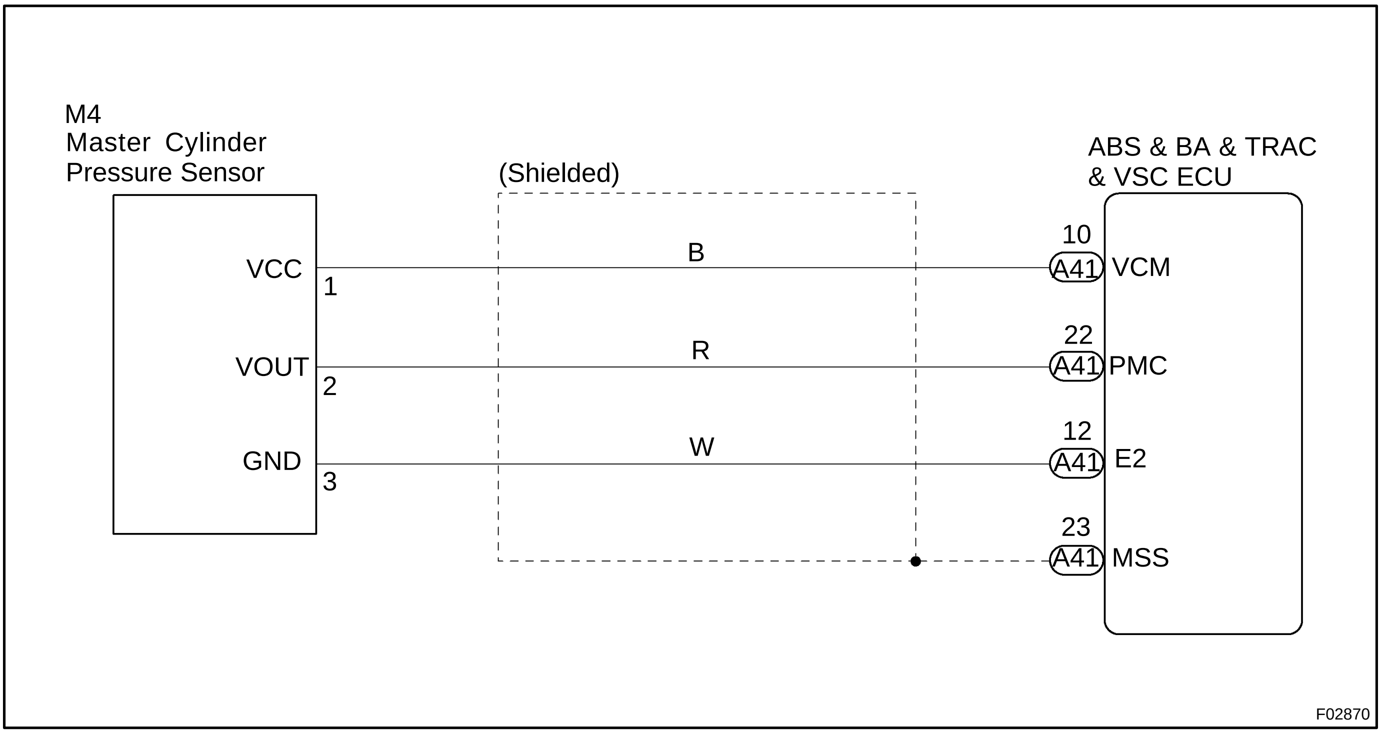
DIC9R-01

DTC	C1246 / 46	Master Cylinder Pressure Sensor Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1246 / 46	Either of the following 1., 2., 3., 4. or 5. is detected: 1. At a vehicle speed of 4 mph (7 km/h) or more, PMC terminal voltage does not change by more than 0.005 V once it exceeds 0.86 V continues for at least 30 secs. 2. Interference occurs to ECU terminal PMC 7 times or more for 5 sec. 3. ECU terminal STP is OFF, and the condition that terminal PMC voltage becomes more than 0.86 V or less than 0.3 V continues for 5 sec. or more. 4. The condition that ECU terminal IG1 voltage is 9.5 V to 17.0 V, and terminal VCM voltage other than the range from 4.4 V to 5.6 V continues for 1.2 sec. or more. 5. The condition that ECU terminal VCM voltage is 4.4 V to 5.6 V, and terminal PMC voltage other than the range from 0.14 V to 4.85 V continues for 1.2 sec. or more.	★Master cylinder pressure sensor ★Master cylinder pressure sensor circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	Check output value of the master cylinder pressure sensor.

PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the DATA LIST mode on the hand-held tester.

CHECK:
Check that the brake fluid pressure value of the master cylinder pressure sensor displayed on the hand-held tester is changing when depressing the brake pedal.

OK:
Brake fluid pressure value must be changing.

OK → **Go to step 4.**

NG

2	Check master cylinder pressure sensor.

PREPARATION:
(a) Install the LSPV gauge to the front caliper bleeder plug portion, and bleed the LSPV gauge.
SST 09709-29018
(b) Remove the air cleaner inlet and battery clamp cover.

CHECK:
Start the engine and depress the brake pedal, then check the relation between the fluid pressure and voltage of PMC and E2 terminals of the skid control ECU with connectors still connected.

OK:

Front brake caliper fluid pressure	Voltage
0 kPa (0 Kgf/cm^2, 0 psi)	0.37 to 0.63 V
5,883 kPa (60 kgf/cm^2, 853 psi)	1.57 to 1.83 V
11,768 kPa (120 kgf/cm^2, 1,706 psi)	2.77 to 3.03 V

HINT:
Voltage between terminals VCM and E2: 4.7 to 5.3 V

NG → **Replace master cylinder pressure sensor.**

OK

3	Check for open and short circuit in harness and connector between master cylinder pressure sensor and skid control ECU (See page IN-36).

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

OK

Replace master cylinder pressure sensor.

4	Check whether or not the ECU terminal STP input voltage is changed when the stop light switch is turned on and off.

NO → **Check the stop light switch circuit (See page DI-573).**

YES

Check and replace skid control ECU.

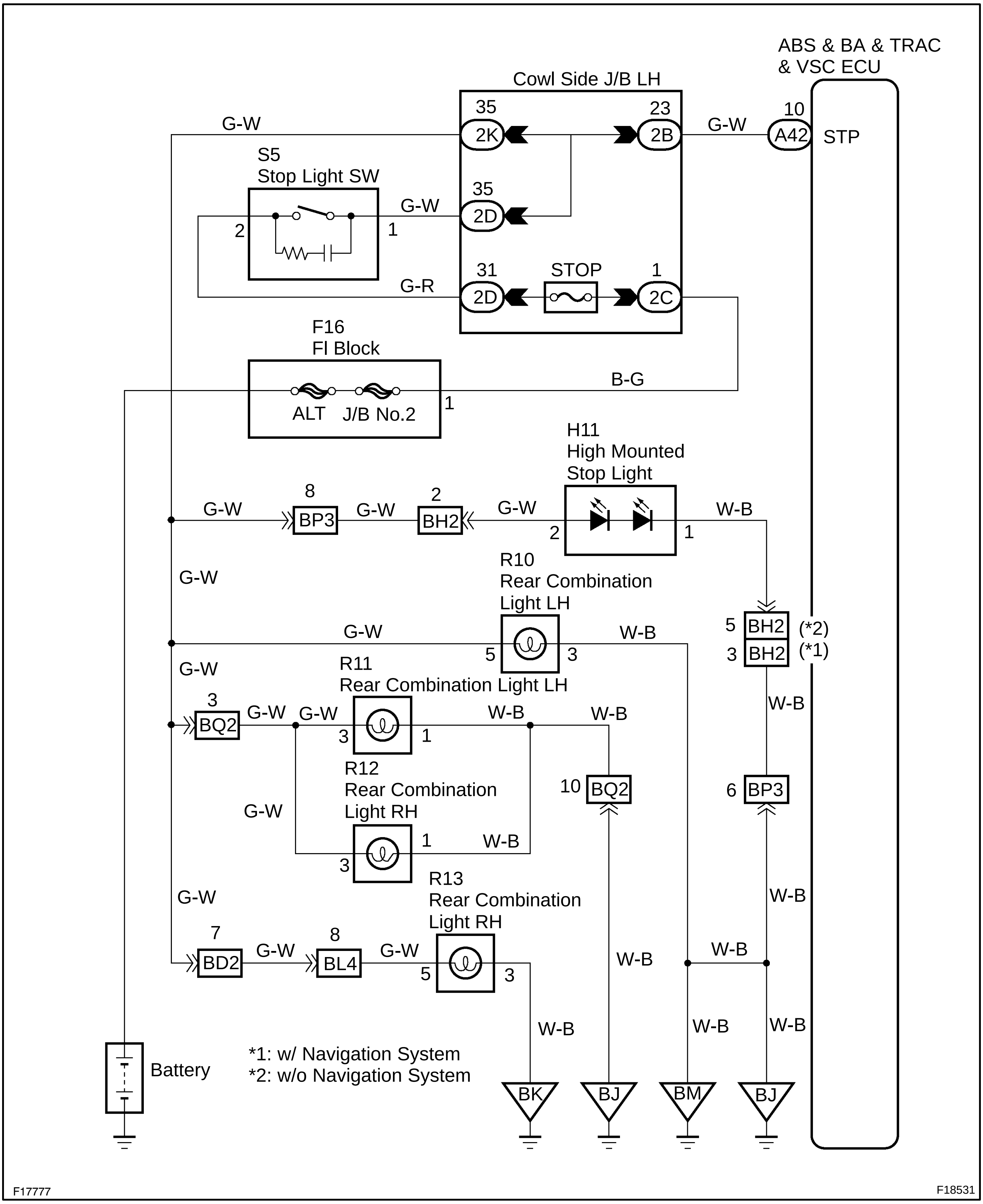
DIC9S-02

DTC	C1249 / 49	Stop Light Switch Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1249 / 49	ECU terminal IG1 voltage is 9.5 to 17.2 V, ABS is in non-operation, and an open in stop light switch circuit continues for 0.3 sec. or more.	★Stop light bulb ★Stop light switch circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check operation of the stop light switch.

CHECK:
Check that the stop light lights up when the brake pedal is depressed and goes OFF when the brake pedal is released.

OK → **Go to step 3.**

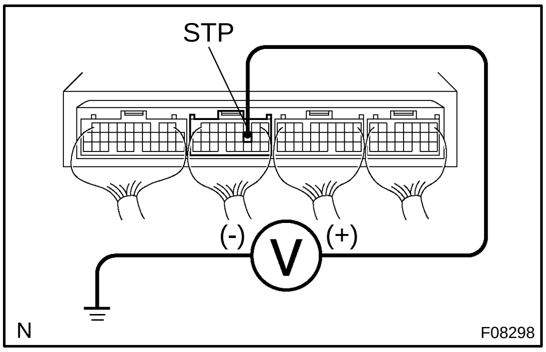
NG ↓

2	Check stop light circuit (See page BE-50).

NG → **Check stop light bulb and repair or replace stop light circuit.**

OK ↓

3	Check voltage between terminal STP of skid control ECU and body ground.



PREPARATION:
Remove the skid control ECU with connectors still connected.
CHECK:
Measure voltage between terminal STP of the skid control ECU and body ground when the brake pedal is depressed.
OK:
Voltage: 10 to 14 V

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page IN-36).**

NG ↓

4	**Check for open circuit in harness and connector between skid control ECU and stop light switch (See page IN-36).**

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

OK

Check and replace skid control ECU.

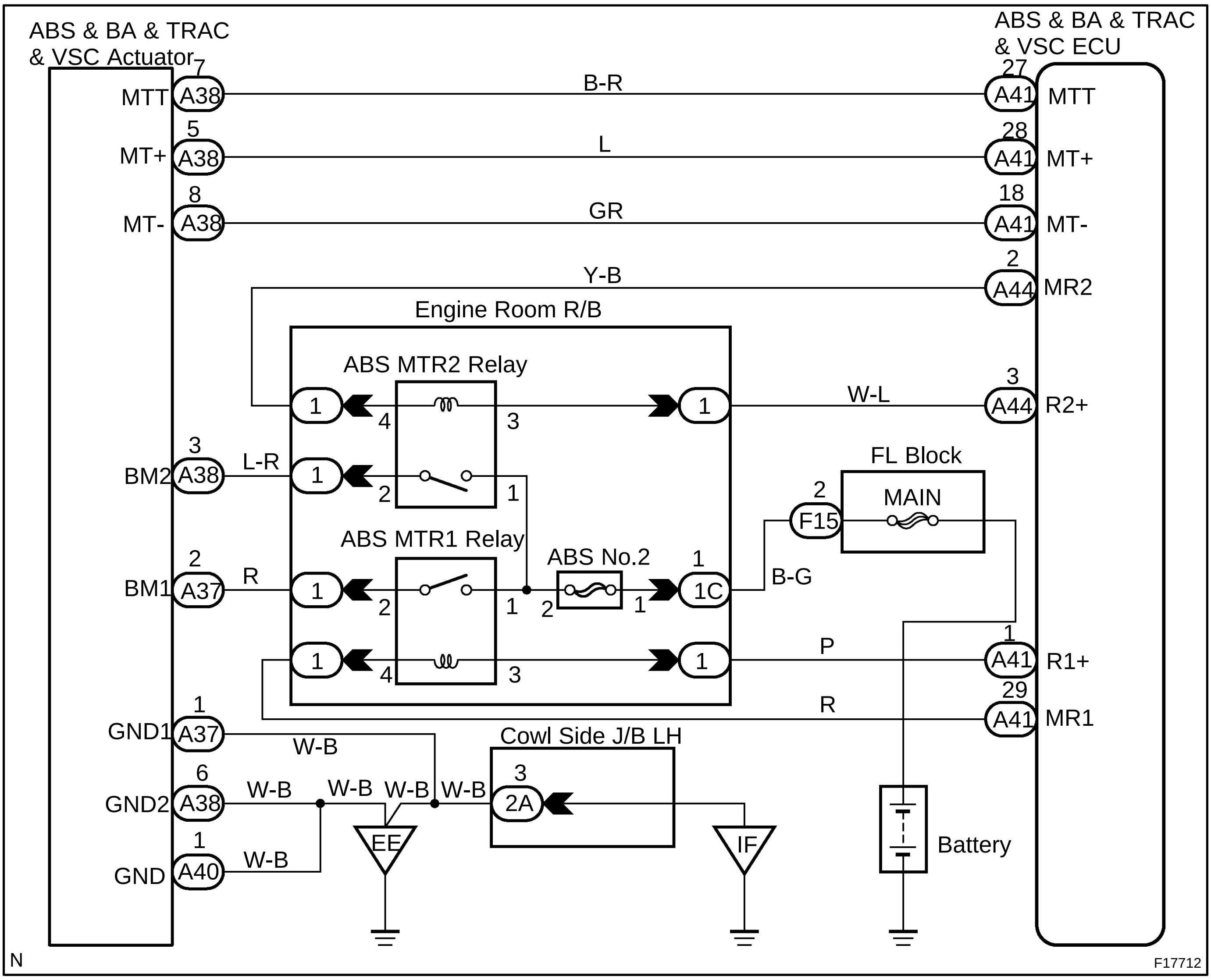
DIC9T-02

DTC	C1251 / 51	Hydraulic Brake Booster Pump Motor Malfunction

CIRCUIT DESCRIPTION

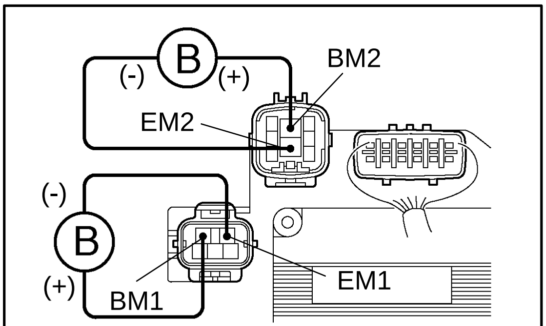
DTC No.	DTC Detecting Condition	Trouble Area
C1251 / 51	Either of the following 1. or 2. is detected: 1. After turning the ignition switch ON, the current of more than 30 A flows to the motor for more than 1 sec. 2. After turning the ignition switch ON, less than 7 A change in current is detected more than 3 times in a row when the motor is ON.	Hydraulic brake booster pump motor

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of hydraulic brake booster pump motor.**



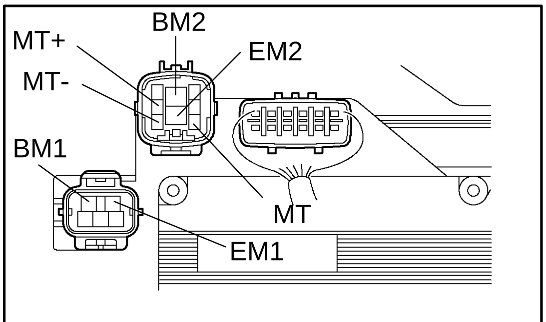
F02859

PREPARATION:
Disconnect the 2 connectors from the hydraulic brake booster.
CHECK:
Connect the battery positive ± lead to terminal BM1 or BM2 and the battery negative ≧ lead to terminal EM1 or EM2 of the hydraulic brake booster (pump motor) connector.
OK:
The operation sound of the pump motor should be heard.

NG	**Go to step 4.**

OK

2	**Check hydraulic brake booster resistance.**



F04505

PREPARATION:
Disconnect the 2 connectors from the hydraulic brake booster.
CHECK:
Check resistance between terminals MT+ and MT-, BM1 and MT, BM2 and MT, EM1 and MT+, EM2 and MT+ of the hydraulic brake booster connector.
OK:
30 to 36 Ω

NG	**Replace the hydraulic brake booster assembly.**

OK

3 **Check for open circuit in harness and connector between hydraulic brake booster (MT+, MT-) and skid control ECU (See page IN-36).**

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

OK

Check and replace skid control ECU.

4 **Check for open or short circuit in harness and connector between hydraulic brake booster and skid control ECU (See page IN-36).**

NG → **Replace wire harness.**

OK

5 **Check hydraulic brake booster pump motor (See page BR-64).**

NG → **Replace hydraulic brake booster pump motor.**

OK

Replace hydraulic brake booster.

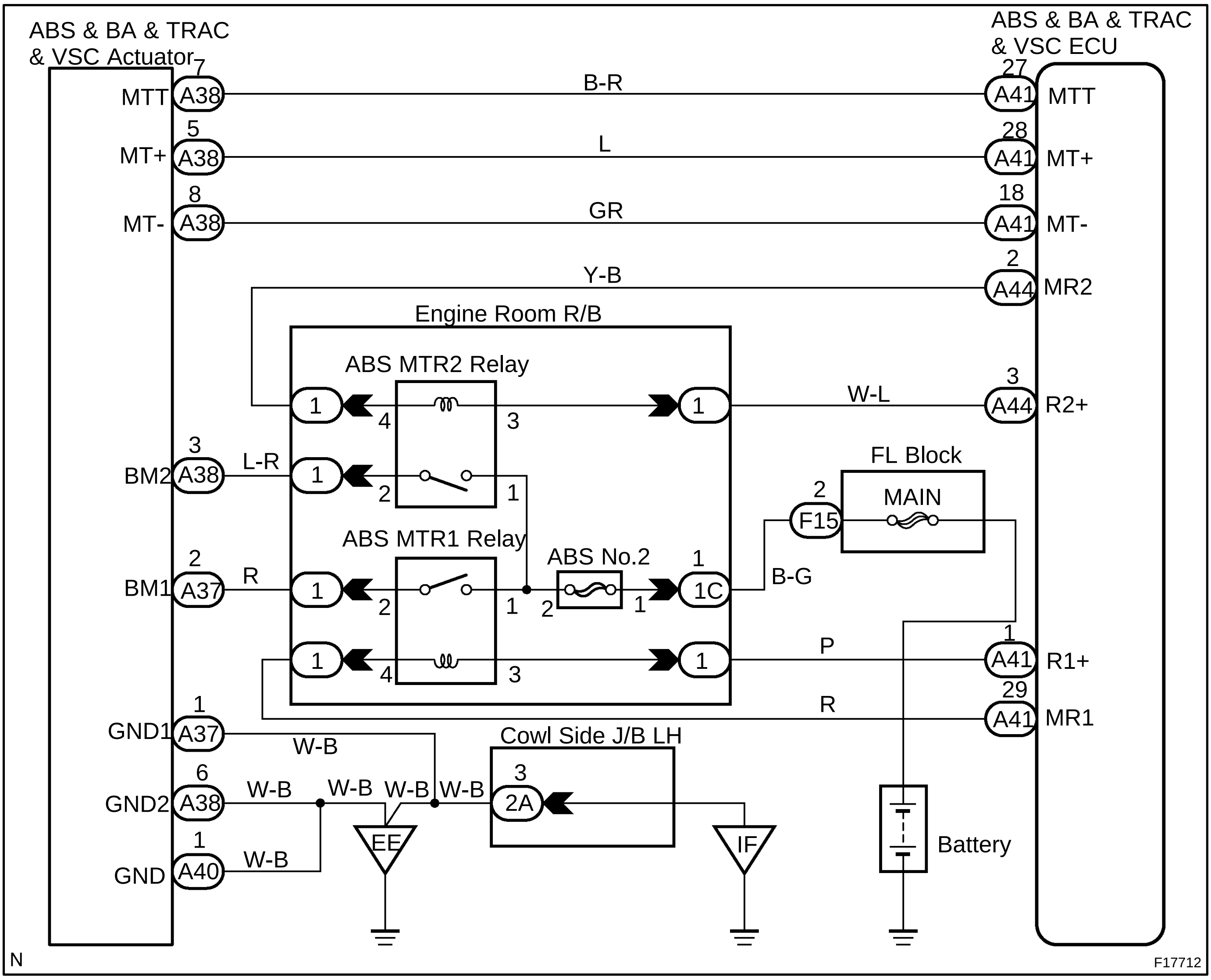
DIC9U-02

DTC	C1252 / 52	Hydraulic Brake Booster Pump Motor ON Time Abnormally Long

CIRCUIT DESCRIPTION

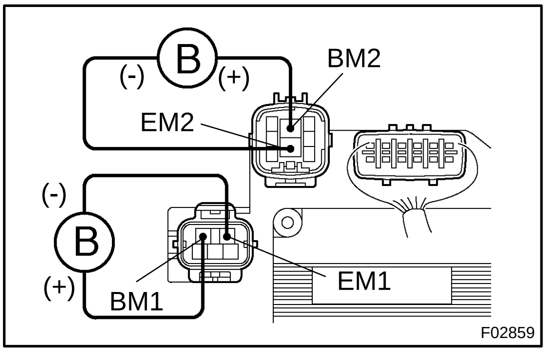
DTC No.	DTC Detecting Condition	Trouble Area
C1252 / 52	After the ignition switch is turned ON, the power is supplied to the pump motor for more than 5 minutes.	★Hydraulic brake booster pump motor ★Hydraulic brake booster pump motor circuit ★Pressure switch (PH or PL)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of hydraulic brake booster pump motor.**



PREPARATION:

Disconnect the 2 connectors from the hydraulic brake booster.

CHECK:

Connect the battery positive ± lead to terminal BM1 or BM2 and the battery negative ≧ lead to terminal EM1 or EM2 of the hydraulic brake booster (pump motor) connector.

OK:

The operation sound of the pump motor should be heard.

NG	**Go to step 9.**

OK

2	**Check for short circuit (to B+) in harness and connector between BM1 or BM2 of hydraulic brake booster and ABS motor 1 relay or ABS motor 2 relay (See page IN-36).**

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

OK

3	**Check for short circuit (to B+) in harness and connector between MT of hydraulic brake booster and skid control ECU (See page IN-36).**

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

OK

4	**Check pressure switch (PH).**

In case of using the hand-held tester:

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the DATA LIST mode on the hand-held tester.

CHECK:

Depress the brake pedal more than 40 times with the ignition switch OFF, then turn the ignition switch ON and check the pressure switch (PH) condition.

HINT:

When pressure in the power supply system is released, reaction force becomes light and stroke becomes longer.

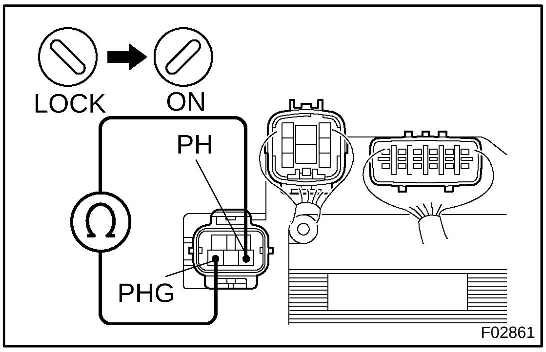
OK:

"OFF" turns to "ON".

HINT:

OFF: Low pressure

ON: High pressure



In case of not using the hand-held tester:

PREPARATION:

(a) Disconnect the connector (5P) from the hydraulic brake booster.
(b) With the ignition switch OFF, depress the brake pedal more than 40 times to decrease the accumulator pressure.

HINT:

When pressure in the power supply system is released, reaction force becomes light and stroke becomes longer.

CHECK:

Measure resistance between terminals PH and PHG of the hydraulic brake booster connector.

OK:

Resistance: 1.0 kΩ

PREPARATION:

(a) Connect the connector (5P) to the hydraulic brake booster.
(b) Disconnect the connector (5P) after the ignition switch is turned ON and the pump motor is stopped.

CHECK:

Measure resistance between terminals PH and PHG of the hydraulic brake booster connector.

OK:

Resistance: 0 Ω

HINT:

After inspection, connect the connector and clear the DTC (See page DI-505).

NG	**Replace hydraulic brake booster assembly.**

OK

5	**Check pressure switch (PL).**

In case of using hand-held tester:

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the DATA LIST mode on the hand-held tester.

CHECK:

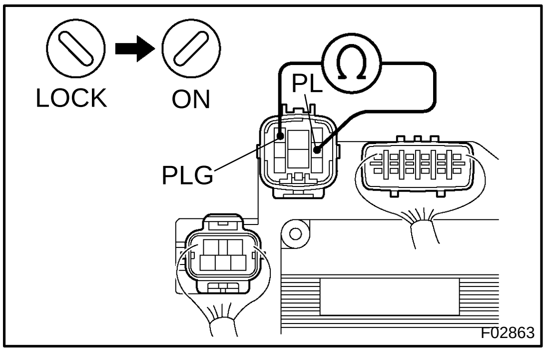
Depress the brake pedal more than 40 times with the ignition switch OFF, then turn the ignition switch ON and check the pressure switch (PL) condition.

HINT:
When pressure in the power supply system is released, reaction force becomes light and stroke becomes longer.

OK:

"OFF" turns to "ON".

HINT:
OFF: Low pressure
ON: High pressure



In case of not using hand-held tester:

PREPARATION:

(a) Disconnect the connector (8P) from the hydraulic brake booster.
(b) With the ignition switch OFF, depress the brake pedal more than 40 times to decrease the accumulator pressure.

HINT:
When pressure in the power supply system is released, reaction force becomes light and stroke becomes longer.

CHECK:

Measure resistance between terminals PL and PLG of the hydraulic brake booster connector.

OK:

Resistance: 5.7 kΩ

PREPARATION:

(a) Connect the connector (8P) to the hydraulic brake booster.
(b) Disconnect the connector (8P) after the ignition switch is turned ON and the pump motor is stopped.

CHECK:

Measure resistance between terminals PL and PLG of the hydraulic brake booster connector.

OK:

Resistance: 1.0 kΩ

HINT:
After inspection, connect the connector and clear the DTC (See page DI-505).

NG → **Replace hydraulic brake booster assembly.**

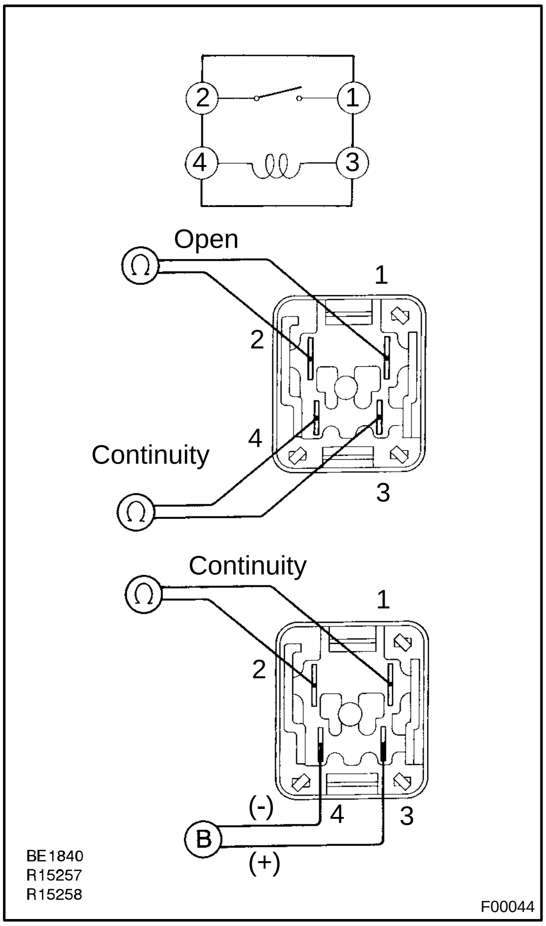
OK

6	**Check for short circuit (to B+) in harness and connector between pressure switch and skid control ECU (See page IN-36).**

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

OK

7	**Check ABS motor 1 relay and ABS motor 2 relay.**



PREPARATION:
Remove the ABS motor 1 relay and ABS motor 2 relay from the engine room J/B.

CHECK:
Check continuity between the motor relay terminals listed in the table below.

OK:

Terminals 3 and 4	Continuity (Reference value *1)
Terminals 1 and 2	Open

*1: ABS motor 1 relay: 54 Ω
ABS motor 2 relay: 62 Ω

CHECK:
(a) Apply battery positive voltage between terminals 3 and 4.
(b) Check continuity between terminals.

OK:

Terminals 1 and 2	Continuity

NG → **Replace ABS motor 1 relay or ABS motor 2 relay.**

OK

8	**Check for short circuit in harness and connector between ABS motor 1 relay or ABS motor 2 relay and skid control ECU (See page IN-36).**

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

OK

Check and replace skid control ECU.

9	**Check for open or short circuit in harness and connector between hydraulic brake booster and skid control ECU (See page IN-36).**

NG → **Replace wire harness.**

OK

10	**Check hydraulic brake booster pump motor (See page BR-64).**

NG → **Replace hydraulic brake booster pump motor.**

OK

Replace hydraulic brake booster.

DIC9V-02

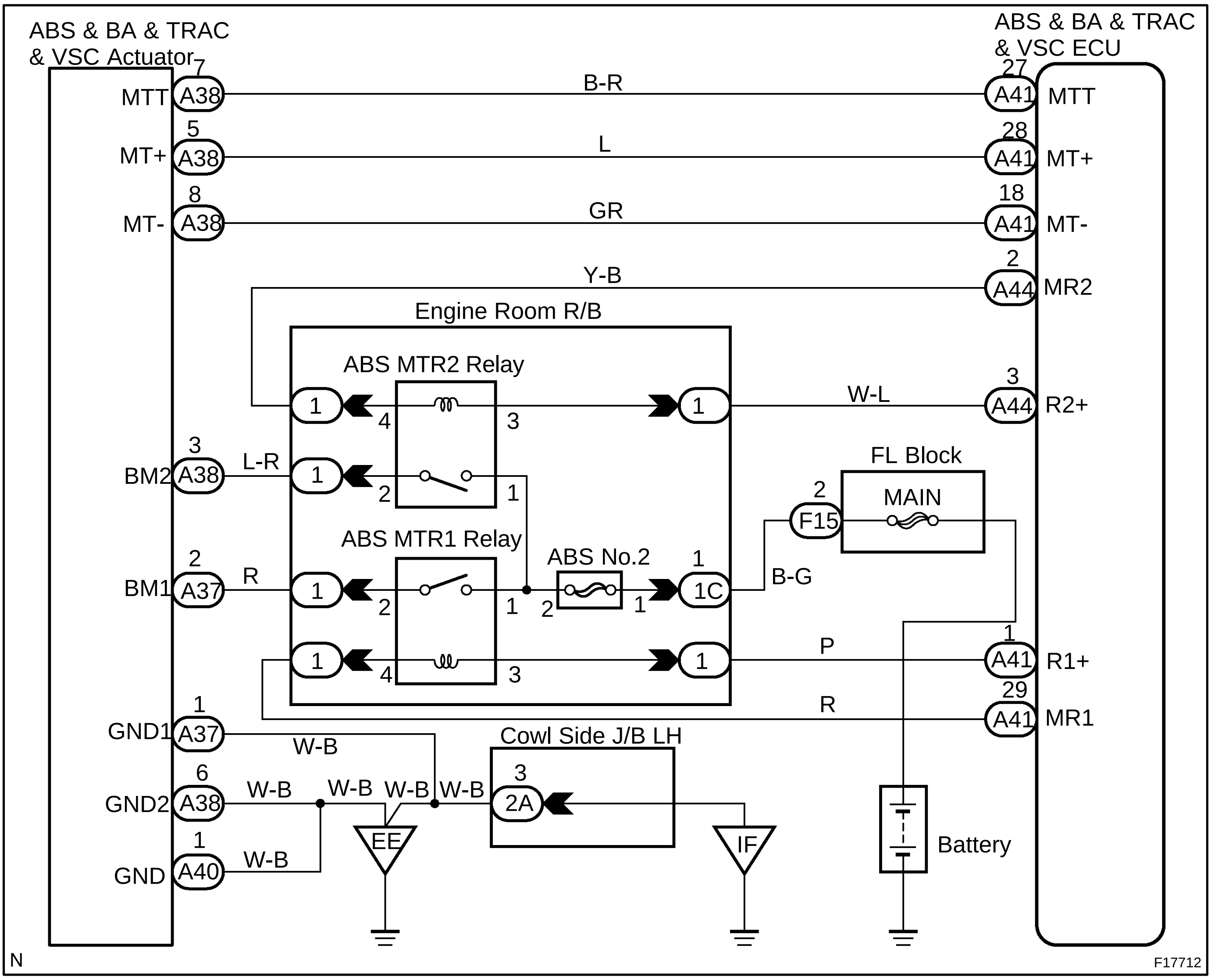
DTC	C1253 / 53	Motor Relay Circuit

CIRCUIT DESCRIPTION

The ABS motor 1 relay and ABS motor 2 relay supply power to the hydraulic brake booster pump motor. While the ABS & BA & TRAC & VSC are activated, the ECU switches the motor relay ON and operates the hydraulic brake booster pump motor.

DTC No.	DTC Detecting Condition	Trouble Area
C1253 / 53	When any of the following 1. through 4. is detected: 1. After turning the ignition switch ON, open in the relay coil is detected for more than 1 sec. 2. When the pressure switch does not control motor driving, the condition that the motor relay is always ON continues for more than 1 sec. due to short circuit. 3. When the pressure switch (PH) detects the low pressure or while the pump motor operates to increase the pressure, the condition that the motor relay does not turn ON continues for more than 0.2 sec. 4. When pressure switch does not control motor driving, the condition that the motor relay is always ON due to the welded contact continues for more than 2 sec.	★ABS motor 1 or ABS motor 2 relay ★ABS motor 1 or ABS motor 2 relay circuit ★Hydraulic brake booster pump motor circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Start the inspection from step 1, in case of using the hand-held tester and start from step 3, in case of not using hand-held tester.

1	**Check ABS motor 1 and ABS motor 2 relay operation.**

PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand-held tester.

CHECK:
Check the operation sound of the ABS motor relays individually when operating it with the hand-held tester.

OK:
The operation sound of the ABS motor 1 relay and ABS motor 2 relay should be heard.

NG → **Go to step 3.**

OK

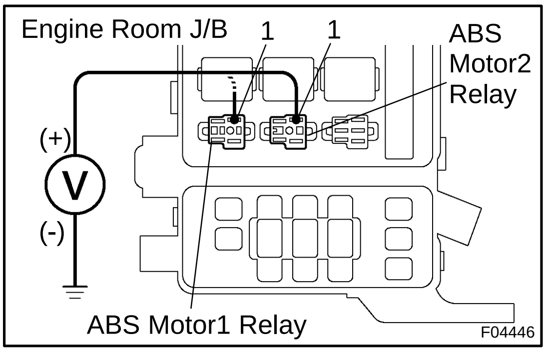
2	**Check for short circuit (to B+) in harness and connector between MT of hydraulic brake booster and skid control ECU (See page IN-36).**

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

OK

Check and replace skid control ECU.

3	Check voltage between terminal 1 of engine room J/B (for ABS motor 1 relay and ABS motor 2 relay) and body ground.



PREPARATION:
Remove the ABS motor 1 relay and ABS motor 2 relay from the engine room J/B.

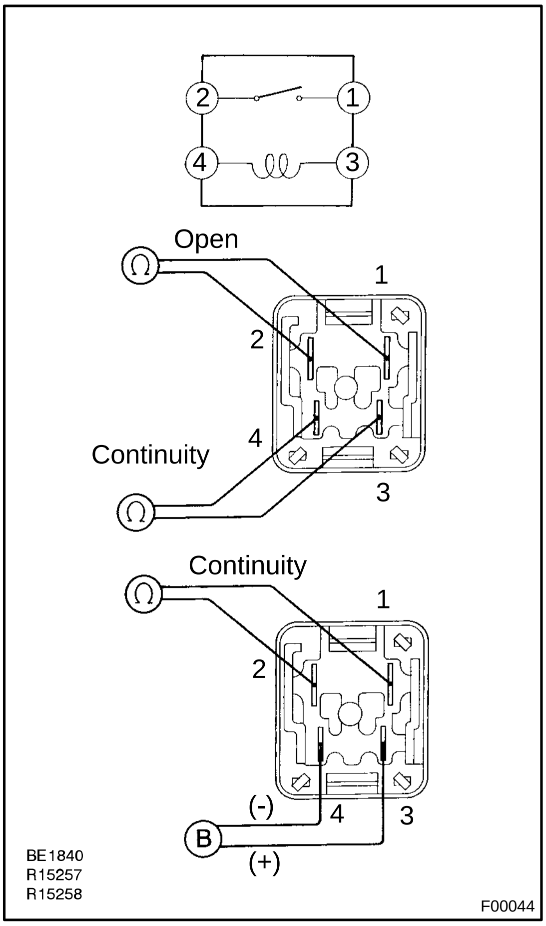
CHECK:
Measure voltage between terminal 1 of the engine room J/B (for ABS motor 1 relay and ABS motor 2 relay) and body ground.

OK:
Voltage: 10 to 14 V

NG	Check and repair harness or connector.

OK

4	Check ABS motor 1 relay and ABS motor 2 relay.



PREPARATION:
Remove the ABS motor 1 relay and ABS motor 2 relay from the engine room J/B.

CHECK:
Check continuity between the motor relay terminals listed in the table below.

OK:

Terminals 3 and 4	Continuity (Reference value *1)
Terminals 1 and 2	Open

*1: ABS motor 1 relay: 54 Ω
ABS motor 2 relay: 62 Ω

CHECK:
(a) Apply battery positive voltage between terminals 3 and 4.
(b) Check continuity between terminals.

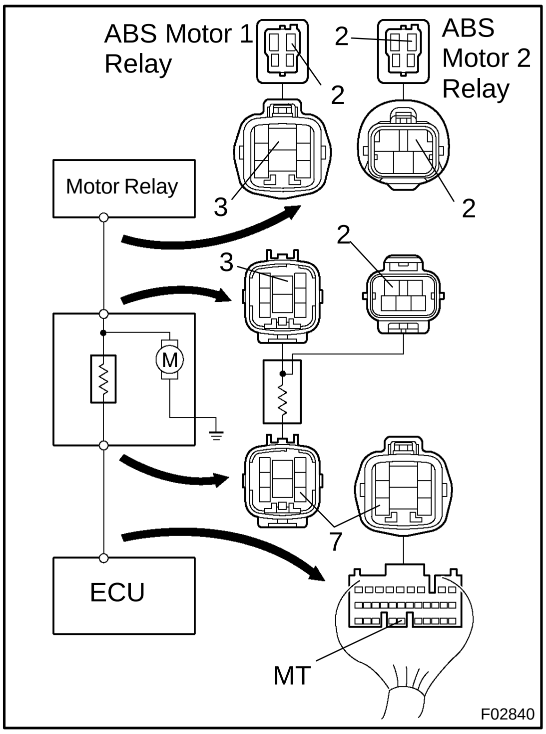
OK:

Terminals 1 and 2	Continuity

NG → **Replace ABS motor 1 relay or ABS motor 2 relay.**

OK

5	**Check continuity between terminal MT of the ABS & BA & TRAC & VSC ECU and terminals BM1 and BM2, respectively.**



PREPARATION:

Disconnect the 2 connectors from the hydraulic brake booster.

CHECK:

(a) Check continuity between terminal BM1 of the ABS motor 2 relay and terminal MT of the ABS & BA & TRAC & VSC ECU.

(b) Check continuity between terminal BM2 of the ABS motor 1 relay and terminal MT of the ABS & BA & TRAC & VSC ECU.

OK:

Continuity

HINT:

There is resistance of 33 ± 3 Ω between terminal BM1or BM2 and MT of the hydraulic brake booster.

NG → **Repair or replace harness, connector or hydraulic brake booster.**

OK

6	**Check for open and short circuit in harness and connector between ABS motor1 and ABS motor2 relay and ABS & BA & TRAC & VSC ECU (See page IN-36).**

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

OK

Check and replace ABS & BA & TRAC & VSC ECU.

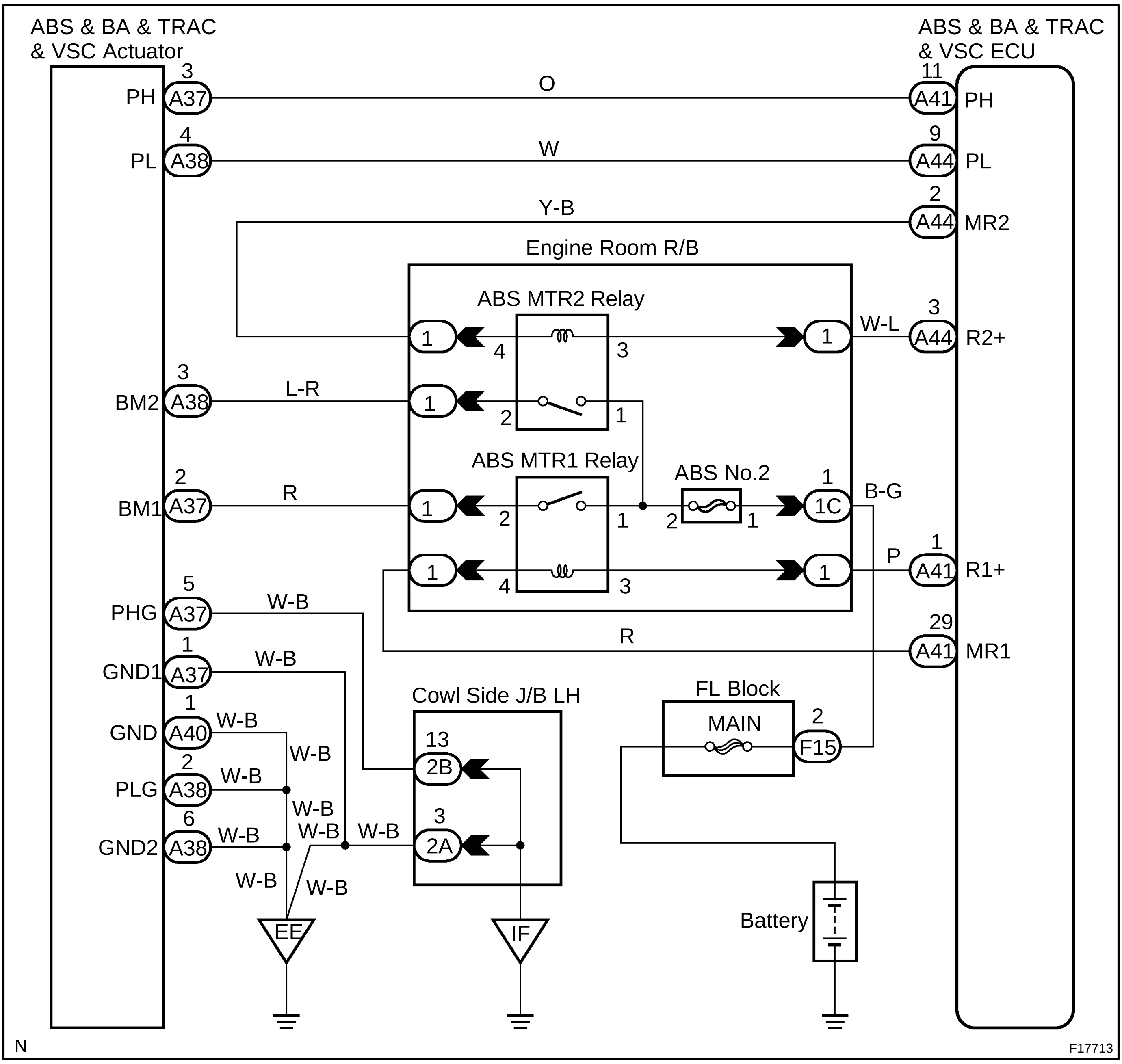
DIC9W-01

DTC	C1254 / 54	Pressure Switch Circuit

CIRCUIT DESCRIPTION

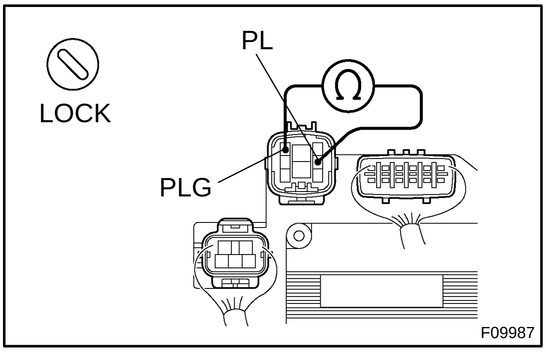
DTC No.	DTC Detecting Condition	Trouble Area
C1254 / 54	Either of the following 1. or 2. is detected: 1. After turning the ignition switch ON, short or open circuit in pressure switch (PL) continued for more than 1 sec. 2. After turning the ignition switch ON, open in pressure switch (PH) continued for more than 1 sec.	★Pressure switch (PH or PL) ★Pressure switch circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check pressure switch (PL) resistance.**



PREPARATION:

(a) Disconnect the connector (8P) from the hydraulic brake booster.

(b) With the ignition switch OFF, depress the brake pedal more than 40 times to decrease the accumulator pressure.

HINT:
When pressure in the power supply system is released, reaction force becomes light and stroke becomes longer.

CHECK:
Measure resistance between terminals PL and PLG of the hydraulic brake booster connector.

OK:

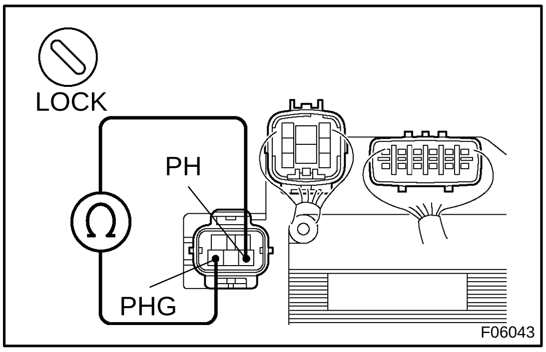
Resistance: 5.1 to 6.3 kΩ

HINT:
After inspection, connect the connector and clear the DTC (See page DI-505).

NG	**Replace hydraulic brake booster assembly.**

OK

2	**Check pressure switch (PH) resistance.**



PREPARATION:

(a) Disconnect the connector (5P) from the hydraulic brake booster.

(b) With the ignition switch OFF, depress the brake pedal more than 40 times to decrease the accumulator pressure.

HINT:

When pressure in the power supply system is released, reaction force becomes light and stroke becomes longer.

CHECK:

Measure resistance between terminals PH and PHG of the hydraulic brake booster connector.

OK:

Resistance: 0.9 to 1.1 kΩ

HINT:

After inspection, connect the connector and clear the DTC (See page DI-505).

NG → **Replace hydraulic brake booster assembly.**

OK

3	**Check for open and short circuit in harness and connector between pressure switch and skid control ECU (See page IN-36).**

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

OK

Check and replace skid control ECU.

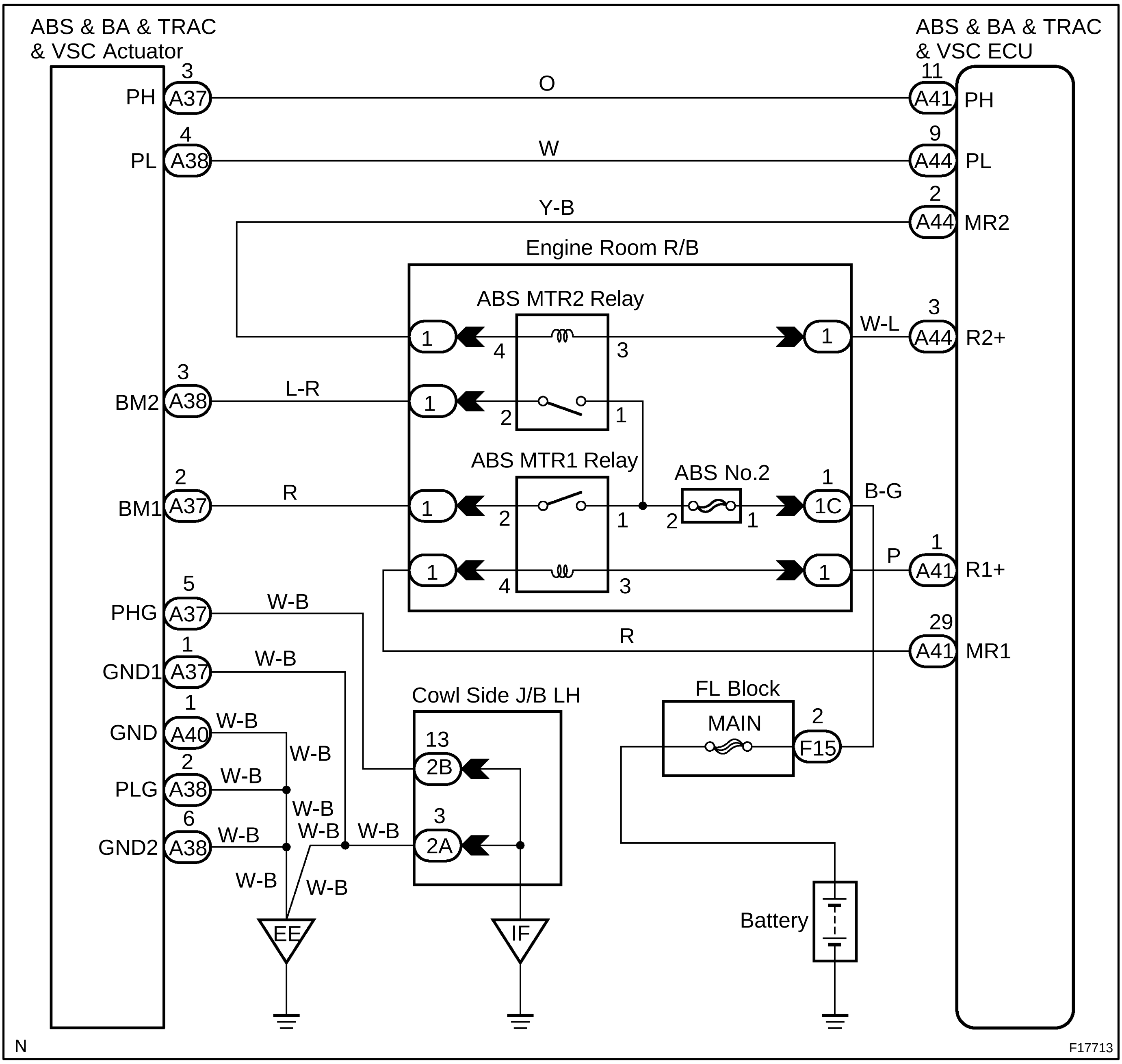
DIC9X-02

DTC	C1256 / 56	Accumulator Low Pressure Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1256 / 56	Any of the following 1. through 7. is detected: 1. With the vehicle running, when the pressure switch (PL) detects high pressure, although ABS, TRAC or VSC does not control, the pressure switch (PL) detects low pressure for more than 1.4 sec. 2. With the vehicle running, when the pressure switch (PL) detects high pressure, although ABS, TRAC or VSC controls, the pressure switch (PL) detects low pressure for more than 0.2 sec. 3. After the ignition switch is turned ON, the pressure switch (PL) detects low pressure for more than 64 sec. 4. With the vehicle running, after ignition switch has been ON, the pressure switch (PL) detects low pressure for more than 0.2 sec. although ABS, TRAC, or VSC does not control and when the pressure switch is ON and stuck under high pressure. 5. With the vehicle running, after ignition switch is ON, the pressure switch (PL) detects low pressure for more than 0.2 sec. when ABS, TRAC or VSC controls, the pressure switch is ON and stuck under high pressure. 6. With the vehicle running, after ignition switch is ON, the pressure switch (PL) is stuck to under low pressure although ABS, TRAC or VSC does not control for more than 1.4 sec. 7. With the vehicle running, after ignition switch is ON, the pressure switch (PL) is stuck under low pressure when ABS, TRAC or VSC controls for more than 0.2 sec.	★Accumulator ★Pressure switch (PH or PL) ★Hydraulic brake booster pump motor

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check accumulator operation.

PREPARATION:

(a) Turn the ignition switch OFF, and depress the brake pedal 40 times or more.

HINT:

When pressure in the power supply system is released, reaction force becomes light and stroke becomes longer.

(b) Install the LSPV gauge (SST) to the rear brake caliper and bleed air.

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CHECK:

Depress the brake pedal with a force of more than 294 N (30 kgf, 66 lbf) and turn the ignition switch ON, then check the rear brake caliper pressure when an increase of pressure changes from acutely to mildly.

OK:

5,099 to 8,924 kPa (52 to 91 kgf/cm^2, 740 to 1,294 psi) at 20˚C (68˚F)

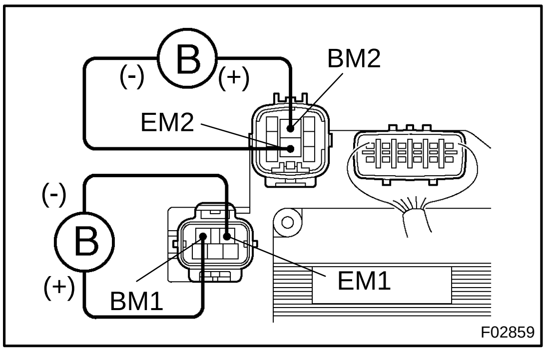
HINT:

If the value is not within the standard, cool the engine room and check it again.

NG → **Replace accumulator.**

OK

2	Check operation of hydraulic brake booster pump motor.



PREPARATION:

Disconnect the 2 connectors from the hydraulic brake booster.

CHECK:

Connect the battery positive ± lead to BM1 or BM2 terminal and the battery negative ≧ lead to EM1 or EM2 terminal of the hydraulic brake booster (pump motor) connector.

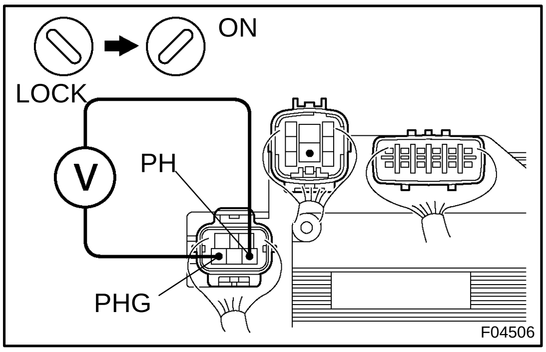
OK:

The operation sound of the pump motor should be heard.

NG → **Go to step 7.**

OK

3	**Check pressure switch (PH) operation.**



PREPARATION:

(a) Turn the ignition switch OFF, and depress the brake pedal 40 times or more.

HINT:

When pressure in the power supply system is released, reaction force becomes light and stroke becomes longer.

(b) Install the LSPV gauge (SST) to the rear brake caliper and bleed air.

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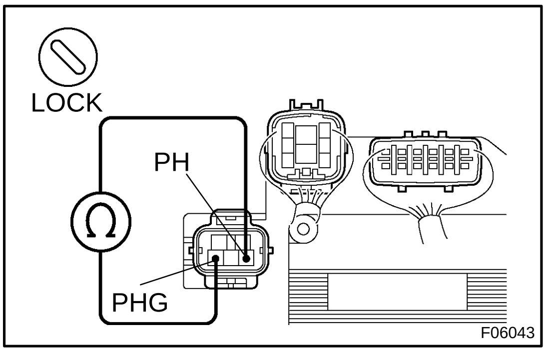
CHECK:

While checking the voltage between terminals PH and PHG of the hydraulic brake booster, depress the brake pedal with a force of more than 294 N (30 kgf, 66 lbf) and turn the ignition switch ON, then check the rear wheel cylinder pressure when voltage changes from 6 V to 0 V.

OK:

12,553 to 20,104 kpa (128 to 205 kgf·cm^2, 1,820 to 2,916 psi)



PREPARATION:

Turn the ignition switch OFF and disconnect the connector (5P) from the hydraulic brake booster.

CHECK:

While checking the resistance between terminals PH and PHG, depress the brake pedal changing the force in a range of 197 N (20 kgf, 44 lbf) to 294 N (30 kgf, 66 lbf) and check the rear wheel cylinder pressure when resistance changes from 0 kΩ to 1 kΩ between PH and PHG.

OK:

11,964 to 18,240 kpa (122 to 186 kgf·cm^2, 1,735 to 2,645 psi)

HINT:

After inspection, connect the connector, fill brake reservoir with brake fluid and clear the DTC (See page DI-505).

OK	**Go to step 5.**

NG

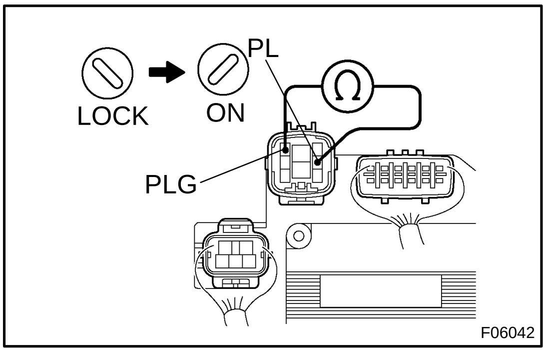
4	**Check for open circuit in harness and connector between pressure switch (PH) and skid control ECU (See page IN-36).**

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

OK

Replace hydraulic brake booster assembly.

5	**Check pressure switch (PL) operation.**



PREPARATION:

(a) Turn the motor switch OFF, and depress the brake pedal 40 times or more.

HINT:
When pressure in the power supply system is released, reaction force becomes light and stroke becomes longer.

(b) Install the LSPV gauge (SST) to the rear brake caliper and bleed air.
SST 09709 -29018

(c) Disconnect the connector (8P) from the hydraulic brake booster.

CHECK:

While checking the resistance between terminals PL and PLG of the hydraulic brake booster, depress the brake pedal with a force of more than 294 N (30 kgf, 66 lbf) and turn the ignition switch ON, then check the rear wheel cylinder pressure when the resistance changes from 5.7 kΩ to 1.0 kΩ.

OK:

9,022 to 15,102 kpa (92 to 154 kgf·cm^2, 1,308 to 2,190 psi)

PREPARATION:

Turn the ignition switch OFF and disconnect the connector (8P) from the hydraulic brake booster.

CHECK:

While checking the resistance between terminals PL and PLG of the hydraulic brake booster, depress the brake pedal changing the force in a range of 197 N (20 kgf, 44 lbf) to 294 N (30 kgf, 66 lbf) and check the rear wheel cylinder pressure when resistance changes from 1.0 kΩ to 5.7 kΩ.

OK:

8,532 to 13,337 kpa (87 to 136 kgf·cm^2, 1,237 to 1,934 psi)

HINT:
After inspection, connect the connector, fill brake reservoir with brake fluid and clear the DTC (See page DI-505).

NG → **Replace hydraulic brake booster assembly.**

OK

6	**Check pressure switch (PH) and pressure switch (PL)**

CHECK:
Compare the pressure value of the rear wheel cylinder measured in check pressure switch (PL) operation with the one measured in check pressure switch (PH) operation.

OK:

★ **Pressure when the voltage between PH and PHG becomes 6 to 0 V > pressure when the resistance between PL and PLG becomes 5.7 kΩ to 1.0 kΩ.**

★ **Pressure when the resistance between PH and PHG becomes 0 kΩ to 1 kΩ > pressure when the resistance between PL and PLG becomes 1.0 kΩ to 5.7 kΩ.**

NG → **Replace hydraulic brake booster assembly.**

OK

Check and replace skid control ECU.

7	**Check for open or short circuit in harness and connector between hydraulic brake booster pump motor and hydraulic brake booster (See page IN-36).**

NG → **Replace wire harness.**

OK

8	**Check hydraulic brake booster pump motor (See page BR-64).**

NG → **Replace hydraulic brake booster pump motor.**

OK ↓

Replace hydraulic brake booster.

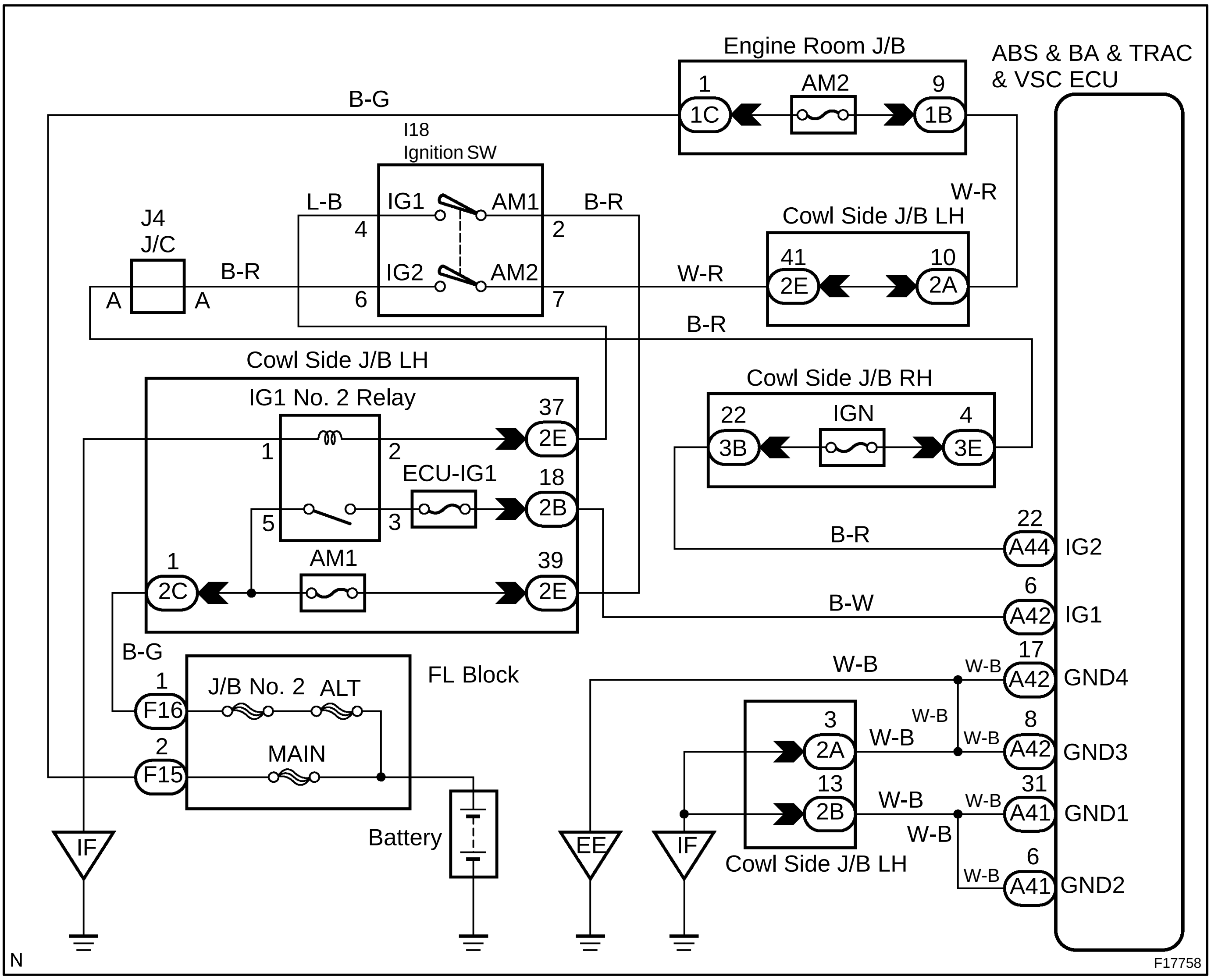
DIC9Y-01

DTC	C1257 / 57	Power Supply Drive Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1257 / 57	When a malfunction inside ECU is detected.	★Battery ★Power source circuit ★Skid control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check battery positive voltage.**

OK:

Voltage: 10 to 14 V

NG → **Check and repair the charging system.**

OK ↓

2	**Check voltage of the ECU IG power source.**

In case of using the hand-held tester:

PREPARATION:

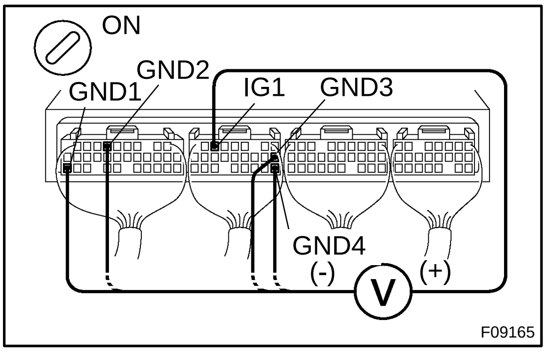
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the DATA LIST mode on the hand-held tester.

CHECK:

Check the voltage condition output from the ECU displayed on the hand-held tester.

OK:

"Normal" is displayed.



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In case of not using the hand-held tester:

PREPARATION:

Remove the skid control ECU with connectors still connected.

CHECK:

(a) Turn the ignition switch ON.
(b) Measure voltage between terminals IG1 and GND of the skid control ECU connector.

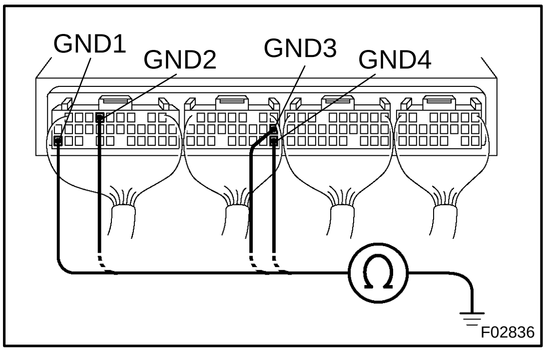
OK:

Voltage: 10 to 14 V

OK → **Turn ignition switch OFF, check and replace skid control ECU.**

NG ↓

3	**Check continuity between terminal GND of skid control ECU connector and body ground.**



CHECK:
Measure resistance between terminal GND of the skid control ECU connector and body ground.

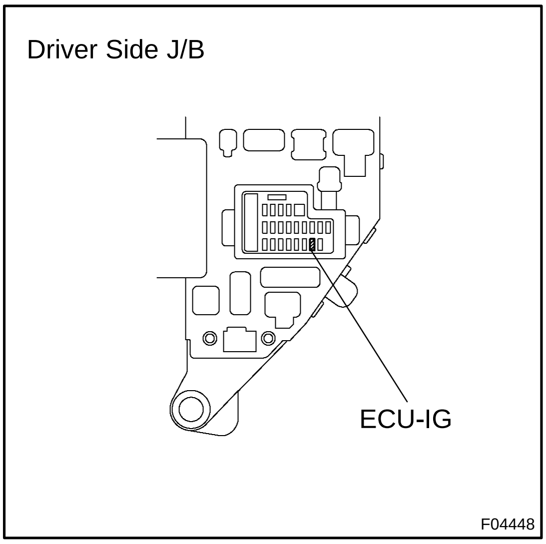
OK:

Resistance: 1 Ω or less

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

OK

4	**Check ECU-IG fuse.**



PREPARATION:
Remove the ECU-IG fuse from the driver side J/B.

CHECK:
Check continuity of the 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

Check for open circuit in harness and connector between skid control ECU and battery (See page IN-36).

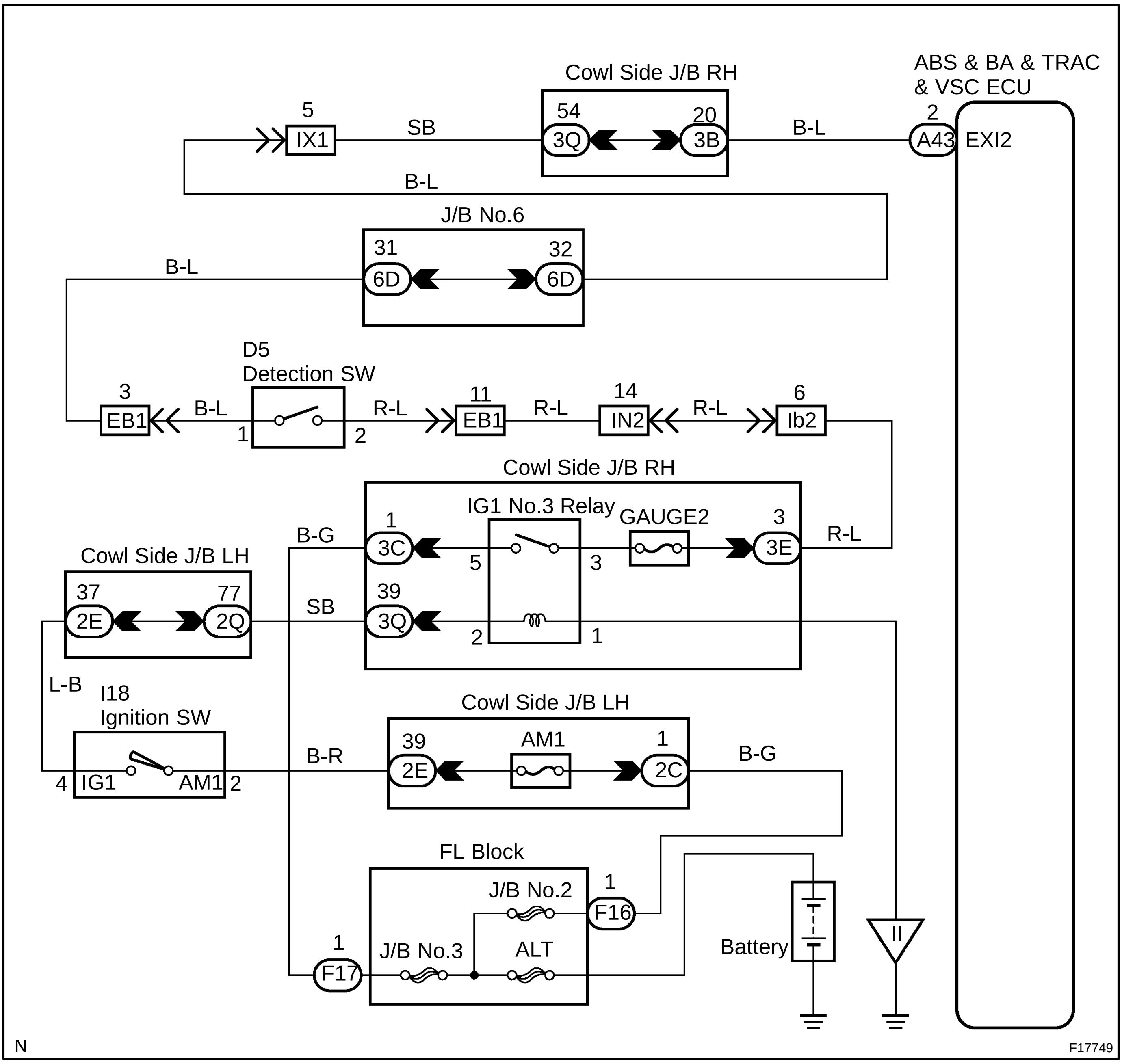
DIC9Z-01

DTC	C1268 / 68	Transfer L4 Position Switch Circuit

CIRCUIT DESCRIPTION

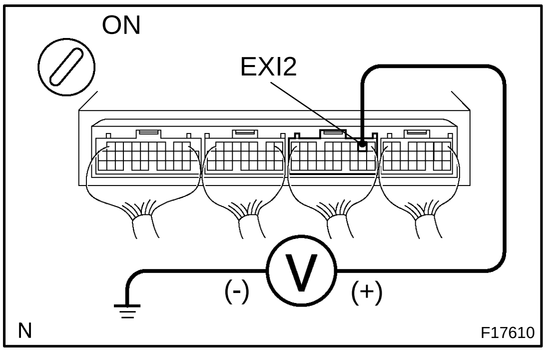
DTC No.	DTC Detecting Condition	Trouble Area
C1268 / 68	Open or short circuit in transfer L4 position switch.	★Transfer L4 position switch ★Transfer L4 position switch circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal EXI2 of skid control ECU and body ground.**



PREPARATION:

Remove the skid control ECU with connectors still connected.

CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminal EXI2 of the skid control ECU and body ground when the transfer is in the L4 position.

OK:

Voltage: 10 to 14 V

OK → **Proceed to next circuit inspection shown in problem symptoms chart (See page DI-526).**

NG

2	**Check transfer L4 position switch (See page TR-49).**

NG → **Replace transfer L4 position switch.**

OK

3	**Check for open or short circuit in harness and connector between transfer L4 position switch and skid control ECU (See page IN-36).**

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

OK

4	**Check for open or short circuit in harness and connector between skid control ECU and ECM (See page IN-36).**

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

OK

Check and replace skid control ECU.

DICA0-01

DTC	C1290 / 66	Zero Point Calibration of Steering Sensor Undone

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1290 / 66	The steering sensor zero point calibration position vastly differs from the recorded value. (The angle becomes larger)	★Yaw rate sensor zero point calibration undone ★Steering angle sensor zero point calibration undone

INSPECTION PROCEDURE

1	**Perform zero point calibration. (See page DI-505)**

HINT:
This code is output when a problem occurs in a zero point calibration of the steering angle sensor and yaw rate sensor.
Therefore, clear the stored zero point calibration data and correct the zero points.
(a) Clear the zero point calibration data.
(b) Perform a zero point calibration of the steering sensor and yaw rate sensor.

NEXT

2	**Is DTC output?**

(a) Clear the DTCs.
(b) Turn the ignition switch to the ON position.
(c) Are the same DTCs detected?

NO → **Proceed to next circuit inspection shown in problem symptoms table.**

YES

No problem.

HINT:
When the registered data is not equal to the input data, the DTC will be output.

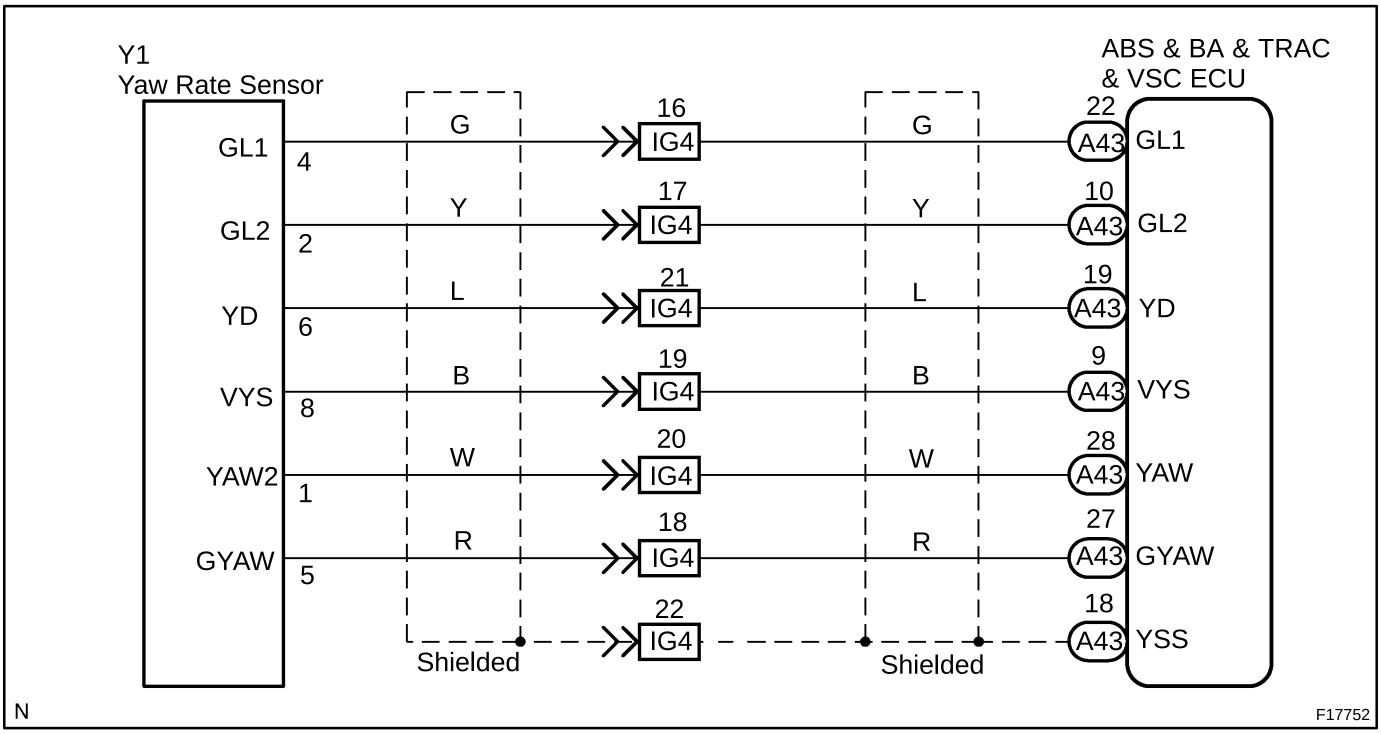
DICA1-01

DTC	C1336 / 39	Zero Point Calibration of Deceleration Sensor Undone

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1236 / 39	When either of the following 1. or 2. is detected: 1. In TEST mode, the shift lever is shifted to other than P position within 2 sec. after ECU terminal IG1 is turned ON for the first time. 2. When the deceleration sensor zero point recorded in ECU is deleted.	★Deceleration sensor ★Deceleration sensor circuit ★PNP switch circuit (R position)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check whether zero point calibration of yaw rate (deceleration) sensor has been done or not.

PREPARATION:

Shift the shift lever in the P position and turn the ignition switch ON. Repeat connecting and releasing Ts and E_1 terminals of the DLC1 4 times or more for 8 sec. After this, turn the ignition switch OFF and after connecting terminals Ts and E_1, turn it ON again.

2	**Carry out yaw rate (deceleration) sensor zero point calibration and confirm it by VSC TRAC warning light.**

OK:

VSC TRAC warning light blinks

OK → **No problem.**

NG ↓

3	**Check DTC for the VSC (See page DI-505).**

*1 :Other than DTC C1336 / 39 is output.
*2 :DTC C1336 / 39 only is output.

***1** → **Repair ABS control system according to the code output.**

***2** ↓

4	**Check for open and short circuit in harness and connector between PNP switch (P position) and skid control ECU and ECM (See page IN-36).**

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

OK ↓

5	**Check for open and short circuit in harness and connector between yaw rate (deceleration) sensor and skid control ECU (See page IN-36).**

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

OK ↓

6	**Check yaw rate (deceleration) sensor (See page DI-505).**

NG → **Replace yaw rate sensor.**

OK

Check and replace skid control ECU.

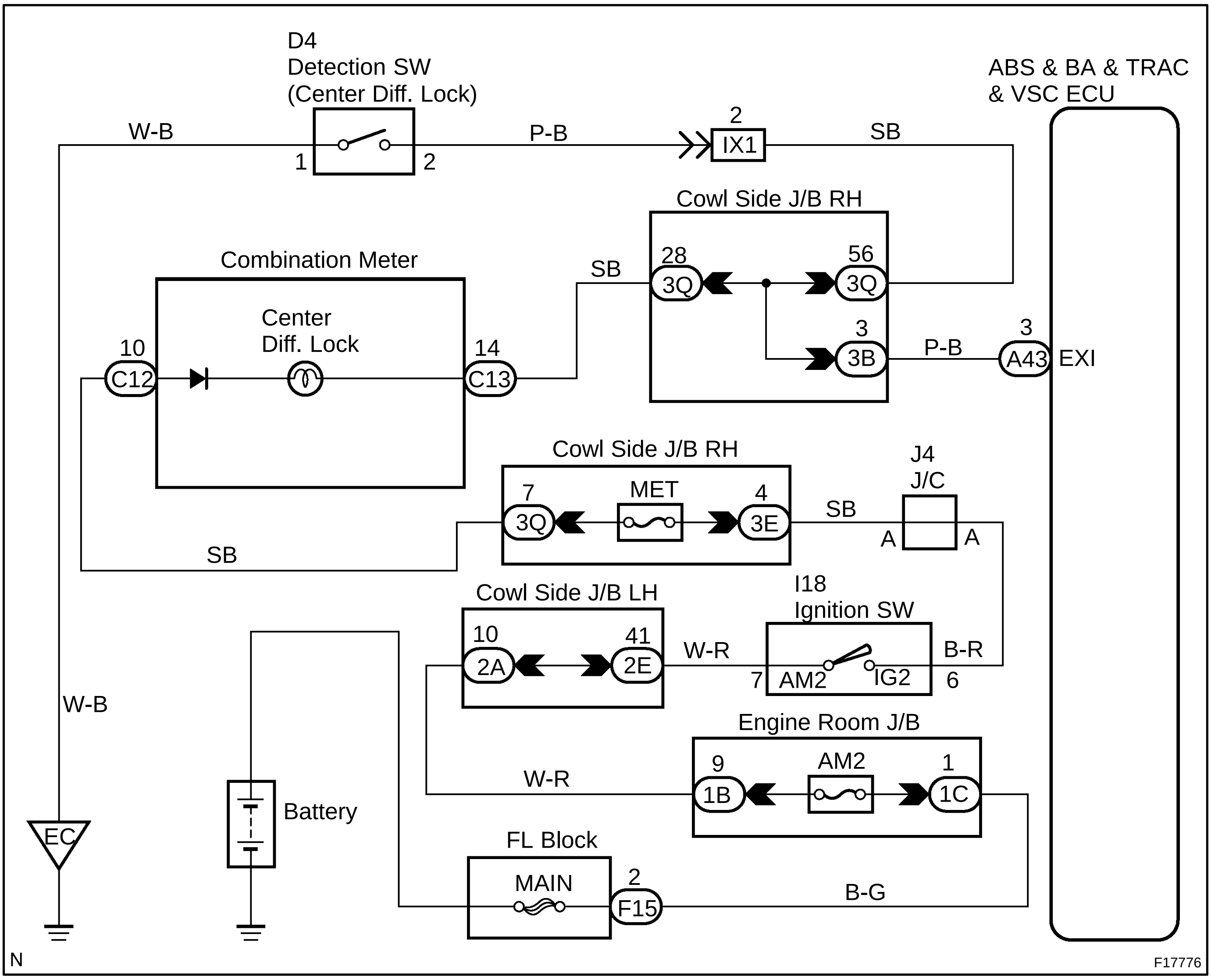
DICA2-01

DTC	C1340 / 47	Center Differential Lock Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1240 / 47	Open or short in center differential lock circuit.	★Center differential lock system ★Center differential lock circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check that the center differential is free and center diff. lock switch is OFF.**

NG → **Repair the center differential lock system.**

OK

2	**Is DTC output?**

Check the DTC on page DI-505 .

NO → **END**

YES

3	**Check that bulb for center diff. lock indicator light is not burnt out.**

NG → **Replace indicator light.**

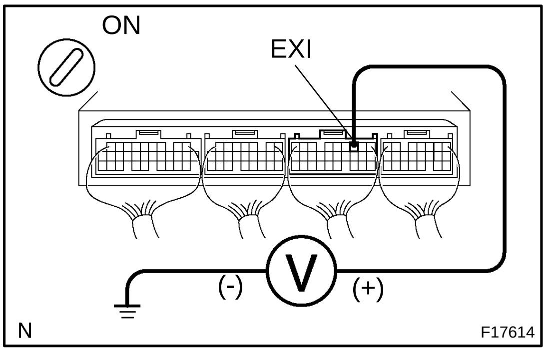
OK

4	**Check for open circuit in harness and connector between battery and center diff. lock indicator light, center diff. lock indicator light and skid control ECU (See page IN-36).**

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

OK

5	**Check voltage between terminal EXI of skid control ECU and body ground.**



PREPARATION:

Remove the skid control ECU with connectors still connected.

CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminal EXI of the skid control ECU and body ground when the transfer is in the L4 position.

OK:

Voltage: 10 to 14 V

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

OK

6	**Check transfer indicator switch (See page TR-49).**

NG → **Replace transfer indicator switch.**

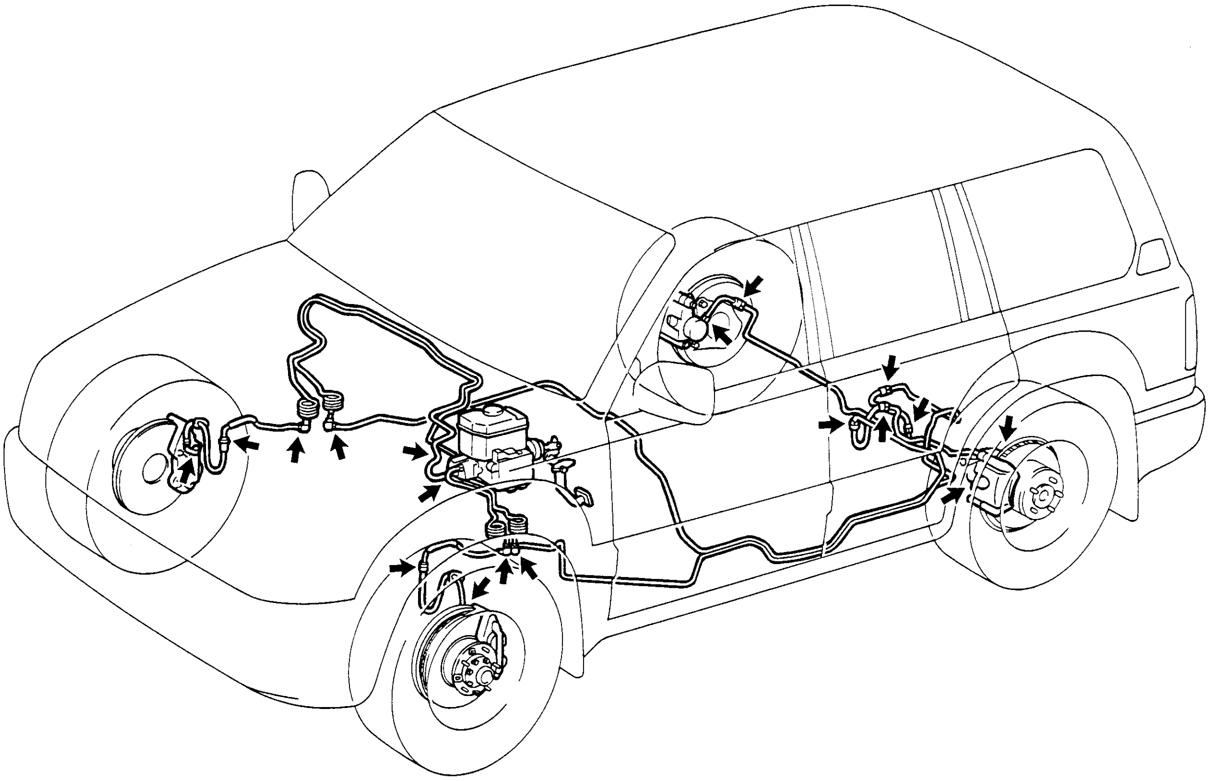
OK

Check and replace skid control ECU.

DICAE-01

Check for Fluid Leakage

Check for fluid leakage from the actuator or hydraulic lines.



N

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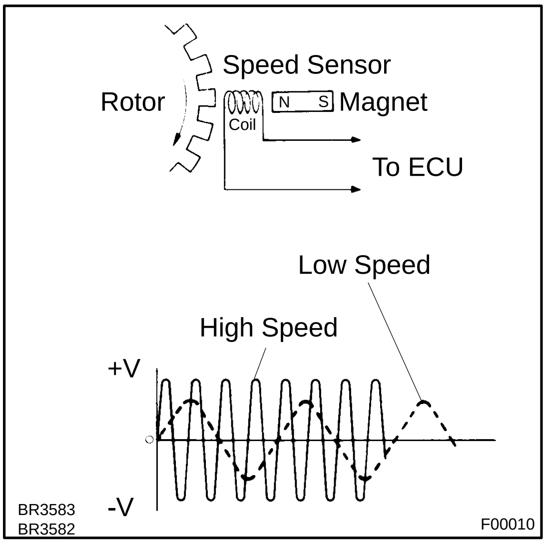
DIC94-02

CIRCUIT INSPECTION

DTC	C0200 / 31 - C1239 / 39	Speed Sensor Circuit

CIRCUIT DESCRIPTION

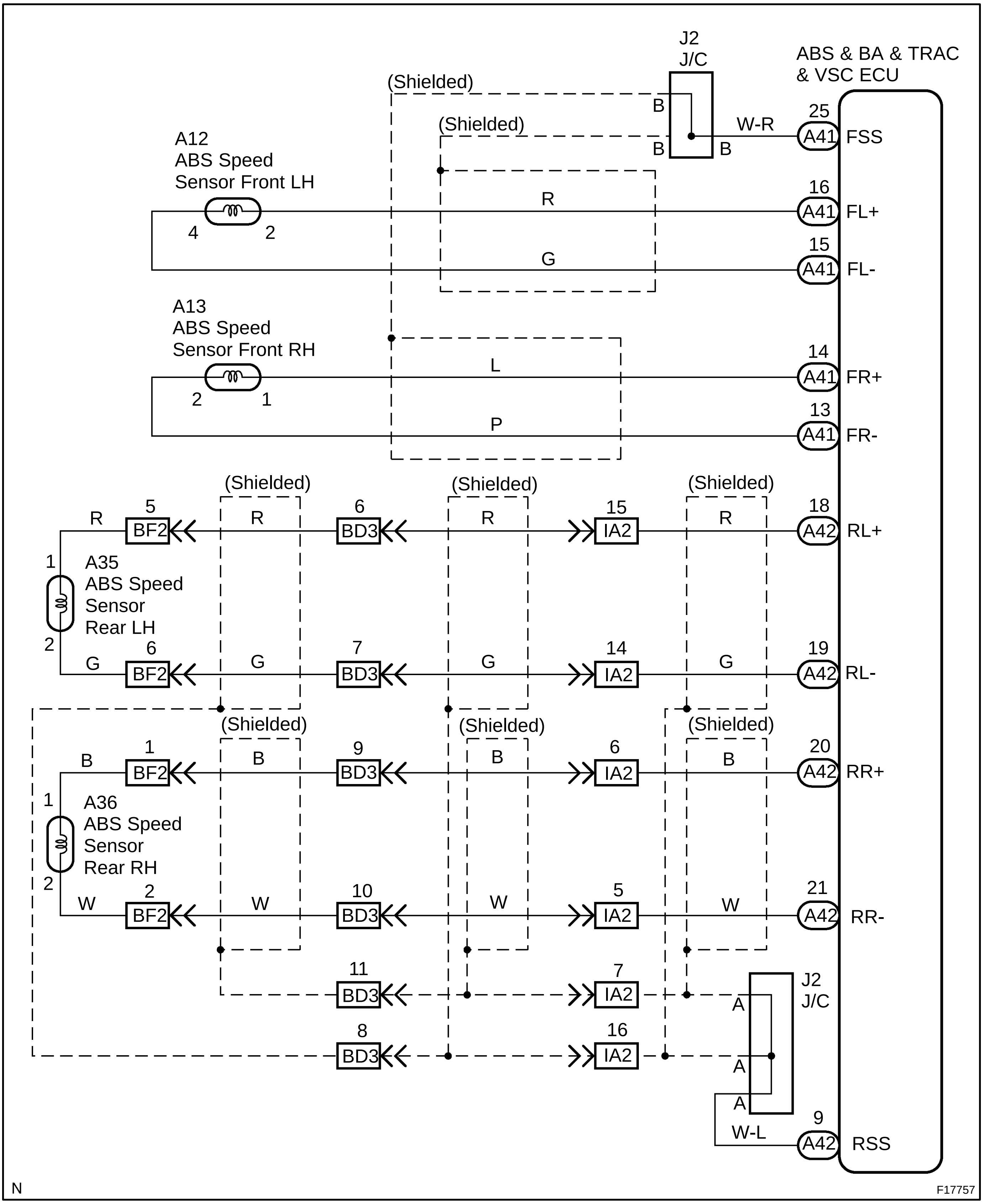


The speed sensor detects wheel speed and sends the appropriate signals to the ECU. These signals are used for control of the ABS & BA & TRAC & VSC control system. The front and rear rotors each have 48 serrations.
When the rotors rotate, the magnetic field emitted by the permanent magnet in the speed sensor generates 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
C0200 / 31 C0205 / 32 C0210 / 33 C0215 / 34	Detection of any of the conditions 1. through 4.: 1. At a vehicle speed of 6 mph (10 km/h) or more, pulses are not input for 15 sec. 2. Momentary interruption of the speed sensor signal occurs at least 7 times in the time between switching the ignition switch ON and switching it OFF. 3. Continuous noise occurs into the speed sensor signals with a vehicle speed at 12 mph (20 km/h) or more. 4. The condition that the speed sensor signal circuit is open continues for 0.12 sec. or more. ★ABS does not function ★Brake pedal is not depressed ★Parking brake is not set ★Rear differential does not lock Under the above conditions, when the difference in velocity between the highest rotating and the second highest rotating wheels is within 1 mph (2 km/h), the slowest wheel rotates at 0 mph (0 km/h), and the second slowest wheel rotates at 7 mph (12 km/h) for 1 second or more.	★Right front, left front, right rear and left rear speed sensor ★Each speed sensor circuit ★Sensor rotor
C1235 / 35 C1236 / 36 C1238 / 38 C1239 / 39	Continuous noise occurs into the speed sensor signals with a vehicle speed at 12 mph (20 km/h) or more continues for 5 sec or more.	★Right front, left front, right rear, left rear speed sensor ★Speed sensor rotor

HINT:
★ DTC No. C0200 / 31 and C1235 / 35 are for the right front speed sensor.
★ DTC No. C0205 / 32 and C1236 / 36 are for the left front speed sensor.
★ DTC No. C0210 / 33 and C1238 / 38 are for the right rear speed sensor.
★ DTC No. C0215 / 34 and C1239 / 39 are for the left rear speed sensor.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	**Check output value of speed sensor.**

PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the DATALIST mode on the hand-held tester.

CHECK:
Check that there is no difference between the speed value output from the speed sensor displayed on the hand-held tester and the speed value displayed on the speedometer when driving the vehicle.

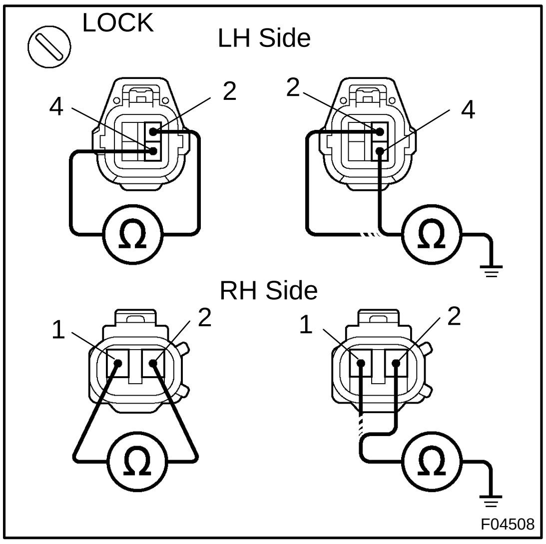
OK:
There is almost no difference from the displayed speed value.

HINT:
There is tolerance of ± 10 % in the speedometer indication.

OK → **Go to step 4.**

NG ↓

2	**Check speed sensor.**



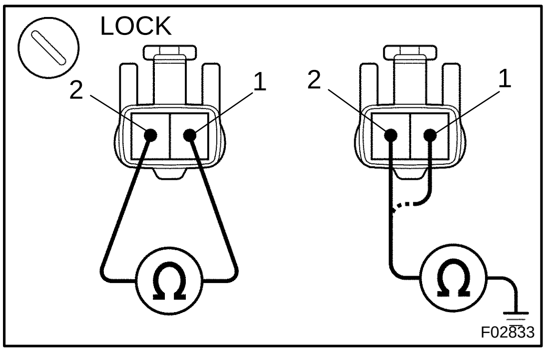
Front:

PREPARATION:
(a) Make sure that there is no looseness at the connector's locking part and connecting part of the connector.
(b) Disconnect the speed sensor connector.

CHECK:
★ LH side:
Measure resistance between terminals 2 and 4 of the speed sensor connector.
★ RH side:
Measure resistance between terminals 1 and 2 of the speed sensor connector.

OK:
Resistance: 0.92 to 1.22 kΩ

CHECK:
★ LH side:
Measure resistance between terminals 2 and 4 of the speed sensor connector and body ground.
★ RH side:
Measure resistance between terminals 1 and 2 of the speed sensor connector and body ground.



OK:

Resistance: 1 MΩ or higher

Rear:

PREPARATION:

(a) Make sure that there is no looseness at the connector's locking part and connecting part of the connector.

(b) Disconnect the speed sensor connector.

CHECK:

Measure resistance between terminals 1 and 2 of the speed sensor connector.

OK:

Resistance: 1.0 to 1.4 kΩ

CHECK:

Measure resistance between terminal 1 or 2 of the 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-505).

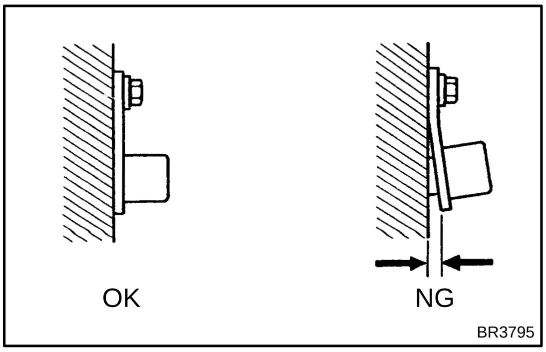
OK

3	**Check for open and short circuit in harness and connector between each speed sensor and ECU (See page IN-36).**

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

OK

4	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 front steering knuckle or rear axle carrier.

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

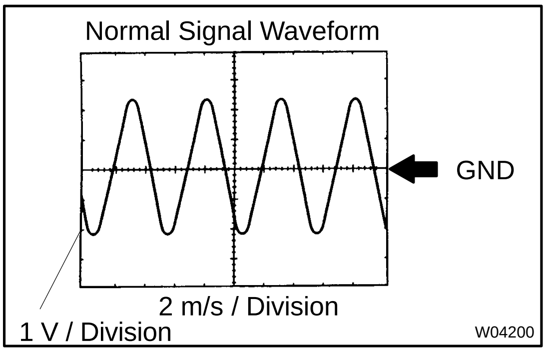
NG → **Replace speed sensor.**

NOTICE:

Check the speed sensor signal last (See page DI-505).

OK

5	Check speed sensor and sensor rotor serrations.



(REFERENCE) INSPECTION USING OSCILLOSCOPE

PREPARATION:

(a) Remove the skid control ECU with connectors still connected.

(b) Connect the oscilloscope to each of terminals FR+ - FR-, FL+ - FL-, RR+ - RR- or RL+ - RL- of the skid control ECU.

CHECK:

Drive the vehicle at about 12 mph (20 km/h), and check the signal waveform.

HINT:

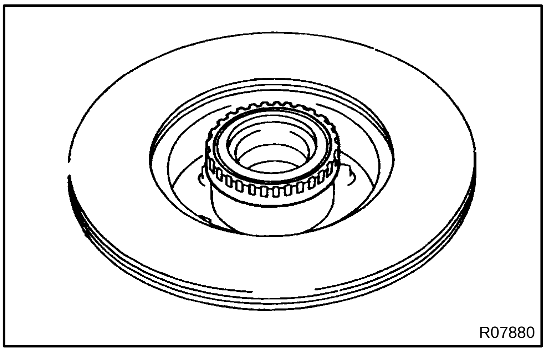
★ As vehicle speed (rpm of the wheels) increase, a cycle of the waveform narrows and the fluctuation in the output voltage becomes greater.

★ When noise is identified in the waveform on the oscilloscope, error signals are generated due to the speed sensor rotor's scratches, looseness or foreign matter deposited on it.

OK → **Check and replace skid control ECU.**

NG

6	**Check sensor rotor and sensor tip.**


R07880

Front:

PREPARATION:

Remove the front axle hub (See page SA-12).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign matter.

PREPARATION:

Remove the front speed sensor (See page BR-69).

CHECK:

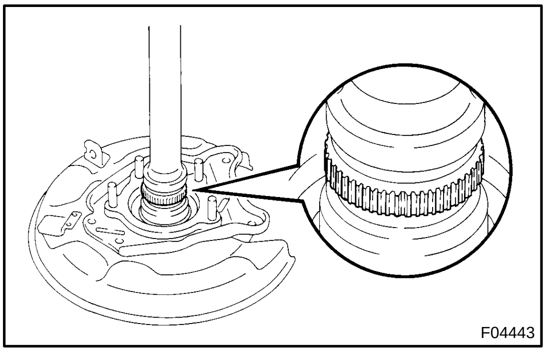
Check the sensor tip.

OK:

No scratches or foreign matter on the sensor tip.

HINT:

If foreign matter (including that on the sensor rotor side) is identified, remove it and after reassembling, check the output wareform.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Rear:

PREPARATION:

Remove the rear axle shaft (See page SA-84).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign matter.

PREPARATION:

Remove the rear speed sensor (See page BR-72).

CHECK:

Check the sensor tip.

OK:

No scratches or foreign matter on the sensor tip.

HINT:

If foreign matter (including that on the sensor rotor side) is identified, remove it and after reassembling, check the output wareform.

NG	**Replace speed sensor or rotor.**

NOTICE:

Check the speed sensor signal last (See page DI-505).

OK

Check and replace skid control ECU.

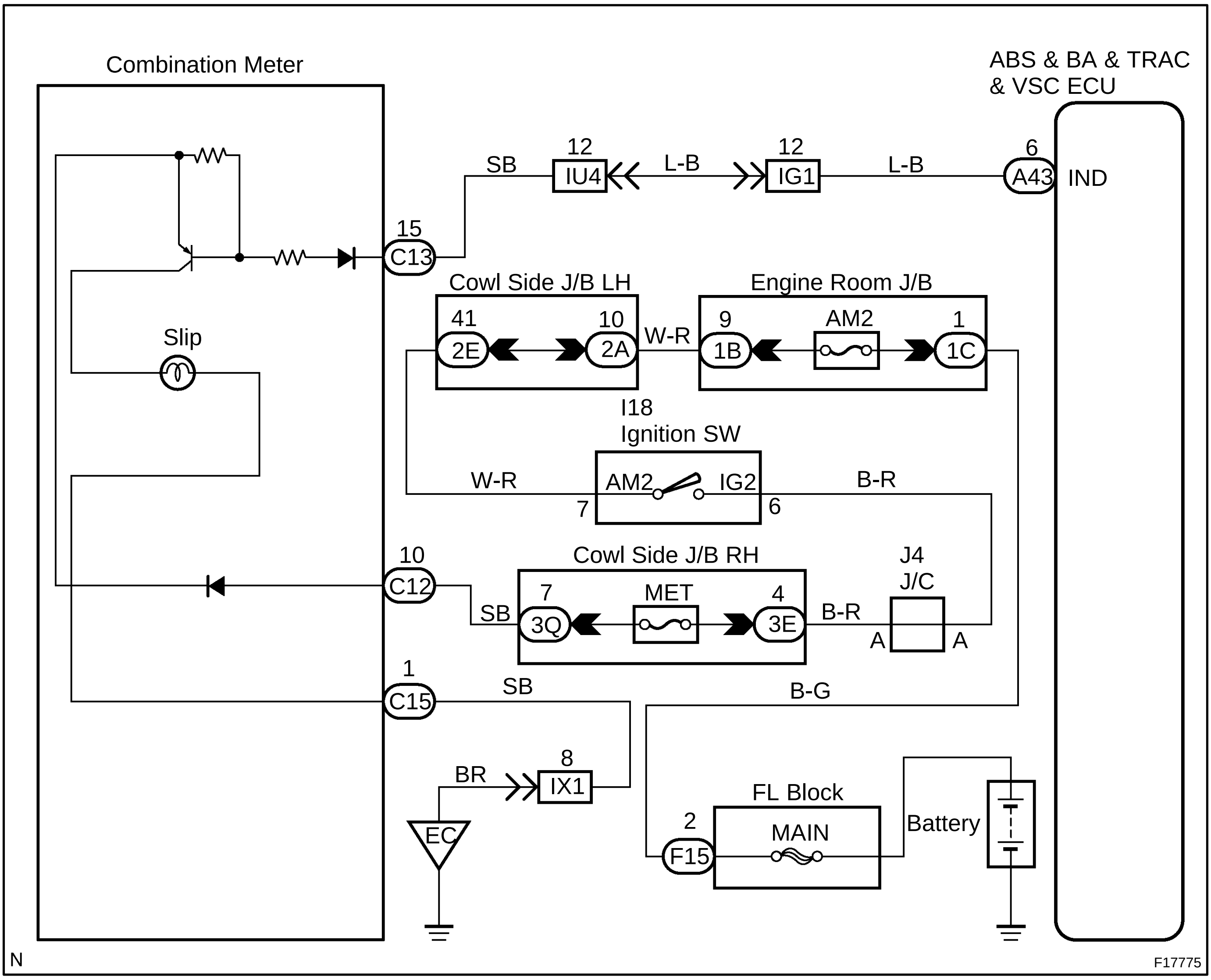
DICA8-02

SLIP Indicator Light Circuit

CIRCUIT DESCRIPTION

The SLIP indicator blinks during VSC operation.

WIRING DIAGRAM



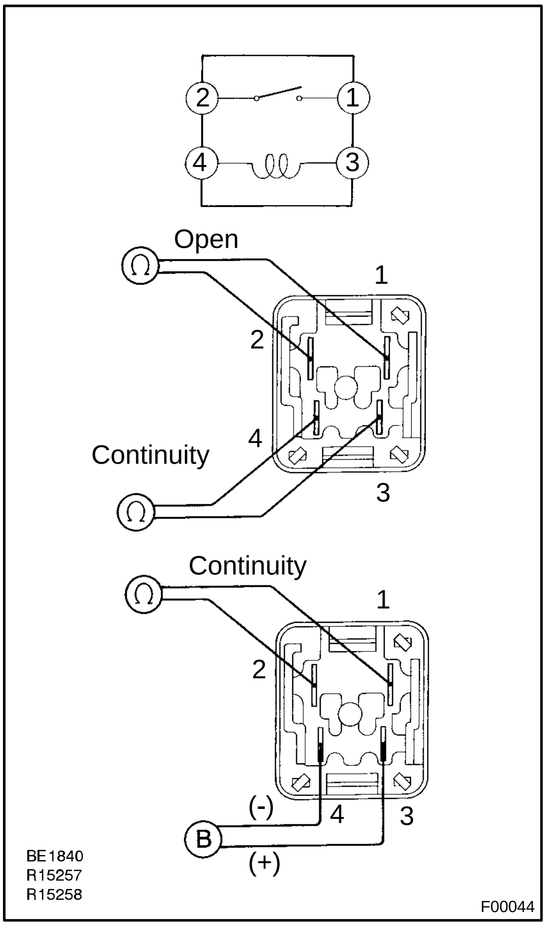
INSPECTION PROCEDURE

1	Do the warning lights other than SLIP indicator light come on?

YES → **Go to step 3.**

NO

2	Check IG1 No. 1 relay.



PREPARATION:

Remove the IG1 No. 1 relay from the engine room J/B.

CHECK:

Check continuity between the IG1 No. 1 relay terminals listed in the table below.

OK:

Terminals 3 and 4	Continuity
Terminals 1 and 2	Open

CHECK:

(a) Apply battery positive voltage between terminals 3 and 4.

(b) Check continuity between terminals.

OK:

Terminals 1 and 2	Continuity

NG → **Replace IG1 No. 1 relay.**

OK

Check for open circuit in harness and connector between IG1 No. 1 relay and combination meter (See page IN-36).

3	**Check SLIP indicator light.**

Check if that the open circuit in the combination meter circuit (See page BE-58).

NG → **Repair SLIP indicator light bulb or combination meter assembly.**

OK

4	**Check for short circuit in harness and connector between SLIP indicator light and skid control ECU (See page IN-36).**

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

OK

Check and repair skid control ECU.

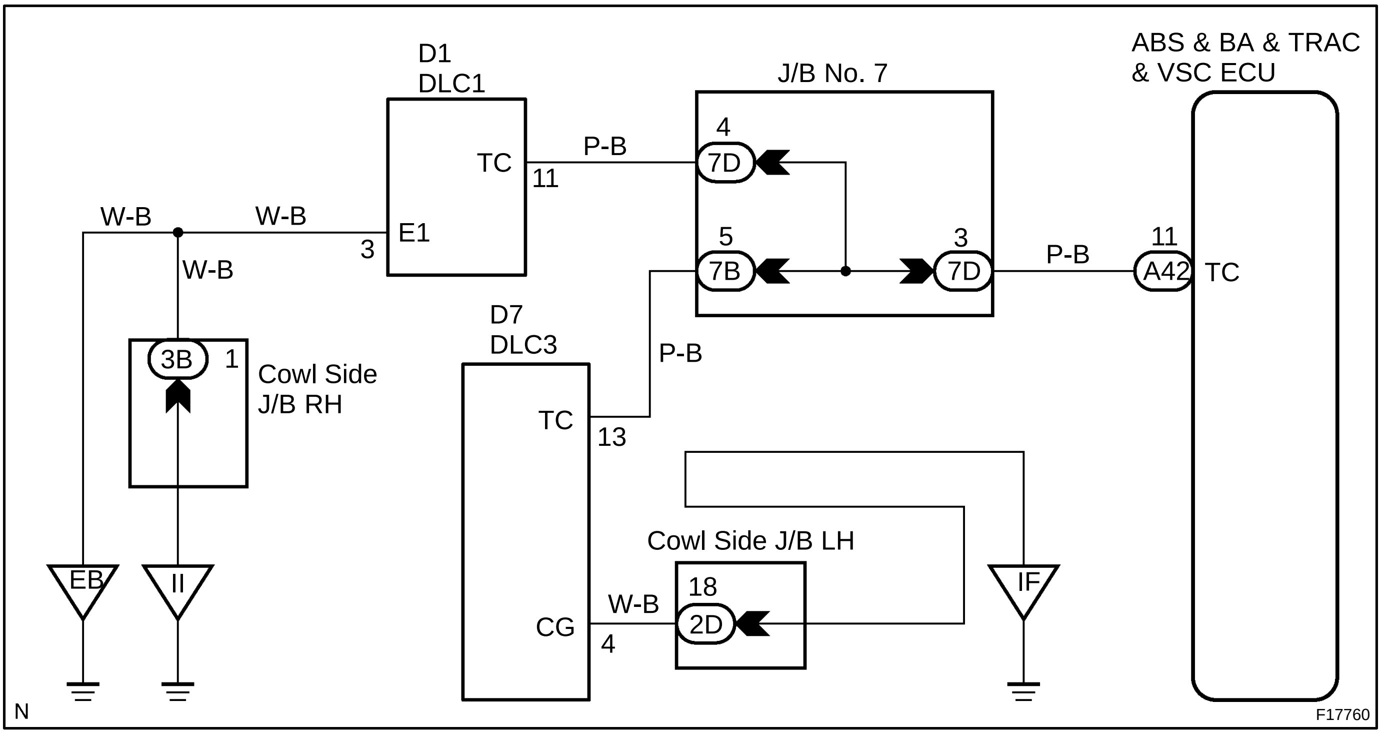
DICAC-01

Tc Terminal Circuit

CIRCUIT DESCRIPTION

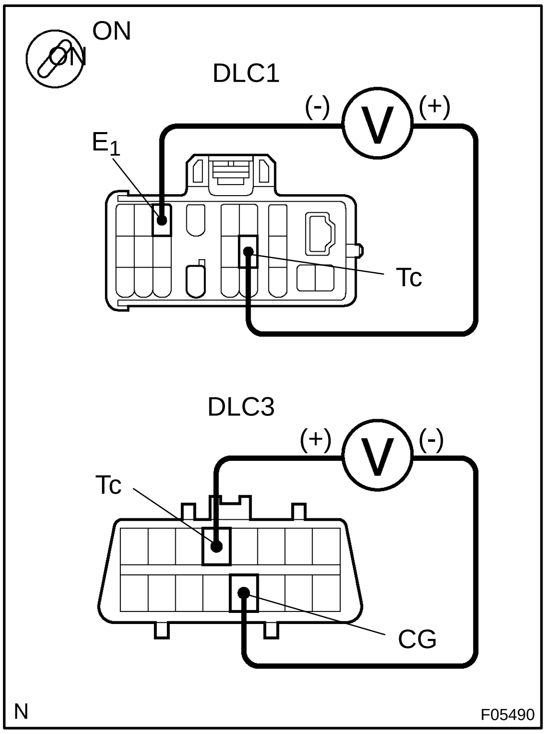
Connecting terminals Tc and E_1 of the DLC1 or Tc and CG of the DLC3 causes the ECU to display the DTC by flashing the ABS warning light and VSC TRAC warning light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Tc and E_1 of DLC1 or Tc and CG of DLC3.**



CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals Tc and E1 of the DLC1 or Tc and CG of the DLC3.

OK:

Voltage: 10 to 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	**IG switch OFF, and check for open and short circuit in harness and connector between skid control ECU and DLC1 or DLC3, DLC1 or DLC3 and body ground (See page IN-36).**

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

OK

Check and replace skid control ECU.

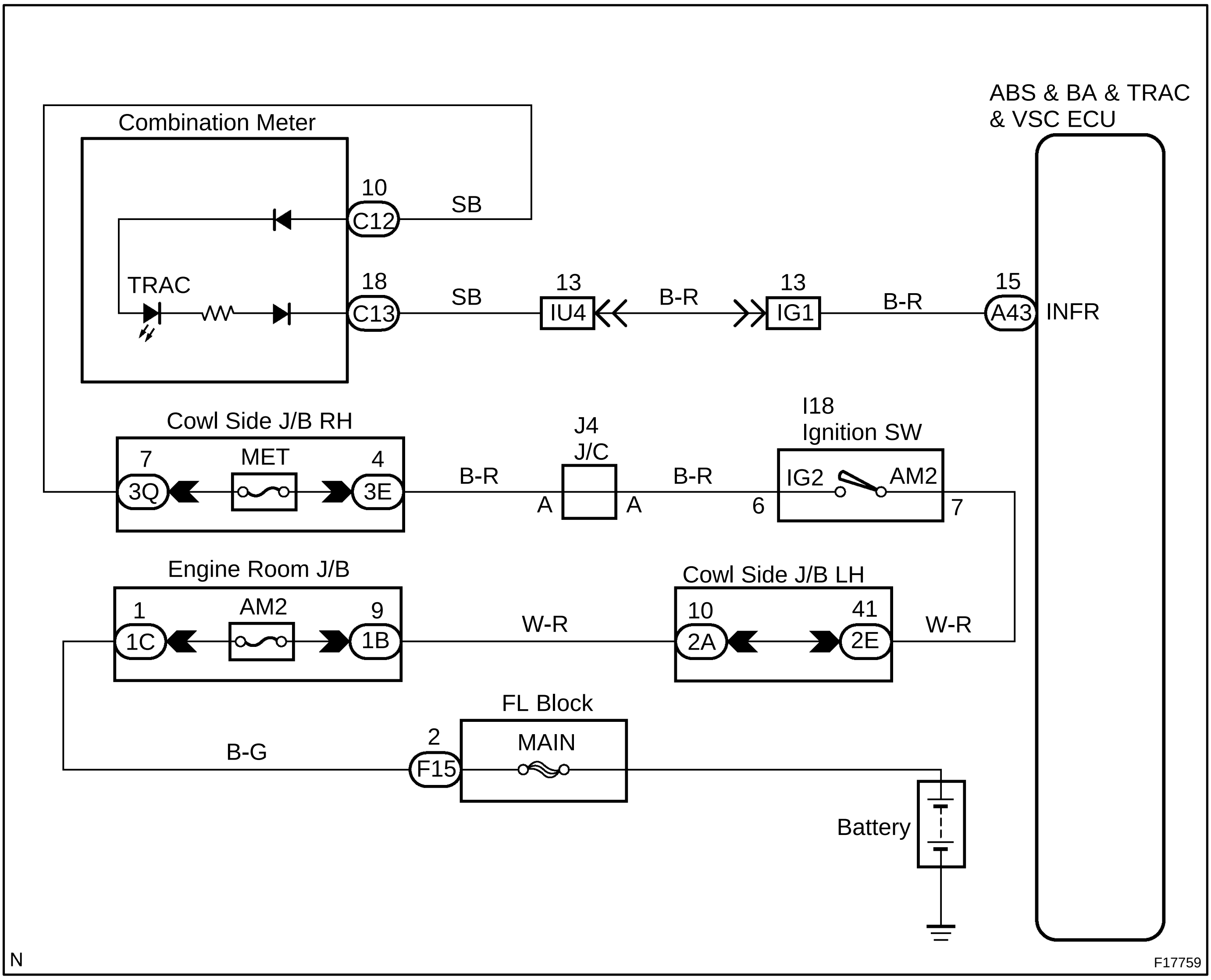
DICA9-02

TRAC Indicator Light Circuit

CIRCUIT DESCRIPTION

The TRAC indicator light blinks during TRAC operation.

WIRING DIAGRAM



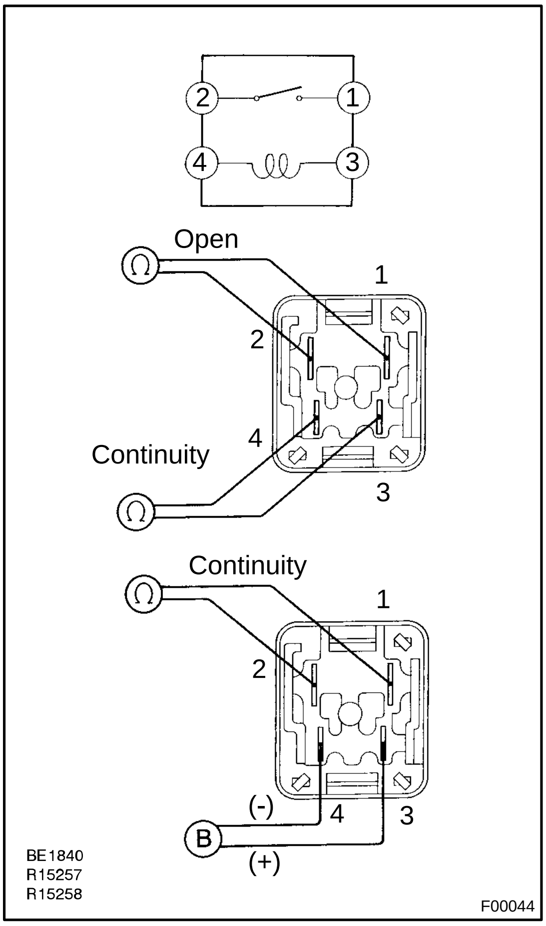
INSPECTION PROCEDURE

1	Do the warning lights other than TRAC indicator light come on?

YES → **Go to step 3.**

NO ↓

2	Check IG1 No. 1 relay.



PREPARATION:

Remove the IG1 No. 1 relay from the engine room J/B.

CHECK:

Check continuity between the IG1 No. 1 relay terminals listed in the table below.

OK:

Terminals 3 and 4	Continuity
Terminals 1 and 2	Open

CHECK:

(a) Apply battery positive voltage between terminals 3 and 4.

(b) Check continuity between terminals.

OK:

Terminals 1 and 2	Continuity

NG → **Replace IG1 No. 1 relay.**

OK ↓

Check for open circuit in harness and connector between IG1 No. 1 relay and combination meter (See page IN-36).

3	**Check TRAC indicator light.**

Check that the open circuit in the combination meter circuit (See page BE-58).

NG → **Repair TRAC indicator light bulb or combination meter assembly.**

OK

4	**Check for short circuit in harness and connector between TRAC indicator light and skid control ECU (See page IN-36).**

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

OK

Check and repair skid control ECU.

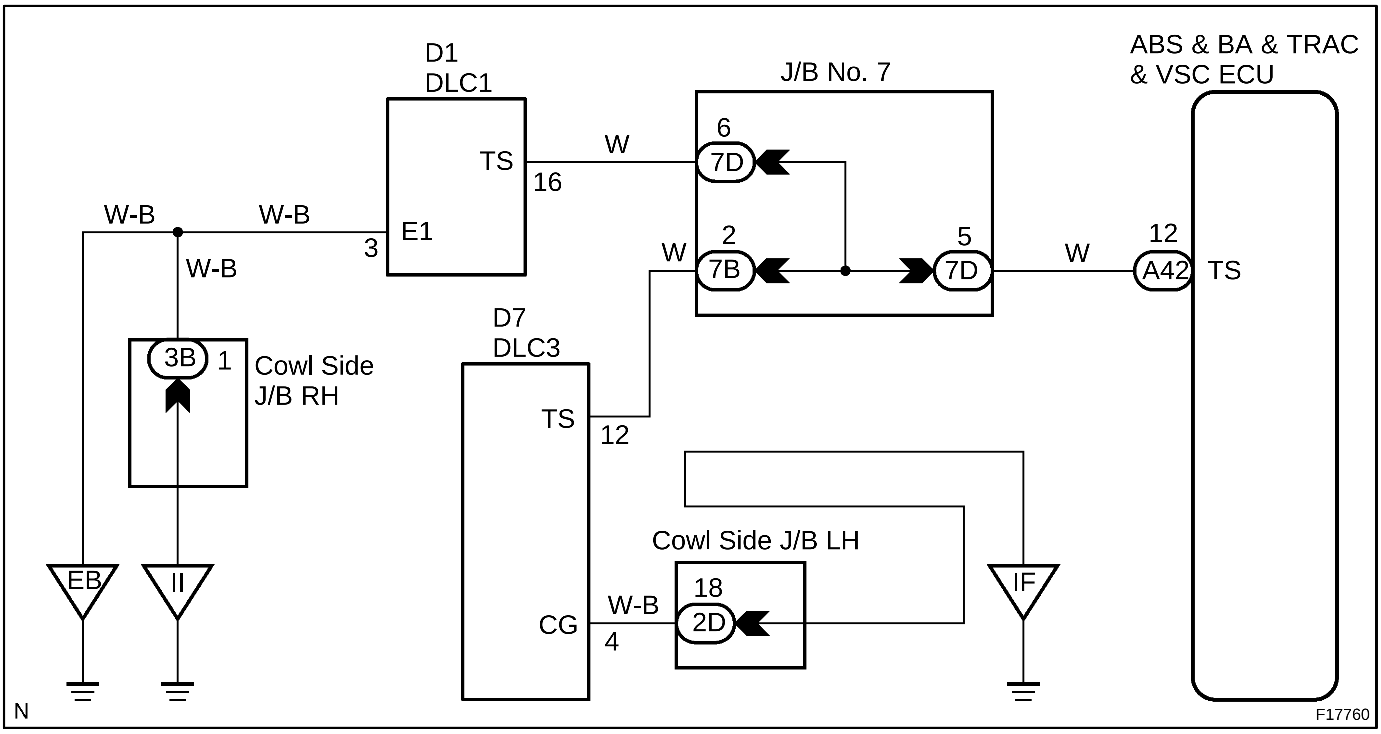
DICAD-01

Ts Terminal Circuit

CIRCUIT DESCRIPTION

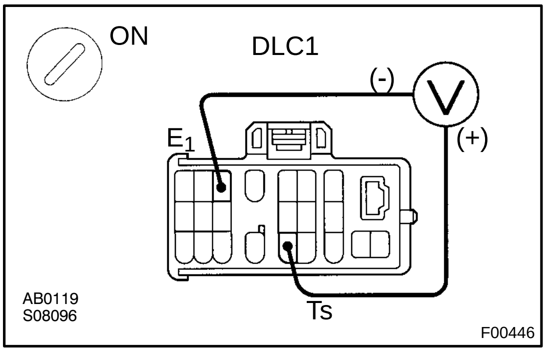
The sensor check circuit detects abnormalities in the speed sensor signal which cannot be detected by the DTC check.
Connecting terminals Ts and E_1 of the DLC1 starts the check.

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 the DLC1.

OK:
Voltage: 10 to 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	**IG switch OFF, and check for open and short circuit in harness and connector between skid control ECU and DLC1, DLC1 and body ground (See page IN-36).**

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

OK

Check and replace skid control ECU.

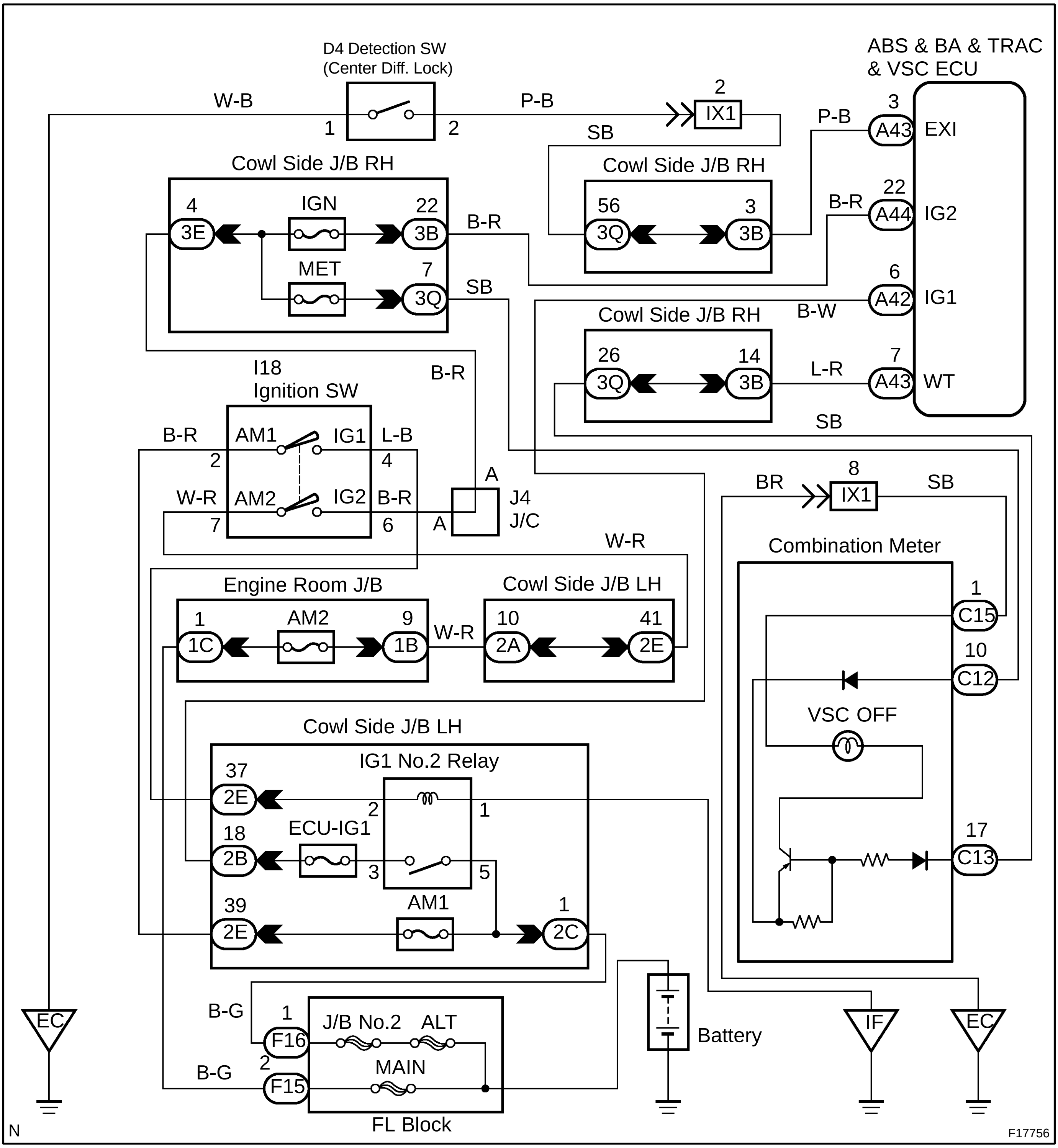
DICAA-02

VSC OFF Indicator Light, Center Diff Lock Switch Circuit

CIRCUIT DESCRIPTION

This is the VSC control main switch. When the center differential is locked, VSC control goes off and the VSC OFF indicator light lights up.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	**Check operation of the VSC OFF indicator light.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.

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

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

CHECK:

Check that "ON" and "OFF" of the VSC OFF indicator light can be shown on the combination meter with the hand-held tester.

NG	**Go to step 3.**

OK

2	**Is DTC output for VSC?**

YES	**Repair circuit indicated by the output code.**

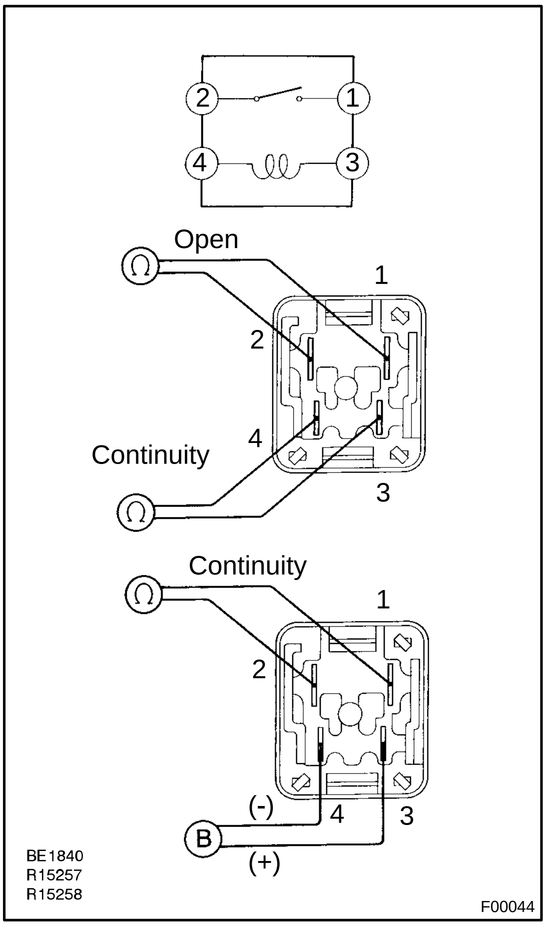
NO

3	**Does the warning lights other than VSC OFF indicator light come on?**

YES	**Go to step 5.**

NO

4	Check IG1 No. 1 relay.



PREPARATION:
Remove the IG1 No. 1 relay from the engine room J/B.
CHECK:
Check continuity between the IG1 No. 1 relay terminals listed in the table below.
OK:

Terminals 3 and 4	Continuity
Terminals 1 and 2	Open

CHECK:
(a) Apply battery positive voltage between terminals 3 and 4.
(b) Check continuity between terminals.
OK:

Terminals 1 and 2	Continuity

NG → **Replace IG1 No. 1 relay.**

OK

Check for open circuit in harness and connector between IG1 No. 1 relay and combination meter (See page IN-36).

5	Check VSC OFF indicator light.

Check that the open circuit in the combination meter circuit (See page BE-58).

NG → **Repair VSC OFF indicator light bulb or combination meter assembly.**

OK

6	**Check for short circuit in harness and connector between VSC OFF indicator light and skid control ECU (See page IN-36).**

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

OK

7	**Check if center diff. lock switch remains ON, or check wire harness between center diff. lock switch and body ground for short circuit.**

NG → **Repair center diff. lock switch or repair or replace wire harness.**

OK

Check and repair skid control ECU.

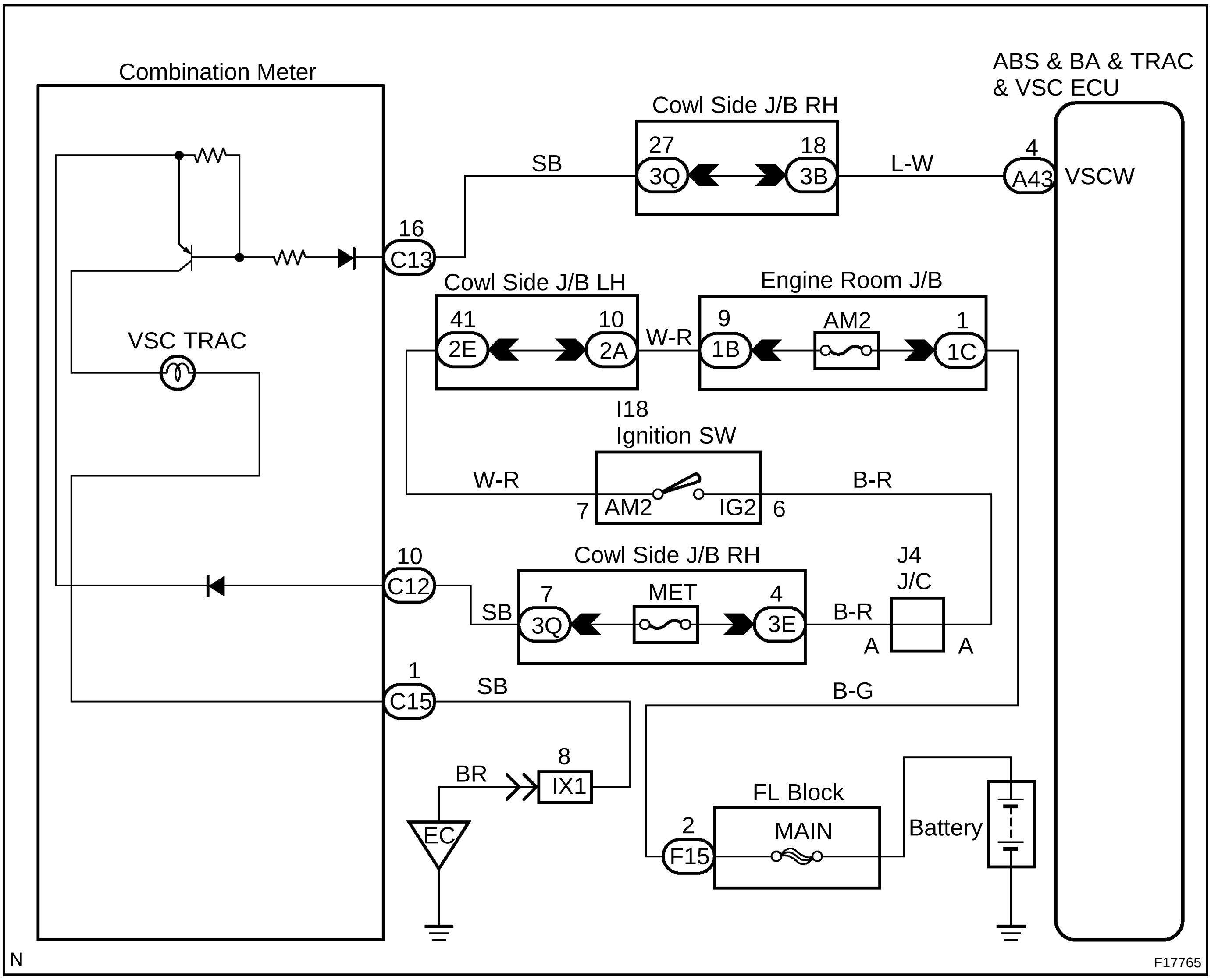
DICA6-02

VSC TRAC Warning Light Circuit

CIRCUIT DESCRIPTION

If the ECU stores DTC, the VSC TRAC warning light illuminates the combination meter.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Troubleshoot in accordance with the table below for each trouble symptom.

VSC TRAC warning light does not light up	*1
VSC TRAC warning light remains on	*2

*1: Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

*2: After inspection with step 4, start the inspection from step 5 in case of using the hand-held tester and start from step 6 in case of not using hand-held tester.

1	Check operation of the VSC TRAC warning light.

PREPARATION:

(a) Connect the hand-held tester to the DLC3.

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

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

CHECK:

Check that ”ON” and ”OFF” of the VSC TRAC warning light can be shown on the combination meter on the hand-held tester.

OK → **Check and replace skid control ECU.**

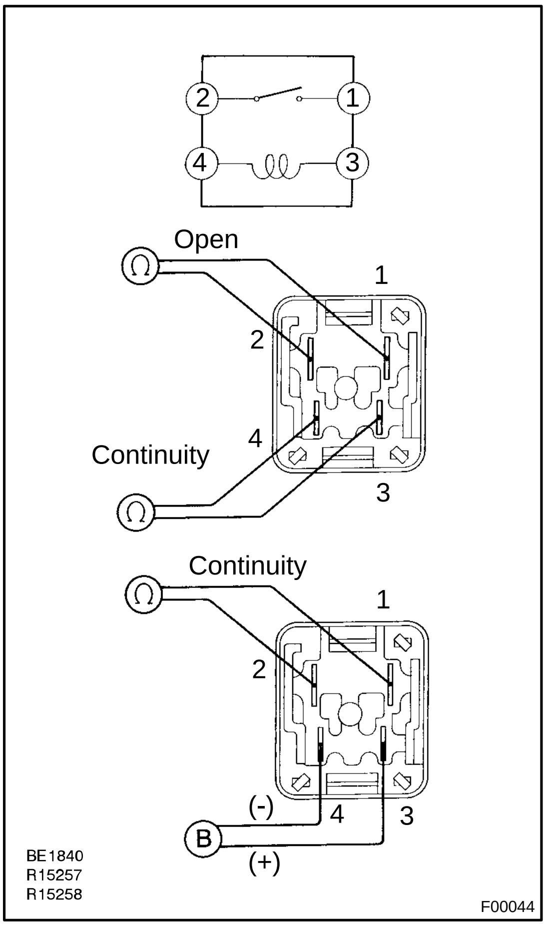
NG

2	Does the warning lights other than VSC TRAC warning light come on?

YES → **Repair VSC TRAC warning light bulb or combination meter assembly.**

NO

3	Check IG1 No. 1 relay.



PREPARATION:
Remove the IG1 No. 1 relay from the engine room J/B.
CHECK:
Check continuity between the IG1 No. 1 relay terminals listed in the table below.
OK:

Terminals 3 and 4	Continuity
Terminals 1 and 2	Open

CHECK:
(a) Apply battery positive voltage between terminals 3 and 4.
(b) Check continuity between terminals.
OK:

Terminals 1 and 2	Continuity

NG — **Replace IG1 No. 1 relay.**

OK

Check for open circuit in harness and connector between IG1 No. 1 relay and combination meter (See page IN-36).

4	**Check that the ECU connectors are securely connected to the ECU.**

NO → **Connect the connector to the ECU.**

YES

5	**Check operation of the VSC TRAC warning light (See step 1).**

OK → **Check and replace skid control ECU.**

NG

6	**Is DTC output?**

Check the DTC on page DI-505 .

YES → **Repair circuit indicated by the output code.**

NO

7	**Check for short circuit in harness and connector between VSC TRAC warning light and skid control ECU (See page IN-36).**

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

OK

Check and repair skid control ECU.

DIC8P-01

CUSTOMER PROBLEM ANALYSIS CHECK

ABS & EBD & BA Check Sheet

Inspector's Name :

Customer's Name		**Registration No.**	
		Registration Date	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuously ☐ Intermittently (times a day)

Symptoms	☐ ABS does not operate.	
	☐ ABS does not operate efficiently.	
	☐ BA does not operate.	
	☐ EBD does not operate.	
	ABS Warning Light Abnormal	☐ Remains ON ☐ Does not light up
	Brake Warning Light Abnormal (PKB released)	☐ Remains ON ☐ Does not light up

DTC Check	**1st Time**	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)

Freeze Frame Data	STOP LIGHT SW	☐ ON ☐ OFF
	SYSTEM	☐ NO SYS ☐ ABS ☐ BA ☐ FAIL SF
	#IG ON	
	VEHICLE SPD	km/h MPH

TRAC & VSC Check Sheet

Inspector's Name :

Customer's Name		**Registration No.**	
		Registration Date	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ TRAC does not operate. (Wheels spin when starting rapidly.)	
	☐ VSC does not operate. (Wheels sideslip at the time of sharp turning.)	
	TRAC OFF Indicator Light Abnormal	☐ Remains ON ☐ Does not light up
	VSC TRC Warning Indicator Abnormal	☐ Displays ☐ Does not display
	SLIP Indicator Light Abnormal	☐ Remains ON ☐ Does not light up
	Skid Control Buzzer Abnormal	☐ Sounds ☐ Does not sound

Check Item	**ABS Warning Light**	☐ Normal ☐ Malfunction Code (Code)
	Malfunction Indicator Light	☐ Normal ☐ Malfunction Code (Code)

DTC Check	**1st Time**	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)

Freeze Frame Data	VSC/TRC OFF SW	☐ ON ☐ OFF
	SYSTEM	☐ VSC/TRC
	SHIFT POSITION	☐ P,N ☐ 2 ☐ R ☐ 3 ☐ D ☐ 4 ☐ L ☐ FAIL
	STEERING ANG	deg
	YAW RAT	deg/s
	MAS CYL PRESS	V
	THROTTLE	deg
	MAS PRESS GRADE	MPa/s
	G (RIGHT&LEFT)	G
	G (BACK&FORTH)	G

DIC8V-01

DIAGNOSTIC TROUBLE CODE CHART

NOTICE:

When removing the part, turn the ignition switch OFF.

HINT:

★ Using SST 09843-18020 or 09843-18040, connect terminals Tc and E_1 of the DLC1 or Tc and CG of the DLC3.

★ If any abnormality is not found when inspecting parts, inspect the ECU.

★ If a malfunction code is displayed during the DTC check, check the circuit listed that 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 chart of ABS:

DTC No. (See Page)	Detection Item	Trouble Area
C0278 / 11 (DI-531)	Open or short in ABS solenoid relay circuit	★ABS solenoid relay ★ABS solenoid relay circuit
C0279 / 12 (DI-531)	B+ short in ABS solenoid relay circuit	
C0226 / 21 (DI-528)	Open or short in hydraulic brake booster solenoid circuit (SFR circuit)	★Hydraulic brake booster ★SFRR or SFRH circuit
C0236 / 22 (DI-528)	Open or short in hydraulic brake booster solenoid circuit (SFL circuit)	★Hydraulic brake booster ★SFLR or SFLH circuit
C0246 / 23 (DI-528)	Open or short in hydraulic brake booster solenoid circuit (SRR circuit)	★Hydraulic brake booster ★SRRR or SRRH circuit
C0256 / 24 (DI-528)	Open or short in hydraulic brake booster solenoid circuit (SRL circuit)	★Hydraulic brake booster ★SRLR or SRLH circuit
C1225 / 25 (DI-543)	Open or short in hydraulic brake booster solenoid circuit (SA1 circuit)	★Hydraulic brake booster ★SA1 circuit
C1226 / 26 (DI-543)	Open or short in hydraulic brake booster solenoid circuit (SA2 circuit)	★Hydraulic brake booster ★SA2 circuit
C1227 / 27 (DI-543)	Open or short in hydraulic brake booster solenoid circuit (SA3 circuit)	★Hydraulic brake booster ★SA3 circuit
C1228 / 28 (DI-543)	Open or short in hydraulic brake booster solenoid circuit (STR circuit)	★Hydraulic brake booster ★STR circuit
C0200 / 31*1 (DI-615)	Right front wheel speed sensor signal malfunction	★Right front, left front, right rear and left rear speed sensor ★Each speed sensor circuit ★Sensor rotor
C0205 / 32*1 (DI-615)	Left front wheel speed sensor signal malfunction	
C0210 / 33*1 (DI-615)	Right rear wheel speed sensor signal malfunction	
C0215 / 34*1 (DI-615)	Left rear wheel speed sensor signal malfunction	
C1235 / 35 (DI-615)	Foreign matter is attached on the tip of the right front sensor	★Right front, left front, right rear, left rear speed sensor ★Sensor rotor
C1236 / 36 (DI-615)	Foreign matter is attached on the tip of the left front sensor	
C1237 / 37 (DI-557)	Size of some tires is different from the other tires	Tire size

C1238 / 38 (DI-615)	Foreign matter is attached on the tip of the right rear sensor	★Right front, left front, right rear, left rear speed sensor ★Sensor rotor
C1239 / 39 (DI-615)	Foreign matter is attached on the tip of the left rear sensor	
C1241 / 41 (DI-558)	Low battery positive voltage or abnormally high battery positive voltage	★Battery ★IC regulator ★Power source circuit
C1242 / 42*2 (DI-561)	Open in IG2 circuit	★Battery ★IC regulator ★Power source circuit
C1243 / 43 (DI-564)	Malfunction in deceleration sensor (constant output)	★Deceleration sensor ★Wire harness for deceleration sensor system
C1244 / 44 (DI-567)	Open or short in deceleration sensor circuit	★Deceleration sensor ★Deceleration sensor circuit
C1245 / 45 (DI-564)	Malfunction in deceleration sensor	★Deceleration sensor ★Wire harness for deceleration sensor system
C1246 / 46 (DI-570)	Malfunction in master cylinder pressure sensor	★Master cylinder pressure sensor ★Master cylinder pressure sensor circuit
C1249 / 49 (DI-573)	Open in stop light switch circuit	★Stop light bulb ★Stop light switch circuit
C1251 / 51*2 (DI-577)	Pump motor is locked Open circuit in pump motor ground	Hydraulic brake booster pump motor
C1252 / 52*2 (DI-580)	Hydraulic brake booster pump motor malfunction	★Hydraulic brake booster pump motor ★Hydraulic brake booster pump motor circuit ★Pressure switch (PH or PL)
C1253 / 53*2 (DI-586)	Hydraulic brake booster pump motor relay malfunction	★ABS motor1 or ABS motor 2 relay ★ABS motor1 or ABS motor 2 relay circuit ★Hydraulic brake booster pump motor circuit
C1254 / 54*2 (DI-592)	Pressure switch malfunction	★Pressure switch (PH or PL) ★Pressure switch circuit
C1256 / 56*2 (DI-595)	Accumulator low pressure malfunction	★Accumulator ★Pressure switch (PH or PL) ★Hydraulic brake booster pump motor
C1257 / 57*2 (DI-602)	Power supply drive circuit malfunction	★Battery ★Power source circuit ★Skid control ECU
C1203 / 59 (DI-536)	ECM communication circuit malfunction	★TRC+ or TRC- circuit ★ENG+ or ENG- circuit ★ECM
C1268 / 68 (DI-605)	Transfer L4 position signal transmission failure	★Transfer L4 position switch ★Transfer L4 position switch circuit
Always ON (DI-621)	Malfunction in skid control ECU	★Battery ★IC regulator ★Power source circuit ★Skid control ECU

*1: As the DTC cannot be erased by replacing parts alone do either of the following operations.
(1) Clear the DTC (See page DI-505).
(2) At a speed of 20 km/h (12 mph), drive the vehicle for 30 sec. or more.
*2: Using the following table, troubled parts can be specified.

Table of Trouble Part and DTC:

DTC		C1242/42		C1251/51		C1252/52		C1253/53		C1254/54		C1256/56		C1257/57	
BRAKE warning light and buzzer		Light	Buzzer	Light	Buzzer	Light	Buzzer	Light	Buzzer	Light	Buzzer	Light	Buzzer	Light	Buzzer
Pressure switch	PH					☐	☐			☐		☐	☐		
	PL					☐	☐			☐		☐	☐		
Pump motor circuit	Pump motor			☐	☐	☐	☐					☐	☐		
	MTT wire harness					☐	☐	☐							
	MT+ wire harness			☐											
	MT- wire harness			☐											
Accumulator malfunction												☐	☐		
Motor relay circuit	MR1 open circuit							☐							
	MR2 open circuit							☐							
	MR1 welded contact					☐	☐	☐							
	MR2 welded contact					☐	☐	☐							
Hydraulic brake booster	Pressure leaks					☐	☐					☐	☐		
Power source*	IG2 open circuit	☐													
ECU	Power supply circuit													☐	

*: When IG1 circuit is open, the ABS warning light and BRAKE warning light come on.

DTC chart of VSC:

DTC No. (See Page)	Detection Item	Trouble Area
C1231 / 31 (DI-546)	Malfunction in steering angle sensor	★Steering angle sensor ★Steering angle sensor circuit
C1232 / 32 (DI-551)	Malfunction in deceleration sensor	★Deceleration sensor ★Deceleration sensor circuit
C1233 / 33 (DI-553)	Open or short in yaw rate sensor circuit	★Yaw rate sensor ★Yaw rate sensor circuit
C1234 / 34 (DI-553)	Malfunction in yaw rate sensor	★Yaw rate sensor ★Yaw rate sensor circuit
C1335 / 35 (DI-546)	Open circuit in steering angle sensor	★Steering angle sensor ★Steering angle sensor circuit
C1210 / 36 (DI-538)	Zero point calibration of yaw rate sensor undone	★Yaw rate sensor ★Yaw rate sensor circuit ★PNP switch circuit (P position)
C1336 / 39 (DI-609)	Zero point calibration of deceleration sensor undone	★Deceleration sensor ★Deceleration sensor circuit ★PNP switch (P position) circuit
C1223 / 43 (DI-540)	Malfunction in ABS control system	ABS control system
C1224 / 44 (DI-541)	Open or short in NE signal circuit	★NEO circuit ★ECM ★Skid control ECU
C1290 / 66 (DI-608)	Zero point calibration of steering sensor undone	★Steering angle sensor zero point calibration ★Yaw rate sensor zero point calibration
C1340 / 47 (DI-612)	Open circuit in center differential lock signal	★Center differential lock system ★Center differential lock circuit
C1201 / 51 (DI-535)	ECM system malfunction	Engine control system
C1203 / 53 (DI-536)	ECM communication circuit malfunction	★TRC+ or TRC- circuit ★ENG+ or ENG- circuit ★ECM
Always ON (DI-627)	Malfunction in skid control ECU Open in VSC TRAC warning light circuit	★Power source circuit ★VSC TRAC warning light circuit

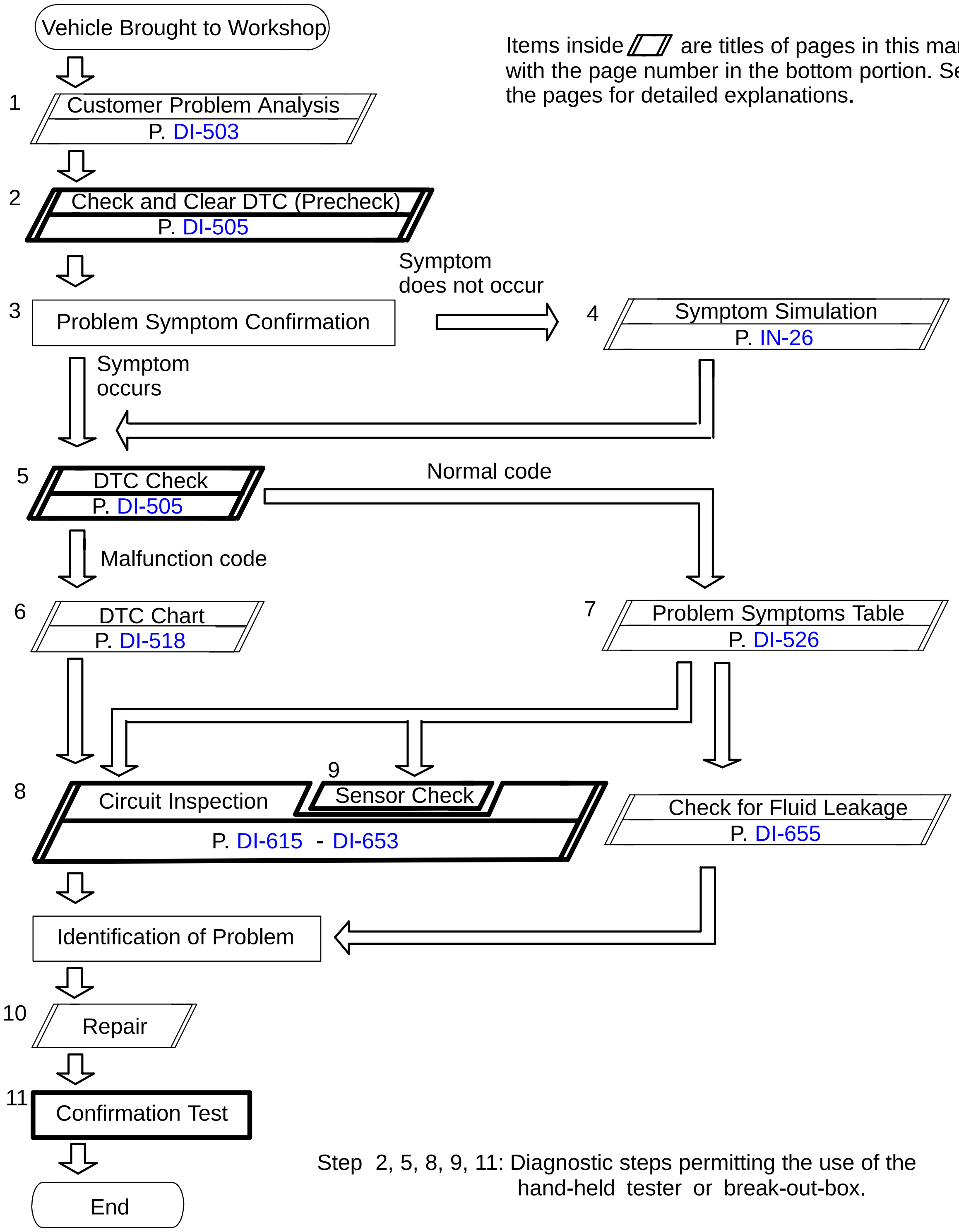
HINT:
There is a case that TOYOTA hand-held tester cannot be used when the VSC TRAC warning light is always on.

ABS & VEHICLE STABILITY CONTROL (VSC) & BRAKE ASSIST (BA) SYSTEM

DIC8N-01

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot in accordance with the procedure on the following pages.



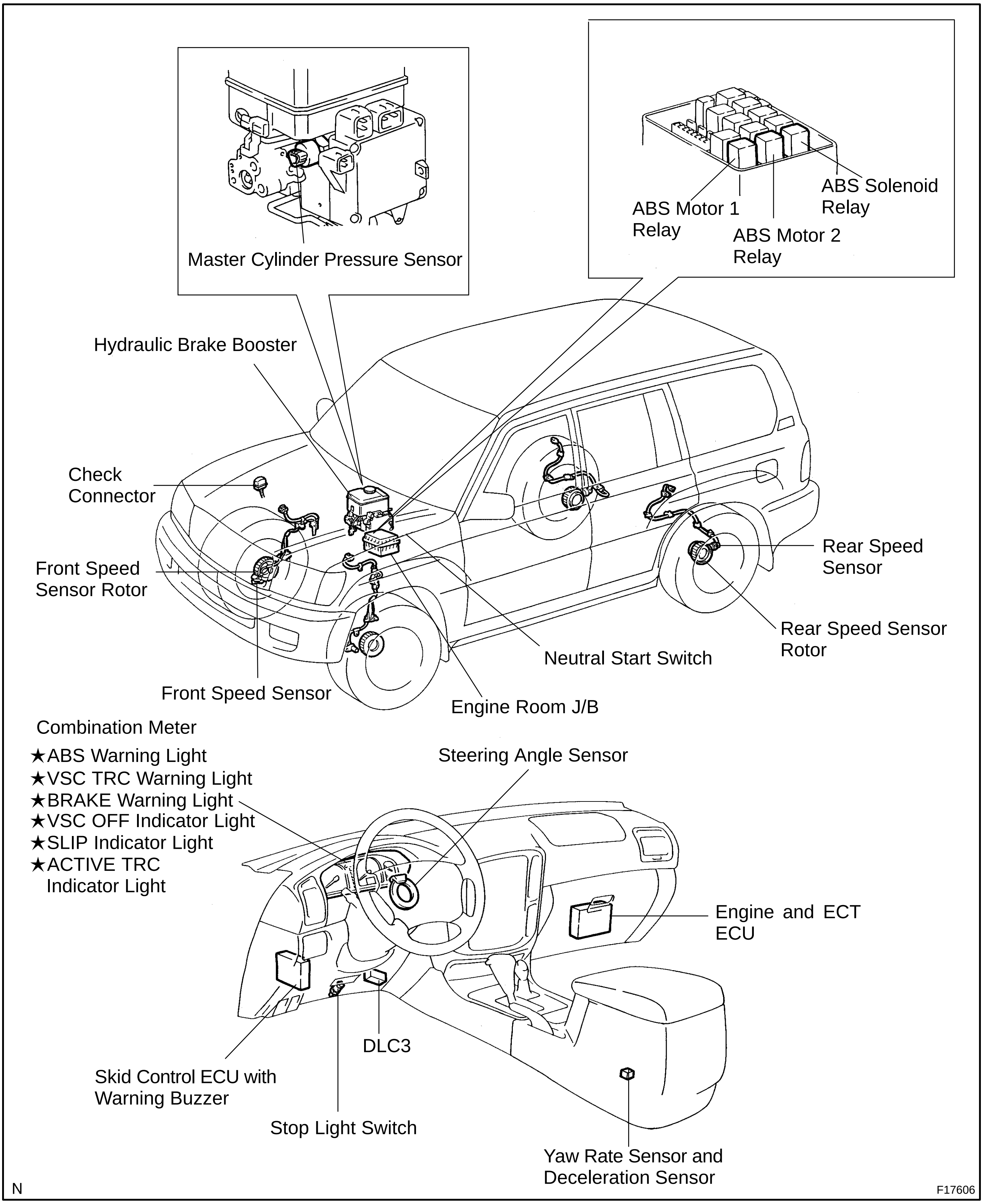
Items inside ▱ are titles of pages in this manual, with the page number in the bottom portion. See the pages for detailed explanations.

Step 2, 5, 8, 9, 11: Diagnostic steps permitting the use of the hand-held tester or break-out-box.

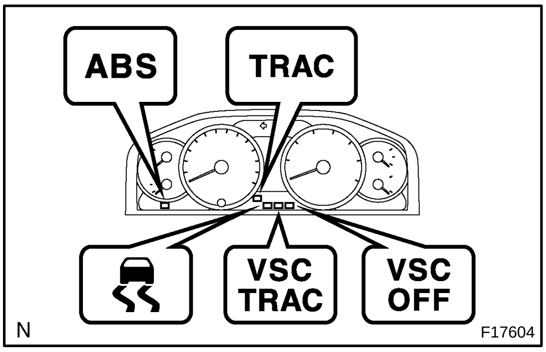
Fail safe function:
When a failure occurs in the ABS & BA & TRAC & VSC systems, the ABS and VSC warning lights are lit and ABS & BA & TRAC & VSC operation is prohibited. In addition to this, when the failure which disables EBD operation occurs, the BRAKE warning light is lit as well and EBD operation is prohibited.

DIC8X-01

PARTS LOCATION



DIC8S-02



PRE-CHECK

1. DIAGNOSIS SYSTEM

(a) Check the warning lights and buzzer.

(1) Release the parking brake lever.

(2) When the ignition switch is turned ON, check that the ABS, VSC TRAC and BRAKE warning lights, VSC OFF, SLIP and TRAC indicator lights come on for 3 sec.

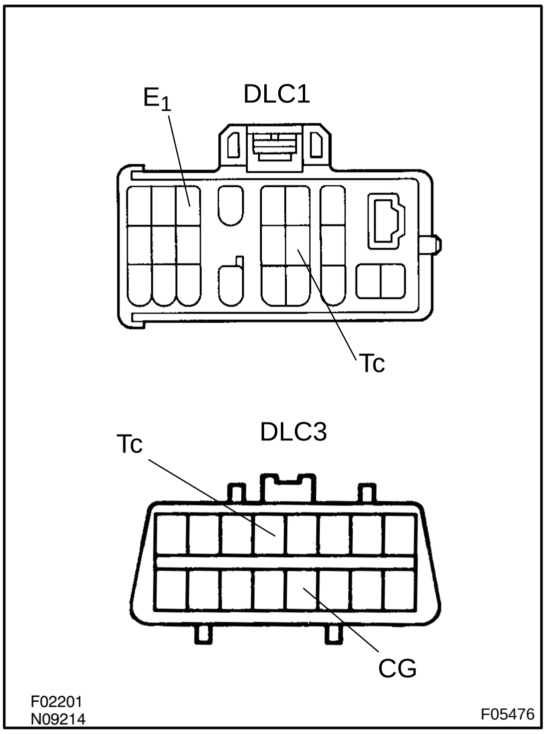
(3) When depressing the brake pedal repeatedly, it may turn on the ABS, VSC TRAC and BRAKE warning lights, VSC OFF indicator light and buzzer.

HINT:

★ If the ECU stores DTC, the ABS, VSC TRAC and BRAKE warning lights and VSC OFF indicator light come ON.

★ If the indicator check result is not normal, proceed to troubleshooting for the ABS warning light circuit, VSC TRAC warning light circuit, brake warning light circuit, VSC OFF indicator light circuit, SLIP indicator light circuit and ACTIVE TRAC indicator light circuit.

Trouble Area	See Page
ABS warning light circuit	DI-627
VSC TRAC warning light circuit	DI-631
BRAKE warning light circuit	DI-635
VSC OFF indicator light circuit	DI-645
SLIP indicator light circuit	DI-639
TRAC indicator light circuit	DI-642



(b) In case of not using hand-held tester:
Check the DTC.

(1) Using SST, connect terminals Tc and E_1 of the DLC1 or Tc and CG of the DLC3.

SST 09843-18020 or 09843-18040

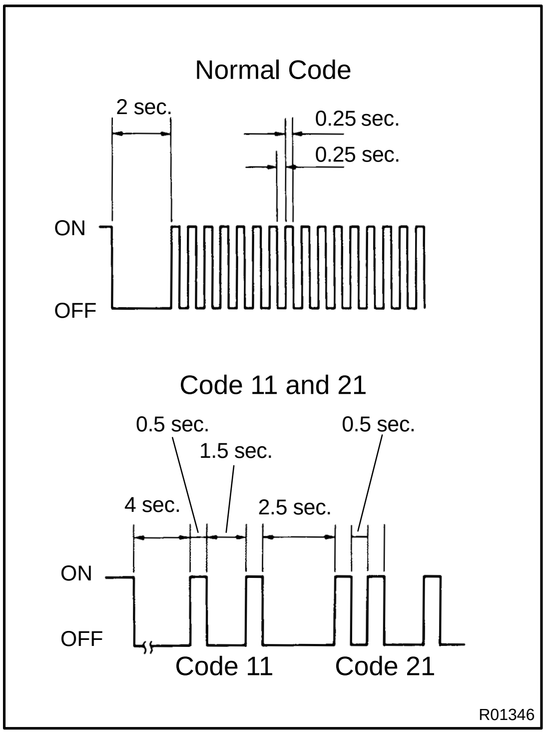
(2) Turn the ignition switch ON.

(3) Read the DTC from the ABS or VSC TRAC warning light on the combination meter.

HINT:

★ If no code appears, inspect the Tc circuit, ABS or VSC TRAC warning light circuit.

Trouble Area	See page
Tc circuit	DI-651
ABS warning light circuit	DI-627
VSC TRAC warning light circuit	DI-631

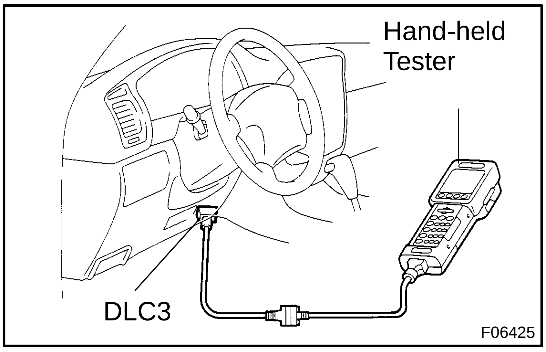


★ As an example, the blinking patterns for normal code and codes 11 and 21 are shown on the left.

(4) Codes are explained in the code table on page DI-518 .

(5) After completing the check, disconnect terminals Tc and E_1 of the DLC1 or Tc and CG of the DLC3 and turn off the display.

If 2 or more malfunctions are indicated at the same time the lowest numbered DTC will be displayed 1st.



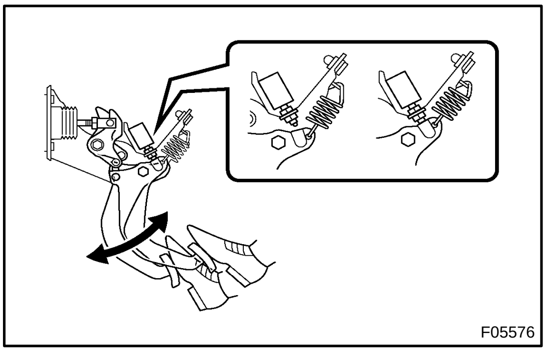
(c) In case of using hand-held tester:
Check the DTC.

(1) Hook up the hand-held tester to the DLC3.

(2) Turn the ignition switch ON.

(3) Read the DTC by following the prompts on the tester screen.

HINT:
Please refer to the hand-held tester operator's manual for further details.



(d) In case of not using hand-held tester:
Clear the DTC.

(1) Using SST, connect terminals Tc and E_1 of the DLC1 or Tc and CG of the DLC3.

SST 09843-18020 or 09843-18040

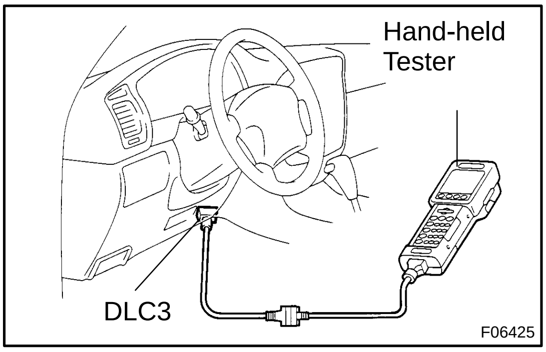
(2) Turn the ignition switch ON.

(3) Clear the DTC stored in the ECU by depressing the brake pedal 8 or more times within 5 sec.

(4) Check that the warning light shows the normal code.

(5) Remove the SST from the terminals of the DLC1 or DLC3.

SST 09843-18020 or 09843-18040



(e) In case of using hand-held tester:
Clear the DTC.
(1) Hook up the hand-held tester to the DLC3.
(2) Turn the ignition switch ON.
(3) Operate the hand-held tester to erase the codes. (See the hand-held tester operator's manual.)

2. DATA LIST

HINT:
According to the DATA LIST displayed by the hand-held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as a first step of troubleshooting is one of the methods to shorten labor time.

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON.
(c) According to the display on the tester, read the "DATA LIST".

Item	Measurement Item/Range (Display)	Normal Condition*	Diagnostic Note
HB MOT RELAY	HB Motor relay status/ ON or OFF	-	-
ABS MOT RELAY	Motor relay status/ ON or OFF	-	-
SOL RELAY	Solenoid relay status/ ON or OFF	-	-
PRESS HIGH	HIGH Hydraulic brake boost pressure/ ON or OFF	-	-
PRESS LOW	LOW Hydraulic brake boost pressure/ ON or OFF	-	-
VSC/TRC OFF SW	VSC OFF switch/ ON or OFF	-	-
IDLE SW	Main idle switch/ ON or OFF	ON: Accelerator pedal released OFF: Accelerator pedal depressed	-
STOP LIGHT SW	Stop light switch/ ON or OFF	ON: Brake pedal released OFF: Brake pedal depressed	-
PKB SW	PKB sw/ ON or OFF	ON: Parking brake applied OFF: Parking brake released	-
ABS OPERT FR	Front Right wheel operation/ BEFORE or OPERATE	BEFORE: No ABS operation (FR) OPERATE: During ABS operation (FR)	-
ABS OPERT FL	Front Left wheel operation/ BEFORE or OPERATE	BEFORE: No ABS operation (FL) OPERATE: During ABS operation (FL)	-
ABS OPERT RR	Rear Right wheel operation/ BEFORE or OPERATE	BEFORE: No ABS operation (RR) OPERATE: During ABS operation (RR)	-
ABS OPRET RL	Rear Left wheel operation/ BEFORE or OPERATE	BEFORE: No ABS operation (RL) OPERATE: During ABS operation (RL)	-
WHEEL SPD FR	Front Right wheel speed / Min.: 0km/h, Max.: 326.4 km/h	Actual wheel speed	Speed indicated on speedometer

WHEEL SPD FL	Front Left wheel speed/ Min.: 0km/h, Max.: 326.4 km/h	Actual wheel speed	Speed indicated on speedometer
WHEEL SPD RR	Rear Right wheel speed/ Min.: 0km/h, Max.: 326.4 km/h	Actual wheel speed	Speed indicated on speedometer
WHEEL SPD RL	Rear Left wheel speed/ Min.: 0km/h, Max.: 326.4 km/h	Actual wheel speed	Speed indicated on speedometer
DECELERAT SENS	G sensor (GL1 filter)/ Min.: -1.869 G, Max.: 1.869	Approximately 0 ± 0.13 G at still condition	Reading changes when vehicle is bounced
DECELERAT SENS2	G sensor (GL2 filter)/ Min.: -1.869 G, Max.: 1.869	Approximately 0 ± 0.13 G at still condition	Reading changes when vehicle is bounced
IG VOLTAGE	ECU IG power voltage/ UNDER or NORMAL or OVER	-	-
SFRR	SFRR/ ON or OFF	-	-
SFRH	SFRH/ ON or OFF	-	-
SFLR	SFLR/ ON or OFF	-	-
SFLH	SFLH/ ON or OFF	-	-
SRRR (SRR)	SRRR (SRR)/ ON or OFF	-	-
SRRH (SRH)	SRRH (SRH)/ ON or OFF	-	-
SRLR	SRLR/ ON or OFF	-	-
SRLH	SRLH/ ON or OFF	-	-
SRCF (SA1)	SRCF (SA1)/ ON or OFF	-	-
SRCR (SA2)	SRCR (SA2)/ ON or OFF	-	-
SRMF (SMCF, SA3)	SRMF (SMCF, SA3)/ ON or OFF	-	-
SRMR (SMCR, STR)	SRMR (SMCR, STR)/ ON or OFF	-	-
THROTTLE	Throttle position sensor/ Min.: 0 deg, Max.: 125 deg	-	-
ENGINE SPD	Engine Speed/ Min.: 0 rpm, Max.: 6000 rpm	Actual engine speed	-
YAW RATE	Yaw rate sensor/ Min.: -128 deg/s, Max.: 128 deg/s	-	-
YAW ZERO VALUE	Memorized zero value/ Min.: -128 deg/s, Max.: 128 deg/s	-	-
STEERING ANG	Steering sensor/ Min.: -1682 deg, Max.: 1877 deg	-1682 to 1877 deg	Turning the steering wheel changes the value Left : Becomes grater Right : Becomes smaller
MAS CYL PRS 1	Master cylinder pressure 1/ Min.: 0 V, Max.: 5 V	When brake pedal is released: 0.3 - 0.9 V	Reading increases when brake pedal is depressed
AIR BLD SUPPORT	Air bleed support/ NOT SUP or SUPPORT	w/ BA: Supported w/ VSC: Not supported	-
TEST MODE	Test mode operation/ NORMAL or TEST	NORMAL: Normal mode TEST: During test mode	-
#CODES	Number of Trouble Code/ Min.: 0, Max.: 255	MIn.: 0, Max.: 45	-

3. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the hand-held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as a first step of troubleshooting is one of the methods to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch ON.

(c) According to the display on the tester, perform the "ACTIVE TEST".

HINT:

IG must be turned ON to proceed the ACTIVE TEST using a hand-held tester.

*1: For VSC equipped vehicles only

Item	Test Details	Diagnostic Note
SFRR	Turns ABS solenoid (SFRR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFRH	Turns ABS solenoid (SFRH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFLR	Turns ABS solenoid (SFLR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFLH	Turns ABS solenoid (SFLH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRRR	Turns ABS solenoid (SRRR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRRH	Turns ABS solenoid (SRRH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRLR	Turns ABS solenoid (SRLR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRLH	Turns ABS solenoid (SRLH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRCF (SA1)	Turns ABS solenoid (SRCF (SA1)) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRCR (SA2)	Turns ABS solenoid (SRCR (SA2)) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRMF (SMCF, SA3)	Turns ABS solenoid (SMCF, SA3)) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRMR (SMCR, STR)	Turns ABS solenoid (SRMR (SMCR, STR)) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFRR & SFRH	Turns ABS solenoid SFRR & SFRH ON / OFF	Operation of solenoid (clicking sound) can be heard
SFLR & SFLH	Turns ABS solenoid SFLR & SFLH ON / OFF	Operation of solenoid (clicking sound) can be heard
SRH & SRR	Turns ABS solenoid SRRR & SRRH ON / OFF	Operation of solenoid (clicking sound) can be heard
SRLR & SRLH	Turns ABS solenoid SRLR & SRLH ON / OFF	Operation of solenoid (clicking sound) can be heard
SFRH & SFLH	Turns ABS solenoid SFRH & SFLH ON / OFF	Operation of solenoid (clicking sound) can be heard
SRCF & SRCR	Turns ABS solenoid SRCF & SRCR ON / OFF	Operation of solenoid (clicking sound) can be heard

SRMF & SRMR	Turns ABS solenoid SRMF & SRMR ON / OFF	Operation of solenoid (clicking sound) can be heard
SOL RELAY	Turns ABS solenoid relay ON/OFF	Operation of solenoid (clicking sound) can be heard
ABS MOT RELAY	Turns ABS motor relay ON/OFF	Operation of motor (clicking sound) can be heard
TRAC MOT RELAY	Turns TRC motor relay ON/OFF	Operation of motor (clicking sound) can be heard
ABS WARN LIGHT	Turns ABS warning light ON / OFF	Observe combination meter
VSC WARN LIGHT	Turns VSC warning light ON / OFF	Observe combination meter
VSC/ TRC OFF IND	Turns VSC / TRC OFF indicator ON / OFF	Observe combination meter
SLIP INDI LIGHT	Turns SLIP indicator light ON / OFF	Observe combination meter
BRAKE WRN LIGHT	Turns BRAKE warning light ON / OFF	Observe combination meter
VSC/BR WARN BUZ	Turns VSC / BRAKE warning buzzer ON / OFF	Buzzer can be heard

4. FREEZE FRAME DATA

(a) The vehicle (sensor) status memorized during ABS and/or VSC operation or at the time of error code detection can be displayed by the hand-held tester.

(b) Only one record of freeze frame data is stored and the freeze frame data generated during ABS and/or VSC operation are constantly updated. Also, the number of the ignition switch's ”ON” after the freeze frame data is stored can be memorized up to 31 and it can be displayed.

HINT:

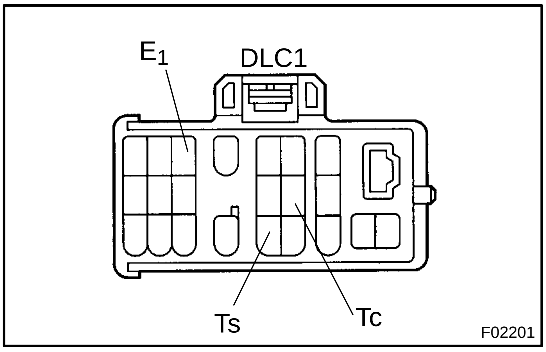
If the ignition switch ”ON” operation exceeds 31 times, ”31” appears on the display.

(c) If the diagnosis code abnormality occurs, the freeze frame data at the occurrence of the abnormality is stored but the ABS actuation data is deleted.

Hand-held tester display	Measurement Item	Reference Value*
VEHICLE SPD	Wheel speed sensor reading	Speed indicated on speedometer
STOP LIGHT SW	Stop light switch signal	Stop light switch ON: ON, OFF: OFF
# IG ON	Number of operations of ignition switch ON after memorizing freeze frame data	0 - 31
MAS CYL PRESS	Master cylinder pressure sensor reading	Brake pedal release : 0.3 to 0.9 V Brake pedal depress: 0.8 to 4.5 V
MASS PRESS GRADE	Master cylinder pressure sensor change	-30 to 200 MPa/s
SYSTEM	System status	ABS activated: ABS VSC/TRC activated: VSC/TRC BA activated: BA Fail safe mode activated: FAIL SF No system activated: NO SYS
YAW RATE	Yaw rate angle sensor reading	-100 to 100
STEERING ANG	Steering sensor reading	Left turn: Increase Right turn: Drop
THROTTLE	Throttle position sensor reading	Release accelerator pedal: Approx. 0 deg. Depress accelerator pedal: Approx. 90 deg.
G (RIGHT & LEFT)	Right and left G	-1.869 to 1.869
G (BACK & FORTH)	Back and forth G	-1.869 to 1.869
VSC (TRC) OFF SW	VSC OFF switch signal	TRAC OFF SW ON: ON OFF: OFF

Hand-held tester display	Measurement Item	Reference Value*
SHIFT POSITION	Shift lever position	FAIL P,N R D 4 3 2 L
THROTTLE	Throttle sensor reading	0 to 125 deg.

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



5. SPEED SENSOR SIGNAL CHECK (TEST MODE)

HINT:

★ When replacing the yaw rate sensor or ECU, make sure to perform a yaw rate sensor zero point calibration.

★ If the ignition switch is turned from the ON to the ACC or LOCK position during test mode, DTC will be erased.

(a) In case of not using hand-held tester:
Check the speed sensor signal.

(1) Turn the ignition switch OFF.

(2) Using SST, connect terminals Ts and E_1 of the DLC1.

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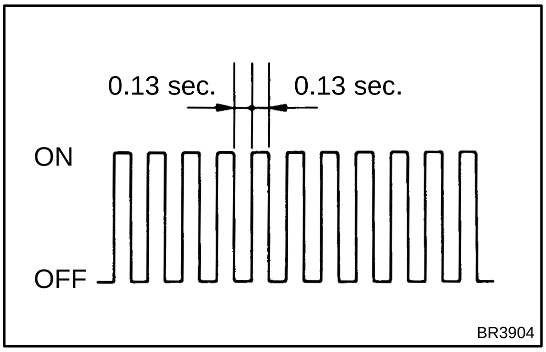
(3) Start the engine.



(4) Check that the ABS warning light blinks.

HINT:

If the ABS warning light does not blink, inspect the ABS warning light circuit and Ts circuit (See page DI-627 and DI-653).

(5) Keep the vehicle in the stationary condition on the flat place for 6 sec. or more.

(6) Shift the transfer lever in the L4 position and turn the center diff. lock switch ON.

(7) Shift the transfer lever back.

(8) Leaving the vehicle in the stationary condition and the brake pedal in a free condition for 1 sec. or more, continue to depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more for 1 sec. or more.

(9) Leaving the vehicle in the stationary condition, depress the brake pedal with a force of 980 N (100 kgf, 221 lbf) or more quickly.

HINT:
At this time, the ABS warning light comes on for 3 sec.

(10) Drive the vehicle straight forward.
When driving the vehicle with a speed faster than 28 mph (45 km/h) for several seconds, check that the ABS warning light goes off.

HINT:
There is a case that the sensor check is not completed if the vehicle has its wheels spun or its steering wheel turned during this check.

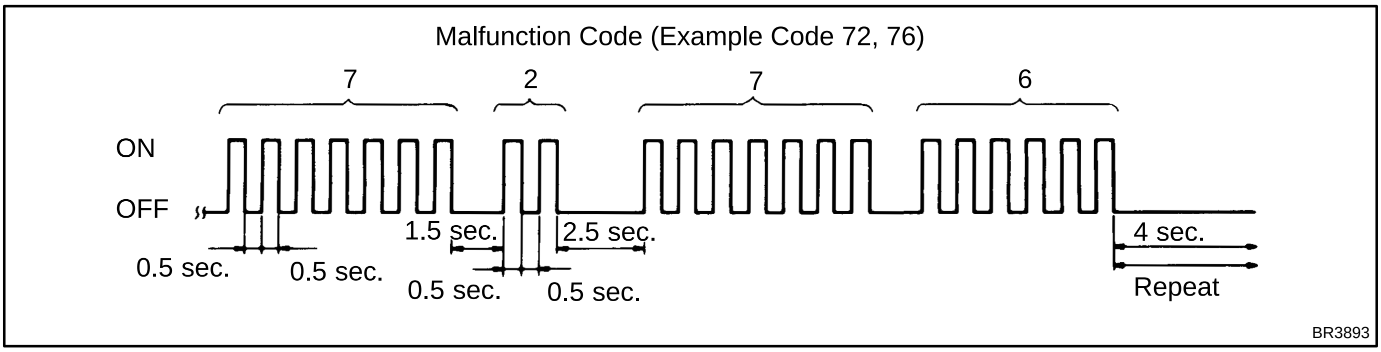
(11) Stop the vehicle.

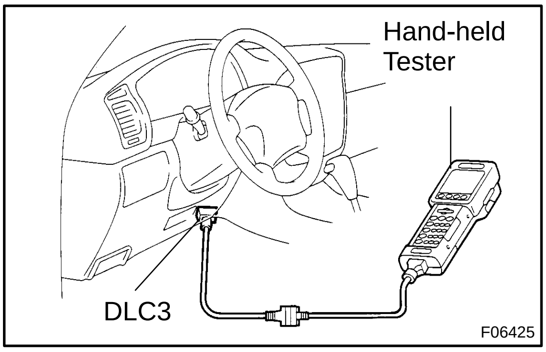
(12) Using SST, connect terminals Tc and E_1 of the DLC1 or Tc and CG of the DLC3.
SST 09843-18020 or 09843-18040

(13) Read the number of blinks of the ABS warning light.

HINT:
- ★ See the list of DTC 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.

(14) After doing the check, disconnect the SST from terminals of the DLC1 or terminals of the DLC1 and DLC3, and turn the ignition switch OFF.
SST 09843-18020 or 09843-18040





(b) In case of using hand-held tester:
Check the sensor signal.
(1) Hook up the hand-held tester to the DLC3.
(2) Do step (3) to (10) on the previous page.
(3) Read the DTC by following the prompts on the tester screen.

HINT:
Please refer to the hand-held tester operator's manual for further details.

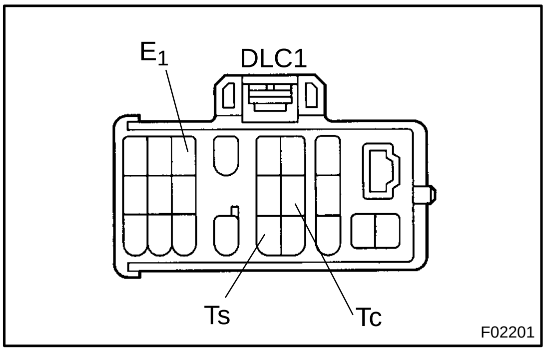
DTC of speed sensor signal check function:

Code No.	Diagnosis	Trouble Area
C1271 / 71	Low output voltage in right front speed sensor	★Right front speed sensor ★Sensor installation ★Sensor rotor
C1272 / 72	Low output voltage in left front speed sensor	★Left front speed sensor ★Sensor installation ★Sensor rotor
C1273 / 73	Low output voltage in right rear speed sensor	★Right rear speed sensor ★Sensor installation ★Sensor rotor
C1274 / 74	Low output voltage in left rear speed sensor	★Left rear speed sensor ★Sensor installation ★Sensor rotor
C1275 / 75	Abnormal change in output voltage of right front speed sensor	Right front speed sensor rotor
C1276 / 76	Abnormal change in output voltage of left front speed sensor	Left front speed sensor rotor
C1277 / 77	Abnormal change in output voltage of right rear speed sensor	Right rear speed sensor rotor
C1278 / 78	Abnormal change in output voltage of left rear speed sensor	Left rear speed sensor rotor
C1279 / 79	Deceleration sensor is faulty	★Deceleration sensor ★Sensor installation
C1281 / 81	Master cylinder pressure sensor output signal is faulty	Master cylinder pressure sensor
C1282 / 82	Transfer indicator (center diff. lock) switch malfunction	Transfer indicator (center diff. lock) switch
C1283 / 83	Transfer L4 position switch malfunction	Transfer L4 position switch

6. In case of not using hand-held tester:
VSC SENSOR CHECK (TEST MODE)

NOTICE:
When having replaced the yaw rate sensor, deceleration sensor and/or ECU, perform a zero point calibration of the yaw rate and deceleration sensors (See step 8.).

HINT:
If the ignition switch is turned from the ON to the ACC or LOCK during test mode, DTC will be erased.



(a) Procedures for test mode:
(1) Turn the ignition switch OFF.
(2) Check that the shift lever is in the P position, and turn the steering wheel to the neutral position.
(3) Using SST, connect terminals Ts and E_1 of the DLC1.
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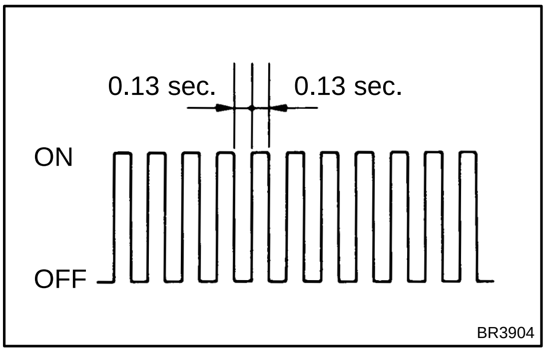
(4) Start the engine.

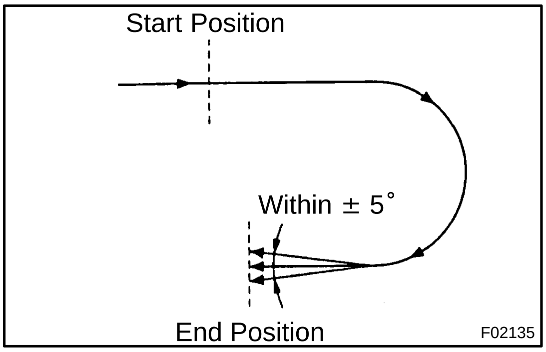


(5) Check that the VSC TRAC warning light blinks.

HINT:
If the VSC TRAC warning light does not blink, inspect the VSC TRAC warning light circuit and Ts terminal circuit (See page DI-631 and DI-653).

Turn the steering wheel either to the left or right 450° or more from the vehicle stationary condition, and turn back the steering wheel to the straight ahead position.

(b) Keep the vehicle stationary on a level place for 1 sec. or more.



(c) Check the yaw rate sensor.
Shift the shift lever to the D position and drive the vehicle at a vehicle speed of approx. 5 km/h (3 mph), turn the steering wheel either to the left or right 90° or more, and maintain this angle until the vehicle has turned 180°.
Stop the vehicle and shift the shift lever to the P position. Check that the VSC buzzer sounds for 3 sec.

If the VSC buzzer sounds, the sensor check is in normal completion.
If the VSC buzzer does not sound, do the sensor check again.
If the VSC buzzer still does not sound, check the VSC buzzer circuit, then do the sensor check again.

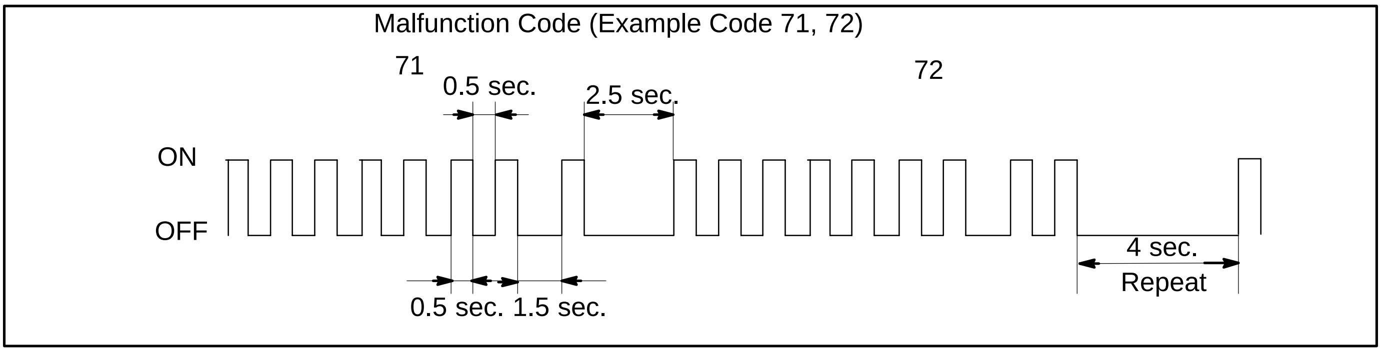
Trouble Area	See page
VSC buzzer circuit	DI-649

HINT:
★ Make a 180° turn. At the end of the turn, the direction of the vehicle should be within 180° ± 5° of its start position.
★ Do not spin the wheels.

(d) Read the DTC.
(1) Using SST, connect terminals Tc and E_1 of the DLC1 or Tc and CG of the DLC3.
SST 09843-18020 or 09843-18040
(2) Read the number of times the VSC TRAC warning light blinks.

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.



(3) After doing the check, disconnect the SST from terminals of the DLC1 or terminals of the DLC1 and DLC3 and turn the ignition switch OFF.

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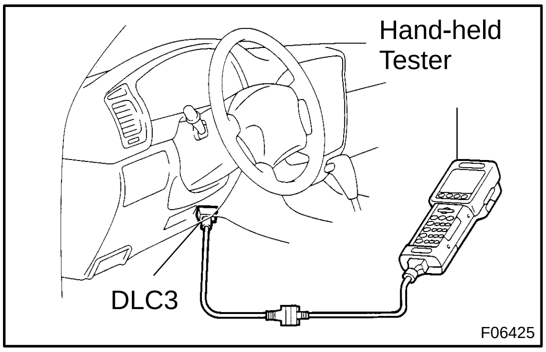


7. In case of using hand-held tester:
CHECK VSC SENSOR SIGNAL

NOTICE:

When having replaced the yaw rate sensor, deceleration sensor and/or ECU, perform a zero point calibration of the yaw rate and deceleration sensors (See step 7.). Make sure that this operation should be done before starting the following.

(a) Hook up the hand-held tester to the DLC3.

(b) Do steps (a)-(2) and from (a)-(4) to (c) on the previous page.

(c) Read the DTC by following the prompts on the tester screen.

HINT:

Please refer to the hand-held tester operator's manual for further details.

DTC of the VSC sensor check function:

Code No.	Diagnosis	Trouble Area
C0371 / 71	Yaw rate sensor output signal malfunction	★Yaw rate sensor ★Yaw rate sensor circuit

8. IF NECESSARY, PERFORM ZERO POINT CALIBRATION OF YAW RATE AND DECELERATION SENSORS

HINT:

★ When having replaced the yaw rate sensor, deceleration sensor or/and the ECU, make sure to perform a yaw rate and deceleration sensors zero point calibration.

★ This operation is also required when the deceleration sensor or yaw rate sensor has been replaced since the calibrated zero point of both sensors will be erased.

NOTICE:

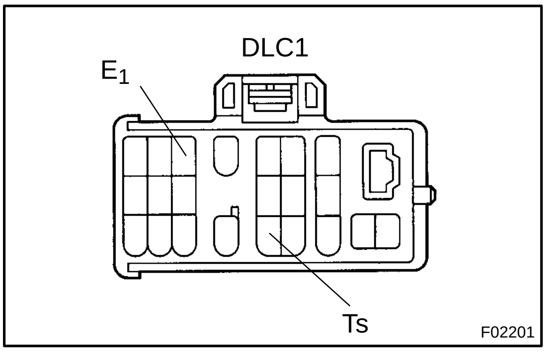
★ **While obtaining the zero point, do not vibrate the vehicle by tilting, moving or shaking it and keep it in a stationary condition. (Do not start the engine.)**

★ **Be sure to do this on a level surface (within an inclination of 1 %).**

(a) Clear the zero point of the yaw rate and deceleration sensors.

(1) Shift the shift lever to P range.

(2) Turn the ignition switch ON in a stationary condition.



(3) With the ignition switch ON, using SST, repeat a cycle of short and open between terminals Ts and E_1 of the DLC1 4 times or more within 8 sec. Check that the VSC warning light is lit indicating the recorded zero point is erased.

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(4) Turn the ignition switch OFF.

(b) Obtain the zero point of the yaw rate sensor.

(1) Disconnect terminals Ts and E_1 of the DLC1.

(2) Turn the ignition switch ON.

HINT:

The vehicle should be in a stationary condition with the shift lever in the P position.

(3) Check that the lighted VSC warning light goes off about 15 sec. after the ignition switch is turned ON.

HINT:

Even if the ignition is not turned OFF in step (a)-(4) and remains ON, a yaw rate sensor zero point calibration can be completed. In this case, the VSC warning light is lit about 15 sec. and starts blinking. (Normal code)

(4) After ensuring that the VSC warning light remains OFF for 2 sec., turn the ignition switch OFF.

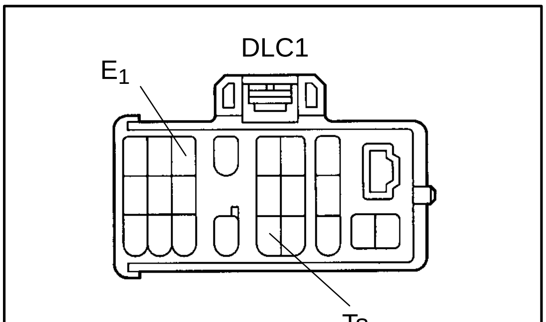
HINT:

If the ignition switch is not turned OFF in step (a)-(4), ensure the blinking of the VSC warning light for 2 sec. and turn the ignition switch OFF.

(c) Perform a deceleration sensor zero point calibration.

NOTICE:

After step (b) (a yaw rate sensor zero point calibration), the VSC warning light goes off. At this time, if the vehicle is driven without performing step (c) (a deceleration sensor zero point calibration), deceleration sensor zero point calibration malfunction will be detected and the VSC warning light will light up. Therefore, perform step (c) right after step (b).



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(1) Using SST, connect terminals Ts and E_1 of the DLC1.

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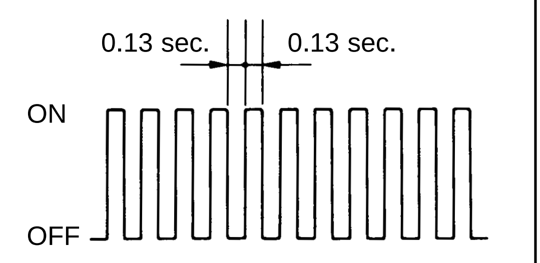
(2) Turn the ignition switch ON.

HINT:

Keep the vehicle in a stationary condition with the shift lever in the P position.



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(3) After turning the ignition switch ON, check that the VSC warning light is lit for about 4 sec. and then starts quick blinking at 0.13 sec. intervals.

(4) After ensuring the blinking of the VSC warning light for 2 sec., turn the ignition switch OFF.

(5) Remove the SST and disconnect terminals Ts and E1 of the DLC1.

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DIC91-01

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.

NOTICE:

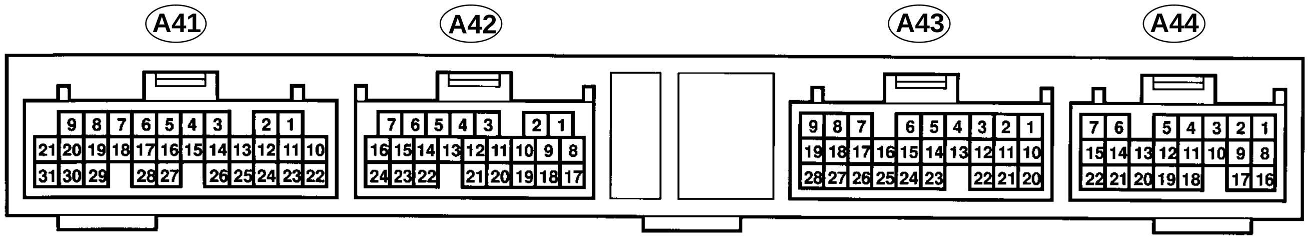
When replacing the skid control ECU, sensor, etc., turn the ignition switch OFF.

Symptom	Suspected Area	See page
ABS does not operate BA does not operate	Only when 1. to 4. are all normal and the problem is still occurring, replace the skid control ECU. 1. Reconfirm the DTC and check that the normal code is output. 2. IG power source circuit 3. Speed sensor circuit 4. Check the hydraulic brake booster with a checker or hand-held tester. If abnormal, check the hydraulic circuit for leakage (See page DI-655).	DI-505 DI-558 DI-615 BR-40
ABS does not operate efficiently BA does not operate	Only when 1. to 4. are all normal and the problem is still occurring, replace the skid control ECU. 1. Reconfirm the DTC and check that the normal code is output. 2. Speed sensor circuit 3. Stop light switch circuit 4. Check the hydraulic brake booster with a checker or hand-held tester. If abnormal, check the hydraulic circuit for leakage (See page DI-655).	DI-505 DI-615 DI-573 BR-40
ABS warning light abnormal	1. ABS warning light circuit 2. Skid control ECU	DI-627 IN-36
DTC check cannot be done	Only when 1. to 4. are all normal and the problem is still occurring, replace the skid control ECU. 1. ABS warning light circuit 2. VSC OFF indicator light, center diff. lock indicator switch circuit 3. Center diff. lock indicator switch circuit 4. Tc terminal circuit	DI-627 DI-645 DI-612 DI-651
Speed sensor signal check cannot be done	1. Ts terminal circuit 2. Skid control ECU	DI-653 IN-36
TRAC does not operate	Only when 1. to 4. are all normal and the problem is still occurring, replace the skid control 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-505 DI-558 DI-655 DI-615
VSC does not operate	Only when 1. to 7. are all normal and the problem is still occurring, replace the skid control 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 5. Deceleration sensor circuit 6. Yaw rate sensor circuit 7. Steering angle sensor circuit	DI-505 DI-558 DI-655 DI-615 DI-570 DI-553 DI-605

VSC TRAC warning light abnormal	1. VSC TRAC warning light circuit 2. Skid control ECU	DI-631 IN-36
BRAKE warning light abnormal	1. BRAKE warning light circuit 2. Skid control ECU	DI-635 IN-36
SLIP indicator light abnormal	1. SLIP indicator light circuit 2. Skid control ECU	DI-639 IN-36
VSC OFF indicator abnormal	1. VSC OFF indicator light, center diff. lock switch circuit 2. Skid control ECU	DI-645 IN-36
TRAC indicator light abnormal	1. TRAC indicator light circuit 2. Skid control ECU	DI-642 IN-36

DIC8Z-01

TERMINALS OF ECU



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
SA1 (A41 - 2) - GND (A41 - 6, 31, A42 - 8, 17)	G - W-B	IG switch ON, ABS warning light OFF	10 to 14 V
SA2 (A41 - 3) - GND (A41 - 6, 31, A42 - 8, 17)	B - W-B	IG switch ON, ABS warning light OFF	10 to 14 V
SA3 (A41 - 4) - GND (A41 - 6, 31, A42 - 8, 17)	G-W - W-B	IG switch ON, ABS warning light OFF	10 to 14 V
STR (A41 - 5) - GND (A41 - 6, 31, A42 - 8, 17)	G-Y - W-B	IG switch ON, ABS warning light OFF	10 to 14 V
SFLR (A41 - 7) - GND (A41 - 6, 31, A42 - 8, 17)	B-Y - W-B	IG switch ON, ABS warning light OFF	10 to 14 V
SRRH (A41 - 8) - GND (A41 - 6, 31, A42 - 8, 17)	W - W-B	IG switch ON, ABS warning light OFF	10 to 14 V
SRRR (A41 - 9) - GND (A41 - 6, 31, A42 - 8, 17)	B-O - W-B	IG switch ON, ABS warning light OFF	10 to 14 V
VCM (A41 - 10) - GND (A41 - 6, 31, A42 - 8, 17)	B - W-B	IG switch ON	4.5 to 5.5 V
PH (A41 - 11) - GND (A41 - 6, 31, A42 - 8, 17)	O - W-B	IG switch ON, pressure switch (PH) ON	Below 0.9 V
		IG switch ON, pressure switch (PH) OFF	5 to 8 V
FR+ (A41 - 14) - FR- (A41 - 13)	L - P	IG switch ON, slowly turn right front wheel	AC generation
FL+ (A41 - 16) - FL- (A41 - 15)	R - G	IG switch ON, slowly turn left front wheel	AC generation
SR (A41 - 19) - R1+ (A41 - 1)	G-Y - P	IG switch ON, ABS warning light OFF	10 to 14 V
SFLH (A41 - 21) - GND (A41 - 6, 31, A42 - 8, 17)	Y - W-B	IG switch ON, ABS warning light OFF	10 to 14 V
PMC (A41 - 22) - E2 (A41 - 12)	R - W	IG switch ON, stop light switch OFF	0.3 to 0.7 V
E2 (A41 - 12) - GND (A41 - 6, 31, A42 - 8, 17)	W - W-B	IG switch OFF	Continuity
MTT (A41 - 27) - GND (A41 - 6, 31, A42 - 8, 17)	B-R - W-B	IG switch ON (Motor relay is OFF)	Below 1.5 V
MT+ (A41 - 28) - MT- (A41 - 18)	L - GR	IG switch ON (Motor relay is ON)	Below 1.5 V
MR1 (A41 - 29) - R1+ (A41 - 1)	R - P	IG switch ON, hydraulic brake booster pump motor running	10 to 14 V
WA (A42 - 1) - GND (A41 - 6, 31, A42 - 8, 17)	R-L - W-B	IG switch ON, ABS warning light OFF	Below 2.0 V

BZ (A42 - 2) - GND (A41 - 6, 31, A42 - 8, 17)	L - W-B	IG switch ON, VSC buzzer sound can be heard	Below 1.5 V
D/G (A42 - 3) - GND (A41 - 6, 31, A42 - 8, 17)	V-W - W-B	IG switch ON	10 to 14 V
P (A42 - 5) - GND (A41 - 6, 31, A42 - 8, 17)	G-W - W-B	IG switch ON, shift lever is in P position	10 to 14 V
IG1 (A42 - 6) - GND (A41 - 6, 31, A42 - 8, 17)	B-W - W-B	IG switch ON	10 to 14 V
NEO (A42 - 7) - GND (A41 - 6, 31, A42 - 8, 17)	W - W-B	Engine idling	Pulse generation
STP (A42 - 10) - GND (A41 - 6, 31, A42 - 8, 17)	G-W - W-B	Stop light switch pushed in	10 to 14 V
		Stop light switch released	2 to 5 V
Tc (A42 - 11) - GND (A41 - 6, 31, A42 - 8, 17)	P-B - W-B	IG switch ON and terminals Tc-E_1 of DLC1 connected	Below 1.0 V
		IG switch ON and terminals Tc-E_1 of DLC1 not connected	10 to 14 V
Ts (A42 - 12) - GND (A41 - 6, 31, A42 - 8, 17)	W - W-B	IG switch ON and terminals Ts-E_1 of DLC1 connected	Below 1.0 V
		IG switch ON and terminals Ts-E_1 of DLC1 not connected	10 to 14 V
PKB (A42 - 13) - GND (A41 - 6, 31, A42 - 8, 17)	R-W - W-B	IG switch ON, parking brake switch ON	Below 1.5 V
		IG switch ON, parking brake switch OFF	10 to 14 V
ENG+ (A42 - 14) - ENG - (A42 - 22)	R - G	IG switch ON	Pulse generation
RL+ (A42 - 18) - RL- (A42 - 19)	R - G	IG switch ON, slowly turn left rear wheel	AC generation
RR+ (A42 - 20) - RR- (A42 - 21)	B - W	IG switch ON, slowly turn right rear wheel	AC generation
TRC+ (A42 - 24) - TRC- (A42 - 16)	Y - L	IG switch ON	Pulse generation
EXI2 (A43 - 2) - GND (A41 - 6, 31, A42 - 8, 17)	B-L - W-B	IG switch ON, transfer in L4 position	8 to 14 V
		IG switch ON, transfer in any position except L4	Below 1.5 V
EXI (A43 - 3) - GND (A41 - 6, 31, A42 - 8, 17)	P-B - W-B	IG switch ON, center diff. lock switch ON	Below 2.0 V
		IG switch ON, center diff. lock switch OFF	10 to 14 V
VSCW (A43 - 4) - GND (A41 - 6, 31, A42 - 8, 17)	L-W - W-B	IG switch ON, VSC TRAC warning light ON	Below 2.0 V
		IG switch ON, VSC TRAC warning light OFF	10 to 14 V
BRL (A43 - 5) - GND (A41 - 6, 31, A42 - 8, 17)	Y-G - W-B	IG switch ON, BRAKE warning light ON	10 to 14 V
		IG switch ON, BRAKE warning light OFF	Below 2.0 V
IND (A43 - 6) - GND (A41 - 6, 31, A42 - 8, 17)	L-B - W-B	IG switch ON, SLIP indicator light ON	Below 2.0 V
		IG switch ON, SLIP indicator light OFF	10 to 14 V
WT (A43 - 7) - GND (A41 - 6, 31, A42 - 8, 17)	L-R - W-B	IG switch ON, VSC OFF indicator light ON	Below 2.0 V
		IG switch ON, VSC OFF indicator light OFF	10 to 14 V
VYS (A43 - 9) - GYAW (A43 - 27)	B - W-R	IG switch ON	4.5 to 5.5 V
GL2 (A43 - 10) - GYAW (A43 - 27)	Y - P	IG switch ON, vehicle is placed on the horizontal surface	2.0 to 3.0 V
SS1+ (A43 - 14) - SS1- (A43 - 23)	W - G	Engine idling, slowly turn steering wheel	Pulse generation (See page DI-546)
INFR (A43 - 15) - GND (A41 - 6, 31, A42 - 8, 17)	B-R - W-B	IG switch ON, ACTIVE TRAC indicator light ON	Below 1.5 V
		IG switch ON, ACTIVE TRAC indicator light OFF	10 to 14 V
YD (A43 - 19) - GND (A41 - 6, 31, A42 - 8, 17)	L - W-B	Approx. 1 sec. after IG switch ON	4.5 to 5.3 V

GL1 (A43 - 22) - GYAW (A43 - 27)	G-R	IG switch ON, vehicle is placed on the horizontal surface	2.0 to 3.0 V
GYAW (A43 - 27) - GND (A41 - 6, 31, A42 - 8, 17)	R - W-B	IG switch OFF	Continuity
YAW (A43 - 28) - GYAW (A43 - 27)	W - R	IG switch ON, vehicle is in stationary condition	2 to 3 V
SRLR (A44 - 1) - GND (A41 - 6, 31, A42 - 8, 17)	R-G - W-B	IG switch ON, ABS warning light OFF	10 to 14 V
MR2 (A44 - 2) - R2+ (A44 - 3)	Y-B - W-L	IG switch ON, hydraulic brake booster pump motor running	10 to 14 V
AST (A44 - 6) - GND (A41 - 6, 31, A42 - 8, 17)	R-Y - W-B	IG switch ON, ABS warning light OFF	10 to 14 V
SRLH (A44 - 7) - GND (A41 - 6, 31, A42 - 8, 17)	R-W - W-B	IG switch ON, ABS warning light OFF	10 to 14 V
SFRR (A44 - 8) - GND (A41 - 6, 31, A42 - 8, 17)	B-W - W-B	IG switch ON, ABS warning light OFF	10 to 14 V
PL (A44 - 9) - GND (A41 - 6, 31, A42 - 8, 17)	W - W-B	IG switch ON, pressure switch ON	3 to 5 V
		IG switch ON, pressure switch OFF	7 to 11 V
TRIG (A44 - 20) - GND (A41 - 6, 31, A42 - 8, 17)	L - R	IG switch ON, ABS warning light OFF	10 to 14 V
+BO (A44 - 21) - GND (A41 - 6, 31, A42 - 8, 17)	LG - L	IG switch ON	10 to 14 V
SFRH (A44 - 16) - GND (A41 - 6, 31, A42 - 8, 17)	LG - W-B	IG switch ON, ABS warning light OFF	10 to 14 V
IG2 (A44 - 22) - GND (A41 - 6, 31, A42 - 8, 17)	B-W - W-B	IG switch ON	10 to 14 V

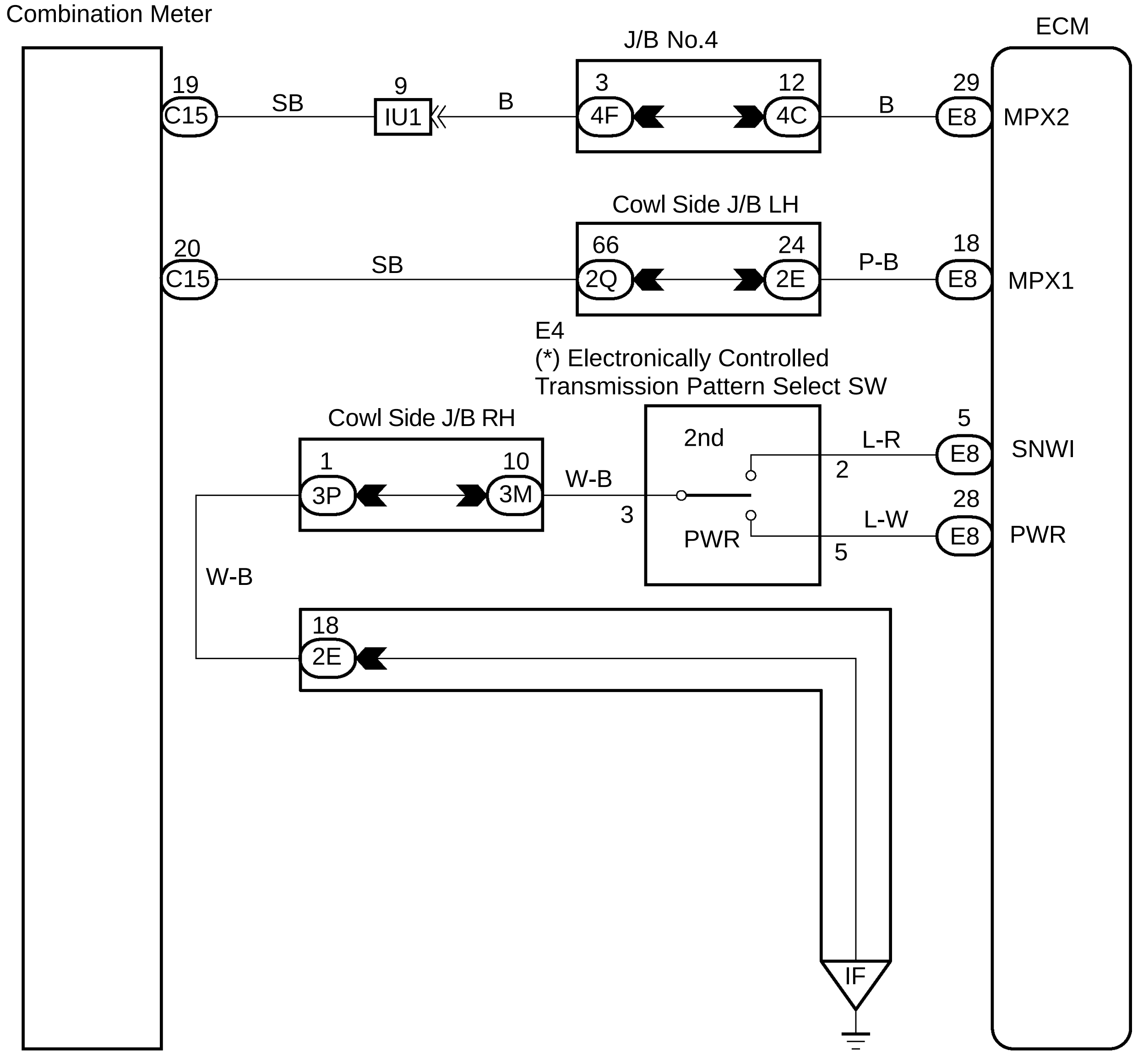
DIB3N-02

Pattern Select Switch Circuit (2nd Start Switch)

CIRCUIT DESCRIPTION

When 2nd start mode is selected with the pattern select switch, the ECM controls the solenoid valves and the transmission starts from 2nd gear.
In D position, the transmission automatically shifts up through 3rd to 5th as usual.
In 2nd position, the transmission is held in 2nd gear.

WIRING DIAGRAM



(*) Pattern Select Switch (2nd Start Switch)
When the 2nd start switch is pushed, the switch contact is made and the 2nd mode is selected.
To cancel the 2nd start, push the 2nd start switch once again. The 2nd start is automatically cancelled out when the ignition switch is turned OFF.

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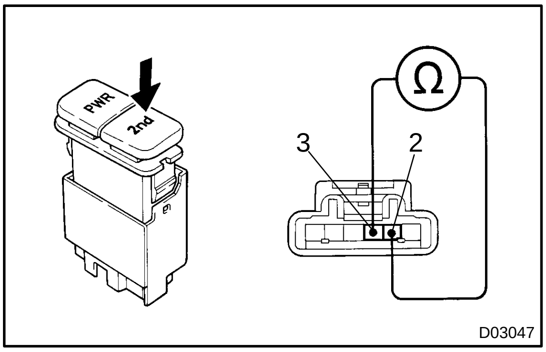
D12771

INSPECTION PROCEDURE

1	Check pattern select switch (2nd start switch).



PREPARATION:
Disconnect the pattern select switch connector.

CHECK:
Check continuity between terminals 2 and 3 of pattern select switch connector when pattern select switch is set to 2nd start switch ON and OFF.

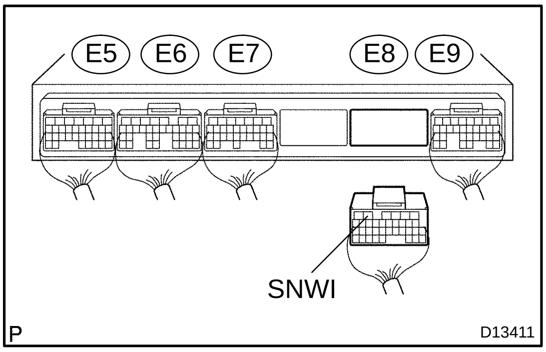
OK:

2nd start switch	Specified condition
Press continuously "2nd" switch	Continuity
Release "2nd" switch	No continuity

NG → **Replace the pattern select switch.**

OK

2	Check harness and connector between terminal SNWI of ECM and body ground.



PREPARATION:
(a) Connect the pattern select switch connector.
(b) Disconnect the connector of ECM.

CHECK:
Check continuity between terminal SNWI of ECM and body ground when the pattern select switch is set to 2nd start switch ON and OFF.

OK:

2nd start switch	Specified condition
Press contnuously "2nd" switch	Continuity
Release "2nd" switch	No Continuity

OK → **Proceed to next circuit inspection shown on matrix chart (See page DI-396).**

NG

Repair or replace harness or connector (See page IN-36).

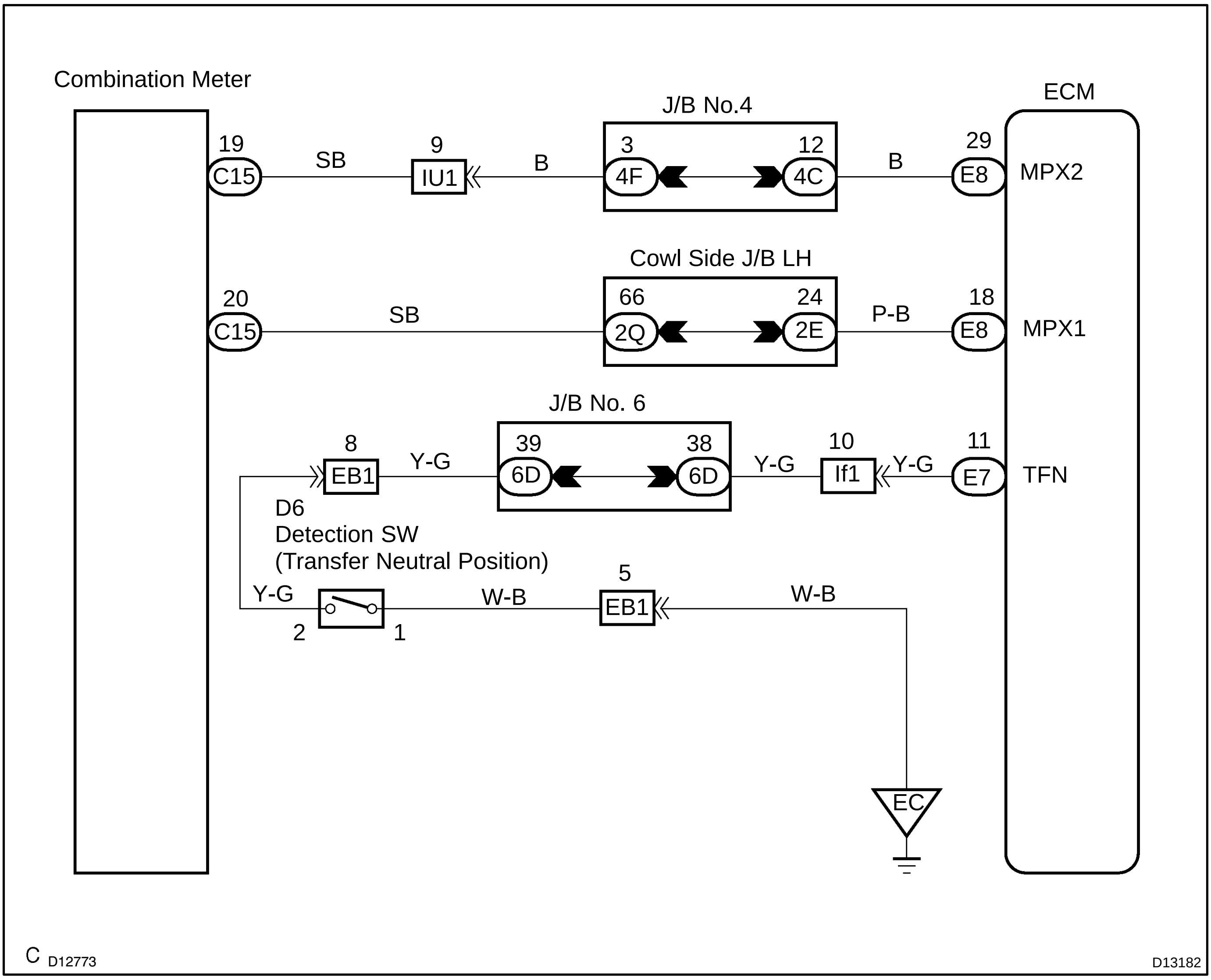
DI3C7-07

A/T. P. (Automatic Transmission Parking) Indicator Circuit

CIRCUIT DESCRIPTION

The propeller shaft and wheels are free even when the transmission shift lever is set to P as long as the transfer shift lever is in Neutral position. The A/T.P. indicator light lights up to warn the driver that the propeller shaft and wheels are not locked.
If the A/T.P. indicator light goes on, the transfer shift lever should be shifted to the positions other than N position.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check park/neutral position switch (See page DI-402).**

NG → **Replace the park/neutral position switch.**

OK

2	**Check transfer neutral position switch (See page DI-457).**

NG → **Replace the transfer neutral position switch.**

OK

3	**Check harness and connector between ECM and transfer neutral position switch, transfer neutral position switch and body ground (See page IN-36).**

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

OK

Proceed to next circuit inspection shown on matrix chart (See page DI-396).

DIC2Y-01

CIRCUIT INSPECTION

DTC	P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)

DTC	P0850	Park/Neutral Switch Input Circuit

CIRCUIT DESCRIPTION

The park/neutral position switch detects the shift lever position and sends signals to the ECM.

DTC No.	DTC Detection Condition	Trouble Area
P0705	(2-trip detection logic) ★All switches are OFF simultaneously for P, R, N, D, 3 and 2 positions. ★2 or more switches are ON simultaneously for P, R, N, (D 4), 3 and (2 L) positions.	★Short in park/neutral position switch circuit ★Park/neutral position switch ★ECM
P0850	Park/neutral position switch remaines ON (P, N position) during driving under conditions (a) and (b) for 30 sec. (2-trip detection logic) (a) Vehicle speed: 70 km/h (44 mph) or more (b) Engine speed: 1,500 - 2,500 rpm	

MONITOR DESCRIPTION

The park/neutral position switch detects the shift lever position and sends a signal to the ECM.
For security, the park/neutral position switch detects the shift lever position so that engine can be started only when the vehicle is in P or N shift position.
When the park/neutral position switch sends more than one signal at a time from switch positions P, R, N or D, the ECM interprets this as a fault in the switch. The ECM will turn on the MIL and store the DTC.

MONITOR STRATEGY

P0705:

Related DTCs	P0705	Park/neutral position switch/Verify switch input
Required sensors/Components	Park/neutral position switch	
Frequency of operation	Continuous	
Duration	Condition (A), (B) and (D)	2 sec.
	Condition (C)	60 sec.
MIL operation	2 driving cycle	
Sequence of operation	None	

P0850:

Related DTCs	P0850	Park/neutral position switch/Verify switch cycling
Required sensors/Components	Main	Park/neutral position switch
	Sub	Crankshaft position sensor (NE), MAF meter
Frequency of operation	Continuous	
Duration	30 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

P0705:

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Ignition switch	ON	
Battery voltage	10.5 V or more	

P0850:

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Vehicle speed	70 km/h (43 mph) or more	-
Engine speed	1,500 rpm or more	2,500 rpm or less
Intake air amount per revolution	0.9 g/rev. or more	-

TYPICAL MALFUNCTION THRESHOLDS

P0705:

Detection criteria	Threshold
One of the following conditions is met: Condition (A), (B), (C) or (D)	
Condition (A)	
Number of the following signal input at the same time	2 or more
P switch	ON
N switch	
R switch	
D switch	
3 switch	
2 switch	
Condition (B)	
Number of the following signal input at the same time	2 or more
NSW switch	ON
R switch	
D switch	
3 switch	
2 switch	
Condition (C)	
All of following conditions are met	
P switch	OFF
N switch	
NSW switch	
R switch	
D switch	
3 switch	
2 switch	
Condition (D)	
Both (i) and (ii) are met	
(i) One of followings is met	
NSW switch	ON
P switch	
N switch	
R switch	
(ii) One of followings is met	
4 switch	ON
L switch	

P0850:

Detection criteria	Threshold
NSW signal	ON

COMPONENT OPERATING RANGE

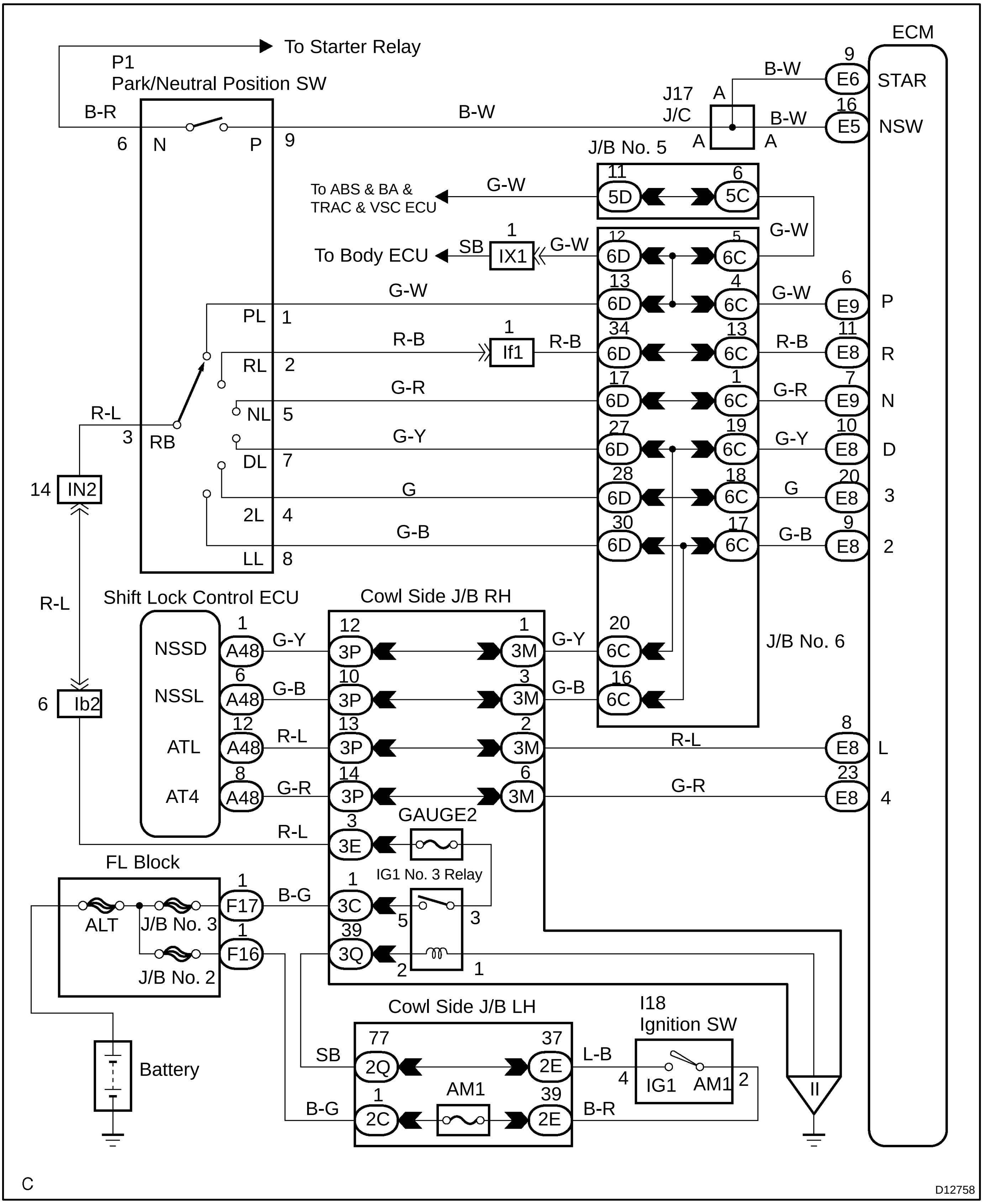
P0705:

Parameter	Standard value
Park/neutral position switch	The park/neutral position switch sends only one signal to the ECM.

P0850:

Parameter	Standard value
Park/neutral position switch	The park/neutral position switch is OFF when avobe condition.

WIRING DIAGRAM



INSPECTION PROCEDURE

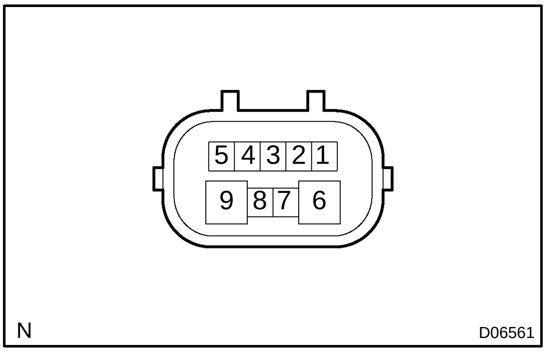
HINT:

According to the DATA LIST displayed by the OBD II scan tool or Hand-held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as a first step of troubleshooting is one method to shorten labor time.

(a) Warm up the engine.
(b) Turn the ignition switch OFF.
(c) Connect the OBD II scan tool or Hand-held tester to the DLC3.
(d) Turn the ignition switch ON.
(e) Push the "ON" button of OBD II scan tool or Hand-held tester.
(f) Select the item "/DIAGNOSIS/ENHANCED OBD II/DATA LIST/ALL (or ATM)".
(g) According to the display on tester, read the "DATA LIST".

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
PNP SW [NSW]	PNP SW Status/ ON or OFF	Shift lever position is; P or N: ON Except P or N: OFF	The shift lever position and these values are different, there are failures of the PNP switch or shift cable adjustment.
REVERSE	PNP SW Status/ ON or OFF	Shift lever position is; R: ON Except R: OFF	
DRIVE	PNP SW Status/ ON or OFF	Shift lever position is; D and 4: ON Except D and 4: OFF	

1 Check park/neutral position switch.



PREPARATION:

(a) Jack up the vehicle.
(b) Disconnect the park/neutral position switch connector.

CHECK:

Check continuity between each terminal shown below when the shift lever is moved to each position.

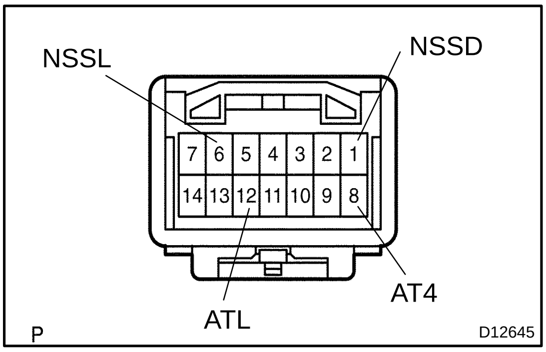
OK:

Shift position	Terminal No. to continuity	Terminal No. to continuity
P	1 - 3	6 - 9
R	2 - 3	-
N	3 - 5	6 - 9
D, 4	3 - 7	-
3	3 - 4	-
2, L	3 - 8	-

NG — **Replace park/neutral position switch (See page AT-7).**

OK

2	Check transmission control switch.



PREPARATION:

(a) Connect the park/neutral position switch connector.

(b) Disconnect the shift lock control computer connector (transmission control switch).

CHECK:

Check continuity between each terminal of shift lock control computer (transmission control switch).

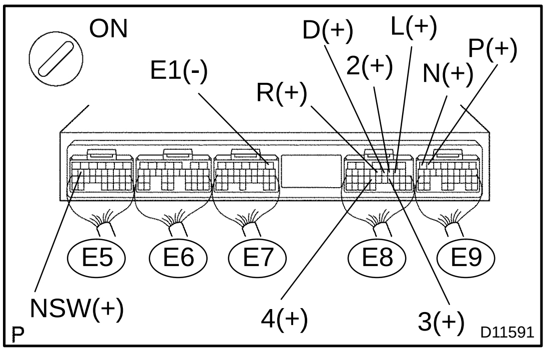
OK:

Shift position	Tester connection	Specified valve
D	1 - 8 (NSSD - AT4)	No continuity
4		Continuity
2	6 - 12 (NSSL - ATL)	No continuity
L		Continuity

NG → **Replace the transmission control switch (See page AT-20).**

OK

3	Measure voltage between each terminals of NSW, P, R, N, D, 4, 3, 2, L and E1 of ECM.



PREPARATION:

(a) Connect the shift lock control computer connector (transmission control switch).

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between each terminals NSW, P, R, N, D, 4, 3, 2, L and E1 of ECM when the shift lever is shifted to the following positions.

OK:

Tester connection	Condition	Specified condition
NSW - Body ground	Shift lever position: P and N	Below 1 V
	Shift lever position: Except P and N	Battery voltage
P- Body ground	Shift lever position: P	Battery voltage
R - Body ground	Shift lever position: R	Battery voltage*
N - Body ground	Shift lever position: N	Battery voltage
D - Body ground	Shift lever position: D and 4	Battery voltage
4 - Body ground	Shift lever position: 4	Battery voltage
3 - Body ground	Shift lever position: 3	Battery voltage
2 - Body ground	Shift lever position: 2 and L	Battery voltage
L - Body ground	Shift lever position: L	Battery voltage

HINT:

*: The voltage will drop slightly due to lighting up of the back up light.

OK	Check and replace the ECM (See page IN-36).

NG

Repair or replace the harness or connector (See page IN-36).

DIC2Z-01

DTC	P0710	Transmission Fluid Temperature Sensor ”A” Circuit

DTC	P0712	Transmission Fluid Temperature Sensor ”A” Circuit Low Input

DTC	P0713	Transmission Fluid Temperature Sensor ”A” Circuit High Input

CIRCUIT DESCRIPTION

The ATF temperature sensor converts fluid temperature into a resistance value which is input into the ECM.

DTC No.	DTC Detecting Condition	Trouble Area
P0710	(a) and (b) is detected momentary within 0.5 sec. when neither P0712 or P0713 is not detected (1-trip detection logic) (a) ATF temperature sensor resistance is less than 79 Ω. (b) ATF temperature sensor resistance is more than 156 kΩ. HINT: Within 0.5 sec. the malfunction switches from (a) to (b) or from (b) to (a)	★Open or short in ATF temperature sensor No. 1 circuit ★ATF temperature sensor No. 1 ★ECM
P0712	ATF temperature sensor resistance is less than 79 Ω. for 0.5 sec. or more (1-trip detection logic)	
P0713	ATF temperature sensor resistance is more than 156 kΩ. 15 minutes or more after the engine start DTC is detected for 0.5 sec. or more (1-trip detection logic)	

MONITOR DESCRIPTION

The automatic transmission fluid (ATF) temperature sensor converts ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, and the ECM detects an opens or shorts in the ATF temperature circuit. If the resistance value of the ATF temperature is less than 79 Ω*1 or more than 156 kΩ*2, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM will turn on the MIL and store the DTC.

*1: 150°C (302°F) or more is indicated regardless of the actual ATF temperature.

*2: -40°C (-40°F) is indicated regardless of the actual ATF temperature.

HINT:

The ATF temperature can be checked on the OBD II scan tool or hand-held tester display.

MONITOR STRATEGY

Related DTCs	P0710	ATF temperature sensor/Range check (Fluttering)
	P0712	ATF temperature sensor/Range check (Low resistance)
	P0713	ATF temperature sensor/Range check (High resistance)
Required sensors/Components	ATF temperature sensor	
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Range check (Fluttering, Low resistance)		
The typical enabling condition is not available.	-	
Range check (High resistance)		
Time after engine start	15 min. or more	-

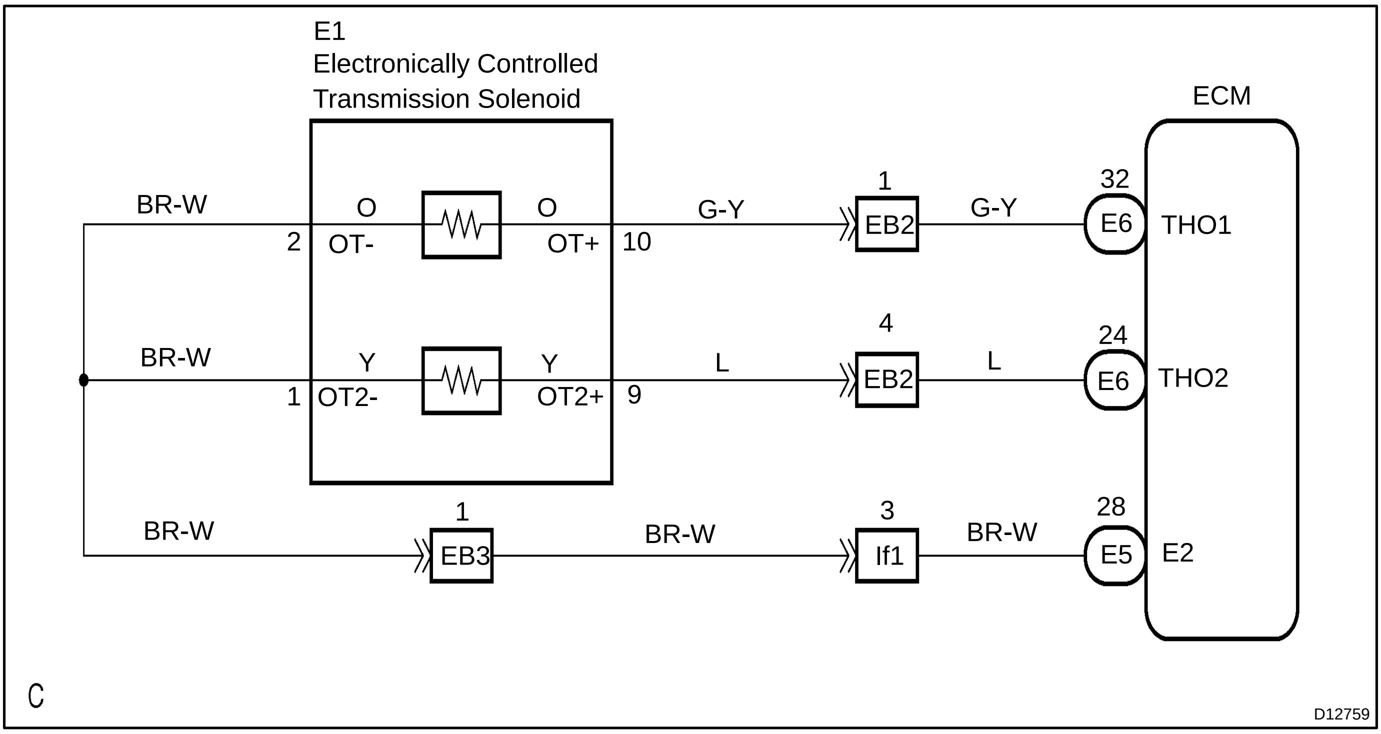
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Range check (Fluttering)	
ATF temperature sensor resistance	Less than 79 Ω or More than 156 kΩ
Range check (Low resistance)	
ATF temperature sensor resistance	Less than 79 Ω
Range check (High resistance)	
ATF temperature sensor resistance	More than 156 kΩ

COMPONENT OPERATING RANGE

Parameter	Standard value
ATF temperature sensor resistance	Atmospheric temperature to approx. 130°C (266°F)

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
According to the DATA LIST displayed by the OBD Ⅱ scan tool or Hand-held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as a first step of troubleshooting is one method to shorten labor time.

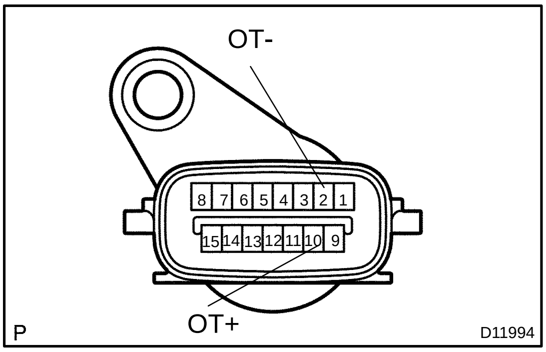
(a) Warm up the engine.
(b) Turn the ignition switch OFF.
(c) Connect the OBD Ⅱ scan tool or Hand-held tester to the DLC3.
(d) Turn the ignition switch ON.
(e) Push the "ON" button of OBD Ⅱ scan tool or Hand-held tester.
(f) Select the item "/DIAGNOSIS/ENHANCED OBD Ⅱ/DATA LIST/ALL (or ATM)".
(g) According to the display on tester, read the "DATA LIST".

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
AT FLUID TEMP	ATF Temp. Sensor No.1 Value/ min.: -40°C (-40°F) max.: 215°C (419°F)	80°C (176°F) (After Stall Test)	If the value is "-40°C (-40°F)" or "215°C (419°F)", ATF temp. sensor No. 1 circuit is opened or shorted.

HINT:
When DTC P0712 is output and OBD Ⅱ scan tool or hand-held tester output is 150°C (302°F), there is a short circuit.
Measure the resistance between THO1 (THO) and body ground.

Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
150°C (302°F) or more	Short circuit

1	Check transmission wire.

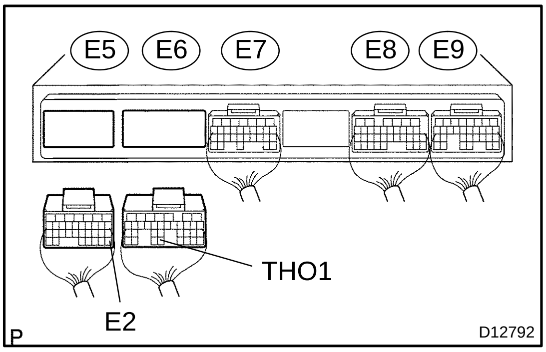


PREPARATION:
Disconnect the transmission wire connector from the transmission.
CHECK:
Measure the resistance between terminals OT+ and OT-.
OK:
79 Ω to 156 kΩ
CHECK:
Measure resistance between terminals OT+ and OT- of the transmission wire connector and body ground.
OK:
Resistance: 1 MΩ or higher

NG **Replace the transmission wire (ATF temperature sensor).**

OK

2	Measure resistance between terminal THO1 and E2 of ECM connector.



PREPARATION:

(a) Connect the transmission wire connector.

(b) Disconnect the connector of the ECM.

CHECK:

Measure the resistance between terminals THO1 and E2.

OK:

79 Ω to 156 kΩ

CHECK:

Measure resistance between terminals THO1 and E2 of the ECM connector and body ground.

OK:

Resistance: 1 MΩ or higher

NG — **Repair or replace the harness or connector (See page IN-36).**

OK

Check and replace the ECM (See page IN-36).

DIC30-01

DTC	P0711	Transmission Fluid Temperature Sensor "A" Performance

CIRCUIT DESCRIPTION

The ATF temperature sensor converts fluid temperature into a resistance value which is input into the ECM.

DTC No.	DTC Detecting Condition	Trouble Area
P0711	(A) Both (a) and (b) are detected: (2-trip detection logic) (a) Intake air and engine coolant temps. are more than -10°C (14°F) at engine start (b) After normal driving for over 20 min. and 9 km (6 mile) or more, ATF temp. is less than 20°C (68°F) (B) After 17 min. of engine start, the ATF temp. is 110°C (230°F) or more (2–trip detection logic).	★Open or short in ATF temperature sensor No. 1 circuit ★ATF temperature sensor No. 1 ★ECM

MONITOR DESCRIPTION

The ATF temperature sensor converts the ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature and detects an opens or shorts in the ATF temperature circuit or a fault of the ATF temperature sensor.
After running the vehicle for a certain period, the ATF temperature should increase. If the ATF temperature is below 10°C (50°F) after running the vehicle for a certain period, the ECM interprets this as a fault, and turns on the MIL.
When the ATF temperature is 110°C (230°F) or more after 17 minutes of engine cold start, the ECM also determines this as a fault, turns on the MIL, and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0711	ATF temperature sensor/Rationality check
Required sensors/Components	ATF temperature sensor	
Frequency of operation	Continuous	
Duration	3 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
ATF Temperature sensor "A" circuit	There is no malfunction in the circuit shown on the left.	
ECT (Engine coolant temperature) sensor circuit		
IAT (Intake air temperature) sensor circuit		
Time after engine start	18 min. and 20 sec. or more	-
ECT	-15 °C (5°F) or more	-
Driving distance after engine start	9 km (6 mile) or more	-
IAT (12 sec. after engine start)	-20 °C (-4°F) or more	-
ECT (12 sec. after engine start)	-20 °C (-4°F) or more	-

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
ATF Temperature	Less than 10°C (50°F) (ATF temperature = -10°C (14°F) at engine start) (Conditions vary with ATF temperature at engine start)

COMPONENT OPERATING RANGE

Parameter	Standard value
ATF temperature sensor	Atmospheric temperature to approx. 130°C (266°F)

WIRING DIAGRAM

See page DI-410 .

INSPECTION PROCEDURE

1	**Check other DTCs output (in addition to DTC P0711).**

PREPARATION:
(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or hand-held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the "ON" button of the OBD II scan tool or the hand-held tester.
(f) Select the item "DIAGNOSIS/ENHANCED OBD II/DTC INFO/CURRENT CODES".

CHECK:
Read the DTCs using the OBD II scan tool or the hand-held tester.

RESULT:

Display (DTC output)	Proceed to
Only "P0711" is output	A
"P0711" and other DTCs	B

HINT:
If any other codes besides "P0711" is output, perform the troubleshooting for those DTCs first.

B **Go to relevant DTC chart (See page DI-389).**

A

2	**Check transmission fluid level (See page DI-361).**

NG → **Add fluid.**

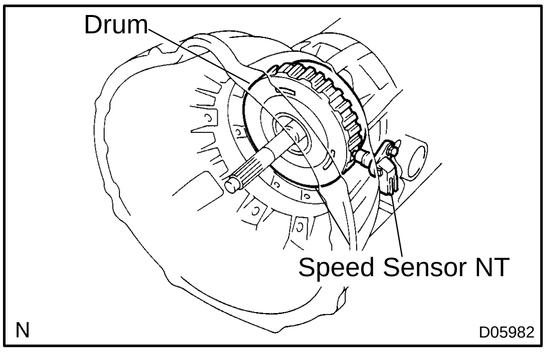
OK

Replace the transmission wire (ATF temperature sensor).

DIB35-02

DTC	P0717	Input Speed Sensor Circuit No Signal

CIRCUIT DESCRIPTION



The speed sensor NT detects the rotation speed of the input shaft from the rotation of the drum. Its construction is the same as that of the speed sensor SP2.
By comparing the speed sensor NT signal and speed sensor SP2 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 providing smooth gear shift.

DTC No.	DTC Detection Condition	Trouble Area
P0717	All conditions below are detected for 5 secs. or more (1-trip detection logic) (a) Gear change not being performed (b) Gear position: 1st, 2nd, 3rd, 4th or 5th (c) T/M input shaft rpm: 300 rpm or less (d) T/M output shaft rpm: 1,000 rpm or more (e) Park/neutral position switch: OFF (f) Shift solenoid valves, park/neutral posotion switch and vehicle speed sensor are in normal operation	★Open or short in speed sensor NT circuit ★Speed sensor NT ★ECM ★Automatic transmission assembly

MONITOR DESCRIPTION

The input speed sensor detects the transmission input shaft speed. The ECM determines the gear shift timing based on a comparison of the input speed sensor (input shaft speed) with the output speed sensor (output shaft speed).
When the output shaft speed is higher then the expected value and the input shaft speed is 300 rpm or less while running with the shift in the D position, the ECM will conclude that there is malfunction of the input turbine speed sensor (NT). The ECM will illuminate the MIL and a DTC is set.

MONITOR STRATEGY

Related DTCs	P0717	Speed sensor (NT)/Verify pulse input
Required sensors/Components	Main	Speed sensor (NT)
	Sub	Speed sensor (NO)
Frequency of operation	Continuous	
Duration	5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Shift change	Shift change is completed and before starting next shift change operation	
Transmission Shift position	4th or 5th	
Output shaft rpm	1,000 rpm or more	-
NSW switch	OFF	
R switch	OFF	
L switch	OFF	
Engine	Running	

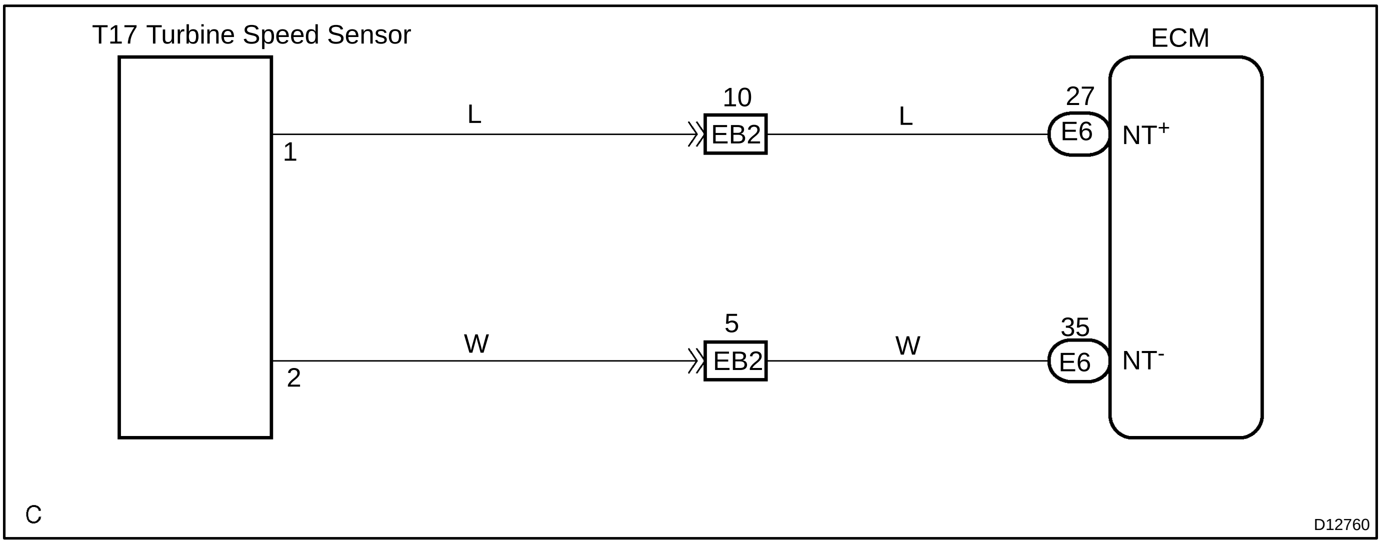
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Sensor signal rpm	Less than 300 rpm

COMPONENT OPERATING RANGE

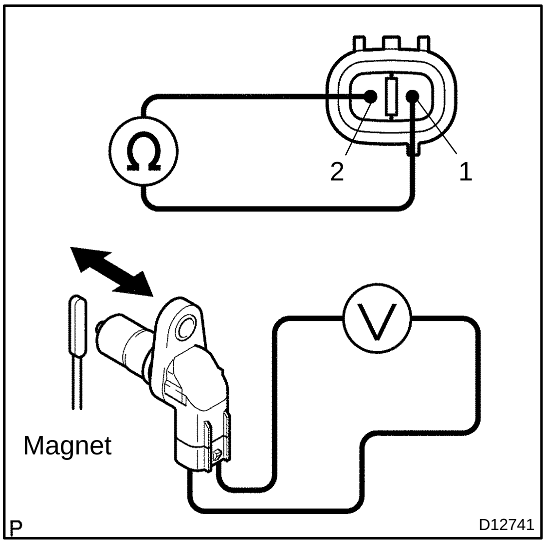
Parameter	Standard value
Speed sensor (NT)	Input speed is equal to engine speed when lock-up ON.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check speed sensor NT.**



PREPARATION:

Remove the speed sensor NT.

CHECK:

(a) Measure the resistance between the sensor terminals.

Standard: 560 to 680 Ω at 20°C (68°F)

(b) Measure the voltage between the sensor terminals when a magnet is put close to the front end of the sensor then moved away quickly.

Standard: Sensor generates voltage intermittently

HINT:

The generated voltage is extremely low.

OK:

Standard

NG	**Replace speed sensor NT.**

OK

2	**Check harness and connector between ECM and speed sensor NT (See page IN-36).**

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

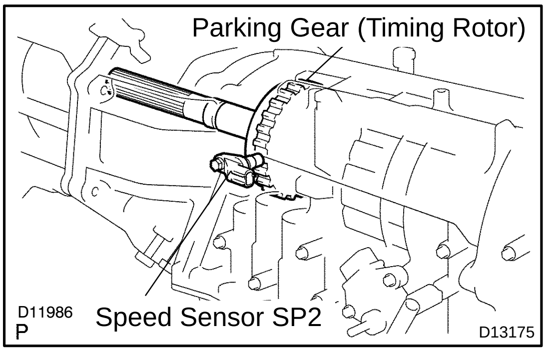
OK

Check and replace the ECM (See page IN-36).

DIB36-02

DTC	P0722	Output Speed Sensor Circuit No Signal

CIRCUIT DESCRIPTION



The speed sensor SP2 detects the rotation speed of the transmission output shaft and sends signals to the ECM. The ECM determines the vehicle speed based on these signals. An AC voltage is generated in the speed sensor SP2 coil as the parking gear mounted on the rear planetary gear assy rotates, and this voltage is sent to the ECM. The parking gear on the rear planetary gear is used as the timing rotor for this sensor.
The gear shift point and lock-up timing are controlled by the ECM based on the signals from this vehicle speed sensor and the throttle position sensor signal. If the speed sensor SP2 malfunctions, the ECM uses input signals from the speed sensor NT as a back-up signal.

DTC No.	DTC Detection Condition	Trouble Area
P0722	All conditions below are detected 500 times or more continuously (1-trip detection logic) (a) No signal from speed sensor SP2 is input to ECM while 4 pulses of No. 1 vehicle speed sensor signal are sent (b) Vehicle speed is 9 km/h (6 mph) or more for at least 4 sec. (c) Park/neutral position switch is OFF. (d) Transfer position is except neutral (4WD).	★Open or short in speed sensor SP2 circuit ★Speed sensor SP2 ★ECM

MONITOR DESCRIPTION

The output speed sensor monitors the output shaft speed. The ECM controls the gearshift point and the lock up timing based on the signals from the output speed sensor and throttle position sensor.
If the ECM detects no signal from the output shaft speed sensor even while the vehicle is moving, it will conclude that is a malfunction of the output speed sensor. The ECM will illuminate the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P0722	Speed sensor SP2/Verify pulse input
Required sensors/Components	Speed sensor SP2	
Frequency of operation	Continuous	
Duration	500 output shaft revolution	
MIL operation	Immediate	
Sequence of operation	None	

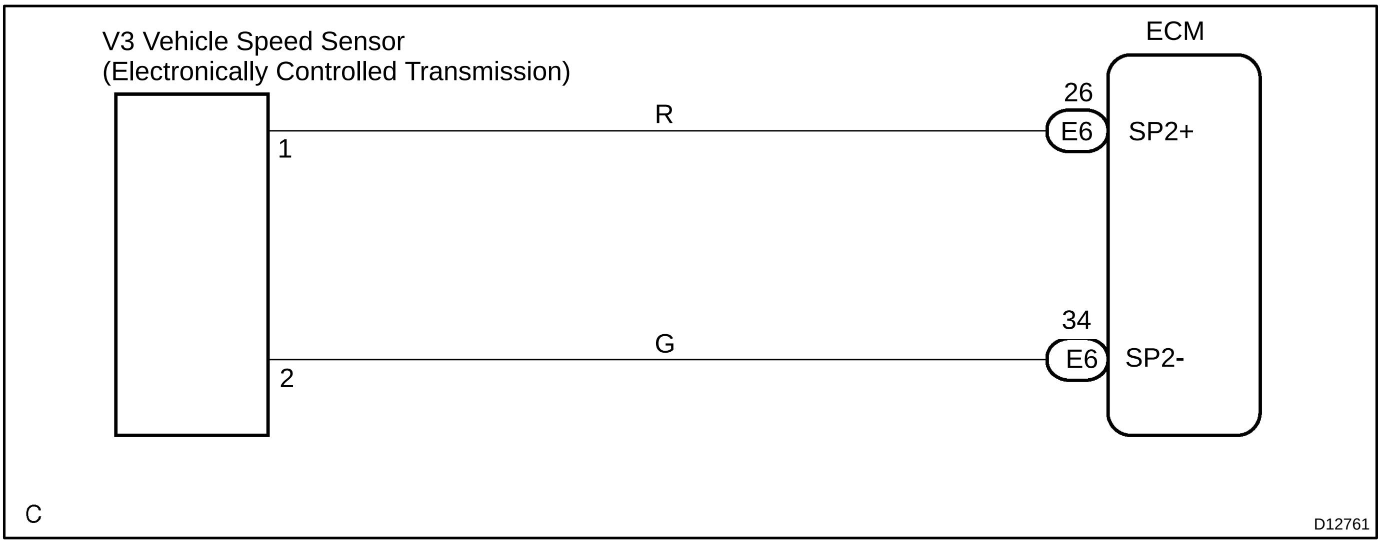
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Vehicle speed range (4 sec. or more)	9 km/h (6 mph) or more	-
NSW switch	OFF	
Transfer neutral switch	OFF	

TYPICAL MALFUNCTION THRESHOLDS

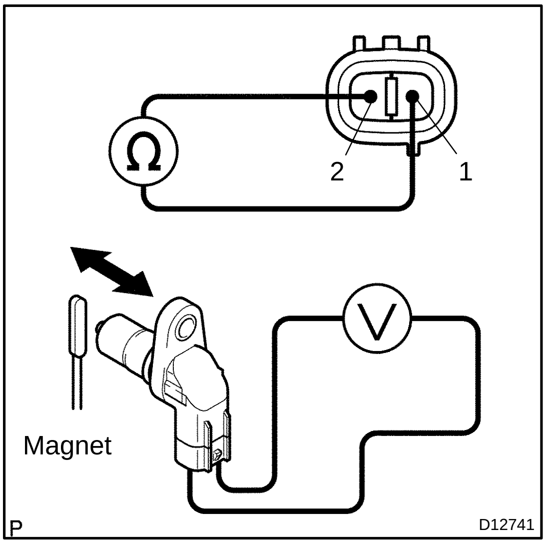
Detection criteria	Threshold
No pulse input during 4 vehicle speed sensor pulse input	500 times or more

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check speed sensor SP2.



PREPARATION:

Remove the speed sensor SP2.

CHECK:

(a) Measure the resistance between the sensor terminals.
Standard: 560 to 680 Ω at 20°C (68°F)

(b) Measure the voltage between the sensor terminals when a magnet is put close to the front end of the sensor then moved away quickly.
Standard: Sensor generates voltage intermittently.

HINT:
The generated voltage is extremely low.

OK:

Standard

NG → **Replace speed sensor SP2.**

OK

2	Check harness and connector between ECM and speed sensor SP2 (See page IN-36).

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

OK

Check and replace the ECM (See page IN-36).

DIB37-02

DTC	P0724	Brake Switch "B" Circuit High

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 signal to ECM. Then the ECM cancels operation of the lock-up clutch while braking is in progress.

DTC No.	DTC Detection Condition	Trouble Area
P0724	Stop light switch always turn on even vehicle is driver Go and Stop 10 times. (2-trip detection logic)	★Short in stop light switch signal circuit ★Stop light switch ★ECM

MONITOR DESCRIPTION

When the stop light switch remains ON during "stop and go" driving, the ECM interprets this as a fault in the stop light switch and the MIL comes on and the ECM stores the DTC. The vehicle must stop and go (3 km/h (2 mph) to 30 km/h (19 mph)) ten times for two driving cycles in order to detect malfunction.

MONITOR STRATEGY

Related DTCs	P0724	Stop light switch/Range check/Rationality
Required sensors/Components	Main	Stop light switch
	Sub	Vehicle speed sensor
Frequency of operation	Continuous	
Duration	GO and STOP 10 times	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
The stop light switch remains on during GO and STOP 10 times.		
GO and STOP are defined as follows;		
GO: Vehicle speed	30 km/h (19 mph) or more	-
STOP: Vehicle speed	-	Less than 3 km/h (2 mph)

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Brake switch status	ON stuck

WIRING DIAGRAM

See page DI-278 .

INSPECTION PROCEDURE

1	Check stop light switch (See page BE-50).

NG → Replace stop light switch.

OK

2	Check harness and connector between ECM and stop light switch (See page IN-36).

NG → Repair or replace harness or connector.

OK

Check and replace ECM (See page IN-36).

DIB38-02

DTC	P0748	Pressure Control Solenoid ”A” Electrical (Shift Solenoid Valve SL1)

CIRCUIT DESCRIPTION

Shifting from 1st to 5th is performed in combination with ON and OFF of the shift solenoid valves S1, S2, SR, SL1 and SL2, 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.
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).
: ON X: OFF

Position	NORMAL						S1 OFF						S2 OFF						SR OFF					
	Gear	S1	S2	SR	SL1	SL2	Gear	S1	S2	SR	SL1	SL2	Gear	S1	S2	SR	SL1	SL2	Gear	S1	S2	SR	SL1	SL2
"R"	R	○	×	×	×	○	R	×	×	×	×	○	R	○	×	×	×	○	R	○	×	×	×	○
"D"	1 st	○	×	×	×	○	4 th ↓ 3 rd	×	× ↓ ○	×	×	○	1 st	○	×	×	×	○	1 st	○	×	×	×	○
	2 nd	○	○	×	×	○	3 rd	×	○	×	×	○	1 st ↓ 4 th	○ ↓ ×	×	×	×	○	2 nd	○	○	×	×	○
	3 rd	×	○	×	×	○	3 rd	×	○	×	×	○	4 th	×	×	×	×	○	3 rd	×	○	×	×	○
	4 th	×	×	×	×	○	4 th	×	×	×	×	○	4 th	×	×	×	×	○	4 th	×	×	×	×	○
	5 th	×	×	○	○	×	5 th	×	×	○	○	×	5 th	×	×	○	○	×	4 th	×	×	×	○	×
"3"	1 st	○	×	×	×	○	3 rd ↓ 3 rd E/B	×	× ↓ ○	×	×	○ ↓ ×	1 st	○	×	×	×	○	1 st	○	×	×	×	○
	2 nd	○	○	×	×	○	3 rd ↓ 3 rd E/B	×	○	×	×	○ ↓ ×	1 st ↓ 3 rd E/B	○ ↓ ×	×	×	×	○ ↓ ×	2 nd	○	○	×	×	○
	3 rd E/B	×	○	×	×	×	3 rd E/B	×	○	×	×	×	3 rd E/B	×	×	×	×	×	3 rd E/B ↓ 3 rd	×	○	×	×	× ↓ ○
	4 th	×	×	○	×	○	4 th	×	×	○	×	○	4 th	×	×	○	×	○	3 rd	×	× ↓ ○	×	×	○ ↓ ○
	5 th	×	×	○	○	×	5 th	×	×	○	○	×	5 th	×	×	○	○	×	3 rd E/B ↓ 3 rd	×	× ↓ ○	×	○ ↓ ×	× ↓ ○
"2"	1 st	○	×	×	×	○	1 st	×	×	×	×	○	1 st	○	×	×	×	○	1 st	○	×	×	×	○
	2 nd E/B	○	○	○	×	×	3 rd E/B	×	○	○	×	×	2 nd E/B ↓ 4 th	○ ↓ ×	×	○	×	× ↓ ○	2 nd	○	○	×	×	×
	3 rd E/B	×	○	○	×	×	3 rd E/B	×	○	○	×	×	Fail 4th	×	×	○	×	× ↓ ○	2 nd	× ↓ ○	○	×	×	×
	4 th	×	×	○	×	○	4 th	×	×	○	×	○	4 th	×	×	○	×	○	1 st ↓ 2 nd	× ↓ ○	× ↓ ○	×	×	○ ↓ ×
	5 th	×	×	○	○	×	5 th	×	×	○	○	×	5 th	×	×	○	○	×	1 st E/B ↓ 2 nd	× ↓ ○	○	×	○ ↓ ×	×
"L"	1 st E/B	○	×	×	×	×	1 st E/B	×	×	×	×	×	1 st E/B	○	×	×	×	×	1 st E/B	○	×	×	×	×
	2 nd E/B	○	○	○	×	×	3 rd E/B	×	○	○	×	×	2 nd E/B ↓ 4 th	○ ↓ ×	×	○	×	× ↓ ○	2 nd	○	○	×	×	×
	3 rd E/B	×	○	○	×	×	3 rd E/B	×	○	○	×	×	Fail 4 th	×	×	○	×	× ↓ ○	2 nd	× ↓ ○	○	×	×	×
	4 th	×	×	○	×	○	4 th	×	×	○	×	○	4 th	×	×	○	×	○	1 st ↓ 2 nd	× ↓ ○	× ↓ ○	×	×	○ ↓ ×
	5 th	×	×	○	○	×	5 th	×	×	○	○	×	5 th	×	×	○	○	×	1 st E/B ↓ 2 nd	× ↓ ○	× ↓ ○	×	○ ↓ ×	×

: ON X: OFF

Position	S1 S2 OFF						S2 SR OFF						S1 SR OFF						S1 S2 SR OFF					
	Gear	S1	S2	SR	SL1	SL2	Gear	S1	S2	SR	SL1	SL2	Gear	S1	S2	SR	SL1	SL2	Gear	S1	S2	SR	SL1	SL2
"R"	R	×	×	×	×	○	R	○	×	×	×	○	R	×	×	×	×	○	R	×	×	×	×	○
"D"	4 th	×	×	×	×	○	1 st	○	×	×	×	○	4 th → 3 rd	×	× → ○	×	×	○	4 th	×	×	×	×	○
	4 th	×	×	×	×	○	1 st → 4 th	○ → ×	×	×	×	○	3 rd	×	○	×	×	○	4 th	×	×	×	×	○
	4 th	×	×	×	×	○	4 th	×	×	×	×	○	3 rd	×	○	×	×	○	4 th	×	×	×	×	○
	4 th	×	×	×	×	○	4 th	×	×	×	×	○	4 th	×	×	×	×	○	4 th	×	×	×	×	○
	5 th	×	×	○	○	×	4 th	×	×	×	○ → ×	× → ○	4 th	×	×	×	○ → ×	× → ○	4 th	×	×	×	○ → ×	× → ○
"3"	3 rd → 3 rd E/B	×	×	×	×	○ → ×	1 st	○	×	×	×	○	3 rd	×	× → ○	×	×	○ → ○	3 rd	×	×	×	×	○ → ○
	3 rd → 3 rd E/B	×	×	×	×	○ → ×	1 st → 3 rd	○ → ×	×	×	×	○ → ○	3 rd	×	○	×	×	○ → ○	3 rd	×	×	×	×	○ → ○
	3 rd E/B	×	×	×	×	×	3 rd E/B → 3 rd	×	×	×	×	× → ○	3 rd E/B → 3 rd	×	○	×	×	× → ○	3 rd E/B → 3 rd	×	×	×	×	× → ○
	4 th	×	×	○	×	○	3 rd	×	×	×	×	○ → ○	3 rd	×	× → ○	×	×	○ → ○	3 rd	×	×	×	×	○ → ○
	5 th	×	×	○	○	×	1 st E/B → 3 rd	×	×	×	○ → ×	× → ○	3 rd E/B → 3 rd	×	× → ○	×	○ → ×	× → ○	3 rd E/B → 3 rd	×	×	×	○ → ×	× → ○
"2"	1 st	×	×	×	×	○	1 st	○	×	×	×	○	1 st	×	×	×	×	○	1 st	×	×	×	×	○
	Fail 4 th	×	×	○	×	× → ○	1 st E/B → 1 st	○	×	×	×	× → ○	2 nd	×	○	×	×	×	1 st E/B → 1 st	×	×	×	×	× → ○
	Fail 4 th	×	×	○	×	× → ○	1 st E/B → 1 st	× → ○	×	×	×	× → ○	2 nd	×	○	×	×	×	1 st E/B → 1 st	×	×	×	×	× → ○
	4 th	×	×	○	×	○	1 st	× → ○	×	×	×	○	1 st → 2nd	×	× → ○	×	×	○ → ×	1 st	×	×	×	×	○
	5 th	×	×	○	○	×	1 st E/B → 1 st	× → ○	×	×	○ → ×	× → ○	1 st E/B → 2nd	×	× → ○	×	○ → ×	×	1 st E/B → 1 st	×	×	×	○ → ×	× → ○
"L"	1 st E/B	×	×	×	×	×	1 st E/B	○	×	×	×	×	1 st E/B	×	×	×	×	×	1 st E/B	×	×	×	×	×
	Fail 4 th	×	×	○	×	× → ○	1 st E/B → 1 st	○	×	×	×	× → ○	2 nd	×	○	×	×	×	1 st E/B → 1 st	×	×	×	×	× → ○
	Fail 4 th	×	×	○	×	× → ○	1 st E/B → 1 st	× → ○	×	×	×	× → ○	2 nd	×	○	×	×	×	1 st E/B → 1 st	×	×	×	×	× → ○
	4 th	×	×	○	×	○	1 st	× → ○	×	×	×	○	1 st → 2nd	×	× → ○	×	×	○ → ×	1 st	×	×	×	×	○
	5 th	×	×	○	○	×	1 st E/B → 1 st	× → ○	×	×	○ → ×	× → ○	1 st E/B → 2nd	×	× → ○	×	○ → ×	×	1 st E/B → 1 st	×	×	×	○ → ×	× → ○

DTC No.	DTC Detection Condition	Trouble Area
P0748	ECM checks for an open or short circuit in shift solenoid valves SL1 (1-trip detection logic) (a) When solenoid, duty ratio equal to 100% (b) When solenoid is not energized, duty ratio is less than 3%	Open or short in shift solenoid valve SL1 circuit Shift solenoid valve SL1 ECM

MONITOR DESCRIPTION

The ECM commands gearshift by turning the shift solenoid valves "ON/OFF". When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and illuminates the MIL and stores the DTC. And the ECM performs the fail-safe function and turns the other shift solenoid valves in good condition "ON/OFF" (In case of an open or short circuit, the ECM stops sending current to the circuit.).

MONITOR STRATEGY

Related DTCs	P0748	Shift solenoid valve SL1/Range check
Required sensors/Components	Shift solenoid valve SL1	
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Battery voltage	10 V or more	-

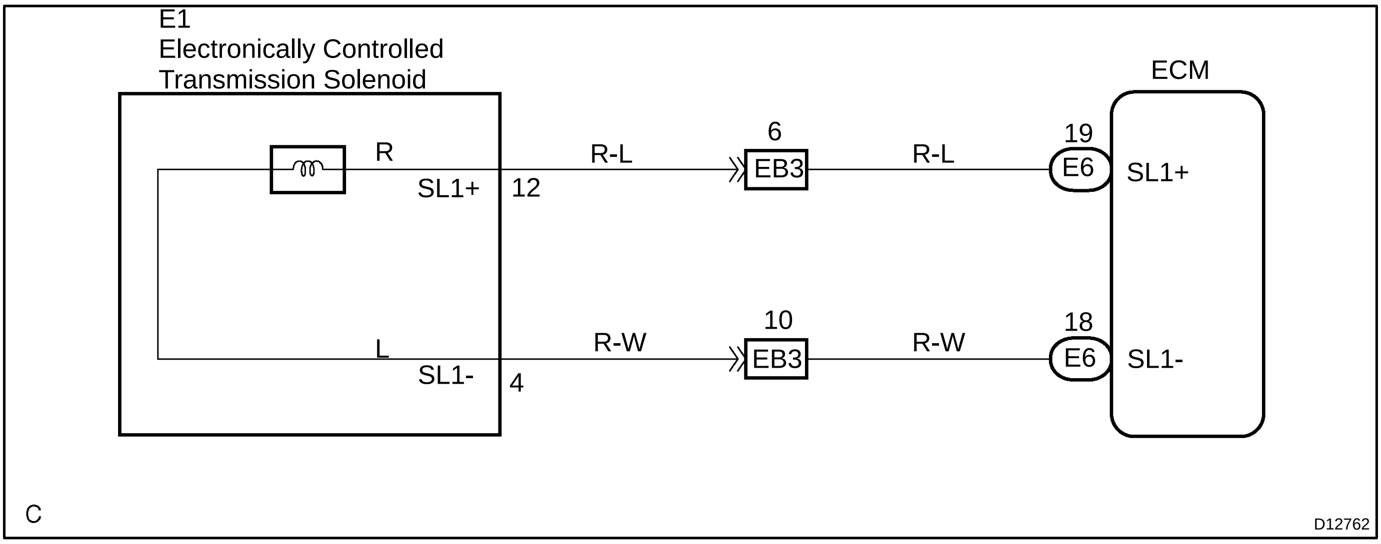
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Output signal duty	100%

COMPONENT OPERATING RANGE

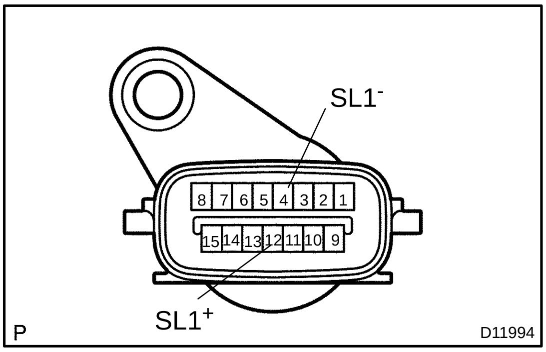
Parameter	Standard value
Output signal duty	Less than 100%

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check transmission wire.**



PREPARATION:

Disconnect the trasmission wire connector.

CHECK:

Measure resistance between SL1$^+$ and SL1$^-$ of transmission wire.

OK:

Resistance: 5.0 to 5.6 Ω at 20°C (68°F)

CHECK:

Measure resistance between terminals SL1$^+$ and SL1$^-$ of the transmission wire connector and body ground.

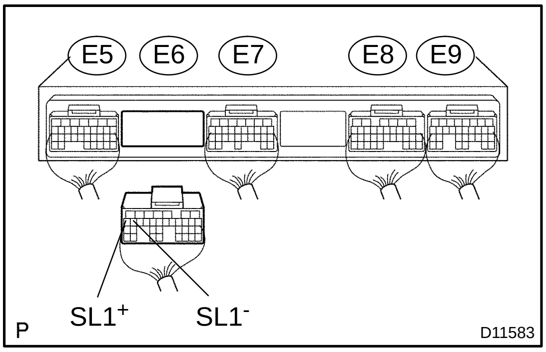
OK:

Resistance: 1 MΩ or higher

NG → **Go to step 3.**

OK

2	**Measure resistance between terminal SL1$^+$ and SL1$^-$ of ECM connector.**



PREPARATION:

(a) Connect the transmission wire connector.

(b) Disconnect the connector of the ECM.

CHECK:

Measure resistance between terminals SL1$^+$ and SL1$^-$ of ECM connector.

OK:

Resistance: 5.0 to 5.6 Ω at 20°C (68°F)

CHECK:

Measure resistance between terminals SL1$^+$ and SL1$^-$ of the ECM connector and body ground.

OK:

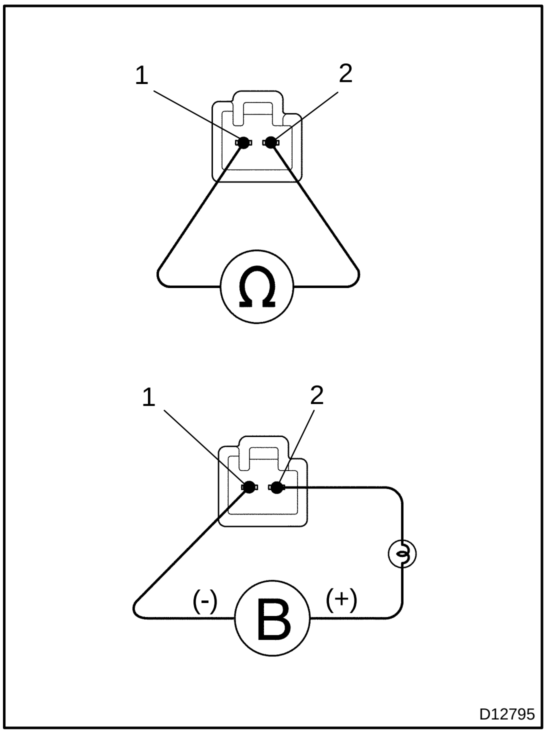
Resistance: 1 MΩ or higher

NG → **Repair or replace the harness or connector (See page IN-36).**

OK

Check and replace the ECM (See page IN-36).

3	Check shift solenoid valve SL1.



PREPARATION:

(a) Jack up the vehicle.

(b) Remove the oil pan.

(c) Remove the shift solenoid valve SL1.

CHECK:

(a) Measure the resistance between terminals 1 and 2 of solenoid connector.

Standard: 5.0 to 5.6 Ω at 20°C (68°F)

(b) Connect the positive (+) lead with an 21 W bulb to terminal 2 of solenoid connector and negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

Standard: Solenoid sounds operation noise.

OK:

Standard

NG → **Replace the shift solenoid valve SL1 (See page AT-8).**

OK ↓

Repair or replace the transmission wire (See page AT-6).

DIC31-01

DTC	P0751	Shift Solenoid ”A” Performance (Shift Solenoid Valve S1)

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, 4th or 5th gear). Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves, valve body or automatic transmission (clutch, brake or gear etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P0751	The gear required by the ECM does not match the actual gear when driving (2-trip detection logic)	★Shift solenoid valve S1 is stuck open or closed ★Valve body is blocked up or stuck ★Automatic transmission (clutch, brake or gear etc.)

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ”ON/OFF”. According to the input shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd, 4th or 5th gear position. When the gear position commanded by the ECM and the actual gear position are not same, the ECM illuminates the MIL.

MONITOR STRATEGY

Related DTCs	P0751	Shift solenoid valve S1/OFF malfunction
		Shift solenoid valve S1/ON malfunction
Required sensors/Components	Main	Shift solenoid valve S1
	Sub	Vehicle speed sensor, Throttle position sensor, Speed sensor (NT), Speed sensor (NO)
Frequency of operation	Continuous	
Duration	OFF malfunction (A) and (B)	0.4 sec.
	OFF malfunction (C)	Immediate
	ON malfunction (A), (B) and (C)	0.4 sec.
	ON malfunction (D)	3 sec.
	ON malfunction (E)	0.5 sec.
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The following conditions are common to all conditions below: Off malfunction (A), (B), (C) and ON malfunction (A), (B), (C), (D), (E)		
The monitor will run whenever the following DTCs are not present.	See page DI-361	

Turbine speed sensor (NT) circuit	There is no malfunction in the circuits shown on the left.	
Output speed sensor (NO) circuit		
Shift solenoid ”A” (S1) circuit		
Shift solenoid ”B” (S2) circuit		
Shift solenoid ”E” (SR) circuit		
Pressure control solenoid ”A” (SL1) circuit		
Pressure control solenoid ”B” (SL2) circuit		
ECT (Engine coolant temperature) sensor circuit		
KCS sensor circuit		
ETCS (Electric throttle control system)	Not system down	
Transmission shift position	”D”	
ECT	40°C (104°F) or more	-
Spark advance from Max. retard timing by KCS control	0° CA or more	-
Engine	Running	
Transfer range	”HIGH”*1	
Transfer range ”HIGH” *1 (This condition is applied only 4WD)		
*1 Following conditions met		
Vehicle speed sensor ”A” circuit	There is no malfunction in the circuits shown on the left.	
Output shaft speed sensor circuit		
Transfer output speed	143 rpm or more	-
NO/NOtf (Transfer input speed/Transfer output speed)	0.9 or more	Less than 1.1
OFF malfunction (A)		
ECM selected gear	1st	
Vehicle speed	2 km/h (1 mph) or more	Less than 40 km/h (25 mph)
Throttle valve opening angle	8% or more and 6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
OFF malfunction (B)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Continuous time for ECM selecting 4th gear	2 sec. or more	-
Actual gear when ECM selected 4th gear	4th	
OFF malfunction (C)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
ON malfunction (A)		
ECM selected gear	1st	
Vehicle speed	2 km/h (1 mph) or more	Less than 40 km/h (25 mph)
Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
ON malfunction (B)		
ECM selected gear	4th	
Vehicle speed	2 km/h (1 mph) or more	-

Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
ON malfunction (C)		
ECM selected gear	3rd	
Vehicle speed	2 km/h (1 mph) or more	-
Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
ON malfunction (D)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Vehicle speed (During transition from 4th to 5th gear)	-	Less than 100 km/h (62 mph)
ON malfunction (E)		
ECM selected gear	5th	
Engine speed - Turbine speed (NE - NT) (After transition from 4th to 5th gear)	-	150 rpm
Vehicle speed (After transition from 4th to 5th gear)	-	Less than 100 km/h (62 mph)

TYPICAL MALFUNCTION THRESHOLDS

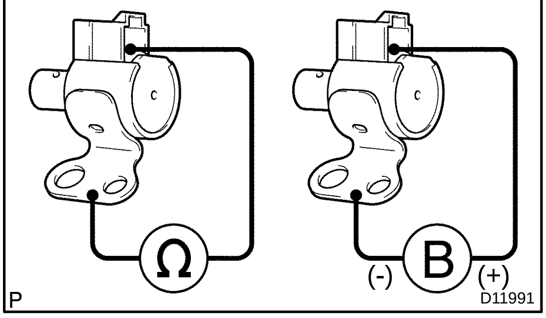
Detection criteria	Threshold
[OFF malfunction]	
All of the following conditions are met: Condition (A), (B) and (C)	
It is necessary 2 detections/one drive cycle 1st detection; temporary flag ON 2nd detection; pending fault code ON	
OFF malfunction (A)	
Turbine speed/Output speed (NT/NO)	0.93 or more and 1.07 or less
OFF malfunction (B)	
Turbine speed/Output speed (NT/NO)	0.65 or more and 0.79 or less
OFF malfunction (C)	
Output record from ECM for 4th → 5th upshifting	Recorded
[ON malfunction]	
Either of the following conditions is met: **★ON malfunction (A) and (B)** **★ON malfunction (B) or (C), and ON malfunction (D) or (E)**	
ON malfunction (A) and (B)	
Turbine speed/Output speed (NT/NO)	3.30 or more and 7.50 or less
ON malfunction (C)	
Turbine speed/Output speed (NT/NO)	1.91 or more and 2.35 or less
ON malfunction (D)	

Turbine speed - Output speed x 4th gear ratio (NT - NO x 4th gear ratio)	1,000 rpm or more
ON malfunction (E)	
Turbine speed - Output speed x 5th gear ratio (NT - NO x 5th gear ratio)	1,000 rpm or more

INSPECTION PROCEDURE

1	**Check shift solenoid valve S1 operation.**

Shift solenoid S1:



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Remove the shift solenoid valve S1.

CHECK:

Measure the resistance between the solenoid connector terminal and the body ground.

OK:

Resistance: 11 to 15 Ω at 20°C (68°F)

CHECK:

Connect the battery positive lead to the solenoid connector terminal and the battery negative lead to the solenoid body ground.

OK:

Solenoid sounds operation noise.

NG	**Replace shift solenoid valve S1 (See page AT-8).**

OK

2	**Check valve body (See page DI-396).**

NG	**Repair or replace valve body.**

OK

Repair or replace transmission (See page AT-30).

DIC32-01

DTC	P0756	Shift Solenoid "B" Performance (Shift Solenoid Valve S2)

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, 4th or 5th gear). Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves, valve body or automatic transmission (clutch, brake or gear etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P0756	The gear required by the ECM does not match the actual gear when driving (2-trip detection logic)	★Shift solenoid valve S2 is stuck open or closed ★Valve body is blocked up or stuck ★Automatic transmission (clutch, brake or gear etc.)

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves "ON/OFF". According to the input shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd, 4th or 5th gear position). When the gear position commanded by the ECM and the actual gear position are not same, the ECM illuminates the MIL.

MONITOR STRATEGY

Related DTCs	P0756	Shift solenoid valve S2/OFF malfunction
		Shift solenoid valve S2/ON malfunction
Required sensors/Components	Main	Shift solenoid valve S2
	Sub	Vehicle speed sensor, Throttle position sensor, Speed sensor (NT), Speed sensor (NO)
Frequency of operation	Continuous	
Duration	OFF malfunction (A), (B), (C)	0.4 sec.
	OFF malfunction (D)	Immediate
	ON malfunction (A) and (B)	0.4 sec.
	ON malfunction (C)	3 sec.
	ON malfunction (D)	0.5 sec.
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The following conditions are common to all conditions below: OFF malfunction (A), (B), (C), (D) and ON malfunction (A), (B), (C), (D)		
The monitor will run whenever the following DTCs are not present.	See page DI-361	

Turbine speed sensor (NT) circuit	There is no malfunction in the circuits shown on the left.	
Output speed sensor (NO) circuit		
Shift solenoid ”A” (S1) circuit		
Shift solenoid ”B” (S2) circuit		
Shift solenoid ”E” (SR) circuit		
Pressure control solenoid ”A” (SL1) circuit		
Pressure control solenoid ”B” (SL2) circuit		
ECT (Engine coolant temperature) sensor circuit		
KCS sensor circuit		
ETCS (Electric throttle control system)	Not system down	
Transmission shift position	”D”	
ECT	40°C (104°F) or more	-
Spark advance from Max. retard timing by KCS control	0° CA or more	-
Engine	Running	
Transfer range	”HIGH”*1	
Transfer range ”HIGH” *1 (This condition is applied only 4WD)		
*1 Following conditions met		
Vehicle speed sensor ”A” circuit	There is no malfunction in the circuits shown on the left.	
Output shaft speed sensor circuit		
Transfer output speed	143 rpm or more	-
NO/NOtf (Transfer input speed/Transfer output speed)	0.9 or more	Less than 1.1
OFF malfunction (A)		
ECM selected gear	1st	
Vehicle speed	2 km/h (1 mph) or more	Less than 40 km/h (25 mph)
Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
OFF malfunction (B)		
ECM selected gear	2nd	
Vehicle speed	2 km/h (1 mph) or more	-
Output speed	2nd → 1st down shift point or more	-
Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
OFF malfunction (C)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Continuous time for ECM selecting 4th gear	2 sec. or more	-
Actual gear when ECM selected 4th gear	4th	
OFF malfunction (D)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
ON malfunction (A)		
ECM selected gear	1st	
Vehicle speed	2 km/h (1 mph) or more	Less than 40 km/h (25 mph)

Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
ON malfunction (B)		
ECM selected gear	4th	
Vehicle speed	2 km/h (1 mph) or more	-
Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
ON malfunction (C)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Vehicle speed (During transition from 4th to 5th gear)	-	Less than 100 km/h (62 mph)
ON malfunction (D)		
ECM selected gear	5th	
Engine speed - Turbine speed (NE - NT) (After transition from 4th to 5th gear)	-	Less than 150 rpm
Vehicle speed (After transition from 4th to 5th gear)	-	Less than 100 km/h (62 mph)

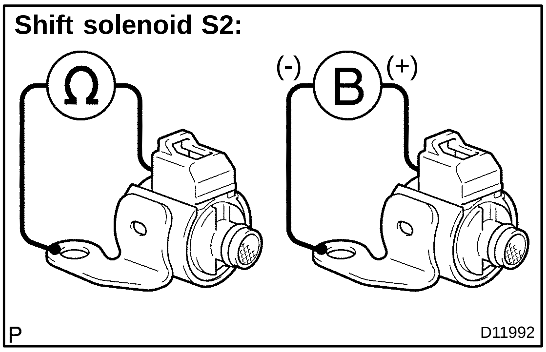
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
[OFF malfunction]	
All of the following conditions are met: Condition (A), (B), (C) and (D)	
It is necessary 2 detections/one drive cycle 1st detection; temporary flag ON 2nd detection; pending fault code ON	
OFF malfunction (A) and (B)	
Turbine speed/Output speed (NT/NO)	3.30 or more and 7.50 or less
OFF malfunction (C)	
Turbine speed/Output speed (NT/NO)	0.65 or more and 0.79 or less
OFF malfunction (D)	
Output record from ECM for 4th → 5th upshifting	Recorded
[ON malfunction]	
Both of the following conditions are met: ON malfunction (A) or (B), and ON malfunction (C) or (D)	
ON malfunction (A)	
Turbine speed/Output speed (NT/NO)	1.91 or more and 2.35 or less
ON malfunction (B)	
Turbine speed/Output speed (NT/NO)	1.28 or more and 1.53 or less
ON malfunction (C)	
Turbine speed - Output speed x 4th gear ratio (NT - NO x 4th gear ratio)	1,000 rpm or more

ON malfunction (E)	
Turbine speed - Output speed x 5th gear ratio (NT - NO x 5th gear ratio)	1,000 rpm or more

INSPECTION PROCEDURE

1	**Check shift solenoid valve S2 operation.**



PREPARATION:
(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Remove the shift solenoid valve S2.

CHECK:
Measure the resistance between the solenoid connector terminal and the body ground.

OK:
Resistance: 11 to 15 Ω at 20°C (68°F)

CHECK:
Connect the battery positive lead to the solenoid connector terminal and the battery negative lead to the solenoid body ground.

OK:
Solenoid sounds operation noise.

NG → **Replace shift solenoid valve S2 (See page AT-8).**

OK

2	**Check valve body (See page DI-396).**

NG → **Repair or replace valve body.**

OK

Repair or replace transmission (See page AT-30).

DIB3A-02

DTC	P0771	Shift Solenoid "E" Performance (Shift Solenoid Valve SR)

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, 4th or 5th gear). Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves, valve body or automatic transmission (clutch, brake or gear etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P0771	The gear required by the ECM does not match the actual gear when driving (2-trip detection logic)	⋆Shift solenoid valve SR is stuck open or closed ⋆Shift solenoid valve SL1 is stuck open or closed ⋆Valve body is blocked up or stuck ⋆Automatic transmission (clutch, brake or gear etc.)

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves "ON/OFF". According to the input shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd, 4th or 5th gear position). When the gear position commanded by the ECM and the actual gear position are not same, the ECM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0771	Shift solenoid valve SR/Rationality check
Required sensors/Components	Main	Shift solenoid valve SR
	Sub	Speed sensor (NT), Speed sensor (NO), Crankshaft position sensor (NE)
Frequency of operation	Continuous	
Duration	OFF malfunction (A)	0.4 sec.
	OFF malfunction (B) and (C)	Immediate
	ON malfunction	0.15 sec.
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The following items are common to all condition below: OFF malfunction (A), (B), (C) and ON malfunction		
The monitor will run whenever the following DTCs are not present.	See page DI-361	

Turbine speed sensor (NT) circuit	There is no malfunction in the circuits shown on the left.	
Output speed sensor (NO) circuit		
Shift solenoid "A" (S1) circuit		
Shift solenoid "B" (S2) circuit		
Shift solenoid "E" (SR) circuit		
Pressure control solenoid "A" (SL1) circuit		
Pressure control solenoid "B" (SL2) circuit		
ECT (Engine coolant temperature) sensor circuit		
KCS sensor circuit		
ETCS (Electric throttle control system)	Not system down	
Transmission shift position	"D"	
ECT	40°C (104°F) or more	-
Spark advance from Max. retard timing by KCS control	0° CA or more	-
Engine	Running	
Transfer range	"HIGH"*1	
Transfer range "HIGH" *1 (This condition is applied only 4WD)		
*1 Following conditions met		
Vehicle speed sensor "A" circuit	There is no malfunction in the circuits shown on the left.	
Output shaft speed sensor circuit		
Transfer output speed	143 rpm or more	-
NO/NOtf (Transfer input speed/Transfer output speed)	0.9 or more	Less than 1.1
OFF malfunction (A)		
ECM selected gear	5th	
Vehicle speed	2 km/h (1 mph)	-
Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
OFF malfunction (B)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Continuous time for ECM selecting 4th gear	2 sec. or more	-
OFF malfunction (C)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
ON malfunction		
Current ECM selected gear	2th	
Last ECM selected gear	1st	
Throttle valve opening angle (During transition from 1st to 2nd gear)	4.5% or more at 2,000 rpm (conditions vary with turbine speed)	-

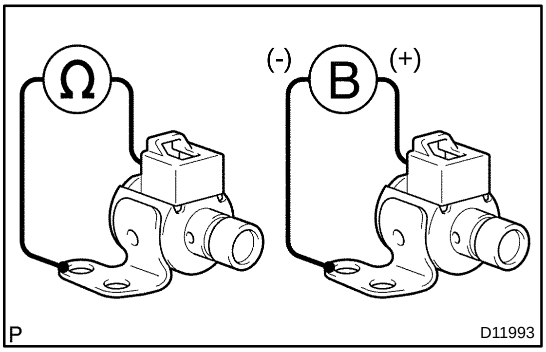
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
[OFF malfunction]	
All of the following conditions are met: OFF malfunction (A), (B) and (C)	

It is necessary 2 detections/one drive cycle 1st detection; temporary flag ON 2nd detection; temporary pending fault code ON	
OFF malfunction (A)	
Turbine speed/Output speed (NT/NO)	0.93 or more and 1.07 or less
OFF malfunction (B)	
Turbine speed/Output speed (NT/NO)	Not change as follow 0.93 or more and 1.07 or less ↓ 0.65 or more and 0.79 or less
OFF malfunction (C)	
Output record from ECM for 4th → 5th upshifting	Recorded
[ON malfunction]	
It is necessary 2 detections/one drive cycle 1st detection; temporary flag ON 2nd detection; temporary pending fault code ON	
Turbine speed - Output speed x 1st gear ratio (NT - NO x 1st gear ratio)	150 rpm or more

INSPECTION PROCEDURE

1	**Check shift solenoid valve SR operation.**



PREPARATION:

(a) Jack up the vehicle.

(b) Remove the oil pan.

(c) Remove the shift solenoid valve SR.

CHECK:

Measure the resistance between the solenoid connector terminal and the body ground.

OK:

Resistance: 11 to 15 Ω at 20°C (68°F)

CHECK:

Connect the battery positive lead to the solenoid connector terminal and the battery negative lead to the solenoid body ground.

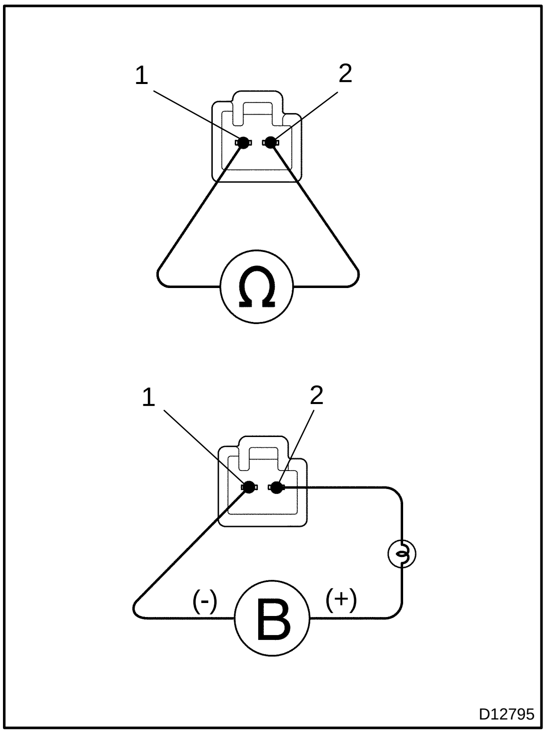
OK:

Solenoid sounds operation noise.

NG	**Replace shift solenoid valve SR (See page AT-8).**

OK

2	Check shift solenoid valve SL1 operation.



PREPARATION:

Remove the shift solenoid valve SL1.

CHECK:

(a) Measure the resistance between terminals 1 and 2 of solenoid connector.

Standard: 5.0 to 5.6 Ω at 20°C (68°F)

(b) Connect the positive (+) lead with an 21 W bulb to terminal 2 of solenoid connector and negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

Standard: Solenoid sounds operation noise.

OK:

Standard

NG → **Replace shift solenoid valve SL1 (See page AT-8).**

OK

3	Check valve body (See page DI-396).

NG → **Repair or replace valve body (See page AT-8).**

OK

Repair or replace transmission (See page AT-30).

DIB3B-02

DTC	P0776	Pressure Control Solenoid ”B” Performance (Shift Solenoid Valve SL2)

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, 4th or 5th gear). Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves, valve body or automatic transmission (clutch, brake or gear etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P0776	The gear required by the ECM does not match the actual gear when driving (2-trip detection logic)	□Shift solenoid valve SL2 is stuck open or closed □Valve body is blocked up or stuck □Automatic transmission (clutch, brake or gear etc.)

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ”ON/OFF”. According to the input shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd, 4th or 5th gear position). When the gear position commanded by the ECM and the actual gear position are not same, the ECM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0776	Shift solenoid valve SL2/ON malfunction
Required sensors/Components	Main	Shift solenoid valve SL2
	Sub	Speed sensor (NT), Speed sensor (NO), Crankshaft position sensor (NE)
Frequency of operation	Continuous	
Duration	ON malfunction (A), (B) and (C)	0.4 sec.
	ON malfunction (D)	3 sec.
	ON malfunction (E)	0.5 sec.
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The following items are common to all condition below: ON malfunction (A), (B), (C), (D) and (E)		
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Turbine speed sensor (NT) circuit	There is no malfunction in the circuits shown on the left.	
Output speed sensor (N) circuit		
Shift solenoid "A" (S1) circuit		
Shift solenoid "B" (S2) circuit		
Shift solenoid "E" (SR) circuit		
Pressure control solenoid "A" (SL1) circuit		
Pressure control solenoid "B" (SL2) circuit		
ECT (Engine coolant temperature) sensor circuit		
KCS sensor circuit		
ETCS (Electric throttle control system)	Not system down	
Transmission shift position	"D"	
ECT	40°C (104°F) or more	-
Spark advance from Max. retard timing by KCS control	0° CA or more	-
Engine	Running	
Transfer range	"HIGH"*1	
Transfer range "HIGH" *1 (This condition is applied only 4WD)		
*1 Following conditions met		
Vehicle speed sensor "A" circuit	There is no malfunction in the circuits shown on the left.	
Output shaft speed sensor circuit		
Transfer output speed	143 rpm or more	-
NO/NOtf (Transfer input speed/Transfer output speed)	0.9 or more	Less than 1.1
ON malfunction (A)		
ECM selected gear	1st	
Vehicle speed	2 km/h (1 mph) or more	Less than 40 km/h (25 mph)
Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
ON malfunction (B)		
ECM selected gear	3rd	
Vehicle speed	2 km/h (1 mph)	-
Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
ON malfunction (C)		
ECM selected gear	4th	
Vehicle speed	2 km/h (1 mph) or more	-
Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
ON malfunction (D)		
Current ECM selected gear	5th	

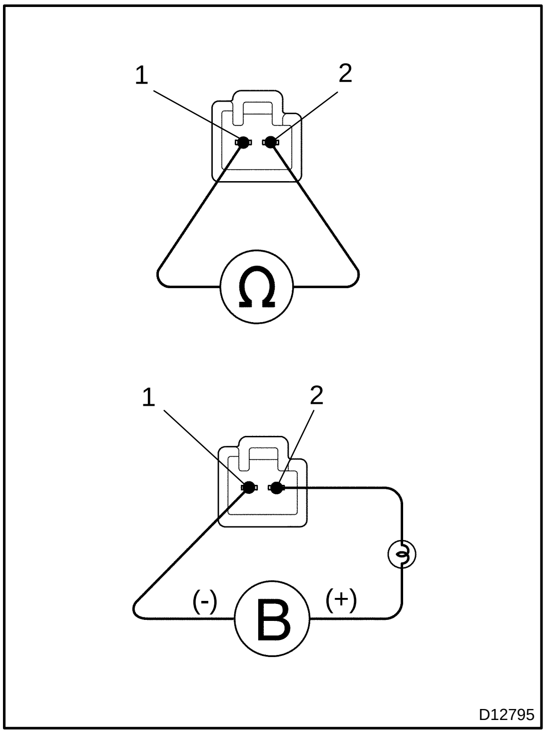
Last ECM selected gear	4th	
Vehicle speed (During transition from 4th to 5th gear)	-	Less than 100 km/h (62 mph)
ON malfunction (E)		
ECM selected gear	5th	
Engine speed - Turbine speed (NE - NT) (After transition from 4th to 5th gear)	-	Less than 150 rpm
Vehicle speed (After transition from 4th to 5th gear)	-	Less than 100 km/h (62 mph)

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Both of the following conditions are met: ☐ **ON malfunction (A) and (B), or ON malfunction (C)** ☐ **ON malfunction (D) or (E)**	
ON malfunction (A)	
Turbine speed/Output speed (NT/NO)	3.30 or more and 7.50 or less
ON malfunction (B)	
Turbine speed/Output speed (NT/NO)	1.28 or more and 1.53 or less
ON malfunction (C)	
Turbine speed/Output speed (NT/NO)	0.93 or more and 1.07 or less
ON malfunction (D)	
Turbine speed - Output speed x 4th gear ratio (NT - NO x 4th gear ratio)	1,000 rpm or more
ON malfunction (E)	
Turbine speed - Output speed x 5th gear ratio (NT - NO x 5th gear ratio)	1,000 rpm or more

INSPECTION PROCEDURE

1	**Check shift solenoid valve SL2 operation.**



PREPARATION:
(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Remove the shift solenoid valve SL2.

CHECK:
(a) Measure the resistance between terminals 1 and 2 of solenoid connector.
Standard: 5.0 to 5.6 Ω at 20°C (68°F)
(b) Connect the positive (+) lead with an 21 W bulb to terminal 2 of solenoid connector and negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.
Standard: Solenoid sounds operation noise.

OK:
Standard

NG → **Replace shift solenoid valve SL2 (See page AT-8).**

OK

2	**Check valve body (See page DI-396).**

NG → **Repair or replace valve body (See page AT-8).**

OK

Repair or replace transmission (See page AT-30).

DIB3C-02

DTC	P0778	Pressure Control Solenoid ”B” Electrical (Shift Solenoid Valve SL2)

CIRCUIT DESCRIPTION

See page DI-426 .

DTC No.	DTC Detection Condition	Trouble Area
P0778	ECM checks for an open or short circuit in shift solenoid valves SL2 (1-trip detection logic) (a) When solenoid is energized, duty ratio exceed 75% (b) When solenoid is not energized, duty ratio is less than 3%	★Open or short in shift solenoid valve SL2 circuit ★Shift solenoid valve SL2 ★ECM

MONITOR DESCRIPTION

The ECM commands gearshift by turning the shift solenoid valves ”ON/OFF”. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and illuminates the MIL and stores the DTC. And the ECM performs the fail-safe function and turns the other shift solenoid valves in good condition ”ON/OFF” (In case of an open or short circuit, the ECM stops sending current to the circuit.) (see page DI-426).

MONITOR STRATEGY

Related DTCs	P0778	Shift solenoid valve SL2/Range check
Required sensors/Components	Shift solenoid valve SL2	
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	1 driving cycle	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Battery voltage	10 V or more	-

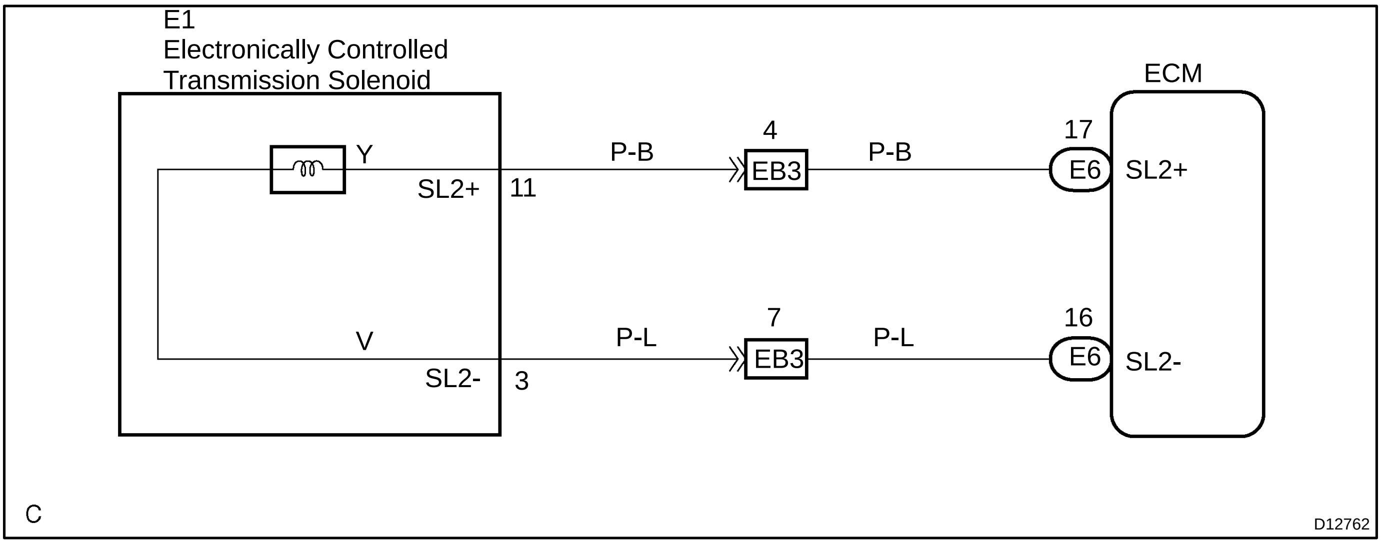
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Output signal duty	100%

COMPONENT OPERATING RANGE

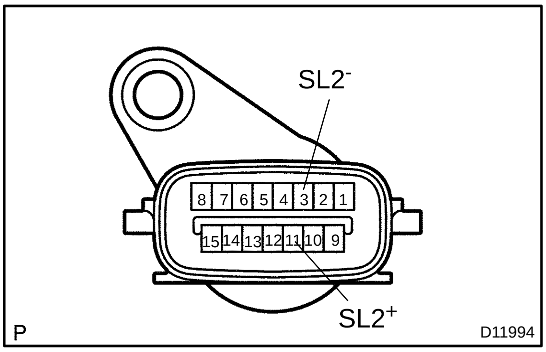
Parameter	Standard value
Output signal duty	Less than 100%

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transmission wire.



PREPARATION:

Disconnect the transmission wire connector.

CHECK:

Measure resistance between $SL2^+$ and $SL2^-$ of transmission wire.

OK:

Resistance: 5.0 to 5.6 Ω at 20°C (68°F)

CHECK:

Measure resistance between terminals $SL2^+$ and $SL2^-$ of the transmission wire connector and body ground.

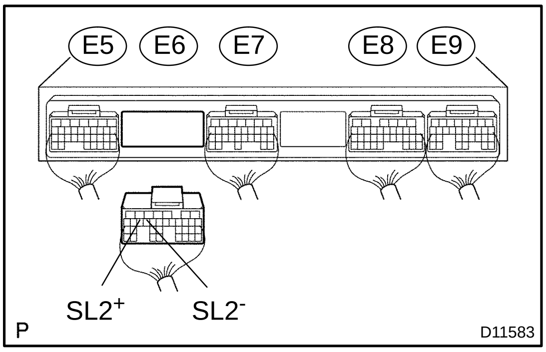
OK:

Resistance: 1 MΩ or higher

NG	Go to step 3.

OK

2	Measure resistance between terminal SL2+ and SL2- of ECM connector.



PREPARATION:

(a) Connect the transmission wire connector.

(b) Disconnect the connector of the ECM.

CHECK:

Measure resistance between terminals SL2+ and SL2- of ECM connector.

OK:

Resistance: 5.0 to 5.6 Ω at 20°C (68°F)

CHECK:

Measure resistance between terminals SL2+ and SL2- of the ECM connector and body ground.

OK:

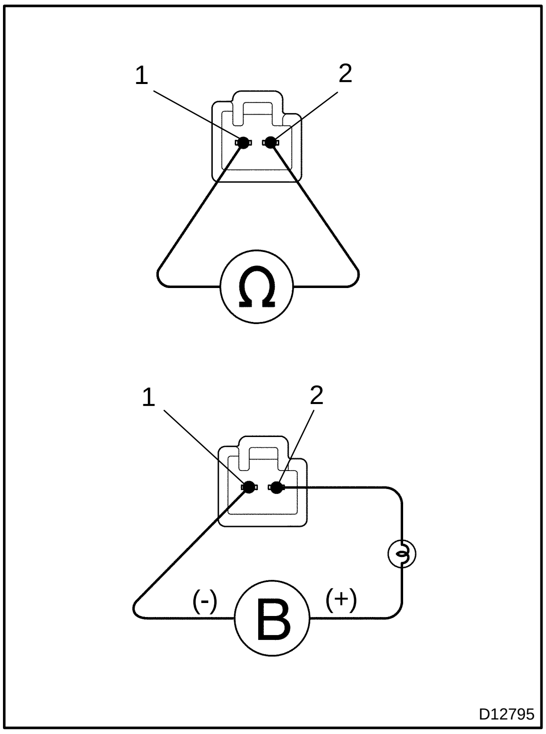
Resistance: 1 MΩ or higher

NG → **Repair or replace the harness or connector (See page IN-36).**

OK ↓

Check and replace the ECM (See page IN-36).

3	**Check shift solenoid valve SL2.**



PREPARATION:
(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Remove the shift solenoid valve SL2.

CHECK:
(a) Measure the resistance between terminals 1 and 2 of solenoid connector.
Standard: 5.0 to 5.6 Ω at 20°C (68°F)
(b) Connect the positive (+) lead with an 21 W bulb to terminal 2 of solenoid connector and negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.
Standard: Solenoid sounds operation noise.

OK:
Standard

NG → **Replace the shift solenoid valve SL2 (See page AT-8).**

OK ↓

Repair or replace the transmission wire (See page AT-6).

DIB3D-02

DTC	P0781	1-2 Shift

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, 4th or 5th gear). Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves, valve body or automatic transmission (clutch, brake or gear etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P0781	The gear required by the ECM does not match the actual gear when driving (2-trip detection logic)	★Valve body is blocked up or stuck (1-2 shift) ★Automatic transmission assembly ★ECM

MONITOR DESCRIPTION

The ECM calculates the "actual" transmission gear by comparing the signals from the input speed sensor and the output speed sensor. The ECM can detect many mechanical problems in the shift solenoids, valve body, and the transmission clutches, brakes, and gears. If the ECM detects that the actual gear position and the commanded gear position are different, it will illuminate the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P0781	Valve body/Rationality check
Required sensors/Components	Main	Valve body
	Sub	Automatic transmission assembly, Speed sensor (NT), Speed sensor (NO), Vehicle speed sensor, Throttle speed sensor
Frequency of operation	Continuous	
Duration	Condition (A) and (B)	0.4 sec.
	Condition (C)	3 sec.
	Condition (D)	0.5 sec.
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The Following items are common to all conditions below: Condition (A), (B), (C) and (D)		
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Turbine speed sensor (NT) circuit	There is no malfunction in the circuits shown on the left.	
Output speed sensor (NO) circuit		
Shift solenoid ”A” (S1) circuit		
Shift solenoid ”B” (S2) circuit		
Shift solenoid ”E” (SR) circuit		
Pressure control solenoid ”A” (SL1) circuit		
Pressure control solenoid ”B” (SL2) circuit		
ECT (Engine coolant temperature) sensor circuit		
KCS sensor circuit		
ETCS (Electric throttle control system)	Not system down	
Transmission shift position	”D”	
ECT	40°C (104°F) or more	-
Spark advance from Max. retard timing by KCS control	0° CA or more	-
Engine	Running	
Transfer range	”HIGH”*1	
Transfer range ”HIGH” *1 (This condition is applied only 4WD)		
*1 Following conditions met		
Vehicle speed sensor ”A” circuit	There is no malfunction in the circuits shown on the left.	
Output shaft speed sensor circuit		
Transfer output speed	143 rpm or more	-
NO/NOtf (Transfer input speed/Transfer output speed)	0.9 or more	Less than 1.1
Condition (A)		
ECM selected gear	2nd	
Vehicle speed	2 km/h (1 mph) or more	-
Output speed	2nd → 1st down shift point or more	-
Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
Condition (B)		
ECM selected gear	4th	
Vehicle speed	2 km/h (1 mph) or more	-
Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
Condition (C)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Vehicle speed (During transition from 4th to 5th gear)	-	Less than 100 km/h (62 mph)
Condition (D)		

ECM selected gear	5th	
Engine speed - Turbine speed (NE - NT) (After transition from 4th to 5th gear)	-	Less than 150 rpm
Vehicle speed (After transition from 4th to 5th gear)	-	Less than 100 km/h (62 mph)

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Both of the following conditions are met: Condition (A), and Condition (B), (C) or (D)	
Condition (A)	
Turbine speed/Output speed (NT/NO)	3.30 or more and 7.50 or less
Condition (B)	
Turbine speed/Output speed (NT/NO)	1.28 or more and 1.53 or less
Condition (C)	
Turbine speed - Output speed x 4th gear ratio (NT - NO x 4th gear ratio)	1,000 rpm or more
Condition (D)	
Turbine speed - Output speed x 5th gear ratio (NT - NO x 5th gear ratio)	1,000 rpm or more

INSPECTION PROCEDURE

1	**Check other DTCs output (in addition to DTC P0781).**

PREPARATION:

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or hand-held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the ”ON” button of the OBD II scan tool or the hand-held tester.
(f) Select the item ”DIAGNOSIS/ENHANCED OBD II/DTC INFO/CURRENT CODES”.

CHECK:

Read the DTCs using the OBD II scan tool or the hand-held tester.

RESULT:

Display (DTC output)	Proceed to
Only ”P0781” is output	A
”P0781” and other DTCs	B

HINT:
If any other codes besides ”P0781” is output, perform the troubleshooting for those DTCs first.

B | **Go to relevant DTC chart (See page DI-389)**

A

2	Clear the DTC and running test (See page DI-361).

CHECK:
Clear the DTC again, and check DTC again after conducting the running test.

OK:
Normal code

OK	END

NG

Repair or replace valve body (See page AT-8).

DIB3E-02

DTC	P0818	Driveline Disconnect Switch Input Circuit

CIRCUIT DESCRIPTION

The ECM detects the signal from the transfer neutral position switch.
This DTC indicates that the transfer neutral position switch remains ON.

DTC No.	DTC Detecting Condition	Trouble Area
P0818	Transfer neutral position switch remains ON while vehicle running under conditions for 30 sec. (2-trip detection logic) ★Vehicle speed is 25 km/h or more ★Transfer shift position is H	★Short in transfer neutral position switch circuit ★Transfer neutral position switch ★ECM

MONITOR DESCRIPTION

The ECM detects whether or not the transfer gear is in the neutral position by monitoring the signal from the transfer neutral position switch.
If the ECM detects that the transfer-case is in neutral under the following conditions, the ECM will conclude that there is a malfunction of the transfer-case neutral position switch:

★ Transfer-case neutral position switch indicates that the transfer-case is in neutral.
★ Transfer-case shifter is in the "H" position.
★ The vehicle is traveling at 25 km/h (16 mph) or more.
★ The neutral switch has been ON for more than thirty seconds.

If all of the above conditions are detected, the ECM will conclude that there is a malfunction of the transfer-case neutral position switch, illuminate the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P0818	Transfer neutral position switch/Verify switch cycling
Required sensors/Components	Main	Transfer neutral position switch
	Sub	Vehicle speed sensor
Frequency of operation	Continuous	
Duration	30 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

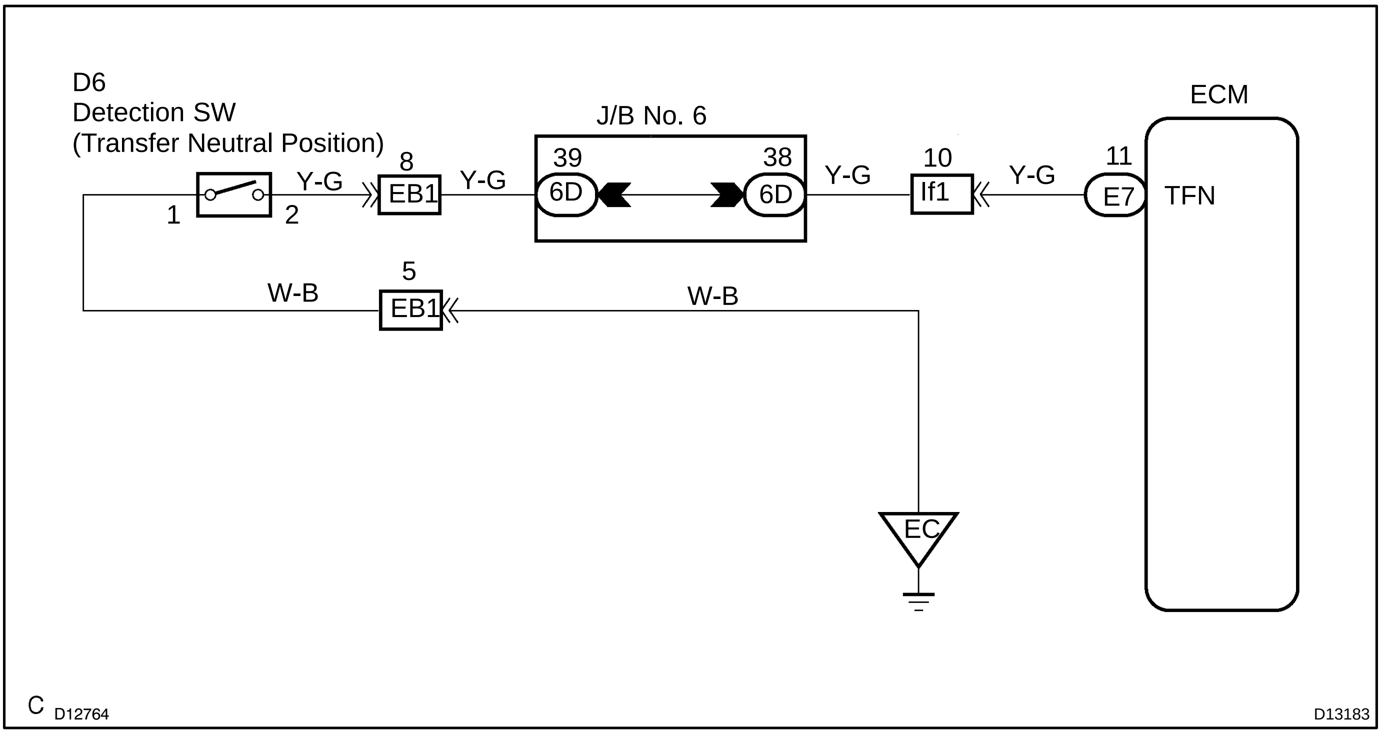
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Vehicle speed	25 km/h (16 mph) or more	-
Transfer position	High	
Ignition switch ON and time after OFF to ON	0.5 sec. or more	-

TYPICAL MALFUNCTION THRESHOLDS

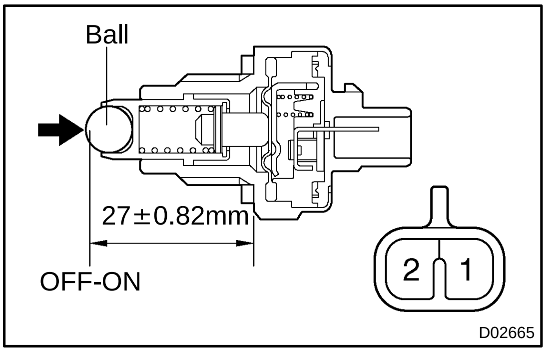
Detection criteria	Threshold
Transfer neutral switch signal	ON

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transfer neutral position switch.



PREPARATION:
Remove the transfer neutral position switch.
CHECK:
Check the continuity between the switch terminals when pushing the ball at the tip of the switch.
OK:

Switch	Specified condition
Push	Continuity
Free	No continuity

NG → **Replace transfer neutral position switch.**

OK

2	Check harness and connector between ECM and transfer neutral position switch, transfer neutral position switch and body ground (See page IN-36).

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

OK

Check and replace the ECM (See page IN-36).

DIB3F-02

DTC	P0973	Shift Solenoid "A" Control Circuit Low (Shift Solenoid Valve S1)

DTC	P0974	Shift Solenoid "A" Control Circuit High (Shift Solenoid Valve S1)

CIRCUIT DESCRIPTION

See page DI-426 .

DTC No.	DTC Detection Condition	Trouble Area
P0973	ECM detects short in solenoid valve S1 circuit 4 times when solenoid valve S1 is operated (1-trip detection logic)	★Short in shift solenoid valve S1 circuit ★Shift solenoid valve S1 ★ECM
P0974	ECM detects open in solenoid valve S1 circuit 4 times when solenoid valve S1 is not operated (1-trip detection logic)	★Open in shift solenoid valve S1 circuit ★Shift solenoid valve S1 ★ECM

MONITOR DESCRIPTION

The ECM commands gearshift by turning the shift solenoid valves "ON/OFF". When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and illuminates the MIL and stored the DTC. And the ECM performs the fail-safe function and turns the other shift solenoid valves in good condition "ON/OFF" (In case of an open or short circuit, the ECM stops sending current to the circuit.).

MONITOR STRATEGY

Related DTCs	P0973	Shift solenoid valve S1/Range check (Low resistance)
	P0974	Shift solenoid valve S1/Range check (High resistance)
Required sensors/Components	Shift solenoid valve S1	
Frequency of operation	Continuous	
Duration	0.1 sec. x 2 (times) or more	
MIL operation	1 driving cycle	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Range check (Low resistance)		
Solenoid	ON	
Range check (High resistance)		
Solenoid	OFF	

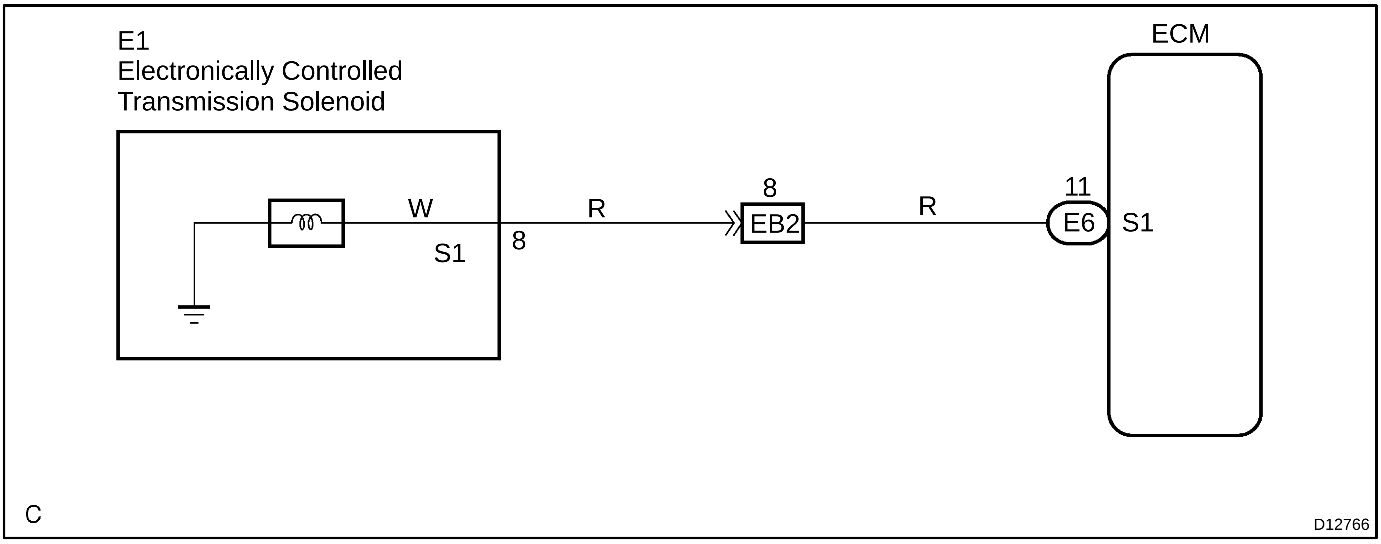
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Range check (Low resistance)	
Intelligent power MOS diagnosis fail signals detected while the solenoid is operated	Fail at solenoid resistance: 8 Ω or less
Range check (High resistance)	
Intelligent power MOS diagnosis fail signals detected while the solenoid is not operated	Fail at solenoid resistance: 100 kΩ or more

COMPONENT OPERATING RANGE

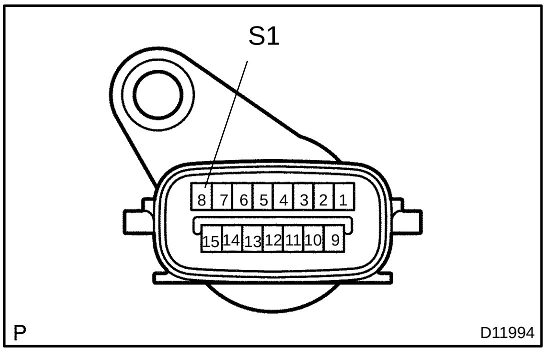
Parameter	Standard value
Shift solenoid valve S1	Resistance: 11 to 15 Ω at 20˚C (68˚F)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transmission wire.

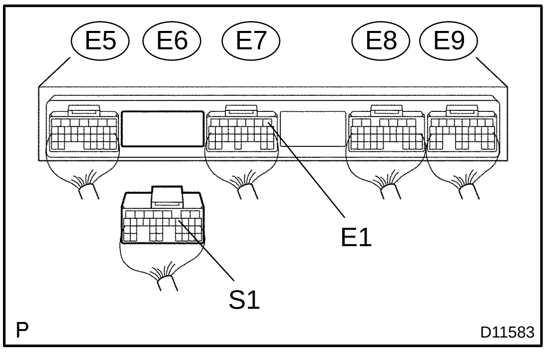


PREPARATION:
Disconnect the transmission wire connector.
CHECK:
Measure resistance between S1 of transmission wire connector and body ground.
OK:
Resistance: 11 to 15 Ω at 20°C (68°F)

NG → **Go to step 3.**

OK

2	Measure resistance between terminal S1 and E1 of ECM connector.



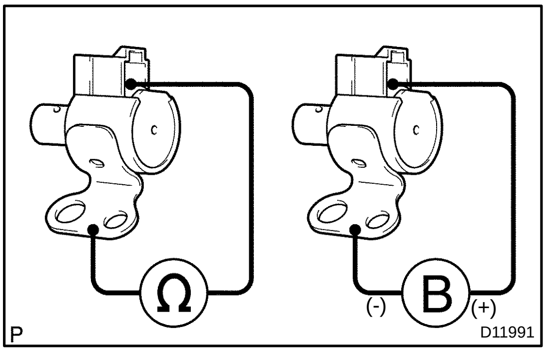
PREPARATION:
(a) Connect the transmission wire connector.
(b) Disconnect the connector of the ECM.
CHECK:
Measure resistance between terminals S1 and E1 of ECM connector.
OK:
Resistance: 11 to 15 Ω at 20°C (68°F)

NG → **Repair or replace the harness or connector (See page IN-36).**

OK

Check and replace the ECM (See page IN-36).

3	Check shift solenoid valve S1.



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Remove the shift solenoid valve S1.

CHECK:

Measure the resistance between the solenoid connector terminal and the body ground.

OK:

Resistance: 11 to 15 Ω at 20°C (68°F)

CHECK:

Connect the battery positive lead to the solenoid connector terminal and the battery negative lead to the solenoid body ground.

OK:

Solenoid sounds operation noise.

NG	Replace the shift solenoid valve S1 (See page AT-8).

OK

Repair or replace the transmission wire (See page AT-6).

DIB3G-02

DTC	P0976	Shift Solenoid ”B” Control Circuit Low (Shift Solenoid Valve S2)

DTC	P0977	Shift Solenoid ”B” Control Circuit High (Shift Solenoid Valve S2)

CIRCUIT DESCRIPTION

See page DI-426 .

DTC No.	DTC Detection Condition	Trouble Area
P0976	ECM detects short in solenoid valve S2 circuit 4 times when solenoid valve S2 is operated (1-trip detection logic)	★Short in shift solenoid valve S2 circuit ★Shift solenoid valve S2 ★ECM
P0977	ECM detects open in solenoid valve S2 circuit 4 times when solenoid valve S2 is not operated (1-trip detection logic)	★Open in shift solenoid valve S2 circuit ★Shift solenoid valve S2 ★ECM

MONITOR DESCRIPTION

The ECM commands gearshift by turning the shift solenoid valves ”ON/OFF”. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and illuminates the MIL and stored the DTC. And the ECM performs the fail-safe function and turns the other shift solenoid valves in good condition ”ON/OFF” (In case of an open or short circuit, the ECM stops sending current to the circuit.).

MONITOR STRATEGY

Related DTCs	P0976	Shift solenoid valve S2/Range check (Low resistance)
	P0977	Shift solenoid valve S2/Range check (High resistance)
Required sensors/Components	Shift solenoid valve S2	
Frequency of operation	Continuous	
Duration	0.1 sec. x 2 (times) or more	
MIL operation	1 driving cycle	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Range check (Low resistance)		
Solenoid	ON	
Range check (High resistance)		
Solenoid	OFF	

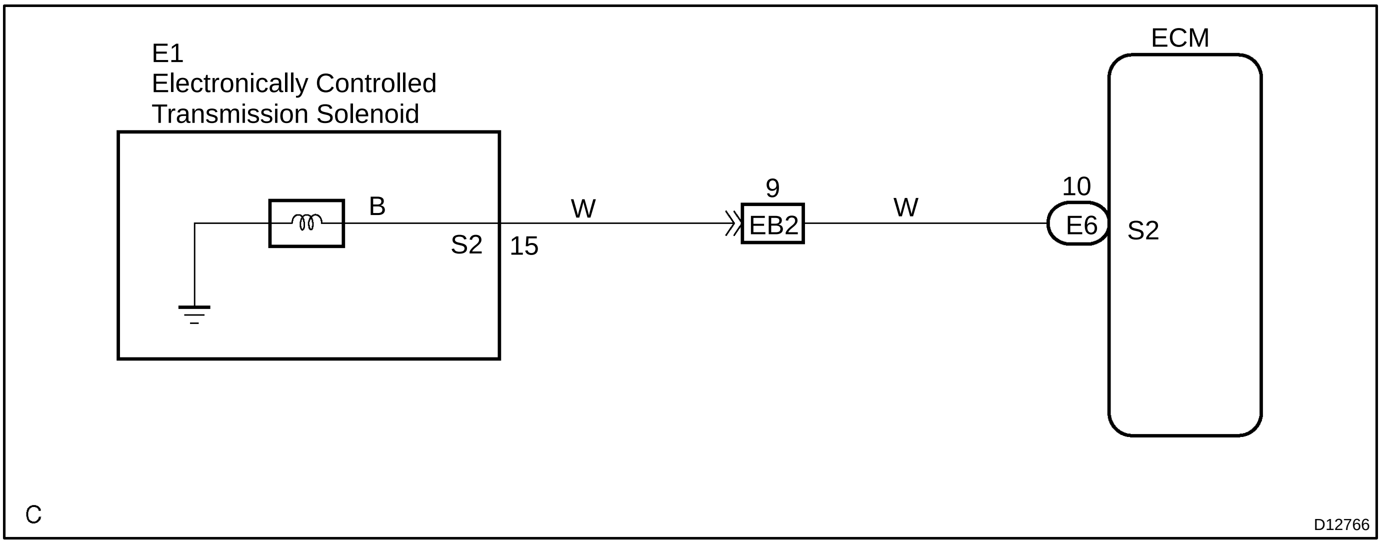
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Range check (Low resistance)	
Intelligent power MOS diagnosis fail signal detected while the solenoid is operated	Fail at solenoid resistance: 8 Ω or less
Range check (High resistance)	
Intelligent power MOS diagnosis fail signal detected while the solenoid is not operated	Fail at solenoid resistance: 100 kΩ or more

COMPONENT OPERATING RANGE

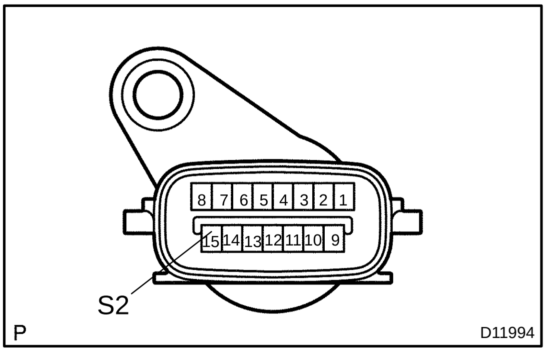
Parameter	Standard value
Shift solenoid valve S2	Resistance: 11 to 15 Ω at 20˚C (68˚F)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transmission wire.

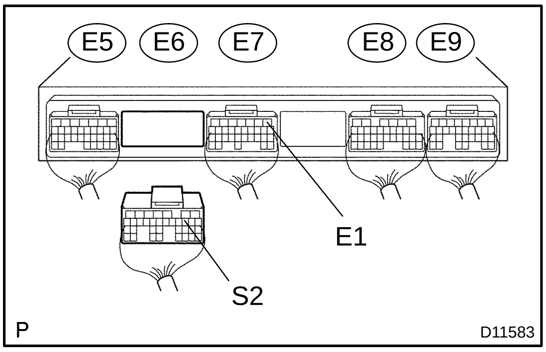


PREPARATION:
Disconnect the transmission wire connector.
CHECK:
Measure resistance between S2 of transmission wire connector and body ground.
OK:
Resistance: 11 to 15 Ω at 20°C (68°F)

NG	Go to step 3.

OK

2	Measure resistance between terminal S2 and E1 of ECM connector.



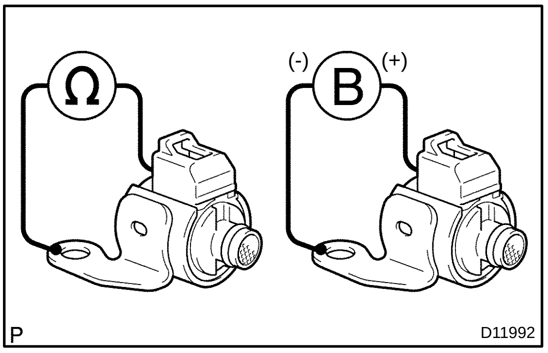
PREPARATION:
(a) Connect the transmission wire connector.
(b) Disconnect the connector of the ECM.
CHECK:
Measure resistance between terminals S2 and E1 of ECM connector.
OK:
Resistance: 11 to 15 Ω at 20°C (68°F)

NG	Repair or replace the harness or connector (See page IN-36).

OK

Check and replace the ECM (See page IN-36).

3	**Check shift solenoid valve S2.**



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Remove the shift solenoid valve S2.

CHECK:

Measure the resistance between the solenoid connector terminal and the body ground.

OK:

Resistance: 11 to 15 Ω at 20°C (68°F)

CHECK:

Connect the battery positive lead to the solenoid connector terminal and the battery negative lead to the solenoid body ground.

OK:

Solenoid sounds operation noise.

NG	**Replace the shift solenoid valve S2 (See page AT-8).**

OK

Repair or replace the transmission wire (See page AT-6).

DIB3H-02

DTC	P0985	Shift Solenoid ”E” Control Circuit Low (Shift Solenoid Valve SR)

DTC	P0986	Shift Solenoid ”E” Control Circuit High (Shift Solenoid Valve SR)

CIRCUIT DESCRIPTION

see page DI-426 .

DTC No.	DTC Detection Condition	Trouble Area
P0985	ECM detects short in solenoid valve SR circuit 4 times when solenoid valve SR is operated (1-trip detection logic)	★Short in shift solenoid valve SR circuit ★Shift solenoid valve SR ★ECM
P0986	ECM detects open in solenoid valve SR circuit 4 times when solenoid valve SR is not operated (1-trip detection logic)	★Open in shift solenoid valve SR circuit ★Shift solenoid valve SR ★ECM

MONITOR DESCRIPTION

The ECM commands gearshift by turning the shift solenoid valves ”ON/OFF”. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and illuminates the MIL and stores the DTC. And the ECM performs the fail-safe function and turns the other shift solenoid valves in good condition ”ON/OFF” (In case of an open or short circuit, the ECM stops sending current to the circuit.) (see page DI-426).

MONITOR STRATEGY

Related DTCs	P0985	Shift solenoid valve SR/Range check (Low resistance)
	P0986	Shift solenoid valve SR/Range check (High resistance)
Required sensors/Components	Shift solenoid valve SR	
Frequency of operation	Continuous	
Duration	0.1 sec. x 2 (times) or more	
MIL operation	1 driving cycle	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Range check (Low resistance)		
Solenoid	ON	
Range check (High resistance)		
Solenoid	OFF	

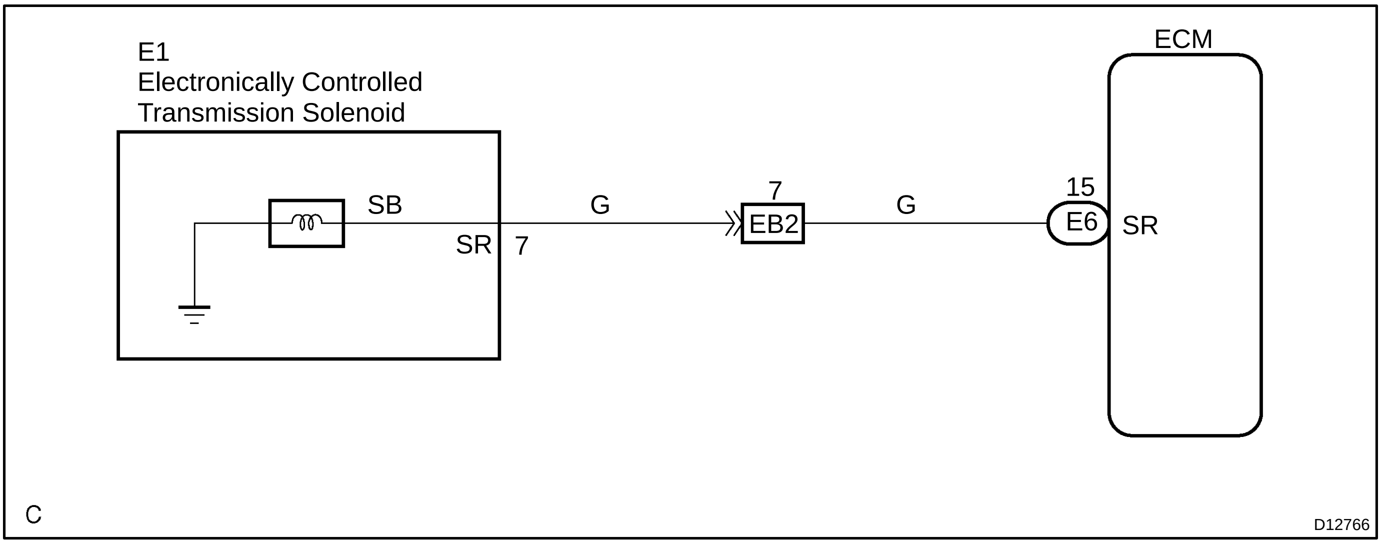
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Range check (Low resistance)	
Intelligent power MOS diagnosis fail signals detected while the solenoid is operated	Fail at solenoid resistance: 8 Ω or less
Range check (High resistance)	
Intelligent power MOS diagnosis fail signals detected while the solenoid is not operated	Fail at solenoid resistance: 100 kΩ or more

COMPONENT OPERATING RANGE

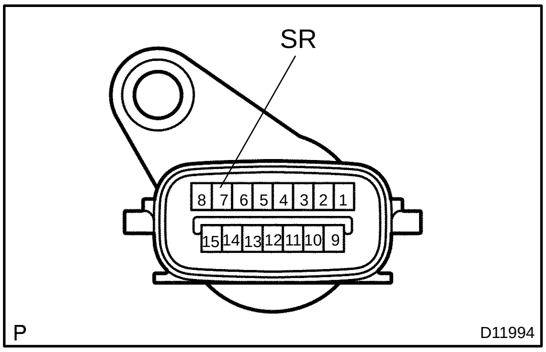
Parameter	Standard value
Shift solenoid valve SR	Resistance: 11 to 15 at 20˚C (68˚F)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transmission wire.

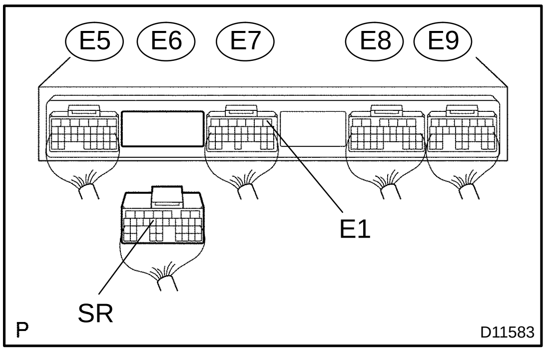


PREPARATION:
Disconnect the transmission wire connector.
CHECK:
Measure resistance between SR of transmission wire connector and body ground.
OK:
Resistance: 11 to 15 Ω at 20°C (68°F)

NG → **Go to step 3.**

OK

2	Measure resistance between terminal SR and E1 of ECM connector.



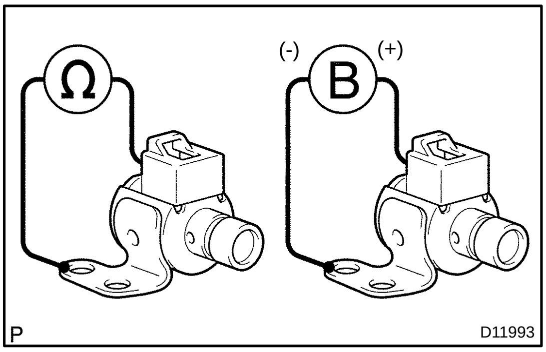
PREPARATION:
(a) Connect the transmission wire connector.
(b) Disconnect the connector of the ECM.
CHECK:
Measure resistance between terminals SR and E1 of ECM connector.
OK:
Resistance: 11 to 15 Ω at 20°C (68°F)

NG → **Repair or replace the harness or connector (See page IN-36).**

OK

Check and replace the ECM (See page IN-36).

3	**Check shift solenoid valve SR.**



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Remove the shift solenoid valve SR.

CHECK:

Measure the resistance between the solenoid connector terminal and the body ground.

OK:

Resistance: 11 to 15 Ω at 20°C (68°F)

CHECK:

Connect the battery positive lead to the solenoid connector terminal and the battery negative lead to the solenoid body ground.

OK:

Solenoid sounds operation noise.

NG → **Replace the shift solenoid valve SR (See page AT-8).**

OK

Repair or replace the transmission wire (See page AT-6).

DICEA-01

DTC	P1782	T/F L4 Range Position Switch Performance

CIRCUIT DESCRIPTION

The ECM detects the signal from the transfer L4 position switch.
This DTC indicates that the transfer L4 position switch remains ON.

DTC No.	DTC Detecting Condition	Trouble Area
P1782	Transfer L4 position switch remains ON while vehicle running under conditions for 18 seconds or more (1-trip detection logic) (a) Output shaft speed 3000 rpm or less (b) Transfer shift position is H	★Short in transfer L4 position switch circuit ★Transfer L4 position switch ★ECM

MONITOR DESCRIPTION

The ECM monitors the transfer-case L4 position switch to determine when the transfer-case L4 gear is engaged. If the transfer-case L4 gears remain engaged under the following conditions, the ECM will conclude that there is a malfunction of the L4 position switch:

- ★ L4 switch indicated that the L4 transfer-case gears are engaged.
- ★ Transfer-case shifter is in the ”H” position.
- ★ Transfer-case output shaft rpm is between 750 and 3,000 rpm.
- ★ The specified time period has elapsed.

If all of the above conditions are detected, the ECM will conclude that there is a malfunction of the L4 switch, illuminate the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P1782	Transfer L4 position switch/ON malfunction
Required sensors/Components	Transfer L4 position switch	
Frequency of operation	Continuous	
Duration	ON malfunction (A)	1.8 sec.
	ON malfunction (B)	0.5 sec.
MIL operation	2 driving cycles	
Sequence of operation	None	

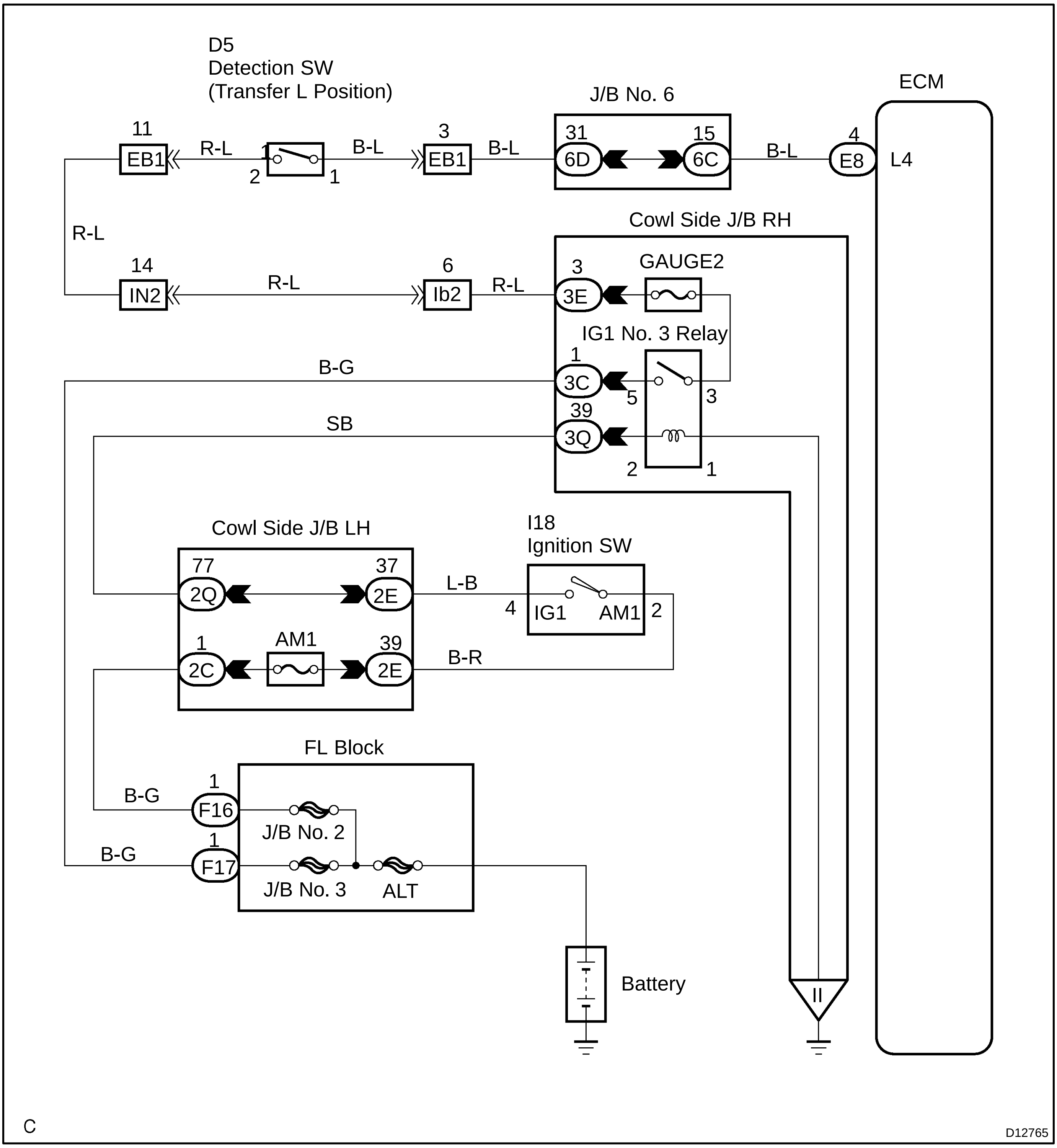
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The following items are common to all conditions below: ON malfunction (A) and (B)		
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Output speed sensor circuit	There is no malfunction in the circuits shown on the left.	
Vehicle speed sensor ”A” circuit		
Transfer neutral position switch	OFF	
ON malfunction (A)		
Output speed (Transfer output speed)	1,000 rpm or more	Less than 3,000 rpm
ON malfunction (B)		
Output speed (Transfer output speed)	143 rpm or more	-

TYPICAL MALFUNCTION THRESHOLDS

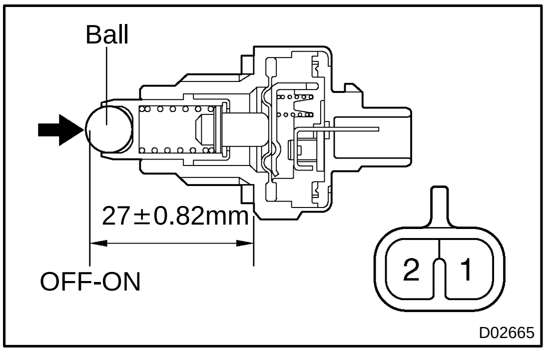
Detection criteria	Threshold
Both of the following conditions is met: ON malfunction (A) and (B)	
ON malfunction (A)	
L4 switch	ON
ON malfunction (B)	
Actual Transfer gear ratio Transfer input speed/Transfer output speed (NO/NOtf)	0.9 or more and Less than 1.1

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transfer L4 position switch.



PREPARATION:

Remove the transfer L4 position switch.

CHECK:

Check the continuity between the switch terminals when pushing the ball at the tip of the switch.

OK:

Switch	Specified condition
Push	Continuity
Free	No continuity

NG → **Replace transfer L4 position switch.**

OK

2	Check harness and connector between battery and transfer L4 position switch, transfer L4 position switch and ECM (See page IN-36).

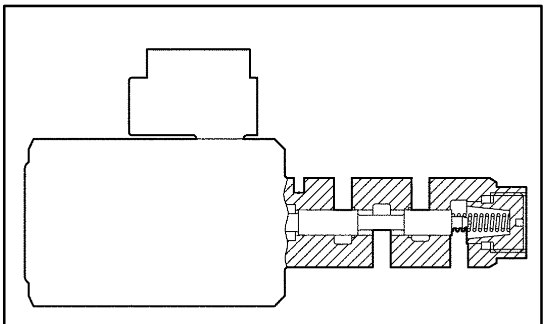
NG → **Repair or replace the harness or connector.**

OK

Check and replace the ECM (See page IN-36).

DIB3J-02

DTC	P2714	Pressure Control Solenoid ”D” Performance (Shift Solenoid Valve SLT)



D01769

SYSTEM DESCRIPTION

The ECM calculates the shifting condition by using the signals from the vehicle speed sensor, throttle position sensor, etc.. And compares this result with the signal that ECM sends to SLT to detect mechanical trouble of the shift solenoid valve SLT, valve body, torque converter clutch and automatic transmission assembly (clutch, brake or gear etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P2714	ECM detects a malfunction on SLT (ON side) according to the revolution difference of the turbine and the output shaft, and also by the oil pressure.	★Shift solenoid valve SLT is stuck open or closed ★Valve body blocked up or stuck ★Automatic transmission assembly

MONITOR DESCRIPTION

The ECM sends (ED: delete ”the”) signals (Duty Ratio) to the shift solenoid valve SLT based on the information such as the signal from throttle position sensor and the vehicle speed sensor.
Based on the signal’s duty-ratio, the shift solenoid valve SLT adjusts the hydraulic pressure to the primary regulator valve to an appropriate level. This function enables a smooth vehicle operation by adjusting the line hydraulic pressure to match the engine output and running condition.
The ECM calculates the ”actual” transmission gear by comparing the signals from the input speed sensor and the output speed sensor. The ECM can detect many mechanical problems in the shift solenoids, valve body, and the transmission clutches, brakes, and gears. If the ECM detects that the actual gear position and the commanded gear position are different, it will illuminate the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P2714	Shift solenoid valve SLT/ON malfunction
Required sensors/Components	Main	Shift solenoid valve SLT
	Sub	Valve body, ATF temperature sensor, Speed sensor (NT), Speed sensor (NO)
Frequency of operation	Continuous	
Duration	Immediate	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

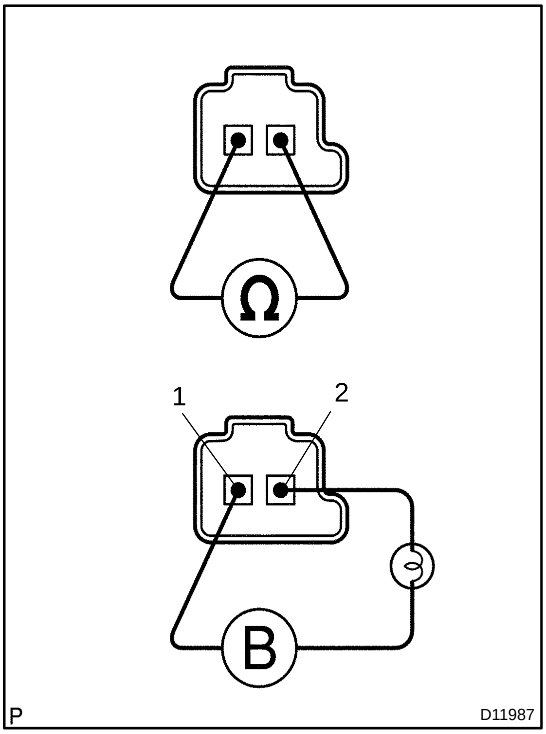
Item	Specification	
	Minimum	Maximum
[The following items are common to all conditions below: OFF malfunction (A) and (B)]		
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Turbine speed sensor (NT) circuit	There is no malfunction in the circuits shown on the left.	
Output speed sensor (NO) circuit		
Transmission Fluid Temperature Sensor ”A” circuit		
Shift solenoid ”A” (S1) circuit		
Shift solenoid ”B” (S2) circuit		
Shift solenoid ”E” (SR) circuit		
Pressure control solenoid ”A” (SL1) circuit		
Pressure control solenoid ”B” (SL2) circuit		
Pressure control solenoid ”D” (SLT) circuit		
ECT (Engine coolant temperature) sensor circuit		
KCS sensor circuit		
ETCS (Electric throttle control system)	Not system down	
Transmission shift position	”D”	
ECT	40°C (104°F) or more	-
Spark advance from Max. retard timing by KCS control	0° CA or more	-
Engine	Running	
Transfer range	”HIGH”*1	
ATF temperature	10°C or more	-
Transfer range ”HIGH” *1 (This condition is applied only 4WD)		
*1 Following conditions met		
Vehicle speed sensor ”A” circuit	There is no malfunction in the circuits shown on the left.	
Output shaft speed sensor circuit		
Transfer output speed	143 rpm or more	-
NO/NOtf (Transfer input speed/Transfer output speed)	0.9 or more	Less than 1.1

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Summation of C1 clutch heat generations = Σ (Turbine speed - Output speed x Temporary ratio)	Specified value

INSPECTION PROCEDURE

1	Check shift solenoid valve SLT operation.



PREPARATION:
(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Remove the shift solenoid valve SLT.

CHECK:
(a) Measure the resistance between terminals 1 and 2 of solenoid connector.
Standard: 5.0 to 5.6 Ω at 20˚C (68˚F)
(b) Connect the positive (+) lead with an 21 W bulb to terminal 2 of solenoid connector and negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.
Standard: Solenoid sounds operation noise.

OK:
Standard

NG → **Replace the shift solenoid valve SLT (See page AT-8).**

OK ↓

2	Check valve body (See page DI-396).

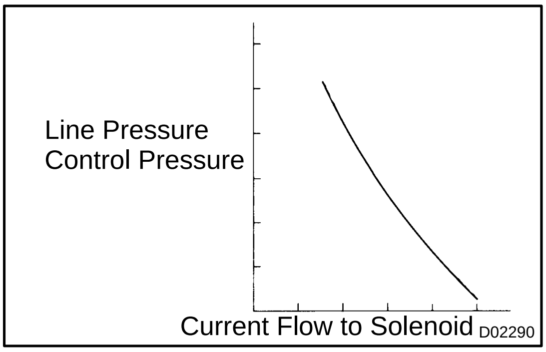
NG → **Replace the valve body (See page AT-8).**

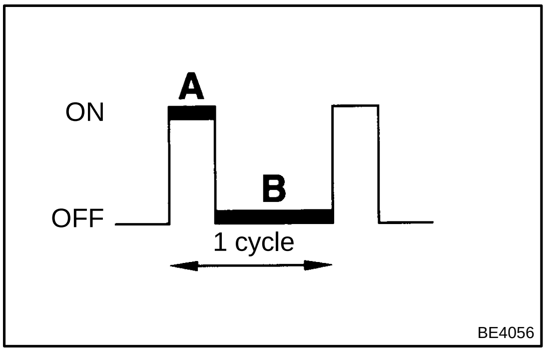
OK ↓

Repair or replace transmission (See page AT-30).

DIB3K-02

DTC	P2716	Pressure Control Solenoid ”D” Electrical (Shift Solenoid Valve SLT)





CIRCUIT DESCRIPTION

The throttle pressure that is applied to the primary regulator valve (which modulates line pressure) causes the solenoid valve SLT, under electronic control, to precisely and minutely modulate and generate line pressure according to the accelerator pedal effort, or the detected engine power output.

This controls the line pressure and provides smooth shifting characteristics.

Upon receiving the throttle valve opening angle signal, ECM controls the line pressure by sending a predetermined (*) duty ratio to the solenoid valve, modulating the line pressure, and generating throttle pressure.

(*) 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

$$\text{Duty Ratio} = \frac{A}{A + B} \times 100\ (\%)$$

DTC No.	DTC Detection Condition	Trouble Area
P2716	ECM detects solenoid SLT circuit open or short malfunction for 1 sec. or more (1-trip detection logic)	★Open or short in shift solenoid valve SLT circuit ★Shift solenoid valve SLT ★ECM

MONITOR DESCRIPTION

When an open or short in the linear solenoid valve (SLT) circuit is detected, the ECM interprets this as a fault. The ECM will turn ON the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P2716	Shift solenoid valve SLT/Range check
Required sensors/Components	Shift solenoid valve SLT	
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Solenoid current cut status	Not cut	
Battery voltage	11 V or more	-
CPU command duty ratio to SLT	19% or more	-

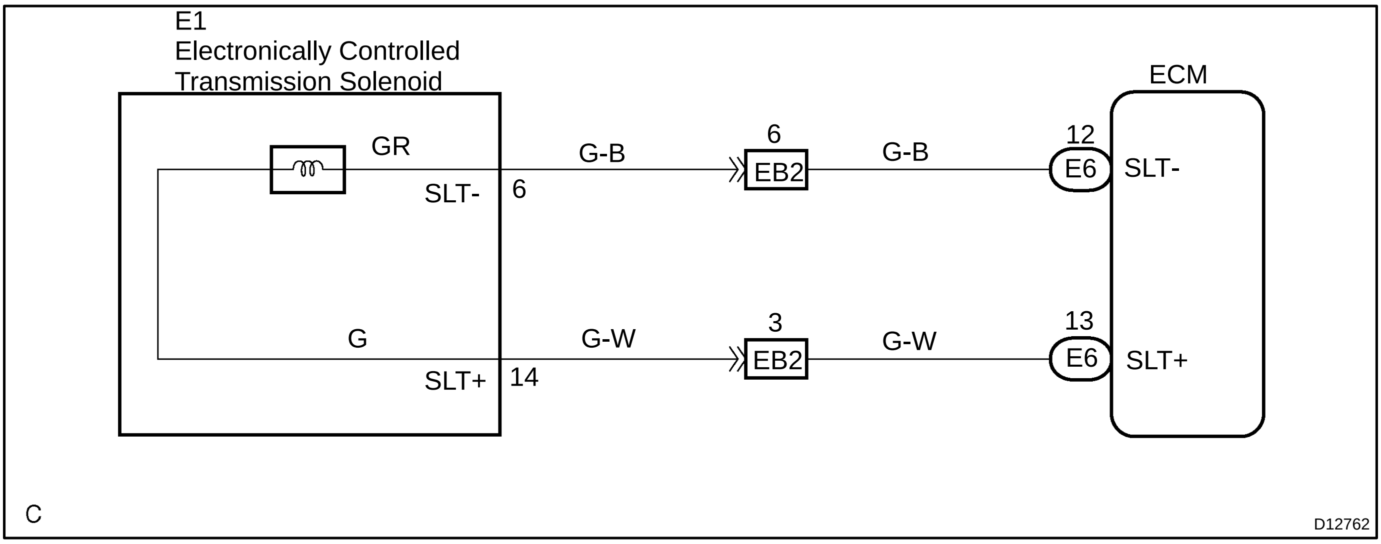
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Solenoid status from IC	Fail (Open or short)

COMPONENT OPERATING RANGE

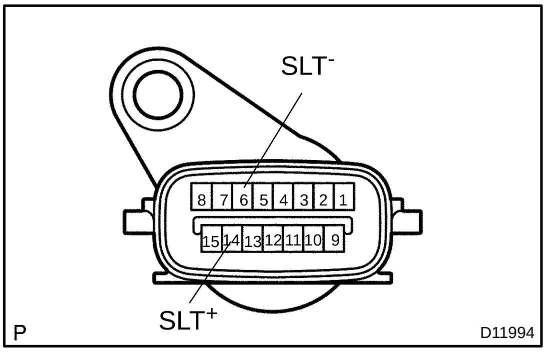
Parameter	Standard value
Output signal duty	Less than 100%

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transmission wire.



PREPARATION:

Disconnect the transmission wire connector.

CHECK:

Measure resistance between SLT+ and SLT- of transmission wire.

OK:

Resistance: 5.0 to 5.6 Ω at 20°C (68°F)

CHECK:

Measure resistance between terminals SLT+ and SLT- of the transmission wire connector and body ground.

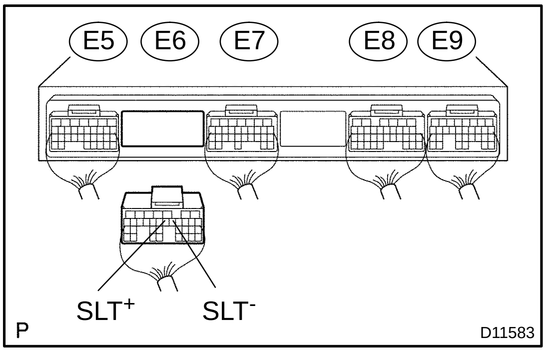
OK:

Resistance: 1 MΩ or higher

NG	Go to step 3.

OK

2	Measure resistance between terminal SLT+ and SLT- of ECM connector.



PREPARATION:

(a) Connect the transmission wire connector.

(b) Disconnect the connector of the ECM.

CHECK:

Measure resistance between terminals SLT+ and SLT- of ECM connector.

OK:

Resistance: 5.0 to 5.6 Ω at 20°C (68°F)

CHECK:

Measure resistance between terminals SLT+ and SLT- of the ECM connector and body ground.

OK:

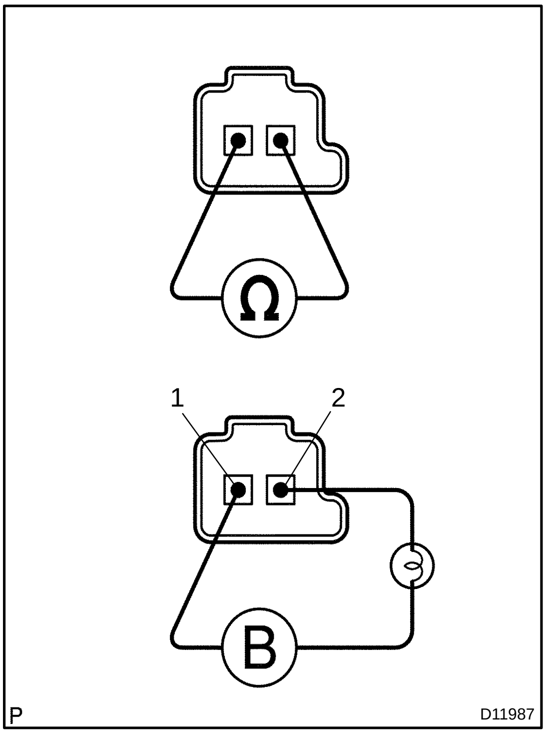
Resistance: 1 MΩ or higher

NG	Repair or replace the harness or connector (See page IN-36).

OK

Check and replace the ECM (See page IN-36).

3	Check shift solenoid valve SLT.



PREPARATION:
(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Remove the shift solenoid valve SLT.

CHECK:
(a) Measure the resistance between terminals 1 and 2 of solenoid connector.
Standard: 5.0 to 5.6 Ω at 20°C (68°F)
(b) Connect the positive (+) lead with an 21 W bulb to terminal 2 of solenoid connector and negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.
Standard: Solenoid sounds operation noise.

OK:
Standard

NG → **Replace the shift solenoid valve SLT (See page AT-8).**

OK ↓

Repair or replace the transmission wire (See page AT-6).

DIC33-01

DTC	P2740	Transmission Fluid Temperature Sensor ”B” Circuit

DTC	P2742	Transmission Fluid Temperature Sensor ”B” Circuit Low Input

DTC	P2743	Transmission Fluid Temperature Sensor ”B” Circuit High Input

CIRCUIT DESCRIPTION

The ATF temperature sensor converts fluid temperature into a resistance value which is input in to the ECM.
ATF temperature sensor No.2 is on the transmission and just before the oil cooler inlet pipeline.
If ECM detects the abnormally high temperature of ATF by this sensor, it draws driver’s attention by illuminating the warning lamp.

HINT:

★ The temperature of ATF easily raises when towing, climbing hills and in traffic, etc.

★ If the ATF temperature sensor No.2 shorts, the signal that indicates the ATF temperature is 150°C (302°F) or higher is input in ECM.

Vehicle conditions when sensor is in normal and when the vehicle is in short are indicated in the table below.

ATF temperature No.2 Sensor State	Detection Condition	Symptom	Recovery Condition
Sensor is normal	★AT fluid temp. more than 150°C (302°F).	★AT Oil Temp. warning light remains on	★AT fluid temp. less than 135°C (275°F). *1
	★AT fluid temp. more than 130°C (266°F).	★Shift point too high.	★AT fluid temp. less than 110°C (230°F).
Sensor is in short	★Any conditions.	★AT Oil Temp. warning light remains on ★Shift point too high.	★Symptoms still occur

HINT:

*1: When AT fluid temperature is in normal range, it decreases to less than 135°C within 5 minutes with the shift lever in P or N position in a idling state.

DTC No.	DTC Detecting Condition	Trouble Area
P2740	(a) and (b) is detected momentary within 0.5 sec. when neither P2742 or P2743 is not detected (1-trip detection logic) (a) ATF temperature sensor resistance is less than 79 Ω. (b) ATF temperature sensor resistance is more than 156 kΩ. HINT: Wthin 0.5 sec. the malfunction switches from (a) to (b) or from (b) to (a)	★Open or short in ATF temperature sensor No. 2 circuit ★ATF temperature sensor No. 2 ★ECM
P2742	ATF temperature sensor resistance is less than 79 Ω. for 0.5 sec. or more (1-trip detection logic)	
P2743	DTC is detected for 0.5 sec. or more (1-trip detection logic) ATF temperature sensor resistance is more than 156 kΩ. after started engine for 15 minutes or more	

MONITOR DESCRIPTION

The automatic transmission fluid (ATF) temperature sensor converts ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, and the ECM detects an opens or shorts in the ATF temperature circuit. If the resistance value of the ATF temperature is less than 79 Ω or more than 156 kΩ, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM will turn on the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P2740	ATF temperature sensor/Range check (Fluttering)
	P2742	ATF temperature sensor/Range check (Low resistance)
	P2743	ATF temperature sensor/Range check (High resistance)
Required sensors/Components	ATF temperature sensor	
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Range check (Fluttering, Low resistance)		
The typical enabling condition is not available.	-	
Range check (High resistance)		
Time after engine start	15 min. or more	-

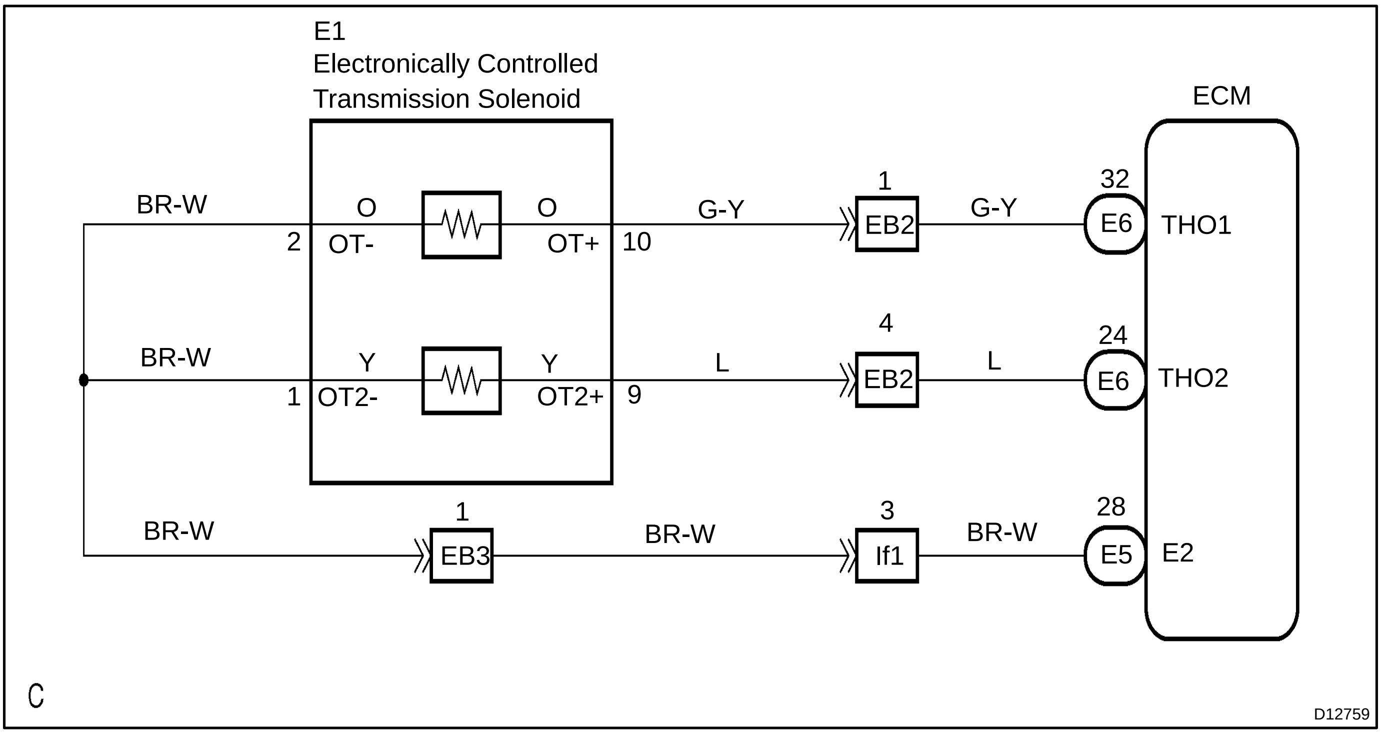
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Range check (Fluttering)	
ATF temperature sensor resistance	Less than 25 Ω or More than 156 kΩ
Range check (Low resistance)	
ATF temperature sensor resistance	Less than 25 Ω
Range check (High resistance)	
ATF temperature sensor resistance	More than 156 kΩ

COMPONENT OPERATING RANGE

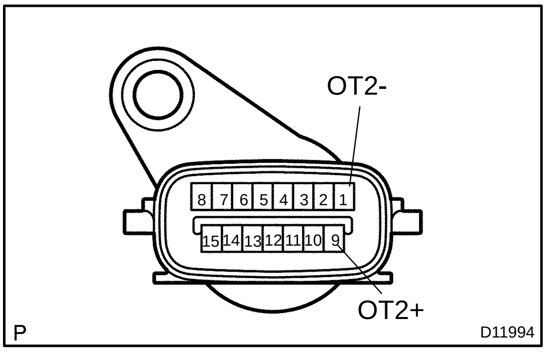
Parameter	Standard value
ATF temperature sensor	Atmospheric temperature to approx. 130°C (266°F)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transmission wire.



PREPARATION:
Disconnect the transmission wire connector from the transmission.

CHECK:
Measure the resistance between terminals OT2+ and OT2-.

OK:
79 Ω to 156 kΩ

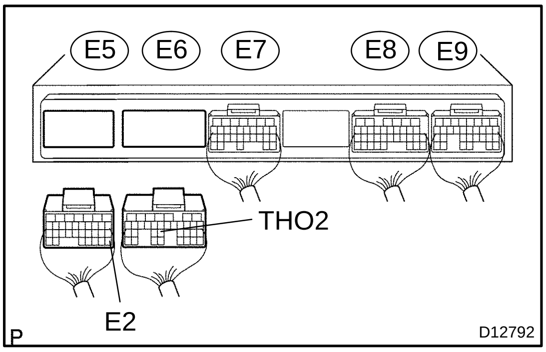
CHECK:
Measure resistance between terminals OT2+ and OT2- of the transmission wire connector and body ground.

OK:
Resistance: 1 MΩ or higher

NG	Replace the transmission wire (ATF temperature sensor).

OK

2	Measure resistance between terminal THO2 and E2 of ECM connector.



PREPARATION:

(a) Connect the transmission wire connector.

(b) Disconnect the connector of the ECM.

CHECK:

Measure the resistance between terminals THO2 and E2.

OK:

79 Ω to 156 kΩ

CHECK:

Measure resistance between terminals THO2 and E2 of the ECM connector and body ground.

OK:

Resistance: 1 MΩ or higher

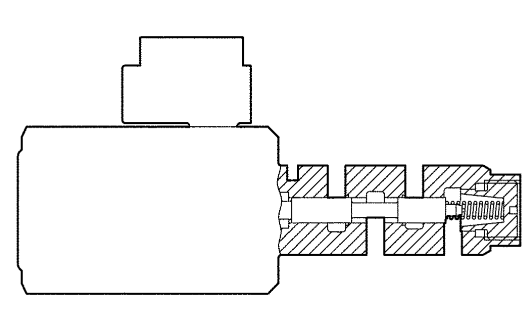
NG → **Repair or replace the harness or connector (See page IN-36).**

OK

Check and replace the ECM (See page IN-36).

DIB3L-02

DTC	P2757	Torque Converter Clutch Pressure Control Solenoid Performance(Shift Solenoid Valve SLU)



D01769

SYSTEM DESCRIPTION

The ECM uses the signals from the Throttle Position Sensor and Air-flow Meter 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 SLU, valve body, torque converter clutch and automatic transmission assembly (clutch, brake or gear etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P2757	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)	★Shift solenoid valve SLU is stuck open or closed ★Valve body blocked up or stuck ★Lock-up clutch ★Automatic transmission assembly

MONITOR DESCRIPTION

The ECM controls the oil pressure to the lock-up clutch based on engine-load information from the throttle position sensor, crankshaft position sensor, input speed sensor, and the oil pressure sensor for shift-solenoid SLU. The ECM commands the shift-solenoid SLU using a duty-cycle control signal. In turn, the shift solenoid operates the lock-up control valve and causes lock-up or flexible lock-up of the torque converter clutch.
To monitor the condition of the lock up clutch, the ECM monitors the signals from the input speed sensor, crank position sensor, the throttle position sensor, and air flow meter. The ECM uses this information to determine when the vehicle's torque converter clutch should be locked-up. The ECM can detect many mechanical problems in the shift solenoids, valve body, and the transmission clutches, brakes, and gears. If the ECM detects that the torque converter clutch locked below the minimum lock-up speed, it will illuminate the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P2757	Shift solenoid valve SLU/OFF malfunction
		Shift solenoid valve SLU/ON malfunction
Required sensors/Components	Main	Shift solenoid valve SLU
	Sub	Valve body, Vehicle speed sensor, Throttle position sensor, Speed sensor (NT), Speed sensor (NO)
Frequency of operation	Continuous	
Duration	OFF malfunction	2 sec.
	ON malfunction	1.8 sec.
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The following items are common to all conditions below: OFF malfunction and ON malfunction		
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Turbine speed sensor (NT) circuit	There is no malfunction in the circuits shown on the left.	
Output speed sensor (NO) circuit		
Shift solenoid "A" (S1) circuit		
Shift solenoid "B" (S2) circuit		
Shift solenoid "E" (SR) circuit		
Torque converter clutch pressure control solenoid circuit		
KCS sensor circuit		
ETCS (Electric throttle control system)	Not system down	
Transmission shift position	"D"	
ECT (Engine coolant temperature)	40°C (104°F) or more	-
Spark advance from Max. retard timing by KCS control	0° CA or more	-
Engine	Running	
ECM selected gear	4th or 5th	
Vehicle speed	25 km/h or more	-
Shift solenoid "A" (S1) circuit	There is no malfunction in the circuits shown on the left.	
Shift solenoid "B" (S2) circuit		
Pressure control solenoid "B" (SL2) circuit		
1-2 Shift valve		
Transfer neutral position switch	OFF	
Transfer range	"HIGH"*1	
Transfer range "HIGH" *1 (This condition is applied only 4WD)		
*1 Following conditions met		
Vehicle speed sensor "A" circuit	There is no malfunction in the sensor circuits shown on the left.	
Output shaft speed sensor circuit		
Transfer output speed	143 rpm or more	-
NO/NOtf (Transfer input speed/Transfer output speed)	0.9 or more	Less than 1.1
OFF malfunction		
ECM lock-up command	ON (SLU pressure: 513kpa or more)	
Vehicle speed	-	Less than 100 km/h (62 mph)
ON malfunction		
ECM lock-up command	OFF (SLU pressure: less than 4kpa)	
Throttle valve opening angle	9% or more	-
Vehicle speed	-	Less than 60 km/h (38 mph)

TYPICAL MALFUNCTION THRESHOLDS

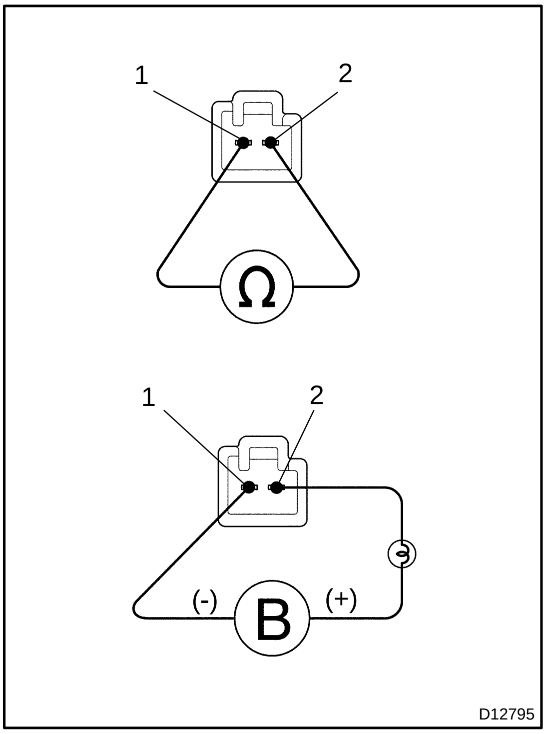
Detection criteria	Threshold
OFF malfunction	
Engine speed - Turbine speed	70 rpm or more
ON malfunction	
It is necessary 2 detections/one driving cycle 1st detection; temporary flag ON 2nd detection; pending fault code ON	
Vehicle speed must be under 10 km/h (6 mph) once before 2nd detection	
|Engine speed - Turbine speed|	Less then 35 rpm

COMPONENT OPERATING RANGE

Parameter	Standard value
Speed sensor (NT)	Input speed is equal to engine speed when lock-up ON.

INSPECTION PROCEDURE

1	Check shift solenoid valve SLU operation.



PREPARATION:

(a) Jack up the vehicle.

(b) Remove the oil pan.

(c) Remove the shift solenoid valve SLU.

CHECK:

(a) Measure the resistance between terminals 1 and 2 of solenoid connector.

Standard: 5.0 to 5.6 Ω at 20°C (68°F)

(b) Connect the positive (+) lead with an 21 W bulb to terminal 2 of solenoid connector and negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

Standard: Solenoid sounds operation noise.

OK:

Standard

NG → **Replace the shift solenoid valve SLU (See page AT-8).**

OK

2	Check valve body (See page DI-396).

NG — Replace the valve body (See page AT-8).

OK

3	Check torque converter clutch (See page AT-34).

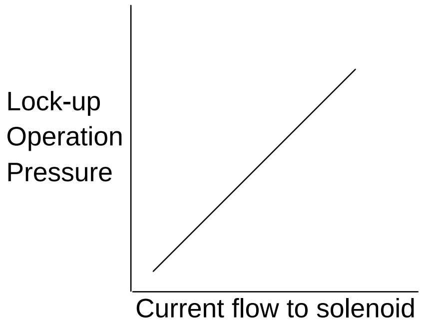
OK — Repair or replace transmission (See page AT-30).

NG

Replace the torque converter clutch (See page AT-30).

DIB3M-02

DTC	P2759	Torque Converter Clutch Pressure Control Solenoid Control Circuit Electrical(Shift Solenoid Valve SLU)

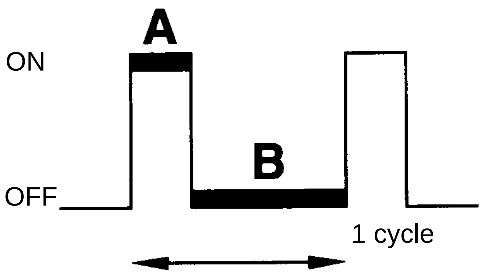


CIRCUIT DESCRIPTION

The amount of current flow to the solenoid is controlled by the (*) duty ratio of the ECM output signal. The higher the duty ratio becomes, the higher the lock-up hydraulic pressure becomes during the lock-up operation.

(*) 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



BE4056

(*)

$$\text{Duty Ratio} = \frac{A}{A + B} \times 100\ (\%)$$

D00160

DTC No.	DTC detection condition	Trouble Area
P2759	The following condition is detected. (1-trip detection logic) SLU output signal's duty ON of 3.3 msec. or more with duty ratio of least 95% lasts for 1 second.	★Open or short in shift solenoid valve SLU circuit ★Shift solenoid valve SLU ★ECM

MONITOR DESCRIPTION

The ECM controls the oil pressure to the lock-up clutch based on engine-load information from the throttle position sensor, crankshaft position sensor, input speed sensor, and the oil pressure sensor for shift-solenoid SLU. The ECM commands the shift-solenoid SLU using a duty-cycle control signal. In turn, the shift solenoid operates the lock-up control valve and cause lock-up or flexible lock-up of the torque converter clutch. The ECM illuminates the MIL and store the DTC when ECM detects an open or a short circuit malfunction in the shift solenoid valve SLU.

MONITOR STRATEGY

Related DTCs	P2759	Shift solenoid valve SLU/Range check
Required sensors/Components	Shift solenoid valve SLU	
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Battery voltage	10 V or more	-

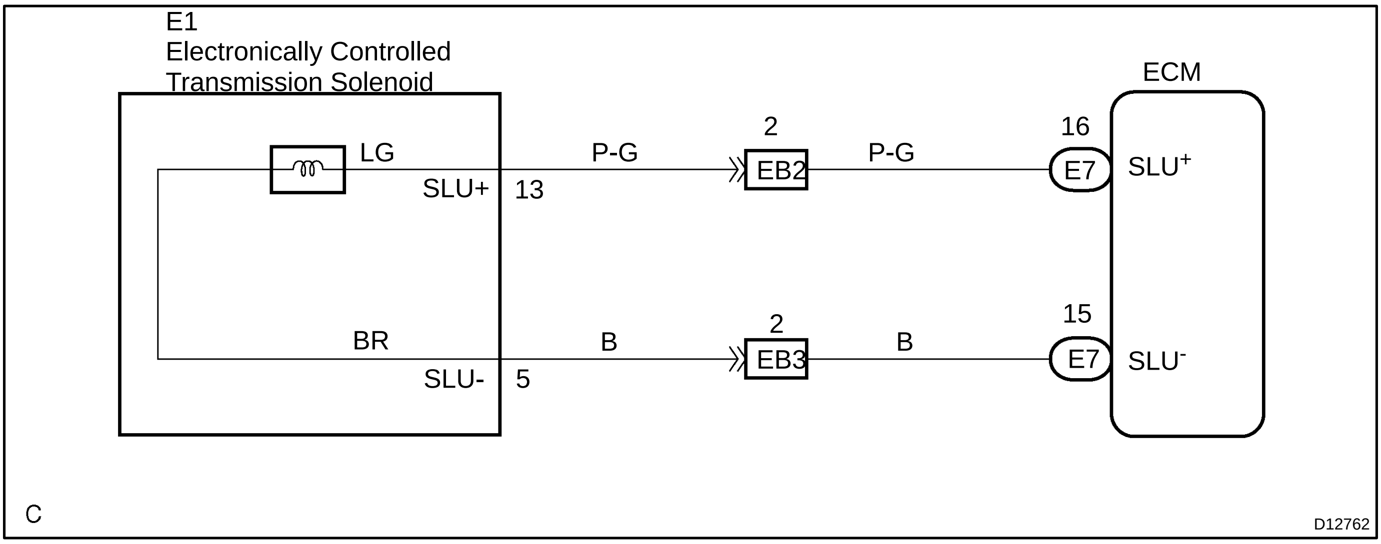
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Output signal duty	100%

COMPONENT OPERATING RANGE

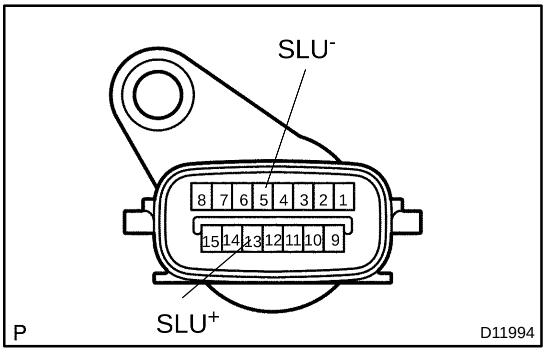
Parameter	Standard value
Output signal duty	Less than 100%

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check transmission wire.**



PREPARATION:

Disconnect the transmission wire connector.

CHECK:

Measure resistance between SLU^+ and SLU^- of transmission wire.

OK:

Resistance: 5.0 to 5.6 Ω at 20°C (68°F)

CHECK:

Measure resistance between terminals SLU^+ and SLU^- of the transmission wire connector and body ground.

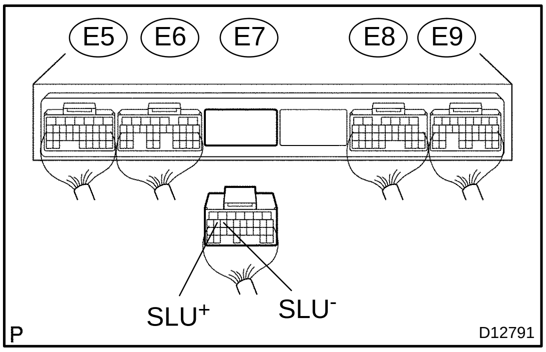
OK:

Resistance: 1 MΩ or higher

NG	**Go to step 3.**

OK

2	**Measure resistance between terminal SLU^+ and SLU^- of ECM connector.**



PREPARATION:

(a) Connect the transmission wire connector.

(b) Disconnect the connector of the ECM.

CHECK:

Measure resistance between terminals SLU^+ and SLU^- of ECM connector.

OK:

Resistance: 5.0 to 5.6 Ω at 20°C (68°F)

CHECK:

Measure resistance between terminals SLU^+ and SLU^- of the ECM connector and body ground.

OK:

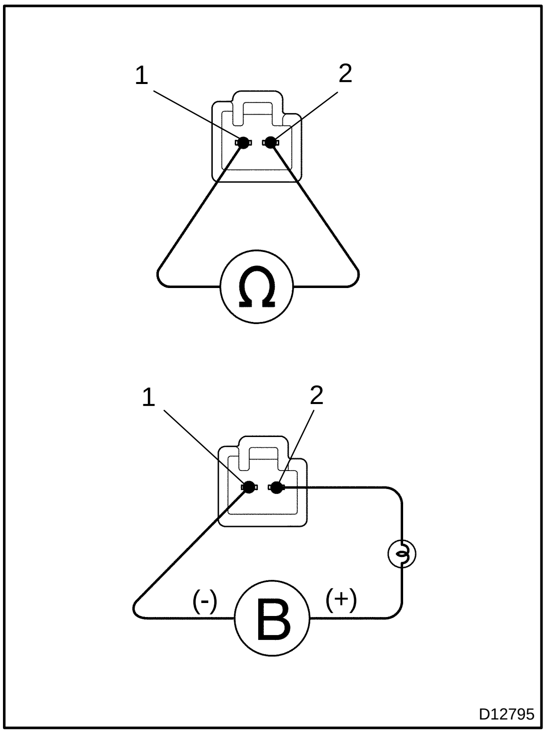
Resistance: 1 MΩ or higher

NG	**Repair or replace the harness or connector (See page IN-36).**

OK

Check and replace the ECM (See page IN-36).

3	**Check shift solenoid valve SLU.**



PREPARATION:

(a) Jack up the vehicle.

(b) Remove the oil pan.

(c) Remove the shift solenoid valve SLU.

CHECK:

(a) Measure the resistance between terminals 1 and 2 of solenoid connector.

Standard: 5.0 to 5.6 Ω at 20°C (68°F)

(b) Connect the positive (+) lead with an 21 W bulb to terminal 2 of solenoid connector and negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

Standard: Solenoid sounds operation noise.

OK:

Standard

NG → **Replace the shift solenoid valve SLU (See page AT-8).**

OK ↓

Repair or replace the transmission wire (See page AT-6).

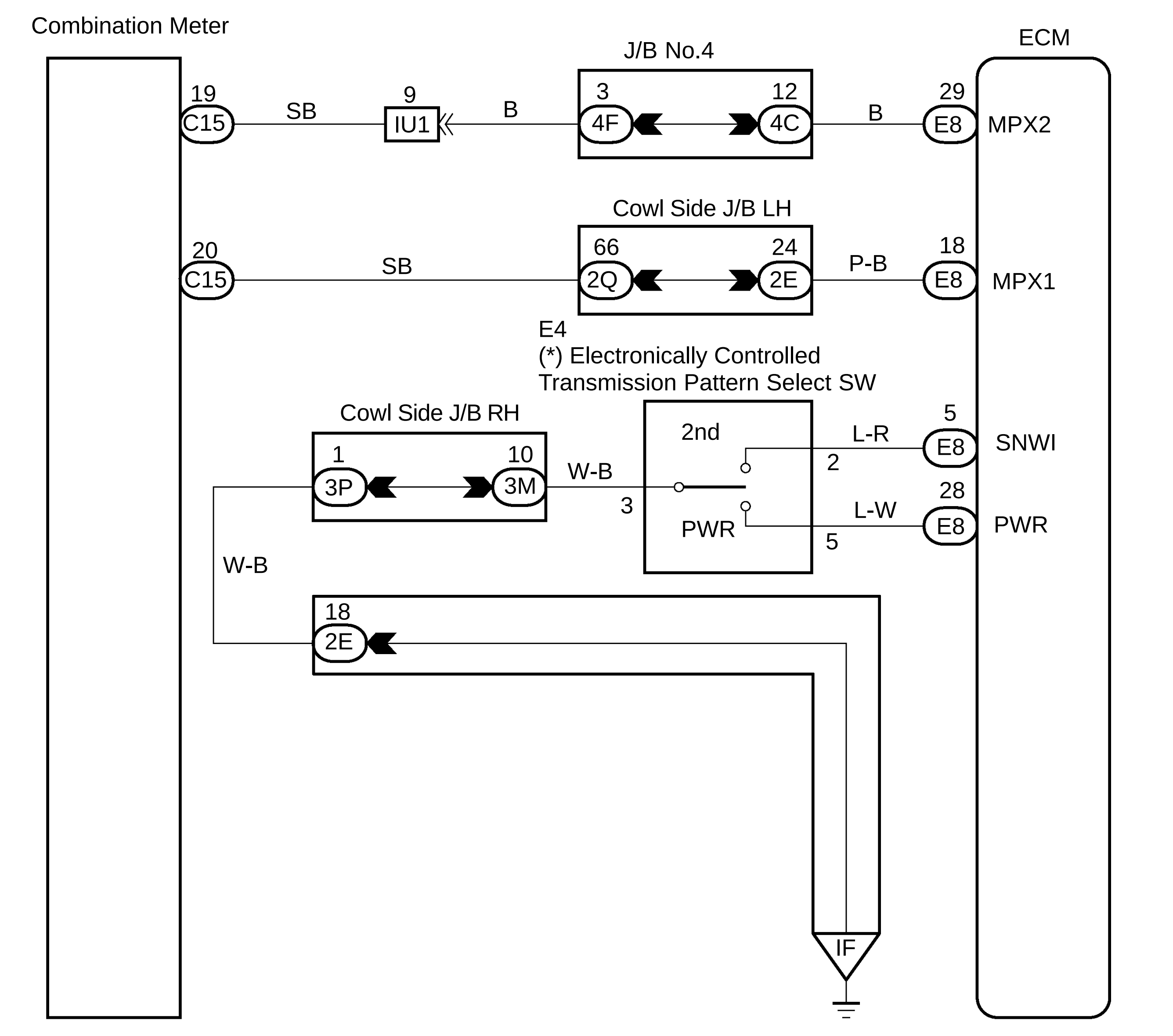
DI3C5-07

Pattern Select Switch Circuit (PWR Mode Switch)

CIRCUIT DESCRIPTION

The ECM memory contains the shift programs for the NORMAL and POWER patterns, 2 position, L position and the lock-up patterns. Following the programs corresponding to the signals from the pattern select switch, the park/neutral position and other various sensors, the ECM switches the solenoid valves ON and OFF, and controls the transmission gear change and the lock-up clutch operation.

WIRING DIAGRAM



(*) Pattern Select Switch (PWR Mode Switch)
When the PWR mode switch is pushed in, the switch contact is made and the PWR mode is selected.
To cancel the PWR mode, push the PWR mode switch once again.

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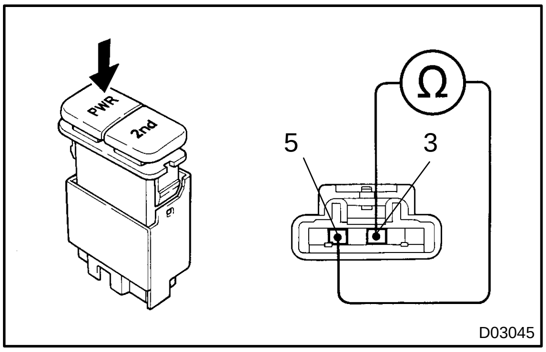
INSPECTION PROCEDURE

1	Check pattern select switch (PWR mode switch).



PREPARATION:

Disconnect the pattern select switch connector.

CHECK:

Check continuity between terminals 3 and 5 of pattern select switch connector when the select switch is set to PWR and NORM positions.

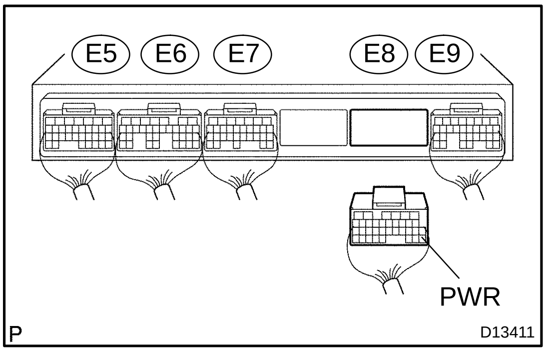
OK:

Pattern select switch	Specified condition
PWR	Continuity
NORM	No continuity

NG → **Replace the pattern select switch.**

OK

2	Check harness and connector between terminal PWR of ECM and body ground.



PREPARATION:

(a) Connect the pattern select switch connector.

(b) Disconnect the connector of ECM.

CHECK:

Check continuity between terminal PWR of ECM and body ground when the pattern select switch is set to the PWR (POW-ER) position and NORM (NORMAL) position.

OK:

Pattern select switch	Specified condition
PWR	Continuity
NORM	No Continuity

HINT:

The ECM uses the normal pattern signal if the PWR signal is not input.

OK → **Proceed to next circuit inspection shown on matrix chart (See page DI-396).**

NG

Repair or replace harness or connector (See page IN-36).

DI3BO-03

CUSTOMER PROBLEM ANALYSIS CHECK

Automatic Transmission System Check Sheet	Inspector's Name :

Customer's Name		VIN	
		Production Date	/ /
		Licence Plate 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 → 4th ☐ 4th → 5th)
	☐ No down-shift (☐ 5th → 4th ☐ 4th → 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 (DTC)
	2nd Time	☐ Normal code ☐ Malfunction code (DTC)

DI3BQ-04

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.

*1: ★...MIL light up

DTC No. (See Page)	Detection Item	Trouble Area	MIL *1	Memory
P0500 (DI-274)	Vehicle Speed Sensor "A"	Open or short in No. 1 vehicle speed sensor circuit No. 1 vehicle speed sensor Combination meter ECM	★	
P0705 (DI-402)	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	Short in park/neutral position switch circuit Park/neutral position switch ECM	★	
P0710 (DI-410)	Transmission Fluid Temperature Sensor "A" Circuit	Open or short in ATF temperature sensor No.1 circuit ATF temperature sensor No.1 ECM	★	
P0711 (DI-415)	Transmission Fluid Temperature Sensor "A" Performance	ATF temperature sensor No.1 ECM	★	
P0712 (DI-410)	Transmission Fluid Temperature Sensor "A" Circuit Low Input	Short in ATF temperature sensor No.1 circuit ATF temperature sensor No.1 ECM	★	
P0713 (DI-410)	Transmission Fluid Temperature Sensor "A" Circuit High Input	Open in ATF temperature sensor No.1 circuit ATF temperature sensor No.1 ECM	★	
P0717 (DI-418)	Input Speed Sensor Circuit No Signal	Open or short in speed sensor NT circuit Speed sensor NT ECM	★	
P0722 (DI-421)	Output Speed Sensor	Open or short in speed sensor SP2 circuit Speed sensor SP2 ECM	★	
P0724 (DI-424)	Brake Switch "B" Circuit High	Short in stop light switch circuit Stop light switch ECM	★	
P0748 (DI-426)	Pressure Control Solenoid "A" Electrical (Shift Solenoid Valve SL1)	Open or short in shift solenoid valve SL1 circuit Shift solenoid valve SL1 ECM	★	
P0751 (DI-433)	Shift Solenoid "A" Performance (Shift Solenoid Valve S1)	Shift solenoid valve S1 is stuck open or closed Valve body is blocked up or stuck Shift solenoid valve S1 Automatic transmission assembly ECM	★	
P0756 (DI-437)	Shift Solenoid "B" Performance (Shift Solenoid Valve S2)	Shift solenoid valve S2 is stuck open or closed Valve body is blocked up or stuck Shift solenoid valve S2 Automatic transmission assembly ECM	★	
P0771 (DI-441)	Shift Solenoid "E" Performance (Shift Solenoid Valve SR)	Shift solenoid valve SR is stuck open or closed Shift solenoid valve SL1 is stuck open or closed Valve body is blocked up or stuck Shift solenoid valve SR Shift solenoid valve SL1 Automatic transmission assembly ECM	★	

P0776 (DI-445)	Pressure Control Solenoid "B" Performance (Shift Solenoid Valve SL2)	Shift solenoid valve SL2 is stuck open or closed Valve body is blocked up or stuck Shift solenoid valve SL2 Automatic transmission assembly ECM	★	
P0778 (DI-449)	Pressure Control Solenoid "B" Electrical (Shift Solenoid Valve SL2)	Open or short in shift solenoid valve SL2 circuit Shift solenoid valve SL2 ECM	★	
P0781 (DI-453)	1-2 Shift	Valve body is blocked up or stuck (1-2 shift valve) Automatic transmission assembly ECM	★	
P0818 (DI-457)	Driveline Disconnect Switch Input Circuit	Short in transfer neutral position switch circuit Transfer neutral position switch ECM	★	
P0850 (DI-402)	Park/Neutral Switch Input Circuit	Short in park/neutral position switch circuit Park/neutral position switch ECM	★	
P0973 (DI-460)	Shift Solenoid "A" Control Circuit Low (Shift Solenoid Valve S1)	Open or short in shift solenoid valve S1 circuit Shift solenoid valve S1 ECM	★	
P0974 (DI-460)	Shift Solenoid "A" Control Circuit High (Shift Solenoid Valve S1)		★	
P0976 (DI-464)	Shift Solenoid "B" Control Circuit Low (Shift Solenoid Valve S2)	Open or short in shift solenoid valve S2 circuit Shift solenoid valve S2 ECM	★	
P0977 (DI-464)	Shift Solenoid "B" Control Circuit High (Shift Solenoid Valve S2)		★	
P0985 (DI-468)	Shift Solenoid "E" Control Circuit Low (Shift Solenoid Valve SR)	Open or short in shift solenoid valve SR circuit Shift solenoid valve SR ECM	★	
P0986 (DI-468)	Shift Solenoid "E" Control Circuit High (Shift Solenoid Valve SR)		★	
P1782 (DI-472)	T/F L4 Range Position Switch Performance	Short in transfer L4 position switch circuit Transfer L4 position switch ECM	★	
P2714 (DI-476)	Pressure Control Solenoid "D" Performance (Shift Solenoid Valve SLT)	Shift solenoid valve SLT is stuck open or closed Valve body is blocked up or stuck Shift solenoid valve SLT Automatic transmission assembly ECM	★	
P2716 (DI-479)	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)	Open or short in shift solenoid valve SLT circuit Shift solenoid valve SLT ECM	★	
P2740 (DI-483)	Transmission Fluid Temperature Sensor "B" Circuit	Open or short in ATF temperature sensor No. 2 circuit ATF temperature sensor No. 2 ECM	★	
P2742 (DI-483)	Transmission Fluid Temperature Sensor "B" Circuit Low	Short in ATF temperature sensor No. 2 circuit ATF temperature sensor No. 2 ECM	★	
P2743 (DI-483)	Transmission Fluid Temperature Sensor "B" Circuit High	Open in ATF temperature sensor No. 2 circuit ATF temperature sensor No. 2 ECM	★	

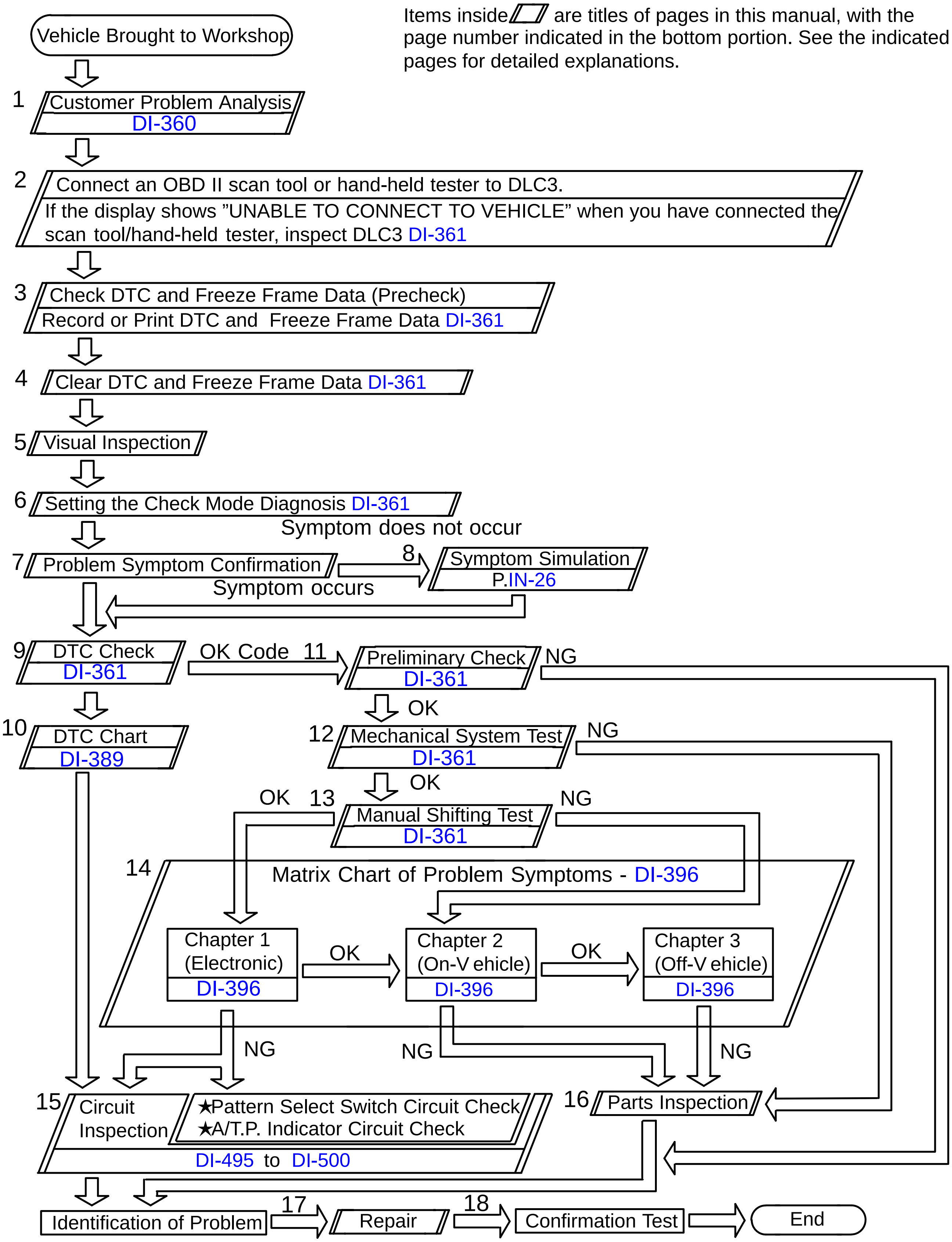
P2757 (DI-487)	Torque Converter Clutch Pressure Control Solenoid Performance (Shift Solenoid Valve SLU)	□Shift solenoid valve SLU is stuck open or closed □Valve body is blocked up or stuck □Shift solenoid valve SLU □Automatic transmission assembly □ECM	★	
P2759 (DI-491)	Torque Converter Clutch Pressure Control Solenoid Control Circuit Electrical (Shift Solenoid Valve SLU)	□Open or short in shift solenoid valve SLU circuit □Shift solenoid valve SLU □ECM	★	

AUTOMATIC TRANSMISSION

DI3BN-04

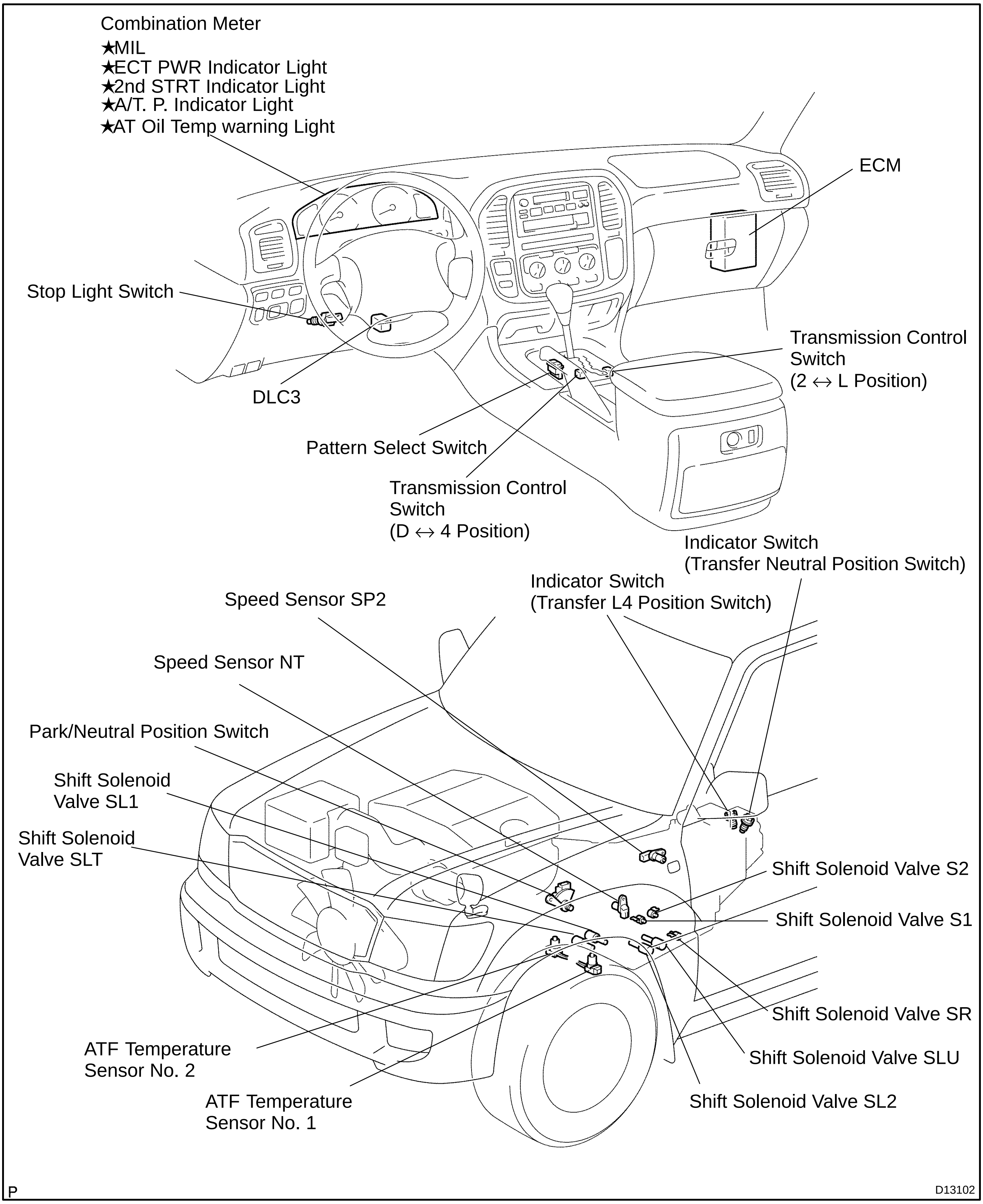
HOW TO PROCEED WITH TROUBLESHOOTING

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.



DI3BR-05

PARTS LOCATION



DIC2W-01

PRECAUTION

NOTICE:

Perform the RESET MEMORY (AT initialization) when replacing the automatic transmission assy, engine assy or the ECM (See page DI-361).

HINT:

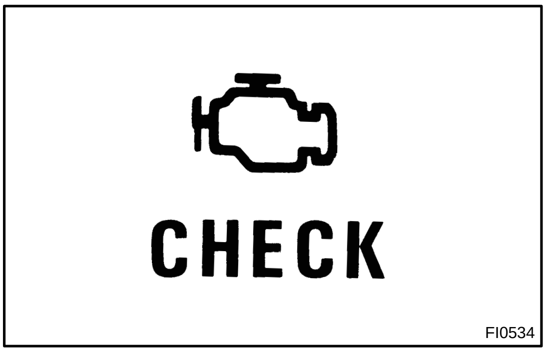
Initialization can not be completed by only disconnecting the battery terminal.

PRE-CHECK

1. DIAGNOSIS SYSTEM

(a) Description

(1) When troubleshooting OBD II vehicles, the only difference from the usual troubleshooting procedure is that you need to connect an OBD II scan tool complying with SAE J1987 or a hand-held tester to the vehicle, and read off various data output from the vehicle's ECM.



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(2) OBD II regulations require that the vehicle's on-board computer illuminate the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in the computer itself or in the drive system components which affect the vehicle emissions. In addition to the MIL illuminating when a malfunction is detected, the applicable DTCs prescribed by SAE J2012 are recorded in the ECM memory (See page DI-381).

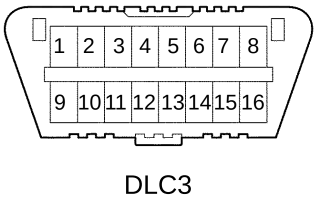
If the malfunction does not occur in 3 consecutive trips, the MIL goes off but the DTCs remain in the ECM memory.

(3) To check the DTCs, connect the OBD II scan tool or hand-held tester to the DLC3 of the vehicle. The OBD II scan tool or hand-held tester also enables you to erase the DTCs and check freeze frame data and various forms of engine data (For instruction book).

(4) The 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 a manufacturer within the prescribed limits (See the DTC chart on page DI-381).

(5) The diagnosis system operates in the normal mode during the 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 the check mode when troubleshooting, the technician can cause the MIL to light up for a malfunction that is only detected once or momentarily. (hand-held tester).

(6) *2 trip detection logic:
When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory. If the same malfunction is detected again during the second test drive, this second detection causes the MIL to illuminate.



(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 to 14 V

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

★ If the communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
★ If the communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.

(c) Inspect the battery voltage.
Battery Voltage: 11 to 14 V
If voltage is below 11 V, recharge the battery before proceeding.

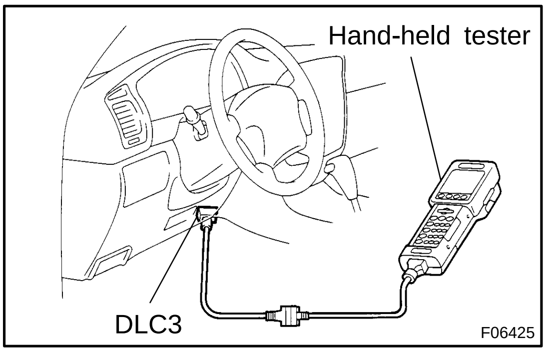
(d) Check the MIL.
(1) The MIL comes on when the ignition switch is turned ON and the engine is not running.

HINT:
If the MIL does not light up, troubleshoot the combination meter (See page BE-63).

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

2. Normal Mode:
DTC CHECK

NOTICE:
Hand-held tester only:
When the diagnostic system is switched from the normal mode to the check mode, all the DTCs and freeze frame data recorded in the normal mode will be erased. So before switching modes, always check the DTCs and freeze frame data, and note them down.



(a) Checking DTCs using the OBD II scan tool or hand-held tester.
 (1) Connect the OBD II scan tool or hand-held tester to DLC3.
 (2) Turn the ignition switch ON.
 (3) Use the OBD II scan tool or 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).
 (4) See page DI-381 to confirm the details of the DTCs.

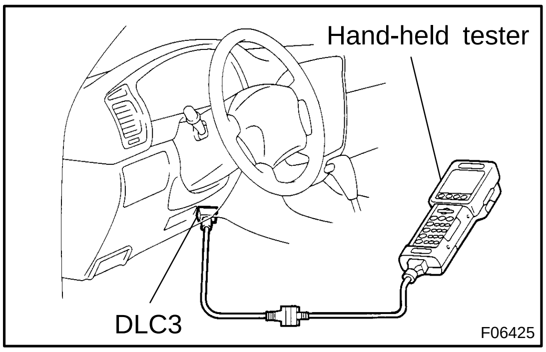
NOTICE:
When simulating symptoms with an OBD II scan tool (excluding hand-held tester) to check the DTCs, use the normal mode. For codes on the DTCs chart subject to "2 trip detection logic", turn the ignition switch OFF after the symptom is simulated once. Then repeat the simulation process again. When the problem has been simulated twice, the MIL is indicated on the instrument panel and DTCs are recorded in the ECM.

(b) When using the OBD II scan tool or hand-held tester: Clearing the DTCs.
 (1) Connect the OBD II scan tool or hand-held tester to DLC3.
 (2) Turn the ignition switch ON.
 (3) When operating an OBD II scan tool (complying with SAE J1978) or hand-held tester to erase the codes, the DTCs and freeze frame data will be erased. (See the OBD II scan tool's instruction book for operating instructions.)

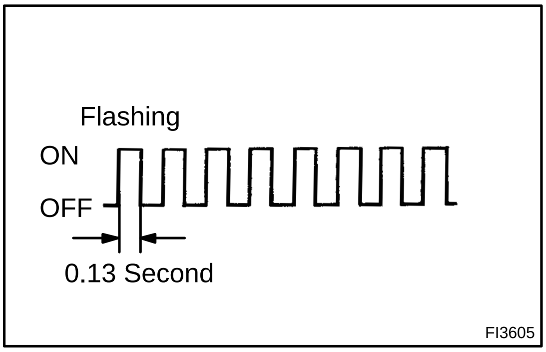
(c) When not using the OBD II scan tool or hand-held tester: Clearing the DTCs.
 (1) Disconnecting the battery terminal or remove the EFI and ETCS fuse from engine room J/B for 60 seconds or more.

3. Check Mode: DTC CHECK

HINT:
Hand-held tester only:
Compared to the normal mode, the check mode has more sensing ability to detect malfunctions. Furthermore, the same diagnostic items which are detected in the normal mode can also be detected in the check mode.



(a) Procedure for Check Mode using the hand-held tester.
   (1) Check the initial conditions.
      ★ Battery positive voltage 11 V or more
      ★ Throttle valve fully closed
      ★ Transmission in P or N position
      ★ A/C switched OFF
   (2) Turn the ignition switch OFF.
   (3) Connect the hand-held tester to the DLC3.
   (4) Turn the ignition switch ON.



   (5) Switch the hand-held tester from the normal mode to the check mode (Check that the MIL flashes).

NOTICE:
If the hand-held tester switches the ECM from the normal mode to the check mode or vice-versa, or if the ignition switch is turned from ON to ACC or OFF during the check mode, the DTC and freeze frame data will be erased.

   (6) Start the engine (MIL goes off after the engine starts).
   (7) Simulate the conditions of the malfunction described by the customer.

NOTICE:
Leave the ignition switch ON until you have checked the DTCs, etc.

   (8) After simulating the malfunction conditions, use the hand-held tester diagnosis selector to check the DTCs and freeze frame data, etc.

HINT:
Be sure not to turn the ignition switch OFF, as turning it OFF switches the diagnosis system from the check mode to the normal mode, which erases all the DTCs, etc.

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

(b) When using the OBD II scan tool or hand-held tester: Clearing the DTCs.
   (1) Connect the OBD II scan tool or hand-held tester to DLC3.
   (2) Turn the ignition switch ON.

(3) When operating an OBD II scan tool (complying with SAE J1978) or hand-held tester to erase the codes, the DTCs and freeze frame data will be erased. (See the OBD II scan tool's instruction book for operating instructions.)

(c) When not using the OBD II scan tool or hand-held tester: Clearing the DTCs.

(1) Disconnecting the battery terminal or remove the EFI and ETCS fuse from engine room J/B for 60 seconds or more.

4. DATA LIST

HINT:

According to the DATA LIST displayed by the OBD II scan tool or Hand-held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as a first step of troubleshooting is one method to shorten labor time.

(a) Warm up the engine.
(b) Turn the ignition switch OFF.
(c) Connect the OBD II scan tool or Hand-held tester to the DLC3.
(d) Turn the ignition switch ON.
(e) Push the "ON" button of OBD II scan tool or Hand-held tester.
(f) Select the item "/DIAGNOSIS/ENHANCED OBD II/DATA LIST/ALL (or ATM)".
(g) According to the display on tester, read the "DATA LIST".

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
STOP LIGHT SW	Stop light SW Status/ ON or OFF	★Brake Pedal is depressed: ON ★Brake Pedal is released: OFF	←
SHIFT	Actual Gear Position/ 1st, 2nd, 3rd, 4th or 5th	Shift Lever Position is; ★L: 1st ★2: 1st or 2nd ★3: 1st, 2nd or 3rd ★4: 1st, 2nd, 3rd or 4th ★D: 1st, 2nd, 3rd, 4th or 5th	←
PNP SW [NSW]	PNP SW Status/ ON or OFF	Shift lever position is; P or N: ON Except P or N: OFF	The shift lever position and these values are different, there are failures of the PNP switch or shift cable adjustment.
REVERSE	PNP SW Status/ ON or OFF	Shift lever position is; R: ON Except R: OFF	
DRIVE	PNP SW Status/ ON or OFF	Shift lever position is; D and 4: ON Except D and 4: OFF	
4th/DRIVE	PNP SW Status/ ON or OFF	Shift lever position is; 4: ON Except 4: OFF	
3RD	PNP SW Status/ ON or OFF	Shift lever position is; 3: ON Except 3: OFF	
2ND	PNP SW Status/ ON or OFF	Shift lever position is; 2 and L: ON Except 2 and L: OFF	
LOW	PNP SW Status/ ON or OFF	Shift lever position is; L: ON Except L: OFF	
LOCK UP SOL	Lock Up Solenoid Status/ ON or OFF	★Lock Up: ON ★Except Lock Up: OFF	←

PATTERN SW (M)	Pattern SW (PWR) Status/ ON or OFF	Pattern SW (PWR) is; Pushed in: ON Pushed once again: OFF	←
SNOW SW	Pattern SW (2nd) Status/ ON or OFF	★IG SW ON: OFF ↓ ★Pattern SW (2nd) Push: ON ↓ ★Pattern SW (2nd) Push: OFF	←
SOLENOID (SLT)	Shift Solenoid SLT Status/ ON or OFF	IG SW ON: ON	←
SOLENOID (SLU)	Shift Solenoid SLU Status/ ON or OFF	★Lock Up: ON ★Except Lock Up: OFF	←
SPD (SP2)	Counter Gear Speed display/ min.: 0 km/h (0 mph) max.: 255 km/h (158 mph)	Vehicle stopped: 0 km/h (0 mph)	←
AT FLUID TEMP	ATF Temp. Sensor No. 1 Value/ min.: -40°C (-40°F) max.: 215°C (419°F)	80°C (176°F) (After Stall Test)	If the value is "-40°C (-40°F)" or "215°C (419°F)", ATF temp. sensor No. 1 circuit is opened or shorted.

5. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the Hand-held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as a first step of troubleshooting is one method to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch OFF.
(c) Connect the Hand-held tester to the DLC3.
(d) Turn the ignition switch ON.
(e) Push the "ON" button of Hand-held tester.
(f) Select the item "/DIAGNOSIS/ENHANCED OBD II/ACTIVE TEST".
(g) According to the display on tester, perform the "ACTIVE TEST".

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set the each shift position by yourself. [Vehicle Condition] Less than 50 km/h (31 mph) [Others] ★Press → button: Shift up ★Press ← button: Shift down	Possible to check the operation of the shift solenoid values. HINT: Shifting to the 5th gear is possible only when the vehicle stops or idle is ON.
LOCK UP	[Test Details] Control the shift solenoid SLU to set the ATM to the lock-up condition. [Vehicle Condition] Vehicle Speed: 58 km/h (36 mph) or more	Possible to check the SLU operation.
LINE PRESS UP	[Test Details] Operate the shift solenoid SLT and raise the line pressure. [Vehicle Condition] ★Vehicle Stopped. ★IDL: ON [Others] ON: Line pressure up. OFF: No action (normal operation)	-

6. DEFINITION OF TERMS

Term	Definition
Monitor description	Description of what the ECM monitors and how it detects malfunctions (monitoring purpose and its details).
Related DTCs	Diagnostic code
Typical enabling condition	Preconditions that allow the ECM to detect malfunctions. With all preconditions satisfied, the ECM sets the DTC when the monitored value(s) exceeds the malfunction threshold(s).
Sequence of operation	The priority order that is applied to monitoring, if multiple sensors and components are used to detect the malfunction. While another sensor is being monitored, the next sensor or component will not be monitored until the previous monitoring has concluded.
Required sensor/components	The sensors and components that are used by the ECM to detect malfunctions.
Frequency of operation	The number of times that the ECM checks for malfunctions per driving cycle. "Once per driving cycle" means that the ECM detects malfunction only one time during a single driving cycle. "Continuous" means that the ECM detects malfunction every time when enabling condition is met.
Duration	The minimum time that the ECM must sense a continuous deviation in the monitored value(s) before setting a DTC. This timing begins after the "typical enabling conditions" are met.
Malfunction thresholds	Beyond this value, the ECM will conclude that there is a malfunction and set a DTC.
MIL operation	MIL illumination timing after a defect is detected. "Immediately" means that the ECM illuminates MIL the instant the ECM determines that there is a malfunction. "2 driving cycle" means that the ECM illuminates MIL if the same malfunction is detected again in the 2nd driving cycle.

7. TOYOTA/LEXUS PART AND SYSTEM NAME LIST

This reference list indicates the part names used in this manual along with their definitions.

TOYOTA/LEXUS name	Definition
Toyota HCAC system, Hydrocarbon adsorptive Catalyst (HCAC) system, HC adsorptive three-way catalyst	HC adsorptive three-way catalytic converter
Variable Valve Timing sensor, VVT sensor	Camshaft position sensor
Variable valve timing system, VVT system	Camshaft timing control system
Camshaft timing oil control valve, Oil control valve OCV, VVT, VSV	Camshaft timing oil control valve
Variable timing and lift, VVTL	Camshaft timing and lift control
Crankshaft position sensor "A"	Crankshaft position sensor
Engine speed sensor	Crankshaft position sensor
THA	Intake air temperature
Knock control module	Engine knock control module
Knock sensor	Engine knock sensor
Mass or volume air flow circuit	Mass air flow sensor circuit
Vacuum sensor	Manifold air pressure sensor
Internal control module, Control module, Engine control ECU, PCM	Power train control module
FC idle	Deceleration fuel cut
Idle air control valve	Idle speed control
VSV for CCV, Canister close valve VSV for canister control	Evaporative emissions canister vent valve
VSV for EVAP, Vacuum switching valve assembly No. 1, EVAP VAV, Purge VSV	Evaporative emissions canister purge valve
VSV for pressure switching valve, Bypass VSV	Evaporative emission pressure switching valve
Vapor pressure sensor, EVAP pressure sensor, Evaporative emission control system pressure sensor	Fuel tank pressure sensor
Charcoal canister	Evaporative emissions canister
ORVR system	On-boad refueling vapor recovery system
Intake manifold runner control	Intake manifold tuning system
Intake manifold runner valve, IMRV, IACV (runner valve)	Intake manifold tuning valve
Intake control VSV	Intake manifold tuning solenoid valve

AFS	Air fuel ratio sensor
O2 sensor	Heater oxygen sensor
Oxygen sensor pumping current circuit	Oxygen sensor output signal
Oxygen sensor reference ground circuit	Oxygen sensor signal ground
Accel position sensor	Accelerator pedal position sensor
Throttle actuator control motor, Actuator control motor, Electronic throttle motor, Throttle control motor	Electronic throttle actuator
Electronic throttle control system, Throttle actuator control system	Electronic throttle control system
Throttle/pedal position sensor, Throttle/pedal position switch, Throttle position sensor/switch	Throttle position sensor
Turbo press sensor	Turbocharger pressure sensor
Turbo VSV	Turbocharger pressure control solenoid valve
P/S pressure switch	Power-steering pressure switch
VSV for ACM	Active control engine mount
Speed sensor, Vehicle speed sensor ”A”, Speed sensor for skid control ECU	Vehicle speed sensor
ATF temperature sensor, Trans. fluid temp. sensor, ATF temperature sensor ”A”	Transmission fluid temperature sensor
Electronic controlled automatic transmission, ECT	Electronically controlled automatic
Intermediate shaft speed sensor ”A”	Counter gear speed sensor
Output speed sensor	Output shaft speed sensor
Input speed sensor, Input turbine speed sensor ”A”, Speed sensor (NT), Turbine speed sensor	Input turbine speed sensor
PNP switch, NSW	Park/neutral position switch
Pressure control solenoid	Transmission pressure control solenoid
Shift solenoid	Transmission shift solenoid valve
Transmission control switch, Shift lock control unit	Shift lock control module
Engine immobilizer system, Immobilizer system	Vehicle anti-theft system

8. The monitor will run whenever the following DTCs are not present (Monitor disablement List)

HINT:

This table indicates ECM monitoring status for the items in the upper columns if the DTCs in each line on the left are being set.

As for the ”X” mark, when the DTC on the left is stored, detection of the DTC in the upper column is not performed.

Monitor disablement (X : disabled)

Monitor detected malfunction

DTC		P0010,P0020	P0031-0052	P0031-0052	P0037-0058	P0043-P0064	P0100-P0103	P0101	P0110-P0113	P0115-P0118	P0116	P0120-P2135	P0125	P0128	P0130-P0153	P0134-P0154	P0136,P0156	P0142,P0162	P0171-P0175	P0300,P0308	P0325-P0333	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0401	P0402	P0405	P0409	P0420,P0430	P0440-P0446	P0450,P0453
	Component/System	VVT VVS1,2	FrO2S heater sensor 1	A/F sensor heater sensor 1	FrO2S heater sensor 2	FrO2S heater sensor 3	MAF sensor	MAF sensor	IAT sensor	ECT sensor	ECT sensor	TP sensor	Insufficient ECT for CL	Thermostat	O2S Sensor 1	FrO2S,A/F sensor (No Activity)	O2S Sensor 2	O2S Sensor 3	Fuel system	Misfire	Knock sensor	CKP sensor	CMP sensor	VVT sensor 1,2	Ignitor	EGR system (closed)	EGR system (open)	EGR Lift sensor	EGR Lift sensor	Catalyst	EVAP system	EVAP press sensor
P0010,P0020	VVT VVS1,2													×					×													
P0031-0052	FrO2S heater sensor 1													×	×	×	×	×	×							×	×			×		
P0031-0052	A/F sensor heater sensor 1													×			×	×	×							×	×			×		
P0037-0058	FrO2S heater sensor 2																×	×												×		
P0043-0064	FrO2S heater sensor 3																	×														
P0100-P0103	MAF sensor										×		×	×	×	×	×	×	×	×						×	×			×	×	
P0110-P0113	IAT sensor												×	×	×	×	×	×		×						×	×				×	
P0115-P0118	ECT sensor							×					×	×	×	×	×	×	×	×						×	×		×	×	×	
P0120-P2135	TP sensor							×							×	×	×	×	×	×						×	×			×	×	
P0125	ECT sensor							×						×	×	×	×	×	×	×						×	×		×	×	×	
P0128	Thermostat																															
P0130-P0153	O2S Sensor 1													×		×	×	×								×	×			×		
P0134,P0154	Closed Loop			×										×	×		×	×	×							×	×			×	×	
P0136,P0156	O2S Sensor 2																													×		
P0142,P0162	O2S Sensor 3																															
P0171-P0172	Fuel system													×	×	×	×	×								×	×			×	×	
P0300-P0308	Misfire		×											×	×	×	×	×												×	×	
P0325-P0333	Knock sensor																			×						×	×					
P0335	CKP sensor							×						×	×	×	×	×	×	×						×	×			×	×	
P0340,P0341	CMP sensor							×						×	×	×	×	×	×	×						×	×			×	×	
P0340-P0346	VVT sensor 1,2													×																		
P0351-P0358	Ignitor													×					×							×	×			×	×	
P0401	EGR system (closed)													×					×											×		
P0402	EGR system (open)													×	×	×	×	×	×											×	×	
P0405,P0409	Lift sensor																															
P0420,P0430	Catalyst																															
P0442-P0456	EVAP system														×	×	×	×														
P0450,P0451	EVAP press sensor																														×	

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			Monitor disablement (X : disabled)																													
	DTC		P0010,P0020	P0031-0052	P0031-0052	P0037-0058	P0043-P0064	P0100-P0103	P0101	P0110-P0113	P0115-P0118	P0116	P0120-P2135	P0125	P0128	P0130-P0153	P0134-P0154	P0136,P0156	P0142,P0162	P0171-P0175	P0300,P0308	P0325-P0333	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0401	P0402	P0405	P0409	P0420,P0430	P0440-P0446	P0450-P0453
		Component/System	VVT VVS1,2	FrO2S heater sensor 1	A/F sensor heater sensor 1	FrO2S heater sensor 2	FrO2S heater sensor 3	MAF sensor	MAF sensor	IAT sensor	ECT sensor	ECT sensor	TP sensor	Insufficient ECT for CL	Thermostat	O2S Sensor 1	FrO2S,A/F sensor (No Activity)	O2S Sensor 2	O2S Sensor 3	Fuel system	Misfire	Knock sensor	CKP sensor	CMP sensor	VVT sensor 1,2	Ignitor	EGR system (closed)	EGR system (open)	EGR Lift sensor	EGR Lift sensor	Catalyst	EVAP system	EVAP press sensor
Monitor detected malfunction	P0500	VVS													×	×	×	×	×	×	×						×	×			×	×	
	P0505,P0511	ISC valve														×																	
	P0560	Battery																															
	P0617	Starter signal																															
	P0705	Shift lever position switch																															
	P0710	Trans fluid temp sensor																															
	P0715-P0717	Output speed sensor																															
	P0715-P0717	Input speed sensor																															
	P0724	Stop lamp switch																															
	P0741-P0796	Trans solenoid (function)																															
	P0748-P0798	Trans solenoid (range)																															
	P0850	PNP switch																			×												
	P1010	OCV for VVTL													×					×													
	P2120-P2138	Accel position sensor																															
	P2120,P2103	Throttle motor																															
	P1126	Electronic magenet clutch																															
	P1129	Electronic throttle system																															
	P0011,P0012	VVT system 1,2													×					×							×	×			×	×	
	P1011,P1012	VVTL System													×					×							×	×			×	×	
	P1430	Pressure sensor (HC adsorber)																														×	×
	P2004,P2006	Intake manifold runner conrtol																															
	P2009,P2010	Intake manifold runner circuit																															
	P2014,16,17	Intake manifold runner sensor																															
	P2196,P2198	A/F sensor (rationality)													×			×	×								×	×			×		
	P2237,P2240	A/F sensor (open)													×			×	×								×	×			×		
	P2423,P2424	HC adsorption catalyst																															
	P2714-P2759	Trans solenoid (SLU-SLD)																															
	P2A00,P2A03	A/F sensor (slow response)													×			×	×								×	×			×		

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Monitor disablement (X：disabled)

Monitor detected malfunction

DTC	Component/System	P0500 VVS (ECT2sensor)	P0500 VVS (ECT1sensor,non-ECT)	P0500 VVS (M/T)	P0505,P0511 ISC valve	P0560 Battery	P0617 Starter signal	P0705 Shift lever position switch	P0710 Trans fluid temp sensor	P0715-P0717 Output speed sensor	P0715-P0717 Input speed sensor	P0724 Stop lamp switch	P0741-P0796 Trans solenoid (function) *1	P0741-P0796 Trans solenoid (function) *2	P0748-P0798 Trans solenoid (range)	P0850 PNP switch	P1010,P1020 VVTL	P1120-P2138 Accel position sensor	P2120,P2103 Throttle motor	P1126 Electronic magenet clutch	P1129 Electronic throttle system	P0011-P0012 VVT system 1,2	P1011,P1012 VVTL System	P1430 Pressure sensor (HC adsorber)	P2004,P2006 Intake manifold runner conrtol	P2009,P2010 Intake manifold runner circuit	P2014,16,17 Intake manifold runner sensor	P2196,P2198 A/F sensor (rationality)	P2237,P2240 A/F sensor (open)	P2423,P2424 HC adsorption catalyst	P2714-P2759 Yrans solenoid (SLU-SLD)	P2A00,P2A03 A/F sensor (slow response)
P0010,P0020	VVT VVS1,2												×																			
P0031-0052	FrO2S heater sensor 1				×								×																	×		
P0031-0052	A/F sensor heater sensor 1				×																							×	×	×		×
P0037-0058	FrO2S heater sensor 2																											×		×		
P0043-0064	FrO2S heater sensor 3																													×		
P0100-P0103	MAF sensor			×	×								×				×					×	×					×	×	×		×
P0110-P0113	IAT sensor												×												×			×	×			×
P0115-P0118	ECT sensor			×	×								×	×			×					×	×		×			×	×	×		×
P0120-P2135	TP sensor		×		×								×															×	×	×		×
P0125	ECT sensor			×	×								×	×			×					×						×	×	×		×
P0128	Thermostat																															
P0130-P0153	O2S Sensor 1				×								×																	×		
P0134,P0154	Closed Loop				×								×															×	×	×		×
P0136,P0156	O2S Sensor 2																											×		×		
P0142,P0162	O2S Sensor 3																													×		
P0171-P0172	Fuel system				×								×															×	×	×		×
P0300-P0308	Misfire				×								×															×	×	×		×
P0325-P0333	Knock sensor												×																			
P0335	CKP sensor				×								×				×					×	×					×	×	×		×
P0340,P0341	CMP sensor				×								×				×					×	×					×	×	×		×
P0340-P0346	VVT sensor 1,2																															
P0351-P0358	Ignitor				×								×																	×		
P0401	EGR system (closed)												×																	×		
P0402	EGR system (open)				×								×															×	×	×		×
P0405,P0409	Lift sensor																															
P0420,P0430	Catalyst																															
P0442-P0456	EVAP system				×																							×	×			×
P0450,P0451	EVAP press sensor																															

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			Monitor disablement (X : disabled)																													
	DTC		P0500	P0500	P0500	P0505,P0511	P0560	P0617	P0705	P0710	P0715-P0717	P0715-P0717	P0724	P0741-P0796	P0741-P0796	P0748-P0798	P0850	P1010,P1020	P1120-P2138	P2102,P2103	P1126	P1129	P0011-P0012	P1011,P1012	P1430	P2004,P2006	P2009,P2010	P2014,16,17	P2196,P2198	P2237,P2240	P2423,P2424	P2714-P2759	P2A00,P2A03
		Component/System	VVS (ECT2sensor)	VVS (ECT1sensor,non-ECT)	VVS (M/T)	ISC valve	Battery	Starter signal	Shift lever position switch	Trans fluid temp sensor	Output speed sensor	Input speed sensor	Stop lamp switch	Trans solenoid (function) *1	Trans solenoid (function) *2	Trans solenoid (range)	PNP switch	VVTL	Accel position sensor	Throttle motor	Electronic magenet clutch	Electronic throttle system	VVT system 1,2	VVTL System	Pressure sensor (HC adsorber)	Intake manifold runner conrtol	Intake manifold runner circuit	Intake manifold runner sensor	A/F sensor (rationality)	A/F sensor (open)	HC adsorption catalyst	Yrans solenoid (SLU-SLD)	A/F sensor (slow response)
Monitor detected malfunction	P0500	VVS				×					×	×		×	×														×	×	×		×
	P0505,P0511	ISC valve																											×	×			×
	P0560	Battery																															
	P0617	Starter signal																															
	P0705	Shift lever position switch																															
	P0710	Trans fluid temp sensor																															
	P0715-P0717	Output speed sensor												×																			
	P0715-P0717	Input speed sensor																															
	P0724	Stop lamp switch																															
	P0741-P0796	Trans solenoid (function)																															
	P0748-P0798	Trans solenoid (range)									×	×		×	×																		
	P0850	PNP switch				×								×																			
	P1010	OCV for VVTL																															
	P2120-P2138	Accel position sensor																															
	P2102,P2103	Throttle motor																															
	P1126	Electronic magenet clutch																															
	P1129	Electronic throttle system																															
	P0011,P0012	VVT system 1,2				×																									×		
	P1011,P1012	VVTL System				×																											×
	P1430	Pressure sensor (HC adsorber)																															
	P2004,P2006	Intake manifold runner conrtol																															
	P2009,P2010	Intake manifold runner circuit																								×							
	P2014,16,17	Intake manifold runner sensor																								×							
	P2196,P2198	A/F sensor (rationality)				×								×																	×		×
	P2237,P2240	A/F sensor (open)				×								×																	×		×
	P2423,P2424	HC adsorption catalyst																															
	P2714-P2759	Trans solenoid (SLU-SLD)												×																			
	P2A00,P2A03	A/F sensor (slow response)				×								×																	×		

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9. PROBLEM SYMPTOM CONFIRMATION

Taking into consideration the results of the customer problem analysis, try to reproduce the symptoms. If the problem is that the transmission does not shift up, shift down, or the shift point is too high or too low, conduct the following road test referring to the automatic shift schedule and simulate the problem symptoms.

10. ROAD TEST

NOTICE:

Perform the test at normal operating ATF temperature 50 to 80°C (122 to 176°F).

(a) D position test (NORM and PWR pattern):
Shift into the D position and fully depress the accelerator pedal and check the following points.

(1) Check up-shift operation.
Check that 1 → 2, 2 → 3, 3 → 4 and 4 → 5th up-shifts take place, and that the shift points conform to the automatic shift schedule (See page SS-23).

HINT:

★ 5th Gear Up-shift Prohibition Control (1. Coolant temp. is 55°C (131°F) or less. 2. Vehicle speed is 51 km/h (32 mph) or less.)
★ 4th Gear Up-shift Prohibition Control (1. Coolant temp. is 40°C (104°F) or less. 2. Vehicle speed is 45 km/h (28 mph) or less.)
★ 5th Gear Lock-up Prohibition Control (1. Brake pedal is depressed. 2. Coolant temp. is 60°C (140°F) or less.)
★ When the 2nd start switch is on, there is no 1→2 up-shift and 2→1 down-shift.

(2) Check for shift shock and slip.
Check for shock and slip at the 1 → 2, 2 → 3, 3 → 4 and 4 → 5th up-shifts.

(3) Check for abnormal noises and vibration.
Drive in the D position lock-up or 5th 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, 4th and 5th gears, check that the possible kick-down vehicle speed limits for 2 → 1, 3 → 2, 4 → 3 and 5th → 4 kick-downs conform to those indicated on the automatic shift schedule (See page SS-23).

(5) Check abnormal shock and slip at kick-down.

(6) Check the lock-up mechanism.
★ Drive in D position 5th gear, at a steady speed (lock-up ON) of about 70 km/h (43 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) 4 position test:
Shift into the 4 position and fully depress the accelerator pedal and check the following points.

(1) Check up-shift operation.
Check that the 1 → 2, 2 → 3 and 3 → 4 up-shift takes place and that the shift point conforms to the automatic shift schedule (See page SS-23).

HINT:

★ There is no 5th up-shift in the 4 position.
★ 4th Gear Lock-up Prohibition Control (1. Brake pedal is depressed. 2. Coolant temp. is 60°C (140°F) or less.)

(2) Check engine braking.
While driving in the 4 position and 4th 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.

(4) Check the lock-up mechanism.
- ★ Drive in 4 position 4th gear, at a steady speed (lock-up ON) of about 64 km/h (40 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.

(c) 3 position test:
Shift into the 3 position and fully depress the accelerator pedal and check the following points.

(1) Check up-shift operation.
Check that the 1 → 2 and 2 → 3 up-shift takes place and that the shift point conforms to the automatic shift schedule (See page SS-23).

(2) Check engine braking.
While running in the 3 position and 3rd 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.

(d) 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 that the 1 → 2 up-shift takes place and that the shift point conforms to the automatic shift schedule (See page SS-23).

HINT:
When the 2nd start switch is ON, there is no 1 → 2 up-shift and 2 → 1 down-shift.

(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.

(e) L position test:
Shift into the L 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.

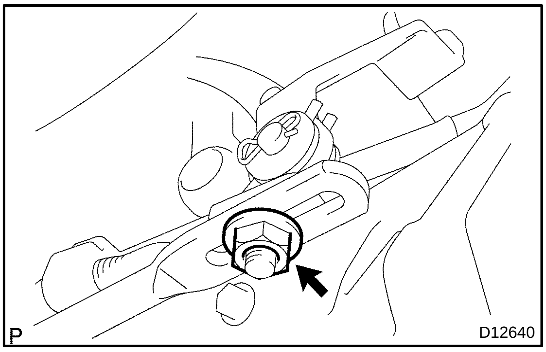
(2) Check engine braking.
While running in the L position, release the accelerator pedal and check the engine braking effect.

(3) Check for abnormal noises during acceleration and deceleration.

(f) R position test:
Shift into the R position, lightly depress the accelerator pedal, and check that the vehicle moves backward without any abnormal noise or vibration.

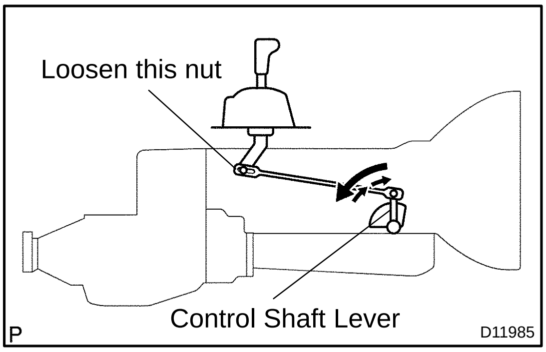
CAUTION:
Before conducting this test ensure that the test area is free from people and obstruction.

(g) 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 that the parking lock pawl holds the vehicle in place.

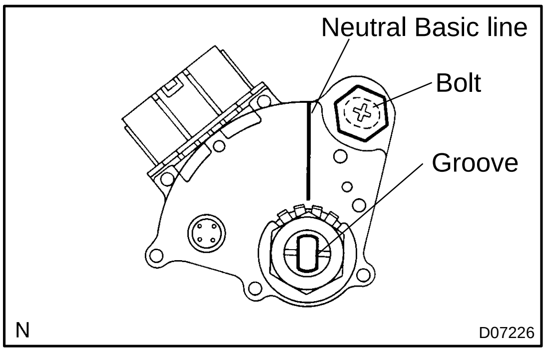


11. ADJUST SHIFT LEVER POSITION

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.
(a) Loosen the nut on the shift lever.
(b) Push the control shaft fully rearward.



(c) Return the control shaft lever 2 notches to N position.
(d) Set the shift lever to N position.
(e) 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)
(f) 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.



12. ADJUST PARK/NEUTRAL POSITION SWITCH

★ 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.

★ Loosen the park/neutral position switch bolt and set the shift lever to the N position.
★ Align the groove with neutral basic line.
★ Hold in position and tighten the bolt.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

★ For continuity inspection of the park/neutral position switch, see page DI-394 .

13. CHECK IDLE SPEED

Idle speed (In N position and air conditioner OFF):
700 ± 50 rpm

14. MECHANICAL SYSTEM TESTS

(a) Measure the stall speed.

The object of this test is to check the overall performance of the transmission and engine by measuring the stall speeds in the D and R positions.

NOTICE:

- ★ **Do the test at normal operating fluid temperature 70 to 80 °C (158 to 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 all 4 wheels.
(2) Connect an OBD II scan tool or hand-held tester to DLC3.
(3) Fully apply the parking brake.
(4) Keep your left foot pressing 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: 2,150 ± 150 rpm

(7) Do the same test in R position.

Stall speed: 2,150 ± 150 rpm

Evaluation:

Problem	Possible cause
(a) Engine stall speed low in D and R positions	★Engine output may be insufficient ★Stator one-way clutch is not operating properly HINT: If the value is less than the specified value by 600 rpm or more, the torque converter could be faulty.
(b) Engine stall speed high in D position	★Line pressure too low ★Clutch No. 1 (C_1) slipping ★One-way clutch No.3 (F_3) not operating properly
(c) Engine stall speed high in R position	★Line pressure too low ★Brake No. 4 (B_4) slipping ★Clutch No. 3 (C_3) slipping ★One-way clutch No.1 (F_1) not operating properly
(d) Engine stall speed high in D and R positions	★Line pressure too low ★Improper fluid level

(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 clutch and brake.

NOTICE:

★ **Do the test at normal operating fluid temperature 70 to 80 °C (158 to 176 °F).**
★ **Be sure to allow 1 minute interval between tests.**
★ **Take 3 measurements and take the average value.**

(1) Fully apply the parking brake.
(2) Start the engine and check idle speed.

Idle speed (In N position and air conditioner OFF): 700 ± 50 rpm.

(3) 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.

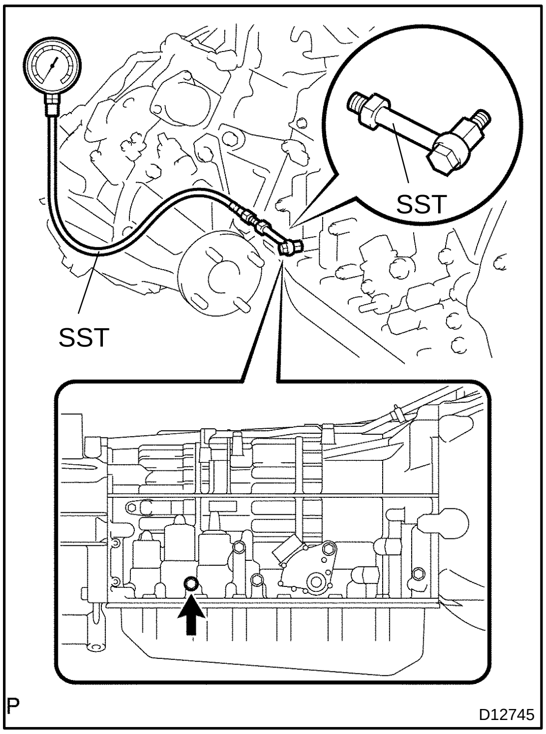
Time lag:
N → D Less than 1.2 seconds

(4) 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 ★Clutch No. 1 (C_1) worn ★One-way clutch No.3 (F_3) not operating properly
N → R time lag is longer	★Line pressure too low ★Clutch No. 3 (C_3) worn ★Brake No. 4 (B_4) worn ★One-way clutch No.1 (F_1) not operating properly



15. HYDRAULIC TEST

Measure the line pressure.

NOTICE:

- ★ **Do the test at normal operation fluid temperature 70 to 80˚C (158 to 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.**
- ★ **This check must be conducted after checking and adjusting engine.**
- ★ **Perform under condition that A/C is OFF.**
- ★ **When conducting stall test, do not continue more than 10 seconds.**

(1) Warm up the ATF.

(2) Remove the test plug on the transmission case center right side and connect SST.

SST 09992-00095 (09992-00231, 09992-00271)

(3) Fully apply the parking brake and chock the 4 wheels.

(4) Start the engine and check idling speed.

(5) Keep your left foot pressing firmly on the brake pedal and shift into D position.

(6) Measure the line pressure when the engine is idling.

(7) Depress the accelerator pedal all the way down. Quickly read the highest line pressure when engine speed reaches stall speed.

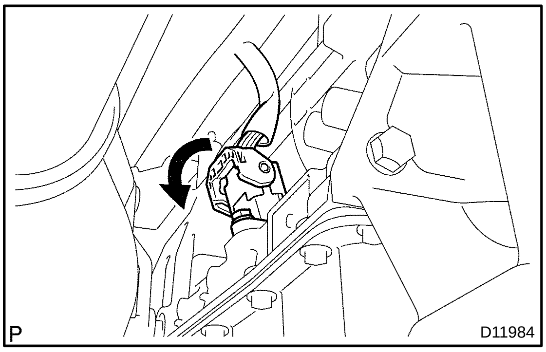
(8) In the same manner, do the test in R position.

Specified line pressure:

Condition	D position kPa (kgf/cm^2, psi)	R position kPa (kgf/cm^2, psi)
Idling	362 to 420 (3.7 to 4.2, 53 to 59)	500 to 580 (5.1 to 5.9, 73 to 84)
Stall	1,360 to 1,460 (13.8 to 14.9, 196 to 212)	1,295 to 1,415 (13.2 to 14.4, 188 to 205)

Evaluation

Problem	Possible cause
If the measured value at all positions are higher	★Shift solenoid valve SLT defective ★Regulator valve defective
If the measured value at all positions are lower	★Shift solenoid valve SLT defective ★Regulator valve defective ★Oil pump defective
If pressure is low in the D position only	★D position circuit fluid leakage ★Clutch No. 1 (C_1) defective
If pressure is low in the R position only	★R position circuit fluid leakage ★Clutch No. 3 (C_3) defective ★Brake No. 4 (B_4) defective



16. 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 transmission.

(a) Disconnect the transmission 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, 3, 4 and D positions.
Check that the gear change corresponds to the shift position.

Shift Position	Gear Position
D	4th
4	4th
3	3rd
2	1st
L	1st
R	Reverse
P	Pawl Lock

HINT:
If the gear positions of the L, 2, 3, 4 and D are difficult to distinguish, do the following road test.
If any abnormality is found in the above test, the problem is in the transmission itself.

(c) Connect the transmission wire.
(d) Cancel out DTC.

17. RESET MEMORY

CAUTION:

Perform the RESET MEMORY (AT initialization) when replacing the automatic transmission assy, engine assy or the ECM.

NOTICE:

Hand-held tester only

HINT:

The ECM memorizes the condition that the ECT controls the automatic transmission assy and engine assy according to those characteristics. Therefore, when the automatic transmission assy, engine assy, or ECM has been replaced, it is necessary to reset the memory so that the ECM can memorize the new information.

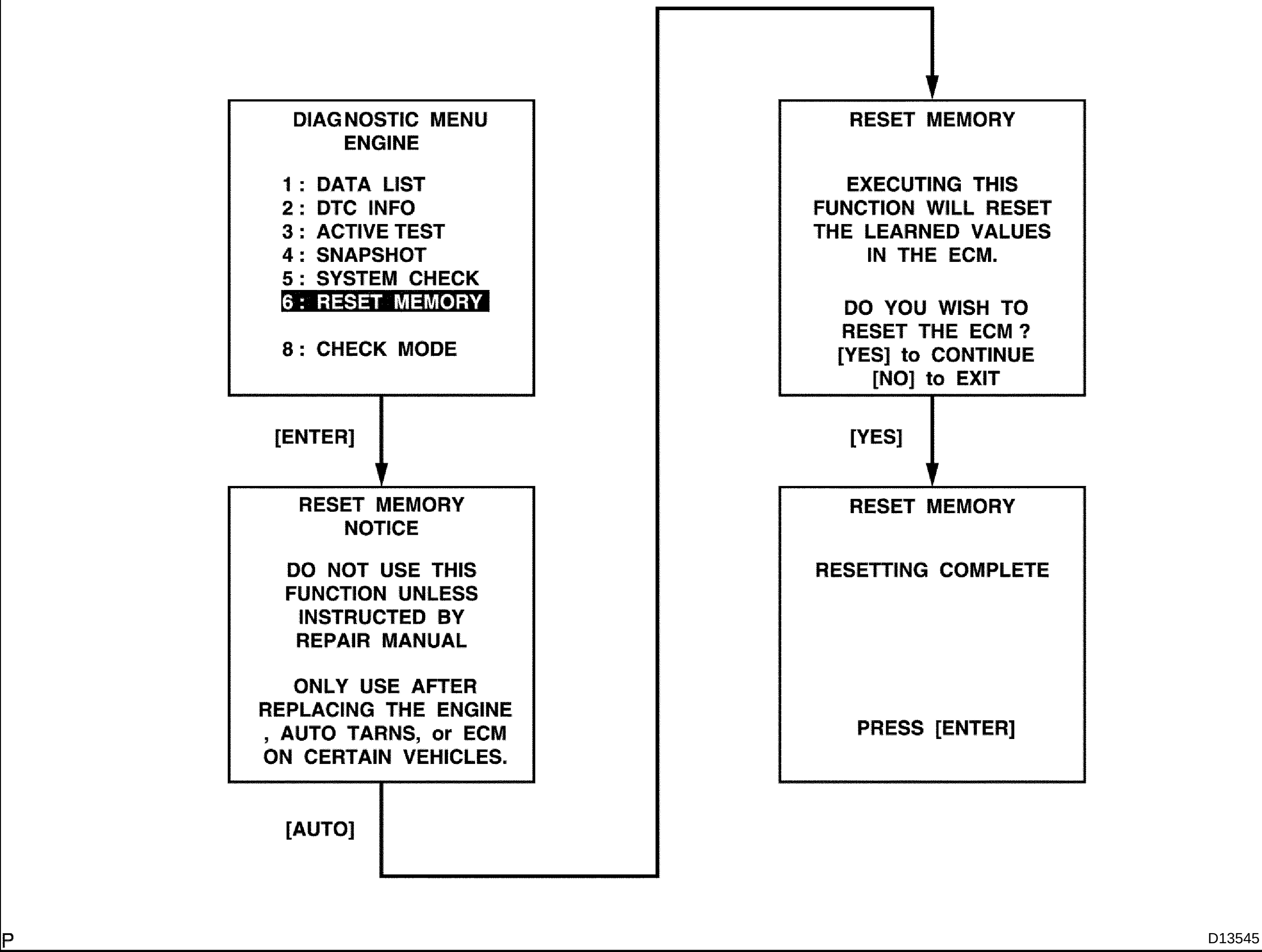
Reset procedure is as follows.

(a) Turn the ignition switch off.
(b) Connect the hand-held tester to the DLC3.
(c) Turn the ignition switch to the ON position and push the hand-held tester main switch on.
(d) Select the item "DIAGNOSIS/ENHANCED OBD II".
(e) Perform the reset memory procedure from the ENGINE menu.

CAUTION:

After performing the RESET MEMORY, be sure to perform the ROAD TEST described earlier.

Tester menu flow:



MEMO

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DI3BT-04

PROBLEM SYMPTOMS TABLE

If a normal code is displayed during the diagnostic trouble code check although the trouble still occurs, check the electrical 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.

Chapter 1: Electronic Circuit Matrix Chart

HINT:

*1: When a malfunction is on the circuit *1 mark is attached, DTC is output.

Symptom	Suspect Area	See page
No up-shift (A particular gear, from 1st to 4th gear, is not up-shifted)	1. Shift solenoid valve (S1) circuit *1 2. Shift solenoid valve (S2) circuit *1 3. ECM	DI-460 DI-464 IN-36
No up-shift (4th → 5th)	1. Transmission control switch circuit (D - 4) *1 2. Engine coolant temp. sensor circuit *1 3. Speed sensor NT circuit *1 4. Shift solenoid valve (SL1) circuit *1 5. Shift solenoid valve (SL2) circuit *1 6. Shift solenoid valve (SR) circuit *1 7. ECM	DI-402 DI-36 DI-418 DI-426 DI-449 DI-468 IN-36
No up-shift (3rd → 4th)	1. Engine coolant temp. sensor circuit *1 2. Shift solenoid valve (S2) circuit *1 3. ECM	DI-36 DI-464 IN-36
No up-shift (1st → 2nd)	1. Transmission control switch circuit (2 - L) *1 2. Shift solenoid valve (S2) circuit *1 3. ECM	DI-402 DI-464 IN-36
No down-shift (5th → 4th)	1. Transmission control switch circuit (D - 4) *1 2. Shift solenoid valve (SL1) circuit *1 3. Shift solenoid valve (SL2) circuit *1 4. Shift solenoid valve (SR) circuit *1 5. ECM	DI-402 DI-426 DI-449 DI-468 IN-36
No down-shift (2nd → 1st)	1. Transmission control switch circuit (2 - L) *1 2. Shift solenoid valve (S2) circuit *1 3. ECM	DI-402 DI-464 IN-36
No down-shift (A particular gear, from 1st to 4th gear, is not down-shifted)	1. Shift solenoid valve (S1) circuit *1 2. Shift solenoid valve (S2) circuit *1 3. ECM	DI-460 DI-464 IN-36
No lock-up	1. ATF temperature sensor circuit *1 2. Transfer L4 position switch circuit *1 3. Stop light switch circuit *1 4. Speed sensor NT circuit *1 5. Shift solenoid valve (SLU) circuit *1 6. ECM	DI-410 DI-472 DI-424 DI-418 DI-491 IN-36
No lock-up off	ECM	IN-36

Shift point too high or too low	1. Shift solenoid valve (SLT) circuit *1 2. Speed sensor NT circuit *1 3. Speed sensor SP2 circuit *1 4. Throttle position sensor circuit *1 5. ATF temperature sensor circuit *1 6. Pattern select switch circuit (PWR mode switch) 7. Transfer L4 position switch circuit *1 8. ECM	DI-479 DI-418 DI-421 DI-36 DI-410 DI-495 DI-472 IN-36
Up-shift to 5th from 4th while shift lever is 4 position	1. Transmission control switch circuit (D - 4) *1 2. ECM	DI-402 IN-36
Up-shift to 5th from 4th while engine is cold	1. Engine coolant temp. sensor circuit *1 2. ECM	DI-36 IN-36
Up-shift to 4th from 3rd while shift lever is 3 position	1. Park/neutral position switch circuit *1 2. ECM	DI-402 IN-36
Up-shift to 3rd from 2nd while shift lever is 2 position	1. Park/neutral position switch circuit *1 2. ECM	DI-402 IN-36
Up-shift to 2nd from 1st while shift lever is L position	1. Transmission control switch circuit (2 - L) *1 2. ECM	DI-402 IN-36
Harsh engagement (N → D)	1. Speed sensor NT circuit *1 2. Shift solenoid valve (SL1) circuit *1 3. Shift solenoid valve (SLT) circuit *1 4. ECM	DI-418 DI-426 DI-479 IN-36
Harsh engagement (Lock-up)	1. Speed sensor NT circuit *1 2. Speed sensor SP2 circuit *1 3. Shift solenoid valve (SLU) circuit *1 4. ECM	DI-418 DI-421 DI-491 IN-36
Harsh engagement (Any driving position)	ECM	IN-36
Poor acceleration	1. ATF temperature sensor No.2 circuit *1 2. ECM	DI-483 IN-36
No engine braking	ECM	IN-36
No kick-down	ECM	IN-36
Engine stalls when starting off or stopping	ECM	IN-36
No pattern select (PWR)	1. Pattern select switch circuit (PWR mode switch) 2. ECM	DI-495 IN-36
No 2nd start	1. Pattern select switch circuit (2nd start switch) 2. Transmission control switch circuit (2 - L) *1 3. ECM	DI-497 DI-402 IN-36
AT Oil Temp. warning light remains on Lock-up at 3rd gear Shift point too high	1. ATF temperature sensor No.2 circuit *1 2. ECM	DI-483 IN-36
A/T.P. indicator light does not light up	1. A/T.P. indicator light circuit 2. Combination meter circuit 3. ECM	DI-500 BE-58 IN-36

Chapter 2: On-Vehicle Repair
(★: A750E, A750F AUTOMATIC TRANSMISSION Repair Manual Pub. No. RM999U)

Symptom	Suspect Area	See page
Vehicle does not move in any forward position and reverse positions	1. Transmission control rod 2. Manual valve 3. Parking lock pawl 4. Off-vehicle repair matrix chart	DI-361 ★ ★ -
Vehicle does not move in R position	1. Valve body assy 2. Off-vehicle repair matrix chart	AT-8 -
No up-shift (1st → 2nd)	1. Valve body assy 2. Off-vehicle repair matrix chart	AT-8 -
No up-shift (2nd → 3rd)	1. Valve body assy 2. Off-vehicle repair matrix chart	AT-8 -
No up-shift (3rd → 4th)	1. Valve body assy 2. Off-vehicle repair matrix chart	AT-8 -
No up-shift (4th → 5th)	1. Valve body assy 2. Off-vehicle repair matrix chart	AT-8 -
No down-shift (5th → 4th)	1. Valve body assy 2. Off-vehicle repair matrix chart	AT-8 -
No down-shift (4th → 3rd)	1. Valve body assy 2. Off-vehicle repair matrix chart	AT-8 -
No down-shift (3rd → 2nd)	1. Valve body assy 2. Off-vehicle repair matrix chart	AT-8 -
No down-shift (2nd → 1st)	1. Valve body assy 2. Off-vehicle repair matrix chart	AT-8 -
No lock-up or No lock-up off	1. Shift solenoid valve (SLU) 2. Valve body assy 3. Off-vehicle repair matrix chart	DI-487 AT-8 -
Harsh engagement (N → D)	1. Shift solenoid valve (SL1) 2. Valve body assy 3. C_1 accumulator 4. Off-vehicle repair matrix chart	DI-441 AT-8 ★ -
Harsh engagement (Lock-up)	1. Shift solenoid valve (SLU) 2. Valve body assy 3. Off-vehicle repair matrix chart	DI-487 AT-8 -
Harsh engagement (N → R)	1. Shift solenoid valve (SLT) 2. Shift solenoid valve (SLU) 3. Valve body assy 4. C_3 accumulator 5. Off-vehicle repair matrix chart	DI-476 DI-487 AT-8 ★ -
Harsh engagement (1st →2nd → 3rd → 4th → 5th)	1. Shift solenoid valve (SLT) 2. Shift solenoid valve (SL1) 3. Valve body assy	DI-476 DI-441 AT-8
Harsh engagement (1st → 2nd)	1. Valve body assy 2. B_3 accumulator 3. Off-vehicle repair matrix chart	AT-8 ★ -
Harsh engagement (2nd → 3rd)	1. Valve body assy 2. C_3 accumulator 3. Off-vehicle repair matrix chart	AT-8 ★ -
Harsh engagement (3rd → 4th)	1. Valve body assy 2. C_2 accumulator 3. Off-vehicle repair matrix chart	AT-8 ★ -

Harsh engagement (4th → 5th)	1. Shift solenoid valve (SL1) 2. Shift solenoid valve (SL2) 3. Valve body assy 4. Off-vehicle repair matrix chart	DI-441 DI-445 AT-8 -
Harsh engagement (5th → 4th)	1. Shift solenoid valve (SL1) 2. Shift solenoid valve (SL2) 3. Valve body assy 4. Off-vehicle repair matrix chart	DI-441 DI-445 AT-8 -
Slip or shudder (Forward and reverse)	1. Transmission control rod 2. Valve body assy 3. Oil strainer 4. Off-vehicle repair matrix chart	DI-361 AT-8 AT-8 -
No engine braking (1st: L position)	1. Valve body assy 2. Off-vehicle repair matrix chart	AT-8 -
No engine braking (2nd: 2 position)	1. Valve body assy 2. Off-vehicle repair matrix chart	AT-8 -
No kick-down	Valve body assy	AT-8
Shift point too high or too low	1. Shift solenoid valve (SLT) 2. Shift solenoid valve (SL1) 3. Valve body assy	DI-476 DI-441 AT-8
Poor acceleration	1. Shift solenoid valve (SLT) 2. Valve body assy	DI-476 AT-8
Engine stalls when starting off or stopping	1. Shift solenoid valve (SLU) 2. Valve body assy	DI-487 AT-8

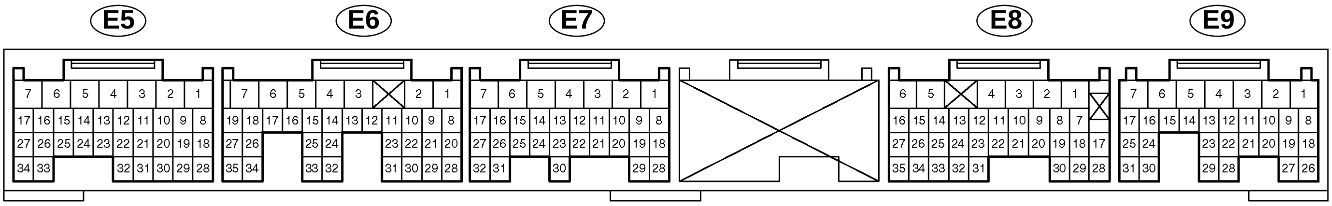
Chapter 3: Off-Vehicle Repair
(★: A750E, A750F AUTOMATIC TRANSMISSION Repair Manual Pub. No. RM999U)

Symptom	Suspect Area	See page
Vehicle does not move in any forward position and reverse positions	1. Rear planetary gear unit 2. Torque converter clutch	★ AT-34
Vehicle does not move in R position	1. Brake No. 4 (B_4) 2. Clutch No. 3 (C_3) 3. One-way clutch No.4 (F_1)	★ ★ ★
No up-shift (1st → 2nd)	1. Brake No. 3 (B_3) 2. One-way clutch No.1 (F_1) 3. One-way clutch No. 2 (F_2)	★ ★ ★
No up-shift (2nd → 3rd)	Clutch No. 3 (C_3)	★
No up-shift (3rd → 4th)	Clutch No. 2 (C_2)	★
No up-shift (4th → 5th)	1. Brake No. 1 (B_1) 2. Clutch No. 1 (C_1)	★ ★
No lock-up or No lock-up off	Torque converter clutch	AT-34
Harsh engagement (N → D)	1. Clutch No. 1 (C_1) 2. One-way clutch No.3 (F_3)	★ ★
Harsh engagement (N → R)	1. Clutch No. 3 (C_3) 2. Brake No. 4 (B_4) 3. One-way clutch No.1 (F_1)	★ ★ ★
Harsh engagement (1 → 2)	1. Brake No. 3 (B_3) 2. One-way clutch No.1 (F_1) 3. One-way clutch No. 2 (F_2)	★ ★ ★
Harsh engagement (2 → 3)	Clutch No. 3 (C_3)	★
Harsh engagement (3 → 4)	Clutch No. 2 (C_2)	★
Harsh engagement (4 → 5th)	1. Brake No. 1 (B_1) 2. Clutch No. 1 (C_1)	★ ★
Harsh engagement (Lock-up)	Torque converter clutch	AT-34
Slip or shudder (Forward and reverse: After warm-up)	1. One-way clutch No.1 (F_1) 2. Clutch No. 3 (C_3) 3. Torque converter clutch clutch	★ ★ ★
Slip or shudder (Particular position: Just after engine starts)	Torque converter clutch	AT-34
Slip or shudder (R position)	1. Brake No. 4 (B_4) 2. One-way clutch No.1 (F_1) 3. Clutch No. 3 (C_3)	★ ★ ★
Slip or shudder (1st)	1. Clutch No. 1 (C_1) 2. One-way clutch No.3 (F_3)	★ ★
Slip or shudder (2nd)	1. Clutch No. 1 (C_1) 2. Brake No. 3 (B_3) 3. One-way clutch No.1 (F_1) 4. One-way clutch No.2 (F_2)	★ ★ ★ ★
Slip or shudder (3rd)	1. Clutch No. 1 (C_1) 2. Clutch No. 3 (C_3) 3. One-way clutch No.1 (F_1)	★ ★ ★
Slip or shudder (4th)	1. Clutch No. 1 (C_1) 2. Clutch No. 2 (C_2)	★ ★
Slip or shudder (5th)	1. Clutch No. 2 (C_2) 2. Clutch No. 3 (C_3) 3. Brake No. 1 (B_1)	★ ★ ★
No engine braking (1st – 4th: D position)	Clutch No. 1 (C_1)	★

No engine braking (1st: L position)	Brake No. 4 (B_4)	★
No engine braking (2nd: 2 position)	Brake No. 2 (B_2)	★
No engine braking (3rd: 3 position)	Brake No. 1 (B_1)	★
Poor acceleration (All positions)	Torque converter clutch	AT-34
Poor acceleration (5th)	1. Clutch No. 1 (C_1) 2. Clutch No. 3 (C_3) 3. Brake No. 1 (B_1) 4. Front planetary gear unit	★ ★ ★ ★
Engine stalls when starting off or stopping	Torque converter clutch	AT-34

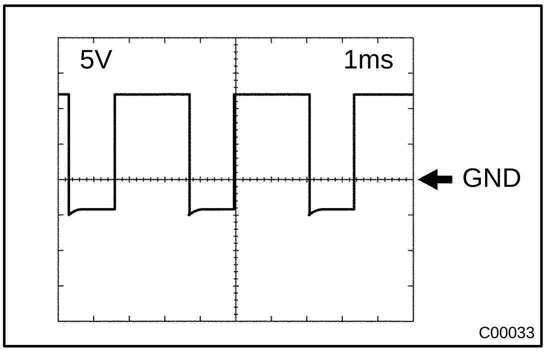
DIB31-02

TERMINALS OF ECM



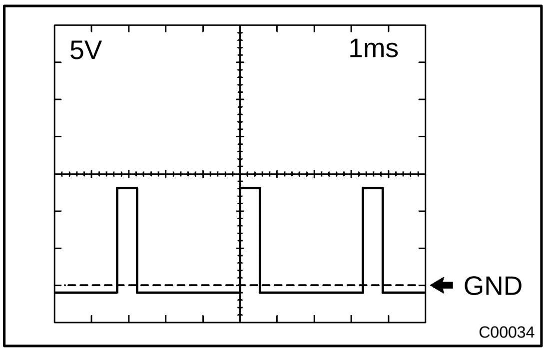
Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
P (E9-6) - E1 (E7-1)	G-W - BR	IG switch ON and shift lever P position	10 to 14
		IG switch ON and shift lever other than P position	Below 1
N (E9-7) - E1 (E7-1)	G-R - BR	IG switch ON and shift lever N position	10 to 14
		IG switch ON and shift lever other than N position	Below 1
L4 (E8-4) - E1 (E7-1)	B-L - BR	IG switch ON and Transfer shift lever L position	9 to 14
		IG switch ON and Transfer shift lever other than L position	Below 1.5
SNWI (E8-5) - E1 (E7-1)	L-R - BR	IG switch ON	9 to 14
		IG switch ON and Press continuously 2nd start switch	Below 1
L (E8-8) - E1 (E7-1)	R-L - BR	IG switch ON and shift lever L position	9 to 14
		IG switch ON and shift lever other than L position	Below 1.5
2 (E8-9) - E1 (E7-1)	G-B - BR	IG switch ON and shift lever 2 and L position	9 to 14
		IG switch ON and shift lever other than 2 and L position	Below 1.5
D (E8-10) - E1 (E7-1)	G-Y - BR	IG switch ON and shift lever D and 4 position	9 to 14
		IG switch ON and shift lever other than D and 4 position	Below 1.5
R (E8-11) - E1 (E7-1)	R-B - BR	IG switch ON and shift lever R position	9 to 14
		IG switch ON and shift lever other than R position	Below 1.5
STP (E8-19) - E1 (E7-1)	G-W - BR	Brake pedal is depressed	7.5 to 14
		Brake pedal is released	Below 1.5
3 (E8-20) - E1 (E7-1)	G - BR	IG switch ON and shift lever 3 position	9 to 14
		IG switch ON and shift lever other than 3 position	Below 1.5
4 (E8-23) - E1 (E7-1)	G-R - BR	IG switch ON and shift lever 4 position	9 to 14
		IG switch ON and shift lever other than 4 position	Below 1.5
PWR (E8-28) - E1 (E7-1)	L-W - BR	IG switch ON and Pattern select switch " PWR" OFF	9 to 14
		IG switch ON and Pattern select switch "PWR" ON	Below 1
TFN (E7-11) - E1 (E7-1)	Y-G - BR	IG switch ON and Transfer shift lever N position	Below 1.5
		IG switch ON and Transfer shift lever other than N position	9 to 14
SLU+ (E7-16) - SLU- (E7-15)	P-G - B	Engine idle speed	Pulse generation 2 reference
S2 (E6-10) - E1 (E7-1)	W - BR	IG switch ON	Below 1.5
		2nd or 3rd gear	9 to 14
		1st, 4th or 5th gear	Below 1.5
S1 (E6-11) - E1 (E7-1)	R - BR	IG switch ON	9 to 14
		1st or 2nd gear	9 to 14
		3rd, 4th or 5th gear	Below 1.5

SLT^{+} (E6-13) - SLT^{-} (E6-12)	G-W - G-B	Engine idle speed	Pulse generation 1 reference
SR (E6-15) - E1 (E7-1)	G - BR	IG switch ON	Below 1.5
		5th gear	9 to 14
		1st gear	Below 1
SL2+ (E6-17) - SL2- (E6-16)	P-B - P-L	Engine idle speed	Pulse generation 3 reference
SL1+ (E6-19) - SL1- (E6-18)	R-L - R-W	Engine idle speed	Pulse generation 4 reference
THO2 (E6-24) - E2 (E5-28)	L - BR-W	ATF temperature: 115°C (239°F) or more	Below 1.5
$SP2^{+}$ (E6-26) - $SP2^{-}$ (E6-34)	R - G	Vehicle speed 20 km/h (12 mph)	Pulse generation 6 reference
NT^{+} (E6-27) - NT^{-} (E6-35)	L - W	Engine idle speed	Pulse generation 5 reference
THO1 (E6-32) - E2 (E5-28)	G-Y - BR-W	ATF temperature: 115°C (239°F) or more	Below 1.5
NSW (E5-16) - E1 (E7-1)	B-W - BR	IG switch ON and shift lever P and N position	Below 1.5
		IG switch ON and shift lever other than P and N position	9 to 14



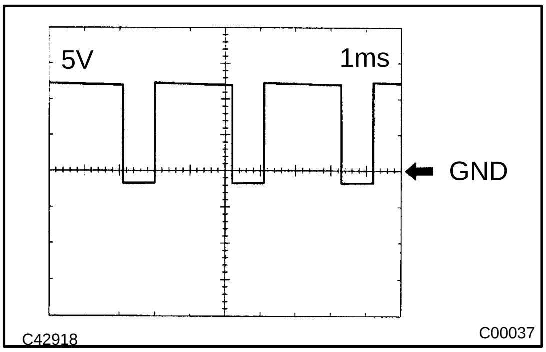
Pulse generation 1
Reference:

Item	Condition
Terminal	SLT+ - SLT-
Tool setting	5V/DIV, 1ms/DIV
Vehicle condition	Engine idle speed



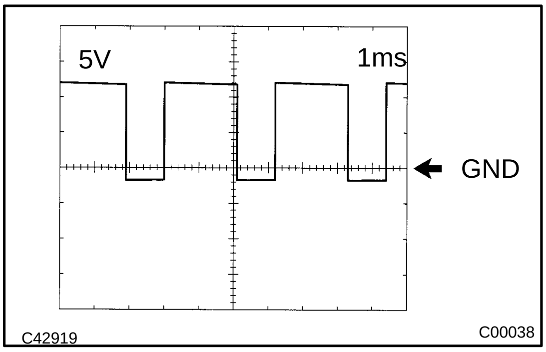
Pulse generation 2
Reference:

Item	Condition
Terminal	SLU+ - SLU-
Tool setting	5V/DIV, 1ms/DIV
Vehicle condition	Engine idle speed



Pulse generation 3
Reference:

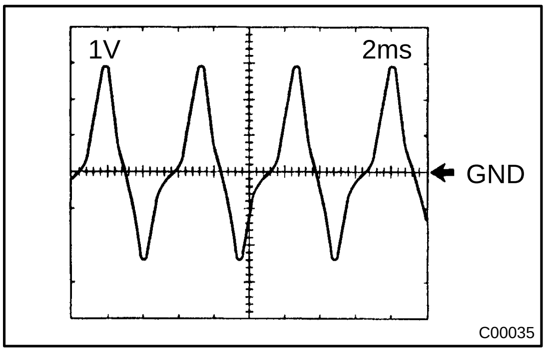
Item	Condition
Terminal	SL2+ - SL2-
Tool setting	5V/DIV, 1ms/DIV
Vehicle condition	Engine idle speed



Pulse generation 4

Reference:

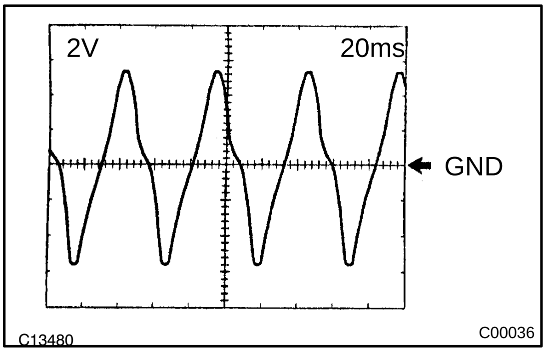
Item	Condition
Terminal	SL1+ - SL1-
Tool setting	5V/DIV, 1ms/DIV
Vehicle condition	Engine idle speed



Pulse generation 5

Reference:

Item	Condition
Terminal	NT+ - NT-
Tool setting	1V/DIV, 2ms/DIV
Vehicle condition	Engine idle speed



Pulse generation 6

Reference:

Item	Condition
Terminal	SP2+ - SP2-
Tool setting	2V/DIV, 20ms/DIV
Vehicle condition	Vehicle speed 20 km/h (12 mph)

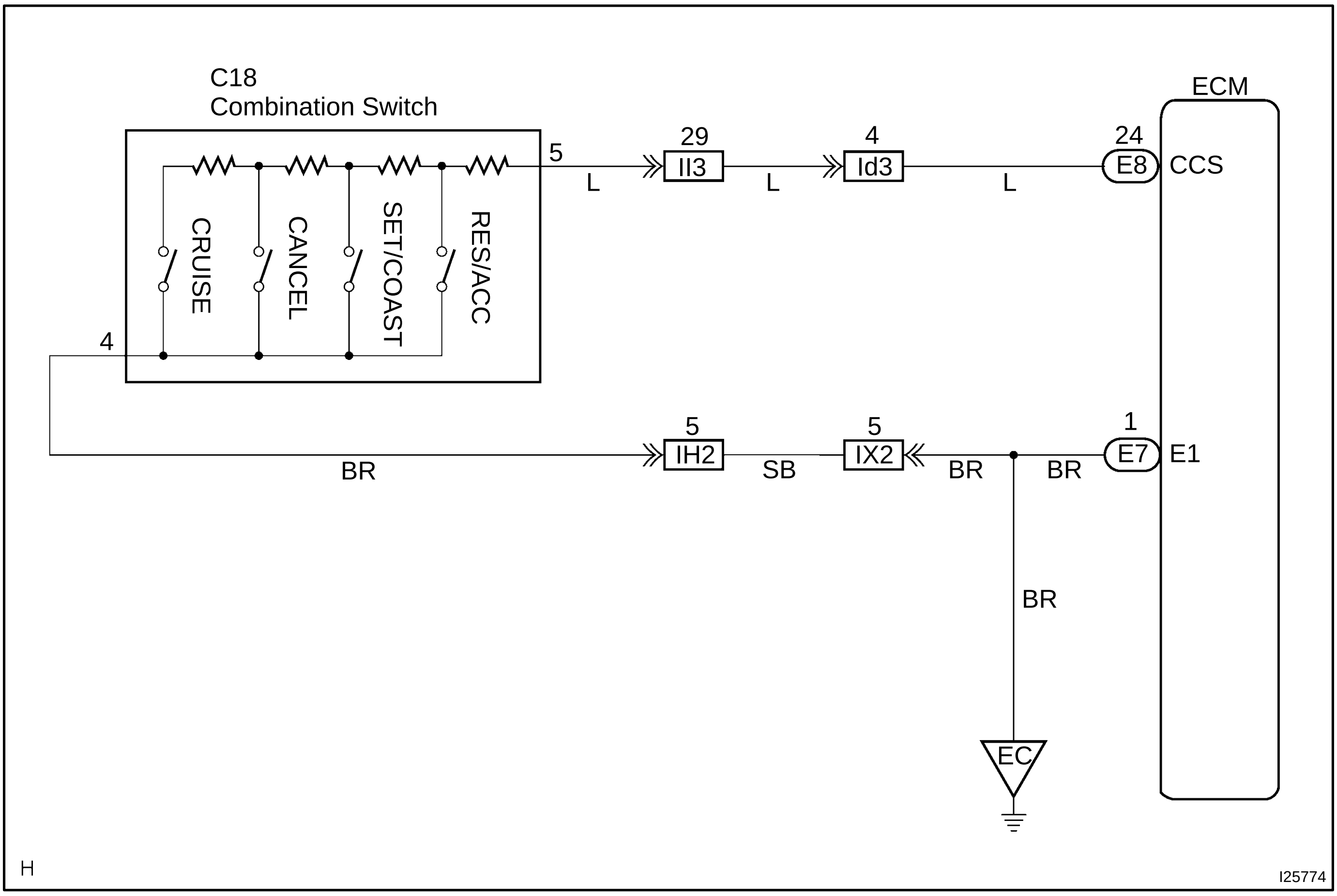
DIB6C-01

Main Switch Circuit (Cruise Control Switch)

CIRCUIT DESCRIPTION

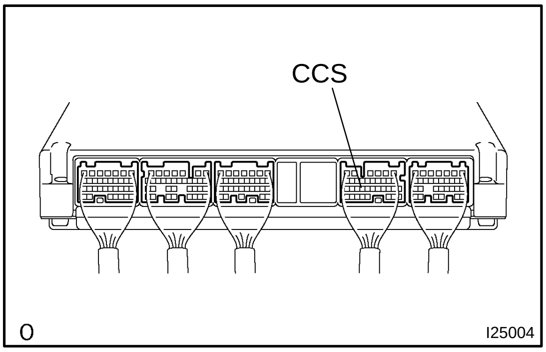
This circuit carries the -/SET, +/RESUME and Cancel signals (each voltage) to the ECM.

WIRING DIAGRAM



INSPECTION PROCEDURE

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



PREPARATION:

(a) Remove the ECM with connector still connected.

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminal CCS of ECM connector and body ground, when each of the -/SET, +RES and CANCEL is turned ON.

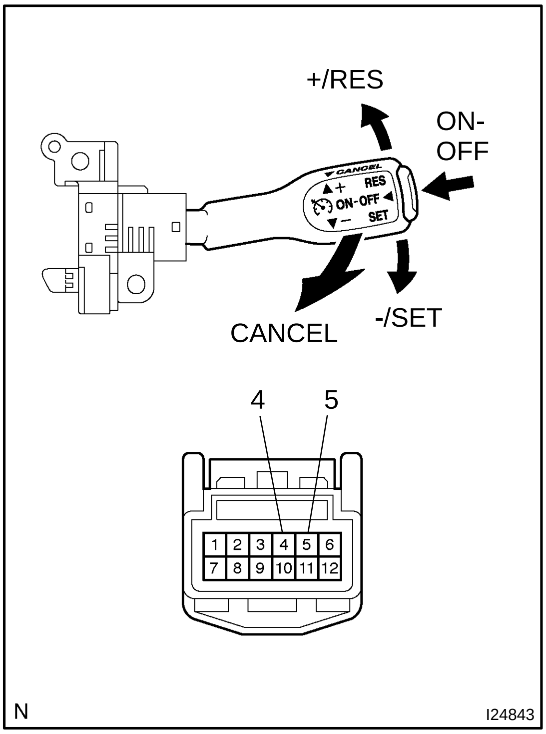
OK:

Switch Position	Voltage
Neutral	9 - 14 V
+/RES	2.1 - 4 V
-/SET	4 - 7.1 V
CANCEL	6 - 10.1 V

OK → **Proceed to next circuit inspection shown on problem symptom table (See page DI-991).**

NG

2	Check main switch continuity.



PREPARATION:

(a) Remove steering wheel center pad (See page SR-9).

(b) Disconnect the control switch connector.

CHECK:

(a) Measure resistance between terminals 4 and 5 of cruise control switch connector when control switch is operated.

Switch position	Resistance (Ω)
Neutral	∞ (No continuity)
+/RES	210 - 270
-/SET	560 - 700
CANCEL	1380 - 1700

(b) Check continuity between terminals 4 and 5 of control switch connector when main switch is held on and off.

OK:

Switch position	Tester connection	Specified condition
OFF	4 - 5	No continuity
ON	4 - 5	Continuity

NG → **Replace control switch.**

OK

3	**Check harness and connector between ECM and cruise control switch, cruise control switch and body ground (See page IN-26).**

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

OK

4	**Check cruise control indicator light (See combination meter.)**

NG → **Replace combination meter.**

OK

Check and replace ECM (See page IN-36).

DI3CI-14

CIRCUIT INSPECTION

DTC	P0500/21	Vehicle Speed Sensor ”A”

DTC	P0503/23	Vehicle Speed Sensor ”A” Intermittent/Erratic/High

CIRCUIT DESCRIPTION

See page .DI-274

DTC No.	DTC Detection Condition	Trouble Area
P0500/21 P0503/23	No vehicle speed sensor signal to ECM under following conditions (a) and (b): (2 trip detection logic) (a) Park/neutral position switch is OFF (b) Vehicle is being driven	★Combination meter ★Open or short in vehicle speed sensor circuit ★Vehicle speed sensor ★ECM

WIRING DIAGRAM

See page .DI-274

INSPECTION PROCEDURE

See page .DI-274

DIB6A-01

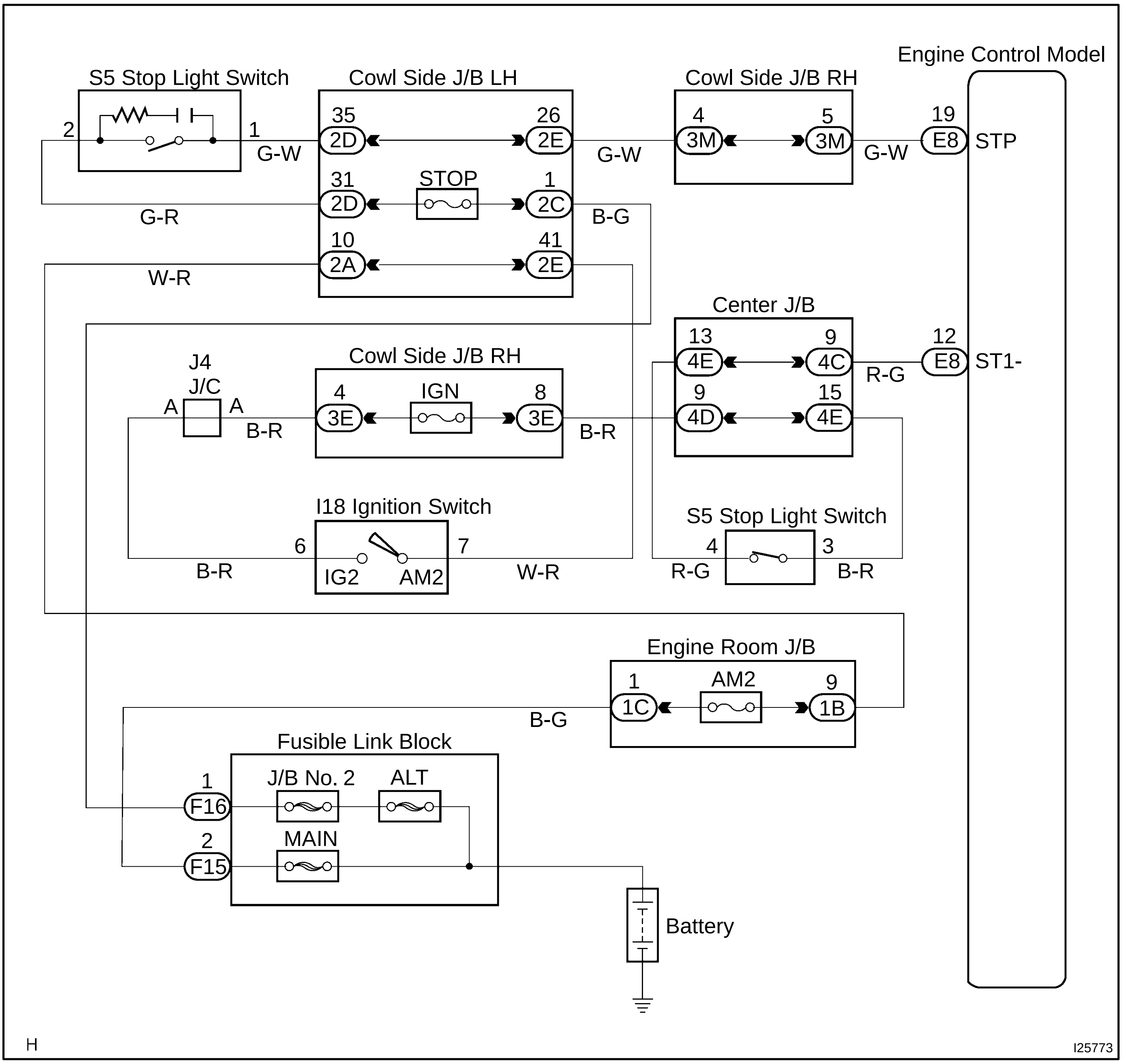
DTC	P0571/52	Brake Switch ”A” Circuit

CIRCUIT DESCRIPTION

When the brake pedal is depressed, the stop light switch sends a signal to the ECM. When the ECM 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 condition is that battery positive voltage is supplied to terminal STP.
When the brake is on, battery positive voltage is normally applied through the STOP fuse and stop light switch to terminal STP of the ECM, and the ECM 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.

DTC No.	Detection Item	Trouble Area
P0571/52	Stop light switch circuit.	★Stop light switch ★Harness or connector between ECM and stop light switch circuit ★ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
In case of using the hand-held tester, start the inspection from step 1 and in case of not using the hand-held tester, start from step 2.

1	**Check stop light switch using hand-held tester.**

PREPARATION:
Connect the hand-held tester to the DLC3.
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main SW ON.

CHECK:
Select the item "STOP LIGHT SW" in the DATA LIST and read its valve displayed.

OK:
Brake pedal depressed: ON
Brake pedal released: OFF

OK	**Proceed to next circuit inspection shown in problem symptom table (See page DI-991).**

NG

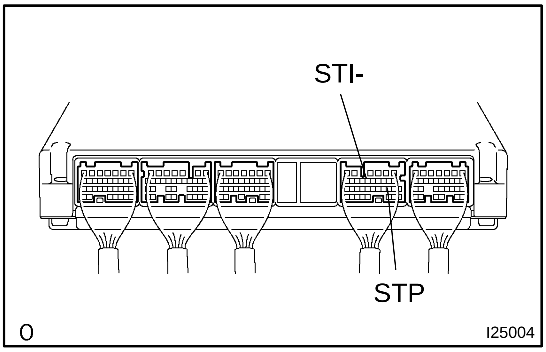
2	**Check operation of stop light.**

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-49).**

OK

3	**Check voltage between terminal STP/STI- of ECM connector and body ground.**



PREPARATION:

(a) Remove the ECM with connectors still connected.

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminal STP/STI- of ECM 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 in problem symptom table (See page DI-991).**

NG

4	**Check wire harness and connector between terminal STP of ECM and stop light switch, and terminal STI- of ECM and stop light switch (See page IN-36).**

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

OK

Check and replace ECM (See page IN-36).

DIB6B-01

DTC	P0607/54	Control Module Performance

CIRCUIT INSPECTION

This DTC expresses the internal abnormalities of ECM.

DTC No.	Detection Item	Trouble Area
P0607/54	★Cruise control input signal abnormal. ★Stop light switch input signal abnormal.	★ECM

INSPECTION PROCEDURE

Check and replace ECM (See page IN-36).

DIB6D-01

CRUISE MAIN Indicator Light Circuit

CIRCUIT DESCRIPTION

When the cruise control main switch is turned ON, CRUISE MAIN indicator light lights up.

INSPECTION PROCEDURE

1	Perform Active Test of hand-held tester.

PREPARATION:

Connect the hand-held tester to the DLC3.

CHECK:

Check the cruise indicator of the combination meter using Active Test.

OK:

Description	Tester display	Check condition
CRUISE Indicator light	CRUISE INDIC	ON/OFF

OK → **Proceed to next circuit inspection shown on problem symptom table (See page DI-991).**

NG

Check and replace combination meter. (See page IN-36).

DI26S-20

CUSTOMER PROBLEM ANALYSIS CHECK

CRUISE CONTROL SYSTEM Check Sheet

Inspector's name: ________________

Customer's Name		**Registration No.**	
		Registration Year	
		Frame No.	
Date of Vehicle Brought in	/ /	**Odometer Reading**	**km** **Mile**

Condition of Problem Occurrence	**Date of Problem Occurrence**	/ /
	Frequency 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 ☐ 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
	☐ Cruise main indicator light	☐ Remains ON ☐ Does not light up ☐ Blinks

DTC Check	**1st Time**	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)

DI26U-32

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
P0500/21 (DI-992)	Vehicle Speed Sensor "A"	★Combination meter ★Open or short in vehicle speed sensor circuit ★Vehicle speed sensor ★ECM
P0503/23 (DI-992)	Vehicle Speed Sensor "A" Intermittent/Erratic/High	
P0571/52 (DI-993)	Brake Switch "A" Circuit	★Short in stop light switch circuit ★Stop light switch ★ECM
P0607/54 (DI-997)	Control Module Performance	★ECM

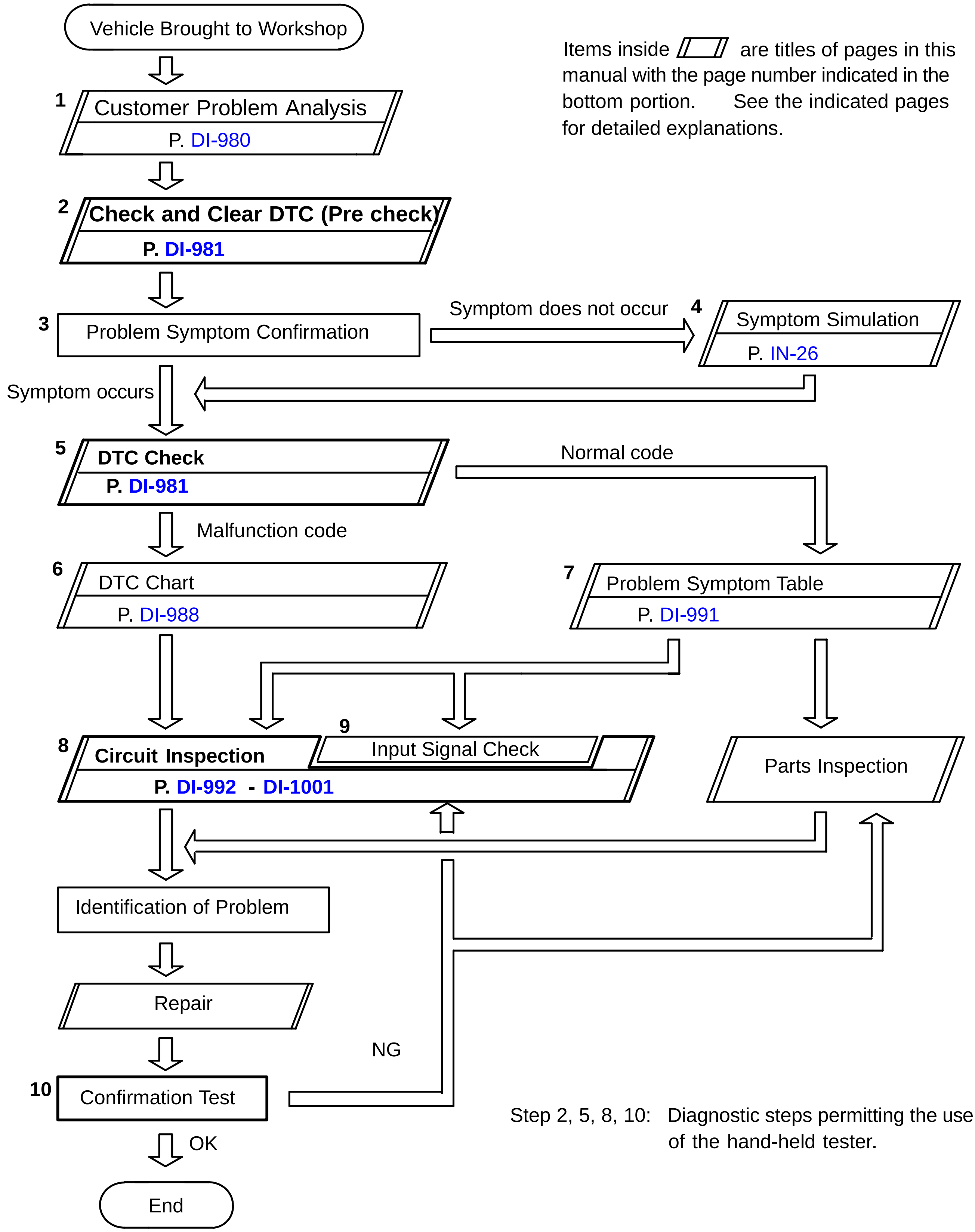
CRUISE CONTROL SYSTEM

DI26R-35

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot in accordance with the procedure on the following page.

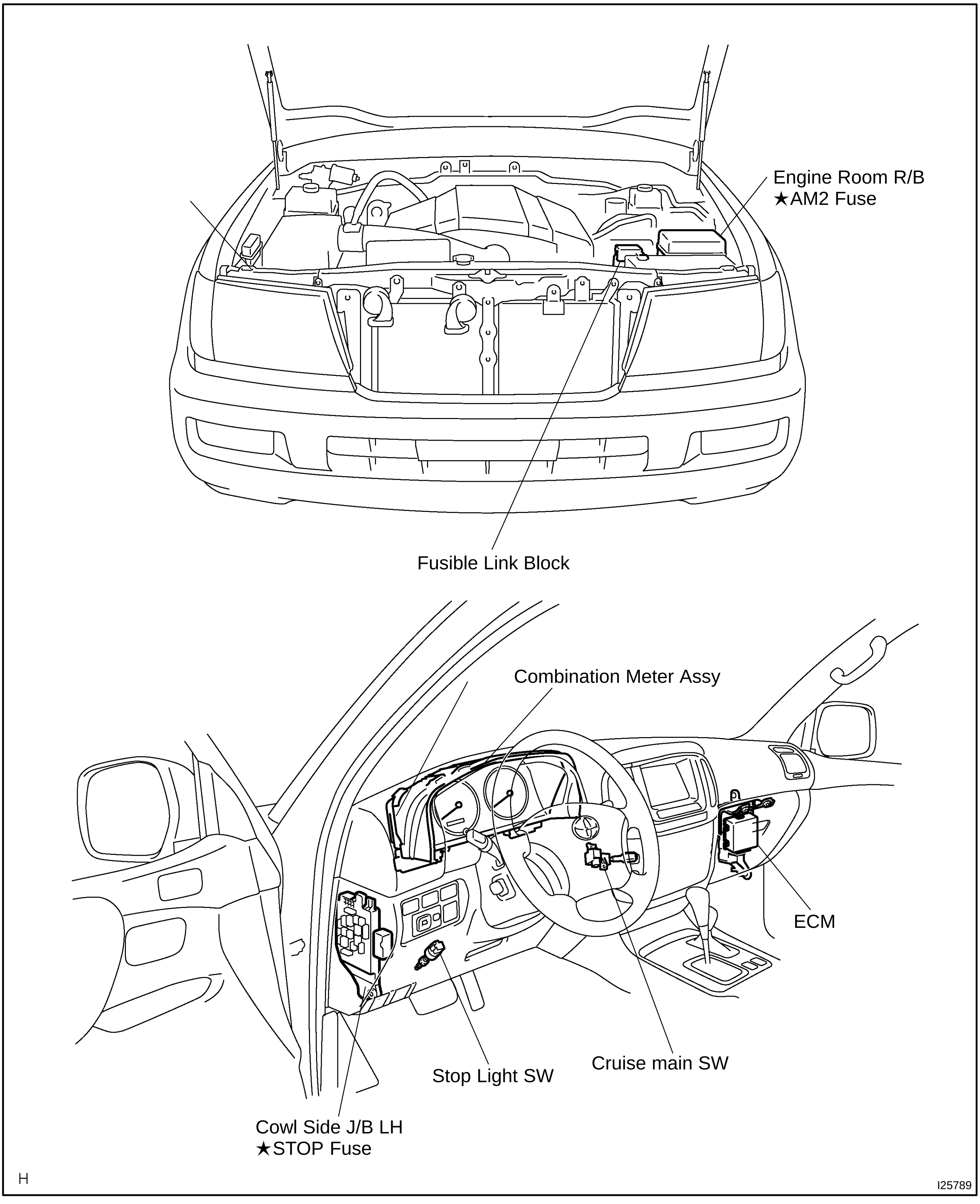
Items inside ⏥ are titles of pages in this manual with the page number indicated in the bottom portion. See the indicated pages for detailed explanations.



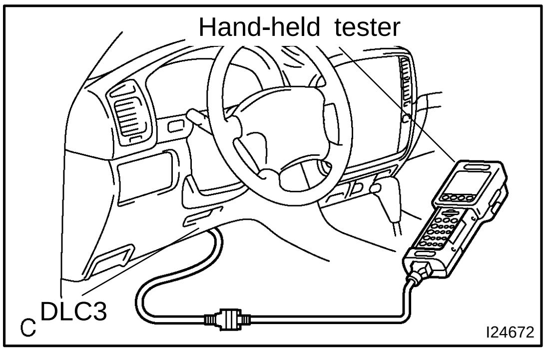
Step 2, 5, 8, 10: Diagnostic steps permitting the use of the hand-held tester.

DI3CG-08

PARTS LOCATION



DIB69-01



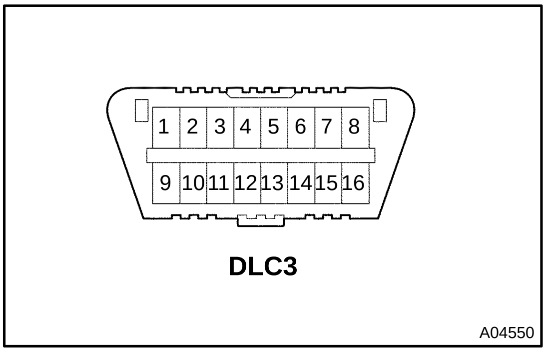
PRE-CHECK

1. DIAGNOSIS SYSTEM

(a) Description

ECM controls the function of cruise control on this vehicle. Data of the cruise control or DTC can be read from DLC3 of the vehicle. When a trouble occurs on cruise control, Check CRUISE MAIN indicator does not light up but DTC inspection is performed.

Therefore when there seems to be a trouble on cruise control, use hand-held tester or SST to check and troubleshoot it.



(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.

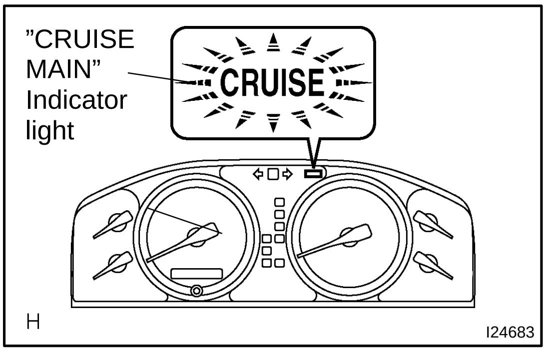
Terminal No.	Connection/Specified Condition	Condition
4	Chassis Ground ↔ Body Ground/1 or less	Always
13	TC ↔ Body Ground/9 - 14 V	Always

HINT:

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

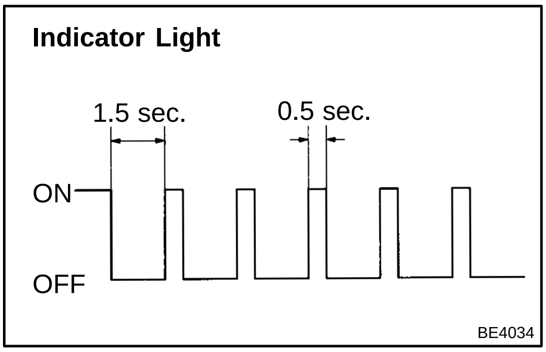
★ If communication is normal when the tool is connected to another vehicle, inspect DLC3 on the original vehicle.

★ 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.

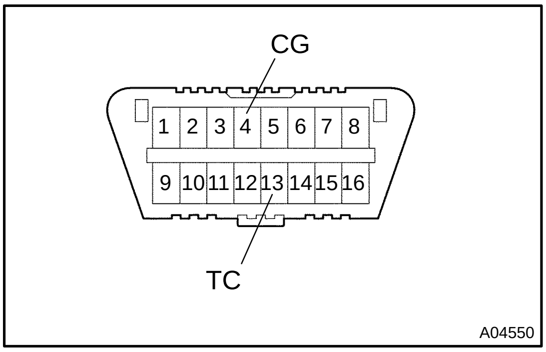


(c) Check the indicator.
(1) Turn the ignition switch to ON.
(2) Check that the CRUISE MAIN indicator light comes on when the cruise control main switch is turned ON, and that the indicator light goes off when the main switch is turned OFF.

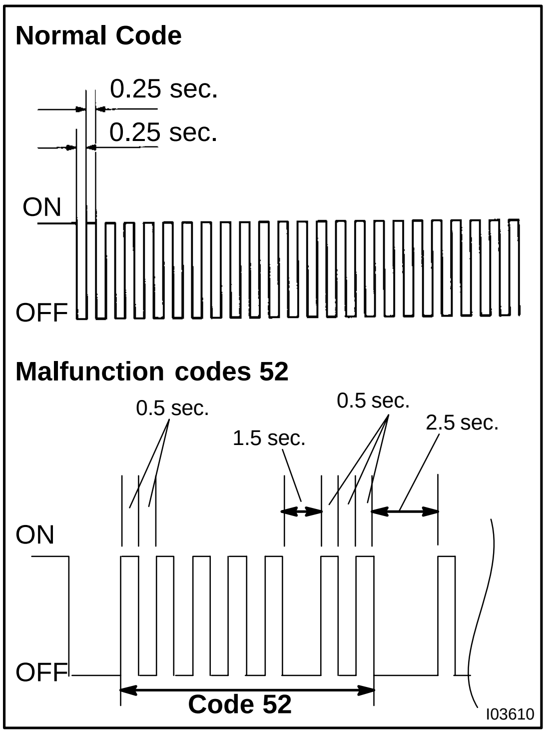
HINT:
If the indicator check result is not normal, proceed to troubleshooting (See page BE-2) for the combination meter section.



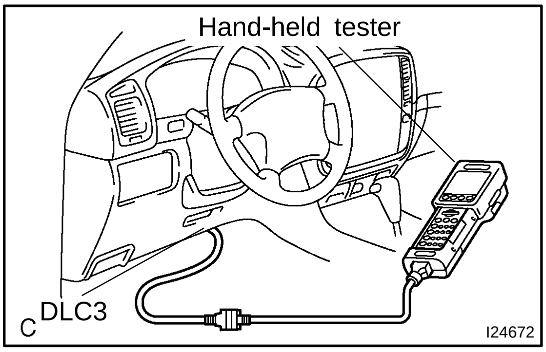
(d) Check the DTC.
HINT:
If a malfunction occurs in the speed sensor or stop light switch, etc. during cruise control driving, the ECM actuates AUTO CANCEL of the cruise control and turns ON and OFF the CRUISE MAIN indicator light to inform the driver of a malfunction. At the same time, the malfunction is stored in memory as a diagnostic trouble code.



(e) Output DTC using diagnosis check wire.
(1) Turn the ignition switch ON.
(2) Using SST, connect terminals Tc and CG of DLC3.
SST 09843-18040
(3) Read the DTC on the CRUISE MAIN indicator light.



HINT:
★ If the DTC is not output, inspect the diagnosis circuit.
★ As an example, the blinking patterns for codes; normal 52 are shown in the illustration.



2. USING HAND-HELD TESTER

(a) Hook up the hand-held tester to the DLC3.

(b) Monitor the ECU data by following the prompts on the tester screen.

HINT:

Hand-held tester has a "Snapshot" function which records the monitored data.

Please refer to the hand-held tester operator's manual for further details.

3. DTC CLEARANCE

(a) The following actions will erase the DTCs and freeze frame data.

(1) Operating the hand-held tester to erase the codes (See the hand-held tester instruction book for operating instructions.).

(2) Disconnecting the battery terminals or EFI fuse.

(b) After completing repairs, the DTC retained in memory can be cleared by removing the EFI fuse for 10 seconds or more with the ignition switch off.

(c) Check that the normal code is displayed after connecting the fuse.

4. DATA LIST

HINT:

According to the DATA LIST displayed by the hand-held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as a first step of troubleshooting is one of the method to shorten the labor time.

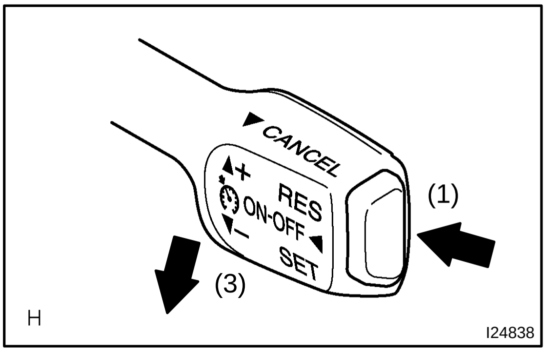
(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch ON.

(c) According to the display on tester, read the "DATA LIST".

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
VEHICLE SPD	Vehicle speed/ min.: 0 km/h (0 mph)max.: 255 km/h (158 mph)	Actual vehicle speed	-
MEMORY SPD	Vehicle speed/ min.: 0 km/h (0 mph)max.: 255 km/h (158 mph)	Actual vehicle speed	-
THROTTLE	Throttle operating angle/ min.: 0 km/h (0 mph)max.: 125 km/h (mph)	Actual vehicle speed	-
CRUISE CONTROL	Cruise control	ON: Cruise control is SET OFF: Cruise control is UNSET	-
MAIN SW (MAIN)	Main switch (Main CPU)	ON: Main switch (Main CPU) is SET OFF: Main switch (Main CPU) is UNSET	-

MAIN SW (SUB)	Main switch (Sub CPU)	ON: Main switch (Sub CPU) is SET OFF: Main switch (Sub CPU) is UNSET	-
CCS READY M	Switch ready (Main CPU)	ON: Switch ready (Main CPU) is SET OFF: Switch ready (Main CPU) is UNSET	-
CCS READY S	Switch ready (Sub CPU)	ON: Switch ready (Sub CPU) is SET OFF: Switch ready (Sub CPU) is UNSET	-
CCS INDICATOR M	Switch indicator (Main CPU)	ON: Switch indicator (Main CPU) is ON OFF: Switch indicator (Main CPU) is OFF	-
CCS INDICATOR S	Switch indicator (Sub CPU)	ON: Switch indicator (Sub CPU) is ON OFF: Switch indicator (Sub CPU) is OFF	-
CANCEL SW	CANCEL switch	ON: CANCEL switch is SET OFF: CANCEL switch is UNSET	-
SET/COAST SW	SET/COAST switch	ON: SET/COAST switch is SET OFF: SET/COAST switch is UN-SET	-
RES/ACC SW	RES/ACC switch	ON: RES/ACC switch is SET OFF: RES/ACC switch is UNSET	-
STP LIGHT SW2-M	Stop light SW signal (Main CPU)	ON: Brake pedal depressed OFF: Brake pedal released	-
STP LIGHT SW2-S	Stop light SW signal (Sub CPU)	ON: Brake pedal depressed OFF: Brake pedal released	-
STP LIGHT SW1-M	Stop light SW signal (Sub CPU)	ON: Brake pedal depressed OFF: Brake pedal released	-
SHIFT D POS	Shift D position	ON: Shift is D position OFF: Shift is except D position	-



5. PROBLEM SYMPTOM CONFIRMATION (ROAD TEST)

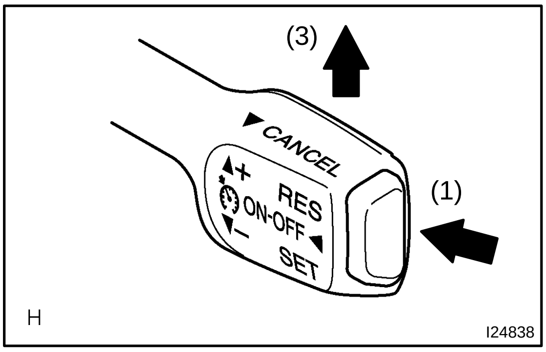
(a) Inspect the SET switch.

(1) Push the main switch ON.

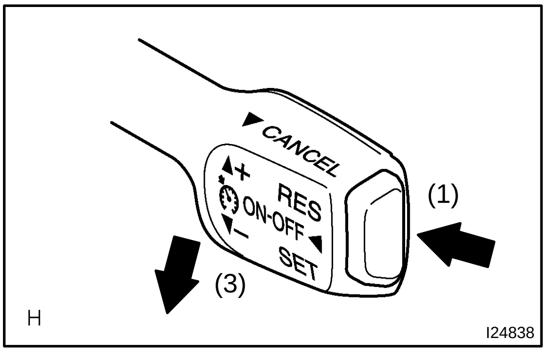
(2) Drive at a desired speed [40 km/h (25 mph) or higher].

(3) Press the control switch to the -/SET.

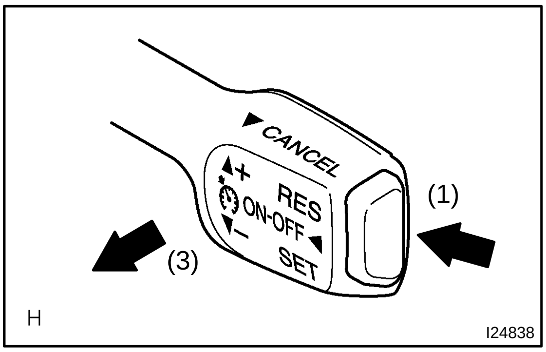
(4) After releasing the switch, check that the vehicle cruises at the desired speed.



(b) Inspect the ACCEL switch.
  (1) Push the main switch button to 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 pulled up to +/RES, and that the vehicle cruises at the set speed when the switch is released.
  (4) Momentarily press the control switch upward to the +/RES and then immediately release it. Check that the vehicle speed increases by about 1.5 km/h (Tap-up function).

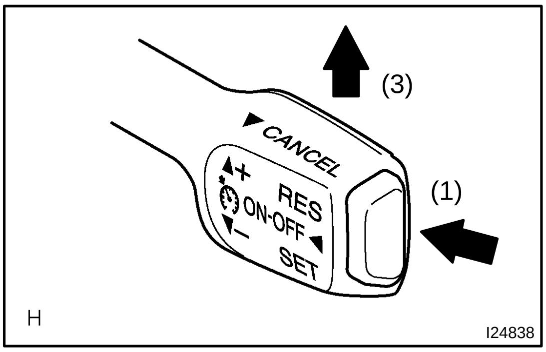


(c) Inspect the COAST switch.
  (1) Push the main switch button to ON.
  (2) Drive at a desired speed [40 km/h (25 mph) or higher].
  (3) Check that the vehicle speed decreases while the control switch is push down to -/SET, and the vehicle cruises at the set speed when the switch is released.
  (4) Momentarily press the control switch downward to -/SET , and then immediately release it. Check that the vehicle speed decreases by about 1.5 km/h (Tap-down function).

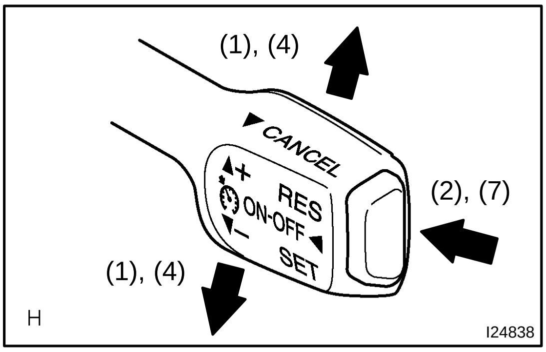


(d) Inspect the CANCEL switch.
  (1) Push the main button to ON.
  (2) Drive at a desired speed [40 km/h (25 mph) or higher].
  (3) When operating one of the followings, check that the cruise control system is cancelled and that the normal driving mode is reset.
    ★ Depress the brake pedal
    ★ Shift to except D position
    ★ Push the main switch button to OFF

★ Pull the cruise control switch to CANCEL



(e) Inspect the RESUME switch.
  (1) Push the main switch button to ON.
  (2) Drive at a desired speed [40 km/h (25 mph) or higher].
  (3) When operating one of the followings, check that the cruise control system is cancelled and that the normal driving mode is reset.
    ★ Depress the brake pedal
    ★ Shift to except D position
    ★ Press the main switch button to OFF
  (4) After the control switch is pulled up to +/RES at the driving speed of more than 40 km/h (25 mph), check that the vehicle restores the speed before the cancellation.



6. INPUT SIGNAL CHECK

HINT:

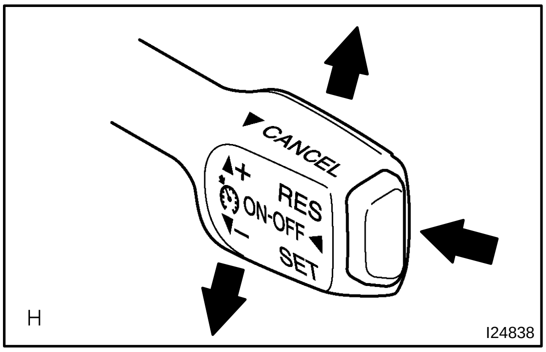
★ For check No.1 - No. 3
  Turn the ignition switch to ON.

★ For check No. 4
  Jack up the vehicle.
  Start the engine.
  Shift to D position

(a) Check the input signal
  (1) Keep the main switch to -/SET or +/RES position and hold it down or hold it up.
  (2) Press the switch button to ON.
  (3) Check that the CRUISE mainindicator light blinks twice or 3 times repeatedly after 3 seconds.
  (4) Turn the -/SET or +/RES switch to OFF.
  (5) Operate each switch as listed in the table below.
  (6) Read the blinking pattern of the CRUISE main indicator light.
  (7) After performing the check, turn the main switch button to OFF.

HINT:
When 2 or more signals are input to the ECM, the lowest numbered code will be displayed first.

No.	Operation Method	CRUISE Main Indicator Light Blinking Pattern	Diagnosis
1	Turn -/SET switch ON	Light ON / OFF, 0.5 sec., 0.5 sec.	-/SET switch circuit is normal
2	Turn +/RES switch ON	Light ON / OFF	+/RES switch circuit is normal
3	Turn CANCEL switch ON	Light ON / OFF, Switch OFF, Switch ON	CANCEL switch circuit is normal
	Depress brake pedal (Turn stop lamp switch assy ON)		Stop light switch circuit is normal
	Shift to except D position (Turn PNP switch OFF)	Light ON / OFF, Switch ON, Switch OFF	PNP switch circuit is normal



7. INPUT SIGNAL CHECK (Using hand-held tester)

(a) Connect the hand-held tester to DLC3.

(b) Check the control switch (MAIN, CANCEL, SET/COAST, RES/ACC).

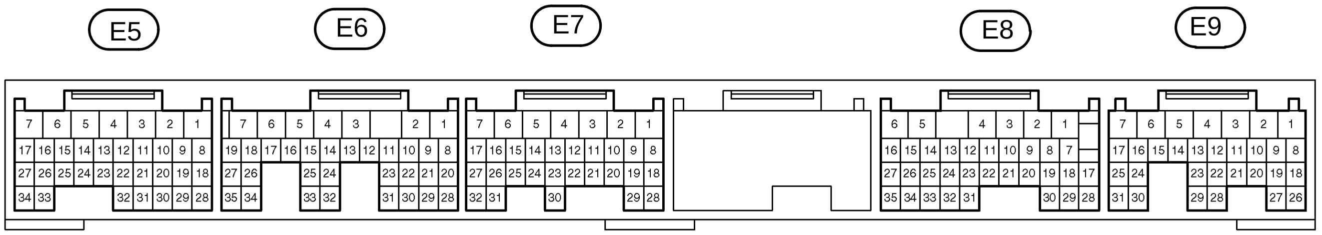
DI26X-37

PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
SET not occurring or CANCEL occurring. (DTC is Normal)	1. Input Signal Circuit 2. Vehicle Speed Sensor Circuit 3. Stop Light Switch Circuit 4. Park/Neutral Position Switch Circuit 5. ECM	DI-997 DI-992 DI-993 IN-36
SET not occurring or CANCEL occurring. (DTC is not output)	1. ECM	IN-36
Actual vehicle speed deviates above or below the set speed.	1. Input Signal Circuit 2. ECM	DI-997 IN-36
Gear shifting occurs frequently between 3rd and O/D when driving on uphill road. (Hurting)	1. ECM	IN-36
Cruise control not cancelled, even when brake pedal is depressed.	1. Stop Light Switch Circuit 2. ECM	DI-993 IN-36
Cruise control not cancelled, even when transmission is shifted to "N" position.	1. Park/Neutral Position Switch Circuit 2. ECM	 IN-36
Control switch does not operate. (+/SET, +/RES, CANCEL not possible)	1. Cruise Control Switch Circuit 2. ECM	DI-998 IN-36
SET possible at 40 km/h (25 mph) or less, or CANCEL does not operate at 40 km/h (25 mph) or less.	1. Input Signal Circuit 2. ECM	DI-997 IN-36
Poor response is ACCEL and RESUME modes.	1. ECM	IN-36
O/D does not resume, even though the road is not uphill.	1. ECM	IN-36
DTC memory is erased.	1. ECM	IN-36
DTC is not output, or is output when should not be.	1. Diagnosis Circuit 2. ECM	- IN-36
Cruise MAIN indicator light remains ON or falls to light up.	1. Input Signal Circuit 2. ECM	DI-997 IN-36
Cruise MAIN indicator light does not light up.	1. Cruise MAIN indicator Light Circuit	DI-1001

DI3CH-17

TERMINALS OF ECM



Symbols (Terminals No.)	Wiring Color	Condition	Specified condition
STP ↔ E1 (E8-19 ↔ E7-1)	G-W ↔ BR	Depress brake pedal	10 - 16 V
		Release brake pedal	Below 1 V
CCS ↔ E1 (E8-24 ↔ E7-1)	L ↔ BR	Ignition switch ON	10 - 16 V
		Ignition switch ON CANCEL switch hold ON	3.6 - 7.2 V
		Ignition switch ON -/SET switch hold ON	2.1 - 4.9 V
		Ignition switch ON +/RES switch hold ON	0.7 - 2.6 V
		Ignition switch ON Main switch OFF	Below 1 V
		Ignition switch ON Main switch ON	10 - 14 V
ST1- ↔ E1 (E8-12 ↔ E7-1)	R-G ↔ BR	Depress brake pedal	Below 1 V
		Release brake pedal	10 - 14 V

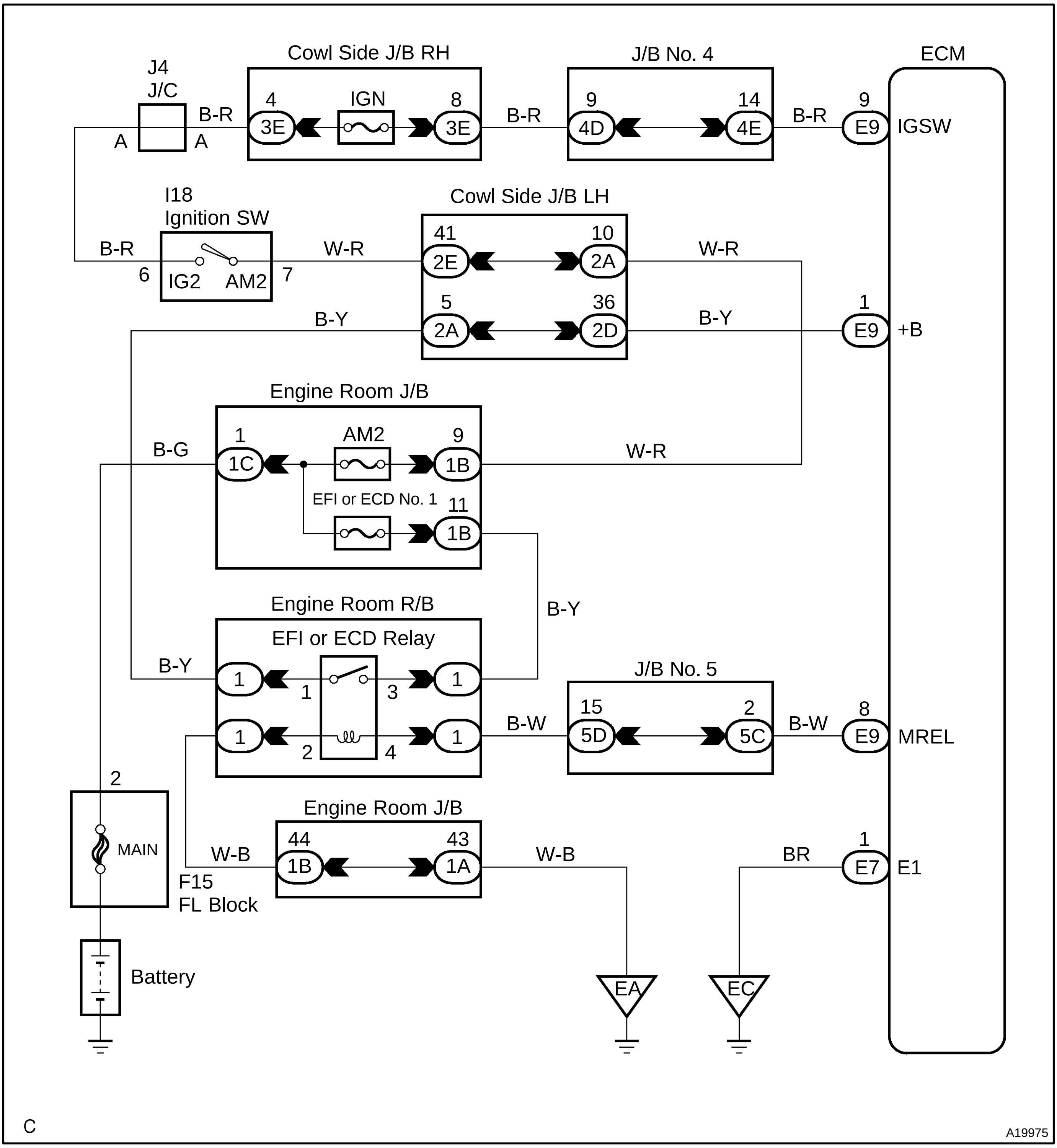
DIB2X-02

ECM Power Source Circuit

CIRCUIT DESCRIPTION

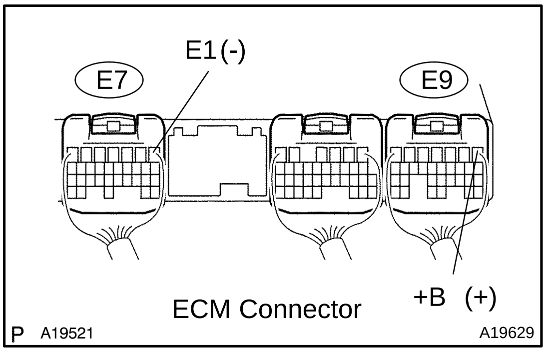
When the ignition switch is turned ON, battery positive voltage is applied to terminal IGSW of the ECM and the EFI or ECD relay control circuit in the ECM sends a signal to terminal MREL of the ECM switching on the EFI or ECD relay.
This signal causes current to flow to the coil, closing the contacts of the EFI or ECD relay and supplying power to terminal +B of the ECM.

WIRING DIAGRAM



INSPECTION PROCEDURE

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



PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals +B and E1 of the ECM connectors.
OK:
Voltage: 9 to 14 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page BE-2).**

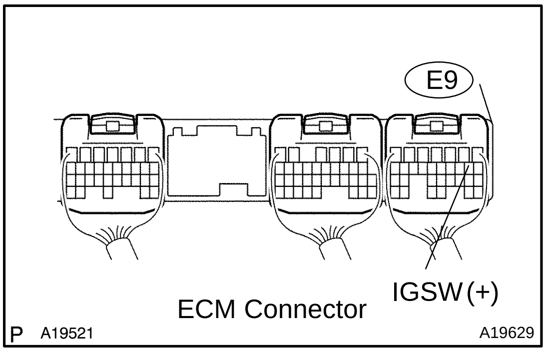
NG

2	Check for open in harness and connector between terminal E1 of ECM and body ground (See page IN-36).

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

OK

3	Check voltage between terminal IGSW of ECM connector and body ground.

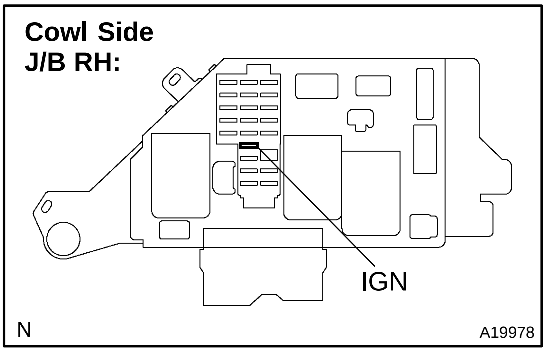


PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminal IGSW of the ECM connector and body ground.
OK:
Voltage: 9 to 14 V

OK → **Go to step 6.**

NG

4	**Check IGN fuse.**



PREPARATION:
Remove the IGN fuse from the cowl side J/B RH.
CHECK:
Check the continuity of the IGN fuse.
OK:
Continuity

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

OK

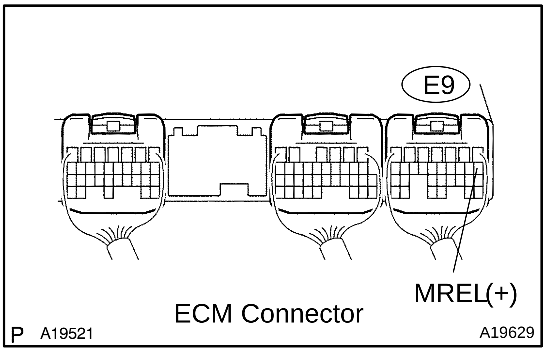
5	**Check ignition switch (See page BE-29).**

NG → **Replace ignition switch.**

OK

Check and repair harness and connector between battery and ignition switch, and ignition switch and ECM (See page IN-36).

6	**Check voltage between terminal MREL of ECM connector and body ground.**



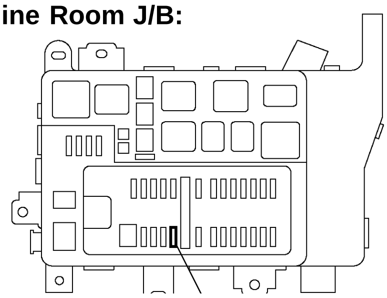
PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminal MREL of the ECM connector and body ground.
OK:
Voltage: 9 to 14 V

NG → **Replace ECM (See page SF-60).**

OK

7	Check EFI or ECD No. 1 fuse of engine room J/B.

Engine Room J/B:



PREPARATION:
Remove the EFI or ECD No. 1 fuse from the engine room J/B.
CHECK:
Check continuity of EFI or ECD No. 1 fuse.
OK:
Continuity

NG → **Check for short in all harness and components connected to EFI or ECD No. 1 fuse.**

OK

8	Check EFI or ECD relay (See page SF-38).

NG → **Replace EFI or ECD relay.**

OK

9	Check for open and short in harness and connector between terminal MREL of ECM and body ground (See page IN-36).

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

OK

Check and repair harness or connector between EFI or ECD No. 1 fuse and battery (See page IN-36).

DIB2Y-02

Fuel Pump Control Circuit

CIRCUIT DESCRIPTION

Refer to DTC P0230 on page DI-162 .

WIRING DIAGRAM

Refer to DTC P0230 on page DI-162 .

INSPECTION PROCEDURE

Hand-held tester:

1	**Check fuel pump operation (See page SF-7).**

OK → **Go to step 8.**

NG ↓

2	**Connect hand-held tester, and check operation of fuel pump relay.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / FUEL PUMP / SPD.

CHECK:

Check the operation of the fuel pump relay when it is switched ON and OFF by the hand-held tester.

OK:

Operating noise can be heard from the relay.

OK → **Go to step 4.**

NG ↓

3	**Check operation of fuel pump relay (See page SF-40).**

NG → **Replace fuel pump relay.**

OK ↓

4	Check fuel pump (See page SF-7).

NG → Repair or replace fuel pump.

OK

5	Check circuit opening relay (See page SF-39).

NG → Replace circuit opening relay.

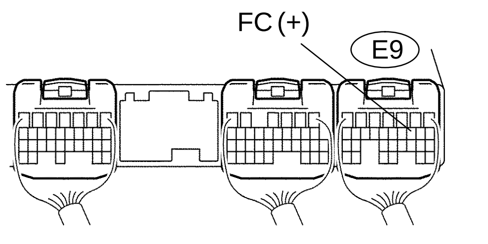
OK

6	Check for open in harness and connector between EFI or ECD relay and fuel pump, and fuel pump and body ground (See page IN-36).

NG → Repair or replace harness or connector.

OK

7	Check voltage between terminal FC and E1 of ECM connector.



PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminal FC of the ECM connector and body ground.
OK:
Voltage: 9 to 14 V

NG → **Check for open in harness and connector between battery and FC terminal of ECM (See page IN-36).**

OK

Proceed to problem symptoms table (See page DI-48).

8	Check fuel pump resistor (See page SF-42).

NG → **Replace fuel pump resistor.**

OK

Check for open in harness and connector between circuit opening relay and fuel pump resistor, and fuel pump resistor and fuel pump (See page IN-36).

OBD II scan tool (excluding hand-held tester):

1	**Check operation of fuel pump (See page SF-7).**

OK → Go to step 7.

NG ↓

2	**Check operation of fuel pump relay (See page SF-40).**

NG → Replace fuel pump relay.

OK ↓

3	**Check fuel pump (See page SF-7).**

NG → Repair or replace fuel pump.

OK ↓

4	**Check circuit opening relay (See page SF-39).**

NG → Replace circuit opening relay.

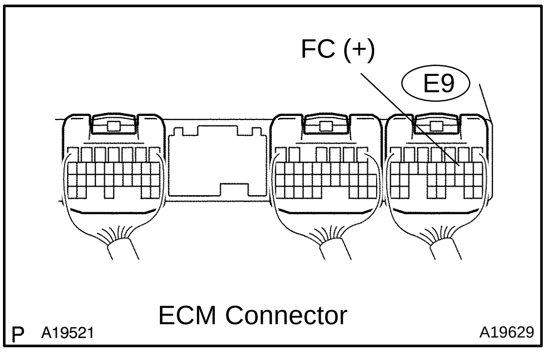
OK ↓

5	**Check for open in harness and connector between EFI or ECD relay and fuel pump, and fuel pump and body ground (See page IN-36).**

NG → Repair or replace harness or connector.

OK ↓

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



PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminal FC of the ECM connector and body ground.
OK:
Voltage: 9 to 14 V

NG → **Check for open in harness and connector between battery and FC terminal of ECM (See page IN-36).**

OK

Proceed to problem symptoms table (See page DI-48).

7	Check fuel pump resistor (See page SF-42).

NG → **Replace fuel pump resistor.**

OK

Check for open in harness and connector between circuit opening relay and fuel pump resistor, fuel pump resistor and fuel pump (See page IN-36).

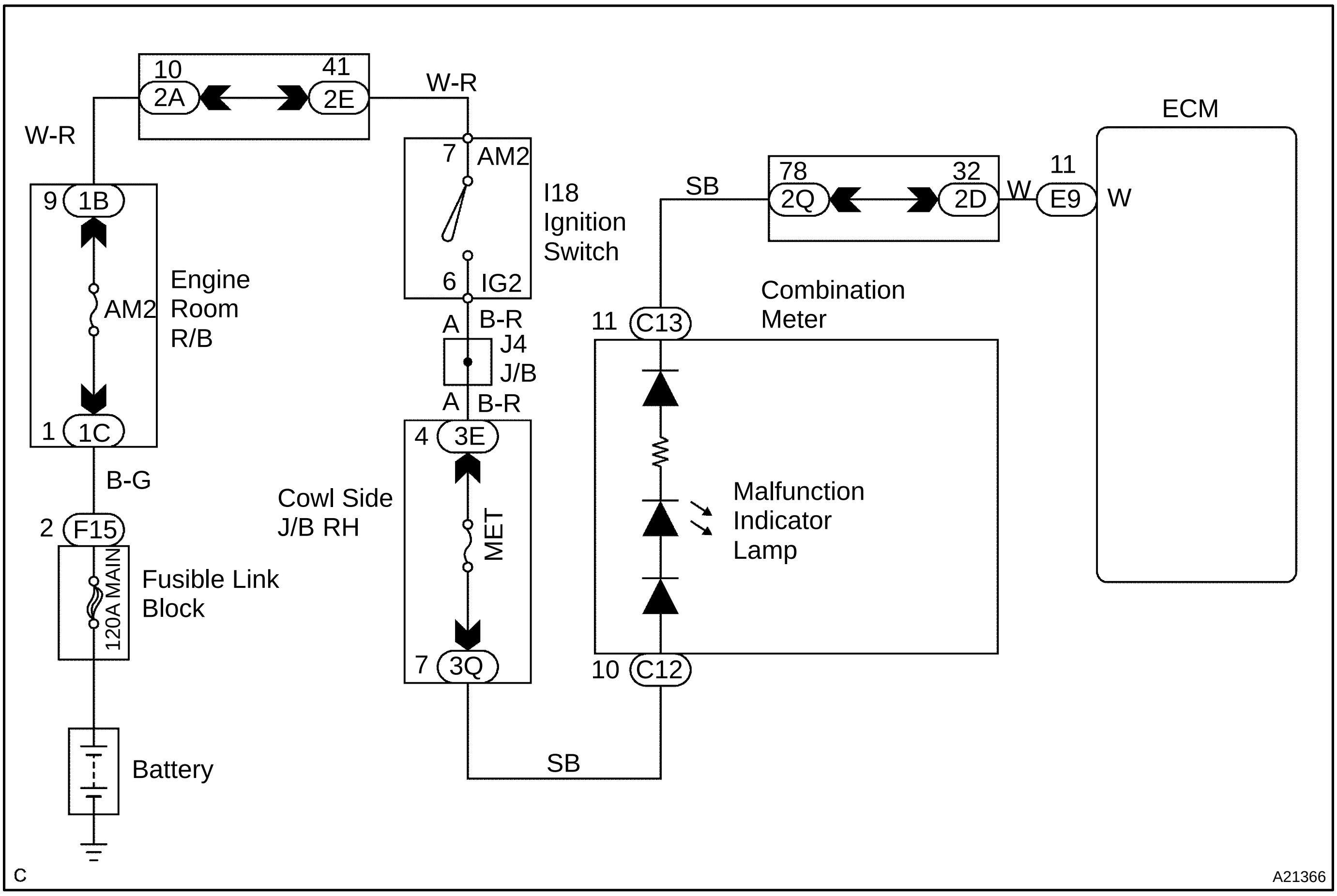
DIC2V-01

MIL Circuit

CIRCUIT DESCRIPTION

If the ECM detects a trouble, the MIL lights up. At this time, the ECM records a DTC in the memory.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Troubleshoot each trouble symptom in accordance with the chart below .

MIL remains on	Start inspection from step 1
MIL does not light up	Start inspection from step 3

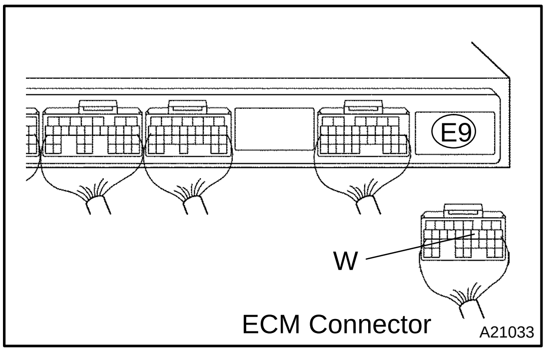
1 Clear DTC.

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) Read the DTC (See page DI-3).
(d) Clear the DTC (See page DI-3).
(e) Check that MIL does not light up.
Standard: MIL does not light up

OK → **Repair circuit indicated by output code (See page DI-36).**

NG ↓

2 Check harness and connector (Check for short in wire harness).



(a) Disconnect the E9 ECM connector.
(b) Turn the ignition switch ON.
(c) Check that MIL does not light up.
Standard: MIL does not light up

OK → **Replace ECM (See page SF-60).**

NG ↓

Check and repair harness and connector between combination meter and ECM (See page IN-36).

3	**Check that MIL lights up.**

Check that MIL lights up when turning the ignition switch ON.

Standard: MIL lights up

OK → **System OK.**

NG ↓

4	**Inspect combination meter assy (MIL circuit).**

See the combination meter troubleshooting on page BE-63 .

NG → **Repair or replace bulb or combination meter assembly.**

OK ↓

Check and repair harness and connector between combination meter and ECM (See page IN-36).

DIC22-01

CIRCUIT INSPECTION

DTC	P0031	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 1)

DTC	P0032	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 1)

DTC	P0037	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 2)

DTC	P0038	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 2)

DTC	P0051	Oxygen Sensor Heater Control Circuit Low (Bank 2 Sensor 1)

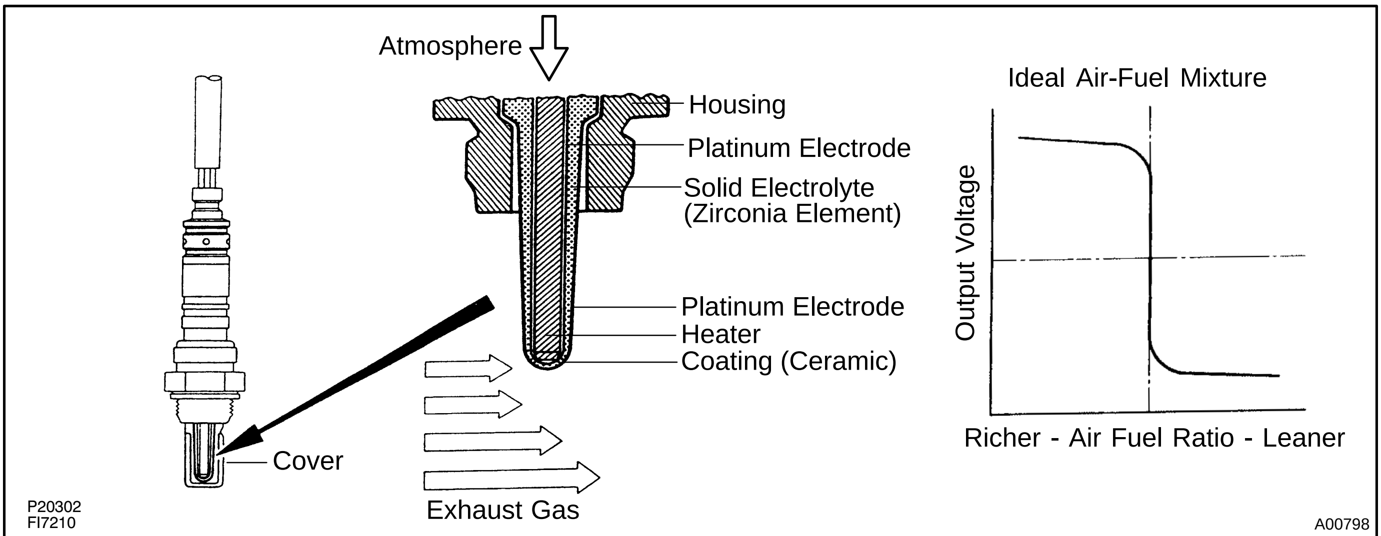
DTC	P0052	Oxygen Sensor Heater Control Circuit High (Bank 2 Sensor 1)

DTC	P0057	Oxygen Sensor Heater Control Circuit Low (Bank 2 Sensor 2)

DTC	P0058	Oxygen Sensor Heater Control Circuit High (Bank 2 Sensor 2)

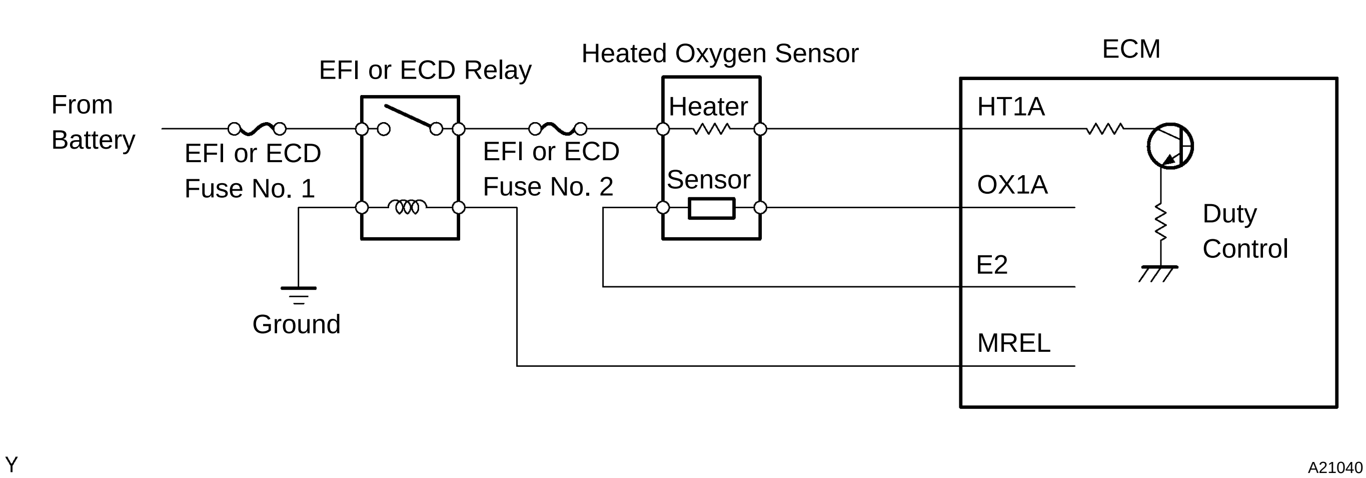
CIRCUIT DESCRIPTION

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 which 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 the ECM with feedback to control 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 (low voltage, i.e. less than 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 heated oxygen sensor informs the ECM of the RICH condition (high voltage, i.e. more than 0.45 V). The ECM judges by the voltage output 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 voltage, this disables the ECM for performing an 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.



HINT:
The ECM provides a pulse width modulated control circuit to adjust current through the heater. The heated oxygen sensor heater circuit uses a relay on the B+ side of the circuit.

Reference (Bank 1 Sensor 1 System Drawing) :



DTC No.	DTC Detecting Condition	Trouble Area
P0031 P0037 P0051 P0057	Heater current is 0.25 A or less when the heater operates with more than 10.5 V positive battery voltage	★Open in heater circuit of heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★ECM
P0032 P0038 P0052 P0058	When heater operates, heater current exceeds 2.0 A	★Short in heater circuit of heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★ECM

HINT:

★ Bank 1 refers to bank the includes cylinder No. 1.
★ Bank 2 refers to bank that does not includes cylinder No. 1.
★ Sensor 1 refers to the sensor closer to the engine assembly.
★ Sensor 2 refers to the sensor farther away from the engine assembly.

MONITOR DESCRIPTION

The sensing portion of the heated oxygen sensor has a zirconia element which is used to detect oxygen concentration in the exhaust. If the zirconia element is at the proper temperature and difference of the oxygen concentration between the inside and outside surface of sensor is large, the zirconia element will generate voltage signals. In order to increase the oxygen concentration detecting capacity in the zirconia element, the ECM supplements the heat from the exhaust with heat from a heating element inside the sensor. When current in the sensor is out of the standard operating range, the ECM interprets this as a fault in the heated oxygen sensor and sets a DTC.

Example:

The ECM will set a high current DTC if the current in the sensor is more than 2.0 A when the heater is OFF. Similarly, the ECM will set a low current DTC if the current is less than 0.25 A when the heater is ON.

MONITOR STRATEGY

Related DTCs	P0031	Heated oxygen sensor heater current bank 1 sensor 1 (Low current)
	P0032	Heated oxygen sensor heater current bank 1 sensor 1 (High current)
	P0037	Heated oxygen sensor heater current bank 1 sensor 2 (Low current)
	P0038	Heated oxygen sensor heater current bank 1 sensor 2 (High current)
	P0051	Heated oxygen sensor heater current bank 2 sensor 1 (Low current)
	P0052	Heated oxygen sensor heater current bank 2 sensor 1 (High current)
	P0057	Heated oxygen sensor heater current bank 2 sensor 2 (Low current)
	P0058	Heated oxygen sensor heater current bank 2 sensor 2 (High current)
Required sensors/components	Main sensors/components	Heated oxygen sensor
	Related sensors/components	Vehicle speed sensor
Frequency of operation	Continuous	
Duration	0.3 sec.	
MIL operation	P0031, P0037, P0051, P0057: 1 driving cycle	
	P0032, P0038, P0052, P0058: Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
P0031, P0037, P0051, P0057 (Low current):		
Either of the following conditions is met:	A or B	
A. Following conditions are met:	1, 2, 3, 4 and 5	
1. Time after engine start	250 sec.	500 sec.
2. Battery voltage	10.5 V	-
3. Vehicle speed	-	90 km/h (56 mph)
4. Misfire	Not detected	
5. Pass/Fail detection in this driving cycle	Not detected	
B. Following conditions are met:	1, 2, 3, 4 and 5	
1. Time after engine start	500 sec.	-
2. Battery voltage	10.5 V	-
3. Vehicle speed	40 km/h (25 mph)	-
4. Misfire	Not detected	
5. Pass/Fail detection in this driving cycle	Not detected	
P0032, P0038, P0052, P0058 (High current):		
Intrusive heating is OFF		

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0031, P0037, P0051, P0057 (Low current):	
Heated oxygen sensor heater current	Less than 0.25 A (at 0.3 sec. after heater "ON")
P0032, P0038, P0052, P0058 (High current):	
Heated oxygen sensor heater current	More than 2.0 A (while intrusive heating is OFF)

COMPONENT OPERATING RANGE

Parameter	Standard Value
Heated oxygen sensor heater current under the following conditions: (a) Engine has been warmed up (b) Engine is idling (c) Battery voltage is 11 to 14 V	0.4 to 1.0 A

MONITOR RESULT

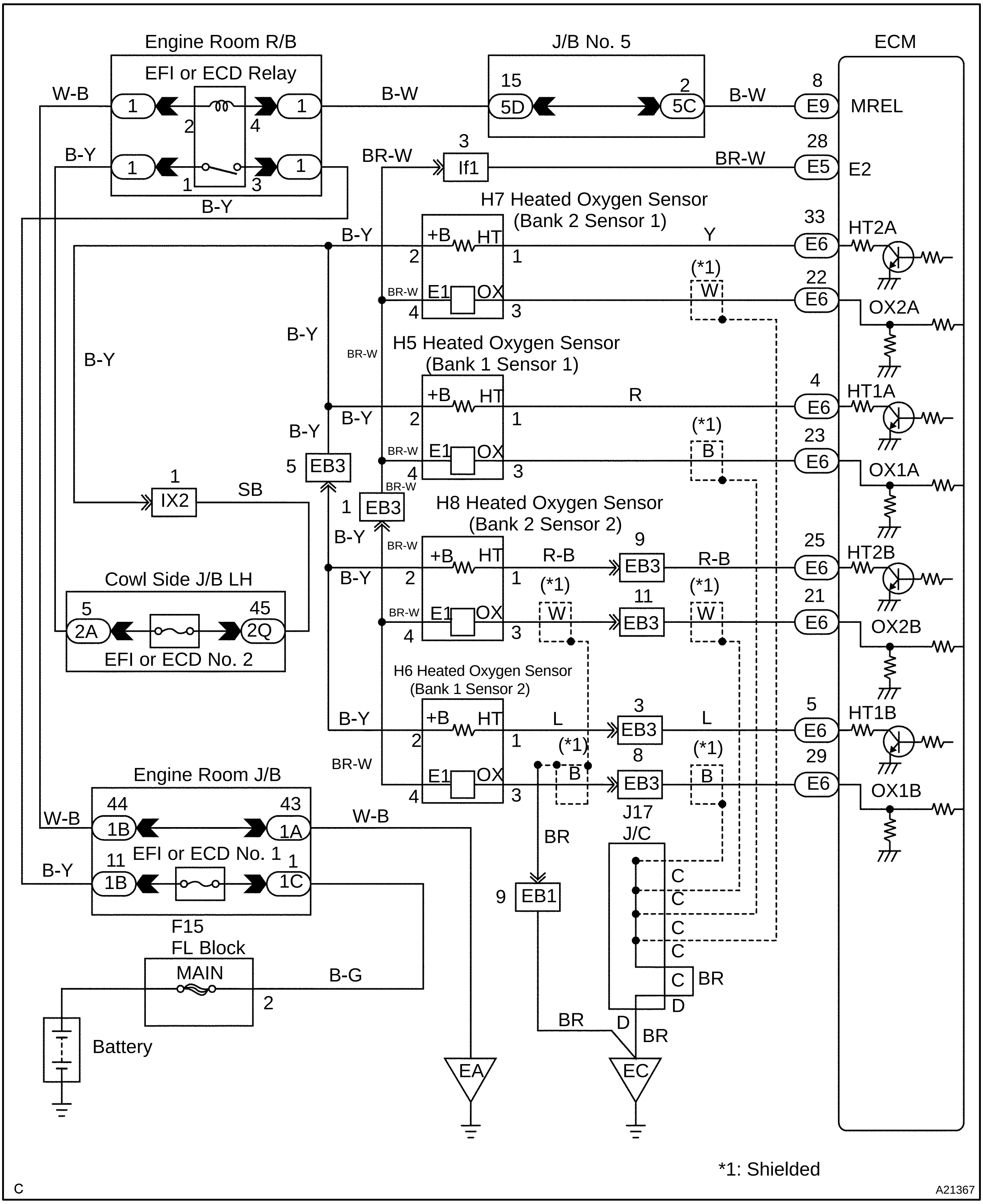
The detailed information is described in "CHECKING MONITOR STATUS" (see page DI-3).

★ TID (Test Identification) is assigned to each emission-related component.
★ TLT (Test Limit Type):
If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
★ CID (Component Identification) is assigned to each test value.
★ Unit Conversion is used to calculate the test value indicated on generic OBD scan tools.

TID $04: HO2S Heater

TLT	CID	Unit Conversion	Description of Test Value	Description of Test Limit
1	$01	Multiply by 0.000076 (A)	Maximum HO2S heater current (bank 1 sensor 1)	Malfunction criterion
1	$02	Multiply by 0.000076 (A)	Maximum HO2S heater current (bank 1 sensor 2)	Malfunction criterion
1	$10	Multiply by 0.000076 (A)	Maximum HO2S heater current (bank 2 sensor 1)	Malfunction criterion
1	$20	Multiply by 0.000076 (A)	Maximum HO2S heater current (bank 2 sensor 2)	Malfunction criterion

WIRING DIAGRAM

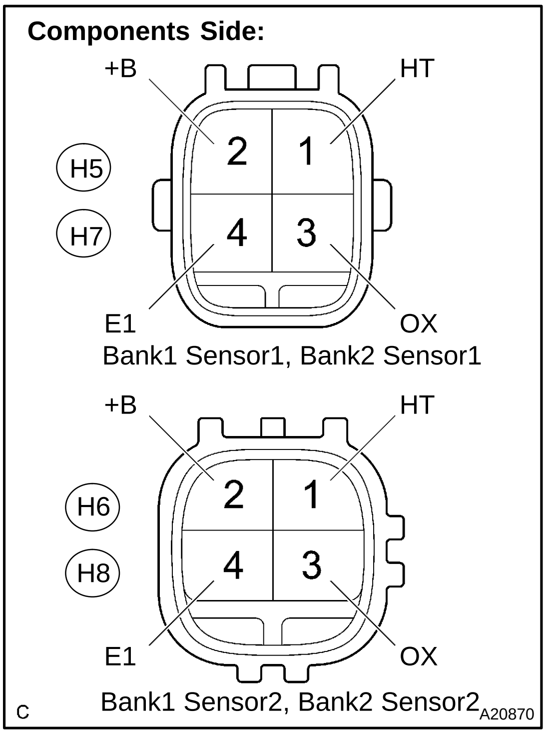


INSPECTION PROCEDURE

HINT:

Read freeze frame data using 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 to determine whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Check resistance of heated oxygen sensor heater.**



PREPARATION:

Disconnect the H5, H6, H7 or H8 heated oxygen sensor connector.

CHECK:

Measure resistance between terminals of the heated oxygen sensor.

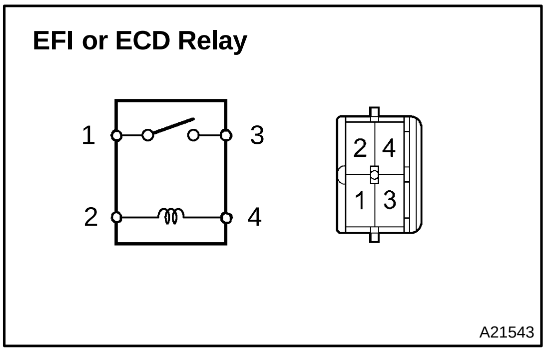
OK:

Tester Connection	Specified Condition
HT (H5-1) - +B (H5-2)	11 to 16 Ω (20°C)
HT (H6-1) - +B (H6-2)	11 to 16 Ω (20°C)
HT (H7-1) - +B (H7-2)	11 to 16 Ω (20°C)
HT (H8-1) - +B (H8-2)	11 to 16 Ω (20°C)

NG	**Replace heated oxygen sensor.**

OK

2	Check EFI or ECD relay.



PREPARATION:
Remove the EFI or ECD relay from the engine room R/B.

CHECK:
Inspect the EFI or ECD relay.

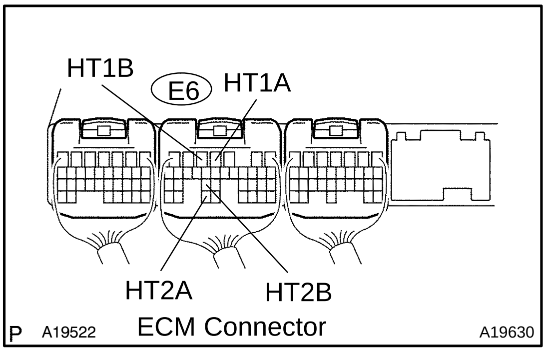
OK:

Terminal No.	Condition	Specified Condition
2 - 4	Constant	Continuity
1 - 3	Usually	No Continuity
	Apply B+ between terminals 2 and 4	Continuity

NG → **Replace EFI or ECD relay.**

OK

3	Check voltage between terminals HT1A, HT2A, HT1B, HT2B of ECM connectors and body ground.



PREPARATION:
Turn the ignition switch ON.

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

HINT:
- ★ Connect terminal HT1A to the bank 1 sensor 1.
- ★ Connect terminal HT1B to the bank 1 sensor 2.
- ★ Connect terminal HT2A to the bank 2 sensor 1.
- ★ Connect terminal HT2B to the bank 2 sensor 2.

OK:

Tester Connection	Specified Condition
HT1A (E6-4) - Body ground	9 to 14 V
HT1B (E6-5) - Body ground	9 to 14 V
HT2A (E6-33) - Body ground	9 to 14 V
HT2B (E6-25) - Body ground	9 to 14 V

OK → **Replace ECM (See page SF-60).**

NG

Check and repair harness or connector between EFI or ECD relay and heated oxygen sensor, and heated oxygen sensor and ECM (See page IN-36).

DIC23-01

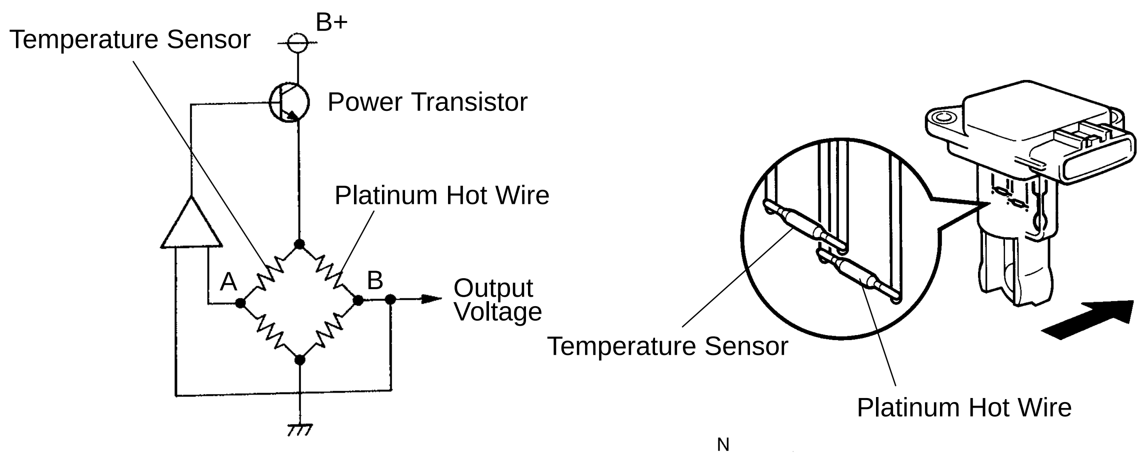
DTC	P0100	Mass or Volume Air Flow Circuit

DTC	P0102	Mass or Volume Air Flow Circuit Low Input

DTC	P0103	Mass or Volume Air Flow Circuit High Input

CIRCUIT DESCRIPTION

The Mass Air Flow (MAF) meter measures the amount of air flowing through the throttle valve. The ECM uses this information to determine the fuel injection time and provide a proper air fuel ratio. Inside the MAF meter, there is a heated platinum wire exposed to the flow of intake air.
By applying a specific current to the wire, the ECM heats this wire to a given temperature. The flow of incoming air cools the wire and an internal thermistor, affecting their resistance. To maintain a constant current value, the ECM varies the voltage applied to these components in the MAF meter. The voltage level is proportional to the airflow through the sensor. The ECM interprets this voltage as the intake air amount.
The circuit is constructed so that the platinum hot wire and temperature sensor provide a bridge circuit, with the power transistor controlled so that the potential of A and B remains equal to maintain the set temperature.



FI6929
A09074
A09707

DTC No.	DTC Detection Condition	Trouble Area
P0100	Open or short in mass air flow meter circuit for more than 3 sec.	★Open or short in mass air flow meter circuit ★Mass air flow meter ★ECM
P0102	Open or short in mass air flow meter circuit for more than 3 sec.	
P0103	Open in mass air flow meter circuit for more than 3 sec. (EVG circuit) Short in mass air flow meter circuit for more than 3 sec. (+B circuit)	

HINT:
After confirming DTC P0100, P0102 or P0103, use the hand-held tester or the OBD II scan tool to confirm the MAF ratio from the ALL menu (to reach the ALL menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL).

Mass Air Flow Value (gm/sec.)	Malfunction
Approx. 0.0	★Mass air flow meter power source circuit open ★VG circuit open or short
271.0 or more	★EVG circuit open

MONITOR DESCRIPTION

If there is a defect in the MAF (Mass Air Flow) meter or an open or short circuit, the voltage level will deviate outside the normal operating range. The ECM interprets this deviation as a defect in the MAF meter and sets a DTC.
Example:
When the MAF meter voltage output is less than 0.2 V, or more than 4.9 V, and if either the condition continues for more than 3 sec.

MONITOR STRATEGY

Related DTCs	P0100	Mass air flow meter circuit range check (Fluttering)
	P0102	Mass air flow meter circuit range check (Low voltage)
	P0103	Mass air flow meter circuit range check (High voltage)
Required sensors/components	Mass air flow meter	
Frequency of operation	Continuous	
Duration	3 sec.	
MIL operation	Immediate (When engine speed is at less than 4,000 rpm) 2 driving cycles (When engine speed is at 4,000 rpm or more)	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)
The typical enabling condition is not available	-

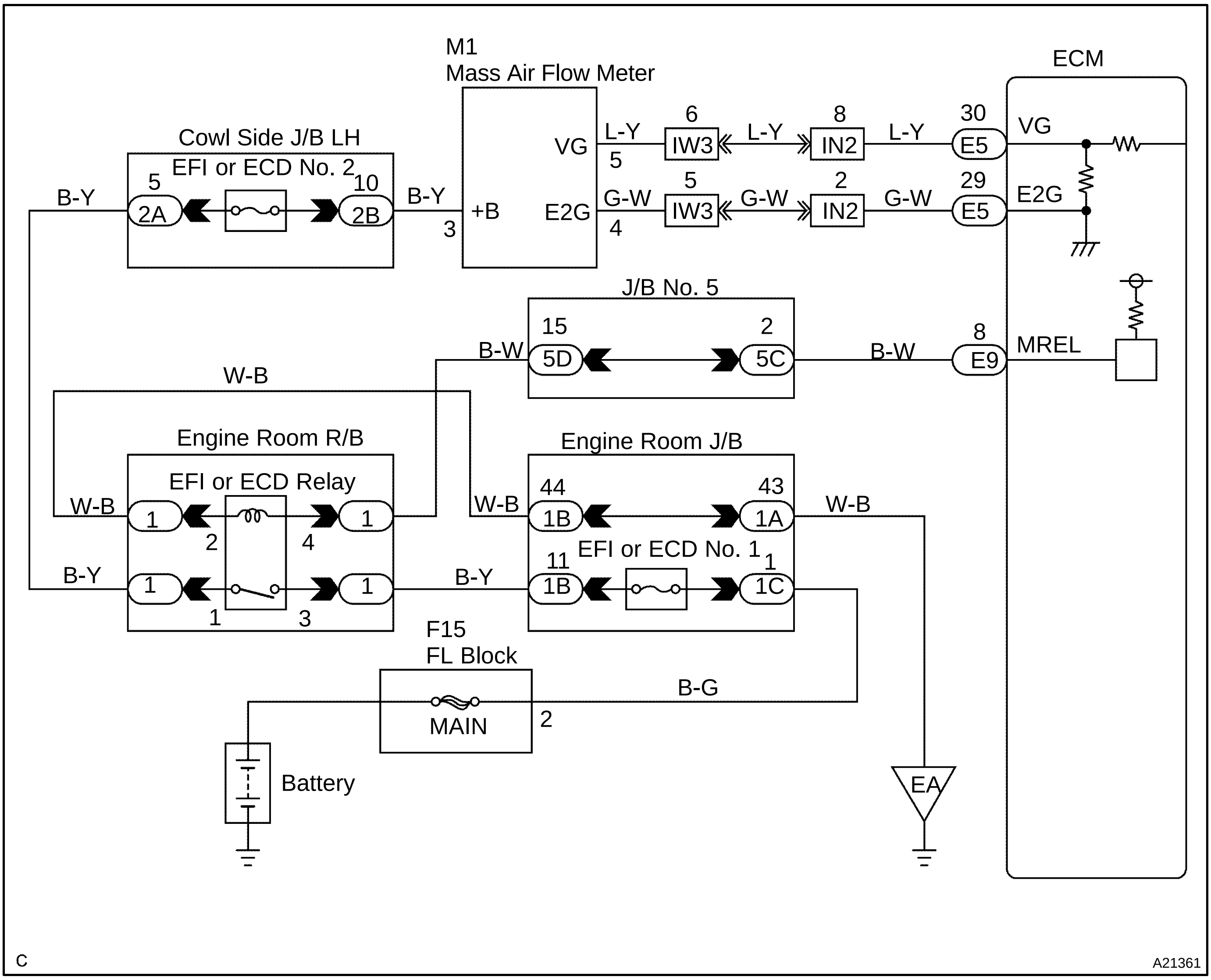
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0100:	
Mass air flow meter voltage	Less than 0.2 V or more than 4.9 V
P0102:	
Mass air flow meter voltage	Less than 0.2 V
P0103:	
Mass air flow meter voltage	More than 4.9 V

COMPONENT OPERATING RANGE

Parameter	Standard Value
Mass air flow meter voltage	0.4 to 2.2 V

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Connect OBD II scan tool or hand-held tester, and read value of mass air flow rate.**

PREPARATION:
(a) Connect the OBD II scan tool or hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the OBD II scan tool or the hand-held tester main switch ON.
(c) Start the engine.
(d) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / MAF.

CHECK:
Read the mass air flow rate on the OBD II scan tool or the hand-held tester.

RESULT:

Air Flow Rate (gm/s)	Proceed to
0.0	A
271.0 or more	B
Between 1 and 270.0 (*1)	C

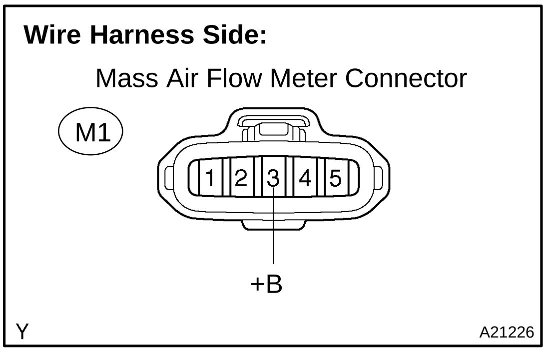
*1: The value must be changed when the throttle valve is opened or closed.

B — **Go to step 6.**

C — **Check for intermittent problems (See page DI-3).**

A

2	Check voltage of mass air flow meter power source.



PREPARATION:

(a) Disconnect the M1 mass air flow meter connector.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminal of the mass air flow meter connector and body ground.

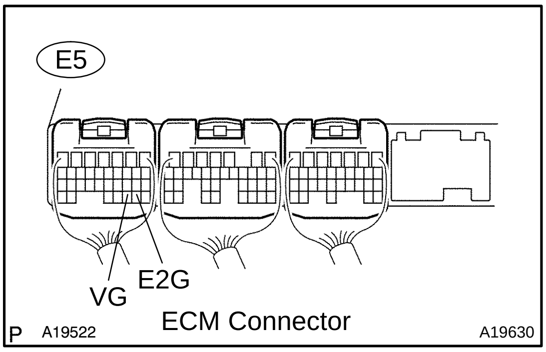
OK:

Tester Connection	Specified Condition
+B (M1-3) - Body ground	9 to 14 V

NG Go to step 5.

OK

3	Check voltage between terminal VG of ECM connector and body ground.



PREPARATION:

Start the engine.

CHECK:

Measure the voltage between the specified terminal of the E5 ECM connector.

HINT:

The shift position should be P or N and the A/C switch should be turned OFF.

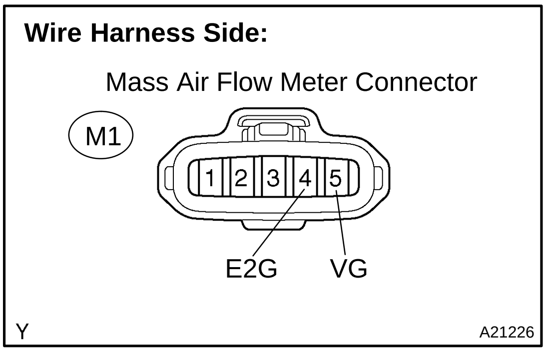
OK:

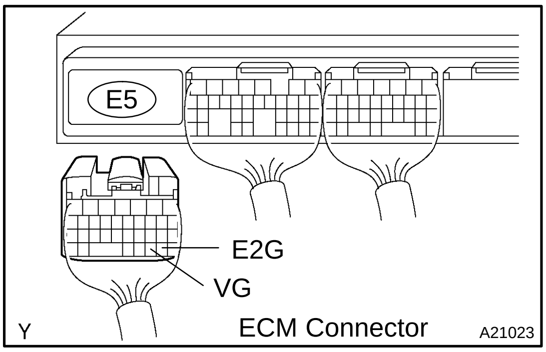
Tester Connection	Condition	Specified Condition
VG (E5-30) - E2G (E5-29)	Engine is idling	0.5 to 3.0 V

OK Replace ECM (See page SF-60).

NG

4	Check for open and short in harness and connector between mass air flow meter and ECM.





PREPARATION:

(a) Disconnect the M1 mass air flow meter connector.
(b) Disconnect the E5 ECM connector.

CHECK:

Check the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
VG (M1-5) - VG (E5-30)	Below 1 Ω
E2G (M1-4) - E2G (E5-29)	Below 1 Ω
VG (M1-5) or VG (E5-30) - Body ground	10 kΩ or higher

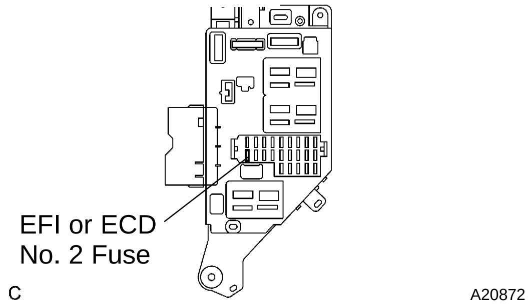
NG → **Repair or replace harness or connector.**

OK

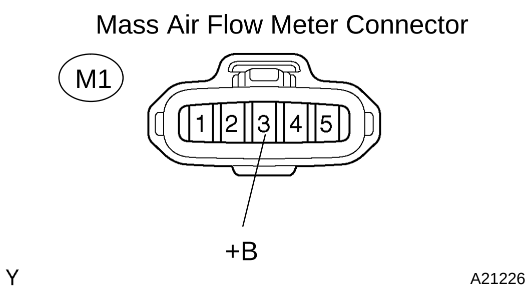
Replace mass air flow meter.

5	**Check for open and short in harness and connector between mass air flow meter and EFI or ECD relay.**

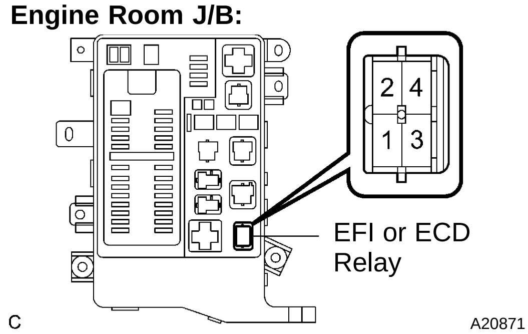
Cowl Side J/B LH:



Wire Harness Side:



Engine Room J/B:



Check EFI or ECD No. 2 fuse:

PREPARATION:

Remove the EFI or ECD No. 2 fuse from the cowl side J/B LH.

CHECK:

Check for continuity in the EFI or ECD No. 2 fuse.

OK:

Continuity

Check harness and connector:

PREPARATION:

(a) Install the EFI or ECD No. 2 fuse.
(b) Disconnect the M1 mass air flow meter connector.
(c) Remove the EFI or ECD relay from the engine room R/B.

CHECK:

Check the resistance between the wire harness side connectors.

OK:

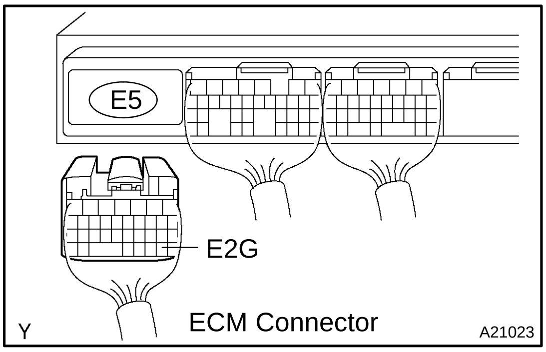
Tester Connection	Specified Condition
+B (M1-3) - Engine Room J/B (EFI or ECD relay terminal 1)	Below 1 Ω
+B (M1-3) or Engine room J/B (EFI or ECD relay terminal 1) - Body ground	10 kΩ or higher

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

OK

Check ECM power source circuit
(See page DI-345).

6	Check continuity between terminal E2G of ECM connector and body ground.



CHECK:

Check the resistance between terminal of the E5 ECM connector and body ground.

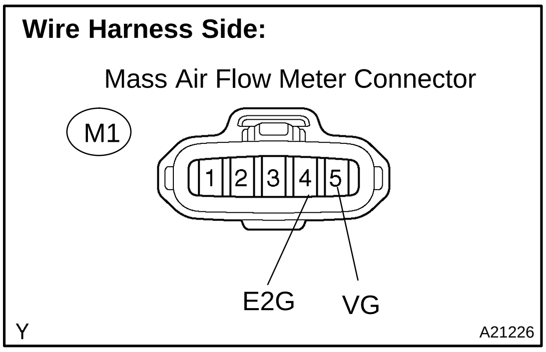
OK:

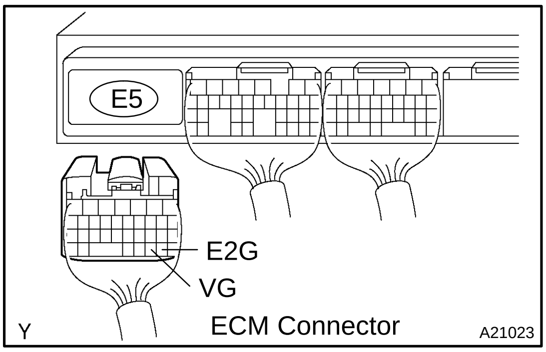
Tester Connection	Specified Condition
E2G (E5-29) - Body ground	Below 1 Ω

NG → **Replace ECM (See page SF-60).**

OK

7	Check for open in harness and connector between mass air flow meter and ECM.





PREPARATION:

(a) Disconnect the M1 mass air flow meter connector.

(b) Disconnect the E5 ECM connector.

CHECK:

Check the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
VG (M1-5) - VG (E5-30)	Below 1 Ω
E2G (M1-4) - E2G (E5-29)	Below 1 Ω
VG (M1-5) or VG (E5-30) - Body ground	10 kΩ or higher
E2G (M1-4) or E2G (E5-29) - Body ground	10 kΩ or higher

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

OK

Replace mass air flow meter.

DI1LC-17

DTC	P0101	Mass or Volume Air Flow Circuit Range/ Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0100, P0102 and P0103 on page DI-57 .

DTC No.	DTC Detecting Condition	Trouble Area
P0101	After engine is warmed up, conditions (a), (b), (c) and (d) continue for more than 10 seconds: (2 trip detection logic) (a) Throttle valve fully closed (b) Voltage output of the mass air flow meter is more than 2.2 V. (c) Engine coolant temperature is more than 70 ˚C (158 ˚F). (d) Engine speed is less than 900 rpm.	★Mass air flow meter
	Conditions (a), (b) and (c) continue for more than 6 seconds with engine speed: (2 trip detection logic) (a) Engine speed is more than 0 rpm. (b) VTA is more than 0.1 V. (c) Voltage output of the mass air flow meter is less than 0.25 V.	

MONITOR DESCRIPTION

The MAF (Mass Air Flow) meter helps the ECM calculate the amount of air flowing through the throttle valve. The ECM uses this information to determine the fuel injection time and provide a proper air fuel ratio. Inside the MAF meter, there is a heated platinum wire exposed to the flow of intake air. By applying a specific current to the wire, the ECM heats this wire to a given temperature. The flow of incoming air cools the wire and an internal thermistor, affecting their resistance. To maintain a constant current value, the ECM varies the voltage applied to these components in the MAF meter. The voltage level is proportional to the air flow through the MAF meter. The ECM interprets this voltage as the intake air amount. If there is a defect in the MAF meter or an open or short circuit, the voltage level will deviate outside the normal operating range. The ECM interprets this deviation as a defect in the MAF meter and sets a DTC.
Example:
If the voltage is more than 2.2 V at idle or less than 0.25 V at idle OFF, the ECM interprets this as a defect in the MAF meter and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0101	Mass air flow meter rationality
Required sensors/components	Main sensors/components	Mass air flow meter
	Related sensors/components	Engine speed sensor, Engine coolant temperature sensor, Throttle position sensor
Frequency of operation	Continuous	
Duration	10 sec. (High voltage) 6 sec. (Low voltage)	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
High voltage:		
Engine speed	-	900 rpm
Idle	ON	
Engine coolant temperature	70°C (158°F)	-
Low voltage:		
Engine speed	0 rpm	-
Throttle position	0.1 V	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Mass air flow meter voltage (High voltage)	More than 2.2 V
Mass air flow meter voltage (Low voltage)	Less than 0.25 V

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Are there any other codes (besides DTC P0101) being output?**

PREPARATION:
(a) Connect the hand-held tester or the OBD II scan tool to DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:
Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC output)	Proceed to
”P0101” and other DTCs	A
Only P0101	B

HINT:
If any other codes besides P0101 are output, perform the troubleshooting for those codes first.

B → **Replace mass air flow meter.**

A

Go to relevant DTC chart (See page DI-36).

DI1LE-13

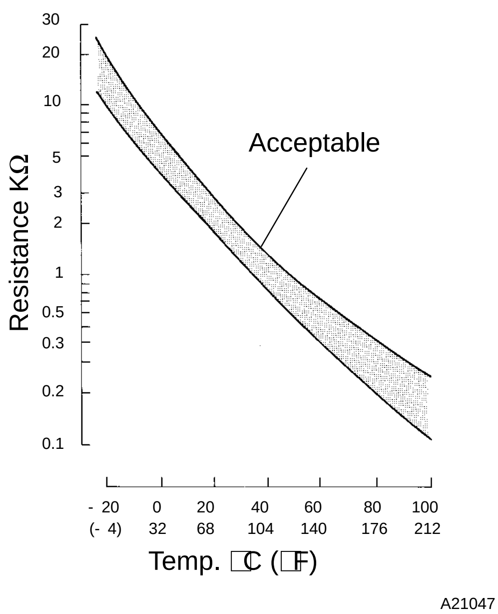
DTC	P0110	Intake Air Temperature Circuit

DTC	P0112	Intake Air Temperature Circuit Low Input

DTC	P0113	Intake Air Temperature Circuit High Input

CIRCUIT DESCRIPTION

(Fig.1)



The intake air temperature (IAT) sensor, mounted on the mass air flow (MAF) meter, monitors the intake air temperature. The IAT sensor has a thermistor that varies its resistance depending on the temperature of the intake air. When the air temperature is low, the resistance in the thermistor increases. When the temperature is high, the resistance drops. The variations in resistance are reflected as voltage changes to the ECM terminal. (See Fig. 1).

The intake air temperature sensor is connected to the ECM (See below). The 5 V power source voltage in the ECM is applied to the intake air temperature sensor from terminal THA (THAR) 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 voltage at terminal THA (THAR) also changes. Based on this signal, the ECM increases the fuel injection volume to improve the driveability during cold engine operation.

DTC No.	Proceed to	DTC Detection Condition	Trouble Area
P0110	Step 1	Open or short in intake air temperature sensor circuit for 0.5 sec.	★Open or short in intake air temperature sensor circuit ★Intake air temperature sensor (built in mass air flow meter) ★ECM
P0112	Step 4	Short in intake air temperature sensor circuit for 0.5 sec.	
P0113	Step 2	Open in intake air temperature sensor circuit for 0.5 sec.	

HINT:

After confirming DTC ”P0110, P0112 or P0113”, use the hand-held tester or the OBD II scan tool to confirm the intake air temperature in the ”DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL”.

Temperature Displayed	Malfunction
-40 °C (-40°F)	Open circuit
140°C (284°F) or more	Short circuit

MONITOR DESCRIPTION

The ECM monitors the sensor voltage and uses this value to calculate the intake air temperature. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a fault in the IAT (Intake Air Temperature) sensor and sets a DTC.
Example:
When the sensor voltage output equal to -40°C (-40°F), or more than 140°C (284°F).

MONITOR STRATEGY

Related DTCs	P0110	Intake air temperature sensor range check (Fluttering)
	P0112	Intake air temperature sensor range check (Low resistance)
	P0113	Intake air temperature sensor range check (High resistance)
Required sensors/components	Intake air temperature sensor	
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)
The typical enabling condition is not available	-

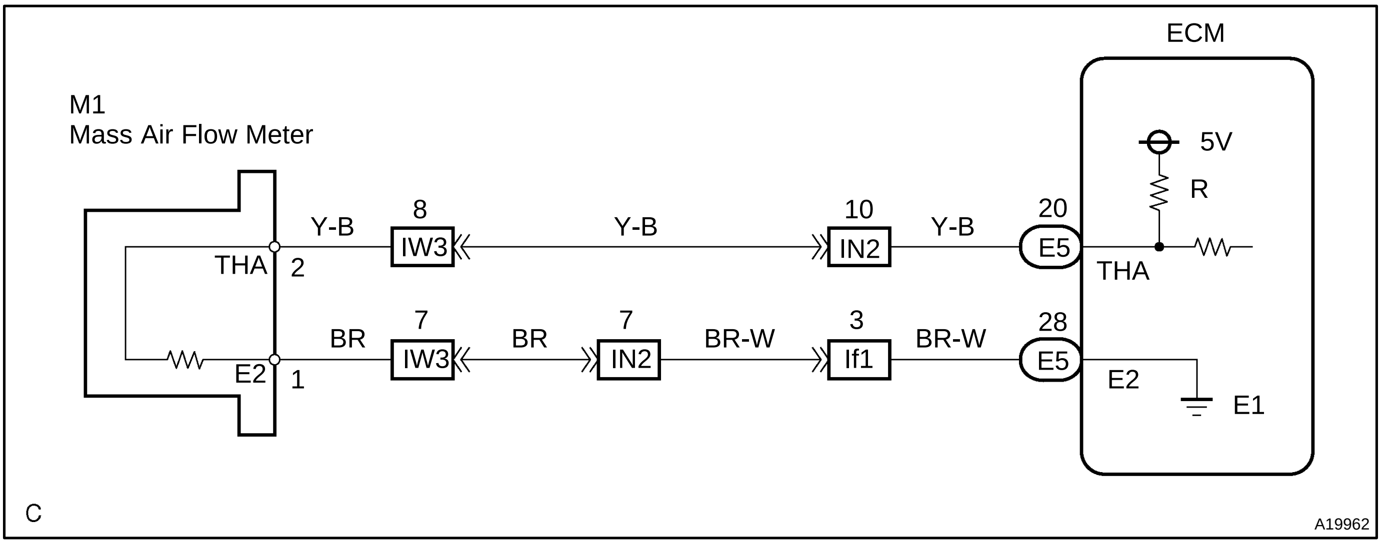
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0110:	
Intake air temperature sensor resistance (Intake air temperature)	Less than 98.5 Ω, or more than 156 kΩ (More than 140°C (284°F), or less than -40°C (-40°F)
P0112:	
Intake air temperature sensor resistance (Intake air temperature)	Less than 98.5 Ω (More than 140°C (284°F))
P0113:	
Intake air temperature sensor resistance (Intake air temperature)	More than 156 kΩ (Less than -40°C (-40°F))

COMPONENT OPERATING RANGE

Parameter	Standard Value
Intake air temperature sensor resistance	98.5 Ω (140°C (284°F)) to 156 kΩ (-40 °C (-40°F))

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

★ If DTCs related to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.

★ Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

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

PREPARATION:

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

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

(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR.

CHECK:

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

OK:

Same as actual intake air temperature.

RESULT:

Temperature Displayed	Proceed to
-40 °C (-40°F)	A
140°C (284°F) or more	B
OK (Same as present temperature)	C

HINT:

★ If there is an open circuit, the OBD II scan tool or the hand-held tester indicates -40°C (-40 °F).

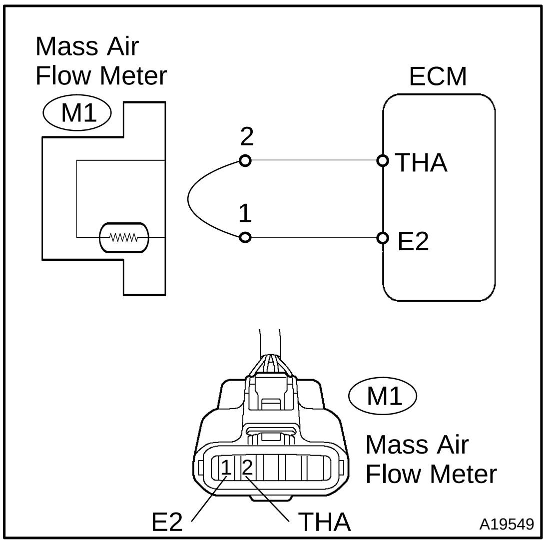
★ If there is a short circuit, the OBD II scan tool or the hand-held tester indicates 140°C (284°F) or more.

B	**Go to step 4.**

C	**Check for intermittent problems (See page DI-3).**

A

2	Check for open in harness or ECM.



PREPARATION:

(a) Disconnect the M1 mass air flow meter connector.

(b) Connect terminals 1 and 2 of the mass air flow meter wire harness side connector.

(c) Turn the ignition switch ON.

(d) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR.

CHECK:

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

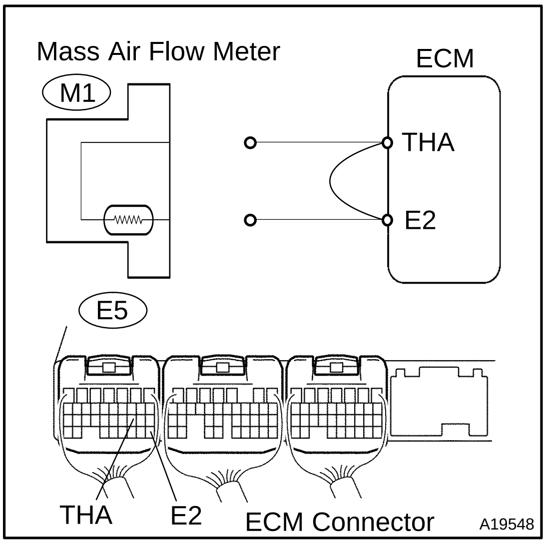
OK:

Temperature 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) Connect terminals THA and E2 of the E5 ECM connector.

HINT:

Before checking, do a visual and contact pressure checks for the ECM connector.

(b) Turn the ignition switch ON.

(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR.

CHECK:

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

OK:

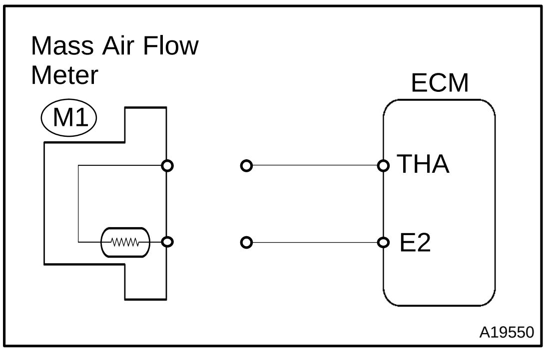
Temperature value: 140°C (284°F) or more

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

NG

Confirm good connection at ECM. If OK, check and replace ECM (See page SF-60).

4	**Check for short in harness and ECM.**



PREPARATION:

(a) Disconnect the M1 mass air flow meter connector.

(b) Turn the ignition switch ON.

(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR.

CHECK:

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

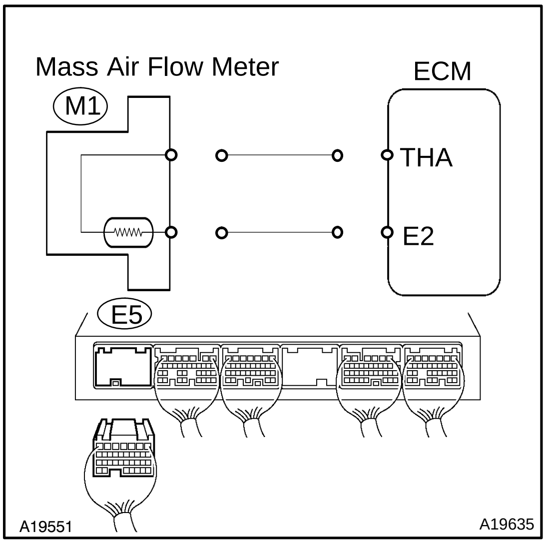
OK:

Temperature value: -40°C (-40°F)

OK	**Replace mass air flow meter.**

NG

5	**Check for short in harness or ECM.**



PREPARATION:

(a) Disconnect the E5 ECM connector.

(b) Turn the ignition switch ON.

(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR.

CHECK:

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

OK:

Temperature value: -40°C (-40°F)

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

NG

Replace ECM (See page SF-60).

DI1LF-13

DTC	P0115	Engine Coolant Temperature Circuit

DTC	P0117	Engine Coolant Temperature Circuit Low Input

DTC	P0118	Engine Coolant Temperature Circuit High Input

CIRCUIT DESCRIPTION

A thermistor is built in the Engine Coolant Temperature (ECT) sensor and changes the resistance value according to the engine coolant temperature.
The structure of the sensor and connection to the ECM is the same the Intake Air Temperature (IAT) sensor.
HINT:
If the ECM detects the DTC ”P0115, P0117 or P0118”, it operates the fail-safe function in which the ECT is assumed to be 80 °C (176 °F).

DTC No.	Proceed to	DTC Detection Condition	Trouble Area
P0115	Step 1	Open or short in engine coolant temperature sensor circuit for 0.5 sec.	★Open or short in engine coolant temperature sensor circuit ★Engine coolant temperature sensor ★ECM
P0117	Step 4	Short in engine coolant temperature sensor circuit for 0.5 sec.	
P0118	Step 2	Open in engine coolant temperature sensor circuit for 0.5 sec.	

HINT:
After confirming DTC ”P0115, P0117 or P0118,” use the OBD II scan tool or the hand-held tester to confirm the engine coolant temperature from the DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL.

Temperature Displayed	Malfunction
-40 °C (-40°F)	Open circuit
140°C (284°F) or more	Short circuit

MONITOR DESCRIPTION

The ECT (Engine Coolant Temperature) sensor is used to monitor the engine coolant temperature. The ECT sensor has a thermistor that varies its resistance depending on the temperature of the engine coolant. When the coolant temperature is low, the resistance in the thermistor increases. When the temperature is high, the resistance drops. The variations in resistance are reflected in the voltage output from the sensor.
The ECM monitors the sensor voltage and uses this value to calculate the engine coolant temperature. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a fault in the ECT sensor and sets a DTC.
Example:
When the ECM calculates that the ECT is less than -40°C (-40°F), or more than 140°C (284°F), and if either the condition continues for 0.5 sec. or more, the ECM will set a DTC.

MONITOR STRATEGY

Related DTCs	P0115	Engine coolant temperature sensor range check (Fluttering)
	P0117	Engine coolant temperature sensor range check (Low resistance)
	P0118	Engine coolant temperature sensor range check (High resistance)
Required sensors/components	Engine coolant temperature sensor	
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)
The typical enabling condition is not available	-

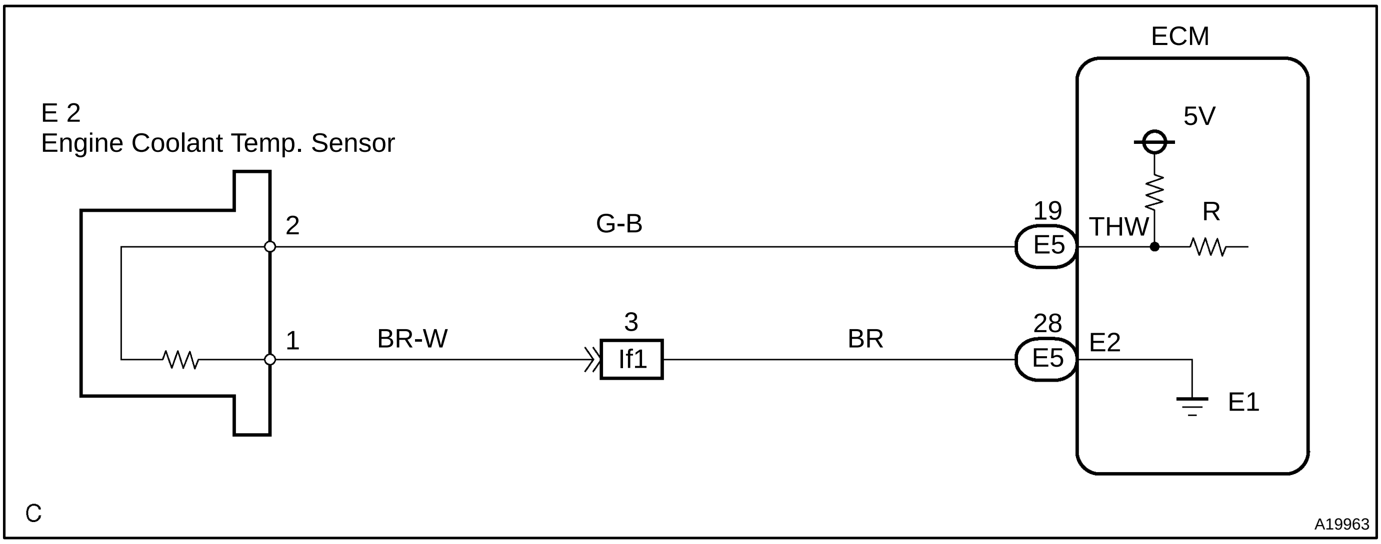
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0115:	
Engine coolant temperature sensor resistance (Coolant temperature)	Less than 79 Ω or more than 156 kΩ (More than 140°C (284°F) or less than -40°C (-40°F))
P0117:	
Engine coolant temperature sensor resistance (Coolant temperature)	Less than 79 Ω (More than 140°C (284°F))
P0118:	
Engine coolant temperature sensor resistance (Coolant temperature)	More than 156 kΩ (Less than -40°C (-40°F))

COMPONENT OPERATING RANGE

Parameter	Standard Value
Engine coolant temperature sensor resistance	79 Ω (140°C (284°F)) to 156 kΩ (-40 °C (-40°F))

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

★ If DTCs related to different system that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.

★ Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

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

PREPARATION:

(a) Connect the OBD II scan tool or the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the OBD II scan tool or hand-held tester main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

CHECK:

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

OK:

Same value as actual engine coolant temperature.

RESULT:

Temperature Displayed	Proceed to
-40 °C (-40°F)	A
140°C (284°F) or more	B
OK (Same as present temperature)	C

HINT:

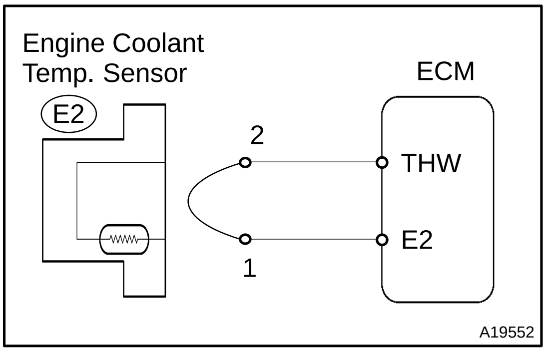
★ If there is an open circuit, OBD II scan tool or hand-held tester indicates -40°C (-40°F).
★ If there is a short circuit, OBD II scan tool or hand-held tester indicates 140°C (284°F) or more.

B → **Go to step 4.**

C → **Check for intermittent problems (See page DI-3).**

A

2	Check for open in harness or ECM.



PREPARATION:

(a) Disconnect the E2 engine coolant temperature (ECT) sensor connector.

(b) Connect terminals 1 and 2 of the engine coolant temperature sensor wire harness side connector.

(c) Turn the ignition switch ON.

(d) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

CHECK:

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

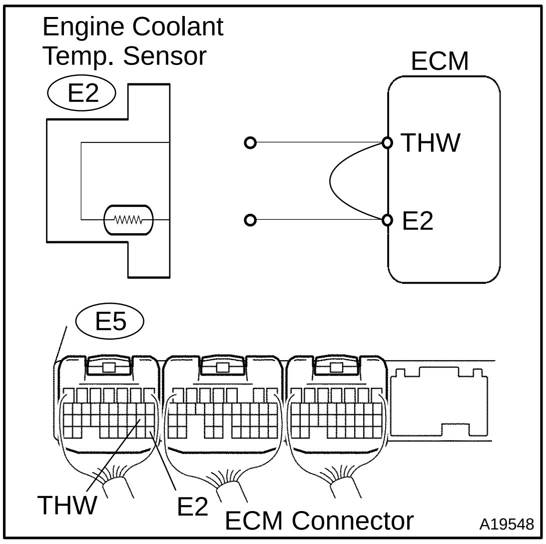
OK:

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

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

NG

3	Check for open in harness or ECM.



PREPARATION:

(a) Disconnect the E2 engine coolant temperature sensor connector.

(b) Connect terminals THW and E2 of the E5 ECM connector.

HINT:

Before checking, do a visual and contact pressure checks for the ECM connector.

(c) Turn the ignition switch ON.

(d) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

CHECK:

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

OK:

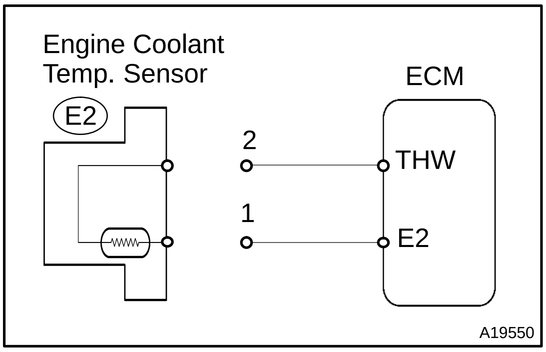
Temperature value: 140°C (284°F) or more

OK	Repair or replace harness or connector.

NG

Confirm good connection at ECM. If OK, check and replace ECM (See page SF-60).

4	Check for short in harness and ECM.



PREPARATION:

(a) Disconnect the E2 engine coolant temperature sensor connector.

(b) Turn the ignition switch ON.

(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

CHECK:

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

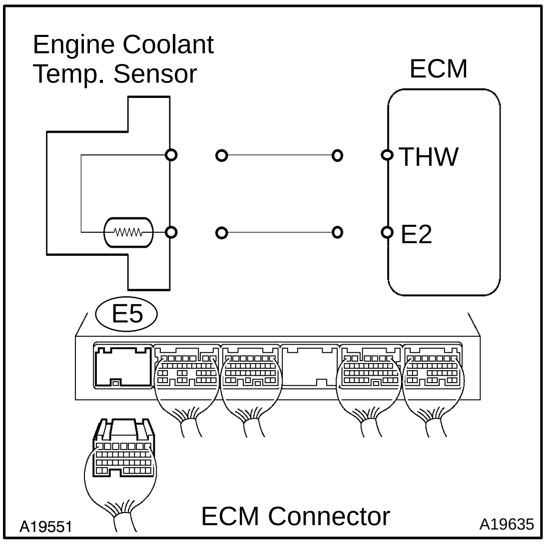
OK:

Temperature value: -40°C (-40°F)

OK	Replace engine coolant temperature sensor.

NG

5	**Check for short in harness or ECM.**



PREPARATION:

(a) Disconnect the E5 ECM connector.

(b) Turn the ignition switch ON.

(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

CHECK:

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

OK:

Temperature value: -40°C (-40°F)

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

NG

Replace ECM (See page SF-60).

DI1LG-15

DTC	P0116	Engine Coolant Temperature Circuit Range/ Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0115 on page DI–75.

DTC No.	DTC Detecting Condition	Trouble Area
P0116	If the engine coolant temperature was 35°C (95°F) or more but less than 60°C (140°F) when the engine is started, and if conditions (a) and (b) are met: (a) Vehicle has accelerated and decelerated. (b) Engine coolant temperature remains within 3°C (5.4°F) of the initial engine coolant temperature (2 trip detection logic)	★Engine coolant temperature sensor
	★If the engine coolant temperature is more than 60°C (140°F) when the engine is started and the vehicle has accelerated and decelerated ★If the engine coolant temperature sensor records a temperature variation below 1°C (1.8°F) successively 6 times (6 trip detection logic)	

MONITOR DESCRIPTION

The ECT (Engine Coolant Temperature) sensor is used to monitor the engine coolant temperature. The ECT sensor has a thermistor that varies its resistance depending on the temperature of the engine coolant. When the coolant temperature is low, the resistance in the thermistor increases. When the temperature is high, the resistance drops. The variations in resistance are reflected in the voltage output from the sensor. The ECM monitors the sensor voltage and uses this value to calculate the engine coolant temperature. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a fault in the ECT sensor and sets a DTC.
Examples:
(1) Upon starting the engine, the ECT is between 35°C (95°F) and 60°C (140°F). If after driving for 250 sec., the ECT still remains within 3°C (5.4°F) of the starting temperature, a DTC will be set (2 trip detection logic).
(2) Upon starting the engine, the ECT is over 60°C (140°F). If after driving for 250 sec., the ECT still remains within 1°C (1.8°F) of the starting temperature, a DTC will be set (6 trip detection logic).

MONITOR STRATEGY

Related DTCs	P0116	Engine coolant temperature sensor range check (Stuck)
Required sensors/components	Main sensors/components	Engine coolant temperature sensor
	Related sensors/components	Intake air temperature sensor, Crankshaft position sensor, Mass air flow meter
Frequency of operation	Continuous	
Duration	250 sec.	
MIL operation	2 driving cycles (When temperature is fixed between 35°C (95°F) and 60°C (140°F)) 6 driving cycles (When temperature is fixed at 60°C (140°F) or more)	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Case 1 (When temperature is fixed between 35°C (95°F) and 60°C (140°F)):		
Cumulative idle off period	250 sec.	-
Speed increase 30 km/h (19 mph) or more	10 times	-
Engine coolant temperature	35°C (95°F)	60°C (140°F)
Intake air temperature	-6.7 °C (20°F)	-
Case 2 (When temperature is fixed at 60°C (140°F) or more):		
Engine coolant temperature at engine start	60°C (140°F)	-
Intake air temperature	-6.7 °C (20°F)	-
Stop and go	Once or more (Stop for 20 sec. or more and accelerate to more than 70 km/h (43 mph) with in 40 sec.)	
Steady driving and stop *	Once or more	

*: Vehicle is driven by 65 km/h (40 mph) or more for 30 sec. or more and the vehicle speed reaches 70 km/h (44 mph). The vehicle is decelerated from 65 km/h (40 mph) to 3 km/h (2 mph) or less within 35 sec. and stopped for 10 sec.

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Case1 (When temperature is fixed between 35°C (95°F) and 60°C (140°F)):	
Change of engine coolant temperature value	Less than 3°C (5.4°F)
Case2 (When temperature is fixed at 60°C (140°F) or more):	
Change of engine coolant temperature value	1°C (1.8°F) or less

COMPONENT OPERATING RANGE

Standard Value
Engine coolant temperature changes with the actual engine coolant temperature.

INSPECTION PROCEDURE

HINT:

★ If DTC P0115, P0116, P0117, P0118 and P0125 are output simultaneously, ECT sensor circuit may be open or shorted. Perform the troubleshooting of DTC P0115, P0117 or P0118 first.

★ Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

Replace engine coolant temperature sensor.

DIC24-01

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

DTC	**P0122**	**Throttle/Pedal Position Sensor/Switch ”A” Circuit Low Input**

DTC	**P0123**	**Throttle/Pedal Position Sensor/Switch ”A” Circuit High Input**

DTC	**P0220**	**Throttle/Pedal Position Sensor/Switch ”B” Circuit**

DTC	**P0222**	**Throttle/Pedal Position Sensor/Switch ”B” Circuit Low Input**

DTC	**P0223**	**Throttle/Pedal Position Sensor/Switch ”B” Circuit High Input**

DTC	**P2135**	**Throttle/Pedal Position Sensor/Switch ”A”/”B” Voltage Correction**

HINT:
This is the purpose for the ”throttle position sensor”.

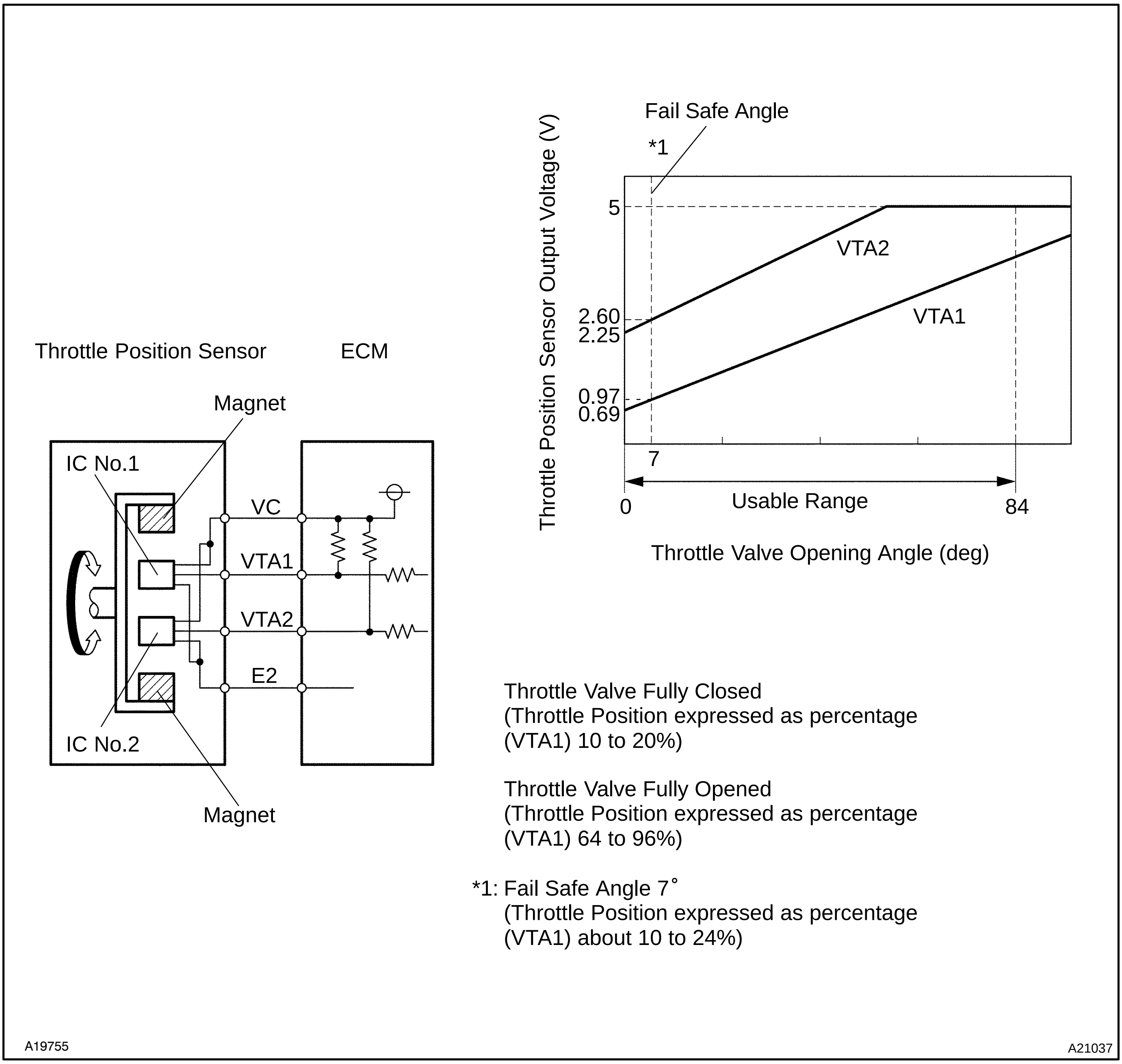
CIRCUIT DESCRIPTION

HINT:

★ This Electrical Throttle Control System (ETCS) does not use a throttle cable.
★ This throttle position sensor is a non-contact type.

The throttle position sensor is mounted on the throttle body and it detects the opening angle of the throttle valve. This sensor is electronically controlled and uses Hall-effect elements, so that accurate control and reliability can be obtained. The throttle position sensor has 2 sensor elements / signal outputs: VTA1 and VTA2. VTA1 used to detect the throttle opening angle and VTA2 is used to detect malfunctions in VTA1. Voltage applied to VTA1 and VTA2 change between 0V and 5V in proportion to the opening angle of the throttle valve. There are several checks that the ECM performs to confirm proper operation of the throttle position sensor and VTA1.

The ECM judges the current opening angle of the throttle valve from these signals input from terminals VTA1 and VTA2, and the ECM controls the throttle motor to make the throttle valve angle properly in response to driver inputs.



DTC No.	DTC Detection Condition	Trouble Area
Condition (a) of DTC P0120, P0122, P0123, P0220, P0222 or P0223 continues for 2 sec. (Open or short in the throttle control motor and sensor circuit)		
P0120	Detection conditions for DTCs P0122 and P0123 are not satisfied but condition (a) is satisfied (a) VTA1 is ”0.2 V or less” or VTA1 is ”4.8 V or more”	★Throttle control motor and sensor ★ECM
P0122	(a) VTA1 is 0.2 V or less	★Throttle control motor and sensor ★Short in VTA1 circuit ★Open in VC circuit ★ECM
P0123	(a) VTA1 is 4.8 V or more	★Throttle control motor and sensor ★Open in VTA1 circuit ★Open in E2 circuit ★VC and VTA1 circuit are short-circuited ★ECM
P0220	Detection conditions for DTCs P0222 and P0223 are not satisfied but condition (a) is satisfied (a) VTA2 is ”0.5 V or less” or VTA2 is ”4.8 V or more” and VTA1 is ”0.2 V or more” and VTA1 is ”1.8 V or less”	★Throttle control motor and sensor ★ECM
P0222	(a) VTA2 is 0.5 V or less	★Throttle control motor and sensor ★Short in VTA2 circuit ★Open in VC circuit ★ECM
P0223	(a) VTA2 is ”4.8 V or more” and VTA1 is ”0.2 V or more” and VTA1 is ”1.8 V or less”	★Throttle control motor and sensor ★Open in VTA2 circuit ★Open in E2 circuit ★VC and VTA2 circuit are short-circuited ★ECM
P2135	Condition (a) continues for 0.5 sec. or more, or condition (b) continues for 0.4 sec. or more: (a) Difference between VTA1 and VTA2 is 0.02 V or less (b) VTA1 is ”0.2 V or less” and VTA2 is ”0.5 V or less”	★VTA1 and VTA2 circuit are short-circuited ★Throttle control motor and sensor ★ECM

HINT:

★ After confirming DTCs, use the hand-held tester or the OBD II scan tool to confirm the throttle valve opening percentage and closed throttle position switch condition.

★ THROTTLE POS means VTA1 signal as well as the THROTTLE POS #2 for the VTA2 signal.

Reference (Normal condition):

Tester display	Accelerator pedal fully released	Accelerator pedal fully depressed
THROTTLE POS	10 to 24 %	66 to 98%
THROTTLE POS #2	2.1 to 3.1 V	4.5 to 5.5 V

MONITOR DESCRIPTION

The ECM uses throttle position sensor to monitor the throttle valve opening angle.

(a) There is a specific voltage difference expected between VTA1 and VTA2 for each throttle opening angle.

★ If the difference between VTA1 and VTA2 is incorrect the ECM interprets this as a fault and will set a DTC.

(b) VTA1 and VTA2 each have a specific voltage operating range.

★ If VTA1 or VTA2 is out of the normal operating range the ECM interprets this as a fault and will set a DTC.

(c) VTA1 and VTA2 should never be close to the same voltage levels.

★ If VTA1 is within 0.02 V of VTA2 the ECM interprets this as a short circuit in the throttle position sensor system and will set a DTC.

FAIL SAFE

If the ETCS (Electronic Throttle Control System) has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16°) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel infection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimum speed.

If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.

If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P0120	Throttle position sensor (sensor 1) range check (Fluttering)
	P0122	Throttle position sensor (sensor 1) range check (Low voltage)
	P0123	Throttle position sensor (sensor 1) range check (High voltage)
	P0220	Throttle position sensor (sensor 2) range check (Fluttering)
	P0222	Throttle position sensor (sensor 2) range check (Low voltage)
	P0223	Throttle position sensor (sensor 2) range check (High voltage)
	P2135	Throttle position sensor range check (Correlation)
Required sensors/components	Throttle position sensor	
Frequency of operation	Continuous	
Duration	2 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	See ”List of disable a monitor” (on page DI-3).
Throttle control motor power	ON

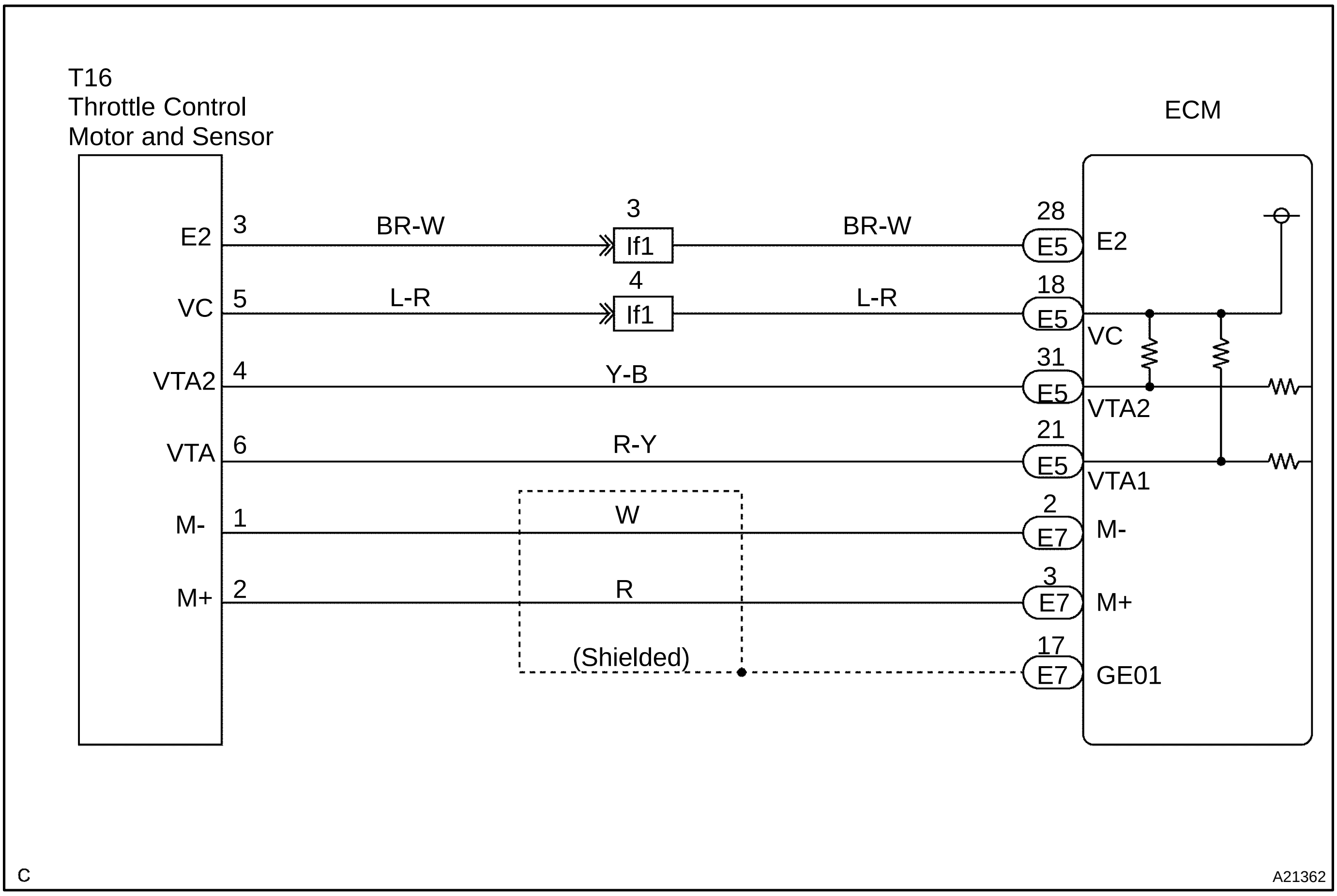
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0120:	
VTA1 voltage	0.2 V or less or 4.8 V or more (2 sec. or more)
P0122:	
VTA1 voltage	0.2 V or less (2 sec. or more)
P0123:	
VTA1 voltage	4.8 V or more (2 sec. or more)
P0220:	
VTA2 voltage	0.5 V or less or 4.8 V or more (2 sec. or more)
P0222:	
VTA2 voltage	0.5 V or less (2 sec. or more)
P0223:	
Both of the following conditions are met for 2 sec. or more:	A and B
A. VTA1 voltage	0.2 V or more and 1.8 V or less
B. VTA2 voltage	4.8 V or more
P2135:	
Different between VTA1 and VTA2 voltage	0.02 V or less
Both of the following conditions are met:	A and B
A. VTA1 voltage	0.2 V or less
B. VTA2 voltage	0.5 V or less

COMPONENT OPERATING RANGE

Parameter	Standard Value
Throttle position sensor VTA1 voltage	0.6 to 3.96 V
Throttle position sensor VTA2 voltage	2.25 to 5.0 V

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

★ If DTCs related to different system that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.

★ Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

Hand-held tester:

1	**Connect hand-held tester, and read the voltage for throttle position sensor data.**

PREPARATION:

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

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

(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / THROTTLE POS and THROTTLE POS #2.

CHECK:

Read voltage value displayed on the hand-held tester.

OK:

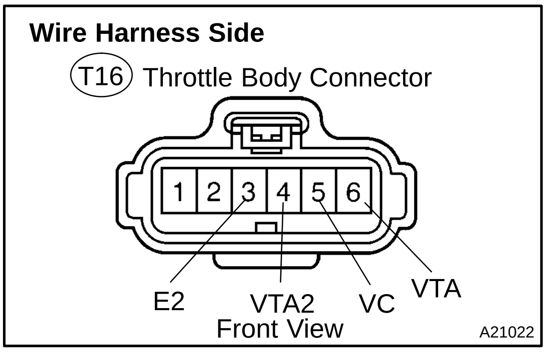
RESULT:

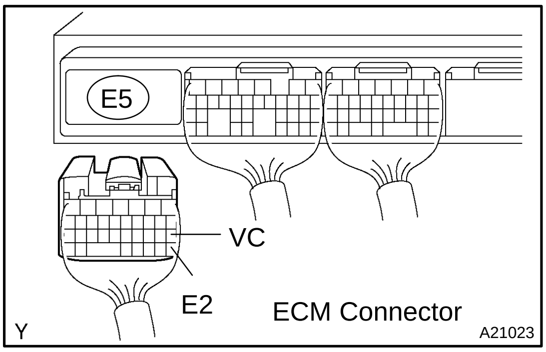
<table>
<tr><th colspan="4">Throttle position expressed as percentage and voltage</th><th rowspan="3">Trouble area</th><th rowspan="3">Proceed to</th></tr>
<tr><th colspan="2">Accelerator pedal released</th><th colspan="2">Accelerator pedal depressed</th></tr>
<tr><th>THROTTLE POS (VTA1)</th><th>THROTTLE POS #2 (VTA2)</th><th>THROTTLE POS (VTA1)</th><th>THROTTLE POS #2 (VTA2)</th></tr>
<tr><td>0 %</td><td>0 to 0.2 V</td><td>0 %</td><td>0 to 0.2 V</td><td>VC circuit open</td><td rowspan="4">A</td></tr>
<tr><td>100 %</td><td>4.5 to 5.5 V</td><td>100 %</td><td>4.5 to 5.5 V</td><td>E2 circuit open</td></tr>
<tr><td>0 % or 100 %</td><td>2.1 to 3.1 V (Fail safe)</td><td>0 % or 100 %</td><td>2.1 to 3.1 V (Fail safe)</td><td>VTA1 circuit open or ground short</td></tr>
<tr><td>about 16 % (Fail safe)</td><td>0 to 0.2 or 4.5 to 5.5 V</td><td>about 16 % (Fail safe)</td><td>0 to 0.2 or 4.5 to 5.5 V</td><td>VTA2 circuit open or ground short</td></tr>
<tr><td>10 to 24 %</td><td>2.15 to 3.05 V</td><td>64 to 96 % (Does not fail safe)</td><td>4.5 to 5.5 V (Does not fail safe)</td><td>Throttle position sensor circuit is normal</td><td>B</td></tr>
</table>

B	**Go to step 5.**

A

2	**Check for open and short in harness and connector between ECM and throttle position sensor.**





PREPARATION:

(a) Disconnect the T16 throttle control motor and sensor connector.

(b) Disconnect the E5 ECM connector.

CHECK:

Check the resistance between the wire harness side connectors.

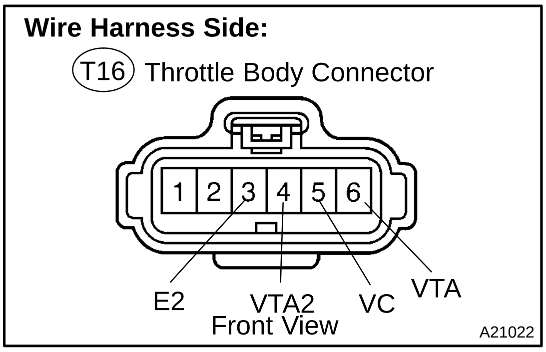
OK:

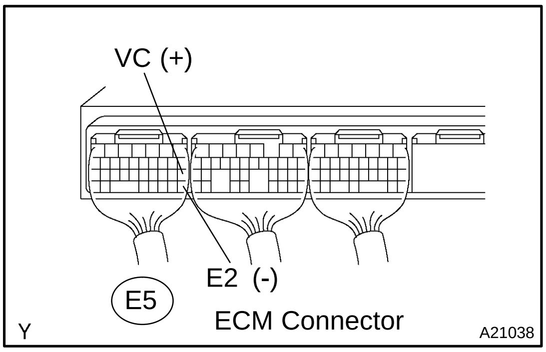
Tester Connection	Specified Condition
VC (T16-5) - VC (E5-18)	Below 1 Ω
VTA (T16-6) - VTA1 (E5-21)	
VTA2 (T16-4) - VTA2 (E5-31)	
E2 (T16-3) - E2 (E5-28)	
VC (T16-5) or VC (E5-18) - Body ground	10 kΩ or higher
VTA (T16-6) or VTA1 (E5-21) - Body ground	
VTA2 (T16-4) or VTA2 (E5-31) - Body ground	

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

OK

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





PREPARATION:

(a) Disconnect the T16 throttle control motor and sensor connector.

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between the specified terminals of the E5 ECM connector.

OK:

Tester Connection	Specified Condition
VC (E5-18) - E2 (E5-28)	4.5 to 5.5 V

NG → **Replace ECM (See page SF-60).**

OK

4	**Replace throttle body (See page SF-36).**

Go

5	**Check if DTC output recur.**

PREPARATION:
(a) Clear the DTC (See page DI-3).
(b) Start the engine.
(c) Run the engine at idle for 15 seconds or more.

CHECK:
Read the DTC (See page DI-3).

RESULT:

Display (DTC Output)	Proceed to
"P0120, P0122, P0123, P0220, P0222, P0223 and/or P2135" are output again	A
No DTC output	B

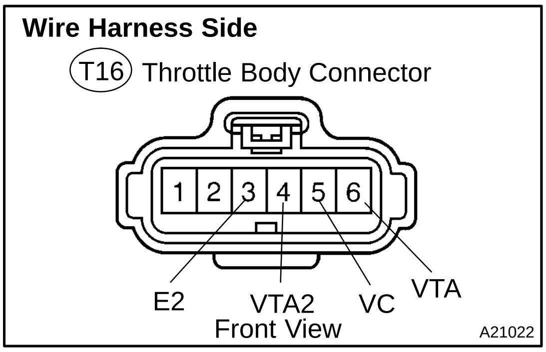
B → **System is OK.**

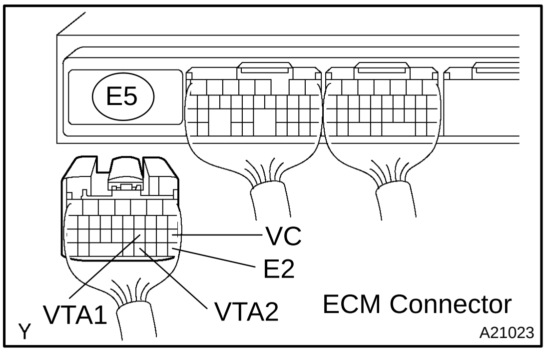
A

Replace ECM (See page SF-60).

OBD II scan tool (excluding hand-held tester):

1	Check for open and short in harness and connector between ECM and throttle position sensor.





PREPARATION:

(a) Disconnect the T16 throttle control motor and sensor connector.

(b) Disconnect the E5 ECM connector.

CHECK:

Check the resistance between the wire harness side connectors.

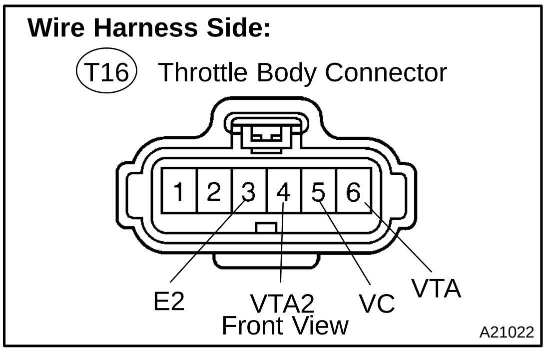
OK:

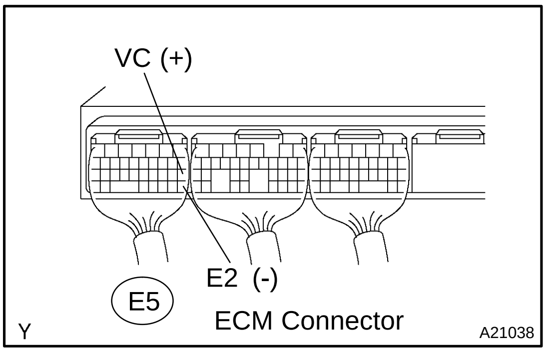
Tester Connection	Specified Condition
VC (T16-5) - VC (E5-18)	Below 1 Ω
VTA (T16-6) - VTA1 (E5-21)	
VTA2 (T16-4) - VTA2 (E5-31)	
E2 (T16-3) - E2 (E5-28)	
VC (T16-5) or VC (E5-18) - Body ground	10 kΩ or higher
VTA (T16-6) or VTA1 (E5-21) - Body ground	
VTA2 (T16-4) or VTA2 (E5-31) - Body ground	

NG	Repair or replace harness or connector.

OK

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





PREPARATION:

(a) Disconnect the T16 throttle control motor and sensor connector.

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between the specified terminals of the E5 ECM connector.

OK:

Tester Connection	Specified Condition
VC (E5-18) - E2 (E5-28)	4.5 to 5.5 V

NG → **Replace ECM (See page SF-60).**

OK

3	**Replace throttle body (See page SF-36).**

Go

4	**Check if DTC output recur.**

PREPARATION:
(a) Clear the DTC (See page DI-3).
(b) Start the engine.
(c) Run the engine at idle for 15 seconds or more.

CHECK:
Read the DTC (See page DI-3).

RESULT:

Display (DTC Output)	Proceed to
"P0120, P0122, P0123, P0220, P0222, P0223 and/or P2135" are output again	A
No DTC output	B

B → **System is OK.**

A

Replace ECM (See page SF-60).

DI1LI-19

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

HINT:
This is the purpose of the ”throttle position sensor”.

CIRCUIT DESCRIPTION

Refer to DTC P0120 on page DI-84 .

DTC No.	DTC Detecting Condition	Trouble Area
P0121	Condition (a) continues for 2.0 sec.: (a) Difference between VTA1 and VTA2 deviates from the threshold	Throttle control motor and sensor

MONITOR DESCRIPTION

The ECM uses throttle position sensor to monitor the throttle valve opening angle.
This sensor including two signals, VTA1 and VTA2. VTA1 is used to detect the throttle opening angle and VTA2 is used to detect malfunctions in VTA1. There are several checks that the ECM performs confirm proper operation of the throttle position sensor and VTA1.
There is a specific voltage difference expected between VTA1 and VTA2 for each throttle opening angle. If the voltage output difference of the VTA1 and VTA2 deviates from the normal operating range, the ECM interprets this as a malfunction of the throttle position sensor. The ECM will turn on the MIL and a DTC is set.

FAIL SAFE

If the ETCS (Electronic Throttle Control System) has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16°) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel infection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimum speed.
If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.
If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P0121	Throttle position sensor rationality
Required sensors/components	Throttle position sensor	
Frequency of operation	Continuous	
Duration	2 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See ”List of disable a monitor” (on page DI-3).	
VTA2 voltage	-	4.6 V

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Different between VTA1 and VTA2 |VTA1 - (VTA2 × 0.8 to 1.2)|* * Corrected by learning value	Less than 0.1 V and more than 0.4 V

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

Replace throttle control motor and sensor (See page SF-36).

DIBSS-02

DTC	P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control

CIRCUIT DESCRIPTION

Refer to DTC P0115 on page DI-75 .

DTC No.	DTC Detection Condition	Trouble Area
P0125	If THW or THA is less than -6.6°C (20°F) at engine start and 20 min. or more after starting engine, engine coolant temp. sensor value is 20°C (68°F) or less (2 trip detection logic)	★Cooling system ★Engine coolant temperature sensor ★Thermostat
	If THW and THA is between -6.6°C (20°F) and 10°C (50°F) at engine start, 5 min. or more after starting engine and engine coolant temp. sensor value is 20°C (68°F) or less (2 trip detection logic)	
	If THW and THA greater than 10°C (50°F) at engine start and 2 min. or more after starting engine, engine coolant temp. sensor value is 20°C (68°F) or less (2 trip detection logic)	

MONITOR DESCRIPTION

The ECT (Engine Coolant Temperature) sensor is used to monitor the temperature of the engine coolant. The resistance of the sensor varies with the actual coolant temperature. The ECM applies a voltage to the sensor and the varying resistance of the sensor causes the signal voltage to vary. The ECM monitors the ECT signal voltage after engine start-up. If, after sufficient time has passed, the sensor still reports that the engine is not warmed up enough for closed-loop fuel control after sufficient time has passed, the ECM interprets this as a fault in the sensor or cooling system and sets a DTC.
Example:
The engine coolant temperature was 0°C (32°F) at engine start. After 5 min. running time, the ECT sensor still indicates that the engine is not warmed up enough to begin air fuel ratio feedback control of the air-fuel ratio. The ECM interprets this as a fault in the sensor or cooling system and will set a DTC.

MONITOR STRATEGY

Related DTCs	P0125	Insufficient coolant temperature for closed loop fuel control
Required sensors/components	Main sensors/components	Engine coolant temperature sensor, Cooling system, Thermostat
	Related sensors/components	Mass air flow meter
Frequency of operation	Continuous	
Duration	2 min. (at engine start, engine coolant or intake air temperature of 10°C (50°F) or more) 5 min. (at engine start, engine coolant or intake air temperature of -6.6°C (20°F) to 10°C (50°F)) 20 min. (at engine start, engine coolant or intake air temperature of less than -6.6°C (20°F))	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of Disable a Monitor" table (on page DI-3)	
Fuel cut	OFF	
Engine	Running	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Time until "engine coolant temperature" detection temperature reaches feedback start temperature	
When the temperature at the time of engine starting is 10°C (50°F) or more	Engine coolant temperature is less than "closed-loop enable temperature" when 2 min. or more after engine start
When the temperature at the time of engine starting is "-6.6 °C (20°F)" to "10°C (50°F)"	Engine coolant temperature is less than "closed-loop enable temperature" when 5 min. or more after engine start
When the temperature at the time of engine starting is -6.6 °C (20°F) or less	Engine coolant temperature is less than "closed-loop enable temperature" when 20 min. or more after engine start

INSPECTION PROCEDURE

HINT:

★ If DTC P0115, P0116, P0117, P0118 and P0125 are output simultaneously, engine coolant temperature sensor circuit may be open or short. Perform the troubleshooting of DTC P0115, P0117 or P0118 first.

★ Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

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

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTCs using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC output)	Proceed to
P0125	A
"P0125" and other DTCs	B

HINT:

If any other codes besides "P0125" are output, perform the troubleshooting for those DTCs first.

B	Go to relevant DTC chart (See page DI-36).

A

2	Inspect thermostat (See page CO-12).

NG → **Replace thermostat (See page CO-1 1).**

OK

3	Check cooling system.

CHECK:

Check that there is detect cooling system which causes overcool, such as abnormal radiator fan operation, modified cooling system and so on.

NG → **Repair or replace cooling system.**

OK

Replace engine coolant temperature sensor.

DIC25-01

DTC	P0128	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)

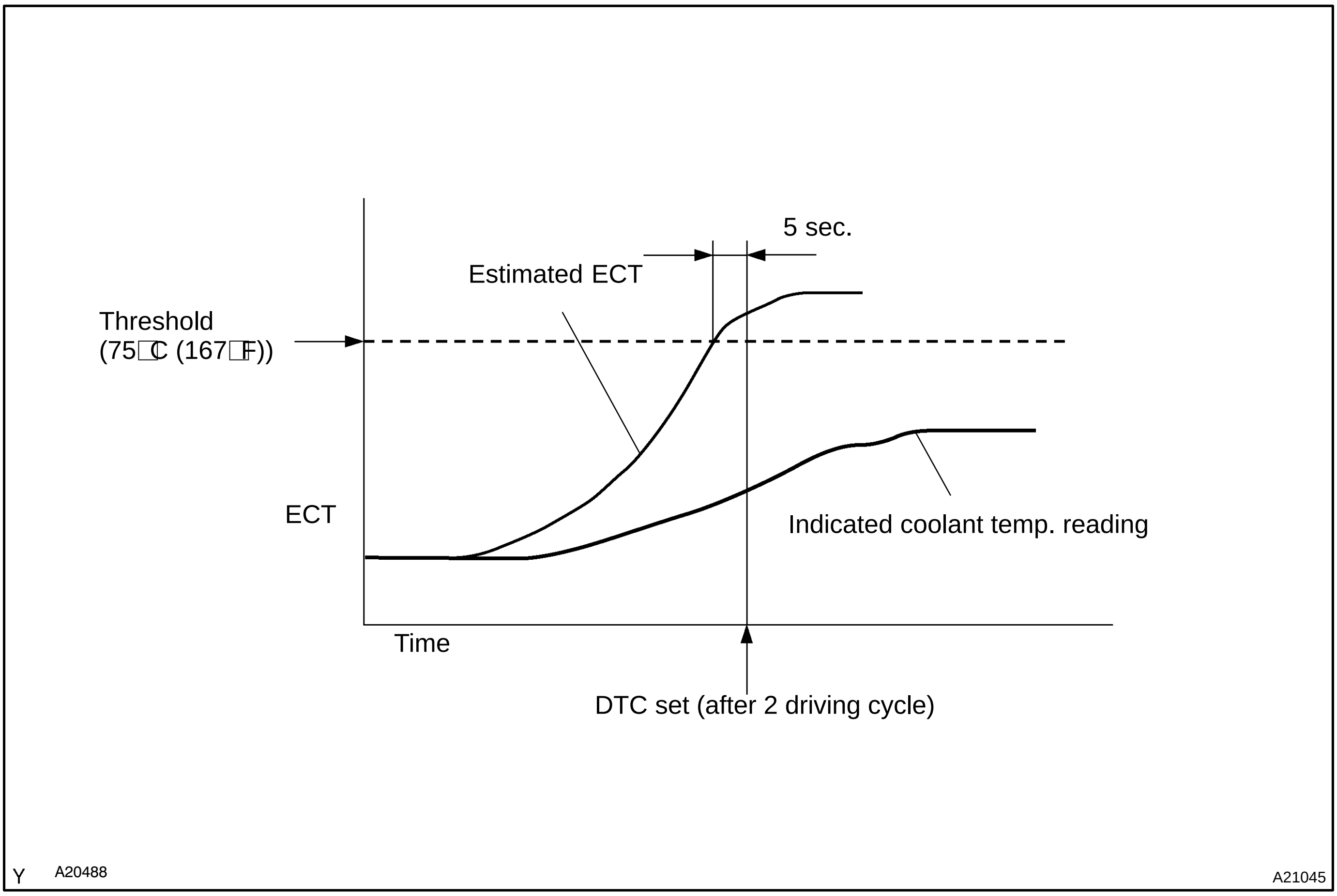
HINT:
This is the purpose of ”thermostat” malfunction detection.

CIRCUIT DESCRIPTION

If the engine coolant temperature does not reach 75°C (167°F) despite sufficient warm-up time has elapsed.

DTC No.	DTC Detection condition	Trouble Area
P0128	Condition (a), (b) and (c) are met: (a) Cold start (b) After sufficient warm-up time has elapsed (c) Engine coolant temperature greater than 75°C (167°F)	★Thermostat ★Cooling system ★Engine coolant temperature sensor ★ECM

MONITOR DESCRIPTION



The ECM estimates the coolant temperature based on starting temperature, engine loads, and engine speeds. The ECM then compares the estimated temperature with the actual ECT (Engine Coolant Temperature). When the estimated coolant temperature reaches 75°C (167°F), the ECM checks the actual ECT. If the actual ECT is less than 75°C (167°F), the ECM will interpret this as a fault in the thermostat or engine cooling system and set a DTC.

MONITOR STRATEGY

Related DTCs	P0128	Thermostat
Required sensors/components	Main sensors/components	Engine coolant temperature sensor, Engine cooling system, Thermostat
	Related sensors/components	Intake air temperature sensor, Vehicle speed sensor
Frequency of operation	Once per drive cycle	
Duration	15 min.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	11.0 V	-
Intake air temperature (at engine start)	-10 °C (14°F)	35°C (95°F)
Engine coolant temperature (at engine start)	-10 °C (14°F)	35°C (95°F)
Difference between intake air temperature and engine coolant temperature (at engine start)	-15 °C (-27°F)	7°C (12.6°F)

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Duration period of both A and B	5 sec. or more
A Estimated engine coolant temperature	75°C (167°F) or more
B Engine coolant temperature sensor output value	Less than 75°C (167°F)

MONITOR RESULT

The detailed information is described in “CHECKING MONITOR STATUS” (see page DI-3).

★ TID (Test Identification) is assigned to each emission-related component.

★ TLT (Test Limit Type):
If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.

★ CID (Component Identification) is assigned to each test value.

★ Unit Conversion is used to calculate the test value indicated on generic OBD scan tools.

TID $08: Thermostat

TLT	CID	Unit Conversion	Description of Test Value	Description of Test Limit
1	$01	Multiply by 0.625 and subtract 40 (°C)	ECT sensor output when estimated ECT reaches malfunction criterion	Malfunction criterion

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1 Are there any other codes (besides DTC P0128) being output?

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
P0128	A
P0128 and other DTCs	B

HINT:

If any other codes besides P0128 are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI–36).**

A

2 Check cooling system.

CHECK:

Check that there is a defect in the cooling system which causes over-cool, such as abnormal radiator fan operation, modified cooling system and so on.

NG → **Repair or replace cooling system.**

OK

3	Check thermostat (See page CO-12).

NG → **Replace thermostat.**

OK

Replace ECM (See page SF-60).

DIC26-01

DTC	P0130	Oxygen Sensor Circuit (Bank 1 Sensor 1)

DTC	P0150	Oxygen Sensor Circuit (Bank 2 Sensor 1)

DTC	P2195	Oxygen Sensor Signal Stack Lean (Bank 1 Sensor 1)

DTC	P2196	Oxygen Sensor Signal Stack Rich (Bank 1 Sensor 1)

DTC	P2197	Oxygen Sensor Signal Stack Lean (Bank 2 Sensor 1)

DTC	P2198	Oxygen Sensor Signal Stack Rich (Bank 2 Sensor 1)

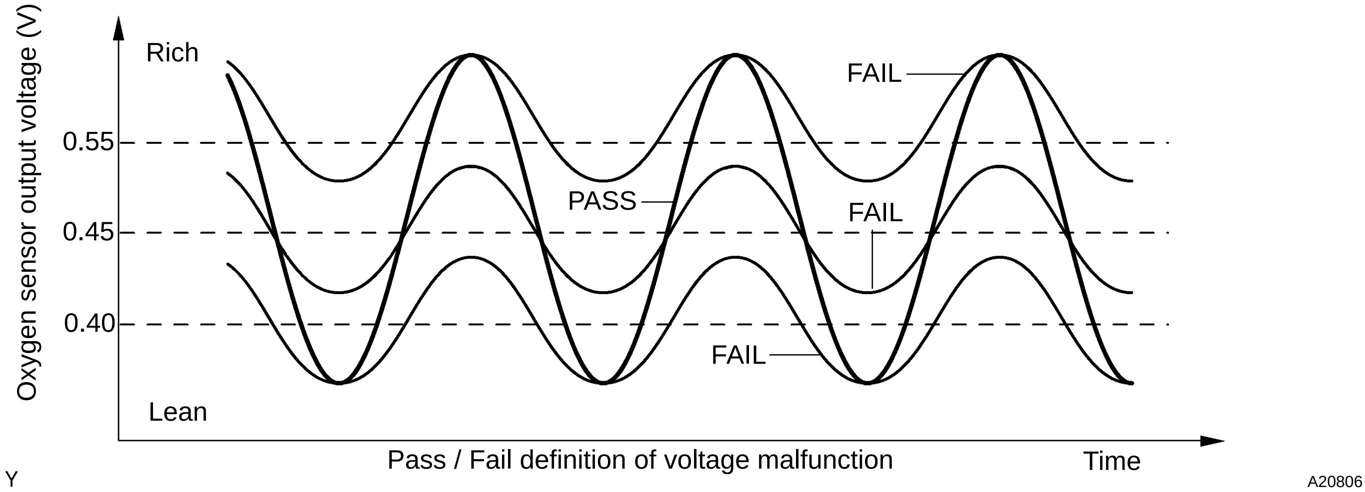
CIRCUIT DESCRIPTION

Refer to DTC P0031 on page DI-49 .

DTC No.	Detection Item	Trouble Area
P0130 P0150	Output voltage 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)	★Open or short in heated oxygen sensor circuit ★Heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★Air induction system ★Fuel pressure ★Injector ★ECM
P2195 P2197	Output voltage of heated oxygen sensor remains at 0.55 V or less, during idling after engine is warmed up (2 trip detection logic)	
P2196 P2198	Output voltage of heated oxygen sensor remains at 0.4 V or more, during idling after engine is warmed up (2 trip detection logic)	

HINT:
- ★ Bank 1 refers to bank that includes cylinder No. 1.
- ★ Bank 2 refers to bank that does not includes cylinder No. 2.
- ★ Sensor 1 refers to the sensor closer to the engine assembly.
- ★ The heated oxygen sensor's output voltage and the short−term fuel trim value can be read using the OBD II scan tool or hand−held tester.

MONITOR DESCRIPTION



Pass / Fail definition of voltage malfunction

The ECM uses the heated oxygen sensor information to regulate the air-fuel ratio close to a stoichiometric ratio. This maximizes the catalytic converter's ability to purify the exhaust gas. The sensor detects oxygen levels in the exhaust gas and sends this signal to the ECM.
The inner surface of the sensor element is exposed to outside air. The outer surface of the sensor element is exposed to exhaust gas. The sensor element is made of platinum coated zirconia and includes an integrated heating element. The heated oxygen sensor has the characteristic whereby its output voltage changes suddenly in the vicinity of the stoichiometric air-fuel ratio. The heated oxygen sensor generates output voltage between 0 V and 1.0 V in response to the oxygen concentration in exhaust gas. When the output voltage of the heated oxygen sensor is 0.55 V or more, the ECM judges that the air-fuel ratio is RICH. When it is 0.4 V or less, the ECM judges that the air-fuel ratio is LEAN.
Under normal condition, the output voltage from the heated oxygen sensor alternates RICH and LEAN sides periodically. If the heated oxygen sensor outputs RICH signal (or LEAN signal) constantly, or if the heated oxygen sensor cannot output enough voltage to reach the minimum specification, the ECM interprets this as a malfunction in the heated oxygen sensor and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0130	Front heated oxygen sensor voltage is constant at lean side or rich side (Bank 1)
	P0150	Front heated oxygen sensor voltage is constant at lean side or rich side (Bank 2)
	P2195	Front heated oxygen sensor voltage is constant at lean side (Bank 1)
	P2196	Front heated oxygen sensor voltage is constant at rich side (Bank 1)
	P2197	Front heated oxygen sensor voltage is constant at lean side (Bank 2)
	P2198	Front heated oxygen sensor voltage is constant at rich side (Bank 2)
Required sensors/components	Main sensors/components	Front heated oxygen senor
	Related sensors/components	Crank position sensor, Vehicle speed sensor
Frequency of operation	Once per drive cycle	
Duration	20 to 36 sec. x (3 times)	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
There is history that the following conditions A and B were met:	20 sec. (Continuously)	-
A. Vehicle speed	40 km/h (25 mph)	-
B. Engine speed	900 rpm	-
Time after engine start	120 sec.	-
Idle	ON	
Fuel system status	Closed loop	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0130, P0150:	
Either of the following conditions A or B is met:	3 times or more
A. Front oxygen sensor voltage is 0.55 V or less	For 18 sec. or more
B. Front oxygen sensor voltage is 0.4 V or more	For 18 sec. or more
P2195, P2197:	
Front heated oxygen sensor voltage	Constant 0.55 V or less
P2196, P2198:	
Front heated oxygen sensor voltage	Constant 0.4 V or more

COMPONENT OPERATING RANGE

Parameter	Standard value
In the normal condition, the heated oxygen sensor voltage	0 to 1 V

O2S TEST RESULT

Refer to page DI-3 for detailed information.

Front HO2S voltage monitor

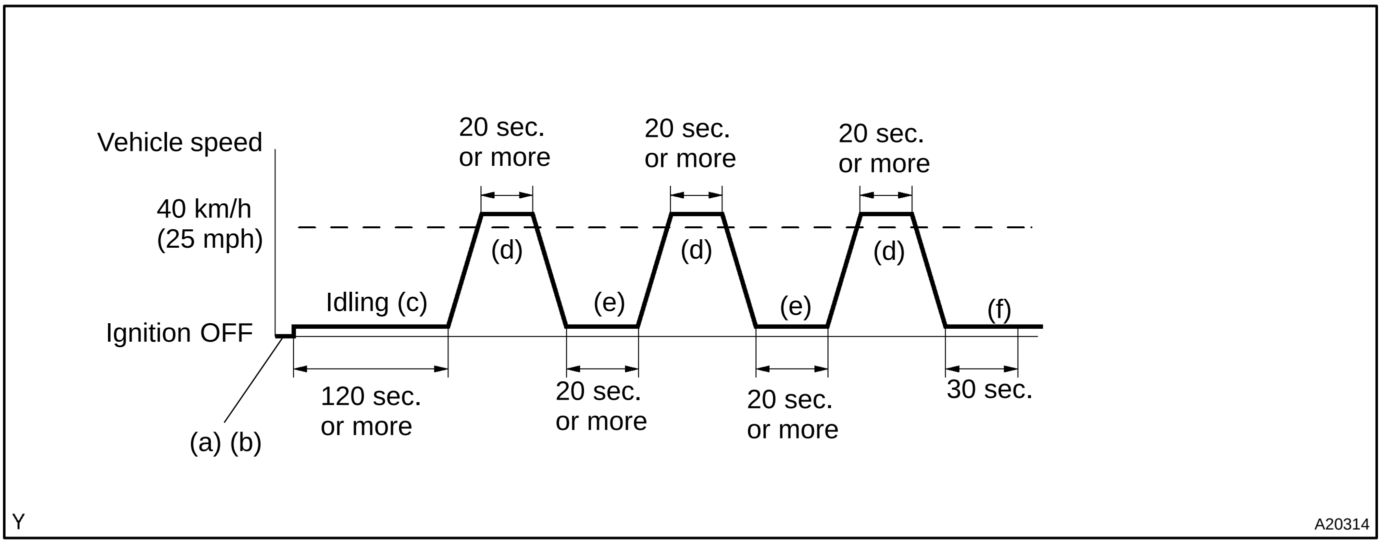
If the HO2S voltage is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$07	Minimum front HO2S voltage	N/A	V
$08	Maximum front HO2S voltage	N/A	V

WIRING DIAGRAM

Refer to DTC P0031 on page DI-49 .

CONFIRMATION DRIVING PATTERN



(a) Connect the hand-held tester to the DLC3.
(b) Switch the hand-held tester from the ”normal mode” to the ”check mode” (See page DI-3).
(c) Start the engine and let the engine idle for 120 seconds or more.
(d) Drive the vehicle at 25 mph (40 km/h) or more for 20 seconds or more.
(e) Let the engine idle for 20 seconds or more. Perform steps (d) and (e) at 3 times.
(f) Let the engine idle for 30 seconds.

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

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 hand-held tester, turn the ignition switch OFF after performing steps (c) to (f), then perform steps (c) to (f) again.

INSPECTION PROCEDURE

HINT:
Hand-held tester only:
The narrowing down the trouble area is possible by performing ACTIVE TEST of the following ”A/F CONTROL” (Heated oxygen sensor or another can be distinguished).
(a) Perform ACTIVE TEST by hand-held tester (A/F CONTROL).
HINT:
”A/F CONTROL” is an ACTIVE TEST which changes the injection volume to -12.5 % or +25 %.
(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
(4) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL”.
(5) Perform ”A/F CONTROL” with the engine in an idle condition (press the right or left button).

RESULT:
Heated oxygen sensor reacts in accordance with increase and decrease of injection volume
+25% → rich output: More than 0.5 V
-12.5% → lean output: Less than 0.4 V

NOTICE:

However, there is a few seconds delay in the sensor 1 (front sensor) output. And there is about 20 seconds delay in the sensor 2 (rear sensor).

	Output voltage of heated oxygen sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspect trouble area
Case 1	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	—
Case 2	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Sensor 2: rear sensor (sensor 2, heater, sensor 2 circuit)
Case 4	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Extremely rich or lean of the actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of the heated oxygen sensors (sensor 1 and 2).

For displaying the graph indication, enter ”ACTIVE TEST / A/F CONTROL / USER DATA” then select ”O2S B1S1 and O2S B1S2” by pressing ”YES” button and push ”ENTER” button before pressing ”F4” button.

NOTICE:

If the vehicle is short of fuel, the air-fuel ratio becomes LEAN and heated oxygen sensor DTCs will be recorded, and the MIL then comes on.

HINT:

★ If different DTCs related to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may be open.

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

★ A high heated oxygen sensor (sensor 1) voltage (0.5 V or more) could be caused by a rich air fuel mixture. Check for conditions that would cause the engine to run rich.

★ A low heated oxygen sensor (sensor 1) voltage (0.4 V or less) could be caused by a lean air fuel mixture. Check for conditions that would cause the engine to run lean.

1	**Are there any other codes (besides DTC P0130, P0150, P2195, P2197, P2196 or P2198) being output?**

PREPARATION:

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

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

(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
”P0130, P0150, P2195, P2196, P2197 and/or P2198”	A
”P0130, P0150 P2195, P2196, P2197 or P2198” and other DTCs	B

HINT:

If any other codes besides ”P0130, P0150, P2195, P2196, P2197 and/or P2198” are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI-36).**

A

2	Check output voltage of heated oxygen sensor during idling.

PREPARATION:

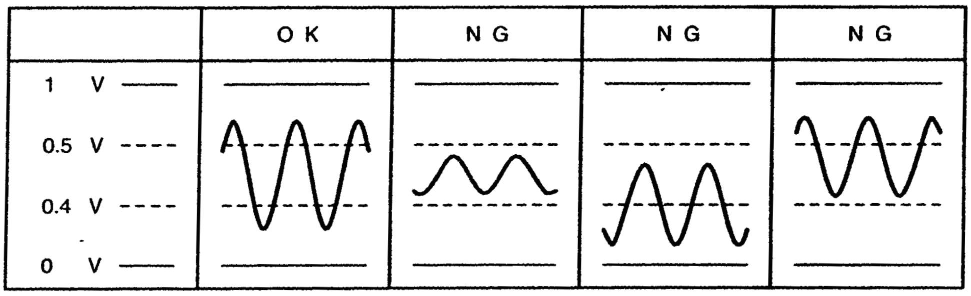
(a) Warm up the heated oxygen sensor with the engine speed at 2,500 rpm for approximately 90 seconds.
(b) Connect the hand-held tester or OBD II scan tool to the DLC3.
(c) When using hand-held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B1 S1 or B2 S1.

CHECK:

Check the output voltage of the heated oxygen sensor during idling the OBD II scan tool or hand-held tester.

OK:

Heated oxygen sensor output voltage:
Alternates repeatedly between less than 0.4 V and more than 0.5 V (See the following table).

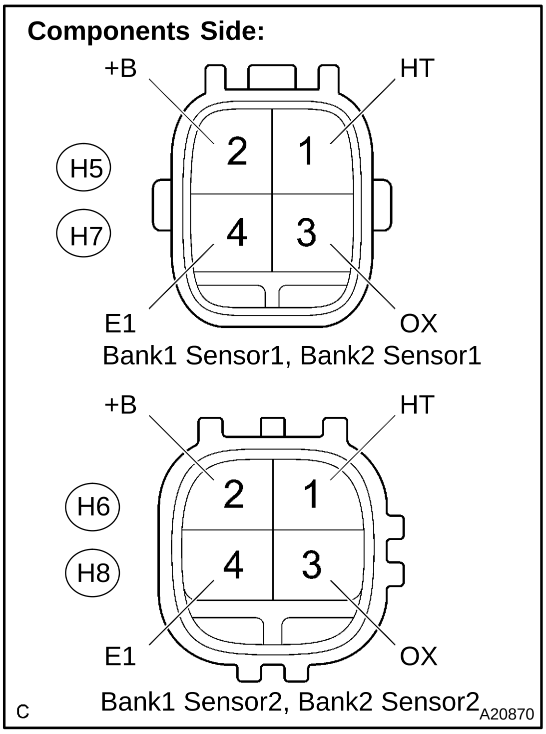


Q30018

OK → **Go to step 9.**

NG

3	**Check resistance of heated oxygen sensor heater.**



PREPARATION:
Disconnect the H5, H6, H7 or H8 heated oxygen sensor connector.

CHECK:
Measure resistance between terminals of the heated oxygen sensor.

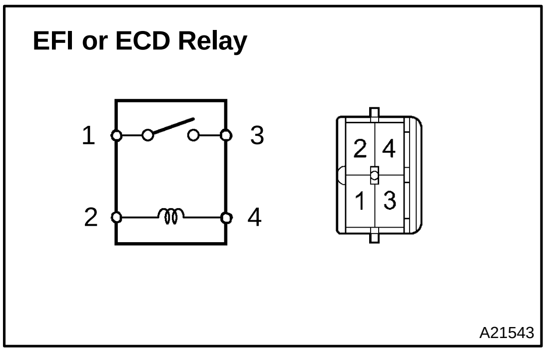
OK:

Tester Connection	Specified Condition
HT (H5-1) - +B (H5-2)	11 to 16 Ω (20°C)
HT (H6-1) - +B (H6-2)	11 to 16 Ω (20°C)
HT (H7-1) - +B (H7-2)	11 to 16 Ω (20°C)
HT (H8-1) - +B (H8-2)	11 to 16 Ω (20°C)

NG → **Replace heated oxygen sensor.**

OK

4	**Check EFI or ECD relay.**



PREPARATION:
Remove the EFI or ECD relay from the engine room R/B.

CHECK:
Inspect the EFI or ECD relay.

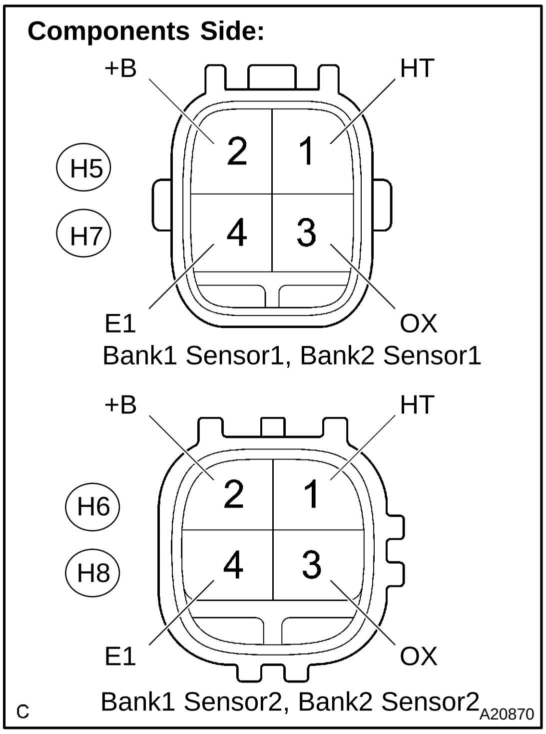
OK:

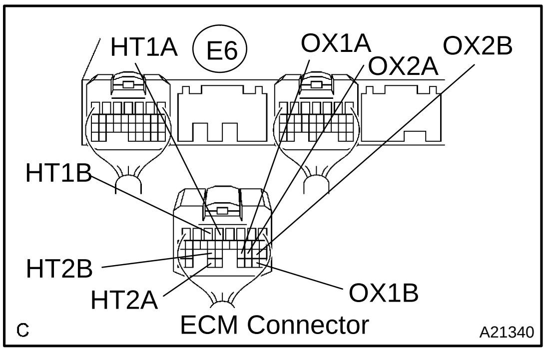
Terminal No.	Condition	Specified Condition
2 - 4	Constant	Continuity
1 - 3	Usually	No Continuity
	Apply B+ between terminals 2 and 4	Continuity

NG → **Replace EFI or ECD relay.**

OK

5	Check for open and short in harness and connector between ECM and heated oxygen sensor.





PREPARATION:

(a) Disconnect the H5, H6, H7 or H8 heated oxygen sensor connector.

(b) Disconnect the E6 ECM connector.

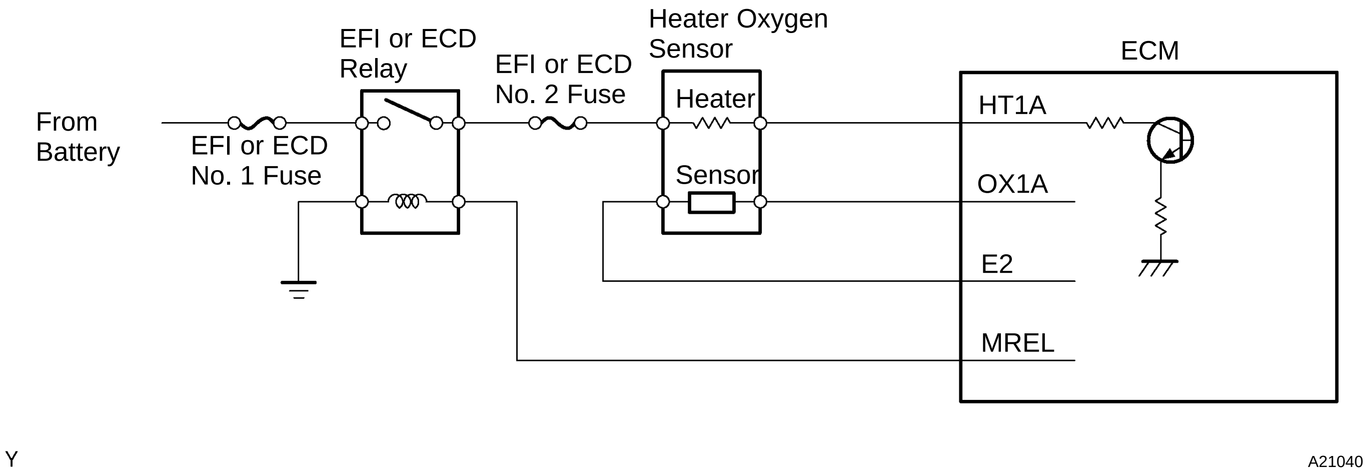
CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
OX (H5-3) - OX1A (E6-23)	Below 1 Ω
HT (H5-1) - HT1A (E6-4)	Below 1 Ω
OX (H6-3) - OX1B (E6-29)	Below 1 Ω
HT (H6-1) - HT1B (E6-5)	Below 1 Ω
OX (H7-3) - OX2A (E6-22)	Below 1 Ω
HT (H7-1) - HT2A (E6-33)	Below 1 Ω
OX (H8-3) - OX2B (E6-21)	Below 1 Ω
HT (H8-1) - HT2B (E6-25)	Below 1 Ω
OX (H5-3) or OX1A (E6-23) - Body ground	10 kΩ or higher
HT (H5-1) or HT1A (E6-4) - Body ground	10 kΩ or higher
OX (H6-3) or OX1B (E6-29) - Body ground	10 kΩ or higher
HT (H6-1) or HT1B (E6-5) - Body ground	10 kΩ or higher
OX (H7-3) or OX2A (E6-22) - Body ground	10 kΩ or higher
HT (H7-1) or HT2A (E6-33) - Body ground	10 kΩ or higher
OX (H8-3) or OX2B (E6-21) - Body ground	10 kΩ or higher
HT (H8-1) or HT2B (E6-25) - Body ground	10 kΩ or higher

Reference (Bank 1 Sensor 1 System Drawing)



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

OK ↓

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

<u>**CHECK:**</u>
Check the air induction system for vacuum leaks.

NG → **Repair or replace air induction system.**

OK ↓

7	**Check fuel pressure (See page SF-7).**

<u>**CHECK:**</u>
Check the fuel pressure (high or low pressure).

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

OK ↓

8	Check injector injection (See page SF-24).

NG → Replace injector.

OK ↓

Replace heated oxygen sensor.

9	Perform confirmation driving pattern.

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

Go ↓

10	Is there DTC P0130, P0150, P2195, P2196, P2197 or P2198 being output again?

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

YES ↓

Replace ECM (See page SF-60).

DIC27-01

DTC	P0133	Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 1)

DTC	P0153	Oxygen Sensor Circuit Slow Response (Bank 2 Sensor 1)

CIRCUIT DESCRIPTION

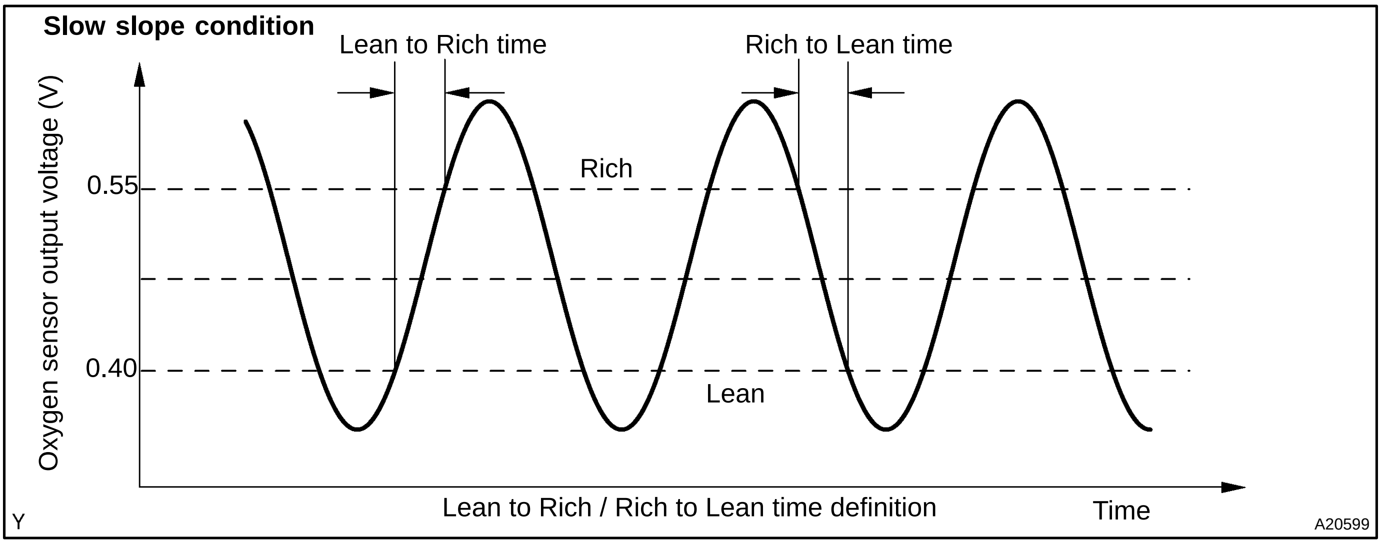
Refer to DTC P0031 on page DI-49 .

DTC No.	DTC Detecting Condition	Trouble Area
P0133 P0153	After engine has been warmed up, if response time that heated oxygen sensor's output voltage reaches from RICH to LEAN, or from LEAN to RICH, is 0.6 seconds or more during idling. (2 trip detection logic)	★Open or short in heated oxygen sensor circuit ★Heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★Air induction system ★Fuel pressure ★Injector ★ECM
	If response time of heated oxygen sensor's output voltage in one RICH-LEAN cycle is 5.6 seconds or more during idling. (2 trip detection logic)	

HINT:

★ Bank 1 refers to bank that includes cylinder No. 1.
★ Bank 2 refers to bank that does not includes cylinder No. 1.
★ Sensor 1 refers to the sensor closer to the engine assembly.

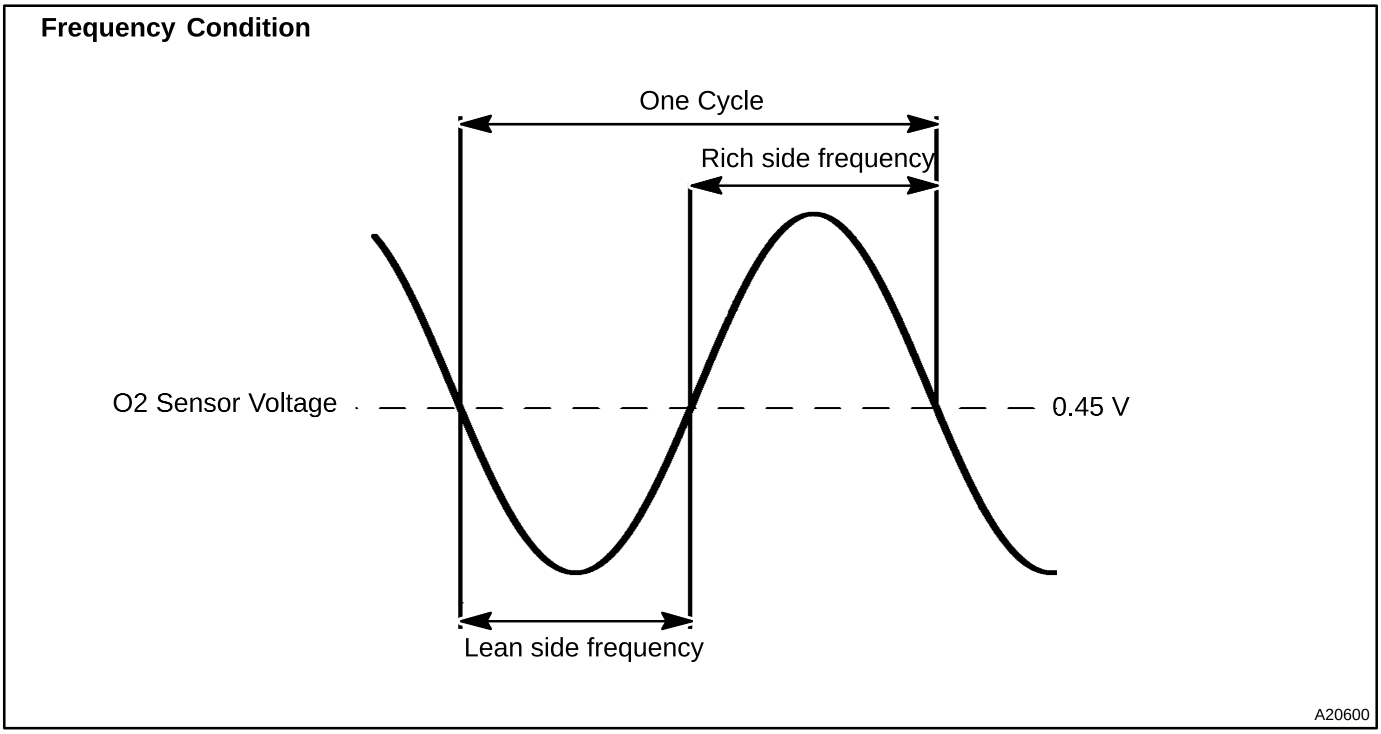
MONITOR DESCRIPTION



The ECM uses the heated oxygen sensor information to regulate the air-fuel ratio close to a stoichiometric ratio. This maximizes the catalytic converter's ability to purify the exhaust gases. The sensor detects oxygen levels in the exhaust gas and sends this signal to the ECM.

The inner surface of the sensor element is exposed to outside air. The outer surface of the sensor element is exposed to exhaust gas. The sensor element is made of platinum coated zirconia and includes an integrated heating element. The heated oxygen sensor has the characteristic whereby its output voltage changes suddenly in the vicinity of the stoichiometric air-fuel ratio. The heated oxygen sensor generates waveforms of a voltage between 0 V and 1 V in response to the oxygen concentration in exhaust gas. When the output voltage of the heated oxygen sensor is 0.55 V or more, the ECM judges that the air-fuel ratio is RICH. When it is 0.40 V or less, the ECM judges that the air-fuel ratio is LEAN.

The ECM monitors the response feature of the heated oxygen sensor. If the response time of the heated oxygen sensor output status change from RICH to LEAN or vice versa becomes longer, the ECM interprets this as a malfunction in the heated oxygen sensor and sets a DTC.



MONITOR STRATEGY

Related DTCs	P0133	Front heated oxygen sensor response monitor (Bank 1)
	P0153	Front heated oxygen sensor response monitor (Bank 2)
Required sensors/components	Main sensors/components	Front heated oxygen sensor
	Related sensors/components	Crank position sensor, Vehicle speed sensor, Mass air flow meter
Frequency of operation	Once per drive cycle	
Duration	Within 60 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Frequency idle condition:		
There is history that the following conditions were met for 20 sec.	A and B	
A. Vehicle speed	40 km/h (25 mph)	-
B. Engine speed	900 rpm	-
Idle	ON	
Vehicle speed	-	5 km/h (3 mph)
Fuel system status	Closed loop	
Time after engine start	120 sec.	-
Engine coolant temperature	40°C (104°F)	-
Frequency cruise condition:		
There is history that the following conditions were met for 20 sec.	A and B	
A. Vehicle speed	40 km/h (25 mph)	-
B. Engine speed	900 rpm	-
Intake air amount	3 g/sec.	13 g/sec.
Time after engine start	120 sec.	-
Idle	OFF	
Fuel system status	Closed loop	
Engine speed	1,000 rpm	3,500 rpm
Engine coolant temperature	70°C (158°F)	-
Slow slope condition:		
Both of the following condition were met for 20 sec.	A and B	
A. Vehicle speed	40 km/h (25 mph)	-
B. Engine speed	900 rpm	-
Time after engine start	120 sec.	-
Idle	ON	
Vehicle speed	-	5 km/h (3 mph)

Fuel system status	Closed loop	
Engine coolant temperature	40°C (104°F)	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Frequency idle condition	
Time required by the sensor's output voltage to change in one RICH-LEAN cycle	5.6 sec. or more
Frequency cruise condition	
Time required by the sensor's output voltage to change in one RICH-LEAN cycle	a specific time or more
Slow slope condition	
Both of the following conditions were met	A and B
A. Number of judgment made	3 times
B. Following conditions were met	(a) or (b)
(a) Average lean to rich response time	0.9 sec. or more
(b) Average rich to lean response time	0.9 sec. or more

COMPONENT OPERATING RANGE

Parameter	Standard value
Voltage output from heated oxygen sensor	Quickly fluctuates between 0.4 and 0.55 V

O2S TEST RESULT

Refer to page DI-3 for detailed information.

Front HO2S slow slope monitor

If the HO2S sensor voltage is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$03	(Test constant) Low sensor voltage for response time calculation	N/A	V
$04	(Test constant) High sensor voltage for response time calculation	N/A	V

If the time required to change is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$31	Time to change from Lean (±0.4 V) to Rich (≧0.55 V)	N/A	sec.
$32	Time to change from Rich (≧0.55 V) to Lean (±0.4 V)	N/A	sec.

Front HO2S frequency monitor (idling)

If the $38 is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$38	Response time of heated oxygen sensor's output voltage in one RICH-LEAN cycle	N/A	sec.

Front HO2S frequency monitor (cruse)

If the $90 is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$90	Remained value of that average of switching frequency is subtracted from average of switching frequency threshold	Multiply by 0.04096 plus 5.2	sec.

WIRING DIAGRAM

Refer to DTC P0031 on page DI-49 .

INSPECTION PROCEDURE

HINT:

Hand-held tester only:

The narrowing down the trouble area is possible by performing ACTIVE TEST of the following ”A/F CONTROL” (Heated oxygen sensor or another can be distinguished).

(a) Perform ACTIVE TEST by hand-held tester (A/F CONTROL).

HINT:

”A/F CONTROL” is the ACTIVE TEST which changes the injection volume to -12.5 % or +25 %.

(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
(4) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL”.
(5) Perform ”A/F CONTROL” with the engine in an idle condition (press the right or left button).

RESULT:

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume
+25 % → rich output: More than 0.5 V
-12.5 % → lean output: Less than 0.4 V

NOTICE:

However, there is a few second delay in the sensor 1 (front sensor) output. And there is about 20 seconds delay in the sensor 2 (rear sensor).

	Output voltage of heated oxygen sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspect trouble area
Case 1	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	—
Case 2	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Sensor 2: rear sensor (sensor 2, heater, sensor 2 circuit)
Case 4	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Extremely rich or lean of the actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of the heated oxygen sensors (sensor 1 and 2).

For displaying the graph indication, enter ”ACTIVE TEST / A/F CONTROL / USER DATA” then select ”O2S B1S1 and O2S B1S2” by pressing ”YES” button and push ”ENTER” button before pressing ”F4” button.

NOTICE:

If the vehicle is short of fuel, the air-fuel ratio becomes LEAN and DTCs P0133 and/or P0153 will be recorded, and the MIL then comes on.

★ If different DTCs related to different systems while terminal E2 as ground terminal are output simultaneously, terminal E2 may be open.

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

★ A high heated oxygen sensor (sensor 1) voltage (0.5 V or more) could be caused by a rich air fuel mixture. Check for conditions that would cause the engine to run rich.

★ A low heated oxygen sensor (sensor 1) voltage (0.4 V or less) could be caused by a lean air fuel mixture. Check for conditions that would cause the engine to run lean.

1	Are there any other codes (besides DTC P0133 or P0153) being output?

PREPARATION:
(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:
Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
”P0133 and/or P0153”	A
”P0133 or P0153” and other DTCs	B

HINT:
If any other codes besides ”P0133 and/or P0153” are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI-36).**

A

2	Check output voltage of heated oxygen sensor during idling.

PREPARATION:

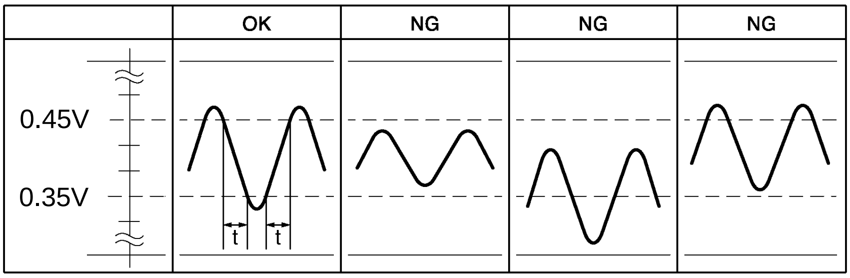
(a) Warm up the heated oxygen sensor with the engine speed at 2,500 rpm for approximately 90 seconds.
(b) Connect the hand-held tester or OBD II scan tool to the DLC3.
(c) When using hand-held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B1 S1 or B2 S1.

CHECK:

Check the output voltage of the heated oxygen sensor while idling the OBD II scan tool or hand-held tester.

OK:

Heated oxygen sensor output voltage:
Alternates between less than 0.35 V and more than 0.45 V, and period of ”t” must exist less than 0.6 seconds (See the following table).

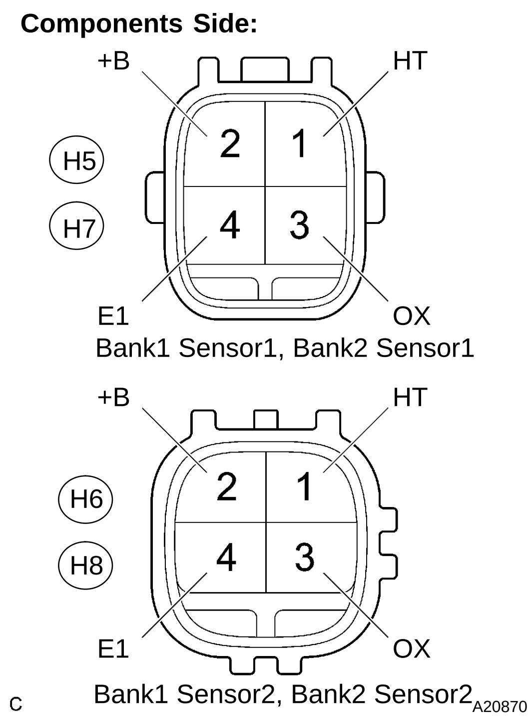


N
A20315

OK → Go to step 9.

NG

3	Check resistance of heated oxygen sensor heater.



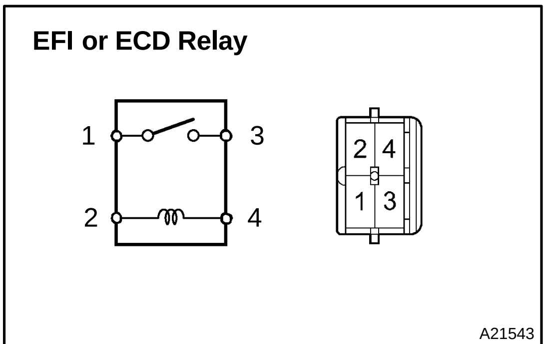
PREPARATION:
Disconnect the H5, H6, H7 or H8 heated oxygen sensor connector.
CHECK:
Measure resistance between terminals of the heated oxygen sensor.
OK:

Tester Connection	Specified Condition
HT (H5-1) - +B (H5-2)	11 to 16 Ω (20˚C)
HT (H6-1) - +B (H6-2)	11 to 16 Ω (20˚C)
HT (H7-1) - +B (H7-2)	11 to 16 Ω (20˚C)
HT (H8-1) - +B (H8-2)	11 to 16 Ω (20˚C)

NG → **Replace heated oxygen sensor.**

OK

4	Check EFI or ECD relay.



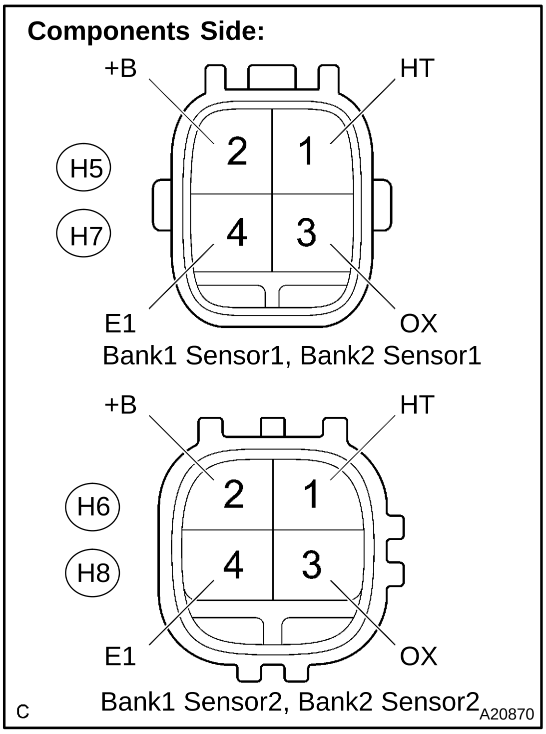
PREPARATION:
Remove the EFI or ECD relay from the engine room R/B.
CHECK:
Inspect the EFI or ECD relay.
OK:

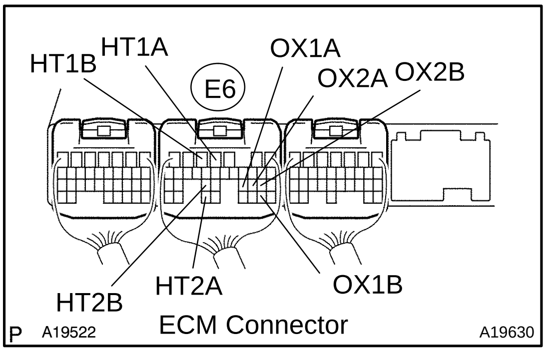
Terminal No.	Condition	Specified Condition
2 - 4	Constant	Continuity
1 - 3	Usually	No Continuity
	Apply B+ between terminals 2 and 4	Continuity

NG → **Replace EFI or ECD relay.**

OK

5	Check for open and short in harness and connector between ECM and heated oxygen sensor.





PREPARATION:

(a) Disconnect the H5, H6, H7 or H8 heated oxygen sensor connector.

(b) Disconnect the E6 ECM connector.

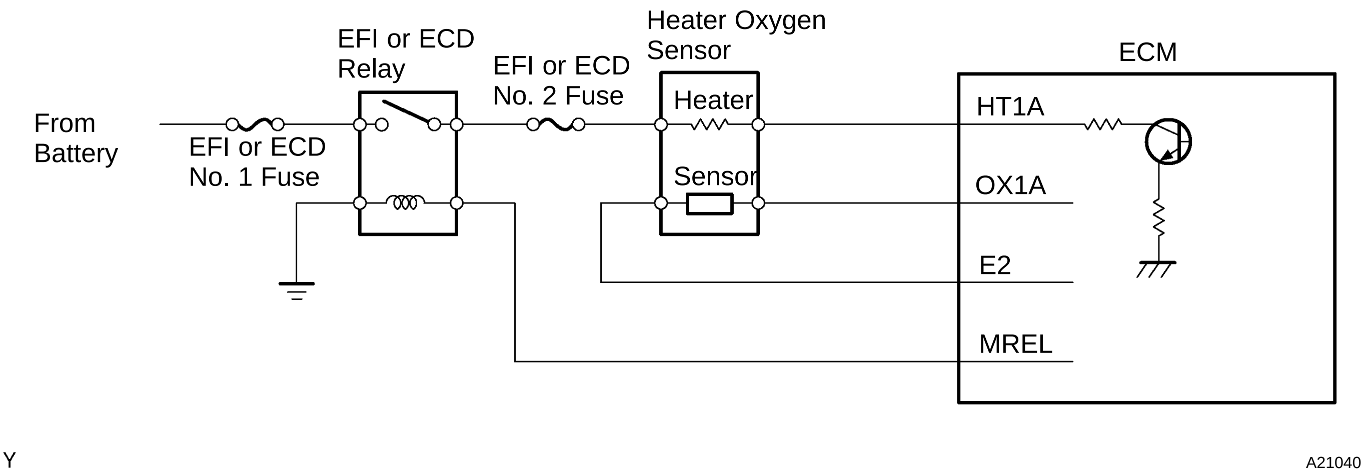
CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
OX (H5-3) - OX1A (E6-23)	Below 1 Ω
HT (H5-1) - HT1A (E6-4)	Below 1 Ω
OX (H6-3) - OX1B (E6-29)	Below 1 Ω
HT (H6-1) - HT1B (E6-5)	Below 1 Ω
OX (H7-3) - OX2A (E6-22)	Below 1 Ω
HT (H7-1) - HT2A (E6-33)	Below 1 Ω
OX (H8-3) - OX2B (E6-21)	Below 1 Ω
HT (H8-1) - HT2B (E6-25)	Below 1 Ω
OX (H5-3) or OX1A (E6-23) - Body ground	10 kΩ or higher
HT (H5-1) or HT1A (E6-4) - Body ground	10 kΩ or higher
OX (H6-3) or OX1B (E6-29) - Body ground	10 kΩ or higher
HT (H6-1) or HT1B (E6-5) - Body ground	10 kΩ or higher
OX (H7-3) or OX2A (E6-22) - Body ground	10 kΩ or higher
HT (H7-1) or HT2A (E6-33) - Body ground	10 kΩ or higher
OX (H8-3) or OX2B (E6-21) - Body ground	10 kΩ or higher
HT (H8-1) or HT2B (E6-25) - Body ground	10 kΩ or higher

Reference (Bank 1 Sensor 1 System Drawing)



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

OK

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

CHECK:
Check the air induction system for vacuum leaks.

NG — **Repair or replace air induction system.**

OK

7	**Check fuel pressure (See page SF-7).**

CHECK:
Check the fuel pressure (high or low pressure).

NG — **Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF-1).**

OK

8	Check injector injection (See page SF-24).

NG → **Replace injector.**

OK

Replace heated oxygen sensor.

9	Perform confirmation driving pattern (See page DI-106).

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

Go

10	Is there DTC P0133 or P0153 being output again?

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

YES

Replace heated oxygen sensor.

DIC28-01

DTC	P0134	Oxygen Sensor Circuit No Activity Detected (Bank 1 Sensor 1)

DTC	P0154	Oxygen Sensor Circuit No Activity Detected (Bank 2 Sensor 1)

CIRCUIT DESCRIPTION

Refer to DTC P0031 on page DI-49 .

DTC No.	DTC Detecting Condition	Trouble Area
P0134 P0154	After the engine is warmed up, heated oxygen sensor (bank 1, sensor 1) output does not indicate RICH (more than 0.45 V) even once when the following conditions continue for 65 sec. or more: (a) Engine speed: 1,400 rpm or more (b) Vehicle speed: 25 to 81 mph (40 to 130 km/h) or more (c) Throttle valve does not fully closed (d) 180 sec. or more after starting engine (e) Engine coolant temperature more than 40°C (104°F)	★Open or short in heated oxygen sensor circuit ★Heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★Air induction system ★Fuel pressure ★PCV hose connection ★PCV valve and hose ★Injector ★Gas leakage on exhaust system ★PCV piping ★ECM

HINT:

★ Bank 1 refers to bank that includes cylinder No. 1.

★ Bank 2 refers to bank that does not includes cylinder No. 1.

★ Sensor 1 refers to the sensor closer to the engine assembly.

★ After confirming DTC P0134 and P0154, check the output voltage of the heated oxygen sensor in the "DIAGNOSIS / ENHANCE OBD II / DATA LIST / ALL" using the OBD II scan tool or the hand−held tester. If output voltage of the heated oxygen sensor is always less than 0.1 V, heated oxygen sensor circuit may be open or short.

MONITOR DESCRIPTION

The ECM uses the heated oxygen sensor to optimize the air-fuel mixture in closed-loop fuel control. This control helps decrease exhaust emissions by providing the catalyst with a nearly stoichiometric mixture. The sensor detects the oxygen level in the exhaust gas and the ECM uses this data to control the air-fuel ratio. The sensor output voltage ranges from 0 V to 1 V. If the signal voltage is less than 0.4 V, the air-fuel ratio is LEAN. If the signal voltage is more than 0.55 V, the air-fuel ratio is RICH. If the conditions for the closed-loop fuel control are met and after a specified time-period, the sensor's output signal never indicates RICH, the ECM will conclude that the closed-loop fuel control is malfunctioning. The ECM will illuminate the MIL and a DTC is set.

MONITOR STRATEGY

Related DTCs	P0134	Excessive time to enter closed loop (Bank 1)
	P0154	Excessive time to enter closed loop (Bank 2)
Required sensors/components	Main sensors/components	Front heated oxygen sensor
	Related sensors/components	Crank position sensor, Engine coolant temperature sensor, Vehicle speed sensor
Frequency of operation	Once per drive cycle	
Duration	65 sec.	
MIL operation	1 driving cycle	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Both of the following conditions were met	A and B	
A. Time after following conditions met for 50 sec.	(a), (b), (c), (d), (e) and (f)	
(a) Engine coolant temperature	40°C (104°F)	-
(b) Engine speed	1,400 rpm	-
(c) Vehicle speed	40 km/h (25 mph)	-
(d) Idle	OFF	
(e) Time after engine start	180 sec.	-
(f) Fuel enrichment correction factor	1	63.998
B. Neither fail nor pass is determined yet in the present drive cycle		

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Front heated oxygen sensor voltage	Less than 0.45 V

COMPONENT OPERATING RANGE

Parameter	Standard value
In the normal condition, the front heated oxygen sensor voltage	0 to 1 V

WIRING DIAGRAM

Refer to DTC P0031 on page DI-49 .

INSPECTION PROCEDURE

HINT:
Hand-held tester only:
The narrowing down the trouble area is possible by performing ACTIVE TEST of the following ”A/F CONTROL” (Heated oxygen sensor or another can be distinguished).
(a) Perform ACTIVE TEST by hand-held tester (A/F CONTROL).
HINT:
”A/F CONTROL” is the ACTIVE TEST which changes the injection volume to -12.5 % or +25 %.
(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
(4) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL”.
(5) Perform ”A/F CONTROL” with the engine in an idle condition (press the right or left button).

RESULT:

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume
+25 % → rich output: More than 0.5 V
-12.5 % → lean output: Less than 0.4 V

NOTICE:
However, there is a few seconds delay in the sensor 1 (front sensor) output. And there is about 20 seconds delay in the sensor 2 (rear sensor).

	Output voltage of heated oxygen sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspect trouble area
Case 1	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	—
Case 2	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Sensor 2: rear sensor (sensor 2, heater, sensor 2 circuit)
Case 4	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Extremely rich or lean of the actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of the heated oxygen sensors (sensor 1 and 2).
For displaying the graph indication, enter ”ACTIVE TEST / A/F CONTROL / USER DATA” then select ”O2S B1S1 and O2S B1S2” by pressing ”YES” button and push ”ENTER” button before pressing ”F4” button.
HINT:

- ★ If different DTCs related to different systems terminal E2 as the ground terminal are output simultaneously, terminal E2 may be open.
- ★ Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- ★ A high heated oxygen sensor (sensor 1) voltage (0.5 V or more) could be caused by a rich air fuel mixture. Check for conditions that would cause the engine to run rich.
- ★ A low heated oxygen sensor (sensor 1) voltage (0.4 V or less) could be caused by a lean air fuel mixture. Check for conditions that would cause the engine to run lean.

1	**Are there any other codes (besides DTCs P0134 and P0154) being output?**

PREPARATION:
(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:
Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
”P0134 and/or P0154”	A
”P0134 or P0154” and other DTCs	B

HINT:
If any other codes besides P0134 and/or P0154 are output, perform the troubleshooting for those codes first.

B	**Go to relevant DTC chart (See page DI-36).**

A

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

PREPARATION:

(a) Connect the OBD II scan tool or the hand-held tester to the DLC3.
(b) Warm up the engine to the normal operating temperature.
(c) When using hand-held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B1 S1 or B2 S1.

CHECK:

Read the voltage output of the heated oxygen sensors when the engine speed is suddenly increased.
HINT:
Quickly accelerate the engine to 4,000 rpm 3 times by using the accelerator pedal.

OK:

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

OK → **Go to step 12.**

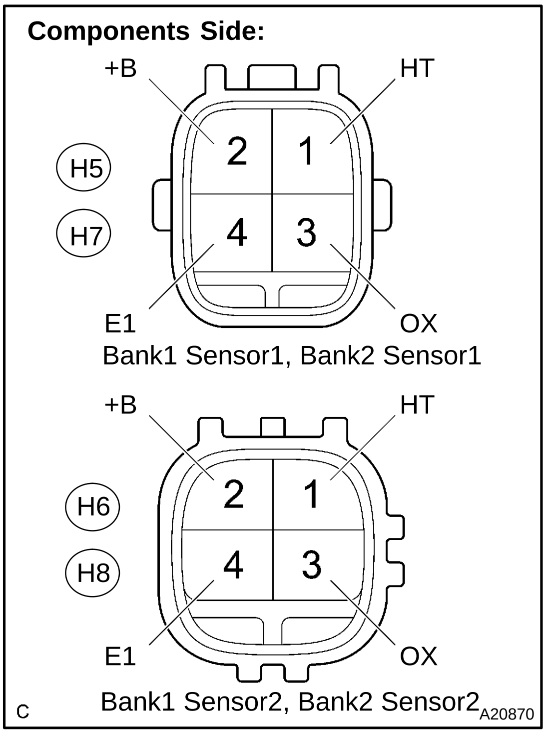
NG

3	Check connection of PCV piping.

NG → **Repair or replace PCV piping.**

OK

4	Check resistance of heated oxygen sensor heater.



PREPARATION:
Disconnect the H5, H6, H7 or H8 heated oxygen sensor connector.

CHECK:
Measure resistance between terminals of the heated oxygen sensor.

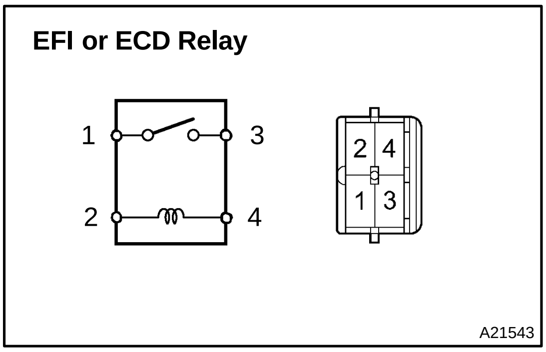
OK:

Tester Connection	Specified Condition
HT (H5-1) - +B (H5-2)	11 to 16 Ω (20°C)
HT (H6-1) - +B (H6-2)	11 to 16 Ω (20°C)
HT (H7-1) - +B (H7-2)	11 to 16 Ω (20°C)
HT (H8-1) - +B (H8-2)	11 to 16 Ω (20°C)

NG → **Replace heated oxygen sensor.**

OK

5	Check EFI or ECD relay.



PREPARATION:
Remove the EFI or ECD relay from the engine room R/B.

CHECK:
Inspect the EFI or ECD relay.

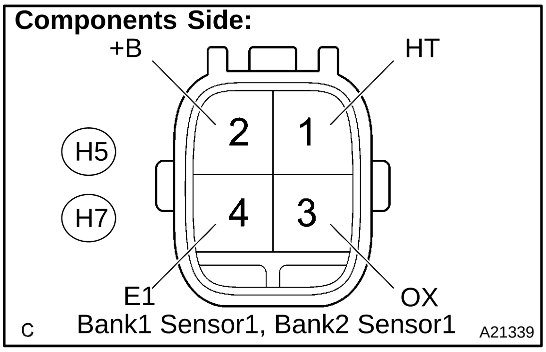
OK:

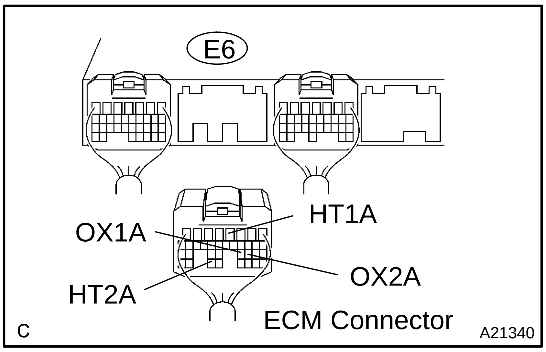
Terminal No.	Condition	Specified Condition
2 - 4	Constant	Continuity
1 - 3	Usually	No Continuity
	Apply B+ between terminals 2 and 4	Continuity

NG → **Replace EFI or ECD relay.**

OK

6	Check for open and short in harness and connector between ECM and heated oxygen sensor (bank 1, 2 sensor 1).





PREPARATION:

(a) Disconnect the H5 or H7 heated oxygen sensor connector.

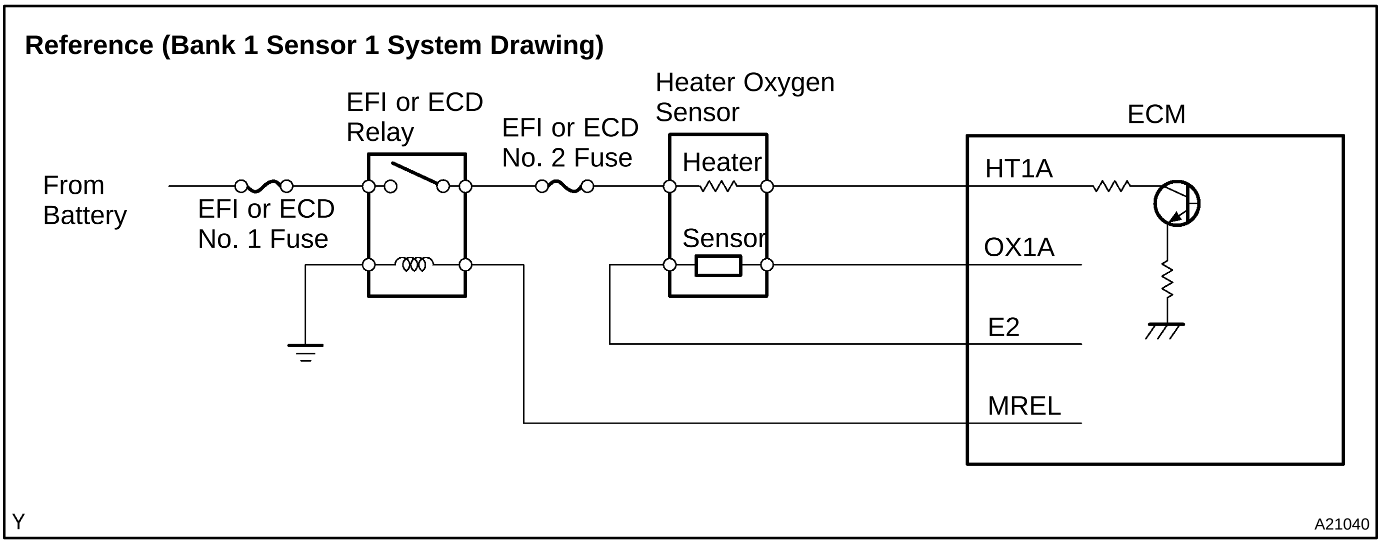
(b) Disconnect the E6 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
OX (H5-3) - OX1A (E6-23)	Below 1 Ω
HT (H5-1) - HT1A (E6-4)	Below 1 Ω
OX (H7-3) - OX2A (E6-22)	Below 1 Ω
HT (H7-1) - HT2A (E6-33)	Below 1 Ω
OX (H5-3) or OX1A (E6-23) - Body ground	10 kΩ or higher
HT (H5-1) or HT1A (E6-4) - Body ground	10 kΩ or higher
OX (H7-3) or OX2A (E6-22) - Body ground	10 kΩ or higher
HT (H7-1) or HT2A (E6-33) - Body ground	10 kΩ or higher



NG	Repair or replace harness or connector.

OK

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

NG → **Perform troubleshooting for misfire (See page DI-167).**

OK

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

CHECK:
Check the air induction system for vacuum leaks.

NG → **Repair or replace air induction system.**

OK

9	**Check fuel pressure (See page SF-7).**

CHECK:
Check the fuel pressure (high or low pressure).

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

OK

10	**Check injector injection (See page SF-24)**

NG → **Replace injector.**

OK

11	**Check exhaust system for gas leakage.**

NG → **Repair or replace exhaust gas leakage point.**

OK

Replace heated oxygen sensor (bank 1, 2 sensor 1).

12	**Perform confirmation driving pattern (See page DI-106).**

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

Go

13	**Are there DTCs P0134 and P0154 being output again?**

YES → **Replace ECM (See page SF-60).**

NO

14	**Confirm if vehicle has run out of fuel in past.**

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

YES

DTCs P0134 and P0154 are caused by running out of fuel.

DIC29-01

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

DTC	P0156	Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 2)

CIRCUIT DESCRIPTION

Refer to DTC P0031 on page DI-49 .

DTC No.	DTC Detecting Condition	Trouble Area
P0136 P0156	The following condition (a) or (b) continues 300 sec. or more. (a) During driving with the engine warmed up, heated oxygen sensor output does not change. (b) Heated oxygen sensor output is very low most of the time.	□Open or short in heated oxygen sensor circuit □Heated oxygen sensor □Heated oxygen sensor heater □EFI or ECD relay

HINT:

- Bank 1 refers to bank that includes cylinder No. 1.
- Bank 2 refers to bank that does not includes cylinder No. 1.
- Sensor 2 refers to the sensor farther away from the engine assembly.

MONITOR DESCRIPTION

The ECM monitors the rear heated oxygen sensor in the following 3 items:

(1) If the rear heated oxygen sensor voltage changes between Rich and Lean while the vehicle is running (repeating acceleration and deceleration). If not, the ECM interprets this as a malfunction, illuminates the MIL, and then sets DTC.

(2) If the rear heated oxygen sensor voltage does not remain at less than 0.05 V for a long time while the vehicle is running. If not, the ECM interprets this as a malfunction, illuminates the MIL, and then sets DTC.

(3) If the sensor's voltage drops to below 0.2 V (extremely Lean status) immediately when the vehicle decelerates and the fuel cut is working. if not, the ECM interprets this to mean the sensor's response feature has deteriorated, illuminates the MIL, and then sets DTC.

MONITOR STRATEGY

Related DTCs	P0136	Heated rear oxygen sensor output voltage (Crack) (Bank 1)
		Heated rear oxygen sensor output voltage (Bank 1)
		Heated rear oxygen sensor slow response (Bank 1)
	P0156	Heated rear oxygen sensor output voltage (Crack) (Bank 2)
		Heated rear oxygen sensor output voltage (Bank 2)
		Heated rear oxygen sensor slow response (Bank 2)
Required sensors/components	Main sensors/components	Heated rear oxygen sensor
	Related sensors/components	Mass air flow meter, Vehicle speed sensor
Frequency of operation	Once per drive cycle	
Duration	300 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Case 1 (Output voltage (crack)):		
Vehicle speed	3 km/h (2 mph)	-
Idle	OFF	
Fuel cut	OFF	
Time after fuel cut ON to OFF	40 sec.	-
Intake air amount per revolution	0.7 g/rev	-
Case 2 (Output voltage):		
All of the following conditions are met:	A, B, C and D	
A. Pass/fail detection in this driving cycle	Not detected	
B. Engine	Running	
C. Time after engine start	0 sec.	-
D. Either of the following conditions is met:	(a) or (b)	
(a) Cumulative time while heated oxygen sensor heater is ON	22 sec.	-
(b) At once more heated oxygen sensor voltage	0.2 V	-
Case 3 (Slow response):		
Rear oxygen sensor voltage before the fuel cut	0.2 V or more	-
Catalyst condition	Warmed up	
Engine coolant temperature	75°C (167°F)	-

Fuel cut	Operating	
Time after engine start	200 sec.	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Case 1 (Output voltage (crack)):	
Following conditions are met:	A, B and C
A. Cumulative rear heated oxygen sensor monitor time	300 sec. or more
B. Time while rear heated oxygen sensor voltage is less than 0.05 V	180 sec. or more
C. Maximum rear heated oxygen sensor rich time (0.45 V or more)	Less than 20 sec.
Case 2 (Output voltage):	
Number of heated oxygen sensor voltage "switching"	0 time or less
"Switching" is counted when the sensor signal crosses the minimum or maximum voltage	
Minimum voltage	Less than 0.4 V
Maximum voltage	0.5 V or more
Case 3 (Slow response):	
Time until the rear oxygen sensor voltage drops to 0.2 V after fuel cut starts operating	6 sec. or more

COMPONENT OPERATING RANGE

Parameter	Standard Value
Heated oxygen sensor voltage	0 to 1 V

O2S TEST RESULT

Refer to page DI-3 for detailed information.

Rear HO2S voltage monitor

If the HO2S sensor voltage is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$07	Minimum rear HO2S voltage	N/A	V
$08	Maximum rear HO2S voltage	N/A	V

If the time required to change is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$31	Time to change from Lean (<0.4 V) to Rich (±0.5 V)	N/A	sec.
$32	Time to change from Rich (±0.5 V) to Lean (<0.4 V)	N/A	sec.

Rear HO2S slow response monitor

If the elapsed time is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$37	Until rear HO2S voltage drops to 0.2 V after fuel-cut starting	N/A	sec.

Rear HO2S element monitor

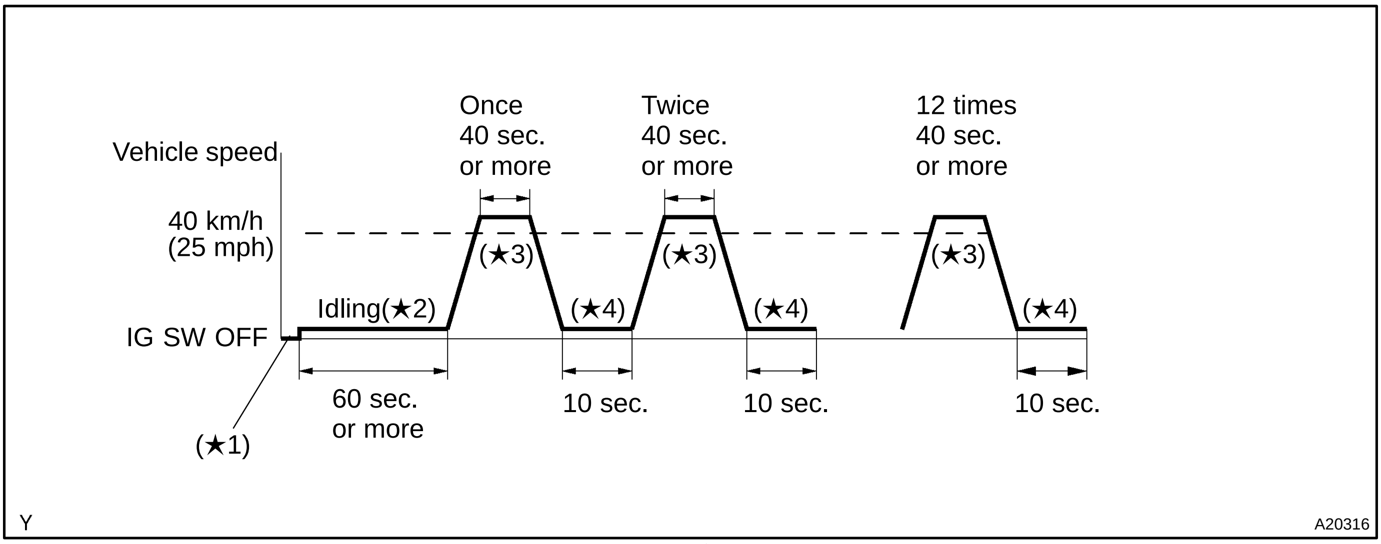
If all the values ($81, $84, $85 and $87) are out of the standard values, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$81	Percentage of monitoring time when the HO2S voltage is less than 0.05 V	Multiply 0.3906	%
$84	Percentage of monitoring time when the HO2S voltage is more than 0.7 V	Multiply 0.3906	%
$85	Time when the HO2S voltage is 0.45 V or more	Multiply 0.2621	sec.
$87	Percentage of monitoring time when the HO2S voltage is 0.45 V or more	Multiply 0.3906	%

WIRING DIAGRAM

Refer to DTC P0031 on page DI-49 .

CONFIRMATION DRIVING PATTERN



1. **Connect the hand-held tester to the DLC3. (★1)**
2. **Switch the hand-held tester from the normal mode to the check mode (See page DI-3). (★1)**
3. **Start the engine and let the engine idle for 60 seconds or more. (★2)**
4. **Drive the vehicle at 40 km/h (25 mph) or more for 40 seconds or more. (★3)**
5. **Let the engine idle for 10 seconds or more. (★4)**
6. **Perform steps 4. and 5. for 12 times.**

HINT:

If a malfunction exists, the MIL will light up on the multi-information display during step 6.

NOTICE:

If the conditions in this test are not strictly followed, a malfunction detection will not occur. If you do not have a hand-held tester, turn the ignition switch OFF after performing steps from 3 to 6, then perform steps from 3 to 6 again.

INSPECTION PROCEDURE

HINT:

Hand-held tester only:

The narrowing down the trouble area is possible by performing ACTIVE TEST of the following ”A/F CONTROL” (Heated oxygen sensor or another can be distinguished).

(a) Perform ACTIVE TEST by hand-held tester (A/F CONTROL).

HINT:

”A/F CONTROL” is the ACTIVE TEST which changes the injection volume to -12.5 % or +25 %.

(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
(4) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL”.
(5) Perform ”A/F CONTROL” with the engine in an idle condition (press the right or left button).

<u>**RESULT:**</u>

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume
+25 % → rich output: More than 0.5 V
-12.5 % → lean output: Less than 0.4 V

NOTICE:

However, there is a few seconds delay in the sensor 1 (front sensor) output. And there is about 20 seconds delay in the sensor 2 (rear sensor).

	Output voltage of heated oxygen sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspect trouble area
Case 1	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	—
Case 2	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Sensor 2: rear sensor (sensor 2, heater, sensor 2 circuit)
Case 4	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Extremely rich or lean of the actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of the heated oxygen sensors.
For displaying the graph indication, first enter "ACTIVE TEST / A/F CONTROL / USER DATA," then select "02S B1S1and O2S B1S2" by pressing "YES" button, and push "ENTER" button before pressing "F4" button.
HINT:

- If different DTCs that are related to different system are output simultaneously while terminal E2 is used as a ground terminal, terminal E2 may be open.
- Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Are there any other codes (besides DTC P0136 or P0156) being output?**

PREPARATION:
(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:
Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
P0136	A
"P0136" and other DTCs	B

HINT:
If any other codes besides P0136 are output, perform the troubleshooting for those DTCs first.

B | **Go to relevant DTC chart (See page DI-36).**

A

2	Check output voltage of heated oxygen sensor.

PREPARATION:
(a) Connect the OBD II scan tool or the hand-held tester to the DLC3.
(b) After warming up the engine, run the engine at 2,500 rpm for 3 minutes.
(c) When using hand-held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B2 S1 or B2 S2.

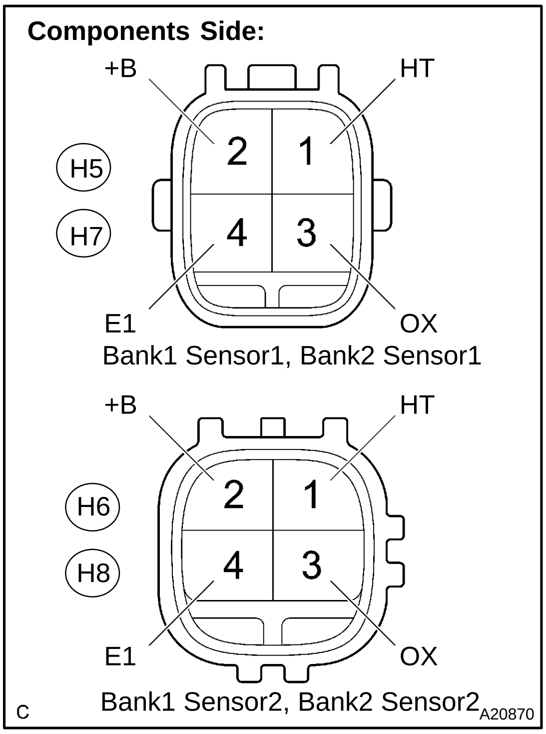
CHECK:
Read the voltage output of the heated oxygen sensor when the engine speed is suddenly increased.
HINT:
Quickly accelerate the engine to 4,000 rpm 3 minutes by using the accelerator pedal.

OK:
Heated oxygen sensor output voltage: Alternates from 0.4 V or less to 0.5 V or more.

OK → **Go to step 6.**

NG

3	Check resistance of heated oxygen sensor heater.



PREPARATION:
Disconnect the H5, H6, H7 or H8 heated oxygen sensor connector.

CHECK:
Measure resistance between terminals of the heated oxygen sensor.

OK:

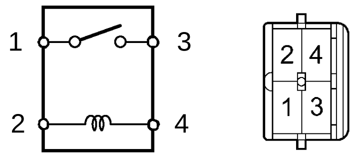
Tester Connection	Specified Condition
HT (H5-1) - +B (H5-2)	11 to 16 Ω (20˚C)
HT (H6-1) - +B (H6-2)	11 to 16 Ω (20˚C)
HT (H7-1) - +B (H7-2)	11 to 16 Ω (20˚C)
HT (H8-1) - +B (H8-2)	11 to 16 Ω (20˚C)

NG → **Replace heated oxygen sensor.**

OK

4	Check EFI or ECD relay.

EFI or ECD Relay



A21543

PREPARATION:

Remove the EFI or ECD relay from the engine room R/B.

CHECK:

Inspect the EFI or ECD relay.

OK:

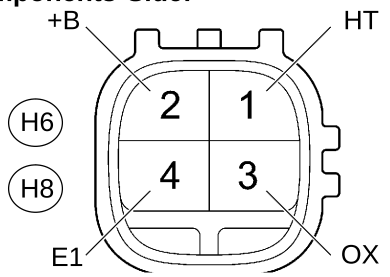
Terminal No.	Condition	Specified Condition
2 - 4	Constant	Continuity
1 - 3	Usually	No Continuity
	Apply B+ between terminals 2 and 4	Continuity

NG → **Replace EFI or ECD relay.**

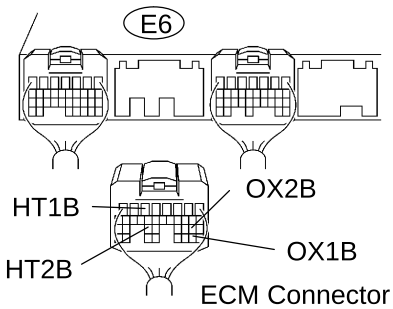
OK

5	Check for open and short in harness and connector between ECM and heated oxygen sensor.

Components Side:



C Bank1 Sensor2, Bank2 Sensor2 A21341



C ECM Connector A21340

PREPARATION:

(a) Disconnect the H6 or H8 heated oxygen sensor connector.

(b) Disconnect the E6 ECM connector.

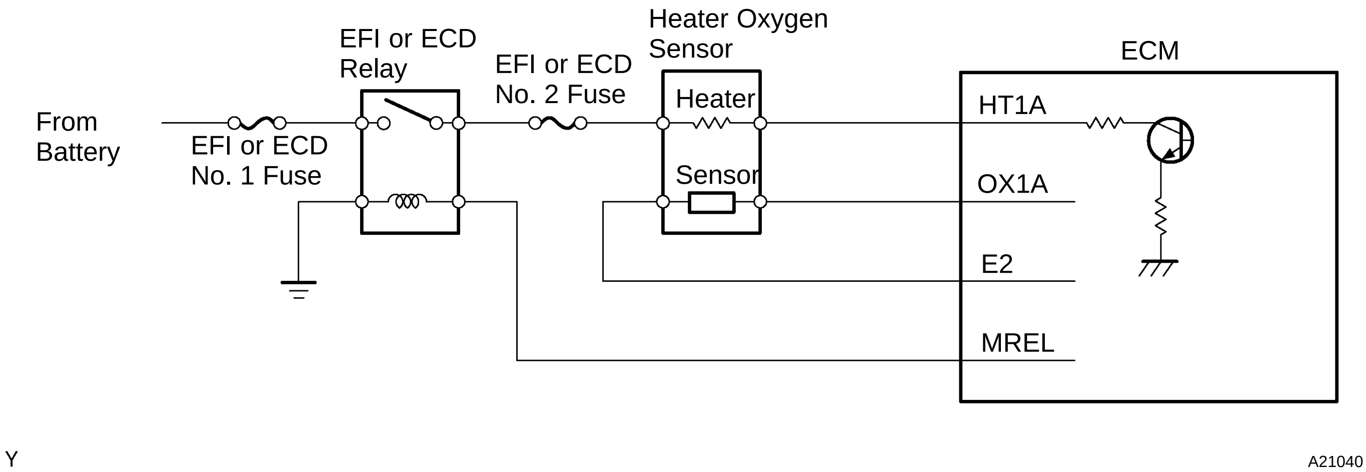
CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
OX (H6-3) - OX1B (E6-29)	Below 1 Ω
HT (H6-1) - HT1B (E6-5)	Below 1 Ω
OX (H8-3) - OX2B (E6-21)	Below 1 Ω
HT (H8-1) - HT2B (E6-25)	Below 1 Ω
OX (H6-3) or OX1B (E6-29) - Body ground	10 kΩ or higher
HT (H6-1) or HT1B (E6-5) - Body ground	10 kΩ or higher
OX (H8-3) or OX2B (E6-21) - Body ground	10 kΩ or higher
HT (H8-1) or HT2B (E6-25) - Body ground	10 kΩ or higher

Reference (Bank 1 Sensor 1 System Drawing)



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

OK

Replace heated oxygen sensor.

6	**Perform confirmation driving pattern.**

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

Go

7	**Is the DTC P0136 or P0156 being output again?**

NO → **Check for intermittent problems.**

YES

Replace heated oxygen sensor.

DIC2A-01

DTC	P0171	System too Lean (Bank 1)

DTC	P0172	System too Rich (Bank 1)

DTC	P0174	System too Lean (Bank 2)

DTC	P0175	System too Rich (Bank 2)

CIRCUIT DESCRIPTION

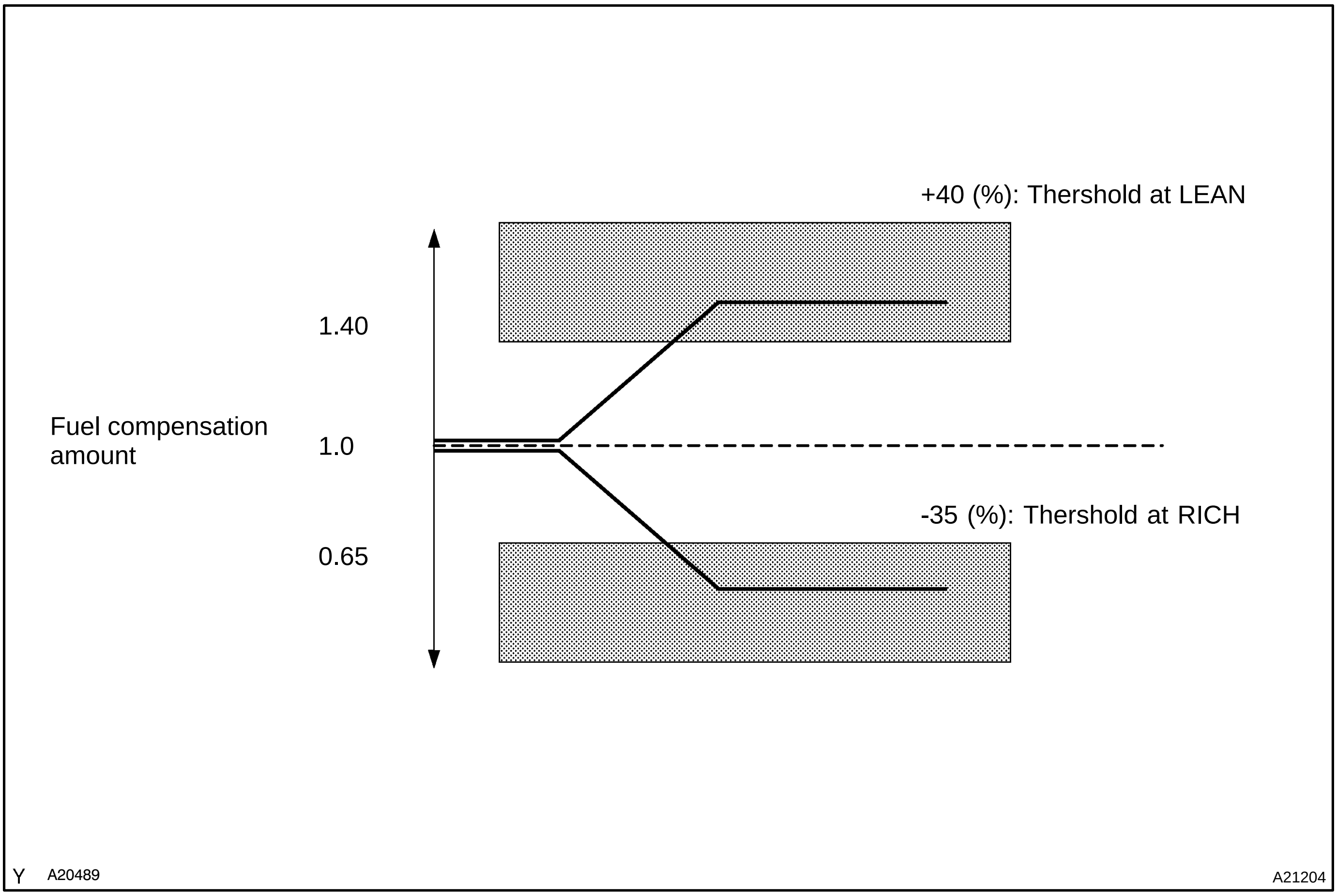
The fuel trim is related to the feedback compensation value, not to the basic injection time. The fuel trim includes the short-term fuel trim and the long-term fuel trim.
The short-term fuel trim is the short-term fuel compensation used to maintain the air-fuel ratio at stoichiometric air-fuel ratio. The signal from the heated oxygen sensor indicates whether the air-fuel ratio is RICH or LEAN compared to the stoichiometric air-fuel ratio. This variance triggers a reduction in the fuel volume if the air-fuel ratio is RICH, and an increase in the fuel volume if it is LEAN.
The long-term fuel trim is the overall fuel compensation carried out in long-term to compensate for a continual deviation of the short-term fuel trim from the central value, due to individual engine differences, wear overtime and changes in the operating environment.
If both the short-term fuel trim and the long-term fuel trim are LEAN or RICH beyond a certain value, it is detected as a malfunction and the MIL is illuminated and a DTC is set.

DTC No.	DTC Detecting Condition	Trouble Area
P0171 P0174	When air-fuel ratio feedback is stable after warming up engine, fuel trim is considerably in error on LEAN side (2 trip detection logic)	□Air induction system □Injector blockage □Mass air flow meter □Engine coolant temperature sensor □Fuel pressure □Gas leakage in exhaust system □Open or short in heated oxygen sensor (bank 1, 2 sensor 1) circuit □Heated oxygen sensor (bank 1, 2 sensor 1) □Heated oxygen sensor heater (bank 1, 2 sensor 1) □EFI or ECD relay □PCV piping □ECM
P0172 P0175	When air-fuel ratio feedback is stable after warming up engine, fuel trim is considerably in error on RICH side (2 trip detection logic)	□Injector leak, blockage □Mass air flow meter □Engine coolant temperature sensor □Ignition system □Fuel pressure □Gas leakage in exhaust system □Open or short in heated oxygen sensor (bank 1, 2 sensor 1) circuit □Heated oxygen sensor (bank 1, 2 sensor 1) □ECM

HINT:

- When DTC P0171 or P0174 is recorded, the actual air-fuel ratio is on the LEAN side. When DTC P0172 or P0175 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 or P0174 may be 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 % (engine coolant temperature is more than 75 C (167 F)), the system is functioning normally.

MONITOR DESCRIPTION



Under closed-loop fuel control, fuel injection amounts that deviate from the ECM's estimated fuel amount will cause a change in the long-term fuel trim compensation value. This long-term fuel trim is adjusted when there are persistent deviations in the short-term fuel trim values. And the deviation from a simulated fuel injection amount by the ECM affects a smoothed fuel trim learning value. The smoothed fuel trim learning value is the combination of smoothed short term fuel trim (fuel feedback compensation value) and smoothed long term fuel trim (learning value of the air-fuel ratio). When the smoothed fuel trim learning value exceeds the DTC threshold, the ECM interprets this as a fault in the fuel system and sets a DTC.
Example:
If the smoothed fuel trim learning value is more than +40% or less than -35% the ECM interprets this as a malfunction in the fuel system.

MONITOR STRATEGY

Related DTCs	P0171	Fuel system lean (Bank 1)
	P0172	Fuel system rich (Bank 1)
	P0174	Fuel system lean (Bank 2)
	P0175	Fuel system rich (Bank 2)
Required sensors/components	Main sensors/components	Front oxygen sensor
	Related sensors/components	Engine coolant temperature sensor, Mass air flow meter, Crankshaft position sensor
Frequency of operation	Continuous	
Duration	10 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	11 V	-
Fuel system: Closed loop	13 sec.	-
One of the following conditions is met:	A or B	
A. Engine speed	-	1,000 rpm
B. Intake air amount per revolution	0.26 g/sec.	-
Warm up condition to enable air fuel ratio learning control	Conditions are met	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Following condition is continue for 3 sec.	A or B
A. Smoothed fuel trim learning value (Lean)	40% or more
B. Smoothed fuel trim learning value (Rich)	-35% or less

WIRING DIAGRAM

Refer to DTC P0031 on page DI-49 .

INSPECTION PROCEDURE

HINT:
Hand-held tester only:
The narrowing down the trouble area is possible by performing ACTIVE TEST of the following ”A/F CONTROL” (Heated oxygen sensor or another can be distinguished).
(a) Perform ACTIVE TEST by hand-held tester (A/F CONTROL).
HINT:
”A/F CONTROL” is the ACTIVE TEST which changes the injection volume to -12.5 % or +25 %.
(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
(4) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL”.
(5) Perform ”A/F CONTROL” with the engine in an idle condition (press the right or left button).

RESULT:

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume
+25 % → rich output: More than 0.5 V
-12.5 % → lean output: Less than 0.4 V

NOTICE:
However, there is a few seconds delay in the sensor 1 (front sensor) output. And there is about 20 seconds delay in the sensor 2 (rear sensor).

	Output voltage of heated oxygen sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspect trouble area
Case 1	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	—
Case 2	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Sensor 2: rear sensor (sensor 2, heater, sensor 2 circuit)
Case 4	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Extremely rich or lean of the actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of the heated oxygen sensors (sensor 1 and 2).
For displaying the graph indication, enter "ACTIVE TEST / A/F CONTROL / USER DATA" then select "O2S B1S1 and O2S B1S2" by pressing "YES" button and push "ENTER" button before pressing "F4" button.
HINT:

- If different DTCs related to different systems that have terminal E2 as the ground terminal, terminal E2 may be open.
- Read freeze frame data using the hand-held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- A high heated oxygen sensor (sensor 1) voltage (0.5 V or more) could be caused by a rich air fuel mixture. Check for conditions that would cause the engine to run rich.
- A low heated oxygen sensor (sensor 1) voltage (0.4 V or less) could be caused by a lean air fuel mixture. Check for conditions that would cause the engine to run lean.

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

CHECK:
Check the air induction system for vacuum leaks.

NG	**Repair or replace air induction system.**

OK

2	**Check connection of PCV piping.**

NG	**Repair or replace PCV piping.**

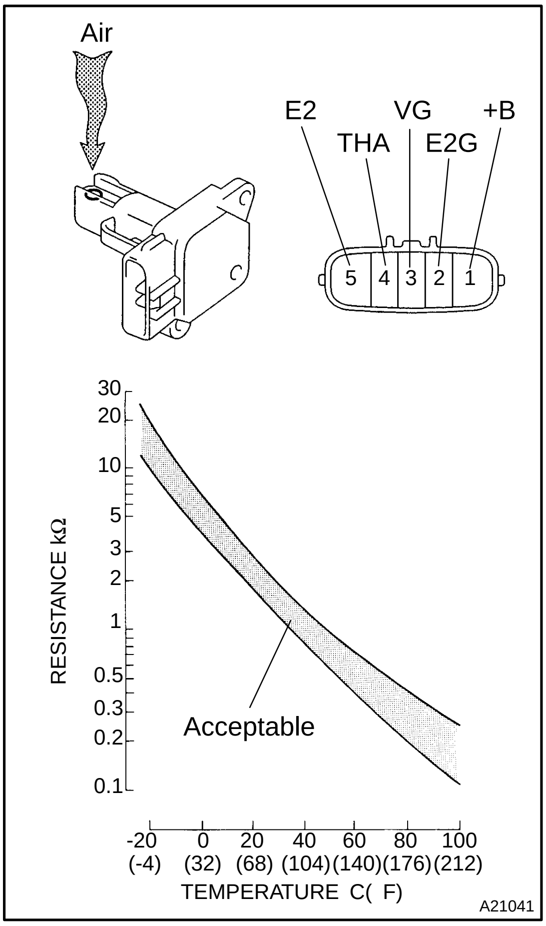
OK

3	**Check injector injection (See page SF-24).**

NG	**Replace injector.**

OK

4	Check mass air flow meter.



PREPARATION:

Remove the mass air flow meter.

CHECK:

(a) Inspect output voltage.

(1) Apply battery voltage across terminals +B and E2G.

(2) Connect the positive (+) tester prove to terminal VG, and negative (-) tester prove to terminal E2G.

(3) Blow air into the mass air flow sensor, and check that the voltage fluctuates.

(b) Inspect resistance.

(1) Measure the resistance between terminals of the intake air temperature sensor.

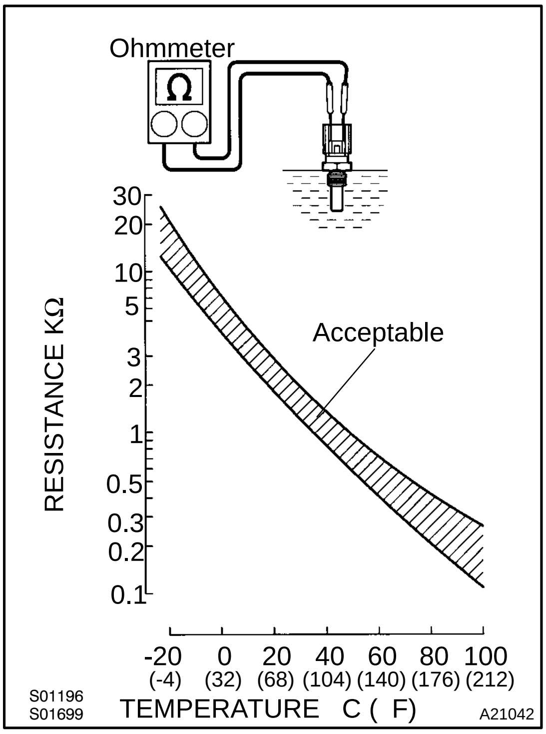
Resistance:

Tester Connection	Temperature	Specified Condition
THA (4) - E2 (5)	-20 C (-4 F)	13.6 to 18.4 kΩ
	20 C (68 F)	2.21 to 2.69 kΩ
	60 C (140 F)	0.49 to 0.67 kΩ

NG **Replace mass air flow meter.**

OK

5 Check engine coolant temperature sensor.



PREPARATION:

Remove the engine coolant temperature sensor.

CHECK:

(a) Measure the resistance between the terminals of the engine coolant temperature sensor.

Resistance:

Tester Connection	Specified Condition
1 - 2	2.32 to 2.59 kΩ (20 C (68 F))
	0.310 to 0.326 kΩ (80 C (176 F))

NOTICE:

In case of checking the engine coolant temperature sensor in the water, be careful not to allow water to go into the terminals. After checking, dry the sensor.

HINT:

Alternate procedure: Connect an ohmmeter to the installed engine coolant temperature sensor and read the resistance. Use an infrared thermometer to measure the engine temperature in the immediate vicinity of the sensor. Compare these values to the resistance/temperature graph. Change the engine temperature (warm up or allow to cool down) and repeat the test.

(b) Reinstall the engine coolant temperature sensor.

NG → **Repair or replace engine coolant temperature sensor.**

OK

6 Check for spark and ignition (See page IG-1).

NG → **Repair or replace ignition system.**

OK

7	**Check fuel pressure (See page SF-7).**

CHECK:
Check the fuel pressure (high or low pressure).

NG	**Check and replace fuel pump, pressure regulator, fuel pipe line and filter (See page SF-1).**

OK

8	**Check exhaust system for gas leakage.**

NG	**Repair or replace exhaust gas leakage point.**

OK

9	Check output voltage of heated oxygen sensor (bank 1, 2 sensor 1) during idling.

PREPARATION:

(a) Warm up the heated oxygen sensor with the engine speed at 2,500 rpm for approximately 90 seconds.

(b) Connect the hand-held tester or OBD II scan tool to the DLC3.

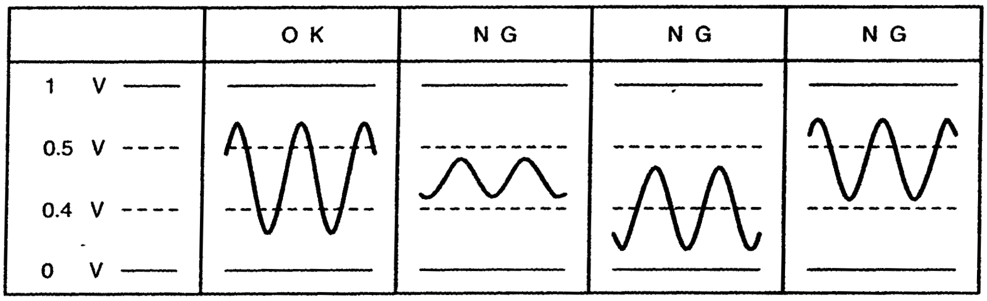
(c) When using hand-held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B1 S1 or B2 S1.

CHECK:

Check the output voltage of the heated oxygen sensor during idling using the OBD II scan tool or hand-held tester.

OK:

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

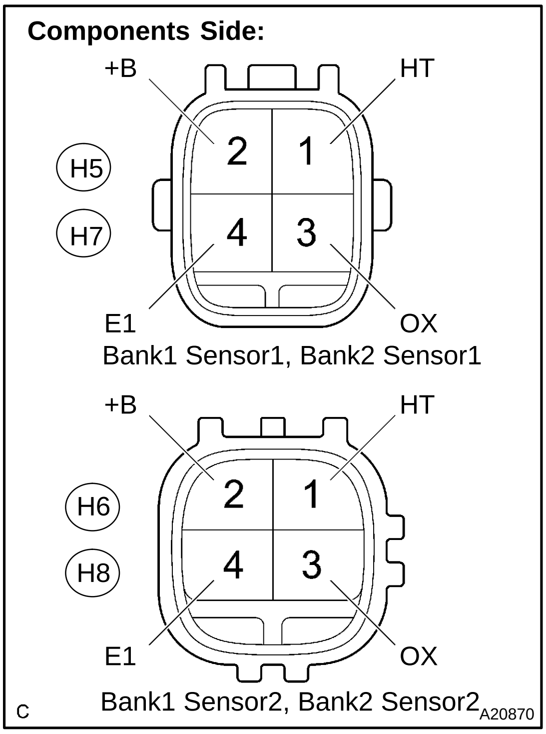


Q30018

OK	Go to step 17.

NG

10	Check resistance of heated oxygen sensor heater.



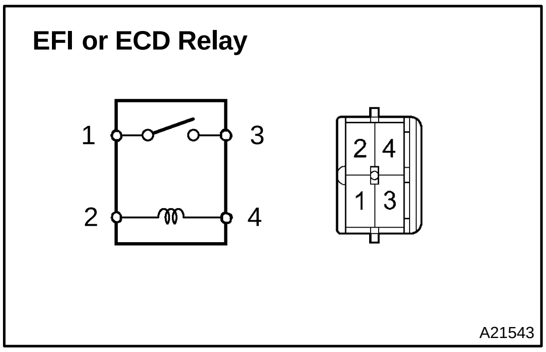
PREPARATION:
Disconnect the H5, H6, H7 or H8 heated oxygen sensor connector.
CHECK:
Measure resistance between terminals of the heated oxygen sensor.
OK:

Tester Connection	Specified Condition
HT (H5-1) - +B (H5-2)	11 to 16 Ω (20°C)
HT (H6-1) - +B (H6-2)	11 to 16 Ω (20°C)
HT (H7-1) - +B (H7-2)	11 to 16 Ω (20°C)
HT (H8-1) - +B (H8-2)	11 to 16 Ω (20°C)

NG → **Replace heated oxygen sensor.**

OK

11	Check EFI or ECD relay.



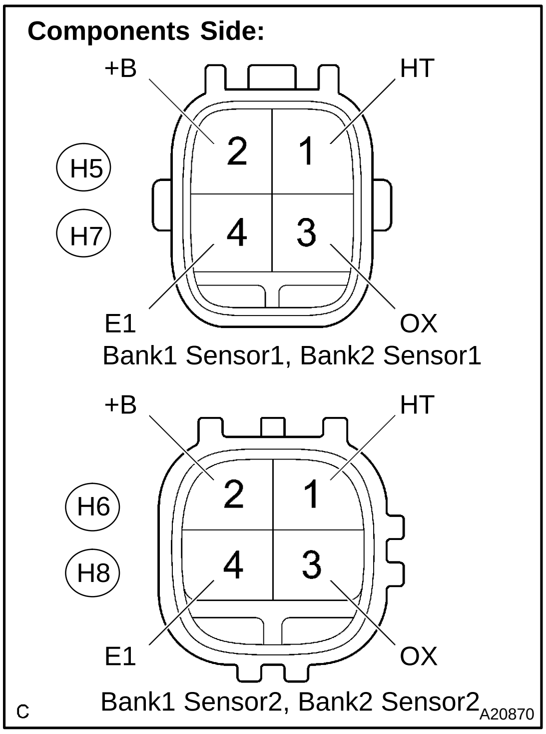
PREPARATION:
Remove the EFI or ECD relay from the engine room R/B.
CHECK:
Inspect the EFI or ECD relay.
OK:

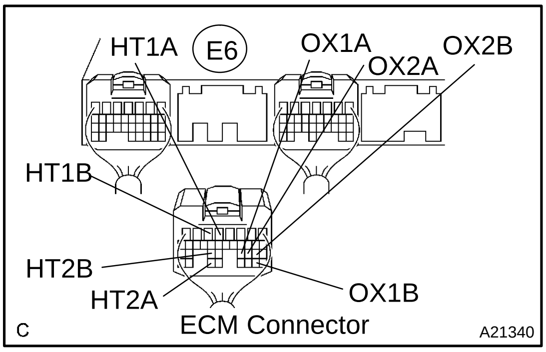
Terminal No.	Condition	Specified Condition
2 - 4	Constant	Continuity
1 - 3	Usually	No Continuity
	Apply B+ between terminals 2 and 4	Continuity

NG → **Replace EFI or ECD relay.**

OK

12	Check for open and short in harness and connector between ECM and heated oxygen sensor.





PREPARATION:

(a) Disconnect the H5, H6, H7 or H8 heated oxygen sensor connector.

(b) Disconnect the E6 ECM connector.

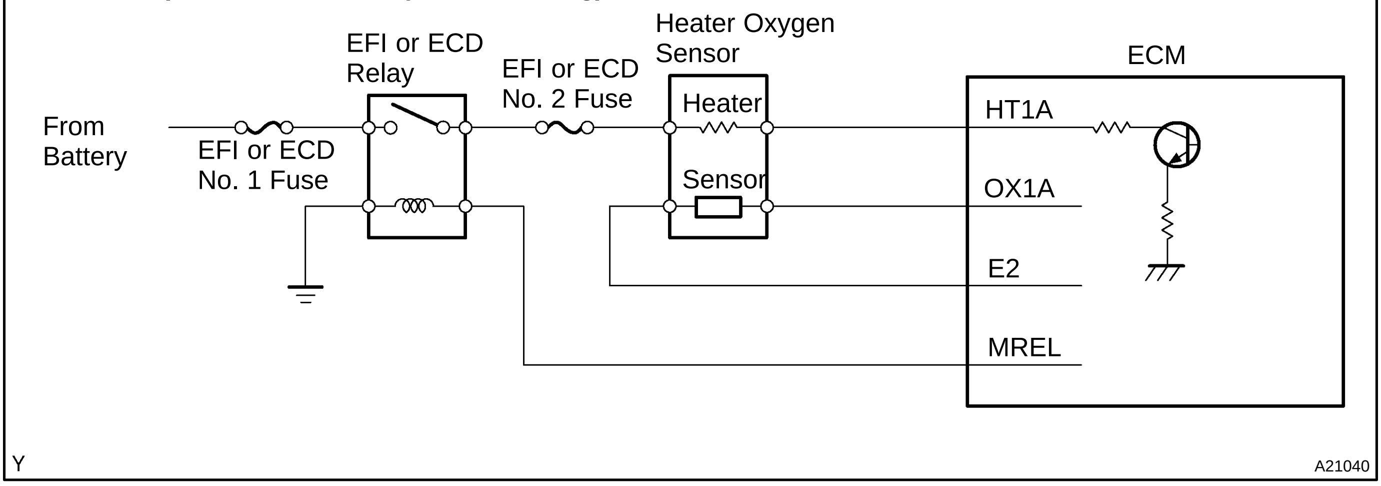
CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
OX (H5-3) - OX1A (E6-23)	Below 1 Ω
HT (H5-1) - HT1A (E6-4)	Below 1 Ω
OX (H6-3) - OX1B (E6-29)	Below 1 Ω
HT (H6-1) - HT1B (E6-5)	Below 1 Ω
OX (H7-3) - OX2A (E6-22)	Below 1 Ω
HT (H7-1) - HT2A (E6-33)	Below 1 Ω
OX (H8-3) - OX2B (E6-21)	Below 1 Ω
HT (H8-1) - HT2B (E6-25)	Below 1 Ω
OX (H5-3) or OX1A (E6-23) - Body ground	10 kΩ or higher
HT (H5-1) or HT1A (E6-4) - Body ground	10 kΩ or higher
OX (H6-3) or OX1B (E6-29) - Body ground	10 kΩ or higher
HT (H6-1) or HT1B (E6-5) - Body ground	10 kΩ or higher
OX (H7-3) or OX2A (E6-22) - Body ground	10 kΩ or higher
HT (H7-1) or HT2A (E6-33) - Body ground	10 kΩ or higher
OX (H8-3) or OX2B (E6-21) - Body ground	10 kΩ or higher
HT (H8-1) or HT2B (E6-25) - Body ground	10 kΩ or higher

Reference (Bank 1 Sensor 1 System Drawing)



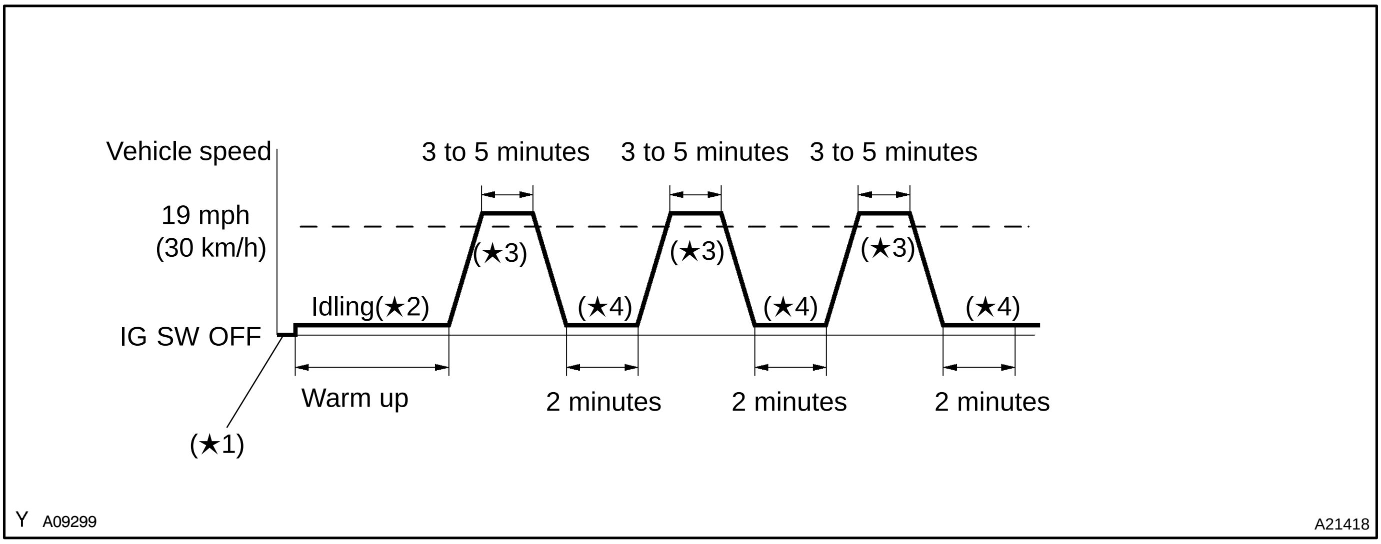
NG — **Replace or replace harness or connector.**

OK

13	**Replace heated oxygen sensor.**

Go

14	**Perform confirmation driving pattern.**



(a) Disconnect the battery terminal and wait for a minute (clear learning value of the air fuel ratio). (★1)
(b) Connect the hand-held tester to the DLC3. (★1)
(c) Switch the hand-held tester from the normal mode to the check mode (See page DI-3). (★1)
(d) Start the engine and let it idle until engine coolant temperature is 75 ˚C (167 ˚F) or more. (★2)
(e) Drive the vehicle at 19 mph (30 km/h) or more for 3 minutes or more. (★3)
(f) Let the engine idle for approx. 2 minutes. (★4)
(g) Perform steps (e) and (g) at least 3 times.

HINT:
If a malfunction exists, the MIL will be illuminated during step (f).

NOTICE:
If the conditions in this test are not strictly followed, detecting a malfunction may be difficult. If you do not have a hand-held tester, turn the ignition switch OFF after performing steps (e) to (f), and then do step (f) again.

GO

15	**Is there DTC P0171, P0172, P0174 or P0175 being output again?**

YES → **Replace ECM (See page SF-60) and perform confirmation driving pattern (Refer to step 14).**

NO

16	**Confirm if vehicle has run out of fuel in past.**

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

YES

DTC P0171, P0172, P0174 or P0175 is caused by running out of fuel.

17	**Perform confirmation driving pattern.**

HINT:
Clear all DTCs prior to performing the confirmation driving pattern (Refer to step 14).

Go

18	**Is there DTC P0171, P0172 P0174 and/or P0175 being output again?**

NO → **Go to step 22.**

YES

19	**Replace heated oxygen sensor.**

Go

20	**Perform confirmation driving pattern.**

HINT:
Clear all DTCs prior to performing the confirmation driving pattern (Refer to step 14).

Go

21	Is the DTC P0171, P0172, P0174 and/or P0175 being output again?

YES → **Replace ECM (See page SF-60) and perform confirmation driving pattern (Refer to step 14).**

No

22	Confirm if vehicle has run out of fuel in past.

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

YES

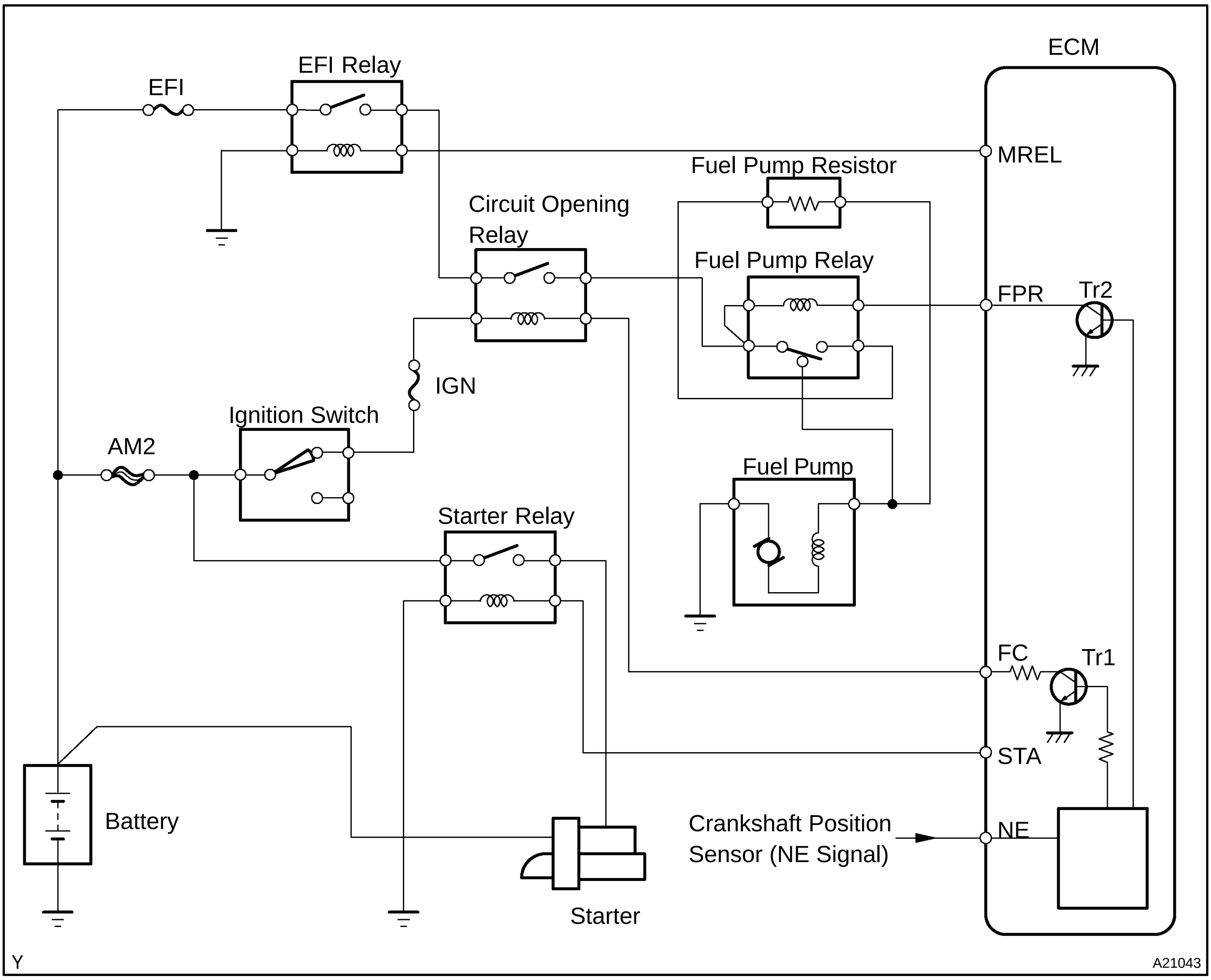
DTC is caused by running out of fuel (DTCs P0171, P0172 P0174 and/or P0175).

DIC2B-01

DTC	P0230	Fuel Pump Primary Circuit

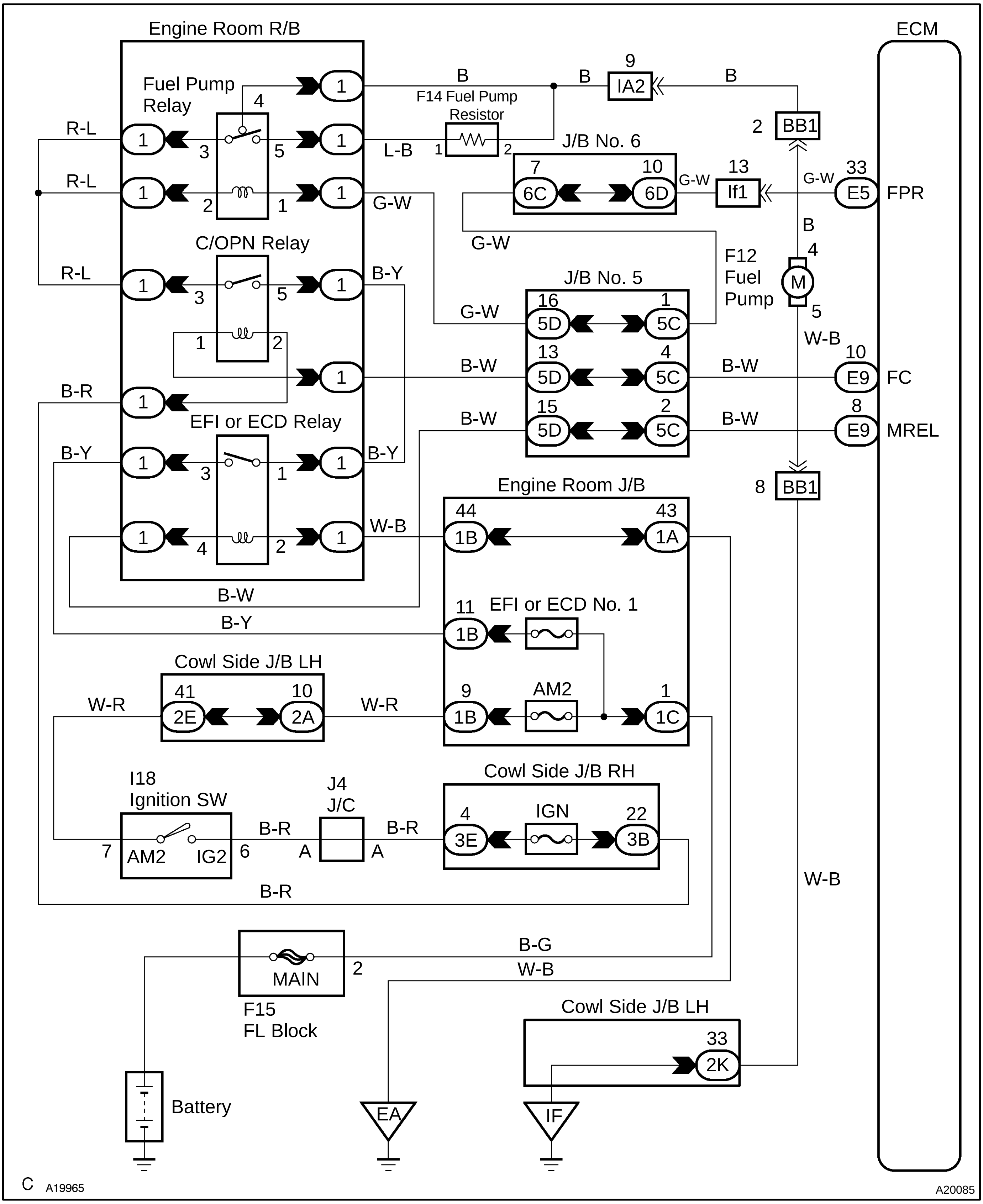
CIRCUIT DESCRIPTION

In the diagram below, when the engine is cranked, current flows from terminal STAR of the ECM to the starter relay coil and also current flows to terminal STA of the ECM (STA signal).
When the STA signal and NE signal are input to the ECM, the Tr1 is turned ON, current flows to the 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 the Tr1 ON (circuit opening relay ON) and the fuel pump also keeps operating.
The fuel pump speed is controlled at two levels (high speed or low speed) by the condition of the engine (starting, light load, heavy load). When the engine starts (STA ON), the Tr2 in the ECM is OFF, so the fuel pump relay closes and battery positive voltage is applied directly to the fuel pump. The fuel pump operates at high speed.
After the engine starts during idling or light loads, since the Tr2 goes ON, power is supplied to the fuel pump via the fuel pump resistor. The fuel pump operates at low speed.



DTC No.	DTC Detecting Condition	Trouble Area
P0230	Open or short in fuel pump relay circuit	★Open or short in fuel pump relay circuit ★Fuel pump relay ★Circuit opening relay ★Fuel pump ★ECM

WIRING DIAGRAM



HINT:

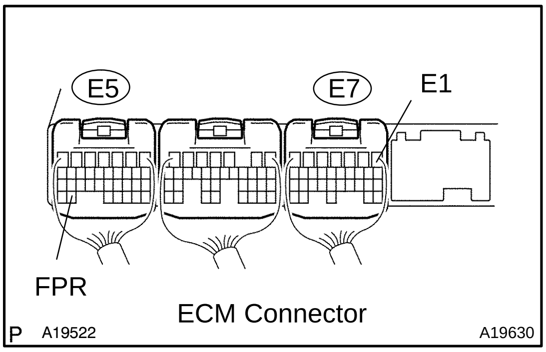
This diagnostic chart is based on premise that engine is started. If the engine is not started, proceed to problem symptoms table on DI-48 .

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	Check voltage between terminal FPR and E1 of ECM.



CHECK:

Measure the voltage between terminals of E5 and E7 ECM connectors.

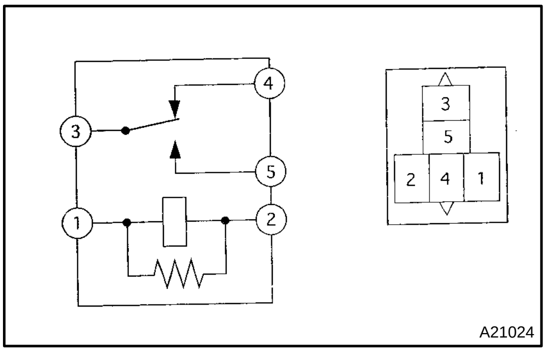
OK:

Tester Connection	Condition	Specified Condition
FPR (E5-33) - E1 (E7-1)	STA signal ON	9 to 14 V
FPR (E5-33) - E1 (E7-1)	STA signal OFF	0 to 3 V

OK → **Replace ECM (See page SF-60).**

NG

2	Check fuel pump relay.



PREPARATION:

Remove the fuel pump relay from the engine room R/B.

CHECK:

Inspect the fuel pump relay.

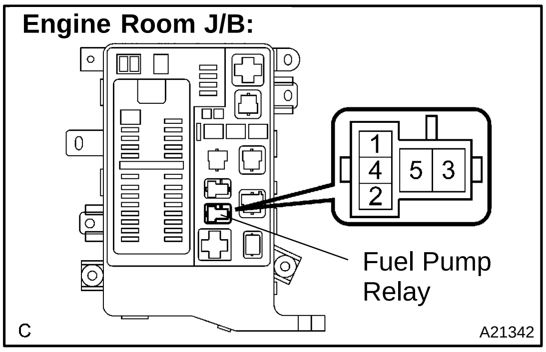
OK:

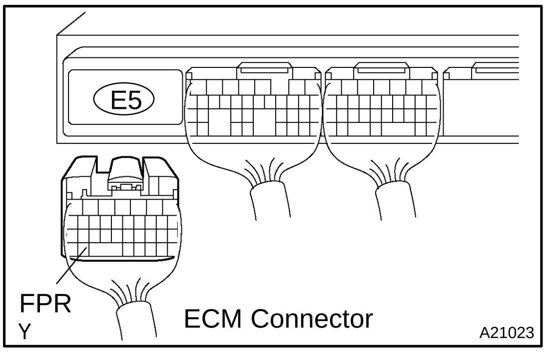
Tester Connection	Specified Condition
1 - 2	Continuity
3 - 4	Continuity
3 - 5	No continuity
3 - 5	Continuity (Apply battery voltage terminal 1 and 2)

NG → **Replace fuel pump relay.**

OK

3	**Check for open and short in harness and connector between fuel pump relay and ECM.**





PREPARATION:

(a) Remove the fuel pump relay from the engine room J/B.

(b) Disconnect the E5 ECM connector.

CHECK:

Measure the resistance between wire harness side connectors.

OK:

Tester Connection	Specified Condition
Engine Room J/B (Fuel pump relay terminal 1) - FPR (E5-33)	Below 1 Ω
Engine Room J/B (Fuel pump relay terminal 1) or FPR (E5-33) - Body ground	10 kΩ or higher

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

OK

Replace ECM (See page SF-60).

DIC2C-01

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

DTC	P0307	Cylinder 7 Misfire Detected

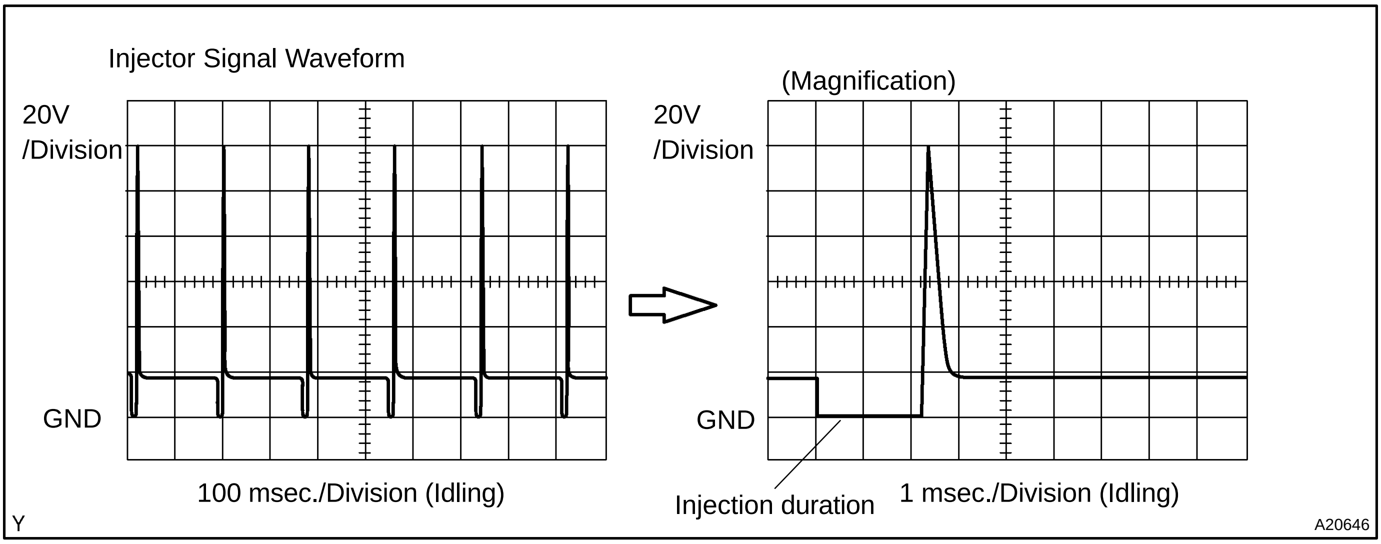
DTC	P0308	Cylinder 8 Misfire Detected

CIRCUIT DESCRIPTION

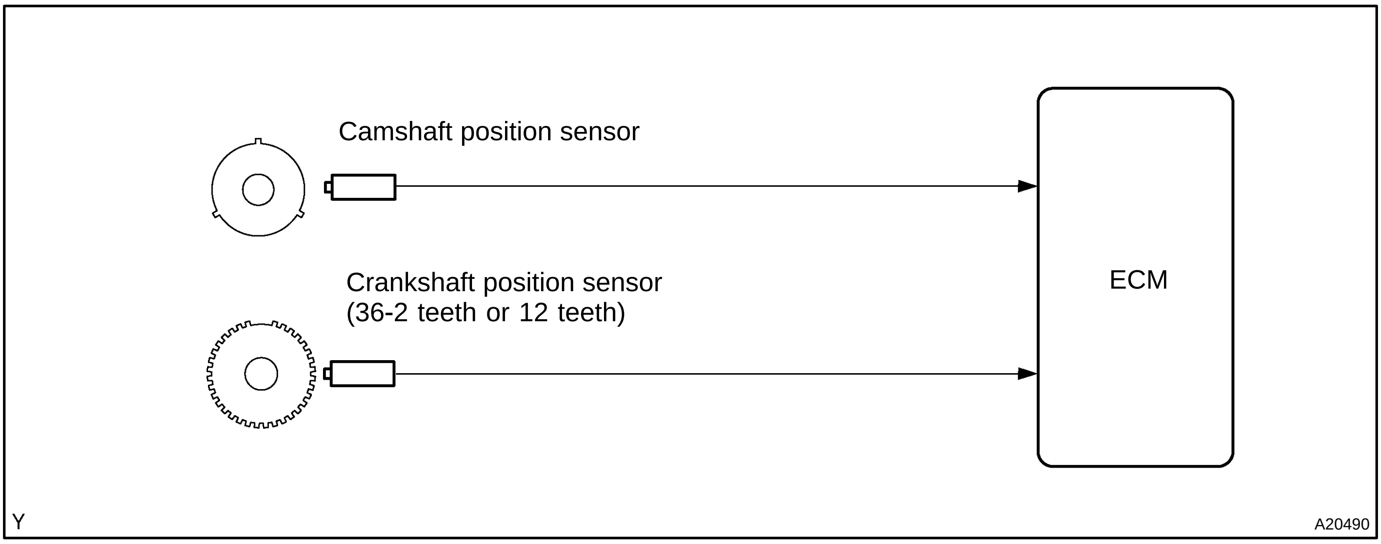
When a misfire occurs in the engine, hydrocarbons (HC) enter the exhaust in high concentrations. If this HC concentration is high enough, there could be an increase in exhaust emissions levels. High concentrations of HC can also cause to temperature of the catalyst to increase, possibly damaging the catalyst. To prevent this increase in emissions and limit the possibility of thermal damage, the ECM monitors the misfire rate. When the temperature of the catalyst reaches a point of thermal degradation, the ECM will blink the MIL. For monitoring misfire, the ECM uses both the camshaft position sensor and the crankshaft position sensor. The camshaft position sensor is used to identify misfiring cylinders and the crankshaft position sensor is used to measure variations in the crankshaft rotation speed. The misfire counter increments when crankshaft rotation speed variations exceed threshold values.
If the misfiring rate exceeds the threshold value and could cause emissions deterioration, the ECM illuminates the MIL.

DTC No.	DTC Detecting Condition	Trouble Area
P0300	Misfiring of random cylinders is detected	★Open or short in engine wire ★Connector connection ★Vacuum hose connection ★Ignition system ★Injector ★Fuel pressure ★Mass air flow meter ★Engine coolant temperature sensor ★Compression pressure ★Valve clearance ★Valve timing ★PCV piping ★ECM
P0301 P0302 P0303 P0304 P0305 P0306 P0307 P0308	Misfiring of each cylinder is detected	

HINT:
When several codes for a misfiring cylinder are recorded repeatedly but no random misfire code is recorded, it indicates that the misfires have been detected and recorded at different times.
Reference: Inspection using the oscilloscope.
With the engine idling, check the waveform between terminals #1 to #8 and E01 of the ECM connectors.
HINT:
The correct waveform is as shown.



MONITOR DESCRIPTION



The ECM illuminates the MIL (2 trip detection logic) if:
The ECM will illuminate the MIL when the percent misfire exceeds the specified limit per 1,000 engine revolutions. One occurrence of excessive misfire during engine start will set the MIL. Four occurrences are required to set the MIL 1,000 revolutions after engine start.
The ECM blinks the MIL (MIL blinks immediately) if:

★ Within 200 engine revolutions at a high rpm, the threshold for ”percent of misfire causing catalyst damage” is reached 1 time.
★ Within 200 engine revolutions at a normal rpm, the threshold for ”percent of misfire causing catalyst damage” is reached 3 time.

MONITOR STRATEGY

Related DTCs	P0300	Random/Multiple cylinder misfire detected
	P0301	Cylinder 1 misfire detected
	P0302	Cylinder 2 misfire detected
	P0303	Cylinder 3 misfire detected
	P0304	Cylinder 4 misfire detected
	P0305	Cylinder 5 misfire detected
	P0306	Cylinder 6 misfire detected
	P0307	Cylinder 7 misfire detected
	P0308	Cylinder 8 misfire detected
Required sensors/components	Main sensors/components	Camshaft position sensor, Crankshaft position sensor
	Related sensors/components	Engine coolant temperature sensor, Intake air temperature sensor, Throttle position sensor
Frequency of operation	Continuous	
Duration	Every 1,000 revolutions (soon after engine is started: 1 time, other 4 times) (emission related misfire) Every 200 revolutions (1 or 3 times) (catalyst deteriorating misfire)	
MIL operation	2 driving cycles MIL ON Immediate MIL blinking (Catalyst deteriorating misfire)	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

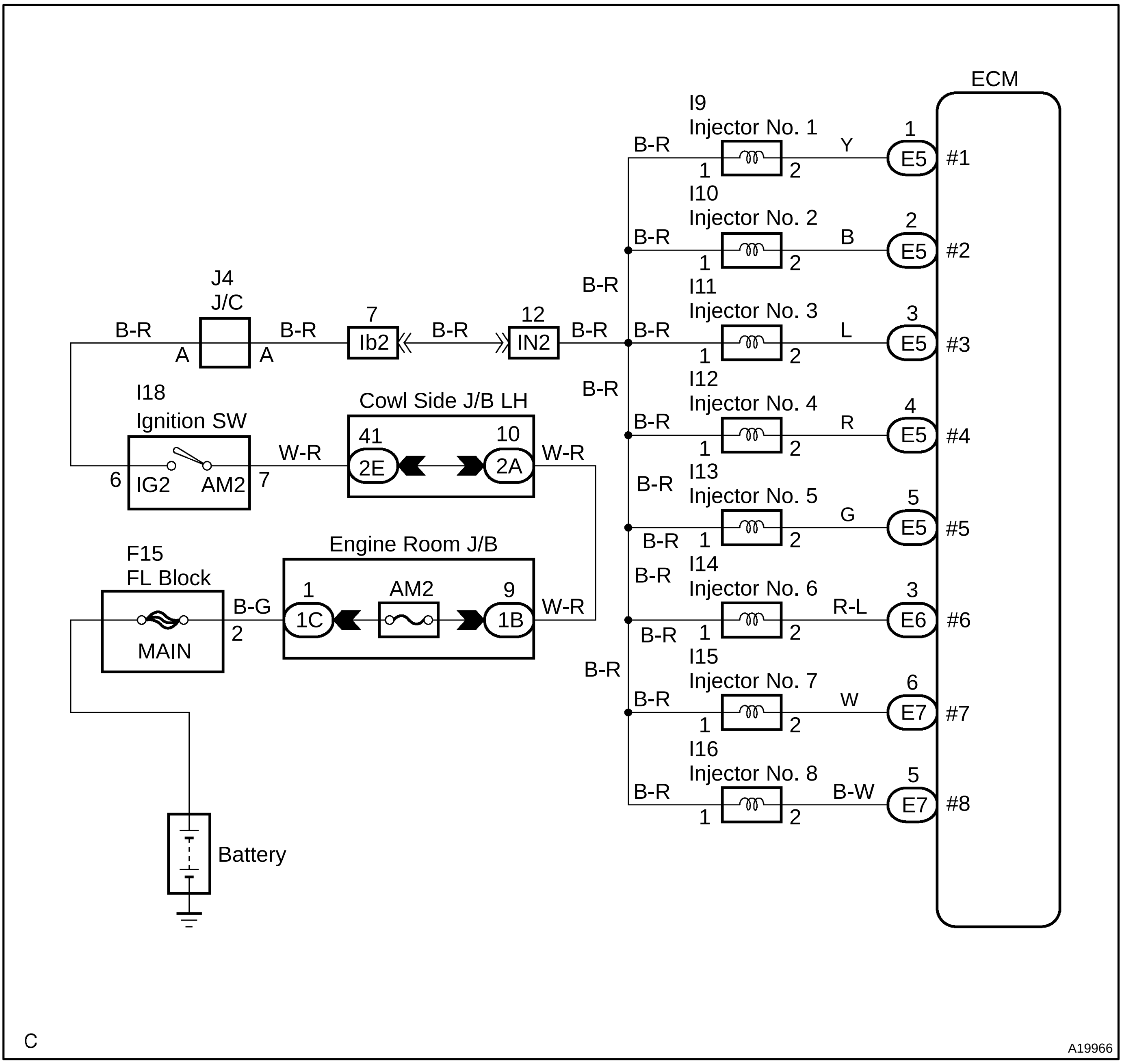
Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	8 V	-
VVT	Normal operation (i. e. not under scan-tool control)	
Engine speed fluctuation	Engine speed should not have changed rapidly	
Engine speed (Two full revolutions (2 rev.) after engine has started)	400 rpm	5,300 rpm
All of the following conditions are met:	A, B and C	
A. Engine coolant temperature	-10 °C (14°F)	-
B. Either of the following conditions is met:	(a) or (b)	
(a) Intake air temperature	-10 °C (14°F)	-
(b) Engine coolant temperature	75°C (167°F)	-
C. Either of the following conditions is met:	(a) or (b)	
(a) Engine coolant temperature at engine started	-7 °C (19°F)	-
(b) Engine coolant temperature	20°C (68°F)	-
Intake air amount per revolution (varies with engine speed)	0.4 g/rev.	-
Throttle position learning	Completed	
Throttle position	Rapid throttle opening or closing operation has not occurred	
	-	Changing value of throttle position Less than 0.5° per 0.008 sec.
Rough road counter	-	14 times/1,000 revolutions (Not running on rough road)
For paired cylinder misfire (6 or 8 cylinders):		
When ECT is between -10°C (14°F) and 75°C (167°F), the following conditions are met:	A and B	
A. Engine speed	-	3,000 rpm
B. Intake air amount per revolution at 1,800 rpm (varies with engine speed)	0.7 g/sec.	-
When ECT is over 75°C (167°F), the following conditions are met:	A or (B and C)	
A. NE signal plate tooth width learning was not completed		
B. Engine speed	-	3,000 rpm
C. Intake air amount per revolution at 1,800 rpm (varies with engine speed)	0.7 g/sec.	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Emission related misfire rate: 1. During the first 1,000 revolutions after engine start (MIL is set when misfire is detected 1 time) 2. After the first 1,000 revolutions have occurred (MIL is set when misfire is detected 4 times)	3 %/1,000 revolutions
Catalyst damage misfire count: 1. Low engine rpm area (ex. less than 3,000 rpm): 200 revolutions (MIL is set when misfire is detected 3 times) 2. High engine rpm area: Every 200 revolutions	96 count/200 revolutions (Threshold varies with engine speed and intake air amount per revolution)

WIRING DIAGRAM

Refer to DTC P0351 on page DI-202 for the wiring diagram of the ignition system.



CONFIRMATION DRIVING PATTERN

(a) Connect the hand-held tester to the DLC3.
(b) Record DTC and the freeze frame data.
(c) Use the hand-held tester to set to the check mode (See page DI-3).
(d) Read the value on the misfire counter for each cylinder when idling. If the value is displayed on the misfire counter, skip the following procedure of confirmation driving.
(e) 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 hand-held tester, turn the ignition switch OFF after the symptom is simulated once. Then repeat the simulation process again.

HINT:

In order to memorize the DTC of misfire, it is necessary to drive around MISFIRE RPM, MISFIRE LOAD in the DATA LIST for the following period of time. 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.

Engine Speed	Time
Idling	3 minutes 30 seconds or more
1,000 rpm	3 minutes or more
2,000 rpm	1 minute 30 seconds or more
3,000 rpm	1 minute or more

(f) Check if there is misfire and DTC and the freeze frame data. Record the DTC's, freeze frame data and misfire counter data.
(g) Turn the ignition switch OFF and wait at least 5 seconds.

INSPECTION PROCEDURE

HINT:

★ If DTCs besides misfire DTCs are memorized simultaneously, troubleshoot the non-misfire DTCs first.
★ If the misfire does not occur when the vehicle is brought to the workshop, the misfire can be confirmed by reproducing the condition of the freeze frame data. Also, after finishing the repair, confirm that there is no misfire (See confirmation driving pattern).
★ On 6 and 8 cylinder engines, misfiring cylinder identification is disabled at high engine speed and only a general misfire fault code P0300 is stored instead of a cylinder specific misfire fault code (P0301 to P0308).
If the misfire starts in a high engine speed area or the misfire occurs only in a high engine speed area, only code P0300 may be stored.

When only a general misfire fault code like P0300 is stored:
★ Erase the general misfire fault code from the hand-held tester or OBD II scan tool.
★ Start the engine and drive the confirmation patten.
★ Read the value of the misfire ratio for each cylinder. Or read the DTC.
★ Perform repairs on the cylinder that has a high misfire ratio. Or repair the cylinder indicated by the DTC.
★ After finishing repairs, drive the confirmation pattern again and confirm that no misfire occurs.
★ When either of SHORT FT #1, LONG FT #1, SHORT FT #2 or LONG FT #2 in the freeze frame data is over the range of ±20 %, there is a possibility that the air-fuel ratio is becoming 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 of misfire only during engine warm-up.
★ If the misfire cannot be reproduced, the following reasons may apply: 1) the vehicle has low fuel, 2) improper fuel is being used, and 3) the ignition plug is contaminated.

★ Be sure to check the value on the misfire counter after the repair.

1	**Are there any other codes (besides DTC P0300, P0301, P0302, P0303, P0304 P0305, P0306, P0307 or P0308) being output?**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
"P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307 and/or P0308"	A
"P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307 or P0308" and other DTCs	B

HINT:
If any other codes besides "P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307 or P0308" are output, perform the troubleshooting for those DTC.

B → **Go to relevant DTC chart (See page DI-36).**

A

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

CHECK:

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

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

OK

3	**Check connection of PCV piping.**

NG → **Repair or replace PCV piping.**

OK

4	**Connect hand-held tester, and read the number of misfire.**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) Start the engine.
(d) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / CYL#1 to CYL#8.

CHECK:

Read the number of misfire on the hand-held tester or the OBD II scan tool.

HINT:

When a misfire is not reproduced, be sure to branch below based on the stored DTC.

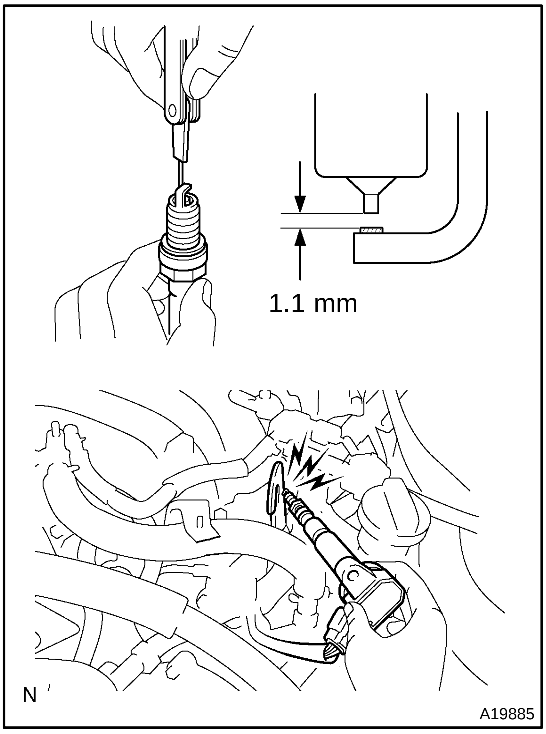
RESULT:

High Misfire Rate Cylinder	Proceed to
1 or 2 cylinders	A
More than 3 cylinders	B

B **Go to step 15.**

A

5	Check spark plug and spark of misfiring cylinder.



PREPARATION:
(a) Remove the ignition coil assembly.
(b) Remove the spark plug.

CHECK:
(a) Check the electrode for carbon deposits.
(b) Check the spark plug type (See page IG-1).
(c) Check electrode gap.

OK:
No large carbon deposit present.
Not wet with gasoline or oil.
Electrode gap: 1.0 to 1.3 mm (0.039 to 0.051 in.)

NOTICE:
If adjusting the gap of a new spark plug, bend only "the base / ground" electrode. Do not touch the tip. Never attempt to adjust the gap on a used plug.

PREPARATION:
(a) Install the spark plug to the ignition coil assembly.
(b) Disconnect the injector connector.
(c) Ground spark plug.

CHECK:
Check if spark occurs while engine is being cracked.

CAUTION:
Always disconnect each injector connector.

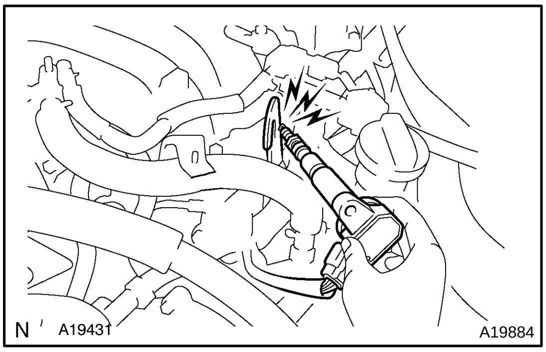
NOTICE:
Do not crank the engine for more than 2 seconds.

OK:
Spark occurs across electrode gap.

OK	Go to step 8.

NG

6	**Change normal spark plug and check spark of misfiring cylinder.**



PREPARATION:

(a) Change to the normal spark plug.

(1) Remove the spark plug that may be faulty from the ignition coil assembly.

(2) Install the spark plug to the ignition coil assembly.

(b) Disconnect the injector connector.

(c) Ground the spark plug.

CHECK:

Check if spark occurs while the engine is being cranked.

CAUTION:

Always disconnect each injector connector.

NOTICE:

Do not crank the engine for more than 2 seconds.

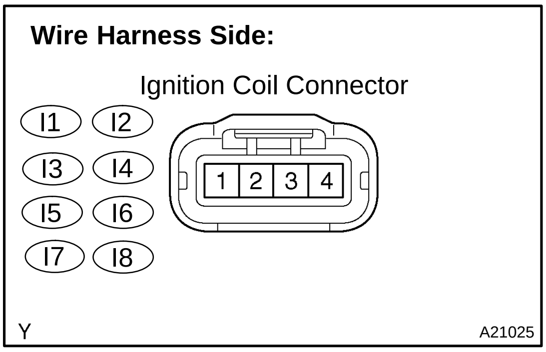
OK:

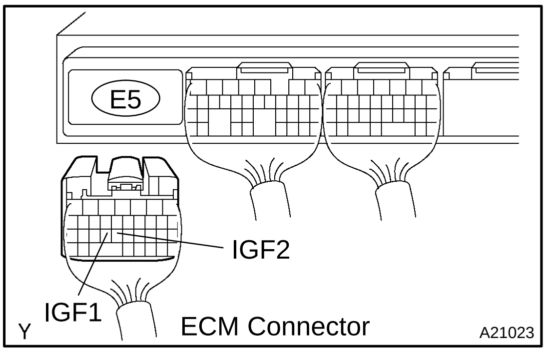
Spark jumps across electrode gap.

OK	**Replace spark plug.**

NG

7	**Check for open and short in harness and connector between ignition coil and ECM.**





Check the harness and connector between the ignition coil and the ECM (IGF terminal) connectors:

PREPARATION:

(a) Disconnect the I1, I2, I3, I4, I5, I6, I7 or I8 ignition coil connector.

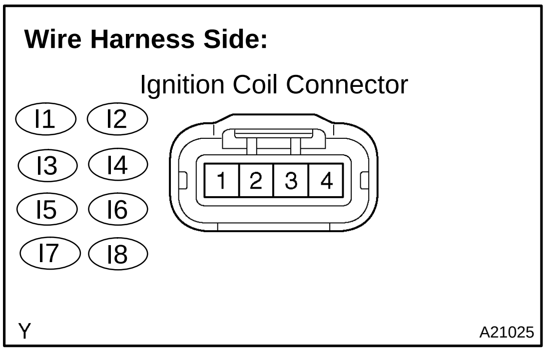
(b) Disconnect the E5 ECM connector.

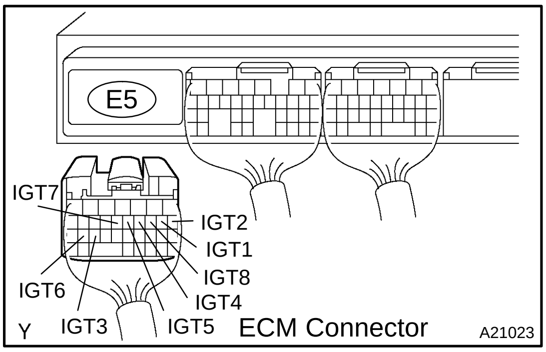
CHECK:

Check the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
Ignition coil (I1-2) - IGF1 (E5-24)	Below 1 Ω
Ignition coil (I2-2) - IGF2 (E5-23)	Below 1 Ω
Ignition coil (I3-2) - IGF1 (E5-24)	Below 1 Ω
Ignition coil (I4-2) - IGF2 (E5-23)	Below 1 Ω
Ignition coil (I5-2) - IGF1 (E5-24)	Below 1 Ω
Ignition coil (I6-2) - IGF2 (E5-23)	Below 1 Ω
Ignition coil (I7-2) - IGF1 (E5-24)	Below 1 Ω
Ignition coil (I8-2) - IGF2 (E5-23)	Below 1 Ω
Ignition coil (I1-2) or IGF1 (E5-24) - Body ground	10 kΩ or higher
Ignition coil (I2-2) or IGF2 (E5-23) - Body ground	10 kΩ or higher
Ignition coil (I3-2) or IGF1 (E5-24) - Body ground	10 kΩ or higher
Ignition coil (I4-2) or IGF2 (E5-23) - Body ground	10 kΩ or higher
Ignition coil (I5-2) or IGF1 (E5-24) - Body ground	10 kΩ or higher
Ignition coil (I6-2) or IGF2 (E5-23) - Body ground	10 kΩ or higher
Ignition coil (I7-2) or IGF1 (E5-24) - Body ground	10 kΩ or higher
Ignition coil (I8-2) or IGF2 (E5-23) - Body ground	10 kΩ or higher





Check the harness and connector between the ignition coil and the ECM (IGT terminal) connectors:

PREPARATION:

(a) Disconnect the I1, I2, I3, I4, I5, I6, I7 or I8 ignition coil connector.

(b) Disconnect the E5 ECM connector.

CHECK:

Check the resistance between the wire harness side connectors.

OK:

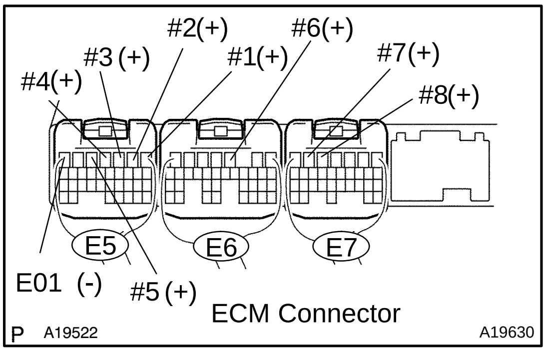
Tester Connection	Specified Condition
Ignition coil (I1-3) - IGT1 (E5-9)	Below 1 Ω
Ignition coil (I2-3) - IGT2 (E5-8)	Below 1 Ω
Ignition coil (I3-3) - IGT3 (E5-25)	Below 1 Ω
Ignition coil (I4-3) - IGT4 (E5-11)	Below 1 Ω
Ignition coil (I5-3) - IGT5 (E5-12)	Below 1 Ω
Ignition coil (I6-3) - IGT6 (E5-26)	Below 1 Ω
Ignition coil (I7-3) - IGT7 (E5-13)	Below 1 Ω
Ignition coil (I8-3) - IGT8 (E5-10)	Below 1 Ω
Ignition coil (I1-3) or IGT1 (E5-9) - Body ground	10 kΩ or higher
Ignition coil (I2-3) or IGT2 (E5-8) - Body ground	10 kΩ or higher
Ignition coil (I3-3) or IGT3 (E5-25) - Body ground	10 kΩ or higher
Ignition coil (I4-3) or IGT4 (E5-11) - Body ground	10 kΩ or higher
Ignition coil (I5-3) or IGT5 (E5-12) - Body ground	10 kΩ or higher
Ignition coil (I6-3) or IGT6 (E5-26) - Body ground	10 kΩ or higher
Ignition coil (I7-3) or IGT7 (E5-13) - Body ground	10 kΩ or higher
Ignition coil (I8-3) or IGT8 (E5-10) - Body ground	10 kΩ or higher

OK → **Replace ignition coil with igniter, then confirm that there is no misfire.**

NG

Repair or replace harness or connector.

8	Check ECM terminal of misfiring cylinder.



PREPARATION:
Turn the ignition switch ON.

CHECK:
Measure the voltage between the terminals of the E5, E6 and E7 ECM connectors.

OK:

Tester Connection	Specified Condition
#1 (E5-1) - E01 (E5-7)	9 to 14 V
#2 (E5-2) - E01 (E5-7)	9 to 14 V
#3 (E5-3) - E01 (E5-7)	9 to 14 V
#4 (E5-4) - E01 (E5-7)	9 to 14 V
#5 (E5-5) - E01 (E5-7)	9 to 14 V
#6 (E6-3) - E01 (E5-7)	9 to 14 V
#7 (E7-6) - E01 (E5-7)	9 to 14 V
#8 (E7-5) - E01 (E5-7)	9 to 14 V

OK → **Go to step 11.**

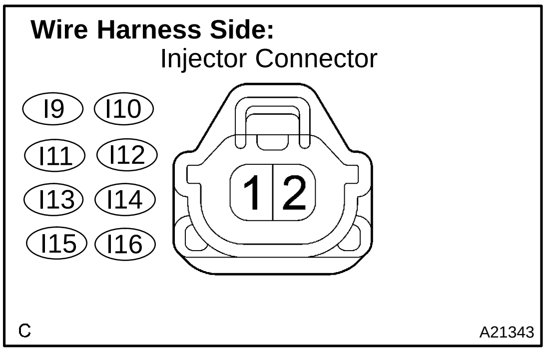
NG

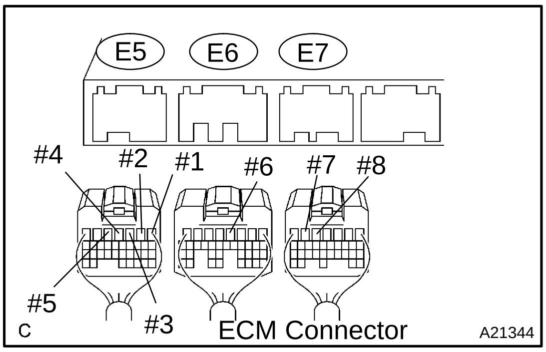
9	Check injector resistance of misfiring cylinder (See page SF-19).

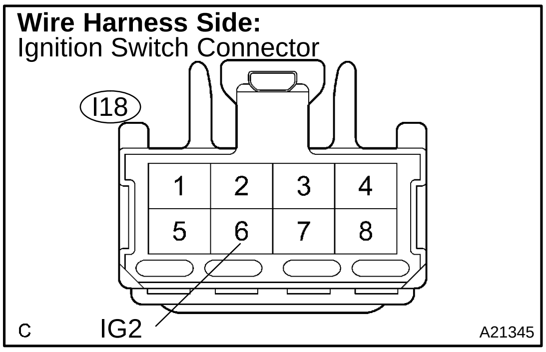
NG → **Replace injector.**

OK

10	Check for open and short in harness and connector between ignition SW and injector, injector and ECM of misfiring cylinder.







Check the harness and the connector between the injector connector and the ECM connector:

PREPARATION:

(a) Disconnect the I9, I10, I11, I12, I13, I14, I15 or I16 injector connector.

(b) Disconnect the E5, E6 or E7 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
Injector (I9-2) - #1 (E5-1)	Below 1 Ω
Injector (I10-2) - #2 (E5-2)	Below 1 Ω
Injector (I11-2) - #3 (E5-3)	Below 1 Ω
Injector (I12-2) - #4 (E5-4)	Below 1 Ω
Injector (I13-2) - #5 (E5-5)	Below 1 Ω
Injector (I14-2) - #6 (E6-3)	Below 1 Ω
Injector (I15-2) - #7 (E7-6)	Below 1 Ω
Injector (I16-2) - #8 (E7-5)	Below 1 Ω
Injector (I9-2) or #1 (E5-1) - Body ground	10 kΩ or higher
Injector (I10-2) or #2 (E5-2) - Body ground	10 kΩ or higher
Injector (I11-2) or #3 (E5-3) - Body ground	10 kΩ or higher
Injector (I12-2) or #4 (E5-4) - Body ground	10 kΩ or higher
Injector (I13-2) or #5 (E5-5) - Body ground	10 kΩ or higher
Injector (I14-2) or #6 (E6-3) - Body ground	10 kΩ or higher
Injector (I15-2) or #7 (E7-6) - Body ground	10 kΩ or higher
Injector (I16-2) or #8 (E7-5) - Body ground	10 kΩ or higher

Check the harness and connector between the injector connector and the ignition switch:

PREPARATION:

(a) Disconnect the I9, I10, I11, I12, I13, I14, I15 or I16 injector connector.

(b) Disconnect the I18 ignition switch connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
Injector (I9-1) - IG2 (I18-6)	Below 1 Ω
Injector (I10-1) - IG2 (I18-6)	Below 1 Ω
Injector (I11-1) - IG2 (I18-6)	Below 1 Ω
Injector (I12-1) - IG2 (I18-6)	Below 1 Ω
Injector (I13-1) - IG2 (I18-6)	Below 1 Ω
Injector (I14-1) - IG2 (I18-6)	Below 1 Ω
Injector (I15-1) - IG2 (I18-6)	Below 1 Ω
Injector (I16-1) - IG2 (I18-6)	Below 1 Ω
Injector (I9-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Injector (I10-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Injector (I11-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Injector (I12-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Injector (I13-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Injector (I14-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Injector (I15-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Injector (I16-1) or IG2 (I18-6) - Body ground	10 kΩ or higher

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

OK

11	Check injector injection of misfiring cylinder (See page SF-24).

NG → Replace injector.

OK

12	Check compression pressure of misfiring cylinder (See page EM-3).

NG → Repair or replace.

OK

13	Check valve clearance of misfiring cylinder (See page EM-4).

NG → Adjust valve clearance.

OK

14	Check result of step 4 switch step by number of misfire cylinder.

High misfire rate cylinder	Proceed to
1 or 2 cylinders	A
More than 3 cylinders	B

B → Check for intermittent problems (See page DI-3).

A

15	Check valve timing (Check for looseness or a jumped tooth of timing belt) (See page EM-22).

NG → **Adjust valve timing (Repair or replace timing belt).**

OK

16	Check fuel pressure (See page SF-7).

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

OK

17	Check intake air temperature and mass air flow rate.

PREPARATION:

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

(b) Turn the ignition switch ON.

CHECK:

Check the intake air temperature.

(1) Select the item ”DIAGNOSIS/ENHANCED OBD II/DATA LIST/ALL/INTAKE AIR”.

(2) Read its value displayed on the hand-held tester or the OBD II scan tool.

OK:

Equivalent to ambient temperature

CHECK:

Check the air flow rate.

(1) Select the item ”DIAGNOSIS/ENHANCED OBD II/DATA LIST/ALL/MAF”.

(2) Read its value displayed on the hand-held tester or the OBD II scan tool.

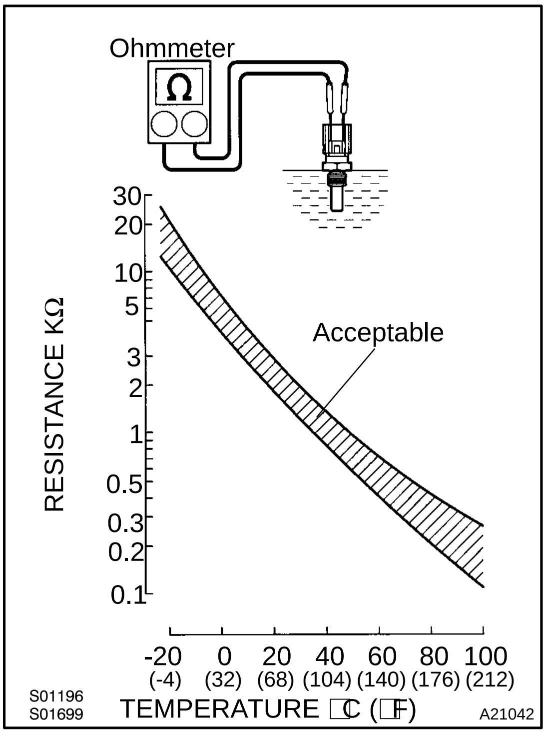
OK:

Condition	Air Flow Rate (gm/s)
Ignition switch ON (do not start engine)	0
Idling	4 to 6
Running without load (2,500 rpm)	13 to 20
Idling to quickly accelerating	Air flow rate fluctuates

NG **Replace mass air flow meter.**

OK

18	Check engine coolant temperature sensor.



PREPARATION:

Remove the engine coolant temperature sensor.

CHECK:

Measure the resistance between the terminals of the engine coolant temperature sensor.

Resistance:

Tester Connection	Specified Condition
1 - 2	2.32 to 2.59 kΩ (20°C (68°F))
	0.310 to 0.326 kΩ (80°C (176°F))

NOTICE:

In case of checking the engine coolant temperature sensor in the water, be careful not to allow water to go into the terminals. After checking, dry the sensor.

HINT:

Alternate procedure: Connect an ohmmeter to the installed engine coolant temperature sensor and read the resistance. Use an infrared thermometer to measure the engine temperature in the immediate vicinity of the sensor. Compare these values to the resistance/temperature graph. Change the engine temperature (warm up or allow to cool down) and repeat the test.

NG → **Replace engine coolant temperature sensor.**

OK

19	Switch step by number of misfire cylinder (Refer result of step 4).

High misfire rate cylinder	Proceed to
1 or 2 cylinders	A
More than 3 cylinders	B

B → **Go to step 5.**

A

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

DI1LQ-14

DTC	P0325	Knock Sensor 1 Circuit (Bank 1 or Single Sensor)

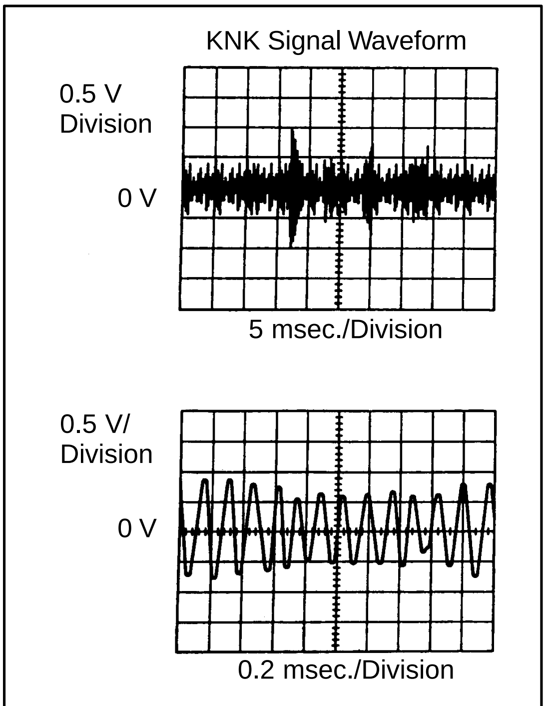
DTC	P0330	Knock Sensor 2 Circuit (Bank 2)

CIRCUIT DESCRIPTION

Each knock sensor is fitted 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. The piezoelectric element sends a signal to the ECM, 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 signal of knock sensor 1 signal to ECM with engine speed between 2,000 rpm and 5,400 rpm	★Open or short in knock sensor 1 circuit ★Knock sensor 1 (looseness) ★ECM
P0330	No signal of knock sensor 2 signal to ECM with engine speed between 2,000 rpm and 5,400 rpm	★Open or short in knock sensor 2 circuit ★Knock sensor 2 (looseness) ★ECM

HINT:
- ★ Bank 1 refers to the bank that includes cylinder No. 1.
- ★ Bank 2 refers the the bank that does not include cylinder No. 1.



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Reference: INSPECTION USING OSCILLOSCOPE
- ★ With the engine racing (4,000 rpm), check the waveform between terminals KNK1 and KNK2 of the ECM connector and body ground.

HINT:
The correct waveform is as shown.
- ★ Spread the time on the horizontal axis, and confirm that period of the wave is 0.13 msec. (Normal mode vibration frequency of knock sensor: 8.1 kHz)

HINT:
If normal mode vibration frequency is not 8.1 kHz, the sensor has malfunction.

MONITOR DESCRIPTION

The knock sensor located on the cylinder block, detects spark knock.
When spark knock occurs, the sensor pick-up vibrates in a specific frequency range. When the ECM detects the voltage in this frequency range, it retards the ignition timing to suppress the spark knock.
The ECM also senses background engine noise with the knock sensor and uses this noise to check for faults in the sensor. If the knock sensor signal level is too low for more than 10 sec., and if the knock sensor output voltage is out of normal range, the ECM interprets this as a fault in the knock sensor and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0325	Knock sensor (Bank 1) range check or rationality
	P0330	Knock sensor (Bank 2) range check or rationality
Required sensors/components	Main sensors/components	Knock sensor
	Related sensors/components	Crankshaft position sensor, Camshaft position sensor, Engine coolant temperature sensor, Mass air flow meter
Frequency of operation	Continuous	
Duration	10 sec.	
MIL operation	Immediate	
Sequence of operation	None	

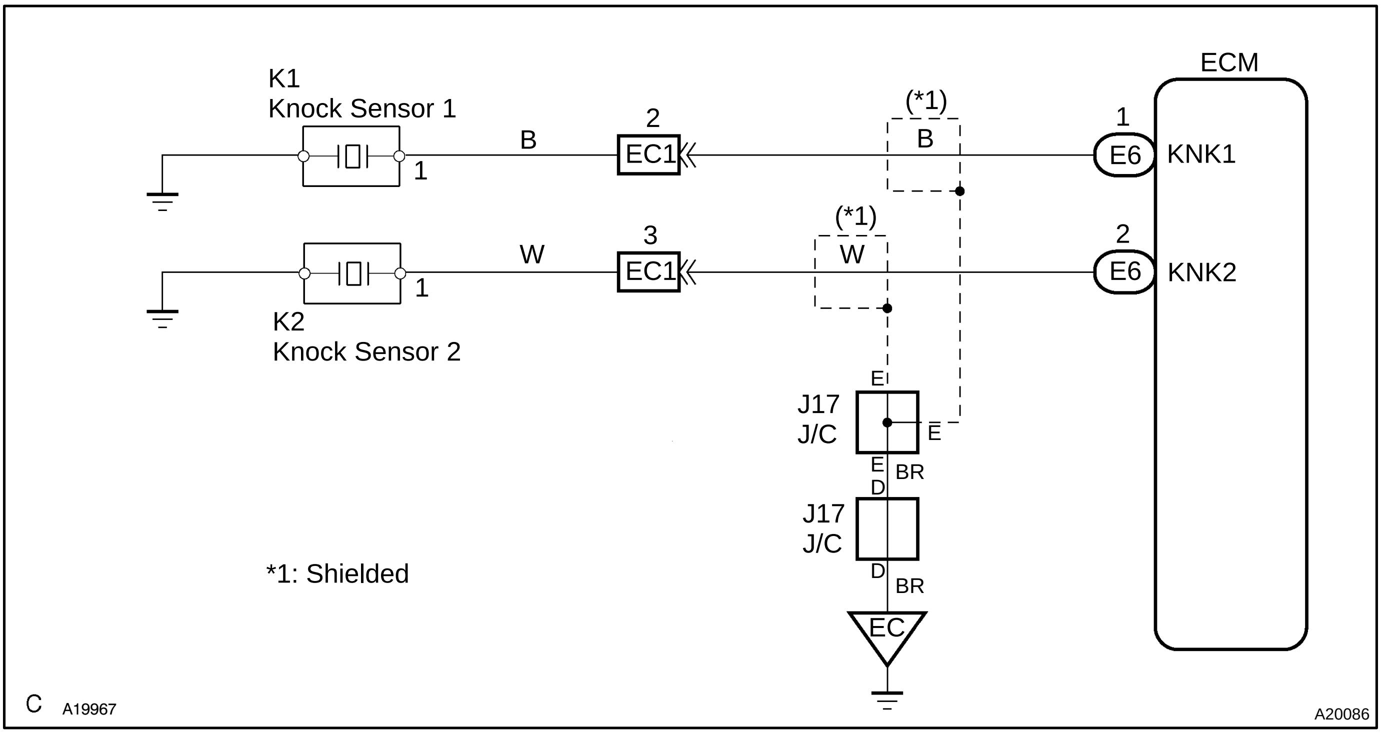
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	10 V	-
Idle	OFF	
Time after engine start	5 sec.	-
Engine coolant temperature	60°C (140°F)	-
Intake air amount per revolution	0.45 g/rev	-
Engine speed	2,000 rpm	5,400 rpm

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Sensor failure is indicated when the knock sensor output level is below the specific threshold for:	10 sec.

WIRING DIAGRAM



INSPECTION PROCEDURE

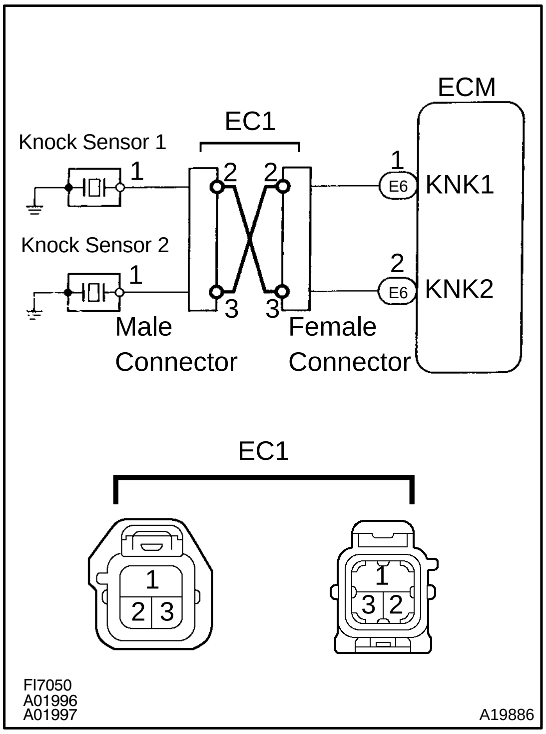
HINT:

★ DTC P0325 is for the bank 1 knock sensor circuit.

★ DTC P0330 is for the bank 2 knock sensor circuit.

★ Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	**Connect OBD II scan tool or hand-held tester, and check knock sensor circuit.**



PREPARATION:

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

(b) Disconnect the EC1 connector.

(c) Connect the terminals of the disconnected EC1 male connector and EC1 female as follows.

Male connector ↔ Female connector
Terminal 2 ↔ Terminal 3
Terminal 3 ↔ Terminal 2

(d) Turn ignition switch ON and push the OBD II scan tool or hand-held tester main switch ON.

(e) After the engine is warmed up, perform quick racing to 4,000 rpm 3 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

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-36).**

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

OK

Replace ECM (See page SF-60).

3	**Check for open and short in harness and connector between EC1 connector and knock sensor (See page IN-36).**

HINT:

★ If DTC P0325 has changed to P0330, check the knock sensor circuit on the bank 1 side.

★ If DTC P0330 has changed to P0325, check the knock sensor circuit on the bank 2 side.

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

OK

Replace knock sensor.

DIC2D-01

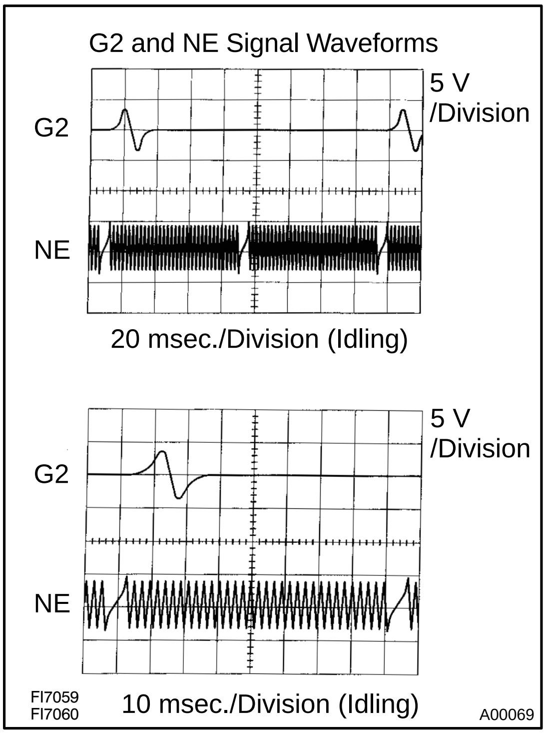
DTC	P0335	Crankshaft Position Sensor ”A” Circuit

DTC	P0339	Crankshaft Position Sensor ”A” Circuit Intermittent

CIRCUIT DESCRIPTION

The crankshaft position sensor system consists of a crankshaft position sensor plate and a pick-up coil. The sensor plate has 34 teeth and is installed on the crankshaft. The pick-up coil is made of an iron core and magnet. The sensor plate rotates and as each tooth passes through the pick-up coil, a pulse signal is created. The pick-up coil generates 34 signals for each engine revolution. Based on these signals, the ECM calculates the crankshaft position and engine RPM. Using these calculations, the fuel injection time and ignition timing are controlled.

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 ★Signal plate ★ECM
	No crankshaft position sensor signal to ECM with engine speed 600 rpm or more (2 trip detection logic)	
P0339	In condition (a), (b) and (c), when no crankshaft position sensor (NE) signal is input for 0.05 sec. or more. : (1 trip detection logic) (c) Engine revolution 1000 rpm or more (d) STA signal is OFF (e) 3 sec. or more has lapsed after STA signal is switched from ON to OFF.	



Reference: Inspection using the oscilloscope.
The correct waveform is as shown.

Tester Connection	Specified Condition
G2+ (E7-27) - G2- (E7-32)	Correct waveform is as shown
NE+ (E7-25) - NE- (E7-24)	

MONITOR DESCRIPTION

If there is no signal from the crankshaft sensor even though the engine is revolving, the ECM interprets this as a malfunction of the sensor.

MONITOR STRATEGY

Related DTCs	P0335	Crankshaft position sensor range check or rationality
Required sensors/components	Main sensors/components	Crankshaft position sensor
	Related sensors/components	Engine speed sensor
Frequency of operation	Continuous	
Duration	Case 1: 4.7 sec. Case 2: 0.016 sec. Case 3: 2 rev x 5 times	
MIL operation	Case 1: 2 driving cycles Case 2, 3: 1 driving cycle	
Sequence of operation	None	

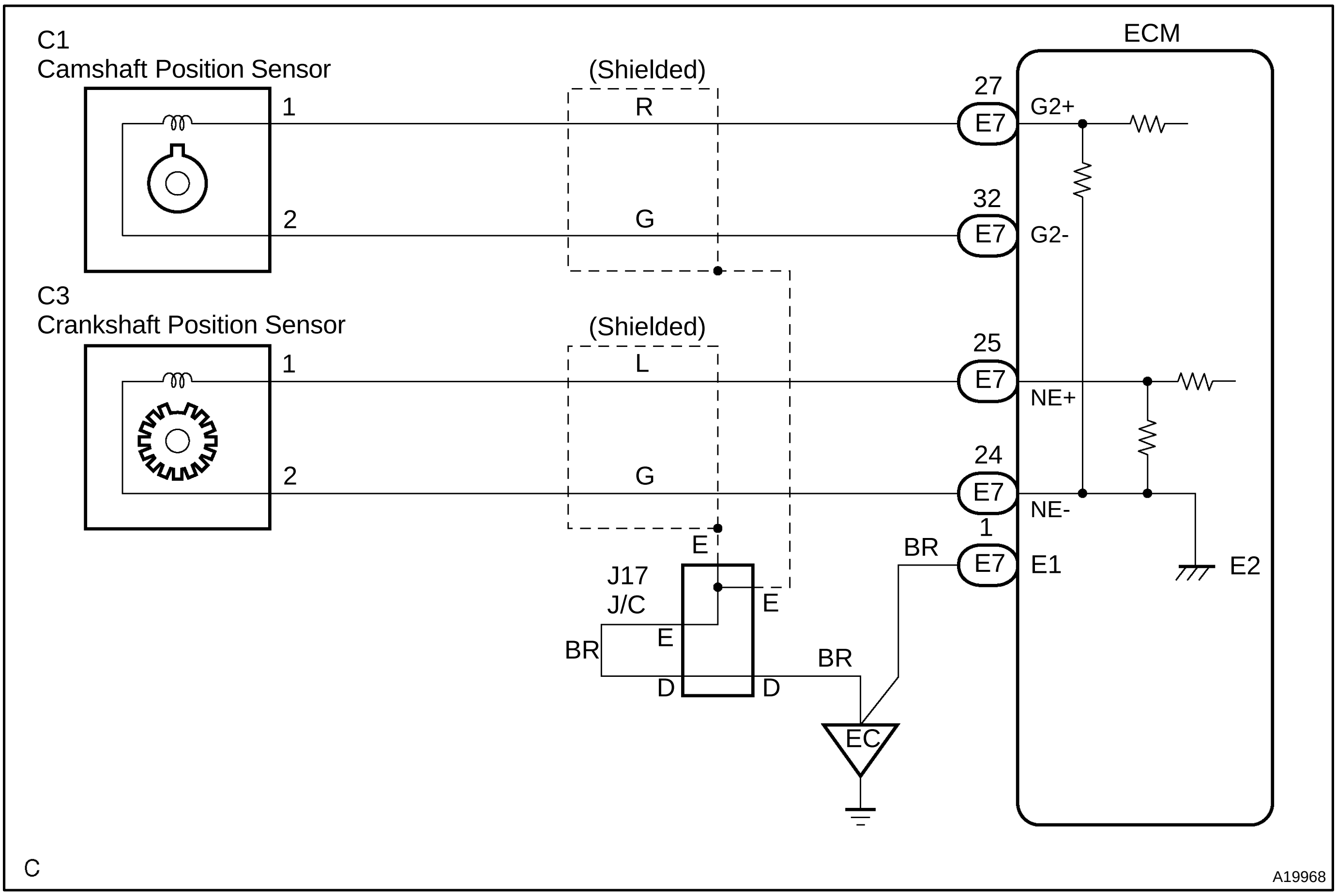
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Case 1:		
Starter	ON	
Minimum battery voltage while starter ON	-	11 V
Case 2:		
Engine speed	600 rpm	-
Starter	OFF	
Time after starter ON to OFF	3 sec.	-
Case 3:		
Time after starter ON to OFF	0.3 sec.	-
Number of camshaft position sensor signal pulse	1	
Battery voltage	7 V	-
Minimum battery voltage while starter ON	-	11 V

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Case 1:	
Engine speed signal	No signal for 4.7 sec.
Case 2:	
Engine speed signal	No signal for 0.016 sec.
Case 3:	
Number of crankshaft position sensor signal pulse	17 or more and 29 or less

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- ★ Read freeze frame data using the hand-held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting it is useful for determining whether the vehicle was running or stopped. the engine was warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.
- ★ READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL

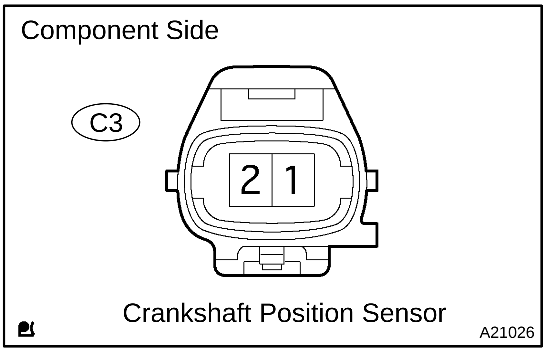
(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.

(b) Start the engine and push the hand-held tester or the OBD II scan tool main switch ON.

(c) Select the item ”DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / ENGINE SPD”.

- ★ The engine speed can be confirmed in DATA LIST using the hand-held tester or OBD II scan tool. If there is no NE signals from the crankshaft position sensor despite the engine revolving, the engine speed will be indicated as zero. If voltage output of the crankshaft position sensor is insufficient, the engine speed will be indicated as lower RPM (than the actual RPM).

1	**Check resistance of crankshaft position sensor.**



PREPARATION:
Disconnect the C3 crankshaft position sensor connector.

CHECK:
Measure the resistance between terminals 1 and 2.

OK:

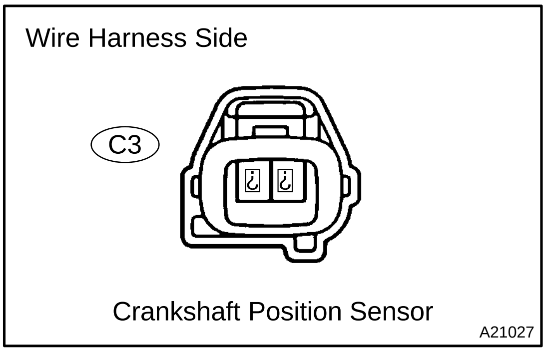
Tester Connection	Specified Condition
1 - 2	985 to 1,600 Ω at cold
	1,265 to 1,890 Ω at hot

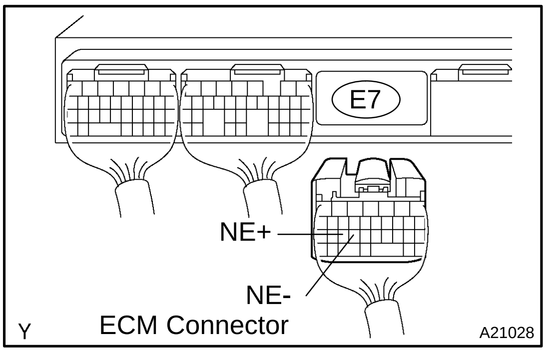
NOTICE:
” Cold” and ”Hot” shown above mean the temperature of the coils themselves. ”Cold” is form -10˚C (14˚F) to 50˚C (122˚F) and ”Hot” is from 50˚C (122˚F) to 100˚C (212˚F).

NG	**Replace crankshaft position sensor.**

OK

2	Check for open and short in harness and connector between ECM and crankshaft position sensor.





PREPARATION:

(a) Disconnect the C3 crankshaft position sensor connector.

(b) Disconnect the E7 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
Crankshaft position sensor (C3-1) - NE+ (E7-25)	Below 1 Ω
Crankshaft position sensor (C3-2) - NE- (E7-24)	Below 1 Ω
Crankshaft position sensor (C3-1) or NE+ (E7-25) - Body ground	10 kΩ or higher
Crankshaft position sensor (C3-2) or NE- (E7-24) - Body ground	10 kΩ or higher

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

OK

3	Check sensor installation (crankshaft position sensor).

CHECK:

Check the crankshaft position sensor installation.

NG — **Tighten sensor.**

OK

4	**Inspect teeth of sensor plate.**

PREPARATION:
Remove the crankshaft angle sensor plate (See page EM-15).

CHECK:
Check the teeth of sensor plate.

NG → **Replace sensor plate.**

OK

Replace ECM (See page SF-60).

DIC2E-01

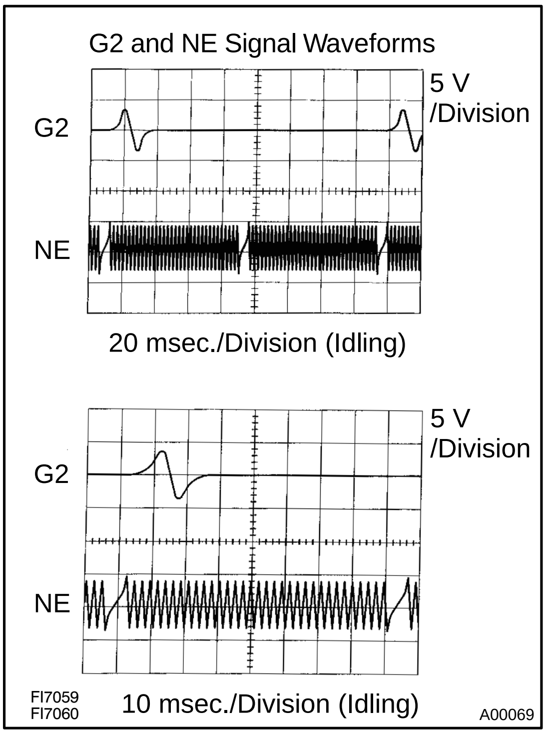
DTC	P0340	Camshaft Position Sensor ”A” Circuit (Bank 1 or Single Sensor)

DTC	P0341	Camshaft Position Sensor ”A” Circuit Range/Performance (Single Sensor)

CIRCUIT DESCRIPTION

The camshaft position sensor (G signal) consists of a magnet iron core and pickup coil.
The G signal plate has 1 tooth on its outer circumference and is installed on the LH camshaft timing pulley.
When the camshafts rotate, protrusion on the signal plate and air gap on the pickup coil change, causing fluctuations in the magnetic field and generating a voltage in the pickup coil.
The NE signal plate has 34 teeth and is mounted on the crankshaft. The NE signal sensor generates 34 signals at every engine revolution. The ECM detects the crankshaft angle and the engine revolution based on the NE signals, and the cylinder and the angle of the G2 based on the combination of the G and NE signals.

DTC No.	DTC Detection 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 ★LH camshaft timing pulley ★Jumping teeth of timing belt ★ECM
	No camshaft position sensor signal to ECM with engine speed 600 rpm or more (1 trip detection logic)	
P0341	While crankshaft rotates twice, camshaft position sensor signal will be input to ECM 12 times or more (1 trip detection logic) ★Hint: Under normal condition, the camshaft position signal is input into the ECM 3 times per 2 engine revolutions	



Reference: Inspection using the oscilloscope.
The correct waveform is as shown.

Tester Connection	Specified Condition
G2+ (E7-27) - G2- (E7-32)	Correct waveform is as shown
NE+ (E7-25) - NE- (E7-24)	

MONITOR DESCRIPTION

If there is no signal from the camshaft position sensor even though the engine is turning, or if the rotation of the camshaft and the crankshaft is not synchronized, the ECM interprets this as a malfunction of the sensor.

MONITOR STRATEGY

Related DTCs	P0340	Camshaft position sensor (Bank 1) range check or rationality
	P0341	Camshaft position sensor (Bank 1) range check or rationality
Required sensors/components	Main sensors/components	Camshaft position sensor
	Related sensors/components	Crankshaft position sensor, Engine speed sensor
Frequency of operation	Continuous	
Duration	5 sec.	
MIL operation	P0340 case 1 (no signal): 2 driving cycles P0340 case 2 (mis-aligned), P0341: Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
P0340 Case 1 (No signal):		
Starter	ON	
Minimum battery voltage while starter ON	-	11 V
P0340 Case 2 (Mis-aligned):		
Engine speed	600 rpm	-
Starter	OFF	
P0341:		
Starter	After OFF to ON timing	
Engine revolution	720°CA	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0340 Case 1 (No signal):	
Camshaft position sensor signal	No signal
P0340 Case 2 (Mis-aligned):	
Crankshaft/camshaft alignment is mis-aligned (judged by comparing the crankshaft position to the camshaft position)	
Camshaft position sensor signal: No input in appropriate timing.	
P0341:	
Crankshaft/Camshaft alignment	Mis-aligned
Camshaft position sensor count	12 or more / 720°CA (= Engine 2 revolutions)

COMPONENT OPERATING RANGE

Parameter	Standard Value
Camshaft position sensor signal input during every 720°CA	3

WIRING DIAGRAM

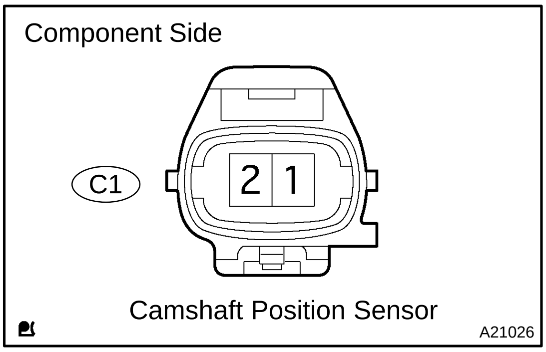
Refer to DTC P0335 on page DI-191 .

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	**Check resistance of camshaft position sensor.**



PREPARATION:

Disconnect the C1 camshaft position sensor connector.

CHECK:

Measure the resistance between terminals 1 and 2.

OK:

Tester Connection	Specified Condition
1 - 2	1,630 to 2,740 Ω at cold
	2,065 to 3,225 Ω at hot

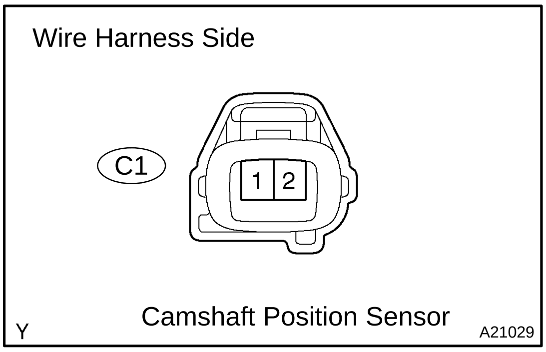
NOTICE:

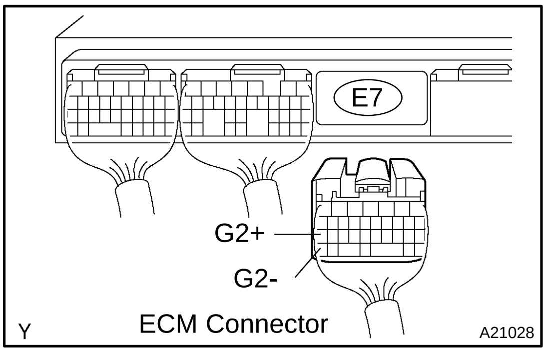
" Cold" and "Hot" shown above mean the temperature of the coils themselves. "Cold" is from -10°C (14°F) to 50°C (122°F) and "Hot" is from 50°C (122°F) to 100°C (212°F).

NG	**Replace camshaft position sensor.**

OK

2	**Check for open and short in harness and connector between ECM and camshaft position sensor.**





PREPARATION:

(a) Disconnect the C1 camshaft position sensor connector.

(b) Disconnect the E7 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
Camshaft position sensor (C1-1) - G2+ (E7-27)	Below 1 Ω
Camshaft position sensor (C1-2) - G2- (E7-32)	Below 1 Ω
Camshaft position sensor (C1-1) or G2+ (E7-27) - Body ground	10 kΩ or higher
Camshaft position sensor (C1-2) or G2- (E7-32) - Body ground	10 kΩ or higher

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

OK

3	**Check sensor installation (Camshaft position sensor).**

CHECK:

Check the camshaft position sensor installation.

NG → **Tighten sensor.**

OK

4	**Inspect teeth of LH camshaft timing belt pulley.**

PREPARATION:
Remove the LH camshaft timing belt pulley (See page EM-35).
CHECK:
Check the LH camshaft timing belt pulley.

NG → **Replace LH camshaft timing pulley.**

OK

Replace ECM (See page SF-60).

DIC2F-01

DTC	**P0351**	**Igniter Coil ”A” Primary/Secondary Circuit**

DTC	**P0352**	**Igniter Coil ”B” Primary/Secondary Circuit**

DTC	**P0353**	**Igniter Coil ”C” Primary/Secondary Circuit**

DTC	**P0354**	**Igniter Coil ”D” Primary/Secondary Circuit**

DTC	**P0355**	**Igniter Coil ”E” Primary/Secondary Circuit**

DTC	**P0356**	**Igniter Coil ”F” Primary/Secondary Circuit**

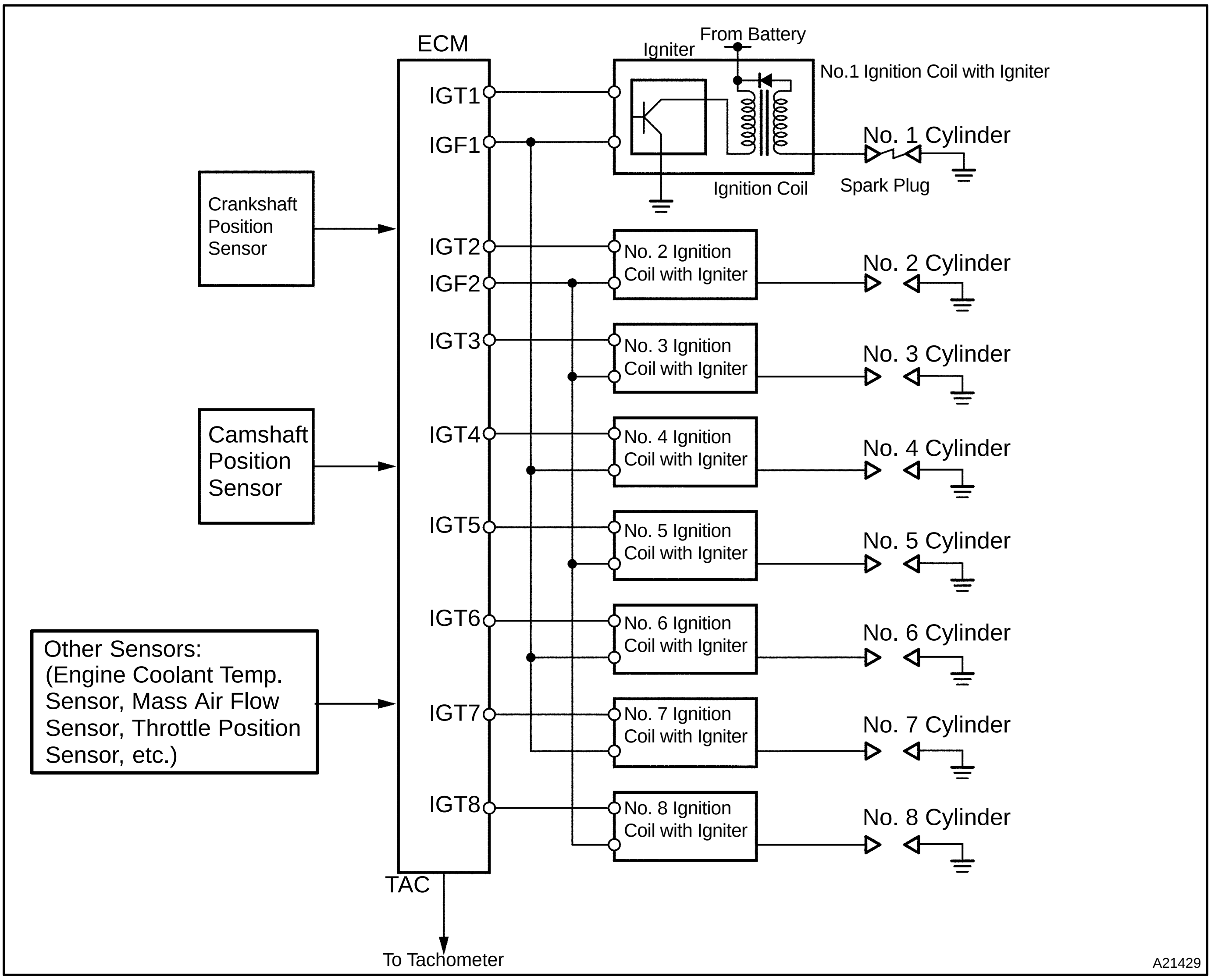
DTC	**P0357**	**Igniter Coil ”G” Primary/Secondary Circuit**

DTC	**P0358**	**Igniter Coil ”H” Primary/Secondary Circuit**

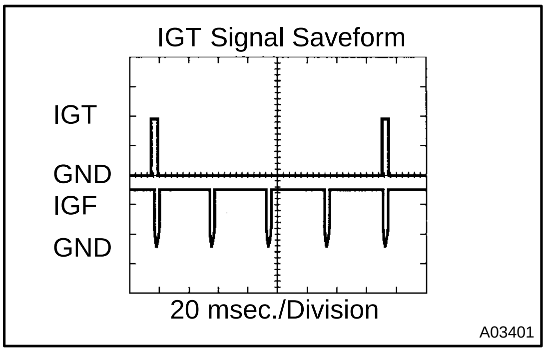
HINT:
- ★ These DTCs indicate a malfunction related to primary circuit.
- ★ If DTC P0351 is displayed, check No. 1 ignition coil with igniter circuit.
- ★ If DTC P0352 is displayed, check No. 2 ignition coil with igniter circuit.
- ★ If DTC P0353 is displayed, check No. 3 ignition coil with igniter circuit.
- ★ If DTC P0354 is displayed, check No. 4 ignition coil with igniter circuit.
- ★ If DTC P0355 is displayed, check No. 5 ignition coil with igniter circuit.
- ★ If DTC P0356 is displayed, check No. 6 ignition coil with igniter circuit.
- ★ If DTC P0357 is displayed, check No. 7 ignition coil with igniter circuit.
- ★ If DTC P0358 is displayed, check No. 8 ignition coil with igniter circuit.

CIRCUIT DESCRIPTION

These DTCs indicate a malfunction related to primary circuit.
The DIS is a 1-cylinder ignition system which ignites one cylinder with one ignition coil. In the 1-cylinder ignition system, the one spark plug is connected to the end of the secondary winding. High voltage generated in the secondary winding is applied directly to the spark plug. The spark of the spark plug passes from the center electrode to the ground electrode.
The ECM determines the ignition timing and outputs the ignition signals (IGTs) for each cylinder. Using the IGT, the ECM turns on and off the power transistor inside the igniter and this switches on and off the current to the primary coil. When current to the primary coil is cut off, high-voltage is generated in the secondary coil and this voltage is applied to the spark plugs to create sparks inside the cylinders. As the ECM cuts the current to the primary coil, the igniter sends back the ignition confirmation signal (IGF) for each cylinder ignition to the ECM.

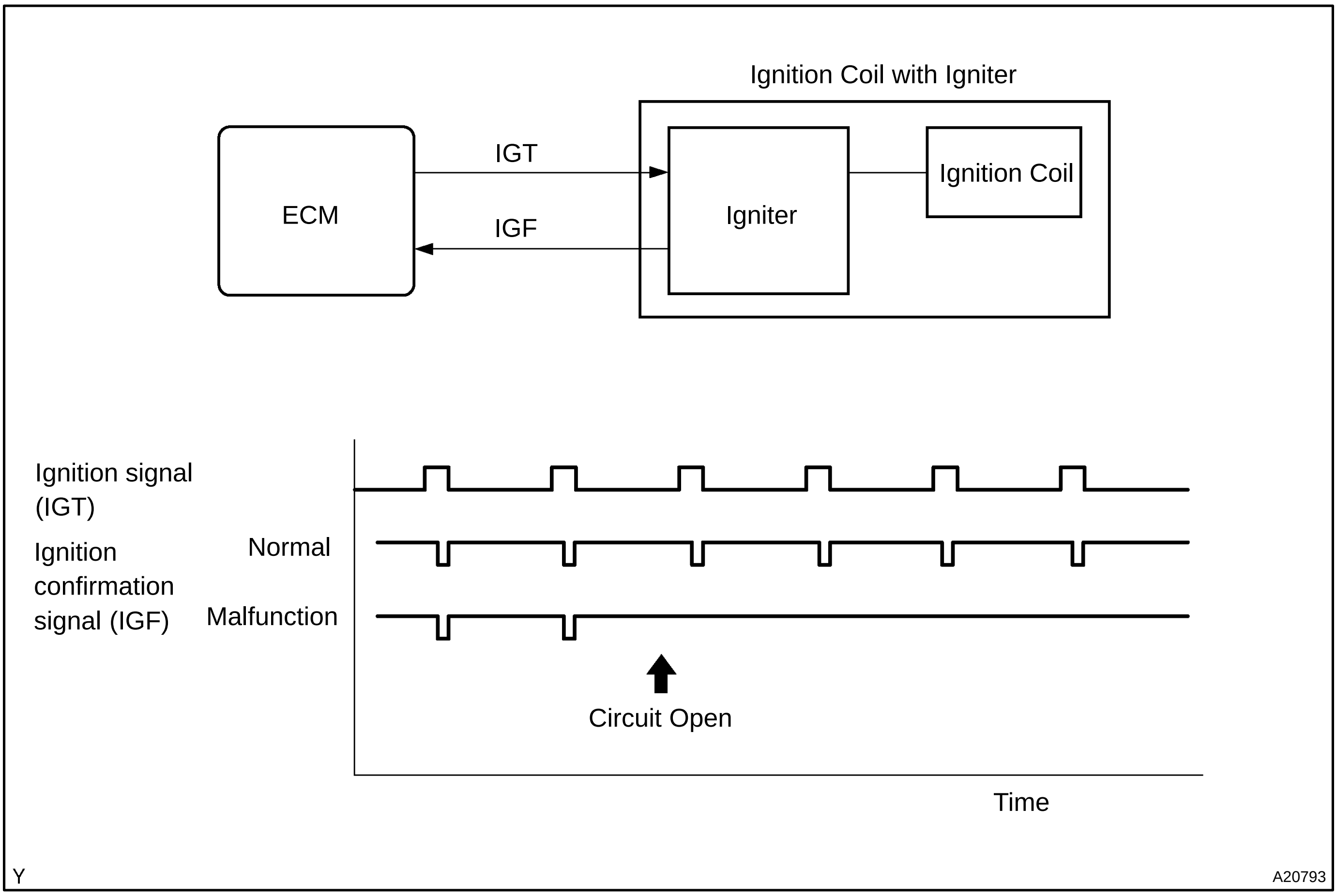


DTC No.	DTC Detecting Condition	Trouble Area
P0351 P0352 P0353 P0354 P0355 P0356 P0357 P0358	No IGF signal to ECM while engine is running	★Open or short in IGF1 or IGF2 and IGT1 to IGT8 circuit from ignition coil with igniter to ECM ★No. 1 to No. 8 ignition coil with igniter ★Ignition system ★ECM



Reference: Inspection using the oscilloscope.
During cranking or idling, check the waveform between terminals IG1 to IG8 and E1, and IGF1, IGF2 and E1 of the E5 and E7 ECM connectors.

MONITOR DESCRIPTION



If the ECM does not receive the IGF after sending the IGT it interprets this as a fault in the igniter and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0351	No. 1 ignition coil with igniter circuit malfunction
	P0352	No. 2 ignition coil with igniter circuit malfunction
	P0353	No. 3 ignition coil with igniter circuit malfunction
	P0354	No. 4 ignition coil with igniter circuit malfunction
	P0355	No. 5 ignition coil with igniter circuit malfunction
	P0356	No. 6 ignition coil with igniter circuit malfunction
	P0357	No. 7 ignition coil with igniter circuit malfunction
	P0358	No. 8 ignition coil with igniter circuit malfunction
Required sensors/components	Igniter	
Frequency of operation	Continuous	
Duration	0.256 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Engine speed	-	1,500 rpm
Either of the following conditions is met:	A or B	
A. Following conditions are met:	(a) and (b)	
(a) Engine speed	-	500 rpm
(b) Battery voltage	6 V	-
B. Following conditions are met:	(a) and (b)	
(a) Engine speed	500 rpm	-
(b) Battery voltage	10 V	-

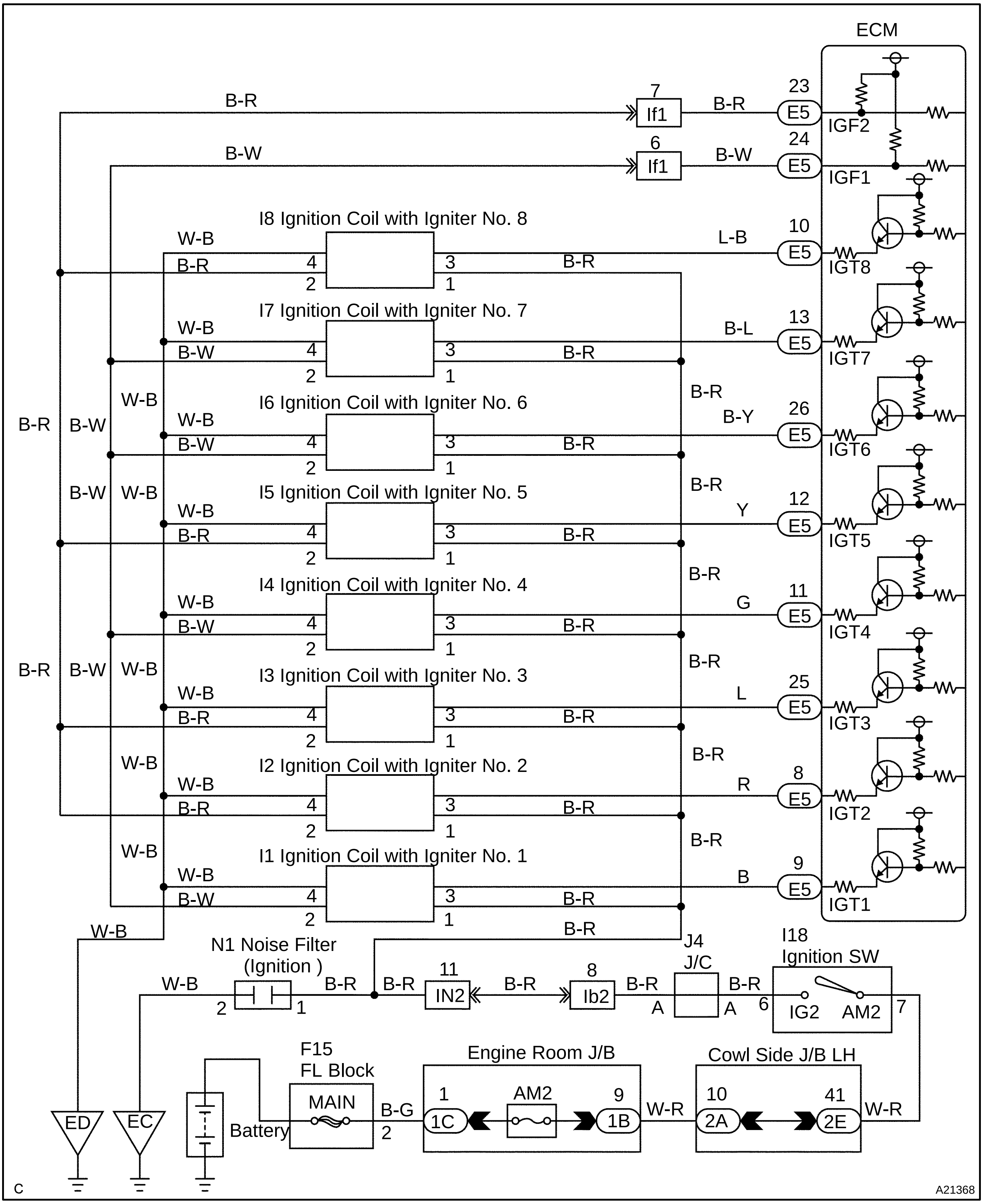
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
"Ignition signal fail count"	More than 2
"Ignition signal fail count" is as follows:	When IGF should have returned despite sending IGT.

COMPONENT OPERATING RANGE

Standard Value
Confirmed signal number = ignition signal number

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

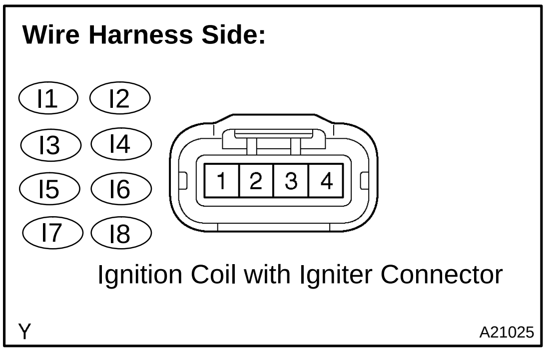
- ★ If DTCs P0351, P0354, P0356 and P0357 are output simultaneously, IGF1 circuit may be open or short.
- ★ If DTCs P0352, P0353, P0355 and P0358 are output simultaneously, IGF2 circuit may be open or short.
- ★ Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

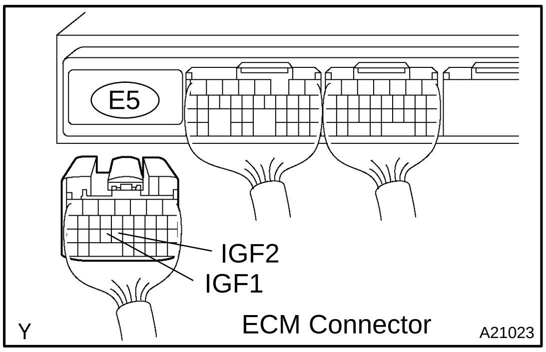
1	**Check spark plug and spark (See page IG-1).**

NG → **Go to step 4.**

OK

2	**Check for open and short in harness and connector in IGF signal circuits between ECM and ignition coil with igniter.**





PREPARATION:

(a) Disconnect the I1, I2, I3, I4, I5, I6, I7 or I8 ignition coil will igniter connector.

(b) Disconnect the E5 ECM connector.

CHECK:

Check the resistance between the wire harness side connectors.

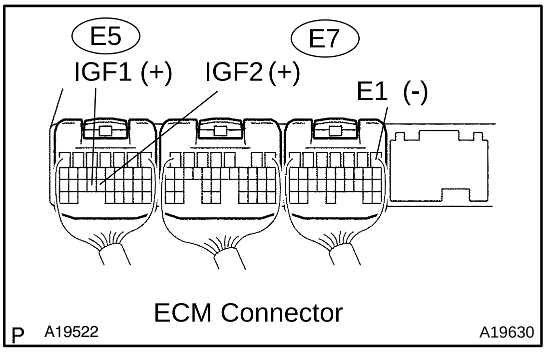
OK:

Tester Connection	Specified Condition
Ignition coil (I1-2) - IGF1 (E5-24)	Below 1 Ω
Ignition coil (I2-2) - IGF2 (E5-23)	Below 1 Ω
Ignition coil (I3-2) - IGF1 (E5-24)	Below 1 Ω
Ignition coil (I4-2) - IGF2 (E5-23)	Below 1 Ω
Ignition coil (I5-2) - IGF1 (E5-24)	Below 1 Ω
Ignition coil (I6-2) - IGF2 (E5-23)	Below 1 Ω
Ignition coil (I7-2) - IGF1 (E5-24)	Below 1 Ω
Ignition coil (I8-2) - IGF2 (E5-23)	Below 1 Ω
Ignition coil (I1-2) or IGF1 (E5-24) - Body ground	10 kΩ or higher
Ignition coil (I2-2) or IGF2 (E5-23) - Body ground	10 kΩ or higher
Ignition coil (I3-2) or IGF1 (E5-24) - Body ground	10 kΩ or higher
Ignition coil (I4-2) or IGF2 (E5-23) - Body ground	10 kΩ or higher
Ignition coil (I5-2) or IGF1 (E5-24) - Body ground	10 kΩ or higher
Ignition coil (I6-2) or IGF2 (E5-23) - Body ground	10 kΩ or higher
Ignition coil (I7-2) or IGF1 (E5-24) - Body ground	10 kΩ or higher
Ignition coil (I8-2) or IGF2 (E5-23) - Body ground	10 kΩ or higher

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

OK

3	**Disconnect ignition coil with igniter connector, and check voltage between terminals IGF1, IGF2 and E1 of ECM connector.**



PREPARATION:

(a) Disconnect the I1, I2, I3, I4, I5, I6, I7 or I8 ignition coil with igniter connector.

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between the E5 and E7 ECM connectors.

OK:

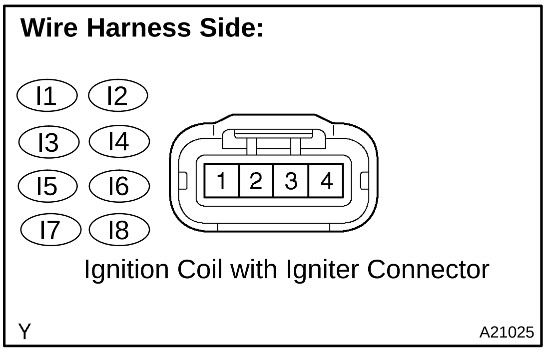
Tester Connection	Specified Condition
IGF1 (E5-24) - E1 (E7-1)	4.5 to 5.5 V
IGF2 (E5-23) - E1 (E7-1)	4.5 to 5.5 V

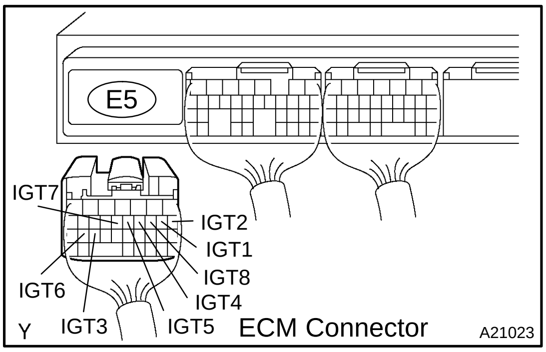
NG → **Replace ECM (See page SF-60).**

OK

Replace ignition coil with igniter.

4	**Check for open and short in harness and connector in IGT signal circuit between ECM and ignition coil with igniter.**





PREPARATION:

(a) Disconnect the I1, I2, I3, I4, I5, I6, I7 or I8 ignition coil connector.

(b) Disconnect the E5 ECM connector.

CHECK:

Check the resistance between the wire harness side connectors.

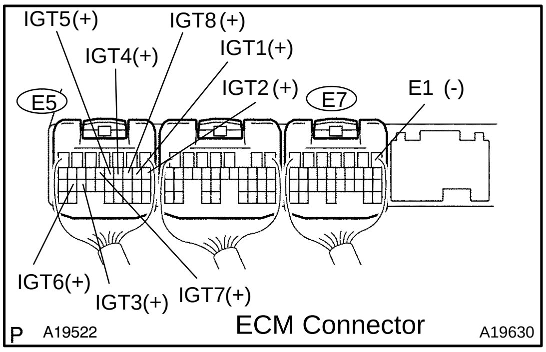
OK:

Tester Connection	Specified Condition
Ignition coil (I1-2) - IGT1 (E5-9)	Below 1 Ω
Ignition coil (I2-2) - IGT2 (E5-8)	Below 1 Ω
Ignition coil (I3-2) - IGT3 (E5-25)	Below 1 Ω
Ignition coil (I4-2) - IGT4 (E5-11)	Below 1 Ω
Ignition coil (I5-2) - IGT5 (E5-12)	Below 1 Ω
Ignition coil (I6-2) - IGT6 (E5-26)	Below 1 Ω
Ignition coil (I7-2) - IGT7 (E5-13)	Below 1 Ω
Ignition coil (I8-2) - IGT8 (E5-10)	Below 1 Ω
Ignition coil (I1-2) or IGT1 (E5-9) - Body ground	10 kΩ or higher
Ignition coil (I2-2) or IGT2 (E5-8) - Body ground	10 kΩ or higher
Ignition coil (I3-2) or IGT3 (E5-25) - Body ground	10 kΩ or higher
Ignition coil (I4-2) or IGT4 (E5-11) - Body ground	10 kΩ or higher
Ignition coil (I5-2) or IGT5 (E5-12) - Body ground	10 kΩ or higher
Ignition coil (I6-2) or IGT6 (E5-26) - Body ground	10 kΩ or higher
Ignition coil (I7-2) or IGT7 (E5-13) - Body ground	10 kΩ or higher
Ignition coil (I8-2) or IGT8 (E5-10) - Body ground	10 kΩ or higher

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

OK

5	Check voltage between terminals IGT1 - IGT8 and E1 of ECM connector and body ground.



CHECK:

Measure the voltage between terminals the E5 and E7 ECM connectors when the engine is cranked.

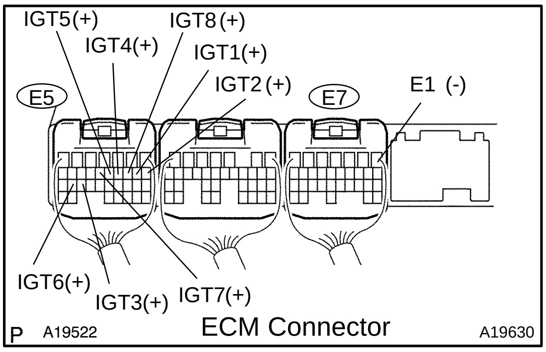
OK:

Tester Connection	Specified Condition
IGT1 (E5-9) - E1 (E7-1)	More than 0.1 V or less than 4.5 V
IGT2 (E5-8) - E1 (E7-1)	
IGT3 (E5-25) - E1 (E7-1)	
IGT4 (E5-11) - E1 (E7-1)	
IGT5 (E5-12) - E1 (E7-1)	
IGT6 (E5-26) - E1 (E7-1)	
IGT7 (E5-13) - E1 (E7-1)	
IGT8 (E5-10) - E1 (E7-1)	

NG **Replace ECM (See page SF-60).**

OK

6	Disconnect ignition coil with igniter connector, and check voltage between terminals IGT1 - IGT8 of ECM connector and body ground.



PREPARATION:

Disconnect the I1, I2, I3, I4, I5, I6, I7 or I8 ignition coil with igniter connector.

CHECK:

Measure the voltage between terminals the E5 and E7 ECM connectors when the engine is cranked.

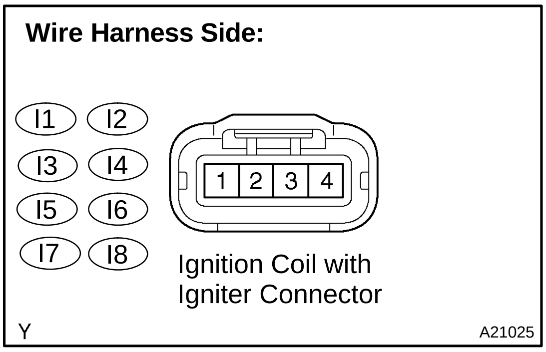
OK:

Tester Connection	Specified Condition
IGT1 (E5-9) - E1 (E7-1)	4.5 V or more
IGT2 (E5-8) - E1 (E7-1)	
IGT3 (E5-25) - E1 (E7-1)	
IGT4 (E5-11) - E1 (E7-1)	
IGT5 (E5-12) - E1 (E7-1)	
IGT6 (E5-26) - E1 (E7-1)	
IGT7 (E5-13) - E1 (E7-1)	
IGT8 (E5-10) - E1 (E7-1)	

NG — **Replace ECM (See page SF-60).**

OK

7 Check ignition coil with igniter power source circuit.



PREPARATION:

Disconnect the I1, I2, I3, I4, I5, I6, I7 or I8 ignition coil with igniter connector.

CHECK:

Measure the voltage between the terminal of the wire harness side connector and body ground.

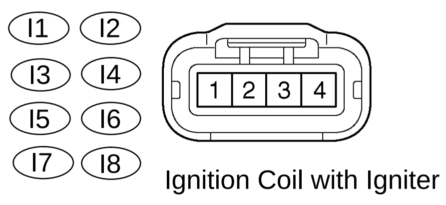
OK:

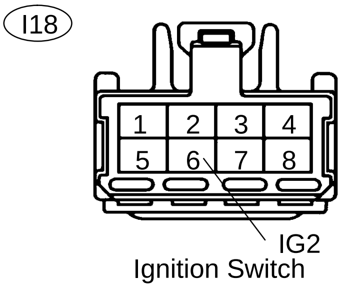
Tester Connection	Specified Condition
I1-1 - Body ground	9 to 14 V
I2-1 - Body ground	
I3-1 - Body ground	
I4-1 - Body ground	
I5-1 - Body ground	
I6-1 - Body ground	
I7-1 - Body ground	
I8-1 - Body ground	

OK — **Repair ignition coil with igniter.**

NG

8	Check for open and short in harness and connector between ignition switch and ignition coil with igniter.





PREPARATION:

(a) Disconnect the I1, 2, I3, I4, I5, I6, I7 or I8 ignition coil with igniter connector.

(b) Disconnect the I18 ignition switch connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
Ignition coil (I1-1) - IG2 (I18-6)	Below 1 Ω
Ignition coil (I2-1) - IG2 (I18-6)	Below 1 Ω
Ignition coil (I3-1) - IG2 (I18-6)	Below 1 Ω
Ignition coil (I4-1) - IG2 (I18-6)	Below 1 Ω
Ignition coil (I5-1) - IG2 (I18-6)	Below 1 Ω
Ignition coil (I6-1) - IG2 (I18-6)	Below 1 Ω
Ignition coil (I7-1) - IG2 (I18-6)	Below 1 Ω
Ignition coil (I8-1) - IG2 (I18-6)	Below 1 Ω
Ignition coil (I1-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Ignition coil (I2-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Ignition coil (I3-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Ignition coil (I4-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Ignition coil (I5-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Ignition coil (I6-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Ignition coil (I7-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Ignition coil (I8-1) or IG2 (I18-6) - Body ground	10 kΩ or higher

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

OK

Replace ignition coil with igniter.

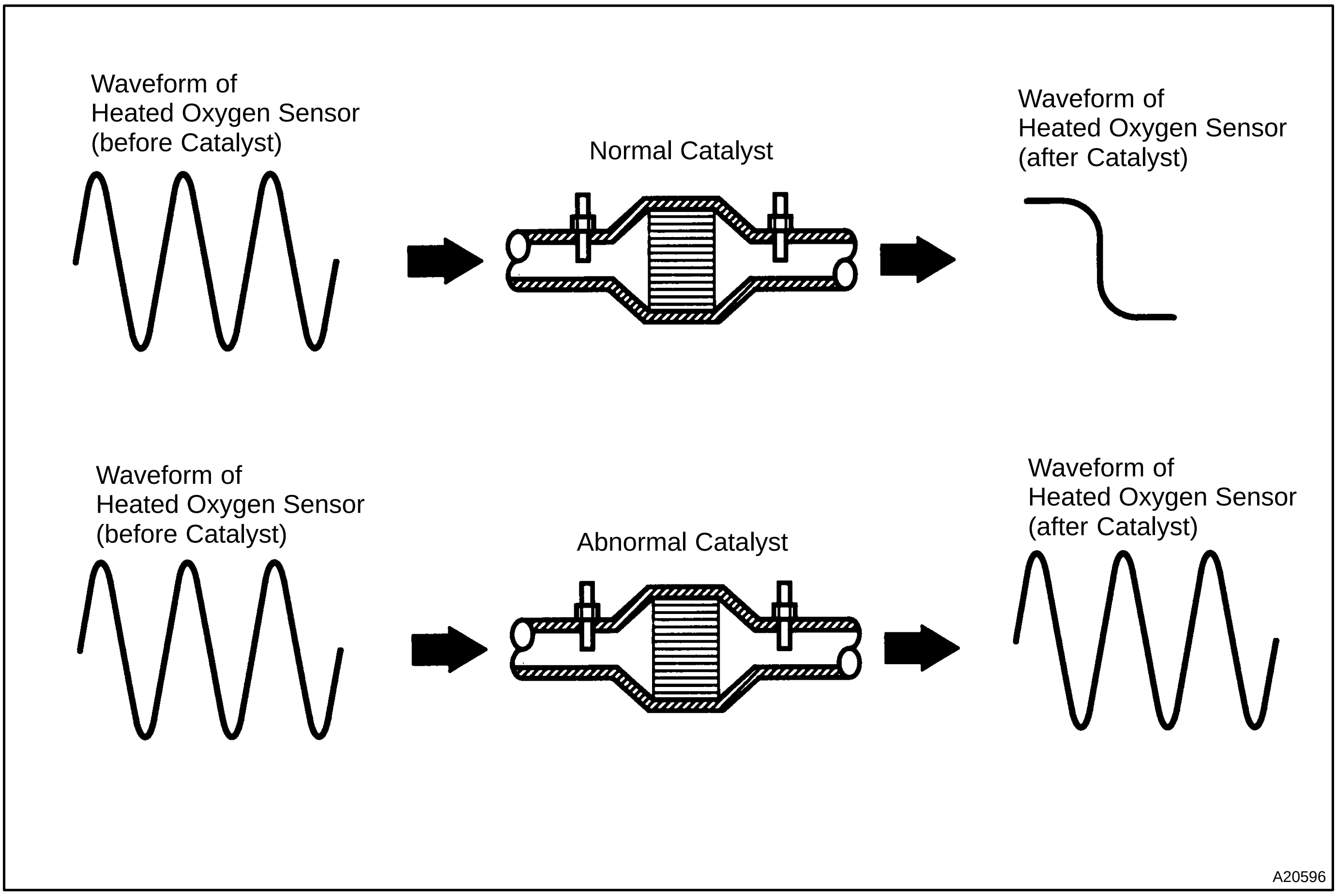
DIC2G-01

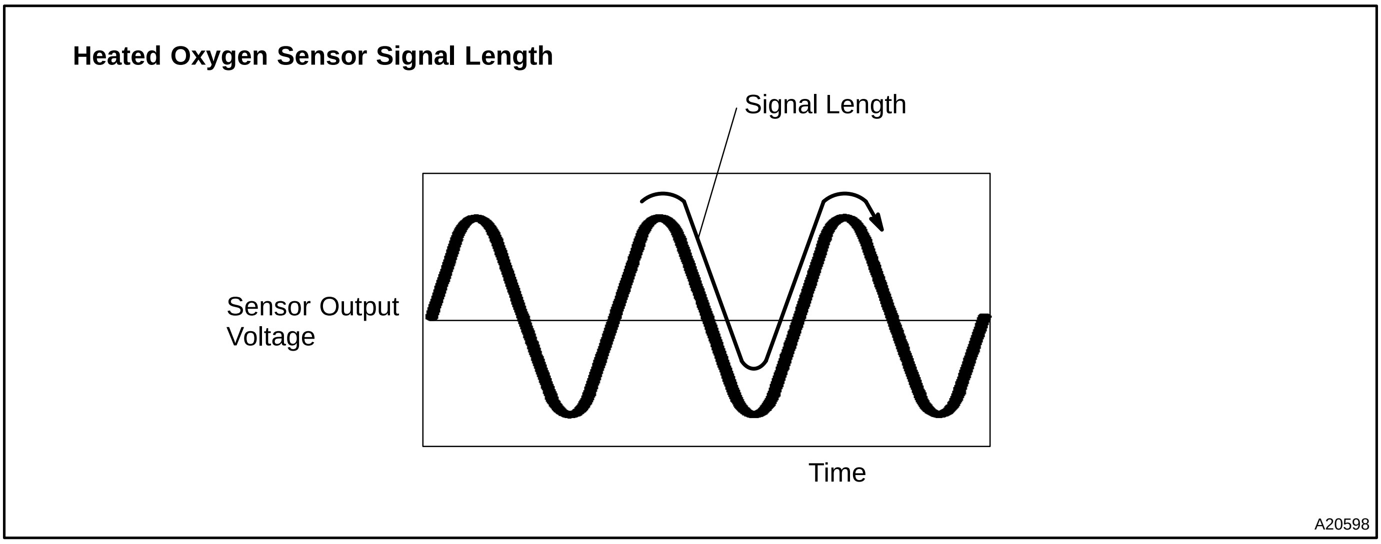
DTC	P0420	Catalyst System Efficiency Below Threshold (Bank 1)

DTC	P0430	Catalyst System Efficiency Below Threshold (Bank 2)

MONITOR DESCRIPTION

The vehicle is equipped with two heated oxygen sensors. One is mounted upstream from the TWC (Three-Way Catalytic) converter (Front Oxygen Sensor, ”sensor 1”), the second is mounted downstream (Rear Oxygen Sensor ”sensor 2”). The catalyst efficiency monitor compares the sensor 1 and sensor 2 signals in order to calculate TWC ability to store the oxygen.
During normal operation, the TWC stores and releases oxygen as needed. This results in low oxygen variations in the post TWC exhaust stream as shown below.





DTC No.	DTC Detecting Condition	Trouble Area
P0420 P0430	After engine and catalyst are warmed up, and while vehicle is driven within set vehicle and engine speed range, waveform of heated oxygen sensors have same amplitude (2 trip detection logic)	★Gas leakage on exhaust system ★Heated oxygen sensor (bank 1, 2 sensor 1, 2) ★Three-way catalytic converter

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 closest to the engine assembly.
- ★ Sensor 2 refers to the sensor farthest away from the engine assembly.

MONITOR STRATEGY

Related DTCs	P0420	Bank 1 catalyst is deteriorated
	P0430	Bank 2 catalyst is deteriorated
Required sensors/components	Main sensors/components	Front and rear heated oxygen sensor
	Related sensors/components	Mass air flow meter, Engine coolant temperature sensor, Engine speed sensor, Intake air temperature sensor
Frequency of operation	Once per driving cycle	
Duration	90 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	11 V	-
Intake air temperature	-10 °C (14°F)	-
Idle	OFF	
Intake air amount	8 g/sec.	50 g/sec.
Engine speed	-	4,000 rpm
Engine coolant temperature	75°C (167°F)	
Estimated catalyst temperature conditions are met:	A and B	
A. Estimated temperature of up stream catalyst	450°C (842°F)	820°C (1,508°F)
B. Estimated temperature of down stream catalyst	450°C (842°F)	820°C (1,508°F)
Fuel system status	Closed loop	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Catalyst deterioration level (Heated oxygen sensor locus length ratio)	0.6 or more
Number of times detection	8 times

MONITOR RESULT

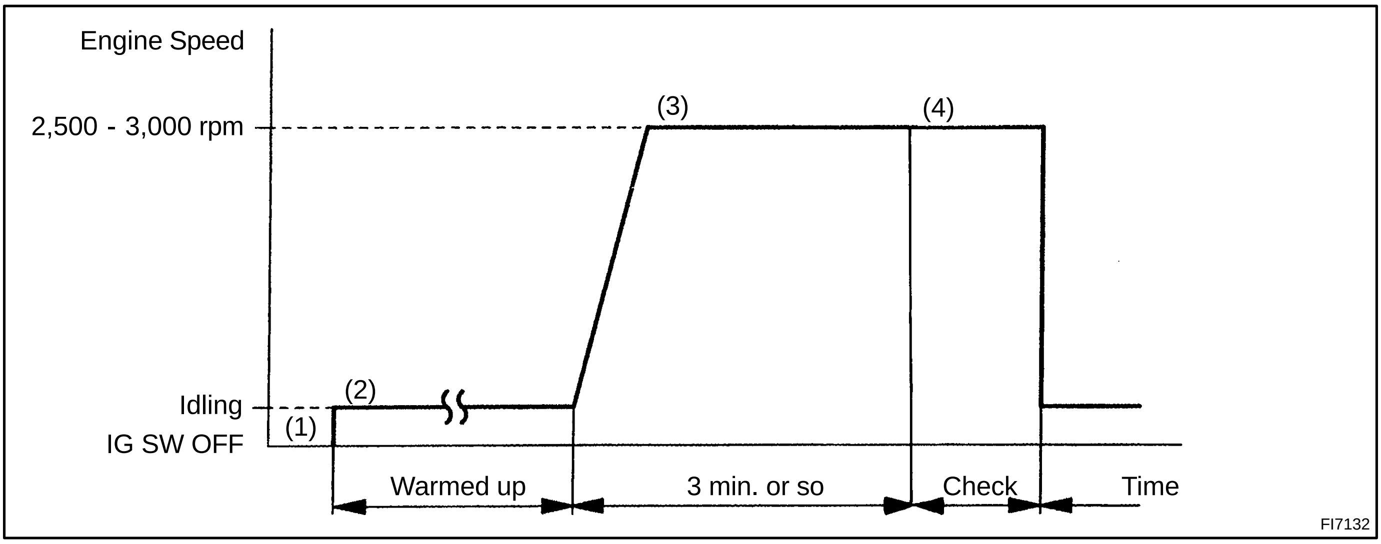
The detailed information is described in "CHECKING MONITOR STATUS" (see page DI-3).

- ★ TID (Test Identification) is assigned to each emission-related component.
- ★ TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- ★ CID (Component Identification) is assigned to each test value.
- ★ Unit Conversion is used to calculate the test value indicated on generic OBD scan tools.

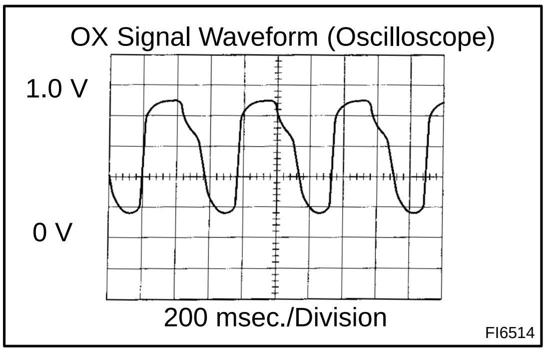
TID $01: Catalyst- Using Front HO2S and Rear HO2S

TLT	CID	Unit Conversion	Description of Test Value	Description of Test Limit
0	$01	Multiply by 0.0078 (no dimension)	Catalyst deterioration level bank 1: Determined by waveform of front HO2S and rear HO2S	Malfunction criterion
0	$02	Multiply by 0.0078 (no dimension)	Catalyst deterioration level bank 2: Determined by waveform of front HO2S and rear HO2S	Malfunction criterion

CONFIRMATION ENGINE RACING PATTERN



(a) Connect the hand-held tester to the DLC3, or connect the probe of the oscilloscope between terminals OXL1, OXL2, OXR1, OXR2 and E1 of the ECM connector.
(b) Start the engine and warm it up with all accessories switched OFF until engine coolant temperature is stable.
(c) Race the engine at 2,500 - 3,000 rpm for about 3 minutes.
(d) After confirming that the waveform of the heated oxygen sensor (bank 1, 2 sensor 1 (OX1A, OX2A)), oscillate around 0.5 V during feedback to the ECM, check the waveform of the heated oxygen sensor (bank 1, 2 sensor 2 (OX1B, OX2B)).



HINT:
If there is a malfunction in the system, the waveform of the heated oxygen sensor (bank 1, 2 sensor 2 (OX1B, OX2B)) is almost the same as that of the heated oxygen sensor (bank 1, 2 sensor 1 (OX1A, OX2A)) 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 the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	**Are there any other codes (besides DTC P0420 or P0430) being output?**

PREPARATION:
(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:
Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
”P0420 and/or P0430”	A
”P0420 or P0430” and other DTCs	B

HINT:
If any other codes besides ”P0420 and/or P0430” are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI-36).**

A

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

NG → **Repair or replace exhaust gas leakage point.**

OK

3	**Check heated oxygen sensor (bank 1, 2 sensor 1) (See page SF-57).**

HINT:
Refer to the hint following the end of this flowchart.

NG → **Replace heated oxygen sensor.**

OK

4	**Check heated oxygen sensor (bank 1, 2 sensor 2) (See page SF-57).**

HINT:
Refer to the hint following the end of this flowchart.

NG → **Replace heated oxygen sensor.**

OK

Replace the front and rear three-way catalytic converter in the bank a malfunction is detected.

HINT:
Hand-held tester only:
The narrowing down the trouble area is possible by performing ACTIVE TEST of the following ”A/F CONTROL” (Heated oxygen sensor or another can be distinguished).
(a) Perform ACTIVE TEST by hand-held tester (A/F CONTROL).
HINT:
”A/F CONTROL” is the ACTIVE TEST which changes the injection volume to -12.5 % or +25 %.
(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
(4) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL”.
(5) Perform ”A/F CONTROL” with the engine in an idle condition (press the right or left button).

RESULT:

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume
+25 % → rich output: More than 0.5 V
-12.5 % → lean output: Less than 0.4 V

NOTICE:

However, there is a few second delay in the sensor 1 (front sensor) output. And there is about 20 seconds delay in the sensor 2 (rear sensor).

	Output voltage of heated oxygen sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspect trouble area
Case 1	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	—
Case 2	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Sensor 2: rear sensor (sensor 2, heater, sensor 2 circuit)
Case 4	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Extremely rich or lean of the actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of the heated oxygen sensors (sensor 1 and 2).

For displaying the graph indication, enter ”ACTIVE TEST / A/F CONTROL / USER DATA” then select ”O2S B1S1 and O2S B1S2” by pressing ”YES” button and push ”ENTER” button before pressing ”F4” button.

NOTICE:

If the vehicle is short of fuel, the air-fuel ratio becomes LEAN and DTCs P0133 and/or P0153 will be recorded, and the MIL then comes on.

- ★ If different DTCs related to different systems while terminal E2 as ground terminal are output simultaneously, terminal E2 may be open.
- ★ Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- ★ A high heated oxygen sensor (sensor 1) voltage (0.5 V or more) could be caused by a rich air fuel mixture. Check for conditions that would cause the engine to run rich.
- ★ A low heated oxygen sensor (sensor 1) voltage (0.4 V or less) could be caused by a lean air fuel mixture. Check for conditions that would cause the engine to run lean.

DIC2H-01

DTC	P0441	Evaporative Emission Control System Incorrect Purge Flow

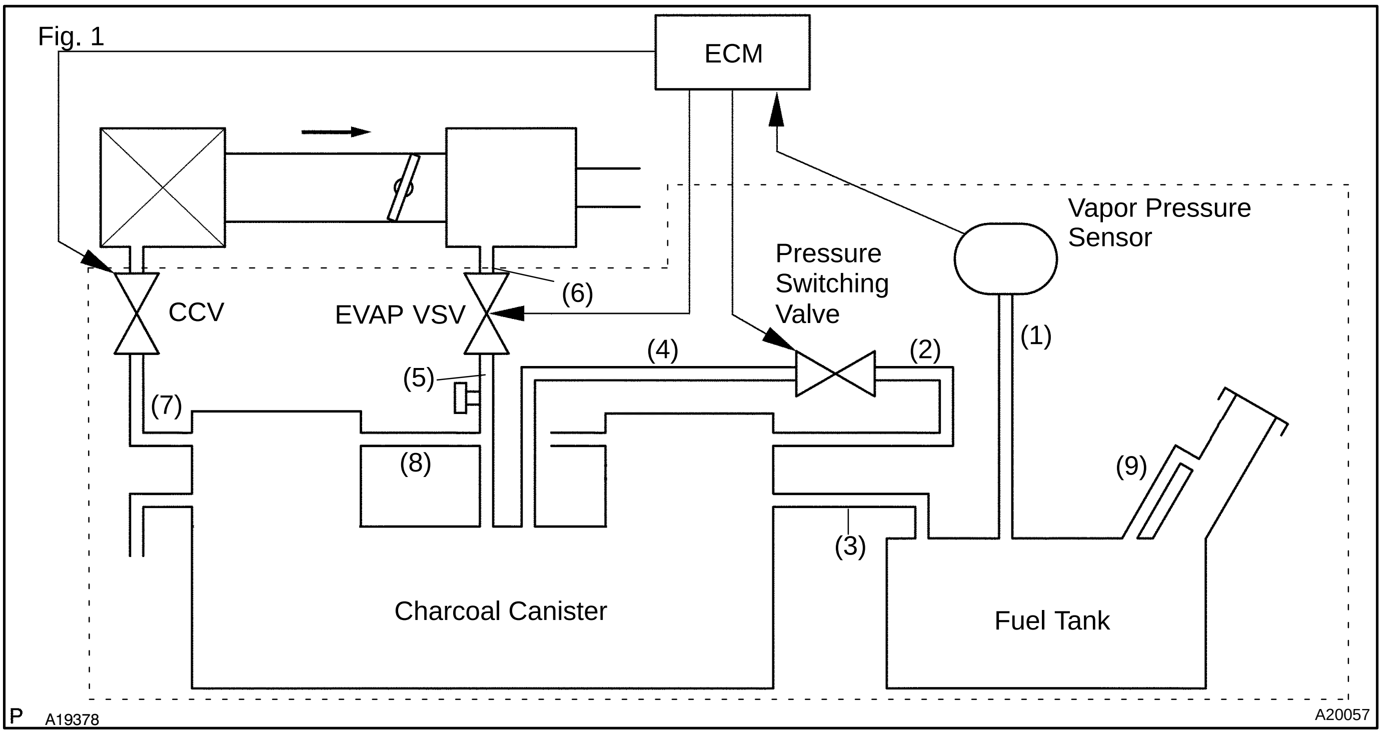
DTC	P0446	Evaporative Emission Control System Vent Control Circuit

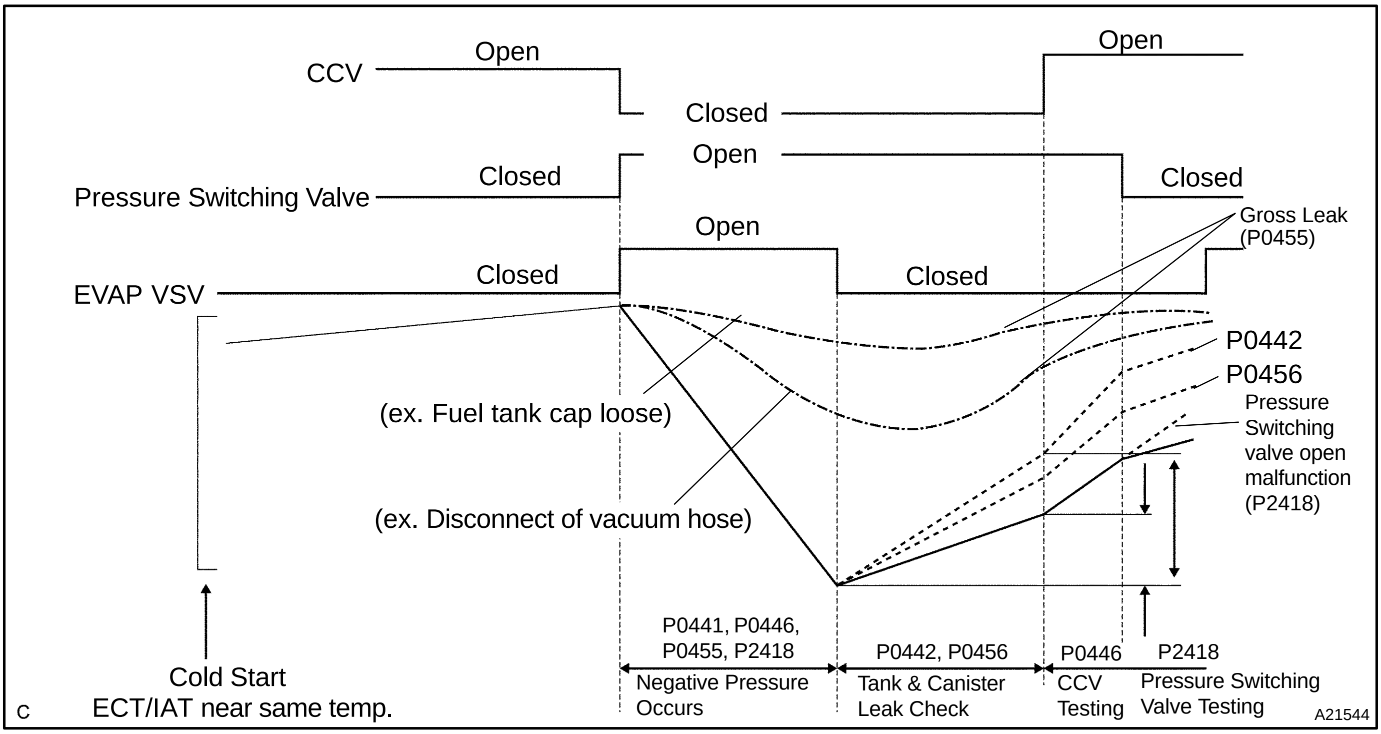
DTC	P2418	Evaporative Emission System Valve Control Circuit/Open

CIRCUIT DESCRIPTION

The vapor pressure sensor, canister closed valve (CCV), and pressure switching valve 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, P0446 and P2418 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 EVAP VSV, the pressure switching valve, or in the vapor pressure sensor itself.

Fig. 1





DTC No.	DTC Detecting Condition	Trouble Area
P0441	Pressure in charcoal canister and fuel tank does not drop during purge control (2 trip detection logic)	★Vacuum hose cracks, holed, blocked, damaged or disconnected ((1), (2), (3), (4), (5), (6), (7), (8) and (9) in Fig. 1) ★Fuel tank cap incorrectly installed ★Fuel tank cap cracked or damaged ★Open or short in vapor pressure sensor circuit ★Vapor pressure sensor ★Open or short in VSV circuit for EVAP ★EVAP VSV ★Open or short in VSV circuit for CCV ★CCV ★Open or short in VSV circuit for pressure switching valve ★Pressure switching valve ★Fuel tank cracked, holed or damaged ★Charcoal canister cracked, holed or damaged ★ECM
	During purge cut-off, pressure is very low compared with atmospheric pressure (2 trip detection logic)	
P0446	No fuel tank pressure rise when commanding the CCV open after an EVAP leak test	
	A high negative pressure (vacuum) does not occurs in the system when commanding the EVAP VSV open and CCV closed with the pressure switching valve open	
P2418	No fuel tank pressure change when commanding the pressure switching valve closed for the check after the EVAP leak test	
	A high negative pressure (vacuum) does not occurs in the system when commanding the EVAP VSV open and CCV closed with the pressure switching valve open	

HINT:
Typical DTC output of each trouble part

Trouble part		Typical DTC output (*1)
Small Leak		P0442 and/or P0456
Medium Leak (ex.: Vacuum hose loose)		P0455
Large Leak (ex.: Fuel tank cap loose)		P0441, P0446, P0455 and P2418
EVAP VSV	Open Malfunction	P0441
	Close Malfunction	P0441, P0446, P0455 and P2418
CCV	Open Malfunction	P0441, P0446, P0455 and P2418
	Close Malfunction	P0446
Pressure Switching Valve	Open Malfunction	P2418
	Close Malfunction	P0441, P0446, P0455 and P2418

*1: ECM may output some other DTC combination.

MONITOR DESCRIPTION

P0441

The ECM checks for a stuck closed malfunction in the EVAP VSV by commanding it to open with the CCV closed. If a high negative pressure does not develop in the fuel tank, the ECM determines that the EVAP VSV remains closed. The ECM turns on the MIL and a DTC is set.

The ECM checks for EVAP VSV ”stuck open” fault by commanding both valves (EVAP VSV and CCV) to close at a time when the fuel tank is at atmospheric pressure. If the fuel tank develops a high negative pressure at this early stage of the test, the ECM determines that the EVAP VSV is stuck OPEN.

The ECM will turn on the MIL and a DTC is set.

P0446

The ECM checks the CCV ”stuck closed” by commanding the CCV to open after the EVAP leak test. If the fuel tank pressure does not rise (lose vacuum), the ECM determines that the CCV is stuck closed. The ECM will turn on the MIL and a DTC is set.

If the EVAP VSV ”stuck closed” is detected, the ECM determines that the CCV is ”stuck open”. The ECM turns on the MIL and a DTC is set.

P2418

The ECM checks the pressure switching valve (bypass VSV) ”stuck open” by commanding the pressure switching valve to close after the EVAP leak test. If the fuel tank pressure does not change, the ECM determines that the pressure switching valve is malfunctioning. The ECM will turn on the MIL and a DTC is set.

If the EVAP VSV ”stuck closed” is detected, the ECM determines that the CCV is ”stuck closed”. The ECM turns on the MIL and a DTC is set.

MONITOR STRATEGY

Related DTCs	P0441	EVAP VSV malfunction
	P0446	CCV malfunction
	P2418	Bypass VSV malfunction
Required sensors/components	EVAP VSV, CCV, Bypass VSV and Vapor pressure sensor	
Frequency of operation	Once per drive cycle	
Duration	P0441 : 90 sec. P0446 : 10 sec. P2418 : 10 sec.	
MIL operation	2 drive cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Same as P0442 (see page DI-245).

TYPICAL MALFUNCTION THRESHOLDS

P0441

Detection Criteria	Threshold
Either the following condition is met:	A or B
A. Following conditions are met:	(a) and (b)
(a) Fuel tank pressure at the vacuum introduction start	-1.6 kPa (-12 mmHg, -0.47 in.Hg) or more
(b) Difference between the fuel tank pressure at the vacuum introduction start and completion	Less than 0.9 kPa (7 mmHg, 0.27 in.Hg)
B. Following conditions are met:	(a) and (b)
(a) Difference between "minimum" fuel tank pressure before the leak check and the fuel tank pressure at 14 sec. after the leak check	0.5 kPa or more (3.5 mmHg, 0.15 in.Hg)
(b) Fuel tank pressure at 14 sec. after the leak check	Less than -3.7 kPa (-28 mmHg, -1.1 in.Hg)

P0446

Case 1: CCV stuck closed	
Fuel tank pressure when the CCV is opened after an EVAP leak check	Not changing
Case 2: CCV stuck open	
Fuel tank pressure after the EVAP VSV is opened and manifold vacuum is introduced to the fuel tank	Not changing

P2418

Case 1: Bypass VSV stuck open	
Fuel tank pressure when the pressure switching valve is closed after an EVAP leak check	Not changing
Case 2: Bypass VSV stuck closed	
Fuel tank pressure after the EVAP VSV is opened and manifold vacuum is introduced to the fuel tank	Not changing

MONITOR RESULT

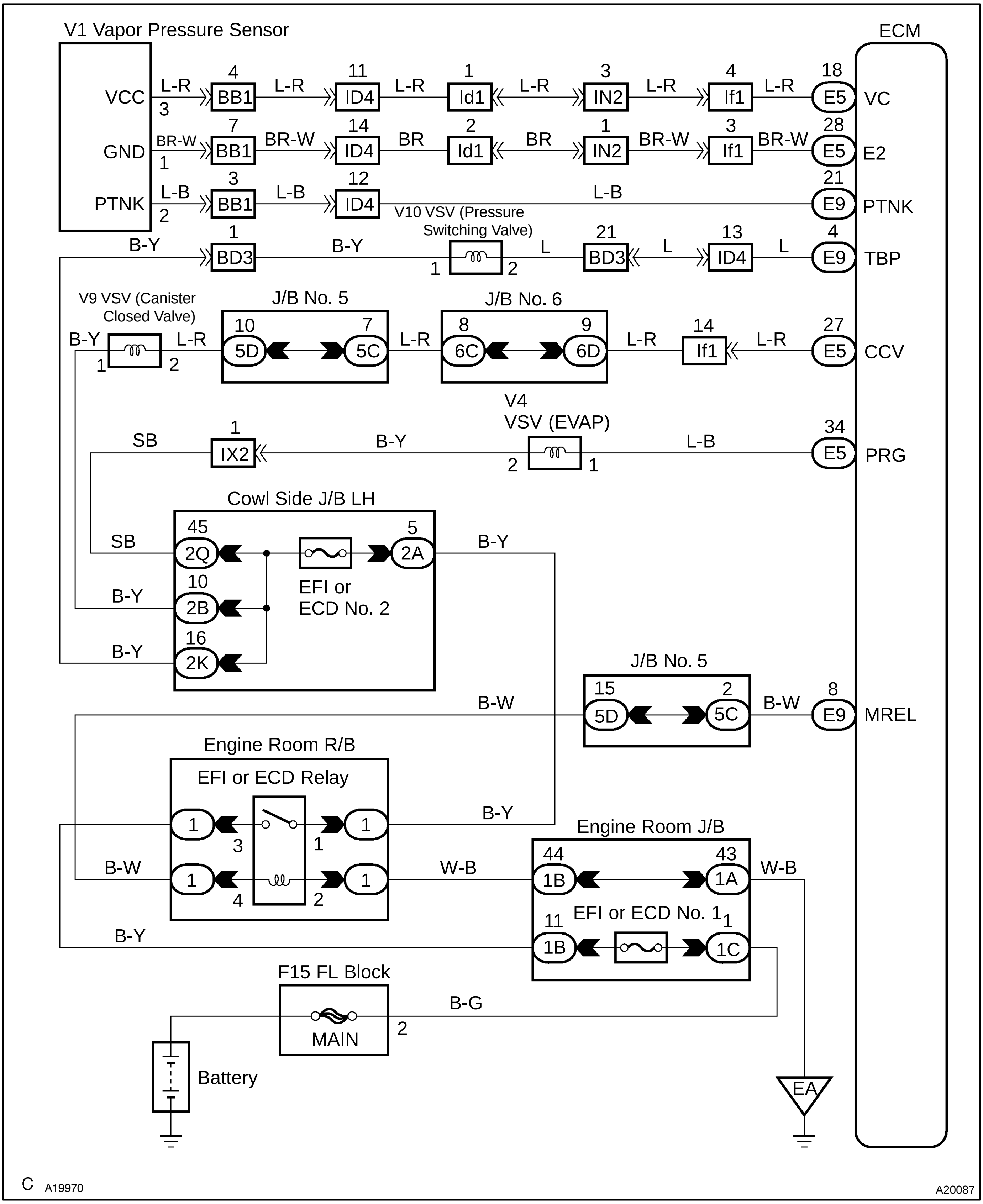
The detailed information is described in “CHECKING MONITOR STATUS” (see page DI-3).

- ★ TID (Test Identification) is assigned to each emission-related component.
- ★ TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- ★ CID (Component Identification) is assigned to each test value.
- ★ Unit Conversion is used to calculate the test value indicated on generic OBD scan tools.

TID $02: EVAP - Vacuum Monitor

TLT	CID	Unit Conversion	Description of Test Value	Description of Test Limit
1	$01	Multiply by 0.0916 (mmHg)	Test value of EVAP VSV: Determined by fuel tank pressure change during vacuum introduction	Malfunction criterion
1	$02	Multiply by 0.0458 and subtract 2.93 (mmHg)	Test value of bypass VSV (pressure switching valve): Determined by fuel tank pressure change at switching over bypass VSV	Malfunction criterion
0	$03	Multiply by 0.0458 (mmHg)	Test value of 0.04 inch leak: Determined by fuel tank pressure change	Malfunction criterion
0	$04	Multiply by 0.0458 (mmHg)	Test value of 0.02 inch leak: Determined by fuel tank pressure change	Malfunction criterion
1	$05	Multiply by 0.0458 and subtract 2.93 (mmHg)	Test value of CCV: Determined by fuel tank pressure change at switching over CCV	Malfunction criterion

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

★ If DTC P0441 (Purge Flow), P0446 (CCV) or P2418 (Pressure switching valve) or P0451 (Evaporative Pressure Sensor) is output with DTC P0442, P0455 or P0456, first troubleshoot DTC P0441, P0446 or P0451. If no malfunction is detected, troubleshoot DTC P0442, P0455 or P0456 next.

★ Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

★ When the ENGINE RUN TIME in the freeze frame data is less than 200 seconds, carefully check the vapor pressure sensor.

Hand-held tester:

1	**Check that fuel tank cap meets OEM specifications.**

NG → **Replace with a cap that meets OEM specifications.**

OK

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

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

OK

3	**Check fuel tank cap (See page EC-5).**

NG → **Replace fuel tank cap.**

OK

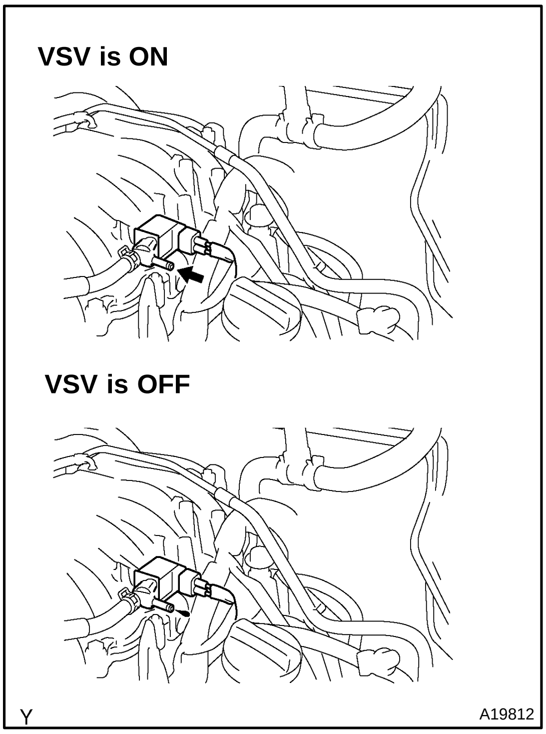
4	Check filler neck for damage.

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

NG	Replace filler pipe.

OK

5	Check purge flow.



PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Select the "ENHANCED OBD II / ACTIVE TEST" mode on the hand-held tester.
(c) Disconnect the vacuum hose for the EVAP VSV from the charcoal canister.
(d) Start the engine.
(e) Select the item "EVAP (ALON) / ALL" in the ACTIVE TEST and operate EVAP VSV.

CHECK:
When the EVAP VSV is operated by the 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 9.

NG

6	**Check vacuum hose between intake manifold and EVAP VSV, and EVAP VSV 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 vacuum hose.**

OK

7	**Check operation of EVAP VSV (See page SF-44).**

NG → **Replace EVAP VSV.**

OK

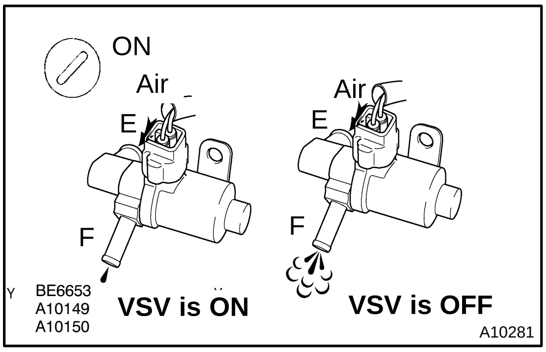
8	**Check for open and short in harness and connector between EFI or ECD relay and EVAP VSV, and EVAP VSV and ECM (See page IN-36).**

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

OK

Replace ECM (See page SF-60).

9	Check CCV.



PREPARATION:
(a) Disconnect the vacuum hose for the CCV VSV from the charcoal canister.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the "ENHANCED OBD II / ACTIVE TEST" mode on the hand-held tester.
(d) Select the item "CAN CTRL VSV / ALL" in the ACTIVE TEST and operate CCV.

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

OK:
VSV is ON:
Air does not flow from port E to port F.
VSV is OFF:
Air from port E flows out through port F.

OK	Go to step 13.

NG

10	Check vacuum hose between CCV 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 vacuum hose.

OK

11	Check operation of CCV (See page SF-48).

NG	Replace CCV.

OK

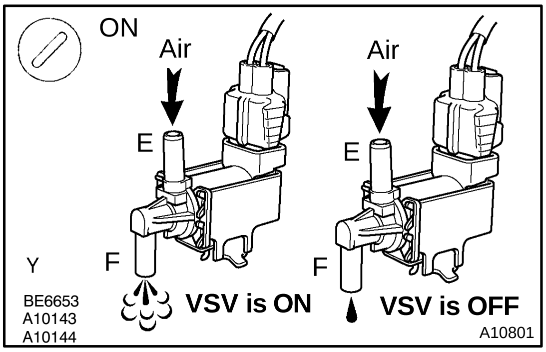
12	Check for open and short in harness and connector between EFI or ECD relay and CCV, and CCV and ECM (See page IN-36).

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

OK

Replace ECM (See page SF-60).

13	Check pressure switching valve.



PREPARATION:

(a) Turn the ignition switch ON and push the hand-held tester main switch ON.

(b) Select the "ENHANCED OBD II / ACTIVE TEST" mode on the hand-held tester.

(c) Select the item "TANK BYPASS VSV / ALL" in the ACTIVE TEST and operate pressure switching valve.

CHECK:

Check the VSV operation when it is operated by the hand-held tester.

OK:

VSV is ON:
Air from port E flows out through port F.
VSV is OFF:
Air does not flow from port E to port F.

OK → **Go to step 16.**

NG

14	Check operation of pressure switching valve (See page SF-46).

NG → **Replace pressure switching valve.**

OK

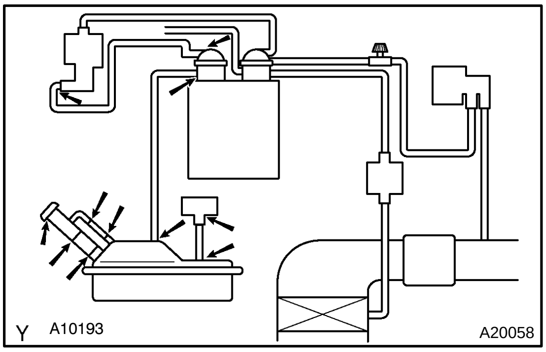
15	**Check for open and short in harness and connector between EFI or ECD relay and pressure switching valve, and pressure switching valve and ECM (See page IN-36).**

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

OK

Replace ECM (See page SF-60).

16	**Check whether hose close to fuel tank has been modified, and check whether there are signs of any accident near fuel tank.**



CHECK:

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

★ Fuel tank
★ Fuel tank filler pipe
★ Hoses and tubes around fuel tank

NG → **Repair or replace evaporative emission leak part.**

OK

17	**Check vacuum hoses between vapor pressure sensor and fuel tank, and charcoal canister and pressure switching valve.**

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 vacuum hose.**

OK

18	Check hose and tube between fuel tank and charcoal canister.

CHECK:

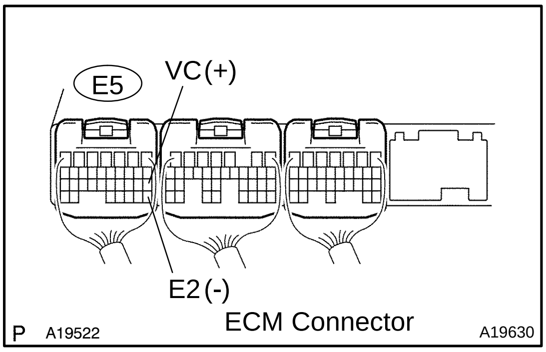
(a) Check for proper connection of the fuel tank and fuel evap pipe (See page EC-2), fuel evap pipe and fuel tube under the floor, fuel tube under the floor and charcoal canister.

(b) Check the hose and tube for cracks, hole and damage.

NG → **Repair or replace hose and tube.**

OK

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



CHECK:

Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals the E5 ECM connector.

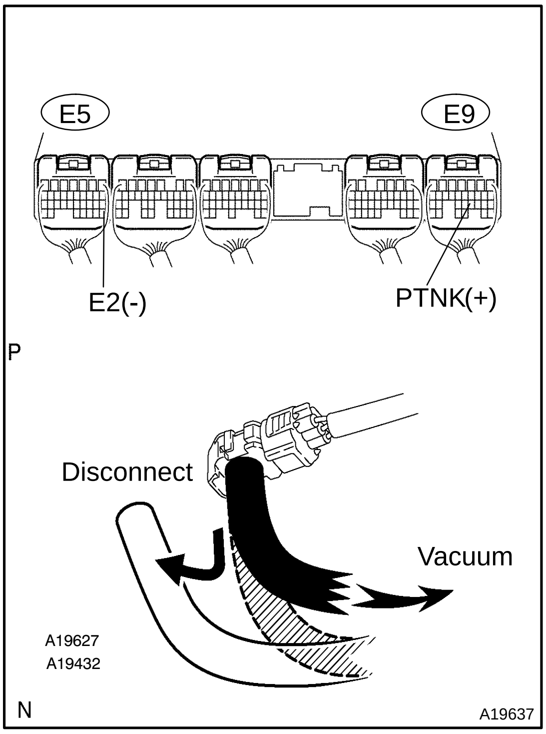
OK:

Tester Connection	Specified Condition
VC (E5-18) - E2 (E5-28)	4.5 to 5.5 V

NG → **Replace ECM (See page SF-60).**

OK

20	**Check voltage between terminals PTNK and E2 of ECM connectors.**



PREPARATION:
Turn the ignition switch ON.

CHECK:
Measure the voltage between terminals PTNK and E2 of the ECM connectors at following condition (1) and (2).

(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:
Condition (1) Voltage: 2.9 to 3.7 V
Condition (2) Voltage: 0.5 V or less

OK	**Go to step 22.**

NG

21	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN-36).**

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

OK

Replace ECM (See page SF-60).

22	**Check fuel tank inlet valve.**

NG	**Replace fuel tank inlet valve.**

OK

23	Check fuel tank.

NG → Replace fuel tank.

OK

24	Check charcoal canister for cranks, hole and damage.

NG → Replace charcoal canister.

OK

Replace ECM (See page SF-60).

OBD II scan tool (excluding hand-held tester):

1	Check that fuel tank cap meets OEM specifications.

NG → Replace with a cap that meets OEM specifications.

OK

2	Check that fuel tank cap is correctly installed.

NG → Correctly install fuel tank cap.

OK

3	Check fuel tank cap (See page EC-5).

NG → Replace fuel tank cap.

OK

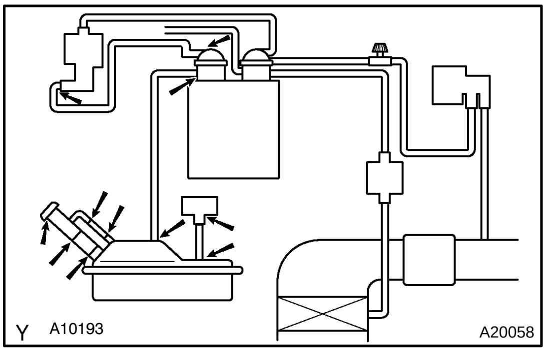
4	Check filler neck for damage.

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

NG → Replace filler pipe.

OK

5	**Check whether hose close to fuel tank has 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 the following parts:

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

NG	**Repair or replace evaporative emissions leak part.**

OK

6	**Check vacuum hoses between vapor pressure sensor and fuel tank, charcoal canister and pressure switching valve.**

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 vacuum hose.**

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 EC-2), 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 hose and tube.**

OK

8	Check vacuum hoses ((8) and (9) in Fig. 1 in circuit description).

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 vacuum hose.**

OK

9	Check VSV connector for EVAP, VSV connector for CCV, VSV connector for pressure switching valve and vapor pressure sensor connector for looseness and disconnection.

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

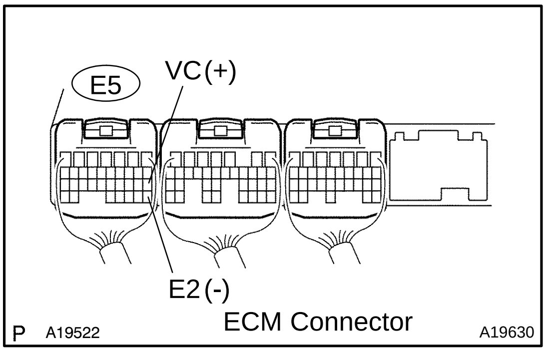
OK

10	Check charcoal canister for cracks, hole and damage.

NG → **Replace charcoal canister.**

OK

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



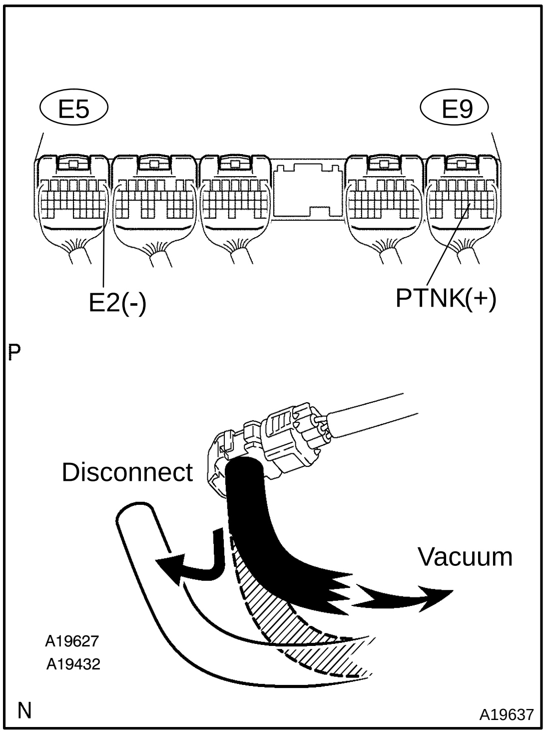
CHECK:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals the E5 ECM connector.
OK:

Tester Connection	Specified Condition
VC (E5-18) - E2 (E5-28)	4.5 to 5.5 V

NG — **Replace ECM (See page SF-60).**

OK

12	**Check voltage between terminals PTNK and E2 of ECM connectors.**



PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals PTNK and E2 of the ECM connectors at following condition (1) and (2).

(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:
Condition (1) Voltage: 2.9 to 3.7 V
Condition (2) Voltage: 0.5 V or less

OK — **Go to step 14.**

NG

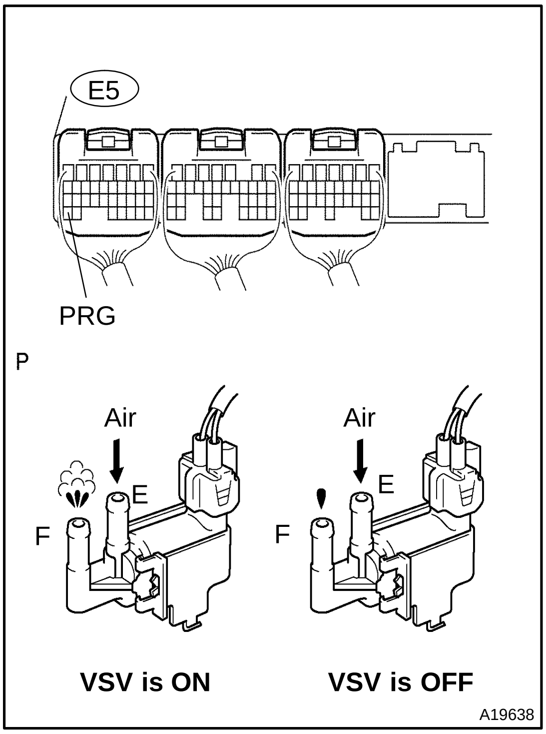
13	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN-36).**

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

OK

Replace ECM (See page SF-60).

14	**Check EVAP VSV.**



PREPARATION:

(a) Remove the glove compartment door (See page SF-60).

(b) Turn the ignition switch ON.

CHECK:

Check the VSV function.

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

(2) Disconnect between terminal PRG of the ECM connector and body ground (OFF).

OK:

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

OK → **Go to step 17.**

NG

15	**Check operation of EVAP VSV (See page SF-44).**

NG → **Replace EVAP VSV.**

OK

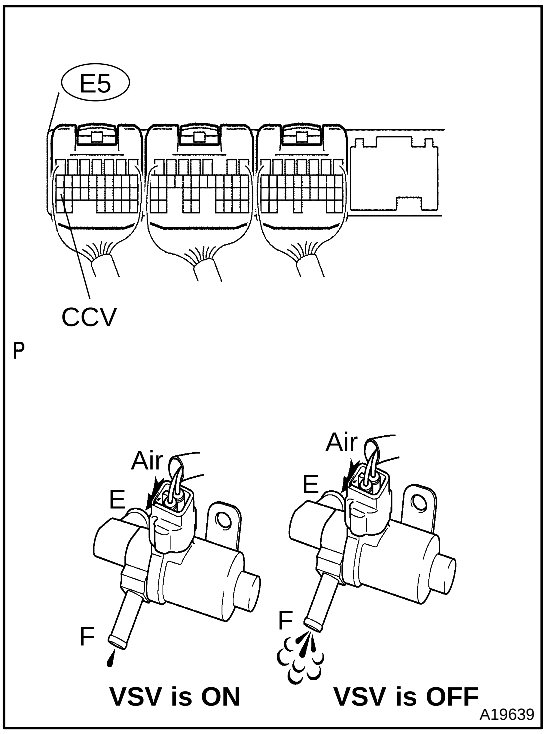
16	Check for open and short in harness and connector between EFI or ECD relay and EVAP VSV, and EVAP VSV and ECM (See page IN-36).

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

OK

Replace ECM (See page SF-60).

17	Check CCV.



PREPARATION:
Turn the ignition switch ON.
CHECK:
Check the VSV function.
(1) Connect the terminal CCV of the ECM connector and body ground (ON).
(2) Disconnect the terminal CCV of the ECM connector and body ground (OFF).
OK:
(1) VSV is ON:
Air does not flow from port E to port F.
(2) VSV is OFF:
Air from port E flows out through port F.

OK → **Go to step 20.**

NG

18	Check operation of CCV (See page SF-48).

NG → **Replace CCV.**

OK

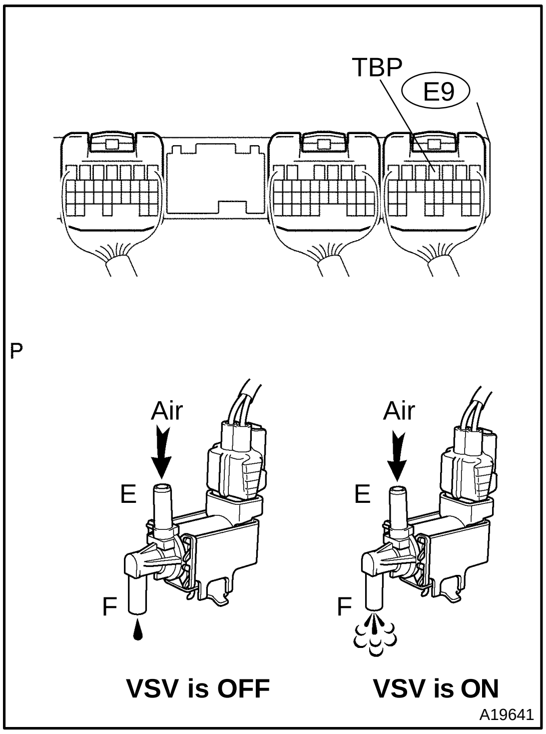
19	Check for open and short in harness and connector between EFI or ECD relay and CCV, and CCV and ECM (See page IN-36).

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

OK ↓

Replace ECM (See page SF-60).

20	Check pressure switching valve.



PREPARATION:

Turn the ignition switch ON.

CHECK:

Check the VSV function.

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

(2) Disconnect the terminal TBP of the ECM connector and body ground (OFF).

OK:

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

OK → **Go to step 23.**

NG ↓

21	Check operation of pressure switching valve (See page SF-46).

NG → **Replace pressure switching valve.**

OK ↓

22	Check for open and short in harness and connector between EFI or ECD relay and pressure switching valve, and pressure switching valve and ECM (See page IN-36).

NG → Repair or replace harness or connector.

OK ↓

Replace ECM (See page SF-60).

23	Check fuel tank inlet valve.

NG → Replace fuel tank inlet valve.

OK ↓

24	Check fuel tank.

NG → Replace fuel tank.

OK ↓

It is likely that vehicle user did not properly close fuel tank cap.

DIC2I-01

DTC	P0442	Evaporative Emission Control System Leak Detected (Small Leak)

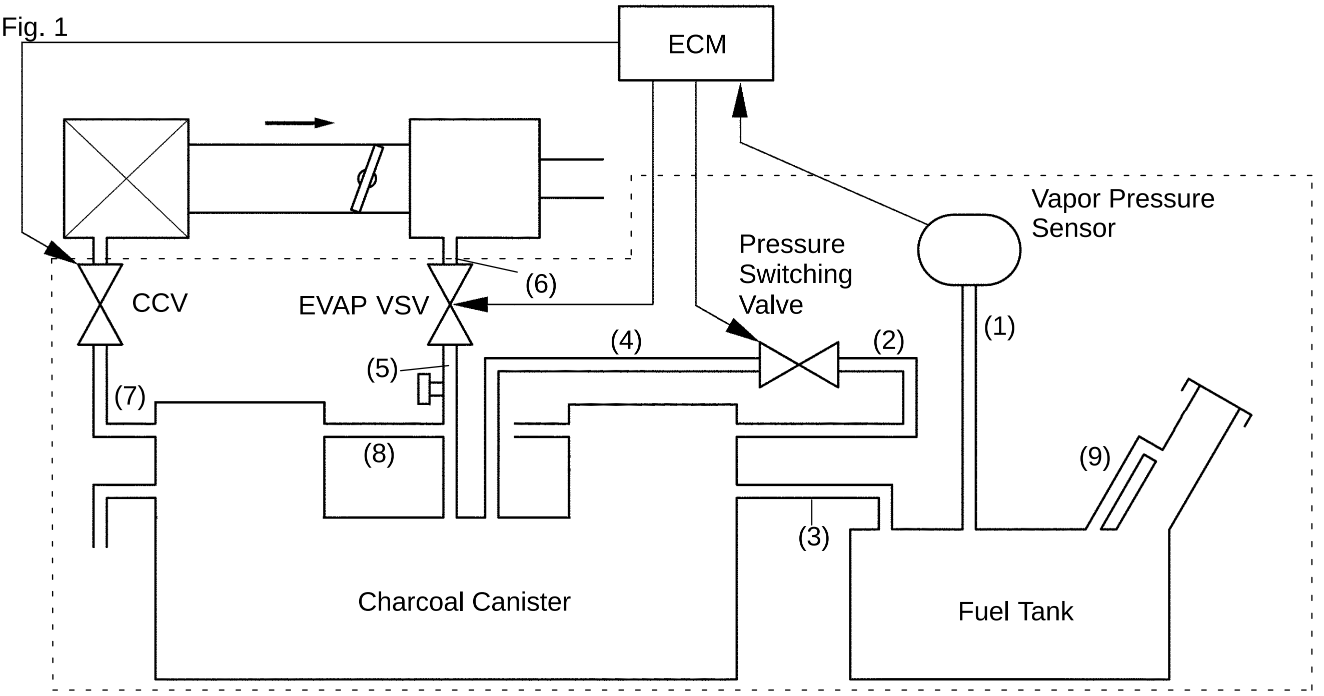
DTC	P0455	Evaporative Emission Control System Leak Detected (Gross Leak)

DTC	P0456	Evaporative Emission Control System Leak Detected (Very Small Leak)

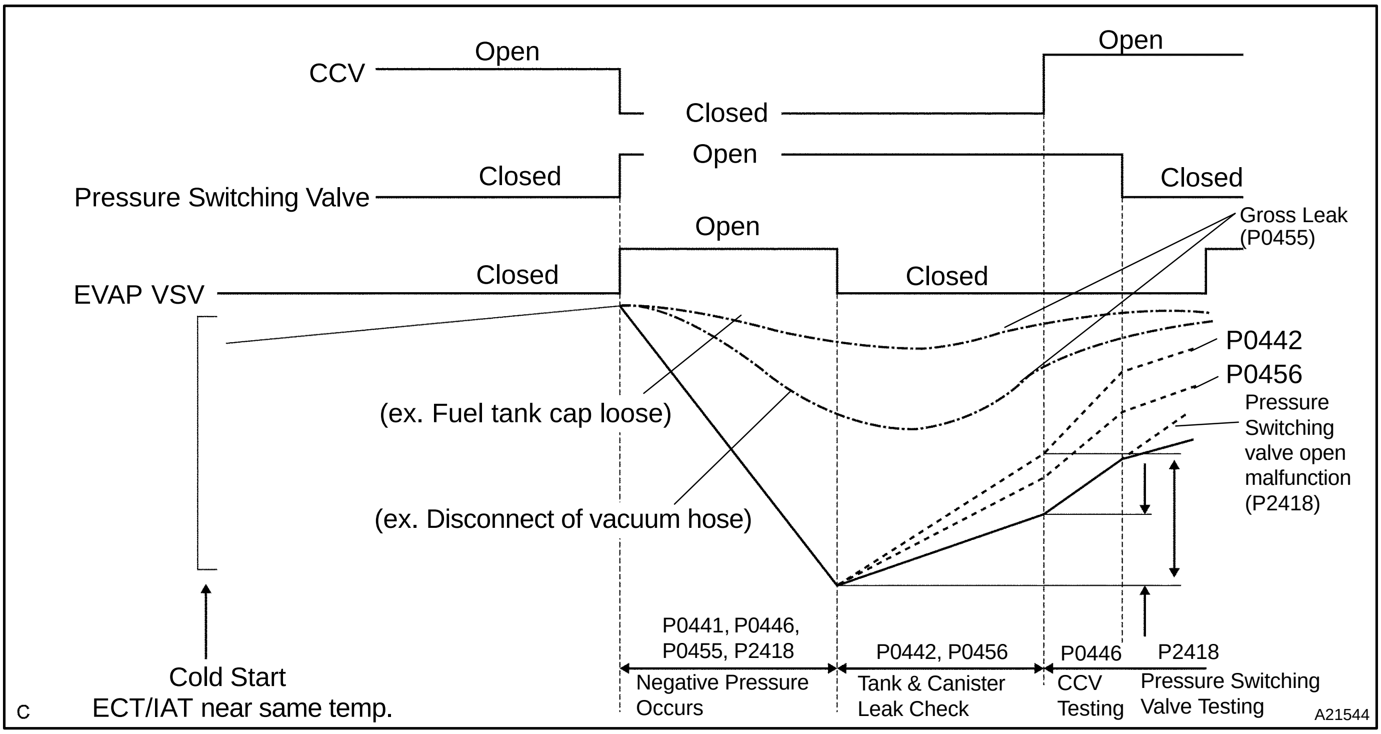
CIRCUIT DESCRIPTION

The vapor pressure sensor, canister closed valve (CCV) and pressure switching valve 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 P0442, P0455 or P0456 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



P A19378 A20057



MONITOR DESCRIPTION

A leak in the evaporative emission system prompts the ECM to set DTC P0442, P0455 or P0456.

The ECM checks for leaks in the system by introducing a high negative pressure (vacuum) from the intake manifold by commanding the EVAP VSV open while the CCV (vent) is closed and the pressure switching valve is open. After sufficient time has elapsed the fuel tank should have developed a high negative pressure (vacuum) and the EVAP VSV closed. The ECM then monitors the pressure-rise (loss of vacuum) in the fuel tank. If the pressure rises too rapidly, the ECM concludes that there is a leak in the system. The ECM will turn on the MIL and set a DTC.

The ECM has separate DTCs for small and large leaks:

(1) DTC P0442 is set when the internal fuel tank pressure has a large increase and the EVAP system has a small leak.

(2) DTC P0455 is set when the EVAP system has various large leaks. Even though the ECM sends a signal to the EVAP VSV (when CCV is closed) to create a vacuum, the internal fuel tank pressure does not decrease beyond a specified level.

(3) DTC P0456 is set when the internal fuel tank pressure increase slightly and the EVAP system has a small leak.

HINT:
Refer to DTCs P0441, P0446 and P2418

DTC No.	DTC Detecting Condition	Trouble Area
P0442	After the negative pressure introduction has been completed, if the pressure in the EVAP system sharply increases.	After the negative pressure introduction has been completed, if the pressure in the EVAP system sharply increases. ★Hose or tube cracked, holed, damaged or loose seal ((3) in Fig. 1) ★Fuel tank cap incorrectly installed ★Fuel tank cap cracked or damaged ★Vacuum hose cracked, holed, blocked, damaged or disconnected ((1), (2), (4), (5), (6), (7), (8) and (9) in Fig. 1) ★Fuel tank cracked, holed or damaged ★Charcoal canister cracked, holed or damaged ★Open or short in vapor pressure sensor circuit ★Vapor pressure sensor ★ECM
P0455	If the vacuum is not strong enough, the ECM assumes the EVAP system has a large hole.	
P0456	If the pressure in the EVAP system slightly increase while the ECM performs a leak check.	

HINT:
Typical DTC output of each trouble part

Trouble part		Typical DTC output (*1)
Small Leak		P0442 and/or P0456
Medium Leak (ex: Vacuum hose loose)		P0455
Large Leak (ex: Fuel tank cap loose)		P0441, P0446, P0455 and P2418
EVAP VSV	Open Malfunction	P0441
	Close Malfunction	P0441, P0446, P0455 and P2418
CCV	Open Malfunction	P0441, P0446, P0455 and P2418
	Close Malfunction	P0446
Pressure Switching Valve	Open Malfunction	P2418
	Close Malfunction	P0441, P0446, P0455 and P2418

*1: ECM may output some other DTC combination.

MONITOR STRATEGY

Related DTCs	P0442	Small leak (0.040 inch or more large hole) is detected
	P0455	Gross leak detected
	P0456	Very small leak (0.020 inch hole) is detected
Required sensors/components	Main sensors/components	Vapor pressure sensor
	Related sensors/components	Mass air flow sensor, Engine coolant temperature sensor EVAP VSV (purge VSV), CCV
Frequency of operation	Once per drive cycle	
Duration	60 sec.	
MIL operation	2 drive cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Criteria	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Common pre-conditions for 0.020, 0.040 inch and gross:		
Altitude	-	2,400 m (7,872 ft.)
Throttle position learning	Completed	
Vapor pressure sensor	No malfunction	
Difference between intake air temperature and engine coolant temperature at engine start	-7 °C (-13°F)	11.1°C (20°F)
Vehicle speed condition	A or B	
A. Time after vehicle stopped (Less than 10 km/h (6 mph))	90 sec.	-
B. Time after vehicle started (7 km/h (4 mph) or more)	20 sec.	-
0.020 inch malfunction detection:		
Engine coolant temperature at engine start	10°C (50°F)	32°C (89.6°F)
Intake air temperature at engine start	10°C (50°F)	32°C (89.6°F)
Intake air temperature	10°C (50°F)	-
Fuel level condition in fuel tank during leak check	Fuel slosh is small (must not drive on road in bad conditions)	
Time after engine start	-	50 min.
Fuel tank pressure condition before leak check (Fuel tank condition before closed negative pressure introduction)	Tank inside pressure change is small before negative pressure introduction. (Reference: If fuel in tank is high temperature, vapor volume increase and tank inside pressure changes also increase)	
Vehicle speed and intake air amount condition before and after negative pressure introduction	Steady speed and not change greatly of intake air amount	
Fuel level	-	90%
0.020 inch leak detection	Not completed	
0.040 inch leak detection	Not detected	
CCV malfunction, bypass VSV malfunction	Not detected	
Vehicle speed	-	130 km/h (81 mph)
EVAP VSV (Evap purge VSV) malfunction	Not detected	
0.040 inch and gross malfunction:		
Engine coolant temperature at engine start	10°C (50°F)	35°C (95°F)
Intake air temperature at engine start	10°C (50°F)	35°C (95°F)
Intake air temperature	10°C (50°F)	-
Fuel level condition in fuel tank during leak check	Fuel slosh is small (must not drive on road in bad conditions)	
Time after engine start	-	50 min.
Fuel tank pressure condition before leak check (Fuel tank condition before closed negative pressure introduction)	Tank inside pressure change is small before negative pressure introduction. (Reference: If fuel in tank is high temperature, vapor volume increase and tank inside pressure changes also increase)	

Vehicle speed and intake air amount condition before and after negative pressure introduction	Steady speed and not change greatly of intake air amount	
Fuel level	-	90%
0.040 inch leak detection	Not completed	
Fuel tank pressure at vacuum introduction completed	-2.4 kPa (-18 mmHg, -0.71 in.Hg)	-
P0446 VSV check	Not executed	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
0.020 inch malfunction detection:	
Fuel tank pressure changing value for 5 sec. from -2.0 kPa (-15 mmHg, -0.59 in.Hg) point	Increase 0.067 kPa (0.5 mmHg, 0.02 in.Hg) or more
Fuel tank pressure changing value for 5 sec. from -2.7 kPa (-20 mmHg, -0.79 in.Hg) point	Increase 0.067 kPa (0.5 mmHg, 0.02 in.Hg) or more
0.040 inch malfunction detection:	
Fuel tank pressure changing value for 5 sec. from -2.0 kPa (-15 mmHg, -0.59 in.Hg) point	Increase 0.16 kPa (1.2 mmHg, 0.05 in.Hg) or more
Fuel tank pressure changing value for 5 sec. from -2.7 kPa (-20 mmHg, -0.79 in.Hg) point	Increase 0.16 kPa (1.2 mmHg, 0.05 in.Hg) or more
Gross leak detection:	
Fuel tank pressure min. value at vacuum introduction	-2.4 kPa (-18 mmHg, -0.71 in.Hg) or more

MONITOR RESULT

The detailed information is described in “CHECKING MONITOR STATUS” (see page DI-3).

- ★ TID (Test Identification) is assigned to each emission-related component.
- ★ TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- ★ CID (Component Identification) is assigned to each test value.
- ★ Unit Conversion is used to calculate the test value indicated on generic OBD scan tools.

TID $02: EVAP - Vacuum Monitor

TLT	CID	Unit Conversion	Description of Test Value	Description of Test Limit
1	$01	Multiply by 0.0916 (mmHg)	Test value of EVAP VSV: Determined by fuel tank pressure change during vacuum introduction	Malfunction criterion
1	$02	Multiply by 0.0458 and subtract 2.93 (mmHg)	Test value of bypass VSV (pressure switching valve): Determined by fuel tank pressure change at switching over bypass VSV	Malfunction criterion
0	$03	Multiply by 0.0458 (mmHg)	Test value of 0.04 inch leak: Determined by fuel tank pressure change	Malfunction criterion
0	$04	Multiply by 0.0458 (mmHg)	Test value of 0.02 inch leak: Determined by fuel tank pressure change	Malfunction criterion
1	$05	Multiply by 0.0458 and subtract 2.93 (mmHg)	Test value of CCV: Determined by fuel tank pressure change at switching over CCV	Malfunction criterion

WIRING DIAGRAM

Refer to DTC P0441, P0446 and P2418 on page DI-222 .

Hand-held tester:

1	**Check that fuel tank cap meets OEM specifications.**

NG → **Replace with a cap that meets OEM specifications.**

OK

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

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

OK

3	**Check fuel tank cap (See page EC-5).**

NG → **Replace fuel tank cap.**

OK

4	**Check filler neck for damage.**

PREPARATION:

Remove the fuel tank cap.

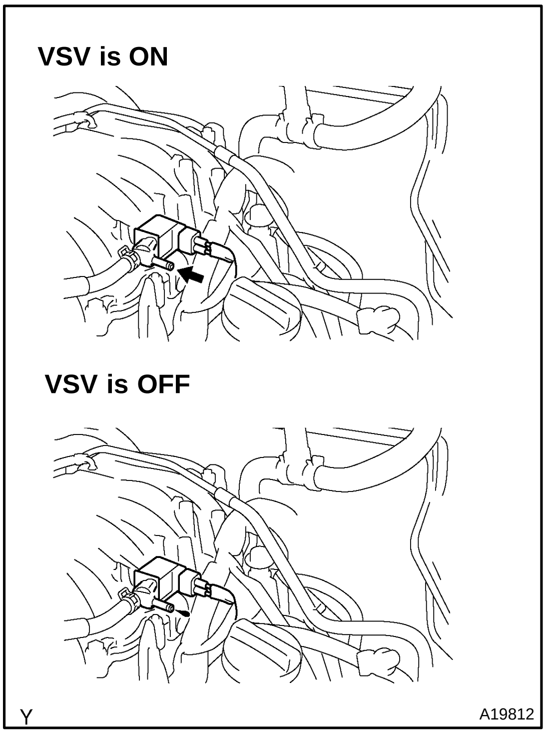
CHECK:

Visually inspect the filler neck for damage.

NG → **Replace filler pipe.**

OK

5	Check purge flow.



PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Select the "ENHANCED OBD II / ACTIVE TEST" mode on the hand-held tester.
(c) Disconnect the vacuum hose for the EVAP VSV from the charcoal canister.
(d) Start the engine.
(e) Select the item "EVAP (ALON) / ALL" in the ACTIVE TEST and operate EVAP VSV.

CHECK:
When the EVAP VSV is operated by the 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 9.

NG

6	Check vacuum hose between intake manifold and EVAP VSV, and EVAP VSV 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 vacuum hose.

OK

7	Check operation of EVAP VSV (See page SF-44).

NG → Replace EVAP VSV.

OK

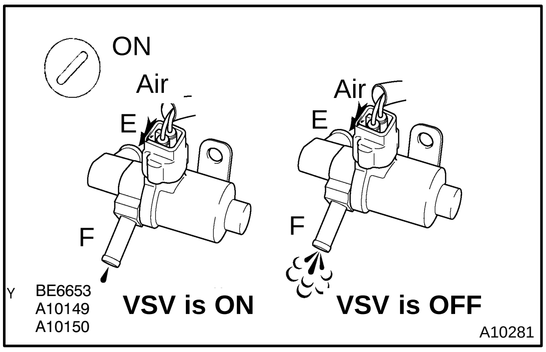
8	Check for open and short in harness and connector between EFI or ECD relay and EVAP VSV, and EVAP VSV and ECM (See page IN-36).

NG → Repair or replace harness or connector.

OK

Replace ECM (See page SF-60).

9	**Check CCV.**



PREPARATION:

(a) Disconnect the vacuum hose for the CCV from the charcoal canister.

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

(c) Select the "ENHANCED OBD II / ACTIVE TEST" mode on the hand-held tester.

(d) Select the item "CAN CTRL VSV / ALL" in the ACTIVE TEST and operate CAN CTRL VSV (Press the right or left button).

CHECK:

Check the VSV operation when it is operated by the hand-held tester.

OK:

VSV is ON:
Air does not flow from port E to port F.
VSV is OFF:
Air from port E flows out through port F.

OK	**Go to step 13.**

NG

10	**Check vacuum hose between CCV 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 vacuum hose.**

OK

11	**Check operation of CCV (See page SF-48).**

NG — **Replace CCV.**

OK

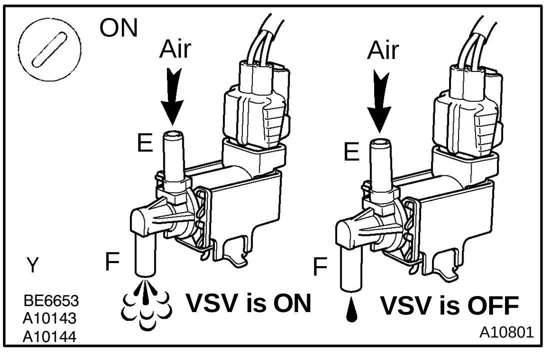
12	**Check for open and short in harness and connector between EFI or ECD relay and CCV, and CCV and ECM (See page IN-36).**

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

OK

Replace ECM (See page SF-60).

13	**Check pressure switching valve.**



PREPARATION:

(a) Turn the ignition switch ON and push the hand-held tester main switch ON.

(b) Select the "ENHANCED OBD II / ACTIVE TEST" mode on the hand-held tester.

(c) Select the item "TANK BYPASS VSV / ALL" in the ACTIVE TEST and operate TANK BYPASS VSV (press the right or left button).

CHECK:

Check the VSV operation when it is operated by the hand-held tester.

OK:

VSV is ON:
Air from port E flows out through port F.
VSV is OFF:
Air does not flow from port E to port F.

OK — **Go to step 16.**

NG

14	**Check operation of pressure switching valve (See page SF-46).**

NG → **Replace pressure switching valve.**

OK

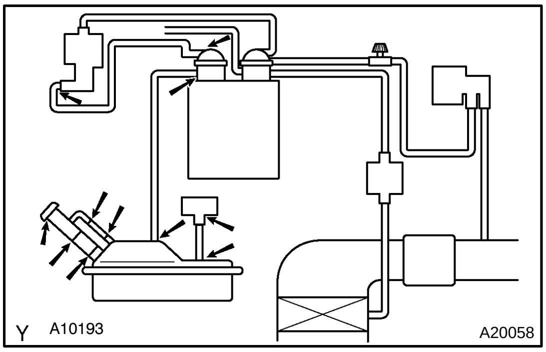
15	**Check for open and short in harness and connector between EFI or ECD relay and pressure switching valve, and pressure switching valve and ECM (See page IN-36).**

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

OK

Replace ECM (See page SF-60).

16	**Check whether hose close to fuel tank has 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 the following parts:

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

NG → **Repair or replace evaporative emissions leak part.**

OK

17	**Check vacuum hoses between vapor pressure sensor and fuel tank, and charcoal canister and pressure switching valve.**

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 vacuum hose and tube.**

OK

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

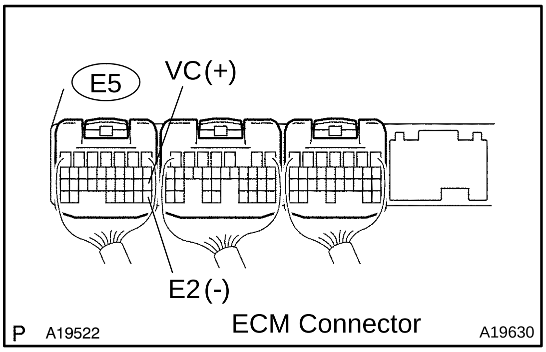
CHECK:

(a) Check for proper connection of the fuel tank and fuel evap pipe (See page EC-2), 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 hose and tube.**

OK

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



CHECK:
Turn the ignition switch ON.

CHECK:
Measure the voltage between terminals of the E5 ECM connector.

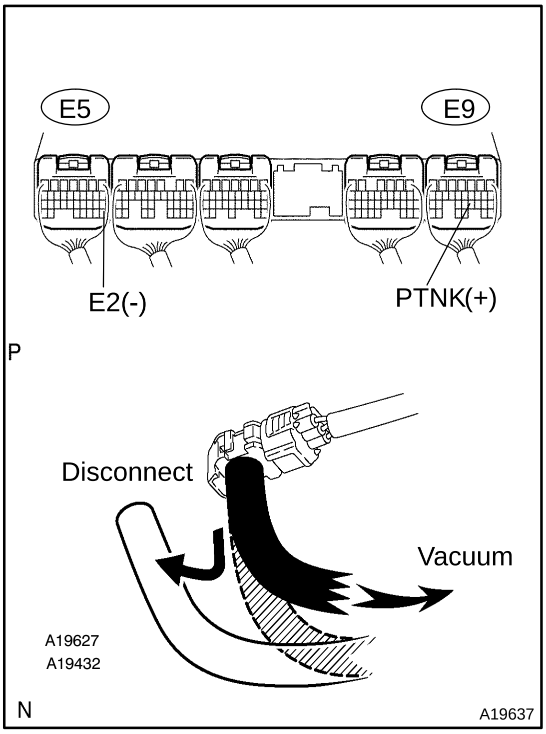
OK:

Tester Connection	Specified Condition
VC (E5-18) - E2 (E5-28)	4.5 to 5.5 V

NG → **Replace ECM (See page SF-60).**

OK

20	**Check voltage between terminals PTNK and E2 of ECM connectors.**



PREPARATION:

(a) Remove the glove compartment door (See page SF-60).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals PTNK and E2 of the ECM connectors at following condition (1) and (2).

(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:

Condition (1) Voltage: 2.9 to 3.7 V

Condition (2) Voltage: 0.5 V or less

OK	**Go to step 22.**

NG

21	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN-36).**

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

OK

Replace ECM (See page SF-60).

22	**Check fuel tank inlet valve.**

NG	**Replace fuel tank inlet valve.**

OK

23	Check fuel tank.

NG → Replace fuel tank.

OK

24	Check charcoal canister for cranks, hole and damage.

NG → Replace charcoal canister.

OK

Replace ECM (See page SF-60).

OBD II scan tool (excluding hand-held tester):

1	**Check that fuel tank cap meets OEM specifications.**

NG → **Replace with a cap that meets OEM specifications.**

OK

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

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

OK

3	**Check fuel tank cap (See page EC-5).**

NG → **Replace fuel tank cap.**

OK

4	**Check filler neck for damage.**

PREPARATION:

Remove the fuel tank cap.

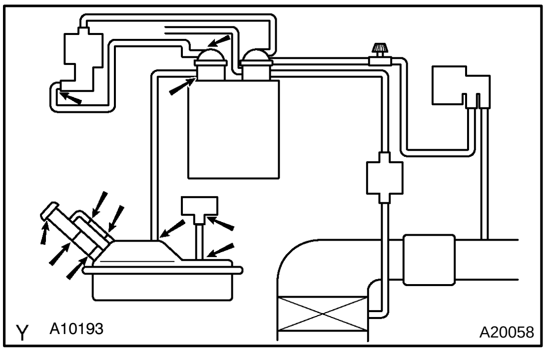
CHECK:

Visually inspect the filler neck for damage.

NG → **Replace filler pipe.**

OK

5	**Check whether hose close to fuel tank has 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 the following parts:

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

NG	**Repair or replace evaporative emission leak part.**

OK

6	**Check vacuum hoses between vapor pressure sensor and fuel tank, charcoal canister and pressure switching valve, and pressure switching valve 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 vacuum hose.**

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 EC-2), 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 hose and tube.**

OK

8	Check vacuum hoses ((5), (6), (7), (8) and (9) in Fig. 1 in circuit description).

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 vacuum hose.**

OK

9	Check VSV connector for EVAP, VSV connector for CCV, VSV connector for pressure switching valve and vapor pressure sensor connector for looseness and disconnection.

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

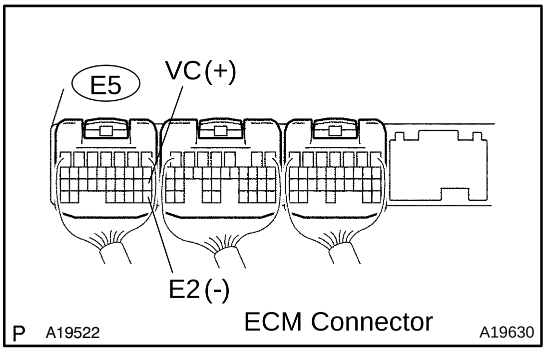
OK

10	Check charcoal canister for cracks, hole and damage.

NG → **Replace charcoal canister.**

OK

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



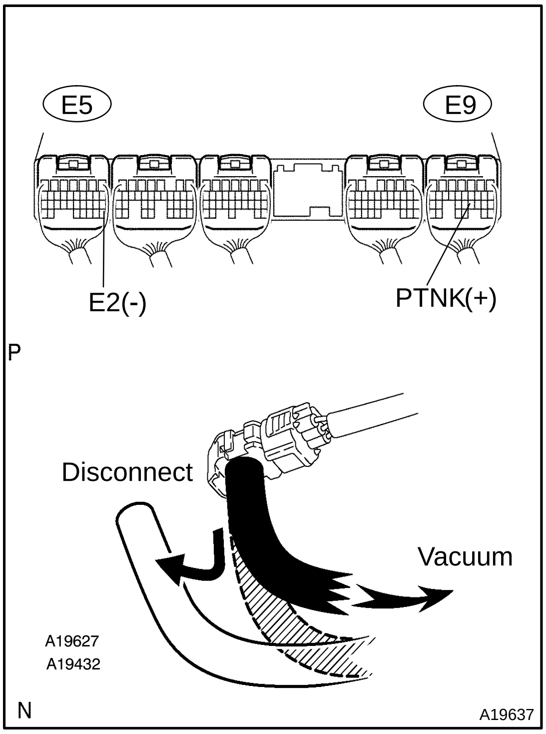
CHECK:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals of the E5 ECM connector.
OK:

Tester Connection	Specified Condition
VC (E5-18) - E2 (E5-28)	4.5 to 5.5 V

NG — **Replace ECM (See page SF-60).**

OK

12	Check voltage between terminals PTNK and E2 of ECM connectors.



PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals PTNK and E2 of the ECM connectors at following condition (1) and (2).

(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:
Condition (1) Voltage: 2.9 to 3.7 V
Condition (2) Voltage: 0.5 V or less

OK — **Go to step 14.**

NG

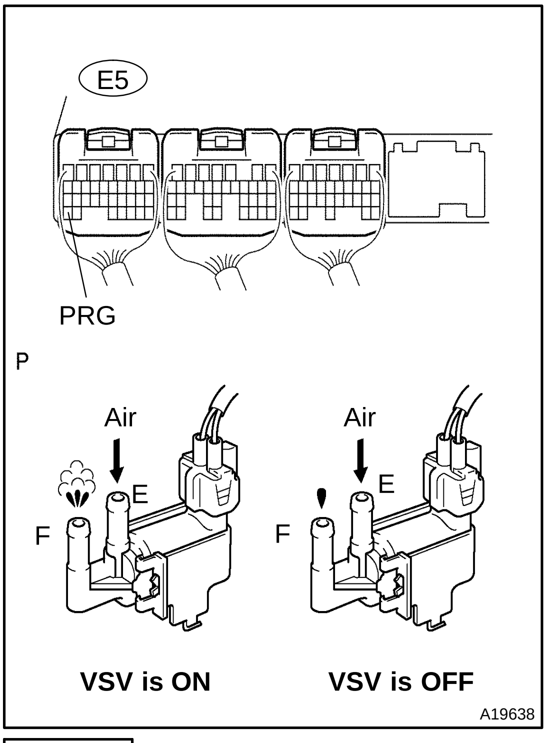
13	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN-36).**

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

OK

Replace ECM (See page SF-60).

14	**Check EVAP VSV.**



PREPARATION:
Turn the ignition switch ON.
CHECK:
Check the VSV function.
(1) Connect between terminal EVP1 of the ECM connector and body ground (ON).
(2) Disconnect between terminal EVP1 of the ECM connector and body ground (OFF).
OK:
(1) VSV is ON:
Air from port E flows out through port F.
(2) VSV is OFF:
Air does not flow from port E to port F.

OK — **Go to step 17.**

NG

15	Check operation of EVAP VSV (See page SF-44).

NG → Replace EVAP VSV.

OK

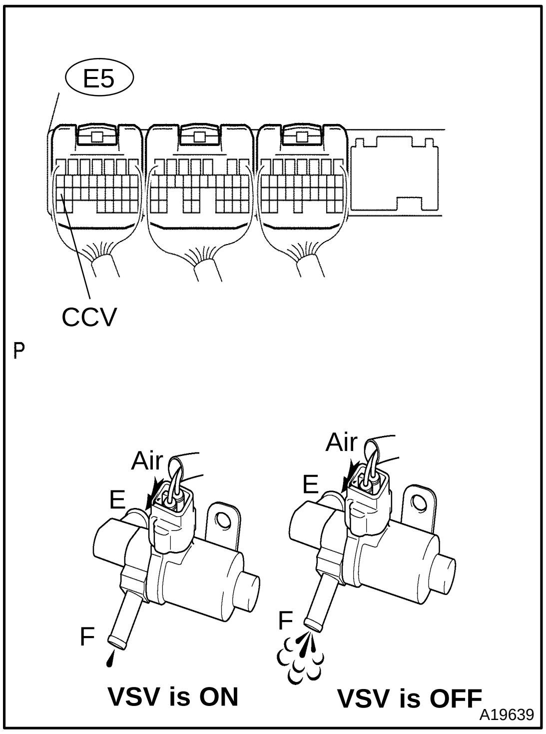
16	Check for open and short in harness and connector between EFI or ECD relay and EVAP VSV, and EVAP VSV and ECM (See page IN-36).

NG → Repair or replace harness or connector.

OK

Replace ECM (See page SF-60).

17	Check CCV.



PREPARATION:
Turn the ignition switch ON.

CHECK:
Check the VSV function.

(1) Connect between terminal CCV of the ECM connector and body ground (ON).
(2) Disconnect between terminal CCV of the ECM connector and body ground (OFF).

OK:

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

OK → Go to step 20.

NG

18	Check operation of CCV (See page SF-48).

NG → Replace CCV.

OK

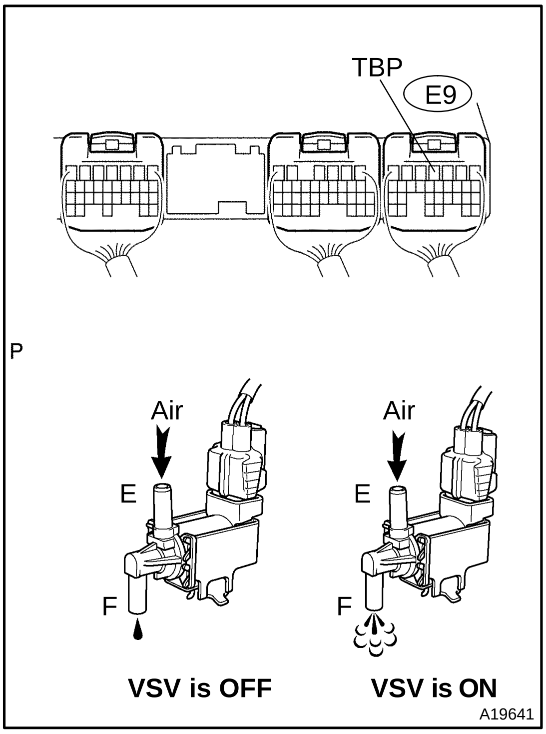
19	Check for open and short in harness and connector between EFI or ECD relay and CCV, and CCV and ECM (See page IN-36).

NG → Repair or replace harness or connector.

OK

Replace ECM (See page SF-60).

20	Check pressure switching valve.



PREPARATION:
Turn the ignition switch ON.

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

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

OK	Go to step 23.

NG

21	Check operation of pressure switching valve (See page SF-46).

NG	Replace pressure switching valve.

OK

22	Check for open and short in harness and connector between EFI or ECD relay and pressure switching valve, and pressure switching valve and ECM (See page IN-36).

NG → Repair or replace harness or connector.

OK ↓

Replace ECM (See page SF-60).

23	Check fuel tank inlet valve.

NG → Replace fuel tank inlet valve.

OK ↓

24	Check fuel tank.

NG → Replace fuel tank.

OK ↓

It is likely that vehicle user did not properly close fuel tank cap.

DIC2J-01

DTC	P0451	Evaporative Emission Control System Pressure Sensor/Switch Range/Performance

DTC	P0452	Evaporative Emission Control System Pressure Sensor/Switch Low Input

DTC	P0453	Evaporative Emission Control System Pressure Sensor/Switch High Input

MONITOR DESCRIPTION

DTC ”P0451, P0452 or P0453” is recorded by the ECM when the vapor pressure sensor malfunctions.

P0451

The ECM sensor pressure in the fuel tank using the vapor pressure sensor. The ECM supplies the sensor with a regulated 5 V reference voltage and the sensor returns a signal voltage between 0.5 V and 4.5 V according to the pressure level in the fuel tank.
When the pressure in the fuel tank is low, the output voltage of the vapor pressure sensor is low. When it is high, the output voltage is high.
For this DTC P0451, the ECM checks for a ”noisy” sensor or a ”stuck” sensor.
The ECM checks for a ”noisy” sensor by monitoring the fuel tank pressures when the vehicle is stationary and there should be little variation in the tank pressure. If the indicated pressure varies beyond specified limits, the ECM will illuminate the MIL (2-trip detection logic) and a DTC is set.
The ECM checks for a ”stuck” sensor by monitoring the fuel tank pressure for an extended time period. If the indicated pressure does not change over this period, the ECM will conclude that the fuel tank pressure sensor is malfunctioning, The ECM will illuminate the MIL and a DTC is set.

P0452 and P0453

The ECM sensor pressure in the fuel tank using the vapor pressure sensor. The ECM supplies the sensor with a regulated 5 V reference voltage and the sensor returns a signal voltage between 0.5 V and 4.5 V according to the pressure level in the fuel tank.
If the output voltage of the vapor pressure sensor is out of normal range, the ECM will determine that there is a malfunction in the sensor or sensor circuit.
When pressure indicated by the vapor pressure sensor deviates below -3.999 kPa (-30 mmHg, -1.18 in.Hg) or above 1.999 kPa (15 mmHg, 0.59 in.Hg), the ECM interprets this as a malfunction in the vapor pressure sensor. The ECM will turn on the MIL and a DTC will be set.

DTC No.	DTC Detecting Condition	Trouble Area
P0451	Vapor pressure sensor output extremely changes under conditions of (a) and (b): (2 trip detection logic) (a) Vehicle speed: 0 km/h (0mph), Engine speed: Idling and pressure switching valve is OFF (b) Vapor pressure sensor value ≧ opening pressure valve of charcoal canister	★Open or short in vapor pressure sensor circuit ★Vapor pressure sensor ★ECM
P0452	10 seconds or less after engine starting condition vapor pressure sensor fixed value continues for fixed value or less: (2 trip detection logic)	
P0453	10 seconds or less after engine starting condition vapor pressure sensor fixed value continues for fixed value or more: (2 trip detection logic)	

MONITOR STRATEGY

P0451

Related DTCs	P0451	Evaporative emission control system pressure sensor range/performance
Required sensors/components	Main sensors/components	Vapor pressure sensor
	Related sensors/components	Mass air flow meter, Engine coolant temperature sensor
Frequency of operation	Once per driving cycle	
Duration	Signal fluctuation (noise) monitoring: 10 sec. No signal change (stuck) monitoring: 20 min.	
MIL operation	2 driving cycles	
Sequence of operation	None	

P0452 and P0453

Related DTCs	P0452	Evaporative emission control system pressure sensor/switch low input
	P0453	Evaporative emission control system pressure sensor/switch high input
Required sensors/components	Main sensors/components	Vapor pressure sensor
	Related sensors/components	Mass air flow meter, Engine coolant temperature sensor
Frequency of operation	Once per driving cycle	
Duration	17 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

P0451

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Signal fluctuation (noise) monitoring:		
Altitude	-	2,400 m (7,872 ft)
Difference between intake air temperature and engine coolant temperature at engine start	-7 °C (-12.6 °F)	11.1 °C (20 °F)
Engine coolant temperature at engine start	4.4 °C (40 °F)	35 °C (95 °F)
Intake coolant temperature at engine start	4.4 °C (40 °F)	35 °C (95 °F)
Vehicle stop and idling	5 sec.	15 sec.
Stuck monitoring:		
Altitude	-	2,400 m (7,872 ft)
Vapor pressure sensor	No malfunction	
Difference between intake air temperature and engine coolant temperature at engine start	-7 °C (-12.6 °F)	11.1 °C (20 °F)
Engine coolant temperature at engine start	4.4 °C (40 °F)	35 °C (95 °F)
Intake air coolant temperature at engine start	4.4 °C (40 °F)	35 °C (95 °F)
Time after engine start	5 sec.	-

P0452 and P0453

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Difference between intake air temperature and engine coolant temperature at engine start	-	12 °C (21.6 °F)
Engine coolant temperature at engine start	10 °C (50 °F)	35 °C (95 °F)
Intake air temperature at engine start	10 °C (50 °F)	35 °C (95 °F)
Engine	Running	

TYPICAL MALFUNCTION THRESHOLDS

P0451

Detection Criteria	Threshold
Signal fluctuation (noise) monitoring:	
The number of times the output changed ±0.667 kPa (± 5 mmHg, ± 0.02 in.Hg) or more during 5 to 15 sec. after idling and vehicle stop	5 times or more
No signal change (stuck) monitoring:	
Fuel tank pressure "no change" time (less than 0.018 kPa (0.135 mmHg, 0.005 in.Hg) change since engine start)	10 min. or more

P0452 and P0453

Detection Criteria	Threshold
P0452:	
Fuel tank pressure	Less than -3.999 kPa (-30 mmHg, -1.18 in.Hg) / when engine running
P0453:	
Fuel tank pressure	1.999 kPa (15 mmHg, 0.59 in.Hg) or more / when engine running

WIRING DIAGRAM

Refer to DTC P0441, P0446 and P2418 on page DI-222 .

INSPECTION PROCEDURE

HINT:

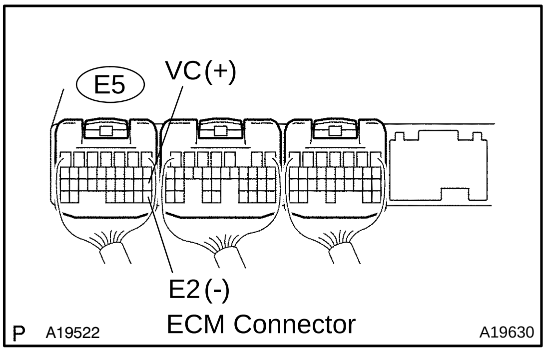
★ If different DTCs related to different system that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may be open.

★ If DTC P0441 (Purge Flow), P0446 (CCV), P0451, P0452 or P0453 (Evaporative Pressure Sensor) is output with DTC P0442 or P0456, troubleshoot DTC P0441, P0446, P0451, P0452 or P0453 first. If no malfunction is detected, troubleshoot DTC P0442 or P0456 next.

★ Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was 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 vapor pressure sensor.

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



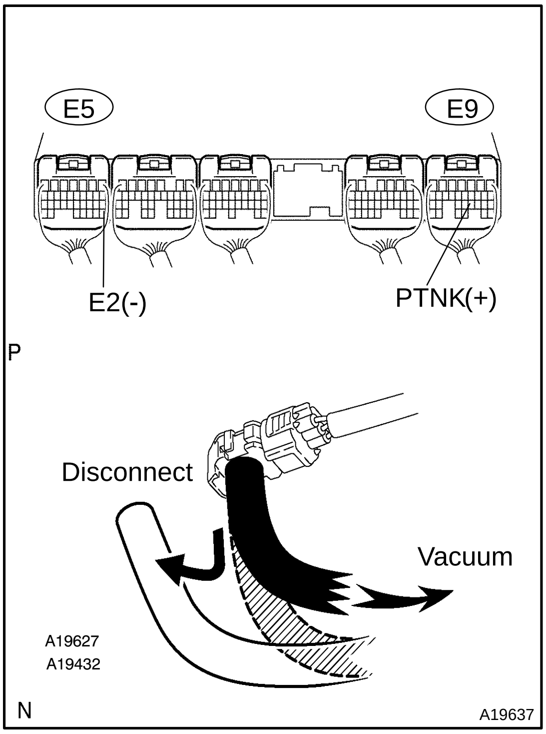
CHECK:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals of the E5 ECM connector.
OK:

Tester Connection	Specified Condition
VC (E5-18) - E2 (E5-28)	4.5 to 5.5 V

NG — **Replace ECM (See page SF-60).**

OK

2	Check voltage between terminals PTNK and E2 of ECM connectors.



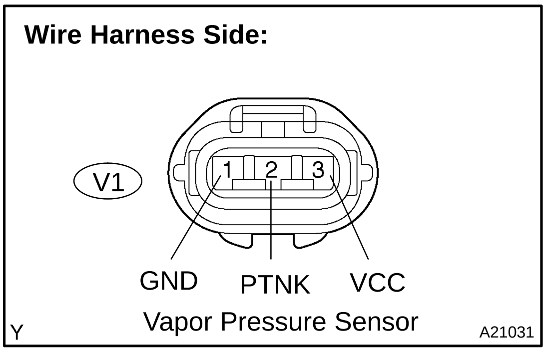
PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals PTNK and E2 of the ECM connectors.
(1) Disconnect the vacuum hose from the vapor pressure sensor.
(2) Using the MITYVAC (Hand-Held Vacuum Pump), apply a vacuum of 4.0 kPa (30 mmHg, 1.18 in.Hg) to the vapor pressure sensor.
(3) Check the vapor pressure sensor output waveform using a hand-held tester.

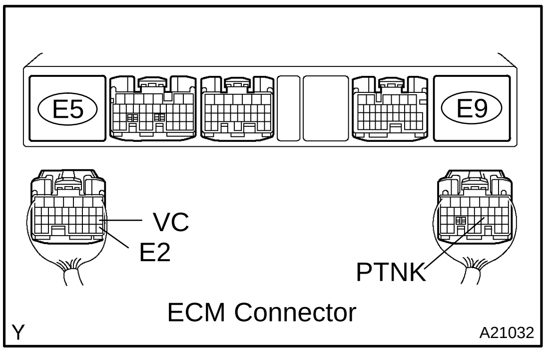
NOTICE:
The vacuum applied to the vapor pressure sensor must be less than 66.7 kPa (500 mmHg, 19.7 in.Hg).
OK:
(1) Voltage: 2.9 to 3.7 V
(2) Voltage: 0.5 V or less
(3) A consecutive waveform presents.

OK — **Check for intermittent problems (See page DI-3).**

NG

3	**Check for open and short in harness and connector between vapor pressure sensor and ECM.**





PREPARATION:

(a) Disconnect the V1 vapor pressure sensor connector.

(b) Disconnect the E5 and E9 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
PTNK (V1-2) - PTNK (E9-21)	Below 1 Ω
GND (V1-1) - E2 (E5-28)	Below 1 Ω
VCC (V1-3) - VC (E5-18)	Below 1 Ω
PTNK (V1-2) or PTNK (E9-21) - Body ground	10 kΩ or higher
VCC (V1-3) or VC (E5-18) - Body ground	10 kΩ or higher

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

OK ↓

Replace vapor pressure sensor.

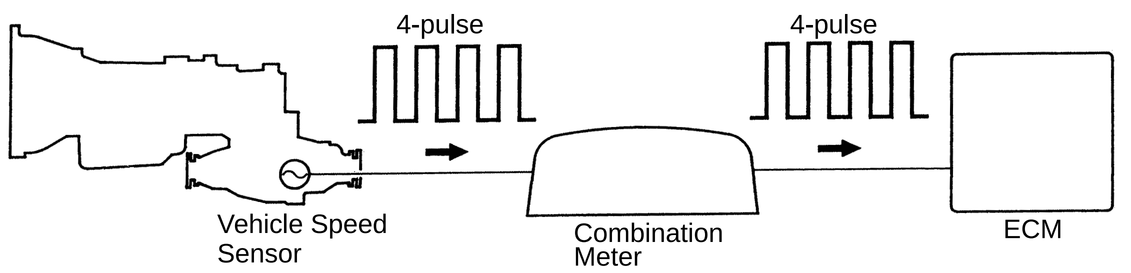
DI3CQ-13

DTC	P0500	Vehicle Speed Sensor ”A”

DTC	P0503	Vehicle Speed Sensor ”A” Intermittent/ Erratic/High

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 pulse signals.



DTC No.	Proceed to	DTC Detection Condition	Trouble Area
P0500	Step 1	No vehicle speed sensor signal to ECM under following conditions (a) and (b): (1 trip detection logic) (a) Park/neutral position switch is OFF (b) Vehicle is being driven	★Combination meter ★Open or short in vehicle speed sensor circuit ★Vehicle speed sensor ★ECM
P0503	DI-3	Intermittent problem in the vehicle speed sensor circuit	

MONITOR DESCRIPTION

The ECM assumes that the vehicle is driven when the park/neutral position switch is OFF and it has been over 4 sec. since the actual vehicle speed was 9 km/h (6 mph) or more.
If there is no signal from the vehicle speed sensor with these conditions satisfied, the ECM concludes that there is a fault in the vehicle speed sensor. The ECM will turn on the MIL and a DTC is set.

MONITOR STRATEGY

Related DTCs	P0500	Vehicle speed sensor "A" pulse input error
Required sensors/components	Main sensors	Vehicle speed sensor
	Related sensors	Park/Neutral position switch, Engine coolant temperature sensor, Combination meter
Frequency of operation	Continuous	
Duration	500 output X 4 times	
MIL operation	Immediate	
Sequence of operation	None	

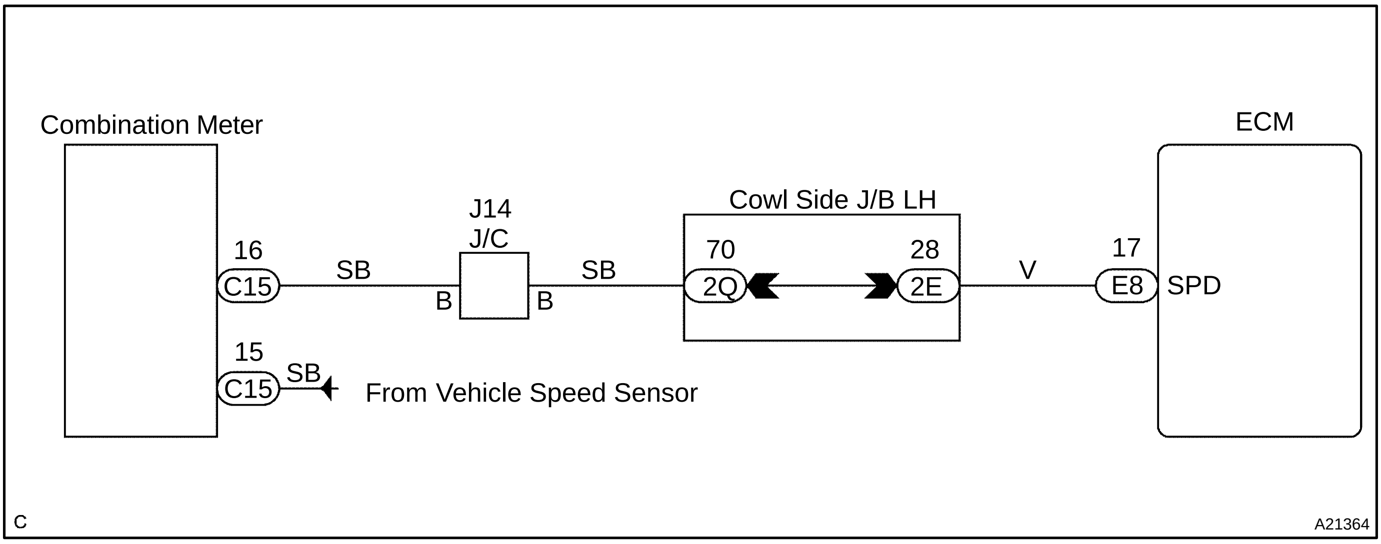
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Vehicle speed is 9 km/h (6 mph) or more	4 sec.	-
Park/neutral position switch	OFF	
Transfer neutral switch	Not "N" position	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Sensor signal	No pulse input

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

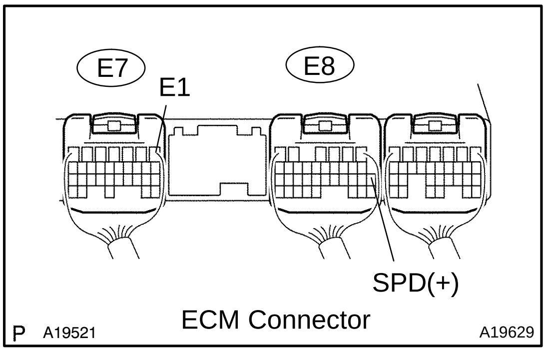
1	**Check operation of speedometer.**

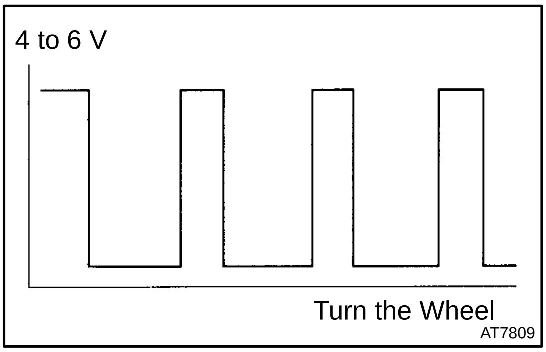
CHECK:
Drive the vehicle and check if the operation of the speedometer in the combination meter is normal.
HINT:
The vehicle speed is operating normally if the speedometer display is normal.

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

OK

2	**Check voltage between terminal SPD and E1 of ECM connector.**





PREPARATION:

(a) Shift the shift lever to neutral.

(b) Jack up the rear wheel on one side.

(c) Turn the ignition switch ON.

CHECK:

Measure the voltage between the specified terminal of the E7 and E8 ECM connector when the wheel is turned slowly.

OK:

Tester Connection	Specified Condition
SPD (E8-17) - E1 (E7-1)	Generated intermittently

HINT:

The output voltage should fluctuate up and down similarly to the diagram on the left when the wheel is turned slowly.

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

OK ↓

Replace ECM (See page SF-60).

DIC2K-01

DTC	P0504	Brake Switch ”A”/”B” Correlation

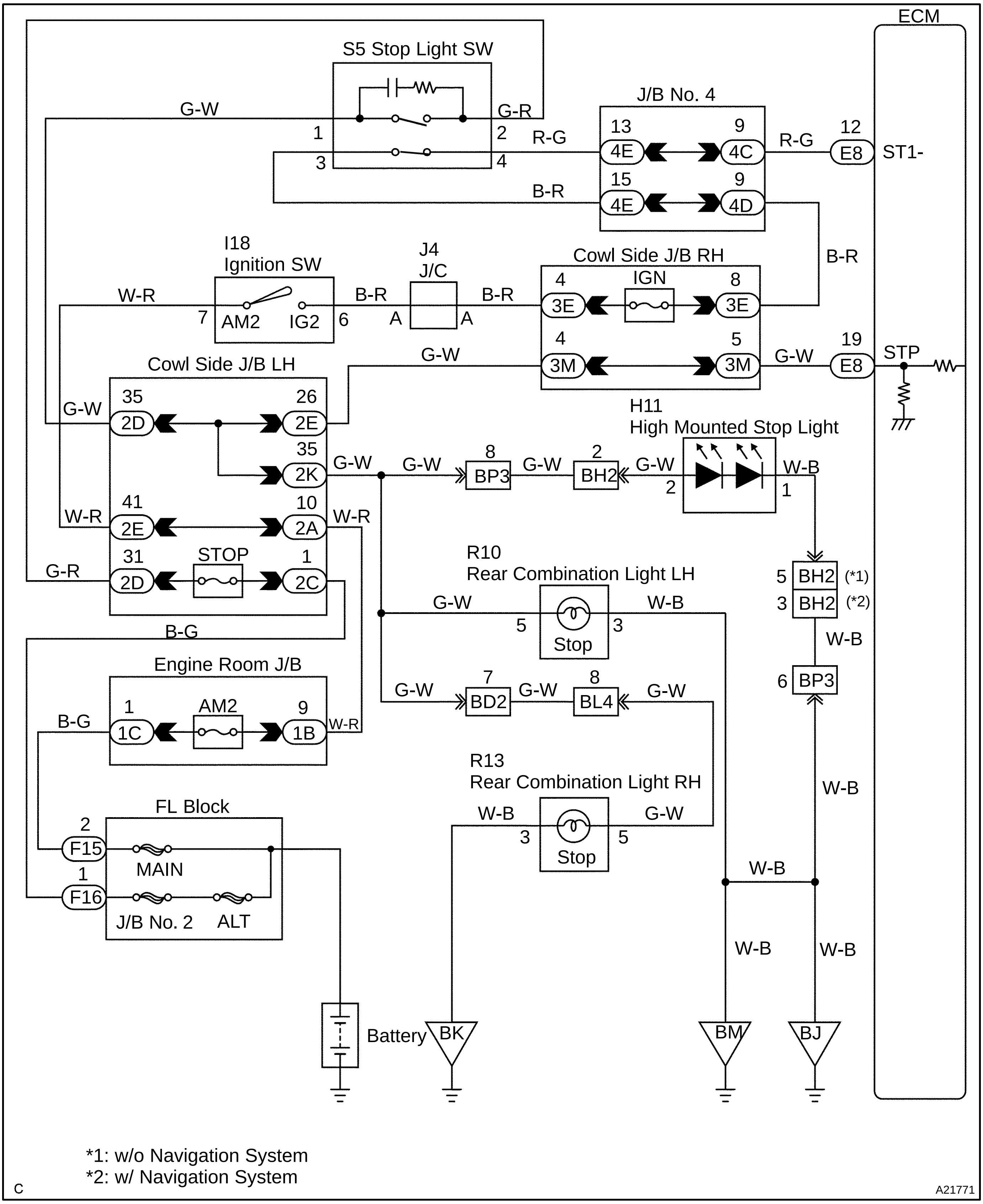
CIRCUIT DESCRIPTION

In addition to turning on the stop lamps, the stop lamp switch signals are used for a variety of engine, transmission, and suspension functions as well as being an input for diagnostic checks. It is important that the switch operates properly, therefore this switch is designed with two complementary signal outputs: STP and ST1-. The ECM analyzes these signal outputs to detect malfunctions in the stop lamp switch.
HINT:
Normal condition is as shown in the table.

Signal	Brake pedal released	In transition	Brake pedal depressed
STP	OFF	ON	ON
ST1-	ON	ON	OFF

DTC No.	DTC Detection Condition	Trouble Area
P0504	Conditions (a), (b) and (c) continue for 0.5 sec. or more: (a) Ignition switch ON (b) Brake pedal released (c) STP signal is OFF when the ST1- signal is OFF	★Short in stop lamp switch signal circuit ★Stop lamp fuse ★Stop lamp switch ★ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

Hand-held tester:

1	**Check operation of stop light.**

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

NG → **Check and repair stop light circuit.**

OK ↓

2	**Check STOP fuse.**

PREPARATION:
Remove the STOP fuse from the cowl side J/B LH.
CHECK:
Check the continuity of the STOP fuse.
OK:
Continuity

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

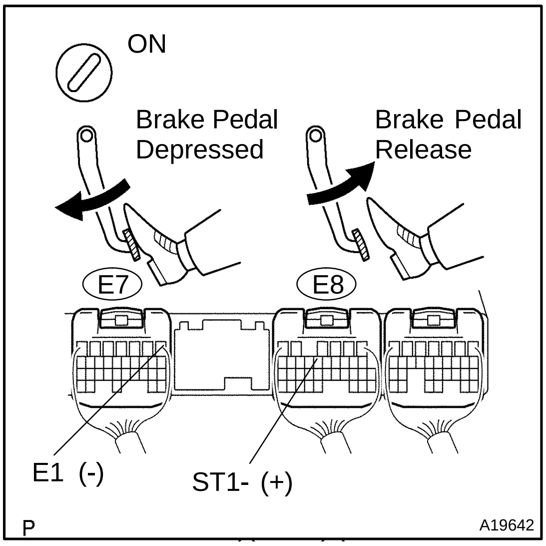
OK ↓

3	**Check stop light switch (See page BE-50).**

NG → **Replace stop light switch.**

OK ↓

4	**Check STP signal and ST1- voltage.**



PREPARATION:

(a) Turn the ignition switch ON.

(b) Select the item "DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STOP LIGHT SW".

CHECK:

Read the signal displayed on the hand-held tester.

OK:

Brake Pedal	Specified Condition
Depressed	STP Signal ON
Released	STP Signal OFF

CHECK:

Measure the voltage between the specified terminals of the E7 and E8 ECM connectors.

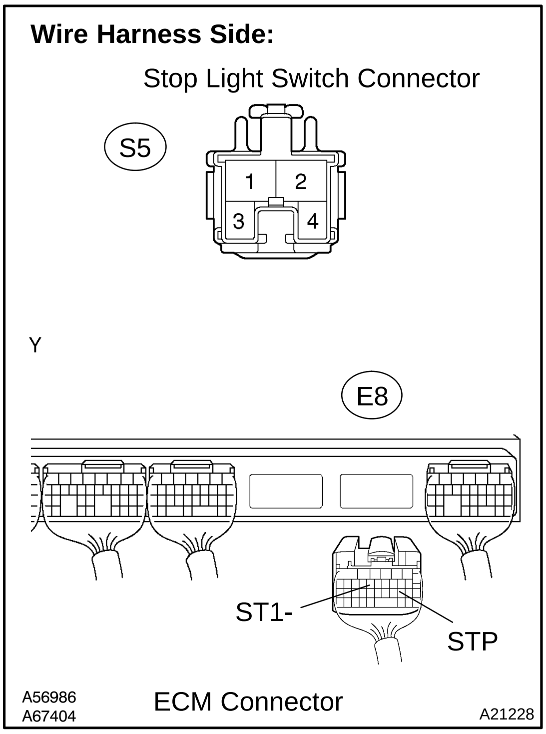
OK:

Tester Connection	Brake Pedal	Specified Condition
ST1- (E8-12) - E1 (E7-1)	Depressed	Below 1.5 V
	Released	7.5 to 14 V

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

NG

5	Check harness and connector between ECM and stop light switch.



PREPARATION:

(a) Disconnect the S5 stop light switch connector.

(b) Disconnect the E8 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
Stop light switch (S5-1) - STP (E8-19)	Below 1 Ω
Stop light switch (S5-4) - ST1- (E8-12)	Below 1 Ω
Stop light switch (S5-1) or STP (E8-19) - Body ground	10 kΩ or higher
Stop light switch (S5-4) or ST1- (E8-12) - Body ground	10 kΩ or higher

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

OK

Replace ECM (See page SF-60).

OBD II scan tool (excluding hand-held tester):

1	**Check operation of stop light.**

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

NG → **Check and repair stop light circuit.**

OK

2	**Check STOP fuse.**

PREPARATION:
Remove the STOP fuse from the cowl side J/B LH.
CHECK:
Check the continuity of the STOP fuse.
OK:
Continuity

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

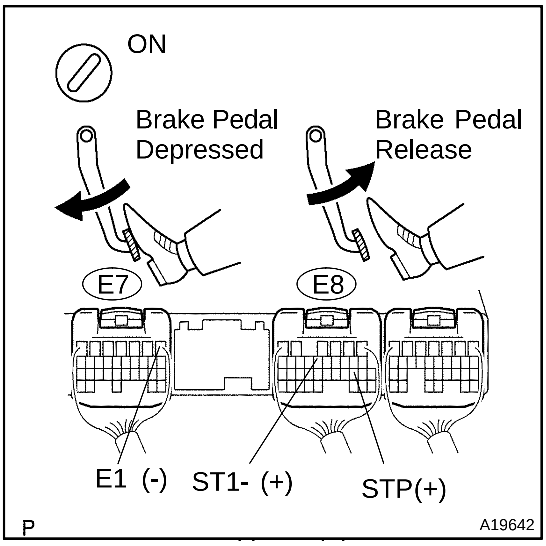
OK

3	**Check stop light switch (See page BE-50).**

NG → **Replace stop light switch.**

OK

4	**Check STP signal.**



PREPARATION:
Turn the ignition switch ON.

CHECK:
Measure the voltage between the specified terminals of the E7 and E8 ECM connectors.

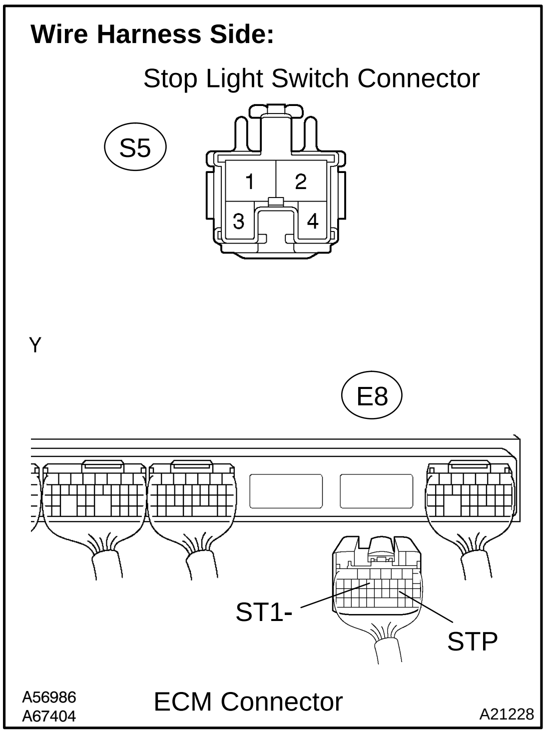
OK:

Tester Connection	Brake Pedal Position	Specified Condition
STP (E8-19) - E1 (E7-1)	Depressed	7.5 to 14 V
	Released	Below 1.5 V
ST1- (E8-12) - E1 (E7-1)	Depressed	Below 1.5 V
	Released	7.5 to 14 V

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

NG

5 Check harness and connector between ECM and stop light switch.



PREPARATION:

(a) Disconnect the S5 stop light switch connector.

(b) Disconnect the E8 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
Stop light switch (S5-1) - STP (E8-19)	Below 1 Ω
Stop light switch (S5-4) - ST1- (E8-12)	Below 1 Ω
Stop light switch (S5-1) or STP (E8-19) - Body ground	10 kΩ or higher
Stop light switch (S5-4) or ST1- (E8-12) - Body ground	10 kΩ or higher

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

OK

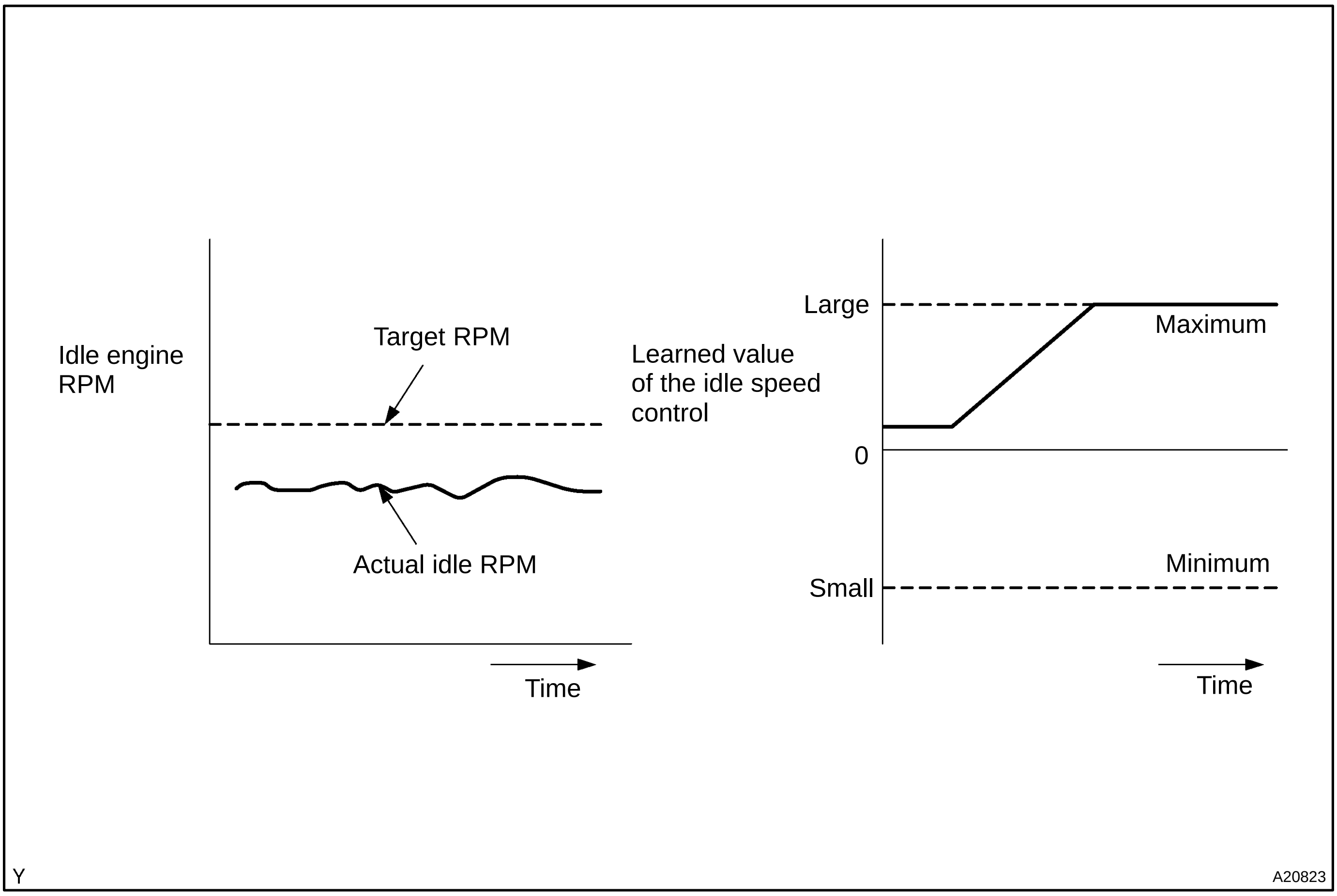
Replace ECM (See page SF-60).

DIC2L-01

DTC	P0505	Idle Air Control System

MONITOR DESCRIPTION

The idle speed is controlled by the ETCS (Electronic Throttle Control System).
The ETCS is composed of the throttle motor which operates the throttle valve, and the throttle position sensor, which detects the opening angle of the throttle valve.
The ECM controls the throttle motor to provide the proper throttle valve opening angle to obtain the target idle speed.
The ECM regulates the idle speed by opening and closing the throttle valve using the ETCS. The ECM concludes that the idle speed control ECM function is malfunctioning if: 1) the actual idle RPM varies more than the specified amount, or 2) a learned value of the idle speed control remains at the maximum or minimum five times or more during a drive cycle. The ECM will turn on the MIL and set a DTC.
Example:
If the actual idle RPM varies from the target idle RPM by more than 100 (*1) rpm five times during a drive cycle, the ECM will turn on the MIL and a DTC is set.
HINT:
*1: RPM threshold varies with engine load.



DTC No.	DTC Detecting Condition	Trouble Area
P0505	Idle speed continues to vary greatly from target speed (1 trip detection logic)	★Electric throttle control system ★Air induction system ★PCV hose connection

MONITOR STRATEGY

Related DTCs	P0505	Idle air control malfunction
Required sensors/components	Main sensors/components	Crankshaft position sensor
	Related sensors/components	Vehicle speed sensor, Engine coolant temperature sensor
Frequency of operation	Functional check: Once per trip Range check: Continuous	
Duration	Functional check: 10 min. Range check: 10 sec.	
MIL operation	Functional check: 2 driving cycles Range check: Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Functional check:		
Precondition is met when both of the following are met	A and B	
A. Intake air flow rate learnings is enabled	3 sec.	-
B. Engine	Running	
Range check:		
Output signal duty	10%	90%
Battery voltage	10 V	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Functional check:	
Case 1:	
All of the following conditions are met:	A, B and C
A. Engine RPM - target engine RPM (History that vehicle had run for 10 km/h (6.2 mph) or more)	Less than -100 rpm or more than 200 rpm (A/C ON or park/neutral position switch ON) or Less than -100 rpm or more than 150 rpm (A/C OFF and park/neutral position switch OFF)
B. Number of fall judgment	5 times or more
C. Intake air control flow rate learning value	Value when fail is judged first + 3.31 L/sec. or more or Value when fail is judged first - 3.31 L/sec. or less
Case 2:	
Both or the following condition are met:	A and B
A. Engine RPM - target engine RPM (History that vehicle had run for 10 km/h (6.2 mph) or more)	Less than -100 rpm or more than 200 rpm (A/C ON or park/neutral position switch ON) or Less than -100 rpm or more than 150 rpm (A/C OFF and park/neutral position switch OFF)
B. Intake air control flow rate learning value is for 5 sec.	2.48 L/sec. or less or 11 L/sec. or more

Range check:
Missing output duty change

INSPECTION PROCEDURE

HINT:

★ When the throttle position is slightly opened (the accelerator pedal is slightly depressed) because a floor carpet is overlapped on the accelerator pedal, or if not fully releasing the accelerator pedal, etc., DTC P0505 will possibly be detected.

★ Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	Are there any other codes (besides P0505) being output?

PREPARATION:

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

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

(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
P0505	A
"P0505" and other DTCs	B

HINT:

If any other codes besides P0505 are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI-36).**

A

2	Check connection of PCV piping.

NG → **Repair or replace PCV piping.**

OK

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

CHECK:

Check for vacuum leaks in air induction system.

NG → **Repair or replace air induction system.**

OK ↓

Check electric throttle control system (See page SF-33).

DIC2M-01

DTC	P0560	System Voltage

MONITOR DESCRIPTION

The battery supplies electricity to the ECM even when the ignition switch is OFF. This electricity allows the ECM store data such as DTC history, freeze frame data, fuel trim values, and other data.
If the battery voltage falls below a minimum level, the ECM will conclude that there is a fault in the power supply circuit. The next time the engine starts, the ECM will turn on the MIL and a DTC will be set.

DTC No.	DTC Detecting Condition	Trouble Area
P0560	Open in back up power source circuit	★Open in back-up power source circuit ★EFI or ECD No.1 fuse ★ECM

HINT:
If DTC P0560 present, the ECM will not store another DTC.

MONITOR STRATEGY

Related DTCs	P0560	System voltage malfunction
Required sensors/components	ECM	
Frequency of operation	Continuous	
Duration	3 sec.	
MIL operation	Immediate (*1)	
Sequence of operation	None	

*1: The DTC is set immediate. The MIL will be illuminated after the next engine start.

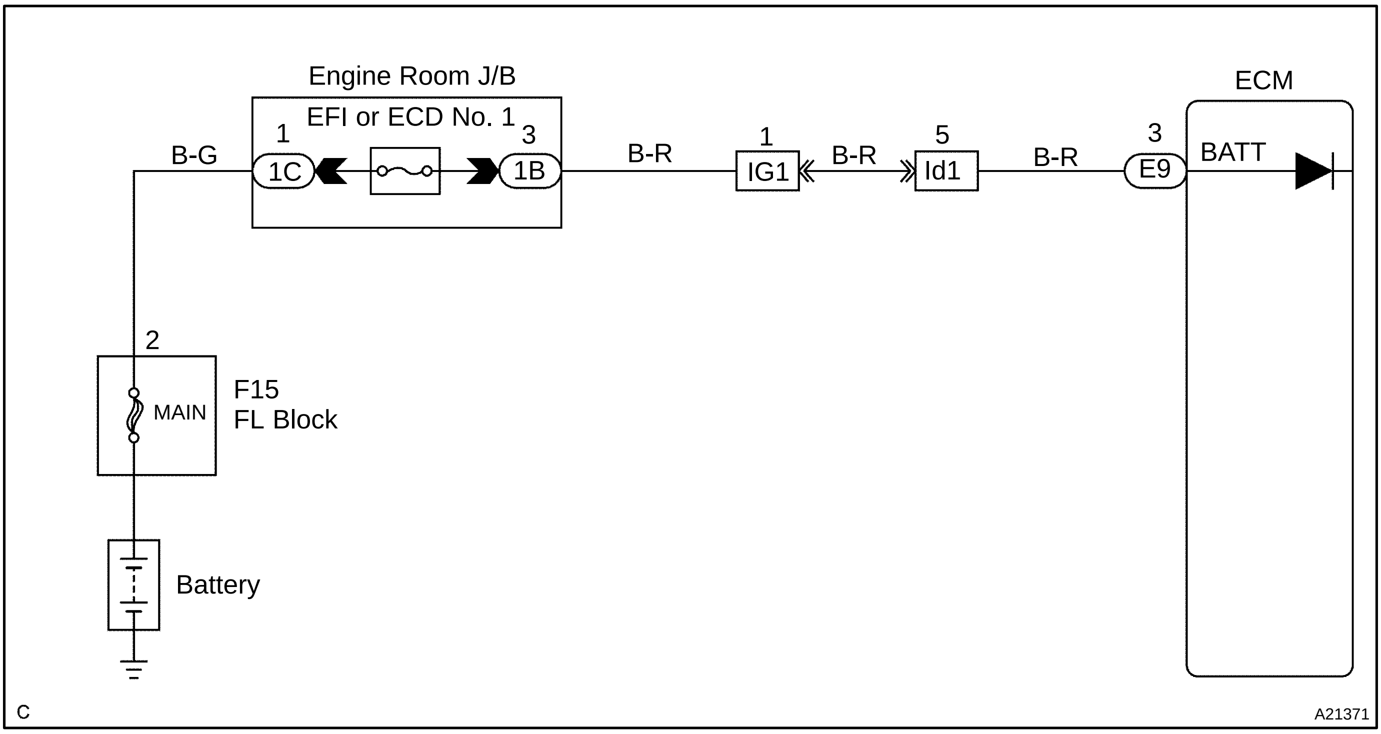
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Stand-by RAM	Initialized	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Battery voltage	Less than 3.5 V

WIRING DIAGRAM

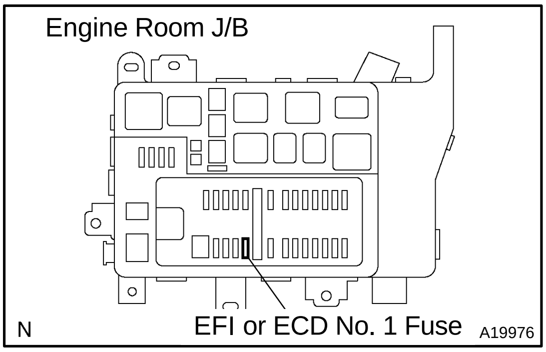


INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	**Check EFI or ECD No. 1 fuse of engine room J/B.**



PREPARATION:

Remove the EFI or ECD No. 1 fuse from the engine room J/B.

CHECK:

Check the continuity of the EFI or ECD No. 1 fuse.

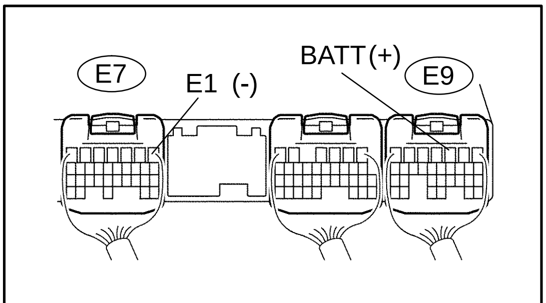
OK:

Continuity

NG	**Check for short in all harness and components connected to EFI or ECD No. 1 fuse.**

OK

2	Check voltage between terminal BATT and E1 of ECM connector.



CHECK:

Measure the voltage between terminals of the E7 and E9 ECM connector.

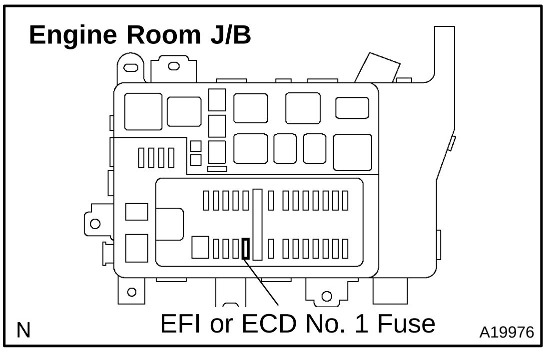
OK:

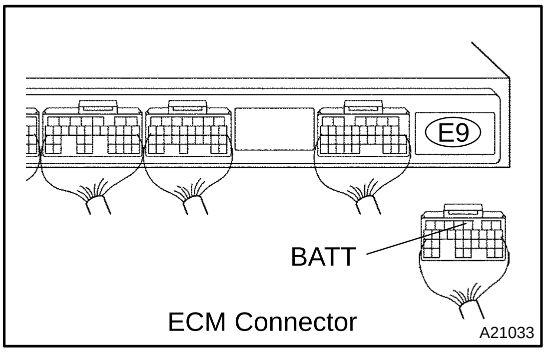
Tester Connection	Specified Condition
BATT (E9-3) - E1 (E7-1)	9 to 14 V

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

NG

3	Check for open and short in harness and connector between ECM and EFI or ECD No. 1 fuse, EFI or ECD No. 1 fuse and battery.





Check the harness and the connector between the EFI or ECD No. 1 fuse and the ECM:

PREPARATION:

(a) Remove the EFI or ECD No. 1 fuse from the engine room J/B.

(b) Disconnect the E9 ECM connector.

CHECK:

Measure the resistance between the wire harness side connector.

OK:

Tester Connection	Specified Condition
Engine Room J/B (EFI or ECD No. 1 fuse terminal 2) - BATT (E9-3)	Below 1 Ω
Engine Room J/B (EFI or ECD No. 1 fuse terminal 2) or BATT (E9-3) - Body ground	10 kΩ or higher

Check the harness and connector between the EFI or ECD No. 1 fuse and the battery:

PREPARATION:

(a) Remove the EFI or ECD No. 1 fuse from the engine room J/B.

(b) Disconnect the battery positive terminal.

CHECK:

Measure the resistance between the wire harness side connector.

OK:

Tester Connection	Specified Condition
Engine Room J/B (EFI or ECD No. 1 fuse terminal 1) - Battery positive terminal	Below 1 Ω
Engine Room J/B (EFI or ECD No. 1 fuse terminal 1) or Battery positive terminal - Body ground	10 kΩ or higher

NG	Repair or replace harness or connector.

OK

Check and replace engine room J/B.

DI1MF-11

DTC	P0604	Internal Control Module Random Access Memory (RAM) Error

DTC	P0606	ECM/PCM Processor

DTC	P0607	Control Module Performance

DTC	P0657	Actuator Supply Voltage Circuit / Open

MONITOR DESCRIPTION

The ECM continuously monitors its internal memory status, internal circuits, and output signals to the throttle actuator. This self-check insures that the ECM is functioning properly. If any malfunction is detected, the ECM will set the appropriate DTC and illuminate the MIL.
The ECM memory status is diagnosed by internal "mirroring" of the main CPU and the sub CPU to detect RAM (Random Access Memory) errors. The two CPUs also perform continuous mutual monitoring.
The ECM sets a DTC if: 1) outputs from the 2 CPUs are different and deviate from the standards, 2) the signals to the throttle actuator deviate from the standards, 3) a malfunction is found in the throttle actuator supply voltage, and 4) any other ECM malfunction is found.

DTC No.	DTC Detecting Condition	Trouble Area
P0604 P0606 P0607 P0657	ECM malfunction	★ECM

MONITOR STRATEGY

Related DTCs	P0604	Random access memory (RAM) error range check
	P0606	ECM range check/description
	P0657	Actuator supply voltage circuit range check
Required sensors/components	ECM	
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)
The typical enabling condition is not available	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0604:	
RAM mirror check failure	
P0606:	
ECM error	
P0657:	
ECM error	

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

Replace ECM (See page SF-60).

DIC2N-01

DTC	P0617	Starter Relay Circuit High

MONITOR DESCRIPTION

While the engine is being cranked, the battery positive voltage is applied to terminal STA of the ECM.
If the vehicle is being driven and the ECM detects the starter control signal (STA), the ECM concludes that the starter control circuit is malfunctioning. The ECM will turn on the MIL and a DTC is set.

DTC No.	DTC Detection Condition	Trouble Area
P0617	When all conditions (a), (b) and (c) are satisfied for 20 seconds with battery (+B) voltage 10.5 V or more (a) Vehicle speed ± 20 km/h (12.4 mph) (b) Engine revolution ± 1,000 rpm (c) STA signal ON	★Park/neutral position switch ★Starter relay circuit ★Ignition switch ★ECM

MONITOR STRATEGY

Related DTCs	P0617	Starter signal error
Required sensors/components	Main sensors/components	Starter signal
	Related sensors/components	Vehicle speed sensor, Engine speed sensor
Frequency of operation	Continuous	
Duration	20 sec.	
MIL operation	Immediate	
Sequence of operation	None	

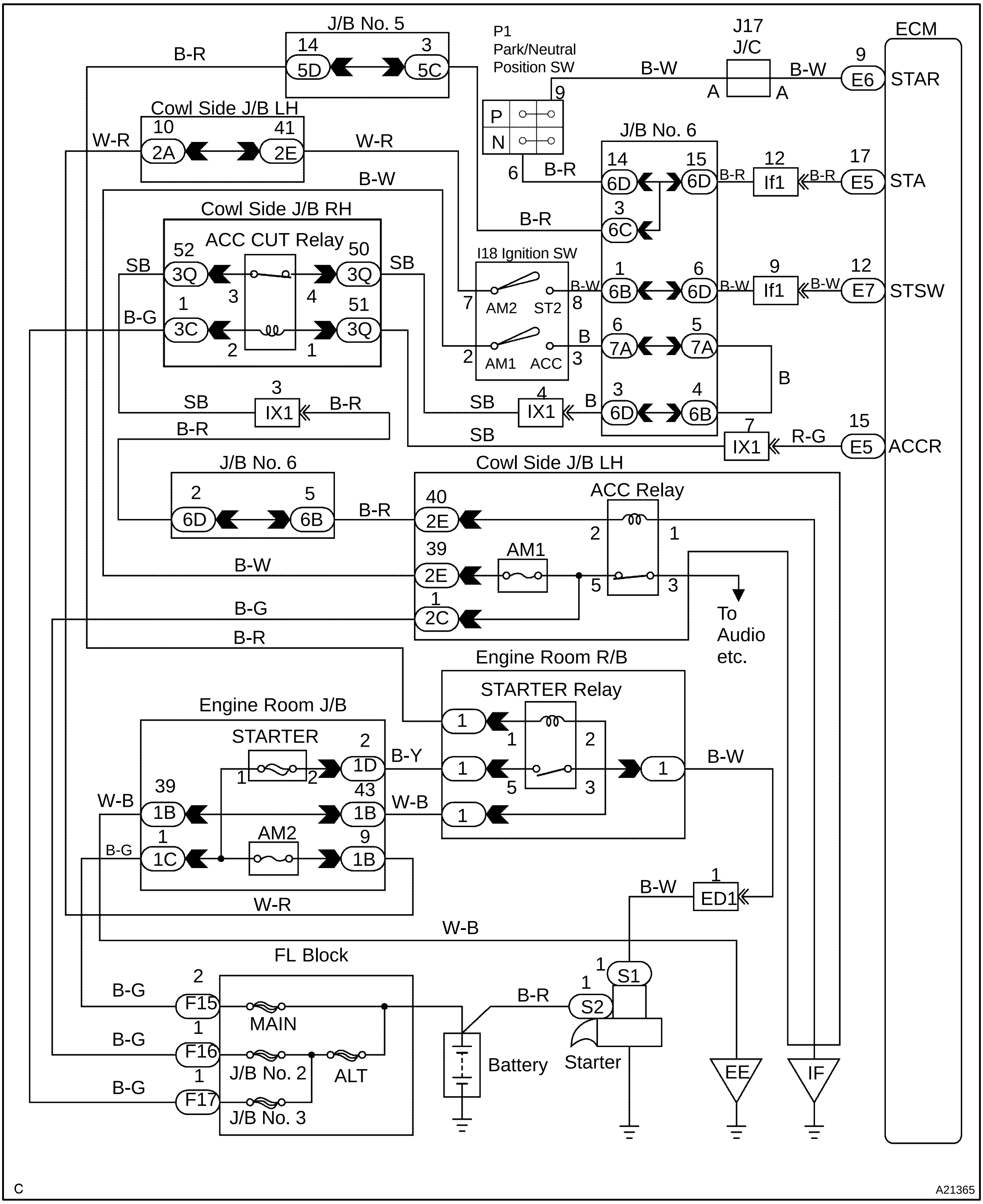
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	10.5 V	-
Vehicle speed	20 km/h (12.4 mph)	-
Engine speed	1,000 rpm	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Starter signal	ON (at "more than 20 km/h (12.4 mph) and more than 1,000 rpm")

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand-held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

Hand-held tester:

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

PREPARATION:

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch ON, and push the hand-held tester main switch ON.

(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STARTER SIG.

CHECK:

Read the STA signal on the hand-held tester while the starter operates.

OK:

Ignition Switch Position	ON	START
STA Signal	OFF	ON

OK → **Go to step 5.**

NG

2	**Check park/neutral position switch (See page DI-402).**

NG → **Replace park/neutral position switch.
Go to next step 5 after the replacement.**

OK

3	**Check ignition switch (See page BE-29).**

NG → **Replace ignition switch.
Go the next step 5 after the replacement.**

OK

4	**Connect hand-held tester, and check STA signal.**

PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON, and push the hand-held tester main switch ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STARTER SIG.
CHECK:
Read the STA signal on the hand-held tester while the starter operates.
OK:

Ignition Switch Position	ON	START
STA Signal	OFF	ON

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

OK

5	**Check DTC reoccur.**

PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and hand-held tester main switch ON.
(c) Clear DTC (See page DI-3).
(d) Drive the vehicle more than 40 km/h (25 mph) for 20 seconds or more.
CHECK:
Check DTC reoccur.
RESULT:

Display (DTC output)	Proceed to
P0617	A
No DTC output	B

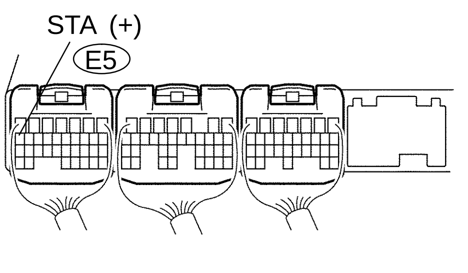
A → **Replace ECM (See page SF-60).**

B

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

OBD II scan tool (excluding hand-held tester):

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



ECM Connector

PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure the voltage between terminal STA of the ECM connector and the body ground, while cranking the engine (ignition switch START position) and while not engine cranking the engine (ignition switch position ON).

OK:

Voltage:
6 V or more (ignition switch START position)
0 V (ignition switch ON position)

OK	**Go to step 5.**

NG

2	**Check park/neutral position switch (See page DI-402).**

NG	**Replace park/neutral position switch.** **Go to next step 5 after the replacement.**

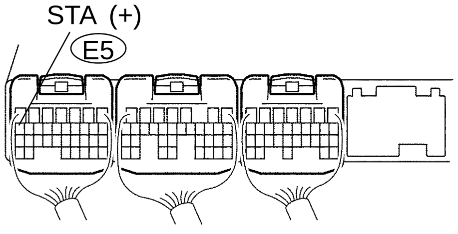
OK

3	**Check ignition switch (See page BE-29).**

NG	**Replace ignition switch.** **Go to next step 5 after the replacement.**

OK

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



PREPARATION:
Turn the ignition switch ON.

CHECK:
Measure the voltage between terminal STA of the ECM connector and the body ground, while cranking the engine (ignition switch START position) and while not engine cranking the engine (ignition switch position ON).

OK:

Voltage:
6 V or more (ignition switch START position)
0 V (ignition switch ON position)

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

OK

5	Check DTC reoccur.

PREPARATION:
(a) Connect the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and hand-held tester main switch ON.
(c) Clear DTC (See page DI-3).
(d) Drive the vehicle more than 40 km/h (25 mph) for 20 seconds or more.

CHECK:
Check DTC reoccur.

RESULT:

Display (DTC output)	Proceed to
P0617	A
No DTC output	B

A → **Replace ECM (See page SF-60).**

B

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

DIC2O-01

DTC	P2102	Throttle Actuator Control Motor Circuit Low

DTC	P2103	Throttle Actuator Control Motor Circuit High

CIRCUIT DESCRIPTION

The throttle motor is operated by the ECM and it opens and closes the throttle valve.
The opening angle of the throttle valve is detected by the throttle position sensor which is mounted on the throttle body. The throttle position sensor provides feedback to the ECM. This feedback allows the ECM to control the throttle motor and monitor the throttle opening angle as the ECM responds to driver inputs.
HINT:
This Electrical Throttle Control System (ETCS) does not use a throttle cable.

DTC No.	DTC Detection Condition	Trouble Area
P2102	Conditions (a) and (b) continue for 2.0 seconds: (a) Throttle control motor output duty 80 % or more (b) Throttle control motor current 0.5 A or less	★Open in throttle control motor and sensor circuit ★Throttle control motor and sensor ★ECM
P2103	Either of following conditions is met. (a) Throttle control motor current 10 A or more (0.1 sec) (b) Throttle control motor current 7 A or more (0.6 sec.)	★Short in throttle control motor and sensor circuit ★Throttle control motor and sensor ★Throttle valve ★Throttle body ★ECM

MONITOR DESCRIPTION

The ECM monitors the current through the electronic throttle motor and detects malfunctions or open circuit in the throttle motor based on the voltage of the current. When the current deviates from the standard, the ECM concludes that there is a fault in the throttle motor.
Or, if the throttle valve is not functioning properly (for example, stuck ON) the ECM concludes that there is a fault and turns on the MIL and a DTC is set.
Example:
When the current is more than 10 A. Or the current is less than 0.5 A when the motor driving duty ratio is exceeding 80%. The ECM concludes that the current is out of range, turns on the MIL and a DTC is set.

FAIL SAFE

If the ETCS (Electronic Throttle Control System) has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16˚) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel infection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimum speed.
If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.
If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P2102	Throttle actuator control motor current (Low current)
	P2103	Throttle actuator control motor current (High current)
Required sensors/components	Throttle actuator motor	
Frequency of operation	Continuous	
Duration	2 sec.	
MIL operation	P2102: Immediate P2103: 1 driving cycle	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
P2102:		
Throttle motor	ON	
Duty-cycle ratio to open throttle actuator	80%	-
Throttle actuator power supply	8 V	-
Current motor current - Motor current at 0.016 sec. before	-	0.2 A
P2103:		
Throttle motor	ON	
Either of the following conditions is met:	A or B	
A. Throttle actuator power supply	8 V	-
B. Throttle actuator power	ON	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P2102:	
Throttle motor current	Less than 0.5 A (when motor drive duty 80% or more)
P2103:	
Throttle motor current	More than 10 A (0.1 sec.) More than 7 A (0.6 sec.)

WIRING DIAGRAM

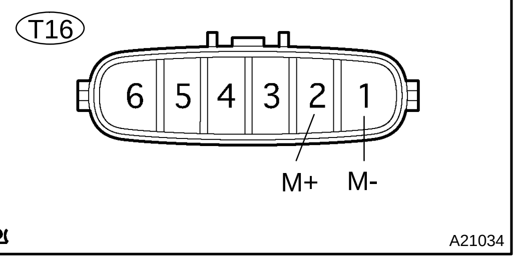
Refer to DTC P0120 on page DI-84 .

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	Check throttle control motor.

Component Side:
Throttle Control Motor and Sensor



PREPARATION:
Disconnect the throttle control motor and sensor connector.

CHECK:
Measure the resistance between terminals of the throttle control motor.

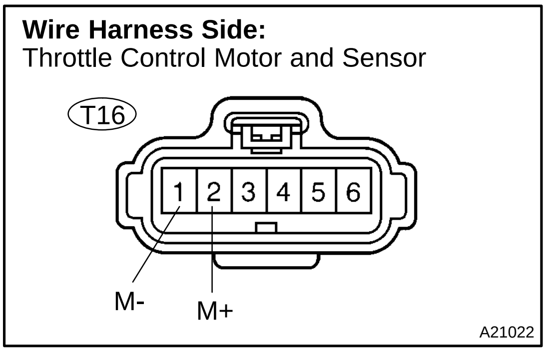
OK:

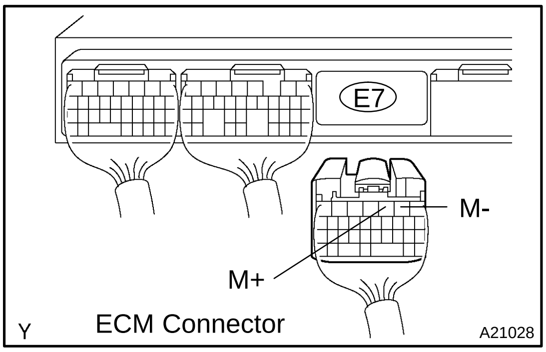
Tester Connection	Specified Condition
M+ (T16-2) - M- (T16-1)	0.3 to100 Ω (20°C (68°F))

NG → **Replace throttle body (See page SF-36).**

OK

2	Check for open and short in harness and connector between throttle control motor and ECM.





PREPARATION:

(a) Disconnect the T16 throttle control motor and sensor connector.

(b) Disconnect the E7 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
M+ (T16-2) - M+ (E7-3)	Below 1 Ω
M- (T16-1) - M- (E7-2)	Below 1 Ω
M+ (T16-2) or M+ (E7-3) - Body ground	10 kΩ or higher
M- (T16-1) or M- (E7-2) - Body ground	10 kΩ or higher

NG	Repair or replace harness or connector.

OK

3	Visually check throttle valve.

CHECK:

Check between the throttle valve and the housing for foreign objects.
Also, check if the valve can open and close smoothly.

NG	Remove foreign object and clean throttle body.

OK

Replace ECM (See page SF-60).

DIC2P-01

DTC	P2111	Throttle Actuator Control System -Stuck Open

DTC	P2112	Throttle Actuator Control System -Stuck Closed

CIRCUIT DESCRIPTION

The throttle motor is operated by the ECM and it opens and closes the throttle valve using gears. The opening angle of the throttle valve is detected by the throttle position sensor, which is mounted on the throttle body. The throttle position sensor provides feedback to the ECM to control the throttle motor and set the throttle valve angle in response to driver input.
HINT:
This Electrical Throttle Control System (ETCS) does not use a throttle cable.

DTC No.	DTC Detection Condition	Trouble Area
P2111	Throttle motor locked during ECM order to close.	★Throttle control motor and sensor circuit ★Throttle control motor and sensor ★Throttle body ★Throttle valve
P2112	Throttle motor locked during ECM order to open.	

MONITOR DESCRIPTION

The ECM concludes that there is a malfunction of the ETCS (Electronic Throttle Control System) when the throttle valve remains at a fixed angle despite high drive current from the ECM. The ECM will turn on the MIL and a DTC is set.

FAIL SAFE

If the ETCS (Electronic Throttle Control System) has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16°) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel infection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimum speed.
If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.
If a "pass" condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P2111	Throttle motor actuator lock (Open)
	P2112	Throttle motor actuator lock (Closed)
Required sensors/components	Main sensors/components	Throttle actuator motor
	Related sensors/components	Throttle position sensor
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
P2111:		
Throttle motor current	2 A	-
Throttle motor duty to close side	80%	-
P2112:		
Throttle motor current	2 A	-
Throttle motor duty to open side	80%	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
|Current throttle position sensor voltage at this time - throttle position sensor voltage 0.016 sec. earlier|	Less than 0.1 V when throttle motor open (or close) duty 80% or more

WIRING DIAGRAM

Refer to DTC P0120 on page DI-84 .

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

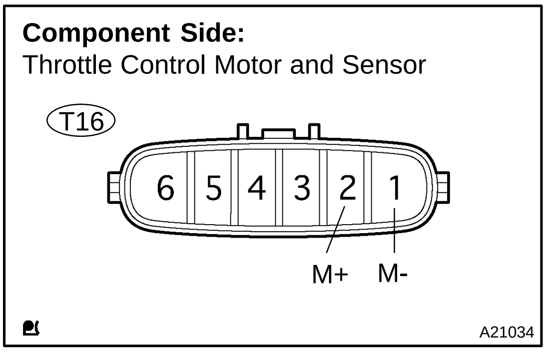
1	**Visually check throttle valve.**

PREPARATION:
Remove the intake air connector.
CHECK:
Check whether or not a foreign matter is caught between the throttle valve and housing. Also, if the valve can open and close smoothly.

NG → **Remove foreign matter and clean throttle body.**

OK

2	**Check throttle control motor.**



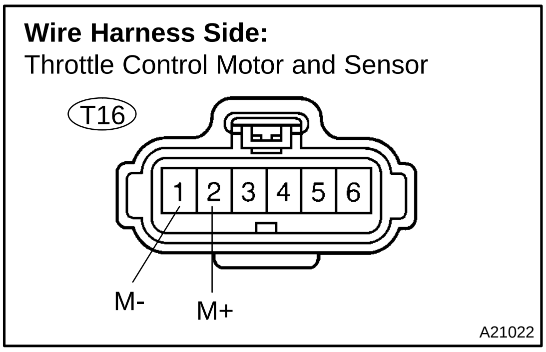
PREPARATION:
Disconnect the throttle control motor and sensor connector.
CHECK:
Measure the resistance between terminals of the throttle control motor.
OK:

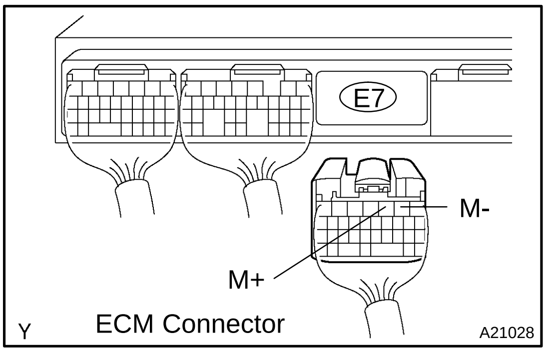
Tester Connection	Specified Condition
M+ (T16-2) - M- (T16-1)	0.3 to100 Ω (20°C (68°F))

NG → **Replace throttle body (See page SF-36).**

OK

3	**Check for open and short in harness and connector between ECM and throttle control motor.**





PREPARATION:

(a) Disconnect the T16 throttle control motor and sensor connector.

(b) Disconnect the E7 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
M+ (T16-2) - M+ (E7-3)	Below 1 Ω
M- (T16-1) - M- (E7-2)	Below 1 Ω
M+ (T16-2) or M+ (E7-3) - Body ground	10 kΩ or higher
M- (T16-1) or M- (E7-2) - Body ground	10 kΩ or higher

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

OK

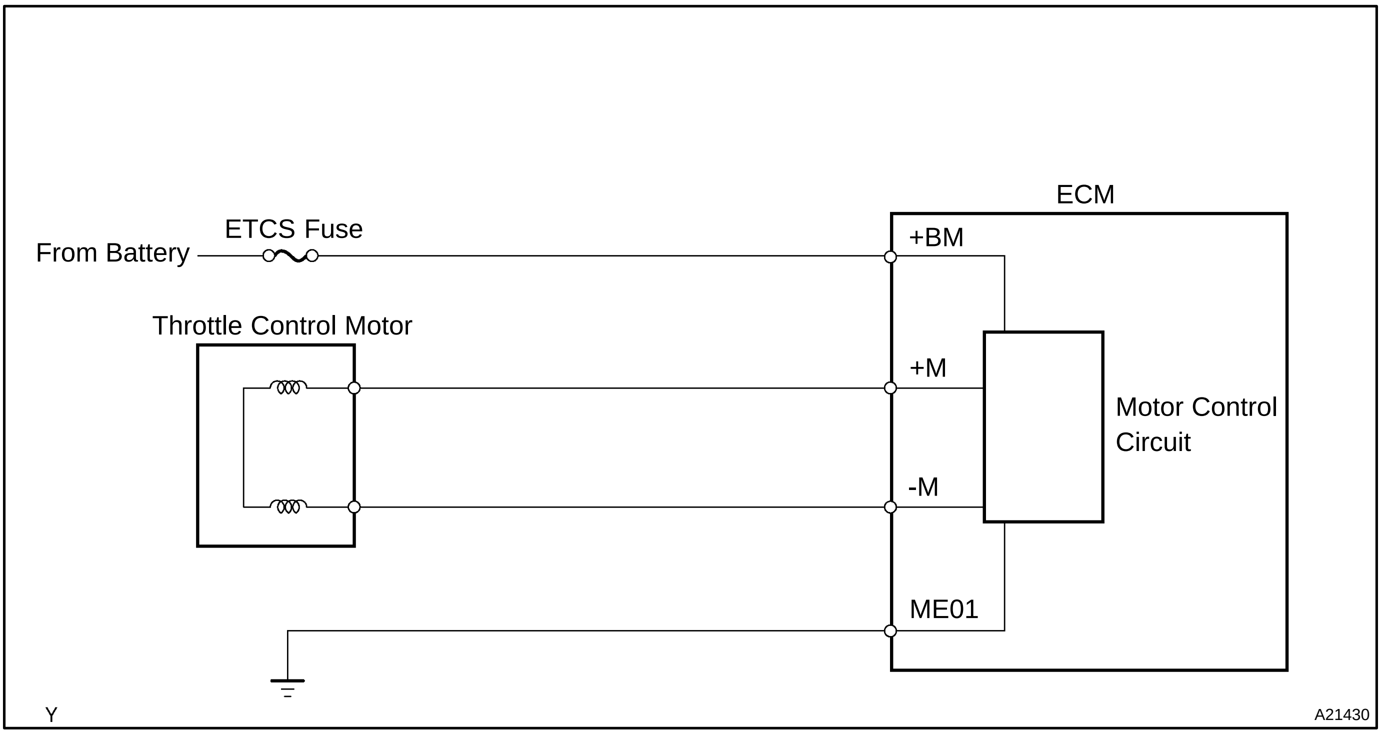
Check for intermittent problems
(See page DI-3).

DIC2Q-01

DTC	P2118	Throttle Actuator Control Motor Current Range/Performance

CIRCUIT DESCRIPTION

The Electronic Throttle Control System (ETCS) has a dedicated power supply circuit. The voltage (+BM) is monitored and when the voltage is low (less than 4V), the ECM concludes that the ETCS has a fault and current to the throttle control motor is cut.
When the voltage becomes unstable, the ETCS itself becomes unstable. For this reason, when the voltage is low, the current to the motor is cut. If repairs are made and the system has returned to normal, turn the ignition switch to OFF. The ECM then allows current to flow to the motor and the motor can be restarted.
HINT:
This Electrical Throttle Control System (ETCS) does not use a throttle cable.



DTC No.	DTC Detection Condition	Trouble Area
P2118	Open in ETCS power source circuit	★Open in ETCS power source circuit ★ETCS fuse ★ECM

MONITOR DESCRIPTION

The ECM monitors the battery supply voltage applied to the electronic throttle motor. When the power supply voltage drops below the threshold, the ECM concludes that the power supply has an open circuit. A DTC is set and the MIL is turned on.

FAIL SAFE

If the ETCS (Electronic Throttle Control System) has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16°) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel infection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimum speed.
If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.
If a "pass" condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P2118	Throttle actuator motor power supply line range check (Low voltage)
Required sensors/components	Throttle actuator motor	
Frequency of operation	Continuous	
Duration	0.8 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Actuator power	ON	
Battery voltage	8 V	-

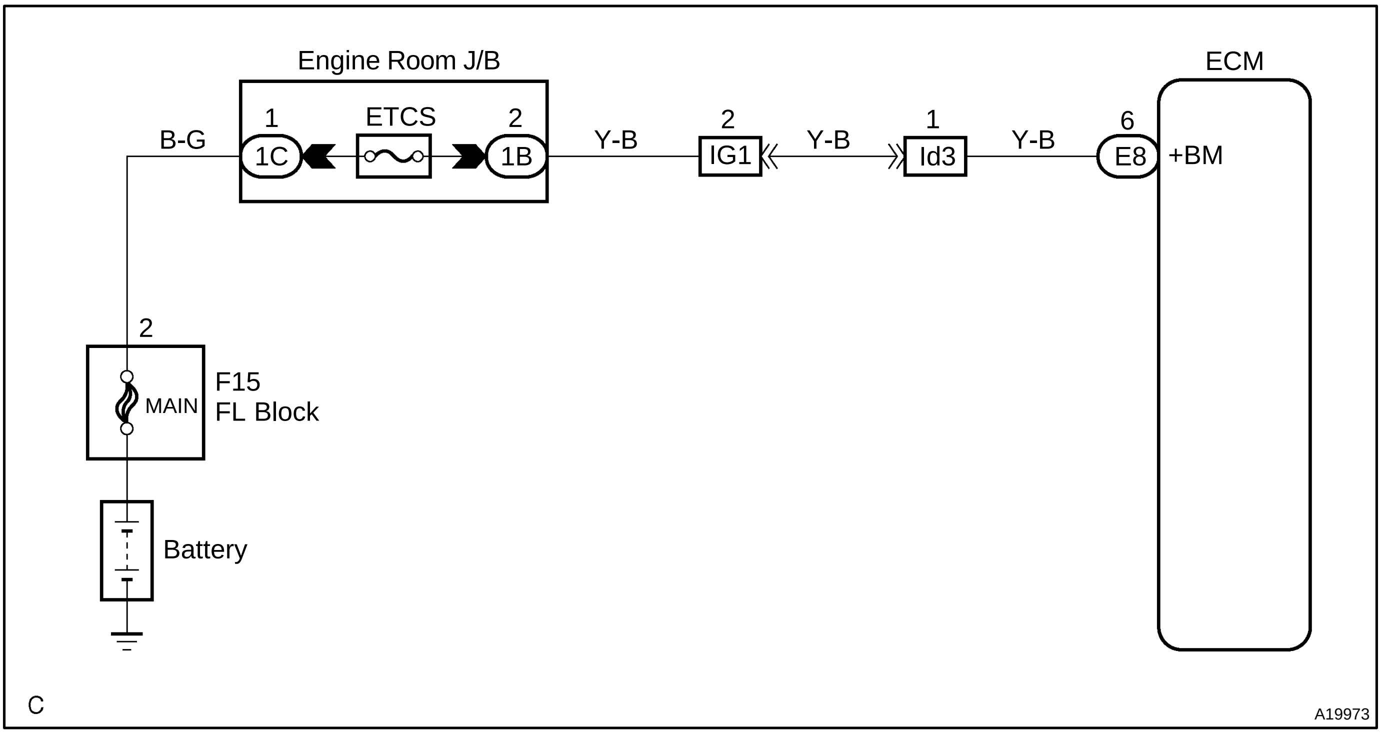
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Throttle actuator motor power supply voltage	Less than 4 V

COMPONENT OPERATING RANGE

Parameter	Standard Value
Throttle actuator motor power supply voltage	9 to 14 V

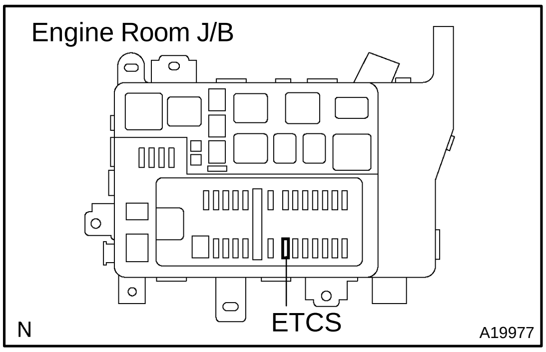
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	**Check ETCS fuse.**

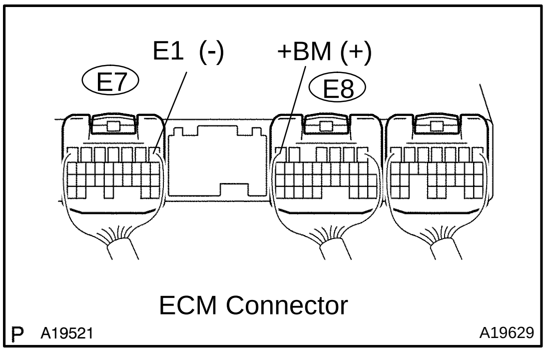


PREPARATION:
Remove the ETCS fuse from the engine room J/B.
CHECK:
Check the continuity of the ETCS fuse.
OK:
Continuity

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

OK

2	**Check voltage between terminal +BM and E1 of ECM connector.**



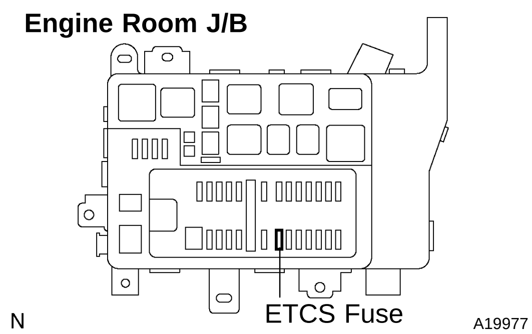
CHECK:
Measure the voltage between the specified terminals of the E7 and E8 ECM connector.
OK:

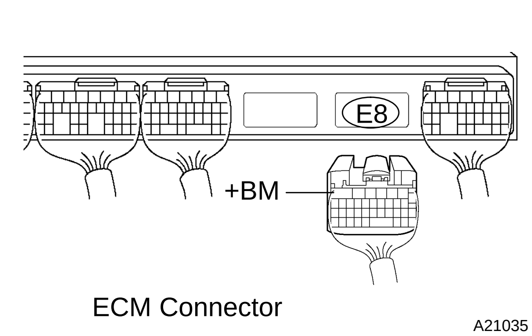
Tester Connection	Specified Condition
+BM (E8-6) - E7 (E7-1)	9 to 14 V

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

NG

3	Check for open or short in harness or connector between battery and ETCS fuse, ETCS fuse and ECM.





Check the harness and the connector between the ETCS fuse and the ECM:

PREPARATION:

(a) Remove the ETCS fuse from the engine room J/B.

(b) Disconnect the E8 ECM connector.

CHECK:

Measure the resistance between the wire harness side connector.

OK:

Tester Connection	Specified Condition
Engine Room J/B (ETCS fuse terminal 2) - +BM (E8-6)	Below 1 Ω
Engine Room J/B (ETCS fuse terminal 2) or +BM (E8-6) - Body ground	10 kΩ or higher

Check the harness and connector between the ETCS fuse and the battery:

PREPARATION:

(a) Remove the ETCS fuse from the engine room J/B.

(b) Disconnect the battery positive terminal.

CHECK:

Measure the resistance between the wire harness side connector.

OK:

Tester Connection	Specified Condition
Engine Room J/B (ETCS fuse teminal 1) - Battery positive terminal	Below 1 Ω
Engine Room J/B (ETCS fuse terminal 1) or Battery positive terminal - Body ground	10 kΩ or higher

NG	Repair or replace harness or connector.

OK

Check engine room J/B.

DTC P2119 Throttle Actuator Control Throttle Body Range/Performance

CIRCUIT DESCRIPTION

The Electric Throttle Control System (ETCS) is composed of a throttle motor that operates the throttle valve, a throttle position sensor that detects the opening angle of the throttle valve, an accelerator pedal position sensor that detects the accelerator pedal position, and the ECM that controls the ETCS system.

The ECM operates the throttle motor to position the throttle valve for proper response to driver inputs. The throttle position sensor, mounted on the throttle body, detects the opening angle of the throttle valve and provides this signal to the ECM so that the ECM can regulate the throttle motor.

DTC No.	DTC Detection Condition	Trouble Area
P2119	Throttle opening angle continues to vary greatly from target throttle opening angle	★Electric throttle control system ★Throttle body

MONITOR DESCRIPTION

The ECM determines the "actual" throttle angle based on the throttle position sensor signal. The "actual" throttle position is compared to the "target" throttle position commanded by the ECM. If the difference of these two values exceeds a specified limit, the ECM interprets this as a fault in the ETCS (Electronic Throttle Control System). The ECM turns on the MIL and a DTC is set.

FAIL SAFE

If the ETCS (Electronic Throttle Control System) has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16°) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel infection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimum speed.

If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.

If a "pass" condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P2119	Electronic throttle control system failure
Required sensors/components	Main sensors	Throttle actuator motor
	Related sensors	Throttle position sensor
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)
The typical enabling condition is not available	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Difference between "target throttle position" and "actual throttle position"	0.3 V or more

COMPONENT OPERATING RANGE

Standard Value
Commanded throttle position and current throttle position are nearly same

WIRING DIAGRAM

Refer to DTC P2102 and P2103 on page DI-302 .

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	**Are there any other codes (besides DTC P2119) being output?**

PREPARATION:
(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:
Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

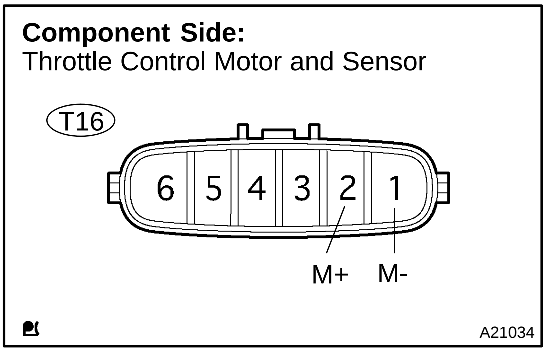
Display (DTC Output)	Proceed to
P2119	A
"P2119" and other DTC	B

HINT:
If any other codes besides P2119 are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI-36).**

A

2	Check throttle control motor.



PREPARATION:
Disconnect the throttle control motor and sensor connector.

CHECK:
Measure the resistance between terminals of the throttle control motor.

OK:

Tester Connection	Specified Condition
M+ (T16-2) - M- (T16-1)	0.3 to100 Ω (20°C (68°F))

NG → **Replace throttle body (See page SF-36).**

OK ↓

3	Replace ECM and clear DTC (Check if DTC outputs reoccur).

PREPARATION:
(a) Replace ECM.
(b) Clear the DTC (See page DI-3).
(c) Start and warm up the engine.
(d) Run the engine at idle for 15 seconds or more.

CHECK:
Read the DTC using the hand-held tester or the OBD II scan tool.

OK:
No DTC output.

OK → **System is normal.**

NG ↓

Replace throttle body.

DIC2S-01

DTC	**P2120**	**Throttle/Pedal Position Sensor/Switch ”D” Circuit**

DTC	**P2122**	**Throttle/Pedal Position Sensor/Switch ”D” Circuit Low Input**

DTC	**P2123**	**Throttle/Pedal Position Sensor/Switch ”D” Circuit High Input**

DTC	**P2125**	**Throttle/Pedal Position Sensor/Switch ”E” Circuit**

DTC	**P2127**	**Throttle/Pedal Position Sensor/Switch ”E” Circuit Low Input**

DTC	**P2128**	**Throttle/Pedal Position Sensor/Switch ”E” Circuit High Input**

DTC	**P2138**	**Throttle/Pedal Position Sensor/Switch ”D”/”E” Voltage Correlation**

HINT:
This is the repair procedure for the ”accelerator pedal position sensor”.

CIRCUIT DESCRIPTION

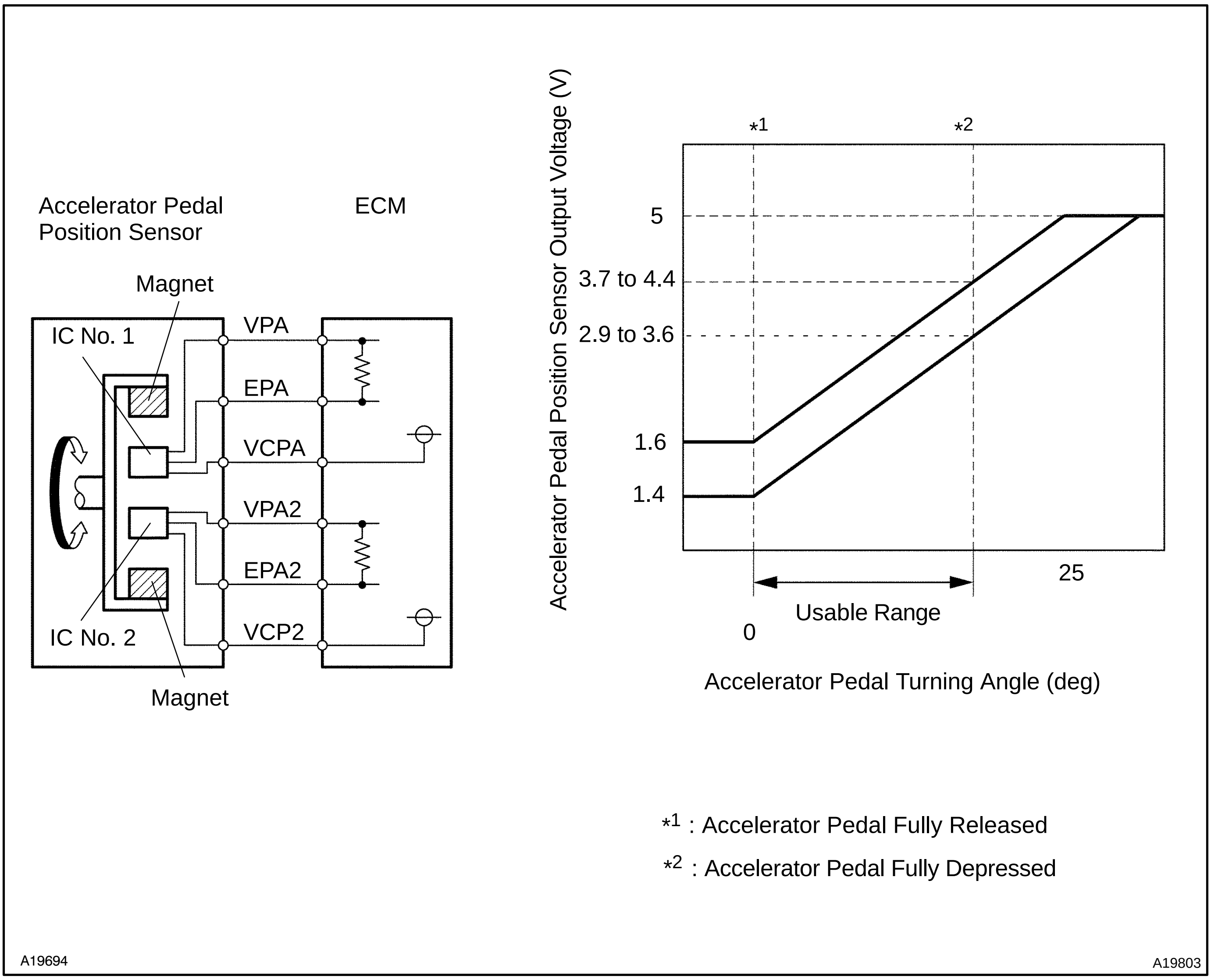
HINT:

★ This electrical throttle system does not use a throttle cable.
★ This accelerator pedal position sensor is a non-contact type.

The accelerator pedal position sensor is mounted in the accelerator pedal to detect the angle of the accelerator pedal. This sensor is electronically controlled and uses Hall-effect elements.

In the accelerator pedal position sensor, the voltage applied to terminals VPA and VPA2 of the ECM changes between 0 V and 5 V in proportion to the angle of the accelerator pedal. The VPA is a signal to indicate the actual accelerator pedal angle and is used for the engine control. VPA2 is used to detect malfunctions of the sensor itself.

The ECM judges the current angle of the accelerator pedal from these signals input from terminals VPA and VPA2, and the ECM controls the throttle motor based on these signals.



DTC No.	DTC Detection Condition (Open or short in accelerator pedal position sensor circuit)	Main trouble Area
P2120	Condition (a) continues for 0.5 seconds or more: (a) VPA ± 0.2 V and VPA2 ≧ 0.97 deg, or VPA ≧ 4.8 V	★Accelerator pedal position sensor ★ECM
P2122	Condition (a) and (b) continues for 0.5 seconds or more: (a) VPA ± 0.2 V (b) VPA2 ≧ 0.97 deg	★Accelerator pedal position sensor ★VCPA circuit open ★VPA circuit open or ground short ★ECM
P2123	Condition (a) continues for 2.0 seconds or more: (a) VPA ≧ 4.8 V	★Accelerator pedal position sensor ★EPA circuit open ★ECM
P2125	Condition (a) continues for 0.5 seconds or more: (a) VPA2 ± 0.5 V and VPA ≧ 0.97 deg, or VPA2 ≧ 4.8 V and 0.2 V ± VPA ± 3.45 V	★Accelerator pedal position sensor ★ECM
P2127	Condition (a) and (b) continues for 0.5 seconds or more: (a) VPA2 ± 0.5 V (b) VPA ≧ 0.97 deg	★Accelerator pedal position sensor ★VCP2 circuit open ★VPA2 circuit open or ground short ★ECM
P2128	Condition (a) and (b) continues for 2.0 seconds or more: (a) VPA2 ≧ 4.8 V (a) 0.2 V ± VPA ± 3.45 V	★Accelerator pedal position sensor ★EPA circuit open ★ECM
P2138	Condition (a) or (b) continues for 2.0 seconds or more: (a) |VPA - VPA2| ± 0.02 V (b) VPA ± 0.2 V and VPA2 ± 0.5 V	★VPA and VPA2 circuit are short circuited ★Accelerator pedal position sensor ★ECM

HINT:
After confirming DTC P2120, P2122, P2123, P2125, P2127, P2128 and P2138 use the OBD II scan tool or the hand-held tester to confirm the accelerator pedal opening percentage.

Trouble area	Accelerator pedal position expressed as voltage			
	Accelerator pedal completely released		Accelerator pedal fully depressed	
	ACCEL POS #1	ACCEL POS #2	ACCEL POS #1	ACCEL POS #2
VC circuit open	0 to 0.2 V	0 to 0.2 V	0 to 0.2 V	0 to 0.2 V
VPA circuit open or ground short	0 to 0.2 V	1.2 to 2.0 V	0 to 0.2 V	3.4 to 5.3 V
VPA2 circuit open or ground short	0.5 to 1.1 V	0 to 0.2 V	2.6 to 4.5 V	0 to 0.2 V
E2 circuit open	4.5 to 5.5 V	4.5 to 5.5 V	4.5 to 5.5 V	4.5 to 5.5 V

MONITOR DESCRIPTION

When VPA or VPA2, deviates from the standard, or the difference between the voltage outputs of the two sensors is less than threshold, the ECM concludes that there is a defect in the accelerator pedal position sensor. The ECM turns on the MIL and a DTC is set.
Example:
When the voltage output of the VPA below 0.2 V or exceeds 4.8 V.

FAIL SAFE

The accelerator pedal position sensor has two (main and sub) sensor circuits. If a malfunction occurs in either of the sensor circuits, the ECM detects the abnormal signal voltage difference between the two sensor circuits and switches to limp mode. In limp mode, the remaining circuit is used to calculate the accelerator pedal opening to allow the vehicle to continue driving.
If both circuits malfunction, the ECM regards the opening angle of the accelerator pedal to be fully closed. In this case, the throttle valve will remain closed as if the engine is idling.
If a "pass" condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P2120	Accelerator position sensor 1 (VPA) range check (Fluttering)
	P2122	Accelerator position sensor 1 (VPA) range check (Low voltage)
	P2123	Accelerator position sensor 1 (VPA) range check (High voltage)
	P2125	Accelerator position sensor 2 (VPA2) range check (Fluttering)
	P2127	Accelerator position sensor 2 (VPA2) range check (Low voltage)
	P2128	Accelerator position sensor 2 (VPA2) range check (High voltage)
	P2138	Accelerator position sensor correlation range check
Required sensors/components	Accelerator position sensor	
Frequency of operation	Continuous	
Duration	2 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Ignition switch	ON	
Throttle control motor power	ON	

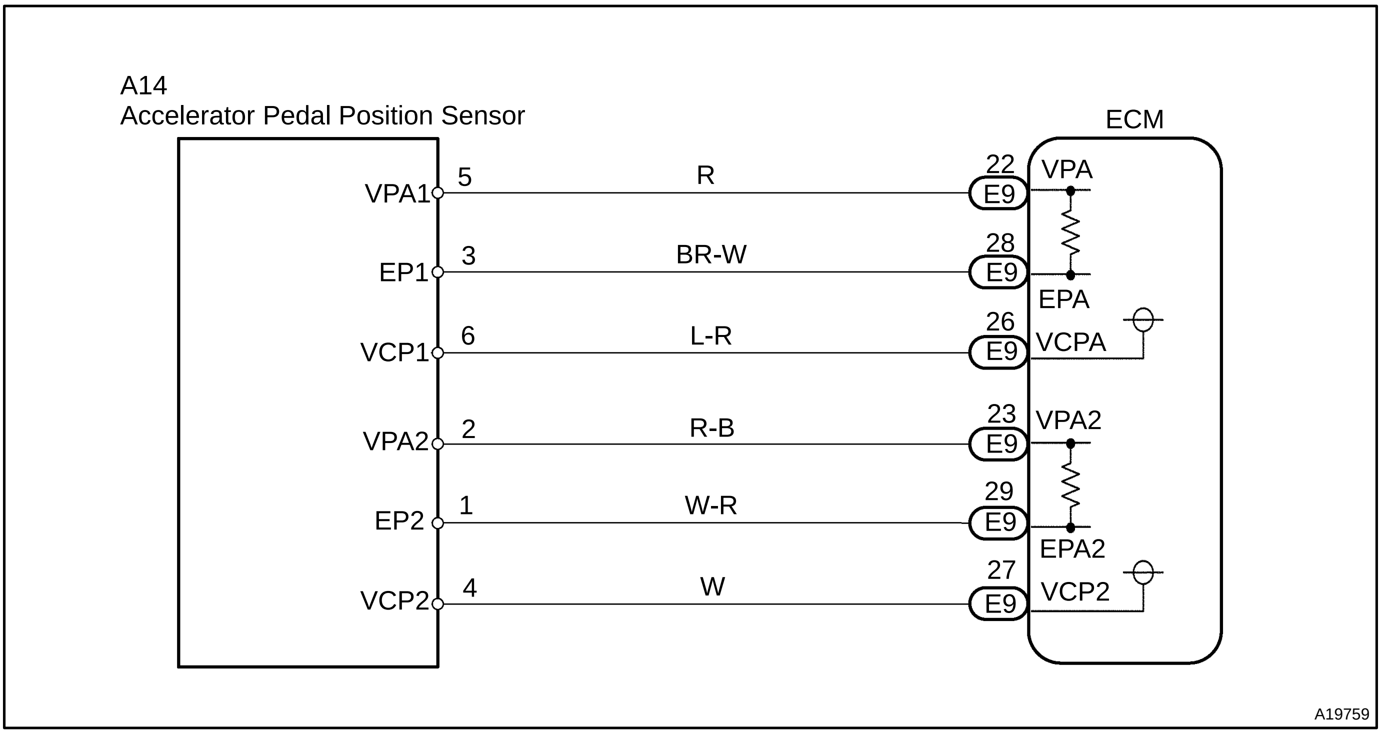
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P2120:	
VPA voltage	0.2 V or less or 4.8 V or more fluttering
P2122:	
VPA voltage	0.2 V or less (When VPA2 angle 1 deg or more)
P2123:	
VPA voltage	4.8 V or more
P2125:	
VPA2 voltage	0.5 V or less or 4.8 V or more fluttering
P2127:	
VPA2 voltage	0.5 V or less (When VPA angle 1 deg or more)
P2128:	
Following conditions are met:	A and B
A. VPA voltage	0.2 V or more and 3.45 V or less
B. VPA2 voltage	4.8 V or more
P2138:	
Following condition is met for	A or B
A. Difference between VPA and VPA2 voltages	0.02 V or less
B. Both following conditions are met:	(a) and (b)
(a) VPA voltage	0.2 V or less
(b) VPA2 voltage	0.5 V or less

COMPONENT OPERATING RANGE

Parameter	Standard Value
VPA voltage	More than 0.2 V and less than 4.8 V
VPA2 voltage	More than 0.5 V and Less than 4.8 V
Difference between VPA and VPA2 voltages	More than 0.02 V

WIRING DIAGRAM

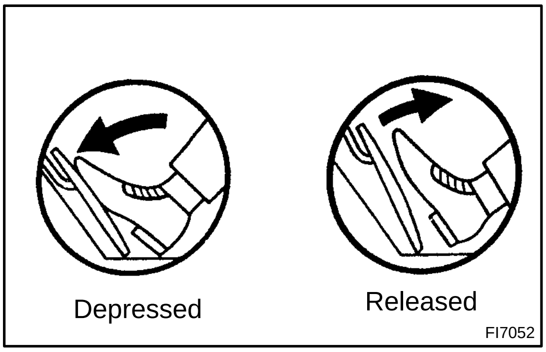


INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

Hand-held tester:

1	**Connect hand-held tester, and read the voltage for accelerator pedal position sensor data.**



PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ETCS / ACCEL POS #1 and ACCEL POS #2.

CHECK:
Read the voltage for the accelerator pedal position sensor data.

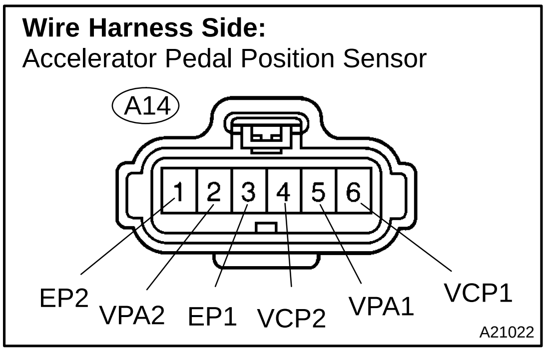
OK:

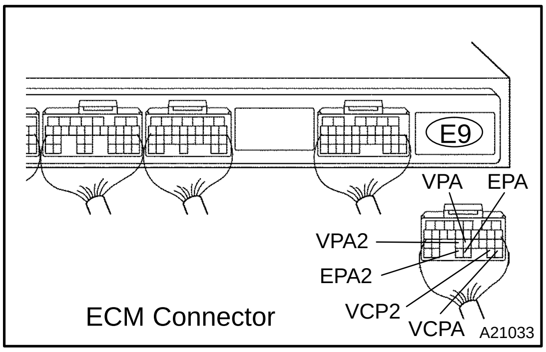
Accelerator pedal	ACCEL POS #1	ACCEL POS #2
Released	0.5 to 1.1 V	1.2 to 2.0 V
Depressed	2.6 to 4.5 V	3.4 to 5.3 V

OK → **Go to step 5.**

NG

2	**Check for open and short in harness and connector in VCPA, VCP2, VPA, VPA2 EPA and EPA2 circuit between ECM and accelerator pedal position sensor.**





PREPARATION:

(a) Disconnect the A14 accelerator pedal position sensor connector.

(b) Disconnect the E9 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

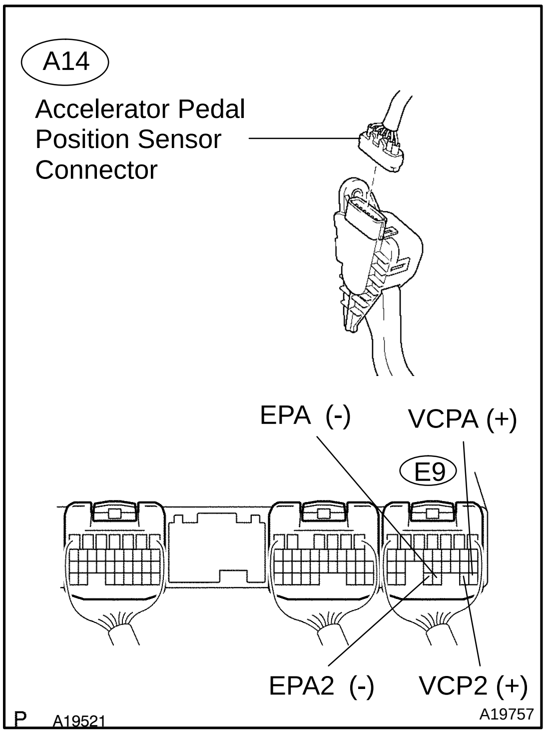
OK:

Tester Connection	Specified Condition
VPA1 (A14-5) - VPA (E9-22)	Below 1 Ω
EP1 (A14-3) - EPA (E9-28)	Below 1 Ω
VCP1 (A14-6) - VCPA (E9-26)	Below 1 Ω
VPA2 (A14-2) - VPA2 (E9-23)	Below 1 Ω
EP2 (A14-1) - EPA2 (E9-29)	Below 1 Ω
VCP2 (A14-4) - VCP2 (E9-27)	Below 1 Ω
VPA1 (A14-5) or VPA (E9-22) - Body ground	10 kΩ or higher
EP1 (A14-3) or EPA (E9-28) - Body ground	10 kΩ or higher
VCP1 (A14-6) or VCPA (E9-26) - Body ground	10 kΩ or higher
VPA2 (A14-2) or VPA2 (E9-23) - Body ground	10 kΩ or higher
EP2 (A14-1) or EPA2 (E9-29) - Body ground	10 kΩ or higher
VCP2 (A14-4) or VCP2 (E9-27) - Body ground	10 kΩ or higher

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

OK

3	Check voltage between terminals VCPA and EPA, and VCP2 and EPA2 of ECM terminals.



PREPARATION:

(a) Turn the ignition switch ON.

(b) Disconnect the A14 accelerator pedal position sensor connector.

CHECK:

Measure the voltage between the specified terminals of the E9 ECM connector.

OK:

Tester Connection	Specified Condition
VCPA (E9-26) - EPA (E9-28)	4.5 to 5.5 V
VCP2 (E9-27) - EPA2 (E9-29)	4.5 to 5.5 V

NG → **Replace ECM (See page SF-60).**

OK

4	Replace accelerator pedal assembly (See page SF-58).

Go

5	Check if DTC output recur?

PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Disconnect the battery terminals or remove the EFI or ECD No. 1 fuse and ETCS fuse (Clear DTCs).
(c) Start the engine.
(d) Drive the engine at idle for 15 seconds or more.

CHECK:
Read the DTC output.

OK:
No DTC output.

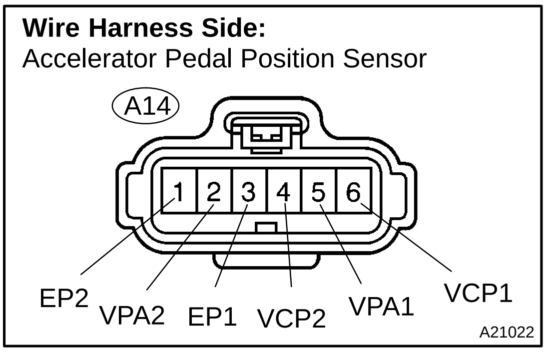
OK → **System is OK.**

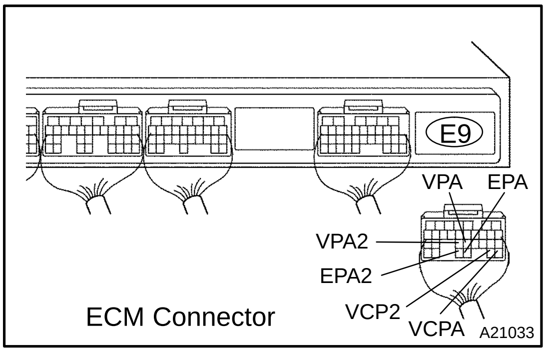
NG ↓

Replace ECM (See page SF-60).

OBD II scan tool (excluding hand-held tester):

1	**Check for open and short in harness and connector in VCPA, VCP2, VPA, VPA2 EPA and EPA2 circuit between ECM and accelerator pedal position sensor.**





PREPARATION:

(a) Disconnect the A14 accelerator pedal position sensor connector.

(b) Disconnect the E9 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

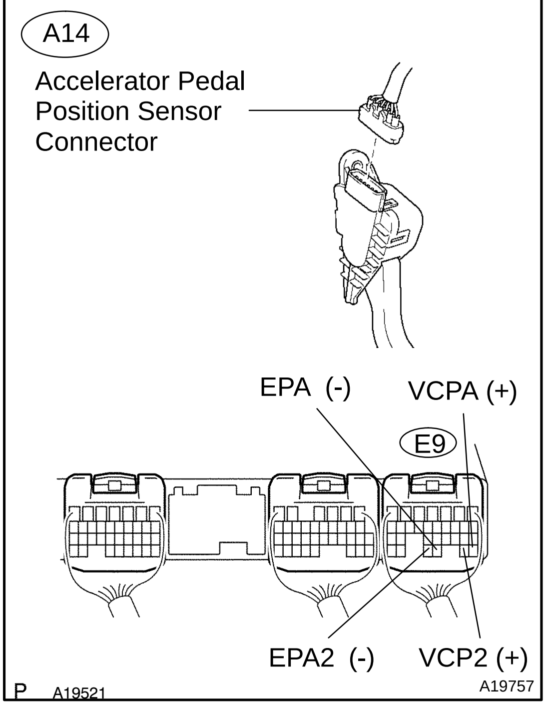
OK:

Tester Connection	Specified Condition
VPA1 (A14-5) - VPA (E9-22)	Below 1 Ω
EP1 (A14-3) - EPA (E9-28)	Below 1 Ω
VCP1 (A14-6) - VCPA (E9-26)	Below 1 Ω
VPA2 (A14-2) - VPA2 (E9-23)	Below 1 Ω
EP2 (A14-1) - EPA2 (E9-29)	Below 1 Ω
VCP2 (A14-4) - VCP2 (E9-27)	Below 1 Ω
VPA1 (A14-5) or VPA (E9-22) - Body ground	10 kΩ or higher
EP1 (A14-3) or EPA (E9-28) - Body ground	10 kΩ or higher
VCP1 (A14-6) or VCPA (E9-26) - Body ground	10 kΩ or higher
VPA2 (A14-2) or VPA2 (E9-23) - Body ground	10 kΩ or higher
EP2 (A14-1) or EPA2 (E9-29) - Body ground	10 kΩ or higher
VCP2 (A14-4) or VCP2 (E9-27) - Body ground	10 kΩ or higher

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

OK

2	**Check voltage between terminals VCPA and EPA, and VCP2 and EPA2 of ECM terminals.**



PREPARATION:

(a) Turn the ignition switch ON.

(b) Disconnect the A14 accelerator pedal position sensor connector.

CHECK:

Measure the voltage between the specified terminals of the E9 ECM connector.

OK:

Tester Connection	Specified Condition
VCPA (E9-26) - EPA (E9-28)	4.5 to 5.5 V
VCP2 (E9-27) - EPA2 (E9-29)	4.5 to 5.5 V

NG → **Replace ECM (See page SF-60).**

OK

3	**Replace accelerator pedal assembly (See page SF-58).**

Go

4	**Check if DTC output recur?**

PREPARATION:

(a) Connect the OBD II scan tool to the DLC3.
(b) Disconnect the battery terminals or remove the EFI or ECD No. 1 fuse and ETCS fuse (Clear DTCs).
(c) Start the engine.
(d) Drive the engine at idle for 15 seconds or more.

CHECK:

Read the DTC output.

OK:

No DTC output.

OK → **System is OK.**

NG ↓

Replace ECM (See page SF-60).

DIC2T-01

DTC	P2121	Throttle/Pedal Position Sensor/Switch ”D” Circuit Range/Performance

HINT:
This is repair procedure for the ”accelerator pedal position sensor”.

CIRCUIT DESCRIPTION

Refer to DTC P2120 on page DI-318 .

DTC No.	DTC Detecting Condition	Trouble Area
P2121	Conditions (a) and (b) continue for 0.5 seconds: (a) Difference between VPA and VPA2 exceeds the threshold (b) IDL is OFF	★Accelerator pedal position sensor circuit ★Accelerator pedal position sensor ★ECM

MONITOR DESCRIPTION

The accelerator pedal position sensor is mounted on the accelerator pedal bracket. The accelerator pedal position sensor has 2 sensor elements/signal outputs: VPA1 and VPA2. VPA1 is used to detect the actual accelerator pedal angle (used for engine control) and VPA2 is used to detect malfunctions in VPA1. When the difference between the voltage outputs of VPA1 and VPA2 deviate from the standard, the ECM concludes the accelerator pedal position sensor has a malfunction. The ECM turns on the MIL and a DTC is set.

FAIL SAFE

The accelerator pedal position sensor has two (main and sub) sensor circuits. If a malfunction occurs in either of the sensor circuits, the ECM detects the abnormal signal voltage difference between the two sensor circuits and switches to limp mode. In limp mode, the remaining circuit is used to calculate the accelerator pedal opening to allow the vehicle to continue driving.
If both circuits malfunction, the ECM regards the opening angle of the accelerator pedal to be fully closed. In this case, the throttle valve will remain closed as if the engine is idling.
If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P2121	Accelerator position sensor (rationality)
Required sensors/components	Accelerator position sensor	
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Either of the following conditions is met	A or B	
A. Ignition switch	ON	
B. Throttle control motor power	ON	
System is not under limp home mode due to accelerator pedal position sensor malfunction		

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
|VPA - (VPA2 - 0.8)|* *Corrected by learning value	More than 0.4 V

WIRING DIAGRAM

Refer to DTC P2120 on page DI-318 .

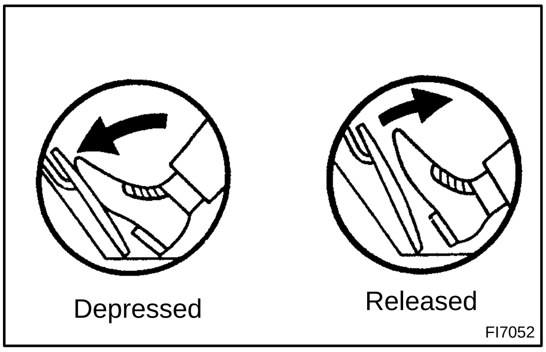
INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

Hand-held tester:

1	**Connect hand-held tester, and read the voltage for accelerator pedal position sensor data.**



PREPARATION:

(a) Connect the hand-held tester to the DLC3.

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

(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ETCS / ACCEL POS #1 and ACCEL POS #2.

CHECK:

Read the voltage for the accelerator pedal position sensor data.

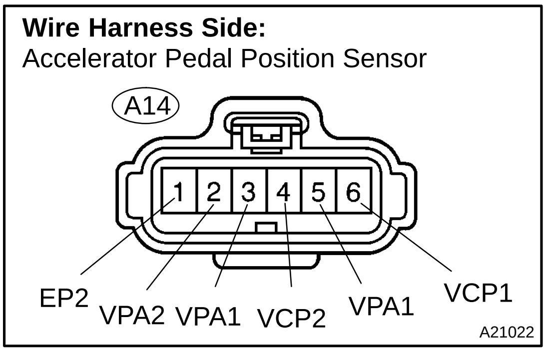
OK:

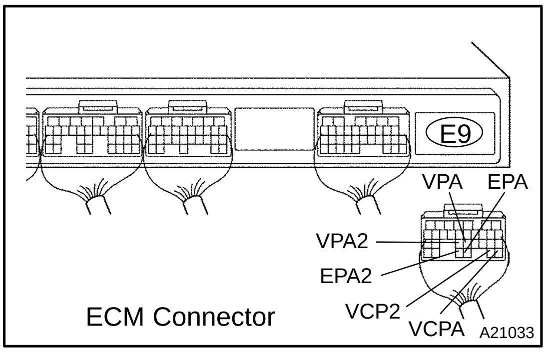
Accelerator pedal	ACCEL POS #1	ACCEL POS #2
Released	0.5 to 1.1 V	1.2 to 2.0 V
Depressed	2.6 to 4.5 V	3.4 to 5.3 V

OK	**Replace ECM (See page SF-60).**

NG

2	Check for open and short in harness and connector between accelerator pedal position sensor and ECM.





PREPARATION:

(a) Disconnect the A14 accelerator pedal position sensor connector.

(b) Disconnect the E9 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Standard (Check for open):

Tester Connection	Specified Condition
VPA1 (A14-5) - VPA (E9-22)	Below 1 Ω
EP1 (A14-3) - EPA (E9-28)	Below 1 Ω
VCP1 (A14-6) - VCPA (E9-26)	Below 1 Ω
VPA2 (A14-2) - VPA2 (E9-23)	Below 1 Ω
EP2 (A14-1) - EPA2 (E9-29)	Below 1 Ω
VCP2 (A14-4) - VCP2 (E9-27)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
VPA1 (A14-5) or VPA (E9-22) - Body ground	10 kΩ or higher
EP1 (A14-3) or EPA (E9-28) - Body ground	10 kΩ or higher
VCP1 (A14-6) or VCPA (E9-26) - Body ground	10 kΩ or higher
VPA2 (A14-2) or VPA2 (E9-23) - Body ground	10 kΩ or higher
EP2 (A14-1) or EPA2 (E9-29) - Body ground	10 kΩ or higher
VCP2 (A14-4) or VCP2 (E9-27) - Body ground	10 kΩ or higher

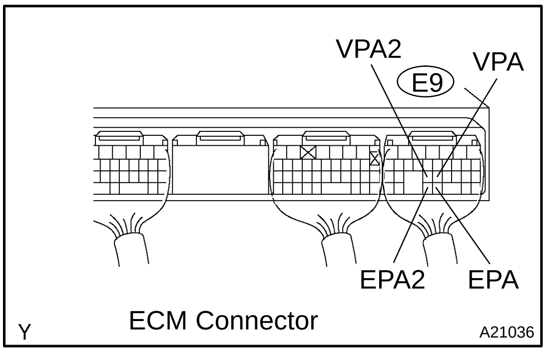
NG → **Repair or replace harness or connector.**

OK

Replace accelerator pedal pedal assembly.

OBD II scan tool (excluding hand-held tester):

1	Check voltage between terminals VPA and EPA, VPA2 and EPA2 of ECM connector.



PREPARATION:
Turn the ignition switch ON.

CHECK:
Measure the voltage between the specified terminals of the E9 ECM connector.

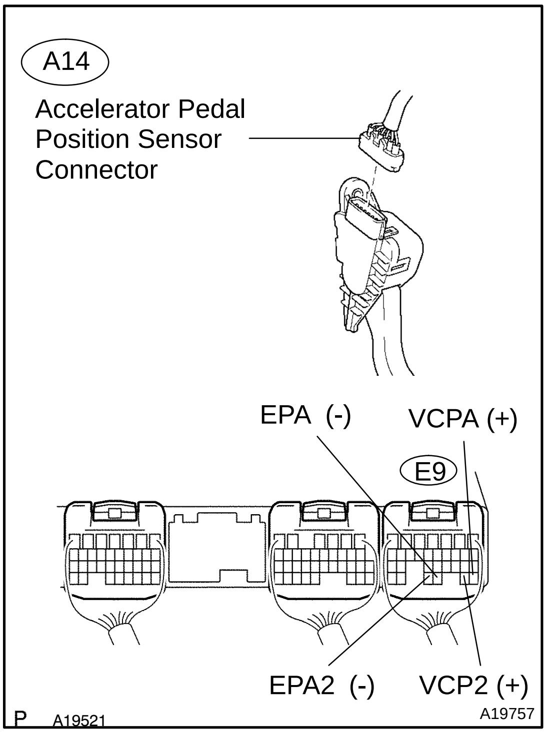
OK:

Accelerator Pedal Position	Tester Connection VPA (E9-22) - EPA (E9-28)	Tester Connection VPA2 (E9-23) - EPA2 (E9-29)
Released	0.5 to 1.1 V	1.2 to 2.0 V
Depressed	2.6 to 4.5 V	3.4 to 5.3 V

OK — **Replace ECM (See page SF-60).**

NG

2	Check for open and short in harness and connector between accelerator pedal position sensor and ECM.



PREPARATION:

(a) Turn the ignition switch ON.

(b) Disconnect the A14 accelerator pedal position sensor connector.

CHECK:

Measure the voltage between the specified terminals of the E9 ECM connector.

OK:

Tester Connection	Specified Condition
VCPA (E9-26) - EPA (E9-28)	4.5 to 5.5 V
VCP2 (E9-27) - EPA2 (E9-29)	4.5 to 5.5 V

NG → **Replace ECM (See page SF-60).**

OK

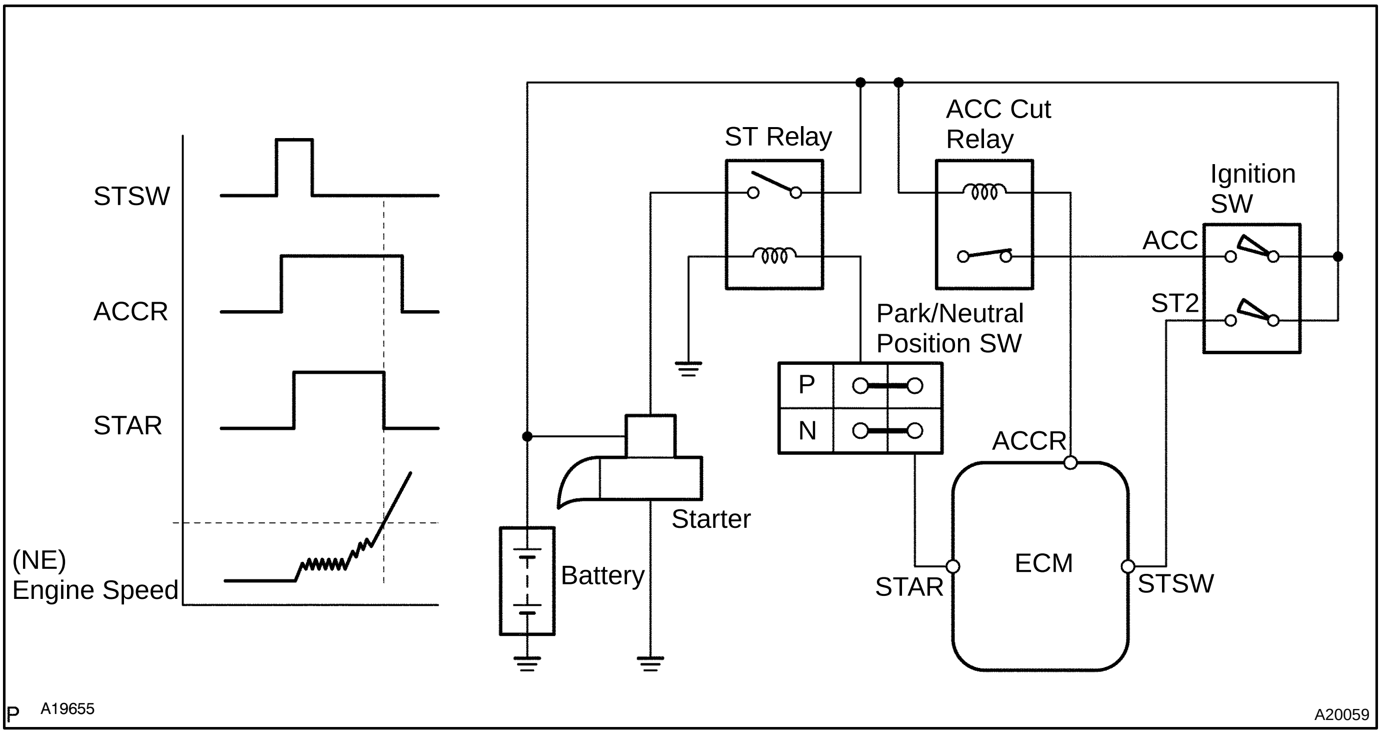
Replace accelerator pedal assembly.

DIC2U-01

Cranking Hold Function Circuit

CIRCUIT DESCRIPTION

The starter is controlled by the ECM, when the ECM detects a start signal (STSW) from the ignition switch, this system monitors the engine speed (NE) and continues to operate the starter until it has determined that the engine has started (engine speed reaches approximately 500 rpm). If the engine is already running and the ignition switch is turned to START, the ECM will not operate the starter.



WIRING DIAGRAM

Refer to DTC P0617 on page DI-296 .

INSPECTION PROCEDURE

Hand-held tester:

1	**Check operation of engine cranking.**

CHECK:

When turning the ignition switch to the START position, check whether the starter motor starts.

OK:

Starter motor starts.

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

NG

2	**Connect hand-held tester, and check STA signal.**

PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON, and push the hand-held tester main switch ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STARTER SIG.

CHECK:
Read the STA signal on the hand-held tester while the starter operates.

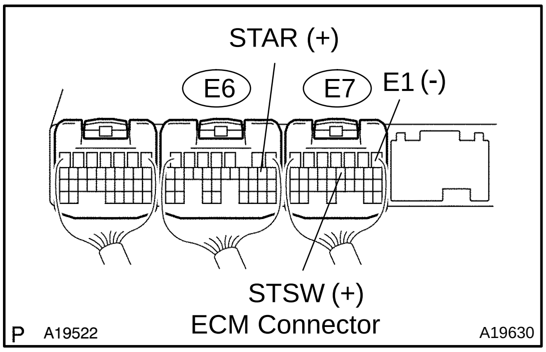
OK:

Ignition Switch Position	ON	START
STA Signal	OFF	ON

NG → **Go to step 5.**

OK

3	**Check voltage between terminal STAR, STSW and E1 of ECM connector.**



CHECK:
Measure the voltage between the terminals of the E6 and E7 ECM connectors, while cranking the engine (ignition switch START position).

OK:

Tester Connection	Specified Condition
STAR (E6-9) - E1 (E7-1)	9 to 14 V
STSW (E7-12) - E1 (E7-1)	9 to 14 V

RESULT:

Terminal STAR	Terminal STSW	Proceed to
9 to 14 V	9 to 14 V	A
0 V	9 to 14 V	B
0 V	0 V	C

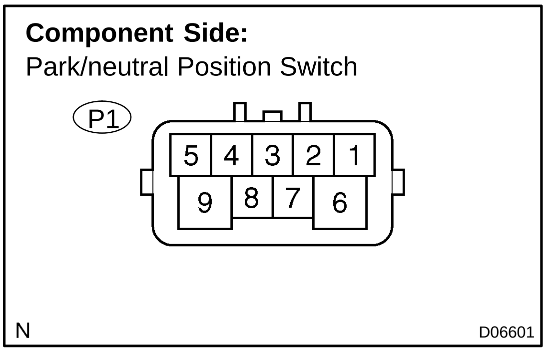
B → **Replace ECM (See page SF-60).**

C → **Go to step 9.**

A

4 Check park/neutral position switch.

Component Side:
Park/neutral Position Switch



PREPARATION:
Remove the P1 park/neutral position switch connector.

CHECK:
Check continuity between each terminal shown below when the shift lever is moved to each range.

Shift range	Terminal No. to continuity	
P	1 - 3	6 - 9
R	2 - 3	-
N	3 - 5	6 - 9
D	3 - 7	-
2	3 - 4	-
L	3 - 8	-

OK:
There is continuity.

NG → **Replace the park/neutral position switch.**

OK

Check and repair harness and connector between park/neutral position switch and ECM (See page IN-36).

5 Check starter relay (See page ST-18).

NG → **Replace starter relay.**

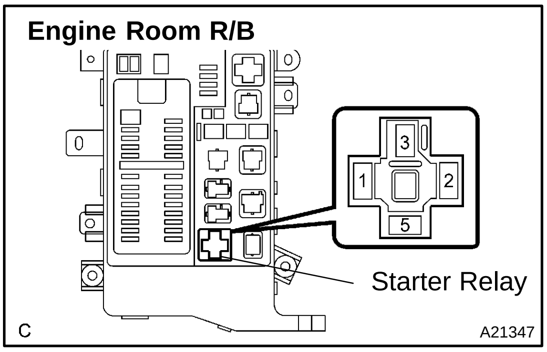
OK

6 Check for open and short in harness and connector between park/neutral position switch and starter relay, starter relay and body ground (See page IN-36).

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

OK

7	Check engine room R/B (Starter relay voltage).



PREPARATION:
Remove the starter relay from the engine room R/B.
CHECK:
Measure the voltage between the terminal of the engine room R/B and body ground.
OK:

Tester Connection	Specified Condition
Starter relay (5) - Body ground	9 to 14 V

NG → **Check and repair harness and connector between starter relay and battery.**

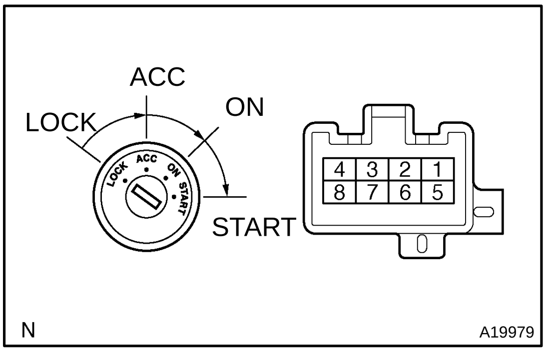
OK

8	Check starter (See page ST-16).

NG → **Repair or replace starter.**

OK

9	Check ignition switch.



PREPARATION:
(a) Remove the lower finish panel.
(b) Disconnect the ignition switch connector.
CHECK:
Check continuity between terminals shown below.
OK:

Switch Position	Terminal No. to continuity	
LOCK	-	-
ACC	2-3	-
ON	2-3-4	6-7
START	1-2-4	6-7-8

NG → **Replace ignition switch.**

OK

Check for open in harness and connector between ECM and ignition switch, ignition switch and battery (See page IN-36).

OBD II scan tool (excluding hand-held tester):

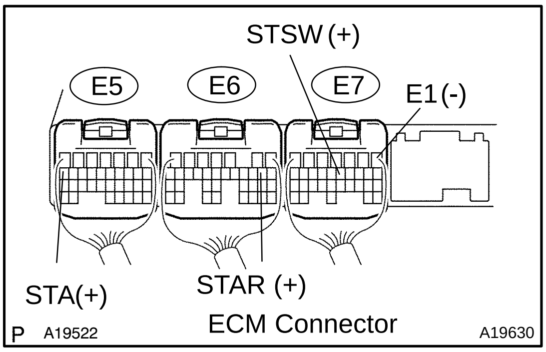
1	Check operation of engine cranking.

CHECK:
When turning the ignition switch to the ST position, check whether the starter motor starts.

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

NG ↓

2	Check voltage between terminal STSW, STAR, STA and E1 of ECM connector.



CHECK:
Measure the voltage between the terminals of E5, E6 and E7 ECM connectors, while cranking the engine (ignition switch START position).

OK:

Tester Connection	Specified Condition
STA (E5-17) - E1 (E7-1)	9 to 14 V
STAR (E6-9) - E1 (E7-1)	9 to 14 V
STSW (E7-12) - E1 (E7-1)	9 to 14 V

RESULT:

Terminal STA	Terminal STAR	Terminal STSW	Proceed to
9 to 14 V	9 to 14 V	9 to 14 V	A
0 V	9 to 14 V	9 to 14 V	B
0 V	0 V	9 to 14 V	C
0 V	0 V	0 V	D

B → **Go to step 7.**

C → **Replace ECM (See page SF-60).**

D → **Go to step 8.**

A ↓

3	Check starter relay (See page ST-18).

NG → Replace starter relay.

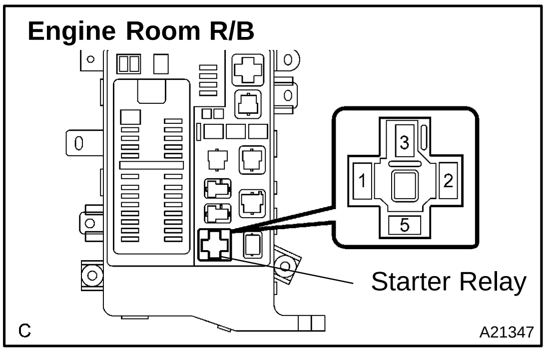
OK

4	Check for open and short in harness and connector between park/neutral position switch and starter relay, starter relay and body ground (See page IN-36).

NG → Repair or replace harness or connector.

OK

5	Check engine room R/B (Starter relay voltage).



PREPARATION:
Remove the starter relay from the engine room R/B.
CHECK:
Measure the voltage between the terminal of the engine room R/B and body ground.
OK:

Tester Connection	Specified Condition
Starter relay (5) - Body ground	9 to 14 V

NG → Check and repair harness and connector between starter relay and battery (See page IN-36).

OK

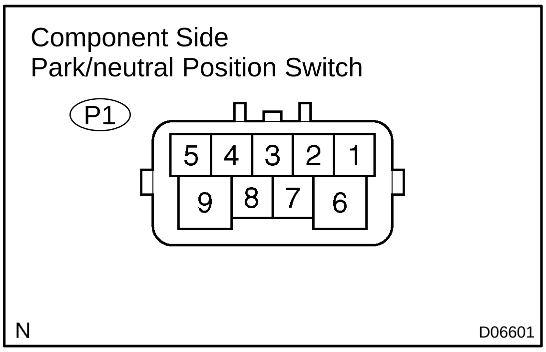
6	**Check starter (See page ST-16).**

NG	**Repair or replace starter.**

OK

Check and repair harness and connector between starter relay and starter, starter and battery (See page IN-36).

7	**Check park/neutral position switch.**



PREPARATION:

Remove the P1 park/neutral position switch connector.

CHECK:

Check continuity between each terminal shown below when the shift lever is moved to each range.

Shift range	Terminal No. to continuity	
P	1 - 3	6 - 9
R	2 - 3	-
N	3 - 5	6 - 9
D	3 - 7	-
2	3 - 4	-
L	3 - 8	-

OK:

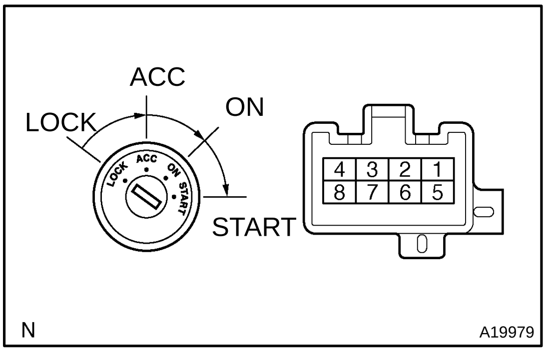
There is continuity.

NG	**Replace the park/neutral position switch.**

OK

Check and repair harness and connector between park/neutral position switch and ECM (See page IN-36).

8	**Check ignition switch.**



PREPARATION:
(a) Remove the lower finish panel.
(b) Disconnect the ignition switch connector.

CHECK:
Check continuity between terminals shown below.

OK:

Switch Position	Terminal No. to continuity	
LOCK	-	-
ACC	2-3	-
ON	2-3-4	6-7
START	1-2-4	6-7-8

NG → **Replace ignition switch.**

OK

Check and replace harness and connector between ECM and ignition switch, ignition switch and battery (See page IN-36).

DI079-18

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE CONTROL SYSTEM Check Sheet

Inspector's Name ______

Customer's Name		VIN	
Driver's Name		Production Date	
Data Vehicle Brought in		Licence Plate No.	
Engine model		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. ____ ˚C/____ ˚F)
	Place	☐ Highway ☐ Suburbs ☐ Inner city ☐ Uphill ☐ Downhill ☐ Rough road ☐ Other ______
	Engine Temp.	☐ Cold ☐ Warming up ☐ After warming up ☐ Any temp. ☐ Other ______
	Engine Operation	☐ Starting ☐ Just after starting (min.) ☐ Idling ☐ Racing ☐ Driving ☐ Constant speed ☐ Acceleration ☐ Deceleration ☐ A/C switch ON/OFF ☐ Other ______

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

DI1L4-19

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 the codes listed in the table below. For details of each code, refer to the ”See page” under the respective ”DTC No.” in the DTC chart.

DTC No. (See page)	Detection Item	Trouble Area	MIL*1	Memory
P0031 (DI-49)	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 1)	•Open in heater circuit of heated oxygen sensor •Heated oxygen sensor heater •EFI or ECD relay •ECM	☐	☐
P0032 (DI-49)	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 1)	•Short in heater circuit of heated oxygen sensor •Heated oxygen sensor heater •EFI or ECD relay •ECM	☐	☐
P0037 (DI-49)	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 2)	•Open in heater circuit of heated oxygen sensor •Heated oxygen sensor heater •EFI or ECD relay •ECM	☐	☐
P0038 (DI-49)	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 2)	•Short in heater circuit of heated oxygen sensor •Heated oxygen sensor heater •EFI or ECD relay •ECM	☐	☐
P0051 (DI-49)	Oxygen Sensor Heater Control Circuit Low (Bank 2 Sensor 1)	•Open in heater circuit of heated oxygen sensor •Heated oxygen sensor heater •EFI or ECD relay •ECM	☐	☐
P0052 (DI-49)	Oxygen Sensor Heater Control Circuit High (Bank 2 Sensor 1)	•Short in heater circuit of heated oxygen sensor •Heated oxygen sensor heater •EFI or ECD relay •ECM	☐	☐
P0057 (DI-49)	Oxygen Sensor Heater Control Circuit Low (Bank 2 Sensor 2)	•Open in heater circuit of heated oxygen sensor •Heated oxygen sensor heater •EFI or ECD relay •ECM	☐	☐
P0058 (DI-49)	Oxygen Sensor Heater Control Circuit High (Bank 2 Sensor 2)	•Short in heater circuit of heated oxygen sensor •Heated oxygen sensor heater •EFI or ECD relay •ECM	☐	☐
P0100 (DI-57)	Mass or Volume Air Flow Circuit	•Open or short in mass air flow meter circuit •Mass air flow meter •ECM	☐	☐
P0101 (DI-65)	Mass or Volume Air Flow Circuit Range/Performance Problem	•Mass air flow meter	☐	☐
P0102 (DI-57)	Mass or Volume Air Flow Circuit Low Input	•Open or short in mass air flow meter circuit •Mass air flow meter •ECM	☐	☐
P0103 (DI-57)	Mass or Volume Air Flow Circuit High Input	•Open or short in mass air flow meter circuit (+B circuit) •Mass air flow meter •ECM	☐	☐

P0110 (DI-68)	Intake Air Temperature Circuit	✶Open or short in intake air temperature sensor circuit ✶Intake air temperature sensor (built in mass air flow meter) ✶ECM	☐	☐
P0112 (DI-68)	Intake Air Temperature Circuit Low Input	✶Open or short in intake air temperature sensor circuit ✶Intake air temperature sensor (built in mass air flow meter) ✶ECM	☐	☐
P0113 (DI-68)	Intake Air Temperature Circuit High Input	✶Open or short in intake air temperature sensor circuit ✶Intake air temperature sensor (built in mass air flow meter) ✶ECM	☐	☐
P0115 (DI-75)	Engine Coolant Temperature Circuit	✶Open or short in engine coolant temperature sensor circuit ✶Engine coolant temperature sensor ✶ECM	☐	☐
P0116 (DI-82)	Engine Coolant Temperature Circuit Range/Performance Problem	✶Engine coolant temperature sensor	☐	☐
P0117 (DI-75)	Engine Coolant Temperature Circuit Low Input	✶Open or short in engine coolant temperature sensor circuit ✶Engine coolant temperature sensor ✶ECM	☐	☐
P0118 (DI-75)	Engine Coolant Temperature Circuit High Input	✶Open or short in engine coolant temperature sensor circuit ✶Engine coolant temperature sensor ✶ECM	☐	☐
P0120 (DI-84)	Throttle Pedal Position Sensor/ Switch "A" Circuit	✶Throttle control motor and sensor ✶ECM	☐	☐
P0121 (DI-97)	Throttle/Pedal Position Sensor/ Switch "A" Circuit Range/Performance Problem	✶Throttle control motor and sensor	☐	☐
P0122 (DI-84)	Throttle/Pedal Position Sensor/ Switch "A" Circuit Low Input	✶Throttle control motor and sensor ✶Short in VTA1 circuit ✶Open in VC circuit ✶ECM	☐	☐
P0123 (DI-84)	Throttle/Pedal Position Sensor/ Switch "A" Circuit High Input	✶Throttle control motor and sensor ✶Open in VTA1 circuit ✶Open in E2 circuit ✶VC and VTA1 circuit are short-circuited ✶ECM	☐	☐
P0125 (DI-99)	Insufficient Coolant Temperature for Closed Loop Fuel Control	✶Cooling system ✶Engine coolant temperature sensor ✶Thermostat	☐	☐
P0128 (DI-102)	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)	✶Thermostat ✶Cooling system ✶Engine coolant temperature sensor ✶ECM	¿	¿
P0130 (DI-106)	Oxygen Sensor Circuit (Bank 1 Sensor 1)	✶Open or short in heated oxygen sensor circuit ✶Heated oxygen sensor ✶Heated oxygen sensor heater ✶EFI or ECD relay ✶Air induction system ✶Fuel pressure ✶Injector ✶ECM	☐	☐

P0133 (DI-117)	Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 1)	★Open or short in heated oxygen sensor circuit ★Heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★Air induction system ★Fuel pressure ★Injector ★ECM	☐	☐
P0134 (DI-129)	Oxygen Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	★Open or short in heated oxygen sensor circuit ★Heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★Air induction system ★Fuel pressure ★PCV hose connection ★PCV valve and hose ★Injector ★Gas leakage on exhaust system ★PCV piping ★ECM	☐	☐
P0136 (DI-138)	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)	★Open or short in heated oxygen sensor circuit ★Heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay	☐	☐
P0150 (DI-106)	Oxygen Sensor Circuit (Bank 2 Sensor 1)	★Open or short in heated oxygen sensor circuit ★Heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★Air induction system ★Fuel pressure ★Injector ★ECM	☐	☐
P0153 (DI-117)	Oxygen Sensor Circuit Slow Response (Bank 2 Sensor 1)	★Open or short in heated oxygen sensor circuit ★Heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★Air induction system ★Fuel pressure ★Injector ★ECM	☐	☐
P0154 (DI-129)	Oxygen Sensor Circuit No Activity Detected (Bank 2 Sensor 1)	★Open or short in heated oxygen sensor circuit ★Heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★Air induction system ★Fuel pressure ★PCV hose connection ★PCV valve and hose ★Injector ★Gas leakage on exhaust system ★PCV piping ★ECM	☐	☐
P0156 (DI-138)	Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 2)	★Open or short in heated oxygen sensor circuit ★Heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay	☐	☐

P0171 (DI-147)	System too Lean (Bank 1)	★Air induction system ★Injector blockage ★Mass air flow meter ★Engine coolant temperature sensor ★Fuel pressure ★Gas leakage on exhaust system ★Open or short in heated oxygen sensor (bank 1 sensor 1) circuit ★Heated oxygen sensor (bank 1 sensor 1) ★Heated oxygen sensor heater ★EFI or ECD relay ★PCV piping ★ECM	☐	☐
P0172 (DI-147)	System too Rich (Bank 1)	★Injector leak, blockage ★Mass air flow meter ★Engine coolant temperature sensor ★Ignition system ★Fuel pressure ★Gas leakage in exhaust system ★Open or short in heated oxygen sensor (bank 1 sensor 1) circuit ★Heated oxygen sensor (bank 1 sensor 1) ★ECM	☐	☐
P0174 (DI-147)	System too Lean (Bank 2)	★Air induction system ★Injector blockage ★Mass air flow meter ★Engine coolant temperature sensor ★Fuel pressure ★Gas leakage on exhaust system ★Open or short in heated oxygen sensor (bank 2 sensor 1) circuit ★Heated oxygen sensor (bank 2 sensor 1) ★Heated oxygen sensor heater ★EFI or ECD relay ★PCV piping ★ECM	☐	☐
P0175 (DI-147)	System too Rich (Bank 2)	★Injector leak, blockage ★Mass air flow meter ★Engine coolant temperature sensor ★Ignition system ★Fuel pressure ★Gas leakage in exhaust system ★Open or short in heated oxygen sensor (bank 2 sensor 1) circuit ★Heated oxygen sensor (bank 2 sensor 1) ★ECM	☐	☐
P0220 (DI-84)	Throttle/Pedal Position Sensor/ Switch "B" Circuit	★Throttle control motor and sensor ★ECM	☐	☐
P0222 (DI-84)	Throttle/Pedal Position Sensor/ Switch "B" Circuit Low Input	★Throttle control motor and sensor ★Short in VTA2 circuit ★Open in VC circuit ★ECM	☐	☐
P0223 (DI-84)	Throttle/Pedal Position Sensor/ Switch "B" Circuit High Input	★Throttle control motor and sensor ★Open in VTA2 circuit ★Open in E2 circuit ★VC and VTA2 circuit are short-circuited ★ECM	☐	☐

P0230 (DI-162)	Fuel Pump Primary Circuit	★Open or short in fuel pump relay circuit ★Fuel pump relay ★Circuit opening relay ★Fuel pump ★ECM	-	☐
P0300 (DI-167)	Random/Multiple Cylinder Misfire Detected	★Open or short in engine wire ★Connector connection ★Vacuum hose connection ★Ignition system ★Injector ★Fuel pressure ★Mass air flow meter ★Engine coolant temperature sensor ★Compression pressure ★Valve clearance ★Valve timing ★PCV piping ★ECM	☐*2	☐
P0301 (DI-167)	Cylinder 1 Misfire Detected		☐*2	☐
P0302 (DI-167)	Cylinder 2 Misfire Detected		☐*2	☐
P0303 (DI-167)	Cylinder 3 Misfire Detected		☐*2	☐
P0304 (DI-167)	Cylinder 4 Misfire Detected		☐*2	☐
P0305 (DI-167)	Cylinder 5 Misfire Detected		☐*2	☐
P0306 (DI-167)	Cylinder 6 Misfire Detected		☐*2	☐
P0307 (DI-167)	Cylinder 7 Misfire Detected		☐*2	☐
P0308 (DI-167)	Cylinder 8 Misfire Detected		☐*2	☐
P0325 (DI-186)	Knock Sensor 1 Circuit (Bank 1 or Single Sensor)	★Open or short in knock sensor 1 circuit ★Knock sensor 1 (looseness) ★ECM	☐	☐
P0330 (DI-186)	Knock Sensor 2 Circuit (Bank 2)	★Open or short in knock sensor 2 circuit ★Knock sensor 2 (looseness) ★ECM	☐	☐
P0335 (DI-191)	Crankshaft Position Sensor "A" Circuit	★Open or short in crankshaft position sensor circuit ★Crankshaft position sensor ★Signal plate ★ECM	☐	☐
P0339 (DI-191)	Crankshaft Position Sensor "A" Circuit Intermittent	★Open or short in crankshaft position sensor circuit ★Crankshaft position sensor ★Signal plate ★ECM	-	☐
P0340 (DI-197)	Camshaft Position Sensor "A" Circuit (Bank 1 or Single Sensor)	★Open or short in camshaft position sensor circuit ★Camshaft position sensor ★LH camshaft timing pulley ★Jumping teeth of timing belt ★ECM	☐	☐
P0341 (DI-197)	Camshaft Position Sensor "A" Circuit Range/Performance (Bank 1 or Single Sensor)		☐	☐
P0351 (DI-202)	Ignition Coil "A" Primary/Secondary Circuit	★Open or short in IGF 1 and IGT 1 circuit from No. 1 ignition coil with igniter to ECM ★No. 1 ignition coil with igniter ★Ignition system ★ECM	☐	☐
P0352 (DI-202)	Ignition Coil "B" Primary/Secondary Circuit	★Open or short in IGF 2 and IGT 2 circuit from No. 2 ignition coil with igniter to ECM ★No. 2 ignition coil with igniter ★Ignition system ★ECM	☐	☐

P0353 (DI-202)	Ignition Coil "C" Primary/Secondary Circuit	★Open or short in IGF 2 and IGT 3 circuit from No. 3 ignition coil with igniter to ECM ★No. 3 ignition coil with igniter ★Ignition system ★ECM	☐	☐
P0354 (DI-202)	Ignition Coil "D" Primary/Secondary Circuit	★Open or short in IGF 1 and IGT 4 circuit from No. 4 ignition coil with igniter to ECM ★No. 4 ignition coil with igniter ★Ignition system ★ECM	☐	☐
P0355 (DI-202)	Ignition Coil "E" Primary/Secondary Circuit	★Open or short in IGF 2 and IGT 5 circuit from No. 5 ignition coil with igniter to ECM ★No. 5 ignition coil with igniter ★Ignition system ★ECM	☐	☐
P0356 (DI-202)	Ignition Coil "F" Primary/Secondary Circuit	★Open or short in IGF 1 and IGT 6 circuit from No. 6 ignition coil with igniter to ECM ★No. 6 ignition coil with igniter ★Ignition system ★ECM	☐	☐
P0357 (DI-202)	Ignition Coil "G" Primary/Secondary Circuit	★Open or short in IGF 1 and IGT 7 circuit from No. 7 ignition coil with igniter to ECM ★No. 7 ignition coil with igniter ★Ignition system ★ECM	☐	☐
P0358 (DI-202)	Ignition Coil "H" Primary/Secondary Circuit	★Open or short in IGF 2 and IGT 8 circuit from No. 8 ignition coil with igniter to ECM ★No. 8 ignition coil with igniter ★Ignition system ★ECM	☐	☐
P0420 (DI-215)	Catalyst System Efficiency Below Threshold (Bank 1)	★Gas leakage on exhaust system ★Heated oxygen sensor (bank 1 sensor 1, 2) ★Three-way catalytic converter	☐	☐
P0430 (DI-215)	Catalyst System Efficiency Below Threshold (Bank 2)	★Gas leakage on exhaust system ★Heated oxygen sensor (bank 2 sensor 1, 2) ★Three-way catalytic converter	☐	☐
P0441 (DI-222)	Evaporative Emission Control System Incorrect Purge Flow	★Vacuum hose cracks, holed, blocked, damaged or disconnected ((1), (2), (3), (4), (5), (6), (7), (8) and (9) in Fig. 1) ★Fuel tank cap incorrectly installed ★Fuel tank cap cracked or damaged ★Open or short in vapor pressure sensor circuit ★Vapor pressure sensor ★Open or short in VSV circuit for EVAP ★EVAP VSV ★Open or short in VSV circuit for CCV ★CCV ★Open or short in VSV circuit for pressure switching valve ★Pressure switching valve ★Fuel tank cracked, holed or damaged ★Charcoal canister cracked, holed or damaged ★ECM	☐	☐

P0442 (DI-245)	Evaporative Emission Control System Leak Detected (Small Leak)	After the negative pressure introduction has been completed, if the pressure in the EVAP system sharply increases. ✶Hose or tube cracked, holed, damaged or loose seal ((3) in Fig. 1) ✶Fuel tank cap incorrectly installed ✶Fuel tank cap cracked or damaged ✶Vacuum hose cracked, holed, blocked, damaged or disconnected ((1), (2), (4), (5), (6), (7), (8) and (9) in Fig. 1) ✶Fuel tank cracked, holed or damaged ✶Charcoal canister cracked, holed or damaged ✶Open or short in vapor pressure sensor circuit ✶Vapor pressure sensor ✶ECM	□	□
P0446 (DI-222)	Evaporative Emission Control System Vent Control Circuit	✶Same as DTC No. P0441	□	□
P0451 (DI-268)	Evaporative Emission Control System Pressure Sensor/Switch Range/Performance	✶Open or short in vapor pressure sensor circuit ✶Vapor pressure sensor ✶ECM	□	□
P0452 (DI-268)	Evaporative Emission Control System Pressure Sensor/Switch Low Input	✶Open in vapor pressure sensor circuit ✶Vapor pressure sensor ✶ECM	□	□
P0453 (DI-268)	Evaporative Emission Control System Pressure Sensor/Switch High Input	✶Short in vapor pressure sensor circuit ✶Vapor pressure sensor ✶ECM	□	□
P0455 (DI-245)	Evaporative Emission Control System Leak Detected (Gross Leak)	✶Same as DTC No. P0442	□	□
P0456 (DI-245)	Evaporative Emission Control System Leak Detected (Very Small Leak)	✶Same as DTC No. P0442	□	□
P0500 (DI-274)	Vehicle Speed Sensor "A"	✶Combination meter ✶Open or short in vehicle speed sensor circuit ✶Vehicle speed sensor ✶ECM	□	□
P0503 (DI-274)	Vehicle Speed Sensor "A" Intermittent/Erratic/High		-	□
P0504 (DI-278)	Brake Switch "A"/"B" Correlation	✶Short in stop lamp switch signal circuit ✶STOP fuse ✶Stop lamp switch ✶ECM	-	□
P0505 (DI-286)	Idle Air Control System	✶Air induction system ✶Electric throttle control system ✶PCV hose connection	□	□
P0560 (DI-290)	System Voltage	✶Back-up power source circuit ✶EFI or ECD No. 1 fuse ✶ECM	□	□
P0571 (DI-993)	Brake Switch "A" Circuit	✶Stop light switch signal circuit ✶Stop light switch ✶ECM	-	□
P0604 (DI-294)	Internal Control Module Random Access Memory (RAM) Error	✶ECM	□	□
P0606 (DI-294)	ECM/PCM Processor	✶ECM	□	□
P0607 (DI-294)	Control Module Performance	✶ECM	□	□

P0617 (DI-296)	Starter Relay Circuit High	★Park/neutral position switch ★Starter relay circuit ★Ignition switch ★ECM	☐	☐
P0657 (DI-294)	Actuator Supply Voltage Circuit / Open	★ECM	☐	☐
P0724 (DI-424)	Brake Switch "B" Circuit High	★Short in stop light switch signal circuit ★Stop light switch ★ECM	☐	☐
P2102 (DI-302)	Throttle Actuator Control Motor Circuit Low	★Open in throttle control motor and sensor circuit ★Throttle control motor and sensor ★ECM	☐	☐
P2103 (DI-302)	Throttle Actuator Control Motor Circuit High	★Short in throttle control motor and sensor circuit ★Throttle control motor and sensor ★Throttle valve ★Throttle body ★ECM	☐	☐
P2111 (DI-306)	Throttle Actuator Control System - Stuck Open	★Throttle control motor and sensor circuit ★Throttle control motor and sensor ★Throttle valve ★Throttle body	☐	☐
P2112 (DI-306)	Throttle Actuator Control System - Stuck Closed	★Throttle control motor and sensor circuit ★Throttle control motor and sensor ★Throttle valve ★Throttle body	☐	☐
P2118 (DI-310)	Throttle Actuator Control Motor Current Range/Performance	★Open in throttle control motor and sensor power source circuit ★ETCS fuse ★ECM	☐	☐
P2119 (DI-315)	Throttle Actuator Control Throttle Body Range/Performance	★Electric throttle control system ★Throttle body	☐	☐
P2120 (DI-318)	Throttle/Pedal Position Sensor/ Switch "D" Circuit	★Accelerator pedal position sensor ★ECM	☐	☐
P2121 (DI-331)	Throttle/Pedal Position Sensor/ Switch "D" Circuit Range/Performance	★Accelerator pedal position sensor	☐	☐
P2122 (DI-318)	Throttle/Pedal Position Sensor/ Switch "D" Circuit Low Input	★Accelerator pedal position sensor ★VCPA circuit open ★VPA circuit open or ground short ★ECM	☐	☐
P2123 (DI-318)	Throttle/Pedal Position Sensor/ Switch "D" Circuit High Input	★Accelerator pedal position sensor ★EPA circuit open ★ECM	☐	☐
P2125 (DI-318)	Throttle/Pedal Position Sensor/ Switch "E" Circuit	★Accelerator pedal position sensor ★ECM	☐	☐
P2127 (DI-318)	Throttle/Pedal Position Sensor/ Switch "E" Circuit Low Input	★Accelerator pedal position sensor ★VCP2 circuit open ★VPA2 circuit open or ground short ★ECM	☐	☐
P2128 (DI-318)	Throttle/Pedal Position Sensor/ Switch "E" Circuit High Input	★Accelerator pedal position sensor ★EPA circuit open ★ECM	☐	☐
P2135 (DI-84)	Throttle Pedal Position Sensor/ Switch "A" / "B" Voltage Correlation	★VTA1 and VTA2 circuit are short-circuited ★Throttle control motor and sensor ★ECM	☐	☐

P2138 (DI-318)	Throttle Pedal Position Sensor/ Switch "D" / "E" Voltage Correlation	★VPA and VPA2 circuit are short circuited ★Accelerator pedal position sensor ★ECM	☐	☐
P2195 (DI-106)	Oxygen Sensor Signal Stuck Lean (Bank 1 Sensor 1)	★Open or short in heated oxygen sensor circuit ★Heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★Air induction system ★Fuel pressure ★Injector ★ECM	☐	☐
P2196 (DI-106)	Oxygen Sensor Signal Stuck Rich (Bank 1 Sensor 1)		☐	☐
P2197 (DI-106)	Oxygen Sensor Signal Stuck Lean (Bank 2 Sensor 1)		☐	☐
P2198 (DI-106)	Oxygen Sensor Signal Stuck Rich (Bank 2 Sensor 1)		☐	☐
P2418 (DI-222)	Evaporative Emission System Valve Control Circuit/Open	★Same as DTC No. P0441	☐	☐

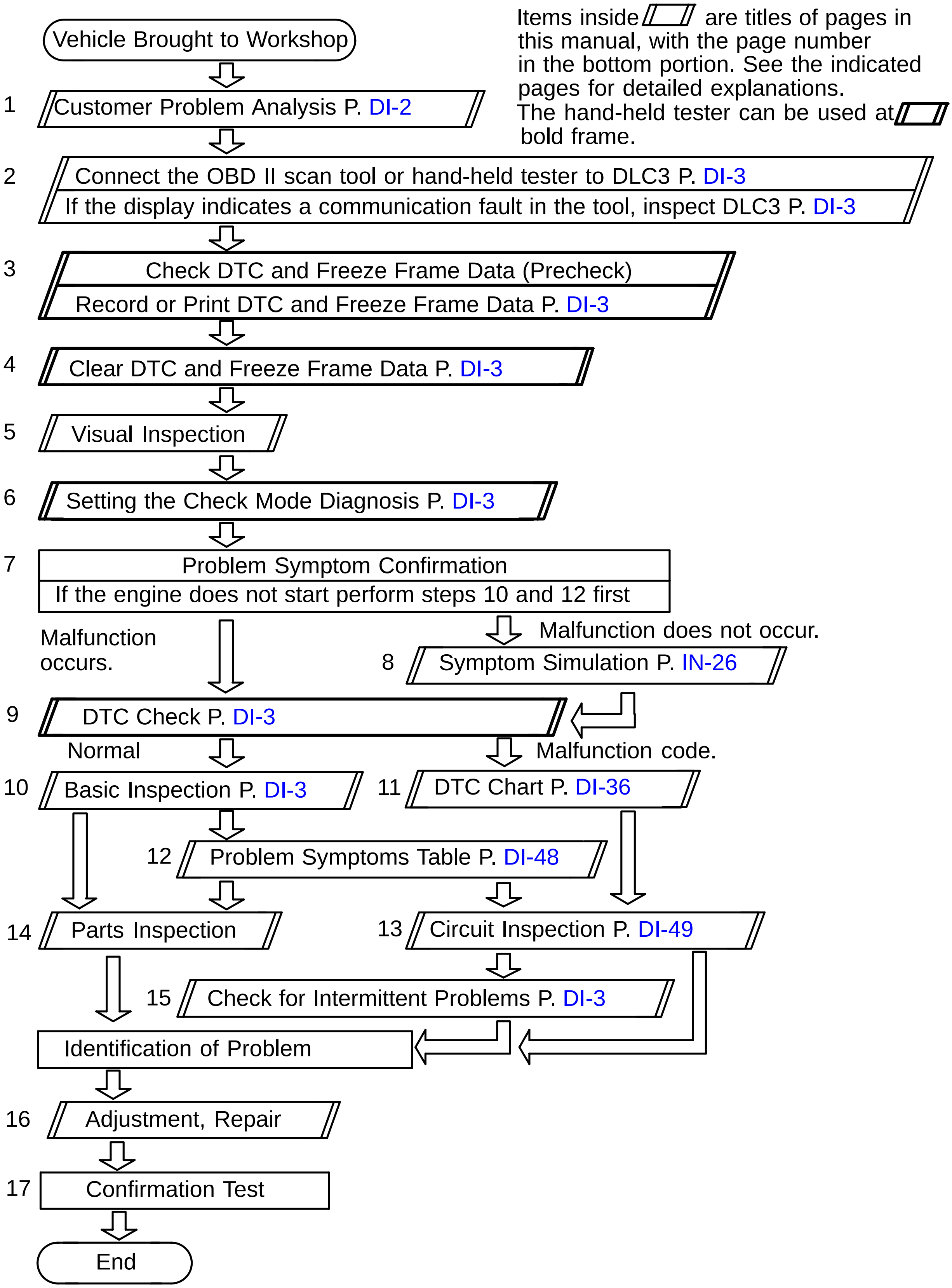
*1: - .... MIL does not light up. ☐ .... MIL lights up.
*2: MIL lights up or blinks.

ENGINE

DI078-23

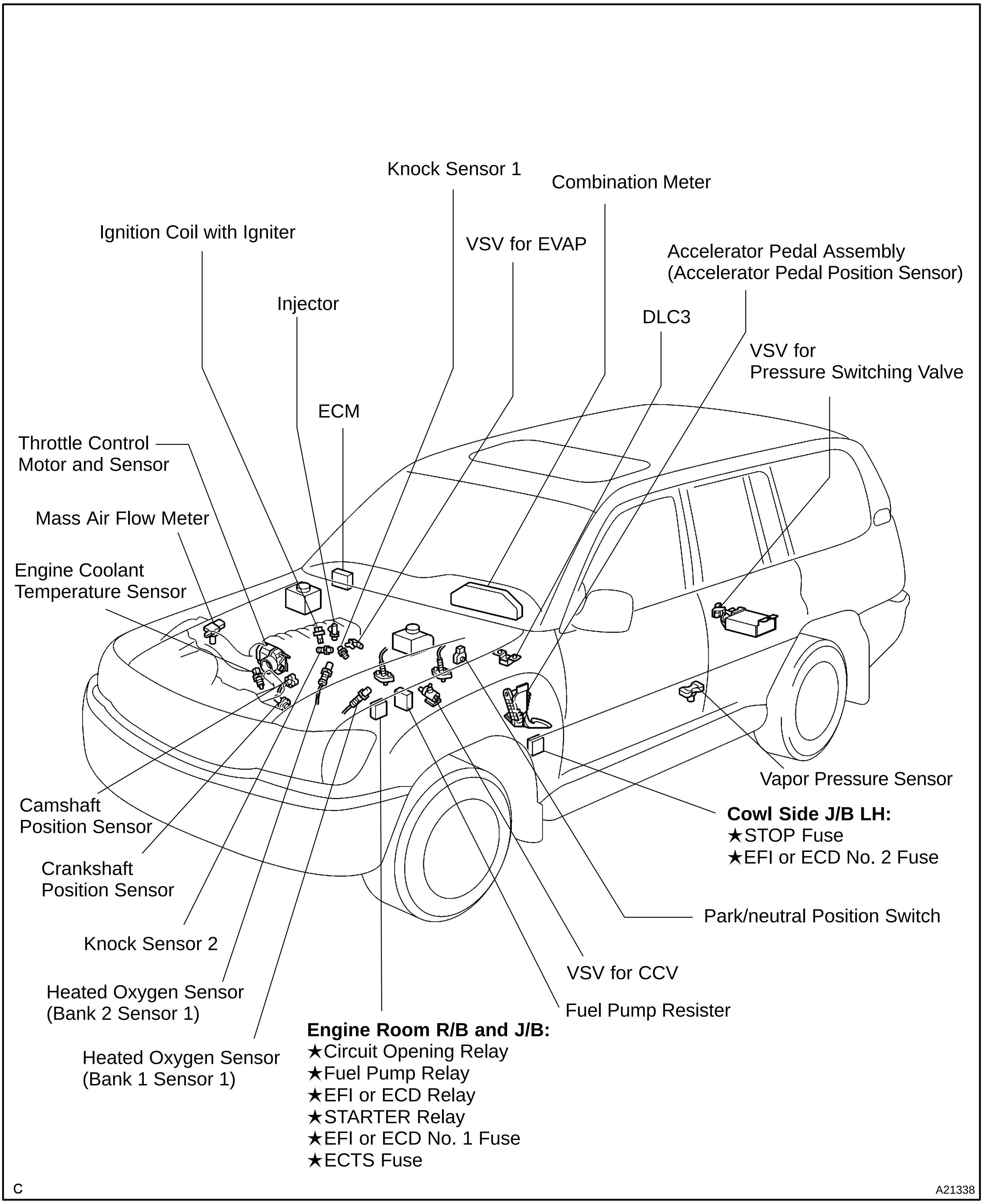
HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot in accordance with the procedure on the following page.



DI1L5-18

PARTS LOCATION



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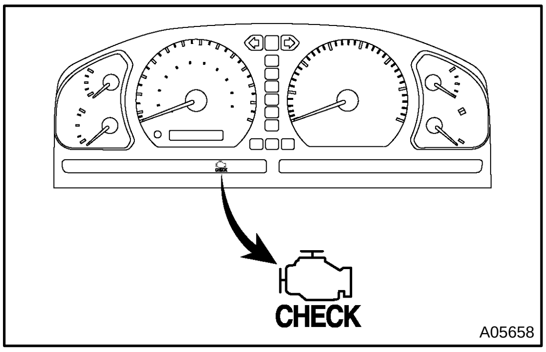

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PRE-CHECK

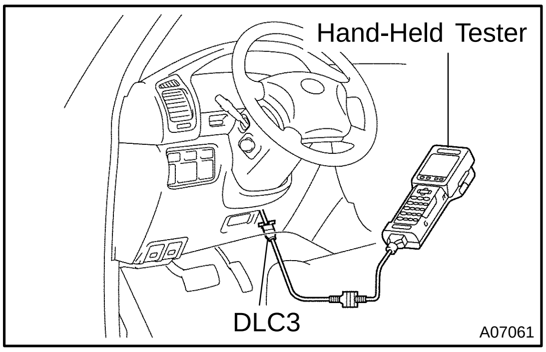
1. DIAGNOSIS SYSTEM

(a) Description

★ When troubleshooting On-Board Diagnostic (OBD II) vehicles, the vehicle must be connected to the OBD II scan tool (in compliance with SAE J1978) or the hand-held tester. Various data output from the vehicle's ECM can then be read.

★ OBD II regulations require that the vehicle's on-board computer illuminates the Malfunction Indicator Light (MIL) on the instrument panel when the computer detects a malfunction in: 1) the emission control system/components, or 2) the powertrain control components (which affect vehicle emissions), or 3) the computer. In addition, the applicable Diagnostic Trouble Codes (DTCs) prescribed by SAE J2012 are recorded in the ECM memory (See page DI-36).

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



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★ To check the DTC, connect the hand-held tester or OBD II scan tool to the Data Link Connector 3 (DLC3) of the vehicle. The hand-held tester or OBD II scan tool also enables you to erase the DTC and check the freeze frame data and various forms of engine data (See the instruction manual for the OBD II scan tool or the hand-held tester). The DTC includes SAE controlled codes and manufacturer controlled codes. SAE controlled codes must be set according to the SAE, while manufacturer controlled codes can be set by a manufacturer with certain restrictions (See the DTC chart on page DI-36).

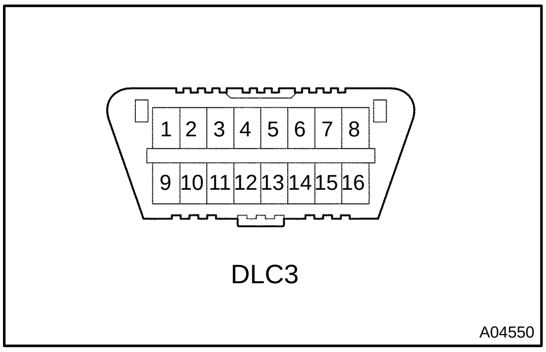
★ The diagnosis system operates in "normal mode" during normal vehicle use. In "normal mode", 2 trip detection logic* is used to ensure accurate detection of malfunctions. A "check mode" is also available to technicians as an option. In "check mode", 1 trip detection logic is used for simulating malfunction symptoms and increasing the system's ability to detect malfunctions, including intermittent malfunctions (hand-held tester only) (See step 3).

★ *2 trip detection logic:
When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory. This is known as 1st trip detection. If the ignition switch is turned OFF and then ON again, and the same malfunction is detected again, the MIL will illuminate. This is known as 2nd trip detection.

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

Priorities for troubleshooting:
When multiple DTCs occur, find out the order in which the DTCs should be inspected by checking the component's DTC chart. If no instructions are written in the DTC chart, check DTCs in the following order of priority:

(1) DTCs other than fuel trim malfunction DTCs (P0171, P0172, P0174 and P0175) and misfire DTCs (P0300 to P0308).
(2) Fuel trim malfunction DTCs (P0171, P0172, P0174 and P0175).
(3) Misfire DTCs (P0300 to P0308).



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

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

HINT:
Connect the cable of the hand-held tester to the DLC3, turn the ignition switch ON and attempt to use the hand-held tester. If the screen displays UNABLE TO CONNECT TO VEHICLE, a problem exists in the vehicle side or the tester side.

★ If the communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
★ If the communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.

(c) Inspect the battery voltage.
Battery Voltage: 11 to 14 V
If voltage is below 11 V, recharge the battery before proceeding.

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

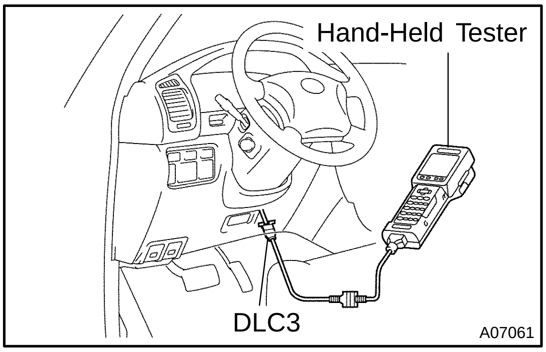
HINT:
If the MIL is not illuminated, troubleshoot the MIL circuit (See page DI-355).

(2) When the engine is started, the MIL should not illuminate. If the lamp remains on, the diagnosis system has detected a malfunction or abnormality in the system.

2. DTC CHECK (Normal Mode)

NOTICE:

- ★ **If no DTC appears in normal mode:**
  On the OBD II scan tool or the hand-held tester check the pending fault code using the Continuous Test Results function (Mode 7 for SAE J1979).
- ★ **When the diagnosis system is changed from normal mode to check mode or vice-versa, all DTCs and freeze frame data recorded in normal mode will be erased. Before changing modes, always check and make a note of DTCs and freeze frame data.**



(a) Checking DTCs using the OBD II scan tool or hand-held tester.

(1) Connect the OBD II scan tool or the hand-held tester to DLC3.

(2) Turn the ignition switch ON.

(3) Use the OBD II scan tool or the hand-held tester to check the DTCs and freeze frame data and then write them down.
For the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODEDS. For the OBD II scan tool, see its instruction manual.

(4) See page DI-36 to confirm the details of the DTCs.

NOTICE:

When simulating a symptom with the OBD II scan tool (excluding hand-held tester) to check the DTCs, use the normal mode. For DTCs chart subject to "2 trip detection logic", perform either of the following actions.

- ★ **Check the pending fault code:**
  For the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
- ★ **Turn the ignition switch OFF after the symptom is simulated once. Then repeat the simulation process again. When the problem has been simulated twice, the MIL comes on and the DTCs are recorded in the ECM.**

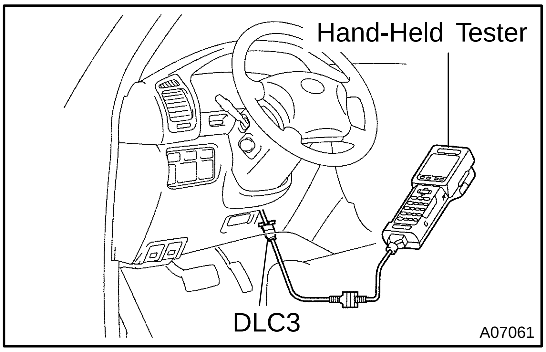
★ **Check the pending fault code using the Continuous Test Results function (Mode 7 for SAE J1979) on the OBD II scan tool.**

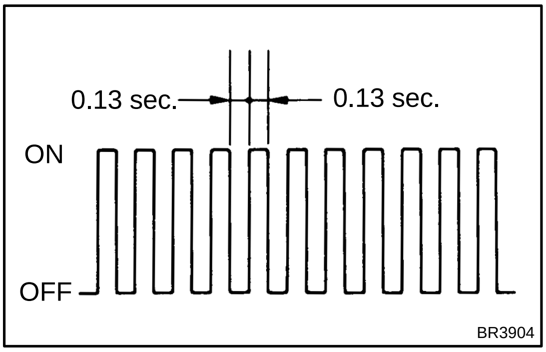
(b) Clearing the DTCs using the OBD II scan tool or the hand-held tester.
  (1) Connect the OBD II scan tool or the hand-held tester to the DLC3.
  (2) Turn the ignition switch ON.
  (3) Erase DTCs and freeze frame data with the OBD II scan tool (complying with SAE J1978) or the hand-held tester. For the hand-held tester: 1) enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODES; and 2) press YES. For the OBD II scan tool, see its instruction manual.

(c) Clearing the DTCs not using the OBD II scan tool or the hand-held tester.
Remove the EFI or ECD No. 1 and ETCS fuses from the engine room J/B for more than 60 seconds, or disconnect the battery terminal for more than 60 seconds.
After disconnecting the battery terminal, perform the ”INITIALIZE procedure.

3. DTC CHECK (Check Mode)

HINT:
Hand-held tester only:
Check mode has a higher sensitivity to detect malfunctions and can detect malfunctions that normal mode cannot detect. Check mode can also detect all the malfunctions that normal mode can detect.





(a) Follow these steps when preparing to use the hand-held tester check mode.
  (1) Make sure that the items below are true:
    ★ Battery positive voltage 11 V or more
    ★ Throttle valve fully closed
    ★ Transmission in the P or N position
    ★ A/C switched OFF
  (2) Turn the ignition switch OFF.
  (3) Connect the hand-held tester to the DLC3.
  (4) Turn the ignition switch ON.
  (5) Change the ECM to check mode with the hand-held tester. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / CHECK MODE. Make sure the MIL flashes as shown in the illustration.

NOTICE:
All DTCs and freeze frame data recorded will be erased if: 1) the hand-held tester is used to change the ECM from normal mode to check mode or vice-versa; or 2) during check mode, the ignition switch is turned from ON to ACC or OFF.

(6) Start the engine. The MIL should turn off after the engine starts.
(7) Simulate the conditions of the malfunction described by the customer.
(8) After simulating the malfunction conditions, use the hand-held tester diagnosis selector to check the DTC, freeze frame data and other data.
(9) After checking the DTC, inspect the applicable circuit.

(b) Clearing DTCs using the OBD II scan tool or the hand-held tester.
(1) Connect the OBD II scan tool or the hand-held tester to the DLC3.
(2) Turn the ignition switch ON.
(3) Erase DTCs and freeze frame data with the OBD II scan tool (complying with SAE J1978) or the hand-held tester. For the hand-held tester: 1) enter the following menus: DIAGNOSIS ENHANCED OBD II / DTC INFO / CLEAR CODES; and 2) press YES. For the OBD II scan tool, see its instruction manual.

(c) Clearing the DTCs without using the OBD II scan tool or the hand-held tester.
Remove the EFI or ECD No. 1 and ETCS fuses from the engine room J/B for more than 60 seconds, or disconnect the battery terminal for more than 60 seconds.
After disconnecting the battery terminal, perform the "INITIALIZE" procedure.

4. FAIL-SAFE CHART

If any of the following code is recorded, the ECM enters fail-safe mode.

DTC No.	Fail-Safe Operation	Fail-Safe Deactivation Conditions
P0031 P0032 P0037 P0038 P0051 P0052 P0057 P0058	The heater circuit in which an abnormality is detected is turned off	Ignition switch OFF
P0100 P0102 P0103	Ignition timing is calculated from engine speed and throttle angle	"Pass" condition detected
P0110 P0112 P0113	Intake air temperature is fixed at 20°C (68°F)	"Pass" condition detected
P0115 P0117 P0118	Engine coolant temperature is fixed at 80°C (176°F)	"Pass" condition detected

P0120 P0121 P0122 P0123 P0220 P0222 P0223 P0607 P0657 P2102 P2103 P2111 P2112 P2118 P2119 P2135	If the Electronic Throttle Control System (ETCS) has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16°) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimal speed. If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly. If the accelerator pedal is depressed quickly, the vehicle may speed up and slow down erratically.	”Pass” condition is detected and then the ignition switch is turned OFF.
P0325 P0330	Max. timing retardation	Ignition switch OFF
P0351 P0352 P0353 P0354 P0355 P0356 P0357 P0358	Fuel cut	”Pass” condition detected
P2120 P2121 P2122 P2123 P2125 P2127 P2128 P2138	The accelerator pedal position sensor has two (main and sub) sensor circuits. If a malfunction occurs in either of the sensor circuits, the ECM detects the abnormal signal voltage difference between the two sensor circuits and switches to limp mode. In limp mode, the remaining circuit is used to calculate the accelerator pedal opening to allow the vehicle to continue driving. If both circuits malfunction, the ECM regards the opening angle of the accelerator pedal to be fully closed. In this case, the throttle valve will remain closed as if the engine is idling.	”Pass” condition is detected and the ignition switch is turned OFF.

5. CHECK FOR INTERMITTENT PROBLEMS

Hand-held tester only:

Inspect the vehicle’s ECM using check mode. Intermittent problems are easier to detect when the ECM is in check mode with hand-held tester. In check mode, the ECM uses 1 trip detection logic, which has a higher sensitivity to malfunctions than normal mode (default), which uses 2 trip detection logic.

(a) Clear the DTCs. (See step 2)
(b) Set the check mode. (See step 3)
(c) Perform a simulation test (See page IN-26).
(d) Check the connector and terminal (See page IN-36).
(e) Wiggle the harness and connector (See page IN-36).

6. BASIC INSPECTION

When the malfunction is not confirmed in the DTC check, troubleshooting should be carried out in all the possible circuits considered as causes of the problem. In many cases, by carrying out the basic engine check shown in the following flowchart, the location causing the problem can be found quickly and efficiently. Therefore, using this check is essential in the engine troubleshooting.

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

NO → **Charge or replace battery.**

YES

2	**Is engine cranked?**

NO → **Proceed to page ST-16 and ST-18 , and continue to troubleshoot.**

YES

3	**Does engine start?**

NO → **Go to step 6.**

YES

4	**Check air filter.**

PREPARATION:
Remove the air filter.
CHECK:
Visual check that the air filter is not excessively dirty or oily.

NG → **Repair or replace air filter.**

OK

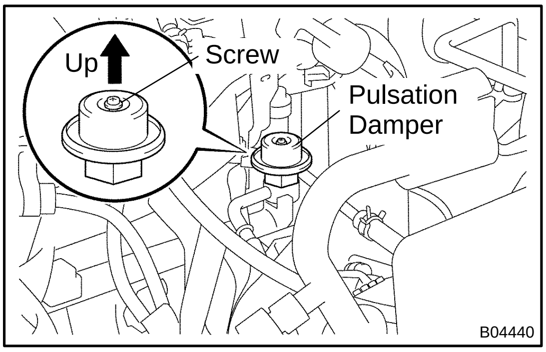
5	**Check idle speed.**

PREPARATION:
(a) Warm up the engine to the normal operating temperature.
(b) Switch off all the accessories.
(c) Switch off the A/C.
(d) Shift the transmission into the N position.
(e) Connect the OBD II scan tool or hand-held tester to the DLC3 of the vehicle.
CHECK:
Use CURRENT DATA to check the idle speed.
OK:
Idle speed:
650 to 750 rpm

NG → **Proceed to problem symptoms table on page DI-48.**

OK

6	**Check fuel pressure.**



PREPARATION:

(a) Be sure that enough fuel is in the tank.
(b) Connect the hand-held tester to the DLC3.
(c) Turn the ignition switch ON and push the hand-held tester main switch ON.
(d) Use the ACTIVE TEST mode to operate the fuel pump.
(e) Please refer to the hand-held tester operator's manual for further details.
(f) If you have no hand-held tester, connect the positive (+) and negative (-) leads from the battery to the fuel pump connector (See page SF-7).

CHECK:

Check that the pulsation damper screw rises up when the fuel pump operation (See page SF-7).

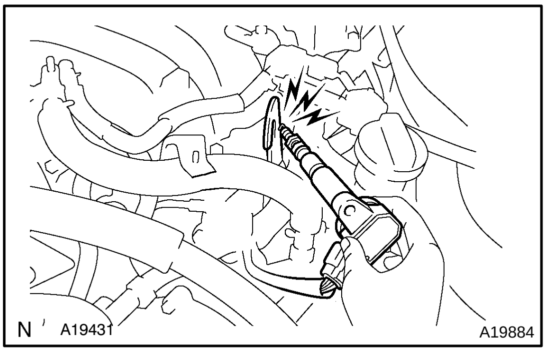
HINT:

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

NG	**Proceed to page SF-7 and continue to troubleshoot.**

OK

7	**Check for spark.**



PREPARATION:

(a) Disconnect the ignition coil.
(b) Remove the spark plug.
(c) Install the spark plug to the ignition coil.
(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 from being injected from the injectors during this test, don't crank the engine for more than 5 to 10 seconds at a time.

NG	**Proceed to page IG-1 and continue to troubleshoot.**

OK

Proceed to problem symptoms table on page DI-48 .

7. DATA LIST

HINT:
Using the hand-held tester DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to shorten labor time.

NOTICE:
In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Warm up the engine.
(b) Turn the ignition switch OFF.
(c) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(d) Turn the ignition switch ON.
(e) Push the "ON" button of the hand-held tester.
(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST.
(g) According to the display on tester, read the "DATA LIST".

Item	Measurement Item/Range (Display)	Normal Condition*	Diagnostic Note
INJECTOR	Injection period of the No. 1 cylinder/ Min.: 0 ms, Max.: 32.64 ms	Idling: 2.1 to 3.9 ms	-
IGN ADVANCE	Ignition timing advance for No.1 cylinder/ Min.: -64 deg., Max.: 63.5 deg.	Idling: BTDC 5 to 25°	-
CALC LOAD	Calculated load by ECM/ Min.: 0%, Max.: 100%	★Idling: 12.5 to 19.7% ★Racing without load (2,500 rpm): 10.7 to 17.9%	-
MAF	Air flow rate from MAF sensor/ Min.: 0 gm/s, Max.: 655 gm/s	★Idling: 4.1 to 6.4 gm/sec. ★Racing without load (2,500 rpm): 12.5 to 20.8 gm/sec.	If value is approximately 0.0 gm/s: ★Mass air flow meter power source circuit open ★VG circuit open or short If value is 160.0 gm/s or more: ★E2G circuit open
ENGINE SPD	Engine Speed/ Min.: 0 rpm, Max.: 16,383 rpm	Idling: 650 to 750 rpm	-
COOLANT TEMP	Coolant temperature/ Min.: -40°C, Max.: 140°C	After warming up: 80 to 95°C (176 to 203°F)	★If value is -40°C (-40°F): sensor circuit is open. ★If value is 140°C (284°F) or more: sensor circuit is shorted.
INTAKE AIR	Intake air temperature/ Min.: -40 °C, Max.: 140 °C	Equivalent to ambient temp. (After cold soak)	
THROTTLE POS	Absolute throttle position sensor/ Min.: 0%, Max.: 100%	★Throttle fully closed: 10 to 24% ★Throttle fully open: 66 to 98%	Read value with the ignition switch ON (Do not start engine).
THROTTLE INITIAL	Throttle fully closed rearing value	0.5 to 0.9 V	-
CTP SW	Closed throttle position switch/ ON or OFF	★Throttle fully closed: ON ★Throttle open: OFF	-
VEHICLE SPD	Vehicle speed/ Min.: 0 km/h, Max.: 255 km/h	Vehicle stopped: 0 km/h (0 mph)	Speed indicated on speedometer
O2S B1 S1	Oxygen sensor output voltage of the bank 1 sensor 1/ Min.: 0 V, Max.: 1.275 V	Idling: 0.1 to 0.9 V	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables the technician to check the voltage output of each sensor.
O2S B2 S1	Oxygen sensor output voltage of the bank 2 sensor 1/ Min.: 0 V, Max.: 1.275 V		Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables the technician to check the voltage output of each sensor.

O2S B1 S2	Oxygen sensor output voltage of the bank 1 sensor 2/ Min.: 0 V, Max.: 1.275 V	Driving 50 km/h (31 mph): 0.1 to 0.9 V	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables the technician to check the voltage output of each sensor.
O2S B2 S2	Oxygen sensor output voltage of the bank 2 sensor 2/ Min.: 0 V, Max.: 1.275 V		Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables the technician to check the voltage output of each sensor.
SHORT FT #1	Short term fuel trim of bank 1/ Min.: -100%, Max.: 100%	0 ± 20%	This item is short-term fuel compensation used to maintain air-fuel ratio at stoichiometric air-fuel ratio
LONG FT #1	Long term fuel trim of bank 1/ Min.: -100%, Max.: 100%	0 ± 20%	This item is overall, long-term fuel compensation that helps to maintain air-fuel ratio at stoichiometric air-fuel ratio (steadies long term deviations of short-term fuel trim from central value)
TOTAL FT #1	Total fuel trim of bank 1/ Min.: 0.5, Max.: 1.496	Idling: 0.5 to 1.4	-
SHORT FT #2	Short term fuel trim of bank 2/ Min.: -100%, Max.: 100%	0 ± 20%	Same as SHORT FT #1
LONG FT #2	Long term fuel trim of bank 2/ Min.: -100%, Max.: 100%	0 ± 20%	Same as LONG FT #1
TOTAL FT #2	Total fuel trim of bank 2/ Min.: 0.5, Max.: 1.496	Idling: 0.5 to 1.4	-
O2FT B1 S1	Short term fuel trim associated with the bank 1, sensor 1/ Min.: -100%, Max.: 100%	0 ± 20%	Same as SHORT FT #1
O2FT B1 S2	Short term fuel trim associated with the bank 1, sensor 2/ Min.: -100%, Max.: 100%	0 ± 20%	Same as SHORT FT #2
O2FT B2 S1	Short term fuel trim associated with the bank 2, sensor 1/ Min.: -100%, Max.: 100%	0 ± 20%	Same as SHORT FT #1
O2FT B2 S2	Short term fuel trim associated with the bank 2, sensor 2/ Min.: -100%, Max.: 100%	0 ± 20%	Same as SHORT FT #2
O2 LR B1 S1	Response time of the O2 sensor lean to rich (bank 1, sensor 1)/ Min.: 0 ms, Max.: 16,711 ms	Idling after warming up: 0 to 1,000 ms	-
O2 LR B2 S1	Response time of the O2 sensor lean to rich (bank 2, sensor 1)/ Min.: 0 ms, Max.: 16,711 ms	Idling after warming up: 0 to 1,000 ms	-
O2 RL B1 S1	Response time of the O2 sensor rich to lean (bank 1, sensor 1)/ Min.: 0 ms, Max.: 16,711 ms	Idling after warming up: 0 to 1,000 ms	-
O2 RL B2 S1	Response time of the O2 sensor rich to lean (bank 2, sensor 1)/ Min.: 0 ms, Max.: 16,711 ms		-

FUEL SYS #1	Fuel system status (Bank1)/ OL or CL or OLDRIVE or OL-FAULT or CLFAULT	Idling after warming up: CL	★OL: Open Loop-has not yet satisfied conditions to go closed loop. ★CL: Closed Loop-using oxygen sensor(s) as feed back for fuel control. ★OL DRIVE: Open loop due to driving conditions (Power enrichment, deceleration enlargement). ★OL FAULT: Open loop due to detected system fault. ★CL FAULT: Closed loop, but fault with at least one oxygen sensor may be using single oxygen sensor for fuel control.
FUEL SYS #2	Fuel system status (Bank2)/ OL or CL or OLDRIVE or OL-FAULT or CLFAULT		
FC IDL	Idle fuel cut/ ON or OFF	Fuel cut operation: ON	FC IDL = "ON" when throttle valve fully closed and engine speed is over 1,500 rpm.
MIL	MIL status/ ON or OFF	MIL ON: ON	-
STARTER SIG	Starter signal/ ON or OFF	Cranking: ON	-
A/C SIG	A/C signal/ ON or OFF	A/C ON: ON	-
PNP SW [NSW]	Park/neutral position switch signal/ ON or OFF	P or N range: ON	-
ELECT LOAD SIG	Electrical load signal/ ON or OFF	Defogger switch ON: ON	-
STOP LIGHT SW	Stop light switch/ ON or OFF	★Brake pedal depressed: ON ★Brake pedal released: OFF	-
FUEL PMP SP CTL	Fuel pump speed control status/ ON or OFF	Idling: ON	-
FUEL PUMP/SPD	Fuel pump/speed status/ ON/H or OFF/M, L	Idling: ON	-
A/C MAG CLUTCH	A/C magnet clutch status/ ON or OFF	A/C magnet clutch ON: ON	-
EVAP VSV	VSV status for EVAP control/ ON or OFF	VSV operating: ON	VSV for EVAP is controlled by the ECM (ground side duty control)
IGNITION	Ignition counter/ Min.: 0, Max.: 400	0 to 400	-
VAPOR PRESS	Vapor pressure/ Min.: -4.125 kPa, Max.: 2.125 kPa	Fuel tank cap removed: 0 kPa	Pressure inside of fuel tank as read by the vapor pressure sensor.
CYL #1 - CYL #8	Misfire ratio of the cylinder/ Min.: 0%, Max.: 50%	0%	This item is displayed in only idling

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

8. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the hand-held tester or the OBD II scan tool allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as a first step of troubleshooting is one method to shorten diagnostic time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch OFF.
(c) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(d) Turn the ignition switch ON.
(e) Push the "ON" button of the hand-held tester or the OBD II scan tool.
(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST.
(g) According to the display on tester, perform the "ACTIVE TEST".

Item	Test Details	Diagnostic Note
INJ VOL	[Test Details] Control the injection volume. Min.: -12.5%, Max.: 24.8% [Vehicle Condition] Engine speed: 3,000 rpm or less.	★All injectors are tested at once. ★Injection volume is gradually changed between -12.5 and 25%
A/F CONTROL	[Test Details] Control injection volume -12.5 or 25 % (change injection volume -12.5 % or 25 %) [Vehicle Condition] Engine speed: 3,000 rpm or less	Following A/F CONTROL procedure enables technician to check and graph voltage outputs of both the A/F sensor and heated oxygen sensor For displaying graph, enter "ACTIVE TEST / A/F CONTROL / USER DATA", select "AFS B1S1 and O2S B1S2" by pressing "YES" and push "ENTER". Then press "F4"
FUEL PUMP / SPD	[Test Details] Control the fuel pump speed. ON or OFF	-
VVT CTRL B1	[Test Details] Active VVT system (Bank 1) ON or OFF	★ON: Rough idle or engine stall ★OFF: Normal engine speed
VVT CTRL B2	[Test Details] Active VVT system (Bank 2) ON or OFF	★ON: Rough idle or engine stall ★OFF: Normal engine speed
CAN CTRL VSV	[Test Details] Activate the VSV for canister control. ON or OFF	-
TANK BYPASS VSV	[Test Details] Activate the VSV for tank bypass. ON or OFF	-
A/C MAG CLUTCH	[Test Details] Control the A/C magnet clutch. ON or OFF	-
EVAP VSV (ALONE)	[Test Details] Activate the VSV for EVAP control. ON or OFF	-

TC/TE1	[Test Details] Connect the TC and TE1. ON or OFF	Switch to the same state as the connection between terminal TC and TE1.
FC IDL PROHBT	[Test Details] Control the idle fuel cut prohibit. ON or OFF	-

9. DEFINITION OF TERMS

Term	Definition
Monitor description	Description of what the ECM monitors and how it detects malfunctions (monitoring purpose and its details).
Related DTCs	Diagnostic code
Typical enabling condition	Preconditions that allow the ECM to detect malfunctions. With all preconditions satisfied, the ECM sets the DTC when the monitored value(s) exceeds the malfunction threshold(s).
Sequence of operation	The priority order that is applied to monitoring, if multiple sensors and components are used to detect the malfunction. When a sensor is being monitored, the next sensor or component will not be monitored until the sensor monitoring is finished.
Required sensor/components	The sensors and components that are used by the ECM to detect malfunctions.
Frequency of operation	The number of times that the ECM checks for malfunctions per driving cycle. "Once per driving cycle" means that the ECM detects the malfunction only one time during a single driving cycle. "Continuous" means that the ECM detects malfunction every time an enabling condition is met.
Duration	The minimum time that the ECM must sense a continuous deviation in the monitored value(s) before setting a DTC. This timing begins after the "typical enabling conditions" are met.
Malfunction thresholds	Beyond this value, the ECM will conclude that there is a malfunction and set a DTC.
MIL operation	MIL illumination timing after a defect is detected. "Immediately" means that the ECM illuminates MIL the instant the ECM determines that there is a malfunction. "2 driving cycle" means that the ECM illuminates MIL if the same malfunction is detected again in the 2nd driving cycle.

10. TOYOTA/LEXUS PART AND SYSTEM NAME LIST

This reference list indicates the part names used in this manual along with their definitions.

TOYOTA/LEXUS name	Definition
Toyota HCAC system, Hydro-carbon Adsorptive Catalyst (HCAC) system, HC adsorptive three-way catalyst	HC adsorptive three-way catalytic converter
Variable Valve Timing sensor, VVT sensor	Camshaft position sensor
Variable valve timing system, VVT system	Camshaft timing control system
Camshaft timing oil control valve, Oil control valve, OCV, VVT, VSV	Camshaft timing oil control valve
Variable timing and lift, VVTL	Camshaft timing and lift control
Crankshaft position sensor "A"	Crankshaft position sensor
Engine speed sensor	Crankshaft position sensor
THA	Intake air temperature
Knock control module	Engine knock control module
Knock sensor	Engine knock sensor
Mass or volume air flow circuit	Mass air flow sensor circuit
Vacuum sensor	Manifold air pressure sensor
Internal control module, Control module, Engine control ECU, PCM	Power train control module
FC idle	Deceleration fuel cut

Idle air control valve	Idle speed control
VSV for CCV, Canister close valve VSV for canister control	Evaporative emissions canister vent valve
VSV for EVAP, Vacuum switching valve assembly No. 1, EVAP VSV, Purge VSV	Evaporative emissions canister purge valve
VSV for pressure switching valve, Bypass VSV	Evaporative emission pressure switching valve
Vapor pressure sensor, EVAP pressure sensor, Evaporative emission control system pressure sensor	Fuel tank pressure sensor
Charcoal canister	Evaporative emissions canister
ORVR system	On-board refueling vapor recovery system
Intake manifold runner control	Intake manifold tuning system
Intake manifold runner valve, IMRV, IACV (runner valve)	Intake manifold tuning valve
Intake control VSV	Intake manifold tuning solenoid valve
AFS	Air fuel ratio sensor
O2 sensor	Heater oxygen sensor
Oxygen sensor pumping current circuit	Oxygen sensor output signal
Oxygen sensor reference ground circuit	Oxygen sensor signal ground
Accel position sensor	Accelerator pedal position sensor
Throttle actuator control motor, Actuator control motor, Electronic throttle motor, Throttle control motor	Electronic throttle actuator
Electronic throttle control system, Throttle actuator control system	Electronic throttle control system
Throttle/pedal position sensor, Throttle/pedal position switch, Throttle position sensor/switch	Throttle position sensor
Turbo press sensor	Turbocharger pressure sensor
Turbo VSV	Turbocharger pressure control solenoid valve
P/S pressure switch	Power-steering pressure switch
VSV for ACM	Active control engine mount
Speed sensor, Vehicle speed sensor "A", Speed sensor for skid control ECU	Vehicle speed sensor
ATF temperature sensor, Trans. fluid temp. sensor, ATF temperature sensor "A"	Transmission fluid temperature sensor
Electronic controlled automatic transmission, ECT	Electronically controlled automatic
Intermediate shaft speed sensor "A"	Counter gear speed sensor
Output speed sensor	Output shaft speed sensor
Input speed sensor, Input turbine speed sensor "A", Speed sensor (NT), Turbine speed sensor	Input turbine speed sensor
PNP switch, NSW	Park/neutral position switch
Pressure control solenoid	Transmission pressure control solenoid
Shift solenoid	Transmission shift solenoid valve
Transmission control switch, Shift lock control unit	Shift lock control module
Engine immobiliser system, Immobiliser system	Vehicle anti-theft system

11. The monitor will run whenever the following DTCs are not present (Monitor disablement List)

HINT:

This table indicates ECM monitoring status for the items in the upper columns if the DTCs in each line on the left are being set.

As for the "X" mark, when the DTC on the left is stored, detection of the DTC in the upper column is not performed.

Monitor disablement (X - disabled)

Monitor detected malfunction

Fault code	Fault code	Component/ system	P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0030,50	P0135,P0155	P0036,56	P0043,44,63,64	P0100	P0101	P0105	P0106	P0110	P0115	P0116	P0120,P0121	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308
			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0031,32,51,52	P0031,32,51,52	P0037,38,57,58	P0043,44,63,64	P0100-P0103	P0101	P0105-P0108	P0106	P0110-P0113	P0115-P0118	P0116	P0120-P0223,P2135	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308
			VVT VSV1,2	VVT System1 -Advance	VVT System1 - Retard	VVT System - Misalignment	VVT System2 - Advance	VVT System2 - Retard	O2 Sensor Heater - Sensor1	A/F Sensor Heater - Sensor1	O2 Sensor Heater - Sensor2	O2 Sensor Heater - Sensor3	MAF sensor	MAF sensor	MAP sensor	MAP sensor	IAT sensor	ECT sensor	ECT sensor	TP sensor	Insufficient ECT for Closed Loop	Thermostat	O2 Sensor -Sensor1	O2 Sensor, A/F Sensor(No Activity) - Sensor1	O2 Sensor - Sensor2	O2 Sensor - Sensor3	Fuel system	Misfire
P0010,P0020	P0010,P0020	VVT VSV1,2																				X					X	
P0011	P0011	VVT System1 - Advance				X		X														X					X	
P0012	P0012	VVT System1 - Retard				X		X														X					X	
P0016,P0018	P0016,P0018	VVT System - Misalignment																										
P0021	P0021	VVT System2 - Advance			X	X																X					X	
P0022	P0022	VVT System2 - Retard			X																	X					X	
P0030,50	P0031,32,51,52	O2 Sensor Heater - Sensor1																				X	X	X	X	X	X	
P0135,P0155	P0031,32,51,52	A/F Sensor Heater - Sensor1																				X			X	X	X	
P0036,56	P0037,38,57,58	O2 Sensor Heater - Sensor2																							X	X		
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater - Sensor3																								X		
P0100,P0101	P0100-P0103	MAF sensor		X	X		X	X											X		X	X	X	X	X	X	X	X
P0105,P0106	P0105-P0108	MAP sensor		X	X		X	X											X		X	X	X	X	X	X	X	X
P0110	P0110-P0113	IAT sensor																			X	X	X	X	X	X		X
P0115,P0116	P0115-P0118	ECT sensor		X	X	X	X	X						X		X					X	X	X	X	X	X	X	X
P0120,P0121	P0120-P0223,P2135	TP sensor												X		X							X	X	X	X	X	X
P0125	P0125	Insufficient ECT for Closed Loop		X	X		X	X						X		X						X	X	X	X	X	X	X
P0128	P0128	Thermostat																										
P0130-P0153	P0130-P0153	O2 Sensor - Sensor1																				X		X	X	X		
P0134,P0154	P0134,P0154	O2 Sensor, A/F Sensor(No Activity) - Sensor1								X												X	X		X	X	X	
P0136,P0156	P0136,P0156	O2 Sensor - Sensor2																										
P0142,P0162	P0142,P0162	O2 Sensor - Sensor3																										
P0171,P0172	P0171,P0172	Fuel system																				X	X	X	X	X		
P0300-P0308	P0300-P0308	Misfire							X													X	X	X	X	X		
P0325,P0330	P0325-P0333	Knock sensor																										X
P0335	P0335	CKP sensor		X	X		X	X						X		X						X	X	X	X	X	X	X
P0340, P0341	P0340, P0341	CMP sensor		X	X		X	X						X		X						X	X	X	X	X	X	X
P0340-P0346	P0340-P0346	VVT sensor1,2																				X						
P0351-P0358	P0351-P0358	Ignitor		X	X		X	X														X						
P0385	P0385	CKP sensor 2												X		X						X	X	X	X	X	X	X
P0401	P0401	EGR system (closed)																				X					X	
P0402	P0402	EGR system (open)																				X	X	X	X	X	X	
P0405,P0409	P0405-P0409	Lift sensor																									X	
P0420,P0430	P0420,P0430	Catalyst																										
P0442-P0456	P0442-P0456	EVAP system																					X	X	X	X		
P0450,P0451	P0450-P0453	EVAP press sensor																										

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			Monitor disablement (X - disabled)																									
Fault code			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0030,50	P0135,P0155	P0036,56	P0043,44,63,64	P0100	P0101	P0105	P0106	P0110	P0115	P0116	P0120,P0121	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308
	Fault code		P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0031,32,51,52	P0031,32,51,52	P0037,38,57,58	P0043,44,63,64	P0100-P0103	P0101	P0105-P0108	P0106	P0110-P0113	P0115-P0118	P0116	P0120-P0223,P2135	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308
		Component/ system	VVT VSV1,2	VVT System1 -Advance	VVT System1 - Retard	VVT System - Misalignment	VVT System2 - Advance	VVT System2 - Retard	O2 Sensor Heater - Sensor1	A/F Sensor Heater - Sensor1	O2 Sensor Heater - Sensor2	O2 Sensor Heater - Sensor3	MAF sensor	MAF sensor	MAP sensor	MAP sensor	IAT sensor	ECT sensor	ECT sensor	TP sensor	Insufficient ECT for Closed Loop	Thermostat	O2 Sensor -Sensor1	O2 Sensor, A/F Sensor(No Activity) - Sensor1	O2 Sensor - Sensor2	O2 Sensor - Sensor3	Fuel system	Misfire
P0500	P0500	VSS																				X	X	X	X	X	X	X
P0511	P0511	IAC valve																					X					
P0510	P0510	Idle switch												X		X						X	X		X	X	X	X
P0560	P0560	System Voltage																										
P0617	P0617	Starter signal																										
P0705	P0705	Shift lever position switch																										
P0710	P0710-P0713	Trans fluid temp sensor																										
P0720-P0793	P0720-P0793	Output speed sensor																										
P0715-P0717	P0715-P0717	Input speed sensor																										
P0724	P0724	Stop lamp switch																										
P0741-P0796	P0741-P0796	Trans solenoid (function)																										
P0748-P0798	P0748-P0799	Trans solenoid (range)																										
P0850	P0850	PNP switch																										X
P1010,P1020	P1010,P1020	VVTL																				X					X	
P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)																				X					X	
P1126	P1126	Electronic magnet clutch																										
P1129	P1129	Electronic throttle system																										
P1430	P1430	HC adsorber ACT press sensor																										
P2004,6	P2004,6	Intake Manifold Runner Control																										
P2009,10	P2009,10	Intake Manifold Runner Control Circuit																										
P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																										
P2102,P2103	P2102,P2103	Throttle motor																										
P2120-P2138	P2120-P2138	Accel position sensor																										
P2196,P2198	P2196,P2198	A/F sensor (rationality)																				X			X	X		
P2226	P2226	BARO sensor																					X		X	X		
P2237,P2240	P2237,P2240	A/F sensor (open)																				X			X	X		
P2423,24	P2423,24	HC Adsorption Catalyst																										
P2430,2,3	P2430,2,3	AIR Pressure Sensor(Low/High)																										
P2431	P2431	AIR Pressure Sensor(Rationality)																										
P2440	P2440	AIR control valve stuck open																					X	X	X	X	X	
P2441	P2441	AIR control valve stuck close																					X	X	X	X	X	
P2444	P2444	AIP stuck On																					X	X	X	X	X	
P2445	P2445	AIP stuck Off																					X	X	X	X	X	
P2714-P2759	P2714-P2759	Trans solenoid(SLU-SLD)																										
P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)																				X			X	X		

Monitor detected malfunction

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Monitor detected malfunction			Monitor disablement (X - disabled)																									
Fault code			P0325,P0330	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405	P0409	P0420,P0430	P0440-P0446	P0450,P0451	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710	P0720-P0793	P0715-P0717	P0724	P0741-P0796
	Fault code		P0325-P0333	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405,P0406	P0409	P0420,P0430	P0440-P0446	P0450-P0453	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710-P0713	P0720-P0793	P0715-P0717	P0724	P0741-P0796
		Component/ system	Knock sensor	CKP sensor	CMP sensor	VVT sensor1,2	Ignitor	CKP sensor 2	EGR system (closed)	EGR system (open)	EGR Lift sensor	EGR Lift sensor	Catalyst	EVAP system	EVAP press sensor	VSS(ECT2sensor)	VSS(ECT1sensor, non-ECT)	VSS(M/T)	IAC valve	Idle switch	System Voltage	Starter signal	Shift lever position switch	Trans fluid temp sensor	Output speed sensor	Input speed sensor	Stop lamp switch	Trans solenoid (function)*1
P0010,P0020	P0010,P0020	VVT VSV1,2																										X
P0011	P0011	VVT System1 - Advance							X	X			X	X					X									
P0012	P0012	VVT System1 - Retard							X	X			X	X					X									
P0016,P0018	P0016,P0018	VVT System - Misalignment																										
P0021	P0021	VVT System2 - Advance							X	X			X	X					X									
P0022	P0022	VVT System2 - Retard							X	X			X	X					X									
P0030,50	P0031,32,51,52	O2 Sensor Heater - Sensor1							X	X			X						X									X
P0135,P0155	P0031,32,51,52	A/F Sensor Heater - Sensor1							X	X			X						X									
P0036,56	P0037,38,57,58	O2 Sensor Heater - Sensor2											X															
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater - Sensor3																										
P0100,P0101	P0100-P0103	MAF sensor							X	X			X	X				X	X									X
P0105,P0106	P0105-P0108	MAP sensor							X	X			X	X				X	X									X
P0110	P0110-P0113	IAT sensor							X	X				X														X
P0115,P0116	P0115-P0118	ECT sensor							X	X		X	X	X				X	X									X
P0120,P0121	P0120-P0223,P2135	TP sensor							X	X			X	X			X		X									X
P0125	P0125	Insufficient ECT for Closed Loop							X	X		X	X	X				X	X									X
P0128	P0128	Thermostat																										
P0130-P0153	P0130-P0153	O2 Sensor - Sensor1							X	X			X	X					X									X
P0134,P0154	P0134,P0154	O2 Sensor, A/F Sensor(No Activity) - Sensor1							X	X			X						X									X
P0136,P0156	P0136,P0156	O2 Sensor - Sensor2											X															
P0142,P0162	P0142,P0162	O2 Sensor - Sensor3																										
P0171,P0172	P0171,P0172	Fuel system							X	X			X	X					X									X
P0300-P0308	P0300-P0308	Misfire											X	X					X									X
P0325,P0330	P0325-P0333	Knock sensor							X	X																		X
P0335	P0335	CKP sensor							X	X			X	X					X									X
P0340, P0341	P0340, P0341	CMP sensor							X	X			X	X					X									X
P0340-P0346	P0340-P0346	VVT sensor1,2																										
P0351-P0358	P0351-P0358	Ignitor							X	X			X	X					X									X
P0385	P0385	CKP sensor 2							X	X			X	X					X									
P0401	P0401	EGR system (closed)											X															X
P0402	P0402	EGR system (open)											X	X					X									X
P0405,P0409	P0405-P0409	Lift sensor																										
P0420,P0430	P0420,P0430	Catalyst																										
P0442-P0456	P0442-P0456	EVAP system																	X									
P0450,P0451	P0450-P0453	EVAP press sensor												X														

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				Monitor disablement (X - disabled)																									
	Fault code			P0325,P0330	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405	P0409	P0420,P0430	P0440-P0446	P0450,P0451	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710	P0720-P0793	P0715-P0717	P0724	P0741-P0796
		Fault code		P0325-P0333	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405,P0406	P0409	P0420,P0430	P0440-P0446	P0450-P0453	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710-P0713	P0720-P0793	P0715-P0717	P0724	P0741-P0796
			Component/ system	Knock sensor	CKP sensor	CMP sensor	VVT sensor1,2	Ignitor	CKP sensor 2	EGR system (closed)	EGR system (open)	EGR Lift sensor	EGR Lift sensor	Catalyst	EVAP system	EVAP press sensor	VSS(ECT2sensor)	VSS(ECT1sensor, non-ECT)	VSS(M/T)	IAC valve	Idle switch	System Voltage	Starter signal	Shift lever position switch	Trans fluid temp sensor	Output speed sensor	Input speed sensor	Stop lamp switch	Trans solenoid (function)*1
Monitor detected malfunction	P0500	P0500	VSS							X	X			X	X					X						X	X		X
	P0511	P0511	IAC valve																										
	P0510	P0510	Idle switch								X			X	X					X									X
	P0560	P0560	System Voltage																										
	P0617	P0617	Starter signal																										
	P0705	P0705	Shift lever position switch																										
	P0710	P0710-P0713	Trans fluid temp sensor																										
	P0720-P0793	P0720-P0793	Output speed sensor																										X
	P0715-P0717	P0715-P0717	Input speed sensor																										
	P0724	P0724	Stop lamp switch																										
	P0741-P0796	P0741-P0796	Trans solenoid (function)																										
	P0748-P0798	P0748-P0799	Trans solenoid (range)																							X	X		X
	P0850	P0850	PNP switch																	X									X
	P1010,P1020	P1010,P1020	VVTL																										
	P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)							X	X			X	X					X									
	P1126	P1126	Electronic magnet clutch																										
	P1129	P1129	Electronic throttle system																										
	P1430	P1430	HC adsorber ACT press sensor												X	X													
	P2004,6	P2004,6	Intake Manifold Runner Control																										
	P2009,10	P2009,10	Intake Manifold Runner Control Circuit																										
	P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																										
	P2102,P2103	P2102,P2103	Throttle motor																										
	P2120-P2138	P2120-P2138	Accel position sensor																										
	P2196,P2198	P2196,P2198	A/F sensor (rationality)							X	X			X						X									X
	P2226	P2226	BARO sensor																										X
	P2237,P2240	P2237,P2240	A/F sensor (open)							X	X			X						X									X
	P2423,24	P2423,24	HC Adsorption Catalyst																										
	P2430,2,3	P2430,2,3	AIR Pressure Sensor(Low/High)																										
	P2431	P2431	AIR Pressure Sensor(Rationality)																										
	P2440	P2440	AIR control valve stuck open							X	X			X															
	P2441	P2441	AIR control valve stuck close							X	X			X															
	P2444	P2444	AIP stuck On							X	X			X															
	P2445	P2445	AIP stuck Off							X	X			X															
	P2714-P2759	P2714-P2759	Trans solenoid(SLU-SLD)																										X
	P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)							X	X			X						X									X

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Monitor disablement (X - disabled)

Monitor detected malfunction: Fault code	Fault code	Component/ system	P0741-P0796	P0748-P0798	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,P2006	P2009.P2010	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
			P0741-P0796	P0748-P0999	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,6	P2009,10	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
			Trans solenoid (function)*2	Trans solenoid (range)	PNP switch	VVTL	VVTL system1(,2)	Electronic magnet clutch	Electronic throttle system	HC adsorber ACT press sensor	Intake Manifold Runner Control	Intake Manifold Runner Control Circuit	Intake Manifold Runner Position Sensor	Throttle motor	Accel position sensor	A/F Sensor(Rationality) - Sensor1	BARO sensor	A/F Sensor(Open) - Sensor1	HC Adsorption Catalyst	AIR Pressure Sensor(Low/High)	AIR Pressure Sensor(Rationality)	AIR control valve stuck open	AIR control valve stuck close	AIP stuck On	AIP stuck Off	Trans solenoid(SLU-SLD)	A/F Sensor (Slow response) - Sensor1
P0010,P0020	P0010,P0020	VVT VSV1,2																				X	X	X	X		
P0011	P0011	VVT System1 - Advance																				X	X	X	X		
P0012	P0012	VVT System1 - Retard																				X	X	X	X		
P0016,P0018	P0016,P0018	VVT System - Misalignment																				X	X	X	X		
P0021	P0021	VVT System2 - Advance																				X	X	X	X		
P0022	P0022	VVT System2 - Retard																				X	X	X	X		
P0030,50	P0031,32,51,52	O2 Sensor Heater - Sensor1																	X			X	X	X	X		
P0135,P0155	P0031,32,51,52	A/F Sensor Heater - Sensor1														X		X	X			X	X	X	X		X
P0036,56	P0037,38,57,58	O2 Sensor Heater - Sensor2														X			X								
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater - Sensor3																	X								
P0100,P0101	P0100-P0103	MAF sensor				X	X									X		X	X			X	X	X	X		X
P0105,P0106	P0105-P0108	MAP sensor				X	X									X		X	X			X	X	X	X		X
P0110	P0110-P0113	IAT sensor									X					X		X				X	X	X	X		X
P0115,P0116	P0115-P0118	ECT sensor	X			X	X				X					X		X	X			X	X	X	X		X
P0120,P0121	P0120-P0223,P2135	TP sensor														X		X	X			X	X	X	X		X
P0125	P0125	Insufficient ECT for Closed Loop	X			X										X		X	X			X	X	X	X		X
P0128	P0128	Thermostat																									
P0130-P0153	P0130-P0153	O2 Sensor - Sensor1																	X			X	X	X	X		
P0134,P0154	P0134,P0154	O2 Sensor, A/F Sensor(No Activity) - Sensor1														X		X	X			X	X	X	X		X
P0136,P0156	P0136,P0156	O2 Sensor - Sensor2														X			X								
P0142,P0162	P0142,P0162	O2 Sensor - Sensor3																	X								
P0171,P0172	P0171,P0172	Fuel system														X		X	X			X	X	X	X		X
P0300-P0308	P0300-P0308	Misfire														X		X	X			X	X	X	X		X
P0325,P0330	P0325-P0333	Knock sensor																				X	X	X	X		
P0335	P0335	CKP sensor				X	X									X		X	X			X	X	X	X		X
P0340, P0341	P0340, P0341	CMP sensor				X	X									X		X	X			X	X	X	X		X
P0340-P0346	P0340-P0346	VVT sensor1,2																				X	X	X	X		
P0351-P0358	P0351-P0358	Ignitor																	X			X	X	X	X		
P0385	P0385	CKP sensor 2				X	X									X		X	X			X	X	X	X		X
P0401	P0401	EGR system (closed)																	X								
P0402	P0402	EGR system (open)														X		X	X			X	X	X	X		X
P0405,P0409	P0405-P0409	Lift sensor																									
P0420,P0430	P0420,P0430	Catalyst																									
P0442-P0456	P0442-P0456	EVAP system														X		X				X	X	X	X		X
P0450,P0451	P0450-P0453	EVAP press sensor																				X	X	X	X		

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Monitor detected malfunction: Fault code			Monitor disablement (X - disabled)																								
Fault code			P0741-P0796	P0748-P0798	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,P2006	P2009.P2010	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
	Fault code		P0741-P0796	P0748-P0999	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,6	P2009,10	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
		Component/ system	Trans solenoid (function)*2	Trans solenoid (range)	PNP switch	VVTL	VVTL system1(,2)	Electronic magnet clutch	Electronic throttle system	HC adsorber ACT press sensor	Intake Manifold Runner Control	Intake Manifold Runner Control Circuit	Intake Manifold Runner Position Sensor	Throttle motor	Accel position sensor	A/F Sensor(Rationality) - Sensor1	BARO sensor	A/F Sensor(Open) - Sensor1	HC Adsorption Catalyst	AIR Pressure Sensor(Low/High)	AIR Pressure Sensor(Rationality)	AIR control valve stuck open	AIR control valve stuck close	AIP stuck On	AIP stuck Off	Trans solenoid(SLU-SLD)	A/F Sensor (Slow response) - Sensor1
P0500	P0500	VSS	X													X		X	X			X	X	X	X		X
P0511	P0511	IAC valve														X		X									X
P0510	P0510	Idle switch														X		X	X								X
P0560	P0560	System Voltage																									
P0617	P0617	Starter signal																									
P0705	P0705	Shift lever position switch																									
P0710	P0710-P0713	Trans fluid temp sensor																									
P0720-P0793	P0720-P0793	Output speed sensor																									
P0715-P0717	P0715-P0717	Input speed sensor																									
P0724	P0724	Stop lamp switch																									
P0741-P0796	P0741-P0796	Trans solenoid (function)																									
P0748-P0798	P0748-P0799	Trans solenoid (range)	X																								
P0850	P0850	PNP switch																									
P1010,P1020	P1010,P1020	VVTL																				X	X	X	X		
P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)																				X	X	X	X		X
P1126	P1126	Electronic magnet clutch																									
P1129	P1129	Electronic throttle system																									
P1430	P1430	HC adsorber ACT press sensor																									
P2004,6	P2004,6	Intake Manifold Runner Control																									
P2009,10	P2009,10	Intake Manifold Runner Control Circuit																									
P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																									
P2102,P2103	P2102,P2103	Throttle motor																									
P2120-P2138	P2120-P2138	Accel position sensor																									
P2196,P2198	P2196,P2198	A/F sensor (rationality)																	X			X	X	X	X		X
P2226	P2226	BARO sensor														X		X				X	X	X	X		X
P2237,P2240	P2237,P2240	A/F sensor (open)																	X			X	X	X	X		X
P2423,24	P2423,24	HC Adsorption Catalyst																									
P2430,2,3	P2430,2,3	AIR Pressure Sensor(Low/High)																			X	X	X	X	X		
P2431	P2431	AIR Pressure Sensor(Rationality)																				X	X	X	X		
P2440	P2440	AIR control valve stuck open														X		X	X								X
P2441	P2441	AIR control valve stuck close														X		X	X								X
P2444	P2444	AIP stuck On														X		X	X								X
P2445	P2445	AIP stuck Off														X		X	X								X
P2714-P2759	P2714-P2759	Trans solenoid(SLU-SLD)																									
P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)																	X			X	X	X	X		

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12. O2S TEST RESULT

INTRODUCTION

The O2S TEST RESULT refers to the results of the engine control module (ECM) when it monitors the oxygen sensor (O2S), and it can be read using the hand-held tester or the generic OBD II scantool. Based on this, you can find the O2S's conditions.

The ECM monitors the O2S in the various items. You can read the monitor result (TEST DATA) of each monitor item using the O2S TEST RESULT. However, the output value of the TEST DATA is the latest "snapshot" value that is taken after monitoring and therefore is not dynamic.

In this repair manual, the description of the O2S TEST RESULT (for O2S related DTCs) are written in a table.

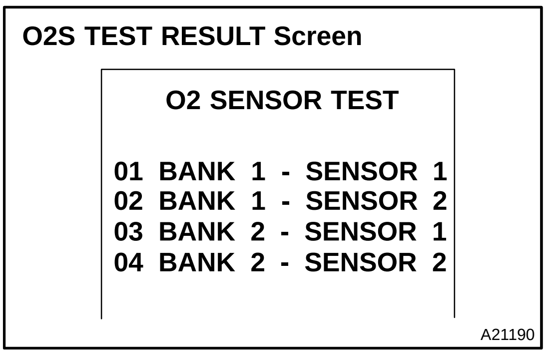
This table consists of 5 items:

(1) TEST ID (a code applied to each TEST DATA)
(2) Description of TEST DATA
(3) Conversion Factor (When Conversion Factor has a value written in the table, multiply the TEST DATA value appearing on the scan tool by the Conversion Factor value. The result will be the required value.)
(4) Unit
(5) Standard Value

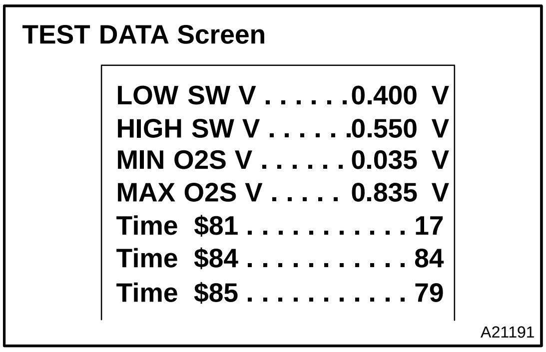
If the TEST DATA value appearing on the scan tool is out of the standard value, the O2S is malfunctioning. If it is within the standard value, the O2S is functioning normally. However, if the value is on the borderline of the standard value, the O2S may malfunction very soon.

HOW TO READ O2S TEST RESULT USING HAND-HELD TESTER

(a) Connect the hand-held tester to the DLC3.



(b) On the tester screen, select the following menus: DIAGNOSIS/CARB OBDII/O2S TEST RESULT. A list of the O2S equipped on the vehicle will be displayed.



(c) Select the desired O2S and press ENTER. The following screen will appear.

(d) Press HELP and ¿ simultaneously. More information will appear.

(e) Example:

(1) The hand-held tester displays ”17” as a value of the ”TIME $81” (see the illustration on the left).

(2) Find the Conversion Factor value of ”TIME $81” in the O2S TEST RESULT chart below. 0.3906 is specified for $81 in this chart.

(3) Multiply ”17” in step (1) by 0.3906 (Conversion Factor) in the step (2).

17 x 0.3906 = 6.6 %

(4) If the answer is within the standard value, the ”TIME $81” can be confirmed to be normal.

O2S TEST RESULT Chart

TEST ID	Description of TEST DATA	Conversion Factor	Unit	Standard Value
$81	Percentage of monitoring time when the HO2S voltage is less than 0.05V	Multiply 0.3906	%	Within 60 %

13. CHECKING MONITOR STATUS

NOTICE:

The Monitor Status is not applicable to the heated oxygen sensor (HO2S). The HO2S status can be checked with O2S TEST RESULT.

(a) INTRODUCTION

The purpose of the monitor result (mode 6) is to allow access to the results for on-board diagnostic monitoring tests of specific components/systems that are not continuously monitored. Examples are catalyst, EVAP and thermostat.

The monitor result allows the OBD scan tool to display the monitor status, test value and test limit. The monitor status indicates whether the component is functioning normally or not (PASS or FAIL). The test value is the value that was used to determine the monitor status. When the test value is inside the test limit, the ECM determines the component is functioning normally (PASS). If the test value is outside the test limit, the ECM determines the component is malfunctioning (FAIL).

A problem in these components/systems can be found by comparing the test value and test limit. The monitor result information is included under “MONITOR RESULT” in the DTC sections.

(b) PROCEDURE

NOTICE:

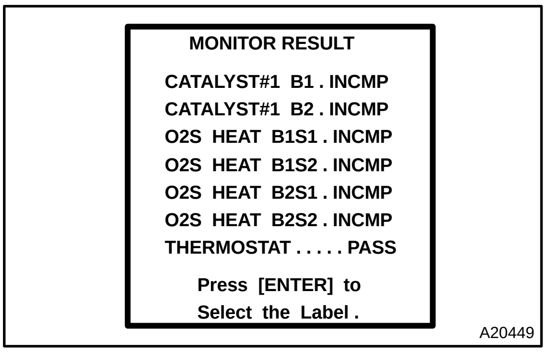
The monitor result and test value are cleared when the ignition switch is turned OFF.

(1) Connect the hand-held tester to the DLC3.

(2) Turn the ignition switch ON.

(3) Clear the DTCs.

(4) Run the vehicle in accordance with the applicable drive pattern described in READINESS MONITOR DRIVE PATTERN (see page DI-30).



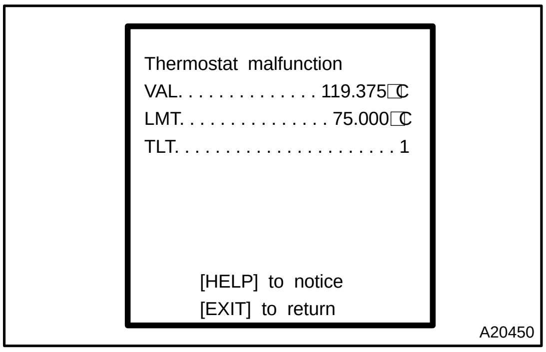
(5) Select from the tester menus: DIAGNOSIS, ENHANCED OBD II, MONITOR INFO and MONITOR RESULT. The monitor result appears after the component name.

INCMP: The component has not been monitored yet.

PASS: The component is functioning normally.

FAIL: The component is malfunctioning.

(6) Confirm that the component is set to either PASS or FAIL.



(7) Select the component (Label) and press ENTER. The accuracy test value appears when the monitor result is either PASS or FAIL.
VAL The test value
LMT: The test limit
TLT: The test limit type. Either 0 or 1 is displayed.

(8) If TLT is 0, the component is malfunctioning when the test value is higher than the test limit. If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.

(9) Compare the test value with the test limit. The test value is usually significantly higher or lower than the test limit. If the test value is on the borderline of the test limit, there is a potential malfunction in the component.

HINT:
The monitor result might on rare occasions be PASS even if the MIL is illuminated. This indicates the system malfunctioned on a previous driving cycle. This might be caused by an intermittent problem.

DI1L9-13

PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
Engine does not crank (Does not start)	16.Starter 17.Starter relay 18.Park/neutral position switch	ST-16 ST-18 DI-402
No initial combustion (Does not start)	1. ECM power source circuit 2. Fuel pump control circuit 3. Engine control module (ECM)	DI-345 DI-350 IN-36
No complete combustion (Does not start)	1. Fuel pump control circuit	DI-350
Engine cranks normally but difficult to start	1. Starter signal circuit 2. Fuel pump control circuit 3. Compression	DI-336 DI-350 EM-3
Difficult to start with cold engine	1. Starter signal circuit 2. Fuel pump control circuit	DI-336 DI-350
Difficult to start with hot engine	1. Starter signal circuit 2. Fuel pump control circuit	DI-336 DI-350
High engine idle speed (Poor idling)	1. A/C switch circuit 2. ECM power source circuit	- DI-345
Low engine idle speed (Poor idling)	1. A/C switch circuit 2. Fuel pump control circuit	- DI-350
Rough idling (Poor idling)	1. Compression 2. Fuel pump control circuit	EM-3 DI-350
Hunting (Poor idling)	1. ECM power source circuit 2. Fuel pump control circuit	DI-345 DI-350
Hesitation/Poor acceleration (Poor driveability)	1. Fuel pump control circuit 2. A/T faulty	DI-350 DI-396
Surging (Poor driveability)	1. Fuel pump control circuit	DI-350
Engine stalls soon after starting	1. Fuel pump control circuit	DI-350
Engine stalls during A/C operation	1. A/C switch circuit 2. Engine control module (ECM)	- IN-36
Unable to refuel/Difficult to refuel	1. ORVR system	-

DIC21-01

READINESS MONITOR DRIVE PATTERN

1. PURPOSE OF THE READINESS TESTS

★ The On-Board Diagnostic (OBD II) system is designed to monitor the performance of emission-related components and report any detected abnormalities in the form of Diagnostic Trouble Codes (DTCs). Since the various components need to be monitored during different driving conditions, the OBD II system is designed to run separate monitoring programs called Readiness Monitors. Many state Inspection and Maintenance (I/M) programs require that vehicles complete their Readiness Monitors prior to beginning an emissions test.

★ The current status of the Readiness Monitors can be seen by using the hand-held tester with version 9.0 software (or newer), or a generic OBD II Scan tool.

★ To view the Readiness Monitor status using the hand-held tester, select "Monitor Status" from the Enhanced OBD II Menu.

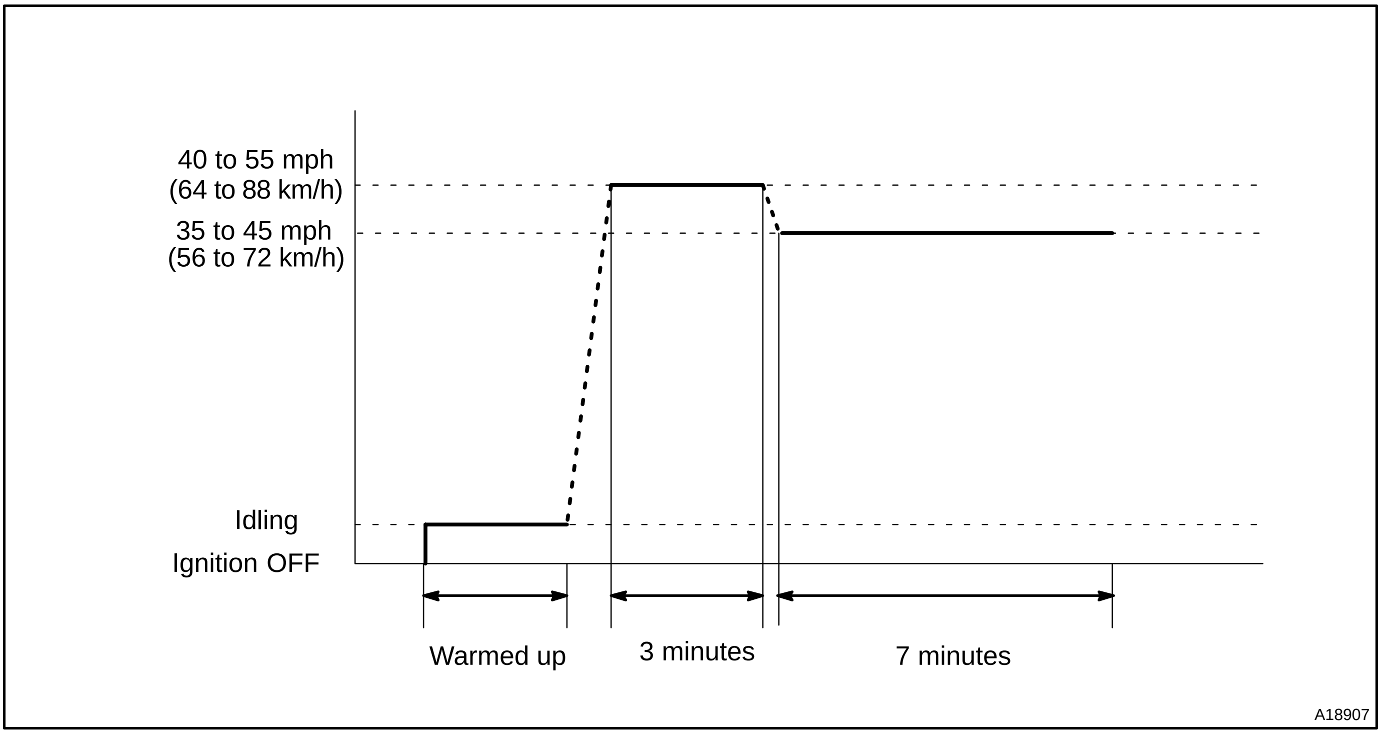
★ A status of "complete" indicates that the necessary conditions have been met to run the performance tests for the related Readiness Monitor.

★ The Readiness Monitor will be reset to "incomplete" if:
  ★ ECM has lost power (battery or fuse).
  ★ DTCs have been cleared.
  ★ The conditions for running the Readiness Monitor have not been met.

★ In the event that any Readiness Monitor shows "incomplete," follow the appropriate Readiness Monitor Drive Pattern to active the monitor and change the readiness status to "complete."

CAUTION:
Strictly observe of posted speed limits, traffic laws, and road conditions when performing these drive patterns.
NOTICE:
These drive patterns represent the fastest method to satisfy all necessary conditions which allow the specific readiness monitor to complete.
In the event that the drive pattern must be interrupted (possibly due to traffic conditions or other factors) the drive pattern can be resumed, and in most cases, the readiness monitor will still set to "complete".
To ensure rapid completion of readiness monitors, avoid sudden changes in vehicle load and speed (driving up and down hills and/or sudden acceleration).

2. CATALYST MONITOR (O2S TYPE)



(a) Preconditions
The monitor will not run unless:
- ★ MIL is OFF.
- ★ Engine Coolant Temperature (ECT) is 75˚C (167˚F) or greater.
- ★ Intake Air Temperature (IAT) is -10˚C (14˚F) or greater

NOTICE:
The readiness test can be completed in cold ambient conditions (less than -10˚C / 14˚F), if the drive pattern is repeated a second time after cycling the ignition off.

(b) Drive Pattern
(1) Connect the OBD II scan tool to the DLC3 to check monitor status and preconditions.
(2) Drive the vehicle at 40 to 55 mph (64 to 88 km/h) for approximately for 3 minutes.

NOTICE:
Drive with smooth throttle operation and avoid sudden acceleration.
If IAT is less than 10˚C (50˚F) when engine was started, drive the vehicle at 40 to 55 mph (64 to 88 km/h) for additional 4 minutes.

(3) Drive the vehicle at 35 to 45 mph (56 to 72 km/h) for approximately 7 minutes.

NOTICE:
Drive with smooth throttle operation and avoid sudden deceleration as much as possible with the throttle fully closed.

(4) If readiness status does not switch to complete, make sure that the preconditions are met and the ignition switch is turned OFF and then repeat steps (2) and (3).
(5) Release pressure in the fuel tank by removing and then reinstalling the fuel tank cap.
(6) Start the engine and immediately begin driving as directed.

3. EVAP MONITOR (VACUUM PRESSURE MONITOR)

NOTICE:
A cold soak must be performed prior to conducting the drive pattern to complete the Internal Pressure Readiness Monitor.

(a) Cold Soak Preconditions
The monitor will not run unless:
- ★ MIL is OFF
- ★ Fuel level is approximately 1/2 to 3/4
- ★ Altitude is 7,800 feet (2,400 m) or less

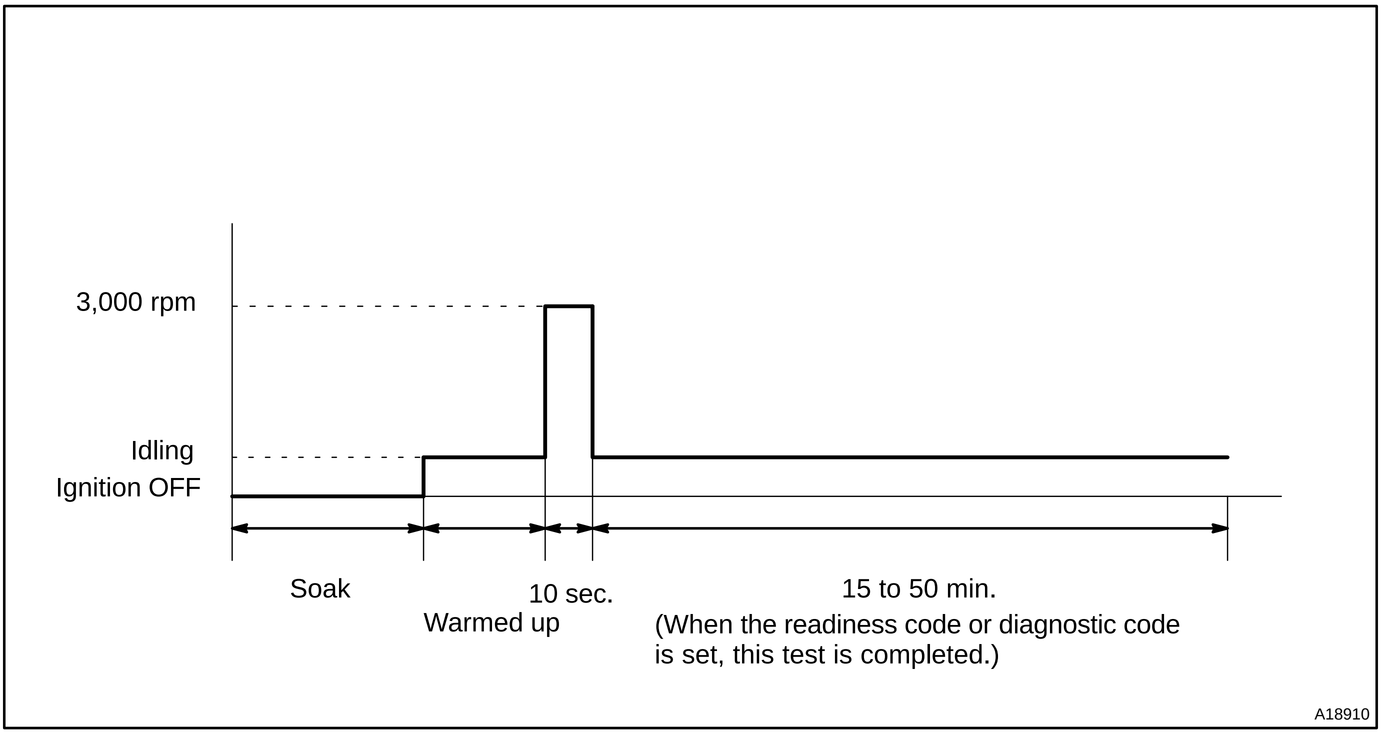
(b) Cold Soak Procedure
Let the vehicle cold soak for 8 hours or until the difference between IAT and ECT becomes less than 7°C (13°F)

HINT:
Examples:

★ Scenario 1
ECT = 24°C (75°F)
IAT = 16°C (60°F)
Difference between ECT and IAT is 8°C (15°F)
→ The monitor will not run because difference between ECT and IAT is greater than 7°C (13°F)

★ Scenario 2
ECT = 21°C (70°F)
IAT = 20°C (68°F)
Difference between ECT and IAT is 1°C (2°F)
→ The monitor will run because difference between ECT and IAT is less than 7°C (13°F)

4. EVAP MONITOR (VACUUM PRESSURE MONITOR) (CONTINUED)



(a) Preconditions
The monitor will not run unless:
- ★ MIL is OFF
- ★ Fuel level is approximately 1/2 to 3/4
- ★ Altitude is 7,800 feet (2,400 m) or less*
- ★ Engine Coolant Temperature (ECT) is between 4.4°C and 35°C (40°F and 95°F)
- ★ Intake Air Temperature (IAT) is between 4.4°C and 35°C (40°F and 95°F)
- ★ Cold Soak Procedure has been completed
- ★ Before starting the engine, the difference between ECT and IAT must be less than 7°C (13°F)

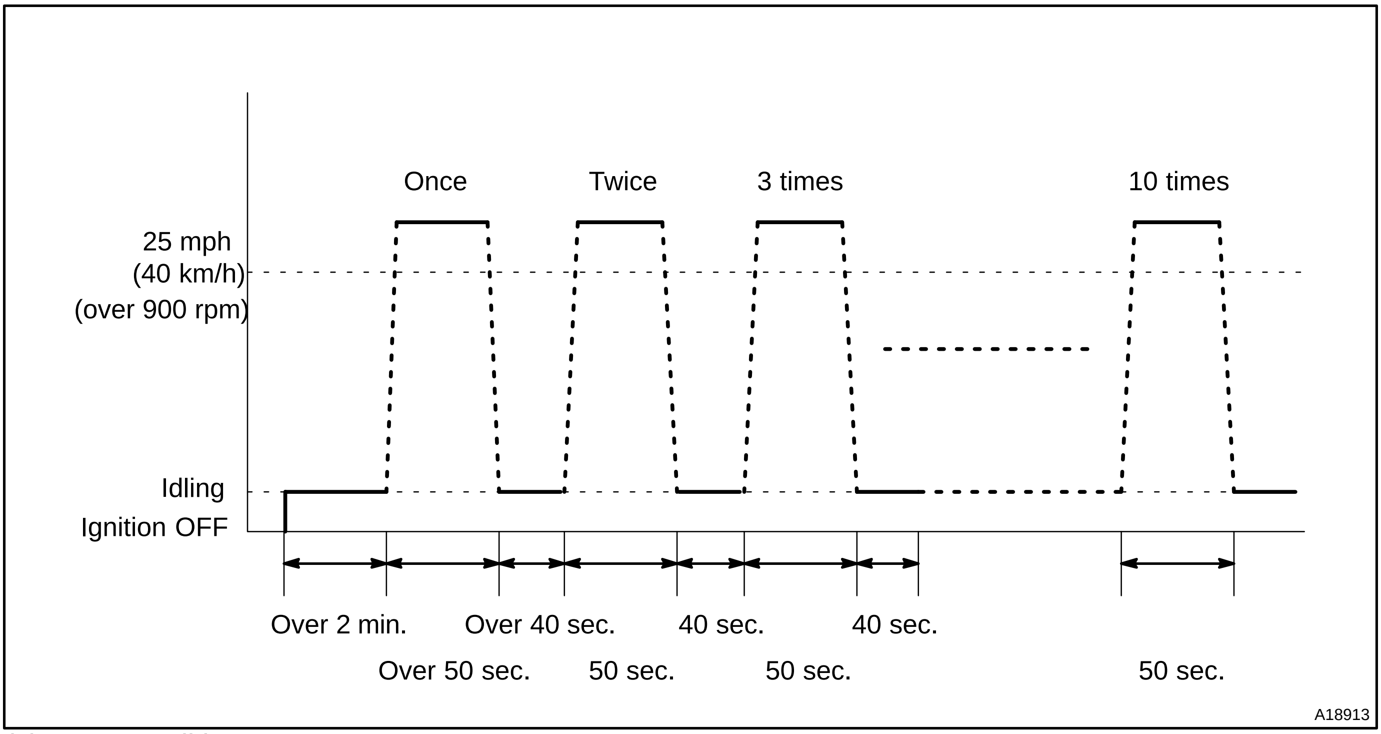
HINT:
Examples:
- ★ Scenario 1
  ECT = 24°C (75°F)
  IAT = 16°C (60°F)
  Difference between ECT and IAT is 8°C (15°F)
  → The monitor will not run because difference between ECT and IAT is greater than 7°C (13°F)
- ★ Scenario 2
  ECT = 21°C (70°F)
  IAT = 20°C (68°F)
  Difference between ECT and IAT is 1°C (2°F)
  → The monitor will run because difference between ECT and IAT is less than 7°C (13°F)

The readiness test can be completed in cold ambient conditions (less than 40°F / 4.4°C) and/or at high altitudes (more than 7,800 feet / 2,400 m) if the drive pattern is repeated a second time after cycling the ignition off.

(b) Drive Pattern
(1) Connect the OBD II scan tool to DLC3 to check monitor status and preconditions (refer to ”a”).
(2) Release pressure in fuel tank by removing the fuel tank cap and then reinstalling it.
(3) Start the engine and allow it to idle until ECT becomes 75°C (167°F) or higher.
(4) Run the engine at 3,000 rpm for about 10 seconds.
(5) Allow the engine to idle with the A/C ON (to create slight load) for 15 to 50 minutes.

NOTICE:
If the vehicle is not equipped with A/C put a slight load on the engine by doing the following :
- ★ **Securely set the parking brake.**
- ★ **Block the drive wheels with wheel chocks.**
- ★ **Allow the vehicle to idle in drive for 15 to 50 minutes.**

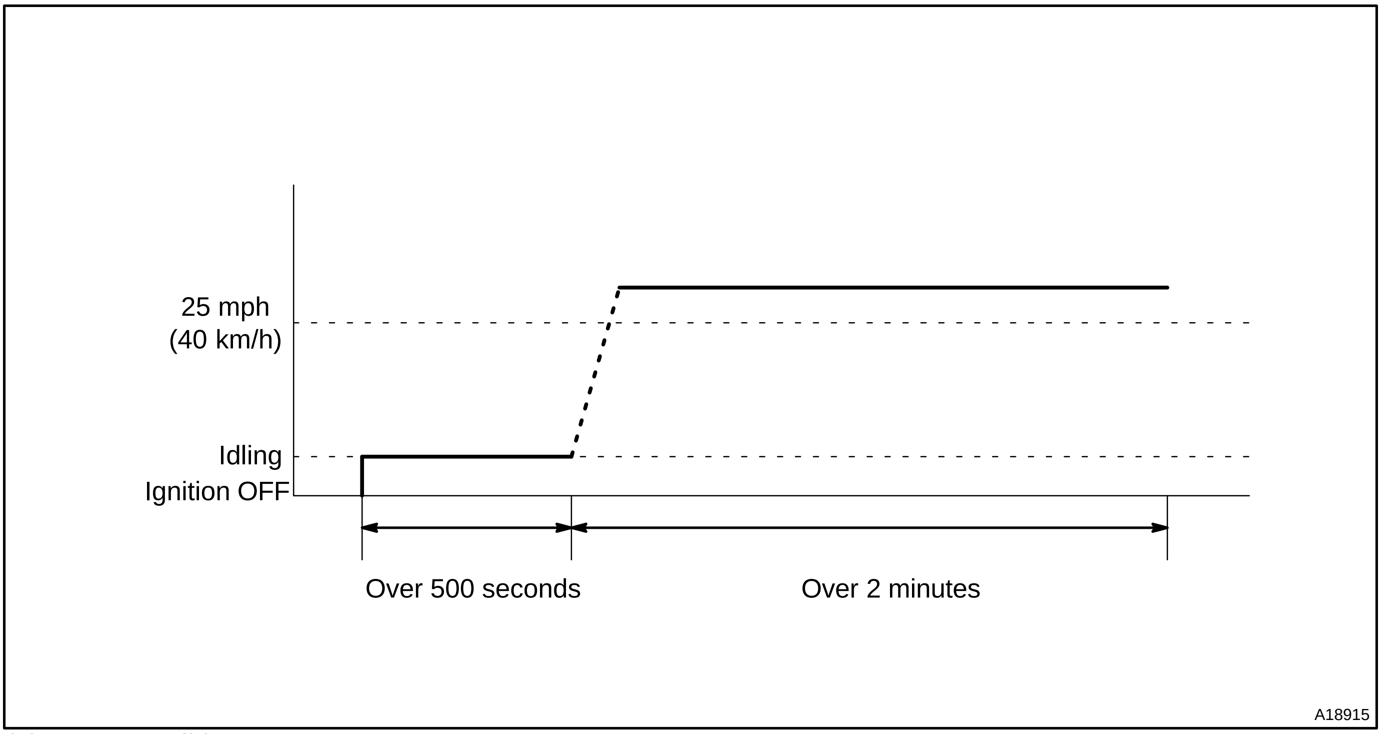
5. OXYGEN SENSOR MONITOR (FRONT AND REAR O2S SYSTEM)



(a) Preconditions
The monitor will not run unless:
★ MIL is OFF

(b) Drive Pattern
(1) Connect the OBD II scan tool to DLC3 to check monitor status and preconditions (refer to step ”a”).
(2) Start the engine and allow it to idle for 2 minutes or more.
(3) Drive the vehicle at 25 mph (40 km/h) or more for at least 50 seconds.
(4) Stop the vehicle and allow the engine to idle for 40 seconds or more.
(5) Perform steps (3) and (4) ten times.
(6) Check the status of the readiness monitor on the scan tool display. If readiness status did not switch to complete, ensure preconditions are met, turn the ignition off and then repeat steps (1) and (5).

6. OXYGEN SENSOR HEATER MONITOR



(a) Preconditions

The monitor will not run unless:

★ MIL is OFF

(b) Drive Pattern

(1) Connect the OBD II scan tool to the DLC3 to check monitor status and preconditions (refer to step ”a”).

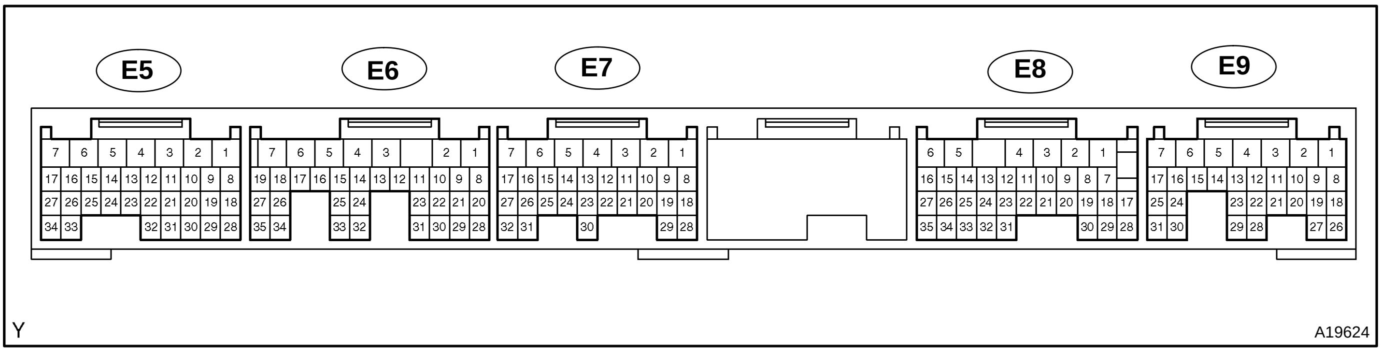
(2) Start the engine and allow it to idle for 500 seconds or more.

(3) Drive the vehicle at 25 mph (40 km/h) or more at least 2 minutes.

(4) Check the status of the readiness monitor on the scan tool display. If readiness status did not switch to complete, ensure the preconditions are met, turn the ignition off and then repeat steps (2) and (3).

DI1L7-17

TERMINALS OF ECM



Each ECM terminals standard normal voltage is shown in the table below. In the table, first follow the information under "Condition".
Look under "Symbols (Terminals No.)" for the terminals to be inspected.
The standard normal voltage between the terminals is shown under "STD Voltage".
Use the illustration above as a reference for the ECM terminals.

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage
BATT (E9-3) - E1 (E7-1)	B-R - BR	Always	9 to 14 V
+BM (E8-6) - E1 (E7-1)	Y-B - BR		
IGSW (E9-9) - E1 (E7-1)	B-R - BR	IG switch ON	9 to 14 V
+B (E9-1) - E1 (E7-1)	B-Y - BR		
MREL (E9-8) - E1 (E7-1)	B-W - BR	IG switch ON	9 to 14 V
VC (E5-18) - E2 (E5-28)	L-R - BR-W	IG switch ON	4.5 to 5.5 V
VG (E5-30) - E2G (E5-29)	L-Y - G-W	Idling, P or N position, A/C switch OFF	0.5 to 3.0 V
THA (E5-20) - E2 (E5-28)	Y-B - BR-W	Idling, Intake air temp. 20°C (68°F)	0.5 to 3.4 V
THW (E5-19) - E2 (E5-28)	G-B - BR-W	Idling, Engine coolant temp. 80°C (176°F)	0.2 to 1.0 V
VTA1 (E5-21) - E2 (E5-28)	R-Y - BR-W	IG switch ON, Accelerator pedal released	0.5 to 1.2 V
		IG switch ON, Accelerator pedal depressed	3.2 to 4.8 V
VTA2 (E5-31) - E2 (E5-28)	Y-B - BR-W	IG switch ON, Accelerator pedal released	2.0 to 3.1 V
		IG switch ON, Accelerator pedal depressed	4.7 to 5.1 V
VPA (E9-22) - E2 (E5-28)	R - BR-W	IG switch ON, Accelerator pedal released	0.3 to 0.9 V
		IG switch ON, Accelerator pedal depressed	3.2 to 4.8 V
VPA2 (E9-23) - E2 (E5-28)	R-B - BR-W	IG switch ON, Accelerator pedal released	1.8 to 2.7 V
		IG switch ON, Accelerator pedal depressed	4.7 to 5.1 V
VCPA (E9-26) - EPA (E9-28)	L-R - BR-W	IG switch ON	4.5 to 5.5 V
VCP2 (E9-27) - EPA2 (E9-29)	W - W-R	IG switch ON	4.5 to 5.5 V
OX1A (E6-23) - E1 (E7-1) OX1B (E6-29) - E1 (E7-1)	B - BR B - BR	Maintain engine speed at 2,500 rpm for 2 minutes after warming up	Pulse generation (See page DI-215)
OX2A (E6-22) - E1 (E7-1) OX2B (E6-21) - E1 (E7-1)	W - BR W - BR	Maintain engine speed at 2,500 rpm for 2 minutes after warming up	Pulse generation (See page DI-215)
HT1A (E6-4) - E1 (E7-1) HT1B (E6-5) - E1 (E7-1) HT2A (E6-33) - E1 (E7-1) HT2B (E6-25) - E1 (E7-1)	R - BR L - BR Y - BR R - B - BR	Idling	Below 3.0 V
		IG switch ON	9 to 14 V

#1 (E5-1) - E01 (E5-7) #2 (E5-2) - E01 (E5-7) #3 (E5-3) - E01 (E5-7) #4 (E5-4) - E01 (E5-7) #5 (E5-5) - E01 (E5-7) #6 (E6-3) - E01 (E5-7) #7 (E7-6) - E01 (E5-7) #8 (E7-5) - E01 (E5-7)	Y - W-B B - W-B L - W-B R - W-B G - W-B R-L - W-B W - W-B B-W - W-B	IG switch ON	9 to 14 V
		Idling	Pulse generation (See page DI-167)
KNK1 (E6-1) - E1 (E7-1)	B - BR	Maintain engine speed at 4,000 rpm after warming up	Pulse generation (See page DI-186)
KNK2 (E6-2) - E1 (E7-1)	W - BR		
G2+ (E7-27) - G2- (E7-32)	R - G	Idling	Pulse generation (See page DI-191)
NE+ (E7-25) - NE- (E7-24)	L - G		
PRG (E5-34) - E1 (E7-1)	L-B - BR	IG switch ON	9 to 14 V
CCV (E5-27) - E1 (E7-1)	L-R - BR	IG switch ON	9 to 14 V
TBP (E9-4) - E1 (E7-1)	L - BR	IG switch ON, disconnect vacuum hose from VSV for pressure switching valve	9 to 14 V
PTNK (E9-21) - E2 (E5-28)	L-B - BR-W	Ignition switch ON	2.9 to 3.7 V
		Apply vacuum 4.0 kPa (30 mmHg, 1.18 in.Hg)	Below 0.5 V
SPD (E8-17) - E1 (E7-1)	V - BR	IG switch ON, Rotate driving wheel slowly	Pulse generation (See page DI-274)
M+ (E7-3) - E1 (E7-1) M- (E7-2) - E1 (E7-1)	R - BR W - BR	Idling	Pulse generation (See page DI-302)
FPR (E5-33) - E1 (E7-1)	G-W - BR	IG switch ON	0 to 3.0 V
FC (E9-10) - E1 (E7-1)	B-W - BR	IG switch ON	9 to 14 V
IGT1 (E5-9) - E1 (E7-1) IGT2 (E5-8) - E1 (E7-1) IGT3 (E5-25) - E1 (E7-1) IGT4 (E5-11) - E1 (E7-1) IGT5 (E5-12) - E1 (E7-1) IGT6 (E5-26) - E1 (E7-1) IGT7 (E5-13) - E1 (E7-1) IGT8 (E5-10) - E1 (E7-1)	B - BR R - BR L - BR G - BR Y - BR B-Y - BR B-L - BR L-B - BR	Idling	Pulse generation (See page DI-202)
IGF1 (E5-24) - E1 (E7-1) IGF2 (E5-23) - E1 (E7-1)	B-W - BR B-R - BR	IG switch ON	4.5 to 5.5 V
		Idling	Pulse generation (See page DI-202)
STP (E8-19) - E1 (E7-1)	G-W - BR	Brake pedal is depressed	7.5 to 14 V
		Brake pedal is released	Below 1.5 V
ST1- (E8-12) - E1 (E7-1)	R-G - BR	Brake pedal is depressed	Below 1.5 V
		Brake pedal is released	7.5 to 14 V
STA (E5-17) - E1 (E7-1)	B-R - BR	Shift lever range P or N, Ignition switch START	6.0 V or more
STSW (E7-12) - E1 (E7-1)	B-W - BR	Shift lever range P or N, ignition switch START	6.0 V or more
ACCR (E5-15) - E1 (E7-1)	R-G - BR	Shift lever range P or N, ignition switch START	9 to 14 V
STAR (E6-9) - E1 (E7-1)	B-W - BR	Shift lever range P or N, ignition switch START	9 to 14 V
NSW (E5-16) - E1 (E7-1)	B-W - BR	IG switch ON, Other shift position in P, N	9 to 14 V
		IG switch ON, Shift position in P, N	0 to 3.0 V
W (E9-11) - E1 (E7-1)	W - BR	Idling	9 to 14 V
		IG switch ON	Below 3.0 V
SIL (E9-18) - E1 (E7-1)	V-W - BR	During transmission	Pulse generation
TACH (E9-5) - E1 (E7-1)	B - BR	Idling	Pulse generation

DIB5X-02

CIRCUIT INSPECTION

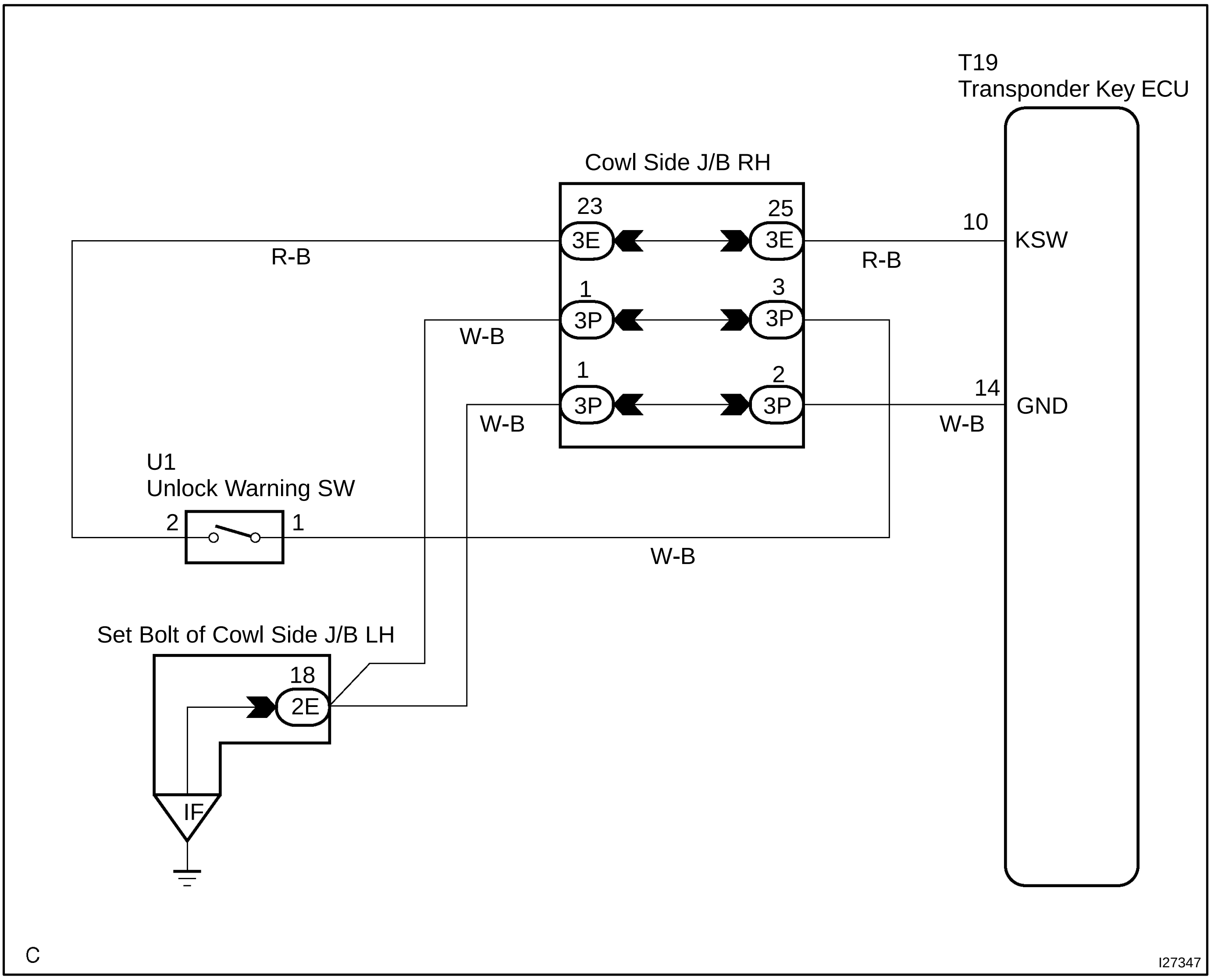
DTC	B2780	Key Unlock Warning Switch Malfunction

CIRCUIT DESCRIPTION

This DTC is detected when the Transponder key ECU does not detect the key unlock warning switch ON even with the ignition switch ON. (In normal condition, the key unlock warning switch should be ON when the ignition switch is ON.)

DTC No.	DTC Detecting Condition	Trouble Area
B2780	The key unlock warning switch On is not detected when the ignition switch is ON.	★Key unlock warning switch ★Wire harness

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
In case of using the hand-held tester, start the inspection from step 1 and in case of not using the hand-held tester, start from step 2.

1	**Check key unlock warning switch using hand-held tester.**

PREPARATION:
Connect the hand-held tester to the DLC3.
CHECK:
Check the key unlock warning switch using DATA LIST.

OK → **Go to step 4.**

NG ↓

2	**Check key unlock warning switch (See page BE-29).**

NG → **Replace the key unlock warning switch.**

OK ↓

3	**Check wire harness and connector between key unlock warning switch and transponder key ECU (See page IN-36).**

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

OK ↓

Replace transponder key ECU.

4	**Check whether or not DTC is detected when DTC is cleared, key is inserted into ignition key cylinder and IG SW is turned ON. (See page DI-1004).**

RESULT:

OK	B2780 is not output.
NG	B2780 is output.

NG → **Replace Transponder Key ECU).**

OK

No problem at this time.
It is suspected that DTC was detected for some reason in the past.

DIB5Y-01

DTC	B2784	TRANSPONDER KEY COIL MALFUNCTION

CIRCUIT DESCRIPTION

This DTC is output when short or open of the key coil built in the transponder key amplifier is detected.

DTC No.	DTC Detecting Condition	Trouble Area
B2784	Transponder key coil malfunction	Transponder key amplifier with coil

INSPECTION PROCEDURE

Replace key.

DI1AK-22

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE IMMOBILISER 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)

DIAGNOSTIC TROUBLE CODE CHART

DTC No. (SEE PAGE)	Circuit Inspection	Trouble Area
B2780 (DI-1014)	Key unlock warning switch malfunction	★Key unlock warning switch ★Wire harness
B2784 (DI-1017)	Transponder key coil malfunction	Transponder key amplifier with coil
B2793 (DI-1018)	Transponder chip malfunction	Key
B2794 (DI-1019)	Unmatched encryption code	★Key ★Transponder key amplifier
B2795 (DI-1020)	Unmatched key code	★Key ★Unregistered key inserted before
B2796 (DI-1021)	No communication in immobiliser system	★Key ★Transponder key amplifier with coil ★Wire harness ★Transponder key ECU
B2797 (DI-1023)	Communication malfunction No.1	★Key ★Wire harness ★Transponder key amplifier with coil ★Transponder key ECU
B2798 (DI-1026)	Communication malfunction No.2	★Key ★Transponder key amplifier with coil ★Wire harness ★Transponder key ECU
B2799/99 (DI-1026)	Engine immobiliser system malfunction	★Wire harness ★Transponder key ECU ★ECM

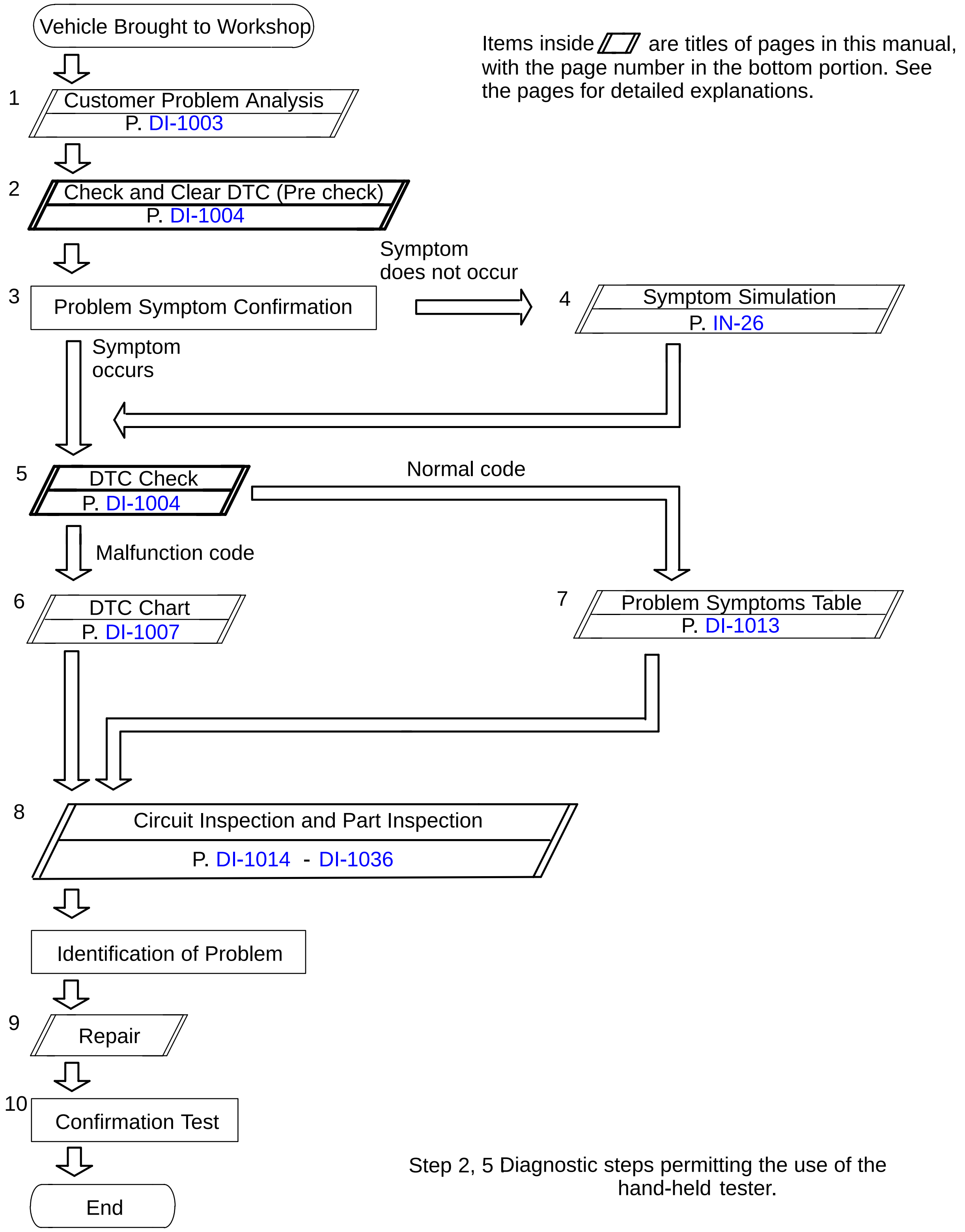
HINT:
To reduce the unnecessary exchange of Transponder key ECU, check that a trouble occurs with the original Transponder key ECU at the time of exchanging Transponder key ECU and the trouble will disappear with a new Transponder key ECU.

ENGINE IMMOBILISER SYSTEM

DI1AJ-40

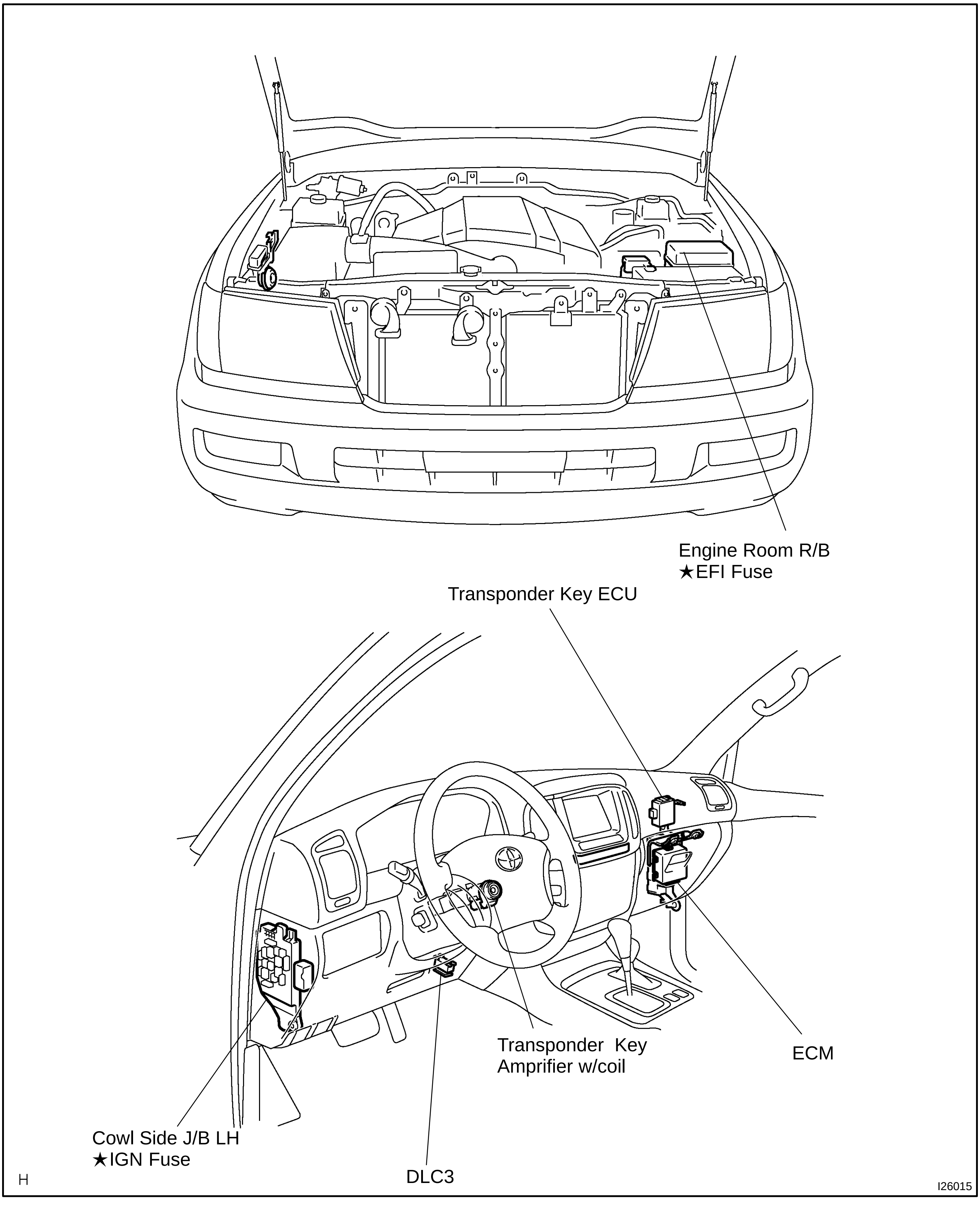
HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot in accordance with the procedure on the following pages.

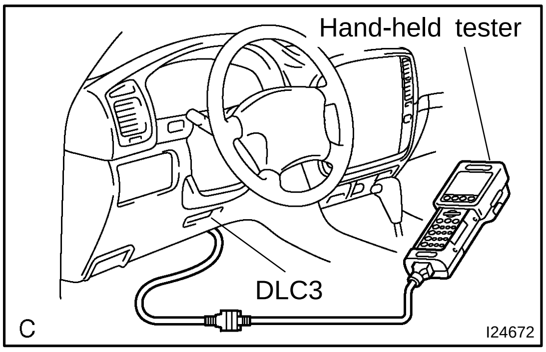


DI3CE-03

PARTS LOCATION



DI1AL-28

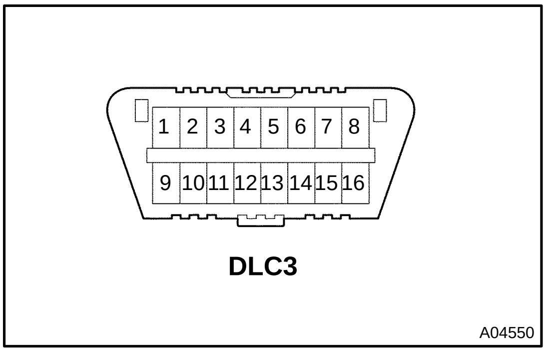


PRE-CHECK

1. DIAGNOSIS SYSTEM

(a) Description

ECM controls the function of immobiliser on this vehicle. Data of the immobiliser or DTC can be read from DLC3 of the vehicle. When a trouble occurs on immobiliser, MIL does not light up but DTC inspection is performed. Therefore when there seems to be a trouble on immobiliser, use hand-held tester or SST to check and troubleshoot it.



(b) Inspect the DLC3.

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 hand-held tester to DLC3, turned the ignition switch ON and operated the hand-held tester, 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

(a) Check the DTC (Using hand-held tester).

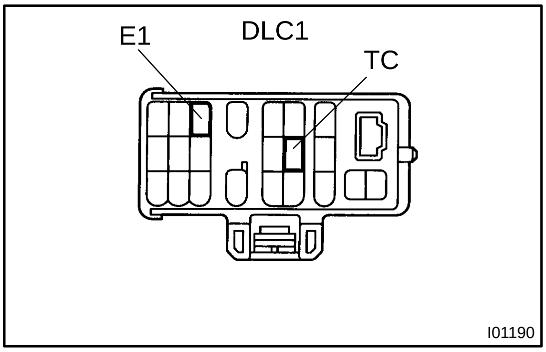
(1) Prepare hand-held tester.

(2) Connect hand-held tester to DLC3 under the instrument panel lower pad.

(3) Turn the ignition switch ON and turn hand-held tester switch ON.

(4) Use hand-held tester to check the DTCs. and "Snap-shot function" which records the monitor data (For operating instructions, see the hand-held tester instruction book.).

(5) See page DI-1007 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 11 (TC) and 3 (E1) of DLC1.

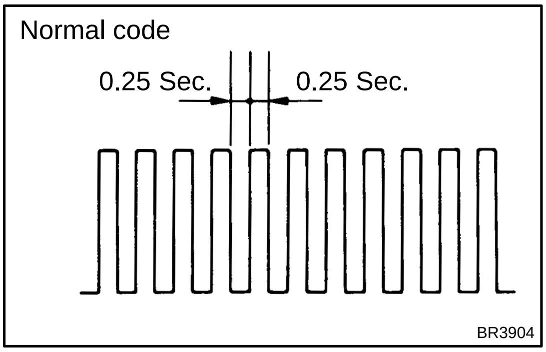
SST 09843-18020

(3) Read the diagnostic trouble code from malfunction indicator lamp.

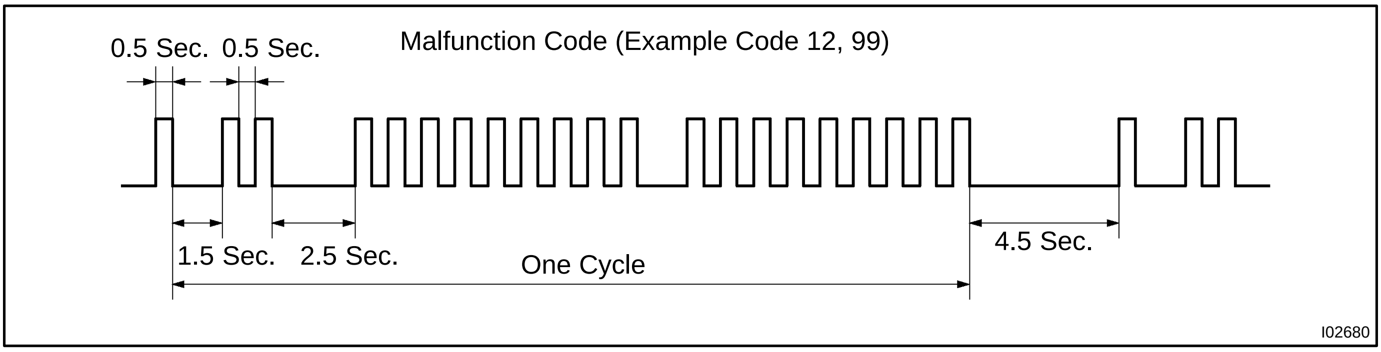
HINT:

★ 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 engine data.



★ As an example, the blinking patterns for codes; normal, 12 and 99 are shown in the charts.



(4) When DTC "99" is output, there is a trouble of immobiliser. Start troubleshooting referring to PROBLEM SYMPTOMS TABLE.

(5) After completing the check, disconnect terminals 11 (TC) and 3 (E1) 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 operations will erase the DTCs and freeze frame data.

(1) Operating the hand-held tester to erase the codes (See the hand-held tester instruction book for operating instructions.).

(2) Disconnecting the battery terminals or EFI fuse.

3. CHECK HAND-HELD TESTER

(a) ECU DATA MONITOR

(1) Make a judgement of good or bad and find out a malfunctioning part by the data monitor.

Standard:

TRANSPONDER KEY ECU

Item	Condition	Specified Condition
IMMOBILISER	Ignition switch ON → When key is not inserted in the ignition switch cylinder	UNSET/SET
MASTER KEY	Ignition switch ON with master key → Pull out key from ignition switch cylinder	CORRESP/WRONG
SUB KEY	Ignition switch ON with sub-key → Pull out key from ignition switch cylinder	CORRESP/WRONG
REGIST MAS CODE	-	0 - 3
REGIST SUB CODE	-	0 - 1
KEY SW	Ignition switch ON → Without key	ON/OFF
IG SW	Ignition switch ON → OFF	ON/OFF

(b) ACTIVE TEST

(1) Make a judgement of good or bad and find out a malfunctioning part by the active test.

Standard:

TRANSPONDER KEY ECU

Item	Operation
SECURITY INDIC	ON / OFF

DI1AP-34

PROBLEM SYMPTOMS TABLE

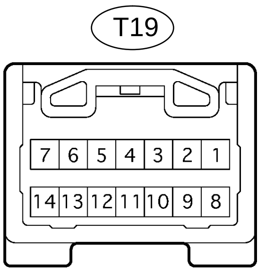
Symptom	Suspect Area	See page
Immobiliser is not set. (Engine starts with key codes other than the registered key code.)	1. Transponder key ECU	IN-36
Engine does not start.	1. Key 2. Wire harness 3. Transponder key coil 4. Amplifier 5. Transponder key ECU 6. ECM	*1 IN-36 BE-196 IN-36
Security indicator is always ON.	1. Multi-display (security indicator) 2. Wire harness 3. Transponder key ECU	*2 IN-36 IN-36
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 amplifier with coil 3. Transponder key ECU	IN-36 BE-196 IN-36
Security indicator is OFF. (When DTC of immobiliser is output)	1. Wire harness 2. Transponder key amplifier with coil 3. Transponder key ECU	IN-36 BE-196 IN-36
Security indicator is OFF. (When DTC of immobiliser is not output)	1. Multi-display (security indicator) 2. Diagnosis circuit 3. Wire harness 4. Transponder key ECU	IN-36 IN-36
Security indicator is abnormally blinking.	1. Wire harness 2. Transponder key ECU	IN-36 IN-36
No code is output.	1. Power source circuit 2. Transponder key ECU	DI-1031 IN-36

*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.
*2 : Finish the automatic registration mode because the mode might still remain.

DIB5W-01

TERMINALS OF ECM

1. TRANSPONDER KEY ECU



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I25609

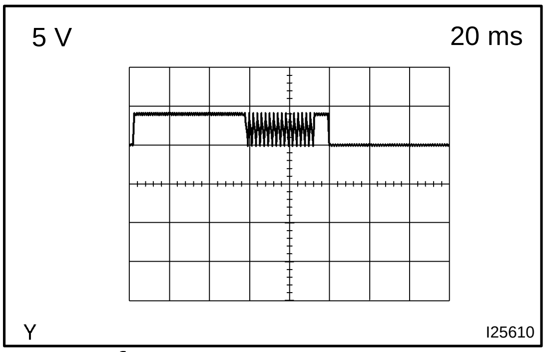
(a) Disconnect the transponder key ECU connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Condition	Specified condition
T19-14 - Body ground (GND - Body ground)	W-B ↔ Body ground	Constant	Continuity
T19-1 - T19-14 (+B - GND)	L-W ↔ W-B	Constant	10 - 14 V
T19-2 - T19-14 (IG - GND)	B-R ↔ W-B	Ignition switch OFF → ON	0 V → 10 - 14 V
T19-10 - T19-14 (KSW - GND)	R-B ↔ W-B	No key in the ignition key cylinder → With key	No Continuity → Continuity
T19-4 - T19-14 (CTY - GND)	R-Y ↔ W-B	Driver's door close → open	No Continuity → Continuity
T19-10 - T19-14 (KSW - GND)	R-B ↔ W-B	No key in the ignition key cylinder → With key	10 - 14 V → 0 V
T19-8 - T19-14 (VC5 - GND)	Y ↔ W-B	Ignition switch OFF → ON	0 V → 5 V
T19-12 - T19-14 (TXCT - GND)	V-G ↔ W-B	Ignition switch OFF → ON	Waveform 1
T19-11 - T19-14 (CODE - GND)	L-B ↔ W-B	Ignition switch OFF → ON	Waveform 2
T19-6 - T19-14 (EFIO - GND)	W ↔ W-B	Ignition switch OFF → ON	Waveform 3
T19-7 - T19-14 (EFII - GND)	Y ↔ W-B	Ignition switch OFF → ON	Waveform 4
T19-3 - T19-14 (IND - GND)	G-R ↔ W-B	Immobiliser system unset → set	0 V → 10 - 14 V ↔ 0 V
T19-4 - T19-14 (CTY - GND)	R-Y ↔ W-B	Driver's door close → open	10 - 14 V → 0 V

(b) Inspection using osilloscope.

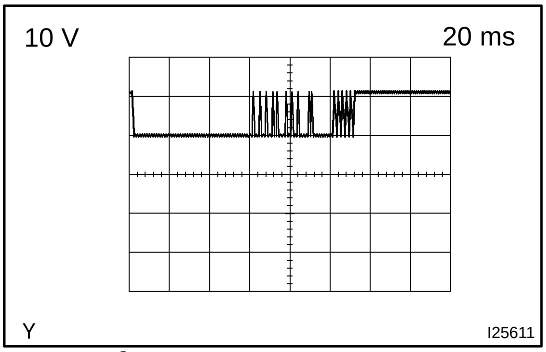
Referece:



(c) Waveform 1

Item	Condition
Terminal	TXCT - GND
Tool setting	5 V/DIV, 20 ms/DIV
Vehicle condition	Ignition switch ON

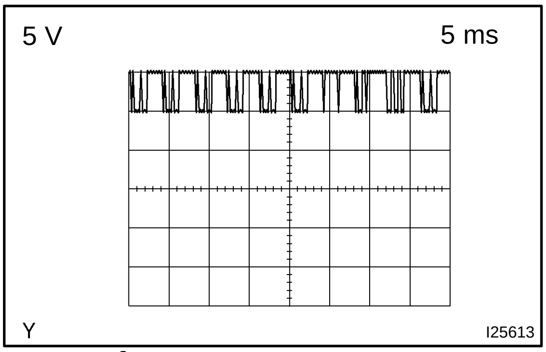
Referece:



(d) Waveform 2

Item	Condition
Terminal	CODE - GND
Tool setting	10 V/DIV, 20 ms/DIV
Vehicle condition	Ignition switch ON

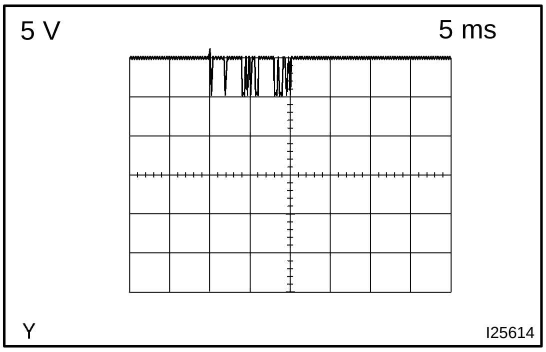
Referece:



(e) Waveform 3

Item	Condition
Terminal	EFIO - GND
Tool setting	5 V/DIV, 5 ms/DIV
Vehicle condition	Ignition switch ON

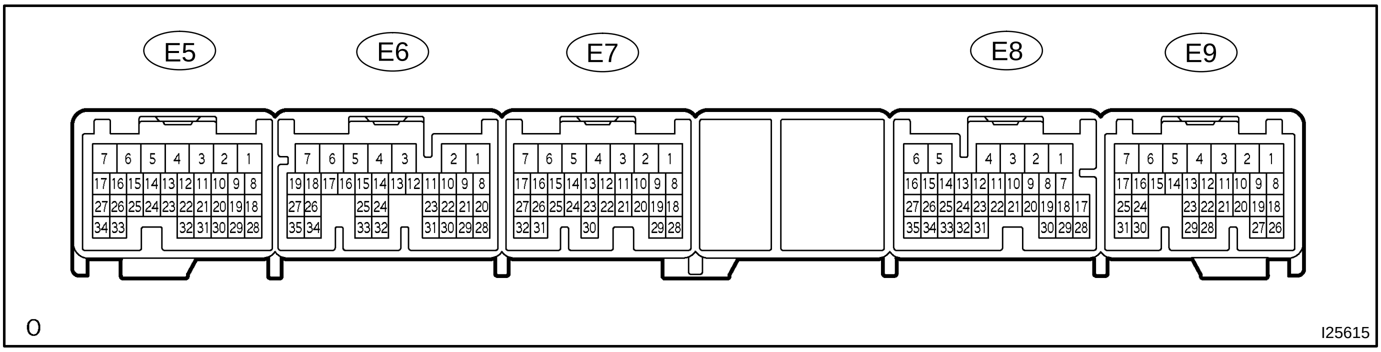
Referece:



(f) Waveform 4

Item	Condition
Terminal	EFII - GND
Tool setting	5 V/DIV, 5 ms/DIV
Vehicle condition	Constant

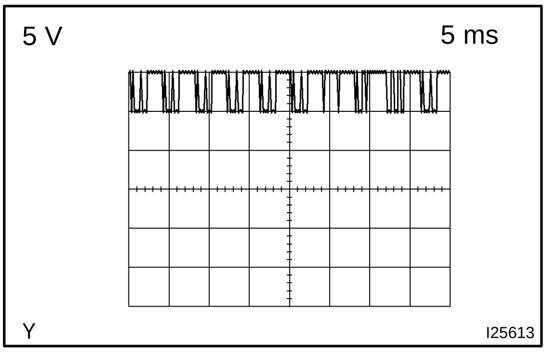
2. ECM



Symbols (Terminal No.)	Wiring Color	Condition	Specified condition
E9-3 ↔ E7-1 (BATT ↔ E1)	B-R ↔ BR	Constant	9 - 14 V
E9-1 ↔ E7-1 (+B ↔ E1)	B-Y ↔ BR	Ignition switch OFF → ON	9 - 14 V
E9-2 ↔ E7-1 (+B2 ↔ E1)	B-Y ↔ BR	Ignition switch OFF → ON	9 - 14 V
E9-9 ↔ E7-1 (IGSW ↔ E1)	B-R ↔ BR	Ignition switch OFF → ON	9 - 14 V
E8-27 ↔ E7-1 (IMI ↔ E1)	W ↔ BR	No key in the ignition key cylinder → With key	Waveform 1
E8-26 ↔ E7-1 (IMO ↔ E1)	Y ↔ BR	No key in the ignition key cylinder → With key	Waveform 2
E7-1 ↔ Body ground (E1 ↔ Body ground)	BR ↔ Body ground	Constant	Continuity

(a) Inspection using osilloscope.

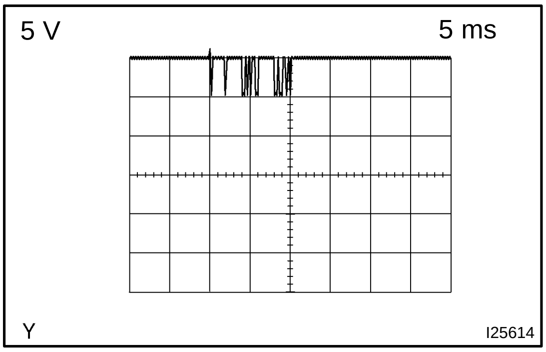
Referece:



(b) Waveform 1

Item	Condition
Terminal	IMI - GND
Tool setting	5 V/DIV, 5 ms/DIV
Vehicle condition	Ignition switch ON

Referece:



(c) Waveform 2

Item	Condition
Terminal	IMO - GND
Tool setting	5 V/DIV, 5 ms/DIV
Vehicle condition	Constant

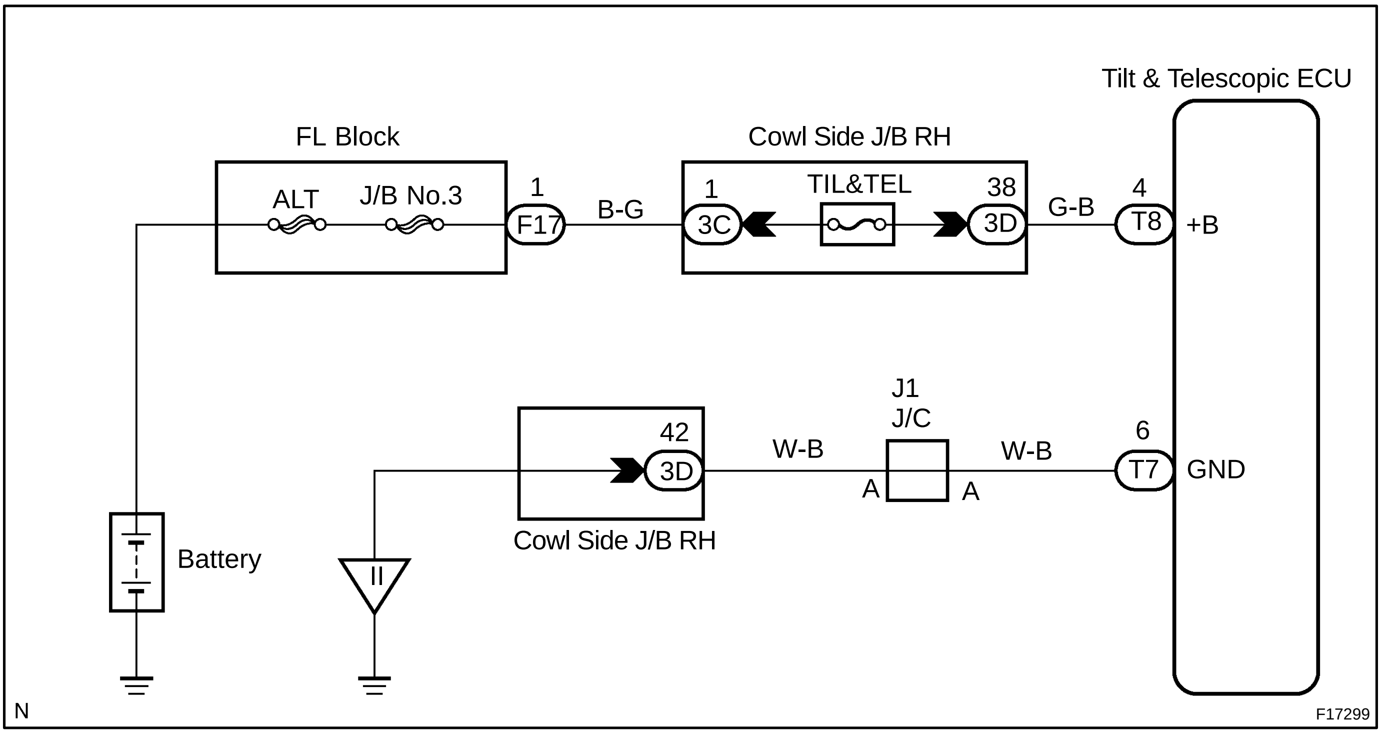
DI23L-17

Actuator Power Source Circuit

CIRCUIT DESCRIPTION

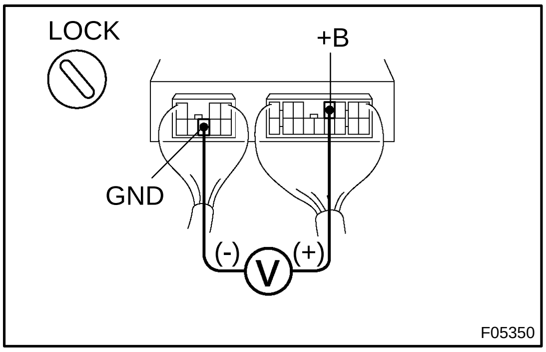
This is the power source for the motors.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminals +B and GND of ECU connector.



PREPARATION:
Remove ECU with connectors still connected.

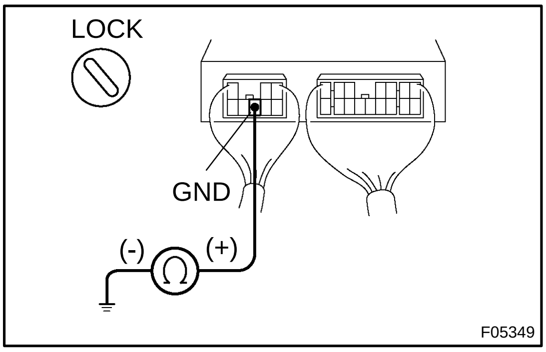
CHECK:
Measure voltage between terminals +B and GND of ECU connector.

OK:
Voltage: 8 - 16 V

OK — **Proceed to next circuit inspection shown on the problem symptoms table (See page DI-663).**

NG

2	Check continuity between terminal GND of ECU connector and body ground.



CHECK:
Measure resistance between terminal GND of ECU connector and body ground.

OK:
Resistance: 1 kΩ or less

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

OK

3	**Check POWER fuse.**

PREPARATION:

Remove POWER fuse from passenger side J/B.

CHECK:

Check continuity of POWER fuse.

OK:

Continuity

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

OK

Check for open circuit in harness and connector between ECU and battery (See page IN-36).

DI23F-13

CIRCUIT INSPECTION

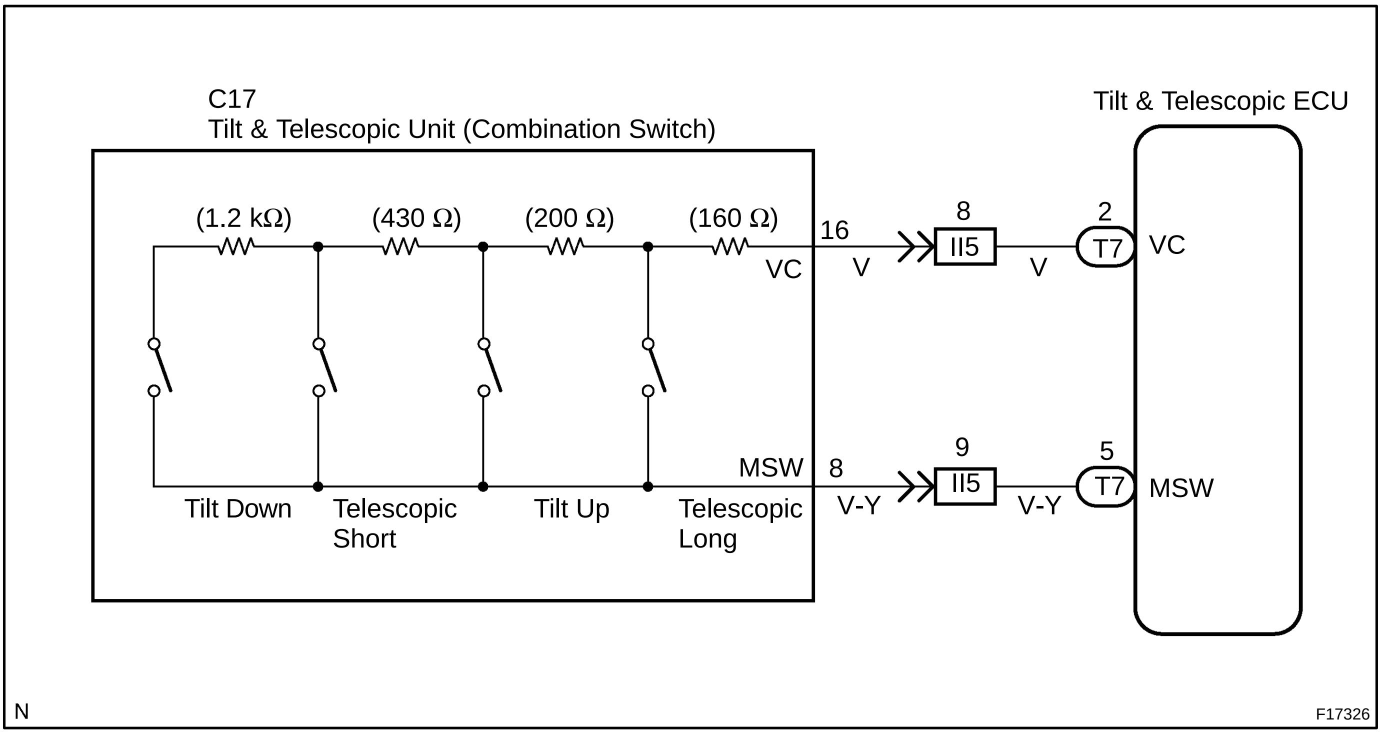
DTC	B2603	Tilt and Telescopic Manual switch circuit Malfunction

CIRCUIT DESCRIPTION

The different voltage value is input to tilt and telescopic ECU by operating the manual switch. Then tilt and telescopic ECU judges which motor and which direction tilt motor or telescopic motor should be moved based on the voltage value.

DTC No.	DTC Detecting Condition	Trouble Area
B2603	The abnormal voltage value which is not within the specification is input to tilt and telescopic ECU when being operated with the manual switch.	★Tilt and telescopic manual switch circuit ★Tilt and telescopic ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check tilt and telescopic manual switch circuit (See page DI-687).

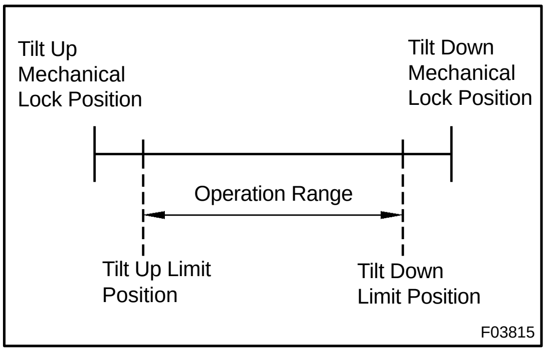
NG → Repair or replace malfunction part.

OK

Check and replace the tilt and telescopic ECU (See page IN-36).

DI23G-17

DTC	B2610	Tilt Position Sensor or Tilt Motor Circuit Malfunction



CIRCUIT DESCRIPTION

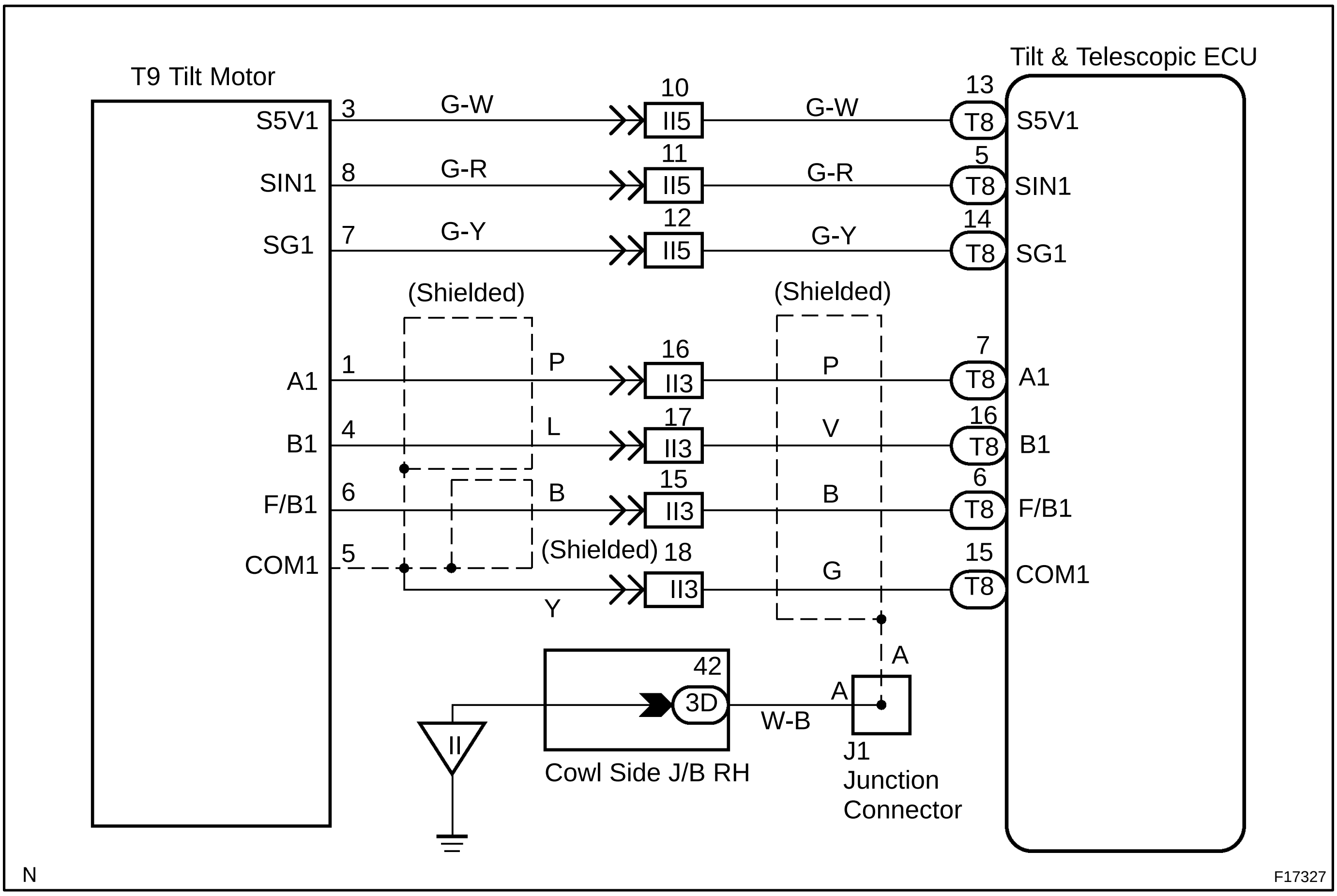
Tilt motor is operated by the power voltage supplied from tilt and telescopic ECU and makes the steering column tilt upward and downward. Tilt position sensor (Hole IC) in the tilt motor detects the tilt of the steering column and outputs the signal to the CPU in response to that tilt.

HINT:

Limit positions can be confirmed on the screen of the TOYOTA hand-held tester.

DTC No.	DTC Detecting Condition	Trouble Area
B2610	During tilt function operation, tilt operation stops within the operation range.	★Sensor power source circuit ★Actuator power source circuit ★Tilt motor circuit ★Tilt and telescopic ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check sensor power source circuit (See page DI-679).

NG → Repair or replace malfunction part.

OK

2	Check actuator power source circuit (See page DI-676).

NG → Repair or replace malfunction part.

OK

3	Check tilt motor circuit (See page DI-681).

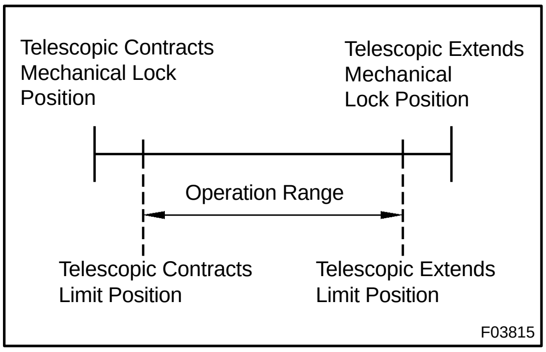
NG → Repair or replace malfunction part.

OK

Check and replace the tilt and telescopic ECU (See page IN-36).

DI23H-17

DTC	B2611	Telescopic Position Sensor or Telescopic Motor Circuit Malfunction



CIRCUIT DESCRIPTION

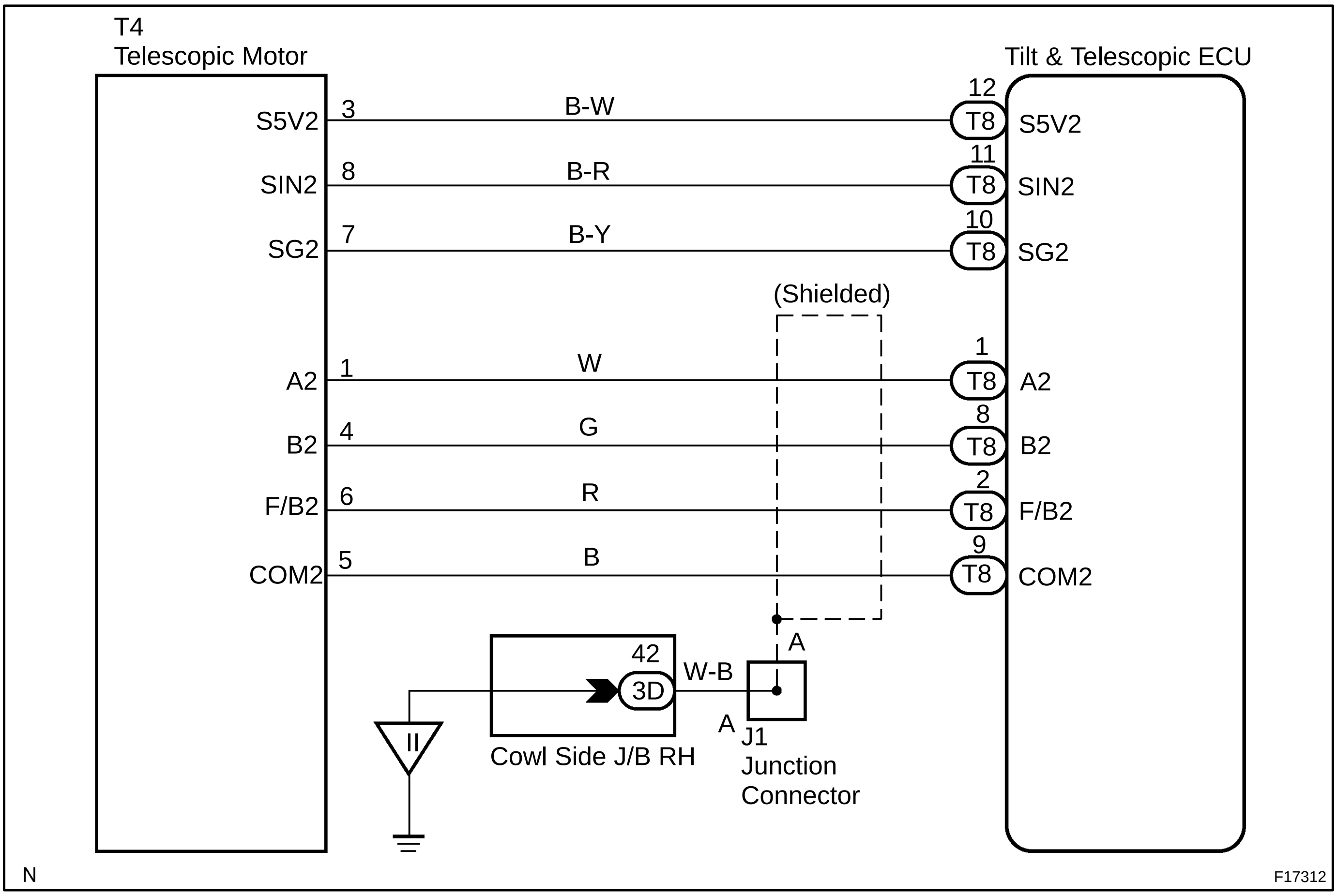
Telescopic motor is operated by the power voltage supplied from tilt and telescopic ECU and makes the steering column slide forward and rearward. Telescopic position sensor (Hole IC) in the telescopic motor detects the sliding position of the forward and rearward direction of the steering column and outputs the signal to the CPU in response to that sliding amount.

HINT:

Limit positions can be confirmed on the screen of the TOYOTA hand-held tester.

DTC No.	DTC Detecting Condition	Trouble Area
B2611	During telescopic function operation, telescopic operation stops within the operation range.	★Sensor power source circuit ★Actuator power source circuit ★Telescopic motor circuit ★Tilt and telescopic ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check sensor power source circuit (See page DI-679).**

NG → **Repair or replace malfunction part.**

OK ↓

2	**Check actuator power source circuit (See page DI-676).**

NG → **Repair or replace malfunction part.**

OK ↓

3	**Check telescopic motor circuit (See page DI-684).**

NG → **Repair or replace malfunction part.**

OK ↓

Check and replace the tilt and telescopic ECU (See page IN-36).

DI23I-16

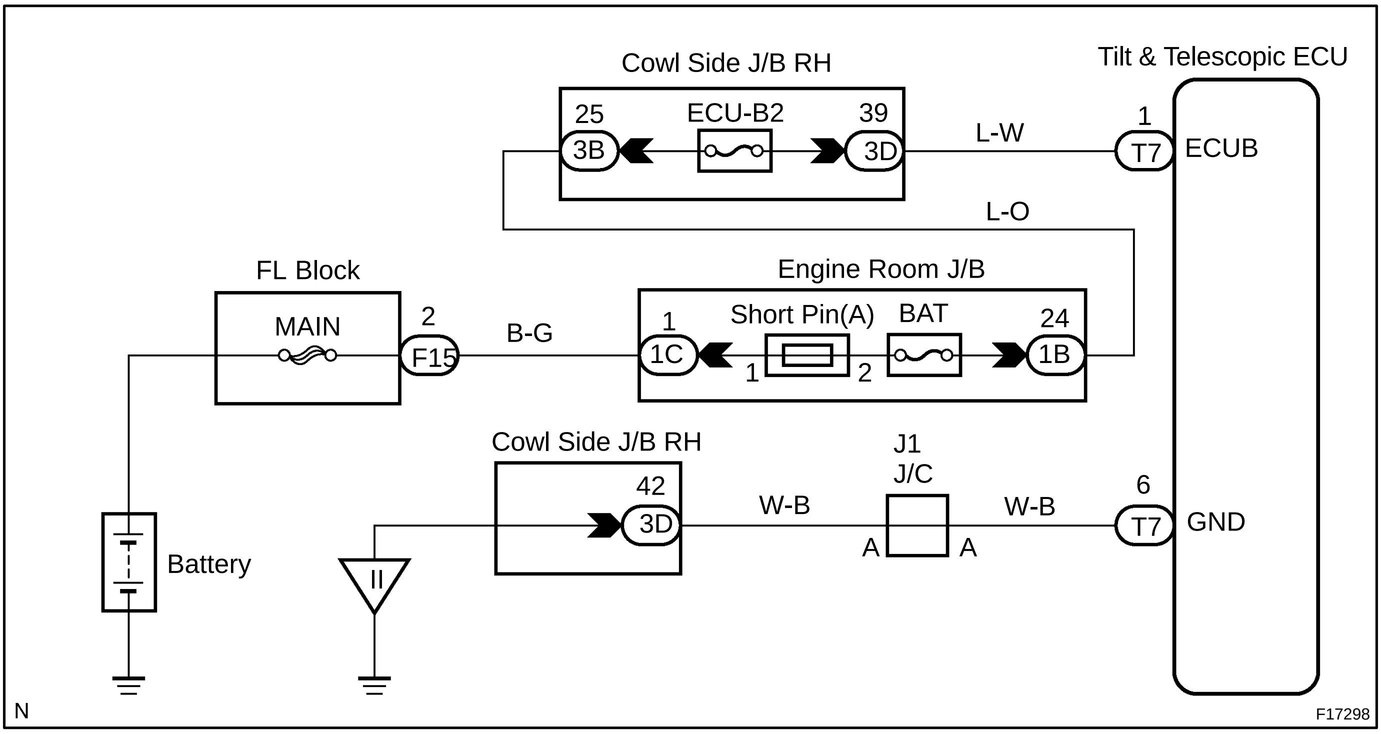
DTC	B2620	ECU Power Source Circuit Malfunction

CIRCUIT DESCRIPTION

ECU power source circuit supply the battery positive voltage to tilt and telescopic ECU.

DTC No.	DTC Detecting Condition	Trouble Area
B2620	The condition that the voltage of the ECU Power Source circuit drop to be 8V or less continues for 10 seconds or more	★Battery ★ECU power source circuit ★Tilt and telescopic ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check that the battery positive voltage is 11V or more when engine is stopped.

NG — Charge or replace battery.

OK

2	Check ECU power source circuit (See page DI-673).

NG — Repair or replace malfunction part.

OK

Check and replace the tilt and telescopic ECU (See page IN-36).

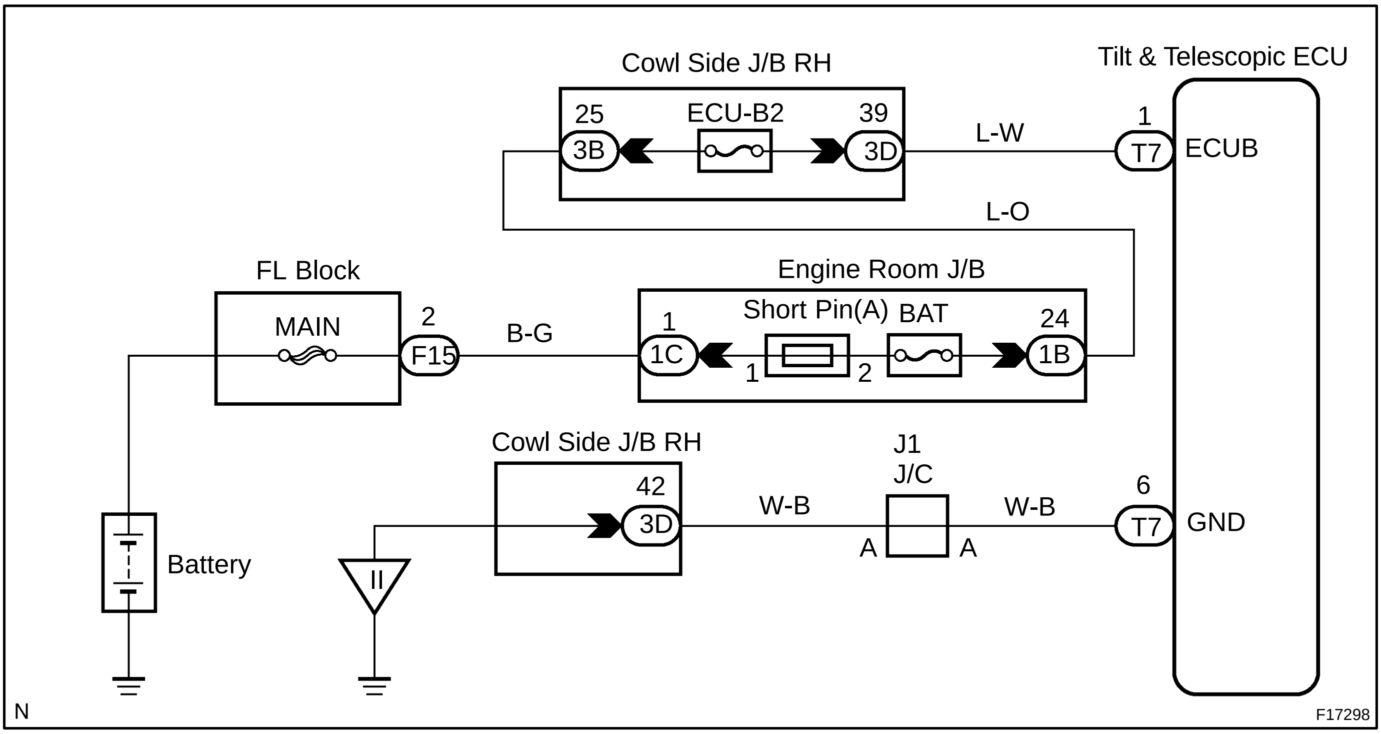
DI23K-16

ECU Power Source Circuit

CIRCUIT DESCRIPTION

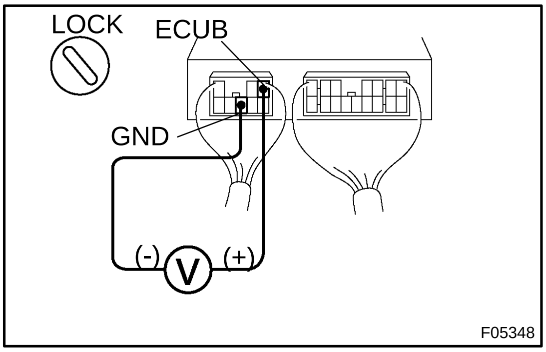
The ECU power source supplies power to the CPU and sensors, etc. power is supplied to the ECU even when the ignition switch is lock position.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminals ECUB and GND of ECU connector.

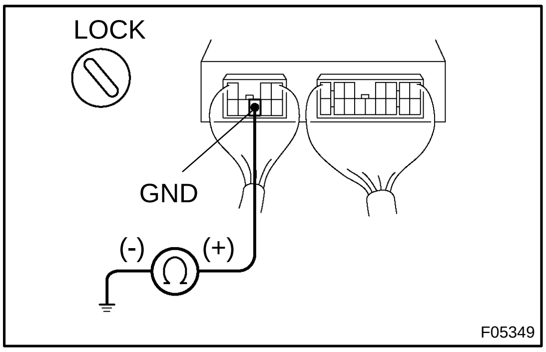


PREPARATION:
Remove ECU with connectors still connected.
CHECK:
Measure voltage between terminals ECUB and GND of ECU connector.
OK:
Voltage: 8 - 16 V

OK → **Proceed to next circuit inspection shown on the problem symptoms table (See page DI-663).**

NG

2	Check continuity between terminal GND of ECU connector and body ground.



CHECK:
Measure resistance between terminal GND of ECU connector and body ground.
OK:
Resistance: 1 kΩ or less

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

OK

3	Check ECU-B fuse.

PREPARATION:
Remove ECU-B fuse from engine room R/B.
CHECK:
Check continuity of ECU-B fuse.
OK:
Continuity

NG → **Check for short in harness and all components connected to ECU-B fuse.**

OK

Check for open circuit in harness and connector between ECU and battery (See page IN-36).

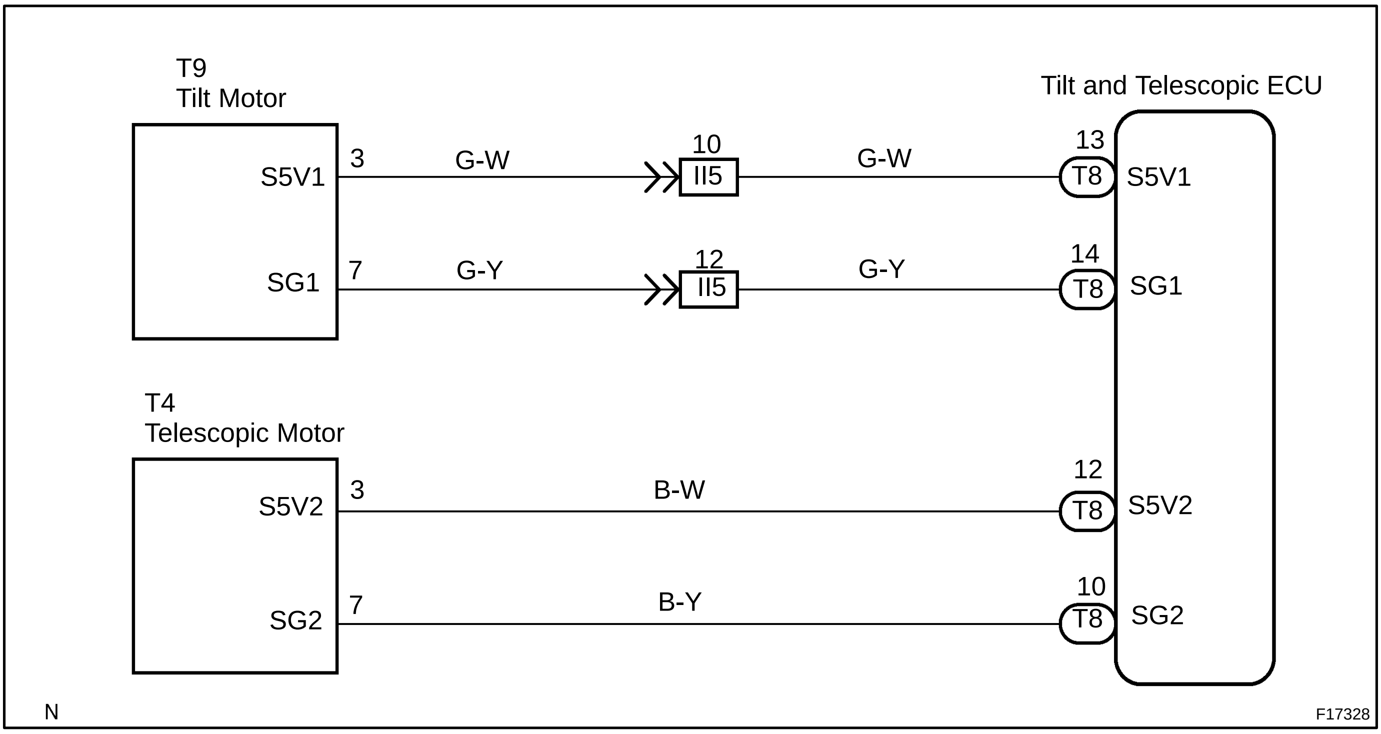
DI1TO-14

Sensor Power Source Circuit

CIRCUIT DESCRIPTION

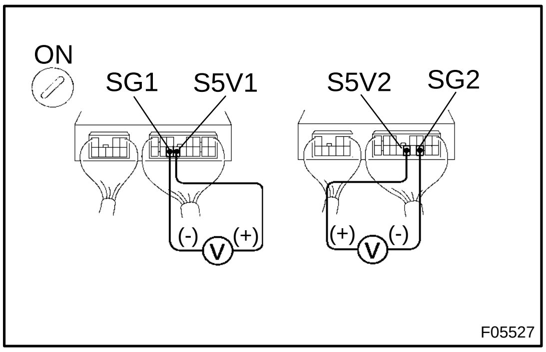
Power to the position sensor is output from ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals S5V1 and SG1, S5V2 and SG2 of ECU connector.**



PREPARATION:

Remove ECU with connectors still connected.

CHECK:

Measure voltage between terminals S5V1 and SG1, S5V2 and SG2 of ECU connector.

OK:

Voltage: 4.5 - 5.5 V

NG → **Go to step 3.**

OK

2	**Check for open circuit in harness and connector between terminals S5V1 and SG1, S5V2 and SG2 of ECU connector.**

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

OK

Proceed to next circuit inspection shown on the problem symptoms table (See page DI-663).

3	**Check for short circuit in harness between terminals S5V1 and SG1, S5V2 and SG2 of ECU connector.**

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

OK

Check and replace tilt and telescopic ECU (See page IN-36).

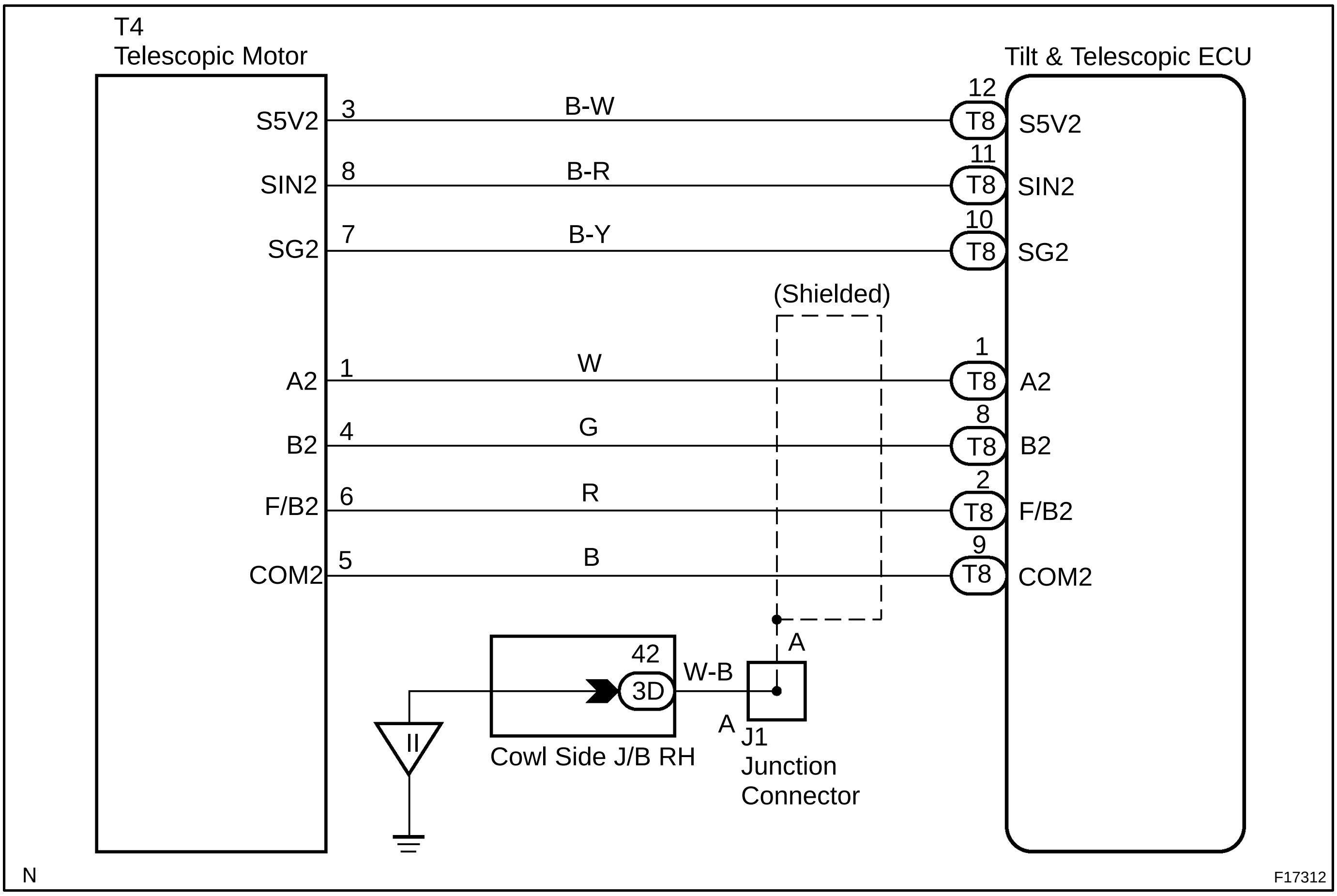
DI23N-17

Telescopic Motor Circuit

CIRCUIT DESCRIPTION

The ECU provides both +B and ground for the telescopic motor.
Reversing polarity of the applied voltage reverses the motor.

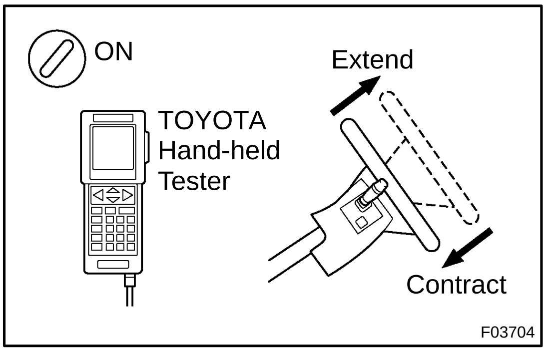
WIRING DIAGRAM



INSPECTION PROCEDURE

In case of using TOYOTA hand-held tester, start inspection from step 1.
In case of not using TOYOTA hand-held tester, start inspection from step 2.

1	**Check telescopic motor operation using TOYOTA hand-held tester.**



PREPARATION:
(a) Connect the TOYOTA hand-held tester to the DLC3.
(b) Turn 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.

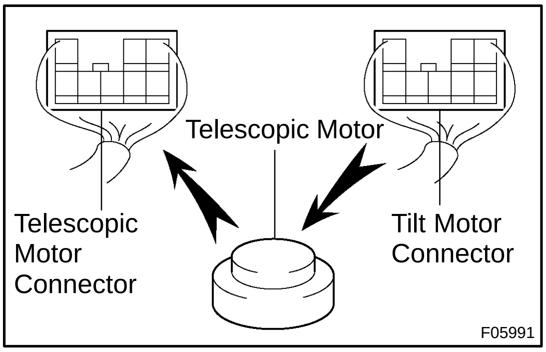
CHECK:
Check that the steering column length become short (long) and confirm that telescopic position value change when the ACTIVE TEST carried out.

OK:
Steering column length must be short (long).
Telescopic position value must be changed.

OK	**Proceed to next circuit inspection shown on the problem symptoms table (See page DI-663).**

NG

2	**Check telescopic motor.**



PREPARATION:
(a) Disconnect telescopic motor connector and tilt motor connector.
(b) Remove telescopic motor (See page SR-30).

CHECK:
Connect tilt motor connector to telescopic motor. Then confirm that telescopic motor moved when operating the manual switch.

NG	**Replace telescopic motor.**

OK

3	**Check for open or short circuit in harness and connector between tilt and telescopic ECU and telescopic motor (See page IN-36).**

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

OK

Proceed to next circuit inspection shown on the problem symptoms table (See page DI-663).

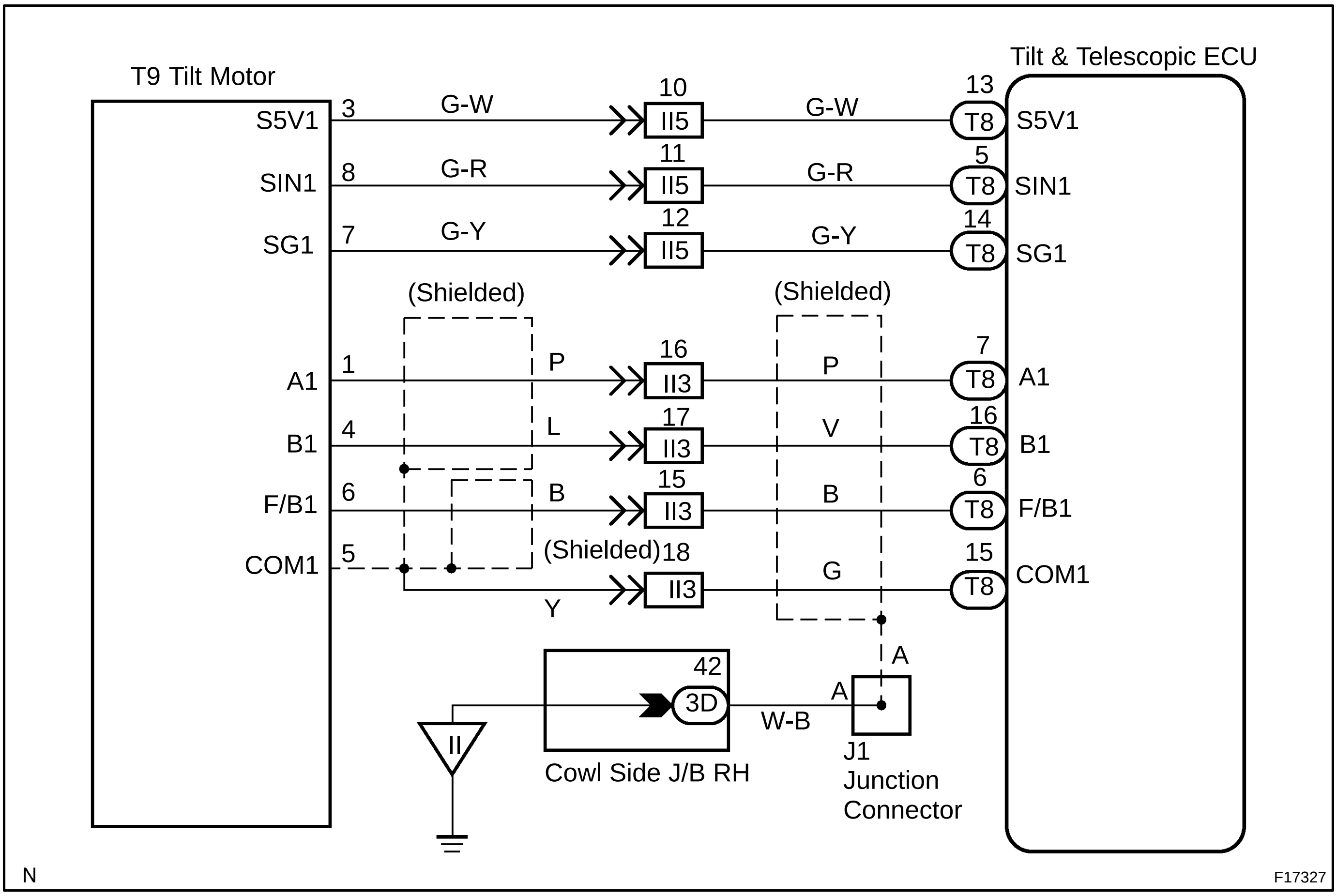
DI23M-18

Tilt Motor Circuit

CIRCUIT DESCRIPTION

The ECU provided both +B and ground for the tilt motor.
Reversing polarity of the applied voltage reverses the motor.

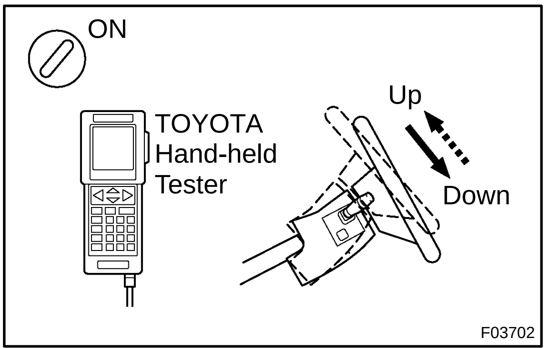
WIRING DIAGRAM



INSPECTION PROCEDURE

In case of using TOYOTA hand-held tester, start inspection from step 1.
In case of not using TOYOTA hand-held tester, start inspection from step 2.

1	Check tilt motor operation using TOYOTA hand-held tester.



PREPARATION:

(a) Connect the TOYOTA hand-held tester to the DLC3.
(b) Turn 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 that the steering wheel tilt up (down) and confirm that tilt position value change when the ACTIVE TEST carried out.

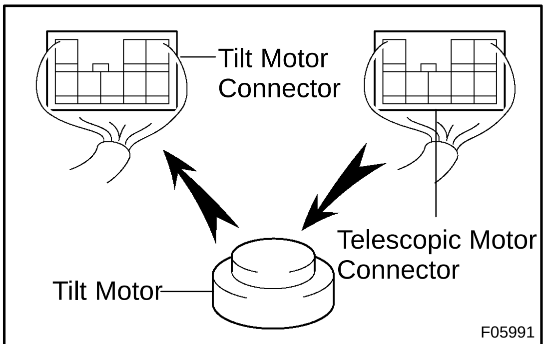
OK:

Steering wheel must be moved upward (downward).
Tilt position value must be changed.

OK	Proceed to next circuit inspection shown on the problem symptoms table (See page DI-663).

NG

2	Check tilt motor.



PREPARATION:

(a) Disconnect tilt motor connector and telescopic motor connector.
(b) Remove tilt motor (See page SR-30).

CHECK:

Connect telescopic motor connector to tilt motor. Then confirm that tilt motor moved when operating the manual switch.

NG	Replace tilt motor.

OK

3	**Check for open or short circuit in harness and connector between tilt and telescopic ECU and tilt motor (See page IN-36).**

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

OK

Proceed to next circuit inspection shown on the problem symptoms table (See page DI-663).

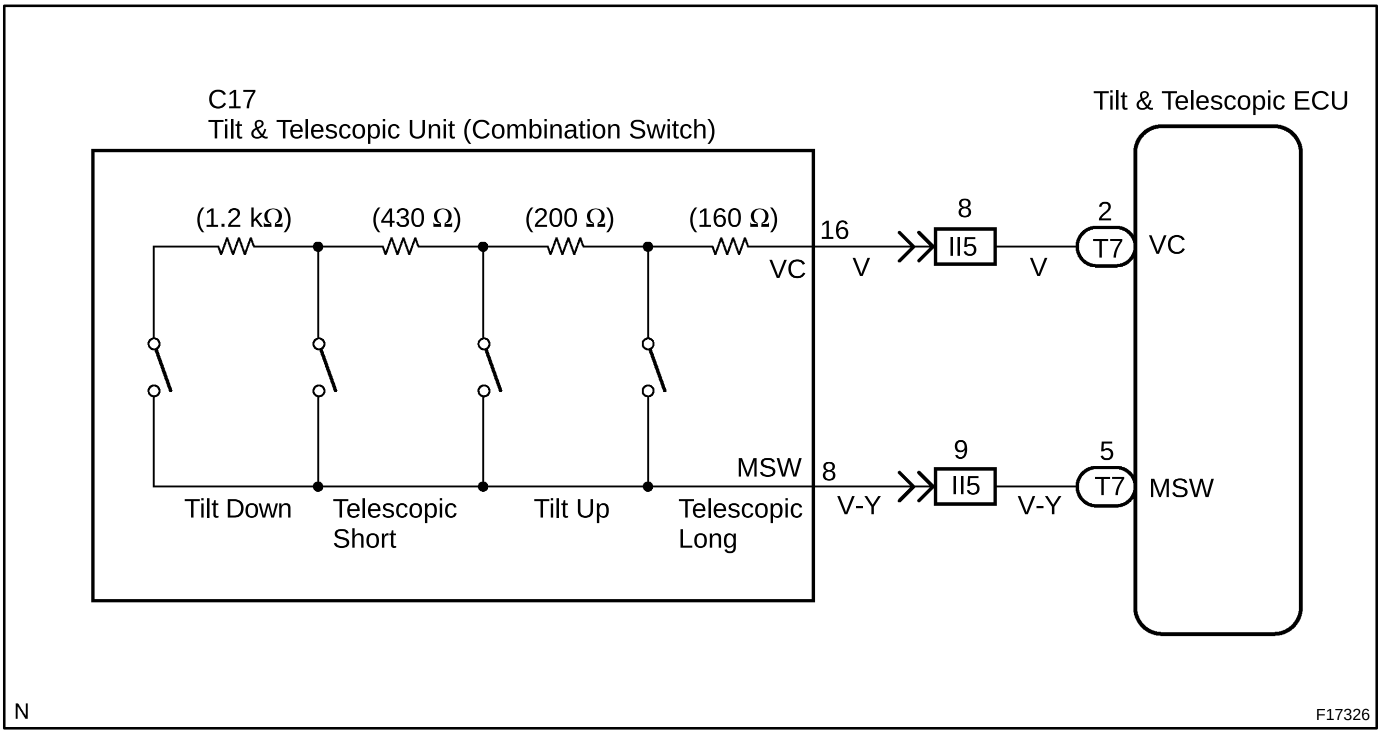
DI23O-13

Tilt and Telescopic Manual Switch Circuit

CIRCUIT DESCRIPTION

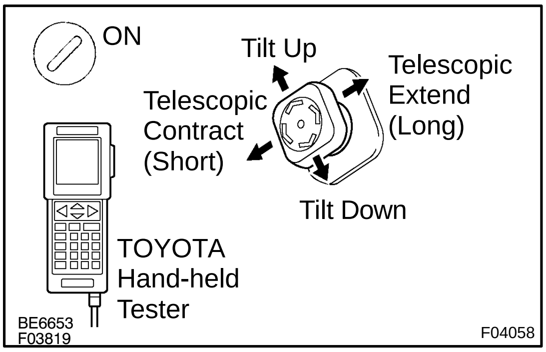
The different voltage signals which are occurred by operating the manual switch are sent to the tilt and telescopic ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check tilt and telescopic manual switch voltage.**



When using TOYOTA hand-held tester

PREPARATION:

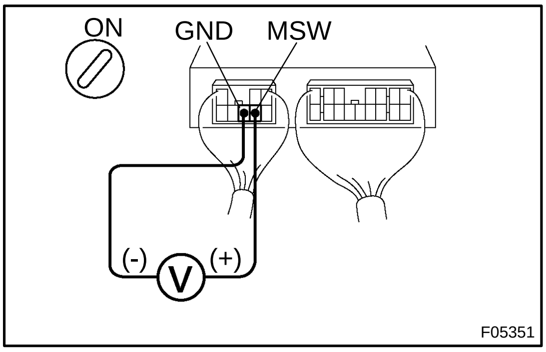
(a) Connect the TOYOTA hand-held tester to the DLC3.

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

(c) Select DATALIST mode on the TOYOTA hand-held tester.

CHECK:

Read the voltages on the tester screen when operating the manual switch.



When not using TOYOTA hand-held tester

PREPARATION:

Remove tilt and telescopic ECU with connector still connected.

CHECK:

Measure voltage between terminals MSW and GND of ECU connector when operating the manual switch.

OK:

Manual switch position	Standard voltage
Neutral position	0.00 – 0.20 V
Tilt up	1.30 – 1.70 V
Tilt down	0.30 – 0.50 V
Telescopic short	0.65 – 0.95 V
Telescopic long	2.05 – 2.75 V

RESULT:

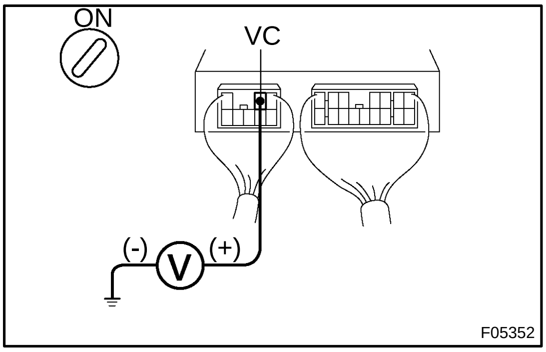
A	Switch voltages in all directions are within the standard.
B	Switch voltage in a certain direction is out of the standard.
C	Switch voltages in all directions are out of the standard.

A — **Proceed to next circuit inspection shown on the problem symptoms table (See page DI-663).**

B — **Replace the manual switch.**

C

2	Check voltage between terminal VC of ECU connector and body ground.



PREPARATION:

Remove ECU with connectors still connected.

CHECK:

Measure voltage between terminal VC of ECU and body ground.

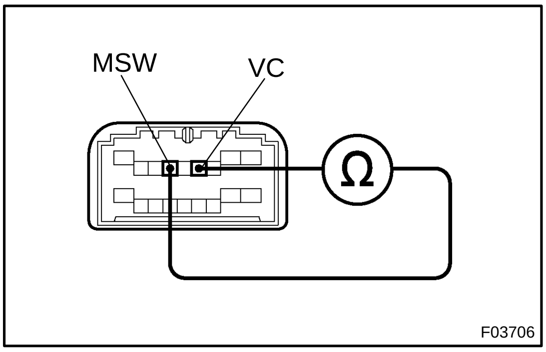
OK:

Voltage: 4.5 - 5.5 V

NG — **Go to step 4.**

OK

3	**Check tilt and telescopic manual switch.**



PREPARATION:

Disconnect combination switch connector.

CHECK:

Measure resistance between terminals VC and MSW of combination switch connector when operating the manual switch.

OK:

Switch position	Resistance
Tilt up	360 Ω
Tilt down	1,990 Ω
Telescopic short	790 Ω
Telescopic long	160 Ω

NG → **Replace the manual switch.**

OK

4	**Check for open or short circuit in harness and connector between tilt and telescopic ECU and manual switch (See page IN-36).**

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

OK

Proceed to next circuit inspection shown on the problem symptoms table (See page DI-663).

DI238-03

CUSTOMER PROBLEM ANALYSIS CHECK

POWER TILT AND POWER TELESCOPIC STEERING 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	☐ Continuous ☐ Intermittent (times a day)

Symptoms	Manual Function does not Operate	☐ Both Tilt and Telescopic ☐ Tilt only ☐ Telescopic only
	Auto Away/Return Function does not Operate	☐ Both Auto Away and Auto Return ☐ Auto Away only ☐ Auto Return only
	☐ Memory Function does not Operate	

DTC Check	1st Time	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)

DI1T7-11

DIAGNOSTIC TROUBLE CODE CHART

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

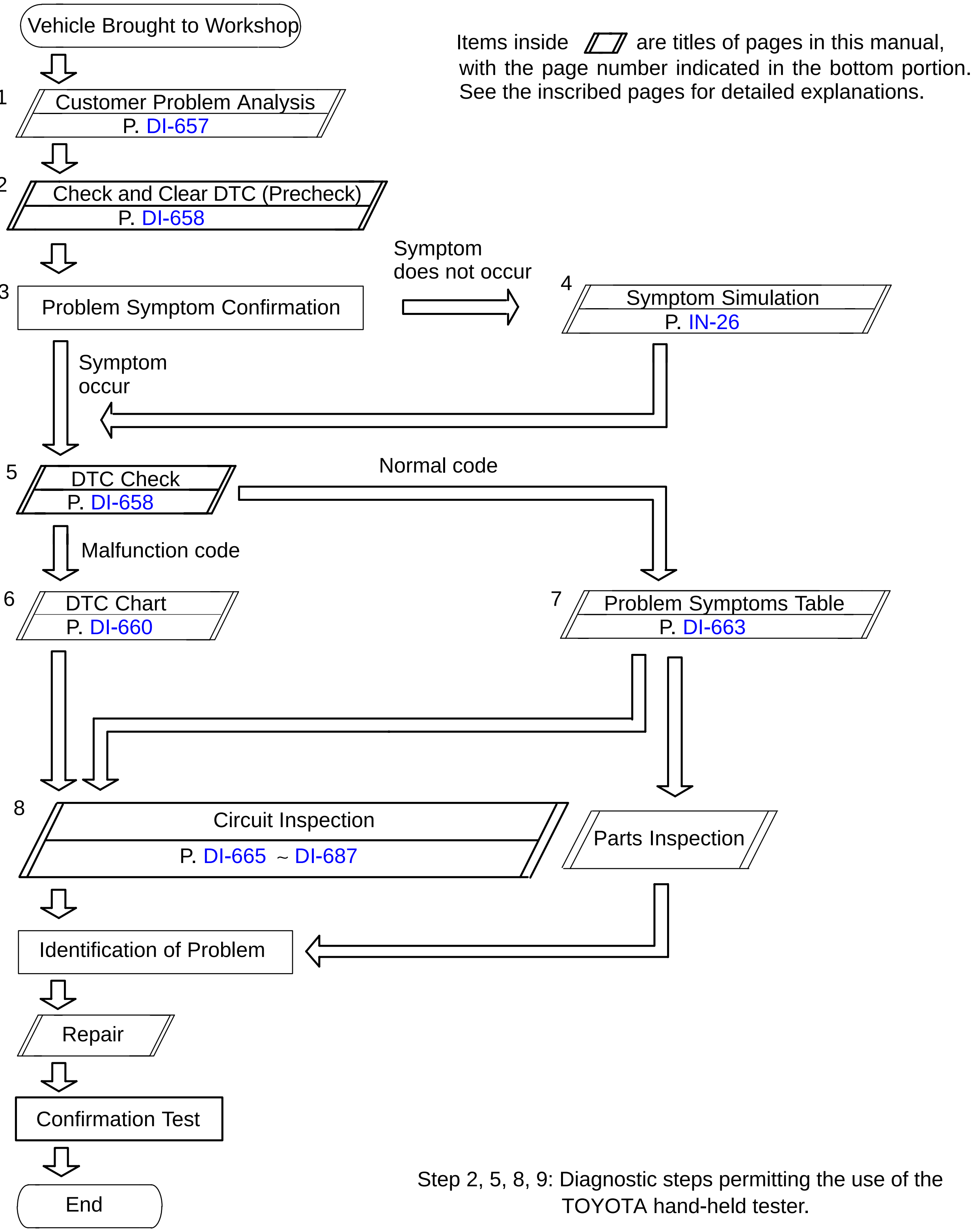
DTC No. (See Page)	Detection Item	Trouble Area
B2603 (DI-665)	Tilt and telescopic manual switch malfunction	★Tilt and telescopic manual switch circuit ★Tilt and telescopic ECU
B2610 (DI-667)	Tilt position sensor or tilt motor malfunction	★Sensor power source circuit ★Actuator power source circuit ★Tilt motor circuit ★Tilt and telescopic ECU
B2611 (DI-669)	Telescopic position sensor or telescopic motor malfunction	★Sensor power source circuit ★Actuator power source circuit ★Telescopic motor circuit ★Tilt and telescopic ECU
B2620 (DI-671)	ECU power source circuit malfunction	★Battery ★ECU power source circuit ★Tilt and telescopic ECU

POWER TILT AND POWER TELESCOPIC STEERING COLUMN

DI237-14

HOW TO PROCEED WITH TROUBLESHOOTING

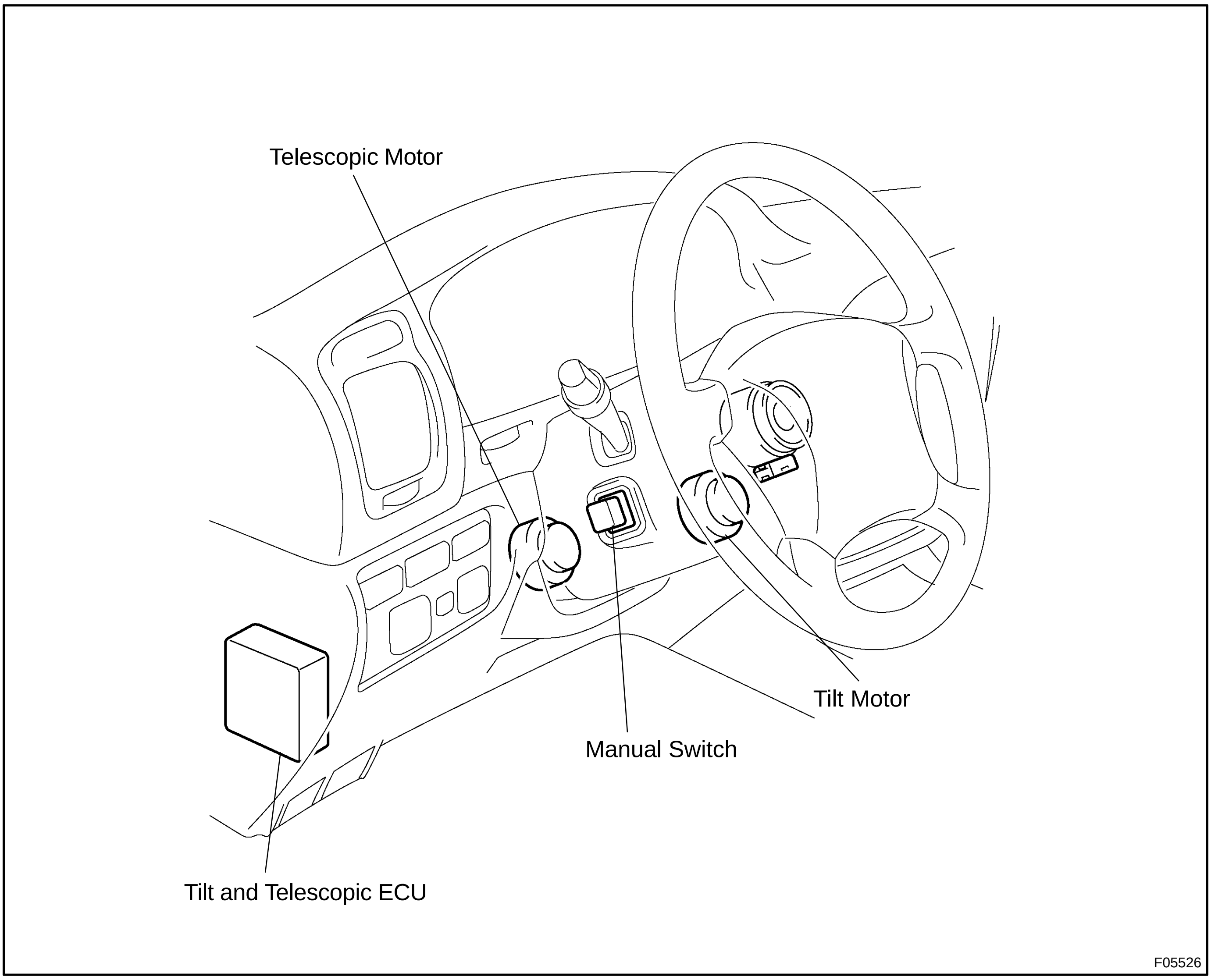
Perform troubleshooting in accordance with the procedure on the following page.



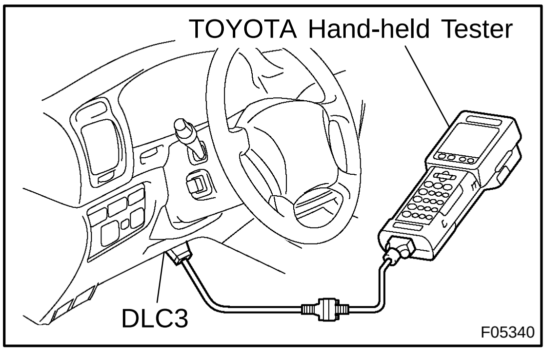
Step 2, 5, 8, 9: Diagnostic steps permitting the use of the TOYOTA hand-held tester.

DI23B-11

PARTS LOCATION



DI239-15



PRE-CHECK

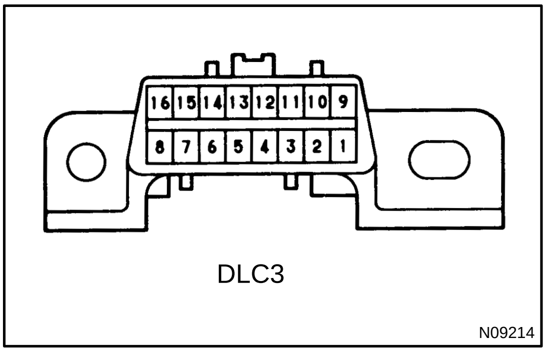
1. DESCRIPTION

(a) DIAGNOSIS SYSTEM

When troubleshooting Multiplex OBD (M-OBD) vehicles, the only difference from the usual troubleshooting procedure is that you connect the TOYOTA hand-held tester to vehicle, and read off various data output from the vehicle's Power Tilt and Telescopic Steering ECU.

The Power Tilt and Telescopic Steering ECU records the applicable DTCs when the computer detects a malfunction in the computer itself or its circuit.

To check the DTCs, connect a TOYOTA hand-held tester to DLC3 on the vehicle. The TOYOTA hand-held tester enables you to erase the DTCs and activate the several actuators and check freeze frame data and various forms on steering data.



(b) DATA LINK CONNECTOR 3 (DLC3)

The Power Tilt and Telescopic Steering ECU uses ISO 14230 for communication. The terminal arrangement of DLC3 complies with SAE J1962 and matches the ISO 14230 format.

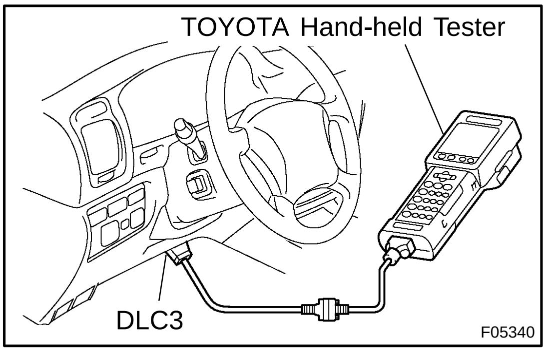
Terminal No.	Connection	Voltage or Resistance	Condition
7	Bus + Line	Pulse generation	During transmission
4	Chassis Ground	↔ Body Ground 1 Ω or less	Always
5	Signal Ground	↔ Body Ground 1 Ω or less	Always
16	Battery Positive	↔ Body Ground 9 - 14 V	Always

HINT:

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

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

★ If communication is still not possible when the tester is connected to another vehicle, the problem is probably in the tester itself, so consult the Service Department listed in the tester's Operator's Manual.



2. DIAGNOSIS INSPECTION

(a) Check the DTC.

(1) Prepare the TOYOTA hand-held tester.

(2) Connect the TOYOTA hand-held tester to DLC3 at the lower of the instrument panel.

(3) Turn the ignition switch ON and turn the TOYOTA hand-held tester switch ON.

(4) Use the TOYOTA hand-held tester to check the DTCs and freeze frame data, note or print them (See the Operator's Manual for operating instructions.).

(5) See page DI-660 to confirm the details of the DTC.

(b) Clear the DTC.

The following actions will erase the DTC and freeze frame data.

★ When using the TOYOTA hand-held tester:
Operating the TOYOTA hand-held tester to erase the DTCs (See the Operator's Manual for operating instructions.).

★ When not using the TOYOTA hand-held tester:
Disconnecting the battery terminals.

DI23D-13

PROBLEM SYMPTOMS TABLE

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.
The table below will be useful for you in troubleshooting these electrical systems. The most likely causes of the malfunction are shown in the order of their probability. Inspect each part in the order shown, and replace the part when it is found to be faulty.

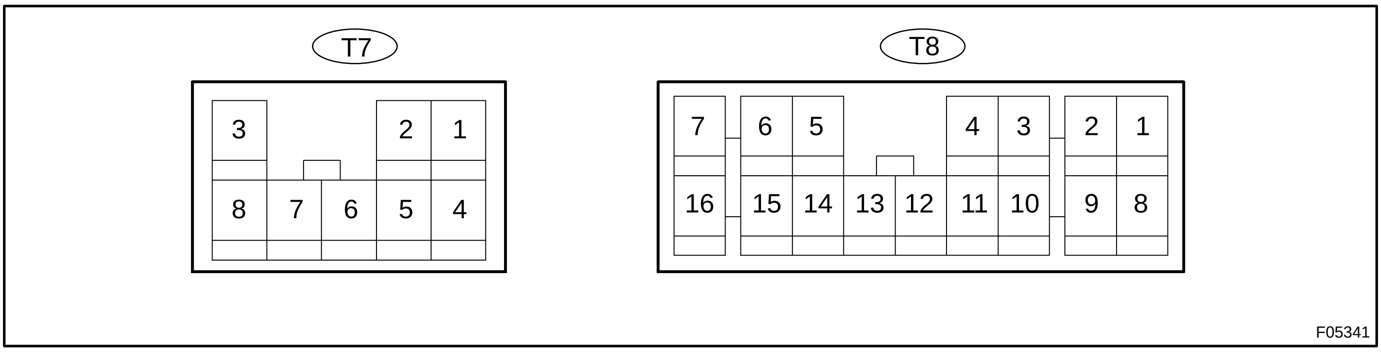
- ☐ If the instruction "Proceed to next circuit inspection shown on the chart" is given in the flow chart for each circuit, proceed to the circuit with the next highest number in the table to continue the check.
- ☐ If the problem still occurs even though there are no abnormalities in any of the other circuits, then check and replace ECU.

Symptom	Suspect Area	See page
Both tilt and telescopic: Manual, auto away/return and memory functions ☐Do not operate ☐Stop part way ☐Do not stop	1. Multiplex communication system 2. ECU power source circuit 3. Key unlock warning switch 4. Body ECU 5. Actuator power source circuit 6. Sensor power source circuit 7. Tilt motor circuit 8. Telescopic motor circuit 9. Tilt and telescopic ECU	- DI-673 BE-29 DI-1038 DI-676 DI-679 DI-681 DI-684 IN-36
Tilt only: Manual, auto away/return and memory functions ☐Do not operate ☐Stop part way ☐Do not stop	1. Multiplex communication system 2. Sensor power source circuit 3. Tilt motor circuit 4. Tilt and telescopic ECU	- DI-679 DI-681 IN-36
Telescopic only: Manual, auto away/return and memory functions ☐Do not operate ☐Stop part way ☐Do not stop	1. Multiplex communication system 2. Sensor power source circuit 3. Telescopic motor circuit 4. Tilt and telescopic ECU	- DI-679 DI-684 IN-36
Both tilt and telescopic: Only tilt and telescopic manual switch function does not operate	1. Multiplex communication system 2. Tilt and telescopic manual switch circuit 3. Tilt motor circuit 4. Telescopic motor circuit 5. Tilt and telescopic ECU	- DI-687 DI-681 DI-684 IN-36
Tilt only: Only tilt and telescopic manual switch function does not operate	1. Multiplex communication system 2. Tilt and telescopic manual switch circuit 3. Tilt motor circuit 4. Tilt and telescopic ECU	- DI-687 DI-681 IN-36
Telescopic only: Only tilt and telescopic manual switch function does not operate	1. Multiplex communication system 2. Tilt and telescopic manual switch circuit 3. Telescopic motor circuit 4. Tilt and telescopic ECU	- DI-687 DI-684 IN-36

Symptom	Suspect Area	See page
Both away and return: Only auto away/return function does not operate	1. Check status of auto away function using TOYOTA hand-held tester 2. Multiplex communication system 3. Ignition switch 4. Key unlock warning switch 5. Tilt motor circuit 6. Telescopic motor circuit 7. Tilt and telescopic ECU	- - BE-29 BE-29 DI-681 DI-684 IN-36
Only away: Only Auto away/return function does not operate	1. Multiplex communication system 2. Key unlock warning switch 3. Ignition switch 4. Tilt motor circuit 5. Telescopic motor circuit 6. Tilt and telescopic ECU	- BE-29 BE-29 DI-681 DI-684 IN-36
Only return: Only auto away/return function does not operate	1. Multiplex communication system 2. Key unlock warning switch 3. Ignition switch 4. Tilt motor circuit 5. Telescopic motor circuit 6. Tilt and telescopic ECU	- BE-29 BE-29 DI-681 DI-684 IN-36

DI23C-14

TERMINALS OF ECU



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
IG (T7-4) - GND (T7-6)	B-W - W-B	IG switch ON	10 - 14 (DC)
		IG switch LOCK	Below 1 (DC)
VC (T7-2) - GND (T7-6)	V - W-B	Always	4.5 - 5.5 (DC)
GND (T7-6) - Body Ground	W-B - Body Ground	Always	Below 1 (DC)
ECUB (T7-1) - Body Ground	L-W - Body Ground	Always	10 - 14 (DC)
ECUB (T7-1) - GND (T7-6)	L-W - W-B	Always	10 - 14 (DC)
MSW (T7-5) - GND (T7-6)	V-Y - W-B	Tilt up by manual switch	1.30 - 1.70 (DC)
		Tilt down by manual switch	0.30 - 0.50 (DC)
		Telescopic extended by manual switch	2.05 - 2.75 (DC)
		Telescopic contracted by manual switch	0.65 - 0.95 (DC)
		Manual switch is not operating	Below 0.20 (DC)
+B (T8-4) - GND (T7-6)	G-B - W-B	Always	10 - 14 (DC)
S5V1 (T8-13) - SG1 (T8-14)	G-W - G-Y	IG switch ON	4.5 - 5.5 (DC)
S5V2 (T8-12) - SG2 (T8-10)	B-W - B-Y	IG switch ON	4.5 - 5.5 (DC)
A1 (T8-7) - COM1 (T8-15)	P - G	IG switch ON, tilt up or down by manual switch	190 - 230 (AC)
B1 (T8-16) - COM1 (T8-15)	V - G	IG switch ON, tilt up or down by manual switch	190 - 230 (AC)
A2 (T8-1) - COM2 (T8-9)	W - B	IG switch ON, telescopic extend or contracted by manual switch	190 - 230 (AC)
B2 (T8-8) - COM2 (T8-9)	G - B	IG switch ON, telescopic extend or contracted by manual switch	190 - 230 (AC)

DI3IY-09

CIRCUIT INSPECTION

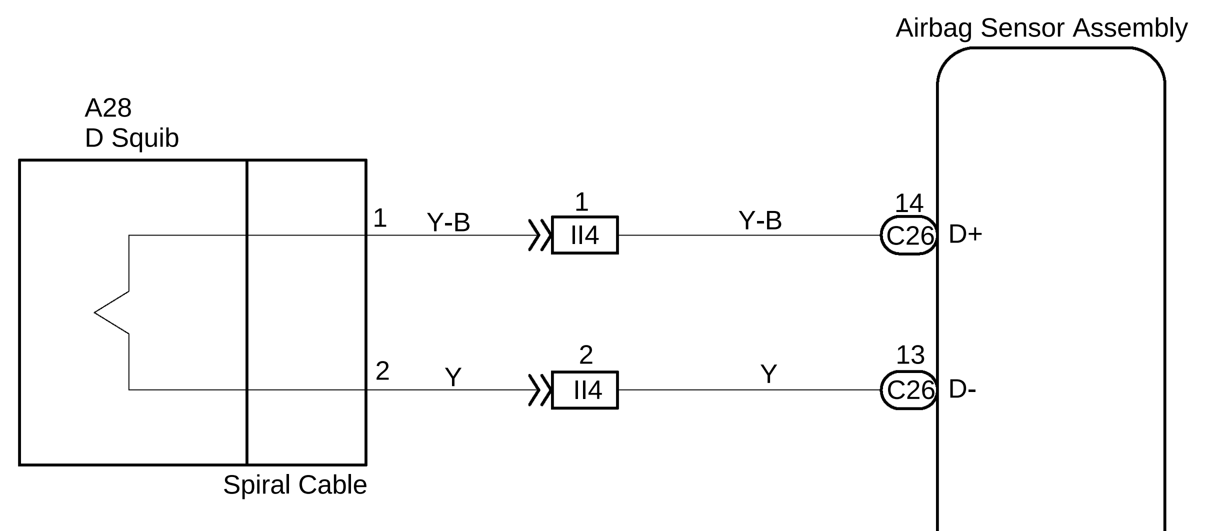
DTC	B0100/13	Short in D Squib Circuit

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag sensor assembly, the spiral cable and the 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-3 .
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 in D squib circuit ★D squib malfunction ★Spiral cable malfunction ★Airbag sensor assembly malfunction	★Steering wheel pad (D squib) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check connector.**

CHECK:

Make sure that the orange spiral cable connector is not damaged.

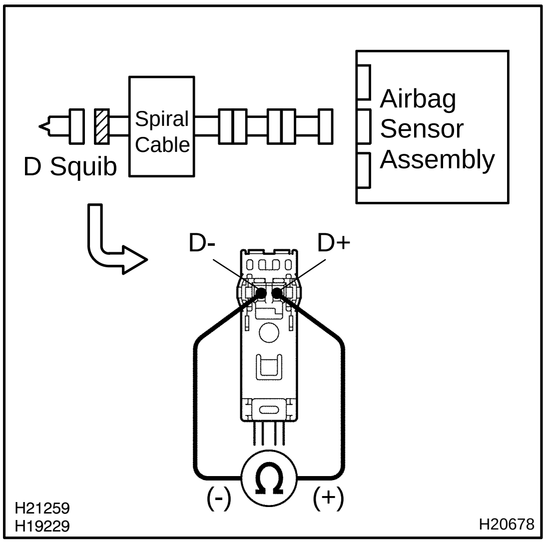
OK:

The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **Replace spiral cable.**

OK

3	**Check D squib circuit.**



PREPARATION:

Release the airbag activation prevention mechanism built in the connector on the airbag sensor assembly side between the steering wheel pad (D squib) and the airbag sensor assembly (See page DI-692).

CHECK:

Measure the resistance between D+ and D- of the orange connector on the steering wheel pad (D squib) side between the airbag sensor assembly and the steering wheel pad (D squib).

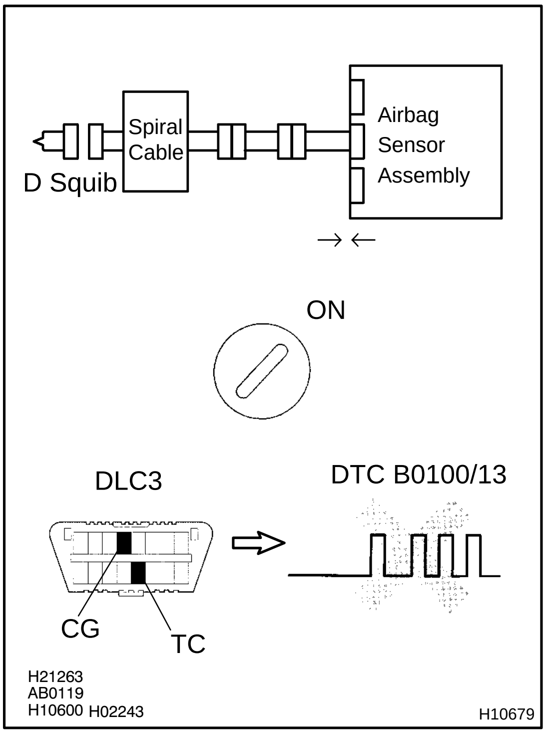
OK:

Resistance: 1 MΩ or Higher

NG → **Go to step 6.**

OK

4	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

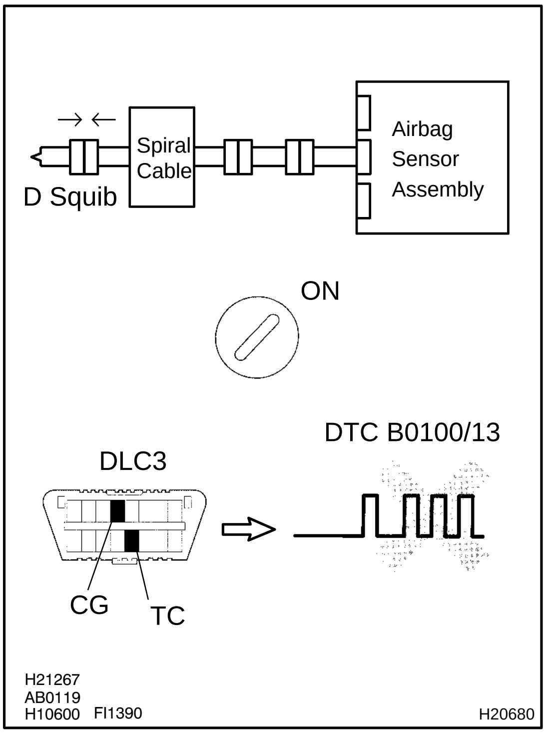
DTC B0100/13 is not output.

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

5	Check D squib.



PREPARATION:
(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the steering wheel pad (D squib) to the spiral cable.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:
(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:
DTC B0100/13 is not output.

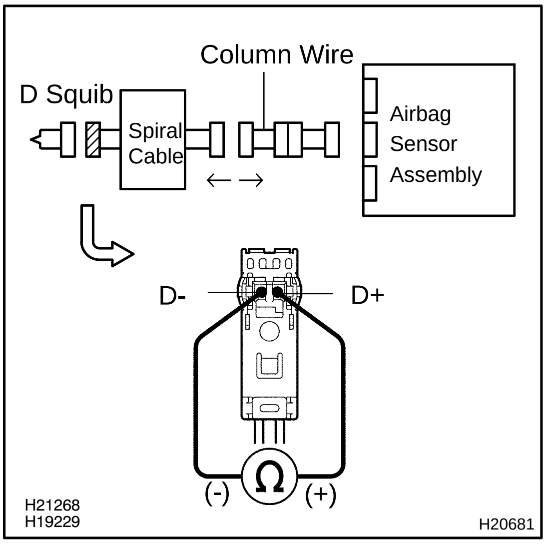
HINT:
Codes other than code B0100/13 may be output at this time, but they are not relevant to this check.

NG	Replace steering wheel pad (D squib).

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.

6	**Check spiral cable.**



PREPARATION:

(a) Disconnect the spiral cable connector from the column wire.

(b) Release the airbag activation prevention mechanism built in the connector of the spiral cable on the airbag sensor assembly side (See page DI-692).

CHECK:

Measure the resistance between D+ and D- of the orange spiral cable connector on the steering wheel pad (D squib) side.

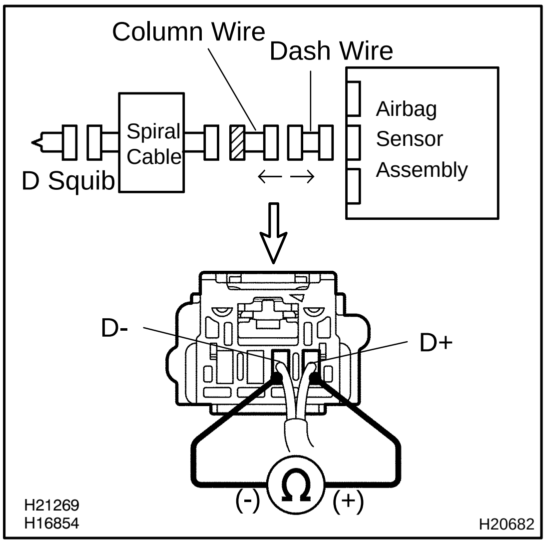
OK:

Resistance: 1 MΩ or Higher

NG	**Replace spiral cable.**

OK

7	**Check column wire.**



PREPARATION:

(a) Disconnect the column wire connector from the dash wire.

(b) Release the airbag activation prevention mechanism built in the connector of the column wire on the airbag sensor assembly side (See page DI-692).

CHECK:

Measure the resistance between D+ and D- of the column wire connector on the spiral cable side.

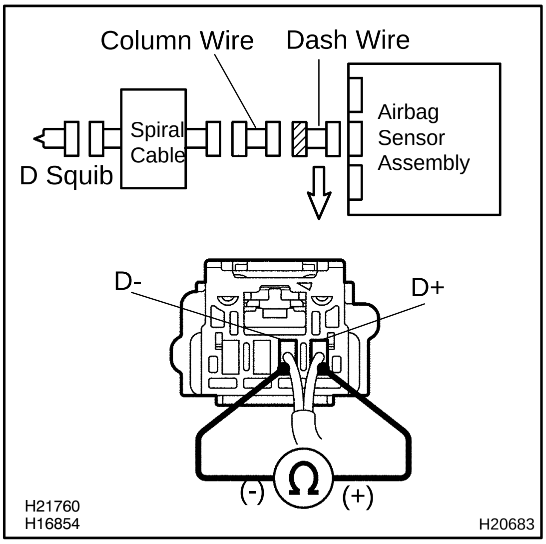
OK:

Resistance: 1 MΩ or Higher

NG	**Repair or replace column wire.**

OK

8	Check dash wire.



PREPARATION:

Release the airbag activation prevention mechanism built in the connector of the dash wire on the airbag sensor assembly side (See page DI-692).

CHECK:

Measure the resistance between D+ and D- of the dash wire connector on the column wire side.

OK:

Resistance: 1 MΩ or Higher

NG	Repair or replace dash wire.

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.

DI3IZ-04

DTC	B0101/14	Open in D Squib Circuit

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag sensor assembly, the spiral cable and the 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-3 .
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 in D squib circuit ★D squib malfunction ★Spiral cable malfunction ★Airbag sensor assembly malfunction	★Steering wheel pad (D squib) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire

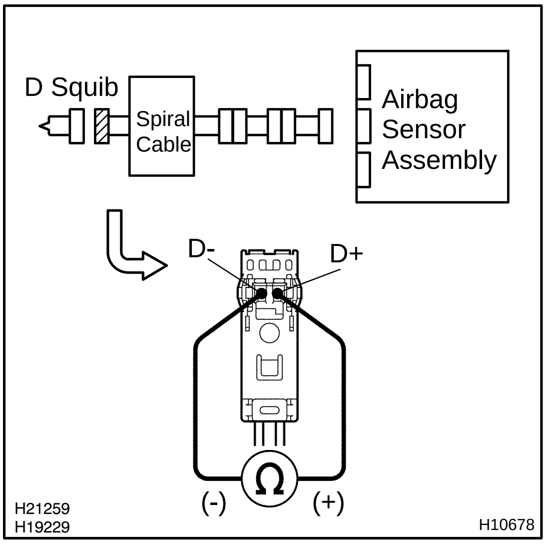
WIRING DIAGRAM

See page DI-71 1.

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check D squib circuit.**

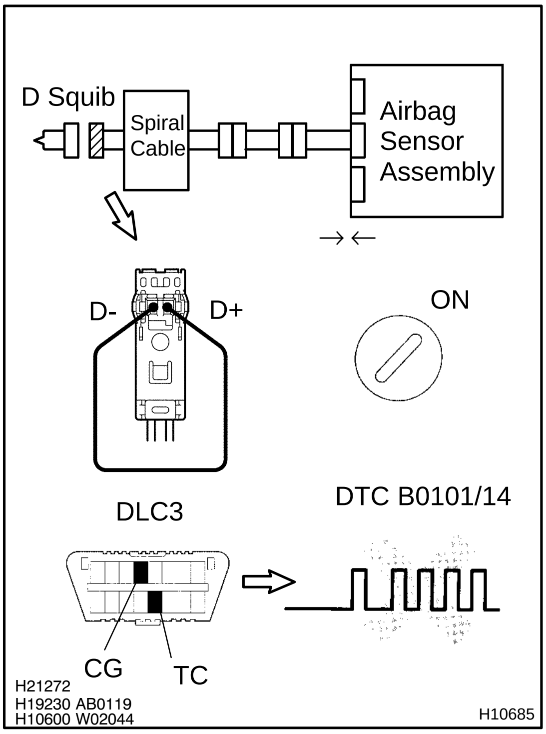


CHECK:
Measure the resistance between D+ and D- of the orange connector on the steering wheel pad (D squib) side between the airbag sensor assembly and the steering wheel pad (D squib).
OK:
Resistance: Below 1 Ω

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 orange connector on the steering wheel pad (D squib) side between the airbag sensor assembly and the steering wheel pad (D squib).

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B0101/14 is not output.

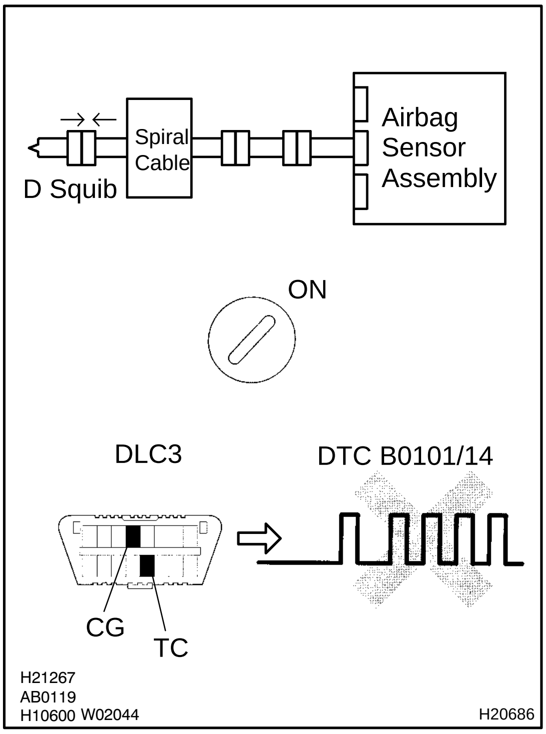
HINT:

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 the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the steering wheel pad (D squib) to the spiral cable.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B0101/14 is not output.

HINT:

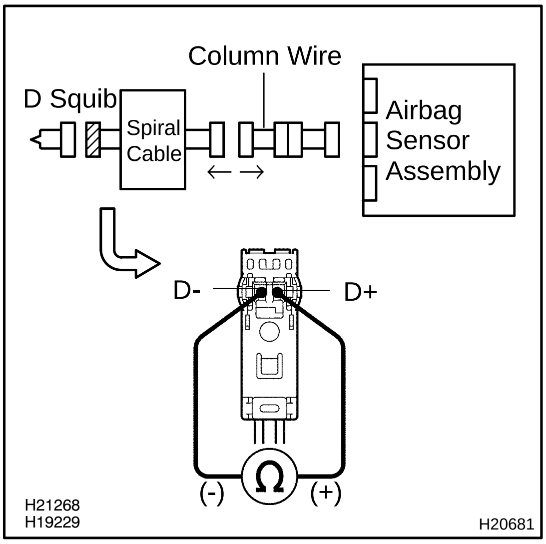
Codes other than code B0101/14 may be output at this time, but they are not relevant to this check.

NG	**Replace steering wheel pad (D squib).**

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.

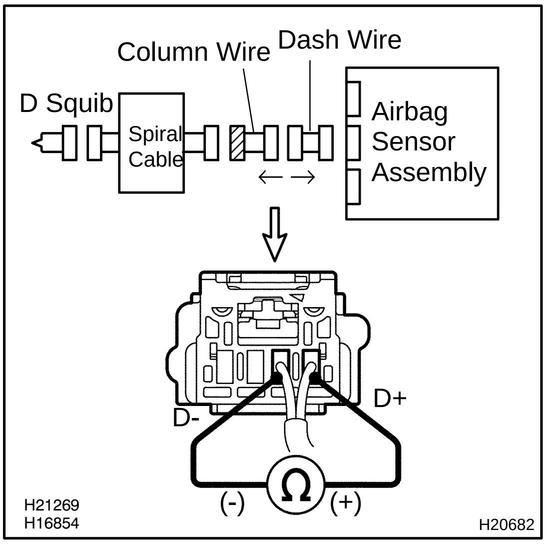


PREPARATION:
Disconnect the spiral cable connector from the column wire.
CHECK:
Measure the resistance between D+ and D- of the orange spiral cable connector on the steering wheel pad (D squib) side.
OK:
Resistance: Below 1 Ω

NG	Replace spiral cable.

OK

6	Check column wire.

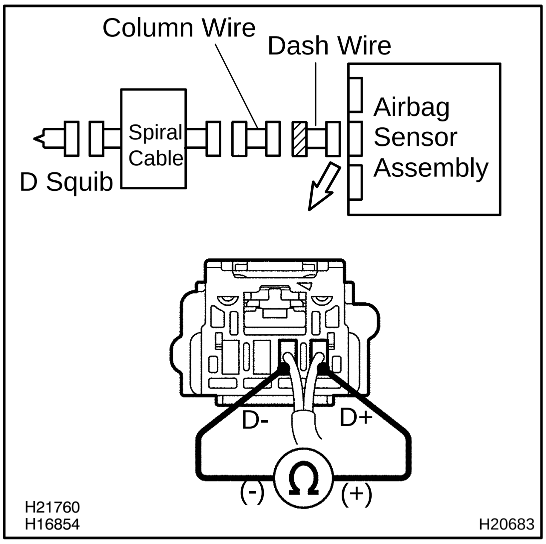


PREPARATION:
Disconnect the column wire connector from the dash wire.
CHECK:
Measure the resistance between D+ and D- of the column wire connector on the spiral cable side.
OK:
Resistance: Below 1 Ω

NG	Repair or replace column wire.

OK

7	**Check dash wire.**



CHECK:

Measure the resistance between D+ and D- of the dash wire connector on the column wire side.

OK:

Resistance: Below 1 Ω

NG	**Repair or replace dash wire.**

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.

DI3J0-04

DTC	B0102/11	Short in D Squib Circuit (to Ground)

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag sensor assembly, the spiral cable and the 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-3 .
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 in D squib circuit (to ground) ★D squib malfunction ★Spiral cable malfunction ★Airbag sensor assembly malfunction	★Steering wheel pad (D squib) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire

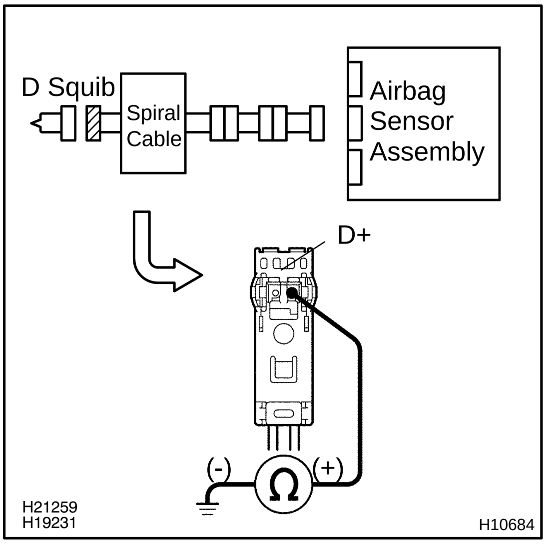
WIRING DIAGRAM

See page DI-71 1.

INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-923).

2	Check D squib circuit.



CHECK:
Measure the resistance between the body ground and D+ of the orange connector on the steering wheel pad (D squib) side between the airbag sensor assembly and the steering wheel pad (D squib) side.

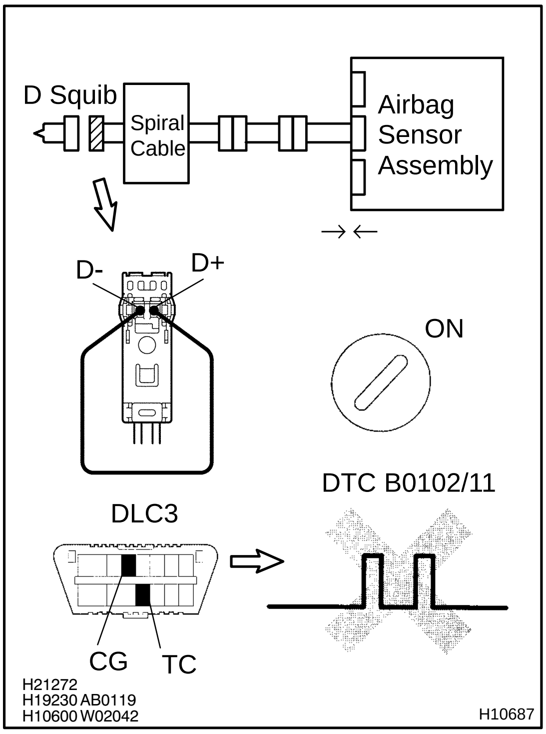
OK:

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 orange connector on the steering wheel pad (D squib) side between the airbag sensor assembly and the steering wheel pad (D squib).
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:
(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check DTC (See page DI-692).

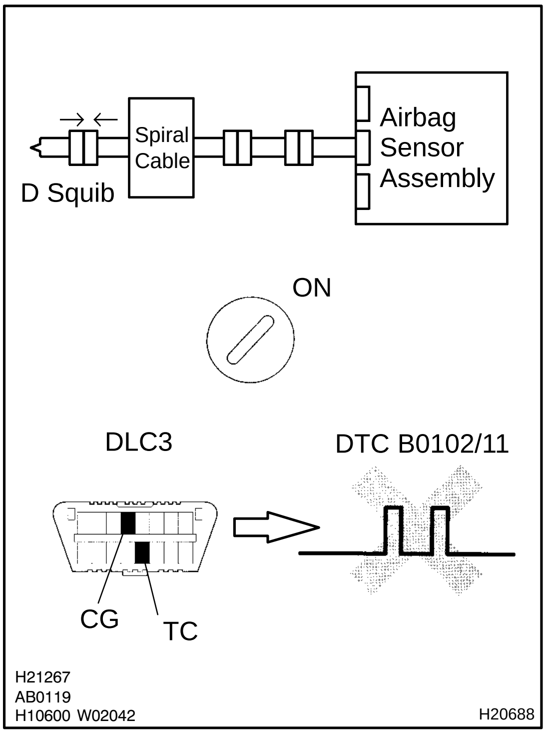
OK:
DTC B0102/11 is not output.

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 the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the steering wheel pad (D squib) to the spiral cable.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B0102/11 is not output.

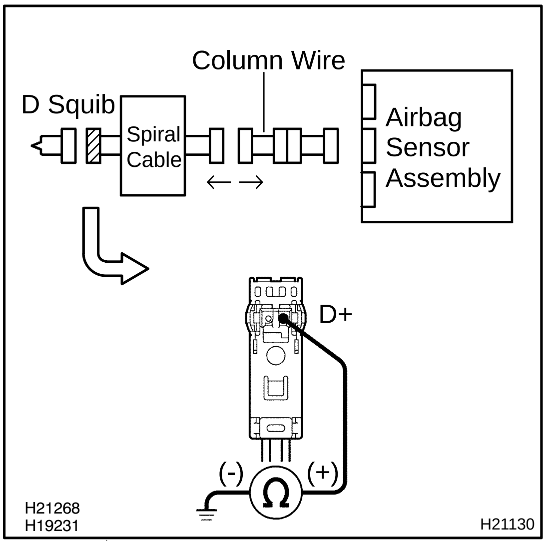
HINT:
Codes other than code B0102/11 may be output at this time, but they are not relevant to this check.

NG	**Replace steering wheel pad (D squib).**

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.**

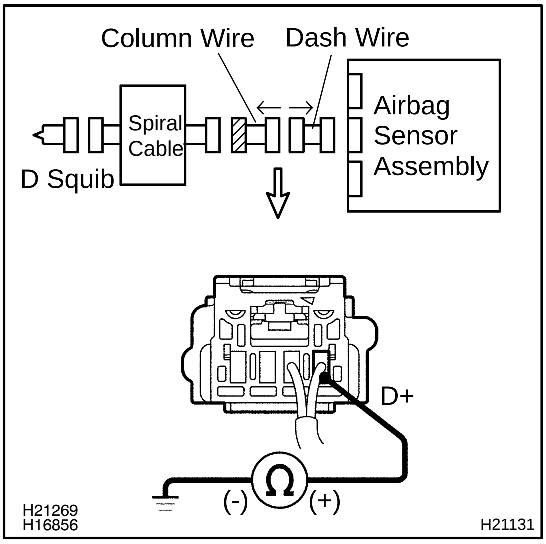


PREPARATION:
Disconnect the spiral cable connector from the column wire.
CHECK:
Measure the resistance between the body ground and D+ of the orange spiral cable connector on the steering wheel pad (D squib) side.
OK:
Resistance: 1 MΩ or Higher

NG → **Replace spiral cable.**

OK

6	**Check column wire.**

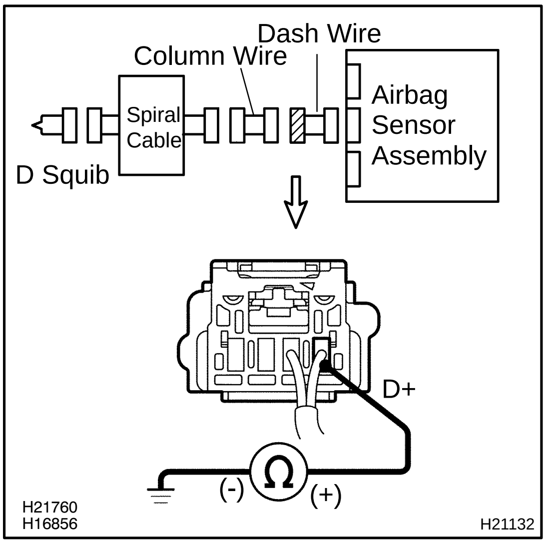


PREPARATION:
Disconnect the column wire connector from the dash wire.
CHECK:
Measure the resistance between the body ground and D+ of the column wire connector on the spiral cable side.
OK:
Resistance: 1 MΩ or Higher

NG → **Repair or replace column wire.**

OK

7	**Check dash wire.**



CHECK:
Measure the resistance between the body ground and D+ of the dash wire connector on the column wire side.
OK:
Resistance: 1 MΩ or Higher

NG	**Repair or replace dash wire.**

OK

From the results of the above inspection, the malfunctioning par 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.

DI3J1-05

DTC	B0103/12	Short in D Squib Circuit (to B+)

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag sensor assembly, the spiral cable and the steering wheel pad. It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each components, see page OPERATION on page RS-3 .
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 circuit (to B+) ★D squib malfunction ★Spiral cable malfunction ★Airbag sensor assembly malfunction	★Steering wheel pad (D squib) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire

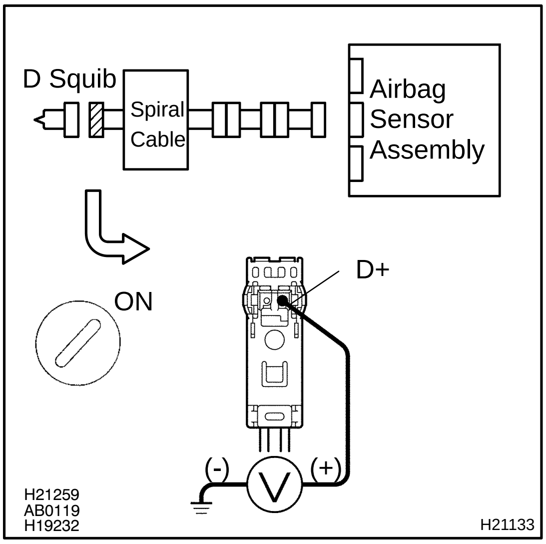
WIRING DIAGRAM

See page DI-71 1.

INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-923).

2	Check D squib circuit.



PREPARATION:
Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

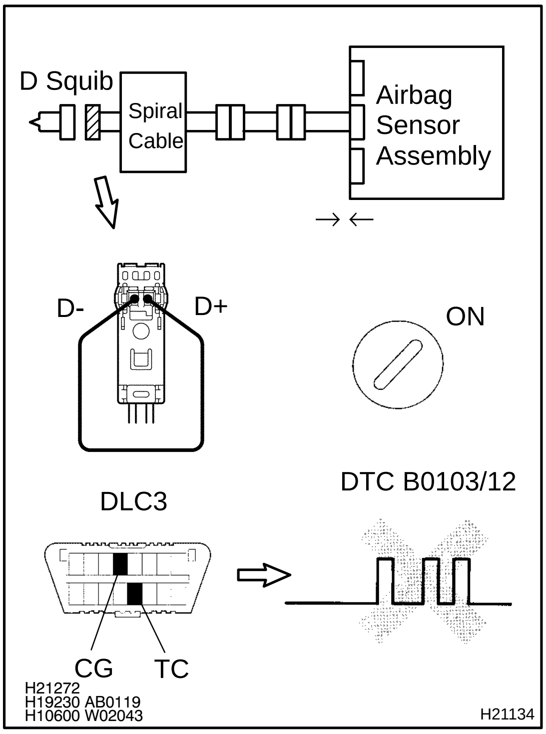
CHECK:
(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and D+ of the orange connector on the steering wheel pad (D squib) side between the airbag sensor assembly and the steering wheel pad (D squib).

OK:
Voltage: Below 1 V

NG	Go to step 5.

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the connector to the airbag sensor assembly.
(d) Using a service wire, connect D+ and D- of the orange connector on the steering wheel pad (D squib) side between the airbag sensor assembly and the steering wheel pad (D squib).
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

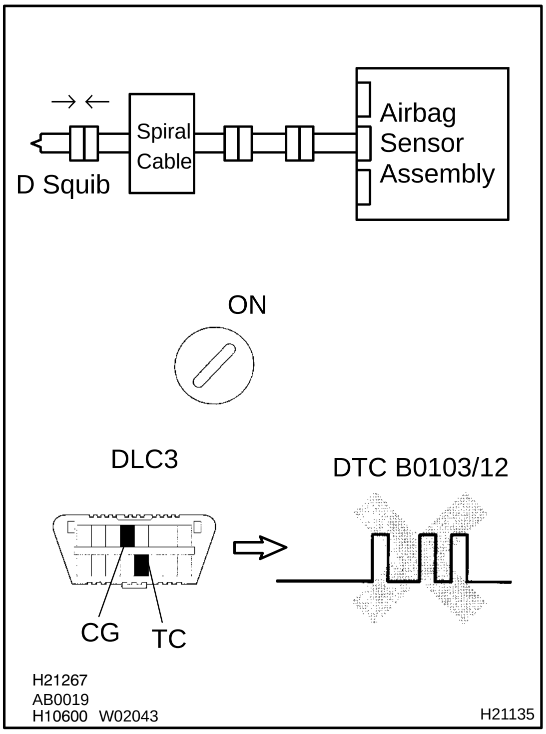
DTC B0103/12 is not output.

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 the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the steering wheel pad (D squib) to the spiral cable.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B0103/12 is not output.

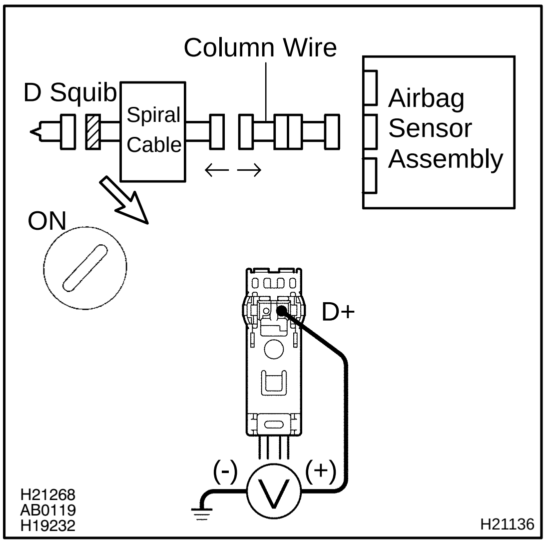
HINT:
Codes other than code B0103/12 may be output at this time, but they are not relevant to this check.

NG	**Replace steering wheel pad (D squib).**

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 the ignition switch to LOCK.

(b) Disconnect the spiral cable connector from the column wire.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and D+ of the orange spiral cable connector on the steering wheel pad (D squib) side.

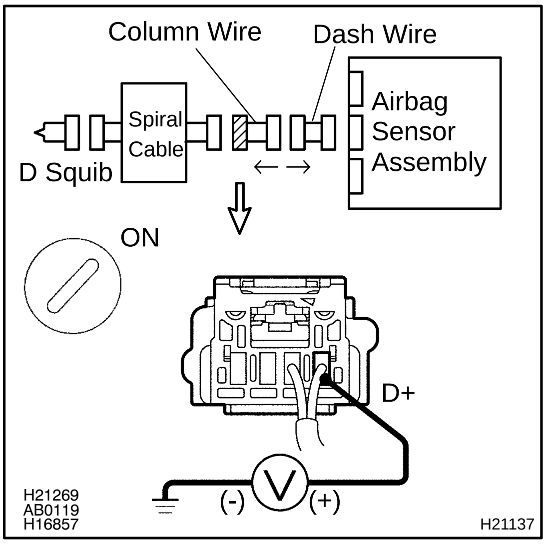
OK:

Voltage: Below 1 V

NG	**Replace spiral cable.**

OK

6	**Check column wire.**



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect the column wire connector from the dash wire.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and D+ of the column wire connector on the spiral cable side.

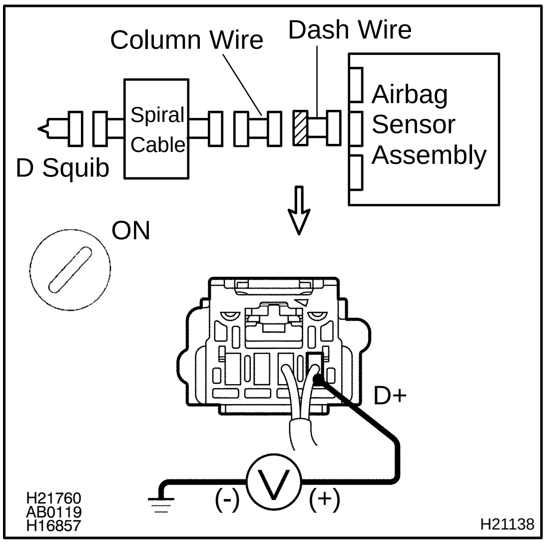
OK:

Voltage: Below 1 V

NG	**Repair or replace column wire.**

OK

7	**Check dash wire.**



CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and D+ of the dash wire connector on the column wire side.

OK:

Voltage: Below 1 V

NG	**Repair or replace dash wire.**

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.

DI6P7-26

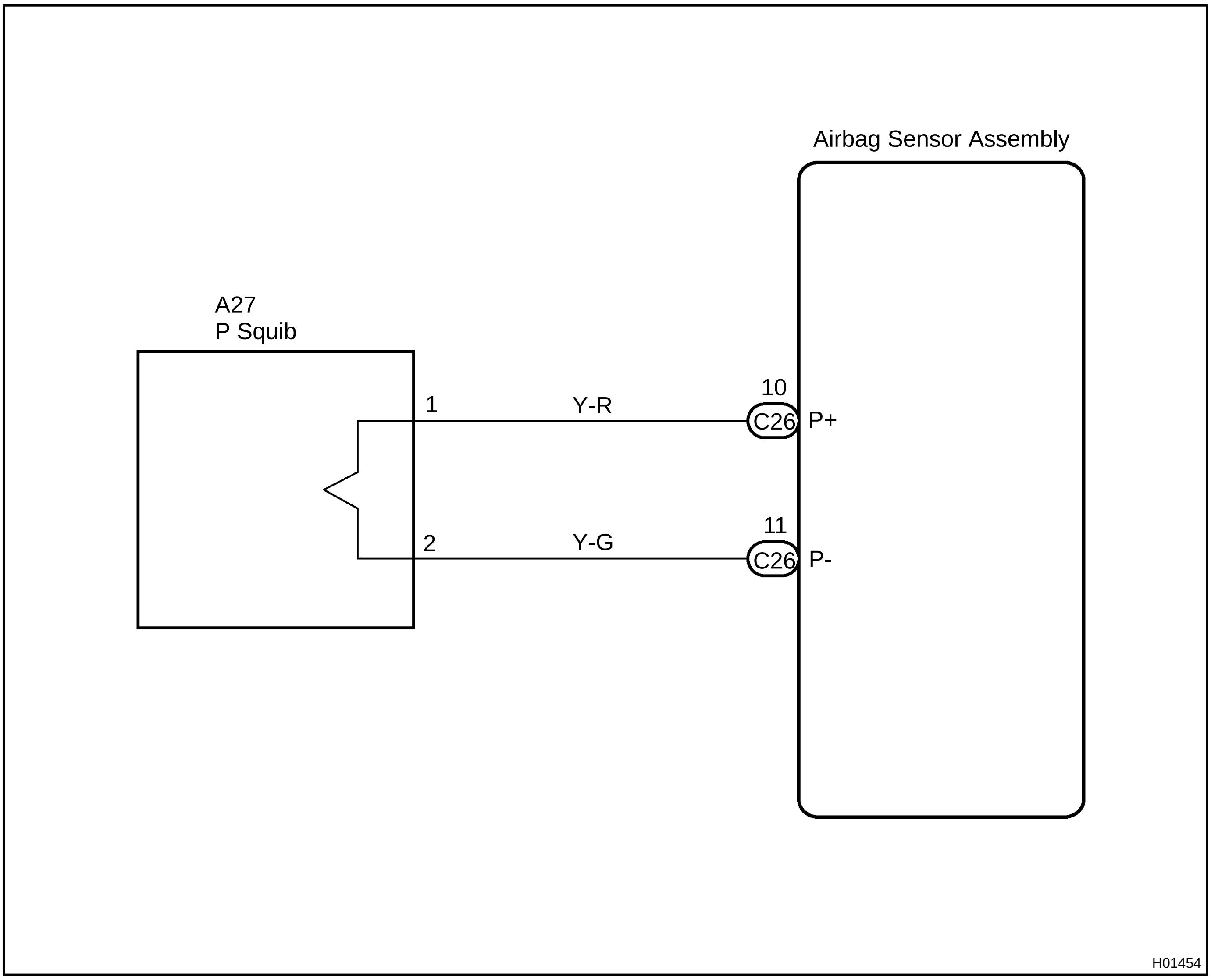
DTC	B0105/53	Short in P Squib Circuit

CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag sensor assembly and the 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-3 .
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 in P squib circuit ★P squib malfunction ★Airbag sensor assembly malfunction	★Front passenger airbag assembly (P squib) ★Airbag sensor assembly ★Dash wire

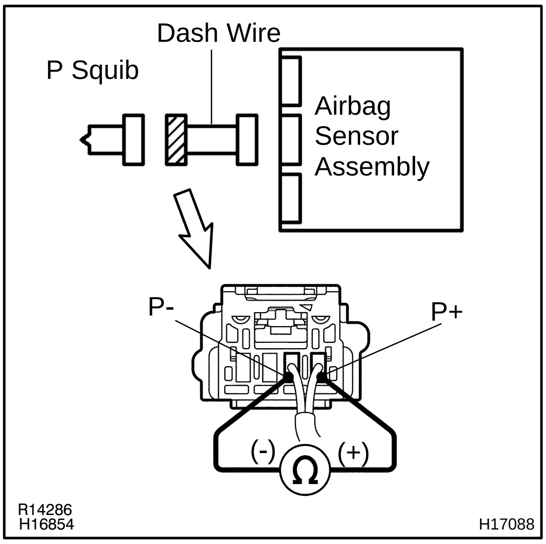
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check dash wire (P squib circuit).**



PREPARATION:
Release the airbag activation prevention mechanism built in the connector of the dash wire on the airbag sensor assembly side (See page DI-692).

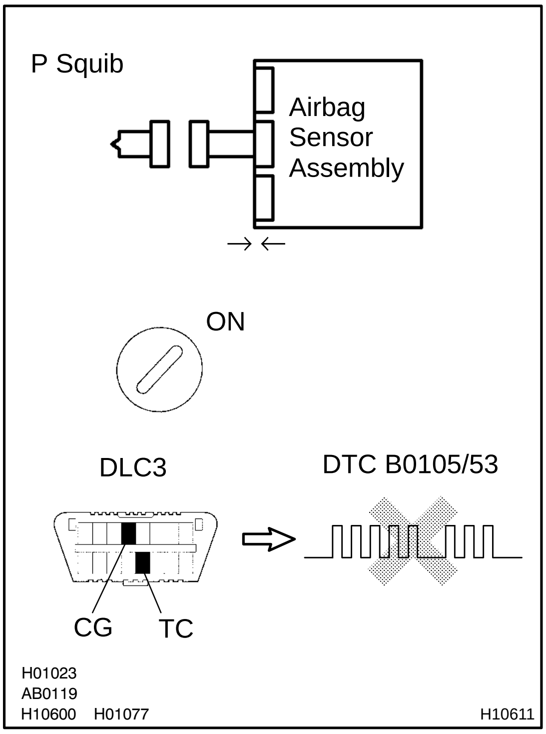
CHECK:
Measure the resistance between P+ and P- of the dash wire connector on the front passenger airbag assembly (P squib) side.

OK:
Resistance: 1 MΩ or Higher

NG	**Repair or replace dash wire.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B0105/53 is not output.

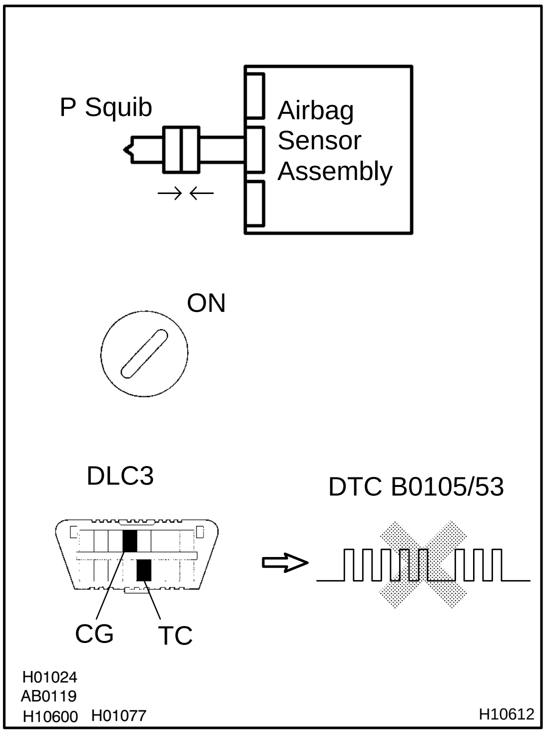
HINT:

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 the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the front passenger airbag assembly (P squib) connector.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

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 (P squib).**

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.

DI6P8-14

DTC	B0106/54	Open in P Squib Circuit

CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag sensor assembly and the 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-3 .
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 in P squib circuit ★P squib malfunction ★Airbag sensor assembly malfunction	★Front passenger airbag assembly (P squib) ★Airbag sensor assembly ★Dash wire

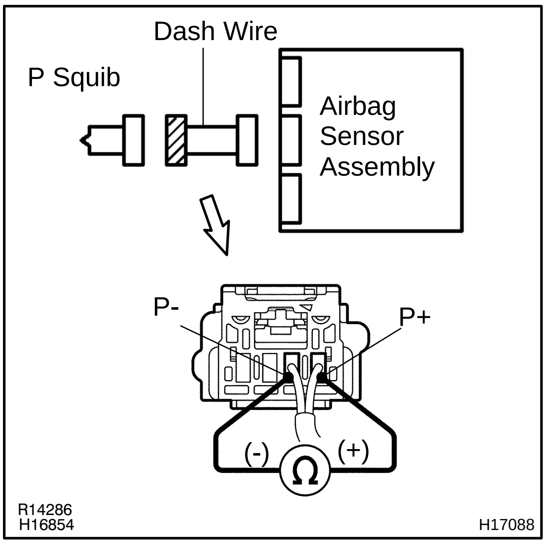
WIRING DIAGRAM

See page DI-732 .

INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-923).

2	Check dash wire (P squib circuit).



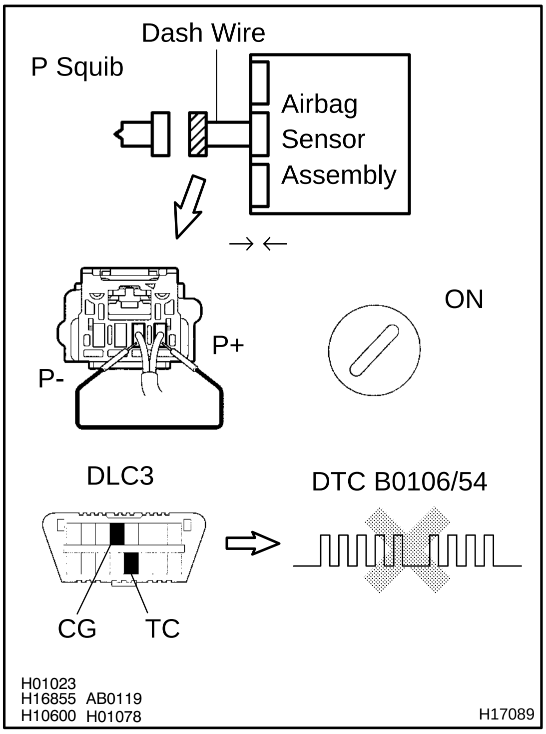
CHECK:
Measure the resistance between P+ and P- of the dash wire connector on the front passenger airbag assembly (P squib) side.

OK:
Resistance: Below 1 Ω

NG	Repair or replace dash wire.

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 dash wire connector on the front passenger airbag assembly (P squib) side.

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

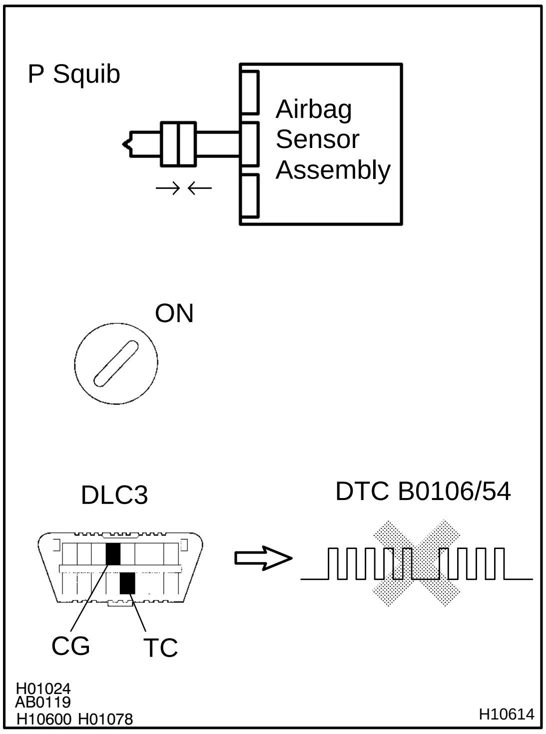
DTC B0106/54 is not output.

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 the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the front passenger airbag assembly (P squib) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 (P squib).**

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.

DI6P9-14

DTC	B0107/51	Short in P Squib Circuit (to Ground)

CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag sensor assembly and the 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-3 .
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 in P squib circuit (to ground) ★P squib malfunction ★Airbag sensor assembly malfunction	★Front passenger airbag assembly (P squib) ★Airbag sensor assembly ★Dash wire

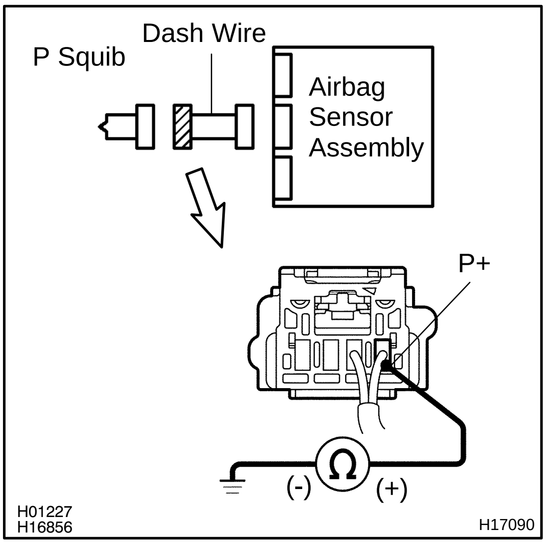
WIRING DIAGRAM

See page DI-732 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check dash wire (P squib circuit).**



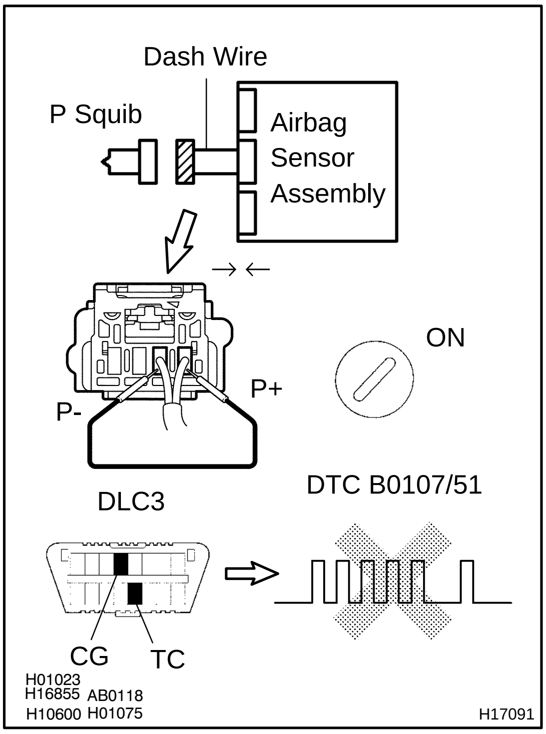
CHECK:
Measure the resistance between the body ground and P+ of the dash wire connector on the front passenger airbag assembly (P squib) side.

OK:
Resistance: 1 MΩ or Higher

NG	**Repair or replace dash wire.**

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 dash wire connector on the front passenger airbag assembly (P squib) side.

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B0107/51 is not output.

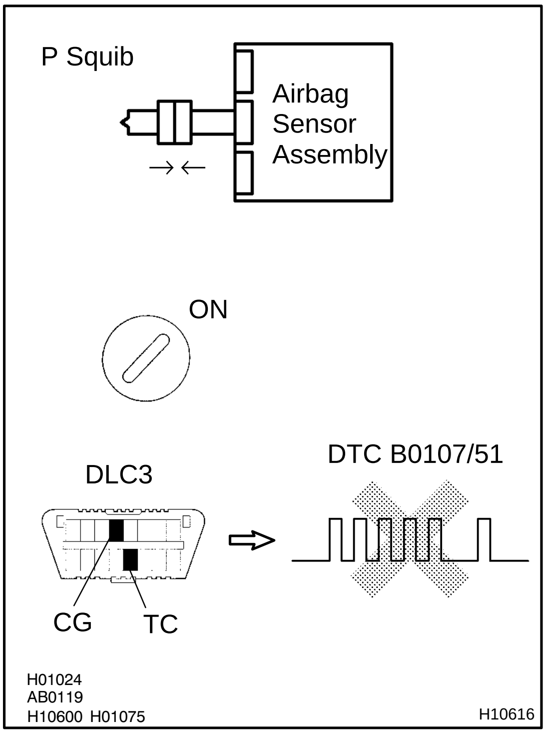
HINT:

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 the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the front passenger airbag assembly (P squib) connector.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

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 (P squib).**

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.

DI6PA-13

DTC	B0108/52	Short in P Squib Circuit (to B+)

CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag sensor assembly and the 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-3 .
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 in P squib circuit (to B+) ★P squib malfunction ★Airbag sensor assembly malfunction	★Front passenger airbag assembly (P squib) ★Airbag sensor assembly ★Dash wire

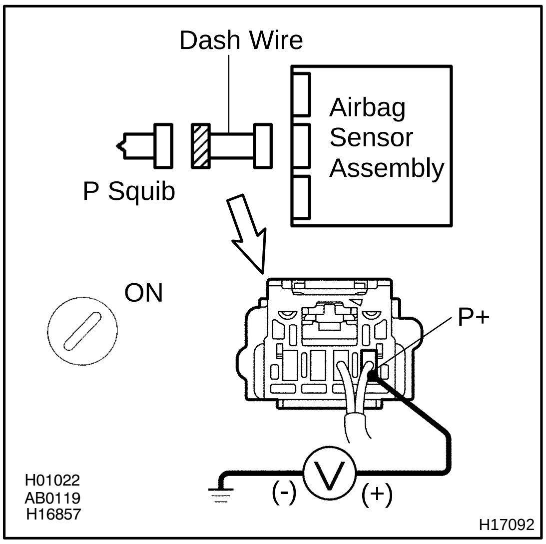
WIRING DIAGRAM

See page DI-732 .

INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-923).

2	Check dash wire (P squib circuit).



PREPARATION:
Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

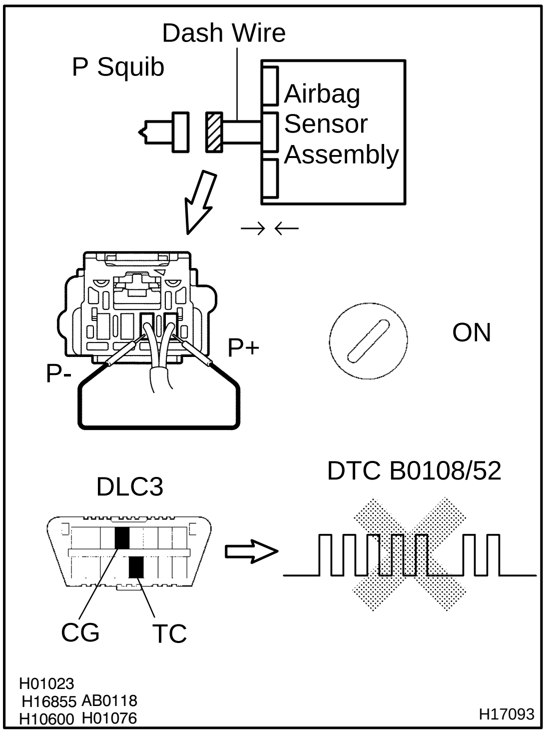
CHECK:
(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and P+ of the dash wire connector on the front passenger airbag assembly (P squib) side.

OK:
Voltage: Below 1 V

NG	Repair or replace dash wire.

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the connector to the airbag sensor assembly.
(d) Using a service wire, connect P+ and P- of the dash wire connector on the front passenger airbag assembly (P squib) side.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

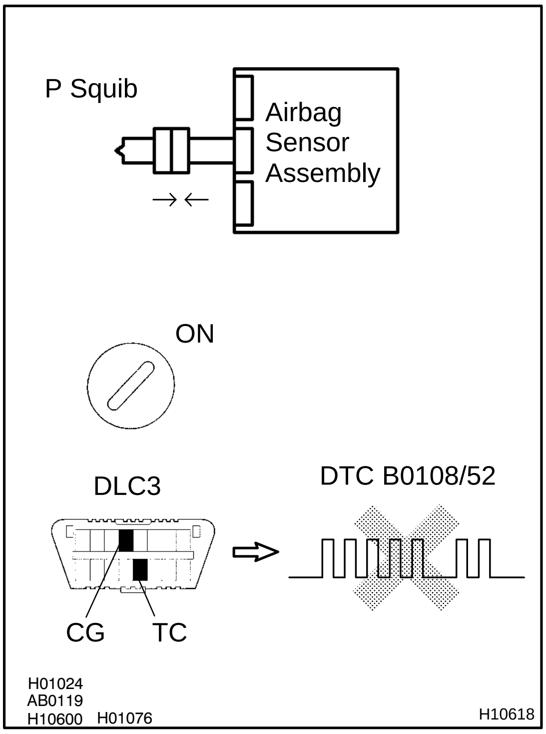
DTC B0108/52 is not output.

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 the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the front passenger airbag assembly (P squib) connector.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

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 (P squib).**

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	B0110/43	Short in Side Squib RH Circuit

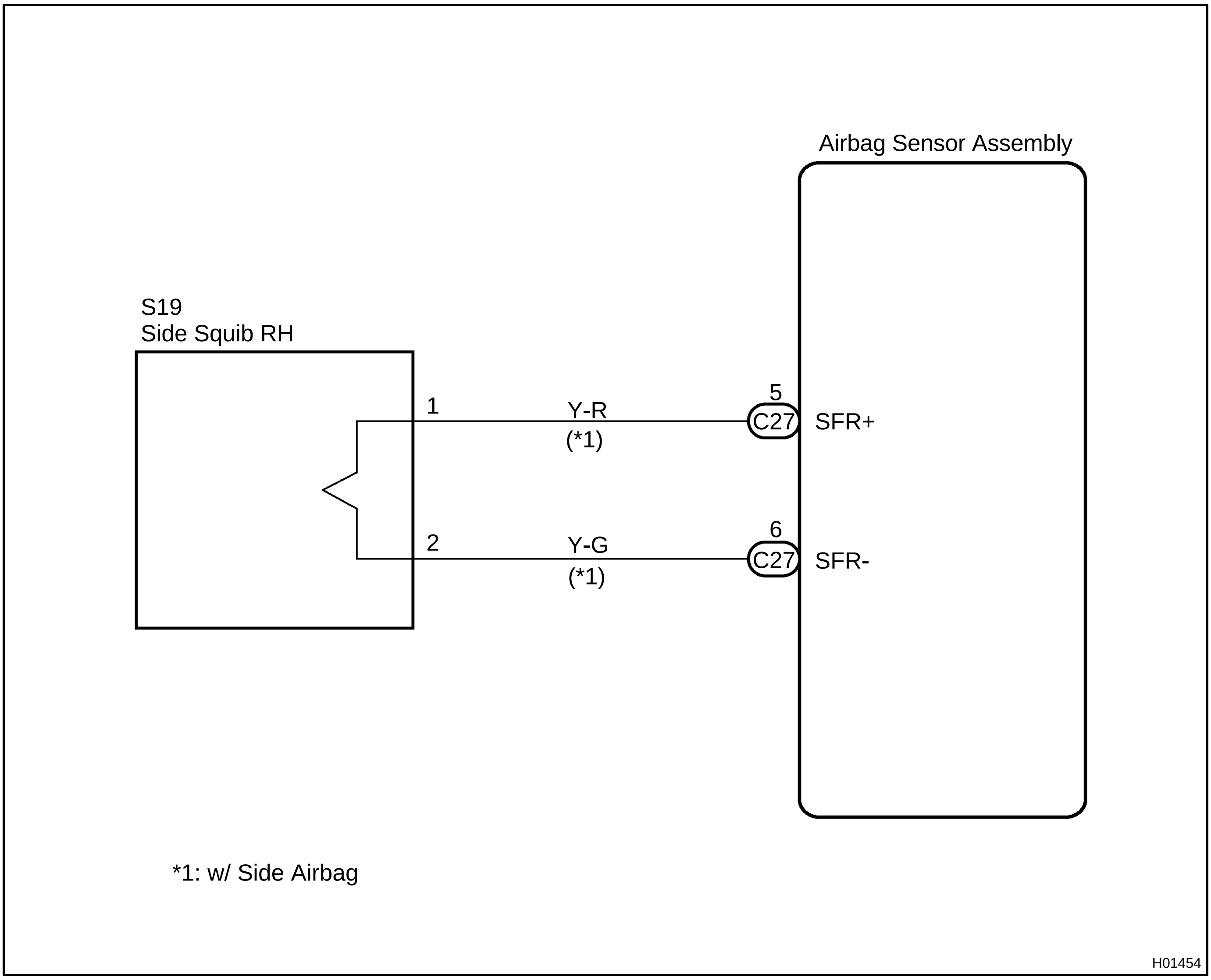
CIRCUIT DESCRIPTION

The side squib RH circuit consists of the airbag sensor assembly and the 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-3 .
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 in side squib RH circuit ★Side squib RH malfunction ★Airbag sensor assembly malfunction	★Side airbag assembly RH (Side squib RH) ★Airbag sensor assembly ★Floor No. 2 wire

HINT:
DTC B0110/43 is indicated only for the vehicle equipped with the side airbag.

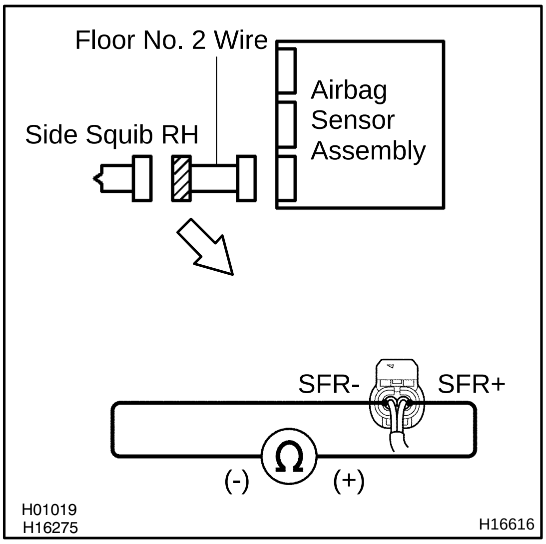
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 2 wire (side squib RH circuit).**



PREPARATION:

Release the airbag activation prevention mechanism built in the connector of the floor No. 2 wire on the airbag sensor assembly side (See page DI-692).

CHECK:

Measure the resistance between SFR+ and SFR- of the floor No. 2 wire connector on the side airbag assembly RH (side squib RH) side.

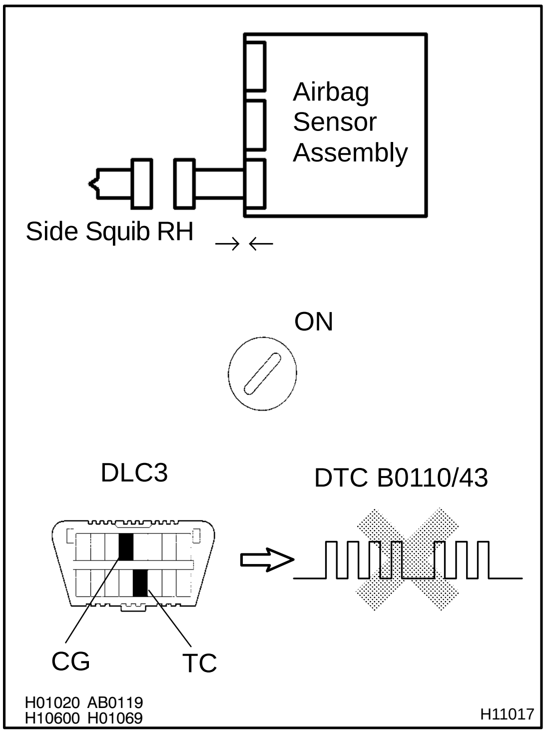
OK:

Resistance: 1 MΩ or Higher

NG	**Repair or replace floor No. 2 wire.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

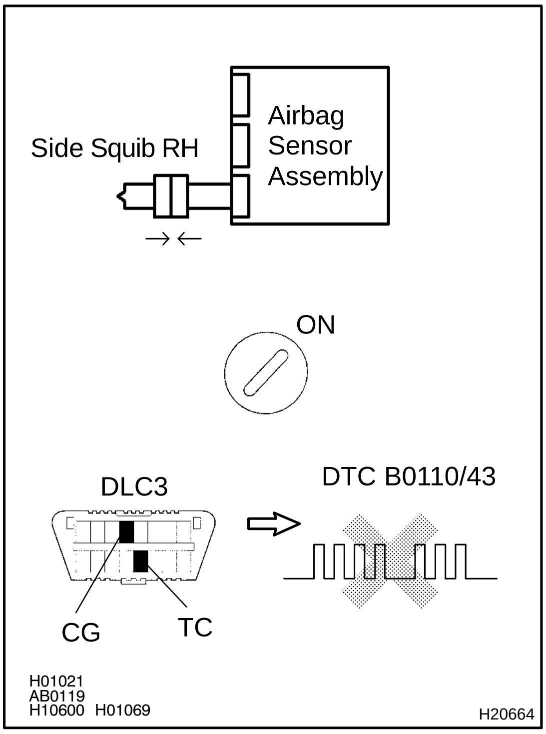
DTC B0110/43 is not output.

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 the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the side airbag assembly RH (side squib RH) connector.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

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 (side squib 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.

DI6PC-20

DTC	B0111/44	Open in Side Squib RH Circuit

CIRCUIT DESCRIPTION

The side squib RH circuit consists of the airbag sensor assembly and the 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-3 .
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 in side squib RH circuit ★Side squib RH malfunction ★Airbag sensor assembly malfunction	★Side airbag assembly RH (Side squib RH) ★Airbag sensor assembly ★Floor No. 2 wire

HINT:
DTC B0111/44 is indicated only for the vehicle equipped with the side airbag.

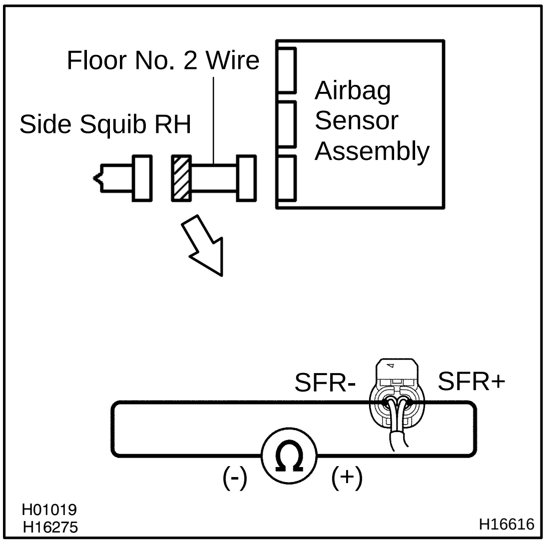
WIRING DIAGRAM

See page DI-745 .

INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-923).

2	Check floor No. 2 wire (side squib RH circuit).



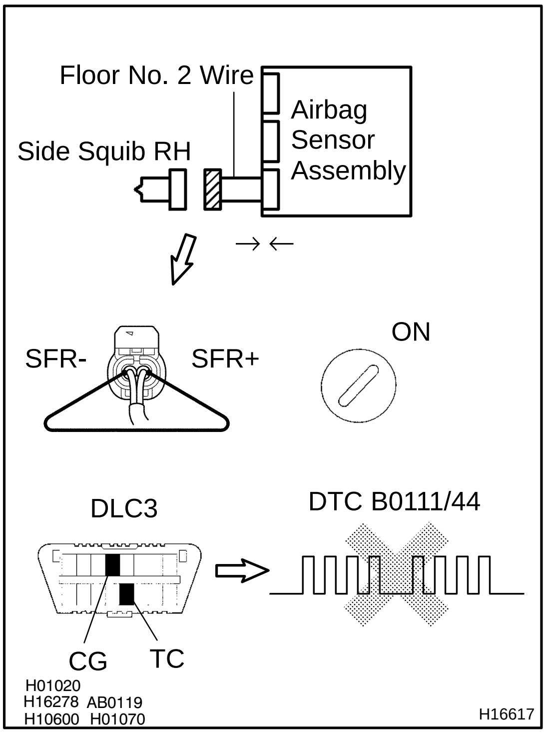
CHECK:
Measure the resistance between SFR+ and SFR- of the floor No. 2 wire connector on the side airbag assembly RH (side squib RH) side.

OK:
Resistance: Below 1 Ω

NG	Repair or replace floor No. 2 wire.

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 floor No. 2 wire connector on the side airbag assembly RH (side squib RH) side.

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B0111/44 is not output.

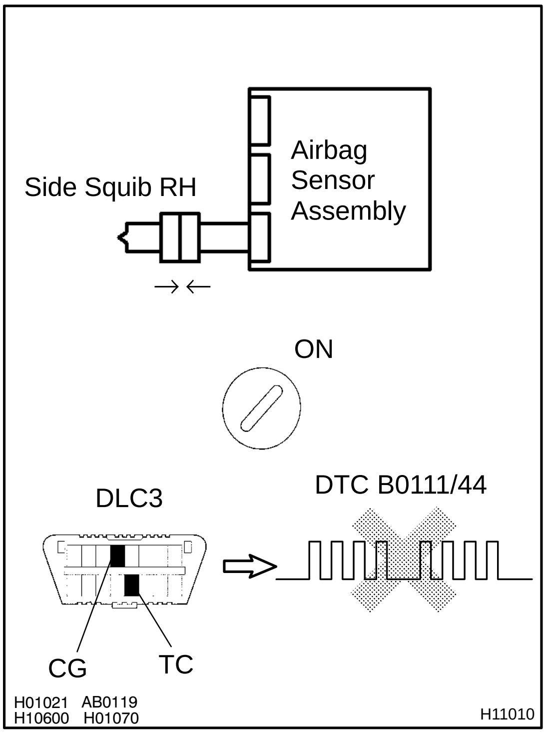
HINT:

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 the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the side airbag assembly RH (side squib RH) connector.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

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 (side squib 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	B0112/41	Short in Side Squib RH Circuit (to Ground)

CIRCUIT DESCRIPTION

The side squib RH circuit consists of the airbag sensor assembly and the 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-3.
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 in side squib RH circuit (to ground) ★Side squib RH malfunction ★Airbag sensor assembly malfunction	★Side airbag assembly RH (Side squib RH) ★Airbag sensor assembly ★Floor No. 2 wire

HINT:
DTC B0112/41 is indicated only for the vehicle equipped with the side airbag.

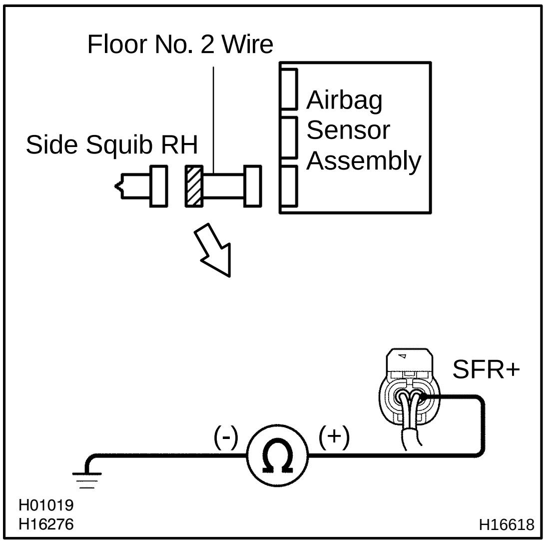
WIRING DIAGRAM

See page DI-745.

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 2 wire (side squib RH circuit).**



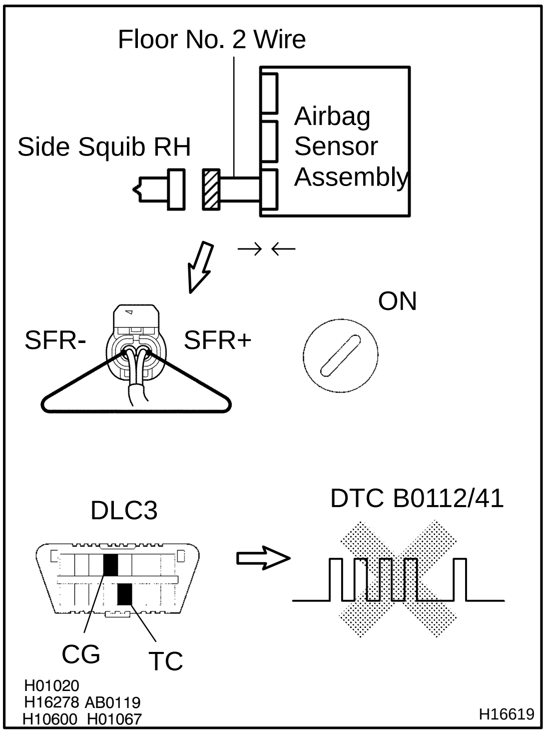
CHECK:
Measure the resistance between the body ground and SFR+ of the floor No. 2 wire connector on the side airbag assembly RH (side squib RH) side.

OK:
Resistance: 1 MΩ or Higher

NG → **Repair or replace floor No. 2 wire.**

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 floor No. 2 wire connector on the side airbag assembly RH (side squib RH) side.

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

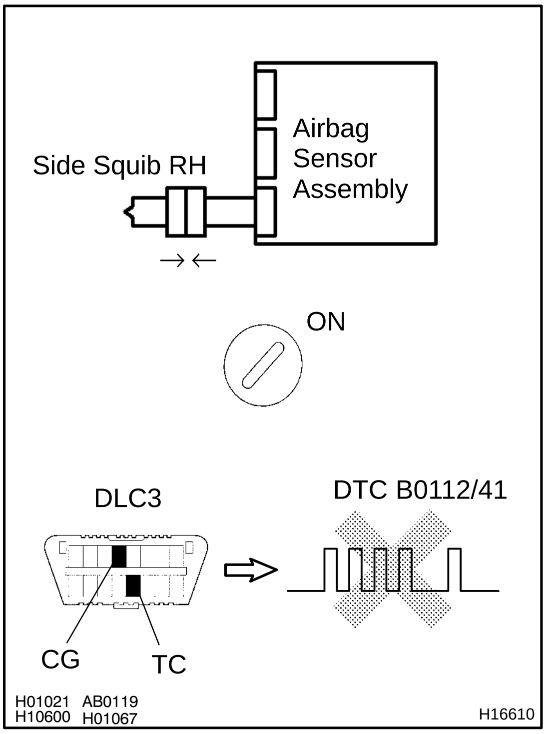
DTC B0112/41 is not output.

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 the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the side airbag assembly RH (side squib RH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 (side squib 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.

DI6PE-22

DTC	B0113/42	Short in Side Squib RH Circuit (to B+)

CIRCUIT DESCRIPTION

The side squib RH circuit consists of the airbag sensor assembly and the 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-3 .
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 in side squib RH circuit (to B+) ★Side squib RH malfunction ★Airbag sensor assembly malfunction	★Side airbag assembly RH (Side squib RH) ★Airbag sensor assembly ★Floor No. 2 wire

HINT:
DTC B0113/42 is indicated only for the vehicle equipped with the side airbag.

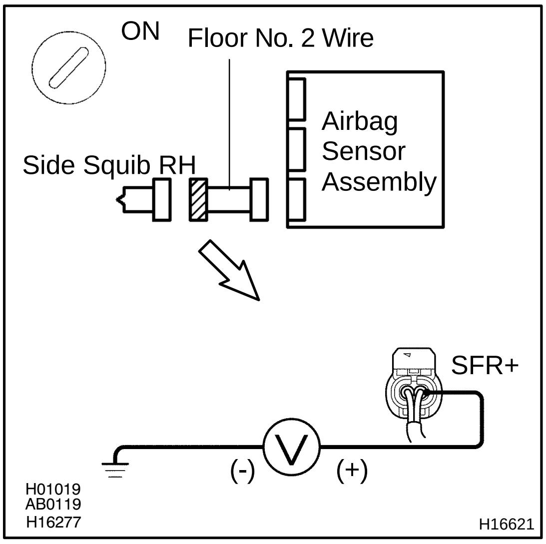
WIRING DIAGRAM

See page DI-745 .

INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-923).

2	Check floor No. 2 wire (side squib RH circuit).



PREPARATION:
Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

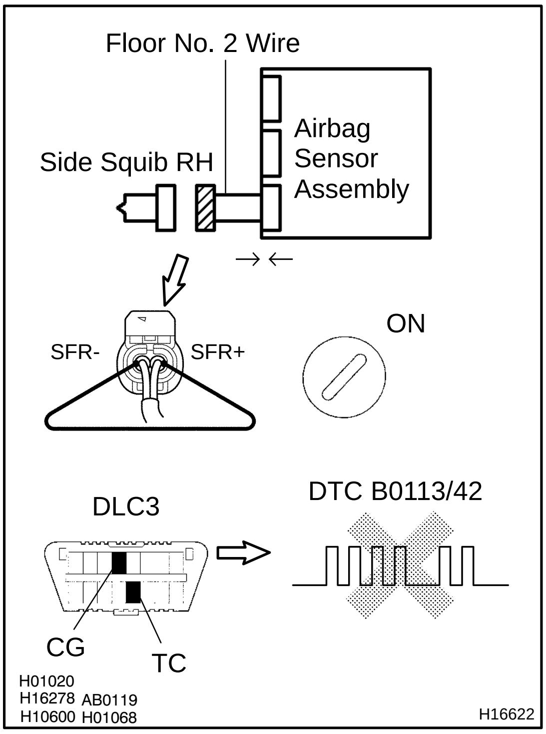
CHECK:
(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and SFR+ of the floor No. 2 wire connector on the side airbag assembly RH (side squib RH) side.

OK:
Voltage: Below 1 V

NG	Repair or replace floor No. 2 wire.

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the connector to the airbag sensor assembly.

(d) Using a service wire, connect SFR+ and SFR- of the floor No. 2 wire connector on the side airbag assembly RH (side squib RH) side.

(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B0113/42 is not output.

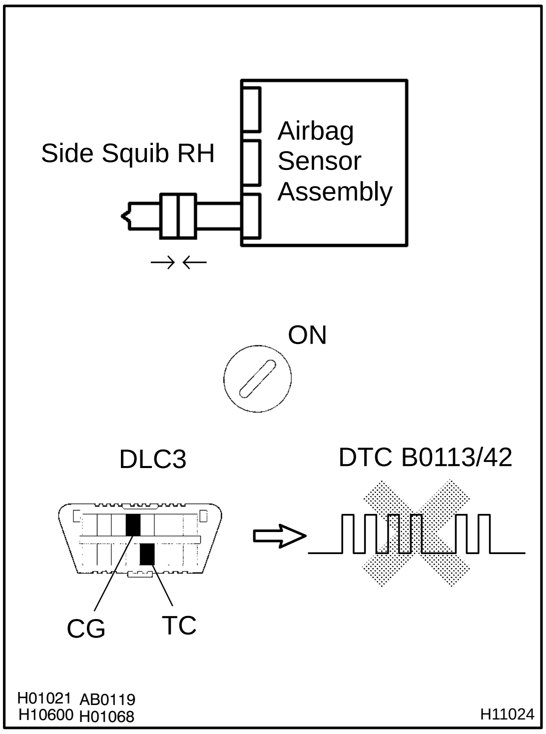
HINT:

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 the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the side airbag assembly RH (side squib RH) connector.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

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 (side squib 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.

DI6PF-34

DTC	B0115/47	Short in Side Squib LH Circuit

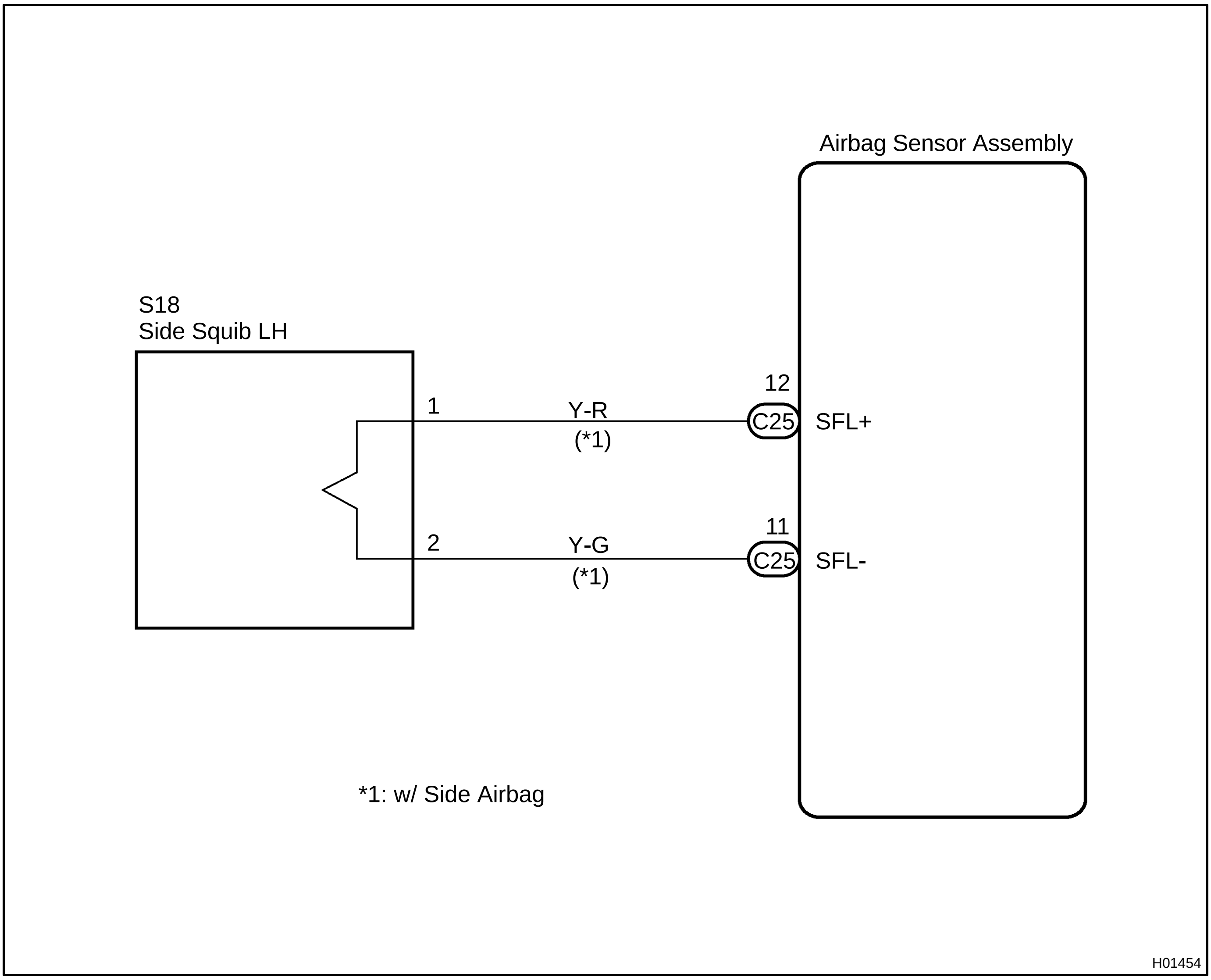
CIRCUIT DESCRIPTION

The side squib LH circuit consists of the airbag sensor assembly and the 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-3 .
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 in side squib LH circuit ★Side squib LH malfunction ★Airbag sensor assembly malfunction	★Side airbag assembly LH (Side squib LH) ★Airbag sensor assembly ★Floor No. 1 wire

HINT:
DTC B0115/47 is indicated only for the vehicle equipped with the side airbag.

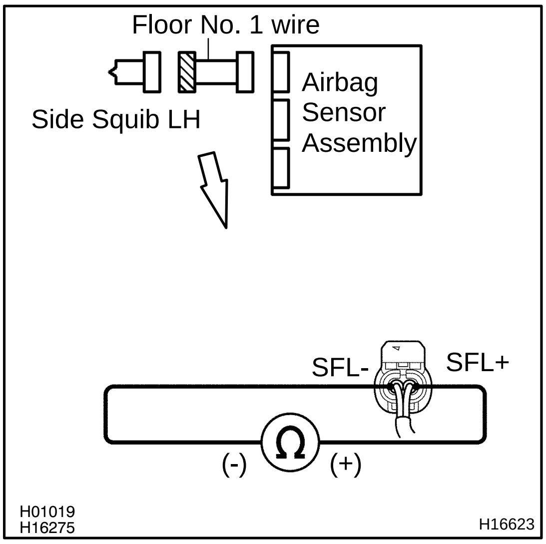
WIRING DIAGRAM



INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-923).

2	Check floor No. 1 wire (side squib LH circuit).



PREPARATION:
Release the airbag activation prevention mechanism built in the connector of the floor No. 1 wire on the airbag sensor assembly side (See page DI-692).

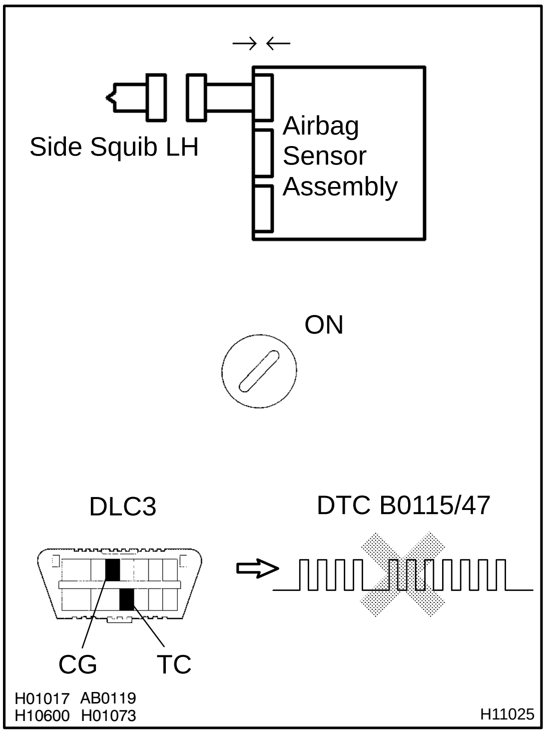
CHECK:
Measure the resistance between SFL+ and SFL- of the floor No. 1 wire connector on the side airbag assembly LH (side squib LH) side.

OK:
Resistance: 1 MΩ or Higher

NG	Repair or replace floor No. 1 wire.

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B0115/47 is not output.

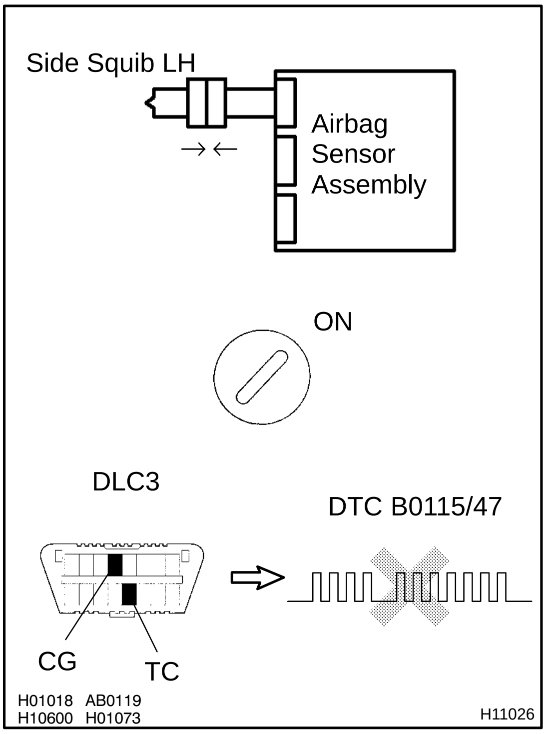
HINT:

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 the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the side airbag assembly LH (side squib LH) connector.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

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 (side squib 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.

DI6PG-21

DTC	B0116/48	Open in Side Squib LH Circuit

CIRCUIT DESCRIPTION

The side squib LH circuit consists of the airbag sensor assembly and the 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-3 .
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 in side squib LH circuit ★Side squib LH malfunction ★Airbag sensor assembly malfunction	★Side airbag assembly LH (Side squib LH) ★Airbag sensor assembly ★Floor No. 1 wire

HINT:
DTC B0116/48 is indicated only for the vehicle equipped with the side airbag.

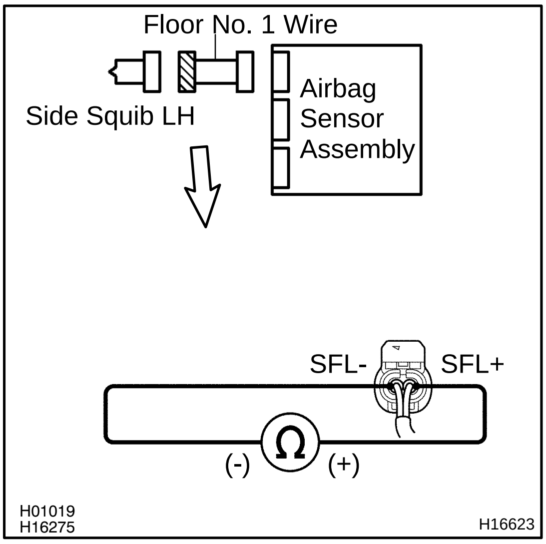
WIRING DIAGRAM

See page DI-758 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 1 wire (side squib LH circuit).**



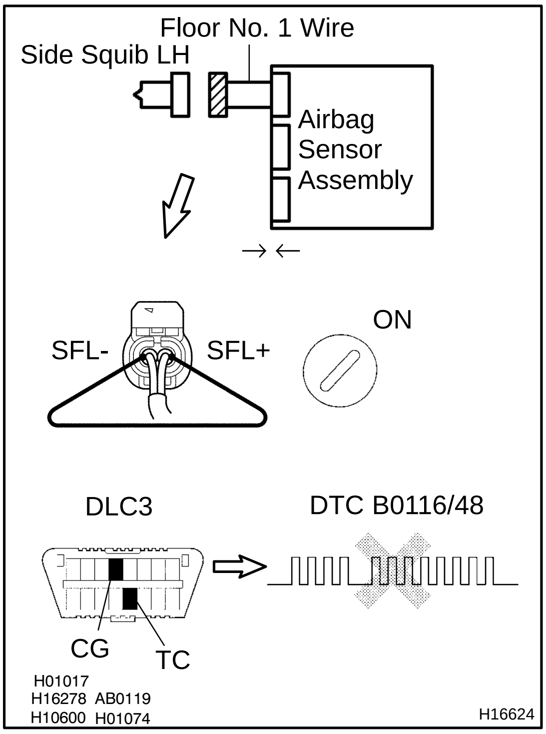
CHECK:
Measure the resistance between SFL+ and SFL- of the floor No. 1 wire connector on the side airbag assembly LH (side squib LH) side.

OK:
Resistance: Below 1 Ω

NG	**Repair or replace floor No. 1 wire.**

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 floor No. 1 wire connector on the side airbag assembly LH (side squib LH) side.
(c) Connect the negative (-) terminal cable to the battery, and wait at least 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

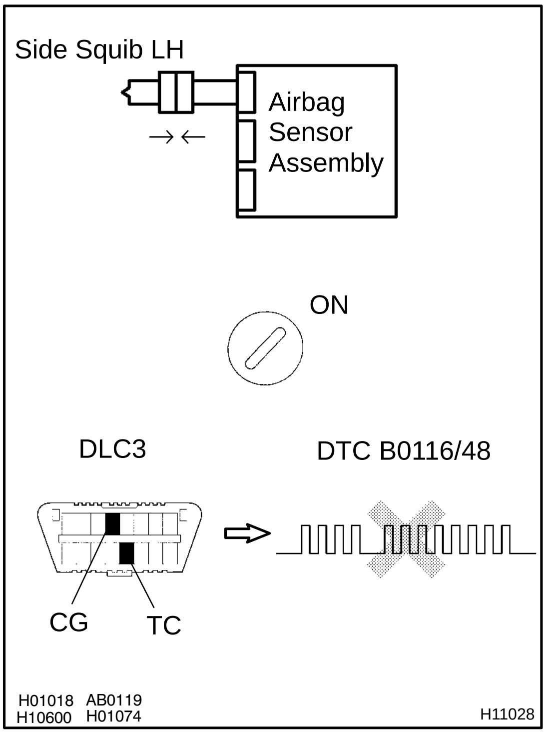
DTC B0116/48 is not output.

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 the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the side airbag assembly LH (side squib LH) connector.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

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 (side squib 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.

DI6PH-21

DTC	B0117/45	Short in Side Squib LH Circuit (to Ground)

CIRCUIT DESCRIPTION

The side squib LH circuit consists of the airbag sensor assembly and the 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-3 .
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 in side squib LH circuit (to ground) ★Side squib LH malfunction ★Airbag sensor assembly malfunction	★Side airbag assembly LH (Side squib LH) ★Airbag sensor assembly ★Floor No. 1 wire

HINT:
DTC B0117/45 is indicated only for the vehicle equipped with the side airbag.

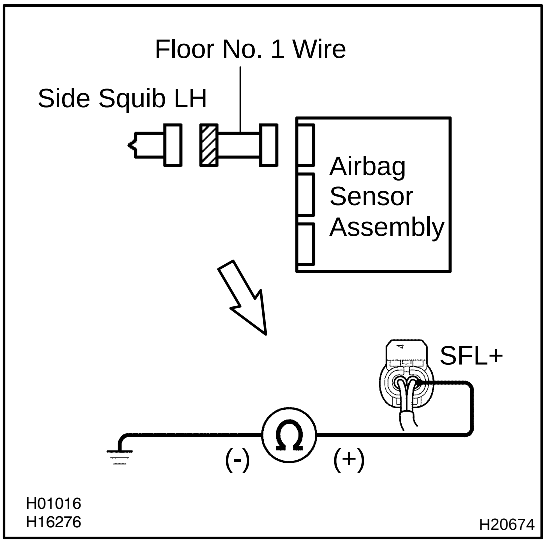
WIRING DIAGRAM

See page DI-758 .

INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-923).

2	Check floor No. 1 wire (side squib LH circuit).



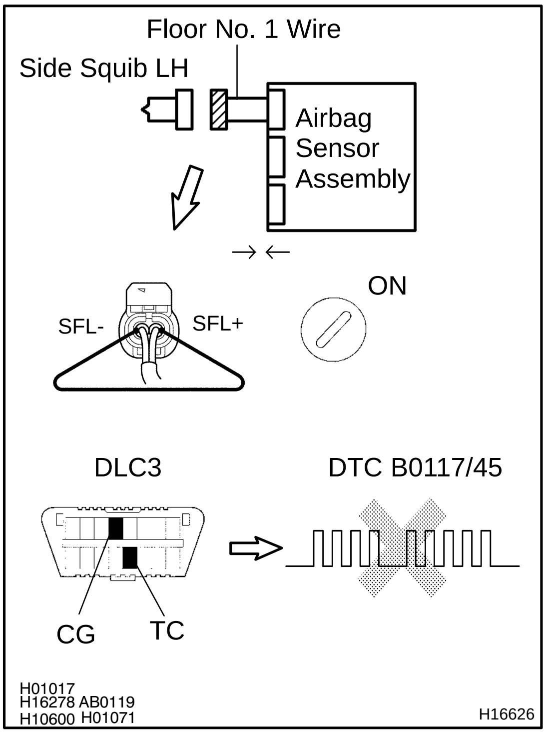
CHECK:
Measure the resistance between the body ground and SFL+ of the floor No. 1 wire connector on the side airbag assembly LH (side squib LH) side.

OK:
Resistance: 1 MΩ or Higher

NG → **Repair or replace floor No. 1 wire.**

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 floor No. 1 wire connector on the side airbag assembly LH (side squib LH) side.
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

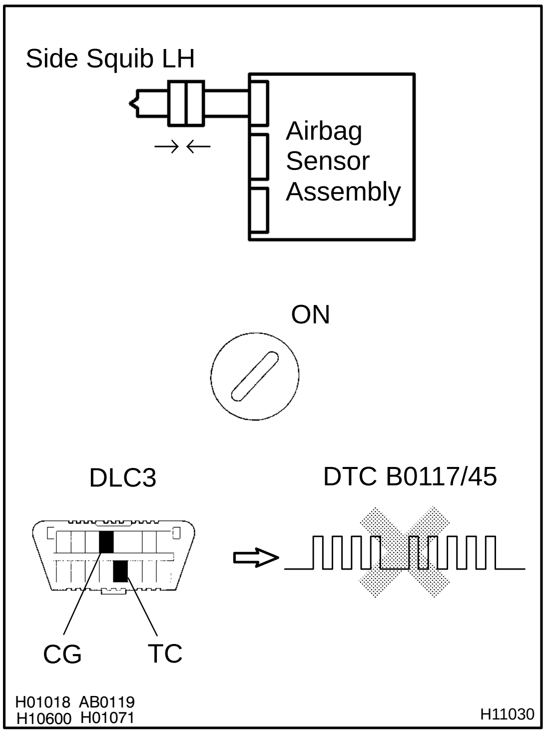
DTC B0117/45 is not output.

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 the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the side airbag assembly LH (side squib LH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 (side squib 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.

DI6PI-21

DTC	B0118/46	Short in Side Squib LH Circuit (to B+)

CIRCUIT DESCRIPTION

The side squib LH circuit consists of the airbag sensor assembly and the 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-3 .
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 in side squib LH circuit (to B+) ★Side squib LH malfunction ★Airbag sensor assembly malfunction	★Side airbag assembly LH (Side squib LH) ★Airbag sensor assembly ★Floor No. 1 wire

HINT:
DTC B0118/46 is indicated only for the vehicle equipped with the side airbag.

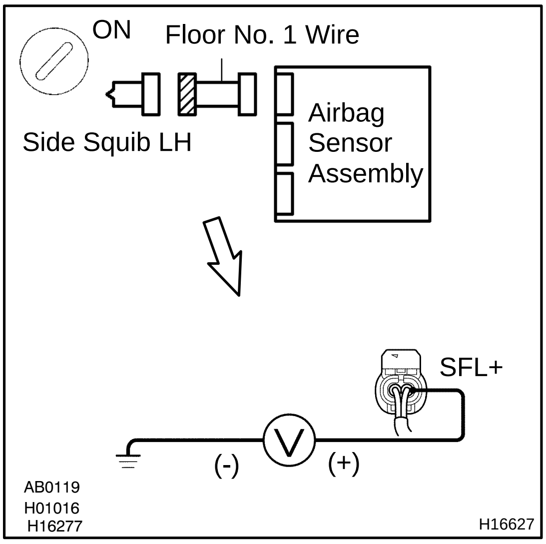
WIRING DIAGRAM

See page DI-692 .

INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-692).

2	Check floor No. 1 wire (side squib LH circuit).



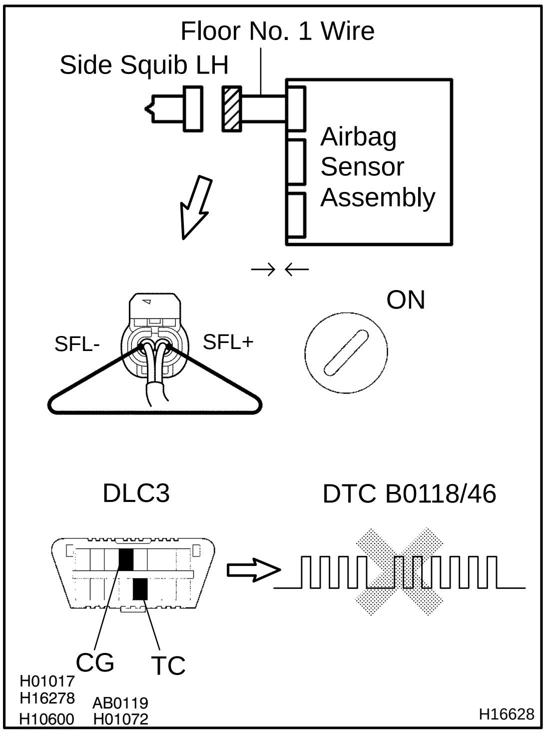
CHECK:
(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and SFL+ of the floor No. 1 wire connector on the side airbag assembly LH (side squib LH) side.

OK:
Voltage: Below 1 V

NG	Repair or replace floor No. 1 wire.

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the connector to the airbag sensor assembly.

(d) Using a service wire, connect SFL+ and SFL- of the floor No. 1 wire connector on the side airbag assembly LH (side squib LH) side.

(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

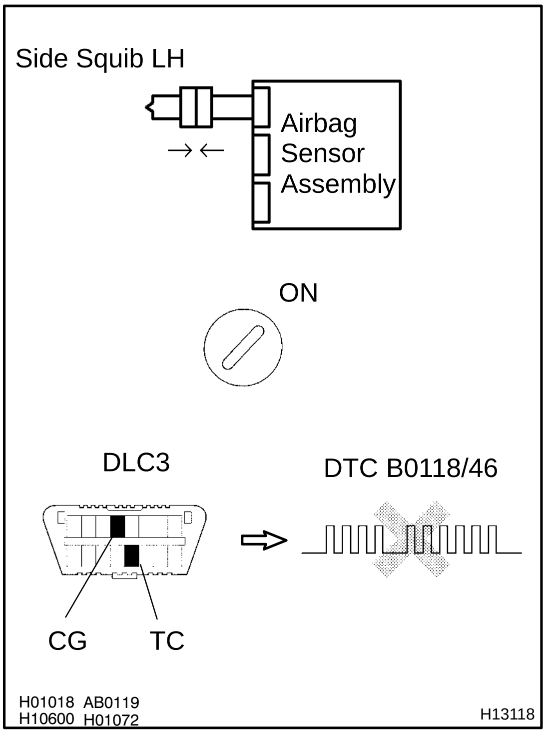
DTC B0118/46 is not output.

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 the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the side airbag assembly LH (side squib LH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 (side squib 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.

DIB3R-01

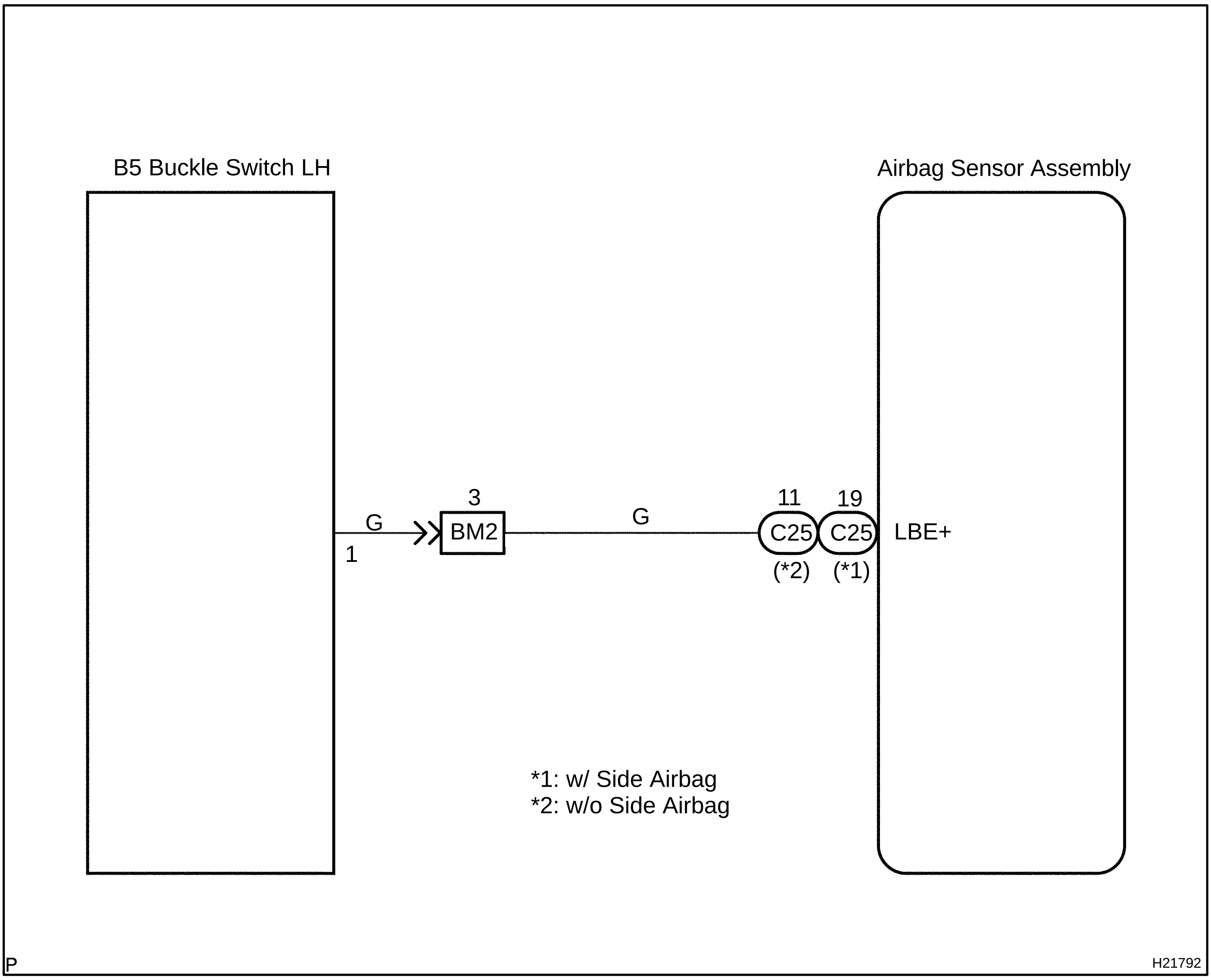
DTC	B0126/B0127/27	Seat Belt Buckle Switch LH Malfunction

CIRCUIT DESCRIPTION

The seat belt buckle switch LH malfunction circuit consists of the airbag sensor assembly and the front seat inner belt LH (seat belt buckle switch LH).
For details of the function of each component, see OPERATION on page RS-3 .
DTC B0126/B0127/27 is recorded when a malfunction is detected in the seat belt buckle switch LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0126/B0127/27	★Seat belt buckle switch LH circuit malfunction	★Front seat inner belt LH (Seat belt buckle switch LH) ★Airbag sensor assembly ★Floor No. 1 wire ★Front seat wire LH

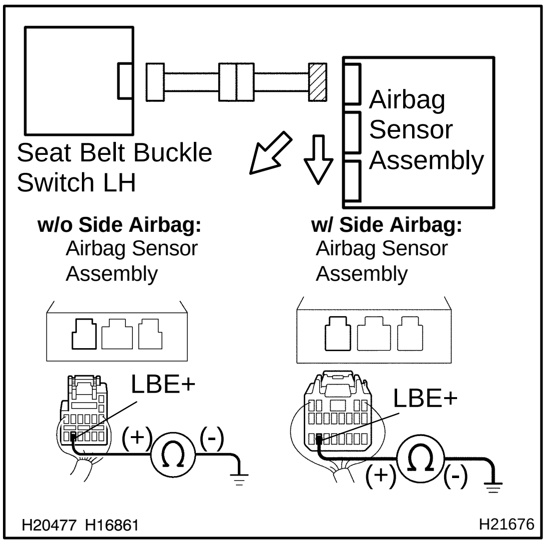
WIRING DIAGRAM



INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-692).

2	Check wire harness (to ground).



CHECK:

Measure the resistance between the body ground and LBE+ of the connector on the airbag sensor assembly side between the front seat inner belt LH (seat belt buckle switch LH) and the airbag sensor assembly.

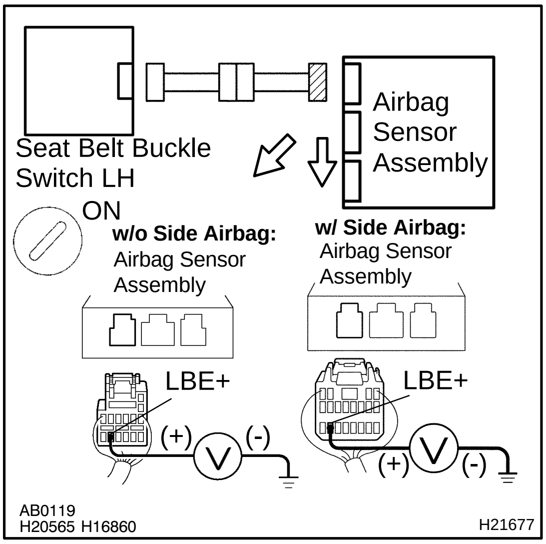
OK:

Resistance: 1 MΩ or Higher

NG	Go to step 7.

OK

3	Check wire harness (to B+).



PREPARATION:

Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and LBE+ of the connector on the airbag sensor assembly side between the front seat inner belt LH (seat belt buckle switch LH) and the airbag sensor assembly.

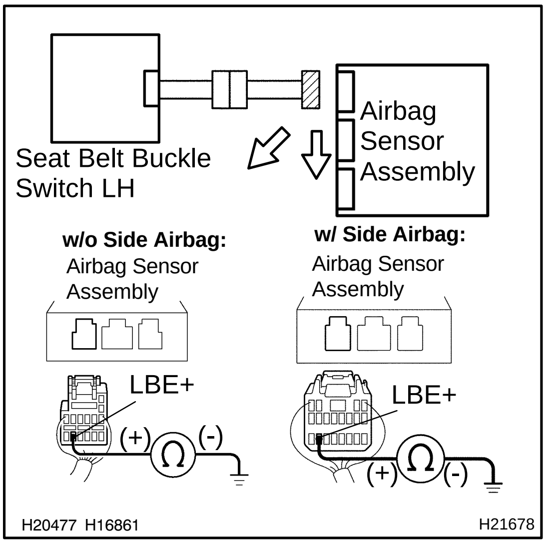
OK:

Voltage: Below 1 V

NG	Go to step 8.

OK

4	**Check front seat inner belt LH.**



PREPARATION:

(a) Connect the connector of the front seat inner belt LH (seat belt buckle switch LH).

(b) Unlock the seat belt for the driver's seat.

CHECK:

Measure the resistance between the body ground and LBE+ of the connector on the airbag sensor assembly side between the front seat inner belt LH (seat belt buckle switch LH) and the airbag sensor assembly.

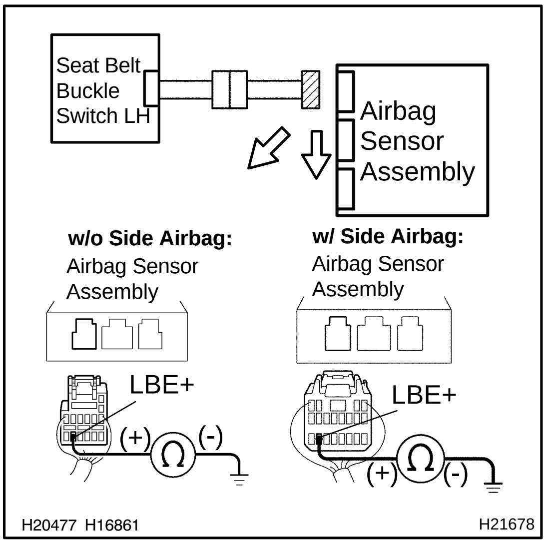
OK:

Resistance: 1 kΩ - 1.6 kΩ

NG — **Replace front seat inner belt LH.**

OK

5	**Check front seat inner belt LH.**



PREPARATION:

Lock the seat belt for the driver's seat.

CHECK:

Measure the resistance between the body ground and LBE+ of the connector on the airbag sensor assembly side between the front seat inner belt LH (seat belt buckle switch LH) and the airbag sensor assembly.

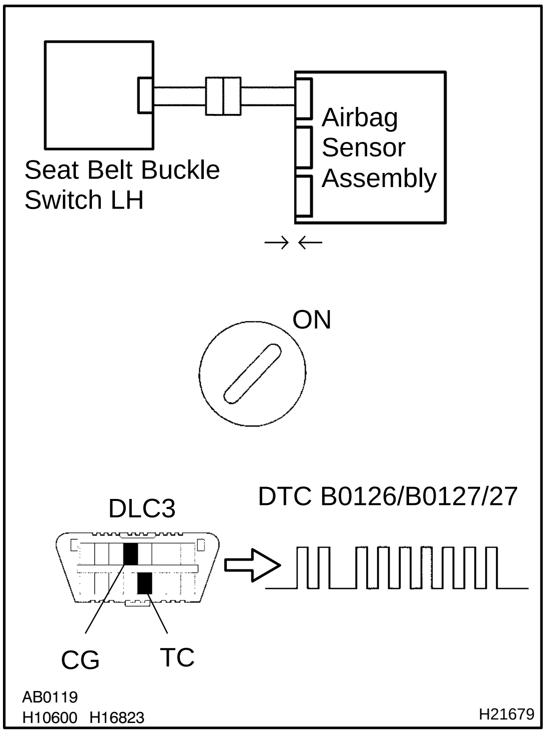
OK:

Resistance: 100 Ω - 500 Ω

NG — **Replace front seat inner belt LH.**

OK

6	**Check airbag sensor assembly.**



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the connector to the airbag sensor assembly.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B0126/B0127/27 is not output.

HINT:

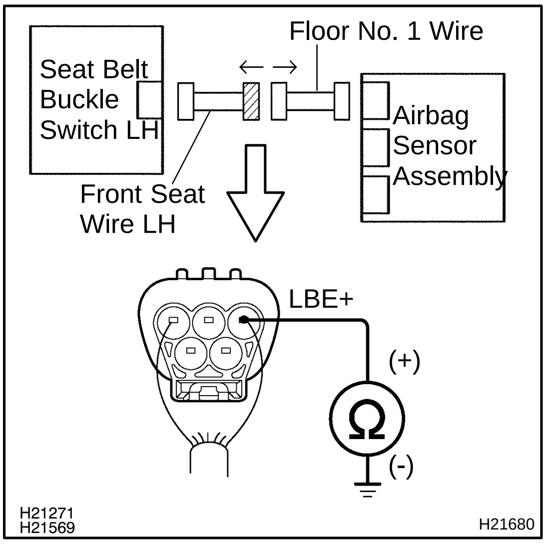
Codes other than code B0126/B0127/27 may be output at this time, but they are not relevant to this check.

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.

7	**Check front seat wire LH (to ground).**



PREPARATION:

Disconnect the front seat wire LH connector from the floor No. 1 wire.

CHECK:

Measure the resistance between the body ground and LBE+ of the front seat wire LH connector on the floor No. 1 wire side.

OK:

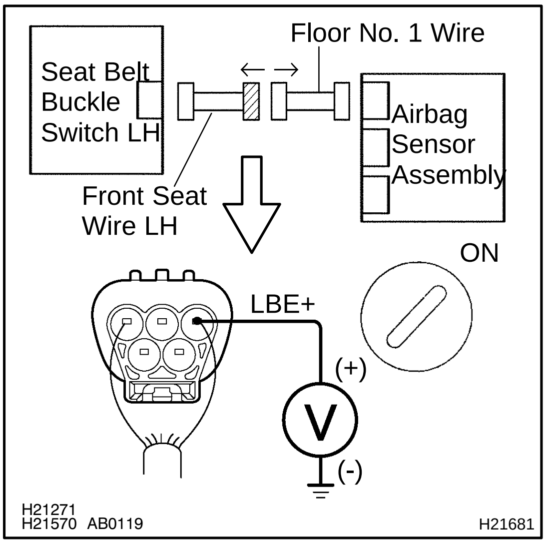
Resistance: 1 MΩ or Higher

NG → **Repair or replace front seat wire LH.**

OK

Repair or replace floor No. 1 wire.

8	**Check front seat wire LH (to B+).**



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Disconnect the front seat wire LH connector from the floor No. 1 wire.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and LBE+ of the front seat wire LH connector on the floor No. 1 wire side.

OK:

Voltage: Below 1 V

NG	**Repair or replace front seat wire LH.**

OK

Repair or replace floor No. 1 wire.

DI6PJ-26

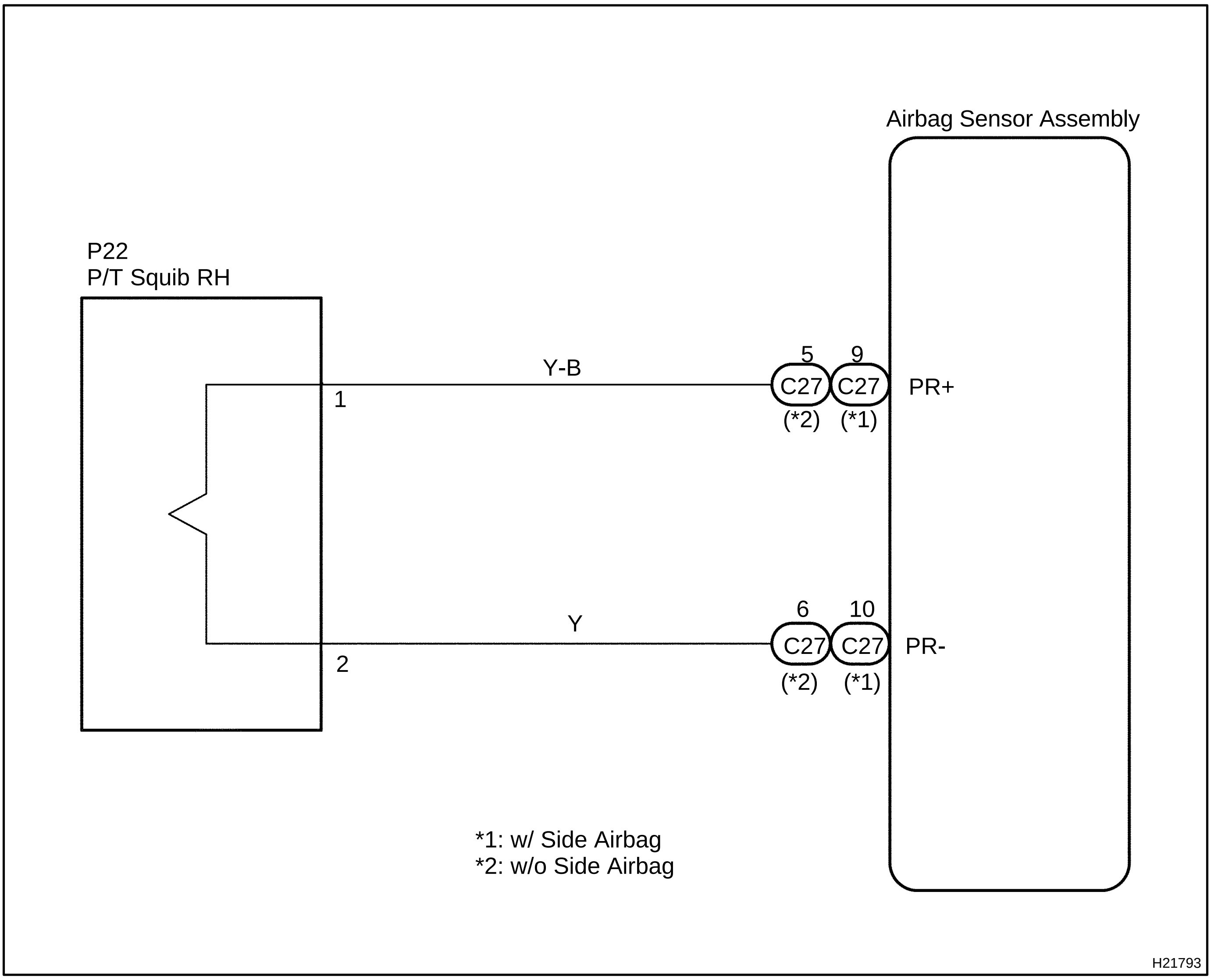
DTC	B0130/63	Short in P/T Squib RH Circuit

CIRCUIT DESCRIPTION

The P/T squib RH circuit consists of the airbag sensor assembly and the 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-3 .
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 in P/T squib RH circuit ★P/T squib RH malfunction ★Airbag sensor assembly malfunction	★Seat belt pretensioner RH (P/T squib RH) ★Airbag sensor assembly ★Floor No. 2 wire

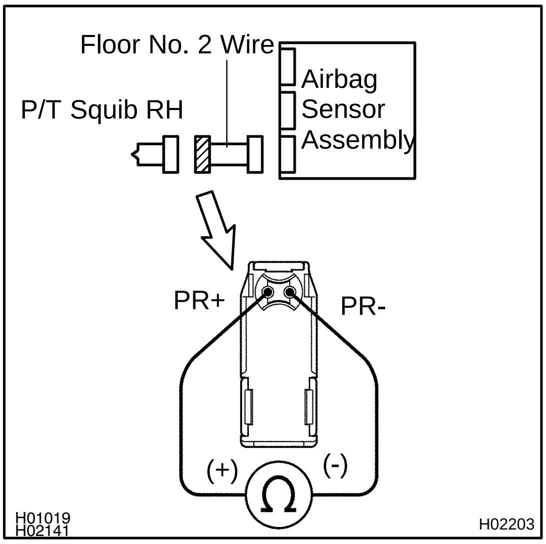
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 2 wire (P/T squib RH circuit).**



PREPARATION:

Release the airbag activation prevention mechanism built in the connector of the floor No. 2 wire on the airbag sensor assembly side (See page DI-692).

CHECK:

Measure the resistance between PR+ and PR- of the floor No. 2 wire connector on the seat belt pretensioner RH (P/T squib RH) side.

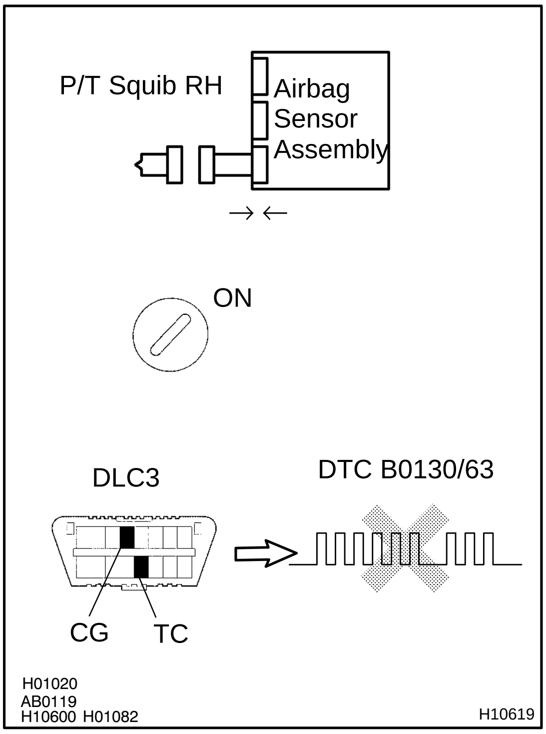
OK:

Resistance: 1 MΩ or Higher

NG	**Repair or replace floor No. 2 wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

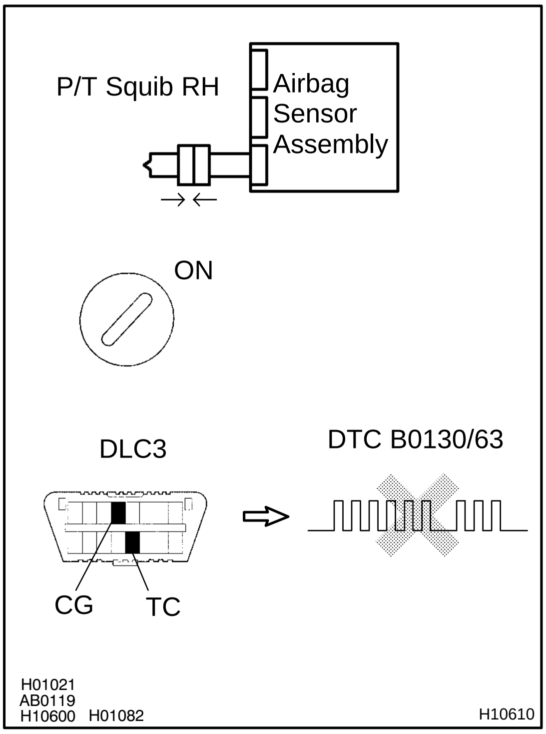
DTC B0130/63 is not output.

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 the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the seat belt pretensioner RH (P/T squib RH) connector.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

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 (P/T squib 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.

DI6PK-16

DTC	B0131/64	Open in P/T Squib RH Circuit

CIRCUIT DESCRIPTION

The P/T squib RH circuit consists of the airbag sensor assembly and the 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-3 .
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 in P/T squib RH circuit ★P/T squib RH malfunction ★Airbag sensor assembly malfunction	★Seat belt pretensioner RH (P/T squib RH) ★Airbag sensor assembly ★Floor No. 2 wire

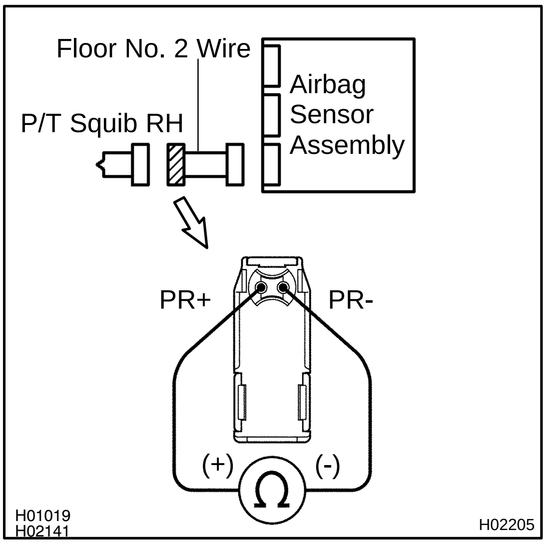
WIRING DIAGRAM

See page DI-777 .

INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-923).

2	Check floor No. 2 wire (P/T squib RH circuit).

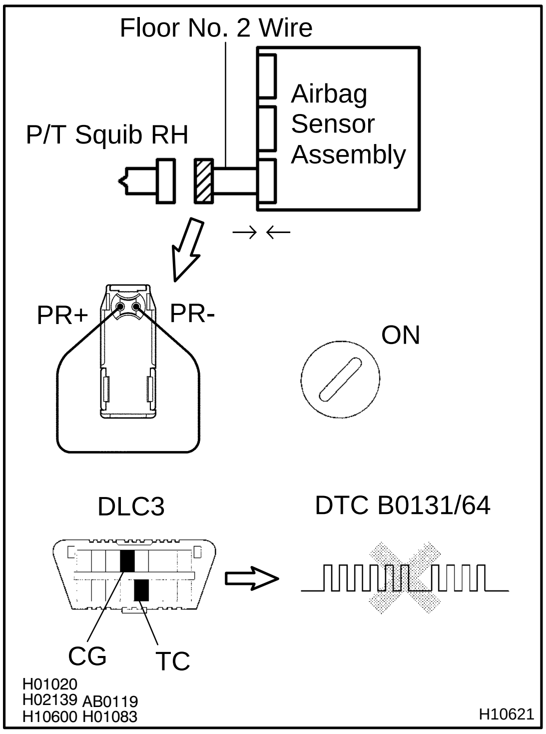


CHECK:
Measure the resistance between PR+ and PR- of the floor No. 2 wire connector on the seat belt pretensioner RH (P/T squib RH) side.
OK:
Resistance: Below 1 Ω

NG	Repair or replace floor No. 2 wire.

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 floor No. 2 wire connector on the seat belt pretensioner RH (P/T squib RH) side.

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B0131/64 is not output.

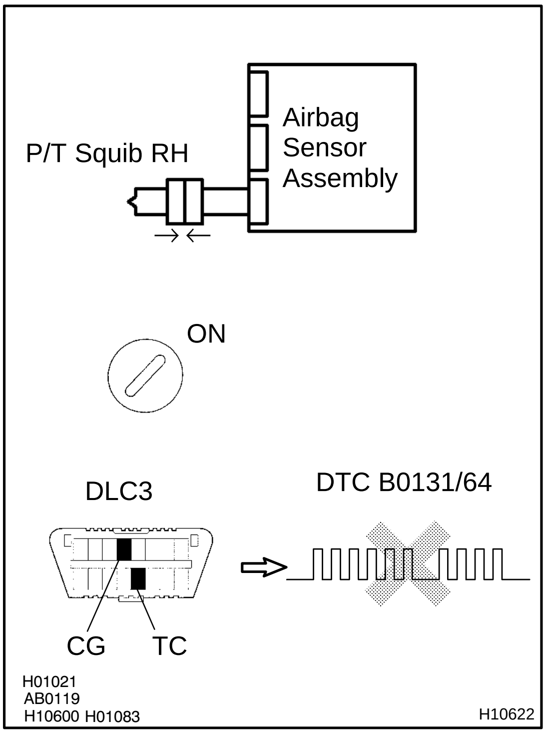
HINT:

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 the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the seat belt pretensioner RH (P/T squib RH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 (P/T squib 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 the 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-3 .
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 in P/T squib RH circuit (to ground) ★P/T squib RH malfunction ★Airbag sensor assembly malfunction	★Seat belt pretensioner RH (P/T squib RH) ★Airbag sensor assembly ★Floor No. 2 wire

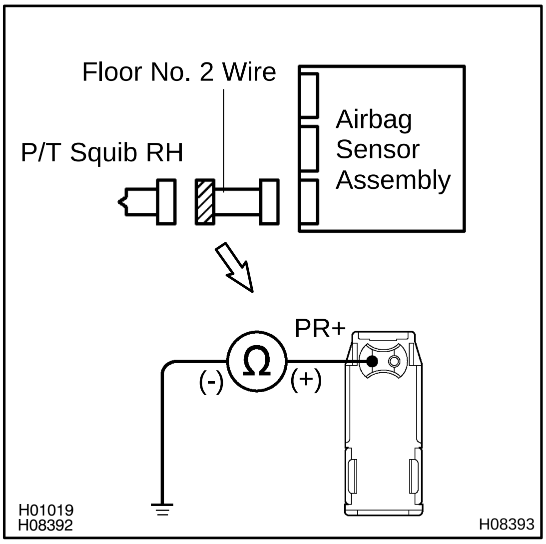
WIRING DIAGRAM

See page DI-692 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-692).**

2	**Check floor No. 2 wire (P/T squib RH circuit).**

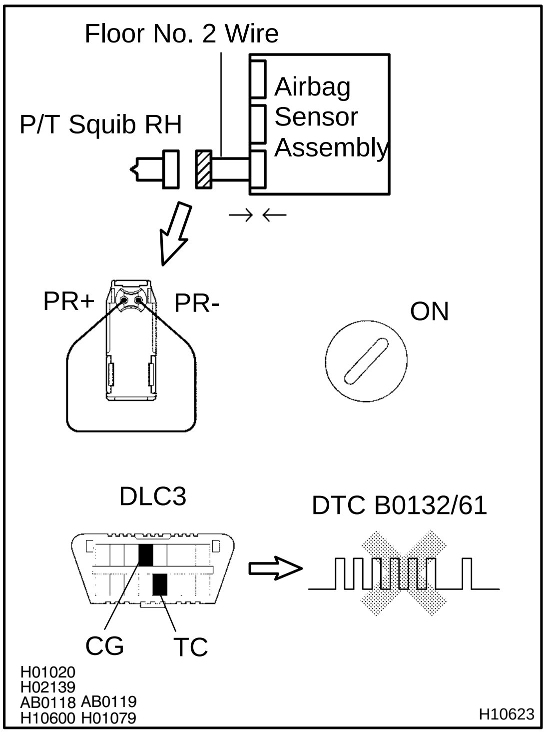


CHECK:
Measure the resistance between the body ground and PR+ of the floor No. 2 wire connector on the seat belt pretensioner RH (P/T squib RH) side.
OK:
Resistance: 1 MΩ or Higher

NG	**Repair or replace floor No. 2 wire.**

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 floor No. 2 wire connector on the seat belt pretensioner RH (P/T squib RH) side.

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

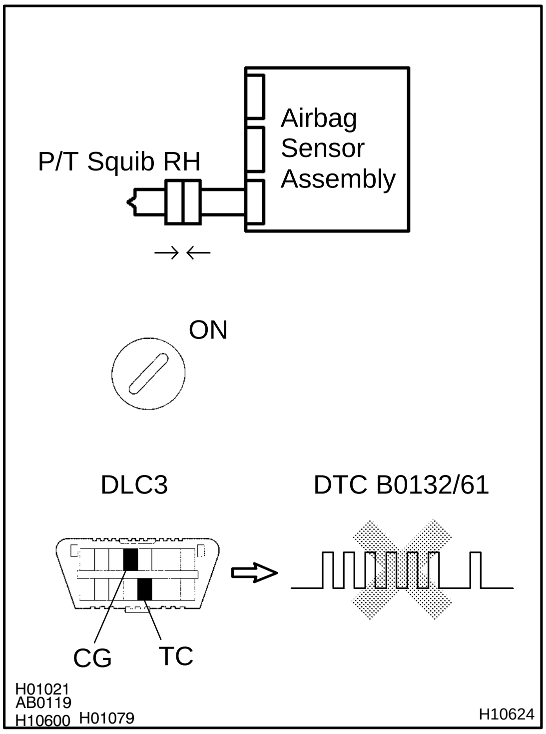
DTC B0132/61 is not output.

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 the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the seat belt pretensioner RH (P/T squib RH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 (P/T squib 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.

DI6PM-16

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 the 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-3 .
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 in P/T squib RH circuit (to B+) ★P/T squib RH malfunction ★Airbag sensor assembly malfunction	★Seat belt pretensioner RH (P/T squib RH) ★Airbag sensor assembly ★Floor No. 2 wire ★Dash wire (Bench seat)

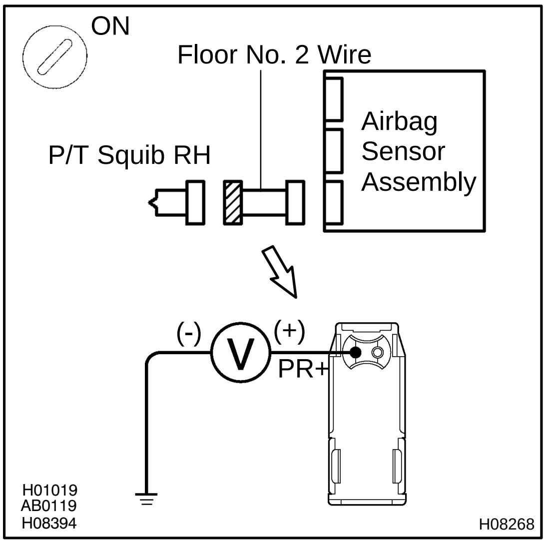
WIRING DIAGRAM

See page DI-777 .

INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-923).

2	Check floor No. 2 wire (P/T squib RH circuit).



PREPARATION:
Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

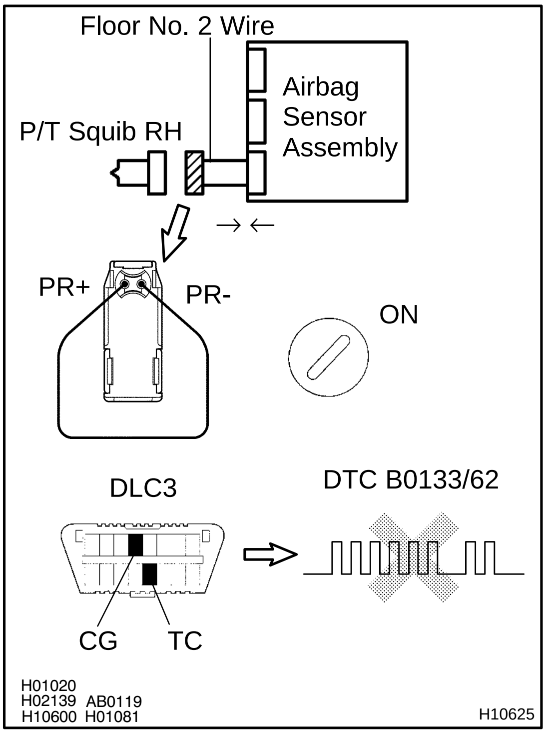
CHECK:
(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and PR+ of the floor No. 2 wire connector on the seat belt pretensioner RH (P/T squib RH) side.

OK:
Voltage: Below 1 V

NG	Repair or replace floor No. 2 wire.

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 floor No. 2 wire connector on the seat belt pretensioner RH (P/T squib RH) side.
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

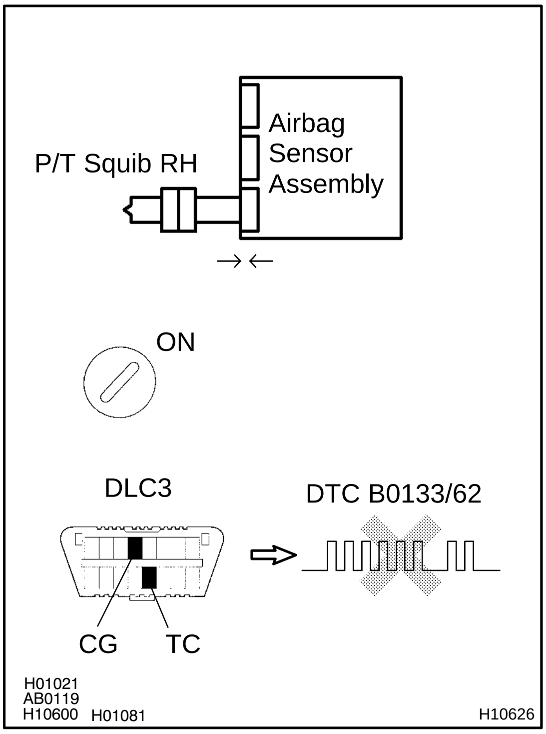
DTC B0133/62 is not output.

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 the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the seat belt pretensioner RH (P/T squib RH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 (P/T squib 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.

DI6PN-26

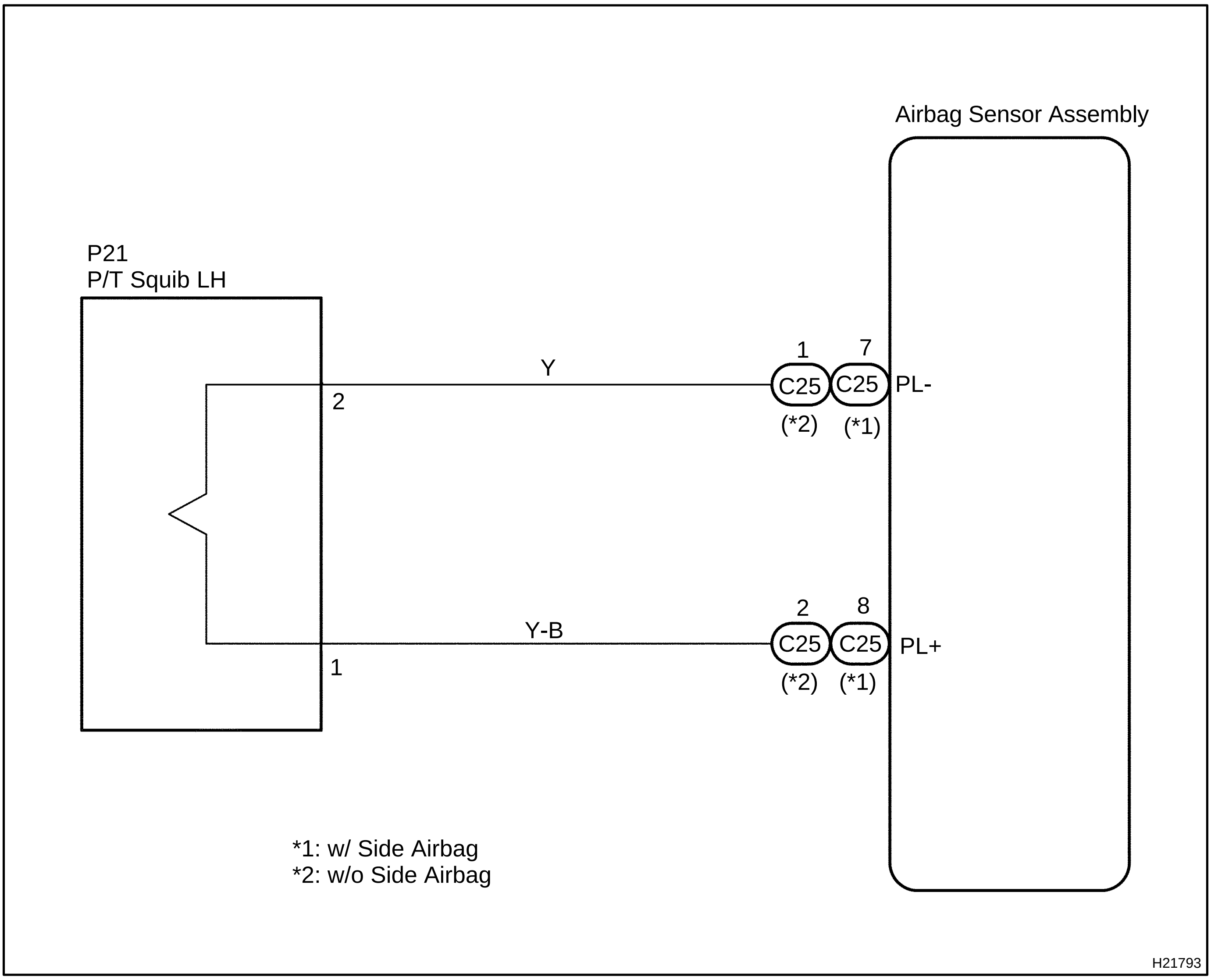
DTC	B0135/73	Short in P/T Squib LH Circuit

CIRCUIT DESCRIPTION

The P/T squib LH circuit consists of the airbag sensor assembly and the 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-3.
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 in P/T squib LH circuit ★P/T squib LH malfunction ★Airbag sensor assembly malfunction	★Seat belt pretensioner LH (P/T squib LH) ★Airbag sensor assembly ★Floor No. 1 wire

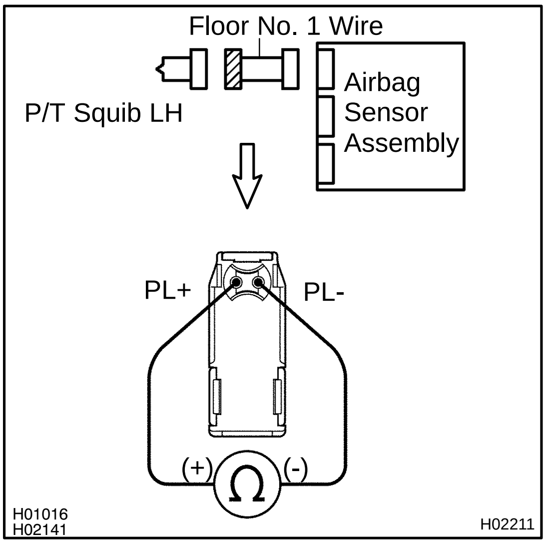
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 1 wire (P/T squib LH circuit).**



PREPARATION:

Release the airbag activation prevention mechanism built in the connector of the floor No. 1 wire on the airbag sensor assembly side (See page DI-692).

CHECK:

Measure the resistance between PL+ and PL- of the floor No. 1 wire connector on the seat belt pretensioner LH (P/T squib LH) side.

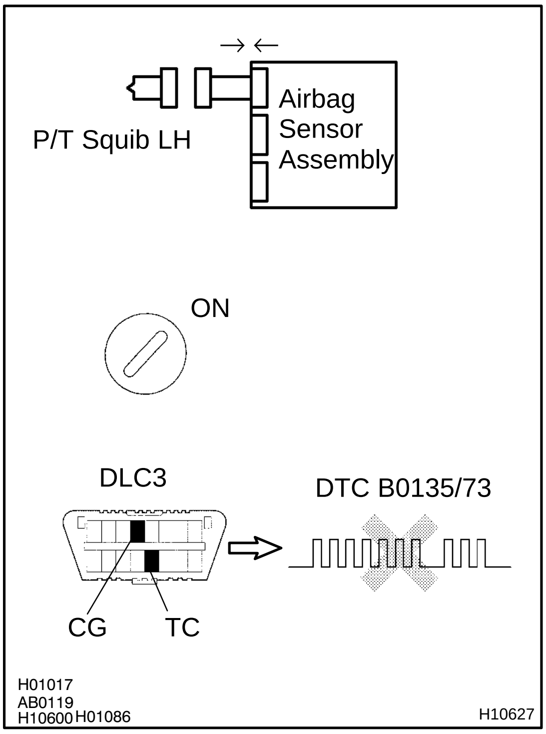
OK:

Resistance: 1 MΩ or Higher

NG	**Repair or replace floor No. 1 wire.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B0135/73 is not output.

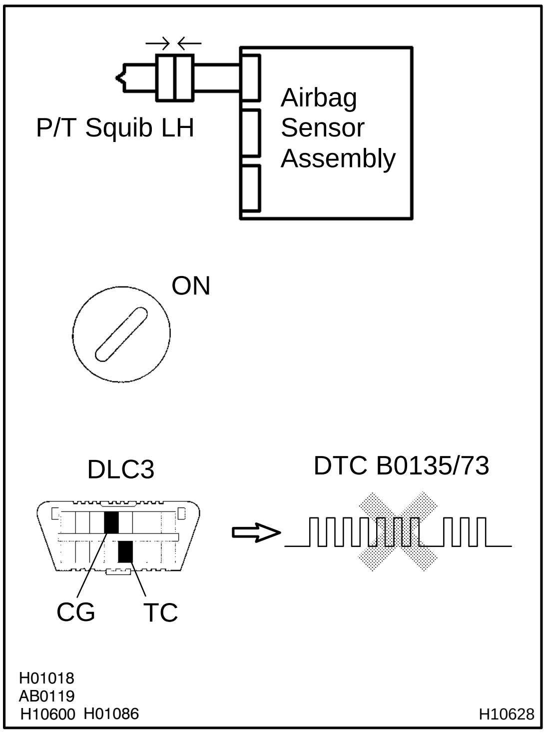
HINT:

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 the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the seat belt pretensioner LH (P/T squib LH) connector.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

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 (P/T squib 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.

DI6PO-16

DTC	B0136/74	Open in P/T Squib LH Circuit

CIRCUIT DESCRIPTION

The P/T squib LH circuit consists of the airbag sensor assembly and the 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-3 .
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 in P/T squib LH circuit ★P/T squib LH malfunction ★Airbag sensor assembly malfunction	★Seat belt pretensioner LH (P/T squib LH) ★Airbag sensor assembly ★Floor No. 1 wire

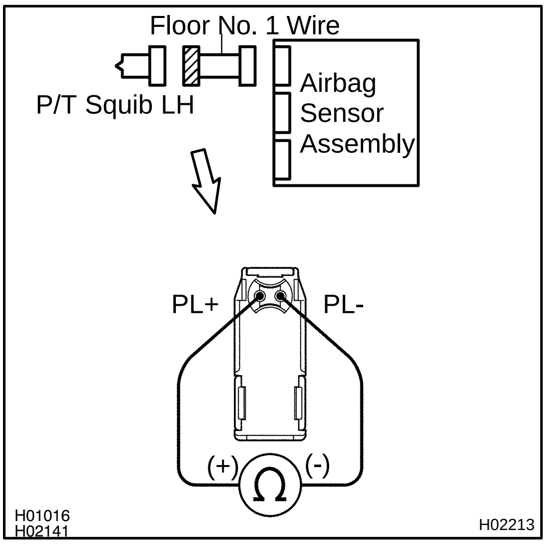
WIRING DIAGRAM

See page DI-790 .

INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-923).

2	Check floor No. 1 wire (P/T squib LH circuit).



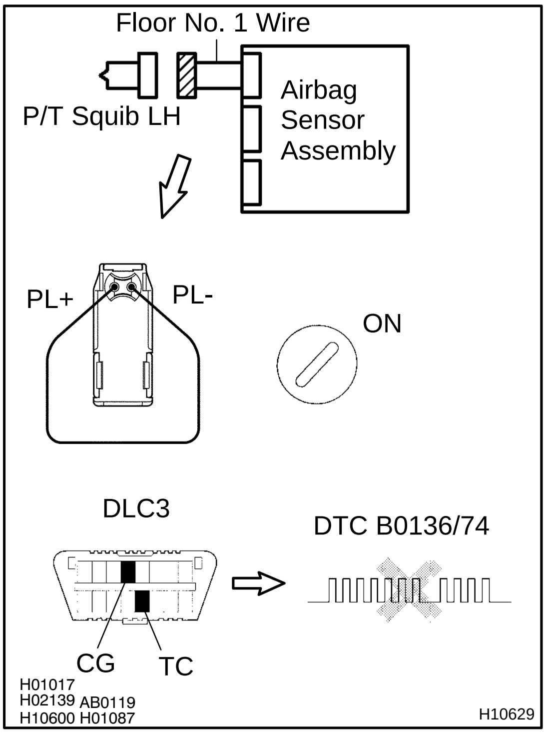
CHECK:
Measure the resistance between PL+ and PL- of the floor No. 1 wire connector on the seat belt pretensioner LH (P/T squib LH) side.

OK:
Resistance: Below 1 Ω

NG	Repair or replace floor No. 1 wire.

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 floor No. 1 wire connector on the seat belt pretensioner LH (P/T squib LH) side.

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

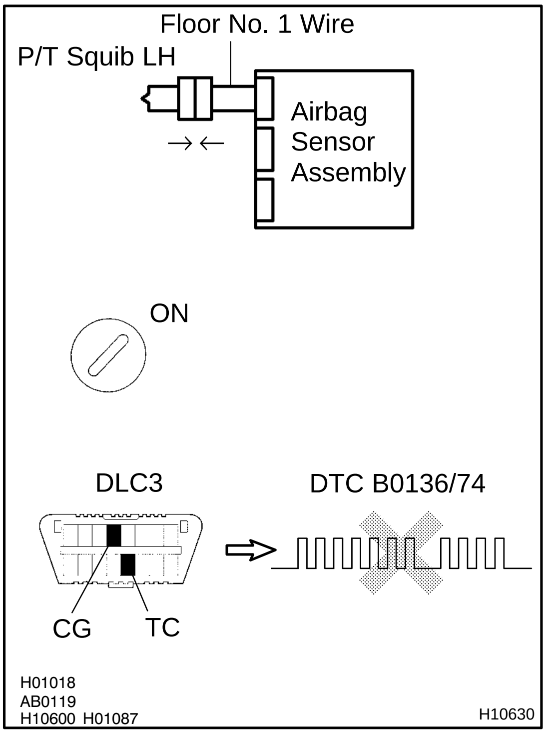
DTC B0136/74 is not output.

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 the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the seat belt pretensioner LH (P/T squib LH) connector.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

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 (P/T squib 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.

DI6PP-16

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 the 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-3 .
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 in P/T squib LH circuit (to ground) ★P/T squib LH malfunction ★Airbag sensor assembly malfunction	★Seat belt pretensioner LH (P/T squib LH) ★Airbag sensor assembly ★Floor No. 1 wire

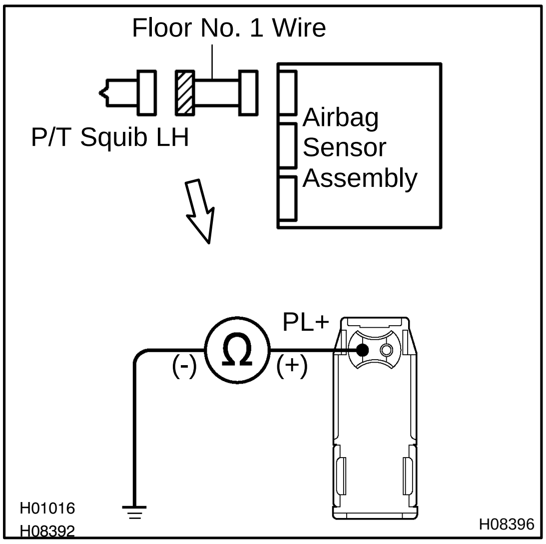
WIRING DIAGRAM

See page DI-790 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 1 wire (P/T squib LH circuit).**



CHECK:
Measure the resistance between the body ground and PL+ of the floor No. 1 wire connector on the seat belt pretensioner LH (P/T squib LH) side.

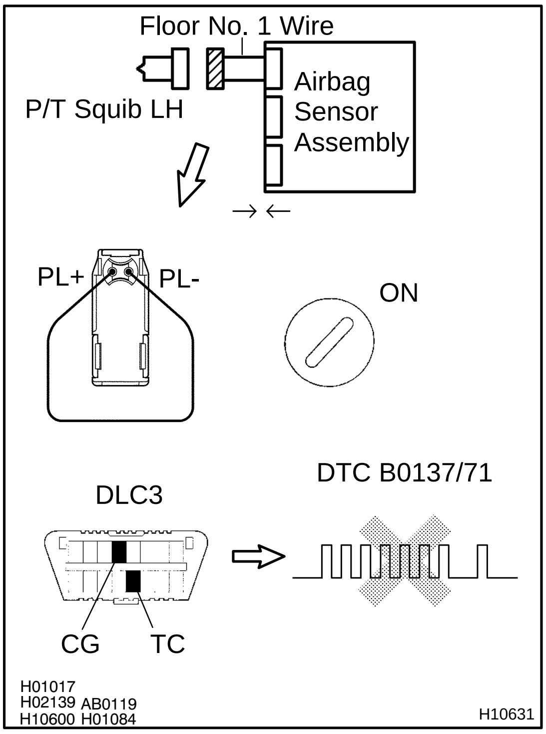
OK:

Resistance: 1 MΩ or Higher

NG	**Repair or replace floor No. 1 wire.**

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 floor No. 1 wire connector on the seat belt pretensioner LH (P/T squib LH) side.

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B0137/71 is not output.

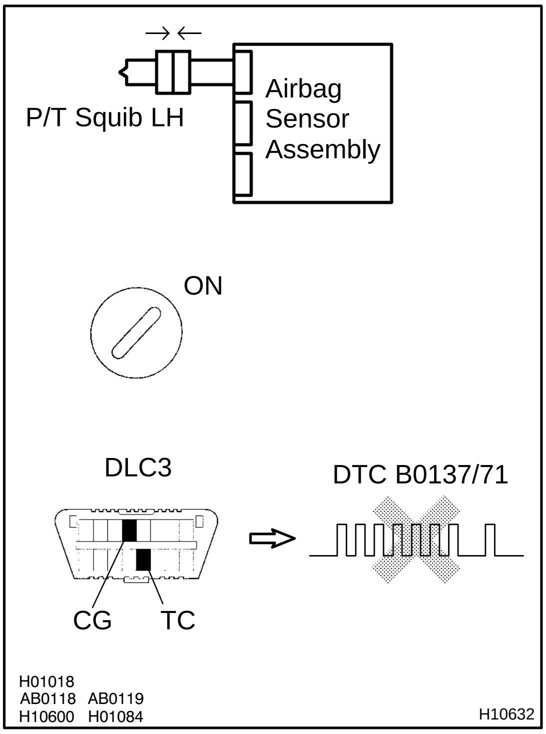
HINT:

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 the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the seat belt pretensioner LH (P/T squib LH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:
(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 (P/T squib 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.

DI6PQ-16

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-3 .
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 in P/T squib LH circuit (to B+) ★P/T squib LH malfunction ★Airbag sensor assembly malfunction	★Seat belt pretensioner LH (P/T squib LH) ★Airbag sensor assembly ★Floor No. 1 wire

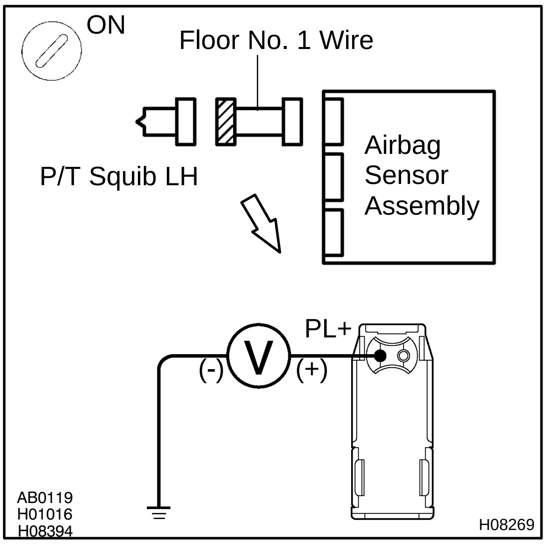
WIRING DIAGRAM

See page DI-790 .

INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-923).

2	Check floor No. 1 wire (P/T squib LH circuit).



PREPARATION:
Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

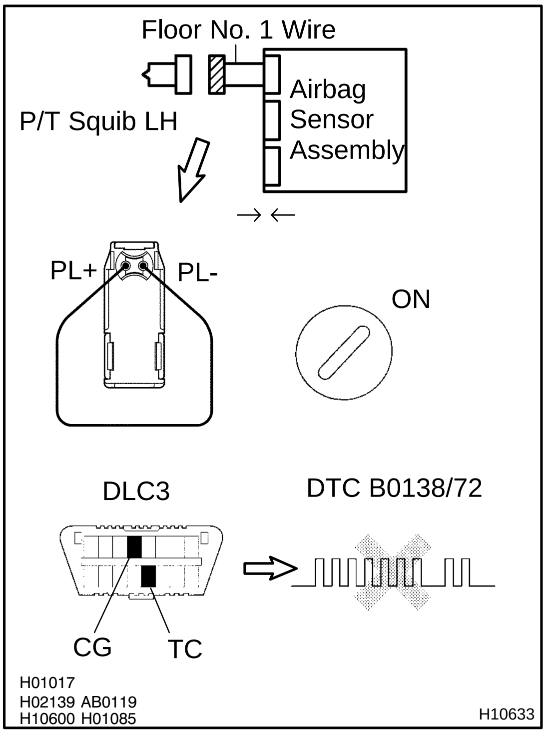
CHECK:
(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and PL+ of the floor No. 1 wire connector on the seat belt pretensioner LH (P/T squib LH) side.

OK:
Voltage: Below 1 V

NG	Repair or replace floor No. 1 wire.

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 floor No. 1 wire connector on the seat belt pretensioner LH (P/T squib LH) side.

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

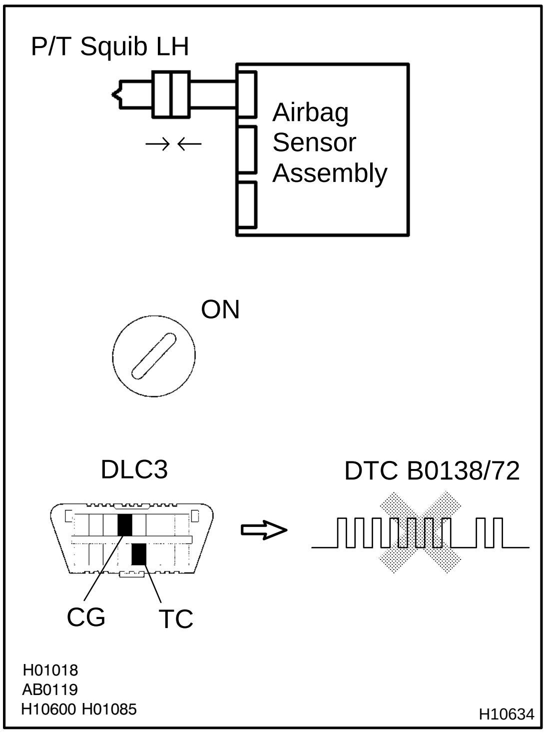
DTC B0138/72 is not output.

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 the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the seat belt pretensioner LH (P/T squib LH) connector.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

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 (P/T squib 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.

DI6PR-15

DTC	B1100/31	Airbag Sensor Assembly Malfunction

CIRCUIT DESCRIPTION

The airbag sensor assembly consists of the 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.

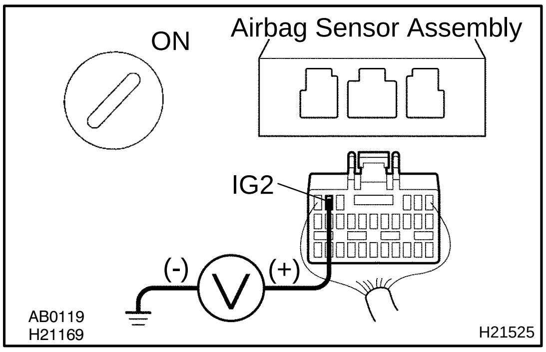
DTC No.	DTC Detecting Condition	Trouble Area
B1100/31	★Airbag sensor assembly malfunction	★Airbag sensor assembly

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-923).**

2	**Check airbag sensor assembly.**

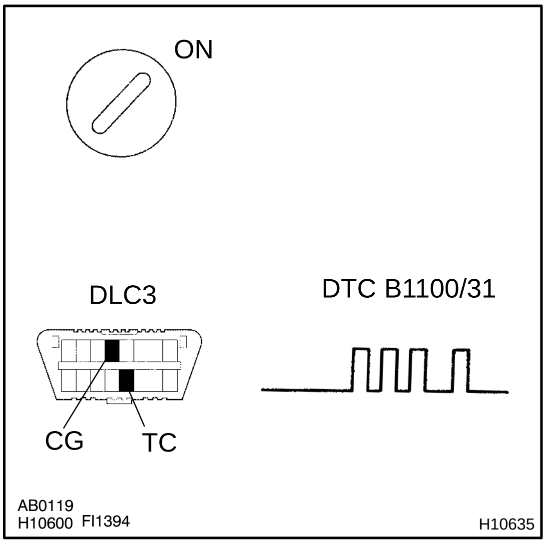


PREPARATION:
Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
CHECK:
(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and IG2 of the dash wire connector on the airbag sensor assembly side.
OK:
Voltage: 10 - 14 V

NG	**Check that an abnormality occurs on the battery and charging system.**

OK

3	**Is DTC B1100/31 output again?**



PREPARATION:

Clear the DTC (See page DI-692).

CHECK:

(a) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(b) Turn the ignition switch to ON, and wait at least for 10 seconds.

(c) Repeat operation in step (a) and (b) at least 5 times.

(d) Check the DTC (See page DI-692).

OK:

DTC B1100/31 is output.

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-26).**

YES

Replace airbag sensor assembly.

DIB3S-01

DTC	B1135/24	Half Connection in Airbag Sensor Assembly Connector

CIRCUIT DESCRIPTION

The airbag sensor assembly detects partial connection of connector.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B1135/24 is recorded when the airbag sensor assembly detects an open in the electrical connection check mechanism of the airbag sensor connector or in the airbag sensor circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1135/24	★Malfunction of electrical connection check mechanism of airbag sensor assembly connector ★Airbag sensor assembly malfunction	★Electrical connection check mechanism ★Airbag sensor assembly

INSPECTION PROCEDURE

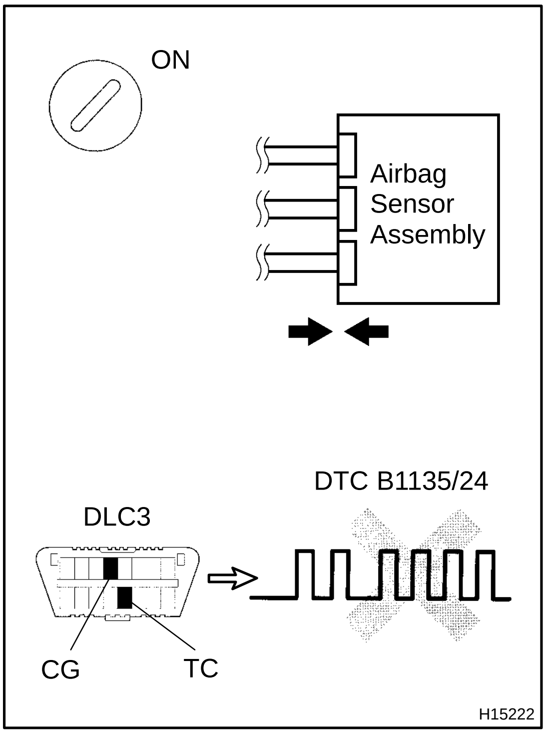
1	**Are connectors of airbag sensor assembly properly connected?**

NO → **Connect connectors.**

YES

2	**Prepare for inspection (See step 1 on page DI-923).**

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connectors to the airbag sensor assembly.

(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

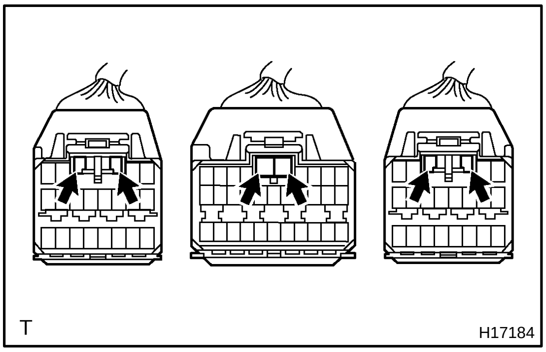
DTC B1135/24 is not output.

HINT:
Codes other than code B1135/24 may be output at this time, but they are not relevant to this check.

OK	**Complete.**

NG

4	**Perform a visual check of the disconnection detection pin.**



OK:

No deformation is identified.

HINT:
Compare it with the other 2 connector pins.

NG	**Repair or replace wire harness.**

OK

Replace airbag sensor assembly.

DIB3T-01

DTC	B1140/32	Side and Curtain Shield Airbag Sensor Assembly RH Malfunction

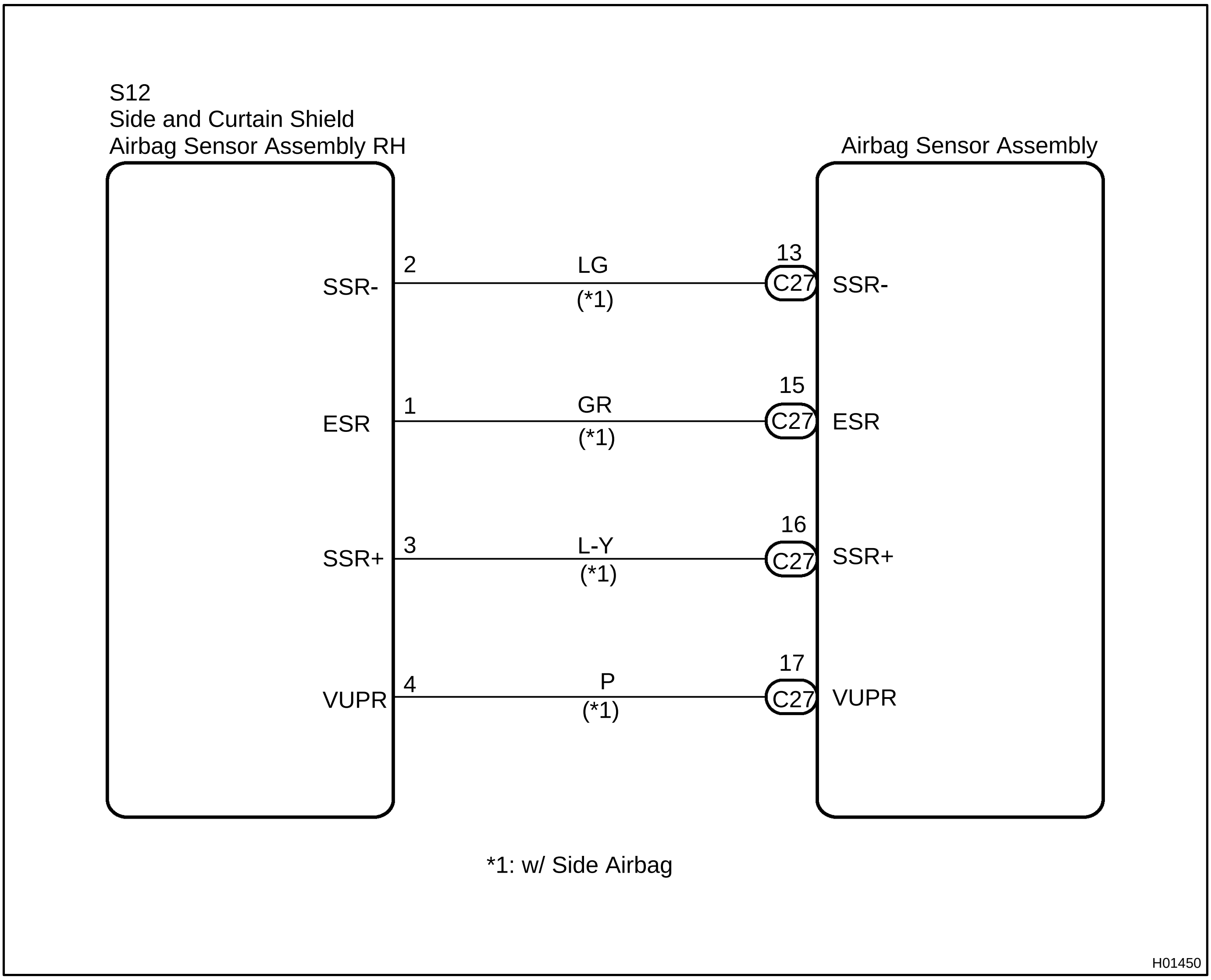
CIRCUIT DESCRIPTION

The side and curtain shield 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 detects diagnosis system malfunction.
DTC B1140/32 is recorded when occurrence of a malfunction in the side and curtain shield airbag sensor assembly RH is detected.

DTC No.	DTC Detecting Condition	Trouble Area
B1140/32	★Side and curtain shield airbag sensor assembly RH malfunction	★Side and curtain shield airbag sensor assembly RH ★Floor No. 2 wire ★Airbag sensor assembly

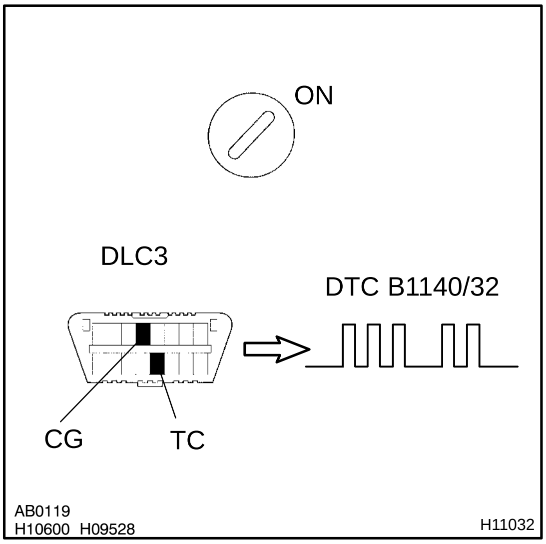
HINT:
DTC B1140/32 is indicated only for the vehicle equipped with the side airbag.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Is DTC B1140/32 output?



CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1140/32 is output.

HINT:

Codes other than code B1140/32 may be output at this time, but they are not relevant to this check.

NO	**The malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.**

YES

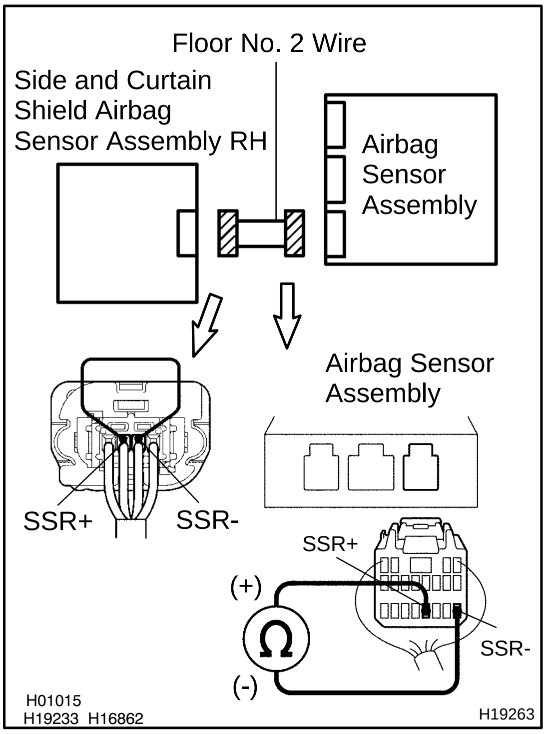
2	Is connector of side and curtain shield airbag sensor assembly RH properly connected?

NO	**Connect connector.**

YES

3	Prepare for inspection (See step 1 on DI-923).

4	**Check floor No. 2 wire.**



PREPARATION:

Using a service wire, connect SSR+ and SSR- of the floor No. 2 wire connector on the side and curtain shield airbag sensor assembly RH side.

CHECK:

Measure the resistance between SSR+ and SSR- of the floor No. 2 wire connector on the airbag sensor assembly side.

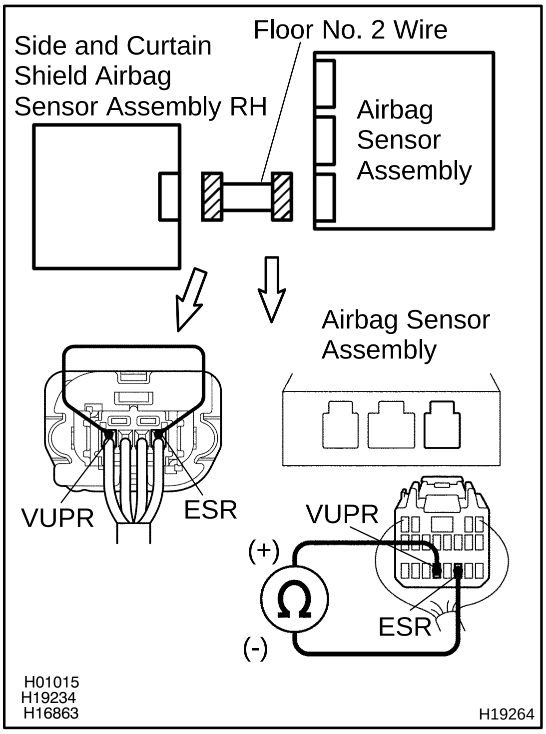
OK:

Resistance: Below 1 Ω

NG	**Repair or replace floor No. 2 wire.**

OK

5	**Check floor No. 2 wire.**



PREPARATION:

Using a service wire, connect VUPR and ESR of the floor No. 2 wire connector on the side and curtain shield airbag sensor assembly RH side.

CHECK:

Measure the resistance between VUPR and ESR of the floor No. 2 wire connector on the airbag sensor assembly side.

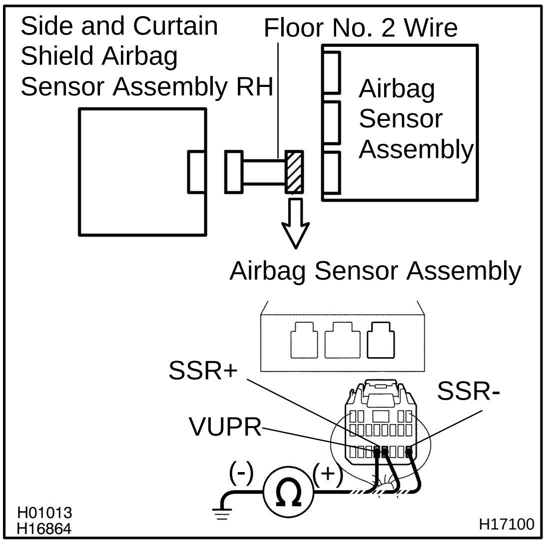
OK:

Resistance: Below 1 Ω

NG	**Repair or replace floor No. 2 wire.**

OK

6	**Check floor No. 2 wire (to ground).**



CHECK:

Measure the resistance between the body ground and each of VUPR, SSR+ and SSR- of the floor No. 2 wire connector on the airbag sensor assembly side.

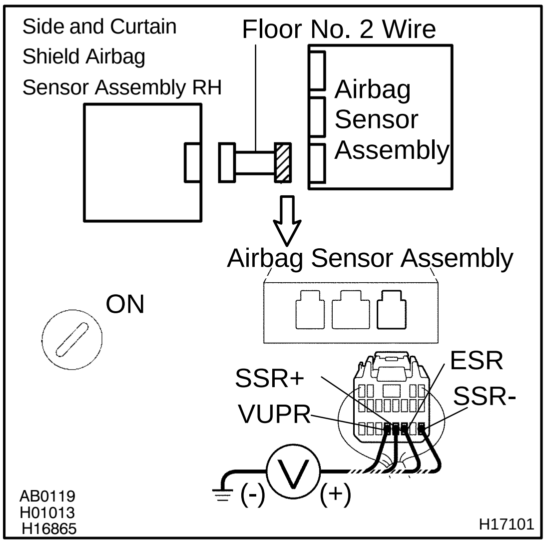
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace floor No. 2 wire.**

OK

7	**Check floor No. 2 wire (to B+).**



PREPARATION:

Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and each of VUPR, SSR+, SSR- and ESR of the floor No. 2 wire connector on the airbag sensor assembly side.

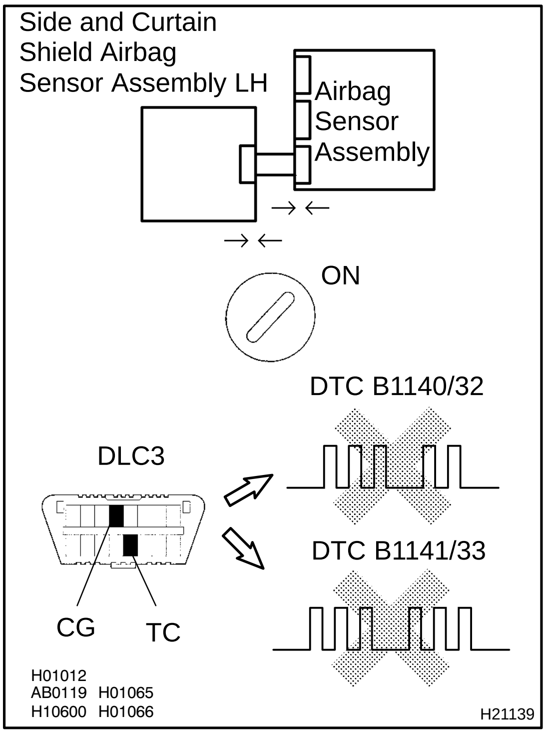
OK:

Voltage: Below 1 V

NG → **Repair or replace floor No. 2 wire.**

OK

8	**Check airbag sensor assembly.**



PREPARATION:

(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the connector to the airbag sensor assembly.
(d) Change the side and curtain shield airbag sensor assembly LH position with RH position.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

Neither DTC B1140/32 nor B1141/33 are not output.

HINT:
Codes other than code B1140/32 or B1141/33 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly (DTC B1140/32 is output).**

NG	**Replace side and curtain shield airbag sensor assembly RH (DTC B1141/33 is output).**

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.

DIB3U-01

DTC	B1141/33	Side and Curtain Shield Airbag Sensor Assembly LH Malfunction

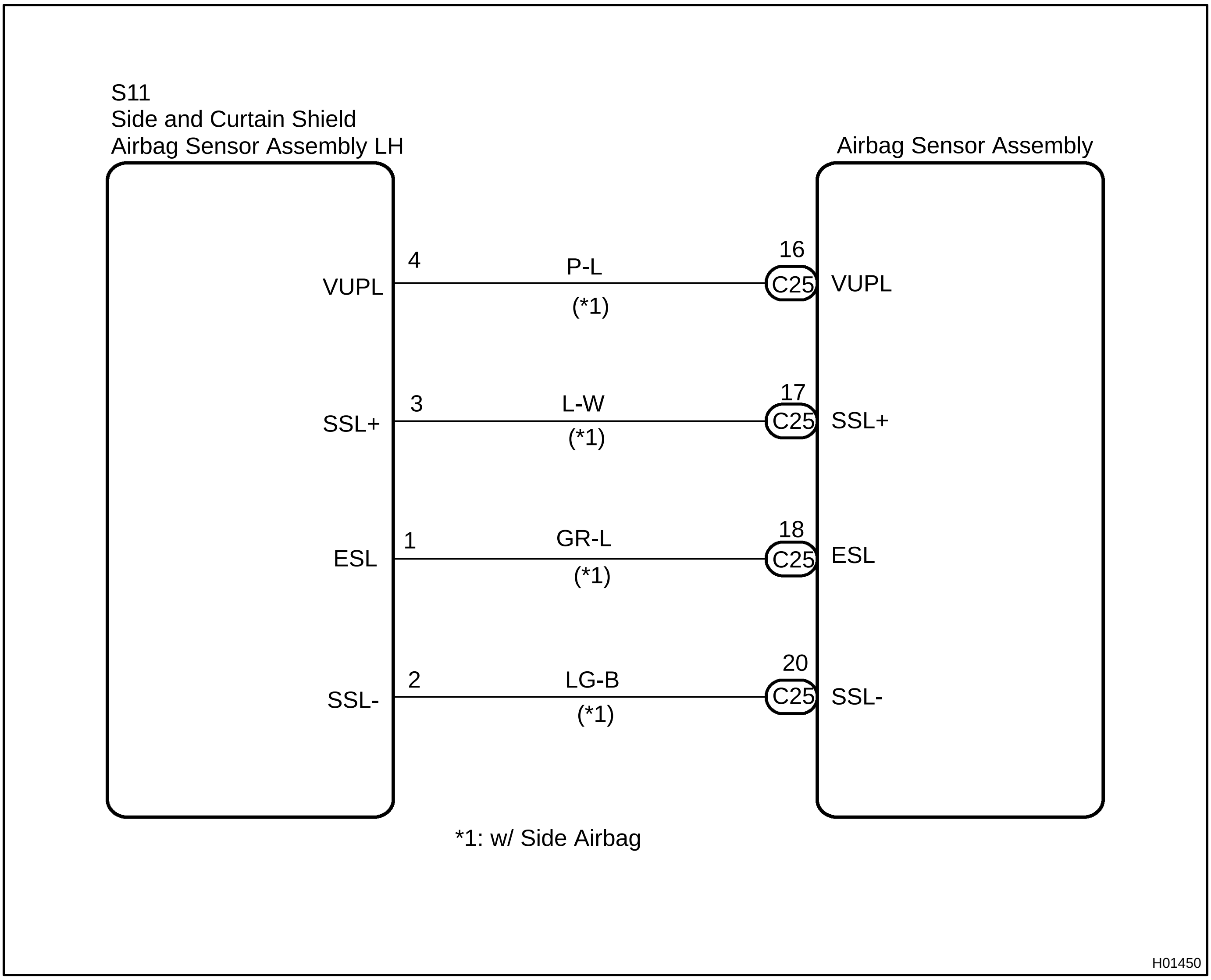
CIRCUIT DESCRIPTION

The side and curtain shield 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 detects diagnosis system malfunction.
DTC B1141/33 is recorded when occurrence of a malfunction in the side and curtain shield airbag sensor assembly LH is detected.

DTC No.	DTC Detecting Condition	Trouble Area
B1141/33	★Side and curtain shield airbag sensor assembly LH malfunction	★Side and curtain shield airbag sensor assembly LH ★Floor No. 1 wire ★Airbag sensor assembly

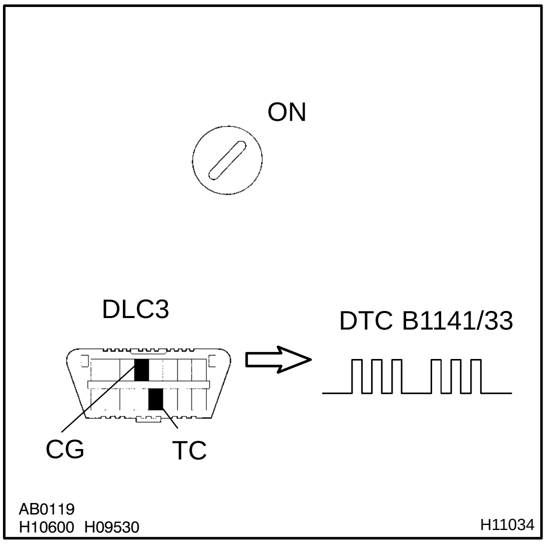
HINT:
DTC B1141/33 is indicated only for the vehicle equipped with the side airbag.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Is DTC B1141/33 output?



CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B1141/33 is output.

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

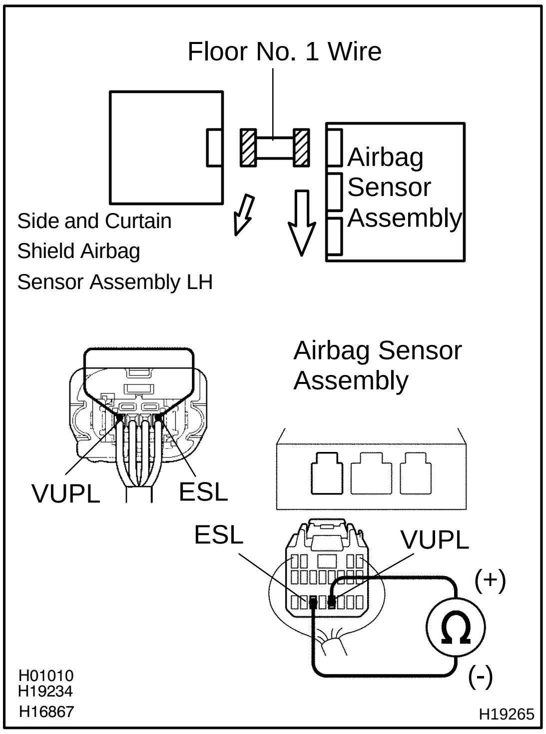
2	Is connector of side and curtain shield airbag sensor assembly LH properly connected?

NO → **Connect connector.**

YES

3	Prepare for inspection (See step 1 on page DI-923).

4	**Check floor No. 1 wire.**



PREPARATION:

Using a service wire, connect VUPL and ESL of the floor No. 1 wire connector on the side and curtain shield airbag sensor assembly LH side.

CHECK:

Measure the resistance between VUPL and ESL of the floor No. 1 wire connector on the airbag sensor assembly side.

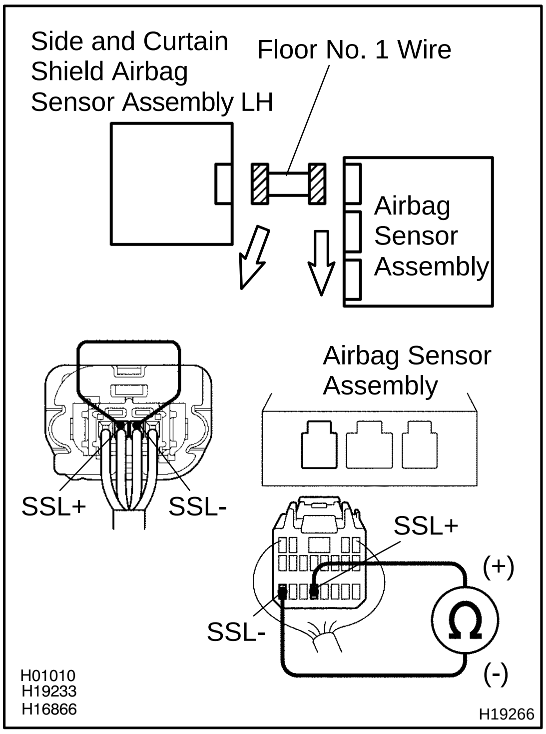
OK:

Resistance: Below 1 Ω

NG	**Repair or replace floor No. 1 wire.**

OK

5	**Check floor No. 1 wire.**



PREPARATION:

Using a service wire, connect SSL+ and SSL- of the floor No. 1 wire connector on the side and curtain shield airbag sensor assembly LH side.

CHECK:

Measure the resistance between SSL+ and SSL- of the floor No. 1 wire connector on the airbag sensor assembly side.

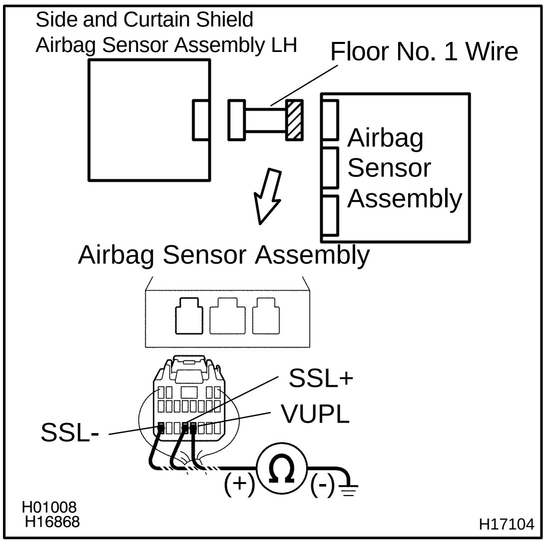
OK:

Resistance: Below 1 Ω

NG	Repair or replace floor No. 1 wire.

OK

6	**Check floor No. 1 wire (to ground).**



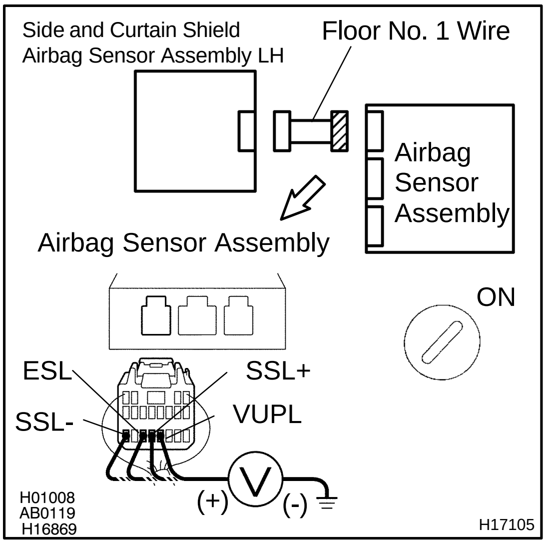
CHECK:
Measure the resistance between the body ground and each of VUPL, SSL+ and SSL- of the floor No. 1 wire connector on the airbag sensor assembly side.

OK:
Resistance: 10 kΩ or Higher

NG	**Repair or replace floor No. 1 wire.**

OK

7	**Check floor No. 1 wire (to B+).**



PREPARATION:
Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

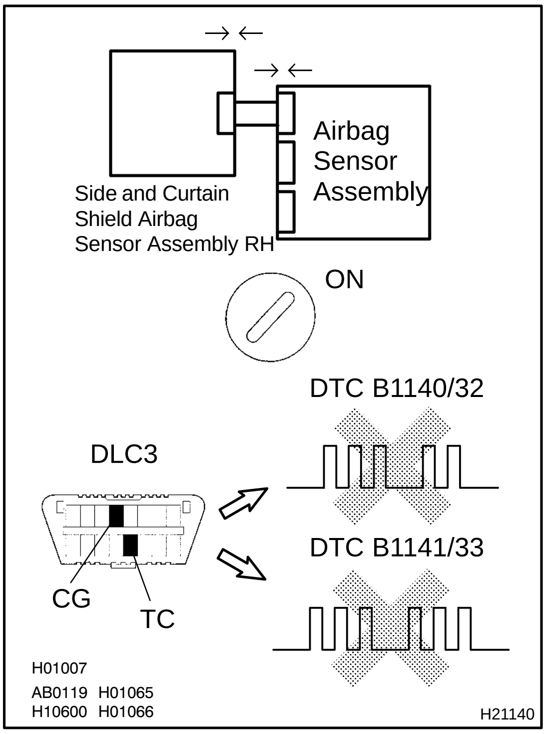
CHECK:
(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and each of VUPL, SSL+, SSL- and ESL of the floor No. 1 wire connector on the airbag sensor assembly side.

OK:
Voltage: Below 1 V

NG	**Repair or replace floor No. 1 wire.**

OK

8	**Check airbag sensor assembly.**



PREPARATION:

(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the connector to the airbag sensor assembly.
(d) Change the side and curtain shield airbag sensor assembly RH position with LH position.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

Neither DTC B1141/33 nor B1140/32 are not output.

HINT:
Codes other than code B1141/33 or B1140/32 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly (DTC B1141/33 is output).**

NG	**Replace side and curtain shield airbag sensor assembly LH (DTC B1140/32 is output).**

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.

DIB3V-01

DTC	B1148/36	Front Airbag Sensor RH Malfunction

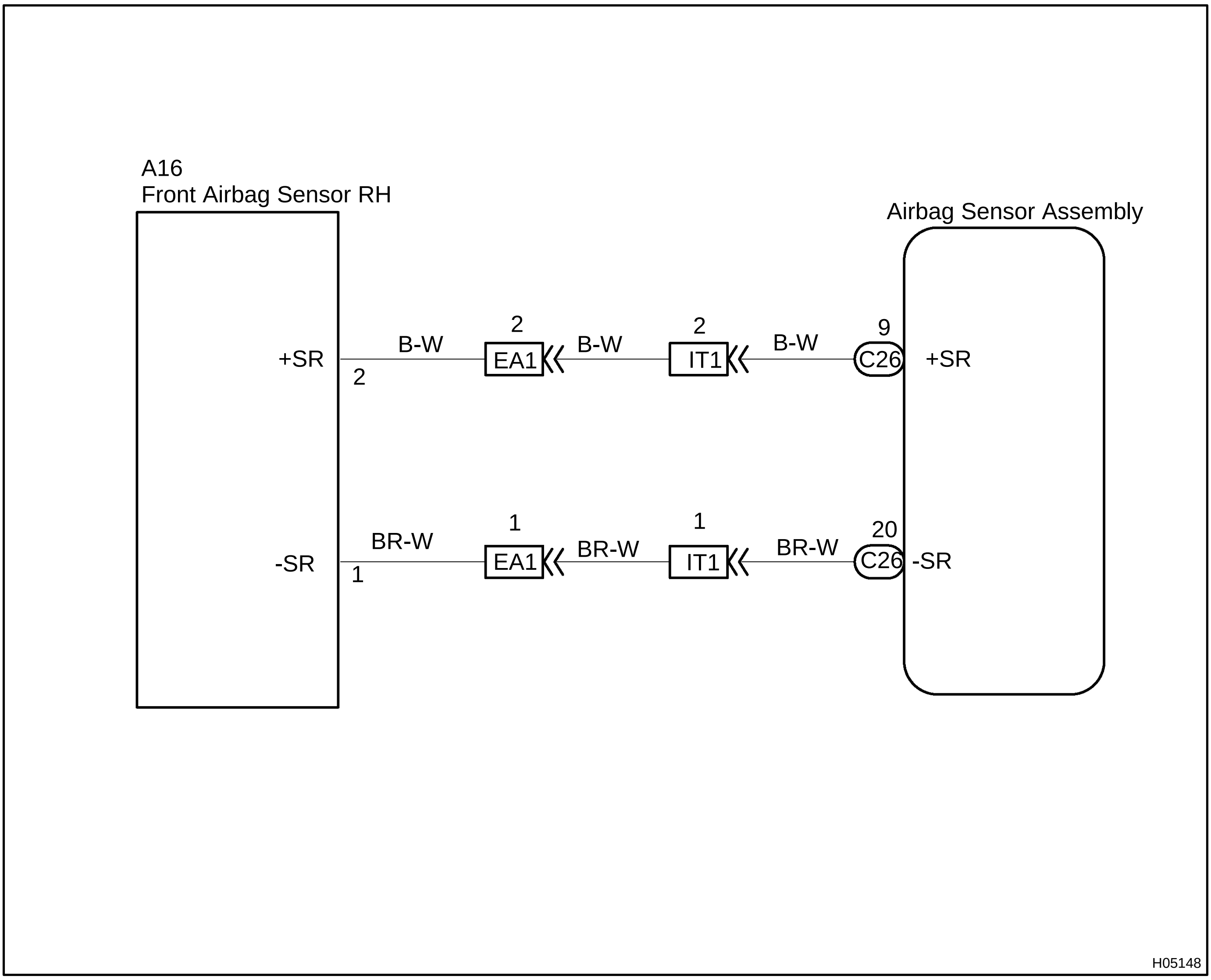
CIRCUIT DESCRIPTION

The front airbag sensor RH circuit consists of the diagnosis circuit and frontal deceleration sensor, etc.
If receives signals from the frontal deceleration sensor, judges whether or not the SRS must be activated, and detects diagnosis system malfunction.
DTC B1148/36 is recorded when occurrence of a malfunction in the front airbag sensor RH is detected.

DTC No.	DTC Detecting Condition	Trouble Area
B1148/36	★Front airbag sensor RH malfunction	★Front airbag sensor RH ★Airbag sensor assembly ★Dash wire ★Engine room No. 2 wire ★Engine room main wire

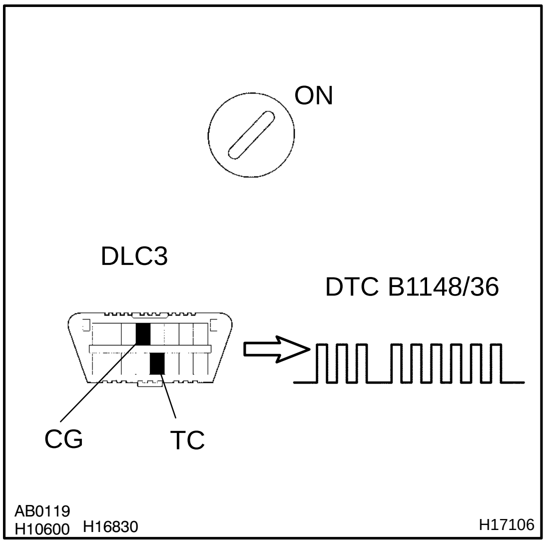
HINT:
DTC B1148/36 is indicated only for the vehicle equipped with the side airbag and without the side airbag (dual stage airbag).

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Is DTC B1148/36 output?



CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1148/36 is output.

HINT:

Codes other than code B1148/36 may be output at this time, but they are not relevant to this check.

NO → **The malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.**

YES

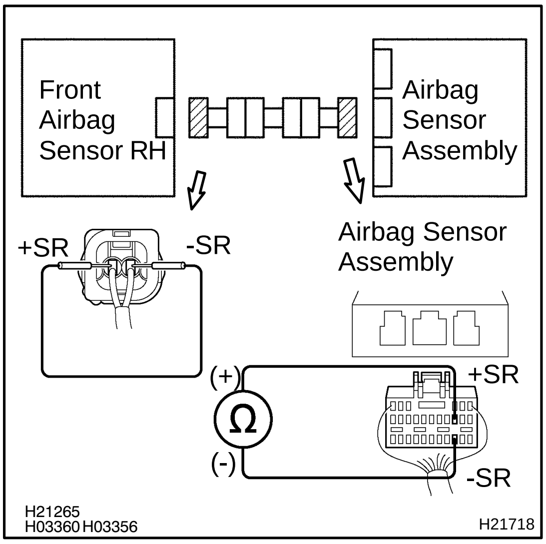
2	Is connector of front airbag sensor RH properly connected?

No → **Connect connector.**

YES

3	Prepare for inspection (See step 1 on DI-923).

4	Check wire harness.

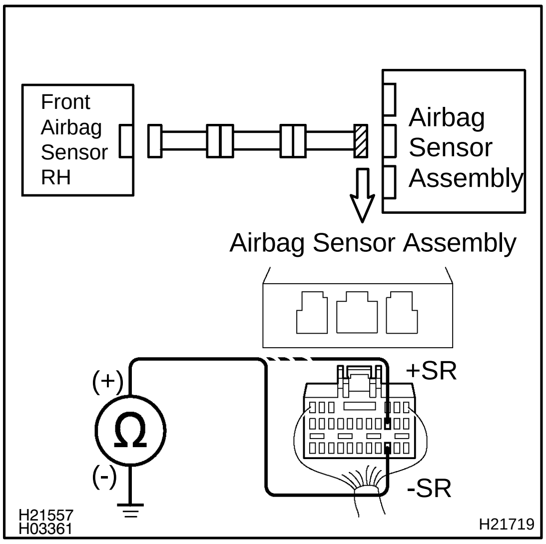


PREPARATION:
Using a service wire, connect +SR and -SR on the front airbag sensor RH side between the front airbag sensor RH and the airbag sensor assembly.
CHECK:
Measure the resistance between +SR and -SR on the airbag sensor assembly side between the front airbag sensor RH and the airbag sensor assembly.
OK:
Resistance: Below 1 Ω

NG	Go to step 8.

OK

5	Check wire harness (to ground).

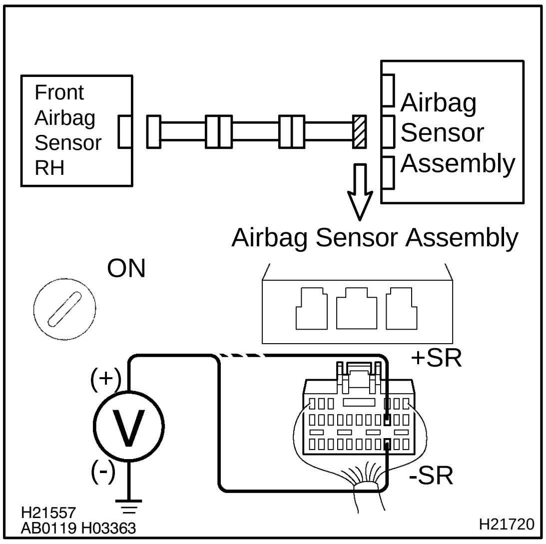


CHECK:
Measure the resistance between the body ground and each of +SR and -SR on the airbag sensor assembly side between the front airbag sensor RH and the airbag sensor assembly.
OK:
Resistance: 1 MΩ or Higher

NG	Go to step 10.

OK

6	Check wire harness (to B+).



PREPARATION:

Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and each of +SR and -SR on the airbag sensor assembly side between the front airbag sensor RH and the airbag sensor assembly.

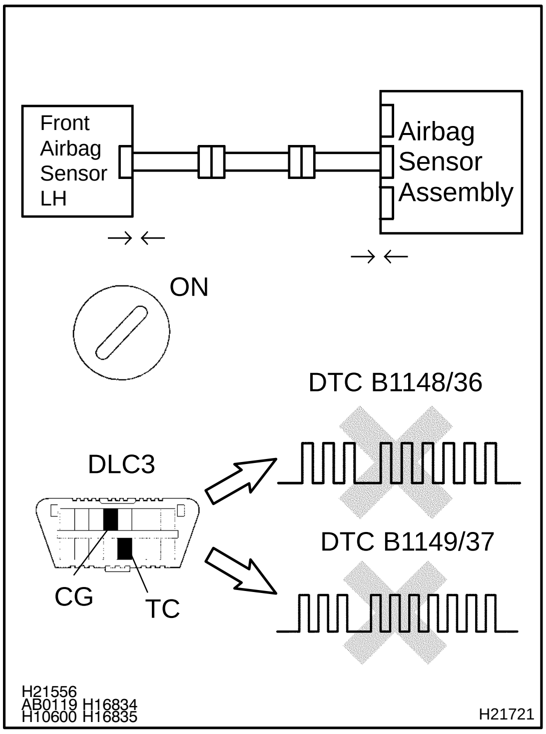
OK:

Voltage: Below 1 V

NG	Go to step 12.

OK

7	Check airbag sensor assembly.



PREPARATION:

(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the connector to the airbag sensor assembly.
(d) Change the front airbag sensor LH position with RH position.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

Neither DTC B1148/36 nor B1149/37 are not output.

HINT:
Codes other than code B1148/36 or B1149/37 may be output at this time, but they are not relevant to this check.

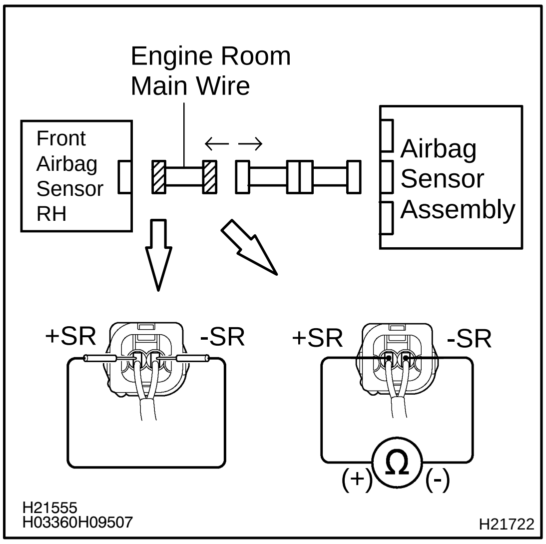
NG	Replace airbag sensor assembly (DTC B1148/36 is output).

NG	Replace front airbag sensor RH (DTC B1149/37 is output).

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.**



PREPARATION:

(a) Disconnect the engine room main wire connector on the airbag sensor assembly side.

(b) Using a service wire, connect +SR and -SR of the engine room main wire connector on the front airbag sensor RH side.

CHECK:

Measure the resistance between +SR and -SR of the engine room main wire connector on the airbag sensor assembly side.

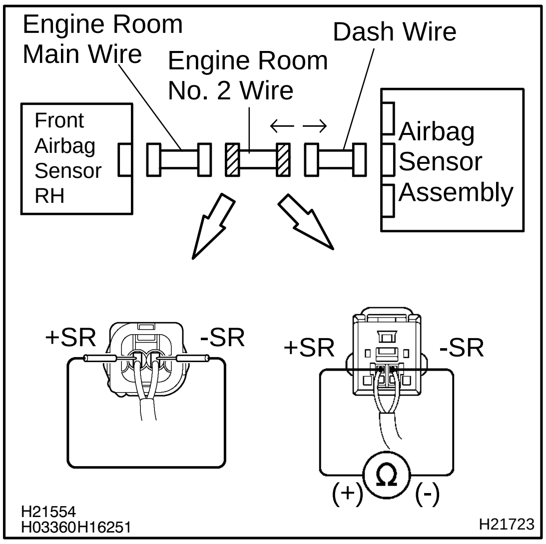
OK:

Resistance: Below 1 Ω

NG	**Repair or replace engine room main wire.**

OK

9	**Check engine room No. 2 wire.**



PREPARATION:

(a) Disconnect the engine room No. 2 wire connector from the dash wire.

(b) Using a service wire, connect +SR and -SR of the engine room No. 2 wire connector on the engine room main wire side.

CHECK:

Measure the resistance between +SR and -SR of the engine room No. 2 wire connector on the dash wire side.

OK:

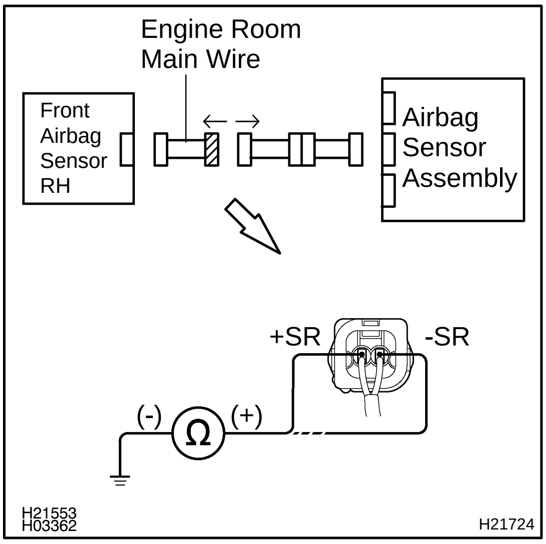
Resistance: Below 1 Ω

NG	**Repair or replace engine room No. 2 wire.**

OK

Repair or replace dash wire.

10	Check engine room main wire (to ground).



PREPARATION:

Disconnect the engine room main wire connector on the airbag sensor assembly side.

CHECK:

Measure the resistance between the body ground and each of +SR and -SR of the engine room main wire connector on the airbag sensor assembly side.

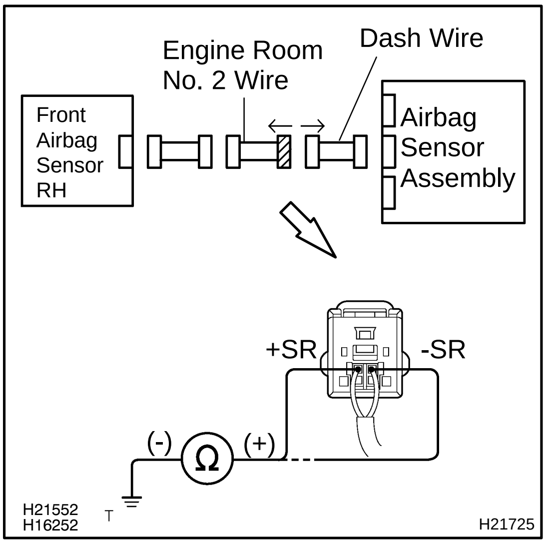
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace engine room main wire.**

OK

11	Check engine room No. 2 wire (to ground).



PREPARATION:

Disconnect the engine room No. 2 wire connector from the dash wire.

CHECK:

Measure the resistance between the body ground and each of +SR and -SR of the engine room No. 2 wire connector on the dash wire side.

OK:

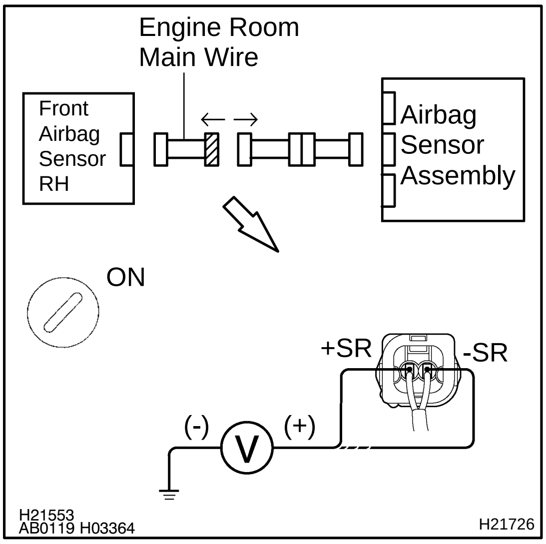
Resistance: 1 MΩ or Higher

NG → **Repair or replace engine room No. 2 wire.**

OK

Repair or replace dash wire.

12	Check engine room main wire (to B+).



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Disconnect the engine room main wire connector on the airbag sensor assembly side.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and each of +SR and -SR of the engine room main wire connector on the airbag sensor assembly side.

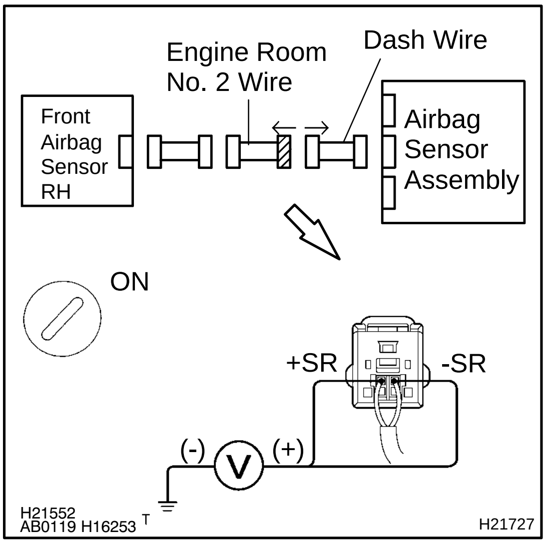
OK:

Voltage: Below 1 V

NG	Repair or replace engine room main wire.

OK

13	Check engine room No. 2 wire (to B+).



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Disconnect the engine room No. 2 wire connector from the dash wire.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and each of +SR and -SR of the engine room No. 2 wire connector on the dash wire side.

OK:

Voltage: Below 1 V

NG	Repair or replace engine room No. 2 wire.

OK

Repair or replace dash wire.

DIB3W-01

DTC	B1149/37	Front Airbag Sensor LH Malfunction

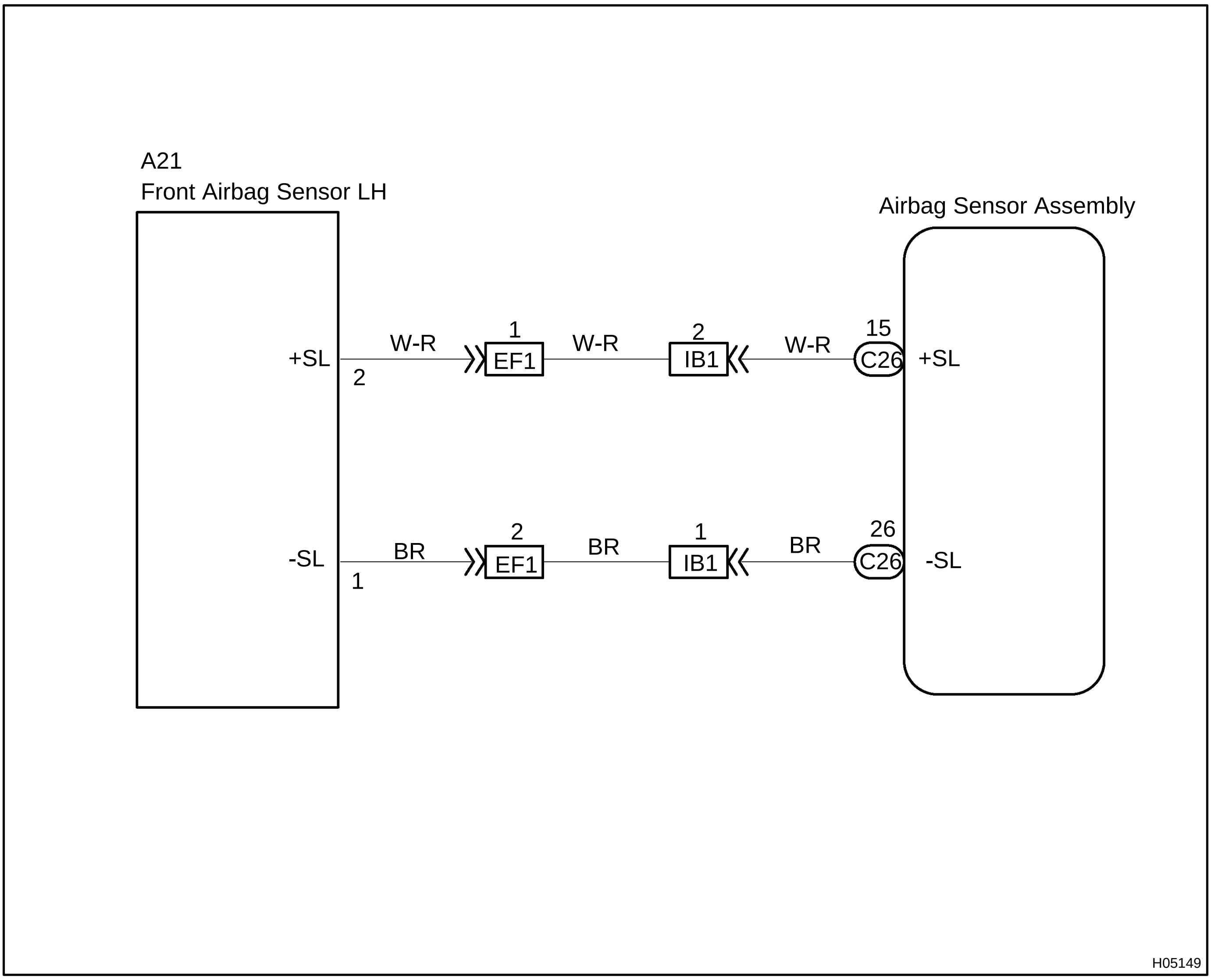
CIRCUIT DESCRIPTION

The front airbag sensor LH circuit consists of the diagnosis circuit and frontal deceleration sensor, etc.
If receives signals from the frontal deceleration sensor, judges whether or not the SRS must be activated, and detects diagnosis system malfunction.
DTC B1149/37 is recorded when malfunction is detected in the front airbag sensor LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1149/37	★Front airbag sensor LH malfunction	★Front airbag sensor LH ★Airbag sensor assembly ★Dash wire ★Engine room No. 2 wire ★Engine room main wire

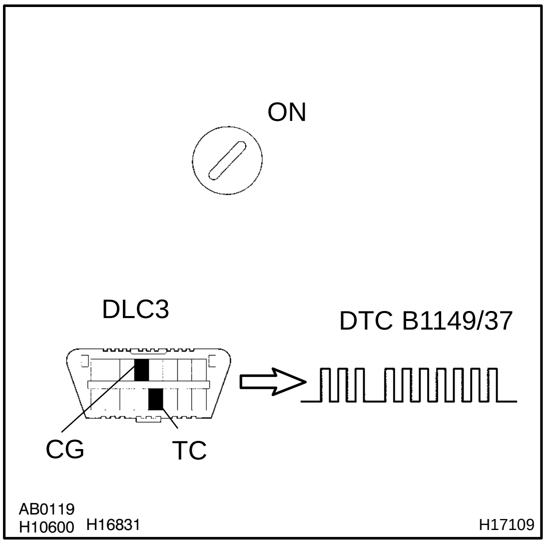
HINT:
DTC B1149/37 is indicated only for the vehicle equipped with the side airbag and without the side airbag (dual stage airbag).

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Is DTC B1149/37 output?**



CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1149/37 is output.

HINT:
Codes other than code B1149/37 may be output at this time, but they are not relevant to this check.

NO → **The malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.**

YES

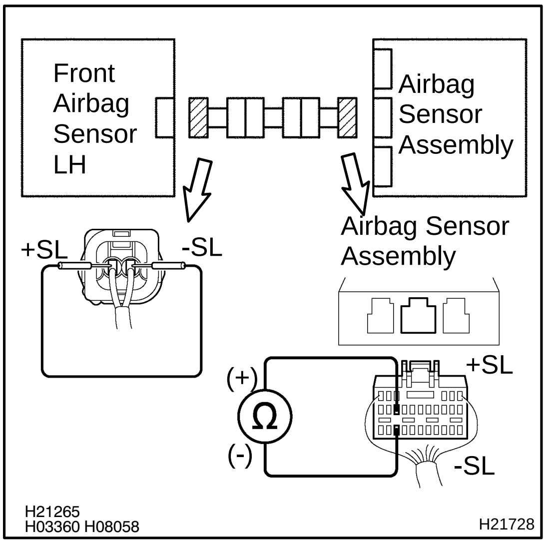
2	**Is connector of front airbag sensor LH properly connected?**

NO → **Connect connector.**

YES

3	**Prepare for inspection (See step 1 on page DI-923).**

4	Check wire harness.



PREPARATION:

Using a service wire, connect +SL and -SL on the front airbag sensor LH side between the airbag sensor assembly and the front airbag sensor LH.

CHECK:

Measure the resistance between +SL and - SL on the airbag sensor assembly side between the front airbag sensor LH and the airbag sensor assembly.

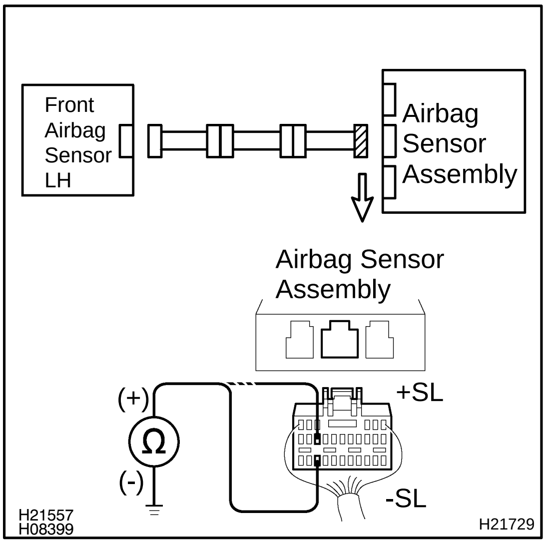
OK:

Resistance: Below 1 Ω

NG	Go to step 8.

OK

5	Check wire harness (to ground).



CHECK:

Measure the resistance between the body ground and each of +SL and -SL on the airbag sensor assembly side between the front airbag sensor LH and the airbag sensor assembly.

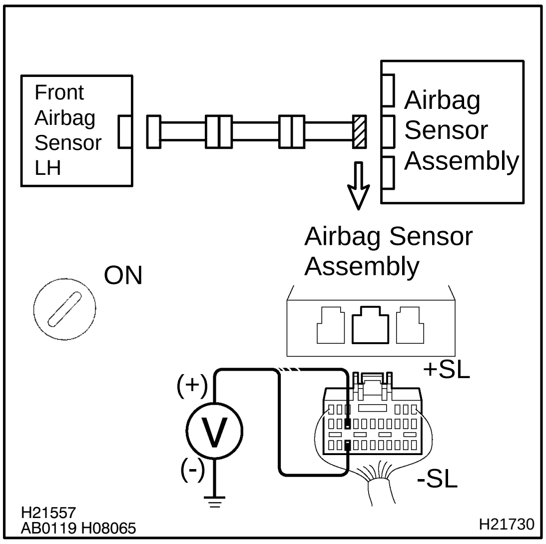
OK:

Resistance: 1 MΩ or Higher

NG	Go to step 10.

OK

6	Check wire harness (to B+).



PREPARATION:
Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

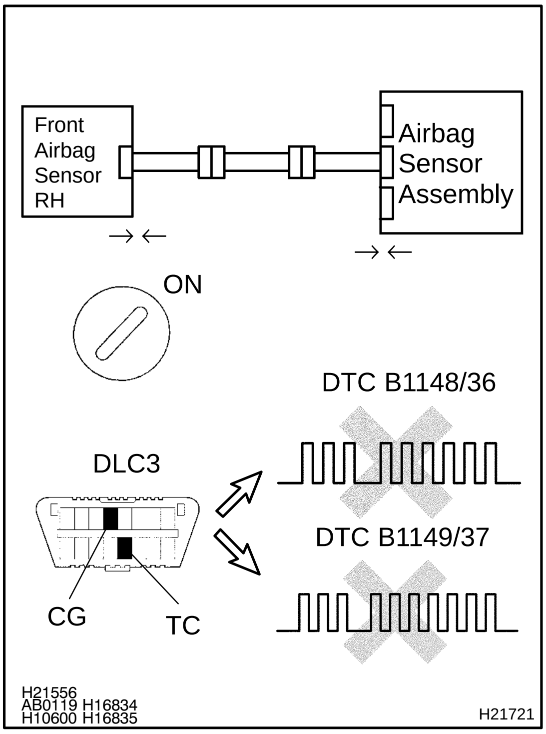
CHECK:
(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and each of +SL and -SL on the airbag sensor assembly side between the front airbag sensor LH and the airbag sensor assembly.

OK:
Voltage: Below 1 V

NG	Go to step 12.

OK

7	Check airbag sensor assembly.



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the connector to the airbag sensor assembly.

(d) Change the front airbag sensor RH position with LH position.

(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

Neither DTC B1148/36 nor B1149/37 not output.

HINT:
Codes other than code B1149/37 or B1148/36 may be output at this time, but they are not relevant to this check.

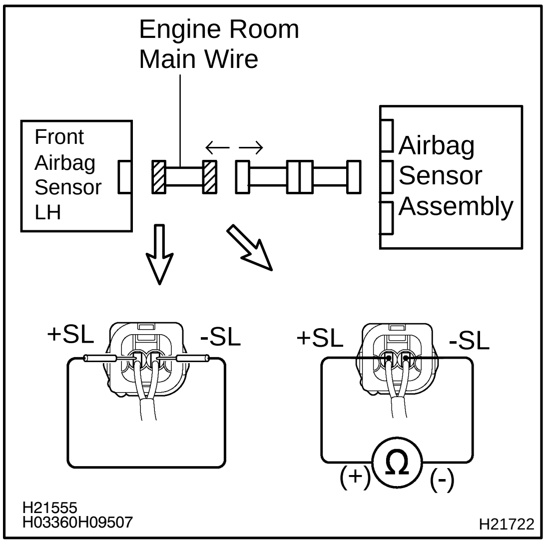
NG	Replace airbag sensor assembly (DTC B1149/37 is output).

NG	Replace front airbag sensor LH (DTC B1148/36 is output).

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.**



PREPARATION:

(a) Disconnect the engine room main wire connector on the airbag sensor assembly side.

(b) Using a service wire, connect +SL and -SL of the engine room main wire on the front airbag sensor LH side.

CHECK:

Measure the resistance between +SL and -SL of the engine room main wire connector on the airbag sensor assembly side.

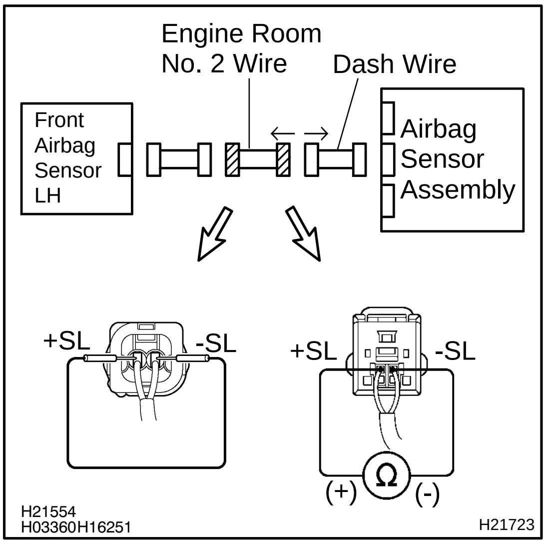
OK:

Resistance: Below 1 Ω

NG → **Repair or replace engine room main wire.**

OK

9	**Check engine room No. 2 wire.**



PREPARATION:

(a) Disconnect the engine room No. 2 wire connector from the dash wire.

(b) Using a service wire, connect +SL and -SL of the engine room No. 2 wire on the engine room main wire side.

CHECK:

Measure the resistance between +SL and -SL of the engine room No. 2 wire connector on the dash wire side.

OK:

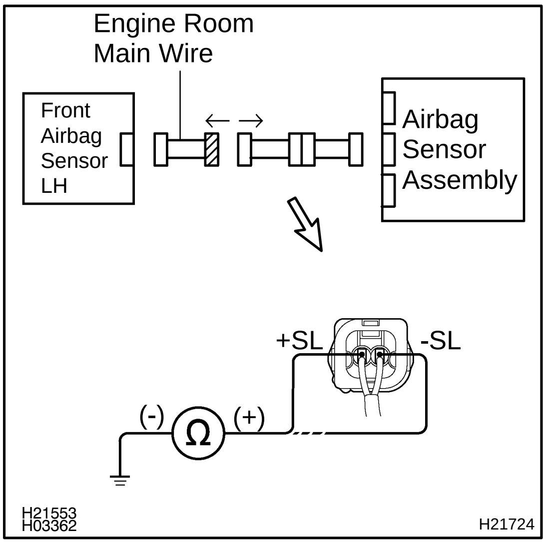
Resistance: Below 1 Ω

NG → **Repair or replace engine room No. 2 wire.**

OK

Repair or replace dash wire.

10	Check engine room main wire (to ground).



PREPARATION:
Disconnect the engine room main wire connector on the airbag sensor assembly side.

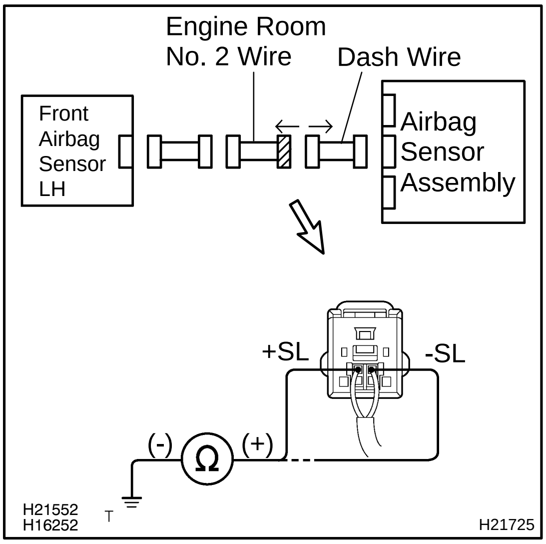
CHECK:
Measure the resistance between the body ground and each of +SL and -SL of the engine room main wire connector on the airbag sensor assembly side.

OK:
Resistance: 1 MΩ or Higher

NG → **Repair or replace engine room main wire.**

OK

11	Check engine room No. 2 wire (to ground).



PREPARATION:
Disconnect the engine room No. 2 wire connector from the dash wire.

CHECK:
Measure the resistance between the body ground and each of +SL and -SL of the engine room No. 2 wire connector on the dash wire side.

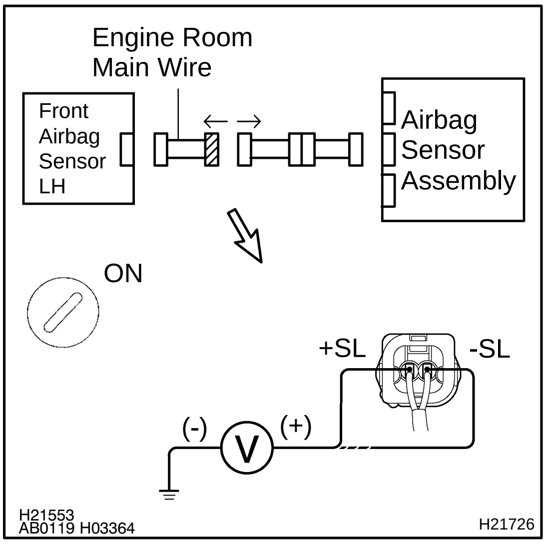
OK:
Resistance: 1 MΩ or Higher

NG → **Repair or replace engine room No. 2 wire.**

OK

Repair or replace dash wire.

12	Check engine room main wire (to B+).



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Disconnect the engine room main wire connector on the airbag sensor assembly side.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and each of +SL and -SL of the engine room main wire connector on the airbag sensor assembly side.

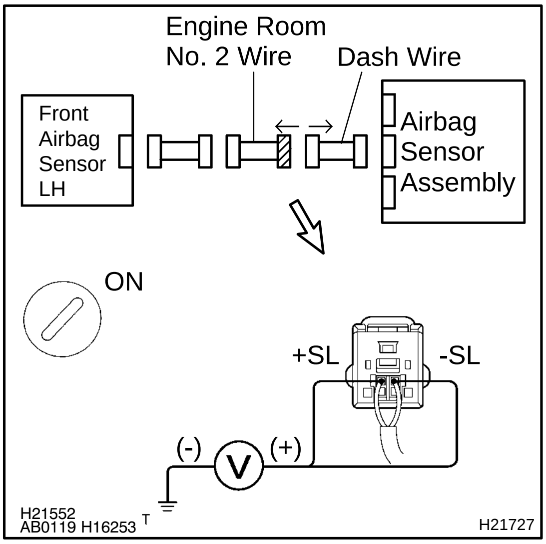
OK:

Voltage: Below 1 V

NG	Repair or replace engine room main wire.

OK

13	Check engine room No. 2 wire (to B+).



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Disconnect the engine room No. 2 wire connector from the dash wire.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and each of +SL and -SL of the engine room No. 2 wire connector on the dash wire side.

OK:

Voltage: Below 1 V

NG	Repair or replace engine room No. 2 wire.

OK

Repair or replace dash wire.

DIB3X-01

DTC	B1153/25	Seat Position Sensor Assembly Malfunction

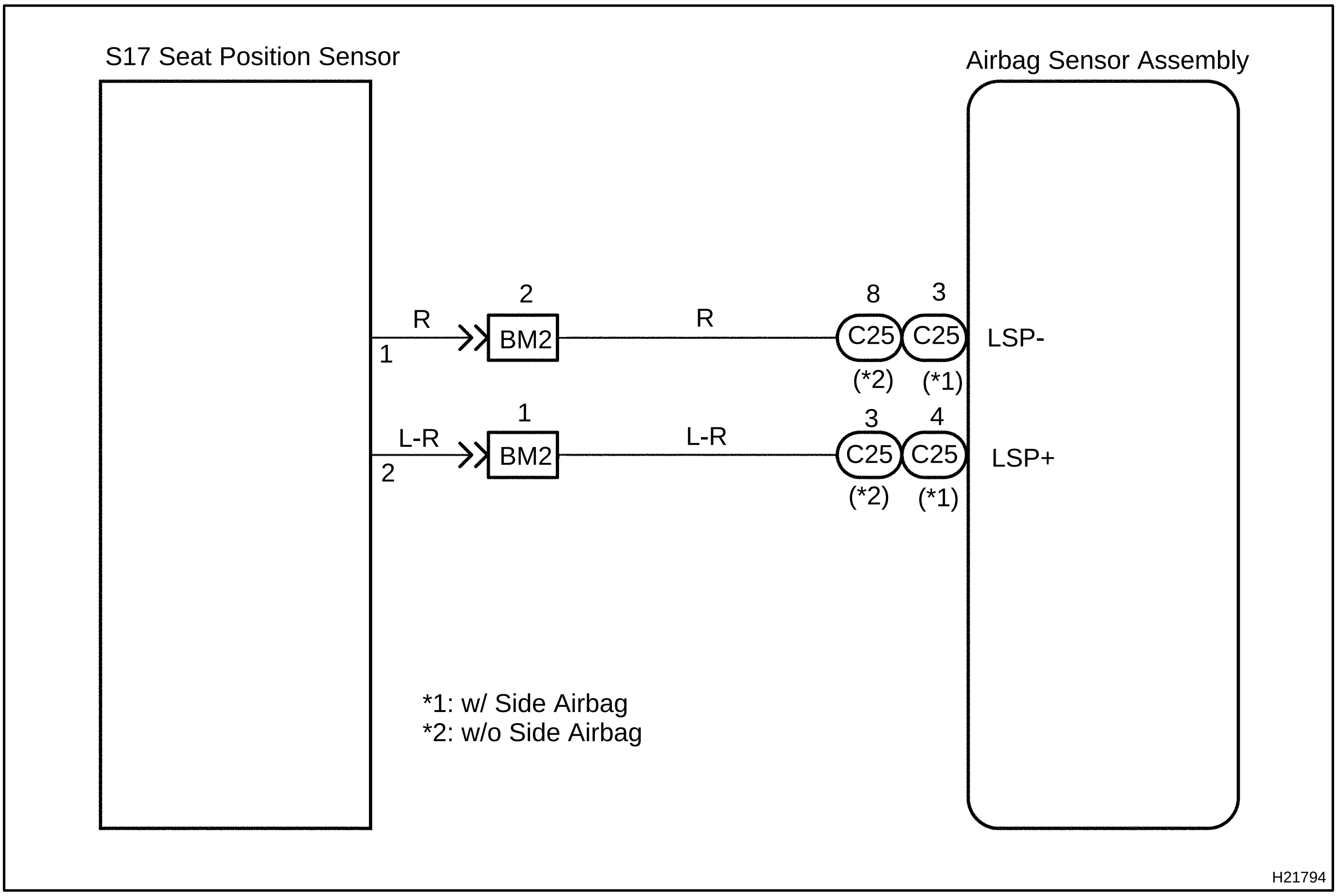
CIRCUIT DESCRIPTION

The seat position sensor circuit consists of the airbag sensor assembly and the seat position sensor assembly.
For details of the function of each components, see OPERATION on page RS-3 .
B1153/25 is recorded when a malfunction is detected in the seat position sensor circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1153/25	★Seat position sensor assembly malfunction	★Seat position sensor assembly ★Airbag sensor assembly ★Floor No. 1 wire ★Front seat wire LH

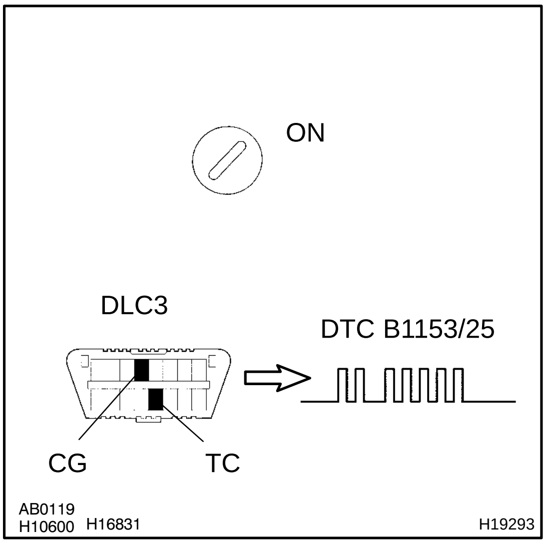
HINT:
DTC B1153/25 is indicated only for the vehicle equipped with the side airbag and without the side airbag (dual stage airbag).

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Is DTC B1153/25 output ?



CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B1153/25 is output.

HINT:
Codes other than code B1153/25 may be output at this time, but they are not relevant to this check.

NO → **The malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.**

YES

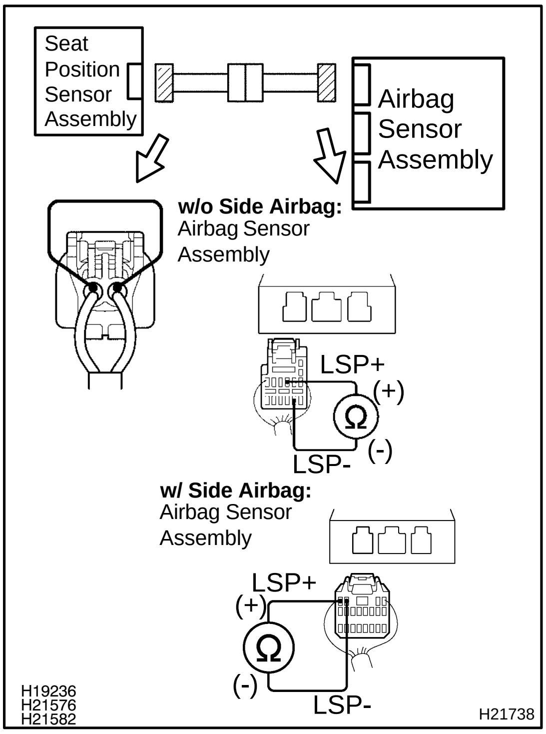
2	Is connector of the seat position sensor assembly properly connected ?

NO → **Connect connector.**

YES

3	Prepare for inspection (See step 1 on DI-923).

4	**Check wire harness.**



PREPARATION:
Using a service wire, connect LSP+ and LSP- of the connector on the seat position sensor assembly side between the airbag sensor assembly and the seat position sensor assembly.

CHECK:
Measure the resistance between LSP+ and LSP- of the connector on the airbag sensor assembly side between the seat position sensor assembly and the airbag sensor assembly.

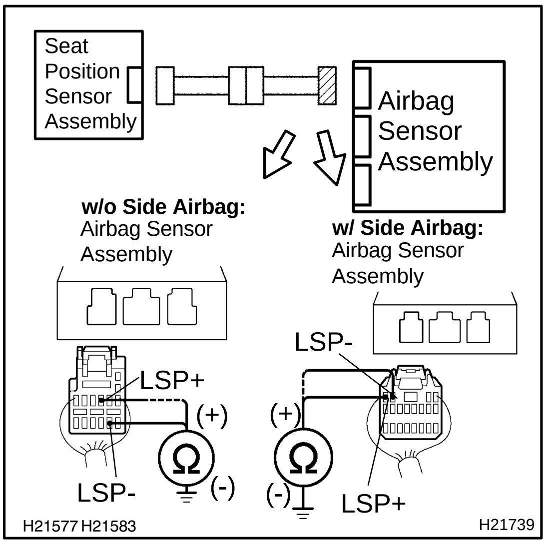
OK:

Resistance: Below 1 Ω

NG → **Go to step 9.**

OK

5	**Check wire harness (to ground).**



PREPARATION:
Release the service wire from the connector on the seat position sensor assembly side.

CHECK:
Measure the resistance between the body ground and each of LSP+ and LSP- of the connector on the airbag sensor assembly side between the seat position sensor assembly and the airbag sensor assembly.

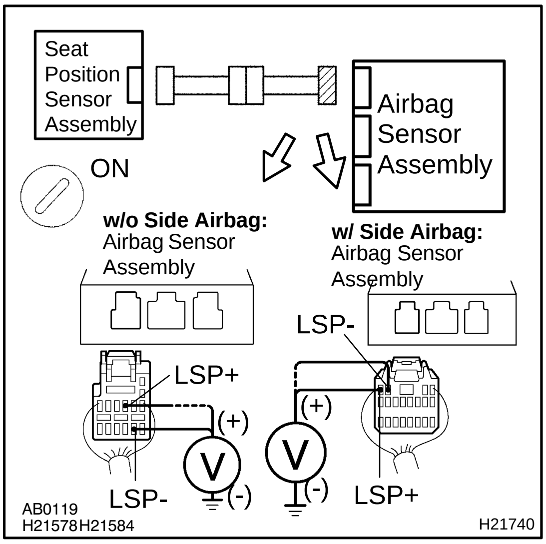
OK:

Resistance: 10 kΩ or Higher

NG → **Go to step 10.**

OK

6	**Check wire harness (to B+).**



PREPARATION:

Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and each of LSP+ and LSP- of the connector on the airbag sensor assembly side between the seat position sensor assembly and the airbag sensor assembly.

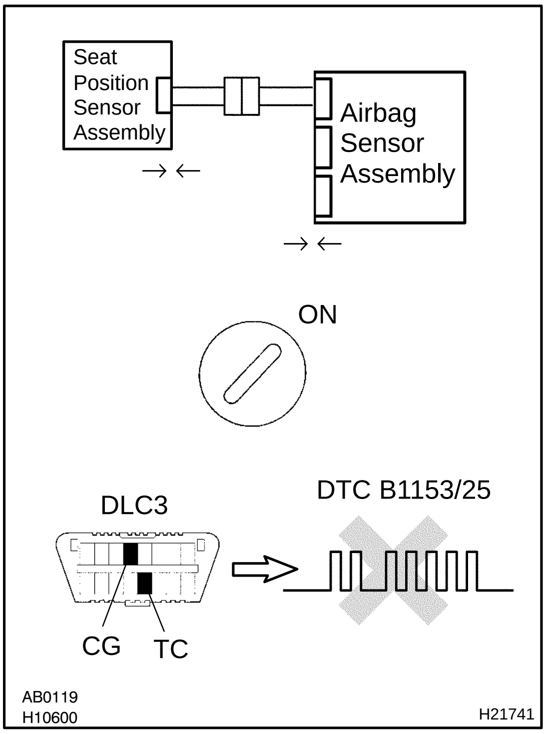
OK:

Voltage: Below 1 V

NG — **Go to step 11.**

OK

7	**Check seat position sensor assembly.**



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the connectors of the seat position sensor assembly and the airbag sensor assembly.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1153/25 is not output.

HINT:

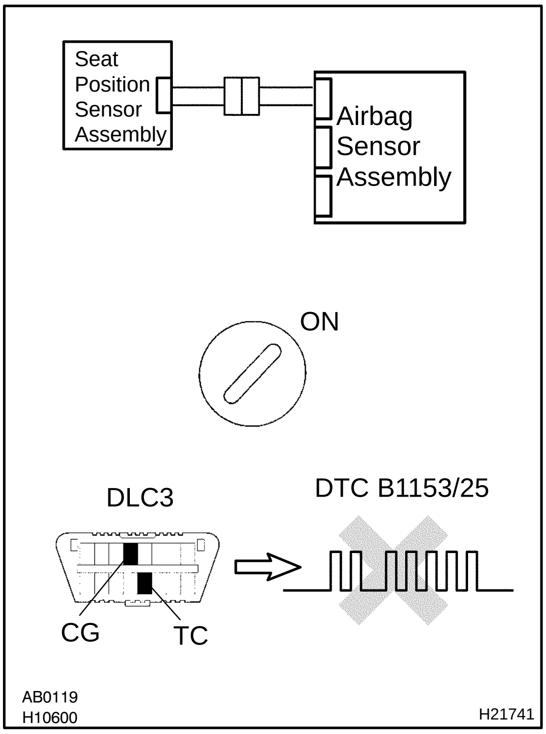
Codes other that code B1153/25 may be output at this time, but they are not relevant to this check.

NG	**Replace seat position sensor assembly, then go to next step.**

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	**Is DTC B1153/25 output again ?**



PREPARATION:

(a) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1153/25 is not output.

HINT:

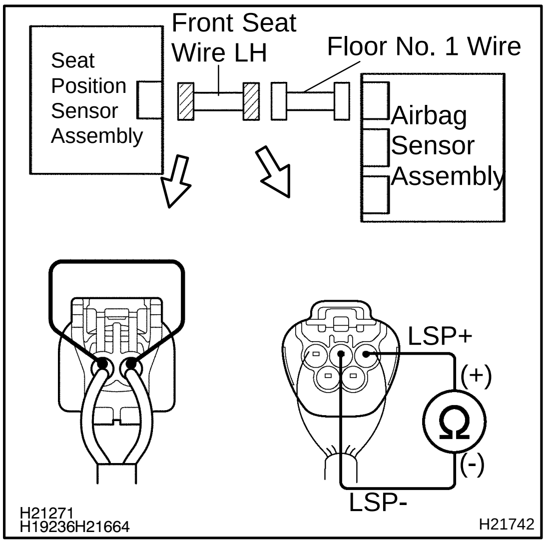
Codes other that code B1153/25 may be output at this time, but they are not relevant to this check.

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.

9	Check front seat wire LH.



PREPARATION:

(a) Disconnect the front seat wire LH connector from the floor No. 1 wire.

(b) Using a service wire, connect LSP+ and LSP- of the front seat wire LH connector on the seat position sensor assembly side.

CHECK:

Measure the resistance between LSP+ and LSP- of the front seat wire LH connector on the floor No. 1 wire side.

OK:

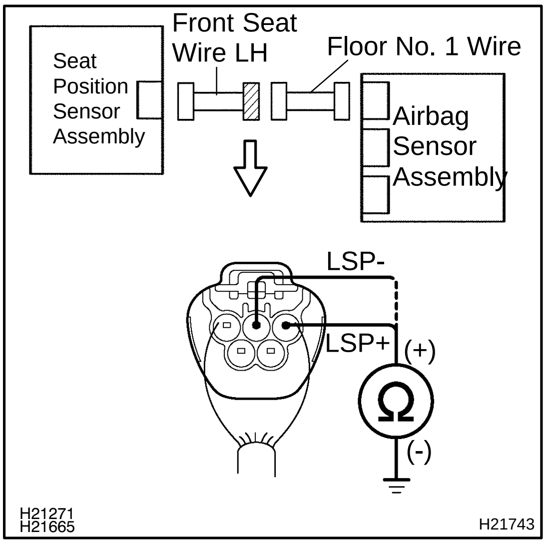
Resistance: Below 1 Ω

NG	Repair or replace front seat wire LH.

OK

Repair or replace floor No. 1 wire.

10	Check front seat wire LH (to ground).



PREPARATION:

(a) Disconnect the front seat wire LH connector from the floor No. 1 wire.

(b) Release the service wire from the front seat wire LH connector on the seat position sensor assembly side.

CHECK:

Measure the resistance between the body ground and each of LSP+ and LSP- of the front seat wire LH connector on the floor No. 1 wire side.

OK:

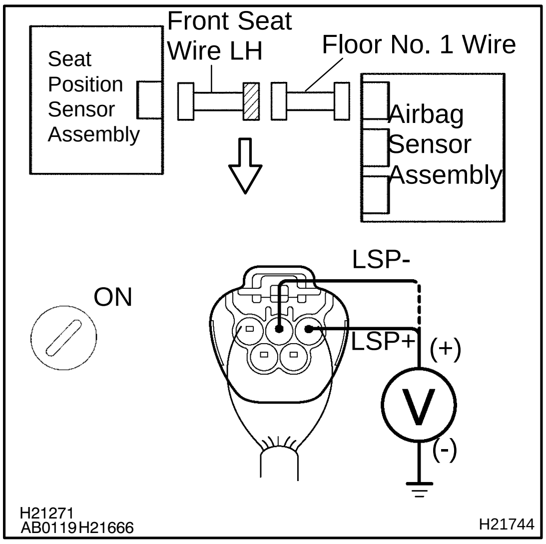
Resistance: 10 kΩ or Higher

NG	Repair and replace floor No. 1 wire.

OK

Repair and replace floor No. 1 wire.

11	**Check front seat wire LH (to B+).**



PREPARATION:

Disconnect the front seat wire LH connector from the floor No. 1 wire.

CHECK:

Measure the voltage between the body ground and each of LSP+ and LSP- of the front seat wire LH connector on the floor No. 1 wire side.

OK:

Voltage: Below 1 V

NG — **Repair or replace front seat wire LH.**

OK

Repair or replace floor No. 1 wire.

DIB3Y-01

DTC	B1154/38	Curtain Shield Airbag Sensor Assembly RH Malfunction

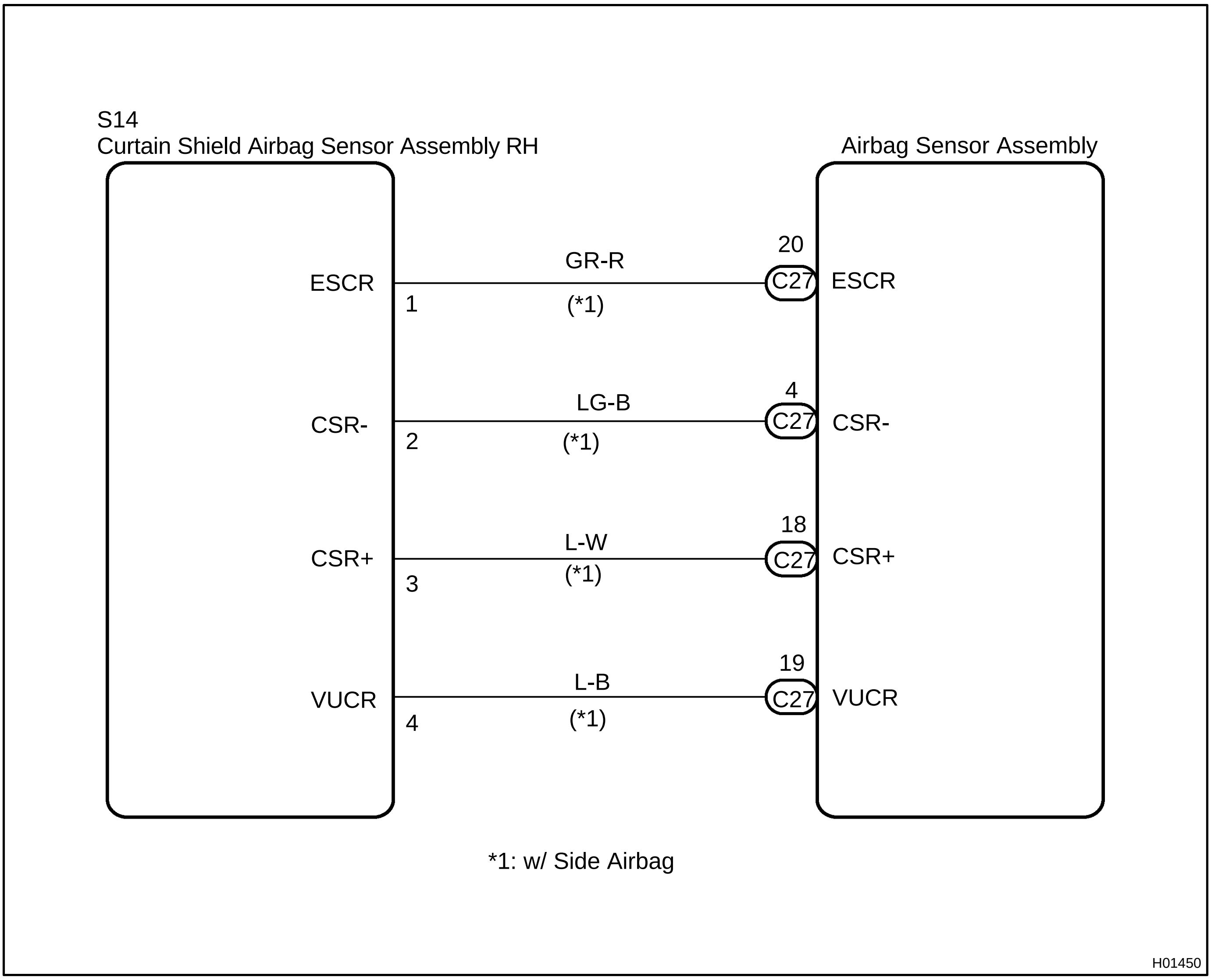
CIRCUIT DESCRIPTION

The curtain shield 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 detects diagnosis system malfunction.
DTC B1154/38 is recorded when occurrence of a malfunction in the curtain shield airbag sensor assembly RH is detected.

DTC No.	DTC Detecting Condition	Trouble Area
B1154/38	★Curtain shield airbag sensor assembly RH malfunction	★Curtain shield airbag sensor assembly RH ★Floor No. 2 wire ★Airbag sensor assembly

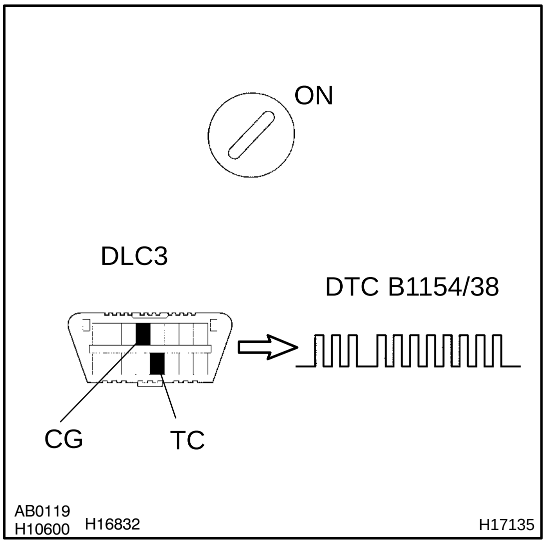
HINT:
DTC B1154/38 is indicated only for the vehicle equipped with the side airbag.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Is DTC B1154/38 output?



CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1154/38 is output.

HINT:

Codes other than code B1154/38 may be output at this time, but they are not relevant to this check.

NO → **The malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.**

YES

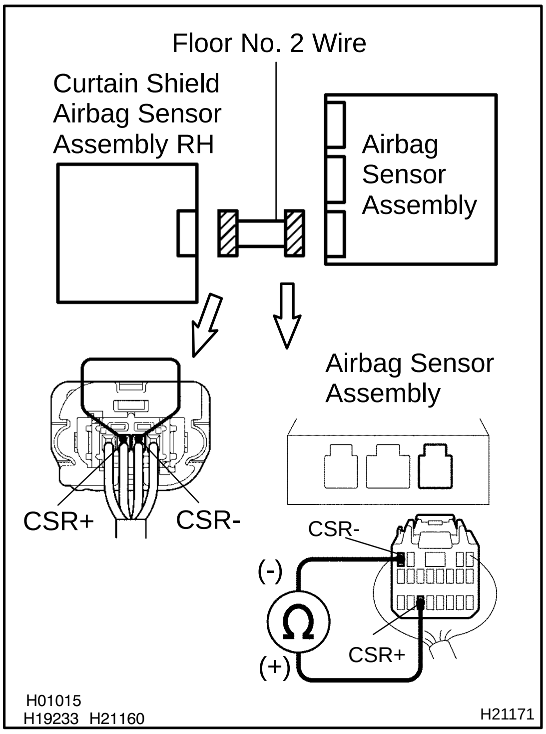
2	Is connector of curtain shield airbag sensor assembly RH properly connected?

NO → **Connect connector.**

YES

3	Prepare for inspection (See step 1 on DI-923).

4	Check floor No. 2 wire.

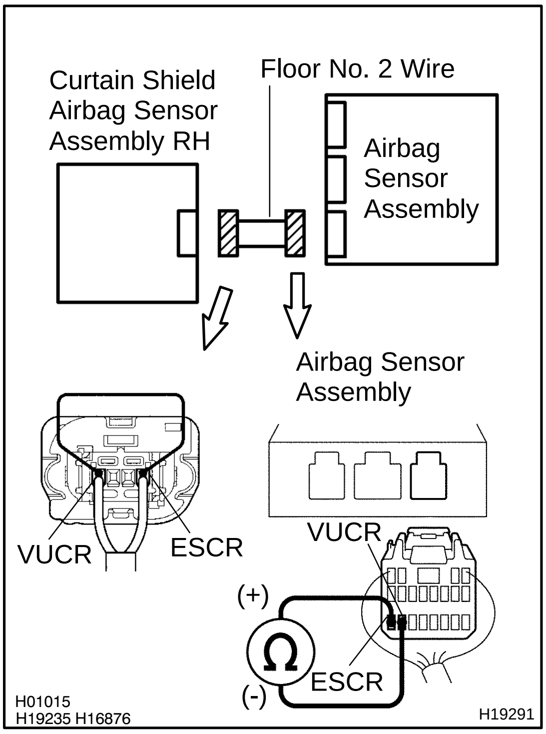


PREPARATION:
Using a service wire, connect CSR+ and CSR- of the floor No. 2 wire connector on the curtain shield airbag sensor assembly RH side.
CHECK:
Measure the resistance between CSR+ and CSR- of the floor No. 2 wire connector on the airbag sensor assembly side.
OK:
Resistance: Below 1 Ω

NG	Repair or replace floor No. 2 wire.

OK

5	**Check floor No. 2 wire.**



PREPARATION:
Using a service wire, connect VUCR and ESCR of the floor No. 2 wire connector on the curtain shield airbag sensor assembly RH side.

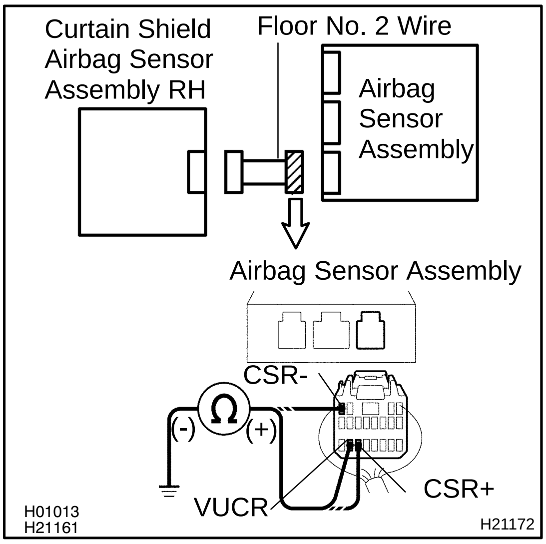
CHECK:
Measure the resistance between VUCR and ESCR of the floor No. 2 wire connector on the airbag sensor assembly side.

OK:
Resistance: Below 1 Ω

NG	**Repair or replace floor No. 2 wire.**

OK

6	**Check floor No. 2 wire (to ground).**

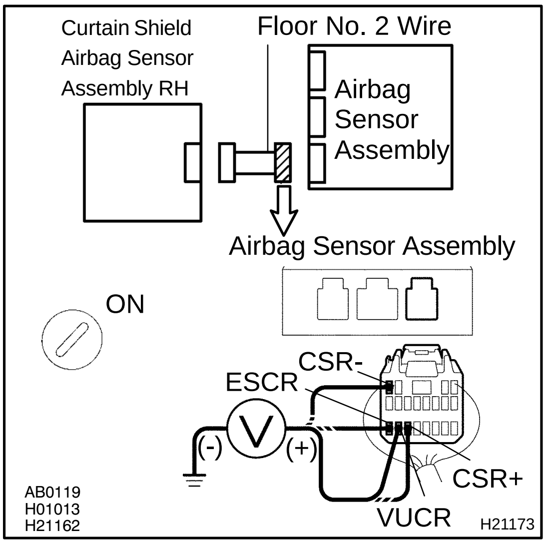


CHECK:
Measure the resistance between the body ground and each of VUCR, CSR+ and CSR- of the floor No. 2 wire connector on the airbag sensor assembly side.
OK:
Resistance: 10 kΩ or Higher

NG	**Repair or replace floor No. 2 wire.**

OK

7	**Check floor No. 2 wire (to B+).**

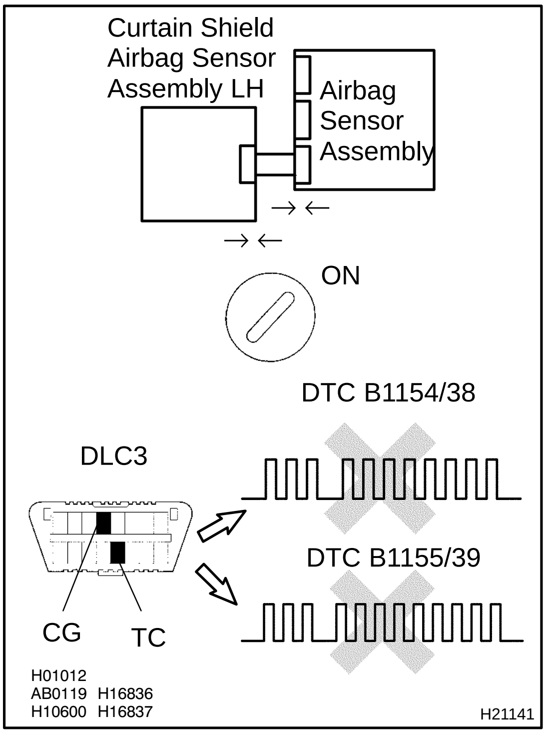


PREPARATION:
Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
CHECK:
(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and each of VUCR, CSR+, CSR- and ESCR of the floor No. 2 wire connector on the airbag sensor assembly side.
OK:
Voltage: Below 1 V

NG	**Repair or replace floor No. 2 wire.**

OK

8	**Check airbag sensor assembly.**



PREPARATION:

(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the connector to the airbag sensor assembly.
(d) Change the curtain shield airbag sensor assembly LH position with RH position.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

Neither DTC B1154/38 nor B1155/39 are not output.

HINT:
Codes other than code B1154/38 or B1155/39 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly (DTC B1154/38 is output).**

NG	**Replace curtain shield airbag sensor assembly RH (DTC B1155/39 is output).**

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.

DIB3Z-01

DTC	B1155/39	Curtain Shield Airbag Sensor Assembly LH Malfunction

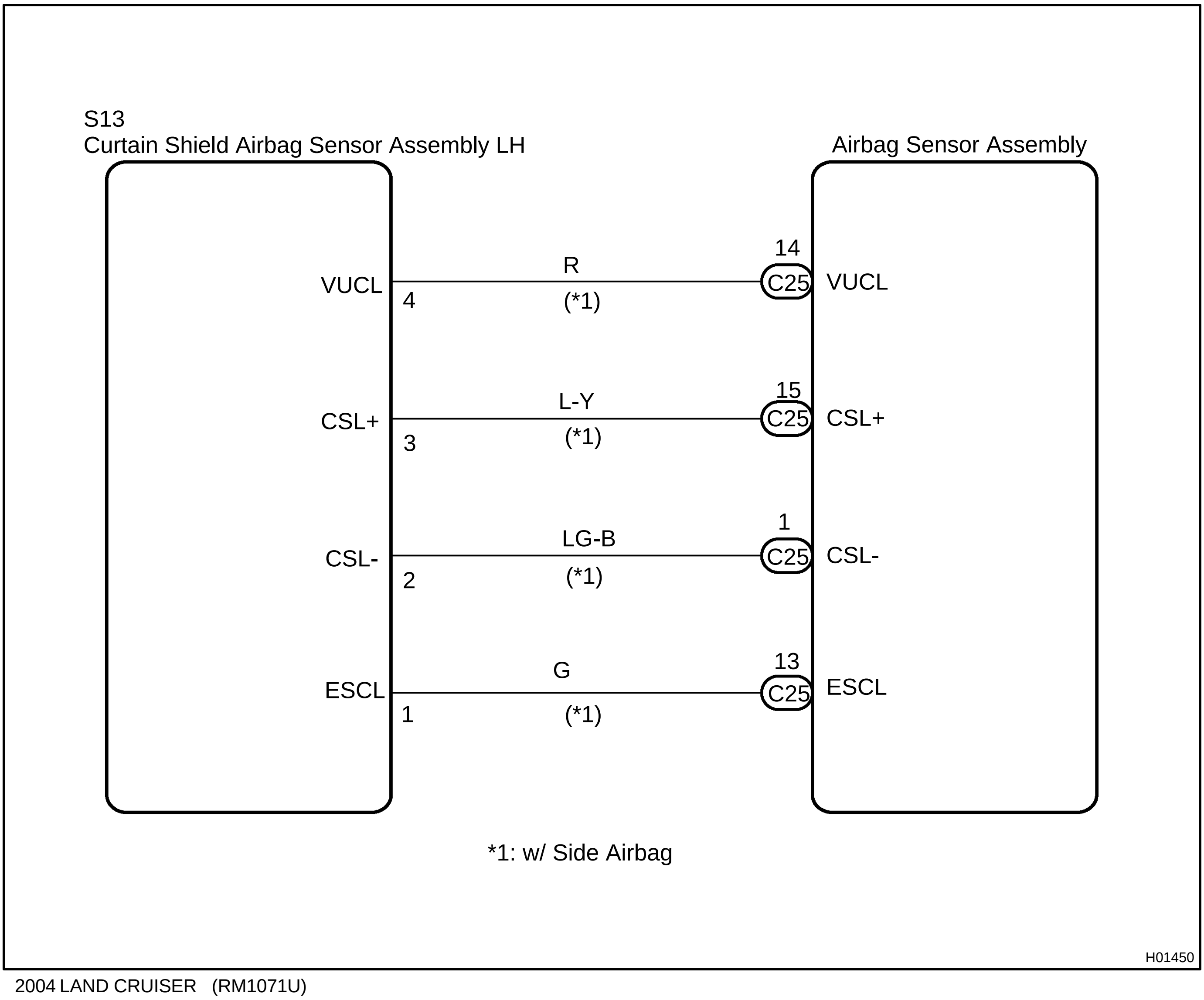
CIRCUIT DESCRIPTION

The curtain shield 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 detects diagnosis system malfunction.
DTC B1155/39 is recorded when occurrence of a malfunction in the curtain shield airbag sensor assembly LH is detected.

DTC No.	DTC Detecting Condition	Trouble Area
B1155/39	★Curtain shield airbag sensor assembly LH malfunction	★Curtain shield airbag sensor assembly LH ★Floor No. 1 wire ★Airbag sensor assembly

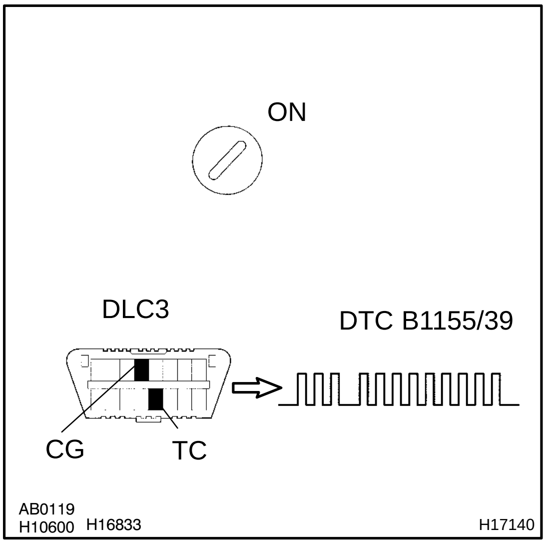
HINT:
DTC B1155/39 is indicated only for the vehicle equipped with the side airbag.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Is DTC B1155/39 output?



CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B1155/39 is output.

HINT:
Codes other than code B1155/39 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

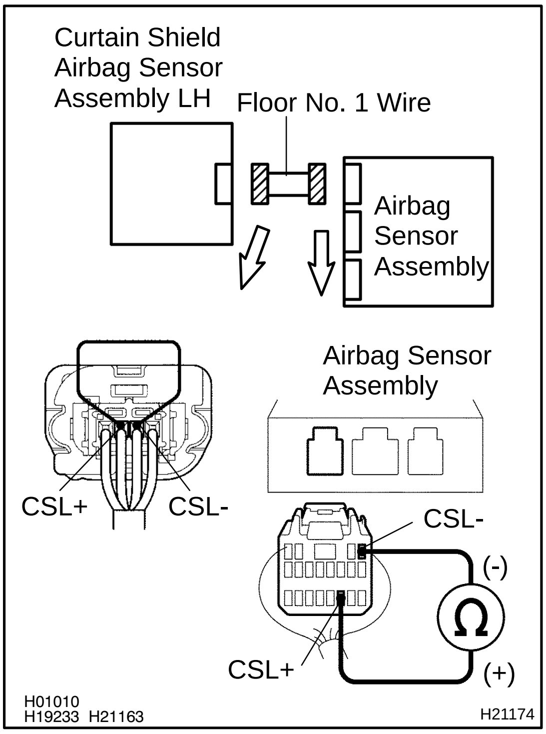
2	Is connector of curtain shield airbag sensor assembly LH properly connected?

NO → **Connect connector.**

YES

3	Prepare for inspection (See step 1 on page DI-923).

4	**Check floor No. 1 wire.**



PREPARATION:

Using a service wire, connect CSL+ and CSL- of the floor No. 1 wire connector on the curtain shield airbag sensor assembly LH side.

CHECK:

Measure the resistance between CSL+ and CSL- of the floor No. 1 wire connector on the airbag sensor assembly side.

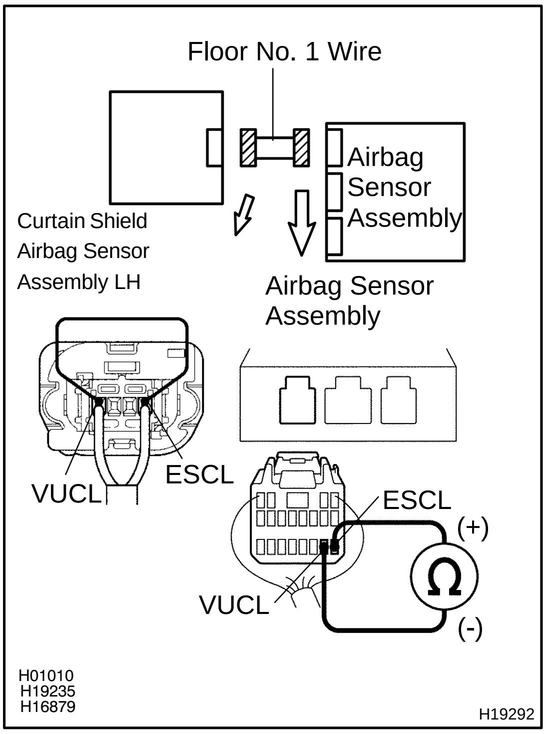
OK:

Resistance: Below 1 Ω

NG → **Repair or replace floor No. 1 wire.**

OK

5	**Check floor No. 1 wire.**



PREPARATION:

Using a service wire, connect VUCL and ESCL of the floor No. 1 wire connector on the curtain shield airbag sensor assembly LH side.

CHECK:

Measure the resistance between VUCL and ESCL of the floor No. 1 wire connector on the airbag sensor assembly side.

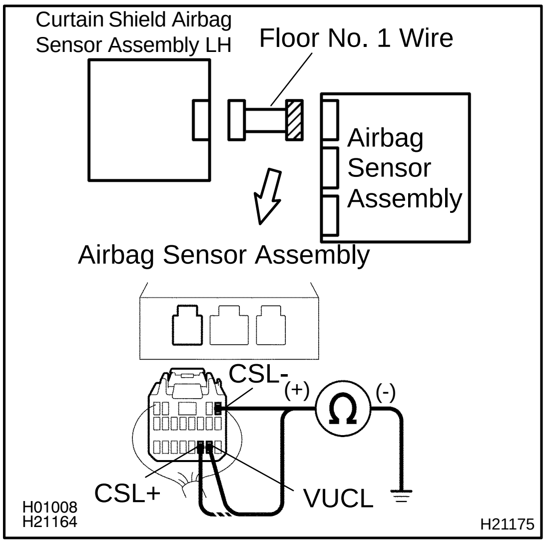
OK:

Resistance: Below 1 Ω

NG	**Repair or replace floor No. 1 wire.**

OK

6	Check floor No. 1 wire (to ground).



CHECK:

Measure the resistance between the body ground and each of VUCL, CSL+ and CSL- of the floor No. 1 wire connector on the airbag sensor assembly side.

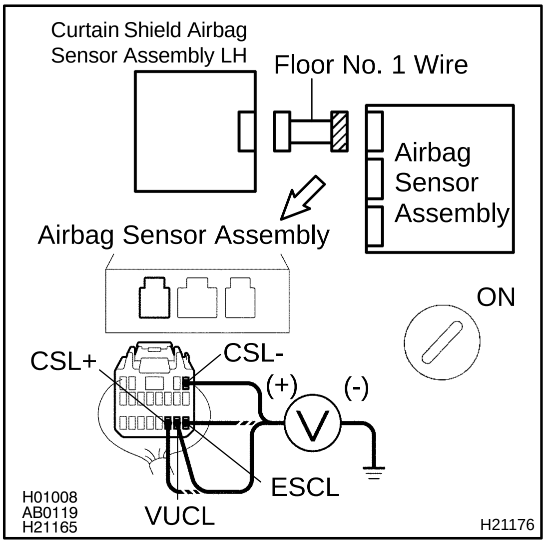
OK:

Resistance: 10 kΩ or Higher

NG	Repair or replace floor No. 1 wire.

OK

7	Check floor No. 1 wire (to B+).



PREPARATION:

Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and each of VUCL, CSL+, CSL- and ESCL of the floor No. 1 wire connector on the airbag sensor assembly side.

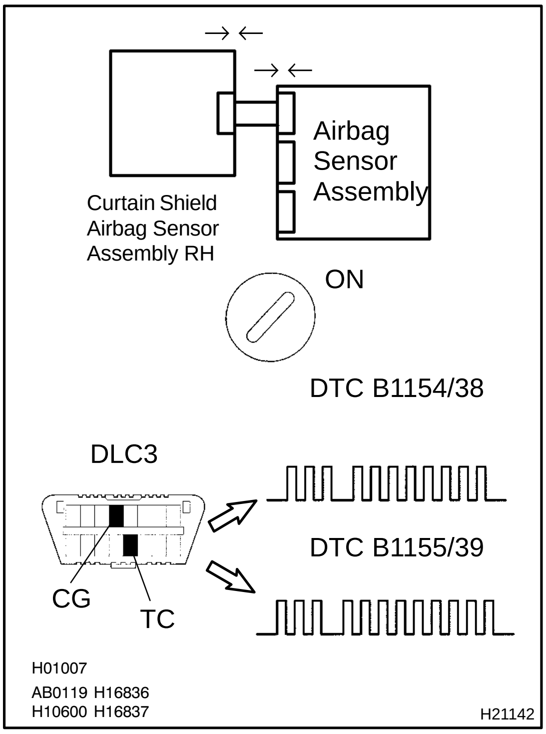
OK:

Voltage: Below 1 V

NG	Repair or replace floor No. 1 wire.

OK

8	**Check airbag sensor assembly.**



PREPARATION:

(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the connector to the airbag sensor assembly.
(d) Change the curtain shield airbag sensor assembly RH position with LH position.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

Neither DTC B1155/39 nor B1154/38 are not output.

HINT:
Codes other than code B1155/39 B1154/38 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly (DTC B1155/39 is output).**

NG	**Replace curtain shield airbag sensor assembly LH (DTC B1154/38 is output).**

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.

DI6PB-34

DTC	B1160/83	Short in Curtain Shield Squib RH Circuit

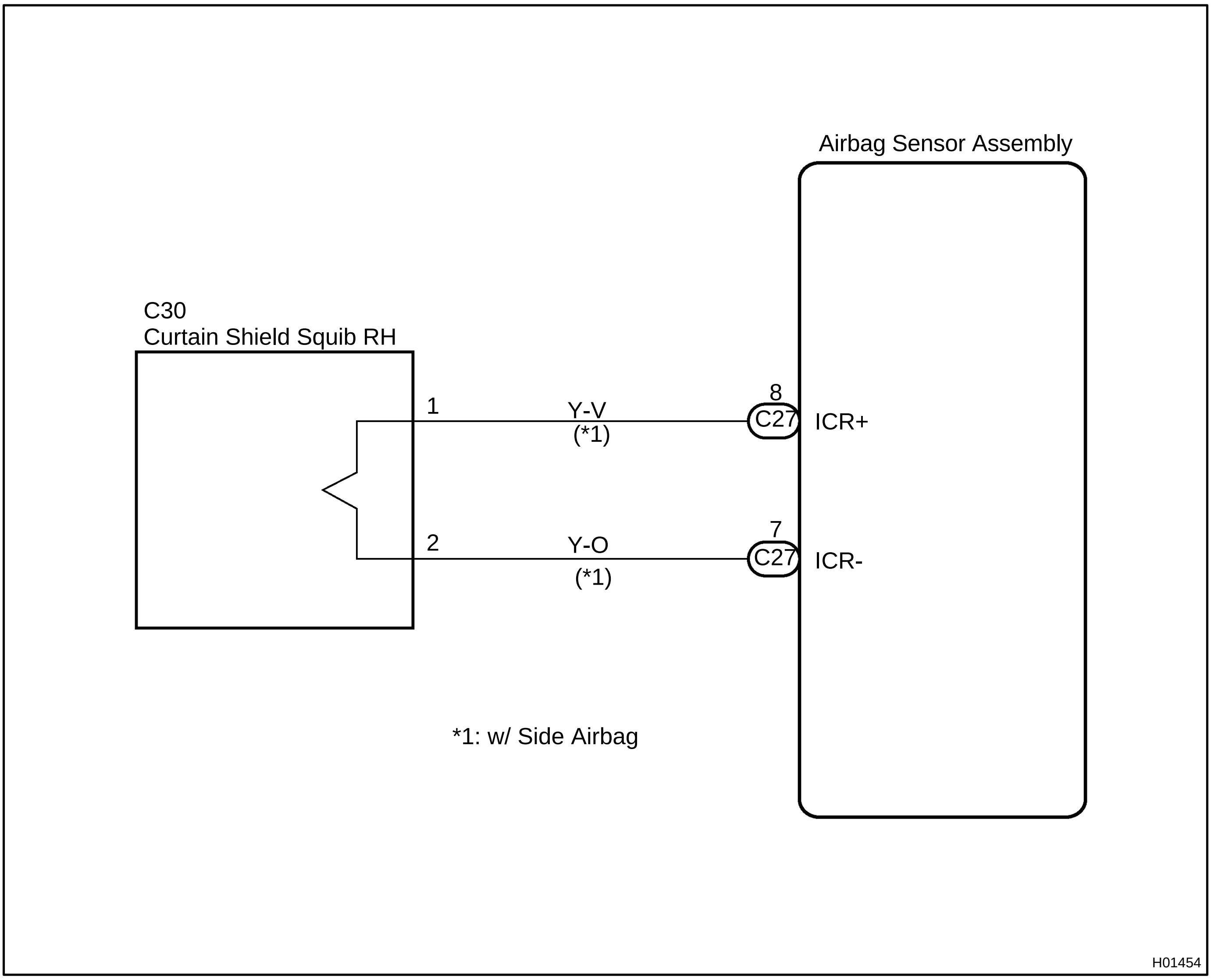
CIRCUIT DESCRIPTION

The curtain shield squib RH circuit consists of the airbag sensor assembly and the curtain shield 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-3.
DTC B1110/83 is recorded when a short is detected in the curtain shield squib RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1110/83	★Short in curtain shield squib RH circuit ★Curtain shield squib RH malfunction ★Airbag sensor assembly malfunction	★Curtain shield airbag assembly RH (Curtain shield squib RH) ★Airbag sensor assembly ★Floor No. 2 wire

HINT:
DTC B1160/83 is indicated only for the vehicle equipped with the side airbag.

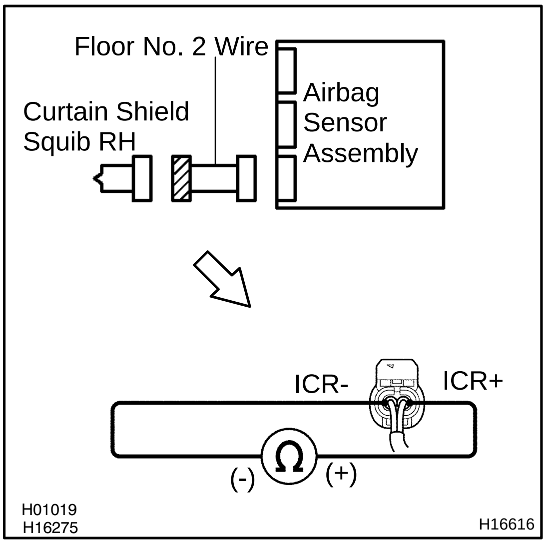
WIRING DIAGRAM



INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-923).

2	Check floor No. 2 wire (curtain shield squib RH circuit).



PREPARATION:

Release the airbag activation prevention mechanism built in the connector of the floor No. 2 wire on the airbag sensor assembly side (See page DI-692).

CHECK:

Measure the resistance between ICR+ and ICR- of the floor No. 2 wire connector on the curtain shield airbag assembly RH (curtain shield squib RH) side.

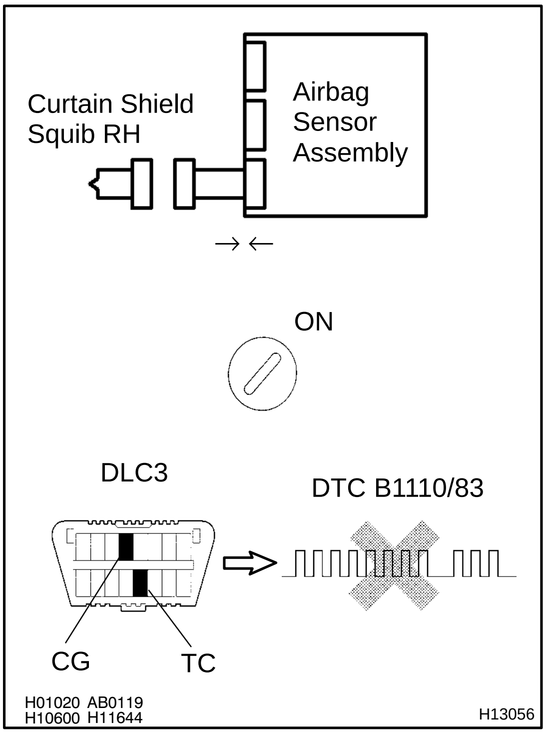
OK:

Resistance: 1 MΩ or Higher

NG	Repair or replace floor No. 2 wire.

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

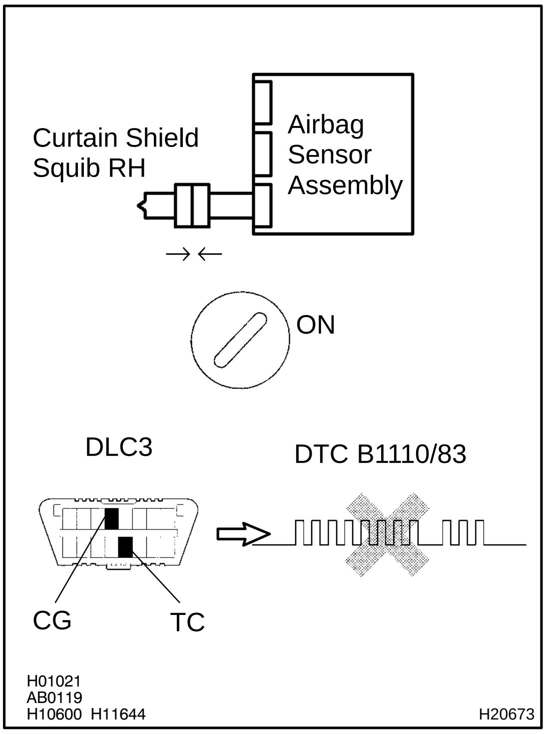
DTC B1110/83 is not output.

HINT:
Codes other than code B1110/83 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check curtain shield squib RH.**



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the curtain shield airbag assembly RH (curtain shield squib RH) connector.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1110/83 is not output.

HINT:

Codes other than code B1110/83 may be output at this time, but they are not relevant to this check.

NG	**Replace curtain shield airbag assembly RH (curtain shield squib 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.

DI6PC-21

DTC	B1161/84	Open in Curtain Shield Squib RH Circuit

CIRCUIT DESCRIPTION

The curtain shield squib RH circuit consists of the airbag sensor assembly and the curtain shield 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-3 .
DTC B1161/84 is recorded when an open is detected in the curtain shield squib RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1161/84	★Open in curtain shield squib RH circuit ★Curtain shield squib RH malfunction ★Airbag sensor assembly malfunction	★Curtain shield airbag assembly RH (Curtain shield squib RH) ★Airbag sensor assembly ★Floor No. 2 wire

HINT:
DTC B1161/84 is indicated only for the vehicle equipped with the side airbag.

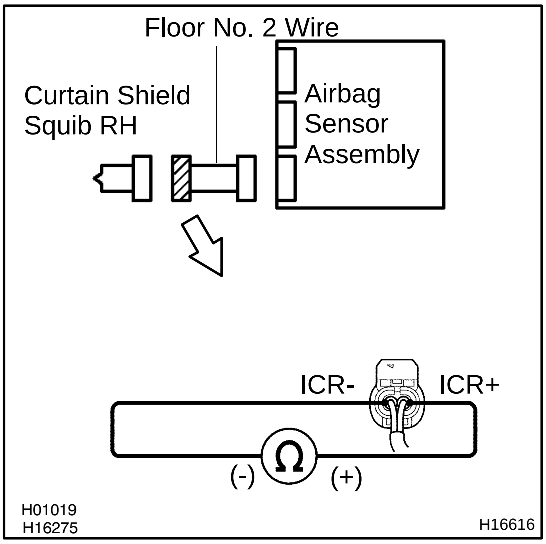
WIRING DIAGRAM

See page DI-856 .

INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-923).

2	Check floor No. 2 wire (curtain shield squib RH circuit).

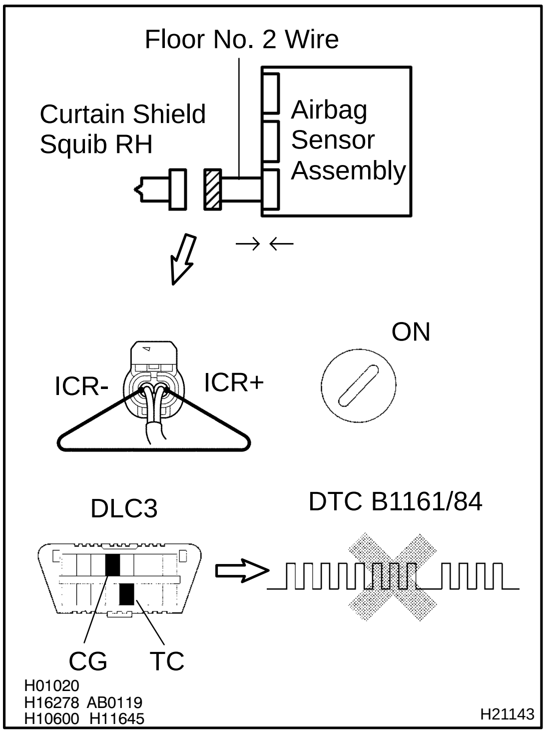


CHECK:
Measure the resistance between ICR+ and ICR- of the floor No. 2 wire connector on the curtain shield airbag assembly RH (curtain shield squib RH) side.
OK:
Resistance: Below 1 Ω

NG	Repair or replace floor No. 2 wire.

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect ICR+ and ICR- of the floor No. 2 wire connector on the curtain shield airbag assembly RH (curtain shield squib RH) side.

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1161/84 is not output.

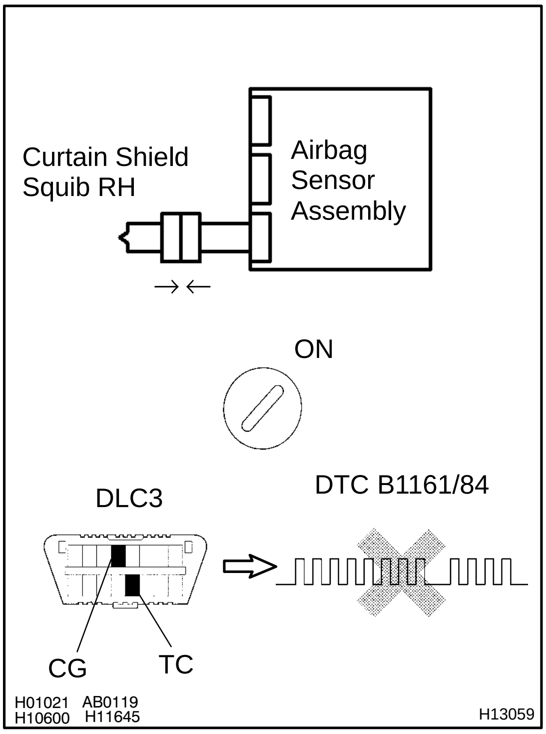
HINT:

Codes other than code B1161/84 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check curtain shield squib RH.**



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the curtain shield airbag assembly RH (curtain shield squib RH) connector.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1161/84 is not output.

HINT:

Codes other than code B1161/84 may be output at this time, but they are not relevant to this check.

NG	**Replace curtain shield airbag assembly RH (curtain shield squib 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.

DI6PD-22

DTC	B1162/81	Short in Curtain Shield Squib RH Circuit (to Ground)

CIRCUIT DESCRIPTION

The curtain shield squib RH circuit consists of the airbag sensor assembly and the curtain shield 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-3 .
DTC B1162/81 is recorded when ground short is detected in the curtain shield squib RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1162/81	★Short in curtain shield squib RH circuit (to ground) ★Curtain shield squib RH malfunction ★Airbag sensor assembly malfunction	★Curtain shield airbag assembly RH (Curtain shield squib RH) ★Airbag sensor assembly ★Floor No. 2 wire

HINT:
DTC B1162/81 is indicated only for the vehicle equipped with the side airbag.

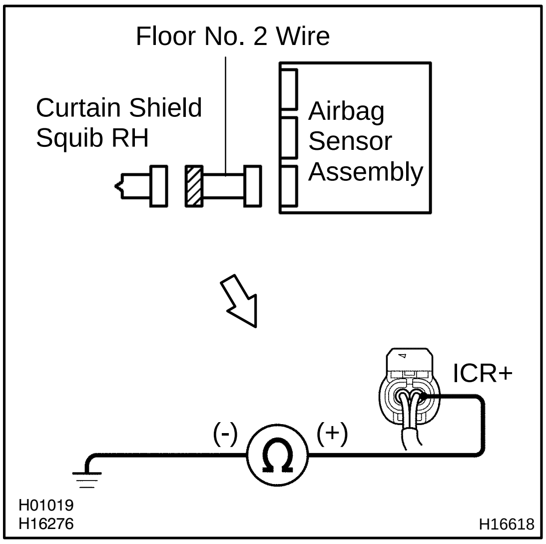
WIRING DIAGRAM

See page DI-856 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 2 wire(curtain shield squib RH circuit).**



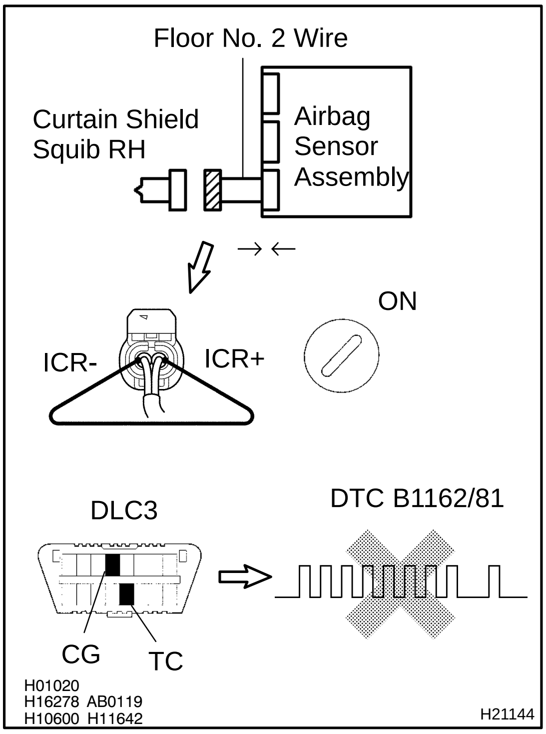
CHECK:
Measure the resistance between the body ground and ICR+ of the floor No. 2 wire connector on the curtain shield airbag assembly RH (curtain shield squib RH) side.

OK:
Resistance: 1 MΩ or Higher

NG	**Repair or replace floor No. 2 wire.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect ICR+ and ICR- of the floor No. 2 wire connector on the curtain shield airbag assembly RH (curtain shield squib RH) side.

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1162/81 is not output.

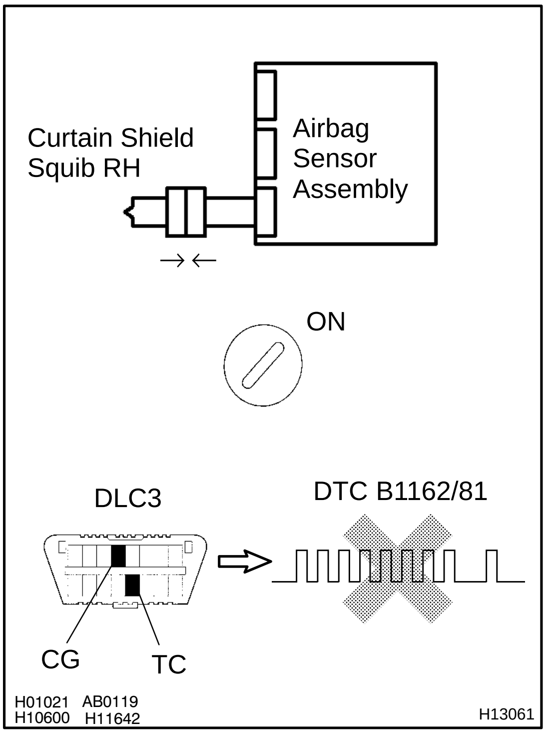
HINT:

Codes other than code B1162/81 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check curtain shield squib RH.**



PREPARATION:

(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the curtain shield airbag assembly RH (curtain shield squib RH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B1162/81 is not output.

HINT:
Codes other than code B1162/81 may be output at this time, but they are not relevant to this check.

NG	**Replace curtain shield airbag assembly RH (curtain shield squib 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.

DTC	B1163/82	Short in Curtain Shield Squib RH Circuit (to B+)

CIRCUIT DESCRIPTION

The curtain shield squib RH circuit consists of the airbag sensor assembly and the curtain shield 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-3 .
DTC B1163/82 is recorded when a B+ short is detected in the curtain shield squib RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1163/82	★Short in curtain shield squib RH circuit (to B+) ★Curtain shield squib RH malfunction ★Airbag sensor assembly malfunction	★Curtain shield airbag assembly RH (Curtain shield squib RH) ★Airbag sensor assembly ★Floor No. 2 wire

HINT:
DTC B1163/82 is indicated only for the vehicle equipped with the side airbag.

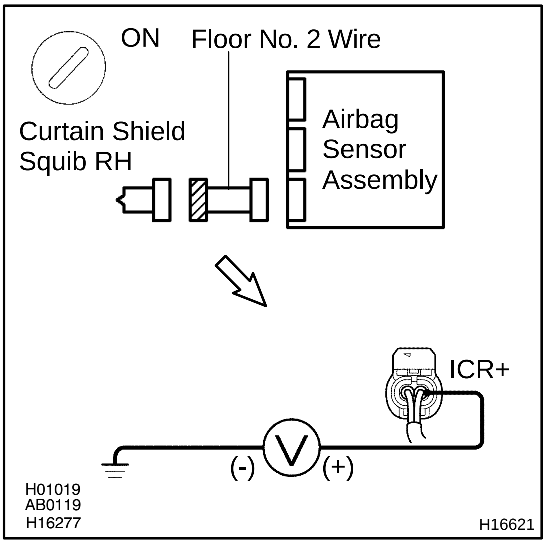
WIRING DIAGRAM

See page DI-856 .

INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-923).

2	Check floor No. 2 wire (curtain shield squib RH circuit).



PREPARATION:
Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

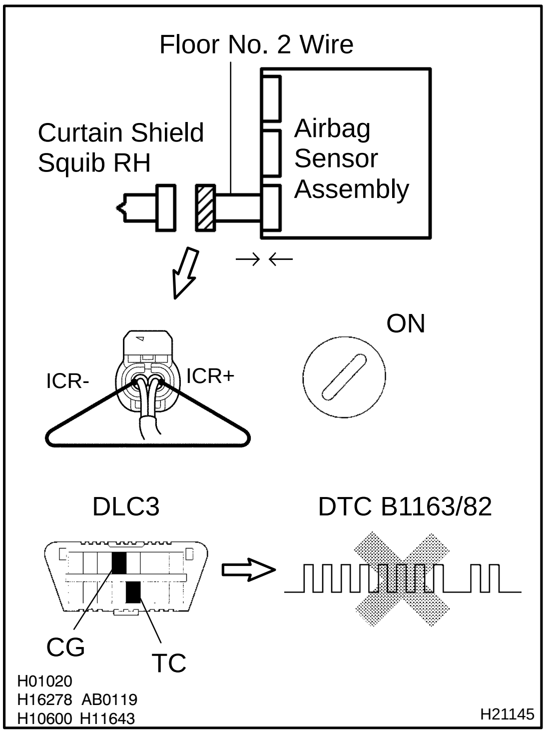
CHECK:
(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and ICR+ of the floor No. 2 wire connector on the curtain shield airbag assembly RH (curtain shield squib RH) side.

OK:
Voltage: Below 1 V

NG	Repair or replace floor No. 2 wire.

OK

3	**Check airbag sensor assembly.**



PREPARATION:
(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the connector to the airbag sensor assembly.
(d) Using a service wire, connect ICR+ and ICR- of the floor No. 2 wire connector on the curtain shield airbag assembly RH (curtain shield squib RH) side.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:
(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

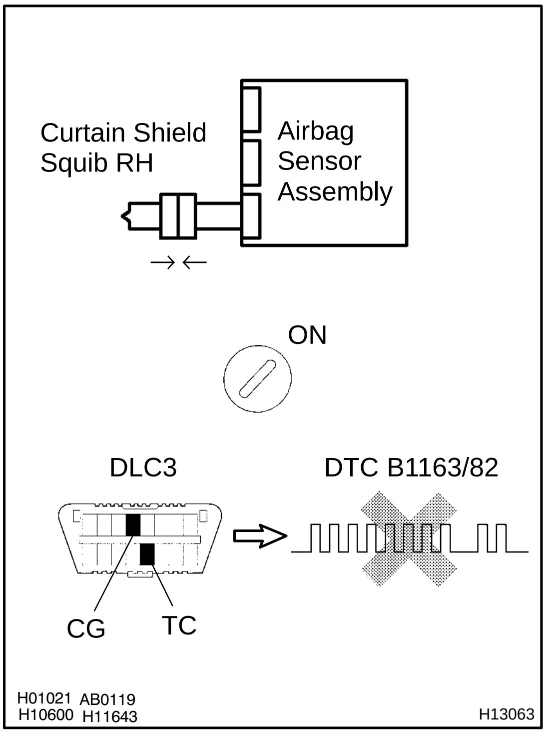
OK:
DTC B1163/82 is not output.

HINT:
Codes other than code B1163/82 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check curtain shield squib RH.**



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the curtain shield airbag assembly RH (curtain shield squib RH) connector.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1163/82 is not output.

HINT:

Codes other than code B1163/82 may be output at this time, but they are not relevant to this check.

NG	**Replace curtain shield airbag assembly RH (curtain shield squib 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.

DTC	B1165/87	Short in Curtain Shield Squib LH Circuit

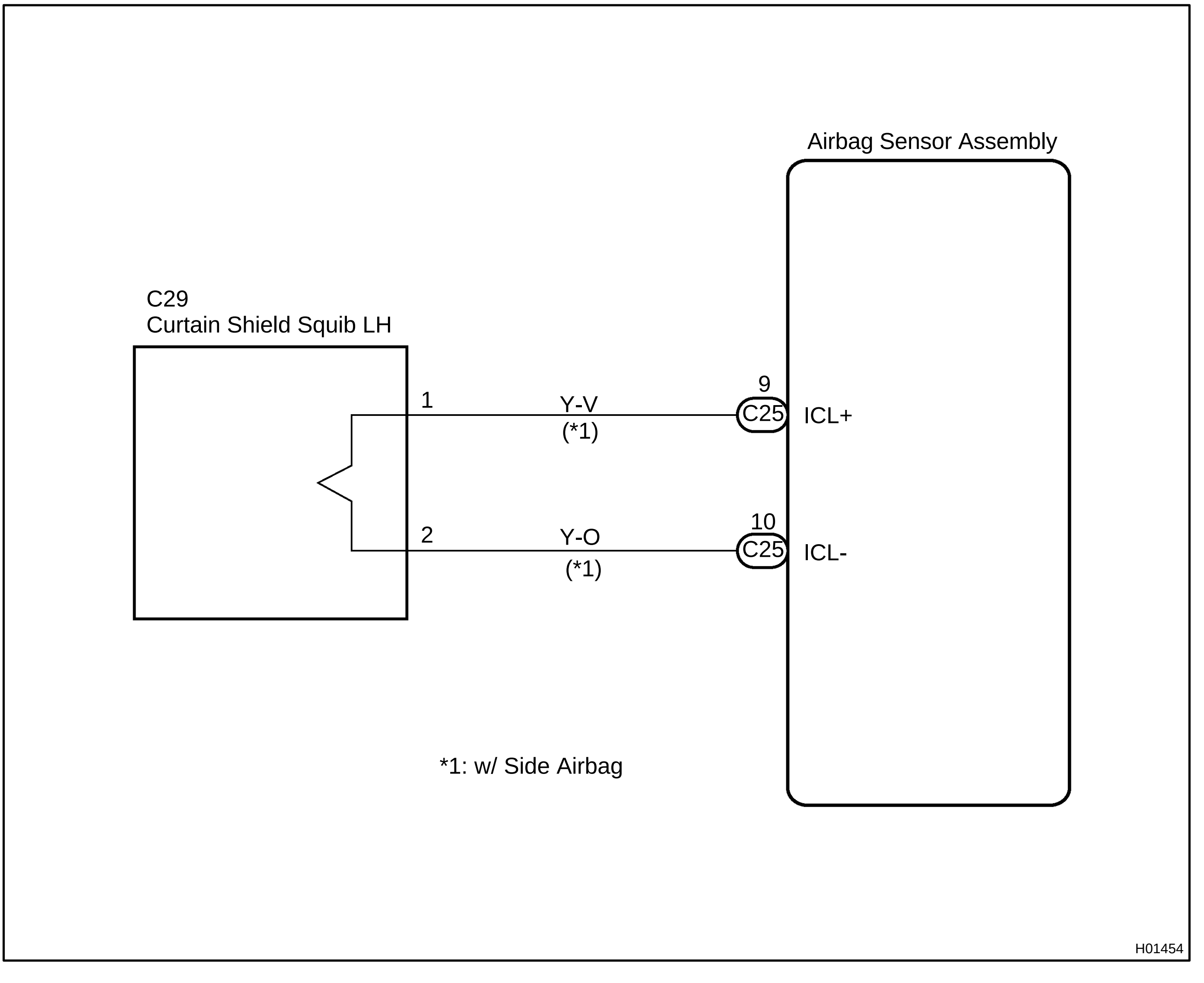
CIRCUIT DESCRIPTION

The curtain shield squib LH circuit consists of the airbag sensor assembly and the curtain shield 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-3 .
DTC B1165/87 is recorded when a short is detected in the curtain shield squib LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1165/87	★Short in curtain shield squib LH circuit ★Curtain shield squib LH malfunction ★Airbag sensor assembly malfunction	★Curtain shield airbag assembly LH (Curtain shield squib LH) ★Airbag sensor assembly ★Floor No. 1 wire

HINT:
DTC B1165/87 is indicated only for the vehicle equipped with the side airbag.

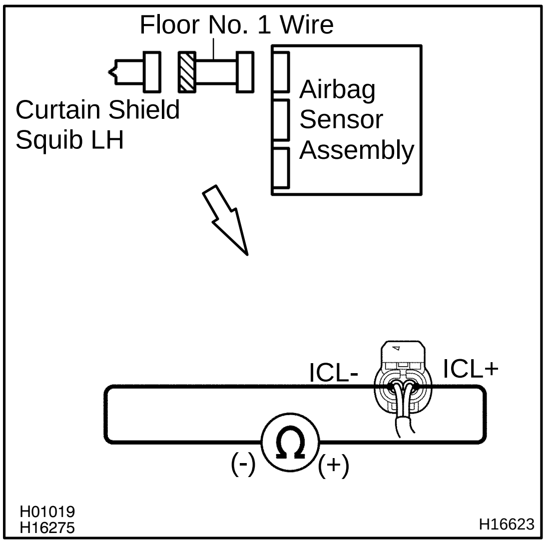
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 1 wire (curtain shield squib LH circuit).**



PREPARATION:

Release the airbag activation prevention mechanism built in the connector of the floor No. 1 wire on the airbag sensor assembly side (See page DI-692).

CHECK:

Measure the resistance between ICL+ and ICL- of the floor No. 1 wire connector on the curtain shield airbag assembly LH (curtain shield squib LH) side.

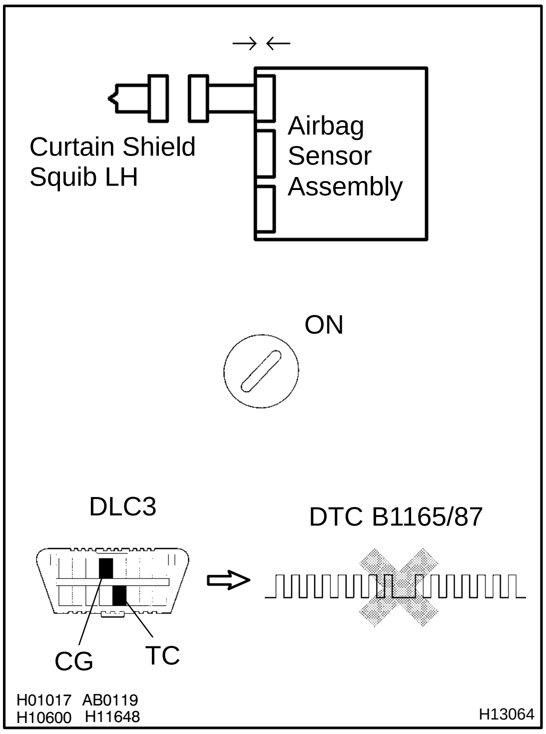
OK:

Resistance: 1 MΩ or Higher

NG	**Repair or replace floor No. 1 wire.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch or ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

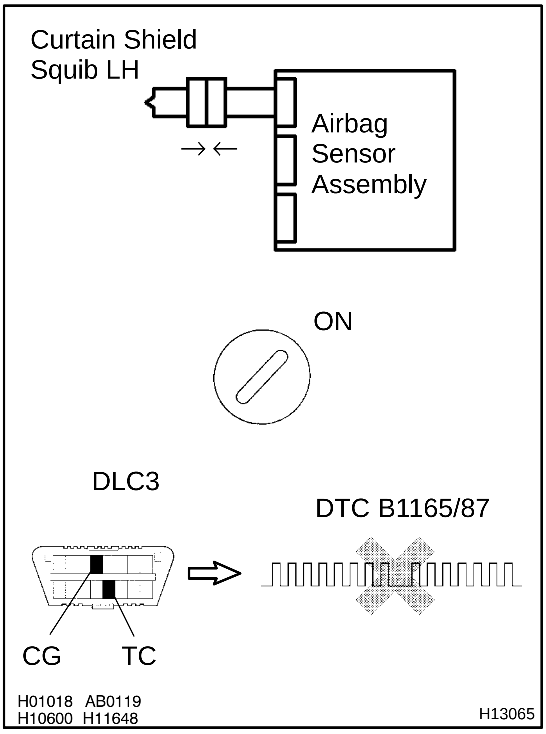
DTC B1165/87 is not output.

HINT:
Codes other than code B1165/87 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check curtain shield squib LH.**



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the curtain shield airbag assembly LH (curtain shield squib LH) connector.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1165/87 is not output.

HINT:

Codes other than code B1165/87 may be output at this time, but they are not relevant to this check.

NG	**Replace curtain shield airbag assembly LH (curtain shield squib 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.

DI6PG-22

DTC	B1166/88	Open in Curtain Shield Squib LH Circuit

CIRCUIT DESCRIPTION

The curtain shield squib LH circuit consists of the airbag sensor assembly and the curtain shield 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-3 .
DTC B1166/88 is recorded when an open is detected in the curtain shield squib LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1166/88	★Open in curtain shield squib LH circuit ★Curtain shield squib LH malfunction ★Airbag sensor assembly malfunction	★Curtain shield airbag assembly LH (Curtain shield squib LH) ★Airbag sensor assembly ★Floor No. 1 wire

HINT:
DTC B1166/88 is indicated only for the vehicle equipped with the side airbag.

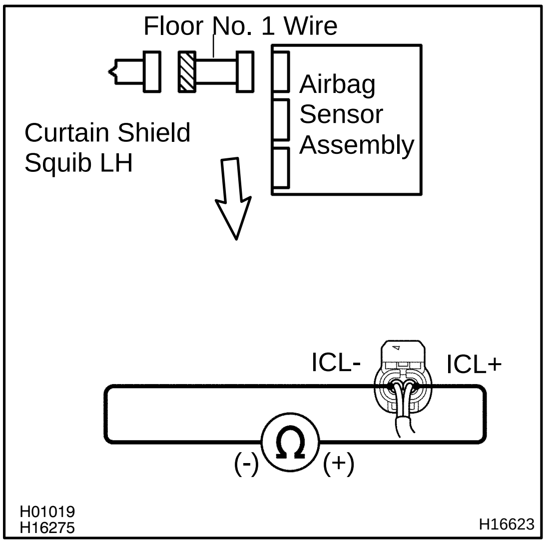
WIRING DIAGRAM

See page DI-869 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 1 wire (curtain shield squib LH circuit).**

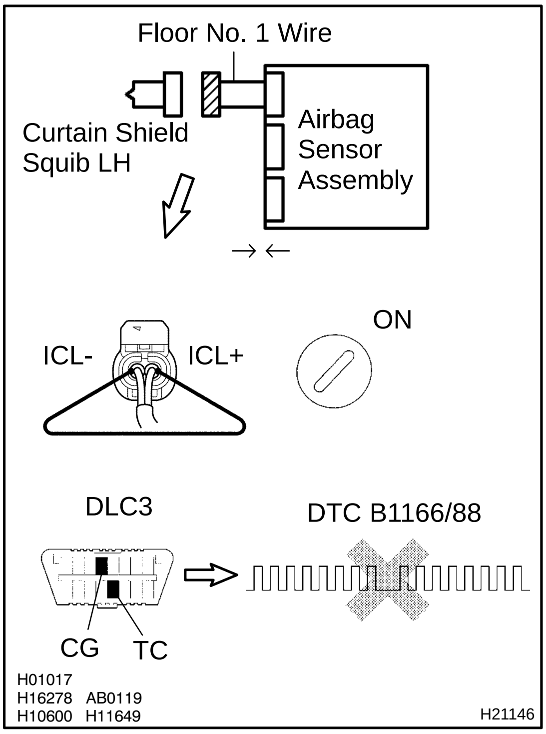


CHECK:
Measure the resistance between ICL+ and ICL- of the floor No. 1 wire connector on the curtain shield airbag assembly LH (curtain shield squib LH) side.
OK:
Resistance: Below 1 Ω

NG	**Repair or replace floor No. 1 wire.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect ICL+ and ICL- of the floor No. 1 wire connector on the curtain shield airbag assembly LH (curtain shield squib LH) side.

(c) Connect the negative (-) terminal cable to the battery, and wait at least 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1166/88 is not output.

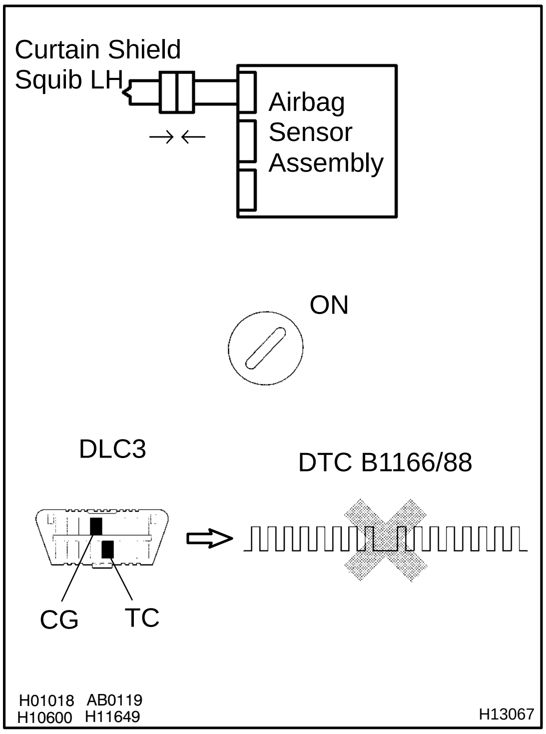
HINT:

Codes other than code B1166/88 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check curtain shield squib LH.**



PREPARATION:

(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the curtain shield airbag assembly LH (curtain shield squib LH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B1166/88 is not output.

HINT:
Codes other than code B1166/88 may be output at this time, but they are not relevant to this check.

NG	**Replace curtain shield airbag assembly LH (curtain shield squib 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.

DI6PH-22

DTC	B1167/85	Short in Curtain Shield Squib LH Circuit (to Ground)

CIRCUIT DESCRIPTION

The curtain shield squib LH circuit consists of the airbag sensor assembly and the curtain shield 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-3 .
DTC B1167/85 is recorded when ground short is detected in the curtain shield squib LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1167/85	★Short in curtain shield squib LH circuit (to ground) ★Curtain shield squib LH malfunction ★Airbag sensor assembly malfunction	★Curtain shield airbag assembly LH (Curtain shield squib LH) ★Airbag sensor assembly ★Floor No. 1 wire

HINT:
DTC B1167/85 is indicated only for the vehicle equipped with the side airbag.

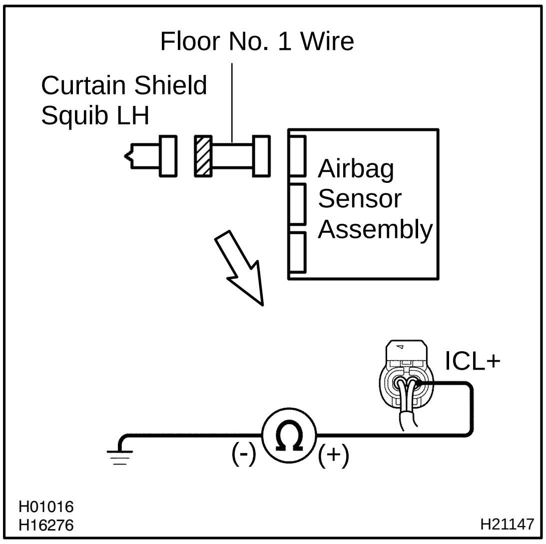
WIRING DIAGRAM

See page DI-856 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 1 wire (curtain shield squib LH circuit).**

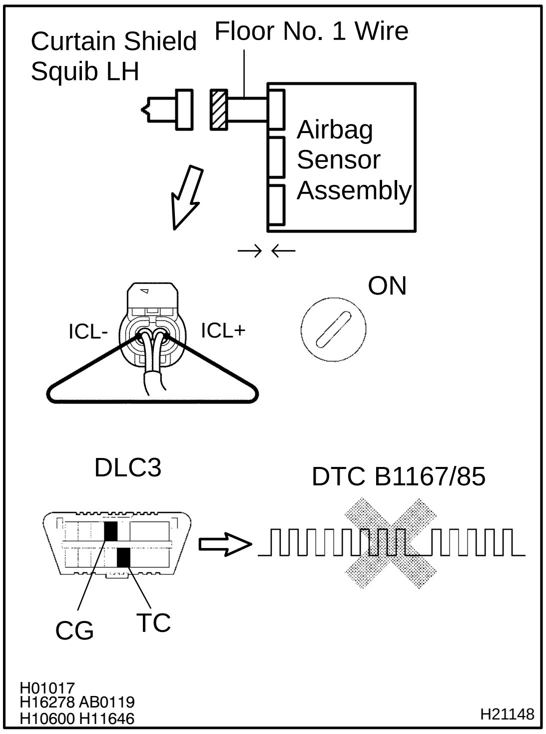


CHECK:
Measure the resistance between the body ground and ICL+ of the floor No. 1 wire connector on the curtain shield airbag assembly LH (curtain shield squib LH) side.
OK:
Resistance: 1 MΩ or Higher

NG	**Repair or replace floor No. 1 wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect ICL+ and ICL- of the floor No. 1 wire connector on the curtain shield airbag assembly LH (curtain shield squib LH) side.

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1167/85 is not output.

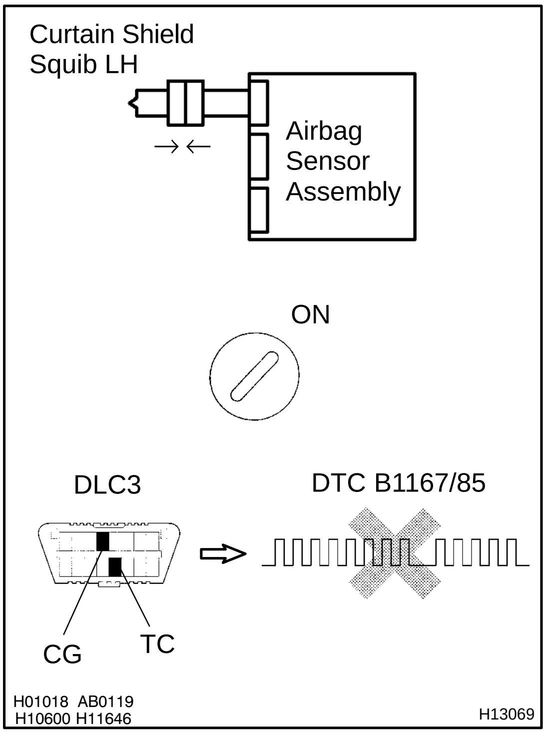
HINT:

Codes other than code B1167/85 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	**Check curtain shield squib LH.**



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the curtain shield airbag assembly LH (curtain shield squib LH) connector.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1167/85 is not output.

HINT:

Codes other than code B1167/85 may be output at this time, but they are not relevant to this check.

NG	**Replace curtain shield airbag assembly LH (curtain shield squib 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	B1168/86	Short in Curtain Shield Squib LH Circuit (to B+)

CIRCUIT DESCRIPTION

The curtain shield squib LH circuit consists of the airbag sensor assembly and the curtain shield 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-3 .
DTC B1168/86 is recorded when a B+ short is detected in the curtain shield squib LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1168/86	★Short in curtain shield squib LH circuit (to B+) ★Curtain shield squib LH malfunction ★Airbag sensor assembly malfunction	★Curtain shield airbag assembly LH (Curtain shield squib LH) ★Airbag sensor assembly ★Floor No. 1 wire

HINT:
DTC B1168/86 is indicated only for the vehicle equipped with the side airbag.

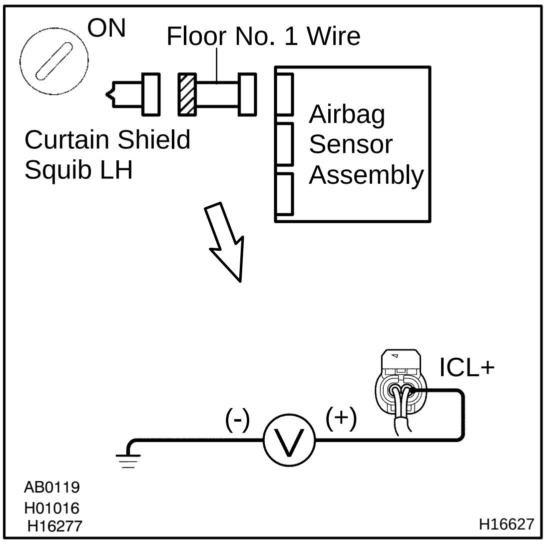
WIRING DIAGRAM

See page DI-869 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 1 wire (curtain shield squib LH circuit).**



PREPARATION:
Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

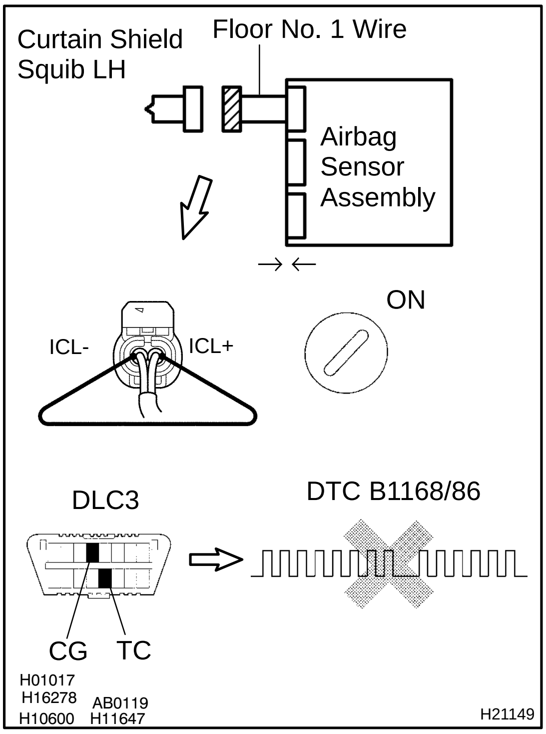
CHECK:
(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and ICL+ of the floor No. 1 wire connector on the curtain shield airbag assembly LH (curtain shield squib LH) side.

OK:
Voltage: Below 1 V

NG	**Repair or replace floor No. 1 wire.**

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the connector to the airbag sensor assembly.
(d) Using a service wire, connect ICL+ and ICL- of the floor No. 1 wire connector on the curtain shield airbag assembly LH (curtain shield squib LH) side.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

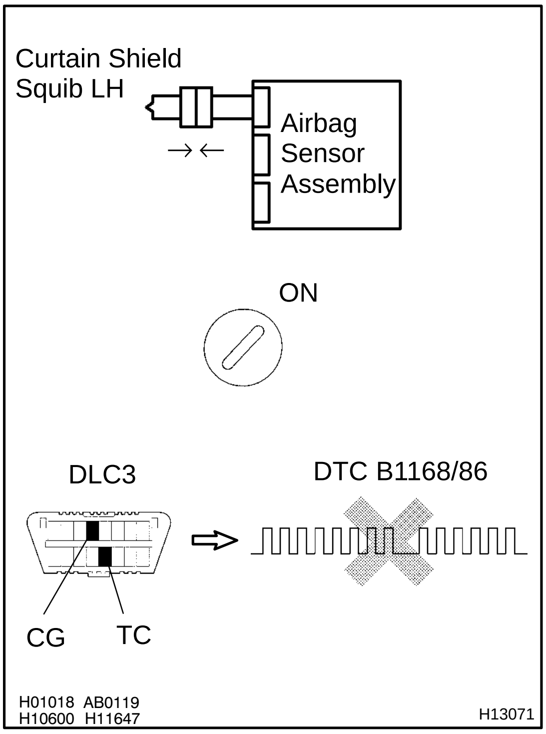
DTC B1168/86 is not output.

HINT:
Codes other than code B1168/86 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check curtain shield squib LH.**



PREPARATION:

(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the curtain shield airbag assembly LH (curtain shield squib LH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B1168/86 is not output.

HINT:
Codes other than code B1168/86 may be output at this time, but they are not relevant to this check.

NG	**Replace curtain shield airbag assembly LH (curtain shield squib 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.

DIB40-01

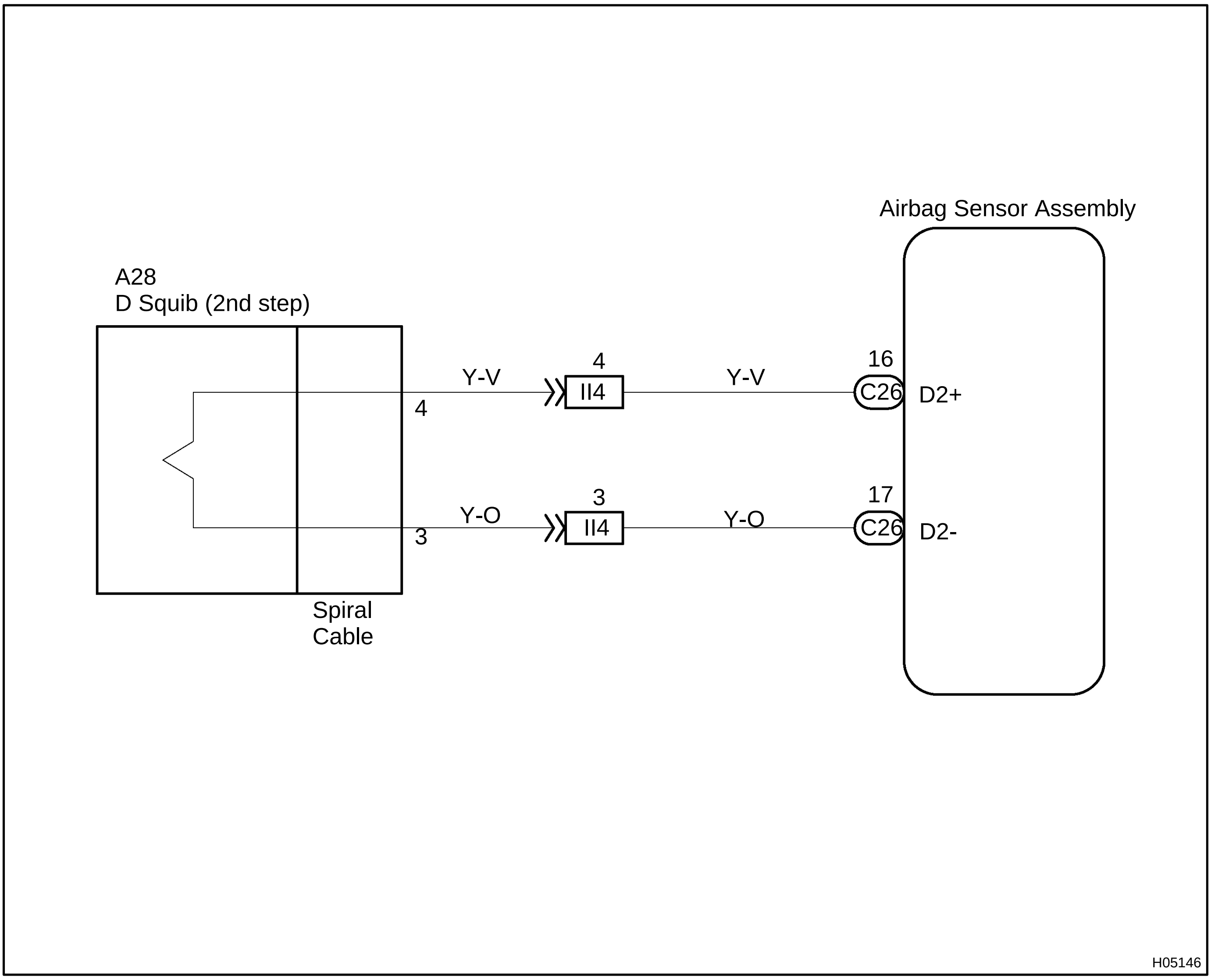
DTC	B1180/17	Short in D Squib (2nd step) Circuit

CIRCUIT DESCRIPTION

The D squib (2nd step) circuit consists of the airbag sensor assembly, the spiral cable and the 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-3 .
DTC B1180/17 is recorded when a short is detected in the D squib (2nd step) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1180/17	★Short in D squib (2nd step) circuit ★D squib (2nd step) malfunction ★Spiral cable malfunction ★Airbag sensor assembly malfunction	★Steering wheel pad (D squib (2nd step)) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check connector.**

CHECK:

Make sure that the black spiral cable connector is not damaged.

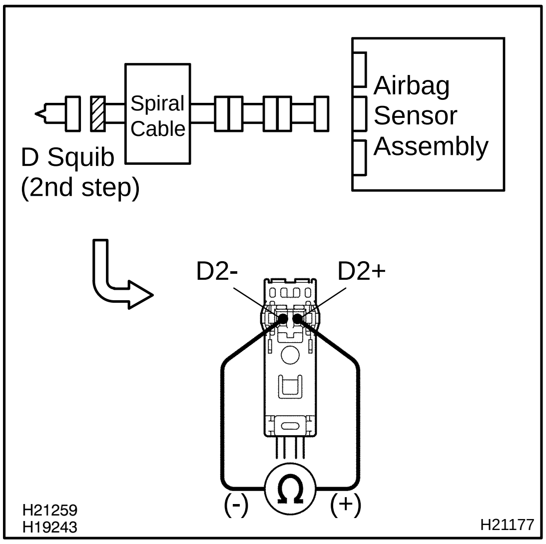
OK:

The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **Replace spiral cable.**

OK

3	**Check D squib (2nd step) circuit.**



PREPARATION:

Release the airbag activation prevention mechanism built in the connector on the airbag sensor assembly side between the air bag sensor assembly and the steering wheel pad (D squib (2nd step)) (See page DI-692).

CHECK:

Measure the resistance between D2+ and D2- of the black connector on the steering wheel pad (D squib (2nd step)) side between the airbag sensor assembly and the steering wheel pad (D squib (2nd step)).

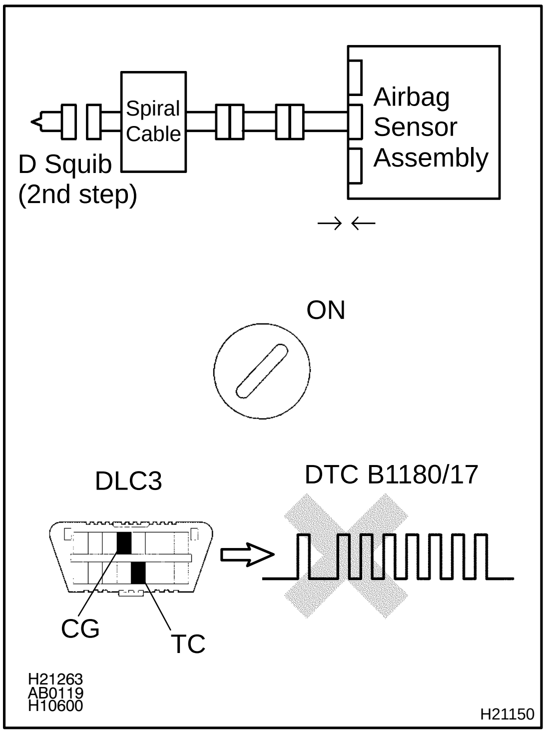
OK:

Resistance: 1 MΩ or Higher

NG → **Go to step 6.**

OK

4	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1180/17 is not output.

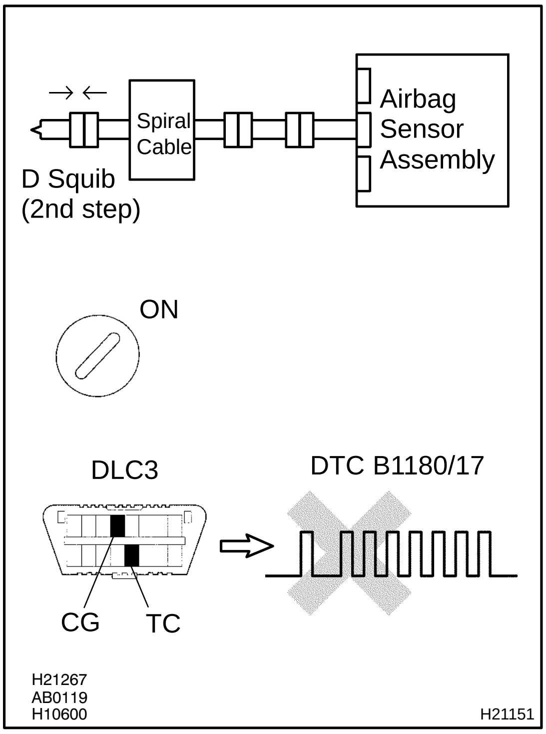
HINT:

Codes other than code B1180/17 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

5	**Check D squib (2nd step).**



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the steering wheel pad (D squib (2nd step)) to the spiral cable.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1180/17 is not output.

HINT:

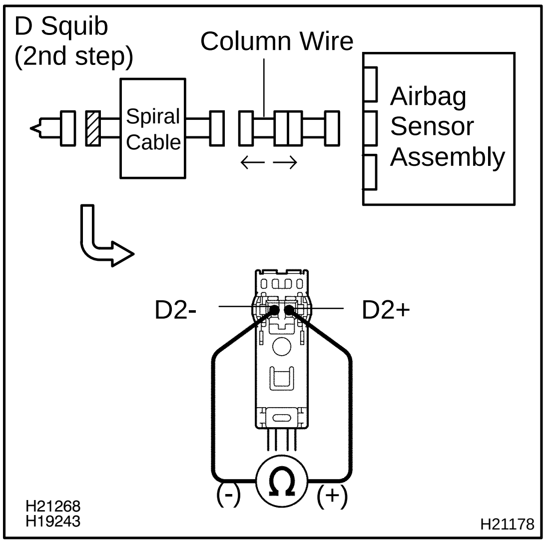
Codes other than code B1180/17 may be output at this time, but they are not relevant to this check.

NG	**Replace steering wheel pad (D squib (2nd step)).**

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.

6	**Check spiral cable.**



PREPARATION:

(a) Disconnect the spiral cable connector from the column wire.

(b) Release the airbag activation prevention mechanism built in the spiral cable connector on the airbag sensor assembly side (See page DI-692).

CHECK:

Measure the resistance between D2+ and D2- of the black spiral cable connector on the steering wheel pad (D squib (2nd step)) side.

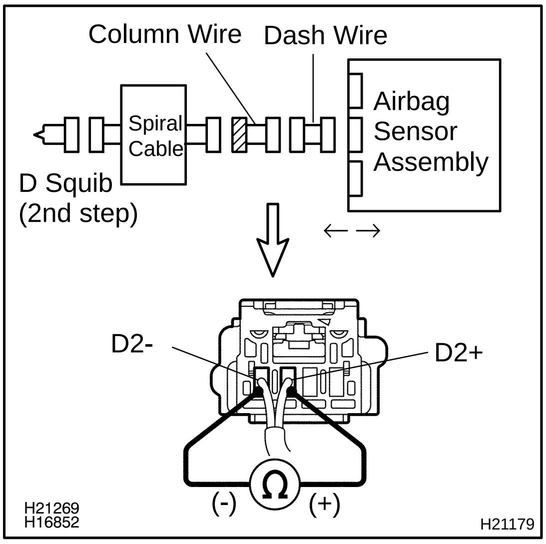
OK:

Resistance: 1 MΩ or Higher

NG	**Replace spiral cable.**

OK

7	**Check column wire.**



PREPARATION:

Release the airbag activation prevention mechanism built in the column wire connector on the airbag sensor assembly side (See page DI-692).

CHECK:

Measure the resistance between D2+ and D2- of the column wire connector on the spiral cable side.

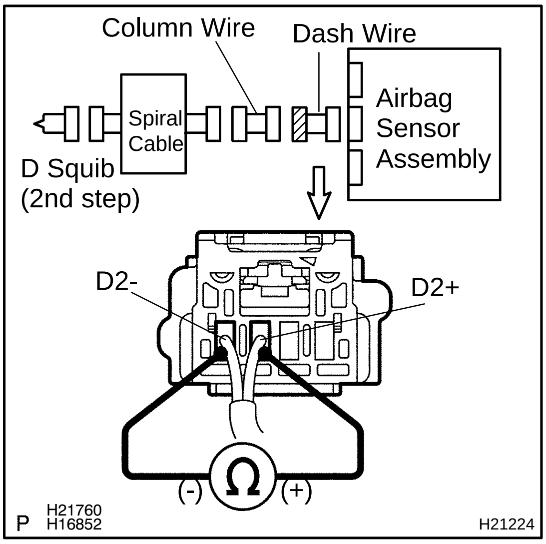
OK:

Resistance: 1 MΩ or Higher

NG	**Repair or replace column wire.**

OK

8	**Check dash wire.**



PREPARATION:
Release the airbag activation prevention mechanism built in the connector of the dash wire on the airbag sensor assembly side (See page DI-692).

CHECK:
Measure the resistance between D2+ and D2- of the dash wire connector on the column wire side.

OK:
Resistance: 1 MΩ or Higher

NG	**Repair or replace dash wire.**

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.

DIB41-01

DTC	B1181/18	Open in D Squib (2nd step) Circuit

CIRCUIT DESCRIPTION

The D squib (2nd step) circuit consists of the airbag sensor assembly, the spiral cable and the 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-3 .
DTC B1181/18 is recorded when an open is detected in the D squib (2nd step) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1181/18	★Open in D squib (2nd step) circuit ★D squib (2nd step) malfunction ★Spiral cable malfunction ★Airbag sensor assembly malfunction	★Steering wheel pad (D squib (2nd step)) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire

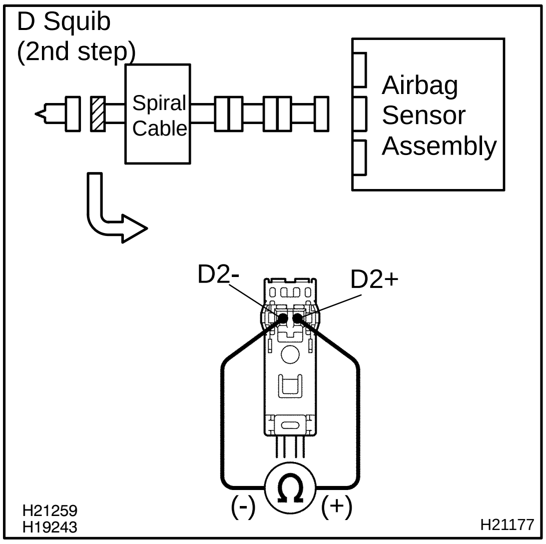
WIRING DIAGRAM

See page DI-882 .

INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-923).

2	Check D squib (2nd step) circuit.



CHECK:
Measure the resistance between D2+ and D2- of the black connector on the steering wheel pad (D squib (2nd step)) side between the airbag sensor assembly and the steering wheel pad (D squib (2nd step)).

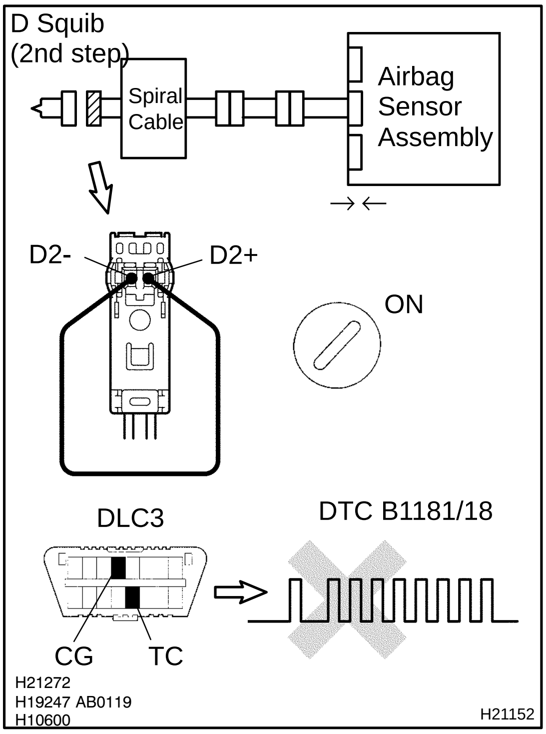
OK:

Resistance: Below 1 Ω

NG	Go to step 6.

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect D2+ and D2- of the black connector on the steering wheel pad (D squib (2nd step)) side between the airbag sensor assembly and the steering wheel pad (D squib (2nd step)).

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1181/18 is not output.

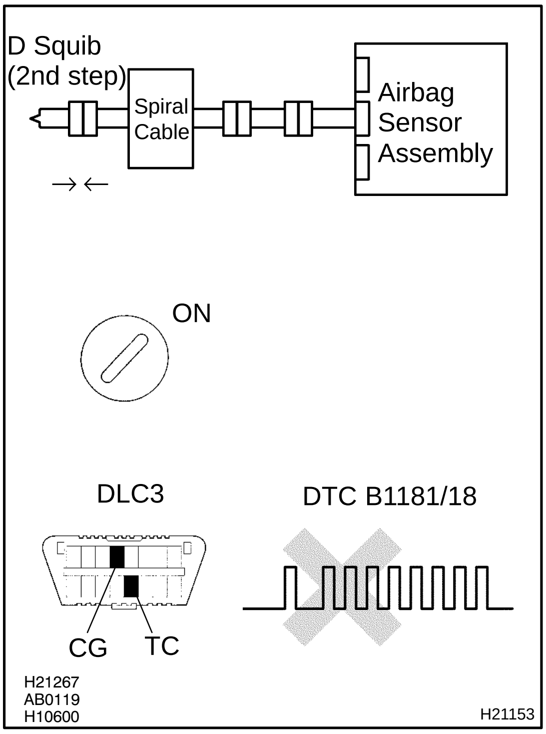
HINT:

Codes other than code B1181/18 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check D squib (2nd step).**



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the steering wheel pad (D squib (2nd step)) to the spiral cable.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1181/18 is not output.

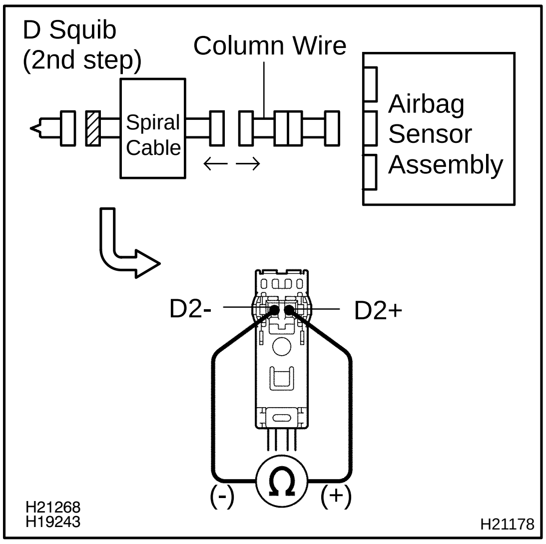
HINT:
Codes other than code B1181/18 may be output at this time, but they are not relevant to this check.

NG → **Replace steering wheel pad (D squib (2nd step)).**

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.**

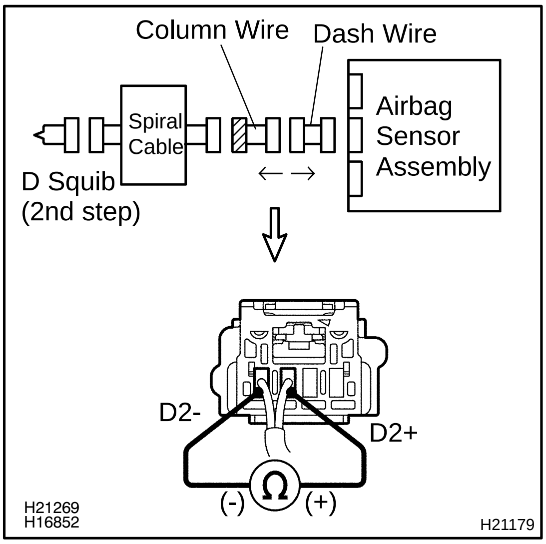


PREPARATION:
Disconnect the spiral cable connector from the column wire.
CHECK:
Measure the resistance between D2+ and D2- of the black spiral cable connector on the steering wheel pad (D squib (2nd step)) side.
OK:
Resistance: Below 1 Ω

NG → **Replace spiral cable.**

OK

6	**Check column wire.**

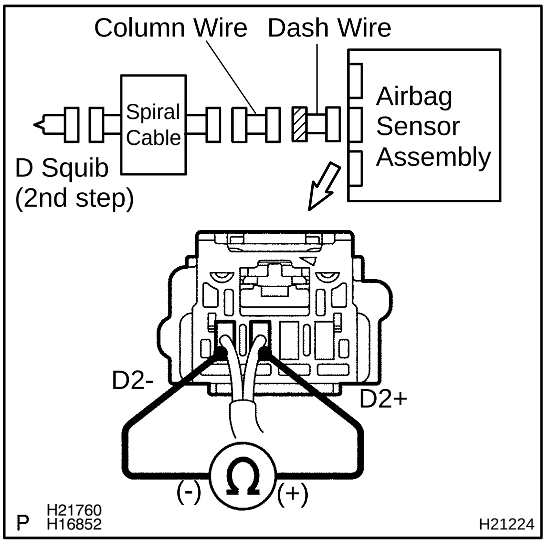


PREPARATION:
Disconnect the column wire connector from the dash wire.
CHECK:
Measure the resistance between D2+ and D2- of the column wire connector on the spiral cable side.
OK:
Resistance: Below 1 Ω

NG → **Repair or replace column wire.**

OK

7	Check dash wire.



CHECK:
Measure the resistance between D2+ and D2- of the dash wire connector on the column wire side.

OK:

Resistance: Below 1 Ω

NG	Repair or replace dash wire.

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.

DI842-01

DTC	B1182/19	Short in D Squib (2nd step) Circuit (to Ground)

CIRCUIT DESCRIPTION

The D squib (2nd step) circuit consists of the airbag sensor assembly, the spiral cable and the 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-3 .
DTC B0102/11 is recorded when a ground short is detected in the D squib (2nd step) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1182/19	⋆Short in D squib (2nd step) circuit (to ground) ⋆D squib (2nd step) malfunction ⋆Spiral cable malfunction ⋆Airbag sensor assembly malfunction	⋆Steering wheel pad (D squib (2nd step)) ⋆Spiral cable ⋆Airbag sensor assembly ⋆Dash wire ⋆Column wire

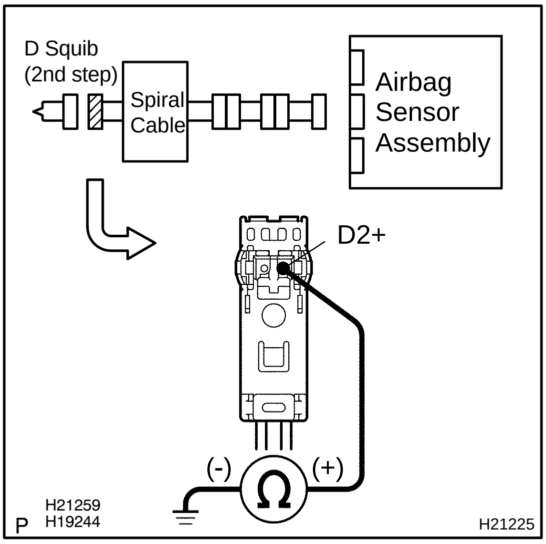
WIRING DIAGRAM

See page DI-882 .

INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-692).

2	Check D squib (2nd step) circuit.



CHECK:
Measure the resistance between the body ground and D2+ of the black connector on the steering wheel pad (D squib (2nd step)) side between the airbag sensor assembly and the steering wheel pad (D squib (2nd step)).

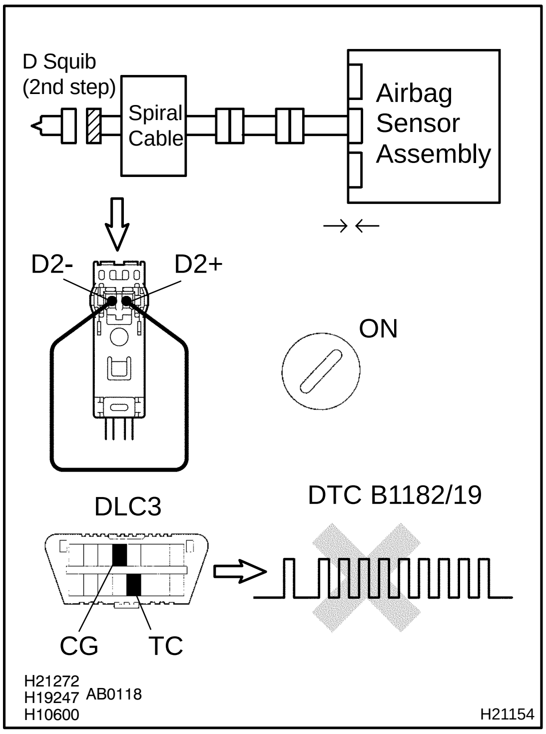
OK:

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 D2+ and D2- of the black connector on the steering wheel pad (D squib (2nd step)) side between the airbag sensor assembly and the steering wheel pad (D squib (2nd step)).

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1182/19 is not output.

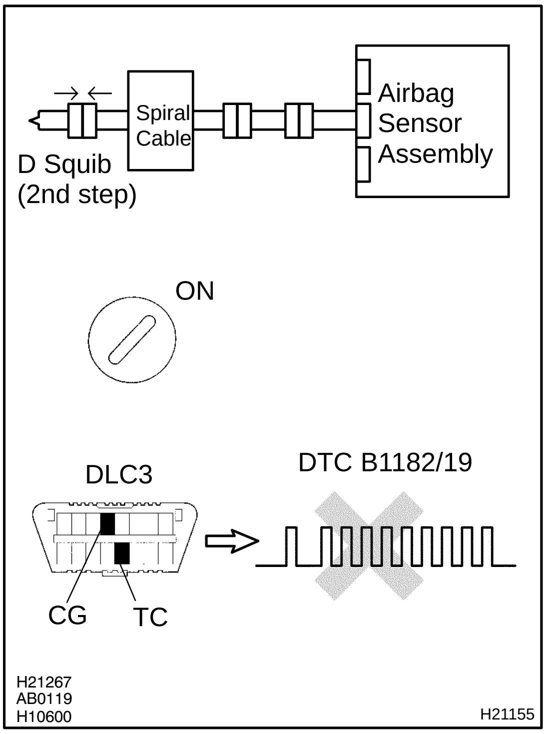
HINT:

Codes other than code B1182/19 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check D squib (2nd step).**



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the steering wheel pad (D squib (2nd step)) to the spiral cable.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1182/19 is not output.

HINT:

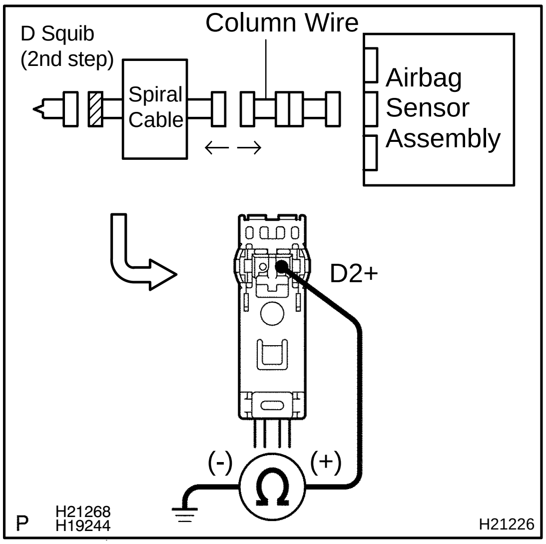
Codes other than code B1182/19 may be output at this time, but they are not relevant to this check.

NG	**Replace steering wheel pad (D squib (2nd step)).**

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.

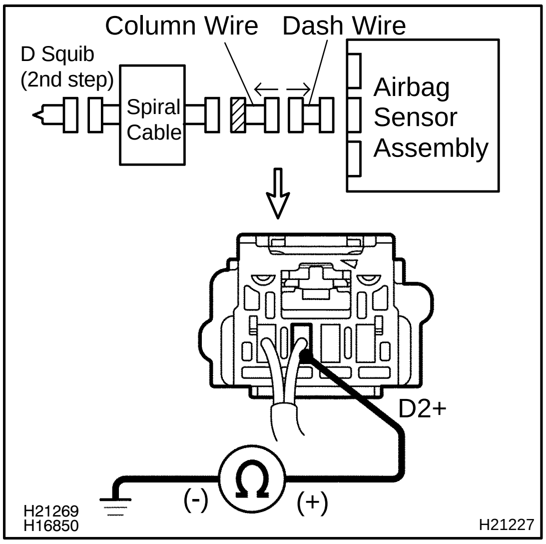


PREPARATION:
Disconnect the spiral cable connector from the column wire.
CHECK:
Measure the resistance between the body ground and D2+ of the black spiral cable connector on the steering wheel pad (D squib (2nd step)) side.
OK:
Resistance: 1 MΩ or Higher

NG	Replace spiral cable.

OK

6	Check column wire.

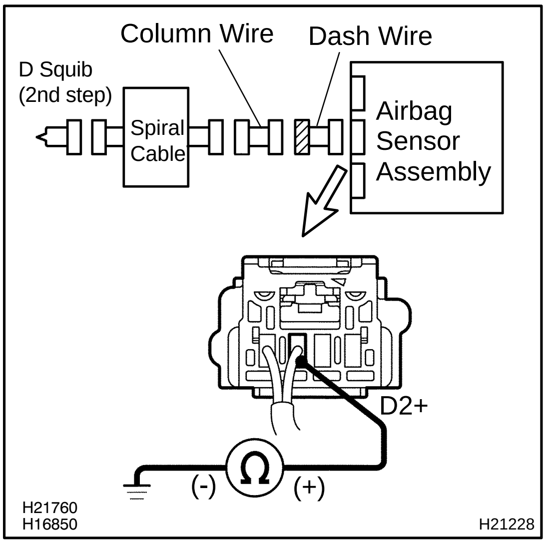


PREPARATION:
Disconnect the column wire connector from the dash wire.
CHECK:
Measure the resistance between the body ground and D2+ of the column wire connector on the spiral cable side.
OK:
Resistance: 1 MΩ or Higher

NG	Repair or replace column wire.

OK

7	**Check dash wire.**



CHECK:

Measure the resistance between the body ground and D2+ of the dash wire connector on the column wire side.

OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace dash wire.**

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	B1183/22	Short in D Squib (2nd step) Circuit (to B+)

CIRCUIT DESCRIPTION

The D squib (2nd step)circuit consists of the airbag sensor assembly, the spiral cable and the 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-3 .

DTC B1183/22 is recorded when a B+ short is detected in the D squib (2nd step) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1183/22	★Short in D squib (2nd step) circuit (to B+) ★D squib (2nd step) malfunction ★Spiral cable malfunction ★Airbag sensor assembly malfunction	★Steering wheel pad (D squib (2nd step)) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire

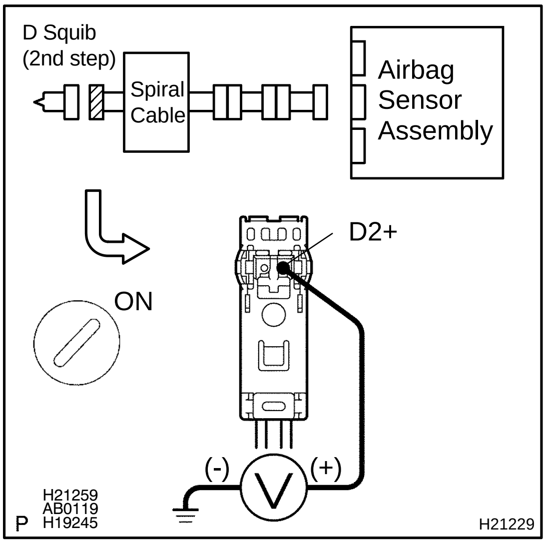
WIRING DIAGRAM

See page DI-882 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check D squib (2nd step) circuit.**



PREPARATION:

Connect the negative (-) terminal cable to the battery and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and D2+ of the black connector on the steering wheel pad (D squib (2nd step)) side between the airbag sensor assembly and the steering wheel pad (D squib (2nd step)).

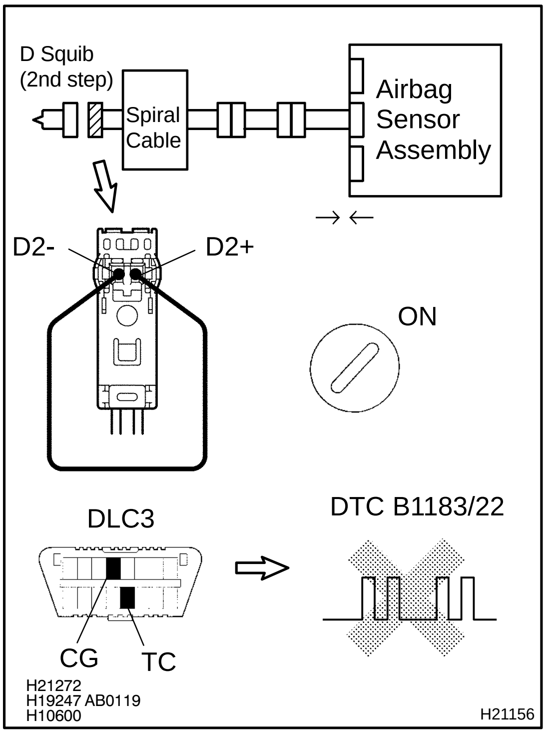
OK:

Voltage: Below 1 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 D2+ and D2- of the black connector on the steering wheel pad (D squib (2nd step)) side between the airbag sensor assembly and the steering wheel pad (D squib (2nd step)).

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

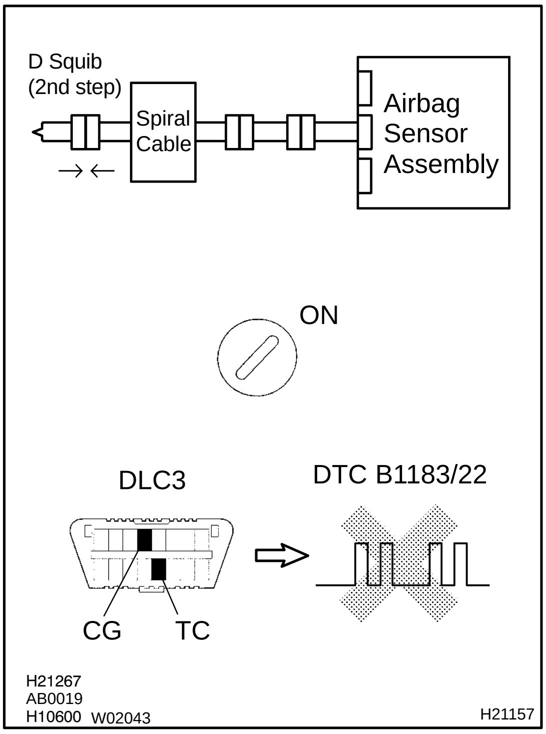
DTC B1183/22 is not output.

HINT:
Codes other than code B1183/22 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check D squib (2nd step).**



PREPARATION:

(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the steering wheel pad (D squib (2nd step)) to the spiral cable.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B1183/22 is not output.

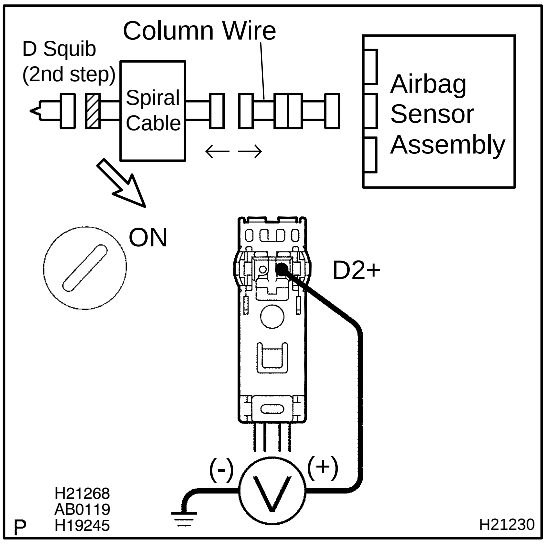
HINT:
Codes other than code B1183/22 may be output at this time, but they are not relevant to this check.

NG	**Replace steering wheel pad (D squib (2nd step)).**

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 the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Disconnect the spiral cable connector from the column wire.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and D2+ of the black spiral cable connector on the steering wheel pad (D squib (2nd step)) side.

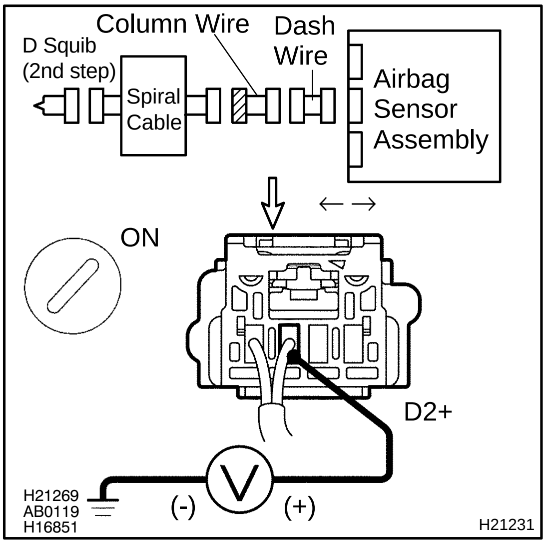
OK:

Voltage: Below 1 V

NG	**Replace spiral cable.**

OK

6	**Check column wire.**



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Disconnect the column wire connector from the dash wire.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and D2+ of the column wire connector on the spiral cable side.

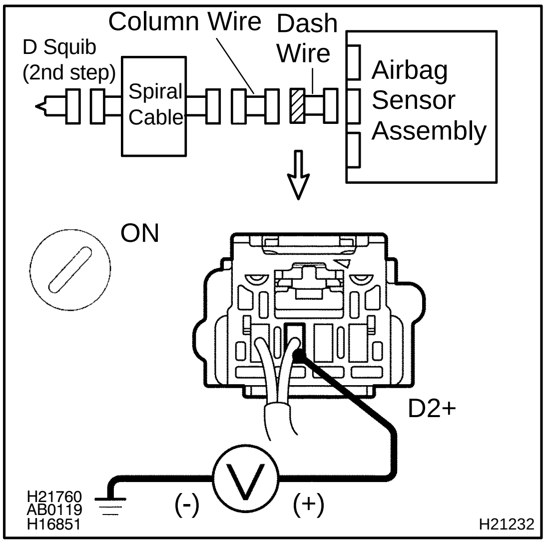
OK:

Voltage: Below 1 V

NG	**Repair or replace column wire.**

OK

7	Check dash wire.



CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and D2+ of the dash wire connector on the column wire side.

OK:

Voltage: Below 1 V

NG	Repair or replace dash wire.

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.

DI8F0-06

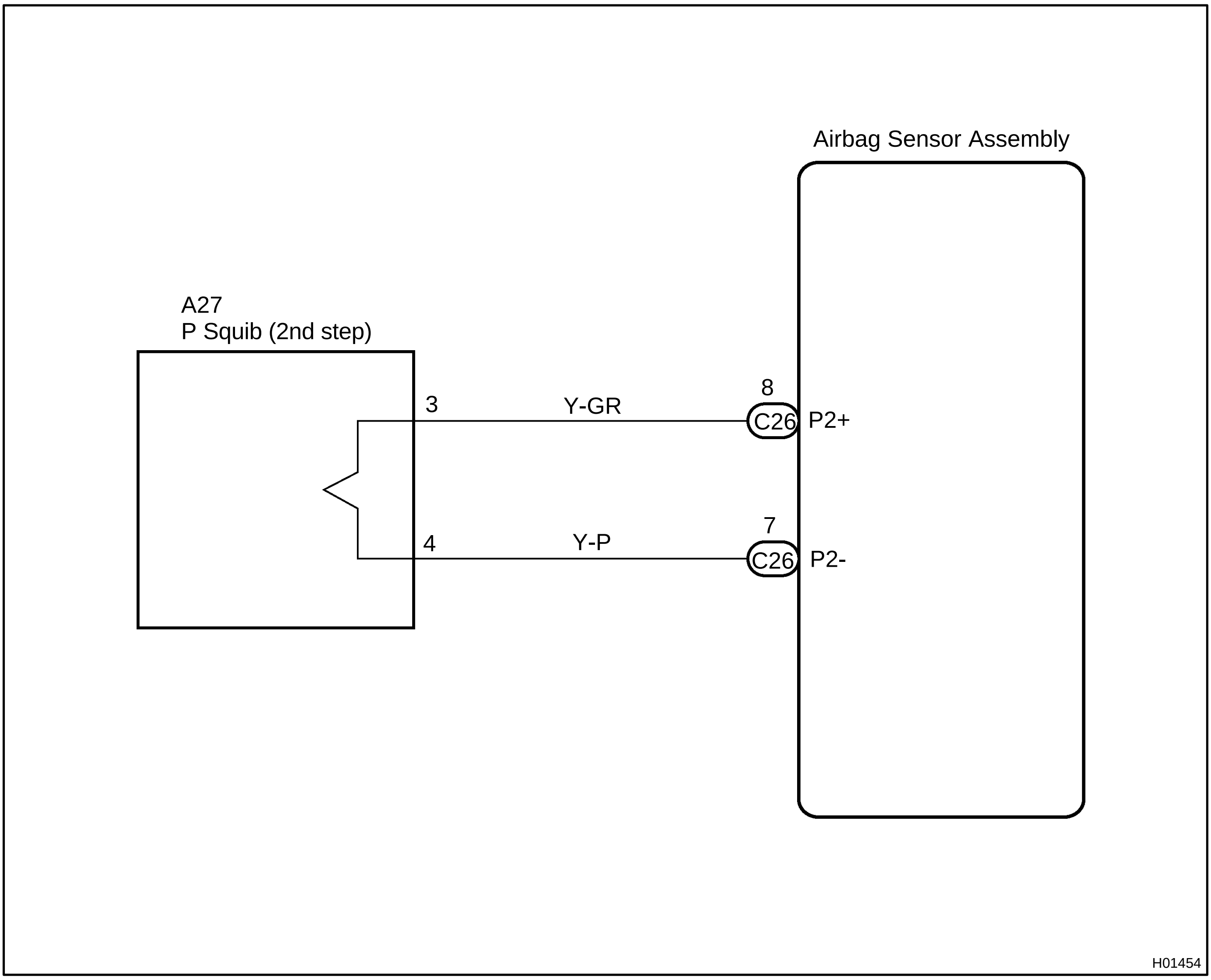
DTC	B1185/57	Short in P Squib (2nd step) Circuit

CIRCUIT DESCRIPTION

The P squib (2nd step) circuit consists of the airbag sensor assembly and the 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-3 .
DTC B1185/57 is recorded when a short is detected in the P squib (2nd step) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1185/57	★Short in P squib (2nd step) circuit ★P squib (2nd step) malfunction ★Airbag sensor assembly malfunction	★Front passenger airbag assembly (P squib (2nd step)) ★Airbag sensor assembly ★Dash wire

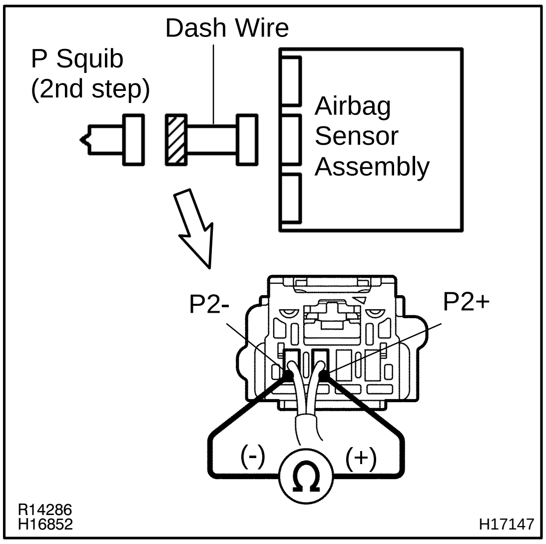
WIRING DIAGRAM



INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-923).

2	Check dash wire (P squib (2nd step) circuit).



PREPARATION:
Release the airbag activation prevention mechanism built in the connector of the dash wire on the airbag sensor assembly side (See page DI-692).

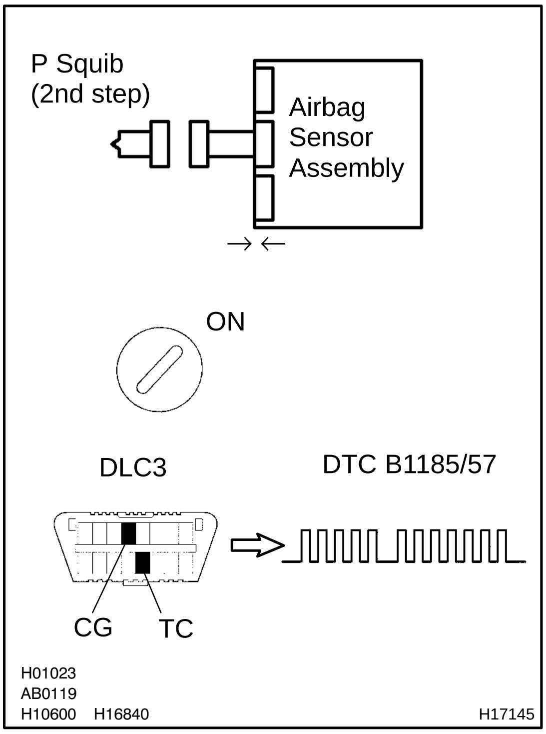
CHECK:
Measure the resistance between P2+ and P2- of the dash wire connector on the front passenger airbag assembly (P squib (2nd step)) side.

OK:
Resistance: 1 MΩ or Higher

NG	Repair or replace dash wire.

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

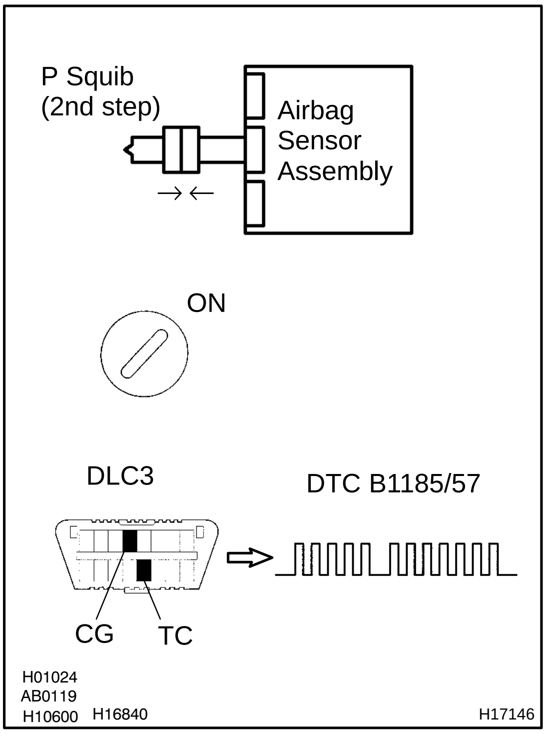
DTC B1185/57 is not output.

HINT:
Codes other than code B1185/57 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check P squib (2nd step).**



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the front passenger airbag assembly (P squib (2nd step)) connector.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1185/57 is not output.

HINT:

Codes other than code B1185/57 may be output at this time, but they are not relevant to this check.

NG → **Replace front passenger airbag assembly (P squib (2nd step)).**

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.

DI8F1-06

DTC	B1186/58	Open in P Squib (2nd step) Circuit

CIRCUIT DESCRIPTION

The P squib (2nd step) circuit consists of the airbag sensor assembly and the 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-3 .
DTC B1186/58 is recorded when an open is detected in the P squib (2nd step) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1186/58	★Open in P squib (2nd step) circuit ★P squib (2nd step) malfunction ★Airbag sensor assembly malfunction	★Front passenger airbag assembly (P squib (2nd step)) ★Airbag sensor assembly ★Dash wire

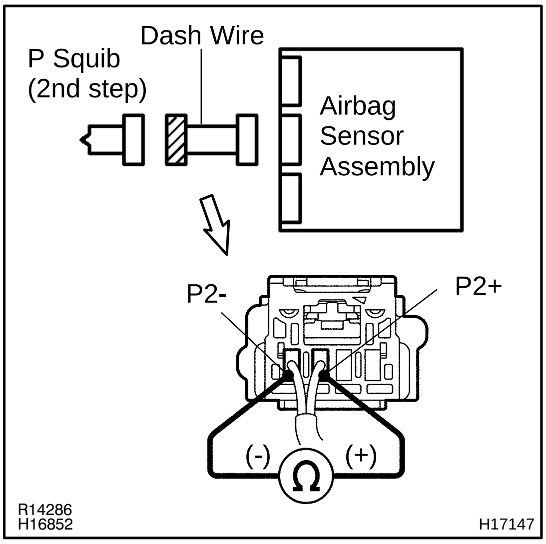
WIRING DIAGRAM

See page DI-903 .

INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-923).

2	Check dash wire (P squib (2nd step) circuit).



CHECK:

Measure the resistance between P2+ and P2- of the dash wire connector on the front passenger airbag assembly (P squib (2nd step)) side.

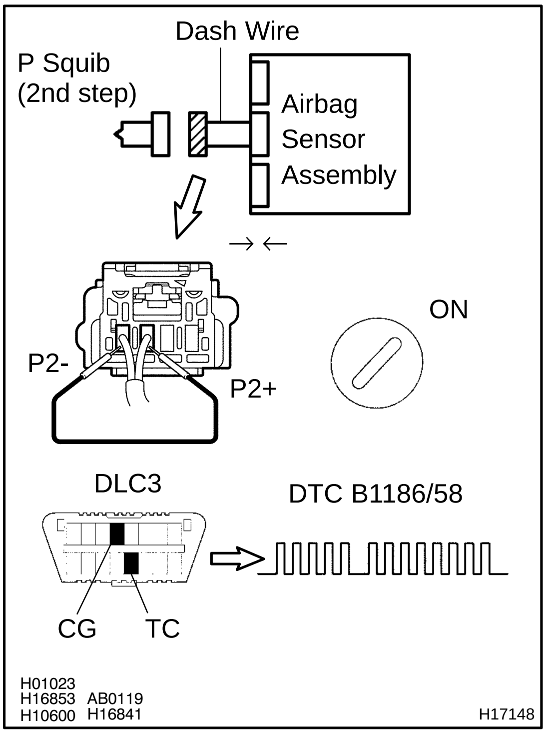
OK:

Resistance: Below 1 Ω

NG	Repair or replace dash wire.

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect P2+ and P2- of the dash wire connector on the front passenger airbag assembly (P squib (2nd step)) side.

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1186/58 is not output.

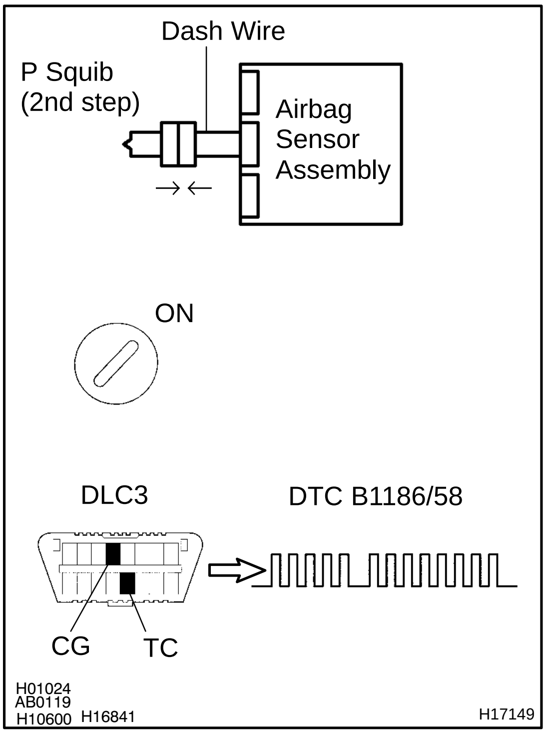
HINT:

Codes other than code B1186/58 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check P squib (2nd step).**



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the front passenger airbag assembly (P squib (2nd step)) to the dash wire.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1186/58 is not output.

HINT:

Codes other than code B1186/58 may be output at this time, but they are not relevant to this check.

NG	**Replace front passenger airbag assembly (P squib (2nd step)).**

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.

DI8F2-06

DTC	B1187/55	Short in P Squib (2nd step) Circuit (to Ground)

CIRCUIT DESCRIPTION

The P squib (2nd step) circuit consists of the airbag sensor assembly and the 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-3 .
DTC B1187/55 is recorded when ground short is detected in the P squib (2nd step) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1187/55	★Short in P squib (2nd step) circuit (to ground) ★P squib (2nd step) malfunction ★Airbag sensor assembly malfunction	★Front passenger airbag assembly (P squib (2nd step)) ★Airbag sensor assembly ★Dash wire

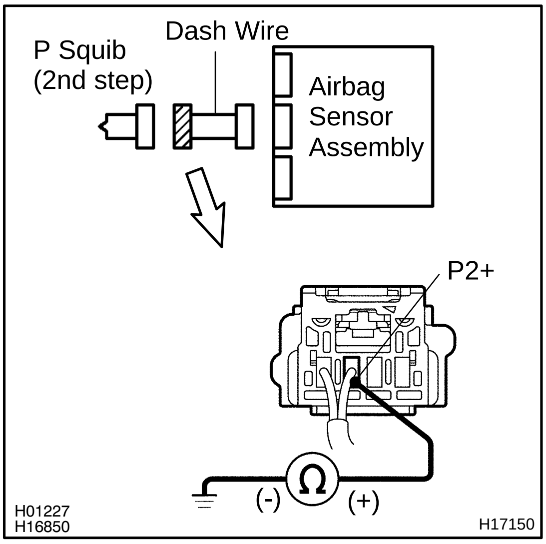
WIRING DIAGRAM

See page DI-903 .

INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-923).

2	Check dash wire(P squib (2nd step) circuit).

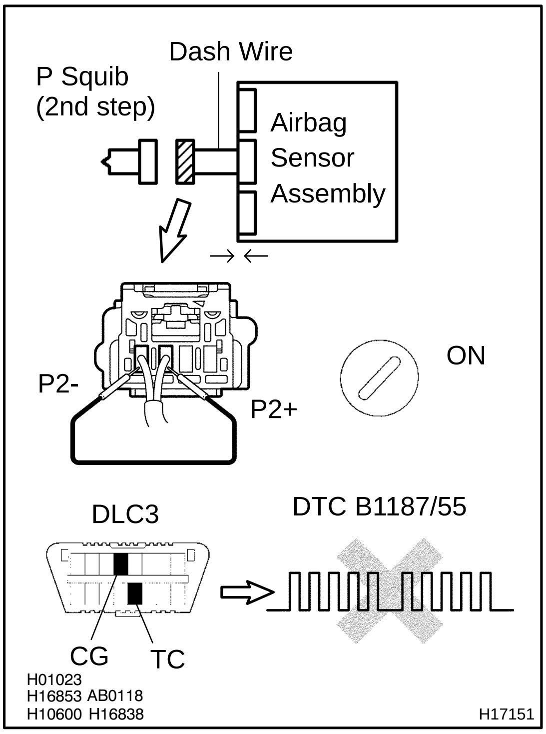


CHECK:
Measure the resistance between the body ground and P2+ of the dash wire connector on the front passenger airbag assembly (P squib (2nd step)) side.
OK:
Resistance: 1 MΩ or Higher

NG	Repair or replace dash wire.

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect P2+ and P2- of the dash wire connector on the front passenger airbag assembly (P squib (2nd step)) side.

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1187/55 is not output.

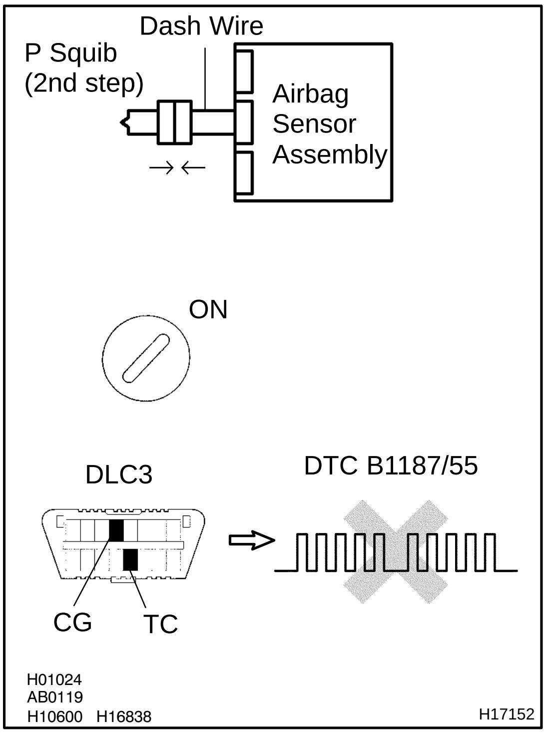
HINT:

Codes other than code B1187/55 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check P squib (2nd step).**



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the front passenger airbag assembly (P squib (2nd step)) to the dash wire.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1187/55 is not output.

HINT:

Codes other than code B1187/55 may be output at this time, but they are not relevant to this check.

NG	**Replace front passenger airbag assembly (P squib (2nd step)).**

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.

DI8F3-06

DTC	B1188/56	Short in P Squib (2nd step) Circuit (to B+)

CIRCUIT DESCRIPTION

The P squib (2nd step) circuit consists of the airbag sensor assembly and the 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-3 .
DTC B1188/56 is recorded when a B+ short is detected in the P squib (2nd step) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1188/56	★Short in P squib (2nd step) circuit (to B+) ★P squib (2nd step) malfunction ★Airbag sensor assembly malfunction	★Front passenger airbag assembly (P squib (2nd step)) ★Airbag sensor assembly ★Dash wire

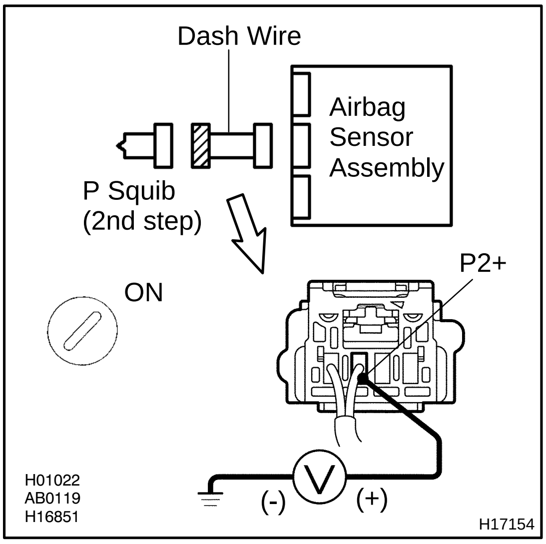
WIRING DIAGRAM

See page DI-903 .

INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-923).

2	Check dash wire (P squib (2nd step) circuit).



PREPARATION:
Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

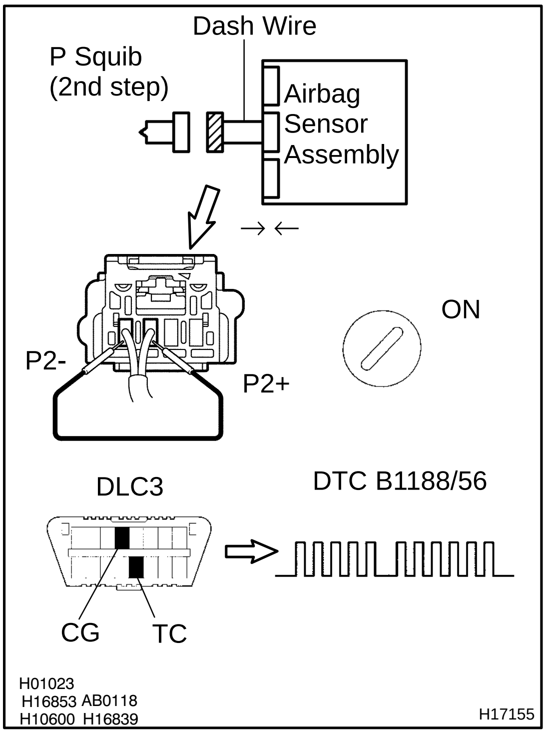
CHECK:
(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and P2+ of the dash wire connector on the front passenger airbag assembly (P squib (2nd step)) side.

OK:
Voltage: Below 1 V

NG	Repair or replace dash wire.

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect P2+ and P2- of the dash wire connector on the front passenger airbag assembly (P squib (2nd step)) side.

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1188/56 is not output.

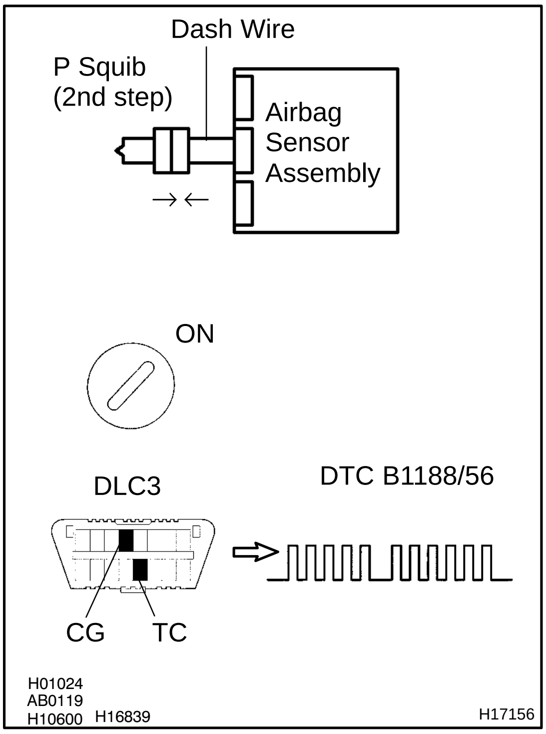
HINT:

Codes other than code B1188/56 may be output at this time, but they are not relevant to this check.

NG	**Replace airbag sensor assembly.**

OK

4	**Check P squib (2nd step).**



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Connect the front passenger airbag assembly (P squib (2nd step)) to the dash wire.

(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1188/56 is not output.

HINT:
Codes other than code B1188/56 may be output at this time, but they are not relevant to this check.

NG → **Replace front passenger airbag assembly (P squib (2nd step)).**

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	B1628/29	RSCA off Switch Indicator Malfunction

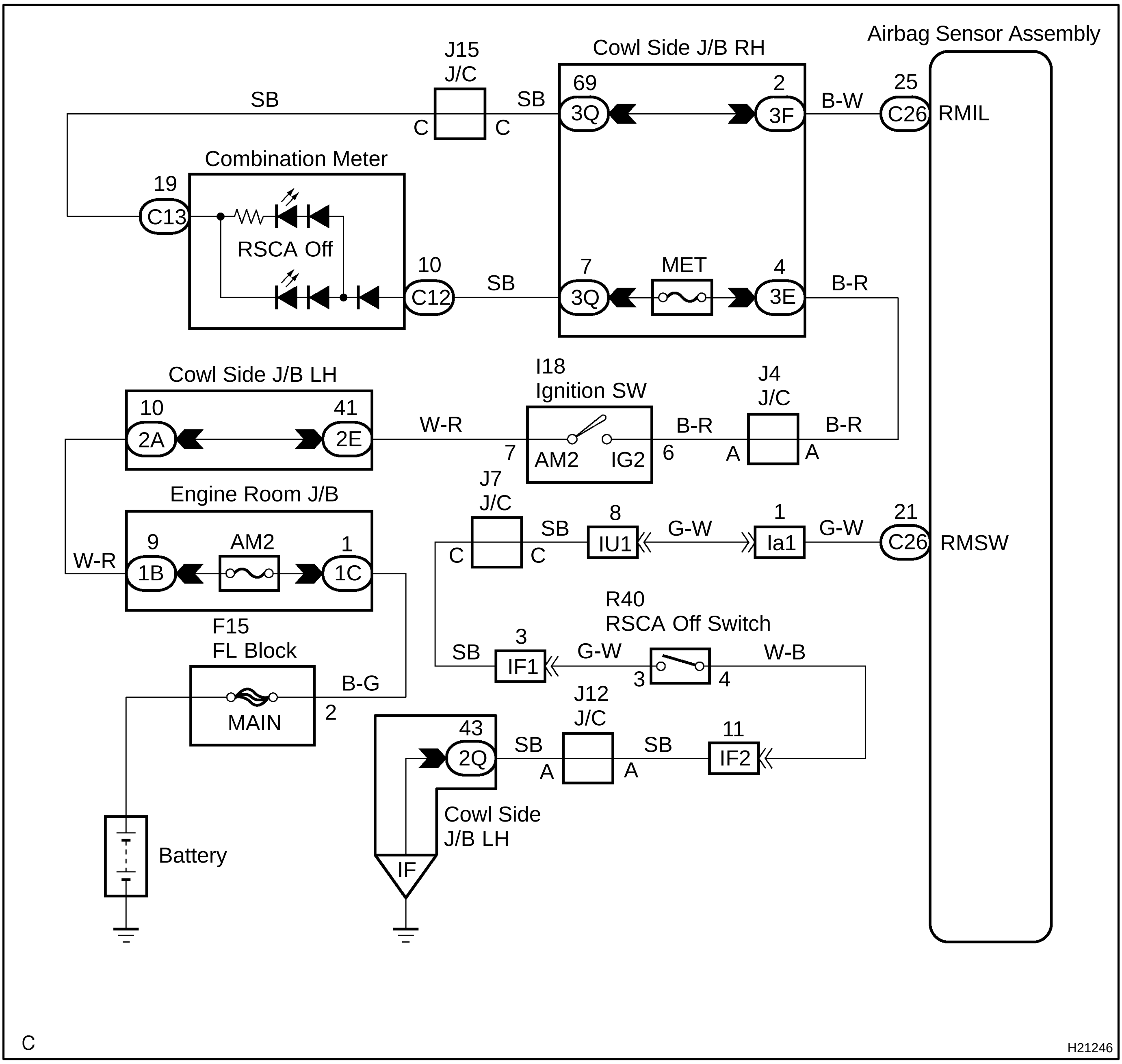
CIRCUIT DESCRIPTION

The RSCA off switch is a mechanism that operates both right and left side of the curtain shield airbag assembly and the seat belt pretensioner when the airbag sensor assembly detects a roll-over.
The RSCA off switch indicator light is installed in the combination meter.
As operating the RSCA off switch, the indicator light comes on to inform the driver that the roll-over detection system is not working.
The initial setting of the roll-over detection system is on. It automatically operates every time the ignition switch is turned on.

DTC No.	DTC Detecting Condition	Trouble Area
B1628/29	★RSCA off indicator circuit malfunction	★RSCA off switch ★Airbag sensor assembly ★Dash wire ★Instrument panel wire

HINT:
DTC B1628/29 is indicated only for the vehicle equipped with the side airbag.

WIRING DIAGRAM



INSPECTION PROCEDURE

The RSCA off indicator light remains on when the RSCA off switch is not operating (Remains ON).

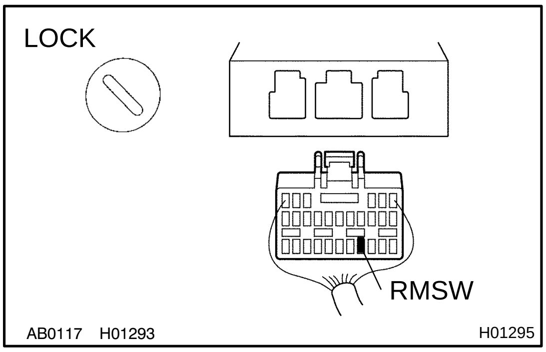
1	**Does indicator light turn off?**

PREPARATION:
Disconnect the combination meter connector.
CHECK:
(a) Turn the ignition switch to ON.
(b) Check operation of RSCA off indicator light.
OK:
The indicator light does not light up.

NO → **Check combination meter (See page BE-58).**

YES

2	**Check wire harness.**

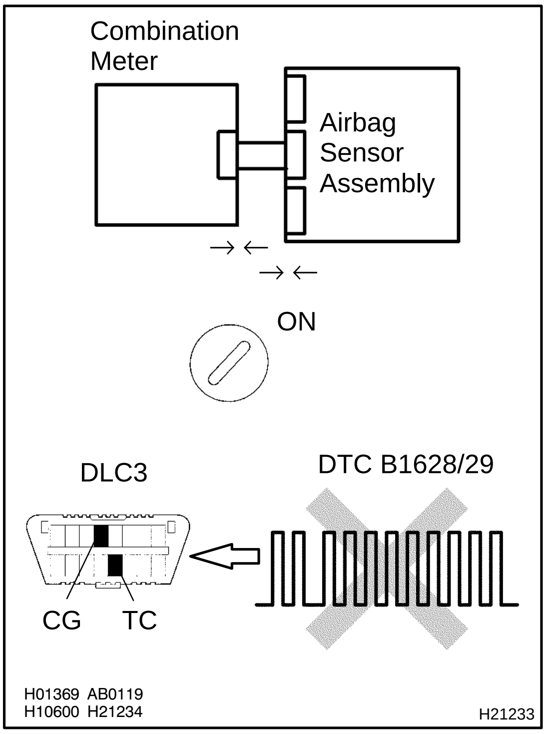


PREPARATION:
(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the airbag sensor assembly connector.
CHECK:
Measure the resistance between the body ground and RMSW on the airbag sensor assembly side between the combination meter and airbag sensor assembly.
OK:
Resistance: 1 MΩ or Higher

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

OK

3	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the airbag sensor assembly connector.
(b) Connect the combination meter connector.
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B2628/29 is not output.

HINT:
Codes other than code B1628/29 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.

The RSCA off indicator light does not come on when the RSCA off switch is operating (Remains OFF).

1	**Check voltage of combination meter.**

PREPARATION:
Disconnect the combination meter connector.
CHECK:
Measure the voltage of the combination meter.
OK:
Voltage: 10 - 14 V

NG → **Check combination meter (See page BE-58).**

OK

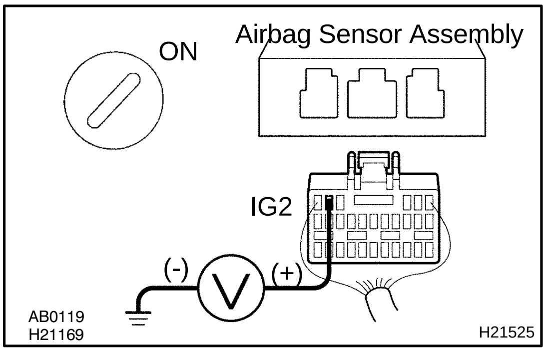
2	**Check wire harness.**

PREPARATION:
Disconnect the combination meter connector.
CHECK:
Measure the voltage between the body ground and RMSW on the combination meter side between the air-bag sensor assembly and the combination meter.
OK:
Voltage: Below 1 V

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

OK

3	**Check wire harness.**



PREPARATION:

(a) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(b) Connect the combination meter connector.
(c) Turn the ignition switch to LOCK, and wait at least for 90 seconds.
(d) Disconnect the airbag sensor assembly connector.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and IG2 on the airbag sensor assembly side.

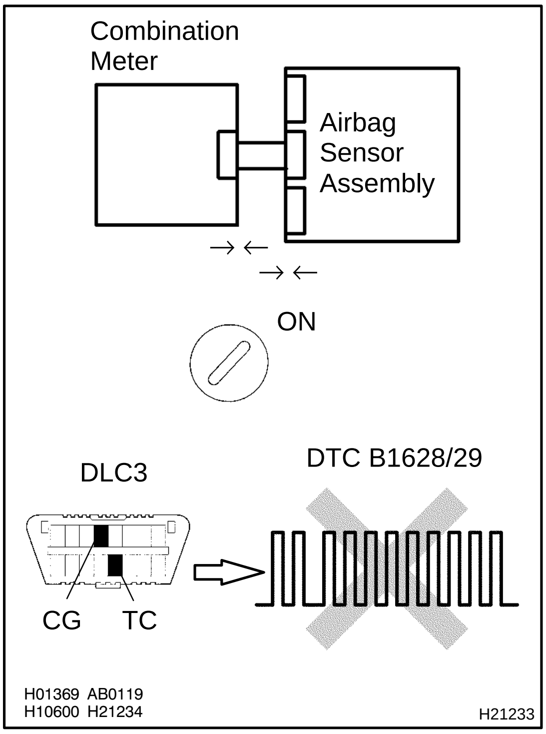
OK:

Voltage: 10 - 14 V

NG	**Repair or replace wire harness.**

OK

4	**Check airbag sensor assembly.**



PREPARATION:

Connect the airbag sensor assembly connector.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1628/29 is not output.

HINT:

Codes other than code B1628/29 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.

DI8FC-09

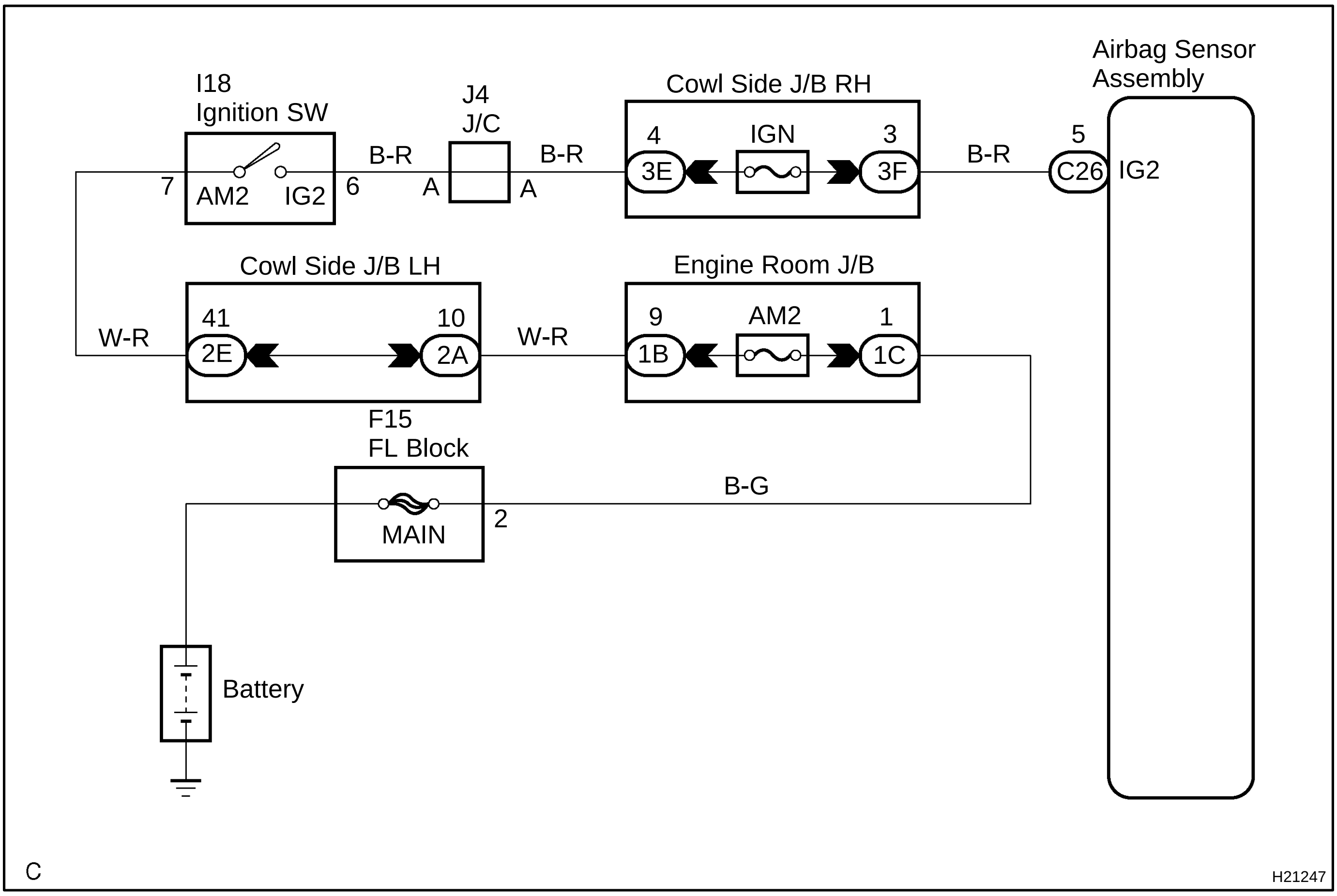
DTC	Normal	Source Voltage Drop

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 differ from the other circuits in that when the SRS warning light remains on and the DTC shows a normal code, source voltage drop is indicated.
Malfunction in this circuit is not recorded in the airbag sensor assembly, and when the source voltage returns to normal, the SRS warning light automatically goes off.

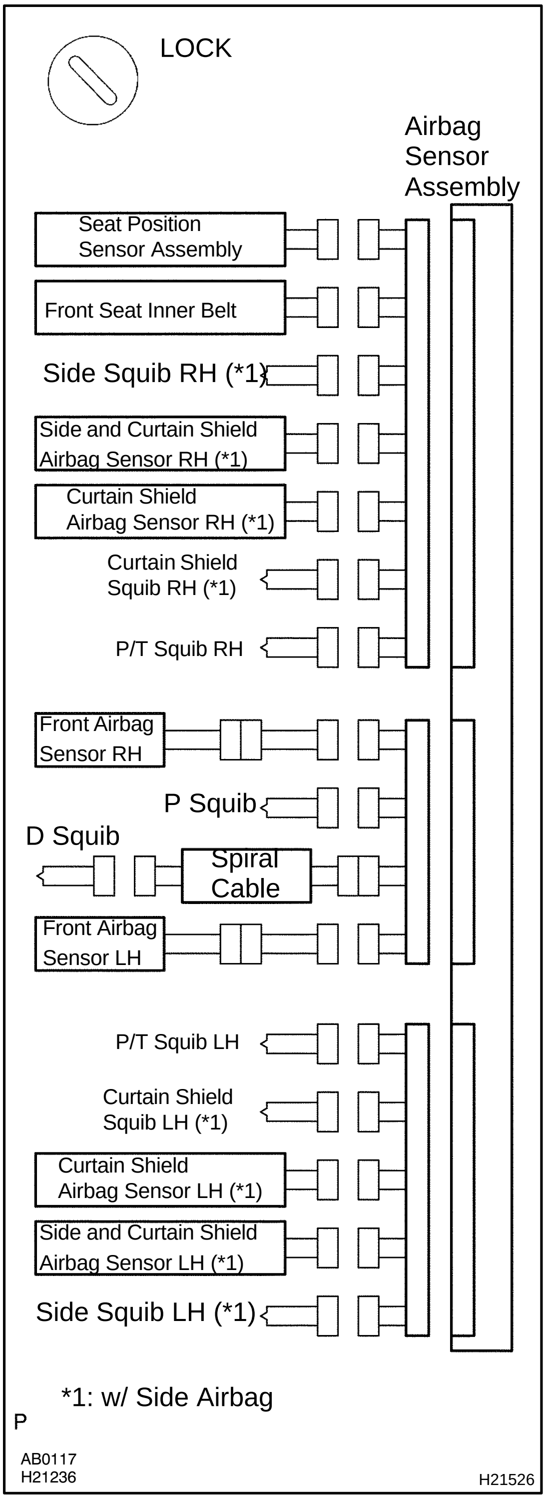
DTC No.	Diagnosis
(Normal)	Source voltage drop

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Prepare for inspection.



PREPARATION:

(a) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(b) Remove the steering wheel pad (See page SR-29).

(c) Disconnect the connector of the front passenger airbag assembly (See page RS-31).

(d) w/ Side airbag:
Disconnect the connector of the side airbag assembly RH and LH (See page RS-44).

(e) w/ Side airbag:
Disconnect the connector of the curtain shield airbag assembly RH and LH (See page RS-59).

(f) Disconnect the connector of the seat belt pretensioner RH and LH (See page BO-141).

(g) Disconnect the connectors of the airbag sensor assembly (See page RS-70).

(h) Disconnect the connector of the front airbag sensor RH and LH (See page RS-75).

(i) w/ Side airbag:
Disconnect the connector of the side and curtain shield airbag sensor assembly RH and LH (See page RS-80).

(j) w/ Side airbag:
Disconnect the connector of the curtain shield airbag sensor assembly RH and LH (See page RS-86).

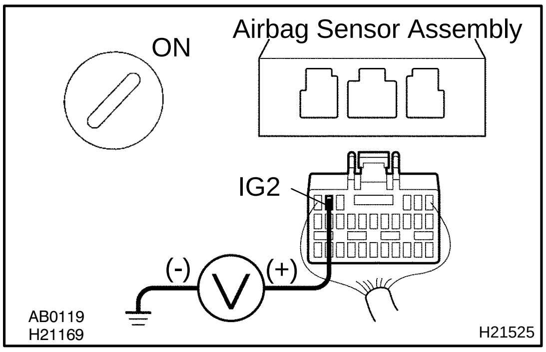
(k) Disconnect the connector of the seat position sensor assembly (See page RS-91).

(l) Disconnect the front seat inner belt LH connector (See page BO-106).

CAUTION:

Store the steering wheel pad, front passenger airbag assembly, side airbag assembly and curtain shield airbag assembly with the front surface facing upward.

2	**Check source voltage.**



PREPARATION:
Connect the negative (-) terminal cable to the battery.

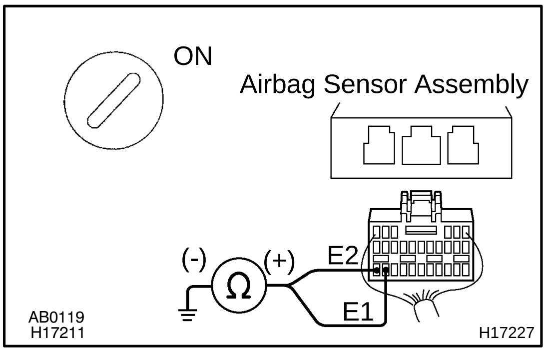
CHECK:
(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and IG2 on the airbag sensor assembly and operate electric system (defogger, wiper, headlight, heater blower, etc.).

OK:
Voltage: 10 - 14 V

NG	**Check harness between battery and airbag sensor assembly, and check battery and charging system.**

OK

3	**Check airbag sensor assembly connector.**



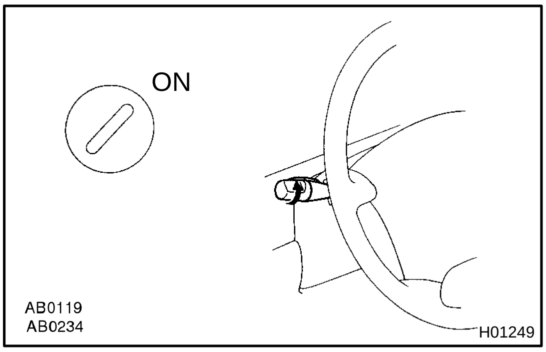
CHECK:
Measure the resistance between the body ground and each of E1 and E2 of the airbag sensor assembly connector.

OK:
Resistance: 0 Ω (Continuity)

NG	**Repair or replace airbag sensor assembly connector.**

OK

4	**Does SRS warning light turn off?**



PREPARATION:

(a) Turn the ignition switch to LOCK.
(b) Connect the steering wheel pad connector.
(c) Connect the front passenger airbag assembly connector.
(d) w/ Side airbag:
Connect the side airbag assembly connectors.
(e) Connect the seat belt pretensioner connectors.
(f) Connect the airbag sensor assembly connectors.
(g) Connect the front airbag sensor connectors.
(h) w/ Side airbag:
Connect the side and curtain shield airbag sensor assembly connectors.
(i) w/ Side airbag:
Connect the curtain shield airbag assembly connectors.
(j) w/ Side airbag:
Connect the curtain shield airbag sensor assembly connectors.
(k) Connect the seat position sensor assembly connector.
(l) Connect the front seat inner belt LH connector.

CHECK:

(a) Turn the ignition switch to ON.
(b) 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.

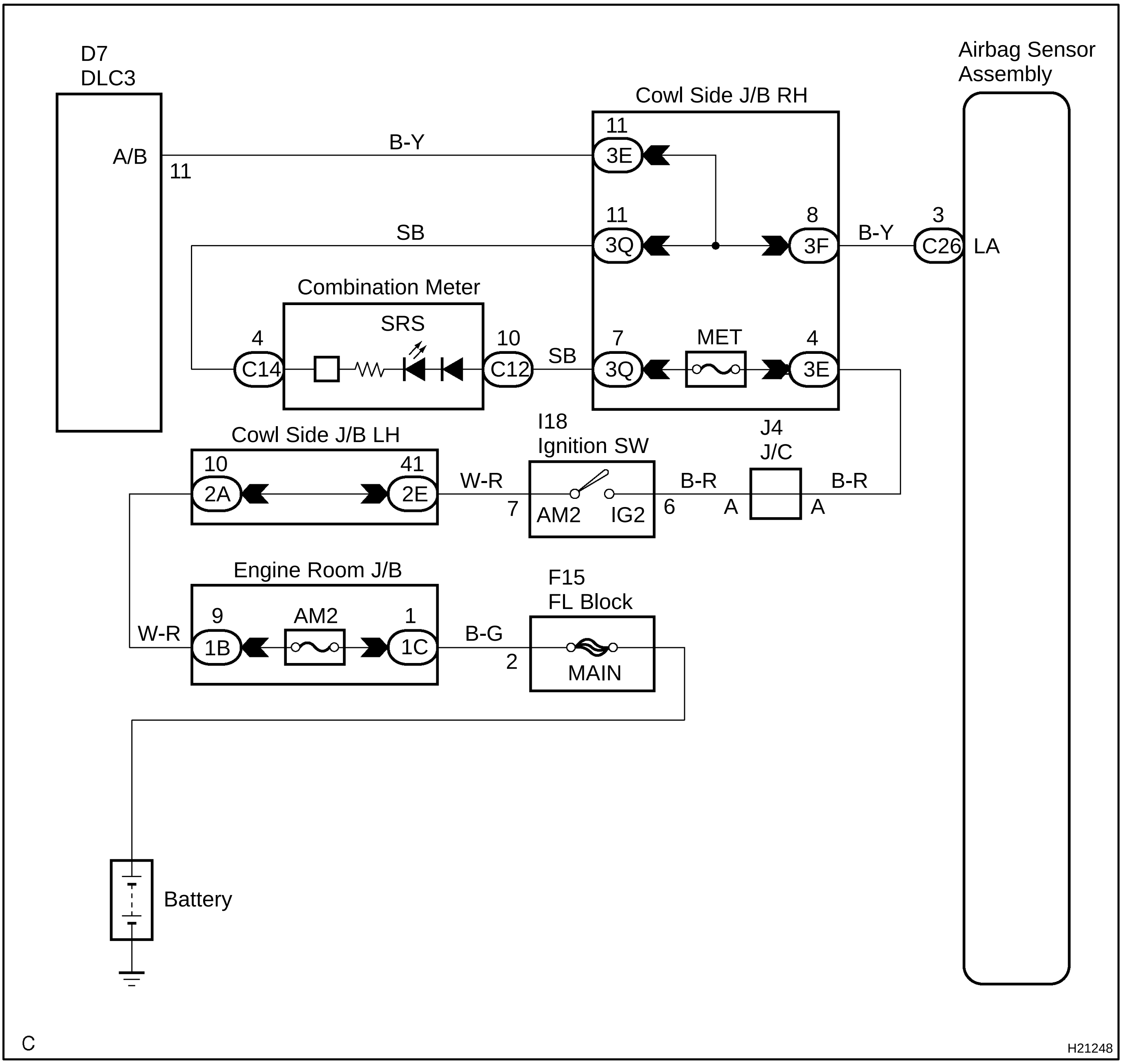
DIB45-01

SRS Warning Light Circuit Malfunction

CIRCUIT DESCRIPTION

The SRS warning light is located on the combination meter.
When the SRS is normal, the SRS warning light comes on for approx. 6 seconds after the ignition switch is turned from the LOCK position to 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 terminal TC and CG of the DLC3 are connected, the DTC is indicated by blinking the SRS warning light.

WIRING DIAGRAM

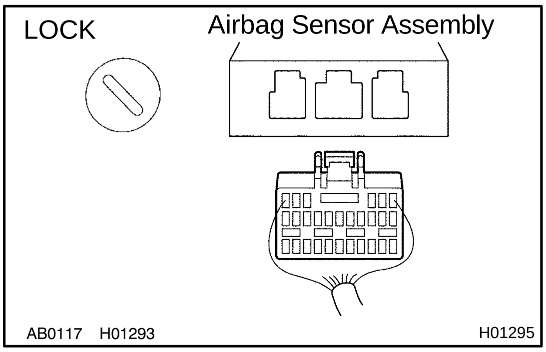


INSPECTION PROCEDURE

Always lights up, when ignition switch is in LOCK position.

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Does SRS warning light turn off?**



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Disconnect the airbag sensor assembly connector.

(d) Connect the negative (-) terminal cable to the battery.

CHECK:

Check operation of SRS warning light.

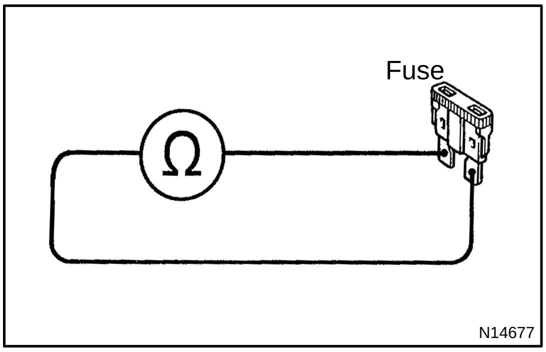
NO	**Check combination mater (See page BE-2).**

YES

Replace airbag sensor assembly.

Does not light up, when ignition switch is turned to ON.

1	**Check AM2 Fuse.**



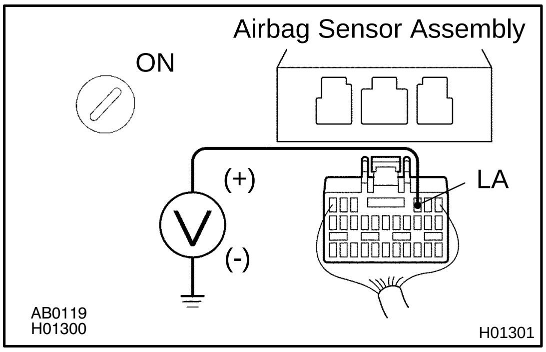
PREPARATION:
Remove the AM2 fuse.
CHECK:
Check continuity of the AM2 fuse.
OK:
Continuity
HINT:
★ Fuse may be burnt out even if it appears to be OK during visual inspection.
★ If fuse is OK, install it.

NG	**Go to step 5.**

OK

2	**Prepare for inspection (See step 1 on page DI-923).**

3	**Check SRS warning light circuit.**

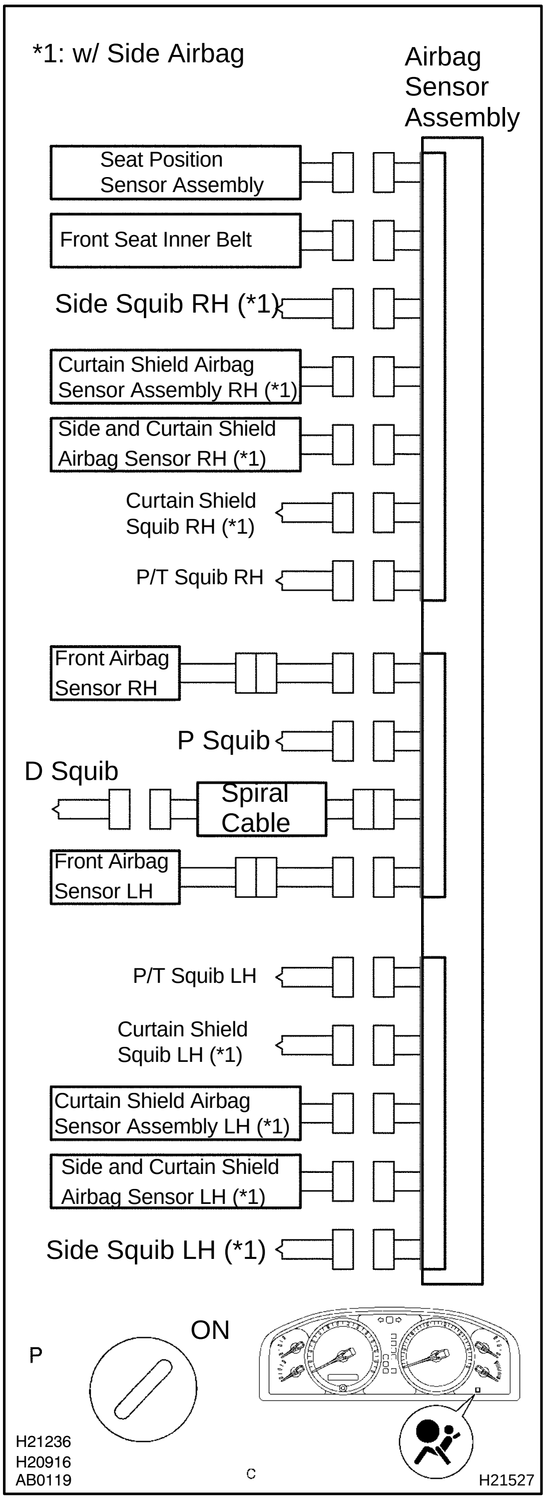


PREPARATION:
Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
CHECK:
(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and LA of the airbag sensor assembly connector.
OK:
Voltage: 10 - 14 V

NG	**Check SRS warning light bulb or repair SRS warning light circuit.**

OK

4	**Does SRS warning light come on?**



PREPARATION:

(a) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(b) Connect the airbag sensor assembly connector.

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.

(b) Check operation of the SRS warning light.

NO	**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 AM2 fuse burnt out again?**

NO → **Using simulation method, reproduce malfunction symptoms (See page IN-26).**

YES

Check harness between AM2 fuse and SRS warning light.

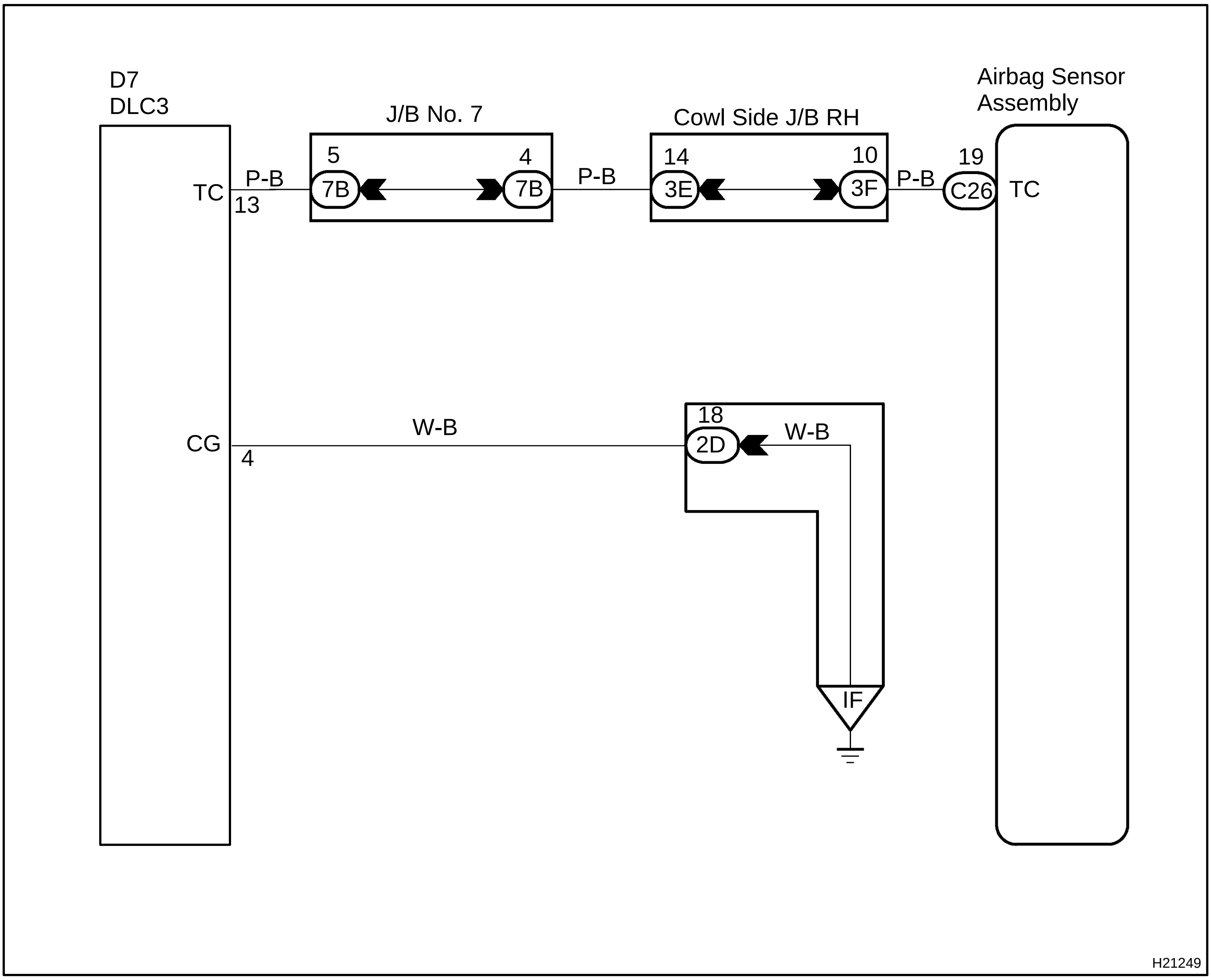
DIB46-02

TC Terminal Circuit

CIRCUIT DESCRIPTION

DTC output mode is set by connecting terminal TC and CG of the DLC3 the airbag sensor assembly. The DTCs are displayed by blinking the SRS warning light.

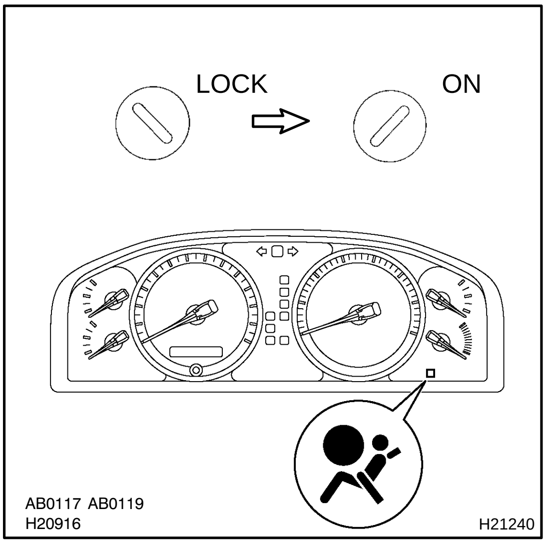
WIRING DIAGRAM



INSPECTION PROCEDURE

If the DTC is not displayed, do the following troubleshooting.

1	**Does SRS warning light light up for approx. 6 seconds?**



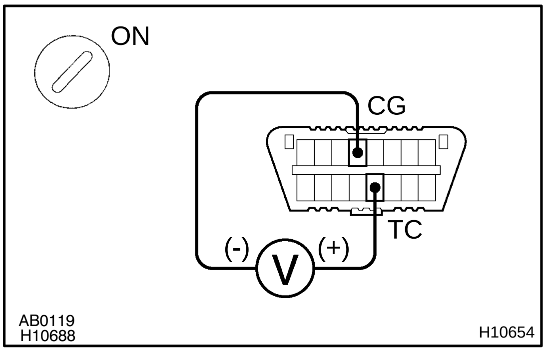
CHECK:

Check operation of the SRS warning light after ignition switch is turned from LOCK position to ON position.

NO → **Check SRS warning light system.**
(See page DI-927)

YES

2	**Check voltage between terminal TC and CG of DLC3.**



PREPARATION:

Turn the ignition switch to ON.

CHECK:

Measure the voltage between terminal TC and CG of DLC3.

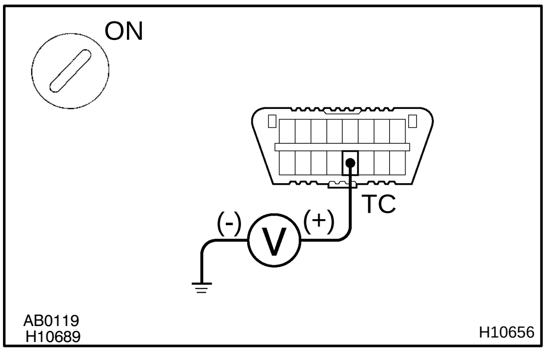
OK:

Voltage: 4 - 14 V

OK → **Go to step 4.**

NG

3	Check voltage between terminal TC of DLC3 and body ground.



CHECK:

Measure the voltage between the body ground and terminal TC of DLC3.

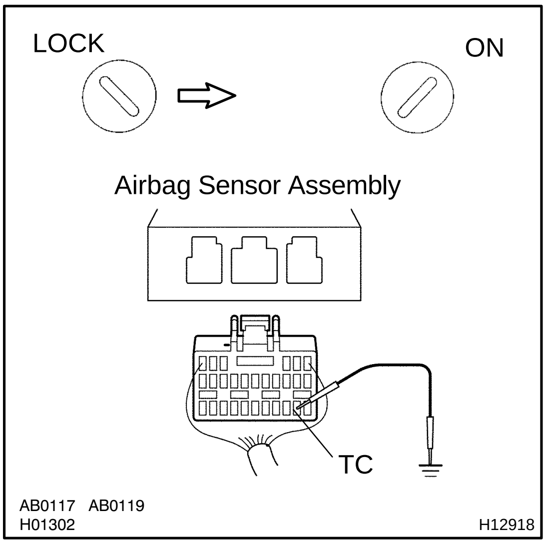
OK:

Voltage: 4 - 14 V

OK → **Check harness between terminal CG of DLC3 and body ground.**

NG ↓

4	Check airbag sensor assembly.



PREPARATION:

(a) Turn the ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the airbag sensor assembly connector.
(d) Insert the 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 the negative (-) terminal cable to the battery.
(g) Turn the ignition switch to ON and wait at least for 20 seconds.
(h) Connect the 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.

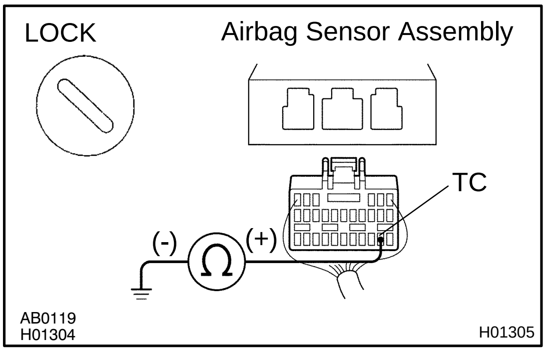
OK → **Check harness between the airbag sensor assembly and DLC3.**

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 the 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.

DI6OX-09

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 Lights Up ☐ Does Not Light Up
	2nd Time	☐ Remains ON ☐ Sometimes Lights Up ☐ Does Not Light Up
DTC Inspection	1st Time	☐ Normal Code ☐ Malfunction Code [Code.]
	2nd Time	☐ Normal Code ☐ Malfunction Code [Code.]

DI6OZ-25

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-711)	★Short in D squib circuit	★Steering wheel pad (squib) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire	ON
B0101/14 (DI-717)	★Open in D squib circuit	★Steering wheel pad (squib) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire	ON
B0102/11 (DI-722)	★Short in D squib circuit (to ground)	★Steering wheel pad (squib) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire	ON
B0103/12 (DI-727)	★Short in D squib circuit (to B+)	★Steering wheel pad (squib) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire	ON
B0105/53 (DI-732)	★Short in P squib circuit	★Front passenger airbag assembly (squib) ★Airbag sensor assembly ★Dash wire	ON
B0106/54 (DI-736)	★Open in P squib circuit	★Front passenger airbag assembly (squib) ★Airbag sensor assembly ★Dash wire	ON
B0107/51 (DI-739)	★Short in P squib circuit (to ground)	★Front passenger airbag assembly (squib) ★Airbag sensor assembly ★Dash wire	ON
B0108/52 (DI-742)	★Short in P squib circuit (to B+)	★Front passenger airbag assembly (squib) ★Airbag sensor assembly ★Dash wire	ON
B0110/43 (*1) (DI-745)	★Short in side squib RH circuit	★Side airbag assembly RH (squib) ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B0111/44 (*1) (DI-749)	★Open in side squib RH circuit	★Side airbag assembly RH (squib) ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B0112/41 (*1) (DI-752)	★Short in side squib RH circuit (to ground)	★Side airbag assembly RH (squib) ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B0113/42 (*1) (DI-755)	★Short in side squib RH circuit (to B+)	★Side airbag assembly RH (squib) ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B0115/47 (*1) (DI-758)	★Short in side squib LH circuit	★Side airbag assembly LH (squib) ★Airbag sensor assembly ★Floor No. 1 wire	Blink

B0116/48 (*1) (DI-762)	★Open in side squib LH circuit	★Side airbag assembly LH (squib) ★Airbag sensor assembly ★Floor No. 1 wire	Blink
B0117/45 (*1) (DI-765)	★Short in side squib LH circuit (to ground)	★Side airbag assembly LH (squib) ★Airbag sensor assembly ★Floor No. 1 wire	Blink
B0118/46 (*1) (DI-768)	★Short in side squib LH circuit (to B+)	★Side airbag assembly LH (squib) ★Airbag sensor assembly ★Floor No. 1 wire	Blink
B0126/B0127/ 27 (DI-771)	★Seat belt buckle switch LH malfunction	★Front seat inner belt LH ★Airbag sensor assembly ★Floor No. 1 wire ★Front seat wire LH	ON
B0130/63 (DI-777)	★Short in P/T squib RH circuit	★Seat belt pretensioner RH (squib) ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B0131/64 (DI-781)	★Open in P/T squib RH circuit	★Seat belt pretensioner RH (squib) ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B0132/61 (DI-784)	★Short in P/T squib RH circuit (to ground)	★Seat belt pretensioner RH (squib) ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B0133/62 (DI-787)	★Short in P/T squib RH circuit (to B+)	★Seat belt pretensioner RH (squib) ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B0135/73 (DI-790)	★Short in P/T squib LH circuit	★Seat belt pretensioner LH (squib) ★Airbag sensor assembly ★Floor No. 1 wire	Blink
B0136/74 (DI-794)	★Open in P/T squib LH circuit	★Seat belt pretensioner LH (squib) ★Airbag sensor assembly ★Floor No. 1 wire	Blink
B0137/71 (DI-797)	★Short in P/T squib LH circuit (to ground)	★Seat belt pretensioner LH (squib) ★Airbag sensor assembly ★Floor No. 1 wire	Blink
B0138/72 (DI-800)	★Short in P/T squib LH circuit (to B+)	★Seat belt pretensioner LH (squib) ★Airbag sensor assembly ★Floor No. 1 wire	Blink
B1100/31 (DI-803)	★Airbag sensor assembly malfunction	★Airbag sensor assembly	ON
B1135/24 (DI-805)	★Half connection in airbag sensor assembly connector	★Airbag sensor assembly ★Dash wire ★Floor No. 1 wire ★Floor No. 2 wire	ON
B1140/32 (*1) (DI-807)	★Side and curtain shield airbag sensor assembly RH malfunction	★Side and curtain shield airbag sensor assembly RH ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B1141/33 (*1) (DI-813)	★Side and curtain shield airbag sensor assembly LH malfunction	★Side and curtain shield airbag sensor assembly LH ★Airbag sensor assembly ★Floor No. 1 wire	Blink
B1148/36 (DI-819)	★Front airbag sensor RH malfunction	★Front airbag sensor RH ★Airbag sensor assembly ★Dash wire ★Engine room No. 2 wire ★Engine room main wire	ON

B1149/37 (DI-828)	★Front airbag sensor LH malfunction	★Front airbag sensor LH ★Airbag sensor assembly ★Dash wire ★Engine room No. 2 wire ★Engine room main wire	ON
B1153/25 (DI-836)	★Seat position sensor malfunction	★Seat position sensor assembly ★Airbag sensor assembly ★Floor No. 1 wire ★Front seat wire LH	ON
B1154/38 (*1) (DI-844)	★Curtain shield airbag sensor assembly RH malfunction	★Curtain shield airbag sensor assembly RH ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B1155/39 (*1) (DI-850)	★Curtain shield airbag sensor assembly LH malfunction	★Curtain shield airbag sensor assembly LH ★Airbag sensor assembly ★Floor No. 1 wire	Blink
B1160/83 (*1) (DI-856)	★Short in curtain shield squib RH circuit	★Curtain shield airbag assembly RH (squib) ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B1161/84 (*1) (DI-860)	★Open in curtain shield squib RH circuit	★Curtain shield airbag assembly RH (squib) ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B1162/81 (*1) (DI-863)	★Short in curtain shield squib RH circuit (to ground)	★Curtain shield airbag assembly RH (squib) ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B1163/82 (*1) (DI-866)	★Short in curtain shield squib RH circuit (to B+)	★Curtain shield airbag assembly RH (squib) ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B1165/87 (*1) (DI-869)	★Short in curtain shield squib LH circuit	★Curtain shield airbag assembly LH (squib) ★Airbag sensor assembly ★Floor No. 1 wire	Blink
B1166/88 (*1) (DI-873)	★Open in curtain shield squib LH circuit	★Curtain shield airbag assembly LH (squib) ★Airbag sensor assembly ★Floor No. 1 wire	Blink
B1167/85 (*1) (DI-876)	★Short in curtain shield squib LH circuit (to ground)	★Curtain shield airbag assembly LH (squib) ★Airbag sensor assembly ★Floor No. 1 wire	Blink
B1168/86 (*1) (DI-879)	★Short in curtain shield squib LH circuit (to B+)	★Curtain shield airbag assembly LH (squib) ★Airbag sensor assembly ★Floor No. 1 wire	Blink
B1180/17 (DI-882)	★Short in D squib (2nd step) circuit	★Steering wheel pad (D squib, 2nd step) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire	ON
B1181/18 (DI-888)	★Open in D squib (2nd step) circuit	★Steering wheel pad (D squib, 2nd step) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire	ON
B1182/19 (DI-893)	★Short in D squib (2nd step) circuit (to ground)	★Steering wheel pad (D squib, 2nd step) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire	ON

B1183/22 (DI-898)	★Short in D squib (2nd step) circuit (to B+)	★Steering wheel pad (D squib, 2nd step) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire	ON
B1185/57 (DI-903)	★Short in P squib (2nd step) circuit	★Front passenger airbag assembly (squib) ★Airbag sensor assembly ★Dash wire	ON
B1186/58 (DI-907)	★Open in P squib (2nd step) circuit	★Front passenger airbag assembly (squib) ★Airbag sensor assembly ★Dash wire	ON
B1187/55 (DI-910)	★Short in P squib (2nd step) circuit (to ground)	★Front passenger airbag assembly (squib) ★Airbag sensor assembly ★Dash wire	ON
B1188/56 (DI-913)	★Short in P squib (2nd step) circuit (to B+)	★Front passenger airbag assembly (squib) ★Airbag sensor assembly ★Dash wire	ON
B1628/29 (*1) (DI-913)	★RSCA cutoff switch indicator	★RSCA cutoff switch ★Airbag sensor assembly ★Dash wire ★Instrument panel wire	Blink
Normal (DI-923)	★System normal	-	OFF
	★Voltage source drop	★Battery ★Airbag sensor assembly	ON

*1: w/ Side Airbag

HINT:

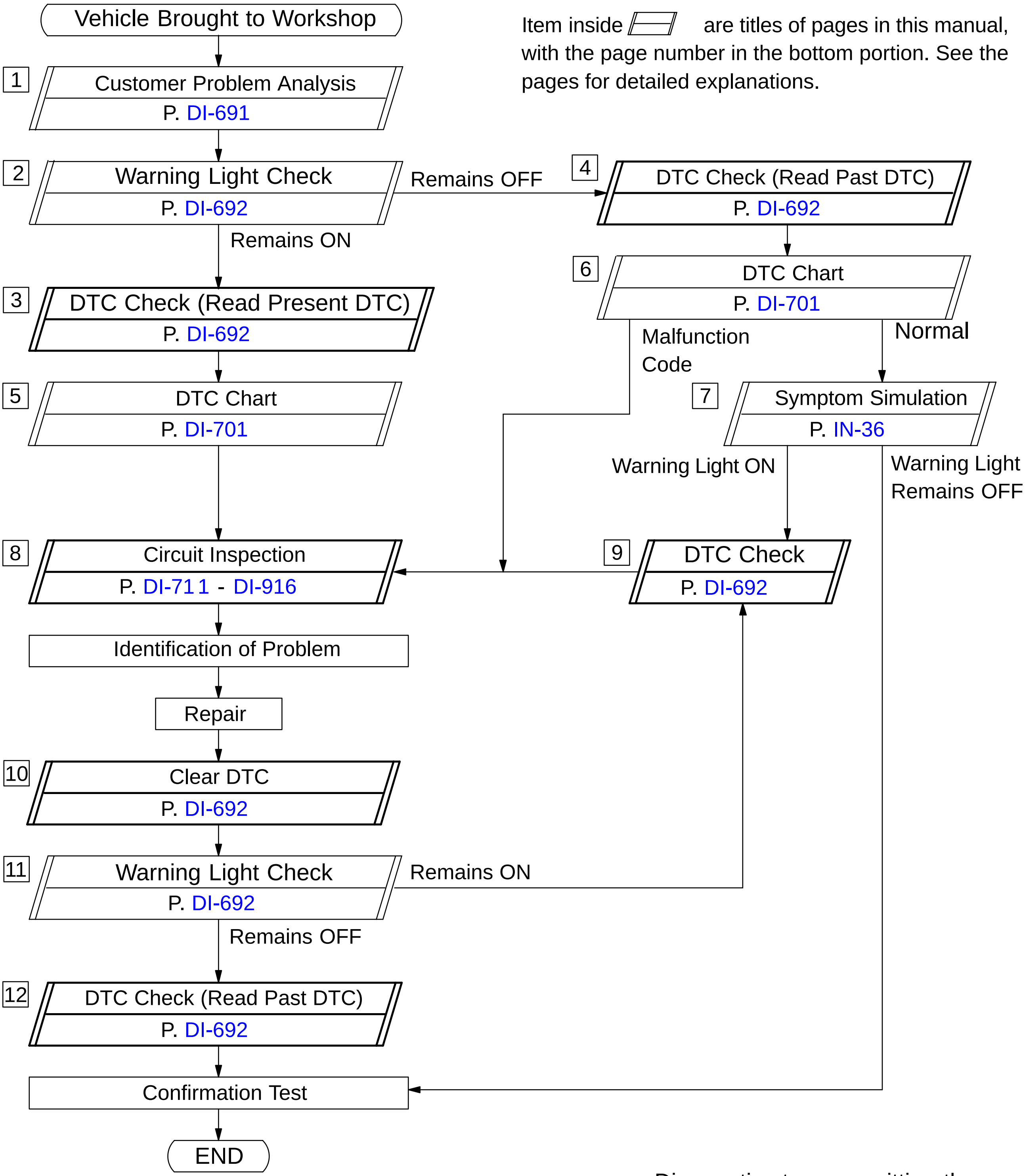
- ★ When the SRS warning light remains lit up and the DTC is the normal code, a voltage source drop is possible.
  This malfunction is not stored in memory by the airbag sensor assembly and if the power source voltage returns to normal, the SRS warning light will automatically go out.
- ★ When 2 or more codes are indicated, smaller numbered code will be shown first.
- ★ If a code not listed on the chart is displayed, the airbag sensor assembly is at fault.
- ★ In the case of any malfunction concerning any open circuit, ground short, or B+ short due to any squib, another malfunction code may not be detected. In this case, correct the malfunction currently indicated and then perform malfunction diagnosis again. Another malfunction code may then be detected.

SUPPLEMENTAL RESTRAINT SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

DI6OW-18

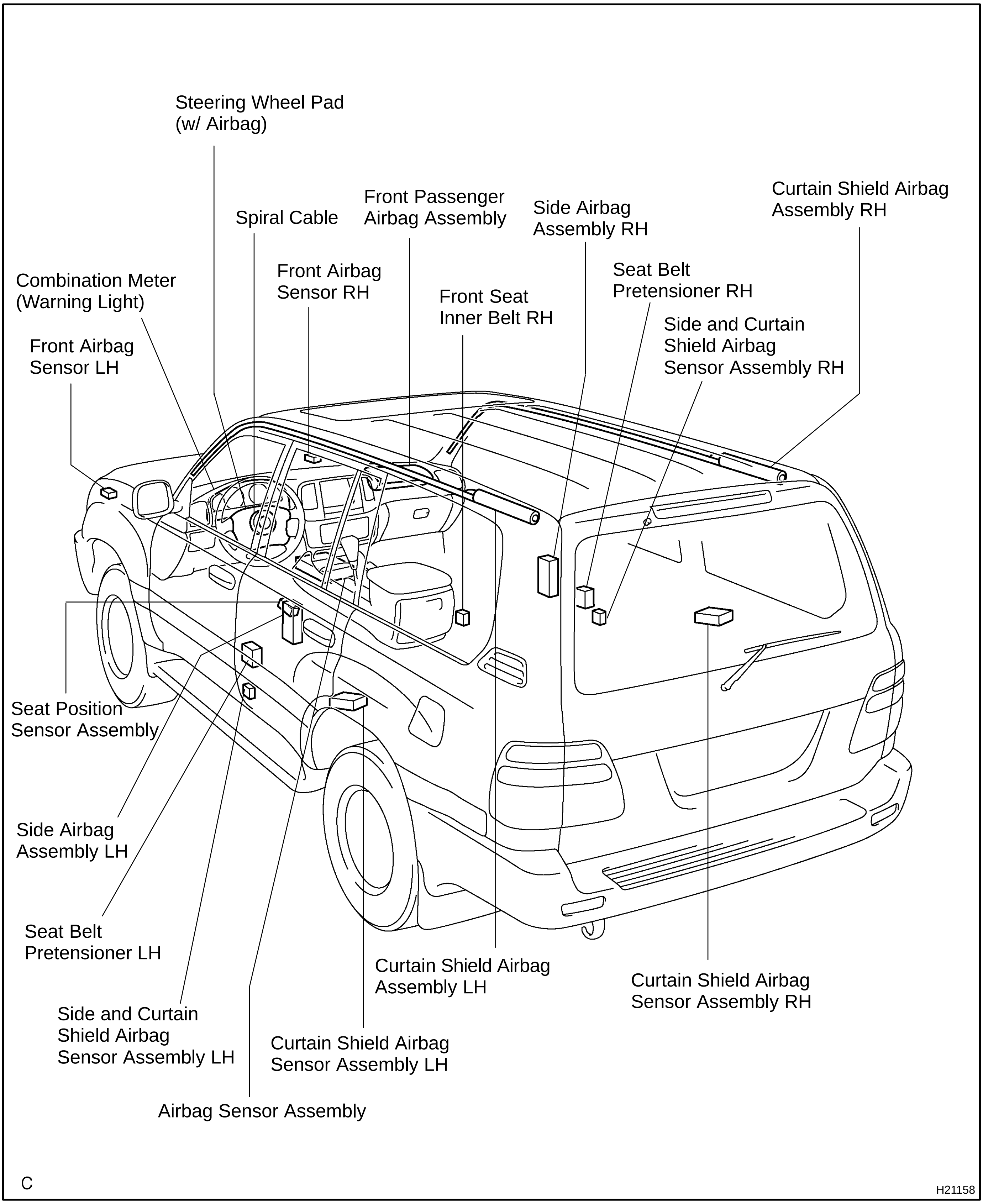
Item inside ▱ are titles of pages in this manual, with the page number in the bottom portion. See the pages for detailed explanations.



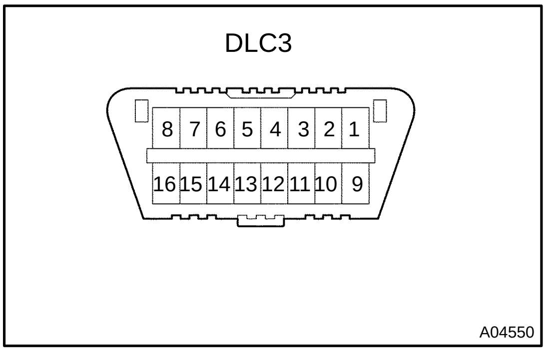
Step 3, 4, 8, 9, 10, 12: Diagnostic steps permitting the use of the TOYOTA hand-held tester.

DI6P0-19

PARTS LOCATION



DIB3P-01



PRE-CHECK

1. DIAGNOSIS SYSTEM

(a) Check the DLC3.

HINT:

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

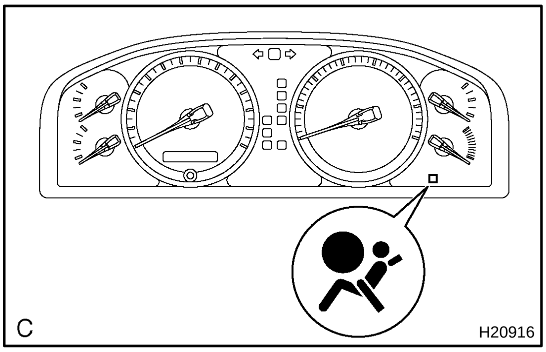
Terminal No.	Connection/Voltage or Resistance	Condition
7	Bus ± Line/Pulse generation	During Transmission
4	Chassis Ground ↔ Body Ground/1 Ω or less	Always
16	Battery Positive ↔ Body Ground/ 9 – 14 V	Always

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 the 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 the 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. SRS WARNING LIGHT CHECK

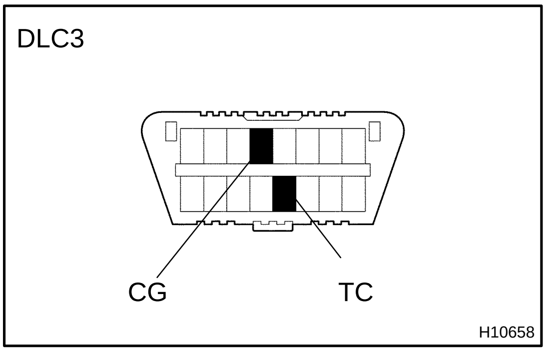
(a) Turn the ignition switch to ON, and check that the SRS warning light comes on.

(b) Check that the SRS warning light goes out after approx. 6 seconds.

HINT:

★ When the ignition switch is at 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 comes on even when the ignition switch is OFF. In this case, a short in the SRS warning light circuit is possible. Proceed to "SRS warning light circuit malfunction" on page DI-927.



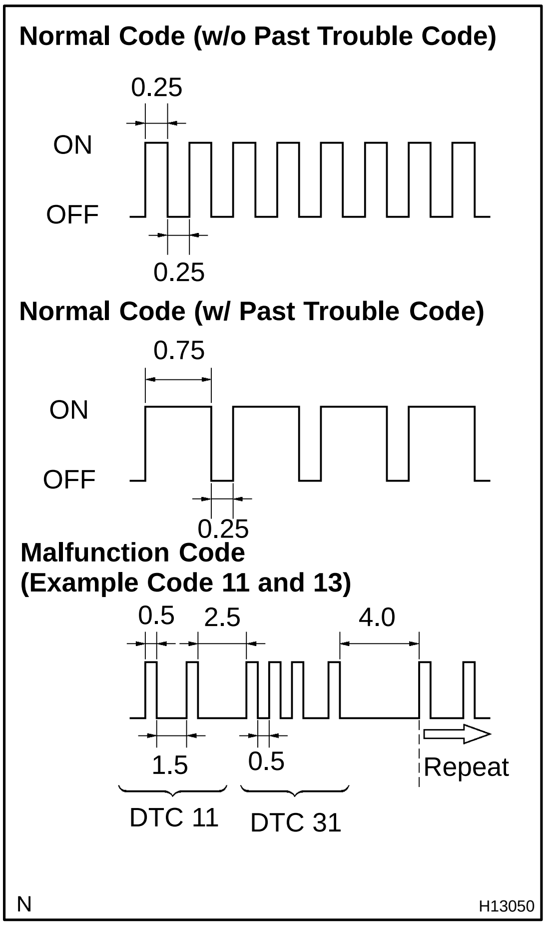
3. DTC CHECK (Using diagnosis check wire)

(a) Present troubles codes:
Output the DTC.
(1) Turn the ignition switch to ON, and wait for approx. 60 seconds.
(2) Using SST, connect terminal TC and CG of the DLC3.
SST 09843-18040

NOTICE:
Pay attention to the terminal connecting position to avoid a malfunction.

(b) Past troubles codes:
Output the DTC.
(1) Using SST, connect terminal TC and CG of the DLC3.
SST 09843-18040
(2) Turn the ignition switch to ON, and wait for approx. 60 seconds.

NOTICE:
Pay attention to the terminal connecting position to avoid a malfunction.



(c) Read the DTC.
Read the DTC by counting the blinking times. As an example, the blinking patterns of normal, 11 and 31 are shown in the illustration.

★ Normal code indication (w/o past trouble code)
The light blinks 2 times per seconds.

★ Normal code indication (w/ past trouble code)
When the past troubles code is stored in the airbag sensor assembly, the light blinks only ones a second.

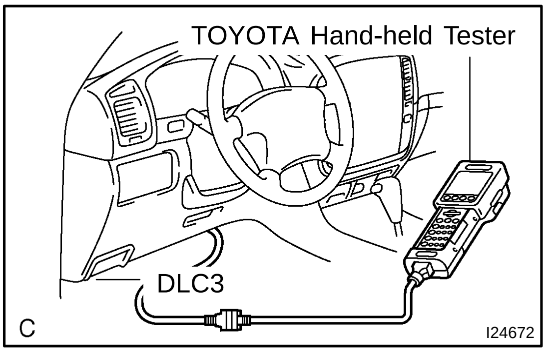
★ Malfunction code indication
The first blinking indicates the first DTC. Second blinking occurs after 1.5- second of pausing.

If there are 2 or more codes, there will be a 2.5-second pause between each code. After all the codes are shown, there will be a 4.0-second pausing, and they will all be repeated.

HINT:

★ If 2 or more malfunctions are found, the indication starts from the smaller numbered code.

★ If the light does not blink or comes out at all, or if DTCs are indicated without a connection of the terminals, proceed to the TC terminal circuit inspection on page DI-932 .



4. DTC CHECK (Using TOYOTA hand-held tester)

(a) Hook up the TOYOTA hand-held tester to 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.

5. DTC CLEARANCE (Not using service wire)

When the ignition switch is turned OFF, the diagnostic trouble code is cleared.

HINT:
Depending on the DTC, the code might not be cleared by turning the ignition switch OFF.
In this case, proceed to the next step.

6. DTC CLEARANCE (Using service wire)

(a) Connect the service wire to terminal TC of the DLC3.

(b) Ground terminal TC of the DLC3.

(c) Turn the ignition switch to the ON position.

(d) Within 3 to 10 sec. after DTC is started to be output, release ground from terminal TC of the DLC3.

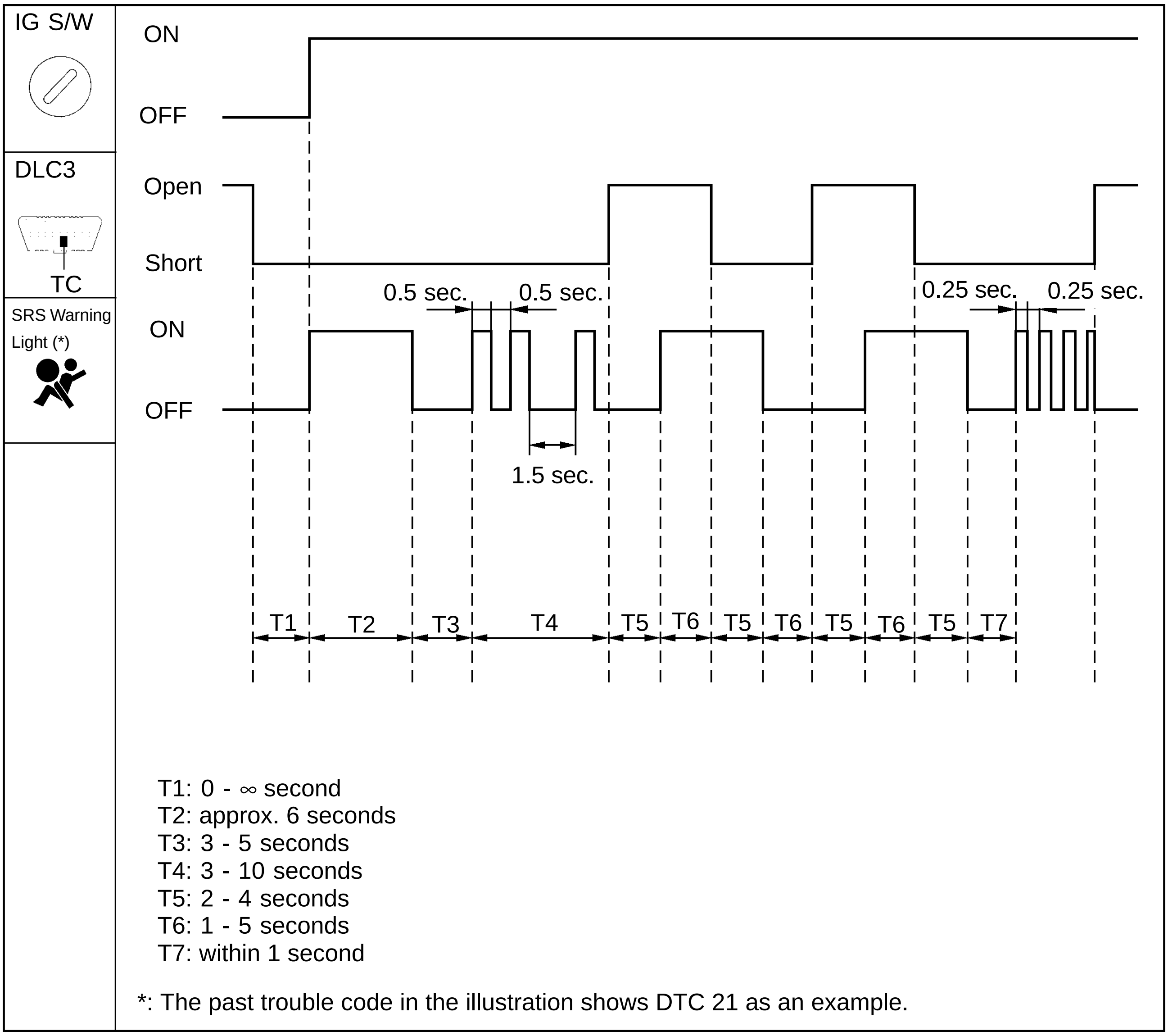
(e) The SRS warning light comes on 2 to 4 sec. later. Within 1 to 5 sec. after that, ground terminal TC of the DLC3.

(f) The SRS warning light goes off 2 to 4 sec. after grounding terminal TC. Within 1 to 5 sec. after that, release ground from terminal TC again.

(g) The SRS warning light comes on again 2 to 4 sec. later. Within 1 to 5 sec. after that, ground terminal TC of the DLC3 again.

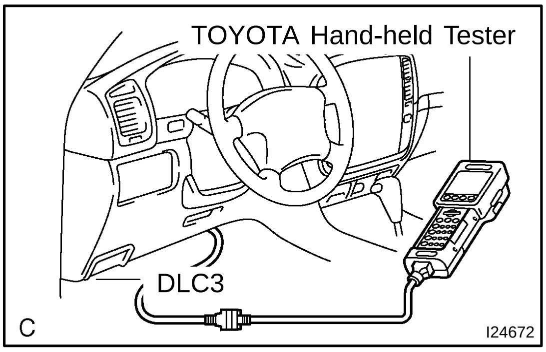
(h) The SRS warning light goes off 2 to 4 sec. later. Within 1 sec. after that, normal code is output indicating that DTC deletion is completed.

If DTCs are not cleared, repeat the above procedure until the codes are cleared.



N

H13049



7. DTC CLEARANCE (Using TOYOTA hand-held tester)

(a) Hook up the TOYOTA hand-held tester to the DLC3.

(b) Clear the DTCs by following the prompts on the tester screen.

HINT:

Please refer to the TOYOTA hand-held tester operation's manual for further details.

8. RELEASE METHOD OF AIRBAG ACTIVATION PREVENTION MECHANISM

An airbag activation prevention mechanism is built into the connector for the squib circuit of the SRS.

As explained in the troubleshooting later, insert a paper with the same thickness as the male terminal between the terminal and the short spring to release it (Refer to illustrations on next 4 pages).

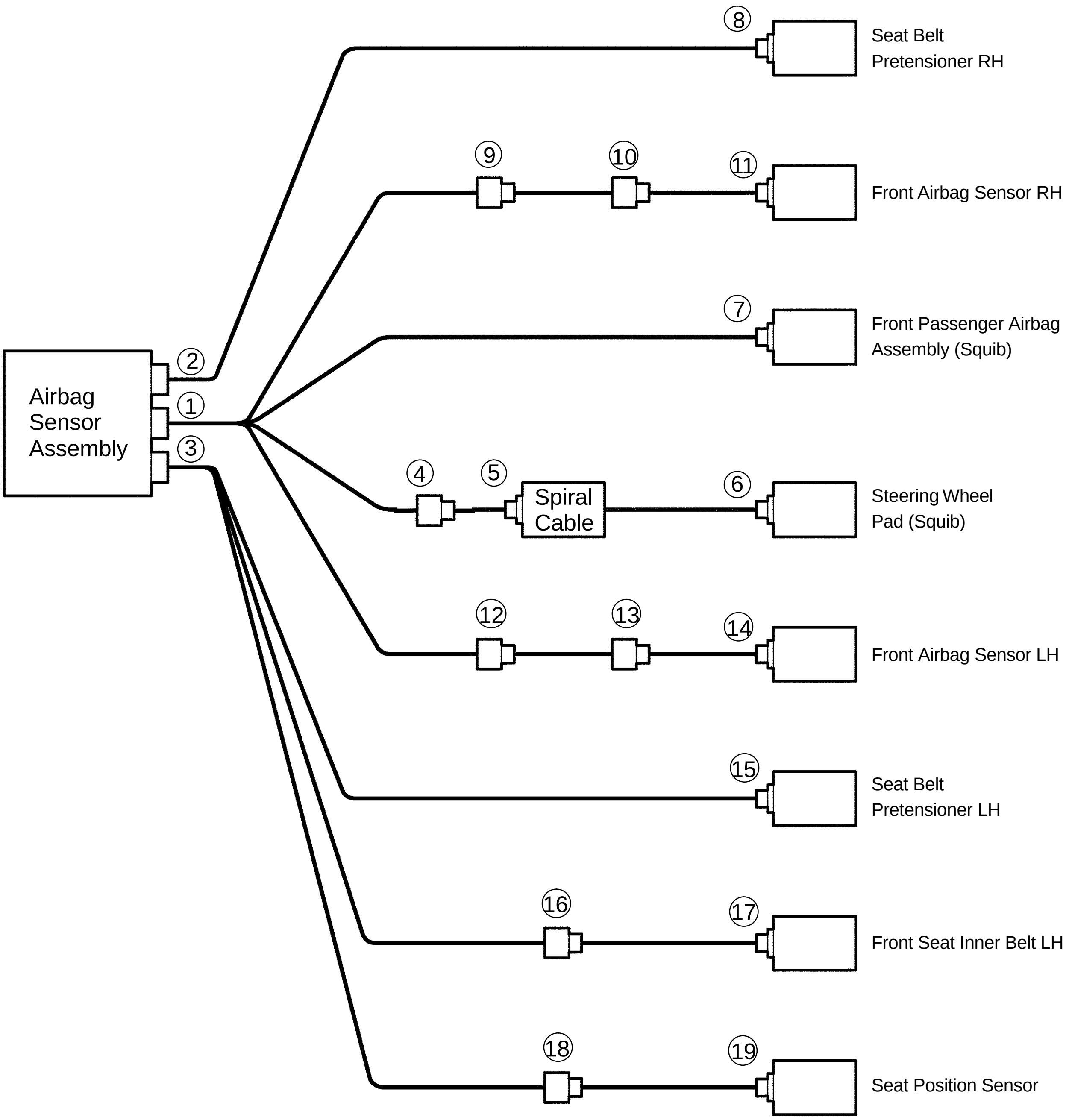
CAUTION:

Never release the airbag activation prevention mechanism on the squib connector.

NOTICE:

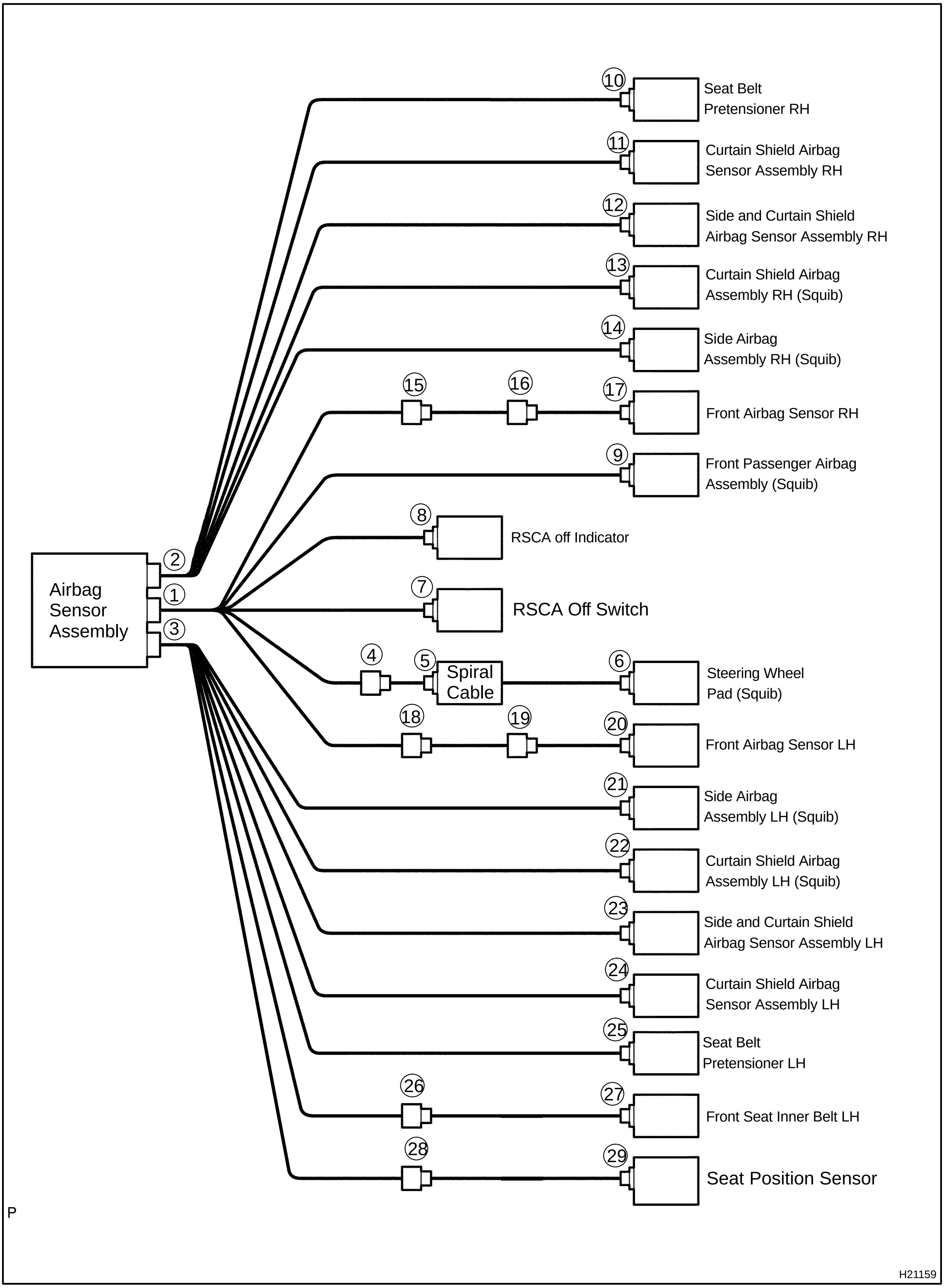
- ★ **Do not release the airbag activation prevention mechanism unless specifically directed by the troubleshooting procedure.**
- ★ **To prevent the terminal and the short spring to be damaged, always use a paper with the same thickness as the male terminals.**

w/o Side Airbag:

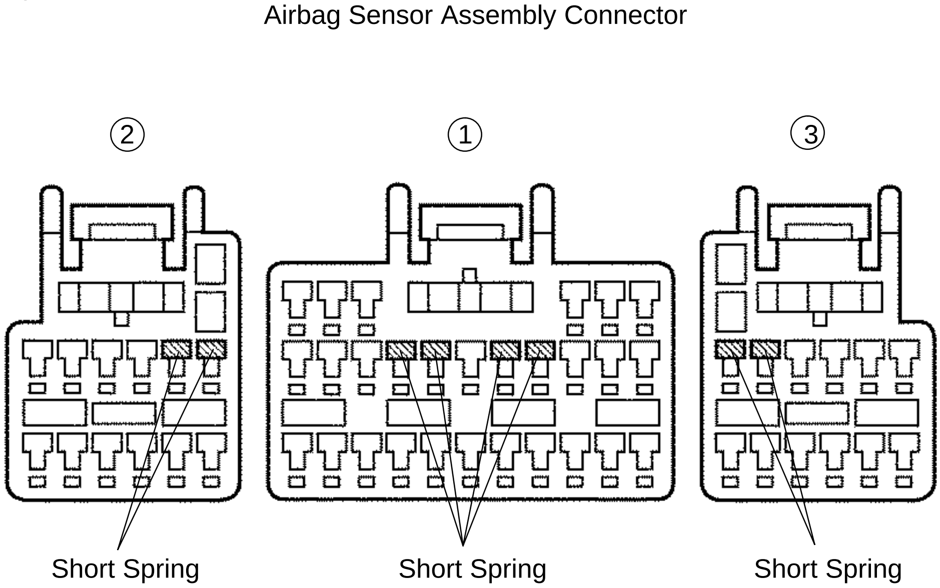


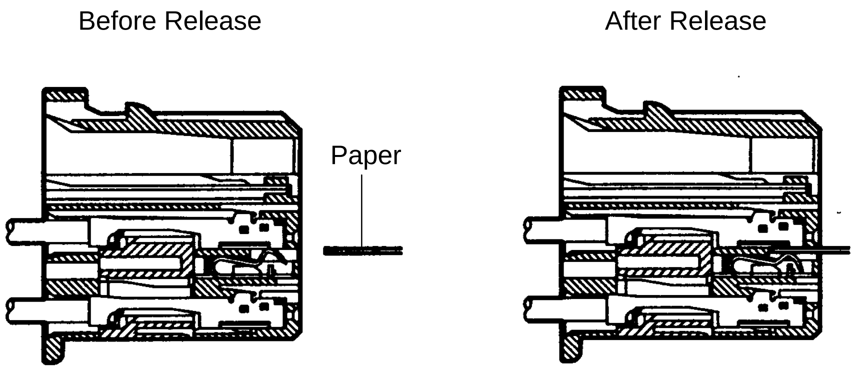
P

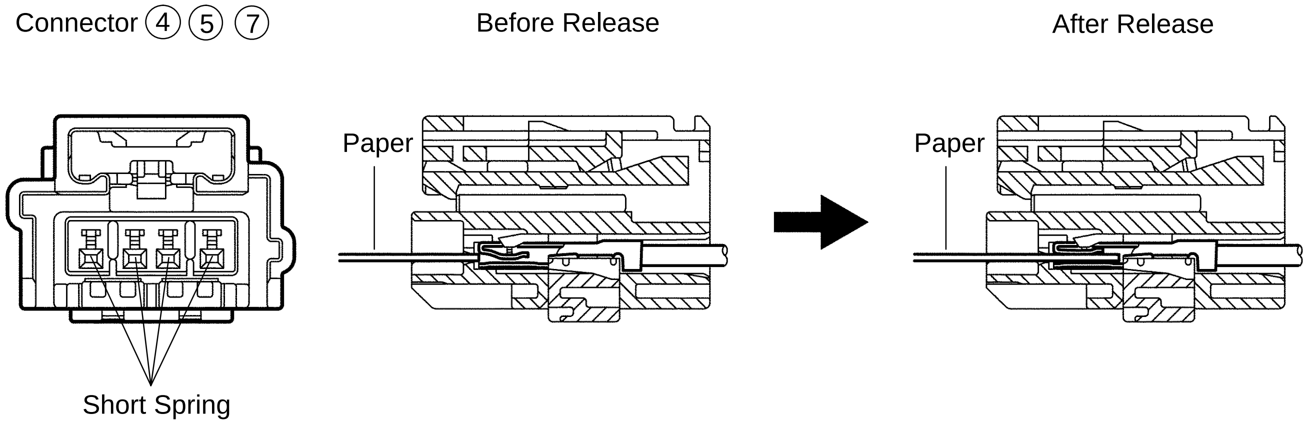
H21251


Airbag Sensor Assembly
1
2
3
4
5
Spiral Cable
6
Steering Wheel Pad (Squib)
7
RSCA Off Switch
8
RSCA off Indicator
9
Front Passenger Airbag Assembly (Squib)
10
Seat Belt Pretensioner RH
11
Curtain Shield Airbag Sensor Assembly RH
12
Side and Curtain Shield Airbag Sensor Assembly RH
13
Curtain Shield Airbag Assembly RH (Squib)
14
Side Airbag Assembly RH (Squib)
15
16
17
Front Airbag Sensor RH
18
19
20
Front Airbag Sensor LH
21
Side Airbag Assembly LH (Squib)
22
Curtain Shield Airbag Assembly LH (Squib)
23
Side and Curtain Shield Airbag Sensor Assembly LH
24
Curtain Shield Airbag Sensor Assembly LH
25
Seat Belt Pretensioner LH
26
27
Front Seat Inner Belt LH
28
29
Seat Position Sensor
P
H21159

w/o Side Airbag:



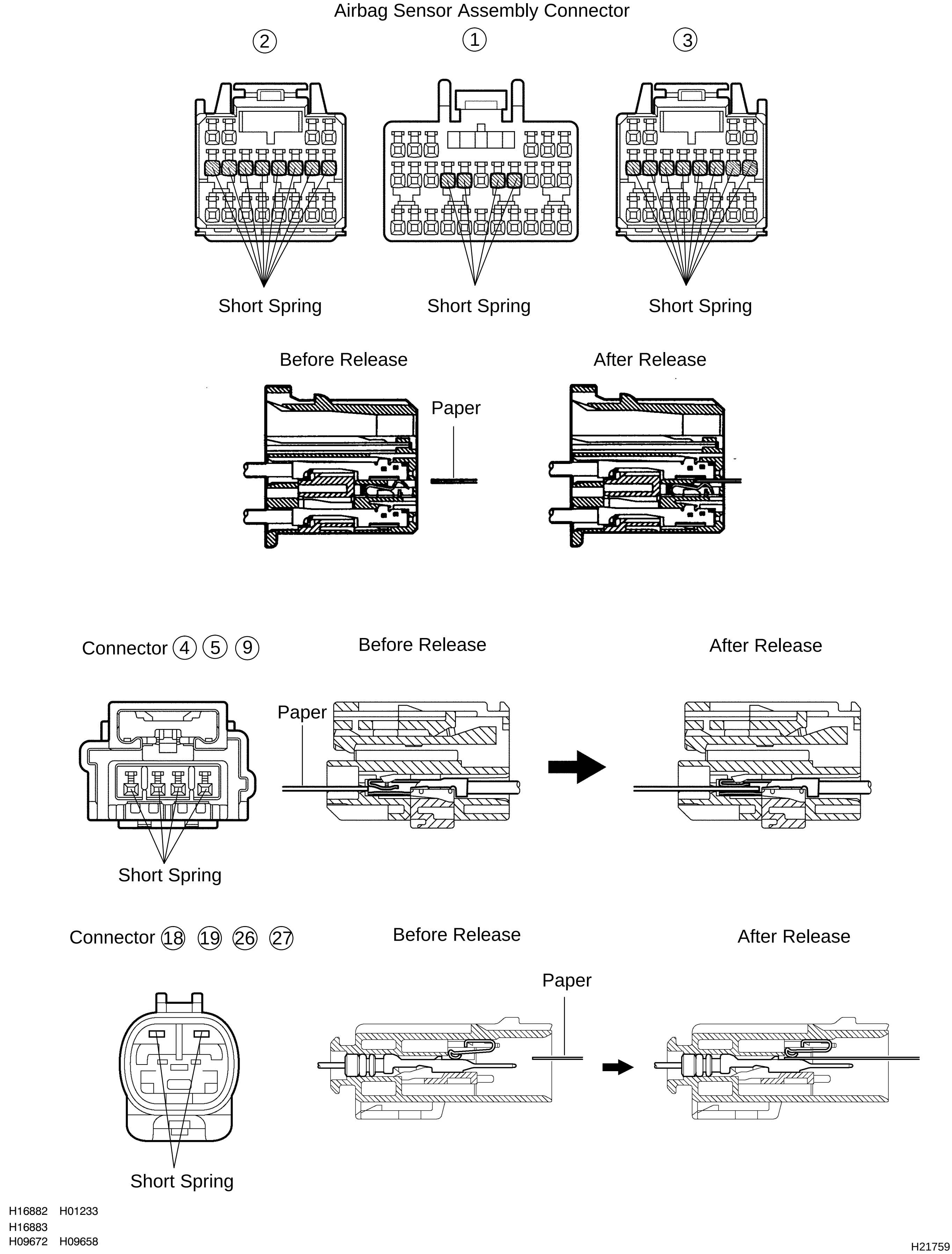




H02297
H01233
H16883

H21585

w/ Side Airbag:



DI8ES-03

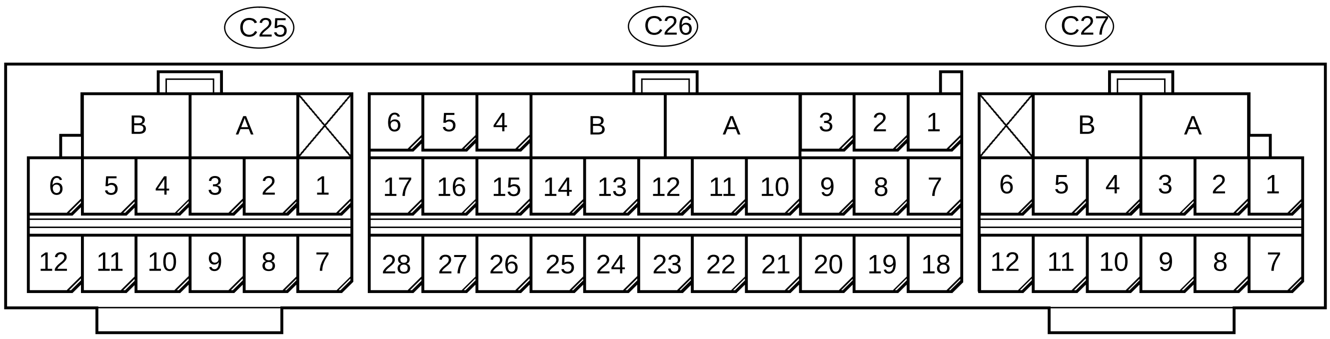
PROBLEM SYMPTOMS TABLE

Proceed with troubleshooting of each circuit in the table below.

Symptom	Suspected Area	See page
★With the ignition switch in ON position, the SRS warning light sometimes lights up after approx. 6 seconds have elapsed.	★SRS warning light circuit	DI-927
★SRS warning light is always lit up even when ignition switch is in the LOCK position.		
★With the ignition switch in ON position, the SRS warning light does not light up.		
★DTC is not displayed.	★TC terminal circuit	DI-932
★SRS warning light is always lit up at the time of DTC check procedure.		
★DTC is displayed without TC and CG terminal connection.		

TERMINALS OF ECU

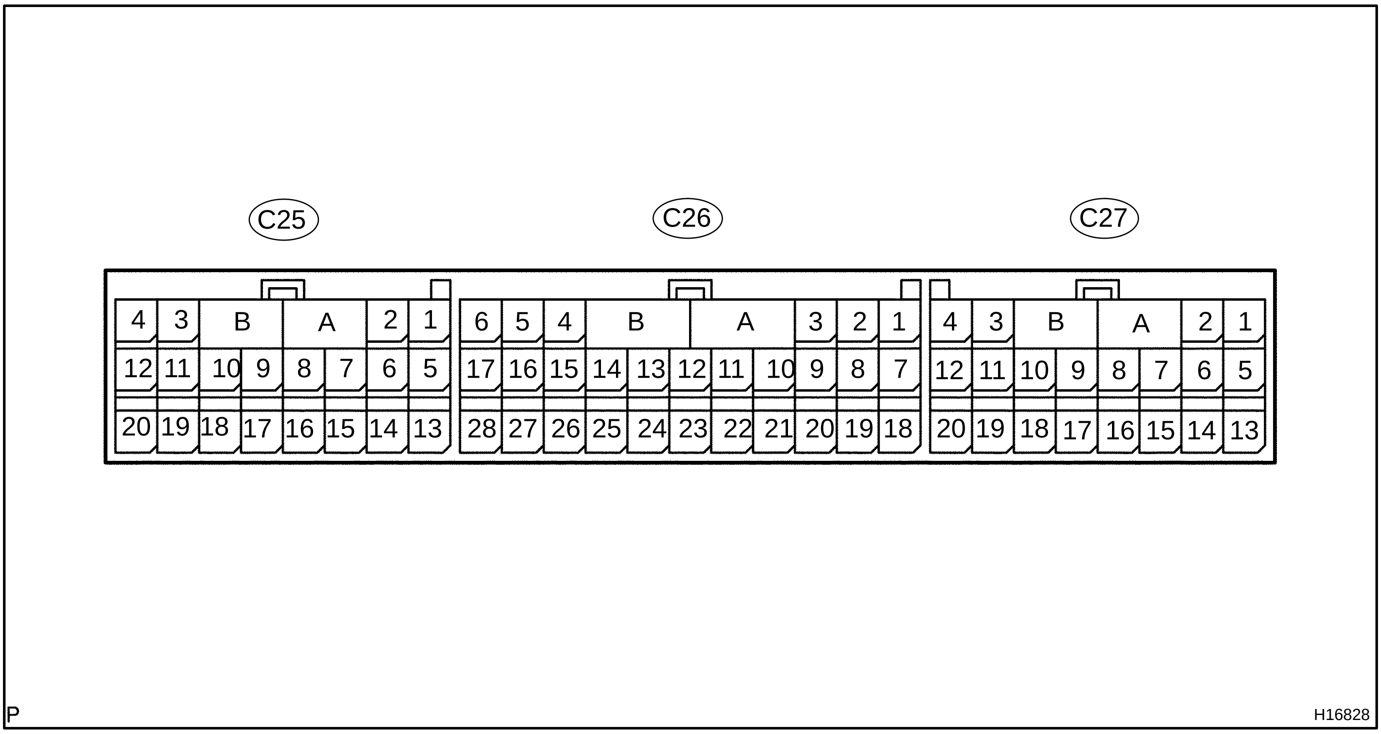
1. w/o Side Airbag:



No.	Symbol	Terminal Name
A	-	Electrical Connector Check Mechanism
B	-	Electrical Connector Check Mechanism
C26 - 3	LA	SRS Warning Light
C26 - 5	IG2	Power Source
C26 - 7	P2-	Squib (Passenger, 2nd step)
C26 - 8	P2+	Squib (Passenger, 2nd step)
C26 - 9	+SR	Front Airbag Sensor RH
C26 - 10	P+	Squib (Passenger)
C26 - 11	P-	Squib (Passenger)
C26 - 12	SIL	Diagnosis
C26 - 13	D-	Squib (Driver)
C26 - 14	D+	Squib (Driver)
C26 - 15	+SL	Front Airbag Sensor LH
C26 - 16	D2+	Squib (Driver, 2nd step)
C26 - 17	D2-	Squib (Driver, 2nd step)
C26 - 19	TC	Diagnosis
C26 - 20	-SR	Front Airbag Sensor RH
C26 - 23	GSW2	Engine ECU
C26 - 26	-SL	Front Airbag Sensor LH
C26 - 27	E1	Ground
C26 - 28	E2	Ground
C25 - 1	PL-	Squib (Seat Belt Pretensioner, LH)
C25 - 2	PL+	Squib (Seat Belt Pretensioner, LH)
C25 - 3	LSP+	Seat Position Sensor Assembly

No.	Symbol	Terminal Name
C25 - 8	LSP-	Seat Position Sensor Assembly
C25 - 11	LBE+	Seat Belt Buckle Switch LH
C27 - 5	PR+	Squib (Seat Belt Pretensioner, RH)
C27 - 6	PR-	Squib (Seat Belt Pretensioner, RH)

2. w/ Side Airbag:



No.	Symbol	Terminal Name
A	-	Electrical Connector Check Mechanism
B	-	Electrical Connector Check Mechanism
C26 - 3	LA	SRS Warning Light
C26 - 5	IG2	Power Source
C26 - 7	P2-	Squib (Passenger, 2nd step)
C26 - 8	P2+	Squib (Passenger, 2nd step)
C26 - 9	+SR	Front Airbag Sensor RH
C26 - 10	P+	Squib (Passenger)
C26 - 11	P-	Squib (Passenger)
C26 - 12	SIL	Diagnosis
C26 - 13	D-	Squib (Driver)
C26 - 14	D+	Squib (Driver)
C26 - 15	+SL	Front Airbag Sensor LH
C26 - 16	D2+	Squib (Driver, 2nd step)
C26 - 17	D2-	Squib (Driver, 2nd step)
C26 - 19	TC	Diagnosis
C26 - 20	-SR	Front Airbag Sensor RH
C26 - 21	RMSW	RSCA Off Switch
C26 - 22	MPX2	Instrument Panel Integration ECU
C26 - 23	GSW2	Diagnosis
C26 - 25	RMIL	RSCA Off Switch Indicator
C26 - 26	-SL	Front Airbag Sensor LH
C26 - 27	E1	Ground
C26 - 28	E2	Ground
C25 - 1	CSL-	Curtain Shield Airbag Sensor Assembly LH

No.	Symbol	Terminal Name
C25 - 3	LSP-	Seat Position Sensor Assembly
C25 - 4	LSP+	Seat Position Sensor Assembly
C25 - 7	PL-	Squib (Seat Belt Pretensioner, LH)
C25 - 8	PL+	Squib (Seat Belt Pretensioner, LH)
C25 - 9	ICL+	Squib (Curtain Shield, LH)
C25 - 10	ICL-	Squib (Curtain Shield, LH)
C25 - 11	SFL-	Squib (Side, LH)
C25 - 12	SFL+	Squib (Side, LH)
C25 - 13	ESCL	Curtain Shield Airbag Sensor Assembly LH
C25 - 14	VUCL	Curtain Shield Airbag Sensor Assembly LH
C25 - 15	CSL+	Curtain Shield Airbag Sensor Assembly LH
C25 - 16	VUPL	Side and Curtain Shield Airbag Sensor Assembly LH
C25 - 17	SSL+	Side and Curtain Shield Airbag Sensor Assembly LH
C25 - 18	ESL	Side and Curtain Shield Airbag Sensor Assembly LH
C25 - 19	LBE+	Seat Belt Buckle Switch LH
C25 - 20	SSL-	Side and Curtain Shield Airbag Sensor Assembly LH
C27 - 4	CSR-	Curtain Shield Airbag Sensor Assembly RH
C27 - 5	SFR+	Squib (Side, RH)
C27 - 6	SFR-	Squib (Side, RH)
C27 - 7	ICR-	Squib (Curtain Shield, RH)
C27 - 8	ICR+	Squib (Curtain Shield, RH)
C27 - 9	PR+	Squib (Seat Belt Pretensioner, RH)
C27 - 10	PR-	Squib (Seat Belt Pretensioner, RH)
C27 - 13	SSR-	Side and Curtain Shield Airbag Sensor Assembly RH
C27 - 15	ESR	Side and Curtain Shield Airbag Sensor Assembly RH
C27 - 16	SSR+	Side and Curtain Shield Airbag Sensor Assembly RH
C27 - 17	VUPR	Side and Curtain Shield Airbag Sensor Assembly RH
C27 - 18	CSR+	Curtain Shield Airbag Sensor Assembly RH
C27 - 19	VUCR	Curtain Shield Airbag Sensor Assembly RH
C27 - 20	ESCR	Curtain Shield Airbag Sensor Assembly RH

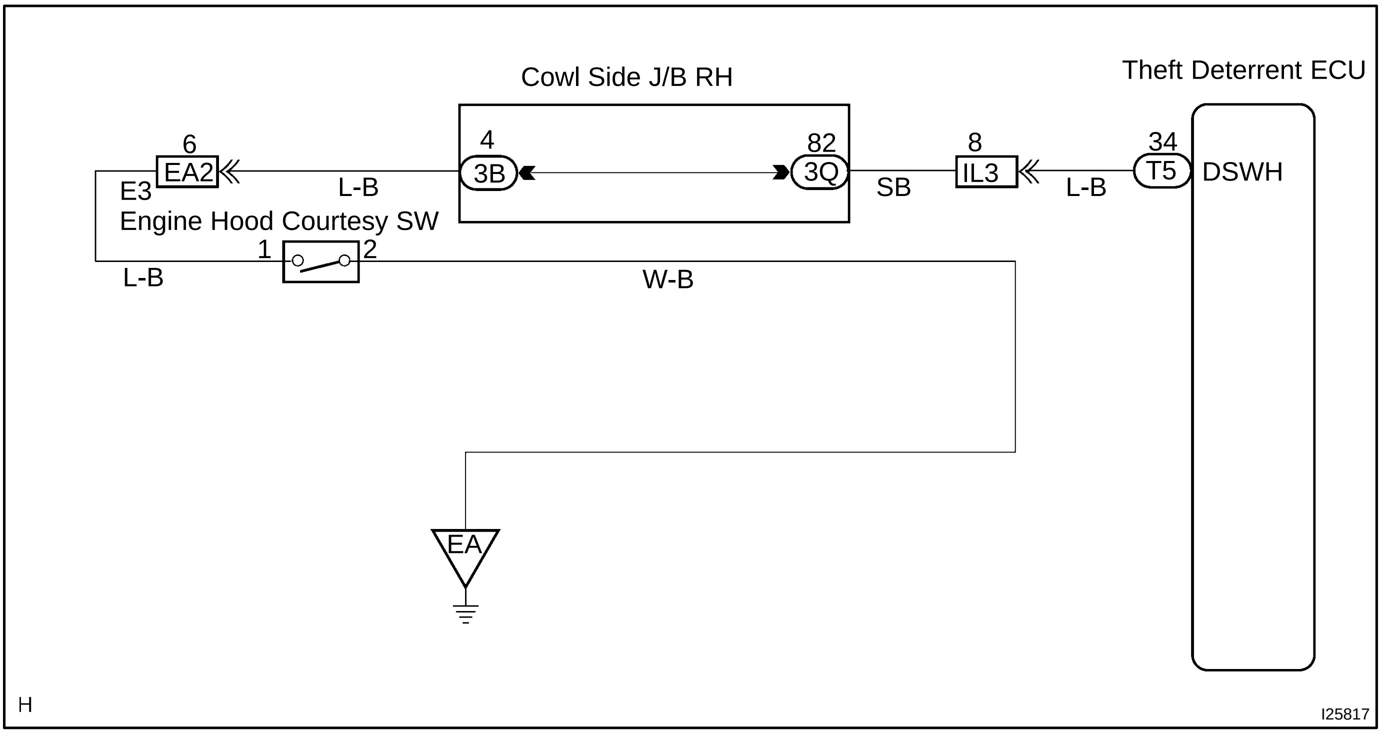
DIB4V-02

Engine hood courtesy switch circuit

CIRCUIT DESCRIPTION

The door courtesy light goes on when the door is opened and goes off when closed.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
In case of using the hand-held tester, start the inspection from step 1 and in case of not using the hand-held tester, start from step 2.

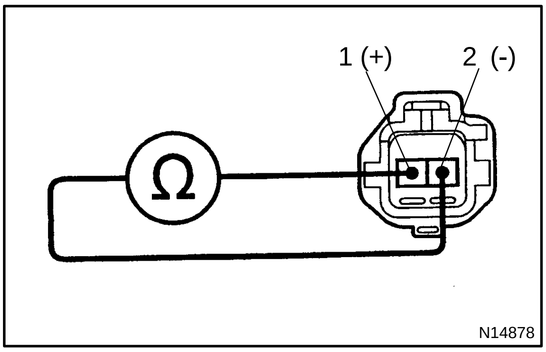
1	**Check engine hood courtesy switch using hand-held tester.**

PREPARATION:
Connect the hand-held tester to DLC 3.
CHECK:
Check that the engine hood courtesy switch operate in DATA LIST (See page DI-1040).

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI-965).**

NG

2	**Check the engine hood courtesy switch.**



PREPARATION:
(a) Remove engine hood lock assembly.
(b) Disconnect engine hoood courtesy switch connector.
CHECK:
Check continuity between terminals 1 and 2 when engine hood lock is locked and inlocked.

Engine hood lock	Tester connection	Specified condition
LOCK	-	No continuity
UNLOCK	1 - 2	Continuity

NG → **Replace the engine hood courtesy switch.**

OK

3	**Check wireharness and connector between courtesy switch and theft deterrent ECU (See page IN-26).**

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

OK

Proceed to next circuit inspection shown on problem symptoms table
(See page DI-965).

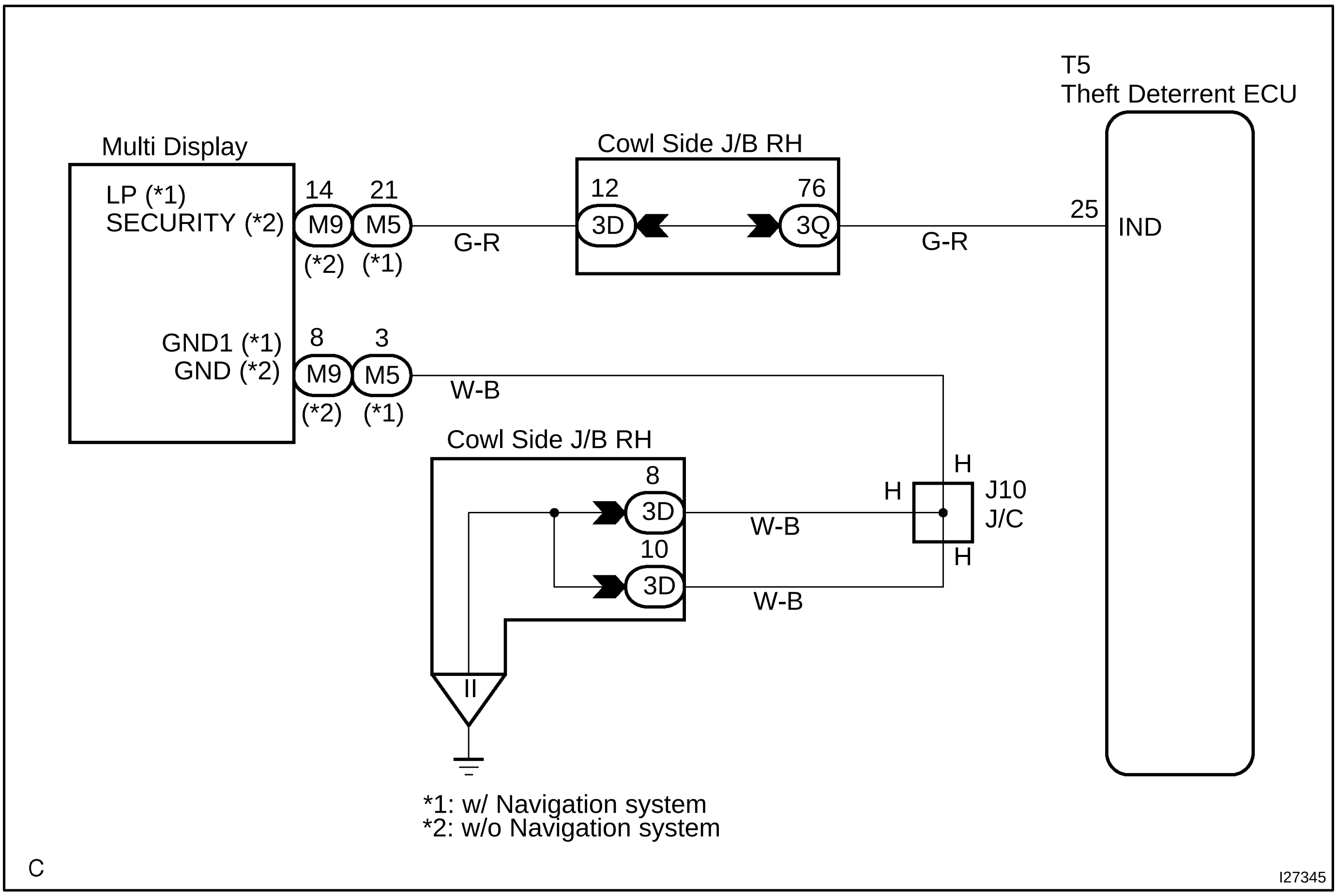
DIB4T-02

Security indicator circuit

CIRCUIT DESCRIPTION

When the theft deterrent system is preparing to be set, this circuit lights up the indicator.
When the system is set, the indicator blinks.
It also indicates the condition of the immobiliser system according to the request from the Transponder Key ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
In case of using the hand-held tester, start the inspection from step 1 and in case of not using the hand-held tester, start from step 2.

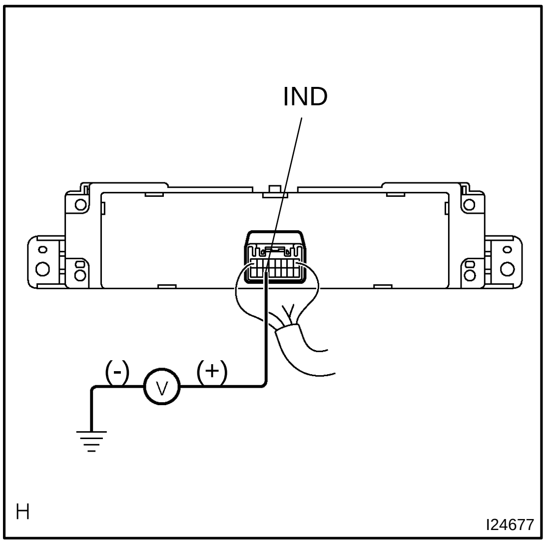
1	Check security indicator using hand-held tester.

PREPARATION:
Connect the hand-held tester to the DLC 3.
CHECK:
Check that the theft deterrent in the indicator lights in ACTIVE TEST (See page DI-955).

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI-965).**

NG

2	Check security indicator.



CHECK:
Connect the positive lead from the battery to terminal 7 (14) and negative lead to terminal 6 (8), and check that the warning light lights up.
( ): w/o Navigation system
OK:
Indicator light lights up.

NG → **Replace multi-display.**

OK

3	Check wire harness and connector between theft deterrent ECU and indicator, indicator and body ground (See page IN-36).

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

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI-965).

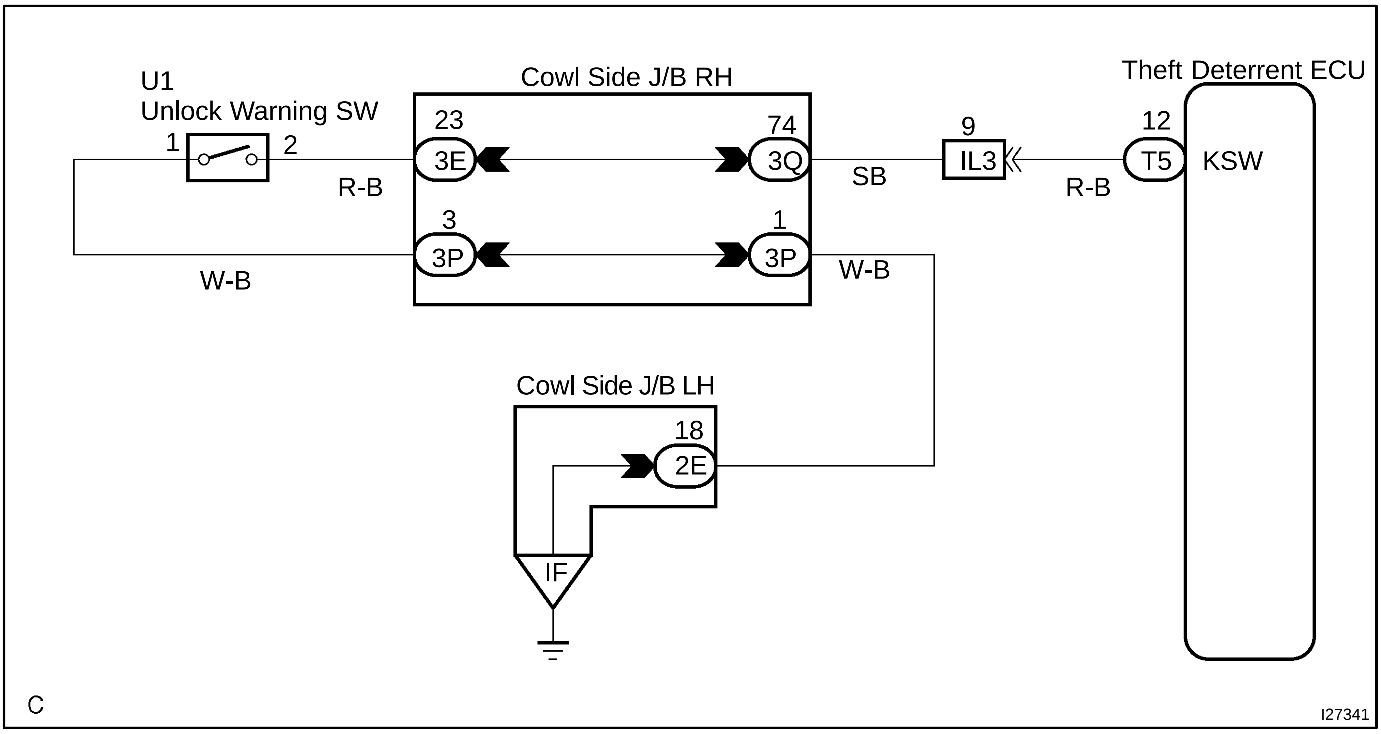
DIB4W-02

Key unlock warning switch circuit

CIRCUIT DESCRIPTION

The key unlock warning switch goes on when the ignition key is inserted 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

HINT:
In case of using the hand-held tester, start the inspection from step 1 and in case of not using the hand-held tester, start from step 2.

1	**Check unlock warning switch using hand-held tester.**

PREPARATION:
Connect the hand-held tester to DLC 3.
CHECK:
Check that the unlock warning switch operate in DATA LIST (See page DI-1040).

OK	**Proceed to next circuit inspection shown on problem symptoms table (See page DI-965).**

NG

2	Check key unlock warning switch (See page BE-29).

NG → Replace the key unlock warning switch.

OK

3	Check wireharness and connector between key unlock warning switch and theft deterrent ECU (See page IN-26).

OK → Repair or replace wireharness or connector.

OK

Proceed to next circuit inspection shown on problem symptoms table
(See page DI-965).

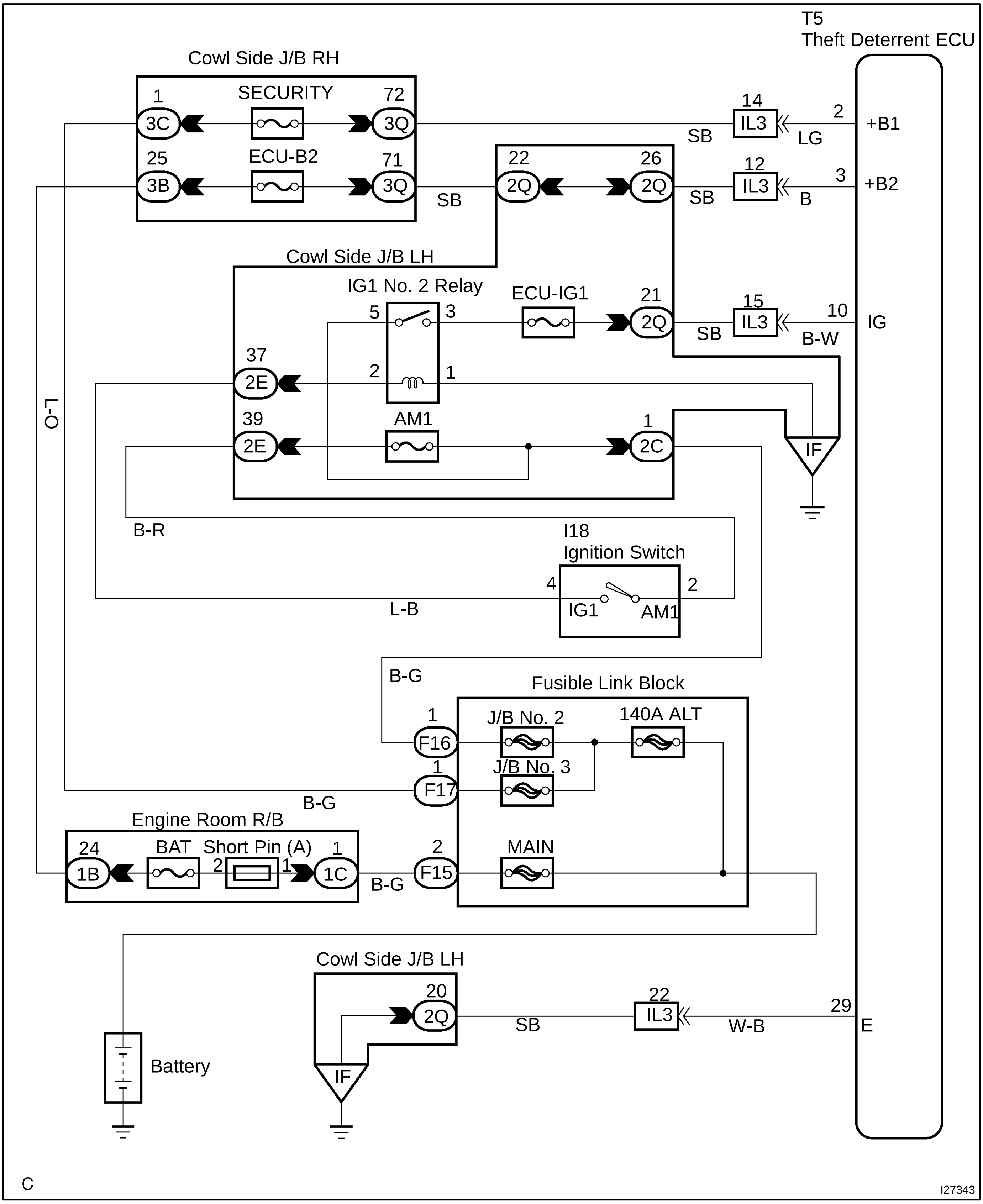
DIB4S-02

CIRCUIT INSPECTION

Power source 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 IG 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, position switch, etc.


T5
Theft Deterrent ECU
Cowl Side J/B RH
SECURITY
1
72
3C
3Q
14
2
IL3
+B1
SB
LG
25
ECU-B2
71
3B
3Q
SB
22
26
2Q
2Q
SB
12
IL3
3
+B2
B
Cowl Side J/B LH
IG1 No. 2 Relay
ECU-IG1
5
3
21
2Q
SB
15
IL3
10
IG
B-W
37
2E
2
1
L-O
39
2E
AM1
1
2C
IF
B-R
I18
Ignition Switch
4
2
IG1
AM1
L-B
B-G
Fusible Link Block
1
J/B No. 2
140A ALT
F16
1
J/B No. 3
F17
B-G
Engine Room R/B
24
BAT
Short Pin (A)
1
2
1
1B
1C
2
F15
MAIN
B-G
Cowl Side J/B LH
20
2Q
SB
22
IL3
29
W-B
E
IF
Battery
C
I27343

INSPECTION PROCEDURE

1	**Check ECU-B2 and SECURITY fuse.**

CHECK:
Check continuity of ECU-B2 and SECURITY fuse.
OK:
Continuity

NG → **Replace faulty fuse.**

OK

2	**Check voltage between terminals +B1, +B2 and E of theft deterrent ECU connector.**

PREPARATION:
(a) Turn the ignition switch OFF.
(b) Disconnect the theft deterrent ECU connector.
CHECK:
Measure the voltage between terminals +B1, +B2 and E.
OK:
Voltage: 10 - 14V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI-965).**

NG

3	**Check wire harness and connector between theft deterrent ECU and body ground (See page IN-36).**

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

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI-965).

DIB4U-02

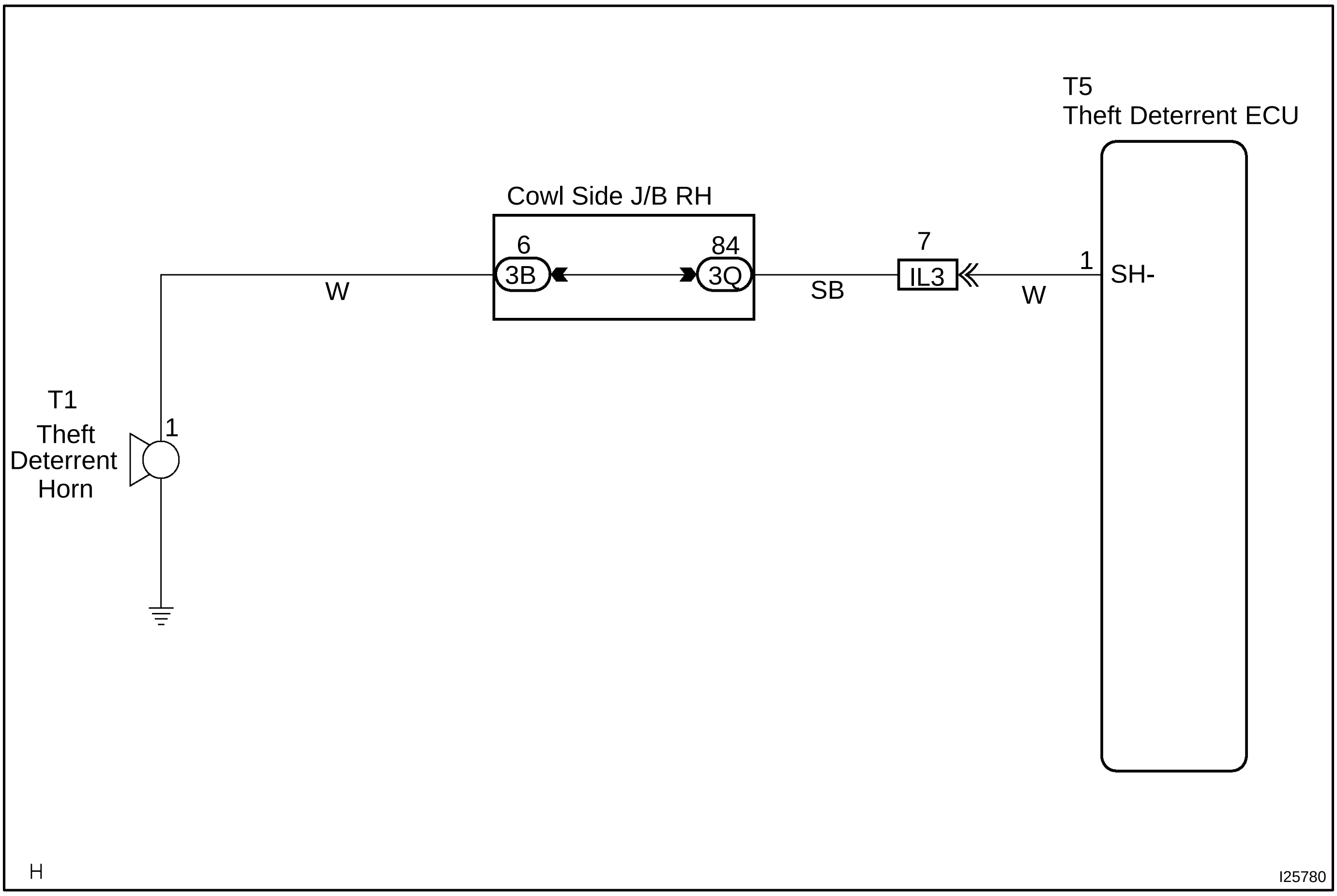
Theft deterrent horn circuit

CIRCUIT DESCRIPTION

When the theft deterrent system is activated, the relay in the ECU is turned ON and OFF at of approximately 0.2 sec. interval, causing the theft deterrent horn to sound (See the wiring diagram below).
In this condition, if any of the following operations is done, the relay in the ECU is turned OFF, thus stopping the theft deterrent horn from sounding:

(1) Unlock the driver door with key.
(2) Turn the ignition switch to ON position.
(3) Unlock the doors with the wireless door lock control system.
(4) Wait for approximately 60 seconds.
(5) Press the panic switch of the wireless door lock control system.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
In case of using the hand-held tester, start the inspection from step 1 and in case of not using the hand-held tester, start from step 2.

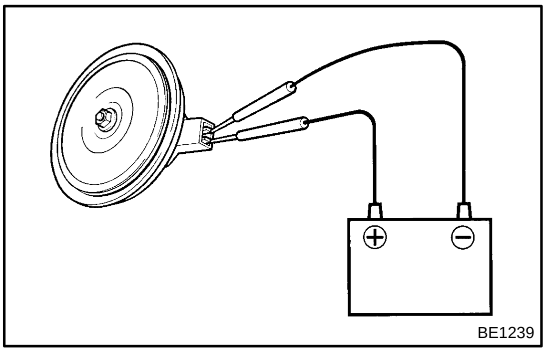
1	**Check theft deterrent horn using hand-held tester.**

PREPARATION:
Connect the hand-held tester to the DLC 3.
CHECK:
Check that the theft deterrent horn sounds in ACTIVE TEST (See page DI-955).

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI-965).**

NG

2	**Check theft deterrent horn.**



CHECK:
Connect positive (+) lead to terminal 1 and negative (-) lead to body ground of theft deterrent horn connector, and that the theft deterrent horn blows.
OK:
Horn sounding.

NG → **Replace theft deterrent horn.**

OK

3	**Check wire harness and connector between theft deterrent ECU and theft deterrent horn (See page IN-26).**

NG → **Check and repair wire harness or connector.**

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI-965).

DI01Q-07

CUSTOMER PROBLEM ANALYSIS CHECK

THEFT DETERRENT SYSTEM Check Sheet

Inspector's name: ________________

<table>
<tr><td rowspan="3">Customer's Name</td><td rowspan="3"></td><td>Registration No.</td><td></td></tr>
<tr><td>Registration Year</td><td></td></tr>
<tr><td>Frame No.</td><td></td></tr>
<tr><td>Date Vehicle Brought In</td><td>/ /</td><td>Odometer Reading</td><td>km
Mile</td></tr>
</table>

<table>
<tr><td colspan="2">Date Problem First Occurred</td><td>/ /</td></tr>
<tr><td colspan="2">Frequency Problem Occurs</td><td>★ Constantly ★ Sometimes (Times per day, month)
★ Once only</td></tr>
<tr><td rowspan="2">Weather Conditions When Problem Occurred</td><td>Weather</td><td>★ Fine ★ Cloudy ★ Rainy ★ Snowy
★ Various/Others</td></tr>
<tr><td>Outdoor Temperature</td><td>★ Hot ★ Warm ★ Cool
★ Cold (Approx. °F (°C))</td></tr>
</table>

<table>
<tr><td rowspan="7">Problem Symptom</td><td colspan="3">★ Theft deterrent system cannot be set.</td></tr>
<tr><td colspan="3">★ Indicator light does not flash when the theft deterrent system is set.
(It stays ON or does not light at all.)</td></tr>
<tr><td>★ Theft deterrent system does not operate.</td><td>★ When unlocked using the door lock knob.
★ When the engine hood is opened.</td><td><u>Malfunction</u>
★ Horns only
★ Theft deterrent horn only
★ Headlights only
★ Taillights only
★ Starter cut only
★ Door lock operation only</td></tr>
<tr><td>★ Once set system cannot be canceled.</td><td colspan="2">★ 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.</td></tr>
<tr><td>★ System cannot be canceled during warning operation.</td><td colspan="2">★ 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.</td></tr>
<tr><td colspan="3">★ Warning operation starts when the system is set and the door or luggage compartment door is opened with the key.</td></tr>
<tr><td colspan="3">★ Others.</td></tr>
</table>

THEFT DETERRENT SYSTEM

DI01P-16

HOW TO PROCEED WITH TROUBLESHOOTING

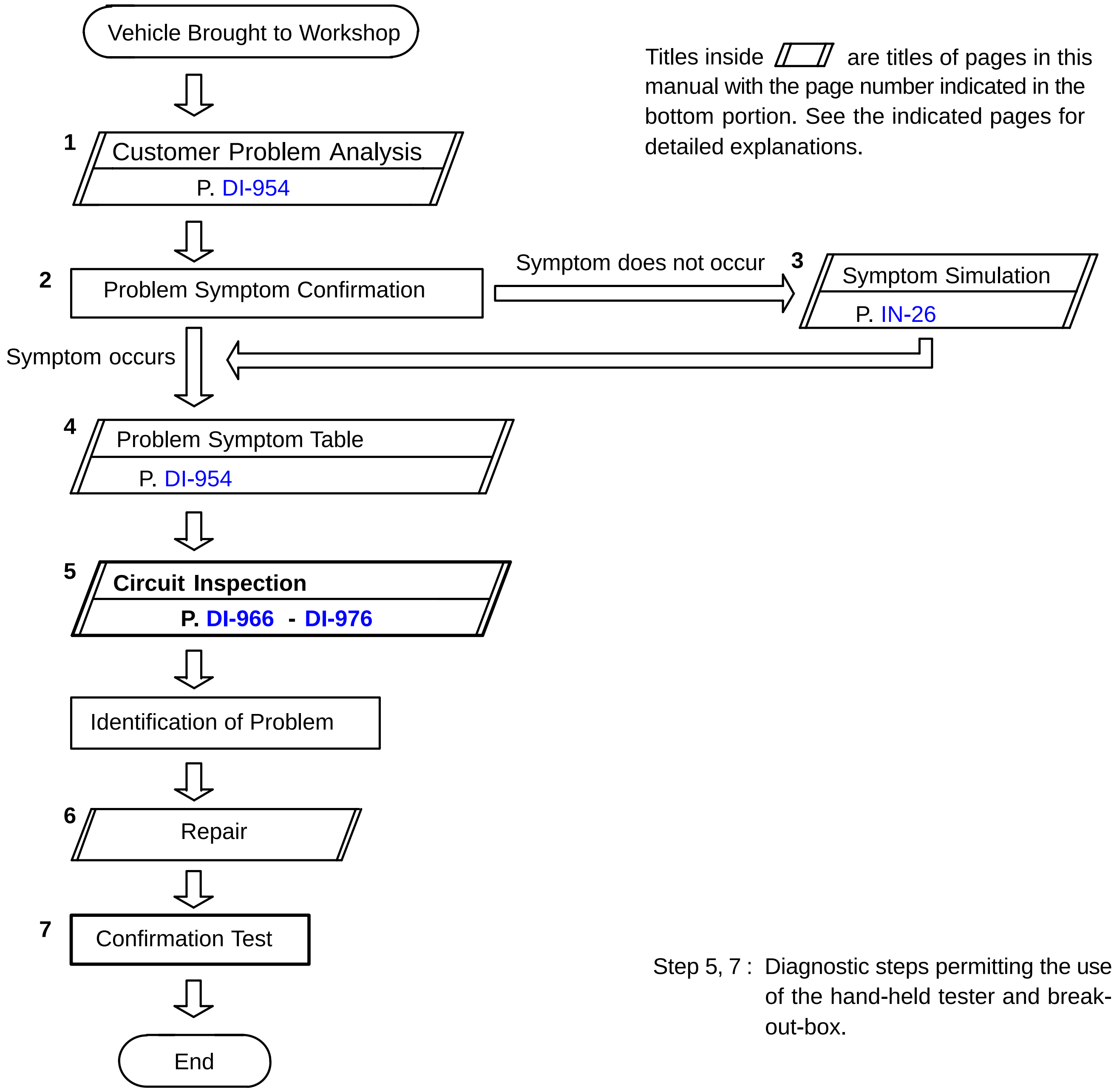
HINT:

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.

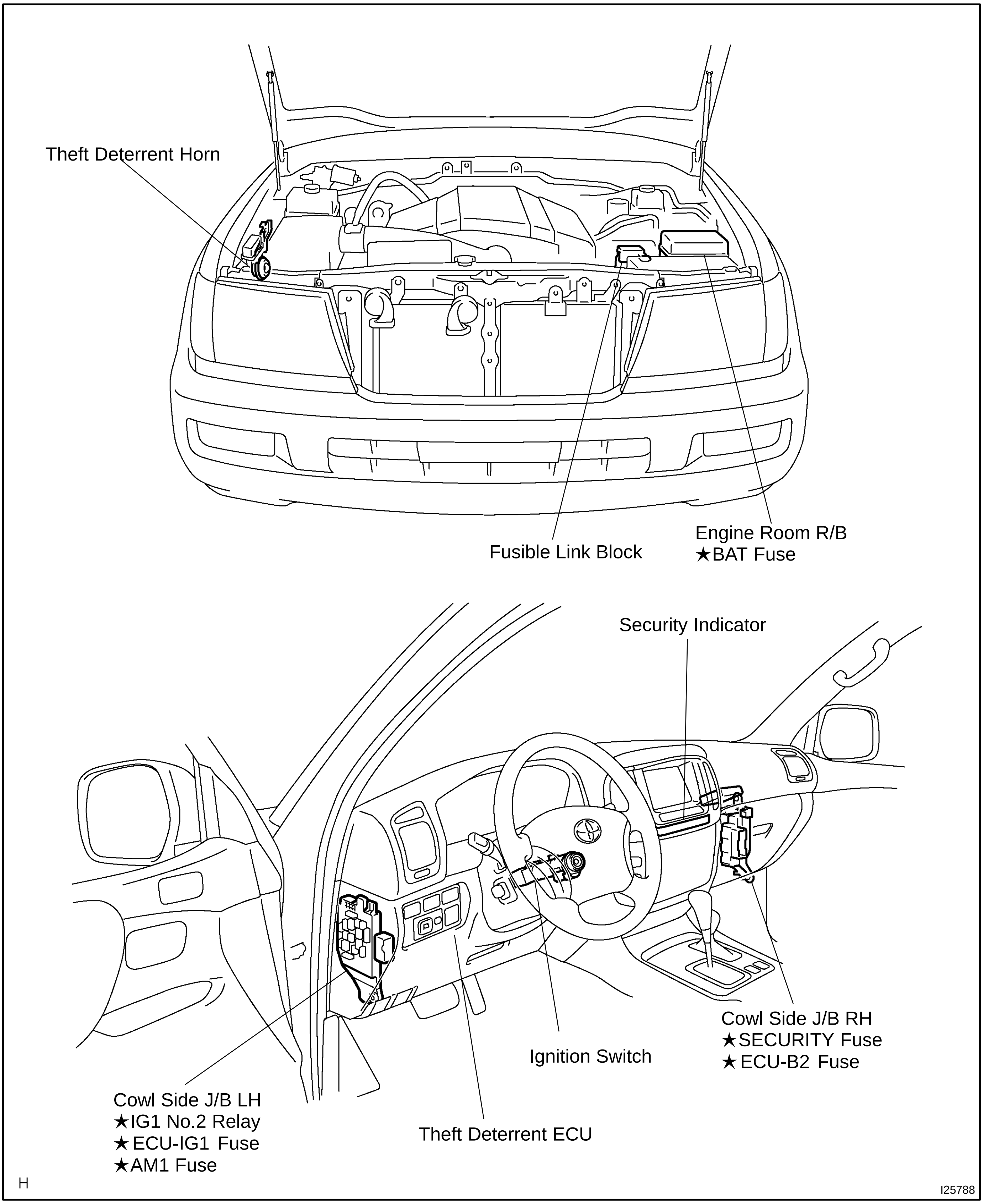
Be sure to use troubleshooting procedure appropriate to the diagnostic tool being used.

Perform troubleshooting in accordance with the procedure on the following page.



DI3CP-03

PARTS LOCATION



DIB4R-01

PRE-CHECK

1. OUTLINE OF THEFT DETERRENT SYSTEM

The security has an ”Alarm Control” and the control consists of 2 modes.

Active mode
This mode begins ”Alarm Control” as the user locks the vehicle by intention (See the reference step 2).

Passive mode
This mode begins ”Alarm Control” even if the user forgets locking the vehicle (See the reference step 5). (This mode begins ”Alarm Control” when the user closed all doors and the engine hood.)

HINT:

”Alarm Control” refers to the function that detects intrusion into the vehicle and sounds an alarm.

Even when the ”Alarm Control” operates in the passive mode, it works as in the active mode if a condition to begin the active mode is met.

2. ACTIVE ARMING MODE

There are 4 modes in active mode.

(1) Disarmed state
The alarm system is not set (theft detection is impossible), and the alarm does not sound. The system does not detect any theft.

(2) Arming preparation (for 30 seconds)
The waiting period when the alarm set requirements are met to when the system is actually set.

(3) Armed state
The state the alarm is set (operation is possible). The system can detect theft.

(4) Alarm sounding:
The system detects theft and informs using sounds and lights.
The state of waiting to switch to armed state again to have alarming interval after finishing alarming time.

Perform forced door lock when the door is unlocked.

Disarmed state (Key not inserted in ignition.)

Perform any of the followings, and the system will go no to ”Arming preparation”:
★With all the doors, engine hood and luggage compartment door closed, lock all doors with the key.
★With all the doors, engine hood and luggage compartment door closed, lock all doors with the wireless remote.
★With all the doors, engine hood and luggage compartment door closed, open and close any of doors, engine hood or luggage compartment door, then close and lock all doors, engine hood and luggage compartment door.

Arming preparation

Perform any of the followings, and the system will return to ”Disarmed state”: ★Open any of the doors, engine hood or luggage compartment door. ★Unlock any of the doors. ★Insert the key in the ignition. ★Reconnect the battery. ★Turn the ignition from OFF to ON.	Perform the following, and the system will go on to ”Armed state”: ★Let 30 seconds elapse with all the doors, engine hood and luggage compartment door closed and locked.

Armed state

Perform any of the followings, and the system will return to ”Disarmed state”: ★Unlock any of the doors or open the luggage compartment door with the wireless remote (☐). ★Unlock the doors or open the luggage compartment door with the key (☐). ★Put the key in the ignition and turn it to ON.	Perform any of the followings, and the system will go on to ”Alarm sounding”: ★Open any of the doors. ★Unlock any of the doors in any way other than with a key or the wireless remote. ★Open the luggage compartment door in any way other than with a key or the wireless remote. ★Open the engine hood. ★Reconnect the battery. ★Turn the ignition from OFF to ON.

Alarm sounding

Perform any of the followings, and the system will return to ”Disarmed state”: ★Unlock any of the doors or open the luggage compartment door with the wireless remote. ★Unlock the doors or open the luggage compartment door with the key. ★Put the key in the ignition and turn it to ON.	The vehicle’s horn and security horn will sound, and the hazard,Tail and Head lights flash for 60 seconds. After the alarm has ended, the system will return to ”Armed state”.

3. PASSIVE ARMING MODE

There are 4 modes in active mode.

(1) Disarmed state (1)

The state is same as the disarmed state in active mode.

(2) Disarmed state (2)

The alarm is not set. Pulling out the key and any of the doors is/are opened. (= the state if the opened door(s) and the engine hood are closed, the alarm is set.)

(3) Arming preparation (for 30 seconds)

The state is same as the arming preparation in active mode.

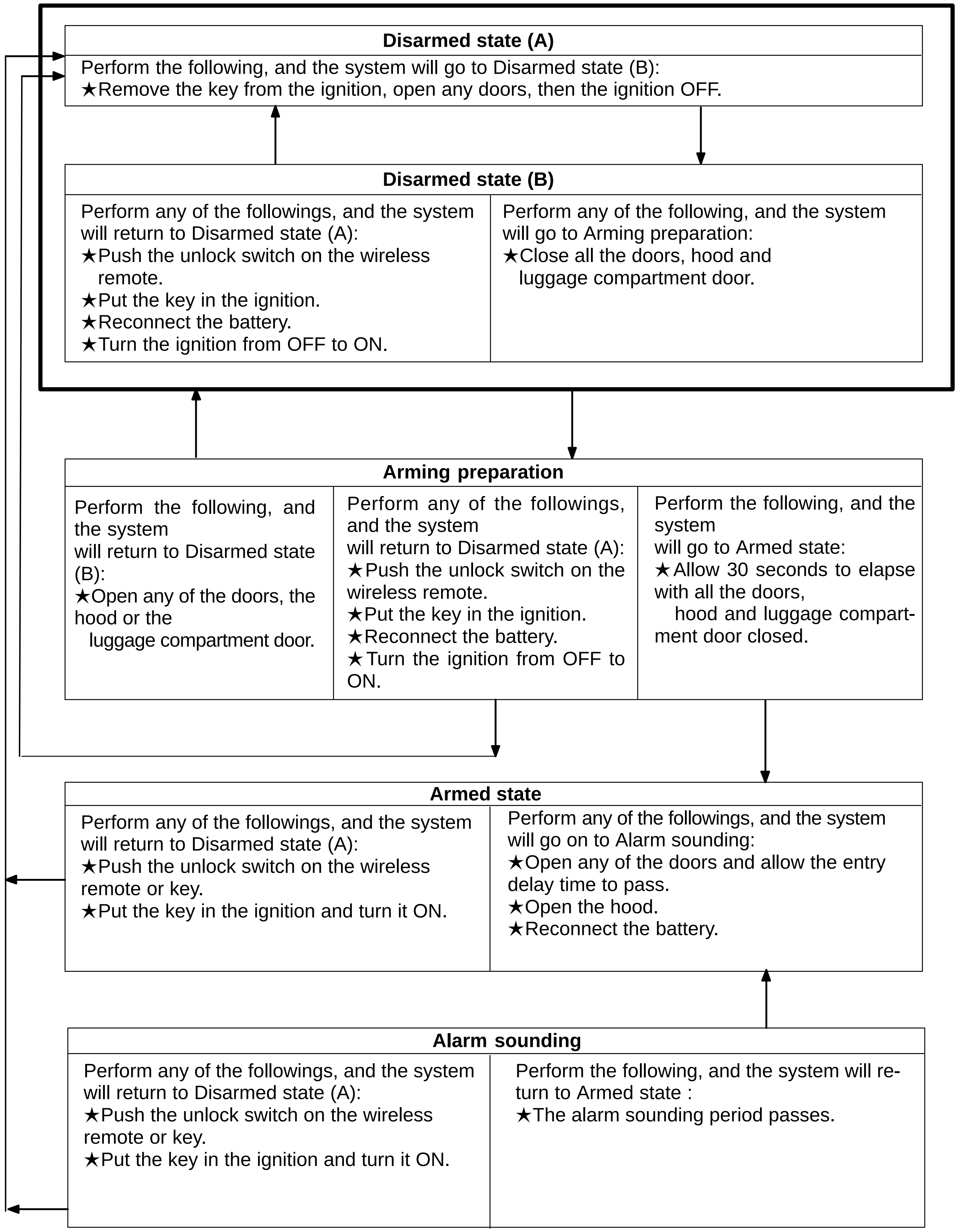
(4) Armed state

The state is same as the armed state in the active mode (However, it does not performs the theft deterrent by unlock operation).

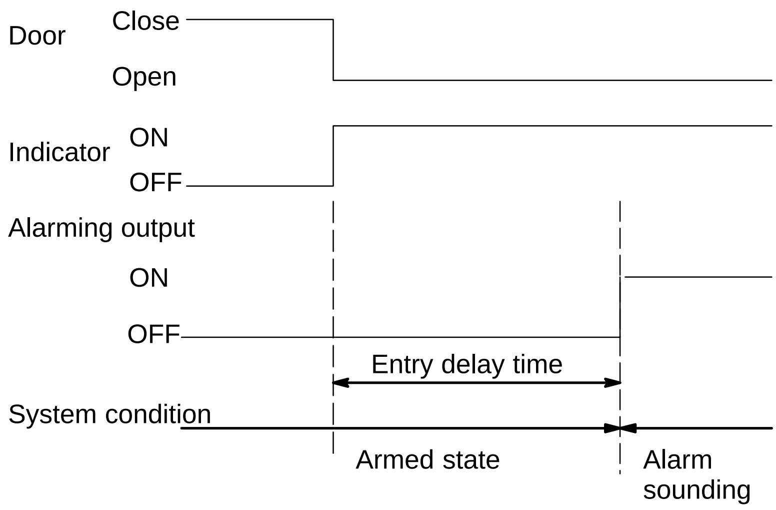
(5) Alarm sounding:

The system detects theft and informs using sounds and lights.

The state is same as the alarming sounding in the active mode (However, it does not performs forced door lock output).


Disarmed state (A)
Perform the following, and the system will go to Disarmed state (B):
★Remove the key from the ignition, open any doors, then the ignition OFF.
Disarmed state (B)
Perform any of the followings, and the system will return to Disarmed state (A):
★Push the unlock switch on the wireless remote.
★Put the key in the ignition.
★Reconnect the battery.
★Turn the ignition from OFF to ON.
Perform any of the following, and the system will go to Arming preparation:
★Close all the doors, hood and luggage compartment door.
Arming preparation
Perform the following, and the system will return to Disarmed state (B):
★Open any of the doors, the hood or the luggage compartment door.
Perform any of the followings, and the system will return to Disarmed state (A):
★Push the unlock switch on the wireless remote.
★Put the key in the ignition.
★Reconnect the battery.
★Turn the ignition from OFF to ON.
Perform the following, and the system will go to Armed state:
★Allow 30 seconds to elapse with all the doors, hood and luggage compartment door closed.
Armed state
Perform any of the followings, and the system will return to Disarmed state (A):
★Push the unlock switch on the wireless remote or key.
★Put the key in the ignition and turn it ON.
Perform any of the followings, and the system will go on to Alarm sounding:
★Open any of the doors and allow the entry delay time to pass.
★Open the hood.
★Reconnect the battery.
Alarm sounding
Perform any of the followings, and the system will return to Disarmed state (A):
★Push the unlock switch on the wireless remote or key.
★Put the key in the ignition and turn it ON.
Perform the following, and the system will return to Armed state :
★The alarm sounding period passes.

HINT:
In the armed state, if one of the doors is opened, entry delay occurs. (14 secs.)
During this time, the mode transfers to the disarmed state when the condition described on the previous page (□) is met.
When the condition is not met, the system judges as a theft occurred, and the mode transfers to alarm sounding.



4. INDICATOR LIGHT OUTPUT

The indicator output the condition of the alarm control and the intrusion sensor control as shown below.

Condition	Indicator light
Disarmed state	OFF
Arming preparation	ON
Armed state (Entry delay time)	OFF (ON)
Alarm sounding	ON

HINT:
Even in disarmed state, the indicator light flashes. (Due to the signal output from immobiliser system). The indicator always flashes by receiving the signal from the immobiliser system at any time in the arming condition.

Flashing frequency:
0.2 seconds (ON)
1.8 seconds (OFF)
Response:
The hazard lights flash under the following conditions.

(1) When the system is set.
When arming preparation is set from disarmed state using the wireless door lock, the hazard lights flash once.

(2) When the system is released.
When disarmed state is set from either arming preparation, armed state or alarm sounding using the wireless door lock, the hazard lights flash twice.

5. SWITCH TO ACTIVE MODE

In each passive mode, when ”disarmed state of active mode → arming preparation switch condition” is met, the active mode switch to each condition. In this case, active mode continues till disarmed state.

Passive mode when transfer condition is met.	Active mode transfer condition
Disarmed state	Arming preparation condition
Arming preparation condition	Arming preparation condition
Armed state (During entry delay time)	Arming condition (After alarming time has elapsed, arming condition if all the doors, engine hood and luggage compartment door is closed, all the doors are locked.)
Alarm sounding	After alarming time has elapsed, arming condition if all the doors, engine hood and luggage compartment door is closed, all the doors are locked.

6. FORCED DOOR LOCK CONTROL

While detecting intrusion into the vehicle and sounding alarm, alarm control outputs the door lock at the moment the door is unlocked, and prevents intrusion into the vehicle.

(1) Condition for Starting Forced Door Lock
Detecting any of the following conditions activates the forced door lock.

Alarm system is in alarm status in active mode.
Except for the case that the key unlock/luggage unlock switch is turned on.
No key is in the ignition key cylinder.
Some of the doors are unlocked.
Since the start of the last forced lock, 0.38 sec. or more has been elapsed.

(2) Conditions for Stopping Forced Door Lock
Detecting any of the following conditions stops the forced door lock.

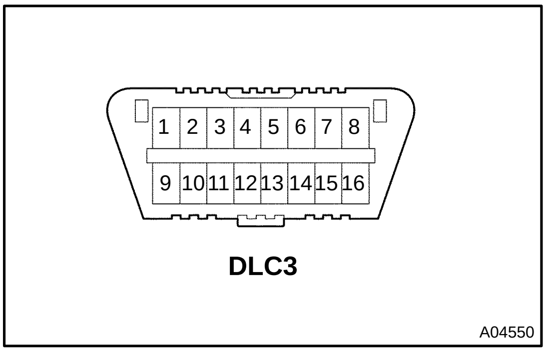
All doors are locked.
An alarm is stopped.
A key is inserted into the key cylinder.

7. PANIC CONTROL

The function to sound the alarm when the user presses the panic switch of the wireless key.

8. ALARM MEMORY CONTROL

If an alarm is activated while a user leaves the vehicle, when the user comes back to the vehicle and reset the security system, the tail lights will come on for 2 sec. to show the alarm occurrence.



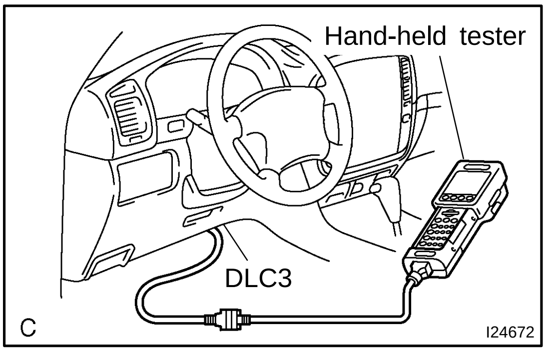
9. DTC CHECK (Using hand-held tester)

(a) Inspect the DLC3.
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.

HINT:
If the display shows "UNABLE TO CONNECT TO VEHICLE" when the cable of hand-held tester is connected to DLC3, the ignition switch is turned ON and the scan tool is operated, there is a problem either on the vehicle side or the tool side.

If communication is normal when the tool is connected to another vehicle, inspect DLC3 on the original vehicle.
If communication does not function 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.

(b) Make sure the details of the DLC3.



(c) Prepare the hand-held tester.
(d) Connect the hand-held to DLC3.
(e) Turn the ignition switch ON and the hand-held tester main switch ON.
(f) Use the hand-held tester to check the DTCs, note them down. (For opening instructions, see the hand-held tester's intrusion book).

10. DATA LIST

HINT:
By the DATA LIST displayed on the Hand-held tester, you can read the value of the switch, sensor, actuator and so on without removing any parts. Reading the DATA LIST as a first step of troubleshooting is one of the method to shorten the labor time.
(a) Turn the ignition switch OFF.
(b) Connect the hand-held tester to DLC3.
(c) Turn the ignition switch ON.
(d) According to the display on the tester, read the "DATA LIST".

THEFT DETERRENT ECU:

Item	Condition	Specified Condition
HOOD COURTSY SW	Engine hood Close → Open	OFF/ON
INTRS DETECT	Intrusion sensor detection OFF → ON	OFF/ON
GLS BRK DETECT	Glass broken sensor detection OFF → ON	OFF/ON
KEY UNLK WRN SW	Insert key	OFF/ON
IG SW	IG switch ON or other	OFF/ON
PASSIVE MODE	Passive mode → other mode	OFF/ON
WARN BY GLS SEN	Warning by glass broken sensor OFF → ON	OFF/ON
INTRUSION SEN	Intrusion sensor OFF → ON	OFF/ON
WARNING (HORN)	Warning by Horn OFF → ON	OFF/ON
ENTRY DELAY	Entry delay time	0 s/14 s /30 s

11. ACTIVE TEST

HINT:
Performing ACTIVE TEST using the Hand-held tester allows the relay, and so on to operate without removing any parts. Performing ACTIVE TEST as a first step of troubleshooting is one of the method to shorten the labor time.
DATA LIST can be displayed during ACTIVE TEST.
(a) Turn the ignition switch OFF.
(b) Connect the Hand-held tester to DLC3.
(c) Turn the ignition switch ON.
(d) According to the display on tester, perform the "ACTIVE TEST".

THEFT DETERRENT ECU:

Item	Test details	Diagnostic note
SECURITY INDIC	Turns security indicator ON/OFF	Connect terminals TC and E1 of DLC1
SECURITY HORN2	Turns security horn2 ON/OFF	-

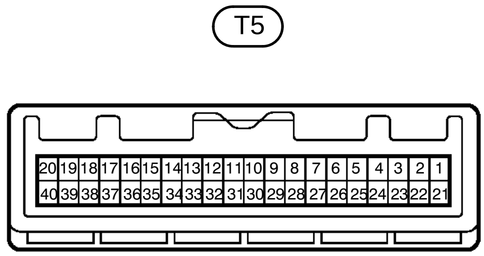
DI01U-14

PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
Theft deterrent system is not set.	1. Security indicator circuit 2. Key unlock warning switch circuit 3. Door courtesy switch circuit 4. Door unlock detection switch circuit 5. Engine hood courtesy switch circuit 6. Power source circuit 7. Theft deterrent ECU	DI-969 DI-974 DI-1062 DI-1110 DI-976 DI-966 -
Security indicator does not light up or blink.	1. Security indicator circuit 2. Theft deterrent ECU	DI-969 -
Theft deterrent system cannot be unset even if ignition switch is ON.	1. Key unlock warning switch circuit 2. Power source circuit 3. Theft deterrent ECU	DI-974 DI-966 -
During warning condition, horn does not operate.	1. Horn circuit 2. Theft deterrent ECU	DI-972 -

DI1AH-21

TERMINALS OF ECU



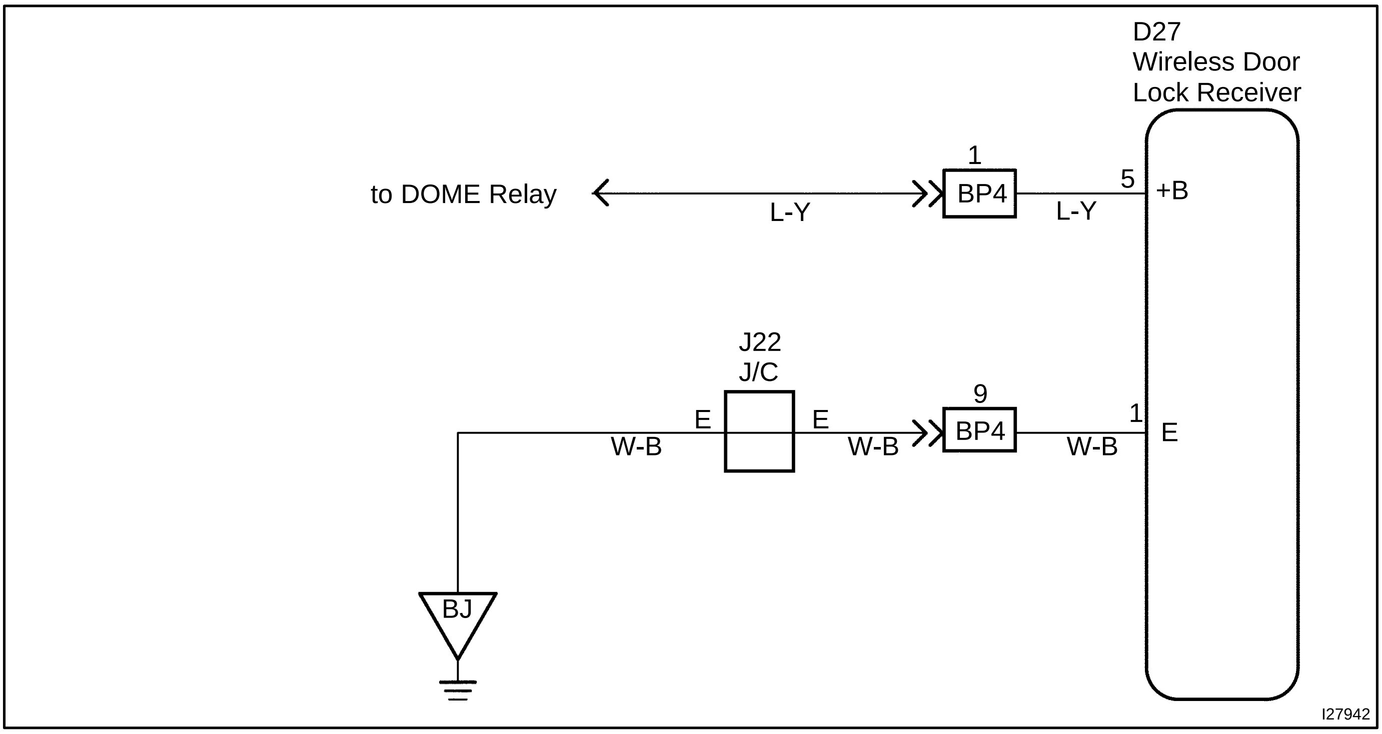
Symbols (Terminals No.)	Wiring Color	Condition	Specified condition
SH- ↔ Body Ground (T5-1 ↔ Body Ground)	W ↔ W-B	Always	10 - 14 V
+B1 ↔ Body ground (T5-2 ↔ Body ground)	LG ↔ Body Ground	Always	10 - 14 V
+B2 ↔ Body Ground (T5-3 ↔ Body Ground)	B ↔ Body Ground	Always	10 - 14 V
HORN ↔ E (T5-5 ↔ T5-29)	G-O ↔ W-B	Horn switch ”OFF”	10 - 14 V
IG ↔ E (T5-10 ↔ T5-29)	B-W ↔ W-B	Ignition switch is turned to ”ON” position	10 - 14 V
GBS ↔ E (T5-11 ↔ T5-29)	Y-G ↔ W-B	Glass sensor is ”ON”	10 - 14 V
		Glass sensor is ”OFF”	Below 1 Ω
KSW ↔ E (T5-12 ↔ T5-29)	R-B ↔ W-B	Key unlock warning switch ”ON” (Key inserted)	Below 1 Ω
		Key unlock warning switch ”OFF” (Key removed)	1 MΩ or higher
IND ↔ E (T5-25 ↔ T5-29)	G-R ↔ W-B	During set preparation	3 - 5 V
E ↔ Body ground (T5-29 ↔ Body Ground)	W-B ↔ Body Ground	Always	10 - 14 V
MPX1 (T5-31)	B	Multiplex communication circuit	-
DSWH ↔ E (T5-34 ↔ T5-29)	L-R ↔ 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

ECU Power Source Circuit

CIRCUIT DESCRIPTION

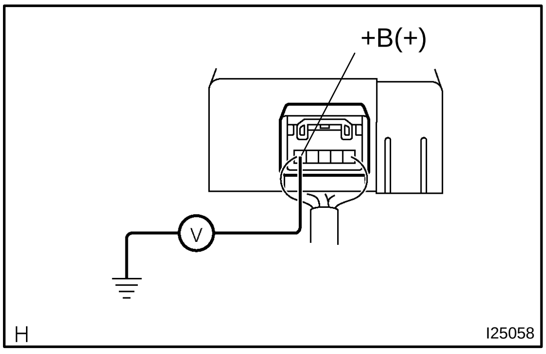
Battery positive voltage is always applied to the terminal +B of the wireless door lock ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal +B of ECU connector and ground.**



PREPARATION:

Remove the wireless door lock ECU.

CHECK:

Measure voltage between terminal +B of ECU connector and ground.

OK:

Voltage: 10 - 14 V

OK	**Proceed to next circuit inspection shown in problem symptom table (See page DI-948).**

NG

2	**Check wire harness and connector between wireless door lock ECU and body ECU (Main) (See page IN-36).**

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

OK

Proceed to next circuit inspection shown in problem symptom table (See page DI-948).

DIB5U-01

CIRCUIT INSPECTION

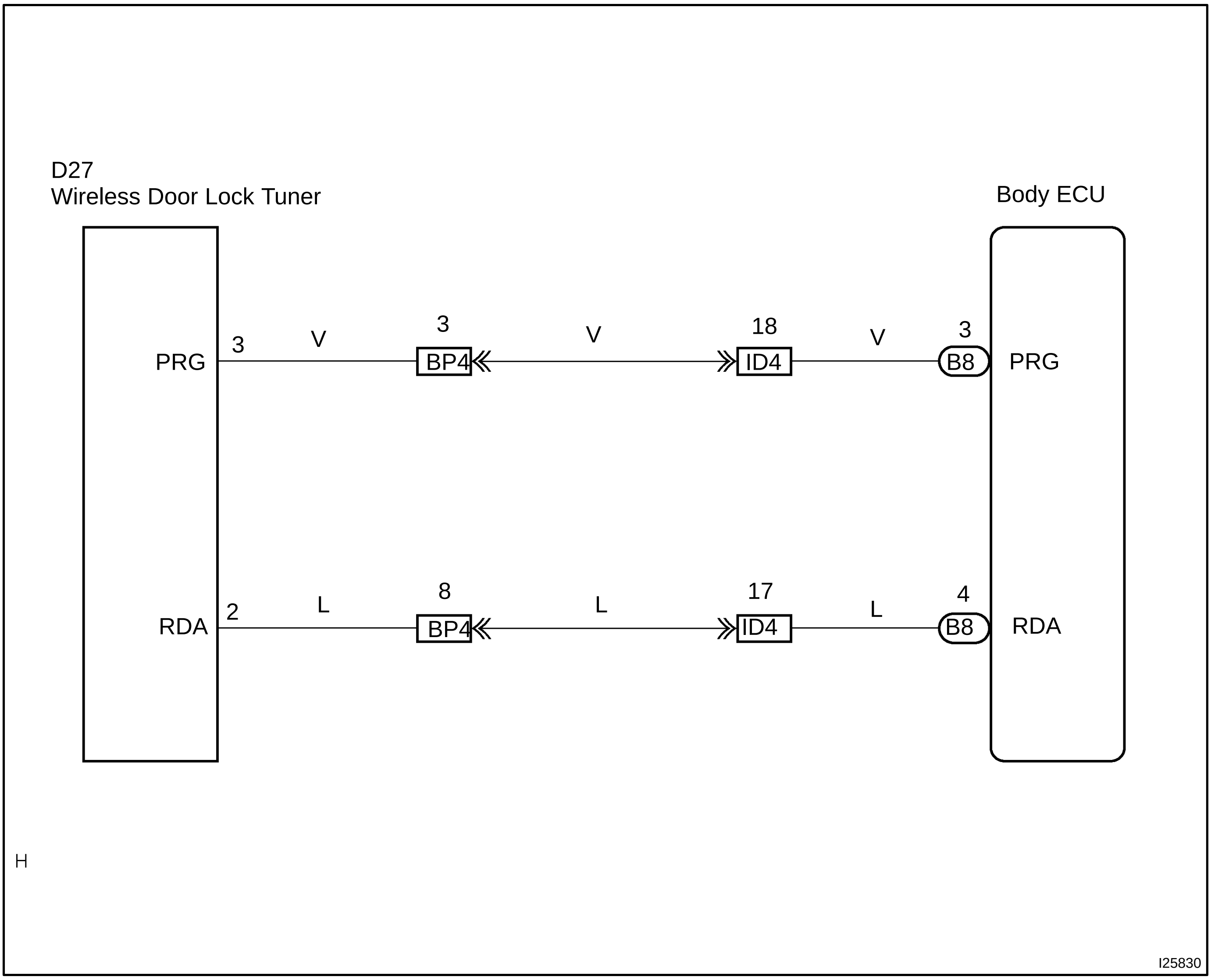
DTC	B1242	Wireless door lock receiver circuit malfunction

CIRCUIT DESCRIPTION

This DTC is output when GND short of RDA terminal is detected.

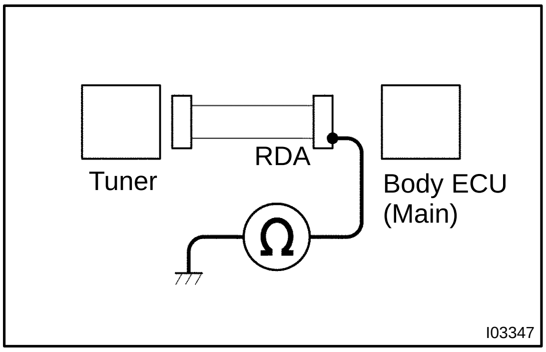
DTC No.	DTC Detecting Condition	Trouble Area
B1242/42	GND short of RDA terminal	★Wire harness ★Wireless door lock tuner ★Body ECU (Main)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check wire harness.**

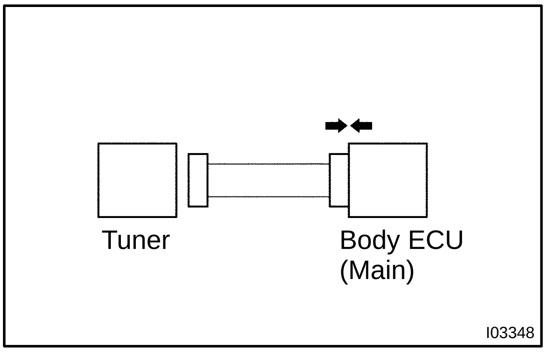


PREPARATION:
Disconnect the connector of tuner and body ECU.
CHECK:
Check the continuity between wireharness and body ground.
OK:
No continuity.

NG → **Repair or replace the wire harness.**

OK

2	**Check body ECU.**



PREPARATION:
Connect the connector of body ECU.
CHECK:
Check the DTC.
OK:
B1242 is not output.

NG → **Replace the body ECU (Main).**

OK

Replace the tuner.

DI0DR-04

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 when each door is opened.	
	☐ Wireless door lock functions incorrectly. (Although one door is unlocked, when the transmitter switch is pressed, all doors become unlocked.)	☐ When RH door is unlocked ☐ When LH door is unlocked
	☐ Others	

DIB5T-01

DIAGNOSTIC TROUBLE CODE CHART

If a malfunction code is displayed during DTC check, check the circuit corresponding to the code in the table below (Proceed to the page given for the circuit).

DTC No. (See Page)	Circuit Inspection	Trouble Area
B1242 (DI-949)	Wireless door lock tuner circuit malfunction	★Wire harness ★Wireless door lock tuner (door control receiver) ★Theft deterrent ECU

WIRELESS DOOR LOCK CONTROL SYSTEM

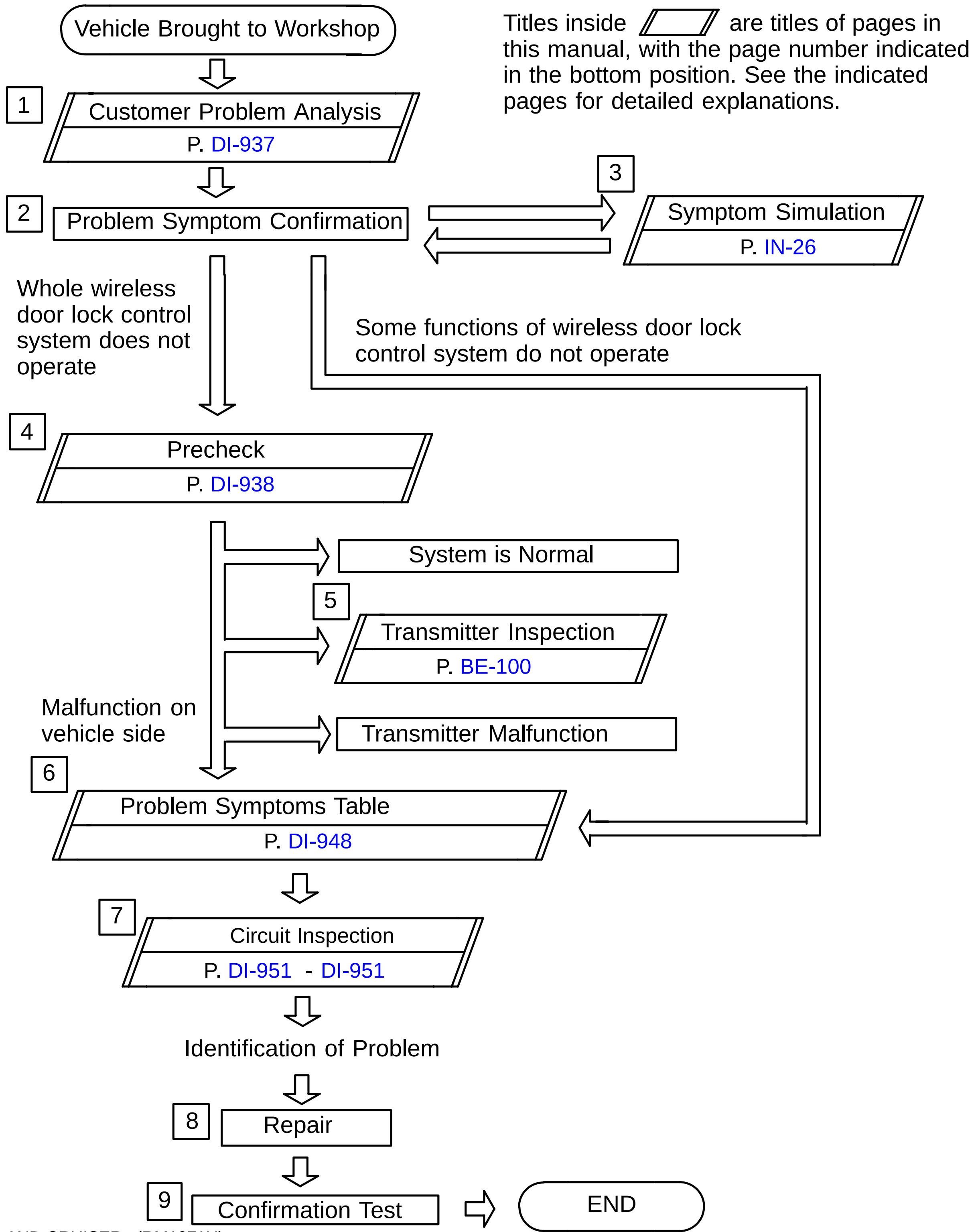
HOW TO PROCEED WITH TROUBLESHOOTING

DI0DQ-13

HINT:

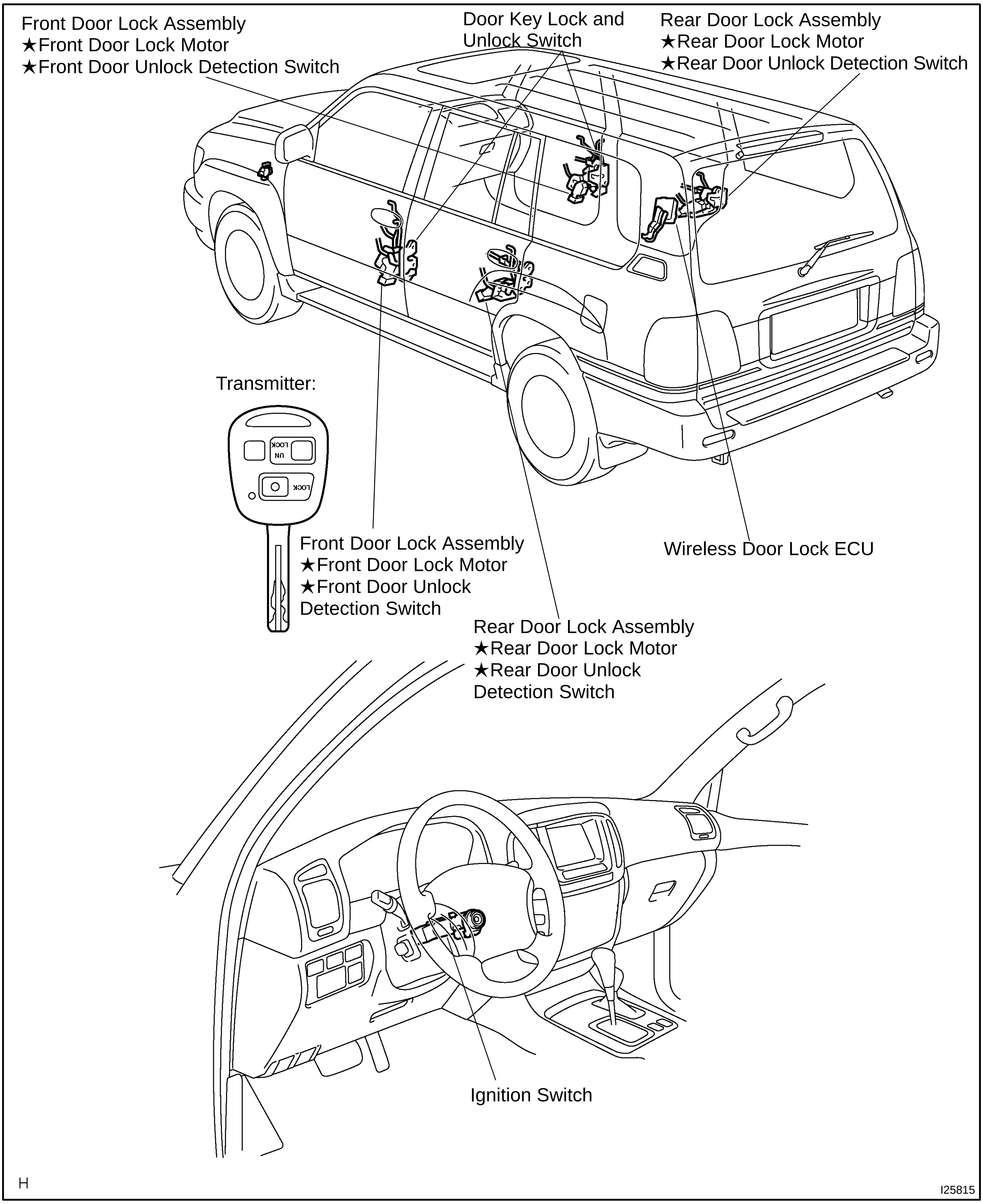
Troubleshooting of the wireless door lock control system is based on the premise that the door lock control system is operating normally. Accordingly, before troubleshooting the wireless door lock control system, first make certain that the door lock control system is operating normally.

Perform troubleshooting in accodnce with procedure on the following page.



DI3CN-03

PARTS LOCATION



DI89V-02

PRE-CHECK

1. CHARACTERS OF WIRELESS DOOR LOCK

(a) The operation distance changes according to how customers hold the transmitter or where it is used.

(b) Because of using the very weak radio wave, if there is a strong wave or noise on the frequency being used, the operation distance may become shorter.

2. WIRELESS DOOR LOCK BASIC FUNCTION

(a) Stand on the driver's side. Stay 1 m away from the vehicle.

(b) Turn the transmitter toward the vehicle and press any one of the transmission switched for 1 sec.

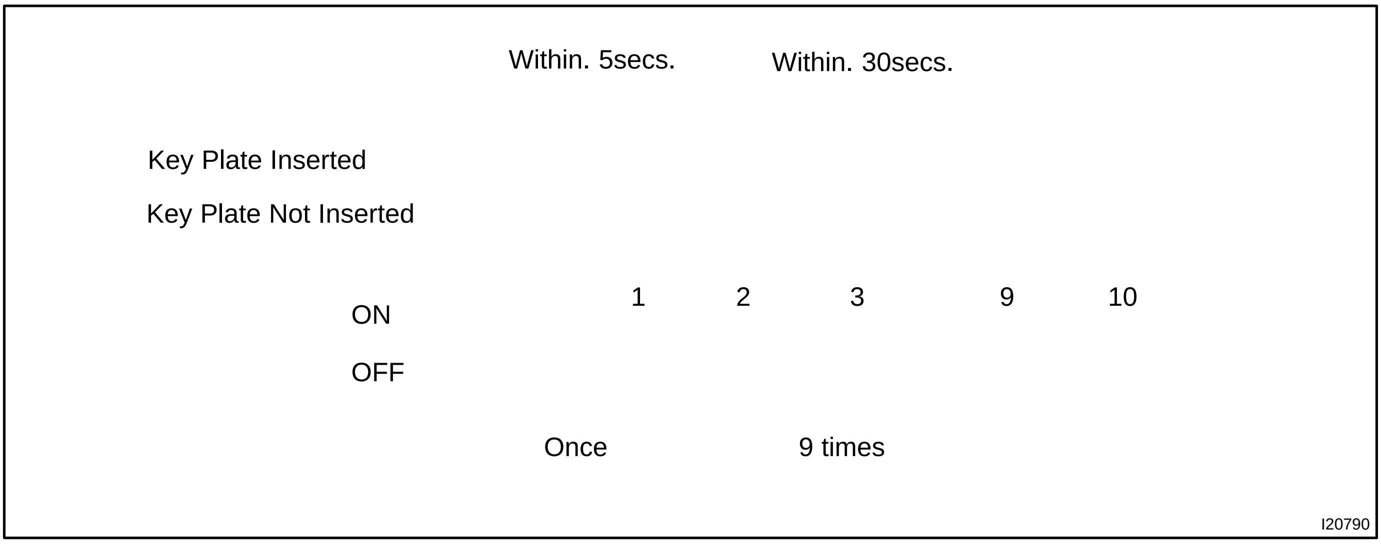
3. INSPECT WIRELESS DOOR LOCK DIAGNOSIS MODE

(a) Start up diagnosis mode.

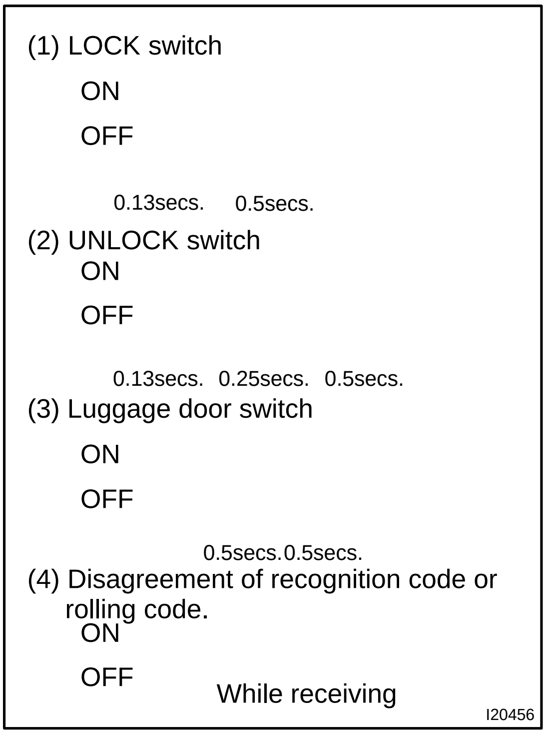
HINT:

Follow the method below.

(1) Insert the ignition key into the ignition key cylinder.
(2) Remove the ignition key from the ignition key cylinder.
(3) Insert the key into the ignition switch.
(4) Turn the ignition switch ON once within 5 sec.
(5) Repeat turning the ignition switch OFF → ON 9 times within 30 sec.
(6) Enter the diagnosis mode, and make sure that the taillight lights up.



(b) Finishing the Diagnosis Mode.
During the Diagnosis mode, turn the ignition switch OFF → ON to go back to the normal mode.
At this time make sure that the taillight lights up.



(c) Diagnosis Mode Check.

HINT:

Check how the taillight lights up when pressing each transmitter switch.

(1) LOCK switch
(2) UNLOCK switch
(3) Luggage door switch
(4) Disagreement of recognition code or rolling code.

HINT:

If (4) is detected in the Diagnosis Check, conduct the recognition code registration.

(5) No response from the taillight.

HINT:

Conduct the following checks.

- □ Wireless door lock transmitter.
- □ Wireless door lock receiver.

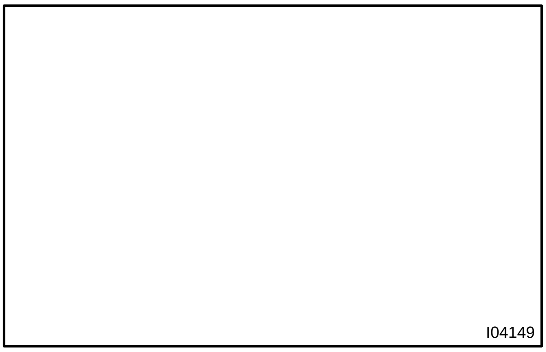
4. INSPECT WIRELESS DOOR LOCK TRANSMITTER OPERATION

HINT:

Refer to ”3. REPLACE TRANSMITTER (LITHIUM) BATTERY”.

(a) Using a screwdriver, remove the 2 screws and cover.

(b) Remove the battery (lithium battery).



(c) Install a new or normal battery (lithium battery).

HINT:

When a new or normal battery can not be obtained, connect 2 new 1.5 V batteries in series, connect the battery (+) to the battery receptacle side terminal and battery (-) to the bottom terminal, then apply 3 V voltage to the transmitter.

(d) In the location where is approx. 1 m away from driver’s outside handle in the right direction, face the key plate of the transmitter to the vehicle, and check the transmitter operation when pressing transmission switch of the transmitter body.

Standard:

- □ Remote control of vehicle door lock can be operated.
- □ LED lights up more than once.

HINT:

- □ The minimum operation distance differs according to operator, the way of holding the transmitter, and location.
- □ As weak wave is used, operation distance might be shortened when noise is detected in strong wave or used frequency.

(e) Install the battery (lithium battery).
(f) Install a cover so that O-ring is not distorted or slipped off.
(g) Using a screwdriver, tighten the 2 screws.

5. CHECK BATTERY CAPACITY

HINT:

- □ Make sure to use the TOYOTA electrical tester.
- □ With the battery unloaded, judge can not be made whether the battery is available or not on the test.
- □ When the transmitter is faulty, the energy amount left in the battery might not be checked correctly.
- □ On the lithium battery used for the transmitter, the voltage more than 2.5 V with the battery unloaded is shown on the tester until the energy is completely consumed. Accordingly when inspecting the energy amount left in the battery, it is necessary to measure the voltage when the battery is loaded. (1.2 kΩ).

I04150

(a) Remove the 2 screws and cover using a (-) driver.
(b) Remove the battery (lithium battery) from the transmitter.
(c) Connect the lead to the (-) terminal of the transmitter and install the battery.

I07522

(d) Connect the (+) tester to the (+) battery (lithium battery), and (-) tester to the lead respectively.
(e) Press one of the transmitting switches on the transmitter for approx. 1 second.
(f) Press the transmitting switch on the transmitter again to check the voltage.

Standard: 2.1 V or more

HINT:

- When the temperature of the battery is low, the judge can not be made correctly.
  When the outcome of the test is less than 2.1 V, conduct the test again after leaving the battery in the place at 18 ˚C for more than 30 minutes.
- By auto power off function, the voltage becomes no load voltage (more than 2.5 V) condition 20 seconds after the switch was pressed.
  Make sure to read the voltage before of it.
- High voltage might be shown 1 to 2 times after leaving the battery, judge should be made with the voltage shown at the 3rd time or later.

(g) Disconnect the lead.
(h) Set the battery (lithium battery) in the transmitter.
(i) Install the cover, so that the O-ring is not distorted or slipped off.
(j) Using a screwdriver, tighten the 2 screws.

6. REPLACE TRANSMITTER (LITHIUM) BATTERY

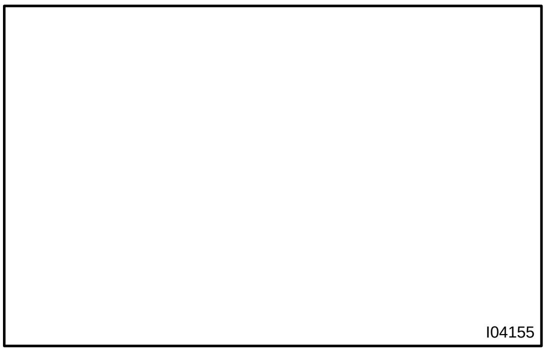
NOTICE:
Special caution should be taken for handling each component as they are precision electronic components.

(a) Using a screwdriver, remove the screw and cover.

NOTICE:
Do not pry out the cover forcibly.

HINT:
Push the cover with a finger so that there becomes clearance, then pry out the cover from that clearance.

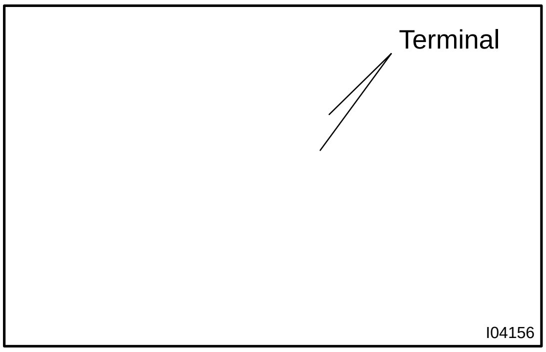
(b) Remove the transmitter.



(c) Using a screwdriver, remove the 2 screws and cover.
(d) Remove the battery (lithium battery).

NOTICE:

- **Do not push the terminals with a finger.**
- **If prying up the battery (lithium battery) forcibly to remove, the terminals are deformed.**



(e) Install a battery (lithium battery) as shown in the illustration.

NOTICE:
Face the battery upward. Take care not to deform the terminals.

(f) Check that O-ring is not distorted or slipped off, and install the cover.
(g) Using a screwdriver, tighten the 2 screws.

NOTICE:
When the shrews are tightened loosely, it might cause faulty contact of battery (lithium battery) and terminals.

(h) Assemble the transmitter to the key plate and the cover.
(i) Using a screwdriver, tighten the screw.

7. REPLACE DOOR CONTROL RECEIVER AND TRANSMITTER

NOTICE:
When replacing the theft deterrent ECU or transmitter, registration of recognition code is necessary because they are provided as a single components.

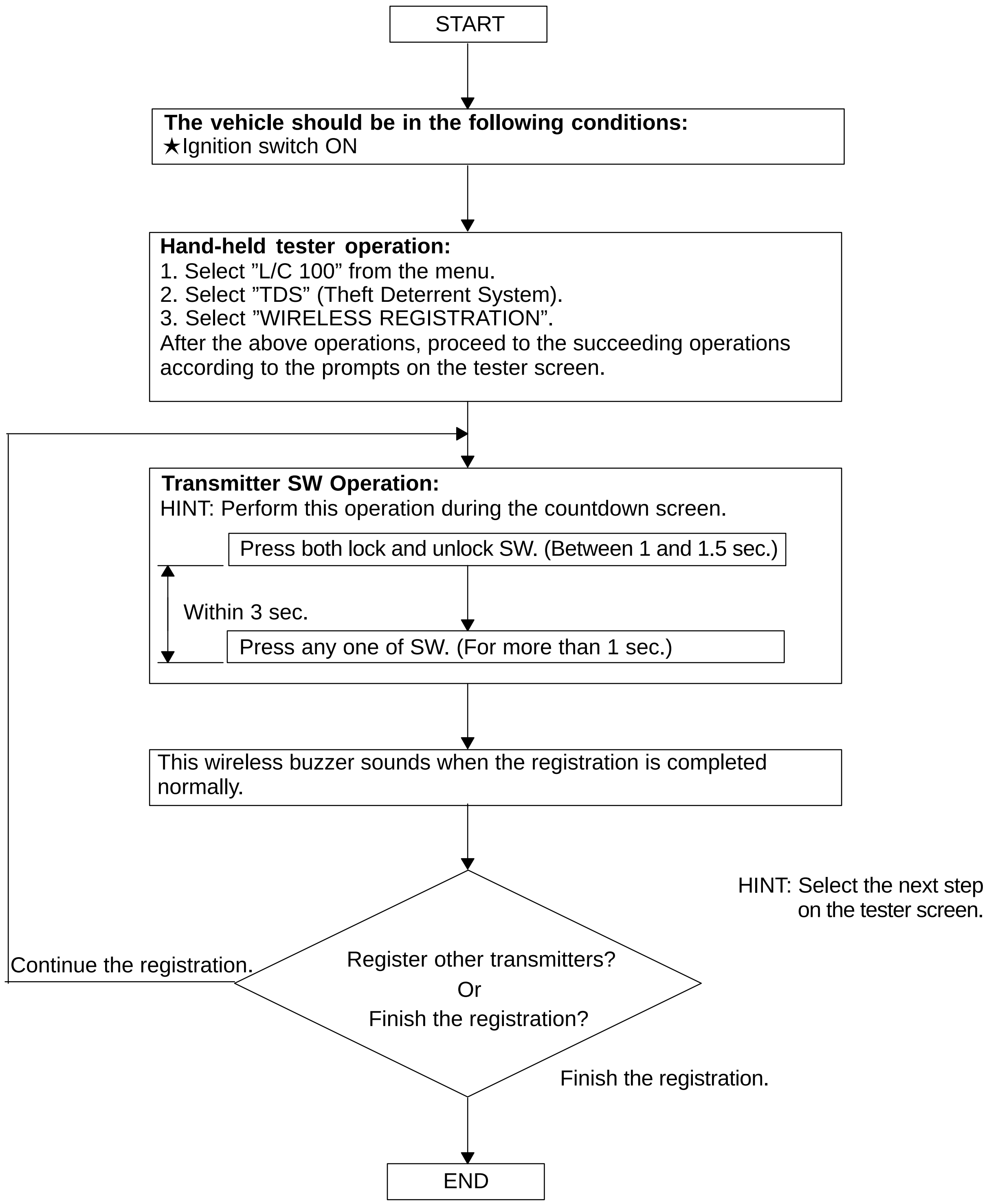
(a) Select the operation mode to perform from the following operation modes.
- Add mode
- Rewrite mode
- Prohibition mode
- Confirmation mode

HINT:
- The "Add mode" is for adding the newly recognized codes for registration while the already registered codes are retained. This mode is used when the transmitter is added. When the number of the registered codes exceeds 4 codes, the previously registered codes will be erased in order, staring from the first registered code.
- The "Rewrite mode" is for erasing all the registered codes and registering newly recognized codes only. This mode is used when the transmitter or the door control receiver is replaced.
- The "Prohibition mode" is for erasing all the registered codes to prohibit the wireless door lock operation. This mode is used when the transmitter is lost.
- The "Confirmation mode" is for confirming the number of recognition codes that are registered. This mode is used to check the number of registered codes when new codes are added to the registration, etc.

(b) Follow the chart on the following page to register the transmitter recognition code to the theft deterrent ECU.

HINT:
- When procedure is out of the specified, the registration operation is cancelled.
- Maximum 4 recognition codes can be registered.
- For the details of the registration procedure, see page BE-93 .

(c) By TOYOTA Hand-Held Tester



HINT:
This page is to show briefly the registration procedure using the hand-held tester.
For detailed procedures, please refer to the prompts on the tester screen.
The number of currently registered codes can be checked out on the first screen of the WIRELESS REGISTRATION.

(d) By Switch Operation:

START

HINT: The registration operation is cancelled if each operation is not completed within the specified time.

The vehicle should be in the following conditions:
★Driver door open (Other doors are closed).
★No key inserted in the IG key cylinder.

Within 5 sec.

Insert and remove the key into/from the ignition cylinder twice.
Insert→remove →insert→remove

Within 40 sec.

Close and open the driver door twice.
Close→open→close→open

Insert and remove the key into/from the ignition cylinder once.
Insert→remove

Within 40 sec.

Close and open the driver door twice.
Close→open→close→open

Insert the key into the ignition key cylinder.
Close all the doors.

Within 40 sec.

HINT: If the IG switch operation is not performed with the specified number of times (If it is 4 times, 6 times or more), this operation is finished with no response.

Mode Selection

Add mode	**Rewrite mode**	**Confirmation mode**	**Prohibition mode**
Turn the IG SW ON ←→LOCK once.	Turn the IG SW ON ←→LOCK twice.	Turn the IG SW ON ←→LOCK 3 times.	Turn the IG SW ON ←→LOCK 5 times.

Remove the key from the IG key cylinder.

Within 3 sec.

Response of whether or not being moved to each mode is given with the number of times of door lock working (lock/unlock).

★Add mode: once*1
★Rewrite mode: twice*1
★Confirmation mode: The number of times equivalent to the number of currently registered codes*2
★Prohibition mode: 5 times*1

HINT: The confirmation mode and the prohibition mode are finished after the responses.

Confirmation mode
Prohibition mode

END

Add mode,
Rewrite mode

Within 40 sec.

Transmitter SW Operation:

Press both lock and unlock SW. (Between 1 and 1.5 sec.)

Within 3 sec.

Press any one of SW. (For more than 1 sec.)

Within 3 sec.

Response of whether or not the registration is completed is given in the form of the number of times of door lock operations (lock/unlock operation).

When registration is completed: once*1
When registration is not completed: twice*1

Register other transmitters?
or
Finish the registration?

Continue the registration.
Within 40 sec.

Finish the registration.

Perform one of the following operations to finish the Add mode and the Rewrite mode.
★Insert the key into the IG key cylinder.
★Open any one of the doors.
★Wait for 40 sec. after the code registration.

HINT: In case of registering 4 codes at a time, the mode will be finished when the 4th code is registered.

DI0DV-12

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 function of wireless door lock control system do no operate.	1. ECU Power Source Circuit. 2. Door Courtesy Switch Circuit. 3. Door Key Lock and Unlock Switch Circuit. 4. Key Unlock Warning Switch Circuit. 5. Wireless Door Lock ECU. 6. Body ECU (Main).	DI-951 DI-1062 DI-1106 DI-1060 IN-36 IN-36
Only door unlock operation is not possible (Lock operation is possible).	1. Door Key Lock and Unlock Switch Circuit 2. Door Unlock Detection Switch Circuit 3. Wireless Door Lock ECU. 4. Body ECU (Main).	DI-1106 DI-1060 IN-36 IN-36
Only door lock operation is not possible (Unlock operation is possible).	1. Door Key Lock and Unlock Switch Circuit 2. Wireless Door Lock ECU 3. Body ECU (Main).	DI-1106 IN-36 IN-36
Only transmitter misoperation prevention function is not possible.	1. Key Unlock Warning Switch Circuit 2. Wireless Door Lock ECU 3. Body ECU (Main).	DI-1060 IN-36 IN-36
Wireless door lock function operates even when each door is opened.	1. Door Courtesy Switch Circuit 2. Wireless Door Lock ECU 3. Body ECU (Main).	DI-1062 IN-36 IN-36
Wireless door lock functions incorrectly. (Although one door is unlocked, when the transmitter switch is pressed, all doors unlock.)	1. Door Unlock Detection Switch Circuit 2. Wireless Door Lock ECU 3. Body ECU (Main).	DI-1060 IN-36 IN-36
Wireless door lock operates, but the taillight does not respond.	1. Taillight Relay Circuit 2. Taillight Circuit 3. Wireless Door Lock ECU 4. Body ECU (Main).	DI-1076 DI-1076 IN-36 IN-36