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VEHICLE STABILITY CONTROL SYSTEM

PRECAUTION

1. PRECAUTION FOR DISCONNECTING THE BATTERY CABLE

NOTE: When disconnecting the battery negative (-) terminal, initialize the following system after the terminal is reconnected:

SYSTEM REFERENCE

System	See procedure
Power back door system	INITIALIZATION

2. EXPRESSIONS OF IGNITION SWITCH

The type of ignition switch used on this model differs according to the specifications of the vehicle. The expressions listed in the table below are used in this article.

IGNITION SWITCH EXPRESSIONS CHART

Expression	Switch Type	
	Ignition Switch (Position)	Engine Switch (Condition)
Ignition switch off	LOCK	off
Ignition switch on (IG)	ON	on (IG)
Ignition switch on (ACC)	ACC	on (ACC)
Engine start	START	start

3. TROUBLESHOOTING PRECAUTIONS

a. When there is a malfunction with terminal contact points or part installation problems, removal and installation of the suspected 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 them 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.

4. 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

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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 Techstream, and also check that system functions and signals received by the ECU are normal using Test Mode.

5. **DTC PRECAUTION**

a. Warnings for some DTCs will not be cleared by just replacing the defective parts. If a warning is still displayed after completing a repair, turn the ignition switch off before beginning the procedure for clearing DTCs.

NOTE: If a part is still malfunctioning even after the DTC is cleared, the DTC will be stored again.

6. **CHASSIS DYNAMOMETER PRECAUTION**

a. Enter Test Mode to disable TRAC and VSC control when using a chassis dynamometer (See **REPAIR INSTRUCTION**).

HINT:

- The vehicle may unexpectedly move off of the dynamometer because of TRAC and VSC operation.
- Pressing the VSC OFF switch does not disable TRAC and VSC operation completely.

NOTE:

- **Make sure that the slip indicator light is blinking (Test Mode is activated).**
- **Secure the vehicle with lock chains for safety.**

7. **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 are any problems in the CAN communication lines, corresponding DTCs for the communication lines are output.

b. If any CAN communication line DTCs are output, repair the malfunction in the communication lines and troubleshoot the VSC system after data communication becomes 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 that have an equal length. A bypass wire should not be used because the data being transmitted will be corrupted.

PARTS LOCATION

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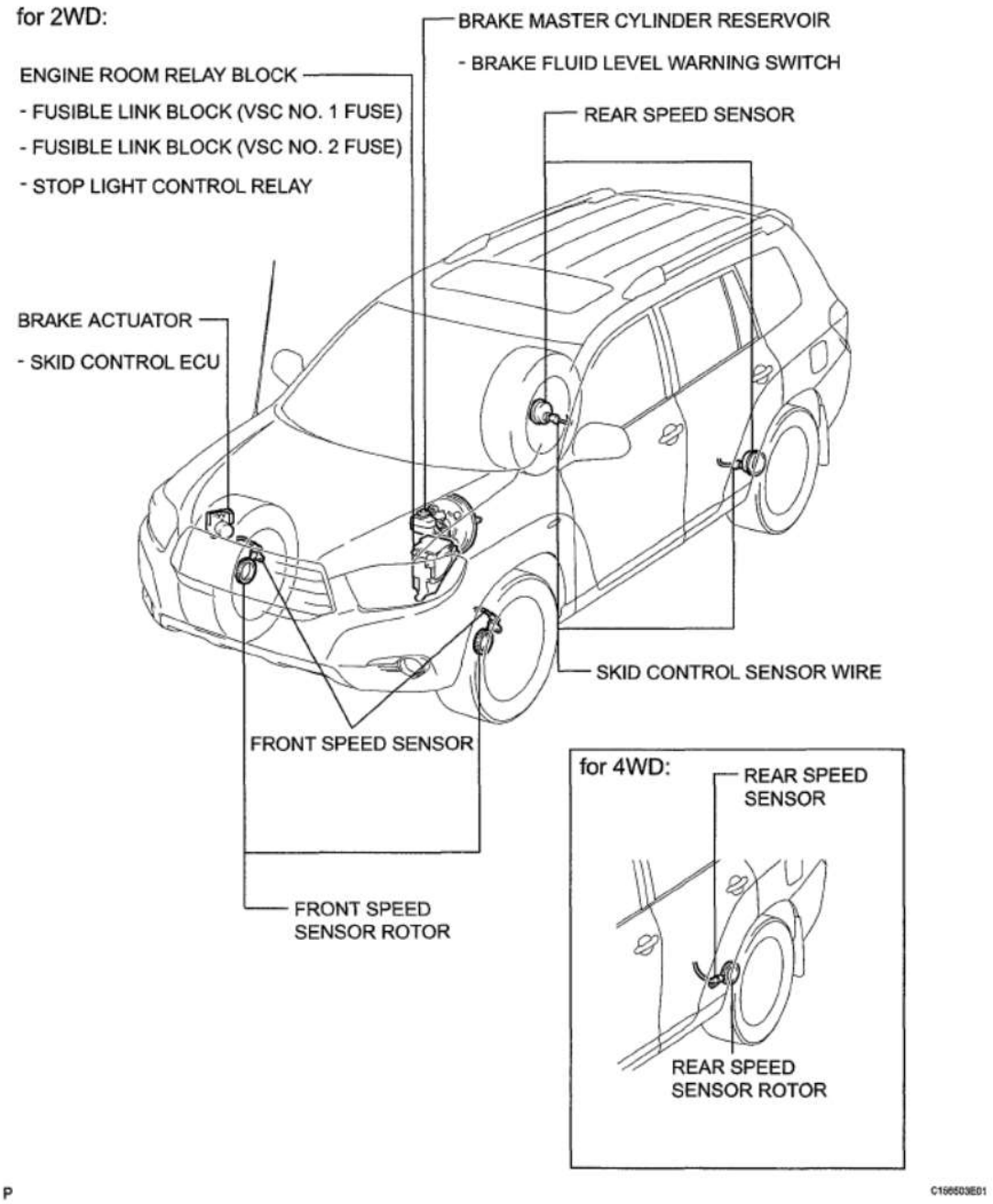
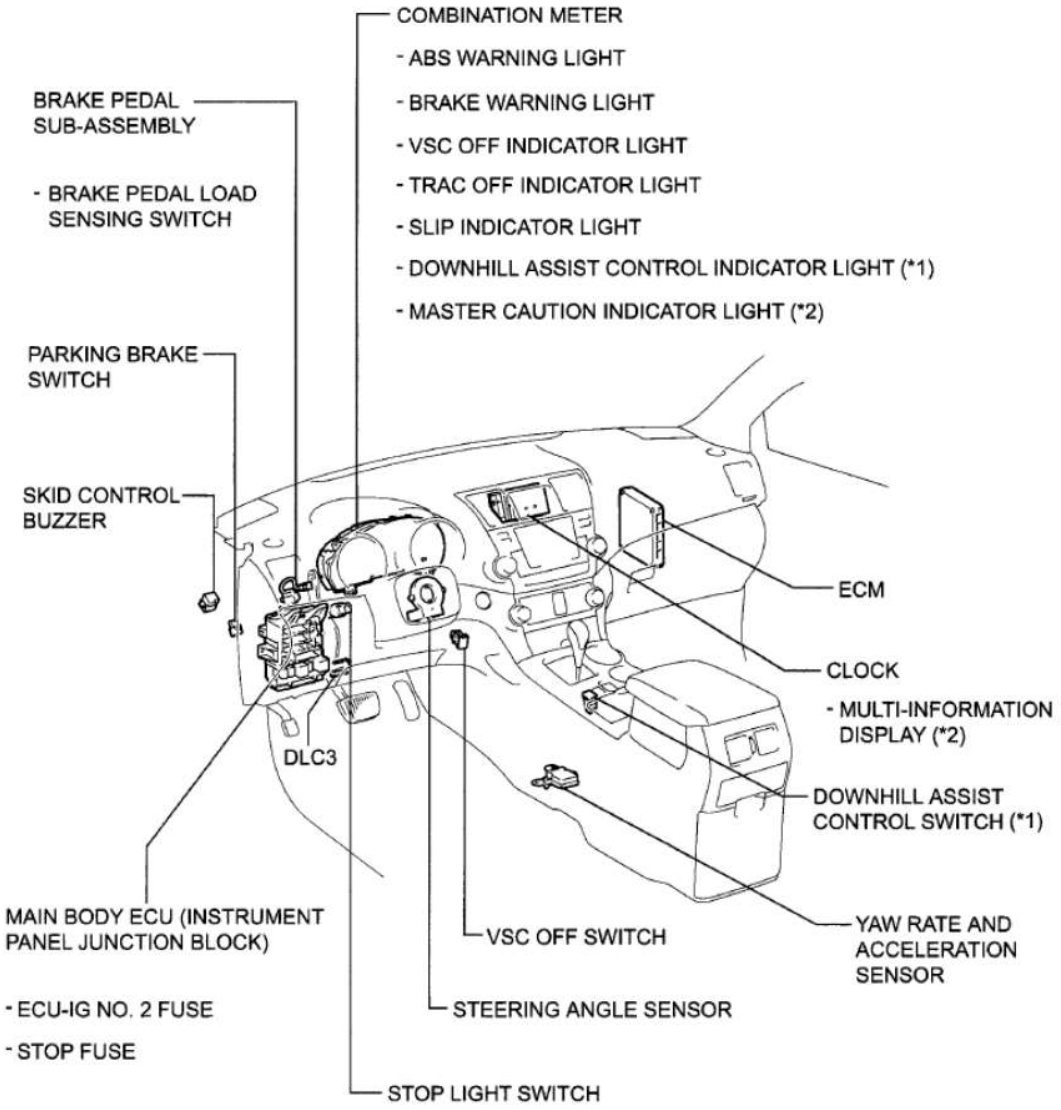


Fig. 1: Identifying Vehicle Stability Control System Parts Location (1 Of 2)
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(*1): for 4WD

(*2): Models with Multi-information Display

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Fig. 2: Identifying Vehicle Stability Control System Parts Location (2 Of 2)
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SYSTEM DIAGRAM

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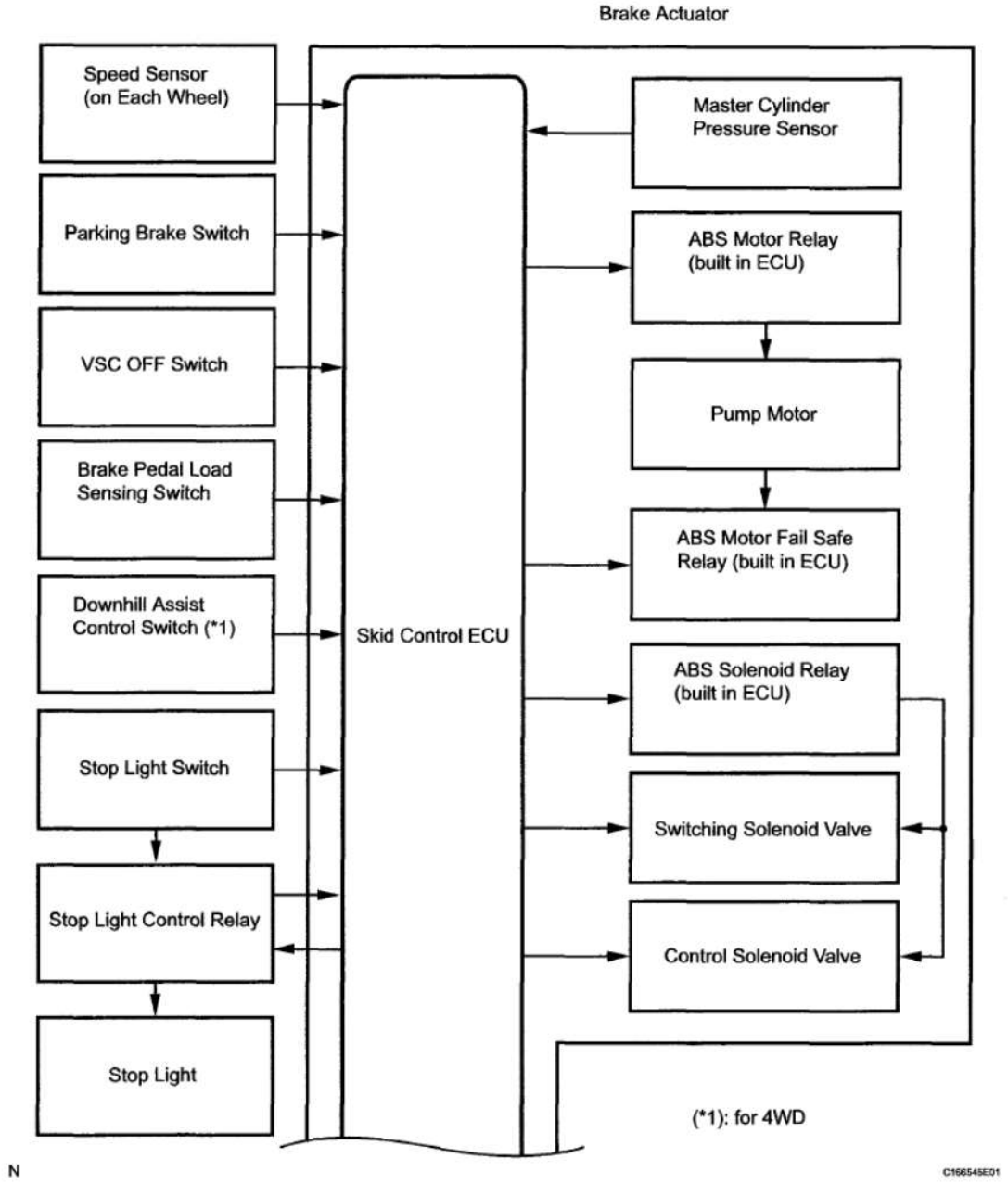


Fig. 3: Vehicle Stability Control System Diagram (1 Of 2)
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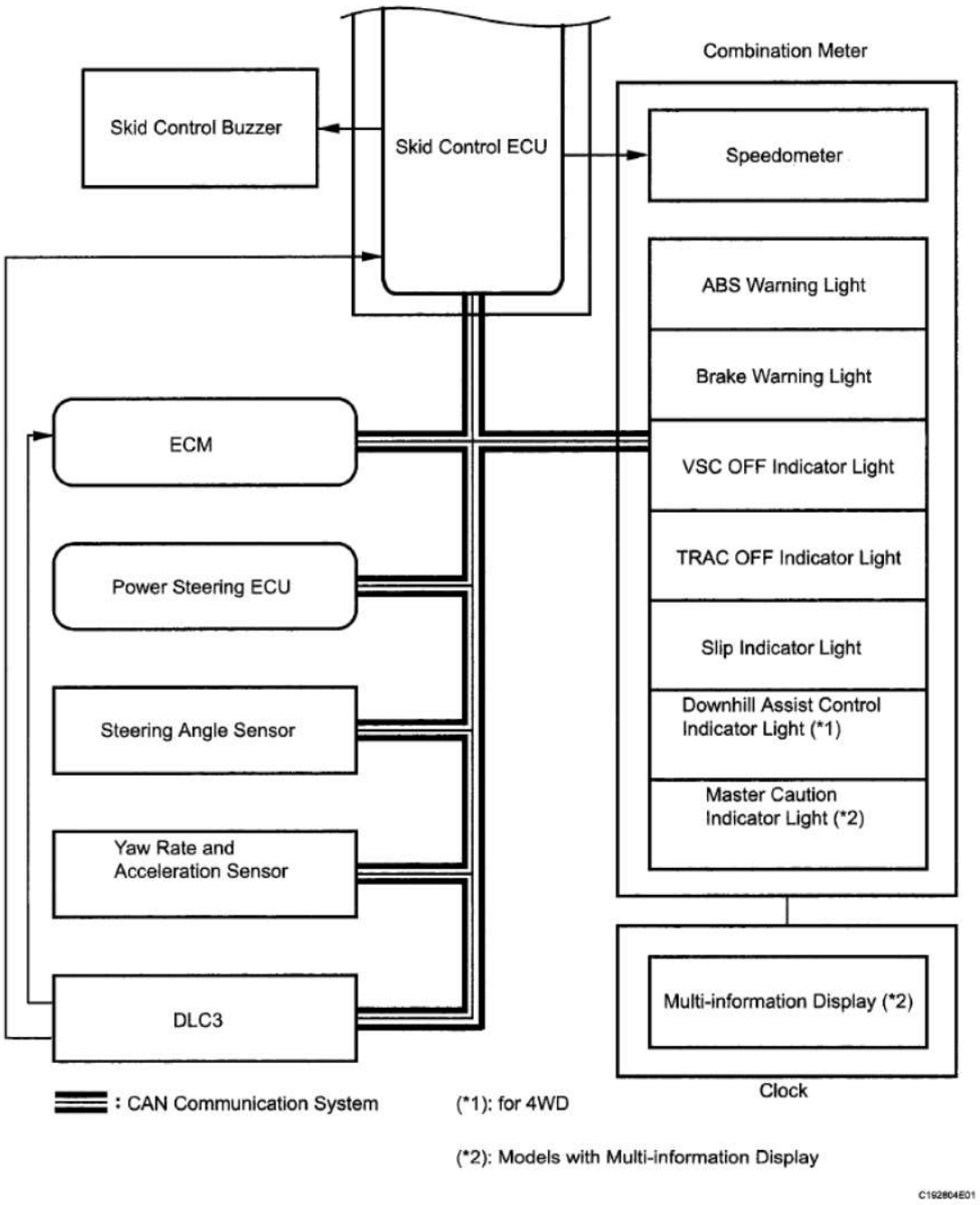


Fig. 4: Vehicle Stability Control System Diagram (2 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TRANSMITTING ECU (TRANSMITTER) REFERENCE

Transmitting ECU (Transmitter)	Receiving ECU	Signals	Communication Method
Skid control ECU	Steering angle sensor	Steering angle sensor request signal	CAN communication system

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Skid control ECU	Yaw rate and acceleration sensor	Yaw rate and acceleration request signal	CAN communication system
Skid control ECU	ECM	• Wheel speed signal • VSC data signal	CAN communication system
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 system
Skid control ECU	Power steering ECU	Target additional torque signal	CAN communication system
Power steering ECU	Skid control ECU	Electronic power steering cooperative control enabling signal	CAN communication system
Skid control ECU	Combination meter	• ABS warning light signal • Brake warning light signal • VSC OFF indicator light signal • TRAC OFF indicator light signal • Slip indicator light signal • Downhill assist control indicator light signal ((1)) • Master caution indicator light signal ((2)) • Wheel speed signal	CAN communication system

(1) for 4WD

(2) Models with multi-information display

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.

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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.

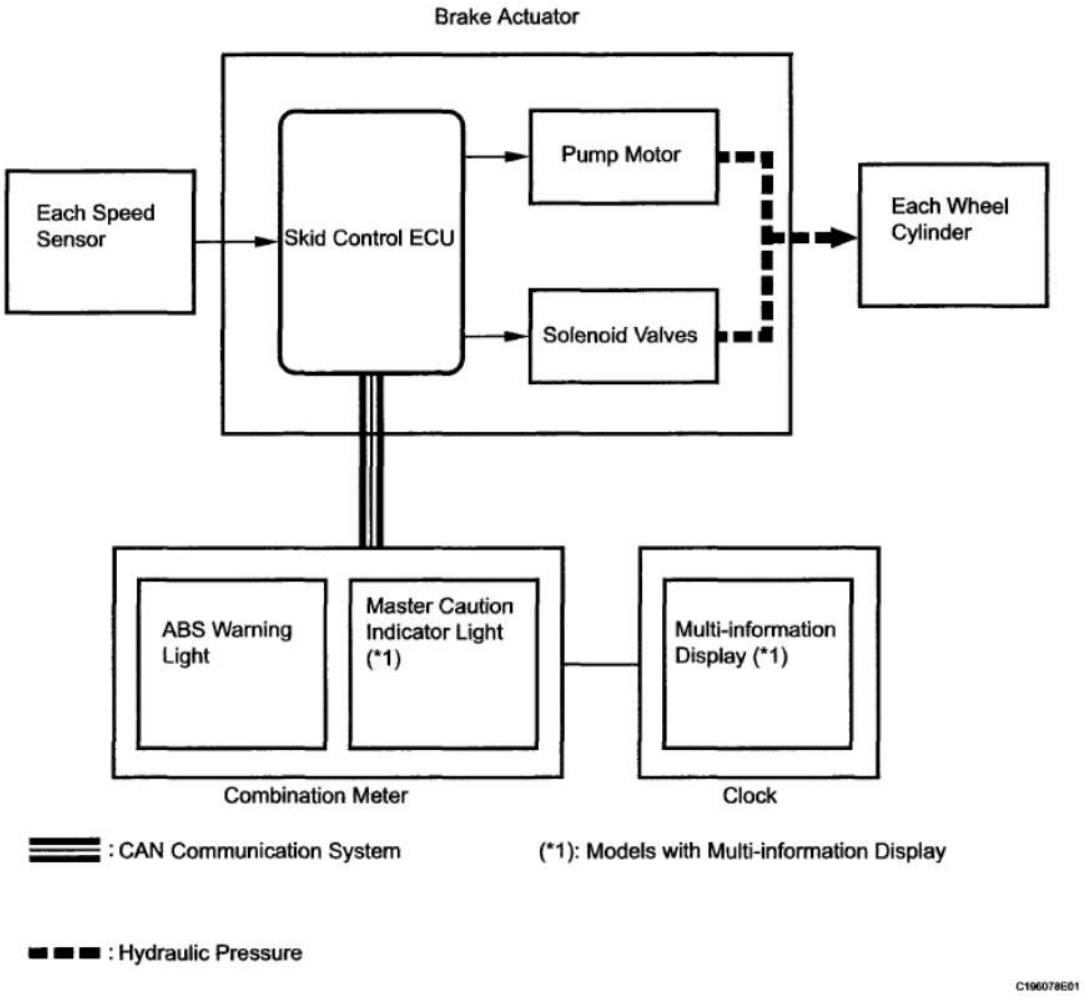


Fig. 5: ABS (Anti-Lock Brake System) Communication Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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.

HINT:

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For vehicles with the multi-information display, the master caution indicator light will come on and a check ABS message will be displayed on the multi-information display if the ABS control cannot be performed.

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 force distribution between the right and left wheels, helping to maintain vehicle behavior.

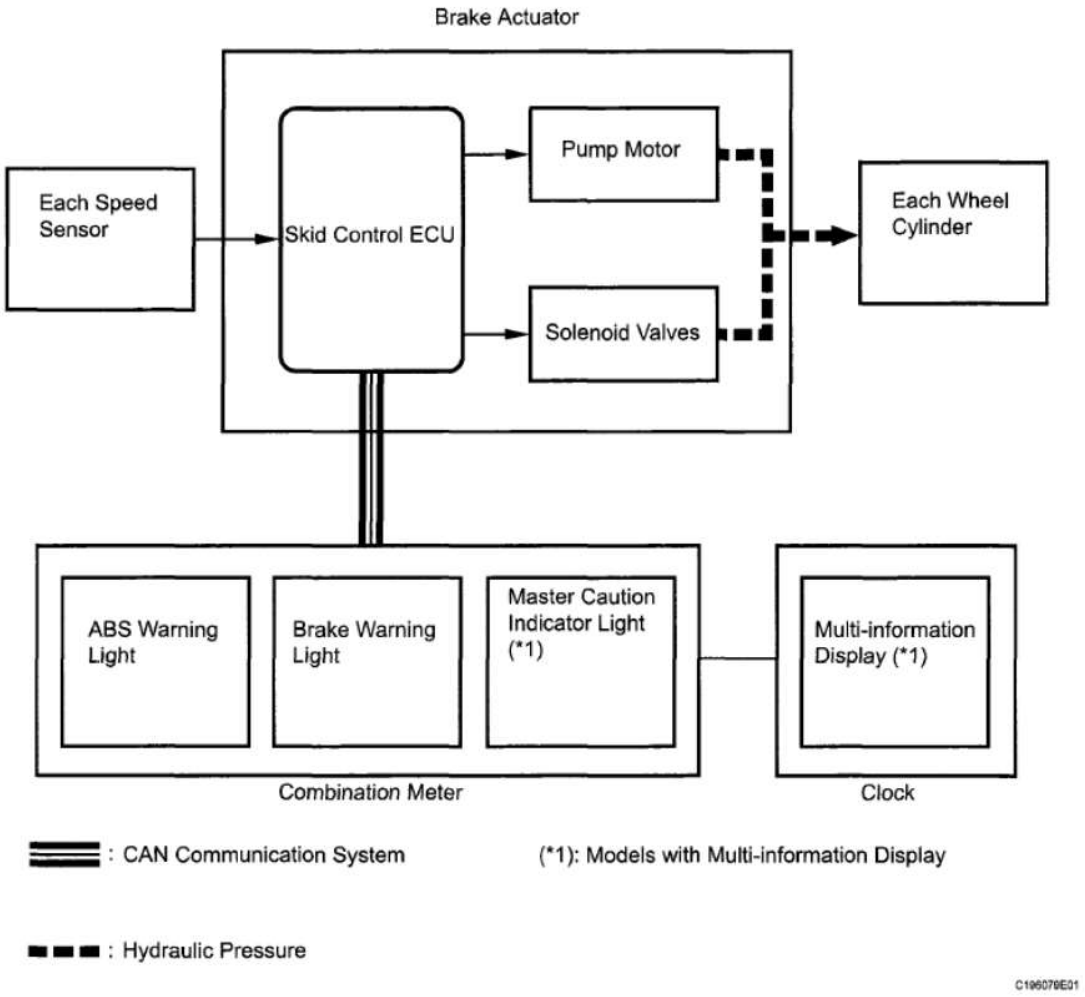


Fig. 6: EBD (Electronic Brake Force Distribution) Communication Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

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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.

HINT:

For vehicles with the multi-information display, the master caution indicator light will come on and a brake malfunction message will be displayed on the multi-information display if the EBD system is malfunctioning.

c. BA (Brake Assist)

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

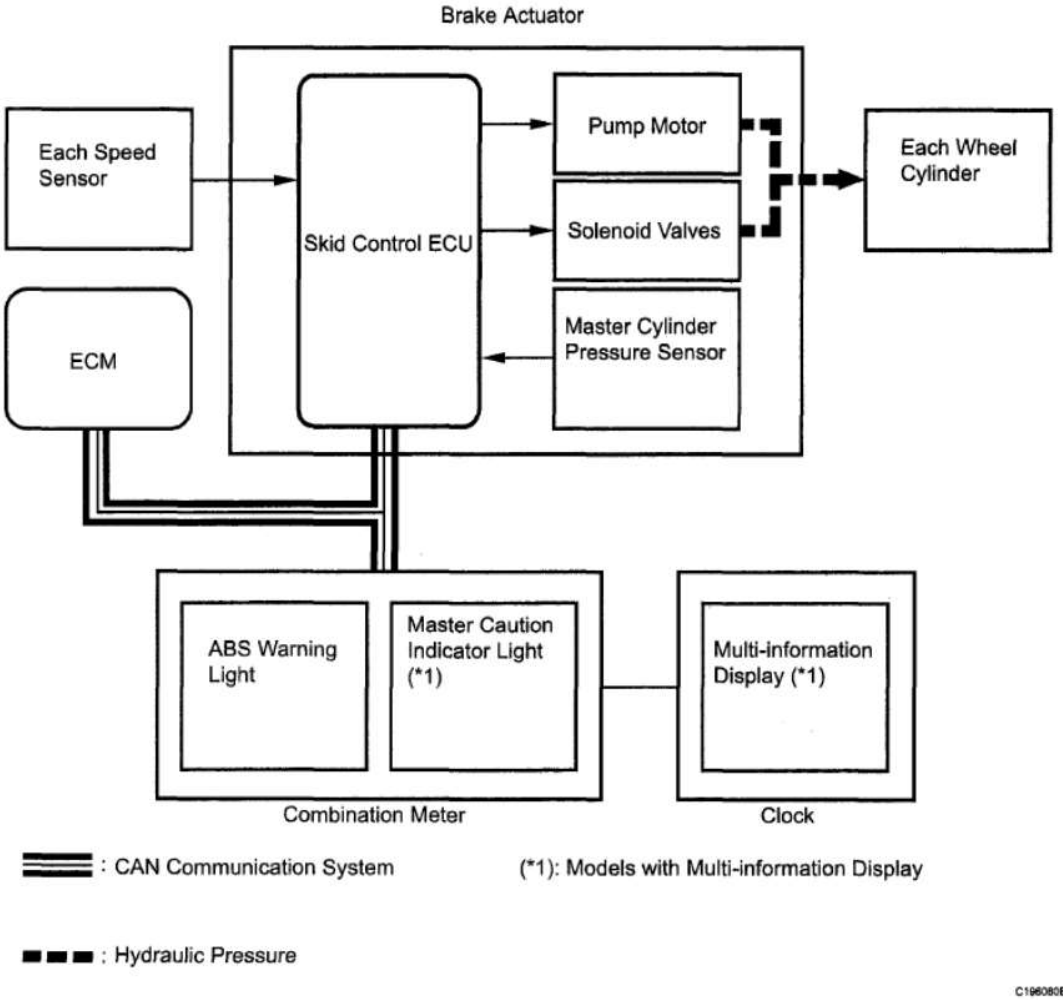


Fig. 7: BA (Brake Assist) Communication Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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1. Operation description

The skid control ECU receives a speed signal from each speed sensor and a 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 valves then control the pressure applied to each wheel cylinder.

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

HINT:

For vehicles with the multi-information display, the master caution indicator light will come on and a check ABS message will be displayed on the multi-information display if the BA system is malfunctioning.

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 accelerating on a slippery surface.

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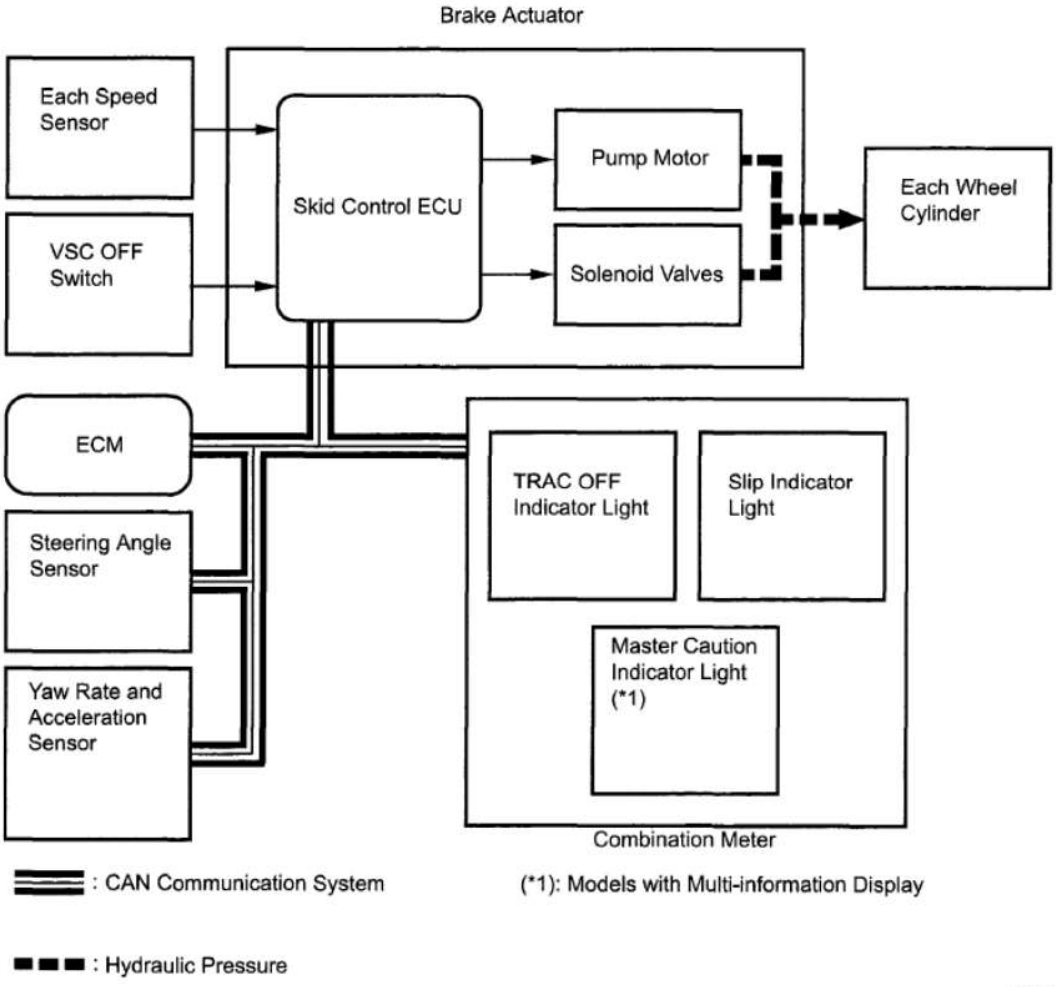


Fig. 8: TRAC (Traction Control) Communication Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

1. Operation description

   The skid control ECU detects wheels pin by receiving signals from each speed sensor and the ECM via CAN communication. 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 blinks when the system is operating. When there is a malfunction in the TRAC system, the slip indicator light will come on.

   The VSC OFF switch stops traction control operation. If TRAC control is turned off, the TRAC OFF indicator light will come on.

   HINT:

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For vehicles with the multi-information display, the master caution indicator light will come on if the TRAC system is malfunctioning.

e. VSC (Vehicle Stability Control)

The VSC system helps prevent the vehicle from slipping sideways as a result of strong front or rear wheel skid during cornering.

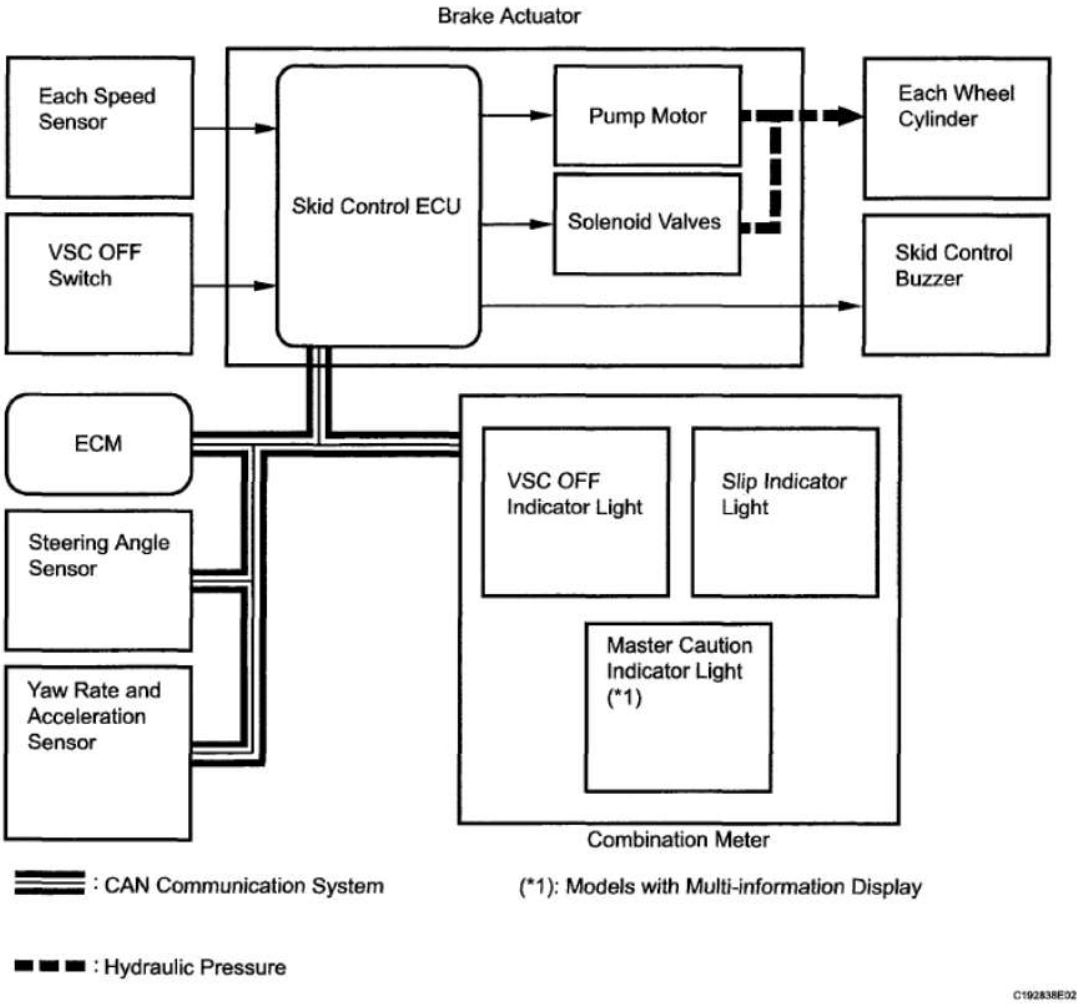


Fig. 9: VSC (Vehicle Stability Control) Communication Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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.

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The slip indicator light blinks, and the skid control buzzer sounds when the system is operating. If a malfunction occurs in the VSC system, the slip indicator light will come on. The VSC OFF switch stops VSC control operation. If VSC control is turned off, the VSC OFF indicator light will come on.

HINT:

For vehicles with the multi-information display, the master caution indicator light will come on if the VSC cannot be performed.

2. **DOWNHILL ASSIST CONTROL (for 4WD)**
   a. The downhill assist control generates four-wheel hydraulic pressure when the downhill assist control switch is pressed and the accelerator and brake pedals are not depressed in order to maintain a constant low vehicle speed while preventing wheel lock.

      HINT:

      The downhill assist control operates when all of the following conditions:

      - Downhill assist control switch is ON.
      - Shift lever is in the S1 or R position.
      - Accelerator pedal and brake pedal are not depressed.
      - Descending a hill at a vehicle speed of 25 km/h (16 mph) or less.

3. **HILL-START ASSIST CONTROL**
   a. The hill-start assist control generates four-wheel hydraulic pressure when the brake pedal is further depressed while the vehicle is stationary in order to prevent the vehicle from moving backward.

      HINT:

      The hill-start assist control will operate when the brake pedal is further depressed while all of the following conditions are met:

      - Shift lever position is in a position other than P.
      - Accelerator pedal is not depressed.
      - Vehicle is at standstill.
      - Parking brake is not applied.

4. **COOPERATIVE CONTROL (ENHANCED-VSC) FUNCTION**

Enhanced-VSC performs coordinated control consisting of VSC and electronic power steering. By integrating these preventive safety functions, Enhanced-VSC ensures driving stability and maneuverability of the vehicle.

If the vehicle loses stability due to wheel slippage, this function performs brake control by applying brake pressure to the wheels. At the same time, electronic power steering provides steering torque assist control to facilitate the driver's steering maneuvers.

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a. Braking control on split friction roads
    1. When braking on a split friction road, the vehicle tends to deflect toward the higher friction side due to the difference between the braking forces on the left and right sides. With Enhanced-VSC, the power steering ECU receives command signals from the skid control ECU. Based on these signals, the power steering ECU operates the motor for the electronic power steering to reduce the effect of the difference between the braking forces on the left and right sides, assisting steering operation. This enables the driver to make steering corrections more easily.

b. Accelerating when surface resistance differs between both sides of wheels
    1. When accelerating on a split friction road, the vehicle tends to deflect toward lower friction side due to the driving force difference between the left and right sides. With Enhanced-VSC, the skid control ECU performs braking control of the drive wheel on the low friction side (traction control function) and transmits command signals to the power steering ECU. Based on these signals, the power steering ECU operates the motor for the electronic power steering to reduce the effect of the driving force difference between the left and right sides, assisting steering operation. As a result, proper motive force and vehicle stability is ensured.

c. Front wheel skid control
    1. When front wheel skidding is detected, engine output is limited and braking control is performed based on the amount of understeer tendency. Accordingly, a moment of force is generated in the vehicle turning direction to limit front wheel skid tendency.
    2. When the skid control ECU determines that there is a front wheel skid tendency, it controls the VSC to dampen the front wheel skid. At the same time, it effects cooperative control with the electronic power steering to provide steering torque assist, which facilitates the driver's steering maneuvers to stabilize the vehicle posture. The system also provides steering torque assist to prevent excessive steering maneuvers. This assist increases the resistance to counter the driver's steering effort if they turn the steering wheel excessively.

d. Rear wheel skid control
    1. When rear wheel skidding is detected, brake force is applied to mainly the outer wheels according to the amount of oversteer tendency. Accordingly, an anti-spin moment is generated to limit the rear wheel skid tendency.
    2. With Enhanced-VSC, the power steering ECU receives command signals from the skid control ECU. Based on these signals, the power steering ECU operates the motor for the electronic power steering to provide steering assist to help the driver compensate for the rear wheel skid tendency. This enables the driver to operate the steering wheel more easily.

5. **ABS with EBD, BA, TRAC and VSC OPERATION**
    a. The skid control ECU calculates vehicle stability tendency based on 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 light blinks and the skid control buzzer sounds to inform the driver that the VSC system is operating. The slip indicator light also blinks when traction control is operating, and the operation being performed is displayed.
6. **FAIL SAFE**

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a. When a failure occurs in the ABS with BA, TRAC and VSC systems, the ABS warning and slip indicator lights come on, and the ABS with BA, TRAC and VSC operations are prohibited. In addition, when there is a failure that disables EBD operation, the brake warning light also comes on and 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.

7. **INITIAL CHECK**

a. When the vehicle speed first reaches approximately 6 km/h (4 mph) after the ignition switch is turned on (IG), each solenoid valve and motor of the brake actuator are sequentially activated to perform an electrical check. During the initial check, the operating sound of the solenoid valves and motor can be heard from the engine compartment, but this is not a malfunction.

8. **INSPECTION MODE**

a. TRAC and VSC operation can be disabled by operating Techstream (See **REPAIR INSTRUCTION**).

9. **FUNCTION OF COMPONENTS**

COMPONENTS FUNCTION CHART

Components	Function
Speed sensor	Detects the wheel speed and sends the signal to the skid control ECU.
Yaw rate and acceleration sensor	• The 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. • The yaw rate sensor detects the vehicle's angular velocity (yaw rate) in the vertical direction based on the amount and direction of the piezoelectric ceramic 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.
Stop light switch	Detects the brake operating conditions and inputs the signals to the skid control ECU.
Brake pedal load sensing switch	• Installed on the brake pedal. • Turned on when the brake pedal is depressed.
Parking brake switch	Detects the parking brake operating conditions and inputs the signals to the skid control ECU.
Master cylinder pressure sensor	• Detects the fluid pressure in the master cylinder. • Housed in the brake actuator assembly.

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Skid control ECU	• Housed in the brake actuator assembly. • Processes signals sent from each sensor to control the ABS, BA, TRAC, and VSC. • Sends and receives 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 valves, pressure reduction solenoid valves, pump motor, and reservoir, and adjusts the brake fluid pressure applied to each wheel cylinder. • Houses the skid control ECU.
ABS motor relay	• Supplies power to the pump motor. • Housed in the skid control ECU.
ABS motor fail safe relay	• Cuts off power to the motor when the pump motor circuit malfunctions. • Housed in the skid control ECU.
ABS solenoid relay	• Supplies power to each solenoid. • Housed in the skid control ECU.
Stop light control relay	Turns on the stop lights during downhill assist control (for 4WD) or hill-start assist control operation.
ABS warning light	• Comes on to inform the driver that a malfunction in the ABS and/or BA system has occurred. • Blinks to output DTCs.
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 system has occurred.
VSC OFF indicator light	Comes on to inform the driver when the VSC off mode is entered using the VSC OFF switch.
TRAC OFF indicator light	Comes on to inform the driver when the TRAC off mode is entered using the VSC OFF switch.
Slip indicator light	• Blinks to inform the driver when the TRAC, VSC, downhill assist control (for 4WD) and/or hill-start assist control operates. • Blinks to output DTCs.
Downhill assist control indicator light ((1))	• Comes on to inform the driver when the downhill assist control operates. • When the downhill assist control switch is on but not all operating conditions are met, the downhill assist control indicator light blinks to inform the driver.
Master caution indicator light ((2))	Comes on to inform the driver that a malfunction in the brake control system has occurred.
Multi-information display ((2))	• Shows a warning message to alert the driver when the skid control ECU detects a malfunction in the brake control system. • Shows the downhill assist control operating conditions when the downhill

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	assist control switch is on but not all operating conditions are met.
Skid control buzzer	• Intermittently sounds to inform the driver that the VSC is operating. • Intermittently sounds to inform the driver if the temperature of the brake actuator has increased excessively due to continuous operation of the downhill assist control (for 4WD) or hill-start assist control.
ECM	Controls the engine output when TRAC and/or VSC are operating according to the signals sent from the skid control ECU via CAN communication.
VSC OFF switch	Pressing this switch turns off TRAC and pressing and holding this switch turns off TRAC and VSC.
Downhill assist control switch ((1))	Pressing this switch turns downhill assist control ON or OFF.
(1) for 4WD (2) Models with multi-information display	

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

*: Use Techstream.

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

         HINT:

         - When DTCs indicating CAN communication system malfunctions are output, repair the CAN communication system before repairing each corresponding sensor (See **HOW TO PROCEED WITH TROUBLESHOOTING**).
         - If any of DTCs U0100, U0123, U0124, and U0126 is output together with a CAN communication DTC, first check the appropriate sensor for a momentary open circuit (See **CHECK FOR INTERMITTENT PROBLEMS**).

Result

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RESULT CHART

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

B: GO TO STEP 5

C: GO TO STEP 6

A: Go to next step

4. **DIAGNOSTIC TROUBLE CODEE CHART**
   a. Proceed to Diagnostic Trouble Code Chart (See **DIAGNOSTIC TROUBLE CODE CHART**).

NEXT: GO TO STEP 7

5. **SYMPTOM SIMULATION**
   a. Proceed to Diagnosis System (See **DIAGNOSIS SYSTEM**).
6. **PROBLEM SYMPTOMS TABLE**
   a. Proceed to Problem Symptoms Table (See **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 harnesses between the sensors and ECUs can be detected using the ECU Data List function of Techstream.

a. Turn the ignition switch off.
b. Connect Techstream to the DLC3.
c. Turn the ignition switch on (IG).
d. Turn Techstream on.
e. Follow the directions on Techstream to display the Data List and select areas where momentary interruptions should be monitored.

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HINT:

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

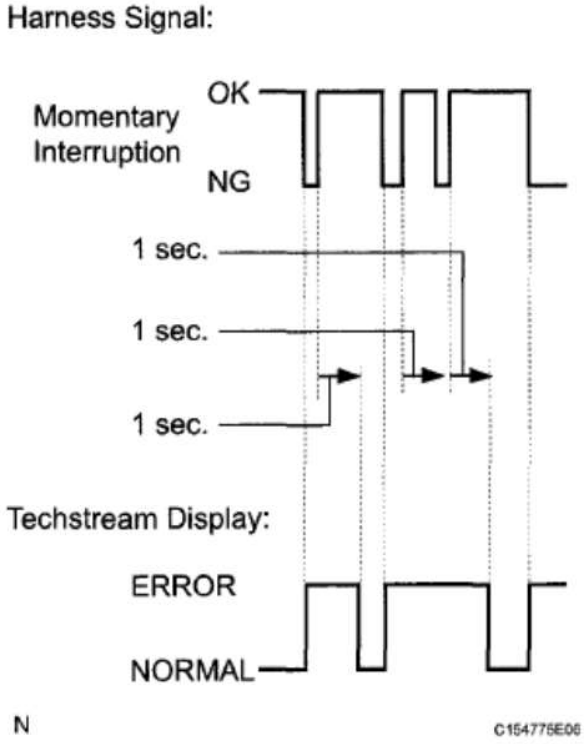


Fig. 10: ERROR Display On Techstream
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ABS/VSC/TRAC:

ABS/VSC/TRAC TESTER DISPLAY REFERENCE

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 sensor open	ERROR: Momentary	

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RR Speed Open	detection/ERROR or NORMAL	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 NORMAL: Normal	-
Master Cylinder Open	Master cylinder pressure sensor open detection/ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
IG Voltage Value Decreased	IG voltage value decrease detection/ERROR or NORMAL	ERROR: Decrease NORMAL: Normal	-
IG Voltage Value Increased	IG voltage value increase detection/ERROR or NORMAL	ERROR: Increase NORMAL: Normal	-
FR Speed Sensor Voltage Open	FR speed sensor voltage open detection/ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
FL Speed Sensor Voltage Open	FL speed sensor voltage open detection/ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RR Speed Sensor Voltage Open	RR speed sensor voltage open detection/ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RL Speed Sensor Voltage Open	RL speed sensor voltage open detection/ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
M/C Pressure Sensor Noise	Master cylinder pressure sensor noise detection/ERROR or NORMAL	ERROR: Malfunction NORMAL: Normal	-
Brake Pedal Switch Open	Brake pedal load sensing switch open detection/ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
Yaw Rate Sensor Voltage Open	Yaw rate sensor voltage open detection/ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-

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EFI Communication Invalid	EFI communication invalid detection/ERROR or NORMAL	ERROR: Invalid NORMAL: Normal	-

f. While observing the screen, gently jiggle the connectors or wire harnesses between the ECUs and sensors, or between ECUs.

OK:

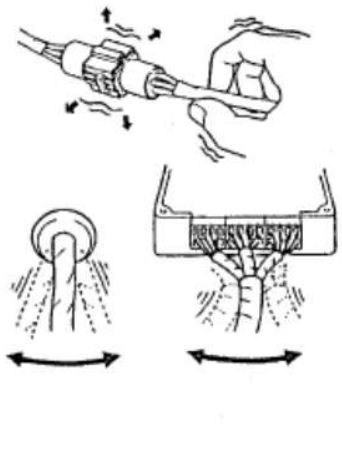
NORMAL display appears.

HINT:

The connector and/or wire harness has a momentary interruption (open circuit) if the display changes. Repair or replace the connectors and/or wire harnesses as one of them is faulty.

CALIBRATION

1. **DESCRIPTION**
   - After replacing any VSC related components or performing front wheel alignment adjustment, clear and read the sensor calibration data.
   - Follow the chart below to perform calibration.



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Fig. 11: Jiggling Connectors Or Wire Harnesses Between ECUs And Sensors
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

CALIBRATION CHART

Parts to be Replaced/Operation	Necessary Operation
Brake actuator assembly (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

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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 (When Using Techstream)**

NOTE:

- **While obtaining the zero points, 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 off.
2. Check that the steering wheel is in the straight-ahead position.
3. Check that the shift lever is in the P position.
4. Connect Techstream to the DLC3.
5. Turn the ignition switch on (IG).
6. Turn Techstream on.
7. Select the skid control ECU to clear the zero point calibration data using Techstream. Enter the following menus: Chassis/ABS/VSC/TRAC/Utility/Reset Memory.
8. Turn the ignition switch off.

NOTE: **If the ignition switch is turned on (IG) for more than 15 seconds with the shift lever in the P position after the zero points of the yaw rate and acceleration sensor have 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 indicator lights.**

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

1. Turn the ignition switch off.
2. Check that the steering wheel is in the straight-ahead position.
3. Check that the shift lever is in the P position.

NOTE: **DTCs C1210 (zero point calibration of yaw rate sensor undone) and C1336 (zero point calibration of acceleration sensor undone) will be recorded if the shift lever is not in the P position.**

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4. Connect Techstream to the DLC3.
5. Turn the ignition switch on (IG).
6. Turn Techstream on.
7. Switch the skid control ECU to Test Mode using Techstream. Enter the following menus: Chassis/ABS/VSC/TRAC/Utility/Test Mode.
8. After Test Mode has been entered, keep the vehicle stationary on a level surface for 2 seconds or more.
9. Check that the slip indicator light comes on for several seconds and then blinks in Test Mode.

HINT:

NOTE:

- **The TRAC OFF indicator light remains on during Test Mode because TRAC is prohibited.**
- **If the slip indicator light does not blink, perform zero point calibration again.**
- **The zero point calibration is performed only once after the system enters Test Mode.**
- **Calibration cannot be performed again until the stored data is cleared.**

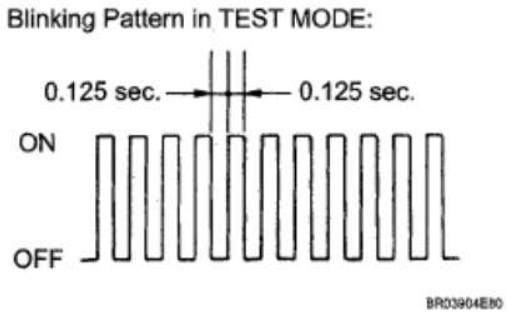


Fig. 12: Slip Indicator Light Blinking Pattern In Test Mode
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. Turn the ignition switch off and disconnect Techstream.

3. **OBTAIN ZERO POINT OF YAW RATE AND ACCELERATION SENSOR (When not Using Techstream)**

NOTE:

- **While obtaining the zero points, 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.

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1. Turn the ignition switch off.
2. Check that the steering wheel is in the straight-ahead position.
3. Check that the shift lever is in the P position.
4. Turn the ignition switch on (IG).
5. The warning light and indicator light come on for 3 seconds to indicate that the initial check is completed.
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 slip indicator light comes on.

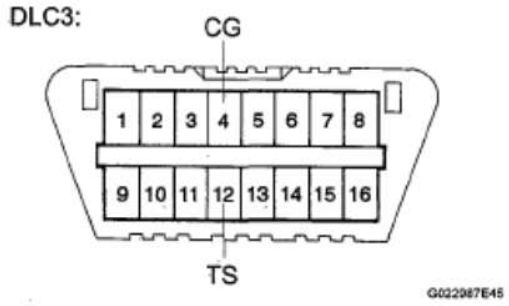


Fig. 13: Identifying Terminals TS And CG Of DLC3
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: If the ignition switch is turned on (IG) for more than 15 seconds with the shift lever in the P position after the zero points of the yaw rate and acceleration sensor have 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 indicator lights.

b. Perform the zero point calibration of the yaw rate and acceleration sensor.
   1. Turn the ignition switch off.
   2. Check that the steering wheel is in the straight-ahead position.
   3. Check that the shift lever is in the P position.

NOTE: DTCs 36 (zero point calibration of yaw rate sensor undone) and 39 (zero point calibration of acceleration sensor undone) will be recorded if the shift lever is not in the P position.

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

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5. Turn the ignition switch on (IG).
6. After Test Mode has been entered, keep the vehicle stationary on a level surface for 2 seconds or more.

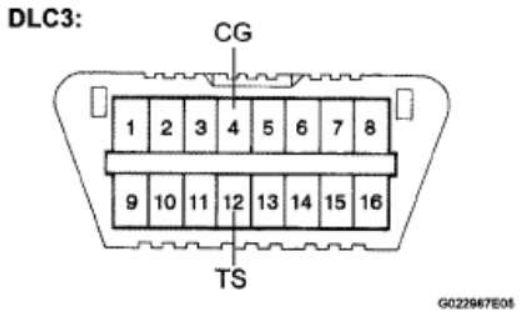


Fig. 14: Identifying Terminals TS And CG Of DLC3
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. Check that the slip indicator light comes on for several seconds and then blinks in Test Mode.

   HINT:

   - The TRAC OFF indicator light remains on during Test Mode because TRAC is prohibited.
   - If the slip indicator light does not blink, perform zero point calibration again.
   - The zero point calibration is performed only once after the system enters Test Mode.
   - Calibration cannot be performed again until the stored data is cleared.

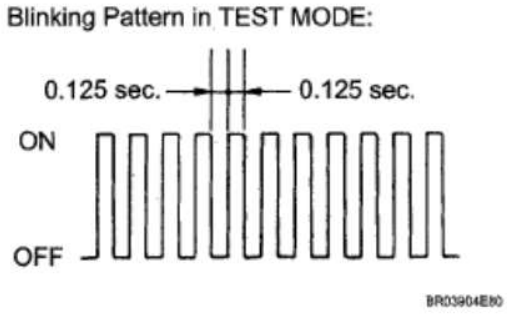


Fig. 15: Slip Indicator Light Blinking Pattern In Test Mode
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8. Turn the ignition switch off and disconnect SST from the DLC3.

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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.

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 on (IG), check that the ABS warning, brake warning, TRAC OFF indicator, VSC OFF indicator, slip indicator and downhill assist control indicator (for 4WD) lights come on for approximately 3 seconds.

HINT:

- If the skid control ECU stores any DTCs, the ABS warning, brake warning, slip indicator and downhill assist control indicator (for 4WD) lights will come on.
- For vehicles with the multi-information display, the master caution indicator light will come on and a warning message will be displayed on the multi-information display if any of the EBD system, BA system, or TRAC system is malfunctioning or if the ABS control or VSC cannot be performed.
- If any of the indicators remains on or does not come on, proceed to troubleshooting for the light circuits listed below.

TROUBLESHOOTING 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
TRAC OFF indicator light circuit (Remains on)	TRAC OFF INDICATOR LIGHT REMAINS ON
TRAC OFF indicator light circuit (Does not come on)	TRAC OFF INDICATOR 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

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Slip indicator light circuit (Does not come on)	**SLIP INDICATOR LIGHT DOES NOT COME ON**
Downhill assist control indicator light circuit (Remains on)	**DOWNHILL ASSIST CONTROL INDICATOR LIGHT REMAINS ON**
Downhill assist control indicator light circuit (Does not come on)	**DOWNHILL ASSIST CONTROL INDICATOR LIGHT DOES NOT COME ON**

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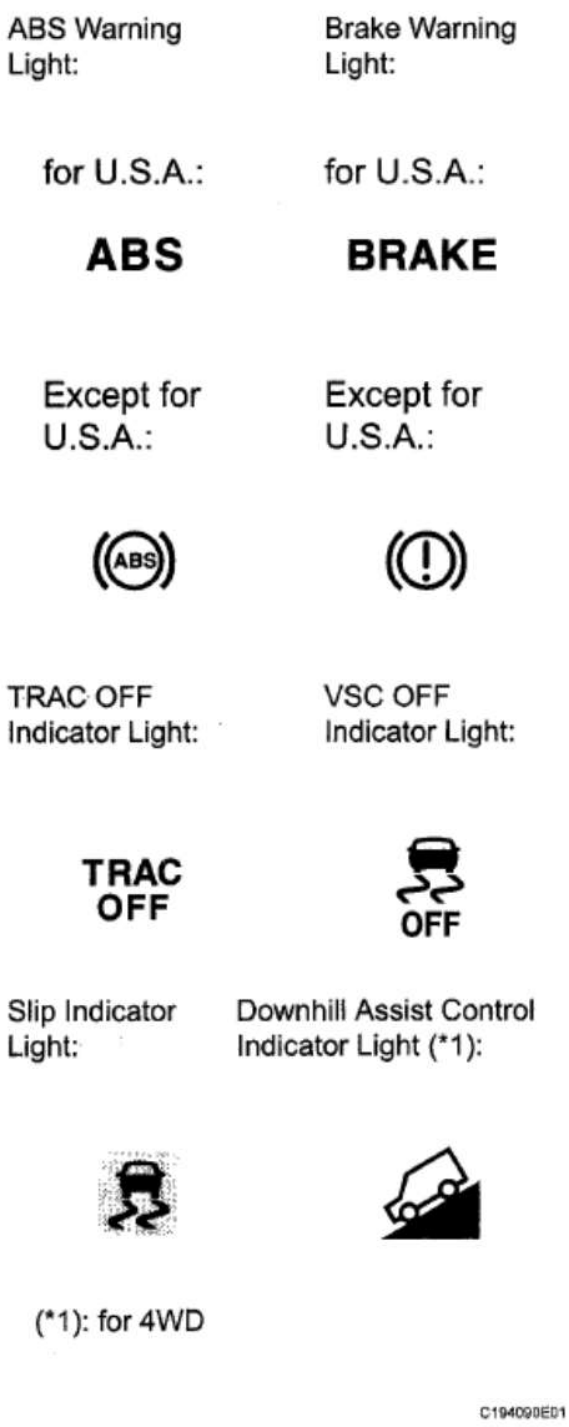


Fig. 16: Identifying ABS Warning, Brake Warning, TRAC OFF Indicator, VSC OFF Indicator And Slip Indicator
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **SENSOR CHECK USING TEST MODE (SIGNAL CHECK) (When Using Techstream)**

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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:

- If the ignition switch is turned from on (IG) to on (ACC) or off during Test Mode (signal check), DTCs recorded during the sensor check will be erased.
- During Test Mode (signal check), the skid control ECU records all DTCs detected in the sensor check. By performing 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 off.
2. Check that the steering wheel is in the straight-ahead position.
3. Check that the shift lever is in the P position.
4. Connect Techstream to the DLC3.
5. Turn the ignition switch on (IG).
6. Turn Techstream on.
7. Switch the skid control ECU to Test Mode using Techstream. Enter the following menus: Chassis/ABS/VSC/TRAC/Utility/Signal Check.
8. Check that the ABS warning and slip indicator lights come on for several seconds and then blink in Test Mode.

   HINT:

   - The TRAC OFF indicator light remains on during Test Mode because TRAC is prohibited.
   - If the ABS warning and slip indicator lights do not blink, inspect the TS and CG terminal circuit and ABS warning and slip indicator light circuits.

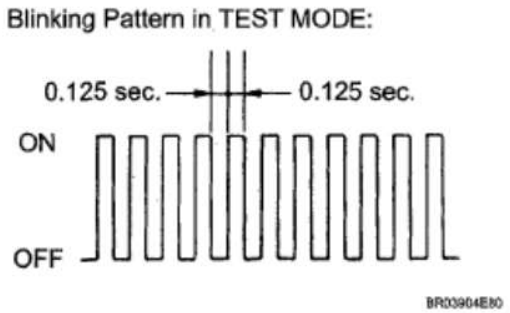


Fig. 17: Slip Indicator Light Blinking Pattern In Test Mode
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9. Check the ABS sensors.

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HINT:

Check that the ABS warning light is blinking in the Test Mode blinking pattern before performing the ABS sensor check.

b. Lost Booster Pressure Judgement Check and Master Cylinder Pressure Sensor Zero Point Calibration

NOTE: Preform the check in the lost booster pressure state (negative pressure in the booster is depressurized).

1. Turn the ignition switch on (IG).
2. Check that the brake warning light comes on when depressing the brake pedal with a force greater than 59 N (6 kgf, 13.2 lbf) for 1 second or more. (The lost booster pressure state is judged as normal.)
3. Start the engine depressing the brake pedal with a force greater than 59 N (6 kgf, 13.2 lbf) for 1 second or more.
4. Check that the brake warning light goes off when quickly releasing the brake pedal. (The lost booster pressure state is judged as normal.)
5. Leave the vehicle for 1 second or more. (Master cylinder pressure sensor zero point calibration)

NOTE:

- **If you slowly depress the brake pedal or depress it again, master cylinder pressure sensor zero point calibration is not performed normally.**
- **If the lost booster pressure judgement check results are not normal, then the master cylinder pressure sensor check will not be able to be performed.**
- **If recheck is performed after the engine has started, end Test Mode, transit to Test Mode again, and release vacuum in the booster by pumping the brake pedal prior to the recheck.**

c. Acceleration Sensor Check

1. Keep the vehicle stationary on a level surface for 1 second or more.

HINT:

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

d. Master Cylinder Pressure Sensor Check

1. Keep 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 greater than 98 N (10 kgf,

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22 lbf) for 1 second.

2. Check that the ABS warning light stays on for 3 seconds.

   HINT:

   - Confirm 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 brake pedal operation above is performed.
   - If the master cylinder pressure sensor check is not completed, depressing the brake pedal causes further decreases in vacuum in the brake booster, making the sensor check difficult to complete.
   - If the vacuum is insufficient, the master cylinder pressure sensor check may not be completed. In this case, run the engine at idle to obtain sufficient vacuum.
   - If the brake pedal is strongly depressed when the vacuum 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 vacuum.

e. Speed Sensor Check

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.

   HINT:

   The sensor check may not be completed if wheels pin 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 if a malfunction is detected during the speed sensor check.

2. Stop the vehicle.

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).**

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- **If the sensor check has not been completed, the ABS warning light will blink while driving and the ABS will 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 the vehicle is stationary.

3. Check the VSC sensor.

HINT:

Check that the slip indicator light is blinking in the Test Mode blinking pattern before performing the VSC sensor check. Yaw Rate Sensor Check

f. Yaw Rate Sensor Check

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 position to the D position 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. Check that the skid control buzzer sounds for 3 seconds.

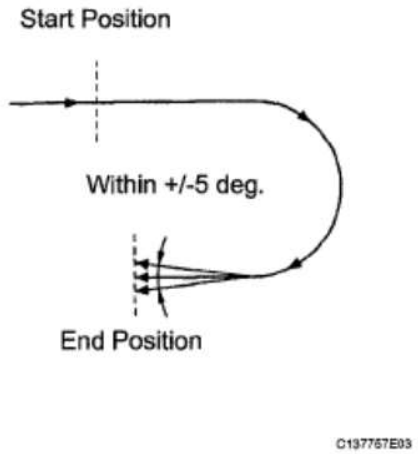


Fig. 18: Identifying Vehicle Driving Positions
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

HINT:

- If the skid control buzzer sounds, the sensor check has 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.

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- If the skid control buzzer still does not sound, the yaw rate sensor may be malfunctioning. Check for DTCs.
- Make a 180° turn. At the end of the turn, the direction of the vehicle should be within 180° +/-5° of its start position.
- Do not allow the wheels to spin.
- Do not turn the ignition switch off while turning.
- Do not move the shift lever to the P position while turning, but changing the vehicle speed, stopping, or driving in reverse is acceptable.
- Complete the turn within 20 seconds.

g. Downhill Assist Control Switch Check (for 4WD)
   1. Push the downhill assist control switch on. Check that the downhill assist control indicator light blinks.
   2. Push the downhill assist control switch off. Check that the downhill assist control indicator light goes off.

h. End of Sensor Check
   1. If the sensor check is completed, the ABS warning light blinks (Test Mode) when the vehicle is stopped and goes off while the vehicle is driving.

NOTE:

- **When the yaw rate sensor, downhill assist control switch (for 4WD), 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 will blink even while the vehicle is driving and the ABS will not operate.**

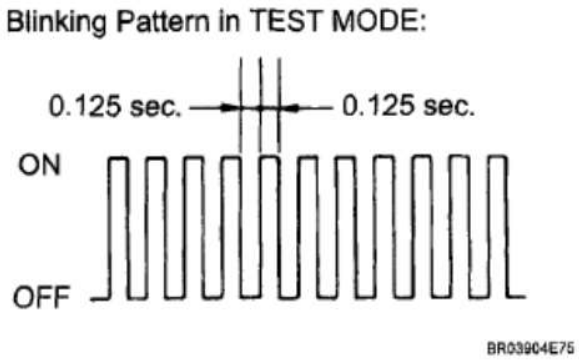


Fig. 19: Downhill Assist Control Indicator Light Blinking Pattern In Test Mode
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i. Read Sensor Check DTCs
   1. Read the DTC (s) by following the tester screen.

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NOTE:

- **If only DTCs other than Test Mode sensor check DTCs are displayed, repair the malfunctions and clear the DTCs.**
- **If Test Mode sensor check DTCs and other DTCs are displayed or if only Test Mode sensor check DTCs are displayed, repair the malfunctions, clear the DTCs, and perform Test Mode inspection again.**

HINT:

See "Sensor Check".

2. Turn the ignition switch off and disconnect Techstream.

j. Sensor Check DTCs

ABS sensor:

ABS SENSOR DTC CHART

DTC Code	Detection Item	Trouble Area
C1271	Low Output Signal of Front Speed Sensor RH	• Front speed sensor RH • Sensor installation • Speed sensor rotor
C1272	Low Output Signal of Front Speed Sensor LH	• Front speed sensor LH • Sensor installation • Speed sensor rotor
C1273	Low Output Signal of Rear Speed Sensor RH	• Rear speed sensor RH • Sensor installation • Speed sensor rotor
C1274	Low Output Signal of Rear Speed Sensor LH	• Rear speed sensor LH • Sensor installation • Speed sensor rotor
C1275	Abnormal Change in Output Signal of Front Speed Sensor RH	Speed sensor rotor
C1276	Abnormal Change in Output Signal of Front Speed Sensor LH	Speed sensor rotor
C1277	Abnormal Change in Output Signal of Rear Speed Sensor RH	Speed sensor rotor
C1278	Abnormal Change in Output Signal of Rear Speed Sensor LH	Speed sensor rotor
C1279	Acceleration Sensor Output Voltage Malfunction	• Sensor installation • Yaw rate and acceleration

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		sensor
C1281	Master Cylinder Pressure Sensor Output Malfunction	• Stop light switch • Brake pedal load sensing switch • Master cylinder pressure sensor

VSC sensor:

VSC SENSOR DTC CHART

DTC Code	Detection Item	Trouble Area
C0371	Yaw Rate Sensor	Yaw rate and acceleration sensor
C1379 ((1))	Downhill Assist Control Switch Malfunction	Downhill assist control switch
(1) for 4WD		

HINT:

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

3. **SENSOR CHECK USING TEST MODE (SIGNAL CHECK) (When not 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:

- If the ignition switch is turned from on (IG) to on (ACC) or off during Test Mode (signal check), DTCs recorded during the sensor check will be erased.
- During Test Mode (signal check), the skid control ECU records all DTCs detected in the sensor check. By performing 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 off.
2. Check that the steering wheel is in the straight-ahead position.
3. Check that the shift lever is in the P position.
4. Using SST, connect terminals TS and CG of the DLC3.

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5. Turn the ignition switch on (IG).

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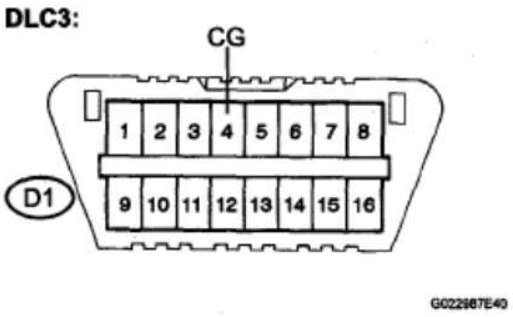


Fig. 20: Identifying Terminals TS And CG Of DLC3
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. Check that the ABS warning and slip indicator lights come on for several seconds and then blink in Test Mode.

   HINT:

   - The TRAC OFF indicator light remains on during Test Mode because TRAC is prohibited.
   - If the ABS warning and slip indicator lights do not blink, inspect the TS and CG terminal circuit and ABS warning and slip indicator light circuits.

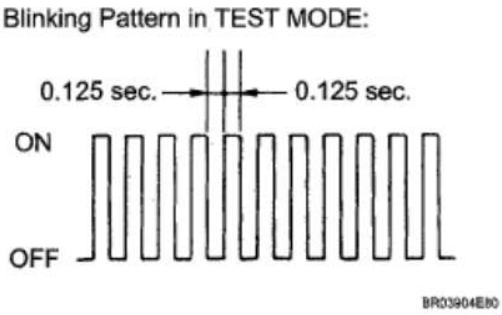


Fig. 21: Slip Indicator Light Blinking Pattern In Test Mode
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. Check the ABS sensors.

   HINT:

   Check that the ABS warning light is blinking in the Test Mode blinking pattern before performing the ABS sensor check.

b. Lost Booster Pressure Judgement Check and Master Cylinder Pressure Sensor Zero Point Calibration

NOTE: Preform the check in the lost booster pressure state (negative

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pressure in the booster is depressurized).

1. Turn the ignition switch on (IG).
2. Check that the brake warning light comes on when depressing the brake pedal with a force greater than 59 N (6 kgf, 13.2 lbf) for 1 second or more. (The lost booster pressure state is judged as normal.)
3. Start the engine depressing the brake pedal with a force greater than 59 N (6 kgf, 13.2 lbf) for 1 second or more.
4. Check that the brake warning light goes off when quickly releasing the brake pedal. (The lost booster pressure state is judged as normal.)
5. Leave the vehicle for 1 second or more. (Master cylinder pressure sensor zero point calibration)

NOTE:

- **If you slowly depress the brake pedal or depress it again, master cylinder pressure sensor zero point calibration is not performed normally.**
- **If the lost booster pressure judgement check results are not normal, then the master cylinder pressure sensor check will not be able to be performed.**
- **If recheck is performed after the engine has started, end Test Mode, transit to Test Mode again, and release vacuum in the booster by pumping the brake pedal prior to the recheck.**

c. Acceleration Sensor Check

1. Keep the vehicle stationary on a level surface for 1 second or more.

   HINT:

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

d. Master Cylinder Pressure Sensor Check

1. Keep 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 greater than 98 N (10 kgf, 22 lbf) for 1 second.
2. Check that the ABS warning light stays on for 3 seconds.

   HINT:

   - Confirm 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 brake pedal operation

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above is performed.

- If the master cylinder pressure sensor check is not completed, depressing the brake pedal causes further decreases in vacuum in the brake booster, making the sensor check difficult to complete.
- If the vacuum is insufficient, the master cylinder pressure sensor check may not be completed. In this case, run the engine at idle to obtain sufficient vacuum.
- If the brake pedal is strongly depressed when the vacuum 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 vacuum.

e. Speed Sensor Check

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.

   HINT:

   - 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 if a malfunction is detected during the speed sensor check.

2. Stop the vehicle.

   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 will blink while driving and the ABS will 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 the vehicle is stationary.

3. Check the VSC sensor.

   HINT:

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Check that the slip indicator light is blinking in the Test Mode blinking pattern before performing the VSC sensor check.

f. Yaw Rate Sensor Check
   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 position to the D position 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. Check that the skid control buzzer sounds for 3 seconds.

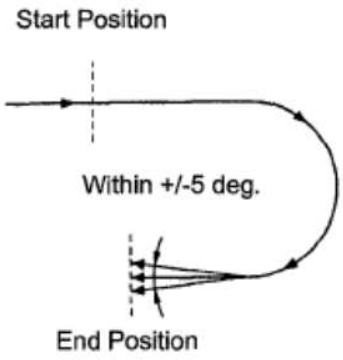


Fig. 22: Identifying Vehicle Driving Positions
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

HINT:

- If the skid control buzzer sounds, the sensor check has 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, the yaw rate sensor may be malfunctioning. Check for DTCs.
- Make a 180° turn. At the end of the turn, the direction of the vehicle should be within 180° +/-5° of its start position.
- Do not allow the wheels to spin.
- Do not turn the ignition switch off while turning.
- Do not move the shift lever to the P position while turning, but changing the vehicle speed, stopping, or driving in reverse is acceptable.
- Complete the turn within 20 seconds.

g. Downhill Assist Control Switch Check (for 4WD)
   1. Push the downhill assist control switch on. Check that the downhill assist control indicator light blinks.

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2. Push the downhill assist control switch off. Check that the downhill assist control indicator light goes off.

h. End of Sensor Check

1. If the sensor check is completed, the ABS warning light blinks (Test Mode) when the vehicle is stopped and goes off while the vehicle is driving.

NOTE:

- **When the yaw rate sensor, downhill assist control switch (for 4WD), 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 will blink even while the vehicle is driving and the ABS will not operate.**

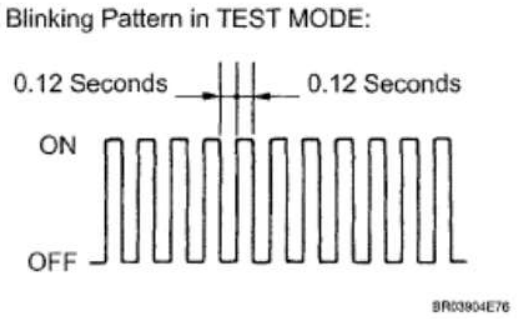


Fig. 23: Downhill Assist Control Indicator Light Blinking Pattern In Test Mode
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

i. Read Sensor Check DTCs

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

SST 09843-18040

2. Count the number of blinks of the ABS warning and slip indicator lights.

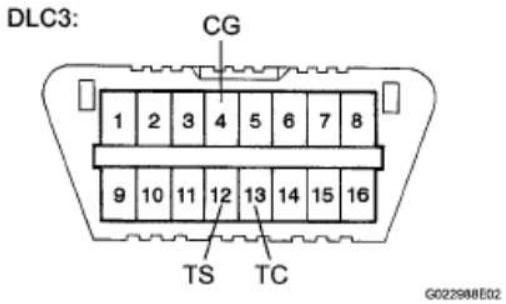


Fig. 24: Identifying Terminals TC, TS And CG Of DLC3
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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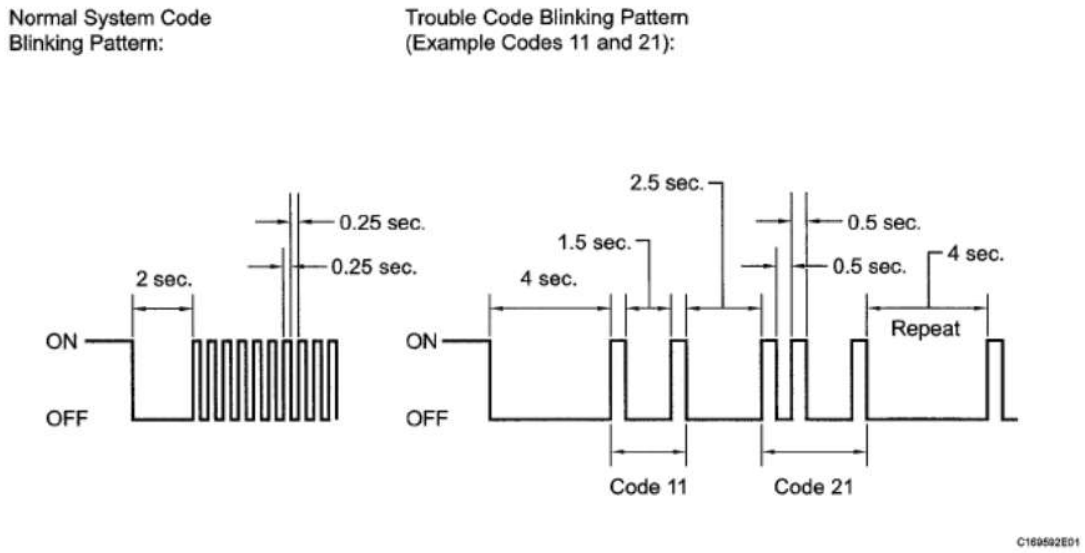


Fig. 25: Blinking Pattern Of ABS Warning And Slip Indicator Lights
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- **If only DTCs other than Test Mode sensor check DTCs are displayed, repair the malfunctions and clear the DTCs.**
- **If Test Mode sensor check DTCs and other DTCs are displayed or if only Test Mode sensor check DTCs are displayed, repair the malfunctions, clear the DTCs, and perform Test Mode inspection again.**

HINT:

- If more than 1 malfunction is detected at the same time, the lowest numbered code will be displayed first.
- See "Sensor Check".

3. After performing the check, disconnect SST from terminals TS and CG, and TC and CG of the DLC3 and turn the ignition switch off.
4. Turn the ignition switch on (IG).

HINT:

- If the ignition switch is not turned on (IG) after SST is removed from the DLC3, the previous Test Mode will continue.
- If the ignition switch is turned on (IG) with terminals TS and CG connected, the previous Test Mode will continue.

j. Sensor Check DTCs

ABS sensor:

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ABS SENSOR DTC CHART

DTC Code	Detection Item	Trouble Area
71	Low Output Signal of Front Speed Sensor RH	• Front speed sensor RH • Sensor installation • Speed sensor rotor
72	Low Output Signal of Front Speed Sensor LH	• Front speed sensor LH • Sensor installation • Speed sensor rotor
73	Low Output Signal of Rear Speed Sensor RH	• Rear speed sensor • RH Sensor installation • Speed sensor rotor
74	Low Output Signal of Rear Speed Sensor LH	• Rear speed sensor LH • Sensor installation • Speed sensor rotor
75	Abnormal Change in Output Signal of Front Speed Sensor RH	Speed sensor rotor
76	Abnormal Change in Output Signal of Front Speed Sensor LH	Speed sensor rotor
77	Abnormal Change in Output Signal of Rear Speed Sensor RH	Speed sensor rotor
78	Abnormal Change in Output Signal of Rear Speed Sensor LH	Speed sensor rotor
79	Acceleration Sensor Output Voltage Malfunction	• Sensor installation • Yaw rate and acceleration sensor
81	Master Cylinder Pressure Sensor Output Malfunction	• Stop light switch • Brake pedal load sensing switch • Master cylinder pressure sensor

VSC sensor:

VSC SENSOR DTC CHART

DTC Code	Detection Item	Trouble Area
71	Yaw Rate Sensor	Yaw rate and acceleration sensor
74 ((1))	Downhill Assist Control Switch Malfunction	Downhill assist control switch
(1) for 4WD		

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HINT:

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

4. **VSC OFF SWITCH CHECK**
   a. Push the VSC OFF switch on.
   b. Check that the TRAC OFF indicator light goes off.

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 any of the brake actuator assembly or sensors, etc., turn the ignition switch off.

HINT:

- Inspect the fuses and relays before investigating the suspected areas shown in the table below.
- Inspect each suspected area in order for the corresponding symptom.

Vehicle Stability Control System:

VEHICLE STABILITY CONTROL SYSTEM PROBLEM SYMPTOMS CHART

Symptom	Suspected Area	Refer to
ABS, BA and/or	Check for DTCs again and make sure that the normal system code is output.	**DTC CHECK/CLEAR**
	IG power source circuit (Low power supply voltage malfunction)	**DTC C1241 LOW POWER SUPPLY VOLTAGE MALFUNCTION**
	IG power source circuit (High power supply voltage malfunction)	**DTC C1417 HIGH POWER SUPPLY VOLTAGE MALFUNCTION**
	Front speed sensor circuit (Output malfunction)	**DTC C1413 FRONT SPEED SENSOR RH OUTPUT MALFUNCTION; DTC C1414 FRONT SPEED SENSOR LH OUTPUT MALFUNCTION**
	Rear speed sensor circuit (Output malfunction)	**DTC C1415 REAR SPEED SENSOR RH OUTPUT MALFUNCTION; DTC C1416 REAR SPEED SENSOR LH OUTPUT MALFUNCTION**
	Front speed sensor circuit (Open or short malfunction)	**DTC C1405 OPEN OR SHORT IN FRONT SPEED SENSOR RH CIRCUIT; DTC C1406 OPEN OR SHORT IN FRONT SPEED SENSOR LH CIRCUIT**

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EBD does not operate	Rear speed sensor circuit (Open or short malfunction)	**DTC C1407 OPEN OR SHORT IN REAR SPEED SENSOR RH CIRCUIT; DTC C1408 OPEN OR SHORT IN REAR SPEED SENSOR LH CIRCUIT**
	Front speed sensor circuit (Comparison malfunction)	**DTC C1401 FRONT SPEED SENSOR RH MALFUNCTION; DTC C1402 FRONT SPEED SENSOR LH MALFUNCTION**
	Rear speed sensor circuit (Comparison malfunction)	**DTC C1403 REAR SPEED SENSOR RH MALFUNCTION; DTC C1404 REAR SPEED SENSOR LH MALFUNCTION**
	Check the brake actuator assembly with Techstream. (Check brake actuator assembly operation using the Active Test function.) If abnormal, check the hydraulic circuit for leaks.	**ON-VEHICLE INSPECTION**
	If the symptom still occurs even after the circuits listed above have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	**REMOVAL**
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 (Output malfunction)	**DTC C1413 FRONT SPEED SENSOR RH OUTPUT MALFUNCTION; DTC C1414 FRONT SPEED SENSOR LH OUTPUT MALFUNCTION**
	Rear speed sensor circuit (Output malfunction)	**DTC C1415 REAR SPEED SENSOR RH OUTPUT MALFUNCTION; DTC C1416 REAR SPEED SENSOR LH OUTPUT MALFUNCTION**
	Front speed sensor circuit (Open or short malfunction)	**DTC C1405 OPEN OR SHORT IN FRONT SPEED SENSOR RH CIRCUIT; DTC C1406 OPEN OR SHORT IN FRONT SPEED SENSOR LH CIRCUIT**
	Rear speed sensor circuit (Open or short malfunction)	**DTC C1407 OPEN OR SHORT IN REAR SPEED SENSOR RH CIRCUIT; DTC C1408 OPEN OR SHORT IN REAR SPEED SENSOR LH CIRCUIT**
	Front speed sensor circuit (Comparison malfunction)	**DTC C1401 FRONT SPEED SENSOR RH MALFUNCTION; DTC C1402 FRONT SPEED SENSOR LH MALFUNCTION**
	Rear speed sensor circuit (Comparison malfunction)	**DTC C1403 REAR SPEED SENSOR RH MALFUNCTION; DTC C1404 REAR SPEED SENSOR LH MALFUNCTION**

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	Stop light switch circuit (Open or short malfunction)	**DTC C1425 OPEN IN STOP LIGHT SWITCH CIRCUIT**
	Stop light switch circuit (Off stuck malfunction)	**DTC C1426 STOP LIGHT SWITCH OFF STUCK MALFUNCTION**
	Check the brake actuator assembly with Techstream. (Check brake actuator assembly operation using the Active Test function.) If abnormal, check the hydraulic circuit for leaks.	**ON-VEHICLE INSPECTION**
	If the symptom still occurs even after the circuits listed above have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	**REMOVAL**
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 symptom still occurs even after the circuits listed above have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	**REMOVAL**
ABS warning light abnormal (Remains on)	ABS warning light circuit	**ABS WARNING LIGHT REMAINS ON**
	Brake actuator assembly (Skid control ECU)	**REMOVAL**
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)	**REMOVAL**
Brake warning light abnormal (Remains on)	Brake warning light circuit	**BRAKE WARNING LIGHT REMAINS ON**
	Brake actuator assembly (Skid control ECU)	**REMOVAL**
Brake warning light abnormal (Does not come on)	Brake warning light circuit	**BRAKE WARNING LIGHT DOES NOT COME ON**
	Brake actuator assembly (Skid control ECU)	**REMOVAL**
	Check for DTCs again and make sure that the normal system code is output.	**DTC CHECK/CLEAR**
	IG power source circuit (Low power supply voltage malfunction)	**DTC C1241 LOW POWER SUPPLY VOLTAGE MALFUNCTION**
	IG power source circuit (High power supply voltage malfunction)	**DTC C1417 HIGH POWER SUPPLY VOLTAGE MALFUNCTION**

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VSC and/or TRAC does not operate	Check the hydraulic circuit for leaks.	-
	Front speed sensor circuit (Output malfunction)	**DTC C1413 FRONT SPEED SENSOR RH OUTPUT MALFUNCTION; DTC C1414 FRONT SPEED SENSOR LH OUTPUT MALFUNCTION**
	Rear speed sensor circuit (Output malfunction)	**DTC C1415 REAR SPEED SENSOR RH OUTPUT MALFUNCTION; DTC C1416 REAR SPEED SENSOR LH OUTPUT MALFUNCTION**
	Front speed sensor circuit (Open or short malfunction)	**DTC C1405 OPEN OR SHORT IN FRONT SPEED SENSOR RH CIRCUIT; DTC C1406 OPEN OR SHORT IN FRONT SPEED SENSOR LH CIRCUIT**
	Rear speed sensor circuit (Open or short malfunction)	**DTC C1407 OPEN OR SHORT IN REAR SPEED SENSOR RH CIRCUIT; DTC C1408 OPEN OR SHORT IN REAR SPEED SENSOR LH CIRCUIT**
	Front speed sensor circuit (Comparison malfunction)	**DTC C1401 FRONT SPEED SENSOR RH MALFUNCTION; DTC C1402 FRONT SPEED SENSOR LH MALFUNCTION**
	Rear speed sensor circuit (Comparison malfunction)	**DTC C1403 REAR SPEED SENSOR RH MALFUNCTION; DTC C1404 REAR SPEED SENSOR LH MALFUNCTION**
	Yaw rate and acceleration sensor circuit (Zero point malfunction)	**DTC C1210 ZERO POINT CALIBRATION OF YAW RATE SENSOR UNDONE; DTC C1336 ZERO POINT CALIBRATION OF ACCELERATION SENSOR UNDONE**
	Yaw rate and acceleration sensor circuit (Power supply malfunction)	**DTC C1381 ACCELERATION SENSOR POWER SUPPLY VOLTAGE MALFUNCTION**
	Acceleration sensor circuit (Comparison malfunction)	**DTC C1420 ACCELERATION SENSOR MALFUNCTION**
	Yaw rate sensor circuit (Comparison malfunction)	**DTC C1436 YAW RATE SENSOR MALFUNCTION**
	Yaw rate and acceleration sensor circuit (Stuck or output malfunction)	**DTC C1232 ACCELERATION SENSOR STUCK MALFUNCTION; DTC C1243 ACCELERATION SENSOR STUCK MALFUNCTION; DTC C1245 ACCELERATION SENSOR OUTPUT MALFUNCTION**
	Yaw rate and acceleration sensor circuit (Continuous invalidation malfunction)	**DTC C1442 INVALID DATA RECEIVED FROM ACCELERATION SENSOR; DTC C1443 INVALID DATA RECEIVED FROM YAW RATE SENSOR**
		DTC C1419 ACCELERATION SENSOR

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	Yaw rate and acceleration sensor circuit (Internal malfunction)	**INTERNAL CIRCUIT; DTC C1435 YAW RATE SENSOR INTERNAL CIRCUIT**
	Steering angle sensor circuit (Zero point malfunction)	**DTC C1290 STEERING ANGLE SENSOR ZERO POINT MALFUNCTION**
	Steering angle sensor circuit (Zero point initialization or calibration malfunction)	**DTC C1439 STEERING ANGLE SENSOR INITIALIZATION INCOMPLETE; DTC C1445 VEHICLE DRIVEN WITH STEERING ANGLE SENSOR NOT INITIALIZED**
	Steering angle sensor circuit (Power supply malfunction)	**DTC C1432 STEERING ANGLE SENSOR POWER SOURCE VOLTAGE MALFUNCTION**
	Steering angle sensor circuit (Output malfunction)	**DTC C1434 STEERING ANGLE SENSOR OUTPUT MALFUNCTION**
	Steering angle sensor circuit (Internal malfunction)	**DTC C1433 STEERING ANGLE SENSOR INTERNAL CIRCUIT**
	If the symptom still occurs even after the circuits listed above have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	**REMOVAL**
VSC 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 symptom still occurs even after the circuits listed above have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	**REMOVAL**
VSC OFF indicator light abnormal (Remains on)	VSC OFF indicator light circuit	**VSC OFF INDICATOR LIGHT REMAINS ON**
	Brake actuator assembly (Skid control ECU)	**REMOVAL**
VSC OFF indicator light abnormal (Does not come on)	VSC OFF indicator light circuit	**VSC OFF INDICATOR LIGHT DOES NOT COME ON**
	Brake actuator assembly (Skid control ECU)	**REMOVAL**
TRAC OFF indicator light abnormal (Remains on)	TRAC OFF indicator light circuit	**TRAC OFF INDICATOR LIGHT REMAINS ON**
	Brake actuator assembly (Skid control ECU)	**REMOVAL**
TRAC OFF indicator light abnormal (Does	TRAC OFF indicator light circuit	**TRAC OFF INDICATOR LIGHT DOES NOT COME ON**
	Brake actuator assembly (Skid	**REMOVAL**

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not come on)	control ECU)	
Slip indicator light abnormal (Remains on)	Slip indicator light circuit	**SLIP INDICATOR LIGHT REMAINS ON**
	Brake actuator assembly (Skid control ECU)	**REMOVAL**
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)	**REMOVAL**
Downhill assist control indicator light abnormal (Remains on) ((1))	Downhill assist control switch circuit	**DTC C1379 DOWNHILL ASSIST CONTROL SWITCH MALFUNCTION (TEST MODE DTC)**
	Downhill assist control indicator light circuit	**DOWNHILL ASSIST CONTROL INDICATOR LIGHT REMAINS ON**
	Brake actuator assembly (Skid control ECU)	**REMOVAL**
Downhill assist control indicator light abnormal (Does not come on) ((1))	Downhill assist control switch circuit	**DTC C1379 DOWNHILL ASSIST CONTROL SWITCH MALFUNCTION (TEST MODE DTC)**
	Downhill assist control indicator light circuit	**DOWNHILL ASSIST CONTROL INDICATOR LIGHT DOES NOT COME ON**
	Brake actuator assembly (Skid control ECU)	**REMOVAL**
Sensor check cannot be done	TS and CG terminal circuit	**TS AND CG TERMINAL CIRCUIT**
	Brake actuator assembly (Skid control ECU)	**REMOVAL**
Skid control buzzer abnormal	Skid control buzzer circuit	**SKID CONTROL BUZZER CIRCUIT**
	Brake actuator assembly (Skid control ECU)	**REMOVAL**
(1) for 4WD		

TERMINALS OF ECU

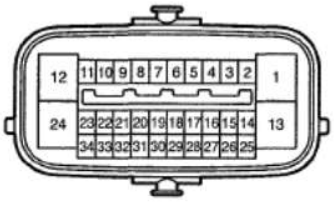
1. **TERMINALS OF ECU**

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Component without harness connected:
(Skid Control ECU)



C160258E01

Fig. 26: Identifying Skid Control ECU Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ECU CONNECTOR TERMINAL DESCRIPTION REFERENCE

Terminal No. (Symbols)	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 (CAN L)	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
21 (BZ)	Skid control buzzer output
22 (STP2)	Stop light control relay input
24 (+BM)	Motor relay power supply
25 (CANH)	CAN communication line H
26 (HDCS) ((1))	Downhill assist control switch input
27 (FSW+)	Brake pedal load sensing switch input
29 (PKB)	Parking brake switch input
30 (CSW)	VSC OFF switch input
31 (STPO)	Stop light control relay output
33 (TS)	Sensor check input
34 (IG1)	ECU power supply

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(1) for 4WD

2. **TERMINAL INSPECTION**

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

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

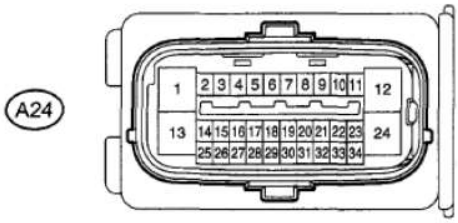


Fig. 27: Identifying Skid Control A24 ECU Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

HINT:

Voltage cannot be measured with the connectors connected to the skid control ECU as the connectors are watertight.

Standard:

VOLTAGE AND RESISTANCE SPECIFICATION

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
A24-1 (GND1) - Body ground	W-B - Body ground	Skid control ECU ground	Always	Below 1 ohms
A24-2 (STP) - Body ground	L - Body ground	Stop light switch input	Stop light switch ON --> OFF (Brake pedal depressed --> released)	8 to 14 V --> Below 1.5 V
A24-12 (+BS) - Body ground	R - Body ground	Solenoid relay power supply	Always	11 to 14 V
A24-13 (GND2) - Body ground	W-B - Body ground	Pump motor ground	Always	Below 1 ohms
A24-21 (BZ) - Body ground	Y - Body ground	Skid control buzzer output	Ignition switch on (IG), buzzer not sounding	6 to 10 V
			Stop light switch ON -->	

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A24-22 (STP2) - Body ground	L - Body ground	Stop light control relay input	OFF (Brake pedal depressed --> released)	8 to 14 V --> Below 1.5 V
A24-24 (+BM) - Body ground	B - Body ground	Motor relay power supply	Always	11 to 14 V
A24-26 (HDCS) ((1)) - Body ground	W - Body ground	Downhill assist control switch input	Downhill assist control switch is pushed in --> released	Below 1 ohms--> 10kohms or higher
A24-27 (FSW+) - Body ground	GR - Body ground	Brake pedal load sensing switch input	Brake pedal load sensing switch OFF --> ON (Brake pedal depressed --> released)	950 to 1050 ohms --> 203 to 223 ohms
A24-29 (PKB) - Body ground	BR - Body ground	Parking brake switch input	Ignition switch on (IG), parking brake switch OFF --> ON	Below 1 ohms--> 10kohms or higher
A24-30 (CSW) - Body ground	G - Body ground	VSC OFF switch input	VSC OFF switch held ON --> OFF (Released)	Below 25 ohms --> 10kohms or higher
A24-31 (STPO) - Body ground	P - Body ground	Stop light control relay output	Ignition switch on (IG)	11 to 14 V
A24-34 (IG1) - Body ground	0 - Body ground	ECU power supply	Ignition switch on (IG)	11 to 14 V
(1) for 4WD				

DIAGNOSIS SYSTEM

1. DESCRIPTION

When troubleshooting a vehicle with the diagnosis system, the only difference from the usual troubleshooting procedure is connecting 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 Techstream to the DLC3 on the vehicle. 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.

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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 downhill assist control indicator (for 4WD) lights will come on in order to warn the driver. For vehicles with the multi-information display, the master caution indicator light will come on and a warning message will be displayed on the multi-information display if any of the EBD system, BA system, or TRAC system is malfunctioning or if the ABS control or VSC cannot be performed.

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

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Fig. 28: Identifying ABS Warning, Brake Warning, Slip Indicator And Downhill Assist Control Indicator
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TROUBLESHOOTING CHART

						Downhill		

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Item/Trouble Area	ABS	EBD	BA	TRAC	VSC	assist control ((1))	Hill-start assist control	Skid control ECU
ABS warning light	o	o	o	-	-	-	-	o
Brake warning light	-	o	-	-	-	-	-	o
Slip indicator light	o	o	o	o	o	o	o	o
Downhill assist control indicator light C1)	• (Downhill assist control switch ON)	• (Downhill assist control switch ON)	• (Downhill assist control switch ON)	• (Downhill assist control switch ON)	• (Downhill assist control switch ON)	• (Downhill assist control switch ON)	• (Downhill assist control switch ON)	• (Downhil assist control switch ON)
Master caution indicator light ((2))	o	o	o	o	o	o	o	o
Multi-information display ((2))	o	o	o	-	-	o	o	o

(1) for 4WD

(2) Models with multi-information display

o: Light or display ON
•: Light ON (Blinking)
-: Light or display OFF

HINT:

- The DTCs are simultaneously stored in the memory.

  The DTCs can be read by connecting SST between terminals TC and CG of the DLC3 and observing the blinking pattern of the ABS warning and slip indicator lights, or by connecting Techstream (See **DTC CHECK/CLEAR**).

- This system has a Test Mode (signal check) function.

  The DTCs can be read by connecting SST between terminals TS and CG of the DLC3 and observing the blinking pattern of the ABS warning and slip indicator lights, or by connecting Techstream (See **TEST MODE PROCEDURE**).

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

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a. Release the parking brake.

NOTE: When releasing the parking brake, move the shift lever to the P position for safety.

HINT:

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

b. When the ignition switch is turned on (IG), check that the ABS warning, brake warning, TRAC OFF indicator, VSC OFF indicator, slip indicator and downhill assist control indicator (for 4WD) 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, TRAC OFF indicator, VSC OFF indicator, slip indicator and downhill assist control indicator (for 4WD) light circuits. If the indicator remains on or does not come on, proceed to troubleshooting for the light circuits listed below.

TROUBLESHOOTING 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
TRAC OFF indicator light circuit (Remains on)	TRAC OFF INDICATOR LIGHT REMAINS ON
TRAC OFF indicator light circuit (Does not come on)	TRAC OFF INDICATOR 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
Downhill assist control indicator light circuit (Remains on)	DOWNHILL ASSIST CONTROL INDICATOR LIGHT REMAINS ON
Downhill assist control indicator light circuit (Does not come on)	DOWNHILL ASSIST CONTROL INDICATOR LIGHT DOES NOT COME ON

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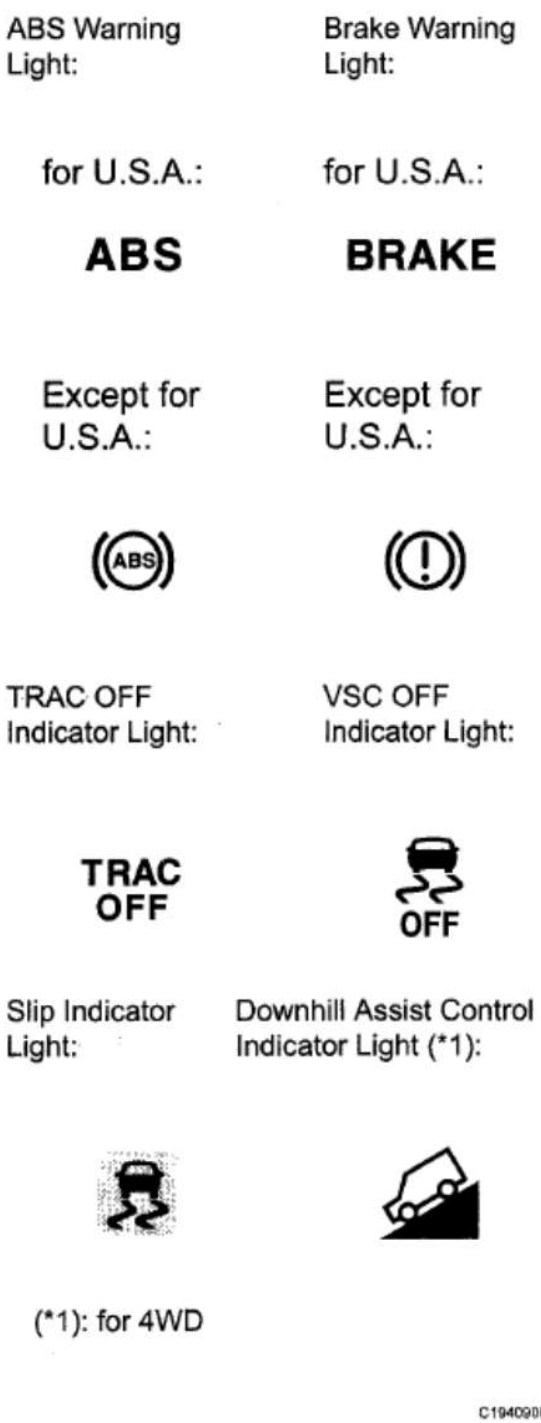


Fig. 29: Identifying ABS Warning, Brake Warning, TRAC OFF Indicator, VSC OFF Indicator And Slip Indicator
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. **SYMPTOM SIMULATION**

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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 troubleshooting 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 is turned on (IG)).

   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.

   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.

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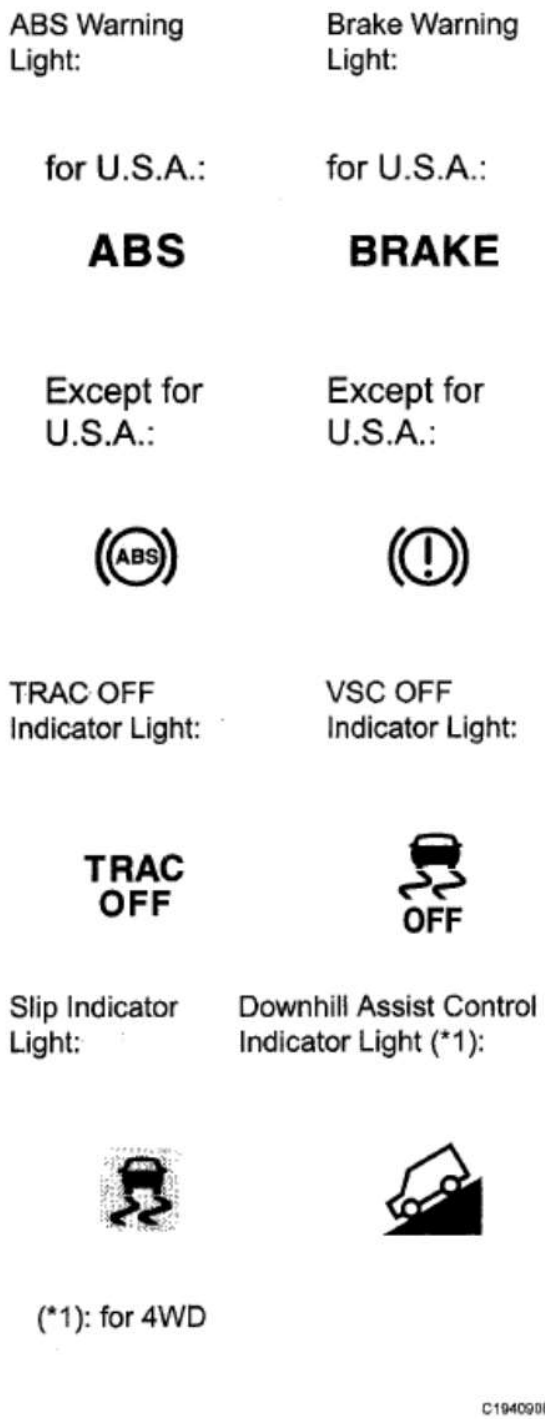


Fig. 30: Shaking Connector And Wire Harness
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DTC CHECK/CLEAR

1. **DTC CHECK/CLEAR (When Using Techstream)**

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a. Check for DTCs.

1. Connect Techstream to the DLC3.
2. Turn the ignition switch on (IG).
3. Turn Techstream on.
4. Read the DTCs following the prompts on the tester screen. Enter the following menus: Chassis/ABS/VSC/TRAC/Trouble Codes.
5. Check the details of the DTCs (See **DIAGNOSTIC TROUBLE CODE CHART**).

b. Clear the DTCs.

1. Connect Techstream to the DLC3.
2. Turn the ignition switch on (IG).
3. Turn Techstream on.
4. Operate Techstream to clear the codes. Enter the following menus: Chassis/ABS/VSC/TRAC/Trouble Codes.
5. According to the display on the tester, select the trouble code data display with the clear button.

2. **DTC CHECK/CLEAR (When not Using Techstream)**

a. Check for DTCs.

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

SST 09843-18040

2. Turn the ignition switch on (IG).
3. Observe the blinking pattern of the ABS warning and slip indicator lights in order to identify the DTC.

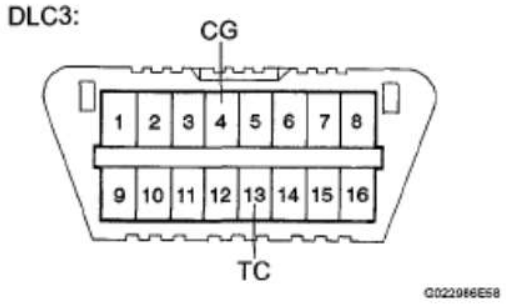


Fig. 31: Identifying Terminals TC And CG Of DLC3
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

HINT:

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

TROUBLESHOOTING CHART

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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**
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**

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

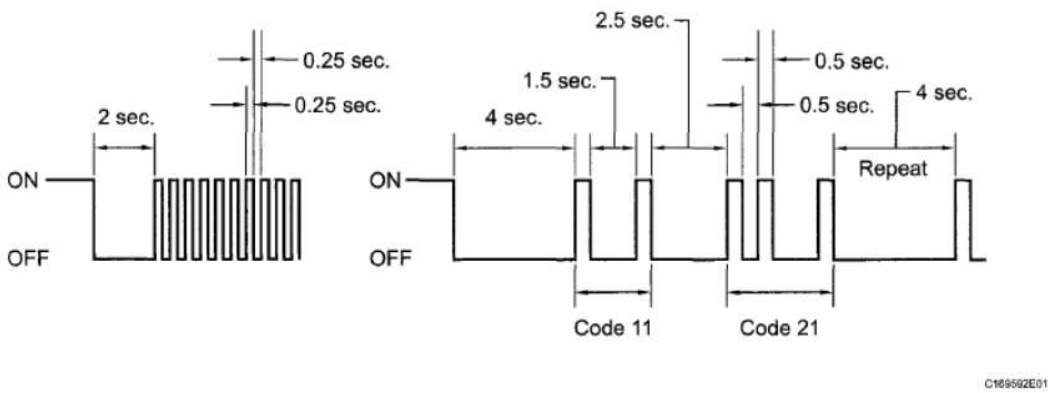


Fig. 32: Blinking Patterns Of Normal System Code And Trouble Codes 11 And 21 For ABS Warning And Slip Indicator Lights
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. Check the details of the DTCs.

DTC chart for ABS:

ABS DTC CHART

Warning Light Display	Techstream Display
11	C0278
12	C0279
13	C0273
14	C0274
21	C0226
22	C0236
23	C0246

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24	C0256
25	C1225
31	C1401
	C1405
32	C1402
	C1406
33	C1403
	C1407
34	C1404
	C1408
35	C1413
36	C1414
37	C1337
38	C1415
39	C1416
41	C1241
	C1417
43	C1243
44	C1419
	C1420
	C1442
45	C1245
46	C1421
	C1422
	C1423
	C1424
49	C1425
	C1426
51	C1427
	C1428
67	C1429
	C1430
	C1431
91	C1361
94	U0073
95	U0124
97	C1381

DTC chart for VSC:

VSC DTC CHART

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Indicator Light Display	Techstream Display
31	C1432
	C1433
	C1434
32	C1232
34	C1435
	C1436
	C1443
36	C1210
39	C1336
43 ((1))	-
51	C1201
53	C1203
62	U0123
63	U0126
64	C1380
65	C1437
	U0100
66	C1290
	C1439
	C1445
98	C1440
	C1441
(1) This DTC is output when the VSC system detects a malfunction in the ABS.	

6. After completing the check, disconnect terminals TC and CG of the DLC3 to turn off the display. If 2 or more DTCs are detected at the same time, the DTCs will be displayed in ascending order.

b. Clear the DTCs.

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

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2. Turn the ignition switch on (IG).

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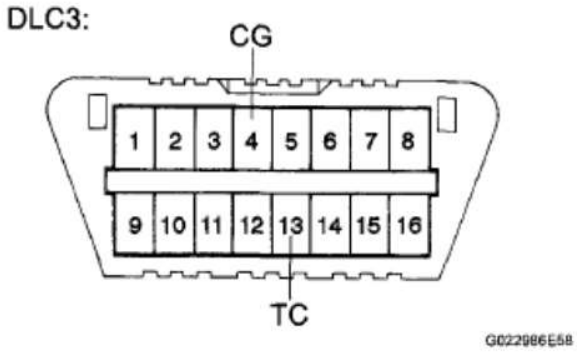


Fig. 33: Identifying Terminals TC And CG Of DLC3
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. Clear the DTCs stored in the ECU by depressing the brake pedal 8 times or more within 5 seconds.
4. Check that the warning light indicates a normal system code.
5. Remove SST from the terminals of the DLC3.

HINT:

Clearing the DTCs cannot be performed by disconnecting the battery terminal or the ECU-IG NO. 2 fuse.

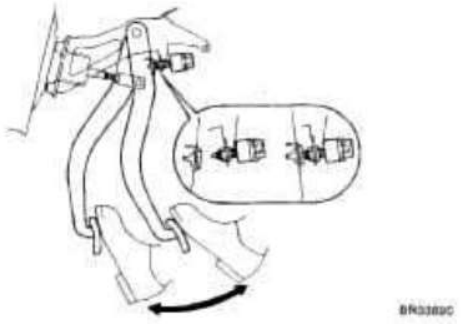


Fig. 34: Depressing Brake Pedal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. **END OF DTC CHECK/CLEAR**
   a. Turn the ignition switch on (IG).
   b. Check that the ABS warning and slip indicator lights go off within approximately 3 seconds after turning the ignition switch on (IG).

FREEZE FRAME DATA

1. **FREEZE FRAME DATA**
   a. Whenever an ABS DTC is detected, the skid control ECU stores the current vehicle (sensor) state

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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 (IG) since the last time the ABS was activated.

HINT:

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 Techstream to the DLC3.
b. Turn the ignition switch on (IG).
c. Turn Techstream on.
d. Enter the following menus: Chassis/ABS/VSC/TRAC/Trouble Codes.
e. According to the display on the tester, select the trouble code data display with Freeze Frame Data.

ABS/VSC/TRAC:

ABS/VSC/TRAC TESTER DISPLAY REFERENCE

Tester Display	Measurement Item	Reference Value
Elapsed Time after Freeze Trigger	Elapsed time after freeze frame trigger	Min.: 0 ms, Max.: 500 ms
Number of IG ON	Number of operations of ignition switch being turned on (IG) after storing Freeze Frame Data	0 to 31
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
TRC (TRAC)A/SC OFF SW	VSC OFF switch signal	VSC OFF switch ON: OFF, OFF: ON
		FAIL 1st

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Gear Position	Gear position information	2nd 3rd 4th 5th 6th 7th 8th P, N R NOT R
Shift Lever Position	Shift lever position information	FAIL 1st 2nd 3rd 4th 5th 6th/B D/M P, N R
Operated System	Operated system status	ABS: ABS activated VSC: VSC activated TRC: TRAC activated BA: BA activated HAB: HAB activated HA-CTRL: Hill-start assist control activated FAIL: Fail safe mode activated SYS: System prohibit activated NON: No operation activated
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
Lateral G	Lateral G	Min.: -25.11 m/s2, 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.: 0 km/h (0 mph), Max.:

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FR Wheel Speed	FR wheel speed	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%
Brake Pedal Load Sensing SW	Brake pedal load sensing switch signal	Brake pedal load sensing switch ON: ON, OFF: OFF
Inspection Mode	Inspection mode	OTHER: Normal mode INSPECT: Inspection mode
Steering Angle Sensor	Steering angle sensor reading	Left turn: Increase Right turn: Decrease
TRC/VSC Off Mode	TRAC/VSC off mode	NORMAL: Normal mode TRC OFF: TRAC off mode VSC OFF: VSC off mode

3. **CLEAR FREEZE FRAME DATA**

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

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

FAIL-SAFE CHART

1. **FAIL SAFE OPERATION**

- If there is a problem with sensor signals or brake actuator systems, the skid control ECU prohibits power supply to the brake actuator and informs the ECM of VSC system failure.

  The brake actuator turns off the solenoids and the ECM stops its VSC according to signals from the skid control ECU. The vehicle will operate in a manner similar to a vehicle that is not equipped with ABS, TRAC and VSC systems.

  ABS control will be prohibited, but EBD control will continue to the extent that EBD control is

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possible. If EBD control is impossible, the brake warning light will come on to warn the driver (See **DIAGNOSIS SYSTEM**).

- If a VSC system component malfunctions before VSC begins, VSC will be prohibited. If a system component malfunctions while VSC is operating, the system will gradually stop operating so as not to trigger a sudden change in vehicle stability.

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

  HINT:

  For vehicles with the multi-information display, the master caution indicator light will come on and a warning message will be displayed on the multi-information display if any of the EBD system, BA system, or TRAC system is malfunctioning or if the ABS control or VSC cannot be performed.

ABS, EBP and BA system:

MALFUNCTIONING AREA REFERENCE

Malfunctioning Area	Control Method
ABS system	ABS, BA, TRAC, VSC, downhill assist control (for 4WD) and hill-start assist control prohibited
BA system	ABS, BA, TRAC, VSC, downhill assist control (for 4WD) and hill-start assist control prohibited
EBD system	ABS, EBD, BA, TRAC, VSC, downhill assist control (for 4WD) and hill-start assist control prohibited

HINT:

A malfunction in either the ABS or BA system will result in identical operation, with ABS, BA, TRAC, VSC, downhill assist control (for 4WD) and hill-start assist control system control being prohibited.

TRAC, VSC, downhill assist control (for 4WD) and hill-start assist control system:

MALFUNCTIONING AREA REFERENCE

Malfunctioning 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
Brake control system (TRAC, downhill assist control (for 4WD) and hill-start assist control systems)	Before control: Disables control During control: Disables control (by gradually stopping control)

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HINT:

The TRAC, VSC, downhill assist control (for 4WD) and hill-start assist control systems use different systems to prohibit different controls depending on the malfunctioning parts.

2. **SYSTEM TEMPERATURE PROTECTION OPERATION**

If the TRAC, downhill assist control (for 4WD) or hill-start assist control system has been used constantly for a long time, the temperature of the brake actuator may excessively increase. If the temperature excessively increases, the skid control buzzer will sound intermittently. If the temperature further increases, the skid control buzzer sounds and the indicator light either comes on or blinks.

INDICATOR CONDITION REFERENCE

System	Indicator Condition
TRAC and hill-start assist control systems	Slip indicator light comes on
Downhill assist control system (for 4WD)	Slip indicator light comes on Downhill assist control indicator light blinks

HINT:

- If the slip indicator light goes off (for the downhill assist control system, the downhill assist control indicator light also comes on (for 4WD)), the systems automatically return to normal operating conditions.
- As this is not a malfunction, no DTC will be recorded.

DATA LIST/ACTIVE TEST

1. **DATA LIST**

HINT:

Using 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 off.
c. Connect Techstream to the DLC3.
d. Turn the ignition switch on (IG).
e. Turn Techstream on.

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f. Enter the following menus: Chassis/ABS/VSC/TRAC/Data List.
g. According to the display on the tester, read the Data List.

ABS/VSC/TRAC:

ABS/VSC/TRAC TESTER DISPLAY REFERENCE

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	-
Slip Indicator Light	Slip indicator light/ON or OFF	ON: Indicator light ON OFF: Indicator light OFF	-
Downhill Assist Control Light ((1))	Downhill assist control 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	-
Brake Pedal Load Sensing SW	Brake pedal load sensing switch/ON or OFF	ON: Brake pedal depressed beyond the specified point OFF: Brake pedal not depressed beyond the specified point	-
Gear Position	Gear position information/P/N, R, 1st-8th, 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	-

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Inspection Mode	Inspection mode/OTHER or INSPECT	OTHER: Normal mode INSPECT: Inspection mode	-
Number of IG ON (Inspection)	Number of ignition switch being turned on (IG) after entering inspection mode/min.: 0, max.: 255	Min.: 0 Max.: 255	-
Downhill Assist Control SW ((1))	Downhill assist control switch/ON or OFF	ON: Switch ON OFF: Switch OFF	-
Master Cylinder Sensor	Master cylinder pressure sensor/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/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
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 Sensor 2	Acceleration sensor 2/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
Zero Point of Decele 2	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	Vehicle stationary: 0 deg/s Right turn: -128 to 0 deg/s Left turn: 0 to 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 Sensor 2	Yaw rate sensor 2/min.: -128 deg/s, max.: 127 deg/s	Vehicle stationary: 0 deg/s Right turn: -128 to 0 deg/s Left turn: 0 to 127 deg/s	-
Zero Point of Yaw Rate 2	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.:	Min.:-25.11 m/s^2	-

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	24.91 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	-
Stop Light Relay ((2))	Stop light control relay/ON or OFF	ON: Relay ON OFF: Relay OFF	-
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
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	-
Stop Light Relay Output ((2))	Stop light control relay output/ON or OFF	ON: Relay output ON OFF: Relay output OFF	-
FR Wheel ABS Ctrl Status	FRL wheel ABS control status/ON or OFF	ON: During control	-
FL Wheel ABS Ctrl Status	FL wheel ABS control status/ON or OFF	ON: During control	-
RR Wheel ABS Ctrl Status	RR wheel ABS control status/ON or OFF	ON: During control	-
RL Wheel ABS Ctrl Status	RL wheel ABS control status/ON or OFF	ON: During control	-

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RR Wheel EBD Ctrl Status	RR wheel EBD control status/ON or OFF	ON: During control	-
RL Wheel EBD Ctrl Status	RL wheel EBD control status/ON or OFF	ON: During control	-
BA Ctrl Status	BA control status/ON or OFF	ON: During control	-
TRC (TRAC) Ctrl Status	TRAC control status/ON or OFF	ON: During control	-
TRC (TRAC) Engine Ctrl Status	TRAC engine control status/ON or OFF	ON: During control	-
TRC (TRAC) Brake Ctrl Status	TRAC brake control status/ON or OFF	ON: During control	-
FR Wheel VSC Ctrl Status	FR wheel VSC control status/ON or OFF	ON: During control	-
FL Wheel VSC Ctrl Status	FL wheel VSC control status/ON or OFF	ON: During control	-
RR Wheel VSC Ctrl Status	RR wheel VSC control status/ON or OFF	ON: During control	-
RL Wheel VSC Ctrl Status	RL wheel VSC control status/ON or OFF	ON: During 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 N*m, max.: 1023 N*m	Min.:-1024 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	-
ABS 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)CA/SC Solenoid (SM2)	Master cut solenoid (SM2)/ON or OFF	ON: Operates	-
TR (A)CA/SC 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	-

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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	-
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	-
TRC/VSC Off Mode	VSC OFF switch/NORMAL, TRC OFF or VSC OFF	NORMAL: Normal mode TRC 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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IG Voltage Value Decreased	IG voltage value decrease detection/ERROR or NORMAL	ERROR: Decrease NORMAL: Normal	-
IG Voltage Value Increased	IG voltage value increase detection/ERROR or NORMAL	ERROR: Increase NORMAL: Normal	-
FR Speed Sensor Voltage Open	FR speed sensor voltage open detection/ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
FL Speed Sensor Voltage Open	FL speed sensor voltage open detection/ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RR Speed Sensor Voltage Open	RR speed sensor voltage open detection/ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RL Speed Sensor Voltage Open	RL speed sensor voltage open detection/ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
M/C Pressure Sensor Noise	Master cylinder pressure sensor noise detection/ERROR or NORMAL	ERROR: Malfunction NORMAL: Normal	-
Brake Pedal Switch Open	Brake pedal load sensing switch open detection/ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
Yaw Rate Sensor Voltage Open	Yaw rate sensor voltage open detection/ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
EFI Communication Invalid	EFI communication invalid detection/ERROR or NORMAL	ERROR: Invalid NORMAL: Normal	-
(1) for 4WD (2) with downhill assist control (for 4WD) or hill-start assist control			

2. **ACTIVE TEST**

HINT:

Using 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 off.
c. Connect Techstream to the DLC3.
d. Turn the ignition switch on (IG).
e. Turn Techstream on.

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f. Enter the following menus: Chassis/ABS/VSC/TRAC/Active Test.
g. According to the display on the tester, perform the Active Test.

ABS/VSC/TRAC:

ABS/VSC/TRAC TESTER DISPLAY REFERENCE

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
Slip Indicator Light	Slip indicator light	Indicator light ON/OFF	Observe combination meter
VSC OFF Indicator Light	VSC OFF indicator light	Indicator light ON/OFF	Observe combination meter
TRAC OFF Indicator Light	TRAC OFF indicator light	Indicator light ON/OFF	Observe combination meter
Downhill Assist Control Light ((1))	Downhill assist control 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
Stop Light Relay ((2))	Stop light control relay	Relay ON/OFF	Stop lights come on
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/TRC Solenoid (SMR)	Master cut solenoid (SM2)	Solenoid ON/OFF	Operating sound of solenoid (clicking sound) can be heard
VSC/TRC Solenoid	Master cut solenoid	Solenoid	Operating sound of solenoid

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(SMF)	(SM1)	ON/OFF	(clicking sound) can be heard

(1) for 4WD

(2) with downhill assist control (for 4WD) or hill-start assist control

DIAGNOSTIC TROUBLE CODE CHART

NOTE: Turn the ignition switch off before removing any parts.

HINT:

- If no abnormality is found when inspecting parts, inspect the skid control ECU and ground points for poor connections.
- 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.
- For DTCs indicated by the warning light or indicator light, refer to the DTC charts in DTC Check/Clear.
- Inspect the fuses and relays before inspecting the trouble areas as shown in the table below.

DTC chart for ABS:

ABS DTC CHART

DTC Code	Detection Item	Trouble Area
C0226	SFR Solenoid Circuit	1. SFRR or SFRH circuit 2. Brake actuator assembly
C0236	SFL Solenoid Circuit	1. SFLR or SFLH circuit 2. Brake actuator assembly
C0246	SRR Solenoid Circuit	1. SRRR or SRRH circuit 2. Brake actuator assembly
C0256	SRL Solenoid Circuit	1. SRLR or SRLH circuit 2. Brake actuator assembly
C0273 (*1)	Open in ABS Motor Relay Circuit	1. Fusible link block (VSC NO. 1 fuse) 2. ABS motor relay circuit 3. Brake actuator assembly (ABS motor relay)
C0274	Short in ABS Motor Relay Circuit	1. ABS motor relay circuit 2. Brake actuator assembly (ABS motor relay)
		1. Fusible link block (VSC

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C0278	Open in ABS Solenoid Relay Circuit	NO. 2 fuse) 2. ABS solenoid relay circuit 3. Brake actuator assembly (ABS solenoid relay)
C0279	Short in ABS Solenoid Relay Circuit	1. ABS solenoid relay circuit 2. Brake actuator assembly (ABS solenoid relay)
C1225	SM Solenoid Circuit	1. SM1 or SM2 circuit 2. Brake actuator assembly
C1241	Low Power Supply Voltage Malfunction	1. ECU-IG NO. 2 fuse 2. Battery 3. Charging system 4. Power source circuit 5. Internal power supply circuit of the skid control ECU
C1243 (*1)	Acceleration Sensor Stuck Malfunction	1. Sensor installation 2. Yaw rate and acceleration sensor
C1245 (*1)	Acceleration Sensor Output Malfunction	1. Sensor installation 2. Yaw rate and acceleration sensor
C1337	Different Diameter Tire Malfunction	1. Tire and wheel size 2. Tire deformation 3. Speed sensor rotor 4. Speed sensor 5. Speed sensor circuit 6. Brake actuator assembly (Skid control ECU)
C1361	Short in ABS Motor Fail Safe Relay Circuit	1. Fusible link block (VSC NO. 1 fuse) 2. ABS motor fail safe relay circuit 3. Brake actuator assembly (ABS motor fail safe relay)
C1381	Acceleration Sensor Power Supply Voltage Malfunction	1. Yaw rate and acceleration sensor power source circuit 2. Yaw rate and acceleration sensor

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C1401 (*1)	Front Speed Sensor RH Malfunction	1. Front speed sensor RH 2. Speed sensor rotor
C1402 (*1)	Front Speed Sensor LH Malfunction	1. Front speed sensor LH 2. Speed sensor rotor
C1403 (*1)	Rear Speed Sensor RH Malfunction	1. Rear speed sensor RH 2. Speed sensor rotor
C1404 (*1)	Rear Speed Sensor LH Malfunction	1. Rear speed sensor LH 2. Speed sensor rotor
C1405 (*1)	Open or Short in Front Speed Sensor RH Circuit	1. Front speed sensor RH 2. Speed sensor circuit 3. Brake actuator assembly (Skid control ECU)
C1406 (*1)	Open or Short in Front Speed Sensor LH Circuit	1. Front speed sensor LH 2. Speed sensor circuit 3. Brake actuator assembly (Skid control ECU)
C1407 (*1)	Open or Short in Rear Speed Sensor RH Circuit	1. Rear speed sensor RH 2. Speed sensor circuit 3. Brake actuator assembly (Skid control ECU)
C1408 (*1)	Open or Short in Rear Speed Sensor LH Circuit	1. Rear speed sensor LH 2. Speed sensor circuit 3. Brake actuator assembly (Skid control ECU)
C1413 (*1)	Front Speed Sensor RH Output Malfunction	1. Front speed sensor RH 2. Speed sensor circuit 3. Speed sensor rotor 4. Brake actuator assembly (Skid control ECU)
C1414 (*1)	Front Speed Sensor LH Output Malfunction	1. Front speed sensor LH 2. Speed sensor circuit 3. Speed sensor rotor 4. Brake actuator assembly (Skid control ECU)
C1415 (*1)	Rear Speed Sensor RH Output Malfunction	1. Rear speed sensor RH 2. Speed sensor circuit 3. Speed sensor rotor

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		4. Brake actuator assembly (Skid control ECU)
C1416 (*1)	Rear Speed Sensor LH Output Malfunction	1. Rear speed sensor LH 2. Speed sensor circuit 3. Speed sensor rotor 4. Brake actuator assembly (Skid control ECU)
C1417	High Power Supply Voltage Malfunction	1. ECU-IG NO. 2 fuse 2. Battery 3. Charging system 4. Power source circuit 5. Internal power supply circuit of the skid control ECU
C1419	Acceleration Sensor Internal Circuit	Yaw rate and acceleration sensor
C1420	Acceleration Sensor Malfunction	1. Sensor installation 2. Yaw rate and acceleration sensor
C1421 (*2)	Open or Short in Master Cylinder Pressure Sensor	Brake actuator assembly (Master cylinder pressure sensor)
C1422 (*2)	Master Cylinder Pressure Sensor Zero Point High Malfunction	1. Stop light switch 2. Stop light switch circuit 3. Master cylinder pressure sensor circuit 4. Brake actuator assembly (Master cylinder pressure sensor)
C1423 (*2)	Master Cylinder Pressure Sensor Zero Point Low Malfunction	Brake actuator assembly (Master cylinder pressure sensor)
C1424 (*2)	Master Cylinder Pressure Sensor Output Malfunction	Brake actuator assembly (Master cylinder pressure sensor)
C1425 (*3)	Open in Stop Light Switch Circuit	1. STOP fuse 2. Stop light switch 3. Stop light switch circuit 4. Stop light control relay 5. Stop light control relay circuit 6. Brake actuator assembly (Skid control ECU)

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C1426	Stop Light Switch OFF Stuck Malfunction	1. STOP fuse 2. Stop light switch 3. Stop light switch circuit 4. Stop light control relay 5. Stop light control relay circuit 6. Brake actuator assembly (Skid control ECU)
C1427 (*1)	Motor Malfunction	1. Brake actuator assembly (Ground circuit) 2. Brake actuator assembly (Motor circuit)
C1428 (*1)	Motor Circuit Malfunction	Brake actuator assembly (Motor circuit)
C1429	Open or Short in Brake Pedal Load Sensing Switch	1. Brake pedal load sensing switch 2. Brake pedal load sensing switch circuit 3. Brake actuator assembly (Skid control ECU)
C1430	Brake Pedal Load Sensing Switch OFF Stuck Malfunction	1. Brake pedal load sensing switch 2. Brake pedal load sensing switch circuit
C1431	Brake Pedal Load Sensing Switch ON Stuck Malfunction	1. Brake pedal load sensing switch 2. Brake pedal load sensing switch circuit
C1442	Invalid Data Received from Acceleration Sensor	Yaw rate and acceleration sensor
U0073	Control Module Communication Bus OFF	CAN communication system
U0124	Lost Communication with Lateral Acceleration Sensor Module	CAN communication system (Skid control ECU to yaw rate and acceleration sensor)

(*1 to *3):
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.

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b. Clear the DTCs.

- (*2):
  a. Turn the ignition switch on (IG).
  b. Keep the vehicle stationary for 5 seconds or more and depress the brake pedal lightly 2 or 3 times.
  c. Drive the vehicle at the vehicle speed of 50 km/h (31 mph) and depress and hold the brake pedal firmly for approximately 3 seconds.
  d. Repeat the above operation 3 times or more and check that the ABS warning light goes off.
  e. Clear the DTCs.
- (*3):
  a. Turn the ignition switch on (IG).
  b. Depress the brake pedal.
  c. Clear the DTCs.

HINT:

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

DTC chart for VSC:

VSC DTC CHART

DTC Code	Detection Item	Trouble Area
C1201	Engine Control System Malfunction	Engine control system
C1203	ECM Communication Circuit Malfunction	ECM
C1210	Zero Point Calibration of Yaw Rate Sensor Undone	Yaw rate and acceleration sensor
C1232	Acceleration Sensor Stuck Malfunction	1. Sensor installation 2. Yaw rate and acceleration sensor
C1290	Steering Angle Sensor Zero Point Malfunction	1. Yaw rate and acceleration sensor zero point calibration incomplete 2. Poor adjustment of the center position of the steering wheel 3. Poor adjustment of front wheel alignment
C1336	Zero Point Calibration of Acceleration Sensor Undone	Yaw rate and acceleration sensor

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C1380	Stop Light Control Relay Malfunction	1. Stop light switch 2. Stop light switch circuit 3. Stop light control relay 4. Stop light control relay circuit 5. Brake actuator assembly (Skid control ECU)
C1432	Steering Angle Sensor Power Source Voltage Malfunction	1. Steering angle sensor power supply 2. Steering angle sensor
C1433	Steering Angle Sensor Internal Circuit	Steering angle sensor
C1434	Steering Angle Sensor Output Malfunction	1. Steering angle sensor power supply 2. Steering angle sensor 3. Brake actuator assembly (Skid control ECU)
C1435	Yaw Rate Sensor Internal Circuit	Yaw rate and acceleration sensor
C1436	Yaw Rate Sensor Malfunction	Yaw rate and acceleration sensor
C1437	Lost Communication with ECM	1. CAN communication system (Skid control ECU to ECM) 2. Brake actuator assembly (Skid control ECU)
C1439	Steering Angle Sensor Initialization Incomplete	1. Steering angle sensor 2. Yaw rate and acceleration sensor 3. Brake actuator assembly (Skid control ECU)
C1440	Unusual Bank Angle Detected	Yaw rate and acceleration sensor
C1441	Brake Booster Malfunction	Brake booster assembly
C1443	Invalid Data Received from Yaw Rate Sensor	Yaw rate and acceleration sensor
C1445	Vehicle Driven with Steering Angle Sensor not Initialized	1. Steering angle sensor 2. Yaw rate and acceleration sensor 3. Brake actuator assembly (Skid control ECU)
U0100	Lost Communication with ECM/PCM	CAN communication system (Skid control ECU to ECM)
U0123	Lost Communication with Yaw	CAN communication system

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	Rate Sensor Module	(Skid control ECU to yaw rate and acceleration sensor)
U0126	Lost Communication with Steering Angle Sensor Module	CAN communication system (Skid control ECU to steering angle sensor)

HINT:

In some cases, Techstream cannot be used when the slip indicator light remains on.

Test Mode DTC for ABS:

TEST MODE DTC CHART FOR ABS

DTC Code	Detection Item	Trouble Area
C1271	Low Output Signal of Front Speed Sensor RH (Test Mode DTC)	1. Front speed sensor RH 2. Sensor installation 3. Speed sensor rotor
C1272	Low Output Signal of Front Speed Sensor LH (Test Mode DTC)	1. Front speed sensor LH 2. Sensor installation 3. Speed sensor rotor
C1273	Low Output Signal of Rear Speed Sensor RH (Test Mode DTC)	1. Rear speed sensor RH 2. Sensor installation 3. Speed sensor rotor
C1274	Low Output Signal of Rear Speed Sensor LH (Test Mode DTC)	1. Rear speed sensor LH 2. Sensor installation 3. Speed sensor rotor
C1275	Abnormal Change in Output Signal of Front Speed Sensor RH (Test Mode DTC)	Speed sensor rotor
C1276	Abnormal Change in Output Signal of Front Speed Sensor LH (Test Mode DTC)	Speed sensor rotor
C1277	Abnormal Change in Output Signal of Rear Speed Sensor RH (Test Mode DTC)	Speed sensor rotor
C1278	Abnormal Change in Output Signal of Rear Speed Sensor LH (Test Mode DTC)	Speed sensor rotor
C1279	Acceleration Sensor Output Voltage Malfunction (Test Mode DTC)	1. Sensor installation 2. Yaw rate and acceleration sensor

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C1281	Master Cylinder Pressure Sensor Output Malfunction (Test Mode DTC)	1. Stop light switch 2. Brake pedal load sensing switch 3. Master cylinder pressure sensor

Test Mode DTC for VSC:

TEST MODE DTC CHART FOR VSC

DTC Code	Detection Item	Trouble Area
C0371	Yaw Rate Sensor (Test Mode DTC)	Yaw rate and acceleration sensor
C1379 ((1))	Downhill Assist Control Switch Malfunction (Test Mode DTC)	Downhill assist control switch
(1) for 4WD		

DTC C0226 SFR SOLENOID CIRCUIT; DTC C0236 SFL SOLENOID CIRCUIT; DTC C0246 SRR SOLENOID CIRCUIT; DTC C0256 SRL SOLENOID CIRCUIT; DTC C1225 ISM 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 C0236 C0246 C0256	Open or short in the solenoid circuit continues for 0.05 seconds or more.	• Solenoid circuit • Brake actuator assembly
C1225	Any of the following is detected: 1. While switching solenoid (SM1 or SM2) is ON, over current continues for 0.15 seconds or more. 2. While switching solenoid (SM1 or SM2) is OFF, an open circuit continues for 0.05 seconds or more. 3. While switching solenoid (SM1 or SM2) is ON, an open circuit continues for 0.05 seconds or more. 4. While switching solenoid (SM1 or SM2) is 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.	• SM1 or SM2 circuit • Brake actuator assembly

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	6. Switching solenoids SM1 and SM2 are shorted for 0.1 seconds or more.	

WIRING DIAGRAM

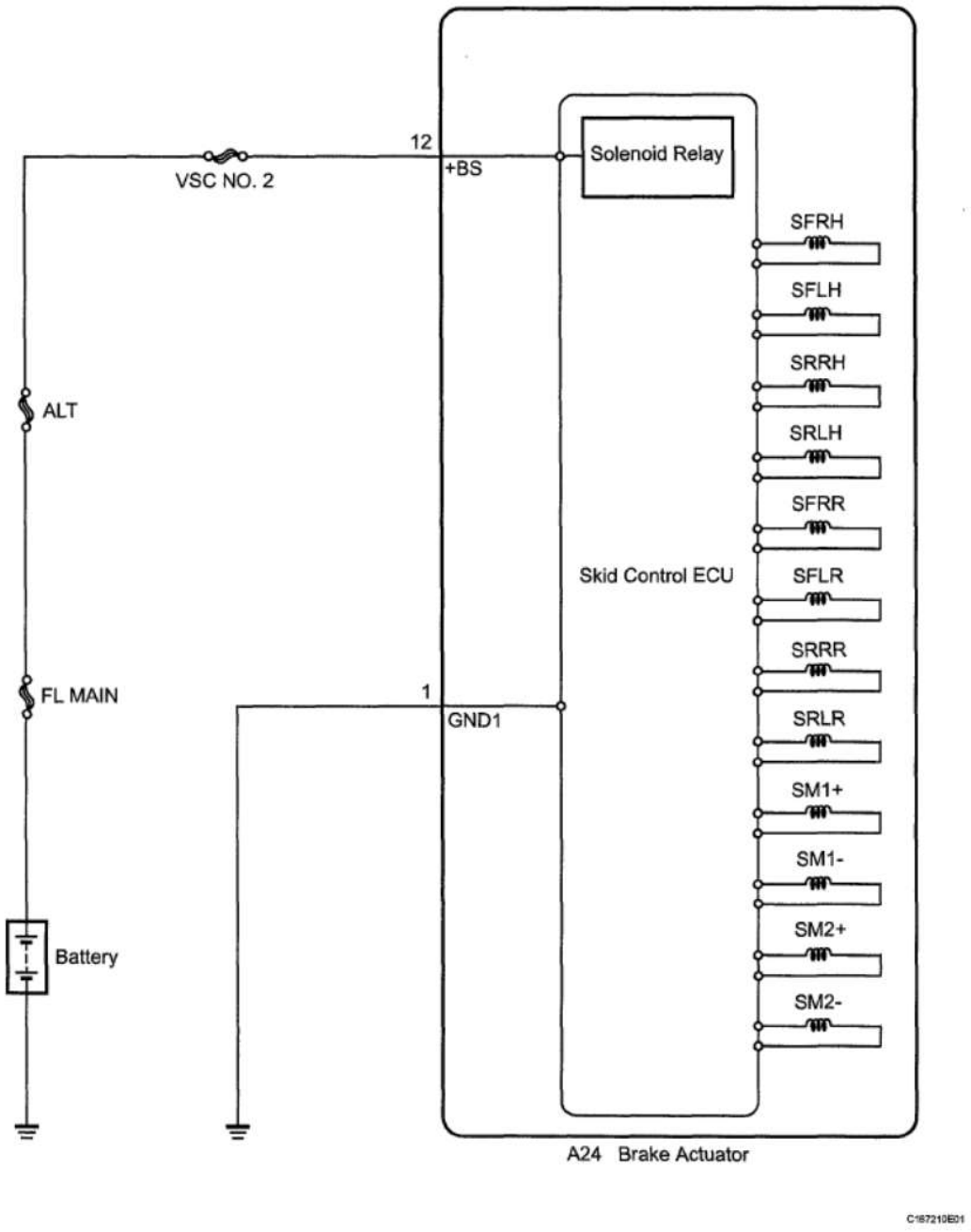


Fig. 35: Skid Control ECU - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

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NOTE: When replacing the brake actuator assembly, perform zero point calibration (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 DTCs are output before replacing the brake actuator assembly.

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

Result

RESULT CHART

Result	Proceed to
DTCs (C0226, C0236, C0246, C0256 and C1225) are not output	A
DTCS (C0226, C0236, C0246, C0256 and/or C1225) are 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 (IG) and the stop light switch off, the ECU performs self diagnosis of the motor and solenoid circuits.
- If the normal system code is output (no trouble codes are 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 **DIAGNOSIS SYSTEM**)

DTC C0273 OPEN IN ABS MOTOR RELAY CIRCUIT; DTC C0274 SHORT IN ABS MOTOR RELAY CIRCUIT; DTC C1361 SHORT IN ABS MOTOR FAIL SAFE RELAY CIRCUIT

DESCRIPTION

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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, these DTCs may be stored.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C0273	Either of the following is detected: 1. All of the following conditions continue for 0.1 seconds or more. o The IG1 terminal voltage is between 9.5 and 17.2 V. o While initial check, or ABS, BA, TRAC or VSC is operating. o Relay contact remains open when the relay is ON. 2. Both of the following conditions continue for 0.1 seconds or more. o The IG1 terminal voltage is less than 9.5 V. o Relay contact remains open when the relay is ON.	• Fusible link block (VSC NO. 1 fuse) • ABS motor relay circuit • Brake actuator assembly (ABS motor relay)
C0274	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	Immediately after the ignition switch is turned on (IG), the relay contact is closed for 4 seconds when the motor fail safe relay is OFF.	• Fusible link block (VSC NO. 1 fuse) • ABS motor fail safe relay circuit • Brake actuator assembly (ABS motor fail safe relay)

WIRING DIAGRAM

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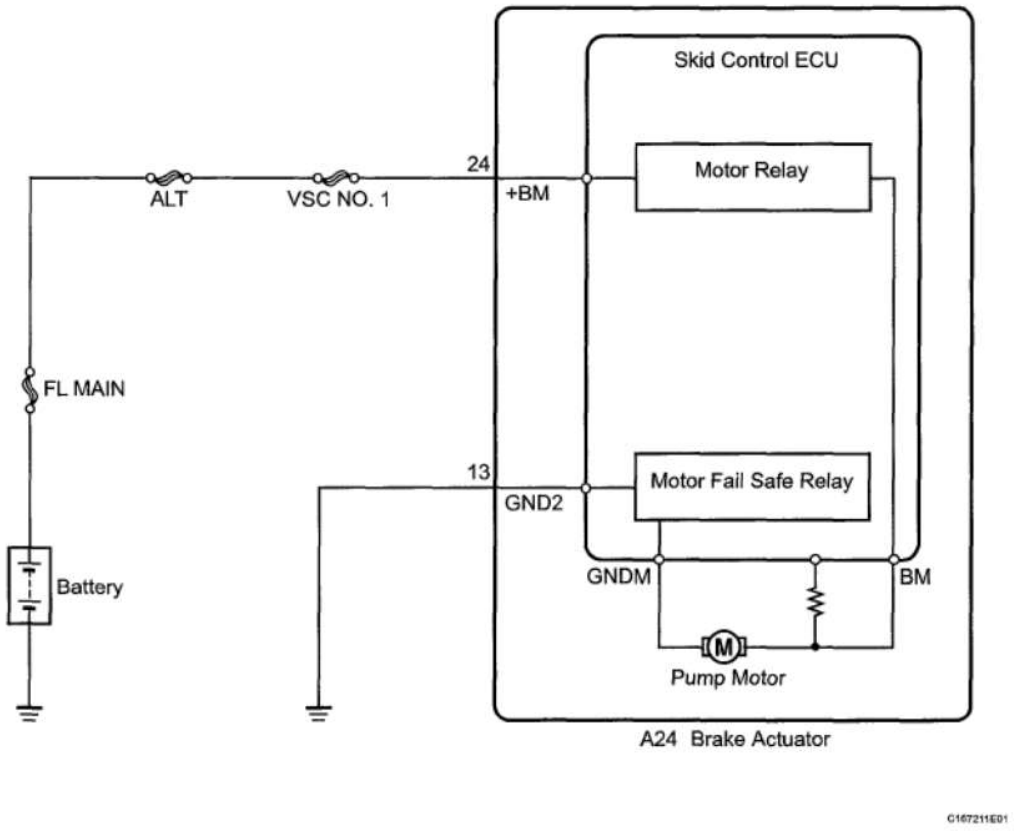


Fig. 36: ABS Motor Fail Safe Relay - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

HINT:

When C1241 and/or C1417 is output together with C0273, C0274 and/or C1361, inspect and repair the trouble areas indicated by C1241 and/or C1417 first (See **DTC C1241 LOW POWER SUPPLY VOLTAGE MALFUNCTION**, or **DTC C1417 HIGH POWER SUPPLY VOLTAGE MALFUNCTION**).

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

   ABS/VSC/TRAC

   ABS/VSC/TRAC TESTER DISPLAY REFERENCE

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

Result

RESULT CHART

Result	Proceed to
Operating sound is not heard	A
Operating sound is heard	B

B: Go to step 5

A: Go to next step

2. **INSPECT VSC NO. 1 FUSE**
   a. Turn the ignition switch off.
   b. Remove the fusible link block from the engine room relay block.
   c. Check if the fusible link is melted.

      OK:

      The fusible link is not melted.

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

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
VSC NO. 1 (50 A) fuse-Body ground	Always	Below 1 ohms

NG: REPLACE FUSIBLE LINK BLOCK (VSC NO. 1 FUSE)

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Engine Room Relay Block:

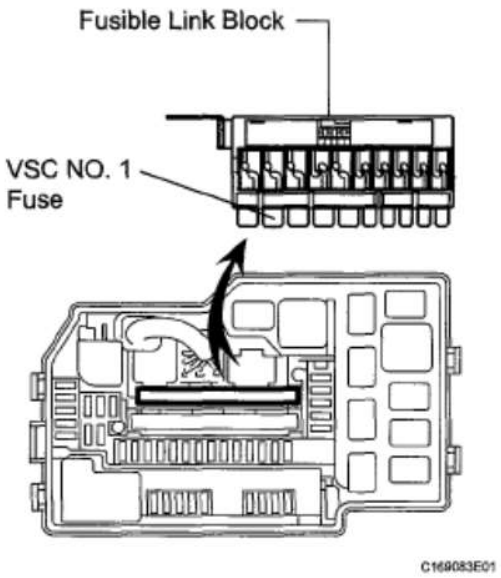


Fig. 37: Identifying VSC No. 1 Fuse And Fusible Link Block
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

3. **INSPECT SKID CONTROL ECU (+BM TERMINAL)**
   a. Install the fusible link block to the engine room relay block with the nut.
   b. Make sure that there is no looseness at the locking part and the connecting part of the connectors.
   c. Disconnect the skid control ECU connector.
   d. Measure the voltage according to the value (s) in the table below.

Standard voltage

VOLTAGE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-24 (+BM) - Body ground	Always	11 to 14 V

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

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

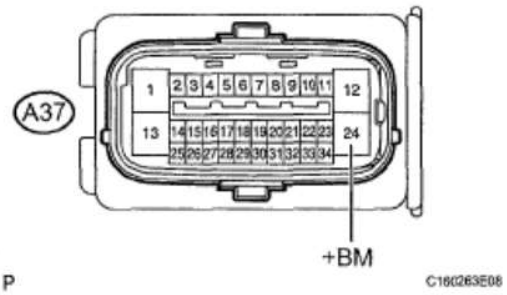


Fig. 38: Identifying +BM Terminal Of Skid Control ECU Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

4. **INSPECT SKID CONTROL ECU (GND2 TERMINAL)**
   a. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-13 (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)

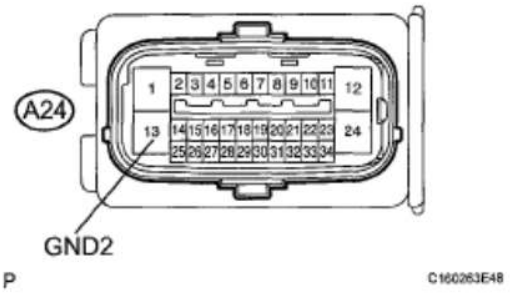


Fig. 39: Identifying GND2 Terminal Of Skid Control ECU Connector

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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 off.
b. Reconnect the skid control ECU connector.
c. Clear the DTCs (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
DTCs (C0273, C0274 and C1361) are not output	A
DTCs (C0273, C0274 and/or C1361) are 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 (IG) and the stop light switch off, the ECU performs self diagnosis of the motor and solenoid circuits.
- If the normal system code is output (no trouble codes are 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 **DIAGNOSIS SYSTEM**)

DTC C0278 OPEN IN ABS SOLENOID RELAY CIRCUIT; DTC C0279 SHORT IN ABS SOLENOID

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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 on (IG), and is turned off if an open or short in the solenoid is detected by 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	Either of the following is detected: 1. Both of the following conditions continue for 0.2 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 0.2 seconds or more. o The IG1 terminal voltage becomes lower than 9.5 V when the relay is turned on. o The relay contact remains open.	• Fusible link block (VSC NO. 2 fuse) • ABS solenoid relay circuit • Brake actuator assembly (ABS solenoid relay)
C0279	Immediately after the ignition switch is turned on (IG), 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, C0236, C0246, C0256 and C1225 (See **WIRING DIAGRAM**).

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

HINT:

When C1241 and/or C1417 is output together with C0278 and/or C0279, inspect and repair the trouble areas indicated by C1241 and/or C1417 first (See **DTC C1241 LOW POWER SUPPLY VOLTAGE MALFUNCTION**, or **DTC C1417 HIGH POWER SUPPLY VOLTAGE MALFUNCTION**).

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1. **INSPECT VSC NO. 2 FUSE**
   a. Remove the fusible link block from the engine room relay block.
   b. Check if the fusible link is melted.

      OK:

      The fusible link is not melted.

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

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
VSC NO. 2 (30 A) fuse-Body ground	Always	Below 1 ohms

NG: REPLACE FUSIBLE LINK BLOCK (VSC NO. 2 FUSE)

Engine Room Relay Block:

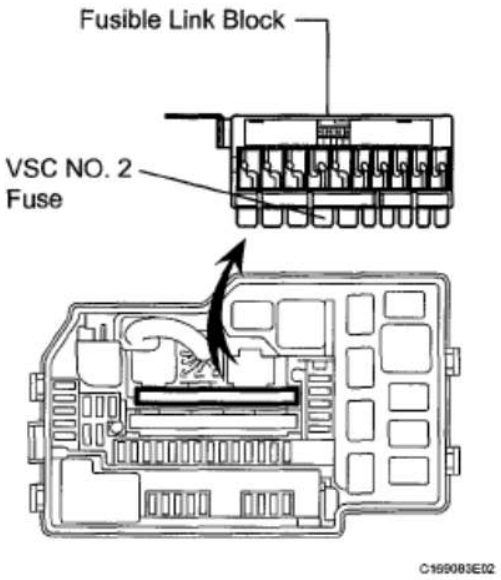


Fig. 40: Identifying Fusible Link Block And VSC No. 2 Fuse
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

2. **INSPECT SKID CONTROL ECU (+BS TERMINAL)**
   a. Install the fusible link block to the engine room relay block with the nut.

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b. Make sure that there is no looseness at the locking part and the connecting part of the connectors.
c. Disconnect the skid control ECU connector.
d. Measure the voltage according to the value (s) in the table below.

Standard voltage

VOLTAGE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-12 (+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)

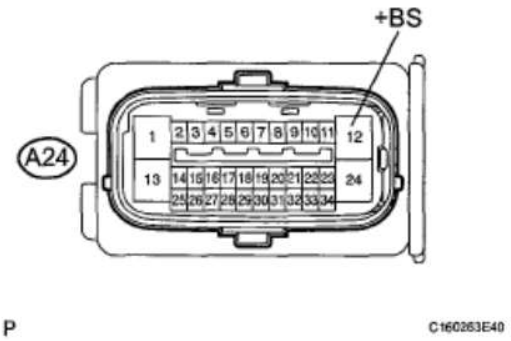


Fig. 41: Identifying +BS Terminal Of Skid Control ECU Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

3. **INSPECT SKID CONTROL ECU (GND1 TERMINAL)**
   a. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-1 (GND1) - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (GND1 CIRCUIT)

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

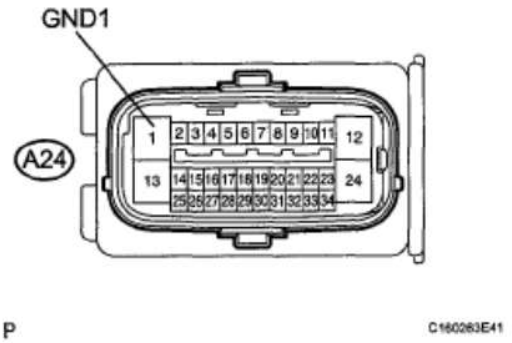


Fig. 42: Identifying GND1 Terminal Of Skid Control ECU Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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 DTCs (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
DTCs (C0278 and C0279) are not output	A
DTCs (C0278 and/or C0279) are 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 (IG) and the stop light switch off, the ECU performs self diagnosis of the motor and solenoid circuits.
- If the normal system code is output (no trouble codes are 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 **DIAGNOSIS SYSTEM**)

DTC C0371 YAW RATE SENSOR (TEST MODE DTC); DTC C1279 ACCELERATION SENSOR OUTPUT VOLTAGE MALFUNCTION (TEST MODE DTC)

DESCRIPTION

DTCs C0371 and C1279 can be deleted when the yaw rate and acceleration sensor sends a yaw rate and/or acceleration signal or when Test Mode ends. DTCs C0371 and C1279 are output only in Test Mode.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C0371	Detected only during Test Mode.	Yaw rate and acceleration sensor
C1279	Detected only during Test Mode.	• Sensor installation • Yaw rate and acceleration sensor

WIRING DIAGRAM

Refer to DTCs C1232, C1243 and C1245 (See **WIRING DIAGRAM**).

INSPECTION PROCEDURE

NOTE: When replacing the yaw rate and acceleration sensor, perform zero point calibration (See CALIBRATION).

1. **CHECK YAW RATE AND ACCELERATION SENSOR INSTALLATION**
   a. Check that the yaw rate and acceleration sensor has been installed properly (See **INSTALLATION**).

      OK:

      The sensor should be tightened to the specified torque.

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The sensor should not be installed in a tilted position.

NG: INSTALL YAW RATE AND ACCELERATION SENSOR CORRECTLY (See **INSTALLATION**)

OK: Go to next step

2. **INSPECT YAW RATE AND ACCELERATION SENSOR (IG TERMINAL)**
   a. Make sure that there is no looseness at the locking part and the connecting part of the connectors.
   b. Disconnect the yaw rate and acceleration sensor connector.
   c. Turn the ignition switch on (IG).
   d. Measure the voltage according to the value (s) in the table below.

Standard voltage

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
O6-4 (IG) - Body ground	Ignition switch on (IG)	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)

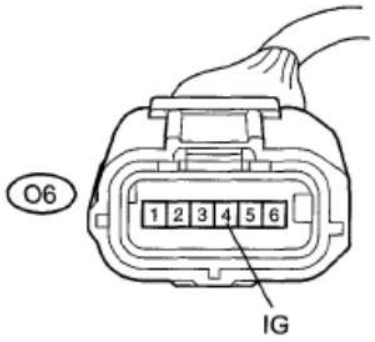


Fig. 43: Identifying IG Terminal Of Yaw Rate And Acceleration Sensor
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

3. **INSPECT YAW RATE AND ACCELERATION SENSOR (GND TERMINAL)**
   a. Turn the ignition switch off.
   b. Measure the resistance according to the value (s) in the table below.

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Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
O6-1 (GND) - Body ground	Always	Below 1 ohms

NOTE: **Check the yaw rate and acceleration sensor signal after replacement (See TEST MODE PROCEDURE).**

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

Front view of wire harness connector:
(to Yaw Rate and Acceleration Sensor)

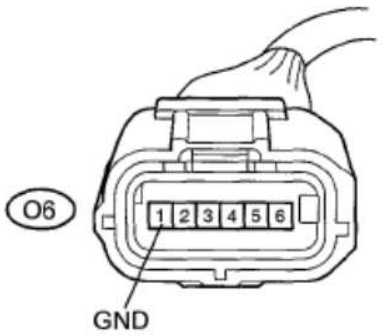


Fig. 44: Identifying GND Terminal Of Yaw Rate And Acceleration Sensor
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: REPLACE YAW RATE AND ACCELERATION SENSOR (See **REMOVAL**)

DTC C1201 ENGINE CONTROL SYSTEM MALFUNCTION

DESCRIPTION

If a malfunction in the engine control system is detected, the operation of VSC and TRAC is prohibited by the fail safe function. When the signals from the engine are input normally, the fail safe control is cancelled and the DTC is not stored.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1201	Engine control system malfunction signal continues for 1 second or more.	Engine control system

INSPECTION PROCEDURE

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1. **CHECK ENGINE CONTROL SYSTEM**
   a. Check if any engine control system DTC is output (See **DTC CHECK/CLEAR** for 2GR-FE, or See **DTC CHECK/CLEAR** for 1 AR-FE).

Result

RESULT CHART

Result	Proceed to
DTC is not output (for 2GR-FE)	A
DTC is not output (for 1AR-FE)	B
DTC is output (for 2GR-FE)	C
DTC is output (for 1AR-FE)	D

B: REPLACE ECM (for 1 AR-FE) (See **REMOVAL**)

C: INSPECT ENGINE CONTROL SYSTEM (for 2GR-FE) (See **DIAGNOSTIC TROUBLE CODE CHART**)

D: INSPECT ENGINE CONTROL SYSTEM (for 1 AR-FE) (See **DIAGNOSTIC TROUBLE CODE CHART**)

A: REPLACE ECM (for 2GR-FE) (See **REMOVAL**)

DTC C1203 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	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

1. **CHECK PART NUMBER (ECM AND BRAKE ACTUATOR ASSEMBLY)**
   a. Check that the proper ECM and brake actuator assembly (skid control ECU) are installed.

OK:

Proper ECUs are installed.

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Result

RESULT CHART

Result	Proceed to
OK (for 2GR-FE)	A
OK (for 1AR-FE)	B
NG	C

B: REPLACE ECM (for 1AR-FE) (See **REMOVAL**)

C: REPLACE ECUS WITH PROPER ONES

A: REPLACE ECM (for 2GR-FE) (See **REMOVAL**)

DTC C1210 ZERO POINT CALIBRATION OF YAW RATE SENSOR UNDONE; DTC C1336 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 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, DTCs U0123 (yaw rate sensor communication trouble) and U0124 (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	Zero point calibration of yaw rate sensor undone.	Yaw rate and acceleration sensor
C1336	Zero point calibration of acceleration sensor undone.	Yaw rate and acceleration sensor

WIRING DIAGRAM

Refer to DTCs C1232, C1243 and C1245 (See **WIRING DIAGRAM**).

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly or yaw rate and acceleration sensor, perform zero point calibration (See CALIBRATION).

HINT:

When U0123, U0124 and/or U0126 is output together with C1210 and/or C1336, inspect and repair the trouble

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areas indicated by U0123, U0124 and/or U0126 first (See **DTC U0073 CONTROL MODULE COMMUNICATION BUS OFF; DTC U0100 LOST COMMUNICATION WITH ECM/PCM; DTC U0123 LOST COMMUNICATION WITH YAW RATE SENSOR MODULE; DTC U0124 LOST COMMUNICATION WITH LATERAL ACCELERATION SENSOR MODULE; DTC U0126 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. **PERFORM TEST MODE (SIGNAL CHECK)**
   a. Turn the ignition switch off.
   b. Perform the sensor check in the Test Mode procedure (See **TEST MODE PROCEDURE**).

   OK:

   All Test Mode DTCs are erased.

   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: Go to step 3

   OK: END

3. **CHECK YAW RATE AND ACCELERATION SENSOR INSTALLATION**
   a. Turn the ignition switch off.
   b. Check that the yaw rate and acceleration sensor has been installed properly (See **INSTALLATION**).

   OK:

   The sensor should be tightened to the specified torque.

   The sensor should not be installed in a tilted position.

   NG: INSTALL YAW RATE AND ACCELERATION SENSOR CORRECTLY (See **INSTALLATION**)

   OK: Go to next step

4. **READ VALUE ON TECHSTREAM (YAW RATE AND ACCELERATION SENSOR)**
   a. Connect Techstream to the DLC3.
   b. Turn the ignition switch on (IG).
   c. Select the Data List mode on Techstream (See **DATA LIST/ACTIVE TEST**).

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ABS/VSC/TRAC:

ABS/VSC/TRAC TESTER DISPLAY REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Deceleration Sensor	Acceleration sensor/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
Deceleration Sensor 2	Acceleration sensor 2/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
Yaw Rate Sensor	Yaw rate sensor/ min.: -128 deg/s, max.: 127 deg/s	Vehicle stationary: 0 deg/s Right turn: -128 to 0 deg/s Left turn: 0 to 127 deg/s	-
Yaw Rate Sensor 2	Yaw rate sensor 2/min.: -128 deg/s, max.: 127 deg/s	Vehicle stationary: 0 deg/s Right turn: -128 to 0 deg/s Left turn: 0 to 127 deg/s	-

d. Check that the yaw rate and acceleration sensor output value displayed on Techstream.

OK:

The yaw rate and acceleration sensor output value is normal.

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: REPLACE YAW RATE AND ACCELERATION SENSOR (See **REMOVAL**)

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

DTC C1232 ACCELERATION SENSOR STUCK MALFUNCTION; DTC C1243 ACCELERATION SENSOR STUCK MALFUNCTION; DTC C1245 ACCELERATION SENSOR OUTPUT MALFUNCTION

DESCRIPTION

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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, DTCs U0123 (malfunction in CAN communication with the yaw rate sensor) and U0124 (malfunction in CAN communication with the acceleration sensor) are set.

These DTCs are also output when calibration has not been completed.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1232	At a vehicle speed of 10 km/h (6 mph) or more, acceleration sensor output value does not change for 30 seconds or more.	• Sensor installation • Yaw rate and acceleration sensor
C1243	While the vehicle speed changes from 30 km/h (19 mph) to 0 km/h (0 mph), the condition that the value of acceleration sensor does not change by 0.0294 G or more occurs 16 times or more.	• Sensor installation • Yaw rate and acceleration sensor
C1245	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 sensor exceeds 0.35 G for 60 seconds or more.	• Sensor installation • Yaw rate and acceleration sensor

WIRING DIAGRAM

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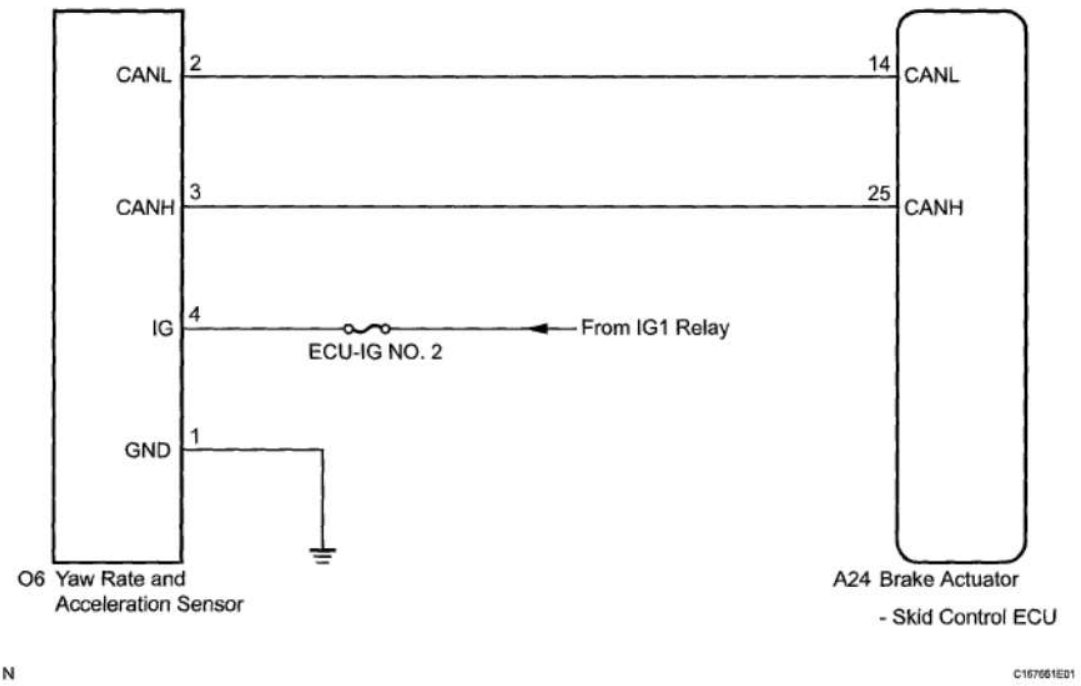


Fig. 45: Yaw Rate And Acceleration Sensor - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When replacing the yaw rate and acceleration sensor, perform zero point calibration (See CALIBRATION).

HINT:

When U0123, U0124 and/or U0126 is output together with C1232, C1243, and/or C1245, inspect and repair the trouble areas indicated by U0123, U0124 and/or U0126 first (See **DTC U0073 CONTROL MODULE COMMUNICATION BUS OFF; DTC U0100 LOST COMMUNICATION WITH ECM/PCM; DTC U0123 LOST COMMUNICATION WITH YAW RATE SENSOR MODULE; DTC U0124 LOST COMMUNICATION WITH LATERAL ACCELERATION SENSOR MODULE; DTC U0126 LOST COMMUNICATION WITH STEERING ANGLE SENSOR MODULE**).

1. **CHECK YAW RATE AND ACCELERATION SENSOR INSTALLATION**
   a. Check that the yaw rate and acceleration sensor has been installed properly (See **INSTALLATION**).

      OK:

      The sensor should be tightened to the specified torque.

The sensor should not be installed in a tilted position.

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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: INSTALL YAW RATE AND ACCELERATION SENSOR CORRECTLY (See **INSTALLATION**)

OK: REPLACE YAW RATE AND ACCELERATION SENSOR (See **REMOVAL**)

DTC C1241 LOW POWER SUPPLY VOLTAGE MALFUNCTION

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	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. When the motor fail safe relay is ON after the motor relay turns 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.	• ECU-IG NO. 2 fuse • Battery • Charging system • Power source circuit • Internal power supply circuit of the skid control ECU

WIRING DIAGRAM

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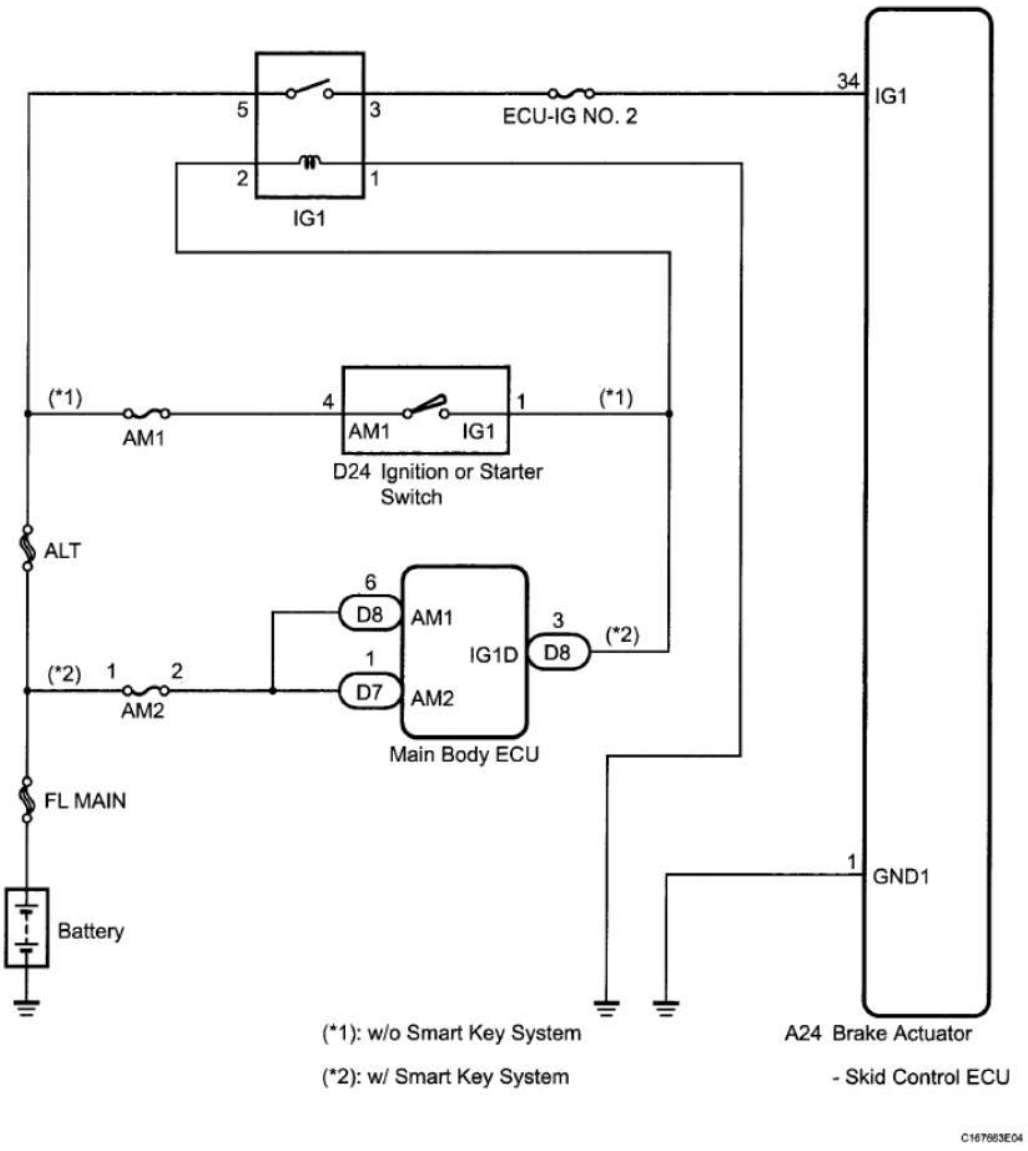


Fig. 46: Power Supply - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

1. **INSPECT ECU-IG NO. 2 FUSE**
   a. Remove the ECU-IG NO. 2 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

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RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
ECU-IG NO. 2 (7.5 A) fuse	Always	Below 1 ohms

NG: REPLACE ECU-IG NO. 2 FUSE

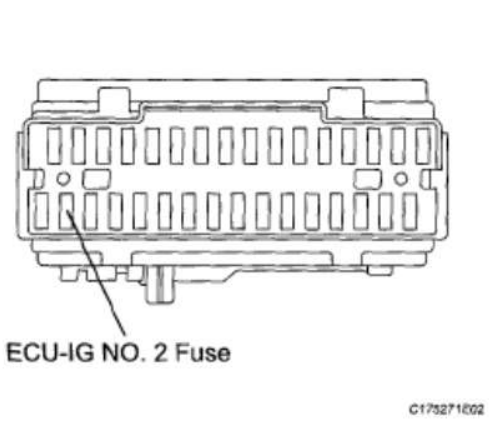


Fig. 47: Identifying ECU-IG No. 2 Fuse
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

2. **CHECK BATTERY**
   a. Install the ECU-IG NO. 2 fuse.
   b. Check the battery voltage.

Standard voltage:

11 to 14 V

Result

RESULT CHART

Result	Proceed to
OK	A
NG (for 2GR-FE)	B
NG (for 1AR-FE)	C

B: CHECK OR REPLACE CHARGING SYSTEM OR BATTERY (for 2GR-FE) (See **PROBLEM SYMPTOMS TABLE**)

C: CHECK OR REPLACE CHARGING SYSTEM OR BATTERY (for 1AR-FE) (See **ON-**

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VEHICLE INSPECTION)

A: Go to next step

3. **INSPECT SKID CONTROL ECU (IG1 TERMINAL)**
   a. Make sure that there is no looseness at the locking part and the connecting part of the connectors.
   b. Disconnect the skid control ECU connector.
   c. Turn the ignition switch on (IG).
   d. Measure the voltage according to the value (s) in the table below.

Standard voltage

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
A24-34 (IG1) - Body ground	Ignition switch on (IG)	11 to 14 V

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

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

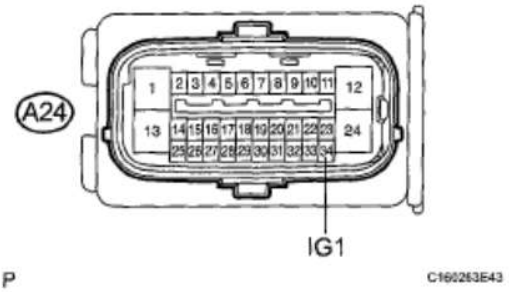


Fig. 48: Identifying IG1 Terminal Of Skid Control ECU Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

4. **INSPECT SKID CONTROL ECU (GND1 TERMINAL)**
   a. Turn the ignition switch off.
   b. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

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Tester Connection	Condition	Specified Condition
A24-1 (GND1) - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (GND1 CIRCUIT)

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

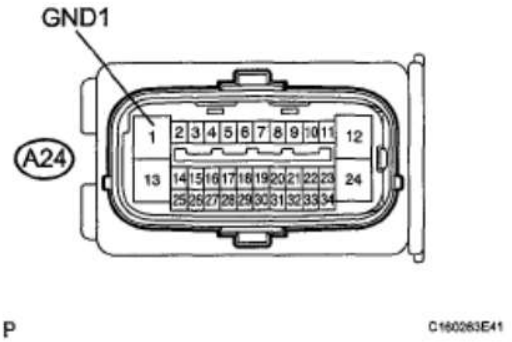


Fig. 49: Identifying GND1 Terminal Of Skid Control ECU Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

5. **RECONFIRM DTC**
   a. Reconnect the skid control ECU connector.
   b. Clear the DTCs (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 (C1241) is not output	A
DTC (C1241) is 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**)

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

DTC C1271 LOW OUTPUT SIGNAL OF FRONT SPEED SENSOR RH (TEST MODE DTC); DTC C1272 LOW OUTPUT SIGNAL OF FRONT SPEED SENSOR LH (TEST MODE DTC); DTC C1275 ABNORMAL CHANGE IN OUTPUT SIGNAL OF FRONT SPEED SENSOR RH (TEST MODE DTC); DTC C1276 ABNORMAL CHANGE IN OUTPUT SIGNAL OF FRONT SPEED SENSOR LH (TEST MODE DTC)

DESCRIPTION

DTCs C1271 to C1276 will be deleted when the speed sensor sends a vehicle speed signal or when Test Mode ends. DTCs from C1271 to C1276 are output only in Test Mode.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1271 C1272	Detected only during Test Mode.	• Front speed sensor RH/LH • Sensor installation • Speed sensor rotor
C1275 C1276	Detected only during Test Mode.	Speed sensor rotor

HINT:

- DTCs C1271 and C1275 are for the front speed sensor RH.
- DTCs C1272 and C1276 are for the front speed sensor LH.

WIRING DIAGRAM

Refer to DTCs C1401 and C1402 (See **WIRING DIAGRAM**).

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

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

ABS/VSC/TRAC:

ABS/VSC/TRAC TESTER DISPLAY REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note

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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	-

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 4

C: Go to step 6

A: Go to next step

2. **REPAIR OR REPLACE HARNESS OR CONNECTOR (SKID CONTROL ECU - FRONT SPEED SENSOR)**
   a. Turn the ignition switch off.
   b. Repair or replace the harness or connector.
   c. Check for any momentary interruption between the skid control ECU and the front speed sensor (See **CHECK FOR INTERMITTENT PROBLEMS**).
   d. Check that there are no momentary interruptions.
3. **PERFORM TEST MODE (SIGNAL CHECK)**
   a. Turn the ignition switch off.
   b. Perform the sensor check in the Test Mode procedure (See **TEST MODE PROCEDURE**).

      OK:

      All Test Mode DTCs are erased.

NG: Go to step 4

OK: END

4. **READ VALUE ON TECHSTREAM (FRONT SPEED SENSOR)**
   a. Turn the ignition switch off.

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b. Connect Techstream to the DLC3.
c. Start the engine.
d. Select the Data List mode on Techstream (See **DATA LIST/ACTIVE TEST**).

ABS/VSC/TRAC:

ABS/VSC/TRAC TESTER DISPLAY REFERENCE

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 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 Techstream is the same as the actual vehicle speed measured using a speedometer tester (calibrated chassis dynamometer).

NG: Go to step 6

OK: Go to next step

5. **PERFORM TEST MODE (SIGNAL CHECK)**
   a. Turn the ignition switch off.
   b. Perform the sensor check in the Test Mode procedure (See **TEST MODE PROCEDURE**).

OK:

All Test Mode DTCs are erased.

NG: Go to step 6

OK: CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **DIAGNOSIS SYSTEM**)

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6. **CHECK FRONT SPEED SENSOR INSTALLATION**
   a. Turn the ignition switch 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:

      8.0 N*m (82 kgf*cm, 71 in.*lbf)

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

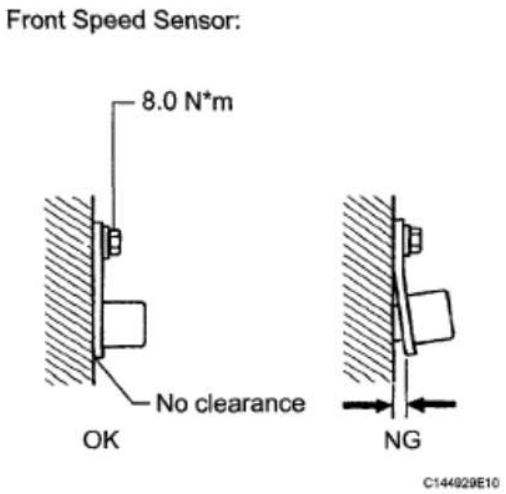


Fig. 50: Identifying Front Speed Sensor Proper Installation Position
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

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

      OK:

      No scratches, oil, or foreign matter on the sensor tip.

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

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NG: CLEAN OR REPLACE FRONT SPEED SENSOR

OK: Go to next step

8. **CHECK FRONT SPEED SENSOR ROTOR**
   a. Remove the front speed sensor rotor (See **REMOVAL** for 2GR-FE, or See **REMOVAL** for 1AR-FE).
   b. Check the speed sensor rotor.

      OK:

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

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

HINT:

If the front speed sensor rotor needs to be replaced, replace it together with the front drive outboard joint shaft assembly.

NG: CLEAN OR REPLACE FRONT SPEED SENSOR ROTOR

OK: Go to next step

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

Standard resistance:

for RH

RESISTANCE SPECIFICATION

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

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition

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2 (FL+) - Body ground	Always	10 kohms or higher
1 (FL-) - Body ground	Always	10 kohms or higher

Component without harness connected:
(Front Speed Sensor)

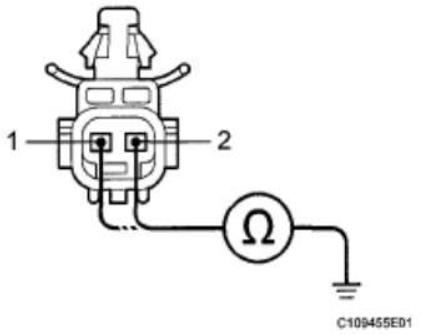


Fig. 51: Measuring Resistance Between Front Speed Sensor Connector Terminal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

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

OK: Go to next step

10. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - FRONT SPEED SENSOR)**
    a. Make sure that there is no looseness at the locking part and the connecting part of the connector.
    b. Disconnect the skid control ECU connector.
    c. Measure the resistance according to the value (s) in the table below.

Standard resistance:

for RH

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-7 (FR+) - A29-2 (FR+)	Always	Below 1 ohms
A24-7 (FR+) - Body ground	Always	10 kohms or higher
A24-6 (FR-) - A29-1 (FR-)	Always	Below 1 ohms
A24-6 (FR-) - Body ground	Always	10 kohms or higher

for LH

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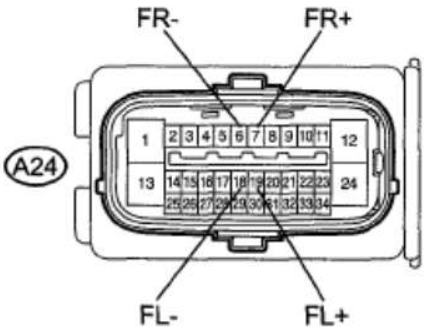
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RESISTANCE SPECIFICATION

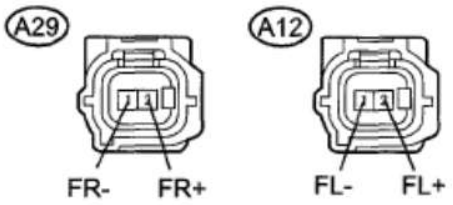
Tester Connection	Condition	Specified Condition
A24-19 (FL+) - A12-2 (FL+)	Always	Below 1 ohms
A24-19 (FL+) - Body ground	Always	10 kohms or higher
A24-18 (FL-) - A12-1 (FL-)	Always	Below 1 ohms
A24-18 (FL-) - Body ground	Always	10 kohms or higher

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. 52: Identifying Skid Control ECU 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.

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b. Turn the ignition switch on (IG).
c. Measure the voltage according to the value (s) in the table below.

Standard voltage:

for RH

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
A29-2 (FR+) - Body ground	Ignition switch on (IG)	8 to 14 V

for LH

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
A12-2 (FL+) - Body ground	Ignition switch on (IG)	8 to 14 V

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

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

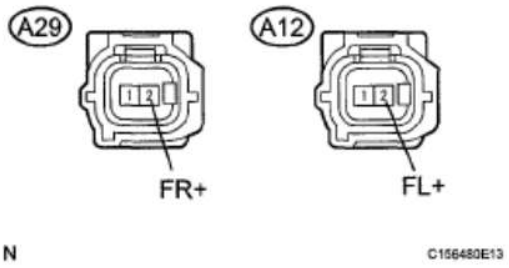


Fig. 53: Identifying Front Speed Sensor Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

12. **PERFORM TEST MODE (SIGNAL CHECK)**
    a. Turn the ignition switch off.
    b. Perform the sensor check in the Test Mode procedure (See **TEST MODE PROCEDURE**).

OK:

All Test Mode DTCs are erased.

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NG: Go to step 13

OK: CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **DIAGNOSIS SYSTEM**)

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

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

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

OK:

All Test Mode DTCs are erased.

NG: Go to step 15

OK: END

15. **REPLACE FRONT SPEED SENSOR ROTOR**
    a. Turn the ignition switch off.
    b. Remove the front drive shaft assembly (See **REMOVAL** for 2GR-FE, or See **REMOVAL** for 1AR-FE).
    c. Replace the front drive outboard joint shaft assembly (front speed sensor rotor) (See **DISASSEMBLY** for 2GR-FE, or See **DISASSEMBLY** for 1 AR-FE).

HINT:

If the front speed sensor rotor needs to be replaced, replace it together with the front drive outboard joint shaft assembly.

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

16. **PERFORM TEST MODE (SIGNAL CHECK)**
    a. Install the front drive shaft assembly.
    b. Perform the sensor check in the Test Mode procedure (See **TEST MODE PROCEDURE**).

OK:

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All Test Mode DTCs are erased.

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

OK: END

DTC C1273 LOW OUTPUT SIGNAL OF REAR SPEED SENSOR RH (TEST MODE DTC); DTC C1274 LOW OUTPUT SIGNAL OF REAR SPEED SENSOR LH (TEST MODE DTC); DTC C1277 ABNORMAL CHANGE IN OUTPUT SIGNAL OF REAR SPEED SENSOR RH (TEST MODE DTC); DTC C1278 ABNORMAL CHANGE IN OUTPUT SIGNAL OF REAR SPEED SENSOR LH (TEST MODE DTC)

DESCRIPTION

DTCs C1273 to C1278 will be deleted when the speed sensor sends a vehicle speed signal or when Test Mode ends. DTCs from C1273 to C1278 are output only in Test Mode.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1273 C1274	Detected only during Test Mode.	• Rear speed sensor RH/LH • Sensor installation • Speed sensor rotor
C1277 C1278	Detected only during Test Mode.	Speed sensor rotor

HINT:

- DTCs C1273 and C1277 are for the rear speed sensor RH.
- DTCs C1274 and C1278 are for the rear speed sensor LH.

WIRING DIAGRAM

Refer to DTCs C1403 and C1404 (See **WIRING DIAGRAM**).

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

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

ABS/VSC/TRAC:

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ABS/VSC/TRAC TESTER DISPLAY REFERENCE

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	-

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 4

C: Go to step 6

A: Go to next step

2. **REPAIR OR REPLACE HARNESS OR CONNECTOR (SKID CONTROL ECU - REAR SPEED SENSOR)**
   a. Turn the ignition switch off.
   b. Repair or replace the harness or connector.
   c. Check for any momentary interruption between the skid control ECU and the rear speed sensor (See **CHECK FOR INTERMITTENT PROBLEMS**).
   d. Check that there are no momentary interruptions.
3. **PERFORM TEST MODE (SIGNAL CHECK)**
   a. Turn the ignition switch off.
   b. Perform the sensor check in the Test Mode procedure (See **TEST MODE PROCEDURE**).

      OK:

      All Test Mode DTCs are erased.

NG: Go to step 4

OK: END

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

   ABS/VSC/TRAC:

   ABS/VSC/TRAC TESTER DISPLAY REFERENCE

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 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 Techstream is the same as the actual vehicle speed measured using a speedometer tester (calibrated chassis dynamometer).

NG: Go to step 6

OK: Go to next step

5. **PERFORM TEST MODE (SIGNAL CHECK)**
   a. Turn the ignition switch off.
   b. Perform the sensor check in the Test Mode procedure (See **TEST MODE PROCEDURE**).

   OK:

   All Test Mode DTCs are erased.

NG: Go to step 6

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OK: CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **DIAGNOSIS SYSTEM**)

6. **CHECK REAR SPEED SENSOR INSTALLATION**
   a. Turn the ignition switch off.
   b. Check the speed sensor installation (for 2WD).

      OK:

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

   c. Check the speed sensor installation (for 4WD).

      OK:

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

      The installation nut is tightened properly.

      Torque:

      8.0 N*m (82 kgf*cm, 71 in.*lbf)

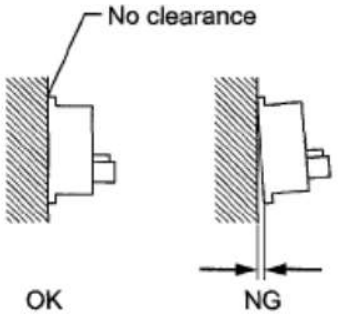
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Rear Speed Sensor:

for 2WD:



for 4WD:

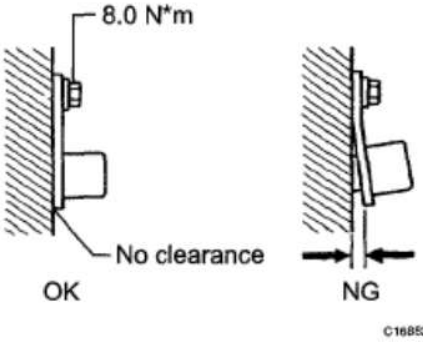


Fig. 54: Identifying Rear Speed Sensor Proper Installation Position
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Result

RESULT CHART

Result	Proceed to
OK (for 4WD)	A
OK (for 2WD)	B
NG (for 2WD)	C
NG (for 4WD)	D

B: Go to step 9

C: INSTALL REAR SPEED SENSOR CORRECTLY (for 2WD) (See **INSTALLATION**)

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D: INSTALL REAR SPEED SENSOR CORRECTLY (for 4WD) (See **INSTALLATION**)

A: Go to next step

7. **CHECK REAR SPEED SENSOR TIP**
   a. Remove the rear speed sensor (See **REMOVAL**).
   b. Check the speed sensor tip.

   OK:

   No scratches, oil, 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 REAR SPEED SENSOR

OK: Go to next step

8. **CHECK REAR SPEED SENSOR ROTOR**
   a. Remove the rear speed sensor rotor (See **REMOVAL**).
   b. Check the speed sensor rotor.

   OK:

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

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

HINT:

If the rear speed sensor rotor needs to be replaced, replace it together with the outboard joint shaft assembly.

NG: CLEAN OR REPLACE REAR SPEED SENSOR ROTOR

OK: Go to next step

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

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Standard resistance:

for 2WD RH

RESISTANCE SPECIFICATION

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

for 4WD RH

RESISTANCE SPECIFICATION

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

for 2WD LH

RESISTANCE SPECIFICATION

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

for 4WD LH

RESISTANCE SPECIFICATION

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

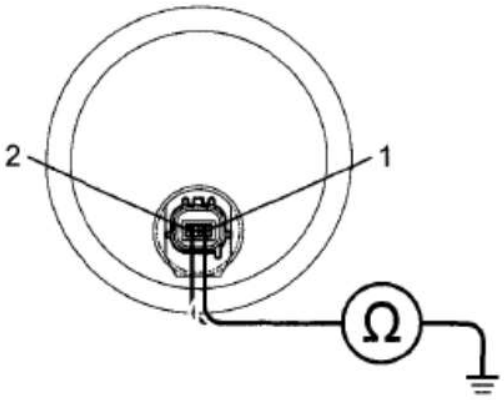
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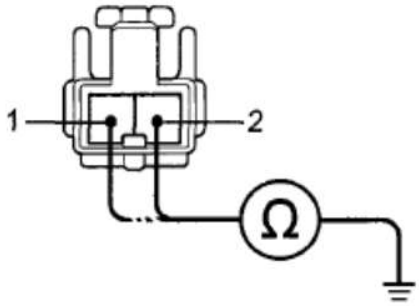
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Component without harness connected:
(Rear Speed Sensor)

for 2WD:



for 4WD:



C194027E01

Fig. 55: Measuring Resistance Between Rear Speed Sensor Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Result

RESULT CHART

Result	Proceed to
OK (for 2WD)	A
OK (for 4WD)	B
NG (for 2WD)	C
NG (for 4WD)	D

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

B: Go to step 11

C: REPLACE REAR SPEED SENSOR (for 2WD) (See **REMOVAL**)

D: REPLACE REAR SPEED SENSOR (for 4WD) (See **REMOVAL**)

A: Go to next step

10. **CHECK HARNESS AND CONNECTOR (SKID CONTROL SENSOR WIRE)**
    a. Make sure that there is no looseness at the locking part and the connecting part of the connectors.
    b. Disconnect the skid control sensor wire.
    c. Measure the resistance according to the value (s) in the table below.

Standard resistance:

for RH

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
z9 ("A"-2) - z9 ("B"-1)	Always	Below 1 ohms
z9 ("A"-2) - z9 ("B"-2)	Always	10 kohms or higher
z9 ("A"-2) - Body ground	Always	10 kohms or higher
z9 ("A"-1) - z9 ("B"-2)	Always	Below 1 ohms
z9 ("A"-1) - z9 ("B"-1)	Always	10 kohms or higher
z9 ("A"-1) - Body ground	Always	10 kohms or higher

for LH

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
z10 ("A"-2) - z10 ("B"-1)	Always	Below 1 ohms
z10 ("A"-2) - z10 ("B"-2)	Always	10 kohms or higher
z10 ("A"-2) - Body ground	Always	10 kohms or higher
z10 ("A"-1) - z10 ("B"-2)	Always	Below 1 ohms
z10 ("A"-1) - z10 ("B"-1)	Always	10 kohms or higher
z10 ("A"-1) - Body ground	Always	10 kohms or higher

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

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Skid Control Sensor Wire:

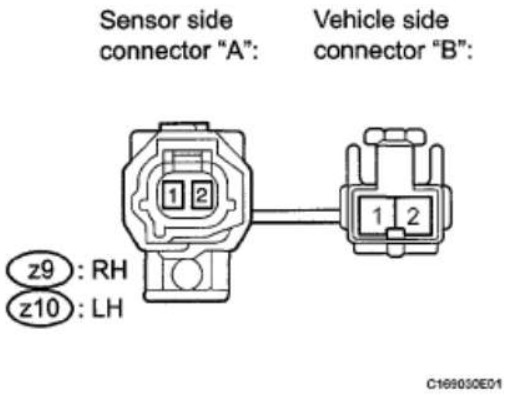


Fig. 56: Identifying Skid Control Sensor Wire Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NG: REPLACE SKID CONTROL SENSOR WIRE

OK: Go to next step

11. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - REAR SPEED SENSOR)**
    a. Reconnect the skid control sensor wire (for 2WD).
    b. Make sure that there is no looseness at the locking part and the connecting part of the connector.
    c. Disconnect the skid control ECU connector.
    d. Measure the resistance according to the value (s) in the table below.

Standard resistance:

for 2WD RH

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-17 (RR+) - z9-2 (RR+)	Always	Below 1 ohms.
A24-17 (RR+) - Body ground	Always	10 kohms or higher
A24-16 (RR-) - z9-1 (RR-)	Always	Below 1 ohms
A24-16 (RR-) - Body ground	Always	10 kohms or higher

for 4WD RH

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-17 (RR+) - N20-1 (RR+)	Always	Below 1 ohms
A24-17 (RR+) - Body ground	Always	10 kohms or higher

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A24-16 (RR-) - N20-2 (RR-)	Always	Below 1 ohms
A24-16 (RR-) - Body ground	Always	10 kohms or higher

for 2WD LH

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-5 (RL+) - z10-2 (RL+)	Always	Below 1 ohms
A24-5 (RL+) - Body ground	Always	10 kohms or higher
A24-4 (RL-) - z10-1 (RL-)	Always	Below 1 ohms
A24-4 (RL-) - Body ground	Always	10 kohms or higher

for 4WD LH

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-5 (RL+) - O39-1 (RL+)	Always	Below 1 ohms
A24-S (RL+) - Body ground	Always	10 kohms or higher
A24-4 (RL-) - O39-2 (RL-)	Always	Below 1 ohms
A24-4 (RL-) - Body ground	Always	10 kohms or higher

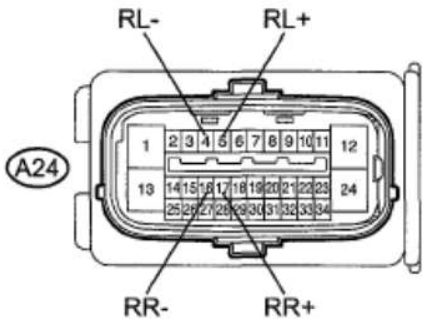
NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

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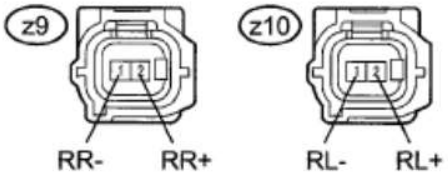
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Front view of wire harness connector:
(to Skid Control ECU)

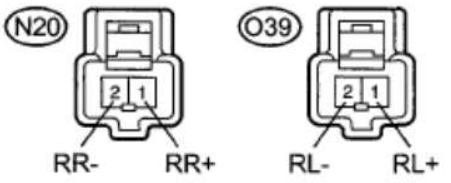


Front view of wire harness connector:
(to Rear Speed Sensor)

for 2WD:



for 4WD:



C169033E04

Fig. 57: Identifying Skid Control ECU And Rear Speed Sensor Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

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

Standard voltage:

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for 2WD RH

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
z9-2 (RR+) - Body ground	Ignition switch on (IG)	8 to 14 V

for 4WD RH

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
N20-1 (RR+) - Body ground	Ignition switch on (IG)	8 to 14 V

for 2WD LH

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
z10-2 (RL+) - Body ground	Ignition switch on (IG)	8 to 14 V

for 4WD LH

VOLTAGE SPECIFICATION

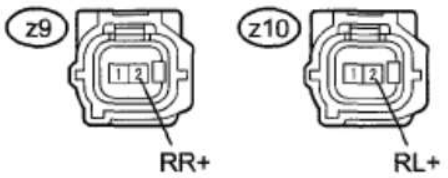
Tester Connection	Switch Condition	Specified Condition
O39-1 (RL+) - Body ground	Ignition switch on (IG)	8 to 14 V

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

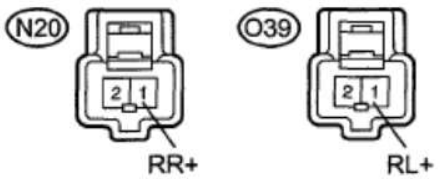
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Front view of wire harness connector:
(to Rear Speed Sensor)

for 2WD:



for 4WD:



N C169034E04

Fig. 58: Identifying Skid Control ECU Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

13. **PERFORM TEST MODE (SIGNAL CHECK)**
    a. Turn the ignition switch off.
    b. Perform the sensor check in the Test Mode procedure (See **TEST MODE PROCEDURE**).

OK:

All Test Mode DTCs are erased.

Result

RESULT CHART

Result	Proceed to
OK	A
NG (for 2WD)	B
NG (for 4WD)	C

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B: Go to step 14

C: Go to step 16

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

14. **REPLACE REAR SPEED SENSOR AND REAR SPEED SENSOR ROTOR**
    a. Turn the ignition switch off.
    b. Replace the rear speed sensor (See **REMOVAL**).
    c. Replace the rear axle hub and bearing assembly (rear speed sensor rotor) (See **ON-VEHICLE INSPECTION**).

    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).**

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

    OK:

    All Test Mode DTCs are erased.

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

OK: END

16. **REPLACE REAR SPEED SENSOR**
    a. Turn the ignition switch off.
    b. Replace the rear speed sensor (See **REMOVAL**).

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

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

    OK:

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All Test Mode DTCs are erased.

NG: Go to step 18

OK: END

18. **REPLACE REAR SPEED SENSOR ROTOR**
    a. Turn the ignition switch off.
    b. Remove the rear drive shaft assembly (See **REMOVAL**).
    c. Replace the outboard joint shaft assembly (rear speed sensor rotor) (See **DISASSEMBLY**).

    HINT:

    If the rear speed sensor rotor needs to be replaced, replace it together with the outboard joint shaft assembly.

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

19. **PERFORM TEST MODE (SIGNAL CHECK)**
    a. Install the rear drive shaft assembly.
    b. Perform the sensor check in the Test Mode procedure (See **TEST MODE PROCEDURE**).

    OK:

    All Test Mode DTCs are erased.

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

OK: END

DTC C1281 MASTER CYLINDER PRESSURE SENSOR OUTPUT MALFUNCTION (TEST MODE DTC)

DESCRIPTION

DTC C1281 will be deleted when the master cylinder pressure sensor sends a master cylinder pressure signal or when Test Mode ends. DTC C1281 is output only in Test Mode.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1281	Detected only during Test Mode.	• Stop light switch • Brake pedal load sensing switch • Master cylinder pressure sensor

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WIRING DIAGRAM

Refer to DTCs C1425 and C1429 (See **WIRING DIAGRAM**, or **DTC C1429 OPEN OR SHORT IN BRAKE PEDAL LOAD SENSING SWITCH**).

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 lights come on when the brake pedal is depressed, and go off when the brake pedal is released.

   OK

   BRAKE PEDAL

Condition	Illumination Condition
Brake pedal depressed	ON
Brake pedal released	OFF

   NG: INSPECT STOP LIGHT CIRCUIT (See **PROBLEM SYMPTOMS TABLE**)

   OK: Go to next step

2. **READ VALUE ON TECHSTREAM (STOP LIGHT SWITCH AND BRAKE PEDAL LOAD SENSING SWITCH)**
   a. Connect Techstream to the DLC3.
   b. Turn the ignition switch on (IG).
   c. Select the Data List mode on Techstream (See **DATA LIST/ACTIVE TEST**).

   ABS/VSC/TRAC:

   ABS/VSC/TRAC TESTER DISPLAY REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Stop Light SW	Stop light switch/ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
Brake Pedal Load Sensing SW	Brake pedal load sensing switch/ON or OFF	ON: Brake pedal depressed beyond the specified point OFF: Brake pedal not depressed beyond the specified point	-

   d. Check that the stop light switch display and brake pedal load sensing switch display observed on Techstream change according to brake pedal operation.

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OK:

The Techstream displays ON or OFF according to brake pedal operation.

e. Slowly depress the brake pedal, and check when the stop light switch and brake pedal load sensing switch turn ON.

OK:

First the stop light switch should turn ON, and then the brake pedal load sensing switch should turn ON.

Result

RESULT CHART

Result	Proceed to
OK	A
NG (Turning on of the stop light switch is not confirmed)	B
NG (Turning on of the brake pedal load sensing switch is not confirmed)	C
NG (The brake pedal load sensing switch turns on first)	D

B: Go to step 5

C: Go to step 6

D: Go to step 7

A: Go to next step

3. **READ VALUE ON TECHSTREAM (MASTER CYLINDER PRESSURE SENSOR)**

a. Select the Data List mode on Techstream (See **DATA LIST/ACTIVE TEST**).

ABS/VSC/TRAC:

ABS/VSC/TRAC TESTER DISPLAY REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Master Cylinder Sensor	Master cylinder pressure sensor/min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V	Reading increases when brake pedal is depressed

b. Check that the brake fluid pressure value of the master cylinder pressure sensor observed on Techstream changes when the brake pedal is depressed.

OK:

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When the pedal is depressed, voltage displayed on Techstream increases.

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

OK: Go to next step

4. **PERFORM TEST MODE (SIGNAL CHECK)**
   a. Turn the ignition switch off.
   b. Perform the sensor check in the Test Mode procedure (See **TEST MODE PROCEDURE**).

   OK:

   All Test Mode DTCs are erased.

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

OK: CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **DIAGNOSIS SYSTEM**)

5. **INSPECT SKID CONTROL ECU (STP TERMINAL)**
   a. Turn the ignition switch off.
   b. Make sure that there is no looseness at the locking part and the connecting part of the connector.
   c. Disconnect the skid control ECU connector.
   d. Measure the voltage according to the value (s) in the table below.

Standard voltage

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
A24-2 (STP) - Body ground	Stop light switch ON (Brake pedal depressed)	8 to 14 V
A24-2 (STP) - Body ground	Stop light switch OFF (Brake pedal released)	Below 1.5 V

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

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

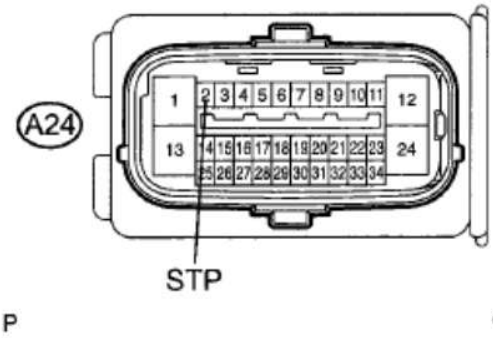


Fig. 59: Identifying STP Terminal Of Skid Control ECU Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

6. **INSPECT SKID CONTROL ECU (FSW+ TERMINAL)**
   a. Turn the ignition switch off.
   b. Make sure that there is no looseness at the locking part and the connecting part of the connector.
   c. Disconnect the skid control ECU connector.
   d. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
A24-27 (FSW+) - Body ground	Brake pedal load sensing switch OFF (Brake pedal depressed)	0.9 to 1.1 kohms
A24-27 (FSW+) - Body ground	Brake pedal load sensing switch ON (Brake pedal released)	192 to 234 ohms

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

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

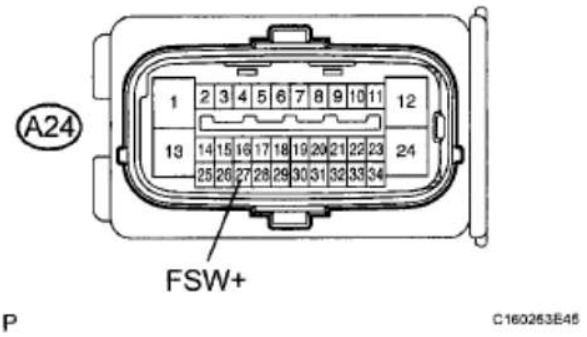


Fig. 60: Identifying FSW+ Terminal Of Skid Control ECU Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

7. **CHECK BRAKE PEDAL AND STOP LIGHT SWITCH INSTALLATION**
   a. Turn the ignition switch off.
   b. Check the brake pedal height and stop light switch installation (See **ADJUSTMENT**).

   OK:

   The brake pedal height and stop light switch installation are normal.

NG: ADJUST BRAKE PEDAL OR STOP LIGHT SWITCH (See **ADJUSTMENT**)

OK: REPLACE BRAKE PEDAL SUB-ASSEMBLY (BRAKE PEDAL LOAD SENSING SWITCH) (See **DISASSEMBLY**)

DTC C1290 STEERING ANGLE SENSOR ZERO POINT MALFUNCTION

DESCRIPTION

The skid control ECU acquires steering angle sensor zero point every time the ignition switch is turned on (IG) 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 the 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.

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Warning operation for the steering angle sensor zero point malfunction will be cancelled by turning the ignition switch off.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1290	The newly acquired steering angle sensor zero point vastly differs from the previous one.	• Yaw rate and acceleration sensor zero point calibration incomplete • Poor adjustment of the center 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, 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. Turn the ignition switch off.
   b. Start the engine.
   c. Drive the vehicle straight ahead at 35 km/h (22 mph) or more for at least 5 seconds.
   d. Check that the center 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 an abnormal center position of the steering wheel, acquire yaw rate and acceleration sensor zero point again after adjusting front wheel alignment and steering position again.

      OK:

      The center position of the steering wheel is correctly set.

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NG: ADJUST FRONT WHEEL ALIGNMENT OR STEERING POSITION (See **FRONT WHEEL ALIGNMENT**)

OK: Go to next step

3. **RECONFIRM DTC**
   a. Turn the ignition switch off.
   b. Clear the DTCs (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 (C1290) is not output	A
DTC (C1290) is 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 C1337 DIFFERENT DIAMETER TIRE MALFUNCTION

DESCRIPTION

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

Therefore, all wheel signals must be equal.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
	The following occurs in 3 consecutive trips:	• Tire and wheel size • Tire deformation • Speed sensor rotor

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C1337	At a vehicle speed of 20 km/h (12 mph) or more, there is a 20 % difference or greater in the average speed between the front wheels and rear wheels for 20 seconds or more.	• Speed sensor • Speed sensor circuit • Brake actuator assembly (Skid control ECU)

WIRING DIAGRAM

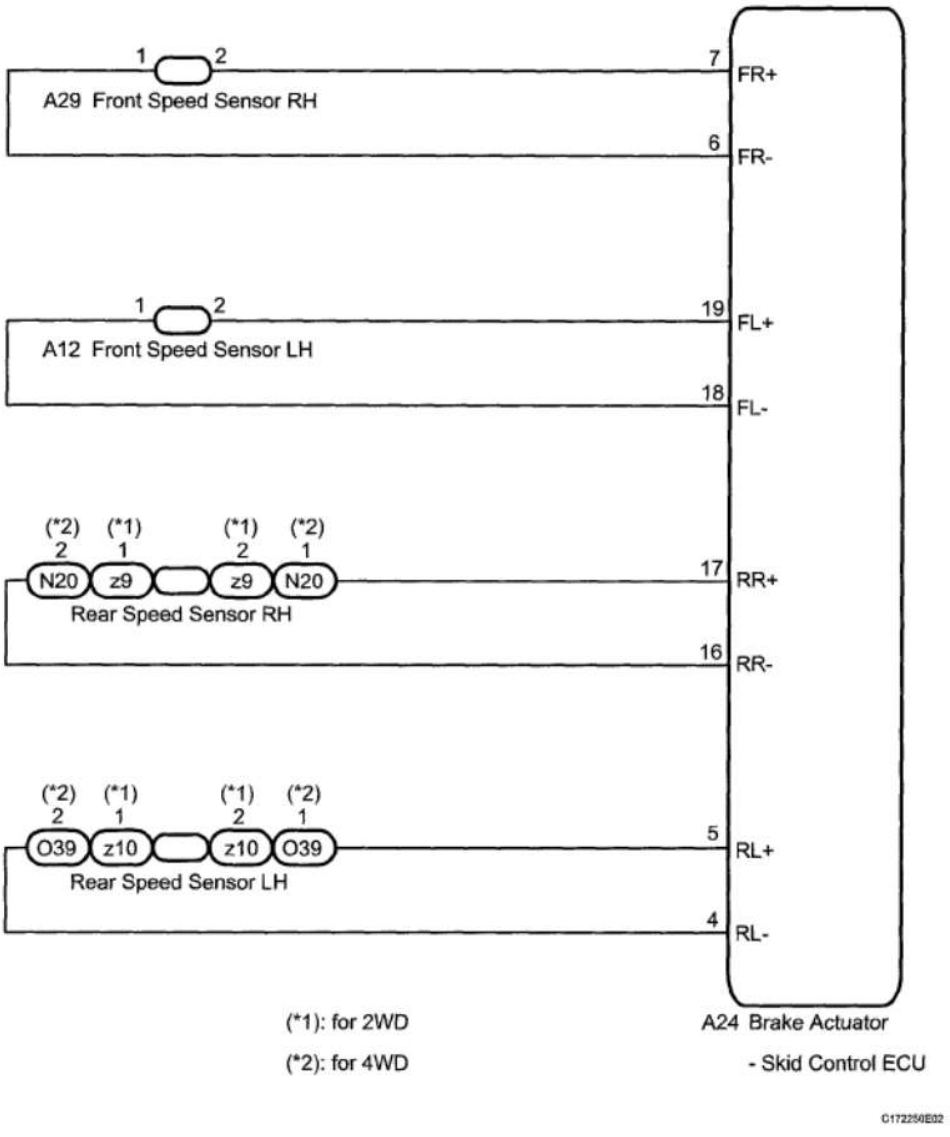


Fig. 61: Different Diameter Tire Malfunction - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

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NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

1. **CHECK TIRES**
   a. Check the size and condition of all 4 wheels (See **INSPECTION**).

      HINT:

      The DTC is output when tire deformation or a difference in tire size is detected.

      OK:

      The diameter of all 4 tires and air pressure are the same.

   Result

   RESULT CHART

Result	Proceed to
OK (Except for rear 2WD)	A
OK (for rear 2WD)	B
NG	C

   B: Go to step 4

   C: REPLACE TIRES SO THAT ALL FOUR TIRES ARE SAME SIZE

   A: Go to next step

2. **CHECK EACH SPEED SENSOR TIP**
   a. Remove the front speed sensor or the rear speed sensor (See **REMOVAL** for front, or **REMOVAL** for rear).
   b. Check the speed sensor tip.

      OK:

      No scratches, oil, 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 EACH SPEED SENSOR

   OK: Go to next step

3. **CHECK EACH SPEED SENSOR ROTOR**

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a. Remove the front speed sensor rotor or the rear speed sensor rotor (See **REMOVAL** 2GR-FE for front, See **REMOVAL** 1AR-FE for front, or See **REMOVAL** for rear).
b. Check the speed sensor rotor.

OK:

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

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

HINT:

- If the front speed sensor rotor needs to be replaced, replace it together with the front drive outboard joint shaft assembly.
- If the rear speed sensor rotor needs to be replaced, replace it together with the outboard joint shaft assembly.

NG: CLEAN OR REPLACE EACH SPEED SENSOR ROTOR

OK: Go to next step

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

Standard resistance:

for 2WD RH

RESISTANCE SPECIFICATION

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 4WD RH

RESISTANCE SPECIFICATION

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

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1 (FR-) - Body ground	Always	10 kohms or higher
1 (RR+) - Body ground	Always	10 kohms or higher
2 (RR-) - Body ground	Always	10 kohms or higher

for 2WD LH

RESISTANCE SPECIFICATION

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

for 4WD LH

RESISTANCE SPECIFICATION

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

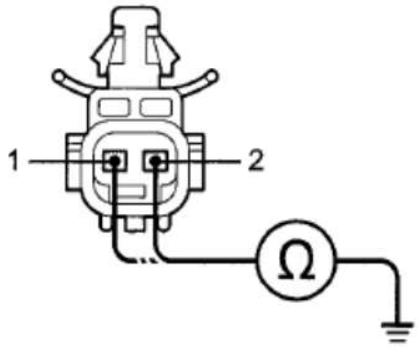
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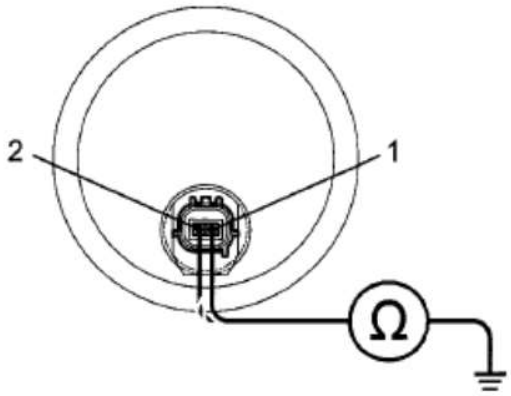
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Component without harness connected:
(Speed Sensor)

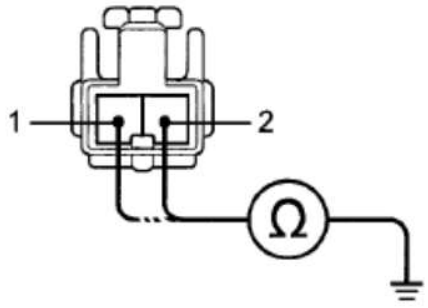
for Front:



for Rear 2WD:



for Rear 4WD:



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Fig. 62: Measuring Resistance Between Speed Sensor Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Result

RESULT CHART

Result	Proceed to
OK (for rear 2WD)	A
OK (Except for rear 2WD)	B
NG	C

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

B: Go to step 6

C: REPLACE EACH SPEED SENSOR

A: Go to next step

5. **CHECK HARNESS AND CONNECTOR (SKID CONTROL SENSOR WIRE)**
   a. Make sure that there is no looseness at the locking part and the connecting part of the connectors.
   b. Disconnect the skid control sensor wire.
   c. Measure the resistance according to the value (s) in the table below.

Standard resistance:

for RH

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
z9 ("A"-2) - z9 ("B"-1)	Always	Below 1 ohms
z9 ("A"-2) - z9 ("B"-2)	Always	10 kohms or higher
z9 ("A"-2) - Body ground	Always	10 kohms or higher
z9 ("A"-1) - z9 ("B"-2)	Always	Below 1 ohms
z9 ("A"-1) - z9 ("B"-1)	Always	10 kohms or higher
z9 ("A"-1) - Body ground	Always	10 kohms or higher

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Skid Control Sensor Wire:

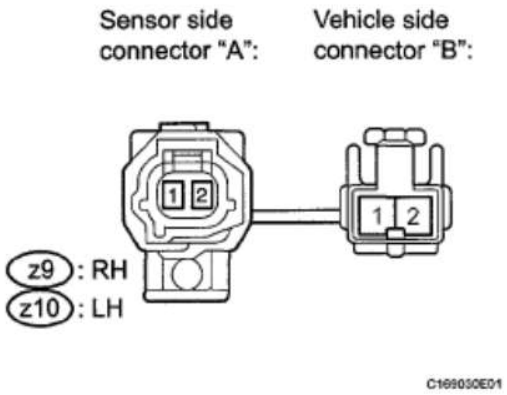


Fig. 63: Identifying Skid Control Sensor Wire Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

for LH

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
z10 ("A"-2) - z10 ("B"-1)	Always	Below 1 ohms
z10 ("A"-2) - z10 ("B"-2)	Always	10 kohms or higher
z10 ("A"-2) - Body ground	Always	10 kohms or higher
z10 ("A"-1) - z10 ("B"-2)	Always	Below 1 ohms
z10 ("A"-1) - z10 ("B"-1)	Always	10 kohms or higher
z10 ("A"-1) - Body ground	Always	10 kohms or higher

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

NG: REPLACE SKID CONTROL SENSOR WIRE

OK: Go to next step

6. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - EACH SPEED SENSOR)**
   a. Reconnect the skid control sensor wire (for 2WD).
   b. Make sure that there is no looseness at the locking part and the connecting part of the connector.
   c. Disconnect the skid control ECU connector.
   d. Measure the resistance according to the value (s) in the table below.

Standard resistance:

for 2WD RH

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RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-7 (FR+) - A29-2 (FR+)	Always	Below 1 ohms
A24-7 (FR+) - Body ground	Always	10 kohms or higher
A24-6 (FR-) - A29-1 (FR-)	Always	Below 1 ohms
A24-6 (FR-) - Body ground	Always	10 kohms or higher
A24-17 (RR+) - z9-2 (RR+)	Always	Below 1 ohms
A24-17 (RR+) - Body ground	Always	10 kohms or higher
A24-16 (RR-) - z9-1 (RR-)	Always	Below 1 ohms
A24-16 (RR-) - Body ground	Always	10 kohms or higher

for 4WD RH

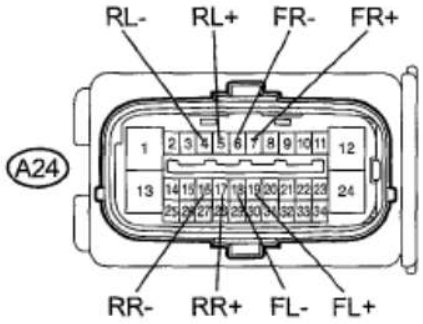
RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-7 (FR+) - A29-2 (FR+)	Always	Below 1 ohms
A24-7 (FR+) - Body ground	Always	10 kohms or higher
A24-6 (FR-) - A29-1 (FR-)	Always	Below 1 ohms
A24-6 (FR-) - Body ground	Always	10 kohms or higher
A24-17 (RR+) - N20-1 (RR+)	Always	Below 1 ohms
A24-17 (RR+) - Body ground	Always	10 kohms or higher
A24-16 (RR-) - N20-2 (RR-)	Always	Below 1 ohms
A24-16 (RR-) - Body ground	Always	10 kohms or higher

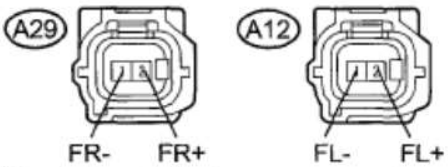
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Front view of wire harness connector:
(to Skid Control ECU)

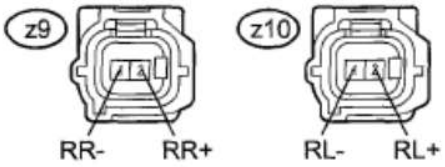


Front view of wire harness connector:
(to Front Speed Sensor)



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

for 2WD:



for 4WD:

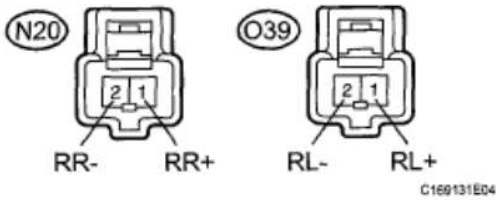


Fig. 64: Identifying Skid Control ECU And Speed Sensor Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

for 2WD LH

RESISTANCE SPECIFICATION

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Tester Connection	Condition	Specified Condition
A24-19 (FL+) - A12-2 (FL+)	Always	Below 1 ohms
A24-19 (FL+) - Body ground	Always	10 kohms or higher
A24-18 (FL-) - A12-1 (FL-)	Always	Below 1 ohms
A24-18 (FL-) - Body ground	Always	10 kohms or higher
A24-5 (RL+) - z10-2 (RL+)	Always	Below 1 ohms
A24-5 (RL+) - Body ground	Always	10 kohms or higher
A24-4 (RL-) - z10-1 (RL-)	Always	Below 1 ohms
A24-4 (RL-) - Body ground	Always	10 kohms or higher

for 4WD LH

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-19 (FL+) - A12-2 (FL+)	Always	Below 1 ohms
A24-19 (FL+) - Body ground	Always	10 kohms or higher
A24-18 (FL-) - A12-1 (FL-)	Always	Below 1 ohms
A24-18 (FL-) - Body ground	Always	10 kohms or higher
A24-5 (RL+) - O39-1 (RL+)	Always	Below 1 ohms
A24-5 (RL+) - Body ground	Always	10 kohms or higher
A24-4 (RL-) - O39-2 (RL-)	Always	Below 1 ohms
A24-4 (RL-) - Body ground	Always	10 kohms or higher

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

OK: Go to next step

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

Standard voltage:

for 2WD RH

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
A29-2 (FR+) - Body ground	Ignition switch on (IG)	8 to 14 V
z9-2 (RR+) - Body ground	Ignition switch on (IG)	8 to 14 V

for 4WD RH

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VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
A29-2 (FR+) - Body ground	Ignition switch on (IG)	8 to 14 V
N20-1 (RR+) - Body ground	Ignition switch on (IG)	8 to 14 V

for 2WD LH

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
A12-2 (FL+) - Body ground	Ignition switch on (IG)	8 to 14 V
z10-2 (RL+) - Body ground	Ignition switch on (IG)	8 to 14 V

for 4WD LH

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
A12-2 (FL+) - Body ground	Ignition switch on (IG)	8 to 14 V
O39-1 (RL+) - Body ground	Ignition switch on (IG)	8 to 14 V

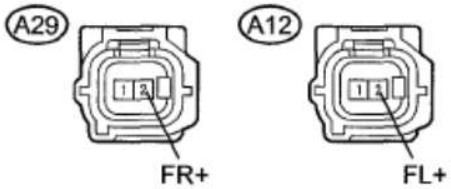
NG: REPLACE BRAKE ACTUATOR ASSEMBLY (See **REMOVAL**)

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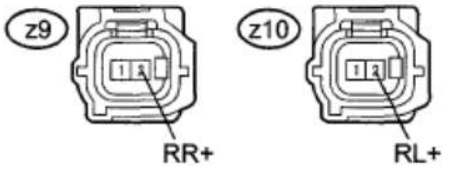
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Front view of wire harness connector:
(to Front Speed Sensor)



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

for 2WD:



for 4WD:

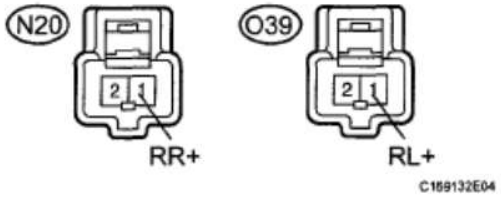


Fig. 65: Identifying Speed Sensor Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

8. **RECONFIRM DTC**
   a. Turn the ignition switch off.
   b. Reconnect the speed sensor connectors.
   c. Clear the DTCs (See **DTC CHECK/CLEAR**).
   d. Start the engine.
   e. Drive the vehicle at a speed of 40 km/h (25 mph) or more for at least 60 seconds.
   f. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

RESULT CHART

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Result	Proceed to
DTC (C1337) is output (Except for rear 2WD)	A
DTC (C1337) is output (for rear 2WD)	B
DTC (C1337) is not output	C

B: Go to step 13

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

A: Go to next step

9. **REPLACE EACH SPEED SENSOR**
   a. Turn the ignition switch off.
   b. Replace the front speed sensor or the rear speed sensor (See **REMOVAL** for front, or **REMOVAL** for rear).

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

10. **RECONFIRM DTC**
    a. Clear the DTCs (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 (C1337) is output	A
DTC (C1337) is not output	B

B: END

A: Go to next step

11. **REPLACE EACH SPEED SENSOR ROTOR**
    a. Turn the ignition switch off.
    b. Remove the front drive shaft assembly or the rear drive shaft assembly (See **REMOVAL** 2GR-FE for front, See **REMOVAL** 1AR-FE for front, or See **REMOVAL** for rear).
    c. Replace the front drive outboard joint shaft assembly (front speed sensor rotor) or the outboard joint shaft assembly (rear speed sensor rotor) (See **DISASSEMBLY** 2GR-FE for front, See

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DISASSEMBLY 1AR-FE for front, or See **DISASSEMBLY** for rear).

HINT:

- If the front speed sensor rotor needs to be replaced, replace it together with the front drive outboard joint shaft assembly.
- If the rear speed sensor rotor needs to be replaced, replace it together with the outboard joint shaft assembly.

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

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

Result

RESULT CHART

Result	Proceed to
DTC (C1337) is output	A
DTC (C1337) is not output	B

B: END

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

13. **REPLACE REAR SPEED SENSOR AND REAR SPEED SENSOR ROTOR**
    a. Turn the ignition switch off.
    b. Replace the rear speed sensor (See **REMOVAL**).
    c. Replace the rear axle hub and bearing assembly (rear speed sensor rotor) (See **ON-VEHICLE INSPECTION**).

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

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PROCEDURE).

14. **RECONFIRM DTC**
    a. Clear the DTCs (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 (C1337) is output	A
DTC (C1337) is not output	B

B: END

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

DTC C1379 DOWNHILL ASSIST CONTROL SWITCH MALFUNCTION (TEST MODE DTC)

DESCRIPTION

DTC C1379 will be deleted when the downhill assist control switch sends a downhill assist control operation signal or when Test Mode ends. DTC C1379 is output only in Test Mode.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1379	Detected only during Test Mode.	Downhill assist control switch

WIRING DIAGRAM

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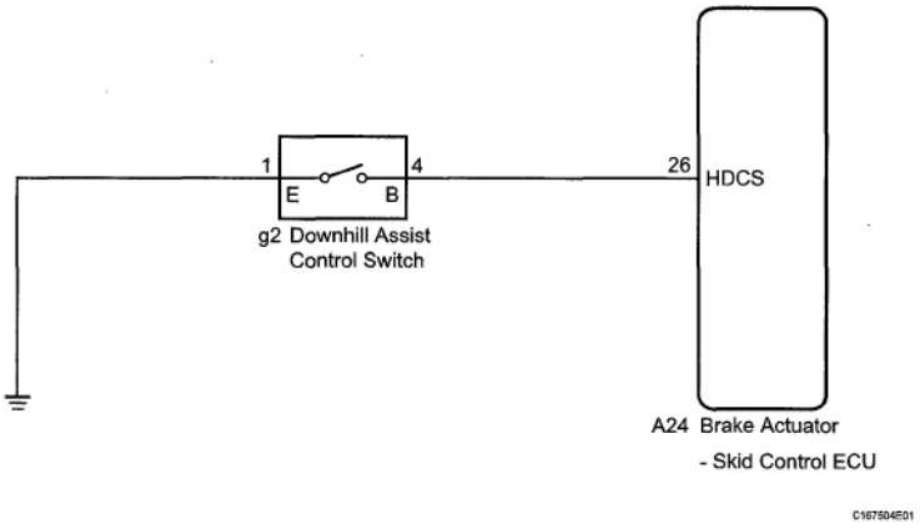


Fig. 66: Downhill Assist Control Switch Malfunction - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

1. **READ VALUE ON TECHSTREAM (DOWNHILL ASSIST CONTROL SWITCH)**
   a. Connect Techstream to the DLC3.
   b. Turn the ignition switch on (IG).
   c. Select the Data List mode on Techstream (See **DATA LIST/ACTIVE TEST**).

   ABS/VSC/TRAC:

   ABS/VSC/TRAC TESTER DISPLAY REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Downhill Assist Control SW	Downhill assist control switch/ON or OFF	ON: Switch ON OFF: Switch OFF	-

   d. Using Techstream, check the switch condition on Techstream changes according to downhill assist control switch operation.

   OK:

   The Techstream displays ON or OFF according to downhill assist control switch operation.

NG: Go to step 3

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OK: Go to next step

2. **PERFORM TEST MODE (SIGNAL CHECK)**
   a. Turn the ignition switch off.
   b. Perform the sensor check in the Test Mode procedure (See **TEST MODE PROCEDURE**).

   OK:

   All Test Mode DTCs are erased.

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

OK: CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **DIAGNOSIS SYSTEM**)

3. **INSPECT DOWNHILL ASSIST CONTROL SWITCH**
   a. Turn the ignition switch off.
   b. Make sure that there is no looseness at the locking part and the connecting part of the connector.
   c. Disconnect the downhill assist control switch connector.
   d. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
4 (B) -1 (E)	Switch is pushed in	Below 1 ohms
4 (B) -1 (E)	Switch is not pushed in	10 kohms or higher

NOTE: Check the downhill assist control switch signal after replacement (See TEST MODE PROCEDURE).

NG: REPLACE DOWNHILL ASSIST CONTROL SWITCH (See **DOWNHILL ASSIST CONTROL SWITCH (FOR 4WD)**)

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Component without harness connected:
(Downhill Assist Control Switch)

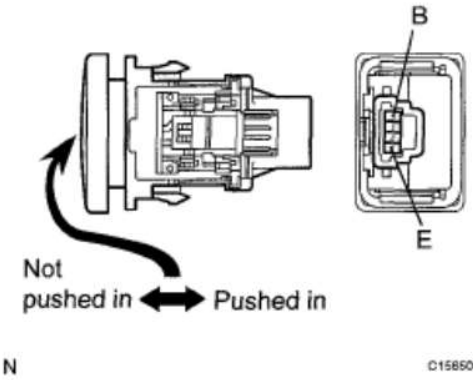


Fig. 67: Inspecting Downhill Assist Control Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

4. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - DOWNHILL ASSIST CONTROL SWITCH)**
   a. Make sure that there is no looseness at the locking part and the connecting part of the connector.
   b. Disconnect the skid control ECU connector.
   c. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-26 (HDCS) - g2-4 (B)	Always	Below 1 ohms
A24-26 (HDCS) - Body ground	Always	10 kohms or higher
g2-1 (E) - 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**).

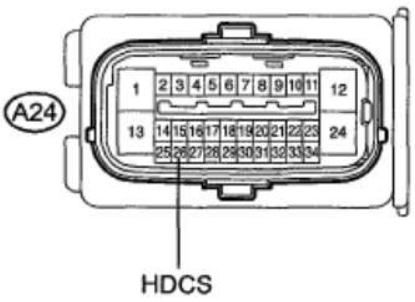
NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

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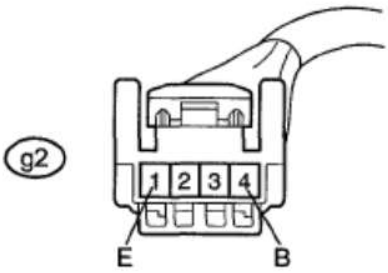
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Front view of wire harness connector:
(to Skid Control ECU)



Front view of wire harness connector:
(to Downhill Assist Control Switch)



N C166258E01

Fig. 68: Identifying Skid Control ECU And Downhill Assist Control Switch Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

DTC C1380 STOP LIGHT CONTROL RELAY MALFUNCTION

DESCRIPTION

Upon receiving the downhill assist control (for 4WD) or hill-start assist control operating signal from the skid control ECU, the relay contact turns on and the stop light comes on.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
	Either of the following is detected:	• Stop light switch

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C1380	1. When the voltage at the IG1 terminal is between 10 and 14 V and the stop light control relay drive output (STPO) is ON, a signal has not been input to the STP terminal for 5 seconds or more. 2. When the voltage at the IG1 terminal is between 10 and 14 V and the stop light control relay drive output (STPO) is OFF, the signal at the STP is different from the input signal at the STP2 for 5 seconds or more.	• Stop light switch circuit • Stop light control relay • Stop light control relay circuit • Brake actuator assembly (Skid control ECU)

WIRING DIAGRAM

Refer to DTC C1425 (See **WIRING DIAGRAM**).

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

HINT:

When C1425 and/or C1426 is output together with C1380, inspect and repair the trouble areas indicated by C1425 and/or C1426 first (See **DTC C1425 OPEN IN STOP LIGHT SWITCH CIRCUIT**, or **DTC C1426 STOP LIGHT SWITCH OFF STUCK MALFUNCTION**).

1. **CHECK STOP LIGHT OPERATION**
   a. Check that the stop lights come on when the brake pedal is depressed, and go off when the brake pedal is released.

   OK

   STOP LIGHT OPERATION CONDITION REFERENCE

Condition	Illumination Condition
Brake pedal depressed	ON
Brake pedal released	OFF

   NG: INSPECT STOP LIGHT CIRCUIT (See **PROBLEM SYMPTOMS TABLE**)

   OK: Go to next step

2. **READ VALUE ON TECHSTREAM (STOP LIGHT SWITCH)**
   a. Connect Techstream to the DLC3.
   b. Turn the ignition switch on (IG).
   c. Select the Data List mode on Techstream (See **DATA LIST/ACTIVE TEST**).

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ABS/VSC/TRAC:

ABS/VSC/TRAC TESTER DISPLAY REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Stop Light SW	Stop light switch/ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-

d. Check that the stop light switch condition observed on Techstream changes according to brake pedal operation.

OK:

The Techstream displays ON or OFF according to brake pedal operation.

NG: Go to step 9

OK: Go to next step

3. **INSPECT SKID CONTROL ECU (STP2 TERMINAL)**
   a. Turn the ignition switch off.
   b. Make sure that there is no looseness at the locking part and the connecting part of the connector.
   c. Disconnect the skid control ECU connector.
   d. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-2 (STP) - A24-22 (STP2)	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (STP2 CIRCUIT)

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

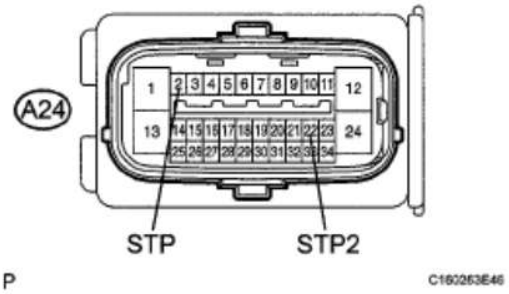


Fig. 69: Identifying STP And STP2 Terminal Of Skid Control ECU Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

OK: Go to next step

4. **PERFORM ACTIVE TEST USING TECHSTREAM (STOP LIGHT CONTROL RELAY)**
   a. Reconnect the skid control ECU connector.
   b. Connect Techstream to the DLC3.
   c. Start the engine.
   d. Select the Active Test mode on Techstream (See **DATA LIST/ACTIVE TEST**).

      ABS/VSC/TRAC:

      ABS/VSC/TRAC TESTER DISPLAY REFERENCE

Tester Display	Test Part	Control Range	Diagnostic Note
Stop Light Relay	Stop light control relay	Relay ON/OFF	Stop lights come on

   e. Check that the "ON" and "OFF" of the stop lights can be shown on the rear combination light by Techstream.

      OK:

      The stop lights turn on or off in accordance with Techstream.

NG: Go to step 6

OK: Go to next step

5. **RECONFIRM DTC**

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a. Turn the ignition switch off.
b. Clear the DTCs (See **DTC CHECK/CLEAR**).
c. Start the engine.
d. Perform a road test.
e. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC (C1380) is not output	A
DTC (C1380) is output	B

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

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

6. **INSPECT STOP LIGHT CONTROL RELAY**
   a. Turn the ignition switch off.
   b. Remove the stop light control relay.
   c. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
3-4	Voltage is not applied between terminals 1 and 2	Below 1 ohms
3-5	Voltage is not applied between terminals 1 and 2	10 kohms or higher
3-4	Voltage is applied between terminals 1 and 2	10 kohms or higher
3-5	Voltage is applied between terminals 1 and 2	Below 1 ohms

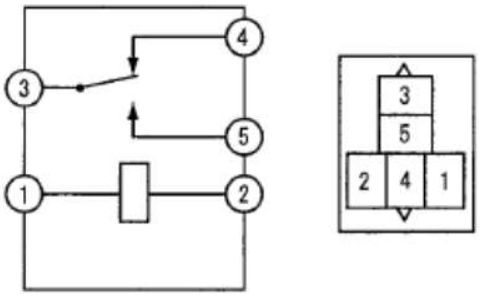
NG: REPLACE STOP LIGHT CONTROL RELAY

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Stop Light Control Relay:



C128459E06

Fig. 70: Stop Light Control Relay Circuit Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

7. **INSPECT ENGINE ROOM RELAY BLOCK (POWER SOURCE TERMINAL)**
   a. Measure the voltage according to the value (s) in the table below.

Standard voltage

VOLTAGE SPECIFICATION

Tester Connection	Condition	Specified Condition
Stop light control relay terminal 5 - Body ground	Always	11 to 14 V
Stop light control relay terminal 2 - Body ground	Ignition switch on (IG)	11 to 14 V

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

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Engine Room Relay Block:

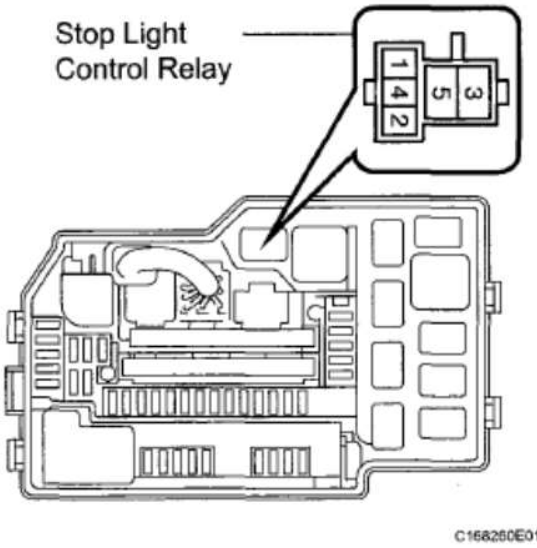


Fig. 71: Identifying Stop Light Control Relay Terminal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

8. **INSPECT SKID CONTROL ECU (STPO TERMINAL)**
   a. Install the stop light control relay.
   b. Make sure that there is no looseness at the locking part and the connecting part of the connector.
   c. Disconnect the skid control ECU connector.
   d. Turn the ignition switch on (IG).
   e. Measure the voltage according to the value (s) in the table below.

Standard voltage

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
A24-31 (STPO) - Body ground	Ignition switch on (IG)	11 to 14 V

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

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

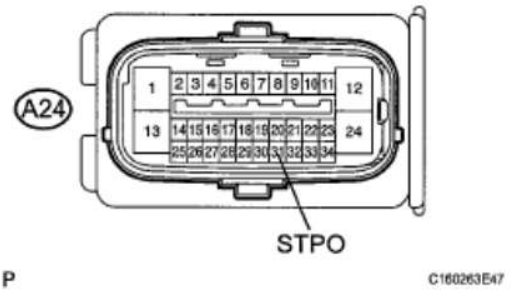


Fig. 72: Identifying STPO Terminal Of Skid Control ECU Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

9. **INSPECT SKID CONTROL ECU (STP TERMINAL)**
   a. Turn the ignition switch off.
   b. Make sure that there is no looseness at the locking part and the connecting part of the connector.
   c. Disconnect the skid control ECU connector.
   d. Measure the voltage according to the value (s) in the table below.

Standard voltage

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
A24-2 (STP) - Body ground	Stop light switch ON (Brake pedal depressed)	8 to 14 V
A24-2 (STP) - Body ground	Stop light switch OFF (Brake pedal released)	Below 1.5 V

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

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

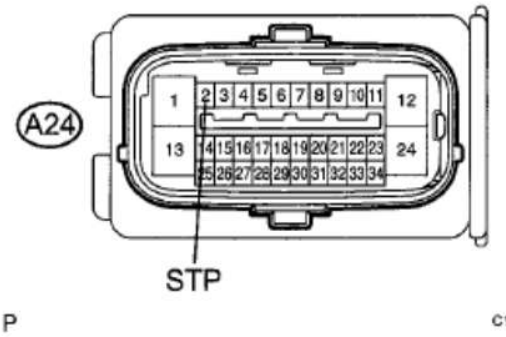


Fig. 73: Identifying STP Terminal Of Skid Control ECU Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

DTC C1381 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, DTCs U0123 (malfunction in CAN communication with the yaw rate sensor) and U0124 (malfunction in CAN communication with the acceleration sensor) are set.

These DTCs are also output when calibration has not been completed.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1381	At a vehicle speed of more than 3 km/h (2 mph), an acceleration sensor power source malfunction signal is received for 10 seconds or more.	• Yaw rate and acceleration sensor power source circuit • Yaw rate and acceleration sensor

WIRING DIAGRAM

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Refer to DTCs C1232, C1243 and C1245 (See **WIRING DIAGRAM**).

INSPECTION PROCEDURE

NOTE: When replacing the yaw rate and acceleration sensor, perform zero point calibration (See CALIBRATION).

HINT:

When U0123, U0124 and/or U0126 is output together with C1381, inspect and repair the trouble areas indicated by U0123, U0124 and/or U0126 first (See **DTC U0073 CONTROL MODULE COMMUNICATION BUS OFF; DTC U0100 LOST COMMUNICATION WITH ECM/PCM; DTC U0123 LOST COMMUNICATION WITH YAW RATE SENSOR MODULE; DTC U0124 LOST COMMUNICATION WITH LATERAL ACCELERATION SENSOR MODULE; DTC U0126 LOST COMMUNICATION WITH STEERING ANGLE SENSOR MODULE**).

1. **INSPECT YAW RATE AND ACCELERATION SENSOR (IG TERMINAL)**
   a. Make sure that there is no looseness at the locking part and the connecting part of the connector.
   b. Disconnect the yaw rate and acceleration sensor connector.
   c. Turn the ignition switch on (IG).
   d. Measure the voltage according to the value (s) in the table below.

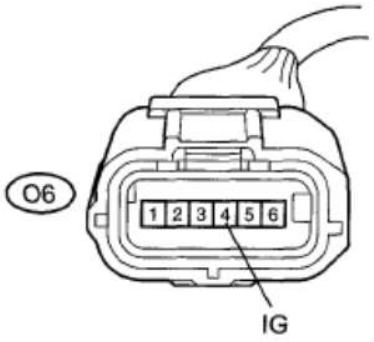
Standard voltage

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
O6-4 (IG) - Body ground	Ignition switch on (IG)	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)



N C156491E09

Fig. 74: Identifying IG Terminal Of Yaw Rate And Acceleration Sensor

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Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

2. **INSPECT YAW RATE AND ACCELERATION SENSOR (GND TERMINAL)**
   a. Turn the ignition switch off.
   b. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
O6-1 (GND) - Body ground	Always	Below 1 ohms

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

Front view of wire harness connector:
(to Yaw Rate and Acceleration Sensor)

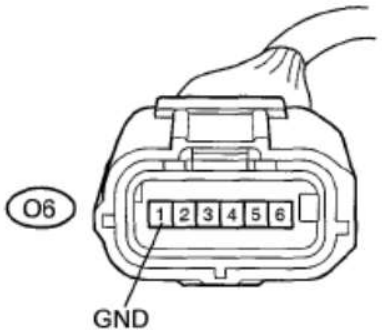


Fig. 75: Identifying GND Terminal Of Yaw Rate And Acceleration Sensor
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

3. **RECONFIRM DTC**
   a. Reconnect the yaw rate and acceleration sensor connector.
   b. Clear the DTCs (See **DTC CHECK/CLEAR**).
   c. Start the engine.
   d. Drive the vehicle at a speed of 3 km/h (2 mph) or more for at least 10 seconds.
   e. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

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RESULT CHART

Result	Proceed to
DTC (C1381) is not output	A
DTC (C1381) is output	B

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**).

B: REPLACE YAW RATE AND ACCELERATION SENSOR (See **REMOVAL**)

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

DTC C1401 FRONT SPEED SENSOR RH MALFUNCTION; DTC C1402 FRONT SPEED SENSOR LH MALFUNCTION

DESCRIPTION

The speed sensor detects wheel speed and sends the appropriate signals to the skid control ECU. These signals are used for ABS control.

Speed sensor rotors have rows of alternating N and S magnetic poles, and their magnetic fields change when the rotors turn.

Each speed sensor detects that magnetic change and sends a pulse signal to the skid control ECU.

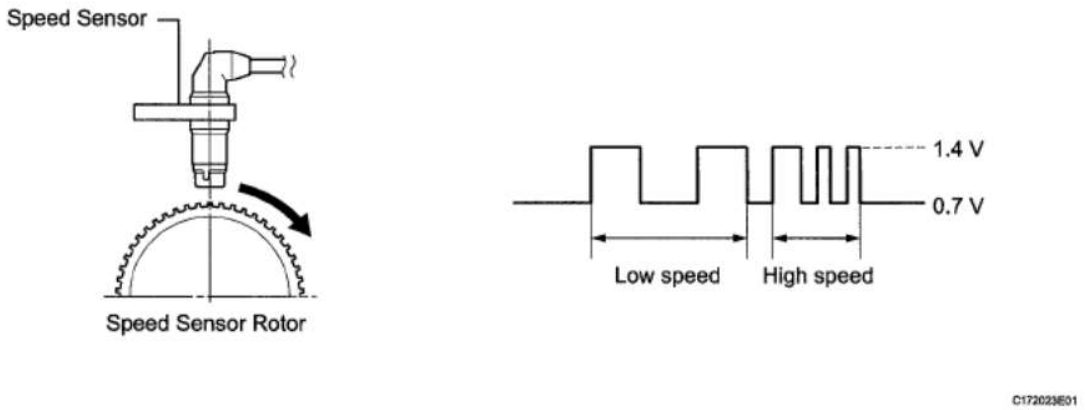


Fig. 76: Identifying Speed Sensor And Speed Sensor Rotor
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DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1401 C1402	Any of the following is detected: 1. At a vehicle speed 10 km/h (6 mph) or more, output voltage from one of the speed sensors is less than that from the other sensors for 15 seconds or more (for 2WD) or for 30 seconds or more (for 4WD). 2. At a vehicle speed less than 10 km/h (6 mph), output from one of the speed sensors is 0 km/h (0 mph) for 1 second or more. 3. At a vehicle speed 10 km/h (6 mph) or more, outputs from both front speed sensors are 0 km/h (0 mph) for 15 seconds or more (for 2WD) or for 30 seconds or more (for 4WD).	• Front speed sensor RH/LH • Speed sensor rotor

HINT:

- DTC C1401 is for the front speed sensor RH.
- DTC C1402 is for the front speed sensor LH.

WIRING DIAGRAM

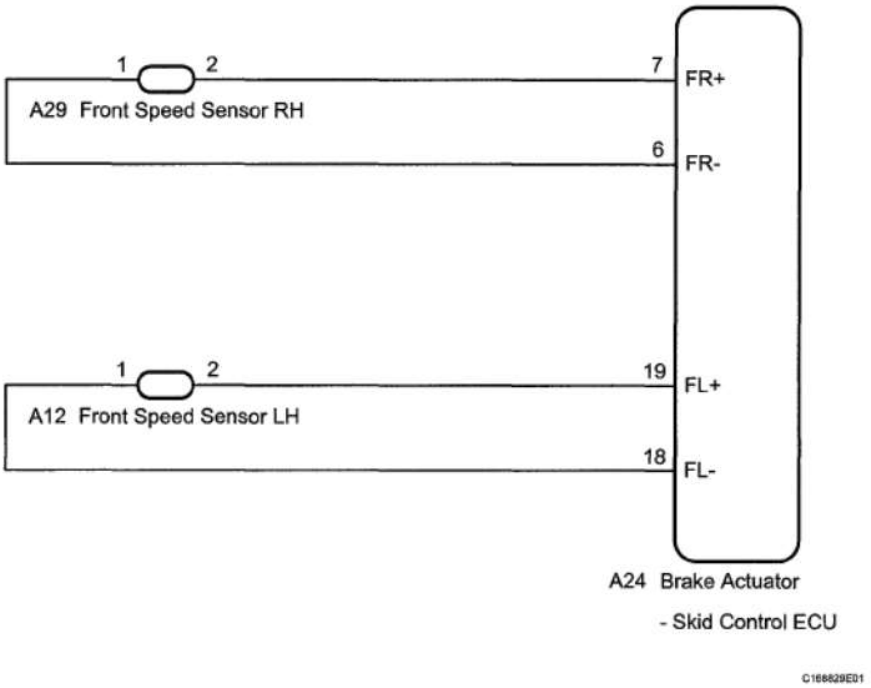


Fig. 77: Front Speed Sensor RH - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

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1. **CHECK FRONT SPEED SENSOR INSTALLATION**
   a. 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:

      8.0 N*m (82 kgf*cm, 71 in.*lbf)

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

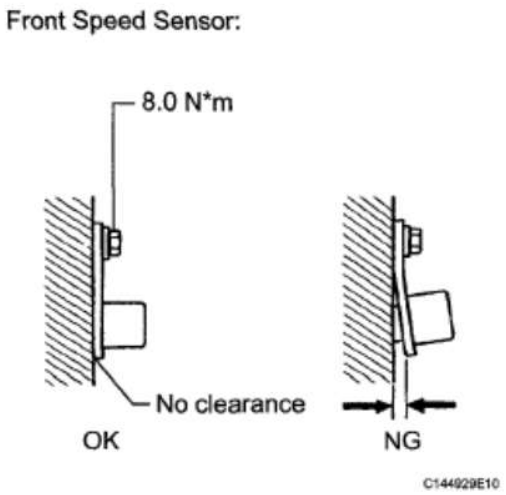


Fig. 78: Identifying Front Speed Sensor Proper Installation Position
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

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

      OK:

      No scratches, oil, or foreign matter on the sensor tip.

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

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NG: CLEAN OR REPLACE FRONT SPEED SENSOR

OK: Go to next step

3. **CHECK FRONT SPEED SENSOR ROTOR**
   a. Remove the front speed sensor rotor (See **REMOVAL** for 2GR-FE, or See **REMOVAL** for 1AR-FE).
   b. Check the speed sensor rotor.

      OK:

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

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

HINT:

If the front speed sensor rotor needs to be replaced, replace it together with the front drive outboard joint shaft assembly.

NG: CLEAN OR REPLACE FRONT SPEED SENSOR ROTOR

OK: Go to next step

4. **READ VALUE ON TECHSTREAM (FRONT SPEED SENSOR)**
   a. Install the front speed sensor and the front speed sensor rotor.
   b. Connect Techstream to the DLC3.
   c. Start the engine.
   d. Select the Data List mode on Techstream (See **DATA LIST/ACTIVE TEST**).

      ABS/VSC/TRAC:

      ABS/VSC/TRAC TESTER DISPLAY REFERENCE

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 Techstream and the speed value displayed on the speedometer when driving the vehicle.

      HINT:

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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 Techstream is the same as the actual vehicle speed measured using a speedometer tester (calibrated chassis dynamometer).

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: Go to step 5

OK: CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **DIAGNOSIS SYSTEM**)

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

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

6. **RECONFIRM DTC**
   a. Clear the DTCs (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
DTCs (C1401 and C1402) are not output	A
DTCs (C1401 and/or C1402) are output	B

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

HINT:

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- If the front speed sensor rotor needs to be replaced, replace it together with the front drive outboard joint shaft assembly.
- 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 FRONT SPEED SENSOR ROTOR

A: END

DTC C1403 REAR SPEED SENSOR RH MALFUNCTION; DTC C1404 REAR SPEED SENSOR LH MALFUNCTION

DESCRIPTION

The speed sensor detects wheel speed and sends the appropriate signals to the skid control ECU. These signals are used for ABS control.

Speed sensor rotors have rows of alternating N and S magnetic poles, and their magnetic fields change when the rotors turn.

Each speed sensor detects that magnetic change and sends a pulse signal to the skid control ECU.

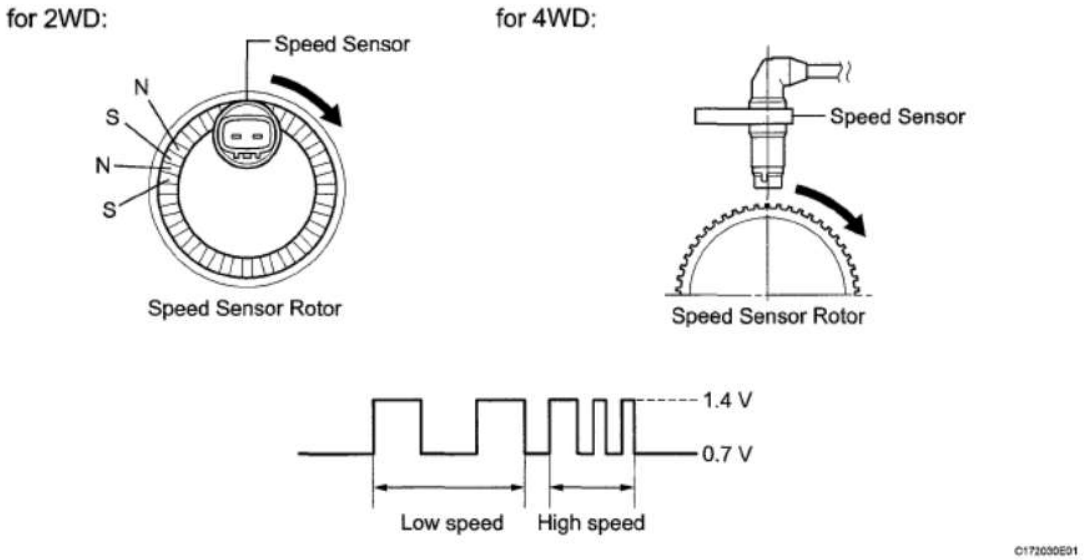


Fig. 79: Identifying Speed Sensor And Speed Sensor Rotor
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DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
	Any of the following is detected:	

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C1403 C1404	1. At a vehicle speed 10 km/h (6 mph) or more, output voltage from one of the speed sensors is less than that from the other sensors for 15 seconds or more (for 2WD) or for 30 seconds or more (for 4WD). 2. At a vehicle speed less than 10 km/h (6 mph), output from one of the speed sensors is 0 km/h (0 mph) for 1 second or more. 3. At a vehicle speed less than 10 km/h (6 mph), outputs from both rear speed sensors are 0 km/h (0 mph) for a cumulative time of 200 seconds.	• Rear speed sensor RH/LH • Speed sensor rotor

HINT:

- DTC C1403 is for the rear speed sensor RH.
- DTC C1404 is for the rear speed sensor LH.

WIRING DIAGRAM

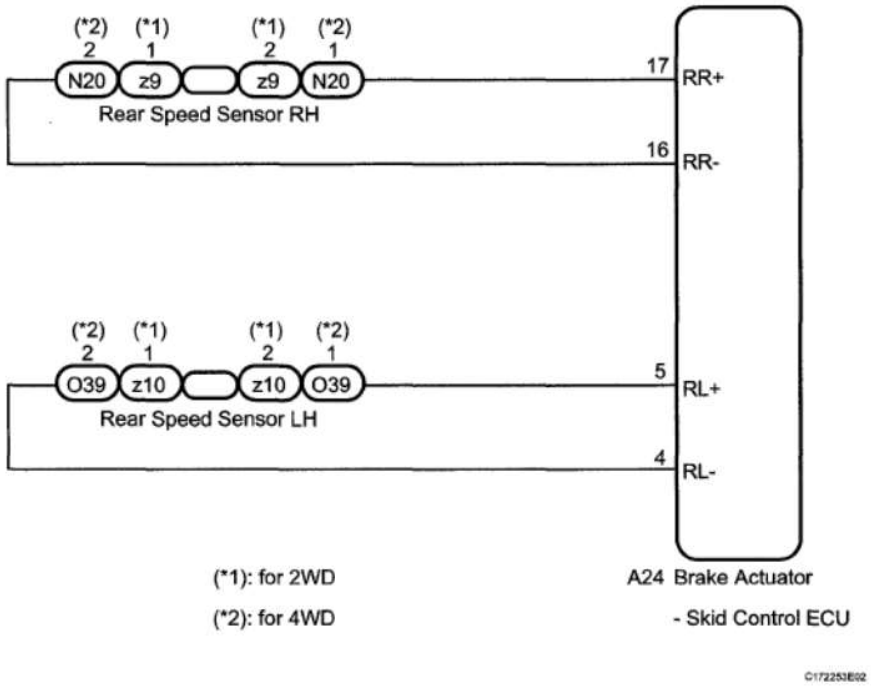


Fig. 80: Rear Speed Sensor RH - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

1. **CHECK REAR SPEED SENSOR INSTALLATION**
   a. Check the speed sensor installation (for 2WD).

      OK:

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

b. Check the speed sensor installation (for 4WD).

OK:

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

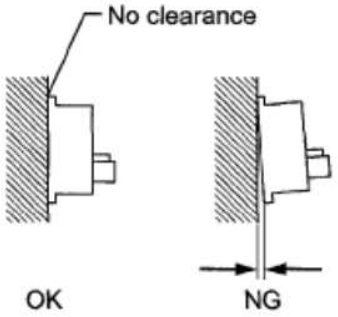
The installation nut is tightened properly.

Torque:

8.0 N*m (82 kgf*cm, 71 in.*lbf)

Rear Speed Sensor:

for 2WD:



for 4WD:

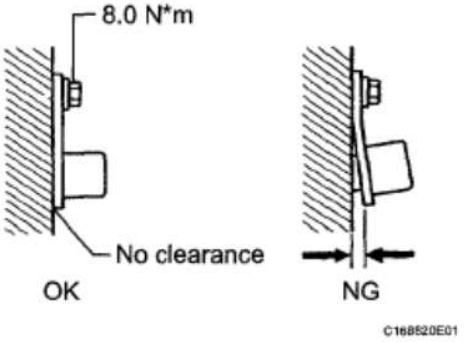


Fig. 81: Identifying Rear Speed Sensor Proper Installation Position
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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Result

RESULT CHART

Result	Proceed to
OK (for 4WD)	A
OK (for 2WD)	B
NG (for 2WD)	C
NG (for 4WD)	D

B: Go to step 4

C: INSTALL REAR SPEED SENSOR CORRECTLY (for 2WD) (See **INSTALLATION**)

D: INSTALL REAR SPEED SENSOR CORRECTLY (for 4WD) (See **INSTALLATION**)

A: Go to next step

2. **CHECK REAR SPEED SENSOR TIP**
   a. Remove the rear speed sensor (See **REMOVAL**).
   b. Check the speed sensor tip.

OK:

No scratches, oil, 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 REAR SPEED SENSOR

OK: Go to next step

3. **CHECK REAR SPEED SENSOR ROTOR**
   a. Remove the rear speed sensor rotor (See **REMOVAL**).
   b. Check the speed sensor rotor.

OK:

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

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

HINT:

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If the rear speed sensor rotor needs to be replaced, replace it together with the outboard joint shaft assembly.

NG: CLEAN OR REPLACE REAR SPEED SENSOR ROTOR

OK: Go to next step

4. **READ VALUE ON TECHSTREAM (REAR SPEED SENSOR)**
   a. Install the rear speed sensor and the rear speed sensor rotor.
   b. Connect Techstream to the DLC3.
   c. Start the engine.
   d. Select the Data List mode on Techstream (See **DATA LIST/ACTIVE TEST**).

   ABS/VSC/TRAC:

   ABS/VSC/TRAC TESTER DISPLAY REFERENCE

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 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 Techstream is the same as the actual vehicle speed measured using a speedometer tester (calibrated chassis dynamometer).

Result

RESULT CHART

Result	Proceed to
NG (for 4WD)	A
NG (for 2WD)	B
OK	C

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

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.

- 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 REAR SPEED SENSOR AND REAR SPEED SENSOR ROTOR

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

A: Go to next step

5. **REPLACE REAR SPEED SENSOR**
   a. Turn the ignition switch off.
   b. Replace the rear speed sensor (See **REMOVAL**).

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

6. **RECONFIRM DTC**
   a. Clear the DTCs (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
DTCs (C1403 and C1404) are not output	A
DTCs (C1403 and/or C1404) are output	B

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

HINT:

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- If the rear speed sensor rotor needs to be replaced, replace it together with the outboard joint shaft assembly.
- 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 REAR SPEED SENSOR ROTOR

A: END

DTC C1405 OPEN OR SHORT IN FRONT SPEED SENSOR RH CIRCUIT; DTC C1406 OPEN OR SHORT IN FRONT SPEED SENSOR LH CIRCUIT

DESCRIPTION

The speed sensor detects wheel speed and sends the appropriate signals to the skid control ECU. These signals are used for ABS control.

Speed sensor rotors have rows of alternating N and S magnetic poles, and their magnetic fields change when the rotors turn.

Each speed sensor detects that magnetic change and sends a pulse signal to the skid control ECU.

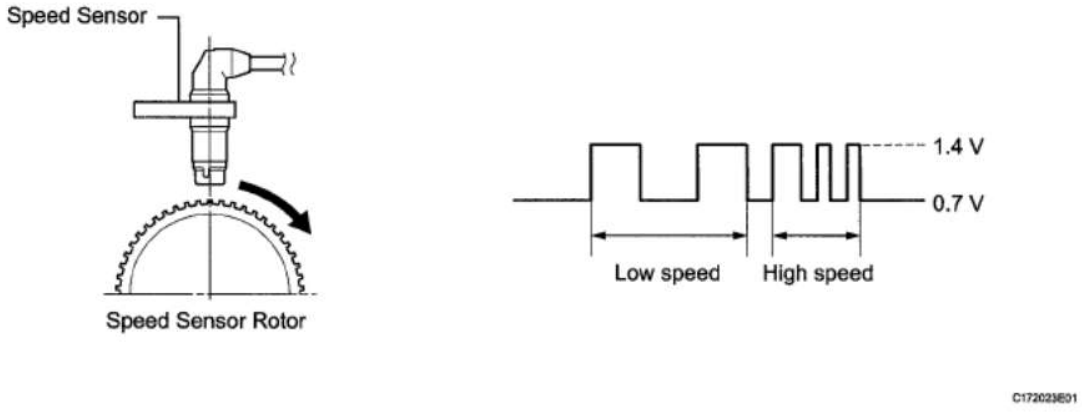


Fig. 82: Identifying Speed Sensor And Speed Sensor Rotor
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1405 C1406	Either of the following is detected: 1. An open in the speed sensor signal circuit continues for 0.5 seconds or more. 2. 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 • Brake actuator assembly (Skid control ECU)

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HINT:

- DTC C1405 is for the front speed sensor RH.
- DTC C1406 is for the front speed sensor LH.

WIRING DIAGRAM

Refer to DTCs C1401 and C1402 (See **WIRING DIAGRAM**).

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

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

ABS/VSC/TRAC:

ABS/VSC/TRAC TESTER DISPLAY REFERENCE

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 4

OK: Go to next step

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

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ABS/VSC/TRAC:

ABS/VSC/TRAC TESTER DISPLAY REFERENCE

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 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 Techstream is the same as the actual vehicle speed measured using a speedometer tester (calibrated chassis dynamometer).

NG: Go to step 4

OK: Go to next step

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

Result

RESULT CHART

Result	Proceed to
DTCs (C1405 and C1406) are not output	A
DTCs (C1405 and/or C1406) are output	B

HINT:

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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 **DIAGNOSIS SYSTEM**)

4. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - FRONT SPEED SENSOR)**
   a. Turn the ignition switch off.
   b. Make sure that there is no looseness at the locking part and the connecting part of the connectors.
   c. Disconnect the skid control ECU connector and the front speed sensor connector.
   d. Measure the resistance according to the value (s) in the table below.

Standard resistance:

for RH

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-7 (FR+) - A29-2 (FR+)	Always	Below 1 ohms
A24-7 (FR+) - Body ground	Always	10 kohms or higher
A24-6 (FR-) - A29-1 (FR-)	Always	Below 1 ohms
A24-6 (FR-) - Body ground	Always	10 kohms or higher

for LH

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-19 (FL+) - A12-2 (FL+)	Always	Below 1 ohms
A24-19 (FL+) - Body ground	Always	10 kohms, or higher
A24-18 (FL-) - A12-1 (FL-)	Always	Below 1 ohms
A24-18 (FL-) - Body ground	Always	10 kohms or higher

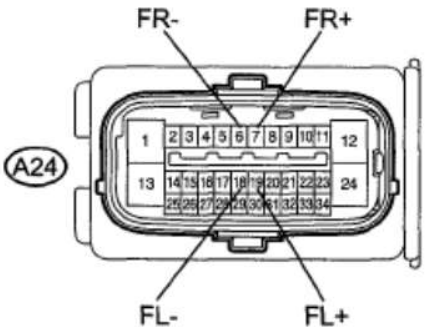
NG: DTC C1407 OPEN OR SHORT IN REAR SPEED SENSOR RH CIRCUIT; DTC C1408 OPEN OR SHORT IN REAR SPEED SENSOR LH CIRCUIT

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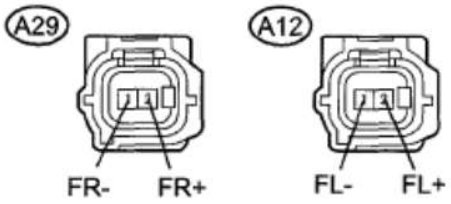
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Front view of wire harness connector:
(to Skid Control ECU)



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



C160262E07

Fig. 83: Identifying Skid Control ECU And Front Speed Sensor Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

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

Standard voltage:

for RH

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition

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A29-2 (FR+) - Body ground	Ignition switch on (IG)	8 to 14 V

for LH

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
A12-2 (FL+) - Body ground	Ignition switch on (IG)	8 to 14 V

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

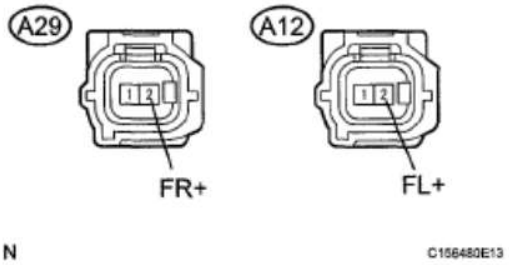


Fig. 84: Identifying Front Speed Sensor Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

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

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

DTC C1407 OPEN OR SHORT IN REAR SPEED SENSOR RH CIRCUIT; DTC C1408 OPEN OR SHORT IN REAR SPEED SENSOR LH CIRCUIT

DESCRIPTION

The speed sensor detects wheel speed and sends the appropriate signals to the skid control ECU. These signals are used for ABS control.

Speed sensor rotors have rows of alternating N and S magnetic poles, and their magnetic fields change when the

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rotors turn.

Each speed sensor detects that magnetic change and sends a pulse signal to the skid control ECU.

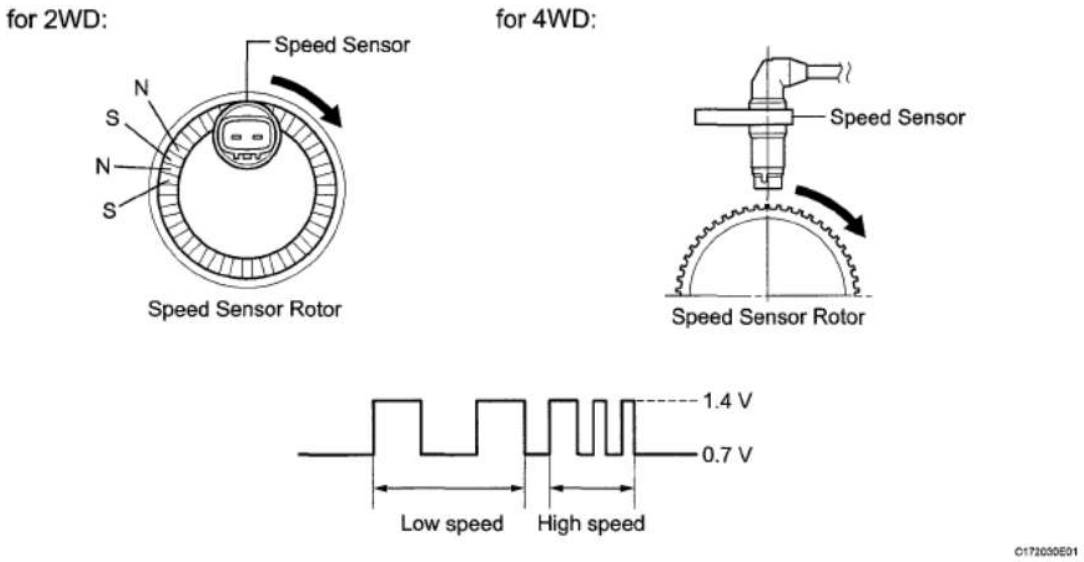


Fig. 85: Identifying Speed Sensor And Speed Sensor Rotor
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1407 C1408	Either of the following is detected: 1. An open in the speed sensor signal circuit continues for 0.5 seconds or more. 2. With the IG1 terminal voltage 9.5 V or more, the sensor power supply voltage decreases for 0.5 seconds or more.	• Rear speed sensor RH/LH • Speed sensor circuit • Brake actuator assembly (Skid control ECU)

HINT:

- DTC C1407 is for the rear speed sensor RH.
- DTC C1408 is for the rear speed sensor LH.

WIRING DIAGRAM

Refer to DTCs C1403 and C1404 (See **WIRING DIAGRAM**).

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

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

ABS/VSC/TRAC:

ABS/VSC/TRAC TESTER DISPLAY REFERENCE

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	-

Result

RESULT CHART

Result	Proceed to
There are no momentary interruptions	A
There are momentary interruptions (for 2WD)	B
There are momentary interruptions (for 4WD)	C

HINT:

Perform the above inspection before removing the sensor and connector.

B: Go to step 4

C: Go to step 5

A: Go to next step

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

ABS/VSC/TRAC:

ABS/VSC/TRAC TESTER DISPLAY REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
RR Wheel	RR wheel speed sensor reading/min.: 0	Actual wheel	Similar speed as

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Speed	km/h (0 mph), max.: 326 km/h (202 mph)	speed	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 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 Techstream is the same as the actual vehicle speed measured using a speedometer tester (calibrated chassis dynamometer).

Result

RESULT CHART

Result	Proceed to
OK	A
NG (for 2WD)	B
NG (for 4WD)	C

B: Go to step 4

C: Go to step 5

A: Go to next step

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

Result

RESULT CHART

Result	Proceed to

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DTCs (C1407 and C1408) are not output	A
DTCs (C1407 and/or C1408) are 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 **DIAGNOSIS SYSTEM**)

4. **CHECK HARNESS AND CONNECTOR (SKID CONTROL SENSOR WIRE)**
   a. Turn the ignition switch off.
   b. Make sure that there is no looseness at the locking part and the connecting part of the connectors.
   c. Disconnect the skid control sensor wire.
   d. Measure the resistance according to the value (s) in the table below.

Standard resistance:

for RH

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
z9 ("A"-2) - z9 ("B"-1)	Always	Below 1 ohms
z9 ("A"-2) - z9 ("B"-2)	Always	10 kohms or higher
z9 ("A"-2) - Body ground	Always	10 kohms or higher
z9 ("A"-1) - z9 ("B"-2)	Always	Below 1 ohms
z9 ("A"-1) - z9 ("B"-1)	Always	10 kohms or higher
z9 ("A"-1) - Body ground	Always	10 kohms or higher

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Skid Control Sensor Wire:

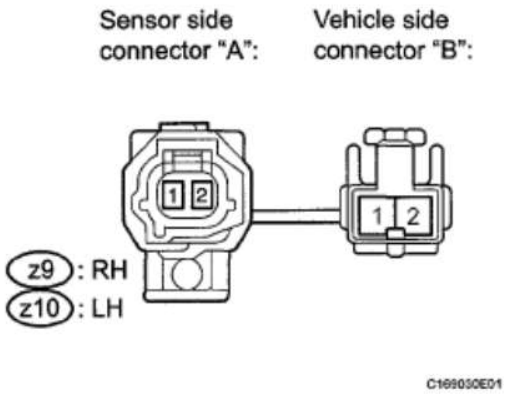


Fig. 86: Identifying Skid Control Sensor Wire Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

for LH

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
z10 ("A"-2) - z10 ("B"-1)	Always	Below 1 ohms
z10 ("A"-2) - z10 ("B"-2)	Always	10 kohms or higher
z10 ("A"-2) - Body ground	Always	10 kohms or higher
z10 ("A"-1) - z10 ("B"-2)	Always	Below 1 ohms
z10 ("A"-1) - z10 ("B"-1)	Always	10 kohms or higher
z10 ("A"-1) - Body ground	Always	10 kohms or higher

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

NG: REPLACE SKID CONTROL SENSOR WIRE

OK: Go to next step

5. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - REAR SPEED SENSOR)**
   a. Turn the ignition switch off.
   b. Reconnect the skid control sensor wire (for 2WD).
   c. Make sure that there is no looseness at the locking part and the connecting part of the connectors.
   d. Disconnect the skid control ECU connector and the rear speed sensor connector.
   e. Measure the resistance according to the value (s) in the table below.

Standard resistance:

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for 2WD RH

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-17 (RR+) - z9-2 (RR+)	Always	Below 1 ohms
A24-17 (RR+) - Body ground	Always	10 kohms or higher
A24-16 (RR-) - z9-1 (RR-)	Always	Below 1 ohms
A24-16 (RR-) - Body ground	Always	10 kohms or higher

for 4WD RH

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-17 (RR+) - N20-1 (RR+)	Always	Below 1 ohms
A24-17 (RR+) - Body ground	Always	10 kohms or higher
A24-16 (RR-) - N20-2 (RR-)	Always	Below 1 ohms
A24-16 (RR-) - Body ground	Always	10 kohms or higher

for 2WD LH

RESISTANCE SPECIFICATION

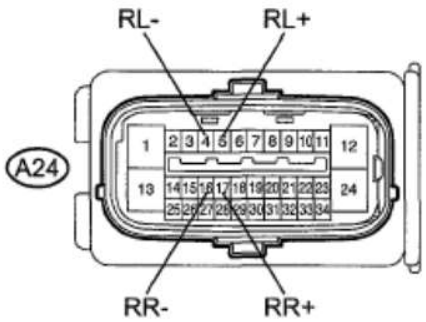
Tester Connection	Condition	Specified Condition
A24-5 (RL+) - z10-2 (RL+)	Always	Below 1 ohms
A24-5 (RL+) - Body ground	Always	10 kohms or higher
A24-4 (RL-) - z10-1 (RL-)	Always	Below 1 ohms
A24-4 (RL-) - Body ground	Always	10 kohms or higher

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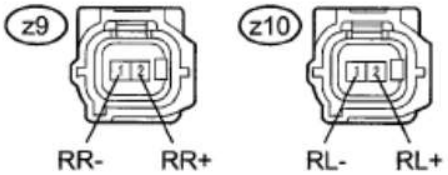
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Front view of wire harness connector:
(to Skid Control ECU)



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

for 2WD:



for 4WD:

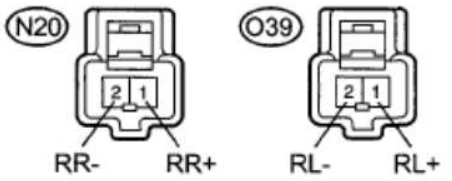


Fig. 87: Identifying Skid Control ECU And Rear Speed Sensor Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

for 4WD LH

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-5 (RL+) - O39-1 (RL+)	Always	Below 1 ohms
A24-5 (RL+) - Body ground	Always	10 kohms or higher
A24-4 (RL-) - O39-2 (RL-)	Always	Below 1 ohms
A24-4 (RL-) - Body ground	Always	10 kohms or higher

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NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

OK: Go to next step

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

Standard voltage:

for 2WD RH

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
z9-2 (RR+) - Body ground	Ignition switch on (IG)	8 to 14 V

for 4WD RH

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
N20-1 (RR+) - Body ground	Ignition switch on (IG)	8 to 14 V

for 2WD LH

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
Z10-2 (RL+) - Body ground	Ignition switch on (IG)	8 to 14 V

for 4WD LH

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
O39-1 (RL+) - Body ground	Ignition switch on (IG)	8 to 14 V

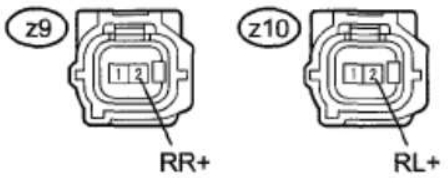
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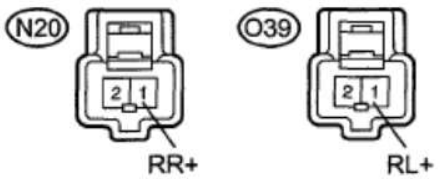
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Front view of wire harness connector:
(to Rear Speed Sensor)

for 2WD:



for 4WD:



N C169034E04

Fig. 88: Identifying Skid Control ECU Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Result

RESULT CHART

Result	Proceed to
OK (for 2WD)	A
OK (for 4WD)	B
NG	C

NOTE: **Check the speed 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**).

B: REPLACE REAR SPEED SENSOR (for 4WD) (See **REMOVAL**)

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

A: REPLACE REAR SPEED SENSOR (for 2WD) (See **REMOVAL**)

DTC C1413 FRONT SPEED SENSOR RH OUTPUT MALFUNCTION; DTC C1414 FRONT SPEED SENSOR LH OUTPUT MALFUNCTION

DESCRIPTION

The speed sensor detects wheel speed and sends the appropriate signals to the skid control ECU. These signals are used for ABS control.

Speed sensor rotors have rows of alternating N and S magnetic poles, and their magnetic fields change when the rotors turn.

Each speed sensor detects that magnetic change and sends a pulse signal to the skid control ECU.

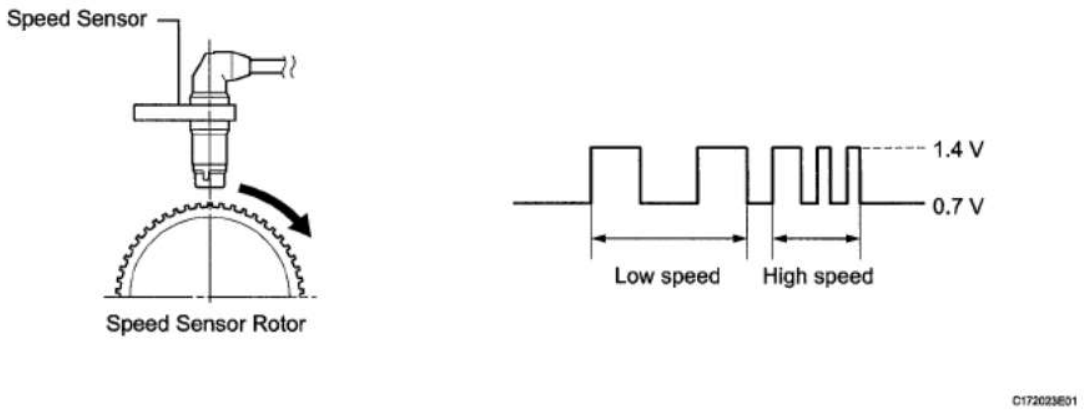


Fig. 89: Identifying Speed Sensor And Speed Sensor Rotor
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1413 C1414	Any of the following is detected: 1. An open in the sensor signal circuit of a malfunctioning area occurs 255 times or more. 2. At a vehicle speed 20 km/h (12 mph) or more, noise occurs in the sensor signals of a malfunctioning wheel 75 times or more within 5 seconds. 3. At a vehicle speed 10 km/h (6 mph) or more, noise occurs once per rotor rotation for 15 seconds or more.	• Front speed sensor RH/LH • Speed sensor circuit • Speed sensor rotor • Brake actuator assembly (Skid control ECU)

HINT:

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- DTC C1413 is for the front speed sensor RH.
- DTC C1414 is for the front speed sensor LH.

WIRING DIAGRAM

Refer to DTCs C1401 and C1402 (See **WIRING DIAGRAM**).

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

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

ABS/VSC/TRAC:

ABS/VSC/TRAC TESTER DISPLAY REFERENCE

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 4

OK: Go to next step

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

ABS/VSC/TRAC:

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ABS/VSC/TRAC TESTER DISPLAY REFERENCE

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 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 Techstream is the same as the actual vehicle speed measured using a speedometer tester (calibrated chassis dynamometer).

NG: Go to step 4

OK: Go to next step

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

Result

RESULT CHART

Result	Proceed to
DTCs (C1413 and C1414) are not output	A
DTCs (C1413 and/or C1414) are 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**).

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

A: Go to next step

4. **CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION)** (See **DIAGNOSIS SYSTEM**)
   a. Turn the ignition switch 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:

      8.0 N*m (82 kgf*cm, 71 in.*lbf)

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

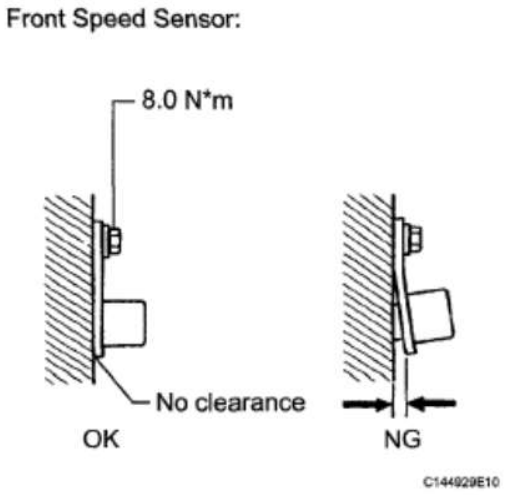


Fig. 90: Identifying Front Speed Sensor Proper Installation Position
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

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

      OK:

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No scratches, oil, 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

6. **CHECK FRONT SPEED SENSOR ROTOR**
   a. Remove the front speed sensor rotor (See **REMOVAL** for 2GR-FE, or See **REMOVAL** for 1AR-FE).
   b. Check the speed sensor rotor.

   OK:

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

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

HINT:

If the front speed sensor rotor needs to be replaced, replace it together with the front drive outboard joint shaft assembly.

NG: CLEAN OR REPLACE FRONT SPEED SENSOR ROTOR

OK: Go to next step

7. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - FRONT SPEED SENSOR)**
   a. Install the front speed sensor and the front speed sensor rotor.
   b. Make sure that there is no looseness at the locking part and the connecting part of the connectors.
   c. Disconnect the skid control ECU connector and the front speed sensor connector.
   d. Measure the resistance according to the value (s) in the table below.

Standard resistance:

for RH

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-7 (FR+) - A29-2 (FR+)	Always	Below 1 ohms
A24-7 (FR+) - Body ground	Always	10 kohms or higher

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A24-6 (FR-) - A29-1 (FR-)	Always	Below 1 ohms
A24-6 (FR-) - Body ground	Always	10 kohms or higher

for LH

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-19 (FL+) - A12-2 (FL+)	Always	Below 1 ohms
A24-19 (FL+) - Body ground	Always	10 kohms or higher
A24-18 (FL-) - A12-1 (FL-)	Always	Below 1 ohms
A24-18 (FL-) - Body ground	Always	10 kohms or higher

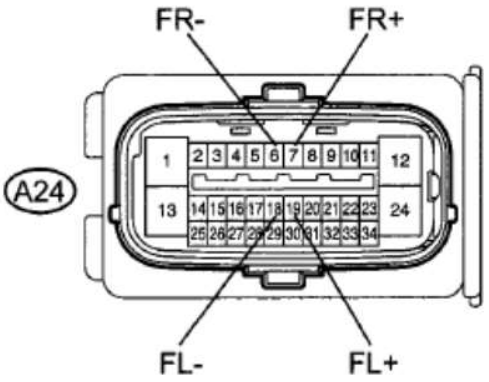
NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

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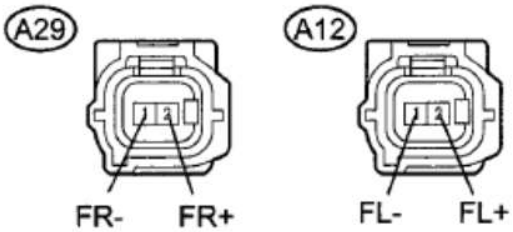
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Front view of wire harness connector:
(to Skid Control ECU)



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



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Fig. 91: Identifying Skid Control ECU And Front Speed Sensor Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

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

Standard voltage:

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for RH

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
A29-2 (FR+) - Body ground	Ignition switch on (IG)	8 to 14 V

for LH

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
A12-2 (FL+) - Body ground	Ignition switch on (IG)	8 to 14 V

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

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

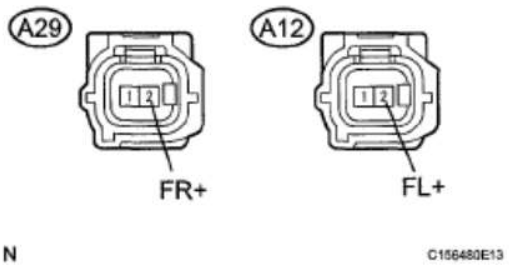


Fig. 92: Identifying Front Speed Sensor Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

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

DTC C1415 REAR SPEED SENSOR RH OUTPUT MALFUNCTION; DTC C1416 REAR SPEED SENSOR LH OUTPUT MALFUNCTION

DESCRIPTION

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The speed sensor detects wheel speed and sends the appropriate signals to the skid control ECU. These signals are used for ABS control.

Speed sensor rotors have rows of alternating N and S magnetic poles, and their magnetic fields change when the rotors turn.

Each speed sensor detects that magnetic change and sends a pulse signal to the skid control ECU.

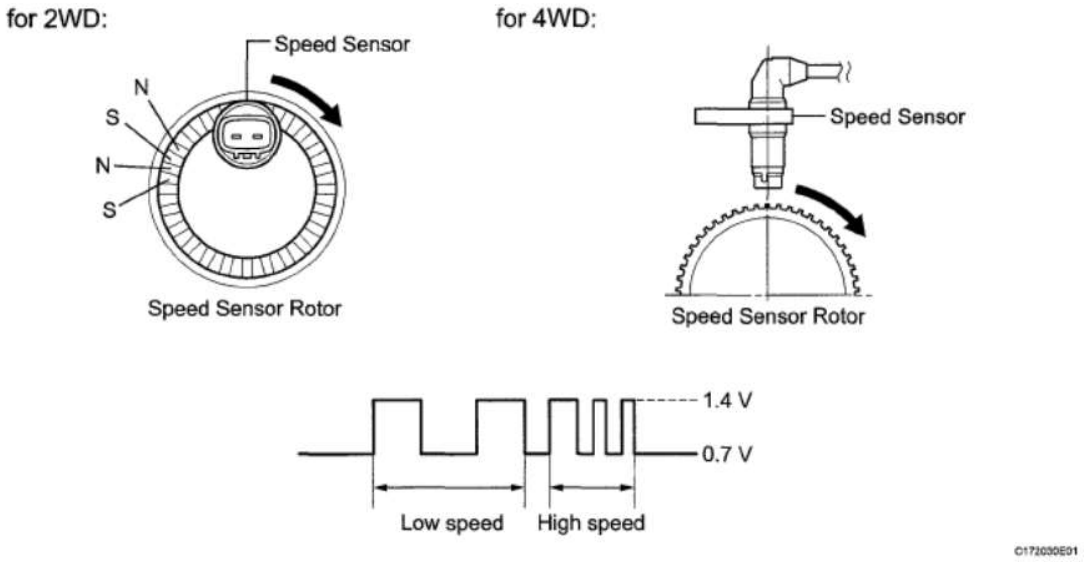


Fig. 93: Identifying Speed Sensor And Speed Sensor Rotor
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1415 C1416	Any of the following is detected: 1. An open in the sensor signal circuit of a malfunctioning area occurs 255 times or more. 2. At a vehicle speed 20 km/h (12 mph) or more, noise occurs in the sensor signals of a malfunctioning wheel 75 times or more within 5 seconds. 3. At a vehicle speed 10 km/h (6 mph) or more, noise occurs once per rotor rotation for 15 seconds or more.	• Rear speed sensor RH/LH • Speed sensor circuit • Speed sensor rotor • Brake actuator assembly (Skid control ECU)

HINT:

- DTC C1415 is for the rear speed sensor RH.
- DTC C1416 is for the rear speed sensor LH.

WIRING DIAGRAM

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Refer to DTCs C1403 and C1404 (See **WIRING DIAGRAM**).

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

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

ABS/VSC/TRAC:

ABS/VSC/TRAC TESTER DISPLAY REFERENCE

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 4

OK: Go to next step

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

ABS/VSC/TRAC:

ABS/VSC/TRAC TESTER DISPLAY REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
RR Wheel	RR wheel speed sensor reading/min.: 0	Actual wheel	Similar speed as

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Speed	km/h (0 mph), max.: 326 km/h (202 mph)	speed	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 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 Techstream is the same as the actual vehicle speed measured using a speedometer tester (calibrated chassis dynamometer).

NG: Go to step 4

OK: Go to next step

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

Result

RESULT CHART

Result	Proceed to
DTCs (C1415 and C1416) are not output	A
DTCs (C1415 and/or C1416) are 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 **DIAGNOSIS**

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SYSTEM)

4. **CHECK REAR SPEED SENSOR INSTALLATION**
   a. Turn the ignition switch off.
   b. Check the speed sensor installation (for 2WD).

      OK:

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

   c. Check the speed sensor installation (for 4WD).

      OK:

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

      The installation nut is tightened properly.

      Torque:

      8.0 N*m (82 kgf*cm, 71 in.*lbf)

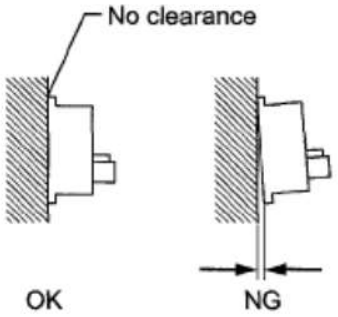
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Rear Speed Sensor:

for 2WD:



for 4WD:

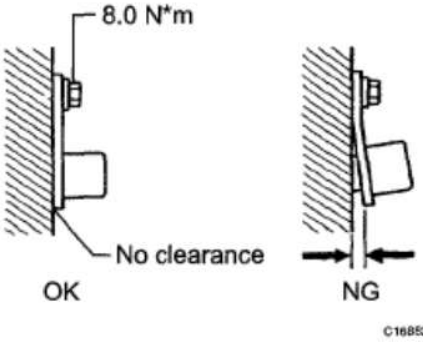


Fig. 94: Identifying Rear Speed Sensor Proper Installation Position
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Result

RESULT CHART

Result	Proceed to
OK (for 4WD)	A
OK (for 2WD)	B
NG (for 2WD)	C
NG (for 4WD)	D

B: Go to step 7

C: INSTALL REAR SPEED SENSOR CORRECTLY (for 2WD) (See **INSTALLATION**)

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D: INSTALL REAR SPEED SENSOR CORRECTLY (for 4WD) (See **INSTALLATION**)

A: Go to next step

5. **CHECK REAR SPEED SENSOR TIP**
   a. Remove the rear speed sensor (See **REMOVAL**).
   b. Check the speed sensor tip.

OK:

No scratches, oil, 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 REAR SPEED SENSOR

OK: Go to next step

6. **CHECK REAR SPEED SENSOR ROTOR**
   a. Remove the rear speed sensor rotor (See **REMOVAL**).
   b. Check the speed sensor rotor.

OK:

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

Result

RESULT CHART

Result	Proceed to
NG	A
OK	B

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

HINT:

If the rear speed sensor rotor needs to be replaced, replace it together with the outboard joint shaft assembly.

B: Go to step 8

A: CLEAN OR REPLACE REAR SPEED SENSOR ROTOR

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7. **CHECK HARNESS AND CONNECTOR (SKID CONTROL SENSOR WIRE)**
   a. Make sure that there is no looseness at the locking part and the connecting part of the connectors.
   b. Disconnect the skid control sensor wire.
   c. Measure the resistance according to the value (s) in the table below.

Standard resistance: for RH

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
z9 ("A"-2) - z9 ("B"-1)	Always	Below 1 ohms
z9 ("A"-2) - z9 ("B"-2)	Always	10 kohms or higher
z9 ("A"-2) - Body ground	Always	10 kohms or higher
z9 ("A"-1) - z9 ("B"-2)	Always	Below 1 ohms
z9 ("A"-1) - z9 ("B"-1)	Always	10 kohms or higher
z9 ("A"-1) - Body ground	Always	10 kohms or higher

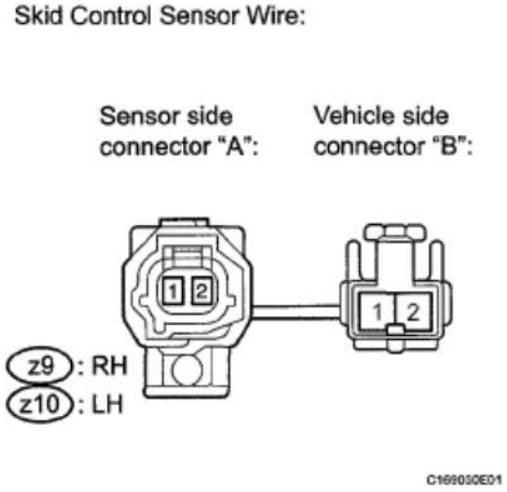


Fig. 95: Identifying Skid Control Sensor Wire Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

for LH

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
z10 ("A"-2) - z10 ("B"-1)	Always	Below 1 ohms
z10 ("A"-2) - z10 ("B"-2)	Always	10 kohms or higher
z10 ("A"-2) - Body ground	Always	10 kohms or higher
z10 ("A"-1) - z10 ("B"-2)	Always	Below 1 ohms
z10 ("A"-1) - z10 ("B"-1)	Always	10 kohms or higher
z10 ("A"-1) - Body ground	Always	10 kohms or higher

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

NG: REPLACE SKID CONTROL SENSOR WIRE

OK: Go to next step

8. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - REAR SPEED SENSOR)**
   a. Install the rear speed sensor and the rear speed sensor rotor.
   b. Reconnect the skid control sensor wire (for 2WD).
   c. Make sure that there is no looseness at the locking part and the connecting part of the connectors.
   d. Disconnect the skid control ECU connector and the rear speed sensor connector.
   e. Measure the resistance according to the value (s) in the table below.

Standard resistance:

for 2WD RH

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-17 (RR+) - z9-2 (RR+)	Always	Below 1 ohms
A24-17 (RR+) - Body ground	Always	10 kohms or higher
A24-16 (RR-) - z9-1 (RR-)	Always	Below 1 ohms
A24-16 (RR-) - Body ground	Always	10 kohms or higher

for 4WD RH

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-17 (RR+) - N20-1 (RR+)	Always	Below 1 ohms
A24-17 (RR+) - Body ground	Always	10 kohms or higher
A24-16 (RR-) - N20-2 (RR-)	Always	Below 1 ohms
A24-16 (RR-) - Body ground	Always	10 kohms or higher

for 2WD LH

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-5 (RL+) - z10-2 (RL+)	Always	Below 1 ohms
A24-5 (RL+) - Body ground	Always	10 kohms or higher
A24-4 (RL-) - z10-1 (RL-)	Always	Below 1 ohms
A24-4 (RL-) - Body ground	Always	10 kohms or higher

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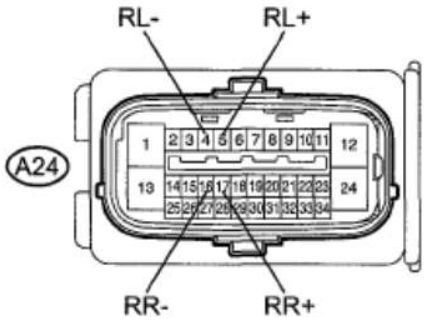
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for 4WD LH

RESISTANCE SPECIFICATION

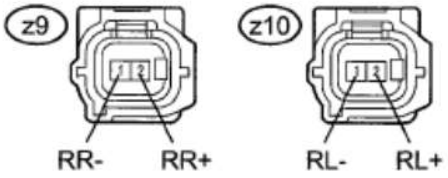
Tester Connection	Condition	Specified Condition
A24-5 (RL+) - O39-1 (RL+)	Always	Below 1 ohms
A24-5 (RL+) - Body ground	Always	10 kohms or higher
A24-4 (RL-) - O39-2 (RL-)	Always	Below 1 ohms
A24-4 (RL-) - Body ground	Always	10 kohms or higher

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



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

for 2WD:



for 4WD:

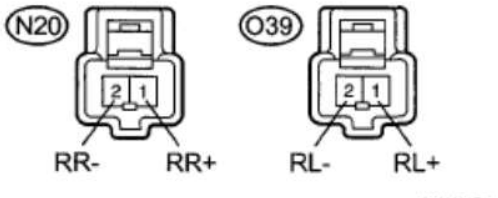


Fig. 96: Identifying Skid Control ECU And Rear Speed Sensor Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

OK: Go to next step

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

Standard voltage:

for 2WD RH

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
z9-2 (RR+) - Body ground	Ignition switch on (IG)	8 to 14 V

for 4WD RH

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
N20-1 (RR+) - Body ground	Ignition switch on (IG)	8 to 14 V

for 2WD LH

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
z-10-2 (RL+) - Body ground	Ignition switch on (IG)	8 to 14 V

for 4WD LH

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
O39-1 (RL+) - Body ground	Ignition switch on (IG)	8 to 14 V

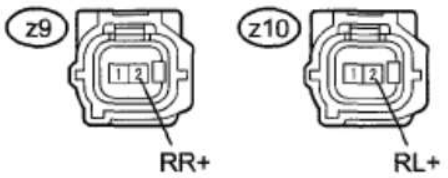
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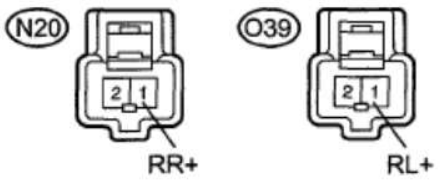
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Front view of wire harness connector:
(to Rear Speed Sensor)

for 2WD:



for 4WD:



N C169034E04

Fig. 97: Identifying Skid Control ECU Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Result

RESULT CHART

Result	Proceed to
OK (for 2WD)	A
OK (for 4WD)	B
NG	C

NOTE: **Check the speed 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**).

B: REPLACE REAR SPEED SENSOR (for 4WD) (See **REMOVAL**)

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

A: REPLACE REAR SPEED SENSOR (for 2WD) (See **REMOVAL**)

DTC C1417 HIGH POWER SUPPLY VOLTAGE MALFUNCTION

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
C1417	The IG1 terminal voltage is 17.4 V or more for 1 second or more.	• ECU-IG NO. 2 fuse • Battery • Charging system • Power source circuit • Internal power supply circuit of the skid control ECU

WIRING DIAGRAM

Refer to DTC C1241 (See **WIRING DIAGRAM**).

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

1. **INSPECT ECU-IG NO. 2 FUSE**
   a. Remove the ECU-IG NO. 2 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

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
ECU-IG NO. 2 (7.5 A) fuse	Always	Below 1 ohms

NG: REPLACE ECU-IG NO. 2 FUSE

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Main Body ECU:

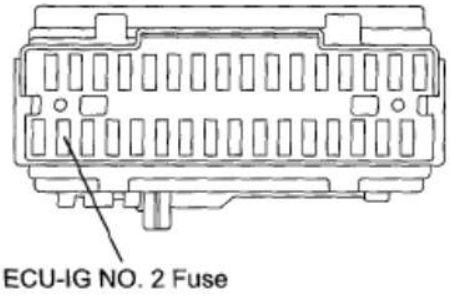


Fig. 98: Identifying ECU-IG No. 2 Fuse
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

2. **CHECK BATTERY**
   a. Install the ECU-IG NO. 2 fuse.
   b. Check the battery voltage.

   Standard voltage:

   11 to 14 V

Result

RESULT CHART

Result	Proceed to
OK	A
NG (for 2GR-FE)	B
NG (for 1AR-FE)	C

B: CHECK OR REPLACE CHARGING SYSTEM OR BATTERY (for 2GR-FE) (See **PROBLEM SYMPTOMS TABLE**)

C: CHECK OR REPLACE CHARGING SYSTEM OR BATTERY (for 1AR-FE) (See **ON-VEHICLE INSPECTION**)

A: Go to next step

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

Standard voltage

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
A24-34 (IG1) - Body ground	Ignition switch on (IG)	11 to 14 V

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 (IG1 CIRCUIT)

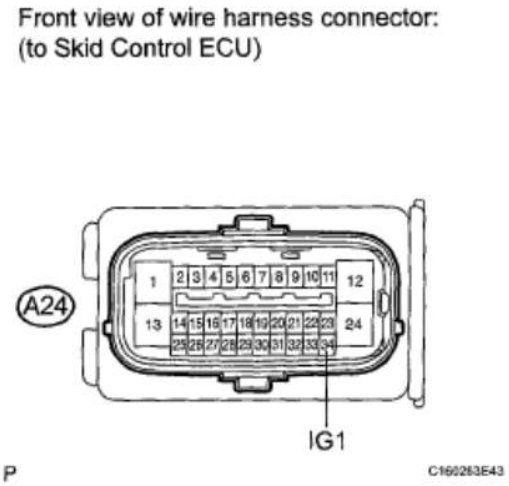


Fig. 99: Identifying IG1 Terminal Of Skid Control ECU Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

DTC C1419 ACCELERATION SENSOR INTERNAL CIRCUIT; DTC C1435 YAW RATE SENSOR INTERNAL CIRCUIT

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,

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GL2).

If there is trouble in the bus lines between the yaw rate and acceleration sensor and the CAN communication system, DTCs U0123 (malfunction in CAN communication with the yaw rate sensor) and U0124 (malfunction in CAN communication with the acceleration sensor) are set.

These DTCs are also output when calibration has not been completed.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1419	A data malfunction signal is received from the acceleration sensor.	Yaw rate and acceleration sensor
C1435	A data malfunction signal is received from the yaw rate sensor.	Yaw rate and acceleration sensor

WIRING DIAGRAM

Refer to DTCs C1232, C1243 and C1245 (See **WIRING DIAGRAM**).

INSPECTION PROCEDURE

NOTE: When replacing the yaw rate and acceleration sensor, perform zero point calibration (See CALIBRATION).

HINT:

When U0123, U0124 and/or U0126 is output together with C1419 and/or C1435, inspect and repair the trouble areas indicated by U0123, U0124 and/or U0126 first (See **DTC U0073 CONTROL MODULE COMMUNICATION BUS OFF; DTC U0100 LOST COMMUNICATION WITH ECM/PCM; DTC U0123 LOST COMMUNICATION WITH YAW RATE SENSOR MODULE; DTC U0124 LOST COMMUNICATION WITH LATERAL ACCELERATION SENSOR MODULE; DTC U0126 LOST COMMUNICATION WITH STEERING ANGLE SENSOR MODULE**).

1. **REPLACE YAW RATE AND ACCELERATION SENSOR**
   a. Replace the yaw rate and acceleration sensor (See **REMOVAL**).

   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**).

   NEXT: END

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DTC C1420 ACCELERATION SENSOR 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, DTCs U0123 (malfunction in CAN communication with the yaw rate sensor) and U0124 (malfunction in CAN communication with the acceleration sensor) are set.

These DTCs are also output when calibration has not been completed.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1420	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.	• Sensor installation • Yaw rate and acceleration sensor

WIRING DIAGRAM

Refer to DTCs C1232, C1243 and C1245 (See **WIRING DIAGRAM**).

INSPECTION PROCEDURE

NOTE: When replacing the yaw rate and acceleration sensor, perform zero point calibration (See CALIBRATION).

HINT:

When U0123, U0124 and/or U0126 is output together with C1420, inspect and repair the trouble areas indicated by U0123, U0124 and/or U0126 first (See **DTC U0073 CONTROL MODULE COMMUNICATION BUS OFF; DTC U0100 LOST COMMUNICATION WITH ECM/PCM; DTC U0123 LOST COMMUNICATION WITH YAW RATE SENSOR MODULE; DTC U0124 LOST COMMUNICATION WITH LATERAL ACCELERATION SENSOR MODULE; DTC U0126 LOST COMMUNICATION WITH STEERING ANGLE SENSOR MODULE**).

1. **CHECK YAW RATE AND ACCELERATION SENSOR INSTALLATION**
   a. Check that the yaw rate and acceleration sensor has been installed properly (See **INSTALLATION**).

      OK:

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The sensor should be tightened to the specified torque.

The sensor should not be installed in a tilted position.

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: INSTALL YAW RATE AND ACCELERATION SENSOR CORRECTLY (See **INSTALLATION**)

OK: REPLACE YAW RATE AND ACCELERATION SENSOR (See **REMOVAL**)

DTC C1421 OPEN OR SHORT IN MASTER CYLINDER PRESSURE SENSOR; DTC C1423 MASTER CYLINDER PRESSURE SENSOR ZERO POINT LOW MALFUNCTION; DTC C1424 MASTER CYLINDER PRESSURE SENSOR OUTPUT MALFUNCTION

DESCRIPTION

The master cylinder pressure sensor is connected to the skid control ECU in the brake actuator assembly.

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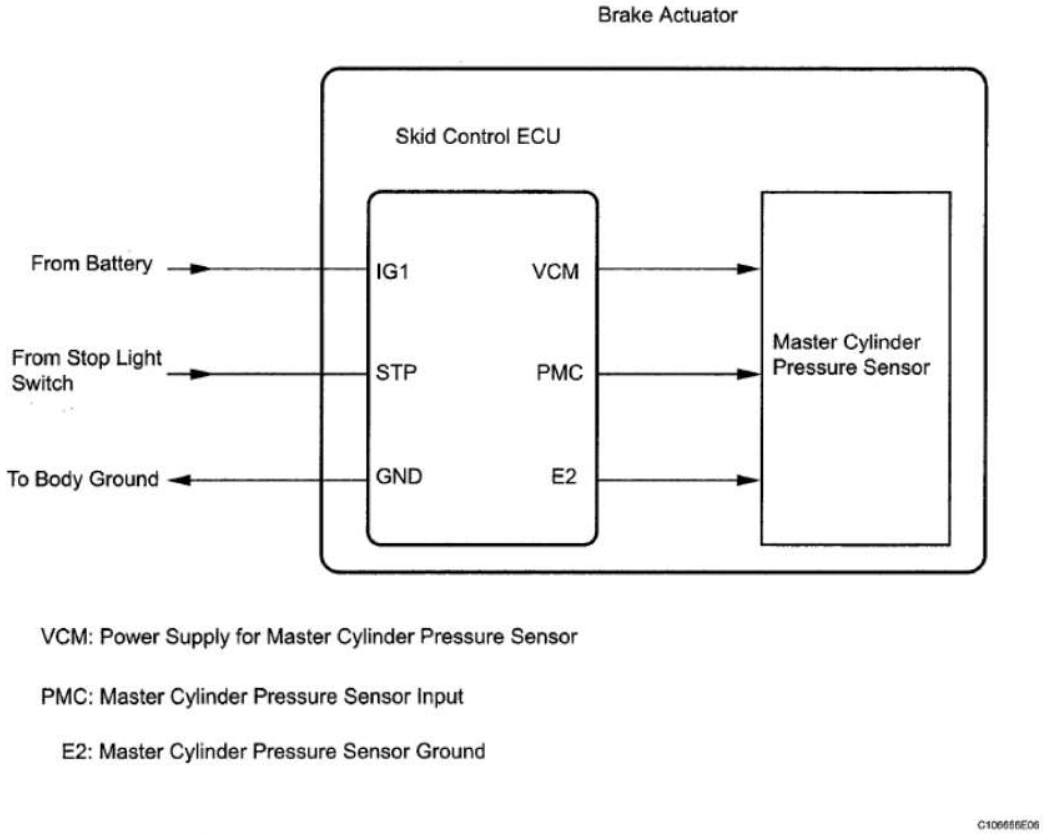


Fig. 100: Master Cylinder Pressure Sensor Communication Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1421	Either of the following is detected: 1. With the IG1 terminal voltage between 9.5 and 17.4 V, the VCM terminal voltage is not between 4.4 and 5.6 V for 1.2 seconds or more. 2. When the VCM terminal voltage is between 4.8 and 5.2 V, the PMC terminal voltage is not between 0.19 and 4.57 V for 1.2 seconds or more.	Brake actuator assembly (Master cylinder pressure sensor)
C1423	The PMC terminal voltage is less than 0.27 V for 5 seconds or more.	Brake actuator assembly (Master cylinder pressure sensor)
	Any of the following is detected: 1. Noise occurs in the PMC terminal 7 times or more within 5 seconds. 2. When the vehicle speed drops from 40 km/h (25 mph) to 10	

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C1424	km/h (6 mph), the master cylinder pressure does not change by at least 0.048 MPa. 3. At a vehicle speed 7 km/h (4.3 mph) or more, the PMC terminal voltage is between 0.86 and 1.0 V and does not change by at least 0.048 MPa for 60 seconds or more. 4. At a vehicle speed 7 km/h (4.3 mph) or more, the PMC terminal voltage is 1.0 V or more and does not change by at least 0.048 MPa for 30 seconds or more.	Brake actuator assembly (Master cylinder pressure sensor)

WIRING DIAGRAM

Refer to DTC C1425 (See **WIRING DIAGRAM**).

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

1. **REPLACE BRAKE ACTUATOR ASSEMBLY**
   a. Replace the brake actuator assembly (master cylinder pressure sensor) (See **REMOVAL**).

NEXT: END

DTC C1422 MASTER CYLINDER PRESSURE SENSOR ZERO POINT HIGH MALFUNCTION

DESCRIPTION

The master cylinder pressure sensor is connected to the skid control ECU in the brake actuator assembly.

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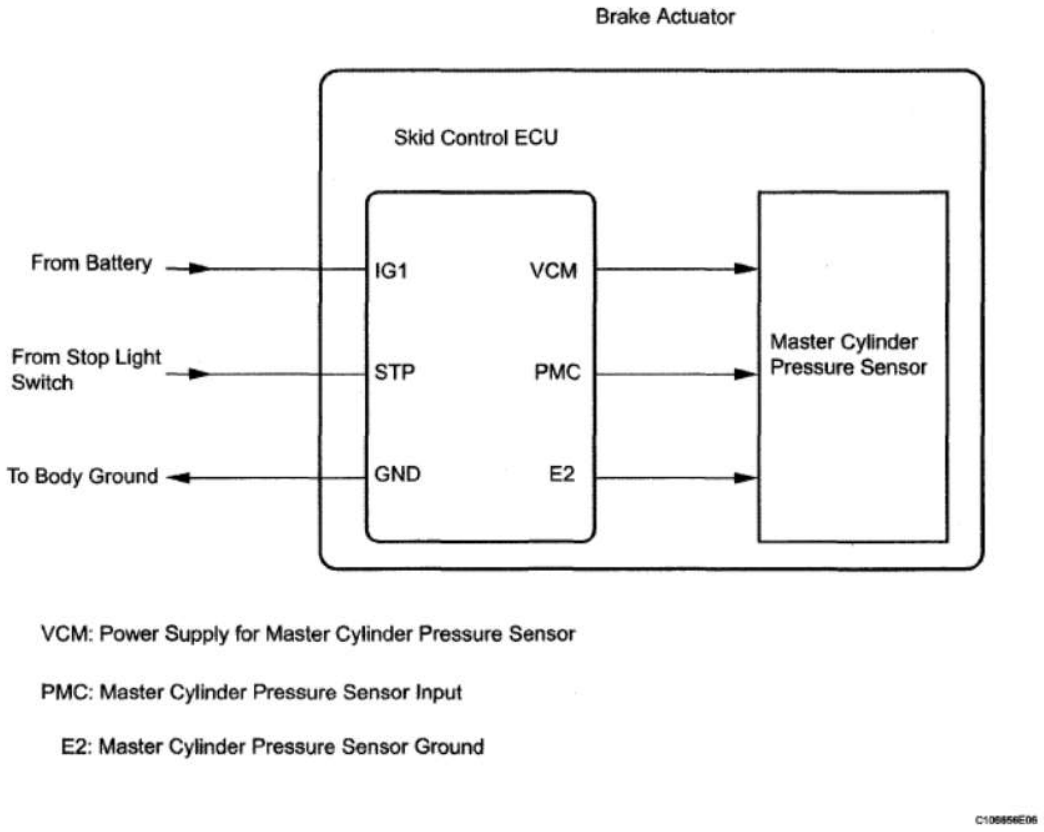


Fig. 101: Brake Actuator Assembly Communication Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1422	When the stop light switch is OFF, the PMC terminal voltage is more than 0.86 V for 5 seconds or more.	• Stop light switch • Stop light switch circuit • Master cylinder pressure sensor circuit • Brake actuator assembly (Master cylinder pressure sensor)

WIRING DIAGRAM

Refer to DTC C1425 (See **WIRING DIAGRAM**).

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

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HINT:

When C1425 and/or C1426 is output together with C1422, inspect and repair the trouble areas indicated by C1425 and/or C1426 first (See **DTC C1425 OPEN IN STOP LIGHT SWITCH CIRCUIT**, or **DTC C1426 STOP LIGHT SWITCH OFF STUCK MALFUNCTION**).

1. **CHECK STOP LIGHT OPERATION**
   a. Check that the stop lights come on when the brake pedal is depressed, and go off when the brake pedal is released.

   OK

   STOP LIGHT OPERATION CONDITION REFERENCE

Condition	Illumination Condition
Brake pedal depressed	ON
Brake pedal released	OFF

   NG: INSPECT STOP LIGHT CIRCUIT (See **PROBLEM SYMPTOMS TABLE**)

   OK: Go to next step

2. **READ VALUE ON TECHSTREAM (STOP LIGHT SWITCH)**
   a. Connect Techstream to the DLC3.
   b. Turn the ignition switch on (IG).
   c. Select the Data List mode on Techstream (See **DATA LIST/ACTIVE TEST**).

   ABS/VSC/TRAC:

   ABS/VSC/TRAC TESTER DISPLAY REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Stop Light SW	Stop light switch/ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-

   d. Check that the stop light condition observed on Techstream changes according to brake pedal operation.

   OK:

   The Techstream displays ON or OFF according to brake pedal operation.

   NG: Go to step 5

   OK: Go to next step

3. **CHECK BRAKE PEDAL AND STOP LIGHT SWITCH INSTALLATION**

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a. Turn the ignition switch off.
b. Check the brake pedal height and stop light switch installation (See **ADJUSTMENT**).

OK:

The brake pedal height and stop light switch installation are normal.

NG: ADJUST BRAKE PEDAL OR STOP LIGHT SWITCH (See **ADJUSTMENT**)

OK: Go to next step

4. **RECONFIRM DTC**
   a. Clear the DTCs (See **DTC CHECK/CLEAR**).
   b. Start the engine.
   c. Drive the vehicle at a speed of 40 km/h (25 mph) or more and perform braking test (decelerate the vehicle by depressing the brake pedal).
   d. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC (C1422) is not output	A
DTC (C1422) is output	B

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

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

5. **INSPECT SKID CONTROL ECU (STP TERMINAL)**
   a. Turn the ignition switch off.
   b. Make sure that there is no looseness at the locking part and the connecting part of the connectors.
   c. Disconnect the skid control ECU connector.
   d. Measure the voltage according to the value (s) in the table below.

Standard voltage

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
A24-2 (STP) - Body ground	Stop light switch ON (Brake pedal depressed)	8 to 14 V
A24-2 (STP) - Body ground	Stop light switch OFF (Brake pedal released)	Below 1.5 V

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

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

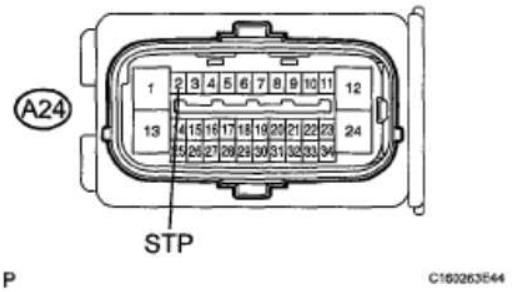


Fig. 102: Identifying STP Terminal Of Skid Control ECU Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

DTC C1425 OPEN IN STOP LIGHT SWITCH CIRCUIT

DESCRIPTION

The skid control ECU (housed in the actuator assembly) inputs stop light switch signals 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
C1425	When IG1 terminal voltage is between 9.5 and 17.4 V, an open stop light switch circuit continues for 3 seconds or more.	• STOP fuse • Stop light switch • Stop light switch circuit • Stop light control relay • Stop light control relay circuit • Brake actuator assembly (Skid control ECU)

WIRING DIAGRAM

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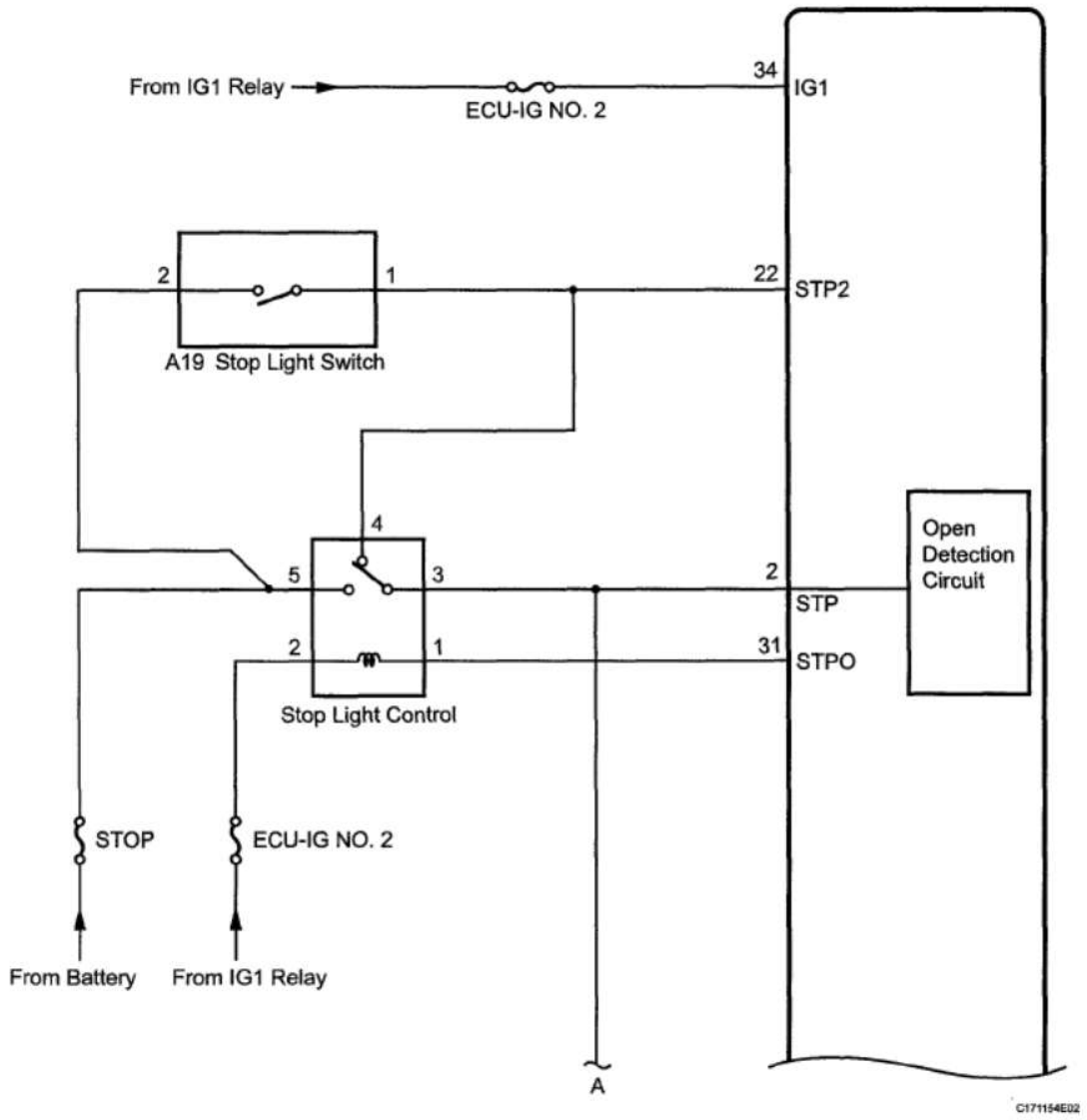


Fig. 103: Stop Light Switch - Wiring Diagram (1 Of 2)
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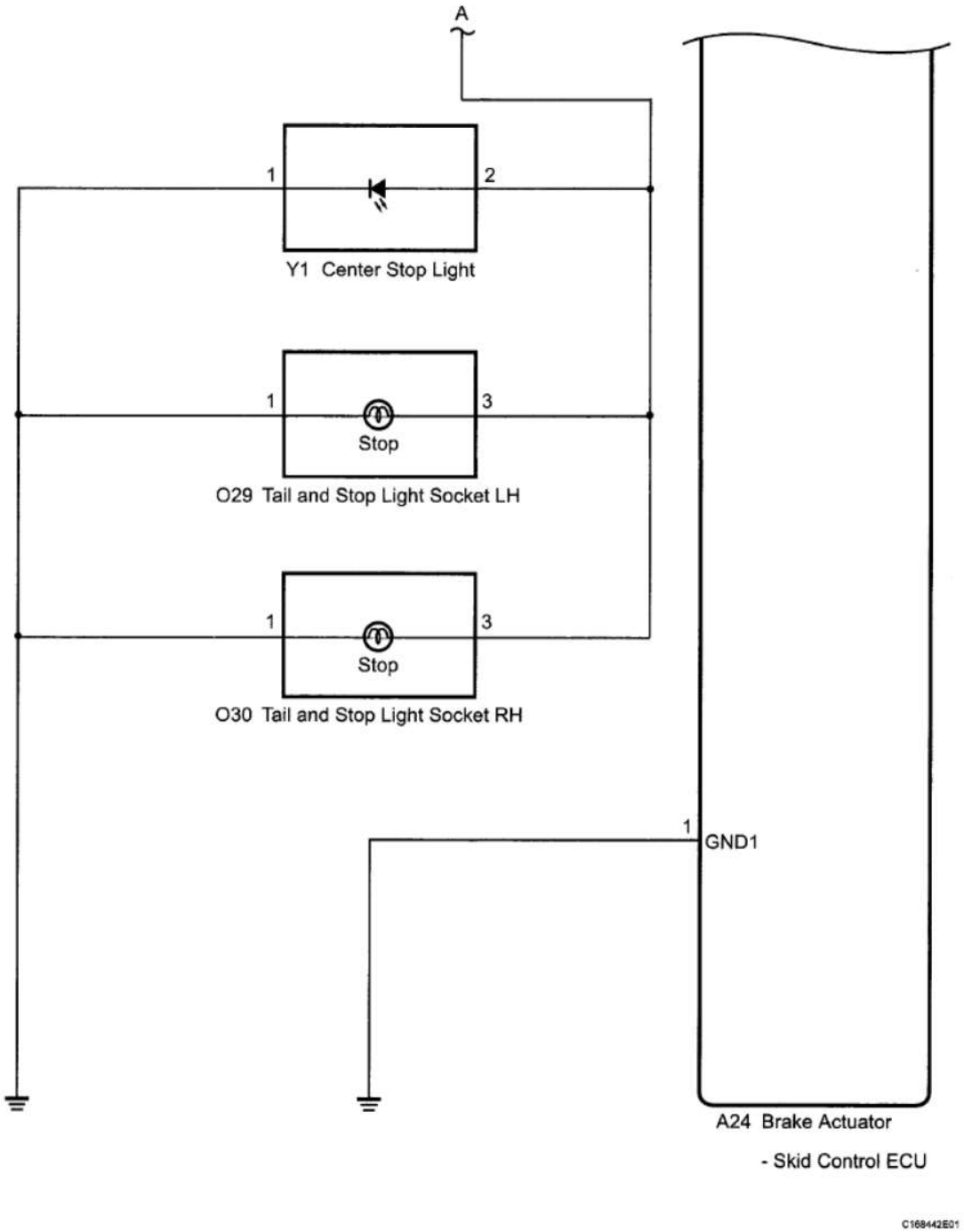


Fig. 104: Stop Light Switch - Wiring Diagram (2 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

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1. **CHECK STOP LIGHT OPERATION**
   a. Check that the stop lights come on when the brake pedal is depressed, and go off when the brake pedal is released.

OK

STOP LIGHT OPERATION CONDITION REFERENCE

Condition	Illumination Condition
Brake pedal depressed	ON
Brake pedal released	OFF

NG: Go to step 4

OK: Go to next step

2. **READ VALUE ON TECHSTREAM (STOP LIGHT SWITCH)**
   a. Connect Techstream to the DLC3.
   b. Turn the ignition switch on (IG).
   c. Select the Data List mode on Techstream (See **DATA LIST/ACTIVE TEST**).

ABS/VSC/TRAC:

ABS/VSC/TRAC TESTER DISPLAY REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Stop Light SW	Stop light switch/ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-

   d. Check that the stop light switch display observed on Techstream changes according to brake pedal operation.

OK:

The Techstream displays ON or OFF according to brake pedal operation.

NG: Go to step 11

OK: Go to next step

3. **RECONFIRM DTC**
   a. Turn the ignition switch off.
   b. Clear the DTCs (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**).

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Result

RESULT CHART

Result	Proceed to
DTC (C1425) is not output	A
DTC (C1425) is 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 **DIAGNOSIS SYSTEM**)

4. **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

RESISTANCE SPECIFICATION

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

NG: REPLACE STOP FUSE

Main Body ECU:

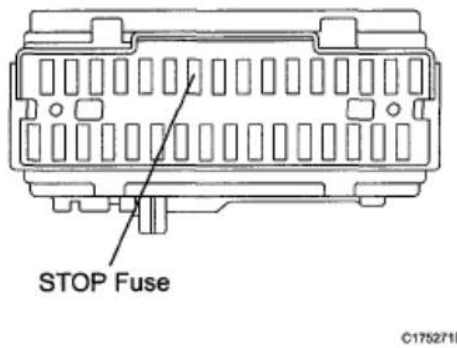


Fig. 105: Identifying STOP Fuse
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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OK: Go to next step

5. **INSPECT STOP LIGHT SWITCH (POWER SOURCE TERMINAL)**
   a. Install the STOP fuse.
   b. Make sure that there is no looseness at the locking part and the connecting part of the connectors.
   c. Disconnect the stop light switch connector.
   d. Measure the voltage according to the value (s) in the table below.

Standard voltage

VOLTAGE SPECIFICATION

Tester Connection	Condition	Specified Condition
A19-2 - Body ground	Always	11 to 14 V

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

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

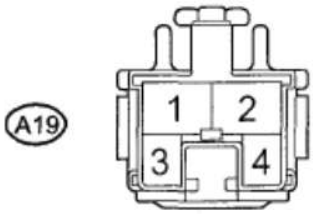


Fig. 106: Identifying Stop Light Switch Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

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

Standard resistance

RESISTANCE SPECIFICATION

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

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

Component without harness connected:
(Stop Light Switch)

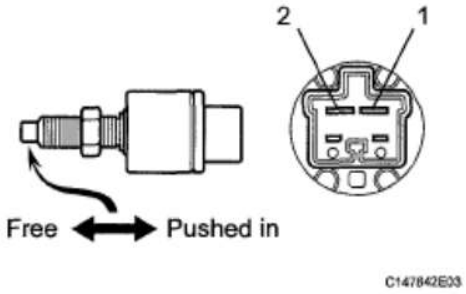


Fig. 107: Inspecting Stop Light Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

7. **INSPECT STOP LIGHT CONTROL RELAY**
   a. Remove the stop light control relay.
   b. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
3-4	Voltage is not applied between terminals 1 and 2	Below 1 ohms

NG: REPLACE STOP LIGHT CONTROL RELAY

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Stop Light Control Relay:

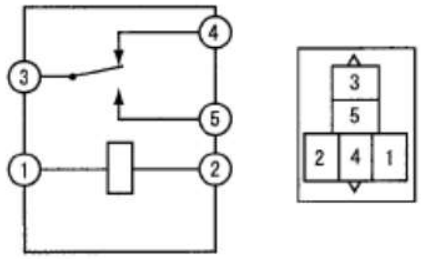


Fig. 108: Identifying Stop Light Control Connector Terminals And Stop Light Control Relay
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

8. **CHECK HARNESS AND CONNECTOR (STOP LIGHT SWITCH - ENGINE ROOM RELAY BLOCK)**
   a. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A19-1 - Stop light control relay terminal 4	Always	Below 1 ohms
A19-1 - Body ground	Always	10 kohms or higher

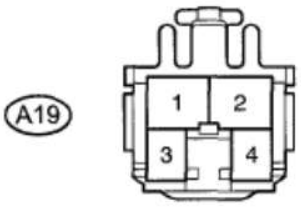
NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

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



Engine Room Relay Block:

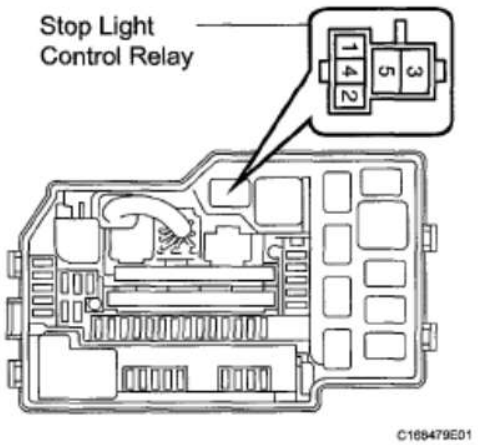


Fig. 109: Identifying Stop Light Switch Connector Terminals And Stop Light Control Relay
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

9. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - ENGINE ROOM RELAY BLOCK)**
   a. Make sure that there is no looseness at the locking part and the connecting part of the connectors.
   b. Disconnect the skid control ECU connector.
   c. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-2 (STP) - Stop light control relay terminal 3	Always	Below 1 ohms

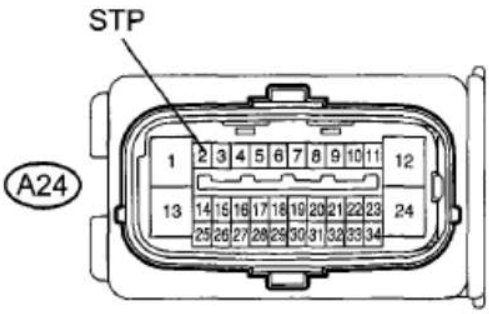
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NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

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



Engine Room Relay Block:

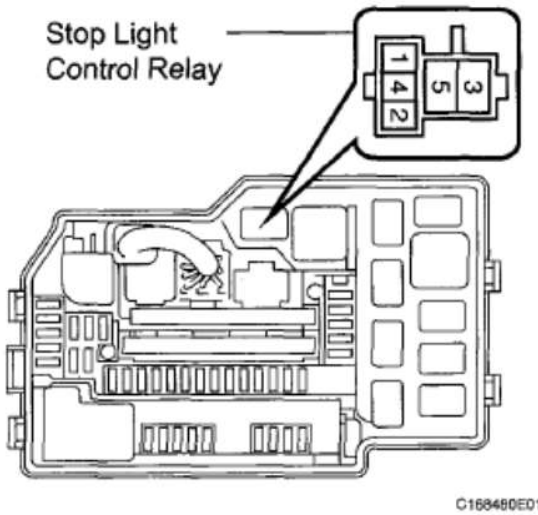


Fig. 110: Identifying Skid Control ECU Connector And Stop Light Control Relay
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

10. **RECONFIRM DTC**
    a. Clear the DTCs (See **DTC CHECK/CLEAR**).
    b. Start the engine.
    c. Depress the brake pedal several times to test the stop light circuit.

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

HINT:

Reinstall the relay, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

RESULT CHART

Result	Proceed to
DTC (C1425) is not output	A
DTC (C1425) is 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 **PROBLEM SYMPTOMS TABLE**)

11. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - ENGINE ROOM RELAY BLOCK)**
    a. Turn the ignition switch off.
    b. Remove the stop light control relay.
    c. Make sure that there is no looseness at the locking part and the connecting part of the connectors.
    d. Disconnect the skid control ECU connector.
    e. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-2 (STP) - Stop light control relay terminal 3	Always	Below 1 ohms

HINT:

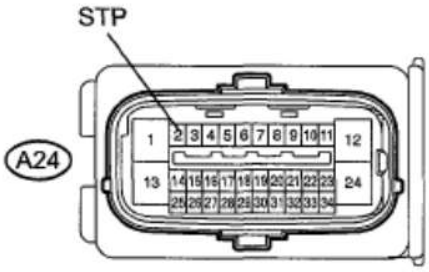
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See **PROBLEM SYMPTOMS TABLE**).

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

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



Engine Room Relay Block:

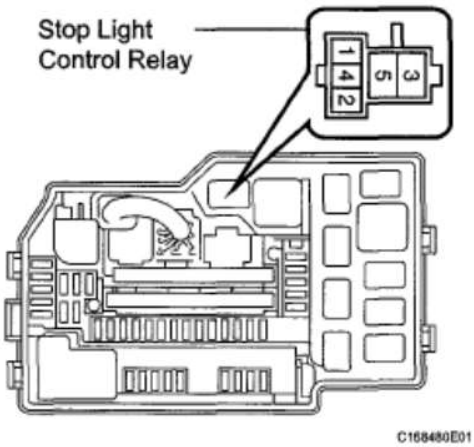


Fig. 111: Identifying Skid Control ECU Connector Terminal And Stop Light Control Relay
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

DTC C1426 STOP LIGHT SWITCH OFF STUCK MALFUNCTION

DESCRIPTION

The skid control ECU (housed in the actuator assembly) inputs stop light switch signals 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

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DTC Code	DTC Detection Condition	Trouble Area
C1426	When the brake pedal load sensing switch is ON, the master cylinder pressure is 2 MPa or more and the deceleration calculated from the vehicle speed is 0.2 G or more, the stop light switch is OFF for 2 seconds or more.	• STOP fuse • Stop light switch • Stop light switch circuit • Stop light control relay • Stop light control relay circuit • Brake actuator assembly (Skid control ECU)

WIRING DIAGRAM

Refer to DTC C1425 (See **WIRING DIAGRAM**).

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 lights come on when the brake pedal is depressed, and go off when the brake pedal is released.

   OK

   STOP LIGHT OPERATION CONDITION REFERENCE

Condition	Illumination Condition
Brake pedal depressed	ON
Brake pedal released	OFF

   NG: Go to step 4

   OK: Go to next step

2. **READ VALUE ON TECHSTREAM (STOP LIGHT SWITCH)**
   a. Connect Techstream to the DLC3.
   b. Turn the ignition switch on (IG).
   c. Select the Data List mode on Techstream (See **DATA LIST/ACTIVE TEST**).

   ABS/VSC/TRAC:

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ABS/VSC/TRAC TESTER DISPLAY REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Stop Light SW	Stop light switch/ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
Brake Pedal Load Sensing SW	Brake pedal load sensing switch/ON or OFF	ON: Brake pedal depressed beyond the specified point OFF: Brake pedal not depressed beyond the specified point	-

d. Check that the stop light switch display and brake pedal load sensing switch display observed on Techstream change according to brake pedal operation.

OK:

The Techstream displays ON or OFF according to brake pedal operation.

e. Slowly depress the brake pedal, and check when the stop light switch and brake pedal load sensing switch turn ON.

OK:

First the stop light switch should turn ON, and then the brake pedal load sensing switch should turn ON.

Result

RESULT CHART

Result	Proceed to
OK	A
NG (Turning on of the stop light switch is not confirmed)	B
NG (The brake pedal load sensing switch turns on first)	C

B: Go to step 11

C: Go to step 12

A: Go to next step

3. **RECONFIRM DTC**
   a. Turn the ignition switch off.
   b. Clear the DTCs (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**).

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Result

RESULT CHART

Result	Proceed to
DTC (C1426) is not output	A
DTC (C1426) is 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**).

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

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

4. **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

RESISTANCE SPECIFICATION

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

NG: REPLACE STOP FUSE

Main Body ECU:

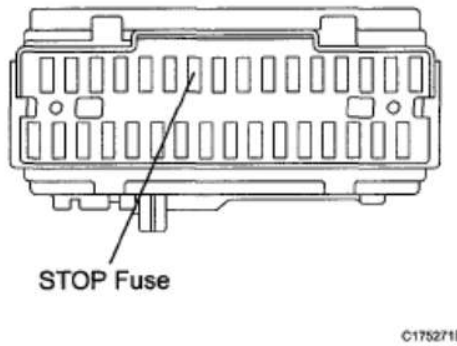


Fig. 112: Identifying STOP Fuse
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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OK: Go to next step

5. **INSPECT STOP LIGHT SWITCH (POWER SOURCE TERMINAL)**
   a. Install the STOP fuse.
   b. Make sure that there is no looseness at the locking part and the connecting part of the connectors.
   c. Disconnect the stop light switch connector.
   d. Measure the voltage according to the value (s) in the table below.

Standard voltage

VOLTAGE SPECIFICATION

Tester Connection	Condition	Specified Condition
A19-2 - Body ground	Always	11 to 14 V

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

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

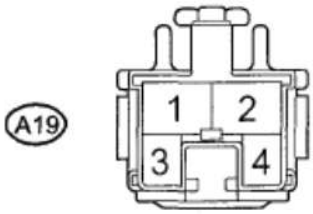


Fig. 113: Identifying Stop Light Switch Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

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

Standard resistance

RESISTANCE SPECIFICATION

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

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

Component without harness connected:
(Stop Light Switch)

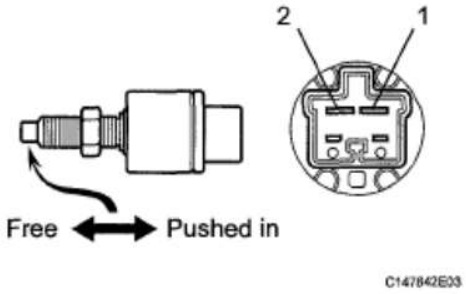


Fig. 114: Inspecting Stop Light Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

7. **INSPECT STOP LIGHT CONTROL RELAY**
   a. Remove the stop light control relay.
   b. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

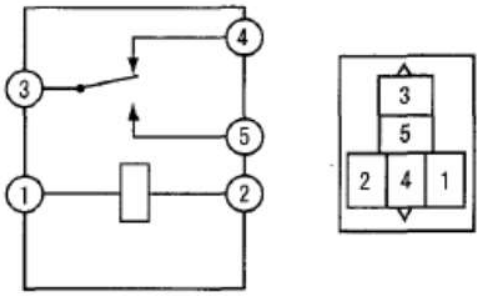
Tester Connection	Condition	Specified Condition
3-4	Voltage is not applied between terminals 1 and 2	Below 1 ohms

NG: REPLACE STOP LIGHT CONTROL RELAY

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Stop Light Control Relay:



C126459E06

Fig. 115: Stop Light Control Relay Circuit Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

8. **CHECK HARNESS AND CONNECTOR (STOP LIGHT SWITCH - ENGINE ROOM RELAY BLOCK)**
   a. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A19-1 - Stop light control relay terminal 4	Always	Below 1 ohms
A19-1 - Body ground	Always	10 kohms or higher

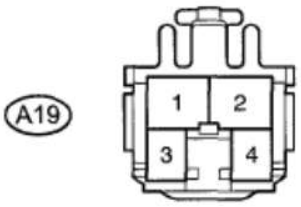
NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

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



Engine Room Relay Block:

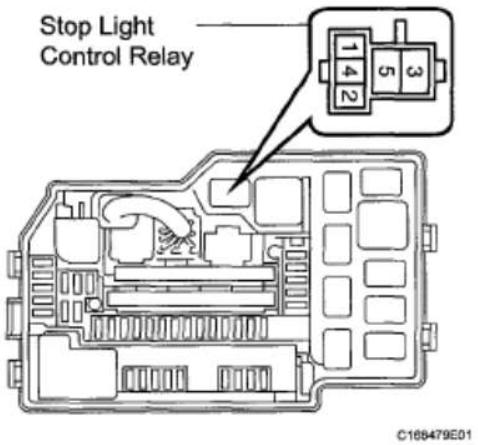


Fig. 116: Identifying Stop Light Switch Connector Terminals And Stop Light Control Relay
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

9. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - ENGINE ROOM RELAY BLOCK)**
   a. Make sure that there is no looseness at the locking part and the connecting part of the connectors.
   b. Disconnect the skid control ECU connector.
   c. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-2 (STP) - Stop light control relay terminal 3	Always	Below 1 ohms

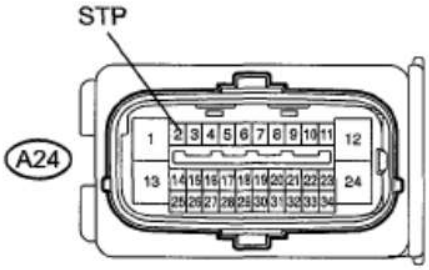
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NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

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



Engine Room Relay Block:

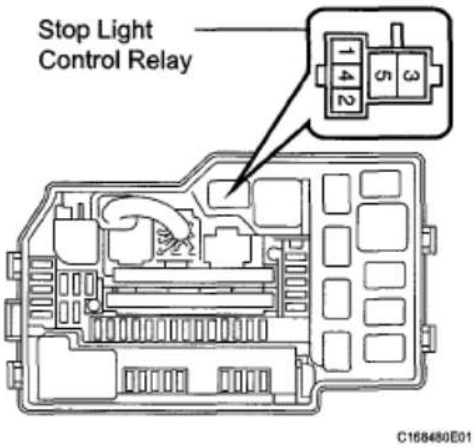


Fig. 117: Identifying Skid Control ECU Connector Terminal And Stop Light Control Relay
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

10. **RECONFIRM DTC**
    a. Clear the DTCs (See **DTC CHECK/CLEAR**).
    b. Start the engine.
    c. Depress the brake pedal several times to test the stop light circuit.
    d. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

HINT:

Reinstall the relay, connectors, etc. and restore the vehicle to its prior condition before rechecking for

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DTCs.

Result

RESULT CHART

Result	Proceed to
DTC (C1426) is not output	A
DTC (C1426) is 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 **PROBLEM SYMPTOMS TABLE**)

11. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - ENGINE ROOM RELAY BLOCK)**
    a. Turn the ignition switch off.
    b. Remove the stop light control relay.
    c. Make sure that there is no looseness at the locking part and the connecting part of the connectors.
    d. Disconnect the skid control ECU connector.
    e. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-2 (STP) - Stop light control relay terminal 3	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**).

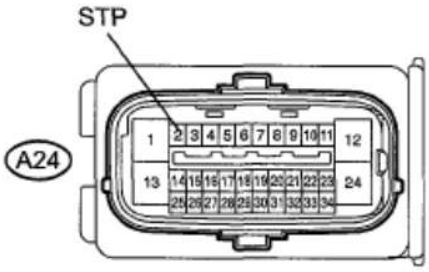
NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

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



Engine Room Relay Block:

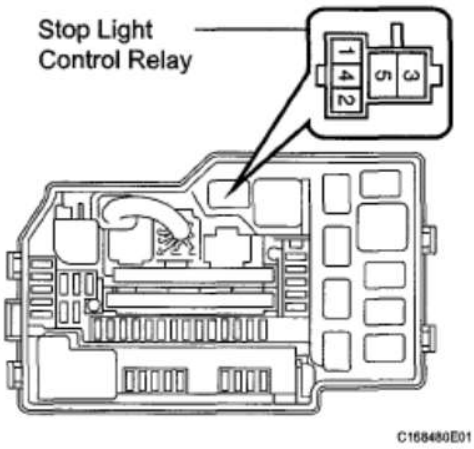


Fig. 118: Identifying Skid Control ECU Connector Terminal And Stop Light Control Relay
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

12. **CHECK BRAKE PEDAL AND STOP LIGHT SWITCH INSTALLATION**
    a. Turn the ignition switch off.
    b. Check the brake pedal height and stop light switch installation (See **ADJUSTMENT**).

OK:

The brake pedal height and stop light switch installation are normal.

HINT:

If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table

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and proceed to the next step (See **PROBLEM SYMPTOMS TABLE**).

NG: ADJUST BRAKE PEDAL OR STOP LIGHT SWITCH (See **ADJUSTMENT**)

OK: REPLACE BRAKE PEDAL SUB-ASSEMBLY (BRAKE PEDAL LOAD SENSING SWITCH) (See **DISASSEMBLY**)

DTC C1427 MOTOR MALFUNCTION

DESCRIPTION

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1427	Actuator pump motor does not operate properly.	• Brake actuator assembly (Ground circuit) • Brake actuator assembly (Motor circuit)

WIRING DIAGRAM

Refer to DTCs C0273, C0274 and C1361 (See **WIRING DIAGRAM**).

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 Techstream to the DLC3.
   b. Start the engine.
   c. Select the Active Test mode on Techstream (See **DATA LIST/ACTIVE TEST**).

   ABS/VSC/TRAC:

   ABS/VSC/TRAC TESTER DISPLAY REFERENCE

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

Result

RESULT CHART

Result	Proceed to
Operating sound is not heard	A

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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 off.
   b. Make sure that there is no looseness at the locking part and the connecting part of the connectors.
   c. Disconnect the skid control ECU connector.
   d. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-13 (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)

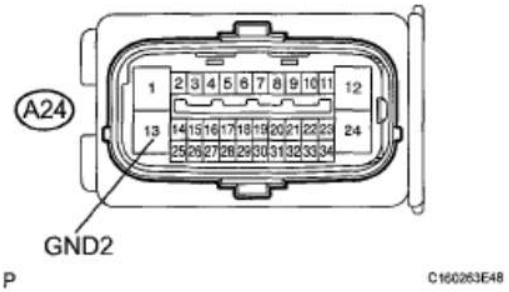


Fig. 119: Identifying GND2 Terminal Of Skid Control ECU Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

3. **RECONFIRM DTC**

HINT:

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

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The ABS motor relay is in the brake actuator assembly. Therefore, ABS 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 off.
b. Reconnect the skid control ECU connector.
c. Clear the DTCs (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 (C1427) is not output	A
DTC (C1427) is 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 (IG) and the stop light switch off, the ECU performs self diagnosis of the motor and solenoid circuits.
- If the normal system code is output (no trouble codes are 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 **DIAGNOSIS SYSTEM**)

DTC C1428 MOTOR CIRCUIT MALFUNCTION

DESCRIPTION

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1428	With the ABS motor relay OFF and the ABS motor fail safe relay ON, an open in the motor circuit continues for 2 seconds or more.	Brake actuator assembly (Motor circuit)

WIRING DIAGRAM

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Refer to DTCs C0273, C0274 and C1361 (See **WIRING DIAGRAM**).

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

1. **REPLACE BRAKE ACTUATOR ASSEMBLY**
   a. Replace the brake actuator assembly (See **REMOVAL**).

NEXT: END

DTC C1429 OPEN OR SHORT IN BRAKE PEDAL LOAD SENSING SWITCH

DESCRIPTION

The brake pedal load sensing switch is turned on when the brake pedal is depressed with force exceeding a predetermined level.

The skid control ECU detects if the brake pedal is depressed or not via this circuit.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1429	An open or short in the brake pedal load sensing switch continues for 0.3 seconds or more.	• Brake pedal load sensing switch • Brake pedal load sensing switch circuit • Brake actuator assembly (Skid control ECU)

WIRING DIAGRAM

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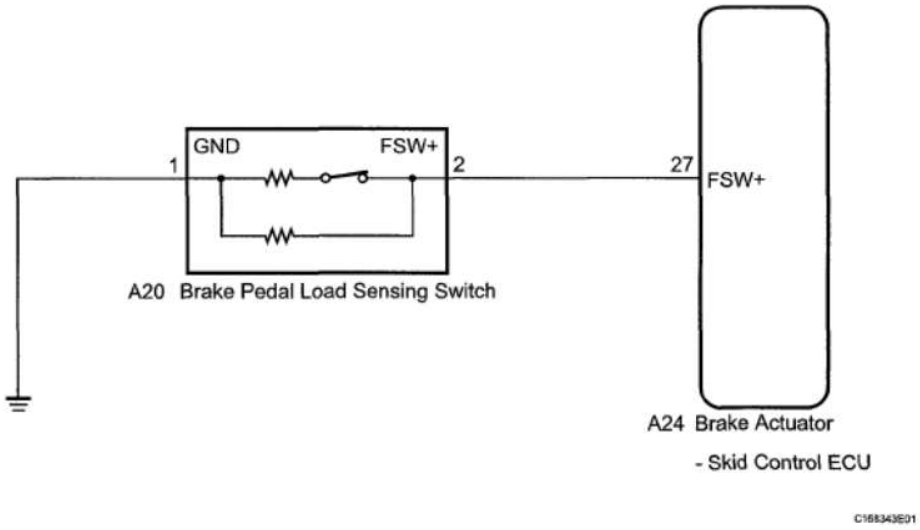


Fig. 120: Brake Pedal Load Sensing Switch - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

HINT:

When C1425 and/or C1426 is output together with C1429, inspect and repair the trouble areas indicated by C1425 and/or C1426 first (See **DTC C1425 OPEN IN STOP LIGHT SWITCH CIRCUIT**, or **DTC C1426 STOP LIGHT SWITCH OFF STUCK MALFUNCTION**).

1. **READ VALUE ON TECHSTREAM (BRAKE PEDAL LOAD SENSING SWITCH)**
   a. Connect Techstream to the DLC3.
   b. Turn the ignition switch on (IG).
   c. Select the Data List mode on Techstream (See **DATA LIST/ACTIVE TEST**).

   ABS/VSC/TRAC:

   ABS/VSC/TRAC TESTER DISPLAY REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Brake Pedal Load Sensing SW	Brake pedal load sensing switch/ON or OFF	ON: Brake pedal depressed beyond the specified point OFF: Brake pedal not depressed beyond the specified point	-

   d. Check that the brake pedal load sensing switch display observed on Techstream changes according

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to brake pedal operation.

OK:

The Techstream displays ON or OFF according to brake pedal operation.

NG: Go to step 3

OK: Go to next step

2. **RECONFIRM DTC**
   a. Turn the ignition switch off.
   b. Clear the DTCs (See **DTC CHECK/CLEAR**).
   c. Start the engine.
   d. Perform the road and braking test.
   e. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC (C1429) is not output	A
DTC (C1429) is output	B

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

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

3. **INSPECT BRAKE PEDAL LOAD SENSING SWITCH**

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Component without harness connected:
(Brake Pedal Load Sensing Switch)

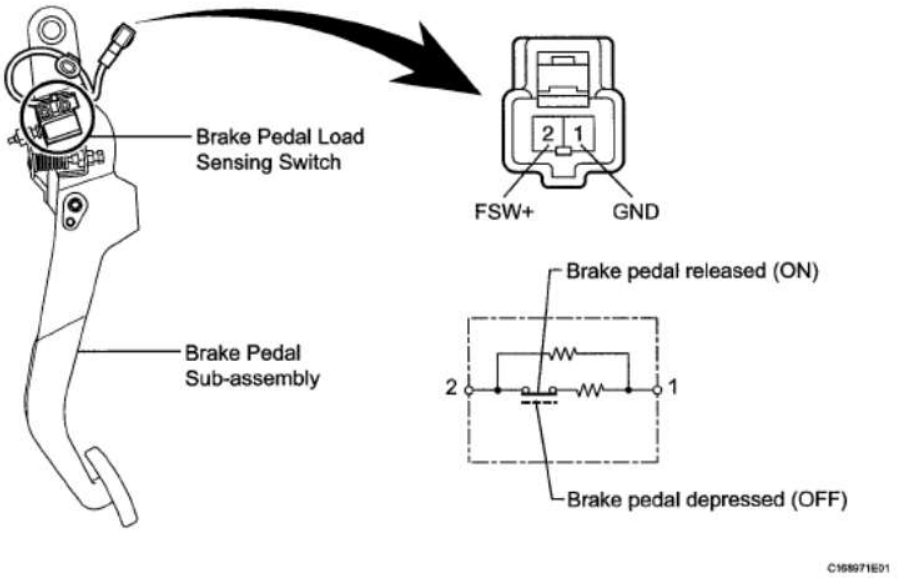


Fig. 121: Inspecting Brake Pedal Load Sensing Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- **Do not remove the brake pedal load sensing switch from the brake pedal sub-assembly.**
- **When there is a malfunction in the brake pedal load sensing switch, replace the brake pedal sub-assembly.**

a. Turn the ignition switch off.
b. Make sure that there is no looseness at the locking part and the connecting part of the connector.
c. Disconnect the brake pedal load sensing switch connector.
d. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
2 (FSW+) -1 (GND)	Brake pedal load sensing switch OFF (Brake pedal depressed)	950 to 1050 ohms
2 (FSW+) -1 (GND)	Brake pedal load sensing switch ON (Brake pedal released)	203 to 223 ohms

NG: REPLACE BRAKE PEDAL SUB-ASSEMBLY (BRAKE PEDAL LOAD SENSING

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SWITCH) (See **DISASSEMBLY**)

OK: Go to next step

4. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - BRAKE PEDAL LOAD SENSING SWITCH)**
   a. Make sure that there is no looseness at the locking part and the connecting part of the connector.
   b. Disconnect the skid control ECU connector.
   c. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-27 (FSW+) - A20-2 (FSW+)	Always	Below 1 ohms
A24-27 (FSW+) - Body ground	Always	10 kohms or higher
A20-1 (GND) - Body ground	Always	Below 1 ohms

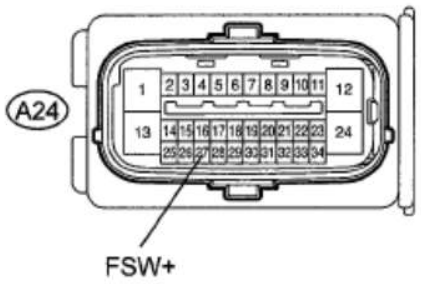
NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

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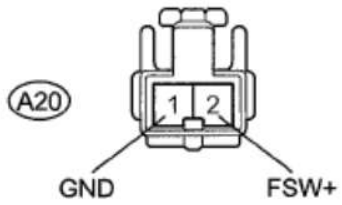
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Front view of wire harness connector:
(to Skid Control ECU)



Front view of wire harness connector:
(to Brake Pedal Load Sensing Switch)



N C168344E02

Fig. 122: Identifying Skid Control ECU And Brake Pedal Load Sensing Switch Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

DTC C1430 BRAKE PEDAL LOAD SENSING SWITCH OFF STUCK MALFUNCTION; DTC C1431 BRAKE PEDAL LOAD SENSING SWITCH ON STUCK MALFUNCTION

DESCRIPTION

The brake pedal load sensing switch is turned on when the brake pedal is depressed with force exceeding a predetermined level.

The skid control ECU detects if the brake pedal is depressed or not via this circuit.

DTC DETECTION CONDITION CHART

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DTC Code	DTC Detection Condition	Trouble Area
C1430	Either of the following is detected: 1. With the stop light switch ON, the brake pedal load sensing switch OFF, and the master cylinder pressure 6 MPa or more, the deceleration is 0.4 G or more for 1 second or more. 2. With the stop light switch ON, the brake pedal load sensing switch OFF, and the master cylinder pressure 6 MPa or more, the vehicle speed is 0 km/h (0 mph) for 5 seconds or more.	• Brake pedal load sensing switch • Brake pedal load sensing switch circuit
C1431	Either of the following is detected: 1. Immediately after the ignition switch is turned on (IG), the brake pedal load sensing switch is ON and the stop light switch is OFF for 10 seconds or more. 2. The condition that the brake pedal load sensing switch remains ON while the vehicle speed increases from 0 km/h (0 mph) to 30 km/h (18 mph) occurs 5 times in succession.	• Brake pedal load sensing switch • Brake pedal load sensing switch circuit

WIRING DIAGRAM

Refer to DTC C1429 (See **DTC C1429 OPEN OR SHORT IN BRAKE PEDAL LOAD SENSING SWITCH**).

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

HINT:

When C1425 and/or C1426 is output together with C1430 and/or C1431, inspect and repair the trouble areas indicated by C1425 and/or C1426 first (See **DTC C1425 OPEN IN STOP LIGHT SWITCH CIRCUIT**, or **DTC C1426 STOP LIGHT SWITCH OFF STUCK MALFUNCTION**).

1. **READ VALUE ON TECHSTREAM (STOP LIGHT SWITCH AND BRAKE PEDAL LOAD SENSING SWITCH)**
   a. Connect Techstream to the DLC3.
   b. Turn the ignition switch on (IG).
   c. Select the Data List mode on Techstream (See **DATA LIST/ACTIVE TEST**).

   ABS/VSC/TRAC:

   ABS/VSC/TRAC TESTER DISPLAY REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic

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			Note
Stop Light SW	Stop light switch/ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
Brake Pedal Load Sensing SW	Brake pedal load sensing switch/ON or OFF	ON: Brake pedal depressed beyond the specified point OFF: Brake pedal not depressed beyond the specified point	-

d. Check that the stop light switch display and brake pedal load sensing switch display observed on Techstream change according to brake pedal operation.

OK:

The Techstream displays ON or OFF according to brake pedal operation.

e. Slowly depress the brake pedal, and check when the stop light switch and brake pedal load sensing switch turn ON.

OK:

First the stop light switch should turn ON, and then the brake pedal load sensing switch should turn ON.

Result

RESULT CHART

Result	Proceed to
OK	A
NG (Turning on of the brake pedal load sensing switch is not confirmed)	B
NG (The brake pedal load sensing switch turns on first)	C

B: Go to step 3

C: Go to step 5

A: Go to next step

2. **RECONFIRM DTC**
   a. Turn the ignition switch off.
   b. Clear the DTCs (See **DTC CHECK/CLEAR**).
   c. Start the engine.
   d. Perform the road and braking test.
   e. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

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RESULT CHART

Result	Proceed to
DTCs (C1430 and C1431) are not output	A
DTCs (C1430 and/or C1431) are output	B

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

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

3. **INSPECT BRAKE PEDAL LOAD SENSING SWITCH**

Component without harness connected:
(Brake Pedal Load Sensing Switch)

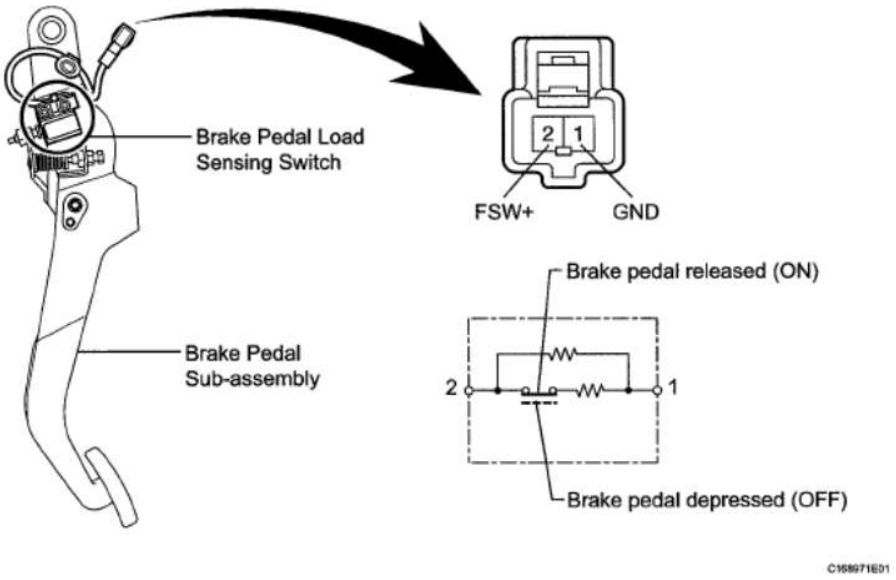


Fig. 123: Inspecting Brake Pedal Load Sensing Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- **Do not remove the brake pedal load sensing switch from the brake pedal sub-assembly.**
- **When there is a malfunction in the brake pedal load sensing switch, replace the brake pedal sub-assembly.**

a. Turn the ignition switch off.
b. Make sure that there is no looseness at the locking part and the connecting part of the connector.
c. Disconnect the brake pedal load sensing switch connector.
d. Measure the resistance according to the value (s) in the table below.

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Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
2 (FSW+) -1 (GND)	Brake pedal load sensing switch OFF (Brake pedal depressed)	950 to 1050 ohms
2 (FSW+) -1 (GND)	Brake pedal load sensing switch ON (Brake pedal released)	203 to 223 ohms

NG: REPLACE BRAKE PEDAL SUB-ASSEMBLY (BRAKE PEDAL LOAD SENSING SWITCH) (See **DISASSEMBLY**)

OK: Go to next step

4. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - BRAKE PEDAL LOAD SENSING SWITCH)**
   a. Make sure that there is no looseness at the locking part and the connecting part of the connector.
   b. Disconnect the skid control ECU connector.
   c. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-27 (FSW+) - A20-2 (FSW+)	Always	Below 1 ohms
A24-27 (FSW+) - Body ground	Always	10 kohms or higher
A20-1 (GND) - Body ground	Always	Below 1 ohms

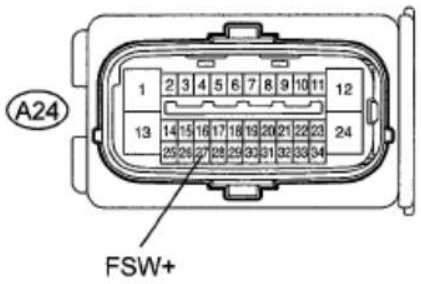
NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

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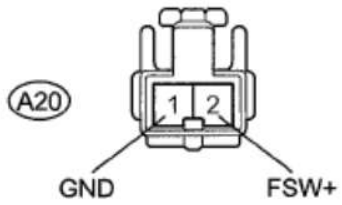
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Front view of wire harness connector:
(to Skid Control ECU)



Front view of wire harness connector:
(to Brake Pedal Load Sensing Switch)



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Fig. 124: Identifying Skid Control ECU And Brake Pedal Load Sensing Switch Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

5. **CHECK BRAKE PEDAL AND STOP LIGHT SWITCH INSTALLATION**
   a. Turn the ignition switch off.
   b. Check the brake pedal height and stop light switch installation (See **ADJUSTMENT**).

OK:

The brake pedal height and stop light switch installation are normal.

NG: ADJUST BRAKE PEDAL OR STOP LIGHT SWITCH (See **ADJUSTMENT**)

OK: REPLACE BRAKE PEDAL SUB-ASSEMBLY (BRAKE PEDAL LOAD SENSING

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SWITCH) (See **DISASSEMBLY**)

DTC C1432 STEERING ANGLE SENSOR POWER SOURCE VOLTAGE MALFUNCTION

DESCRIPTION

Steering angle sensor signals are 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
C1432	Steering angle sensor power supply malfunction signal is received from steering angle sensor.	• Steering angle sensor power supply • Steering angle sensor

WIRING DIAGRAM

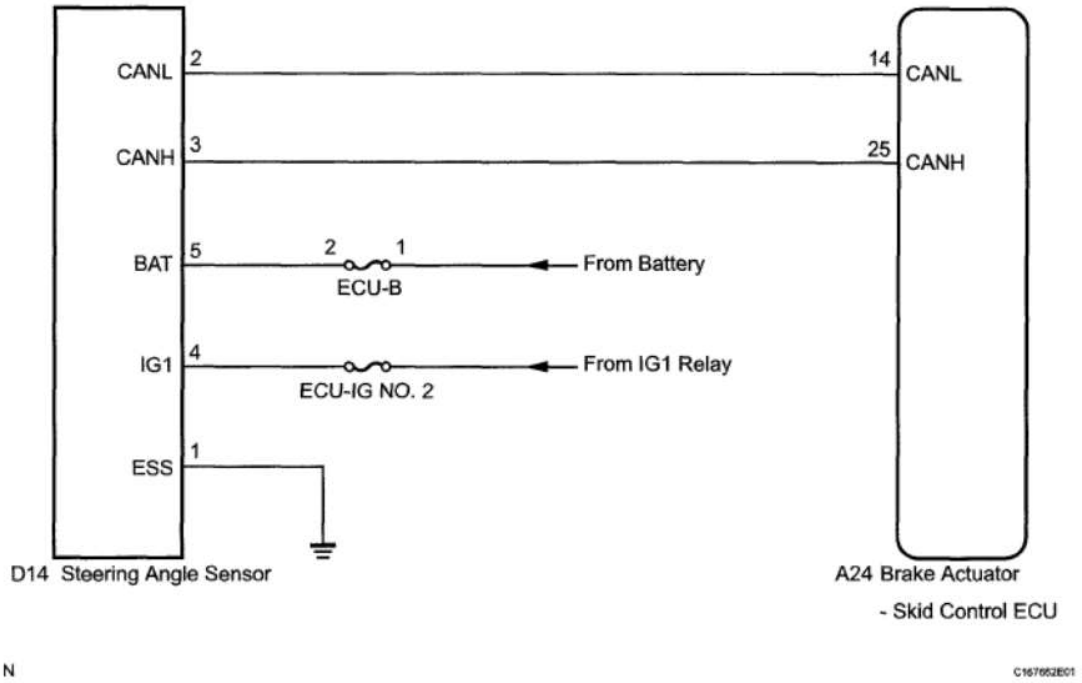


Fig. 125: Steering Angle Sensor - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

HINT:

- When U0073, U0123, U0124 and/or U0126 is output together with C1432, inspect and repair the trouble

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areas indicated by U0073, U0123, U0124 and/or U0126 first (See **DTC U0073 CONTROL MODULE COMMUNICATION BUS OFF; DTC U0100 LOST COMMUNICATION WITH ECM/PCM; DTC U0123 LOST COMMUNICATION WITH YAW RATE SENSOR MODULE; DTC U0124 LOST COMMUNICATION WITH LATERAL ACCELERATION SENSOR MODULE; DTC U0126 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 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. **INSPECT STEERING ANGLE SENSOR (POWER SOURCE TERMINAL)**
   a. Remove the steering wheel and the column cover lower.
   b. Make sure that there is no looseness at the locking part and the connecting part of the connectors.
   c. Disconnect the steering angle sensor connector.
   d. Measure the voltage according to the value (s) in the table below.

Standard voltage

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
D14-4 (IG1) - Body ground	Ignition switch on (IG)	11 to 14 V
D14-5 (BAT) -Body ground	Always	11 to 14 V

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

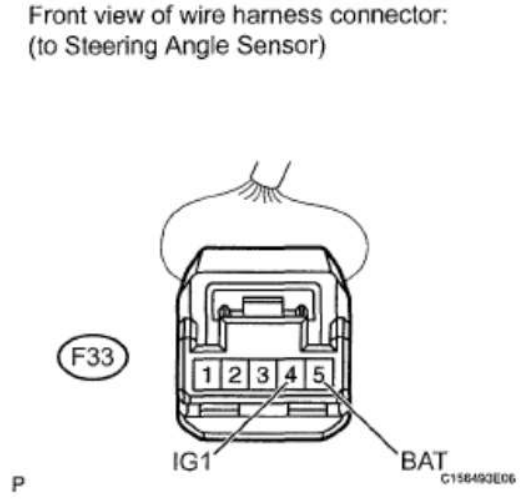


Fig. 126: Identifying Power Source Terminal Of Steering Angle Sensor Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

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2. **INSPECT STEERING ANGLE SENSOR (GROUND TERMINAL)**
   a. Turn the ignition switch off.
   b. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
D14-1 (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)

Front view of wire harness connector:
(to Steering Angle Sensor)

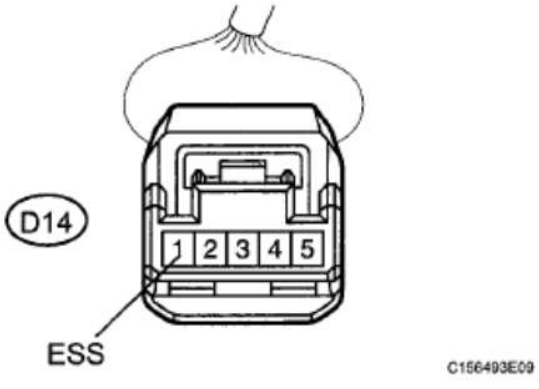


Fig. 127: Identifying Ground Terminal Of Steering Angle Sensor Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: REPLACE STEERING ANGLE SENSOR (See **REMOVAL**)

DTC C1433 STEERING ANGLE SENSOR INTERNAL CIRCUIT

DESCRIPTION

Steering angle sensor signals are 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.

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DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1433	Either of the following is detected: 1. With the IG1 terminal voltage 9.5 to 17.4 V, the skid control ECU receives an error signal from the steering angle sensor for 0.012 seconds. 2. An open in the sensor power supply circuit for 1 second or more.	Steering angle sensor

WIRING DIAGRAM

Refer to DTC C1432 (See **DTC C1432 STEERING ANGLE SENSOR POWER SOURCE VOLTAGE MALFUNCTION**).

INSPECTION PROCEDURE

HINT:

- When U0073, U0123, U0124 and/or U0126 is output together with C1433, inspect and repair the trouble areas indicated by U0073, U0123, U0124 and/or U0126 first (See **DTC U0073 CONTROL MODULE COMMUNICATION BUS OFF; DTC U0100 LOST COMMUNICATION WITH ECM/PCM; DTC U0123 LOST COMMUNICATION WITH YAW RATE SENSOR MODULE; DTC U0124 LOST COMMUNICATION WITH LATERAL ACCELERATION SENSOR MODULE; DTC U0126 LOST COMMUNICATION WITH STEERING ANGLE SENSOR MODULE**).
- When any of the speed sensors 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 sensors or yaw rate and acceleration sensor are output together with 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. **REPLACE STEERING ANGLE SENSOR**
   a. Replace the steering angle sensor (See **REMOVAL**).

   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**).

   NEXT: END

DTC C1434 STEERING ANGLE SENSOR OUTPUT MALFUNCTION

DESCRIPTION

Steering angle sensor signals are 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.

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DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1434	Error in communication between the skid control ECU and the steering angle sensor, or abnormal steering angle sensor zero point.	• Steering angle sensor power supply • Steering angle sensor • Brake actuator assembly (Skid control ECU)

WIRING DIAGRAM

Refer to DTC C1432 (See **DTC C1432 STEERING ANGLE SENSOR POWER SOURCE VOLTAGE MALFUNCTION**).

INSPECTION PROCEDURE

HINT:

- When U0073, U0123, U0124 and/or U0126 is output together with C1434, inspect and repair the trouble areas indicated by U0073, U0123, U01245 and/or U0126 first (See **DTC U0073 CONTROL MODULE COMMUNICATION BUS OFF; DTC U0100 LOST COMMUNICATION WITH ECM/PCM; DTC U0123 LOST COMMUNICATION WITH YAW RATE SENSOR MODULE; DTC U0124 LOST COMMUNICATION WITH LATERAL ACCELERATION SENSOR MODULE; DTC U0126 LOST COMMUNICATION WITH STEERING ANGLE SENSOR MODULE**).
- When any of the speed sensors 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 sensors or yaw rate and acceleration sensor are output together with 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 DTCs (See **DTC CHECK/CLEAR**).
   b. Turn the ignition switch off.
   c. Turn the ignition switch on (IG) again and check that no CAN communication system DTC is output (See **DIAGNOSIS SYSTEM**).
   d. Start the engine.
   e. Drive the vehicle and turn the steering wheel to the right and left at a speed of 35 km/h (22 mph) and check that no speed sensor or yaw rate and acceleration sensor DTCs are output (See **DTC CHECK/CLEAR**).

   Result

RESULT CHART

Result	Proceed to

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No CAN communication system, speed sensor, or yaw rate and acceleration sensor DTCs are output	A
CAN communication system DTC is output	B
Speed sensor or yaw rate and acceleration sensor DTC is output	C

HINT:

- If there is a malfunction in any of the speed sensors or the yaw rate and acceleration sensor, an abnormal value may be output although the steering angle sensor is normal.
- If speed sensor and yaw rate and acceleration sensor DTCs are output simultaneously, repair these two sensors first 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 off.
   b. Remove the steering wheel and the column cover lower.
   c. Make sure that there is no looseness at the locking part and the connecting part of the connector.
   d. Disconnect the steering angle sensor connector.
   e. Measure the voltage according to the value (s) in the table below.

Standard voltage

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
D14-4 (IG1) - Body ground	Ignition switch on (IG)	11 to 14 V
D14-5 (BAT) - Body ground	Always	11 to 14 V

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Front view of wire harness connector:
(to Steering Angle Sensor)

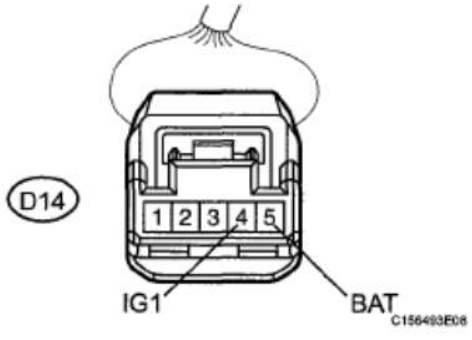


Fig. 128: Identifying Power Source Terminal Of Steering Angle Sensor
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

OK: Go to next step

3. **INSPECT STEERING ANGLE SENSOR (GROUND TERMINAL)**
   a. Turn the ignition switch off.
   b. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
D14-1 (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)

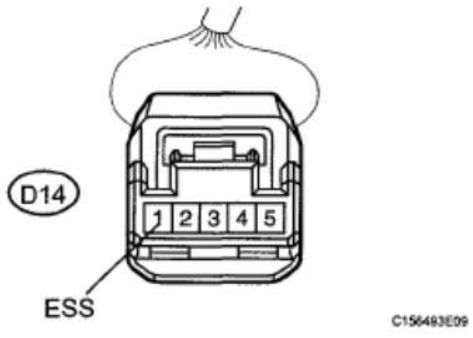


Fig. 129: Identifying Ground Terminal Of Steering Angle Sensor
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: REPLACE STEERING ANGLE SENSOR (See **REMOVAL**)

DTC C1436 YAW RATE SENSOR 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, DTCs U0123 (malfunction in CAN communication with the yaw rate sensor) and U0124 (malfunction in CAN communication with the acceleration sensor) are set.

These DTCs are also output when calibration has not been completed.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1436	Either of the following is detected: 1. With the vehicle stationary, the yaw rate and acceleration sensor output value is not 0 deg/s. 2. Abnormal comparison value.	Yaw rate and acceleration sensor

WIRING DIAGRAM

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Refer to DTCs C1232, C1243 and C1245 (See **WIRING DIAGRAM**).

INSPECTION PROCEDURE

NOTE: When replacing the yaw rate and acceleration sensor, perform zero point calibration (See CALIBRATION).

HINT:

When U0123, U0124 and/or U0126 is output together with C1436, inspect and repair the trouble areas indicated by U0123, U0124 and/or U0126 first (See **DTC U0073 CONTROL MODULE COMMUNICATION BUS OFF; DTC U0100 LOST COMMUNICATION WITH ECM/PCM; DTC U0123 LOST COMMUNICATION WITH YAW RATE SENSOR MODULE; DTC U0124 LOST COMMUNICATION WITH LATERAL ACCELERATION SENSOR MODULE; DTC U0126 LOST COMMUNICATION WITH STEERING ANGLE SENSOR MODULE**).

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

   ABS/VSC/TRAC:

   ABS/VSC/TRAC TESTER DISPLAY REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Yaw Rate Sensor	Yaw rate sensor/min.: -128 deg/s, max.: 127 deg/s	Vehicle stationary: 0 deg/s Right turn: -128 to 0 deg/s Left turn: 0 to 127 deg/s	-
Yaw Rate Sensor 2	Yaw rate sensor 2/min.: -128 deg/s, max.: 127 deg/s	Vehicle stationary: 0 deg/s Right turn: -128 to 0 deg/s Left turn: 0 to 127 deg/s	-

   d. Check that the yaw rate and acceleration sensor output value displayed on Techstream.

Result

RESULT CHART

Result	Proceed to

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NG (The yaw rate and acceleration sensor output value is 0 deg/s when the vehicle is stationary, but the value fluctuates when turning)	A
NG (The yaw rate and acceleration sensor output value is not 0 deg/s when the vehicle is stationary)	B
OK	C

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**).

B: REPLACE YAW RATE AND ACCELERATION SENSOR (See **REMOVAL**)

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

A: Go to next step

2. **CHECK YAW RATE AND ACCELERATION SENSOR INSTALLATION**
   a. Turn the ignition switch off.
   b. Check that the yaw rate and acceleration sensor has been installed properly (See **INSTALLATION**).

OK:

The sensor should be tightened to the specified torque.

The sensor should not be installed in a tilted position.

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: INSTALL YAW RATE AND ACCELERATION SENSOR CORRECTLY (See **INSTALLATION**)

OK: REPLACE YAW RATE AND ACCELERATION SENSOR (See **REMOVAL**)

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DTC C1437 LOST COMMUNICATION WITH ECM

DESCRIPTION

The skid control ECU receives signals from the ECM via the CAN communication system.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1437	When the IG1 terminal voltage is 10 V or more and the vehicle speed is 15 km/h (9 mph) or more, data cannot be sent to the ECM for 2 seconds or more.	• CAN communication system (Skid control ECU to ECM) • Brake actuator assembly (Skid control ECU)

WIRING DIAGRAM

Refer to DTCs U0073, U0100, U0123, U0124 and U0126 (See **WIRING DIAGRAM**).

INSPECTION PROCEDURE

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

   ABS/VSC/TRAC:

   ABS/VSC/TRAC TESTER DISPLAY REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
EFI Communication Open	EFI communication 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 3

   OK: Go to next step

2. **RECONFIRM DTC**

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a. Turn the ignition switch off.
b. Clear the DTCs (See **DTC CHECK/CLEAR**).
c. Start the engine.
d. Drive the vehicle at a speed of 15 km/h (9 mph) or more for 10 seconds or more.
e. Check that no CAN communication system DTC is output (See **DIAGNOSIS SYSTEM**).
f. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC (C1437) is not output	A
DTC (C1437) is output	B
DTC (CAN communication system DTC) is output	C

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

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

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

3. **REPAIR OR REPLACE HARNESS OR CONNECTOR (SKID CONTROL ECU - ECM)**
   a. Turn the ignition switch off.
   b. Repair or replace the harness or connector.
   c. Check for any momentary interruption between the skid control ECU and the ECM (See **CHECK FOR INTERMITTENT PROBLEMS**).
   d. Check that there is no momentary interruption.
4. **RECONFIRM DTC**
   a. Turn the ignition switch off.
   b. Clear the DTCs (See **DTC CHECK/CLEAR**).
   c. Start the engine.
   d. Drive the vehicle at a speed of 15 km/h (9 mph) or more for 10 seconds or more.
   e. Check that no CAN communication system DTC is output (See **DIAGNOSIS SYSTEM**).
   f. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC (C1437) is not output	A

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DTC (C1437) is output	B
DTC (CAN communication system DTC) is output	C

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

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

A: END

DTC C1439 STEERING ANGLE SENSOR INITIALIZATION INCOMPLETE; DTC C1445 VEHICLE DRIVEN WITH STEERING ANGLE SENSOR NOT INITIALIZED

DESCRIPTION

The skid control ECU acquires the steering angle sensor zero point every time the ignition switch is turned on (IG) and the vehicle is driven at 35 km/h (22 mph) or more for approximately 5 seconds. The ECU also stores previous zero points.

Warning of the steering angle sensor zero point malfunction will be cancelled by turning the ignition switch off.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1439	After the steering angle sensor zero point calibration is cleared due to, for example, fluctuations in the power source, the steering angle sensor zero point calibration cannot be obtained for 60 seconds of continuous driving.	• Steering angle sensor • Yaw rate and acceleration sensor • Brake actuator assembly (Skid control ECU)
C1445	Steering angle sensor zero point calibration cannot be obtained when the vehicle is driven without a record of steering angle sensor zero point calibration at a speed of 35 km/h (22 mph) or more for 30 seconds or more without the brake pedal being depressed.	• Steering angle sensor • Yaw rate and acceleration sensor • Brake actuator assembly (Skid control ECU)

WIRING DIAGRAM

Refer to DTCs U0073, U0100, U0123, U0124 and U0126 (See **WIRING DIAGRAM**).

INSPECTION PROCEDURE

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NOTE:

- **When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).**
- **Before proceeding with the inspection, explain to the customer that the output DTC is related to temporary loss of the steering angle zero point calibration, such as when the power source voltage drops when the battery is removed, and confirm that this condition occurred.**

HINT:

- When U0073, U0123, U0124 and/or U0126 is output together with C1439 and/or C1445, inspect and repair the trouble areas indicated by U0073, U0123, U0124 and/or U0126 first (See **DTC U0073 CONTROL MODULE COMMUNICATION BUS OFF; DTC U0100 LOST COMMUNICATION WITH ECM/PCM; DTC U0123 LOST COMMUNICATION WITH YAW RATE SENSOR MODULE; DTC U0124 LOST COMMUNICATION WITH LATERAL ACCELERATION SENSOR MODULE; DTC U0126 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 DTCs (See **DTC CHECK/CLEAR**).
   b. Turn the ignition switch off.
   c. Turn the ignition switch on (IG) again and check that no CAN communication system DTCs are output (See **DIAGNOSIS SYSTEM**).
   d. Drive the vehicle and turn the steering wheel to the right and left at a speed of 35 km/h (22 mph) 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
DTCs (C1439 and/or C1445) are output	A
CAN communication system DTC is output	B
Speed sensor and/or yaw rate and acceleration sensor DTC is output	C
DTCs (C1439 and C1445) are not output	D

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.

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- If the speed sensor and the yaw rate and acceleration sensor DTCs are output simultaneously, repair the sensors and inspect the steering angle sensor. If the same DTC C1439 and/or C1445 is not output again, the DTC may have been stored due to a temporary loss of the steering angle zero point calibration, such as when the power source voltage drops.
- B

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

C: REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See **DIAGNOSTIC TROUBLE CODE CHART**)

D: CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **DIAGNOSIS SYSTEM**)

A: Go to next step

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.
   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 an off-centered position of the steering wheel, acquire 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 (See **FRONT WHEEL ALIGNMENT**)

OK: Go to next step

3. **RECONFIRM DTC**
   a. Turn the ignition switch off.
   b. Clear the DTCs (See **DTC CHECK/CLEAR**).
   c. Start the engine.
   d. Drive the vehicle and turn the steering wheel to the right and left at the speed of 35 km/h (22 mph) or more.
   e. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

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RESULT CHART

Result	Proceed to
DTCs (C1439 and/or C1445) are output	A
DTCs (C1439 and C1445) are not output	B

HINT:

- If the same DTC C1439 and/or C1445 is not output again, the DTC may have been stored due to a temporary loss of the steering angle zero point calibration, such as when the power source voltage drops.
- 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: END

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

DTC C1440 UNUSUAL BANK ANGLE DETECTED

DESCRIPTION

If the skid control ECU determines that the vehicle is being driven at a steep bank angle, the skid control ECU stores DTC C1440 while VSC operation is temporarily disabled.

It is not a malfunction if the system and sensor circuits are normal and if the normal VSC operation resumes.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1440	Driving at a steep bank angle.	Yaw rate and acceleration sensor

INSPECTION PROCEDURE

1. **CHECK DTC**
   a. Clear the DTCs (See **DTC CHECK/CLEAR**).
   b. Perform a road test.
   c. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

Result

RESULT CHART

Result	Proceed to
DTC (C1440) is output	A
DTC (C1440) is not output	B
Yaw rate and acceleration sensor DTC is output	C

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B: END

C: REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See **DIAGNOSTIC TROUBLE CODE CHART**)

A: Go to next step

2. **CLEAR DTC**
   a. Clear the DTCs (See **DTC CHECK/CLEAR**).

HINT:

- If the skid control ECU determines that the vehicle is being driven at a steep bank angle, the skid control ECU stores DTC C1440 while VSC operation is temporarily disabled.
- It is not a malfunction if the system and sensor circuits are normal and if the normal VSC operation resumes.

NEXT: END

DTC C1441 BRAKE BOOSTER MALFUNCTION

DESCRIPTION

If the brake booster is damaged and does not provide braking support when depressing the brake pedal, the skid control ECU determines that the brake booster has a problem and stores DTC C1441 (Brake Booster Malfunction).

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1441	When the brake pedal load sensing switch and master cylinder pressure sensor are functioning normally and the brake pedal load sensing switch is judged as ON, the pressure signal from the master cylinder pressure sensor does not indicate an increase.	Brake booster assembly

INSPECTION PROCEDURE

1. **INSPECT VACUUM SYSTEM**
   a. Check the brake booster assembly (See **ON-VEHICLE INSPECTION**).

NEXT: END

DTC C1442 INVALID DATA RECEIVED FROM ACCELERATION SENSOR; DTC C1443 INVALID DATA RECEIVED FROM YAW RATE SENSOR

DESCRIPTION

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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 condition.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
C1442	With terminal IG1 voltage between 9.5 and 17.4 V, an invalid data signal is received from the acceleration sensor for 10 seconds or more.	Yaw rate and acceleration sensor
C1443	With terminal IG1 voltage between 9.5 and 17.4 V, an invalid data signal is received from the yaw rate sensor for 10 seconds or more.	Yaw rate and acceleration sensor

INSPECTION PROCEDURE

NOTE: When replacing the yaw rate and acceleration sensor, perform zero point calibration (See CALIBRATION).

1. **CHECK DTC**
   a. Clear the DTCs (See **DTC CHECK/CLEAR**).
   b. Start and idle the engine for 60 seconds, and then stop the engine.
   c. Check if the same DTC is recorded (See **DTC CHECK/CLEAR**).

   Result

   RESULT CHART

Result	Proceed to
DTCs (C1442 and/or C1443) are output	A
DTCs (C1442 and C1443) are not 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: CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See **DIAGNOSIS SYSTEM**)

   A: REPLACE YAW RATE AND ACCELERATION SENSOR (See **REMOVAL**)

DTC U0073 CONTROL MODULE COMMUNICATION BUS OFF; DTC U0100 LOST COMMUNICATION WITH ECM/PCM; DTC U0123 LOST COMMUNICATION WITH YAW RATE SENSOR MODULE; DTC U0124 LOST COMMUNICATION WITH LATERAL ACCELERATION SENSOR MODULE; DTC U0126 LOST COMMUNICATION WITH STEERING ANGLE SENSOR MODULE

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DESCRIPTION

The skid control ECU receives signals from the ECM, steering angle sensor, and yaw rate and acceleration sensor via the CAN communication system.

DTC DETECTION CONDITION CHART

DTC Code	DTC Detection Condition	Trouble Area
U0073	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 signals cannot be sent 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. ○ 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	The IG1 terminal voltage is between 10 and 17.4 V and the vehicle speed is 15 km/h (9 mph) or more, data cannot be received from the ECM for 2 seconds or more.	CAN communication system (Skid control ECU to ECM)
U0123	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. ○ 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	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. ○ The condition that data from the acceleration sensor cannot be received occurs once or more within 5 seconds.	and acceleration sensor)
U0126	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. ○ 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

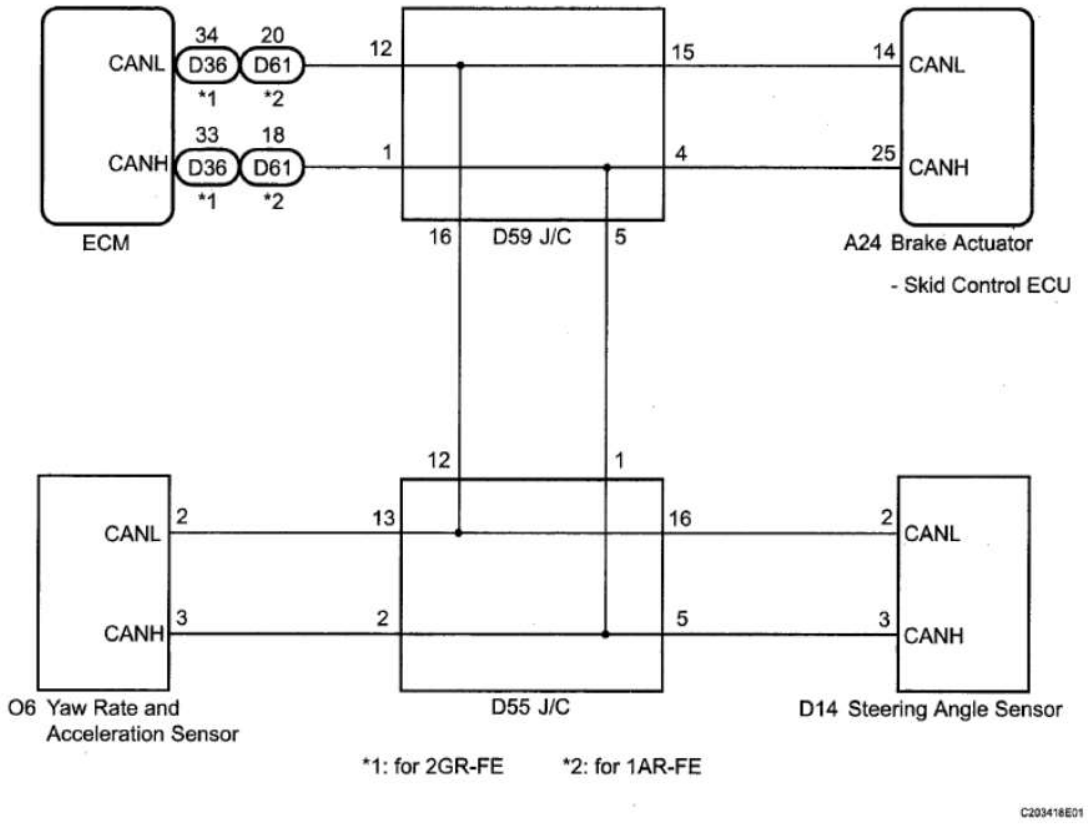


Fig. 130: Lateral Acceleration Sensor And Steering Angle Sensor - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

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

ABS/VSC/TRAC:

ABS/VSC/TRAC TESTER DISPLAY REFERENCE

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 is a constant open circuit	A
There are no momentary interruptions	B
There are momentary interruptions	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 off.
   b. Check if each sensor or ECM connector is securely connected.

OK:

Each connector is securely connected.

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NG: CONNECT CONNECTOR TO EACH SENSOR OR ECM CORRECTLY

OK: Go to next step

3. **RECONFIRM DTC**
   a. Turn the ignition switch off.
   b. Record the output DTCs (for ABS, VSC system and/or CAN communication system) (See **DTC CHECK/CLEAR** for ABS and VSC system, or See **DIAGNOSIS SYSTEM** for CAN communication system).

HINT:

If CAN communication system DTCs and the relevant sensor DTCs are output simultaneously, troubleshoot the relevant sensor DTCs (for ABS and/or VSC system) after the CAN communication system returns to normal.

Result

RESULT CHART

Result	Proceed to
DTC is not output	A
DTC (ABS and/or VSC system DTC) is output	B
DTC (CAN communication system DTC) is output	C

B: REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See **DIAGNOSTIC TROUBLE CODE CHART**)

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

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

4. **REPAIR OR REPLACE HARNESS OR CONNECTOR**
   a. Turn the ignition switch 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 are no momentary interruptions.
5. **RECONFIRM DTC**
   a. Turn the ignition switch off.
   b. Clear the DTCs (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 15 km/h (9 mph) or

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more.

e. Check that no CAN communication system DTC is output (See **DIAGNOSIS SYSTEM**).

f. If ABS and/or VSC system DTCs are output, record them.

Result

RESULT CHART

Result	Proceed to
DTC is not output	A
DTC (ABS and/or VSC system DTC) is output	B
DTC (CAN communication system DTC) is output	C

HINT:

The CAN communication system must be normal when performing troubleshooting for each sensor DTC (for ABS and/or VSC system).

B: REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See **DIAGNOSTIC TROUBLE CODE CHART**)

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

A: END

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:

- For vehicles with the multi-information display, the master caution indicator light will come on and a check ABS message will be displayed on the multi-information display if the ABS control cannot be performed.
- In some cases, Techstream cannot be used when the skid control ECU is abnormal.

WIRING DIAGRAM

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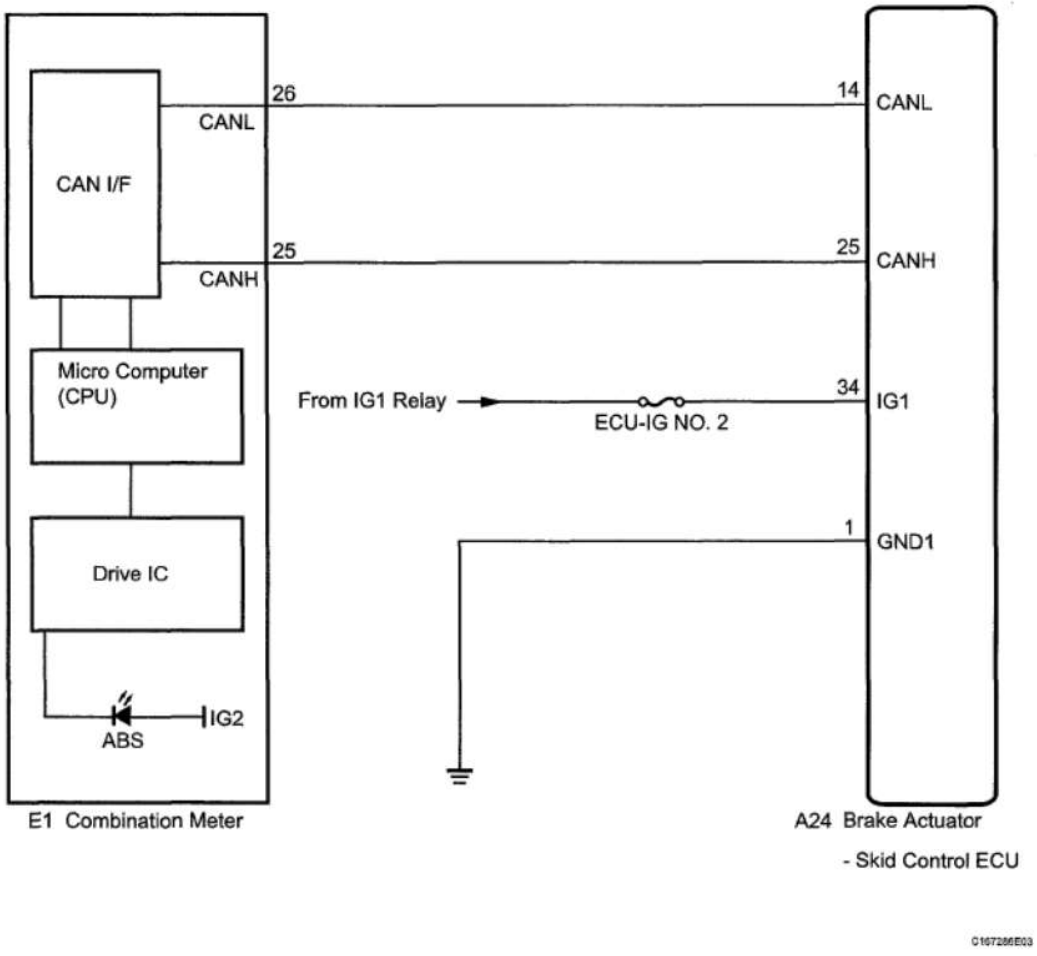


Fig. 131: ABS Warning Light Remains On - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

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

Result

RESULT CHART

Result	Proceed to
DTC is not output	A
DTC is 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

Result

RESULT CHART

Result	Proceed to
OK	A
NG (for 2GR-FE)	B
NG (for 1AR-FE)	C

B: CHECK OR REPLACE CHARGING SYSTEM OR BATTERY (for 2GR-FE) (See **PROBLEM SYMPTOMS TABLE**)

C: CHECK OR REPLACE CHARGING SYSTEM OR BATTERY (for 1AR-FE) (See **ON-VEHICLE INSPECTION**)

A: Go to next step

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

Standard voltage

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VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
A24-34 (IG1) - Body ground	Ignition switch on (IG)	11 to 14 V

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

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

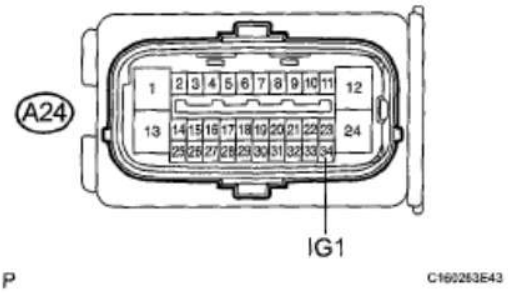


Fig. 132: Identifying IG1 Terminal Of Skid Control ECU Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

5. **INSPECT SKID CONTROL ECU (GND1 TERMINAL)**
   a. Turn the ignition switch off.
   b. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-1 (GND1) - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (GND1 CIRCUIT)

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

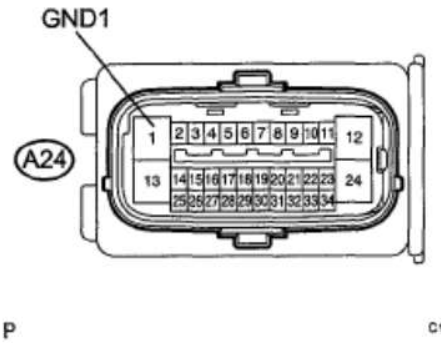


Fig. 133: Identifying GND1 Terminal Of Skid Control ECU Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

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

OK:

The ABS warning light turns on or off in accordance with Techstream operation.

HINT:

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

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

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

ABS WARNING LIGHT DOES NOT COME ON

DESCRIPTION

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

WIRING DIAGRAM

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Refer to ABS Warning Light Remains ON (See **WIRING DIAGRAM**).

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

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

   Result

   RESULT CHART

Result	Proceed to
DTC is not output	A
DTC is 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 on (IG).
   c. Check that the ABS warning light comes on.

   OK:

   The ABS warning light comes on.

   HINT:

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

   NG: Go to step 3

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

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

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d. Check the combination meter.

OK:

The ABS warning light turns on or off in accordance with Techstream operation.

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: 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 has been disabled.

HINT:

For vehicles with the multi-information display, the master caution indicator light will come on and a brake malfunction message will be displayed on the multi-information display if the EBD system is malfunctioning.

WIRING DIAGRAM

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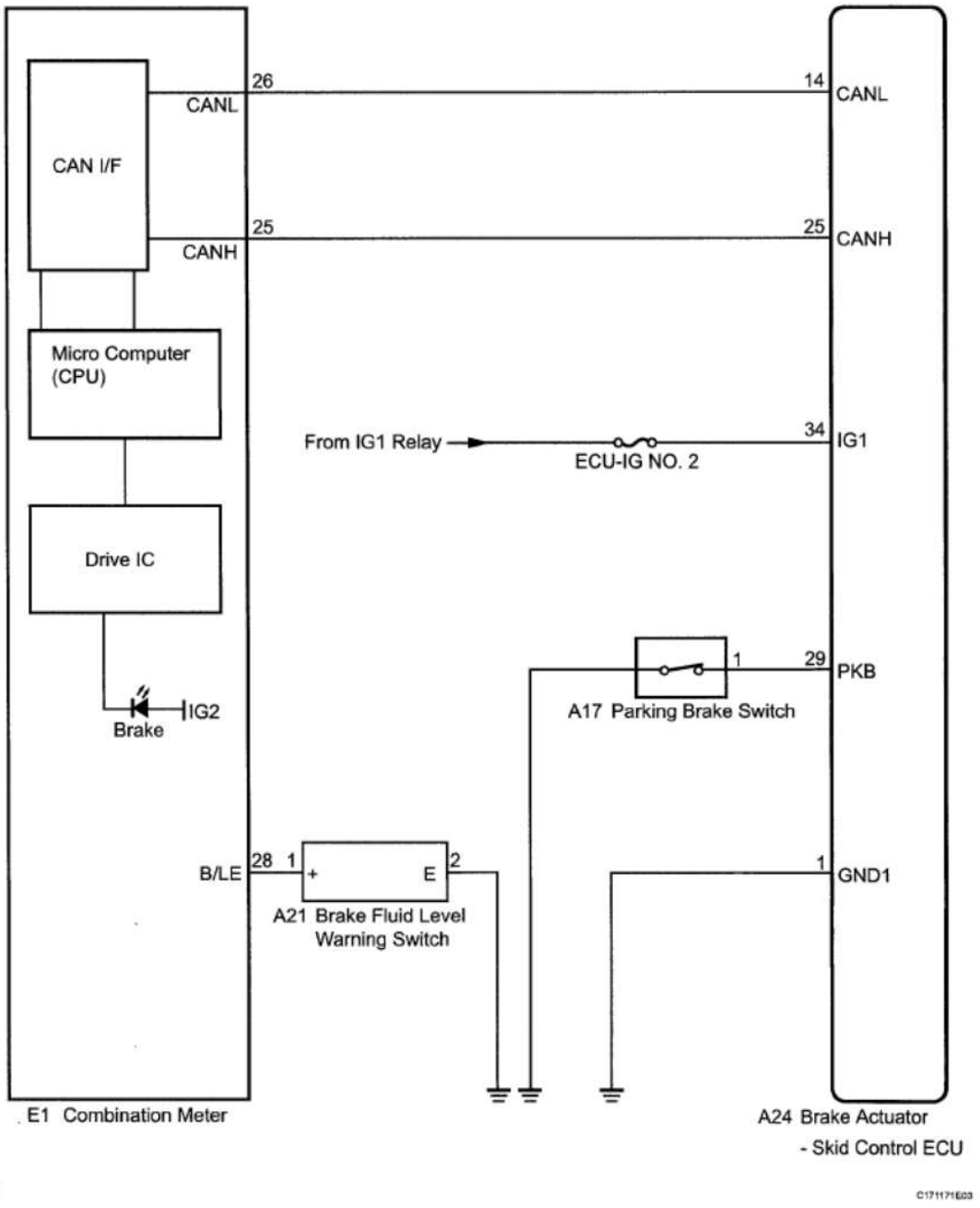


Fig. 134: Brake Warning Light - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: **When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).**

1. **CHECK CAN COMMUNICATION SYSTEM**

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

Result

RESULT CHART

Result	Proceed to
DTC is not output	A
DTC is 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

Result

RESULT CHART

Result	Proceed to
OK	A
NG (for 2GR-FE)	B
NG (for 1AR-FE)	C

B: CHECK OR REPLACE CHARGING SYSTEM OR BATTERY (for 2GR-FE) (See **PROBLEM SYMPTOMS TABLE**)

C: CHECK OR REPLACE CHARGING SYSTEM OR BATTERY (for 1AR-FE) (See **ON-VEHICLE INSPECTION**)

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A: Go to next step

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

Standard voltage

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
A24-34 (IG1) - Body ground	Ignition switch on (IG)	11 to 14 V

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

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

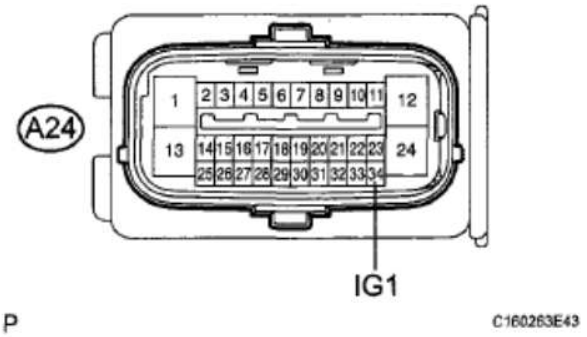


Fig. 135: Identifying IG1 Terminal Of Skid Control ECU Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

5. **INSPECT SKID CONTROL ECU (GND1 TERMINAL)**
   a. Turn the ignition switch off.
   b. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition

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A24-1 (GND1) - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR (GND1 CIRCUIT)

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

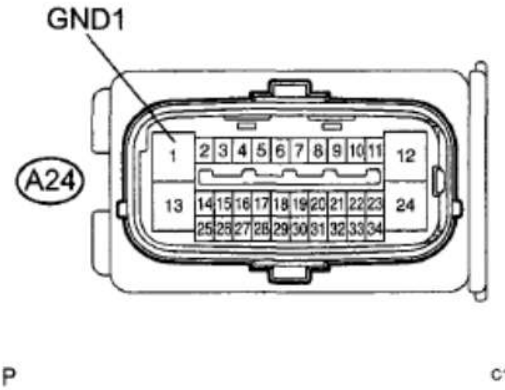


Fig. 136: Identifying GND1 Terminal Of Skid Control ECU Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

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

      ABS/VSC/TRAC:

      ABS/VSC/TRAC TESTER DISPLAY REFERENCE

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 Techstream, check the switch condition on Techstream changes according to parking brake pedal operation.

OK:

The Techstream displays ON or OFF according to parking brake pedal operation.

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NG: Go to step 10

OK: Go to next step

7. **INSPECT BRAKE FLUID LEVEL WARNING SWITCH**
   a. Turn the ignition switch 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:

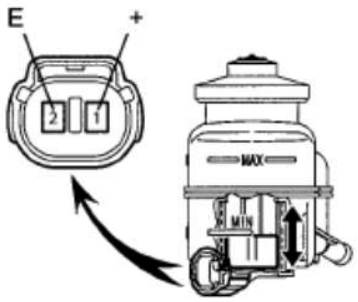
A float is located inside the reservoir. Its position can be changed by increasing or decreasing the level of brake fluid.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
1 (+) - 2 (E)	Brake fluid level warning switch OFF (Float up)	1 9 to 2.1 kohms
1 (+) - 2 (E)	Brake fluid level warning switch ON (Float down)	Below 1 ohms

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



N C156938E01

Fig. 137: Identifying Brake Fluid Level Warning Switch Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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 **INSPECTION**)

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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

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
E1-28 (B/LE) - A21-1 (+)	Always	Below 1 ohms
E1-28 (B/LE) - Body ground	Always	10 kohms or higher
A21-2 (E) - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

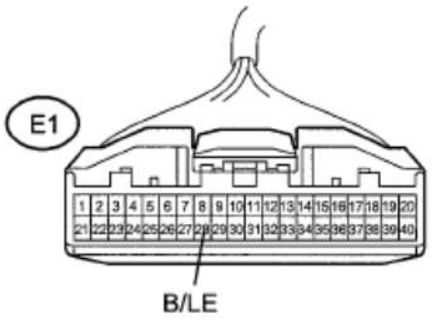
OK: Go to next step

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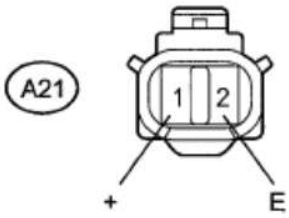
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Front view of wire harness connector:
(to Combination Meter)



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



C158517E07

Fig. 138: Identifying Combination Meter And Brake Fluid Level Warning Switch Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

HINT:

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

OK:

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The brake warning light turns on or off in accordance with Techstream operation.

HINT:

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

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

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

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

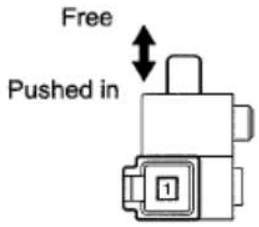
Standard resistance

RESISTANCE SPECIFICATION

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 **DISASSEMBLY**)

Component without harness connected:
(Parking Brake Switch)



N C167308E01

Fig. 139: Inspecting Parking Brake Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

11. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - PARKING BRAKE**

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SWITCH)

a. Disconnect the skid control ECU connector.

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

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-29 (PKB) - A17-1	Always	Below 1 ohms
A24-29 (PKB) - Body ground	Always	10 kohms or higher

HINT:

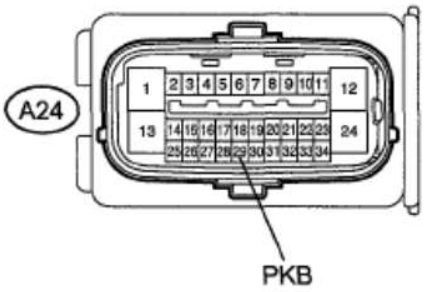
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See **PROBLEM SYMPTOMS TABLE**).

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

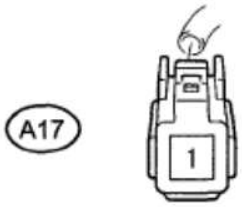
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Front view of wire harness connector:
(to Skid Control ECU)



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



C167306E02

Fig. 140: Identifying Skid Control 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 (See **WIRING DIAGRAM**).

INSPECTION PROCEDURE

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NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

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

Result

RESULT CHART

Result	Proceed to
DTC is not output	A
DTC is 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 on (IG).
   c. Check that the brake warning light comes on.

OK:

The brake warning light comes on.

HINT:

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

NG: Go to step 3

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

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

OK:

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The brake warning light turns on or off in accordance with Techstream operation.

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

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

TRAC 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 TRAC control is turned off, the TRAC OFF indicator light will come on.

WIRING DIAGRAM

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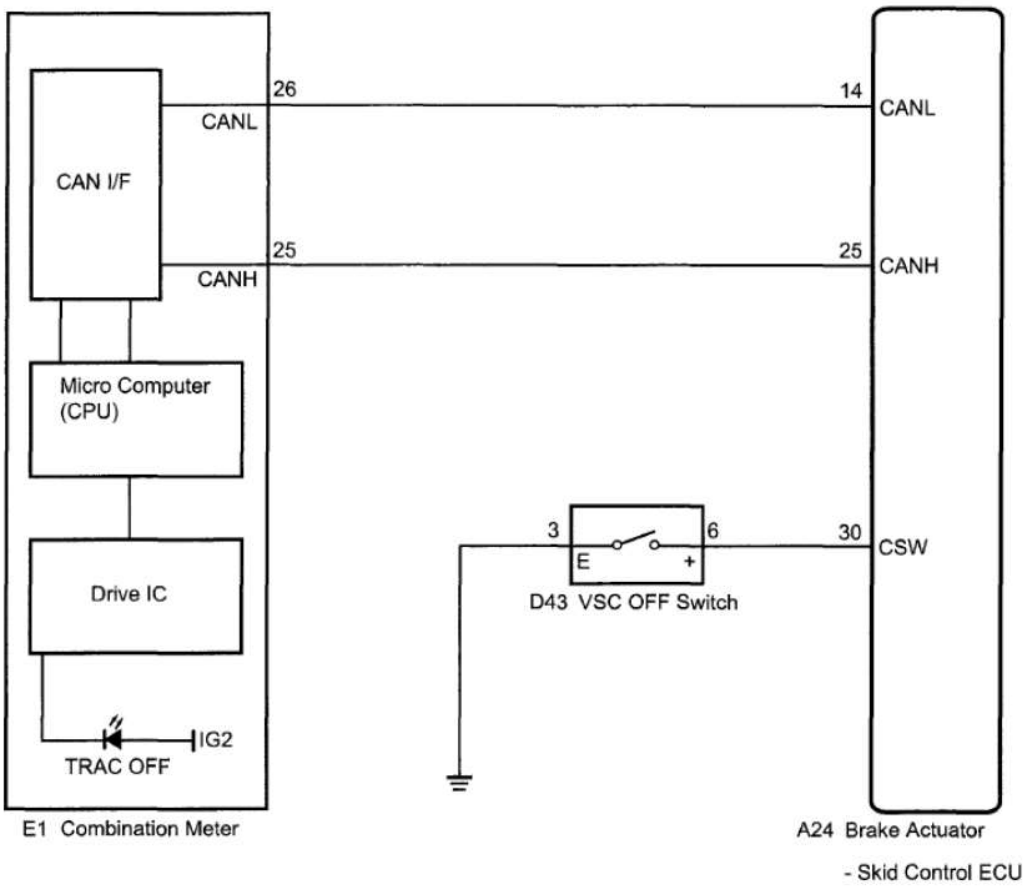


Fig. 141: TRAC OFF Indicator Light Remains On - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

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

Result

RESULT CHART

Result	Proceed to
DTC is not output	A
DTC is 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

Result

RESULT CHART

Result	Proceed to
OK	A
NG (for 2GR-FE)	B
NG (for 1AR-FE)	C

B: CHECK OR REPLACE CHARGING SYSTEM OR BATTERY (for 2GR-FE) (See **PROBLEM SYMPTOMS TABLE**)

C: CHECK OR REPLACE CHARGING SYSTEM OR BATTERY (for 1AR-FE) (See **ON-VEHICLE INSPECTION**)

A: Go to next step

4. **READ VALUE ON TECHSTREAM (VSC OFF SWITCH)**
   a. Connect Techstream to the DLC3.
   b. Turn the ignition switch on (IG).
   c. Select the Data List mode on Techstream (See **DATA LIST/ACTIVE TEST**).

ABS/VSC/TRAC:

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ABS/VSC/TRAC TESTER DISPLAY REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
TRC/VSC Off Mode	VSC OFF switch 1 NORMAL, TRC OFF or VSC OFF	NORMAL: Normal TRC OFF: TRAC off mode VSC OFF: VSC off mode	-

d. Using Techstream, check the switch condition on Techstream changes according to VSC OFF switch operation.

OK:

The Techstream display changes according to VSC OFF switch operation.

NG: Go to step 6

OK: Go to next step

5. **INSPECT COMBINATION METER ASSEMBLY**
   a. Turn the ignition switch off.
   b. Perform the Active Test of the combination meter (meter CPU) using Techstream (See **DATA LIST/ACTIVE TEST**).
   c. Check the combination meter.

OK:

The TRAC OFF indicator light turns on or off in accordance with Techstream operation.

HINT:

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

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

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

6. **INSPECT VSC OFF SWITCH**
   a. Turn the ignition switch off.
   b. Disconnect the VSC OFF switch connector.
   c. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition

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6 (+) - 3 (E)	Switch is pushed in	Below 25 ohms
6 (+) - 3 (E)	Switch is not pushed in	10 kohms or higher

NG: REPLACE VSC OFF SWITCH (See **REMOVAL**)

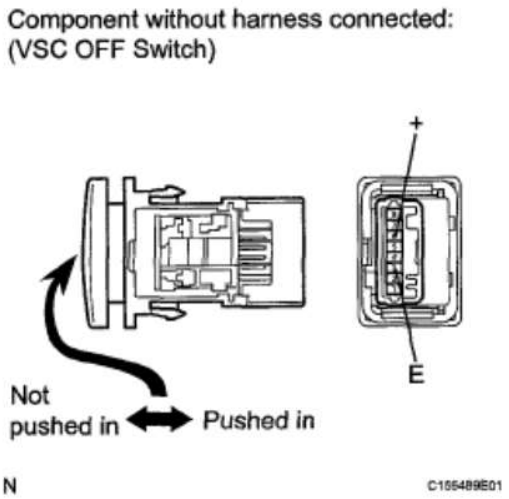


Fig. 142: Inspecting VSC OFF Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

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

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-30 (CSW) - O43-6 (+)	Always	Below 1 ohms
A24-30 (CSW) - Body ground	Always	10 kohms or higher
D43-3 (E) - Body ground	Always	Below 1 ohms

HINT:

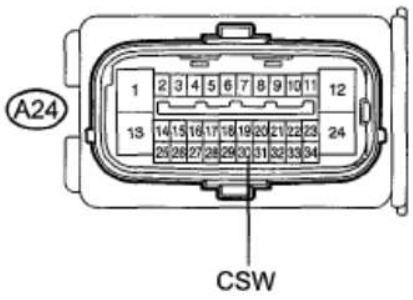
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See **PROBLEM SYMPTOMS TABLE**).

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

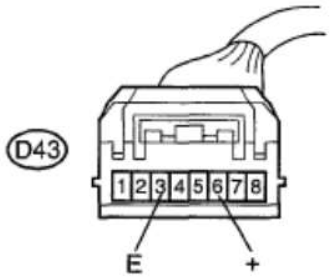
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Front view of wire harness connector:
(to Skid Control ECU)



Front view of wire harness connector:
(to VSC OFF Switch)



N C160275E05

Fig. 143: Identifying Skid Control ECU And VSC OFF Switch Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

TRAC OFF INDICATOR LIGHT DOES NOT COME ON

DESCRIPTION

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

WIRING DIAGRAM

Refer to TRAC OFF Indicator Light Remains ON (See **TRAC OFF INDICATOR LIGHT REMAINS ON**).

INSPECTION PROCEDURE

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NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

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

Result

RESULT CHART

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

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

A: Go to next step

2. **PERFORM ACTIVE TEST USING TECHSTREAM (TRAC OFF INDICATOR LIGHT)**
   a. Connect Techstream to the DLC3.
   b. Start the engine.
   c. Select the Active Test mode on Techstream (See **DATA LIST/ACTIVE TEST**).

ABS/VSC/TRAC:

ABS/VSC/TRAC TESTER DISPLAY REFERENCE

Tester Display	Test Part	Control Range	Diagnostic Note
TRAC OFF Indicator Light	TRAC OFF indicator light	Indicator light ON/OFF	Observe combination meter

   d. Check that the TRAC OFF indicator light on the combination meter turns on or off in accordance with Techstream operation.

OK:

The TRAC OFF indicator light turns on or off in accordance with Techstream operation.

HINT:

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

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 off.
   b. Perform the Active Test of the combination meter (meter CPU) using Techstream (See **DATA LIST/ACTIVE TEST**).
   c. Check the combination meter.

OK:

The TRAC OFF indicator light turns on or off in accordance with Techstream operation.

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: 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 is turned off, the VSC OFF indicator light will come on.

WIRING DIAGRAM

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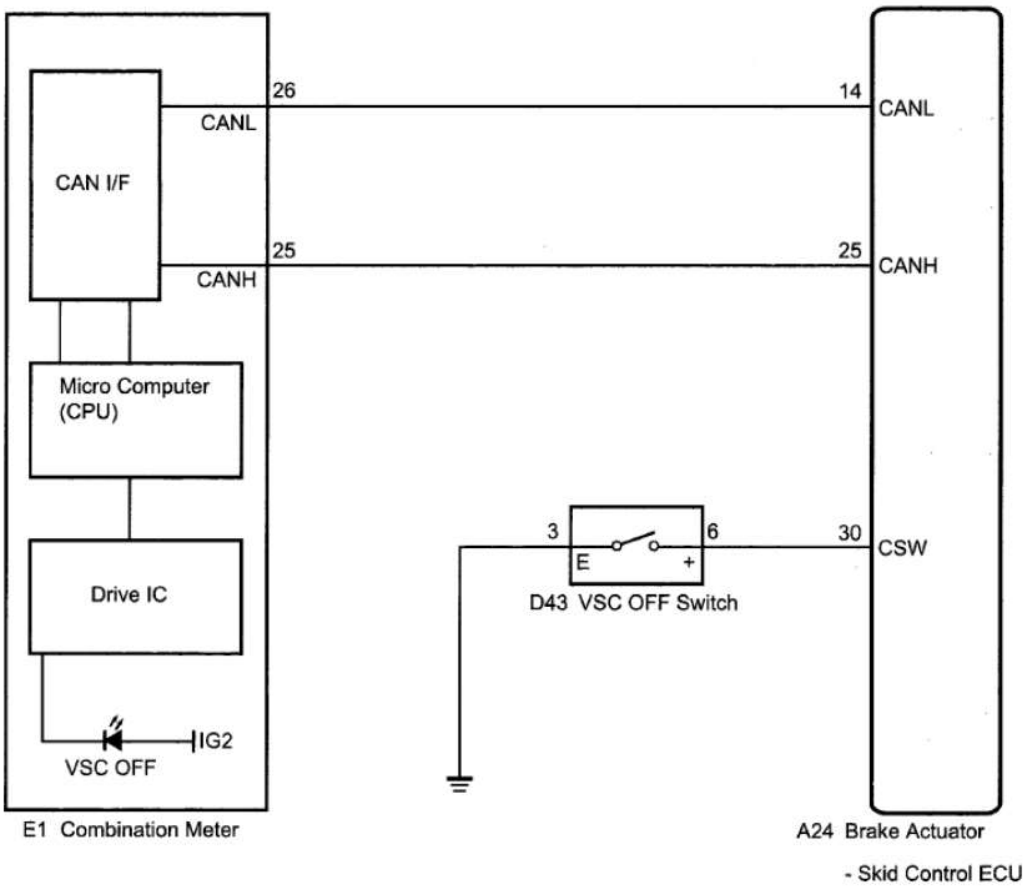


Fig. 144: VSC OFF Indicator Light Remains On - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

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

Result

RESULT CHART

Result	Proceed to
DTC is not output	A
DTC is 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

Result

RESULT CHART

Result	Proceed to
OK	A
NG (for 2GR-FE)	B
NG (for 1AR-FE)	C

B: CHECK OR REPLACE CHARGING SYSTEM OR BATTERY (for 2GR-FE) (See **PROBLEM SYMPTOMS TABLE**)

C: CHECK OR REPLACE CHARGING SYSTEM OR BATTERY (for 1AR-FE) (See **ON-VEHICLE INSPECTION**)

A: Go to next step

4. **READ VALUE ON TECHSTREAM (VSC OFF SWITCH)**
   a. Connect Techstream to the DLC3.
   b. Turn the ignition switch on (IG).
   c. Select the Data List mode on Techstream (See **DATA LIST/ACTIVE TEST**).

ABS/VSC/TRAC:

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ABS/VSC/TRAC TESTER DISPLAY REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
TRC/VSC Off Mode	VSC OFF switch/NORMAL, TRC OFF or VSC OFF	NORMAL: Normal TRC OFF: TRAC off mode VSC OFF: VSC off mode	-

d. Using Techstream, check the switch condition on Techstream changes according to VSC OFF switch operation.

OK:

The Techstream display changes according to VSC OFF switch operation.

NG: Go to step 6

OK: Go to next step

5. **INSPECT COMBINATION METER ASSEMBLY**
   a. Turn the ignition switch off.
   b. Perform the Active Test of the combination meter (meter CPU) using Techstream (See **DATA LIST/ACTIVE TEST**).
   c. Check the combination meter.

OK:

The VSC OFF indicator light turns on or off in accordance with Techstream operation.

HINT:

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

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

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

6. **INSPECT VSC OFF SWITCH**
   a. Turn the ignition switch off.
   b. Disconnect the VSC OFF switch connector.
   c. Measure the resistance according to the value (s) in the table below.

Standard resistance

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RESISTANCE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
6 (+) - 3 (E)	Switch is pushed in	Below 25 ohms
6 (+) - 3 (E)	Switch is not pushed in	10 kohms or higher

NG: REPLACE VSC OFF SWITCH (See **REMOVAL**)

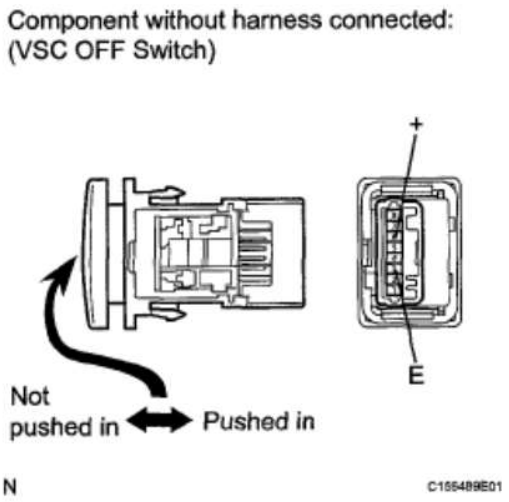


Fig. 145: Inspecting VSC OFF Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

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

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-30 (CSW) - D43-6 (+)	Always	Below 1 ohms
A24-30 (CSW) - Body ground	Always	10 kohms or higher
D43-3 (E) - 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**).

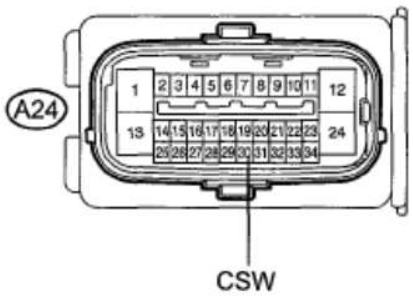
NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

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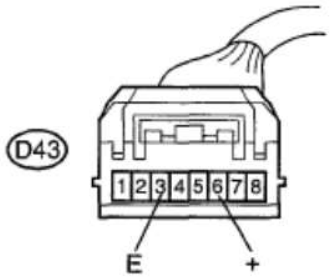
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Front view of wire harness connector:
(to Skid Control ECU)



Front view of wire harness connector:
(to VSC OFF Switch)



N C160275E05

Fig. 146: Identifying Skid Control ECU And VSC OFF Switch Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

VSC OFF INDICATOR LIGHT DOES NOT COME ON

DESCRIPTION

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

WIRING DIAGRAM

Refer to VSC OFF Indicator Light Remains ON (See **VSC OFF INDICATOR LIGHT REMAINS ON**).

INSPECTION PROCEDURE

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NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

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

Result

RESULT CHART

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

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

A: Go to next step

2. **PERFORM ACTIVE TEST USING TECHSTREAM (VSC OFF INDICATOR LIGHT)**
   a. Connect Techstream to the DLC3.
   b. Start the engine.
   c. Select the Active Test mode on Techstream (See **DATA LIST/ACTIVE TEST**).

ABS/VSC/TRAC:

ABS/VSC/TRAC TESTER DISPLAY REFERENCE

Tester Display	Test Part	Control Range	Diagnostic Note
VSC OFF Indicator Light	VSC OFF indicator light	Indicator light ON/OFF	Observe combination meter

   d. Check that the VSC OFF indicator light on the combination meter turns on or off in accordance with Techstream operation.

OK:

The VSC OFF indicator light turns on or off in accordance with Techstream operation.

HINT:

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

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 off.
   b. Perform the Active Test of the combination meter (meter CPU) using Techstream (See **DATA LIST/ACTIVE TEST**).
   c. Check the combination meter.

   OK:

   The VSC OFF indicator light turns on or off in accordance with Techstream operation.

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

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

SLIP INDICATOR LIGHT REMAINS ON

DESCRIPTION

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

If the skid control ECU stores a DTC, the slip indicator light will come on in the combination meter.

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

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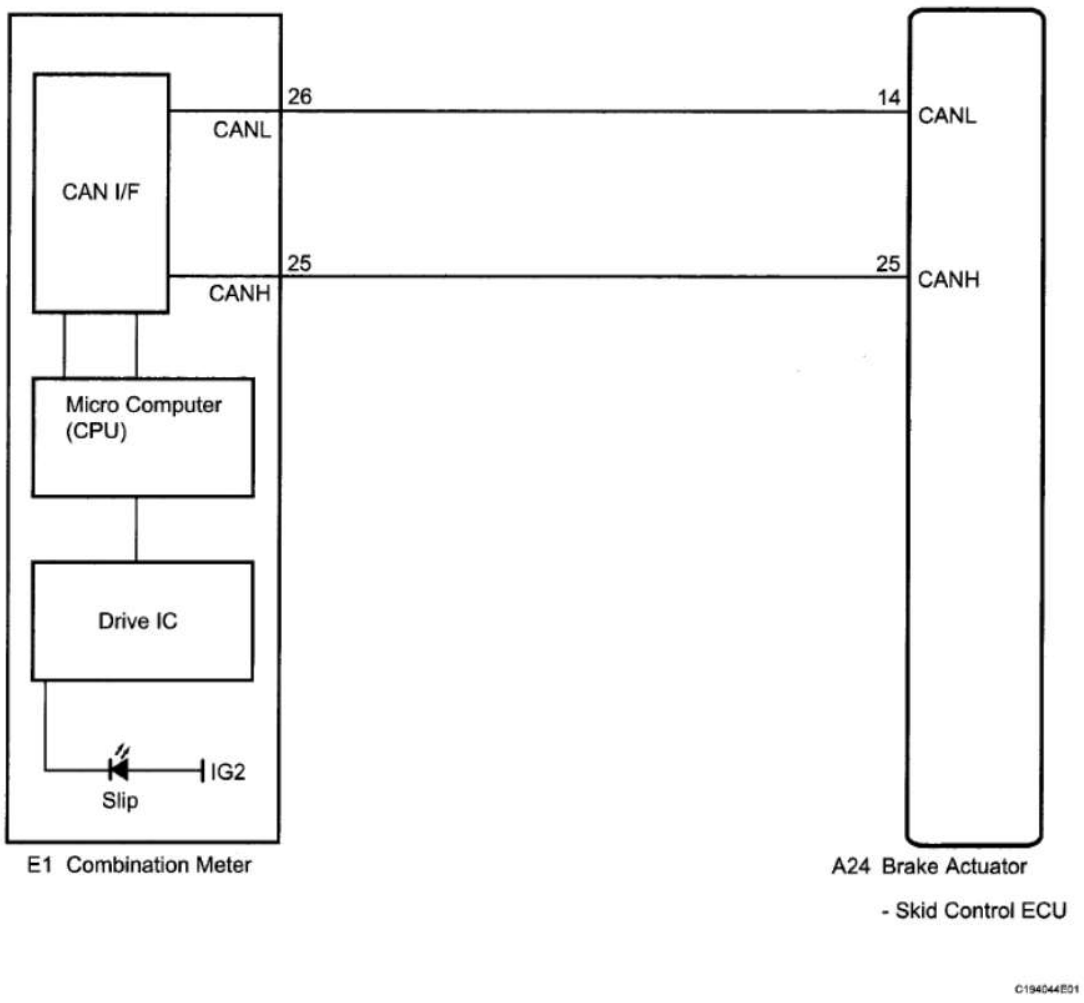


Fig. 147: Slip Indicator Light Remains On - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

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

Result

RESULT CHART

Result	Proceed to
DTC is not output	A
DTC is 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

Result

RESULT CHART

Result	Proceed to
OK	A
NG (for 2GR-FE)	B
NG (for 1AR-FE)	C

B: CHECK OR REPLACE CHARGING SYSTEM OR BATTERY (for 2GR-FE) (See **PROBLEM SYMPTOMS TABLE**)

C: CHECK OR REPLACE CHARGING SYSTEM OR BATTERY (for 1AR-FE) (See **ON-VEHICLE INSPECTION**)

A: Go to next step

4. **INSPECT COMBINATION METER ASSEMBLY**
   a. Perform the Active Test of the combination meter (meter CPU) using Techstream (See **DATA LIST/ACTIVE TEST**).
   b. Check the combination meter.

OK:

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The slip indicator light turns on or off in accordance with Techstream operation.

HINT:

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

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

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

SLIP INDICATOR LIGHT DOES NOT COME ON

DESCRIPTION

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

WIRING DIAGRAM

Refer to Slip Indicator Light Remains ON (See **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 a CAN communication system DTC is output (See **DIAGNOSIS SYSTEM**).

Result

RESULT CHART

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

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

A: Go to next step

2. **PERFORM ACTIVE TEST USING TECHSTREAM (SLIP INDICATOR LIGHT)**
   a. Connect Techstream to the DLC3.
   b. Start the engine.
   c. Select the Active Test mode on Techstream (See **DATA LIST/ACTIVE TEST**).

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ABS/VSC/TRAC:

ABS/VSC/TRAC TESTER DISPLAY REFERENCE

Tester Display	Test Part	Control Range	Diagnostic Note
Slip Indicator Light	Slip indicator light	Indicator light ON/OFF	Observe combination meter

d. Check that the slip indicator light on the combination meter turns on or off in accordance with Techstream operation.

OK:

The slip indicator light turns on or off in accordance with Techstream operation.

HINT:

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

NG: Go to step 3

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

3. **INSPECT COMBINATION METER ASSEMBLY**
   a. Turn the ignition switch off.
   b. Perform the Active Test of the combination meter (meter CPU) using Techstream (See **DATA LIST/ACTIVE TEST**).
   c. Check the combination meter.

OK:

The slip indicator light turns on or off in accordance with Techstream operation.

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

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

DOWNHILL ASSIST CONTROL INDICATOR LIGHT REMAINS ON

DESCRIPTION

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

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The downhill assist control indicator light comes on when the downhill assist control is ready.

Even if the downhill assist control switch is pressed, the downhill assist control indicator light will blink and the downhill assist control will not be activated under the following conditions:

- ABS is malfunctioning.
- Temperature of the brake actuator increases and the downhill assist control is temporarily canceled.

HINT:

For vehicles with the multi-information display, the master caution indicator light will come on and a warning message will be displayed on the multi-information display if the downhill assist control cannot be performed.

If any of the following conditions is met with the downhill assist control switch on, a message will be displayed on the multi-information display to inform that the downhill assist control cannot be performed:

- The shift lever is in any position other that S1 or R.
- The vehicle speed is 25 km/h (16 mph) or more.

WIRING DIAGRAM

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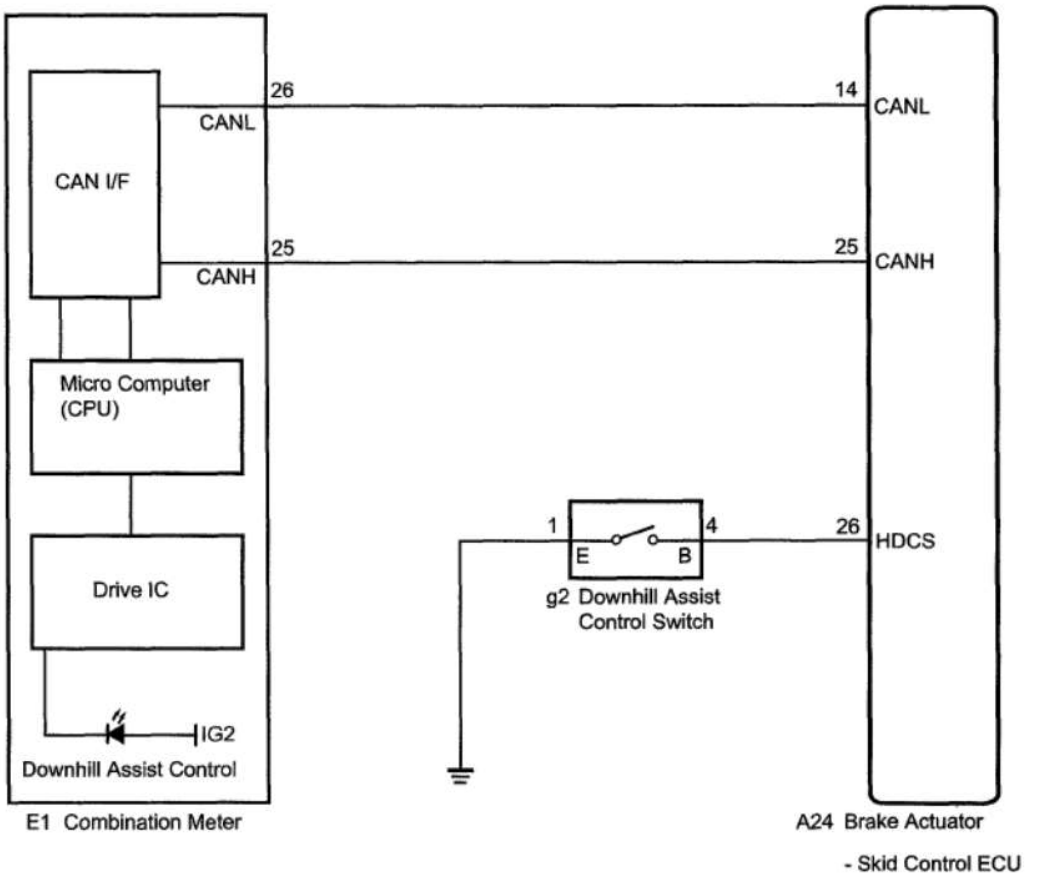


Fig. 148: Downhill Assist Control Indicator Light Remains On - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

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

Result

RESULT CHART

Result	Proceed to
DTC is not output	A
DTC is 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

Result

RESULT CHART

Result	Proceed to
OK	A
NG (for 2GR-FE)	B
NG (for 1AR-FE)	C

B: CHECK OR REPLACE CHARGING SYSTEM OR BATTERY (for 2GR-FE) (See **PROBLEM SYMPTOMS TABLE**)

C: CHECK OR REPLACE CHARGING SYSTEM OR BATTERY (for 1AR-FE) (See **ON-VEHICLE INSPECTION**)

A: Go to next step

4. **READ VALUE ON TECHSTREAM (DOWNHILL ASSIST CONTROL SWITCH)**
   a. Connect Techstream to the DLC3.
   b. Turn the ignition switch on (IG).
   c. Select the Data List mode on Techstream (See **DATA LIST/ACTIVE TEST**).

ABS/VSC/TRAC:

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ABS/VSC/TRAC TESTER DISPLAY REFERENCE

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Downhill Assist Control SW	Downhill assist control switch/ON or OFF	ON: Switch ON OFF: Switch OFF	-

d. Using Techstream, check the switch condition on Techstream changes according to downhill assist control switch operation.

OK:

The Techstream display changes according to downhill assist control switch operation.

NG: Go to step 6

OK: Go to next step

5. **INSPECT COMBINATION METER ASSEMBLY**
   a. Turn the ignition switch off.
   b. Perform the Active Test of the combination meter (meter CPU) using Techstream (See **DATA LIST/ACTIVE TEST**).
   c. Check the combination meter.

OK:

The downhill assist control indicator light turns on or off in accordance with Techstream operation.

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

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

6. **INSPECT DOWNHILL ASSIST CONTROL SWITCH**
   a. Turn the ignition switch off.
   b. Disconnect the downhill assist control switch connector.
   c. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition

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4 (B) -1 (E)	Switch is pushed in	Below 1 ohms
4 (B) -1 (E)	Switch is not pushed in	10 kohms or higher

NOTE: **Check the downhill assist control switch signal after replacement (See TEST MODE PROCEDURE).**

NG: REPLACE DOWNHILL ASSIST CONTROL SWITCH (See **DOWNHILL ASSIST CONTROL SWITCH (FOR 4WD)**)

Component without harness connected:
(Downhill Assist Control Switch)

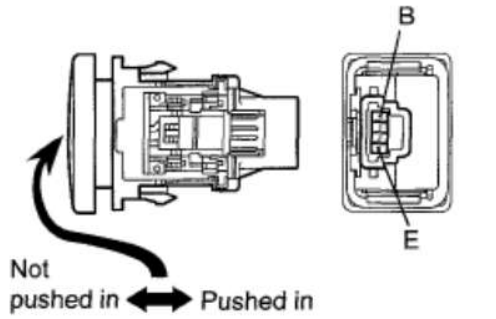


Fig. 149: Inspecting Downhill Assist Control Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

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

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-26 (HDCS) - g2-4 (B)	Always	Below 1 ohms
A24-26 (HDCS) - Body ground	Always	10 kohms or higher
g2-1 (E) - Body ground	Always	Below 1 ohms

HINT:

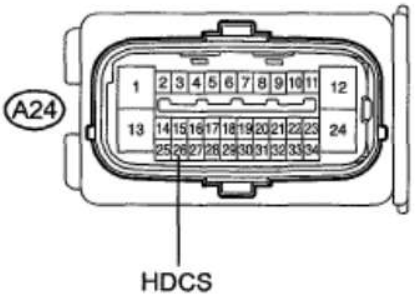
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table

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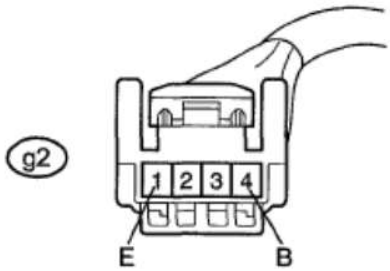
and proceed to the next step (See **PROBLEM SYMPTOMS TABLE**).

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

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



Front view of wire harness connector:
(to Downhill Assist Control Switch)



N C166258E01

Fig. 150: Identifying Skid Control ECU And Downhill Assist Control Switch Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

DOWNHILL ASSIST CONTROL INDICATOR LIGHT DOES NOT COME ON

DESCRIPTION

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

WIRING DIAGRAM

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Refer to Downhill Assist Control Indicator Light Remains ON (See **WIRING DIAGRAM**).

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

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

   Result

   RESULT CHART

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

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

   A: Go to next step

2. **PERFORM ACTIVE TEST USING TECHSTREAM (DOWNHILL ASSIST CONTROL INDICATOR LIGHT)**
   a. Connect Techstream to the DLC3.
   b. Start the engine.
   c. Select the Active Test mode on Techstream (See **DATA LIST/ACTIVE TEST**).

   ABS/VSC/TRAC:

   ABS/VSC/TRAC TESTER DISPLAY REFERENCE

Tester Display	Test Part	Control Range	Diagnostic Note
Downhill Assist Control Light	Downhill assist control indicator light	Indicator light ON/OFF	Observe combination meter

   d. Check that the downhill assist control indicator light on the combination meter turns on or off in accordance with Techstream operation.

   OK:

   The downhill assist control indicator light turns on or off in accordance with Techstream operation.

   HINT:

   If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table

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and proceed to the next step before replacing the part (See **PROBLEM SYMPTOMS TABLE**).

NG: Go to step 3

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

3. **INSPECT COMBINATION METER ASSEMBLY**
   a. Turn the ignition switch off.
   b. Perform the Active Test of the combination meter (meter CPU) using Techstream (See **DATA LIST/ACTIVE TEST**).
   c. Check the combination meter.

OK:

The downhill assist control indicator light turns on or off in accordance with Techstream operation.

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

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

SKID CONTROL BUZZER CIRCUIT

DESCRIPTION

The skid control buzzer sounds during VSC operation.

WIRING DIAGRAM

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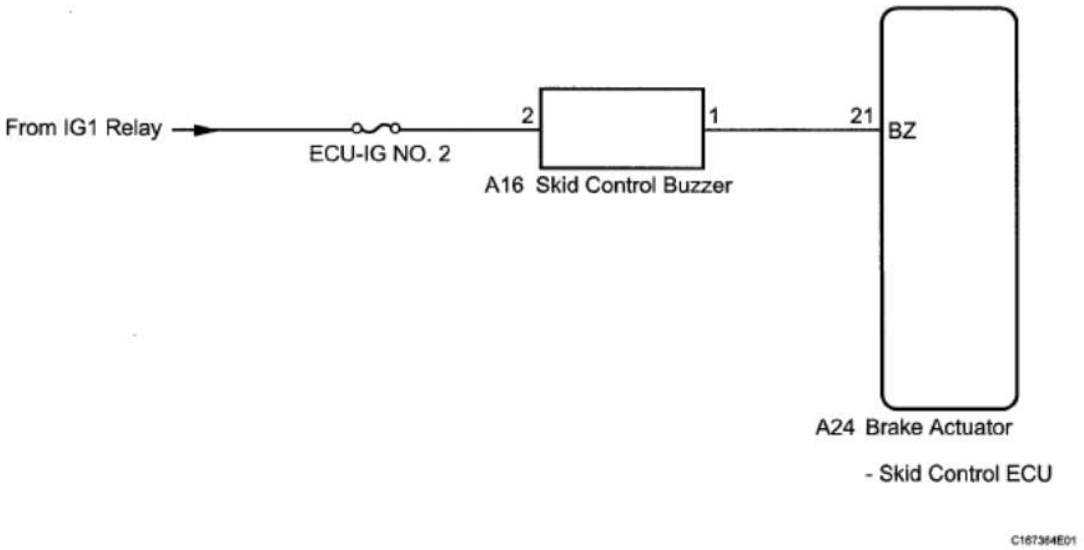


Fig. 151: Skid Control Buzzer - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

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

   ABS/VSC/TRAC:

   ABS/VSC/TRAC TESTER DISPLAY REFERENCE

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/stops when turning the skid control buzzer on/off by using Techstream.

Result

RESULT CHART

Result	Proceed to
Buzzer does not sound or sounds constantly	A
Buzzer sounds/stops	B

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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: END

A: Go to next step

2. **INSPECT SKID CONTROL BUZZER (POWER SOURCE TERMINAL)**
   a. Turn the ignition switch off.
   b. Disconnect the skid control buzzer connector.
   c. Turn the ignition switch on (IG).
   d. Measure the voltage according to the value (s) in the table below.

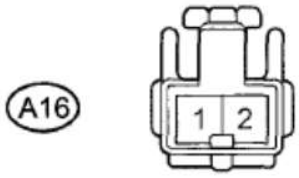
Standard voltage

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
A16-2 - Body ground	Ignition switch on (IG)	11 to 14 V

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

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



C181766E04

Fig. 152: Identifying Skid Control Buzzer Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

3. **INSPECT SKID CONTROL BUZZER**

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a. Turn the ignition switch off.
b. Apply battery negative voltage to terminal 1, and battery positive voltage to terminal 2 of the skid control buzzer, and then check that the buzzer sounds.

OK:

The skid control buzzer sounds.

NG: REPLACE SKID CONTROL BUZZER (See **REMOVAL**)

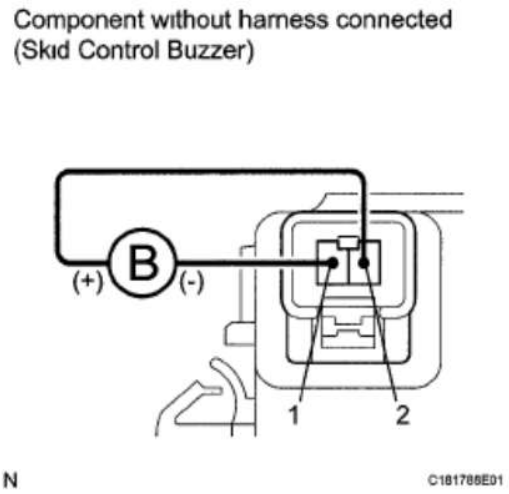


Fig. 153: Inspecting Skid Control Buzzer
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

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

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-21 (BZ) - A16-1	Always	Below 1 ohms
A24-21 (BZ) - Body ground	Always	10 kohms or higher

HINT:

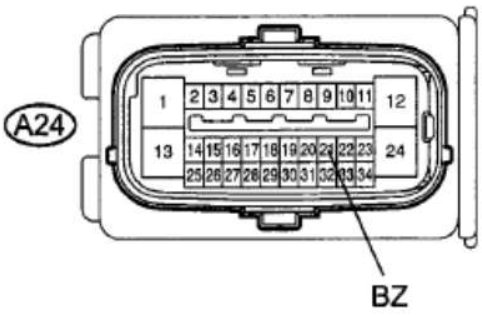
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See **PROBLEM SYMPTOMS TABLE**).

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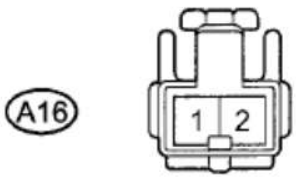
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NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

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



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



C194029E01

Fig. 154: Identifying Skid Control ECU And Skid Control Buzzer Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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.

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WIRING DIAGRAM

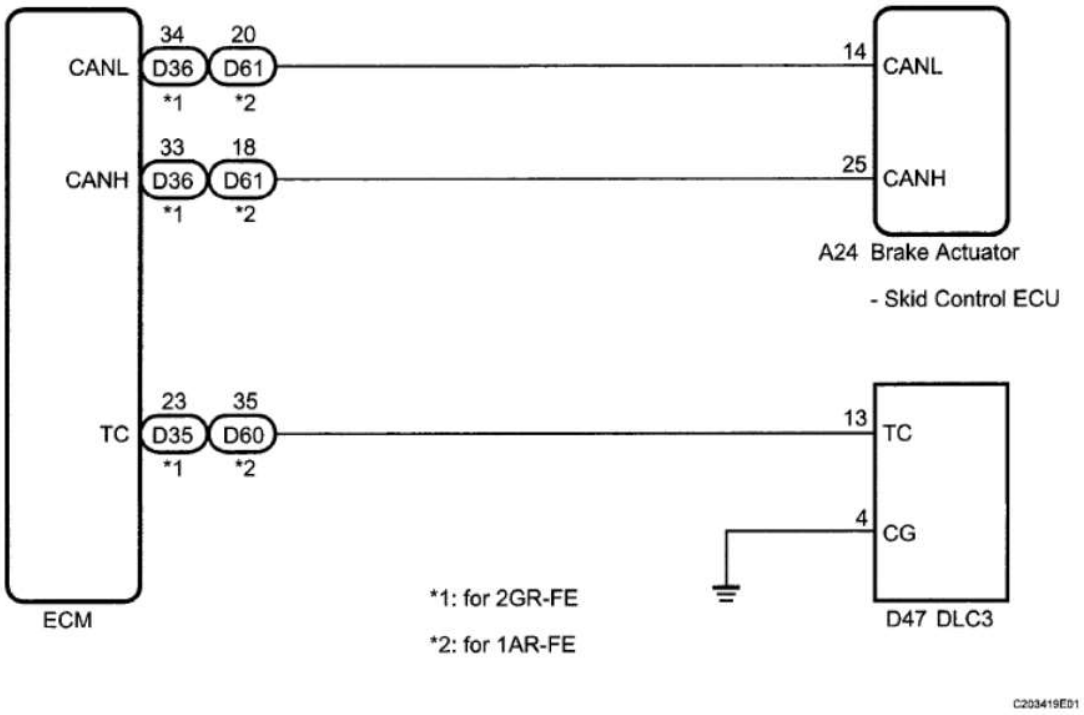


Fig. 155: TC And CG Terminal - Circuit Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

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

Result

RESULT CHART

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

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B: INSPECT CAN COMMUNICATION SYSTEM (See **DIAGNOSTIC TROUBLE CODE CHART**)

A: Go to next step

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

Standard voltage

VOLTAGE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
D47-13 (TC) - D47-4 (CG)	Ignition switch on (IG)	11 to 14 V

DLC3:

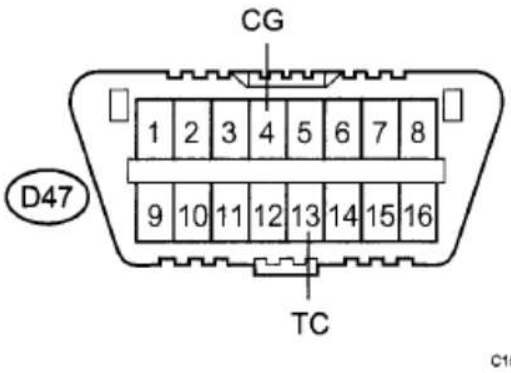


Fig. 156: Identifying DLC3 Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Result

RESULT CHART

Result	Proceed to
NG	A
OK	B

B: Go to step 5

A: Go to next step

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

Standard resistance

for 2GR-FE

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
D47-13 (TC) - D35-23 (TC)	Always	Below 1 ohms
D47-13 (TC) - Body ground	Always	10 kohms or higher

for 1AR-FE

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
D47-13 (TC) - D60-35 (TC)	Always	Below 1 ohms
D47-13 (TC) - Body ground	Always	10 kohms or higher

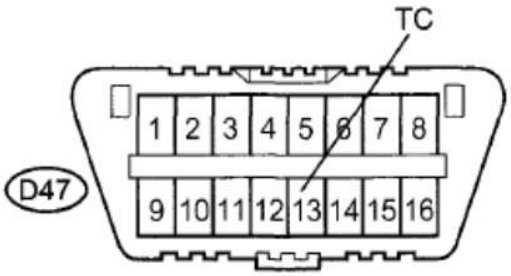
NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

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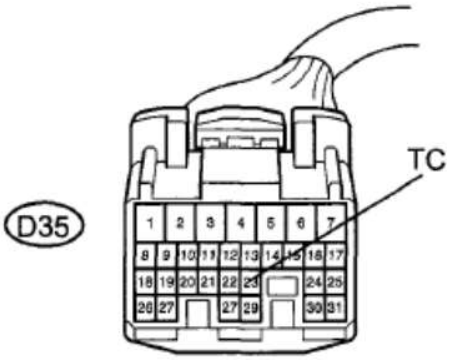
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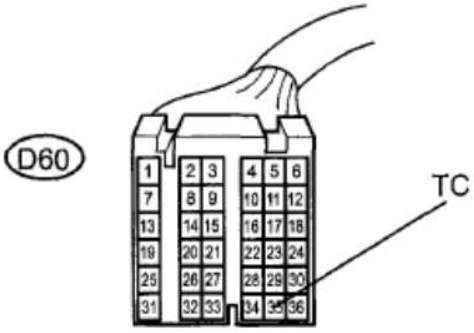
DLC3:



Front view of wire harness connector:
(to ECM for 2GR-FE)



Front view of wire harness connector:
(to ECM for 1AR-FE)



C203420E01

Fig. 157: Identifying DLC3 And ECM Connector Terminals
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

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
D47-4 (CG) - Body ground	Always	Below 1 ohms

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

DLC3:

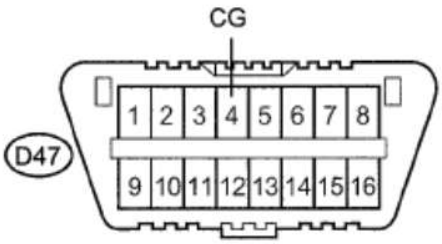


Fig. 158: Identifying CG Terminal Of DLC3
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

OK: Go to next step

5. **CHECK ECM (TC of DLC3 INPUT)**
   a. Turn the ignition switch off.
   b. Reconnect the ECM connector.
   c. Using SST, connect terminals TC and CG of the DLC3.

      SST 09843-18040

   d. Turn the ignition switch on (IG).
   e. Check that the check engine warning light is blinking.

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DLC3:

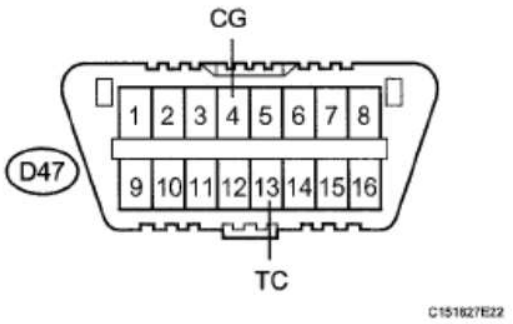


Fig. 159: Identifying CG And TC Terminals Of DLC3
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Result

RESULT CHART

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

HINT:

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

B: REPAIR OR REPLACE WIRE HARNESS OR ECM (TC of ECM CIRCUIT)

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

TS AND CG TERMINAL CIRCUIT

DESCRIPTION

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

Sensor check mode can be entered by connecting terminals TS and CG of the DLC3 and turning the ignition switch from off to on (IG).

WIRING DIAGRAM

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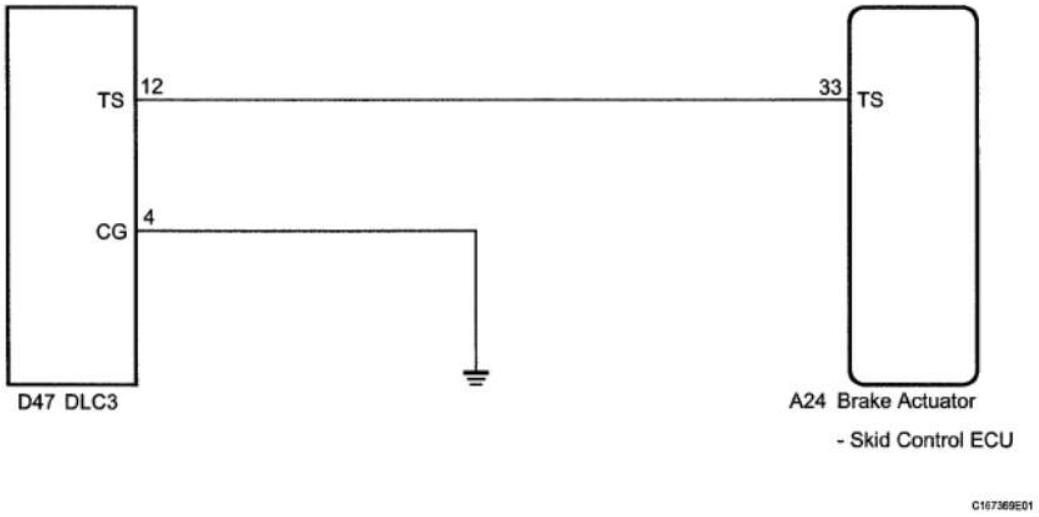


Fig. 160: TS And CG Terminal - Circuit Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When replacing the brake actuator assembly, perform zero point calibration (See CALIBRATION).

1. **CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - TS of DLC3)**
   a. Disconnect the skid control ECU connector.
   b. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
A24-33 (TS) - D47-12 (TS)	Always	Below 1 ohms
A24-33 (TS) - Body ground	Always	10 kohms or higher

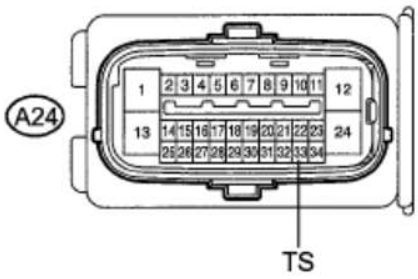
NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

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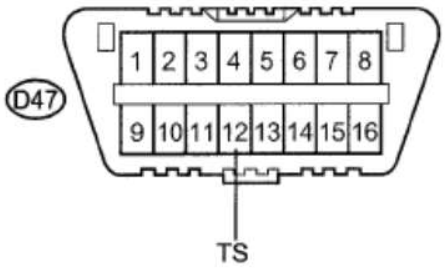
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Front view of wire harness connector:
(to Skid Control ECU)



DLC3:



N

C160276E05

Fig. 161: Identifying Skid Control ECU And DLC3 Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

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

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
D47-4 (CG) - Body ground	Always	Below 1 ohms

HINT:

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

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

DLC3:

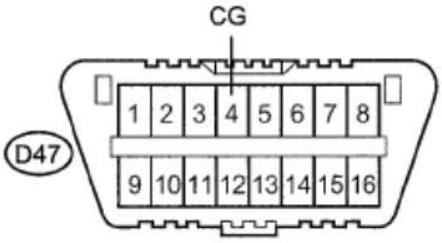


Fig. 162: Identifying CG Terminal Of DLC3
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

BRAKE ACTUATOR

COMPONENTS

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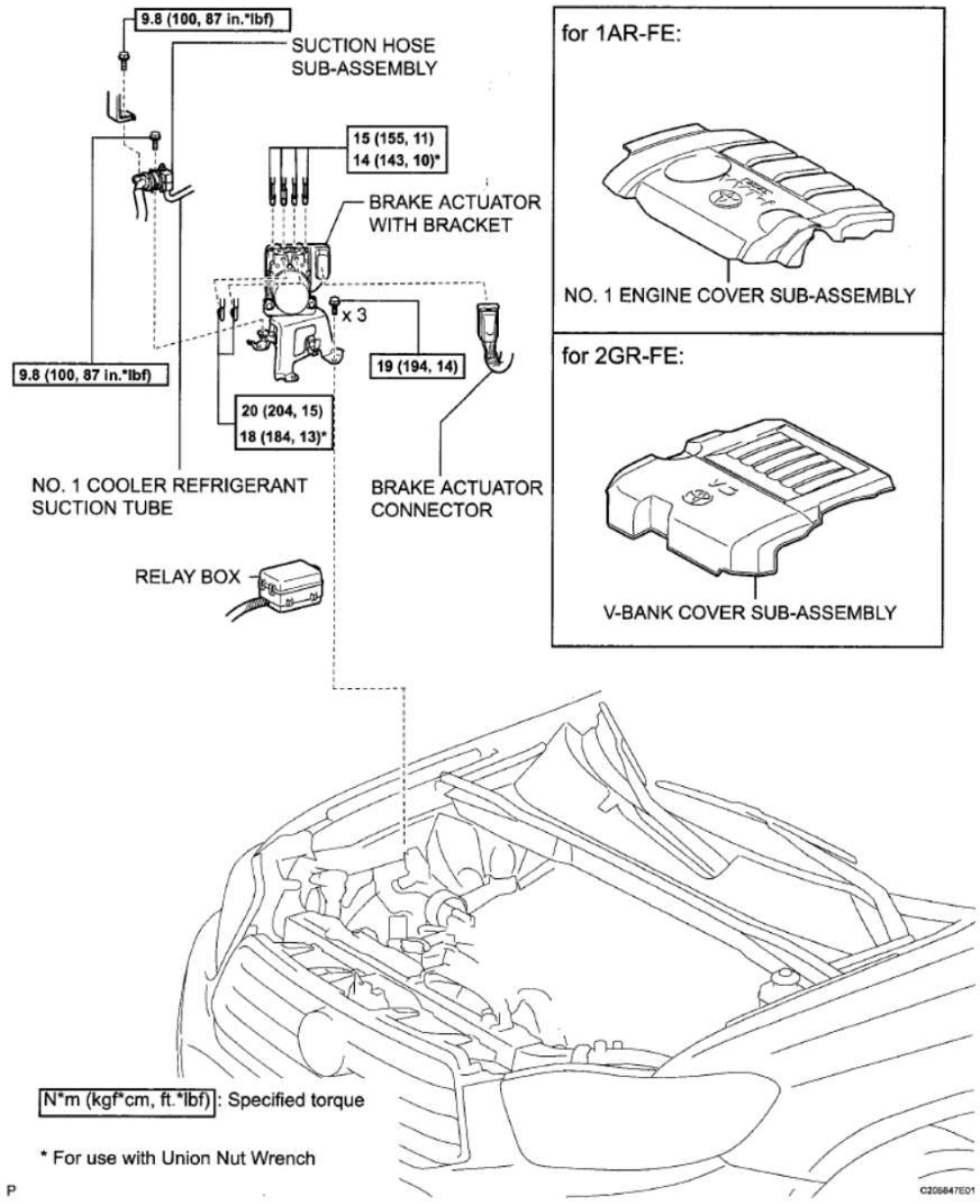


Fig. 163: Identifying Brake Actuator Components With Torque Specification (1 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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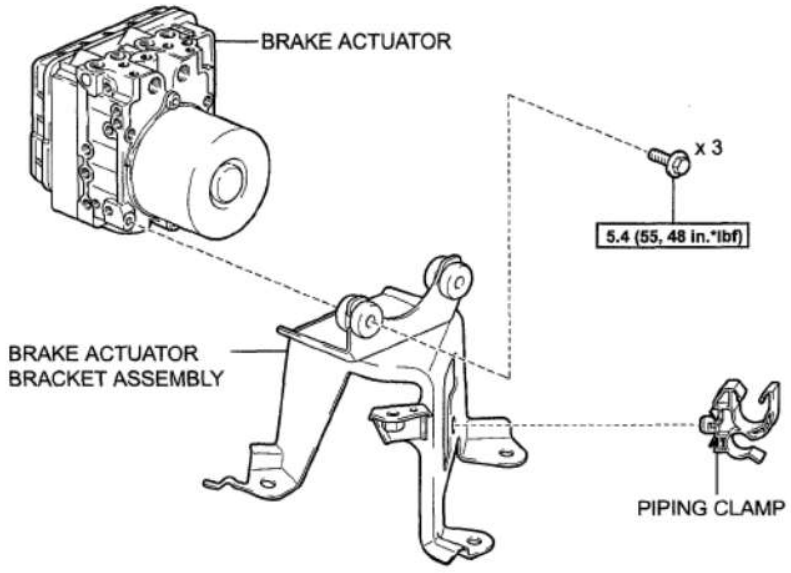


Fig. 164: Identifying Brake Actuator Components With Torque Specification (2 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ON-VEHICLE INSPECTION

1. **CONNECT TECHSTREAM**
   a. Connect Techstream to the DLC3.
   b. Start the engine and run it at idle.
   c. Turn the tester on.
   d. Enter the following menu items: Chassis/ABS/VSC/TRAC/Active Test.

   HINT:

   Refer to Techstream operator's manual for further details.

2. **INSPECT ACTUATOR MOTOR OPERATION**
   a. Enter the following menu items: Active Test/Motor Relay.
   b. Turn the motor relay on, check for actuator motor operation sounds.

   NOTE: Do not keep the motor relay on continuously for more than 5 seconds. If it needs to be operated repeatedly, set an interval of more than 20 seconds between operations.

   c. Turn the motor relay off.

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d. Fully depress the brake pedal and hold it for approximately 15 seconds. Check that the pedal's initial depth is maintained for the entire 15 seconds.
e. Turn the motor relay on, check that the pedal does not pulsate.
f. Turn the motor relay off and release the brake pedal.

3. **INSPECT RIGHT FRONT WHEEL OPERATION**
   a. Enter the following menu items: Active Test/SFRH or SFRR.
   b. Depress the brake pedal and hold it.

NOTE: **Do not turn on a solenoid in a manner different than that shown in the following steps.**

   c. Turn the SFRH and SFRR solenoids on simultaneously, and check that the pedal cannot be depressed further.

NOTE: **Each solenoid operates for 2 seconds and turns off automatically. If it needs to be operated repeatedly, set an interval of more than 20 seconds between operations.**

   d. Turn the SFRH and SFRR solenoids off simultaneously, and check that the pedal can be depressed.
   e. With the pedal still depressed, turn the motor relay on and check that the pedal returns.

NOTE: **Do not keep the motor relay on continuously for more than 5 seconds. If it needs to be operated repeatedly, set an interval of more than 20 seconds between operations.**

   f. Turn the motor relay off and release the brake pedal.

4. **INSPECT OTHER WHEEL OPERATION**
   a. Using the same procedure, check the solenoids of the other wheels.

HINT:

- Left front wheel: SFLH, SFLR
- Right rear wheel: SRRH, SRRR
- Left rear wheel: SRLH, SRLR

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**

NOTE: **When disconnecting the cable, some systems need to be initialized after the cable is reconnected. (See INITIALIZATION)**

2. **REMOVE V-BANK COVER SUB-ASSEMBLY (for 2GR-FE)** (See **REMOVAL**)

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3. **REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY (for 1AR-FE)** (See **REMOVAL**)
4. **REMOVE BRAKE ACTUATOR WITH BRACKET**
   a. Separate the relay box.

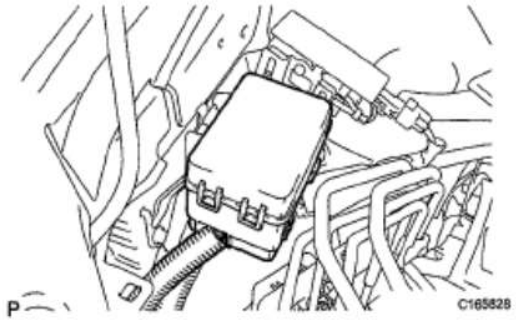


Fig. 165: Identifying Relay Box
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Remove the nut, bolt and separate the suction hose bracket from the brake actuator bracket assembly.

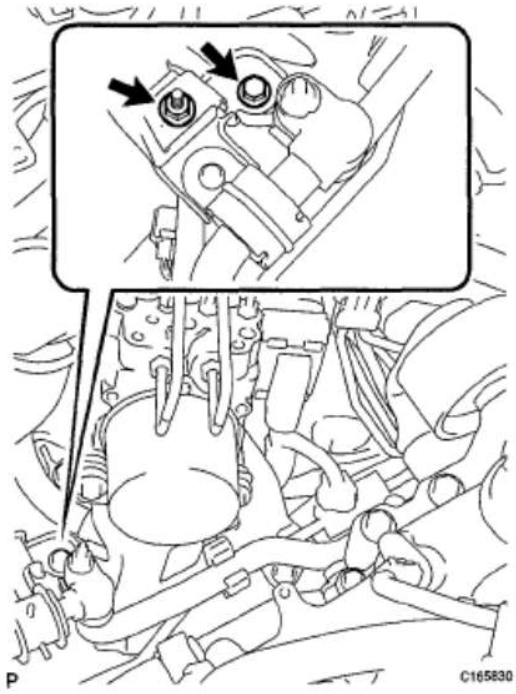


Fig. 166: Locating Suction Hose Bracket Nut And Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   c. Separate the No. 1 cooler refrigerant suction tube from the 2 clamps, and then place the No. 1 cooler refrigerant suction tube next to the clamps.

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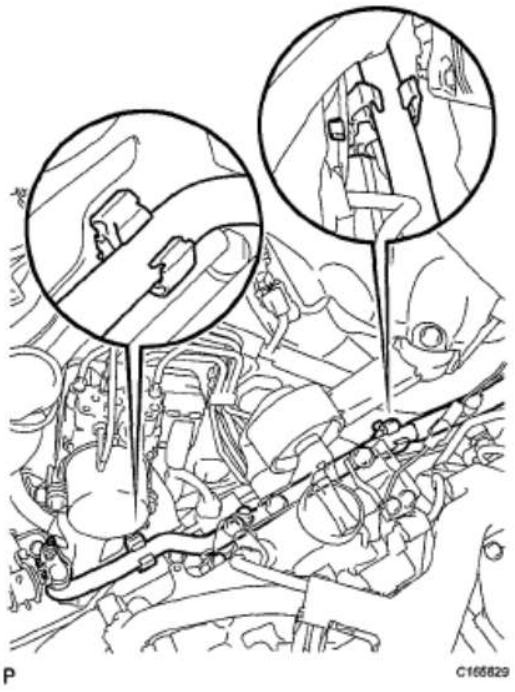


Fig. 167: Identifying No. 1 Cooler Refrigerant Suction Tube And No. 1 Cooler Refrigerant Suction Tube With Clamps
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Release the lock lever and disconnect the brake actuator connector.

NOTE: Be careful not to allow brake fluid to enter the removed connector.

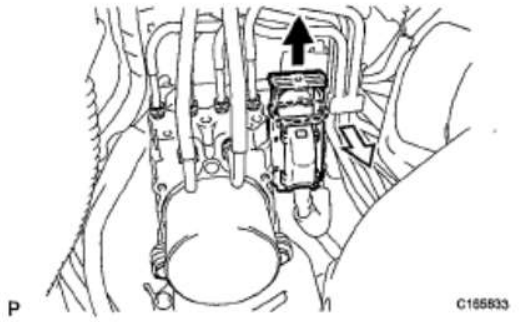


Fig. 168: Disconnecting Brake Actuator Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

e. Using a union nut wrench (10 mm and 12 mm), disconnect the 6 brake lines from the brake actuator with bracket.

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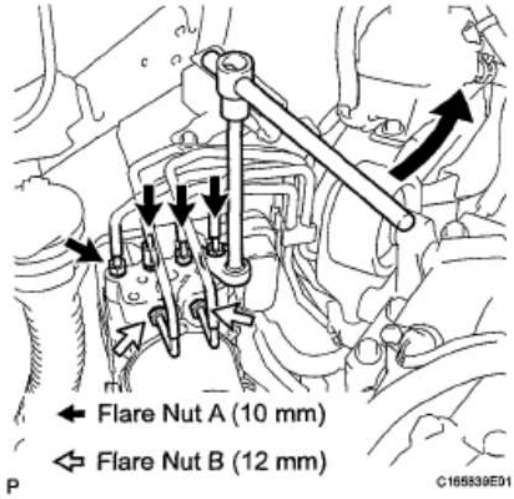


Fig. 169: Disconnecting Brake Lines From Brake Actuator With Bracket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

f. Use tags or make a memo to identify the places to reconnect.

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 of master cylinder
- *6: From 2nd of master cylinder

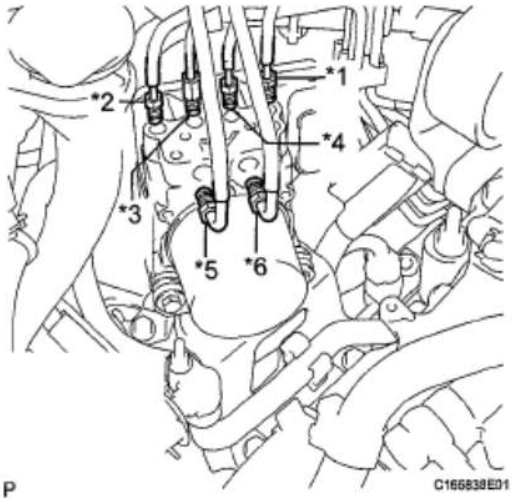


Fig. 170: Identifying Brake Lines Tags
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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g. Remove the 3 bolts and brake actuator with bracket from the body.

NOTE: Do not damage the brake lines or wire harness.

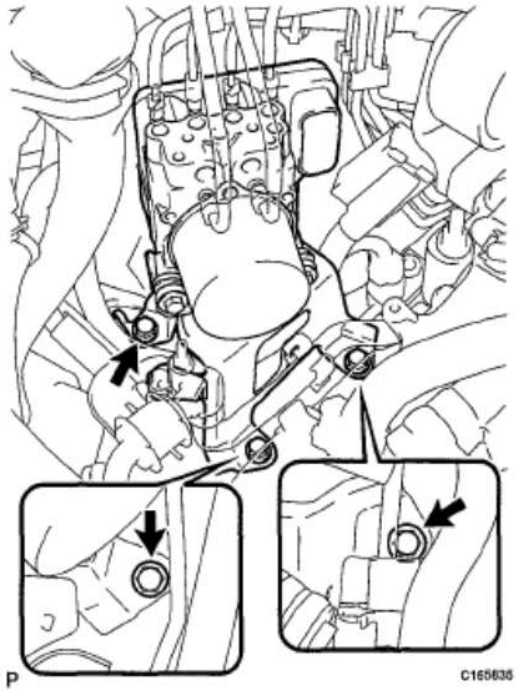


Fig. 171: Locating Brake Actuator Bracket Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. **REMOVE BRAKE ACTUATOR**

a. Remove the piping clamp.

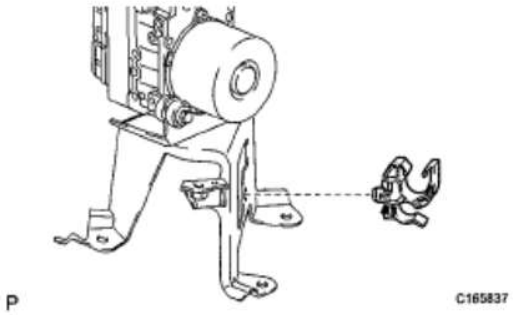


Fig. 172: Identifying Brake Actuator Piping Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Remove the 3 bolts and the brake actuator from the brake actuator bracket assembly.

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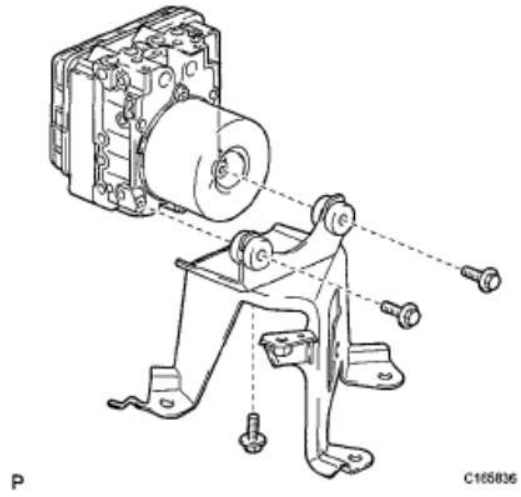


Fig. 173: Identifying Brake Actuator Bracket Assembly With Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

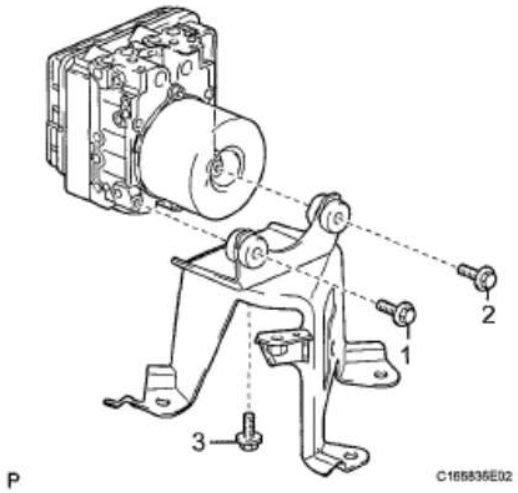
INSTALLATION

1. **INSTALL BRAKE ACTUATOR**
   a. Install the brake actuator to the brake actuator bracket assembly with the 3 bolts.

Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

NOTE:

- **Do not remove the hole plugs of a new brake actuator before connecting the 6 brake lines because the brake actuator is filled with brake fluid.**
- **Do not hold with the actuator by the connector.**
- **Tighten the 3 bolts in the order shown in the illustration.**



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Fig. 174: Identifying Brake Actuator Bracket Assembly Bolts Tightening Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Install the piping clamp to the brake actuator bracket assembly.

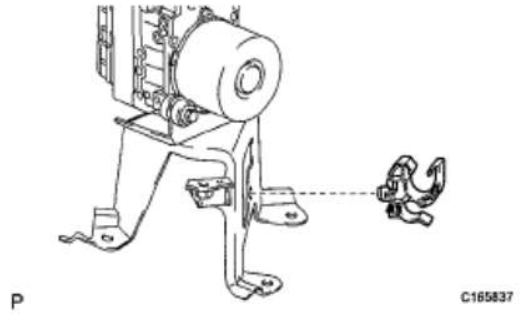


Fig. 175: Identifying Brake Actuator Piping Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

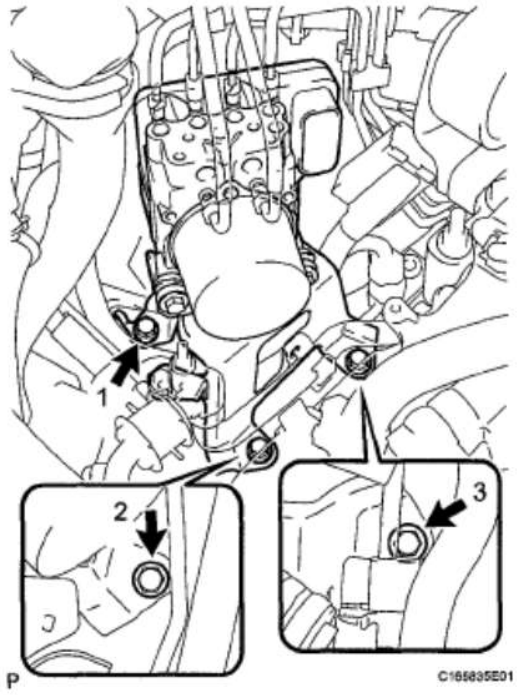
2. **INSTALL BRAKE ACTUATOR WITH BRACKET**

a. Install the brake actuator with bracket to the body with the 3 bolts.

Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)

NOTE:

- **Do not damage the brake lines or wire harness.**
- **Tighten the 3 bolts in the order shown in the illustration.**



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Fig. 176: Identifying Brake Actuator Bracket Bolts Tightening Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Temporarily tighten each brake line to the correct positions of the brake actuator with bracket 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 of master cylinder
- *6: From 2nd of master cylinder

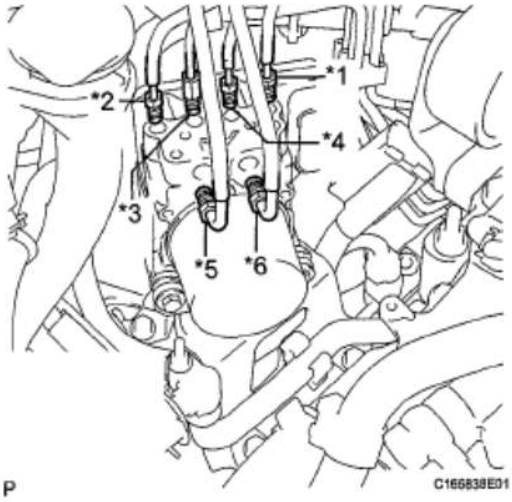


Fig. 177: Identifying Brake Lines Tags
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Using a union nut wrench (10 mm and 12 mm), fully tighten each brake line.

Torque: Flare Nut A (M10) without union nut wrench 15 N*m (155 kgf*cm, 11 ft.*lbf)

Flare Nut A (M10) with union nut wrench 14 N*m (143 kgf*cm, 10 ft.*lbf)

Flare Nut B (M12) without union nut wrench

20 N*m (204 kgf*cm, 15 ft.*lbf)

Flare Nut B (M12) with union nut wrench 18 N*m (184 kgf*cm, 13 ft.*lbf)

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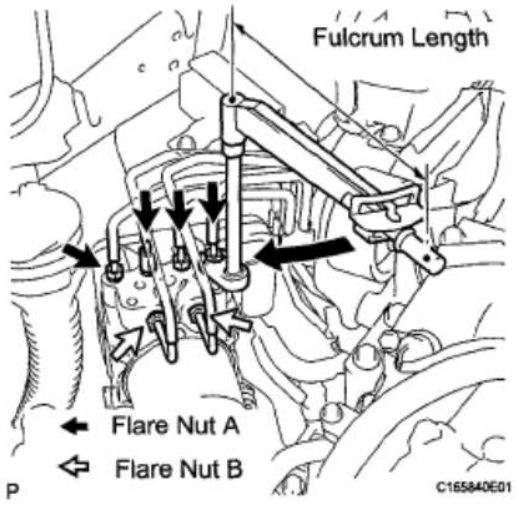


Fig. 178: Tightening Brake Line
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- **Use a torque wrench with a fulcrum length of 250 mm (9.84 in.).**
- **This torque value is effective when the union nut wrench is parallel to the 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 water, oil or dirt to enter.**

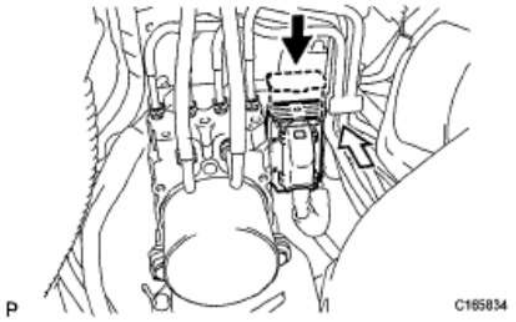


Fig. 179: Connecting Brake Actuator Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

e. Install the No. 1 cooler refrigerant suction tube to the 2 clamps.

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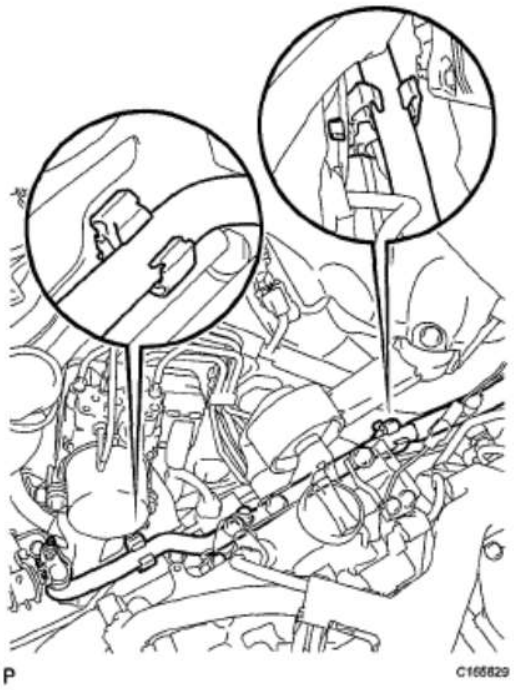


Fig. 180: Identifying No. 1 Cooler Refrigerant Suction Tube And No. 1 Cooler Refrigerant Suction Tube With Clamps
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

f. Install the suction hose bracket to the brake actuator bracket assembly with the nut and bolt.

Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)

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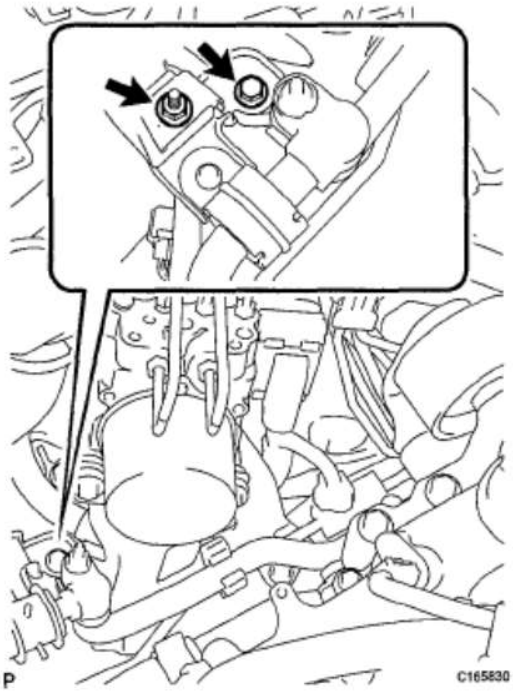


Fig. 181: Locating Suction Hose Bracket Nut And Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

g. Install the relay box.

3. **FILL RESERVOIR WITH BRAKE FLUID** (See **BRAKE FLUID**)
4. **BLEED BRAKE MASTER CYLINDER** (See **BRAKE FLUID**)
5. **BLEED BRAKE LINE** (See **REPLACEMENT**)
6. **BLEED BRAKE ACTUATOR** (See **REPLACEMENT**)

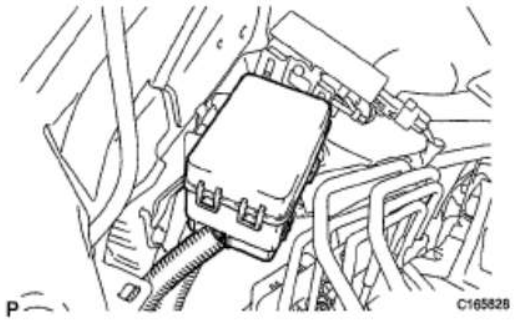


Fig. 182: Identifying Relay Box
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. **INSPECT FLUID LEVEL IN RESERVOIR** (See **BRAKE FLUID**)
8. **INSPECT FOR BRAKE FLUID LEAK**
9. **INSTALL V-BANK COVER SUB-ASSEMBLY (for 2GR-FE)** (See **INSTALLATION**)

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10. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY (for 1AR-FE)** (See **INSTALLATION**)
11. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

NOTE: **When disconnecting the cable, some systems need to be initialized after the cable is reconnected. (See INITIALIZATION)**

12. **INSPECT BRAKE ACTUATOR WITH TECHSTREAM**

HINT:

(See **ON-VEHICLE INSPECTION**).

13. **PERFORM YAW RATE AND ACCELERATION SENSOR ZERO POINT CALIBRATION**

HINT:

(See **CALIBRATION**).

14. **CHECK AND CLEAR DTCS**

HINT:

(See **DTC CHECK/CLEAR**).

FRONT SPEED SENSOR

COMPONENTS

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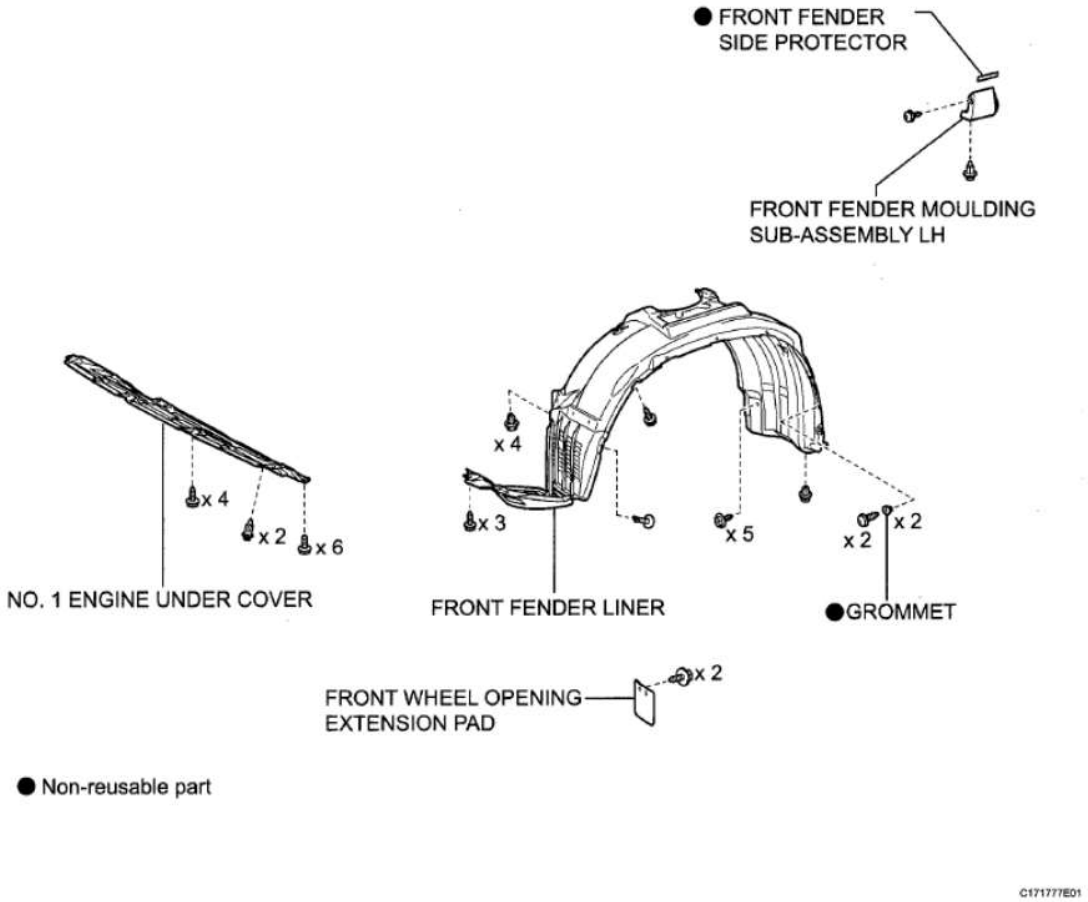


Fig. 183: Identifying Front Speed Sensor Components (1 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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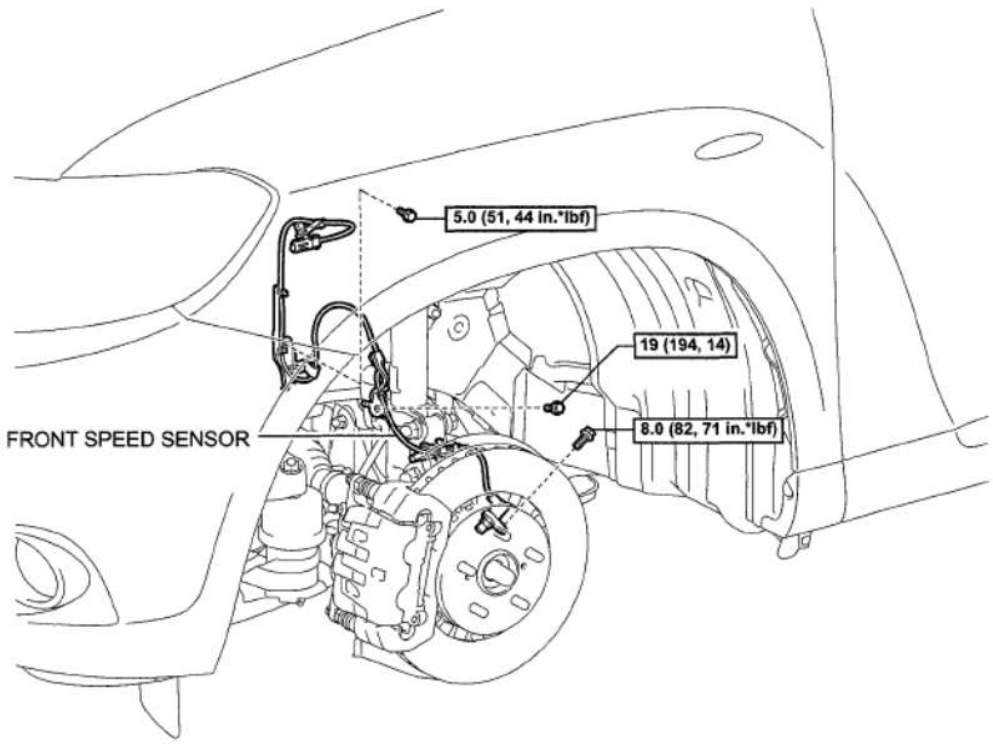


Fig. 184: Identifying Front Speed Sensor Components (2 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

HINT:

- Use the same procedures for the LH side and RH side.
- The following procedures is for the LH side.
- If the sensor rotor needs to be replaced, replace it together with the front drive outboard joint shaft assembly.

for 2GR-FE (See **REMOVAL**)

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for 2GR-FE (See **DISASSEMBLY**)

for 1AR-FE (See **REMOVAL**)

for 1AR-FE (See **DISASSEMBLY**)

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**

NOTE: When disconnecting the cable, some systems need to be initialized after the cable is reconnected. (See INITIALIZATION)

2. **REMOVE FRONT WHEEL**
3. **REMOVE NO. 1 ENGINE UNDER COVER** (See **REMOVAL**)
4. **REMOVE FRONT FENDER MOULDING SUB-ASSEMBLY LH** (See **REMOVAL**)
5. **REMOVE FRONT WHEEL OPENING EXTENSION PAD** (See **REMOVAL**)
6. **REMOVE FRONT FENDER LINER** (See **REMOVAL**)
7. **REMOVE FRONT SPEED SENSOR**
   a. Disconnect the front speed sensor connector and remove the 2 clamps.

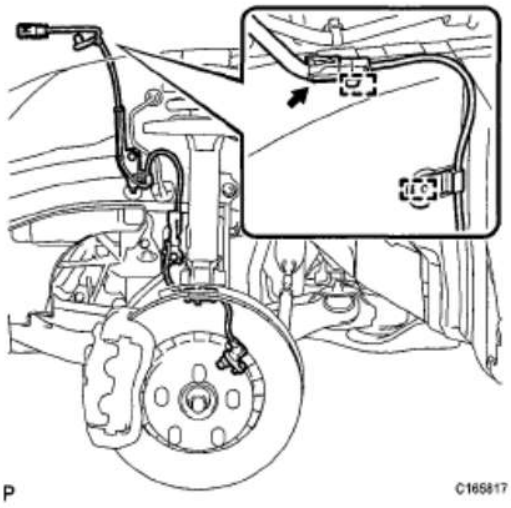


Fig. 185: Locating Front Speed Sensor Connector With Clamps
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Remove the bolt and No. 2 sensor clamp from the body.

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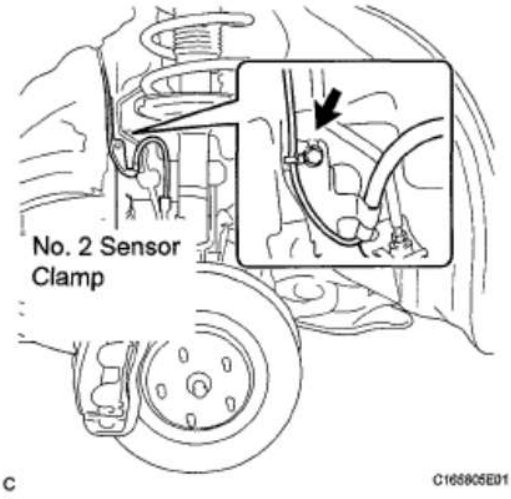


Fig. 186: Locating Bolt With No. 2 Sensor Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Remove the bolt, No. 1 sensor clamp, and flexible hose together from the shock absorber assembly.

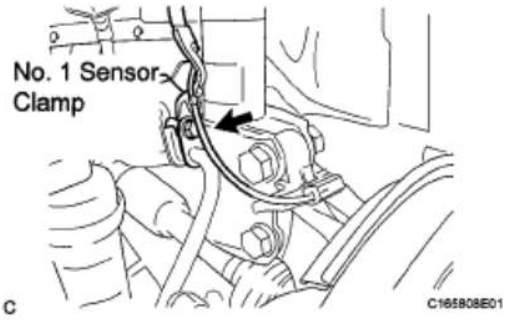


Fig. 187: Locating Bolt With No. 1 Sensor Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Remove the bolt, resin clamp, and the front speed sensor.

NOTE:

- **Prevent foreign matter from attaching to the front speed sensor tip.**
- **Clean the installation hole and the contact surface for the front speed sensor every time it is removed.**

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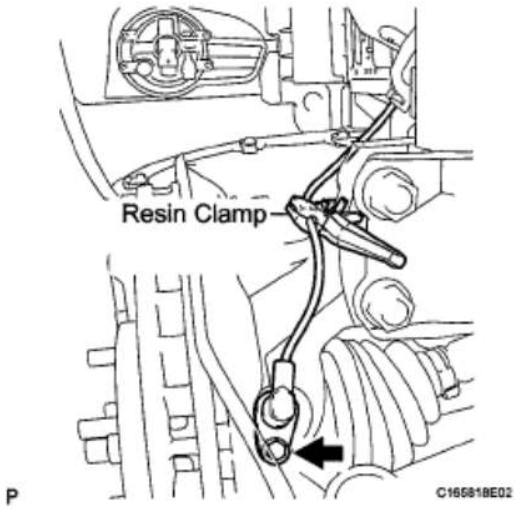


Fig. 188: Locating Bolt With Resin Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

HINT:

- Use the same procedures for the LH side and RH side.
- The following procedure is for the LH side.
- If the sensor rotor needs to be replaced, replace it together with the front drive outboard joint shaft assembly.

for 2GR-FE (See **INSPECTION**)

for 2GR-FE (See **INSTALLATION**)

for 1AR-FE (See **INSPECTION**)

for 1AR-FE (See **INSTALLATION**)

1. **INSTALL FRONT SPEED SENSOR**
   a. Install the resin clamp and the front speed sensor with bolt.

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

NOTE:

- **Prevent foreign matter from attaching to the front speed sensor tip.**
- **Firmly insert the front speed sensor body into the knuckle before tightening the bolt.**
- **After installing the front speed sensor to the knuckle, make sure**

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that there is no clearance between the front speed sensor stay and knuckle. Also make sure that no foreign matter is stuck between the parts.

- **Before installing the clamp, firmly insert the points of the clamp into the installation holes.**

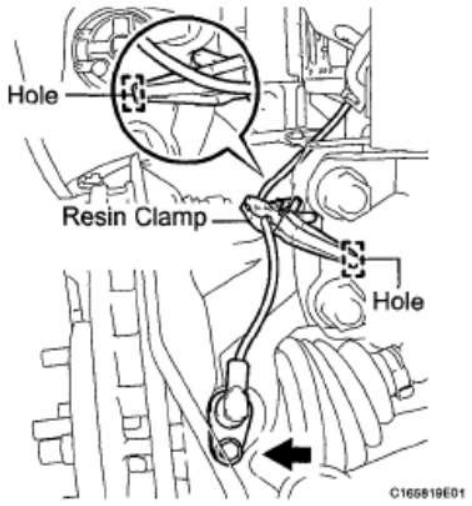


Fig. 189: Locating Front Speed Sensor Bolt With Resin Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Temporarily install the No. 1 sensor clamp.

NOTE: Be sure to insert the No. 1 sensor clamp claw into the stopper hole while installing the No. 1 sensor clamp.

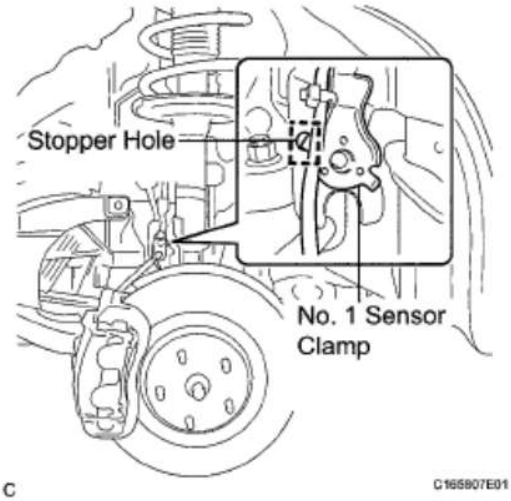


Fig. 190: Identifying No. 1 Sensor Clamp And Stopper Hole
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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c. Install the front flexible hose and the No. 1 sensor clamp together to the shock absorber with the bolt.

Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)

NOTE:

- **Do not twist the wire harness for the front speed sensor when installing it.**
- **A bolt tightens the brake flexible hose and front speed sensor together. Make sure that the flexible hose is positioned over the front speed sensor.**

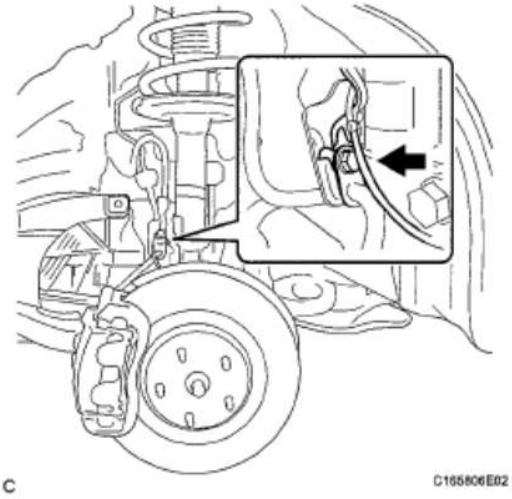


Fig. 191: Locating Brake Flexible Hose Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Install the No. 2 sensor clamp to the body with the bolt.

Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

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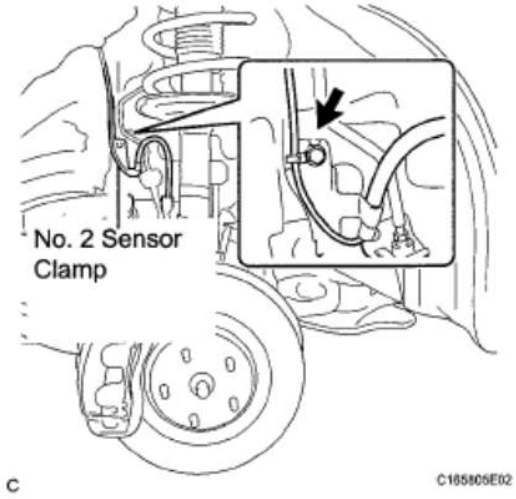


Fig. 192: Locating Bolt With No. 2 Sensor Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

e. Install the 2 clamps and connect the front speed sensor connector.

2. **INSTALL FRONT FENDER LINER** (See **INSTALLATION**)
3. **INSTALL FRONT WHEEL OPENING EXTENSION PAD** (See **INSTALLATION**)
4. **INSTALL FRONT FENDER MOULDING SUB-ASSEMBLY LH** (See **INSTALLATION**)
5. **INSTALL NO. 1 ENGINE UNDER COVER** (See **INSTALLATION**)
6. **INSTALL FRONT WHEEL**

   Torque: 103 N*m (1050 kgf*cm, 76 ft.*lbf)

7. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

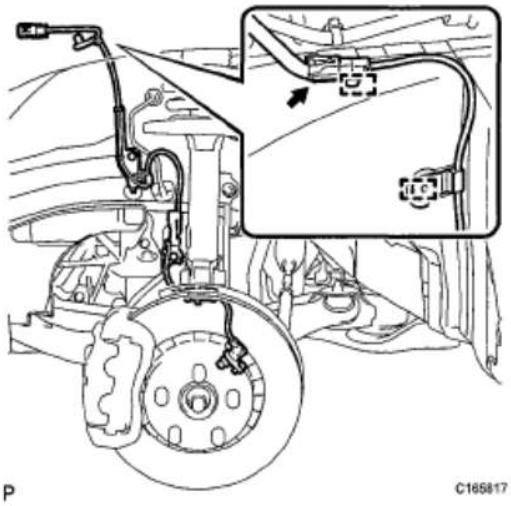


Fig. 193: Locating Front Speed Sensor Connector With Clamps
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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NOTE: **When disconnecting the cable, some systems need to be initialized after the cable is reconnected. (See INITIALIZATION)**

8. **CHECK FOR SPEED SENSOR SIGNAL**

HINT:

(See **TEST MODE PROCEDURE**)

REAR SPEED SENSOR (FOR 2WD)

COMPONENTS

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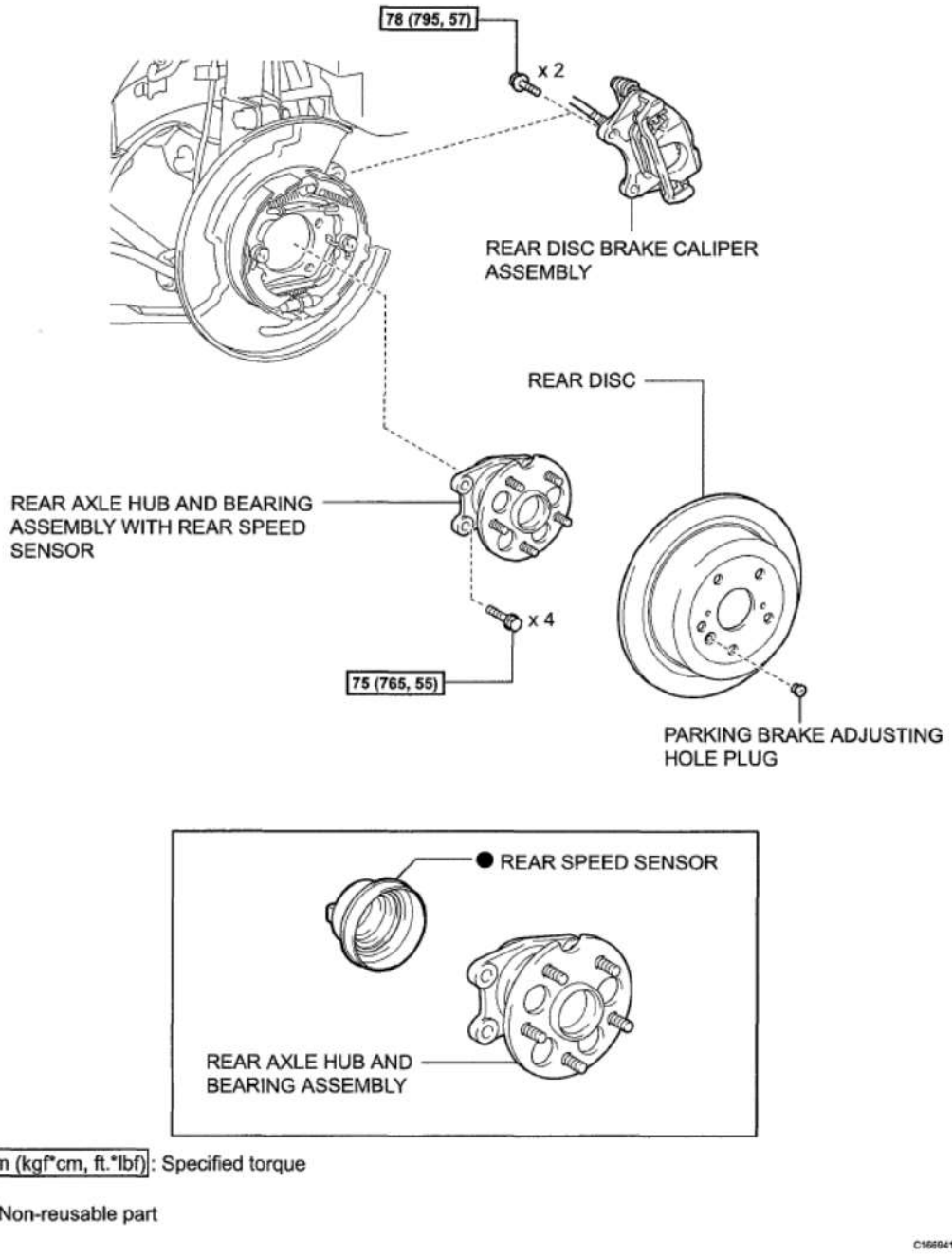


Fig. 194: Identifying Rear Speed Sensor Components With Torque Specification (For 2WD)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

HINT:

- Use the same procedures for the RH side and LH side.
- The following procedure is for the LH side.

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

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**

NOTE: When disconnecting the cable, some systems need to be initialized after the cable is reconnected. (See INITIALIZATION)

2. **REMOVE REAR WHEEL**
3. **SEPARATE REAR SPEED SENSOR WIRE**
   a. Using a screwdriver, disconnect the connector from the rear speed sensor.

NOTE: Be careful not to damage the rear speed sensor.

4. **SEPARATE REAR DISC BRAKE CALIPER ASSEMBLY** (See **REPLACEMENT**)
5. **REMOVE REAR DISC** (See **INSPECTION**)
6. **REMOVE REAR AXLE HUB AND BEARING ASSEMBLY WITH REAR SPEED SENSOR** (See **REMOVAL**)
7. **REMOVE REAR SPEED SENSOR**
   a. Install the 3 hub nuts and mount the rear axle hub and bearing assembly in a vise using aluminum plates.

NOTE: Replace the rear axle hub and bearing assembly if it is dropped or receives a strong shock.



Fig. 195: Disconnecting Rear Speed Sensor Connector

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Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Using a pin punch and hammer, drive out the 2 pins and remove the 2 attachments from SST.

SST 09520-00031 (09521-00010,09520-00040), 09521-00020

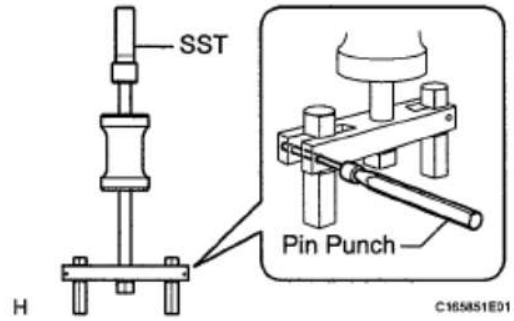


Fig. 196: Driving Out Pins
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Using SST and 2 bolts (diameter: 12 mm, pitch: 1.5 mm), remove the rear speed sensor from the rear axle hub and bearing assembly.

SST 09520-00031 (09521-00010,09520-00040), 09521-00020, 09950-00020

NOTE:

- **Keep the rear speed sensor away from magnets.**
- **Pull the rear speed sensor off straight, taking care not to allow it to contact the rear speed sensor rotor.**
- **If the rear speed sensor rotor is damaged or deformed, replace the rear axle hub and bearing assembly.**
- **Do not scratch the contact surface between the rear axle hub and bearing assembly and the rear speed sensor.**
- **Prevent foreign matter from attaching to the rear speed sensor rotor or tip.**

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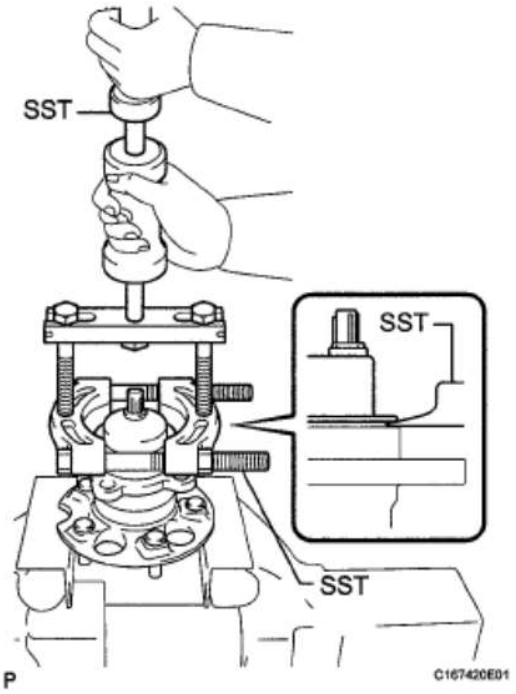


Fig. 197: Removing Rear Speed Sensor From Rear Axle Hub And Bearing Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

HINT:

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

INSTALLATION

HINT:

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

1. **INSTALL REAR SPEED SENSOR**
   a. Clean the contact surface between the rear axle hub and bearing assembly and a new rear speed sensor.

      NOTE: Prevent foreign matter from attaching to the sensor rotor.

   b. Place the rear speed sensor on the axle hub so that the connector is positioned as shown in the illustration.

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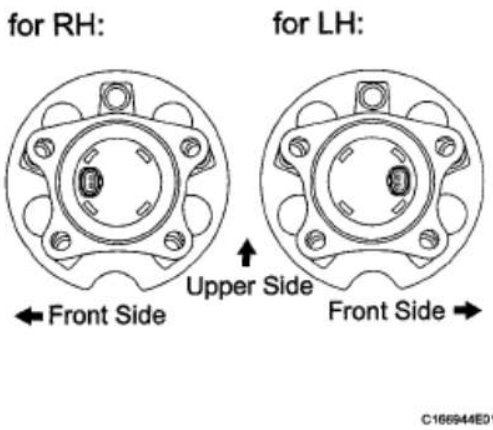


Fig. 198: Identifying Rear Speed Sensor Installation Position On Axle Hub
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. Using SST, a steel plates, V-blocks and press, install a new rear speed sensor to the rear axle hub and bearing assembly.

SST 09214-76011, 09213-58013

NOTE:

- **Keep the rear speed sensor away from magnets.**
- **Do not use a hammer to install the rear speed sensor.**
- **Check that there is no foreign matter such as iron chips on the detecting portion of the rear speed sensor.**
- **Slowly press the rear speed sensor in straight.**

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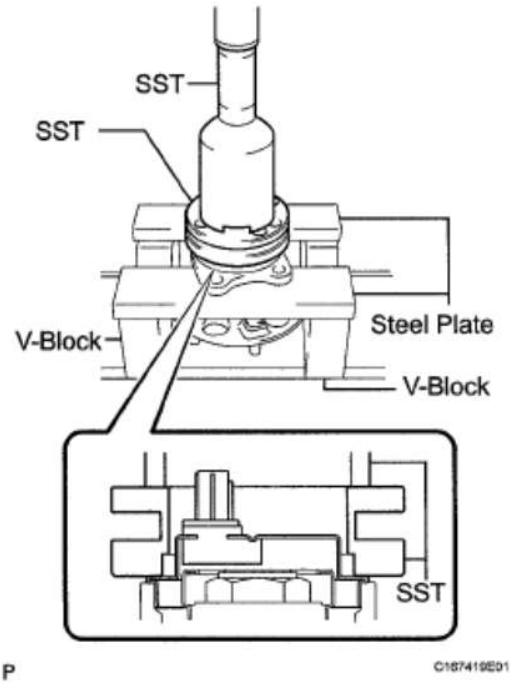


Fig. 199: Installing Rear Speed Sensor To Rear Axle Hub And Bearing Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **INSTALL REAR AXLE HUB AND BEARING ASSEMBLY WITH REAR SPEED SENSOR** (See **INSTALLATION**)
3. **INSPECT REAR AXLE HUB BEARING LOOSENESS** (See **ON-VEHICLE INSPECTION**)
4. **INSPECT REAR AXLE HUB RUNOUT** (See **ON-VEHICLE INSPECTION**)
5. **INSTALL REAR DISC** (See **REASSEMBLY**)
6. **INSTALL REAR DISC BRAKE CALIPER ASSEMBLY** (See **REPLACEMENT**)
7. **INSTALL REAR SPEED SENSOR WIRE**
   a. Connect the connector to the rear speed sensor.
8. **INSTALL REAR WHEEL**

   Torque: 103 N*m (1050 kgf*cm, 76 ft.*lbf)

9. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

NOTE: **When disconnecting the cable, some systems need to be initialized after the cable is reconnected. (See INITIALIZATION)**

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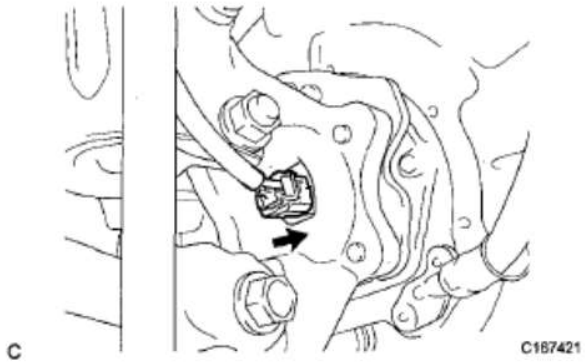


Fig. 200: Connecting Rear Speed Sensor Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. **INSPECT AND ADJUST REAR WHEEL ALIGNMENT**

    HINT:

    (See **REAR WHEEL ALIGNMENT**)

11. **CHECK FOR SPEED SENSOR SIGNAL**

    HINT:

    (See **TEST MODE PROCEDURE**)

REAR SPEED SENSOR (FOR 4WD)

COMPONENTS

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Fig. 201: Identifying Rear Speed Sensor Components (For 4WD) (1 Of 6)
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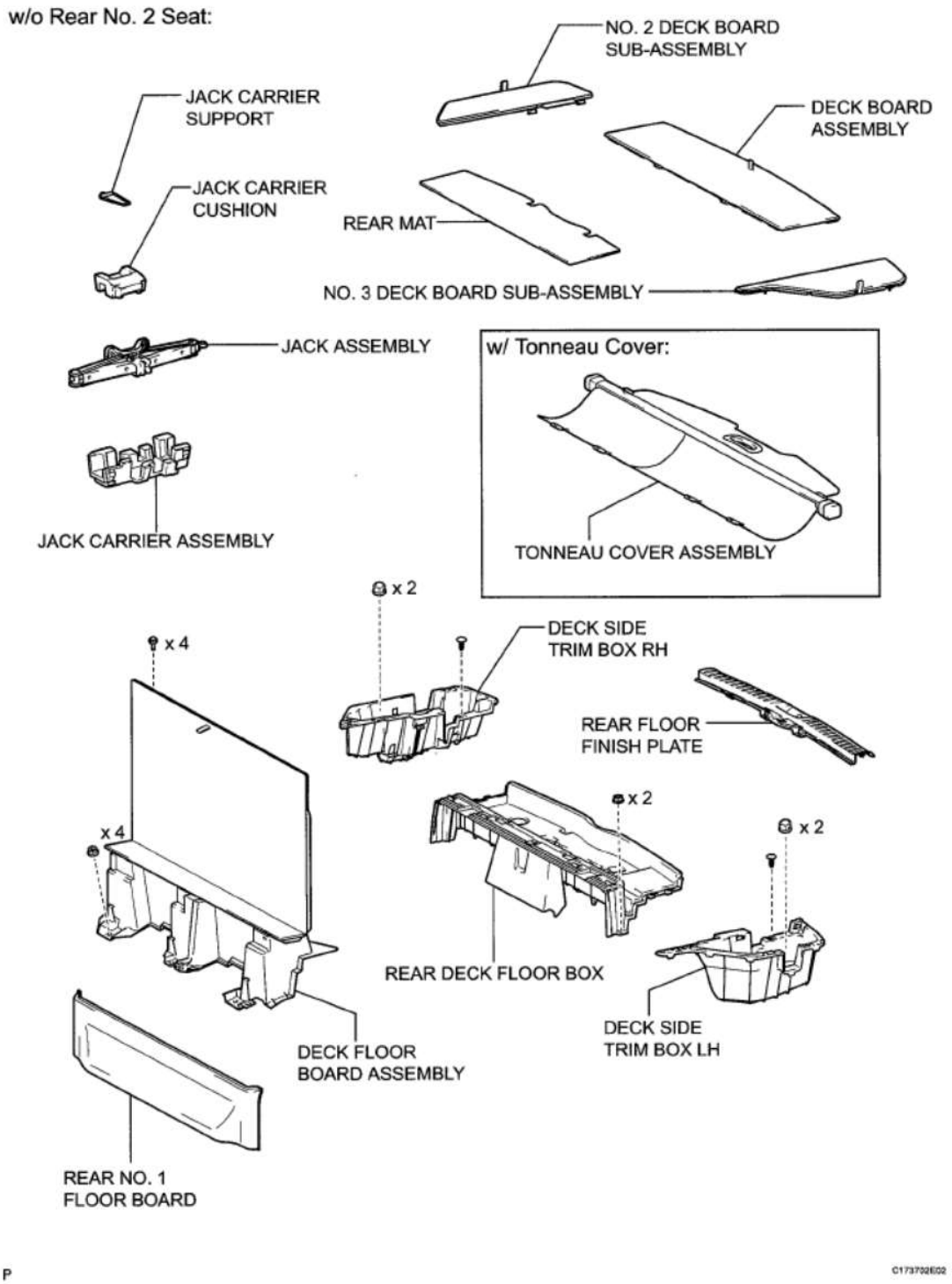


Fig. 202: Identifying Rear Speed Sensor Components (For 4WD) (2 Of 6)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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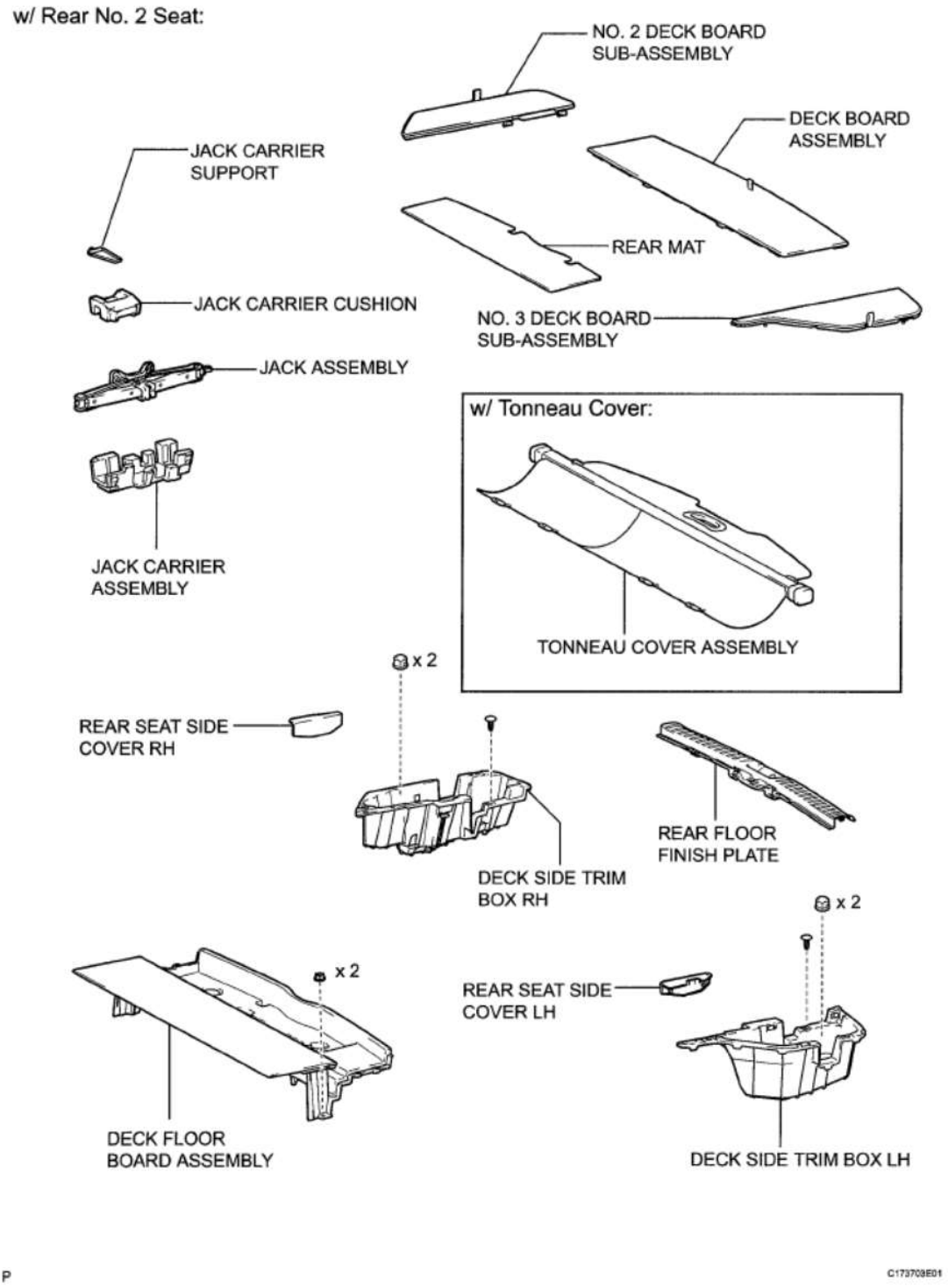


Fig. 203: Identifying Rear Speed Sensor Components (For 4WD) (3 Of 6)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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w/ Rear No. 2 Seat:

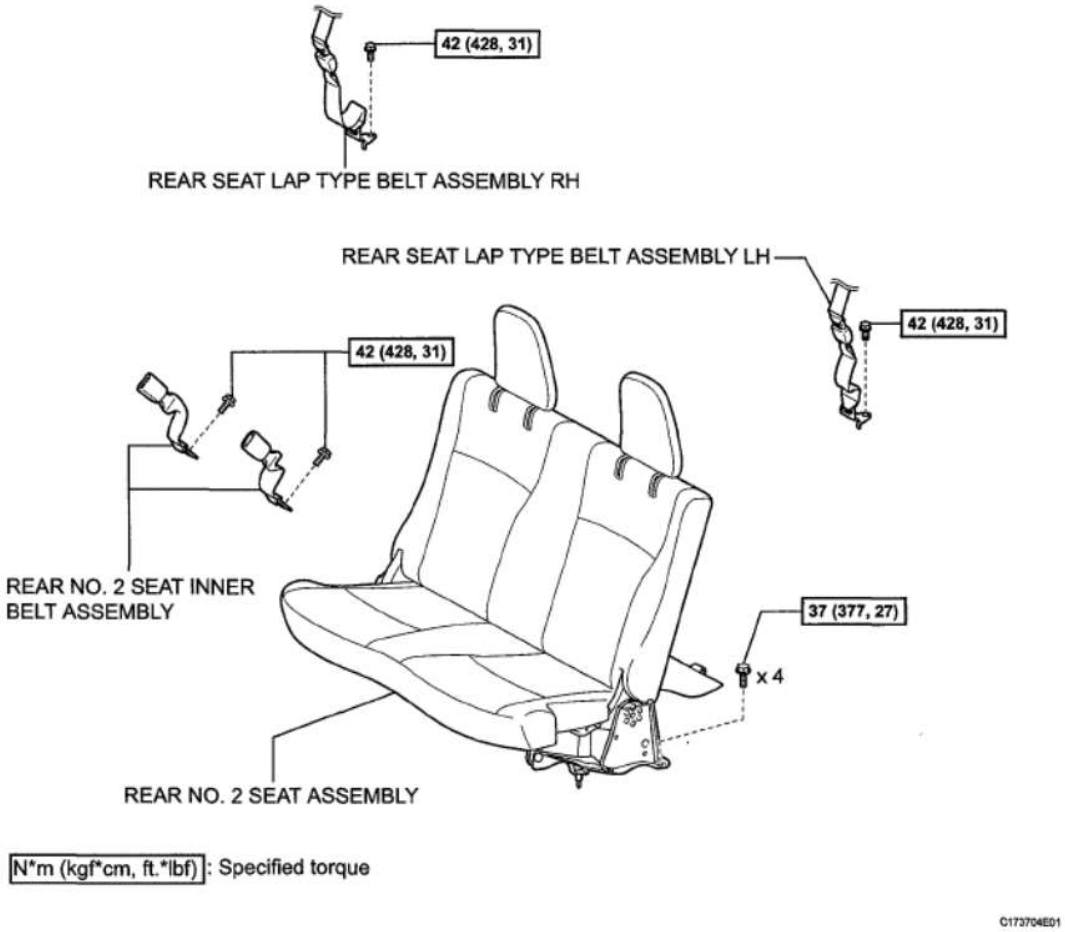


Fig. 204: Identifying Rear Speed Sensor Components (For 4WD) (4 Of 6)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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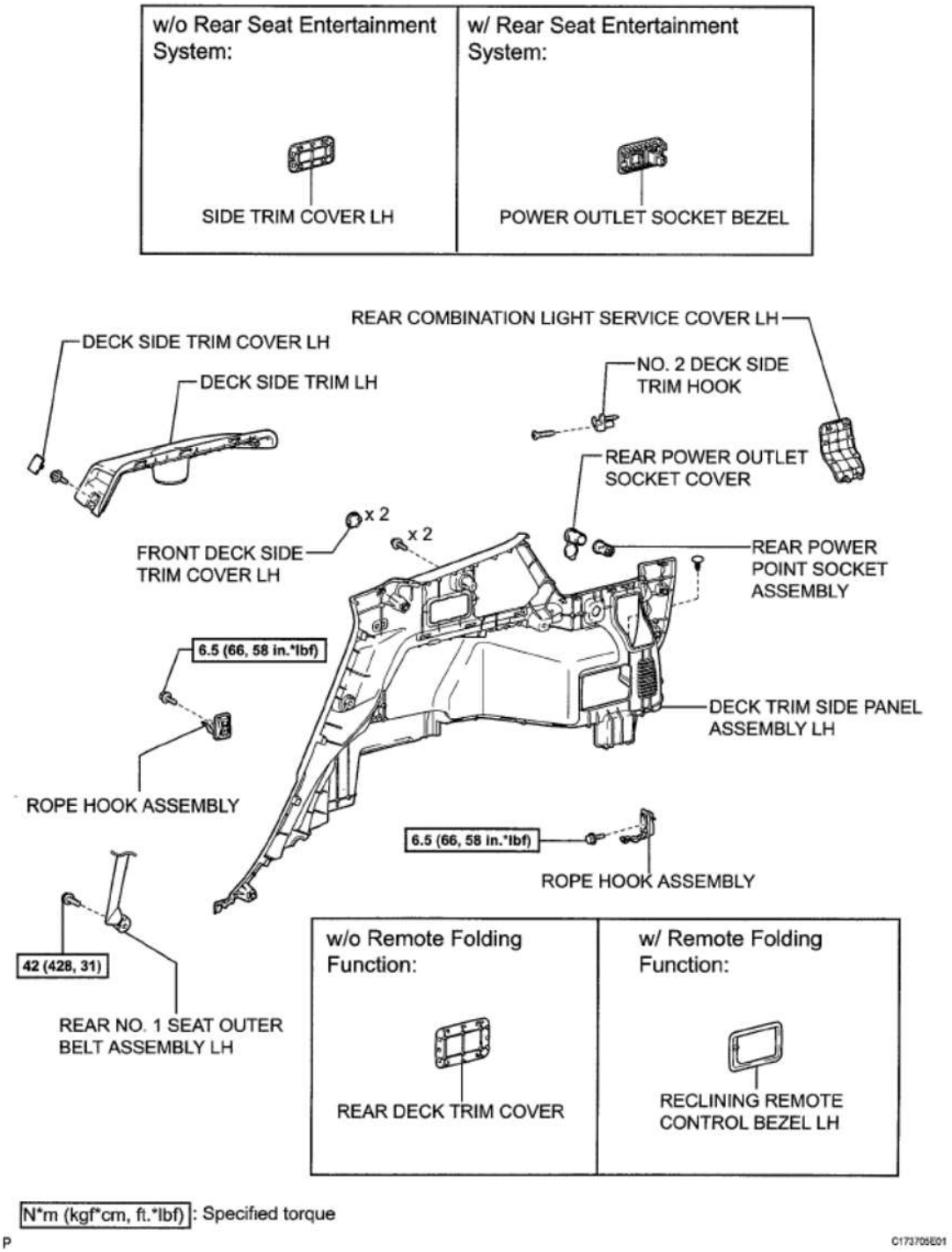


Fig. 205: Identifying Rear Speed Sensor Components (For 4WD) (5 Of 6)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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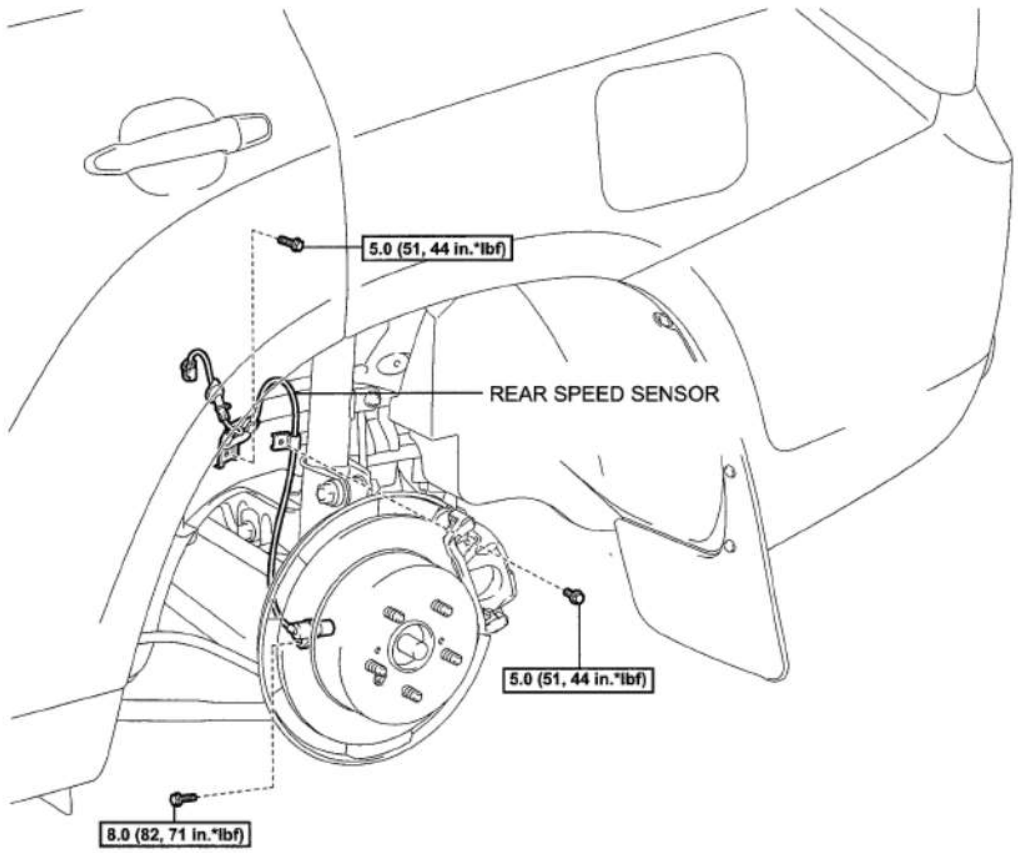


Fig. 206: Identifying Rear Speed Sensor Components (For 4WD) (6 Of 6)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

HINT:

- Use the same procedures for the LH side and RH side.
- The following procedure is for the LH side.
- If the sensor rotor needs to be replaced, replace it together with the outboard joint shaft assembly.

(See **REMOVAL**)

(See **DISASSEMBLY**)

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**

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NOTE: **When disconnecting the cable, some systems need to be initialized after the cable is reconnected. (See INITIALIZATION)**

2. **REMOVE REAR DOOR SCUFF PLATE LH** (See **REMOVAL**)
3. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP LH** (See **REMOVAL**)
4. **REMOVE DECK BOARD ASSEMBLY** (See **REMOVAL**)
5. **REMOVE NO. 3 DECK BOARD SUB-ASSEMBLY** (See **REMOVAL**)
6. **REMOVE NO. 2 DECK BOARD SUB-ASSEMBLY** (See **REMOVAL**)
7. **REMOVE TONNEAU COVER ASSEMBLY (w/ Tonneau Cover)** (See **REMOVAL**)
8. **REMOVE REAR NO. 1 FLOOR BOARD (w/o Rear No. 2 Seat)** (See **REMOVAL**)
9. **REMOVE REAR SEAT SIDE COVER LH (w/ Rear No. 2 Seat)** (See **REMOVAL**)
10. **REMOVE DECK SIDE TRIM BOX LH** (See **REMOVAL**)
11. **REMOVE REAR SEAT SIDE COVER RH (w/ Rear No. 2 Seat)** (See **REMOVAL**)
12. **REMOVE JACK CARRIER SUPPORT**
13. **REMOVE JACK CARRIER CUSHION** (See **REMOVAL**)
14. **REMOVE JACK ASSEMBLY** (See **REMOVAL**)
15. **REMOVE JACK CARRIER ASSEMBLY** (See **REMOVAL**)
16. **REMOVE DECK SIDE TRIM BOX RH** (See **REMOVAL**)
17. **REMOVE DECK FLOOR BOARD ASSEMBLY (w/o Rear No. 2 Seat)** (See **REMOVAL**)
18. **REMOVE REAR MAT** (See **REMOVAL**)
19. **REMOVE DECK FLOOR BOARD ASSEMBLY (w/ Rear No. 2 Seat)** (See **REMOVAL**)
20. **REMOVE REAR DECK FLOOR BOX (w/o Rear No. 2 Seat)** (See **REMOVAL**)
21. **REMOVE REAR NO. 2 SEAT INNER BELT ASSEMBLY (w/ Rear No. 2 Seat)** (See **INSTALLATION**)
22. **DISCONNECT REAR SEAT LAP TYPE BELT ASSEMBLY LH (w/ Rear No. 2 Seat)** (See **REMOVAL**)
23. **DISCONNECT REAR SEAT LAP TYPE BELT ASSEMBLY RH (w/ Rear No. 2 Seat)** (See **REMOVAL**)
24. **REMOVE REAR NO. 2 SEAT ASSEMBLY (w/ Rear No. 2 Seat)** (See **DISASSEMBLY**)
25. **REMOVE REAR FLOOR FINISH PLATE** (See **REMOVAL**)
26. **REMOVE DECK SIDE TRIM COVER LH** (See **REMOVAL**)
27. **REMOVE DECK SIDE TRIM LH** (See **REMOVAL**)
28. **REMOVE SIDE TRIM COVER LH (w/o Rear Seat Entertainment System)** (See **REMOVAL**)
29. **REMOVE POWER OUTLET SOCKET BEZEL (w/ Rear Seat Entertainment System)** (See **REMOVAL**)
30. **REMOVE REAR COMBINATION LIGHT SERVICE COVER LH** (See **REMOVAL**)
31. **REMOVE REAR POWER POINT SOCKET ASSEMBLY** (See **REAR POWER OUTLET SOCKET**)
32. **REMOVE REAR POWER OUTLET SOCKET COVER** (See **INSTALLATION**)

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33. **REMOVE REAR DECK TRIM COVER (w/o Remote Folding Function)** (See **REMOVAL**)
34. **REMOVE RECLINING REMOTE CONTROL BEZEL LH (w/ Remote Folding Function)** (See **REMOVAL**)
35. **REMOVE ROPE HOOK ASSEMBLY (for LH Side)** (See **REMOVAL**)
36. **REMOVE NO. 2 DECK SIDE TRIM HOOK** (See **REMOVAL**)
37. **REMOVE FRONT DECK SIDE TRIM COVER LH** (See **REMOVAL**)
38. **REMOVE REAR NO. 1 SEAT OUTER BELT ASSEMBLY LH** (See **REMOVAL**)
39. **REMOVE DECK TRIM SIDE PANEL ASSEMBLY LH** (See **REMOVAL**)
40. **REMOVE REAR WHEEL**
41. **REMOVE REAR SPEED SENSOR**
    a. Disconnect the rear speed sensor connector.

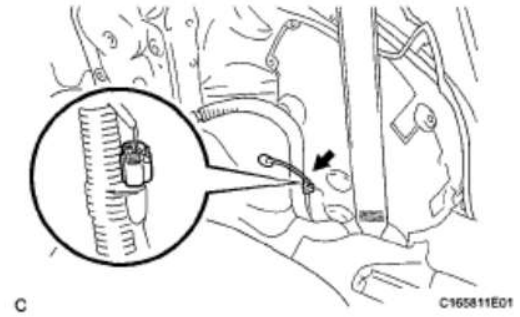


Fig. 207: Locating Rear Speed Sensor Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

    b. Disconnect the grommet of the rear speed sensor wire from the hole of the wheel house.
    c. Remove the 2 bolts, No. 1 clamp and No. 2 clamp from the body and absorber.

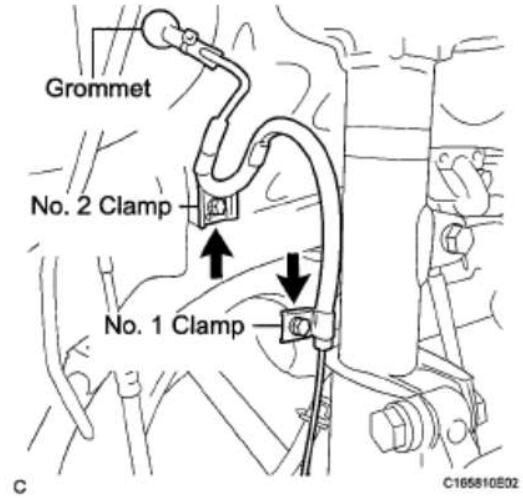


Fig. 208: Identifying Rear Speed Sensor Wire Grommet, Bolts, No. 1 Clamp And No. 2

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Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

d. Remove the bolt and rear speed sensor body from the carrier.

NOTE: Keep the sensor tip and rear speed sensor installation hole free from foreign matter.

INSTALLATION

HINT:

- Use the same procedures for the LH side and RH side.
- The following procedure is for the LH side.
- If the sensor rotor needs to be replaced, replace it together with the outboard joint shaft assembly.

(See **INSPECTION**)

(See **INSTALLATION**)

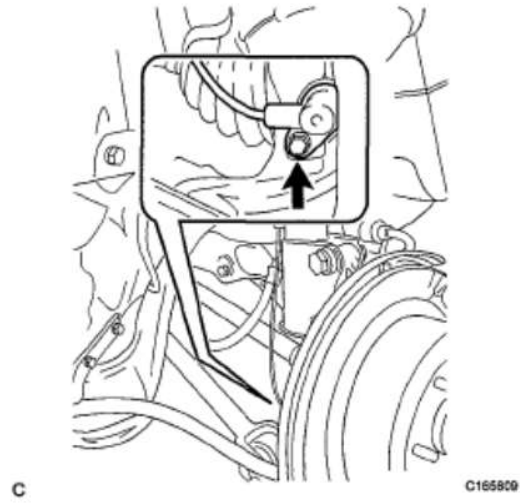


Fig. 209: Locating Rear Speed Sensor Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

1. **INSTALL REAR SPEED SENSOR**
   a. Install the rear speed sensor with the bolt.

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

NOTE:
- **Keep the rear speed sensor tip and sensor installation hole free from foreign matter.**

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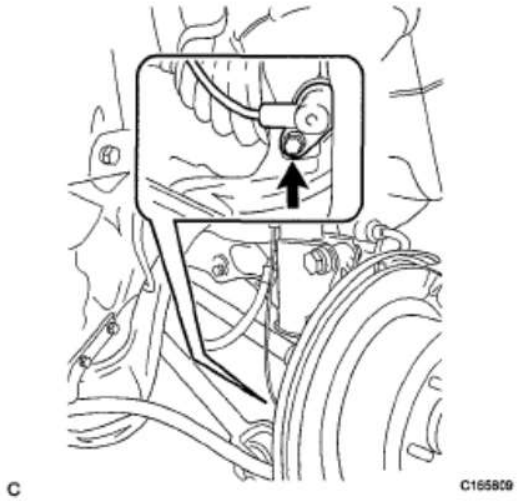


Fig. 210: Locating Rear Speed Sensor Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Install the No. 1 clamp and No. 2 clamp with the 2 bolts.

Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

NOTE: Do not twist the rear speed sensor wire when installing the clamp.

c. Insert the connector and grommet to the inside of the vehicle through the passage hole in the wheel well.

NOTE: Make sure the grommet's band clamp remains on the outside of the vehicle.

d. Hold the grommet and pull it from the inside of the vehicle to the outside of the vehicle. Then fix it in place so that it is not tilted.

NOTE: When pulling out the grommet, do not grip the sensor wire.

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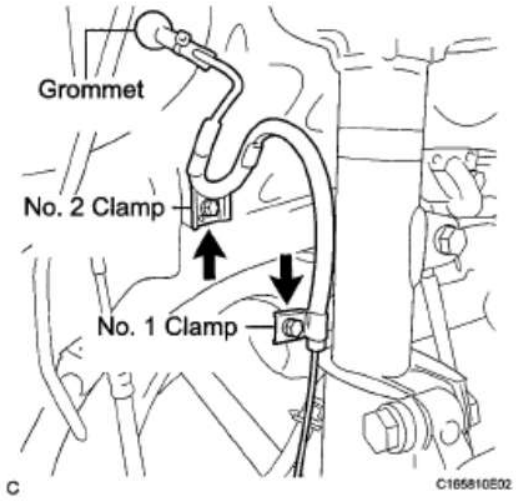


Fig. 211: Identifying Rear Speed Sensor Wire Grommet, Bolts, No. 1 Clamp And No. 2 Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

e. Connect the rear speed sensor connector.

2. **INSTALL DECK TRIM SIDE PANEL ASSEMBLY LH** (See **INSTALLATION**)
3. **CONNECT REAR NO. 1 SEAT OUTER BELT ASSEMBLY LH** (See **INSTALLATION**)
4. **INSTALL FRONT DECK SIDE TRIM COVER LH** (See **INSTALLATION**)
5. **INSTALL NO. 2 DECK SIDE TRIM HOOK** (See **INSTALLATION**)
6. **INSTALL ROPE HOOK ASSEMBLY (for LH Side)** (See **INSTALLATION**)
7. **INSTALL REAR DECK TRIM COVER (w/o Remote Folding Function)** (See **INSTALLATION**)

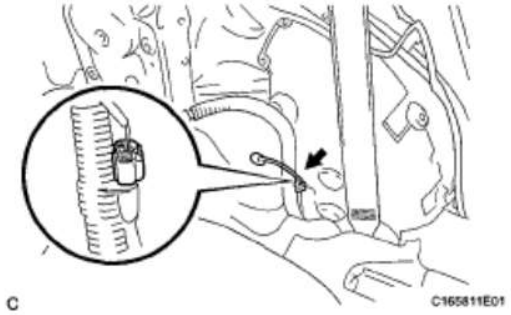


Fig. 212: Locating Rear Speed Sensor Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. **INSTALL RECLINING REMOTE CONTROL BEZEL LH (w/ Remote Folding Function)** (See **INSTALLATION**)
9. **INSTALL REAR POWER OUTLET SOCKET COVER** (See **INSTALLATION**)
10. **INSTALL REAR POWER POINT SOCKET ASSEMBLY** (See **INSTALLATION**)
11. **INSTALL REAR COMBINATION LIGHT SERVICE COVER LH** (See **INSTALLATION**)

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12. **INSTALL SIDE TRIM COVER LH (w/o Rear Seat Entertainment System)** (See **INSTALLATION**)
13. **INSTALL POWER OUTLET SOCKET BEZEL (w/ Rear Seat Entertainment System)** (See **INSTALLATION**)
14. **INSTALL DECK SIDE TRIM LH** (See **INSTALLATION**)
15. **INSTALL DECK SIDE TRIM COVER LH** (See **INSTALLATION**)
16. **INSTALL REAR FLOOR FINISH PLATE** (See **INSTALLATION**)
17. **INSTALL REAR NO. 2 SEAT ASSEMBLY (w/ Rear No. 2 Seat)** (See **INSTALLATION**)
18. **CONNECT REAR SEAT LAP TYPE BELT ASSEMBLY LH (w/ Rear No. 2 Seat)** (See **INSTALLATION**)
19. **CONNECT REAR SEAT LAP TYPE BELT ASSEMBLY RH (w/ Rear No. 2 Seat)** (See **INSTALLATION**)
20. **INSTALL REAR NO. 2 SEAT INNER BELT ASSEMBLY (w/ Rear No. 2 Seat)** (See **INSTALLATION**)
21. **INSTALL REAR DECK FLOOR BOX (w/o Rear No. 2 Seat)** (See **INSTALLATION**)
22. **INSTALL DECK FLOOR BOARD ASSEMBLY (w/o Rear No. 2 Seat)** (See **INSTALLATION**)
23. **INSTALL REAR MAT** (See **INSTALLATION**)
24. **INSTALL DECK FLOOR BOARD ASSEMBLY (w/ Rear No. 2 Seat)** (See **INSTALLATION**)
25. **INSTALL DECK SIDE TRIM BOX LH** (See **INSTALLATION**)
26. **INSTALL REAR SEAT SIDE COVER LH (w/ Rear No. 2 Seat)** (See **INSTALLATION**)
27. **INSTALL DECK SIDE TRIM BOX RH** (See **INSTALLATION**)
28. **INSTALL JACK CARRIER ASSEMBLY** (See **INSTALLATION**)
29. **INSTALL JACK ASSEMBLY** (See **INSTALLATION**)
30. **INSTALL JACK CARRIER CUSHION** (See **INSTALLATION**)
31. **INSTALL JACK CARRIER SUPPORT**
32. **INSTALL REAR SEAT SIDE COVER RH (w/ Rear No. 2 Seat)** (See **INSTALLATION**)
33. **INSTALL REAR NO. 1 FLOOR BOARD (w/o Rear No. 2 Seat)** (See **INSTALLATION**)
34. **INSTALL TONNEAU COVER ASSEMBLY (w/ Tonneau Cover)** (See **INSTALLATION**)
35. **INSTALL NO. 2 DECK BOARD SUB-ASSEMBLY** (See **INSTALLATION**)
36. **INSTALL NO. 3 DECK BOARD SUB-ASSEMBLY** (See **INSTALLATION**)
37. **INSTALL DECK BOARD ASSEMBLY** (See **INSTALLATION**)
38. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP LH** (See **INSTALLATION**)
39. **INSTALL REAR DOOR SCUFF PLATE LH** (See **INSTALLATION**)
40. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

NOTE: **When disconnecting the cable, some systems need to be initialized after the cable is reconnected. (See INITIALIZATION)**

41. **CHECK FOR SPEED SENSOR SIGNAL**

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HINT:

(See **TEST MODE PROCEDURE**)

YAW RATE AND ACCELERATION SENSOR

COMPONENTS

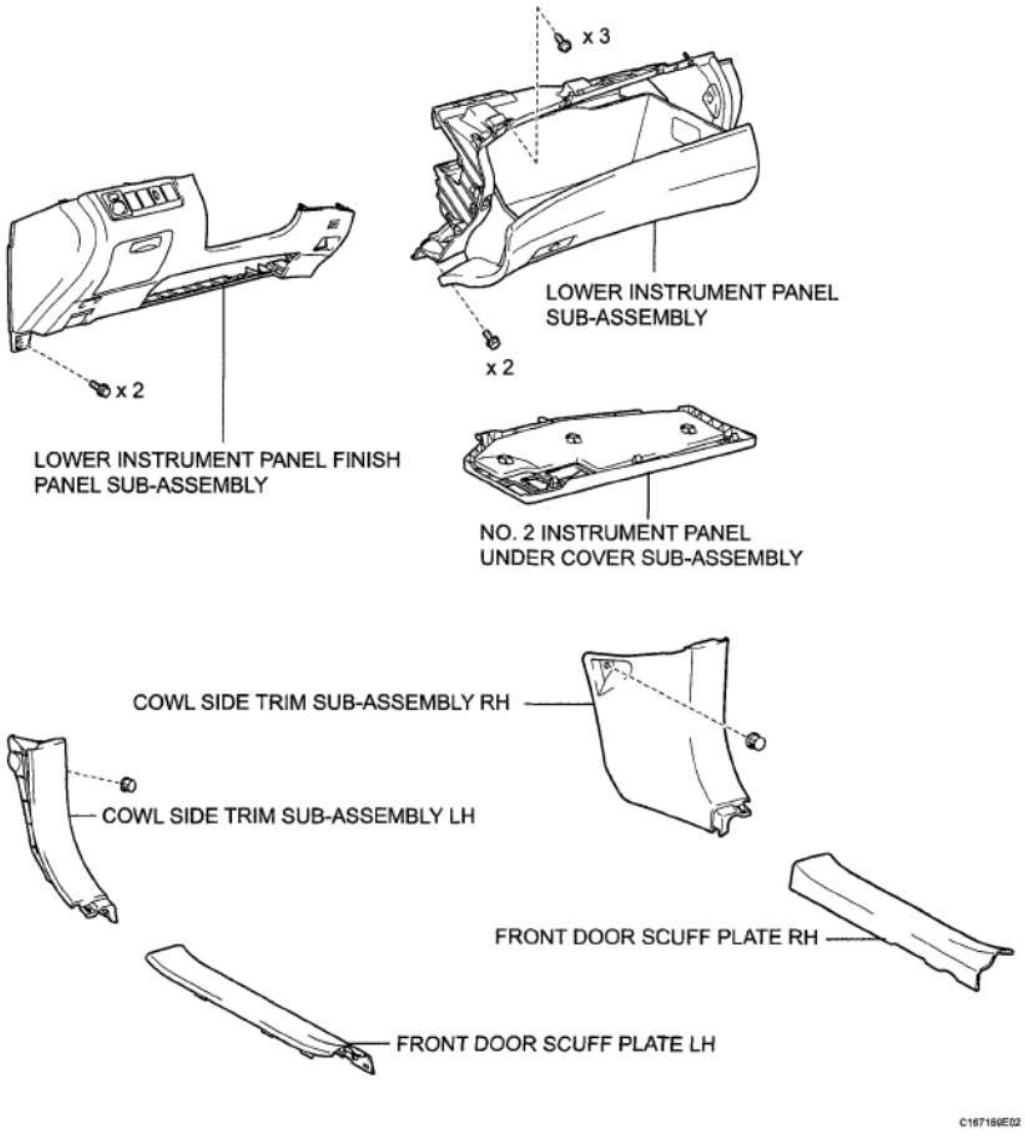


Fig. 213: Identifying Yaw Rate And Acceleration Sensor Components (1 Of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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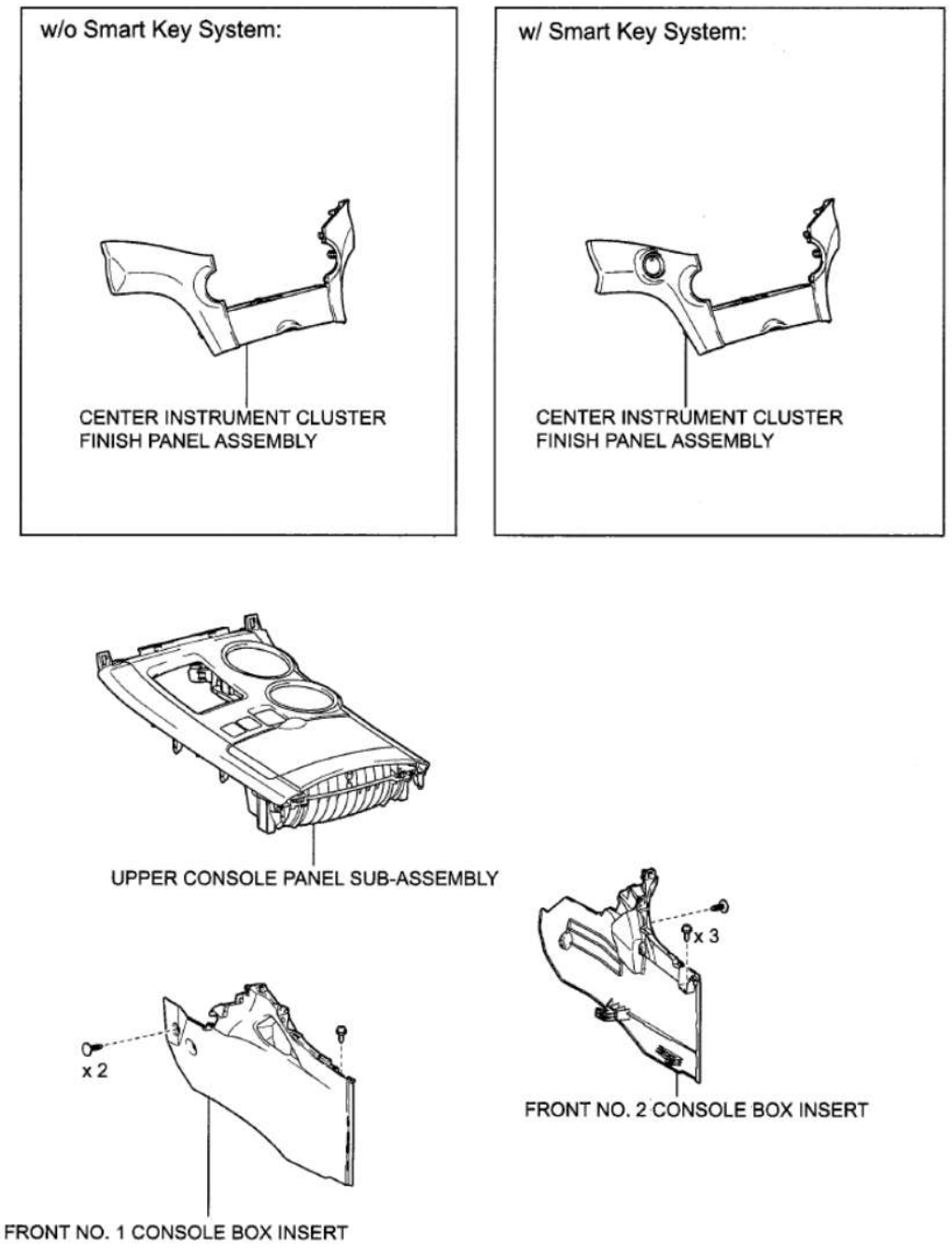


Fig. 214: Identifying Yaw Rate And Acceleration Sensor Components (2 Of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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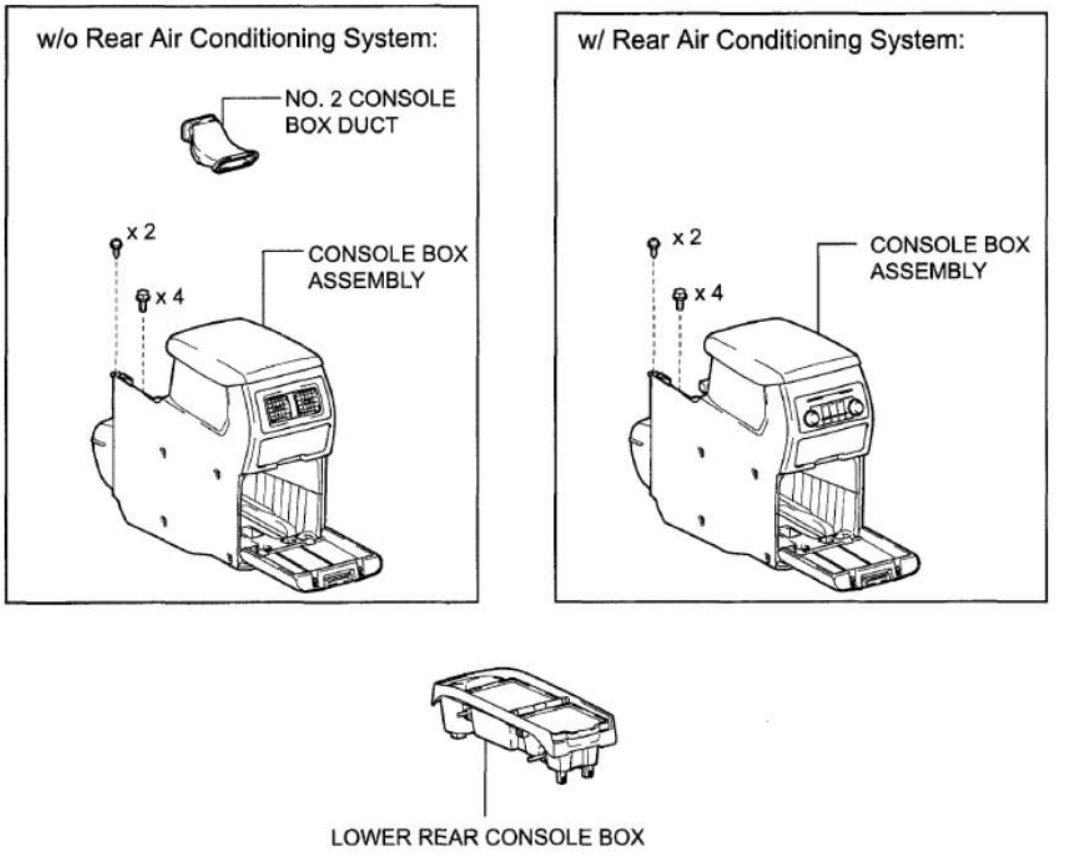


Fig. 215: Identifying Yaw Rate And Acceleration Sensor Components (3 Of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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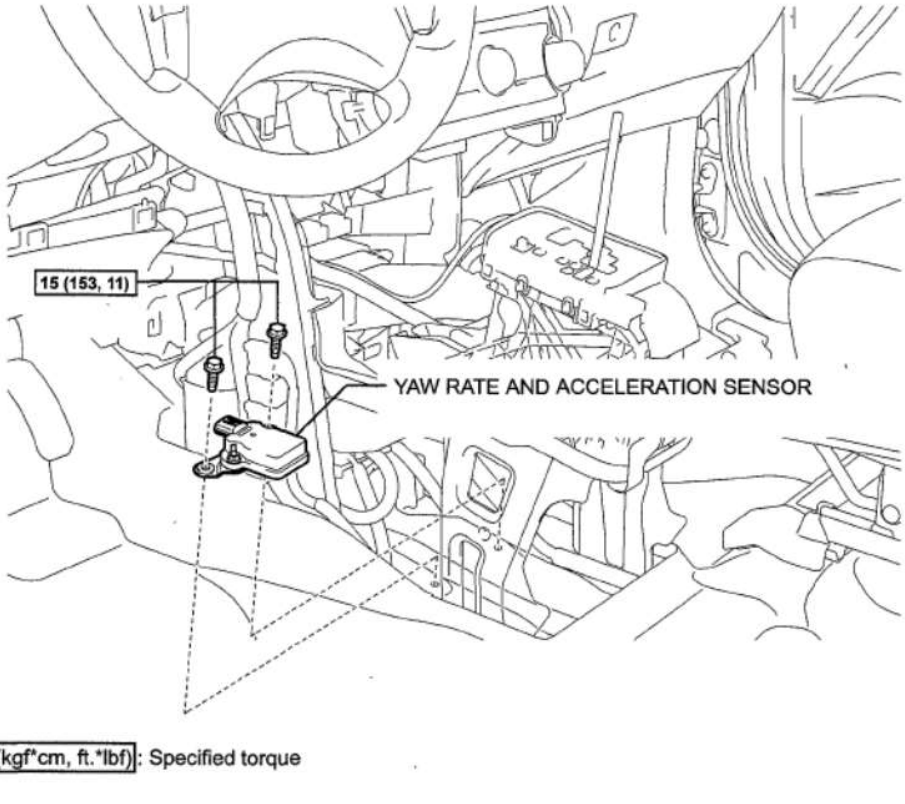


Fig. 216: Identifying Yaw Rate And Acceleration Sensor Components (4 Of 4)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**

   NOTE: When disconnecting the cable, some systems need to be initialized after the cable is reconnected. (See INITIALIZATION)

2. **REMOVE CENTER INSTRUMENT CLUSTER FINISH PANEL ASSEMBLY (w/o Smart Key System)** (See **REMOVAL**)
3. **REMOVE CENTER INSTRUMENT CLUSTER FINISH PANEL ASSEMBLY (w/ Smart Key System)** (See **REMOVAL**)
4. **REMOVE FRONT DOOR SCUFF PLATE LH** (See **REMOVAL**)
5. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH** (See **REMOVAL**)
6. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY (for Manual Air Conditioning System)** (See **REMOVAL**)
7. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY (for Automatic Air Conditioning System)** (See **REMOVAL**)
8. **REMOVE FRONT DOOR SCUFF PLATE RH** (See **REMOVAL**)
9. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH** (See **REMOVAL**)

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10. **REMOVE NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY** (See **REMOVAL**)
11. **REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY** (See **REMOVAL**)
12. **REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY** (See **REMOVAL**)
13. **REMOVE NO. 2 CONSOLE BOX DUCT (w/o Rear Air Conditioning System)** (See **REMOVAL**)
14. **REMOVE LOWER REAR CONSOLE BOX** (See **REMOVAL**)
15. **REMOVE CONSOLE BOX ASSEMBLY (w/o Rear Air Conditioning System)** (See **REMOVAL**)
16. **REMOVE CONSOLE BOX ASSEMBLY (w/ Rear Air Conditioning System)** (See **DISASSEMBLY**)
17. **REMOVE FRONT NO. 1 CONSOLE BOX INSERT** (See **REMOVAL**)
18. **REMOVE FRONT NO. 2 CONSOLE BOX INSERT** (See **REMOVAL**)
19. **REMOVE YAW RATE AND ACCELERATION SENSOR**
    a. Disconnect the connector from the yaw rate and acceleration sensor.

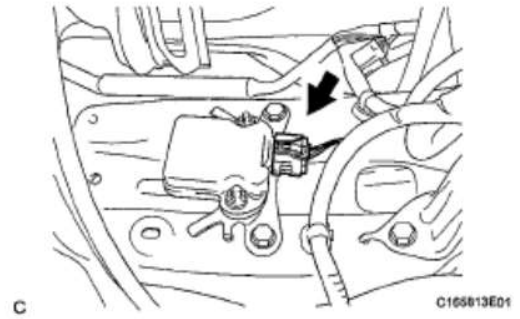


Fig. 217: Locating Yaw Rate And Acceleration Sensor Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

    b. Remove the 2 bolts and yaw rate and acceleration sensor.

NOTE: Do not remove the installation nuts.

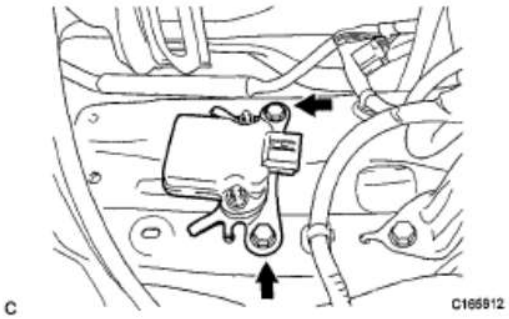


Fig. 218: Locating Yaw Rate And Acceleration Sensor Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

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1. **INSTALL YAW RATE AND ACCELERATION SENSOR**
   a. Install the yaw rate and acceleration sensor with the 2 bolts.

Torque: 15 N*m (153 kgf*cm, 11 ft.*lbf)

NOTE:

- **Be sure to insert the yaw rate and acceleration sensor claw into the stopper hole while installing the yaw rate and acceleration sensor.**
- **Do not damage the yaw rate and acceleration sensor.**
- **Make sure that the yaw rate and acceleration sensor is installed securely.**

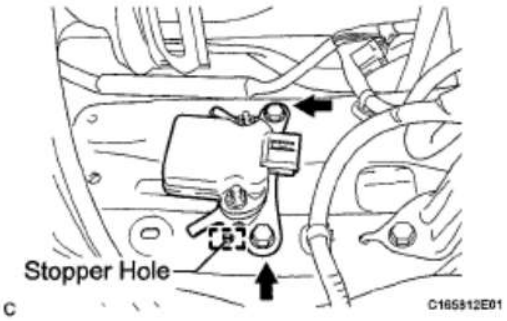
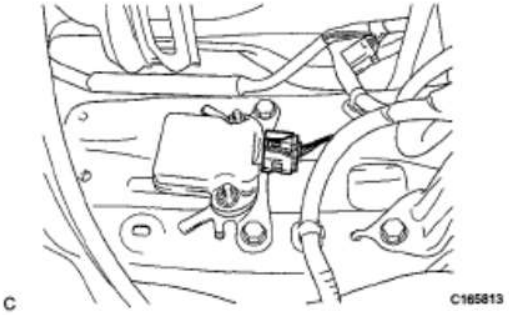


Fig. 219: Locating Yaw Rate And Acceleration Sensor Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Connect the connector to the yaw rate and acceleration sensor.

NOTE: **Make sure that the yaw rate and acceleration sensor connector is connected securely.**

2. **INSTALL FRONT NO. 2 CONSOLE BOX INSERT** (See **INSTALLATION**)
3. **INSTALL FRONT NO. 1 CONSOLE BOX INSERT** (See **INSTALLATION**)
4. **INSTALL CONSOLE BOX ASSEMBLY (w/ Rear Air Conditioning System)** (See **INSTALLATION**)



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Fig. 220: Identifying Yaw Rate And Acceleration Sensor Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. **INSTALL CONSOLE BOX ASSEMBLY (w/o Rear Air Conditioning System)** (See **INSTALLATION**)
6. **INSTALL LOWER REAR CONSOLE BOX** (See **INSTALLATION**)
7. **INSTALL NO. 2 CONSOLE BOX DUCT (w/o Rear Air Conditioning System)** (See **INSTALLATION**)
8. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY** (See **INSTALLATION**)
9. **INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY** (See **INSTALLATION**)
10. **INSTALL NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY** (See **INSTALLATION**)
11. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH** (See **INSTALLATION**)
12. **INSTALL FRONT DOOR SCUFF PLATE RH** (See **INSTALLATION**)
13. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY (for Automatic Air Conditioning System)** (See **INSTALLATION**)
14. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY (for Manual Air Conditioning System)** (See **INSTALLATION**)
15. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH** (See **INSTALLATION**)
16. **REMOVE FRONT DOOR SCUFF PLATE LH** (See **INSTALLATION**)
17. **INSTALL CENTER INSTRUMENT CLUSTER FINISH PANEL ASSEMBLY (w/ Smart Key System)** (See **INSTALLATION**)
18. **INSTALL CENTER INSTRUMENT CLUSTER FINISH PANEL ASSEMBLY (w/o Smart Key System)** (See **INSTALLATION**)
19. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

NOTE: **When disconnecting the cable, some systems need to be initialized after the cable is reconnected. (See INITIALIZATION)**

20. **PERFORM YAW RATE AND ACCELERATION SENSOR ZERO POINT CALIBRATION**

(See **CALIBRATION**)

21. **CHECK FOR YAW RATE SENSOR SIGNAL**

(See **TEST MODE PROCEDURE**)

STEERING ANGLE SENSOR

COMPONENTS

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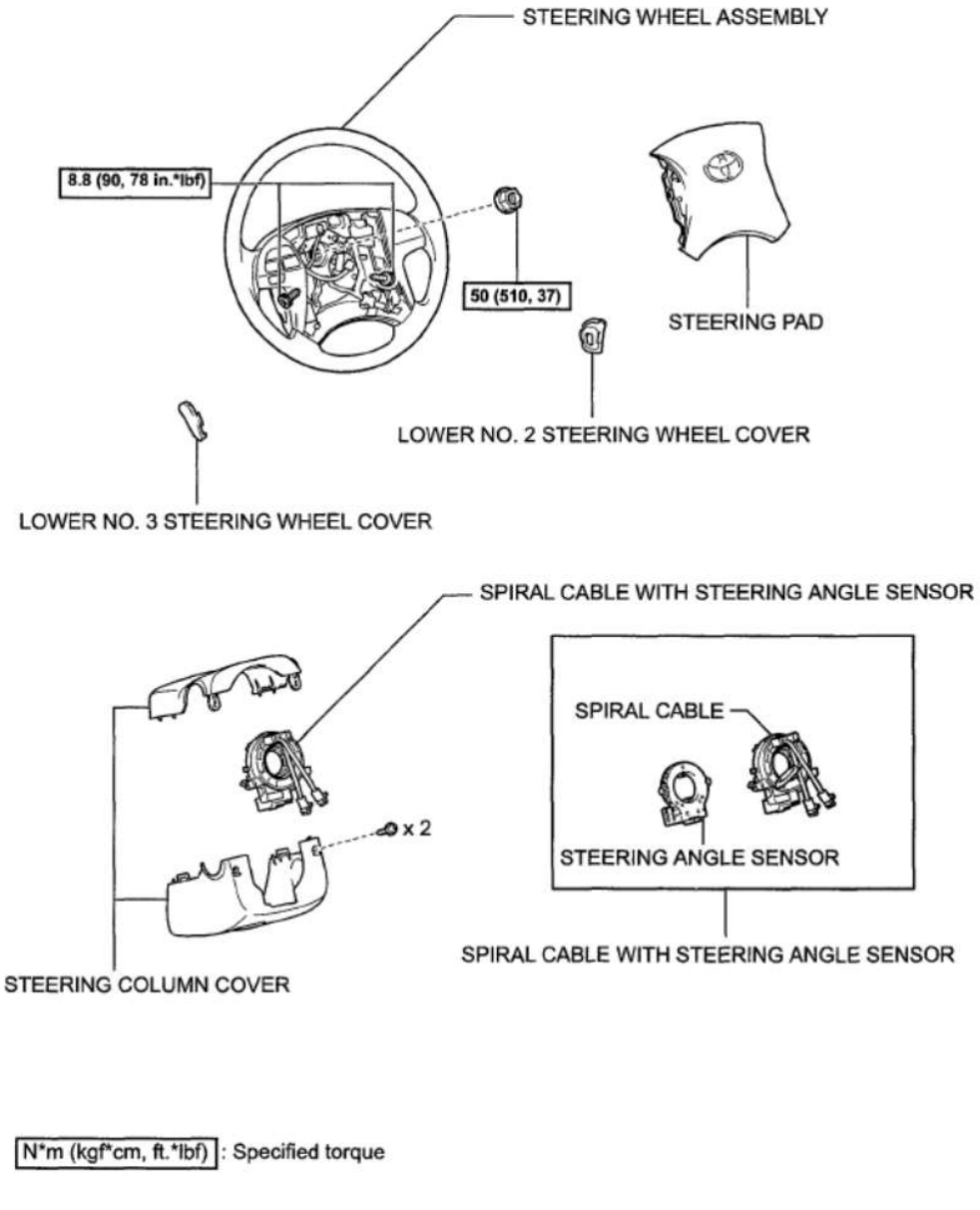


Fig. 221: Identifying Steering Angle Sensor Components With Torque Specification
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. **PRECAUTION**

   (See **AIRBAG SYSTEM**)

2. **FRONT WHEELS FACING STRAIGHT AHEAD**
3. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**

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NOTE: **When disconnecting the cable, some systems need to be initialized after the cable is reconnected. (See INITIALIZATION)**

4. **REMOVE LOWER NO. 3 STEERING WHEEL COVER** (See **REMOVAL**)
5. **REMOVE LOWER NO. 2 STEERING WHEEL COVER** (See **REMOVAL**)
6. **REMOVE STEERING PAD** (See **REMOVAL**)
7. **REMOVE STEERING WHEEL ASSEMBLY** (See **DISASSEMBLY**)
8. **REMOVE STEERING COLUMN COVER** (See **REMOVAL**)
9. **REMOVE SPIRAL CABLE WITH STEERING ANGLE SENSOR** (See **REMOVAL**)
10. **REMOVE STEERING ANGLE SENSOR**
    a. Disengage the 6 claws and 2 pins, and remove the steering angle sensor from the spiral cable.

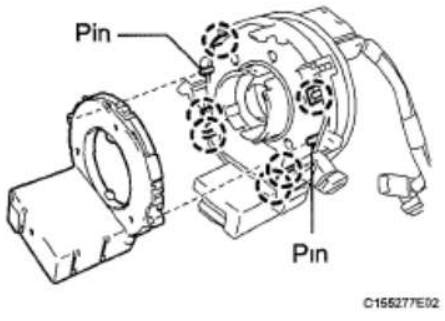


Fig. 222: Identifying Steering Angle Sensor With Claws And Pins
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

1. **INSTALL STEERING ANGLE SENSOR**
    a. Align the 2 locating pins, engage the 6 claws, and install the steering angle sensor to the spiral cable.

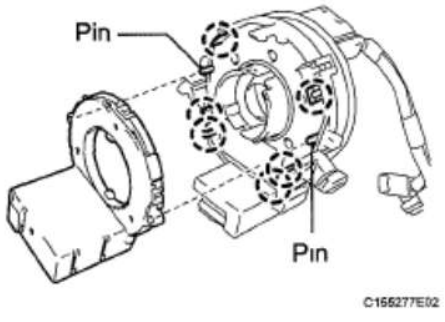


Fig. 223: Identifying Steering Angle Sensor With Claws And Pins
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **INSTALL SPIRAL CABLE WITH STEERING ANGLE SENSOR** (See **INSTALLATION**)

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3. **INSTALL STEERING COLUMN COVER** (See **INSTALLATION**)
4. **ADJUST SPIRAL CABLE** (See **INSTALLATION**)
5. **INSTALL STEERING WHEEL ASSEMBLY** (See **INSTALLATION**)
6. **INSPECT STEERING WHEEL CENTER POINT**
7. **INSTALL STEERING PAD** (See **INSTALLATION**)
8. **INSTALL LOWER NO. 3 STEERING WHEEL COVER** (See **INSTALLATION**)
9. **INSTALL LOWER NO. 2 STEERING WHEEL COVER** (See **INSTALLATION**)
10. **INSPECT STEERING PAD** (See **INSTALLATION**)
11. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

CAUTION:

- **When reconnecting the cable to the negative (-) battery terminal after installing the steering sensor, check that the front tires and steering wheel are kept aligned straight ahead before and after connecting the cable to the negative (-) battery terminal.**
- **When disconnecting the cable, some systems need to be initialized after the cable is reconnected. (See INITIALIZATION)**

12. **INSPECT SRS WARNING LIGHT**

(See **DIAGNOSIS SYSTEM**)

SKID CONTROL BUZZER

COMPONENTS

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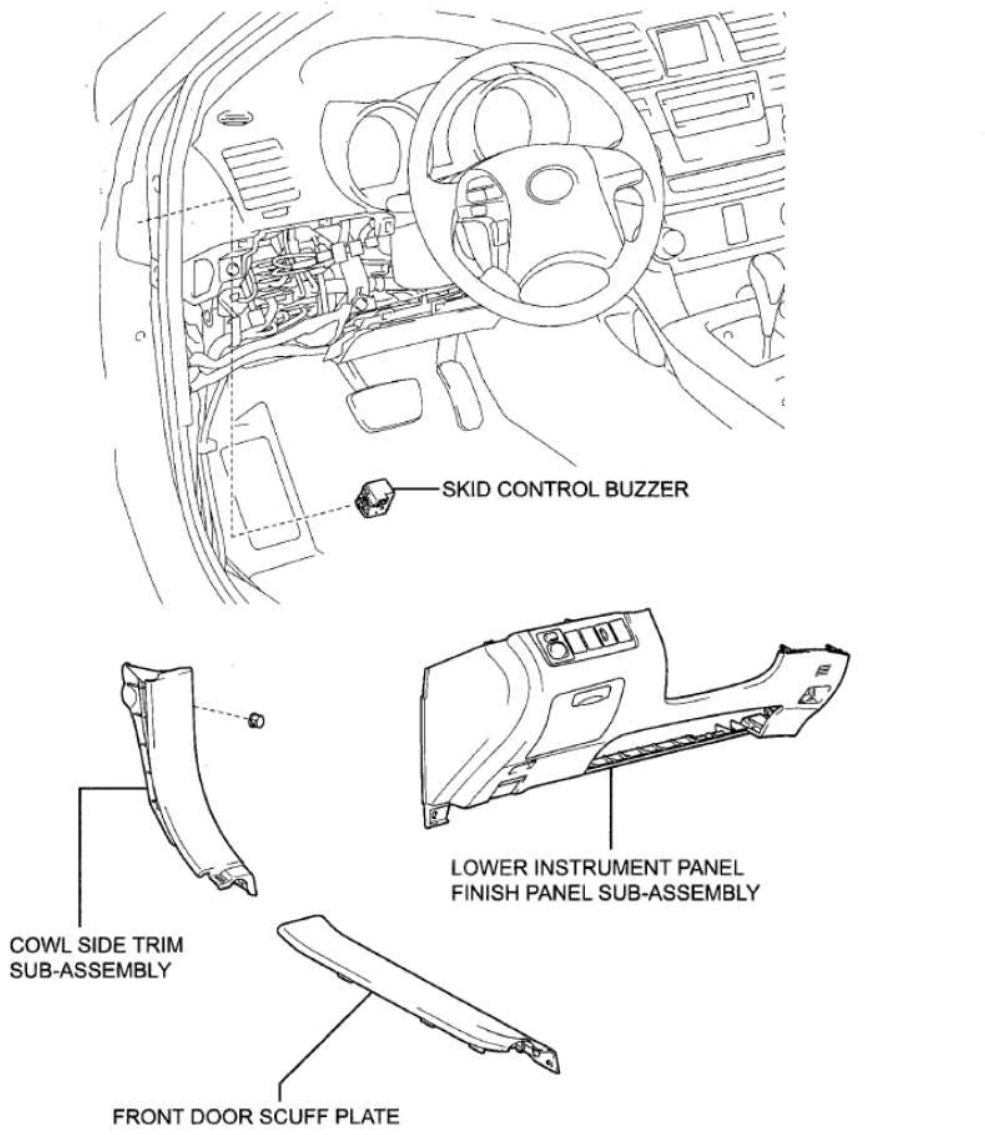


Fig. 224: Identifying Skid Control Buzzer Components
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**

   NOTE: When disconnecting the cable, some systems need to be initialized after the cable is reconnected. (See INITIALIZATION)

2. **REMOVE FRONT DOOR SCUFF PLATE** (See **REMOVAL**)
3. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY** (See **REMOVAL**)

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4. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY (for Manual Air Conditioning System)** (See **REMOVAL**)
5. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY (for Automatic Air Conditioning System)** (See **REMOVAL**)
6. **REMOVE SKID CONTROL BUZZER**
   a. Disconnect the skid control buzzer connector.

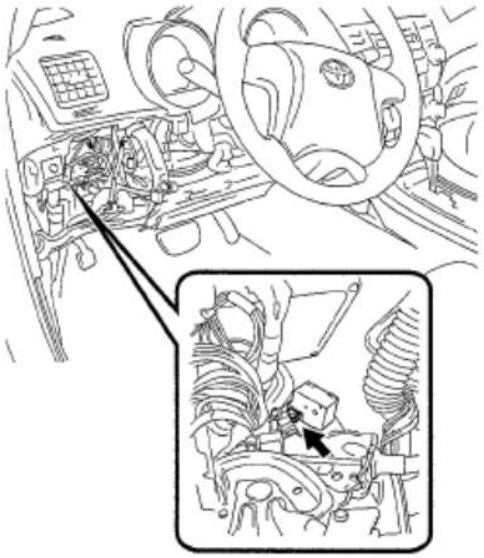


Fig. 225: Locating Skid Control Buzzer Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Remove the clamp and the skid control buzzer.

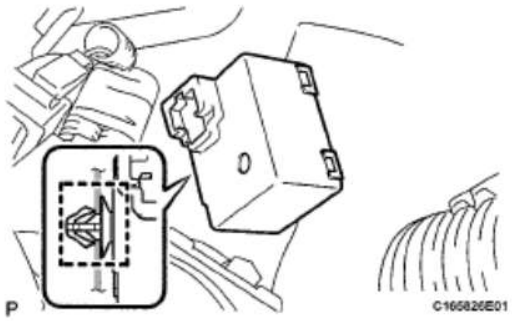


Fig. 226: Identifying Skid Control Buzzer With Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

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1. **INSTALL SKID CONTROL BUZZER**
   a. Install the clamp and skid control buzzer.

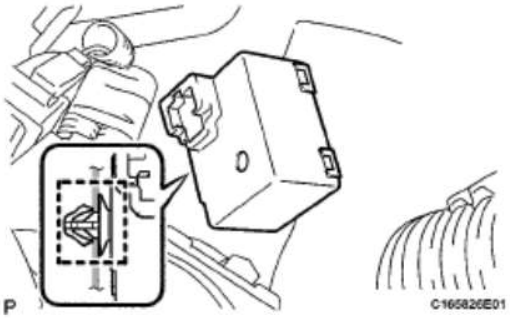


Fig. 227: Identifying Skid Control Buzzer With Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

   b. Connect the skid control buzzer connector.
2. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY (for Automatic Air Conditioning System)** (See **INSTALLATION**)
3. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY (for Manual Air Conditioning System)** (See **INSTALLATION**)
4. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY** (See **INSTALLATION**)
5. **INSTALL FRONT DOOR SCUFF PLATE** (See **INSTALLATION**)
6. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

NOTE: **When disconnecting the cable, some systems need to be initialized after the cable is reconnected. (See INITIALIZATION)**

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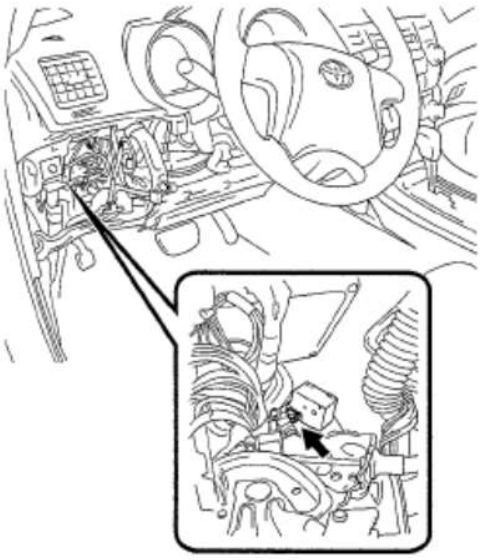


Fig. 228: Locating Skid Control Buzzer Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

VSC OFF SWITCH

COMPONENTS

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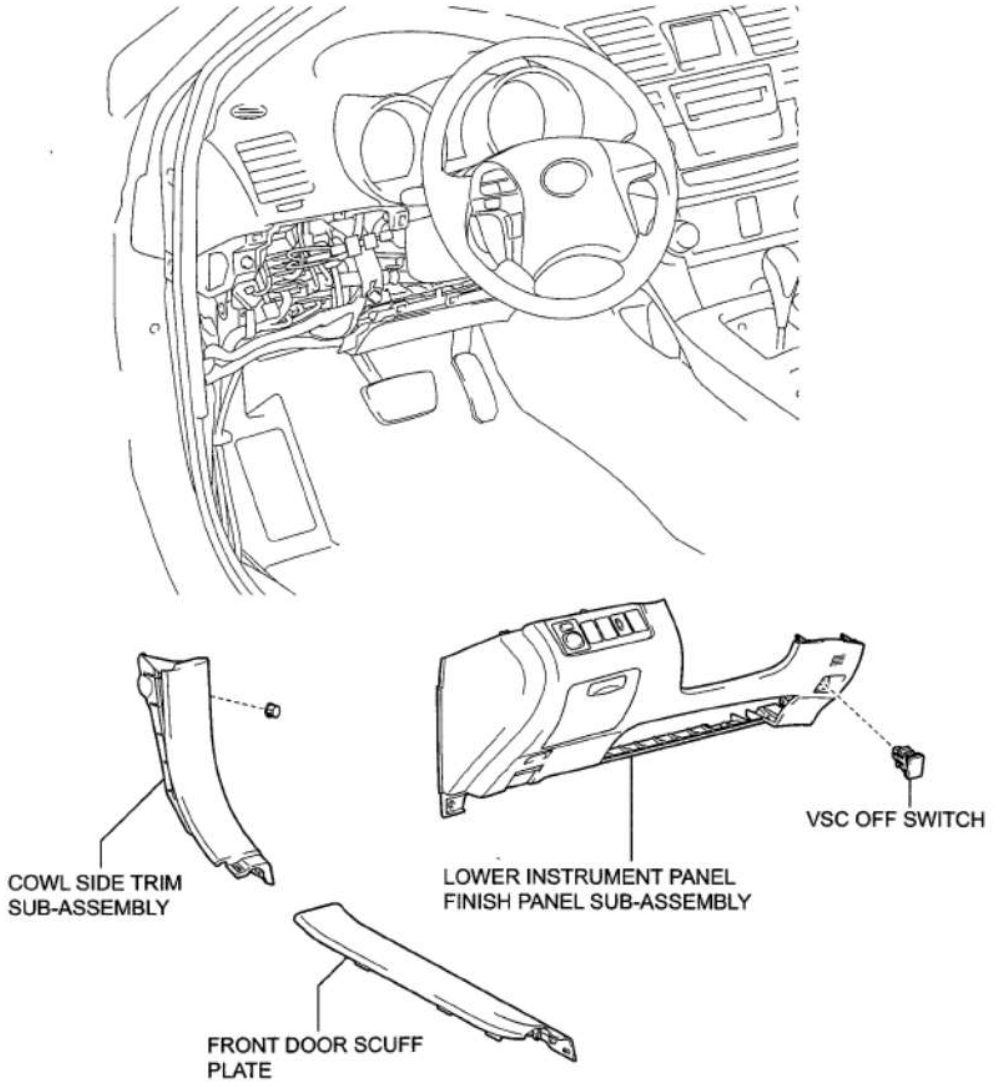


Fig. 229: Identifying VSC OFF Switch Components
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**

   NOTE: When disconnecting the cable, some systems need to be initialized after the cable is reconnected. (See INITIALIZATION)

2. **REMOVE FRONT DOOR SCUFF PLATE** (See **REMOVAL**)
3. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY** (See **REMOVAL**)

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4. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY (for Manual Air Conditioning System)** (See **REMOVAL**)
5. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY (for Automatic Air Conditioning System)** (See **REMOVAL**)
6. **REMOVE VSC OFF SWITCH**
   a. Disengage the 2 claws and remove the VSC off switch.

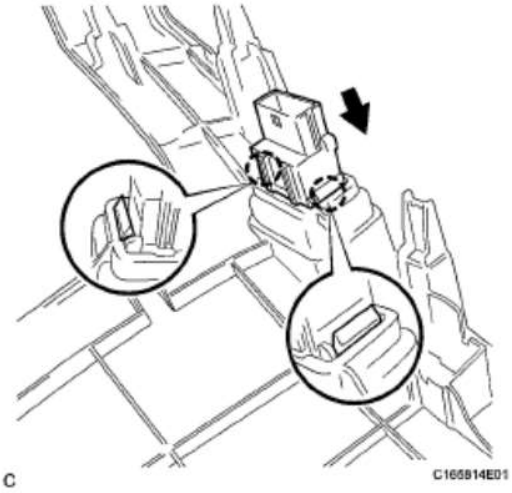


Fig. 230: Removing VSC OFF Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

1. **INSPECT VSC OFF SWITCH**
   a. Measure the resistance according to the value (s) in the table below.

   Standard resistance

   RESISTANCE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
3-6	Switch is not pushed in	10 kohms or higher
3-6	Switch is pushed in	Below 25 ohms

   If the result is not as specified, replace the switch.

   b. Check the illumination operation.

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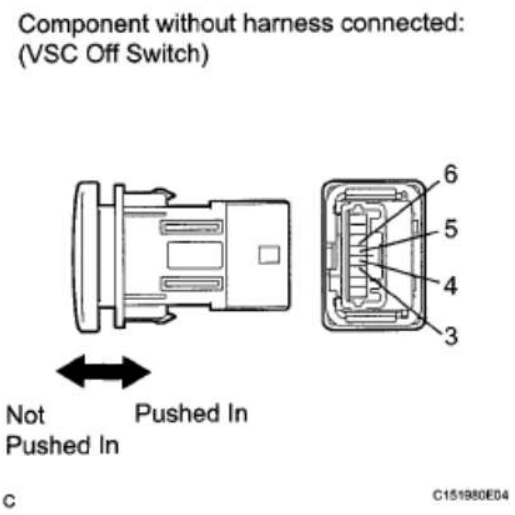


Fig. 231: Inspecting VSC OFF Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard resistance

RESISTANCE SPECIFICATION

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 switch.

INSTALLATION

1. **INSTALL VSC OFF SWITCH**
   a. Engage the 2 claws and install the VSC off switch.
2. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY (for Manual Air Conditioning System)** (See **INSTALLATION**)
3. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY (for Automatic Air Conditioning System)** (See **INSTALLATION**)
4. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY** (See **INSTALLATION**)
5. **INSTALL FRONT DOOR SCUFF PLATE** (See **INSTALLATION**)
6. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

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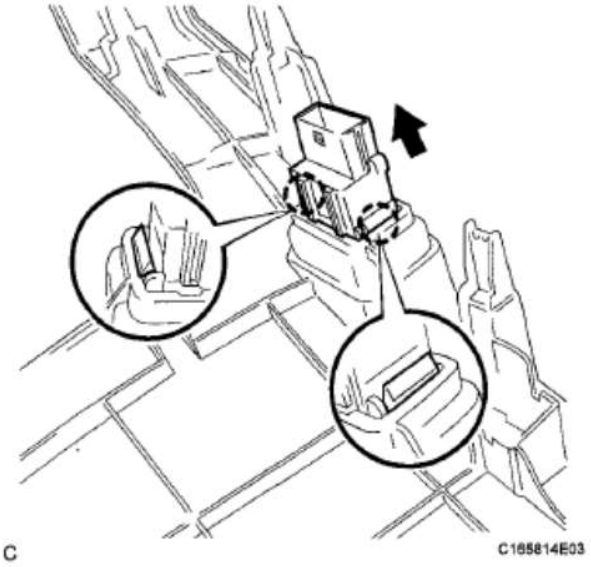


Fig. 232: Installing VSC OFF Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: **When disconnecting the cable, some systems need to be initialized after the cable is reconnected. (See INITIALIZATION)**

7. **CHECK FOR WARNING LIGHT AND INDICATOR LIGHT**

HINT:

(See **TEST MODE PROCEDURE**).

BRAKE PEDAL LOAD SENSING SWITCH

ON-VEHICLE INSPECTION

1. **INSPECT BRAKE PEDAL LOAD SENSING SWITCH**

NOTE:

- **Do not remove the brake pedal load sensing switch from the brake pedal support.**
- **When there is a malfunction in the brake pedal load sensing switch, replace the brake pedal support.**

a. Turn the ignition switch off.
b. Make sure that there is no looseness at the locking part and the connecting part of the connector.
c. Disconnect the brake pedal load sensing switch connector.

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Component without harness connected:
(Brake Pedal Load Sensing Switch)

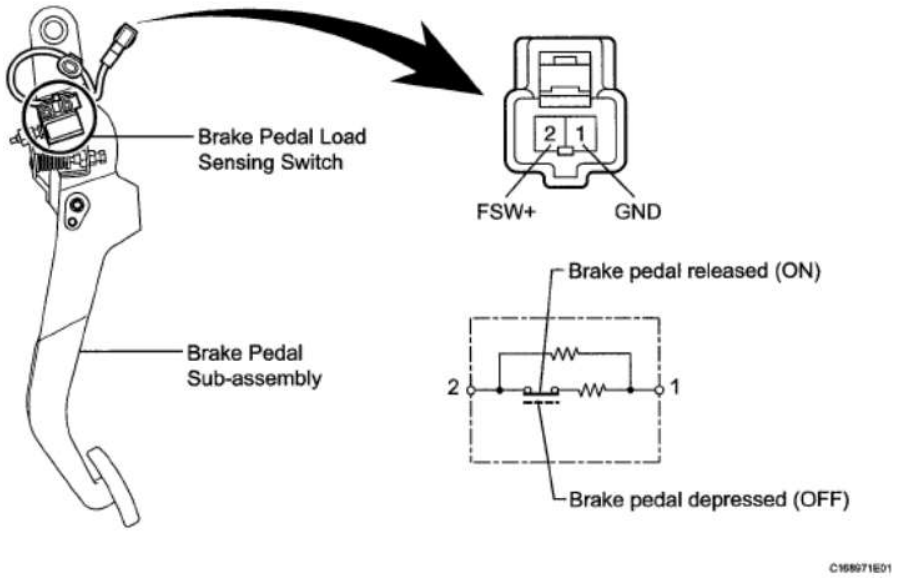


Fig. 233: Inspecting Brake Pedal Load Sensing Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
2 (FSW+) -1 (GND)	Brake pedal load sensing switch OFF (Brake pedal depressed)	950 to 1050 ohms
2 (FSW+) - 1 (GND)	Brake pedal load sensing switch ON (Brake pedal released)	203 to 223 ohms

If the value is not as specified, replace the brake pedal support assembly (See **REMOVAL**).

DOWNHILL ASSIST CONTROL SWITCH (FOR 4WD)

COMPONENTS

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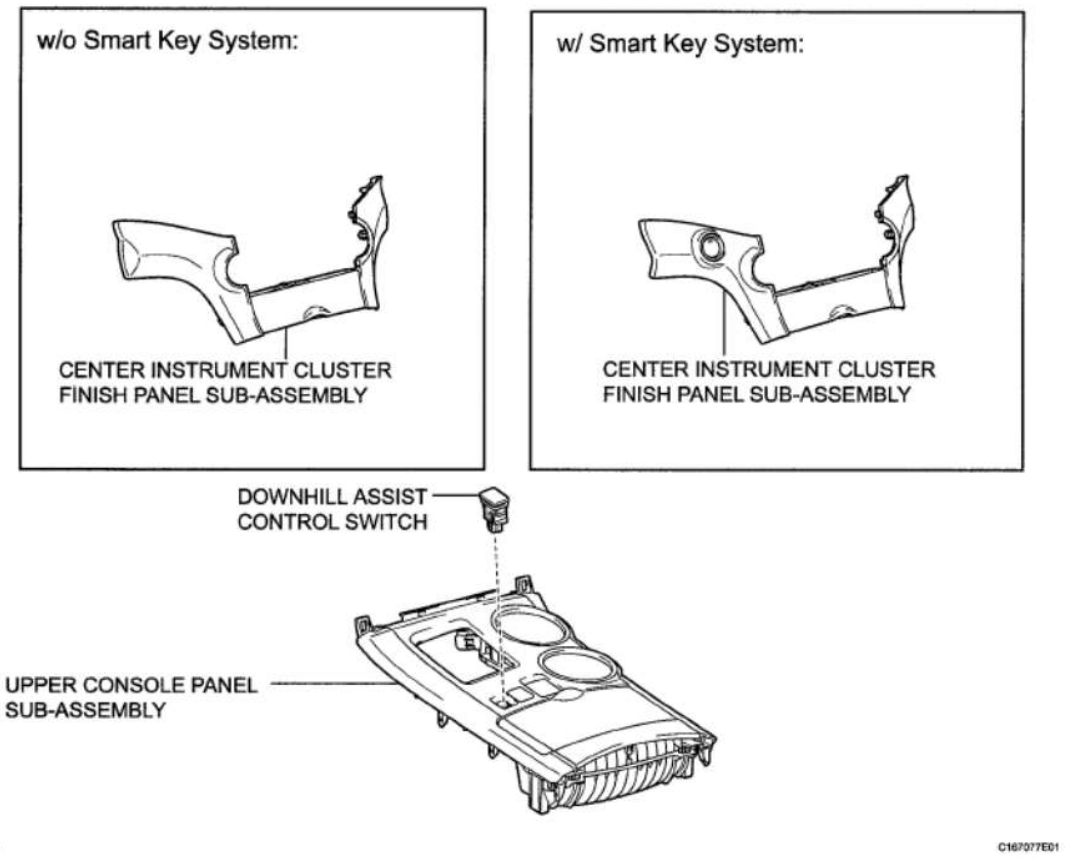


Fig. 234: Identifying Downhill Assist Control Switch Components (For 4WD)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**

   NOTE: When disconnecting the cable, some systems need to be initialized after the cable is reconnected. (See INITIALIZATION)

2. **REMOVE CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY (w/o Smart Key System)** (See **REMOVAL**)
3. **REMOVE CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY (w/ Smart Key System)** (See **REMOVAL**)
4. **REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY** (See **REMOVAL**)
5. **REMOVE DOWNHILL ASSIST CONTROL SWITCH**
   a. Remove the downhill assist control switch connector.

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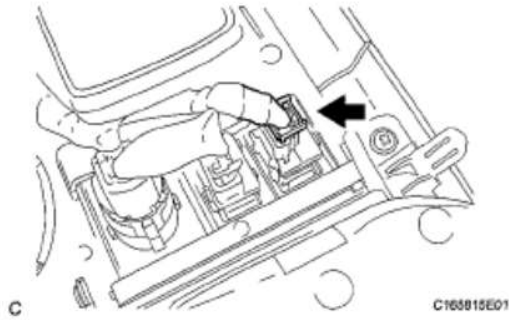


Fig. 235: Locating Downhill Assist Control Switch Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

b. Disengage the 2 claws and remove the downhill assist control switch.

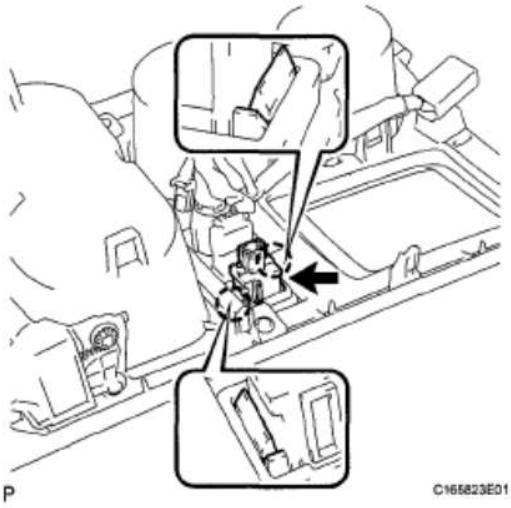


Fig. 236: Locating Downhill Assist Control Switch With Claws
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

1. **INSPECT DOWNHILL ASSIST CONTROL SWITCH**
   a. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Switch Condition	Specified Condition
1-4	Switch is not pushed in	10 kohms or higher
1-4	Switch is pushed in	Below 1 ohms

If the result is not as specified, replace the downhill assist control switch.

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Component without harness connected:
(Downhill Assist Control Switch)

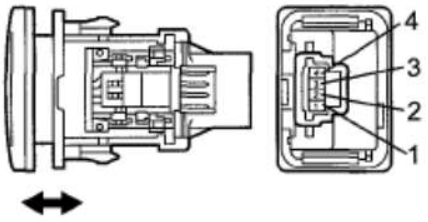


Fig. 237: Inspecting Downhill Assist Control Switch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. Check the illumination operation.
    1. Connect a. battery positive (+) lead to terminal 3 and negative (-) lead to terminal 2. Then check that the bulb in the switch illuminates.

OK:

Bulb illuminates.

If the result is not as specified, replace the downhill assist control switch.

INSTALLATION

1. **INSTALL DOWNHILL ASSIST CONTROL SWITCH**
    a. Engage the 2 claws and install the downhill assist control switch.

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Fig. 238: Locating Downhill Assist Control Switch With Claws
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b. Connect the downhill assist control switch connector.

2. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY** (See **INSTALLATION**)
3. **INSTALL CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY (w/ Smart Key System)** (See **INSTALLATION**)
4. **INSTALL CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY (w/o Smart Key System)** (See **INSTALLATION**)

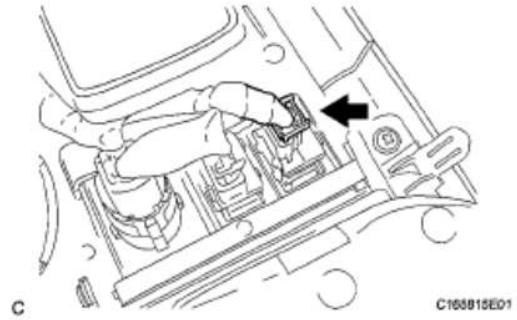


Fig. 239: Locating Downhill Assist Control Switch Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

NOTE: **When disconnecting the cable, some systems need to be initialized after the cable is reconnected. (See INITIALIZATION)**

6. **CHECK FOR WARNING LIGHT AND INDICATOR LIGHT**

(See **TEST MODE PROCEDURE**)

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STOP LIGHT CONTROL RELAY

ON-VEHICLE INSPECTION

1. **INSPECT STOP LIGHT CONTROL RELAY**
   a. Remove the stop light control relay.
   b. Measure the resistance according to the value (s) in the table below.

Standard resistance

RESISTANCE SPECIFICATION

Tester Connection	Condition	Specified Condition
3-4	Voltage is not applied between terminals 1 and 2	Below 1 ohms
3-5	Voltage is not applied between terminals 1 and 2	10 kohms or higher
3-4	Voltage is applied between terminals 1 and 2	10 kohms or higher
3-5	Voltage is applied between terminals 1 and 2	Below 1 ohms

If the value is not as specified, replace the stop light control relay.

Stop Light Control Relay:

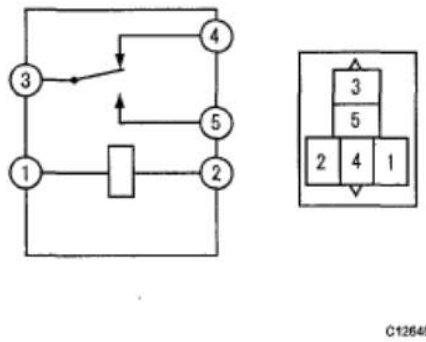


Fig. 240: Stop Light Control Relay Circuit Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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