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ANTI-LOCK BRAKE SYSTEM

PRECAUTION

1. **TROUBLESHOOTING PRECAUTIONS**
   a. When there are malfunctions with terminal contact points or part installation problems, removal and installation of the suspected problem parts may return the system to the normal condition either completely or temporarily.
   b. In order to determine the malfunctioning area, be sure to check the conditions at the time the malfunction occurred, such as DTC output and the Freeze Frame Data, and record it before disconnecting each connector or removing and installing parts.
   c. Since the system may be influenced by malfunctions in systems other than the ABS system, be sure to check for DTCs in other systems.
2. **HANDLING PRECAUTIONS**
   a. Be sure to remove and install the ECU, brake actuator and each sensor, etc. with the ignition switch OFF, unless it is specified in the inspection procedure.
   b. If the ECU, brake actuator or a sensor has been removed and installed, it is necessary to check the system for problems after the parts have been reassembled. Check for DTCs using a Techstream, also check that system functions and signals received by the ECU are normal using Test Mode.
3. **DTC PRECAUTION**
   a. Warnings for some DTCs cannot be cleared only by repairing the malfunctioning parts. If the warning is displayed after repair work, the DTC should be cleared after turning the ignition switch to OFF.

   NOTE: If a DTC for a malfunctioning part reappears after it was cleared, then it has been stored again.

4. **CAN COMMUNICATION SYSTEM PRECAUTIONS**
   a. The CAN communication system is used for data communication between the skid control ECU, the steering angle sensor, the yaw rate sensor (acceleration sensor included) and other ECUs. If there is trouble in the CAN communication line, corresponding communication line DTCs are output.
   b. If any CAN communication line DTC is output, repair the malfunction in the communication line and troubleshoot the ABS system while data communication is normal.
   c. In order to enable CAN communication, a specific type of wiring is used for the CAN communication lines. The wiring used for each communication line is a twisted pair of wires of equal length. A bypass wire should not be used because the data being transmitted will be corrupted.

PARTS LOCATION

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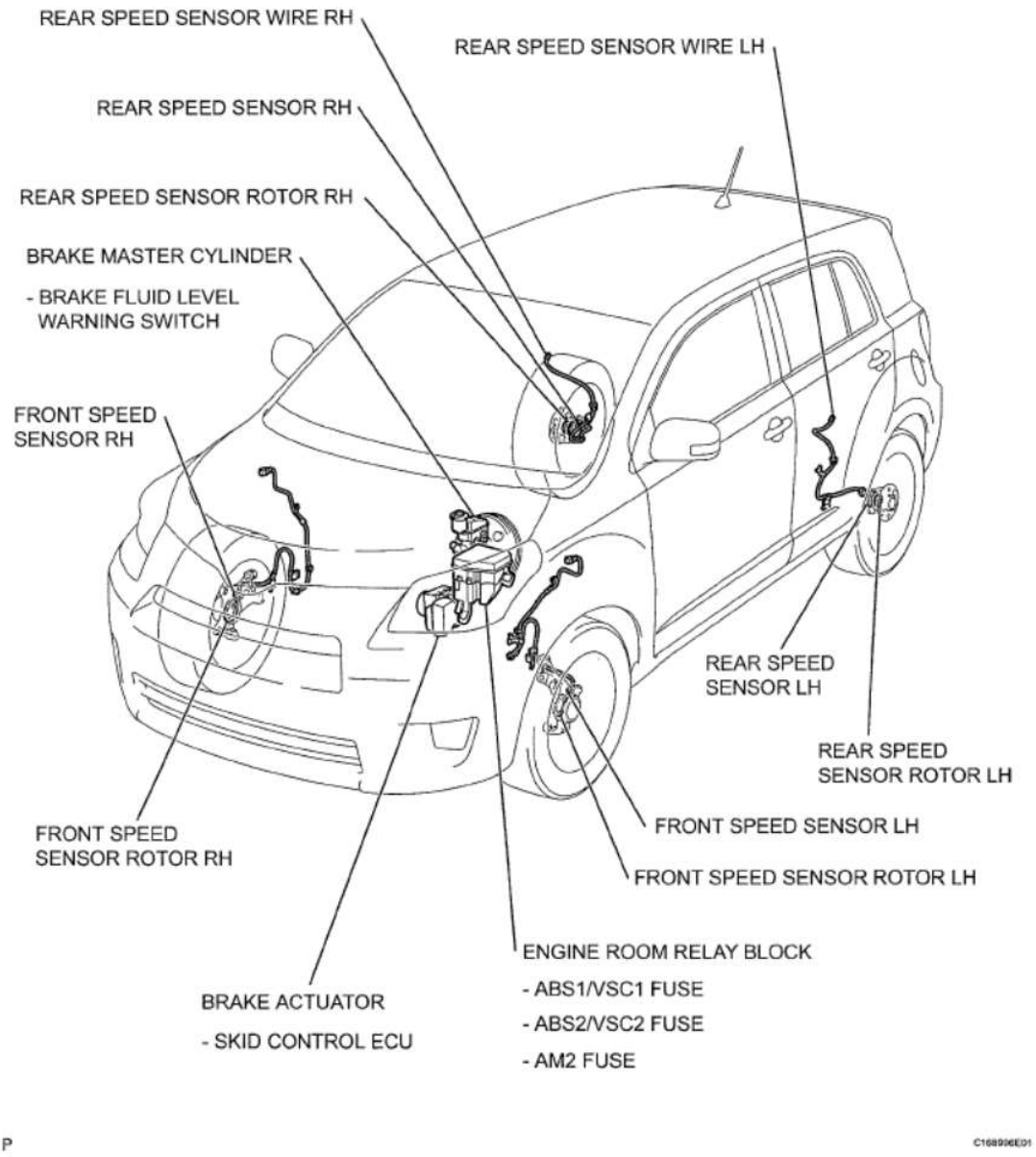


Fig. 1: Identifying Anti-Lock Brake System Parts Location (1 Of 2)
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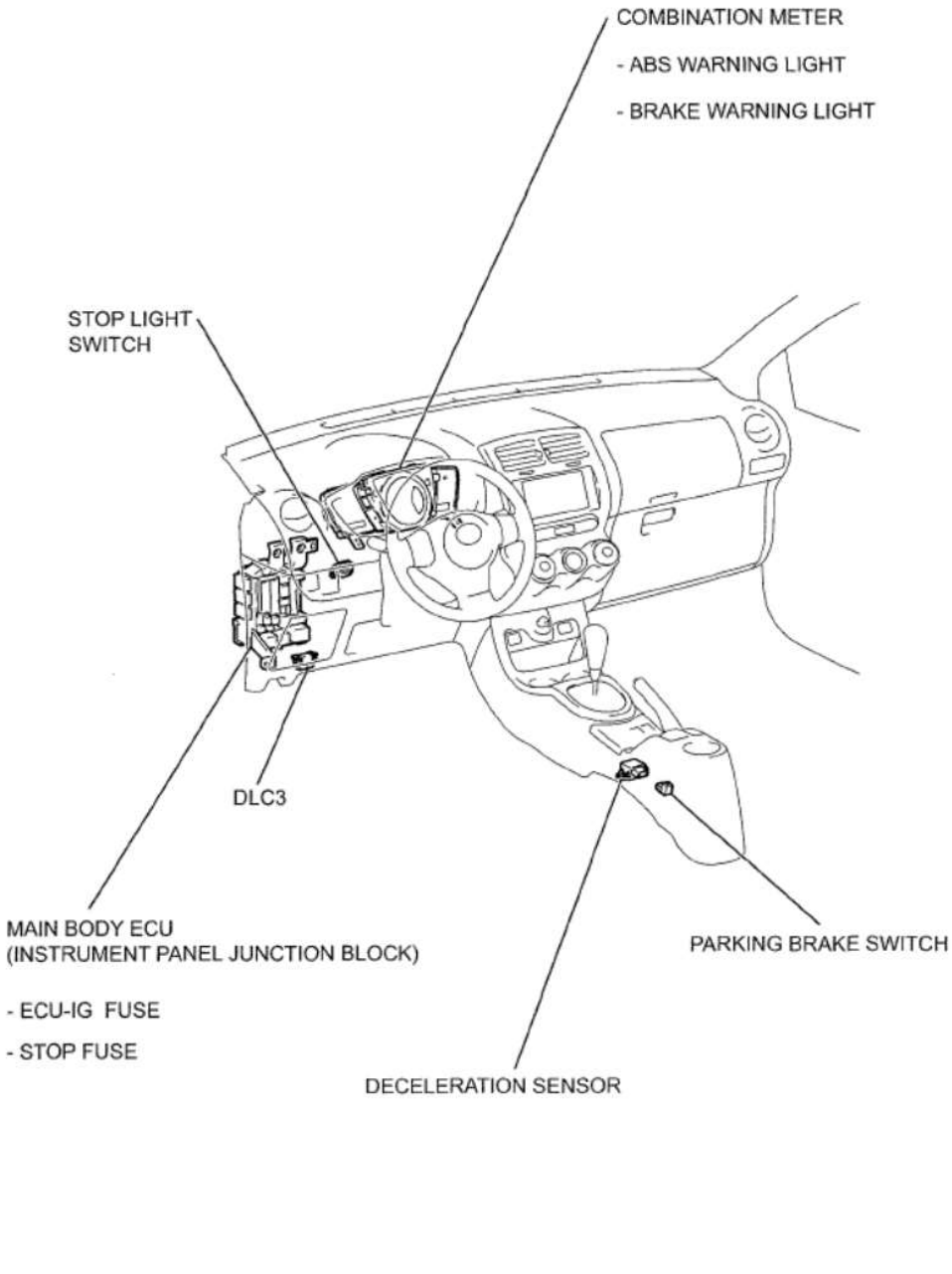


Fig. 2: Identifying Anti-Lock Brake System Parts Location (2 Of 2)
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SYSTEM DIAGRAM

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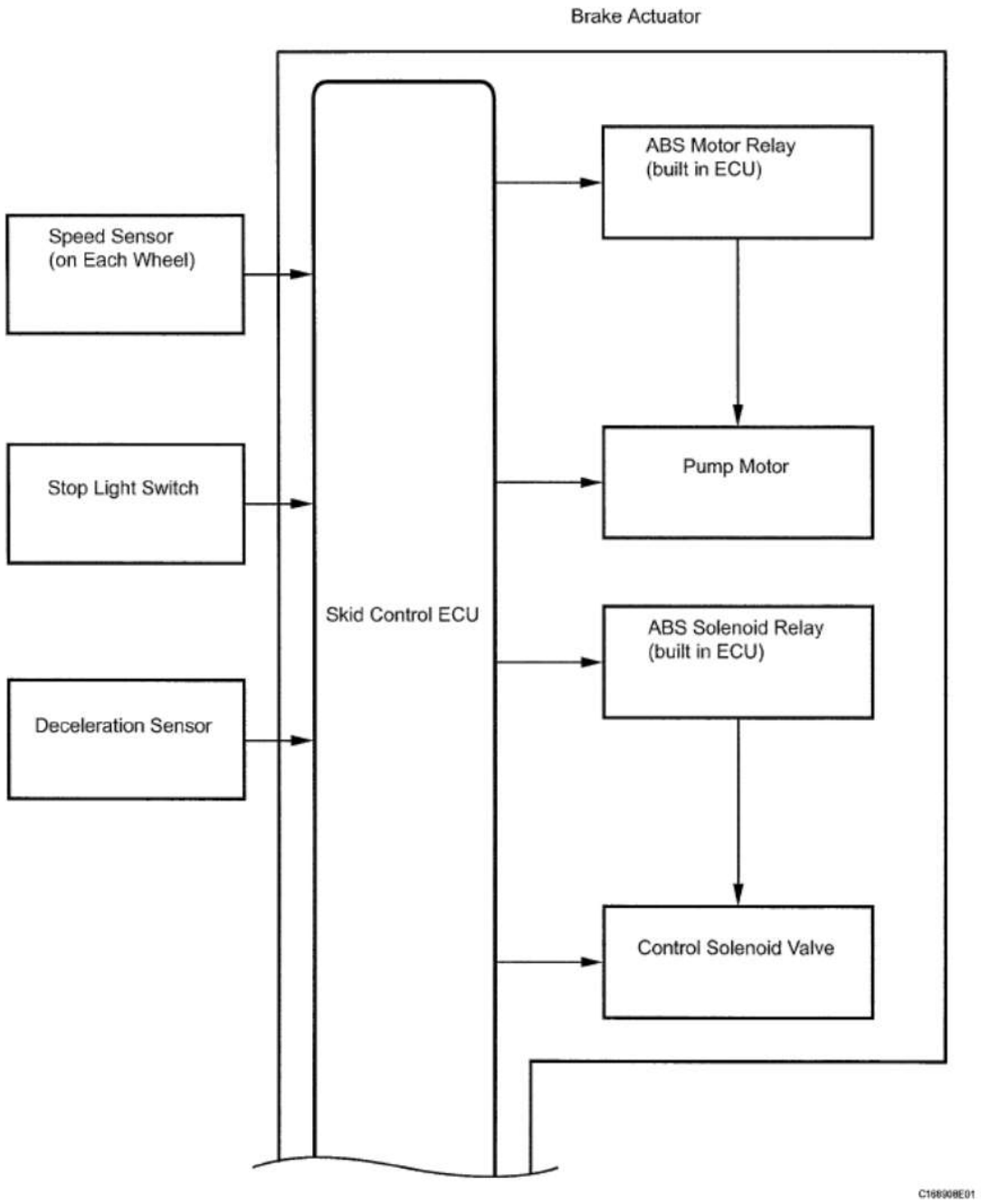


Fig. 3: Anti-Lock Brake System - System Diagram (1 Of 2)
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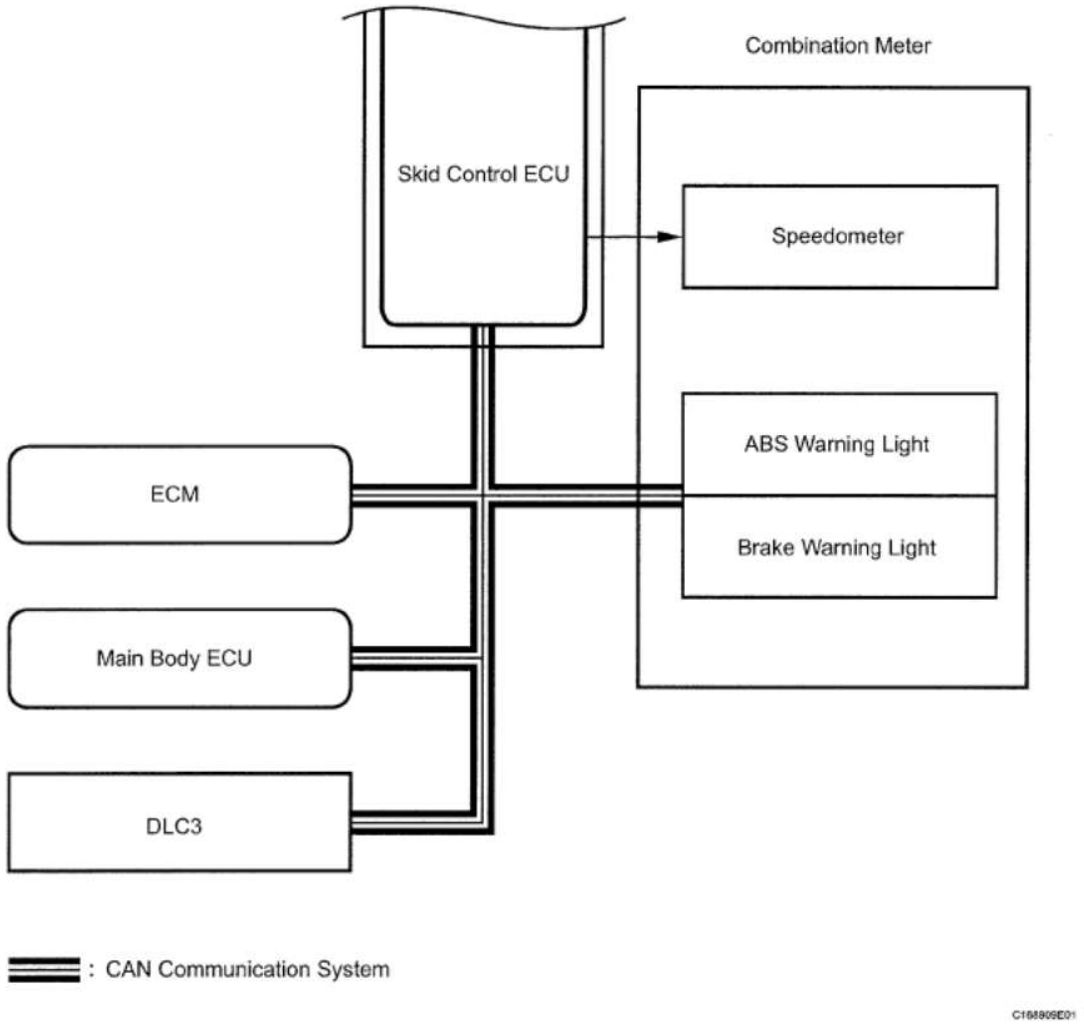


Fig. 4: Anti-Lock Brake System - System Diagram (2 Of 2)
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ECU SIGNAL REFERENCE CHART

Transmitting ECU (transmitter)	Receiving ECU	Signal	Communication Method
ECM	Skid control ECU	• Shift position signal • Throttle position signal • Engine revolution signal	CAN communication
Main body ECU	Skid control ECU	Parking brake switch signal	CAN communication
Skid control ECU	Combination meter	• ABS warning light signal • Brake warning light signal	CAN communication

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		Wheel speed signal	Serial communication

SYSTEM DESCRIPTION

1. FUNCTION DESCRIPTION

HINT:

The skid control ECU is located within the brake actuator assembly.

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.

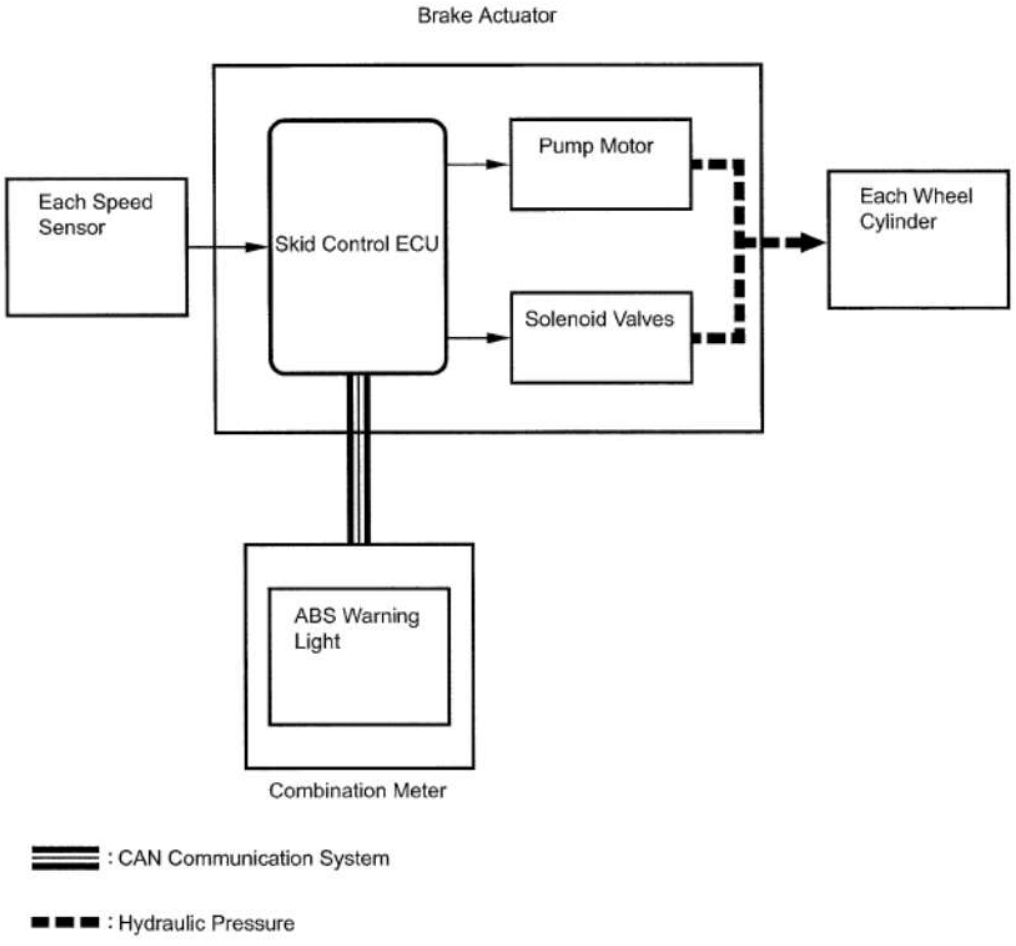


Fig. 5: ABS Function Diagram
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1. Operation description

The skid control ECU detects wheel lock based on speed signals received from the wheel speed sensors. Based on this information, the skid control ECU controls the pump motor and solenoid valves. The pump motor and solenoid valves are used to prevent wheel lock by controlling the hydraulic pressure applied to the brakes at each wheel. The ABS warning light will come on when the system is malfunctioning.

b. EBD (Electronic Brake force Distribution)

The EBD control utilizes ABS, and performs proper brake force distribution between the front and rear wheels in accordance with driving conditions. When braking while cornering, it also controls the brake forces of the right and left wheels, helping to maintain vehicle behavior.

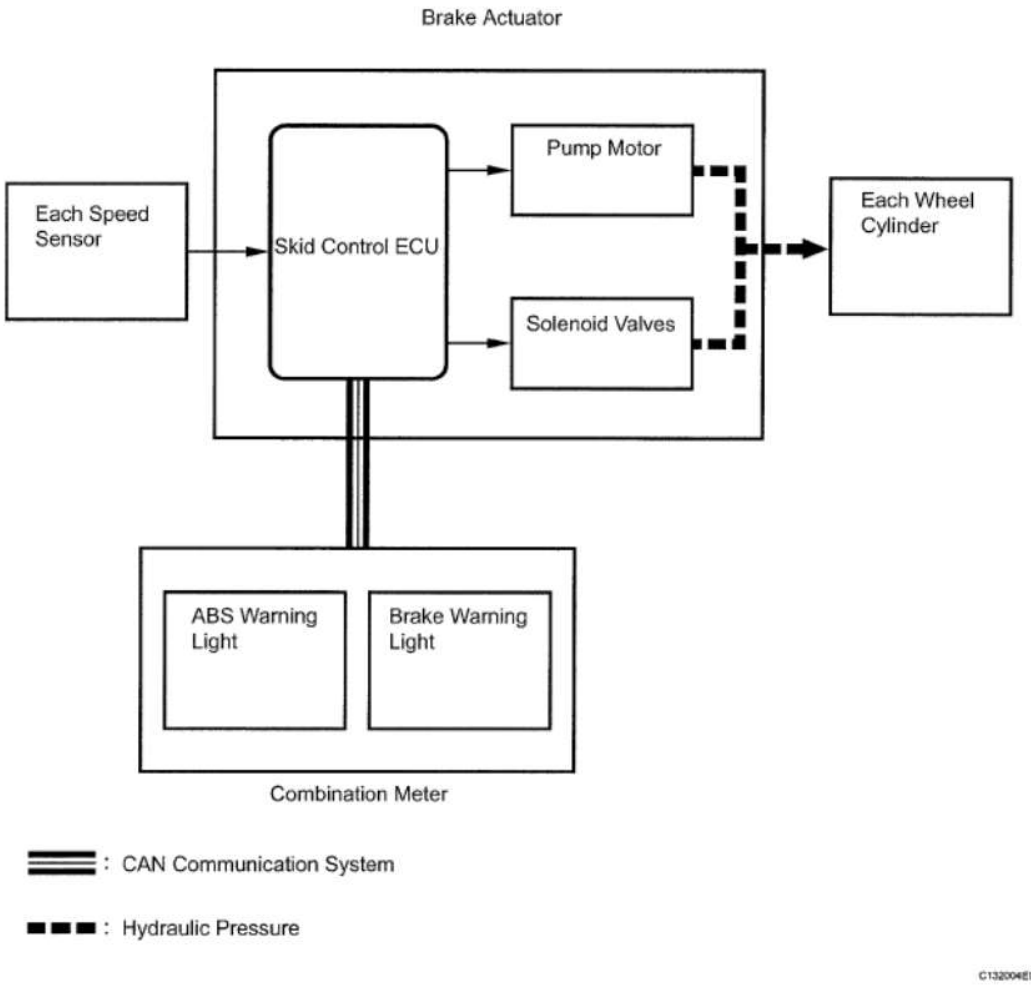


Fig. 6: Electronic Brake Force Distribution - Function Diagram
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1. Operation description

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The skid control ECU receives a speed signal from each wheel speed sensor, and uses these signals to detect locking of the wheels. The ECU uses this information in order to determine appropriate control of the solenoid valves. The solenoid valves control the hydraulic pressure applied to the brake cylinder at each wheel. In this way, the solenoid valves are used to control the brake power split between the front and rear, and left and right wheels. The ABS warning and brake warning lights will come on if there is a malfunction in the EBD system.

2. **ABS with EBD OPERATION**
   a. Based on the signals received from each of the 4 wheel speed sensors, the skid control ECU calculates the speed and deceleration of each wheel, and checks the wheel slippage conditions. The ECU controls the pressure holding valve and pressure reduction valve in order to adjust the brake fluid pressure of each wheel cylinder in accordance with the slippage conditions.
3. **FAIL SAFE**
   a. When a failure occurs in the ABS system, the ABS warning light comes on and system operation is prohibited. In addition to this, when a failure which disables the EBD operation occurs, the brake warning light comes on and EBD operation is prohibited.

      If control is prohibited due to a malfunction during operation, control is disabled gradually to avoid sudden vehicle instability.

   b. If control is prohibited due to a malfunction during operation, control will be disabled gradually. This is to avoid sudden vehicle instability.
4. **INITIAL CHECK**
   a. When the vehicle speed first reaches approximately 6 km/h (4 mph) or more after the ignition switch is turned to ON, each solenoid valve and motor in the brake actuator is sequentially activated to perform an electrical check. During the initial check, the operating sound of the solenoid valves and motors can be heard from the engine compartment, but this is not a malfunction.
5. **FUNCTION OF COMPONENTS**

FUNCTION OF COMPONENTS

Component	Function
Speed sensor	Detects the wheel speed and sends the signal to the skid control ECU.
Deceleration sensor	Detects the acceleration rate of the vehicle in the longitudinal direction and sends the signal to the skid control ECU.
Stop light switch	Detects the brake operating conditions and inputs the results to the skid control ECU.
Main body ECU	Detects the parking brake operating conditions and inputs the result to the skid control ECU via CAN communication.
Skid control ECU	• Housed in the brake actuator assembly. • Processes the signals sent from each sensor to control the ABS and EBD.
Brake actuator assembly	• Consists of the holding solenoid valve, pressure reduction solenoid valve, pump motor, and reservoir, and adjusts the brake fluid pressure applied to each wheel cylinder.

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	• Houses the skid control ECU.
Motor relay	• Supplies power to the pump motor. • Housed in the skid control ECU.
Solenoid relay	• Supplies power to each solenoid. • Housed in the skid control ECU.
ABS warning light	• Comes on to inform the driver that a malfunction in the ABS and/or BA has occurred. • Blinks to output DTC.
Brake warning light	• Comes on to inform the driver that the parking brake is ON when the system is normal, or the brake fluid has decreased. • Comes on to inform the driver that a malfunction in the EBD has occurred.
ECM	Controls the engine information and input the results to skid control ECU via CAN communication.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- The vehicle stability control system troubleshooting procedures are based on the premise that the CAN communication system is normally functioning. Check the CAN communication system first before troubleshooting the vehicle stability control system.
- *: Use a Techstream.

1. **VEHICLE BROUGHT TO WORKSHOP**
2. **CUSTOMER PROBLEM ANALYSIS**
   a. Interview the customer and confirm the trouble.
3. **CHECK DTC AND FREEZE FRAME DATA***
   a. Check and record a DTC and Freeze Frame Data.
   b. Clear the DTC and Freeze Frame Data (See **DTC CHECK / CLEAR** for DTC Check/Clear, or **FREEZE FRAME DATA** for Freeze Frame Data).
   c. Reconfirm the DTC.
      1. Reconfirm the DTC based on the recorded DTC and Freeze Frame Data (See **DTC CHECK / CLEAR** for DTC Check/Clear, or **FREEZE FRAME DATA** for Freeze Frame Data).

         Result

         RESULT CHART

Result	Proceed to
DTC output	A
DTC not output (Problem symptom does not occur)	B

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DTC not output (Problem symptom occurs)	C

B: Go to STEP 5

C: Go to STEP 6

A: Go to next step

4. **DIAGNOSTIC TROUBLE CODE CHART**
   a. Proceed to **DIAGNOSTIC TROUBLE CODE CHART** .

NEXT: Go to STEP 7

5. **SYMPTOM SIMULATION**
   a. Proceed to Check for Intermittent Problems (See **CHECK FOR INTERMITTENT PROBLEMS**).
6. **PROBLEM SYMPTOMS TABLE**
   a. Proceed to **PROBLEM SYMPTOMS TABLE** .
7. **CIRCUIT INSPECTION***
8. **IDENTIFICATION OF PROBLEM**
9. **REPAIR OR REPLACEMENT**
10. **CONFIRMATION TEST***

NEXT : END

CHECK FOR INTERMITTENT PROBLEMS

1. **CHECK FOR INTERMITTENT PROBLEMS**

HINT:

A momentary interruption (open circuit) in the connectors and/or wire harness between the sensors and ECUs can be detected using the ECU Data List function of the Techstream.

a. Turn the ignition switch to OFF and connect a Techstream to the DLC3.
b. Turn the ignition switch to ON. Follow the directions on the Techstream to display the Data List and select areas where momentary interruption should be monitored.

HINT:

- A momentary interruption (open circuit) cannot be detected for 3 seconds after the ignition switch is turned to ON (initial check).
- If the status remains on (ERROR displayed), check the continuity between the ECU and the sensors, or between ECUs.

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- The ERROR display on the Techstream remains on for 1 second after the harness signal changes from momentary interruption (open circuit) to normal condition.

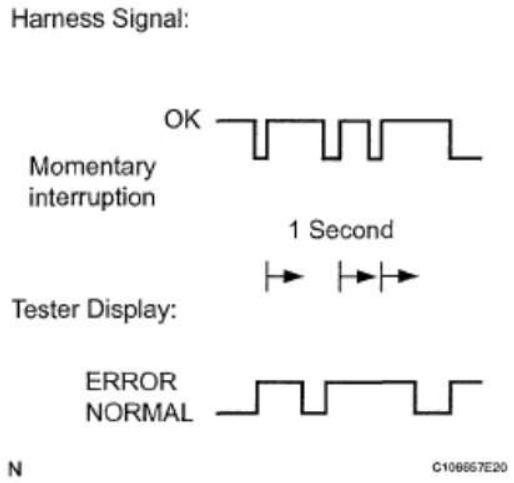


Fig. 7: ECU Blinking Pattern
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ABS/VSC/TRAC:

MEASUREMENT ITEM NORMAL CONDITION CHART

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
FR Speed Open	FR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
FL Speed Open	FL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RR Speed Open	RR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RL Speed Open	RL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
Deceleration Open	Acceleration sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-

c. While observing the screen, gently jiggle the connector or wire harness between the ECU and sensors, or between ECUs.

Result:

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ERROR display does not change.

HINT:

If the display changes, the connector and/or the wire harness has caused a momentary interruption of the circuit. Repair or replace the connector and/or wire harness as one of them is faulty.

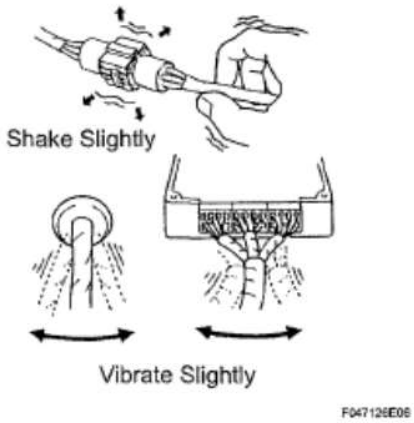


Fig. 8: Shaking Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **SYMPTOM SIMULATION**

HINT:

The most difficult case in troubleshooting is when no symptoms occur. In such cases, a thorough customer problem analysis must be carried out. Then the same or similar conditions and environment in which the problem occurred in the customer's vehicle should be reproduced. No matter how experienced or skilled a technician may be, if he/she proceeds to troubleshoot without confirming the problem symptoms, he/she will likely overlook something important and make a wrong guess at some points in the repair operation. This leads to a standstill in troubleshooting.

a. Vibration method: When vibration seems to be the major cause.

HINT:

Perform the simulation method only during the primary check period (for approximately 6 seconds after the ignition switch ON).

1. Slightly vibrate the part of the sensor considered to be the problem cause with your fingers and check whether the malfunction occurs.
2. Slightly shake the connector vertically and horizontally.

HINT:

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Shaking the relays too strongly may result in open relays.

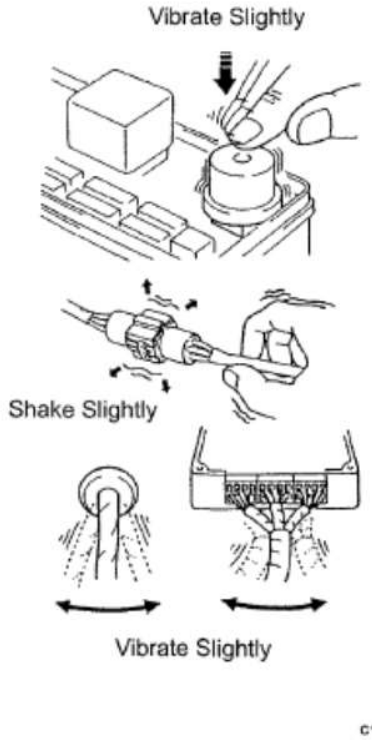


Fig. 9: Shaking Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. Slightly shake the wire harness vertically and horizontally. The connector joint and fulcrum of the vibration are the major areas to be checked thoroughly.

TEST MODE PROCEDURE

1. **WARNING LIGHT AND INDICATOR LIGHT INITIAL CHECK**
   a. Release the parking brake.

NOTE: **Before releasing the parking brake, move the shift lever to the P position for safety (for automatic transaxle model) or set chocks to hold the vehicle for safety (for manual transaxle model).**

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 ON, check that the ABS warning and brake warning lights come on for approximately 3 seconds.

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HINT:

- If the skid control ECU stores any DTCs, the ABS warning light will come on.
- If the indicator remains on or does not come on, proceed to troubleshooting for the light circuits listed below.

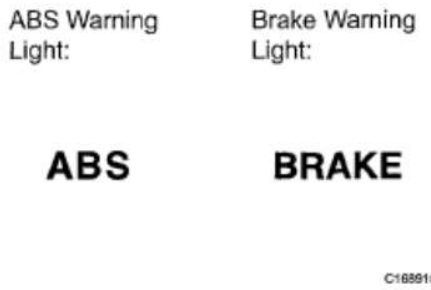


Fig. 10: Identifying ABS Warning Light And Brake Warning Light
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DIAGNOSTIC PROCEDURE CHART

Trouble Area	See procedure
ABS warning light circuit (Remains on)	ABS WARNING LIGHT REMAINS ON
ABS warning light circuit (Does not come on)	ABS WARNING LIGHT DOES NOT COME ON
Brake warning light circuit (Remains on)	BRAKE WARNING LIGHT REMAINS ON
Brake warning light circuit (Does not come on)	BRAKE WARNING LIGHT DOES NOT COME ON

2. **TEST MODE PROCEDURE (SIGNAL CHECK) (Using Techstream)**

HINT:

- If the ignition switch is turned from ON to ACC or OFF during Test Mode (signal check), DTCs recorded during the signal check function will be erased.
- During Test Mode (signal check), the skid control ECU records all DTCs of the signal check function. By performing the Test Mode (signal check), the codes are erased if a normal condition is confirmed. The remaining codes are the codes where an abnormality was found.

a. Procedure to enter Test Mode.

1. Turn the ignition switch to OFF.
2. Check that the steering wheel is in the straight-ahead position.
3. Check that the shift lever is in the P position (for automatic transaxle model) or the parking brake is applied (for manual transaxle model).
4. Connect the Techstream to the DLC3.
5. Turn the ignition switch to ON.
6. Turn the Techstream on.

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7. Enter the following menu items: Chassis / ABS/ VSC/TRAC / Signal Check.
8. Check that the ABS warning light comes on for several seconds and then blink in Test Mode.

HINT:

If the ABS warning light does not blink, inspect the TS and CG terminal circuit and ABS warning light circuit.

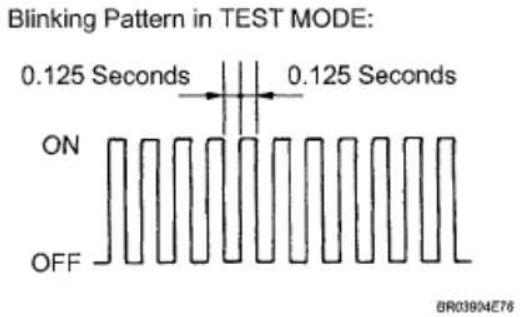


Fig. 11: Identifying ABS Warning Light Blinking Pattern
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DIAGNOSTIC PROCEDURE CHART

Trouble Area	See procedure
TS and CG terminal circuit	**TS AND CG TERMINAL CIRCUIT**
ABS warning light circuit (Remains on)	**ABS WARNING LIGHT REMAINS ON**
ABS warning light circuit (Does not come on)	**ABS WARNING LIGHT DOES NOT COME ON**

3. **DECELERATION SENSOR CHECK (Using Techstream)**
   a. Keep the vehicle stationary on a level surface for 1 second or more.
4. **SPEED SENSOR CHECK (Using Techstream)**
   a. Check the speed sensor signal.
      1. Drive the vehicle straight-ahead.

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

         - The sensor check may not be completed if wheel spin occurs.
         - The ABS warning light blinks when the sensor check has been completed and the brake pedal is depressed.
         - The ABS warning light comes on immediately after a malfunction has been detected during the speed sensor check.
   b. Stop the vehicle.

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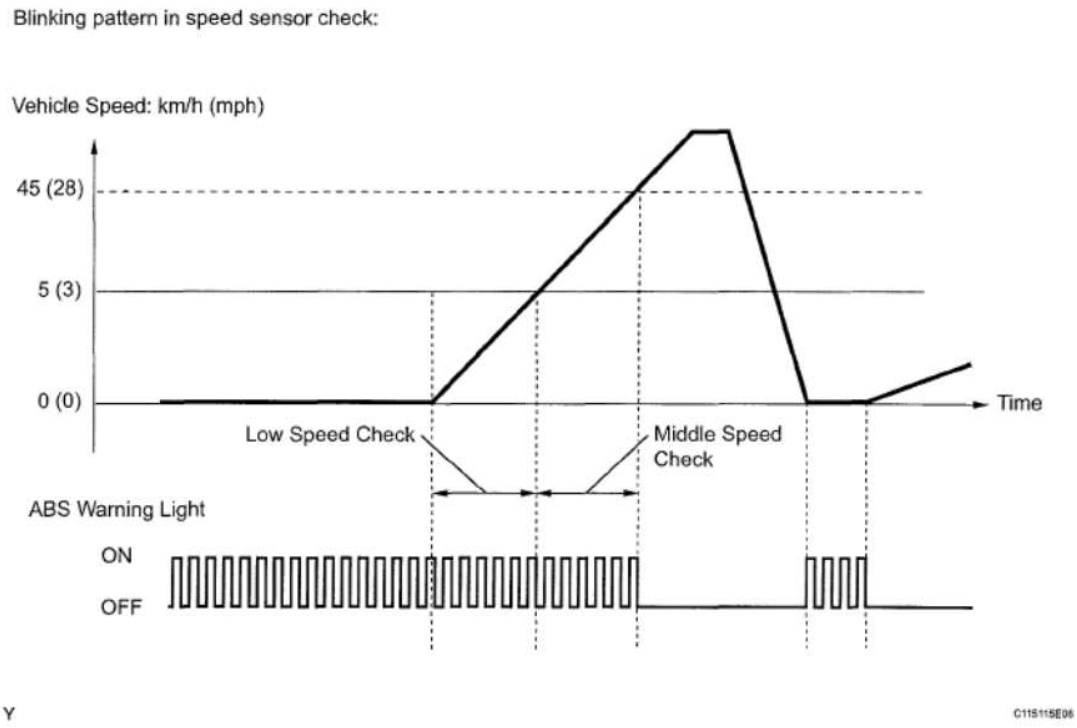


Fig. 12: Identifying ABS Warning Light Blinking Pattern
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NOTE:

- **Before performing the speed sensor check, complete the deceleration sensor check.**
- **The speed sensor check may not be completed if the speed sensor check is started while turning the steering wheel or spinning the wheels.**
- **After the ABS warning light goes off and if the vehicle speed exceeds 80 km/h (50 mph), a sensor check code will be stored again. Decelerate or stop the vehicle before the speed reaches 80 km/h (50 mph).**
- **If the sensor check has not been completed, the ABS warning light blinks while driving and the ABS system does not operate.**

HINT:

When the sensor check has been completed, the ABS warning light goes off while driving and blinks in the Test Mode pattern while stationary.

5. **END OF SENSOR CHECK (Using Techstream)**
   a. If the sensor check is completed, the ABS warning light blinks (Test Mode) when the vehicle stops and the ABS warning light is off while the vehicle is driving.

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NOTE: **If the sensor check is not completed, the ABS warning light blinks even while the vehicle is driving and the ABS does not operate.**

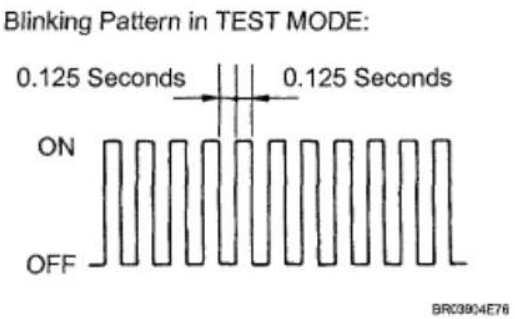


Fig. 13: Identifying ABS Warning Light Blinking Pattern
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6. **READ DTC OF SIGNAL CHECK FUNCTION (Using Techstream)**
   a. Read the DTC(s) by following the tester screen.

NOTE:

- **If only the DTCs are displayed, repair the malfunction area and clear the DTCs.**
- **If the DTCs or Test Mode codes (DTC of signal check function) are displayed, repair the malfunction area, clear the DTCs and perform Test Mode inspection.**

HINT:

See the list of DTCs (See procedure A).

7. **TEST MODE PROCEDURE (SIGNAL CHECK) (Using SST Check Wire)**

HINT:

- If the ignition switch is turned from ON to ACC or OFF during Test Mode (signal check), DTCs recorded during the signal check function will be erased.
- During Test Mode (signal check), the skid control ECU records all DTCs of the signal check function. By performing the Test Mode (signal check), the codes are erased if a normal condition is confirmed. The remaining codes are the codes where an abnormality was found.

a. Procedure to enter Test Mode.
   1. Turn the ignition switch to OFF.
   2. Check that the steering wheel is in the straight-ahead position.
   3. Check that the shift lever is in the P position (for automatic transaxle model) or the parking brake is applied (for manual transaxle model).
   4. Using SST, connect terminals TS and CG of the DLC3.

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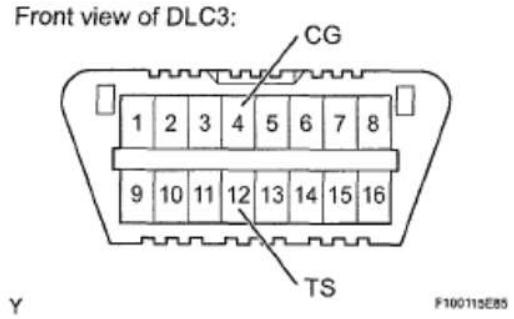


Fig. 14: Identifying DLC3 Connector Terminals TS And CG
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. Turn the ignition switch to ON.
6. Check that the ABS warning light comes on for several seconds and then blink in Test Mode.

HINT:

If the ABS warning light does not blink, inspect the TS and CG terminal circuit and ABS warning light circuit.

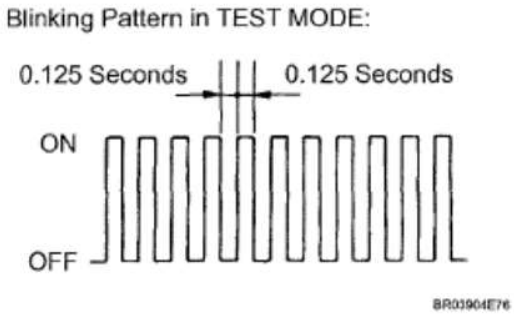


Fig. 15: Identifying ABS Warning Light Blinking Pattern
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DIAGNOSTIC PROCEDURE CHART

Trouble Area	See procedure
TS and CG terminal circuit	**TS AND CG TERMINAL CIRCUIT**
ABS warning light circuit (Remains on)	**ABS WARNING LIGHT REMAINS ON**
ABS warning light circuit (Does not come on)	**ABS WARNING LIGHT DOES NOT COME ON**

8. **DECELERATION SENSOR CHECK (Using SST Check Wire)**
   a. Keep the vehicle stationary on a level surface for 1 second or more.
9. **SPEED SENSOR CHECK (Using SST Check Wire)**

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a. Check the speed sensor signal.

1. Drive the vehicle straight-ahead.

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

   - The sensor check may not be completed if wheelspin occurs.
   - The ABS warning light blinks when the sensor check has been completed and the brake pedal is depressed.
   - The ABS warning light comes on immediately after a malfunction has been detected during the speed sensor check.

b. Stop the vehicle.

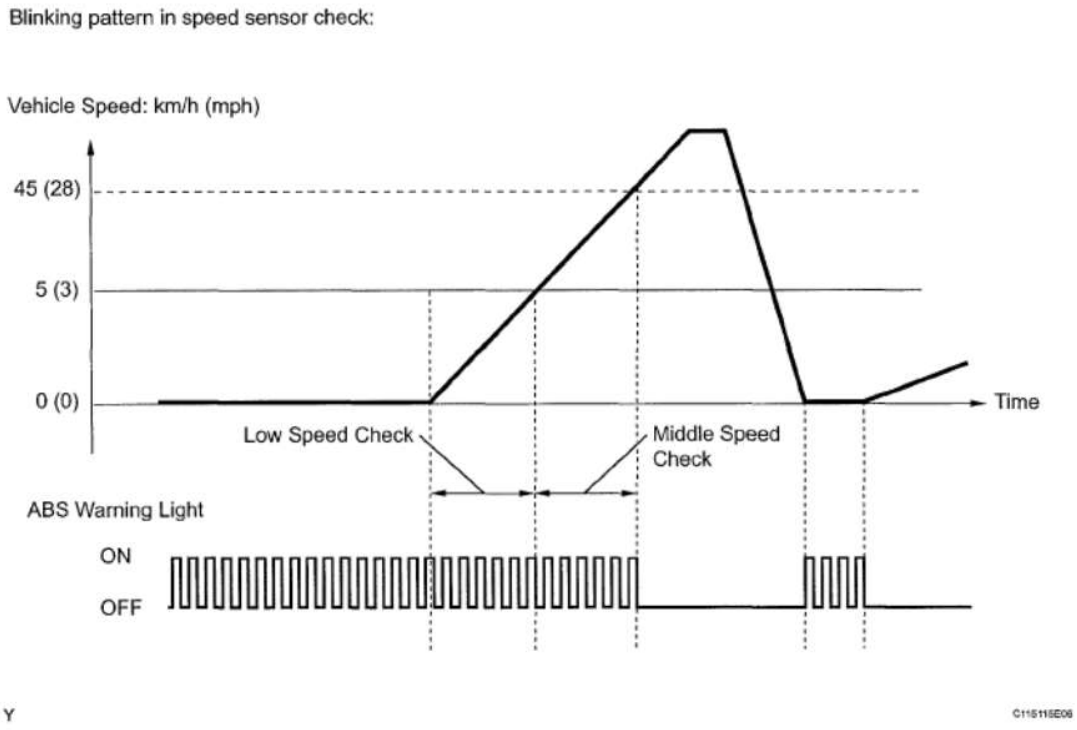


Fig. 16: Identifying ABS Warning Light Blinking Pattern
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- **Before performing the speed sensor check, complete the deceleration sensor check.**
- **The speed sensor check may not be completed if the speed sensor check is started while turning the steering wheel or spinning the wheels.**
- **After the ABS warning light goes off, if vehicle speed exceeds 80 km/h (50 mph), a sensor check code will be stored again.**

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Decelerate or stop the vehicle before the speed reaches 80 km/h (50 mph).

- **If the sensor check has not been completed, the ABS warning light blinks while driving and the ABS system does not operate.**

HINT:

When the sensor check has been completed, the ABS warning light goes off while driving and blinks in the Test Mode pattern while stationary.

10. **END OF SENSOR CHECK (for Using SST Check Wire)**
    a. If the sensor check is completed, the ABS warning light blinks (Test Mode) when the vehicle stops and the ABS warning light is off while the vehicle is driving.

NOTE: **If the sensor check is not completed, the ABS warning light blinks even while the vehicle is driving and the ABS does not operate.**

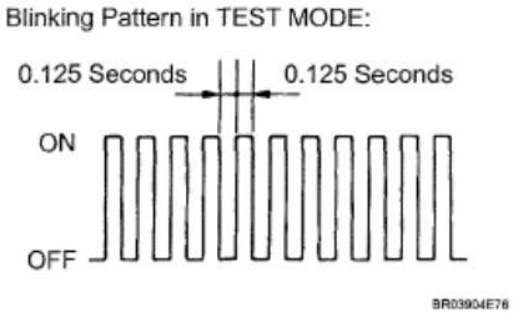
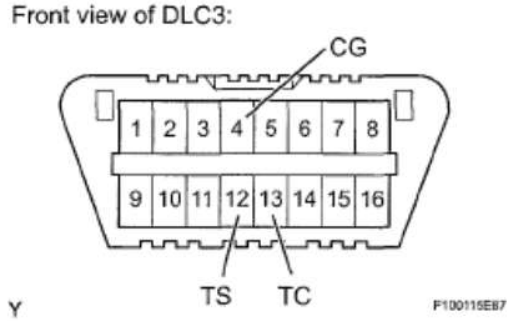


Fig. 17: Identifying ABS Warning Light Blinking Pattern
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

11. **READ DTC OF SIGNAL CHECK FUNCTION (for Using SST Check Wire)**
    a. Using SST, connect terminals TC and CG of the DLC3.

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Fig. 18: Identifying DLC3 Connector Terminals TS And CG
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Count the number of blinks of the ABS warning light.

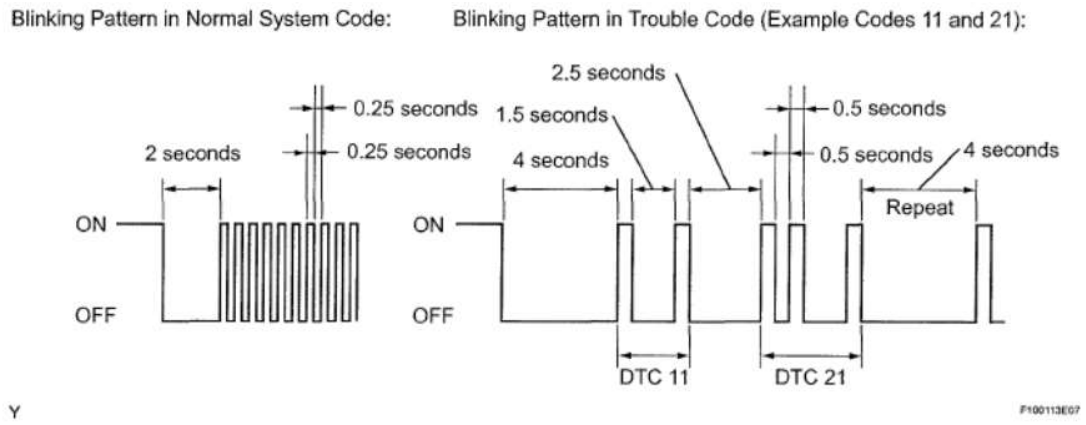


Fig. 19: Blinking Pattern In Normal System Code And Trouble Code
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- **If only the DTCs are displayed, repair the malfunction area and clear the DTCs.**
- **If the DTCs or Test Mode codes (DTC of signal check function) are displayed, repair the malfunction area, clear the DTCs and perform Test Mode inspection.**

HINT:

- If more than 1 malfunction is detected at the same time, the lowest numbered code will be displayed first.
- See the list of DTCs (See procedure A).

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

d. Turn the ignition switch to ON.

HINT:

- If the ignition switch is not turned to ON after SST is removed from the DLC3, the previous Test Mode will continue.
- If the ignition switch is turned to ON with terminals TS and CG shorted, the previous Test Mode will continue.

12. **DTC OF TEST MODE (SIGNAL CHECK) FUNCTION (Procedure "A")**

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DTC CHART

DTC Code	Detection Item	Trouble Area
C1271/71	Low output signal of front speed sensor RH	• Front speed sensor RH • Sensor installation • Speed sensor rotor
C1272/72	Low output signal of front speed sensor LH	• Front speed sensor LH • Sensor installation • Speed sensor rotor
C1273/73	Low output signal of rear speed sensor RH	• Rear speed sensor RH • Sensor installation • Speed sensor rotor
C1274/74	Low output signal of rear speed sensor LH	• Rear speed sensor LH • Sensor installation • Speed sensor rotor
C1275/75	Abnormal change in output signal of front speed sensor RH	Speed sensor rotor
C1276/76	Abnormal change in output signal of front speed sensor LH	Speed sensor rotor
C1277/77	Abnormal change in output signal of rear speed sensor RH	Speed sensor rotor
C1278/78	Abnormal change in output signal of rear speed sensor LH	Speed sensor rotor
C1279/79	Deceleration sensor output voltage malfunction	• Deceleration sensor • Sensor installation

HINT:

The codes in this table are output only in Test Mode (signal check).

PROBLEM SYMPTOMS TABLE

Use the table below to help determine the cause of a problem. The likely causes of the problem are indicated in descending order. Check each suspected area in order. Repair or replace faulty parts or perform adjustments as necessary.

NOTE: When replacing the brake actuator assembly, sensor, etc., turn the ignition switch to OFF.

HINT:

- Inspect the fuse and relay before investigating the suspected areas as shown in the table below.
- Inspect each suspected area in order for the corresponding symptom.

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PROBLEM SYMPTOM CHART

Symptom	Suspected Area	See
ABS and/or EBD does not operate	Check for DTCs again and make sure that the normal system code is output.	**DTC CHECK / CLEAR**
	IG power source circuit	**DTC C1241/41 LOW BATTERY POSITIVE VOLTAGE OR ABNORMALLY HIGH BATTERY POSITIVE VOLTAGE**
	Front speed sensor circuit	**DTC C0200/31 FRONT SPEED SENSOR RH CIRCUIT; DTC C0205/32 FRONT SPEED SENSOR LH CIRCUIT; DTC C1271/71 LOW OUTPUT SIGNAL OF FRONT SPEED SENSOR RH (TEST MODE DTC); DTC C1272/72 LOW OUTPUT SIGNAL OF FRONT SPEED SENSOR LH (TEST MODE DTC)**
	Rear speed sensor circuit	**DTC C0210/33 REAR SPEED SENSOR RH CIRCUIT; DTC C0215/34 REAR SPEED SENSOR LH CIRCUIT; DTC C1273/73 LOW OUTPUT SIGNAL OF REAR SPEED SENSOR RH (TEST MODE DTC); DTC C1274/74 LOW OUTPUT SIGNAL OF REAR SPEED SENSOR LH (TEST MODE DTC)**
	Check the brake actuator assembly with the Techstream. (Check brake actuator assembly operation using the Active Test function.) If abnormal, check the hydraulic circuit for leaks.	**BRAKE ACTUATOR**
	If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	**BRAKE ACTUATOR**
	Check for DTCs again and make sure that the normal system code is output.	**DTC CHECK / CLEAR**
	Front speed sensor circuit	**DTC C0200/31 FRONT SPEED SENSOR RH CIRCUIT; DTC C0205/32 FRONT SPEED SENSOR LH CIRCUIT; DTC C1271/71 LOW OUTPUT SIGNAL OF FRONT SPEED SENSOR RH (TEST MODE DTC); DTC C1272/72 LOW OUTPUT SIGNAL OF FRONT SPEED SENSOR LH (TEST MODE DTC)**
		DTC C0210/33 REAR SPEED SENSOR RH

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ABS and/or EBD does not operate efficiently	Rear speed sensor circuit	**CIRCUIT; DTC C0215/34 REAR SPEED SENSOR LH CIRCUIT; DTC C1273/73 LOW OUTPUT SIGNAL OF REAR SPEED SENSOR RH (TEST MODE DTC); DTC C1274/74 LOW OUTPUT SIGNAL OF REAR SPEED SENSOR LH (TEST MODE DTC)**
	Stop light switch circuit	**DTC C1249/49 OPEN IN STOP LIGHT SWITCH CIRCUIT**
	Check the brake actuator assembly with the Techstream. (Check brake actuator assembly operation using the Active Test function.) If abnormal, check the hydraulic circuit for leaks.	**BRAKE ACTUATOR**
	If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	**BRAKE ACTUATOR**
ABS sensor DTC check cannot be done	Check for DTCs again and make sure that the normal system code is output.	**DTC CHECK / CLEAR**
	TC and CG terminal circuit	**TC AND CG TERMINAL CIRCUIT**
	If the symptoms still occur even after the above circuit in the suspected area has been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	**BRAKE ACTUATOR**
ABS warning light abnormal (Remains on)	ABS warning light circuit	**ABS WARNING LIGHT REMAINS ON**
	Brake actuator assembly (Skid control ECU)	**BRAKE ACTUATOR**
ABS warning light abnormal (Does not come on)	ABS warning light circuit	**ABS WARNING LIGHT DOES NOT COME ON**
	Brake actuator assembly (Skid control ECU)	**BRAKE ACTUATOR**
Brake warning light abnormal (Remains on)	Brake warning light circuit	**BRAKE WARNING LIGHT REMAINS ON**
	Brake actuator assembly (Skid control ECU)	**BRAKE ACTUATOR**
Brake warning light abnormal (Does not	Brake warning light circuit	**BRAKE WARNING LIGHT DOES NOT COME ON**
	Brake actuator assembly (Skid	**BRAKE ACTUATOR**

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come on)	control ECU)	
Sensor check cannot be done	TS and CG terminal circuit	**TS AND CG TERMINAL CIRCUIT**
	Brake actuator assembly (Skid control ECU)	**BRAKE ACTUATOR**

TERMINALS OF ECU

1. **TERMINALS OF ECU**

Component without harness connected:
(Skid Control ECU)

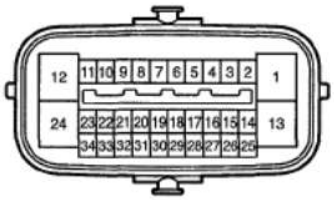


Fig. 20: Identifying Connector Terminals Of ECU
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ECU CONNECTOR TERMINALS REFERENCE CHART

Terminal No. (Symbol)	Terminal Description
1 (GND1)	Skid control ECU ground
3 (GL1)	Deceleration sensor signal input
4 (RL-)	Rear wheel speed LH (-) signal input
5 (RL+)	Rear wheel speed LH (+) power supply output
6 (FR-)	Front wheel speed RH (-) signal input
7 (FR+)	Front wheel speed RH (+) power supply output
12 (+BS)	Solenoid relay power supply
13 (GND2)	Pump motor ground
14 (CANL)	CAN communication line L
15 (GGND)	Deceleration sensor ground
16 (RR-)	Rear wheel speed RH (-) signal input
17 (RR+)	Rear wheel speed RH (+) power supply output
18 (FL-)	Front wheel speed LH (-) signal input
19 (FL+)	Front wheel speed LH (+) power supply output
22 (SP1)	Speed signal output for speedometer
24 (+BM)	Motor relay power supply
25 (CANH)	CAN communication line H

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26 (VGS)	Deceleration sensor power supply
28 (STP)	Stop light switch input
34 (IG1)	ECU power supply

2. **TERMINAL INSPECTION**

a. Disconnect the connector and measure the voltage or resistance on the wire harness side.

Front view of wire harness connector:
(to Skid Control ECU)

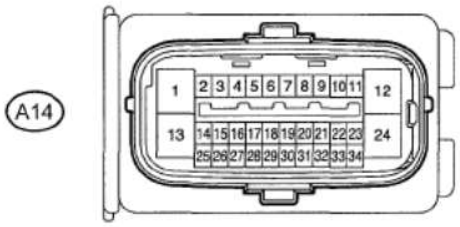


Fig. 21: Identifying Skid Control Control ECU Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

HINT:

Voltage cannot be measured with the connector connected to the skid control ECU as the connector is watertight.

Standard:

ECU CONNECTOR TERMINALS REFERENCE CHART

Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
A14-1 (GND1) - Body ground	W-B - Body ground	Skid control ECU ground	Always	Below 1 ohms
A14-12 (+BS) - Body ground	W - Body ground	Solenoid relay power supply	Always	11 to 14 V
A14-13 (GND2) - Body ground	W-B - Body ground	Pump motor ground	Always	Below 1 ohms
A14-28 (STP) - Body ground	G - Body ground	Stop light switch input	Stop light switch ON --> OFF (Brake pedal depressed --> released)	8 to 14 V --> Below 1.5 V
A14-24 (+BM) - Body ground	B - Body ground	Motor relay power supply	Always	11 to 14 V

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A14-25 (CANH) - A14-14 (CANL)	G-W	CAN BUS	Ignition switch OFF	54 to 69 ohms
A14-34 (IG1) - Body ground	B - Body ground	ECU power supply	Ignition switch ON	11 to 14 V

DIAGNOSIS SYSTEM

1. **DESCRIPTION**

When troubleshooting a vehicle with the diagnosis system, the only difference from the usual troubleshooting procedure is connecting the Techstream to the vehicle and reading various data output from the vehicle's skid control ECU.

The skid control ECU records DTCs when the computer detects a malfunction in the computer itself or in its circuits.

To check the DTCs, connect the Techstream to the DLC3 on the vehicle. The Techstream enables you to erase the DTCs, activate the various actuators, and check the Freeze Frame Data and Data List.

a. Check the battery voltage.

Standard voltage:

11 to 14 V

If the voltage is below 11 V, recharge the battery before proceeding to the next step.

b. Check the DLC3 (See **HOW TO TROUBLESHOOT ECU CONTROLLED SYSTEMS**).

2. **DIAGNOSIS**

a. If the skid control ECU detects a malfunction, the ABS warning and brake warning will blink in order to warn the driver.

The table below indicates which lights will turn on when there is a malfunction in a particular function.

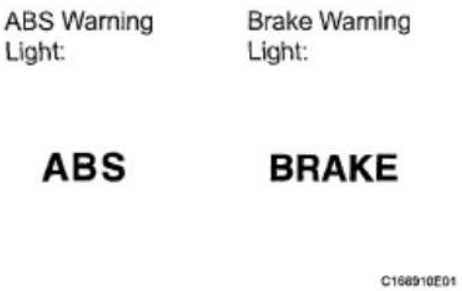


Fig. 22: Identifying ABS Warning Light And Brake Warning Light
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DIAGNOSTIC PROCEDURE CHART

Item / Trouble Area	ABS	EBD
ABS warning light	o	o
Brake warning light	-	o
o: Light ON -: Light OFF		

- The DTCs are simultaneously stored in the memory. The DTCs can be read by connecting the SST between terminals TC and CG of the DLC3 and observing the blinking pattern of the ABS warning light, or by connecting a Techstream.
- This system has a Test Mode (signal check) function (See **TEST MODE PROCEDURE**).

3. **WARNING LIGHT AND INDICATOR LIGHT INITIAL CHECK**

a. Release the parking brake.

NOTE: When releasing the parking brake, move the shift lever to the P position for safety (for automatic transaxle model) or set chocks to hold the vehicle for safety (for manual transaxle model).

HINT:

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

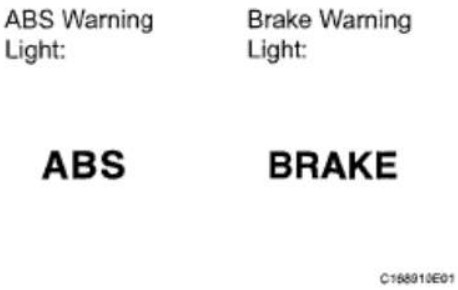


Fig. 23: Identifying ABS Warning Light And Brake Warning Light
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. When the ignition switch is turned to ON, check that the ABS warning and brake warning light come on for approximately 3 seconds.

HINT:

If the warning light and indicator light check result is not normal, proceed to troubleshooting for the ABS warning and brake warning light circuits.

If the indicator remains on or does not come on, proceed to troubleshooting for the light circuits listed below.

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DIAGNOSTIC PROCEDURE CHART

Trouble Area	See procedure
ABS warning light circuit (Remains on)	**ABS WARNING LIGHT REMAINS ON**
ABS warning light circuit (Does not come on)	**ABS WARNING LIGHT DOES NOT COME ON**
Brake warning light circuit (Remains on)	**BRAKE WARNING LIGHT REMAINS ON**
Brake warning light circuit (Does not come on)	**BRAKE WARNING LIGHT DOES NOT COME ON**

DTC CHECK / CLEAR

1. **DTC CHECK/CLEAR (Using Techstream)**
   a. Check the DTC.
      1. Connect the Techstream to the DLC3.
      2. Turn the ignition switch to ON.
      3. Enter the following menu items: Chassis / ABS/ VSC/TRAC / Trouble Codes.

         HINT:

         Refer to the Techstream operator's manual for further details.

   b. Clear the DTC.
      1. Connect the Techstream to the DLC3.
      2. Turn the ignition switch to ON.
      3. Enter the following menu items: Chassis / ABS/ VSC/TRAC / Trouble Codes.
      4. Clear the DTCs by following the prompts on the Techstream.

         HINT:

         Refer to the Techstream operator's manual for further details.

2. **DTC CHECK/CLEAR (for Using SST Check Wire)**
   a. Check the DTC.
      1. Using SST, connect terminals TC and CG of the DLC3.

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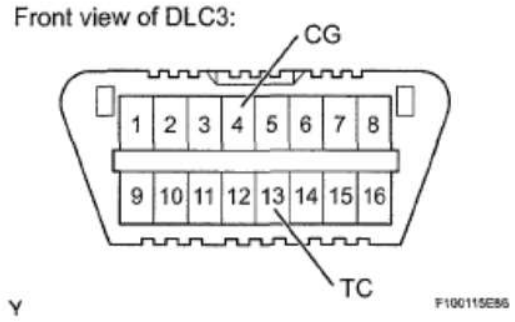


Fig. 24: Identifying DLC3 Connector Terminal CG And TC
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. Turn the ignition switch to ON.
3. Observe the blinking pattern of the ABS warning light in order to identify the DTC.

   HINT:

   If no code appears, inspect the TC and CG terminal circuit and ABS warning light circuit.

DIAGNOSTIC PROCEDURE CHART

Trouble Area	See procedure
TC and CG terminal circuit	TC AND CG TERMINAL CIRCUIT
ABS warning light circuit (Remains on)	ABS WARNING LIGHT REMAINS ON
ABS warning light circuit (Does not come on)	ABS WARNING LIGHT DOES NOT COME ON

4. As an example, the illustration below shows the blinking patterns of the normal system code and trouble codes 11 and 21 for ABS warning light.

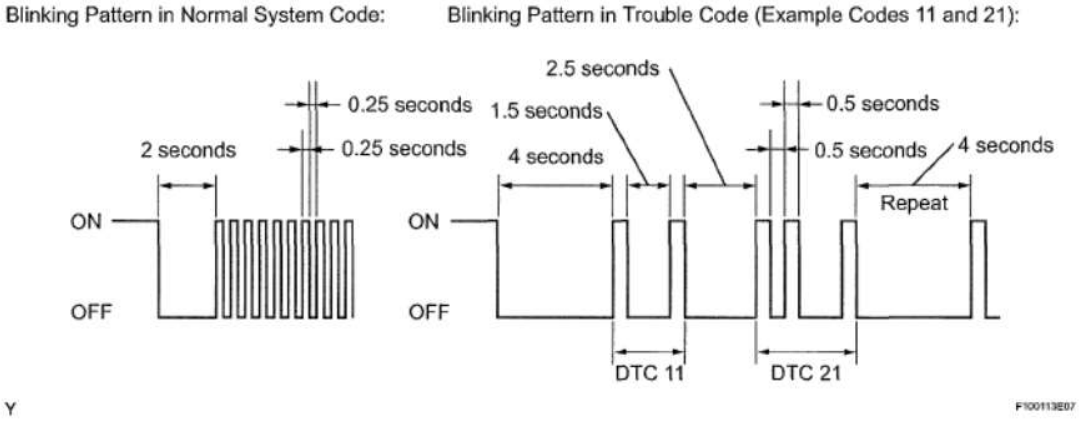


Fig. 25: Blinking Pattern In Normal System Code And Trouble Code
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5. The codes are explained in the code table (See **DIAGNOSTIC TROUBLE CODE CHART**).
6. After completing the check, disconnect terminals TC and CG of the DLC3.

   HINT:

   If 2 or more DTCs are detected at the same time, the DTCs will be displayed in ascending order.

b. Clear the DTC.

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

   SST 09843-18040

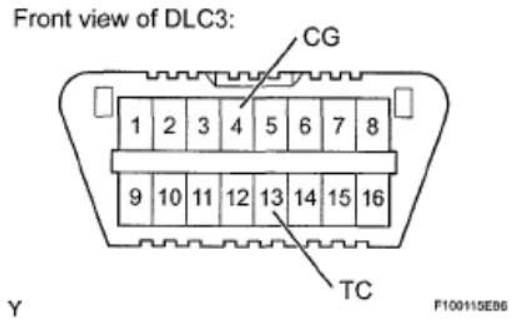


Fig. 26: Identifying DLC3 Connector Terminal CG And TC
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. Turn the ignition switch to ON.
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.

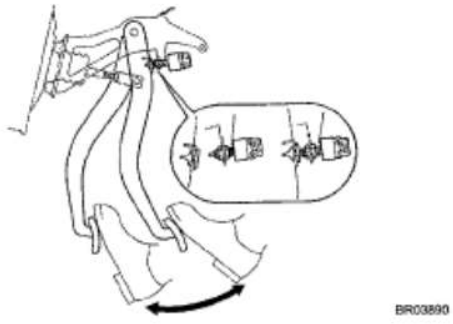


Fig. 27: Checking ABS Warning Light
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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5. Remove SST from the terminals of the DLC3.

   HINT:

   Clearing the DTCs cannot be performed by disconnecting the battery terminal or the ECU-IG fuse.

3. **END OF DTC CHECK/CLEAR**
   a. Turn the ignition switch to ON.
   b. Check that the ABS warning light goes off within approximately 3 seconds.

FREEZE FRAME DATA

1. **FREEZE FRAME DATA**
   a. Whenever a DTC is detected, the skid control ECU stores the current vehicle (sensor) state as Freeze Frame Data.
   b. The skid control ECU stores the number of times (maximum: 31) the ignition switch has been turned from OFF to ON since the last time the ABS was activated.

   HINT:

   - However, if the vehicle is stopped or at a low speed (7 km/h (4.3 mph) or less), or if a DTC is detected, the skid control ECU will stop counting the number.
   - 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 during ABS operation 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.

2. **CHECK FREEZE FRAME DATA**
   a. Connect a Techstream to the DLC3.
   b. Turn the ignition switch to ON.
   c. Turn the Techstream on.
   d. Check the freeze frame data by following the prompts on the Techstream display.

   ABS/VSC/TRAC:

   REFERENCE VALUE CHART

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Tester Display	Measurement Item	Reference Value
Elapsed Time after Freeze Trigger	Elapsed time after freeze trigger	Min.: 0 ms, Max.: 500 ms
Number of IG ON	Number of operations of ignition switch being turned to ON after storing Freeze Frame Data	0 to 31
Stop Light SW	Stop light switch signal	Stop light switch ON: ON, OFF: OFF
Parking Brake SW	Parking brake switch signal	Parking brake switch ON: ON, OFF: OFF
Operated System	Operated system status	ABS activated: ABS Fail safe mode activated: FAIL System prohibit activated: SYS No operation activated: NON
Forward and Rearward G	Forward and backward G	Min.: -25.11 m/s^2 , Max.: 24.91 m/s^2
FR Wheel Speed	FR wheel speed	Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph)
FL Wheel Speed	FL wheel speed	Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph)
RR Wheel Speed	RR wheel speed	Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph)
RL Wheel Speed	RL wheel speed	Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph)
Vehicle Speed	Vehicle speed reading	Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph)
Vehicle Speed Grade	Vehicle speed grade	Min.: -25.11 m/s^2 , Max.: 24.91 m/s^2

3. **CLEAR FREEZE FRAME DATA**

NOTE: Clearing the DTC will also clear the Freeze Frame Data.

a. Connect the Techstream to the DLC3.
b. Turn the ignition switch to ON.
c. Clear the DTC and Freeze Frame Data (See **DTC CHECK / CLEAR**).

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FAIL-SAFE CHART

1. **FAIL SAFE OPERATION**

- If there is a problem with sensor signals or actuator systems, the skid control ECU prohibits power supply to the brake actuator assembly and terminate ABS control.

  The ABS control will be prohibited, but EBD control will continue as much as possible. If EBD control is impossible, the brake warning light will come on to warn the driver (See **DIAGNOSIS SYSTEM**).

- If system components have any malfunction before starting control, immediately stop the operation. If system components have any malfunction during control, gradually stop the control so as not to trigger a sudden change in vehicle conditions.

  If it is impossible to control the systems, the warning light comes on to inform the driver of termination of the systems (See **DIAGNOSIS SYSTEM**).

HINT:

- If the ABS system malfunctions, the brake system operates normally without the ABS system.
- If the brake booster encounters a malfunction, brake performance is gradually lost and ABS control is prohibited.

ABS, EBD and BA system:

FAIL-SAFE CHART

Malfunction Area	Control Method
ABS system	ABS control prohibited
EBD system	ABS control prohibited

DATA LIST / ACTIVE TEST

1. **DATA LIST**

HINT:

Using a Techstream to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTE: In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

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a. Warm up the engine.
b. Turn the ignition switch to OFF.
c. Connect the Techstream to the DLC3.
d. Turn the ignition switch to ON.
e. Turn the Techstream on.
f. Enter the following menu items: Chassis / ABS/ VSC/TRAC / Data List.
g. According to the display on the tester, read the Data List.

ABS/VSC/TRAC

MEASUREMENT ITEM NORMAL CONDITION CHART

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
ABS Warning Light	ABS warning light / ON or OFF	ON: Warning light ON OFF: Warning light OFF	-
Brake Warning Light	Brake warning light / ON or OFF	ON: Warning light ON OFF: Warning light OFF	-
Stop Light SW	Stop light switch / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
Parking Brake SW	Parking brake switch / ON or OFF	ON: Parking brake applied OFF: Parking brake released	-
Deceleration Sensor	Deceleration sensor reading / Min.: -18.52 m/s^2 . Max.: 18.39 m/s^2	Min.:-18.52 m/s^2 Max.: 18.39 m/s^2	Reading changes when vehicle is bounced
Forward and Rearward G	Forward and backward G / Min.: -25.11 m/s^2 , Max.: 24.91 m/s^2	Min.: -25.11 m/s^2 Max.: 24.91 m/s^2	-
FR Wheel Speed	FR wheel speed sensor reading / Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Actual wheel speed	Similar speed as indicated on speedometer
FL Wheel Speed	FL wheel speed sensor reading / Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Actual wheel speed	Similar speed as indicated on speedometer
RR Wheel Speed	RR wheel speed sensor reading / Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Actual wheel speed	Similar speed as indicated on speedometer

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RL Wheel Speed	RL wheel speed sensor reading / Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Actual wheel speed	Similar speed as indicated on speedometer
Vehicle Speed	Maximum wheel speed sensor reading / Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Actual vehicle speed	Speed indicated on speedometer
FR Wheel Acceleration	FR wheel acceleration / Min.: -200.84 m/s^2 , Max.: 199.27 m/s^2	0 m/s^2	-
FL Wheel Acceleration	FL wheel acceleration / Min.: -200.84 m/s^2 , Max.: 199.27 m/s^2	0 m/s^2	-
RR Wheel Acceleration	RR wheel acceleration / Min.: -200.84 m/s^2 , Max.: 199.27 m/s^2	0 m/s^2	-
RL Wheel Acceleration	RL wheel acceleration / Min.: -200.84 m/s^2 , Max.: 199.27 m/s^2	0 m/s^2	-
FR Wheel ABS Ctrl Status	FR wheel ABS control status / ON or OFF	ON: During the control	-
FL Wheel ABS Ctrl Status	FL wheel ABS control status / ON or OFF	ON: During the control	-
RR Wheel ABS Ctrl Status	RR wheel ABS control status / ON or OFF	ON: During the control	-
RL Wheel ABS Ctrl Status	RL wheel ABS control status / ON or OFF	ON: During the control	-
RR Wheel EBD Ctrl Status	RR wheel EBD control status / ON or OFF	ON: During the control	-
RL Wheel EBD Ctrl Status	RL wheel EBD control status / ON or OFF	ON: During the control	-
Solenoid Relay	ABS solenoid relay / ON or OFF	ON: Solenoid relay ON OFF: Solenoid relay OFF	-
ECB (Electronically Controlled Brake system) Motor Relay	ABS motor relay / ON or OFF	ON: Motor relay ON OFF: Motor relay OFF	-
ABS Solenoid (SFRH)	ABS solenoid (SFRH) / ON or OFF	ON: Operates	-
ABS Solenoid (SFRR)	ABS solenoid (SFRR) / ON or OFF	ON: Operates	-
ABS Solenoid (SFLH)	ABS solenoid (SFLH) / ON or OFF	ON: Operates	-
	ABS solenoid (SFLR) / ON or		

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ABS Solenoid (SFLR)	OFF	ON: Operates	-
ABS Solenoid (SRRH)	ABS solenoid (SRRH) / ON or OFF	ON: Operates	-
ABS Solenoid (SRRR)	ABS solenoid (SRRR) / ON or OFF	ON: Operates	-
ABS Solenoid (SRLH)	ABS solenoid (SRLH) / ON or OFF	ON: Operates	-
ABS Solenoid (SRLR)	ABS solenoid (SRLR) / ON or OFF	ON: Operates	-
FR Speed Open	FR speed sensor open detection / Error or Normal	ERROR: Momentary interruption Normal: Normal	-
FL Speed Open	FL speed sensor open detection / ERROR or Normal	ERROR: Momentary interruption Normal: Normal	-
RR Speed Open	RR speed sensor open detection / ERROR or Normal	ERROR: Momentary interruption Normal: Normal	-
RL Speed Open	RL speed sensor open detection / Error or Normal	Error: Momentary interruption Normal: Normal	-
Deceleration Open	Deceleration sensor open detection / Error or Normal	Error: Momentary interruption Normal: Normal	-
Number of DTC	Number of DTC recorded / Min.: 0, Max.: 255	Min.: 0 Max.: 255	-

2. **ACTIVE TEST**

HINT:

Using a Techstream to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts to operate without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Warm up the engine.
b. Turn the ignition switch to OFF.
c. Connect the Techstream to the DLC3.
d. Turn the ignition switch to ON.

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e. Turn the Techstream on.
f. Enter the following menu items: Chassis / ABS/ VSC/TRAC / Active Test.
g. According to the display on the tester, perform the Active Test.

ABS/VSC/TRAC:

ACTIVE TEST

Tester Display	Test Part	Control Range	Diagnostic Note
ABS Warning Light	ABS warning light	Warning light ON / OFF	Observe combination meter
Brake Warning Light	Brake warning light	Warning light ON / OFF	Observe combination meter
Solenoid Relay	ABS solenoid relay	Relay ON / OFF	-
Motor Relay	ABS motor relay	Relay ON / OFF	Operating sound of motor can be heard
ABS Solenoid (SRLR)	ABS solenoid (SRLR)	Solenoid ON / OFF	Operating sound of solenoid (clicking sound) can be heard
ABS Solenoid (SRLH)	ABS solenoid (SRLH)	Solenoid ON/OFF	Operating sound of solenoid (clicking sound) can be heard
ABS Solenoid (SRRR)	ABS solenoid (SRRR)	Solenoid ON / OFF	Operating sound of solenoid (clicking sound) can be heard
ABS Solenoid (SRRH)	ABS solenoid (SRRH)	Solenoid ON / OFF	Operating sound of solenoid (clicking sound) can be heard
ABS Solenoid (SFLR)	ABS solenoid (SFLR)	Solenoid ON / OFF	Operating sound of solenoid (clicking sound) can be heard
ABS Solenoid (SFLH)	ABS solenoid (SFLH)	Solenoid ON / OFF	Operating sound of solenoid (clicking sound) can be heard
ABS Solenoid (SFRR)	ABS solenoid (SFRR)	Solenoid ON / OFF	Operating sound of solenoid (clicking sound) can be heard
ABS Solenoid (SFRH)	ABS solenoid (SFRH)	Solenoid ON / OFF	Operating sound of solenoid (clicking sound) can be heard

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DIAGNOSTIC TROUBLE CODE CHART

NOTE: Turn the ignition switch to OFF before removing parts.

HINT:

- If no abnormality is found when inspecting parts, inspect the skid control ECU and ground points for poor contact.
- If a trouble code is displayed during the DTC check, check the circuit indicated by the DTC. For details of each code, refer to the page for the respective "DTC Code" in the DTC chart.
- When 2 or more DTCs are detected, perform circuit inspection one by one until the problem is identified.

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- Inspect the fuse and relay before investigating the trouble areas as shown in the table below.

DTC chart of ABS:

DTC CHART

DTC Code	Detection Item	Trouble Area
C0200/31*1	Front Speed Sensor RH Circuit	1. Front speed sensor RH 2. Speed sensor circuit 3. Speed sensor rotor 4. Sensor installation 5. Brake actuator assembly (Skid control ECU)
C0205/32*1	Front Speed Sensor LH Circuit	1. Front speed sensor LH 2. Speed sensor circuit 3. Speed sensor rotor 4. Sensor installation 5. Brake actuator assembly (Skid control ECU)
C0210/33*1	Rear Speed Sensor RH Circuit	1. Rear speed sensor RH 2. Speed sensor circuit 3. Speed sensor rotor 4. Sensor installation 5. Brake actuator assembly (Skid control ECU)
C0215/34*1	Rear Speed Sensor LH Circuit	1. Rear speed sensor LH 2. Speed sensor circuit 3. Speed sensor rotor 4. Sensor installation 5. Brake actuator assembly (Skid control ECU)
C0226/21	SFR Solenoid Circuit	1. SFRR or SFRH circuit 2. Brake actuator assembly
C0236/22	SFL Solenoid Circuit	1. SFLR or SFLH circuit 2. Brake actuator assembly
C0246/23	SRR Solenoid Circuit	1. SRRR or SRRH circuit 2. Brake actuator assembly
C0256/24	SRL Solenoid Circuit	1. SRLR or SRLH circuit 2. Brake actuator assembly

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C0273/13*1	Open in ABS Motor Relay Circuit	1. ABS1/VSC1 fuse 2. ABS motor relay circuit 3. Brake actuator assembly (ABS motor relay)
C0274/14	Short to B+ in ABS Motor Relay Circuit	1. ABS motor relay circuit 2. Brake actuator assembly (ABS motor relay)
C0278/11	Open in ABS Solenoid Relay Circuit	1. ABS2/VSC2 fuse 2. ABS solenoid relay circuit 3. Brake actuator assembly (ABS solenoid relay)
C0279/12	Short to B+ in ABS Solenoid Relay Circuit	1. ABS solenoid relay circuit 2. Brake actuator assembly (ABS solenoid relay)
C1235/35	Foreign Object is Attached on Tip of Front Speed Sensor RH	1. Front speed sensor RH 2. Speed sensor rotor 3. Sensor installation 4. Brake actuator assembly (Skid control ECU)
C1236/36	Foreign Object is Attached on Tip of Front Speed Sensor LH	1. Front speed sensor LH 2. Speed sensor rotor 3. Sensor installation 4. Brake actuator assembly (Skid control ECU)
C1238/38	Foreign Object is Attached on Tip of Rear Speed Sensor RH	1. Rear speed sensor RH 2. Speed sensor rotor 3. Sensor installation 4. Brake actuator assembly (Skid control ECU)
C1239/39	Foreign Object is Attached on Tip of Rear Speed Sensor LH	1. Rear speed sensor LH 2. Speed sensor rotor 3. Sensor installation 4. Brake actuator assembly (Skid control ECU)
C1241/41	Low Battery Positive Voltage or Abnormally High Battery Positive	1. ECU-IG fuse 2. Battery 3. Charging system 4. Power source circuit

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	Voltage	5. Internal power supply circuit of the skid control ECU
C1243/43*1	Deceleration Sensor Stuck Malfunction	1. Deceleration sensor 2. Deceleration sensor circuit 3. Brake actuator assembly (Skid control ECU)
C1244/44	Open or Short in Deceleration Sensor Circuit	1. Deceleration sensor 2. Deceleration sensor circuit 3. Brake actuator assembly (Skid control ECU)
C1245/45*1	Deceleration Sensor Output Malfunction	1. Deceleration sensor 2. Deceleration sensor circuit 3. Sensor installation 4. Brake actuator assembly (Skid control ECU)
C1249/49	Open in Stop Light Switch Circuit	1. STOP fuse 2. Stop light switch 3. Stop light switch circuit 4. Brake actuator assembly (Skid control ECU)
C1251/51*1	Open in Pump Motor Circuit	1. Brake actuator assembly (Ground circuit) 2. Brake actuator assembly (Motor circuit)
U0073/94	Control Module Communication Bus OFF	CAN communication system
(*1): Even after the trouble areas are repaired, the ABS warning light will not go off unless the following operations are performed: • Drive the vehicle at 20 km/h (12 mph) for 30 seconds or more and check that the ABS warning light goes off. • Clear the DTC.		

HINT:

In some cases, the Techstream cannot be used when the ABS warning light remains on.

Test Mode DTC of ABS:

DTC CHART

DTC Code	Detection Item	Trouble Area

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C1271/71	Low Output Signal of Front Speed Sensor RH (Test Mode DTC)	1. Front speed sensor RH 2. Sensor installation 3. Speed sensor rotor
C1272/72	Low Output Signal of Front Speed Sensor LH (Test Mode DTC)	1. Front speed sensor LH 2. Sensor installation 3. Speed sensor rotor
C1273/73	Low Output Signal of Rear Speed Sensor RH (Test Mode DTC)	1. Rear speed sensor RH 2. Sensor installation 3. Speed sensor rotor
C1274/74	Low Output Signal of Rear Speed Sensor LH (Test Mode DTC)	1. Rear speed sensor LH 2. Sensor installation 3. Speed sensor rotor
C1275/75	Abnormal Change in Output Signal of Front Speed Sensor RH (Test Mode DTC)	Speed sensor rotor
C1276/76	Abnormal Change in Output Signal of Front Speed Sensor LH (Test Mode DTC)	Speed sensor rotor
C1277/77	Abnormal Change in Output Signal of Rear Speed Sensor RH (Test Mode DTC)	Speed sensor rotor
C1278/78	Abnormal Change in Output Signal of Rear Speed Sensor LH (Test Mode DTC)	Speed sensor rotor
C1279/79	Deceleration Sensor Output Voltage Malfunction (Test Mode DTC)	1. Deceleration sensor 2. Sensor installation

DTC C0200/31 FRONT SPEED SENSOR RH CIRCUIT; DTC C0205/32 FRONT SPEED SENSOR LH CIRCUIT; DTC C1271/71 LOW OUTPUT SIGNAL OF FRONT SPEED SENSOR RH (TEST MODE DTC); DTC C1272/72 LOW OUTPUT SIGNAL OF FRONT SPEED SENSOR LH (TEST MODE DTC)

DESCRIPTION

The speed sensors detect the wheel speeds and send appropriate signals to the skid control ECU. Speed sensor rotors have rows of alternating N and S magnetic poles, and their magnetic fields change as the rotors turn.

The speed sensors detect those magnetic changes and send pulse signals to the skid control ECU. The ECU monitors the wheel speeds through these pulse signals to control the ABS control system. DTCs C1271/71 and C1272/72 can be deleted when the speed sensor sends a vehicle speed signal or the Test Mode ends. DTCs C1271/71 and C1272/72 are output only in the Test Mode.

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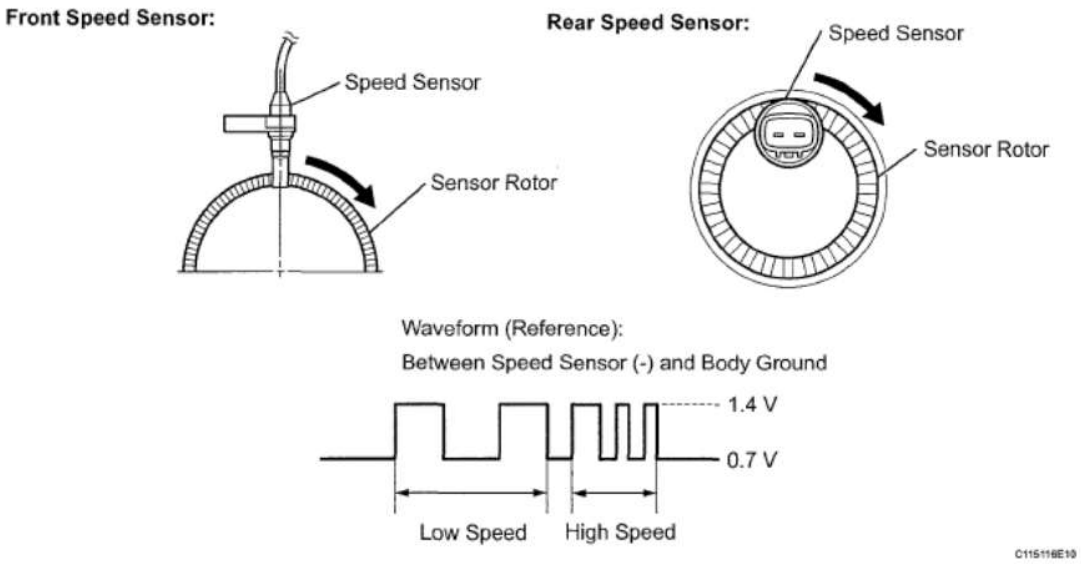


Fig. 28: Speed Sensor Voltage Graph
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C0200/31 C0205/32	When any of the following is detected: 1. At a vehicle speed of 10 km/h (6 mph) or more, an open or short in the sensor signal circuit continues for 1 second or more. 2. Momentary interruption of the sensor signal from the abnormal wheel occurs 255 times or more. 3. An open in the speed sensor signal circuit continues for 0.5 seconds or more. 4. With the IG1 terminal voltage 9.5 V or more, the sensor power supply voltage decreases for 0.5 seconds or more.	• Front speed sensor RH/LH • Speed sensor circuit • Speed sensor rotor • Sensor installation • Brake actuator assembly (Skid control ECU)
C1271/71 C1272/72	Detected only during Test Mode.	• Front speed sensor RH/LH • Sensor installation • Speed sensor rotor

HINT:

- DTCs C0200/31 and C1271/71 are for the front speed sensor RH.
- DTCs C0205/32 and C1272/72 are for the front speed sensor LH.

WIRING DIAGRAM

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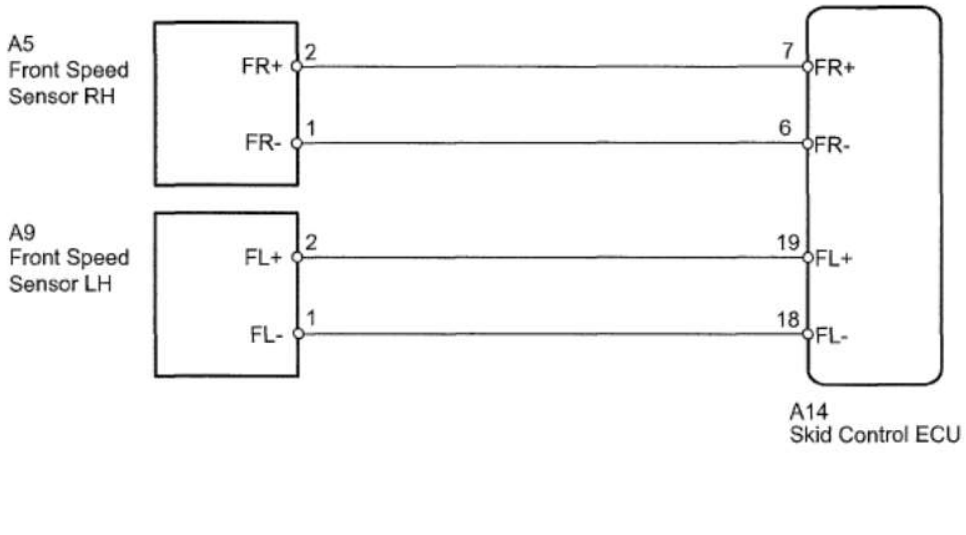


Fig. 29: Front Speed Sensor Circuit - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

1. **CHECK HARNESS AND CONNECTOR (MOMENTARY INTERRUPTION)**
   a. Using a Techstream, check for any momentary interruption in the wire harness and connector corresponding to a DTC (See **CHECK FOR INTERMITTENT PROBLEMS**).

   ABS/VSC/TRAC:

   MEASUREMENT ITEM NORMAL CONDITION CHART

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
FR Speed Open	FR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
FL Speed Open	FL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-

   OK:

   There are no momentary interruptions

   HINT:

   Perform the above inspection before removing the sensor and connector.

NG: Go to step 5

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OK: Go to next step

2. **READ VALUE USING TECHSTREAM (FRONT SPEED SENSOR)**
   a. Turn the ignition switch to OFF.
   b. Connect the Techstream to the DLC3.
   c. Start the engine.
   d. Select the Data List mode on the Techstream (See **DATA LIST / ACTIVE TEST**).

   ABS/VSC/TRAC:

   MEASUREMENT ITEM NORMAL CONDITION CHART

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
FR Wheel Speed	FR wheel speed sensor reading / Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Actual wheel speed	Similar speed as indicated on speedometer
FL Wheel Speed	FL wheel speed sensor reading /Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Actual wheel speed	Similar speed as indicated on speedometer

   e. Check that there is no difference between the speed value output from the speed sensor displayed on the Techstream and the speed value displayed on the speedometer when driving the vehicle.

   HINT:

   Factors that affect the indicated vehicle speed include tire size, tire inflation, and tire wear. The speed indicated on the speedometer has an allowable margin of error. This can be tested using a speedometer tester (calibrated chassis dynamometer). For details about testing and the margin of error, see the reference chart (See **ON-VEHICLE INSPECTION**).

   OK:

   The speed value output from the speed sensor displayed on the Techstream is the same as the actual vehicle speed measured using a speedometer tester (calibrated chassis dynamometer).

NG: Go to step 7

OK: Go to next step

3. **PERFORM TEST MODE (SIGNAL CHECK)**
   a. Perform sensor check in Test Mode procedure (See **TEST MODE PROCEDURE**).

   OK:

   All Test Mode DTCs are erased.

NG: Go to step 7

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OK: Go to next step

4. **RECONFIRM DTC**
   a. Clear the DTC (See **DTC CHECK / CLEAR**).
   b. Start the engine.
   c. Drive the vehicle at a speed of 40 km/h (25 mph) or more for at least 60 seconds.
   d. Check if the same DTC is recorded (See **DTC CHECK / CLEAR**).

   Result

   RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

B: Go to step 12

A : CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **CHECK FOR INTERMITTENT PROBLEMS**)

5. **CHECK IF SKID CONTROL ECU AND FRONT SPEED SENSOR CONNECTORS ARE SECURELY CONNECTED**
   a. Check if the skid control ECU and the front speed sensor connectors are securely connected.
6. **RECONFIRM DTC**
   a. Clear the DTC (See **DTC CHECK / CLEAR**).
   b. Start the engine.
   c. Drive the vehicle at a speed of 40 km/h (25 mph) or more for at least 60 seconds.
   d. Check if the same DTC is recorded (See **DTC CHECK / CLEAR**).

   Result

   RESULT CHART

Result	Proceed to
DTC output	A
DTC not output	B

B : END

A: Go to next step

7. **CHECK FRONT SPEED SENSOR INSTALLATION**
   a. Turn the ignition switch to OFF.

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b. Check the speed sensor installation.

OK:

There is no clearance between the sensor and the front steering knuckle. The installation nut is tightened properly.

Torque:

8.5 N*m (87 kgf*cm, 75 in.*lbf)

NG: INSTALL FRONT SPEED SENSOR CORRECTLY (See **INSTALLATION**)

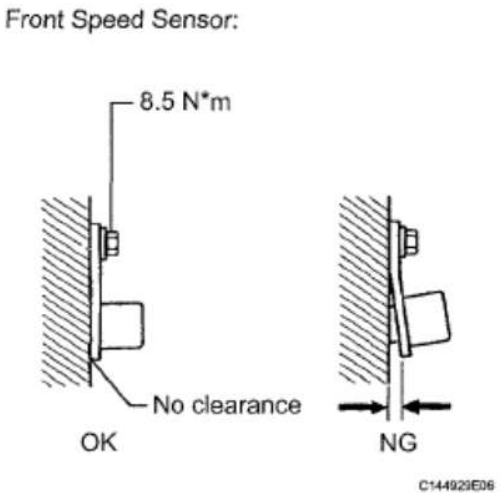


Fig. 30: Identifying Clearance Between Sensor And Front Steering Knuckle
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

8. **CHECK FRONT SPEED SENSOR TIP**
   a. Remove the front speed sensor (See **REMOVAL**).
   b. Check the speed sensor tip.

OK:

No scratches or foreign matter on the sensor tip.

NOTE: **Check the speed sensor signal after cleaning or replacement (See TEST MODE PROCEDURE).**

NG: CLEAN OR REPLACE FRONT SPEED SENSOR

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OK: Go to next step

9. **INSPECT FRONT SPEED SENSOR**
   a. Install the front speed sensor.
   b. Make sure that there is no looseness at the locking part and the connecting part of the connectors.
   c. Disconnect the front speed sensor connector.
   d. Measure the resistance according to the value(s) in the table below.

Standard resistance:

for RH

TESTER CONNECTION SPECIFIED CONDITION CHART

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

for LH

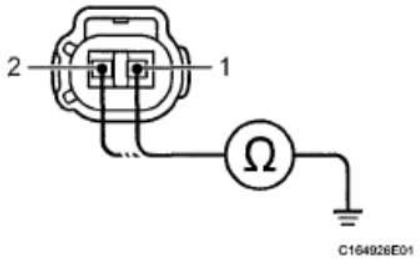
TESTER CONNECTION SPECIFIED CONDITION CHART

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

NOTE: **Check the speed sensor signal after replacement (See TEST MODE PROCEDURE).**

NG: REPLACE FRONT SPEED SENSOR (See **REMOVAL**)

Component without harness connected:
(Front Speed Sensor)



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Fig. 31: Measuring Resistance Between Front Speed Sensor Terminal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

10. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - FRONT SPEED SENSOR)**
    a. Disconnect the skid control ECU connector.
    b. Measure the resistance according to the value(s) in the table below.

Standard resistance:

for RH

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A14-7 (FR+) - A5-2 (FR+)	Always	Below 1 ohms
A14-7 (FR+) - Body ground	Always	10 kohms or higher
A14-6 (FR-) - A5-1 (FR-)	Always	Below 1 ohms
A14-6 (FR-) - Body ground	Always	10 kohms or higher

for LH

TESTER CONNECTION SPECIFIED CONDITION CHART

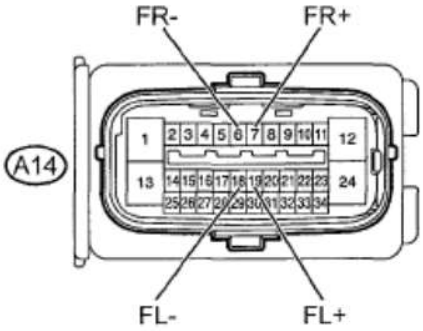
Tester Connection	Condition	Specified Condition
A14-19 (FL+) - A9-2 (FL+)	Always	Below 1 ohms
A14-19 (FL+) - Body ground	Always	10 kohms or higher
A14-18 (FL-) - A9-1 (FL-)	Always	Below 1 ohms
A14-18 (FL-) - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

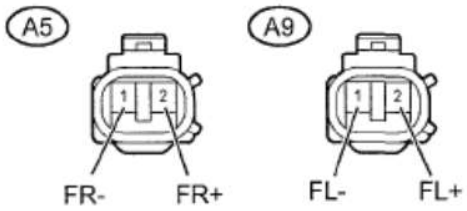
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Front view of wire harness connector:
(to Skid Control ECU)



Front view of wire harness connector:
(to Front Speed Sensor)



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Fig. 32: Identifying Skid Control ECU Connector Terminal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

11. **INSPECT SKID CONTROL ECU (SENSOR INPUT)**
    a. Reconnect the skid control ECU connector.
    b. Turn the ignition switch to ON.
    c. Measure the voltage according to the value(s) in the table below.

Standard voltage:

for RH

TESTER CONNECTION SPECIFIED CONDITION CHART

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Tester Connection	Switch Condition	Specified Condition
A5-2 (FR+) - Body ground	Ignition switch ON	8 to 14 V

for LH

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
A9-2 (FL+) - Body ground	Ignition switch ON	8 to 14 V

NG: REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

Front view of wire harness connector:
(to Front Speed Sensor)

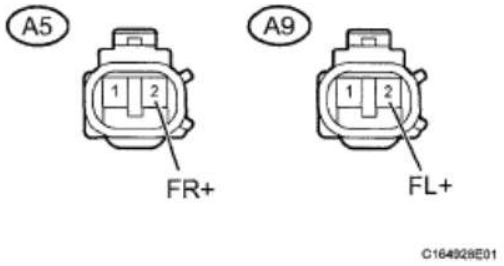


Fig. 33: Identifying Skid Control ECU Connector Terminal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

12. **REPLACE FRONT SPEED SENSOR**
    a. Turn the ignition switch to OFF.
    b. Replace the front speed sensor (See **REMOVAL**).

    NOTE: Check the speed sensor signal after cleaning or replacement (See TEST MODE PROCEDURE).

13. **RECONFIRM DTC**
    a. Clear the DTC (See **DTC CHECK / CLEAR**).
    b. Start the engine.
    c. Drive the vehicle at a speed of 40 km/h (25 mph) or more for at least 60 seconds.
    d. Check if the same DTC is recorded (See **DTC CHECK / CLEAR**).

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Result

RESULT CHART

Result	Proceed to
DTC output	A
DTC not output	B

B : END

A: Go to next step

14. **REPLACE FRONT AXLE HUB BEARING**
    a. Turn the ignition switch to OFF.
    b. Replace the front axle hub bearing (See **REMOVAL**).

    HINT:

    The front speed sensor rotor is incorporated into the front axle hub bearing.

    CAUTION: Check the speed sensor signal after replacement (See TEST MODE PROCEDURE).

15. **RECONFIRM DTC**
    a. Clear the DTC (See **DTC CHECK / CLEAR**).
    b. Start the engine.
    c. Drive the vehicle at a speed of 40 km/h (25 mph) or more for at least 60 seconds.
    d. Check if the same DTC is recorded (See **DTC CHECK / CLEAR**).

    Result

    RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

    HINT:

    If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See **PROBLEM SYMPTOMS TABLE**).

B : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

A : END

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DTC C0210/33 REAR SPEED SENSOR RH CIRCUIT; DTC C0215/34 REAR SPEED SENSOR LH CIRCUIT; DTC C1273/73 LOW OUTPUT SIGNAL OF REAR SPEED SENSOR RH (TEST MODE DTC); DTC C1274/74 LOW OUTPUT SIGNAL OF REAR SPEED SENSOR LH (TEST MODE DTC)

DESCRIPTION

The speed sensors detect the wheel speeds and send appropriate signals to the skid control ECU. Speed sensor rotors have rows of alternating N and S magnetic poles, and their magnetic fields change as the rotors turn.

The speed sensors detect those magnetic changes and send pulse signals to the skid control ECU. The ECU monitors the wheel speeds through these pulse signals to control the ABS control system. DTCs C1273/73 and C1274/74 can be deleted when the speed sensor sends a vehicle speed signal or the Test Mode ends. DTCs C1273/73 and C1274/74 are output only in the Test Mode.

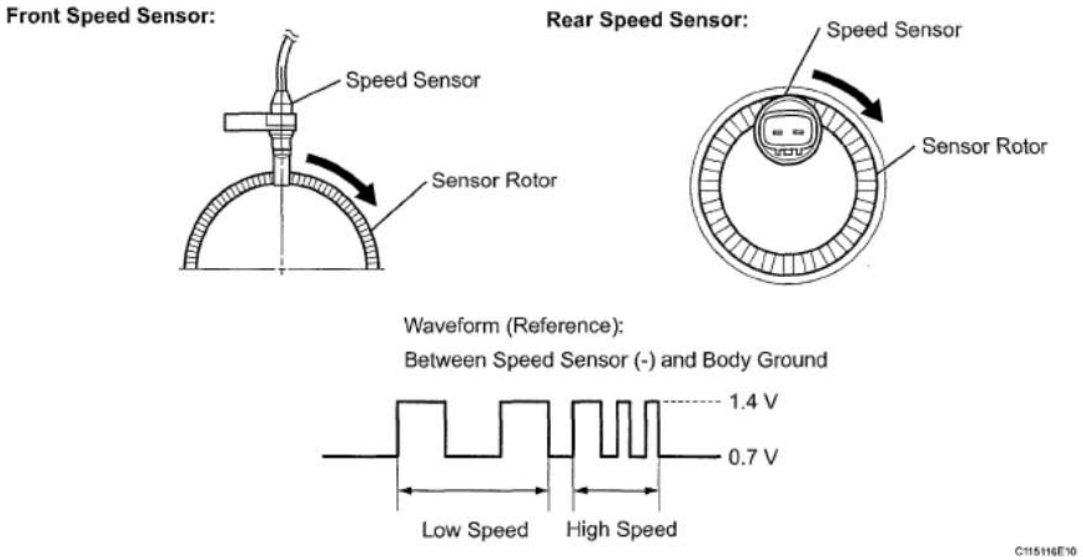


Fig. 34: Speed Sensor Voltage Graph
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C0210/33 C0215/34	When any of the following is detected: 1. At a vehicle speed of 10 km/h (6 mph) or more, an open or short in the sensor signal circuit continues for 1 second or more. 2. Momentary interruption of the sensor signal from the abnormal wheel occurs 255 times or more. 3. An open in the speed sensor signal circuit continues for 0.5 seconds or more.	• Rear speed sensor RH/LH • Speed sensor circuit • Speed sensor rotor • Sensor installation • Brake actuator assembly (Skid control ECU)

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	4. With the IG1 terminal voltage 9.5 V or more, the sensor power supply voltage decreases for 0.5 seconds or more.	
C1273/73 C1274/74	Detected only during Test Mode.	• Rear speed sensor RH/LH • Sensor installation • Speed sensor rotor

HINT:

- DTCs C0210/33 and C1273/73 are for the rear speed sensor RH.
- DTCs C0215/34 and C1274/74 are for the rear speed sensor LH.

WIRING DIAGRAM

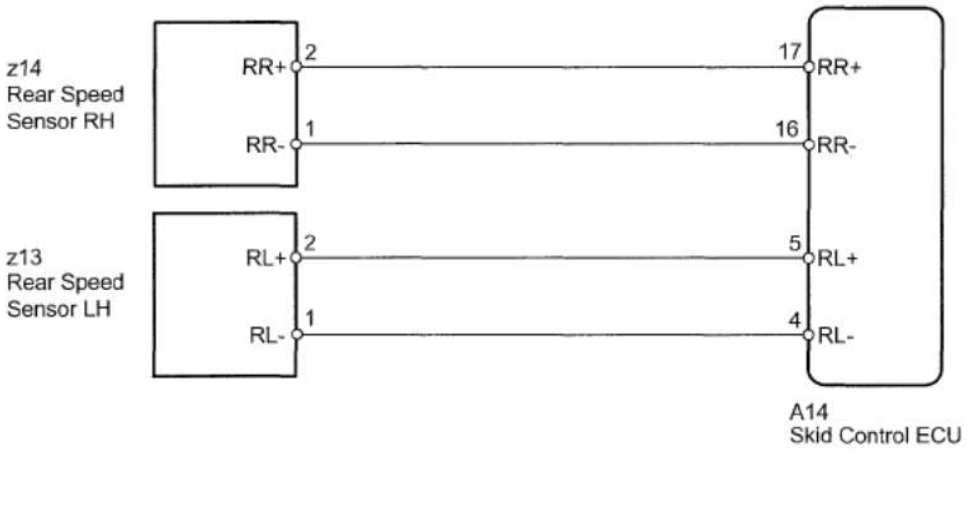


Fig. 35: Rear Speed Sensor Circuit - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

1. **CHECK HARNESS AND CONNECTOR (MOMENTARY INTERRUPTION)**
   a. Using a Techstream, check for any momentary interruption in the wire harness and connector corresponding to a DTC (See **CHECK FOR INTERMITTENT PROBLEMS**).

   ABS/VSC/TRAC:

   MEASUREMENT ITEM NORMAL CONDITION CHART

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
		ERROR: Momentary	

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RR Speed Open	RR speed sensor open detection / ERROR or NORMAL	interruption NORMAL: Normal	-
RL Speed Open	RL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-

OK:

There are no momentary interruptions.

HINT:

Perform the above inspection before removing the sensor and connector.

NG: Go to step 5

OK: Go to next step

2. **READ VALUE USING TECHSTREAM (REAR SPEED SENSOR)**
   a. Turn the ignition switch to OFF.
   b. Connect the Techstream to the DLC3.
   c. Start the engine.
   d. Select the Data List mode on the Techstream (See **DATA LIST / ACTIVE TEST**).

ABS/VSC/TRAC:

MEASUREMENT ITEM NORMAL CONDITION CHART

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
RR Wheel Speed	RR wheel speed sensor reading / Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Actual wheel speed	Similar speed as indicated on speedometer
RL Wheel Speed	RL wheel speed sensor reading / Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Actual wheel speed	Similar speed as indicated on speedometer

   e. Check that there is no difference between the speed value output from the speed sensor displayed on the Techstream and the speed value displayed on the speedometer when driving the vehicle.

HINT:

Factors that affect the indicated vehicle speed include tire size, tire inflation, and tire wear. The speed indicated on the speedometer has an allowable margin of error. This can be tested using a speedometer tester (calibrated chassis dynamometer). For details about testing and the margin of error, see the reference chart (See **ON-VEHICLE INSPECTION**).

OK:

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The speed value output from the speed sensor displayed on the Techstream is the same as the actual vehicle speed measured using a speedometer tester (calibrated chassis dynamometer).

NG: Go to step 7

OK: Go to next step

3. **PERFORM TEST MODE (SIGNAL CHECK)**
   a. Perform sensor check in Test Mode procedure (See **TEST MODE PROCEDURE**).

   OK:

   All Test Mode DTCs are erased.

NG: Go to step 7

OK: Go to next step

4. **RECONFIRM DTC**
   a. Clear the DTC (See **DTC CHECK / CLEAR**).
   b. Start the engine.
   c. Drive the vehicle at a speed of 40 km/h (25 mph) or more for at least 60 seconds.
   d. Check if the same DTC is recorded (See **DTC CHECK / CLEAR**).

   Result

   RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

B: Go to step 12

A : CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **CHECK FOR INTERMITTENT PROBLEMS**)

5. **CHECK IF SKID CONTROL ECU AND REAR SPEED SENSOR CONNECTOR ARE SECURELY CONNECTED**
   a. Check if the skid control ECU and the rear speed sensor connectors are securely connected.
6. **RECONFIRM DTC**
   a. Clear the DTC (See **DTC CHECK / CLEAR**).
   b. Start the engine.
   c. Drive the vehicle at a speed of 40 km/h (25 mph) or more for at least 60 seconds.

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d. Check if the same DTC is recorded (See **DTC CHECK / CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC output	A
DTC not output	B

B : END

A: Go to next step

7. **CHECK REAR SPEED SENSOR INSTALLATION**
   a. Turn the ignition switch to OFF.
   b. Check the speed sensor installation.

OK:

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

NG: INSTALL REAR SPEED SENSOR CORRECTLY (See **INSTALLATION**)

Rear Speed Sensor:

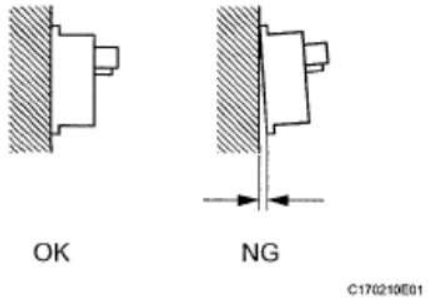


Fig. 36: Identifying Clearance Between Sensor And Rear Axle Carrier
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

8. **INSPECT REAR SPEED SENSOR**
   a. Make sure that there is no looseness at the locking part and the connecting part of the connectors.

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

Standard resistance:

for RH

TESTER CONNECTION SPECIFIED CONDITION CHART

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

for LH

TESTER CONNECTION SPECIFIED CONDITION CHART

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

NOTE: **Check the speed sensor signal after replacement (See TEST MODE PROCEDURE).**

NG: REPLACE REAR SPEED SENSOR (See **REMOVAL**)

Component without harness connected:
(Rear Speed Sensor)

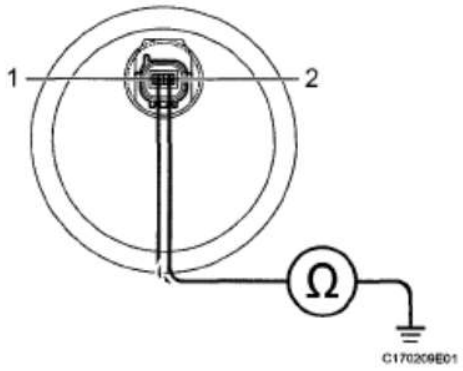


Fig. 37: Measuring Resistance Between Rear Speed Sensor Connector Terminals
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OK: Go to next step

9. **CHECK HARNESS AND CONNECTOR (SPEED SENSOR WIRE)**

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

Standard resistance:

for RH

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
z14-1 - zL1-1	Always	10 kohms or higher
z14-1 - zL1-2	Always	Below 1 ohms
z14-1 - Body ground	Always	10 kohms or higher
z14-2 - zL1-1	Always	Below 1 ohms
z14-2 - zL1-2	Always	10 kohms or higher
z14-2 - Body ground	Always	10 kohms or higher

for LH

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
z13-1 - zL2-1	Always	10 kohms or higher
z13-1 - zL2-2	Always	Below 1 ohms
z13-1 - Body ground	Always	10 kohms or higher
z13-2 - zL2-1	Always	Below 1 ohms
z13-2 - zL2-2	Always	10 kohms or higher
z13-2 - Body ground	Always	10 kohms or higher

NOTE: **Check the speed sensor signal after replacement (See TEST MODE PROCEDURE).**

NG: REPLACE SPEED SENSOR WIRE

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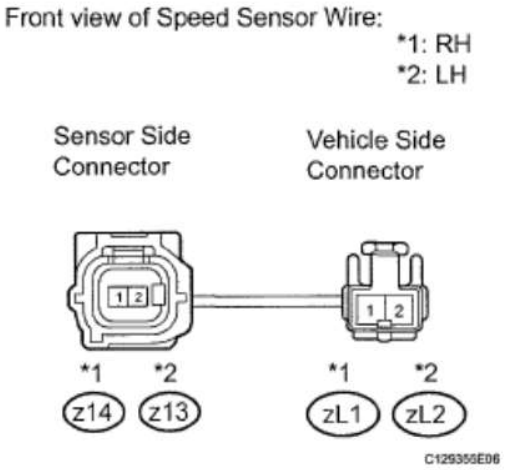


Fig. 38: Identifying Speed Sensor Wire Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

10. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - REAR SPEED SENSOR)**
    a. Reconnect the speed sensor wire.
    b. Disconnect the skid control ECU connector.
    c. Measure the resistance according to the value(s) in the table below.

Standard resistance:

for RH

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A14-17 (RR+) - z14-2 (RR+)	Always	Below 1 ohms
A14-17 (RR+) - Body ground	Always	10 kohms or higher
A14-16 (RR-) - z14-1 (RR-)	Always	Below 1 ohms
A14-16 (RR-) - Body ground	Always	10 kohms or higher

for LH

TESTER CONNECTION SPECIFIED CONDITION CHART

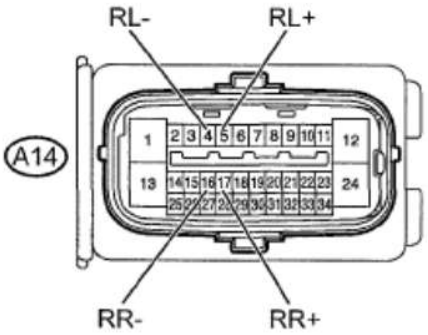
Tester Connection	Condition	Specified Condition
A14-5 (RL+) - 213-2 (RL+)	Always	Below 1 ohms
A14-5 (RL+) - Body ground	Always	10 kohms or higher
A14-4 (RL-) - z13-1 (RL-)	Always	Below 1 ohms
A14-4 (RL-) - Body ground	Always	10 kohms or higher

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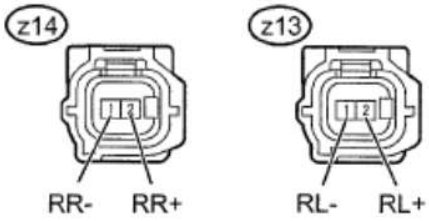
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NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

Front view of wire harness connector:
(to Skid Conrol ECU)



Front view of wire harness connector:
(to Rear Speed Sensor)



C168929E01

Fig. 39: Identifying Skid Control ECU Connector Terminal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

11. **INSPECT SKID CONTROL ECU (SENSOR INPUT)**
    a. Reconnect the skid control ECU connector.
    b. Turn the ignition switch to ON.
    c. Measure the voltage according to the value(s) in the table below.

    Standard voltage:

    for RH

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TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
z14-2 (RR+) - Body ground	Ignition switch ON	8 to 14 V

for LH

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
z13-2 (RL+) - Body ground	Ignition switch ON	8 to 14 V

NG: REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

Front view of wire harness connector:
(to Rear Speed Sensor)

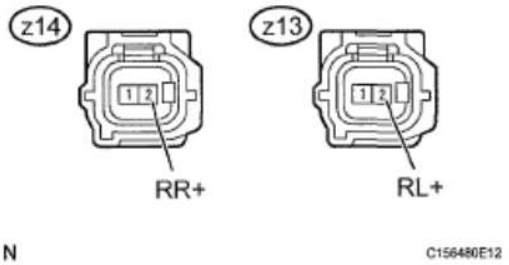


Fig. 40: Identifying Skid Control ECU Connector Terminal (Sensor Input)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

12. **REPLACE REAR AXLE HUB AND BEARING ASSEMBLY**
    a. Turn the ignition switch to OFF.
    b. Replace the rear speed sensor and rear axle hub and bearing assembly (See **REMOVAL**).

    HINT:

    The rear speed sensor rotor is incorporated into the rear axle hub and bearing assembly.

    If the rear speed sensor rotor needs to be replaced, replace it together with the rear axle hub and bearing assembly with rear speed sensor.

    NOTE: Check the speed sensor signal after replacement (See TEST MODE PROCEDURE).

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13. **RECONFIRM DTC**
    a. Clear the DTC (See **DTC CHECK / CLEAR**).
    b. Start the engine.
    c. Drive the vehicle at a speed of 40 km/h (25 mph) or more for at least 60 seconds.
    d. Check if the same DTC is recorded (See **DTC CHECK / CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

HINT:

If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See **PROBLEM SYMPTOMS TABLE**).

B : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

A : END

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

These solenoids turn on when signals are received from the skid control ECU and they control the pressure acting on the wheel cylinders to control the braking force.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C0226/21 C0236/22 C0246/23 C0256/24	When the solenoid relay ON and IG1 terminal voltage is 17.4 V or less, open or short in the solenoid circuit continues for 0.05 seconds or more.	• Solenoid circuit • Brake actuator assembly

WIRING DIAGRAM

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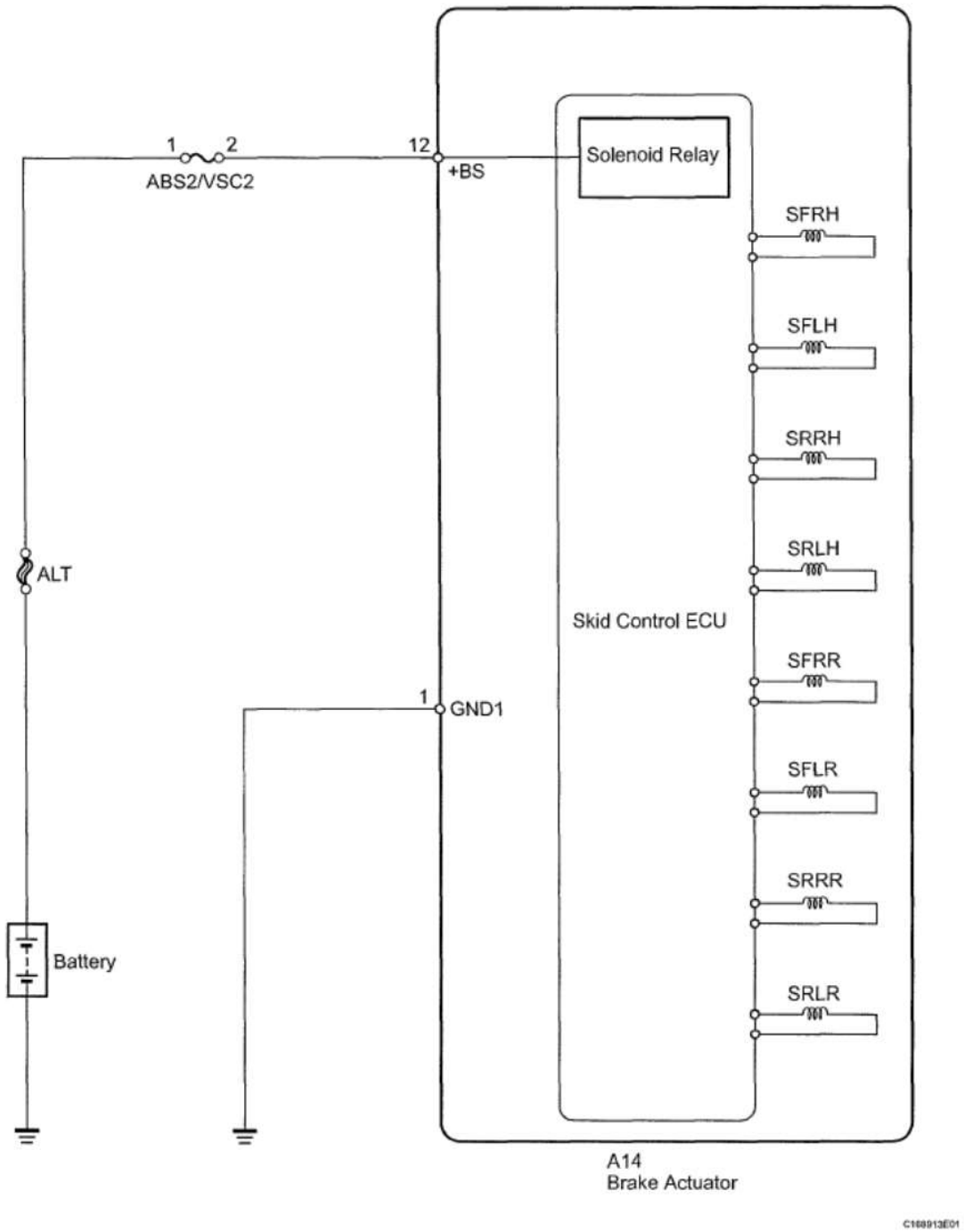


Fig. 41: SFR Solenoid Circuit - Wiring Diagram
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INSPECTION PROCEDURE

1. **RECONFIRM DTC**

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HINT:

These codes are detected when a problem is determined in the brake actuator assembly.

The solenoid circuits are in the brake actuator assembly. Therefore, solenoid circuit inspection and solenoid unit inspection cannot be performed. Be sure to check if any DTC code is output before replacing the brake actuator assembly.

a. Clear the DTC (See **DTC CHECK / CLEAR**).
b. Start the engine.
c. Drive the vehicle at the speed of 20 km/h (12 mph) or more.
d. Check if the same DTC is recorded (See **DTC CHECK / CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

HINT:

- If a speed signal of 6 km/h (4 mph) or more is input to the skid control ECU, with the ignition switch ON and the stop light switch off, the ECU performs self diagnosis of the motor and solenoid circuits.
- If the normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harness, and fuses of the brake actuator assembly. Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness from the brake actuator assembly (skid control ECU), inspect and repair the connector or wire harness.
- It is suspected that the DTCs were output due to a bad connection of the connector terminal.

B : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

A : CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **CHECK FOR INTERMITTENT PROBLEMS**)

DTC C0273/13 OPEN IN ABS MOTOR RELAY CIRCUIT; DTC C0274/14 SHORT TO B+ IN ABS MOTOR RELAY CIRCUIT

DESCRIPTION

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

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If the voltage supplied to the motor relay (+BM) is below the DTCs detection threshold due to low voltage from the battery or alternator, the DTC may be stored.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C0273/13	When either of the following is detected: 1. All of the following conditions continue for 0.12 seconds or more. o The IG1 terminal voltage is 9.5 V or more. o While initial check and ABS is operating. o Relay contact is open when the relay is ON. 2. Both of the following conditions continue for 0.12 seconds. o The IG1 terminal voltage is less than 9.5 V. o Relay contact remains open when the relay is ON.	• ABS1/VSC1 fuse • ABS motor relay circuit • Brake actuator assembly (ABS motor relay)
C0274/14	When the motor relay is OFF, the motor relay remains closed for 4 seconds or more.	• ABS motor relay circuit • Brake actuator assembly (ABS motor relay)

WIRING DIAGRAM

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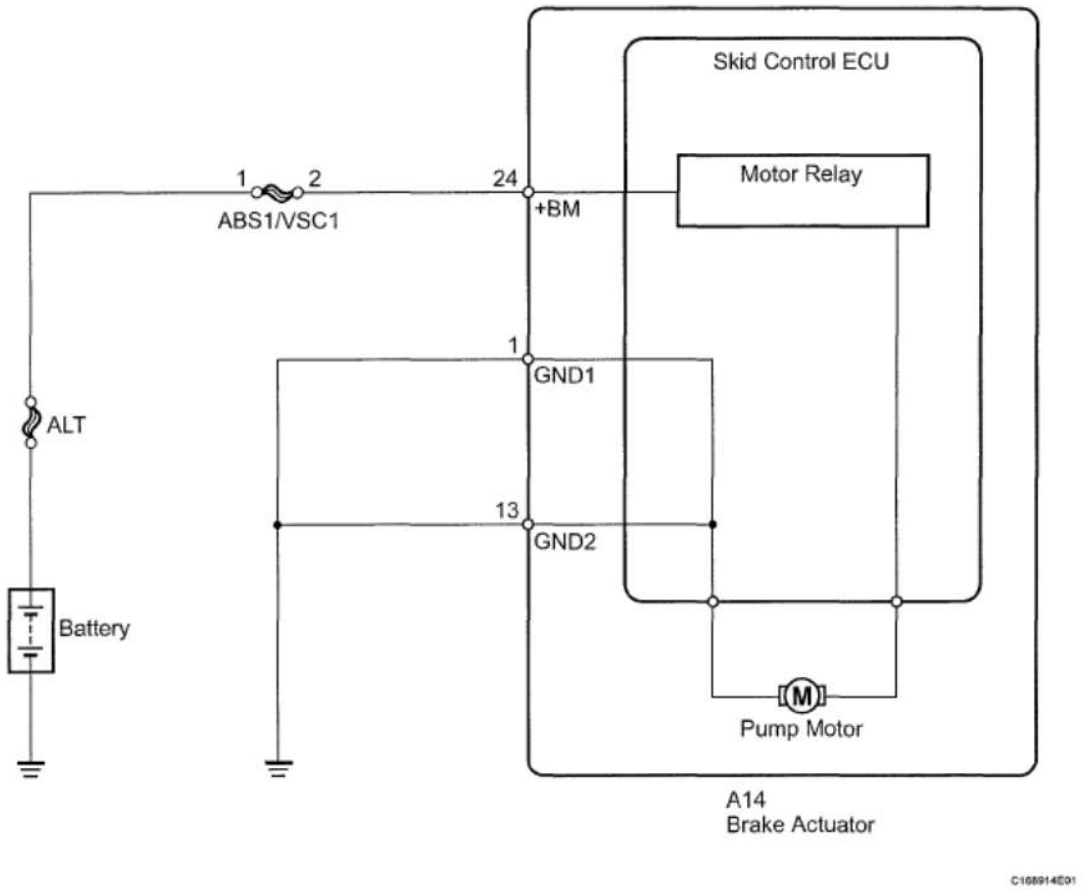


Fig. 42: ABS Pump Motor Relay Circuit - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

HINT:

When C1241/41 is output together with C0273/13 and/or C0274/13 inspect and repair the trouble areas indicated by C1241/41 first (See **DTC C1241/41 LOW BATTERY POSITIVE VOLTAGE OR ABNORMALLY HIGH BATTERY POSITIVE VOLTAGE**).

1. **INSPECT ABS1/VSC1 FUSE**
   a. Remove the ABS1/VSC1 fuse from the engine room relay block.
   b. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
ABS1/VSC1 (50 A) fuse	Always	Below 1 ohms

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NG: REPLACE ABS1/VSC1 FUSE

Engine Room Relay Block:

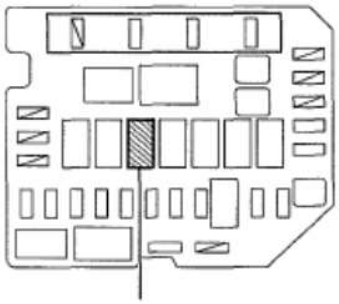


Fig. 43: Identifying ABS1/VSC1 Fuse From Engine Room Relay Block
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

2. **PERFORM ACTIVE TEST USING TECHSTREAM (ABS MOTOR RELAY)**
   a. Install the ABS1/VSC1 fuse.
   b. Connect the Techstream to the DLC3.
   c. Start the engine.
   d. Select the Active Test mode on the Techstream (See **DATA LIST / ACTIVE TEST**).

   ABS/VSC/TRAC:

   ACTIVE TEST

Tester Display	Test Part	Control Range	Diagnostic Note
Motor Relay	ABS motor relay	Relay ON / OFF	Operating sound of motor can be heard

   e. Check the operating sound of the ABS motor relay when operating it with the Techstream.

   Result

   RESULT CHART

Result	Proceed to
The operating sound is not heard	A
The operating sound is heard	B

B: Go to step 5

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A: Go to next step

3. **INSPECT SKID CONTROL ECU (+BM TERMINAL)**
   a. Turn the ignition switch to OFF.
   b. Disconnect the skid control ECU connector.
   c. Measure the voltage according to the value(s) in the table below.

Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A14-24 (+BM) - Body ground	Always	11 to 14 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (+BM CIRCUIT)

Front view of wire harness connector:
(to Skid Control ECU)

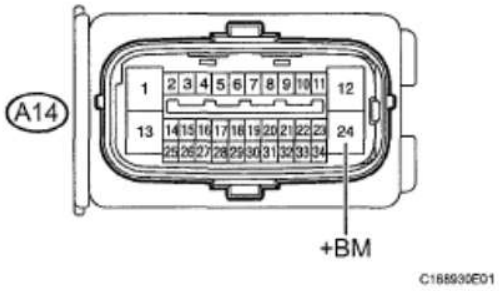


Fig. 44: Identifying Skid Control ECU Connector Terminal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

4. **INSPECT SKID CONTROL ECU (GND TERMINAL)**
   a. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A14-1 (GND1) - Body ground	Always	Below 1 ohms
A14-13 (GND2) - Body ground	Always	Below 1 ohms

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NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)

Front view of wire harness connector:
(to Skid Control ECU)

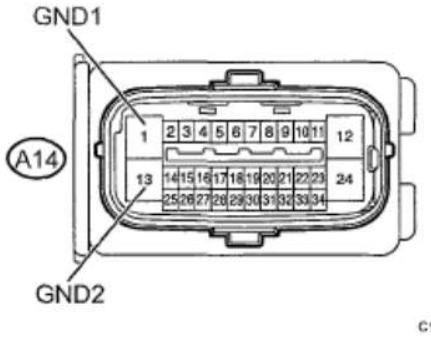


Fig. 45: Identifying Skid Control ECU Connector Terminal (GND Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

5. **RECONFIRM DTC**

HINT:

This code is detected when a problem is identified in the brake actuator assembly.

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

a. Turn the ignition switch to OFF.
b. Reconnect the skid control ECU connector.
c. Clear the DTC (See **DTC CHECK / CLEAR**).
d. Start the engine.
e. Drive the vehicle at a speed of 20 km/h (12 mph) or more for 30 seconds or more.
f. Check if the same DTC is recorded (See **DTC CHECK / CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

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HINT:

- If a speed signal of 6 km/h (4 mph) or more is input to the skid control ECU, with the ignition switch ON and the stop light switch off, the ECU performs self diagnosis of the motor and solenoid circuits.
- If the normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harness, and fuses of the brake actuator assembly. Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness of the brake actuator assembly (skid control ECU), inspect and repair the connector or wire harness.
- It is suspected that the DTCs were output due to a bad connection of the connector terminal.

B : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

A : CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **CHECK FOR INTERMITTENT PROBLEMS**)

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 supplies power to the ABS solenoid.

The solenoid relay is turned on 1.5 seconds after the ignition switch is turned to ON, and is turned off if an open or short in the solenoid is detected by the self diagnosis performed when the vehicle starts running. The ABS solenoid relay is housed in the skid control ECU in the actuator assembly.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C0278/11	When either of the following is detected: 1. Both of the following conditions continue for 0.22 seconds or more. o The IG1 terminal voltage is 9.5 V or more. o The solenoid relay contact is open when the relay is ON. 2. Both of the following conditions continue for 0.22 seconds or more. o The IG1 terminal voltage becomes lower than 9.5 V or less when the relay is turned on. o The relay contact remains open.	• ABS2/VSC2 fuse • ABS solenoid relay circuit • Brake actuator assembly (ABS solenoid relay)
	Immediately after the ignition switch is turned to ON, the	• ABS solenoid relay

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C0279/12	solenoid relay contact is closed for 4.5 seconds when the relay is turned off.	circuit • Brake actuator assembly (ABS solenoid relay)

WIRING DIAGRAM

Refer to **DTCS C0226/21, C0236/22, C0246/23 AND C0256/24** .

INSPECTION PROCEDURE

HINT:

When C1241/41 is output together with C0278/11 and/or C0279/12, inspect and repair the trouble areas indicated by C1241/41 first (See **DTC C1241/41 LOW BATTERY POSITIVE VOLTAGE OR ABNORMALLY HIGH BATTERY POSITIVE VOLTAGE**).

1. **INSPECT ABS2/VSC2 FUSE**
   a. Remove the ABS2/VSC2 fuse from the engine room relay block.
   b. Measure the resistance according to the value(s) in the table below.

   Standard resistance

   TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
ABS2/VSC2 (30 A) fuse	Always	Below 1 ohms

NG: REPLACE ABS2/VSC2 FUSE

Engine Room Relay Block:

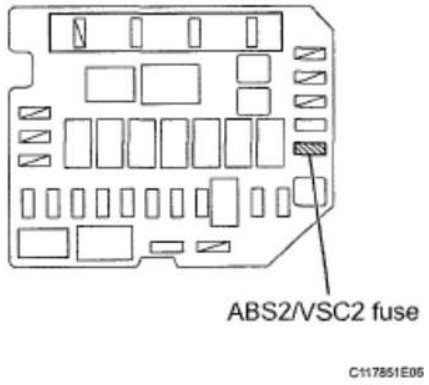


Fig. 46: Identifying ABS2/VSC2 Fuse
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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OK: Go to next step

2. **INSPECT SKID CONTROL ECU (+BS TERMINAL)**
   a. Install the ABS2/VSC2 fuse.
   b. Disconnect the skid control ECU connector.
   c. Measure the voltage according to the value(s) in the table below.

Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A14-12 (+BS) - Body ground	Always	11 to 14 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (+BS CIRCUIT)

Front view of wire harness connector:
(to Skid Control ECU)

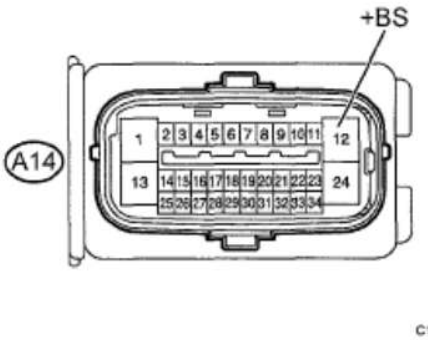


Fig. 47: Identifying Skid Control ECU Connector Terminal (+BS Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

3. **INSPECT SKID CONTROL ECU (GND TERMINAL)**
   a. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A14-1 (GND1) - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)

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Front view of wire harness connector:
(to Skid Control ECU)

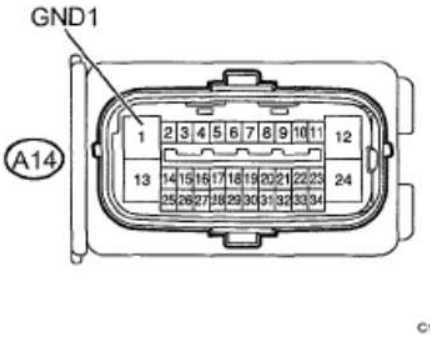


Fig. 48: Identifying Skid Control ECU Connector Terminal (GND Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

4. **RECONFIRM DTC**

HINT:

This code is detected when a problem is identified 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 is output before replacing the brake actuator assembly.

a. Reconnect the skid control ECU connector.
b. Clear the DTC (See **DTC CHECK / CLEAR**).
c. Start the engine.
d. Drive the vehicle at a speed of 20 km/h (12 mph) or more for 30 seconds or more.
e. Check if the same DTC is recorded (See **DTC CHECK / CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

HINT:

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- If a speed signal of 6 km/h (4 mph) or more is input to the skid control ECU, with the ignition switch ON and the stop light switch off, the ECU performs self diagnosis of the motor and solenoid circuits.
- If the normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harnesses, and fuses of the brake actuator assembly. Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness of the brake actuator assembly (skid control ECU), inspect and repair the connector or wire harness.
- It is suspected that the DTCs were output due to a bad connection of the connector terminal.

B : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

A : CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **CHECK FOR INTERMITTENT PROBLEMS**)

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; 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; DTC C1275/75 ABNORMAL CHANGE IN OUTPUT SIGNAL OF FRONT SPEED SENSOR RH (TEST MODE DTC); DTC C1276/76 ABNORMAL CHANGE IN OUTPUT SIGNAL OF FRONT SPEED SENSOR LH (TEST MODE DTC); DTC C1277/77 ABNORMAL CHANGE IN OUTPUT SIGNAL OF REAR SPEED SENSOR RH (TEST MODE DTC); DTC C1278/78 ABNORMAL CHANGE IN OUTPUT SIGNAL OF REAR SPEED SENSOR LH (TEST MODE DTC)

DESCRIPTION

The speed sensors detect the wheel speeds and send appropriate signals to the skid control ECU. Speed sensor rotors have rows of alternating N and S magnetic poles, and their magnetic fields change as the rotors turn.

The speed sensors detect those magnetic changes and send pulse signals to the skid control ECU. The ECU monitors the wheel speeds through these pulse signals to control the ABS control system.

When foreign matter or oil adheres to the speed sensor tip or speed sensor rotor, these DTCs are output. An abnormal waveform input from the sensor determines these conditions.

These DTCs may be detected when a malfunction occurs in the connector terminals or wire harness of the speed sensor circuit.

DTCs C1275/75 to C1278/78 can be deleted when the speed sensor sends a vehicle speed signal or the Test Mode ends. DTCs C1275/75 to C1278/78 are output only in the Test Mode.

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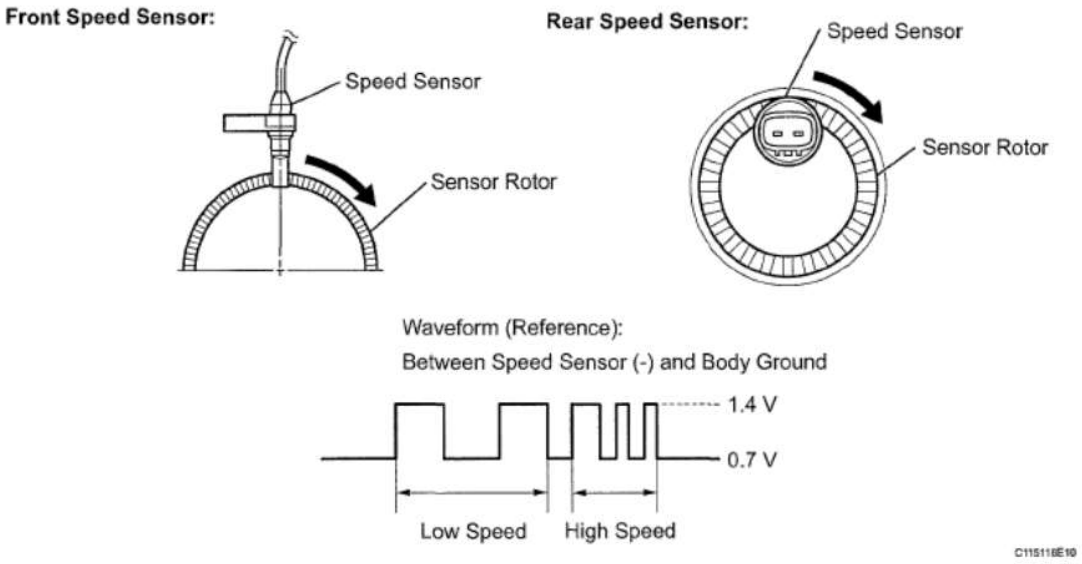


Fig. 49: Speed Sensor Voltage Graph
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1235/35 C1236/36 C1238/38 C1239/39	When either of the following is detected: 1. At a vehicle speed of 20 km/h (12 mph) or more, the IG1 terminal voltage is 17.4 V or less, and noise occurs in the sensor signal from the abnormal wheel for 5 seconds or more. 2. At a vehicle speed of 10 km/h (6 mph) or more, the IG1 terminal voltage is 17.4 V or less, and noise is input once per rotor rotation for 15 seconds or more.	• Speed sensor • Speed sensor rotor • Sensor installation • Brake actuator assembly (Skid control ECU)
C1275/75 C1276/76 C1277/77 C1278/78	Detected only during Test Mode.	Speed sensor rotor

HINT:

- DTCs C1235/35 and C1275/75 are for the front speed sensor RH.
- DTCs C1236/36 and C1276/76 are for the front speed sensor LH.
- DTCs C1238/38 and C1277/77 are for the rear speed sensor RH.
- DTCs C1239/39 and C1278/78 are for the rear speed sensor LH.

WIRING DIAGRAM

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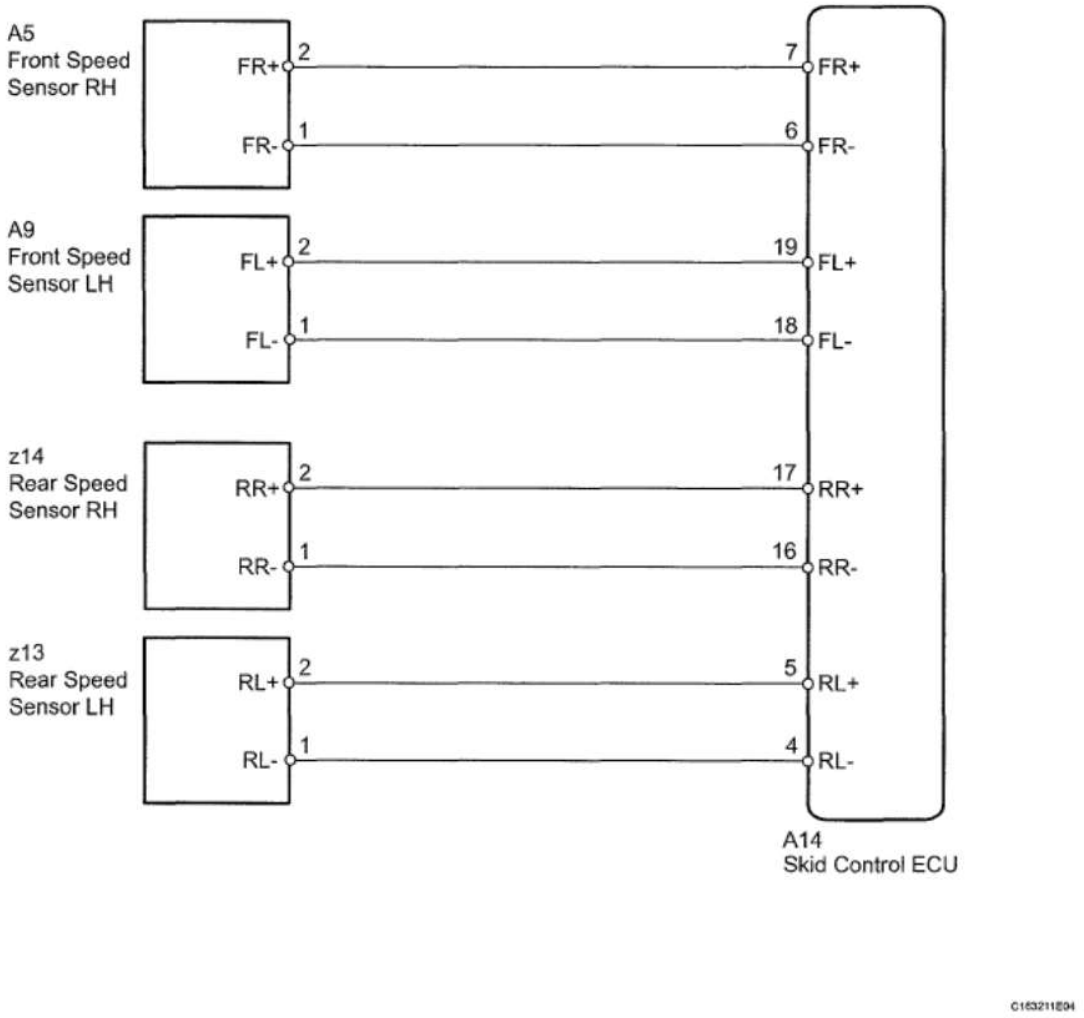


Fig. 50: Front And Rear Speed Sensor - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

HINT:

When C0200/31, C0205/32, C0210/33 and/or C0215/34 is output together with C1235/35, C1236/36, C1238/38, or C1239/39, inspect and repair the trouble areas indicated by C0200/31, C0205/32, C0210/33 and/or C0215/34 first (See **DTC C0200/31 FRONT SPEED SENSOR RH CIRCUIT; DTC C0205/32 FRONT SPEED SENSOR LH CIRCUIT; DTC C1271/71 LOW OUTPUT SIGNAL OF FRONT SPEED SENSOR RH (TEST MODE DTC); DTC C1272/72 LOW OUTPUT SIGNAL OF FRONT SPEED SENSOR LH (TEST MODE DTC)** for front, or **DTC C0210/33 REAR SPEED SENSOR RH CIRCUIT; DTC C0215/34 REAR SPEED SENSOR LH CIRCUIT; DTC C1273/73 LOW OUTPUT SIGNAL OF REAR SPEED SENSOR RH (TEST MODE DTC); DTC C1274/74 LOW OUTPUT SIGNAL OF REAR SPEED SENSOR LH (TEST MODE DTC)** for rear).

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1. **INSPECT EACH SPEED SENSOR**
   a. Make sure that there is no looseness at the locking part and the connecting part of the connectors.
   b. Disconnect each speed sensor connector.
   c. Measure the resistance according to the value(s) in the table below.

Standard resistance:

for RH

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
2 (FR+) - Body ground	Always	10 kohms or higher
1 (FR-) - Body ground	Always	10 kohms or higher
2 (RR+) - Body ground	Always	10 kohms or higher
1 (RR-) - Body ground	Always	10 kohms or higher

for LH

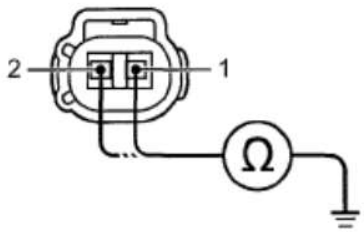
TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
2 (FL+) - Body ground	Always	10 kohms or higher
1 (FL-) - Body ground	Always	10 kohms or higher
2 (RL+) - Body ground	Always	10 kohms or higher
1 (RL-) - Body ground	Always	10 kohms or higher

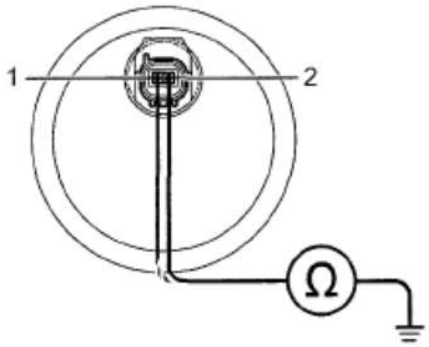
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Component without harness connected:
(Front Speed Sensor)



Component without harness connected:
(Rear Speed Sensor)



C170211E01

Fig. 51: Measuring Resistance Between Front Speed Sensor Terminal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Result

RESULT CHART

Result	Proceed to
OK (for rear)	A
OK (for front)	B
NG	C

NOTE: **Check the speed sensor signal after replacement (See TEST MODE PROCEDURE).**

B: Go to step 3

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C : REPLACE EACH SPEED SENSOR

A: Go to next step

2. **CHECK HARNESS AND CONNECTOR (SPEED SENSOR WIRE)**
   a. Disconnect the speed sensor wire.
   b. Measure the resistance according to the value(s) in the table below.

Standard resistance:

for RH

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
z14-1 - zL1-1	Always	10 kohms or higher
z14-1 - zL1-2	Always	Below 1 ohms
z14-1 - Body ground	Always	10 kohms or higher
z14-2 - zL1-1	Always	Below 1 ohms
z14-2 - zL1-2	Always	10 kohms or higher
z14-2 - Body ground	Always	10 kohms or higher

for LH

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
z13-1 - zL2-1	Always	10 kohms or higher
z13-1 - zL2-2	Always	Below 1 ohms
z13-1 - Body ground	Always	10 kohms or higher
z13-2 - zL2-1	Always	Below 1 ohms
z13-2 - zL2-2	Always	10 kohms or higher
z13-2 - Body ground	Always	10 kohms or higher

NOTE: **Check the speed sensor signal after replacement (See TEST MODE PROCEDURE).**

NG: REPLACE SPEED SENSOR WIRE

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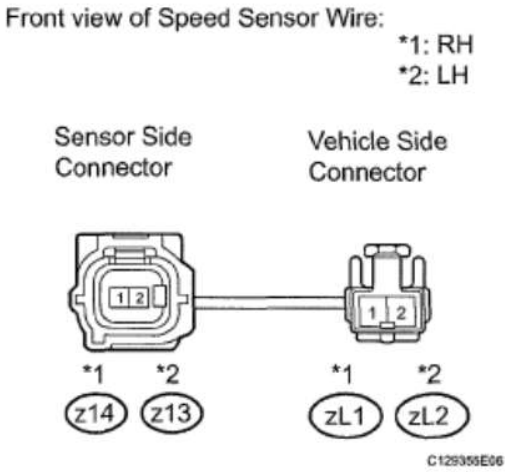


Fig. 52: Identifying Speed Sensor Wire Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

3. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - EACH SPEED SENSOR)**
   a. Reconnect the speed sensor wire.
   b. Disconnect the skid control ECU connector.
   c. Measure the resistance according to the value(s) in the table below.

Standard resistance:

for RH

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A14-7 (FR+) - A5-2 (FR+)	Always	Below 1 ohms
A14-7 (FR+) - Body ground	Always	10 kohms or higher
A14-6 (FR-) - A5-1 (FR-)	Always	Below 1 ohms
A14-6 (FR-) - Body ground	Always	10 kohms or higher
A14-17 (RR+) - z14-2 (RR+)	Always	Below 1 ohms
A14-17 (RR+) - Body ground	Always	10 kohms or higher
A14-16 (RR-) - z14-1 (RR-)	Always	Below 1 ohms
A14-16 (RR-) - Body ground	Always	10 kohms or higher

for LH

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A14-19 (FL+) - A9-2 (FL+)	Always	Below 1 ohms

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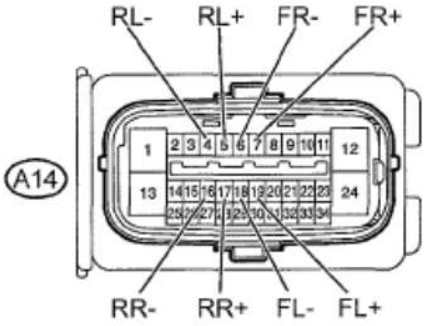
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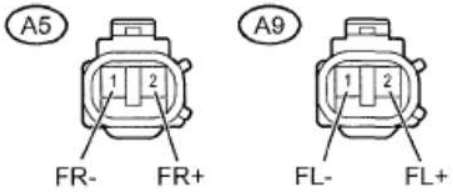
A14-19 (FL+) - Body ground	Always	10 kohms or higher
A14-18 (FL-) - A9-1 (FL-)	Always	Below 1 ohms
A14-18 (FL-) - Body ground	Always	10 kohms or higher
A14-5 (RL+) - z13-2 (RL+)	Always	Below 1 ohms
A14-5 (RL+) - Body ground	Always	10 kohms or higher
A14-4 (RL-) - z13-1 (RL-)	Always	Below 1 ohms
A14-4 (RL-) - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

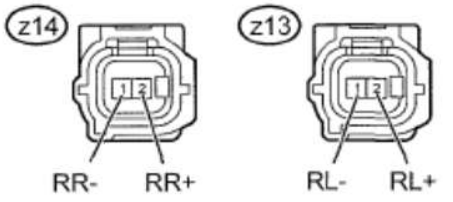
Front view of wire harness connector:
(to Skid Control ECU)



Front view of wire harness connector:
(to Front Speed Sensor)



Front view of wire harness connector:
(to Rear Speed Sensor)



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Fig. 53: Identifying Skid Control ECU And Front Speed Sensor Connector Terminal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

4. **INSPECT SKID CONTROL ECU (SENSOR INPUT)**
   a. Reconnect the skid control ECU connector.
   b. Turn the ignition switch to ON.
   c. Measure the voltage according to the value(s) in the table below.

Standard voltage:

for RH

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
A5-2 (FR+) - Body ground	Ignition switch ON	8 to 14 V
z14-2 (RR+) - Body ground	Ignition switch ON	8 to 14 V

for LH

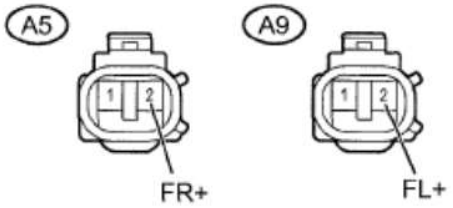
TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
A9-2 (FL+) - Body ground	Ignition switch ON	8 to 14 V
z13-2 (RL+) - Body ground	Ignition switch ON	8 to 14 V

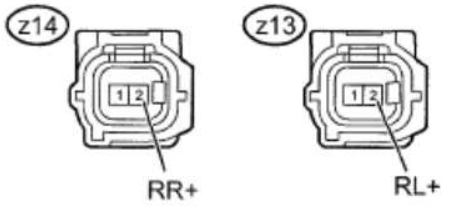
NG: REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

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Front view of wire harness connector:
(to Front Speed Sensor)



Front view of wire harness connector:
(to Rear Speed Sensor)



C164931E01

Fig. 54: Identifying Skid Control ECU Connector Terminal (Sensor Input)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

5. **RECONFIRM DTC**
   a. Turn the ignition switch to OFF.
   b. Reconnect the speed sensor connector.
   c. Clear the DTC (See **DTC CHECK / CLEAR**).
   d. Start the engine.
   e. Drive the vehicle at a speed of 20 km/h (12 mph) or more for at least 60 seconds.
   f. Check if the same DTC is recorded (See **DTC CHECK / CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC output (for front)	A
DTC output (for rear)	B

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DTC not output	C

B: Go to step 12

C : CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **CHECK FOR INTERMITTENT PROBLEMS**)

A: Go to next step

6. **CHECK FRONT SPEED SENSOR TIP**
   a. Turn the ignition switch to OFF.
   b. Remove the front speed sensor (See **REMOVAL**).
   c. Check the speed sensor tip.

   OK:

   No scratches or foreign matter on the sensor tip.

   NOTE: **Check the speed sensor signal after cleaning or replacement (See TEST MODE PROCEDURE).**

NG: CLEAN OR REPLACE FRONT SPEED SENSOR

OK: Go to next step

7. **CHECK FRONT SPEED SENSOR ROTOR**
   a. Check the front speed sensor rotor.

   HINT:

   The front speed sensor rotor is incorporated into the front axle hub bearing.

   OK:

   No scratches, oil, or foreign matter on the rotors.

   NOTE: **Check the speed sensor signal after cleaning or replacement (See TEST MODE PROCEDURE).**

NG: CLEAN OR REPLACE FRONT SPEED SENSOR ROTOR

OK: Go to next step

8. **REPLACE FRONT SPEED SENSOR**

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a. Turn the ignition switch to OFF.
b. Replace front speed sensor (See **REMOVAL**).

NOTE: **Check the speed sensor signal after replacement (See TEST MODE PROCEDURE).**

9. **RECONFIRM DTC**
   a. Clear the DTC (See **DTC CHECK / CLEAR**).
   b. Start the engine.
   c. Drive the vehicle at a speed of 20 km/h (12 mph) or more for at least 60 seconds.
   d. Check if the same DTC is recorded (See **DTC CHECK / CLEAR**).

   Result

   RESULT CHART

Result	Proceed to
DTC output	A
DTC not output	B

B : END

A: Go to next step

10. **REPLACE FRONT AXLE HUB BEARING**
    a. Turn the ignition switch to OFF.
    b. Replace the front axle hub bearing (See **REMOVAL**).

    HINT:

    The front speed sensor rotor is incorporated into the front axle hub bearing.

    NOTE: **Check the speed sensor signal after replacement (See TEST MODE PROCEDURE).**

11. **RECONFIRM DTC**
    a. Clear the DTC (See **DTC CHECK / CLEAR**).
    b. Start the engine.
    c. Drive the vehicle at a speed of 20 km/h (12 mph) or more for at least 60 seconds.
    d. Check if the same DTC is recorded (See **DTC CHECK / CLEAR**).

    Result

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RESULT CHART

Result	Proceed to
DTC output	A
DTC not output	B

B : END

A : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

12. **REPLACE REAR AXLE HUB AND BEARING ASSEMBLY**
    a. Turn the ignition switch to OFF.
    b. Replace the rear speed sensor and rear axle hub and bearing assembly (See **REMOVAL**).

    HINT:

    The rear speed sensor rotor is incorporated into the rear axle hub and bearing assembly.

    If the rear speed sensor rotor needs to be replaced, replace it together with the rear axle hub and bearing assembly with rear speed sensor.

    NOTE: Check the speed sensor signal after replacement (See TEST MODE PROCEDURE).

13. **RECONFIRM DTC**
    a. Clear the DTC (See **DTC CHECK / CLEAR**).
    b. Start the engine.
    c. Drive the vehicle at a speed of 20 km/h (12 mph) or more for at least 60 seconds.
    d. Check if the same DTC is recorded (See **DTC CHECK / CLEAR**).

    Result

RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

B : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

A : END

DTC C1241/41 LOW BATTERY POSITIVE VOLTAGE OR ABNORMALLY HIGH BATTERY POSITIVE VOLTAGE

DESCRIPTION

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If a malfunction is detected in the power supply circuit, the skid control ECU (housed in the actuator assembly) stores this DTC and the fail safe function prohibits ABS operation.

This DTC is stored when the IG1 terminal voltage deviates from the DTC detection condition due to a malfunction in the power supply or charging circuit such as the battery or alternator circuit, etc. The DTC is cancelled when the IG1 terminal voltage returns to normal.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1241/41	When any of the following is detected: 1. At a vehicle speed of 3 km/h (2 mph) or more, the IG1 terminal voltage is less than 9.5 V for 10 seconds or more. 2. When the solenoid relay remains ON and the IG1 terminal voltage is less than 9.5 V, the relay contact is open for 0.22 seconds or more. 3. While the motor fail safe relay is ON after motor relay ON, the IG1 terminal voltage is 9.5 V or less and the actuator pump drive motor is OFF for 0.22 seconds or more. 4. The IG1 terminal voltage is more than 17.4 V for 0.8 seconds or more.	• ECU-IG fuse • Battery • Charging system • Power source circuit • Internal power supply circuit of the skid control ECU

WIRING DIAGRAM

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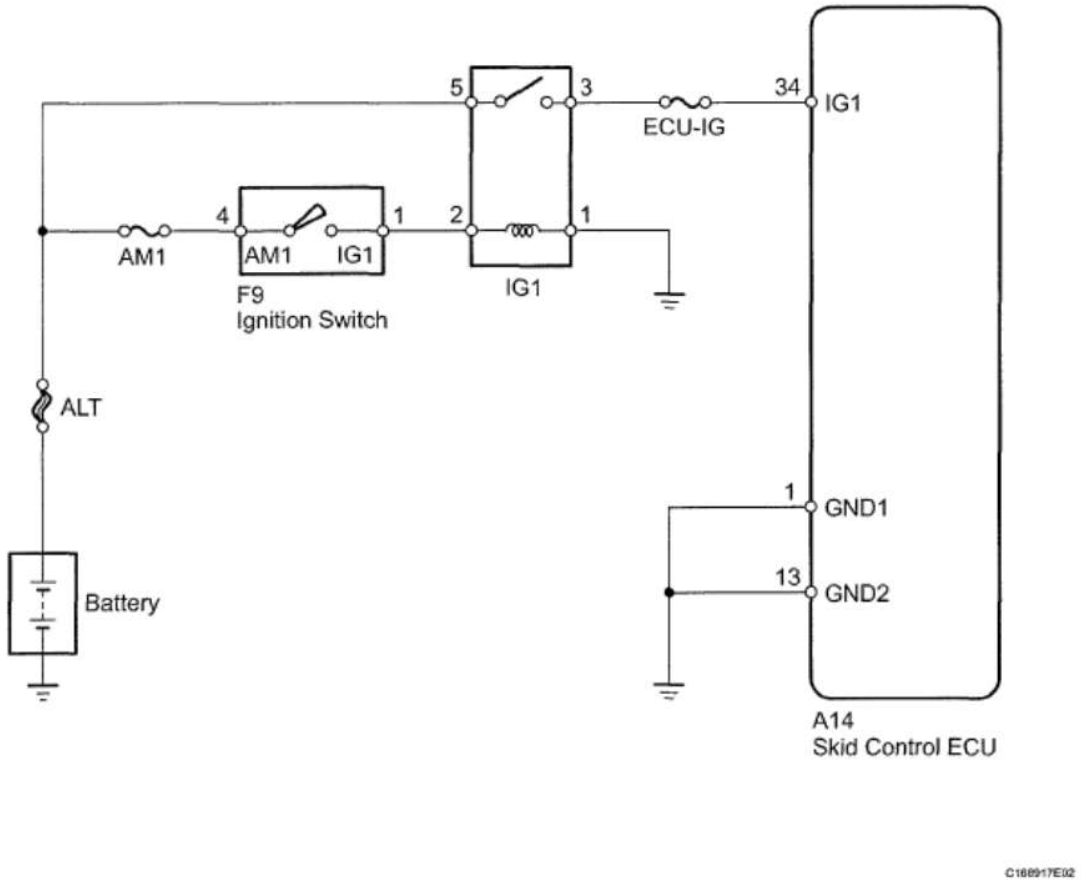


Fig. 55: Low And High Battery Positive Voltage - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

1. **INSPECT ECU-IG FUSE**
   a. Remove the ECU-IG fuse from the main body ECU (instrument panel junction block).
   b. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
ECU-IG (10 A) fuse	Always	Below 1 ohms

NG: REPLACE ECU-IG FUSE

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Main Body ECU:

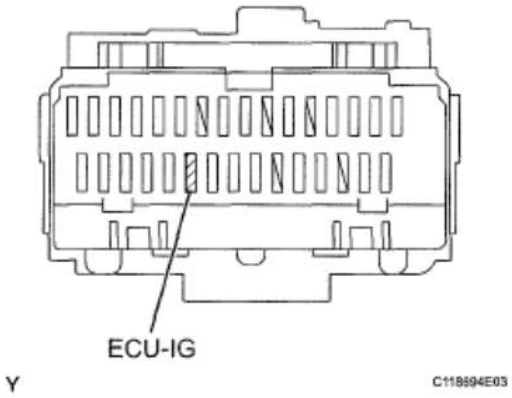


Fig. 56: Identifying ECU-IG Fuse
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

2. **CHECK BATTERY**
   a. Install the ECU-IG fuse.
   b. Check the battery voltage.

      Standard voltage:

      11 to 14 V

NG: CHECK OR REPLACE CHARGING SYSTEM OR BATTERY (See **ON-VEHICLE INSPECTION**)

OK: Go to next step

3. **INSPECT SKID CONTROL ECU (IG1 TERMINAL)**
   a. Disconnect the skid control ECU connector.
   b. Turn the ignition switch to ON.
   c. Measure the voltage according to the value(s) in the table below.

      Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
A14-34 (IG1) - Body ground	Ignition switch ON	11 to 14 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)

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Front view of wire harness connector:
(to Skid Control ECU)

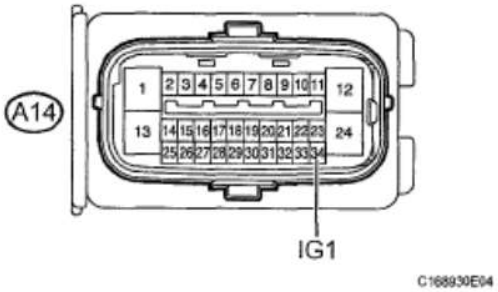


Fig. 57: Identifying Skid Control ECU Connector Terminal (IG1 Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

4. **INSPECT SKID CONTROL ECU (GND TERMINAL)**
   a. Turn the ignition switch to OFF.
   b. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A14-1 (GND1) - Body ground	Always	Below 1 ohms
A14-13 (GND2) - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)

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Front view of wire harness connector:
(to Skid Control ECU)

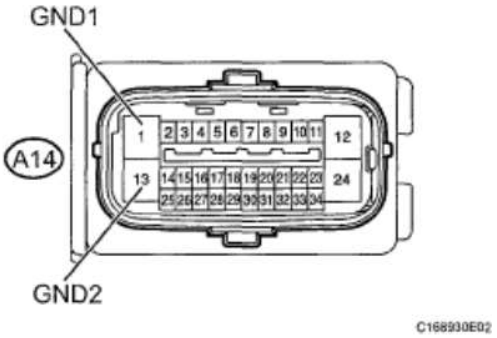


Fig. 58: Identifying Skid Control ECU Connector Terminal (GND Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

5. **RECONFIRM DTC**
   a. Reconnect the skid control ECU connector.
   b. Clear the DTC (See **DTC CHECK / CLEAR**).
   c. Start the engine.
   d. Drive the vehicle at a speed of 20 km/h (12 mph) or more for 30 seconds or more.
   e. Check if the same DTC is recorded (See **DTC CHECK / CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

HINT:

If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See **PROBLEM SYMPTOMS TABLE**).

B : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

A : CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **CHECK FOR INTERMITTENT PROBLEMS**)

DTC C1243/43 DECELERATION SENSOR STUCK MALFUNCTION; DTC C1244/44 OPEN OR

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SHORT IN DECELERATION SENSOR CIRCUIT; DTC C1245/45 DECELERATION SENSOR OUTPUT MALFUNCTION; DTC C1279/79 DECELERATION SENSOR OUTPUT VOLTAGE MALFUNCTION (TEST MODE DTC)

DESCRIPTION

This sensor detects deceleration of the vehicle speed. The sensor signal is used in ABS control. If the sensor functions abnormally, the ABS warning light turns on.

DTC DETECTING CONDITIONS CHART

DTC No.	DTC Detecting Conditions	Trouble Areas
C1243/43	While vehicle speed decreases from 30 km/h (18 mph) to 0 km/h (0mph), sensor signal does not change 16 times or more.	• Deceleration sensor • Deceleration sensor circuit • Brake actuator assembly (skid control ECU)
C1244/44	When any of following 1 through 3 detected: 1. ECU terminal GL1 value of -1.5 G or less or 1.5 G or more continues for 1.2 seconds or more. 2. Deceleration sensor terminal VGS voltage of 4.4 V or less or 5.6 V or more continues for 1.2 seconds or more. 3. Deceleration sensor signal momentary open occurs 7 times or more.	• Deceleration sensor • Deceleration sensor circuit • Brake actuator assembly (skid control ECU)
C1245/45	At vehicle speed of 30 km/h (18 mph) or more, difference between back and forth G value calculated using G sensor signals and back and forth G value calculated using vehicle speed, exceeds 0.35 G for 60 seconds or more.	• Deceleration sensor • Deceleration sensor circuit • Sensor installation • Brake actuator assembly (skid control ECU)
C1279/79	Detected only during Test Mode.	• Deceleration sensor • Sensor installation

WIRING DIAGRAM

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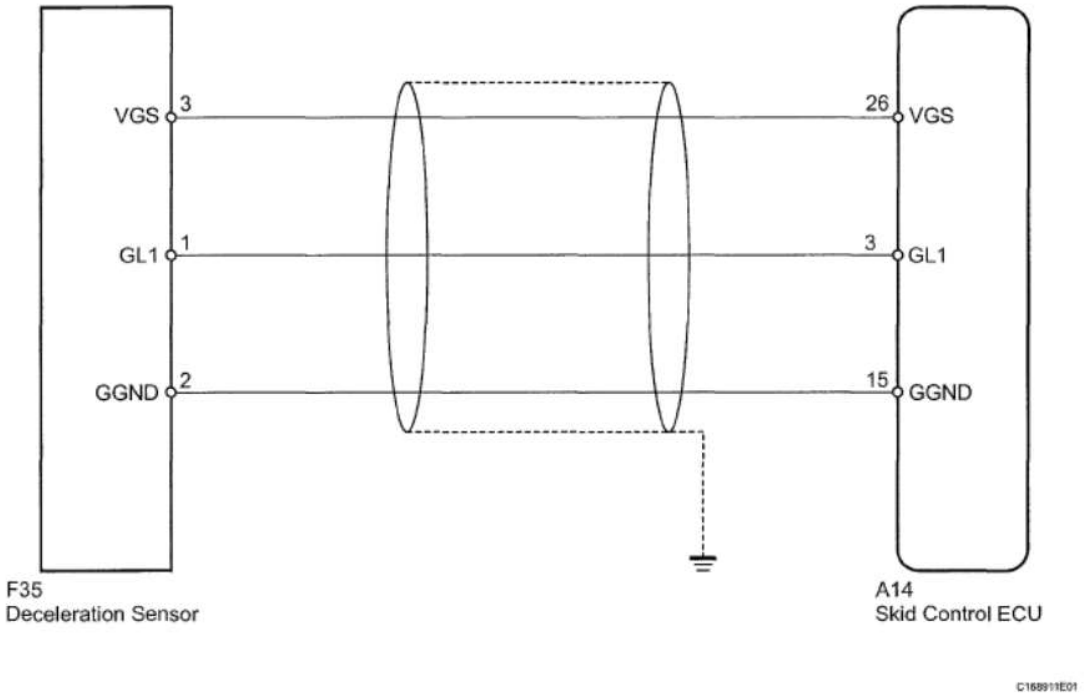


Fig. 59: Deceleration Sensor Stuck Malfunction - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

1. **READ VALUE USING TECHSTREAM (DECELERATION SENSOR)**
   a. Connect the Techstream to the DLC3.
   b. Turn the ignition switch to ON.
   c. Select the Data List mode on the Techstream (See **DATA LIST / ACTIVE TEST**).

MEASUREMENT ITEM NORMAL CONDITION CHART

Tester Display	Measurement Item / Range	Normal Condition	Diagnostic Note
Deceleration sensor	Deceleration sensor reading / Min.: -18.52 m/s^2 , Max.: 18.39 m/s^2	Min.:-18.52 m/s^2 Max.: 18.39 m/s^2	Reading changes when vehicle bounced

   d. Check that the deceleration value of the deceleration sensor displayed on the Techstream changes when the vehicle is tilted.

OK:

Deceleration value must change.

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NG: Go to step 3

OK: Go to next step

2. **RECONFIRM DTC**
   a. Clear the DTCs (See **DTC CHECK / CLEAR**).
   b. Turn the ignition switch to ON again and check if the same DTCs are output (See **DTC CHECK / CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC output	A
DTC not output	B

B : CHECK FOR INTERMITTENT PROBLEMS (See **CHECK FOR INTERMITTENT PROBLEMS**)

A : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

3. **INSPECT DECELERATION SENSOR**
   a. Remove the deceleration sensor.
   b. Connect the 3 dry batteries of 1.5 V in series.
   c. Connect the VGS terminal to the batteries' positive (+) terminal and the GGND terminal to the batteries' negative (-) terminal.
   d. Apply about 4.5 V between the VGS and GGND terminals.

NOTE: Do not apply voltage of 6 V or more to terminals VGS and GGND.

   e. Check the output voltage of the GL1 terminal when the sensor is tilted forward and backward.

Standard Voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Sensor Condition	Specified Condition
1 (GL1) - Batteries' negative (-) terminal	Horizontal	About 2.3 V
1 (GL1) - Batteries' negative (-) terminal	Lean forward	0.4 to 2.3 V
1 (GL1) - Batteries' negative (-) terminal	Lean backward	2.3 to 4.0 V

HINT:

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

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- If dropped, the sensor should be replaced with a new one.
- Check and ensure the correct installation direction of the deceleration sensor.

NG: REPLACE DECELERATION SENSOR (See **REMOVAL**)

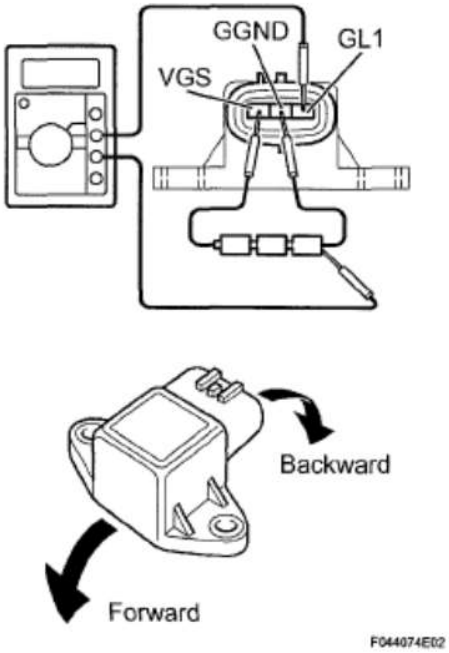


Fig. 60: Connecting VGS Terminal To Batteries' Positive (+) Terminal And GGND Terminal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

4. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - DECELERATION SENSOR)**
   a. Disconnect the skid control ECU connector.
   b. Disconnect the deceleration sensor connector.
   c. Measure the resistance according to the value(s) in the table below.

Standard Resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A14-26 (VGS) - F35-3 (VGS)	Always	Below 1 ohms
A14-15 (GGND) - F35-2 (GGND)	Always	Below 1 ohms
A14-3 (GL1) - F35-1 (GL1)	Always	Below 1 ohms

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

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Standard Resistance

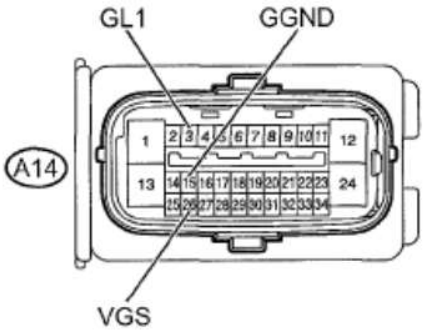
TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A14-26 (VGS) - Body ground	Always	10 kohms or higher
A14-15 (GGND) - Body ground	Always	10 kohms or higher
A14-3 (GL1) - Body ground	Always	10 kohms or higher

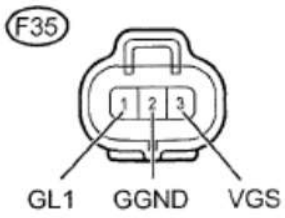
e. Reconnect the deceleration sensor connector.
f. Reconnect the skid control ECU connector.

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

Front view of wire harness connector:
(to Skid Control ECU)



Front view of wire harness connector:
(to Deceleration Sensor)



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Fig. 61: Identifying Deceleration Sensor Connector And Skid Control ECU Connector Terminal
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OK : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

DTC C1249/49 OPEN IN STOP LIGHT SWITCH CIRCUIT

DESCRIPTION

The skid control ECU (housed in the actuator assembly) inputs the stop light switch signal and the condition of brake operation.

The skid control ECU has an open detection circuit, which outputs this DTC when detecting an open in the stop light input line or the ground line of the stop light circuit with the stop light switch off (brake pedal not depressed).

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1249/49	When IG1 terminal voltage is 9.5 V or more, an open circuit of the stop light switch continues for 3 seconds or more.	• STOP fuse • Stop light switch • Stop light switch circuit • Brake actuator assembly (Skid control ECU)

WIRING DIAGRAM

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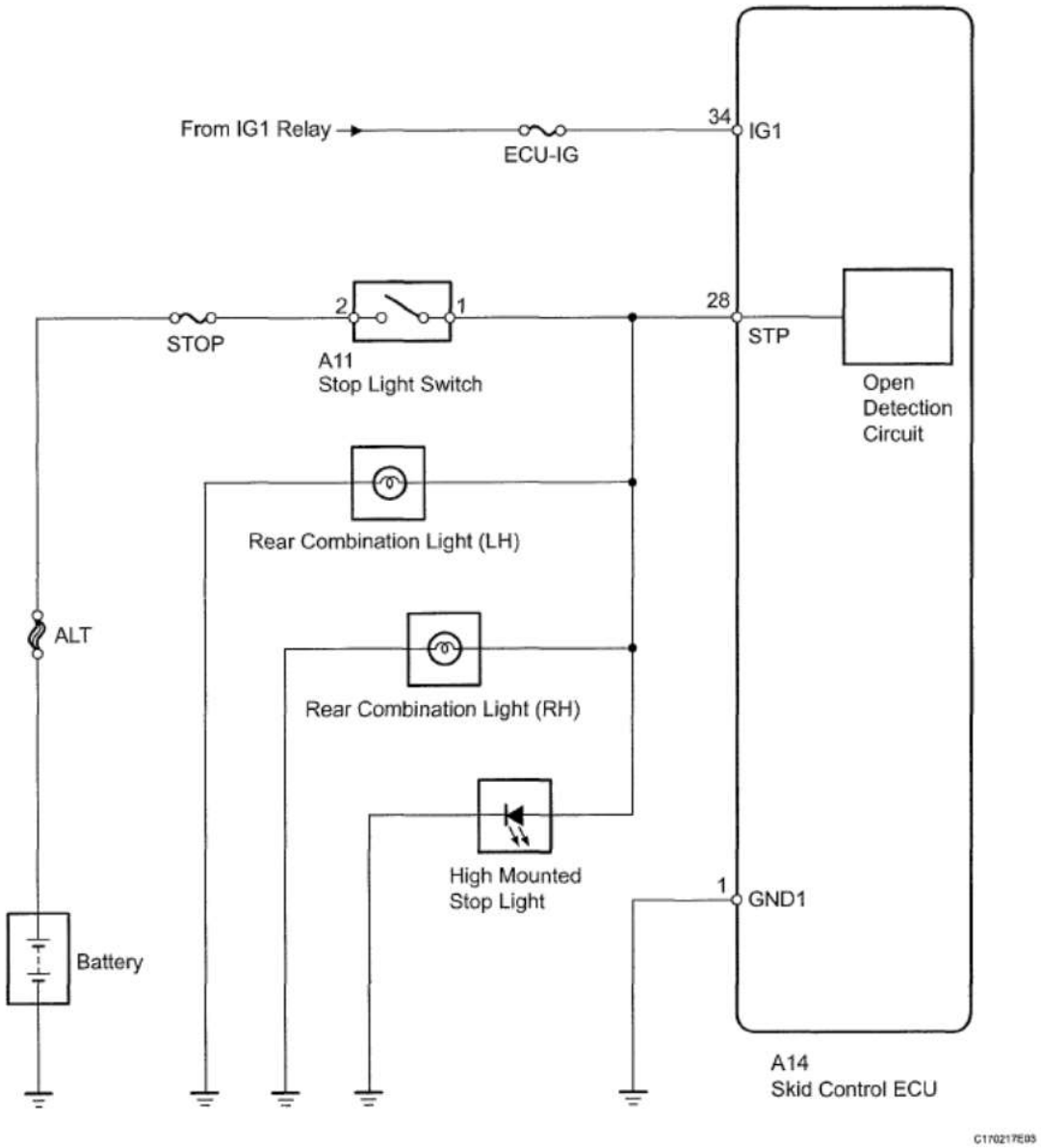


Fig. 62: Stop Light Switch Circuit - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

1. **INSPECT STOP FUSE**
   a. Remove the STOP fuse from the main body ECU (instrument panel junction block).
   b. Measure the resistance according to the value(s) in the table below.

   Standard resistance

   TESTER CONNECTION SPECIFIED CONDITION CHART

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Tester Connection	Condition	Specified Condition
STOP (10 A) fuse	Always	Below 1 ohms

NG: REPLACE STOP FUSE

Main Body ECU:

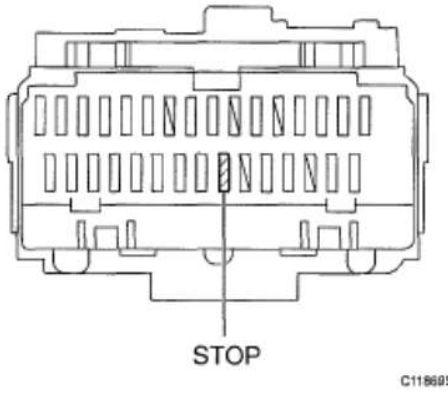


Fig. 63: Identifying STOP Fuse
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

2. **CHECK STOP LIGHT OPERATION**
   a. Install the STOP fuse.
   b. Check that the stop light comes on when the brake pedal is depressed, and goes off when the brake pedal is released.

   OK

   DIAGNOSTIC PROCEDURE CHART

Condition	Illumination Condition
Brake pedal depressed	ON
Brake pedal released	OFF

NG: Go to step 7

OK: Go to next step

3. **INSPECT SKID CONTROL ECU (STP TERMINAL)**
   a. Disconnect the skid control ECU connector.
   b. Measure the voltage according to the value(s) in the table below.

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Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
A14-28 (STP) - Body ground	Stop light switch ON (Brake pedal depressed)	8 to 14 V
A14-28 (STP) - Body ground	Stop light switch OFF (Brake pedal released)	Below 1.5 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (STP CIRCUIT)

Front view of wire harness connector:
(to Skid Control ECU)

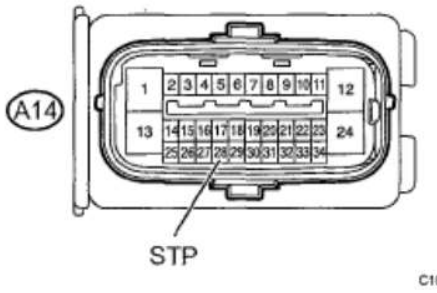


Fig. 64: Identifying Skid Control ECU Connector Terminal (STP Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

4. **INSPECT SKID CONTROL ECU (IG1 TERMINAL)**
   a. Turn the ignition switch to ON.
   b. Measure the voltage according to the value(s) in the table below.

Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
A14-34 (IG1) - Body ground	Ignition switch ON	11 to 14 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)

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Front view of wire harness connector:
(to Skid Control ECU)

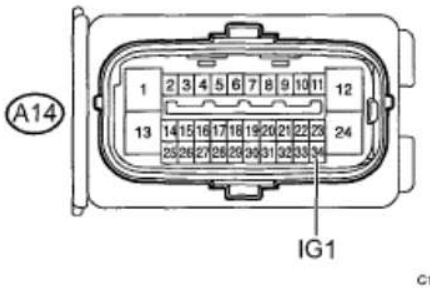


Fig. 65: Identifying Skid Control ECU Connector Terminal (IG1 Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

5. **INSPECT SKID CONTROL ECU (GND TERMINAL)**
   a. Turn the ignition switch to OFF.
   b. Measure the resistance according to the value(s) in the table below.

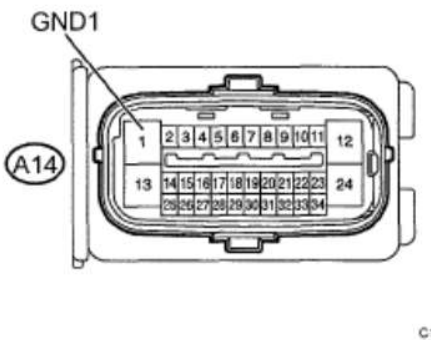
Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A14-1 (GND1) - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)

Front view of wire harness connector:
(to Skid Control ECU)



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Fig. 66: Identifying Skid Control ECU Connector Terminal (GND Terminal)
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OK: Go to next step

6. **RECONFIRM DTC**
   a. Reconnect the skid control ECU connector.
   b. Clear the DTC (See **DTC CHECK / CLEAR**).
   c. Start the engine.
   d. Depress the brake pedal several times to test the stop light circuit.
   e. Check if the same DTC is recorded (See **DTC CHECK / CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

HINT:

If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See **PROBLEM SYMPTOMS TABLE**).

B : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

A : CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **CHECK FOR INTERMITTENT PROBLEMS**)

7. **INSPECT STOP LIGHT SWITCH (POWER SOURCE TERMINAL)**
   a. Disconnect the stop light switch connector.
   b. Measure the voltage according to the value(s) in the table below.

Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A11-2 - Body ground	Always	11 to 14 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)

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Front view of wire harness connector:
(to Stop Light Switch)

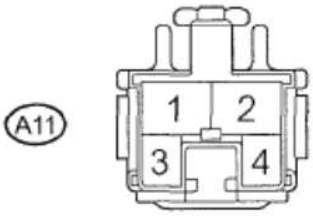


Fig. 67: Identifying Stop Light Switch Connector Terminals (Power Source Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

8. **INSPECT STOP LIGHT SWITCH**
   a. Measure the resistance according to the value(s) in the table below.

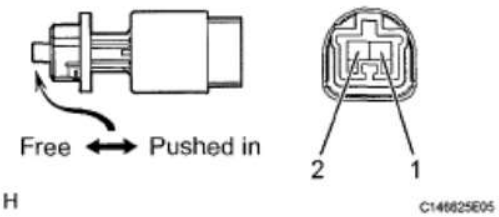
Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

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

NG: REPLACE STOP LIGHT SWITCH (See **REMOVAL**)

Component without harness connected:
(Stop Light Switch)



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Fig. 68: Identifying Stop Light Switch Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

9. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - STOP LIGHT SWITCH)**
   a. Disconnect the skid control ECU connector.
   b. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

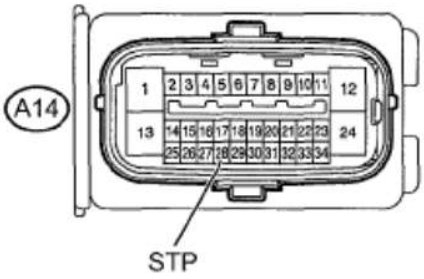
Tester Connection	Condition	Specified Condition
A14-28 (STP) - A11-1	Always	Below 1 ohms
A14-28 (STP) - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

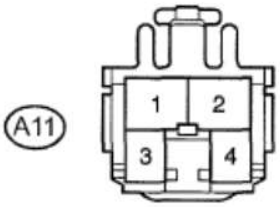
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Front view of wire harness connector:
(to Skid Control ECU)



Front view of wire harness connector:
(to Stop Light Switch)



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Fig. 69: Identifying Stop Light Switch Connector Terminals And Skid Control ECU Connector Terminal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

10. **RECONFIRM DTC**
    a. Reconnect the skid control ECU connector and the stop light switch connector.
    b. Clear the DTC (See **DTC CHECK / CLEAR**).
    c. Start the engine.
    d. Depress the brake pedal several times to test the stop light circuit.
    e. Check if the same DTC is recorded (See **DTC CHECK / CLEAR**).

    Result

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RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

HINT:

If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See **PROBLEM SYMPTOMS TABLE**).

B : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

A : INSPECT LIGHTING SYSTEM (STOP LIGHT CIRCUIT) (See **STOP LIGHT CIRCUIT**)

DTC C1251/51 OPEN IN PUMP MOTOR CIRCUIT

DESCRIPTION

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1251/51	When either of the following is detected: 1. Actuator pump motor does not operate properly. 2. Open in actuator pump motor circuit continues for at least 2 seconds.	• Brake actuator assembly (Ground circuit) • Brake actuator assembly (Motor circuit)

WIRING DIAGRAM

Refer to **DTCS C0273/13 AND C0274/14** .

INSPECTION PROCEDURE

1. **PERFORM ACTIVE TEST USING TECHSTREAM (ABS MOTOR RELAY)**
   a. Connect the Techstream to the DLC3.
   b. Start the engine.
   c. Select the Active Test mode on the Techstream (See **DATA LIST / ACTIVE TEST**).

   ABS/VSC/TRAC:

   ACTIVE TEST

Tester Display	Test Part	Control Range	Diagnostic Note
Motor Relay	ABS motor relay	Relay ON / OFF	Operating sound of motor can be heard

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d. Check the operating sound of the ABS motor relay when operating it with the Techstream.

Result

RESULT CHART

Result	Proceed to
The operating sound is not heard	A
The operating sound is heard	B

B: Go to step 3

A: Go to next step

2. **INSPECT SKID CONTROL ECU (GND TERMINAL)**
   a. Turn the ignition switch to OFF.
   b. Disconnect the skid control ECU connector.
   c. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A14-1 (GND1) - Body ground	Always	Below 1 ohms
A14-13 (GND2) - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)

Front view of wire harness connector:
(to Skid Control ECU)

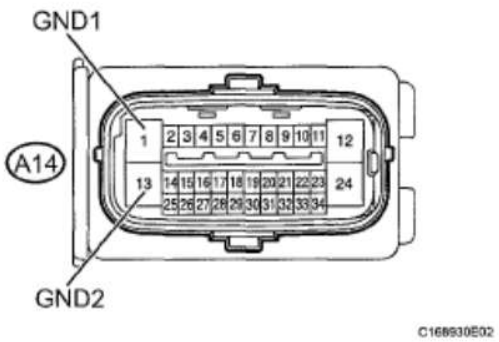


Fig. 70: Identifying Skid Control ECU Connector Terminal (GND Terminal)
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OK: Go to next step

3. **RECONFIRM DTC**

HINT:

This code is detected when a problem is identified in the brake actuator assembly.

The ABS motor relay is in the brake actuator assembly.

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

a. Turn the ignition switch to OFF.
b. Reconnect the skid control ECU connector.
c. Clear the DTC (See **DTC CHECK / CLEAR**).
d. Start the engine.
e. Drive the vehicle at a speed of 20 km/h (12 mph) or more for 30 seconds or more.
f. Check if the same DTC is recorded (See **DTC CHECK / CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

HINT:

- If a speed signal of 6 km/h (4 mph) or more is input to the skid control ECU, with the ignition switch ON and the stop light switch off, the ECU performs self diagnosis of the motor and solenoid circuits.
- If a normal system code is output (the trouble code is not output), jiggle the connectors slightly, wire harness, and fuses of the brake actuator assembly. Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness from the brake actuator assembly (skid control ECU), inspect and repair the connector or wire harness.
- It is suspected that the DTCs were output due to a bad connection of the connector terminal.

B : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

A : CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **CHECK FOR INTERMITTENT PROBLEMS**)

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DTC U0073/94 CONTROL MODULE COMMUNICATION BUS OFF

DESCRIPTION

The skid control ECU receives the signal sent from the ECM via the CAN communication system. When DTCs indicating a CAN communication system malfunction are output, repair the CAN communication system before repairing each corresponding sensor.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
U0073/94	When either of the following is detected: 1. With terminal IG1 10 V or more, data output from skid control ECU is completed, and output continues for 5 seconds or more. 2. With terminal IG1 10 V or more, bus off condition occurs one time or more within 0.3 seconds.	CAN communication system

INSPECTION PROCEDURE

Proceed to CAN communication system (See **DIAGNOSIS SYSTEM**).

HINT:

When DTCs indicating a CAN communication system malfunction are output, repair the CAN communication system before repairing each corresponding sensor.

ABS WARNING LIGHT REMAINS ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.

If any of the following is detected, the ABS warning light remains on:

- The skid control ECU connectors are disconnected from the skid control ECU.
- There is a malfunction in the skid control ECU internal circuit.
- There is an open in the harness between the combination meter and the skid control ECU.
- The ABS control system is defective.

HINT:

In some cases, a Techstream cannot be used when the skid control ECU is abnormal.

WIRING DIAGRAM

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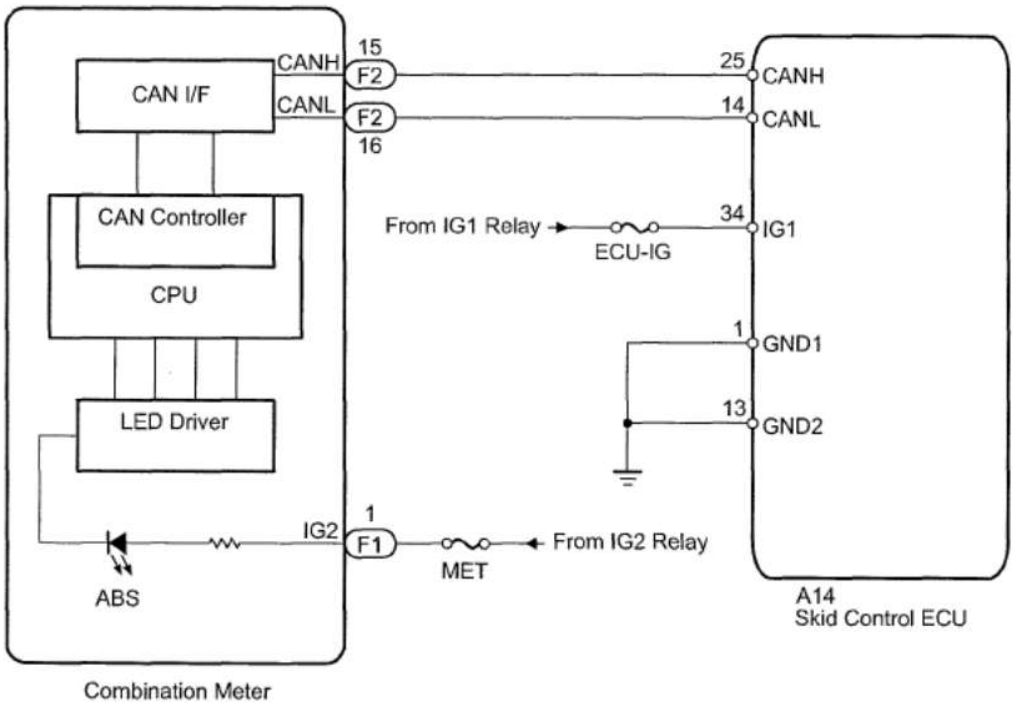


Fig. 71: ABS Warning Light - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

1. **CHECK CAN COMMUNICATION SYSTEM**
   a. Check if the CAN communication system DTC is output (See **DIAGNOSIS SYSTEM**).

   Result

   RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

B : INSPECT CAN COMMUNICATION SYSTEM (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

A: Go to next step

2. **CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED**
   a. Check if the skid control ECU connector is securely connected.

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OK:

The connector is securely connected.

NG: CONNECT CONNECTOR TO ECU CORRECTLY

OK: Go to next step

3. **CHECK BATTERY**
   a. Check the battery voltage.

   Standard voltage:

   11 to 14 V

NG: CHECK OR REPLACE CHARGING SYSTEM OR BATTERY (See **ON-VEHICLE INSPECTION**)

OK: Go to next step

4. **INSPECT SKID CONTROL ECU (IG1 TERMINAL)**
   a. Disconnect the skid control ECU connector.
   b. Turn the ignition switch to ON.
   c. Measure the voltage according to the value(s) in the table below.

   Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
A14-34 (IG1) - Body ground	Ignition switch ON	11 to 14V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)

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Front view of wire harness connector:
(to Skid Control ECU)

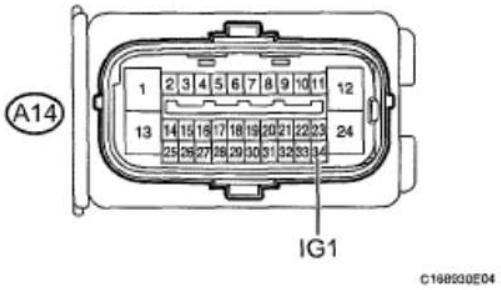


Fig. 72: Identifying Skid Control ECU Connector Terminal (IG1 Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

5. **INSPECT SKID CONTROL ECU (GND TERMINAL)**
   a. Turn the ignition switch to OFF.
   b. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A14-1 (GND1) - Body ground	Always	Below 1 ohms
A14-13 (GND2) - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)

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Front view of wire harness connector:
(to Skid Control ECU)

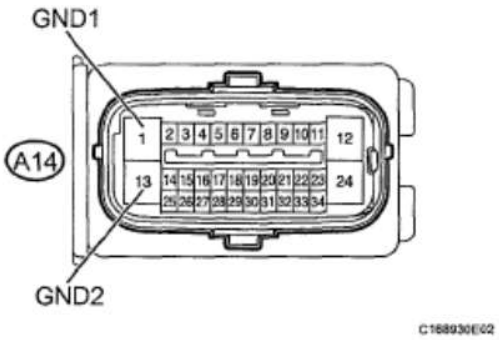


Fig. 73: Identifying Skid Control ECU Connector Terminal (GND Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

6. **INSPECT COMBINATION METER ASSEMBLY**
   a. Reconnect the skid control ECU connector.
   b. Connect a Techstream to the DLC3.
   c. Perform Active Test of the combination meter using the Techstream (See **DATA LIST / ACTIVE TEST**).

      OK:

      The ABS warning light turns ON or OFF in accordance with the Techstream.

NG: Go to step 7

OK : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

7. **REPLACE COMBINATION METER ASSEMBLY**
   a. Turn the ignition switch to OFF.
   b. Replace the combination meter (See **REMOVAL**).
8. **INSPECT COMBINATION METER ASSEMBLY**
   a. Connect the Techstream to the DLC3.
   b. Perform Active Test of the combination meter using the Techstream (See **DATA LIST / ACTIVE TEST**).

      OK:

      The ABS warning light turns ON or OFF in accordance with the Techstream.

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NG: REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

OK : END

ABS WARNING LIGHT DOES NOT COME ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.

WIRING DIAGRAM

Refer to **ABS WARNING LIGHT REMAINS ON** .

INSPECTION PROCEDURE

1. **CHECK CAN COMMUNICATION SYSTEM**
   a. Check if the CAN communication system DTC is output (See **DIAGNOSIS SYSTEM**).

   Result

   RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

B : INSPECT CAN COMMUNICATION SYSTEM (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

A: Go to next step

2. **CHECK ABS WARNING LIGHT**
   a. Disconnect the skid control ECU connector.
   b. Turn the ignition switch to ON.
   c. Check that the ABS warning light comes on.

   OK:

   The ABS warning light comes on.

NG: Go to step 3

OK : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

3. **INSPECT COMBINATION METER ASSEMBLY**

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a. Turn the ignition switch to OFF.
b. Reconnect the skid control ECU connector.
c. Connect a Techstream to the DLC3.
d. Perform Active Test of the combination meter using the Techstream (See **DATA LIST / ACTIVE TEST**).

OK:

The ABS warning light turns ON or OFF in accordance with the Techstream.

NG: REPLACE COMBINATION METER ASSEMBLY (See **REMOVAL**)

OK : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

BRAKE WARNING LIGHT REMAINS ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.

If any of the following is detected, the brake warning light remains on:

- The skid control ECU connector is disconnected from the skid control ECU.
- The brake fluid level is insufficient.
- The parking brake is applied.
- EBD operation is not possible.

WIRING DIAGRAM

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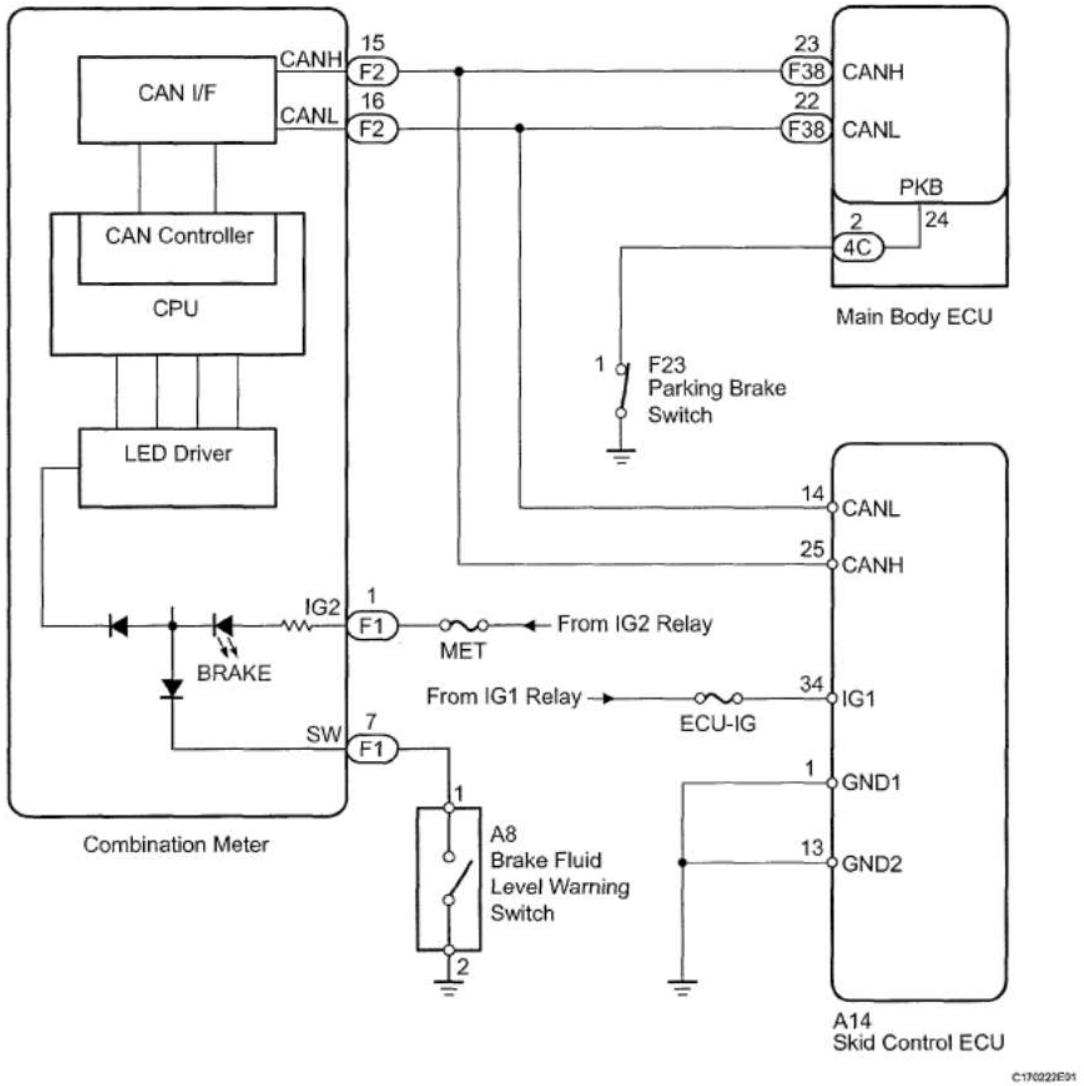


Fig. 74: Brake Warning Light - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

1. **CHECK CAN COMMUNICATION SYSTEM**
   a. Check if the CAN communication system DTC is output (See **DIAGNOSIS SYSTEM**).

Result

RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

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B : INSPECT CAN COMMUNICATION SYSTEM (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

A: Go to next step

2. **CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED**
   a. Check if the skid control ECU connector is securely connected.

      OK:

      The connector is securely connected.

   NG: CONNECT CONNECTOR TO ECU CORRECTLY

   OK: Go to next step

3. **CHECK BATTERY**
   a. Check the battery voltage.

      Standard voltage:

      11 to 14 V

   NG: CHECK OR REPLACE CHARGING SYSTEM OR BATTERY (See **ON-VEHICLE INSPECTION**)

   OK: Go to next step

4. **INSPECT SKID CONTROL ECU (IG1 TERMINAL)**
   a. Disconnect the skid control ECU connector.
   b. Turn the ignition switch to ON.
   c. Measure the voltage according to the value(s) in the table below.

      Standard voltage

      TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
A14-34 (IG1) - Body ground	Ignition switch ON	11 to 14 V

   NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)

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Front view of wire harness connector:
(to Skid Control ECU)

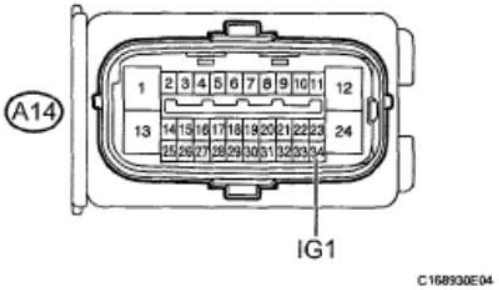


Fig. 75: Identifying Skid Control ECU Connector Terminal (IG1 Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

5. **INSPECT SKID CONTROL ECU (GND TERMINAL)**
   a. Turn the ignition switch to OFF.
   b. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A14-1 (GND1) - Body ground	Always	Below 1 ohms
A14-13 (GND2) - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)

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Front view of wire harness connector:
(to Skid Control ECU)

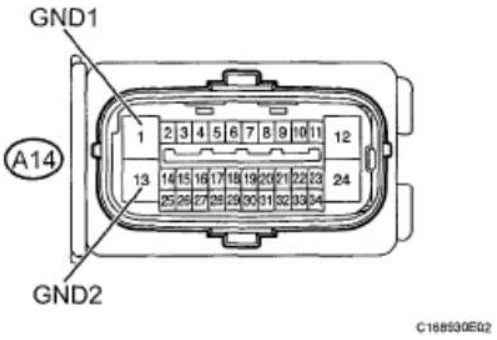


Fig. 76: Identifying Skid Control ECU Connector Terminal (GND Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

6. **READ VALUE USING TECHSTREAM (PARKING BRAKE SWITCH)**
   a. Reconnect the skid control ECU connector.
   b. Connect a Techstream to the DLC3.
   c. Turn the ignition switch to ON.
   d. Select the Data List mode on the Techstream (See **DATA LIST / ACTIVE TEST**).

      ABS/VSC/TRAC:

      MEASUREMENT ITEM NORMAL CONDITION CHART

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Parking Brake SW	Parking brake switch / ON or OFF	ON: Parking brake applied OFF: Parking brake released	-

   e. Using the Techstream, check the input of switch operation when the parking brake pedal is operated.

      OK:

      When the parking brake is operated, the display changes as shown above.

NG: Go to step 12

OK: Go to next step

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7. **INSPECT BRAKE FLUID LEVEL WARNING SWITCH**
   a. Turn the ignition switch to OFF.
   b. Remove the reservoir filler cap and strainer.
   c. Disconnect the brake fluid level warning switch connector.
   d. Measure the resistance according to the value(s) in the table below.

   HINT:

   A float is located inside the reservoir. Its position can be changed by increasing or decreasing the level of brake fluid.

   Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
1 - 2	Switch OFF (Float up)	10 kohms or higher
1 - 2	Switch ON (Float down)	Below 1 ohms

   HINT:

   If there is no problem after finishing the above check, adjust the brake fluid level to the MAX level.

NG: REPLACE BRAKE MASTER CYLINDER RESERVOIR ASSEMBLY (BRAKE FLUID LEVEL WARNING SWITCH) (See **DISASSEMBLY**)

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Component without harness connected:
(Brake Fluid Level Warning Switch)

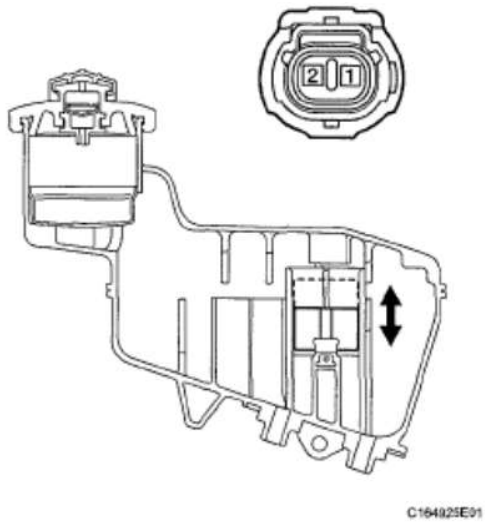


Fig. 77: Checking Brake Fluid Level Warning Switch Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

8. **CHECK HARNESS AND CONNECTOR (COMBINATION METER - BRAKE FLUID LEVEL WARNING SWITCH)**
   a. Disconnect the combination meter connector.
   b. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
F1-7 (SW) - A8-1	Always	Below 1 ohms
F1-7 (SW) - Body ground	Always	10 kohms or higher
A8-2 - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

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Front view of wire harness connector:
(to Brake Fluid Level Warning Switch)



Front view of wire harness connector:
(to Combination Meter)

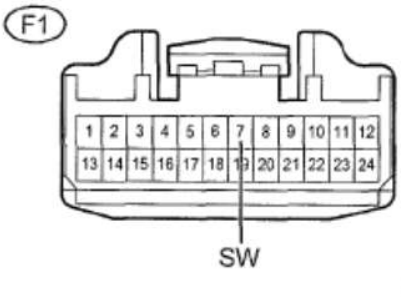


Fig. 78: Identifying Combination Meter Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

9. **INSPECT COMBINATION METER ASSEMBLY**
   a. Connect the Techstream to the DLC3.
   b. Perform Active Test of the combination meter using the Techstream (See **DATA LIST / ACTIVE TEST**).

      OK:

      The brake warning light turns ON or OFF in accordance with the Techstream.

      HINT:

      Reinstall the connectors and restore the vehicle to its prior condition before checking the combination meter.

NG: Go to step 10

OK : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

10. **REPLACE COMBINATION METER ASSEMBLY**
    a. Turn the ignition switch to OFF.
    b. Replace the combination meter (See **REMOVAL**)

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11. **INSPECT COMBINATION METER ASSEMBLY**
    a. Connect the Techstream to the DLC3.
    b. Perform Active Test of the combination meter using the Techstream (See **DATA LIST / ACTIVE TEST**).

    OK:

    The brake warning light turns ON or OFF in accordance with the Techstream.

NG: REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

OK : END

12. **INSPECT PARKING BRAKE SWITCH**
    a. Turn the ignition switch to OFF.
    b. Disconnect the parking brake switch connector.
    c. Measure the resistance according to the value(s) in the table below.

    Standard resistance

    TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
1 - Body ground	Parking brake switch ON (Switch pin free)	Below 1 ohms
1 - Body ground	Parking brake switch OFF (Switch pin pushed in)	10 kohms or higher

NG: REPLACE PARKING BRAKE SWITCH (See **REMOVAL**)

Component without harness connected:
(Parking Brake Switch)

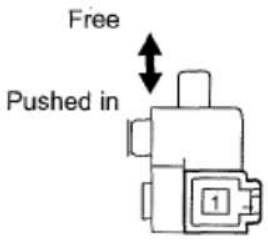


Fig. 79: Inspecting Parking Brake Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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OK: Go to next step

13. **CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - PARKING BRAKE SWITCH)**
    a. Disconnect the main body ECU connector.
    b. Measure the resistance according to the value(s) in the table below.

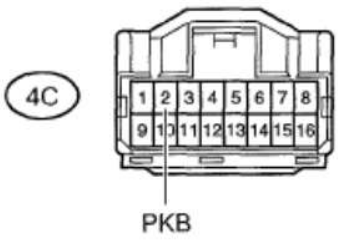
Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

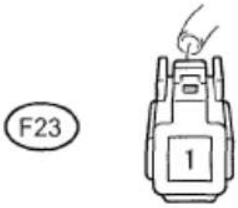
Tester Connection	Condition	Specified Condition
4C-2 (PKB) - F23-1	Always	Below 1 ohms
4C-2 (PKB) - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

Front view of wire harness connector:
(to Main Body ECU)



Front view of wire harness connector:
(to Parking Brake Switch)



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Fig. 80: Identifying Main Body ECU And Parking Brake Switch Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

BRAKE WARNING LIGHT DOES NOT COME ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.

WIRING DIAGRAM

Refer to **BRAKE WARNING LIGHT REMAINS ON** .

INSPECTION PROCEDURE

1. **CHECK CAN COMMUNICATION SYSTEM**
   a. Check if the CAN communication system DTC is output (See **DIAGNOSIS SYSTEM**).

   Result

   RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

   B : INSPECT CAN COMMUNICATION SYSTEM (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

   A: Go to next step

2. **CHECK BRAKE WARNING LIGHT**
   a. Disconnect the skid control ECU connector.
   b. Turn the ignition switch to ON.
   c. Check that the brake warning light comes on.

   OK:

   The brake warning light comes on.

   NG: Go to step 3

   OK : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

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3. **INSPECT COMBINATION METER ASSEMBLY**
   a. Turn the ignition switch to OFF.
   b. Reconnect the skid control ECU connector.
   c. Connect a Techstream to the DLC3.
   d. Perform Active Test of the combination meter using the Techstream (See **DATA LIST / ACTIVE TEST**).

      OK:

      The brake warning light turns ON or OFF in accordance with the Techstream.

NG: REPLACE COMBINATION METER ASSEMBLY (See **REMOVAL**)

OK : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

TC AND CG TERMINAL CIRCUIT

DESCRIPTION

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

WIRING DIAGRAM

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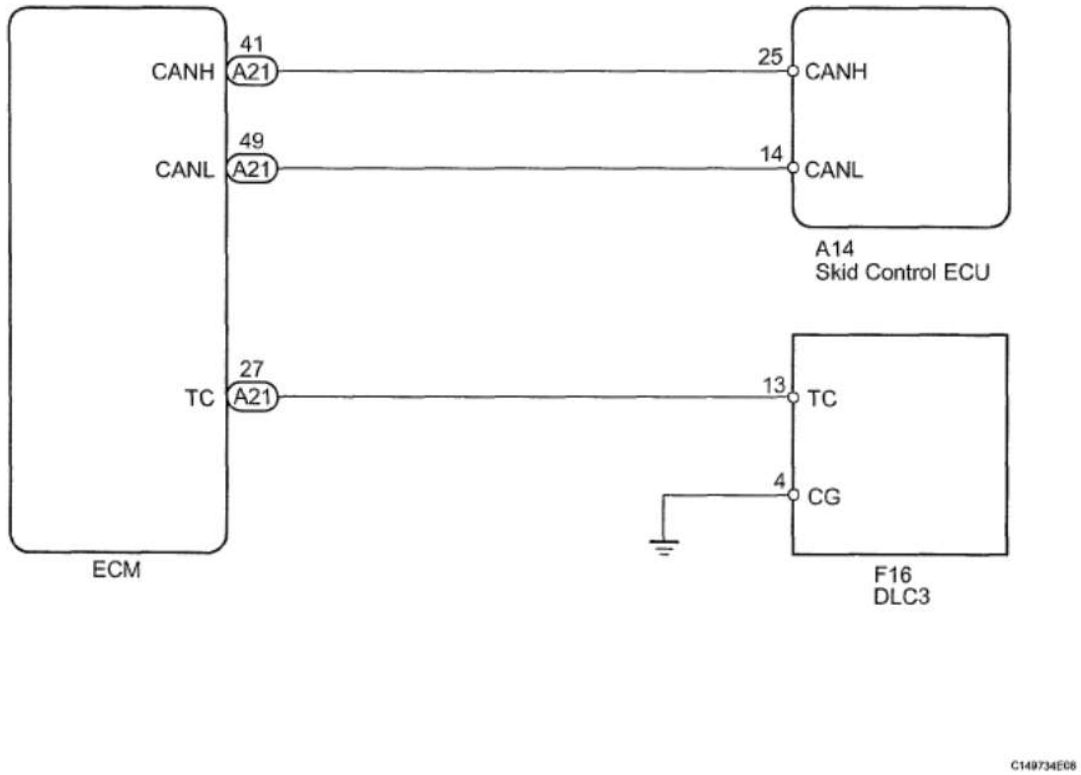


Fig. 81: TC And CG Terminal Circuit - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

HINT:

When the warning lights continue to blink, a ground short in the wiring of terminal TC of the DLC3 or an internal ground short in one or more ECUs is suspected.

INSPECTION PROCEDURE

1. **CHECK CAN COMMUNICATION SYSTEM**
   a. Check if the CAN communication system DTC is output (See **DIAGNOSIS SYSTEM**).

      Result

      RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

B : INSPECT CAN COMMUNICATION SYSTEM (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

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A: Go to next step

2. **INSPECT DLC3**
   a. Turn the ignition switch to ON.
   b. Measure the voltage according to the value(s) in the table below.

Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
F16-13 (TC) - F16-4 (CG)	Ignition switch ON	11 to 14 V

Front view of DLC3:

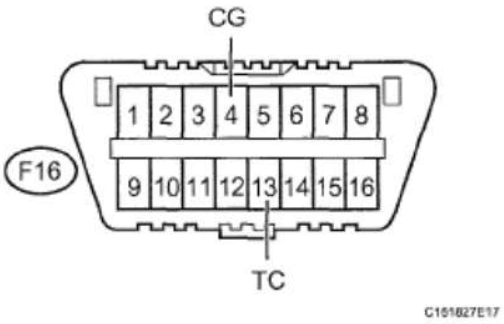


Fig. 82: Identifying DLC3 Connector Terminal CG And TC
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Result

RESULT CHART

Result	Proceed to
NG	A
OK	B

B: Go to step 5

A: Go to next step

3. **CHECK HARNESS AND CONNECTOR (TC of DLC3 - ECM)**
   a. Turn the ignition switch to OFF.
   b. Disconnect the ECM connector.
   c. Measure the resistance according to the value(s) in the table below.

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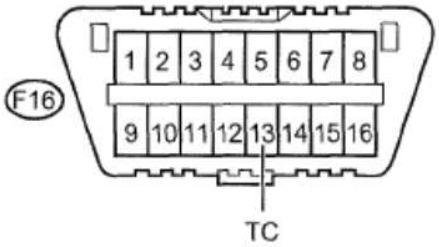
Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

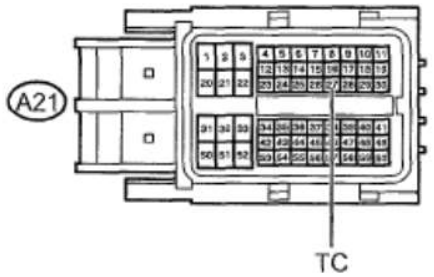
Tester Connection	Condition	Specified Condition
F16-13 (TC) - A21-27 (TC)	Always	Below 1 ohms
F16-13 (TC) - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

Front view of DLC3:



Front view of wire harness connector:
(to ECM)



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Fig. 83: Identifying DLC3 Connector Terminal Of TC
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

4. **CHECK HARNESS AND CONNECTOR (CG of DLC3 - BODY GROUND)**

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

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
F16-4 (CG) - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

Front view of DLC3:

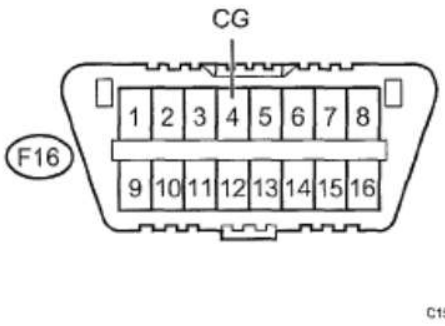


Fig. 84: Identifying DLC3 Connector Terminal CG And Body Ground
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

5. **CHECK ECM (TC of DLC3 INPUT)**
   a. Turn the ignition switch to OFF.
   b. Reconnect the ECM connector.
   c. Using SST, connect terminals TC and CG of the DLC3.
   d. Turn the ignition switch to ON.
   e. Check that the check engine warning light is blinking.

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Front view of DLC3:

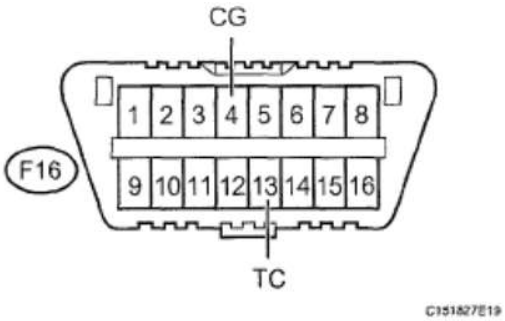


Fig. 85: Identifying DLC3 Connector Terminal CG And TC
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Result

RESULT CHART

Result	Proceed to
Check engine warning light is blinking	A
Check engine warning light is not blinking	B

B : INSPECT SFI SYSTEM (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

A : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

TS AND CG TERMINAL CIRCUIT

DESCRIPTION

In the Test Mode (signal check), a malfunction in the speed sensor that cannot be detected when the vehicle is stopped can be 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 ON.

WIRING DIAGRAM

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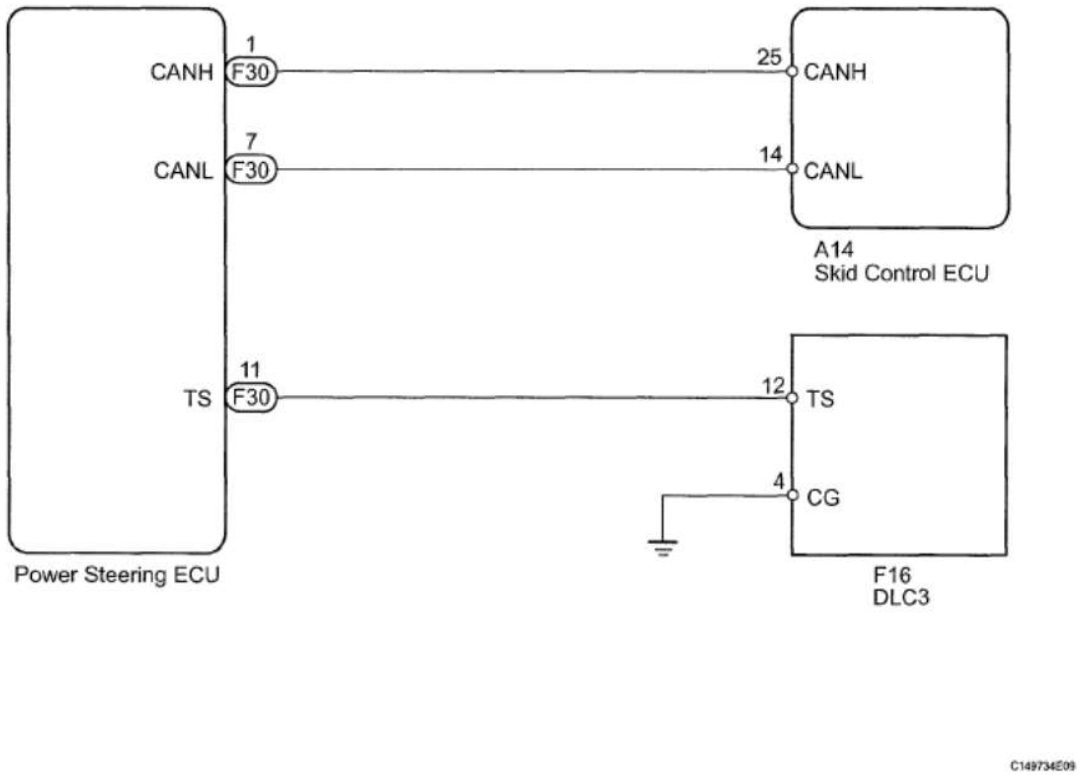


Fig. 86: TS And CG Terminal Circuit - Wiring Diagram
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INSPECTION PROCEDURE

1. **CHECK CAN COMMUNICATION SYSTEM**
   a. Check if the CAN communication system DTC is output (See **DIAGNOSIS SYSTEM**).

   Result

   RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

   B : INSPECT CAN COMMUNICATION SYSTEM (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

   A: Go to next step

2. **INSPECT DLC3**
   a. Turn the ignition switch to ON.
   b. Measure the voltage according to the value(s) in the table below.

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Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
F16-12 (TS) - F16-4 (CG)	Ignition switch ON	11 to 14 V

Front view of DLC3:

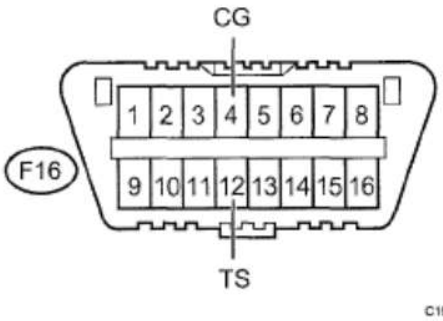


Fig. 87: Identifying DLC3 Connector Terminal CG And TS
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Result

RESULT CHART

Result	Proceed to
NG	A
OK	B

B: Go to step 5

A: Go to next step

3. **CHECK HARNESS AND CONNECTOR (TS of DLC3 - POWER STEERING ECU)**
   a. Turn the ignition switch to OFF.
   b. Disconnect the ECM connector.
   c. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
F16-12 (TS) - F30-11 (TS)	Always	Below 1 ohms

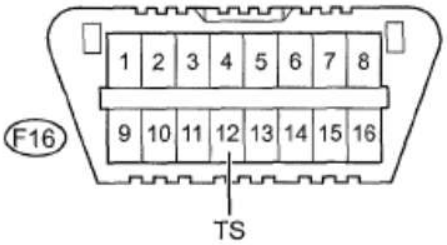
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F16-12 (TS) - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

Front view of DLC3:



Front view of wire harness connector:
(to Power Steering ECU)

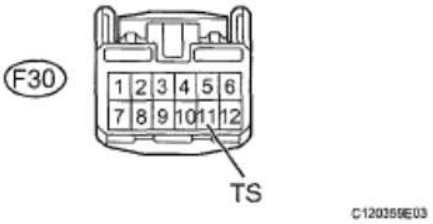


Fig. 88: Identifying DLC3 Connector Terminal TS And Power Steering ECU Connector Terminal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

4. **CHECK HARNESS AND CONNECTOR (CG of DLC3 - BODY GROUND)**
   a. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
F16-4 (CG) - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

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Front view of DLC3:

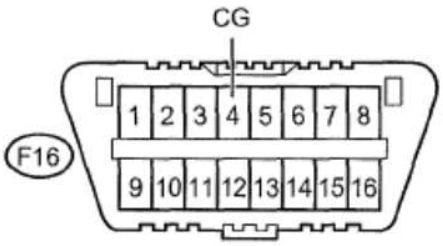


Fig. 89: Identifying DLC3 Connector Terminal CG And Body Ground
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

5. **CHECK POWER STEERING ECU (TS of DLC3 INPUT)**
   a. Turn the ignition switch to OFF.
   b. Reconnect the power steering ECU connector.
   c. Using SST, connect terminals TS and CG of the DLC3.
   d. Turn the ignition switch to ON.
   e. Check that the PS warning light is blinking.

Front view of DLC3:

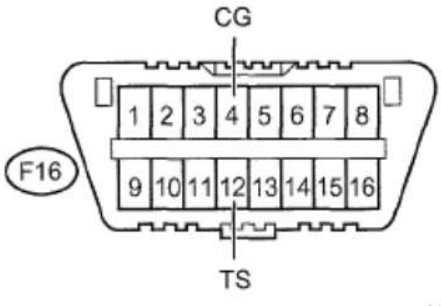


Fig. 90: Identifying DLC3 Connector Terminal CG And TS
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Result

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RESULT CHART

Result	Proceed to
Check PS warning light is blinking	A
Check PS warning light is not blinking	B

B : INSPECT POWER STEERING SYSTEM (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

A : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

VEHICLE STABILITY CONTROL SYSTEM

PRECAUTION

1. **TROUBLESHOOTING PRECAUTIONS**
   a. When there are malfunctions with terminal contact points or part installation problems, removal and installation of the suspected problem parts may return the system to the normal condition either completely or temporarily.
   b. In order to determine the malfunctioning area, be sure to check the conditions at the time the malfunction occurred, such as DTC output and the Freeze Frame Data, and record it before disconnecting each connector or removing and installing parts.
   c. Since the system may be influenced by malfunctions in systems other than the VSC system, be sure to check for DTCs in other systems.
2. **HANDLING PRECAUTIONS**
   a. Do not remove or install VSC parts such as the steering angle sensor or yaw rate sensor (acceleration sensor included) except when required, as they cannot be adjusted correctly after removal or installation.
   b. Be sure to perform preparation before work and confirmation after work is completed by following the directions in the repair manual, when working on the VSC system.
   c. Be sure to remove and install the ECU, brake actuator and each sensor, etc. with the ignition switch OFF, unless it is specified in the inspection procedure.
   d. If the ECU, brake actuator or a sensor has been removed and installed, it is necessary to check the system for problems after the parts have been reassembled. Check for DTCs using a Techstream, also check that system functions and signals received by the ECU are normal using Test Mode.
3. **DTC PRECAUTION**
   a. Warnings for some DTCs cannot be cleared only by repairing the malfunctioning parts. If the warning is displayed after repair work, the DTC should be cleared after turning the ignition switch to OFF.

   NOTE: If a DTC for a malfunctioning part reappears after it was cleared, then it has been stored again.

4. **CHASSIS DYNAMOMETER PRECAUTION**

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a. Disable TRAC and VSC controls when using a chassis dynamometer.
   1. When testing with a 2-wheel drum tester such as a speedometer tester, a combination tester for the speedometer and brake, or a chassis dynamometer, enter Test Mode using a Techstream, or switch to VSC OFF mode to turn TRAC and VSC operation off using the VSC OFF switch.

CAUTION:

- **If the vehicle is tested in normal mode on the drum tester, TRAC and VSC operation may cause the vehicle to jump out from the drum tester.**
- **When switching to VSC OFF mode, the VSC OFF switch must be held for 3 seconds or more with the vehicle stopped. TRAC and VSC operation must both be turned off before beginning testing. During VSC OFF mode, the combination meter's VSC OFF indicator and SLIP indicator lights come on.**
- **Fix the vehicle in place with chains for safety.**

5. **CAN COMMUNICATION SYSTEM PRECAUTIONS**
   a. The CAN communication system is used for data communication between the skid control ECU, the steering angle sensor, the yaw rate sensor (acceleration sensor included) and other ECUs. If there is trouble in the CAN communication line, corresponding communication line DTCs are output.
   b. If any CAN communication line DTC is output, repair the malfunction in the communication line and troubleshoot the VSC system while data communication is normal.
   c. In order to enable CAN communication, a specific type of wiring is used for the CAN communication lines. The wiring used for each communication line is a twisted pair of wires of equal length. A bypass wire should not be used because the data being transmitted will be corrupted.

PARTS LOCATION

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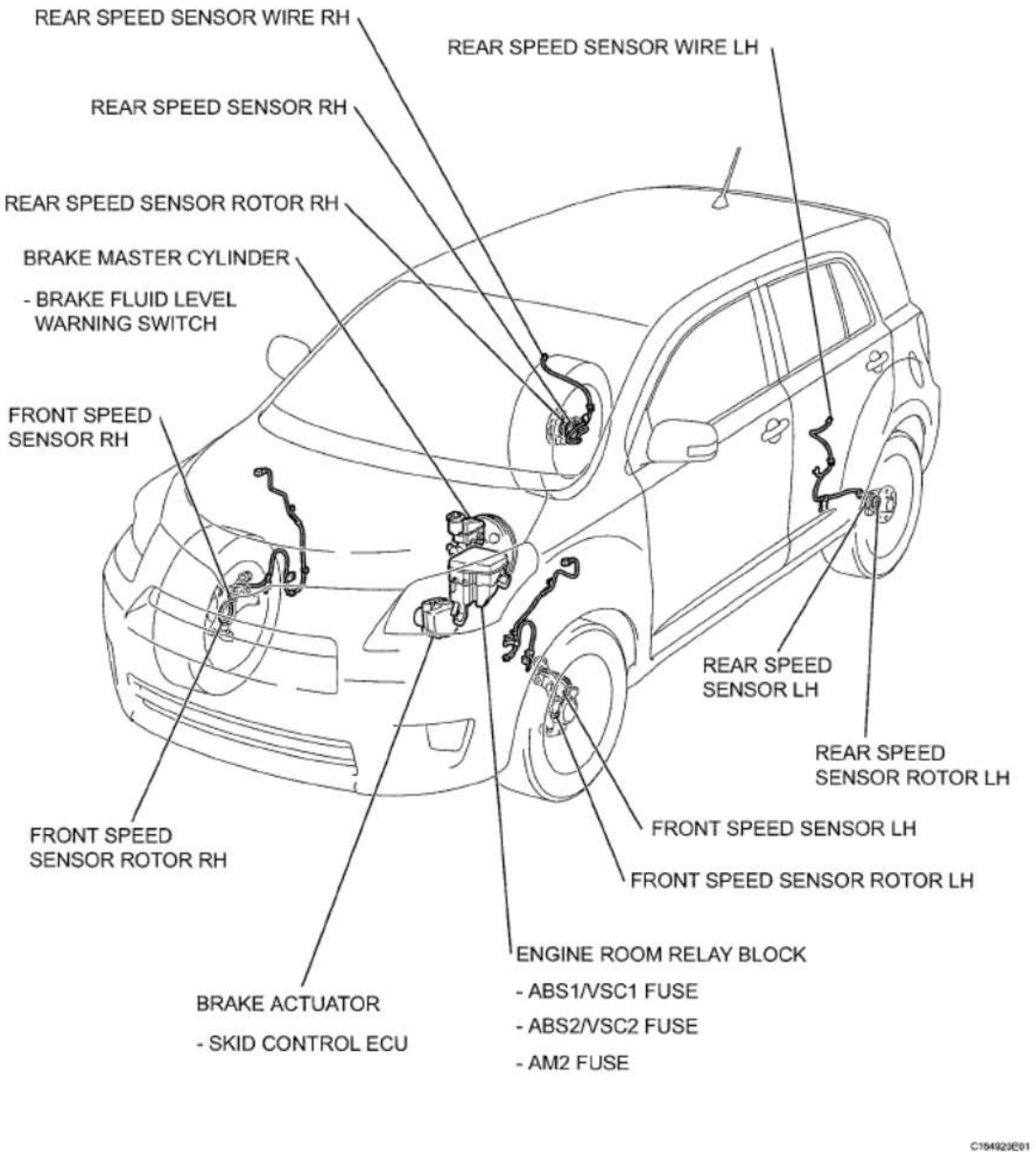


Fig. 91: Identifying Brake Control System Parts Location (1 Of 2)
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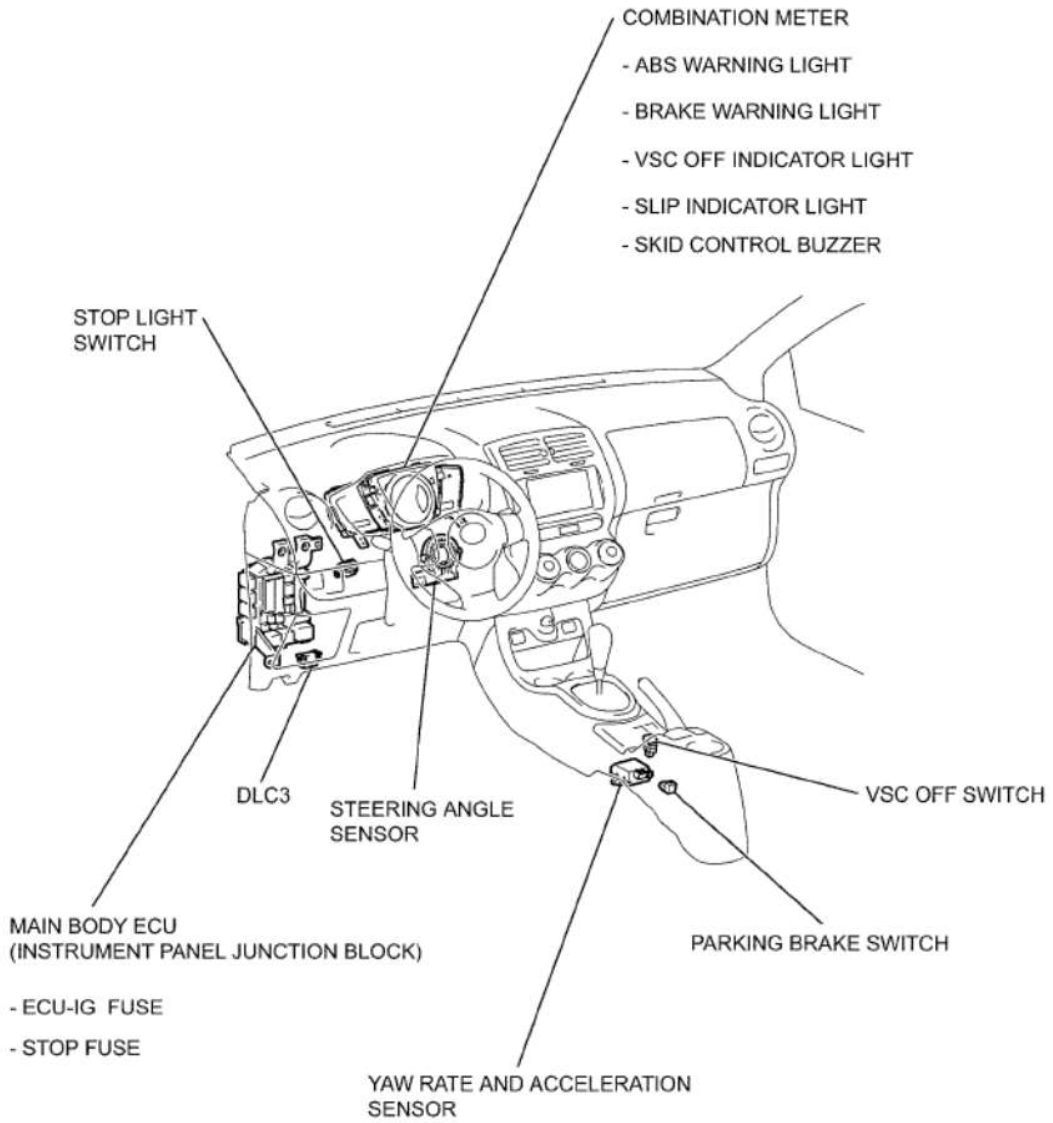


Fig. 92: Identifying Brake Control System Parts Location (2 Of 2)
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SYSTEM DIAGRAM

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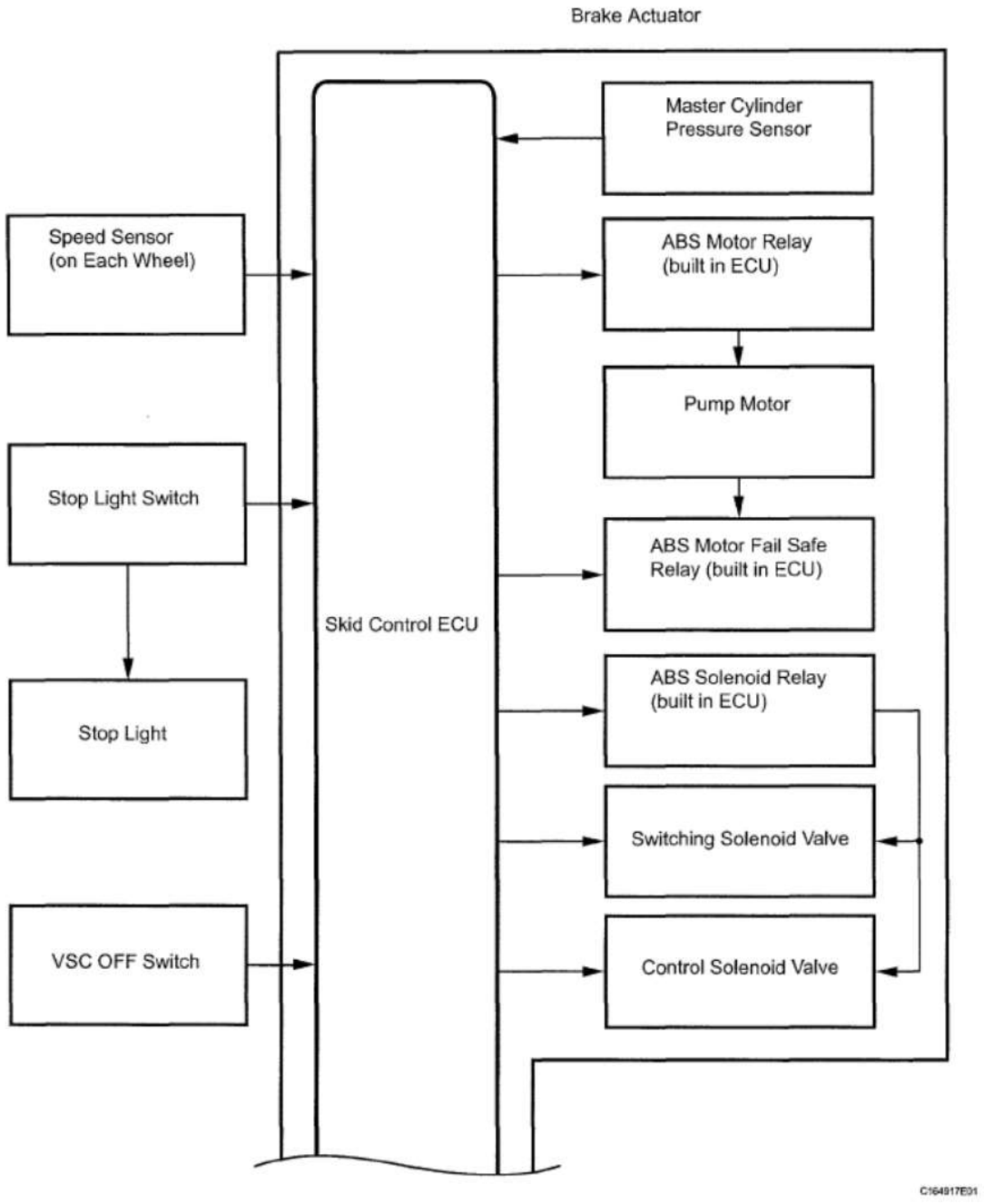


Fig. 93: Brake Control System - System Diagram (1 Of 2)
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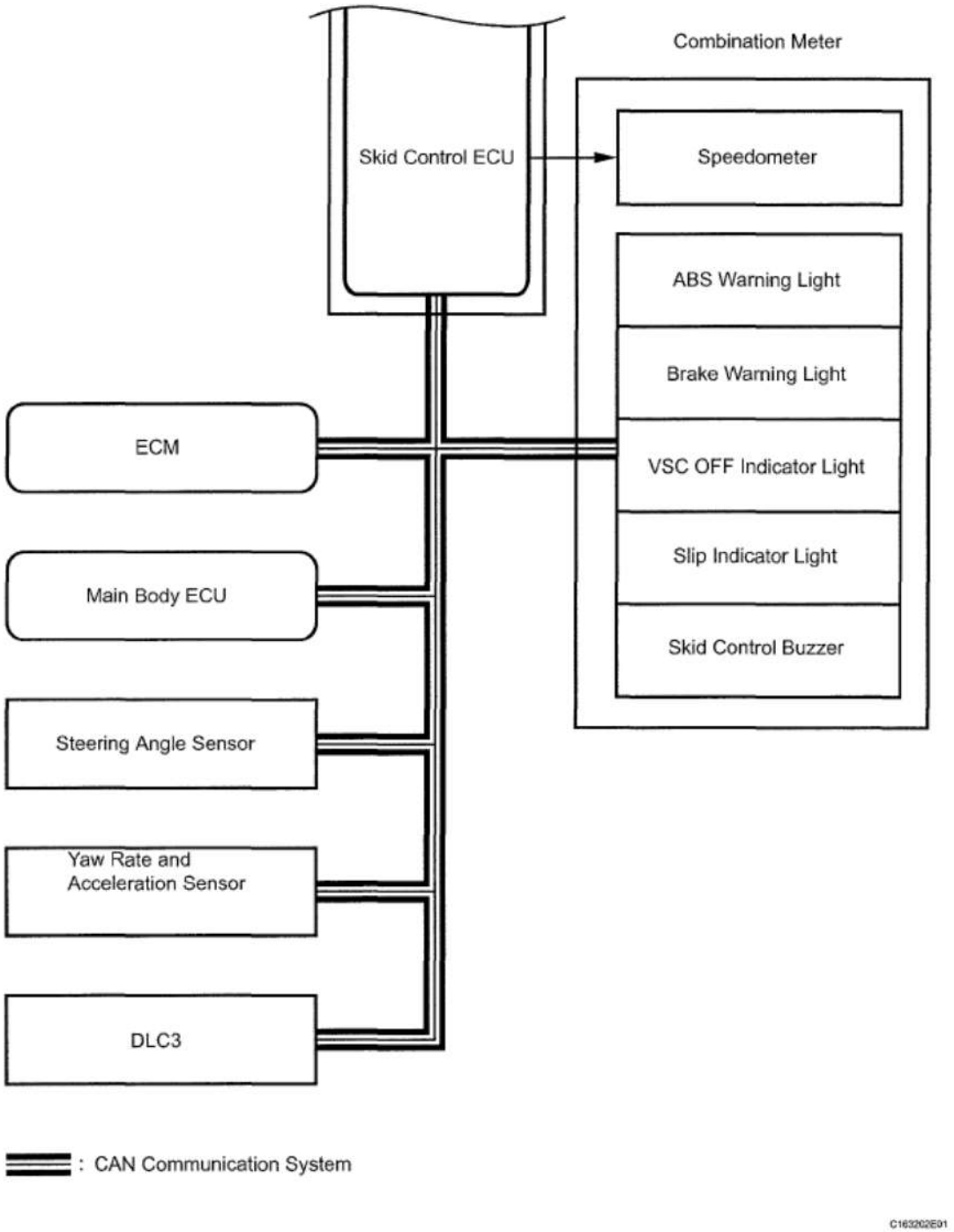


Fig. 94: Brake Control System - System Diagram (2 Of 2)
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ECU SIGNAL REFERENCE CHART

Transmitting ECU (transmitter)	Receiving ECU	Signal	Communication Method

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Skid control ECU	Steering angle sensor	Steering angle sensor request signal	CAN communication
Skid control ECU	Yaw rate and acceleration sensor	Yaw rate and acceleration request signal	CAN communication
Skid control ECU	ECM	• Wheel speed signal • VSC data signal	CAN communication
ECM	Skid control ECU	• Shift position signal • Throttle position signal • Engine revolution signal • Intake air temperature signal • Engine torque request signal • Accelerator pedal position signal	CAN communication
Main body ECU	Skid control ECU	Parking brake switch signal	CAN communication
Skid control ECU	Combination meter	• ABS warning light signal • Brake warning light signal • VSC OFF indicator light signal • SLIP indicator light signal	CAN communication
		Wheel speed signal	Serial communication

SYSTEM DESCRIPTION

1. FUNCTION DESCRIPTION

HINT:

- The skid control ECU is located within the brake actuator assembly.
- The yaw rate sensor and acceleration sensor are combined 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 the wheels from locking when the brakes are applied firmly or when braking on a slippery surface.

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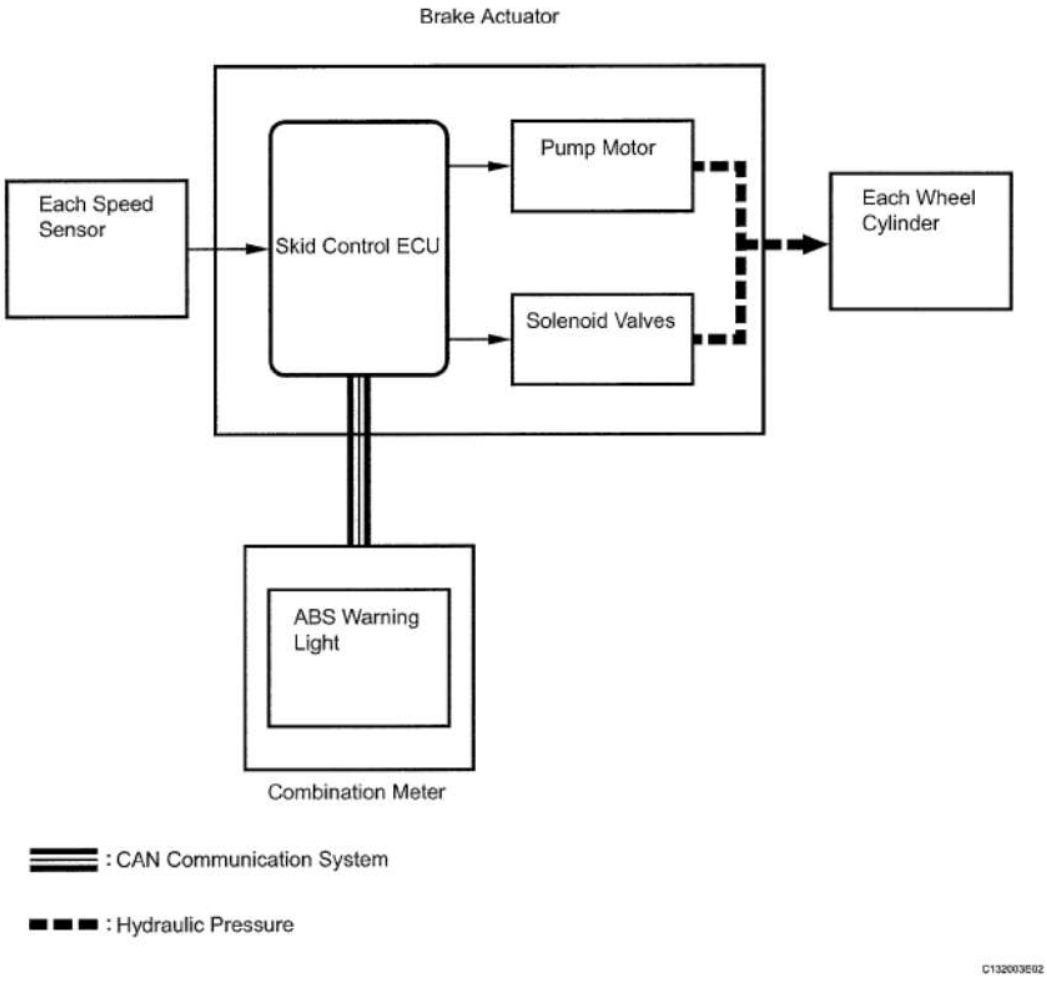


Fig. 95: Anti-Lock Brake System - Function Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

1. Operation description

   The skid control ECU detects wheel lock based on speed signals received from the wheel speed sensors. Based on this information, the skid control ECU controls the pump motor and solenoid valves. The pump motor and solenoid valves are used to prevent wheel lock by controlling the hydraulic pressure applied to the brakes at each wheel. The ABS warning light will come on when the system is malfunctioning.

b. EBD (Electronic Brake force Distribution)

The EBD control utilizes ABS, and performs proper brake force distribution between the front and rear wheels in accordance with driving conditions. When braking while cornering, it also controls the brake forces of the right and left wheels, helping to maintain vehicle behavior.

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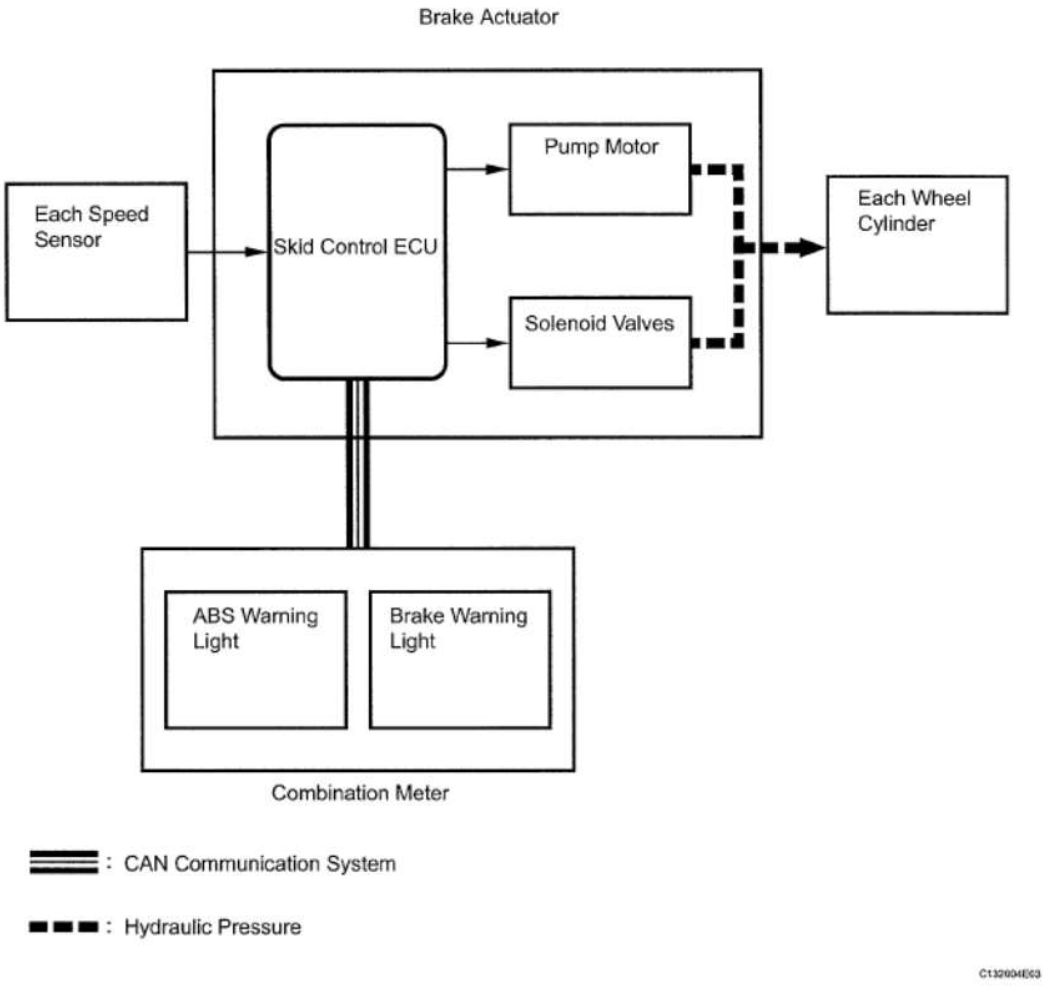


Fig. 96: Electronic Brake Force Distribution - Function Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

1. Operation description

   The skid control ECU receives a speed signal from each wheel speed sensor, and uses these signals to detect locking of the wheels. The ECU uses this information in order to determine appropriate control of the solenoid valves. The solenoid valves control the hydraulic pressure applied to the brake cylinder at each wheel. In this way, the solenoid valves are used to control the brake power split between the front and rear, and left and right wheels. The ABS warning and brake warning lights will come on if there is a malfunction in the EBD system.

c. BA (Brake Assist)

The primary purpose of the brake assist system is to provide auxiliary brake force to assist the driver if the driver cannot generate a large enough brake force during emergency braking, thus helping to maximize the brake performance of the vehicle.

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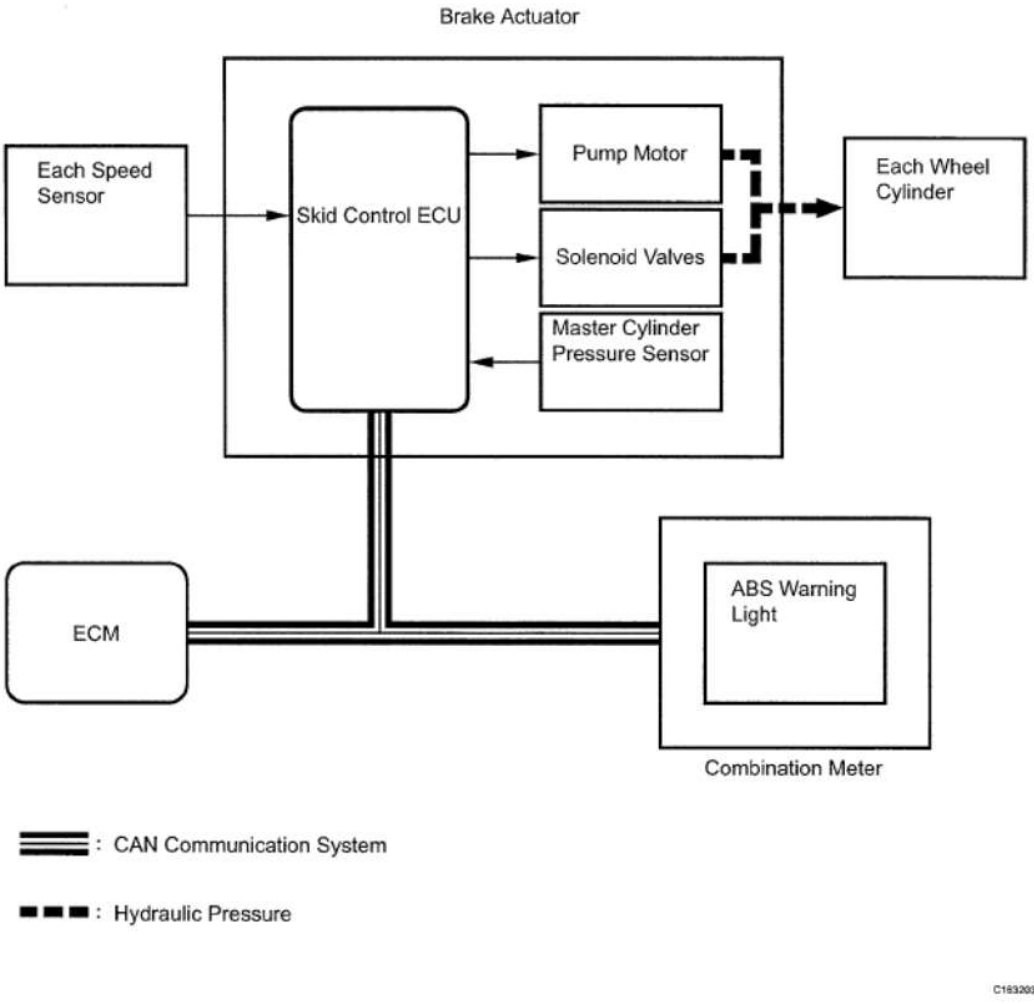


Fig. 97: Brake Assist - Function Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

1. Operation description

   The skid control ECU receives the speed signal from each speed sensor and the fluid pressure signal from the master cylinder pressure sensor to determine whether brake assist is necessary. If brake assist is necessary, the skid control ECU sends control signals to the pump motor and solenoid. The pump and the solenoid valve then control the pressure applied to each wheel cylinder.

   The ABS warning light comes on to indicate a malfunction in the BA system.

d. TRAC (Traction Control)

The TRAC system helps prevent the drive wheels from slipping when the driver depresses the accelerator pedal excessively when starting off or when accelerating on a slippery surface.

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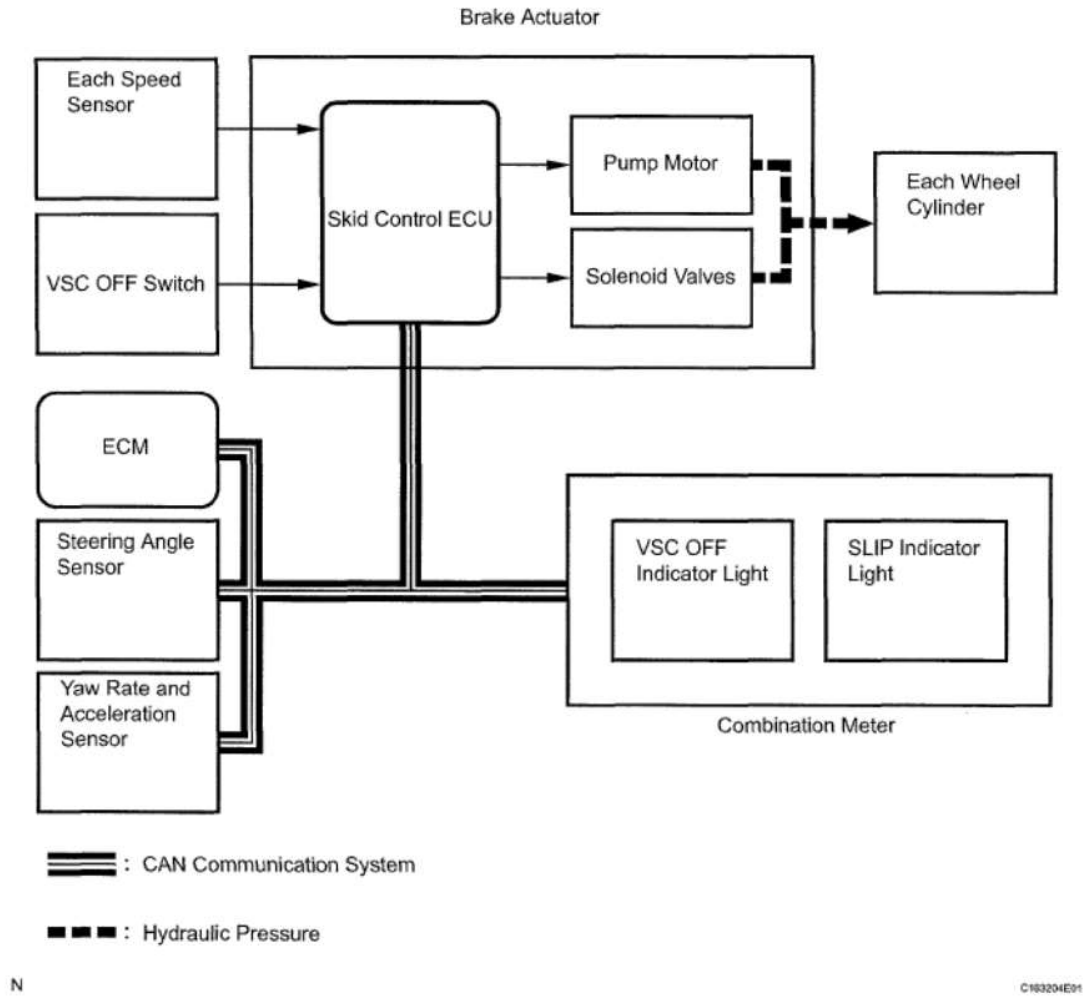


Fig. 98: Traction Control - Function Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

1. Operation description

   The skid control ECU detects the wheelspin by receiving signals from each speed sensor and the ECM via CAN communication. The skid control ECU controls engine torque with the ECM via CAN communication and brake hydraulic pressure through the pump and solenoid valve.

   The SLIP indicator light blinks when the system is operating. When there is a malfunction in the TRAC system, the VSC OFF indicator and SLIP indicator lights will come on.

   Pressing the VSC OFF switch stops traction control operation.

e. VSC (Vehicle Stability Control)

The VSC system helps prevent the vehicle from slipping sideways as a result of strong front or rear

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wheel skid during cornering.

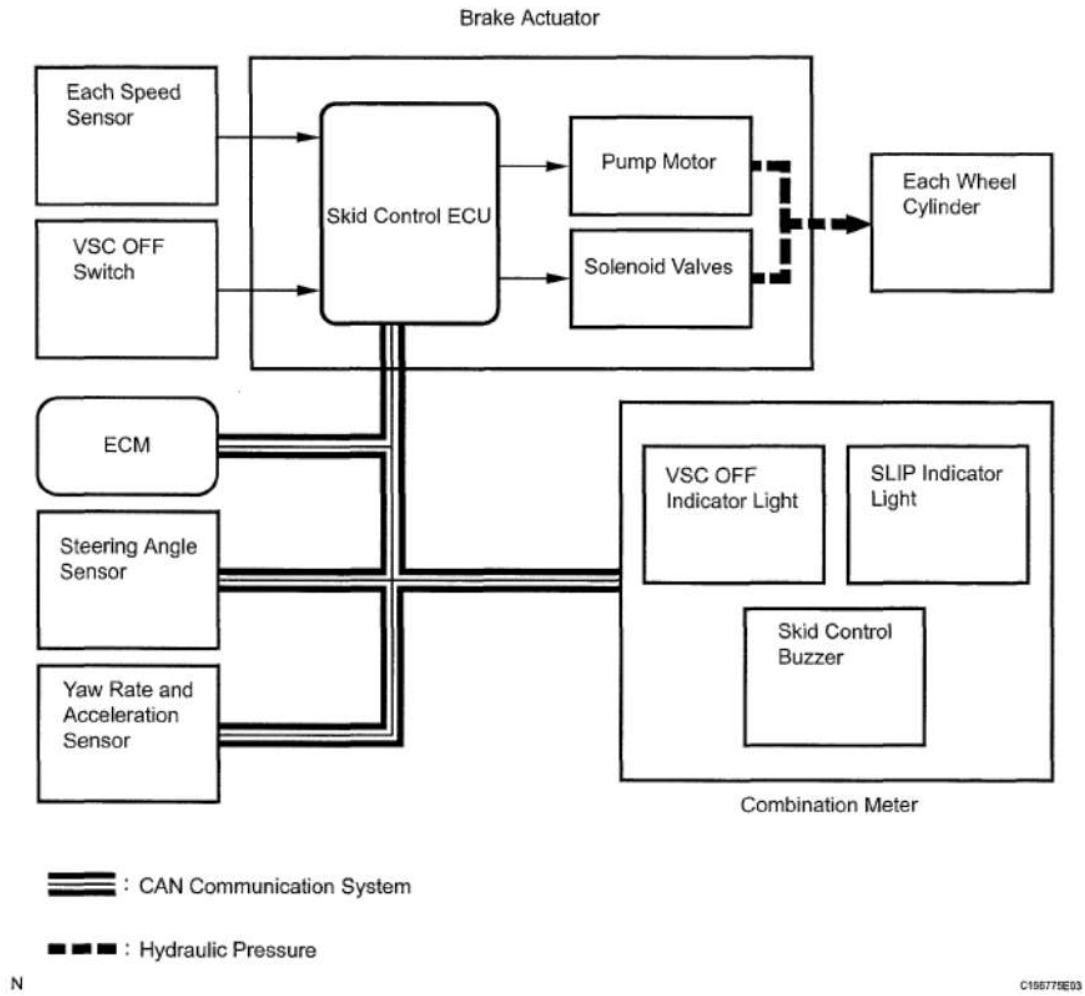


Fig. 99: Vehicle Stability Control - Function Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

1. Operation description

   The skid control ECU determines the vehicle operating conditions based on signals received from the wheel speed sensors, yaw rate and acceleration sensor, and steering angle sensor. The skid control ECU sends signals via CAN communication to the ECM in order to control engine torque. The skid control ECU controls brake hydraulic pressure using the pump and solenoid valves.

   The SLIP indicator light will blink, and the skid control buzzer will sound when the system is operating. If a malfunction occurs in the VSC system, the VSC OFF indicator and SLIP indicator lights will come on.

   Pressing and holding the VSC OFF switch stops VSC control operation.

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2. **ABS with EBD, BA, TRAC and VSC OPERATION**
   a. The skid control ECU calculates vehicle stability tendency based on the signals from the speed sensor, yaw rate and acceleration sensor, and steering angle sensor. In addition, it evaluates the results of the calculations to determine whether any control actions (control of the engine output torque by electronic throttle control and of the wheel brake pressure by the brake actuator assembly) should be implemented.
   b. The SLIP indicator blinks and the skid control buzzer sounds to inform the driver that the VSC system is operating. The SLIP indicator also blinks when traction control is operating.
3. **FAIL SAFE**
   a. When a failure occurs in the ABS with BA, TRAC or VSC systems, the ABS warning, SLIP indicator and VSC OFF indicator lights come on and ABS with BA, TRAC and VSC operations are prohibited. In addition, 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 control is prohibited due to a malfunction during operation, control will be disabled gradually. This is to avoid sudden vehicle instability.
4. **INITIAL CHECK**
   a. When the vehicle speed first reaches approximately 6 km/h (4 mph) or more after the ignition switch is turned to ON, each solenoid valve and motor in the brake actuator is sequentially activated to perform an electrical check. During the initial check, the operating sound of the solenoid valves and motors can be heard from the engine compartment, but this is not a malfunction.
5. **INSPECTION MODE**
   a. TRAC and VSC operation can be disabled by operating the Techstream or VSC OFF switch (See **VEHICLE STABILITY CONTROL SYSTEM**).
6. **FUNCTION OF COMPONENTS**

FUNCTION OF COMPONENTS

Component	Function
Speed sensor	Detects the wheel speed and sends the signal to the skid control ECU.
Yaw rate and acceleration sensor	• Acceleration sensor measures the capacity of the condenser that changes the distance between the electrodes depending on G force, which occurs when the vehicle is accelerated, and converts the measured value into electrical signals. • Yaw rate sensor detects the vehicle's angular velocity (yaw rate) in the vertical direction based on the amount and direction of the piezoelectric ceramics deflection. • Sends signals to the skid control ECU via CAN communication.
Steering angle sensor	• Installed in the combination switch. • Detects the steering amount and direction and sends the signals to the skid control ECU via CAN communication. • Has a magnetic resistance element which detects the rotation of the magnet housed in the detection gear in order to detect the changes in magnetic resistance and the steering amount and direction.

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Stop light switch	Detects the brake operating conditions and inputs the results to the skid control ECU.
Main body ECU	Detects the parking brake operating conditions and inputs the result to the skid control ECU via CAN communication.
Master cylinder pressure sensor	• Detects the fluid pressure in the master cylinder. • Housed in the brake actuator assembly.
Skid control ECU	• Housed in the brake actuator assembly. • Processes the signals sent from each sensor to control the ABS, EBD, BA, TRAC, and VSC. • Sends and receives the control signals to or from the ECM, yaw rate and acceleration sensor, and steering angle sensor, etc. via CAN communication.
Brake actuator assembly	• Consists of the master cylinder cut solenoid valve, retention solenoid valve, pressure reduction solenoid valve, pump motor, and reservoir, and adjusts the brake fluid pressure applied to each wheel cylinder. • Houses the skid control ECU.
Motor relay	• Supplies power to the pump motor. • Housed in the skid control ECU.
Motor fail safe relay	• Cuts off power to the motor when the pump motor circuit malfunctions. • Housed in the skid control ECU.
Solenoid relay	• Supplies power to each solenoid. • Housed in the skid control ECU.
ABS warning light	• Comes on to inform the driver that a malfunction in the ABS and/or BA has occurred. • Blinks to output DTC.
Brake warning light	• Comes on to inform the driver that the parking brake is ON when the system is normal, or the brake fluid has decreased. • Comes on to inform the driver that a malfunction in the EBD has occurred.
VSC OFF indicator light	• Comes on to inform the driver when the VSC OFF mode is entered using VSC OFF switch. • Comes on to inform the driver that a malfunction in the VSC and/or TRAC system has occurred. • Blinks to output DTC.
SLIP indicator light	• Comes on to inform the driver that a malfunction in the VSC and/or TRAC system has occurred. • Blinks to inform the driver that TRAC and/or VSC are operating.
Skid control buzzer	• Housed in the combination meter assembly. • Intermittently sounds to inform the driver that the VSC is operating.
ECM	Controls the engine output when TRAC and/or VSC are operating with the skid control ECU via CAN communication.

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VSC OFF switch	Pressing this switch turns off traction control and pressing and holding this switch turns off traction and VSC controls.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- The vehicle stability control system troubleshooting procedures are based on the premise that the CAN communication system is normally functioning. Check the CAN communication system first before troubleshooting the vehicle stability control system.
- *: Use a Techstream.

1. **VEHICLE BROUGHT TO WORKSHOP**
2. **CUSTOMER PROBLEM ANALYSIS**
   a. Interview the customer and confirm the trouble.
3. **CHECK DTC AND FREEZE FRAME DATA***
   a. Check and record a DTC and Freeze Frame Data.
   b. Clear the DTC and Freeze Frame Data (See **DTC CHECK/CLEAR** for DTC Check/Clear, or **FREEZE FRAME DATA** for Freeze Frame Data).
   c. Reconfirm the DTC.
      1. Reconfirm the DTC based on the recorded DTC and Freeze Frame Data (See **DTC CHECK/CLEAR** for DTC Check/Clear, or **FREEZE FRAME DATA** for Freeze Frame Data).

         HINT:

         If any of the DTCs U0100/65, U0123/62, U0124/95, and U0126/63 is output together with a CAN communication DTC, first check the appropriate sensor for a momentary open circuit (See **CHECK FOR INTERMITTENT PROBLEMS**).

         Result

         RESULT CHART

Result	Proceed to
DTC output	A
DTC not output (Problem symptom does not occur)	B
DTC not output (Problem symptom occurs)	C

B: Go to STEP 5

C: Go to STEP 6

A: Go to next step

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4. **DIAGNOSTIC TROUBLE CODE CHART**
   a. Proceed to **DIAGNOSTIC TROUBLE CODE CHART** .

   NEXT: Go to STEP 7

5. **SYMPTOM SIMULATION**
   a. Proceed to Check for Intermittent Problems (See **CHECK FOR INTERMITTENT PROBLEMS**).
6. **PROBLEM SYMPTOMS TABLE**
   a. Proceed to **PROBLEM SYMPTOMS TABLE** .
7. **CIRCUIT INSPECTION***
8. **IDENTIFICATION OF PROBLEM**
9. **REPAIR OR REPLACEMENT**
10. **CONFIRMATION TEST***

    NEXT : END

CHECK FOR INTERMITTENT PROBLEMS

1. **CHECK FOR INTERMITTENT PROBLEMS**

   HINT:

   A momentary interruption (open circuit) in the connectors and/or wire harness between the sensors and ECUs can be detected using the ECU Data List function of the Techstream.

   a. Turn the ignition switch to OFF and connect a Techstream to the DLC3.
   b. Turn the ignition switch to ON. Follow the directions on the Techstream to display the Data List and select areas where momentary interruption should be monitored.

      HINT:

      - A momentary interruption (open circuit) cannot be detected for 3 seconds after the ignition switch is turned to ON (initial check).
      - If the status remains on (ERROR displayed), check the continuity between the ECU and the sensors, or between ECUs.
      - The ERROR display on the Techstream remains on for 1 second after the harness signal changes from momentary interruption (open circuit) to normal condition.

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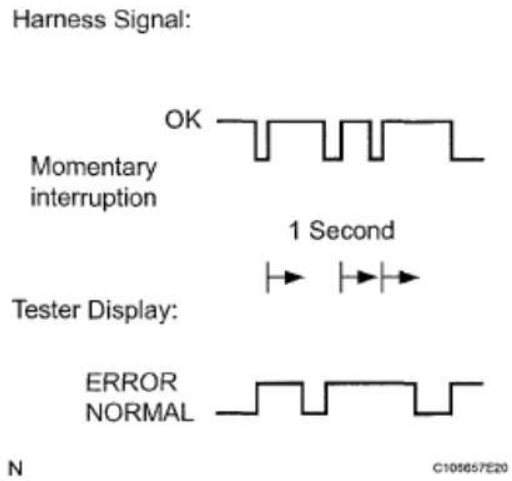


Fig. 100: Identifying Blinking Pattern
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ABS/VSC/TRAC:

MEASUREMENT ITEM NORMAL CONDITION CHART

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
FR Speed Open	FR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
FL Speed Open	FL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RR Speed Open	RR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RL Speed Open	RL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
EFI Communication Open	EFI communication open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
Yaw Rate Open	Yaw rate sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
Deceleration Open	Acceleration sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
Steering Open	Steering angle sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption	-

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		NORMAL: Normal	

c. While observing the screen, gently jiggle the connector or wire harness between the ECU and sensors, or between ECUs.

Result:

ERROR display does not change.

HINT:

If the display changes, the connector and/or the wire harness has caused a momentary interruption of the circuit. Repair or replace the connector and/or wire harness as one of them is faulty.

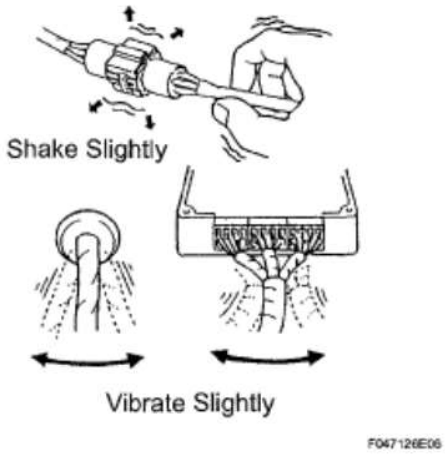


Fig. 101: Shaking Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **SYMPTOM SIMULATION**

HINT:

The most difficult case in troubleshooting is when no symptoms occur. In such cases, a thorough customer problem analysis must be carried out. Then the same or similar conditions and environment in which the problem occurred in the customer's vehicle should be reproduced. No matter how experienced or skilled a technician may be, if he/she proceeds to troubleshoot without confirming the problem symptoms, he/she will likely overlook something important and make a wrong guess at some points in the repair operation. This leads to a standstill in troubleshooting.

a. Vibration method: When vibration seems to be the major cause.

HINT:

Perform the simulation method only during the primary check period (for approximately 6 seconds

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after the ignition switch ON).

1. Slightly vibrate the part of the sensor considered to be the problem cause with your fingers and check whether the malfunction occurs.
2. Slightly shake the connector vertically and horizontally.

   HINT:

   Shaking the relays too strongly may result in open relays.

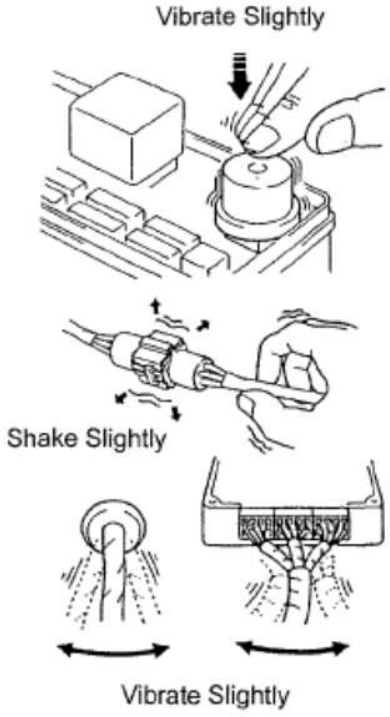


Fig. 102: Shaking Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. Slightly shake the wire harness vertically and horizontally. The connector joint and fulcrum of the vibration are the major areas to be checked thoroughly.

CALIBRATION

1. DESCRIPTION

- After replacing the VSC relevant components or performing "Front wheel alignment adjustment", clear and read the sensor calibration data.
- Follow the chart to perform calibration.

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OPERATION CHART

Replacing Part / Operation	Necessary Operation
Skid control ECU	Yaw rate and acceleration sensor zero point calibration
Yaw rate and acceleration sensor	1. Clearing zero point calibration data 2. Yaw rate and acceleration sensor zero point calibration
Front wheel alignment adjustment	1. Clearing zero point calibration data 2. Yaw rate and acceleration sensor zero point calibration

2. **OBTAIN ZERO POINT OF YAW RATE AND ACCELERATION SENSOR (Using Techstream)**

NOTE:

- **While obtaining the zero point, keep the vehicle stationary and do not vibrate, tilt, move, or shake it. (Do not start the engine.)**
- **Be sure to perform this procedure on a level surface (with an inclination of less than 1 degree).**

a. Clear the zero point calibration data.

1. Turn the ignition switch to OFF.
2. Check that the steering wheel is in the straight-ahead position.
3. Check that the shift lever is in the P position (for automatic transaxle model) or the parking brake is applied (for manual transaxle model).
4. Connect the Techstream to the DLC3.
5. Turn the ignition switch to ON.
6. Turn the Techstream on.
7. Enter the following menu items: Chassis / ABS/ VSC/TRAC / Reset Memory.
8. Turn the ignition switch to OFF.

NOTE: **If the ignition switch is turned to ON for more than 15 seconds with the shift lever in the P position (for automatic transaxle model) or the parking brake applied (for manual transaxle model) after zero point of the yaw rate and acceleration sensor has been cleared, only the zero point of the yaw rate sensor will be stored. If the vehicle is driven under these conditions, the skid control ECU will store the zero point calibration for the acceleration sensor as not being completed. The skid control ECU will then also indicate this as a malfunction of the VSC system using the warning lights.**

b. Perform zero point calibration of the yaw rate and acceleration sensor.

1. Turn the ignition switch to OFF.
2. Check that the steering wheel is in the straight-ahead position.
3. Check that the shift lever is in the P position (for automatic transaxle model) or the parking

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brake is applied (for manual transaxle model).

NOTE: **DTCs C1210/36 and C1336/39 will be recorded if the shift lever is not in the P position (for automatic transaxle model) or the parking brake is not applied (for manual transaxle model) (See DTC C1210/36 ZERO POINT CALIBRATION OF YAW RATE SENSOR UNDONE; DTC C1336/39 ZERO POINT CALIBRATION OF ACCELERATION SENSOR UNDONE).**

4. Connect the Techstream to the DLC3.
5. Turn the ignition switch to ON.
6. Turn the Techstream on.
7. Enter the following menu items: Chassis / ABS/ VSC/TRAC / Test Mode.
8. After the Test Mode has been entered, keep the vehicle stationary on a level surface for 2 seconds or more.
9. Check that the VSC OFF indicator light comes on for several seconds and then blinks in Test Mode.

   HINT:

   - The SLIP indicator light remains on during Test Mode because traction control is prohibited (The SLIP indicator light goes off when the VSC OFF switch is ON.)
   - If the VSC OFF indicator light does not blink, perform 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.

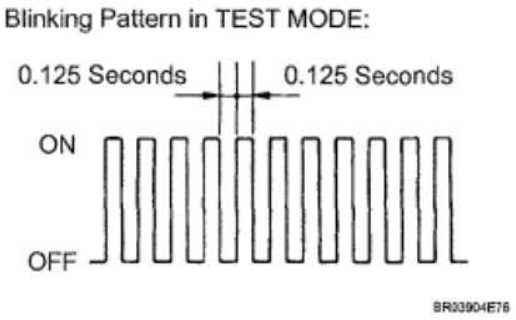


Fig. 103: Identifying ABS Warning Light Blinking Pattern
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. Turn the ignition switch to OFF and disconnect the Techstream.

3. **OBTAIN ZERO POINT OF YAW RATE AND ACCELERATION SENSOR (for Using SST Check Wire)**

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NOTE:

- **While obtaining the zero point, keep the vehicle stationary and do not vibrate, tilt, move, or shake it. (Do not start the engine.)**
- **Be sure to perform this procedure on a level surface (with an inclination of less than 1 degree).**

a. Clear the zero point calibration data.

1. Turn the ignition switch to OFF.
2. Check that the steering wheel is in the straight-ahead position.
3. Check that the shift lever is in the P position (for automatic transaxle model) or apply the parking brake (for manual transaxle model).
4. Turn the ignition switch to ON.
5. The warning light and indicator light come on for 3 seconds to indicate that the initial check is completed.

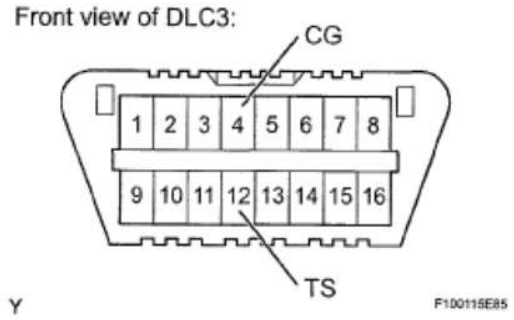


Fig. 104: Identifying DLC3 Connector Terminals TS And CG
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

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7. Check that the VSC OFF indicator light comes on.

NOTE: **If the ignition switch is turned to ON for more than 15 seconds with the shift lever in the P position (for automatic transaxle model) or the parking brake applied (for manual transaxle model) after the zero point of the yaw rate and acceleration sensor has been cleared, only the zero point of the yaw rate sensor will be stored. If the vehicle is driven under these conditions, the skid control ECU will store the zero point calibration for the acceleration sensor as not being completed. The skid control ECU will then also indicate this as a malfunction of the VSC system using the warning lights.**

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b. Perform zero point calibration of the yaw rate and acceleration sensor.

1. Turn the ignition switch to OFF.
2. Check that the steering wheel is in the straight-ahead position.
3. Check that the shift lever is in the P position (for automatic transaxle model) or the parking brake is applied (for manual transaxle model).

NOTE: **DTCs C1210/36 and C1336/39 will be recorded if the shift lever is not in the P position (for automatic transaxle model) or the parking brake is not applied (for manual transaxle model) (See DTC C1210/36 ZERO POINT CALIBRATION OF YAW RATE SENSOR UNDONE; DTC C1336/39 ZERO POINT CALIBRATION OF ACCELERATION SENSOR UNDONE).**

4. Using SST, connect terminals TS and CG of the DLC3.

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5. Turn the ignition switch to ON.
6. Keep the vehicle stationary on a level surface for 2 seconds or more.

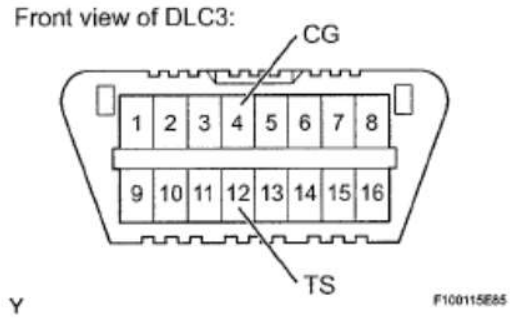


Fig. 105: Identifying DLC3 Connector Terminals TS And CG
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. Check that the VSC OFF indicator light comes on for several seconds and then blinks.

HINT:

- The SLIP indicator light remains on during Test Mode because traction control is prohibited (The SLIP indicator light goes off when the VSC OFF switch is ON.)
- If the VSC OFF indicator light does not blink, perform 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.

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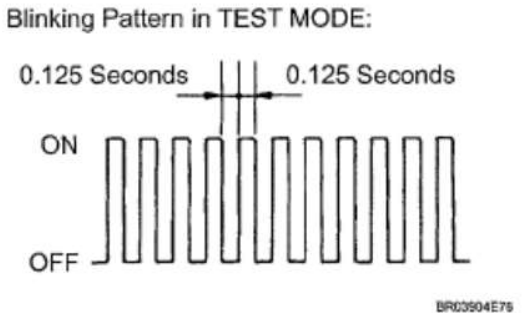


Fig. 106: Identifying ABS Warning Light Blinking Pattern
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. Turn the ignition switch to OFF and disconnect the SST from the DLC3.

TEST MODE PROCEDURE

1. **WARNING LIGHT AND INDICATOR LIGHT INITIAL CHECK**
   a. Release the parking brake.

   NOTE: Before releasing the parking brake, move the shift lever to the P position for safety (for automatic transaxle model) or set chocks to hold the vehicle for safety (for manual transaxle model).

   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 ON, check that the ABS warning, brake warning, VSC OFF indicator and SLIP indicator lights come on for approximately 3 seconds.

   HINT:

   - If the skid control ECU stores any DTCs, the ABS warning, SLIP indicator and VSC OFF indicator lights will come on.
   - If the indicator remains on or does not come on, proceed to troubleshooting for the light circuits listed below.

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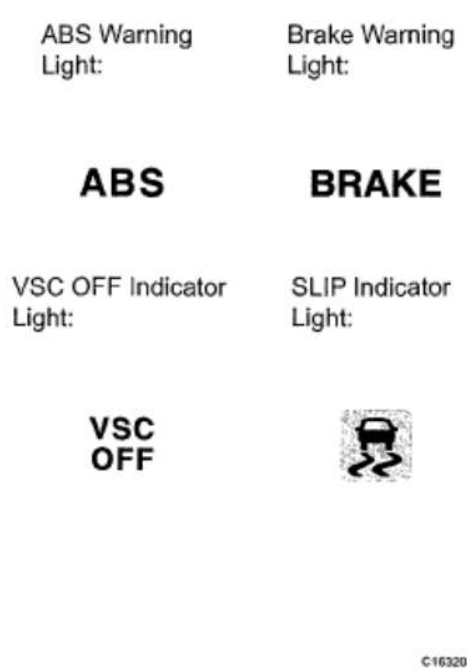


Fig. 107: ABS Warning Light And Brake Warning Light Chart
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DIAGNOSTIC PROCEDURE CHART

Trouble Area	See procedure
ABS warning light circuit (Remains on)	ABS WARNING LIGHT REMAINS ON
ABS warning light circuit (Does not come on)	ABS WARNING LIGHT DOES NOT COME ON
Brake warning light circuit (Remains on)	BRAKE WARNING LIGHT REMAINS ON
Brake warning light circuit (Does not come on)	BRAKE WARNING LIGHT DOES NOT COME ON
VSC OFF indicator light circuit (Remains on)	VSC OFF INDICATOR LIGHT REMAINS ON
VSC OFF indicator light circuit (Does not come on)	VSC OFF INDICATOR LIGHT DOES NOT COME ON
SLIP indicator light circuit (Remains on)	SLIP INDICATOR LIGHT REMAINS ON
SLIP indicator light circuit (Does not come on)	SLIP INDICATOR LIGHT DOES NOT COME ON

2. **TEST MODE PROCEDURE (SIGNAL CHECK) (Using Techstream)**

NOTE: **After replacement of the brake actuator assembly and/or yaw rate and acceleration sensor, perform zero point calibration of the yaw rate and acceleration sensor.**

HINT:

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- If the ignition switch is turned from ON to ACC or OFF during Test Mode (signal check), DTCs recorded during the signal check function will be erased.
- During Test Mode (signal check), the skid control ECU records all DTCs of the signal check function. By performing the Test Mode (signal check), the codes are erased if a normal condition is confirmed. The remaining codes are the codes where an abnormality was found.

a. Procedure to enter Test Mode.

1. Turn the ignition switch to OFF.
2. Check that the steering wheel is in the straight-ahead position.
3. Check that the shift lever is in the P position (for automatic transaxle model) or the parking brake is applied (for manual transaxle model).
4. Connect the Techstream to the DLC3.
5. Turn the ignition switch to ON.
6. Turn the Techstream on.
7. Enter the following menu items: Chassis / ABS/ VSC/TRAC / Signal Check.
8. Check that the ABS warning and VSC OFF indicator lights come on for several seconds and then blink in Test Mode.

   HINT:

   - The SLIP indicator light remains on during Test Mode because traction control is prohibited (The SLIP indicator light goes off when the VSC OFF switch is ON).
   - If the ABS warning and VSC OFF indicator lights do not blink, inspect the TS and CG terminal circuit and ABS warning and VSC OFF indicator light circuits.

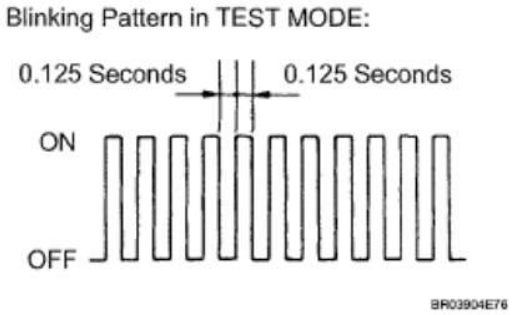


Fig. 108: Identifying ABS Warning Light Blinking Pattern
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DIAGNOSTIC PROCEDURE CHART

Trouble Area	See procedure
TS and CG terminal circuit	**TS AND CG TERMINAL CIRCUIT**
ABS warning light circuit (Remains on)	**ABS WARNING LIGHT REMAINS ON**
ABS warning light circuit (Does not	**ABS WARNING LIGHT DOES NOT**

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come on)	**COME ON**
VSC OFF indicator light circuit (Remains on)	**VSC OFF INDICATOR LIGHT REMAINS ON**
VSC OFF indicator light circuit (Does not come on)	**VSC OFF INDICATOR LIGHT DOES NOT COME ON**

3. **ACCELERATION SENSOR CHECK (Using Techstream)**
   a. Keep the vehicle stationary on a level surface for 1 second or more.

      HINT:

      Acceleration sensor check can be performed with the master cylinder pressure sensor check below.

4. **MASTER CYLINDER PRESSURE SENSOR CHECK (Using Techstream)**
   a. Leave the vehicle in a stationary condition and release the brake pedal for 1 second or more, and quickly and continuously depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more for 1 second.
   b. Check that the ABS warning light stays on for 3 seconds.

      HINT:

      - Ensure that the ABS warning light comes on.
      - While the ABS warning light stays on, continue to depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more.
      - The ABS warning light comes on for 3 seconds every time the brake pedal operation above is performed.
      - If the check of the master cylinder pressure sensor is not completed, depressing the brake pedal causes further decrease in the negative pressure, making the sensor check difficult to complete.
      - If the negative pressure is insufficient, the master cylinder pressure sensor check may not be completed. In this case, run the engine at idle to obtain sufficient negative pressure.
      - If the brake pedal is strongly depressed when the negative pressure is insufficient, the brake warning light may come on in accordance with the booster pressure control. In this case, run the engine at idle to obtain sufficient negative pressure.

5. **SPEED SENSOR CHECK (Using Techstream)**
   a. Check the speed sensor signal.
      1. Drive the vehicle straight-ahead.

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

         - The sensor check may not be completed if wheelspin occurs.
         - The ABS warning light blinks when the sensor check has been completed and the

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brake pedal is depressed.

- The ABS warning light comes on immediately after a malfunction has been detected during the speed sensor check.

b. Stop the vehicle.

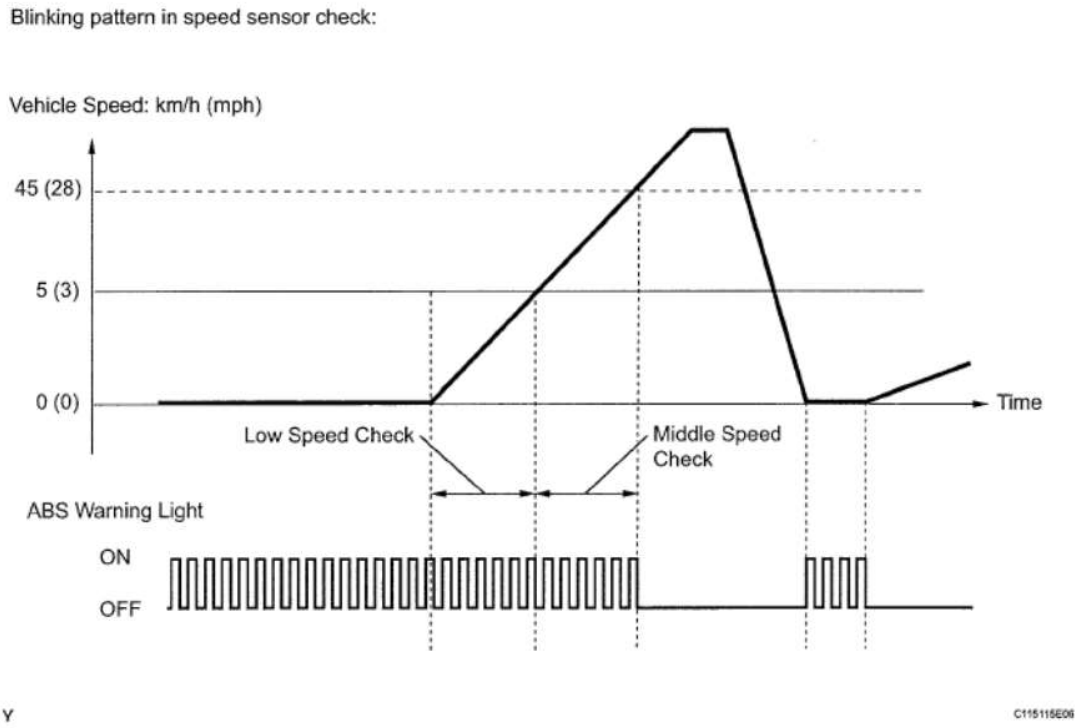


Fig. 109: Identifying ABS Warning Light Blinking Pattern
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- **Before performing the speed sensor check, complete the acceleration sensor and master cylinder pressure sensor checks.**
- **The speed sensor check may not be completed if the speed sensor check is started while turning the steering wheel or spinning the wheels.**
- **After the ABS warning light goes off and if the vehicle speed exceeds 80 km/h (50 mph), a sensor check code will be stored again. Decelerate or stop the vehicle before the speed reaches 80 km/h (50 mph).**
- **If the sensor check has not been completed, the ABS warning light blinks while driving and the ABS system does not operate.**

HINT:

When the sensor check has been completed, the ABS warning light goes off while driving and

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blinks in the Test Mode pattern while stationary.

6. **YAW RATE SENSOR CHECK (Using Techstream)**
   a. Check the output of the yaw rate sensor.
      1. Keep the vehicle in a stationary condition on a level surface for 1 second or more.
      2. Move the shift lever from the P to D position (for automatic transaxle model) or release the parking brake (for manual transaxle model) and drive the vehicle at a speed of approximately 5 km/h (3 mph), and turn the steering wheel either to the left or right 90° or more until the vehicle makes a 180° turn.
      3. Stop the vehicle and move the shift lever to the P position (for automatic transaxle model) or apply the parking brake (for manual transaxle model). Check that the skid control buzzer sounds for 3 seconds.

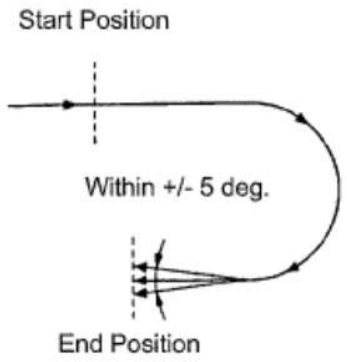


Fig. 110: Identifying Start And End Position Of Vehicle
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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 **SKID CONTROL BUZZER CIRCUIT**), then perform the sensor check again.
- If the skid control buzzer still does not sound, there is a malfunction in the yaw rate sensor, so check the DTC.
- Make a 180° turn. At the end of the turn, the direction of the vehicle should be 180° +/- 5° of its start position.
- Do not spin the wheels.
- Do not turn the ignition switch to OFF while turning.
- Do not move the shift lever to the P position (for automatic transaxle model) or do not apply the parking brake (for manual transaxle model) while turning. Changing the vehicle speed, stopping, or driving in reverse is possible.

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- Complete the turn within 20 seconds.

7. **END OF SENSOR CHECK (Using Techstream)**
   a. If the sensor check is completed, the ABS warning light blinks (Test Mode) when the vehicle stops and the ABS warning light is off while the vehicle is driving.

NOTE:

- **When the yaw rate sensor, acceleration sensor, speed sensor, and master cylinder pressure sensor checks are completed, the sensor check is completed.**
- **If the sensor check is not completed, the ABS warning light blinks even while the vehicle is driving and the ABS does not operate.**

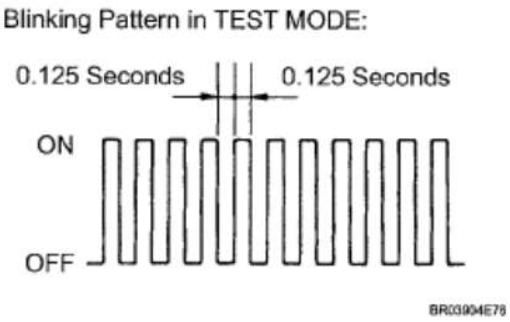


Fig. 111: Identifying ABS Warning Light Blinking Pattern
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. **READ DTC OF SIGNAL CHECK FUNCTION (Using Techstream)**
   a. Read the DTC(s) by following the tester screen.

NOTE:

- **If only the DTCs are displayed, repair the malfunction area and clear the DTCs.**
- **If the DTCs or Test Mode codes (DTC of signal check function) are displayed, repair the malfunction area, clear the DTCs and perform Test Mode inspection.**

HINT:

See the list of DTCs (See procedure A).

9. **TEST MODE PROCEDURE (SIGNAL CHECK) (Using SST Check Wire)**

NOTE: **After replacement of the brake actuator assembly and/or yaw rate and acceleration sensor, perform zero point calibration of the yaw rate and acceleration sensor.**

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HINT:

- If the ignition switch is turned from ON to ACC or OFF during Test Mode (signal check), DTCs recorded during the signal check function will be erased.
- During Test Mode (signal check), the skid control ECU records all DTCs of the signal check function. By performing the Test Mode (signal check), the codes are erased if a normal condition is confirmed. The remaining codes are the codes where an abnormality was found.

a. Procedure to enter Test Mode.

1. Turn the ignition switch to OFF.
2. Check that the steering wheel is in the straight-ahead position.
3. Check that the shift lever is in the P position (for automatic transaxle model) or the parking brake is applied (for manual transaxle model).
4. Using SST, connect terminals TS and CG of the DLC3.

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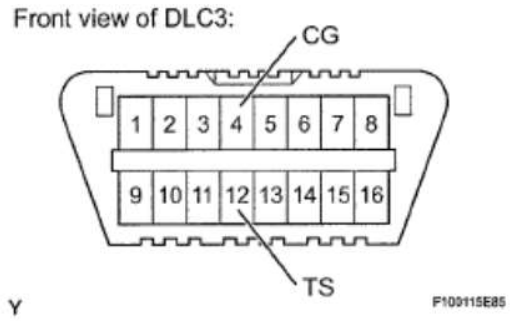


Fig. 112: Identifying DLC3 Connector Terminals TS And CG
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. Turn the ignition switch to ON.
6. Check that the ABS warning and VSC OFF indicator lights come on for several seconds and then blink in Test Mode.

HINT:

- The SLIP indicator light remains on during Test Mode because traction control is prohibited (The SLIP indicator light goes off when the VSC OFF switch is ON).
- If the ABS warning and VSC OFF indicator lights do not blink, inspect the TS and CG terminal circuit and ABS warning and VSC OFF indicator light circuits.

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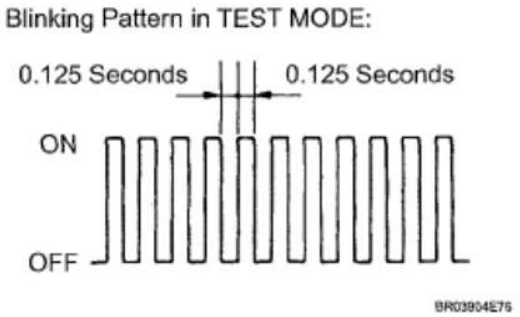


Fig. 113: Identifying ABS Warning Light Blinking Pattern
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DIAGNOSTIC PROCEDURE CHART

Trouble Area	See procedure
TS and CG terminal circuit	**TS AND CG TERMINAL CIRCUIT**
ABS warning light circuit (Remains on)	**ABS WARNING LIGHT REMAINS ON**
ABS warning light circuit (Does not come on)	**ABS WARNING LIGHT DOES NOT COME ON**
VSC OFF indicator light circuit (Remains on)	**VSC OFF INDICATOR LIGHT REMAINS ON**
VSC OFF indicator light circuit (Does not come on)	**VSC OFF INDICATOR LIGHT DOES NOT COME ON**

10. **ACCELERATION SENSOR CHECK (Using SST Check Wire)**
    a. Keep the vehicle stationary on a level surface for 1 second or more.

    HINT:

    Acceleration sensor check can be performed with the master cylinder pressure sensor check below.

11. **MASTER CYLINDER PRESSURE SENSOR CHECK (Using SST Check Wire)**
    a. Leave the vehicle in a stationary condition and release the brake pedal for 1 second or more, and quickly and continuously depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more for 1 second.
    b. Check that the ABS warning light stays on for 3 seconds.

    HINT:

    - Ensure that the ABS warning light comes on.
    - While the ABS warning light stays on, continue to depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more.
    - The ABS warning light comes on for 3 seconds every time the brake pedal operation above is performed.

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- If the check of the master cylinder pressure sensor is not completed, depressing the brake pedal causes further decrease in the negative pressure, making the sensor check difficult to complete.
- If the negative pressure is insufficient, the master cylinder pressure sensor check may not be completed. In this case, run the engine at idle to obtain sufficient negative pressure.
- If the brake pedal is strongly depressed when the negative pressure is insufficient, the brake warning light may come on in accordance with the booster pressure control. In this case, run the engine at idle to obtain sufficient negative pressure.

12. **SPEED SENSOR CHECK (Using SST Check Wire)**
    a. Check the speed sensor signal.
        1. Drive the vehicle straight-ahead.

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

           - The sensor check may not be completed if wheelspin occurs.
           - The ABS warning light blinks when the sensor check has been completed and the brake pedal is depressed.
           - The ABS warning light comes on immediately after a malfunction has been detected during the speed sensor check.

    b. Stop the vehicle.

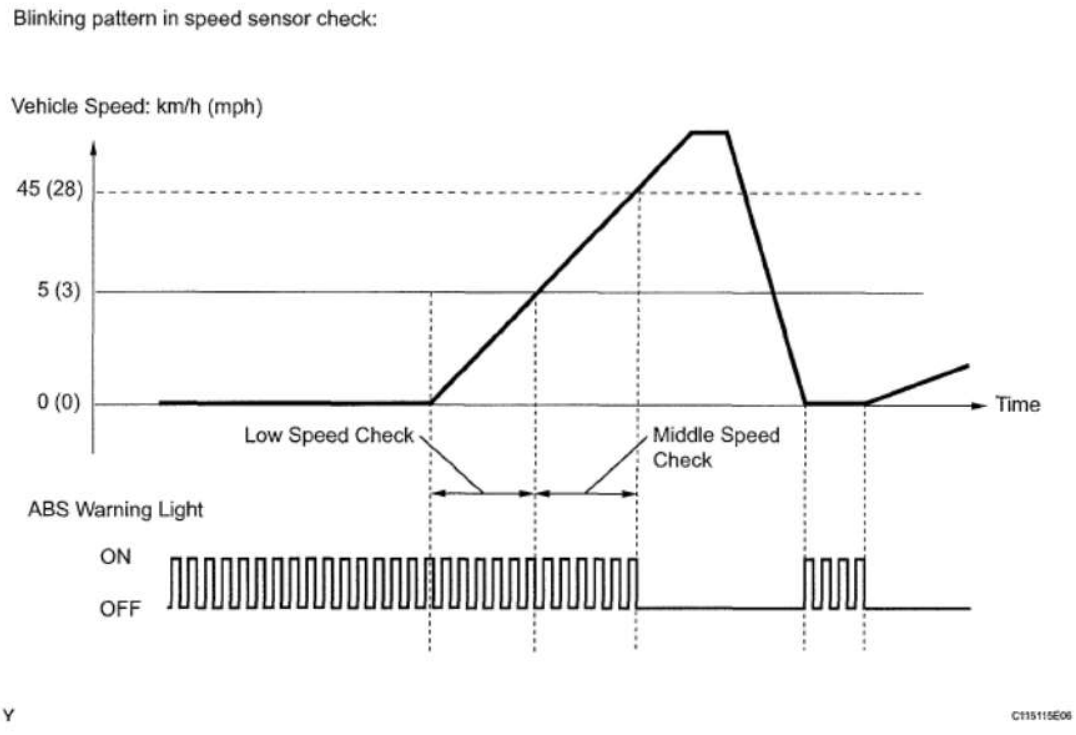


Fig. 114: Identifying ABS Warning Light Blinking Pattern

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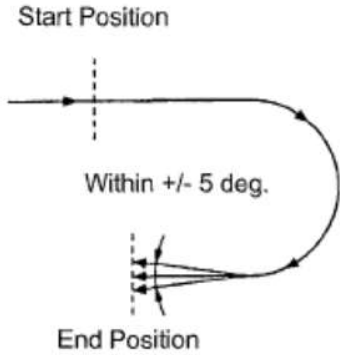
NOTE:

- **Before performing the speed sensor check, complete the acceleration sensor and master cylinder pressure sensor checks.**
- **The speed sensor check may not be completed if the speed sensor check is started while turning the steering wheel or spinning the wheels.**
- **After the ABS warning light goes off, if vehicle speed exceeds 80 km/h (50 mph), a sensor check code will be stored again. Decelerate or stop the vehicle before the speed reaches 80 km/h (50 mph).**
- **If the sensor check has not been completed, the ABS warning light blinks while driving and the ABS system does not operate.**

HINT:

When the sensor check has been completed, the ABS warning light goes off while driving and blinks in the Test Mode pattern while stationary.

13. **YAW RATE SENSOR CHECK (Using SST Check Wire)**
    a. Check the output of the yaw rate sensor.
        1. Keep the vehicle stationary on a level surface for 1 second or more.
        2. Move the shift lever from the P to D position (for automatic transaxle model) or release the parking brake (for manual transaxle model) and drive the vehicle at a vehicle speed of approximately 5 km/h (3 mph) and turn the steering wheel either to the left or right 90° or more and until the vehicle makes a 180° turn.
        3. Stop the vehicle and move the shift lever to the P position (for automatic transaxle model) or apply the parking brake (for manual transaxle model). Check that the skid control buzzer sounds for 3 seconds.



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Fig. 115: Identifying Start And End Position Of Vehicle
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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 **SKID CONTROL BUZZER CIRCUIT**), then perform the sensor check again.
- If the skid control buzzer still does not sound, there is a malfunction in the yaw rate sensor, so check the DTC.
- Make a 180° turn. At the end of the turn, the direction of the vehicle should be 180° +/- 5° of its start position.
- Do not spin the wheels.
- Do not turn the ignition switch to OFF while turning.
- Do not move the shift lever to the P position (for automatic transaxle model) or do not apply the parking brake (for manual transaxle model) while turning. Changing in the vehicle speed, stopping, or driving in reverse is possible.
- Complete the turn within 20 seconds.

14. **END OF SENSOR CHECK (for Using SST Check Wire)**
    a. If the sensor check is completed, the ABS warning light blinks (Test Mode) when the vehicle stops and the ABS warning light is off while the vehicle is driving.

NOTE:

- **When the yaw rate sensor, acceleration sensor, speed sensor, and master cylinder pressure sensor checks are completed, the sensor check is completed.**
- **If the sensor check is not completed, the ABS warning light blinks even while the vehicle is driving and the ABS does not operate.**

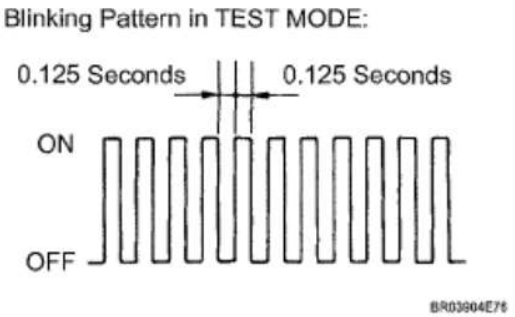


Fig. 116: Identifying ABS Warning Light Blinking Pattern
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15. **READ DTC OF SIGNAL CHECK FUNCTION (for Using SST Check Wire)**
    a. Using SST, connect terminals TC and CG of the DLC3.

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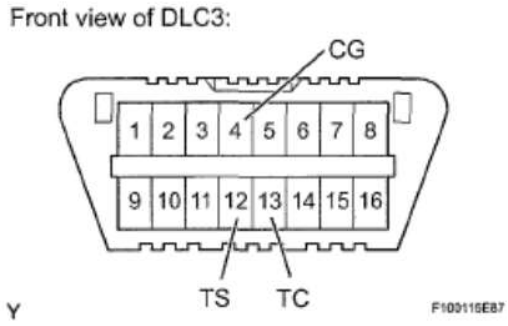


Fig. 117: Identifying DLC3 Connector Terminals TS And CG
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Count the number of blinks of the ABS warning and VSC OFF indicator lights.

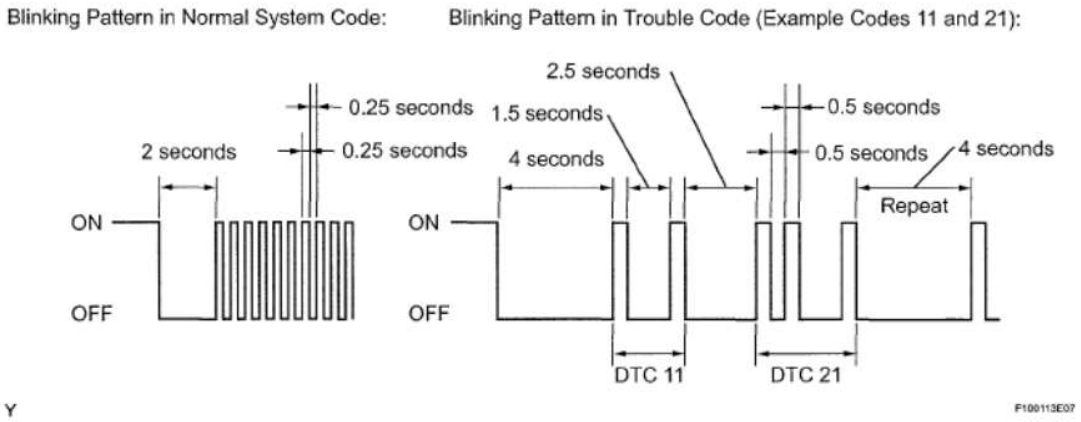


Fig. 118: Blinking Pattern In Normal System Code And Trouble Code
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- **If only the DTCs are displayed, repair the malfunction area and clear the DTCs.**
- **If the DTCs or Test Mode codes (DTC of signal check function) are displayed, repair the malfunction area, clear the DTCs and perform Test Mode inspection.**

HINT:

- If more than 1 malfunction is detected at the same time, the lowest numbered code will be displayed first.
- See the list of DTCs (See procedure A).

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

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d. Turn the ignition switch to ON.

HINT:

- If the ignition switch is not turned to ON after SST is removed from the DLC3, the previous Test Mode will continue.
- If the ignition switch is turned to ON with terminals TS and CG shorted, the previous Test Mode will continue.

16. **DTC OF TEST MODE (SIGNAL CHECK) FUNCTION (Procedure "A")**

ABS sensor:

DTC CHART

DTC Code	Detection Item	Trouble Area
C1271/71	Low output signal of front speed sensor RH	• Front speed sensor RH • Sensor installation • Speed sensor rotor
C1272/72	Low output signal of front speed sensor LH	• Front speed sensor LH • Sensor installation • Speed sensor rotor
C1273/73	Low output signal of rear speed sensor RH	• Rear speed sensor RH • Sensor installation • Speed sensor rotor
C1274/74	Low output signal of rear speed sensor LH	• Rear speed sensor LH • Sensor installation • Speed sensor rotor
C1275/75	Abnormal change in output signal of front speed sensor RH	Speed sensor rotor
C1276/76	Abnormal change in output signal of front speed sensor LH	Speed sensor rotor
C1277/77	Abnormal change in output signal of rear speed sensor RH	Speed sensor rotor
C1278/78	Abnormal change in output signal of rear speed sensor LH	Speed sensor rotor
C1279/79	Acceleration sensor output voltage malfunction	• Yaw rate and acceleration sensor • Sensor installation
C1281/81	Master cylinder pressure sensor output malfunction	• Stop light switch • Master cylinder pressure

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		sensor

VSC sensor:

DTC CHART

DTC Code	Detection Item	Trouble Area
C0371/71	Yaw rate sensor	Yaw rate and acceleration sensor

HINT:

The codes in this table are output only in Test Mode (signal check).

PROBLEM SYMPTOMS TABLE

Use the table below to help determine the cause of a problem. The likely causes of the problem are indicated in descending order. Check each suspected area in order. Repair or replace faulty parts or perform adjustments as necessary.

NOTE: When replacing the brake actuator assembly, sensor, etc., turn the ignition switch to OFF.

HINT:

- Inspect the fuse and relay before investigating the suspected areas as shown in the table below.
- Inspect each suspected area in order for the corresponding symptom.

Vehicle Stability Control System:

PROBLEM SYMPTOM CHART

Symptom	Suspected Area	See
	Check for DTCs again and make sure that the normal system code is output.	**DTC CHECK/CLEAR**
	IG power source circuit	**DTC C1241/41 LOW BATTERY POSITIVE VOLTAGE OR ABNORMALLY HIGH BATTERY POSITIVE VOLTAGE**
	Front speed sensor circuit	**DTC C0200/31 FRONT SPEED SENSOR RH CIRCUIT; DTC C0205/32 FRONT SPEED SENSOR LH CIRCUIT; DTC C1271/71 LOW OUTPUT SIGNAL OF FRONT SPEED SENSOR RH (TEST MODE DTC); DTC C1272/72 LOW OUTPUT SIGNAL OF FRONT SPEED SENSOR LH (TEST MODE DTC)**
	Rear speed sensor	**DTC C0210/33 REAR SPEED SENSOR RH CIRCUIT; DTC C0215/34 REAR SPEED SENSOR LH CIRCUIT; DTC C1273/73 LOW OUTPUT SIGNAL OF REAR SPEED**

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	circuit	**SENSOR RH (TEST MODE DTC); DTC C1274/74 LOW OUTPUT SIGNAL OF REAR SPEED SENSOR LH (TEST MODE DTC)**
ABS, BA and/or EBD does not operate	Check the brake actuator assembly with the Techstream. (Check brake actuator assembly operation using the Active Test function.) If abnormal, check the hydraulic circuit for leaks.	**BRAKE ACTUATOR**
	If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	**BRAKE ACTUATOR**
ABS, BA and/or EBD does not operate efficiently	Check for DTCs again and make sure that the normal system code is output.	**DTC CHECK/CLEAR**
	Front speed sensor circuit	**DTC C0200/31 FRONT SPEED SENSOR RH CIRCUIT; DTC C0205/32 FRONT SPEED SENSOR LH CIRCUIT; DTC C1271/71 LOW OUTPUT SIGNAL OF FRONT SPEED SENSOR RH (TEST MODE DTC); DTC C1272/72 LOW OUTPUT SIGNAL OF FRONT SPEED SENSOR LH (TEST MODE DTC)**
	Rear speed sensor circuit	**DTC C0210/33 REAR SPEED SENSOR RH CIRCUIT; DTC C0215/34 REAR SPEED SENSOR LH CIRCUIT; DTC C1273/73 LOW OUTPUT SIGNAL OF REAR SPEED SENSOR RH (TEST MODE DTC); DTC C1274/74 LOW OUTPUT SIGNAL OF REAR SPEED SENSOR LH (TEST MODE DTC)**
	Stop light switch circuit	**DTC C1249/49 OPEN IN STOP LIGHT SWITCH CIRCUIT**
	Check the brake actuator assembly with the Techstream. (Check brake actuator assembly operation using the Active Test function.) If abnormal, check the hydraulic circuit for	**BRAKE ACTUATOR**

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	leaks.	
	If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	**BRAKE ACTUATOR**
ABS sensor DTC check cannot be done	Check for DTCs again and make sure that the normal system code is output.	**DTC CHECK/CLEAR**
	TC and CG terminal circuit	**TC AND CG TERMINAL CIRCUIT**
	If the symptoms still occur even after the above circuit in the suspected area has been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	**BRAKE ACTUATOR**
ABS warning light abnormal (Remains on)	ABS warning light circuit	**ABS WARNING LIGHT REMAINS ON**
	Brake actuator assembly (Skid control ECU)	**BRAKE ACTUATOR**
ABS warning light abnormal (Does not come on)	ABS warning light circuit	**ABS WARNING LIGHT DOES NOT COME ON**
	Brake actuator assembly (Skid control ECU)	**BRAKE ACTUATOR**
Brake warning light abnormal (Remains on)	Brake warning light circuit	**BRAKE WARNING LIGHT REMAINS ON**
	Brake actuator assembly (Skid control ECU)	**BRAKE ACTUATOR**
Brake warning light abnormal	Brake warning light circuit	**BRAKE WARNING LIGHT DOES NOT COME ON**

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(Does not come on)	Brake actuator assembly (Skid control ECU)	**BRAKE ACTUATOR**
VSC and/or TRAC does not operate	Check for DTCs again and make sure that the normal system code is output.	**DTC CHECK/CLEAR**
	IG power source circuit	**DTC C1241/41 LOW BATTERY POSITIVE VOLTAGE OR ABNORMALLY HIGH BATTERY POSITIVE VOLTAGE**
	Check the hydraulic circuit for leaks.	-
	Front speed sensor circuit	**DTC C0200/31 FRONT SPEED SENSOR RH CIRCUIT; DTC C0205/32 FRONT SPEED SENSOR LH CIRCUIT; DTC C1271/71 LOW OUTPUT SIGNAL OF FRONT SPEED SENSOR RH (TEST MODE DTC); DTC C1272/72 LOW OUTPUT SIGNAL OF FRONT SPEED SENSOR LH (TEST MODE DTC)**
	Rear speed sensor circuit	**DTC C0210/33 REAR SPEED SENSOR RH CIRCUIT; DTC C0215/34 REAR SPEED SENSOR LH CIRCUIT; DTC C1273/73 LOW OUTPUT SIGNAL OF REAR SPEED SENSOR RH (TEST MODE DTC); DTC C1274/74 LOW OUTPUT SIGNAL OF REAR SPEED SENSOR LH (TEST MODE DTC)**
	Yaw rate and acceleration sensor circuit	**DTC C1232/32 STUCK IN ACCELERATION SENSOR; DTC C0371/71 YAW RATE SENSOR (TEST MODE DTC); DTC C1234/34 YAW RATE SENSOR MALFUNCTION; DTC C1243/43 ACCELERATION SENSOR STUCK MALFUNCTION; DTC C1244/44 OPEN OR SHORT IN ACCELERATION SENSOR CIRCUIT; DTC C1245/45 ACCELERATION SENSOR OUTPUT MALFUNCTION; DTC C1279/79 ACCELERATION SENSOR OUTPUT VOLTAGE MALFUNCTION (TEST MODE DTC); DTC C1381/97 ACCELERATION SENSOR POWER SUPPLY VOLTAGE MALFUNCTION**
	Steering angle sensor circuit	**DTC C1231/31 STEERING ANGLE SENSOR CIRCUIT MALFUNCTION**
	If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	**BRAKE ACTUATOR**
	Check for DTCs again and make sure that the	

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	normal system code is output.	DTC CHECK/CLEAR
	TC and CG terminal circuit	TC AND CG TERMINAL CIRCUIT
VSC sensor DTC check cannot be done	If the symptoms still occur even after the above circuit in suspected areas has been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	BRAKE ACTUATOR
VSC OFF indicator abnormal (Remains on)	VSC OFF indicator light circuit	VSC OFF INDICATOR LIGHT REMAINS ON
	Brake actuator assembly (Skid control ECU)	BRAKE ACTUATOR
VSC OFF indicator abnormal (Does not come on)	VSC OFF indicator light circuit	VSC OFF INDICATOR LIGHT DOES NOT COME ON
	Brake actuator assembly (Skid control ECU)	BRAKE ACTUATOR
SLIP indicator light abnormal (Remains on)	SLIP indicator light circuit	SLIP INDICATOR LIGHT REMAINS ON
	Brake actuator assembly (Skid control ECU)	BRAKE ACTUATOR
SLIP indicator light abnormal (Does not come on)	SLIP indicator light circuit	SLIP INDICATOR LIGHT DOES NOT COME ON
	Brake actuator assembly (Skid control ECU)	BRAKE ACTUATOR
Sensor check cannot be done	TS and CG terminal circuit	TS AND CG TERMINAL CIRCUIT
	Brake actuator assembly (Skid control ECU)	BRAKE ACTUATOR
Skid control buzzer abnormal	Skid control buzzer circuit	SKID CONTROL BUZZER CIRCUIT
	Brake actuator assembly (Skid control ECU)	BRAKE ACTUATOR

TERMINALS OF ECU

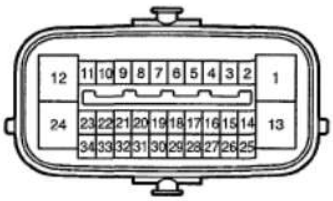
1. **TERMINALS OF ECU**

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Component without harness connected:
(Skid Control ECU)



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Fig. 119: Identifying ECU Connector Terminal
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ECU CONNECTOR TERMINALS REFERENCE CHART

Terminal No. (Symbol)	Terminal Description
1 (GND1)	Skid control ECU ground
2 (STP)	Stop light switch input
4 (RL-)	Rear wheel speed LH (-) signal input
5 (RL+)	Rear wheel speed LH (+) power supply output
6 (FR-)	Front wheel speed RH (-) signal input
7 (FR+)	Front wheel speed RH (+) power supply output
11 (SP1)	Speed signal output for speedometer
12 (+BS)	Solenoid relay power supply
13 (GND2)	Pump motor ground
14 (CANL)	CAN communication line L
16 (RR-)	Rear wheel speed RH (-) signal input
17 (RR+)	Rear wheel speed RH (+) power supply output
18 (FL-)	Front wheel speed LH (-) signal input
19 (FL+)	Front wheel speed LH (+) power supply output
24 (+BM)	Motor relay power supply
25 (CANH)	CAN communication line H
30 (CSW)	VSC OFF switch input
34 (IG1)	ECU power supply

2. **TERMINAL INSPECTION**
   a. Disconnect the connector and measure the voltage or resistance on the wire harness side.

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Front view of wire harness connector:
(to Skid Control ECU)

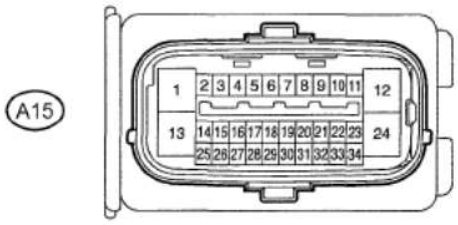


Fig. 120: Identifying Skid Control ECU Connector Terminal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

HINT:

Voltage cannot be measured with the connector connected to the skid control ECU as the connector is watertight.

Standard:

ECU CONNECTOR TERMINALS REFERENCE CHART

Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
A15-1 (GND1) - Body ground	W-B - Body ground	Skid control ECU ground	Always	Below 1 ohms
A15-2 (STP) - Body ground	G - Body ground	Stop light switch input	Stop light switch ON --> OFF (Brake pedal depressed --> released)	8 to 14 V --> Below 1.5 V
A15-12 (+BS) - Body ground	W - Body ground	Solenoid relay power supply	Always	11 to 14 V
A15-13 (GND2) - Body ground	W-B - Body ground	Pump motor ground	Always	Below 1 ohms
A15-24 (+BM) - Body ground	B - Body ground	Motor relay power supply	Always	11 to 14 V
A15-25 (CANH) - A15-14 (CANL)	G-W	CAN BUS	Ignition switch OFF	54 to 69 ohms
A15-30 (CSW) - Body ground	B - Body ground	VSC OFF switch input	VSC OFF switch held ON --> OFF (Not pressed)	Below 25 ohms --> 10 kohms or higher
A15-34 (IG1) - Body ground	B - Body ground	ECU power supply	Ignition switch ON	11 to 14 V

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DIAGNOSIS SYSTEM

1. **DESCRIPTION**

When troubleshooting a vehicle with the diagnosis system, the only difference from the usual troubleshooting procedure is connecting the Techstream to the vehicle and reading various data output from the vehicle's skid control ECU.

The skid control ECU records DTCs when the computer detects a malfunction in the computer itself or in its circuits.

To check the DTCs, connect the Techstream to the DLC3 on the vehicle. The Techstream enables you to erase the DTCs, activate the various actuators, and check the Freeze Frame Data and Data List.

a. Check the battery voltage.

Standard voltage:

11 to 14 V

If the voltage is below 11V, recharge the battery before proceeding to the next step.

b. Check the DLC3 (See **HOW TO TROUBLESHOOT ECU CONTROLLED SYSTEMS**).

2. **DIAGNOSIS**

a. If the skid control ECU detects a malfunction, the ABS warning, brake warning, SLIP indicator and VSC OFF indicator lights will come on in order to warn the driver.

The table below indicates which lights will turn on when there is a malfunction in a particular function.

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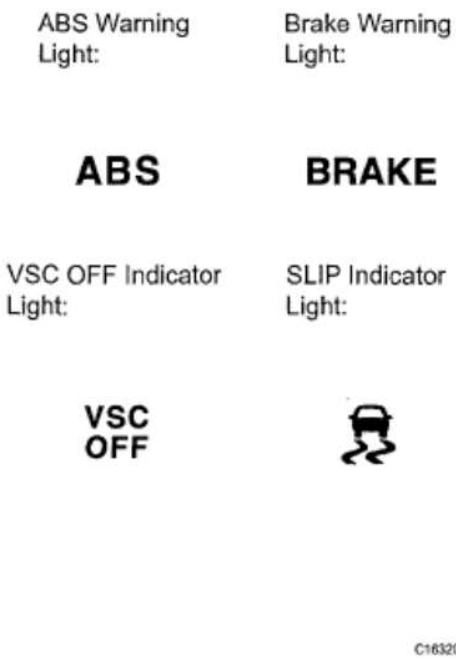


Fig. 121: ABS Warning Light And Brake Warning Light Chart
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DIAGNOSTIC PROCEDURE CHART

Item / Trouble Area	ABS	EBD	BA	TRAC	VSC
ABS warning light	o	o	o	-	-
Brake warning light	-	o	-	-	-
VSC OFF indicator light	o	o	o	o	o
SLIP indicator light	o	o	o	o	o
o: Light ON -: Light OFF					

- The DTCs are simultaneously stored in the memory. The DTCs can be read by connecting the SST between terminals TC and CG of the DLC3 and observing the blinking pattern of the ABS warning and VSC OFF indicator lights, or by connecting a Techstream.
- This system has a Test Mode (signal check) function (See **TEST MODE PROCEDURE**).

3. **WARNING LIGHT AND INDICATOR LIGHT INITIAL CHECK**
   a. Release the parking brake.

NOTE: **When releasing the parking brake, move the shift lever to the P position for safety (for automatic transaxle model) or set chocks to hold the vehicle for safety (for manual transaxle model).**

HINT:

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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 ON, check that the ABS warning, brake warning, VSC OFF indicator and SLIP indicator lights come on for approximately 3 seconds.

HINT:

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

If the indicator remains on or does not come on, proceed to troubleshooting for the light circuits listed below.

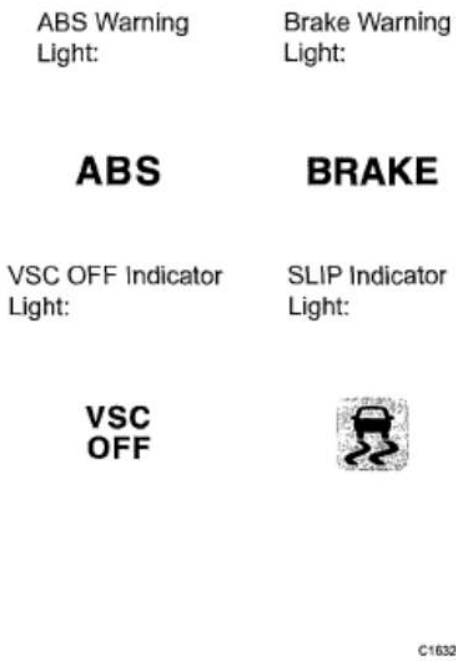


Fig. 122: ABS Warning Light And Brake Warning Light Chart
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DIAGNOSTIC PROCEDURE CHART

Trouble Area	See procedure
ABS warning light circuit (Remains on)	ABS WARNING LIGHT REMAINS ON
ABS warning light circuit (Does not come on)	ABS WARNING LIGHT DOES NOT COME ON
Brake warning light circuit (Remains on)	BRAKE WARNING LIGHT REMAINS ON
Brake warning light circuit (Does not come on)	BRAKE WARNING LIGHT DOES NOT COME ON
VSC OFF indicator light circuit (Remains	VSC OFF INDICATOR LIGHT REMAINS ON

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on)	
VSC OFF indicator light circuit (Does not come on)	**VSC OFF INDICATOR LIGHT DOES NOT COME ON**
SLIP indicator light circuit (Remains on)	**SLIP INDICATOR LIGHT REMAINS ON**
SLIP indicator light circuit (Does not come on)	**SLIP INDICATOR LIGHT DOES NOT COME ON**

DTC CHECK/CLEAR

1. **DTC CHECK/CLEAR (Using Techstream)**
   a. Check the DTC.
      1. Connect the Techstream to the DLC3.
      2. Turn the ignition switch to ON.
      3. Enter the following menu items: Chassis / ABS/ VSC/TRAC / Trouble Codes.

         HINT:

         Refer to the Techstream operator's manual for further details.

   b. Clear the DTC.
      1. Connect the Techstream to the DLC3.
      2. Turn the ignition switch to ON.
      3. Enter the following menu items: Chassis / ABS/ VSC/TRAC / Trouble Codes.
      4. Clear the DTCs by following the prompts on the Techstream.

         HINT:

         Refer to the Techstream operator's manual for further details.

2. **DTC CHECK/CLEAR (for Using SST Check Wire)**
   a. Check the DTC.
      1. Using SST, connect terminals TC and CG of the DLC3.

         SST 09843-18040

      2. Turn the ignition switch to ON.
      3. Observe the blinking pattern of the ABS warning and VSC OFF indicator lights in order to identify the DTC.

         HINT:

         If no code appears, inspect the TC and CG terminal circuit, and ABS warning and VSC OFF indicator light circuits.

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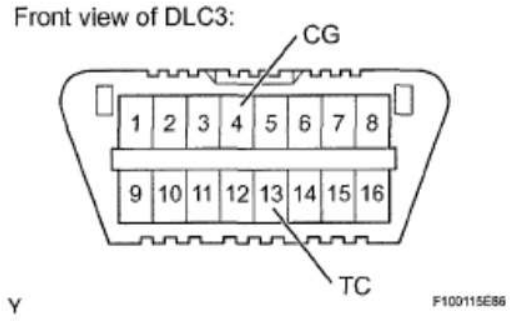


Fig. 123: Identifying DLC3 Connector Terminal CG And TC
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DIAGNOSTIC PROCEDURE CHART

Trouble Area	See procedure
TC and CG terminal circuit	**TC AND CG TERMINAL CIRCUIT**
ABS warning light circuit (Remains on)	**ABS WARNING LIGHT REMAINS ON**
ABS warning light circuit (Does not come on)	**ABS WARNING LIGHT DOES NOT COME ON**
VSC OFF indicator light circuit (Remains on)	**VSC OFF INDICATOR LIGHT REMAINS ON**
VSC OFF indicator light circuit (Does not come on)	**VSC OFF INDICATOR LIGHT DOES NOT COME ON**

4. As an example, the illustration below shows the blinking patterns of the normal system code and trouble codes 11 and 21 for ABS warning and VSC OFF indicator lights.

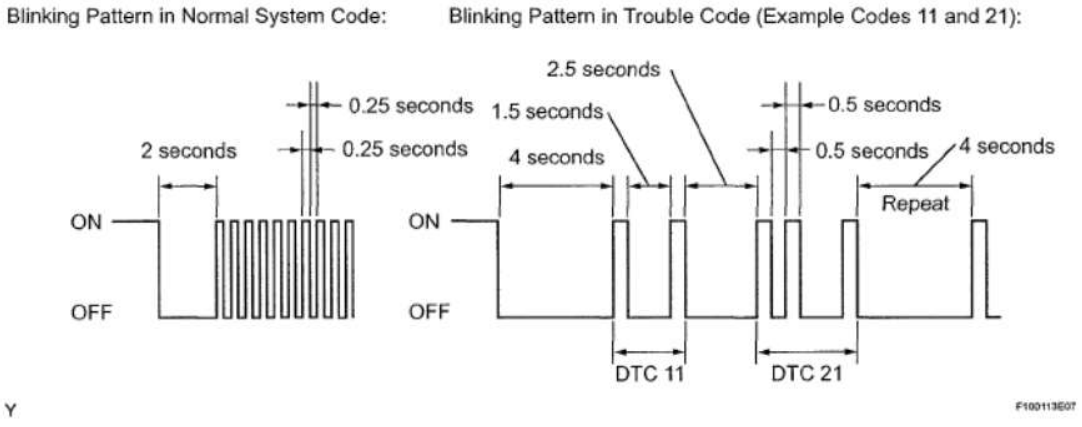


Fig. 124: Blinking Pattern In Normal System Code And Trouble Code
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. The codes are explained in the code table (See **DIAGNOSTIC TROUBLE CODE CHART**).
6. After completing the check, disconnect terminals TC and CG of the DLC3.

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HINT:

If 2 or more DTCs are detected at the same time, the DTCs will be displayed in ascending order.

b. Clear the DTC.

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

SST 09843-18040

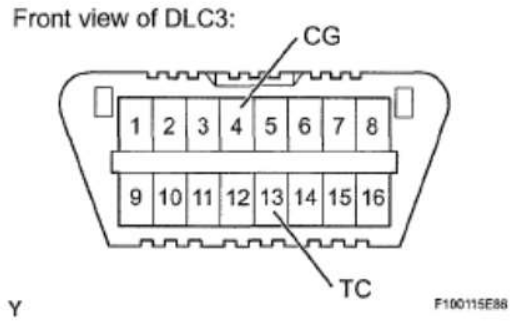


Fig. 125: Identifying DLC3 Connector Terminal CG And TC
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. Turn the ignition switch to ON.
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.

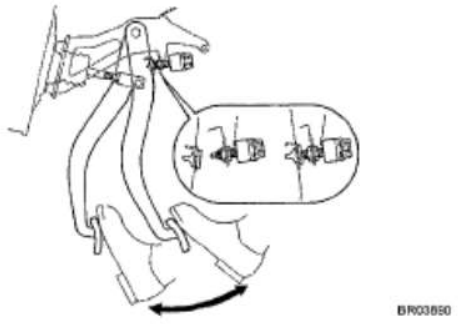


Fig. 126: Checking ABS Warning Light
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. Remove SST from the terminals of the DLC3.

HINT:

Clearing the DTCs cannot be performed by disconnecting the battery terminal or the ECU-IG

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fuse.

3. **END OF DTC CHECK/CLEAR**
   a. Turn the ignition switch to ON.
   b. Check that the ABS warning light goes off within approximately 3 seconds.

FREEZE FRAME DATA

1. **FREEZE FRAME DATA**
   a. Whenever a DTC is detected, the skid control ECU stores the current vehicle (sensor) state as Freeze Frame Data.
   b. The skid control ECU stores the number of times (maximum: 31) the ignition switch has been turned from OFF to ON since the last time the ABS was activated.

   HINT:

   - However, if the vehicle is stopped or at a low speed (7 km/h (4.3 mph) or less), or if a DTC is detected, the skid control ECU will stop counting the number.
   - 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 during ABS operation 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.

2. **CHECK FREEZE FRAME DATA**
   a. Connect a Techstream to the DLC3.
   b. Turn the ignition switch to ON.
   c. Turn the Techstream on.
   d. Check the freeze frame data by following the prompts on the Techstream display.

   ABS/VSC/TRAC:

   REFERENCE VALUE CHART

Tester Display	Measurement Item	Reference Value
Elapsed Time after Freeze Trigger	Elapsed time after freeze trigger	Min.: 0 ms, Max.: 500 ms
Number of IG ON	Number of operations of ignition switch being turned to ON after storing Freeze Frame Data	0 to 31

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Buzzer	Skid control buzzer signal	Skid control buzzer ON: ON, OFF: OFF
Stop Light SW	Stop light switch signal	Stop light switch ON: ON, OFF: OFF
Parking Brake SW	Parking brake switch signal	Parking brake switch ON: ON, OFF: OFF
Gear Position	Gear position information	FAIL P, N R NOT R 1st 2nd 3rd 4th 5th 6th
Shift Lever Position	Shift lever position information	FAIL P, N R D/M 1st 2nd 3rd 4th 5th 6th/B
Operated System	Operated system status	ABS activated: ABS VSC activated: VSC TRAC activated: TRC BA activated: BA HAB activated: HAB Fail safe mode activated: FAIL System prohibit activated: SYS No operation activated: NON
Master Cylinder Sensor	Master cylinder pressure sensor reading	Brake pedal released: 0.3 to 0.9 V Brake pedal depressed: 0.8 to 4.5 V
M/C Sensor Grade	Master cylinder pressure sensor change	Min.: -30 MPa/s, Max.: 225 MPa/s
Yaw Rate Sensor	Yaw rate sensor reading	Min.: -128 deg/s, Max.: 127 deg/s
		Min.: -25.11 m/s^2 , Max.:

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Lateral G	Lateral G	24.91 m/s^2
Forward and Rearward G	Forward and backward G	Min.: -25.11 m/s^2 , Max.: 24.91 m/s^2
FR Wheel Speed	FR wheel speed	Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph)
FL Wheel Speed	FL wheel speed	Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph)
RR Wheel Speed	RR wheel speed	Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph)
RL Wheel Speed	RL wheel speed	Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph)
Vehicle Speed	Vehicle speed reading	Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph)
Vehicle Speed Grade	Vehicle speed grade	Min.: -25.11 m/s^2 , Max.: 24.91 m/s^2
Real Engine Torque	Real engine torque	Min.: -1024 Nm, Max.: 1023 Nm
Accelerator Opening Angle %	Accelerator opening Angle %	Min.: 0 %, Max.: 128 %
Inspection Mode	Inspection mode	Other: Normal mode Inspect: Inspection mode
Steering Angle Sensor	Steering angle sensor reading	Left turn: Increase Right turn: Decrease
TRAC/VSC Off Mode	TRAC/VSC off mode	Normal: Normal mode TRAC OFF: TRAC OFF mode VSC OFF: VSC OFF mode

3. **CLEAR FREEZE FRAME DATA**

NOTE: Clearing the DTC will also clear the Freeze Frame Data.

a. Connect the Techstream to the DLC3.
b. Turn the ignition switch to ON.
c. Clear the DTC and Freeze Frame Data (See **DTC CHECK/CLEAR**).

FAIL-SAFE CHART

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1. **FAIL SAFE OPERATION**
   - If there is a problem with sensor signals or actuator systems, the skid control ECU prohibits power supply to the brake actuator assembly and informs the ECM of VSC system failure.

     The brake actuator assembly turns off each solenoid and the ECM shuts off VSC control (traction control signal) from the skid control ECU accordingly, which turns out to be as if the ABS, TRAC and VSC systems were not installed.

     The ABS control will be prohibited, but EBD control will continue as much as possible. If EBD control is impossible, the brake warning light will come on to warn the driver (See **DIAGNOSIS SYSTEM**).

   - If system components have any malfunction before starting control, immediately stop the operation. If system components have any malfunction during control, gradually stop the control so as not to trigger a sudden change in vehicle conditions.

     If it is impossible to control the systems, the warning light comes on to inform the driver of termination of the systems (See **DIAGNOSIS SYSTEM**).

   HINT:

   If the brake booster encounters a malfunction, brake performance is gradually lost and ABS, BA, TRAC and VSC systems are prohibited.

   ABS, EBD and BA system:

   FAIL-SAFE CHART

Malfunction Area	Control Method
ABS system	ABS, BA, TRAC and VSC control prohibited
BA system	ABS, BA, TRAC and VSC control prohibited
EBD system	ABS, EBD, BA, TRAC and VSC control prohibited

   HINT:

   A malfunction in either the ABS or BA system will result in an identical operation, with ABS, BA, TRAC and VSC system control prohibited.

TRAC and VSC system:

FAIL-SAFE CHART

Malfunction Area	Control Method
Engine control system (TRAC and VSC systems)	Before control: Disables control During control: Uses only the brakes to effect control
Brake control system (VSC system)	Before control: Disables control During control: Uses only the engine to effect control

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Brake control system (TRAC system)	Before control: Disables control During control: Disables control (by gradually ending control)

HINT:

As for the TRAC and VSC systems, different systems prohibit different controls depending on the malfunctioning part.

DATA LIST / ACTIVE TEST

1. **DATA LIST**

   HINT:

   Using a Techstream to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

   NOTE: In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

   a. Warm up the engine.
   b. Turn the ignition switch to OFF.
   c. Connect the Techstream to the DLC3.
   d. Turn the ignition switch to ON.
   e. Turn the Techstream on.
   f. Enter the following menu items: Chassis / ABS/ VSC/TRAC / Data List.
   g. According to the display on the tester, read the Data List.

   ABS/VSC/TRAC

   MEASUREMENT ITEM NORMAL CONDITION CHART

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
ABS Warning Light	ABS warning light / ON or OFF	ON: Warning light ON OFF: Warning light OFF	-
VSC Warning Light	VSC OFF indicator light / ON or OFF	ON: Indicator light ON OFF: Indicator	-

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		light OFF	
Brake Warning Light	Brake warning light / ON or OFF	ON: Warning light ON OFF: Warning light OFF	-
Slip Indicator Light	SLIP indicator light / ON or OFF	ON: Indicator light ON OFF: Indicator light OFF	-
Buzzer	Skid control buzzer / ON or OFF	ON: Buzzer ON OFF: Buzzer OFF	-
Stop Light SW	Stop light switch / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
Parking Brake SW	Parking brake switch / ON or OFF	ON: Parking brake applied OFF: Parking brake released	-
Main Idle SW	Main idle switch / ON or OFF	ON: Accelerator pedal released OFF: Accelerator pedal depressed	-
Gear Position	Gear position information / P, N, R, 1st-6th, FAIL, NOT R	Actual gear position	-
Shift Lever Position	Shift lever position information / P, N, R, D/M, 1st-6th/B, FAIL	Actual shift lever position	-
Shift information	Shift information / ON or OFF	ON: During gear change	-
Inspection Mode	Inspection mode / OTHER or INSPECT	OTHER: Normal mode INSPECT: Inspection mode	-
Number of IG ON (Inspection)	Number of ignition switch to ON after entering inspection mode / Min.: 0, Max.: 255	Min.: 0 Max.: 255	-
Master Cylinder Sensor	Master cylinder pressure sensor 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
Zero Point of M/C	Memorized zero value / Min.: -12.5 MPa, Max.: 12.4 MPa	Min.:-12.5 MPa Max.: 12.4 MPa	-
Deceleration Sensor	Acceleration sensor reading / Min.: -18.52 m/s^2 , Max.: 18.39 ml s^2	Min.:-18.52 m/s^2 Max.: 18.39 m/s^2	Reading changes when vehicle is bounced

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Zero Point of Decele	Memorized zero value / Min.: -25.11 m/s^2 , Max.: 24.91 m/s^2	Min.: -25.11 m/s^2 Max.: 24.91 m/s^2	-
Deceleration Sensor2	Acceleration sensor 2 reading / Min.: -18.52 m/s^2 , Max.: 18.39 ml s^2	Min.:-18.52 m/s^2 Max.: 18.39 m/s^2	Reading changes when vehicle is bounced
Zero Point of Decele2	Memorized zero value / Min.: -25.11 m/s^2 , Max.: 24.91 m/s^2	Min.: -25.11 m/s^2 Max.: 24.91 m/s^2	-
Yaw Rate Sensor	Yaw rate sensor / Min.: -128 deg/ s, Max.: 127 deg/s	Min.: -128 deg/s Max.: 127 deg/s	-
Zero Point of Yaw Rate	Memorized zero value / Min.: -128 deg/s, Max.: 127 deg/s	Min.: -128 deg/s Max.: 127 deg/s	-
Yaw Rate Sensor2	Yaw rate sensor 2 / Min.: -128 deg/s, Max.: 127 deg/s	Min.:-128 deg/s Max.: 127 deg/s	-
Zero Point of Yaw Rate2	Memorized zero value / Min.: -128 deg/s, Max.: 127 deg/s	Min.:-128 deg/s Max.: 127 deg/s	-
Steering Angle Sensor	Steering angle sensor / Min.: -3276.8 deg, Max.: 3276.7 deg	Left turn: Increase Right turn: Decrease	-
Zero Point of Steering Angle	Memorized zero value / Min.: -3276.8 deg, Max.: 3276.7 deg	Min.: -3276.8 deg Max.: 3276.7 deg	-
Lateral G	Lateral G / Min.: -25.11 m/s^2 , Max.: 24.91 m/s^2	Min.: -25.11 m/s^2 Max.: 24.91 m/s^2	-
Forward and Rearward G	Forward and backward G / Min.: -25.11 m/s^2 , Max.: 24.91 m/s^2	Min.:-25.11 m/s^2 Max.: 24.91 m/s^2	-
Yaw Rate Value	Yaw rate value / Min.: -128 deg/s, Max.: 127 deg/s	Min.:-128 deg/s Max.: 127 deg/s	-
Steering Angle Value	Steering angle value / Min.: -3276.8 deg, Max.: 3276.7 deg	Min.: -3276.8 deg Max.: 3276.7 deg	-
FR Wheel Speed	FR wheel speed sensor reading / Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Actual wheel speed	Similar speed as indicated on speedometer
FL Wheel Speed	FL wheel speed sensor reading / Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Actual wheel speed	Similar speed as indicated on speedometer
RR Wheel Speed	RR wheel speed sensor reading / Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Actual wheel speed	Similar speed as indicated on speedometer
RL Wheel Speed	RL wheel speed sensor reading / Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Actual wheel speed	Similar speed as indicated on speedometer

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Vehicle Speed	Maximum wheel speed sensor reading / Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Actual vehicle speed	Speed indicated on speedometer
FR Wheel Acceleration	FR wheel acceleration / Min.: -200.84 m/s^2 , Max.: 199.27 m/s^2	0 m/s^2	-
FL Wheel Acceleration	FL wheel acceleration / Min.: -200.84 m/s^2 , Max.: 199.27 m/s^2	0 m/s^2	-
RR Wheel Acceleration	RR wheel acceleration / Min.: -200.84 m/s^2 , Max.: 199.27 m/s^2	0 m/s^2	-
RL Wheel Acceleration	RL wheel acceleration / Min.: -200.84 m/s^2 , Max.: 199.27 m/s^2	0 m/s^2	-
FR Wheel ABS Ctrl Status	FR wheel ABS control status / ON or OFF	ON: During the control	-
FL Wheel ABS Ctrl Status	FL wheel ABS control status / ON or OFF	ON: During the control	-
RR Wheel ABS Ctrl Status	RR wheel ABS control status / ON or OFF	ON: During the control	-
RL Wheel ABS Ctrl Status	RL wheel ABS control status / ON or OFF	ON: During the control	-
RR Wheel EBD Ctrl Status	RR wheel EBD control status / ON or OFF	ON: During the control	-
RL Wheel EBD Ctrl Status	RL wheel EBD control status / ON or OFF	ON: During the control	-
BA Ctrl Status	BA control status / ON or OFF	ON: During the control	-
TRC (TRAC) Ctrl Status	TRAC control status / ON or OFF	ON: During the control	-
TRC (TRAC) Engine Ctrl Status	TRAC engine control status / ON or OFF	ON: During the control	-
TRC (TRAC) Brake Ctrl Status	TRAC brake control status / ON or OFF	ON: During the control	-
FR Wheel VSC Ctrl Status	FR wheel VSC control status / ON or OFF	ON: During the control	-
FL Wheel VSC Ctrl Status	FL wheel VSC control status / ON or OFF	ON: During the control	-
RR Wheel VSC Ctrl Status	RR wheel VSC control status / ON or OFF	ON: During the control	-
RL Wheel VSC Ctrl Status	RL wheel VSC control status / ON or OFF	ON: During the control	-
Engine Revolutions	Engine revolutions / Min.: 0 r/min, Max.: 65535 r/min	Min..: 0 r/min Max.: 65535 r/min	-
Real Engine Torque	Real engine torque / Min.: -1024	Min.: -1024 N*m	-

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	N*m, Max.: 1023 N*m	Max.: 1023 N*m	
Accelerator Opening Angle %	The difference of a present accelerator/Min.: 0%, Max.: 128 %	Min.: 0 %, Max.: 128 %	-
Solenoid Relay	ABS solenoid relay / ON or OFF	ON: Solenoid relay ON OFF: Solenoid relay OFF	-
ECB (Electronically Controlled Brake system) Motor Relay	ABS motor relay / ON or OFF	ON: Motor relay ON OFF: Motor relay OFF	-
Fail Safe Motor Relay	ABS motor fail safe relay / ON or OFF	ON: Motor relay ON OFF: Motor relay OFF	-
TR(A)C/VSC Solenoid (SM2)	Master cut solenoid (SM2) / ON or OFF	ON: Operates	-
TR(A)C/VSC Solenoid (SM1)	Master cut solenoid (SM1) / ON or OFF	ON: Operates	-
ABS Solenoid (SFRH)	ABS solenoid (SFRH) / ON or OFF	ON: Operates	-
ABS Solenoid (SFRR)	ABS solenoid (SFRR) / ON or OFF	ON: Operates	-
ABS Solenoid (SFLH)	ABS solenoid (SFLH) / ON or OFF	ON: Operates	-
ABS Solenoid (SFLR)	ABS solenoid (SFLR) / ON or OFF	ON: Operates	-
ABS Solenoid (SRRH)	ABS solenoid (SRRH) / ON or OFF	ON: Operates	-
ABS Solenoid (SRRR)	ABS solenoid (SRRR) / ON or OFF	ON: Operates	-
ABS Solenoid (SRLH)	ABS solenoid (SRLH) / ON or OFF	ON: Operates	-
ABS Solenoid (SRLR)	ABS solenoid (SRLR) / ON or OFF	ON: Operates	-
FR Speed Open	FR speed sensor open detection / Error or Normal	Error: Momentary interruption Normal: Normal	-
FL Speed Open	FL speed sensor open detection / Error or Normal	Error: Momentary interruption Normal: Normal	-
RR Speed Open	RR speed sensor open detection / Error or Normal	Error: Momentary interruption Normal: Normal	-

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RL Speed Open	RL speed sensor open detection / Error or Normal	Error: Momentary interruption Normal: Normal	-
EFI Communication Open	EFI communication open detection / Error or Normal	Error: Momentary interruption Normal: Normal	-
Yaw Rate Open	Yaw rate sensor open detection / Error or Normal	Error: Momentary interruption Normal: Normal	-
Deceleration Open	Acceleration sensor open detection / Error or Normal	Error: Momentary interruption Normal: Normal	-
Steering Open	Steering angle sensor open detection / Error or Normal	Error: Momentary interruption Normal: Normal	-
Master Cylinder Open	Master cylinder pressure sensor open detection / Error or Normal	Error: Momentary interruption Normal: Normal	-
MT Voltage Value	Motor driving monitor voltage / Min.: 0 V, Max.: 255 V	Min.: 0 V Max.: 255 V	-
TRAC/VSC Off Mode	TRAC/VSC off mode / Normal, TRAC OFF or VSC OFF	Normal: Normal mode TRAC OFF: TRAC OFF mode VSC OFF: VSC OFF mode	-
Number of DTC	Number of DTC recorded / Min.: 0, Max.: 255	Min.: 0 Max.: 255	-

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2. **ACTIVE TEST**

HINT:

Using a Techstream to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts to operate without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

a. Warm up the engine.
b. Turn the ignition switch to OFF.
c. Connect the Techstream to the DLC3.
d. Turn the ignition switch to ON.
e. Turn the Techstream on.

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f. Enter the following menu items: Chassis / ABS/ VSC/TRAC / Active Test.

g. According to the display on the tester, perform the Active Test.

ABS/VSC/TRAC:

ACTIVE TEST

Tester Display	Test Part	Control Range	Diagnostic Note
ABS Warning Light	ABS warning light	Warning light ON / OFF	Observe combination meter
VSC Warning Light	VSC OFF indicator light	Indicator light ON / OFF	Observe combination meter
Brake Warning Light	Brake warning light	Warning light ON / OFF	Observe combination meter
Slip Indicator Light	SLIP indicator light	Indicator light ON / OFF	Observe combination meter
Buzzer	Skid control buzzer	Buzzer ON / OFF	Buzzer can be heard
Solenoid Relay	ABS solenoid relay	Relay ON / OFF	-
Motor Relay	ABS motor relay	Relay ON / OFF	Operating sound of motor can be heard
ABS Solenoid (SRLR)	ABS solenoid (SRLR)	Solenoid ON / OFF	Operating sound of solenoid (clicking sound) can be heard
ABS Solenoid (SRLH)	ABS solenoid (SRLH)	Solenoid ON / OFF	Operating sound of solenoid (clicking sound) can be heard
ABS Solenoid (SRRR)	ABS solenoid (SRRR)	Solenoid ON / OFF	Operating sound of solenoid (clicking sound) can be heard
ABS Solenoid (SRRH)	ABS solenoid (SRRH)	Solenoid ON / OFF	Operating sound of solenoid (clicking sound) can be heard
ABS Solenoid (SFLR)	ABS solenoid (SFLR)	Solenoid ON / OFF	Operating sound of solenoid (clicking sound) can be heard
ABS Solenoid (SFLH)	ABS solenoid (SFLH)	Solenoid ON / OFF	Operating sound of solenoid (clicking sound) can be heard
ABS Solenoid (SFRR)	ABS solenoid (SFRR)	Solenoid ON / OFF	Operating sound of solenoid (clicking sound) can be heard
ABS Solenoid (SFRH)	ABS solenoid (SFRH)	Solenoid ON / OFF	Operating sound of solenoid (clicking sound) can be heard
VSC/TRAC Solenoid (SMR)	Master cut solenoid (SM2)	Solenoid ON / OFF	Operating sound of solenoid (clicking sound) can be heard
VSC/TRAC Solenoid (SMF)	Master cut solenoid (SM1)	Solenoid ON / OFF	Operating sound of solenoid (clicking sound) can be heard

DIAGNOSTIC TROUBLE CODE CHART

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NOTE: Turn the ignition switch to OFF before removing parts.

HINT:

- If no abnormality is found when inspecting parts, inspect the skid control ECU and ground points for poor contact.
- If a trouble code is displayed during the DTC check, check the circuit indicated by the DTC. For details of each code, refer to the page for the respective "DTC Code" in the DTC chart.
- When 2 or more DTCs are detected, perform circuit inspection one by one until the problem is identified.
- Inspect the fuse and relay before investigating the trouble areas as shown in the table below.

DTC chart of ABS:

DTC CHART

DTC Code	Detection Item	Trouble Area
C0200/31 (*1)	Front Speed Sensor RH Circuit	1. Front speed sensor RH 2. Speed sensor circuit 3. Speed sensor rotor 4. Sensor installation 5. Brake actuator assembly (Skid control ECU)
C0205/32 (*1)	Front Speed Sensor LH Circuit	1. Front speed sensor LH 2. Speed sensor circuit 3. Speed sensor rotor 4. Sensor installation 5. Brake actuator assembly (Skid control ECU)
C0210/33 (*1)	Rear Speed Sensor RH Circuit	1. Rear speed sensor RH 2. Speed sensor circuit 3. Speed sensor rotor 4. Sensor installation 5. Brake actuator assembly (Skid control ECU)
C0215/34 (*1)	Rear Speed Sensor LH Circuit	1. Rear speed sensor LH 2. Speed sensor circuit 3. Speed sensor rotor 4. Sensor installation 5. Brake actuator assembly (Skid control ECU)

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C0226/21	SFR Solenoid Circuit	1. SFRR or SFRH circuit 2. Brake actuator assembly
C0236/22	SFL Solenoid Circuit	1. SFLR or SFLH circuit 2. Brake actuator assembly
C0246/23	SRR Solenoid Circuit	1. SRRR or SRRH circuit 2. Brake actuator assembly
C0256/24	SRL Solenoid Circuit	1. SRLR or SRLH circuit 2. Brake actuator assembly
C0273/13 (*1)	Open in ABS Motor Relay Circuit	1. ABS1/VSC1 fuse 2. ABS motor relay circuit 3. Brake actuator assembly (ABS motor relay)
C0274/14	Short to B+ in ABS Motor Relay Circuit	1. ABS motor relay circuit 2. Brake actuator assembly (ABS motor relay)
C0278/11	Open in ABS Solenoid Relay Circuit	1. ABS2/VSC2 fuse 2. ABS solenoid relay circuit 3. Brake actuator assembly (ABS solenoid relay)
C0279/12	Short to B+ in ABS Solenoid Relay Circuit	1. ABS solenoid relay circuit 2. Brake actuator assembly (ABS solenoid relay)
C1225/25	SM Solenoid Circuit	1. SM1 or SM2 circuit 2. Brake actuator assembly
C1235/35	Foreign Object is Attached on Tip of Front Speed Sensor RH	1. Front speed sensor RH 2. Speed sensor rotor 3. Sensor installation 4. Brake actuator assembly (Skid control ECU)
C1236/36	Foreign Object is Attached on Tip of Front Speed Sensor LH	1. Front speed sensor LH 2. Speed sensor rotor 3. Sensor installation 4. Brake actuator assembly (Skid control ECU)
C1238/38	Foreign Object is Attached on Tip of Rear Speed Sensor RH	1. Rear speed sensor RH 2. Speed sensor rotor 3. Sensor installation

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		4. Brake actuator assembly (Skid control ECU)
C1239/39	Foreign Object is Attached on Tip of Rear Speed Sensor LH	1. Rear speed sensor LH 2. Speed sensor rotor 3. Sensor installation 4. Brake actuator assembly (Skid control ECU)
C1241/41	Low Battery Positive Voltage or Abnormally High Battery Positive Voltage	1. ECU-IG fuse 2. Battery 3. Charging system 4. Power source circuit 5. Internal power supply circuit of the skid control ECU
C1243/43 (*1)	Acceleration Sensor Stuck Malfunction	1. Yaw rate and acceleration sensor 2. Yaw rate and acceleration sensor circuit
C1244/44	Open or Short in Acceleration Sensor Circuit	1. Yaw rate and acceleration sensor 2. Yaw rate and acceleration sensor circuit
C1245/45 (*1)	Acceleration Sensor Output Malfunction	1. Yaw rate and acceleration sensor 2. Yaw rate and acceleration sensor circuit 3. Sensor installation
C1246/46 (*2)	Master Cylinder Pressure Sensor Malfunction	1. Stop light switch circuit 2. Master cylinder pressure sensor circuit 3. Brake actuator assembly (Master cylinder pressure sensor)
C1249/49	Open in Stop Light Switch Circuit	1. STOP fuse 2. Stop light switch 3. Stop light switch circuit 4. Brake actuator assembly (Skid control ECU)
		1. Brake actuator assembly (Ground circuit)

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C1251/51 (*1)	Open in Pump Motor Circuit	2. Brake actuator assembly (Motor circuit)
C1361/91	Short Circuit in ABS Motor Fail Safe Relay Circuit	1. ABS1/VSC1 fuse 2. ABS motor fail safe relay circuit 3. Brake actuator assembly (ABS motor fail safe relay)
C1381/97	Acceleration Sensor Power Supply Voltage Malfunction	1. Yaw rate and acceleration sensor 2. Yaw rate and acceleration sensor power source circuit
U0073/94	Control Module Communication Bus OFF	CAN communication system
U0124/95	Lost Communication with Lateral Acceleration Sensor Module	CAN communication system (Skid control ECU to yaw rate and acceleration sensor)

(*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 20 km/h (12 mph) for 30 seconds or more and check that the ABS warning light goes off.
  b. Clear the DTC.
- (*2):
  a. Keep the vehicle stationary for 5 seconds or more and depress the brake pedal lightly 2 or 3 times.
  b. Drive the vehicle at the vehicle speed of 50 km/h (31 mph) and keep depressing the brake pedal strongly for approximately 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 Techstream cannot be used when the ABS warning light remains on.

DTC chart of VSC:

DTC CHART

DTC Code	Detection Item	Trouble Area
43	ABS Control System Malfunction	ABS control system
C1201/51	Engine Control System Malfunction	Engine control system

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C1203/53	ECM Communication Circuit Malfunction	ECM
C1210/36	Zero Point Calibration of Yaw Rate Sensor Undone	1. Yaw rate and acceleration sensor 2. Zero point calibration undone 3. Brake actuator assembly (Skid control ECU)
C1231/31	Steering Angle Sensor Circuit Malfunction	1. Steering angle sensor 2. Steering angle sensor circuit 3. Steering angle sensor power supply 4. Brake actuator assembly (Skid control ECU)
C1232/32	Stuck in Acceleration Sensor	1. Yaw rate and acceleration sensor 2. Yaw rate and acceleration sensor circuit
C1234/34	Yaw Rate Sensor Malfunction	1. Yaw rate and acceleration sensor 2. Yaw rate and acceleration sensor circuit 3. Sensor installation
C1290/66	Steering Angle Sensor Zero Point Malfunction	1. Yaw rate and acceleration sensor zero point calibration incomplete 2. Poor adjustment of the centered position of the steering wheel 3. Poor adjustment of front wheel alignment
C1336/39	Zero Point Calibration of Acceleration Sensor Undone	1. Yaw rate and acceleration sensor 2. Zero point calibration undone 3. Brake actuator assembly (Skid control ECU)
U0100/65	Lost Communication with ECM / PCM	CAN communication system (Skid control ECU to ECM)
U0123/62	Lost Communication with Yaw Rate Sensor Module	CAN communication system (Skid control ECU to yaw rate and

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		acceleration sensor)
U0126/63	Lost Communication with Steering Angle Sensor Module	CAN communication system (Skid control ECU to steering angle sensor)

HINT:

In some cases, the Techstream cannot be used when the VSC OFF indicator light remains on.

Test Mode DTC of ABS:

DTC CHART

DTC Code	Detection Item	Trouble Area
C1271/71	Low Output Signal of Front Speed Sensor RH (Test Mode DTC)	1. Front speed sensor RH 2. Sensor installation 3. Speed sensor rotor
C1272/72	Low Output Signal of Front Speed Sensor LH (Test Mode DTC)	1. Front speed sensor LH 2. Sensor installation 3. Speed sensor rotor
C1273/73	Low Output Signal of Rear Speed Sensor RH (Test Mode DTC)	1. Rear speed sensor RH 2. Sensor installation 3. Speed sensor rotor
C1274/74	Low Output Signal of Rear Speed Sensor LH (Test Mode DTC)	1. Rear speed sensor LH 2. Sensor installation 3. Speed sensor rotor
C1275/75	Abnormal Change in Output Signal of Front Speed Sensor RH (Test Mode DTC)	Speed sensor rotor
C1276/76	Abnormal Change in Output Signal of Front Speed Sensor LH (Test Mode DTC)	Speed sensor rotor
C1277/77	Abnormal Change in Output Signal of Rear Speed Sensor RH (Test Mode DTC)	Speed sensor rotor
C1278/78	Abnormal Change in Output Signal of Rear Speed Sensor LH (Test Mode DTC)	Speed sensor rotor
C1279/79	Acceleration Sensor Output Voltage Malfunction (Test Mode DTC)	1. Yaw rate and acceleration sensor 2. Sensor installation
	Master Cylinder Pressure Sensor	1. Stop light switch

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C1281/81	Output Malfunction (Test Mode DTC)	2. Master cylinder pressure sensor

Test Mode DTC of VSC:

DTC CHART

DTC Code	Detection Item	Trouble Area
C0371/71	Yaw Rate Sensor (Test Mode DTC)	Yaw rate and acceleration sensor

DTC 43 ABS CONTROL SYSTEM MALFUNCTION

DESCRIPTION

This DTC is output when the VSC system detects a malfunction in the ABS control system.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
43	Malfunction in the ABS control system.	ABS control system

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

1. **CHECK ABS CONTROL SYSTEM**
   a. Clear the DTC (See **DTC CHECK/CLEAR**).
   b. Turn the ignition switch to ON.
   c. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

   Result

   RESULT CHART

Result	Proceed to
DTC not output (relating to ABS control system DTC)	A
DTC output (relating to ABS control system DTC)	B

B : REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See **DIAGNOSTIC TROUBLE CODE CHART**)

A: Go to next step

2. **RECONFIRM DTC**

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a. Turn the ignition switch to OFF.
b. Clear the DTC (See **DTC CHECK/CLEAR**).
c. Start the engine.
d. Drive the vehicle at a speed of approximately 40 km/h (25 mph) or more for 60 seconds or more.
e. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC (43) not output	A
DTC (43) output	B

B : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

A : CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **CHECK FOR INTERMITTENT PROBLEMS**)

DTC C0200/31 FRONT SPEED SENSOR RH CIRCUIT; DTC C0205/32 FRONT SPEED SENSOR LH CIRCUIT; DTC C1271/71 LOW OUTPUT SIGNAL OF FRONT SPEED SENSOR RH (TEST MODE DTC); DTC C1272/72 LOW OUTPUT SIGNAL OF FRONT SPEED SENSOR LH (TEST MODE DTC)

DESCRIPTION

The speed sensors detect the wheel speeds and send appropriate signals to the skid control ECU. Speed sensor rotors have rows of alternating N and S magnetic poles, and their magnetic fields change as the rotors turn.

The speed sensors detect those magnetic changes and send pulse signals to the skid control ECU. The ECU monitors the wheel speeds through these pulse signals to control the ABS control system. DTCs C1271/71 and C1272/72 can be deleted when the speed sensor sends a vehicle speed signal or the Test Mode ends. DTCs C1271/71 and C1272/72 are output only in the Test Mode.

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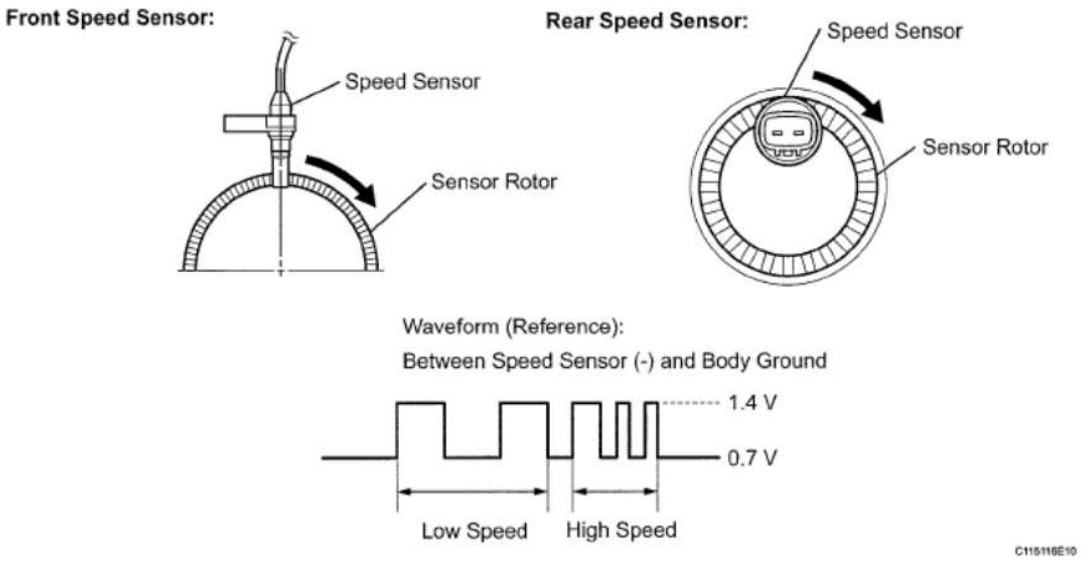


Fig. 127: Speed Sensor Voltage Graph
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C0200/31 C0205/32	When any of the following is detected: 1. At a vehicle speed of 10 km/h (6 mph) or more, an open or short in the sensor signal circuit continues for 1 second or more. 2. Momentary interruption of the sensor signal from the abnormal wheel occurs 255 times or more. 3. An open in the speed sensor signal circuit continues for 0.5 seconds or more. 4. With the IG1 terminal voltage 9.5 V or more, the sensor power supply voltage decreases for 0.5 seconds or more.	• Front speed sensor RH/LH • Speed sensor circuit • Speed sensor rotor • Sensor installation • Brake actuator assembly (Skid control ECU)
C1271/71 C1272/72	Detected only during Test Mode.	• Front speed sensor RH/LH • Sensor installation • Speed sensor rotor

HINT:

- DTCs C0200/31 and C1271/71 are for the front speed sensor RH.
- DTCs C0205/32 and C1272/72 are for the front speed sensor LH.

WIRING DIAGRAM

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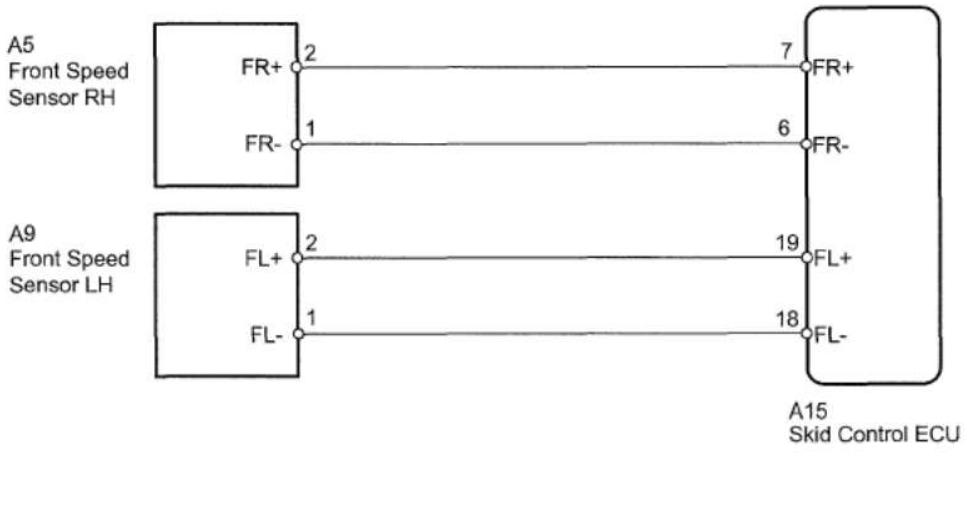


Fig. 128: Front Speed Sensor - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

1. **CHECK HARNESS AND CONNECTOR (MOMENTARY INTERRUPTION)**
   a. Using a Techstream, check for any momentary interruption in the wire harness and connector corresponding to a DTC (See **CHECK FOR INTERMITTENT PROBLEMS**).

ABS/VSC/TRAC:

MEASUREMENT ITEM NORMAL CONDITION CHART

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
FR Speed Open	FR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
FL Speed Open	FL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-

OK:

There are no momentary interruptions

HINT:

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Perform the above inspection before removing the sensor and connector.

NG: Go to step 5

OK: Go to next step

2. **READ VALUE USING TECHSTREAM (FRONT SPEED SENSOR)**
   a. Turn the ignition switch to OFF.
   b. Connect the Techstream to the DLC3.
   c. Start the engine.
   d. Select the Data List mode on the Techstream (See **DATA LIST / ACTIVE TEST**).

   ABS/VSC/TRAC:

   MEASUREMENT ITEM NORMAL CONDITION CHART

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
FR Wheel Speed	FR wheel speed sensor reading / Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Actual wheel speed	Similar speed as indicated on speedometer
FL Wheel Speed	FL wheel speed sensor reading /Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Actual wheel speed	Similar speed as indicated on speedometer

   e. Check that there is no difference between the speed value output from the speed sensor displayed on the Techstream and the speed value displayed on the speedometer when driving the vehicle.

   HINT:

   Factors that affect the indicated vehicle speed include tire size, tire inflation, and tire wear. The speed indicated on the speedometer has an allowable margin of error. This can be tested using a speedometer tester (calibrated chassis dynamometer). For details about testing and the margin of error, see the reference chart (See **ON-VEHICLE INSPECTION**).

   OK:

   The speed value output from the speed sensor displayed on the Techstream is the same as the actual vehicle speed measured using a speedometer tester (calibrated chassis dynamometer).

NG: Go to step 7

OK: Go to next step

3. **PERFORM TEST MODE (SIGNAL CHECK)**
   a. Perform sensor check in Test Mode procedure (See **TEST MODE PROCEDURE**).

   OK:

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All Test Mode DTCs are erased.

NG: Go to step 7

OK: Go to next step

4. **RECONFIRM DTC**
   a. Clear the DTC (See **DTC CHECK/CLEAR**).
   b. Start the engine.
   c. Drive the vehicle at a speed of 40 km/h (25 mph) or more for at least 60 seconds.
   d. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

B: Go to step 12

A : CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **CHECK FOR INTERMITTENT PROBLEMS**)

5. **CHECK IF SKID CONTROL ECU AND FRONT SPEED SENSOR CONNECTORS ARE SECURELY CONNECTED**
   a. Check if the skid control ECU and the front speed sensor connectors are securely connected.
6. **RECONFIRM DTC**
   a. Clear the DTC (See **DTC CHECK/CLEAR**).
   b. Start the engine.
   c. Drive the vehicle at a speed of 40 km/h (25 mph) or more for at least 60 seconds.
   d. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC output	A
DTC not output	B

B : END

A: Go to next step

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7. **CHECK FRONT SPEED SENSOR INSTALLATION**
   a. Turn the ignition switch to OFF.
   b. Check the speed sensor installation.

   OK:

   There is no clearance between the sensor and the front steering knuckle.

   The installation nut is tightened properly.

   Torque:

   8.5 N*m (87 kgf*cm, 75 in.*lbf)

NG: INSTALL FRONT SPEED SENSOR CORRECTLY (See **INSTALLATION**)

Front Speed Sensor:

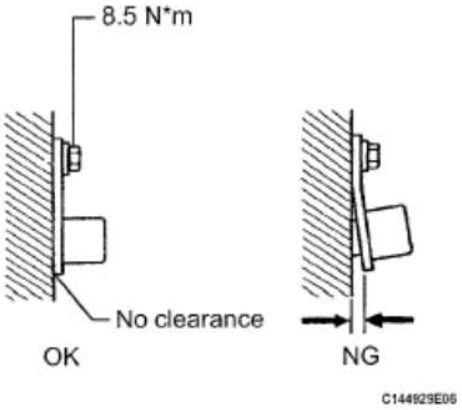


Fig. 129: Identifying Clearance Between Sensor And Front Steering Knuckle
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

8. **CHECK FRONT SPEED SENSOR TIP**
   a. Remove the front speed sensor (See **REMOVAL**).
   b. Check the speed sensor tip.

   OK:

   No scratches or foreign matter on the sensor tip.

   NOTE: Check the speed sensor signal after cleaning or replacement (See

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TEST MODE PROCEDURE).

NG: CLEAN OR REPLACE FRONT SPEED SENSOR

OK: Go to next step

9. **INSPECT FRONT SPEED SENSOR**
   a. Install the front speed sensor.
   b. Make sure that there is no looseness at the locking part and the connecting part of the connectors.
   c. Disconnect the front speed sensor connector.
   d. Measure the resistance according to the value(s) in the table below.

Standard resistance:

for RH

TESTER CONNECTION SPECIFIED CONDITION CHART

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

for LH

TESTER CONNECTION SPECIFIED CONDITION CHART

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

NOTE: **Check the speed sensor signal after replacement (See TEST MODE PROCEDURE).**

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Component without harness connected:
(Front Speed Sensor)

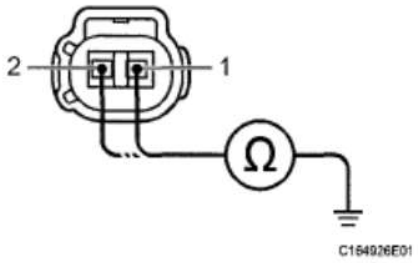


Fig. 130: Measuring Resistance Between Front Speed Sensor Terminal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NG: REPLACE FRONT SPEED SENSOR (See **REMOVAL**)

OK: Go to next step

10. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - FRONT SPEED SENSOR)**
    a. Disconnect the skid control ECU connector.
    b. Measure the resistance according to the value(s) in the table below.

Standard resistance:

for RH

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A15-7 (FR+) - A5-2 (FR+)	Always	Below 1 ohms
A15-7 (FR+) - Body ground	Always	10 kohms or higher
A15-6 (FR-) - A5-1 (FR-)	Always	Below 1 ohms
A15-6 (FR-) - Body ground	Always	10 kohms or higher

for LH

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A15-19 (FL+) - A9-2 (FL+)	Always	Below 1 ohms
A15-19 (FL+) - Body ground	Always	10 kohms or higher
A15-18 (FL-) - A9-1 (FL-)	Always	Below 1 ohms

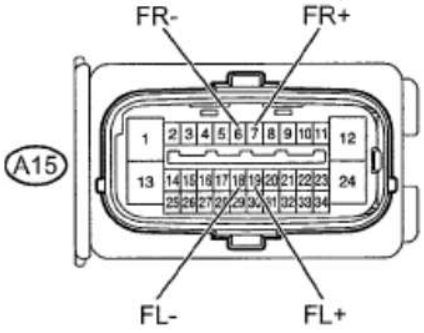
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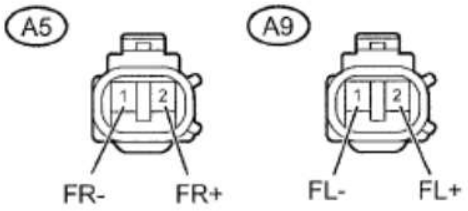
A15-18 (FL-) - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

Front view of wire harness connector:
(to Skid Control ECU)



Front view of wire harness connector:
(to Front Speed Sensor)



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Fig. 131: Identifying Skid Control ECU Connector Terminals And Front Speed Sensor Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

11. **INSPECT SKID CONTROL ECU (SENSOR INPUT)**
    a. Reconnect the skid control ECU connector.
    b. Turn the ignition switch to ON.
    c. Measure the voltage according to the value(s) in the table below.

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Standard voltage:

for RH

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
A5-2 (FR+) - Body ground	Ignition switch ON	8 to 14 V

for LH

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
A9-2 (FL+) - Body ground	Ignition switch ON	8 to 14 V

NG: REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

Front view of wire harness connector:
(to Front Speed Sensor)

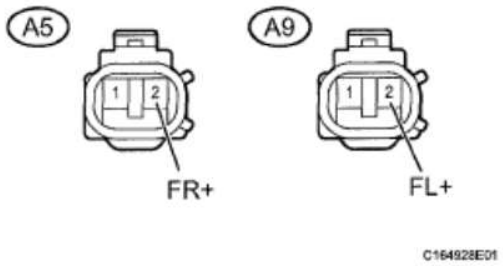


Fig. 132: Identifying Skid Control ECU Connector Terminal (Sensor Input)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

12. **REPLACE FRONT SPEED SENSOR**
    a. Turn the ignition switch to OFF.
    b. Replace the front speed sensor (See **REMOVAL**).

    NOTE: Check the speed sensor signal after cleaning or replacement (See TEST MODE PROCEDURE).

13. **RECONFIRM DTC**
    a. Clear the DTC (See **DTC CHECK/CLEAR**).

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b. Start the engine.
c. Drive the vehicle at a speed of 40 km/h (25 mph) or more for at least 60 seconds.
d. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC output	A
DTC not output	B

B : END

A: Go to next step

14. **REPLACE FRONT AXLE HUB BEARING**
    a. Turn the ignition switch to OFF.
    b. Replace the front axle hub bearing (See **REMOVAL**).

HINT:

The front speed sensor rotor is incorporated into the front axle hub bearing.

CAUTION: Check the speed sensor signal after replacement (See TEST MODE PROCEDURE).

15. **RECONFIRM DTC**
    a. Clear the DTC (See **DTC CHECK/CLEAR**).
    b. Start the engine.
    c. Drive the vehicle at a speed of 40 km/h (25 mph) or more for at least 60 seconds.
    d. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

HINT:

If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the

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table and proceed to the next step (See **PROBLEM SYMPTOMS TABLE**).

B : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

A : END

DTC C0210/33 REAR SPEED SENSOR RH CIRCUIT; DTC C0215/34 REAR SPEED SENSOR LH CIRCUIT; DTC C1273/73 LOW OUTPUT SIGNAL OF REAR SPEED SENSOR RH (TEST MODE DTC); DTC C1274/74 LOW OUTPUT SIGNAL OF REAR SPEED SENSOR LH (TEST MODE DTC)

DESCRIPTION

The speed sensors detect the wheel speeds and send appropriate signals to the skid control ECU. Speed sensor rotors have rows of alternating N and S magnetic poles, and their magnetic fields change as the rotors turn.

The speed sensors detect those magnetic changes and send pulse signals to the skid control ECU. The ECU monitors the wheel speeds through these pulse signals to control the ABS control system. DTCs C1273/73 and C1274/74 can be deleted when the speed sensor sends a vehicle speed signal or the Test Mode ends. DTCs C1273/73 and C1274/74 are output only in the Test Mode.

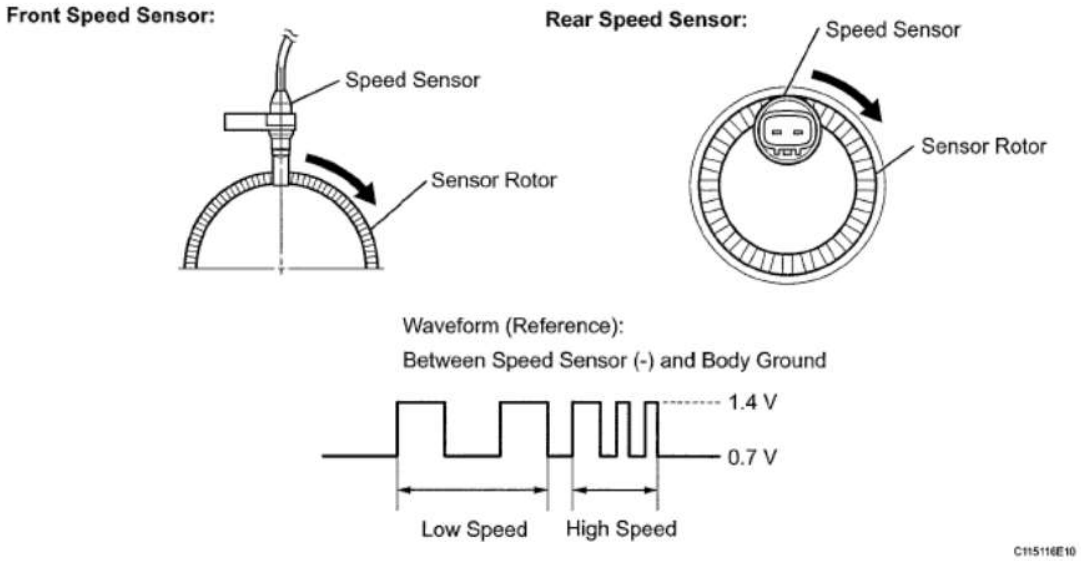


Fig. 133: Speed Sensor Voltage Graph
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
	When any of the following is detected: 1. At a vehicle speed of 10 km/h (6 mph) or more, an open or short in the sensor signal circuit continues for 1	• Rear speed sensor RH/LH

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C0210/33 C0215/34	second or more. 2. Momentary interruption of the sensor signal from the abnormal wheel occurs 255 times or more. 3. An open in the speed sensor signal circuit continues for 0.5 seconds or more. 4. With the IG1 terminal voltage 9.5 V or more, the sensor power supply voltage decreases for 0.5 seconds or more.	• Speed sensor circuit • Speed sensor rotor • Sensor installation • Brake actuator assembly (Skid control ECU)
C1273/73 C1274/74	Detected only during Test Mode.	• Rear speed sensor RH/LH • Sensor installation • Speed sensor rotor

HINT:

- DTCs C0210/33 and C1273/73 are for the rear speed sensor RH.
- DTCs C0215/34 and C1274/74 are for the rear speed sensor LH.

WIRING DIAGRAM

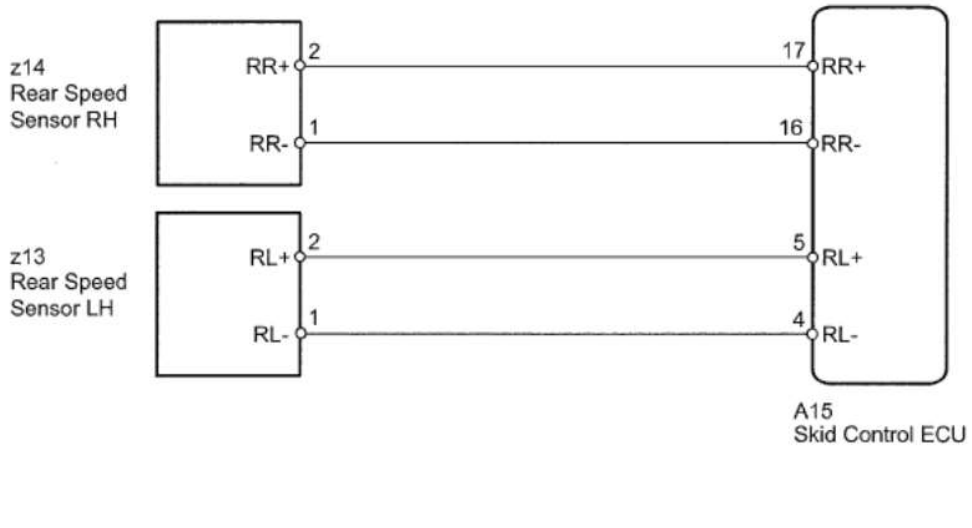


Fig. 134: Rear Speed Sensor - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

1. **CHECK HARNESS AND CONNECTOR (MOMENTARY INTERRUPTION)**

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a. Using a Techstream, check for any momentary interruption in the wire harness and connector corresponding to a DTC (See **CHECK FOR INTERMITTENT PROBLEMS**).

ABS/VSC/TRAC:

MEASUREMENT ITEM NORMAL CONDITION CHART

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
RR Speed Open	RR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RL Speed Open	RL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-

OK:

There are no momentary interruptions.

HINT:

Perform the above inspection before removing the sensor and connector.

NG: Go to step 5

OK: Go to next step

2. **READ VALUE USING TECHSTREAM (REAR SPEED SENSOR)**
   a. Turn the ignition switch to OFF.
   b. Connect the Techstream to the DLC3.
   c. Start the engine.
   d. Select the Data List mode on the Techstream (See **DATA LIST / ACTIVE TEST**).

ABS/VSC/TRAC:

MEASUREMENT ITEM NORMAL CONDITION CHART

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
RR Wheel Speed	RR wheel speed sensor reading / Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Actual wheel speed	Similar speed as indicated on speedometer
RL Wheel Speed	RL wheel speed sensor reading / Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Actual wheel speed	Similar speed as indicated on speedometer

e. Check that there is no difference between the speed value output from the speed sensor displayed

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on the Techstream and the speed value displayed on the speedometer when driving the vehicle.

HINT:

Factors that affect the indicated vehicle speed include tire size, tire inflation, and tire wear. The speed indicated on the speedometer has an allowable margin of error. This can be tested using a speedometer tester (calibrated chassis dynamometer). For details about testing and the margin of error, see the reference chart (See **ON-VEHICLE INSPECTION**).

OK:

The speed value output from the speed sensor displayed on the Techstream is the same as the actual vehicle speed measured using a speedometer tester (calibrated chassis dynamometer).

NG: Go to step 7

OK: Go to next step

3. **PERFORM TEST MODE (SIGNAL CHECK)**
   a. Perform sensor check in Test Mode procedure (See **TEST MODE PROCEDURE**).

      OK:

      All Test Mode DTCs are erased.

   NG: Go to step 7

   OK: Go to next step

4. **RECONFIRM DTC**
   a. Clear the DTC (See **DTC CHECK/CLEAR**).
   b. Start the engine.
   c. Drive the vehicle at a speed of 40 km/h (25 mph) or more for at least 60 seconds.
   d. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

      Result

      RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

   B: Go to step 12

   A : CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **CHECK**

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FOR INTERMITTENT PROBLEMS)

5. **CHECK IF SKID CONTROL ECU AND REAR SPEED SENSOR CONNECTOR ARE SECURELY CONNECTED**
   a. Check if the skid control ECU and the rear speed sensor connectors are securely connected.
6. **RECONFIRM DTC**
   a. Clear the DTC (See **DTC CHECK/CLEAR**).
   b. Start the engine.
   c. Drive the vehicle at a speed of 40 km/h (25 mph) or more for at least 60 seconds.
   d. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC output	A
DTC not output	B

B : END

A: Go to next step

7. **CHECK REAR SPEED SENSOR INSTALLATION**
   a. Turn the ignition switch to OFF.
   b. Check the speed sensor installation.

OK:

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

NG: INSTALL REAR SPEED SENSOR CORRECTLY (See **INSTALLATION**)

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Rear Speed Sensor:

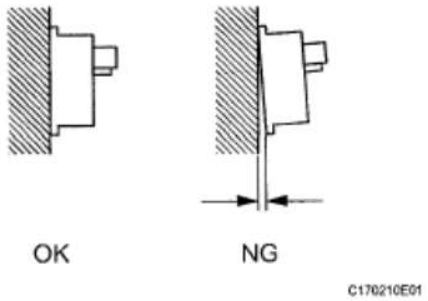


Fig. 135: Identifying Clearance Between Sensor And Rear Axle Carrier
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

8. **INSPECT REAR SPEED SENSOR**
   a. Make sure that there is no looseness at the locking part and the connecting part of the connectors.
   b. Disconnect the rear speed sensor connector.
   c. Measure the resistance according to the value(s) in the table below.

Standard resistance:

for RH

TESTER CONNECTION SPECIFIED CONDITION CHART

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

for LH

TESTER CONNECTION SPECIFIED CONDITION CHART

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

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Component without harness connected:
(Rear Speed Sensor)

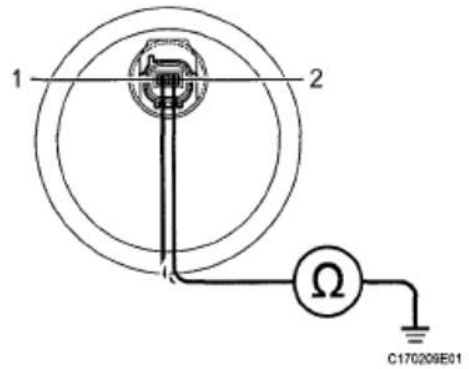


Fig. 136: Measuring Resistance Between Rear Speed Sensor Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: **Check the speed sensor signal after replacement (See TEST MODE PROCEDURE).**

NG: REPLACE REAR SPEED SENSOR (See **REMOVAL**)

OK: Go to next step

9. **CHECK HARNESS AND CONNECTOR (SPEED SENSOR WIRE)**
   a. Disconnect the speed sensor wire.
   b. Measure the resistance according to the value(s) in the table below.

Standard resistance:

for RH

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
z14-1 - zL1-1	Always	10 kohms or higher
z14-1 - zL1-2	Always	Below 1 ohms
z14-1 - Body ground	Always	10 kohms or higher
z14-2 - zL1-1	Always	Below 1 ohms
z14-2 - zL1-2	Always	10 kohms or higher
z14-2 - Body ground	Always	10 kohms or higher

for LH

TESTER CONNECTION SPECIFIED CONDITION CHART

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Tester Connection	Condition	Specified Condition
z13-1 - zL2-1	Always	10 kohms or higher
z13-1 - zL2-2	Always	Below 1 ohms
z13-1 - Body ground	Always	10 kohms or higher
z13-2 - zL2-1	Always	Below 1 ohms
z13-2 - zL2-2	Always	10 kohms or higher
z13-2 - Body ground	Always	10 kohms or higher

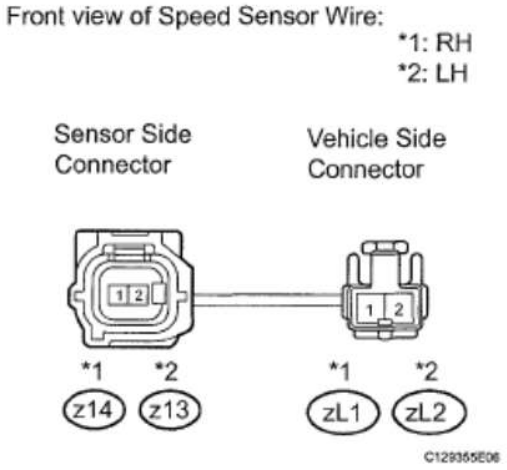


Fig. 137: Identifying Speed Sensor Wire Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: **Check the speed sensor signal after replacement (See TEST MODE PROCEDURE).**

NG: REPLACE SPEED SENSOR WIRE

OK: Go to next step

10. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - REAR SPEED SENSOR)**
    a. Reconnect the speed sensor wire.
    b. Disconnect the skid control ECU connector.
    c. Measure the resistance according to the value(s) in the table below.

Standard resistance:

for RH

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A15-17 (RR+) - z14-2 (RR+)	Always	Below 1 ohms

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A15-17 (RR+) - Body ground	Always	10 kohms or higher
A15-16 (RR-) - z14-1 (RR-)	Always	Below 1 ohms
A15-16 (RR-) - Body ground	Always	10 kohms or higher

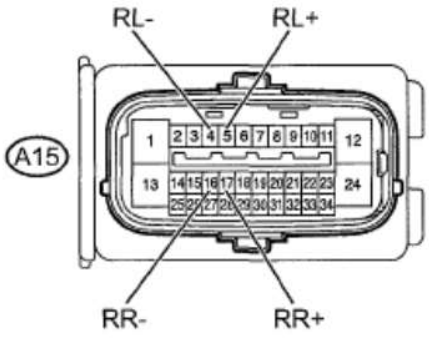
for LH

TESTER CONNECTION SPECIFIED CONDITION CHART

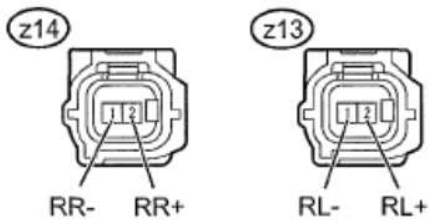
Tester Connection	Condition	Specified Condition
A15-5 (RL+) - z13-2 (RL+)	Always	Below 1 ohms
A15-5 (RL+) - Body ground	Always	10 kohms or higher
A15-4 (RL-) - z13-1 (RL-)	Always	Below 1 ohms
A15-4 (RL-) - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

Front view of wire harness connector:
(to Skid Conrol ECU)



Front view of wire harness connector:
(to Rear Speed Sensor)



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Fig. 138: Identifying Skid Control ECU And Rear Speed Sensor Connector Terminals
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OK: Go to next step

11. **INSPECT SKID CONTROL ECU (SENSOR INPUT)**
    a. Reconnect the skid control ECU connector.
    b. Turn the ignition switch to ON.
    c. Measure the voltage according to the value(s) in the table below.

Standard voltage:

for RH

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
z14-2 (RR+) - Body ground	Ignition switch ON	8 to 14 V

for LH

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
z13-2 (RL+) - Body ground	Ignition switch ON	8 to 14 V

NG: REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

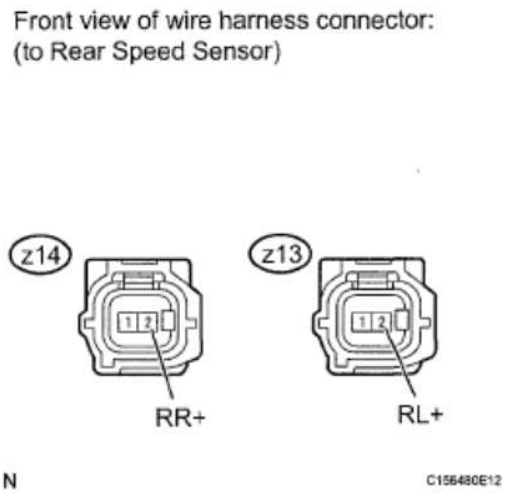


Fig. 139: Identifying Skid Control ECU Connector Terminal (Sensor Input)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

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12. **REPLACE REAR AXLE HUB AND BEARING ASSEMBLY**
    a. Turn the ignition switch to OFF.
    b. Replace the rear speed sensor and rear axle hub and bearing assembly (See **REMOVAL**).

    HINT:

    The rear speed sensor rotor is incorporated into the rear axle hub and bearing assembly.

    If the rear speed sensor rotor needs to be replaced, replace it together with the rear axle hub and bearing assembly with rear speed sensor.

    NOTE: Check the speed sensor signal after replacement (See TEST MODE PROCEDURE).

13. **RECONFIRM DTC**
    a. Clear the DTC (See **DTC CHECK/CLEAR**).
    b. Start the engine.
    c. Drive the vehicle at a speed of 40 km/h (25 mph) or more for at least 60 seconds.
    d. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

    Result

    RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

    HINT:

    If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See **PROBLEM SYMPTOMS TABLE**).

B : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

A : END

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

These solenoids turn on when signals are received from the skid control ECU and they control the pressure acting on the wheel cylinders to control the braking force.

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DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C0226/21 C0236/22 C0246/23 C0256/24	Open or short in the solenoid circuit continues for 0.05 seconds or more.	• Solenoid circuit • Brake actuator assembly
C1225/25	When any of the following is detected: 1. While outputting switching solenoid (SM1 or SM2) ON, overcurrent continues for 0.15 seconds or more. 2. While outputting switching solenoid (SM1 or SM2) OFF, an open circuit continues for 0.05 seconds or more. 3. While outputting switching solenoid (SM1 or SM2) ON, an open circuit continues for 0.05 seconds or more. 4. While outputting switching solenoid (SM1 or SM2) OFF, current continues to be applied for 0.1 seconds or more. 5. Short to GND in the switching solenoid (SM1 or SM2) continues for 0.1 seconds or more. 6. Switching solenoids SM1 and SM2 are shorted for 0.1 seconds or more.	• SM1 or SM2 circuit • Brake actuator assembly

WIRING DIAGRAM

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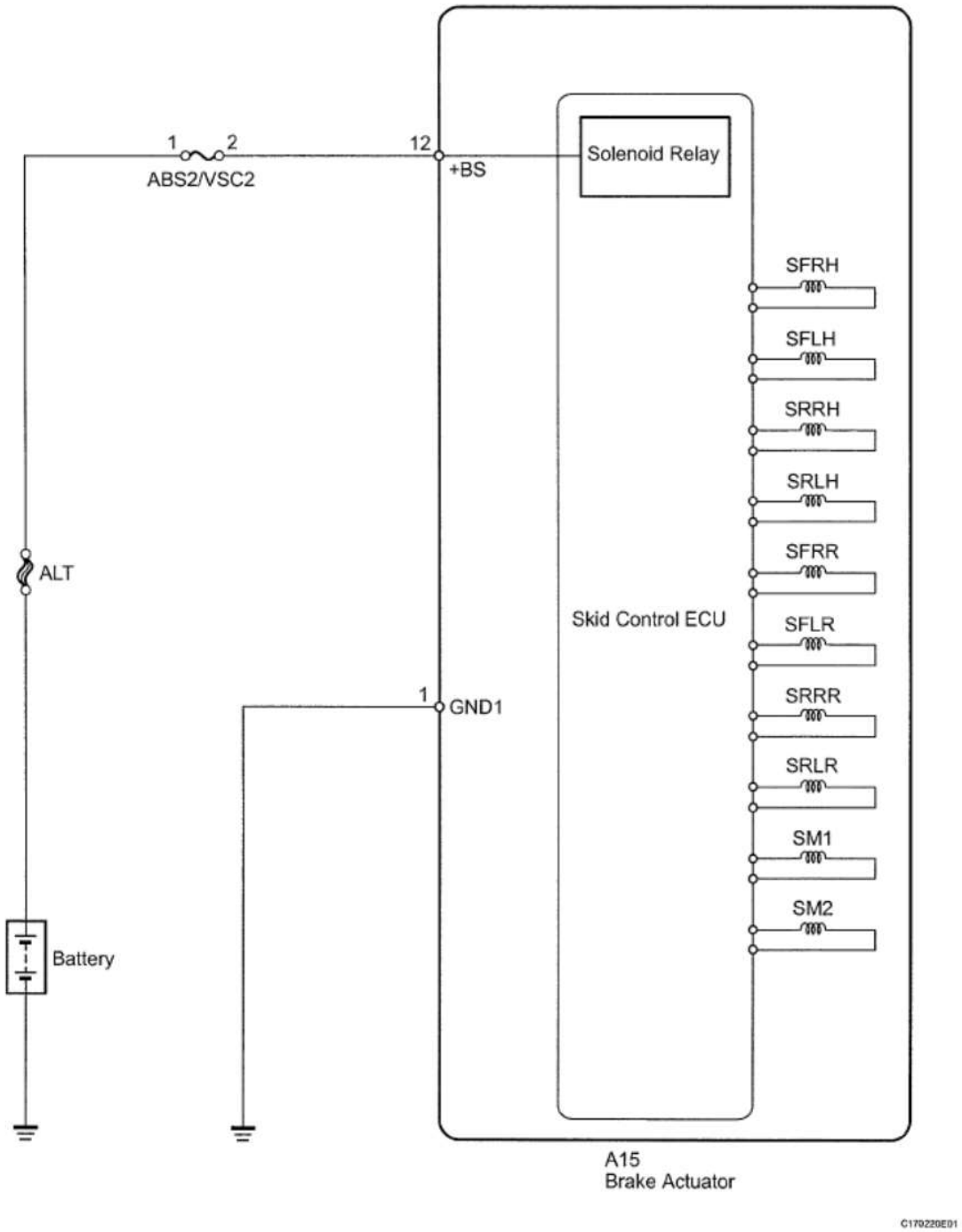


Fig. 140: SFR Solenoid Circuit - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration

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(See CALIBRATION).

1. **RECONFIRM DTC**

HINT:

These codes are detected when a problem is determined in the brake actuator assembly.

The solenoid circuits are in the brake actuator assembly.

Therefore, solenoid circuit inspection and solenoid unit inspection cannot be performed. Be sure to check if any DTC code is output before replacing the brake actuator assembly.

a. Clear the DTC (See **DTC CHECK/CLEAR**).
b. Start the engine.
c. Drive the vehicle at the speed of 20 km/h (12 mph) or more.
d. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

HINT:

- If a speed signal of 6 km/h (4 mph) or more is input to the skid control ECU, with the ignition switch ON and the stop light switch off, the ECU performs self diagnosis of the motor and solenoid circuits.
- If the normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harness, and fuses of the brake actuator assembly. Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness from the brake actuator assembly (skid control ECU), inspect and repair the connector or wire harness.
- It is suspected that the DTCs were output due to a bad connection of the connector terminal.

B : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

A : CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **CHECK FOR INTERMITTENT PROBLEMS**)

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

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CIRCUIT

DESCRIPTION

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

If the voltage supplied to the motor relay (+BM) is below the DTCs detection threshold due to low voltage from the battery or alternator, the DTC may be stored.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C0273/13	When either of the following is detected: 1. All of the following conditions continue for 0.12 seconds or more. o The IG1 terminal voltage is between 9.5 and 17.2 V. o While initial check and ABS, BA, TRAC or VSC is operating. o Relay contact is open when the relay is ON. 2. Both of the following conditions continue for 0.12 seconds. o The IG1 terminal voltage is less than 9.5 V. o Relay contact remains open when the relay is ON.	• ABS1/VSC1 fuse • ABS motor relay circuit • Brake actuator assembly (ABS motor relay)
C0274/14	When the motor relay is OFF, the motor relay remains closed for 4 seconds or more.	• ABS motor relay circuit • Brake actuator assembly (ABS motor relay)
C1361/91	Immediately after the ignition switch is turned to ON, the relay contact is closed for 4 seconds when the motor fail safe relay is OFF.	• ABS1/VSC1 fuse • ABS motor fail safe relay circuit • Brake actuator assembly (ABS motor fail safe relay)

WIRING DIAGRAM

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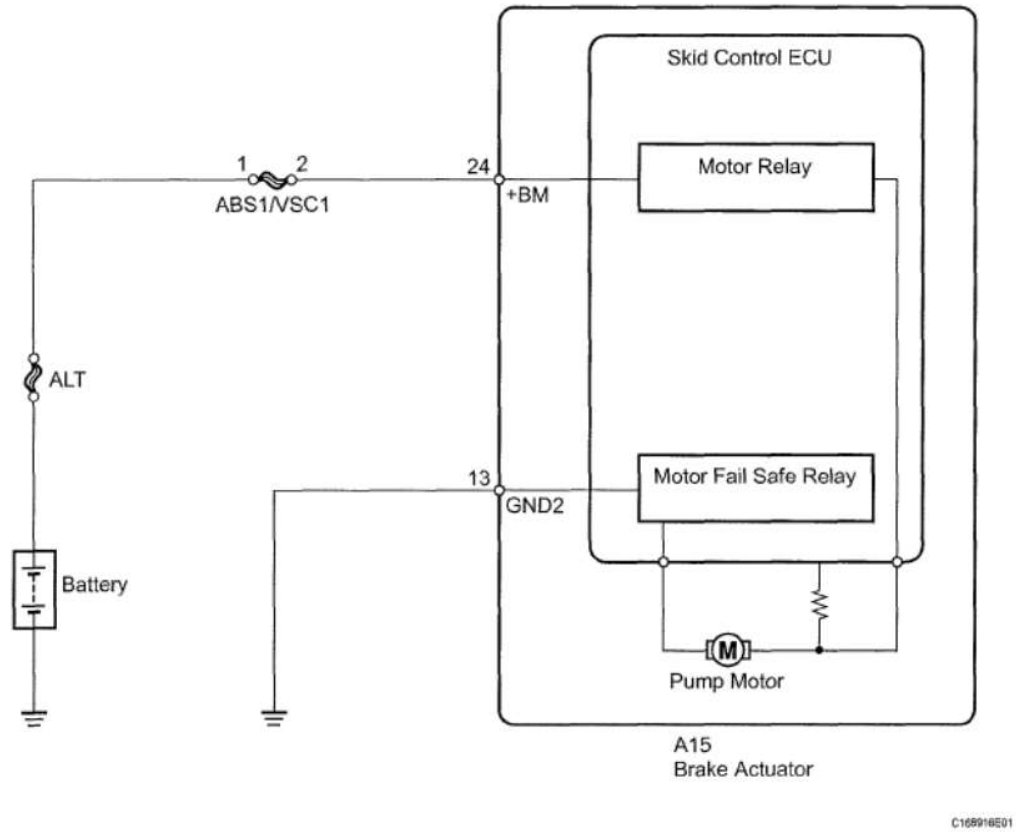


Fig. 141: ABS Motor Relay Circuit - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

HINT:

When C1241/41 is output together with C0273/13, C0274/13 and/or C1361/91 inspect and repair the trouble areas indicated by C1241/41 first (See **DTC C1241/41 LOW BATTERY POSITIVE VOLTAGE OR ABNORMALLY HIGH BATTERY POSITIVE VOLTAGE**).

1. **INSPECT ABS1/VSC1 FUSE**
   a. Remove the ABS1/VSC1 fuse from the engine room relay block.
   b. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

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Tester Connection	Condition	Specified Condition
ABS1/VSC1 (50 A) fuse	Always	Below 1 ohms

NG: REPLACE ABS1/VSC1 FUSE

Engine Room Relay Block:

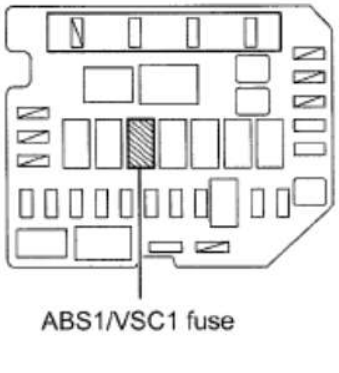


Fig. 142: Identifying ABS1/VSC1 Fuse From Engine Room Relay Block
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

2. **PERFORM ACTIVE TEST USING TECHSTREAM (ABS MOTOR RELAY)**
   a. Install the ABS1/VSC1 fuse.
   b. Connect the Techstream to the DLC3.
   c. Start the engine.
   d. Select the Active Test mode on the Techstream (See **DATA LIST / ACTIVE TEST**).

   ABS/VSC/TRAC:

   ACTIVE TEST

Tester Display	Test Part	Control Range	Diagnostic Note
Motor Relay	ABS motor relay	Relay ON / OFF	Operating sound of motor can be heard

   e. Check the operating sound of the ABS motor relay when operating it with the Techstream.

   Result

   RESULT CHART

Result	Proceed to
The operating sound is not heard	A

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The operating sound is heard	B

B: Go to step 5

A: Go to next step

3. **INSPECT SKID CONTROL ECU (+BM TERMINAL)**
   a. Turn the ignition switch to OFF.
   b. Disconnect the skid control ECU connector.
   c. Measure the voltage according to the value(s) in the table below.

Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A15-24 (+BM) - Body ground	Always	11 to 14 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (+BM CIRCUIT)

Front view of wire harness connector:
(to Skid Control ECU)

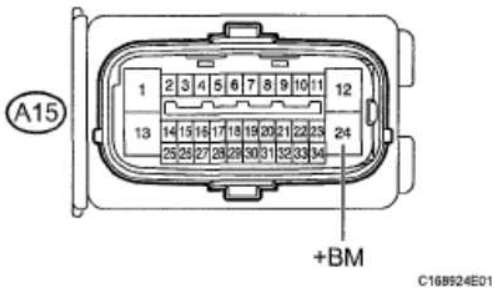


Fig. 143: Identifying Skid Control ECU Connector Terminal (+BM Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

4. **INSPECT SKID CONTROL ECU (GND TERMINAL)**
   a. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

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Tester Connection	Condition	Specified Condition
A15-13 (GND2) - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)

Front view of wire harness connector:
(to Skid Control ECU)

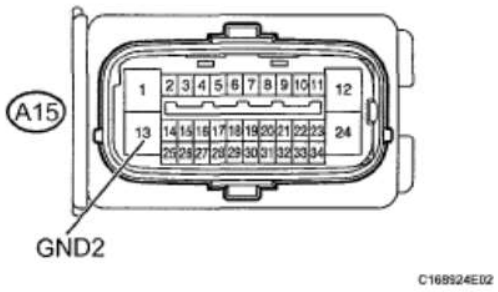


Fig. 144: Identifying Skid Control ECU Connector Terminal (GND Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

5. **RECONFIRM DTC**

HINT:

This code is detected when a problem is identified in the brake actuator assembly.

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

a. Turn the ignition switch to OFF.
b. Reconnect the skid control ECU connector.
c. Clear the DTC (See **DTC CHECK/CLEAR**).
d. Start the engine.
e. Drive the vehicle at a speed of 20 km/h (12 mph) or more for 30 seconds or more.
f. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

RESULT CHART

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Result	Proceed to
DTC not output	A
DTC output	B

HINT:

- If a speed signal of 6 km/h (4 mph) or more is input to the skid control ECU, with the ignition switch ON and the stop light switch off, the ECU performs self diagnosis of the motor and solenoid circuits.
- If the normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harness, and fuses of the brake actuator assembly. Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness of the brake actuator assembly (skid control ECU), inspect and repair the connector or wire harness.
- It is suspected that the DTCs were output due to a bad connection of the connector terminal.

B : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

A : CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **CHECK FOR INTERMITTENT PROBLEMS**)

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 supplies power to the ABS solenoid and TRAC solenoid.

The solenoid relay is turned on 1.5 seconds after the ignition switch is turned to ON, and is turned off if an open or short in the solenoid is detected by the self diagnosis performed when the vehicle starts running. The ABS solenoid relay is housed in the skid control ECU in the actuator assembly.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C0278/11	When either of the following is detected: 1. Both of the following conditions continue for 0.22 seconds or more. o The IG1 terminal voltage is 9.5 V or more. o The solenoid relay contact is open when the relay is ON. 2. Both of the following conditions continue for 0.22 seconds or more.	• ABS2/VSC2 fuse • ABS solenoid relay circuit • Brake actuator assembly (ABS solenoid relay)

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	○ The IG1 terminal voltage becomes lower than 9.5 V or less when the relay is turned on. ○ The relay contact remains open.	
C0279/12	Immediately after the ignition switch is turned to ON, the solenoid relay contact is closed for 4 seconds when the relay is turned off.	• ABS solenoid relay circuit • Brake actuator assembly (ABS solenoid relay)

WIRING DIAGRAM

Refer to **DTCS C0226/21, C0236/22, C0246/23, C0256/24 AND C1225/25** .

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

HINT:

When C1241/41 is output together with C0278/11 and/or C0279/12, inspect and repair the trouble areas indicated by C1241/41 first (See **DTC C1241/41 LOW BATTERY POSITIVE VOLTAGE OR ABNORMALLY HIGH BATTERY POSITIVE VOLTAGE**).

1. **INSPECT ABS2/VSC2 FUSE**
   a. Remove the ABS2/VSC2 fuse from the engine room relay block.
   b. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
ABS2/VSC2 (30 A) fuse	Always	Below 1 ohms

NG: REPLACE ABS2/VSC2 FUSE

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Engine Room Relay Block:

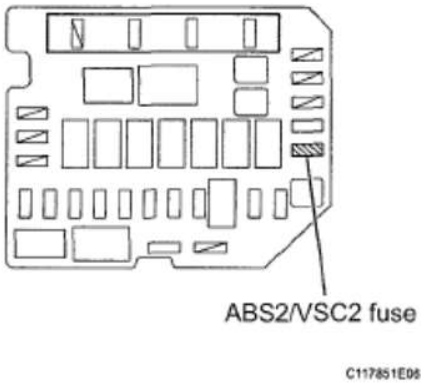


Fig. 145: Identifying ABS2/VSC2 Fuse
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

2. **INSPECT SKID CONTROL ECU (+BS TERMINAL)**
   a. Install the ABS2/VSC2 fuse.
   b. Disconnect the skid control ECU connector.
   c. Measure the voltage according to the value(s) in the table below.

Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A15-12 (+BS) - Body ground	Always	11 to 14 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (+BS CIRCUIT)

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Front view of wire harness connector:
(to Skid Control ECU)

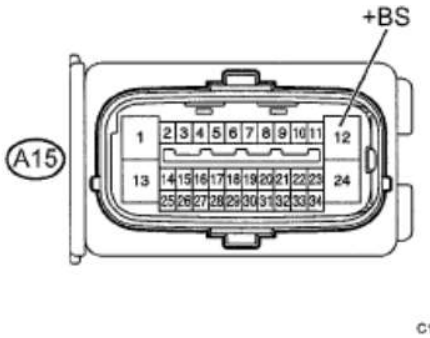


Fig. 146: Identifying Skid Control ECU Connector Terminal (+BS Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

3. **INSPECT SKID CONTROL ECU (GND TERMINAL)**
   a. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A15-1 (GND1) - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)

Front view of wire harness connector:
(to Skid Control ECU)

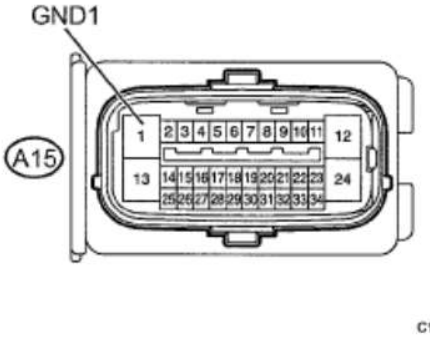


Fig. 147: Identifying Skid Control ECU Connector Terminal (GND Terminal)

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OK: Go to next step

4. **RECONFIRM DTC**

HINT:

This code is detected when a problem is identified 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 is output before replacing the brake actuator assembly.

a. Reconnect the skid control ECU connector.
b. Clear the DTC (See **DTC CHECK/CLEAR**).
c. Start the engine.
d. Drive the vehicle at a speed of 20 km/h (12 mph) or more for 30 seconds or more.
e. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

HINT:

- If a speed signal of 6 km/h (4 mph) or more is input to the skid control ECU, with the ignition switch ON and the stop light switch off, the ECU performs self diagnosis of the motor and solenoid circuits.
- If the normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harnesses, and fuses of the brake actuator assembly. Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness of the brake actuator assembly (skid control ECU), inspect and repair the connector or wire harness.
- It is suspected that the DTCs were output due to a bad connection of the connector terminal.

B : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

A : CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **CHECK FOR INTERMITTENT PROBLEMS**)

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DTC C1201/51 ENGINE CONTROL SYSTEM MALFUNCTION

DESCRIPTION

If a malfunction in the engine control system is detected, the operations of VSC and TRAC are prohibited by the fail safe function. When the signals from the engine are input normally, the fail safe is cancelled and the DTC is not stored.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1201/51	Engine control system malfunction signal continues for 1 second or more.	Engine control system

INSPECTION PROCEDURE

1. **CHECK ENGINE CONTROL SYSTEM**
   a. Check if the engine control system DTC is output (See **DTC CHECK / CLEAR**).

   Result

   RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

B : INSPECT ENGINE CONTROL SYSTEM (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

A : CHECK FOR INTERMITTENT PROBLEMS (ENGINE CONTROL SYSTEM) (See **CHECK FOR INTERMITTENT PROBLEMS**)

DTC C1203/53 ECM COMMUNICATION CIRCUIT MALFUNCTION

DESCRIPTION

The circuit is used to send TRAC and VSC control information from the skid control ECU to the ECM, and engine control information from the ECM to the skid control ECU through the CAN communication system.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1203/53	Engine, drive source and destination variations that are sent from the ECM do not match the ones of the skid control ECU.	ECM

INSPECTION PROCEDURE

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1. **CHECK PART NUMBER (ECM AND BRAKE ACTUATOR ASSEMBLY)**
   a. Check that the proper ECM and brake actuator assembly (skid control ECU) are installed.

Result

RESULT CHART

Result	Proceed to
Proper ECUs are installed	A
Proper ECUs are not installed	B

B : REPLACE ECUS WITH PROPER ONES

A : REPLACE ECM (See **REMOVAL**)

DTC C1210/36 ZERO POINT CALIBRATION OF YAW RATE SENSOR UNDONE; DTC C1336/39 ZERO POINT CALIBRATION OF ACCELERATION SENSOR UNDONE

DESCRIPTION

The skid control ECU receives signals from the yaw rate and acceleration sensor via the CAN communication system.

The yaw rate sensor has the built in acceleration sensor and detects the vehicle's condition using 2 circuits (GL1, GL2). If there is trouble in the bus lines between the yaw rate and acceleration sensor and the CAN communication system, the DTCs U0123/62 (yaw rate sensor communication trouble) and U0124/95 (acceleration sensor communication trouble) are output.

The DTCs are also output when the calibration has not been completed.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1210/36	Zero point calibration of yaw rate sensor undone.	• Yaw rate and acceleration sensor • Zero point calibration undone (Perform zero point calibration and check DTC. If DTC is not output again, the sensor is normal) • Brake actuator assembly (Skid control ECU)
C1336/39	When either of the following is detected: 1. The vehicle runs in the normal mode with zero point calibration undone. 2. After the zero point has been obtained, the zero point voltage of	• Yaw rate and acceleration sensor • Zero point calibration undone (Perform zero point calibration and check DTC. If DTC is not output again, the sensor is normal) • Brake actuator assembly (Skid control

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	the sensor is not between 2.38 and 2.62 V.	ECU)

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

HINT:

When U0123/62, U0124/95 and/or U0126/63 is output along with C1210/36 and/or C1336/39, inspect and repair trouble areas indicated by U0123/62, U0124/95 and/or U0126/63 first (See **DTC U0073/94 CONTROL MODULE COMMUNICATION BUS OFF; DTC U0100/65 LOST COMMUNICATION WITH ECM / PCM; DTC U0123/62 LOST COMMUNICATION WITH YAW RATE SENSOR MODULE; DTC U0124/95 LOST COMMUNICATION WITH LATERAL ACCELERATION SENSOR MODULE; DTC U0126/63 LOST COMMUNICATION WITH STEERING ANGLE SENSOR MODULE**).

1. **PERFORM ZERO POINT CALIBRATION OF YAW RATE AND ACCELERATION SENSOR**
   a. Perform zero point calibration of the yaw rate and acceleration sensor (See **CALIBRATION**).
2. **RECONFIRM DTC**
   a. Turn the ignition switch to OFF.
   b. Clear the DTC (See **DTC CHECK/CLEAR**).
   c. At a speed of 30 km/h (19 mph) or more, drive the vehicle, turn the steering wheel, and decelerate (depress the brake pedal) the vehicle.
   d. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

   Result

   RESULT CHART

Result	Proceed to
DTC output	A
DTC not output	B

   HINT:

   - The DTCs are recorded because zero point calibration has not been completed.
   - End the procedure as the same DTCs are not recorded after completion of zero point calibration.

B : END

A: Go to next step

3. **CHECK YAW RATE AND ACCELERATION SENSOR INSTALLATION**

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a. Turn the ignition switch to OFF.
b. Check that the yaw rate and acceleration sensor has been installed properly.

OK:

The sensor should be tightened to the specified torque.

The sensor should not be tilted.

NG: INSTALL YAW RATE AND ACCELERATION SENSOR CORRECTLY (See **INSTALLATION**)

OK : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

DTC C1231/31 STEERING ANGLE SENSOR CIRCUIT MALFUNCTION

DESCRIPTION

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

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1231/31	When ECU IG1 terminal voltage is between 9.5 and 17.4 V, the steering angle sensor malfunction signal is received.	• Steering angle sensor • Steering angle sensor circuit • Steering angle sensor power supply • Brake actuator assembly (Skid control ECU)

WIRING DIAGRAM

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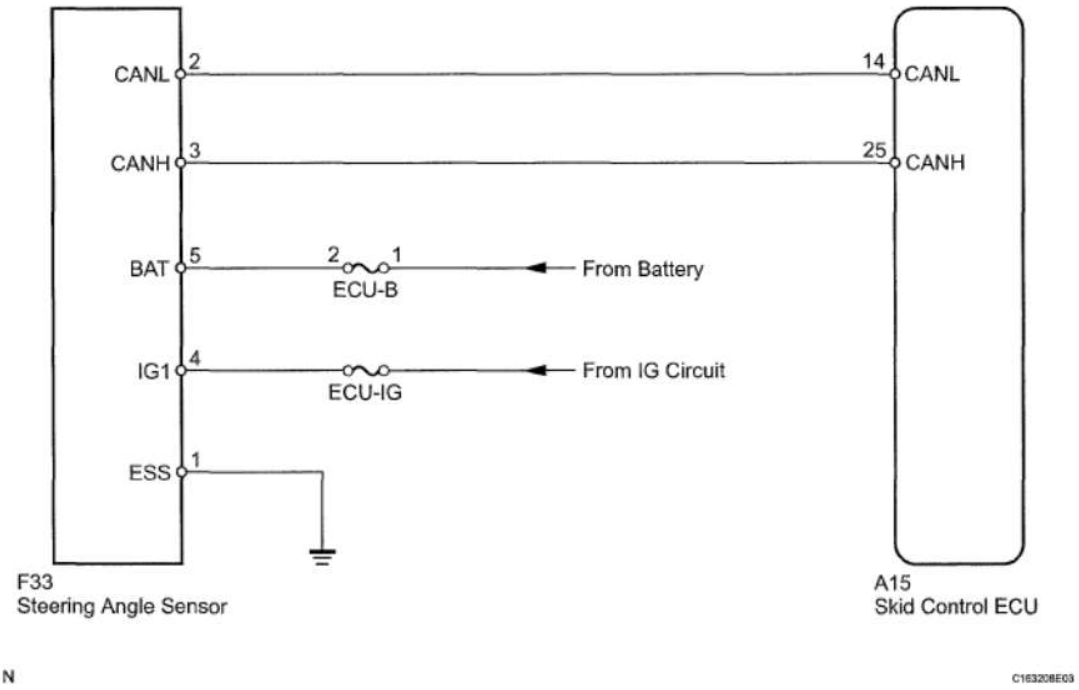


Fig. 148: Steering Angle Sensor Circuit Malfunction - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

HINT:

- When U0073/94, U0123/62, U0124/95 and/or U0126/63 is output together with C1231/31, inspect and repair the trouble areas indicated by U0073/94, U0123/62, U0124/95 and/or U0126/63 first (See **DTC U0073/94 CONTROL MODULE COMMUNICATION BUS OFF; DTC U0100/65 LOST COMMUNICATION WITH ECM / PCM; DTC U0123/62 LOST COMMUNICATION WITH YAW RATE SENSOR MODULE; DTC U0124/95 LOST COMMUNICATION WITH LATERAL ACCELERATION SENSOR MODULE; DTC U0126/63 LOST COMMUNICATION WITH STEERING ANGLE SENSOR MODULE**).
- When the speed sensor or the yaw rate and acceleration 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 or yaw rate and acceleration sensor are output together with other DTCs for the steering angle sensor, inspect and repair the speed sensor and yaw rate and acceleration sensor first, and then inspect and repair the steering angle sensor.

1. **CHECK DTC**
   a. Clear the DTC (See **DTC CHECK/CLEAR**).
   b. Turn the ignition switch to OFF.
   c. Turn the ignition switch to ON again and check that no CAN communication system DTC is output.
   d. Drive the vehicle and turn the steering wheel to the right and left at the speed of 35 km/h (22 mph)

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and check that no speed sensor and yaw rate and acceleration sensor DTCs are output (See **DTC CHECK/CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC (C1231/31) output	A
DTC output (relating to CAN communication system)	B
DTC output (relating to speed sensor or yaw rate and acceleration sensor)	C

HINT:

- If there is a malfunction in the speed sensor or the yaw rate and acceleration sensor, an abnormal value may be output although the steering angle sensor is normal.
- If the speed sensor and the yaw rate and acceleration sensor DTCs are output simultaneously, repair the sensors and inspect the steering angle sensor.

B : INSPECT CAN COMMUNICATION SYSTEM (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

C : REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See **DIAGNOSTIC TROUBLE CODE CHART**)

A: Go to next step

2. **INSPECT STEERING ANGLE SENSOR (POWER SOURCE TERMINAL)**
   a. Turn the ignition switch to OFF.
   b. Remove the steering wheel and the column cover lower.
   c. Disconnect the steering angle sensor connector.
   d. Measure the voltage according to the value(s) in the table below.

Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
F33-4 (IG1) - Body ground	Ignition switch ON	11 to 14 V
F33-5 (BAT) - Body ground	Always	11 to 14 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)

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Front view of wire harness connector:
(to Steering Angle Sensor)

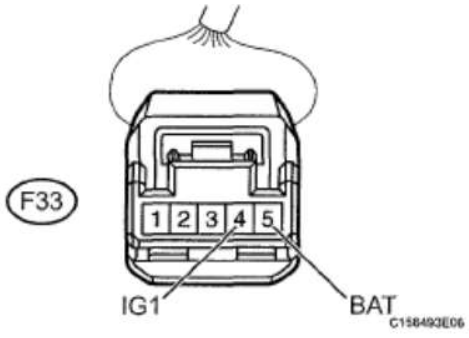


Fig. 149: Identifying Steering Angle Sensor Connector Terminals (Power Source Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

3. **INSPECT STEERING ANGLE SENSOR (GROUND TERMINAL)**
   a. Turn the ignition switch to OFF.
   b. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
F33-1 (ESS) - Body ground	Always	Below 1 ohms

HINT:

If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See **PROBLEM SYMPTOMS TABLE**).

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (GROUND CIRCUIT)

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Front view of wire harness connector:
(to Steering Angle Sensor)

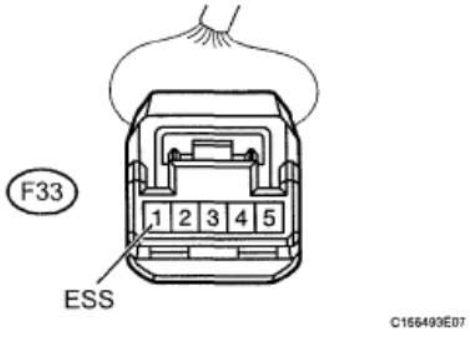


Fig. 150: Identifying Steering Angle Sensor (Ground Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK : REPLACE STEERING ANGLE SENSOR (See **REMOVAL**)

DTC C1232/32 STUCK IN ACCELERATION SENSOR; DTC C0371/71 YAW RATE SENSOR (TEST MODE DTC); DTC C1234/34 YAW RATE SENSOR MALFUNCTION; DTC C1243/43 ACCELERATION SENSOR STUCK MALFUNCTION; DTC C1244/44 OPEN OR SHORT IN ACCELERATION SENSOR CIRCUIT; DTC C1245/45 ACCELERATION SENSOR OUTPUT MALFUNCTION; DTC C1279/79 ACCELERATION SENSOR OUTPUT VOLTAGE MALFUNCTION (TEST MODE DTC); DTC C1381/97 ACCELERATION SENSOR POWER SUPPLY VOLTAGE MALFUNCTION

DESCRIPTION

The skid control ECU receives signals from the yaw rate and acceleration sensor via the CAN communication system.

The yaw rate sensor has a built in acceleration sensor and detects the vehicle's condition using 2 circuits (GL1, GL2).

If there is trouble in the bus lines between the yaw rate and acceleration sensor and the CAN communication system, the DTCs U0123/62 (malfunction in CAN communication with the yaw rate sensor) and U0124/95 (malfunction in CAN communication with the acceleration sensor) are output.

These DTCs are also output when calibration has not been completed.

DTCs C0371/71 and C1279/79 can be deleted when the yaw rate and acceleration sensor sends a yaw rate and/or acceleration signal or the Test Mode ends. DTCs C0371/71 and C1279/79 are output only in the Test Mode.

DTC DETECTION CONDITION CHART

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DTC Code	DTC Detection Condition	Trouble Area
C1232/32	At a vehicle speed of 10 km/h (6 mph) or more, either GL1 or GL2 (input signal) does not change for 30 seconds or more.	• Yaw rate and acceleration sensor • Yaw rate and acceleration sensor circuit
C1234/34	When ECU IG1 terminal voltage is between 9.5 and 17.4 V, the sensor malfunction signal is received from the yaw rate sensor.	• Yaw rate and acceleration sensor • Yaw rate and acceleration sensor circuit • Sensor installation
C1243/43	While the vehicle speed changes from 30 km/h (19 mph) to 0 km/h (0 mph), the condition that the values of GL1 and GL2 do not change 0.0294 G or more occurs 16 times or more.	• Yaw rate and acceleration sensor • Yaw rate and acceleration sensor circuit
C1244/44	When either of the following is detected: 1. A data malfunction signal is received from the acceleration sensor. 2. After the difference between GL1 and GL2 becomes 0.6 G or more with the vehicle stationary, the difference remains 0.4 G or more for 60 seconds or more.	• Yaw rate and acceleration sensor • Yaw rate and acceleration sensor circuit
C1245/45	At a vehicle speed of 30 km/h (19 mph) or more, the difference between the forward and backward G calculated from the acceleration sensor value and that calculated from the vehicle speed exceeds 0.35 G for 60 seconds or more.	• Yaw rate and acceleration sensor • Yaw rate and acceleration sensor circuit • Sensor installation
C1381/97	At a vehicle speed of more than 3 km/h (2 mph), the acceleration sensor power source malfunction signal is received for 10 seconds or more.	• Yaw rate and acceleration sensor • Yaw rate and acceleration sensor power source circuit
C0371/71	Detected only during Test Mode.	Yaw rate and acceleration sensor
C1279/79	Detected only during Test Mode.	• Yaw rate and acceleration sensor • Sensor installation

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WIRING DIAGRAM

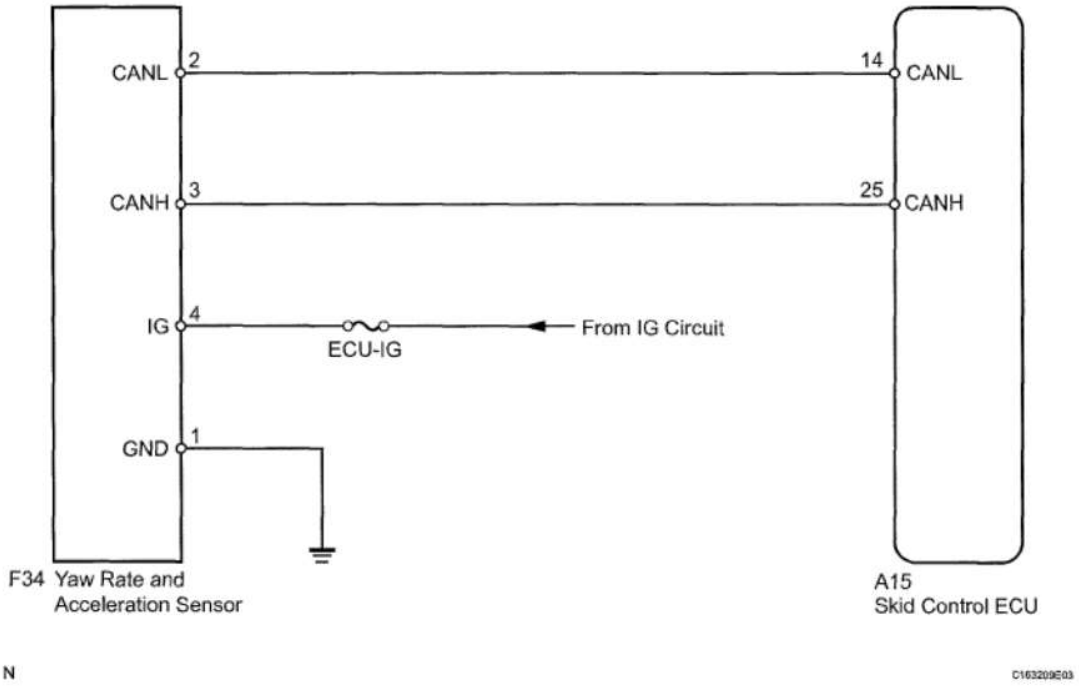


Fig. 151: Yaw Rate And Acceleration Sensor - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When replacing the yaw rate and acceleration sensor, perform zero point calibration (See CALIBRATION).

HINT:

When U0123/62, U0124/95 and/or U0126/63 is output together with C1232/32, C1234/34, C1243/43, C1244/44, C1245/45, and/or C1381/97, inspect and repair the trouble areas indicated by U0123/62, U0124/95 and/or U0126/63 first (See **DTC U0073/94 CONTROL MODULE COMMUNICATION BUS OFF; DTC U0100/65 LOST COMMUNICATION WITH ECM / PCM; DTC U0123/62 LOST COMMUNICATION WITH YAW RATE SENSOR MODULE; DTC U0124/95 LOST COMMUNICATION WITH LATERAL ACCELERATION SENSOR MODULE; DTC U0126/63 LOST COMMUNICATION WITH STEERING ANGLE SENSOR MODULE**).

1. **CHECK DTC**
   a. Clear the DTC (See **DTC CHECK/CLEAR**).
   b. Turn the ignition switch to OFF.
   c. At a speed of 30 km/h (19 mph) or more, drive the vehicle, turn the steering wheel, and decelerate (depress the brake pedal) the vehicle.
   d. Turn the ignition switch to ON again and check that no CAN communication system DTC is output

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(See **DTC CHECK/CLEAR**).

e. Check if DTCs for zero point calibration of the yaw rate sensor undone (C1210/36) or for zero point calibration of the acceleration sensor undone (C1336/39) are output (See **DTC CHECK/CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC output (relating to yaw rate and acceleration sensor)	A
DTC output (relating to CAN communication system)	B
DTC (C1210/36 and/or C1336/39) output	C

B : INSPECT CAN COMMUNICATION SYSTEM (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

C : REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See **DIAGNOSTIC TROUBLE CODE CHART**)

A: Go to next step

2. **CHECK YAW RATE AND ACCELERATION SENSOR INSTALLATION**
   a. Turn the ignition switch to OFF.
   b. Check that the yaw rate and acceleration sensor has been installed properly.

OK:

The sensor should be tightened to the specified torque.

The sensor should not be tilted.

NG: INSTALL YAW RATE AND ACCELERATION SENSOR CORRECTLY (See **INSTALLATION**)

OK: Go to next step

3. **INSPECT YAW RATE AND ACCELERATION SENSOR (IG TERMINAL)**
   a. Disconnect the yaw rate and acceleration sensor connector.
   b. Turn the ignition switch to ON.
   c. Measure the voltage according to the value(s) in the table below.

Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

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Tester Connection	Switch Condition	Specified Condition
F34-4 (IG) - Body ground	Ignition switch ON	11 to 14 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (IG CIRCUIT)

Front view of wire harness connector:
(to Yaw Rate and Acceleration Sensor)

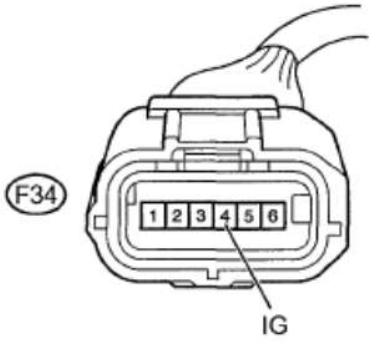


Fig. 152: Identifying Yaw Rate And Acceleration Sensor Connector Terminal (IG Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

4. **INSPECT YAW RATE AND ACCELERATION SENSOR (GND TERMINAL)**
   a. Turn the ignition switch to OFF.
   b. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
F34-1 (GND) - Body ground	Always	Below 1 ohms

NOTE: **Check the yaw rate and acceleration sensor signal after replacement (See TEST MODE PROCEDURE).**

HINT:

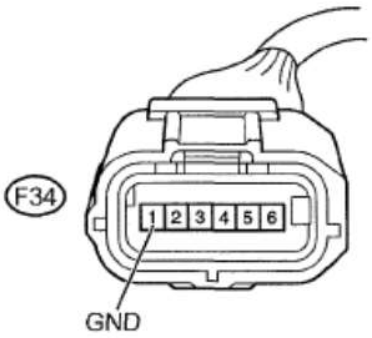
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See **PROBLEM SYMPTOMS TABLE**).

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)

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Front view of wire harness connector:
(to Yaw Rate and Acceleration Sensor)



N C156491E08

Fig. 153: Identifying Yaw Rate And Acceleration Sensor Connector Terminals (GND Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK : REPLACE YAW RATE AND ACCELERATION SENSOR (See **INSTALLATION**)

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; 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; DTC C1275/75 ABNORMAL CHANGE IN OUTPUT SIGNAL OF FRONT SPEED SENSOR RH (TEST MODE DTC); DTC C1276/76 ABNORMAL CHANGE IN OUTPUT SIGNAL OF FRONT SPEED SENSOR LH (TEST MODE DTC); DTC C1277/77 ABNORMAL CHANGE IN OUTPUT SIGNAL OF REAR SPEED SENSOR RH (TEST MODE DTC); DTC C1278/78 ABNORMAL CHANGE IN OUTPUT SIGNAL OF REAR SPEED SENSOR LH (TEST MODE DTC)

DESCRIPTION

The speed sensors detect the wheel speeds and send appropriate signals to the skid control ECU. Speed sensor rotors have rows of alternating N and S magnetic poles, and their magnetic fields change as the rotors turn.

The speed sensors detect those magnetic changes and send pulse signals to the skid control ECU. The ECU monitors the wheel speeds through these pulse signals to control the ABS control system.

When foreign matter or oil adheres to the speed sensor tip or speed sensor rotor, these DTCs are output. An abnormal waveform input from the sensor determines these conditions.

These DTCs may be detected when a malfunction occurs in the connector terminals or wire harness of the speed sensor circuit.

DTCs C1275/75 to C1278/78 can be deleted when the speed sensor sends a vehicle speed signal or the Test Mode ends. DTCs C1275/75 to C1278/78 are output only in the Test Mode.

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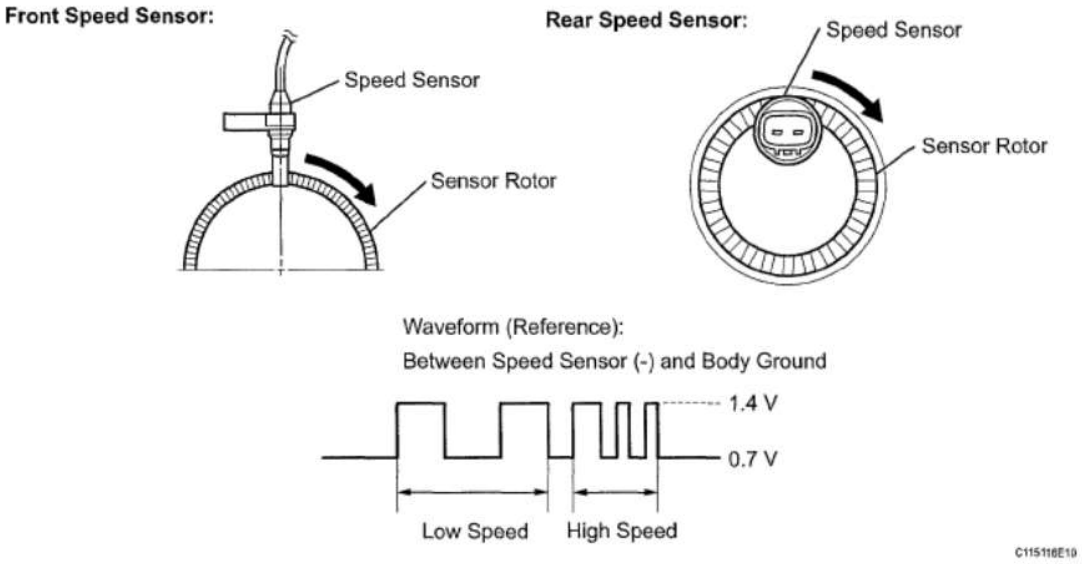


Fig. 154: Speed Sensor Voltage Graph
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1235/35 C1236/36 C1238/38 C1239/39	When either of the following is detected: 1. At a vehicle speed of 20 km/h (12 mph) or more, the IG1 terminal voltage is 17.4 V or less, and noise occurs in the sensor signal from the abnormal wheel for 5 seconds or more. 2. At a vehicle speed of 10 km/h (6 mph) or more, the IG1 terminal voltage is 17.4 V or less, and noise is input once per rotor rotation for 15 seconds or more.	• Speed sensor • Speed sensor rotor • Sensor installation • Brake actuator assembly (Skid control ECU)
C1275/75 C1276/76 C1277/77 C1278/78	Detected only during Test Mode.	Speed sensor rotor

HINT:

- DTCs C1235/35 and C1275/75 are for the front speed sensor RH.
- DTCs C1236/36 and C1276/76 are for the front speed sensor LH.
- DTCs C1238/38 and C1277/77 are for the rear speed sensor RH.
- DTCs C1239/39 and C1278/78 are for the rear speed sensor LH.

WIRING DIAGRAM

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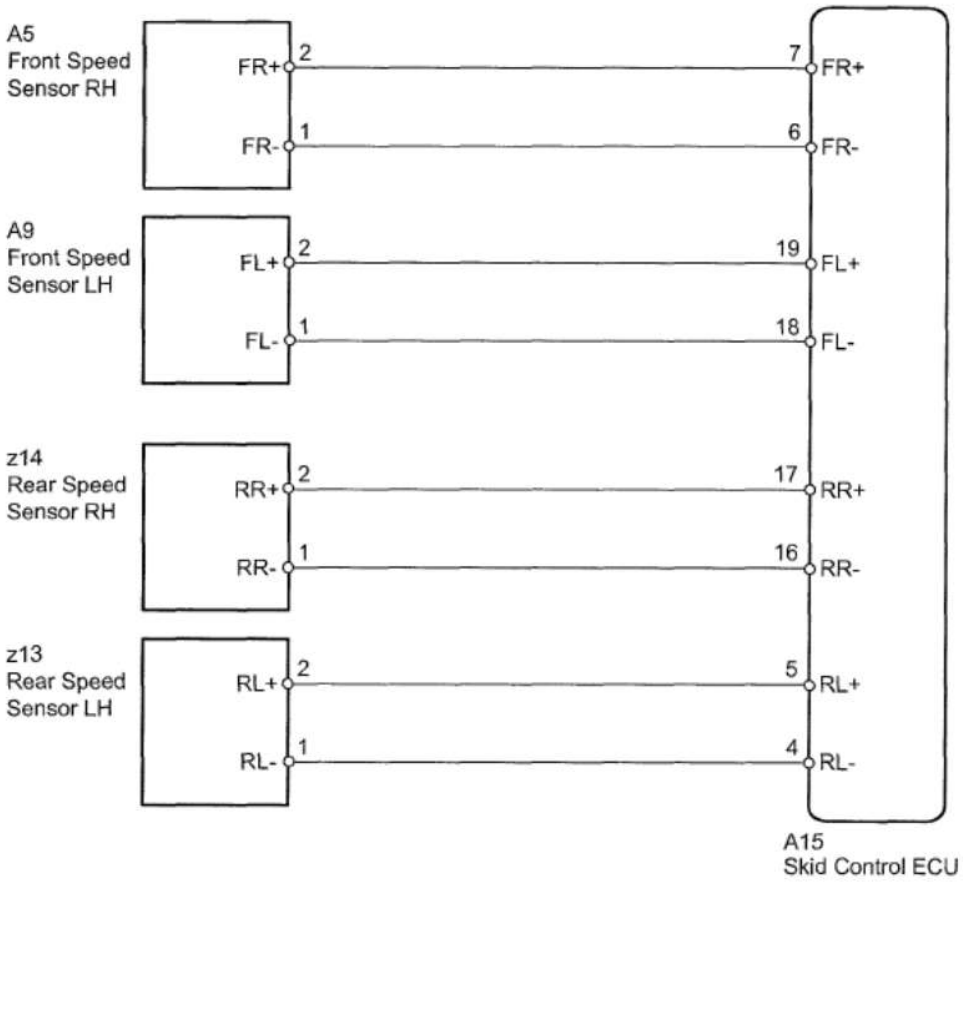


Fig. 155: Front Speed Sensor - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: **When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).**

HINT:

When C0200/31, C0205/32, C0210/33 and/or C0215/34 is output together with C1235/35, C1236/36, C1238/38, or C1239/39, inspect and repair the trouble areas indicated by C0200/31, C0205/32, C0210/33 and/or C0215/34 first (See **DTC C0200/31 FRONT SPEED SENSOR RH CIRCUIT; DTC C0205/32 FRONT SPEED SENSOR LH CIRCUIT; DTC C1271/71 LOW OUTPUT SIGNAL OF FRONT SPEED SENSOR RH (TEST MODE DTC); DTC C1272/72 LOW OUTPUT SIGNAL OF FRONT SPEED SENSOR LH (TEST MODE DTC)** for front, or **DTC C0210/33 REAR SPEED SENSOR RH CIRCUIT; DTC C0215/34 REAR SPEED SENSOR LH CIRCUIT; DTC C1273/73 LOW OUTPUT SIGNAL OF**

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REAR SPEED SENSOR RH (TEST MODE DTC); DTC C1274/74 LOW OUTPUT SIGNAL OF REAR SPEED SENSOR LH (TEST MODE DTC) for rear).

1. **INSPECT EACH SPEED SENSOR**
   a. Make sure that there is no looseness at the locking part and the connecting part of the connectors.
   b. Disconnect each speed sensor connector.
   c. Measure the resistance according to the value(s) in the table below.

Standard resistance:

for RH

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
2 (FR+) - Body ground	Always	10 kohms or higher
1 (FR-) - Body ground	Always	10 kohms or higher
2 (RR+) - Body ground	Always	10 kohms or higher
1 (RR-) - Body ground	Always	10 kohms or higher

for LH

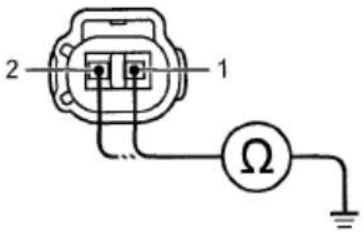
TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
2 (FL+) - Body ground	Always	10 kohms or higher
1 (FL-) - Body ground	Always	10 kohms or higher
2 (RL+) - Body ground	Always	10 kohms or higher
1 (RL-) - Body ground	Always	10 kohms or higher

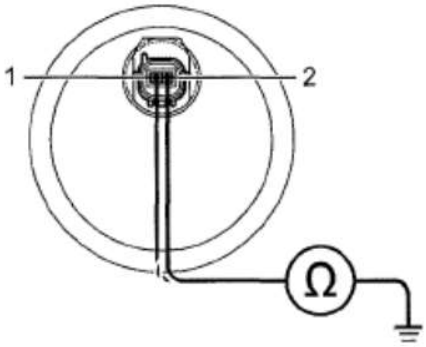
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Component without harness connected:
(Front Speed Sensor)



Component without harness connected:
(Rear Speed Sensor)



C170211E01

Fig. 156: Measuring Resistance Between Front Speed Sensor Terminal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Result

RESULT CHART

Result	Proceed to
OK (for rear)	A
OK (for front)	B
NG	C

NOTE: **Check the speed sensor signal after replacement (See TEST MODE PROCEDURE).**

B: Go to step 3

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C : REPLACE EACH SPEED SENSOR

A: Go to next step

2. **CHECK HARNESS AND CONNECTOR (SPEED SENSOR WIRE)**
   a. Disconnect the speed sensor wire.
   b. Measure the resistance according to the value(s) in the table below.

Standard resistance:

for RH

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
z14-1 - zL1-1	Always	10 kohms or higher
z14-1 - zL1-2	Always	Below 1 ohms
z14-1 - Body ground	Always	10 kohms or higher
z14-2 - zL1-1	Always	Below 1 ohms
z14-2 - zL1-2	Always	10 kohms or higher
z14-2 - Body ground	Always	10 kohms or higher

for LH

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
z13-1 - zL2-1	Always	10 kohms or higher
z13-1 - zL2-2	Always	Below 1 ohms
z13-1 - Body ground	Always	10 kohms or higher
z13-2 - zL2-1	Always	Below 1 ohms
z13-2 - zL2-2	Always	10 kohms or higher
z13-2 - Body ground	Always	10 kohms or higher

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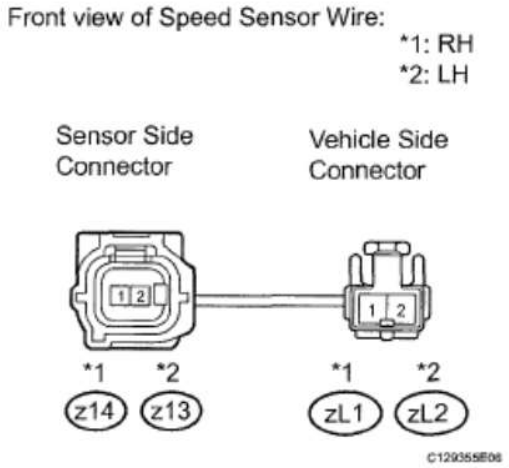


Fig. 157: Identifying Speed Sensor Wire Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: **Check the speed sensor signal after replacement (See TEST MODE PROCEDURE).**

NG: REPLACE SPEED SENSOR WIRE

OK: Go to next step

3. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - EACH SPEED SENSOR)**
   a. Reconnect the speed sensor wire.
   b. Disconnect the skid control ECU connector.
   c. Measure the resistance according to the value(s) in the table below.

Standard resistance:

for RH

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A15-7 (FR+) - A5-2 (FR+)	Always	Below 1 ohms
A15-7 (FR+) - Body ground	Always	10 kohms or higher
A15-6 (FR-) - A5-1 (FR-)	Always	Below 1 ohms
A15-6 (FR-) - Body ground	Always	10 kohms or higher
A15-17 (RR+) - z14-2 (RR+)	Always	Below 1 ohms
A15-17 (RR+) - Body ground	Always	10 kohms or higher
A15-16 (RR-) - z14-1 (RR-)	Always	Below 1 ohms
A15-16 (RR-) - Body ground	Always	10 kohms or higher

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for LH

TESTER CONNECTION SPECIFIED CONDITION CHART

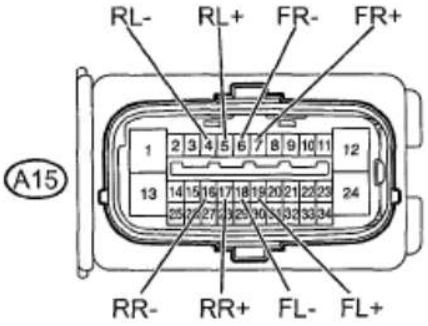
Tester Connection	Condition	Specified Condition
A15-19 (FL+) - A9-2 (FL+)	Always	Below 1 ohms
A15-19 (FL+) - Body ground	Always	10 kohms or higher
A15-18 (FL-) - A9-1 (FL-)	Always	Below 1 ohms
A15-18 (FL-) - Body ground	Always	10 kohms or higher
A15-5 (RL+) - z13-2 (RL+)	Always	Below 1 ohms
A15-5 (RL+) - Body ground	Always	10 kohms or higher
A15-4 (RL-) - z13-1 (RL-)	Always	Below 1 ohms
A15-4 (RL-) - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

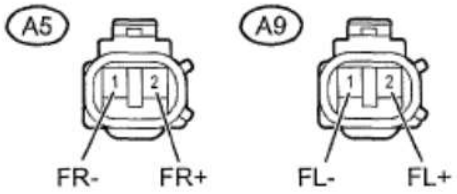
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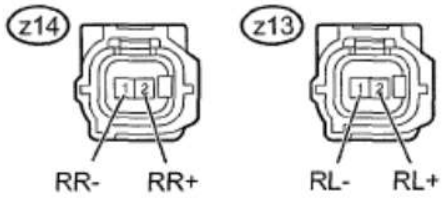
Front view of wire harness connector:
(to Skid Control ECU)



Front view of wire harness connector:
(to Front Speed Sensor)



Front view of wire harness connector:
(to Rear Speed Sensor)



C164930E01

Fig. 158: Identifying Skid Control ECU Connector Terminal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

4. **INSPECT SKID CONTROL ECU (SENSOR INPUT)**
   a. Reconnect the skid control ECU connector.
   b. Turn the ignition switch to ON.
   c. Measure the voltage according to the value(s) in the table below.

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Standard voltage:

for RH

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
A5-2 (FR+) - Body ground	Ignition switch ON	8 to 14 V
214-2 (RR+) - Body ground	Ignition switch ON	8 to 14 V

for LH

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
A9-2 (FL+) - Body ground	Ignition switch ON	8 to 14 V
213-2 (RL+) - Body ground	Ignition switch ON	8 to 14 V

NG: REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

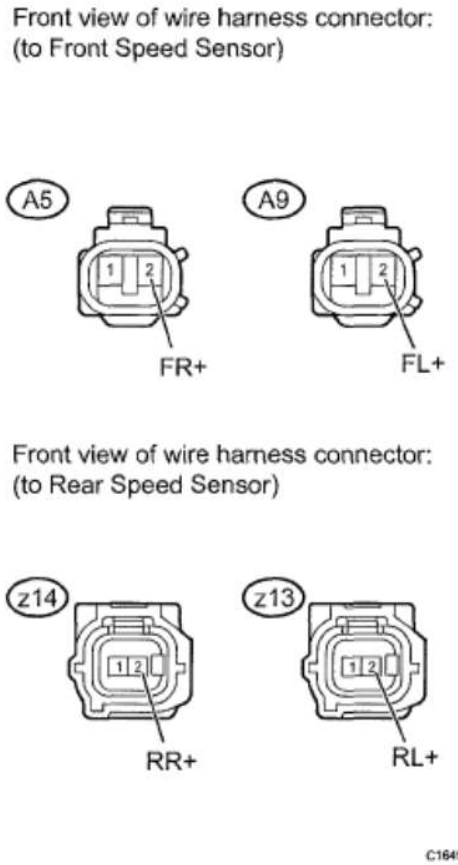


Fig. 159: Identifying Skid Control ECU Connector Terminal (Sensor Input)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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OK: Go to next step

5. **RECONFIRM DTC**
   a. Turn the ignition switch to OFF.
   b. Reconnect the speed sensor connector.
   c. Clear the DTC (See **DTC CHECK/CLEAR**).
   d. Start the engine.
   e. Drive the vehicle at a speed of 20 km/h (12 mph) or more for at least 60 seconds.
   f. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC output (for front)	A
DTC output (for rear)	B
DTC not output	C

B: Go to step 12

C : CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **CHECK FOR INTERMITTENT PROBLEMS**)

A: Go to next step

6. **CHECK FRONT SPEED SENSOR TIP**
   a. Turn the ignition switch to OFF.
   b. Remove the front speed sensor (See **REMOVAL**).
   c. Check the speed sensor tip.

OK:

No scratches or foreign matter on the sensor tip.

NOTE: **Check the speed sensor signal after cleaning or replacement (See TEST MODE PROCEDURE).**

NG: CLEAN OR REPLACE FRONT SPEED SENSOR

OK: Go to next step

7. **CHECK FRONT SPEED SENSOR ROTOR**
   a. Check the front speed sensor rotors.

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HINT:

The front speed sensor rotor is incorporated into the front axle hub bearing.

OK:

No scratches, oil, or foreign matter on the rotors.

NOTE: Check the speed sensor signal after cleaning or replacement (See TEST MODE PROCEDURE).

NG: CLEAN OR REPLACE FRONT SPEED SENSOR ROTOR

OK: Go to next step

8. **REPLACE FRONT SPEED SENSOR**
   a. Turn the ignition switch to OFF.
   b. Replace front speed sensor (See **REMOVAL**).

NOTE: Check the speed sensor signal after replacement (See TEST MODE PROCEDURE).

9. **RECONFIRM DTC**
   a. Clear the DTC (See **DTC CHECK/CLEAR**).
   b. Start the engine.
   c. Drive the vehicle at a speed of 20 km/h (12 mph) or more for at least 60 seconds.
   d. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC output	A
DTC not output	B

B : END

A: Go to next step

10. **REPLACE FRONT AXLE HUB RH BEARING**
    a. Turn the ignition switch to OFF.
    b. Replace the front axle hub bearing (See **REMOVAL**).

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HINT:

The front speed sensor rotor is incorporated into the front axle hub bearing.

NOTE: Check the speed sensor signal after replacement (See TEST MODE PROCEDURE).

11. **RECONFIRM DTC**
    a. Clear the DTC (See **DTC CHECK/CLEAR**).
    b. Start the engine.
    c. Drive the vehicle at a speed of 20 km/h (12 mph) or more for at least 60 seconds.
    d. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC output	A
DTC not output	B

B : END

A : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

12. **REPLACE REAR AXLE HUB AND BEARING ASSEMBLY**
    a. Turn the ignition switch to OFF.
    b. Replace the rear speed sensor and rear axle hub and bearing assembly (See **REMOVAL**).

HINT:

The rear speed sensor rotor is incorporated into the rear axle hub and bearing assembly.

If the rear speed sensor rotor needs to be replaced, replace it together with the rear axle hub and bearing assembly with rear speed sensor.

NOTE: Check the speed sensor signal after replacement (See TEST MODE PROCEDURE).

13. **RECONFIRM DTC**
    a. Clear the DTC (See **DTC CHECK/CLEAR**).
    b. Start the engine.
    c. Drive the vehicle at a speed of 20 km/h (12 mph) or more for at least 60 seconds.
    d. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

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Result

RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

B : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

A : END

DTC C1241/41 LOW BATTERY POSITIVE VOLTAGE OR ABNORMALLY HIGH BATTERY POSITIVE VOLTAGE

DESCRIPTION

If a malfunction is detected in the power supply circuit, the skid control ECU (housed in the actuator assembly) stores this DTC and the fail safe function prohibits ABS operation.

This DTC is stored when the IG1 terminal voltage deviates from the DTC detection condition due to a malfunction in the power supply or charging circuit such as the battery or alternator circuit, etc. The DTC is cancelled when the IG1 terminal voltage returns to normal.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1241/41	When any of the following is detected: 1. At a vehicle speed of 3 km/h (2 mph) or more, the IG1 terminal voltage is less than 9.5 V for 10 seconds or more. 2. When the solenoid relay remains ON and the IG1 terminal voltage is less than 9.5 V, the relay contact is open for 0.22 seconds or more. 3. With the IG1 terminal voltage 9.5 V or less, the vehicle speed sensor power supply decreases for 60 seconds or more. 4. While the motor fail safe relay is ON after motor relay ON, the IG1 terminal voltage is 9.5 V or less and the actuator pump drive motor is OFF for 0.22 seconds or more. 5. The IG1 terminal voltage is more than 17.4 V for 0.8 seconds or more.	• ECU-IG fuse • Battery • Charging system • Power source circuit • Internal power supply circuit of the skid control ECU

WIRING DIAGRAM

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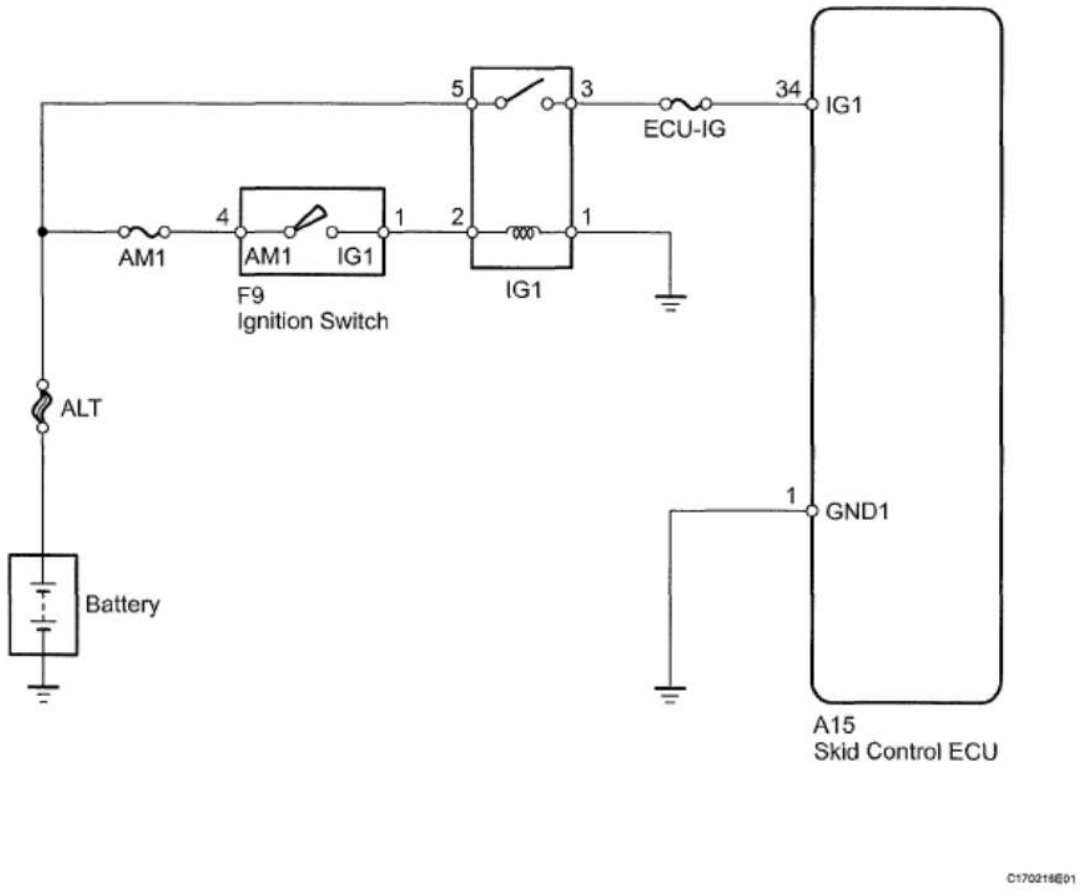


Fig. 160: Low And High Battery Voltage - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

1. **INSPECT ECU-IG FUSE**
   a. Remove the ECU-IG fuse from the main body ECU (instrument panel junction block).
   b. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
ECU-IG (10 A) fuse	Always	Below 1 ohms

NG: REPLACE ECU-IG FUSE

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Main Body ECU:

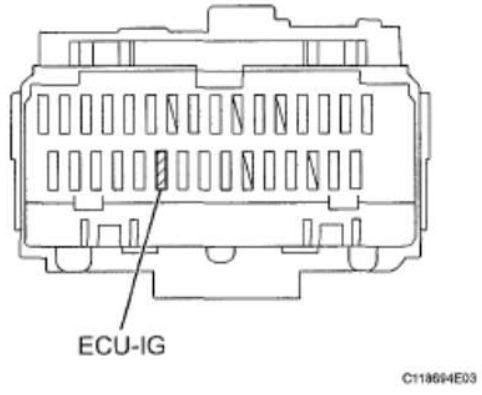


Fig. 161: Identifying ECU-IG Fuse
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

2. **CHECK BATTERY**
   a. Install the ECU-IG fuse.
   b. Check the battery voltage.

   Standard voltage:

   11 to 14 V

NG: CHECK OR REPLACE CHARGING SYSTEM OR BATTERY (See **ON-VEHICLE INSPECTION**)

OK: Go to next step

3. **INSPECT SKID CONTROL ECU (IG1 TERMINAL)**
   a. Disconnect the skid control ECU connector.
   b. Turn the ignition switch to ON.
   c. Measure the voltage according to the value(s) in the table below.

   Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
A15-34 (IG1) - Body ground	Ignition switch ON	11 to 14 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)

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Front view of wire harness connector:
(to Skid Control ECU)

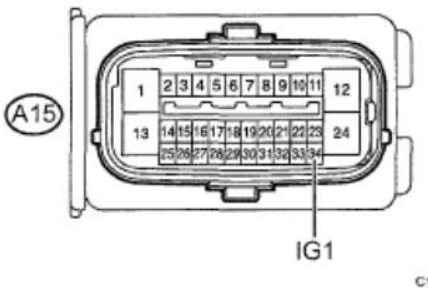


Fig. 162: Identifying Skid Control ECU Connector Terminal (IG1 Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

4. **INSPECT SKID CONTROL ECU (GND TERMINAL)**
   a. Turn the ignition switch to OFF.
   b. Measure the resistance according to the value(s) in the table below.

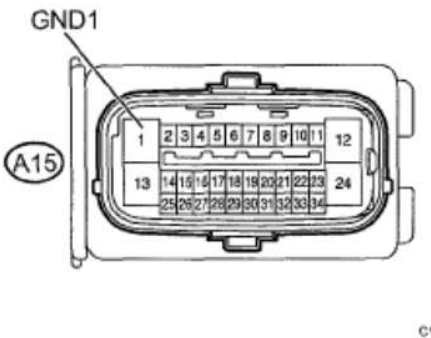
Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A15-1 (GND1) - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)

Front view of wire harness connector:
(to Skid Control ECU)



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Fig. 163: Identifying Skid Control ECU Connector Terminal (GND Terminal)
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OK: Go to next step

5. **RECONFIRM DTC**
   a. Reconnect the skid control ECU connector.
   b. Clear the DTC (See **DTC CHECK/CLEAR**).
   c. Start the engine.
   d. Drive the vehicle at a speed of 20 km/h (12 mph) or more for 30 seconds or more.
   e. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

HINT:

If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See **PROBLEM SYMPTOMS TABLE**).

B : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

A : CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **CHECK FOR INTERMITTENT PROBLEMS**)

DTC C1246/46 MASTER CYLINDER PRESSURE SENSOR MALFUNCTION; DTC C1281/81 MASTER CYLINDER PRESSURE SENSOR OUTPUT MALFUNCTION (TEST MODE DTC)

DESCRIPTION

Master cylinder pressure sensor is connected to the skid control ECU in the brake actuator assembly. DTC C1281/81 can be deleted when the master cylinder pressure sensor sends a master cylinder pressure signal or the Test Mode ends. DTC C1281/81 is output only in the Test Mode.

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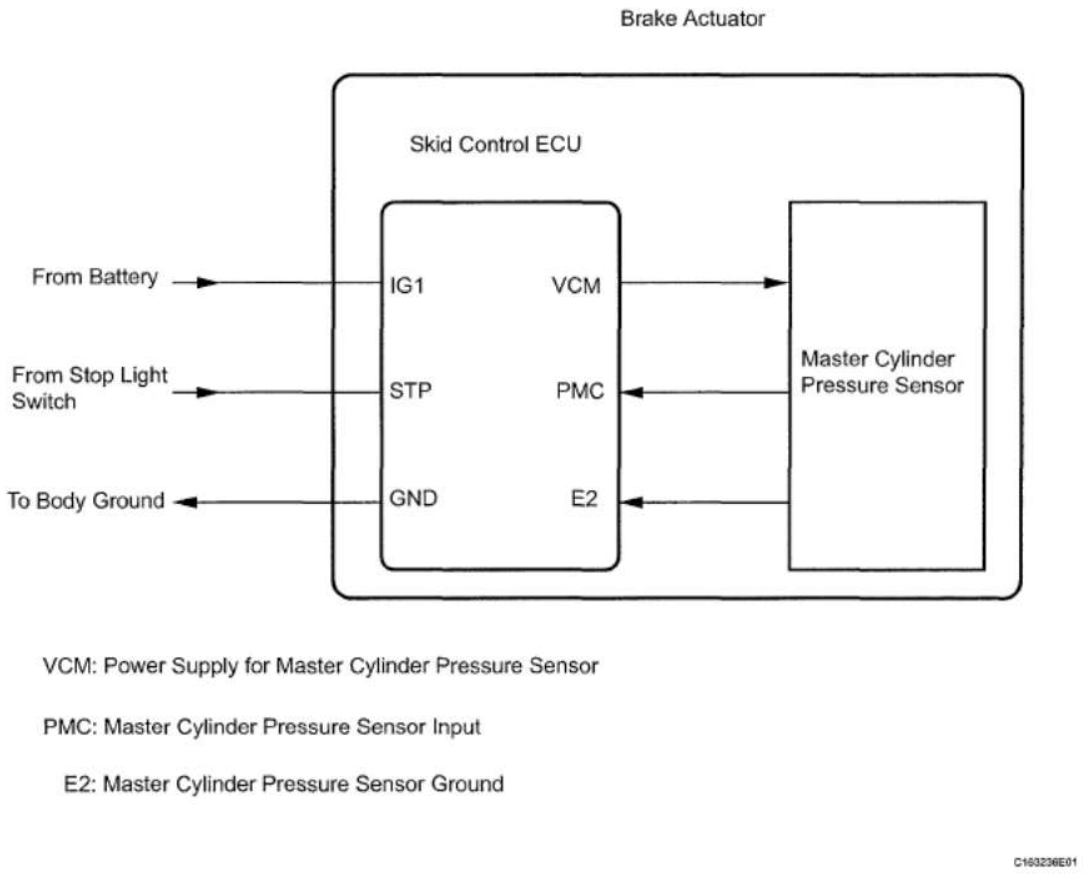


Fig. 164: Master Cylinder Pressure Sensor Malfunction - Communication Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1246/46	When any of the following is detected: 1. At a vehicle speed of 7 km/h (4.3 mph) or more, when the PMC terminal voltage is over 0.86 V, it does not change by 0.005 V or more for 30 seconds. 2. Noise occurs in the PMC terminal 7 times or more within 5 seconds. 3. When the stop light switch is OFF, the PMC terminal voltage is more than 0.86 V or less than 0.3 V for 5 seconds or more. 4. With the IG1 terminal voltage between 9.5 and 17.2 V, the VCM terminal voltage is not between 4.4 and 5.6 V for 1.2 seconds or more. 5. When the VCM terminal voltage is between 4.4 and 5.6	• Stop light switch circuit • Master cylinder pressure sensor circuit • Brake actuator assembly (Master cylinder pressure sensor)

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	V, the PCM terminal voltage is not between 0.14 and 4.85 V for 1.2 seconds or more.	
C1281/81	Detected only during Test Mode.	• Stop light switch • Master cylinder pressure sensor

WIRING DIAGRAM

Refer to **DTC C1249/49** .

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

1. **CHECK STOP LIGHT 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

   PROCEDURE CHART

Condition	Illumination Condition
Brake pedal depressed	ON
Brake pedal released	OFF

NG: INSPECT STOP LIGHT CIRCUIT (See **STOP LIGHT CIRCUIT**)

OK: Go to next step

2. **READ VALUE USING TECHSTREAM (MASTER CYLINDER PRESSURE SENSOR)**
   a. Connect the Techstream to the DLC3.
   b. Start the engine.
   c. Select the Data List mode on the Techstream (See **DATA LIST / ACTIVE TEST**).

   ABS/VSC/TRAC:

   MEASUREMENT ITEM NORMAL CONDITION CHART

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Master Cylinder Sensor	Master cylinder pressure sensor 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

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d. Check that the brake fluid pressure value of the master cylinder pressure sensor observed on the Techstream changes when the brake pedal is depressed.

OK:

When the pedal is depressed, voltage displayed on the Techstream increases.

NG: REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

OK: Go to next step

3. **READ VALUE USING TECHSTREAM (STOP LIGHT SWITCH)**
   a. Select the Data List mode on the Techstream (See **DATA LIST / ACTIVE TEST**).

ABS/VSC/TRAC:

MEASUREMENT ITEM NORMAL CONDITION CHART

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Stop Lamp SW	Stop light switch / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-

   b. Check that the stop light condition observed on the Techstream changes when the brake pedal is depressed.

OK:

When the brake pedal is depressed, the Techstream displays "ON".

NG: Go to step 5

OK: Go to next step

4. **RECONFIRM DTC**
   a. Turn the ignition switch to OFF.
   b. Clear the DTC (See **DTC CHECK/CLEAR**).
   c. Start the engine.
   d. At a speed of 30 km/h (19 mph) or more, drive the vehicle and perform braking test (decelerate the vehicle by depressing the brake pedal).
   e. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

RESULT CHART

Result	Proceed to

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DTC not output	A
DTC output	B

B : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

A : CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **CHECK FOR INTERMITTENT PROBLEMS**)

5. **INSPECT SKID CONTROL ECU (STP TERMINAL)**
   a. Turn the ignition switch to OFF.
   b. Disconnect the skid control ECU connector.
   c. Measure the voltage according to the value(s) in the table below.

Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
A15-2 (STP) - Body ground	Stop light switch ON (Brake pedal depressed)	8 to 14 V
A15-2 (STP) - Body ground	Stop light switch OFF (Brake pedal released)	Below 1.5 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (STP CIRCUIT)

Front view of wire harness connector:
(to Skid Control ECU)

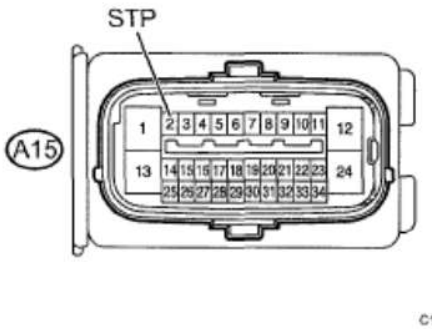


Fig. 165: Identifying Skid Control ECU Connector Terminal (STP Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

DTC C1249/49 OPEN IN STOP LIGHT SWITCH CIRCUIT

DESCRIPTION

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The skid control ECU (housed in the actuator assembly) inputs the stop light switch signal and the condition of brake operation.

The skid control ECU has an open detection circuit, which outputs this DTC when detecting an open in the stop light input line or the ground line of the stop light circuit with the stop light switch off (brake pedal not depressed).

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1249/49	When IG1 terminal voltage is 9.5 V or more, an open circuit of the stop light switch continues for 3 seconds or more.	• STOP fuse • Stop light switch • Stop light switch circuit • Brake actuator assembly (Skid control ECU)

WIRING DIAGRAM

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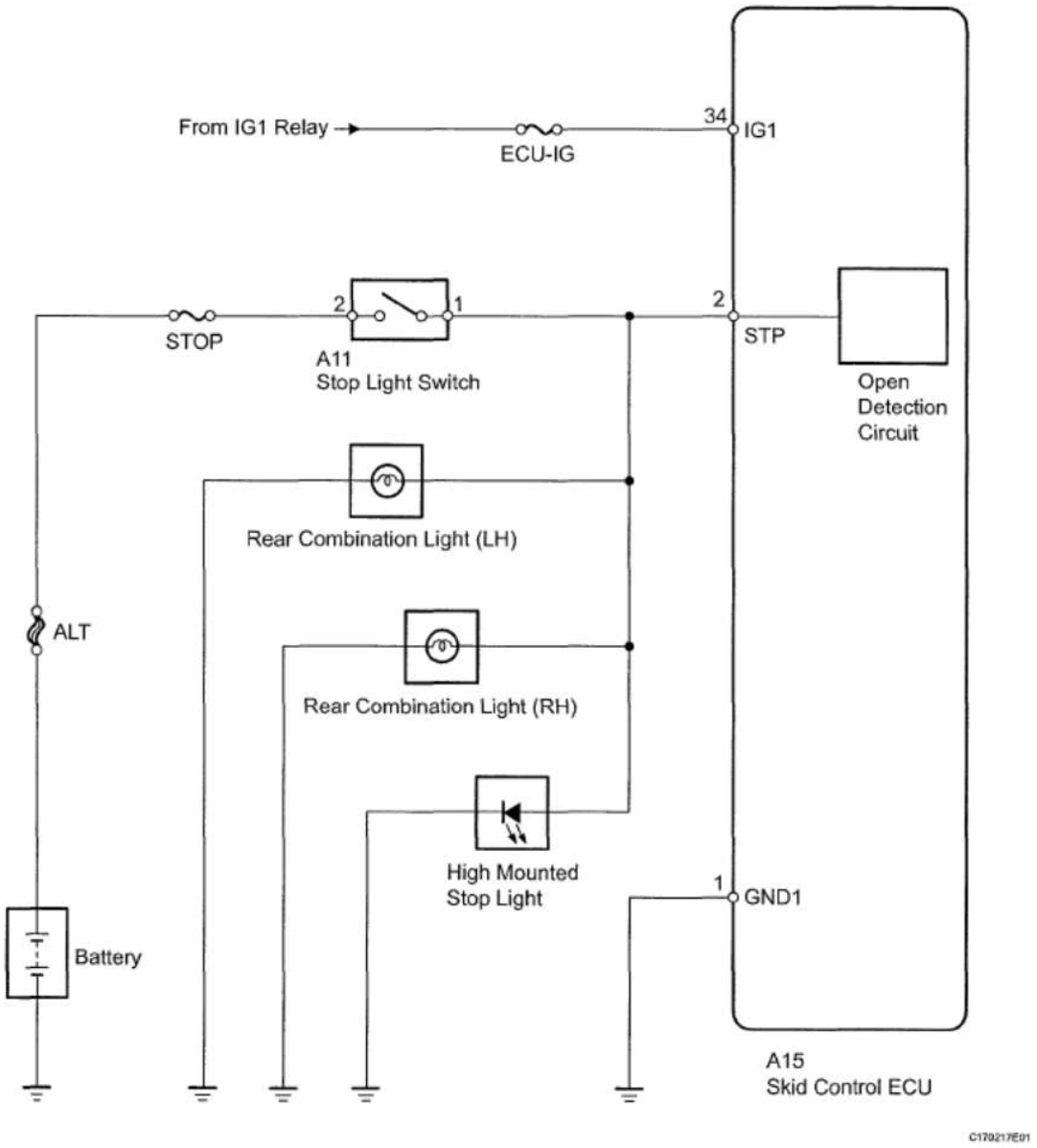


Fig. 166: Stop Light Switch Circuit - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

1. **INSPECT STOP FUSE**
   a. Remove the STOP fuse from the main body ECU (instrument panel junction block).
   b. Measure the resistance according to the value(s) in the table below.

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Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
STOP (10 A) fuse	Always	Below 1 ohms

NG: REPLACE STOP FUSE

Main Body ECU:

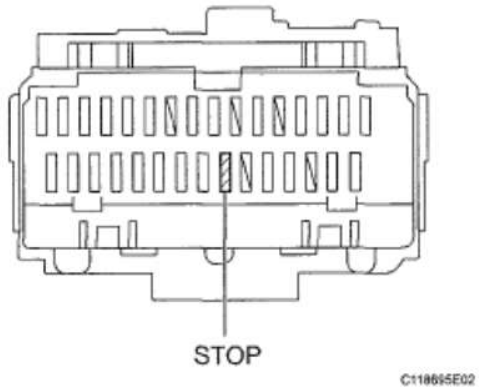


Fig. 167: Identifying STOP Fuse
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

2. **CHECK STOP LIGHT OPERATION**
   a. Install the STOP fuse.
   b. Check that the stop light comes on when the brake pedal is depressed, and goes off when the brake pedal is released.

   OK

   CONDITION CHART

Condition	Illumination Condition
Brake pedal depressed	ON
Brake pedal released	OFF

NG: Go to step 7

OK: Go to next step

3. **INSPECT SKID CONTROL ECU (STP TERMINAL)**

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

Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
A15-2 (STP) - Body ground	Stop light switch ON (Brake pedal depressed)	8 to 14 V
A15-2 (STP) - Body ground	Stop light switch OFF (Brake pedal released)	Below 1.5 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (STP CIRCUIT)

Front view of wire harness connector:
(to Skid Control ECU)

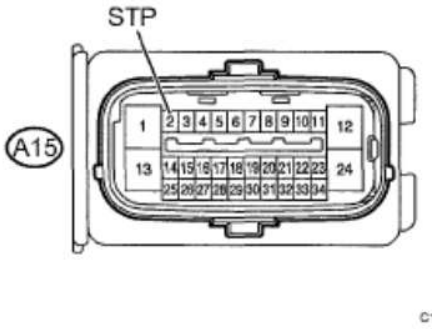


Fig. 168: Identifying Skid Control ECU Connector Terminal (STP Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

4. **INSPECT SKID CONTROL ECU (IG1 TERMINAL)**
   a. Turn the ignition switch to ON.
   b. Measure the voltage according to the value(s) in the table below.

Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
A15-34 (IG1) - Body ground	Ignition switch ON	11 to 14 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)

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Front view of wire harness connector:
(to Skid Control ECU)

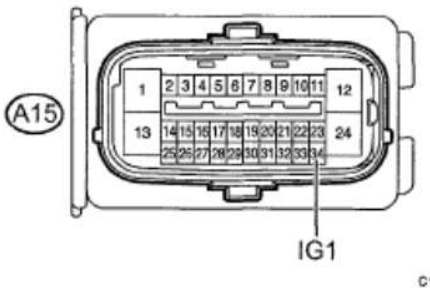


Fig. 169: Identifying Skid Control ECU Connector Terminal (IG1 Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

5. **INSPECT SKID CONTROL ECU (GND TERMINAL)**
   a. Turn the ignition switch to OFF.
   b. Measure the resistance according to the value(s) in the table below.

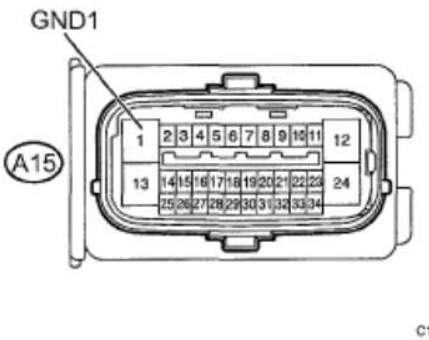
Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A15-1 (GND1) - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)

Front view of wire harness connector:
(to Skid Control ECU)



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Fig. 170: Identifying Skid Control ECU Connector Terminal (GND Terminal)
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OK: Go to next step

6. **RECONFIRM DTC**
   a. Reconnect the skid control ECU connector.
   b. Clear the DTC (See **DTC CHECK/CLEAR**).
   c. Start the engine.
   d. Depress the brake pedal several times to test the stop light circuit.
   e. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

HINT:

If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See **PROBLEM SYMPTOMS TABLE**).

B : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

A : CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **CHECK FOR INTERMITTENT PROBLEMS**)

7. **INSPECT STOP LIGHT SWITCH (POWER SOURCE TERMINAL)**
   a. Disconnect the stop light switch connector.
   b. Measure the voltage according to the value(s) in the table below.

Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A11-2 - Body ground	Always	11 to 14 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)

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Front view of wire harness connector:
(to Stop Light Switch)

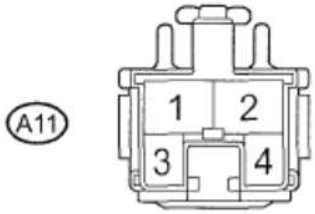


Fig. 171: Identifying Stop Light Switch Connector Terminals (Power Source Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

8. **INSPECT STOP LIGHT SWITCH**
   a. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

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

NG: REPLACE STOP LIGHT SWITCH (See **REMOVAL**)

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Component without harness connected:
(Stop Light Switch)

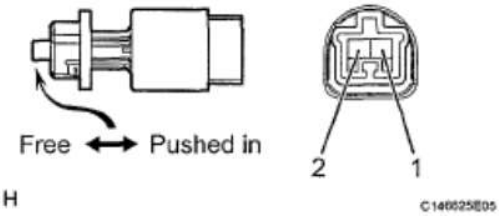


Fig. 172: Identifying Stop Light Switch Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

9. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - STOP LIGHT SWITCH)**
   a. Disconnect the skid control ECU connector.
   b. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

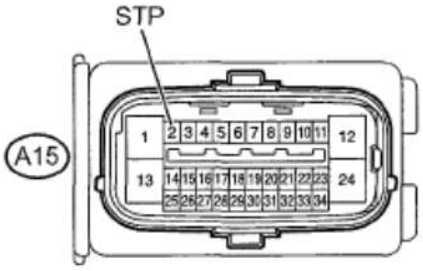
Tester Connection	Condition	Specified Condition
A15-2 (STP) - A11-1	Always	Below 1 ohms
A15-2 (STP) - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

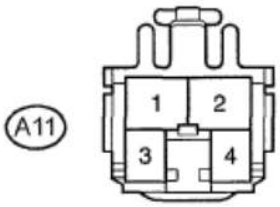
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Front view of wire harness connector:
(to Skid Control ECU)



Front view of wire harness connector:
(to Stop Light Switch)



C168925E01

Fig. 173: Identifying Skid Control ECU Connector Terminal And Stop Light Switch Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

10. **RECONFIRM DTC**
    a. Reconnect the skid control ECU connector and the stop light switch connector.
    b. Clear the DTC (See **DTC CHECK/CLEAR**).
    c. Start the engine.
    d. Depress the brake pedal several times to test the stop light circuit.
    e. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

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RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

HINT:

If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See **PROBLEM SYMPTOMS TABLE**).

B : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

A : INSPECT LIGHTING SYSTEM (STOP LIGHT CIRCUIT) (See **STOP LIGHT CIRCUIT**)

DTC C1251/51 OPEN IN PUMP MOTOR CIRCUIT

DESCRIPTION

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1251/51	When either of the following is detected: 1. Actuator pump motor does not operate properly. 2. Open in actuator pump motor circuit continues for at least 2 seconds.	• Brake actuator assembly (Ground circuit) • Brake actuator assembly (Motor circuit)

WIRING DIAGRAM

Refer to **DTCS C0273/13, C0274/14 AND C1361/91** .

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

1. **PERFORM ACTIVE TEST USING TECHSTREAM (ABS MOTOR RELAY)**
   a. Connect the Techstream to the DLC3.
   b. Start the engine.
   c. Select the Active Test mode on the Techstream (See **DATA LIST / ACTIVE TEST**).

ABS/VSC/TRAC:

ACTIVE TEST

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Tester Display	Test Part	Control Range	Diagnostic Note
Motor Relay	ABS motor relay	Relay ON / OFF	Operating sound of motor can be heard

d. Check the operating sound of the ABS motor relay when operating it with the Techstream.

Result

RESULT CHART

Result	Proceed to
The operating sound is not heard	A
The operating sound is heard	B

B: Go to step 3

A: Go to next step

2. **INSPECT SKID CONTROL ECU (GND2 TERMINAL)**
   a. Turn the ignition switch to OFF.
   b. Disconnect the skid control ECU connector.
   c. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A15-13 (GND2) - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (GND2 CIRCUIT)

Front view of wire harness connector:
(to Skid Control ECU)

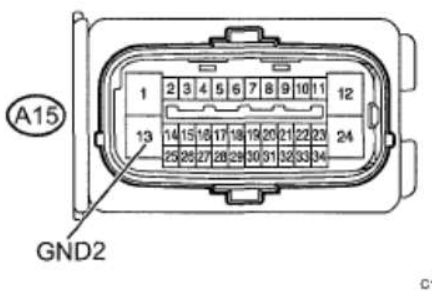


Fig. 174: Identifying Skid Control ECU Connector Terminal (GND Terminal)

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OK: Go to next step

3. **RECONFIRM DTC**

HINT:

This code is detected when a problem is identified in the brake actuator assembly.

The ABS motor relay is in the brake actuator assembly.

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

a. Turn the ignition switch to OFF.
b. Reconnect the skid control ECU connector.
c. Clear the DTC (See **DTC CHECK/CLEAR**).
d. Start the engine.
e. Drive the vehicle at a speed of 20 km/h (12 mph) or more for 30 seconds or more.
f. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

HINT:

- If a speed signal of 6 km/h (4 mph) or more is input to the skid control ECU, with the ignition switch ON and the stop light switch off, the ECU performs self diagnosis of the motor and solenoid circuits.
- If a normal system code is output (the trouble code is not output), jiggle the connectors slightly, wire harness, and fuses of the brake actuator assembly. Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness from the brake actuator assembly (skid control ECU), inspect and repair the connector or wire harness.
- It is suspected that the DTCs were output due to a bad connection of the connector terminal.

B : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

A : CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **CHECK**

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FOR INTERMITTENT PROBLEMS)

DTC C1290/66 STEERING ANGLE SENSOR ZERO POINT MALFUNCTION

DESCRIPTION

The skid control ECU acquires steering angle sensor zero point every time the ignition switch is turned to ON and the vehicle is driven at 35 km/h (22 mph) or more for approximately 5 seconds. The ECU also stores the previous zero point.

If front wheel alignment or steering wheel position is adjusted without disconnecting the negative battery terminal, or if yaw rate and acceleration sensor zero point is not acquired after the adjustments have been completed, the skid control ECU detects the difference between the previous zero point and newly acquired zero point and outputs this DTC to indicate a poor adjustment.

The steering angle sensor zero point malfunction warning will be cancelled by turning the ignition switch to OFF.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1290/66	The steering angle sensor zero point calibration position vastly differs from the recorded value	• Yaw rate and acceleration sensor zero point calibration incomplete • Poor adjustment of the centered position of the steering wheel • Poor adjustment of front wheel alignment

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

1. **PERFORM ZERO POINT CALIBRATION OF YAW RATE AND ACCELERATION SENSOR**
   a. Perform zero point calibration of the yaw rate and acceleration sensor (See **CALIBRATION**).

      HINT:

      - When the stored zero point of the yaw rate and acceleration sensor is erased, the steering angle sensor zero point will also be erased.
      - If the zero point and output value of the yaw rate and acceleration sensor and the output value of the speed sensors are not normal, steering angle sensor zero point cannot be acquired normally even if the vehicle is driven straight ahead at 35 km/h (22 mph) or more.
2. **CHECK STEERING ANGLE SENSOR ZERO POINT CALIBRATION**
   a. Drive the vehicle straight ahead at 35 km/h (22 mph) or more for at least 5 seconds.

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b. Check that the centered position of the steering wheel is correctly set while driving straight ahead.

HINT:

If front wheel alignment and steering position are adjusted as a result of abnormal centered position of the steering wheel, acquire the yaw rate and acceleration sensor zero point again after the adjustments are completed.

OK:

The centered position of the steering wheel is correctly set.

NG: ADJUST FRONT WHEEL ALIGNMENT OR STEERING POSITION

OK: Go to next step

3. **RECONFIRM DTC**
   a. Turn the ignition switch to OFF.
   b. Clear the DTC (See **DTC CHECK/CLEAR**).
   c. Start the engine.
   d. Drive the vehicle and turn the steering wheel to the right and left at a speed of 35 km/h (22 mph) or more.
   e. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

B : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

A : END

DTC U0073/94 CONTROL MODULE COMMUNICATION BUS OFF; DTC U0100/65 LOST COMMUNICATION WITH ECM / PCM; DTC U0123/62 LOST COMMUNICATION WITH YAW RATE SENSOR MODULE; DTC U0124/95 LOST COMMUNICATION WITH LATERAL ACCELERATION SENSOR MODULE; DTC U0126/63 LOST COMMUNICATION WITH STEERING ANGLE SENSOR MODULE

DESCRIPTION

The skid control ECU receives the signals from the ECM, steering angle sensor, and yaw rate and acceleration sensor via the CAN communication system.

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DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
U0073/94	When any of the following is detected: 1. When the IG1 terminal voltage is between 10 and 17.4 V, after the output of data from the skid control ECU is completed, the sending continues for 5 seconds or more. 2. The condition that bus OFF state occurs once or more within 0.1 seconds occurs 10 times in succession. (Sent signals cannot be received.) 3. When the IG1 terminal voltage is between 10 and 17.4 V, a delay in receiving data from the yaw rate and acceleration sensor and steering angle sensor continues for 1 second or more. 4. When the IG1 terminal voltage is between 10 and 17.4 V, the following occurs 10 times in succession. o The condition that a delay in receiving data from the yaw rate and acceleration sensor and steering angle sensor occurs more than once within 5 seconds.	CAN communication system
U0100/65	When either of the following is detected: 1. When the IG1 terminal voltage is between 10 and 17.4 V, and the vehicle speed 15 km/h (9 mph) or more, data cannot be sent to the ECM for 2 seconds or more. 2. When the IG1 terminal voltage is between 10 and 17.4 V, and the vehicle speed 15 km/h (9 mph) or more, data cannot be received to the ECM for 2 seconds or more.	CAN communication system (Skid control ECU to ECM)
U0123/62	When either of the following is detected: 1. When the IG1 terminal voltage is between 10 and 17.4 V, data from the yaw rate sensor cannot be received for 1 second or more. 2. When the IG1 terminal voltage is between 10 and 17.4 V, the following occurs 10 times in succession. o The condition that data from the yaw rate sensor cannot be received occurs once or more within 5 seconds.	CAN communication system (Skid control ECU to yaw rate and acceleration sensor)
U0124/95	When either of the following is detected: 1. When the IG1 terminal voltage is between 10 and 17.4 V, data from the acceleration sensor cannot be received for 1 second or more.	CAN communication system (Skid control ECU to yaw rate

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	2. When the IG1 terminal voltage is between 10 and 17.4 V, the following occurs 10 times in succession. o The condition that data from the acceleration sensor cannot be received occurs once or more within 5 seconds.	and acceleration sensor)
U0126/63	When either of the following is detected: 1. When the IG1 terminal voltage is between 10 and 17.4 V, data from the steering angle sensor cannot be received for 1 second or more. 2. When the IG1 terminal voltage is between 10 and 17.4 V, the following occurs 10 times in succession. o The condition that data from the steering angle sensor cannot be received occurs once or more within 5 seconds.	CAN communication system (Skid control ECU to steering angle sensor)

WIRING DIAGRAM

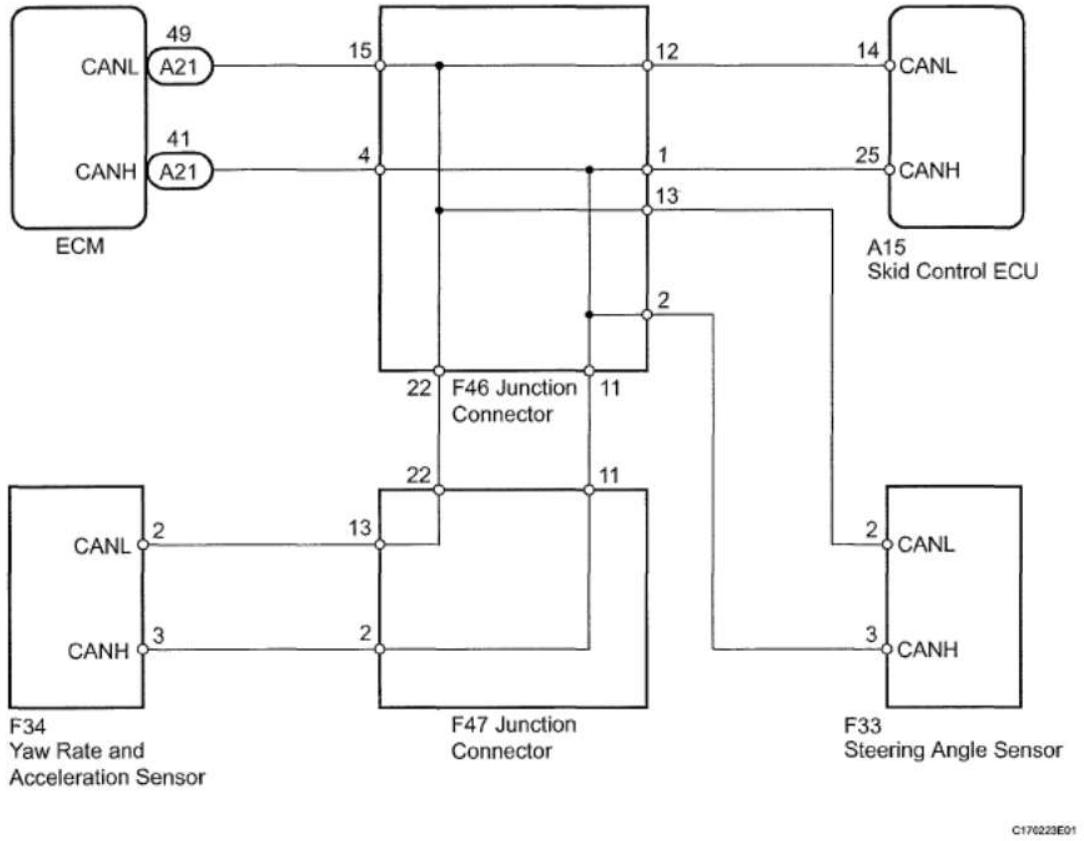


Fig. 175: Yaw Rate And Acceleration Sensor - Wiring Diagram
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INSPECTION PROCEDURE

1. **CHECK HARNESS AND CONNECTOR (MOMENTARY INTERRUPTION)**
   a. Using a Techstream, check for any momentary interruption in the wire harness and connector corresponding to a DTC (See **CHECK FOR INTERMITTENT PROBLEMS**).

   ABS/VSC/TRAC:

   MEASUREMENT ITEM NORMAL CONDITION CHART

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
EFI Communication Open	EFI communication open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
Yaw Rate Open	Yaw rate sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
Steering Open	Steering sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-

   Result

   RESULT CHART

Result	Proceed to
There are momentary interruptions	A
There are no momentary interruptions	B
There is a constant open circuit	C

   HINT:

   Perform the above inspection before removing the sensor and connector.

   B: Go to step 3

   C: Go to step 4

   A: Go to next step

2. **CHECK IF EACH SENSOR AND ECM CONNECTOR IS SECURELY CONNECTED**
   a. Turn the ignition switch to OFF.
   b. Check if each sensor or ECM connector is securely connected.

   OK:

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Each connector is securely connected.

NG: CONNECT CONNECTOR TO EACH SENSOR OR ECM CORRECTLY

OK: Go to next step

3. **RECONFIRM DTC**
   a. Turn the ignition switch to OFF.
   b. Record the output DTCs (for ABS, VSC, and CAN communication) (See **DTC CHECK/CLEAR**).

   HINT:

   If the CAN communication system DTC and the relevant sensor DTCs are output simultaneously, troubleshoot the relevant sensor DTCs (for ABS and VSC) after the CAN communication system returns to normal.

   Result

   RESULT CHART

Result	Proceed to
DTC output (relating to CAN communication system)	A
DTC output (relating to ABS and/or VSC system)	B
DTC not output	C

B : REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See **DIAGNOSTIC TROUBLE CODE CHART**)

C : CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **CHECK FOR INTERMITTENT PROBLEMS**)

A : INSPECT CAN COMMUNICATION SYSTEM (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

4. **REPAIR OR REPLACE HARNESS OR CONNECTOR**
   a. Turn the ignition switch to OFF.
   b. Repair or replace the harness or connector.
   c. Check for any momentary interruption between the skid control ECU and each sensor or ECM (See **CHECK FOR INTERMITTENT PROBLEMS**).
   d. Check that there is no momentary interruption.
5. **RECONFIRM DTC**
   a. Turn the ignition switch to OFF.
   b. Clear the DTC (See **DTC CHECK/CLEAR**).

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c. Start the engine.
d. Drive the vehicle and turn the steering wheel to the right and left at a speed of 15 km/h (9 mph) or more.
e. Check that no CAN communication system DTC is output (See **DTC CHECK/CLEAR**).
f. If ABS and VSC DTCs are output, record them.

Result

RESULT CHART

Result	Proceed to
DTC output (relating to CAN communication system)	A
DTC output (relating to ABS and/or VSC system)	B
DTC not output	C

HINT:

The CAN communication system must be normal when repairing each sensor DTC (for ABS and VSC).

B : REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See **DIAGNOSTIC TROUBLE CODE CHART**)

C : END

A : INSPECT CAN COMMUNICATION SYSTEM (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

ABS WARNING LIGHT REMAINS ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.

If any of the following is detected, the ABS warning light remains on:

- The skid control ECU connectors are disconnected from the skid control ECU.
- There is a malfunction in the skid control ECU internal circuit.
- There is an open in the harness between the combination meter and the skid control ECU.
- The ABS control system is defective.

HINT:

In some cases, a Techstream cannot be used when the skid control ECU is abnormal.

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WIRING DIAGRAM

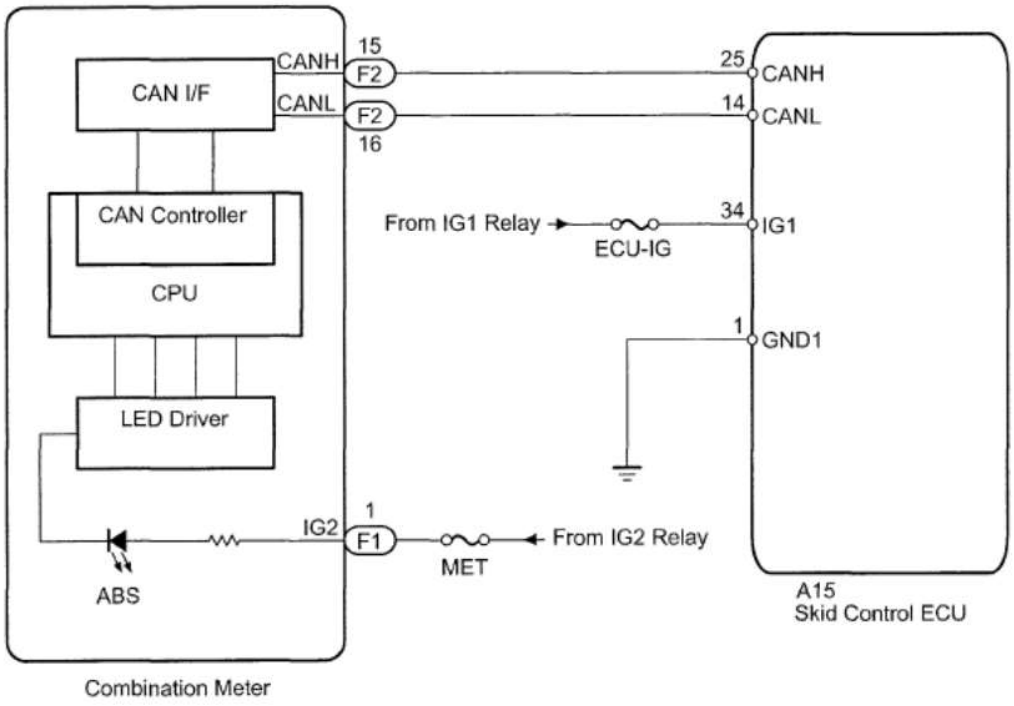


Fig. 176: CAN Communication - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

1. **CHECK CAN COMMUNICATION SYSTEM**
   a. Check if the CAN communication system DTC is output (See **DIAGNOSIS SYSTEM**).

   Result

   RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

B : INSPECT CAN COMMUNICATION SYSTEM (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

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A: Go to next step

2. **CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED**
   a. Check if the skid control ECU connector is securely connected.

      OK:

      The connector is securely connected.

   NG: CONNECT CONNECTOR TO ECU CORRECTLY

   OK: Go to next step

3. **CHECK BATTERY**
   a. Check the battery voltage.

      Standard voltage:

      11 to 14 V

   NG: CHECK OR REPLACE CHARGING SYSTEM OR BATTERY (See **ON-VEHICLE INSPECTION**)

   OK: Go to next step

4. **INSPECT SKID CONTROL ECU (IG1 TERMINAL)**
   a. Disconnect the skid control ECU connector.
   b. Turn the ignition switch to ON.
   c. Measure the voltage according to the value(s) in the table below.

      Standard voltage

      TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
A15-34 (IG1) - Body ground	Ignition switch ON	11 to 14 V

   NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)

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Front view of wire harness connector:
(to Skid Control ECU)

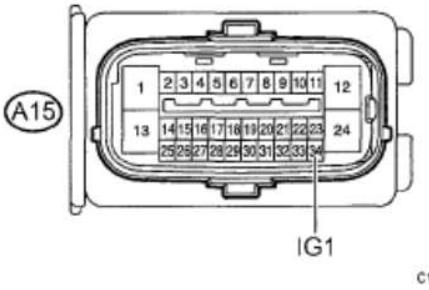


Fig. 177: Identifying Skid Control ECU Connector Terminal (IG1 Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

5. **INSPECT SKID CONTROL ECU (GND TERMINAL)**
   a. Turn the ignition switch to OFF.
   b. Measure the resistance according to the value(s) in the table below.

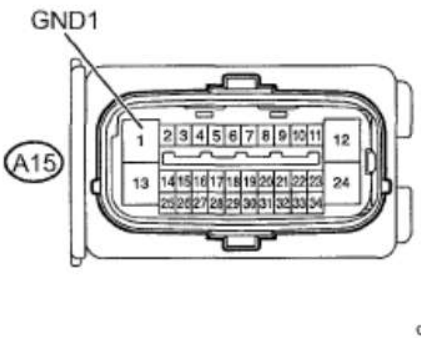
Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A15-1 (GND1) - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)

Front view of wire harness connector:
(to Skid Control ECU)



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Fig. 178: Identifying Skid Control ECU Connector Terminal (GND Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

6. **INSPECT COMBINATION METER ASSEMBLY**
   a. Reconnect the skid control ECU connector.
   b. Connect a Techstream to the DLC3.
   c. Perform Active Test of the combination meter using the Techstream (See **DATA LIST / ACTIVE TEST**).

      OK:

      The ABS warning light turns ON or OFF in accordance with the Techstream.

   NG: Go to step 7

   OK : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

7. **REPLACE COMBINATION METER ASSEMBLY**
   a. Turn the ignition switch to OFF.
   b. Replace the combination meter (See **REMOVAL**).
8. **INSPECT COMBINATION METER ASSEMBLY**
   a. Connect the Techstream to the DLC3.
   b. Perform Active Test of the combination meter using the Techstream (See **DATA LIST / ACTIVE TEST**).

      OK:

      The ABS warning light turns ON or OFF in accordance with the Techstream.

   NG: REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

   OK : END

ABS WARNING LIGHT DOES NOT COME ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.

WIRING DIAGRAM

Refer to **ABS WARNING LIGHT REMAINS ON** .

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INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

1. **CHECK CAN COMMUNICATION SYSTEM**
   a. Check if the CAN communication system DTC is output (See **DIAGNOSIS SYSTEM**).

   Result

   RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

B : INSPECT CAN COMMUNICATION SYSTEM (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

A: Go to next step

2. **CHECK ABS WARNING LIGHT**
   a. Disconnect the skid control ECU connector.
   b. Turn the ignition switch to ON.
   c. Check that the ABS warning light comes on.

   OK:

   The ABS warning light comes on.

NG: Go to step 3

OK : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

3. **INSPECT COMBINATION METER ASSEMBLY**
   a. Turn the ignition switch to OFF.
   b. Reconnect the skid control ECU connector.
   c. Connect a Techstream to the DLC3.
   d. Perform Active Test of the combination meter using the Techstream (See **DATA LIST / ACTIVE TEST**).

   OK:

   The ABS warning light turns ON or OFF in accordance with the Techstream.

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NG: REPLACE COMBINATION METER ASSEMBLY (See **REMOVAL**)

OK : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

BRAKE WARNING LIGHT REMAINS ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.

If any of the following is detected, the brake warning light remains on:

- The skid control ECU connector is disconnected from the skid control ECU.
- The brake fluid level is insufficient.
- The parking brake is applied.
- EBD operation is not possible.

WIRING DIAGRAM

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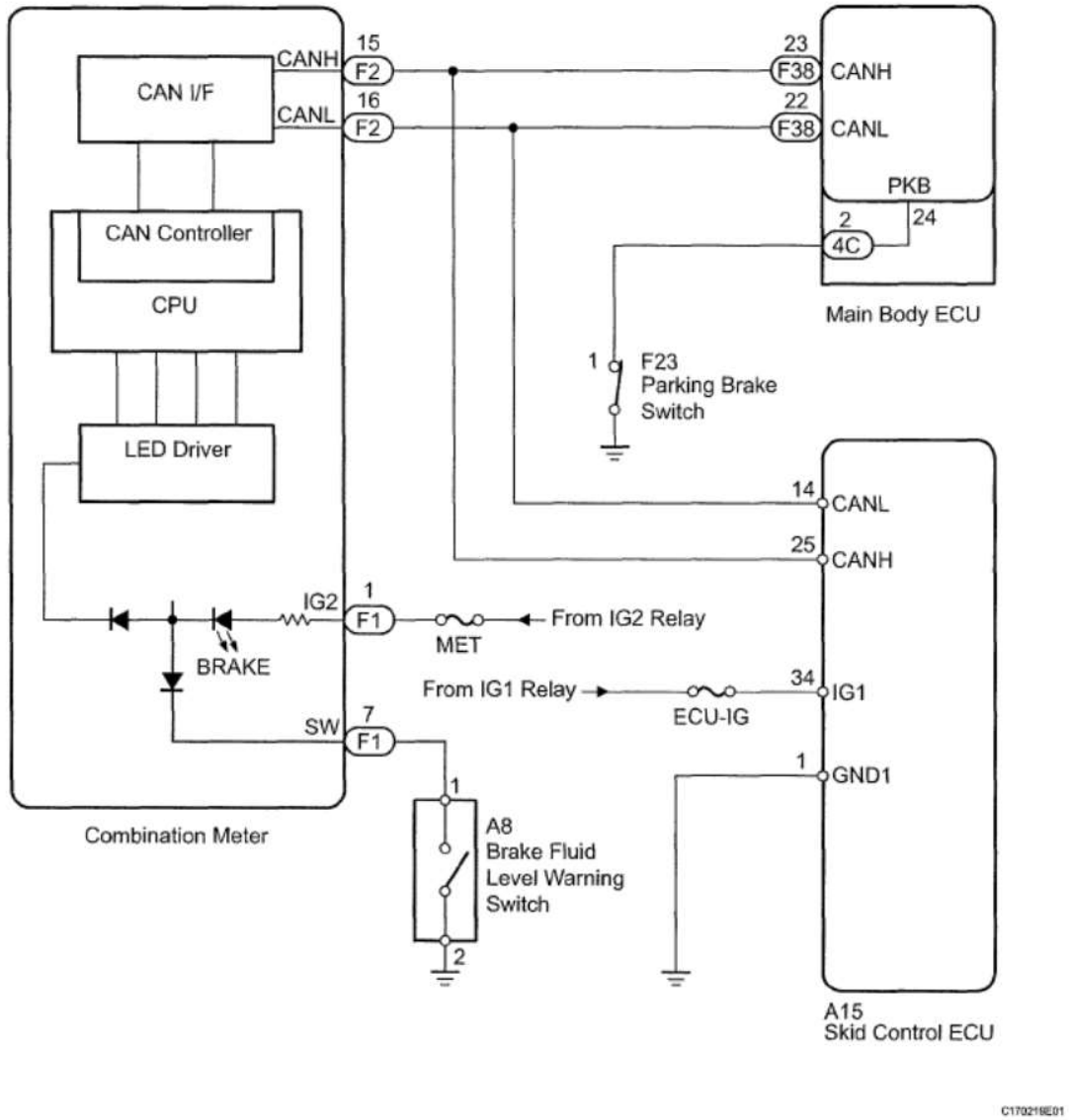


Fig. 179: Brake Warning Light - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

1. **CHECK CAN COMMUNICATION SYSTEM**
   a. Check if the CAN communication system DTC is output (See **DIAGNOSIS SYSTEM**).

   Result

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RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

B : INSPECT CAN COMMUNICATION SYSTEM (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

A: Go to next step

2. **CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED**
   a. Check if the skid control ECU connector is securely connected.

   OK:

   The connector is securely connected.

NG: CONNECT CONNECTOR TO ECU CORRECTLY

OK: Go to next step

3. **CHECK BATTERY**
   a. Check the battery voltage.

   Standard voltage:

   11 to 14 V

NG: CHECK OR REPLACE CHARGING SYSTEM OR BATTERY (See **ON-VEHICLE INSPECTION**)

OK: Go to next step

4. **INSPECT SKID CONTROL ECU (IG1 TERMINAL)**
   a. Disconnect the skid control ECU connector.
   b. Turn the ignition switch to ON.
   c. Measure the voltage according to the value(s) in the table below.

   Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
A15-34 (IG1) - Body ground	Ignition switch ON	11 to 14 V

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NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)

Front view of wire harness connector:
(to Skid Control ECU)

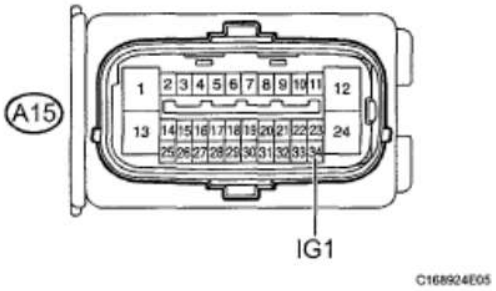


Fig. 180: Identifying Skid Control ECU Connector Terminal (IG1 Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

5. **INSPECT SKID CONTROL ECU (GND TERMINAL)**
   a. Turn the ignition switch to OFF.
   b. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A15-1 (GND1) - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)

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Front view of wire harness connector:
(to Skid Control ECU)

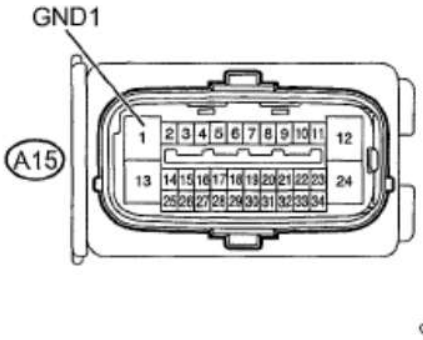


Fig. 181: Identifying Skid Control ECU Connector Terminal (GND Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

6. **READ VALUE USING TECHSTREAM (PARKING BRAKE SWITCH)**
   a. Reconnect the skid control ECU connector.
   b. Connect a Techstream to the DLC3.
   c. Turn the ignition switch to ON.
   d. Select the Data List mode on the Techstream (See **DATA LIST / ACTIVE TEST**).

      ABS/VSC/TRAC:

      MEASUREMENT ITEM NORMAL CONDITION CHART

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Parking Brake SW	Parking brake switch / ON or OFF	ON: Parking brake applied OFF: Parking brake released	-

   e. Using the Techstream, check the input of switch operation when the parking brake pedal is operated.

      OK:

      When the parking brake is operated, the display changes as shown above.

NG: Go to step 12

OK: Go to next step

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7. **INSPECT BRAKE FLUID LEVEL WARNING SWITCH**
   a. Turn the ignition switch to OFF.
   b. Remove the reservoir filler cap and strainer.
   c. Disconnect the brake fluid level warning switch connector.
   d. Measure the resistance according to the value(s) in the table below.

   HINT:

   A float is located inside the reservoir. Its position can be changed by increasing or decreasing the level of brake fluid.

   Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
1 - 2	Switch OFF (Float up)	10 kohms or higher
1 - 2	Switch ON (Float down)	Below 1 ohms

   HINT:

   If there is no problem after finishing the above check, adjust the brake fluid level to the MAX level.

NG: REPLACE BRAKE MASTER CYLINDER RESERVOIR ASSEMBLY (BRAKE FLUID LEVEL WARNING SWITCH) (See **DISASSEMBLY**)

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Component without harness connected:
(Brake Fluid Level Warning Switch)

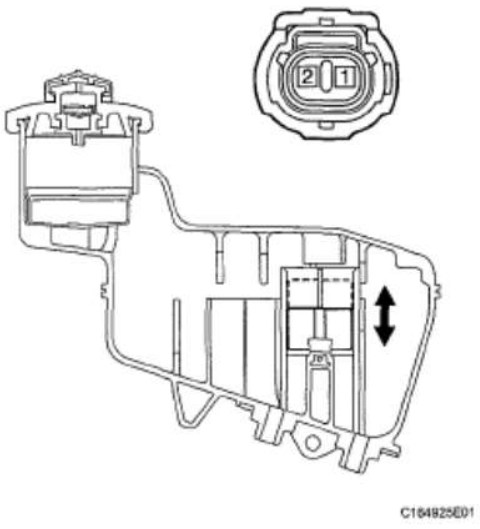


Fig. 182: Checking Brake Fluid Level Warning Switch Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

8. **CHECK HARNESS AND CONNECTOR (COMBINATION METER - BRAKE FLUID LEVEL WARNING SWITCH)**
   a. Disconnect the combination meter connector.
   b. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

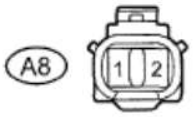
Tester Connection	Condition	Specified Condition
F1-7 (SW) - A8-1	Always	Below 1 ohms
F1-7 (SW) - Body ground	Always	10 kohms or higher
A8-2 - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

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Front view of wire harness connector:
(to Brake Fluid Level Warning Switch)



Front view of wire harness connector:
(to Combination Meter)

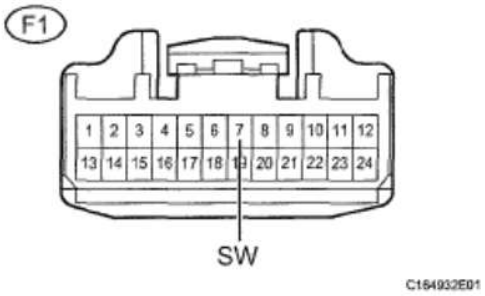


Fig. 183: Identifying Combination Meter Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

9. **INSPECT COMBINATION METER ASSEMBLY**
   a. Connect the Techstream to the DLC3.
   b. Perform Active Test of the combination meter using the Techstream (See **DATA LIST / ACTIVE TEST**).

      OK:

      The brake warning light turns ON or OFF in accordance with the Techstream.

      HINT:

      Reinstall the connectors and restore the vehicle to its prior condition before checking the combination meter.

NG: Go to step 10

OK : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

10. **REPLACE COMBINATION METER ASSEMBLY**
    a. Turn the ignition switch to OFF.
    b. Replace the combination meter (See **REMOVAL**).

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11. **INSPECT COMBINATION METER ASSEMBLY**
    a. Connect the Techstream to the DLC3.
    b. Perform Active Test of the combination meter using the Techstream (See **DATA LIST / ACTIVE TEST**).

    OK:

    The brake warning light turns ON or OFF in accordance with the Techstream.

NG: REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

OK : END

12. **INSPECT PARKING BRAKE SWITCH**
    a. Turn the ignition switch to OFF.
    b. Disconnect the parking brake switch connector.
    c. Measure the resistance according to the value(s) in the table below.

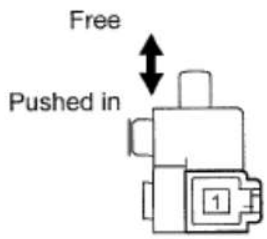
    Standard resistance

    TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
1 - Body ground	Parking brake switch ON (Switch pin free)	Below 1 ohms
1 - Body ground	Parking brake switch OFF (Switch pin pushed in)	10 kohms or higher

NG: REPLACE PARKING BRAKE SWITCH (See **REMOVAL**)

Component without harness connected:
(Parking Brake Switch)



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Fig. 184: Inspecting Parking Brake Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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OK: Go to next step

13. **CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - PARKING BRAKE SWITCH)**
    a. Disconnect the main body ECU connector.
    b. Measure the resistance according to the value(s) in the table below.

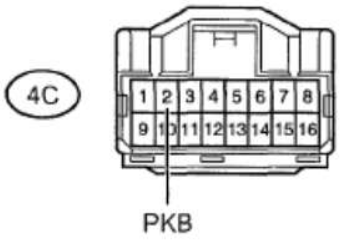
Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

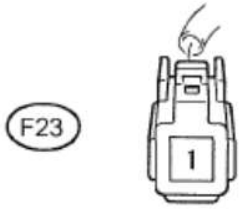
Tester Connection	Condition	Specified Condition
4C-2 (PKB) - F23-1	Always	Below 1 ohms
4C-2 (PKB) - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

Front view of wire harness connector:
(to Main Body ECU)



Front view of wire harness connector:
(to Parking Brake Switch)



C154934E04

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Fig. 185: Identifying Main Body ECU And Parking Brake Switch Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

BRAKE WARNING LIGHT DOES NOT COME ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.

WIRING DIAGRAM

Refer to **BRAKE WARNING LIGHT REMAINS ON** .

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

1. **CHECK CAN COMMUNICATION SYSTEM**
   a. Check if the CAN communication system DTC is output (See **DIAGNOSIS SYSTEM**).

      Result

      RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

   B : INSPECT CAN COMMUNICATION SYSTEM (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

   A: Go to next step

2. **CHECK BRAKE WARNING LIGHT**
   a. Disconnect the skid control ECU connector.
   b. Turn the ignition switch to ON.
   c. Check that the brake warning light comes on.

      OK:

      The brake warning light comes on.

   NG: Go to step 3

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OK : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

3. **INSPECT COMBINATION METER ASSEMBLY**
   a. Turn the ignition switch to OFF.
   b. Reconnect the skid control ECU connector.
   c. Connect a Techstream to the DLC3.
   d. Perform Active Test of the combination meter using the Techstream (See **DATA LIST / ACTIVE TEST**).

      OK:

      The brake warning light turns ON or OFF in accordance with the Techstream.

NG: REPLACE COMBINATION METER ASSEMBLY (See **REMOVAL**)

OK : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

VSC OFF INDICATOR LIGHT REMAINS ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.

Pressing the VSC OFF switch turns off traction control and pressing and holding this switch turns off traction and VSC controls. If VSC control turns OFF, the VSC OFF indicator light will come on.

The VSC OFF indicator light will come on when the skid control ECU stores a DTC.

WIRING DIAGRAM

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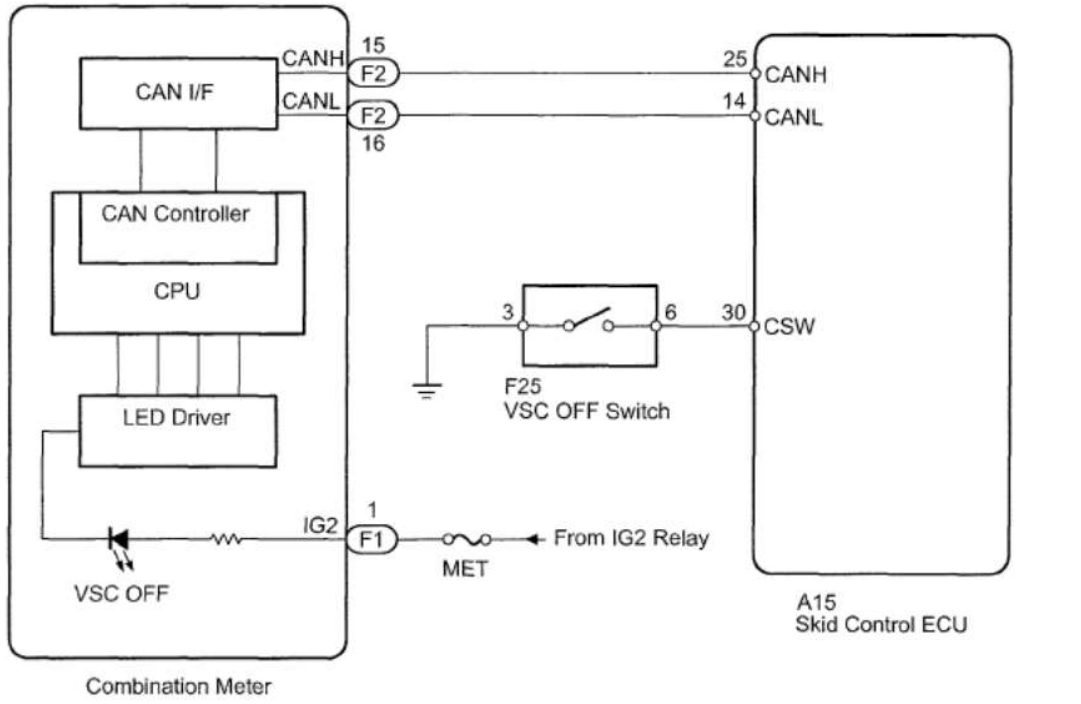


Fig. 186: VSC Off Indicator Light - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

1. **CHECK CAN COMMUNICATION SYSTEM**
   a. Check if the CAN communication system DTC is output (See **DIAGNOSIS SYSTEM**).

   Result

   RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

B : INSPECT CAN COMMUNICATION SYSTEM (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

A: Go to next step

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2. **CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED**
   a. Check if the skid control ECU connector is securely connected.

      OK:

      The connector is securely connected.

   NG: CONNECT CONNECTOR TO ECU CORRECTLY

   OK: Go to next step

3. **CHECK BATTERY**
   a. Check the battery voltage.

      Standard voltage:

      11 to 14 V

   NG: CHECK OR REPLACE CHARGING SYSTEM OR BATTERY (See **ON-VEHICLE INSPECTION**)

   OK: Go to next step

4. **INSPECT SKID CONTROL ECU (CSW TERMINAL)**
   a. Disconnect the skid control ECU connector.
   b. Measure the resistance according to the value(s) in the table below.

      Standard resistance

      TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Condition	Switch Condition	Specified Condition
A15-30 (CSW) - Body ground	VSC OFF Switch held ON	Below 1 ohms
A15-30 (CSW) - Body ground	VSC OFF Switch OFF (Not pressed)	10 kohms or higher

   NG: Go to step 8

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Front view of wire harness connector:
(to Skid Control ECU)

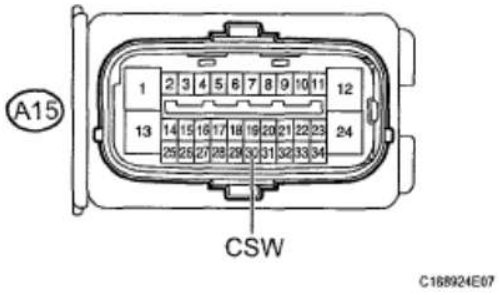


Fig. 187: Identifying Skid Control ECU Connector Terminal (CSW Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

5. **INSPECT COMBINATION METER ASSEMBLY**
   a. Reconnect the skid control ECU connector.
   b. Connect a Techstream to the DLC3.
   c. Perform Active Test of the combination meter using the Techstream (See **DATA LIST / ACTIVE TEST**).

      OK:

      The VSC OFF indicator light turns ON or OFF in accordance with the Techstream.

   NG: Go to step 6

   OK : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

6. **REPLACE COMBINATION METER ASSEMBLY**
   a. Turn the ignition switch to OFF.
   b. Replace the combination meter (See **REMOVAL**).
7. **INSPECT COMBINATION METER ASSEMBLY**
   a. Connect the Techstream to the DLC3.
   b. Perform Active Test of the combination meter using the Techstream (See **DATA LIST / ACTIVE TEST**).

      OK:

      The VSC OFF indicator light turns ON or OFF in accordance with the Techstream.

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NG: REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

OK : END

8. **INSPECT VSC OFF SWITCH**
   a. Disconnect the VSC OFF switch connector.
   b. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
3 - 6	Switch is pushed in	Below 1 ohms
3 - 6	Switch is not pushed in 10	kohms or higher

NG: REPLACE VSC OFF SWITCH (See **REMOVAL**)

Component without harness connected:
(VSC OFF Switch)

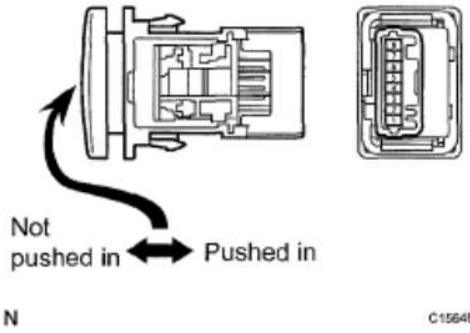


Fig. 188: Inspecting VSC Off Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

9. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - VSC OFF SWITCH)**
   a. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A15-30 (CSW) - F25-6	Always	Below 1 ohms

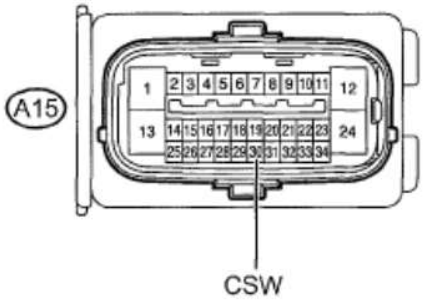
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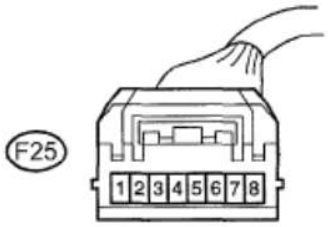
A15-30 (CSW) - Body ground	Always	10 kohms or higher
F25-3 - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

Front view of wire harness connector:
(to Skid Control ECU)



Front view of wire harness connector:
(to VSC OFF Switch)



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Fig. 189: Identifying Skid Control ECU And VSC Off Switch Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK : CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **CHECK FOR INTERMITTENT PROBLEMS**)

VSC OFF INDICATOR LIGHT DOES NOT COME ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.

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Pressing the VSC OFF switch turns off traction control and pressing and holding this switch turns off traction and VSC controls. If VSC control turns OFF, the VSC OFF indicator light will come on.

The VSC OFF indicator light will come on when the skid control ECU stores a DTC.

WIRING DIAGRAM

Refer to **VSC OFF INDICATOR LIGHT REMAINS ON** .

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

1. **CHECK CAN COMMUNICATION SYSTEM**
   a. Check if the CAN communication system DTC is output (See **DIAGNOSIS SYSTEM**).

   Result

   RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

   B : INSPECT CAN COMMUNICATION SYSTEM (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

   A: Go to next step

2. **INSPECT SKID CONTROL ECU (CSW TERMINAL)**
   a. Disconnect the skid control ECU connector.
   b. Measure the resistance according to the value(s) in the table below.

   Standard resistance

   TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Condition	Switch Condition	Specified Condition
A15-30 (CSW) - Body ground	VSC OFF Switch held ON	Below 1 ohms
A15-30 (CSW) - Body ground	VSC OFF Switch OFF (Not pressed)	10 kohms or higher

   NG: Go to step 4

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Front view of wire harness connector:
(to Skid Control ECU)

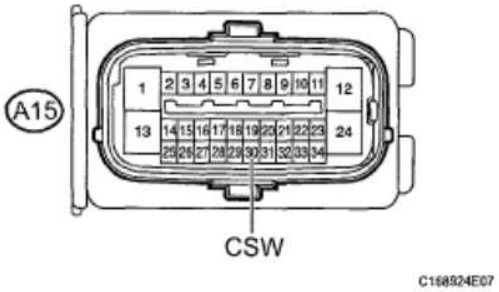


Fig. 190: Identifying Skid Control ECU Connector Terminal (CSW Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

3. **INSPECT COMBINATION METER ASSEMBLY**
   a. Reconnect the skid control ECU connector.
   b. Connect a Techstream to the DLC3.
   c. Perform Active Test of the combination meter using the Techstream (See **DATA LIST / ACTIVE TEST**).

      OK:

      The VSC OFF indicator light turns ON or OFF in accordance with the Techstream.

NG: REPLACE COMBINATION METER ASSEMBLY (See **REMOVAL**)

OK : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

4. **INSPECT VSC OFF SWITCH**
   a. Measure the resistance according to the value(s) in the table below.

      Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
3 - 6	Switch is pushed in	Below 1 ohms
3 - 6	Switch is not pushed in	10 kohms or higher

NG: REPLACE VSC OFF SWITCH (See **REMOVAL**)

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Component without harness connected:
(VSC OFF Switch)

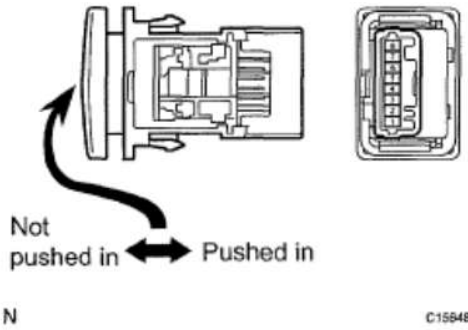


Fig. 191: Inspecting VSC Off Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

5. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - VSC OFF SWITCH)**
   a. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

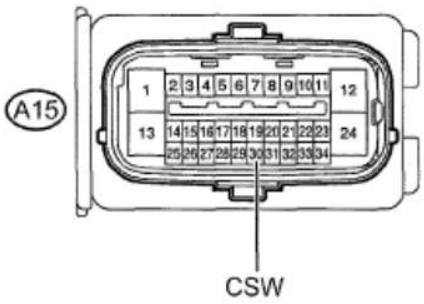
Tester Connection	Condition	Specified Condition
A15-30 (CSW) - F25-6	Always	Below 1 ohms
A15-30 (CSW) - Body ground	Always	10 kohms or higher
F25-3 - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

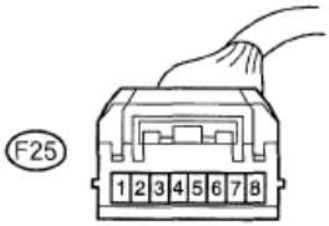
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Front view of wire harness connector:
(to Skid Control ECU)



Front view of wire harness connector:
(to VSC OFF Switch)



C168826E01

Fig. 192: Identifying Skid Control ECU And VSC Off Switch Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK : CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **CHECK FOR INTERMITTENT PROBLEMS**)

SLIP INDICATOR LIGHT REMAINS ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.

Pressing the VSC OFF switch turns off traction control and pressing and holding this switch turns off traction and VSC controls. If traction control turns OFF, the SLIP indicator light will come on.

The SLIP indicator light blinks during VSC and/or TRAC operation.

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When the system fails, the SLIP indicator light comes on to warn the driver (See **DIAGNOSIS SYSTEM**).

The SLIP indicator light comes on when traction control is terminated by pressing the VSC OFF switch.

WIRING DIAGRAM

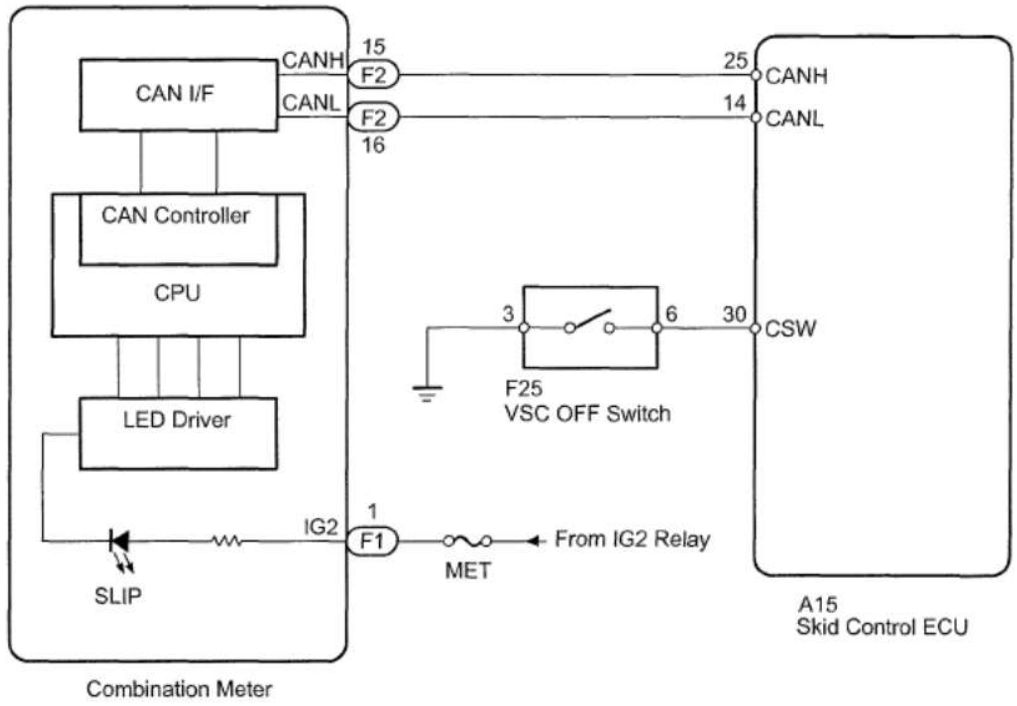


Fig. 193: Slip Indicator Light - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

1. **CHECK CAN COMMUNICATION SYSTEM**
   a. Check if the CAN communication system DTC is output (See **DIAGNOSIS SYSTEM**).

   Result

   RESULT CHART

Result	Proceed to
DTC not output	A

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DTC output	B

B : INSPECT CAN COMMUNICATION SYSTEM (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

A: Go to next step

2. **CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED**
   a. Check if the skid control ECU connector is securely connected.

      OK:

      The connector is securely connected.

   NG: CONNECT CONNECTOR TO ECU CORRECTLY

   OK: Go to next step

3. **CHECK BATTERY**
   a. Check the battery voltage.

      Standard voltage:

      11 to 14 V

   NG: CHECK OR REPLACE CHARGING SYSTEM OR BATTERY (See **ON-VEHICLE INSPECTION**)

   OK: Go to next step

4. **INSPECT SKID CONTROL ECU (CSW TERMINAL)**
   a. Disconnect the skid control ECU connector.
   b. Measure the resistance according to the value(s) in the table below.

      Standard resistance

      TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Condition	Switch Condition	Specified Condition
A15-30 (CSW) - Body ground	VSC OFF Switch held ON	Below 1 ohms
A15-30 (CSW) - Body ground	VSC OFF Switch OFF (Not pressed)	10 kohms or higher

   NG: Go to step 8

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Front view of wire harness connector:
(to Skid Control ECU)



Fig. 194: Identifying Skid Control ECU Connector Terminal (CSW Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

5. **INSPECT COMBINATION METER ASSEMBLY**
   a. Reconnect the skid control ECU connector.
   b. Connect a Techstream to the DLC3.
   c. Perform Active Test of the combination meter using the Techstream (See **DATA LIST / ACTIVE TEST**).

      OK:

      The SLIP indicator light turns ON or OFF in accordance with the Techstream.

   NG: Go to step 6

   OK : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

6. **REPLACE COMBINATION METER ASSEMBLY**
   a. Turn the ignition switch to OFF.
   b. Replace the combination meter (See **REMOVAL**).
7. **INSPECT COMBINATION METER ASSEMBLY**
   a. Perform Active Test of the combination meter using the Techstream (See **DATA LIST / ACTIVE TEST**).

      OK:

      The VSC OFF indicator light turns ON or OFF in accordance with the Techstream.

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NG: REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

OK : END

8. **INSPECT VSC OFF SWITCH**
   a. Disconnect the VSC OFF switch connector.
   b. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
3 - 6	Switch is pushed in	Below 1 ohms
3 - 6	Switch is not pushed in	10 kohms or higher

NG: REPLACE VSC OFF SWITCH (See **REMOVAL**)

Component without harness connected:
(VSC OFF Switch)

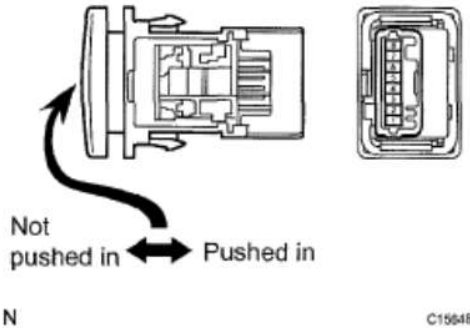


Fig. 195: Inspecting VSC Off Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

9. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - VSC OFF SWITCH)**
   a. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
A15-30 (CSW) - F25-6	Always	Below 1 ohms

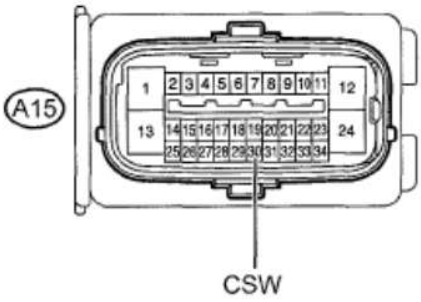
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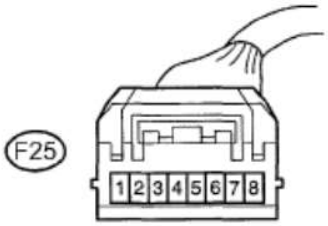
A15-30 (CSW) - Body ground	Always	10 kohms or higher
F25-3 - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

Front view of wire harness connector:
(to Skid Control ECU)



Front view of wire harness connector:
(to VSC OFF Switch)



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Fig. 196: Identifying Skid Control ECU And VSC Off Switch Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK : CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **CHECK FOR INTERMITTENT PROBLEMS**)

SLIP INDICATOR LIGHT DOES NOT COME ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.

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Pressing the VSC OFF switch turns off traction control and pressing and holding this switch turns off traction and VSC controls. If traction control turns OFF, the SLIP indicator light will come on.

The SLIP indicator light blinks during VSC and/or TRAC operation.

When the system fails, the SLIP indicator light comes on to warn the driver (See **DIAGNOSIS SYSTEM**).

WIRING DIAGRAM

Refer to **SLIP INDICATOR LIGHT REMAINS ON** .

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

1. **CHECK CAN COMMUNICATION SYSTEM**
   a. Check if the CAN communication system DTC is output (See **DIAGNOSIS SYSTEM**).

   Result

   RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

B : INSPECT CAN COMMUNICATION SYSTEM (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

A: Go to next step

2. **INSPECT SKID CONTROL ECU (CSW TERMINAL)**
   a. Disconnect the skid control ECU connector.
   b. Measure the resistance according to the value(s) in the table below.

   Standard resistance

   TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Condition	Switch Condition	Specified Condition
A15-30 (CSW) - Body ground	VSC OFF Switch held ON	Below 1 ohms
A15-30 (CSW) - Body ground	VSC OFF Switch OFF (Not pressed)	10 kohms or higher

NG: Go to step 4

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Front view of wire harness connector:
(to Skid Control ECU)

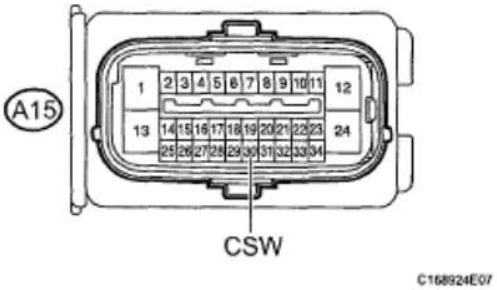


Fig. 197: Identifying Skid Control ECU Connector Terminal (CSW Terminal)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

3. **INSPECT COMBINATION METER ASSEMBLY**
   a. Reconnect the skid control ECU connector.
   b. Connect a Techstream to the DLC3.
   c. Perform Active Test of the combination meter using the Techstream (See **DATA LIST / ACTIVE TEST**).

      OK:

      The SLIP indicator light turns ON or OFF in accordance with the Techstream.

NG: REPLACE COMBINATION METER ASSEMBLY (See **REMOVAL**)

OK : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

4. **INSPECT VSC OFF SWITCH**
   a. Measure the resistance according to the value(s) in the table below.

      Standard resistance

      TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
3 - 6	Switch is pushed in	Below 1 ohms
3 - 6	Switch is not pushed in	10 kohms or higher

NG: REPLACE VSC OFF SWITCH (See **REMOVAL**)

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Component without harness connected:
(VSC OFF Switch)

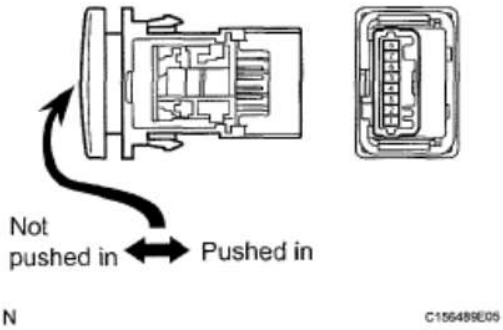


Fig. 198: Inspecting VSC Off Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

5. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - VSC OFF SWITCH)**
   a. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

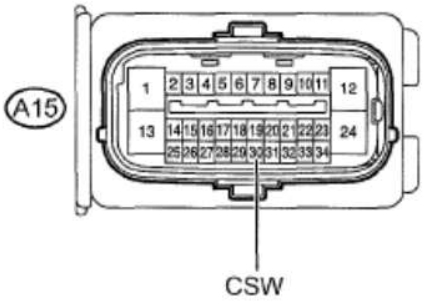
Tester Connection	Condition	Specified Condition
A15-30 (CSW) - F25-6	Always	Below 1 ohms
A15-30 (CSW) - Body ground	Always	10 kohms or higher
F25-3 - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

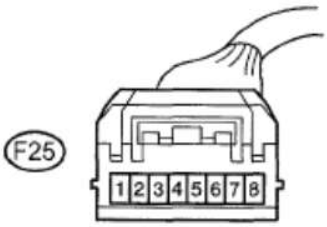
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Front view of wire harness connector:
(to Skid Control ECU)



Front view of wire harness connector:
(to VSC OFF Switch)



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Fig. 199: Identifying Skid Control ECU And VSC Off Switch Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK : CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **CHECK FOR INTERMITTENT PROBLEMS**)

SKID CONTROL BUZZER CIRCUIT

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.

The combination meter has a built-in skid control buzzer. The skid control buzzer sounds during VSC operation.

WIRING DIAGRAM

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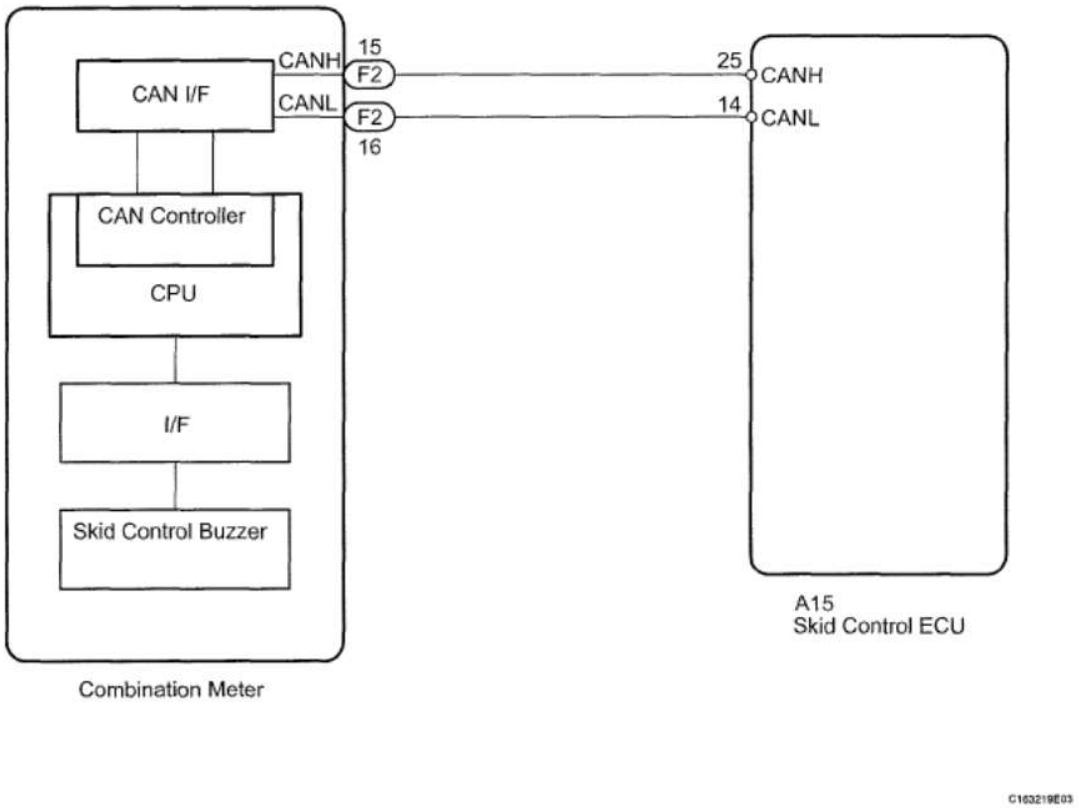


Fig. 200: Skid Control Buzzer Circuit - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: **When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).**

1. **CHECK CAN COMMUNICATION SYSTEM**
   a. Check if the CAN communication system DTC is output (See **DIAGNOSIS SYSTEM**).

   Result

   RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

B : INSPECT CAN COMMUNICATION SYSTEM (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

A: Go to next step

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2. **PERFORM ACTIVE TEST USING TECHSTREAM (SKID CONTROL BUZZER)**
   a. Connect a Techstream to the DLC3.
   b. Start the engine.
   c. Select the Active Test mode on the Techstream (See **DATA LIST / ACTIVE TEST**).

   ABS/VSC/TRAC

   ACTIVE TEST

Tester Display	Test Part	Control Range	Diagnostic Note
Buzzer	Skid control buzzer	Buzzer ON / OFF	Buzzer can be heard

   d. Check that the buzzer sounds or stops in accordance with the Techstream.

   Result

   RESULT CHART

Result	Proceed to
Buzzer does not sound or stop constantly	A
Buzzer sounds and stops	B

B : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

A: Go to next step

3. **REPLACE COMBINATION METER ASSEMBLY**
   a. Turn the ignition switch to OFF.
   b. Replace the combination meter (See **REMOVAL**).
4. **PERFORM ACTIVE TEST USING TECHSTREAM (SKID CONTROL BUZZER)**
   a. Connect the Techstream to the DLC3.
   b. Start the engine.
   c. Select the Active Test mode on the Techstream (See **DATA LIST / ACTIVE TEST**).

   ABS/VSC/TRAC

   ACTIVE TEST

Tester Display	Test Part	Control Range	Diagnostic Note
Buzzer	Skid control buzzer	Buzzer ON / OFF	Buzzer can be heard

   d. Check that the buzzer sounds or stops in accordance with the Techstream.

   Result

   RESULT CHART

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Result	Proceed to
Buzzer does not sound or stop constantly	A
Buzzer sounds and stops	B

B : END

A : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

TC AND CG TERMINAL CIRCUIT

DESCRIPTION

Connecting terminals TC and CG of the DLC3 causes the ECU to display the DTC by blinking the ABS warning light and VSC OFF indicator light.

WIRING DIAGRAM

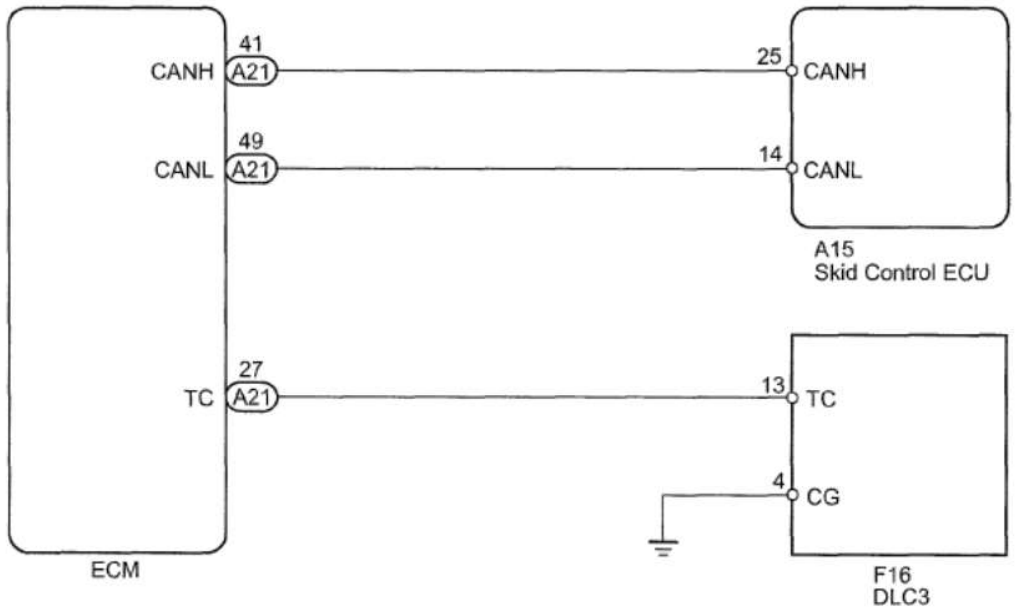


Fig. 201: TC And CG Terminal Circuit - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

HINT:

When the warning lights continue to blink, a ground short in the wiring of terminal TC of the DLC3 or an internal ground short in one or more ECUs is suspected.

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INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

1. **CHECK CAN COMMUNICATION SYSTEM**
   a. Check if the CAN communication system DTC is output (See **DIAGNOSIS SYSTEM**).

   Result

   RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

B : INSPECT CAN COMMUNICATION SYSTEM (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

A: Go to next step

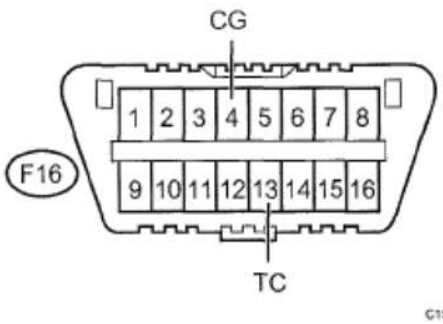
2. **INSPECT DLC3**
   a. Turn the ignition switch to ON.
   b. Measure the voltage according to the value(s) in the table below.

   Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
F16-13 (TC) - F16-4 (CG)	Ignition switch ON	11 to 14 V

Front view of DLC3:



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Fig. 202: Identifying DLC3 Connector Terminal CG And TC
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Result

RESULT CHART

Result	Proceed to
NG	A
OK	B

B: Go to step 5

A: Go to next step

3. **CHECK HARNESS AND CONNECTOR (TC of DLC3 - ECM)**
   a. Turn the ignition switch to OFF.
   b. Disconnect the ECM connector.
   c. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

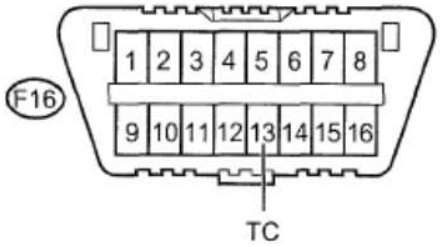
Tester Connection	Condition	Specified Condition
F16-13 (TC) - A21-27 (TC)	Always	Below 1 ohms
F16-13 (TC) - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

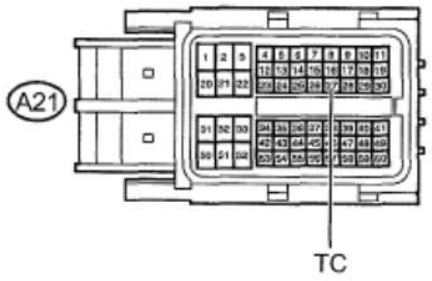
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Front view of DLC3:



Front view of wire harness connector:
(to ECM)



C158618E07

Fig. 203: Identifying DLC3 Connector Terminal Of TC
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

4. **CHECK HARNESS AND CONNECTOR (CG of DLC3 - BODY GROUND)**
   a. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
F16-4 (CG) - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

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Front view of DLC3:

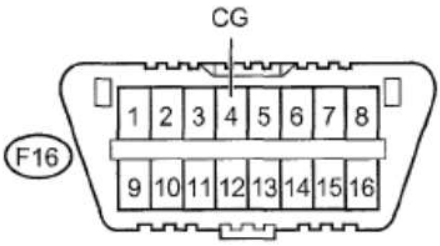


Fig. 204: Identifying DLC3 Connector Terminal CG And Body Ground
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

5. **CHECK ECM (TC of DLC3 INPUT)**
   a. Turn the ignition switch to OFF.
   b. Reconnect the ECM connector.
   c. Using SST, connect terminals TC and CG of the DLC3.
   d. Turn the ignition switch to ON.
   e. Check that the check engine warning light is blinking.

Front view of DLC3:

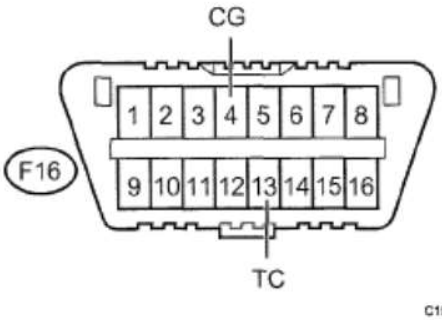


Fig. 205: Identifying DLC3 Connector Terminal CG And TC
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Result

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RESULT CHART

Result	Proceed to
Check engine warning light is blinking	A
Check engine warning light is not blinking	B

B : INSPECT SFI SYSTEM (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

A : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

TS AND CG TERMINAL CIRCUIT

DESCRIPTION

In the Test Mode (signal check), a malfunction in the speed sensor that cannot be detected when the vehicle is stopped can be 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 ON.

WIRING DIAGRAM

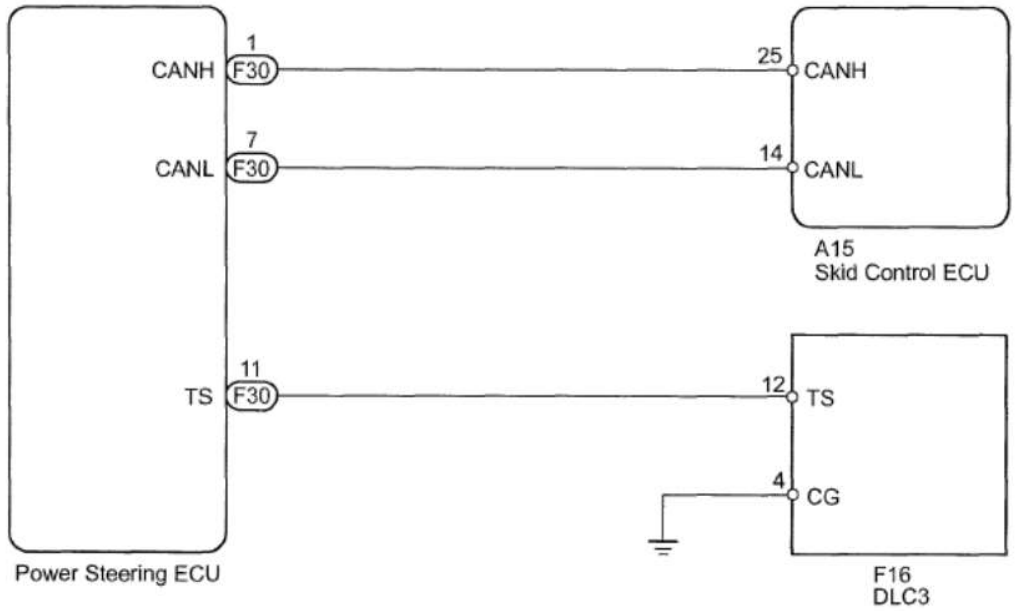


Fig. 206: TS And CG Terminal Circuit - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

1. **CHECK CAN COMMUNICATION SYSTEM**
   a. Check if the CAN communication system DTC is output (See **DIAGNOSIS SYSTEM**).

   Result

   RESULT CHART

Result	Proceed to
DTC not output	A
DTC output	B

B : INSPECT CAN COMMUNICATION SYSTEM (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

A: Go to next step

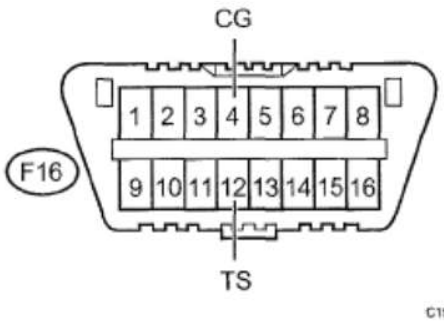
2. **INSPECT DLC3**
   a. Turn the ignition switch to ON.
   b. Measure the voltage according to the value(s) in the table below.

   Standard voltage

   TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
F16-12 (TS) - F16-4 (CG)	Ignition switch ON	11 to 14 V

Front view of DLC3:



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Fig. 207: Identifying DLC3 Connector Terminal CG And TS
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Result

RESULT CHART

Result	Proceed to
NG	A
OK	B

B: Go to step 5

A: Go to next step

3. **CHECK HARNESS AND CONNECTOR (TS of DLC3 - POWER STEERING ECU)**
   a. Turn the ignition switch to OFF.
   b. Disconnect the ECM connector.
   c. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

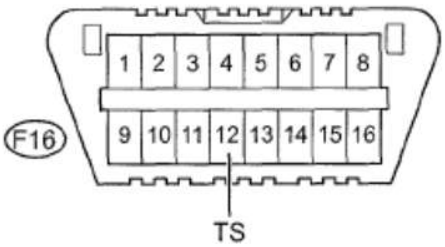
Tester Connection	Condition	Specified Condition
F16-12 (TS) - F30-11 (TS)	Always	Below 1 ohms
F16-12 (TS) - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

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Front view of DLC3:



Front view of wire harness connector:
(to Power Steering ECU)

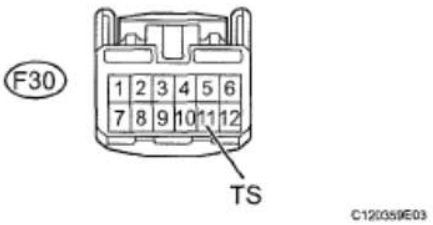


Fig. 208: Identifying DLC3 Connector Terminal TS And Power Steering ECU Connector Terminal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

4. **CHECK HARNESS AND CONNECTOR (CG of DLC3 - BODY GROUND)**
   a. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
F16-4 (CG) - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

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Front view of DLC3:

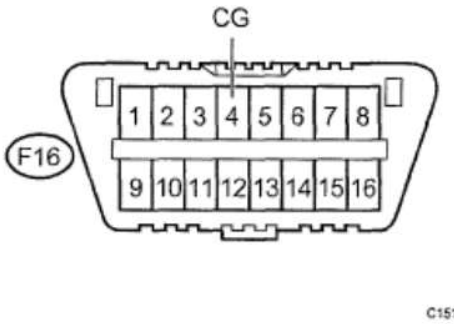


Fig. 209: Identifying DLC3 Connector Terminal CG And Body Ground
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

5. **CHECK POWER STEERING ECU (TS of DLC3 INPUT)**
   a. Turn the ignition switch to OFF.
   b. Reconnect the power steering ECU connector.
   c. Using SST, connect terminals TS and CG of the DLC3.
   d. Turn the ignition switch to ON.
   e. Check that the PS warning light is blinking.

Front view of DLC3:

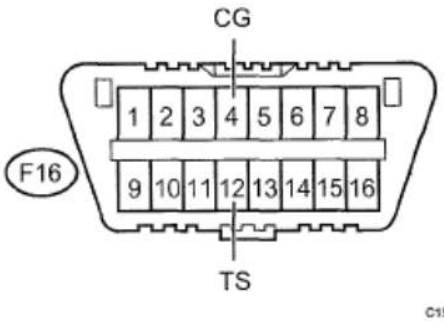


Fig. 210: Identifying DLC3 Connector Terminal CG And TS
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Result

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RESULT CHART

Result	Proceed to
Check PS warning light is blinking	A
Check PS warning light is not blinking	B

B : INSPECT POWER STEERING SYSTEM (See **HOW TO PROCEED WITH TROUBLESHOOTING**)

A : REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

BRAKE ACTUATOR

COMPONENTS

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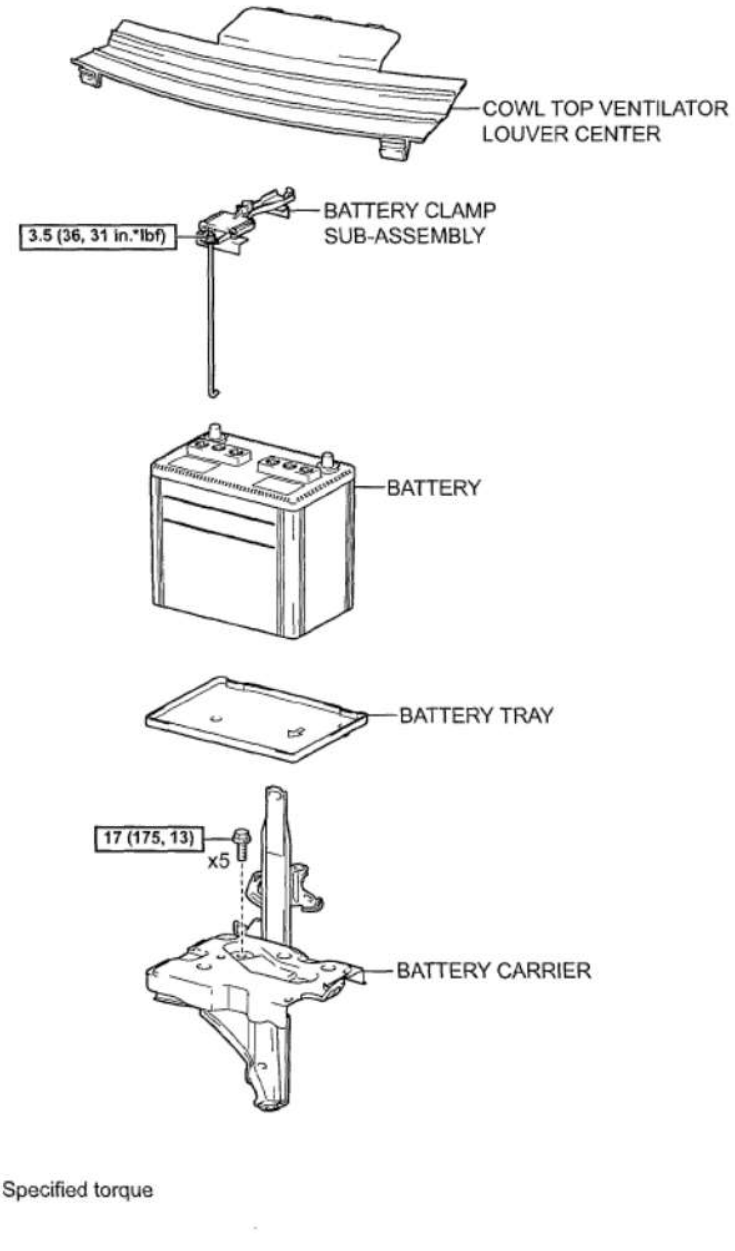


Fig. 211: Identifying Brake Actuator Components With Torque Specifications (1 Of 3)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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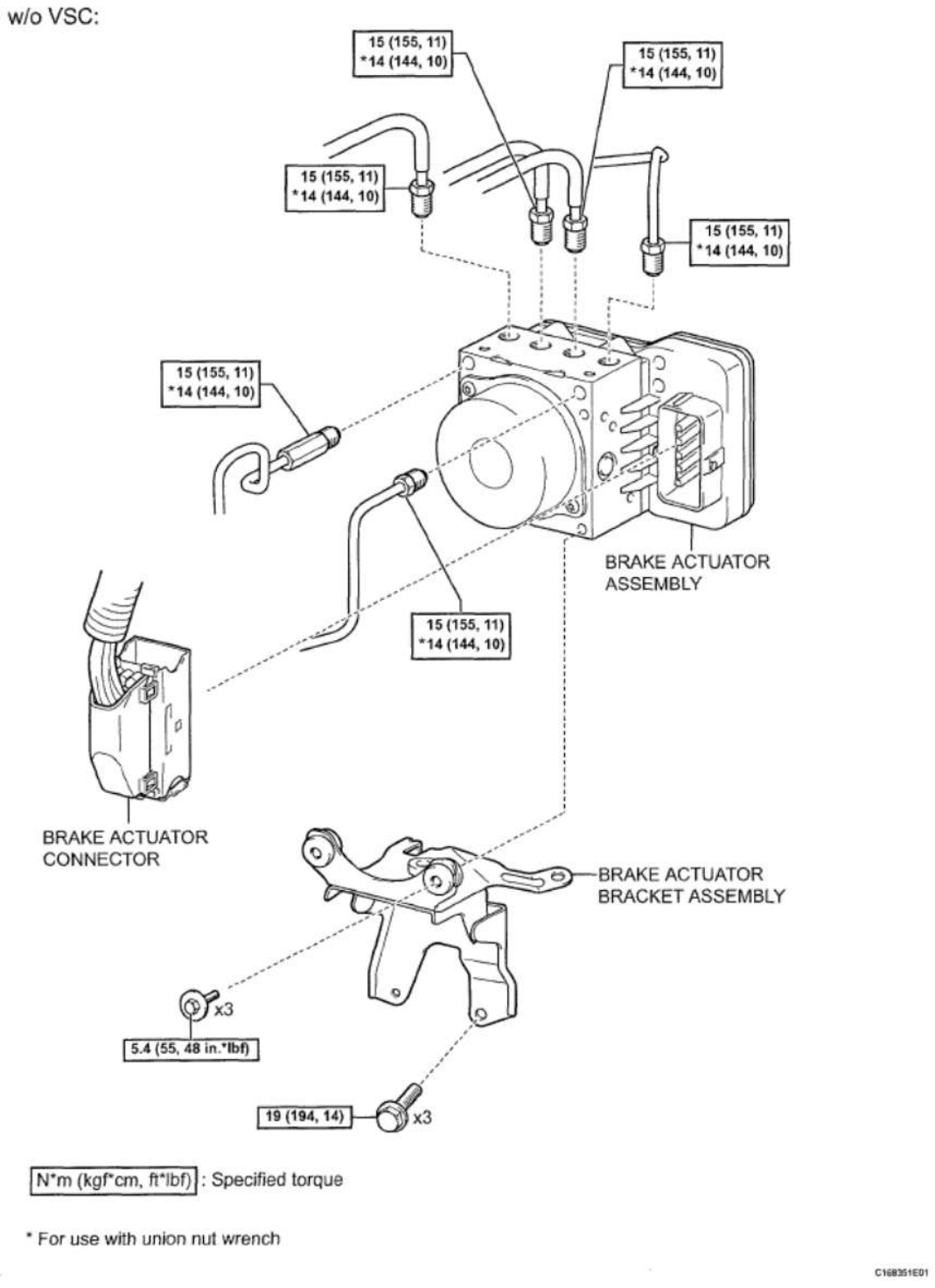


Fig. 212: Identifying Brake Actuator Components With Torque Specifications (2 Of 3)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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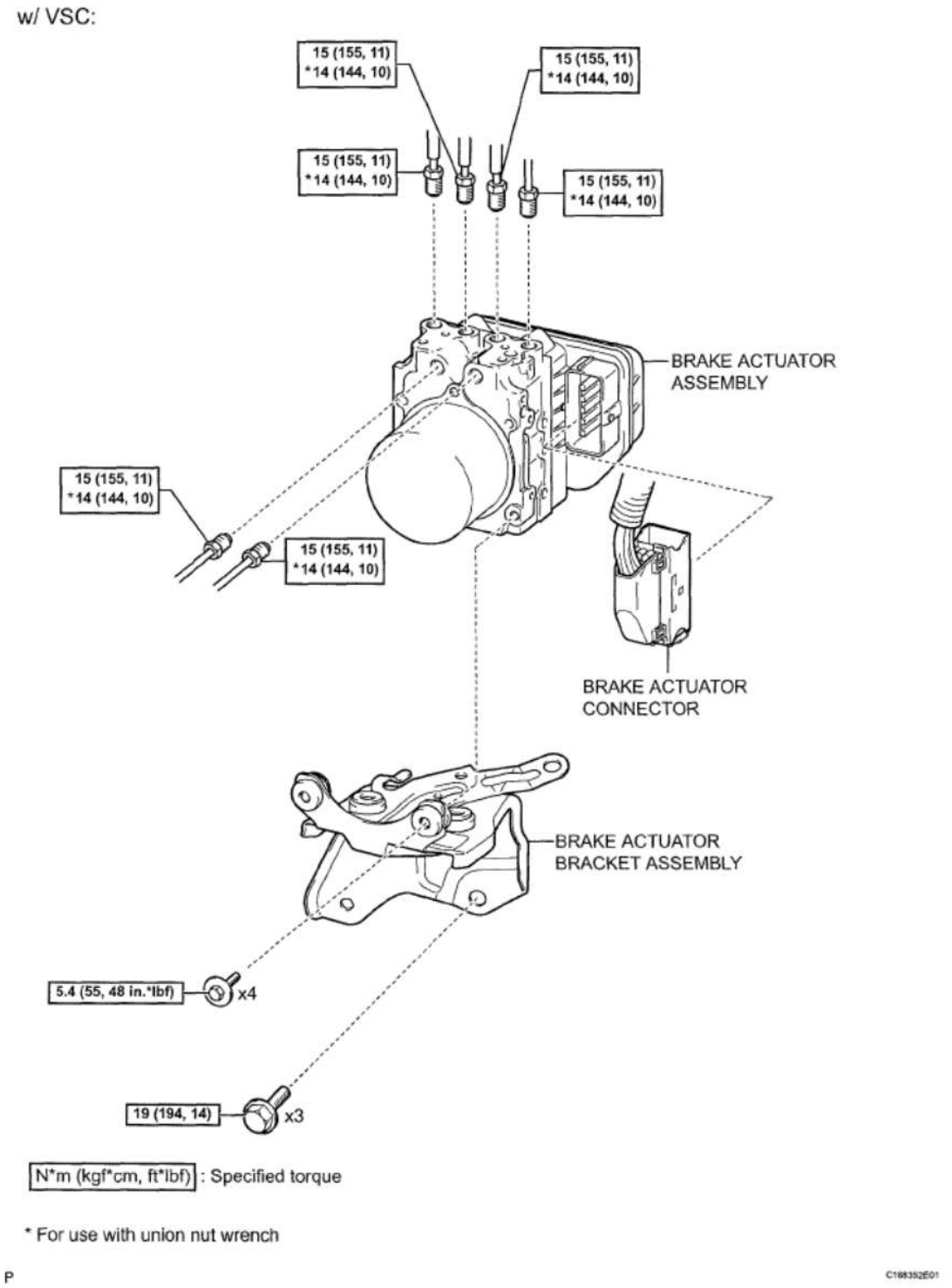


Fig. 213: Identifying Brake Actuator Components With Torque Specifications (3 Of 3)
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ON-VEHICLE INSPECTION

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1. **CONNECT TECHSTREAM**
   a. Connect the Techstream to the DLC3.
   b. Start the engine and allow it to idle.
   c. Turn the tester ON.
   d. Perform the active test using the Techstream. Select the following menu items: Chassis / ABS/ VSC/TRAC / Active Test
2. **INSPECT BRAKE ACTUATOR MOTOR**
   a. With the motor relay ON, check the actuator motor operation sounds.

NOTE: **Do not keep the motor relay turned ON for more than 5 seconds continuously. Allow intervals of at least 20 seconds between consecutive operations.**

   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 further.
   d. With the motor relay ON, check that the pedal does not pulsate.
   e. Turn the motor relay OFF and release the brake pedal.
3. **INSPECT BRAKE ACTUATOR SOLENOID (for Front Right Wheel)**

NOTE: **Never turn a solenoid ON in any manner other than 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 further.

NOTE: **Do not keep the solenoid turned ON for more than 10 seconds continuously. Allow intervals of at least 20 seconds between consecutive operations.**

   c. Turn the SFRH and SFRR solenoids OFF simultaneously, and check that the pedal can be depressed further.
   d. Turn the motor relay ON, and check that the pedal can be depressed.

NOTE: **Do not keep the motor relay turned ON for more than 5 seconds continuously. Allow intervals of at least 20 seconds between consecutive operations.**

   e. Turn the motor relay OFF and release the brake pedal.
4. **INSPECT BRAKE ACTUATOR SOLENOID (for Front Left Wheel)**

NOTE: **Never turn a solenoid ON in any manner other than described below.**

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a. With the brake pedal depressed, perform the following operations.
b. Turn the SFLH and SFLR solenoids ON simultaneously, and check that the pedal cannot be depressed further.

NOTE: Do not keep the solenoid turned ON for more than 10 seconds continuously. Allow intervals of at least 20 seconds between consecutive operations.

c. Turn the SFLH and SFLR solenoids OFF simultaneously, and check that the pedal can be depressed further.
d. Turn the motor relay ON, and check that the pedal can be depressed.

NOTE: Do not keep the motor relay turned ON for more than 5 seconds continuously. Allow intervals of at least 20 seconds between consecutive operations.

e. Turn the motor relay OFF and release the brake pedal.

5. **INSPECT BRAKE ACTUATOR SOLENOID (for Rear Right Wheel)**

NOTE: Never turn a solenoid ON in any manner other than described below.

a. With the brake pedal depressed, perform the following operations.
b. Turn the SRRH and SRRR solenoids ON simultaneously, and check that the pedal cannot be depressed further.

NOTE: Do not keep the solenoid turned ON for more than 10 seconds continuously. Allow intervals of at least 20 seconds between consecutive operations.

c. Turn the SRRH and SRRR solenoids OFF simultaneously, and check that the pedal can be depressed further.
d. Turn the motor relay ON, and check that the pedal can be depressed.

NOTE: Do not keep the motor relay turned ON for more than 5 seconds continuously. Allow intervals of at least 20 seconds between consecutive operations.

e. Turn the motor relay OFF and release the brake pedal.

6. **INSPECT BRAKE ACTUATOR SOLENOID (for Rear Left Wheel)**

NOTE: Never turn a solenoid ON in any manner other than described below.

a. With the brake pedal depressed, perform the following operations.

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b. Turn the SRLH and SRLR solenoids ON simultaneously, and check that the pedal cannot be depressed further.

NOTE: Do not keep the solenoid turned ON for more than 10 seconds continuously. Allow intervals of at least 20 seconds between consecutive operations.

c. Turn the SRLH and SRLR solenoids OFF simultaneously, and check that the pedal can be depressed further.

d. Turn the motor relay ON, and check that the pedal can be depressed.

NOTE: Do not keep the motor relay turned ON for more than 5 seconds continuously. Allow intervals of at least 20 seconds between consecutive operations.

e. Turn the motor relay OFF and release the brake pedal.

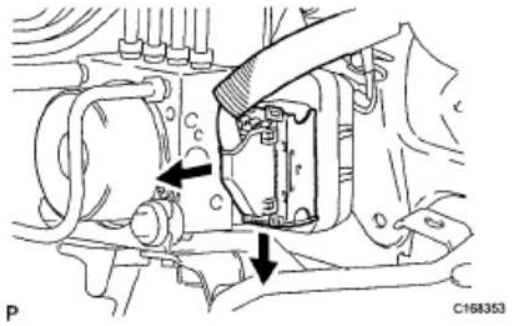
REMOVAL

1. **DRAIN BRAKE FLUID**

NOTE: Immediately wash off any brake fluid that comes into contact with any painted surfaces.

2. **REMOVE COWL TOP VENTILATOR LOUVER CENTER** (See **ON-VEHICLE INSPECTION**)
3. **REMOVE BATTERY** (See **REMOVAL**)
4. **REMOVE BATTERY TRAY**
5. **REMOVE BATTERY CARRIER** (See **REMOVAL**)
6. **REMOVE BRAKE ACTUATOR ASSEMBLY (w/o VSC)**
   a. Release the lock lever and disconnect the brake actuator connector.

NOTE: Be careful not to allow brake fluid to enter the removed connector.



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Fig. 214: Disconnecting Brake Actuator Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Using a union nut wrench, separate the 6 brake tubes from the brake actuator.

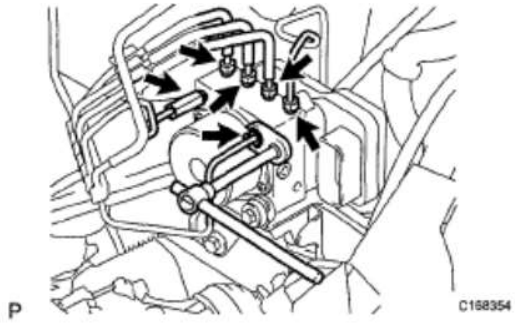


Fig. 215: Locating Brake Tubes And Union Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Use tags or labels to identify the place to reconnect each brake tube.

HINT:

- *1: To front wheel cylinder RH
- *2: To front wheel cylinder LH
- *3: To rear wheel cylinder RH
- *4: To rear wheel cylinder LH
- *5: From 1st master cylinder
- *6: From 2nd master cylinder

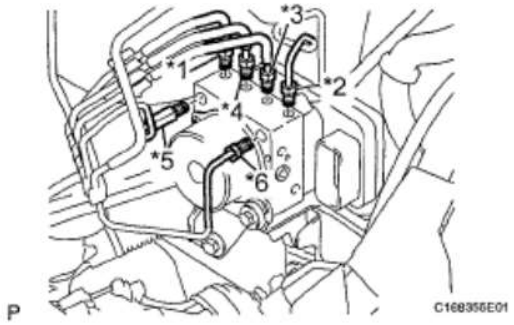


Fig. 216: Identifying Brake Tube
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Remove the 3 bolts and brake actuator with bracket.

NOTE: Do not damage the brake tubes or wire harness.

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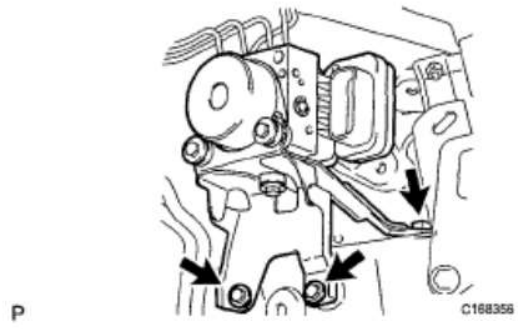


Fig. 217: Locating Brake Actuator With Bracket Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. **REMOVE BRAKE ACTUATOR ASSEMBLY (w/ VSC)**
   a. Release the lock lever and disconnect the brake actuator connector.

NOTE: Be careful not to allow brake fluid to enter the removed connector.

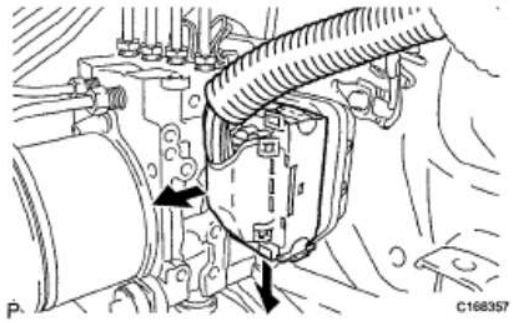


Fig. 218: Disconnecting Brake Actuator Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Using a union nut wrench, separate the 6 brake tubes from the brake actuator.

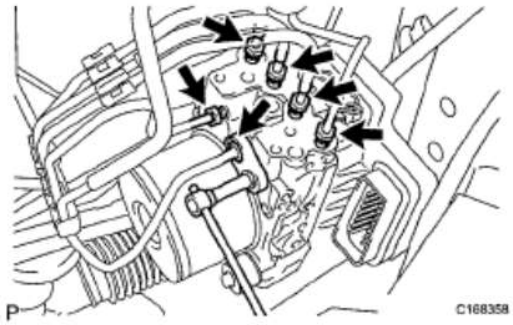


Fig. 219: Locating Brake Tubes From Brake Actuator And Union Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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c. Use tags or labels to identify the place to reconnect each brake tube.

HINT:

- *1: To front wheel cylinder RH
- *2: To front wheel cylinder LH
- *3: To rear wheel cylinder RH
- *4: To rear wheel cylinder LH
- *5: From 1st master cylinder
- *6: From 2nd master cylinder

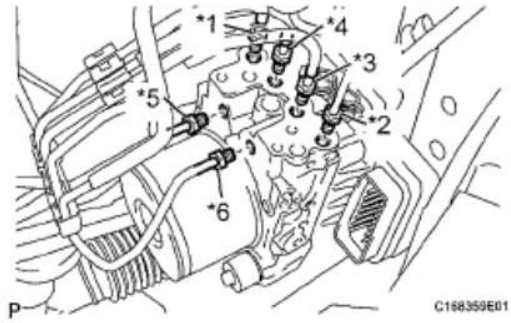


Fig. 220: Identifying Brake Tubes
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Remove the 3 bolts and brake actuator with bracket.

NOTE: Do not damage the brake tubes or wire harness.

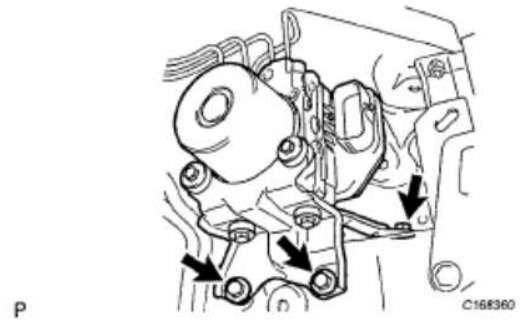


Fig. 221: Locating Brake Actuator With Bracket Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. **REMOVE BRAKE ACTUATOR BRACKET ASSEMBLY (w/o VSC)**
   a. Remove the 3 bolts and actuator bracket.

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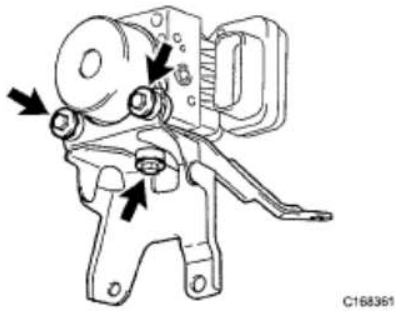


Fig. 222: Locating Actuator Bracket Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. **REMOVE BRAKE ACTUATOR BRACKET ASSEMBLY (w/VSC)**
   a. Remove the 4 bolts and actuator bracket.

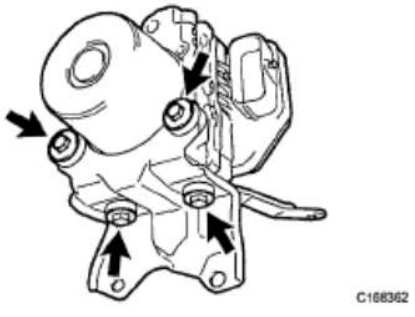


Fig. 223: Locating Actuator Bracket Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

1. **INSTALL BRAKE ACTUATOR BRACKET ASSEMBLY (w/o VSC)**
   a. Install the actuator bracket with the 3 bolts in the sequence shown in the illustration.

   Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

   NOTE:

   - **Do not remove the hole plug before connecting the brake tube. New actuators are filled with brake fluid.**

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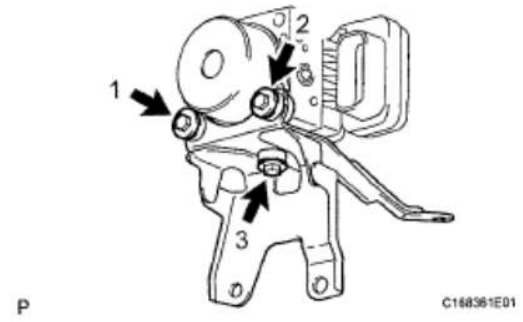


Fig. 224: Locating Actuator Bracket Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- **Do not carry with the connector part of an actuator.**

2. **INSTALL BRAKE ACTUATOR BRACKET ASSEMBLY (w/VSC)**
   a. Install the actuator bracket with the 4 bolts in the sequence shown in the illustration.

Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

NOTE:

- **Do not remove the hole plug before connecting the brake tube. New actuators are filled with brake fluid.**
- **Do not carry with the connector part of an actuator.**

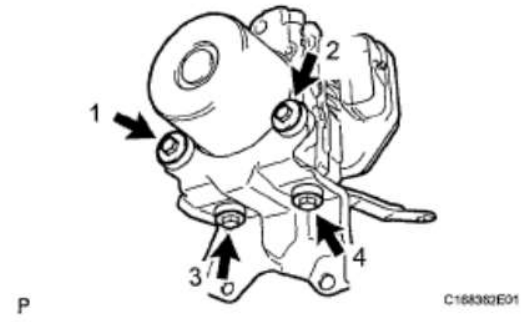


Fig. 225: Locating Actuator Bracket Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. **INSTALL BRAKE ACTUATOR ASSEMBLY (w/o VSC)**
   a. Install the brake actuator with bracket with the 3 bolts in the sequence shown in the illustration.

Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)

NOTE: **Do not damage the brake tubes or wire harness.**

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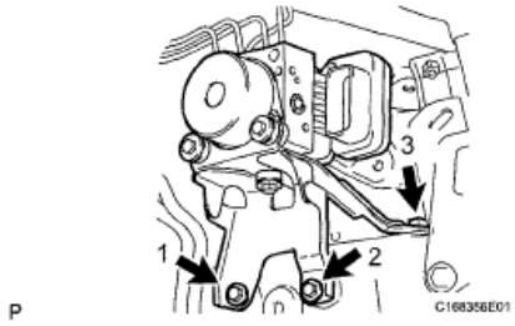


Fig. 226: Locating Actuator Bracket Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Temporarily install each brake tube in the correct positions of the brake actuator as shown in the illustration.

HINT:

- *1: To front wheel cylinder RH
- *2: To front wheel cylinder LH
- *3: To rear wheel cylinder RH
- *4: To rear wheel cylinder LH
- *5: From 1st master cylinder
- *6: From 2nd master cylinder

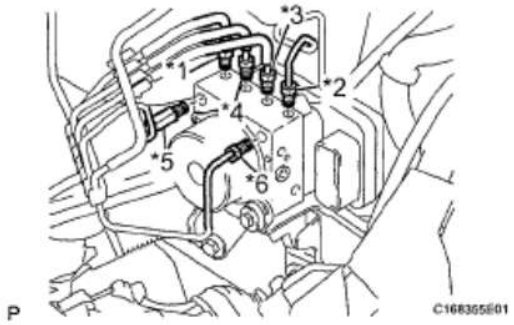


Fig. 227: Identifying Brake Tube
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Using a union nut wrench, install the 6 brake tubes onto the brake actuator.

Torque: without union nut wrench

15 N*m (155 kgf*cm, 11 ft.*lbf)

with union nut wrench

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14 N*m (144 kgf*cm, 10 ft.*lbf)

NOTE:

- **This torque value can be obtained by using a torque wrench with a fulcrum length of 300 mm (11.8 in.) and a union nut wrench with a fulcrum length of 22 mm (0.866 in.) (See REPAIR INSTRUCTION).**

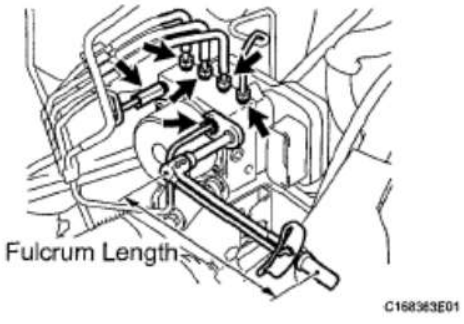


Fig. 228: Identifying Brake Tubes Onto Brake Actuator
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- **This torque value is effective when the union nut wrench is parallel to a torque wrench.**

d. Connect the brake actuator connector.

NOTE:

- **Make sure that the connector is locked securely.**
- **Make sure that the actuator connector can be connected smoothly. Do not allow entry of water, oil or dirt.**

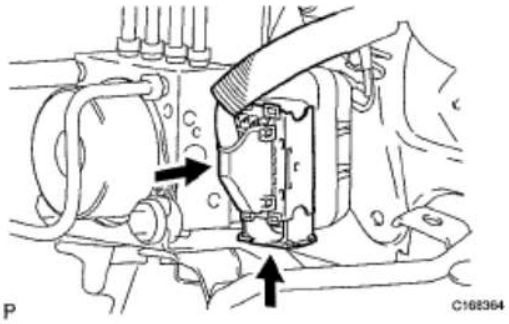


Fig. 229: Locating Brake Actuator Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. **INSTALL BRAKE ACTUATOR ASSEMBLY (w/ VSC)**
   a. Install the brake actuator with bracket with the 3 bolts in the sequence shown in the illustration.

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Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)

NOTE: Do not damage the brake tubes or wire harness.

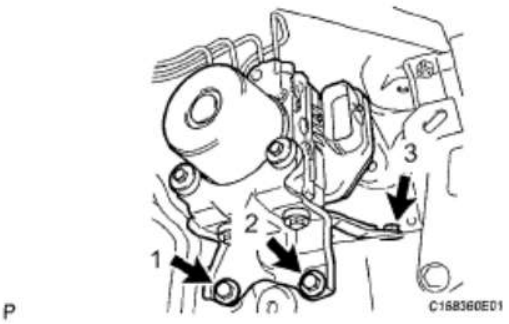


Fig. 230: Locating Brake Actuator With Bracket Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Temporarily install each brake tube in the correct positions of the brake actuator as shown in the illustration.

HINT:

- *1: To front wheel cylinder RH
- *2: To front wheel cylinder LH
- *3: To rear wheel cylinder RH
- *4: To rear wheel cylinder LH
- *5: From 1st master cylinder
- *6: From 2nd master cylinder

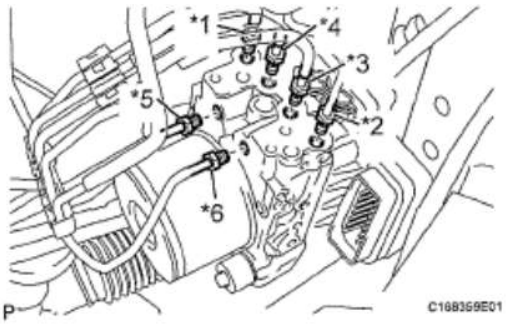


Fig. 231: Identifying Brake Tubes
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Using a union nut wrench, install the 6 brake tubes onto the brake actuator.

Torque: without union nut wrench

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15 N*m (155 kgf*cm, 11 ft.*lbf)

with union nut wrench

14 N*m (144 kgf*cm, 10 ft.*lbf)

NOTE:

- **This torque value can be obtained by using a torque wrench with a fulcrum length of 300 mm (11.8 in.) and a union nut wrench with a fulcrum length of 22 mm (0.866 in.) (See REPAIR INSTRUCTION).**

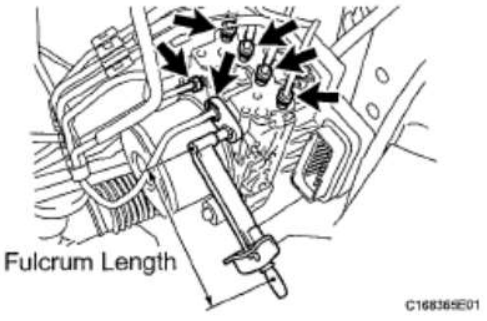


Fig. 232: Locating Brake Tubes Onto Brake Actuator
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

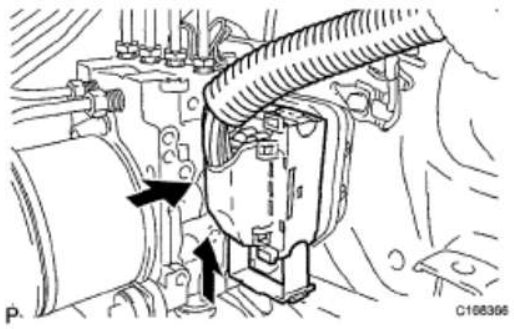
- **This torque value is effective when the union nut wrench is parallel to a torque wrench.**

d. Connect the brake actuator connector.

NOTE:

- **Make sure that the connector is locked securely.**
- **Make sure that the actuator connector can be connected smoothly. Do not allow entry of water, oil or dirt.**

5. **INSTALL BATTERY CARRIER** (See **INSTALLATION**)



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Fig. 233: Connecting Brake Actuator Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. **INSTALL BATTERY TRAY**
7. **INSTALL BATTERY** (See **INSTALLATION**)
8. **FILL RESERVOIR WITH BRAKE FLUID** (See **ON-VEHICLE INSPECTION**)
9. **BLEED MASTER CYLINDER** (See **ON-VEHICLE INSPECTION**)
10. **BLEED BRAKE LINE** (See **REPLACEMENT**)
11. **BLEED BRAKE ACTUATOR (w/ VSC)** (See **REPLACEMENT**)
12. **CHECK FLUID LEVEL IN RESERVOIR** (See **REPLACEMENT**)
13. **INSPECT FOR BRAKE FLUID LEAK**
14. **INSTALL COWL TOP VENTILATOR LOUVER CENTER** (See **REPLACEMENT**)
15. **CHECK ACTUATOR WITH TECHSTREAM**

    (See **ON-VEHICLE INSPECTION**)

16. **PERFORM YAW RATE AND ACCELERATION SENSOR ZERO POINT CALIBRATION (w/ VSC)**

    (See **CALIBRATION**)

17. **CHECK AND CLEAR DTC**

    w/o VSC: (See **DTC CHECK / CLEAR**)

    w/ VSC: (See **DTC CHECK/CLEAR**)

FRONT SPEED SENSOR

COMPONENTS

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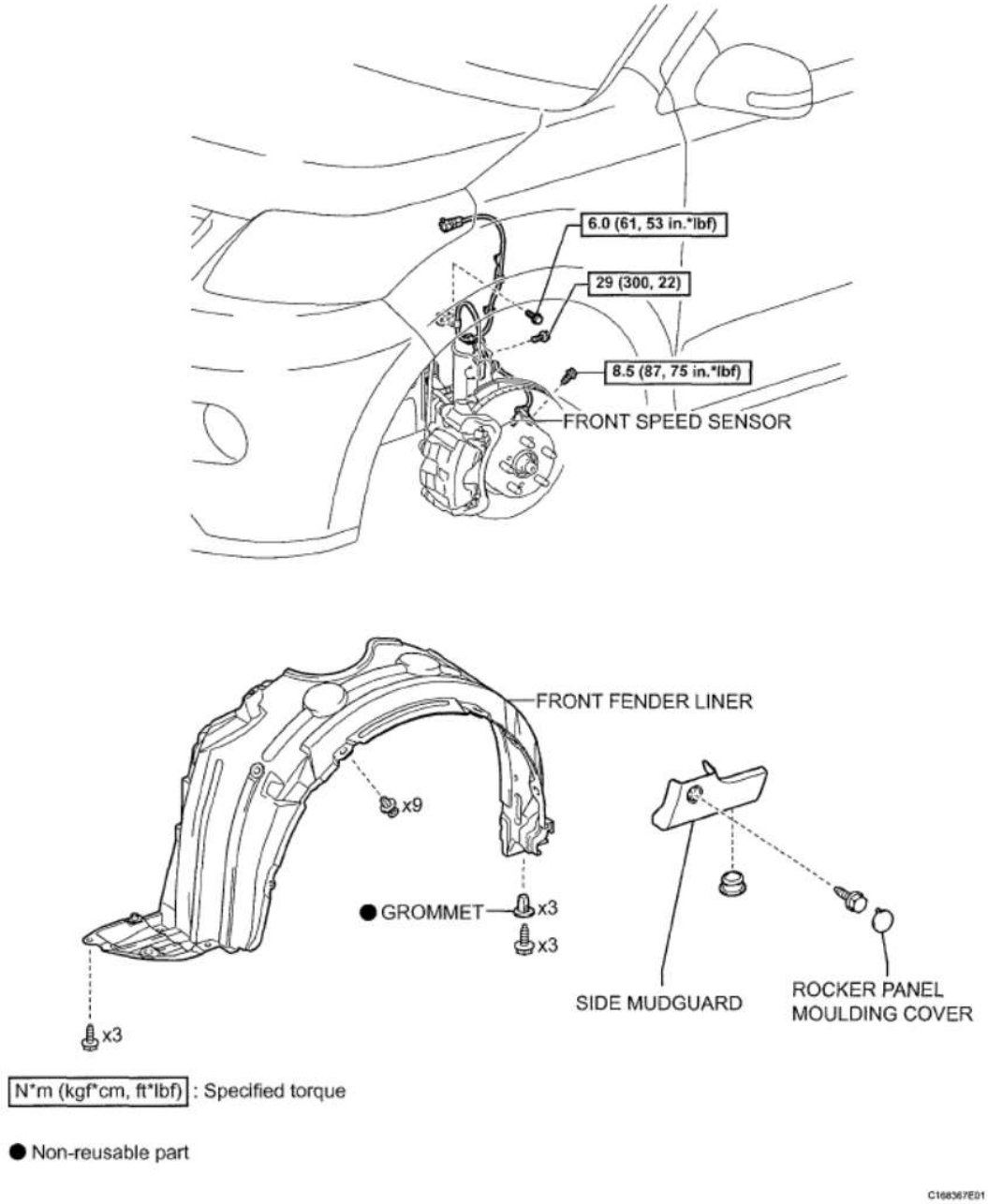


Fig. 234: Identifying Front Speed Sensor Components With Torque Specifications
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. **REMOVE FRONT WHEEL**
2. **REMOVE ROCKER PANEL MOLDING COVER** (See **REMOVAL**)
3. **REMOVE SIDE MUDGUARD** (See **REMOVAL**)
4. **REMOVE FRONT FENDER LINER** (See **REMOVAL**)

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5. **REMOVE FRONT SPEED SENSOR**

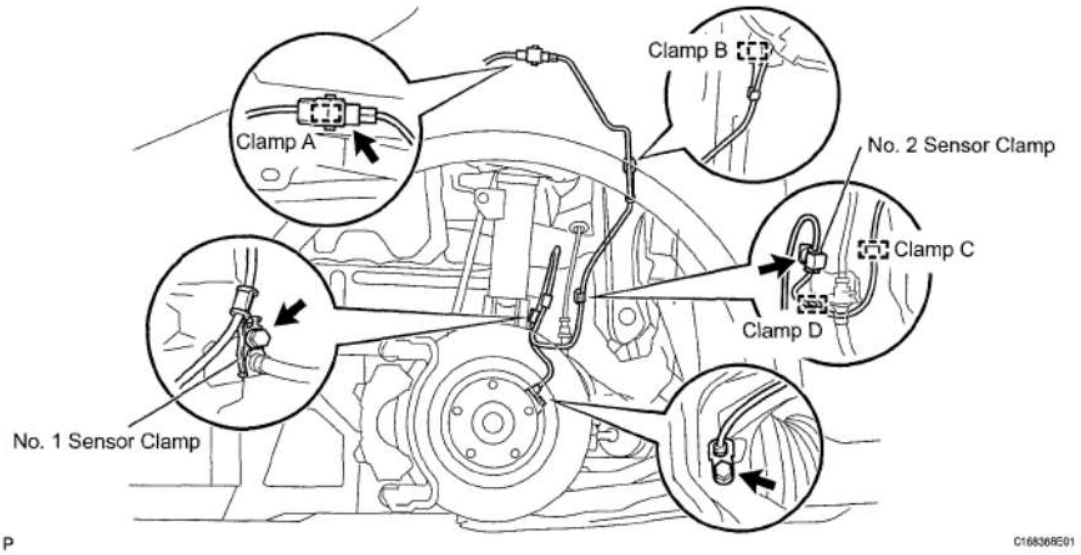


Fig. 235: Locating Clamp A From Body
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

a. Disengage the clamp A from the body.
b. Disconnect the speed sensor connector.
c. Disengage the clamps B, C and D from the body.
d. Remove the bolt and separate the No. 2 sensor clamp from the body.
e. Remove the bolt and separate the No. 1 sensor clamp from the shock absorber.
f. Remove the bolt and remove the speed sensor from the steering knuckle.

NOTE:

- **Keep the speed sensor tip and installation portion free of foreign matter.**
- **Remove the speed sensor without turning it from its original installation angle.**

INSTALLATION

1. **INSTALL FRONT SPEED SENSOR**

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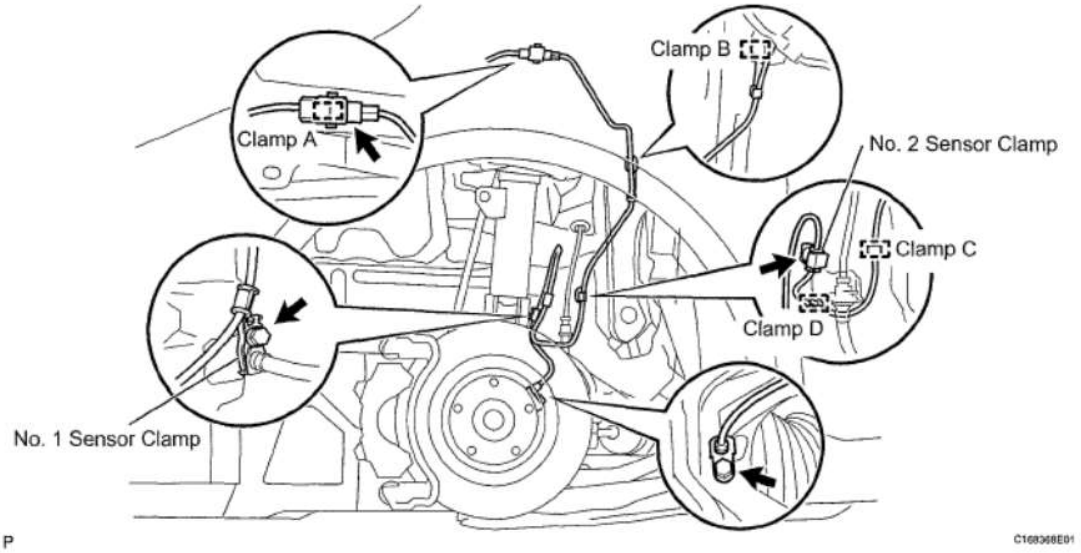


Fig. 236: Locating Clamp A From Body
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

a. Install the speed sensor onto the steering knuckle with the bolt.

Torque: 8.5 N*m (87 kgf*cm, 75 in.*lbf)

NOTE:

- **Check that the speed sensor tip and installation portion are free of foreign matter.**
- **Install the speed sensor without turning it from its original installation angle.**

b. Install the No. 1 sensor clamp onto the shock absorber with the bolt.

Torque: 29 N*m (300 kgf*cm, 22 ft.*lbf)

c. Install the No. 2 sensor clamp onto the body with the bolt.

Torque: 6.0 N*m (61 kgf*cm, 53 in.*lbf)

d. Engage the clamps D, C and B onto the body.
e. Connect the speed sensor connector.
f. Engage the clamp A onto the body.

2. **INSTALL FRONT FENDER LINER** (See **INSTALLATION**)
3. **INSTALL SIDE MUDGUARD** (See **INSTALLATION**)
4. **INSTALL ROCKER PANEL MOLDING COVER** (See **INSTALLATION**)
5. **INSTALL FRONT WHEEL**

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Torque: 103 N*m (1050 kgf*cm, 76 ft.*lbf)

6. **CHECK ABS SENSOR SIGNAL (w/o VSC)**

   (See **TEST MODE PROCEDURE**)

7. **CHECK VSC SENSOR SIGNAL (w/ VSC)**

   (See **TEST MODE PROCEDURE**)

REAR SPEED SENSOR

COMPONENTS

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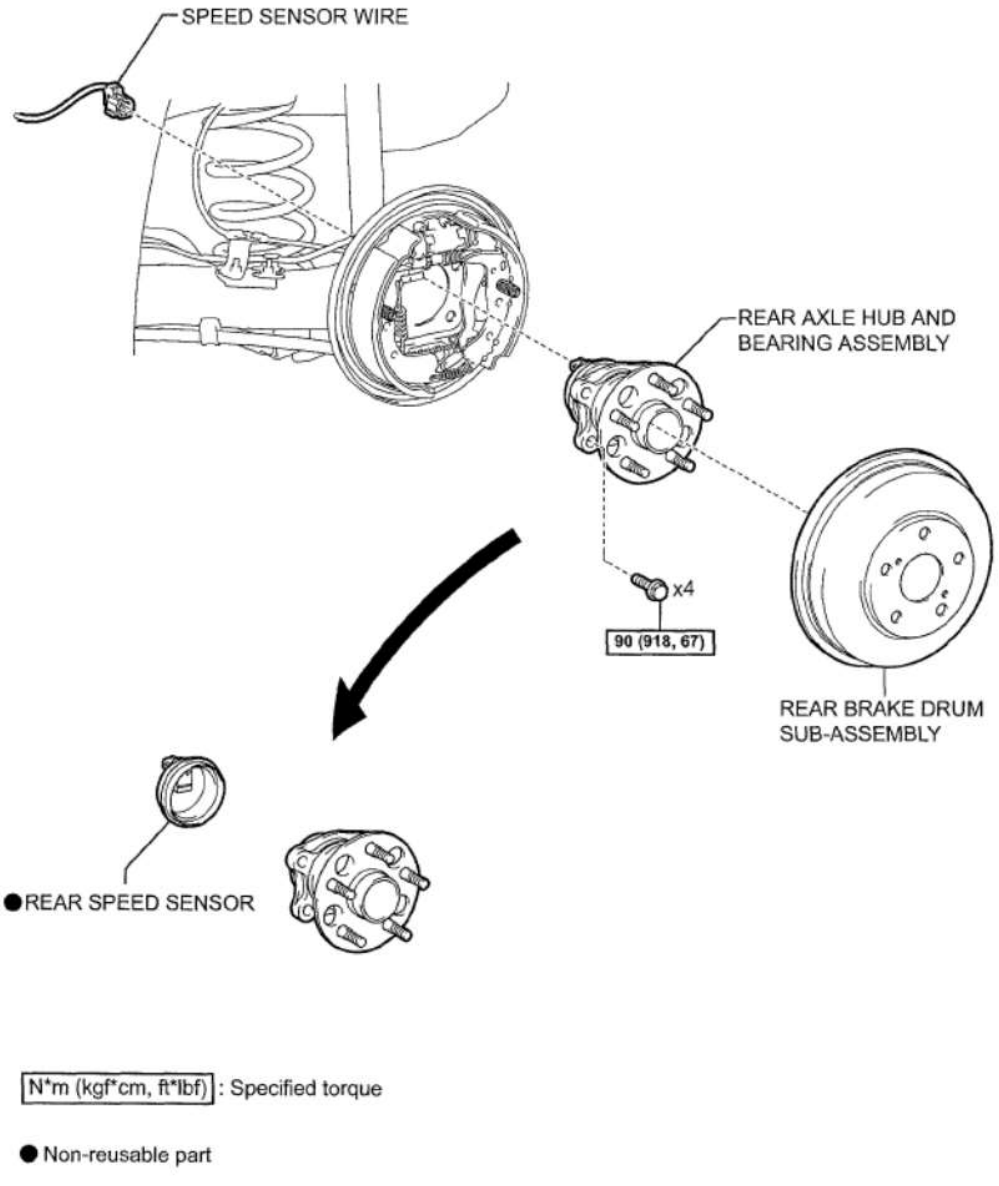


Fig. 237: Identifying Rear Speed Sensor Components With Torque Specifications
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. **REMOVE REAR WHEEL**
2. **REMOVE REAR BRAKE DRUM SUB-ASSEMBLY** (See **REMOVAL**)
3. **DISCONNECT SPEED SENSOR WIRE** (See **REMOVAL**)
4. **REMOVE REAR AXLE HUB AND BEARING ASSEMBLY** (See **REMOVAL**)
5. **REMOVE REAR SPEED SENSOR**

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a. Mount the rear axle hub and bearing assembly in a vice between aluminum plates.

NOTE: If it is dropped or heavily damaged, replace the rear axle hub and bearing assembly.

b. Using a pin punch and hammer, remove the 2 pins from SST (09520-00031) and remove the attachment (09521-00010).

c. Using SST and the 2 bolts (90101-12007), remove the speed sensor from the rear axle hub.

SST 09520-00031 (09520-00040), 09521-00020, 09950-00020

NOTE:

- **Pull the speed sensor off straight, being careful not to make contact with the speed sensor rotor.**

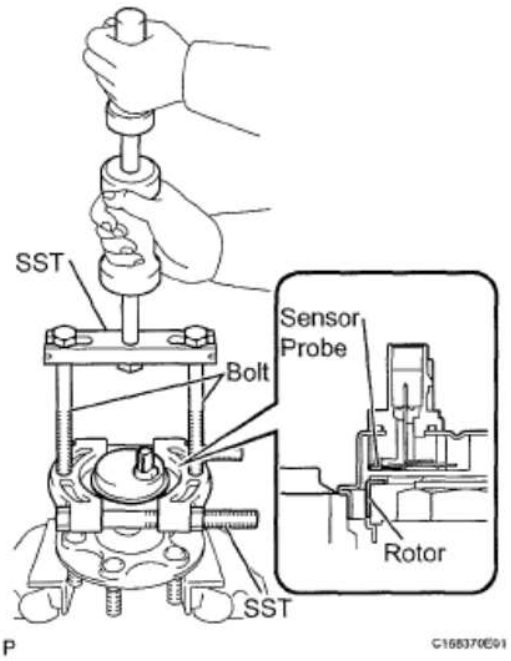


Fig. 238: Pulling Speed Sensor Off Straight
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- **If the speed sensor rotor is damaged or deformed, replace the rear axle hub and bearing assembly.**
- **Do not damage the speed sensor or rear axle hub contact surfaces.**
- **Keep the sensor rotor free of foreign matter.**

INSTALLATION

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1. **INSTALL REAR SPEED SENSOR**
   a. Wipe the sealant off the speed sensor installation surface using non-residue solvent.

   NOTE: Keep the sensor rotor free of foreign matter.

   b. Install the speed sensor onto the rear axle hub in the highest possible installation position.

   HINT:

   The distance between the installation holes should be larger on the upper side than the lower side.

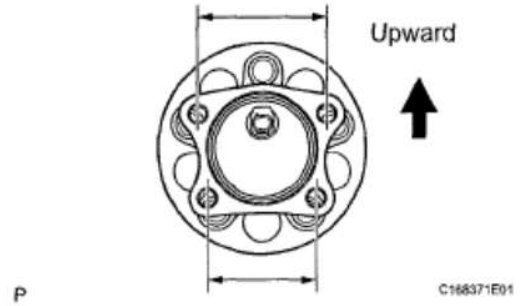


Fig. 239: Identifying Rear Speed Sensor Installation Position
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   c. Using SST and a press, install a new speed sensor into the rear axle hub until it is flush with the end surface of the axle hub.

   SST 09214-76011

NOTE:
- **Do not use a hammer when installing.**
- **Make sure that the sensor probe is free of foreign matter.**
- **Press the speed sensor in slowly without turning it.**

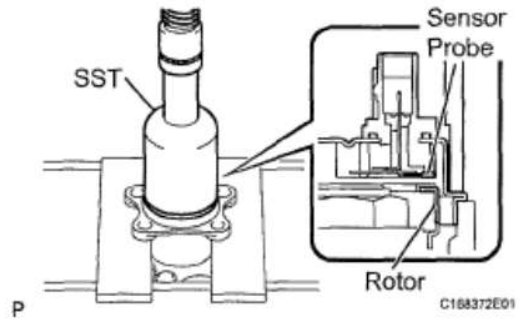


Fig. 240: Installing Speed Sensor Into Rear Axle Hub
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2. **INSTALL REAR AXLE HUB AND BEARING ASSEMBLY** (See **INSTALLATION**)
3. **INSPECT REAR AXLE HUB BEARING** (See **REMOVAL**)
4. **CONNECT SPEED SENSOR WIRE** (See **INSTALLATION**)
5. **INSTALL REAR BRAKE DRUM SUB-ASSEMBLY**
6. **ADJUST REAR DRUM BRAKE SHOE CLEARANCE** (See **INSTALLATION**)
7. **INSTALL REAR WHEEL**

   Torque: 103 N*m (1050 kgf*cm, 76 ft.*lbf)

8. **INSPECT REAR WHEEL ALIGNMENT**

   (See **INSPECTION**)

9. **CHECK ABS SENSOR SIGNAL (w/o VSC)**

   (See **TEST MODE PROCEDURE**)

10. **CHECK VSC SENSOR SIGNAL (w/ VSC)**

    (See **TEST MODE PROCEDURE**)

DECELERATION SENSOR

COMPONENTS

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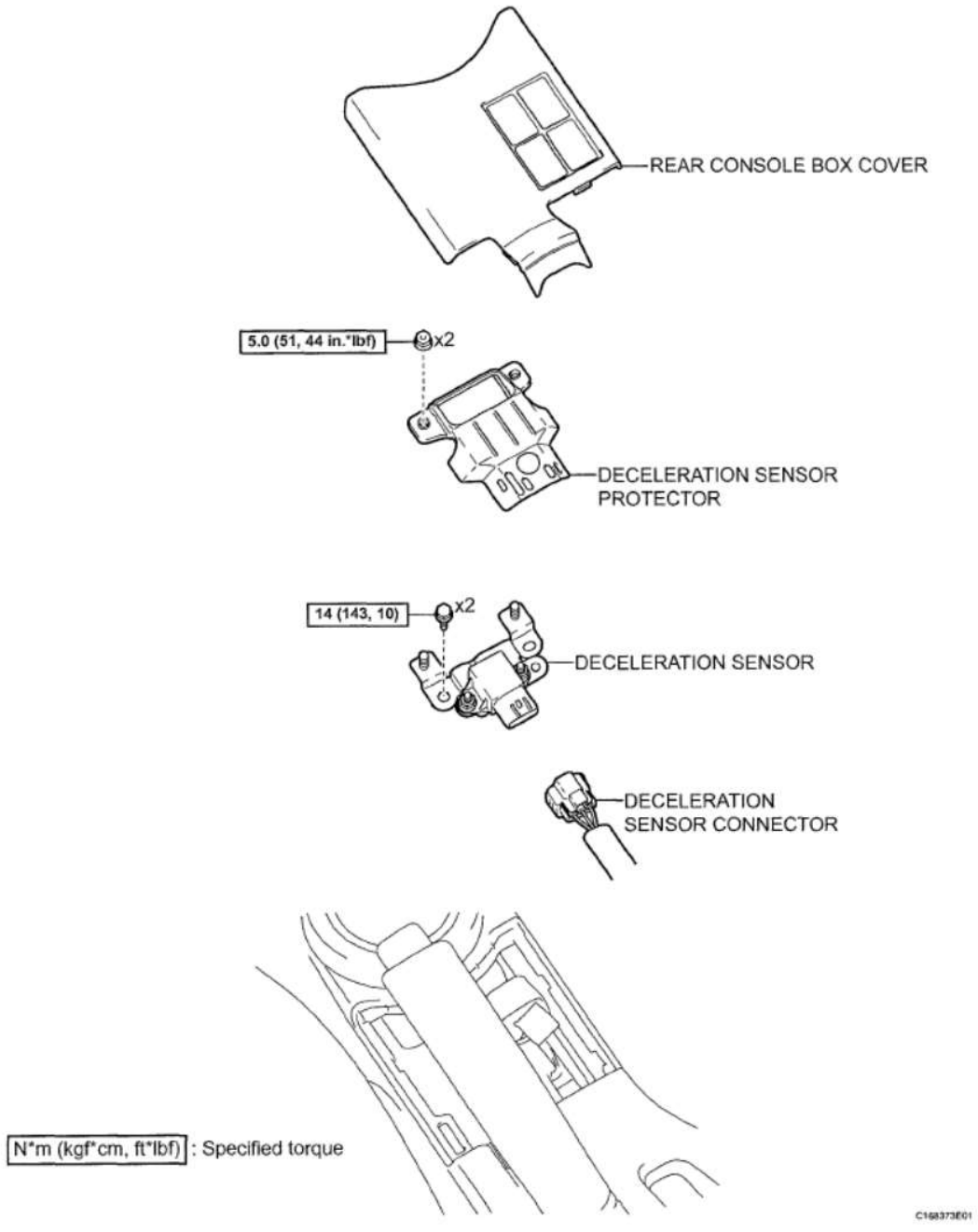


Fig. 241: Identifying Deceleration Sensor Components With Torque Specifications
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. **REMOVE REAR CONSOLE BOX COVER** (See **REMOVAL**)
2. **REMOVE DECELERATION SENSOR PROTECTOR**
   a. Remove the 2 nuts and deceleration sensor protector.

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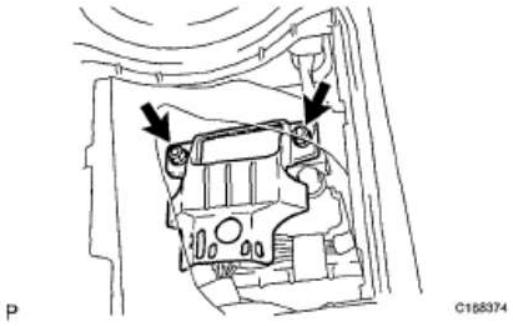


Fig. 242: Locating Deceleration Sensor Protector Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. **REMOVE DECELERATION SENSOR**
   a. Disconnect the deceleration sensor connector.
   b. Remove the 2 bolts and deceleration sensor.

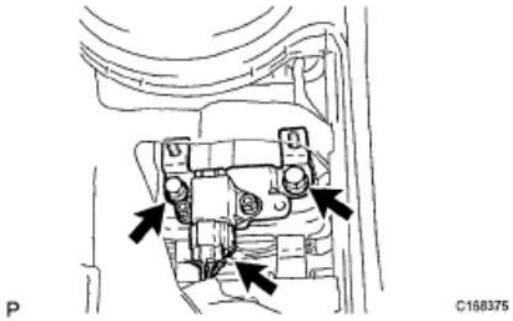


Fig. 243: Locating Deceleration Sensor Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

1. **INSTALL DECELERATION SENSOR**
   a. Install the deceleration sensor with the 2 bolts.

   Torque: 14 N*m (143 kgf*cm, 10 ft.*lbf)

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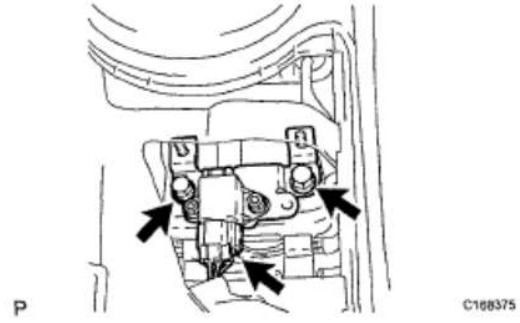


Fig. 244: Locating Deceleration Sensor Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Connect the deceleration sensor connector.

2. **INSTALL DECELERATION SENSOR PROTECTOR**
   a. Install the deceleration sensor protector with the 2 nuts.

   Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

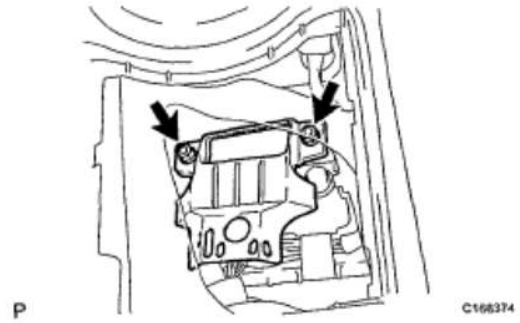


Fig. 245: Locating Deceleration Sensor Protector Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. **INSTALL REAR CONSOLE BOX COVER** (See **INSTALLATION**)
4. **CHECK ABS SENSOR SIGNAL**

   (See **TEST MODE PROCEDURE**)

YAW RATE AND ACCELERATION SENSOR

COMPONENTS

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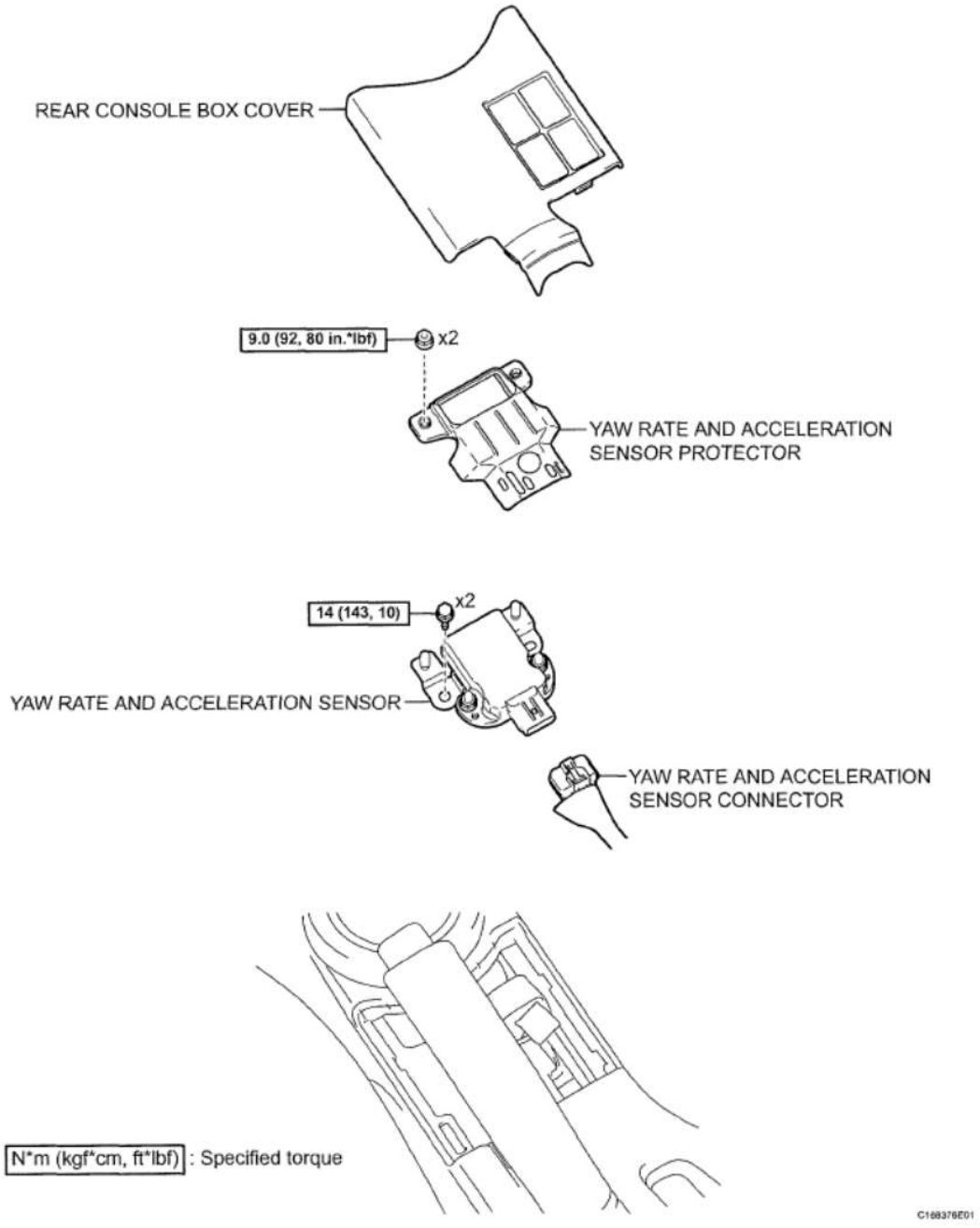


Fig. 246: Identifying Yaw Rate And Acceleration Sensor Components With Torque Specifications
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE REAR CONSOLE BOX COVER** (See **REMOVAL**)
3. **REMOVE YAW RATE AND ACCELERATION SENSOR PROTECTOR**

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a. Remove the 2 nuts and yaw rate and acceleration sensor protector.

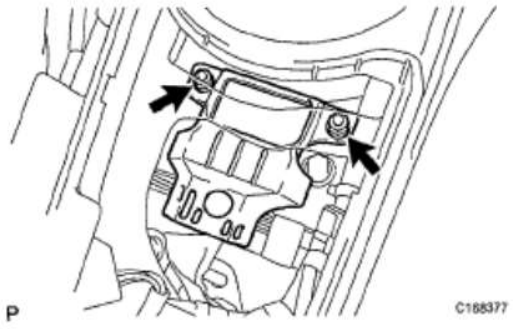


Fig. 247: Locating Yaw Rate And Acceleration Sensor Protector Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. **REMOVE YAW RATE AND ACCELERATION SENSOR**
   a. Disconnect the yaw rate and acceleration sensor connector.
   b. Remove the 2 bolts and yaw rate and acceleration sensor.

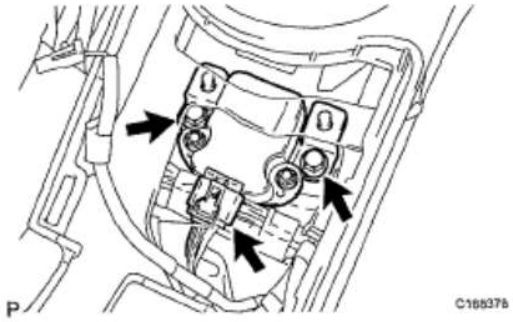


Fig. 248: Locating Yaw Rate And Acceleration Sensor Connector Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

1. **INSTALL YAW RATE AND ACCELERATION SENSOR**
   a. Install the yaw rate and acceleration sensor with the 2 bolts.

   Torque: 14 N*m (143 kgf*cm, 10 ft.*lbf)

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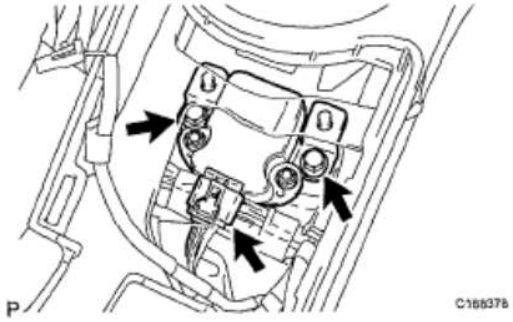


Fig. 249: Locating Yaw Rate And Acceleration Sensor Connector Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Connect the yaw rate and acceleration sensor connector.

2. **INSTALL YAW RATE AND ACCELERATION SENSOR PROTECTOR**
   a. Install the yaw rate and acceleration sensor protector with the 2 nuts.

   Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

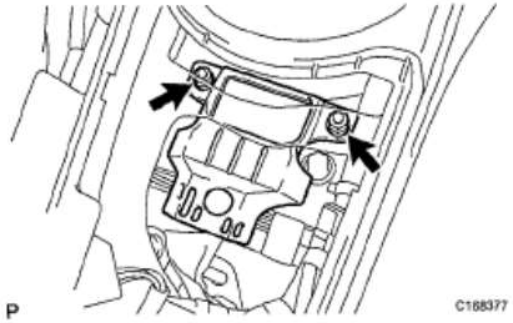


Fig. 250: Locating Yaw Rate And Acceleration Sensor Protector Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. **INSTALL REAR CONSOLE BOX COVER** (See **INSTALLATION**)
4. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

   Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

5. **PERFORM YAW RATE AND ACCELERATION SENSOR ZERO POINT CALIBRATION**

   (See **CALIBRATION**)

6. **CHECK VSC SENSOR SIGNAL**

   (See **TEST MODE PROCEDURE**)

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STEERING ANGLE SENSOR

COMPONENTS

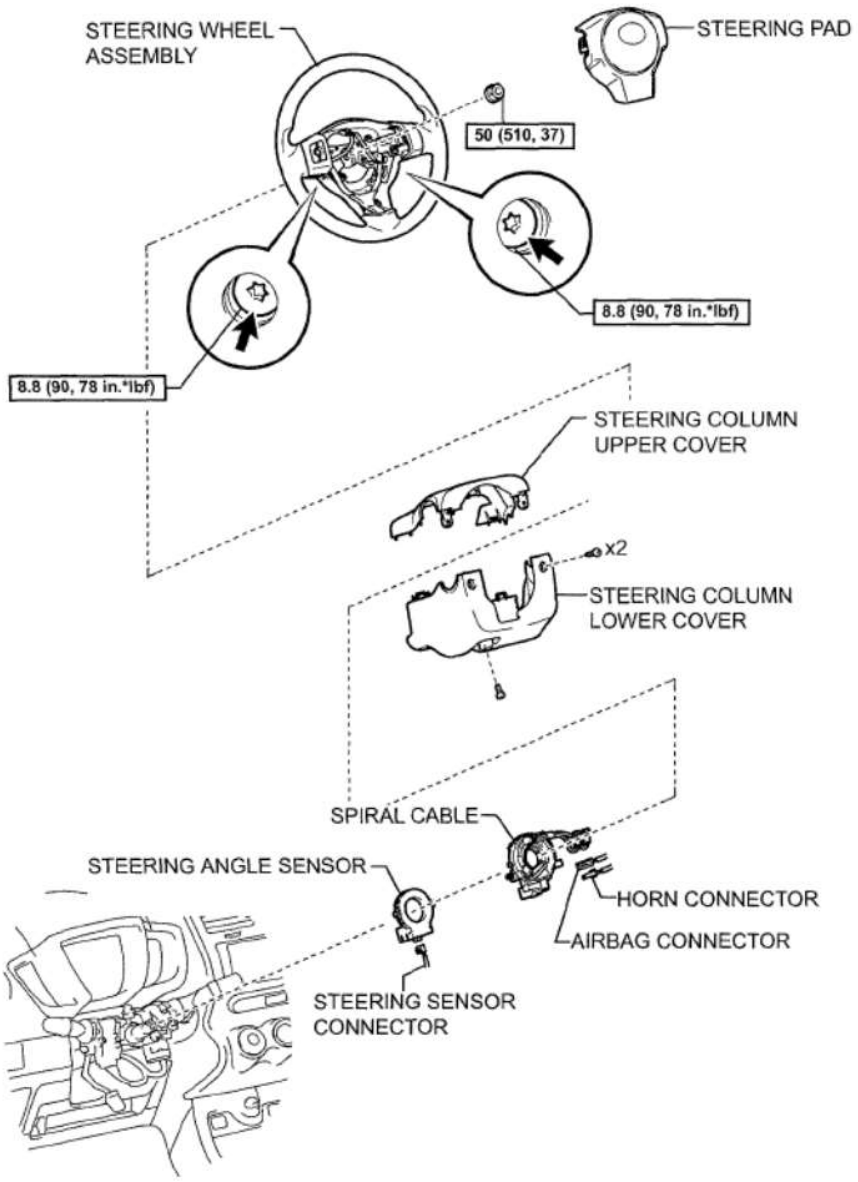


Fig. 251: Identifying Steering Angle Sensor Components With Torque Specifications
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

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CAUTION: Some of these service operations affect the SRS airbag system. Read the precautionary notices concerning the SRS airbag system before servicing (See PRECAUTION).

1. **TURN FRONT WHEELS FACING STRAIGHT AHEAD**
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**

CAUTION: Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.

3. **REMOVE STEERING PAD** (See **REMOVAL**)
4. **REMOVE STEERING WHEEL ASSEMBLY** (See **REMOVAL**)
5. **REMOVE STEERING COLUMN LOWER COVER** (See **REMOVAL**)
6. **REMOVE STEERING COLUMN UPPER COVER** (See **REMOVAL**)
7. **REMOVE SPIRAL CABLE** (See **REMOVAL**)
8. **REMOVE STEERING ANGLE SENSOR**
   a. Disengage the 6 claws and 2 pins, and remove the steering angle sensor from the spiral cable.

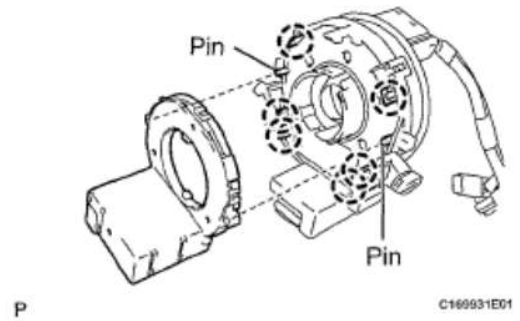


Fig. 252: Identifying Steering Angle Sensor Claws And Pins
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

CAUTION: Some of these service operations affect the SRS airbag system. Read the precautionary notices concerning the SRS airbag system before servicing (See PRECAUTION).

1. **INSTALL STEERING ANGLE SENSOR**
   a. Engage the 6 claws and insert the 2 pins into the holes to install the steering angle sensor onto the spiral cable.

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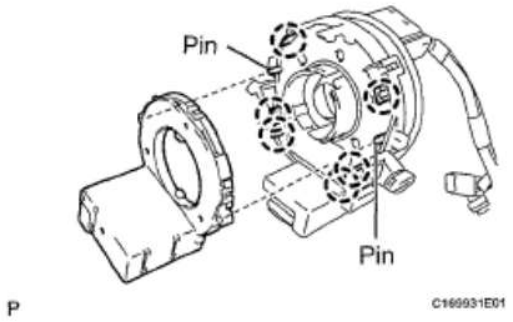


Fig. 253: Identifying Steering Angle Sensor Claws And Pins
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **INSTALL SPIRAL CABLE** (See **INSTALLATION**)
3. **INSTALL STEERING COLUMN UPPER COVER** (See **INSTALLATION**)
4. **INSTALL STEERING COLUMN LOWER COVER** (See **INSTALLATION**)
5. **ADJUST SPIRAL CABLE** (See **INSPECTION**)
6. **INSTALL STEERING WHEEL ASSEMBLY** (See **INSTALLATION**)
7. **INSTALL STEERING PAD** (See **INSTALLATION**)
8. **TURN FRONT WHEELS FACING STRAIGHT AHEAD**
9. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

   Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

10. **INSPECT SRS WARNING LIGHT**

    (See **DIAGNOSIS SYSTEM**)

VSC OFF SWITCH

COMPONENTS

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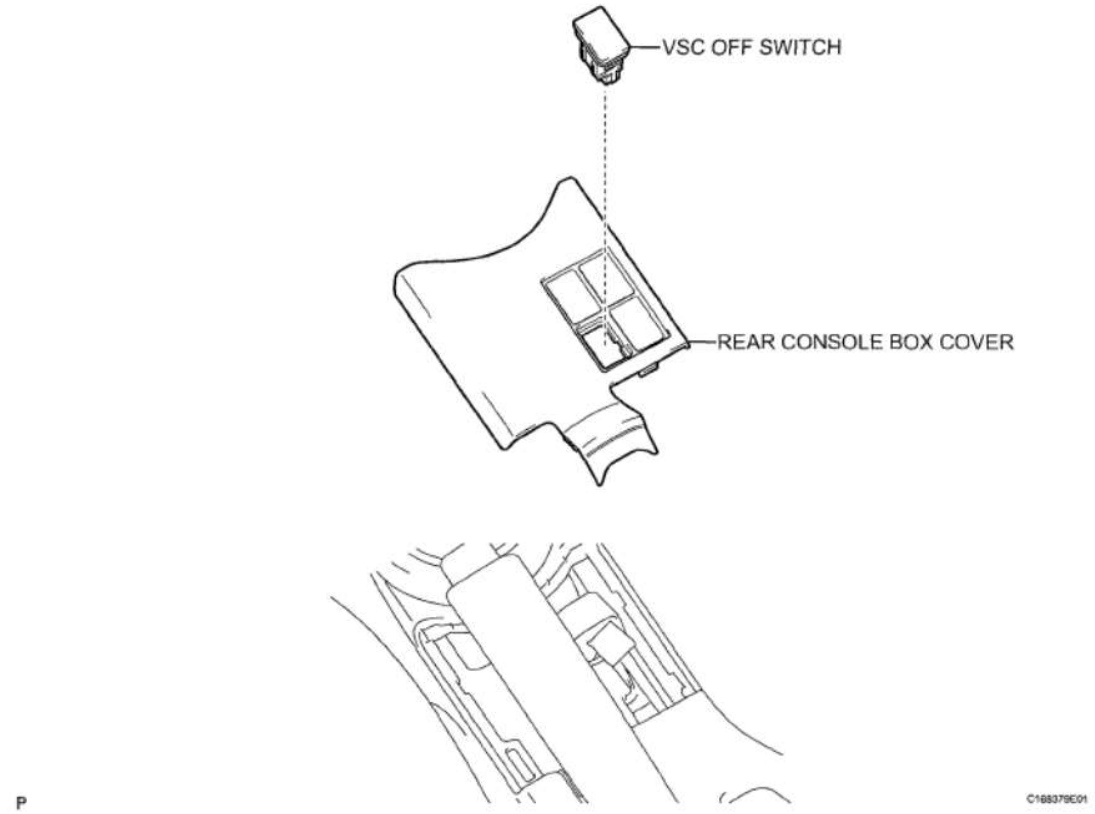


Fig. 254: Identifying VSC Off Switch Components
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. **REMOVE REAR CONSOLE BOX COVER** (See **REMOVAL**)
2. **REMOVE VSC OFF SWITCH**
   a. Disengage the 2 claws and remove the VSC off switch.

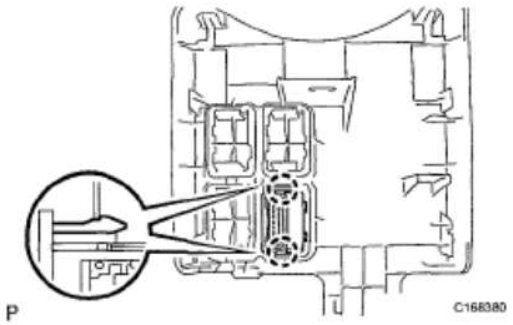


Fig. 255: Identifying VSC Off Switch Claws
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INSPECTION

1. **INSPECT VSC OFF SWITCH**
   a. Measure the resistance according to the value(s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
3 - 6	Released	10 kohms or higher
3 - 6	Pushed in	Below 1 ohms

If the result is not as specified, replace the VSC off switch.

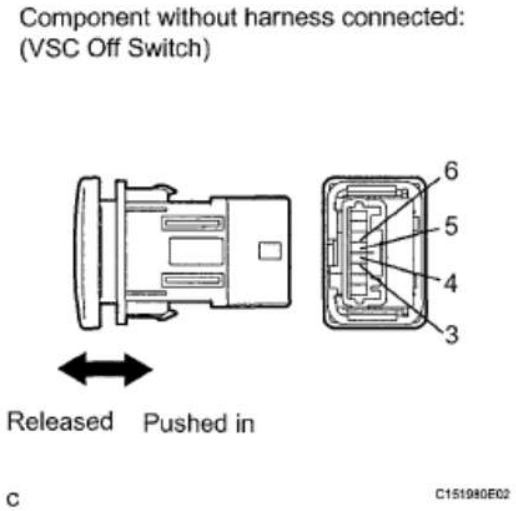


Fig. 256: Inspecting VSC Off Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Check illumination operation.

OK

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Switch Condition	Specified Condition
4 - 5	Battery's positive (+) lead connected to terminal 5 and negative (-) lead to terminal 4	LED illuminates

If the result is not as specified, replace the VSC off switch.

INSTALLATION

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2008 Scion xD
2008 BRAKES Brake Control - xD

1. **INSTALL VSC OFF SWITCH**
   a. Engage the 2 claws and install the VSC off switch.

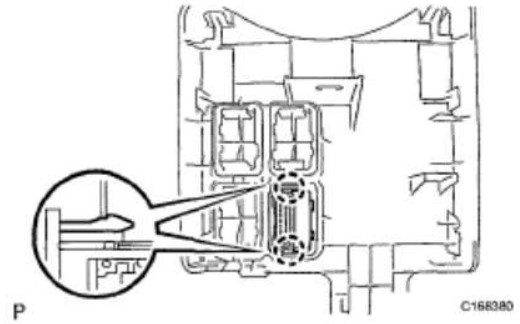


Fig. 257: Identifying VSC Off Switch Claws
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **INSTALL REAR CONSOLE BOX COVER** (See **INSTALLATION**)
3. **INSPECT WARNING LIGHT AND INDICATOR LIGHT**

   (See **TEST MODE PROCEDURE**)

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