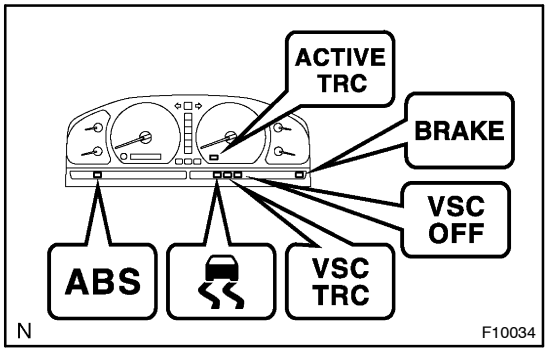


DI6X0–01

PRE–CHECK

1. DIAGNOSIS SYSTEM

(a) Check the warning lights and buzzer.

(1) Release parking brake lever.

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

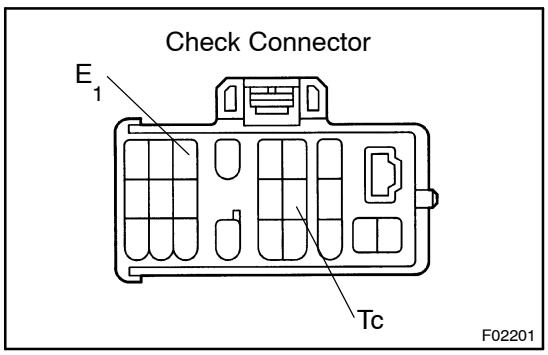
(3) When depressing the brake pedal repeatedly it may turn on the warning lights and buzzer.

HINT:

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

Trouble Area	See Page
ABS warning light circuit	DI–133
VSC TRC warning light circuit	DI–138
BRAKE warning light circuit	DI–144
VSC OFF indicator light circuit	DI–156
SLIP indicator light circuit	DI–149
ACTIVE TRC indicator light circuit	DI–153

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



(1) Using SST, connect terminals Tc and E1 of check connector.
SST 09843–18020

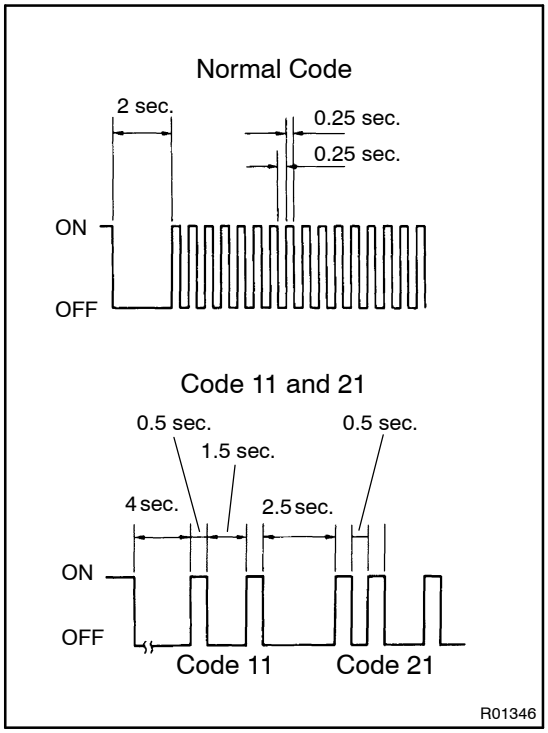
(2) Turn the ignition switch ON.

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

HINT:

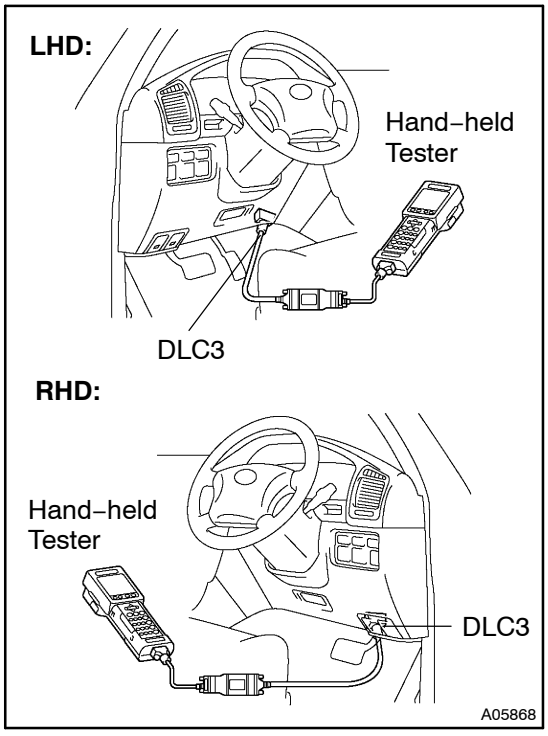
- If no code appears, inspect the Tc circuit, ABS or VSC TRC warning light circuit.

Trouble Area	See page
Tc circuit	DI–164
ABS warning light circuit	DI–133
VSC TRC warning light circuit	DI–138



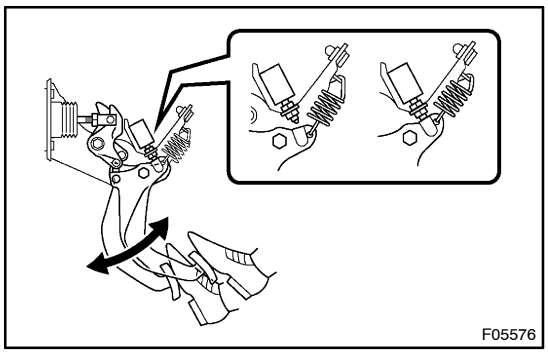
- As an example, the blinking patterns for normal code and codes 11 and 21 are shown on the left.
  (4) Codes are explained in the code table on page DI–15.
  (5) After completing the check, disconnect terminals Tc and E_1 of check connector and turn off the display.

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



(c) In case of using hand–held tester:
Check the DTC.
(1) Hook up the hand–held tester to the DLC3.
(2) Turn the ignition switch ON.
(3) Read the DTC by following the prompts on the tester screen.

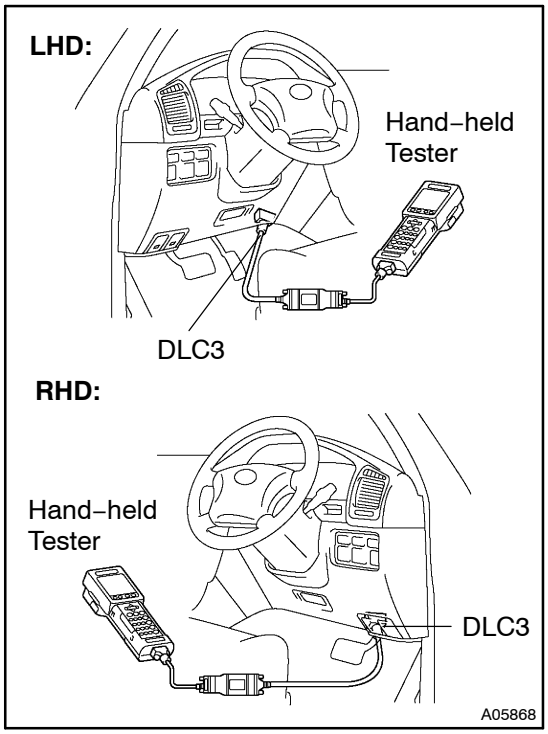
HINT:
Please refer to the hand–held tester operator's manual for further details.



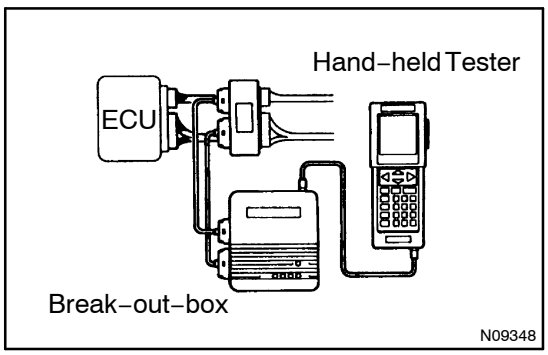
(d) In case of not using hand–held tester:
Clear the DTC.
(1) Using SST, connect terminals Tc and E_1 of check connector.
SST 09843–18020
(2) Turn the ignition switch ON.
(3) Clear the DTC stored in ECU by depressing the brake pedal 8 or more times within 5 sec.

(4) Check that the warning light shows the normal code.
(5) Remove the SST from the terminals of check connector.

SST 09843 –18020

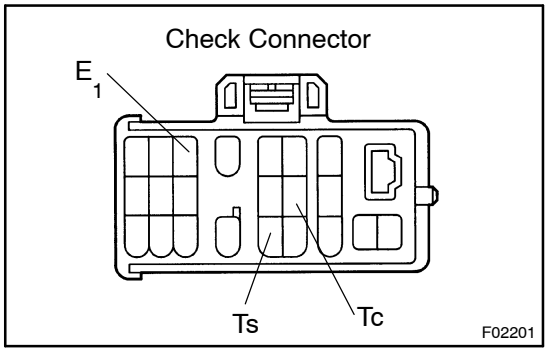


(e) In case of using hand –held tester:
Clear the DTC.
(1) Hook up the hand –held tester to the DLC3.
(2) Turn the ignition switch ON.
(3) Operate the hand –held tester to erase the codes.
(See hand –held tester operator's manual.)



(f) Reference:
Using break –out–box and hand –held tester, measure the ECU terminal values.
(1) Turn the ignition switch OFF.
(2) Hook up the break –out–box and hand –held tester to the vehicle.
(3) Turn the ignition switch ON.
(4) Read the ECU input/output values by following the prompts on the tester screen.

HINT:
- Hand–held tester has a "Snapshot" function. This records the measured values and is effective in the diagnosis of intermittent problems.
- Please refer to the hand –held tester/break –out–box operator's manual for further details.



2. SPEED SENSOR SIGNAL CHECK (TEST MODE)

HINT:

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

(a) In case of not using hand –held tester:

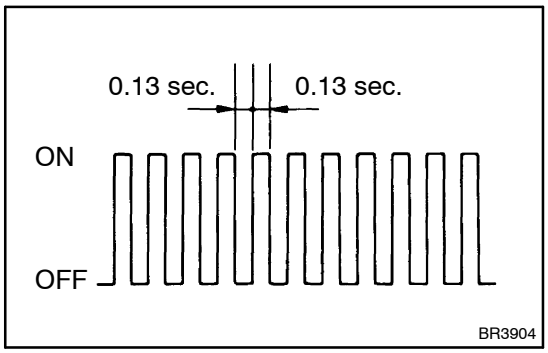
Check the speed sensor signal.

(1) Turn the ignition switch OFF.

(2) Using SST, connect terminals Ts and E_1 of check connector.

SST 09843 –18020

(3) Start the engine.



(4) Check that the ABS warning light blinks.

HINT:

If the ABS warning light does not blink, inspect the ABS warning light circuit and Ts circuit (See page DI–133 and DI–166).

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

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

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

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

HINT:

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

(9) Drive vehicle straight forward.

When driving the vehicle with the speed faster than 45 km/h (28 mph) for several seconds, check that the ABS warning light comes off.

HINT:

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

(10) Stop the vehicle.

(11) Using SST, connect terminals Tc and E_1 of check connector.

SST 09843 –18020

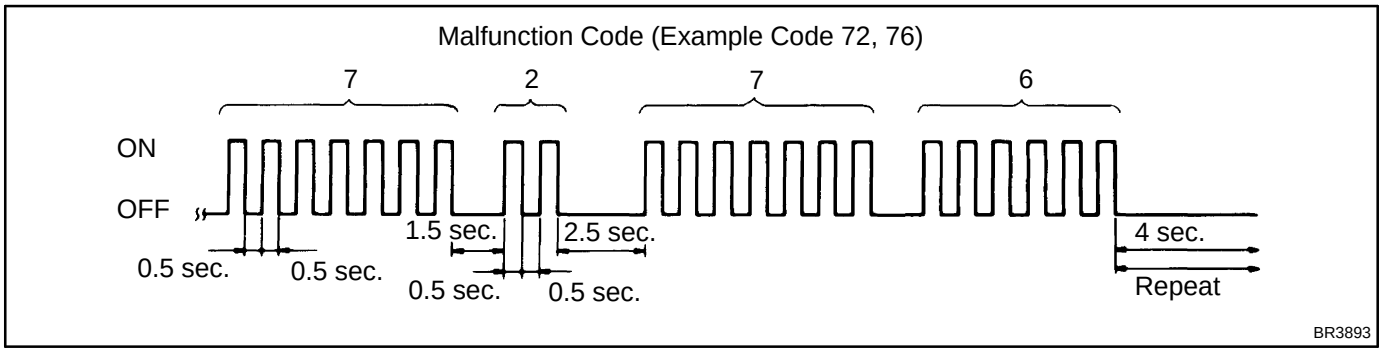
(12) Read the number of blinks of the ABS warning light.

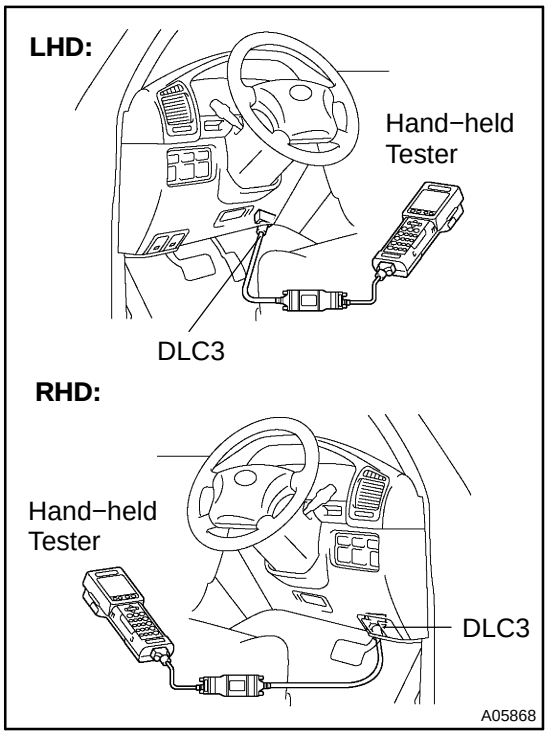
HINT:

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

(13) After doing the check, disconnect the SST from terminals Ts and E_1, Tc and E_1 of check connector and turn ignition switch OFF.

SST 09843−18020





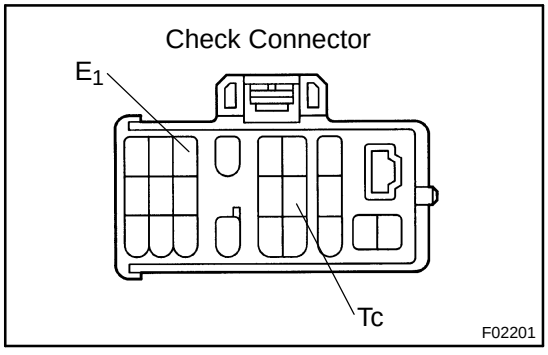
(b) In case of using hand−held tester:
Check the sensor signal.

(1) Hook up the hand−held tester to the DLC3.
(2) Do step (3) and (4) to (10) on the previous page.
(3) Read the DTC by following the prompts on the tester screen.

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

DTC of speed sensor check function:

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



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

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:

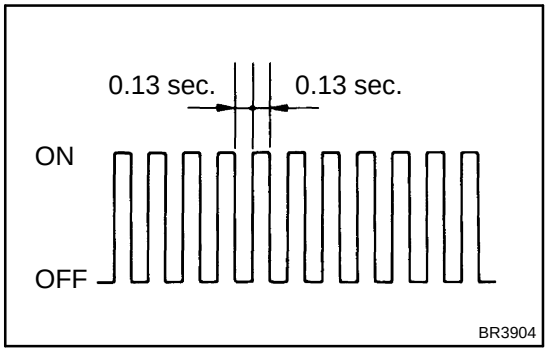
(1) Turn the ignition switch OFF.

(2) Check that the shift lever position is at P range, turn the steering wheel to the neutral range.

(3) Using SST, connect terminals Ts and E_1 of check connector.

SST 09843−18020

(4) Start the engine.



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

HINT:

If the VSC TRC warning light does not blink, inspect the VSC TRC warning light circuit and Ts terminal circuit (See page DI−138 and DI−166).

(b) When replacing yaw rate sensor and/or ECU, the first time only:

Perform the yaw rate sensor zero point calibration.

HINT:

Before the yaw rate sensor zero point calibration, shift the shift lever to P range, turn the ignition switch ON, and repeat connecting and disconnecting between terminals Ts and E_1 of check connector 4 times or more for 8 sec. After this, leave the vehicle in stationary condition for 15 sec. and carry out the yaw rate sensor zero point calibration.

Place the vehicle on the horizontal surface and carry out the zero point calibration of the yaw rate sensor by turning the ignition switch ON.

HINT:

After turning the ignition switch ON, keep the vehicle stationary condition until the VSC TRC warning changes from lighting to light−out.

(c) When replacing deceleration sensor and/or ECU, the first time only:

Perform the deceleration sensor zero point calibration.

HINT:

Before the deceleration sensor zero point calibration, shift the shift lever to P range, turn the ignition switch ON, and repeat connecting and disconnecting between terminals Ts and E_1 of check connector 4 times or more for 8 sec. Then, short circuit the check connector between Ts and E_1 again and turn the ignition switch ON. After this, leave the vehicle in stationary condition for 15 sec. and carry out the deceleration sensor zero point calibration.

Place the vehicle on the horizontal surface and carry out the zero point calibration of the deceleration sensor by turning the ignition switch ON.

HINT:

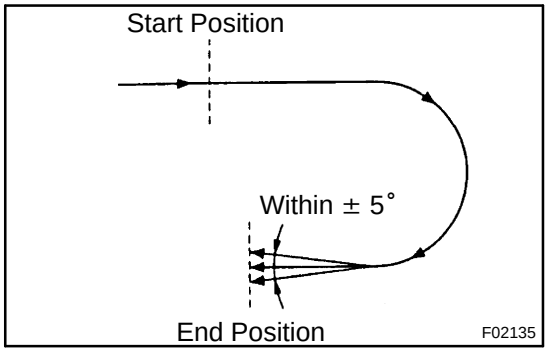
After turning the ignition switch ON, keep the vehicle stationary condition until the VSC TRC warning changes from lighting to blinking in about 2 seconds.

NOTICE:

Do not turn OFF the ignition switch within 2 seconds after VSC TRC warning starts blinking.

(d) Check the steering angle sensor.

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



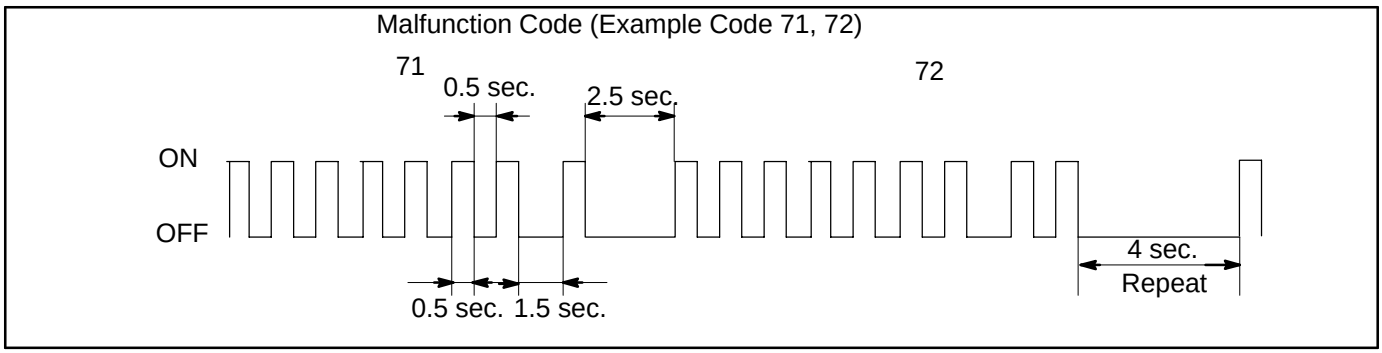
(e) Check the yaw rate sensor.
Shift the shift lever to the D range and drive the vehicle at the vehicle speed of approx. 5 km/h (3 mph), turn the steering wheel either to left or right for 90˚ or more, and maintain 180˚ circular drive for the vehicle.
Stop the vehicle and shift the shift lever to the P range, check that the VSC buzzer sounds for 3 sec.

If the VSC buzzer sounded, the sensor check is in normal completion.
If the VSC buzzer does not sound, do the sensor check again.
If the VSC buzzer still won't sound, there is malfunction in the VSC sensor, so check the DTC.

HINT:
- Drive the vehicle circularly by 180˚. At the end of the turn, the direction of the vehicle should be within 180˚± 5˚ of its start position.
- Do not spin the rear wheels.
- Do not shift the shift lever to P range during the turn.
- Do not stop the vehicle during the turn.

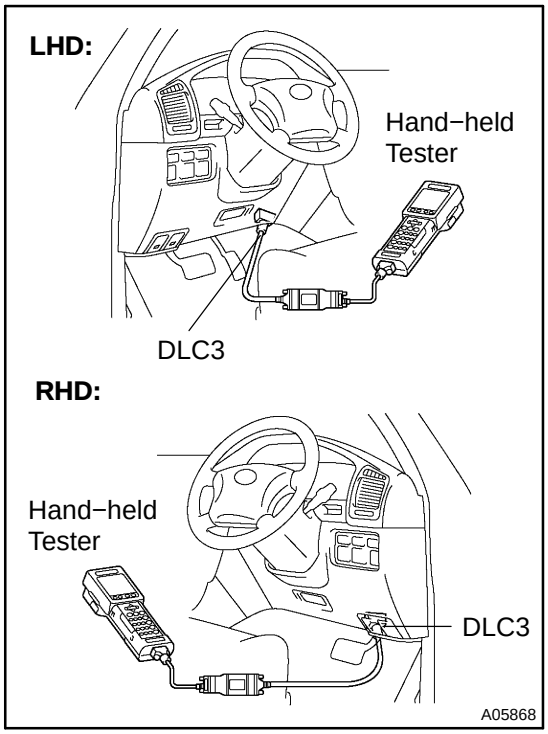
(f) Read the DTC.
(1) Using SST, connect terminals Tc and E_1 of check connector.
SST 09843−18020
(2) Read the number of blinks of the VSC TRC warning light.

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



(3) After doing the check, disconnect the SST from terminals Ts and E_1, Tc and E_1 of check connector and turn ignition switch OFF.

SST 09843−18020



4. In case of using hand−held tester: CHECK VSC SENSOR SIGNAL

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

(b) Do steps (a) − (2), (a) − (4) and (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.

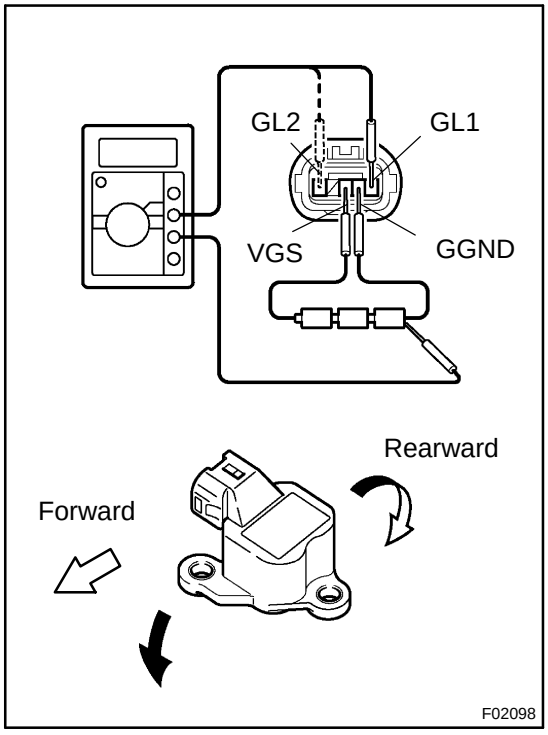
DTC of the VSC sensor check function:

Code No.	Diagnosis	Trouble Area
C0371 / 71	Yaw rate sensor output signal malfunction	S Yaw rate sensor S Yaw rate sensor circuit
C1208 / 72	Steering position sensor output signal malfunction	S Steering position sensor S Steering position sensor circuit

5. DECELERATION SENSOR OPERATION DIAGNOSIS SYSTEM

CAUTION:

While checking the deceleration sensor operating diagnosis system, ABS does not work and brake system works as a conventional brake system.



6. DECELERATION SENSOR CHECK

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

(b) Connect VGS terminal to the batteries' positive (+) terminal, and GGND terminal to the batteries' negative (−) terminal, apply about 4.5 V between VGS and GGND terminals.

NOTICE:

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

(c) Check the output voltage of GL1 and GL2 terminals.

Symbols	Condition	Standard Value
GL1	Horizontal	About 2.3 V
GL1	Lean forward	0.4 V − about 2.3 V
GL1	Lean rearward	About 2.3 V − 4.1 V
GL2	Horizontal	About 2.3 V
GL2	Lean forward	About 2.3 V − 4.1 V
GL2	Lean rearward	0.4 V − about 2.3 V

HINT:

- If the sensor is tilted too much it may show the wrong value.
- If dropped, the sensor should be replaced with a new one.
- The sensor removed from the vehicle should not be placed upside down.

(d) When replacing the deceleration sensor:

Perform the deceleration sensor zero point calibration.

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

HINT:

Before the deceleration sensor zero point calibration, be sure to short circuit the check connector between Ts and E_1 and perform the calibration in test mode.

7. YAW RATE SENSOR ZERO POINT CALIBRATION

HINT:

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

(a) When replacing the ECU:

After replacing ECU, shift the shift lever in P range and turn the ignition switch ON. Do not move the vehicle for 15 sec. or more.

HINT:

At this time, the VSC TRC warning light and VSC OFF indicator light goes on for 15 sec. and goes off. If the VSC TRC warning light and VSC OFF indicator light remains on, carry out yaw rate sensor and deceleration sensor zero point calibration in the test mode.

(b) When replacing the yaw rate sensor:
Shift the shift lever in P range and turn the ignition switch ON, repeat connecting and releasing Ts and E_1 terminals of check connector 4 times or more for 8 sec. After that do not move the vehicle for 15 sec. or more.

HINT:
When the operation (b) is performed, DTC is deleted.