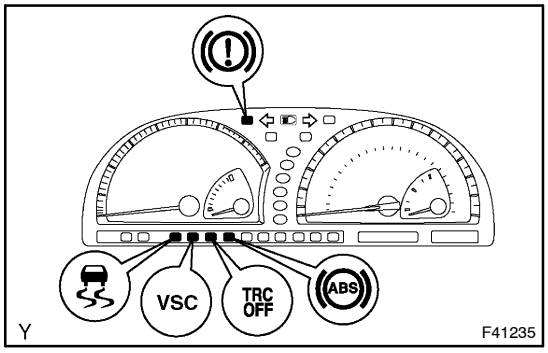
0567V–02



PRE–CHECK

1. DIAGNOSIS SYSTEM

(a) Check the warning lights.

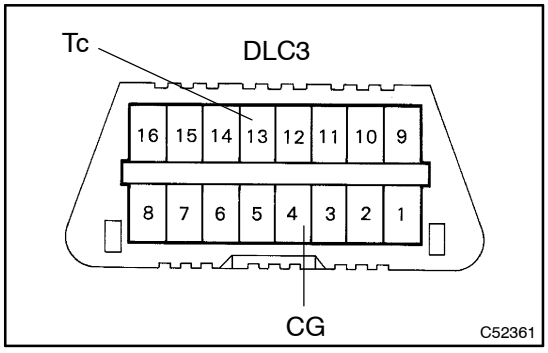
(1) Release the parking break pedal.

(2) When the ignition switch is turned ON, check that the ABS warning light, BRAKE warning light VSC warning light, TRC OFF Indicator light*1 and SLIP indicator light turns on for approx. 3 seconds.

HINT:

- If the ECU stores DTC, ABS warning light, VSC warning light and TRC OFF indicator light are ON.
- If the indicator check result is not normal, proceed to troubleshooting for the ABS warning light circuit, BRAKE warning light circuit, VSC warning light circuit, TRC OFF Indicator light circuit*1 or SLIP indicator light circuit.

Trouble Area	See page
ABS warning light circuit	05–595, 05–596
BRAKE warning light circuit	05–597
VSC warning light circuit	05–609
TRC OFF indicator light circuit*1	05–599
SLIP indicator light circuit	05–601



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

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

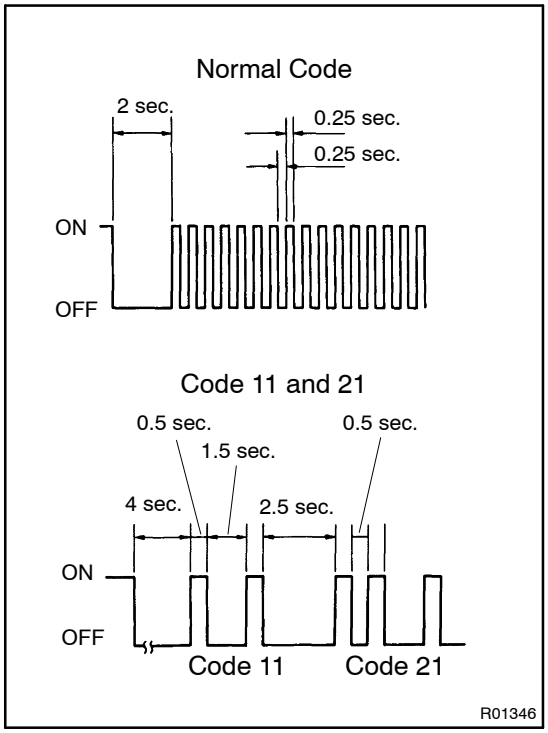
(2) Turn the ignition switch ON.

(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 or VSC waning light circuit.

Trouble Area	See page
Tc terminal circuit	05–607
ABS warning light circuit	05–595, 05–596
VSC warning light circuit	05–609

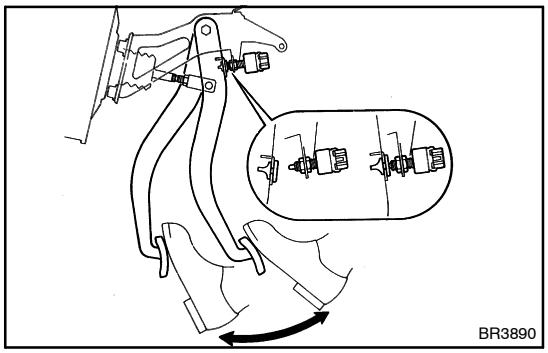


- As an example, the blinking patterns for normal code and codes 11 and 21 are shown on the left.
  (4) Codes are explained in the code table on page 05–523.
  (5) After completing the check, disconnect terminals Tc and CG, and turn off the display.

If 2 or more malfunction codes are identified at the same time, the lowest numbered DTC will be displayed 1st.

(c) In case of using hand–held tester:
Check the DTC.
(1) 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 CG of DLC3.
SST 09843–18040
(2) Turn the ignition switch ON.
(3) Clear the DTC stored in ECU by depressing the break pedal 8 times or more within 5 seconds.
(4) Check that the warning light shows the normal code.
(5) Remove the SST from the terminals of DLC3.
SST 09843–18040

HINT:
Cancellation cannot be done by removing the battery cable or ECU–IG fuse.

(e) In case of using hand–held tester:
Clear the DTC.
(1) Operate the hand–held tester to erase the codes. (See hand–held tester operator's manual.)

2. DATA LIST

HINT:

According to the DATA LIST displayed by the Hand–held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as a first step of troubleshooting is one of the method to shorten the labor time.

(a) Connect the Hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

(c) According to the display on tester, read the ”DATA LIST”.

Item	Measurement Item / Range (Display	Normal Condition	Diagnostic Note
ABS MOT RELAY	ABS motor relay / ON or OFF		
SOL RELAY	Solenoid relay / ON or OFF		
VSC / TRAC OFF SW	VSC / TRAC OFF switch / ON or OFF		
IDLE SW	Main idle switch / ON or OFF	ON : Accelerator pedal released OFF : Accelerator pedal depressed	
STOP LIGHT SW	Stop light switch / ON or OFF	ON : Brake pedal depressed OFF : Brake pedal released	
PKB SW	Parking brake switch / ON or OFF	ON : Parking brake applied OFF : Parking brake released	
RESERVOIR SW	Reservoir level switch / ON or OFF	ON : Fluid is below low level on reservoir tank OFF : Fluid is above low level on reservoir tank	
ABS OPERT FR	ABS operation (FR) / BEFORE or OPERATE	BEFORE : No ABS operation (FR) OPERATE : During ABS operation (FR)	
ABS OPERT FL	ABS operation (FL) / BEFORE or OPERATE	BEFORE : No ABS operation (FL) OPERATE : During ABS operation (FL)	
ABS OPERT RR	ABS operation (RR) / BEFORE or OPERATE	BEFORE : No ABS operation (RR) OPERATE : During ABS operation (RR)	
ABS OPERT RL	ABS operation (RL) / BEFORE or OPERATE	BEFORE : No ABS operation (RL) OPERATE : During ABS operation (RL)	
WHEEL SPD FR	Wheel speed sensor (FR) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed	Speed indicated on speedometer
WHEEL SPD FL	Wheel speed sensor (FL) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed	Speed indicated on speedometer

Item	Measurement Item / Range (Display	Normal Condition	Diagnostic Note
WHEEL SPD RR	Wheel speed sensor (RR) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed	Speed indicated on speedometer
WHEEL SPD RL	Wheel speed sensor (RL) reading / min.: 0 km/h (0 MPH, max.: 326 km/h (202 MPH)	Actual wheel speed	Speed indicated on speedometer
DECELERAT SENS	Deceleration sensor 1 reading / min.: –1.869 G, max.: 1.869 G	Approximately 0 ± 0.13G at still condition	Reading changes when vehicle is bounced
DECELERAT SENS2	Deceleration sensor 2 reading / min.: –1.869 G, max.: 1.869 G	Approximately 0 ± 0.13G at still condition	Reading changes when vehicle is bounced
IG VOLTAGE	ECU power supply voltage / NORMAL or TOO LOW	NORMAL : 9.5 V or over TOO LOW : Below 9.5 V	
SFRR	ABS solenoid (SFRR) / ON or OFF		
SFRH	ABS solenoid (SFRH) / ON or OFF		
SFLR	ABS solenoid (SFLR) / ON or OFF		
SFLH	ABS solenoid (SFLH) / ON or OFF		
SRRR (SRR)	ABS solenoid (SRRR (SRR)) / ON or OFF		
SRRH (SRH)	ABS solenoid (SRRH (SRH)) / ON or OFF		
SRLR	ABS solenoid (SRLR) / ON or OFF		
SRLH	ABS solenoid (SRLH) / ON or OFF		
SRCF (SA1)	TRC solenoid (SRCF (SA1)) / ON or OFF		
SRCR (SA2)	TRC solenoid (SRCR (SA2)) / ON or OFF		
SRMF (SMCF, SA3)	TRC solenoid (SRMF (SMCF, SA3)) / ON or OFF		
SRMR (SMCR, STR)	TRC solenoid (SRMR (SMCR, STR)) / ON or OFF		
SMF (BA–SOL)	TRC solenoid (SMF) / ON or OFF		
SMR	TRC solenoid (SMR) / ON or OFF		
VEHICLE SPD	Maximum wheel speed sensor reading / min.: 0 km/h (0 MPH), max.: 326 km/h (202 MPH)	Actual vehicle speed	Speed indicated on speedometer
MAS CYL PRESS 1	Master cylinder pressure sensor 1 reading / min.: 0 V, max.: 5 V	When brake pedal is released : 0.3 – 0.9 V	Reading increases when brake pedal is depressed
MAS CYL PRESS 2	Master cylinder pressure sensor 2 reading / min.: 0 V, max.: 5 V	When brake pedal is released : 0.3 – 0.9 V	Reading increases when brake pedal is depressed

Item	Measurement Item / Range (Display	Normal Condition	Diagnostic Note
AIR BLD SUPPORT	Air bleed support / SUPPORT or NOT SUP	w / BA : Supported w / VSC : Not supported	
TEST MODE	Test mode / NORMAL or TEST	NORMAL : Normal mode TEST : During test mode	
#CODES	Number of DTC recorded / min.: 0, max.: 255	Min.: 0, max.: 39	

3. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the Hand–held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as a first step of troubleshooting is one of the method to shorten the labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Connect the Hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

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

HINT:

IG must be turned ON to proceed Active Test using a hand–held tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
SFRR	Turns ABS solenoid (SFRR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFRH	Turns ABS solenoid (SFRH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFLR	Turns ABS solenoid (SFLR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFLH	Turns ABS solenoid (SFLH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRRR	Turns ABS solenoid (SRRR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRRH	Turns ABS solenoid (SRRH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRLR	Turns ABS solenoid (SRLR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRLH	Turns ABS solenoid (SRLH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRCF (SA1)	Turns TRAC solenoid SRCF (SA1) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRCR (SA2)	Turns TRAC solenoid SRCR (SA2) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRMF (SMCF, SA3)	Turns TRAC solenoid SRMF (SMCF, SA3) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRMR (SMCR, STR)	Turns TRAC solenoid SRMR (SMCR, STR) ON / OFF	Operation of solenoid (clicking sound) can be heard

Item	Vehicle Condition / Test Details	Diagnostic Note
SMF (BA–SOL)	Turns TRAC solenoid SMF (BA–SOL) ON / OFF	Operation of solenoid (clicking sound) can be heard
SMR	Turns TRAC solenoid SMR ON / OFF	Operation of solenoid (clicking sound) can be heard
SFRR & SFRH	Turns ABS solenoid SFRR & SFRH ON / OFF	Operation of solenoid (clicking sound) can be heard
SFLR & SFLH	Turns ABS solenoid SFLR & SFLH ON / OFF	Operation of solenoid (clicking sound) can be heard
SRH & SRR	Turns ABS solenoid SRH & SRR ON / OFF	Operation of solenoid (clicking sound) can be heard
SRLR & SRLH	Turns ABS solenoid SRLR & SRLH ON / OFF	Operation of solenoid (clicking sound) can be heard
SFRH & SFLH	Turns ABS solenoid SFRH & SFLH ON / OFF	Operation of solenoid (clicking sound) can be heard
SRCF & SRCR	Turns ABS solenoid SRCF & SRCR ON / OFF	Operation of solenoid (clicking sound) can be heard
SRMF & SRMR	Turns ABS solenoid SRMF & SRMR ON / OFF	Operation of solenoid (clicking sound) can be heard
SOL RELAY	Turns ABS solenoid relay ON / OFF	Operation of solenoid (clicking sound) can be heard
ABS MOT RELAY	Turns ABS motor relay ON / OFF	Operation of motor can be heard
ABS WARN LIGHT	Turns ABS warning light ON / OFF	Observe combination meter
VSC WARN LIGHT	Turns VSC warning light ON / OFF	Observe combination meter
VSC / TRC OFF IND	Turns VSC / TRAC OFF indicator ON / OFF	Observe combination meter
SLIP INDI LIGHT	Turns SLIP indicator light ON / OFF	Observe combination meter
BRAKE WRN LIGHT	Turns BRAKE warning light ON / OFF	Observe combination meter
VSC / BR WARN BUZ	Turns VSC / BRAKE warning buzzer ON / OFF	Buzzer can be heard

4. FREEZE FRAME DATA

(a) The vehicle (sensor) status at the occurrence of abnormality of the diagnosis code and during the ABS operating 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 operating 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.

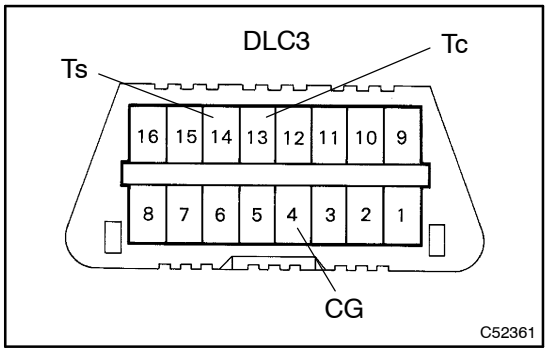
Hand–held tester display	Measurement Item	Reference Value*
VEHICLE SPD	Wheel speed sensor reading	Speed indicated on speedometer
STOP LIGHT SW	Stop light switch signal	Stop light switch ON: ON, OFF: OFF
# IG ON	Number of operations of ignition switch ON after memorizing freeze frame data	0 – 31
MAS CYL PRESS	Master cylinder pressure sensor reading	Brake pedal release : 0.3 – 0.9 V Brake pedal depress: 0.8 – 4.5 V
MASS PRESS GRADE	Master cylinder pressure sensor change	–30 – 200 MPa/s
SYSTEM	System status	ABS activated: ABS VSC/TRC activated: VSC/TRC BA activated: BA Fail safe mode activated: FAIL SF No system activated: NO SYS
YAW RATE	Yaw rate angle sensor reading	–100 – 100
STEERING ANG	Steering sensor reading	Left turn: Increase Right turn: Drop (If 1,150 deg. is displayed, correct reading only displays after driving straight at over 30 km (19 mph).)
THROTTLE	Throttle position sensor reading	Release accelerator pedal: Approx. 0 deg. Depress accelerator pedal: Approx. 90 deg.
G (RIGHT & LEFT)	Right and left G	–1.869 – 1.869
G (BACK & FORTH)	Back and forth G	–1.869 – 1.869
VSC (TRC) OFF SW	VSC OFF switch signal	TRAC OFF SW ON: ON OFF: OFF
SHIFT POSITION	Shift lever position	FAIL P,N R D 4 3 2 L
THROTTLE	Throttle sensor reading	0 – 125 deg.

*: 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.

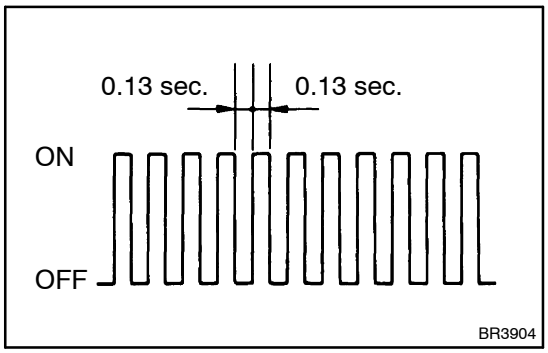
5. SENSOR SIGNAL CHECK (TEST MODE)

HINT:

- If the ignition switch is turned from ON to ACC or LOCK during test mode, DTC of sensor check function will be erased.
- During test mode, ECU records all DTC of sensor check function. By preforming sensor signal check, the codes are erased if normality is confirmed. The codes left over are the codes where abnormality was found.



(a) In case of not using hand–held tester:
Check the ABS sensor signal.
(1) Turn the ignition switch OFF.
(2) Using SST, connect terminals Ts and CG of DLC3.
SST 09843–18040
(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 terminal circuit (See page 05–595, 05–596 and 05–605).

(5) Keep the vehicle in the stationary condition on the flat place for 1 sec. or more.
(6) Keeping 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 147 N (15 kgf, 33 lbf) or more for 1 sec. or more.
(7) Keeping the vehicle in the stationary condition, depress the brake pedal with 98 N (10 kgf, 22 lbf) or more quickly.

HINT:

The above mentioned condition comes into existence, the ABS warning light comes ON for 3 seconds.

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

HINT:

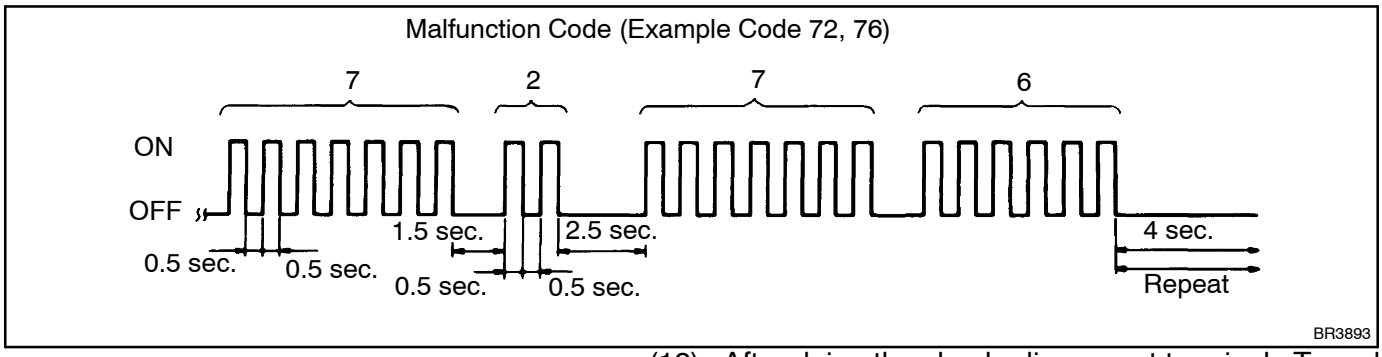
There is a case that the sensor check is not completed if the vehicle has its wheels spun or its steering wheel steered during this check.

(9) Stop the vehicle.
(10) Using SST, connect terminals Tc and CG of DLC3.
SST 09843–18040

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

HINT:

- See the list of DTC (See page 05–523).
- 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.



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

SST 09843–18040

(b) In case of using hand–held tester:

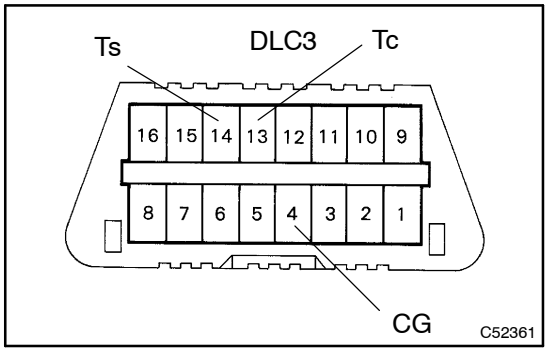
Check the ABS sensor signal.

(1) Do step (3) to (9) of the step (a).

(2) 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.



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

Check the VSC sensor signal.

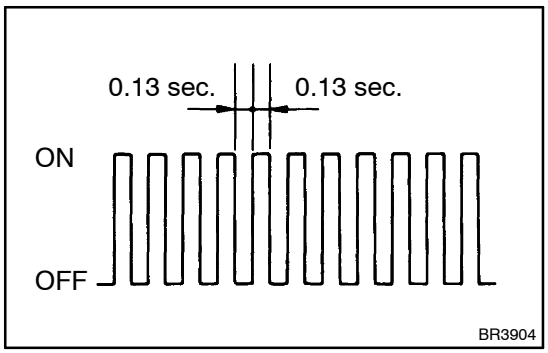
(1) Turn the ignition switch OFF.

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

(3) Using SST, connect terminals Ts and CG of DLC3.

SST 09843–18040

(4) Start the engine.



(5) Check that the VSC warning light blinks.

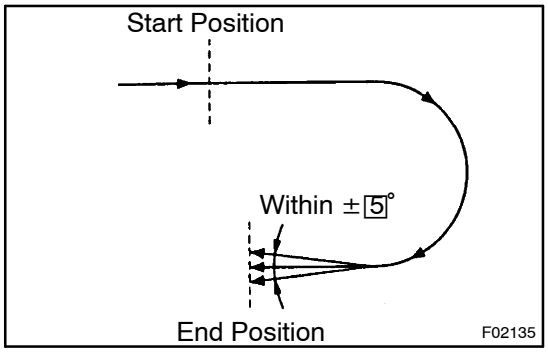
HINT:

If the VSC warning light does not blink, inspect the VSC warning light circuit and Ts terminal circuit (See page 05–609, and 05–605).

(6) After a new ECU installed, the first time only:

Start the engine and keep the vehicle in the stationary condition on the flat place for 3 sec. or more, it's installed the zero point calibration of the yaw rate sensor.

(7) 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.



(8) 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 90° or more, and maintain 180° circular drive for the vehicle.
Stop the vehicle and shift the shift lever to the P position, check that the skid control buzzer sounds for 3 sec.

HINT:

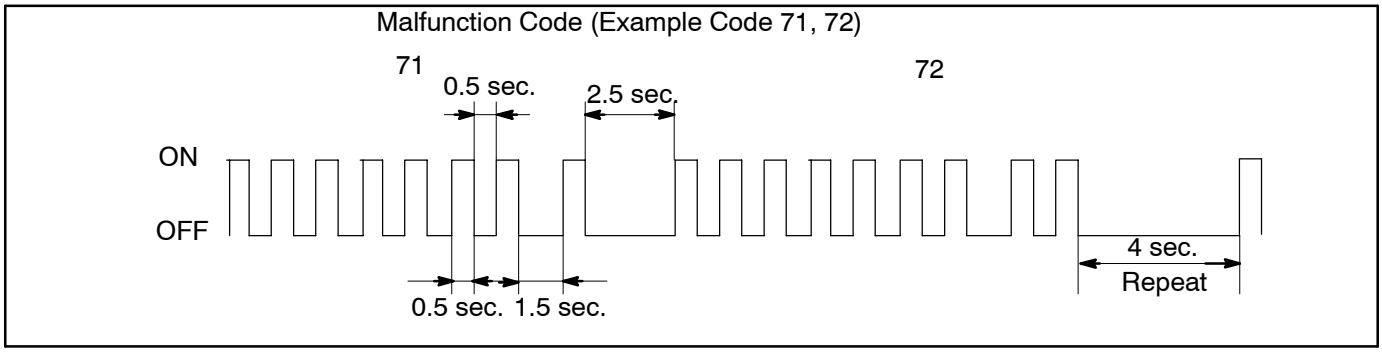
- If the skid control buzzer sounds, the sensor check is in normal completion.
- If the skid control buzzer does not sound, check the skid control buzzer circuit (See page 05–603), then do the sensor check again.
- If the skid control buzzer still won't sound, there is a malfunction in the VSC sensor, so check the DTC.
- Drive the vehicle in a 180° circle. At the end of the turn, the direction of the vehicle should be within 180° ±5° of its start position.
- Do not spin the wheels.

(9) Using SST, connect terminals Tc and CG of DLC3.
SST 09843–18040

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

HINT:

- See the list of DTC (See page 05–523).
- 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.



(11) After doing the check, disconnect the SST from terminals Ts and CG, Tc and CG of DLC3 and turn the ignition switch OFF.
SST 09843–18040

(d) In case of using hand–held tester:
Check the VSC sensor signal.
(1) Do step (4) to (8) of the step (c).
(2) Read the DTC by following the prompts on the tester screen.

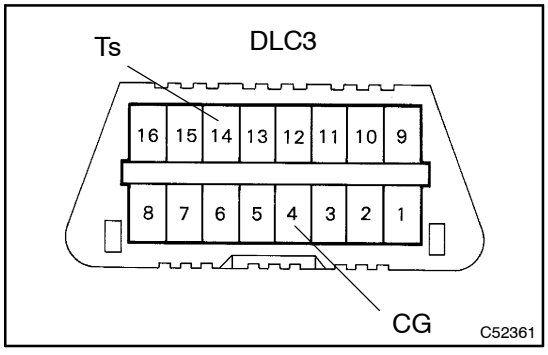
HINT:
Please refer to the hand–held tester operator's manual for further details.

6. YAW RATE SENSOR AND DECELERATION SENSOR ZERO POINT CALIBRATION

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 6. once it is started.
- During step 6., 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 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 indicator light is lit indicating the recorded zero point is erased.
SST 09843–18040
(4) Turn the ignition switch OFF.

(b) Obtain zero point of the yaw rate sensor.
(1) Make the terminals Ts and CG of DLC3 disconnected.
(2) Turn the ignition switch ON.

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

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

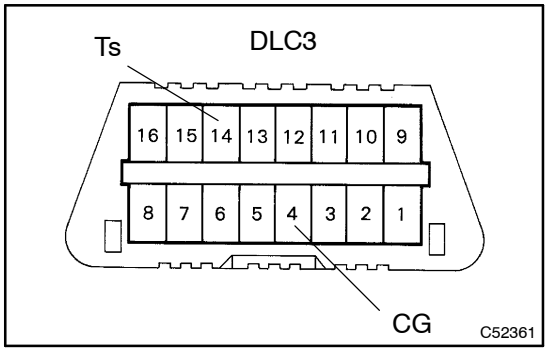
HINT:
Even if the ignition is not turned OFF in step (a)–(4) and remains ON, the yaw rate sensor zero point calibration can be completed. In this case, the TRC OFF indicator light is lit for about 15 sec. and then starts blinking. (Normal code)

(4) After ensuring that the TRC OFF 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 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 VSC warning light will light up. Therefore, perform step (c) right after step (b).

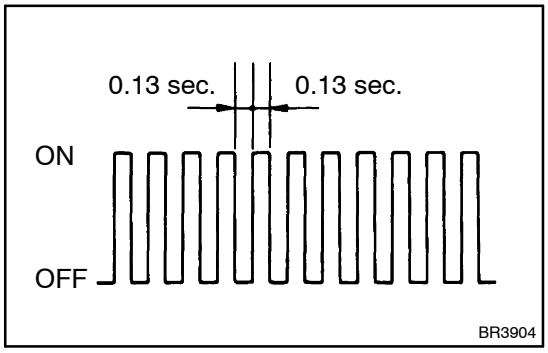


(1) Using SST, connect the terminals Ts and CG of DLC3.

SST 09843–18040

(2) Turn the ignition switch ON.

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



(3) After turning the ignition switch 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 TRC OFF indicator light for 2 sec., turn the ignition switch OFF.

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

SST 09843–18040