

## PRE-CHECK

### 1. DIAGNOSIS SYSTEM

(a) Inspect the battery positive voltage.

**Battery positive voltage: 10 - 14 V**

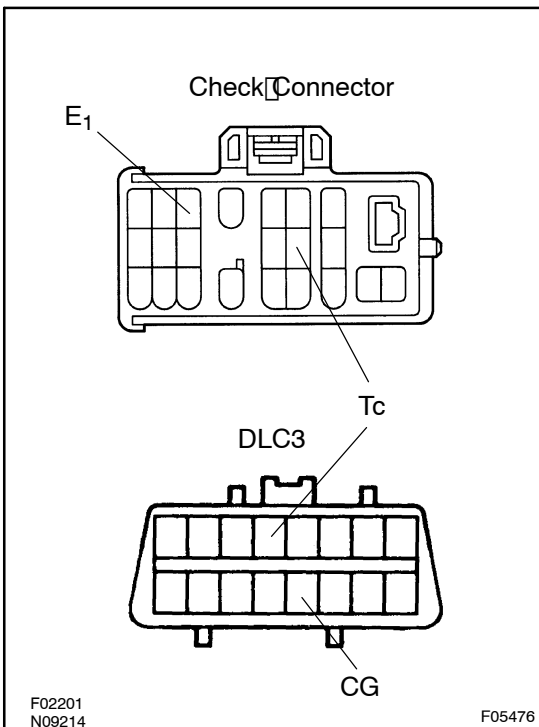
(b) Check the warning lights and indicator lights.

When the ignition switch is ON, check that the ABS warning light, VSC warning light, TRC OFF indicator light and SLIP indicator light go on for 3 sec.

HINT:

- If the ECU stores DTC, VSC warning light, ABS warning light and TRC OFF indicator light are ON.
- If the check result is not normal, proceed to troubleshoot for the light circuit.

Trouble Area	See Page
ABS warning light circuit	DI-86
VSC warning light circuit	DI-94
TRC OFF indicator light circuit	DI-89
SLIP indicator light circuit	DI-92



(c) In case of not using the hand-held tester:

Check the DTC of ABS system.

(1) Using SST, connect terminals Tc and E<sub>1</sub> of check connector or Tc and CG of DLC3.

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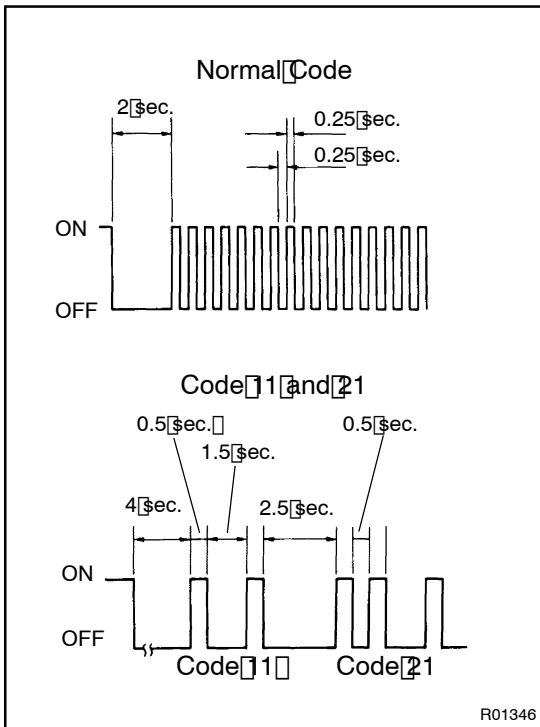
(2) Turn the ignition switch to ON.

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

HINT:

- If no code appears, inspect the diagnostic circuit, ABS warning light circuit and VSC warning light circuit.

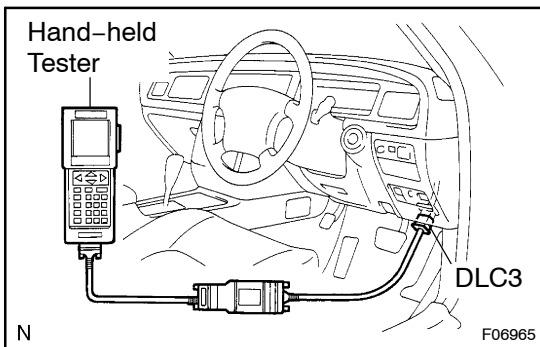
Trouble Area	See Page
Tc terminal circuit	DI-99
ABS warning light circuit	DI-86
VSC warning light circuit	DI-94



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

- Codes are examples in the code table on page DI-13.
- After completing the check, disconnect terminal Tc and CG of DLC3, and turn off the display.

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

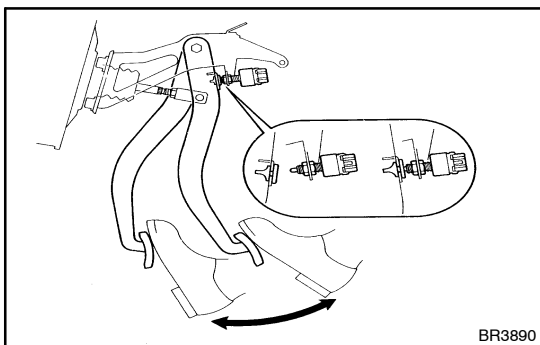


- In case of using the hand-held tester:  
Check the DTC.

- Hook up the hand-held tester to the DLC3.
- Turn the ignition switch to ON.
- Read the DTC by following the prompts on the tester screen.

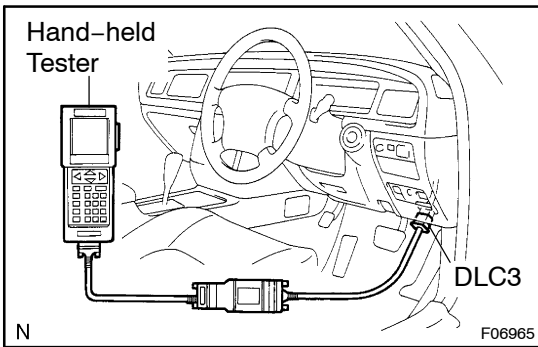
**HINT:**

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



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

- Using SST, connect terminals Tc and CG of DLC3.  
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- Turn the ignition switch to ON.
- Clear the DTC stored in ECU by depressing the brake pedal 8 times or more within 5 sec.
- Check that the warning light show the normal code.
- Remove the SST from the terminals of DLC3.  
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- (f) In case of using the hand-held tester:  
Clear the DTC.
- (1) Hook up the hand-held tester to the DLC3.
  - (2) Turn the ignition switch to ON.
  - (3) Operate the hand-held tester to erase the codes.

**HINT:**

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

**2. FREEZE FRAME DATA**

- (a) The vehicle (sensor) status at the occurrence of abnormality of the diagnosis code and during the ABS operation can be memorized and displayed using the hand-held tester.
- (b) Only one record of freeze frame data is stored, however, freeze frame data during the ABS operation is always up-dated. After the storage of freeze frame data, up to 31 ignition "ON" operations are stored and displayed.

**HINT:**

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

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

Hand-held tester display	Measurement Item	Reference Value
VEHICLE SPD	Vehicle speed	Speed indication of a meter
STOP LIGHT SW	Stop light switch signal	Stop light switch ON: ON, OFF: OFF
# IG ON	Numbers of operations of ignition switch ON after memorizing freeze frame data	0 - 31
MAS CYL PRESS	Master cylinder pressure sensor output voltage	Release brake pedal: 0.3 - 0.9 V Depress brake pedal: 3.2 - 4.5 V
MASS PRESS GRADE	Master cylinder pressure sensor changing declivity	-30 - 200 MPa/s
SYSTEM	Operate system	ABS operate: ABS BA operate: BA
YAW RATE	Yaw rate angle sensor output value	-70 - 70
STEERING ANG	Steering angle sensor output value	Left turn: Increase Right turn: Drop
G (RIGHT & LEFT)	Right and left G	-1.5 - 1.5
G (BACK & FORTH)	Back and forth G	-1.5 - 1.5
VSC / TRC OFF SW	TRC OFF switch signal	TRC OFF SW ON: ON OFF: OFF
SHIFT POSITION	Shift lever position	P: P R: R N: N D: D 2: 2 L: L

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

### 3. In case of not using the hand-held tester: ABS SENSOR SIGNAL CHECK (TEST MODE)

#### NOTICE:

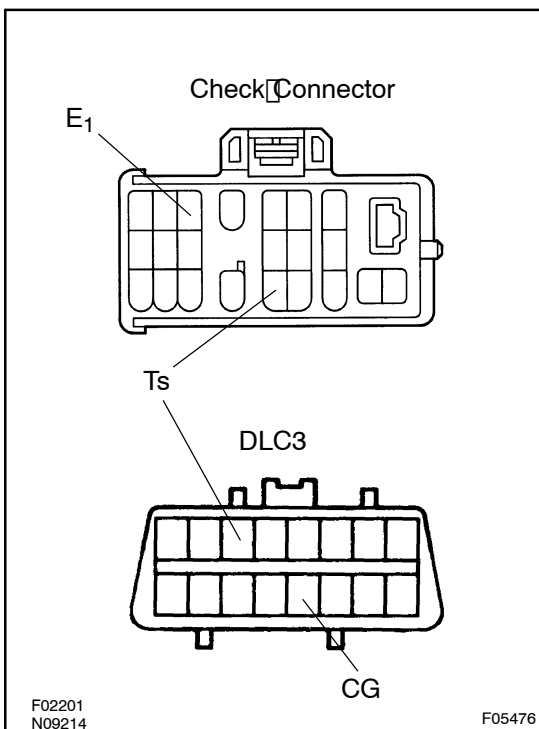
When having replaced the yaw rate sensor, deceleration sensor and/or ECU, perform zero point calibration of the yaw rate and deceleration sensors (See step 7.).

#### HINT:

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

#### (a) Procedures for test mode:

- (1) Turn the ignition switch OFF.
- (2) Set the shift lever to the P range.



- (3) Using SST, connect terminals Ts and E<sub>1</sub> of check connector or Ts and CG of DLC3.

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- (4) Check that the steering wheel is in the straight-ahead position.
- (5) Turn the ignition switch to ON.
- (6) Check that the ABS warning light blinks.

#### HINT:

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

Trouble Area	See page
Ts terminal circuit	DI-101
ABS warning light circuit	DI-86

- (b) Check the deceleration sensor.  
Keep the vehicle in a stationary condition on a level place for 1 sec. or more.
- (c) Check the master cylinder pressure sensor.
  - (1) Leaving the vehicle in a stationary condition and the brake pedal in free condition for 1 sec. or more, continue to depress the brake pedal with a force of 9.8 N (10 kgf, 22 lbf) or more for 1 sec. or more.
  - (2) While the vehicle is stopped, release the brake pedal.
  - (3) While the vehicle is stopped, quickly depress the brake pedal once or more and check the ABS warning light is lit for 3 sec.

#### HINT:

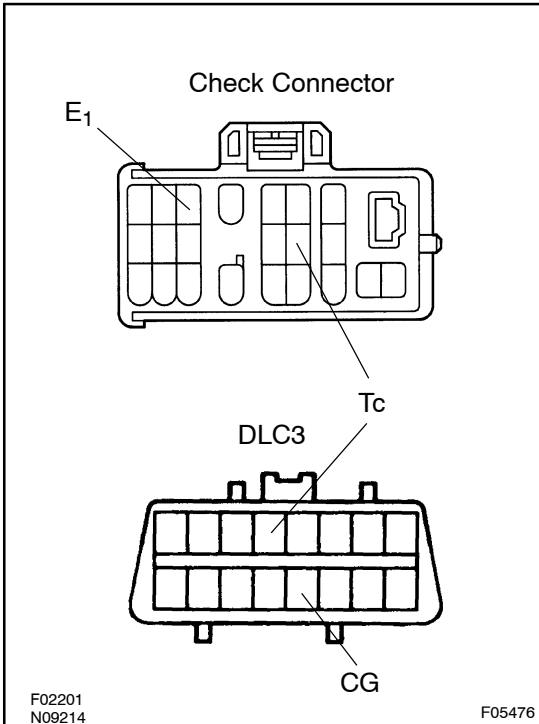
Repeat the operation until the ABS warning light is lit.

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

## HINT:

The sensor check may not be completed if the wheels spin or the steering wheel is steered during this check.

- (e) Stop the vehicle.

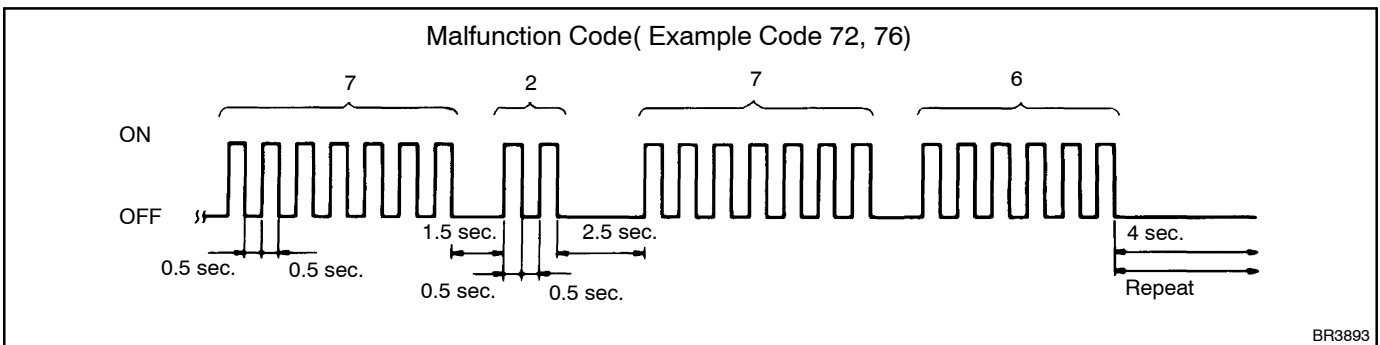


- (f) Using SST, connect terminals Tc and E<sub>1</sub> of check connector or Tc and CG of DLC3.  
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- (g) Read the number of blinks of the ABS warning light.

## HINT:

- See the list of DTC on the next page.
- If all the sensors are normal, the normal code is output (A cycle of 0.25 sec. ON and 0.25 sec. OFF is repeated).
- If 2 or more malfunctions are detected at the same time, the lowest numbered will be displayed 1st.



- (h) After performing the check, disconnect the SST from terminals Ts and CG, Tc and CG of DLC3 and turn the ignition switch OFF.

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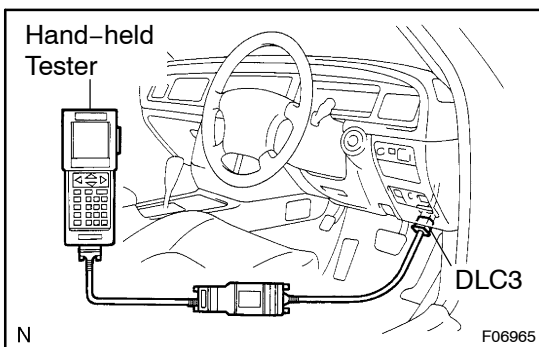
**4. In case of using the hand-held tester:  
ABS SENSOR SIGNAL CHECK (TEST MODE)**

**NOTICE:**

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

**HINT:**

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



- (a) Hook up the hand-held tester to the DLC3.
- (b) Do steps 3.-(a)-(2), (4) and from (b) to (e) on the previous pages.
- (c) Read the DTC by following the prompts on the tester screen.

**HINT:**

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

**DTC of ABS sensor check function:**

Code No.	Diagnosis	Trouble Area
C1271 / 71	Low output voltage of right front speed sensor	<ul style="list-style-type: none"> <li>• Right front speed sensor</li> <li>• Sensor installation</li> <li>• Sensor rotor</li> </ul>
C1272 / 72	Low output voltage of left front speed sensor	<ul style="list-style-type: none"> <li>• Left front speed sensor</li> <li>• Sensor installation</li> <li>• Sensor rotor</li> </ul>
C1273 / 73	Low output voltage of right rear speed sensor	<ul style="list-style-type: none"> <li>• Right rear speed sensor</li> <li>• Sensor installation</li> <li>• Sensor rotor</li> </ul>
C1274 / 74	Low output voltage of left rear speed sensor	<ul style="list-style-type: none"> <li>• Left rear speed sensor</li> <li>• Sensor installation</li> <li>• Sensor rotor</li> </ul>
C1275 / 75	Abnormal change in output voltage of right front speed sensor	Right front speed sensor rotor
C1276 / 76	Abnormal change in output voltage of Left front speed sensor	Left front speed sensor rotor
C1277 / 77	Abnormal change in output voltage of right rear speed sensor	Right rear speed sensor rotor

C1278 / 78	Abnormal change in output voltage of Left rear speed sensor	Left rear speed sensor rotor
C1279 / 79	Deceleration sensor is faulty	<ul style="list-style-type: none"> <li>• Deceleration sensor</li> <li>• Sensor installation</li> </ul>
C1281 / 81	<ul style="list-style-type: none"> <li>• Master cylinder pressure sensor output signal is faulty</li> <li>• The problem symptoms in the brake cannot be confirmed</li> </ul>	<ul style="list-style-type: none"> <li>• Master cylinder pressure sensor</li> <li>• Brake booster</li> </ul>

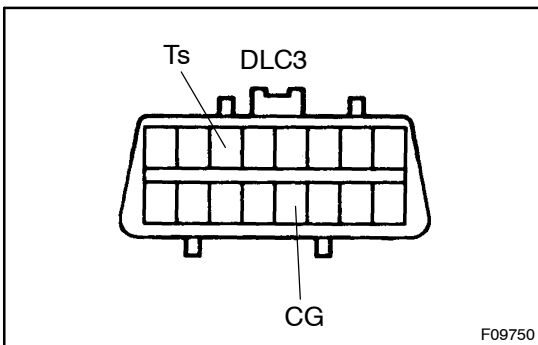
### 5. In case of not using the hand-held tester: VSC SENSOR SIGNAL CHECK (TEST MODE)

#### NOTICE:

When having replaced the yaw rate sensor, deceleration sensor and/or ECU, perform zero point calibration of the yaw rate and deceleration sensors (See step 7.).

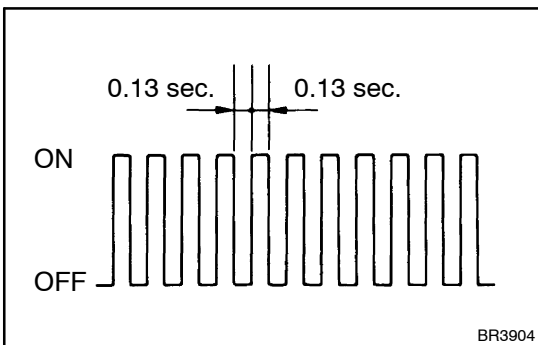
#### HINT:

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

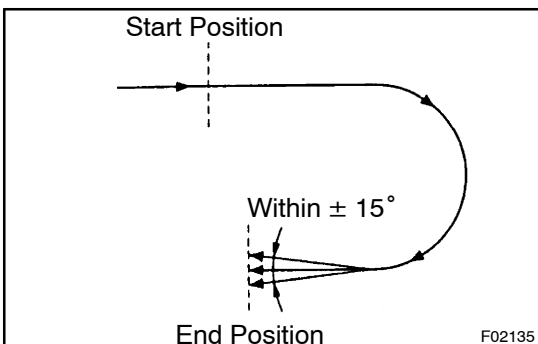


#### (a) Procedures for test mode:

- (1) Turn the ignition switch OFF.
- (2) Check that the shift lever position is at P range. Turn the steering wheel to the straight-ahead position.
- (3) Using SST, connect terminals Ts and CG of DLC3.  
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- (4) Start the engine.



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



#### (b) Check the yaw rate sensor.

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

Stop the vehicle and shift the shift lever to the P range. Check that the VSC warning buzzer sounds for 3 sec.

If the VSC warning buzzer sounds, the sensor check is in normal completion.

If the VSC warning buzzer does not sound, check the VSC warning buzzer circuit, then do the sensor check again.

Trouble Area	See page
VSC warning buzzer circuit	DI-97

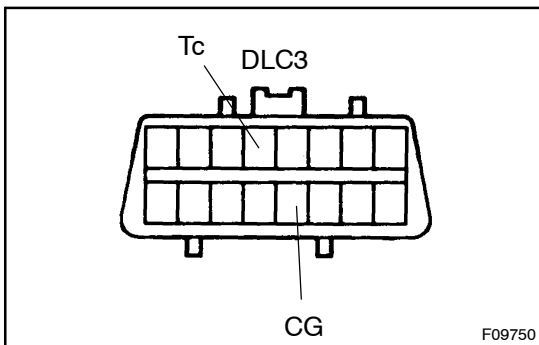
If the VSC warning buzzer still does not sound, there is malfunction in the VSC sensor, so check the DTC.

HINT:

- Drive the vehicle circularly by  $180^\circ$ . At the end of the turn, the direction of the vehicle should be within  $180^\circ \pm 5^\circ$  from its start position.
- Do not spin the wheels.

(c) Check the steering angle sensor.

Turn the steering wheel to either left or right to the full lock position, from the vehicle stationary condition, and turn back the steering wheel to the neutral position.



(d) Read the DTC.

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

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

HINT:

- See the list of DTC shown in the next page.
- If every sensor is normal, a normal code is output. (A cycle of 0.25 sec. ON and 0.25 sec. OFF is repeated.)

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

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**6. In case of using the hand-held tester:**

#### VSC SENSOR SIGNAL CHECK (TEST MODE)

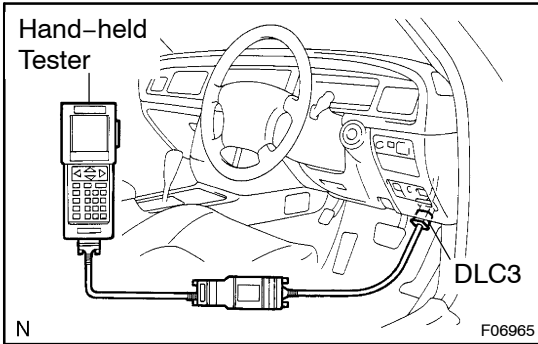
**NOTICE:**

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

HINT:

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





- (a) Hook up the hand-held tester to the DLC3.
- (b) Do steps 5.-(a)-(2), (a)-(4), (b) and (c) on the previous pages.
- (c) Read the DTC by following the prompts on the tester screen.

**HINT:**

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

**DTC of VSC sensor check function:**

Code No.	Diagnosis	Trouble Area
C0371 / 71	Yaw rate sensor output signal malfunction	<ul style="list-style-type: none"> <li>• Yaw rate sensor</li> <li>• Yaw rate sensor circuit</li> </ul>
C1208 / 72	Steering angle sensor output signal malfunction	<ul style="list-style-type: none"> <li>• Steering angle sensor</li> <li>• Steering angle sensor circuit</li> </ul>

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

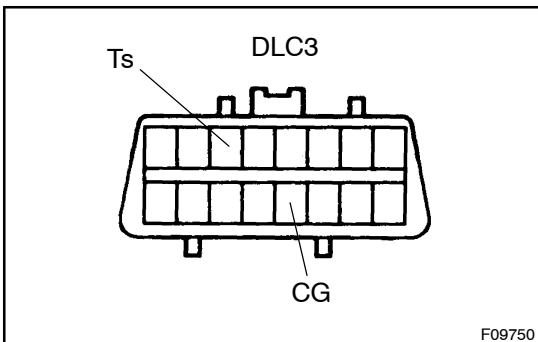
**HINT:**

- When having replaced the yaw rate sensor, deceleration sensor or the ECU, make sure to perform yaw rate and deceleration sensors' zero point calibration. Be sure to complete this step 7. once it is started.
- During step 7., a not-replaced sensor also requires zero point calibration.

**NOTICE:**

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

- (a) Clear the zero points of the yaw rate and deceleration sensors.
  - (1) Shift the shift lever to P range.
  - (2) Turn the ignition switch to ON in a stationary condition.



- (3) With the lit switch ON, using SST, repeat a cycle of short and open between terminals Ts and CG of DLC3 4 times or more within 8 sec. Check that the TRC OFF and VSC indicator light is lit indicating the recorded zero point is erased.

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- (4) Turn the ignition switch OFF and VSC with in 15 sec.
- (b) Obtain zero point of the yaw rate sensor.
  - (1) Make the terminals Ts and CG of DLC3 disconnected.

- (2) Turn the ignition switch to ON.

HINT:

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

- (3) Check that the lit TRC OFF and VSC indicator light goes off about 15 sec. after the ignition switch is turned ON.

HINT:

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

(Normal code)

- (4) After ensuring that the TRC OFF and VSC indicator light remains OFF for 2 sec., turn the ignition switch OFF.

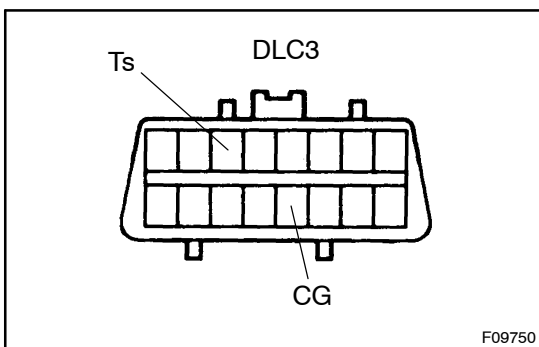
HINT:

If the ignition switch is not turned OFF in step (a)–(4), make sure that the TRC OFF and VSC indicator light blinks for 2 sec. Then turn the ignition switch OFF.

(c) Perform deceleration sensor zero point calibration.

**NOTICE:**

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



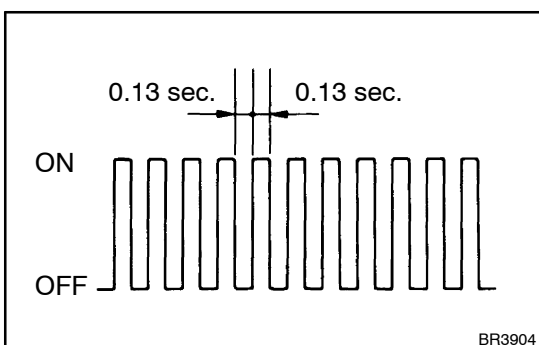
- (1) Using SST, connect the terminals Ts and CG of DLC3.

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- (2) Turn the ignition switch to ON.

HINT:

Place the vehicle in a stationary condition with the shift lever in P range.



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

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

- (5) Remove the SST and make the terminals Ts and CG of DLC3 disconnected.

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