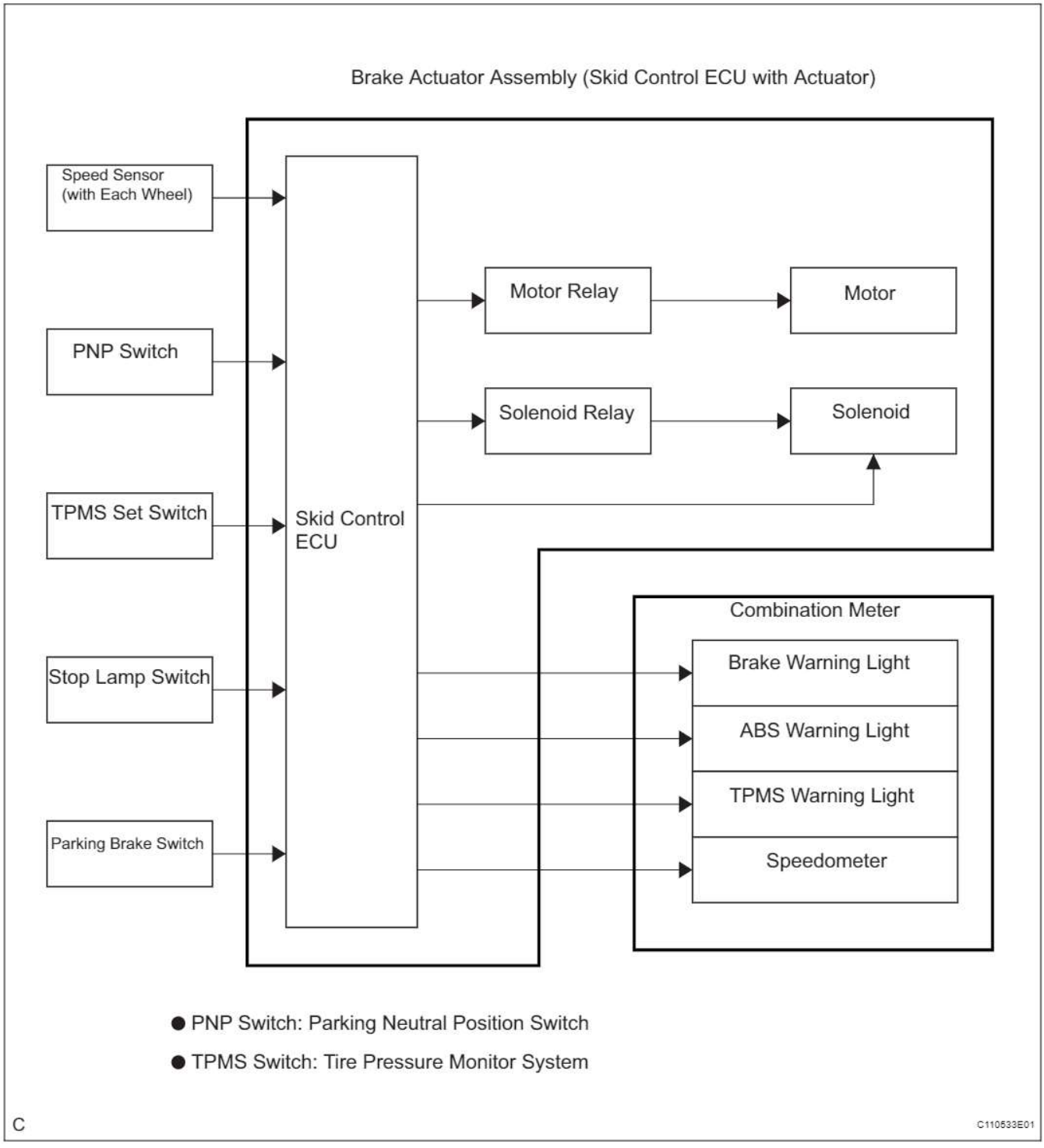
SYSTEM DIAGRAM



BC

SYSTEM DESCRIPTION

1. SYSTEM DESCRIPTION

HINT:

- The skid control ECU is a single unit with BRAKE ACTUATOR.
- The skid control ECU also works as a TPMS (Tire Pressure Monitor System) ECU.

(a) ABS
(Anti-lock Brake System)
The ABS helps prevent the wheels from locking when the brakes are applied firmly or when braking on a slippery surface.

(b) EBD
(Electronic Brake force Distribution)
The EBD control utilizes ABS, realizing proper brake force distribution between front and rear wheels in accordance with driving conditions.
In addition, when braking while cornering, it also controls the brake forces of right and left wheels, helping to maintain vehicle behavior.

BC

2. ABS with EBD OPERATION

(a) Based on the signals received from the 4 wheel speed sensors, the skid control ECU calculates each wheel speed and deceleration, and checks wheel slipping condition. And according to the slipping condition, the ECU controls the pressure holding valve and pressure reduction valve in order to adjust the fluid pressure of each wheel cylinder.

3. FAIL SAFE FUNCTION

(a) When a failure occurs in the ABS system, the ABS warning light comes on and operation is prohibited. In addition to this, when the failure which disables the EBD operation occurs, the brake warning light comes on as well and operation is prohibited.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:
The intelligent tester can be used at step 2, 5, 8, 11.

1	Vehicle Brought to Workshop

2	Customer Problem Analysis

3	Check and Clear DTCs and Freeze Frame Data

HINT:
See page BC-12

4	Problem Symptom Confirmation

- Symptom does not occur: Go to step 5
- Symptom occurs: Go to step 6

5	Symptom Simulation

HINT:
See page IN-34

6	DTC Check

HINT:
See page BC-10

- There is no output: Go to step 7
- There is output: Go to step 8

7	Problem Symptoms Table

HINT:
See page BC-8

Check for fluid leakage and Go to step 10

8	DTC Chart

HINT:
See page BC-15

9	Circuit Inspection

HINT:
When 2 or more DTCs are detected, perform circuit inspection one by one until the problem is identified.

BC

10	Identification of Problem

11	Repair

12	Confirmation Test

End

OPERATION CHECK

1. WARNING LIGHT BULB CHECK

NOTICE:

When releasing the parking brake, set the chocks to hold the vehicle for safety.

HINT:

When the parking brake is applied or the level of the brake fluid is low, the BRAKE warning light comes on.

(a) Release the parking brake lever.

(b) Check that the ABS warning light and BRAKE warning light comes on when the ignition switch is turned on and will go off in about 3 seconds.

(c) If the warning lights do not light, or remain on, the bulb has burned out or the ABS ECU may be defective.



2. SENSOR SIGNAL CHECK (TEST MODE)

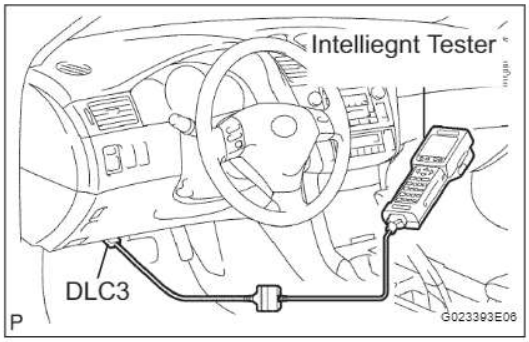
(USING INTELLIGENT TESTER)

If the ignition switch is turned from the ON to the ACC or LOCK position during SIGNAL CHECK (test mode), DTC of sensor check function will be erased.

(a) Procedures for sensor signal check

(1) Turn the ignition switch off.

(2) Check that the shift lever is in P position.



(3) Connect the intelligent tester to the DLC3.

(4) Start the engine.

(5) Operate the intelligent tester in SIGNAL CHECK (test mode).

(6) Check that the ABS warning light blinks.

HINT:

If the ABS warning light does not blink, inspect the ABS warning light circuit.

Trouble area	See procedure
ABS warning light	See page BC-53

(b) Start the sensor signal check.

(1) Drive vehicle straight forward.

Drive the vehicle at a speed of 28 to 34 mph (45 to 55 km/h) or higher for several seconds.

Test	Vehicle Speed	Check
Low speed test	0 to 3 mph (0 to 5 km/h)	Response of sensors
Middle speed test	28 to 34 mph (45 to 55 km/h)	Deviations of sensor signal

HINT:

The sensor check may not be completed if the vehicle has its wheel spun or its steering wheel steered during this check.

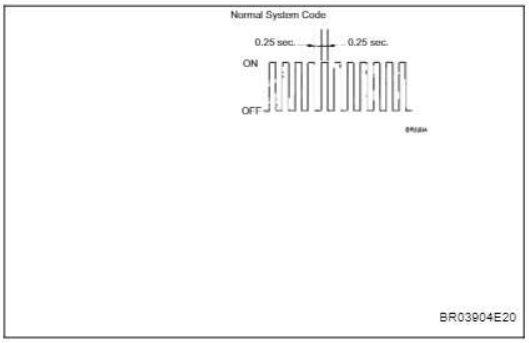
(2) Stop the vehicle.

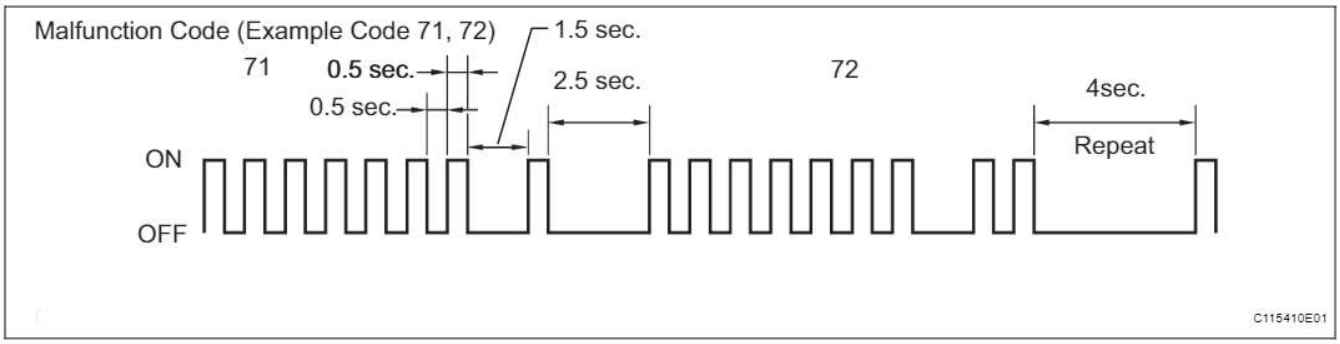
(c) Signal check results.

Check Result	ABS Warning Light
OK	Goes off
NG	Remains on

(d) Read the DTCs.
HINT:
- If the check result is OK, the ABS warning light blink goes off when the brake pedal is once depressed.
- See the list of DTC (Refer to step 3).
- If every sensor is normal, there is a normal system code 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.

(1) Normal system code.
(2) Malfunction code.





3. DTC of speed sensor check function:

Code No.	Diagnosis	Trouble Area
C1271/71	Low output voltage of right front speed sensor	• Right front speed sensor • Sensor installation • Sensor rotor
C1272/72	Low output voltage of left front speed sensor	• Left front speed sensor • Sensor installation • Sensor rotor
C1273/73	Low output voltage of right rear speed sensor	• Right rear speed sensor • Sensor installation • Sensor rotor
C1274/74	Low output voltage of 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

Code No.	Diagnosis	Trouble Area
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

HINT:
The codes in this table are output only in TEST MODE.

DTC	C0273/13	Open or Short Circuit in ABS Motor Relay Circuit

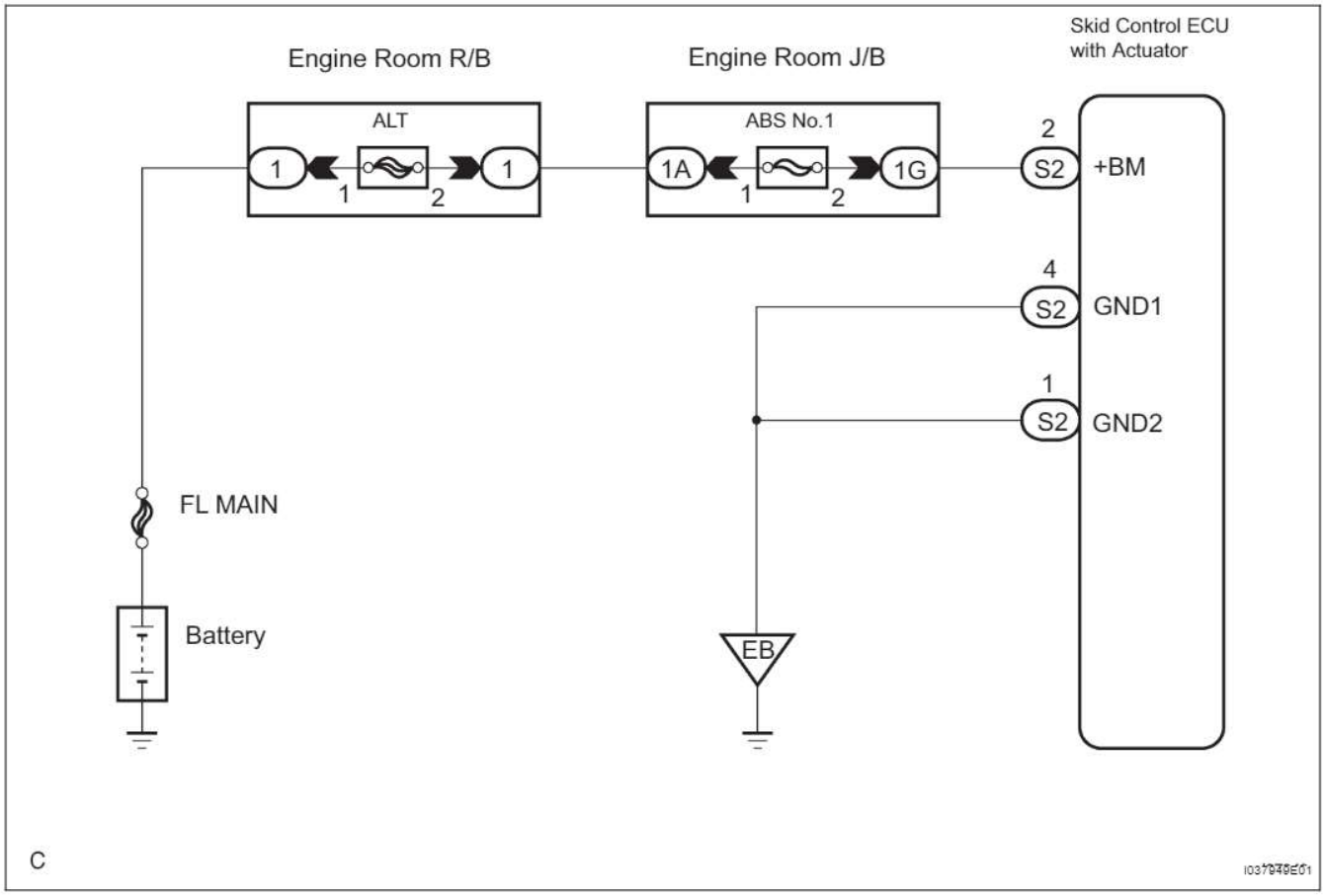
DESCRIPTION

The ABS motor relay supplies power to the ABS pump motor. While the ABS is activated, the ECU switches the motor relay ON and operates the ABS pump motor.

DTC No.	DTC Detecting Condition	Trouble Area
C0273/13	When any of the following (1 to 3) is detected: 1. Pump motor voltage is 2.0 V or more for 1 sec. or more at motor relay OFF. 2. Pump motor voltage is (dropped 4V from IG voltage) or less for 0.1 sec. or more at motor relay ON. 3. After the end of the actuation of the motor relay slow down condition of motor does not meet the specification.	• ABS motor relay • ABS motor relay circuit

BC

WIRING DIAGRAM



HINT:
Start the inspection from step 1 when using the intelligent tester and start from step 2 when not using the intelligent tester.

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (ABS MOTOR RELAY)

(a) Connect the intelligent tester to the DLC3.

(b) Start the engine.
(c) Select the ACTIVE TEST mode on the intelligent tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
ABS MOT RELAY	Turns ABS motor relay ON / OFF	Operation of motor can be heard

(d) Check the operation sound of the ABS motor individually when operating it with the intelligent tester.
OK:
The operation sound of the ABS motor should be heard.

NG → **Go to step 4**

OK

2 INSPECT SKID CONTROL ECU CONNECTOR

BC

(a) Check the ECU connector's connecting condition.
OK:
The connector should be securely connected.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

3 RECONFIRM DTC

HINT:
This code is detected when a problem is determined in the brake actuator assembly.
The ABS Motor Relay is in the brake actuator assembly. Therefore, ABS Motor Relay inspection and relay unit inspection cannot be performed. Be sure to check if the DTC code is output before replacing the brake actuator assembly.
(a) Clear the DTCs (See page BC-10).
(b) Drive the vehicle at a speed of 4 mph (6 km/h) or more.
(c) Are the same DTCs recorded? (See page BC-10)
Result

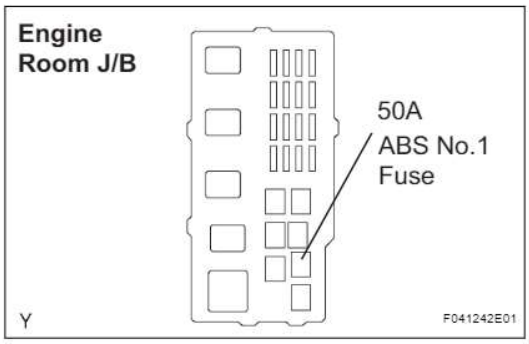
Result	Proceed to
Yes	A
No	B

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

A

REPLACE BRAKE ACTUATOR ASSEMBLY

4 INSPECT ABS NO.1 FUSE



(a) Remove the ABS No.1 fuse from the engine room J/B.
(b) Measure the resistance according to the value(s) in the table below.

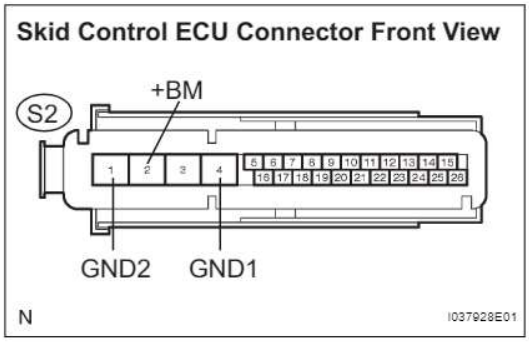
Resistance

Item	Specified condition
ABS No.1 fuse	Below 1 Ω (Continuity)

NG → CHECK FOR SHORT IN ALL HARNESS AND COMPONENTS CONNECTED FUSE

OK

5 INSPECT SKID CONTROL ECU CONNECTOR (+BM TERMINAL VOLTAGE)



(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage according to the value(s) in the table below.

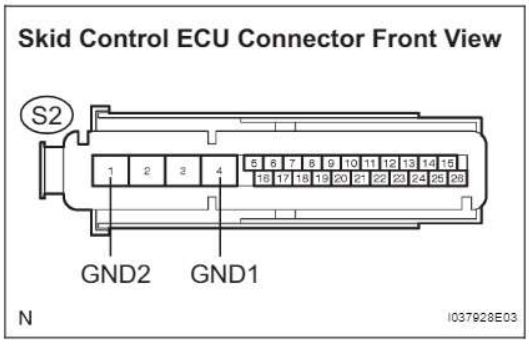
Voltage

Tester Connection	Specified Condition
S2-2 (+BM) - S2-4 (GND)	10 to 14 V
S2-2 (+BM) - S2-1 (GND)	10 to 14 V

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

6 INSPECT SKID CONTROL ECU CONNECTOR (GND TERMINAL CONTINUITY)



(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S2-4 (GND1) - Body ground	Below 1 Ω
S2-1 (GND2) - Body ground	Below 1 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

7 INSPECT SKID CONTROL ECU CONNECTOR

(a) Check the ECU connector's connecting condition.

OK:

The connector should be securely connected.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

8	RECONFIRM DTC

HINT:
This code is detected when a problem is determined in the brake actuator assembly.
The ABS Motor Relay is in the brake actuator assembly. Therefore, ABS Motor Relay inspection and relay unit inspection cannot be performed. Be sure to check if the DTC code is output before replacing the brake actuator assembly.

(a) Clear the DTCs (See page BC-10).
(b) Drive the vehicle at a speed of 4 mph (6 km/h) or more.
(c) Are the same DTCs recorded? (See page BC-10)

Result

Result	Proceed to
Yes	A
No	B

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

A

REPLACE BRAKE ACTUATOR ASSEMBLY

ANTI-LOCK BRAKE SYSTEM

PRECAUTION

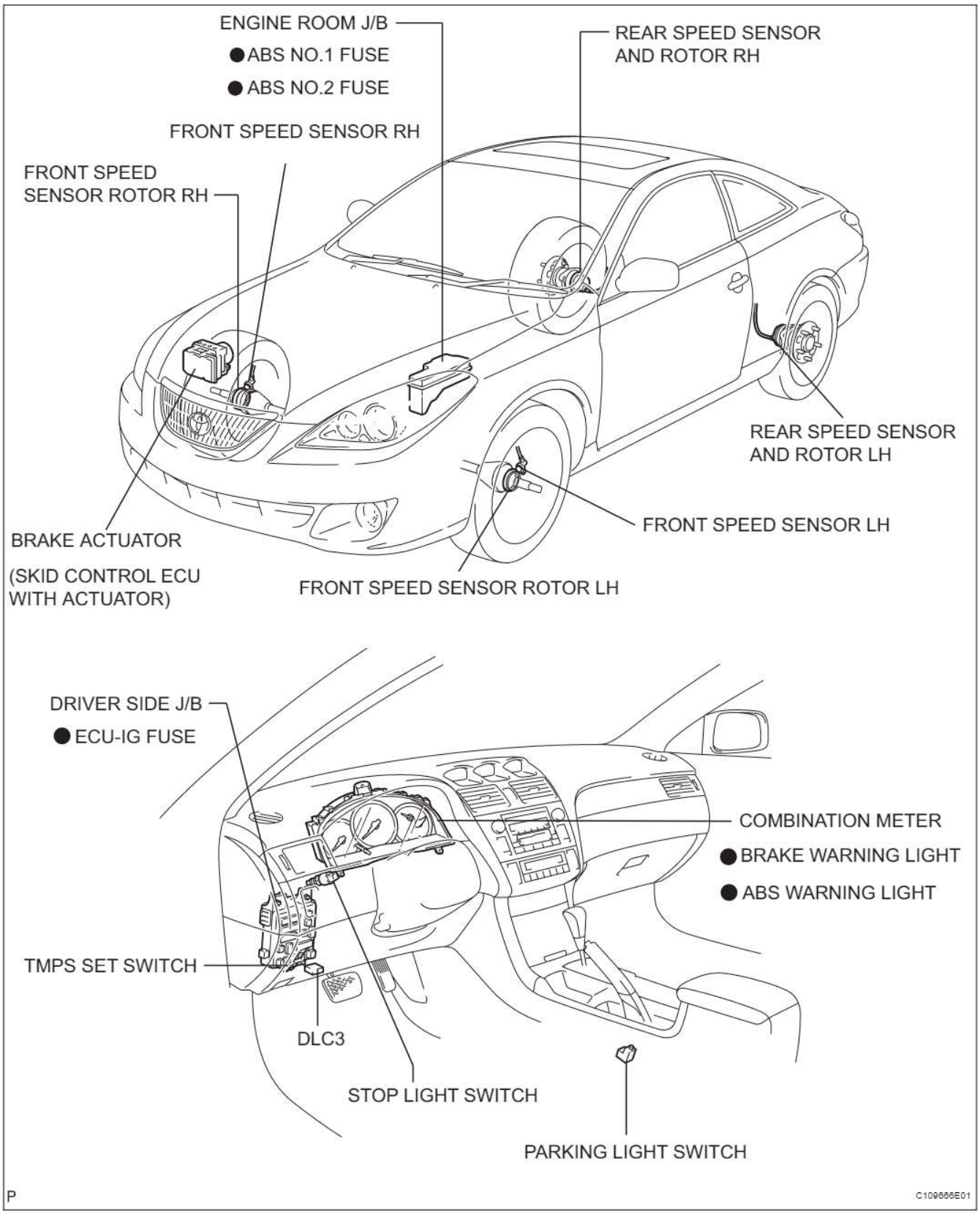
- When there is a malfunction in the contact point of the terminals or installation problems with parts, removal and installation of the suspected problem parts may return the system to the normal condition either completely or temporarily.
- In order to determine the malfunctioning area, be sure to check the conditions at the time the malfunction occurred, such as by DTC output and freeze frame data output, and record it before disconnecting each connector or removing and installing parts.
- Since the ABS with EBD systems may be influenced by a malfunction in the other systems, be sure to check for DTCs in the other systems.
- Be sure to remove and install the brake actuator and each sensor with the ignition switch off unless specified in the inspection procedure.
- When removing and installing the brake actuator and each sensor, be sure to check that the normal display is output in the test mode inspection and in DTC output inspection after installing all parts.

NOTICE:

When disconnecting the negative (-) battery terminal, initialize the following systems after the terminal is reconnected.

System Name	See Procedure
Power Window Control System	See page IN-24
Sliding Roof System	See page IN-24

PARTS LOCATION



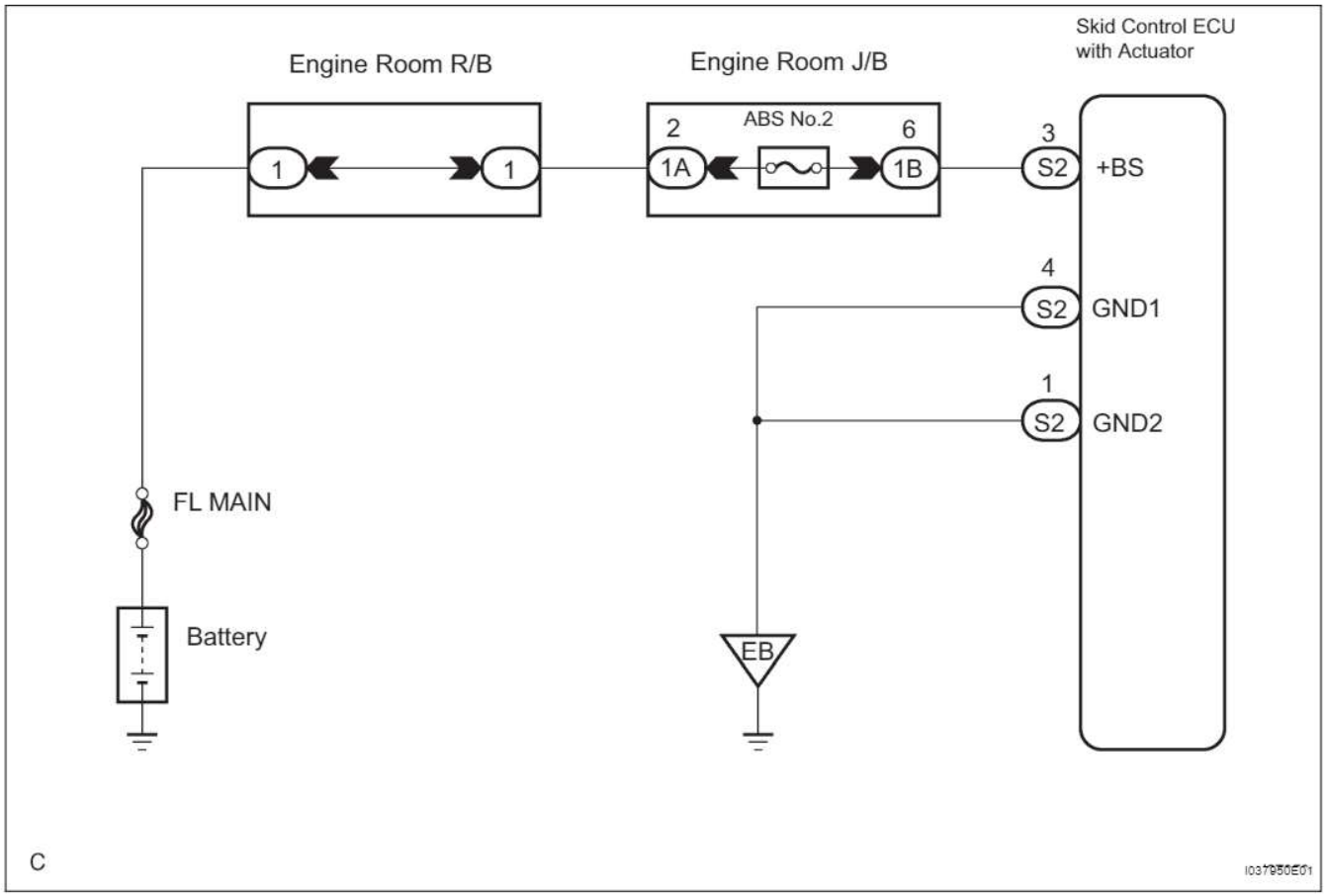
DTC	C0278/11	Open or Short Circuit in ABS Solenoid Relay Circuit

DESCRIPTION

This relay supplies power to each ABS solenoid. After the ignition switch is turned ON, if the ABS initial check is OK, skid control ECU makes ABS solenoid relay turn ON.

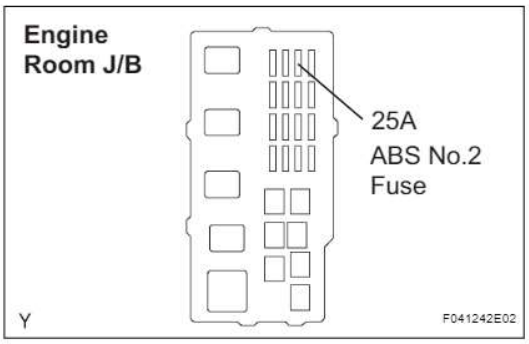
DTC No.	DTC Detecting Condition	Trouble Area
C0278/11	When any of the following (1 to 3) is detected: 1. Internal circuit malfunction in ECU. 2. Valve relay voltage is 80% of IG voltage or less for 0.5 sec. 3. Valve relay voltage is high level at valve relay OFF.	• ABS solenoid relay • ABS solenoid relay circuit • ABS No.2 Fuse • Wire harness (+BS circuit)

WIRING DIAGRAM



BC

1 INSPECT ABS NO.2 FUSE



(a) Remove the ABS No.2 fuse from the engine room J/B.
(b) Measure the resistance according to the value(s) in the table below.

Resistance

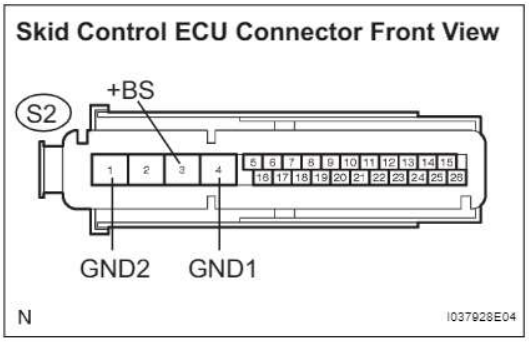
Item	Specified condition
ABS No.2 fuse	Below 1 Ω (Continuity)

NG → **CHECK FOR SHORT IN ALL HARNESS AND COMPONENTS CONNECTED FUSE**

OK

BC

2 INSPECT SKID CONTROL ECU CONNECTOR (+BS TERMINAL VOLTAGE)



(a) Disconnect the skid control ECU connector.
(b) Measure the voltage according to the value(s) in the table below.

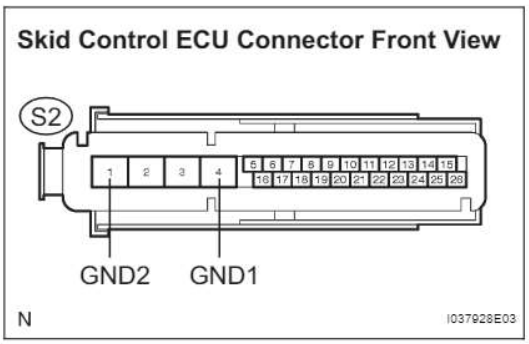
Voltage

Tester Connection	Specified Condition
S2-3 (+BS) - S2-4 (GND1)	10 to 14 V
S2-3 (+BS) - S2-1 (GND2)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (+BS CIRCUIT)**

OK

3 INSPECT SKID CONTROL ECU CONNECTOR (GND TERMINAL)



(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S2-4 (GND1) - Body ground	Below 1 Ω
S2-1 (GND2) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 RECONFIRM DTC

HINT:
This code is detected when a problem is determined in the brake actuator assembly.

The ABS Solenoid Relay is in the brake actuator assembly. Therefore, ABS Solenoid Relay inspection and relay unit inspection cannot be performed. Be sure to check if the DTC code is output before replacing the brake actuator assembly.

(a) Clear the DTCs (See page BC-10).
(b) Drive the vehicle at a speed of 4 mph (6 km/h) or more.
(c) Are the same DTCs recorded? (See page BC-10)

Result

Result	Proceed to
Yes	A
No	B

HINT:
The skid control ECU inspects the solenoid relay circuit when the stop lamp switch is turned off and the vehicle is running at a speed of 4 mph (6 km/h) or more.

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE**

BC

A

REPLACE BRAKE ACTUATOR ASSEMBLY

DTC	C1237/37	Speed Sensor Rotor Faulty

DESCRIPTION

The skid control ECU measure the speed of each wheel by receiving signals from speed sensor. These signals are used for recognizing all 4 wheels are operating properly.

DTC No.	DTC Detecting Condition	Trouble Area
C1237/37	When any of the following (1 to 3) is detected: 1. Wheel speed deviation of unspecified wheel. 2. Wheel sensor signal failure suspicion. 3. Continuous ABS control for 60 sec. or more.	• Sensor rotor • Speed sensor • Speed sensor circuit • Tire & wheel size

1	INSPECT TIRE SIZE

BC

(a) Check tire size and condition of all 4 wheels.
OK:
The diameter of all of four tires and air pressure are the same.

NG → **REPLACE TIRES SO THAT ALL 4 TIRES ARE SAME IN SIZE**

OK

2	INSPECT SPEED SENSOR ROTOR

(a) Check the sensor rotor serrations (See page BC-17 for front, BC-23 for rear).
OK:
No scratches, missing teeth or foreign matter on the sensor rotor.

NG → **REPLACE SENSOR ROTOR**

OK

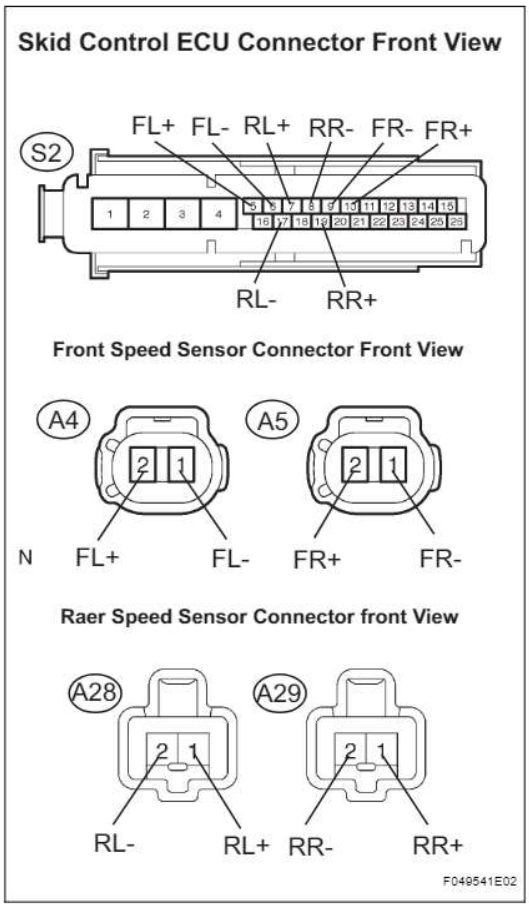
3	INSPECT SPEED SENSOR

(a) Remove the front speed sensor (See page BC-186).
(b) Check the sensor tip.
OK:
No scratches or foreign matter on the sensor tip.

NG → **REPLACE SPEED SENSOR**

OK

4	CHECK HARNESS AND CONNECTOR (SPEED SENSOR - SKID CONTROL ECU)



(a) Disconnect the skid control ECU connector, front speed sensor connectors and rear speed sensor connectors.

(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S2-5 (FL+) - A4-1 (FL+)	Below 1 Ω
S2-6 (FL-) - A4-2 (FL-)	Below 1 Ω
S2-10 (FR+) - A5-1 (FR+)	Below 1 Ω
S2-9 (FR-) - A5-2 (FR-)	Below 1 Ω
S2-7 (RL+) - A28-1 (RL+)	Below 1 Ω
S2-17 (RL-) - A28-2 (RL-)	Below 1 Ω
S2-19 (RR+) - A29-1 (RR+)	Below 1 Ω
S2-8 (RR-) - A29-2 (RR-)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
A4-1 (FL+) - Body ground	10 kΩ or higher
A4-2 (FL-) - Body ground	10 kΩ or higher
A5-1 (FR+) - Body ground	10 kΩ or higher
A5-2 (FR-) - Body ground	10 kΩ or higher
A28-1 (RL+) - Body ground	10 kΩ or higher
A28-2 (RL-) - Body ground	10 kΩ or higher
A29-1 (RR+) - Body ground	10 kΩ or higher
A29-2 (RR-) - Body ground	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

BC

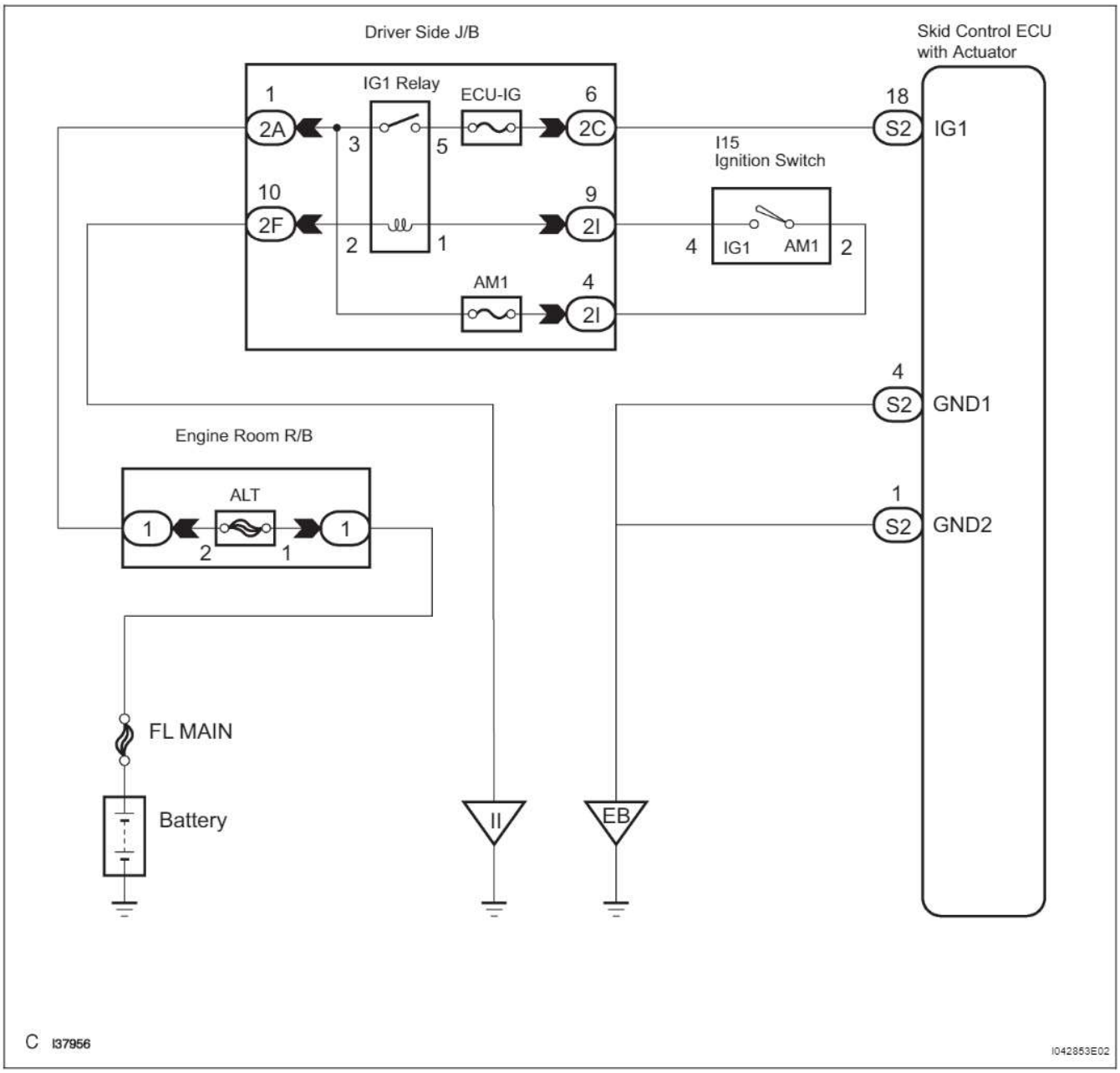
DTC	C1241/41	Low Battery Positive Voltage

DESCRIPTION

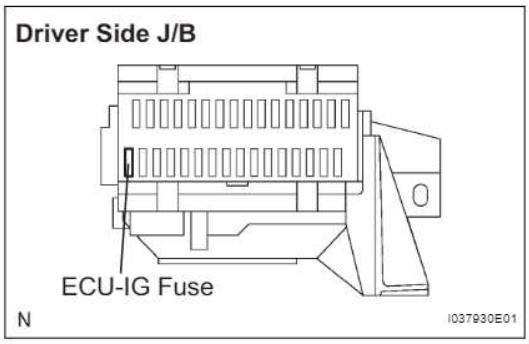
This is the power source circuit of the skid control ECU.
The brake actuator contains the skid control ECU.

DTC No.	DTC Detecting Condition	Trouble Area
C1241/41	With vehicle speed to about 4 mph (6 km/h), battery voltage is less than 9.4 V at the time of non-operation of ABS control or less than 9.2 V at the time of operation of ABS control, or battery voltage is more than 16.9 V.	• Battery • Charging system • Power source circuit

WIRING DIAGRAM



1 INSPECT ECU-IG FUSE



(a) Remove the ECU-IG fuse from the driver side J/B.
(b) Measure the resistance according to the value(s) in the table below.
Resistance

Item	Specified condition
ECU-IG fuse	Below 1 Ω (Continuity)

NG → **INSPECT FOR SHORT CIRCUIT IN ALL HARNESS AND COMPONENTS CONNECTED TO ECU-IG FUSE**

OK

2 INSPECT BATTERY

(a) Check the battery voltage.
Voltage:
11 to 14 V

NG → **INSPECT CHARGING SYSTEM**

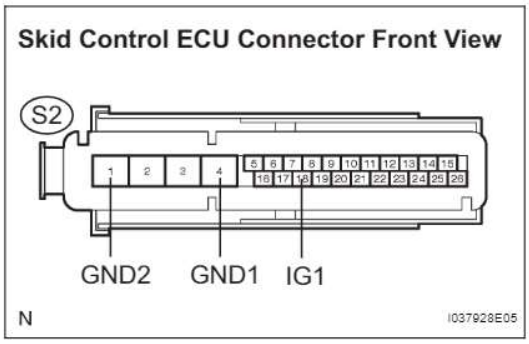
OK

3 INSPECT SKID CONTROL ECU CONNECTOR (IG1 TERMINAL)

(a) WHEN USING INTELLIGENT TESTER:
(1) Connect the intelligent tester to the DLC3.
(2) Start the engine.
(3) Select the DATA LIST mode on the intelligent tester.

Item	Measurement Item / Range (Display)	Normal Condition
IG VOLTAGE	ECU power supply voltage / NORMAL or TOO LOW	NORMAL: 9.8 V or over TOO LOW: Below 9.8 V

(4) Read the voltage condition output from the ECU displayed on the intelligent tester.
OK:
"Normal" is displayed.



(b) WHEN NOT USING INTELLIGENT TESTER:
(1) Disconnect the skid control ECU connector.
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage according to the value(s) in the table below.
Voltage

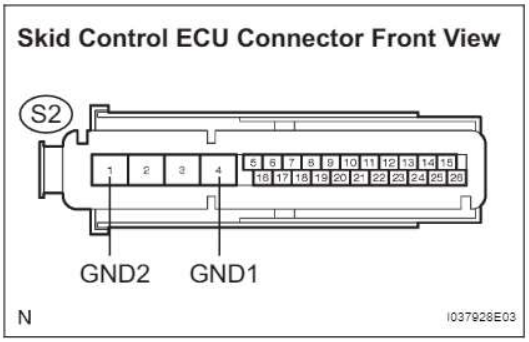
Tester Connection	Specified Condition
S2-18 (IG1) - S2-4 (GND1)	10 to 14 V
S2-18 (IG1) - S2-1 (GND2)	10 to 14 V

NG → **Go to step 4**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

4	INSPECT SKID CONTROL ECU CONNECTOR (GND TERMINAL CONTINUITY)



(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S2-4 (GND1) - Body ground	Below 1 Ω
S2-1 (GND2) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND TERMINAL - BODY GROUND)**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1TERMINAL - BATTERY)

DTC	C1249/58	Stop Light Switch Circuit

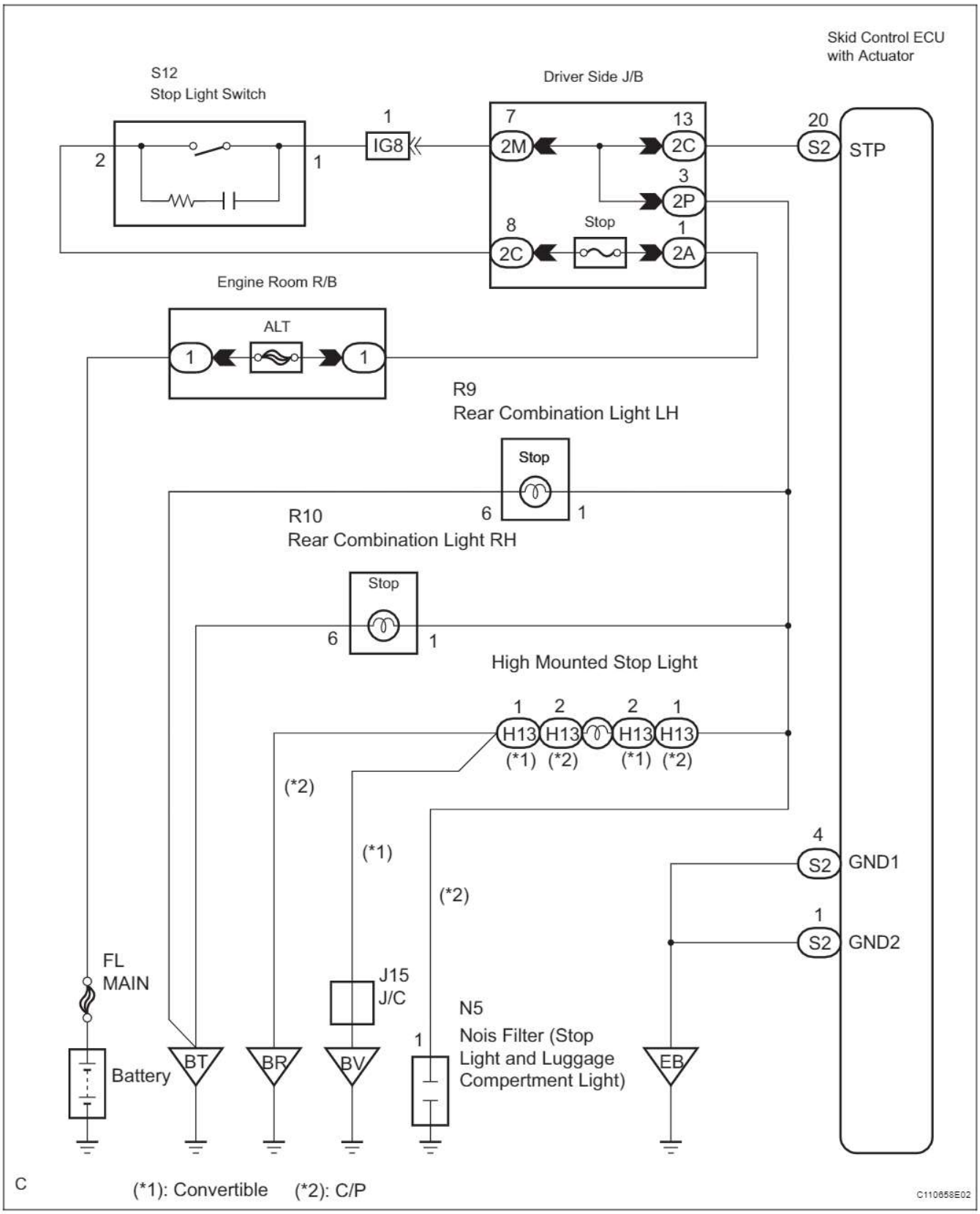
DESCRIPTION

This circuit recognizes brake operation by sending a stop light signal to the skid control ECU.

DTC No.	DTC Detecting Condition	Trouble Area
C1249/58	Stop light switch circuit is open, and stop light switch voltage is in the level between 40 % and 70 % of the battery voltage.	• Stop light switch • Stop light switch circuit

BC

WIRING DIAGRAM



1 CHECK STOP LIGHT SWITCH OPERATION (STOP LIGHT SWITCH CIRCUIT)

(a) Check that the stop light comes on when the brake pedal is depressed and goes off when the brake pedal is released.

OK

Pedal Condition	Illumination Condition
Brake pedal depressed	ON
Brake pedal released	OFF

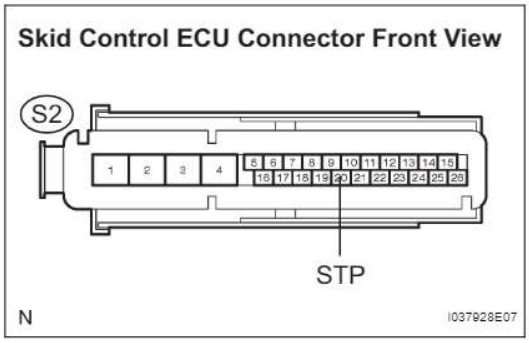
HINT:
Check the stop light bulb as it may have burnt out.

NG → **Go to step 3**

OK

BC

2 INSPECT SKID CONTROL ECU CONNECTOR (STP TERMINAL)



(a) Disconnect the skid control ECU connector.
(b) Measure the voltage according to the value(s) in the table below.

Voltage

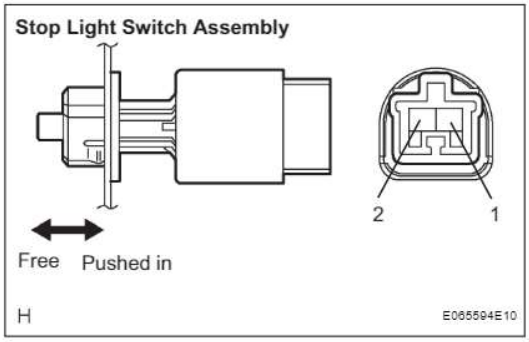
Tester Connection	Switch Condition	Specified Condition
S2-20 (STP) - Body ground	Brake pedal depressed	8 to 14 V
S2-20 (STP) - Body ground	Brake pedal released	Below 4.0 V

NG → **Go to step 4**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

3 INSPECT STOP LIGHT SWITCH ASSEMBLY



(a) Disconnect the stop light switch assembly connector.
(b) Measure the resistance according to the value(s) in the table below.

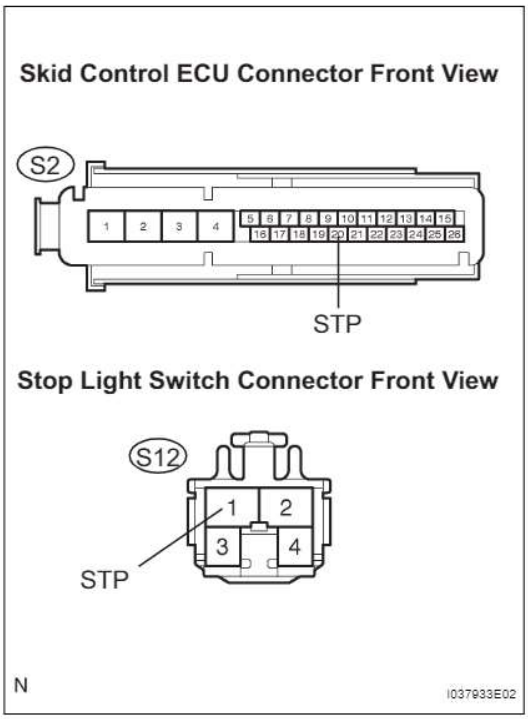
Resistance

Switch Condition	Tester Connection	Specified Condition
Switch pin free	1 - 2	Below 1 Ω
Switch pin pushed in	1 - 2	10 kΩ or higher

NG → **REPLACE STOP LIGHT SWITCH ASSEMBLY**

OK

4	CHECK HARNESS AND CONNECTOR (STOP LIGHT SWITCH - SKID CONTROL ECU)



(a) Disconnect the stop light switch connector and skid control ECU connector.

(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S2-20 (STP) - S12-1 (STP)	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK →

REPLACE BRAKE ACTUATOR ASSEMBLY

BC

DTC C1300/62 Skid Control ECU Malfunction

DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1300/62	Internal control unit of skid control ECU failure.	• Skid control ECU

1 RECONFIRM DTC

(a) Clear the DTCs (See page BC-10).
(b) Turn the ignition switch to the ON position.
(c) Check if the same DTCs are recorded.

Result

Result	Proceed to
DTC C1300/62 is output	A
Except DTC C1300/62 is output	B

B → REPAIR CIRCUIT INDICATED BY OUTPUT DTC

A

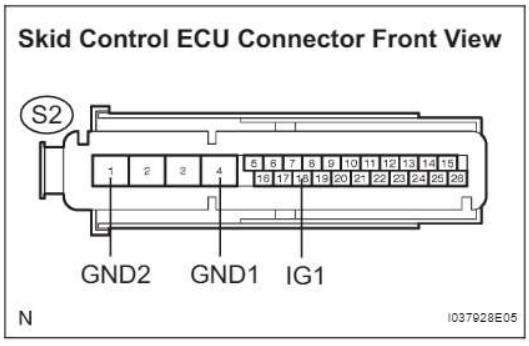
2 INSPECT SKID CONTROL ECU CONNECTOR (IG1 TERMINAL VOLTAGE)

(a) WHEN USING INTELLIGENT TESTER:
(1) Connect the intelligent tester to the DLC3.
(2) Start the engine.
(3) Select the DATA LIST mode on the intelligent tester.

Item	Measurement Item / Range (Display)	Normal Condition
IG VOLTAGE	ECU power supply voltage / NORMAL or TOO LOW	NORMAL: 9.8 V or over TOO LOW: Below 9.8 V

(4) Read the voltage condition output from the ECU displayed on the intelligent tester.
OK:
"Normal" is displayed.

(b) WHEN NOT USING INTELLIGENT TESTER:
(1) Disconnect the skid control ECU connector.
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage according to the value(s) in the table below.
Voltage

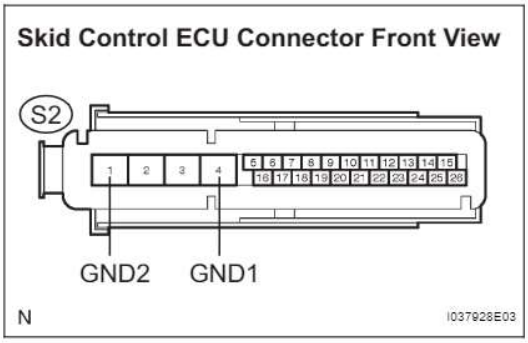


Tester Connection	Specified Condition
S2-18 (IG1) - S2-4 (GND1)	10 to 14 V
S2-18 (IG1) - S2-1 (GND2)	10 to 14 V

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3	INSPECT SKID CONTROL ECU CONNECTOR (GND TERMINAL CONTINUITY)



(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S2-4 (GND1) - Body ground	Below 1 Ω
S2-1 (GND2) - Body ground	Below 1 Ω

NG → CHECK AND REPAIR HARNESS AND CONNECTOR

BC

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

ABS Warning Light Remains ON

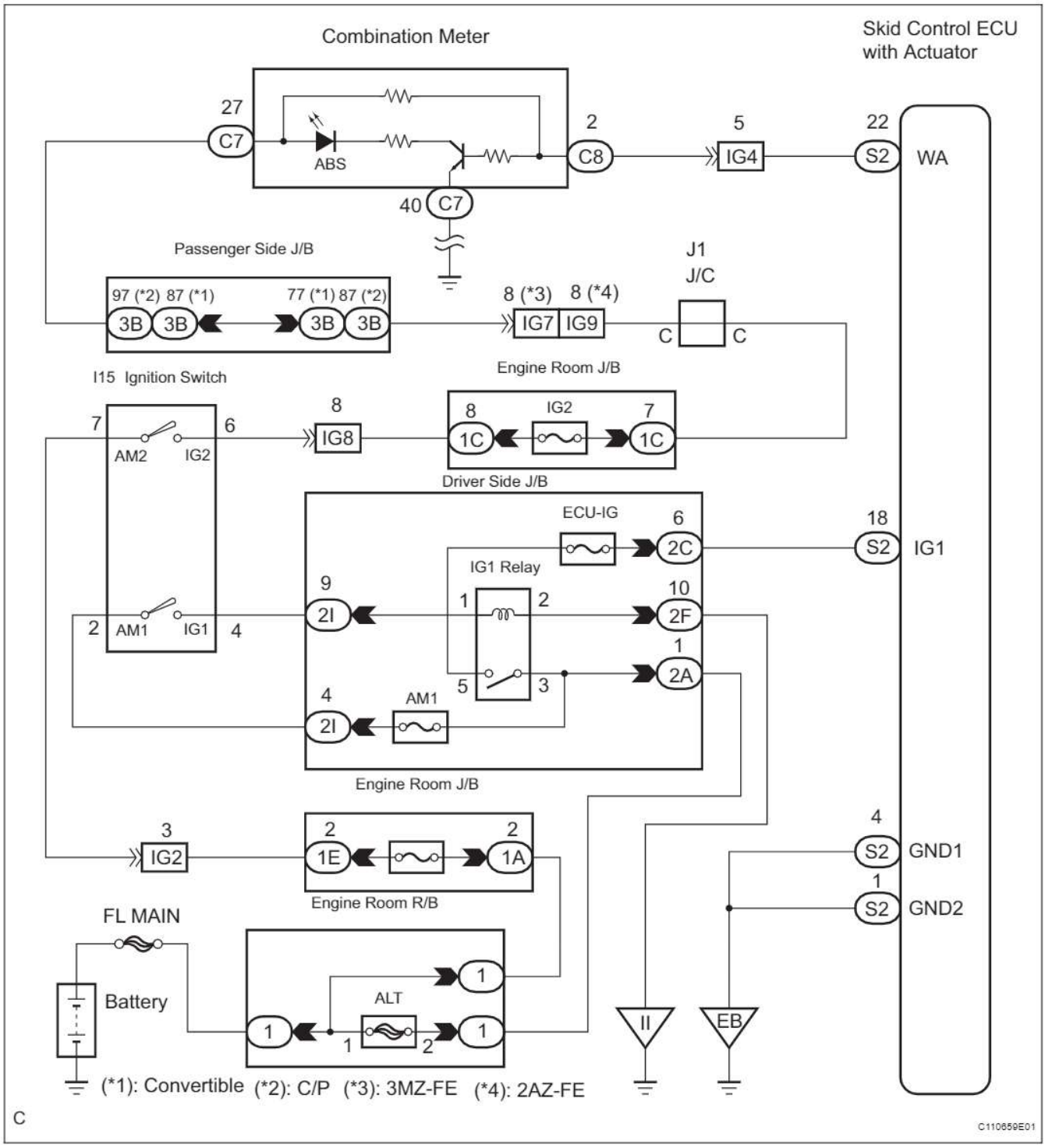
DESCRIPTION

During DTC read by SST (CHECK WIRE), if the ABS warning light remains on, troubleshoot by following this inspection flow.

HINT:

The intelligent tester may not be used when there is a malfunction in the ECU.

WIRING DIAGRAM



1	CHECK DTC

(a) Is DTC output?

Result

Result	Proceed to
DTC is not output	A
DTC is output	B

B → REPAIR CIRCUIT INDICATED BY OUTPUT CODE

A

BC

2	CHECK SKID CONTROL ECU CONNECTOR

NG → CONNECT CONNECTOR TO ECU CORRECTLY

OK

3	INSPECT BATTERY

(a) Check the battery voltage.
Voltage:
11 to 14 V

NG → INSPECT CHARGING SYSTEM

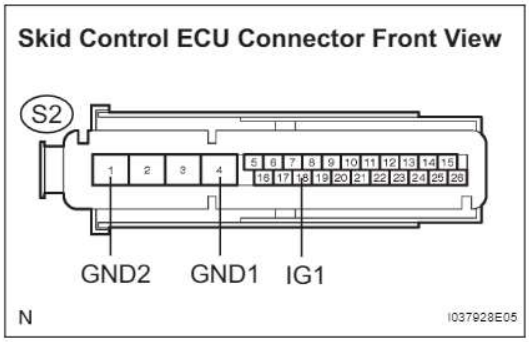
OK

4	INSPECT SKID CONTROL ECU TERMINAL VOLTAGE (IG1 TERMINAL VOLTAGE)

(a) WHEN USING INTELLIGENT TESTER:
(1) Connect the intelligent tester to the DLC3.
(2) Start the engine.
(3) Select the DATA LIST mode on the intelligent tester.

Item	Measurement Item / Range (Display)	Normal Condition
IG VOLTAGE	ECU power supply voltage / NORMAL or TOO LOW	NORMAL: 9.8 V or over TOO LOW: Below 9.8 V

(4) Read the voltage condition output from the ECU displayed on the intelligent tester.
OK:
"Normal" is displayed.



(b) WHEN NOT USING INTELLIGENT TESTER:
(1) Disconnect the skid control ECU connector.
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage according to the value(s) in the table below.

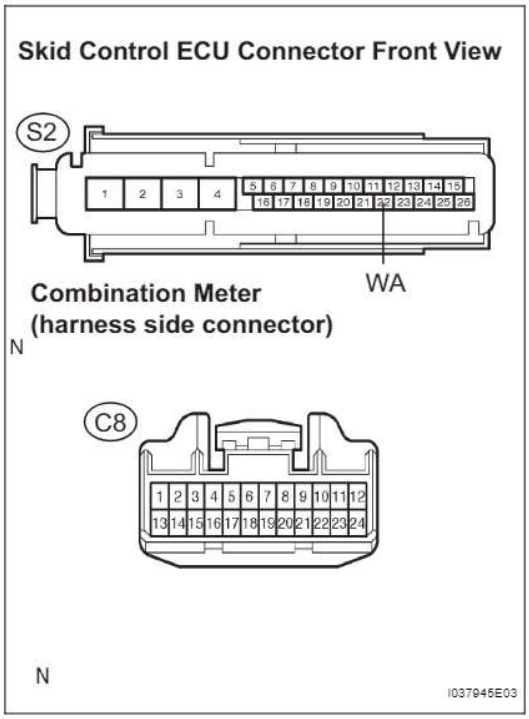
Voltage

Tester Connection	Specified Condition
S2-18 (IG1) - S2-4 (GND1)	11 to 14 V
S2-18 (IG1) - S2-1 (GND2)	11 to 14 V

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

5 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - COMBINATION METER)



(a) Disconnect the skid control ECU connector and combination meter connector.
(b) Measure the resistance according to the value(s) in the table below.

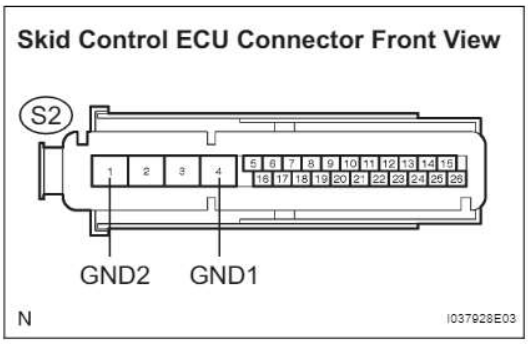
Resistance

Tester Connection	Specified Condition
S2-22 (WA) - (C8-2)	Below 1 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

6	CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - BODY GROUND)



(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S2-4 (GND1) - Body ground	Below 1 Ω
S2-1 (GND2) - Body ground	Below 1 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

BC

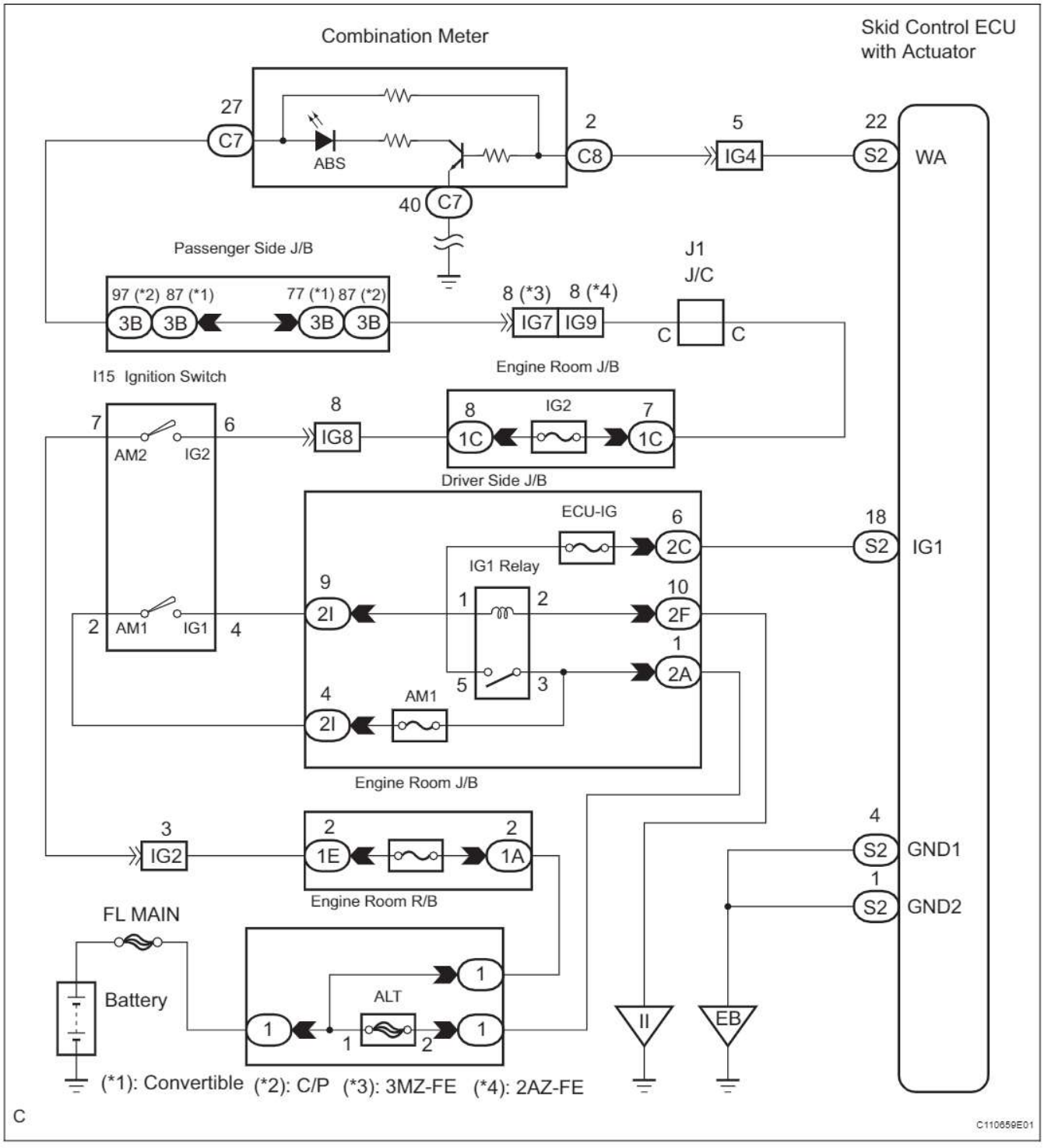
REPLACE BRAKE ACTUATOR ASSEMBLY

ABS Warning Light does not Come ON

DESCRIPTION

If the ECU detects trouble, it will prohibit ABS control, turn on the ABS warning light, and store the DTC. Connect terminals TC and CG of the DLC3 to make the ABS warning light blink and output the DTC.

WIRING DIAGRAM



1	INSPECT ABS WARNING LIGHT

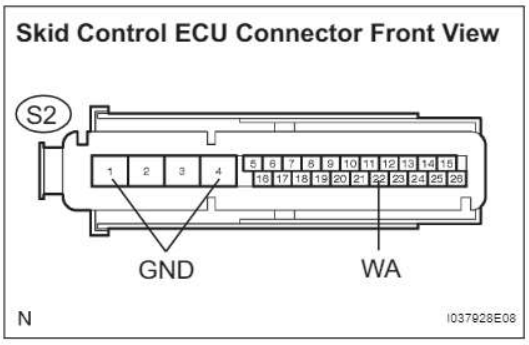
(a) WHEN USING INTELLIGENT TESTER:
(1) Connect the intelligent tester to the DLC3.
(2) Start the engine.
(3) Select the item "ABS WARN LIGHT" in the ACTIVE TEST and operate the ABS warning light on the intelligent tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
ABS WARN LIGHT	Turns ABS warning light ON / OFF	Observe combination meter

(4) Check that "ON" and "OFF" of the ABS warning light can be shown on the combination meter by the intelligent tester.
OK:
Turn the ABS warning light ON or OFF in accordance with the intelligent tester.

BC

(b) WHEN NOT USING INTELLIGENT TESTER:
(1) Turn the ignition switch off and disconnect the skid control ECU connector.
(2) Using service wire, connect terminals WA and GND of the skid control ECU harness side connector.
(3) Turn the ignition switch to the ON position.
(4) Check that the ABS warning light.
OK



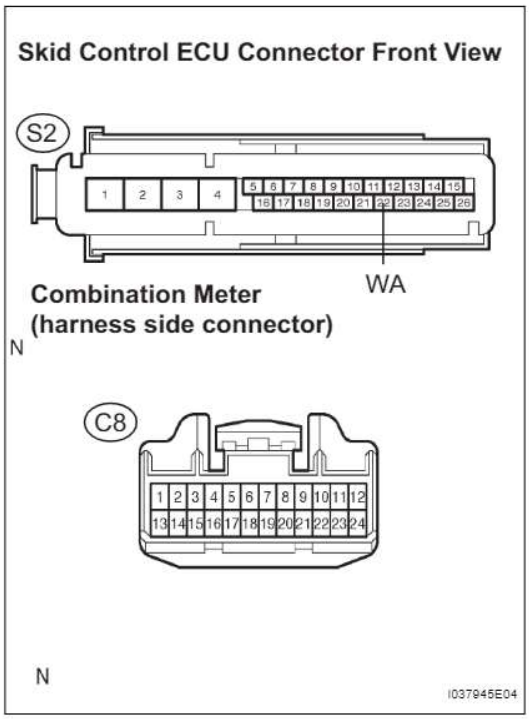
WA - GND Condition	Illumination Condition
Connecting	OFF
Disconnecting	ON

NG → Go to step 2

OK →

REPLACE BRAKE ACTUATOR ASSEMBLY

2	CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - COMBINATION METER)



(a) Disconnect the skid control ECU connector and combination meter connector.

(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S2-22 (WA) - (C8-2)	Below 1 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3	CHECK COMBINATION METER ASSEMBLY

(a) Check if the indicators (shift position, airbag, etc.) other than ABS warning indicator operate normally.

Result

Result	Proceed to
Indicators OK	A
Indicators NG	B

B → CHECK COMBINATION METER ASSEMBLY (COMBINATION METER CIRCUIT)

A

REPAIR OR REPLACE COMBINATION METER ASSEMBLY

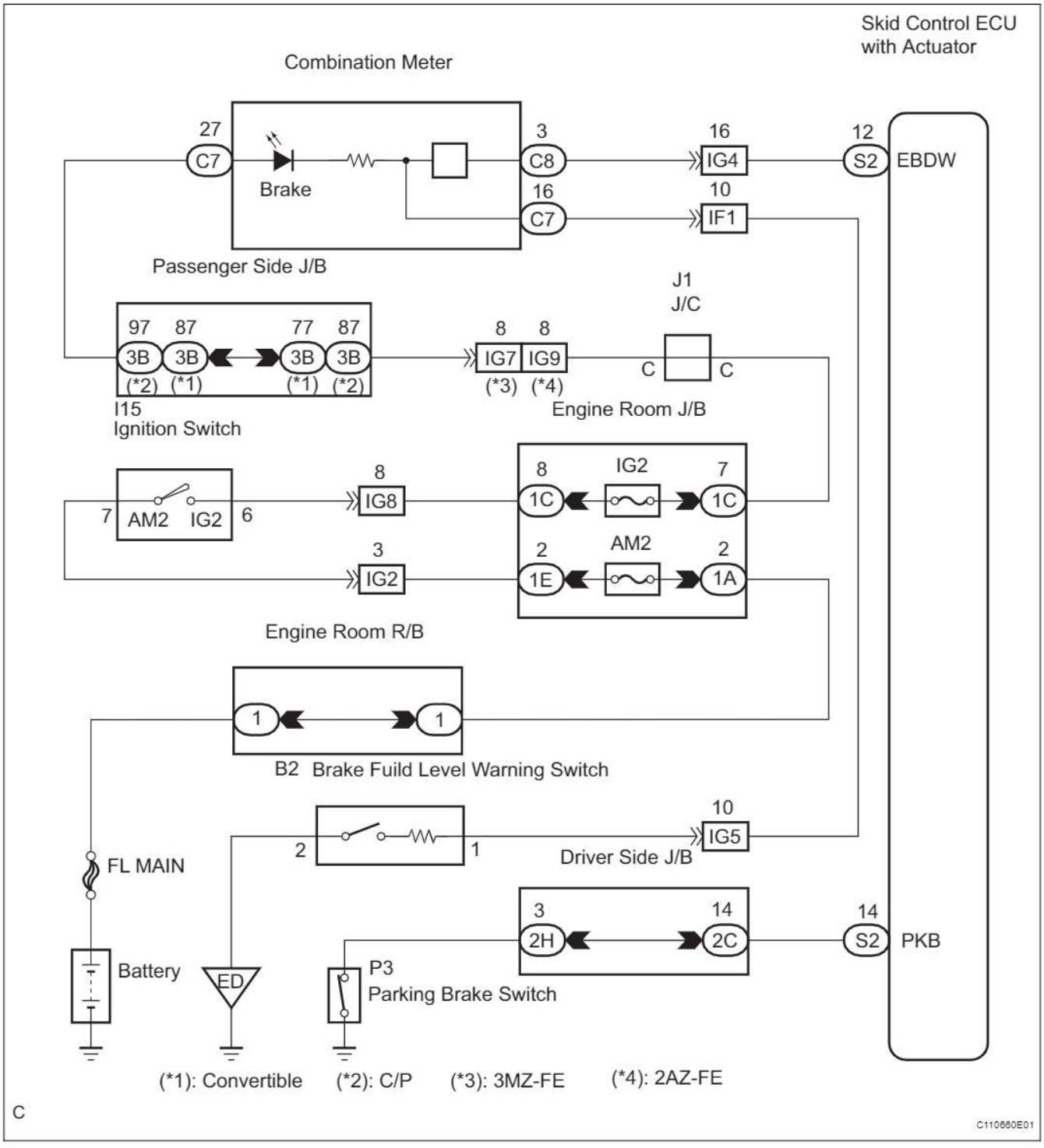
BC

Brake Warning Light Circuit

DESCRIPTION

The brake warning light comes on when the brake fluid is insufficient, the parking brake is applied or the EBD is defective.

WIRING DIAGRAM



HINT:
When releasing the parking brake, set the chocks to hold the vehicle for safety.

1	CHECK BRAKE FLUID

(a) Check that the brake fluid level is properly.

NG → ADD BRAKE FLUID

OK ↓

2	CHECK DTC FOR ABS

(a) Check if other DTCs are recorded (See page BC-10).

NO → Go to step 3

YES ↓

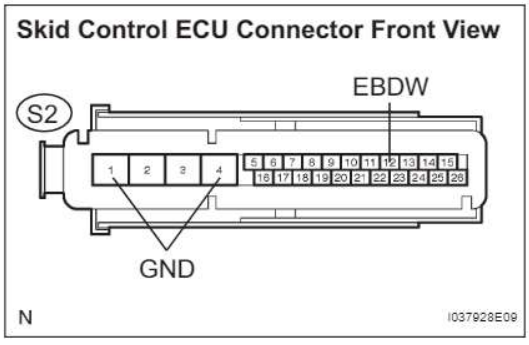
REPAIR CIRCUIT INDICATED BY OUTPUT CODE

3	INSPECT BRAKE WARNING LIGHT

(a) WHEN USING INTELLIGENT TESTER:
(1) Connect the intelligent tester to the DLC3.
(2) Start the engine.
(3) Select the item "BRAKE WARN LIGHT" in the ACTIVE TEST and operate the BRAKE warning light on the intelligent tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
BRAKE WRN LIGHT	Turns BRAKE warning light ON / OFF	Observe combination meter

(4) Check that "ON" and "OFF" of the BRAKE warning light are indicated on the combination meter when using the intelligent tester.
OK:
Turn the BRAKE warning light on or off in accordance with the intelligent tester.



(b) WHEN NOT USING INTELLIGENT TESTER:
(1) Turn the ignition switch off and disconnect the connector from the skid control ECU.
(2) Ground the terminal EBDW of the skid control ECU.
(3) Turn the ignition switch to the ON position.
(4) Check that the brake warning light.
OK:
Turn the light on or off in accordance with the connection of the terminal GND and EBDW.

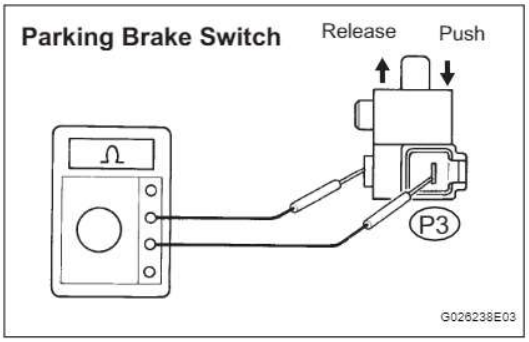
NG → Go to step 4

BC

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

4 INSPECT PARKING BRAKE SWITCH ASSEMBLY



(a) Remove the parking brake switch connector.
(b) Measure the resistance according to the value(s) in the table below.

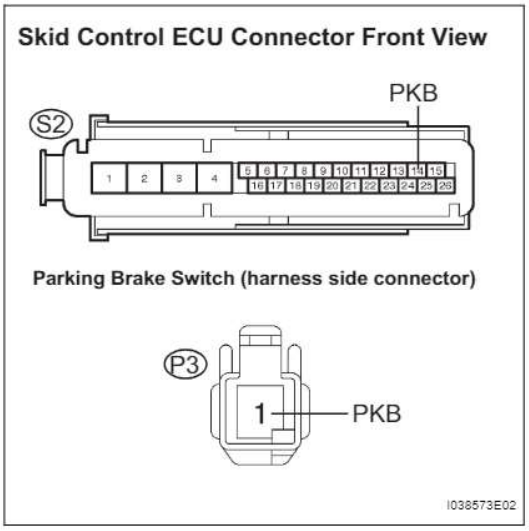
Resistance

Tester Connection	Switch Condition	Specified Condition
P3-1 - Ground part	Released	Below 1 Ω
P3-1 - Ground part	Pushed in	10 kΩ or higher

NG → **REPLACE PARKING BRAKE SWITCH ASSEMBLY**

OK

5 CHECK HARNESS OR CONNECTOR (SKID CONTROL ECU - PARKING BRAKE SWITCH)



(a) Disconnect the skid control ECU connector and the parking brake switch connector.
(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S2-14 (PKB) - P3-1 (PKB)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

Resistance

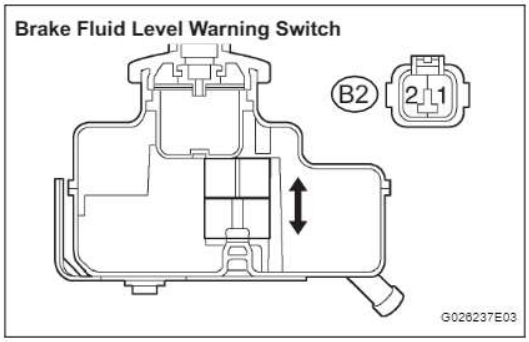
Tester Connection	Specified Condition
S2-14 (PKB) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6 INSPECT BRAKE FLUID LEVEL WARNING SWITCH

(a) Remove the reservoir tank cap and strainer.



(b) Disconnect the brake fluid level warning switch connector.

(c) Measure the resistance according to the value(s) in the table below.

Resistance

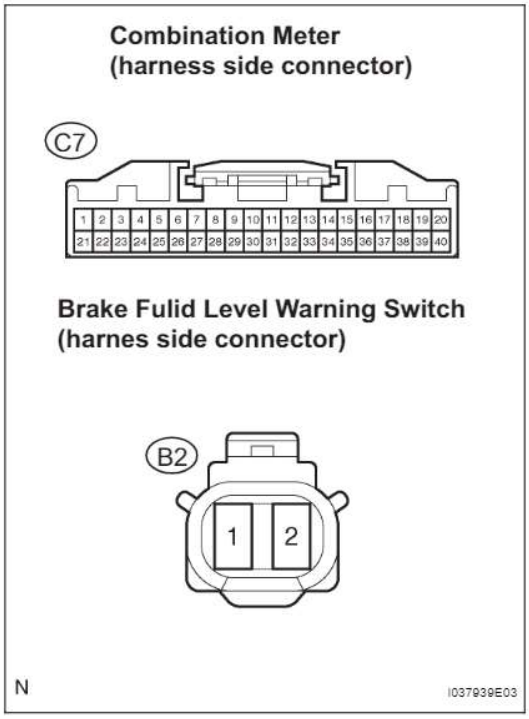
Tester Connection	Switch Condition	Specified Condition
(B2-1) - (B2-2)	Float UP	10 kΩ or higher
(B2-1) - (B2-2)	Float DOWN	Below 1 Ω

NG → REPLACE BRAKE FLUID LEVEL WARNING SWITCH

OK

7	CHECK HARNESS OR CONNECTOR (BRAKE FLUID LEVEL WARNING SWITCH - COMBINATION METER)

BC



(a) Disconnect the combination meter connector and the brake fluid level warning switch connector.

(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
(C7-16) - (B2-1)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

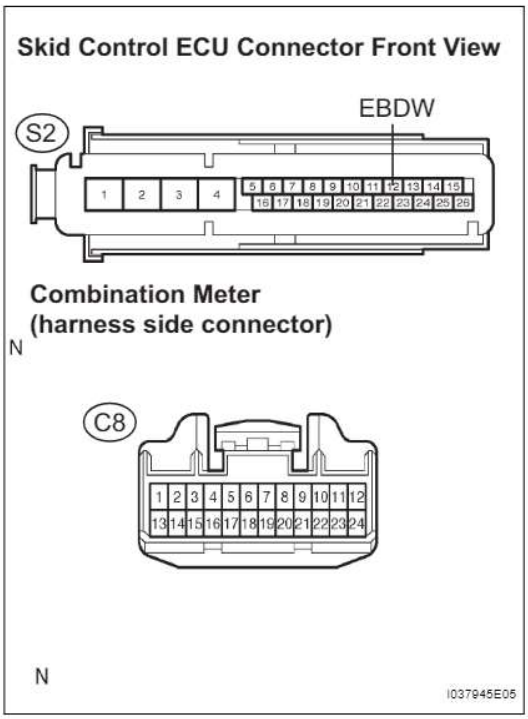
Resistance

Tester Connection	Specified Condition
(C7-16) - Body ground	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

8	CHECK HARNESS OR CONNECTOR (SKID CONTROL ECU - COMBINATION METER)



(a) Disconnect the skid control ECU connector and combination meter connector.

(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S2-12 (EBDW) - C8-3	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S2-12 (EBDW) - Body ground	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

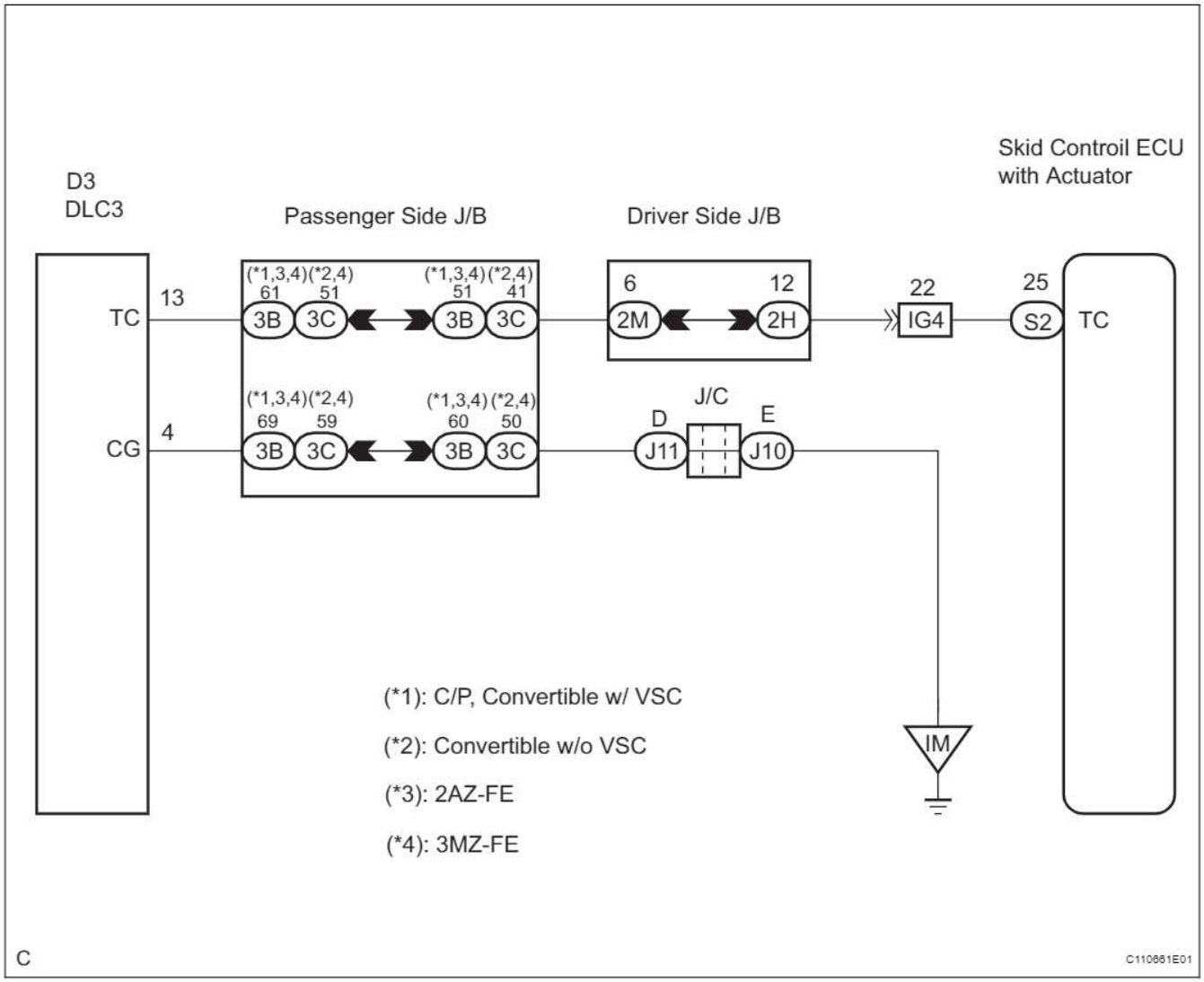
REPLACE COMBINATION METER ASSEMBLY

TC and CG Terminal Circuit

DESCRIPTION

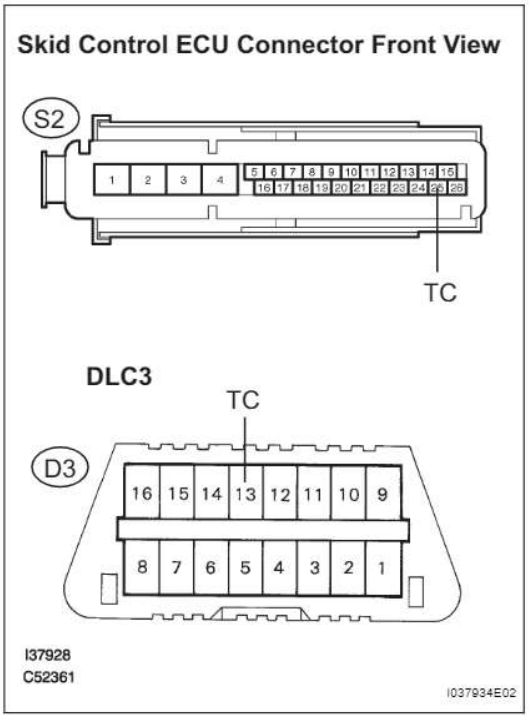
Connecting terminals TC and CG of the DLC3 causes the ECU to display the DTC by flashing the ABS warning light.

WIRING DIAGRAM



1	CHECK WIRE HARNESS (DLC3 - SKID CONTROL ECU)

(a) Turn the ignition switch to the LOCK position.



(b) Disconnect the skid control ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

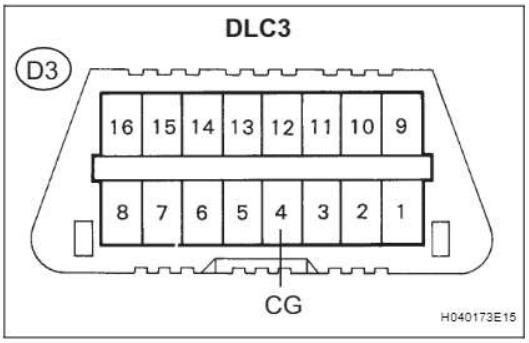
Resistance

Tester Connection	Condition	Specified Condition
D3-13 (TC) - S2-25 (TC)	Always	Below 1 Ω

NG → REPAIR WIRE HARNESS

OK

2 CHECK WIRE HARNESS (CG OF DLC3 - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

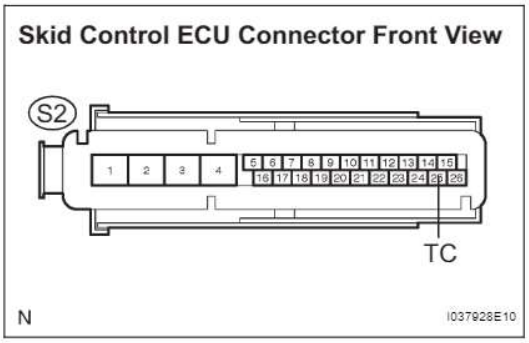
Resistance

Tester Connection	Condition	Specified Condition
D3-4 (CG) - Body ground	Always	Below 1 Ω

NG → REPAIR WIRE HARNESS

OK

3 CHECK WIRE HARNESS (TC OF SKID CONTROL ECU - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Condition	Specified Condition
S2-25 (TC) - Body ground	Always	10 kΩ or higher

NG → REPAIR WIRE HARNESS AND EACH ECU

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

PROBLEM SYMPTOMS TABLE

If there are no DTCs output 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.

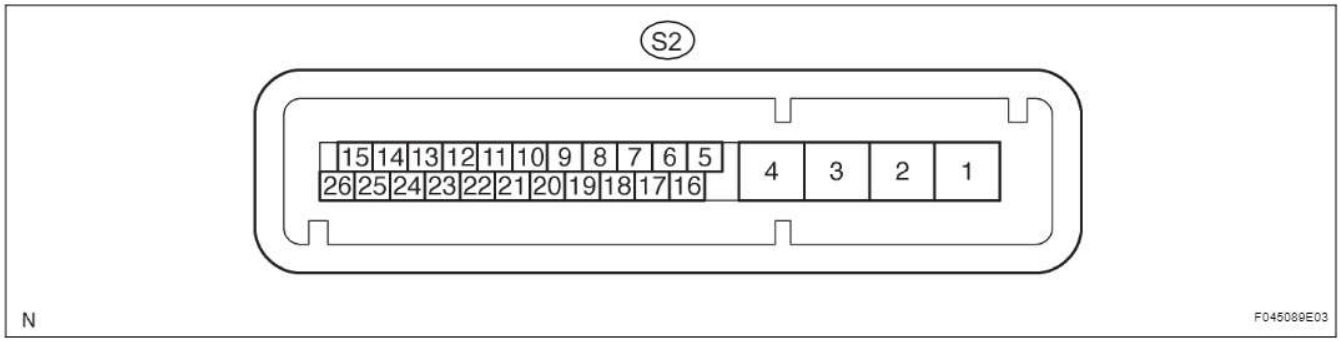
NOTICE:

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

BRAKE CONTROL

Symptom	Suspected area	See page
ABS does not operate	1.Check the DTC reconfirming that the normal code is output.	BC-10
	2.IG power source circuit	BC-40
	3.Speed sensor circuit (Front)	BC-17
	4.Speed sensor circuit (Rear)	BC-23
	5.Check the brake actuator with a intelligent tester.	BC-179
	6.When the above areas (1 to 4) are all normal but the problem still occurs, replace the skid control ECU.	-
ABS does not operate properly	1.Check the DTC reconfirming that the normal code is output.	BC-10
	2.Speed sensor circuit (Front)	BC-17
	3.Speed sensor circuit (Rear)	BC-23
	4.Stop light switch circuit	BC-43
	5.Check the brake actuator with a intelligent tester.	BC-179
	6.When the above areas (1 to 4) are all normal but the problem still occurs, replace the skid control ECU.	-
ABS warning light malfunction	1.ABS warning light circuit	BC-49
	2.Skid control ECU	-
DTC check cannot be performed	1.ABS warning light circuit	BC-49
	2.TC terminal circuit	BC-61
	3.When the above areas (1 and 2) are all normal but the problem still occurs, replace the skid control ECU.	-
Speed sensor signal check cannot be performed	1.Skid control ECU	-

TERMINALS OF ECU



Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	STD Voltage (V)
TC (25) - GND (1, 4)	P-B - W-B	Diagnosis tester communication line	IG switch ON	10 to 14
SP1 (23) - GND (1, 4)	L-O - W-B	Vehicle speed line	Vehicle drive at about 12 mph (20 km/h)	Pulse generation
WA (22) - GND (1, 4)	R-B - W-B	ABS warning line	IG switch ON, ABS warning light ON	5 to 9
WA (22) - GND (1, 4)	R-B - W-B	ABS warning line	IG switch ON, ABS warning light OFF	Below 2.0
STP (20) - GND (1, 4)	G-W - W-B	Stop lamp switch line	Stop light switch ON	8 to 14
STP (20) - GND (1, 4)	G-W - W-B	Stop lamp switch line	Stop light switch OFF	Below 4.0
RR+ (19) - RR- (8)	P - L	Rear RH wheel speed signal	IG switch ON Slowly turn right rear wheel	Pulse generation
IG1 (18) - GND (1, 4)	B-R - W-B	ECU power supply	IG switch ON	10 to 14
+BS (3) - GND (1, 4)	W - W-B	Solenoid valves power supply	Always	10 to 14
+BM (2) - GND (1, 4)	L - W-B	Motor relay power supply	Always	10 to 14
PKB (14) - GND (1, 4)	R-W - W-B	Parking brake switch input	IG switch ON, parking brake switch ON	Below 2.0
PKB (14) - GND (1, 4)	R-W - W-B	Parking brake switch input	IG switch ON, parking brake switch OFF	10 to 14
EBDW (12) - GND (1, 4)	R-Y - W-B	Brake warning line	IG switch ON, BRAKE warning light ON	5 to 9
EBDW (12) - GND (1, 4)	R-Y - W-B	Brake warning line	IG switch ON, BRAKE warning light OFF	Below 2.0
D/G (11) - GND (1, 4)	W - W-B	Diagnosis tester communication line	IG switch ON, ABS warning light OFF	8 to 12
FR+ (10) - FR- (9)	W - B	Front RH wheel speed signal	IG switch ON Slowly turn right front wheel	Pulse generation
RL+ (7) - RL- (17)	R - G	Rear LH wheel speed signal	IG switch ON Slowly turn left rear wheel	Pulse generation
FL+ (5) - FL- (6)	LG - V	Front LH wheel speed signal input	IG switch ON Slowly turn left front wheel	Pulse generation

BC

DIAGNOSIS SYSTEM

1. DIAGNOSIS

NOTICE:

When releasing the parking brake lever, set the chocks to hold the vehicle for safety.

(a) Release the parking brake lever.

(b) If the skid control ECU detects a malfunction, the ABS, brake warning lights will come on to warn the driver. The table below indicates which lights come on when there is a malfunction in a particle function.



BC

Item/Trouble Area	ABS System	EBD System	Skid Control ECU
ABS Warning light	O	O	O
BRAKE Warning light	-	O	O

O: Light ON

-: Light OFF

(c) The DTCs are simultaneously stored in memory. The DTCs can be read by connecting the SST (09843-18043) between the TC and CG terminals of DLC3 and observing the blinking of the ABS warning light, or by connecting a intelligent tester.

DTC CHECK / CLEAR

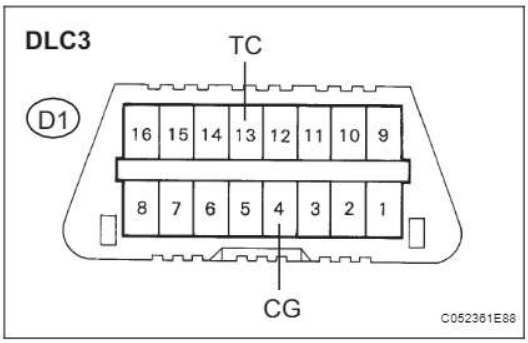
1. DTC CHECK (USING SST CHECK WIRE)

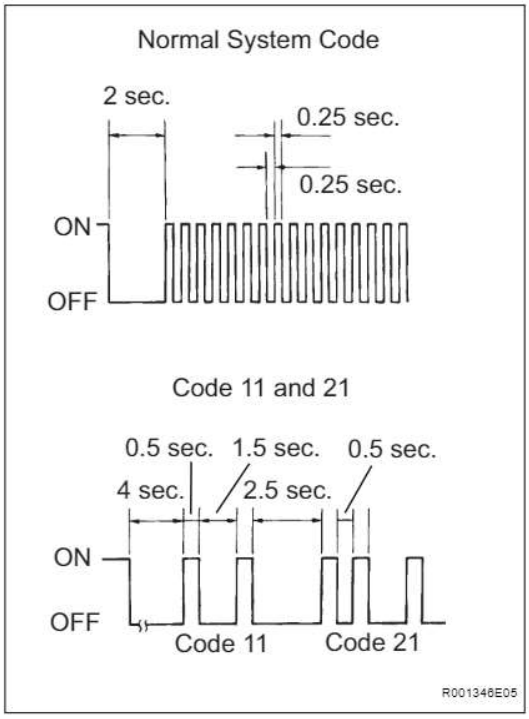
(a) Check DTCs.

(1) Using SST, connect terminals TC and the CG of DLC3.

SST 09843-18040

(2) Turn the ignition switch to the ON position.





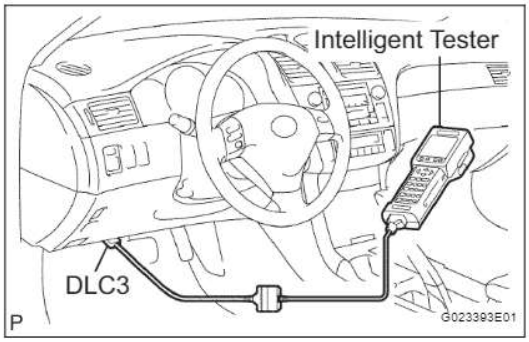
(3) Read the DTC from the ABS warning light on the combination meter assembly.
HINT:
- If no code appears, inspect the TC circuit or ABS warning light circuit.

Trouble Area	See procedure
TC terminal circuit	See page BC-61
ABS warning light remains on circuit	See page BC-49
ABS warning light does not come on circuit	See page BC-53

- As an example, the blinking patterns for a normal system code and trouble codes 11 and 21 are shown on the left.

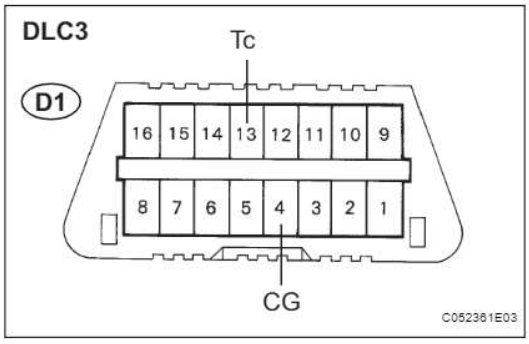
(4) Codes are explained in the code table (See page BC-15).
(5) After completing the check, disconnect terminals TC and CG of the DLC3, and turn off the display. If 2 or more DTCs are detected at the same time, the DTCs will be displayed.

BC



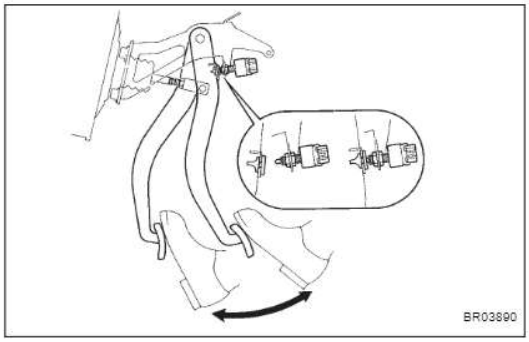
2. DTC CHECK (USING INTELLIGENT TESTER)

(a) Checking DTCs.
(1) Connect the intelligent tester to the DLC3.
(2) Turn the ignition switch to the ON position.
(3) Read the DTCs by following the prompts on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

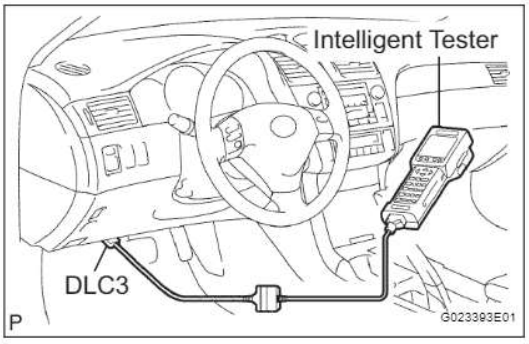


3. CLEAR DTC (USING SST CHECK WIRE)

(a) Clearing the DTCs.
(1) Using SST, connect terminals TC and CG of the DLC3.
SST 09843-18040
(2) Turn the ignition switch to the ON position.



(3) Clear the DTCs stored in ECU by depressing the brake pedal 8 times or more within 5 seconds.
(4) Check that the warning light indicates the normal system code.
(5) Remove the SST(s) from the terminals of the DLC3.
HINT:
Clearing the DTCs cannot be performed by removing the battery cable or ECU-IG fuse.



4. CLEAR DTC (USING INTELLIGENT TESTER)

(a) Clearing the DTCs.
  (1) Connect the intelligent tester to the DLC3.
  (2) Turn the ignition switch to the ON position.
  (3) Operate the intelligent tester to erase the codes.
  HINT:
  Refer to the intelligent tester Operator's Manual for further details.

5. END OF DTC CHECK/CLEAR

(a) Turn the ignition switch to the ON position.
(b) Check that ABS warning lamp goes off in about 3 seconds.

BC

FREEZE FRAME DATA

1. FREEZE FRAME DATA

HINT:

- Whenever a DTC is detected or the ABS operates, the skid control ECU stores the current vehicle (sensor) state as freeze frame data.
- The skid control ECU stores the number of times (maximum: 31) the ignition switch has been turned from off to the On position since the last time ABS was activated. However, if the vehicle was stopped or at low speed (4.3 mph (7 km/h) or less), or if a DTC is detected, the skid control ECU will not count the number since then.
- Freeze frame data at the time the ABS operates: The skid control ECU stores and updates data whenever the ABS system operates.
  When the ECU stores data at the time a DTC is detected, the data stored when the ABS operated is erased.
- Freeze frame data at the time a DTC is detected: When the skid control ECU stores data at the time a DTC is detected, no updates will be performed until the data is cleared.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) From the display on the tester, select the "FREEZE FRAME DATA".

Intelligent tester display	Measurement Item	Reference Value*
VEHICLE SPD	Vehicle speed	Speed indication on the meter
STOP LIGHT SW	Stop light switch signal	Stop light switch ON: ON, OFF: OFF
# IG ON	Numbers of operations of ignition switch ON after memorizing freeze frame data	0 to 31
SYSTEM	Operate system	ABS operate: ABS

FAIL-SAFE CHART

1. FAIL SAFE OPERATION

Malfunction	Symptom
ABS system	Prohibit the ABS control
EBD system	Prohibit the ABS & EBD control

HINT:
If the ABS system encounters a malfunction, the brake system will operate normally without ABS control.

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

According to the DATA LIST displayed on the intelligent tester, you can read the value and status of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one of the methods to shorten labor time.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) From the display on the tester, read the "DATA LIST".

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
ABS MOT RELAY	ABS motor relay / ON or OFF	ON: Motor relay ON	-
SOL RELAY	Solenoid relay / ON or OFF	ON: Solenoid relay ON	-
STOP LIGHT SW	Stop light switch / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
PKB SW	Parking brake switch / ON or OFF	ON: Parking brake applied OFF: Parking brake released	-
ABS OPERT FR	ABS operation (FR) / BEFORE or OPERATE	BEFORE: No ABS operation (FR) OPERATE: During ABS operation (FR)	-
ABS OPERT FL	ABS operation (FL) / BEFORE or OPERATE	BEFORE: No ABS operation (FL) OPERATE: During ABS operation (FL)	-
ABS OPERT RR	ABS operation (RR) / BEFORE or OPERATE	BEFORE: No ABS operation (RR) OPERATE: During ABS operation (RR)	Similar speed as indicated on speed meter
ABS OPERT RL	ABS operation (RL) / BEFORE or OPERATE	BEFORE: No ABS operation (RL) OPERATE: During ABS operation (RL)	Similar speed as indicated on speed meter
WHEEL SPD FR	Wheel speed sensor (FR) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed	Similar speed as indicated on speed meter
WHEEL SPD FL	Wheel speed sensor (FL) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed	Similar speed as indicated on speed meter
WHEEL SPD RR	Wheel speed sensor (RR) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed	-
WHEEL SPD RL	Wheel speed sensor (RL) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed	-
IG VOLTAGE	ECU power supply voltage / NORMAL or TOO LOW	NORMAL: 9.8 V or over TOO LOW: Below 9.8 V	-
SFRR	ABS solenoid (SFRR) ON / OFF	ON: Operate	-
SFRH	ABS solenoid (SFRH) ON / OFF	ON: Operate	-
SFLR	ABS solenoid (SFLR) ON / OFF	ON: Operate	-
SFLH	ABS solenoid (SFLH) ON / OFF	ON: Operate	-
SRRR (SRR)	ABS solenoid (SRRR (SRR)) ON / OFF	ON: Operate	-
SRRH (SRH)	ABS solenoid (SRRH (SRH)) ON / OFF	ON: Operate	-
SRLR	ABS solenoid (SRLR) ON / OFF	ON: Operate	-
SRLH	ABS solenoid (SRLH) ON / OFF	ON: Operate	-

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
AIR BLD SUPPORT	Air bleed support / SUPPORT or NOT SUP	Not supported	-
TEST MODE	Test mode / NORMAL or TEST	NORMAL: Normal mode TEST: During test mode	-
#CODES	Number of DTC recorded / min.: 0, max.: 255	Min.: 0, max.: 19	-

2. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the intelligent tester allows the relay, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the 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 intelligent tester to the DLC3.

(b) Turn the ignition switch to the ON position.

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

HINT:

Ignition switch must be turned to the ON position to proceed to the ACTIVE TEST using the intelligent tester.

BC

Item	Vehicle Condition / 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
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
SRRR & SRRH	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
ABS MOT RELAY	Turns ABS motor relay ON / OFF	Operation of solenoid (clicking sound) can be heard
ABS WARN LIGHT	Turns ABS warning light ON / OFF	Observe combination meter
BRAKE WRN LIGHT	Turns BRAKE warning light ON / OFF	Observe combination meter

DIAGNOSTIC TROUBLE CODE CHART

NOTICE:
When removing parts, turn the ignition switch off.
HINT:

- If an abnormality is not found when inspecting parts, inspect the ECU and ground points for poor contact.
- If a trouble code is displayed during the DTC check, check the circuit listed for that code. For details of each code, refer to the "See page" for respective "DTC No." in the DTC chart.
- When 2 or more DTCs are detected, perform circuit inspection one by one until the problem is identified.

DTC No.	Detection Item	Trouble Area	See page
C0200/31	Front Speed Sensor RH Circuit	1. Right front speed sensor 2. Right front speed sensor circuit 3. Right front speed sensor rotor 4. Sensor installation	BC-17
C0205/32	Front Speed Sensor LH Circuit	1. Left front speed sensor 2. Left front speed sensor circuit 3. Left front speed sensor rotor 4. Sensor installation	BC-17
C0210/33	Rear Speed Sensor RH Circuit	1. Right rear speed sensor 2. Right rear speed sensor circuit 3. Right rear speed sensor rotor 4. Sensor installation	BC-23
C0215/34	Rear Speed Sensor LH Circuit	1. Left rear speed sensor 2. Left rear speed sensor circuit 3. Left rear speed sensor rotor 4. Sensor installation	BC-23
C0226/21	SFR Solenoid Circuit	1. SFRR or SFRH circuit 2. Brake actuator assembly	BC-29
C0236/22	SFL Solenoid Circuit	1. SFLR or SFLH circuit 2. Brake actuator assembly	BC-29
C0246/23	SRR Solenoid Circuit	1. SRLR or SRLH circuit 2. Brake actuator assembly	BC-29
C0256/24	SRL Solenoid Circuit	1. SRLR or SRLH circuit 2. Brake actuator assembly	BC-29
C0273/13	Open or Short Circuit in ABS Motor Relay Circuit	1. ABS motor relay 2. ABS motor relay circuit	BC-31
C0278/11	Open or Short Circuit in ABS Solenoid Relay Circuit	1. ABS solenoid relay 2. ABS solenoid relay circuit 3. ABS No.2 Fuse 4. Wire harness (+BS circuit)	BC-35
C1237/37	Speed Sensor Rotor Faulty	1. Speed sensor 2. Sensor rotor 3. Speed sensor circuit 4. Tire & wheel size	BC-38
C1241/41	Low Battery Positive Voltage	1. Battery 2. Charging system 3. Power source circuit	BC-40
C1249/58	Stop Light Switch Circuit	1. Stop light switch 2. Stop light switch circuit	BC-43
C1300/62	Skid Control ECU Malfunction	1. Skid control ECU	BC-47
C1330/35	Right Front Speed Sensor Circuit	1. Right front speed sensor 2. Right front speed sensor circuit 3. Sensor installation	BC-17

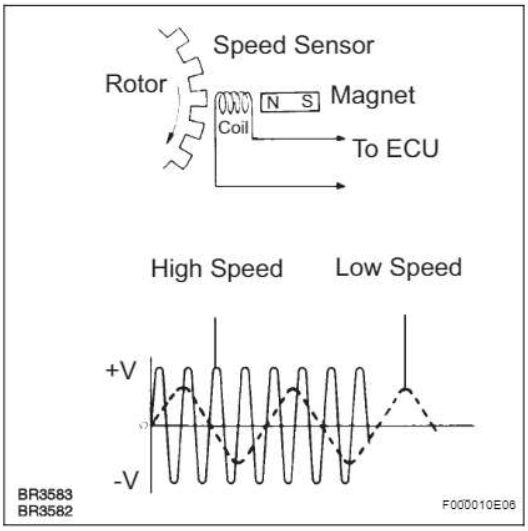
BC

DTC No.	Detection Item	Trouble Area	See page
C1331/36	Left Front Speed Sensor Circuit	1. Left front speed sensor 2. Left front speed sensor circuit 3. Sensor installation	BC-17
C1332/38	Right Rear Speed Sensor Circuit	1. Right rear speed sensor 2. Right rear speed sensor circuit 3. Sensor installation	BC-23
C1333/39	Left Rear Speed Sensor Circuit	1. Left rear speed sensor 2. Left rear speed sensor circuit 3. Sensor installation	BC-23

DTC	C0200/31	Front Speed Sensor RH Circuit
DTC	C0205/32	Front Speed Sensor LH Circuit
DTC	C1330/35	Right Front Speed Sensor Circuit
DTC	C1331/36	Left Front Speed Sensor Circuit

DESCRIPTION

The speed sensor detects wheel speed and transmits the appropriate signals to the ECU. These signals are used for control of the ABS control system. Each of the front and rear rotors has 48 serrations.

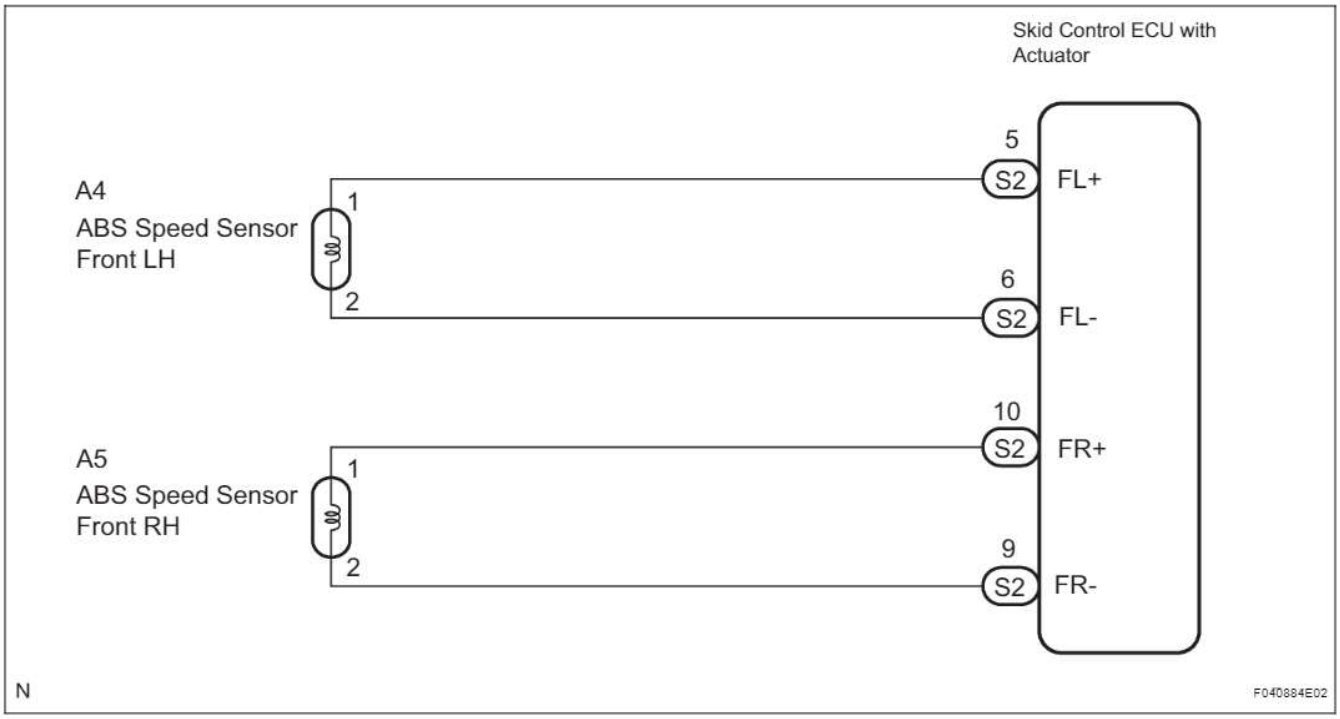


When the rotors rotate, the magnetic field generated by the permanent magnet in the speed sensor induces an AC voltage. Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.

DTC No.	DTC Detecting Condition	Trouble Area
C0200/31 C0205/32	When any of the following (1 to 3) is detected : 1. Non-plausible high frequent signal, high wheel acceleration or high gradient for 20 sec. with the brake pedal applied or for 5 sec. when the brake pedal is not applied. 2. After the initial start or restart and when the vehicle speed has reached 7 mph (12 km/h), the wheel speed of 0 mph (0 km/h) is detected. 3. Deviation of 2 wheel speed.	• Right front and left front speed sensor • Right front and left front speed sensor circuit • Speed sensor rotor • Sensor installation
C1330/35 C1331/36	Detecting abnormality in the resistance value of each speed sensor.	• Right front and left front speed sensor • Speed sensor circuit • Sensor Installation

HINT:
DTC No. C0200/31 and C1330/35 are for the right front speed sensor.
DTC No. C0205/32 and C1331/36 are for the left front speed sensor.

WIRING DIAGRAM



HINT:
Start the inspection from step 1 when using the intelligent tester and start from step 3 when not using the intelligent tester.

1	READ VALUE OF INTELLIGENT TESTER (FRONT SPEED SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select the item "WHEEL SPEED FL (FR)" in the DATA LIST and read the value displayed on the intelligent tester.

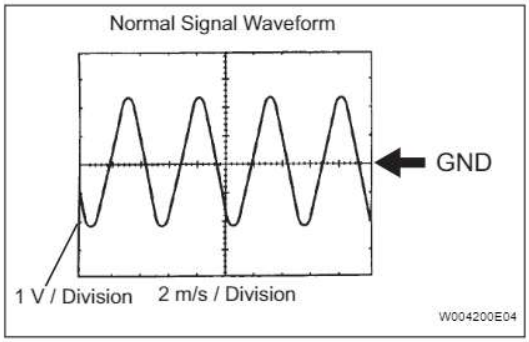
Item	Measurement Item / Range (Display)	Normal Condition
WHEEL SPD FR	Wheel speed sensor (FR) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed
WHEEL SPD FL	Wheel speed sensor (FL) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed

(d) Check that there is no difference between the speed value output from the speed sensor displayed on the intelligent tester and the speed value displayed on the speedometer when driving the vehicle.
OK:
There is almost no difference in the displayed speed value.
HINT:
There is tolerance of +- 10 % in the speedometer indication.

NG	Go to step 3

OK

2	INSPECT SPEED SENSOR AND SENSOR ROTOR SERRATIONS



(a) INSPECTION USING OSCILLOSCOPE
(1) Connect the oscilloscope to terminals FR+ - FR- and FL+ - FL- of the skid control ECU
(2) Drive the vehicle at about 19 mph (30 km/h), and check the signal waveform.
OK:
A waveform as shown in a figure should be output.
HINT:
- As vehicle speed (wheel revolution speed) increases, 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 attached to it.

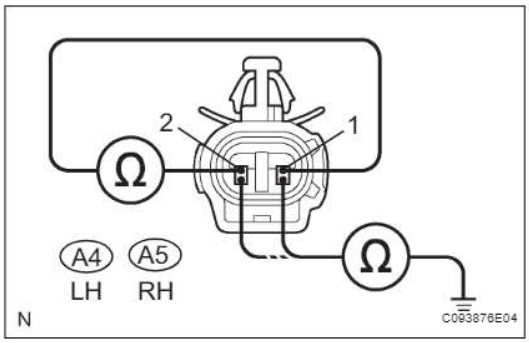
NG → **Go to step 6**

BC

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

3	INSPECT FRONT SPEED SENSOR



(a) Make sure that there is no looseness at the connectors locking part and connecting part of connectors A4 or A5.
(b) Disconnect the speed sensor connector.
(c) Measure the resistance according to the value(s) in the table below.
Resistance
LH:

Tester Connection	Specified Condition
A4-1 (FL+) - A4-2 (FL-)	0.6 to 2.5 kΩ

RH:

Tester Connection	Specified Condition
A5-1 (FR+) - A5-2 (FR-)	0.6 to 2.5 kΩ

(d) Measure the resistance according to the value(s) in the table below.
Resistance
LH:

Tester Connection	Specified Condition
A4-1 (FL+) - Body ground	10 kΩ or higher
A4-2 (FL-) - Body ground	10 kΩ or higher

RH:

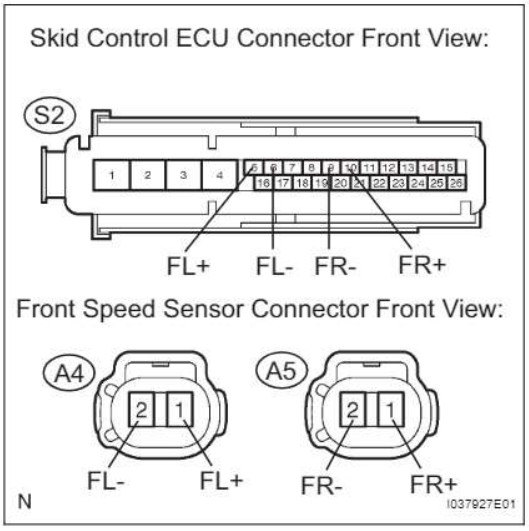
Tester Connection	Specified Condition
A5-1 (FR+) - Body ground	10 kΩ or higher
A5-2 (FR-) - Body ground	10 kΩ or higher

NOTICE:
Check the speed sensor signal after the speed sensor replacement (See page BC-6).

NG → **REPLACE FRONT SPEED SENSOR**

OK

4 CHECK HARNESS AND CONNECTOR (FRONT SPEED SENSOR - SKID CONTROL ECU)



(a) Disconnect the skid control ECU connector and the front speed sensor connectors.
(b) Measure the resistance according to the value(s) in the table below.
Resistance
LH:

Tester Connection	Specified Condition
S2-5 (FL+) - A4-1 (FL+)	Below 1 Ω
S2-6 (FL-) - A4-2 (FL-)	Below 1 Ω

RH:

Tester Connection	Specified Condition
S2-10 (FR+) - A5-1 (FR+)	Below 1 Ω
S2-9 (FR-) - A5-2 (FR-)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.
Resistance
LH:

Tester Connection	Specified Condition
A4-1 (FL+) - Body ground	10 kΩ or higher
A4-2 (FL-) - Body ground	10 kΩ or higher

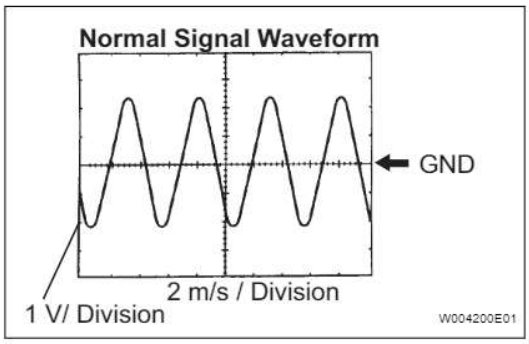
RH:

Tester Connection	Specified Condition
A5-1 (FR+) - Body ground	10 kΩ or higher
A5-2 (FR-) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

5	INSPECT SPEED SENSOR AND SENSOR ROTOR SERRATIONS



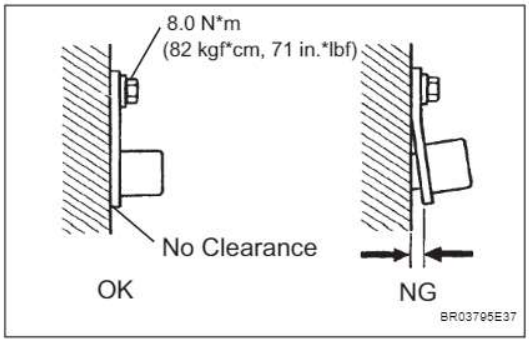
(a) INSPECTION USING OSCILLOSCOPE
(1) Connect the oscilloscope to terminals FR+ - FR- and FL+ - FL- of the skid control ECU
(2) Drive the vehicle at about 19 mph (30 km/h), and check the signal waveform.
OK:
A waveform as shown in a figure should be output.
HINT:
- As vehicle speed (wheel revolution speed) increases, 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 attached to it.

NG → **Go to step 6**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

6	INSPECT FRONT SPEED SENSOR INSTALLATION



(a) Check the speed sensor installation.
OK:
The installation bolt is tightened properly
There is no clearance between the sensor and front steering knuckle.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
NOTICE:
Check the speed sensor signal after speed sensor replacement (See page BC-6).

NG → **REPLACE FRONT SPEED SENSOR**

OK

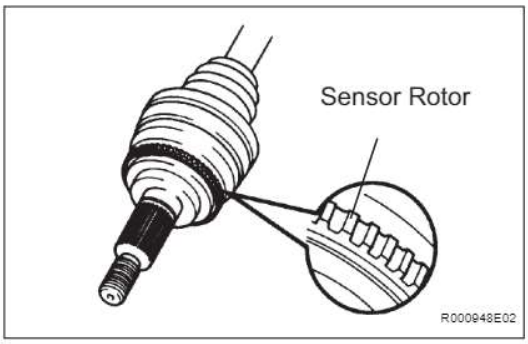
7	INSPECT SPEED SENSOR TIP

(a) Remove the front speed sensor (See page BC-186).
(b) Check the sensor tip.
OK:
No scratches or foreign matter on the sensor tip.
NOTICE:
Check the speed sensor signal after cleaning (See page BC-6).

NG → CLEAN OR REPAIR SPEED SENSOR

OK

8	INSPECT SPEED SENSOR ROTOR



(a) Remove the front drive shaft.
(b) Check the sensor rotor serrations.
OK:
No scratches, missing teeth or foreign matter on the sensor rotor.
HINT:
If a foreign matter is attached, remove it and after reassembling, check the output waveform.

NOTICE:
Check the speed sensor signal after cleaning (See page BC-6).

NG → CLEAN OR REPLACE SPEED SENSOR ROTOR

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

DTC	C0210/33	Rear Speed Sensor RH Circuit
DTC	C0215/34	Rear Speed Sensor LH Circuit
DTC	C1332/38	Right Rear Speed Sensor Circuit
DTC	C1333/39	Left Rear Speed Sensor Circuit

DESCRIPTION

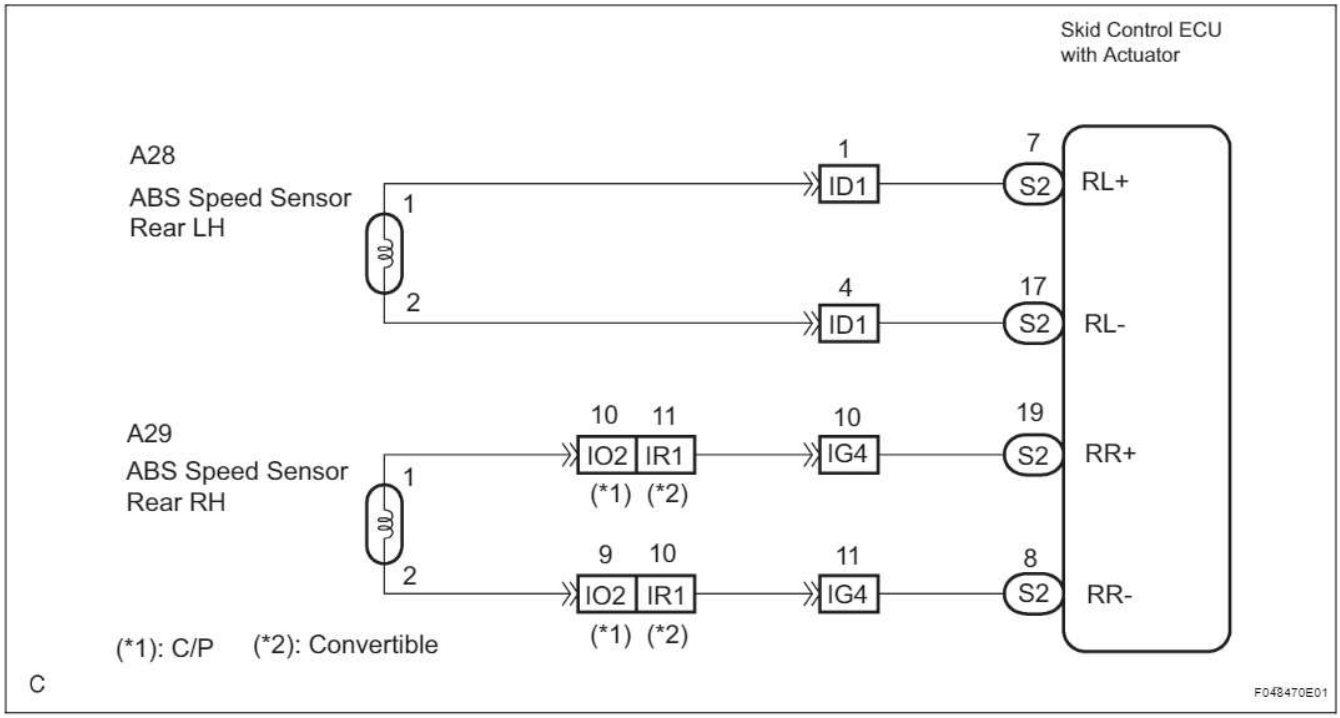
Refer to DTC C0200/31, C0205/32, C1330/35, C1331/36 (See page BC-17).

DTC No.	DTC Detecting Condition	Trouble Area
C0210/33 C0215/34	When any of the following (1 to 3) is detected : 1. Non-plausible high frequent signal, high wheel acceleration or high gradient for 20 sec. with the brake pedal applied for 5 sec. when the brake pedal is not applied. 2. After the initial start or restart and when the vehicle speed has reached 7 mph (12 km/h), the wheel speed of 0 mph (0 km/h) is detected. 3. Deviation of 2 wheel speed.	• Right rear and left rear speed sensor • Right rear and left rear speed sensor circuit • Speed sensor rotor • Sensor installation
C1332/38 C1333/39	Detecting abnormality in the resistance value of each speed sensor.	• Right rear and left rear speed sensor • Speed sensor circuit • Sensor installation

BC

HINT:
DTC No. C0210/33, C1332/38 are for the right rear speed sensor.
DTC No. C0215/34, C1333/39 are for the left rear speed sensor.

WIRING DIAGRAM



HINT:
Start the inspection from step 1 when using the intelligent tester and start from step 3 when not using the intelligent tester.

1 READ VALUE OF INTELLIGENT TESTER (REAR SPEED SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select the DATA LIST mode on the intelligent tester.

Item	Measurement Item / Range (Display)	Normal Condition
WHEEL SPD RR	Wheel speed sensor (RR) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed
WHEEL SPD RL	Wheel speed sensor (RL) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed

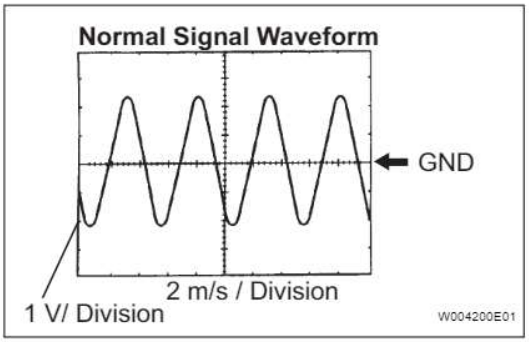
BC

(d) Check that there is no difference between the speed value output from the speed sensor displayed on the intelligent tester and the speed value displayed on the speedometer when driving the vehicle.
OK:
There is almost no difference in the displayed speed value.
HINT:
There is tolerance of +- 10 % in the speedometer indication.

NG → **Go to step 3**

OK

2 INSPECT SPEED SENSOR AND SENSOR ROTOR SERRATIONS



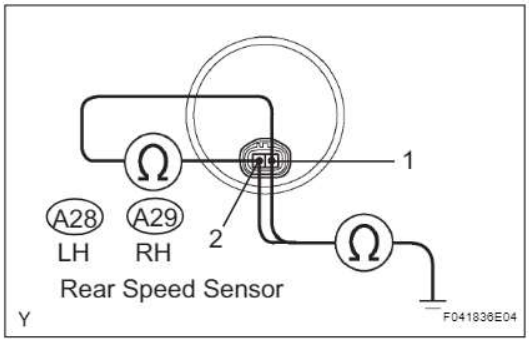
(a) INSPECTION USING OSCILLOSCOPE
(1) Connect the oscilloscope to terminals RR+ - RR- or RL+ - RL- of the skid control ECU.
(2) Drive the vehicle at about 19 mph (30 km/h), and check the signal waveform.
OK:
A waveform as shown in a figure should be output.
HINT:
- As the vehicle speed (wheel revolution speed) increases, 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 attached to it.

NG → **Go to step 6**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

3 INSPECT REAR SPEED SENSOR



(a) Disconnect the rear speed sensor connector.
(b) Measure the resistance according to the value(s) in the table below.

Resistance

LH:

Tester Connection	Specified Condition
(A28-1) - (A28-2)	1.0 to 1.3 kΩ at 20 °C

RH:

Tester Connection	Specified Condition
(A29-1) - (A29-2)	1.0 to 1.3 kΩ at 20 °C

(c) Measure the resistance according to the value(s) in the table below.

Resistance

LH:

Tester Connection	Specified Condition
A28-1 (RL+) - Body ground	10 kΩ or higher
A28-2 (RL-) - Body ground	10 kΩ or higher

RH:

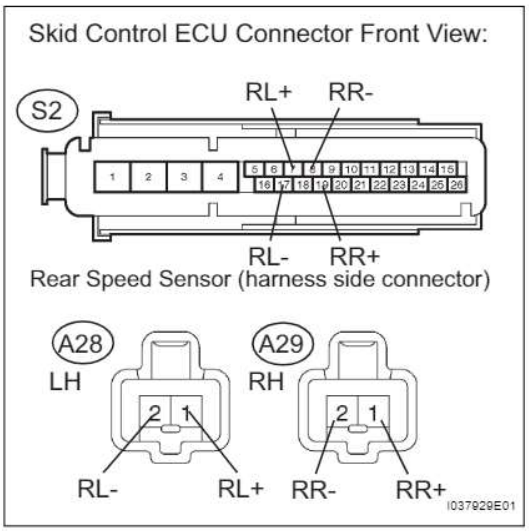
Tester Connection	Specified Condition
A29-1 (RR+) - Body ground	10 kΩ or higher
A29-2 (RR-) - Body ground	10 kΩ or higher

NOTICE:
Check the speed sensor signal after speed sensor replacement (See page BC-6).

NG → **REPLACE REAR SPEED SENSOR**

OK

4 CHECK HARNESS AND CONNECTOR (REAR SPEED SENSOR - SKID CONTROL ECU)



(a) Disconnect the skid control ECU connector and the rear speed sensor connector.

(b) Measure the resistance according to the value(s) in the table below.

Resistance

LH:

Tester Connection	Specified Condition
A28-1 (RL+) - S2-7 (RL+)	Below 1 Ω
A28-2 (RL-) - S2-17 (RL-)	Below 1 Ω

RH:

Tester Connection	Specified Condition
A29-1 (RR+) - S2-19 (RR+)	Below 1 Ω
A29-2 (RR-) - S2-8 (RR-)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

Resistance

LH:

Tester Connection	Specified Condition
A28-1 (RL+) - Body ground	10 kΩ or higher
A28-2 (RL-) - Body ground	10 kΩ or higher

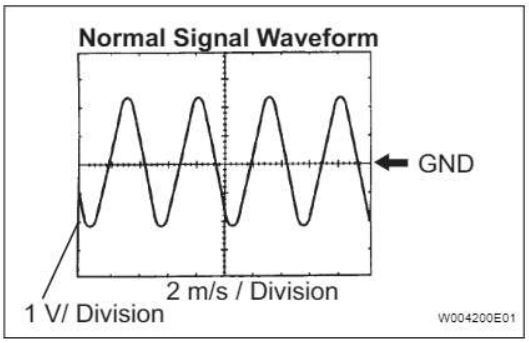
RH:

Tester Connection	Specified Condition
A29-1 (RR+) - Body ground	10 kΩ or higher
A29-2 (RR-) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

5 INSPECT SPEED SENSOR AND SENSOR ROTOR SERRATIONS



(a) INSPECTION USING OSCILLOSCOPE

(1) Connect the oscilloscope to terminals RR+ - RR- or RL+ - RL- of the skid control ECU.

(2) Drive the vehicle at about 19 mph (30 km/h), and check the signal waveform.

OK:

A waveform as shown in a figure should be output.

HINT:

- As vehicle speed (wheel revolution speed) increases, a cycle of the waveform narrows and the fluctuation in the output voltage becomes greater.

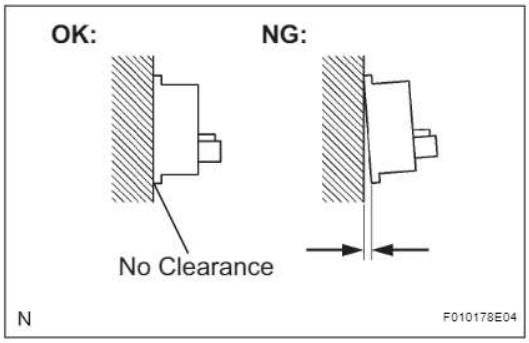
- When noise is identified in the waveform on the oscilloscope, error signals are generated due to the speed sensor rotor's scratches, looseness or foreign matter attach to it.

NG → Go to step 6

OK →

REPLACE BRAKE ACTUATOR ASSEMBLY

6 INSPECT REAR SPEED SENSOR INSTALLATION



(a) Check the sensor installation.

OK:

There is no clearance between the sensor and rear axle carrier.

NOTICE:

Check the speed sensor signal after replacement (See page BC-6).

NG → **REPLACE REAR SPEED SENSOR**

OK →

7 INSPECT REAR SPEED SENSOR TIP

(a) Remove the skid control sensor (See page BC-188).
(b) Check the sensor tip.

OK:

No scratches or foreign matter on the sensor tip.

NOTICE:

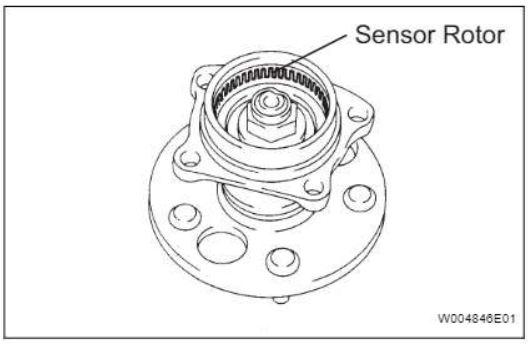
Check the speed sensor signal after rear speed sensor replacement (See page BC-6).

NG → **CLEAN OR REPAIR REAR SPEED SENSOR TIP**

OK →

BC

8	INSPECT SENSOR ROTOR



(a) Check the sensor rotor serrations.
OK:
No scratches, missing teeth or foreign matter on the sensor rotor.

NOTICE:
Check the speed sensor signal after rear speed sensor replacement (See page BC-6).

NG → **REPLACE SPEED SENSOR ROTOR**

OK

BC

REPLACE BRAKE ACTUATOR ASSEMBLY

DTC	C0226/21	SFR Solenoid Circuit

DTC	C0236/22	SFL Solenoid Circuit

DTC	C0246/23	SRR Solenoid Circuit

DTC	C0256/24	SRL Solenoid Circuit

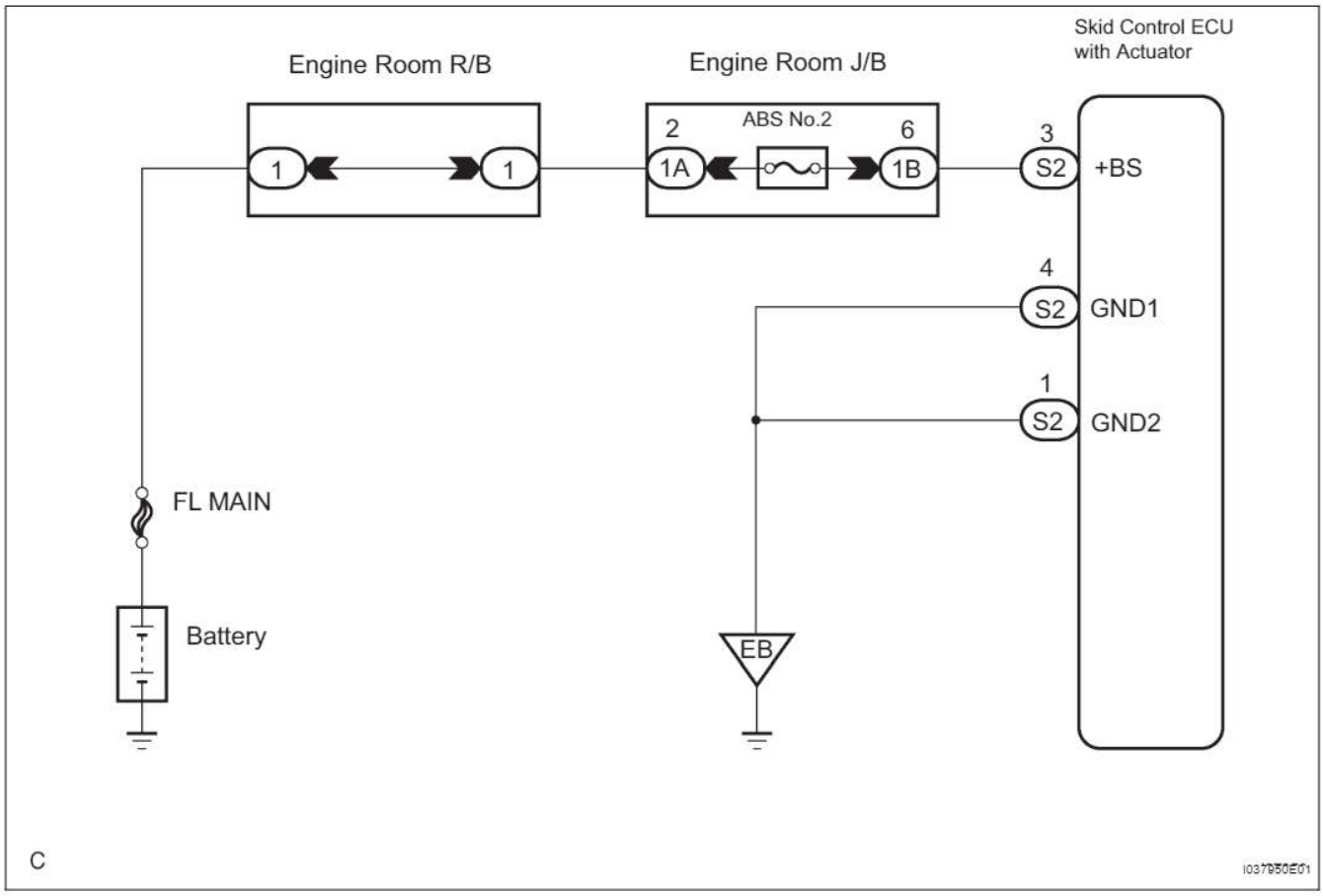
DESCRIPTION

This solenoid goes on when receiving signals from the ECU and controls the pressure acting on the wheel cylinders to control the braking force.

DTC No.	DTC Detecting Condition	Trouble Area
C0226/21 C0236/22 C0246/23 C0256/24	Solenoid valve signal does not match to the check result.	• Each solenoid circuit • Brake actuator assembly

BC

WIRING DIAGRAM



1	RECONFIRM DTC

HINT:
This code is detected when a problem is determined in the brake actuator assembly.
The solenoid circuit is in the brake actuator assembly. Therefore, solenoid circuit inspection and solenoid unit inspection cannot be performed. Be sure to check if the DTC code is output before replacing the brake actuator assembly.

(a) Clear the DTCs (See page BC-10).
(b) Turn the ignition switch to the ON position.
(c) Are the same DTCs recorded?

Result

Result	Proceed to
Yes	A
No	B

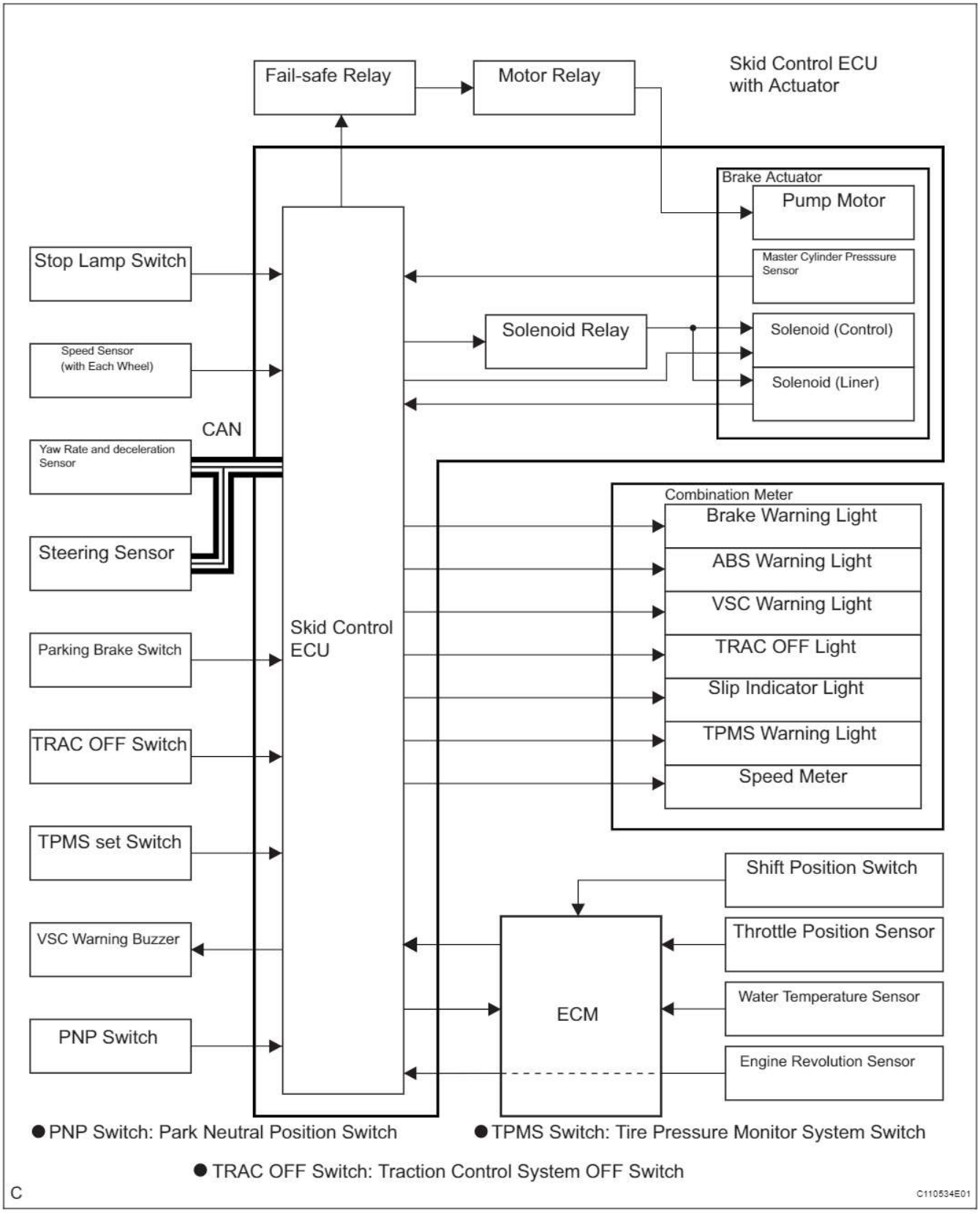
BC

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE**

A

REPLACE BRAKE ACTUATOR ASSEMBLY

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

1. SYSTEM DESCRIPTION

HINT:

- The skid control ECU is a single unit with ABS & TRACTION ACTUATOR.
- The skid control ECU also works as a TPMS (Tire Pressure Monitor System) ECU.
- The yaw rate sensor and deceleration sensor are combined and in a single unit. This unit communicates with the skid control ECU through CAN communication.

(a) ABS
(Anti-lock Brake System)
The ABS helps prevent wheels from locking when the brake is applied firmly or when braking on a slippery surface.

(b) EBD
(Electronic Brake force Distribution)
The EBD control utilizes ABS, realizing proper brake force distribution between front and rear wheels in accordance with driving conditions.
In addition, during cornering braking, it also controls the brake force of the right and left wheels, helping to maintain vehicle behavior.

(c) BA (Brake Assist)
The primary purpose of the brake assist system is to provide an auxiliary brake force to assist the driver who cannot generate a large enough brake force during emergency braking, thus helping to maximize the vehicle's brake performance.

(d) TRAC
(Traction Control)
The TRAC system helps prevent the drive wheels from slipping if the driver presses down on the accelerator pedal excessively when starting off or accelerating on a slippery surface.

(e) VSC
(Vehicle Stability Control)
The VSC system helps prevent the vehicle from slipping sideways as a result of strong front wheel skid or strong rear wheel skid during cornering.
CAN Communication (☐: Receiving signal from Skid Control ECU)

Related ECU/Parts	Signal
Steering Sensor	☐ Steering angle signal
Yaw rate sensor/Deceleration sensor	☐ Yaw rate signal ☐ G-sensor signal

2. ABS with EBD & BA & TRAC & VSC OPERATION

(a) Skid control ECU calculates vehicle stability tendency based on the signal of sensors, speed sensor, yaw rate sensor and steering angle sensor. And it judges whether the control of engine output torque by electronic control throttle and of wheel brake pressure by brake actuator will start or not by the calculation results.

(b) The SLIP indicator blinks and the VSC buzzer sounds to inform the driver that the VSC system is operating. The SLIP indicator also blinks when TRAC is operating, and the operation being performed is displayed.

3. FAIL SAFE FUNCTION

(a) When a failure occurs in the ABS & BA & TRAC & VSC systems, the ABS warning light and the VSC warning light turns on and the ABS & BA & TRAC & VSC operations are prohibited. In addition to this, when there is a failure that disables the EBD operation, the brake warning light also comes on and the EBD operation is prohibited.

(b) If some control is prohibited due to a malfunction during operation, that control will be cut off gradually not to change stability of vehicle suddenly.

HOW TO PROCEED WITH TROUBLESHOOTING

The intelligent tester can be used at step 2, 5, 8, 11.

1	Vehicle Brought to Workshop

2	Check and Clear DTCs and Freeze Frame Data

HINT:
See page BC-84

3	Problem Symptom Confirmation

- Symptom does not occur: Go to step 5
- Symptom occurs: Go to step 6

4	Symptom Simulation

HINT:
See page IN-34

5	DTC Check

HINT:
See page BC-82

- There is no output: Go to step 7
- There is output: Go to step 8

6	Problem Symptoms Table

HINT:
See page BC-78

- Check for fluid leakage and Go to step 10

7	DTC Chart

HINT:
See page BC-88

8	Circuit Inspection

9	Identification of Problem

10	Repair

BC

11	Confirmation Test

End

OPERATION CHECK

1. WARNING LAMP BULB CHECK

(a) Release the parking brake lever.

NOTICE:

When releasing the parking brake, set the chocks to hold the vehicle for safety.

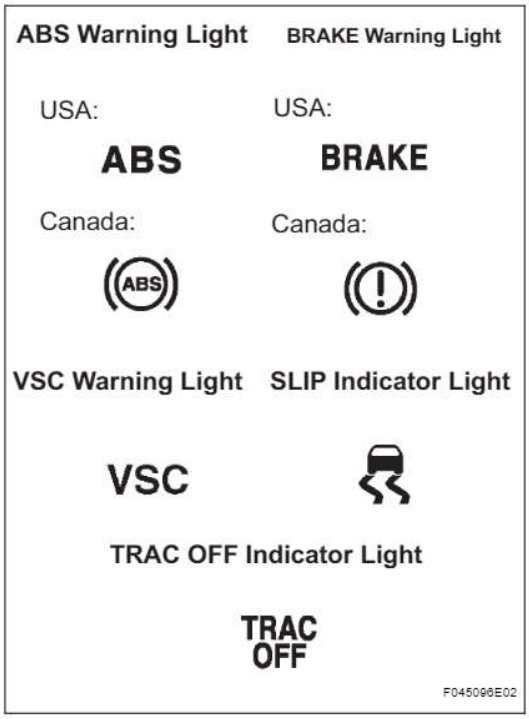
HINT:

When the parking brake is applied or the level of the brake fluid is low, the BRAKE warning light comes on.

(b) When the ignition switch is turned to the ON position, check that the ABS warning light, VSC warning light, TRAC OFF indicator light, BRAKE warning light and SLIP indicator light come on for approximately 3 seconds.

HINT:

If the indicator check result is not normal, proceed to troubleshooting for the ABS warning light circuit, VSC warning light circuit, TRAC OFF indicator light circuit, BRAKE warning light circuit or SLIP indicator light circuit.



Trouble area	See procedure
ABS warning light remains on circuit	BC-142
ABS warning light does not come on circuit	BC-146
BRAKE warning light circuit	BC-156
VSC warning light remains on circuit	BC-149
VSC warning light does not come on circuit	BC-153
TRAC OFF indicator light circuit	BC-162
SLIP indicator light circuit	BC-165

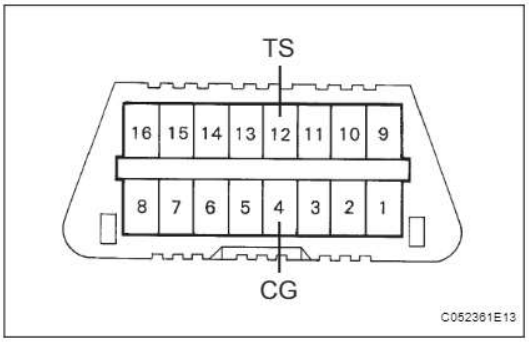
2. TEST MODE (SENSOR SIGNAL CHECK)

(a) Yaw rate sensor, deceleration sensor, master cylinder sensor and speed sensor, checks can be performed.

Check Procedure	SST (Check Wire)	Intelligent Tester
Deceleration sensor	DECELERATION SENSOR CHECK (USING SST CHECK WIRE)	DECELERATION SENSOR CHECK
Master cylinder pressure	MASTER CYLINDER PRESSURE SENSOR CHECK (USING SST CHECK WIRE)	MASTER CYLINDER PRESSURE SENSOR CHECK
Speed sensor	SPEED SENSOR CHECK (USING SST CHECK WIRE)	SPEED SENSOR CHECK
Yaw rate and deceleration sensor	YAW RATE SENSOR CHECK (USING SST CHECK WIRE)	YAW RATE SENSOR CHECK

3. PROCEDURES FOR SENSOR SIGNAL CHECK (USING SST CHECK WIRE)

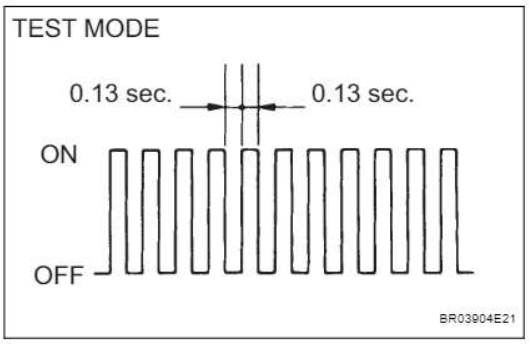
(a) Turn the ignition switch off.



(b) Using SST, connect terminals TS and CG of the DLC3.
SST 09843-18040

(c) Check that the steering wheel is in the straight-ahead position and move the shift lever to the P position.

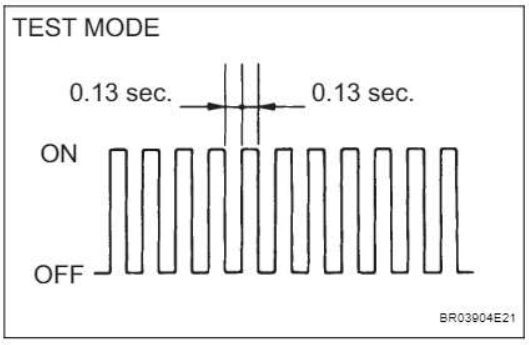
(d) Turn the ignition switch to the ON position.



(e) Check that the ABS warning light and VSC warning light blink as shown in illustration.
HINT:
If the ABS warning light and VSC warning light do not blink, inspect the ABS warning light circuit and VSC warning light circuit.

Trouble area	See procedure
ABS warning light remains on circuit	BC-142
ABS warning light does not come on circuit	BC-146
VSC warning light remains on circuit	BC-149
VSC warning light does not come on circuit	BC-153

(f) Start the engine.



4. DECELERATION SENSOR CHECK (USING SST CHECK WIRE)

(a) Check that the ABS warning light is blinking in TEST MODE.

(b) Keep the vehicle in the stationary condition on a level surface for 1 second or more.

5. MASTER CYLINDER PRESSURE SENSOR CHECK (USING SST CHECK WIRE)

(a) Check that the ABS warning light is blinking in TEST MODE.

(b) Leave the vehicle in a stationary condition and the brake pedal in free condition for 1 second or more, and quickly depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more for 1 second or more.
HINT:
At this time, the ABS warning light comes on for 3 seconds.

6. SPEED SENSOR CHECK (USING SST CHECK WIRE)

(a) Check the ABS warning light is blinking of TEST MODE.

(b) Start the sensor signal check.

(1) Drive the vehicle straight forward.
Drive the vehicle at a speed of 28 mph (45 km/h) or higher for several seconds and check that the ABS warning light goes off.

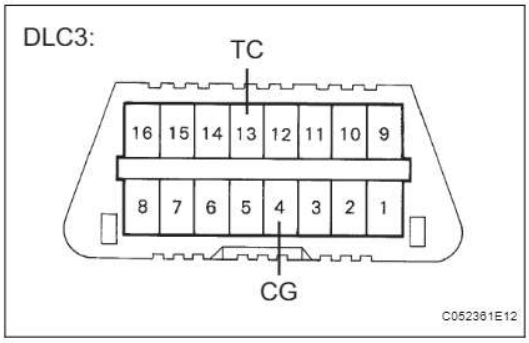
Test	Vehicle Speed	Check
Low speed test	2 to 3 mph (3 to 5 km/h)	Response of sensors
Middle speed test	28 mph (45 km/h) or higher	Deviations of sensor signal

HINT:
The sensor check may not be completed if the vehicle has its wheel spun or its steering wheel turned during this check.

(2) Stop the vehicle.

(c) Signal check results.

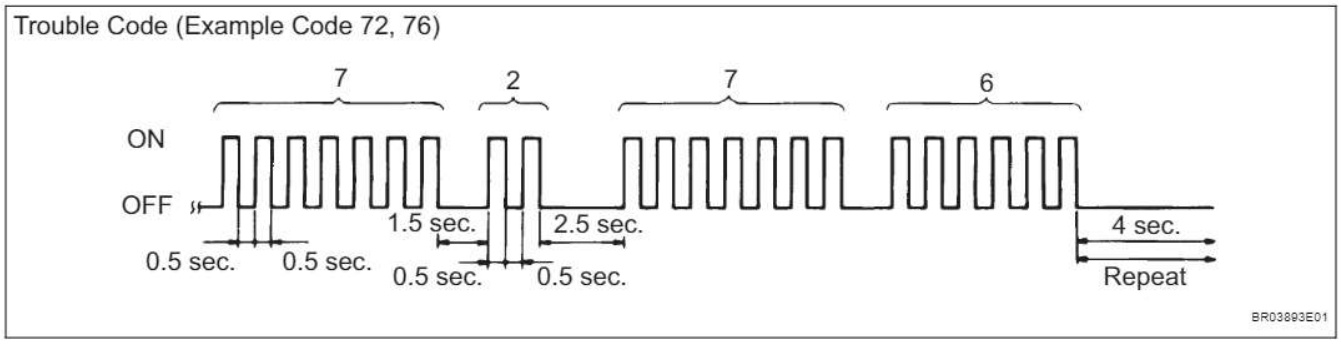
Check Result	ABS Warning Light
OK	Goes off
NG	Remains on



(d) Read the DTCs

(1) Using SST, connect terminals TC and CG of the DLC3.
SST 09843-18040

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

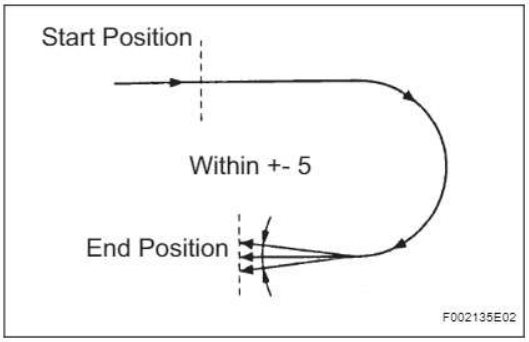


HINT:
- See the list of DTC (Refer to DTC of sensor check function).
- If every sensor is normal, the normal code is output (A cycle of 0.25 second ON and 0.25 second OFF is repeated).
- If more than 1 malfunction is detected at the same time, the lowest numbered code will be displayed first.

(3) After the check, disconnect the SST from terminal TC and CG of the DLC3.

7. YAW RATE SENSOR CHECK (USING SST CHECK WIRE)

(a) Check the VSC warning light is blinking of TEST MODE.

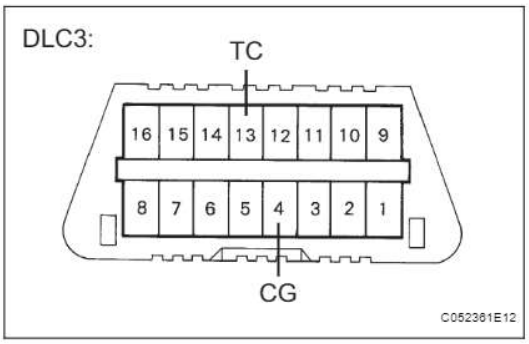


(b) Shift the shift lever to the D range and drive the vehicle at the vehicle speed of approx. 3 mph (5 km/h), turn the steering wheel either to left or right 90° or more, and maintain 180° circular drive for the vehicle.

(c) Stop the vehicle and shift the shift lever to the P position, check that the skid control buzzer sounds for 3 sec.

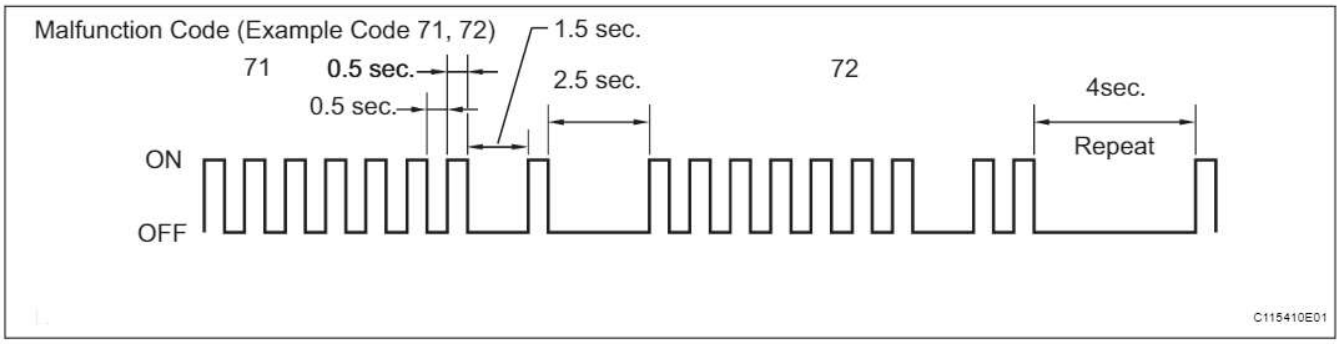
HINT:

- If the skid control buzzer sounds, the sensor check is completed normally.
- If the skid control buzzer does not sound, check the skid control buzzer circuit (See page BC-168), then perform the sensor check again.
- If the skid control buzzer still won't sound, there is a malfunction in the VSC sensor, so check the DTC.
- Drive the vehicle in a 180° circle. 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) Using SST, connect terminals TC and CG of DLC3.
SST 09843-18040

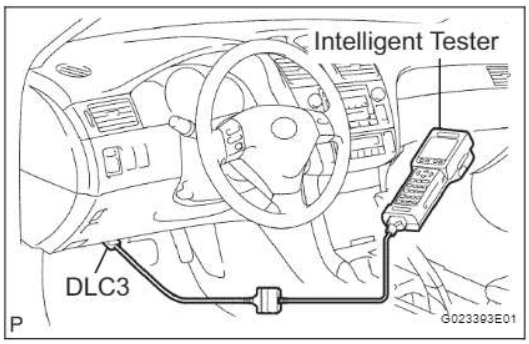
(e) Read the number of blinks of the VSC warning light.



HINT:

- See the list of DTC.
- If every sensor is normal, there is a normal code 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.

(f) After performing the check, disconnect the SST from terminals TS and CG, TC and CG of DLC3 and turn the ignition switch OFF.



8. PROCEDURES FOR SENSOR SIGNAL CHECK

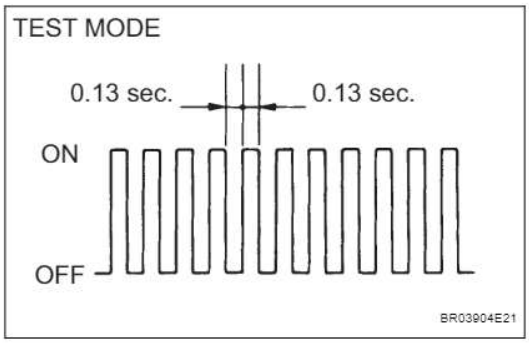
(a) Turn the ignition switch off.

(b) Check that the shift lever is in the P position.

(c) Connect the intelligent tester to the DLC3.

(d) Turn the ignition switch to the ON position.

(e) Operate intelligent tester to test mode (SIGNAL CHECK).



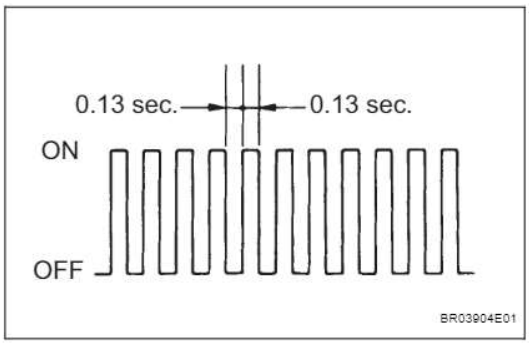
(f) Check that the ABS warning light and VSC warning light blink.

HINT:

If the ABS warning light and VSC warning light do not blink, inspect the ABS warning light circuit and VSC warning light circuit.

Trouble area	See procedure
ABS warning light remains on	BC-142
ABS warning light does not come on	BC-146
VSC warning light remains on	BC-149
VSC warning light does not come on	BC-153

(g) Start the engine.



9. DECELERATION SENSOR CHECK

(a) Check that the ABS warning light is blinking in TEST MODE.

(b) Keep the vehicle in the stationary condition on a level surface for 1 second or more.

10. MASTER CYLINDER PRESSURE SENSOR CHECK

(a) Check that the ABS warning light is blinking in TEST MODE.

(b) Leave the vehicle in a stationary condition and the brake pedal in a free condition for 1 second. or more, and quickly depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more for 1 second or more.

HINT:

At this time, the ABS warning light goes on for 3 seconds.

11. SPEED SENSOR CHECK

(a) Check that the ABS warning light is blinking in TEST MODE.

(b) Start the sensor signal check.

(1) Drive vehicle straight forward.

Drive the vehicle at a speed of 28 mph (45 km/h) or higher for several seconds and check that the ABS warning light goes off.

Test	Vehicle Speed	Check
Low speed test	2 to 3 mph (3 to 5 km/h)	Response of sensors

Test	Vehicle Speed	Check
Middle speed test	28 mph (45 km/h) or higher	Deviations of sensor signal

HINT:
The sensor check may not be completed if the vehicle has its wheel spun or its steering wheel turned during this check.

(2) Stop the vehicle.

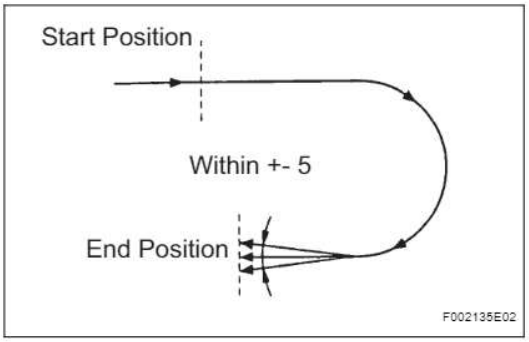
(c) Signal check results.

Check Result	ABS Warning Light
OK	Goes off
NG	Remains on

(d) Read the DTC(s).

12. YAW RATE SENSOR CHECK

(a) Check that the VSC warning light is blinking in TEST MODE.



(b) Move the shift lever to the D position and drive the vehicle at the vehicle speed of approximately 3 mph (5 km/h), turn the steering wheel either to left or right 90° or more, and maintain the vehicle in a 180 degrees circular drive.

(c) Stop the vehicle and shift the shift lever to the P position, check that the skid control buzzer sounds for 3 sec.
HINT:
- If the skid control buzzer sounds, the sensor check is completed normally.
- If the skid control buzzer does not sound, check the skid control buzzer circuit (See page BC-168), then perform the sensor check again.
- If the skid control buzzer still does not sound, there is a malfunction in the VSC sensor, so check the DTC.
- Make a 180 degree 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(s) (Refer to next step).

13. DTC of sensor check function:

Code No.	Diagnosis	Trouble Area
C1271/71	Low output voltage of right front speed sensor	• Right front speed sensor • Sensor installation • Sensor rotor
C1272/72	Low output voltage of left front speed sensor	• Left front speed sensor • Sensor installation • Sensor rotor
C1273/73	Low output voltage of right rear speed sensor	• Right rear speed sensor • Sensor installation • Sensor rotor
C1274/74	Low output voltage of left rear speed sensor	• Left rear speed sensor • Sensor installation • Sensor rotor

Code No.	Diagnosis	Trouble Area
C1275/75	Abnormal change in output voltage of right front speed sensor	Right front 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 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
C0371/71	Signal malfunction	Yaw rate sensor

HINT:
The code in this table are output only in TEST MODE.

BC

DTC	C0210/33	Rear Speed Sensor RH Circuit
DTC	C0215/34	Rear Speed Sensor LH Circuit
DTC	C1238/38	Foreign Object is Attached on Tip of Rear Speed Sensor RH
DTC	C1239/39	Foreign Object is Attached on Tip of Rear Speed Sensor LH

DESCRIPTION

Refer to DTC C0200/31, C0205/32, C1235/35, C1236/36 (See page BC-91).

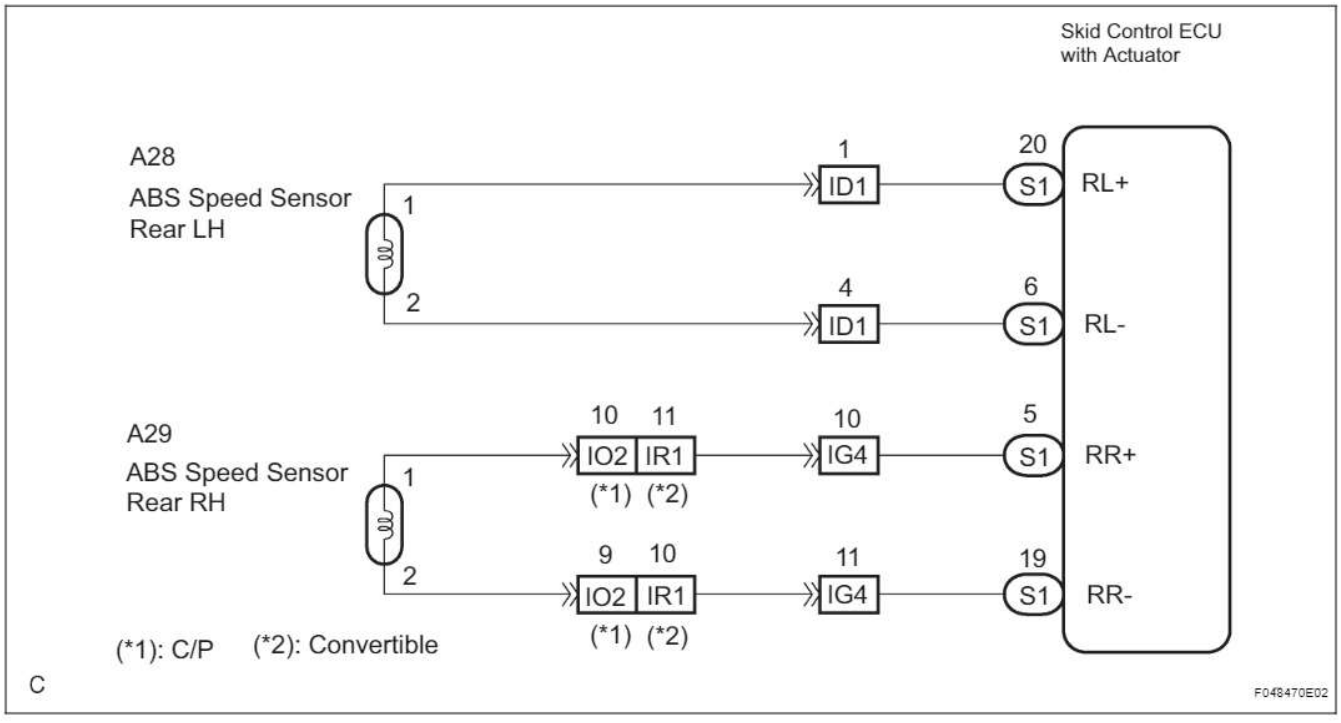
DTC No.	DTC Detecting Condition	Trouble Area
C0210/33 C0215/34	(1) All the following conditions continues for at least 1 second. • Vehicle speed is more than 6 mph (10 km/h). • Open or short in vehicle speed sensor signal circuit. (2) Momentary interruption of the sensor signal of faulty wheel has occurred 7 times or more. (3) Sensor signal circuit is open for 0.5 seconds.	• Right rear and left rear speed sensor • Each speed sensor circuit • Sensor rotor • Sensor installation
C1238/38 C1239/39	All the following conditions for at least 5 seconds. • Vehicle speed is more than 12 mph (20 km/h). • Vehicle speed sensor signal receives interference.	• Right rear and left rear speed sensor • Sensor installation

BC

HINT:

- DTC C0210/33 and C1238/38 are for the right rear speed sensor.
- DTC C0215/34 and C1239/39 are for the left rear speed sensor.

WIRING DIAGRAM



HINT:
Start the inspection from step 1 when using the intelligent tester and start from step 3 when not using the intelligent tester.

1 READ VALUE OF INTELLIGENT TESTER (REAR SPEED SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select the DATA LIST mode on the intelligent tester.

Item	Measurement Item / Range (Display)	Normal Condition
WHEEL SPD RL	Wheel speed sensor (RL) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed
WHEEL SPD RR	Wheel speed sensor (RR) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed

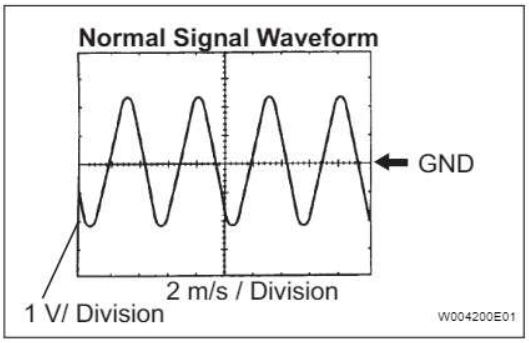
BC

(d) Check that there is no difference between the speed value output from the speed sensor displayed by the intelligent tester and the speed value displayed on the speedometer when driving the vehicle.
OK:
There is almost no difference in the displayed speed value.
HINT:
There is tolerance of +- 10 % in the speedometer indication.

NG → **Go to step 3**

OK

2 INSPECT SPEED SENSOR AND SENSOR ROTOR SERRATIONS



(a) INSPECTION USING OSCILLOSCOPE:
(1) Connect the oscilloscope to terminals RR+ - RR- or RL+ - RL- of the skid control ECU.
(2) Drive the vehicle at approximately 19 mph (30 km/h), and check the signal waveform.
OK:
A waveform as shown in a figure should be output.
HINT:
- As vehicle speed (wheel revolution speed) in creases, 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 attached to it.

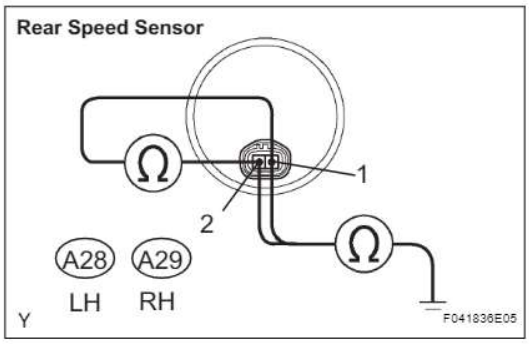
NOTICE:
When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

NG → Go to step 6

OK

REPLACE ABS AND TRACTION ACTUATOR

3 INSPECT REAR SPEED SENSOR



(a) Disconnect the skid control sensor connector.
(b) Measure the resistance according to the value(s) in the table below.

Resistance

LH:

Tester Connection	Specified Condition
(A28-1) - (A28-2)	0.9 to 2.1 kΩ

RH:

Tester Connection	Specified Condition
(A29-1) - (A29-2)	0.9 to 2.1 kΩ

(c) Measure the resistance according to the value(s) in the table below.

Resistance

LH:

Tester Connection	Specified Condition
(A28-1) - Body ground	10 kΩ or higher
(A28-2) - Body ground	10 kΩ or higher

RH:

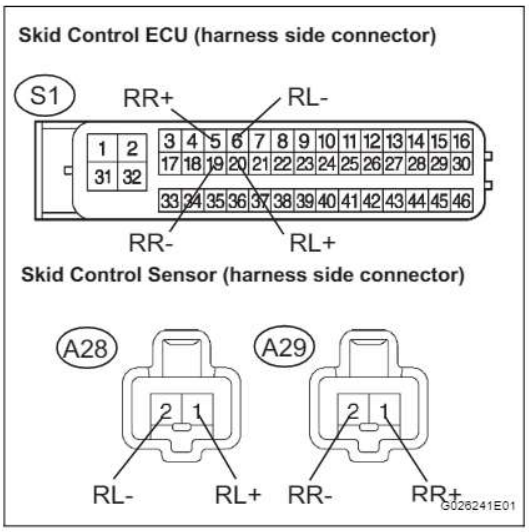
Tester Connection	Specified Condition
(A29-1) - Body ground	10 kΩ or higher
(A29-2) - Body ground	10 kΩ or higher

NOTICE:
Check the speed sensor signal after replacement (See page BC-70).

NG → REPLACE REAR SPEED SENSOR

OK

4 CHECK HARNESS AND CONNECTOR (REAR SPEED SENSOR - SKID CONTROL ECU)



(a) Disconnect the skid control ECU connector and the skid control sensor connector.

(b) Measure the resistance according to the value(s) in the table below.

Resistance

LH:

Tester Connection	Specified Condition
S1-20 (RL+) - A28-1 (RL+)	Below 1 Ω
S1-6 (RL-) - A28-2 (RL-)	Below 1 Ω

RH:

Tester Connection	Specified Condition
S1-5 (RR+) - A29-1 (RR+)	Below 1 Ω
S1-19 (RR-) - A29-2 (RR-)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

Resistance

LH:

Tester Connection	Specified Condition
S1-20 (RL+) - Body ground	10 kΩ or higher
S1-6 (RL-) - Body ground	10 kΩ or higher

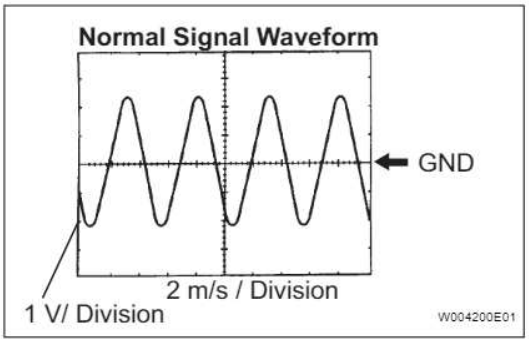
RH:

Tester Connection	Specified Condition
S1-5 (RR+) - Body ground	10 kΩ or higher
S1-19 (RR-) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5 INSPECT SPEED SENSOR AND SENSOR ROTOR SERRATIONS



(a) INSPECTION USING OSCILLOSCOPE:

(1) Connect the oscilloscope to terminals RR+ - RR- or RL+ - RL- of the skid control ECU.

(2) Drive the vehicle at approximately 19 mph (30 km/h), and check the signal waveform.

OK:

A waveform as shown in a figure should be output.

HINT:

- As the vehicle speed (wheel revolution speed) increases, 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 attached to it.

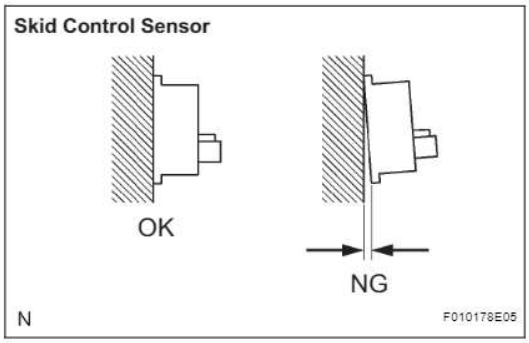
NOTICE:
When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

NG → **Go to step 6**

OK

REPLACE ABS AND TRACTION ACTUATOR

6 INSPECT REAR SPEED SENSOR INSTALLTAION



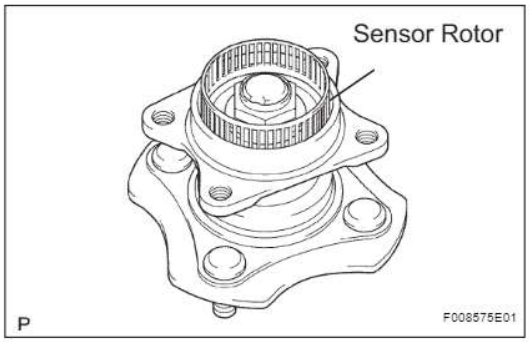
(a) Check the sensor installation.
OK:
There is no clearance between the sensor and rear axle carrier.

NOTICE:
Check the speed sensor signal after the replacement (See page BC-70).

NG → **REPLACE REAR SPEED SENSOR**

OK

7 INSPECT SENSOR ROTOR



(a) Check the sensor rotor serrations.
OK:
No scratches, missing teeth or foreign matter on the rotor.

NOTICE:
Check the speed sensor signal after the replacement (See page BC-70).

NG → **CLEAN OR REPAIR REAR SPEED SENSOR**

OK

8 INSPECT REAR SPEED SENSOR TIP

(a) Remove the rear speed sensor (See page BC-188).
(b) Check the sensor tip.
OK:
No scratches or foreign matter on the sensor tip.

NOTICE:
Check the speed sensor signal after the replacement (See page BC-70).
NOTICE:
When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

NG → **REPLACE SPEED SENSOR ROTOR**

OK

REPLACE ABS AND TRACTION ACTUATOR

BC

VEHICLE STABILITY CONTROL SYSTEM

PRECAUTION

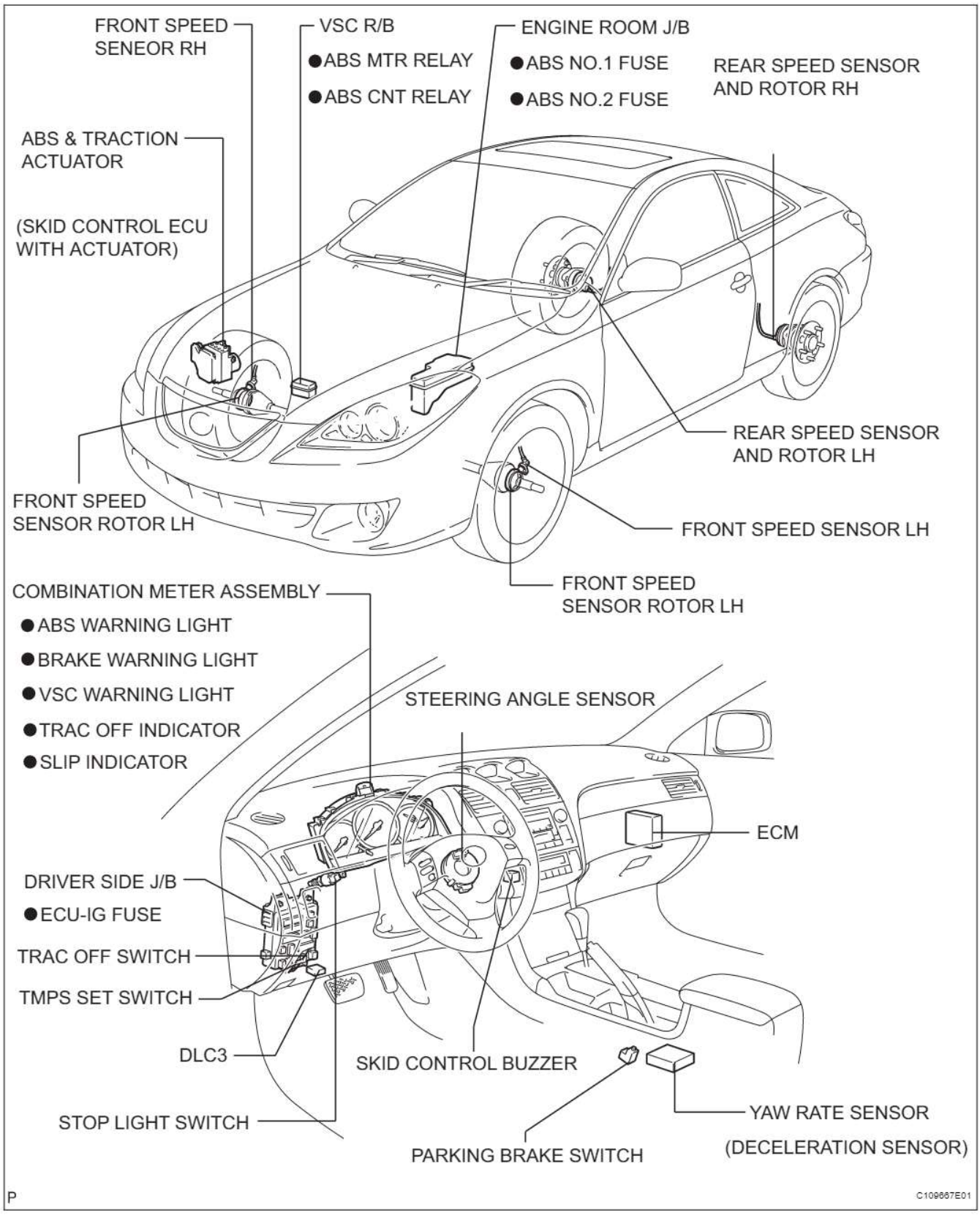
- When there is a malfunction in the contact point of the terminals or installation problems with parts, removal and installation of the suspected problem parts may return the system to the normal condition either completely or temporarily.
- In order to determine the malfunctioning area, be sure to check the conditions at the time the malfunction occurred, such as by DTC output and the freeze frame data output, and record it before disconnecting each connector or removing and installing parts.
- Since the ABS with EBD & BA & TRAC & VSC systems may be influenced by a malfunction in the other systems, be sure to check for DTCs in the other systems.
- Be sure to remove and install the skid control ECU, ABS & TRAC actuator and each sensor with the IG switch OFF unless specified in the inspection procedure.
- When removing and installing the skid control ECU, ABS & TRAC actuator and each sensor, be sure to check that the normal display is output in test mode inspection and in DTC output inspection after installing all the parts.
- After replacing the yaw rate sensor and/or the brake actuator assembly, make sure to perform yaw rate sensor and deceleration sensor zero point calibration (See page BC-76).
- CAN communication system is used for the data communication between the skid control ECU (included in the actuator), the steering angle sensor, and the yaw rate sensor (the deceleration sensor is included). If there is trouble in the CAN communication line, the DTC in the communication line is output.
- If the DTC in the CAN communication line is output, repair the malfunction in the communication line and troubleshoot the ABS with EBD & BA & TRAC & VSC systems under the condition that data communication is normal.
- Since the CAN communication line has its own length and route, it can not be repaired temporarily with the bypass wire, etc.

NOTICE:

When disconnecting the negative (-) battery terminal, initialize the following systems after the terminal is reconnected.

System Name	See procedure
Power Window Control System	IN-24
Sliding Roof System	IN-24

PARTS LOCATION



BC

DTC	C0226/21	SFR Solenoid Circuit

DTC	C0236/22	SFL Solenoid Circuit

DTC	C0246/23	SRR Solenoid Circuit

DTC	C0256/24	SRL Solenoid Circuit

DTC	C1225/25	SM Solenoid Circuit

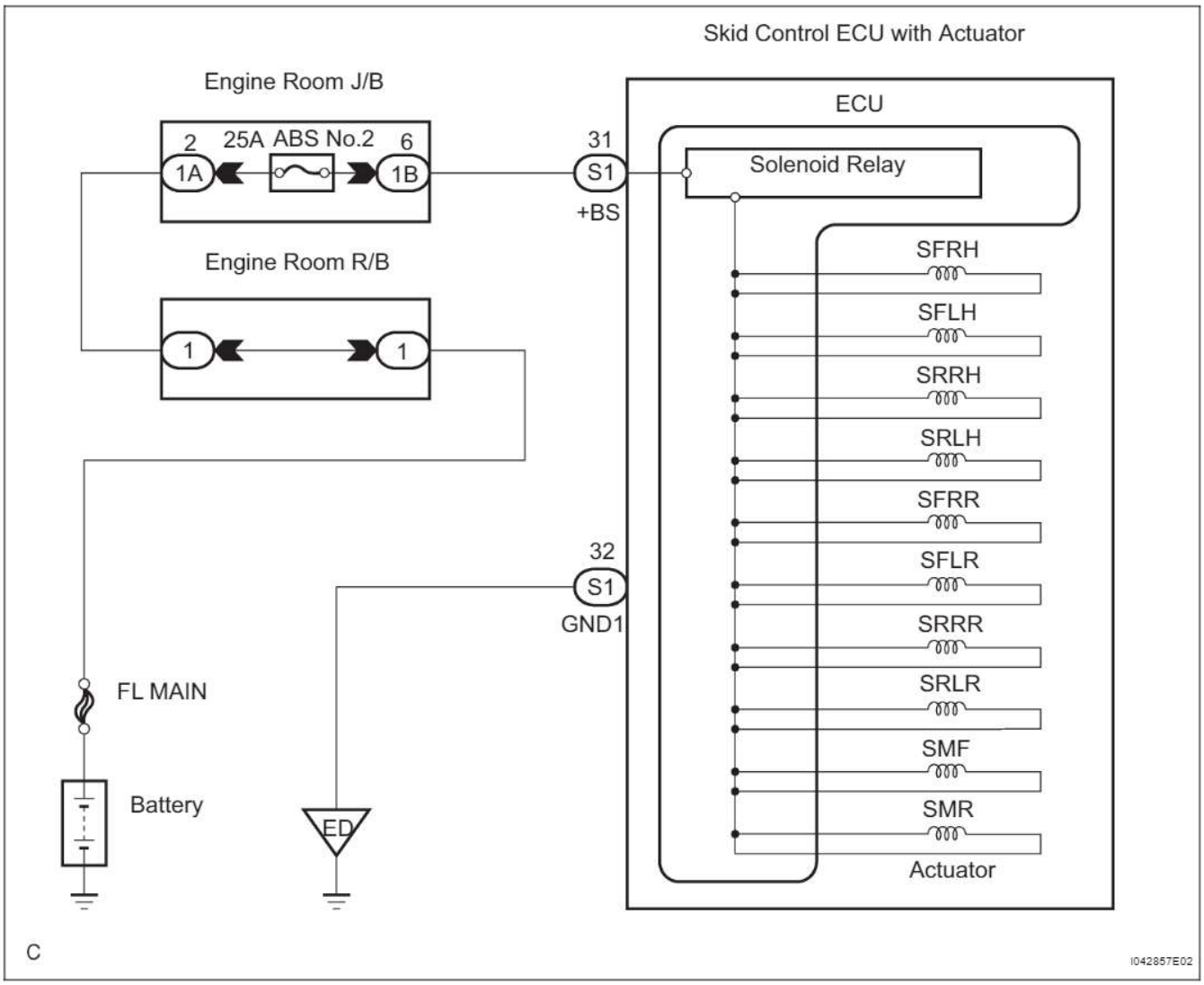
DESCRIPTION

This solenoid goes on when signals are received from the ECU and controls the pressure acting on the wheel cylinders to control the braking force.

BC

DTC No.	DTC Detecting Condition	Trouble Area
C0226/21	Open or short circuit in front right solenoid circuit (SFRR or SFRH) continues for 0.05 sec. or more.	• ABS & TRAC actuator • Each solenoid circuit
C0236/22	Open or short circuit in front left solenoid circuit (SFLR or SFLH) continues for 0.05 sec. or more.	• ABS & TRAC actuator • Each solenoid circuit
C0246/23	Open or short circuit in rear right solenoid circuit (SRRR or SRRH) continues for 0.05 sec. or more.	• ABS & TRAC actuator • Each solenoid circuit
C0256/24	Open or short circuit in rear left solenoid circuit (SRLR or SRLH) continues for 0.05 sec. or more.	• ABS & TRAC actuator • Each solenoid circuit
C1225/25	When any of the following (1 to 5) is detected: (1) All the following conditions continues for at least 0.05 seconds. • When switching solenoid (SM1 or SM2) outputs ON signal. • Over current. (2) All the following conditions continues for at least 0.05 seconds. • When switching solenoid (SM1 or SM2) outputs OFF signal. • Open circuit. (3) All the following conditions continue for at least 0.05 seconds. • When switching solenoid (SM1 or SM2) outputs OFF signal. • Output current monitor is more than 0.15 A. (4) All the following conditions continues for at least 0.05 seconds. • When switching solenoid (SM1 or SM2) outputs ON signal. • Output current is more than 0.348 A. • Difference between current monitor and target value exceeds 2, continues for between 0.1 sec. and 0.15 sec. (5) All the following conditions continue for at least 0.2 seconds. • When switching solenoid (SM1 or SM2) outputs ON signal. • Output current is more than 0.348 A. • Switching solenoid (SM1 or SM2) duty ratio: 1. More than 2.08 2. Less than 0.48	• ABS & TRAC actuator • Each solenoid circuit

WIRING DIAGRAM



BC

1	RECONFIRM DTC

HINT:
This code is detected when a problem is determined in the ABS & TRACTION actuator assembly.
The solenoid circuit is in the ABS & TRACTION actuator assembly.
Therefore, solenoid circuit inspection and solenoid unit inspection cannot be performed. Be sure to check if the DTC code is output before replacing the ABS & TRACTION actuator assembly.

(a) Clear the DTCs (See page BC-82).
(b) Turn the ignition switch to the ON position.
(c) Are the same DTCs recorded?

Result

Result	Proceed to
Yes	A

Result	Proceed to
No	B

NOTICE:
When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE

A → REPLACE ABS AND TRACTION ACTUATOR

BC

DTC	C0273/13	Open in ABS Motor Relay Circuit

DTC	C0274/14	Short to B+ in ABS Motor Relay Circuit

DTC	C1361/91	Short Circuit in ABS Motor Fail Safe Relay Circuit

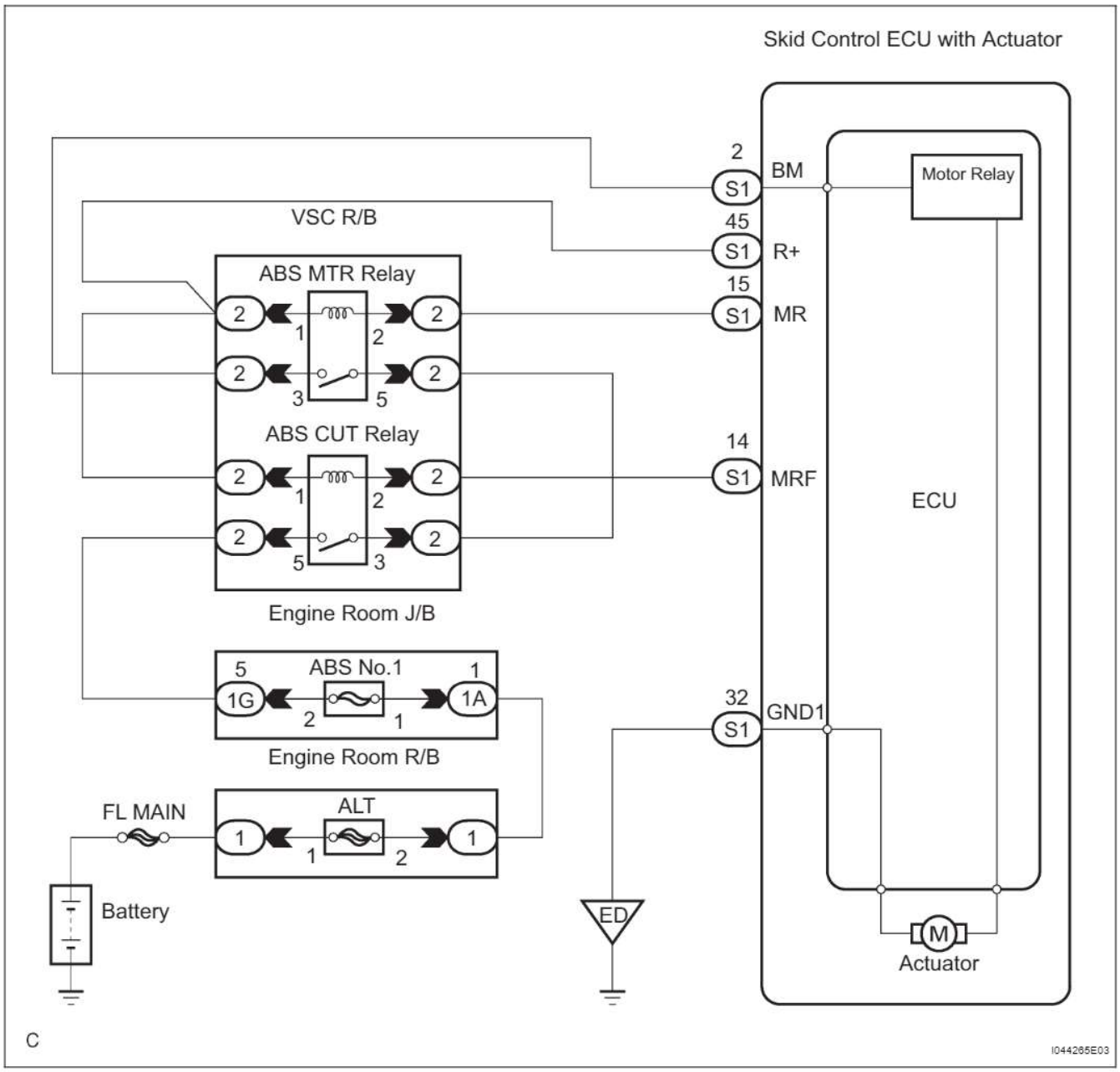
DESCRIPTION

- The ABS motor relays consist of 2 relays are included in the VSC R/B.
- The ABS cut relay is turned on after turning the ignition switch to the ON position. If the DTCs in the ABS pump motor circuit are memorized, the ABS cut relay cuts off the power supply to the ABS motor relay and performs the fail safe.
- While any of the ABS, BA, TRAC and VSC is operating, the skid control ECU (included in the actuator) turns the ABS motor relay on to operate the actuator pump motor.
- If the voltage applied to the ABS motor relays (+BM) drops below the condition that detects the DTCs due to the shortage of the battery or alternator output, the DTCs may be memorized.

BC

DTC No.	DTC Detecting Condition	Trouble Area
C0273/13	When any of the following (1 to 2) is detected: (1) All the following conditions continues for at least 0.2 seconds. • IG1 voltage is between 9.5 and 17.2 V. • During initial check. • ABS, BA, TRAC, and VSC are in operation. • Relay contact is open when the relay is ON. (2) All the following conditions continue for at least 0.2 seconds. • IG1 voltage is less than 9.5 V. • Relay contact remains open when the relay is ON.	• ABS No.1 fuse • ABS MTR relay • ABS MTR relay circuit • VSC R/B
C0274/14	The following condition continues for at least 4 seconds. • Relay contact is closed when the relay is OFF.	• ABS No.1 fuse • ABS MTR relay • ABS MTR relay circuit • VSC R/B
C1361/91	All the following conditions continue for at least 4 seconds. • Immediately after turning IG switch to the ON position. • Relay contact is closed when fail-safe relay is OFF.	• ABS No.1 fuse • VSC R/B • ABS cut relay • ABS cut relay circuit

WIRING DIAGRAM



BC

HINT:
Start the inspection from step 1 when using the intelligent tester and start from step 2 when not using the intelligent tester.

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (ABS MOTOR RELAY OPERATION)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select the ACTIVE TEST mode on the intelligent tester.
(d) Check the operation sound of the ABS motor individually when operating it with the intelligent tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
ABS MOT RELAY	ABS motor relay / ON or OFF	Operation of motor (clicking sound) can be heard

OK:

The operation sound of the ABS motor should be heard.

NOTICE:

When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

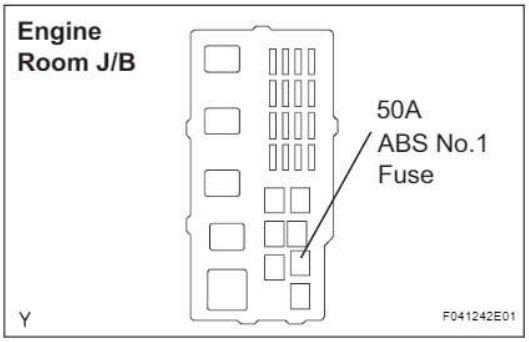
NG → Go to step 2

OK →

REPLACE ABS AND TRACTION ACTUATOR

BC

2 INSPECT ABS NO.1 FUSE



(a) Remove the ABS No.1 fuse from engine room J/B.
(b) Measure the resistance according to the value(s) in the table below.

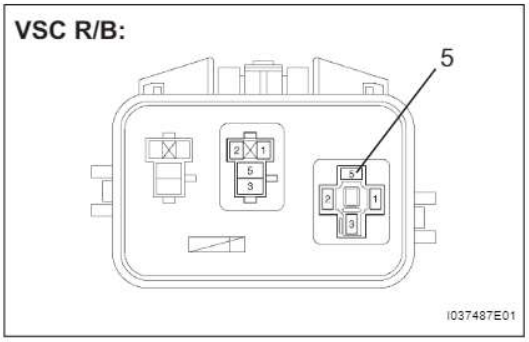
Resistance

Item	Specified condition
ABS No.1 fuse	Below 1 Ω (Continuity)

NG → **CHECK FOR SHORT IN ALL HARNESS AND CONNECTOR CONNECTED TO FUSE AND REPLACE FUSE**

OK →

3 CHECK TERMINAL VOLTAGE (ABS MOTOR RELAY 5 TERMINAL OF VSC R/B)



(a) Remove the ABS MTR relay from the VSC R/B.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage according to the value(s) in the table below.

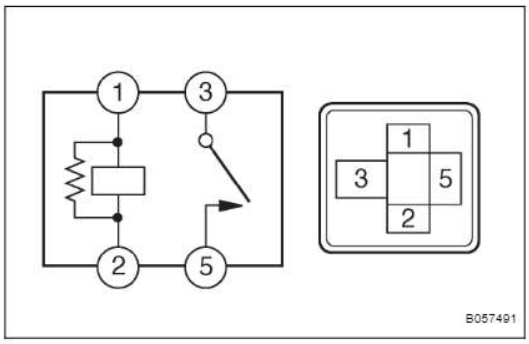
Voltage

Tester Connection	Specified Condition
Terminals 5 - Body ground	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK →

4 INSPECT ABS MOTOR RELAY



(a) Measure the resistance according to the value(s) in the table below.

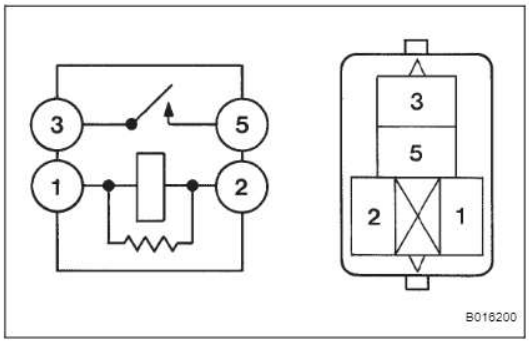
Resistance

Tester Connection	Connection	Specified resistance
3 - 5	Always	10 kΩ or higher (No continuity)
3 - 5	Apply B+ between terminal 1 and 2	Below 1 Ω

NG → REPLACE ABS MOTOR RELAY

OK

5 INSPECT SKID CONTROL RELAY



(a) Measure the resistance according to the value(s) in the table below.

Resistance

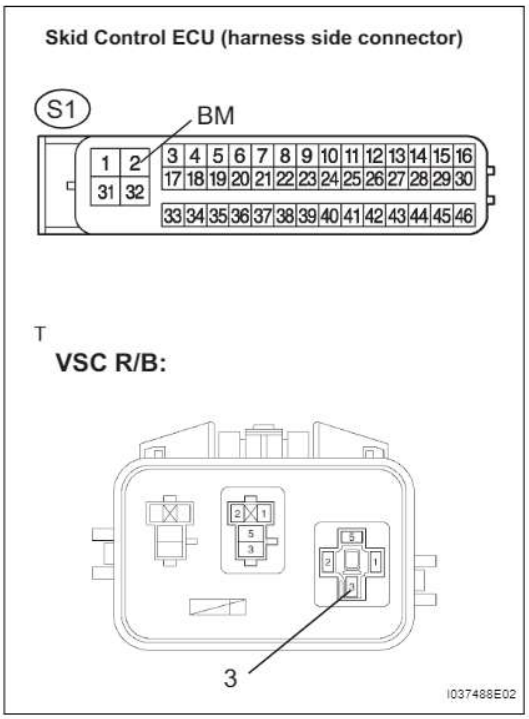
Tester Connection	Connection	Specified resistance
3 - 5	Always	10 kΩ or higher (No continuity)
3 - 5	Apply B+ between terminal 1 and 2	Below 1 Ω

NG → REPLACE SKID CONTROL RELAY

OK

BC

6 CHECK HARNESS AND CONNECTOR (ABS MOTOR RELAY - SKID CONTROL ECU)



(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.
Resistance

Tester Connection	Specified Condition
S1-2 (BM) - 3 (VSC R/B)	Below 1 Ω

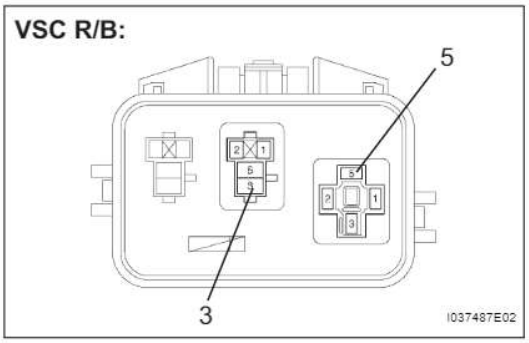
(c) Measure the resistance according to the value(s) in the table below.
Resistance

Tester Connection	Specified Condition
S1-2 (BM) - Body ground	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

7 CHECK HARNESS AND CONNECTOR (ABS MOTOR RELAY - SKID CONTROL RELAY)



(a) Remove the ABS motor relay and skid control relay from VSC R/B.
(b) Measure the resistance according to the value(s) in the table below.
Resistance

Tester Connection	Specified Condition
5 (ABS MOTOR Relay) - 3 (Skid Control Relay)	Below 1 Ω

NOTICE:
When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ABS AND TRACTION ACTUATOR

DTC	C0278/11	Open in ABS Solenoid Relay Circuit

DTC	C0279/12	Short to B+ in ABS Solenoid Relay Circuit

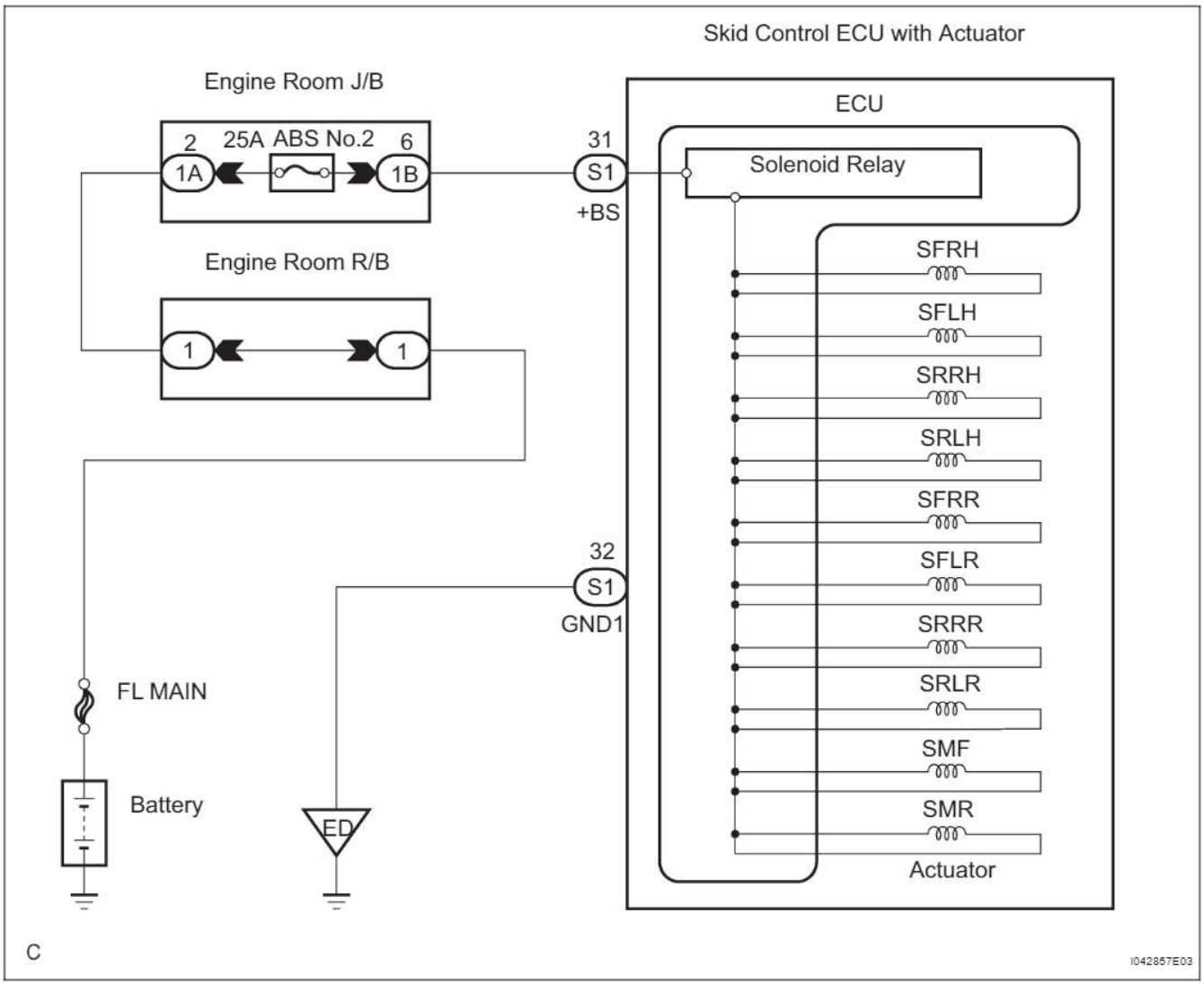
DESCRIPTION

The ABS solenoid relay is built in the ABS & TRACTION Actuator assembly. This relay supplies power to each ABS solenoid. If the initial check is OK, after the ignition switch is turned to the ON position, the relay goes on.

DTC No.	DTC Detecting Condition	Trouble Area
C0278/11	When any of the following (1 to 2) is detected: (1) All the following conditions continue for at least 0.2 seconds. • IG voltage is between 9.5 and 17.2 V. • Relay contact is open when the relay is ON. (2) All the following conditions continue for at least 0.2 seconds. • IG voltage is 9.5 V or less when the relay is ON. • Relay contact remains open.	• ABS No.2 fuse • ABS SOL relay • ABS SOL relay circuit • ABS & TRAC actuator
C0279/12	The following condition continue for at least 0.2 seconds. • Relay contact is closed immediately after turning IG switch to the ON position when the relay is OFF.	• ABS No.2 fuse • ABS SOL relay • ABS SOL relay circuit • ABS & TRAC actuator

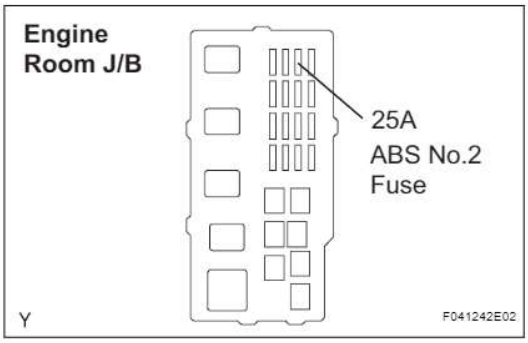
BC

WIRING DIAGRAM



BC

1	INSPECT ABS NO.2 FUSE



(a) Remove the ABS No.2 fuse from the engine room J/B.
(b) Measure the resistance according to the value(s) in the table below.

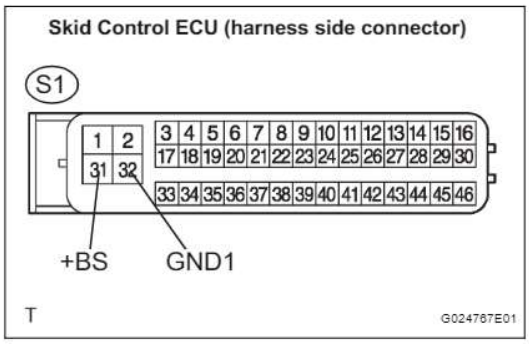
Resistance

Item	Specified condition
ABS No.2 fuse	Below 1 Ω (Continuity)

NG → **CHECK FOR SHORT IN ALL HARNESS AND CONNECTOR CONNECTED FUSE AND REPLACE FUSE**

OK

2 INSPECT SKID CONTROL ECU CONNECTOR (+BS TERMINAL VOLTAGE)



(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage according to the value(s) in the table below.

Voltage

Tester Connection	Specified Condition
S1-31 (+BS) - S1-32 (GND1)	10 to 14 V

NG → **Go to step 4**

OK

3 RECONFIRM DTC

HINT:
This code is detected when a problem is determined in the ABS & TRACTION actuator assembly.
The ABS solenoid relay is in the ABS & TRACTION actuator assembly.
Therefore, solenoid relay circuit inspection relay unit inspection cannot be performed. Be sure to check if the DTC code is output before replacing the ABS & TRACTION actuator assembly.

(a) Clear the DTCs (See page BC-82).
(b) Turn the ignition switch to the ON position.
(c) Are the same DTCs recorded?

Result

Result	Proceed to
Yes	A
No	B

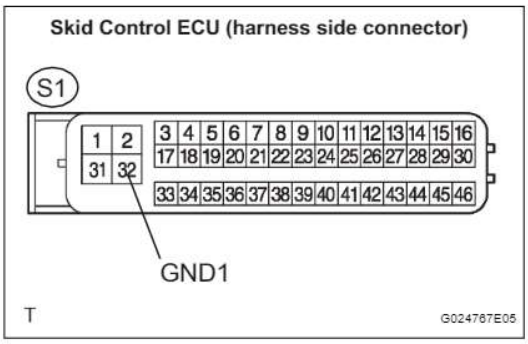
NOTICE:
When replacing ABS & TRACTION ACTUATOR ASSEMBLY, perform zero point calibration (See page BC-76).

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE**

A

REPLACE ABS AND TRACTION ACTUATOR

4	INSPECT SKID CONTROL ECU CONNECTOR (GND TERMINAL CONTINUITY)



(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S1-32 (GND1) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

BC

5	RECONFIRM DTC

HINT:
This code is detected when a problem is determined in the ABS & TRACTION actuator assembly.
The ABS solenoid relay is in the ABS & TRACTION actuator assembly.
Therefore, solenoid relay circuit inspection and relay unit inspection cannot be performed. Be sure to check if the DTC code is output before replacing the ABS & TRACTION actuator assembly.
(a) Clear the DTCs (See page BC-82).
(b) Turn the ignition switch to the ON position.
(c) Are the same DTCs recorded?

Result

Result	Proceed to
Yes	A
No	B

HINT:
It is suspected that the DTCs output was caused by the poor connection of the connector terminal.
NOTICE:
When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE**

A

REPLACE ABS AND TRACTION ACTUATOR

DTC	C1201/51	Engine Control System Malfunction

DESCRIPTION

If trouble occurs the engine control system, the ECM transmits the abnormality to the skid control ECU. The skid control ECU set this DTC and the skid control ECU prohibits TRAC and VSC control.

DTC No.	DTC Detecting Condition	Trouble Area
C1201/51	At the engine speed of 500 rpm, a trouble signal in the engine control system continues for 5 secs. or more.	Engine control system

1	CHECK DTC FOR ENGINE

(a) Check if the normal code is recorded for EFI system.

Result

Result	Proceed to
Normal System Code	A
Trouble Code	B

BC

B → REPAIR ENGINE CONTROL SYSTEM ACCORDING TO DTC OUTPUT

A

REPLACE ECM

DTC	C1203/53	ECM Communication Circuit Malfunction

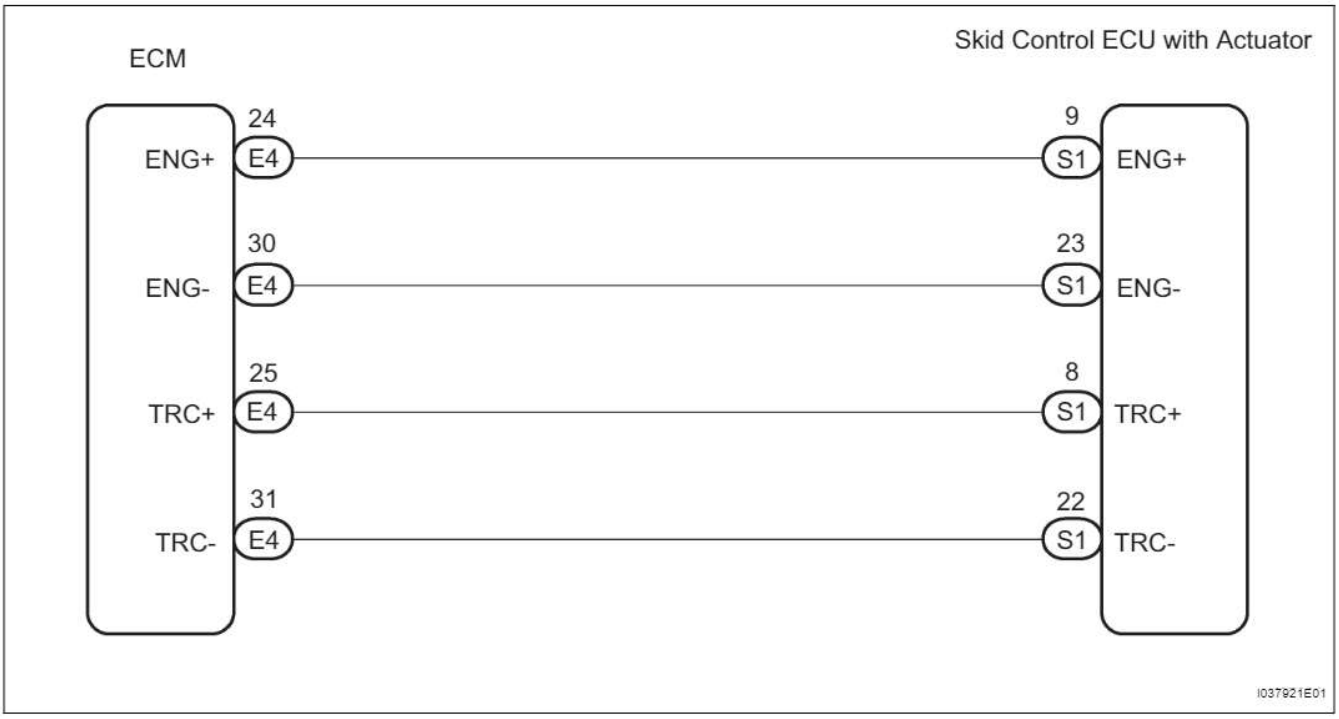
DESCRIPTION

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

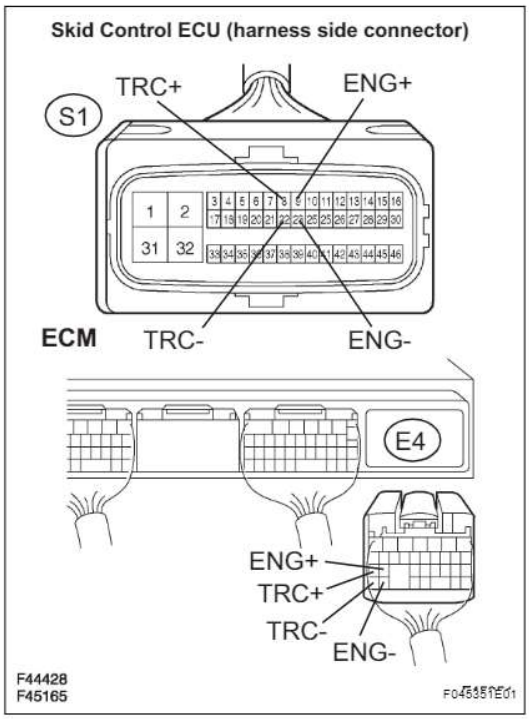
DTC No.	DTC Detecting Condition	Trouble Area
C1203/53	When any of the following (1 to 3) is detected: (1) All the following conditions continue for at least 5 seconds. • IG1 terminal voltage is 9.5 V or more. • Cannot send data to ECM. (2) All the following conditions continue for at least 5 seconds. • IG1 terminal voltage is more than 9.5 V. • Engine speed is 500 rpm or more. • Cannot receive data from ECM. (3) All the following conditions repeat 10 times in a series. • Cannot send data to ECM. • Cannot receive data from ECM. • Both of the above occur at least once within 5 seconds.	• TRC+ or TRC- circuit • ENG+ or ENG- circuit • ECM

BC

WIRING DIAGRAM



1 CHECK HARNESS AND CONNECTOR (ECM - SKID CONTROL ECU)



(a) Disconnect the skid control ECU connector and ECM connector.

(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S1-8 (TRC+) - E4-25 (TRC+)	Below 1 Ω
S1-22 (TRC-) - E4-31 (TRC-)	Below 1 Ω
S1-9 (ENG+) - E4-24 (ENG+)	Below 1 Ω
S1-23 (ENG-) - E4-30 (ENG-)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

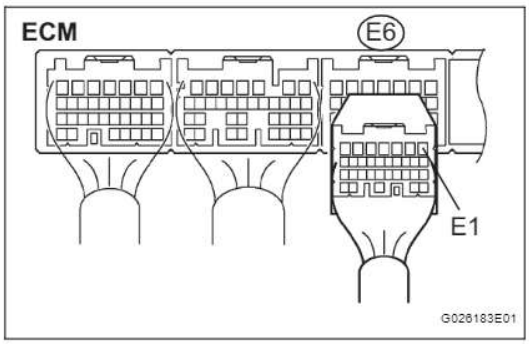
Resistance

Tester Connection	Specified Condition
S1-8 (TRC+) - Body ground	10 kΩ or higher
S1-22 (TRC-) - Body ground	10 kΩ or higher
S1-9 (ENG+) - Body ground	10 kΩ or higher
S1-23 (ENG-) - Body ground	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

2 CHECK HARNESS AND CONNECTOR (E1 OF ECM - BODY GROUND)



(a) Disconnect the ECM connector.

(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
E6-1 (E1) - Body ground	Below 1 Ω

NOTICE:
When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ABS AND TRACTION ACTUATOR

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

DTC	C1336/39	Zero Point Calibration of Deceleration Sensor Undone

DESCRIPTION

ABS & TRACTION actuator receives signals from the yaw rate sensor (deceleration sensor) via CAN communication system.
Yaw rate sensor has the built-in deceleration sensor.
If there is trouble in the bus lines between the yaw rate sensor (deceleration sensor) and CAN communication system, the DTC U0123/62 (yaw rate sensor communication trouble) and U0124/95 (G sensor communication trouble) are output.
The DTC is also output when the calibration has not been completed.

BC

DTC No.	DTC Detecting Condition	Trouble Area
C1210/36	Zero point calibration of yaw rate sensor undone	• Yaw rate sensor (Deceleration sensor) • Zero point calibration undone (Perform zero point calibration and DTC. If DTC is not output again, the sensor is normal)
C1336/39	When any of the following (1 to 2) is detected: (1) Drives in normal mode before completing zero point calibration. (2) Zero point voltage is not within 2.38 V and 2.62 V at zero point calibration.	• Yaw rate sensor (Deceleration sensor) • Zero point calibration undone (Perform zero point calibration and DTC. If DTC is not output again, the sensor is normal)

HINT:
When U0121/94, U0123/62, U0124/95 or U0126/63 are output accompanied with C1210/36 or C1336/39, inspect and repair the trouble areas indicated by U0121/94, U0123/62, U0124/95 or U0126/63 first.

1	PERFORM ZERO POINT CALIBRATION OF YAW RATE SENSOR AND DECELERATION SENSOR

(a) Perform the zero point calibration of the yaw rate sensor and deceleration sensor (See page BC-76).

NEXT

2	RECONFIRM DTC

(a) Clear the DTCs (See page BC-82).
(b) Turn the ignition switch to the ON position.
(c) Are the same DTCs recorded (See page BC-82)?
Result

Result	Proceed to
Yes	A
No	B

B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE

A

3	CHECK SENSOR INSTALLATION

(a) Check that the yaw rate sensor has been installed properly (See page BC-191).

NOTICE:
When replacing the yaw rate sensor, perform zero point calibration (See page BC-76).

NG → INSTALL YAW RATE SENSOR CORRECTLY

OK

REPLACE YAW RATE SENSOR

DTC	C1223/43	ABS Control System Malfunction

HINT:
- This DTC is output when the VSC system detects a malfunction in the ABS system.
- When DTC C1223/43 is memorized, there is no malfunction in the skid control ECU.

DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1223/43	Malfunction in ABS control system	ABS control system

1	CHECK DTC (FOR ABS SYSTEM)

BC

(a) Clear the DTCs (See page BC-82).
(b) Turn the ignition switch to the ON position.
(c) Are the same DTCs recorded (See page BC-82)?
Result

Result	Proceed to
Yes	A
No	B

B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN ON PROBLEM SYMPTOMS TABLE

A → REPAIR CIRCUIT INDICATED BY OUTPUT DTC

DTC	C1224/44	NE Signal Circuit

DESCRIPTION

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

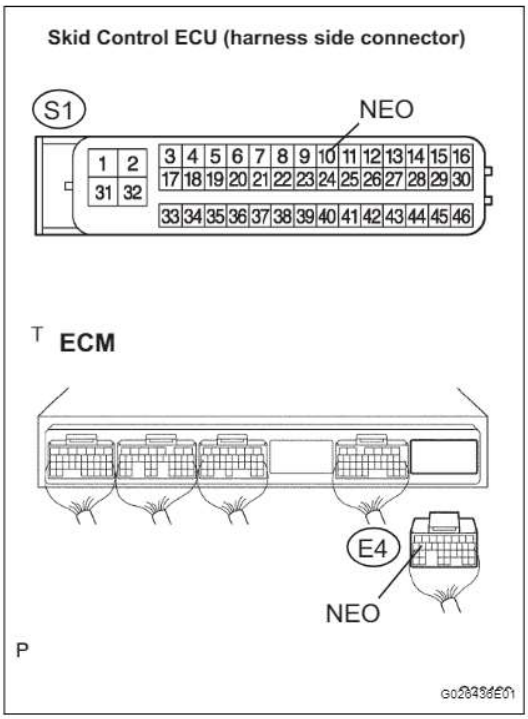
DTC No.	DTC Detecting Condition	Trouble Area
C1224/44	When any of the following (1 to 2) is detected: (1) All the following conditions continue for at least 10 seconds. • Data can be received properly from ECM at a speed of more than 19 mph (30 km/h). • Open or short in engine rpm signal circuit. (2) All the following conditions continue for at least 0.24 seconds. • TRAC is in operation. • Open or short in engine rpm signal circuit.	• NEO circuit • ECM • Skid control ECU

WIRING DIAGRAM

BC



1 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - ECM)



(a) Disconnect the skid control ECU connector and the ECM connector.

(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S1-10 (NEO) - E4-17 (NEO)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

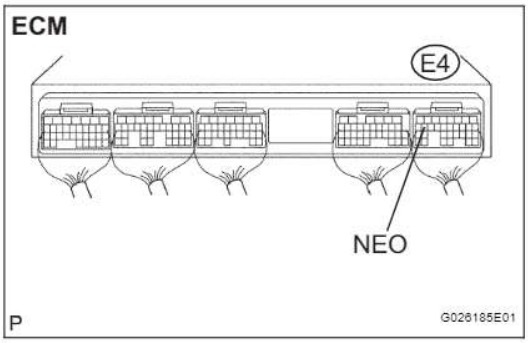
Resistance

Tester Connection	Specified Condition
S1-10 (NEO) - Body ground	10 kΩ or higher

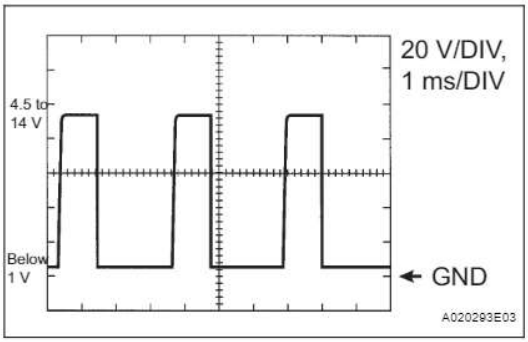
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2 INSPECT ECM TERMINAL VOLTAGE (NEO TERMINAL)



(a) Reconnect the ECM connector and the skid control ECU connector.



(b) Check the signal waveform between terminal NEO (E4-17) of the ECM and body ground for the engine conditions below.

OK

Tester Connection	Engine Condition	Specified condition
E4-17 (NEO) - Body ground	OFF (Ignition switch ON)	4.5 to 14 V or below 1 V
E4-17 (NEO) - Body ground	ON (Idling)	Pulse generation (4.5 to 14 V ⟷ below 1 V)

NG → **REPLACE ECM**

OK

3	INSPECT SKID CONTROL ECU CONNECTOR

(a) Check if the connector is connected.
OK:
The connector should be securely connected.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

4	RECONFIRM DTC

(a) Clear the DTCs (See page BC-82).
(b) Turn the ignition switch to the ON position.
(c) Are the same DTCs recorded?
Result

Result	Proceed to
Yes	A
No	B

NOTICE:
When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

A

REPLACE ABS AND TRACTION ACTUATOR

BC

DTC	C1231/31	Steering Angle Sensor Circuit Malfunction

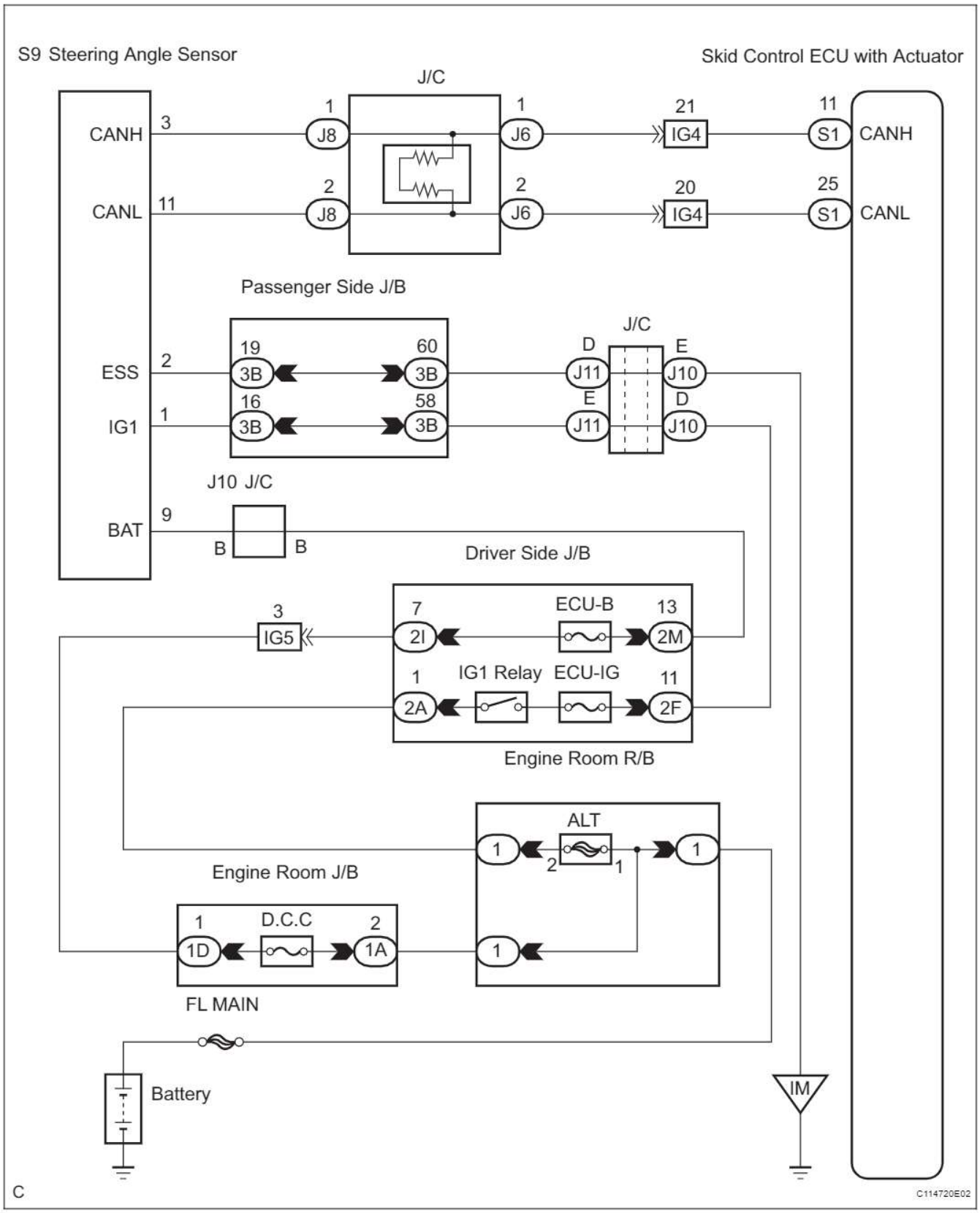
DESCRIPTION

The steering angle sensor signal is sent to the skid control ECU through the CAN communication system. When there is a malfunction in the communication, it will be detected by the diagnosis function.

DTC No.	DTC Detecting Condition	Trouble Area
C1231/31	When ECU IG1 terminal voltage is 9.5 V or more, the steering angle sensor malfunction signal is received.	• Steering angle sensor • Steering angle sensor circuit • CAN communication system

BC

WIRING DIAGRAM

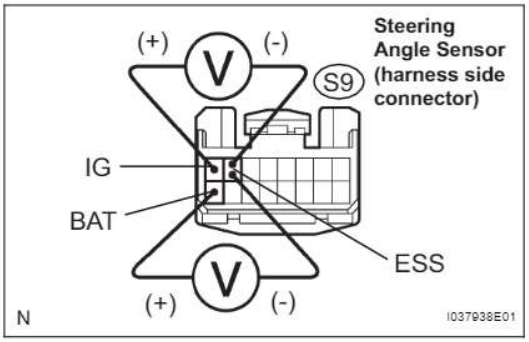


HINT:

- When U0121/94, U0123/62, U0124/95 or U0126/63 are output together with C1231/31, inspect and repair the trouble areas indicated by U0121/94, U0123/62, U0124/95 or U0126/63 first.

- When the speed sensor or the yaw rate sensor has trouble, DTCs for the steering angle sensor may be output even when the steering angle sensor is normal. When DTCs for the speed sensor (C0200/31, C0205/32, C0210/33, C0215/34, C1235/35, C1236/36, C1238/38, C1239/39) or yaw rate and deceleration sensor (C1232/32, C1234/34, C1243/43, C1244/44, C1245/45, C1381/81) are output together with other DTCs for the steering angle sensor, inspect and repair the speed sensor and yaw rate sensor first, and then inspect and repair the steering angle sensor.

1 CHECK TERMINAL VOLTAGE (STEERING ANGLE SENSOR CONNECTOR)



(a) Remove the steering wheel and the column lower cover.
(b) Disconnect the steering angle sensor connector.
(c) Turn the ignition switch to the ON position.
(d) Measure the voltage according to the value(s) in the table below.

Voltage

Tester Connection	Specified Condition
S9-1 (IG) - S9-2 (ESS)	10 to 14 V

(e) Measure the voltage according to the value(s) in the table below.

Voltage

Tester Connection	Specified Condition
S9-9 (BAT) - S9-2 (ESS)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE STEERING ANGLE SENSOR

DTC	C1232/32	Acceleration Sensor Stuck Malfunction
DTC	C1234/34	Yaw Rate Sensor Malfunction
DTC	C1243/43	Acceleration Sensor Stuck Malfunction
DTC	C1244/44	Open or Short in Deceleration Sensor Circuit
DTC	C1245/45	Acceleration Sensor Output Malfunction
DTC	C1381/97	Yaw Rate and / or Acceleration Sensor Power Supply Voltage Malfunction

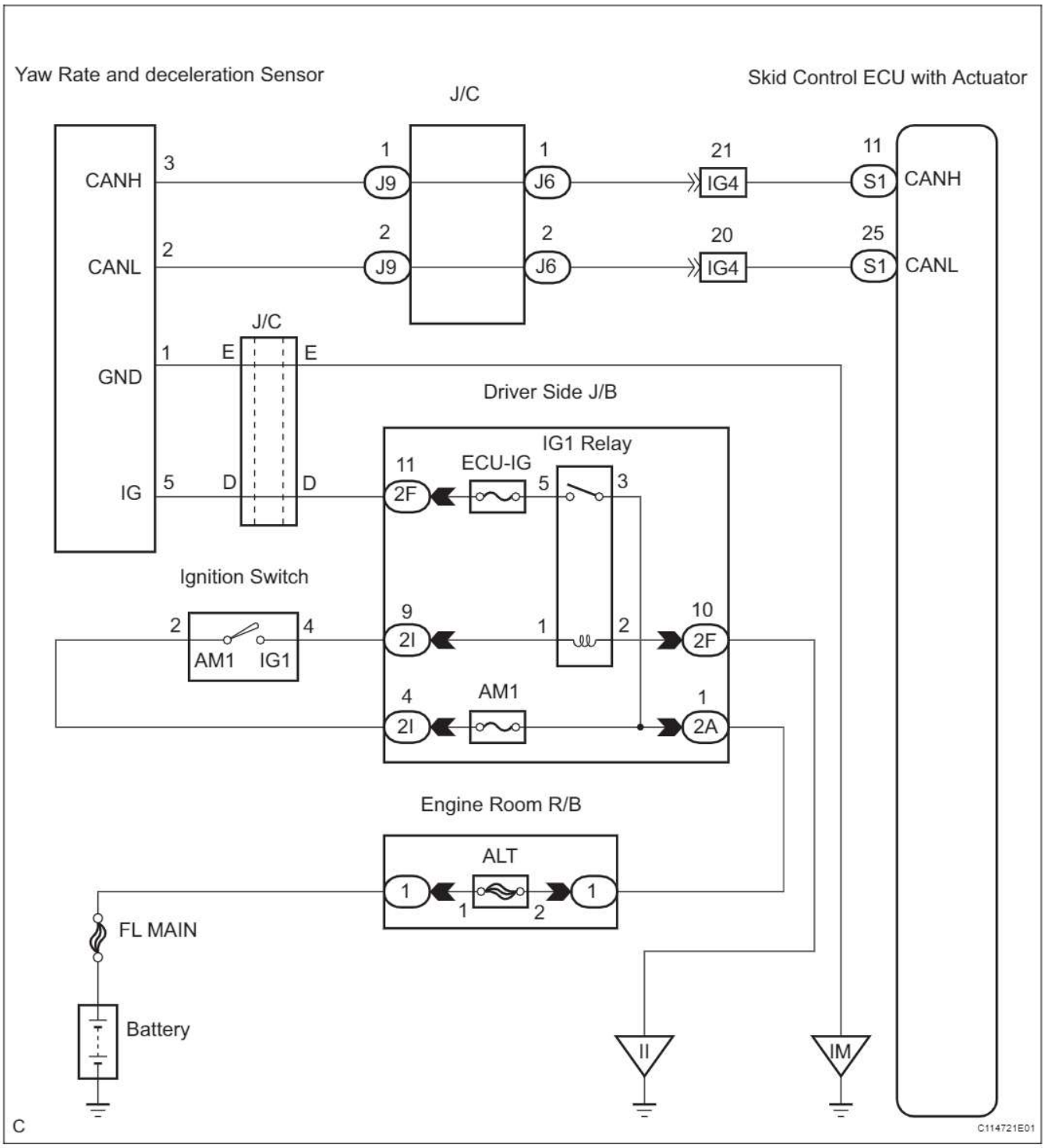
BC

DESCRIPTION

The yaw rate and deceleration sensor detect any gravity applied to the vehicle and transmits the signal to the skid control ECU via CAN communication.

DTC No.	DTC Detecting Condition	Trouble Area
C1232/32	While the vehicle is at a speed of 6 mph (10 km/h) or more, the condition that the fluctuation range of the signal from either GL1 or GL2 is under 80 mV and the other is above 1.9 V continues for 30 seconds or more.	• Yaw rate (deceleration) sensor • Yaw rate (deceleration) sensor circuit • CAN communication circuit
C1234/34	Sensor malfunction signal is received from yaw rate sensor.	• Yaw rate (deceleration) sensor • Yaw rate (deceleration) sensor circuit • CAN communication circuit
C1243/43	The following condition repeats 16 times. • GL1 and GL2 do not change by more than 2LSB when the vehicle decelerates from 19 mph (30 km/h) to 0 mph (0 km/h).	• Yaw rate (deceleration) sensor • Yaw rate (deceleration) sensor circuit • CAN communication circuit
C1244/44	When any of the following (1 to 2) is detected: (1) All the following conditions continue for at least 60 seconds. • Vehicle is stopped. • Difference between GL1 and GL2 does not drop below 0.4 G once it reaches 0.6 G or more. (2) Data malfunction signal is received from G sensor.	• Yaw rate (deceleration) sensor • Yaw rate (deceleration) sensor circuit • CAN communication circuit
C1245/45	The following condition continue for at least 60 seconds. • Difference between the values calculated from G sensor value and vehicle speed exceeds 0.35 G.	• Yaw rate (deceleration) sensor • Yaw rate (deceleration) sensor circuit • CAN communication circuit
C1381/97	• G sensor power source malfunction signal is received for at least 10 sec. at a speed of more than 2 mph (3 km/h).	• Yaw rate (deceleration) sensor • Yaw rate (deceleration) sensor circuit • CAN communication circuit

WIRING DIAGRAM



HINT:
When U0121/94, U0123/62, U0124/95 or U0126/63 are output together with C1232/32 or C1334/34, inspect and repair the trouble areas indicated by U0121/94, U0123/62, U0124/95 or U0126/63 first.

1	CHECK SENSOR INSTALLATION (YAW RATE SENSOR)

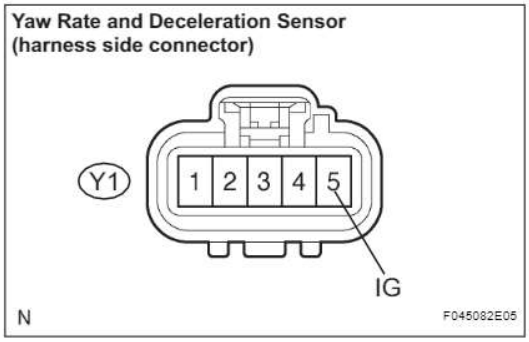
(a) Check that the yaw rate and deceleration sensor has been installed properly (See page BC-191).

OK:
The sensor should be tightened to the specified torque.
The sensor should not be tilted.

NG → **INSTALL YAW RATE SENSOR CORRECTLY**

OK

2 CHECK HARNESS AND CONNECTOR (IG TERMINAL)



(a) Disconnect the yaw rate and deceleration sensor connector.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage according to the value(s) in the table below.

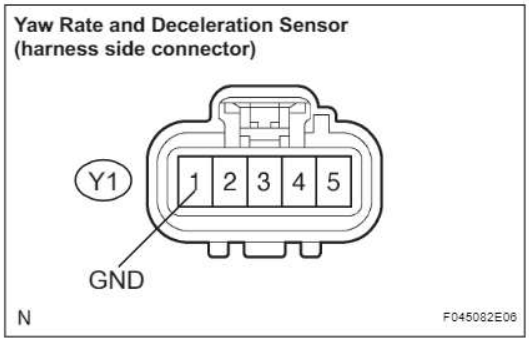
Voltage

Tester Connection	Specified Condition
Y1-5 (IG) - Body ground	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 CHECK HARNESS AND CONNECTOR (GND TERMINAL)



(a) Disconnect the yaw rate and deceleration sensor connector.
(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
Y1-1 (GND) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 CHECK DTC (C1210/36, C1336/39)

(a) Check DTCs (C1210/36, C1336/39)

Result

Result	Proceed to
C1210/36,C1339/39 are output	A
C1210/36,C1339/39 are not output	B

NOTICE:
When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

NOTICE:
When replacing the yaw rate sensor assembly, perform zero point calibration (See page BC-76).

B → REPLACE ABS AND TRACTION ACTUATOR

A

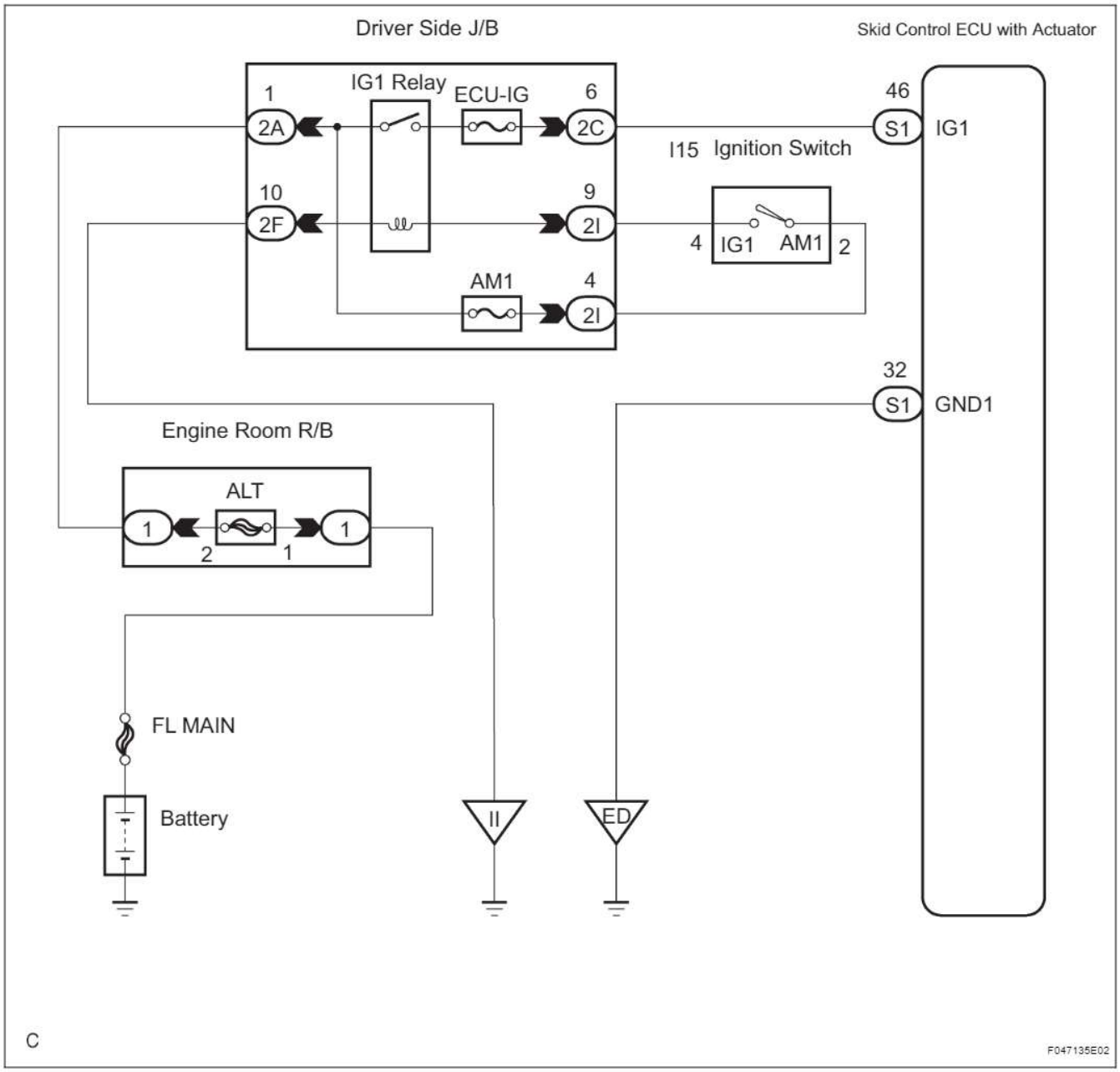
REPLACE YAW RATE SENSOR ASSEMBLY

DTC	C1241/41	Low Battery Positive Voltage

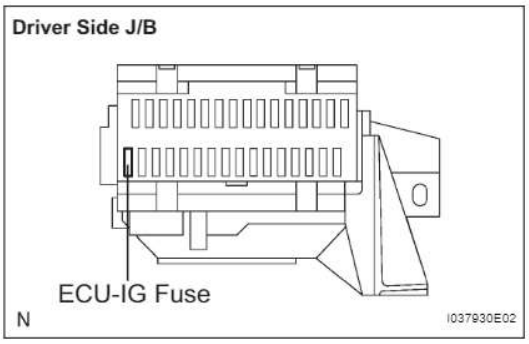
DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1241/41	When any of the following (1 to 2) is detected: (1) All the following conditions continue for at least 10 seconds. • Vehicle speed is more than 2 mph (3 km/h). • IG1 terminal voltage is less than 9.5 V. (2) All the following conditions continue for at least 0.2 seconds. • Solenoid relay remains ON. • IG1 terminal voltage is less than 9.5 V. • Relay contact is open.	• Battery • Charging system • Power source circuit

WIRING DIAGRAM



1 INSPECT ECU-IG FUSE



(a) Remove the ECU-IG fuse from the driver side J/B.
(b) Check continuity of the ECU-IG fuse.
Resistance

Item	Specified condition
ECU-IG Fuse	Below 1 Ω (Continuity)

NG → **INSPECT FOR SHORT CIRCUIT IN ALL HARNESS AND COMPONENTS CONNECTED TO ECU-IG FUSE**

OK

2 INSPECT BATTERY

(a) Check the positive battery voltage.
Voltage:
11 to 14 V

NG → **INSPECT CHARGING SYSTEM**

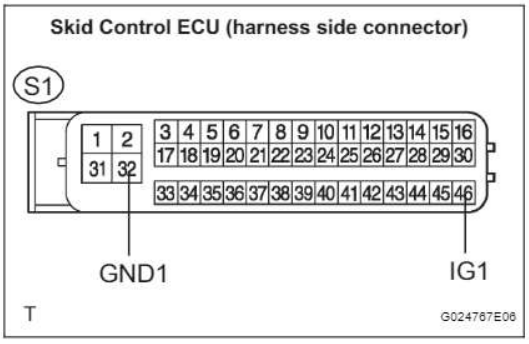
OK

3 INSPECT SKID CONTROL ECU TERMINAL VOLTAGE (IG1 TERMINAL)

(a) WHEN USING INTELLIGENT TESTER:
(1) Connect the intelligent tester to the DLC3.
(2) Start the engine.
(3) Select the DATA LIST mode on the intelligent tester.
(4) Measure the voltage condition output from the ECU displayed on the intelligent tester.

Item	Measurement Item / Range (Display)	Normal Condition
IG VOLTAGE	ECU power supply voltage / UNDER / NORMAL	NORMAL: 9.5 V or over UNDER: Below 9.5 V

OK:
"Normal" is displayed.



(b) WHEN NOT USING INTELLIGENT TESTER:
(1) Disconnect the skid control ECU connector S1.
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage according to the value(s) in the table below.
Voltage

Tester Connection	Specified Condition
S1-46 (IG1) - S1-32 (GND1)	10 to 14 V

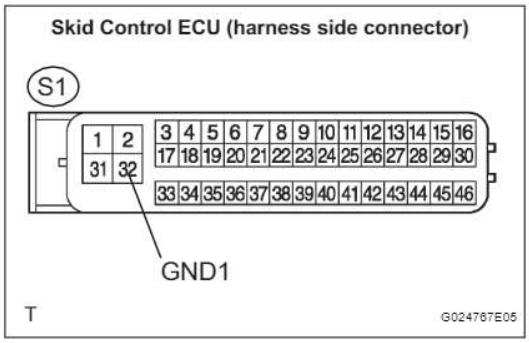
NOTICE:
When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

NG → Go to step 4

OK

REPLACE ABS AND TRACTION ACTUATOR

4 INSPECT SKID CONTROL ECU CONNECTOR (GND TERMINAL CONTINUITY)



(a) Disconnect the skid control ECU connector S1.
(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S1-32 (GND1) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND TERMINAL - BODY GROUND)**

OK

CHECK AND REPAIR HARNESS AND CONNECTOR (IG1 TERMINAL - BATTERY)

BC

CALIBRATION

1. DESCRIPTION

(a) After replacing the VSC relevant components or performing "Front wheel alignment adjustment", clearing and reading the sensor calibration data are necessary.

(b) Follow the chart to perform calibration.

Replacing Parts	Necessary Operation
Skid Control ECU	Yaw rate sensor and deceleration sensor zero point calibration.
Yaw Rate Sensor	1. Clearing zero point calibration data. 2. Yaw rate sensor and deceleration sensor zero point calibration.
Front Wheel Alignment	1. Clearing zero point calibration data. 2. Yaw rate sensor and deceleration sensor zero point calibration.

BC

2. CLEAR ZERO POINT CALIBRATION (USING SST CHECK WIRE)

HINT:

After replacing the yaw rate and deceleration sensor, make sure to clear zero point calibration data in the skid control ECU and perform zero point calibration.

(a) Clear the zero point calibration using the SST check wire.

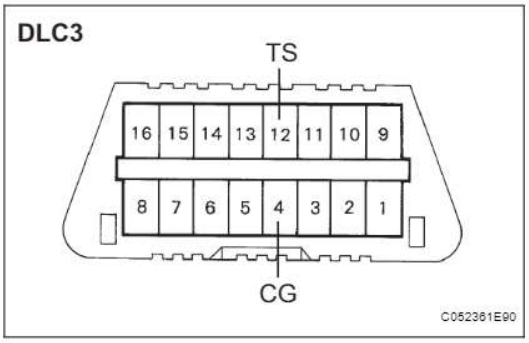
SST 09843-18040

(1) Turn the ignition switch to the ON position.

(2) Using SST, connect and disconnect terminals TS and CG of the DLC3 4 times or more within 8 seconds.

(3) Check that the warning light indicates the normal code.

(4) Remove the SST.



3. PERFORM ZERO POINT CALIBRATION OF YAW RATE SENSOR AND DECELERATION SENSOR (USING SST CHECK WIRE)

HINT:

After replacing the brake actuator assembly, make sure to perform yaw rate sensor and deceleration sensor zero point calibration.

NOTICE:

- **While obtaining the zero point, do not give any vibrate the vehicle by tilting, moving or shaking it and keep it in a stationary condition. (Do not start the engine.)**
- **Be sure to perform this on a level surface (with an inclination less than 1 degrees).**

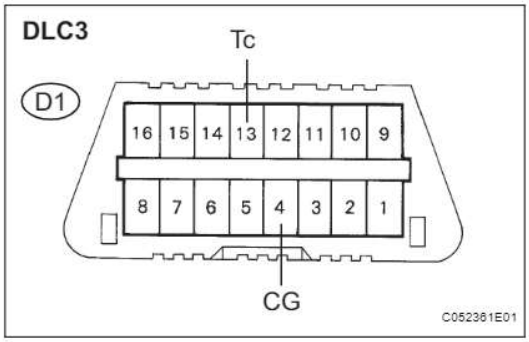
(a) Shift the shift lever to P position.

(b) Clear the zero point calibration.

(c) Procedures for test mode:

(1) Turn the ignition switch to off.

(2) Apply the parking brake is applied (Parking brake switch ON).

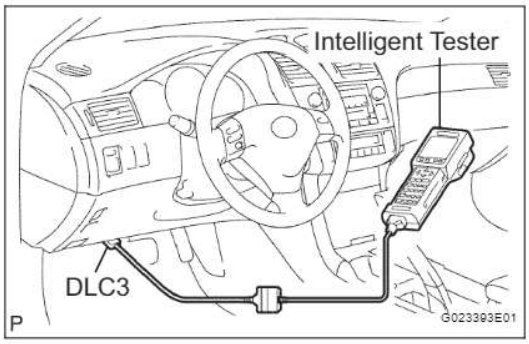


(3) Using SST, it connects terminal TS and CG of the DLC3.
SST 09843-18040
(4) Check that the steering wheel is in the straight-ahead position and move the shift lever to the P position.
(5) Turn the ignition switch to the ON position.

(d) Keep the vehicle in the stationary condition on a level surface for 2 seconds. or more.

(e) Check that the VSC warning light blinks.
HINT:
- If the VSC warning light does not blink, perform the zero point calibration again.
- The zero point calibration is performed only once after the system enters the test mode.
- Calibration cannot be performed again until the stored data is cleared once.

BC



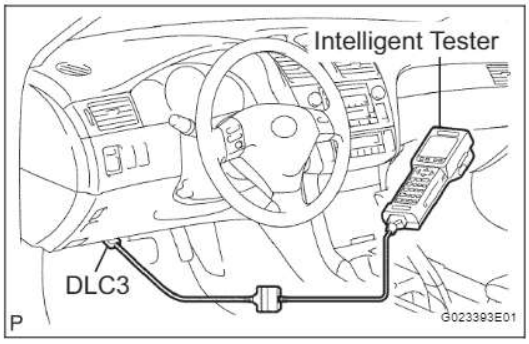
4. CLEAR ZERO POINT CALIBRATION (USING INTELLIGENT TESTER)

(a) Clearing the DTCs.
(1) Connect the intelligent tester to the DLC3.
(2) Turn the ignition switch to the ON position.
(3) Operate the intelligent tester to erase the codes.
HINT:
Refer to the intelligent tester Operator's Manual for further details.

5. PERFORM ZERO POINT CALIBRATION OF YAW RATE SENSOR AND DECELERATION SENSOR (USING INTELLIGENT TESTER)

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 (with an inclination less than 1 degree)**

(a) Check that the steering wheel is in the straight-ahead position and move the shift lever to the P position.



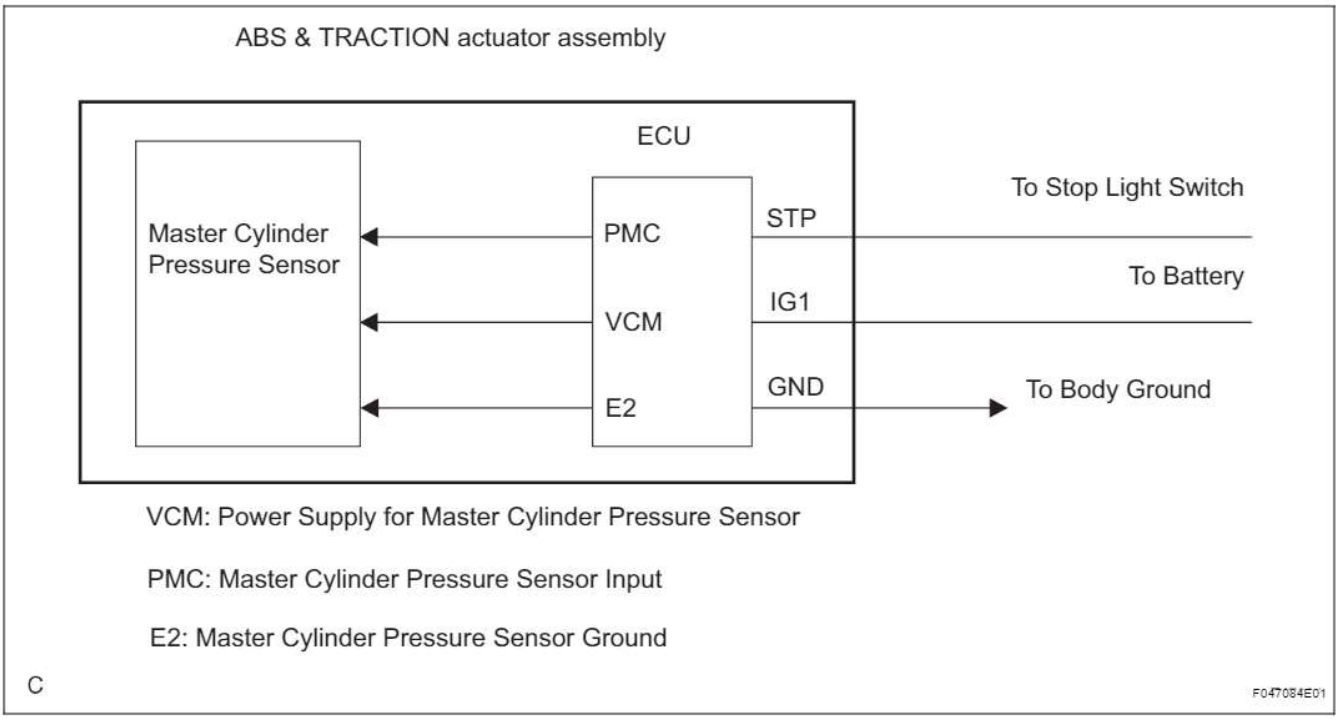
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Operate the intelligent tester to test mode (SIGNAL CHECK).
(e) Obtain the zero point of the yaw rate sensor and deceleration sensor:
(1) Keep the vehicle in the stationary condition on a level surface for 2 seconds. or more.
(2) Check that the VSC warning light blinks.
HINT:
- If the VSC warning light does not blink, perform the zero point calibration again.
- The zero point calibration is performed only once after the system enters the test mode.
- Calibration cannot be performed again until the stored data is cleared once.

(f) Turn the ignition switch off.

DTC	C1246/46	Master Cylinder Pressure Sensor Malfunction

DESCRIPTION

Master cylinder pressure sensor is connected to the skid control ECU in the actuator.



BC

DTC No.	DTC Detecting Condition	Trouble Area
C1246/46	• When the vehicle speed is 4 mph(7 km/h) or more and PMC terminal voltage of skid control ECU exceeds 0.86 V, the condition that the voltage does not change by 0.005 V or more continues for 30 sec. • Noise in terminal PMC of skid control ECU occurs 7 times or more within 5 sec. • When the stop light switch is off, the condition that PMC terminal voltage of skid control ECU is 0.86 V or more, or less than 0.3 V continues for 5 sec. or more. • When IG1 terminal voltage is between 9.5 and 17.2 V, the condition that the VCM terminal voltage of skid control ECU is out of the range from 4.4 to 5.6 V continues for 1.2 sec. or more. • When VCM terminal voltage of skid control ECU is between 4.4 and 5.6 V, the condition that the PMC terminal voltage of skid control ECU is out of the range from 0.14 to 4.85 V continues for 1.2 sec. or more.	• Master cylinder pressure sensor • Master cylinder pressure sensor circuit

HINT:
Start the inspection from step 1 when using the intelligent tester and start from step 2 when not using the intelligent tester.

1	READ VALUE OF INTELLIGENT TESTER (MASTER CYLINDER PRESSURE SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.

(c) Select the DATA LIST mode on the intelligent tester.

Item	Measurement Item / Range (Display)	Normal Condition
MAS CYL PRS 1	Master cylinder pressure sensor 1 reading / min.: 0 V, max.: 5 V	When brake pedal is released : 0.3 to 0.9 V

(d) Check that the brake fluid pressure value of the master cylinder pressure sensor indicated on the intelligent tester, changes when the brake pedal is depressed.

OK:

Brake fluid pressure value should change.

NOTICE:

When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

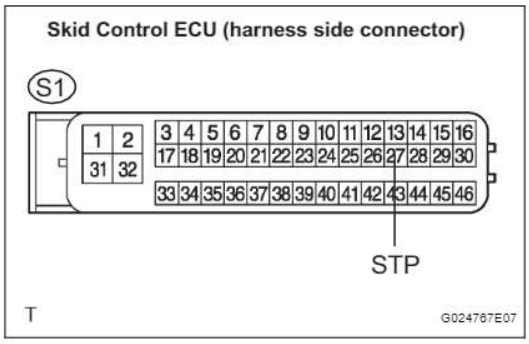
NG → **Go to step 2**

BC

OK →

REPLACE ABS AND TRACTION ACTUATOR

2 INSPECT SKID CONTROL ECU TERMINAL VOLTAGE (STP TERMINAL)



(a) Disconnect the skid control ECU connector.

(b) Measure the voltage according to the value(s) in the table below.

Voltage

Tester Connection	Switch condition	Specified Condition
S1-27 (STP) - Body ground	Brake pedal depressed	8 to 14 V
S1-27 (STP) - Body ground	Brake pedal released	Below 1 V

NOTICE:

When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

NG → **CHECK AND REPLACE STOP LIGHT SWITCH CIRCUIT**

OK →

REPLACE ABS AND TRACTION ACTUATOR

DTC	C1249/49	Open in Stop Light Switch Circuit

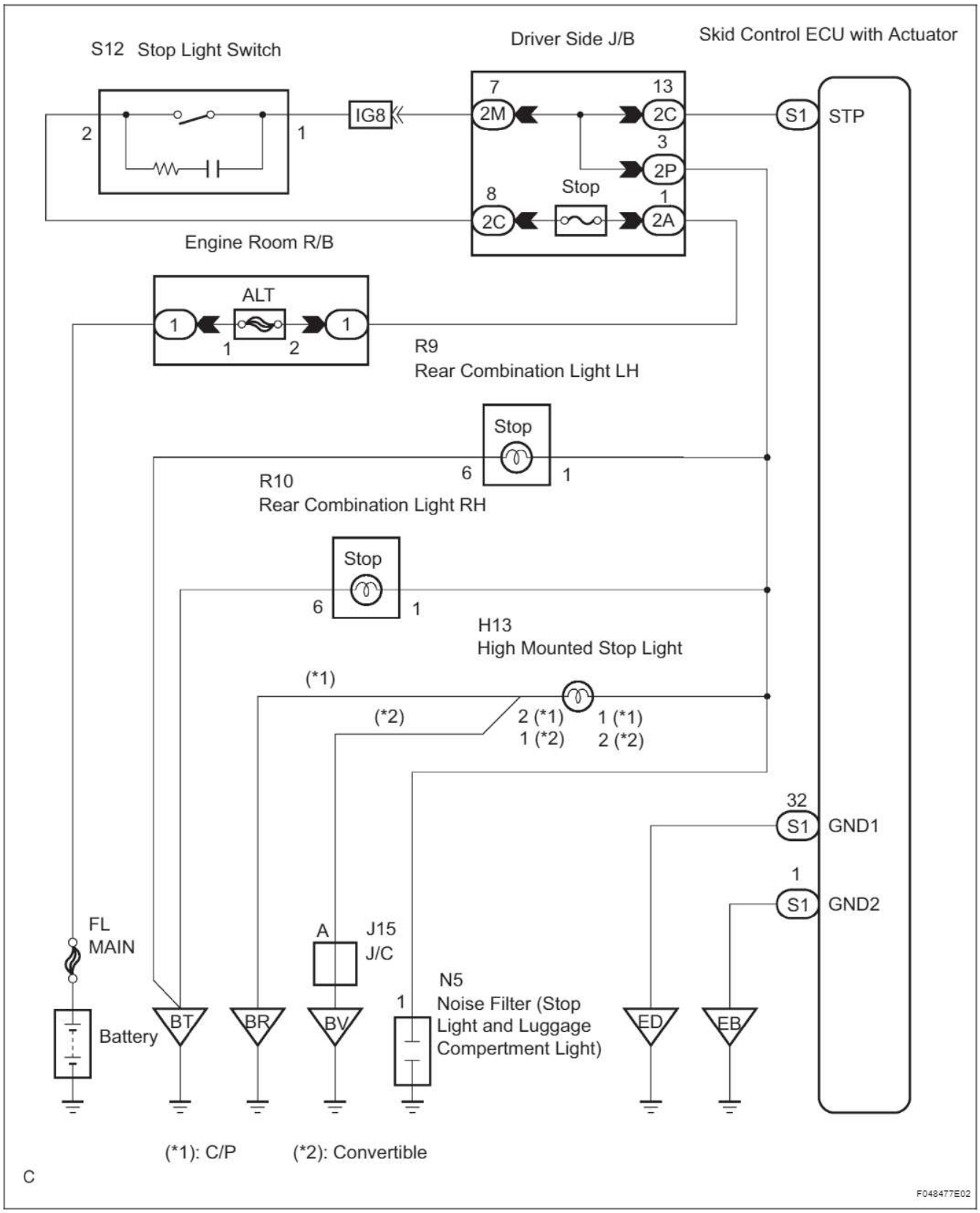
DESCRIPTION

This circuit recognizes brake operation by sending a stop light signal to the skid control ECU.

DTC No.	DTC Detecting Condition	Trouble Area
C1249/49	All the following conditions continue for at least 0.3 seconds. • IG1 terminal voltage is between 9.5 and 17.2 V. • Open in stop light switch circuit.	• Stop light assembly • Stop light switch circuit

BC

WIRING DIAGRAM



1	CHECK STOP LIGHT SWITCH OPERATION

(a) Check that the stop light comes on when the brake pedal is depressed and goes off when the brake pedal is released.

OK

Pedal Condition	Illumination Condition
Brake pedal depressed	ON
Brake pedal released	OFF

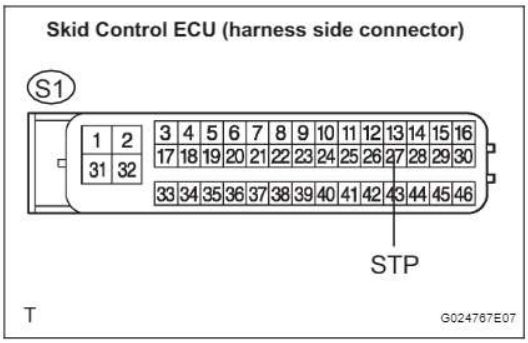
HINT:
Check the stop light bulb as it may have burnt out.

NG → Go to step 4

BC

OK

2	INSPECT SKID CONTROL ECU TERMINAL VOLTAGE (STP TERMINAL)



(a) Disconnect the skid control ECU connector.
(b) Measure the voltage according to the value(s) in the table below.

Voltage

Tester Connection	Switch condition	Specified Condition
S1-27 (STP) - Body ground	Brake pedal depressed	8 to 14 V
S1-27 (STP) - Body ground	Brake pedal released	Below 1 V

NG → Go to step 5

OK

3	RECONFIRM DTC

(a) Clear the DTCs (See page BC-82).
(b) Turn the ignition switch to the ON position.
(c) Are the same DTCs detected?

Result

Result	Proceed to
Yes	A
No	B

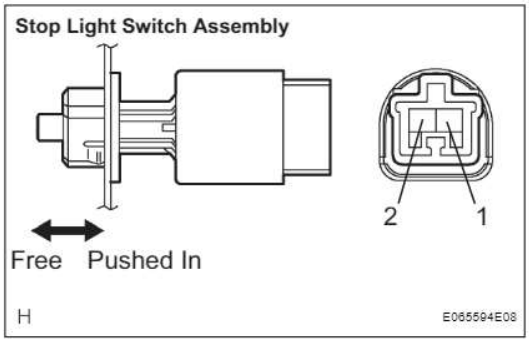
NOTICE:
When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

A

REPLACE ABS AND TRACTION ACTUATOR

4 INSPECT STOP LIGHT SWITCH ASSEMBLY



(a) Disconnect the stop light switch assembly connector.
(b) Measure the resistance according to the value(s) in the table below.

Resistance

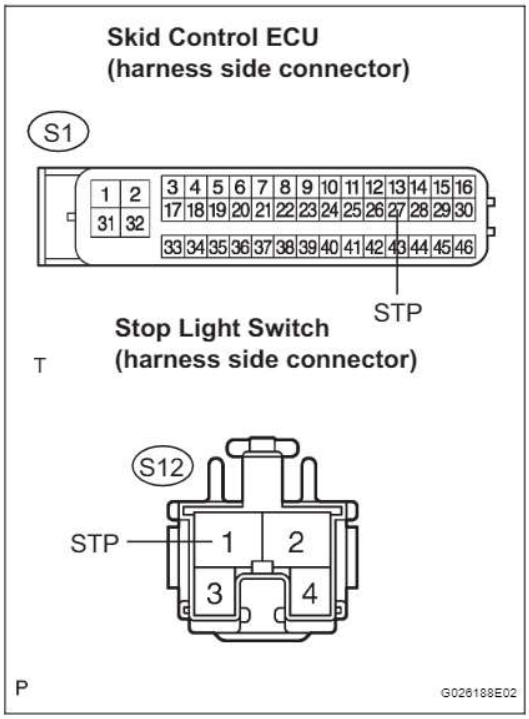
Switch condition	Tester connection	Specified condition
Switch pin free	1 - 2	Below 1 Ω
Switch pin pushed in	1 - 2	10 kΩ or higher

BC

NG → **REPLACE STOP LIGHT SWITCH ASSEMBLY**

OK

5 CHECK HARNESS AND CONNECTOR (STOP LIGHT SWITCH - SKID CONTROL ECU)



(a) Disconnect the stop light switch connector and skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S1-27 (STP) - S12-1 (STP)	Below 1 Ω

NOTICE:
When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ABS AND TRACTION ACTUATOR

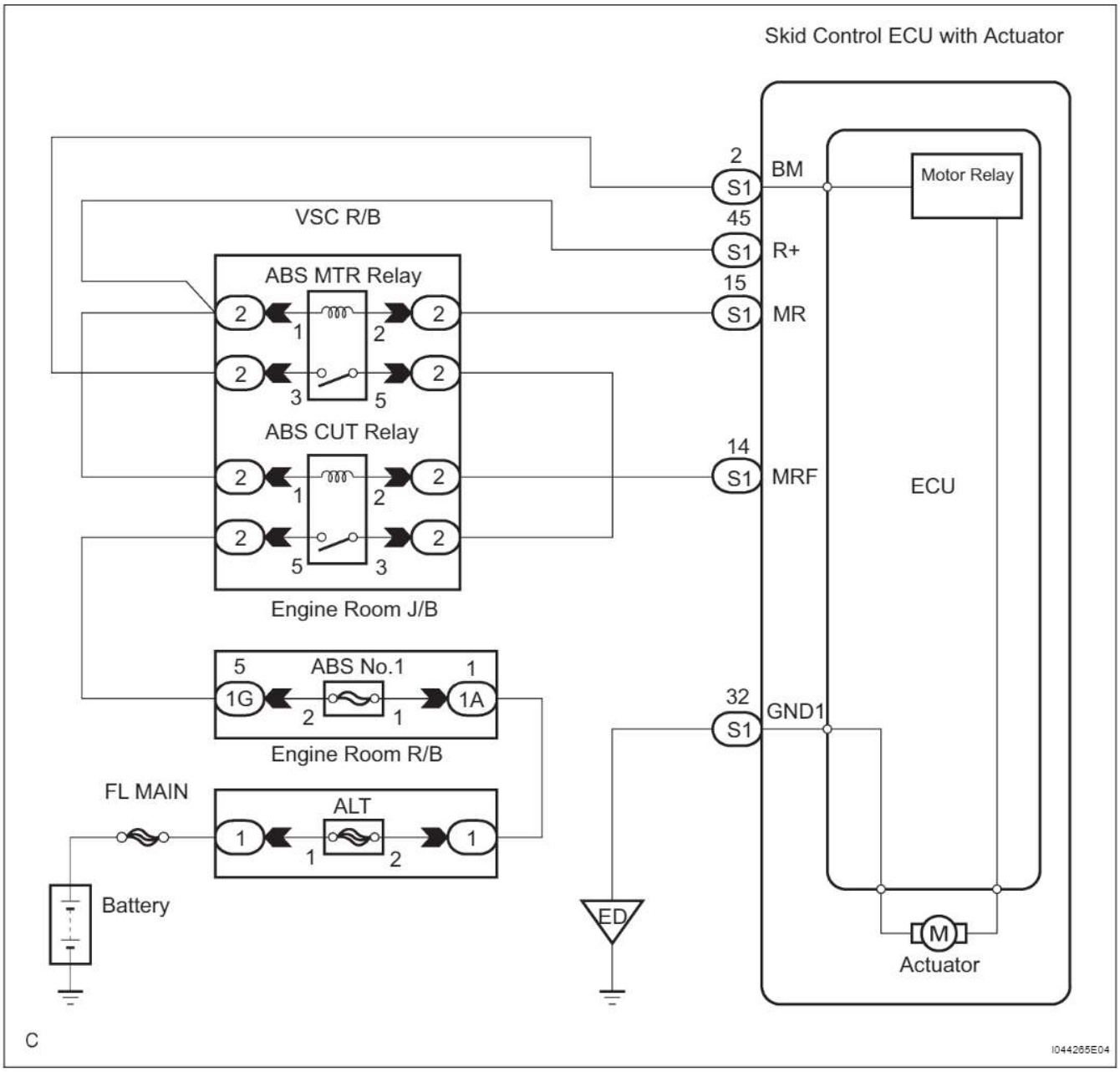
DTC	C1251/51	Open in Pump Motor Circuit

DESCRIPTION

The ABS pump motor is located inside the brake actuator. The motor is used for BA, TRAC and VSC operation.

DTC No.	DTC Detecting Condition	Trouble Area
C1251/51	• Actuator pump motor does not operate properly. • Open in actuator pump motor circuit continues for at least 2 sec.	• ABS & TRAC actuator • ABS & TRAC actuator circuit

WIRING DIAGRAM



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

1 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (ABS MOTOR RELAY OPERATION)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select the ACTIVE TEST mode on the intelligent tester.
(d) Check the operation sound of the ABS motor individually when operating it with the intelligent tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
ABS MOT RELAY	ABS motor relay / ON or OFF	Operation of motor (clicking sound) can be heard

OK:
The operation sound of the ABS motor should be heard.

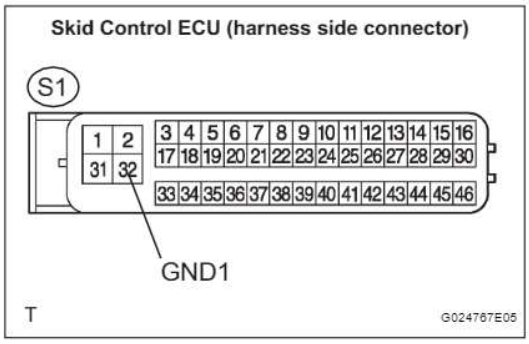
NOTICE:
When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

NG → **Go to step 2**

OK

REPLACE ABS AND TRACTION ACTUATOR

2 INSPECT HARNESS AND CONNECTOR (GND1 OF SKID CONTROL ECU AND BODY GROUND)



(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.
Resistance

Tester Connection	Specified Condition
S1-32 (GND1) - Body ground	Below 1 Ω

NOTICE:
When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ABS AND TRACTION ACTUATOR

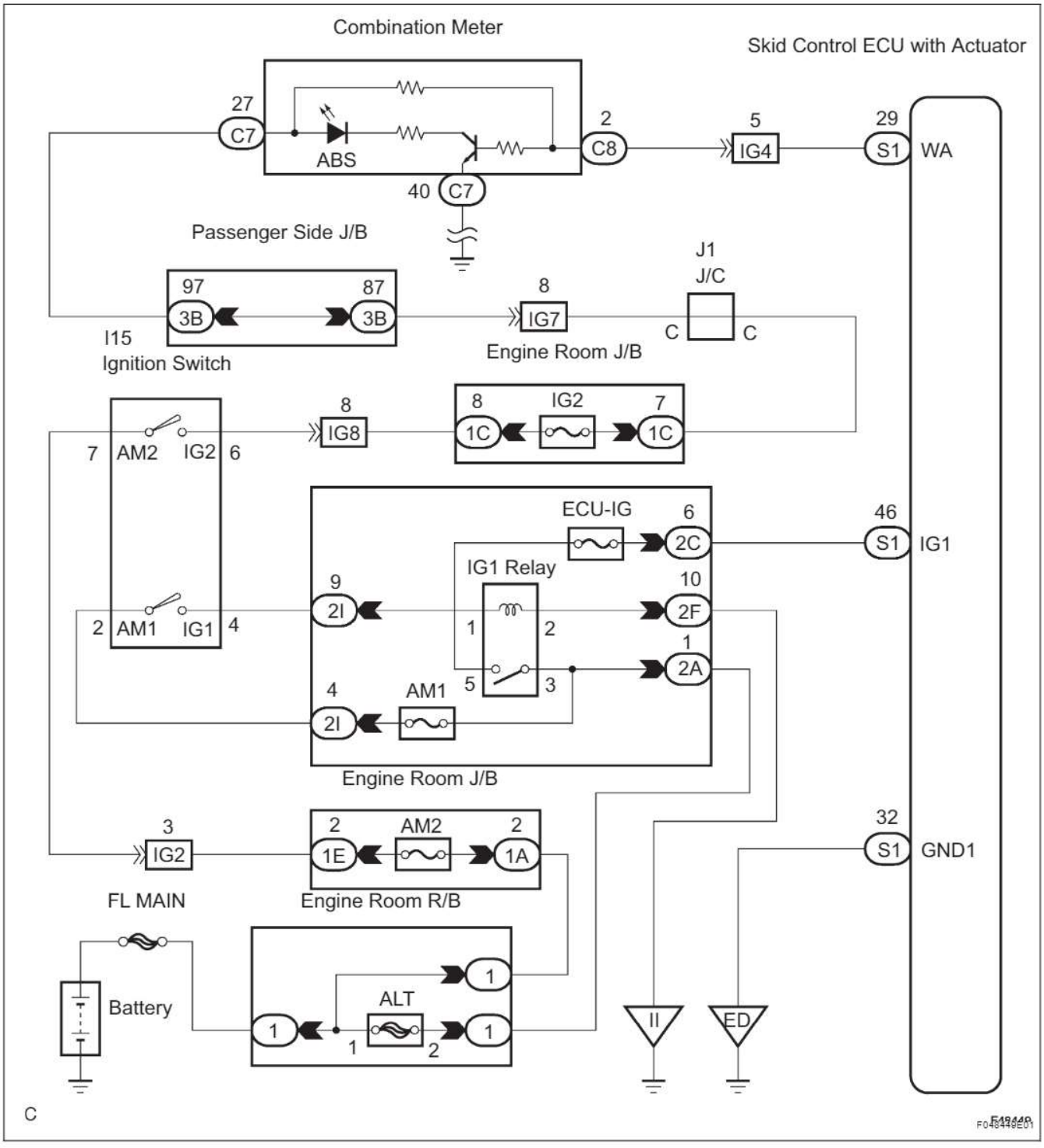
BC

ABS Warning Light Remains ON

DESCRIPTION

During DTC read by SST (Check wire), if the ABS warning light remains on, troubleshoot by following this inspection flow.

WIRING DIAGRAM



1 CHECK DTC

(a) Is DTC output for ABS?

Result

Result	Proceed to
DTC is not output	A
DTC is output	B

B → **REPAIR CIRCUIT INDICATED BY OUTPUT CODE**

A

2 INSPECT SKID CONTROL ECU CONNECTOR

(a) Check the ECU connector's connecting condition.
OK:
The connector should be securely connected.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

3 INSPECT BATTERY

(a) Check the battery voltage.
Voltage:
11 to 14 V

NG → **INSPECT CHARGING SYSTEM**

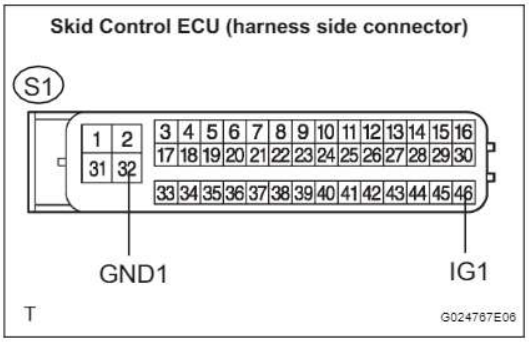
OK

4 INSPECT SKID CONTROL ECU TERMINAL VOLTAGE (IG1 TERMINAL)

(a) WHEN USING INTELLIGENT TESTER:
(1) Connect the intelligent tester to the DLC3.
(2) Start the engine.
(3) Select the DATA LIST mode on the intelligent tester.

Item	Measurement Item / Range (Display)	Normal Condition
IG VOLTAGE	ECU power supply voltage / UNDER / NORMAL	NORMAL: 9.5 V or over UNDER: Below 9.5 V

(4) Read the voltage condition output from the ECU displayed on the intelligent tester.
OK:
"Normal" is displayed.



(b) WHEN NOT USING INTELLIGENT TESTER:
(1) Disconnect the skid control ECU connector.
(2) Turn the ignition switch ON position.
(3) Measure the voltage according to the value(s) in the table below.

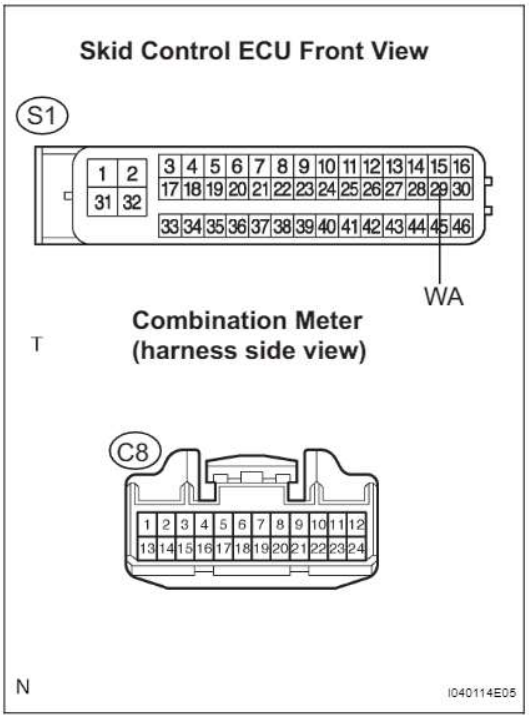
Voltage

Tester Connection	Specified Condition
S1-46 (IG1) - S1-32 (GND1)	11 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

5 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - COMBINATION METER)



(a) Disconnect the skid control ECU connector and combination meter connector.
(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
C8-2 - S1-29 (WA)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

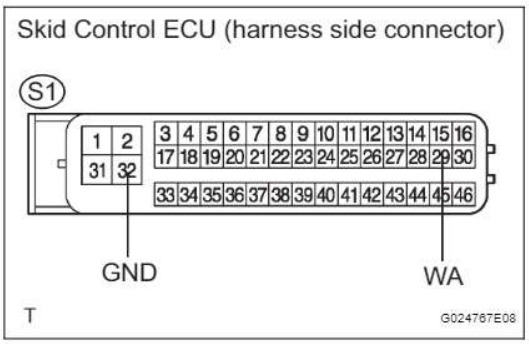
Resistance

Tester Connection	Specified Condition
S1-29 (WA) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

6 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - BODY GROUND)



(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S1-29 (WA) - Body ground	10 kΩ or higher
S1-32 (GND1) - Body ground	Below 1 Ω

NOTICE:
When replacing ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

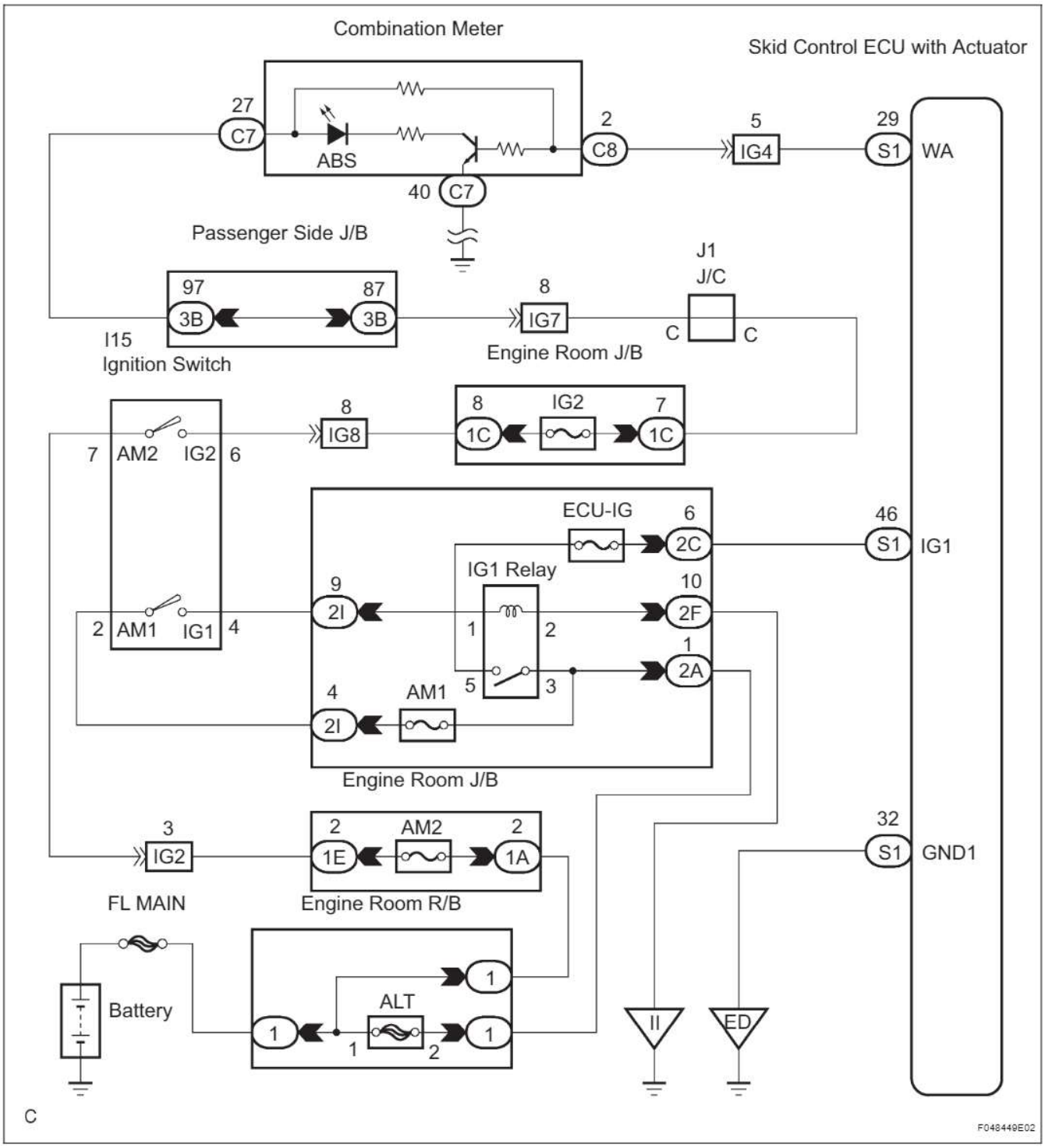
NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE ABS AND TRACTION ACTUATOR

ABS Warning Light does not Come ON

WIRING DIAGRAM



1	INSPECT ABS WARNING LIGHT

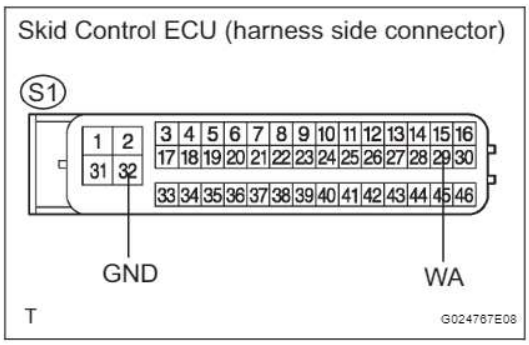
(a) WHEN USING INTELLIGENT TESTER:

(1) Connect the intelligent tester to the DLC3 and start the engine.
(2) Select the item "ABS WARN LIGHT" in the ACTIVE TEST and operate the ABS warning light on the intelligent tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
ABS WARN LIGHT	Turns ABS warning light ON / OFF	Observe combination meter

(3) Check that "ON" and "OFF" of the ABS warning light can be shown on the combination meter by the intelligent tester.
OK:
Turn the ABS warning light ON or OFF in accordance with the intelligent tester.

(b) WHEN NOT USING INTELLIGENT TESTER:
(1) Turn the ignition switch off and disconnect the connector from the skid control ECU.
(2) Ground terminal WA of the skid control ECU.
(3) Turn the ignition switch to the ON position.
(4) Check that the ABS warning light.
OK



WA - GND1 Condition	Illumination Condition
Connecting	OFF
Disconnecting	ON

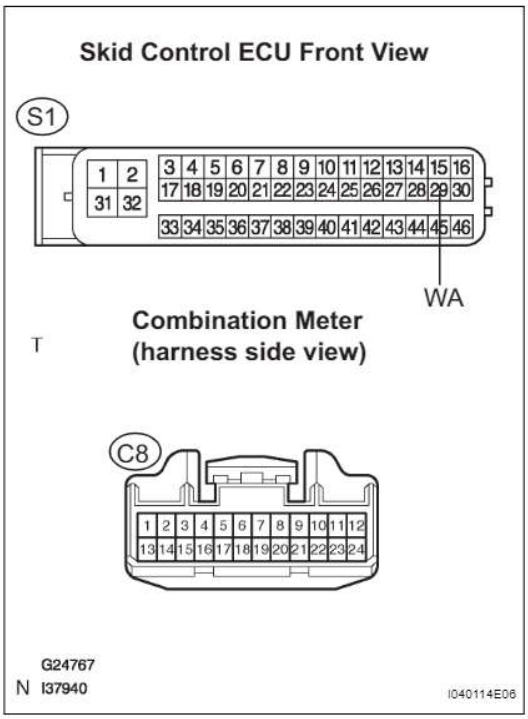
NOTICE:
When replacing ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

NG → **Go to step 2**

OK →

REPLACE ABS AND TRACTION ACTUATOR

2	CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - COMBINATION METER)



(a) Disconnect the skid control ECU connector and combination meter connector.

(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
C8-2 - S1-29 (WA)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S1-29 (WA) - Body ground	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3	CHECK COMBINATION METER ASSEMBLY

(a) Check if the indicators (shift position, airbag, etc.) other than ABS warning indicator operate normally.

Result

Result	Proceed to
Indicators OK	A
Indicators NG	B

B → CHECK COMBINATION METER ASSEMBLY (COMBINATION METER POWER SOURCE CIRCUIT)

A

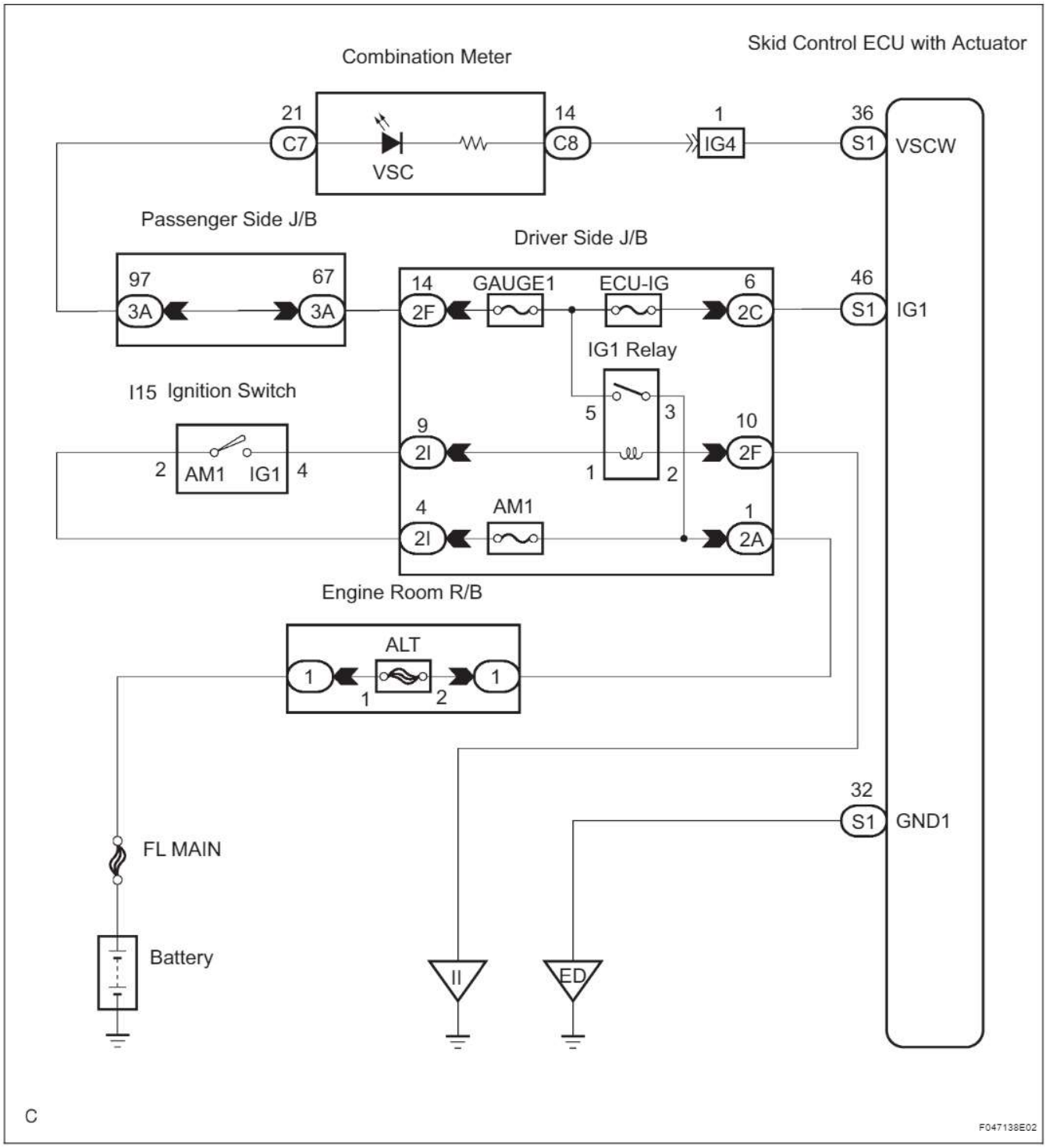
REPAIR OR REPLACE COMBINATION METER ASSEMBLY

VSC Warning Light Remains ON

DESCRIPTION

If the ECU stores DTC, the VSC warning light in the combination meter comes on.

WIRING DIAGRAM



1 CHECK DTC

(a) Is DTC output for ABS and VSC?

Result

Result	Proceed to
DTC is not output	A
DTC is output	B

B → **REPAIR CIRCUIT INDICATED BY OUTPUT CODE**

A

2 INSPECT SKID CONTROL ECU CONNECTOR

(a) Check the ECU connector's connecting condition.
OK:
The connector should be securely connected.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

3 INSPECT BATTERY

(a) Check the battery voltage.
Voltage:
11 to 14 V

NG → **INSPECT CHARGING SYSTEM**

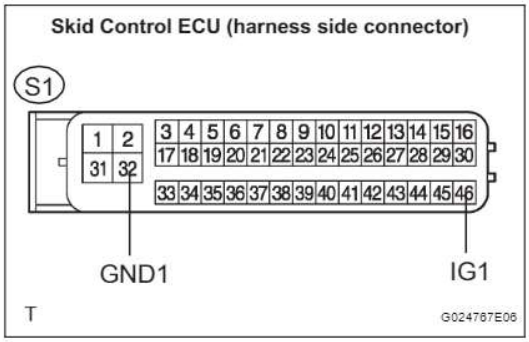
OK

4 INSPECT SKID CONTROL ECU TERMINAL VOLTAGE (IG1 TERMINAL)

(a) WHEN USING INTELLIGENT TESTER:
(1) Connect the intelligent tester to the DLC3.
(2) Start the engine.
(3) Select the DATA LIST mode on the intelligent tester.

Item	Measurement Item / Range (Display)	Normal Condition
IG VOLTAGE	ECU power supply voltage / UNDER / NORMAL	NORMAL: 9.5 V or over UNDER: Below 9.5 V

(4) Check the voltage condition output from the ECU displayed on the intelligent tester.
OK:
"Normal" is displayed.



(b) WHEN NOT USING INTELLIGENT TESTER:
(1) Disconnect the skid control ECU connector.
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage according to the value(s) in the table below.

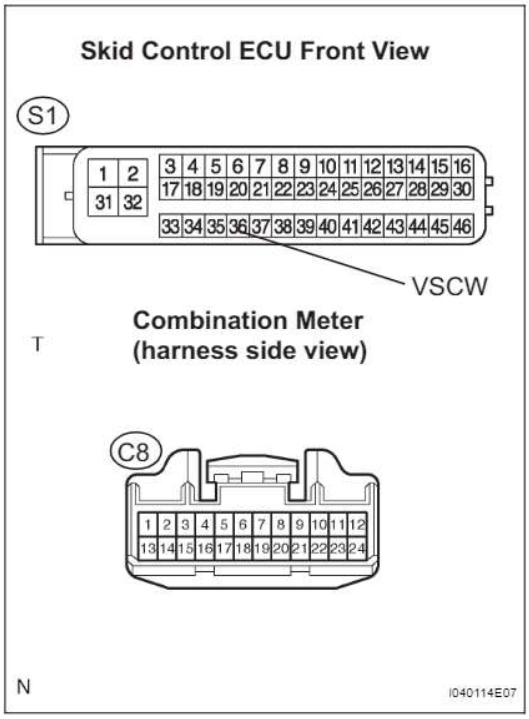
Voltage

Tester Connection	Specified Condition
S1-46 (IG1) - S1-32 (GND1)	11 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - COMBINATION METER)



(a) Disconnect the skid control ECU connector and combination meter connector.
(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
C8 -14 - S1-36 (VSCW)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

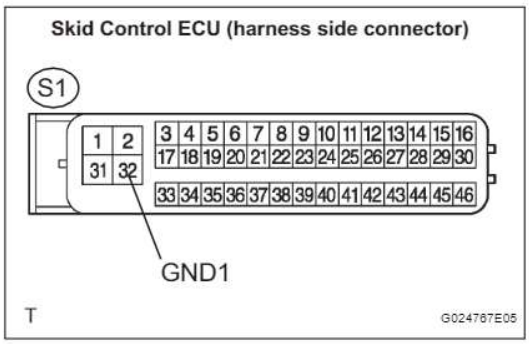
Resistance

Tester Connection	Specified Condition
S1-36 (VSCW) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - BODY GROUND)



(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S1-32 (GND1) - Body ground	Below 1 Ω

NOTICE:
When replacing ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

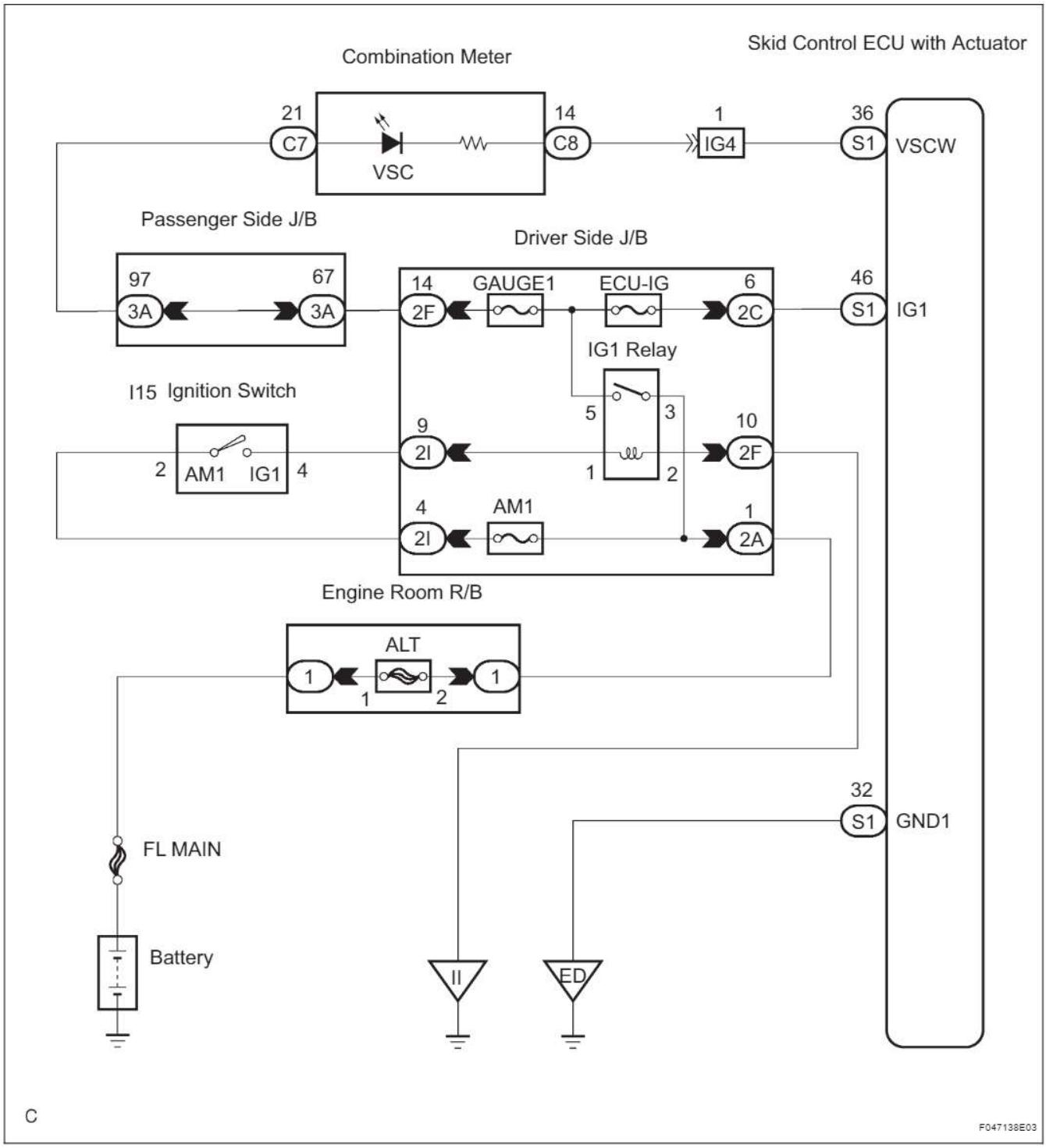
REPLACE ABS AND TRACTION ACTUATOR

VSC Warning Light does not Come ON

DESCRIPTION

If the ECU stores DTC, the VSC warning light in the combination meter comes on.

WIRING DIAGRAM



BC

1	CHECK VSC WARNING LIGHT

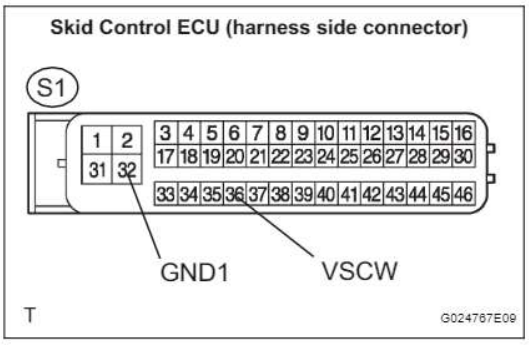
(a) WHEN USING INTELLIGENT TESTER:
(1) Connect the intelligent tester to the DLC3 and start the engine.
(2) Select the item "VSC WARN LIGHT" in the ACTIVE TEST and operate the VSC warning light on the intelligent tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
VSC WARN LIGHT	Turns VSC warning light ON / OFF	Observe combination meter

(3) Check that "ON" and "OFF" of the VSC warning light are indicated on the combination meter when using the intelligent tester.
OK:
Turn the VSC warning light ON or OFF in accordance with the intelligent tester.

BC

(b) WHEN NOT USING INTELLIGENT TESTER:
(1) Turn the ignition switch off and disconnect the connector from the skid control ECU.
(2) Ground the terminal VSCW of skid control ECU.
(3) Turn the ignition switch to the ON position.
(4) Check that the VSC warning light.
OK



VSCW - GND1 Condition	Illumination Condition
Connecting	ON
Disconnecting	OFF

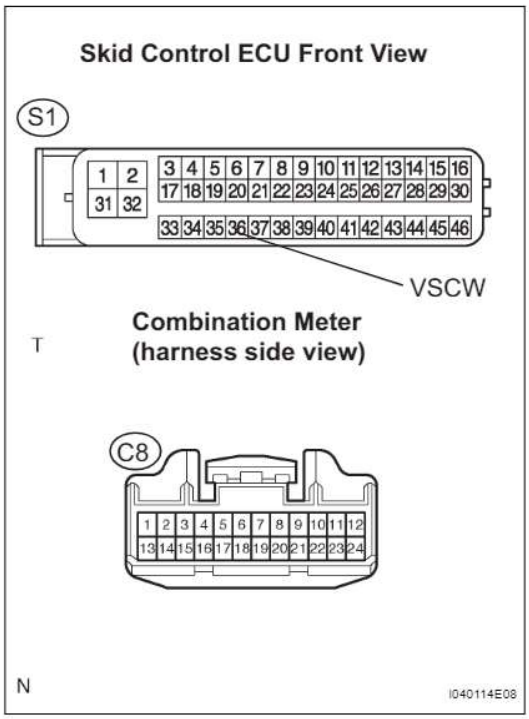
NOTICE:
When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

NG → **Go to step 2**

OK →

REPLACE ABS AND TRACTION ACTUATOR

2 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - COMBINATION METER)



(a) Disconnect the skid control ECU connector and combination meter connector.

(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
C8-14 - S1-36 (VSCW)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S1-36 (VSCW) - Body ground	10 kΩ or higher

BC

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3 CHECK COMBINATION METER ASSEMBLY

(a) Check if the indicators (fuel, turn signal) other than VSC warning indicator operate normally.

Result

Reuslt	Proceed to
Indicators OK	A
Indicators NG	B

B → CHECK COMBINATION METER ASSEMBLY

A

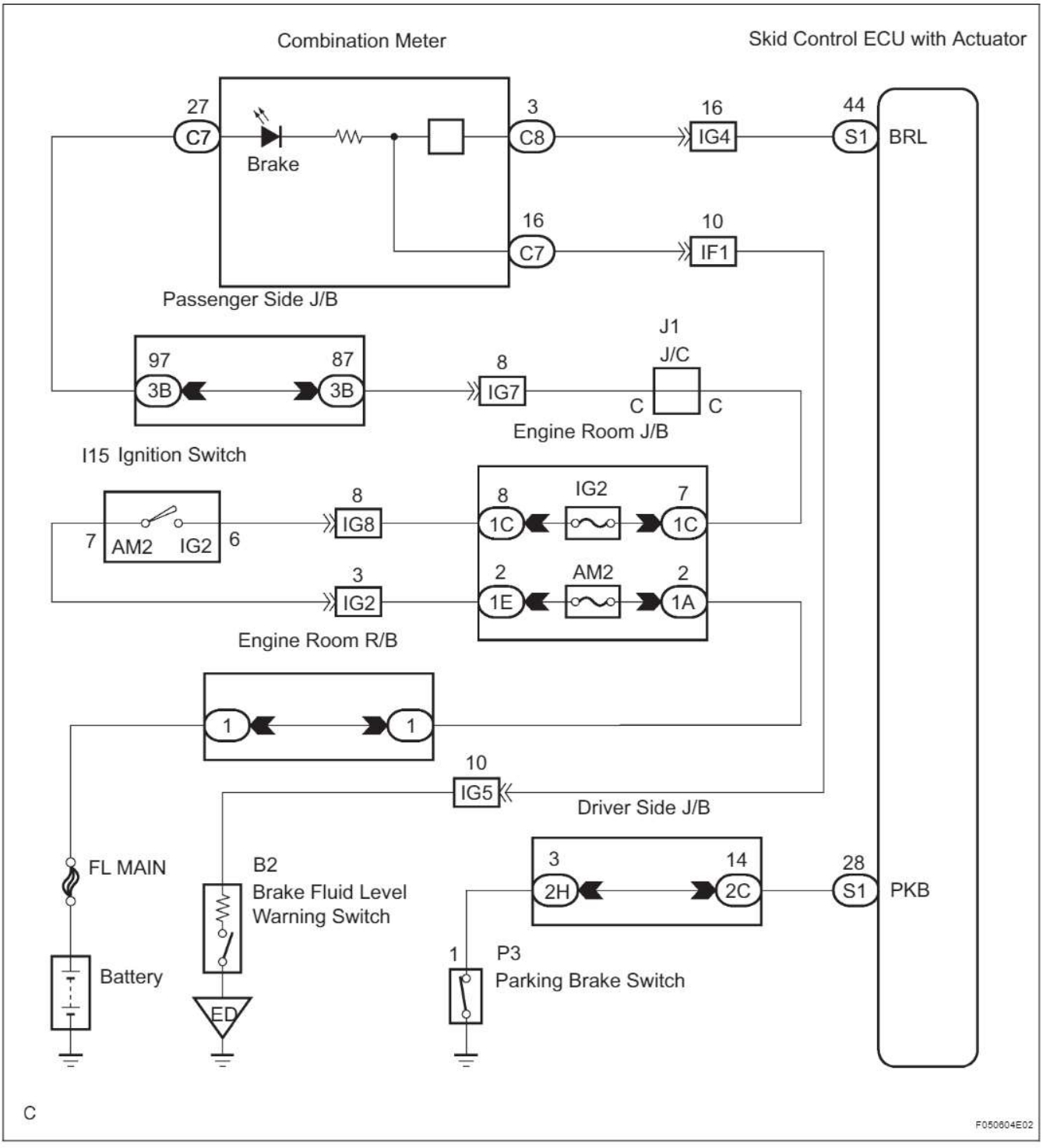
REPAIR OR REPLACE COMBINATION METER ASSEMBLY

Brake Warning Light Circuit

DESCRIPTION

The BRAKE warning light comes on when the brake fluid is insufficient, the parking brake is applied or the EBD is defective.

WIRING DIAGRAM



HINT:
When releasing the parking brake, move the shift lever into the P position in an AT vehicle, and choke in an MT vehicle to hold the vehicle for safety.

1 CHECK BRAKE FLUID

(a) Check that the brake fluid level is proper.

NG → **ADD BRAKE FLUID**

OK

2 CHECK DTC FOR ABS

(a) Are the DTC recorded (See page BC-82)?

Result

Result	Proceed to
Yes	A
No	B

B → **Go to step 3**

A

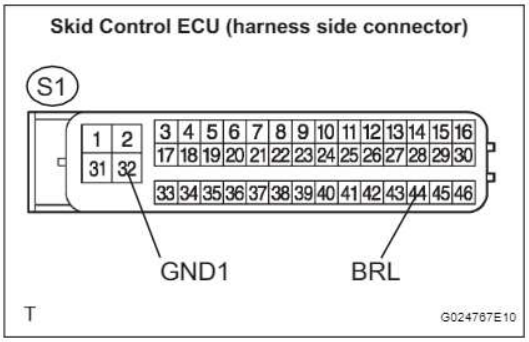
REPAIR CIRCUIT INDICATED BY OUTPUT CODE

3 INSPECT BRAKE WARNING LIGHT

(a) WHEN USING INTELLIGENT TESTER:
(1) Connect the intelligent tester to the DLC3.
(2) Start the engine.
(3) Select the item "BRAKE WARN LIGHT" in the ACTIVE TEST and operate the BRAKE warning light on the intelligent tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
BRAKE WRN LIGHT	Turns BRAKE warning light ON / OFF	Observe combination meter

(4) Check that "ON" and "OFF" of the BRAKE warning light are indicated on the combination meter when using the intelligent tester.
OK:
Turn the BRAKE warning light on or off in accordance with the intelligent tester.



(b) WHEN NOT USING INTELLIGENT TESTER:
(1) Turn the ignition switch off and disconnect the connector from the skid control ECU.
(2) Ground terminal BRL of the skid control ECU.
(3) Turn the ignition switch to the ON position.
(4) Check that the brake warning light.

OK:

Turn the light on or off in accordance with the connection of terminal GND and BRL.

NOTICE:

When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

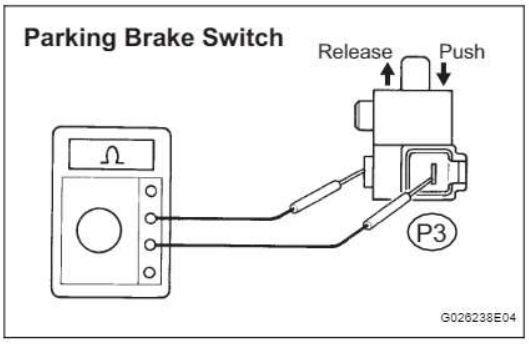
NG → **Go to step 4**

OK

BC

REPLACE ABS AND TRACTION ACTUATOR

4 INSPECT PARKING BRAKE SWITCH ASSEMBLY



(a) Remove the parking brake switch connector.
(b) Measure the resistance according to the value(s) in the table below.

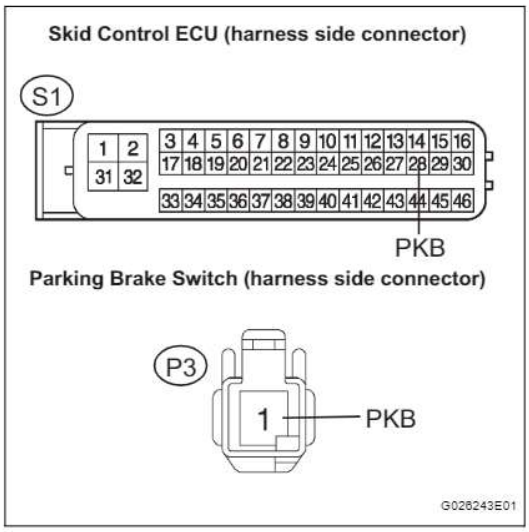
Resistance

Tester Connection	Switch Condition	Specified Condition
P3-1 - Ground part	Released	Below 1 Ω
P3-1 - Ground part	Pushed in	10 kΩ or higher

NG → **REPLACE PARKING BRAKE SWITCH ASSEMBLY**

OK

5 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - PARKING BRAKE SWITCH)



(a) Disconnect the skid control ECU connector and the parking brake switch connector.

(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S1-28 (PKB) - P3-1 (PKB)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

Resistance

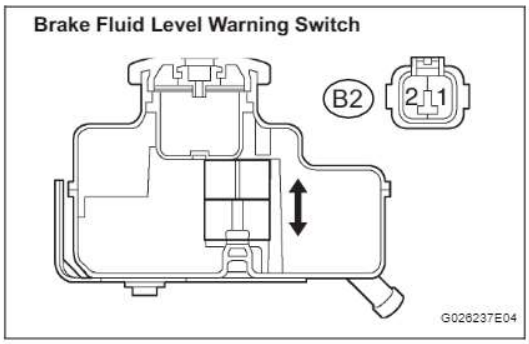
Tester Connection	Specified Condition
S1-28 (PKB) - Body ground	10 kΩ or higher

BC

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

6 INSPECT BRAKE FLUID LEVEL WARNING SWITCH



(a) Remove the reservoir tank cap and strainer.

(b) Disconnect the brake fluid level warning switch connector.

(c) Measure the resistance according to the value(s) in the table below.

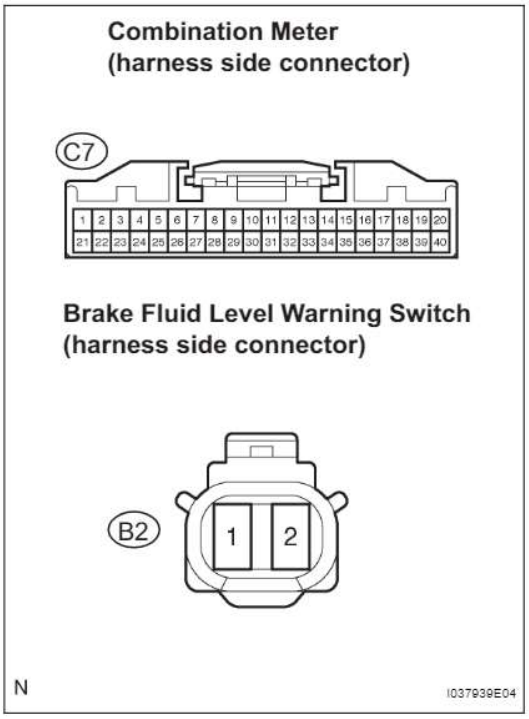
Resistance

Tester Connection	Switch Condition	Specified Condition
(B2-1) - (B2-2)	Float UP	10 kΩ or higher
(B2-1) - (B2-2)	Float DOWN	Below 1 Ω

NG → REPLACE BRAKE FLUID LEVEL WARNING SWITCH

OK

7	CHECK HARNESS AND CONNECTOR (BRAKE FLUID LEVEL WARNING SWITCH - COMBINATION METER)



(a) Disconnect the combination meter connector and the brake fluid level warning switch connector.

(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
(C7-16) - (B2-1)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

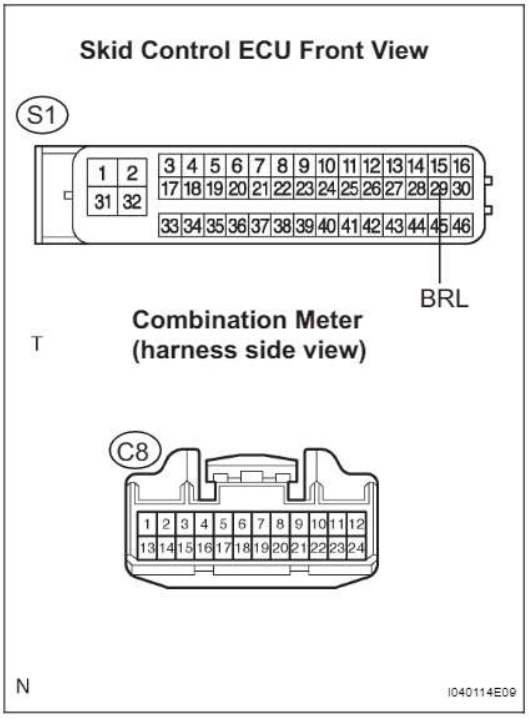
Resistance

Tester Connection	Specified Condition
(C7-16) - Body ground	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

8	CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - COMBINATION METER)



(a) Disconnect the skid control ECU connector and combination meter connector.

(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S1-44 (BRL) - (C8-3)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S1-44 (BRL) - Body ground	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

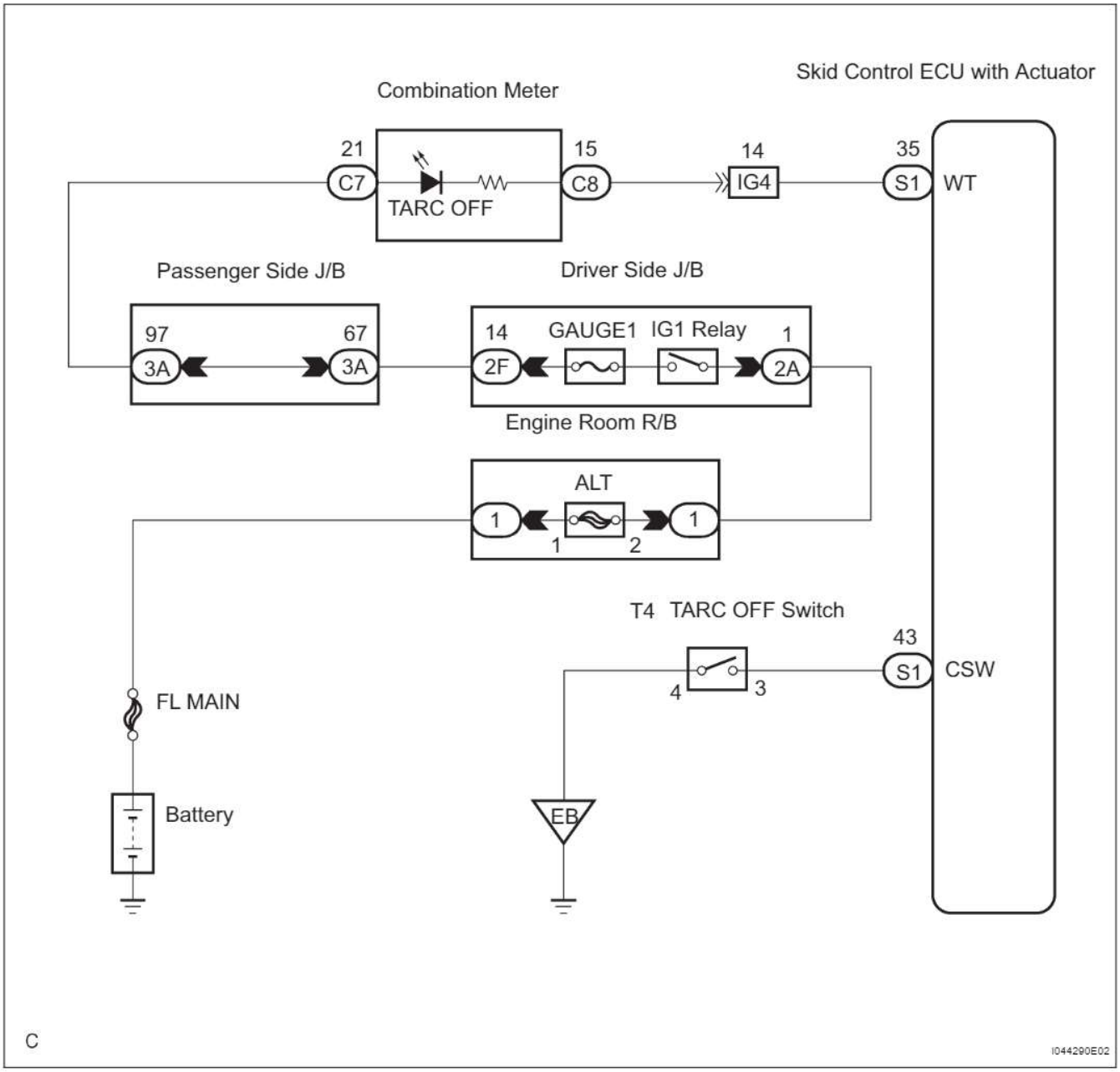
REPAIR OR REPLACE COMBINATION METER ASSEMBLY

TRAC OFF Indicator Light, TRAC OFF Switch Circuit

DESCRIPTION

The skid control ECU detects the TRAC control main switch ON/OFF signal and turns the TRAC OFF light on/off. When the TRAC control switch is pressed, the TRAC control does not operate and the TRAC OFF light comes on.

WIRING DIAGRAM



HINT:
Start the inspection from step 1 when using the intelligent tester and start from step 2 when not using the intelligent tester.

1 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (TRAC OFF INDICATOR LIGHT)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select the item "TRAC OFF LIGHT" in the ACTIVE TEST and operate the TRAC OFF indicator light on the intelligent tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
VSC / TRAC OFF IND	Turns VSC / TRAC OFF indicator ON / OFF	Observe combination meter

(d) Check that "ON" and "OFF" of the TRAC OFF indicator light are indicated on the combination meter when using the intelligent tester.

OK:

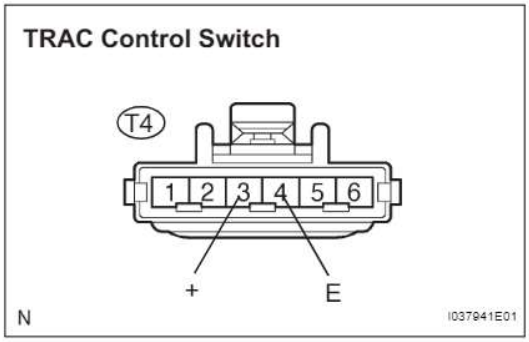
Turn the TRAC OFF indicator light on or off in accordance with the intelligent tester.

BC

NG → **Go to step 4**

OK

2 INSPECT TRACTION CONTROL SWITCH



(a) Remove the TRAC control switch.
(b) Disconnect the TRAC control switch connector.
(c) Measure the resistance according to the value(s) in the table below.

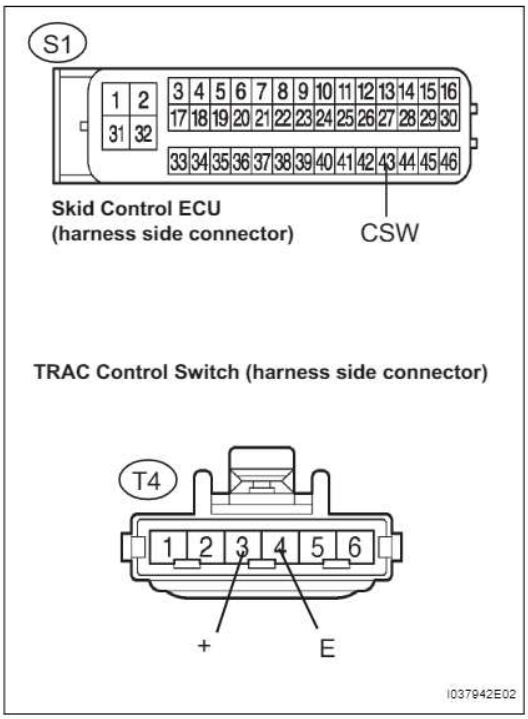
Resistance

Tester Connection	Switch Condition	Specified Condition
T4-3 (+) - T4-4 (E)	Pushed in (ON)	Below 1 Ω
T4-3 (+) - T4-4 (E)	Released (OFF)	10 kΩ or higher

NG → **REPLACE TRACTION CONTROL SWITCH**

OK

3	CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - TRAC OFF SWITCH)



(a) Disconnect the skid control ECU connector and the TRAC control switch connector.

(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S1-43 (CSW) - T4-3 (+)	Below 1 Ω
S1-43 (CSW) - Body ground	10 kΩ or higher
T4-4 (E) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	INSPECT COMBINATION METER ASSEMBLY

(a) Check if the indicators (fuel, turn signal) other than TRAC OFF indicator operate normally.

Result

Result	Proceed to
Indicators OK	A
Indicators NG	B

B → **CHECK COMBINATION METER ASSEMBLY (COMBINATION METER POWER SOURCE CIRCUIT)**

A

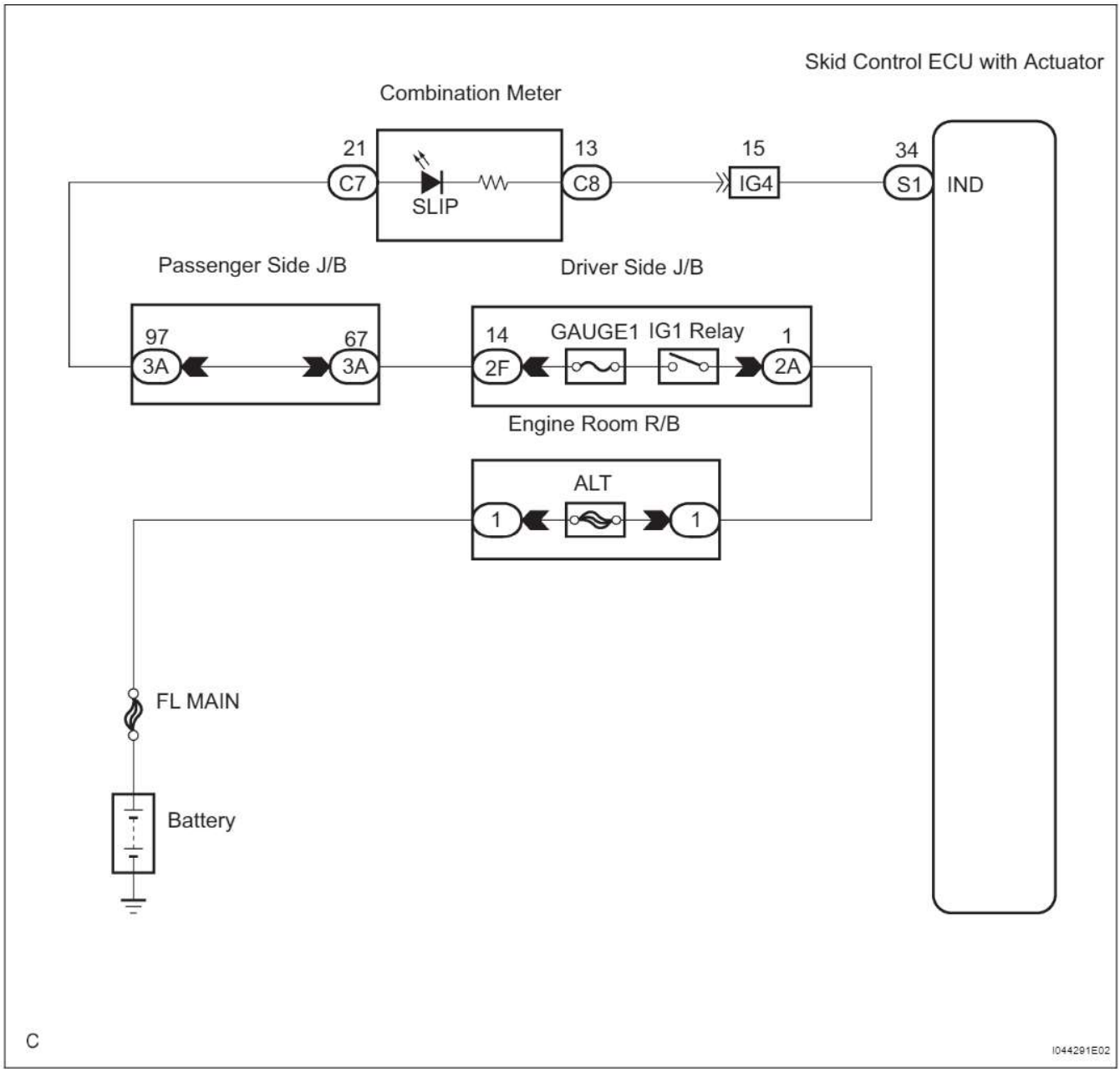
REPAIR OR REPLACE COMBINATION METER ASSEMBLY

Slip Indicator Light Circuit

DESCRIPTION

The SLIP indicator blinks during TRAC & VSC operation.

WIRING DIAGRAM



BC

HINT:
Start the inspection from step 1 when using the intelligent tester and start from step 2 when not using the intelligent tester.

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (SLIP INDICATOR LIGHT)

(a) Connect the intelligent tester to the DLC3.

(b) Start the engine.
(c) Select the item "SLIP INDI LIGHT" in the ACTIVE TEST and operate the SLIP indicator light on the intelligent tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
SLIP INDI LIGHT	Turns SLIP indicator light ON / OFF	Observe combination meter

(d) Check that "ON" and "OFF" of the SLIP indicator light are indicated on the combination meter when using the intelligent tester.
OK:
Turn the SLIP indicator light on or off in accordance with the intelligent tester.

NOTICE:
When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

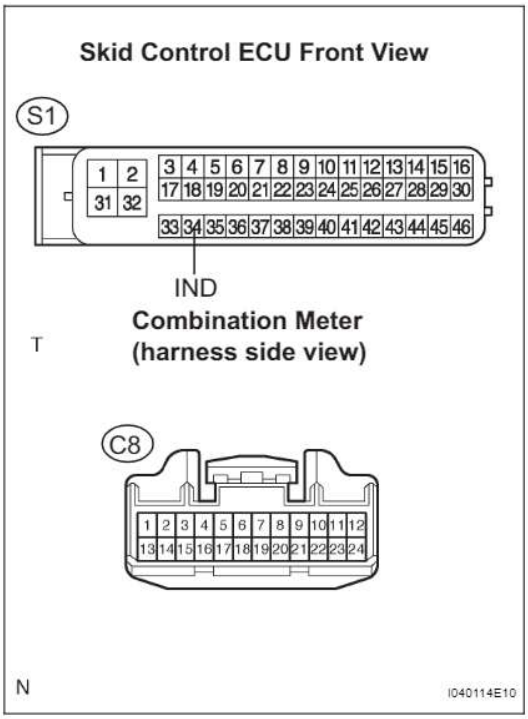
BC

NG → **Go to step 2**

OK →

REPLACE ABS AND TRACTION ACTUATOR

2 CHECK HARNESS AND CONNECTOR



(a) Disconnect the skid control ECU connector and combination meter connector.
(b) Measure the resistance according to the value(s) in the table below.
Resistance

Tester Connection	Specified Condition
C8-13 - S1-34 (IND)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.
Resistance

Tester Connection	Specified Condition
S1-34 (IND) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK →

3	INSPECT COMBINATION METER ASSEMBLY

(a) Check if the indicators (fuel, turn signal) other than SLIP indicator operate normally.

Result

Result	Proceed to
Indicators OK	A
Indicators NG	B

B → CHECK COMBINATION METER ASSEMBLY (COMBINATION METER POWER SOURCE CIRCUIT)

A → REPAIR OR REPLACE COMBINATION METER ASSEMBLY

BC

PROBLEM SYMPTOMS TABLE

ABS WITH EBD & BA & TRAC & VSC SYSTEM

Symptom	Suspected area	See page
ABS does not operate	1.Check the DTC again and make sure that the normal code is output.	BC-82
	2.IG power source circuit and ground circuit.	BC-131
	3.Speed sensor circuit (Front)	BC-91
	4.Speed sensor circuit (Rear)	BC-97
	5.Check the ABS & TRAC actuator with a intelligent tester.	BC-182
	6.If the symptoms still occur even after the above circuits in suspected areas are inspected and proved to be normal, replace the skid control ECU.	-
ABS does not operate efficiently	1.Check the DTC again and make sure that the normal code is output.	BC-82
	2.Speed sensor circuit (Front)	BC-91
	3.Speed sensor circuit (Rear)	BC-97
	3.Stop light switch circuit	BC-136
	4.Check the ABS & TRAC actuator with a intelligent tester.	BC-182
	5.If the symptoms still occur even after the above circuits in suspected areas are inspected and proved to be normal, replace the skid control ECU.	-
ABS warning light abnormal (Remain ON)	1.ABS warning light remains on circuit	BC-142
	2.ABS warning light does not come on circuit	BC-146
	3.Skid control ECU	-
ABS warning light abnormal (Does not light up)	1.ABS warning light remains on circuit	BC-142
	2.ABS warning light does not come on circuit	BC-146
	3.Skid control ECU	-
DTC of ABS check cannot be done	1.Check the DTC again and make sure that the normal code is output.	BC-82
	2.TC and CG terminal circuit	BC-171
	3.If the symptoms still occur even after the above circuits in suspected areas are inspected and proved to be normal, replace the skid control ECU.	-
Sensor signal check cannot be done	1.TS and CG terminal circuit	BC-176
	2.Skid control ECU	-
VSC and/or TRAC does not operate	1.Check the DTC again and make sure that the normal code is output.	BC-82
	2.IG power source circuit and ground circuit.	BC-131
	3.Check the hydraulic circuit for leakage.	-
	4.Speed sensor circuit (Front)	BC-91
	5.Speed sensor circuit (Rear)	BC-97
	6.Deceleration sensor circuit (Calibration)	BC-118
	7.Deceleration sensor circuit (Malfunction)	BC-127
	8.Yaw rate sensor circuit	BC-127
	9.Steering sensor circuit	BC-124
	10.If the symptoms still occur even after the above circuits in suspected areas are inspected and proved to be normal, replace the skid control ECU.	-
SLIP indicator light abnormal	1.SLIP indicator light circuit	BC-165
	2.Skid control ECU	-

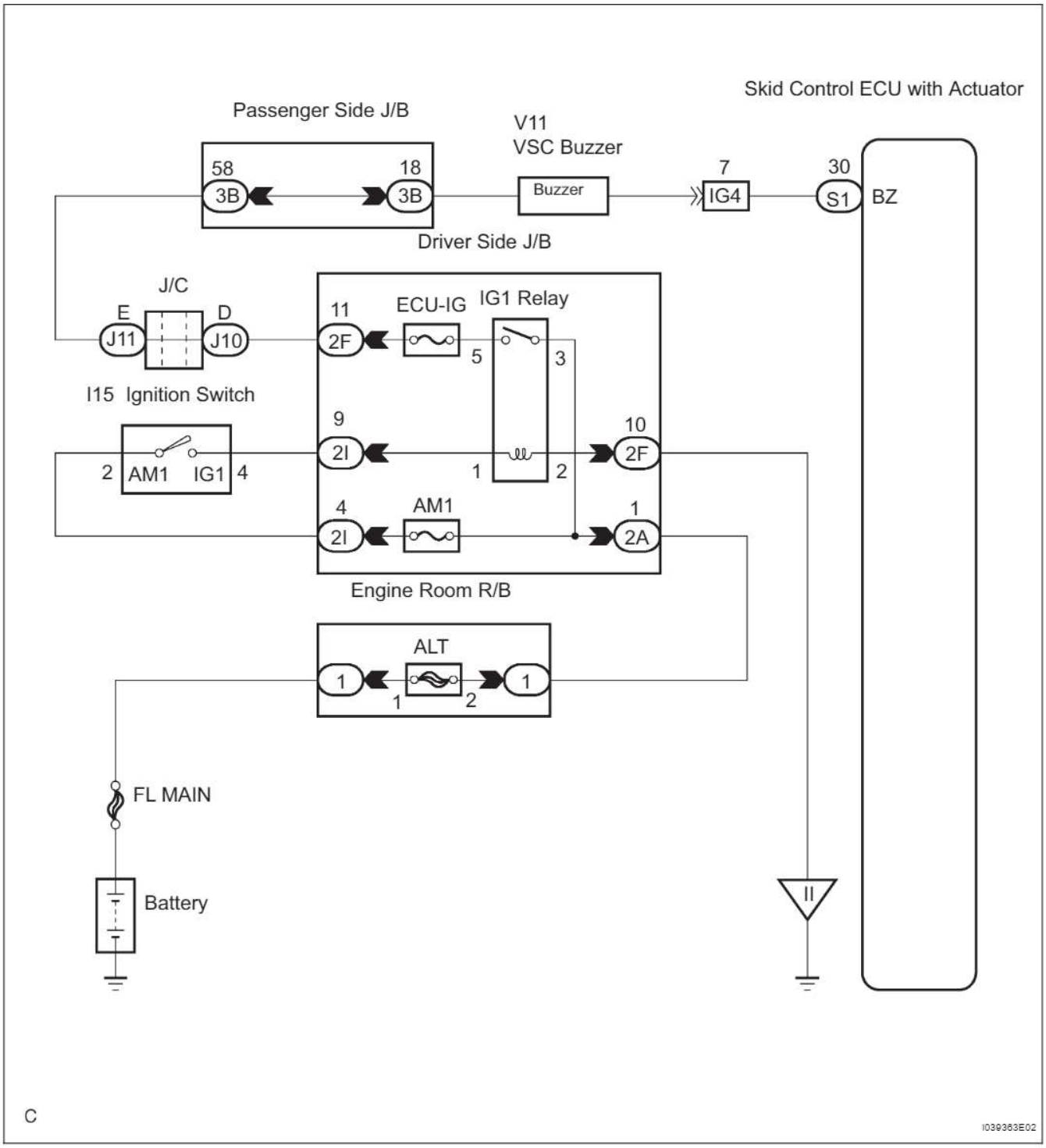
Symptom	Suspected area	See page
TRAC OFF indicator abnormal	1.Check the DTC again and make sure that the normal code is output.	BC-82
	2.TRAC control switch circuit	BC-162
	3.If the symptoms still occur even after the above circuits in suspected areas are inspected and proved to be normal, replace the skid control ECU.	-
DTC of VSC check cannot be done	1.Check the DTC again and make sure that the normal code is output.	BC-82
	2.TC and CG terminal circuit	BC-171
	3.If the symptoms still occur even after the above circuits in suspected areas are inspected and proved to be normal, replace the skid control ECU.	-
VSC warning light abnormal (Remain ON)	1.Check the DTC again and make sure that the normal code is output.	BC-82
	2.VSC warning light remains on circuit	BC-149
	3.VSC warning light does not come on circuit	BC-153
	4.If the symptoms still occur even after the above circuits in suspected areas are inspected and proved to be normal, replace the skid control ECU.	-
VSC warning light abnormal (Does not light up)	1.Check the DTC again and make sure that the normal code is output.	BC-82
	2.VSC warning light remains on circuit	BC-149
	3.VSC warning light does not come on circuit	BC-153
	4.If the symptoms still occur even after the above circuits in suspected areas are inspected and proved to be normal, replace the skid control ECU.	-

Skid Control Buzzer Circuit

DESCRIPTION

The skid control buzzer sounds and SLIP Indicator blinking during VSC operation.

WIRING DIAGRAM



HINT:
Start the inspection from step 1 when using the intelligent tester and start from step 2 when not using the intelligent tester.

1 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (SKID CONTROL BUZZER)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select the item "VSC/BR WARN BUZ" in the ACTIVE TEST and operate the skid control buzzer on the intelligent tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
VSC / BR WARN BUZ	Turns VSC / BRAKE warning buzzer ON / OFF	Buzzer can be heard

(d) Check that skid control buzzer sounds by operating with the intelligent tester.
OK:
The skid control buzzer sounds in accordance with operation of the intelligent tester.

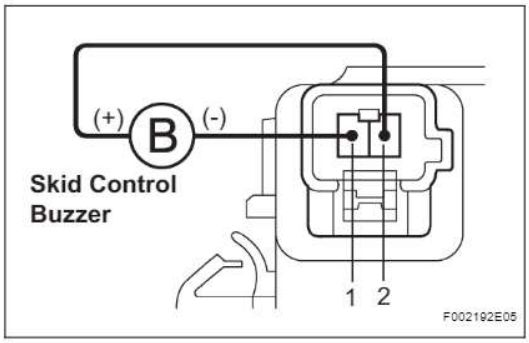
NOTICE:
When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

NG → **Go to step 2**

OK →

REPLACE ABS AND TRACTION ACTUATOR

2 INSPECT SKID CONTROL BUZZER ASSEMBLY

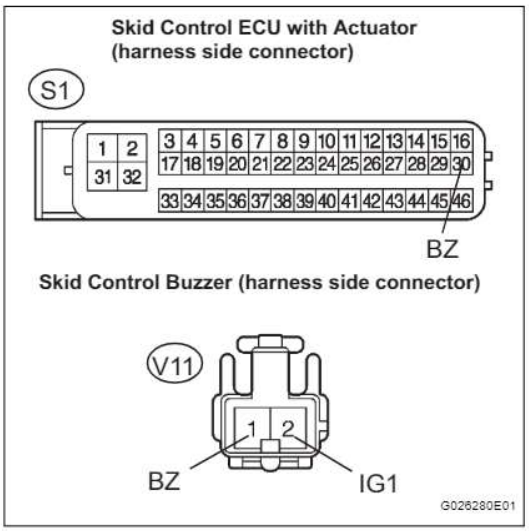


(a) Disconnect the skid control buzzer connector.
(b) Apply a battery positive voltage to terminals 1 and 2 of the skid control buzzer connector, and check that the buzzer sounds.
OK:
The skid control buzzer sound should be heard.

NG → **REPLACE SKID CONTROL BUZZER ASSEMBLY**

OK →

3	CHECK HARNESS AND CONNECTOR (SKID CONTROL BUZZER - SKID CONTROL ECU)



(a) Disconnect the skid control buzzer connector and the skid control ECU connector.

(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S1-30 (BZ) - V11-1 (BZ)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S1-30 (BZ) - Body ground	10 kΩ or higher

NOTICE:
When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

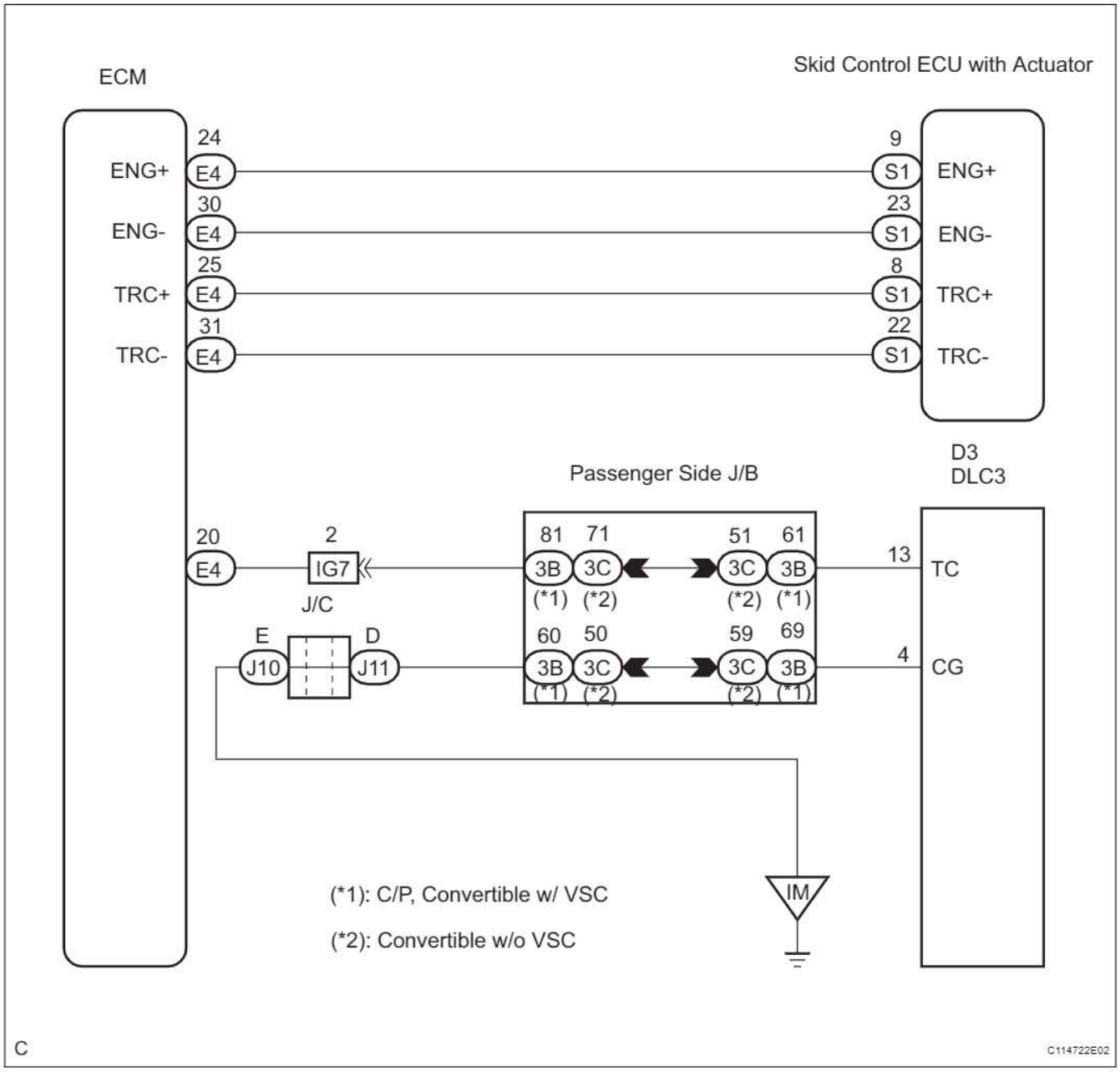
REPLACE ABS AND TRACTION ACTUATOR

TC and CG Terminal Circuit

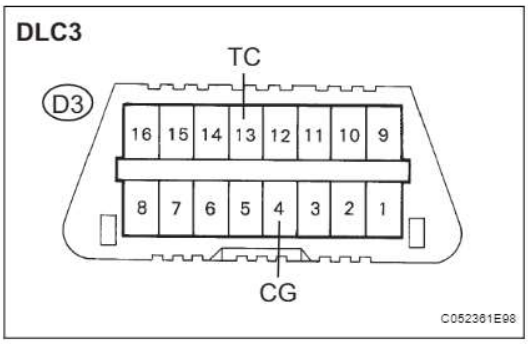
DESCRIPTION

Connecting terminals TC and CG of the DLC3 causes the ECU to display the DTC by flashing the ABS warning light.

WIRING DIAGRAM



1	INSPECT DLC3 TERMINAL VOLTAGE



(a) Turn the ignition switch to the ON position.
(b) Measure the voltage according to the value(s) in the table below.

Voltage

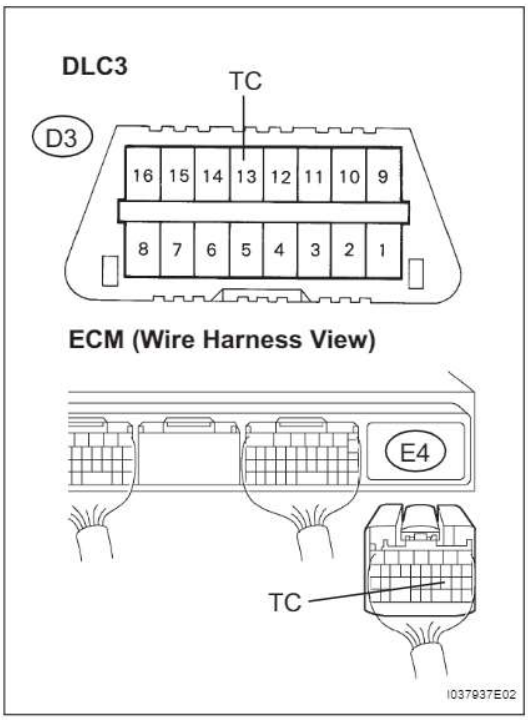
Tester Connection	Specified Condition
D3-13 (TC) - D3-4 (CG)	10 to 14 V

NG → Go to step 4

OK

BC

2	CHECK HARNESS AND CONNECTOR (ECM - DLC3)



(a) Disconnect the ECM connector.
(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
E4-20 (TC) - D3-13 (TC)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

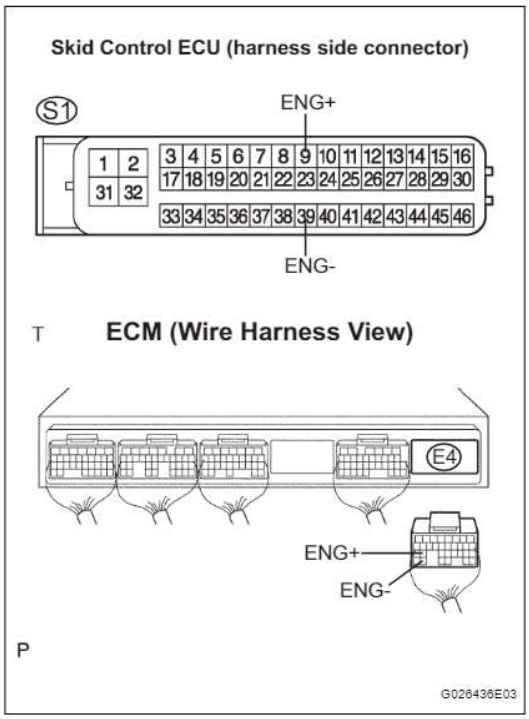
Resistance

Tester Connection	Specified Condition
D3-13 (TC) - Body ground	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3 CHECK HARNESS AND CONNECTOR (ECM - SKID CONTROL ECU)



(a) Disconnect the skid control ECU connector and the ECM connector.

(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
E4-24 (ENG+) - S1-9 (ENG+)	Below 1 Ω
E4-30 (ENG-) - S1-23 (ENG-)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S1-9 (ENG+) - Body ground	10 kΩ or higher
S1-23 (ENG-) - Body ground	10 kΩ or higher

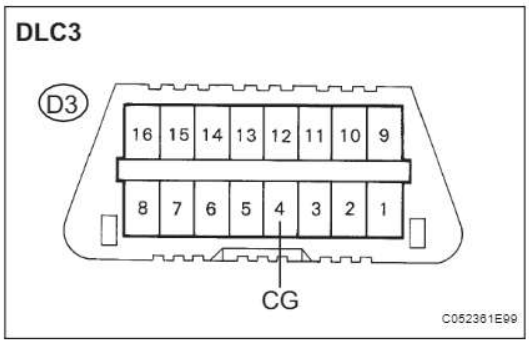
NOTICE:
When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ABS AND TRACTION ACTUATOR

4 CHECK HARNESS AND CONNECTOR (DLC3 - BODY GROUND)



(a) Disconnect the skid control ECU connector.

(b) Measure the resistance according to the value(s) in the table below.

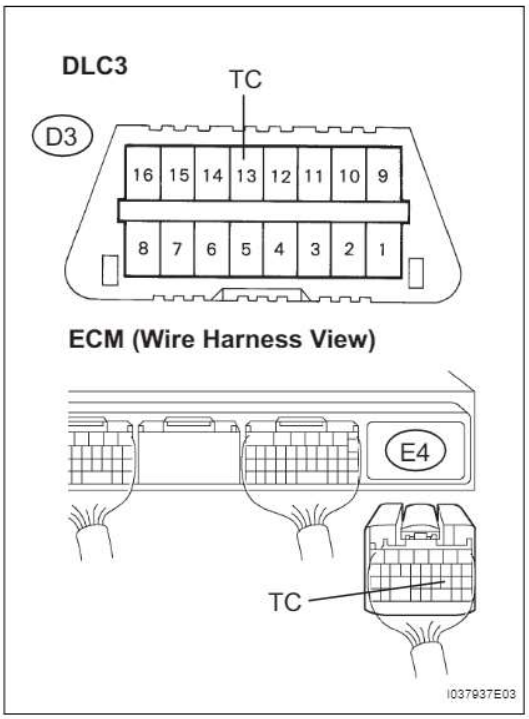
Resistance

Tester Connection	Specified Condition
D3-4 (CG) - Body ground	Below 1 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

5 CHECK HARNESS AND CONNECTOR (ECM - DLC3)



(a) Disconnect the ECM connector.
(b) Measure the resistance according to the value(s) in the table below.
Resistance

Tester Connection	Specified Condition
E4-20 (TC) - D3-13 (TC)	Below 1 Ω

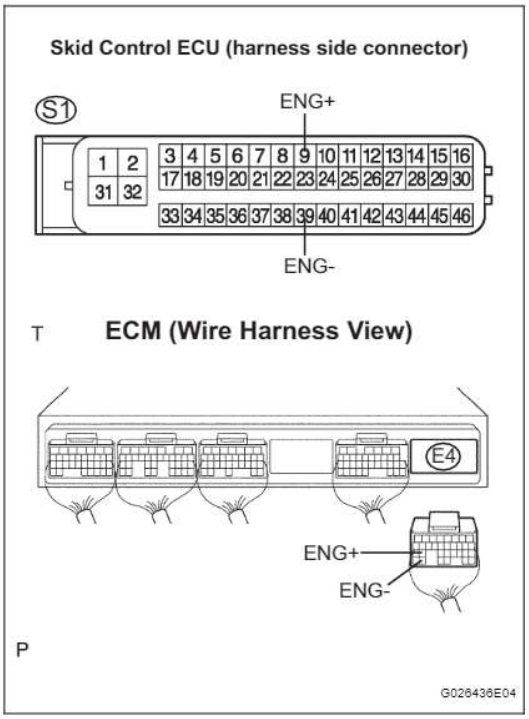
(c) Measure the resistance according to the value(s) in the table below.
Resistance

Tester Connection	Specified Condition
D3-13 (TC) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6 CHECK HARNESS AND CONNECTOR (ECM - SKID CONTROL ECU)



(a) Disconnect the skid control ECU connector and the ECM connector.
(b) Measure the resistance according to the value(s) in the table below.
Resistance

Tester Connection	Specified Condition
E4-24 (ENG+) - S1-9 (ENG+)	Below 1 Ω
E4-30 (ENG-) - S1-23 (ENG-)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.
Resistance

Tester Connection	Specified Condition
S1-9 (ENG+) - Body ground	10 kΩ or higher
S1-23 (ENG-) - Body ground	10 kΩ or higher

NOTICE:
When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

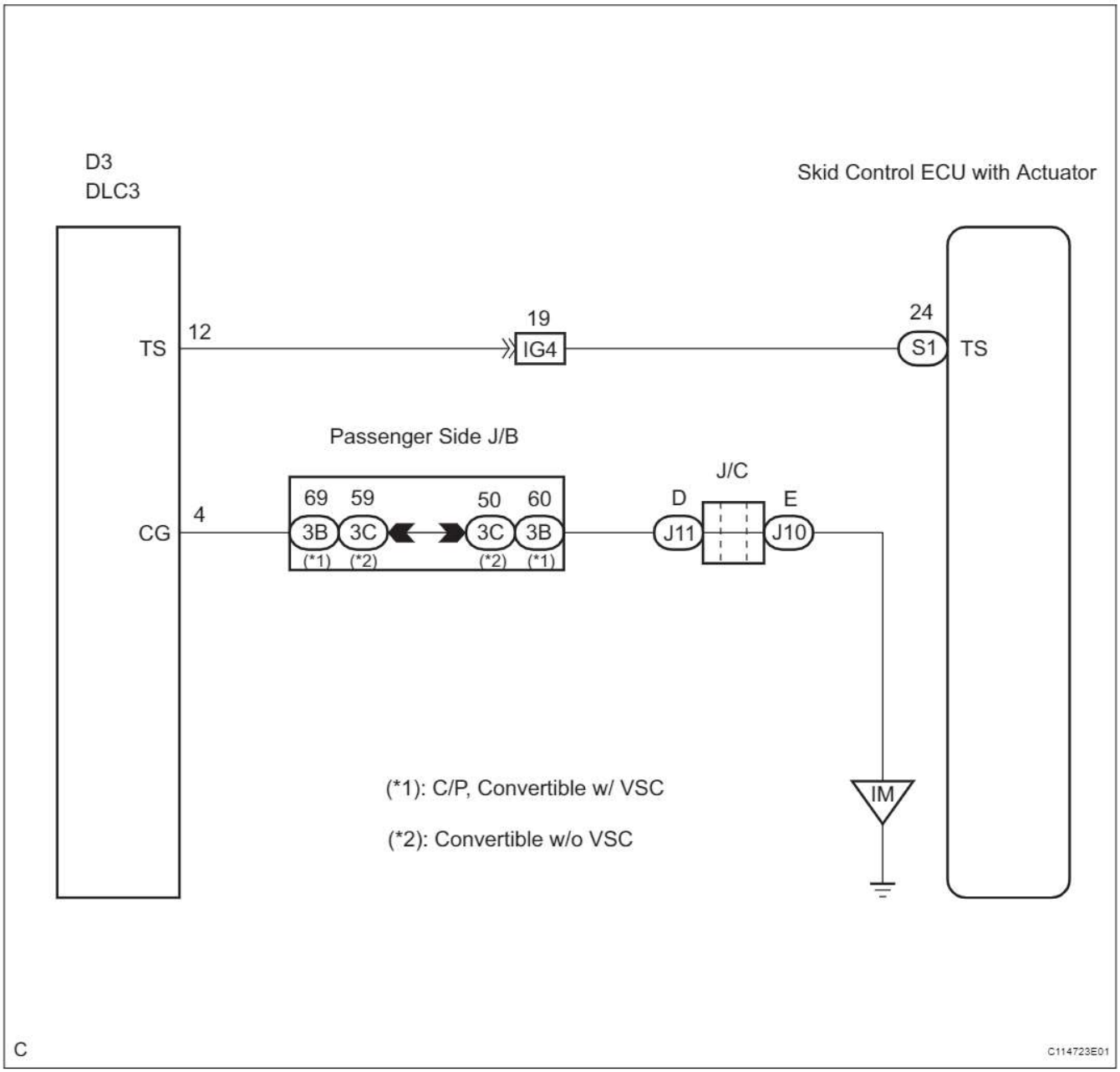
REPLACE ABS AND TRACTION ACTUATOR

TS and CG Terminal Circuit

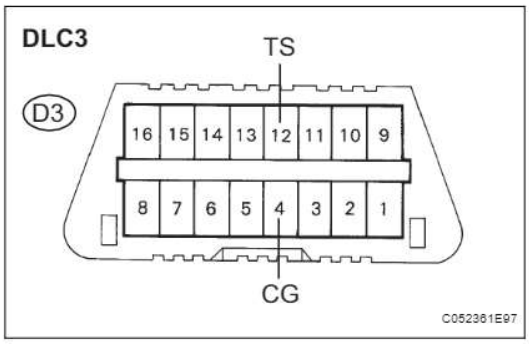
DESCRIPTION

In the sensor check mode, a malfunction of the speed sensor that cannot be detected when the vehicle is stopped is detected while driving.
Transition to the sensor check mode can be performed by connecting terminals TS and CG of the DLC3 and turning the ignition switch from off to the ON position.

WIRING DIAGRAM



1 INSPECT DLC3 TERMINAL VOLTAGE (TS TERMINAL)



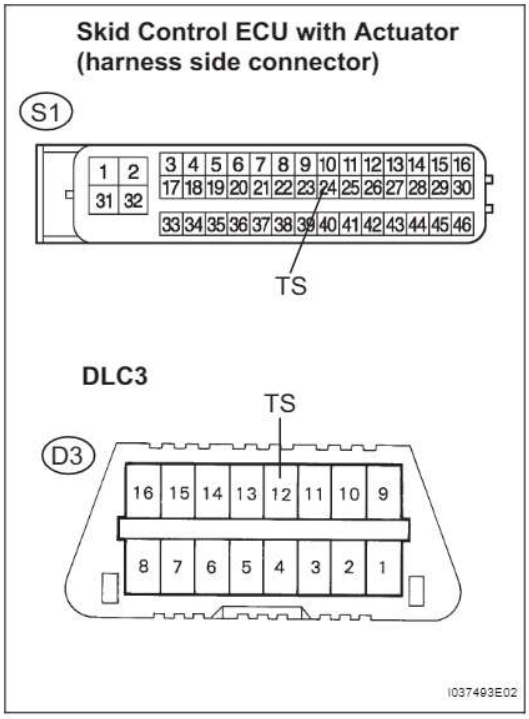
(a) Turn the ignition switch to the ON position.
(b) Measure the voltage according to the value(s) in the table below.
Voltage

Tester Connection	Specified Condition
D3-12 (TS) - D3-4 (CG)	10 to 14 V

NG → Go to step 3

OK

2 CHECK HARNESS AND CONNECTOR (DLC3 - BODY GROUND)



(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.
Resistance

Tester Connection	Specified Condition
S1-24 (TS) - D3-12 (TS)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.
Resistance

Tester Connection	Specified Condition
S1-24 (TS) - Body ground	10 kΩ or higher

NOTICE:
When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

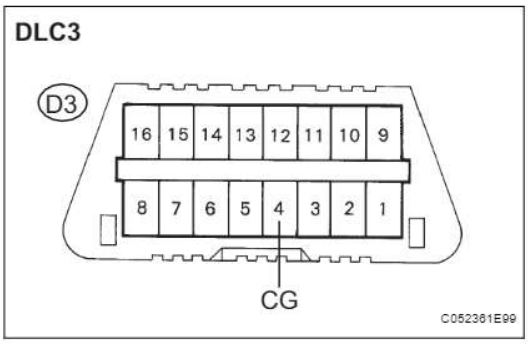
NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ABS AND TRACTION ACTUATOR

BC

3	CHECK HARNESS AND CONNECTOR (BODY GROUND - DLC3)



(a) Measure the resistance according to the value(s) in the table below.

Resistance

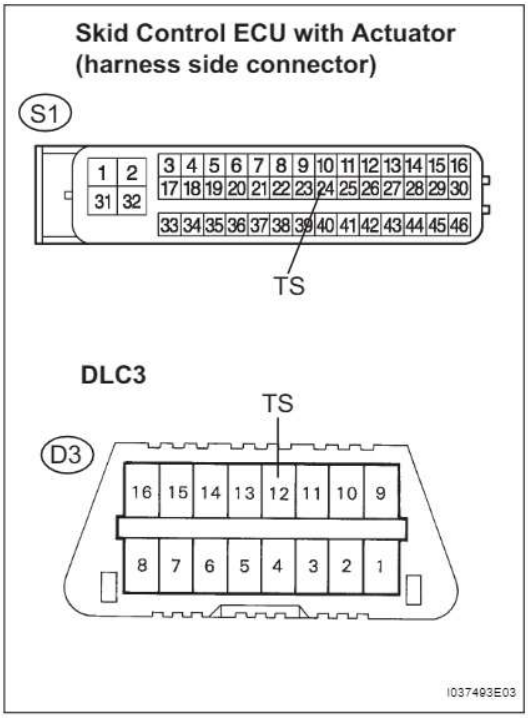
Tester Connection	Specified Condition
D3-4 (CG) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

BC

4	CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - DLC3)



(a) Disconnect the skid control ECU connector.

(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S1-24 (TS) - D3-12 (TS)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition
S1-24 (TS) - Body ground	10 kΩ or higher

NOTICE:
When replacing ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

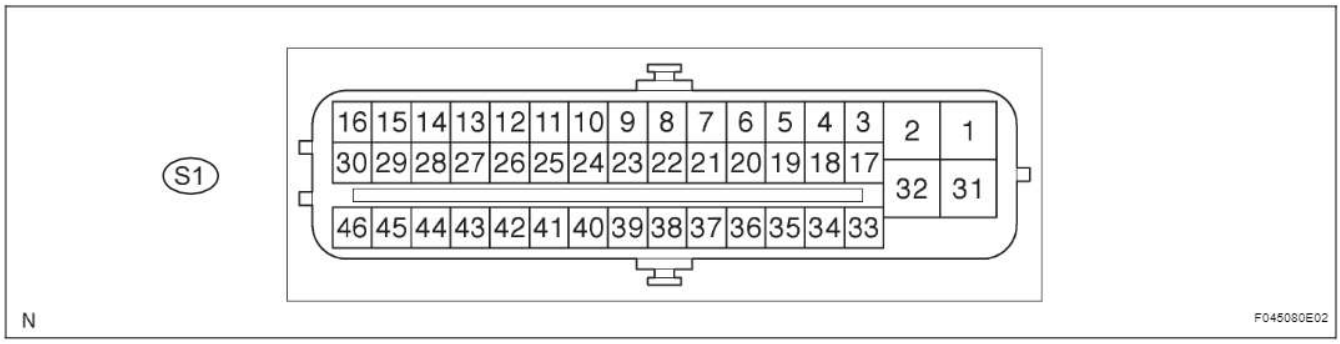
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ABS AND TRACTION ACTUATOR

TERMINALS OF ECU

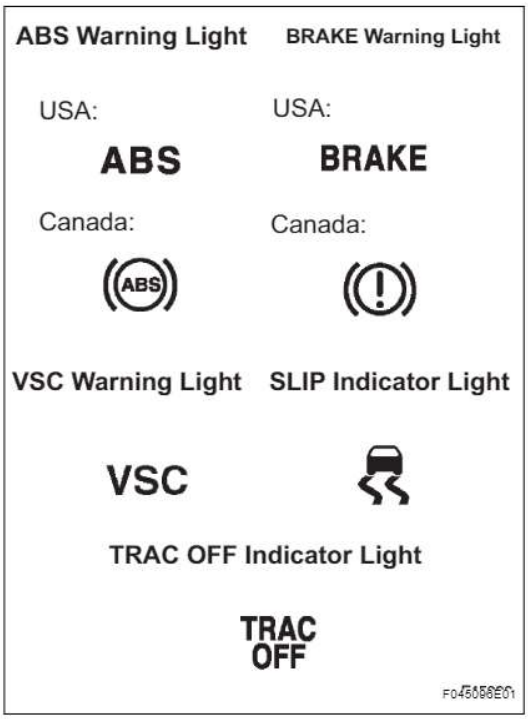
1. SKID CONTROL ECU



Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
BM (S1-2) - GND1 (S1-32), GND2 (S1-1)	B-Y - W-B, W-B	Motor relay test input	IG switch ON, pump motor running	10 to 14 V
FR+ (S1-3) - FR- (S1-17)	W - B	Front RH wheel speed signal input	IG switch ON, slowly turn right front wheel	Pulse generation
RR+ (S1-5) - RR- (S1-19)	P - L	Rear RH wheel speed signal input	IG switch ON, slowly turn right rear wheel	Pulse generation
TRC+ (S1-8) - TRC- (S1-22)	G - L	ECM communication output	IG switch ON	Pulse generation
ENG+ (S1-9) - ENG- (S1-23)	P - V	ECM communication input	IG switch ON	Pulse generation
NEO (S1-10) - GND1 (S1-32), GND2 (S1-1)	BR-R - W-B, W-B	Engine revolution signal input	Engine idling	Pulse generation
CANH (S1-11) - CANL (S1-25)	B - W	CAN communication line	IG switch OFF	54 to 67 Ω
SP1 (S1-12) - GND1 (S1-32), GND2 (S1-1)	L-O - W-B, W-B	Speed signal output	Vehicle drives at about 12 mph (20 km/h)	Pulse generation
D/G (S1-13) - GND1 (S1-32), GND2 (S1-1)	W - W-B, W-B	Diagnosis tester communication line	IG switch ON	10 to 14 V
MRF (S1-14) - R+ (S1-45)	Y-R - V-Y	Fail safe motor relay output	IG switch ON	10 to 14 V
MR (S1-15) - R+ (S1-45)	V-R - V-Y	Motor relay output	IG switch ON, pump motor running	10 to 14 V
FL+ (S1-18) - FL- (S1-4)	V - LG	Front LH wheel speed signal input	IG switch ON, slowly turn left front wheel	Pulse generation
RL+ (S1-20) - RL- (S1-6)	R - G	Rear LH wheel speed signal input	IG switch ON, slowly turn left rear wheel	Pulse generation
TS (S1-24) - GND1 (S1-32), GND2 (S1-1)	LG-B - W-B, W-B	Sensor check input	IG switch ON	10 to 14 V
STP (S1-27) - GND1 (S1-32), GND2 (S1-1)	G-W - W-B, W-B	Stop light switch input	Stop light switch ON (Brake pedal pushed)	8 to 14 V
STP (S1-27) - GND1 (S1-32), GND2 (S1-1)	G-W - W-B, W-B	Stop light switch input	Stop light switch OFF (Brake pedal released)	Below 1.5 V
PKB (S1-28) - GND1 (S1-32), GND2 (S1-1)	R-W - W-B, W-B	Parking brake switch input	IG switch ON, parking brake switch ON	Below 1.5 V
PKB (S1-28) - GND1 (S1-32), GND2 (S1-1)	R-W - W-B, W-B	Parking brake switch input	IG switch ON, parking brake switch OFF	10 to 14 V
WA (S1-29) - GND1 (S1-32), GND2 (S1-1)	R-B - W-B, W-B	ABS warning light output	IG switch ON, ABS warning light ON	6 to 11 V
WA (S1-29) - GND1 (S1-32), GND2 (S1-1)	R-B - W-B, W-B	ABS warning light output	IG switch ON, ABS warning light OFF	Below 2.0 V
BZ (S1-30) - GND1 (S1-32), GND2 (S1-1)	P-B - W-B, W-B	Buzzer output	IG switch ON, VSC buzzer sounds	Below 1.0 ⟷ 10 to 14 V

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
BZ (S1-30) - GND1 (S1-32), GND2 (S1-1)	P-B - W-B, W-B	Buzzer output	IG switch ON, VSC buzzer does not sound	10 to 14 V
+BS (S1-31) - GND1 (S1-32), GND2 (S1-1)	W - W-B, W-B	Solenoid relay power supply	Always	10 to 14 V
IND (S1-34) - GND1 (S1-32), GND2 (S1-1)	GR-B - W-B, W-B	SLIP Indicator light output	IG switch ON, Slip indicator light ON	Below 2.0 V
IND (S1-34) - GND1 (S1-32), GND2 (S1-1)	GR-B - W-B, W-B	SLIP Indicator light output	IG switch ON, Slip indicator light OFF	8 to 14 V
WT (S1-35) - GND1 (S1-32), GND2 (S1-1)	GR - W-B, W-B	TRAC OFF indicator output	IG switch ON, TRAC OFF Indicator light ON	Below 2.0 V
WT (S1-35) - GND1 (S1-32), GND2 (S1-1)	GR - W-B, W-B	TRAC OFF indicator output	IG switch ON, TRAC OFF Indicator light OFF	8 to 14 V
VSCW (S1-36) - GND1 (S1-32), GND2 (S1-1)	R-L - W-B, W-B	VSC warning light output	IG switch ON, VSC warning light ON	Below 2.0 V
P (S1 - 40) - GND1 (S1-32), GND2 (S1-1)	G-W - W-B, W-B	P range switch input	IG switch ON P range switch ON	8 to 14 V
P (S1 - 40) - GND1 (S1-32), GND2 (S1-1)	G-W - W-B, W-B	P range switch input	IG switch ON P range switch OFF	Below 2.0 V
WFSE (S1-42) - GND1 (S1-32), GND2 (S1-1)	W-L - W-B, W-B	WFSE input	IG switch ON	10 to 14 V
CSW (S1-43) - GND1 (S1-32), GND2 (S1-1)	P-L - W-B, W-B	TRAC OFF switch input	TRAC OFF switch OFF	10 to 14 V
BRL (S1-44) - GND1 (S1-32), GND2 (S1-1)	R-Y - W-B, W-B	Brake warning light output	IG switch ON, BRAKE warning light ON	6 to 11 V
BRL (S1-44) - GND1 (S1-32), GND2 (S1-1)	R-Y - W-B, W-B	Brake warning light output	IG switch ON, BRAKE warning light OFF	Below 2.0 V
R+ (S1-45) - GND1 (S1-32), GND2 (S1-1)	V-Y - W-B, W-B	Power supply for motor relay	IG switch ON	10 to 14 V
IG1 (S1-46) - GND1 (S1-32), GND2 (S1-1)	B-R - W-B, W-B	IG1 power supply	IG switch ON	10 to 14 V

BC



DIAGNOSIS SYSTEM

1. DIAGNOSIS

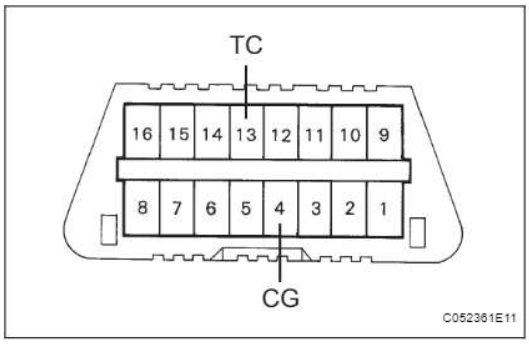
(a) If the skid control ECU detects a malfunction, the ABS, Brake, VSC warning lights and TRAC OFF indicator light will come on to warn the driver. The table below indicates which lights come on when there is a malfunction in a particular function.

Item/Trouble Area	ABS	EBD	BA (Brake Assist)	TRAC	VSC
ABS Warning Light	O	O	O	-	-
Brake Warning Light	-	O	-	-	-

Item/Trouble Area	ABS	EBD	BA (Brake Assist)	TRAC	VSC
TRAC OFF Indicator Light	○	○	○	○	○
VSC Warning Light	○	○	○	○	○

○: Light ON
-: Light OFF

- The DTCs are simultaneously stored in memory. The DTCs can be read by connecting the SST between TC and CG terminals of the DLC3 and observing the blinking of the ABS warning light and VSC warning light, or by connecting a intelligent tester.
- This system has a sensor signal check function (TEST MODE).
  The DTC can be read by connecting the SST between terminals TS and CG of DLC3 and observing the blinking of the ABS warning light and VSC warning light, or by connecting a intelligent tester.



DTC CHECK / CLEAR

1. DTC CHECK (USING SST CHECK WIRE)

(a) Check DTCs.

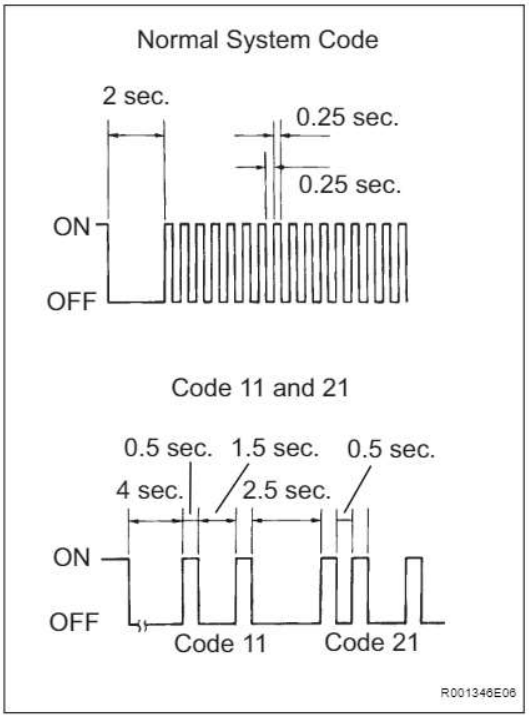
(1) Using SST, connect terminals TC and CG of the DLC3.
SST 09843-18040

(2) Turn the ignition switch to the ON position.

(3) Read the DTC from the ABS warning light and VSC warning light on the combination meter.
HINT:

- If no code appears, inspect the diagnostic circuit or ABS warning light circuit.

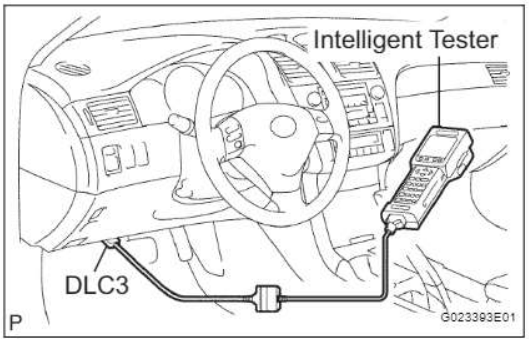
Trouble Area	See procedure
TC and CG terminal circuit	BC-171
ABS warning light remains on circuit	BC-142
ABS warning light does not comes on circuit	BC-146
VSC warning light remains on circuit	BC-149
VSC warning light does not come on circuit	BC-153



- As an example, the blinking patterns for a normal system code and trouble codes 11 and 21 are shown on the left.

(4) Codes are explained in the code table (See page BC-88).

(5) After completing the check, disconnect terminals TC and CG of the DLC3, and turn off the display. If 2 or more DTCs are detected at the same time, the DTCs will be displayed in assenting order.



2. DTC CHECK

(a) Check DTCs.

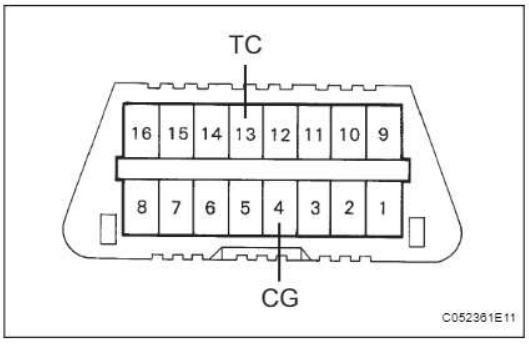
(1) Connect the intelligent tester to the DLC3.

(2) Turn the ignition switch to the ON position.

(3) Read the DTCs following the prompts on the tester screen.

HINT:

Refer to the intelligent tester operator's manual for further details.



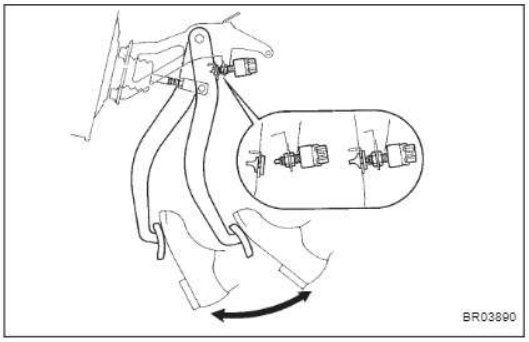
3. CLEAR DTC (USING SST CHECK WIRE)

(a) Clear the DTCs using the SST check wire.

(1) Using SST, connect terminals TC and CG of the DLC3.

SST 09843-18040

(2) Turn the ignition switch to the ON position.



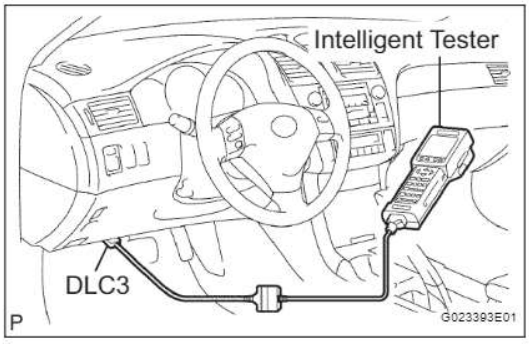
(3) Clear the DTCs stored in the ECU by depressing the brake pedal 8 times or more within 5 seconds.

(4) Check that the warning light indicates a normal system code.

(5) Remove the SST.

HINT:

Clearing the DTCs cannot be performed by removing the battery cable or the ECU-IG fuse



4. CLEAR DTC

(a) Clear the DTCs using the intelligent tester.
  (1) Connect the intelligent tester to the DLC3.
  (2) Turn the ignition switch to the ON position.
  (3) Operate the intelligent tester to clear the codes.
    HINT:
    Refer to the intelligent tester operator's manual for further details.

5. END OF DTC CHECK/CLEAR

(a) Turn the ignition switch to the ON position
(b) Check that the ABS warning light and VSC warning light go off within approximately 3 seconds.

BC

FREEZE FRAME DATA

1. FREEZE FRAME DATA

HINT:

- Whenever a DTC is detected or the ABS operates, the skid control ECU stores the current vehicle (sensor) state as freeze frame data.
- The skid control ECU stores the number of times (maximum: 31) the ignition switch has been turned from off to the ON position since the last time ABS was activated. However, if the vehicle was stopped or at low speed (4.3 mph (7 km/h) or less), or if a DTC is detected, the skid control ECU will not count the number since then.
- Freeze frame data at the time the ABS operates: The skid control ECU stores and updates data whenever the ABS system operates. When the ECU stores data at the time a DTC is detected, the data stored when the ABS operated is erased.
- Freeze frame data at the time a DTC is detected: When the skid control ECU stores data at the time a DTC is detected, no updates will be performed until the data is cleared.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) From the display on the tester, select the "FREEZE FRAME DATA".

BC

Intelligent 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 to 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

Intelligent tester display	Measurement Item	Reference Value*
SHIFT POSITION	Shift lever position	FAIL P,N R D 4 3 2 L

FAIL-SAFE CHART

1. FAIL SAFE OPERATION

Malfunction	Symptom
ABS system	Prohibit the ABS, BA, TRAC, and VSC control
BA system	Prohibit the ABS, BA, TRAC, and VSC control
EBD system	Prohibit the EBD control
TRAC system	Prohibit the TRAC and VSC control
VSC system	Prohibit the TRAC and VSC control

HINT:

- A malfunction in either the ABS or BA system will result in identical operation, with ABS, BA, TRAC, and VSC system control prohibited.
- If control is prohibited due to a malfunction during operation, control will be disabled gradually. This is to avoid sudden vehicle instability.

BC

DATA LIST / ACTIVE TEST

HINT:
With the intelligent tester connected to the DLC3 and the ignition switch in the ON position, the ABS, TRAC and VSC data list can be displayed. Follow the prompts on the tester screen to access the DATA LIST.

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
ABS MOT RELAY	ABS motor relay / ON or OFF	ON : Motor relay ON	-
SOL RELAY	Solenoid relay / ON or OFF	ON : Solenoid relay ON	-
VSC / TRC OFF SW	TRAC control switch / ON or OFF	ON : TRAC control switch ON	-
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 depressed OFF : Brake pedal released	-
PKB SW	Parking brake switch / ON or OFF	ON : Parking brake applied OFF : Parking brake released	-
ABS OPERT FR	ABS operation (FR) / BEFORE or OPERATE	BEFORE : No ABS operation (FR) OPERATE : During ABS operation (FR)	-
ABS OPERT FL	ABS operation (FL) / BEFORE or OPERATE	BEFORE : No ABS operation (FL) OPERATE : During ABS operation (FL)	-
ABS OPERT RR	ABS operation (RR) / BEFORE or OPERATE	BEFORE : No ABS operation (RR) OPERATE : During ABS operation (RR)	-
ABS OPERT RL	ABS operation (RL) / BEFORE or OPERATE	BEFORE : No ABS operation (RL) OPERATE : During ABS operation (RL)	-
WHEEL SPD FR	Wheel speed sensor (FR) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed	Similar speed as indicated on speed meter
WHEEL SPD FL	Wheel speed sensor (FL) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed	Similar speed as indicated on speed meter
WHEEL SPD RR	Wheel speed sensor (RR) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed	Similar speed as indicated on speed meter
WHEEL SPD RL	Wheel speed sensor (RL) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed	Similar speed as indicated on speed meter
DECELERAT SENS	Deceleration sensor 1 reading / min.: -1.869 G, max.: 1.869 G	Approximately 0 +- 0.13G at still condition	Reading changes when vehicle is bounced
DECELERAT SENS2	Deceleration sensor 2 reading / min.: -1.869 G, max.: 1.869 G	Approximately 0 +- 0.13G at still condition	Reading changes when vehicle is bounced
IG VOLTAGE	ECU power supply voltage / UNDER / NORMAL	NORMAL: 9.5 V or over UNDER: Below 9.5 V	-
SFRR	ABS solenoid (SFRR) / ON or OFF	ON : Operate	-
SFRH	ABS solenoid (SFRH) / ON or OFF	ON : Operate	-
SFLR	ABS solenoid (SFLR) / ON or OFF	ON : Operate	-
SFLH	ABS solenoid (SFLH) / ON or OFF	ON : Operate	-
SRRR (SRR)	ABS solenoid (SRRR (SRR)) / ON or OFF	ON : Operate	-

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
SRRH (SRH)	ABS solenoid (SRRH (SRH)) / ON or OFF	ON : Operate	-
SRLR	ABS solenoid (SRLR) / ON or OFF	ON : Operate	-
SRLH	ABS solenoid (SRLH) / ON or OFF	ON : Operate	-
SMF (BA-SOL)	TRAC solenoid (SMF) / ON or OFF	ON : Operate	-
SMR	TRAC solenoid (SMR) / ON or OFF	ON : Operate	-
THROTTLE	Throttle position sensor/ Min.: 0 deg, Max.: 125 deg	Release accelerator pedal: Approx. 0 deg. Depress accelerator pedal: Approx. 90 deg.	-
ENGINE SPD	Engine Speed/ Min.: 0 rpm, Max.: 6000 rpm	Actual engine speed	-
VEHICLE SPD	Maximum wheel speed sensor reading / min.: 0 km/h (0 MPH), max.: 326 km/h (202 MPH)	Actual vehicle speed	Speed indicated on speedometer
YAW RATE	Yaw rate sensor/ Min.: -128 deg/s, Max.: 128 deg/s	Min.: -128 deg/s Max.: 128 deg/s	-
YAW ZERO VALUE	Memorized zero value/ Min.: -128 deg/s, Max.: 128 deg/s	Min.: -128 deg/s Max.: 128 deg/s	-
STEERING ANG	Steering sensor/ Min.: -1152 deg, Max.: 1150.875 deg	Left turn: Increase Right turn: Decrease	-
MAS CYL PRS 1	Master cylinder pressure sensor 1 reading / min.: 0 V, max.: 5 V	When brake pedal is released : 0.3 to 0.9 V	Reading increases when brake pedal is depressed
TEST MODE	Test mode / NORMAL or TEST	NORMAL : Normal mode TEST : During test mode	-
#CODES	Number of DTC recorded / min.: 0, max.: 255	Min.: 0, max.: 39	-

BC

1. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the intelligent tester allows the relay and actuator, etc. to operate without removing any parts. Performing the ACTIVE TEST as the 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 intelligent tester to the DLC3.

(b) Turn the ignition switch to the ON position.

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

HINT:

Ignition switch must be turned to the ON position to proceed to the Active Test using the intelligent tester.

Item	Vehicle Condition / 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

Item	Vehicle Condition / Test Details	Diagnostic Note
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
SMF (BA-SOL)	Turns TRAC solenoid SMF (BA-SOL) ON / OFF	Operation of solenoid (clicking sound) can be heard
SMR	Turns TRAC solenoid SMR 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 solenoid (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 / TRAC OFF IND	Turns VSC / TRAC OFF indicator ON / OFF	Observe combination meter
SLIP INDI LIGHT	Turns SLIP indicator light ON / OFF	Observe combination meter
BRAKE WARN 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

DIAGNOSTIC TROUBLE CODE CHART

HINT:
If a malfunction code is displayed during the DTC check, check the circuit indicated by the DTC. For details of each code, turn to the page for the respective "DTC No." in the DTC chart.

VEHICLE STABILITY CONTROL SYSTEM

DTC No.	Detection Item	Trouble Area	See page
C0200/31*1	Front Speed Sensor RH Circuit	1. Right front speed sensor 2. Each speed sensor circuit 3. Sensor rotor 4. Sensor installation	BC-91
C0205/32*1	Front Speed Sensor LH Circuit	1. Left front speed sensor 2. Each speed sensor circuit 3. Sensor rotor 4. Sensor installation	BC-91
C0210/33*1	Rear Speed Sensor RH Circuit	1. Right rear speed sensor 2. Each speed sensor circuit 3. Sensor rotor 4. Sensor installation	BC-97
C0215/34*1	Rear Speed Sensor LH Circuit	1. Left rear speed sensor 2. Each speed sensor circuit 3. Sensor rotor 4. Sensor installation	BC-97
C0226/21	SFR Solenoid Circuit	1. ABS & TRAC actuator 2. SFRH or SFRR circuit	BC-103
C0236/22	SFL Solenoid Circuit	1. ABS & TRAC actuator 2. SFLH or SFLR circuit	BC-103
C0246/23	SRR Solenoid Circuit	1. ABS & TRAC actuator 2. SRRH or SRRR circuit	BC-103
C0256/24	SRL Solenoid Circuit	1. ABS & TRAC actuator 2. SRLH or SRLR circuit	BC-103
C0273/13*1	Open in ABS Motor Relay Circuit	1. ABS No.1 fuse 2. ABS MTR relay 3. ABS MTR relay circuit 4. VSC R/B	BC-106
C0274/14	Short to B+ in ABS Motor Relay Circuit	1. ABS No.1 fuse 2. ABS MTR relay 3. ABS MTR relay circuit 4. VSC R/B	BC-106
C0278/11	Open in ABS Solenoid Relay Circuit	1. ABS No.2 fuse 2. ABS SOL relay 3. ABS SOL relay circuit 4. ABS & TRAC actuator	BC-111
C0279/12	Short to B+ in ABS Solenoid Relay Circuit	1. ABS No.2 fuse 2. ABS SOL relay 3. ABS SOL relay circuit 4. ABS & TRAC actuator	BC-111
C1201/51	Engine Control System Malfunction	1. Engine control system	BC-115
C1203/53	ECM Communication Circuit Malfunction	1. TRC+ or TRC- circuit 2. ENG+ or ENG- circuit 3. ECM	BC-116
C1210/36	Zero Point Calibration of Yaw Rate Sensor Undone	1. Yaw rate sensor (Deceleration sensor) 2. Zero point calibration undone	BC-118
C1223/43	ABS Control System Malfunction	1. ABS control system	BC-120
C1224/44	NE Signal Circuit	1. NEO circuit 2. ECM 3. Skid control ECU	BC-121

DTC No.	Detection Item	Trouble Area	See page
C1225/25	SM Solenoid Circuit	1. SMF or SMR circuit 2. ABS & TRAC actuator	BC-103
C1231/31	Steering Angle Sensor Circuit Malfunction	1. Steering angle sensor 2. Steering angle sensor circuit 3. CAN communication system	BC-124
C1232/32	Acceleration Sensor Stuck Malfunction	1. Yaw rate sensor (Deceleration sensor) 2. Yaw rate sensor (Deceleration sensor) circuit 3. CAN communication circuit	BC-127
C1234/34	Yaw Rate Sensor Malfunction	1. Yaw rate sensor (Deceleration sensor) 2. CAN communication circuit	BC-127
C1235/35	Foreign Object is Attached on Tip of Front Speed Sensor RH	1. Right front speed sensor 2. Sensor installation	BC-91
C1236/36	Foreign Object is Attached on Tip of Front Speed Sensor LH	1. Left front speed sensor 2. Sensor installation	BC-91
C1238/38	Foreign Object is Attached on Tip of Rear Speed Sensor RH	1. Right rear speed sensor 2. Sensor installation	BC-97
C1239/39	Foreign Object is Attached on Tip of Rear Speed Sensor LH	1. Left rear speed sensor 2. Sensor installation	BC-97
C1241/41	Low Battery Positive Voltage	1. Battery 2. Charging system 3. Power source circuit	BC-131
C1243/43*1	Acceleration Sensor Stuck Malfunction	1. Yaw rate sensor (Deceleration sensor) 2. ?Yaw rate sensor circuit (Deceleration sensor circuit)	BC-127
C1244/44	Open or Short in Deceleration Sensor Circuit	1. Yaw rate sensor (Deceleration sensor) 2. Yaw rate sensor circuit (Deceleration sensor circuit) 3. CAN communication circuit	BC-127
C1245/45*1	Acceleration Sensor Output Malfunction	1. Yaw rate sensor (Deceleration sensor) 2. Yaw rate sensor circuit (Deceleration sensor circuit) 3. CAN communication circuit	BC-127
C1246/46*2	Master Cylinder Pressure Sensor Malfunction	1. Master cylinder pressure sensor 2. Master cylinder pressure sensor circuit	BC-134
C1249/49	Open in Stop Light Switch Circuit	1. Stop light assembly 2. Stop light switch circuit	BC-136
C1251/51*1	Open in Pump Motor Circuit	1. ABS & TRAC actuator	BC-140
C1336/39	Zero Point Calibration of Deceleration Sensor Undone	1. Yaw rate sensor (Deceleration sensor) 2. Zero point calibration not done	BC-118
C1361/91	Short Circuit in ABS Motor Fail Safe Relay Circuit	1. ABS No.1 fuse 2. ABS cut relay 3. ABS cut relay circuit 4. VSC R/B	BC-106
C1381/97	Yaw Rate and / or Acceleration Sensor Power Supply Voltage Malfunction	1. Yaw rate sensor 2. Yaw rate sensor power source circuit 3. CAN communication circuit	BC-127

*1, *2:
Even after the trouble areas are repaired, the ABS warning light will not go off unless the following operations are performed.

- *1:
  (a) Drive the vehicle at 12 mph (20 km/h) for 30 seconds or more and check that the ABS warning light goes off.
  (b) Clear the DTC.
- *2:
  (a) Keep the vehicle in a stationary condition for 5 seconds or more and depress the brake pedal lightly 2 or 3 times.
  (b) Drive the vehicle at a speed of 31 mph (50 km/h). Then depress the brake pedal strongly for about 3 seconds.
  (c) Repeat the above operation 3 times or more and check that the ABS warning light goes off.
  (d) Clear the DTC.
  HINT:
  - In some cases, the intelligent tester cannot be used when ABS warning light remains on.
  - In some cases, the intelligent tester cannot be used when the VSC warning light remains on.

BC

DTC	C0200/31	Front Speed Sensor RH Circuit

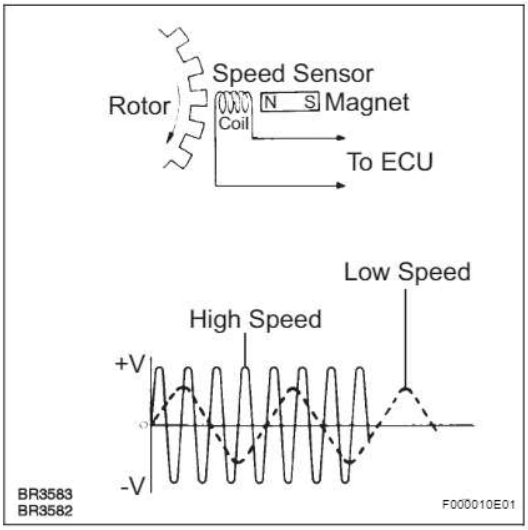
DTC	C0205/32	Front Speed Sensor LH Circuit

DTC	C1235/35	Foreign Object is Attached on Tip of Front Speed Sensor RH

DTC	C1236/36	Foreign Object is Attached on Tip of Front Speed Sensor LH

DESCRIPTION

The speed sensor detects wheel speed and sends the appropriate signals to the ECU. These signals are used to control the ABS control system. The front and rear rotors have 48 serrations each.



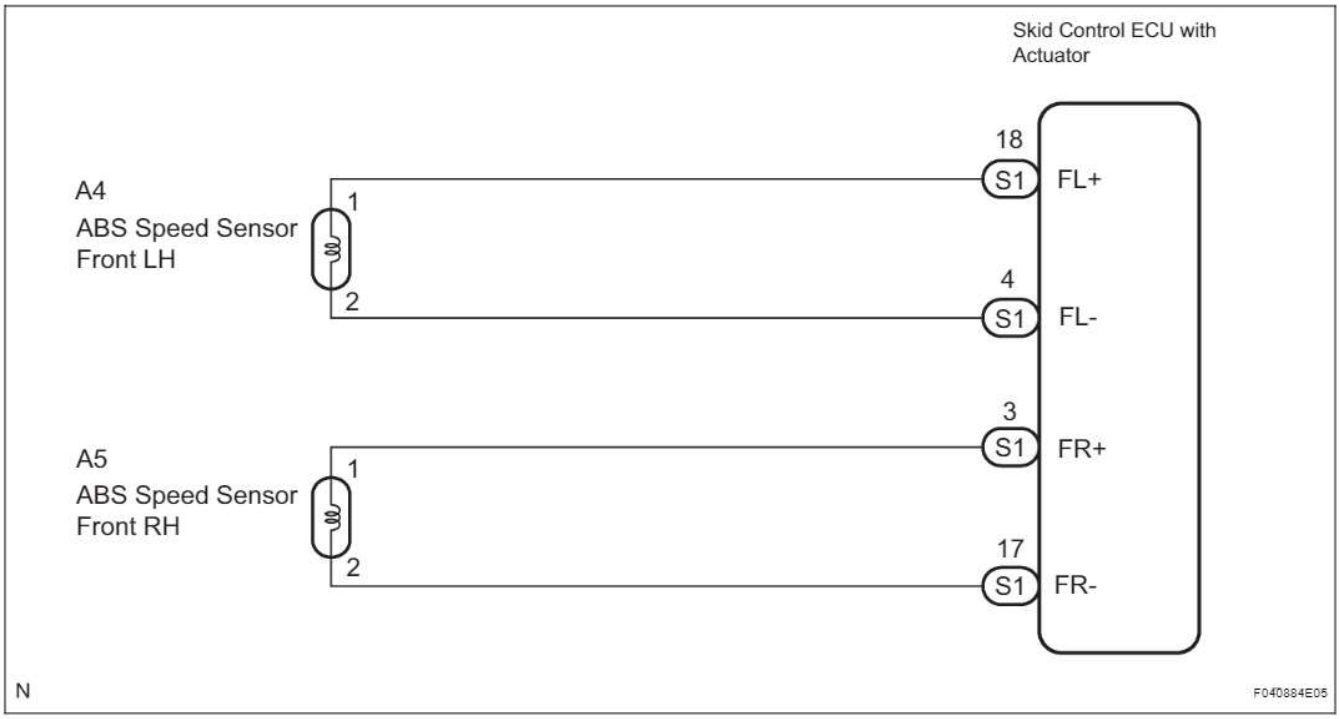
When the rotors rotate, the magnetic field emitted by the permanent magnet in the speed sensor generates AC voltage. Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.

DTC No.	DTC Detecting Condition	Trouble Area
C0200/31 C0205/32	(1) All the following conditions continues for at least 1 second. • Vehicle speed is more than 6 mph (10 km/h). • Open or short in vehicle speed sensor signal circuit. (2) Momentary interruption of the sensor signal of faulty wheel has occurred 7 times or more. (3) Sensor signal circuit is open for 0.5 seconds.	• Right front and left front speed sensor • Each speed sensor circuit • Sensor rotor • Sensor installation
C1235/35 C1236/36	All the following conditions for at least 5 seconds. • Vehicle speed is more than 12 mph (20 km/h). • Vehicle speed sensor signal receives interference.	• Right front and left front speed sensor • Sensor installation

HINT:

- DTC C0200/31 and C1235/35 are for the right front speed sensor.
- DTC C0205/32 and C1236/36 are for the left front speed sensor.

WIRING DIAGRAM



HINT:
Start the inspection from step 1 when using the intelligent tester and start from step 3 when not using the intelligent tester.

1	READ VALUE OF INTELLIGENT TESTER (FRONT SPEED SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select the DATA LIST mode on the intelligent tester.

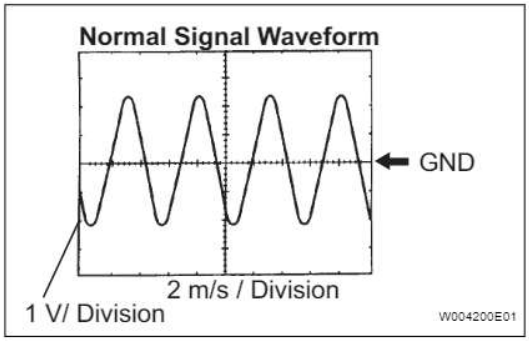
Item	Measurement Item / Range (Display)	Normal Condition
WHEEL SPD FR	Wheel speed sensor (FR) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed
WHEEL SPD FL	Wheel speed sensor (FL) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed

(d) Check that there is no difference between the speed value output from the speed sensor displayed on the intelligent 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.

NG → **Go to step 3**

OK

2	INSPECT SPEED SENSOR AND SENSOR ROTOR SERRATIONS



(a) INSPECTION USING OSCILLOSCOPE
(1) Connect the oscilloscope to terminal FR+ - FR- or FL+ - FL- of the skid control ECU.
(2) Drive the vehicle at about 19 mph (30 km/h), and check the signal waveform.
OK:
A waveform as shown in a figure should be output.
HINT:
- As the vehicle speed (wheel revolution speed) increases, 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 attached to it.

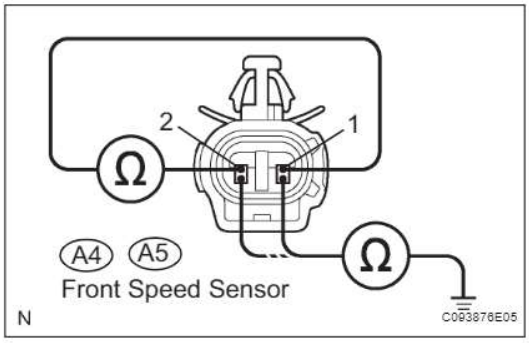
NOTICE:
When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

NG → **Go to step 6**

OK →

REPLACE ABS AND TRACTION ACTUATOR

3	INSPECT FRONT SPEED SENSOR



(a) Make sure that there is no looseness at the connectors' locking part and connecting part of connector.
(b) Disconnect the speed sensor connector.
(c) Measure the resistance according to the value(s) in the table below.
Resistance
LH:

Tester Connection	Specified Condition
A4-1 (FL+) - A4-2 (FL-)	0.6 to 2.5 kΩ

RH:

Tester Connection	Specified Condition
A5-1 (FR+) - A5-2 (FR-)	0.6 to 2.5 kΩ

(d) Measure the resistance according to the value(s) in the table below.
Resistance
LH:

Tester Connection	Specified Condition
A4-1 (FL+) - Body ground	10 kΩ or higher

Tester Connection	Specified Condition
A4-2 (FL-) - Body ground	10 kΩ or higher

RH:

Tester Connection	Specified Condition
A5-1 (FR+) - Body ground	10 kΩ or higher
A5-2 (FR-) - Body ground	10 kΩ or higher

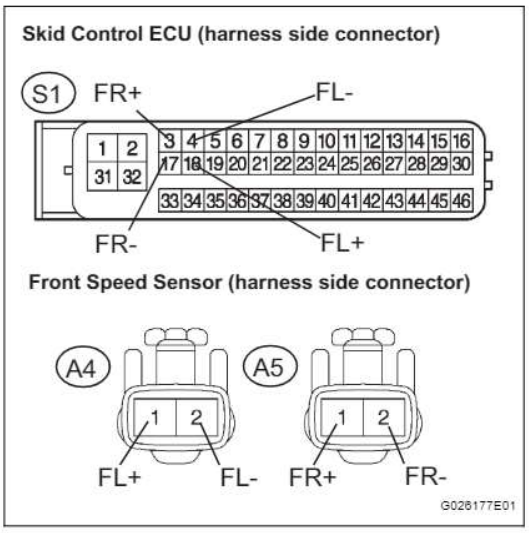
NOTICE:
Check the speed sensor signal after replacement (See page BC-70).

NG → **REPLACE FRONT SPEED SENSOR**

OK

BC

4 CHECK HARNESS AND CONNECTOR (FRONT SPEED SENSOR - SKID CONTROL ECU)



(a) Disconnect the skid control ECU connector and the front speed sensor connector.

(b) Measure the resistance according to the value(s) in the table below.

Resistance

LH:

Tester Connection	Specified Condition
S1-18 (FL+) - A4-1 (FL+)	Below 1 Ω
S1-4 (FL-) - A4-2 (FL-)	Below 1 Ω

RH:

Tester Connection	Specified Condition
S1-3 (FR+) - A5-1 (FR+)	Below 1 Ω
S1-17 (FR-) - A5-2 (FR-)	Below 1 Ω

(c) Measure the resistance according to the value(s) in the table below.

Resistance

LH:

Tester Connection	Specified Condition
S1-18 (FL+) - Body ground	10 kΩ or higher
S1-4 (FL-) - Body ground	10 kΩ or higher

RH:

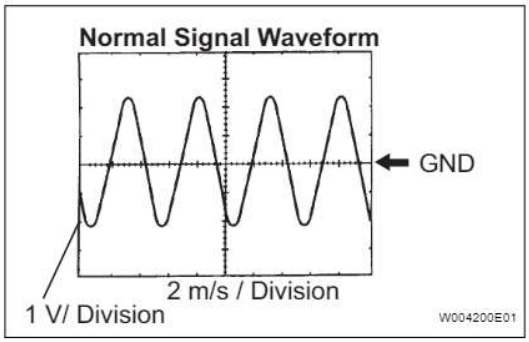
Tester Connection	Specified Condition
S1-3 (FR+) - Body ground	10 kΩ or higher
S1-17 (FR-) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5 INSPECT SPEED SENSOR AND SENSOR ROTOR SERRATIONS

(a) INSPECTION USING OSCILLOSCOPE



(1) Connect the oscilloscope to terminal FR+ - FR- or FL+ - FL- of the skid control ECU.
(2) Drive the vehicle at about 19 mph (30 km/h), and check the signal waveform.

OK:

A waveform as shown in a figure should be output.

HINT:

- As the vehicle speed (Wheel revolution speed) increases, 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 attached to it.

NOTICE:

When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

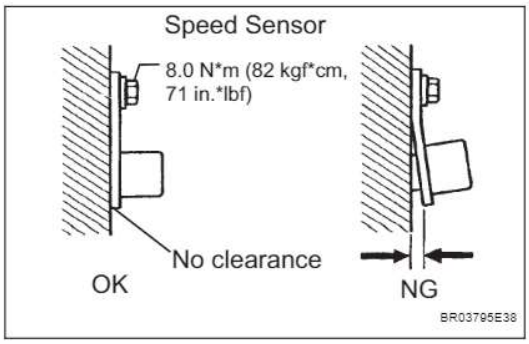
BC

NG → **Go to step 6**

OK →

REPLACE ABS AND TRACTION ACTUATOR

6 INSPECT FRONT SPEED SENSOR INSTALLATION



(a) Check the speed sensor installation.

OK:

The installation bolt is tightened properly.
There is no clearance between the sensor and the front steering knuckle.

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

NOTICE:

Check the speed sensor signal after the replacement (See page BC-70).

NG → **REPLACE FRONT SPEED SENSOR**

OK →

7 INSPECT SPEED SENSOR TIP

(a) Remove the front speed sensor (See page BC-186).
(b) Check the sensor tip.

OK:

No scratches or foreign matter on the sensor tip.

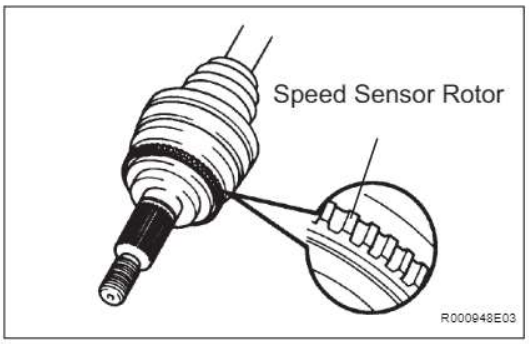
NOTICE:

Check the speed sensor signal after the replacement (See page BC-70).

NG → CLEAN OR REPLACE SPEED SENSOR

OK

8	INSPECT SPEED SENSOR ROTOR



(a) Remove the front speed sensor rotor.
(b) Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign matter on the rotors.

HINT:

If there is foreign matter in the rotor, remove it and check the output waveform after reassembly.

NOTICE:

Check the speed sensor signal after the replacement (See page BC-70).

NOTICE:

When replacing the ABS & TRACTION actuator assembly, perform zero point calibration (See page BC-76).

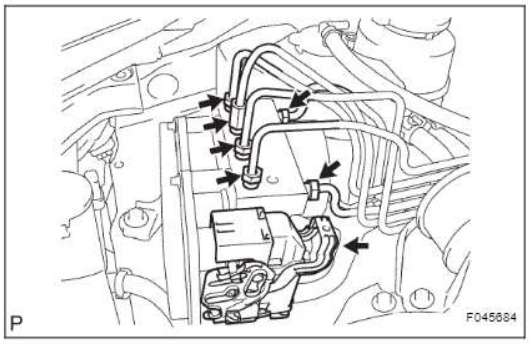
NG → CLEAN OR REPLACE SPEED SENSOR ROTOR

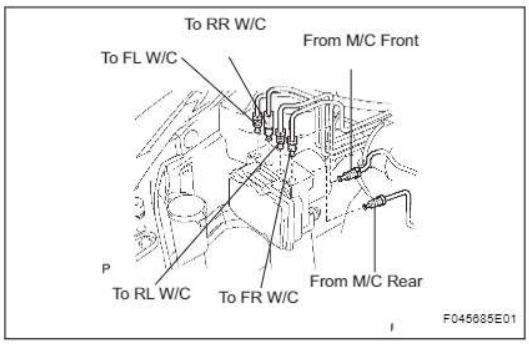
OK

REPLACE ABS AND TRACTION ACTUATOR

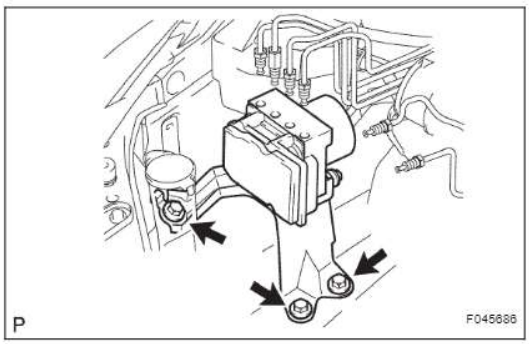
REMOVAL

1. **DRAIN BRAKE FLUID**
   NOTICE:
   Wash brake fluid off immediately if it adheres to any painted surface.
2. **DISCONNECT BATTERY NEGATIVE TERMINAL**
3. **REMOVE BRAKE ACTUATOR WITH BRACKET**
   (a) Release the latch of the brake actuator connector to disconnect the connector.
   (b) Using SST, disconnect the 6 brake tubes from the brake actuator.





   (c) Use tags or make a memo to identify the reconnection points.

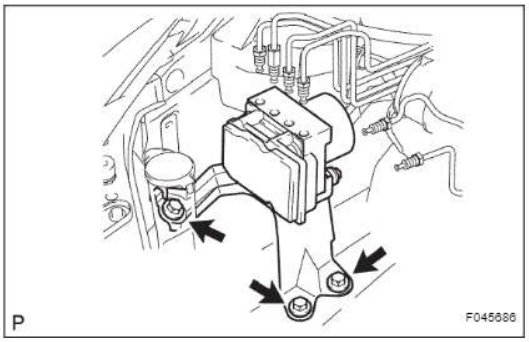


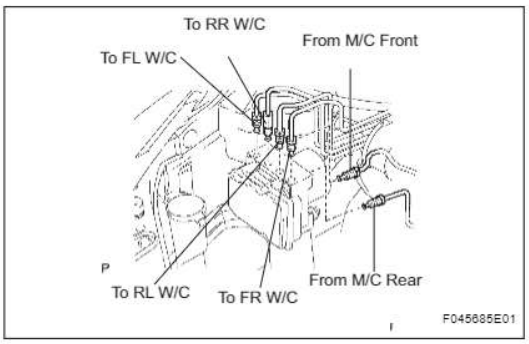
   (d) Remove the 3 bolts and brake actuator with bracket.
   NOTICE:
   Be careful not to damage the brake tubes and wire harness.
4. **REMOVE BRAKE ACTUATOR**
   (a) Remove the 2 nuts and brake actuator from the brake actuator bracket.

INSTALLATION

1. **INSTALL BRAKE ACTUATOR**
   (a) Install the brake actuator to the brake actuator bracket with the 2 nuts.
   Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

2. **INSTALL BRAKE ACTUATOR WITH BRACKET**
   (a) Install the brake actuator with bracket with the 3 bolts.
   Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)
   NOTICE:
   Be careful not to damage the brake tubes and wire harness.





   (b) Using SST, connect each brake line to the correct position of the brake actuator, as shown in the illustration.
   Torque: 15 N*m (155 kgf*cm, 11 ft.*lbf)
   (c) Connect the brake actuator connector.

3. **FILL RESERVOIR WITH BRAKE FLUID**
   HINT:
   See page BR-1

4. **BLEED BRAKE MASTER CYLINDER SUB-ASSEMBLY**
   HINT:
   See page BR-1
   SST 09023-00101

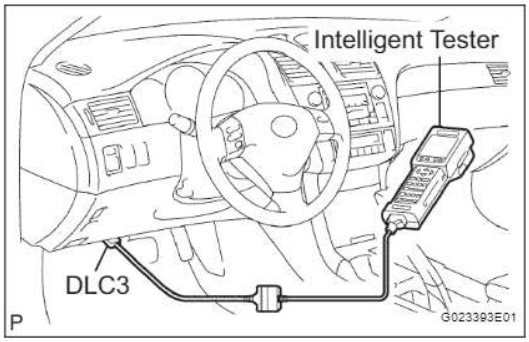
5. **BLEED BRAKE LINE**
   HINT:
   See page BR-1

6. **CHECK BRAKE FLUID LEAKAGE**

7. **CHECK FLUID LEVEL IN RESERVOIR**
   HINT:
   See page BR-1

8. **CONNECT BATTERY NEGATIVE TERMINAL**

9. **CHECK BRAKE ACTUATOR WITH INTELLIGENT TESTER**
   HINT:
   See page BC-179



BRAKE ACTUATOR

ON-VEHICLE INSPECTION

1. CONNECT INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and run at idle.
(c) Select the ACTIVE TEST mode on the intelligent tester.
HINT:
Please refer to the intelligent tester operator's manual for further details.

2. INSPECT ACTUATOR MOTOR OPERATION

(a) With the motor relay on, check the actuator motor operation noise.
(b) Turn the motor relay off.
(c) Depress the brake pedal and hold it for approximately 15 seconds. Check that the brake pedal cannot be depressed.
(d) With the motor relay on, check that the pedal does not pulsate.
NOTICE:
Do not keep the motor relay turned on for more than 5 seconds continuously. When operating it continuously, set an interval of more than 20 seconds.
(e) Turn the motor relay off and release the brake pedal.

3. INSPECT RIGHT FRONT WHEEL OPERATION

NOTICE:
Never turn on the solenoids in a manner described below.
(a) With the brake pedal depressed, perform the following operations.
(b) Turn the SFRH and SFRR solenoids on simultaneously, and check that the pedal cannot be depressed.
NOTICE:
Do not keep the solenoids turned on for more than 5 seconds continuously. When operating it continuously, set an interval of more than 20 seconds.
(c) Turn the SFRH and SFRR solenoids off simultaneously, and check that the pedal can be depressed.
(d) Turn the motor relay on, and check that the pedal returns.
NOTICE:
Do not keep the motor relay turned on for more than 5 seconds continuously. When operating it continuously, set an interval of more than 20 seconds.
(e) Turn the motor relay off and release the brake pedal.

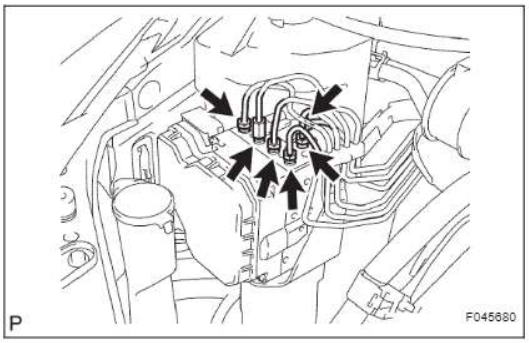
BC

4. INSPECT OTHER WHEEL OPERATION

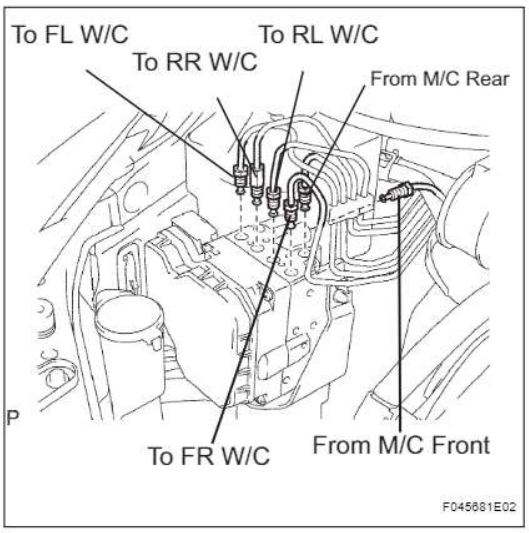
(a) Using the same procedure, check the solenoids of the other wheels.
HINT:
Left front wheel:
SFLH, SFLR
Right rear wheel:
SRRH, SRRR
Left rear wheel:
SRLH, SRLR

REMOVAL

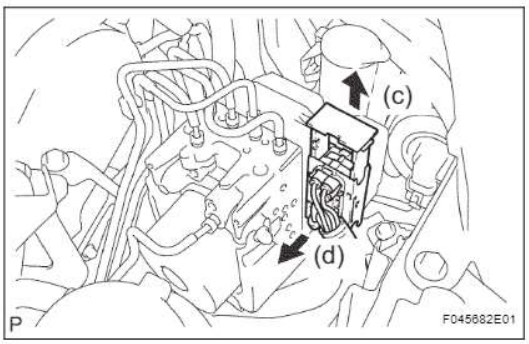
1. **DRAIN BRAKE FLUID**
   NOTICE:
   Wash brake fluid off immediately if it adheres to any painted surface.
2. **DISCONNECT BATTERY NEGATIVE TERMINAL**
3. **REMOVE BRAKE ACTUATOR WITH BRACKET**
   (a) Using SST, disconnect the 6 brake tubes from the actuator with bracket.



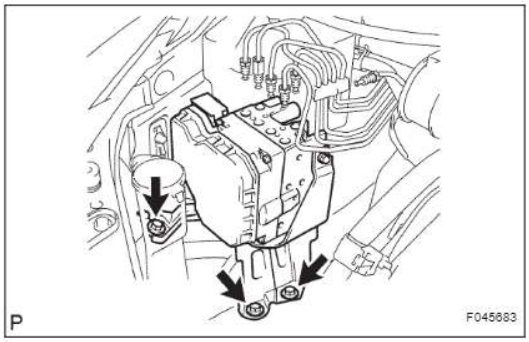
BC



(b) Use tags or make a memo to identify the reconnection points.



(c) Pull the lock lever upward.
(d) Disconnect the actuator connector.



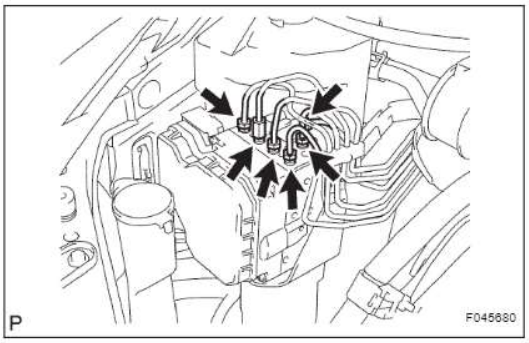
(e) Remove the 3 bolts and the actuator with bracket.
NOTICE:
Be careful not to damage the brake tubes and wire harness.

4. REMOVE BRAKE ACTUATOR

(a) Remove the 2 nuts and the brake actuator assembly from the brake actuator bracket.

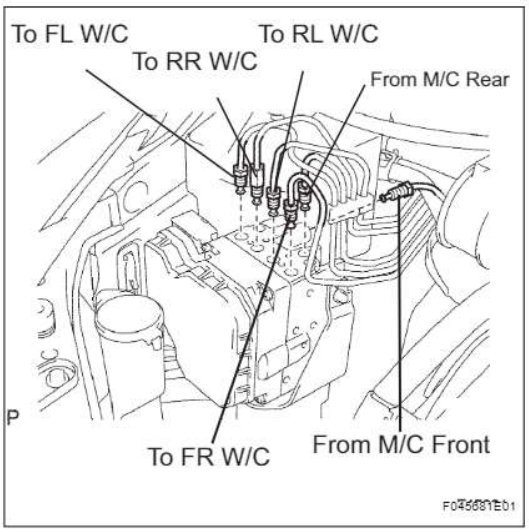
INSTALLATION

1. **INSTALL BRAKE ACTUATOR**
   (a) Install the brake actuator assembly with the 2 nuts.
   Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



2. **INSTALL BRAKE ACTUATOR WITH BRACKET**
   (a) Install the actuator with bracket with the 3 bolts.
   Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)
   NOTICE:
   Be careful not to damage the brake tubes and wire harness.
   (b) Connect the actuator connector.

BC



   (c) Using SST, connect each brake tube to correct positions of the actuator with bracket, as shown in the illustration.
   Torque: 15 N*m (155 kgf*cm, 11 ft.*lbf)

3. **FILL RESERVOIR WITH BRAKE FLUID**
   HINT:
   See page BR-1

4. **BLEED BRAKE MASTER CYLINDER SUB-ASSEMBLY**
   HINT:
   See page BR-1
   SST 09023-00101

5. **BLEED BRAKE LINE**
   HINT:
   See page BR-1

6. **CHECK BRAKE FLUID LEAKAGE**

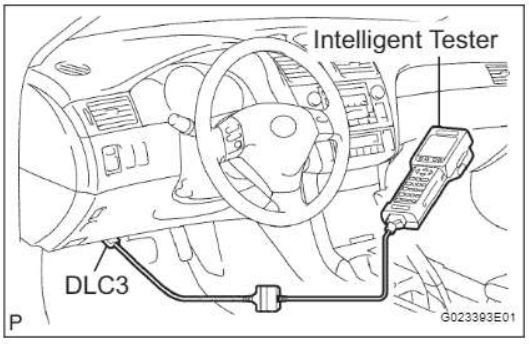
7. **CHECK FLUID LEVEL IN RESERVOIR**
   HINT:
   See page BR-1

8. **CONNECT BATTERY NEGATIVE TERMINAL**

9. **PERFORM INITIALIZATION**
   HINT:
   See page IN-24

10. **PERFORM YAW RATE SENSOR ZERO POINT CALIBRATION**
    HINT:
    See page BC-76

11. **CHECK BRAKE ACTUATOR WITH INTELLIGENT TESTER**
    HINT:
    See page BC-182



BRAKE ACTUATOR (w/ VSC)

ON-VEHICLE INSPECTION

1. CONNECT INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and run at idle.
(c) Select the ACTIVE TEST mode on the intelligent tester.
HINT:
Please refer to the intelligent tester operator's manual for further details.

2. INSPECT ACTUATOR MOTOR OPERATION

(a) With the motor relay on, check the actuator motor operation noise.
(b) Turn the motor relay off.
(c) Depress the brake pedal and hold it for approximately 15 seconds. Check that the brake pedal cannot be depressed.
(d) With the motor relay on, check that the pedal does not pulsate.
NOTICE:
Do not keep the motor relay turned on for more than 5 seconds continuously. When operating it continuously, set an interval of more than 20 seconds.
(e) Turn the motor relay off and release the brake pedal.

3. INSPECT RIGHT FRONT WHEEL OPERATION

NOTICE:
Never turn on the solenoids in a manner different to those described below.

(a) With the brake pedal depressed, perform the following operations.
(b) Turn the SFRH and SFRR solenoids on simultaneously, and check that the pedal cannot be depressed.
NOTICE:
Do not keep the solenoid turned on for more than 10 seconds continuously. When operating it continuously, set an interval of more than 20 seconds.
(c) Turn the SFRH and SFRR solenoids off simultaneously, and check that the pedal can be depressed.
(d) Turn the motor relay on, and check that the pedal returns.
NOTICE:
Do not keep the motor relay turned on for more than 5 seconds continuously. When operating it continuously, set an interval of more than 20 seconds.
(e) Turn the motor relay off and release the brake pedal.

4. INSPECT OTHER WHEEL OPERATION

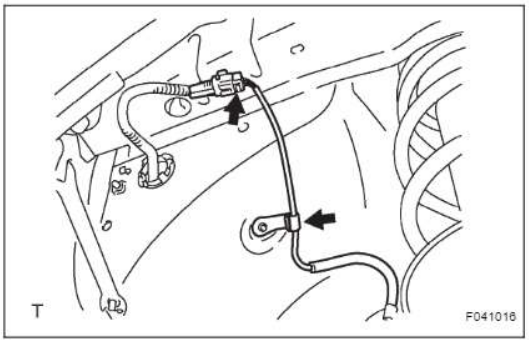
(a) Using the same procedure, check the solenoids of the other wheels.
HINT:
Left front wheel:
SFLH, SFLR
Right rear wheel:
SRRH, SRRR
Left rear wheel:
SRLH, SRLR

FRONT SPEED SENSOR

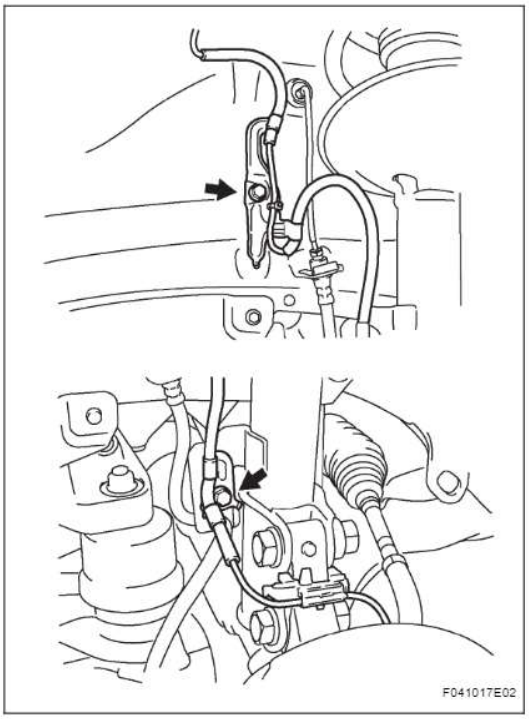
REMOVAL

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

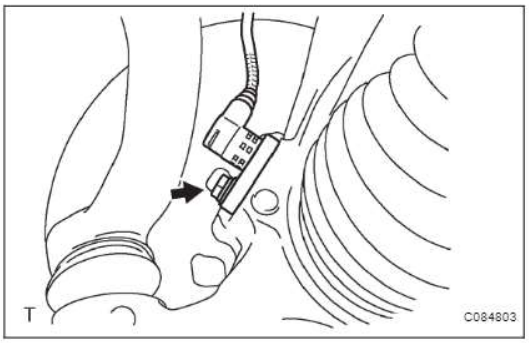
1. **REMOVE FRONT WHEEL**
2. **REMOVE FRONT FENDER LINER LH**
3. **REMOVE SPEED SENSOR FRONT LH**
   (a) Disconnect the speed sensor connector and clamp.

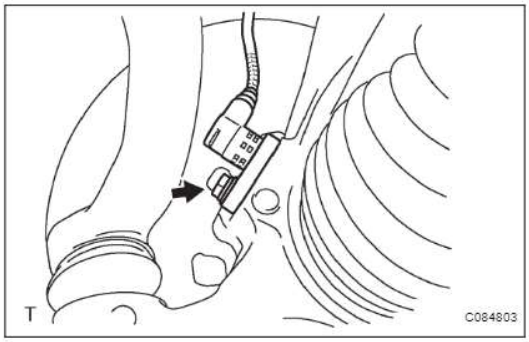


(b) Remove the 2 clamp bolts and disconnect the speed sensor harness from the body and shock absorber.



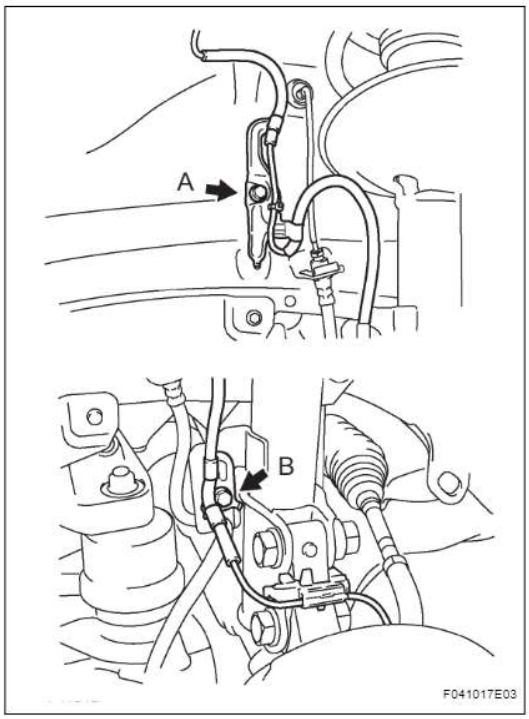
(c) Remove the bolt and the speed sensor front LH.
NOTICE:
Prevent foreign matter from attaching to the sensor tip.



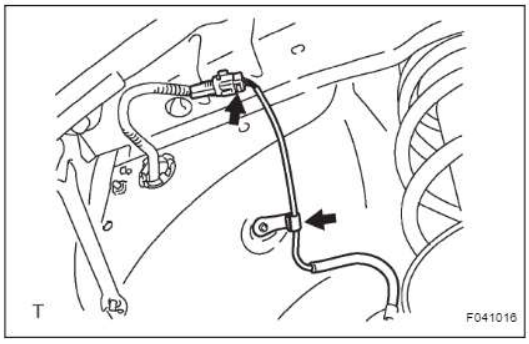


INSTALLATION

1. **INSTALL SPEED SENSOR FRONT LH**
   (a) Install the speed sensor front LH with the bolt.
   Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
   NOTICE:
   Prevent foreign matter from attaching to the sensor tip.



   (b) Install the sensor harness clamps with the 2 bolts "A" and "B" to the body and shock absorber.
   Torque: Bolt A
   5.0 N*m (51 kgf*cm, 44 in.*lbf)
   Bolt B
   19 N*m (192 kgf*cm, 14 in.*lbf)
   (c) Connect the clamp to the knuckle.



   (d) Connect the speed sensor connector and clamp.
2. **INSTALL FRONT FENDER LINER LH**
3. **INSTALL FRONT WHEEL**
   Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
4. **CHECK ABS SPEED SENSOR SIGNAL**
   HINT:
   See page BC-6 for ABS system, BC-70 for VSC system

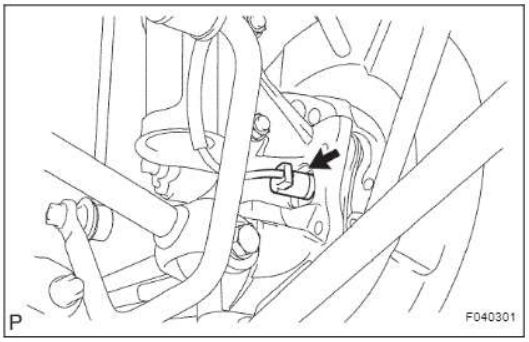
BC

SKID CONTROL SENSOR

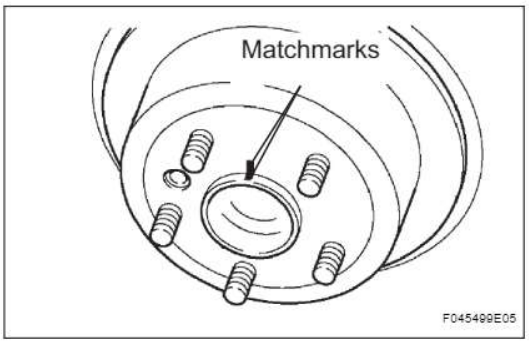
REMOVAL

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

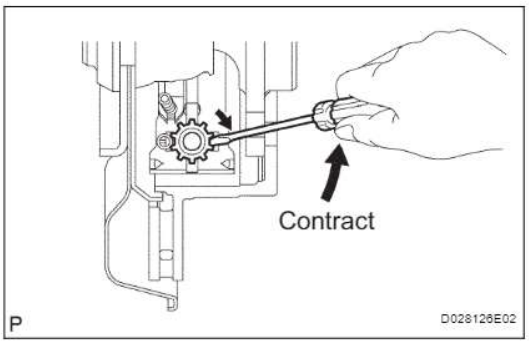
1. **REMOVE REAR WHEEL**
2. **SEPARATE SKID CONTROL SENSOR WIRE**
   (a) Disconnect the connector from the skid control sensor.
3. **REMOVE REAR DISC BRAKE CALIPER ASSEMBLY LH**
   HINT:
   See page BR-29



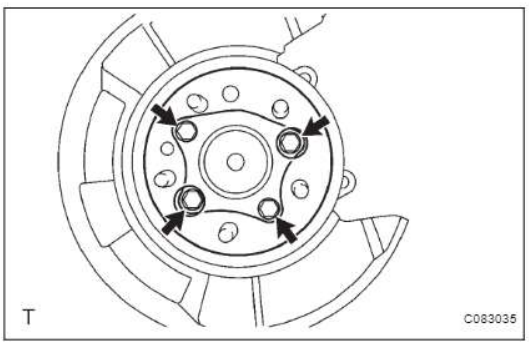
4. **REMOVE REAR DISC**
   (a) Put matchmarks on the rear disc and the axle hub.



   (b) Release the parking brake, and remove the rear disc.
   HINT:
   If the disc cannot be removed easily, turn the shoe adjuster until the wheel turns freely.

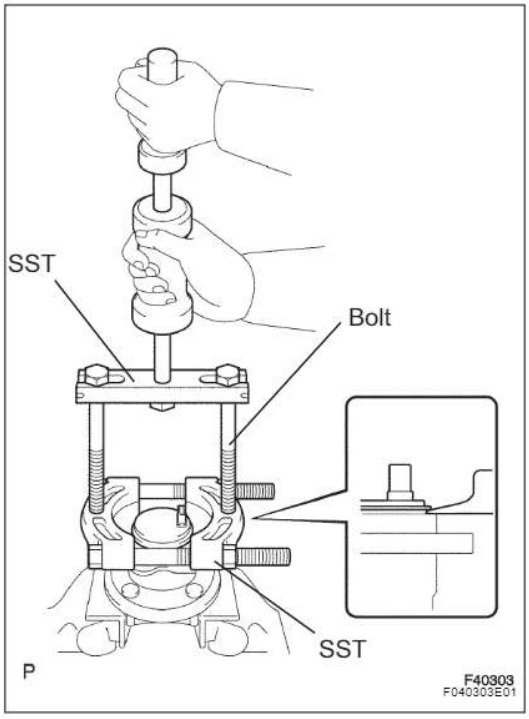


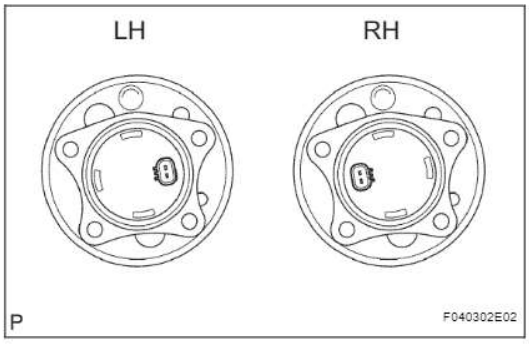
5. **REMOVE REAR AXLE HUB AND BEARING ASSEMBLY LH**
   (a) Remove the 4 bolts and rear axle hub & bearing assembly.
6. **REMOVE SKID CONTROL SENSOR**
   (a) Mount the rear axle hub in a soft jaw vise.
   NOTICE:
   Replace the axle hub & bearing assembly if it is dropped or receives a strong shock.

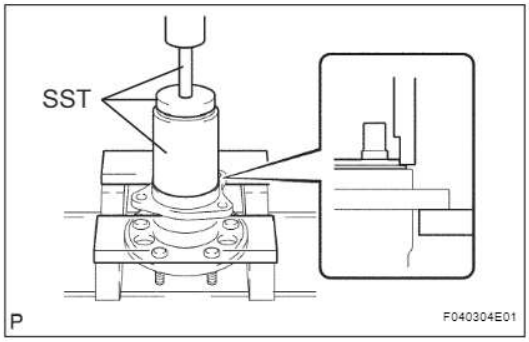


(b) Using a pin punch and hammer, drive out the 2 pins and remove the 2 attachments (09521-00010) from SST.
SST 09520-00031

(c) Using SST and 2 bolts (Diameter: 12 mm, pitch: 1.5 mm), remove the skid control sensor from the rear axle hub.
SST 09520-00031 (09520-00040), 09950-00020, 09521-00020
NOTICE:
- **If damage is inflicted to the sensor rotor, replace the axle hub assembly.**
- **Do not scratch the contact surface of axle hub and speed sensor.**







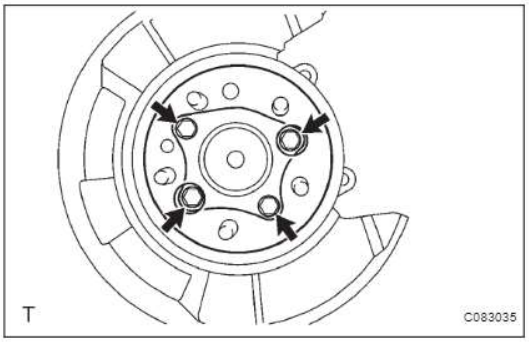
INSTALLATION

1. INSTALL SKID CONTROL SENSOR

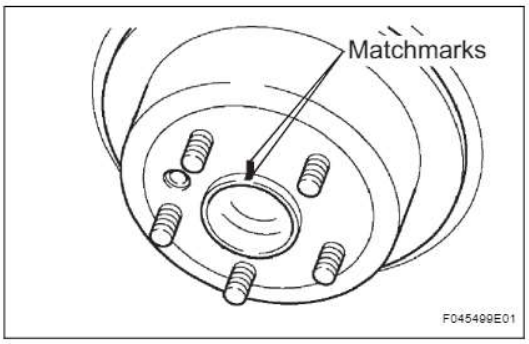
(a) Clean the contact surface of the axle hub and a new skid control sensor.
NOTICE:
Prevent foreign matter from attaching to the sensor rotor.

(b) Place the skid control sensor on the axle hub so that the connector is positioned as shown in the illustration.

(c) Using SST and a press, install the skid control sensor to the axle hub.
NOTICE:
- **Do not tap the skid control sensor with a hammer directly.**
- **Check that there should be no foreign matter on the skid control sensor detection portion.**
- **Press in the skid control sensor straight and slowly.**



2. **INSTALL REAR AXLE HUB AND BEARING ASSEMBLY LH**
   (a) Install the rear axle hub & bearing assembly with the 4 bolts.
   Torque: 80 N*m (816 kgf*cm, 59 ft.*lbf)



3. **INSTALL REAR DISC**
   (a) Aligning the matchmarks, install the rear disc.
   HINT:
   When replacing the rear disc with a new one, select the installation position where the rear disc has the minimum runout.

4. **INSTALL REAR DISC BRAKE CALIPER ASSEMBLY LH**
   HINT:
   See page BR-29

5. **CONNECT SKID CONTROL SENSOR WIRE**
   (a) Connect the connector to the skid control sensor.

6. **INSTALL REAR WHEEL**
   Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

7. **INSPECT AND ADJUST REAR WHEEL ALIGNMENT**
   HINT:
   See page SP-16

8. **CHECK ABS SPEED SENSOR SIGNAL**
   HINT:
   See page BC-6 for ABS system, BC-70 for VSC system

BC

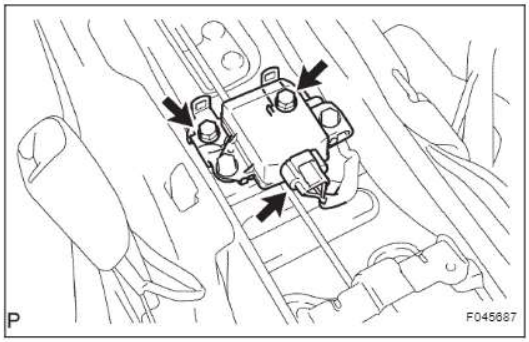
YAW RATE SENSOR

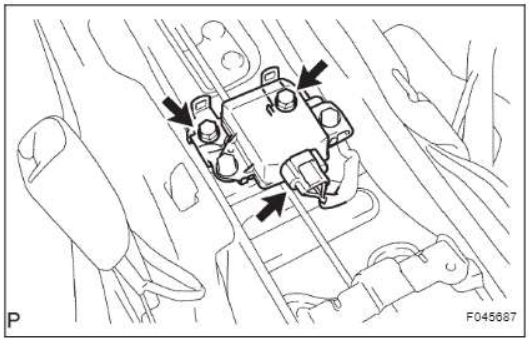
REMOVAL

NOTICE:

- **Do not use the yaw rate sensor if it is dropped or damaged.**
- **Prevent foreign matter from attaching between the yaw rate sensor bracket and body.**
- **Confirm the sensor direction is correct.**

1. **REMOVE CONSOLE UPPER REAR PANEL SUB-ASSEMBLY**
   HINT:
   See page IP-6
2. **REMOVE REAR CONSOLE BOX ASSEMBLY**
3. **REMOVE YAW RATE SENSOR ASSEMBLY**
   (a) Disconnect the yaw rate sensor connector.
   (b) Remove the 2 bolts and yaw rate sensor.





INSTALLATION

1. **INSTALL YAW RATE SENSOR ASSEMBLY**
   (a) Install the yaw rate sensor with the 2 bolts.
   Torque: 13 N*m (127 kgf*cm, 9 ft.*lbf)
   (b) Connect the yaw rate sensor connector.
2. **INSTALL REAR CONSOLE BOX ASSEMBLY**
3. **INSTALL CONSOLE UPPER REAR PANEL SUB-ASSEMBLY**
4. **PERFORM YAW RATE SENSOR ZERO POINT CALIBRATION**
   HINT:
   See page BC-76
5. **INSPECT ABS WARNING LIGHT AND VSC WARNING LIGHT**
   HINT:
   See page BC-70

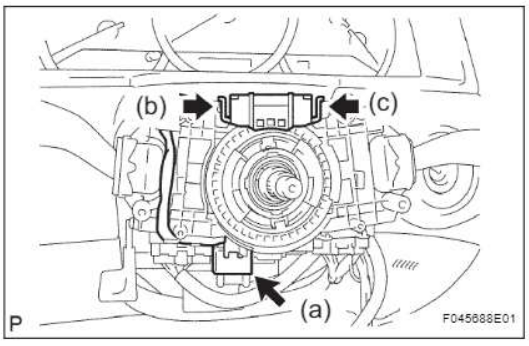
INSTALLATION

1. **INSTALL STEERING SENSOR**
   (a) Install the steering sensor.
   (b) Connect the steering sensor connector.
2. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
   HINT:
   See page RS-1
3. **INSTALL SPIRAL CABLE SUB-ASSEMBLY**
   HINT:
   See page RS-1
4. **CENTER SPIRAL CABLE**
   HINT:
   See page RS-1
5. **INSTALL STEERING WHEEL ASSEMBLY**
   HINT:
   See page SR-11
6. **CONNECT BATTERY NEGATIVE TERMINAL**
7. **INSTALL HORN BUTTON ASSEMBLY**
   HINT:
   See page RS-263
8. **INSPECT HORN BUTTON ASSEMBLY**
   HINT:
   See page RS-263
9. **INSPECT SRS WARNING LIGHT**
   HINT:
   See page RS-30
10. **PERFORM INITIALIZATION**
    HINT:
    When reconnecting the negative battery terminal, it is necessary to initialize other systems (See page IN-24).

STEERING SENSOR

REMOVAL

1. **DISCONNECT BATTERY NEGATIVE TERMINAL**
   HINT:
   See page RS-1
2. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
3. **REMOVE STEERING WHEEL COVER LOWER NO.2**
4. **REMOVE STEERING WHEEL COVER LOWER NO.3**
5. **REMOVE HORN BUTTON ASSEMBLY**
   HINT:
   See page RS-262
6. **REMOVE STEERING WHEEL ASSEMBLY**
   HINT:
   See page SR-5
7. **REMOVE STEERING COLUMN COVER LWR**
   HINT:
   See page SR-5
   SST 09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05021)
8. **REMOVE STEERING COLUMN COVER**
   HINT:
   See page SR-5
9. **REMOVE SPIRAL CABLE SUB-ASSEMBLY**
   HINT:
   See page SR-5
10. **REMOVE STEERING SENSOR**
    HINT:
    See page RS-1



(a) Disconnect the steering sensor connector.
(b) While pressing the 2 claws, remove the steering sensor.

INSPECTION

1. INSPECT SPIRAL CABLE SUB-ASSEMBLY

(a) If any of the following conditions occur, replace the spiral cable sub-assembly with a new one.

Condition:

Scratches or cracks on the connector
Cracks, dents or chipping of the spiral cable sub-assembly

BRAKE SYSTEM

PRECAUTION

- Care must be taken to replace each part properly as it could affect the performance of the brake system and result in a driving hazard. Replace the parts with parts having the same part number or equivalent.
- It is very important to keep parts and the area clean when repairing the brake system.
- If the vehicle is equipped with a mobile communication system, refer to the precaution in the INTRODUCTION section.

PROBLEM SYMPTOMS TABLE

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

BRAKE SYSTEM

Symptom	Suspected area	See page
Low pedal or spongy pedal	1.Fluid leaks in brake system	-
	2.Air in brake system	BR-3
	3.Piston seals (front) (Worn or damaged)	BR-22
	4.Piston seals (rear) (Worn or damaged)	BR-29
	5.Master cylinder (Faulty)	BR-11
	6.Booster push rod (Out of adjustment)	BR-19
Brake drag	1.Brake pedal free play (Minimal)	BR-9
	2.Parking brake lever travel (Out of adjustment)	PB-3
	3.Parking brake wire (Sticking)	PB-6
	4.Parking brake shoe clearance (Out of adjustment)	PB-15
	5.Pad (front) (Cracked or distorted)	BR-24
	6.Pad (rear) (Cracked or distorted)	BR-31
	7.Piston (front) (Stuck)	BR-22
	8.Piston (rear) (Stuck)	BR-29
	9.Piston (front) (Frozen)	BR-22
	10.Piston (front) (Frozen)	BR-29
	11.Booster push rod (Out of adjustment)	BR-19
	12.Vacuum leak in booster system	BR-16
	13. Master cylinder (Faulty)	BR-11
Brake pull	1.Piston (front) (Stuck)	BR-22
	2.Piston (rear) (Stuck)	BR-29
	3.Pad (front) (Oily)	BR-24
	4.Pad (rear) (Oily)	BR-31
	5.Piston (front) (Frozen)	BR-22
	6.Piston (rear) (Frozen)	BR-29
	7.Disc (front) (Scored)	BR-24
	8.Disc (rear) (Scored)	BR-31
	9.Pad (front) (Cracked or distorted)	BR-24
	10.Pad (rear) (Cracked or distorted)	BR-31
Hard pedal but brake inefficient	1.Fluid leaks in brake system	-
	2.Air in brake system	BR-3
	3.Pad (front) (Worn)	BR-24
	4.Pad (rear) (Worn)	BR-31
	5.Pad (front) (Cracked or distorted)	BR-24
	6.Pad (rear) (Cracked or distorted)	BR-31
	7.Pad (front) (Oily)	BR-24
	8.Pad (rear) (Oily)	BR-31
	9.Pad (front) (Glanzed)	BR-24
	10.Pad (rear) (Glanzed)	BR-31
	11.Disc (front) (Scored)	BR-24
	12.Disc (rear) (Scored)	BR-31
	13.Booster push rod (Out of adjustment)	BR-19
	14.Vacuum leaks in booster system	BR-16

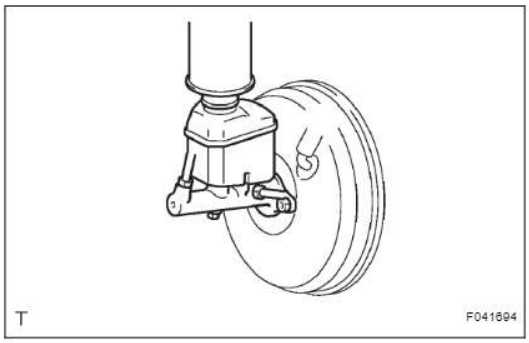
Symptom	Suspected area	See page
Brake noise	1.Pad (front) (Cracked or distorted)	BR-24
	2.Pad (rear) (Cracked or distorted)	BR-31
	3.Installation bolt (front) (Loose)	BR-22
	4.Installation bolt (rear) (Loose)	BR-29
	5.Disc (front) (Scored)	BR-24
	6.Disc (rear) (Scored)	BR-31
	7.Pad support plate (front) (Loose)	BR-24
	8.Pad support plate (rear) (Loose)	BR-31
	9.Sliding pin (front) (Worn)	BR-22
	10.Sliding pin (rear) (Worn)	BR-29
	11.Pad (front) (Dirty)	BR-24
	12.Pad (rear)(Dirty)	BR-31
	13.Pad (front) (Glanzed)	BR-24
	14.Pad (rear) (Glanzed)	BR-31
	15.Anti-squeal shim (front) (Damaged)	BR-27
	16.Anti-squeal shim (rear) (Damaged)	BR-33

BRAKE FLUID

BLEEDING

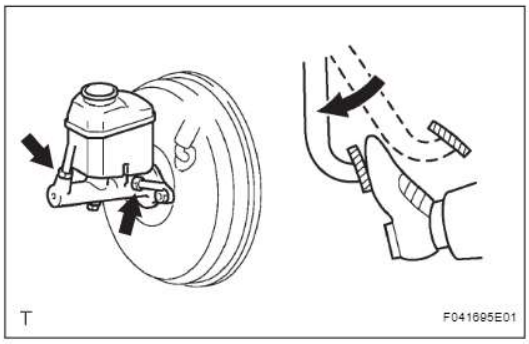
HINT:
If any work is performed on the brake system or if air in the brake lines is suspected, bleed the air out of the brake system.

NOTICE:
Wash brake fluid off immediately if it adheres to any painted surface.



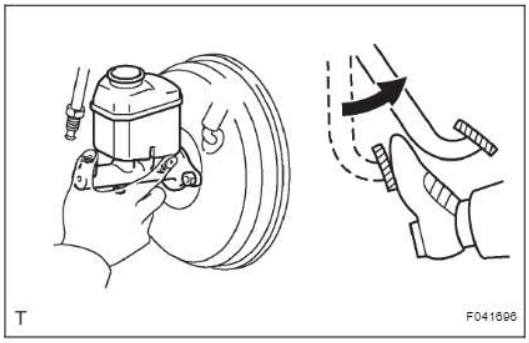
1. **FILL RESERVOIR WITH BRAKE FLUID**
   Fluid:
   SAE J1703 or FMVSS No. 116 DOT3

2. **BLEED BRAKE MASTER CYLINDER**
   HINT:
   If the master cylinder has been disassembled or if the reservoir becomes empty, bleed the air out of the master cylinder.



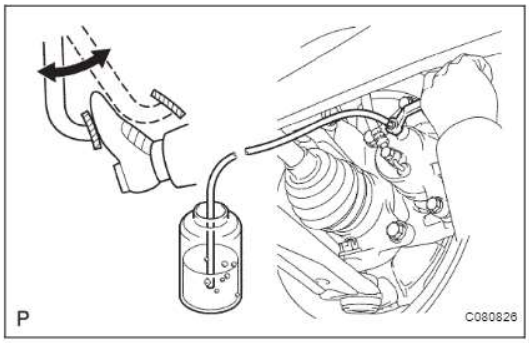
   (a) Disconnect the brake lines from the master cylinder.
   SST 09023-00101

   (b) Slowly depress and hold the brake pedal.

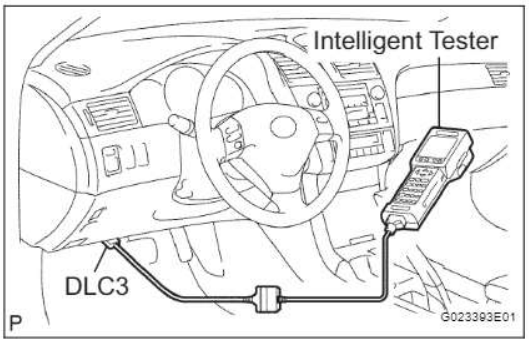


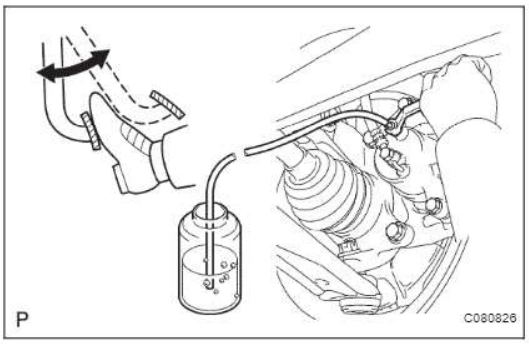
   (c) Cover the outer holes with your fingers, and release the brake pedal.
   (d) Repeat (b) and (c) 3 or 4 times.
   (e) Connect the brake lines to the master cylinder.
   SST 09023-00101
   Torque: 15 N*m (155 kgf*cm, 11 ft.*lbf)

3. **BLEED BRAKE LINE**
   (a) Connect the vinyl tube to the bleeder plug.



   (b) Depress the brake pedal several times, then loosen the bleeder plug with the pedal depressed.
   (c) When fluid stops coming out, tighten the bleeder plug, then release the brake pedal.
   (d) Repeat (b) and (c) until all air in the fluid is completely bled out.
   (e) Tighten the bleeder plug completely.
   Torque: 8.3 N*m (85 kgf*cm, 73 in.*lbf)
   (f) Repeat the above procedures for each wheel to bleed the air out of the brake line.





4. BLEED BRAKE ACTUATOR (w/ VSC)

NOTICE:

After bleeding the air from the brake system, if the height or feel of the brake pedal cannot be obtained, perform air bleeding in the brake actuator assembly with an intelligent tester by following the procedures below.

(a) Depress the brake pedal more than 20 times with the engine off.

(b) Connect the intelligent tester to the DLC3, and turn the ignition switch to the ON position.

NOTICE:

Do not start the engine.

(c) Select "AIR BLEEDING" on the intelligent tester.

HINT:

Please refer to the intelligent tester operator's manual for further details.

(d) Bleed the air out of the brake line as usual when "Step1: Increase" appears on the intelligent tester display.

NOTICE:

- **Bleed the air by following the steps displayed on the intelligent tester.**
- **Make sure that the brake fluid in the master cylinder reservoir tank does not become empty.**

(1) Connect the vinyl tube to either one of the bleeder plugs.

(2) Depress the brake pedal several times, then loosen the bleeder plug connected to the vinyle tube with the pedal depressed.

(3) When fluid stops coming out, tighten the bleeder plug and release the brake pedal.

(4) Repeat (2) and (3) until all air in the fluid is completely bled out.

(5) Tighten the bleeder plug completely.

Torque: 8.3 N*m (85 kgf*cm, 73 in.*lbf)

(6) Repeat the above procedures for each wheel to bleed the air out of the brake line.

(e) Bleed the air out of the suction line when "Step2: Inhalation" appears on the intelligent tester display.

NOTICE:

- **Bleed the air by following the steps displayed on the intelligent tester.**
- **Make sure that the brake fluid in the master cylinder reservoir tank does not become empty.**

(1) Connect the vinyl tube to the bleeder plug at the right front wheel or the right rear wheel and loosen the bleeder plug.

(2) Operate the brake actuator assembly to bleed the air using the intelligent tester.
NOTICE:
- **This operation stops automatically after 4 seconds.**
- **At this time, be sure to release the brake pedal.**

(3) Check if the operation has stopped by referring to the intelligent tester display.
(4) Repeat (2) and (3) until all air in the fluid is completely bled out.
(5) Tighten the bleeder plug completely.
Torque: 8.3 N*m (85 kgf*cm, 73 in.*lbf)
(6) Repeat the above procedures to bleed the air out of the brake line for each wheel.

(f) Bleed the air out of the pressure reduction line when "Step3: Decrease" appears on the intelligent tester display.
NOTICE:
- **Bleed the air by following the steps displayed on the intelligent tester.**
- **Make sure that the brake fluid in the master cylinder reservoir tank does not become empty.**

(1) Connect the vinyl tube to either one of the bleeder plugs.
(2) Loosen the bleeder plug.
(3) Using the intelligent tester, operate the brake actuator assembly, completely depress the brake pedal and keep it.
NOTICE:
- **This operation stops automatically after 4 seconds. When performing this procedure continuously, set an interval of at least 20 seconds.**
- **When the operation is complete, the brake pedal goes down slightly. This is a normal phenomenon caused when the solenoid opens.**
- **During this procedure, the pedal will feel heavy, but completely depress it so that the brake fluid comes out from the bleeder plug.**
- **Be sure to keep depressing the brake pedal. Do not depress and release the pedal repeatedly.**

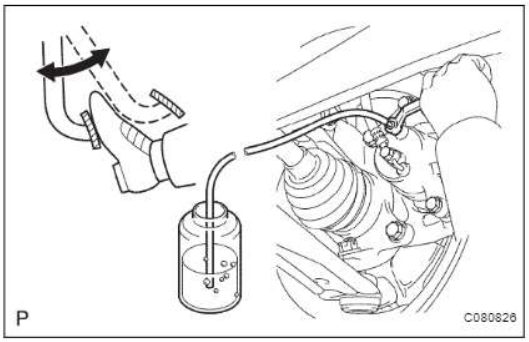
(4) Tighten the bleeder plug, then release the brake pedal.
(5) Repeat (2) to (4) until all the air in the fluid is completely bled out.
(6) Tighten the bleeder plug completely.
Torque: 8.3 N*m (85 kgf*cm, 73 in.*lbf)
(7) Repeat the above procedures for each wheel to bleed the air out of the brake line.

(g) Bleed the air out of the brake line as usual again when "Step4: Increase" appears on the intelligent tester display.

NOTICE:

- **Bleed the air by following the steps displayed on the intelligent tester.**
- **Make sure that the brake fluid in the master cylinder reservoir tank does not become empty.**

(1) Connect the vinyl tube to either one of the bleeder plugs.



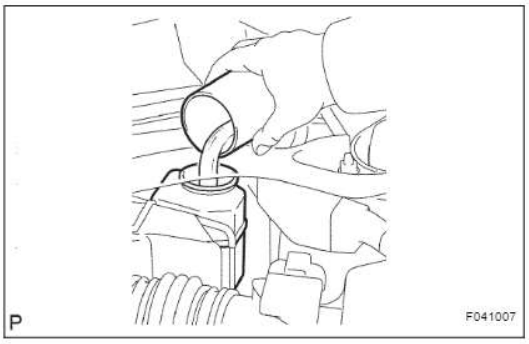
(2) Depress the brake pedal several times, then loosen the bleeder plug connected to the vinyl tube with the pedal depressed.

(3) When fluid stops coming out, tighten the bleeder plug, then release the brake pedal.

(4) Repeat (2) and (3) until all air in the fluid is completely bled out.

(5) Tighten the bleeder plug completely.
Torque: 8.3 N*m (85 kgf*cm, 73 in.*lbf)

(6) Repeat the above procedures for each wheel to bleed the air out of the brake line.



5. CHECK FLUID LEVEL IN RESERVOIR

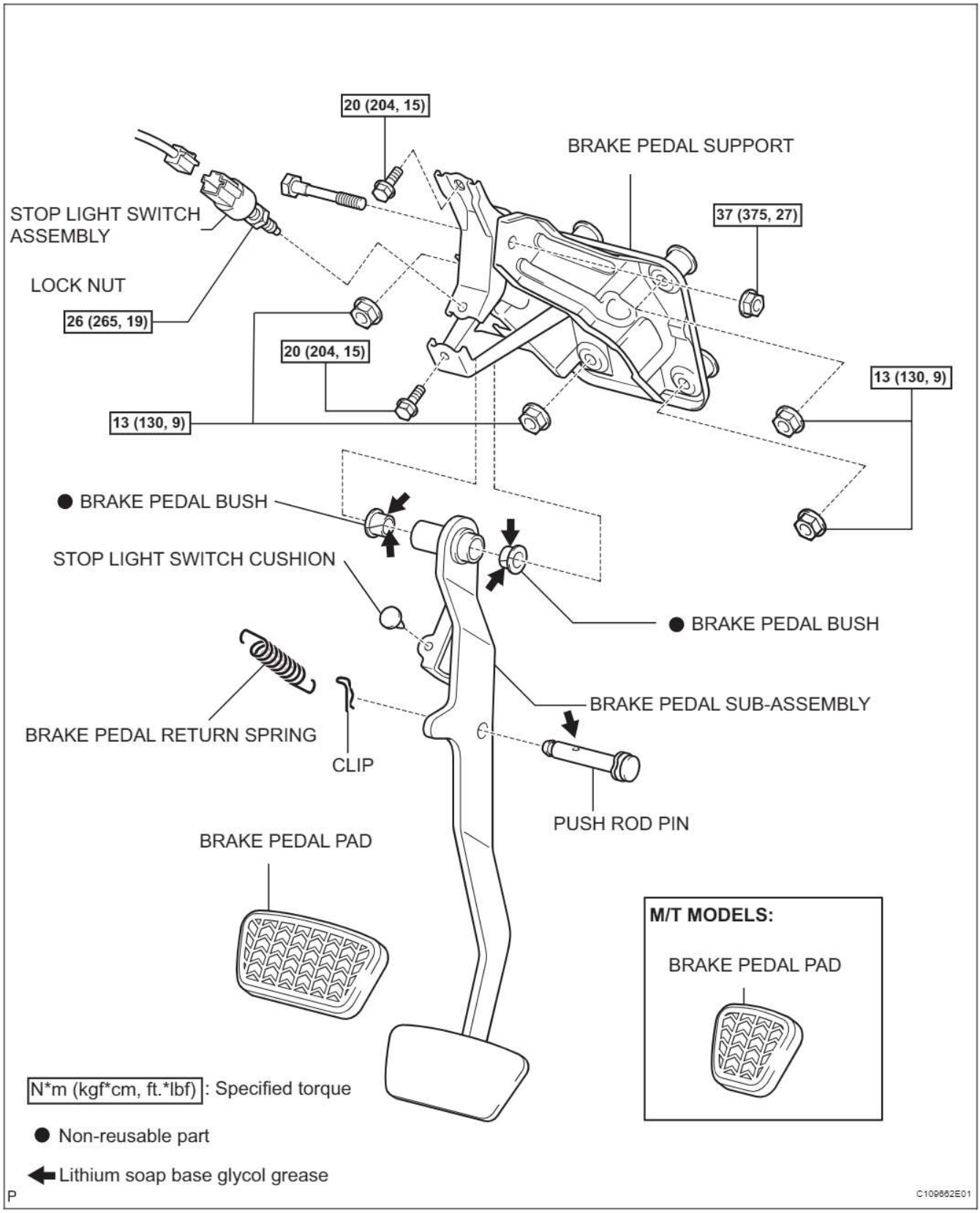
(a) Check the fluid level and add fluid if necessary.
Fluid:
SAE J1703 or FMVSS No. 116 DOT3

REASSEMBLY

1. **INSTALL STOP LIGHT SWITCH CUSHION**
2. **INSTALL BRAKE PEDAL BUSH**
   (a) Apply lithium soap base glycol grease to the parts indicated by arrows.
   (b) Install 2 new brake pedal bushes to brake pedal sub-assembly.
3. **INSTALL BRAKE PEDAL PAD**
4. **INSTALL BRAKE PEDAL SUB-ASSEMBLY**
   (a) Install the brake pedal sub-assembly with the bolt and nut.
   Torque: 37 N*m (375 kgf*cm, 27 ft.*lbf)
5. **INSTALL STOP LIGHT SWITCH ASSEMBLY**
   (a) Install the stop light switch assembly with the stop light switch lock nut.
   HINT:
   After adjusting the brake pedal height, torque the lock nut.
6. **INSTALL BRAKE PEDAL SUPPORT**
   (a) Install the brake pedal support sub-assembly with the 2 bolts and 4 nuts.
   Torque: Bolt
   20 N*m (204 kgf*cm, 15 ft.*lbf)
   Nut
   13 N*m (130 kgf*cm, 9 ft.*lbf)
7. **INSTALL PUSH ROD PIN**
   (a) Apply lithium soap base glycol grease to the parts indicated by arrows.
   (b) Install the push rod pin and clip.
   (c) Connect the stop light switch connector.
8. **INSTALL BRAKE PEDAL RETURN SPRING**
9. **INSTALL INSTRUMENT PANEL REINFORCEMENT ASSEMBLY**
   (a) Install instrument panel reinforcement assembly (See page IP-6).
10. **CHECK AND ADJUST BRAKE PEDAL HEIGHT**
    (a) Check and adjust brake pedal height (See page BR-8).
11. **CHECK PEDAL FREE PLAY**
    (a) Check pedal free play (See page BR-8).
12. **CHECK PEDAL RESERVE DISTANCE**
    (a) Check pedal reserve distance (See page BR-8).
13. **INSPECT SRS WARNING LIGHT**
    (a) Inspect SRS warning light (See page ME-10).

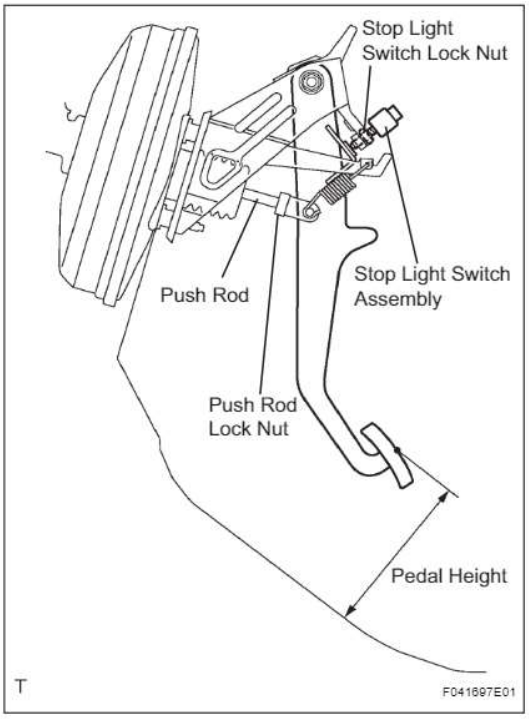
BRAKE PEDAL SUPPORT

COMPONENTS



DISASSEMBLY

1. **REMOVE INSTRUMENT PANEL REINFORCEMENT ASSEMBLY**
   (a) Remove instrument panel reinforcement assembly (See page IP-6).
2. **REMOVE BRAKE PEDAL RETURN SPRING**
3. **REMOVE PUSH ROD PIN**
   (a) Remove the clip and push rod pin.
4. **REMOVE BRAKE PEDAL SUPPORT**
   (a) Disconnect the stop light switch connector.
   (b) Remove the 2 bolts, 4 nuts and brake pedal support sub-assembly.
5. **REMOVE STOP LIGHT SWITCH ASSEMBLY**
   (a) Loosen the stop light switch lock nut and remove the stop light switch assembly.
6. **REMOVE BRAKE PEDAL SUB-ASSEMBLY**
   (a) Remove the nut, bolt and brake pedal sub-assembly from brake pedal support sub-assembly.
7. **REMOVE BRAKE PEDAL PAD**
8. **REMOVE BRAKE PEDAL BUSH**
   (a) Remove the 2 brake pedal bushes from brake pedal sub-assembly.
9. **REMOVE STOP LIGHT SWITCH CUSHION**



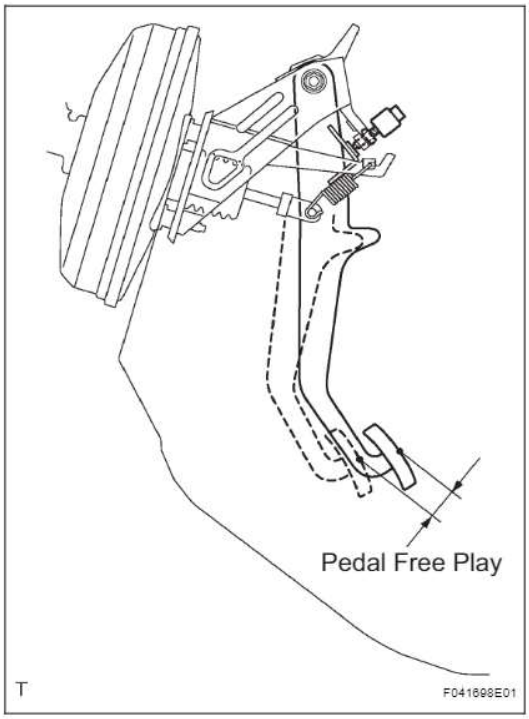
ADJUSTMENT

1. **CHECK AND ADJUST BRAKE PEDAL HEIGHT**
   (a) Check brake pedal height.
   Pedal height from asphalt sheet:
   144.1 to 154.1 mm (5.673 to 6.067 in.)
   (b) Adjust brake pedal height.
   (1) Remove the instrument panel finish panel sub-assembly lower and instrument panel insert sub-assembly lower LH.
   (2) Disconnect the connector from the stop light switch assembly.
   (3) Loosen the stop light switch lock nut and remove the stop light switch assembly.
   (4) Loosen the push rod lock nut.
   (5) Adjust the pedal height by turning the pedal push rod.
   (6) Tighten the push rod lock nut.
   Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)
   (7) Install the stop light switch assembly.
   (8) Connect the connector to the stop light switch assembly.
   (9) Push the brake pedal in 5 to 10 mm (0.20 to 0.39 in.) and turn the stop light switch assembly to lock the nut in the position where the stop light goes off.

(10) After installation, push the brake pedal in 5 to 10 mm (0.20 to 0.39 in.), and check that stop light comes on.
(11) Tighten the stop light switch lock nut.
Torque: 17 N*m (173 kgf*cm, 13 ft.*lbf)
(12) Install the instrument panel insert sub-assembly lower LH and instrument panel finish panel sub-assembly lower.

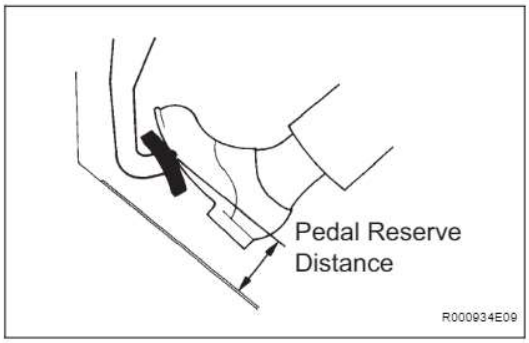
2. CHECK PEDAL FREE PLAY

(a) Stop the engine and depress the brake pedal several times until no vacuum remains in the booster.



(b) Press the pedal until resistance is felt. Measure the distance, as shown in the illustration.
Pedal free play:
1 to 6 mm (0.04 to 0.24 in.)
If incorrect, proceed to the following step.
(1) Check the stop lamp switch clearance.
Stop light switch clearance:
0.5 to 2.4 mm (0.020 to 0.095 in.)
If correct, the pedal free play is OK.
If incorrect, adjust the stop light switch clearance.

BR



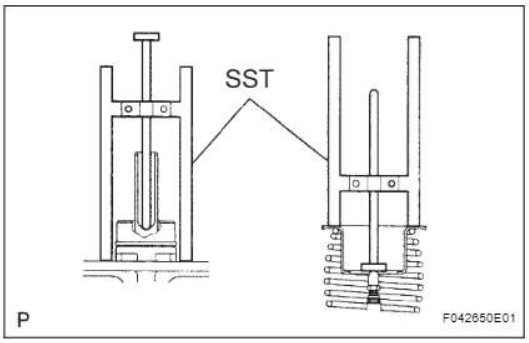
3. CHECK PEDAL RESERVE DISTANCE

(a) Release the parking brake lever.
With the engine running, depress the pedal and measure the pedal reserve distance, as shown in the illustration.
Pedal reserve distance from asphalt sheet at 490 N (50 kgf, 110 lbf):
w/o VSC: More than 68.5 mm (2.7 in.)
w/ VSC: More than 78.0 mm (3.1 in.)
If incorrect, troubleshoot the brake system.

INSPECTION

1. INSPECT BRAKE MASTER CYLINDER

(a) Check the cylinder bore for rust or scoring.



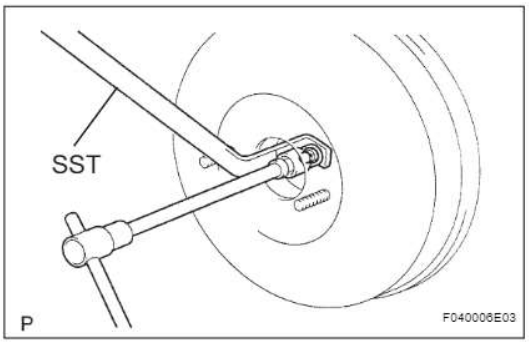
2. INSPECT AND ADJUST BRAKE BOOSTER PUSH ROD

(a) Set SST on the master cylinder and lower the pin of the SST until it slightly touches the piston.
SST 09737-00013

(b) Apply chalk to the flat surfaced tip of the SST pin.

(c) Turn SST upside down and measure the clearance between the brake booster push rod and SST.
Clearance:
0 mm (0 in.)
HINT:
- If there is a clearance between the SST main body and the shell of the brake booster (floating SST main body), the push rod is protruding too far.
- If the chalk does not stick on the tip of the brake booster push rod, the push rod protrusion is insufficient.

Adjust the clearance if either of the above conditions is detected.

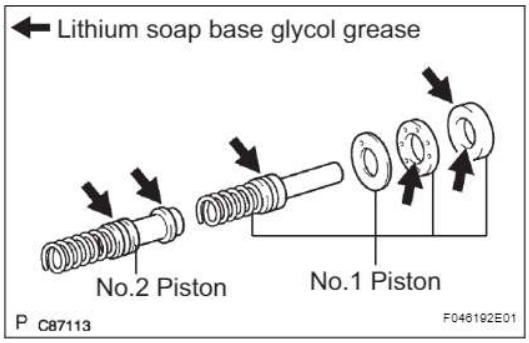


(d) If the clearance is outside of the specified range, fix the push rod using SST and adjust the length of the protruding adjusting bolt.
SST 09737-00020
HINT:
When adjusting the push rod, depress the brake pedal sufficiently so that the push rod sticks out.

REASSEMBLY

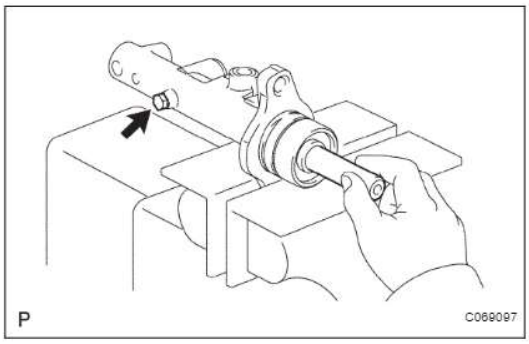
1. INSTALL BRAKE MASTER CYLINDER KIT (w/o VSC)

(a) Place the master cylinder in the vise.

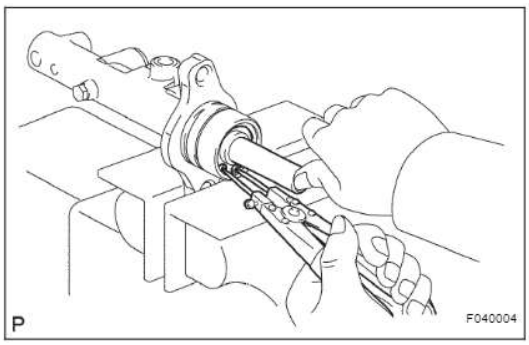


(b) Apply lithium soap base grycol grease to new No.1 and No.2 piston sub-assembly.

(c) Install the No.2 and No.1 piston sub-assembly.
NOTICE:
- **If the piston is inserted at an angle, the cylinder bore could be damaged.**
- **Be careful not to damage the rubber lips on the pistons.**



(d) Push in the piston and install a new gasket and a new piston stopper bolt.
Torque: 10 N*m (100 kgf*cm, 7 ft.*lbf)

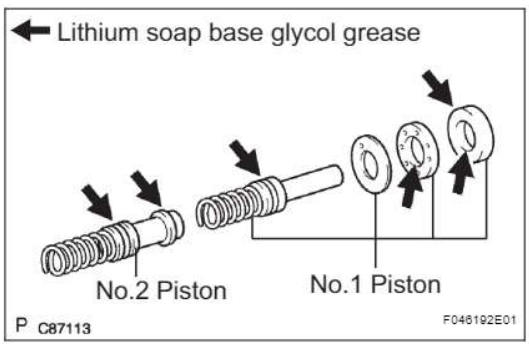


(e) Push in the piston and install the snap ring with snap ring pliers.

(f) Apply lithium soap base grycol grease to a new O-ring and install the O-ring to the master cylinder.

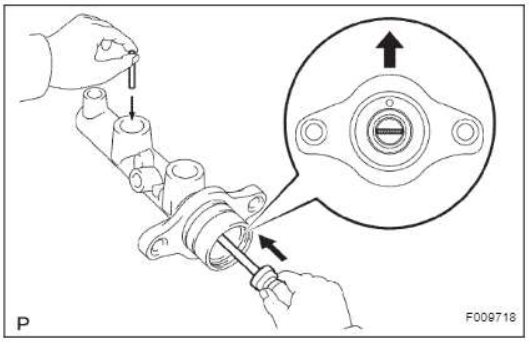
2. INSTALL BRAKE MASTER CYLINDER KIT (w/ VSC)

(a) Place the master cylinder in the vise.

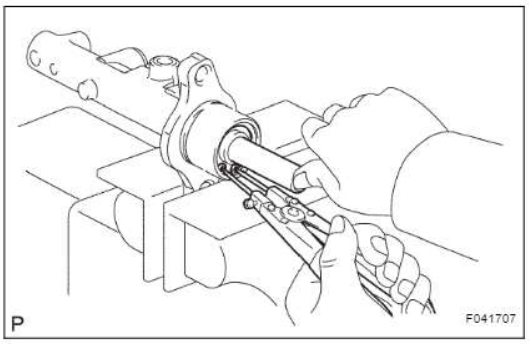


(b) Apply lithium soap base glycol grease to new No.1 and No.2 piston sub-assembly.

(c) Install the No.2 and No.1 piston sub-assembly.
NOTICE:
- **If the piston is inserted at an angle, the cylinder bore could be damaged.**
- **Be careful not to damage the rubber lips on the pistons.**



(d) Insert the No.2 piston with the groove positioning horizontally.
(e) Install the straight pin.



(f) Push in the piston and install the snap ring with snap ring pliers.
(g) Apply lithium soap base glycol grease to a new O-ring and install the O-ring to the master cylinder.

3. INSTALL MASTER CYLINDER RESERVOIR GROMMET

(a) Apply lithium soap base glycol grease to the 2 new master cylinder reservoir grommets.
(b) Install the 2 master cylinder reservoir grommets to the master cylinder reservoir sub-assembly.

4. INSTALL BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY

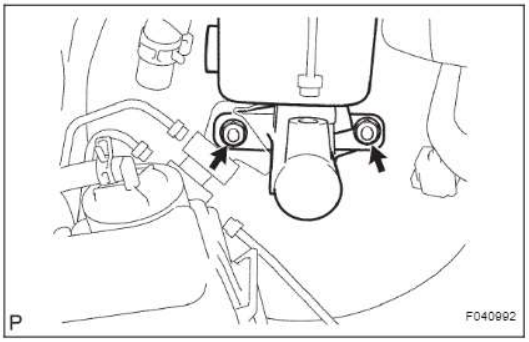
(a) Install the master cylinder reservoir sub-assembly to the master cylinder with the screw.

5. INSTALL BRAKE MASTER CYLINDER RESERVOIR STRAINER

(a) Install the brake master cylinder reservoir strainer.

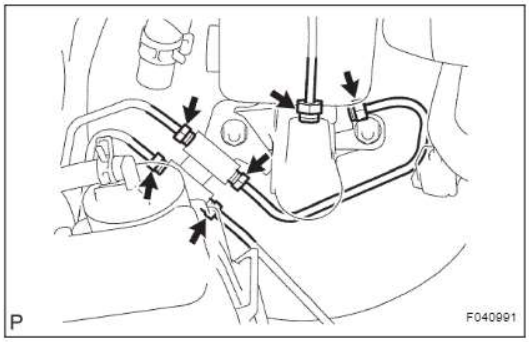
6. INSTALL BRAKE MASTER CYLINDER RESERVOIR FILLER CAP ASSEMBLY

(a) Install the brake master cylinder reservoir filler cap assembly.



7. INSTALL BRAKE MASTER CYLINDER SUB-ASSEMBLY

(a) Install the master cylinder sub-assembly and 2-way with the 2 nuts.
Torque: 13 N*m (127 kgf*cm, 9 ft.*lbf)



(b) Using SST, connect the 6 brake tubes to the master cylinder sub-assembly.
Torque: 15 N*m (155 kgf*cm, 11 ft.*lbf)
SST 09023-00101

(c) Connect the level warning switch connector.

8. FILL RESERVOIR WITH BRAKE FLUID

(a) Fill reservoir with brake fluid (See page BR-1).

9. BLEED BRAKE MASTER CYLINDER

SST 09023-00101

HINT:

See pageBR-1

10. BLEED BRAKE LINE

(a) Bleed brake line (See page BR-1).

11. INSTALL AIR CLEANER ASSEMBLY

12. CHECK FLUID LEVEL IN RESERVOIR

(a) Check fluid level in reservoir (See page BR-1).

13. CHECK BRAKE FLUID LEAKAGE

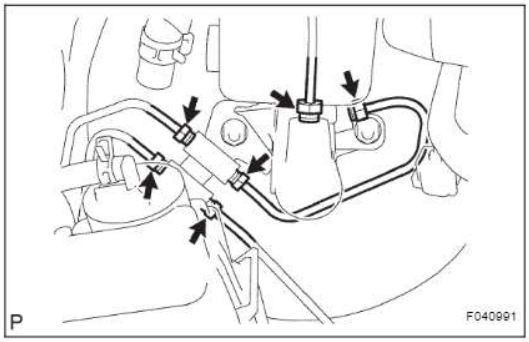
BR

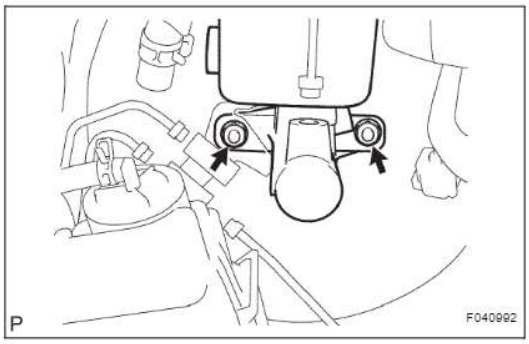
BRAKE MASTER CYLINDER

DISASSEMBLY

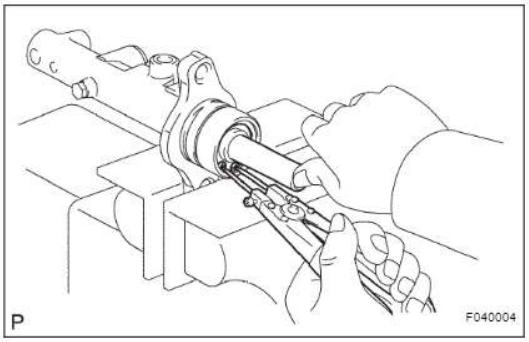
HINT:
COMPONENTS: See page BR-16.

1. **DRAIN BRAKE FLUID**
   NOTICE:
   Wash brake fluid off immediately if it adheres to any painted surface.
2. **REMOVE AIR CLEANER ASSEMBLY**
3. **REMOVE BRAKE MASTER CYLINDER SUB-ASSEMBLY**
   (a) Disconnect the level warning switch connector.
   (b) Using SST, disconnect the 6 brake tubes from the brake master cylinder.
   SST 09023-00101

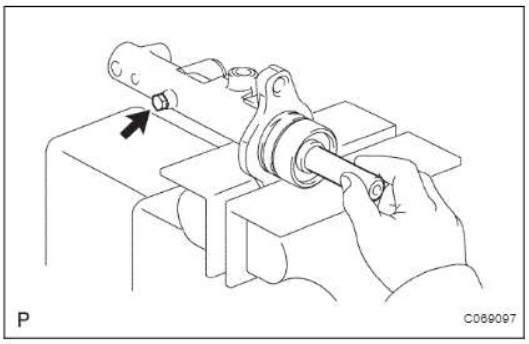




   (c) Remove the 2 nuts, and pull out the 2-way and brake master cylinder sub-assembly.
4. **REMOVE BRAKE MASTER CYLINDER RESERVOIR FILLER CAP ASSEMBLY**
   (a) Pull out the master cylinder reservoir filler cap assembly.
5. **REMOVE BRAKE MASTER CYLINDER RESERVOIR STRAINER**
   (a) Pull out the master cylinder reservoir strainer.
6. **REMOVE BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY**
   (a) Remove the screw and pull out the master cylinder reservoir sub-assembly.
7. **REMOVE MASTER CYLINDER RESERVOIR GROMMET**
   (a) Remove the 2 master cylinder reservoir grommets.
8. **REMOVE BRAKE MASTER CYLINDER KIT (w/o VSC)**
   (a) Place the master cylinder in the vise.
   (b) Remove the O-ring.

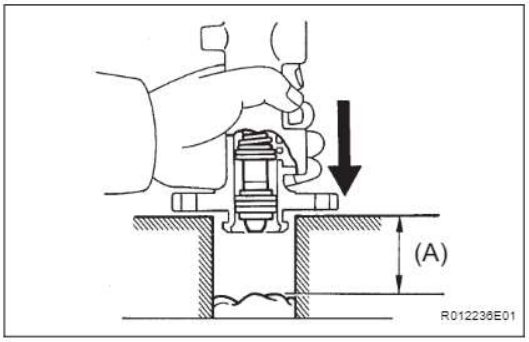


(c) Push in the piston and remove the snap ring with snap ring pliers.



(d) Push in the piston and remove the piston stopper bolt and gasket.

(e) Remove the No.1 piston sub-assembly, pulling straight out not at an angle.
NOTICE:
If pulled out at an angle, the cylinder bore could be damaged.

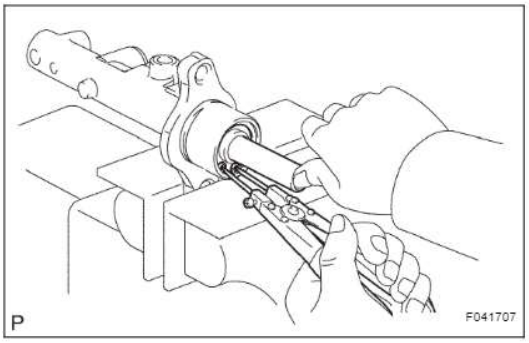


(f) Place a shop rag and 2 wooden blocks on the work table and lightly edge until the No.2 piston sub-assembly drops out of the cylinder.
HINT:
Make sure the distance (A) from the rag and the top of the blocks is at least 100 mm (3.94 in.).
NOTICE:
If pulled out at an angle, the cylinder bore could be damaged.

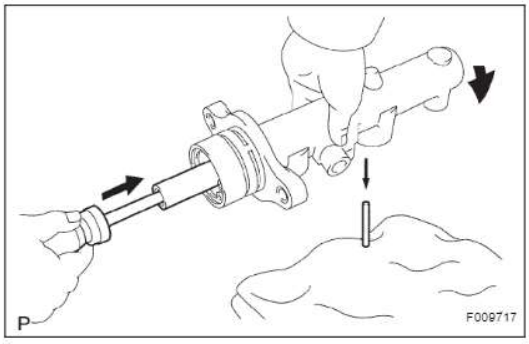
9. REMOVE BRAKE MASTER CYLINDER KIT (w/ VSC)

(a) Place the master cylinder in the vise.

(b) Remove the O-ring.



(c) Push in the piston and remove the snap ring with snap ring pliers.



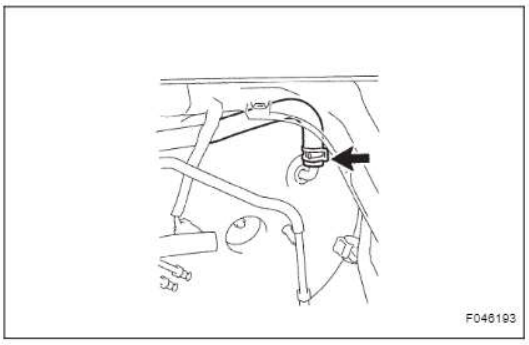
(d) Push in the piston with a screwdriver, and remove the straight pin by turning the cylinder body.
HINT:
Tape the screwdriver tip before use.

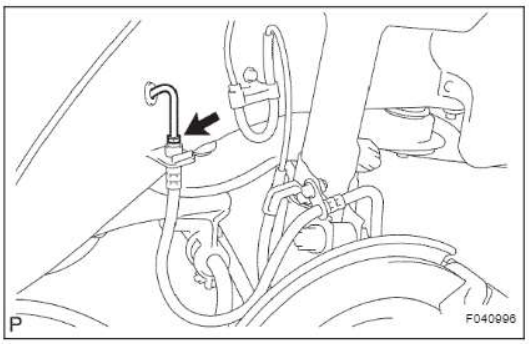
(e) Remove the No.1 and No.2 piston sub-assembly and 2 springs by hand. Pull them straight out, not at an angle.
NOTICE:
If pulled out at an angle, the cylinder bore could be damaged.

REMOVAL

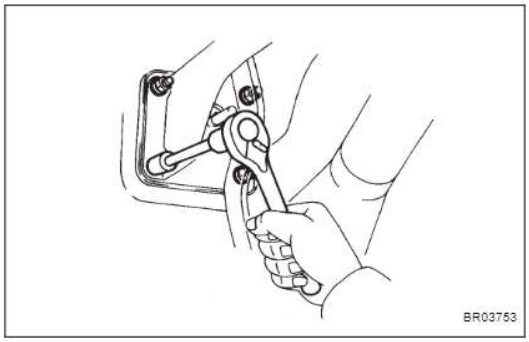
HINT:
COMPONENTS: See page BR-16 .

1. **DRAIN BRAKE FLUID**
   NOTICE:
   Wash brake fluid off immediately if it adheres to any painted surface.
2. **REMOVE AIR CLEANER ASSEMBLY**
3. **REMOVE BRAKE MASTER CYLINDER SUB-ASSEMBLY**
   (a) Remove brake master cylinder sub-assembly (See page BR-11).
   SST 09023-00101
4. **DISCONNECT VACUUM HOSE ASSEMBLY**
   (a) Slide the clip and disconnect the vacuum hose from the brake booster assembly.





5. **REMOVE FRONT BRAKE TUBE NO.5**
   (a) Using SST, remove the front brake tube No.5.
   SST 09023-00101
6. **REMOVE FRONT DOOR SCUFF PLATE LH**
   (a) Remove front door scuff plate LH (See page IP-6).
7. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH**
   (a) Remove cowl side trim sub-assembly LH (See page IP-6).
8. **REMOVE INSTRUMENT PANEL FINISH LOWER PANEL LH**
   (a) Remove instrument panel finish lower panel LH (See page IP-6).
9. **REMOVE BRAKE PEDAL RETURN SPRING**
10. **REMOVE PUSH ROD PIN**
    (a) Remove the clip and push rod pin.
11. **REMOVE BRAKE MASTER CYLINDER PUSH ROD CLEVIS**
    (a) Loosen the push rod lock nut and remove the push rod clevis.



12. REMOVE BRAKE BOOSTER ASSEMBLY

(a) Remove the 4 nuts.

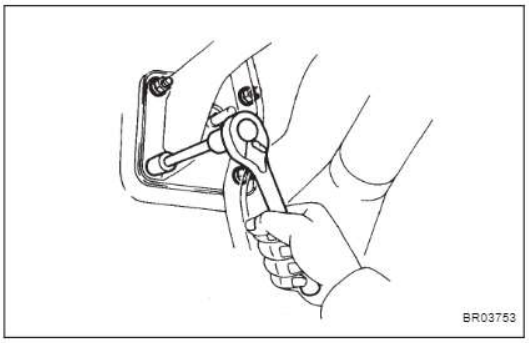
(b) Pull out the brake booster assembly.

NOTICE:
Be careful not to damage the brake tubes and the wire harness.

13. REMOVE BRAKE BOOSTER GASKET

INSTALLATION

1. **INSTALL BRAKE BOOSTER GASKET**
   (a) Install a new brake booster gasket to the brake booster.



2. **INSTALL BRAKE BOOSTER ASSEMBLY**
   (a) Install the brake booster with the 4 nuts.
   Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)
   NOTICE:
   Be careful not to damage the brake tubes and the wire harness.

3. **INSTALL BRAKE MASTER CYLINDER PUSH ROD CLEVIS**
   (a) Install the push rod clevis and the push rod lock nut.
   HINT:
   After adjusting the brake pedal height, torque the lock nut.

BR

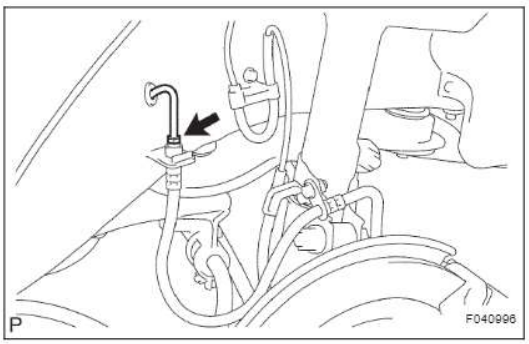
4. **INSTALL PUSH ROD PIN**
   (a) Apply lithium soap base glycol grease to the part indicated by an arrow (See page BR-16).
   (b) Install the push rod pin and clip.

5. **INSTALL BRAKE PEDAL RETURN SPRING**

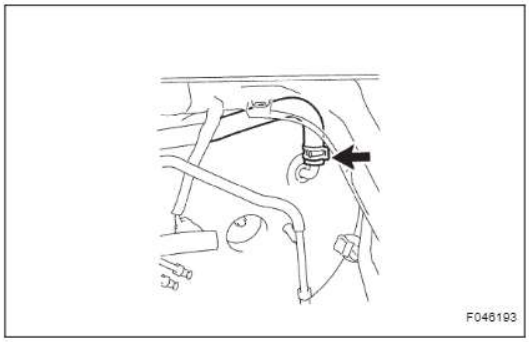
6. **INSTALL INSTRUMENT PANEL FINISH LOWER PANEL LH**
   (a) Install instrument panel finish lower panel LH (See page IP-6).

7. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH**
   (a) Install cowl side trim sub-assembly LH (See page IP-6).

8. **INSTALL FRONT DOOR SCUFF PLATE LH**
   HINT:
   (See page IP-6).



9. **INSTALL FRONT BRAKE TUBE NO.5**
   (a) Using SST, install the front brake tube No.5.
   SST 09023-00101
   Torque: 15 N*m (155 kgf*cm, 11 ft.*lbf)



10. **CONNECT VACUUM HOSE ASSEMBLY**
    (a) Connect the vacuum hose to the brake booster assembly and slide the clip.

11. **INSPECT AND ADJUST BRAKE BOOSTER PUSH ROD**
    HINT:
    See page BR-11
    SST 09737-00013, 09737-00020

12. **INSTALL BRAKE MASTER CYLINDER SUB-ASSEMBLY**
    HINT:
    See page BR-11
    SST 09023-00101

13. **FILL RESERVOIR WITH BRAKE FLUID**
    HINT:
    See page BR-1

14. **BLEED BRAKE MASTER CYLINDER**
    SST 09023-00101

15. **BLEED BRAKE LINE**
    HINT:
    See page BR-1

16. **INSTALL AIR CLEANER ASSEMBLY**

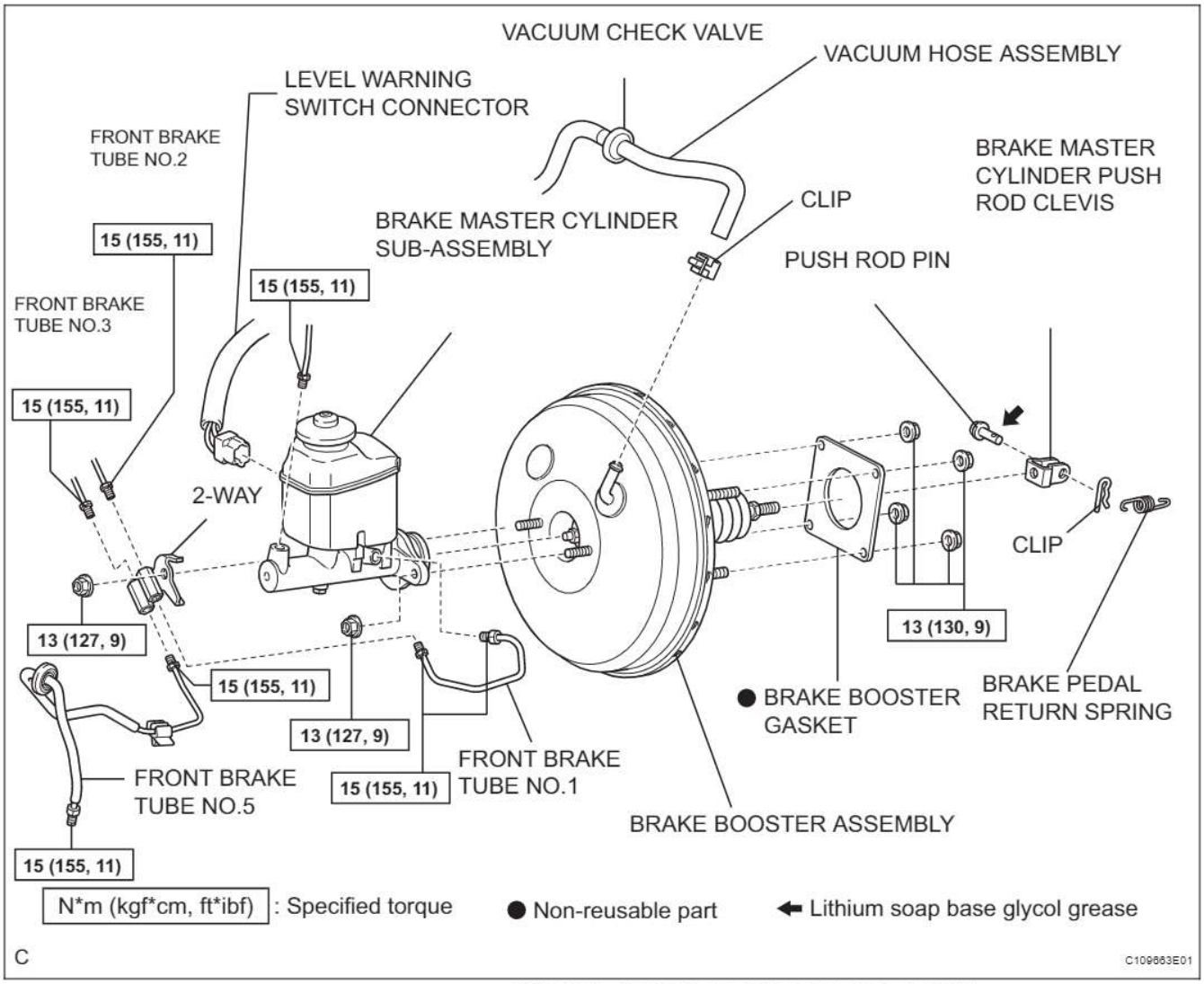
17. **CHECK FLUID LEVEL IN RESERVOIR**
    HINT:
    See page BR-1

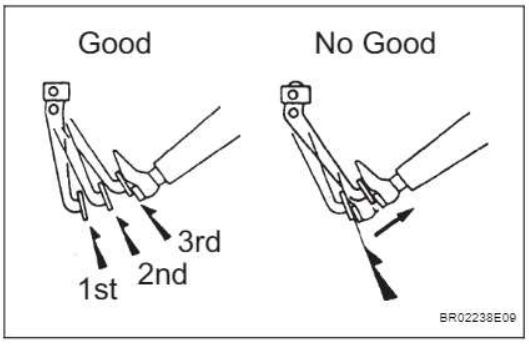
18. **CHECK BRAKE FLUID LEAKAGE**

19. **CHECK AND ADJUST BRAKE PEDAL HEIGHT**
    HINT:
    See page BR-8

BRAKE BOOSTER

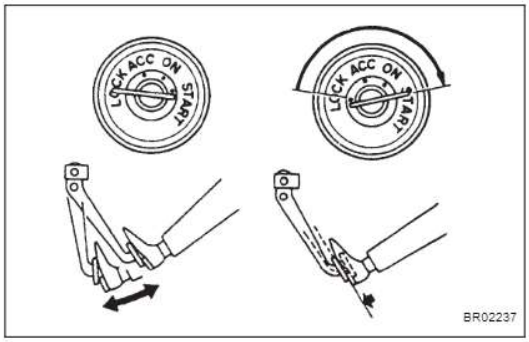
COMPONENTS





ON-VEHICLE INSPECTION

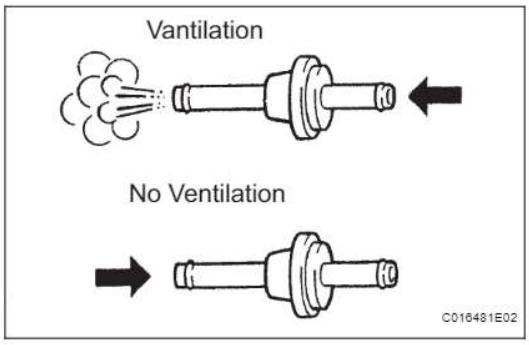
1. **INSPECT BRAKE BOOSTER**
   (a) Air tightness check.
      (1) Start the engine and stop it after 1 or 2 minutes. Depress the brake pedal several times slowly.
      HINT:
      If the pedal can be depressed to the floor the first time, but on the 2nd or 3rd time cannot be depressed as far, the booster is airtight.
      (2) Depress the brake pedal while the engine is running, and stop the engine with the pedal depressed.
      HINT:
      If there is no change in the pedal reserve distance while holding the pedal for 30 seconds, the booster is airtight.



(b) Operating check.
(1) Depress the brake pedal several times with the ignition switch off and check that there is no change in the pedal reserve distance when the pedal is depressed.
(2) Start the engine with the brake pedal depressed.
HINT:
If the pedal goes down slightly, operation is normal.

2. INSPECT VACUUM CHECK VALVE

(a) Check vacuum check valve.
(1) Slide the clip and disconnect the vacuum hose.
(2) Remove the vacuum check valve.



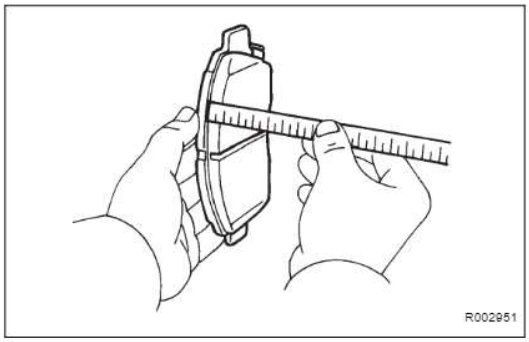
(3) Check that there is ventilation from the booster to engine, and no ventilation from the engine to the booster.
(4) If any fault is found, replace the vacuum check valve.

BR

INSPECTION

1. INSPECT BRAKE CYLINDER AND PISTON

(a) Check the brake cylinder bore and front disc brake piston for rust or scoring.
If necessary, replace the brake cylinder and piston.



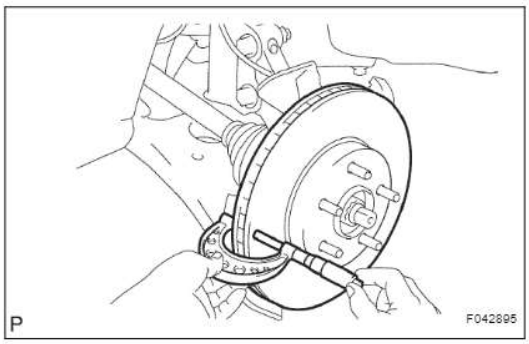
2. INSPECT PAD LINING THICKNESS

(a) Using a ruler, measure the pad lining thickness.
Thickness:
Standard:
12.0 mm (0.472 in.)
Minimum:
1.0 mm (0.039 in.)
If the pad lining thickness is equal to the minimum thickness or less, replace the brake pad.

3. INSPECT FRONT DISC BRAKE PAD SUPPORT PLATE

(a) Inspect the front disc brake pad support plate (No.1) and front disc brake pad support plate (No.2).
HINT:
Make sure that both have sufficient rebound, have no deformation, cracks or wear, and that all rust and dirt is cleaned off.
If necessary, replace the brake pad support plate.

BR



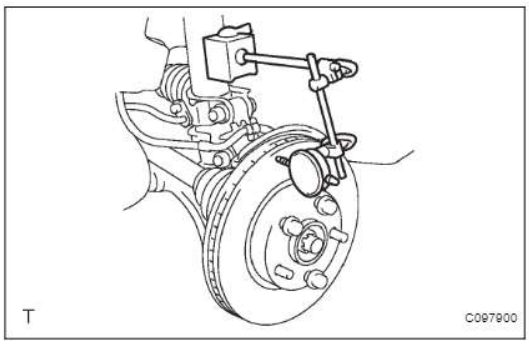
4. INSPECT DISC THICKNESS

(a) Using a micrometer, measure the disc thickness.
Thickness:
Standard:
28.0 mm (1.102 in.)
Minimum:
26.0 mm (1.024 in.)
If the disc thickness is less than the minimum, replace the disc.

5. INSPECT DISC RUNOUT

(a) Check the bearing play in the axial direction and check for the axle hub runout (See page AH-1).

(b) Temporarily fasten the front disc together with the hub nuts.
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)



(c) Using a dial indicator, measure the disc runout 10 mm (0.39 in.) away from the outer edge of the front disc.
Maximum disc runout:
0.05 mm (0.0020 in.)
If the runout exceeds the maximum value, change the installation positions of the disc and axle so that the runout will become minimal. If the runout exceeds the maximum even when the installation positions are changed, grind the disc. If the disc thickness is less than the minimum, replace the front disc.

REASSEMBLY

1. INSTALL FRONT DISC

(a) Aligning the matchmarks, install the front disc.
HINT:
When replacing the disc with a new one, select the installation position where the front disc has the minimum runout.

2. TEMPORARILY TIGHTEN FRONT DISC BRAKE BLEEDER PLUG

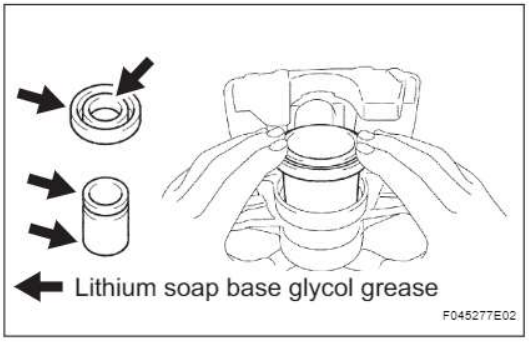
(a) Temporarily install the front disc brake bleeder plug to the front disc brake cylinder sub-assembly.

3. INSTALL FRONT DISC BRAKE BLEEDER PLUG CAP

(a) Install the bleeder plug cap to the front disc brake bleeder plug.

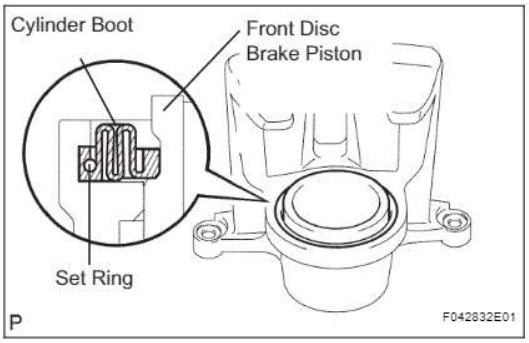
4. INSTALL PISTON SEAL

(a) Apply lithium soap base glycol grease to a new piston seal.
(b) Install the piston seal to the front disc brake cylinder sub-assembly.



5. INSTALL FRONT DISC BRAKE PISTON

(a) Apply lithium soap base glycol grease to the front disc brake piston and new cylinder boot.
(b) Install the cylinder boot to the front disc brake piston.
(c) Install the front disc brake piston to the front disc brake cylinder sub-assembly.
NOTICE:
Do not install the piston forcibly in the front disc brake cylinder sub-assembly.



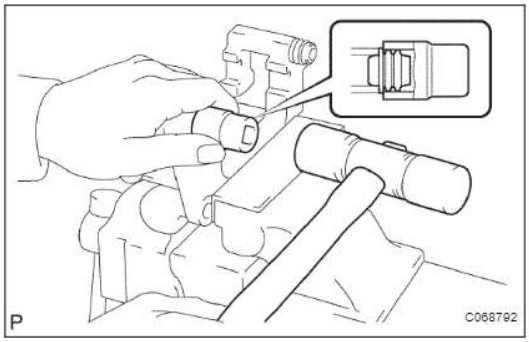
6. INSTALL CYLINDER BOOT

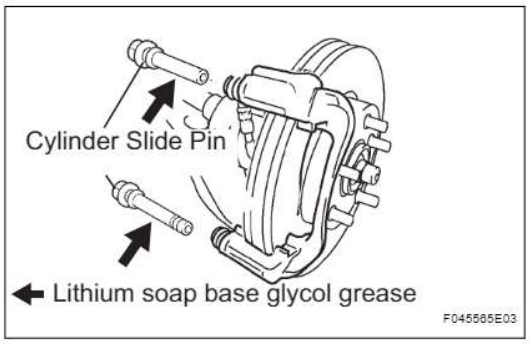
(a) Install a new cylinder boot to the front disc brake cylinder sub-assembly.
NOTICE:
- **Install the boot securely to the grooves of the cylinder and piston.**
- **Do not damage the cylinder boot.**

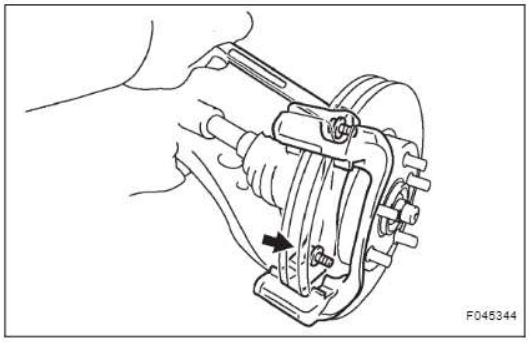
(b) Using a screwdriver, install the set ring.
NOTICE:
Do not damage the cylinder boot.

7. INSTALL FRONT DISC BRAKE BUSH DUST BOOT

(a) Hold the front disc brake cylinder mounting LH in the vise through the soft jaws.
(b) Place the front disc brake cylinder mounting LH in the vise.
(c) Apply lithium soap base glycol grease to the sealing surface of 2 new front disc brake bush dust boots (See pageBR-21).







(d) Using a socket wrench (19 mm) and hammer, drive the 2 front disc brake bush dust boots to the front disc brake cylinder mounting LH.

8. INSTALL FRONT DISC BRAKE CYLINDER SLIDE BUSH

(a) Apply lithium soap base glycol grease to a new front disc brake cylinder slide bush (See page BR-21).

(b) Install the cylinder slide bush to the bottom side of the front disc brake cylinder slide pin (No.2).

9. INSTALL FRONT DISC BRAKE CYLINDER SLIDE PIN

(a) Apply lithium soap base glycol grease to the sliding part and the sealing surface of the front disc brake cylinder slide pin (No.1) and front disc brake cylinder slide pin (No.2).

(b) Install the front disc brake cylinder slide pin (No.1) and front disc brake cylinder slide pin (No.2) to the front disc brake cylinder mounting LH.

(c) Install the front disc brake cylinder slide pin (No.2) to the front disc brake cylinder mounting LH.

10. INSTALL FRONT DISC BRAKE CYLINDER MOUNTING

(a) Install the front disc brake cylinder mounting with the 2 bolts.

Torque: 107 N*m (1,090 kgf*cm, 79 ft.*lbf)

11. INSTALL FRONT DISC BRAKE PAD SUPPORT PLATE

(a) Install the front disc brake pad support plate (No.1) and front disc brake pad support plate (No.2) to the front disc brake cylinder mounting LH.

12. INSTALL ANTI SQUEAL SHIM KIT FRONT

(a) Apply disc brake grease to the anti squeal shims and install them to each pad (See pageBR-21).

NOTICE:

- **When replacing worn pads, the anti squeal shims must be replaced together with the pads.**
- **Install the shims in the correct position and direction.**

(b) Install the pad wear indicator plates to the each pad.

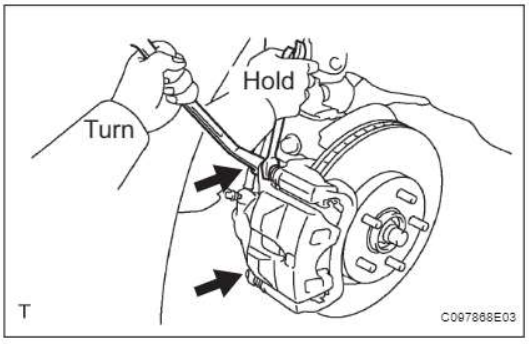
13. INSTALL DISC BRAKE PAD KIT FRONT (PAD ONLY)

(a) Install the disc brake pad kit front to the front disc brake cylinder mounting LH.

NOTICE:

- **There should be no oil or grease on the friction surface of the pads and the disc.**
- **Brake pads are installed with indicator plates facing upward.**

BR



14. **INSTALL FRONT DISC BRAKE CYLINDER SUB-ASSEMBLY**
    (a) Install the front disc brake cylinder sub-assembly with the 2 bolts.
    Torque: 34 N*m (350 kgf*cm, 25 ft.*lbf)

15. **INSTALL FRONT FLEXIBLE HOSE**
    (a) Install 2 new gaskets and flexible hose with the union bolt.
    Torque: 29 N*m (300 kgf*cm, 22 ft.*lbf)
    NOTICE:
    Install the flexible hose lock securely in the lock hole in the disc brake cylinder.

16. **FILL RESERVOIR WITH BRAKE FLUID**
    HINT:
    See page BR-1

17. **BLEED BRAKE MASTER CYLINDER**
    HINT:
    See page BR-1
    SST 09023-00101

18. **BLEED BRAKE LINE**
    HINT:
    See page BR-1

19. **CHECK FLUID LEVEL IN RESERVOIR**
    HINT:
    See page BR-1

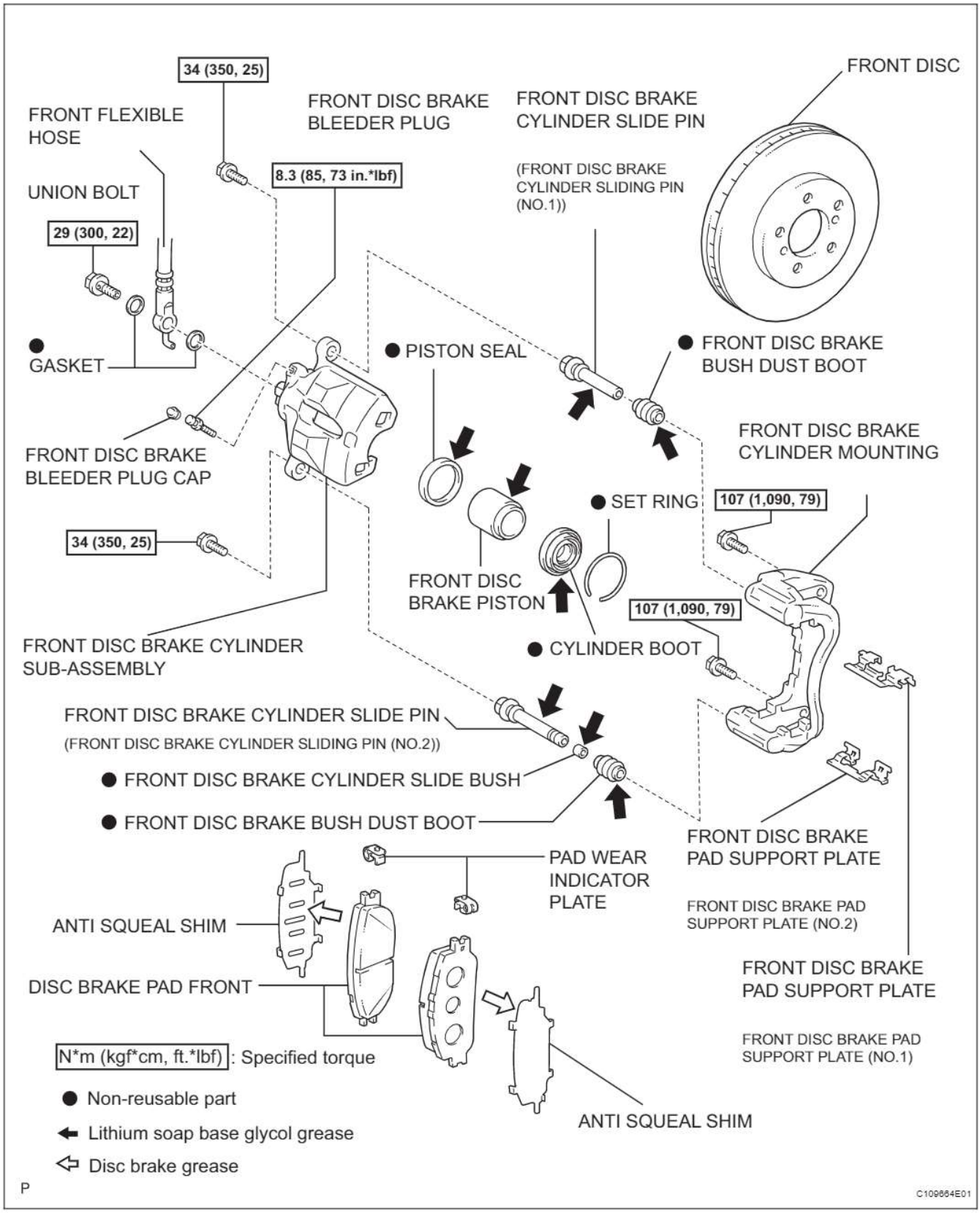
20. **CHECK BRAKE FLUID LEAKAGE**

21. **INSTALL FRONT WHEEL**
    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

BR

FRONT BRAKE

COMPONENTS



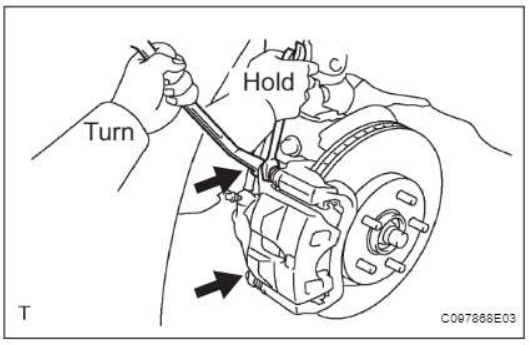
DISASSEMBLY

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. REMOVE FRONT WHEEL

2. DRAIN BRAKE FLUID
NOTICE:
Wash brake fluid off immediately if it adheres to any painted surface.

3. DISCONNECT FRONT FLEXIBLE HOSE
(a) Remove the union bolt and the 2 gaskets from the disc brake cylinder sub-assembly, then disconnect the flexible hose.

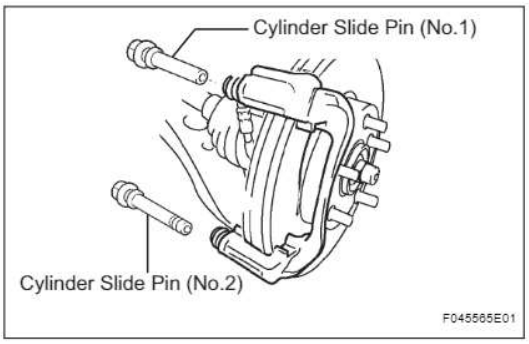


4. REMOVE FRONT DISC BRAKE CYLINDER SUB-ASSEMBLY
(a) Hold the front disc brake cylinder slide pin (No.1), side pin (No.2) and remove the 2 bolts.

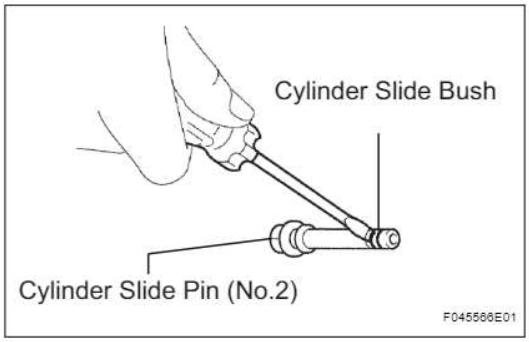
5. REMOVE DISC BRAKE PAD KIT FRONT (PAD ONLY)
(a) Remove the 2 disc brake pads with anti squeal shims from the front disc brake cylinder mounting LH.

6. REMOVE ANTI SQUEAL SHIM KIT FRONT
(a) Remove the 2 anti squeal shims from each pad.
(b) Using a screwdriver, remove the pad wear indicator plates from each pad.

7. REMOVE FRONT DISC BRAKE PAD SUPPORT PLATE
(a) Remove the front disc brake pad support plate (No.1) and front disc brake pad support plate (No.2) from the front disc brake cylinder mounting LH.



8. REMOVE FRONT DISC BRAKE CYLINDER SLIDE PIN
(a) Remove the front disc brake cylinder slide pin (No.1) and front disc brake cylinder slide pin (No.2) from the front disc brake cylinder mounting LH.

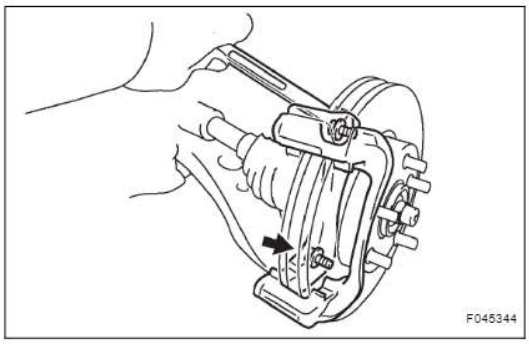


9. REMOVE FRONT DISC BRAKE CYLINDER SLIDE BUSH

(a) Using a screwdriver, remove the front disc brake cylinder slide bush from the front disc brake cylinder slide pin (No.2).

NOTICE:

Do not damage the front disc brake cylinder slide pin (No.2).

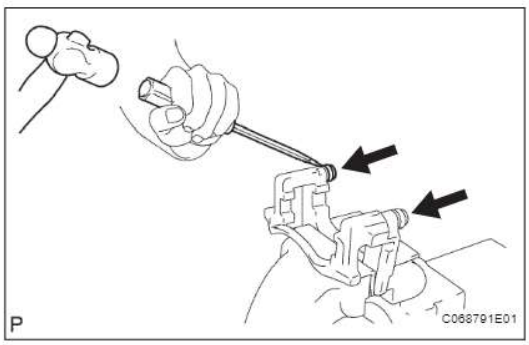


10. REMOVE FRONT DISC BRAKE CYLINDER MOUNTING

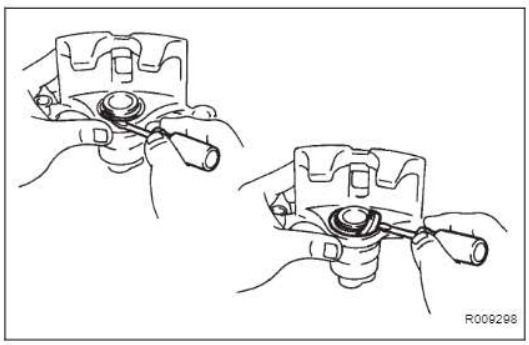
(a) Remove the 2 bolts and front disc brake cylinder mounting LH.

11. REMOVE FRONT DISC BRAKE BUSH DUST BOOT

(a) Hold the front disc brake cylinder mounting LH in the vise through the soft jaws.



(b) Using a screwdriver and hammer, remove the 2 front disc brake bush dust boots from the front disc brake cylinder mounting LH.



12. REMOVE CYLINDER BOOT

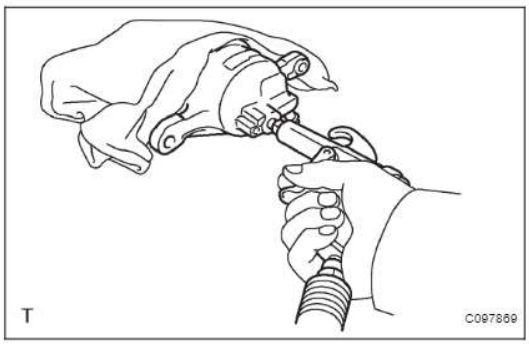
(a) Using a screwdriver, remove the set ring and cylinder boot.

NOTICE:

Do not damage the piston groove and cylinder groove.

13. REMOVE FRONT DISC BRAKE PISTON

(a) Place a shop rag, between the front disc brake piston and the disc brake cylinder sub-assembly.



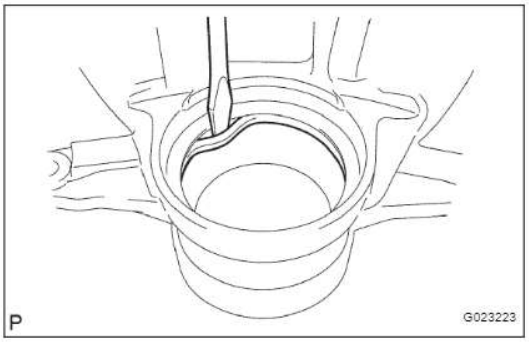
(b) Use compressed air to remove the front disc brake piston from the disc brake cylinder sub-assembly.

CAUTION:

Do not place your fingers in front of the piston when using compressed air.

NOTICE:

Do not spatter the brake fluid.



14. REMOVE PISTON SEAL

(a) Using a screwdriver, remove the piston seal from the front disc brake cylinder sub-assembly.

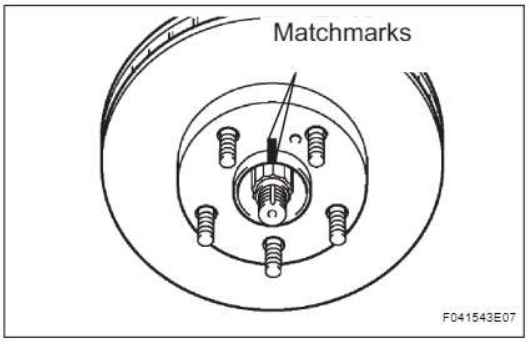
NOTICE:
Do not damage the inner cylinder and cylinder groove.

15. REMOVE FRONT DISC BRAKE BLEEDER PLUG

(a) Remove the front disc brake bleeder plug from the front disc brake cylinder sub-assembly.

16. REMOVE FRONT DISC BRAKE BLEEDER PLUG CAP

(a) Remove the bleeder plug cap from the front disc brake bleeder plug.



17. REMOVE FRONT DISC

(a) Place matchmarks on the front disc and the axle hub.

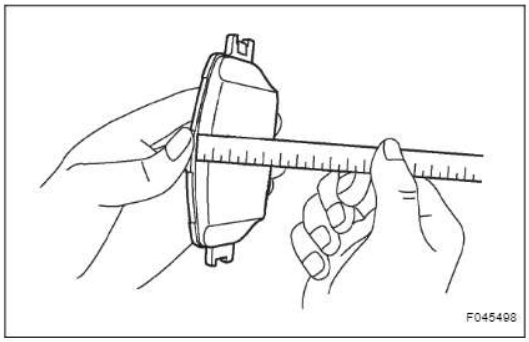
(b) Remove the front disc.

BR

INSPECTION

1. INSPECT BRAKE CYLINDER AND PISTON

(a) Check the cylinder bore and piston for rust or scoring.
If necessary, replace the brake cylinder and piston.



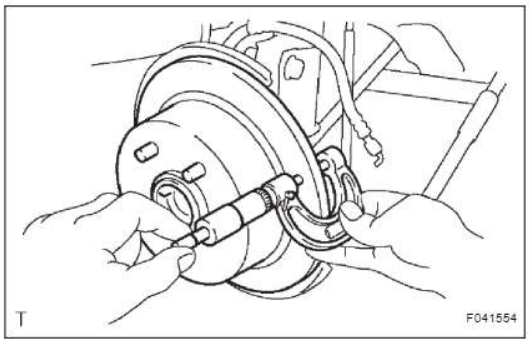
2. INSPECT PAD LINING THICKNESS

(a) Using a ruler, measure the pad lining thickness.
Thickness:
Standard:
10.0 mm (0.394 in.)
Minimum:
1.0 mm (0.039 in.)
If the pad lining thickness is equal to the minimum thickness or less, replace the brake pad.

3. INSPECT REAR DISC BRAKE PAD SUPPORT PLATE

(a) Inspect the front disc brake pad support plate No.1 and front disc brake pad support plate No.2.
HINT:
Make sure that both have sufficient rebound, have no deformation, cracks or wear, and that all rust and dirt is cleaned off.
If necessary, replace the brake pad support plate.

BR



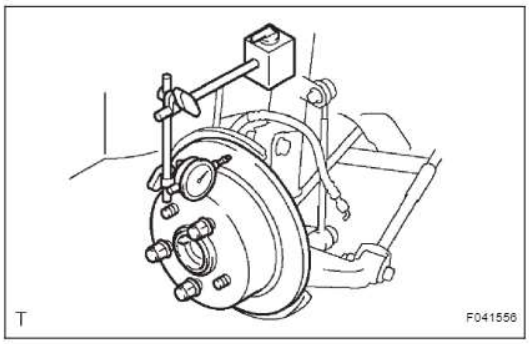
4. INSPECT DISC THICKNESS

(a) Using a micrometer, measure the disc thickness.
Thickness:
Standard:
12.0 mm (0.472 in.)
Minimum:
10.5 mm (0.413 in.)
If the disc thickness is less than the minimum, replace the disc.

5. INSPECT DISC RUNOUT

(a) Check the bearing play in the axial direction and check for the axle hub runout (See page AH-1).

(b) Temporarily fasten the rear disc with hub nuts.
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)



(c) Using a dial indicator, measure the disc runout 10 mm (0.39 in.) away from the outer edge of the rear disc.
Maximum disc runout:
0.15 mm (0.0059 in.)
If the runout exceeds the maximum value, change the installation positions of the disc and axle so that the runout will become minimal. If the runout exceeds the maximum even when the installation positions are changed, grind the disc. If the disc thickness is less than the minimum, replace the rear disc.

REASSEMBLY

1. **INSTALL REAR DISC**
   (a) Aligning the matchmarks, install the rear disc.
   HINT:
   When replacing the disc with a new one, select the installation position where the disc has the minimum runout.

2. **INSTALL PARKING BRAKE SHOE ADJUSTING HOLE PLUG**

3. **ADJUST PARKING BRAKE SHOE CLEARANCE**
   HINT:
   See page PB-12

4. **TEMPORARILY TIGHTEN REAR DISC BRAKE BLEEDER PLUG**
   (a) Temporarily tighten the bleeder plug to the disc brake cylinder.

BR

5. **INSTALL REAR DISC BRAKE BLEEDER PLUG CAP**

6. **INSTALL PISTON SEAL**
   (a) Apply lithium soap base glycol grease to a new piston seal.
   (b) Install the piston seal to the disc brake cylinder.

7. **INSTALL REAR DISC BRAKE PISTON**
   (a) Apply lithium soap base glycol grease to the piston (See page BR-28).
   (b) Install the piston to the disc brake cylinder.
   NOTICE:
   Do not install the piston forcibly in the rear disc brake cylinder sub-assembly.

8. **INSTALL CYLINDER BOOT**
   (a) Apply lithium soap base glycol grease to a new cylinder boot (See page BR-28).
   (b) Install the cylinder boot to the disc brake cylinder.
   NOTICE:
   - **Install the boot securely to the grooves of the cylinder and piston.**
   - **Do not damage the cylinder boot.**

   (c) Using a screwdriver, install a new set ring.
   NOTICE:
   Do not damage the cylinder boot.

9. **INSTALL REAR DISC BRAKE CYLINDER MOUNTING LH**
   (a) Install the cylinder mounting LH with the 2 bolts.
   Torque: 62 N*m (630 kgf*cm, 46 ft.*lbf)

10. **INSTALL REAR DISC BRAKE CYLINDER SLIDE PIN**
    (a) Install the cylinder slide pin (lower) with the cylinder slide bush.
    Torque: 43 N*m (440 kgf*cm, 32 ft.*lbf)

11. INSTALL REAR DISC BRAKE BUSH DUST BOOT

(a) Install the rear disc brake bush dust boot.
  (1) Apply lithium soap base glycol grease to seal surface of 2 new bush dust boots.
  (2) Install the 2 bush dust boots to each cylinder slide pin.

12. INSTALL REAR DISC BRAKE PAD SUPPORT PLATE

(a) Install the rear disc brake pad support plate No.1.
(b) Install the rear disc brake pad support plate No.2.

13. INSTALL REAR DISC BRAKE ANTI SQUEAL SHIM KIT

(a) Coat both sides of No.1 anti squeal shim with disc brake grease, and install the shim together with No.2 anti squeal shim to the outer pad.
NOTICE:
When replacing worn pads, the anti squeal shims must be replaced together with the pads.
(b) Coat both sides of No.4 anti squeal shim with disc brake grease, and install the shim together with No.3 anti squeal shim to the inner pad.
NOTICE:
When replacing worn pads, the anti squeal shims must be replaced together with the pads.
(c) Install the pad wear indicator plate to the inner pad.

14. INSTALL REAR DISC BRAKE PAD KIT (PAD ONLY)

(a) Install the 2 brake pads with the anti squeal shims.
NOTICE:
- **There should be no oil or grease on the friction surface of the pads and the disc.**
- **Inner pad is installed with indicator plate facing downward.**

15. INSTALL REAR DISC BRAKE CYLINDER SLIDE PIN

(a) Apply lithium soap base glycol grease to the cylinder slide pin.
(b) Install and torque the cylinder slide pin (upper) to the disc brake cylinder assembly.
Torque: 43 N*m (440 kgf*cm, 32 ft.*lbf)

16. CONNECT FLEXIBLE HOSE

(a) Connect a new gasket and flexible hose with the union bolt.
Torque: 29 N*m (300 kgf*cm, 22 ft.*lbf)

17. FILL RESERVOIR WITH BRACKET FLUID

HINT:
See page BR-1

18. BLEED BRAKE MASTER CYLINDER

SST 09023-00101

HINT:
See page BR-1

19. BLEED BRAKE LINE

HINT:
See page BR-1

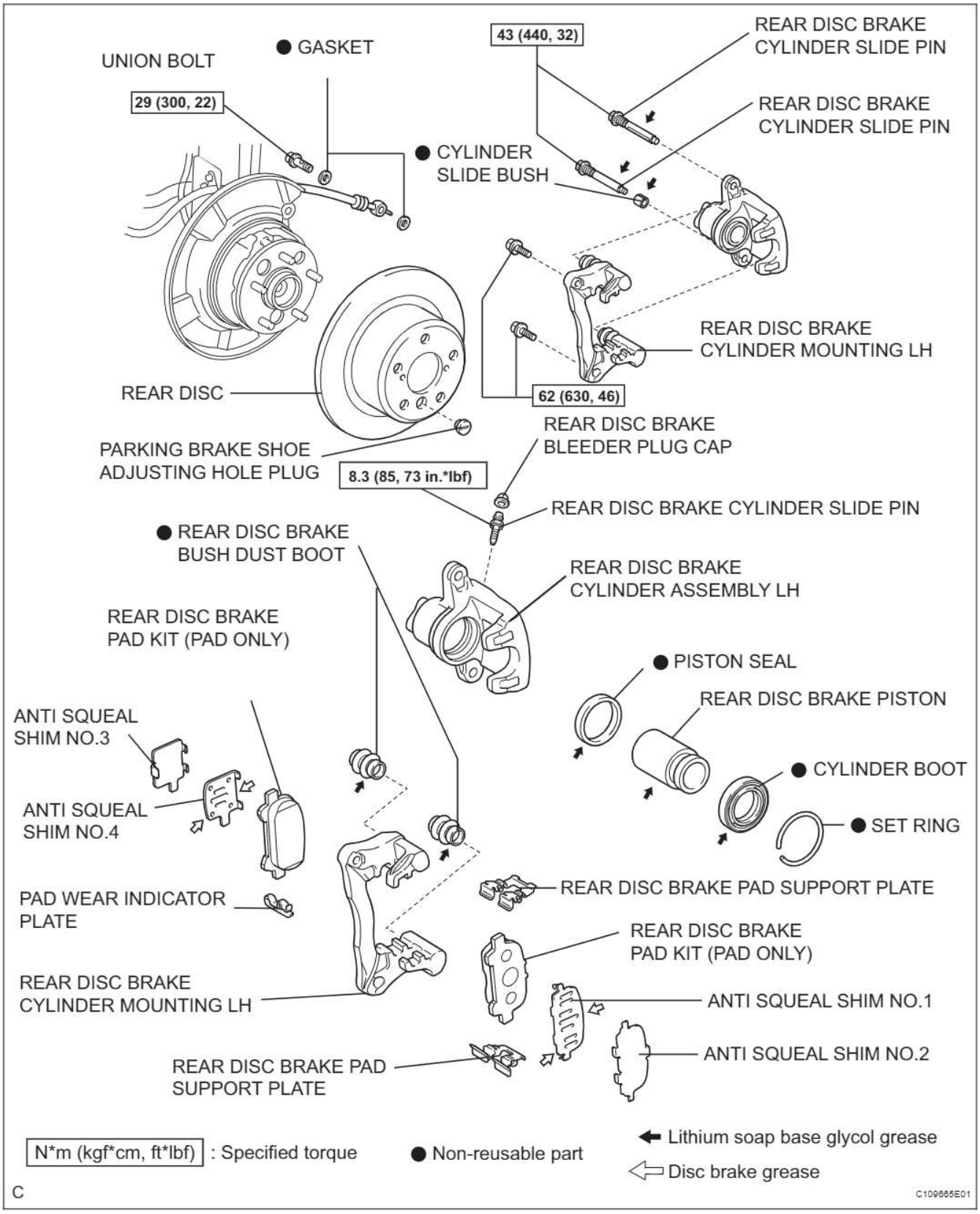
20. **CHECK FLUID LEVEL IN RESERVOIR**
HINT:
See page BR-1

21. **CHECK BRAKE FLUID LEAKAGE**

22. **INSTALL REAR WHEEL**
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

REAR DISC BRAKE

COMPONENTS

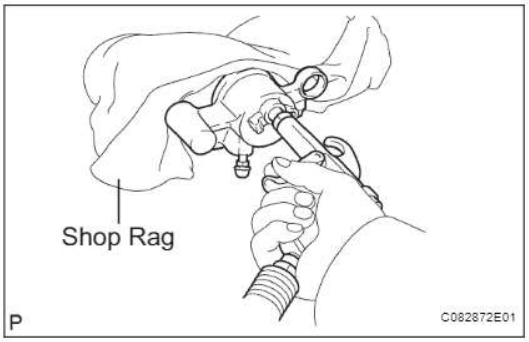


DISASSEMBLY

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. **REMOVE REAR BRAKE**
2. **DRAIN BRAKE FLUID**
   NOTICE:
   Wash brake fluid off immediately if it adheres to any painted surface.
3. **DISPOSE OF FLEXIBLE HOSE**
   (a) Remove the union bolt and gasket from the disc brake cylinder, then disconnect the flexible hose from the disc brake cylinder.
4. **REMOVE REAR DISC BRAKE CYLINDER SLIDE PIN**
   (a) Remove the cylinder slide pin and cylinder slide bush.
5. **REMOVE REAR DISC BRAKE CYLINDER ASSEMBLY LH**
   (a) Remove the cylinder slide pin and disc brake cylinder.
6. **REMOVE REAR DISC BRAKE PAD KIT (PAD ONLY)**
   (a) Remove the 2 brake pads with the anti squeal shims.
7. **REMOVE REAR DISC BRAKE ANTI SQUEAL SHIM KIT**
   (a) Remove the 2 anti squeal shims from each of 2 brake pads.
   (b) Remove the pad wear indicator plate from inner pad.
8. **REMOVE REAR DISC BRAKE PAD SUPPORT PLATE**
   (a) Remove the rear disc brake pad support plate No.1.
   (b) Remove the rear disc brake pad support plate No.2.
9. **REMOVE REAR DISC BRAKE BUSH DUST BOOT**
   (a) Remove the 2 rear disc brake bush dust boots.
10. **REMOVE REAR DISC BRAKE CYLINDER MOUNTING LH**
    (a) Remove the 2 bolts and cylinder mounting LH.
11. **REMOVE CYLINDER BOOT**
    (a) Using a screwdriver, remove the set ring and disc cylinder boot.
    NOTICE:
    Be careful not to damage the piston groove and cylinder groove.

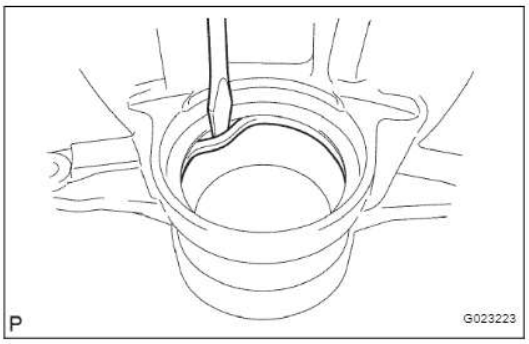


12. REMOVE REAR DISC BRAKE PISTON

(a) Place a shop rag, between the piston and the disc brake cylinder.

(b) Use compressed air to remove the piston from the disc brake cylinder.

CAUTION:
Do not place your fingers in front of the piston when using compressed air.
NOTICE:
Do not spatter the brake fluid.



13. REMOVE PISTON SEAL

(a) Using a screwdriver, remove the piston seal from the brake cylinder.

NOTICE:
Do not damage the inner cylinder and the cylinder groove.

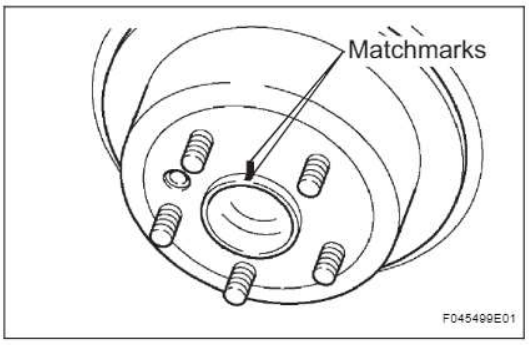
14. REMOVE REAR DISC BRAKE BLEEDER PLUG CAP

15. REMOVE REAR DISC BRAKE BLEEDER PLUG

16. REMOVE PARKING BRAKE SHOE ADJUSTING HOLE PLUG

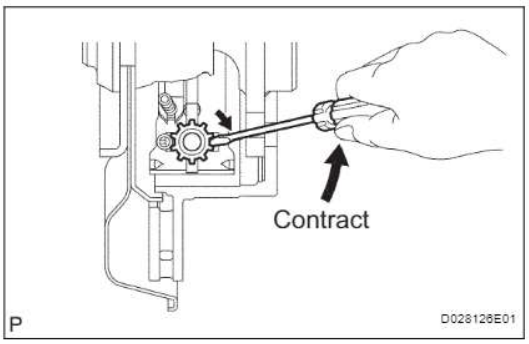
17. REMOVE REAR DISC

(a) Put matchmarks on the rear disc and the axle hub.



(b) Release the parking brake, and remove the rear disc.

HINT:
If the disc cannot be removed easily, turn the shoe adjuster until the wheel turns freely.



PARKING BRAKE SYSTEM

PROBLEM SYMPTOMS TABLE

Use the table below to help find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

PARKING BRAKE SYSTEM

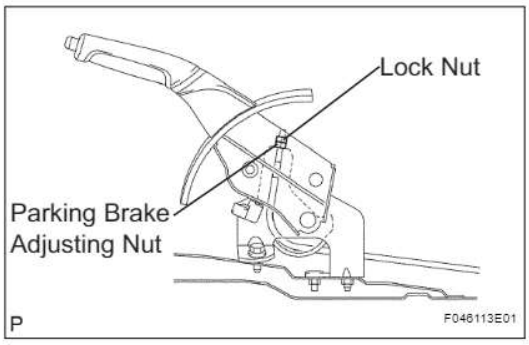
Symptom	Suspected area	See page
Brake drag	1.Parking brake or lever travel (Out of adjustment)	PB-3
	2.Parking brake wire (Sticking)	PB-6
	3.Parking brake shoe clearance (Out of adjustment)	PB-15
	4.Parking brake shoe lining (Cracked or distorted)	PB-13
	5.Tension or return spring (Damaged)	PB-12

INSPECTION

1. **INSPECT PARKING BRAKE LEVER TRAVEL**
   (a) Pull the parking brake lever all the way up, and count the number of clicks.
   Parking brake lever travel:
   6 to 9 clicks at 200 N (20 kgf, 44.1 lbf)

ADJUSTMENT

1. **REMOVE REAR WHEEL**
2. **ADJUST PARKING BRAKE SHOE CLEARANCE**
   HINT:
   See page PB-15
3. **INSTALL REAR WHEEL**
   Torque: 103 N*m (1,050 kgf*cm, 76 in.*lbf)
4. **ADJUST PARKING BRAKE LEVER TRAVEL**
   (a) Remove the shift lever knob sub-assembly (See page IP-9).
   (b) Remove the console upper rear panel sub-assembly (See page IP-9).
   (c) Remove the air duct rear No.1.
   (d) Loosen the lock nut and turn the parking brake wire adjusting nut until the lever travel is correct.
   (e) Using a spanner or equivalent to hold the parking brake adjusting nut, tighten the lock nut.
   Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

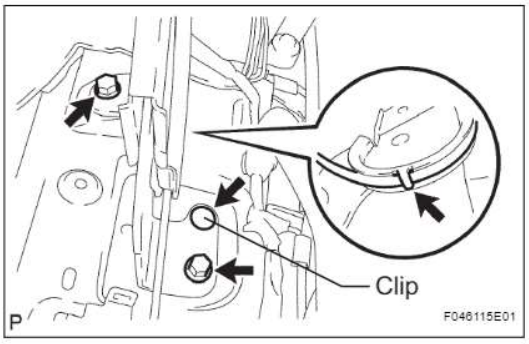


PB

INSTALLATION

1. **INSTALL PARKING BRAKE SWITCH ASSEMBLY**
   (a) Install the parking brake switch assembly with the screw.

2. **INSTALL PARKING BRAKE LEVER SUB-ASSEMBLY**
   (a) Connect the parking brake cable assembly No.1 to the lever and install the parking brake adjusting nut and lock nut.
   (b) Install the parking brake lever sub-assembly with the 2 bolts and clip.
   Torque: 12.5 N*m (128 kgf*cm, 9 ft.*lbf)
   (c) Connect the parking brake switch connector.



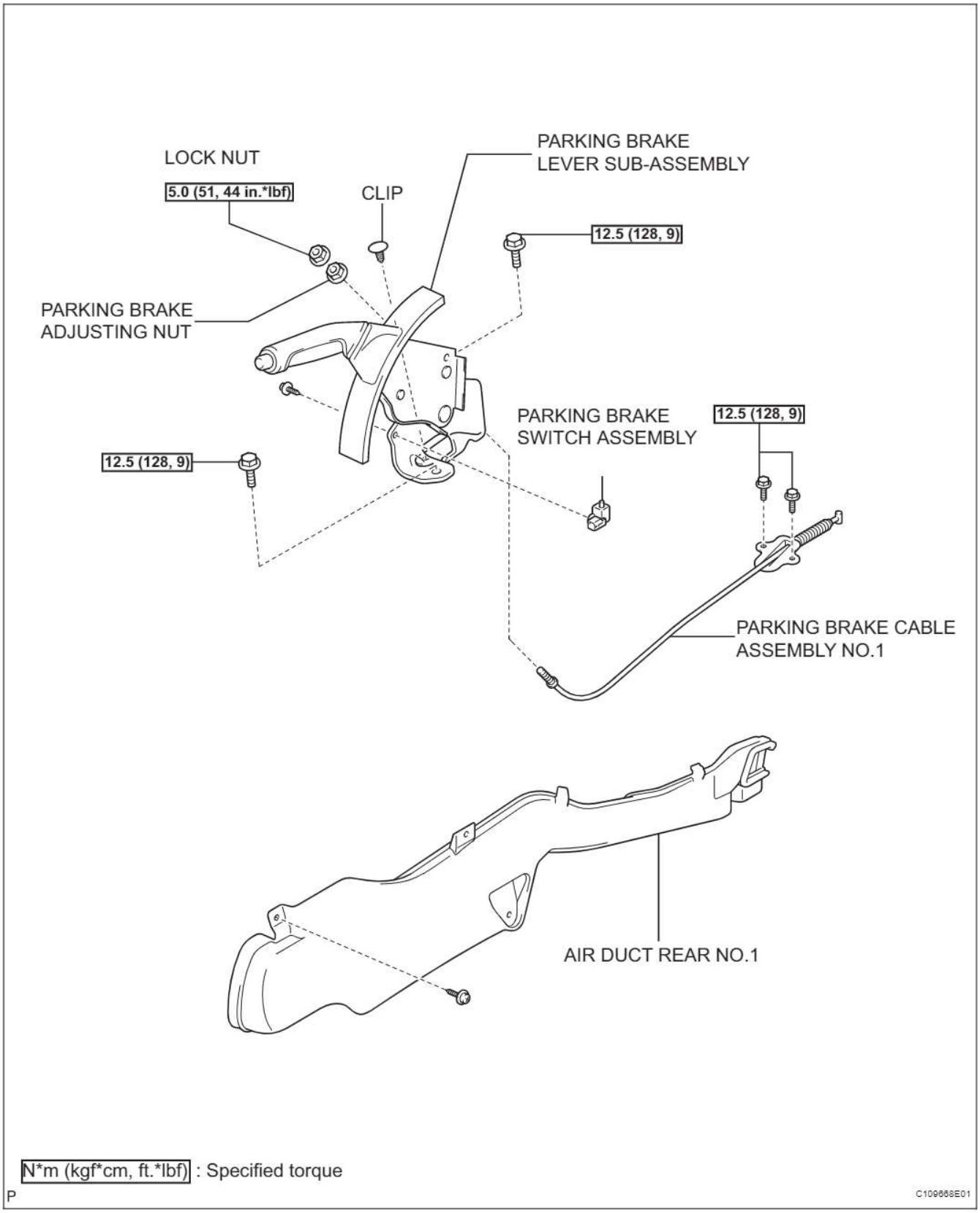
3. **INSPECT PARKING BRAKE LEVER TRAVEL**
   HINT:
   See page PB-3

4. **ADJUST PARKING BRAKE LEVER TRAVEL**
   HINT:
   See page PB-3

PB

PARKING BRAKE LEVER

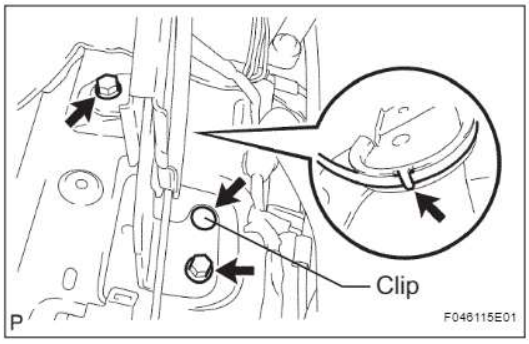
COMPONENTS



REMOVAL

HINT:
COMPONENTS: See page PB-2.

1. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY**
2. **REMOVE CONSOLE UPPER REAR PANEL SUB-ASSEMBLY (See page IP-9)**
3. **REMOVE CONSOLE BOX ASSEMBLY (See page IP-10)**
4. **REMOVE AIR DUCT REAR NO.1**
5. **REMOVE PARKING BRAKE LEVER SUB-ASSEMBLY**
   (a) Disconnect the parking brake switch assembly connector.
   (b) Remove the lock nut and parking brake adjusting nut.
   (c) Remove the 2 bolts and clip.
   (d) Using a screwdriver, disconnect the parking brake cable assembly No.1 and remove the parking brake lever sub-assembly.
6. **REMOVE PARKING BRAKE SWITCH ASSEMBLY**
   (a) Remove the screw and parking brake switch assembly.

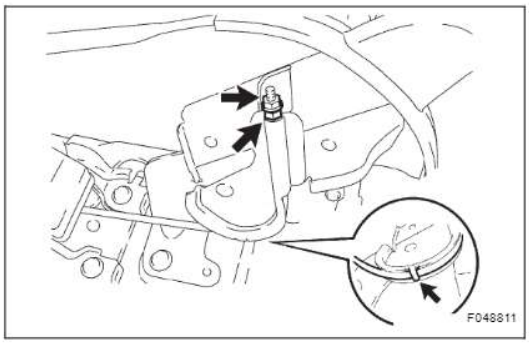


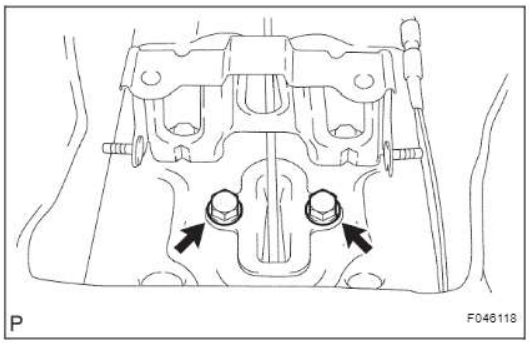
PB

REMOVAL

HINT:
COMPONENTS: See page PB-5
For parking brake cable No.2, employ the same procedure to the No.3 side.

1. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY**
2. **REMOVE CONSOLE UPPER REAR PANEL SUB-ASSEMBLY (See page IP-9)**
3. **REMOVE CONSOLE BOX ASSEMBLY (See page IP-10)**
4. **REMOVE AIR DUCT REAR NO.1**
5. **REMOVE AIR DUCT REAR NO.2**
6. **REMOVE YAW RATE SENSOR ASSEMBLY (w/ VSC) (See page BC-191)**
7. **REMOVE NO.1 PARKING BRAKE CABLE ASSEMBLY**
   (a) Release the parking brake lever.
   (b) Remove the lock nut and parking brake adjusting nut from the parking brake cable assembly No.1.
   (c) Using a screwdriver, raise the pick on the parking brake lever, and remove the parking brake cable assembly No.1 from the parking brake lever.
   (d) Remove the 2 bolts and console box mounting bracket No.2.



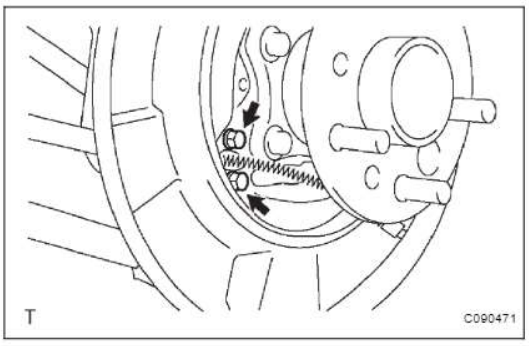


   (e) Remove the 2 bolts and separate the parking brake cable No.1 from the parking brake equalizer.
8. **REMOVE REAR WHEEL**
9. **SEPARATE REAR DISC BRAKE CALIPER ASSEMBLY LH**
   (a) Remove the 2 bolts and separate the rear disc brake caliper assembly LH.
   HINT:
   Do not disconnect the flexible hose from the brake caliper assembly LH.
10. **REMOVE REAR DISC (See page PB-12)**
11. **REMOVE PARKING BRAKE SHOE RETURN TENSION SPRING (See page PB-12)**
12. **REMOVE PARKING BRAKE SHOE STRUT COMPRESSION SPRING**
13. **REMOVE PARKING BRAKE SHOE STRUT LH (See page PB-12)**
14. **REMOVE PARKING BRAKE SHOE (See page PB-13)**

PB

15. REMOVE PARKING BRAKE CABLE HEAT INSULATOR

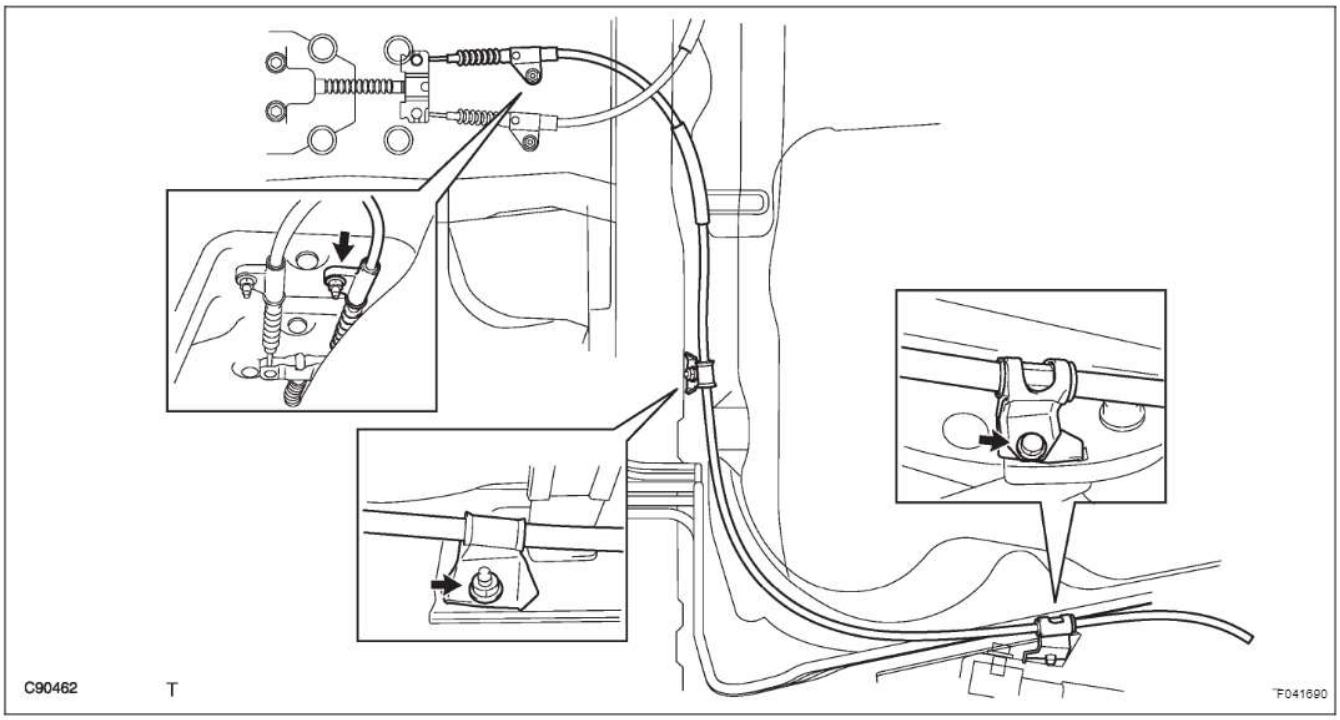
(a) Remove the 3 nuts and parking brake cable heat insulator.



16. REMOVE NO.3 PARKING BRAKE CABLE ASSEMBLY

(a) Remove the 2 bolts and separate the parking brake cable assembly No.3 from the backing plate.

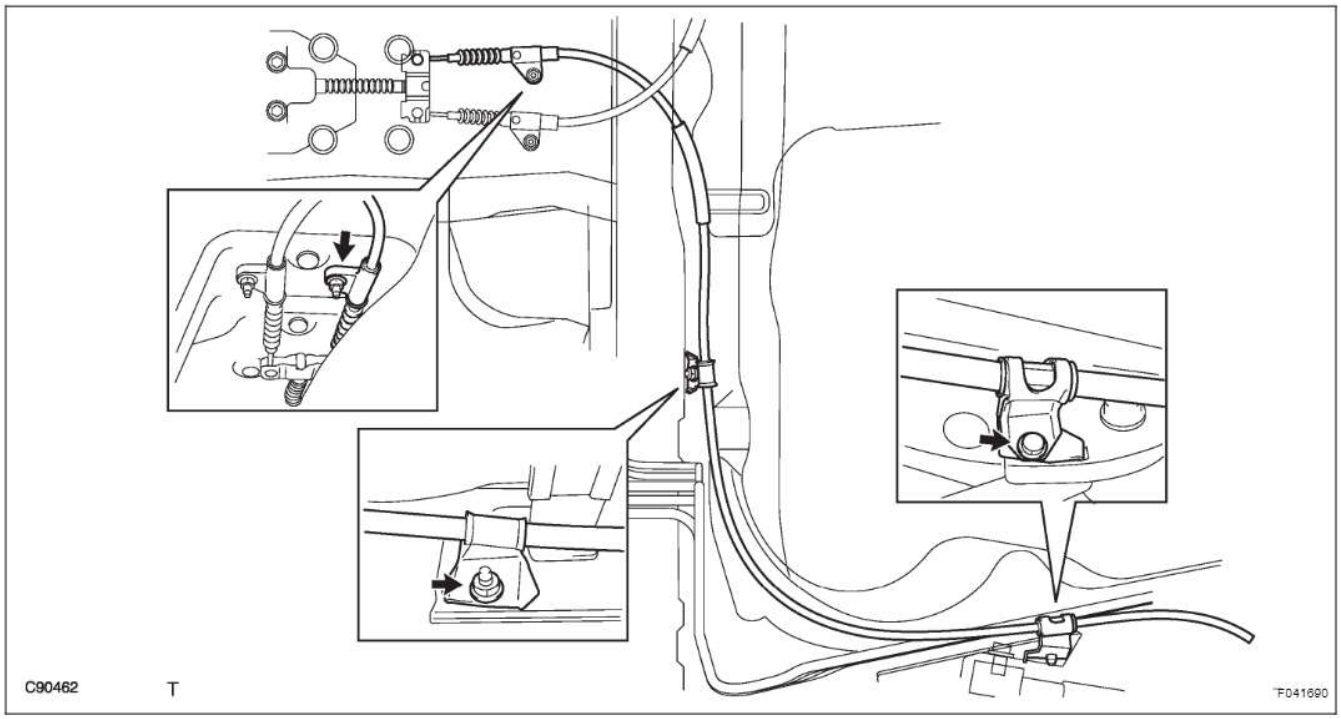
(b) Remove the 2 nuts and bolt, and separate the parking brake cable assembly No.3 from the body.



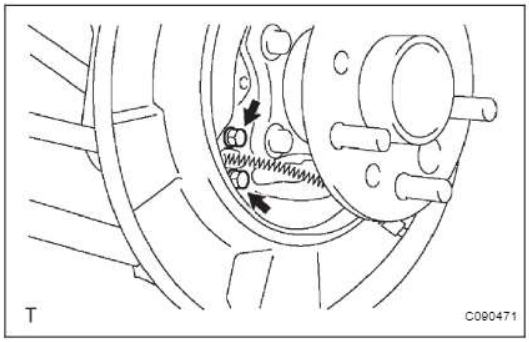
(c) Separate the parking brake cable assembly No.3 from the equalizer and remove the parking brake cable assembly No.3.

INSTALLATION

1. **INSTALL NO.3 PARKING BRAKE CABLE ASSEMBLY**
   (a) Connect the parking brake cable assembly No.3 to the parking brake equalizer.
   (b) Install the 2 nuts, bolt and parking brake cable assembly No.3 to the body.



Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



   (c) Connect the parking brake cable assembly No.3 to the backing plate with the 2 bolts.
   Torque: 7.8 N*m (80 kgf*cm, 69 in.*lbf)

2. **INSTALL PARKING BRAKE CABLE HEAT INSULATOR**
   (a) Install the parking brake heat insulator with the 3 nuts.
   Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

3. **APPLY HIGH TEMPERATURE GREASE (See page PB-14)**

4. **INSTALL PARKING BRAKE SHOE (See page PB-14)**

5. **INSTALL PARKING BRAKE SHOE STRUT LH (See page PB-14)**

6. **INSTALL PARKING BRAKE SHOE STRUT COMPRESSION SPRING**

7. **INSTALL PARKING BRAKE SHOE RETURN TENSION SPRING (See page PB-14)**

8. **CHECK PARKING BRAKE INSTALLATION (See page PB-15)**

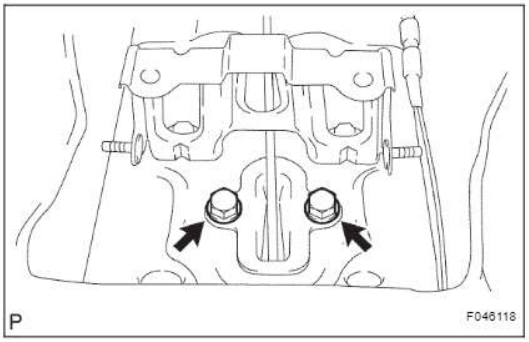
9. **INSTALL REAR DISC (See page PB-15)**

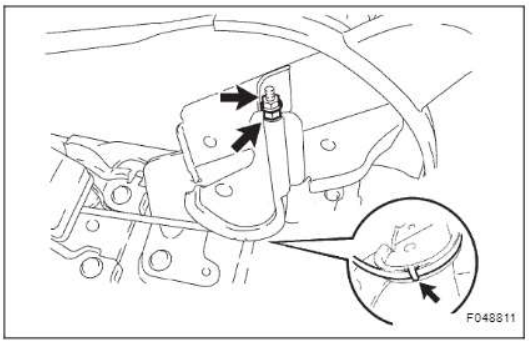
10. **ADJUST PARKING BRAKE SHOE CLEARANCE (See page PB-15)**

11. **INSTALL REAR DISC BRAKE CALIPER ASSEMBLY LH**
    (a) Install the rear disc brake caliper assembly LH with the 2 bolts.
    Torque: 47 N*m (480 kgf*cm, 35 ft.*lbf)

12. **INSTALL REAR WHEEL**
    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

13. **INSTALL NO.1 PARKING BRAKE CABLE ASSEMBLY**
    (a) Connect the parking brake cable assembly No.1 to the parking brake equalizer.
    (b) Install the parking brake cable assembly No.1 with the 2 bolts.
    Torque: 12.5 N*m (128 kgf*cm, 9 ft.*lbf)
    (c) Install the console box mounting bracket No.2 with the 2 bolts.
    Torque: 12.5 N*m (128 kgf*cm, 9 ft.*lbf)





    (d) Install the parking brake cable assembly No.1 with the parking brake adjusting nut and lock nut to the parking brake lever assembly.
    Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)
    (e) Using a screwdriver, fix the parking brake cable No.1 to the pick.

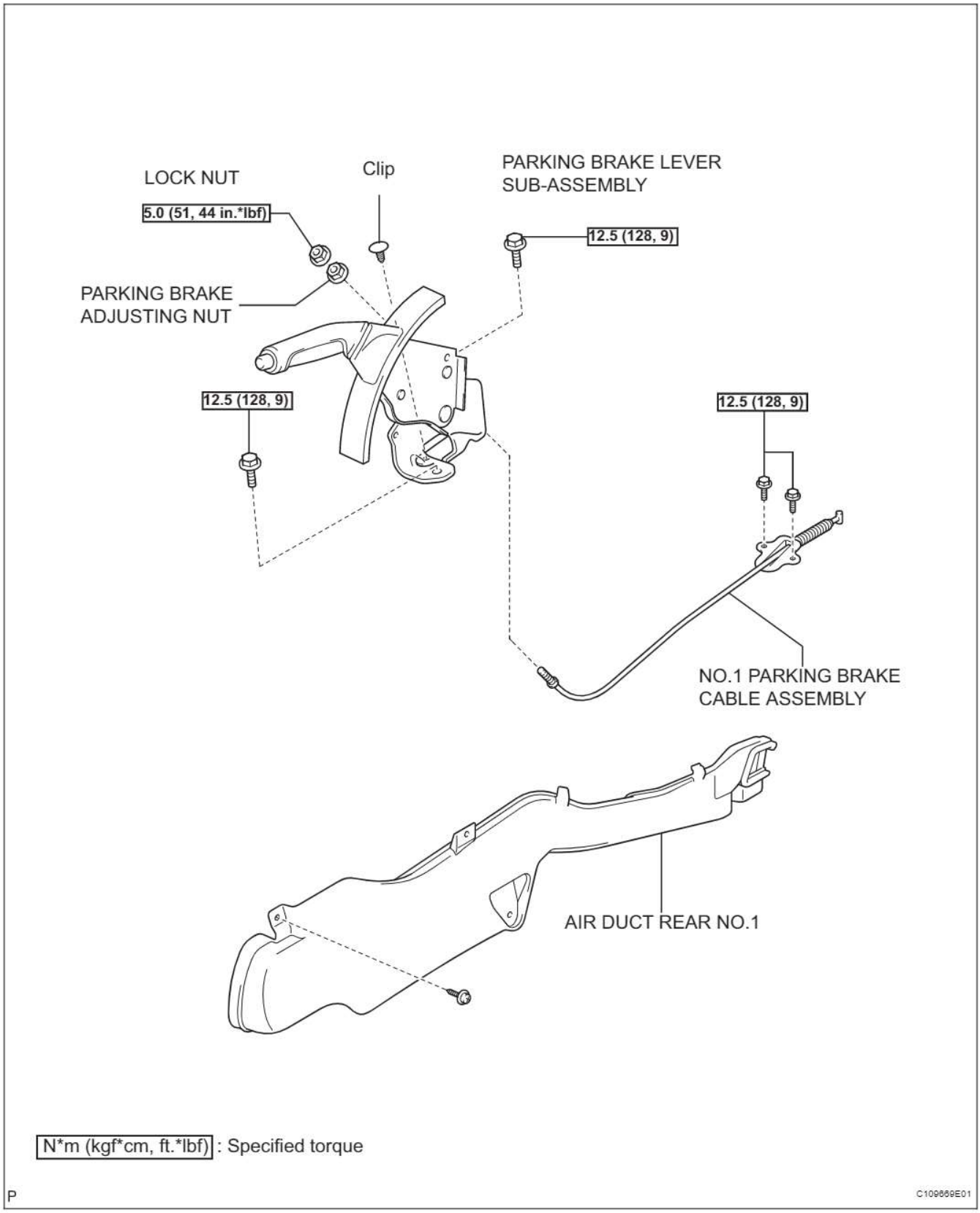
14. **INSTALL YAW RATE SENSOR ASSEMBLY (w/ VSC)**

15. **INSPECT PARKING BRAKE LEVER TRAVEL**
    HINT:
    See page PB-3

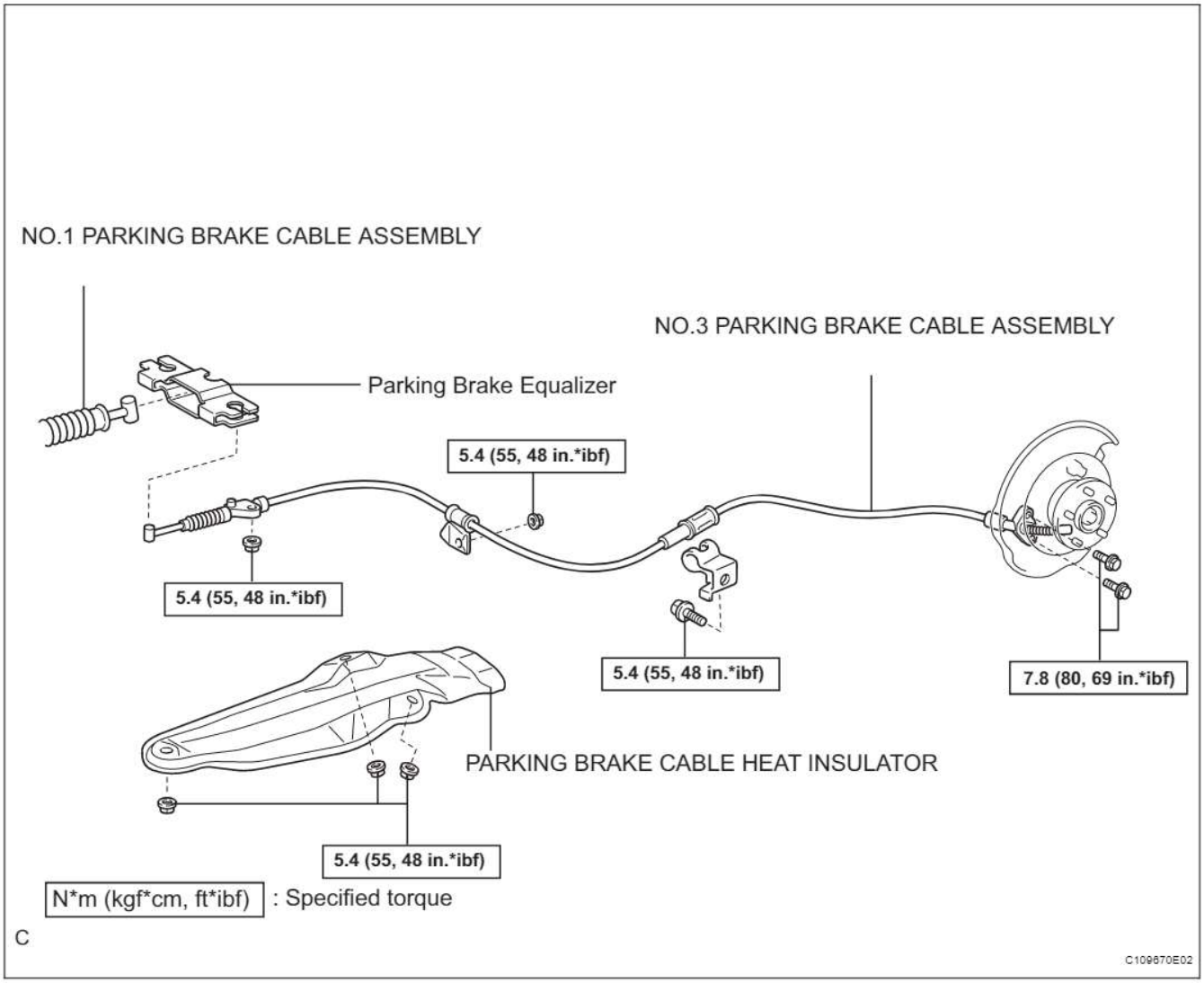
16. **ADJUST PARKING BRAKE LEVER TRAVEL**
    HINT:
    See page PB-3

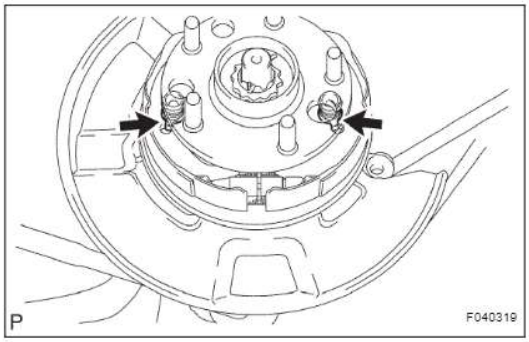
PARKING BRAKE CABLE

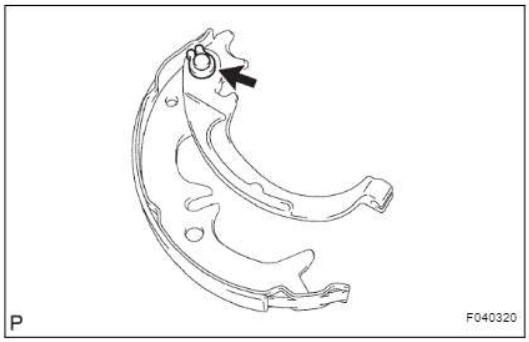
COMPONENTS

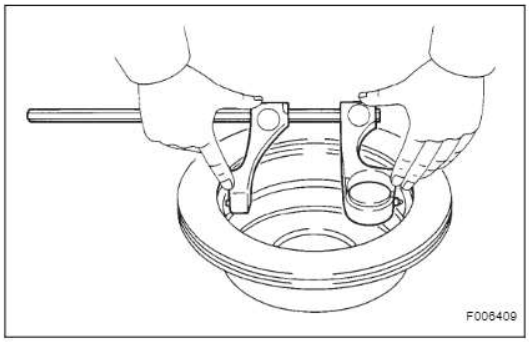


PB


NO.1 PARKING BRAKE CABLE ASSEMBLY
NO.3 PARKING BRAKE CABLE ASSEMBLY
Parking Brake Equalizer
5.4 (55, 48 in.*ibf)
5.4 (55, 48 in.*ibf)
5.4 (55, 48 in.*ibf)
7.8 (80, 69 in.*ibf)
PARKING BRAKE CABLE HEAT INSULATOR
5.4 (55, 48 in.*ibf)
N*m (kgf*cm, ft*ibf) : Specified torque
C
C109670E02







6. REMOVE PARKING BRAKE SHOE

(a) Release the cup claw and remove the parking brake shoe assembly LH No.2 and parking brake shoe assembly LH No.1.

(b) Disconnect the parking brake cable No.3 from the shoe lever.

(c) Remove the tension spring and shoe adjuster screw set from the parking brake shoe assembly LH No.2 and parking brake shoe assembly LH No.1.

(d) Remove the 2 shoe hold-down springs, 4 cups and 2 pins.

(e) Using a screwdriver, remove the C-washer.

(f) Remove the shim and shoe lever from the parking brake shoe assembly LH No.2.

PB

INSPECTION

1. INSPECT BRAKE DISC INSIDE DIAMETER

(a) Using a brake drum gauge or equivalent tool, measure the inside diameter of the rear disc.

Standard inside diameter:
170 mm (6.69 in.)
Maximum inside diameter:
171 mm (6.73 in.)

If the inside diameter exceeds the maximum, replace the brake disc.

2. INSPECT PARKING BRAKE SHOE LINING THICKNESS

(a) Using a ruler, measure the thickness of the shoe lining.

Standard thickness:
2.0 mm (0.079 in.)
Minimum thickness:
1.0 mm (0.039 in.)

If the lining thickness is less than or equal to the minimum, or if there is severe or uneven wear, replace the brake shoe.

3. INSPECT BRAKE DISC AND PARKING BRAKE SHOE LINING FOR PROPER CONTACT

(a) Apply chalk to the inside surface of the disc, then grind down the brake shoe lining to fit the disc.
If the contact between the brake disc and the shoe lining is improper, repair it using a brake shoe grinder or replace the brake shoe assembly.

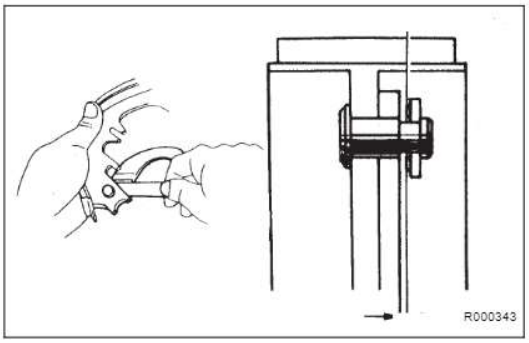
REASSEMBLY

1. APPLY HIGH TEMPERATURE GREASE

(a) Apply high temperature grease to the backing plate which makes contact with the shoe.

2. INSTALL PARKING BRAKE SHOE

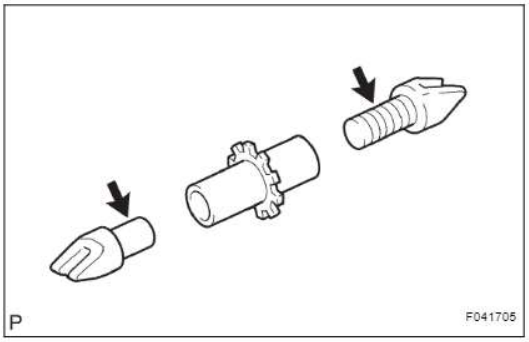
(a) Install the shoe lever and shim to the rear shoe with a new C-washer.



(b) Using a feeler gauge, measure the clearance.
Standard clearance:
Less than 0.35 mm (0.0138 in.)
If the clearance is not within the specification, replace the shim with one of the correct size.

Shim Thickness	Shim Thickness
0.3 mm (0.012 in.)	0.9 mm (0.035 in.)
0.6 mm (0.024 in.)	-

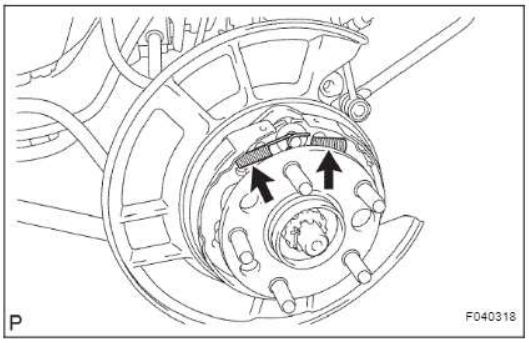
PB



(c) Apply high temperature grease to the adjusting bolt.
(d) Install the shoe adjusting screw set and tension spring to the front and rear shoe.
(e) Install the 2 pins, 4 cups and 2 shoe hold-down springs.
(f) Connect the parking brake cable No.3 to the shoe lever.
(g) Install the front and rear parking brake shoe.

3. INSTALL PARKING BRAKE SHOE STRUT LH

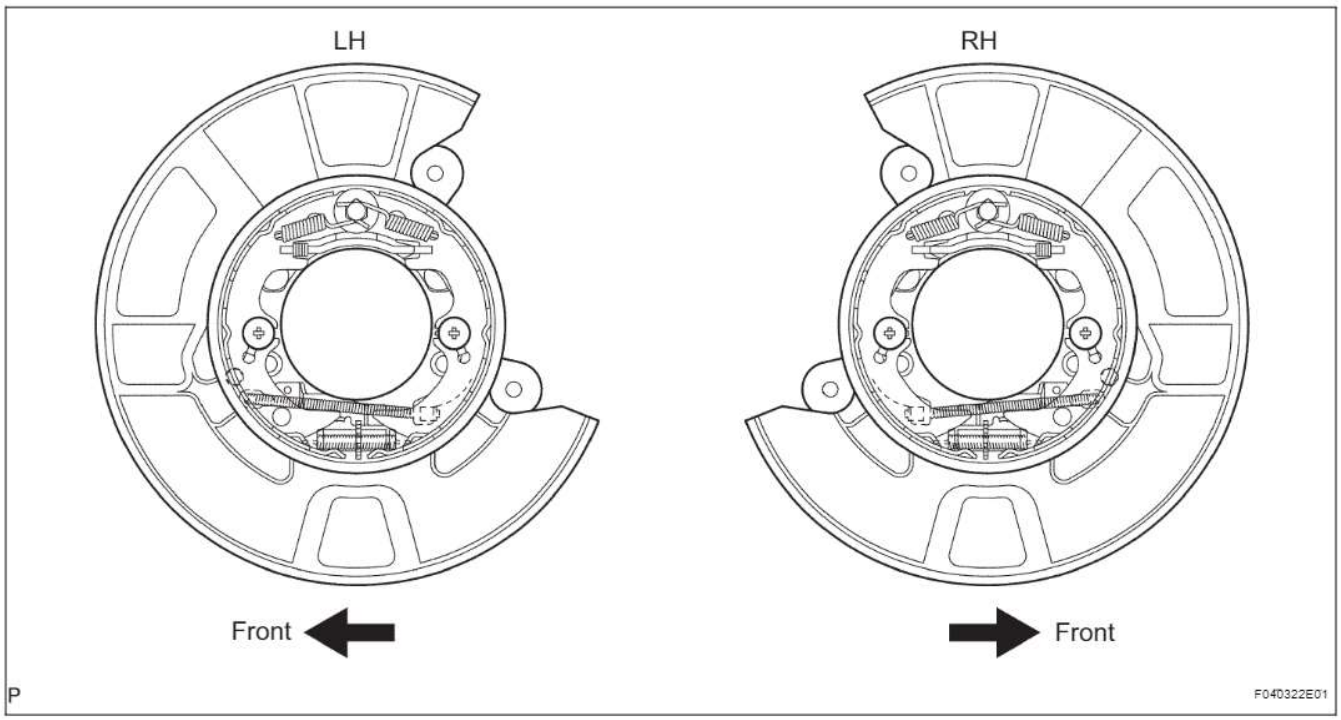
(a) Attach the parking brake shoe strut LH and the parking brake shoe strut compression spring to the parking brake shoe assembly LH No.2 and parking brake shoe assembly LH No.1.



4. INSTALL PARKING BRAKE SHOE RETURN TENSION SPRING

(a) Using needle-nose pliers, install the 2 return tension springs No.1.
HINT:
First install the front side spring then the rear side spring.

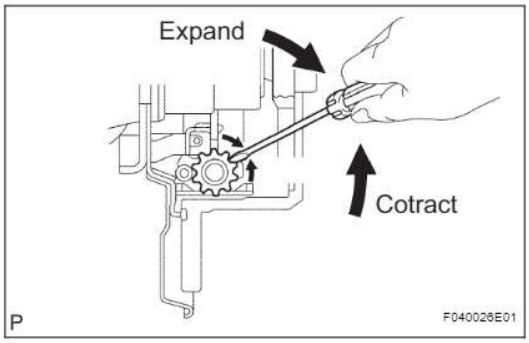
5. **CHECK PARKING BRAKE INSTALLATION**
   (a) Check that each part is installed properly.



NOTICE:
There should be no oil or grease adhering to the friction surface of the shoe lining and disc.

6. **INSTALL REAR DISC**
   (a) Aligning the matchmarks, install the rear disc.

7. **ADJUST PARKING BRAKE SHOE CLEARANCE**
   (a) Temporarily install the hub nuts.
   (b) Remove the hole plug, turn the adjuster and expand the shoes until the disc locks.
   (c) Contract the shoe adjuster until the disc rotates smoothly.
   Standard:
   Return 8 notches
   (d) Check that the shoe has no brake drag.
   (e) Install the hole plug.



8. **INSTALL REAR DISC BRAKE CALIPER ASSEMBLY LH**
   (a) Install the rear disc brake caliper assembly LH with the 2 bolts.
   Torque: 62 N*m (630 kgf*cm, 46 ft.*lbf)

9. **INSTALL REAR WHEEL**
   Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

10. **INSPECT PARKING BRAKE LEVER TRAVEL**
    HINT:
    See page PB-3

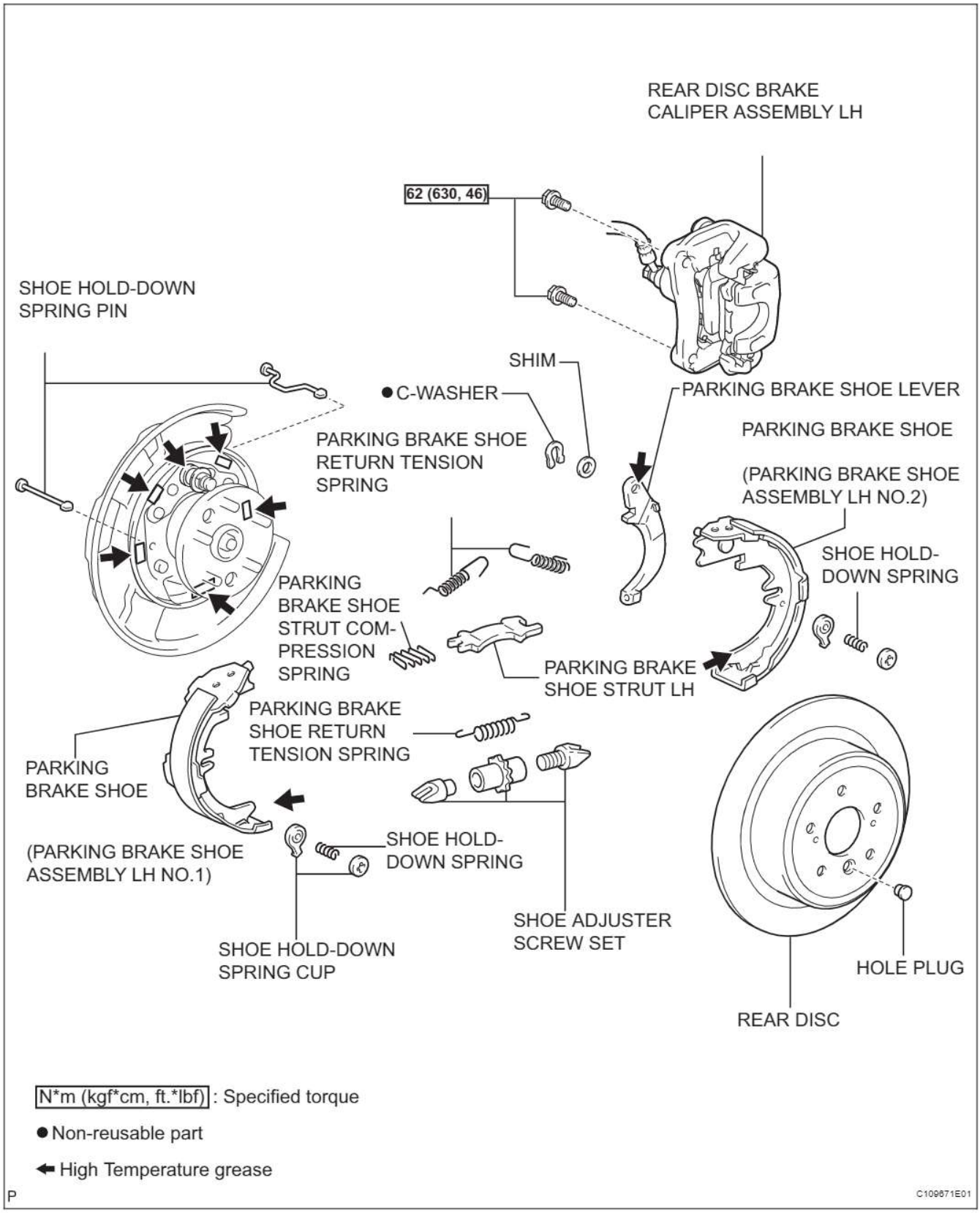
11. ADJUST PARKING BRAKE LEVER TRAVEL

HINT:

See page PB-3

PARKING BRAKE ASSEMBLY

COMPONENTS



DISASSEMBLY

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

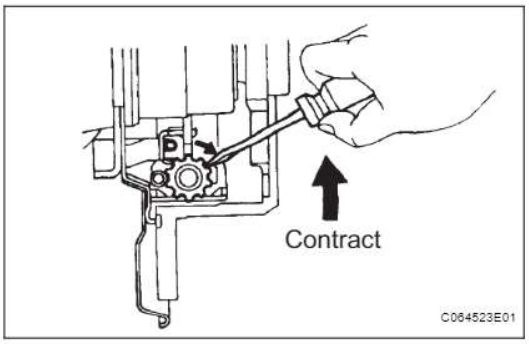
1. REMOVE REAR WHEEL

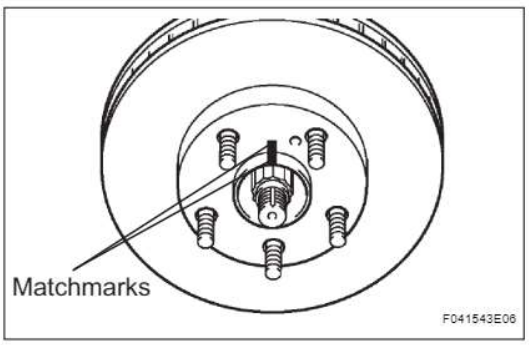
2. SEPARATE REAR DISC BRAKE CALIPER ASSEMBLY LH

(a) Remove the 2 bolts and separate the rear disc brake caliper assembly LH.
HINT:
Do not disconnect the flexible hose from the disc brake caliper assembly LH.

3. REMOVE REAR DISC

(a) Release the parking brake, and remove the rear disc.
HINT:
If the disc cannot be removed easily, turn the shoe adjuster until the wheel turns freely.

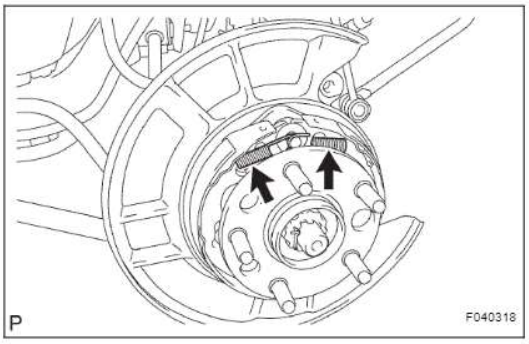




(b) Place machmarks on the rear disc and the axle hub.
(c) Remove the rear disc.

4. REMOVE PARKING BRAKE SHOE RETURN TENSION SPRING

(a) Using needle-nose pliers, remove the 2 parking brake shoe return tension springs No.1.



5. REMOVE PARKING BRAKE SHOE STRUT LH

(a) Remove the parking brake shoe strut LH and the parking brake shoe strut compression spring.