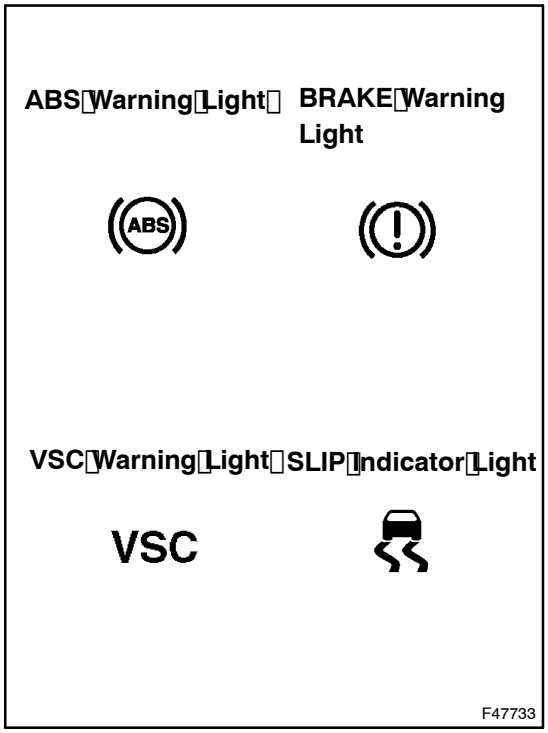
05JK4–01

PRE–CHECK



1. DIAGNOSIS SYSTEM

(a) Check the warning lights.

(1) Release parking brake lever.

NOTICE:

When releasing the parking brake, set the chocks to hold the vehicle for safety.

HINT:

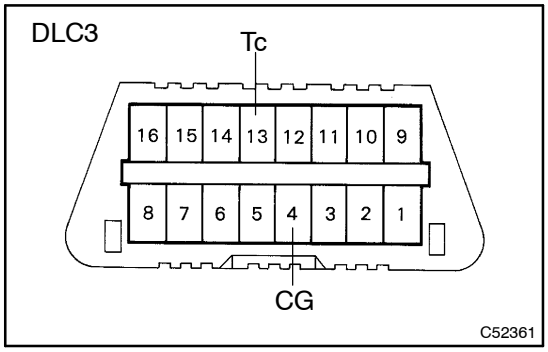
When the parking brake is applied or the level of the brake fluid is low, the BRAKE warning light comes on.

(2) When the ignition switch is turned to the ON position, check that the ABS warning light, BRAKE warning light, VSC warning light and SLIP indicator light remain on for approx. 3 seconds.

HINT:

- If the ECU has any stored DTCs, the ABS warning light, VSC warning light come on.
- If the indicator does not come on, inspect if the bulb is blown out, and also the wire harness between the skid control ECU and the combination meter.
- If the indicator remains on, proceed to troubleshooting for the light circuit below.

Trouble Area	See page
ABS warning light circuit	05–304 or 05–308
VSC warning light circuit	05–311 or 05–315
BRAKE warning light circuit	05–318
SLIP indicator light circuit	05–323



2. DTC CHECK/CLEAR (USING SST CHECK WIRE)

(a) Check DTCs.

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

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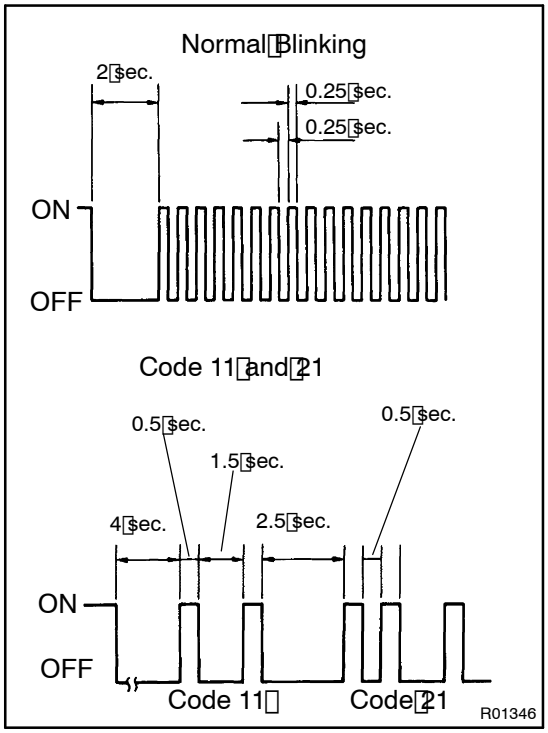
(2) Turn the ignition switch to the ON position.

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

HINT:

- If 2 or more malfunctions are detected at the same time, the lowest numbered code will be displayed first.
- If no code appears, inspect the diagnostic circuit, ABS warning light circuit or VSC warning light circuit.

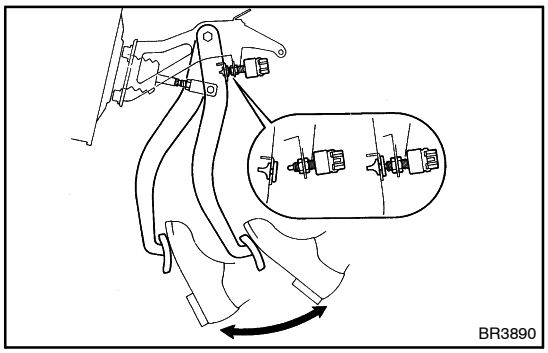
Trouble Area	See page
Tc and CG terminal circuit	05–328
ABS warning light circuit	05–304 or 05–308
VSC warning light circuit	05–311 or 05–315



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

(4) Codes are explained in the code table on page 05–247.

(5) After completing the check, disconnect terminals Tc and CG of the DLC3, and turn off the display.



(b) Clear DTCs.

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

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(2) Turn the ignition switch to the ON position.

(3) Clear the DTCs stored in the ECU by depressing the brake pedal 8 or more times within 5 sec.

(4) Check that the ABS warning light and VSC warning light shows normal blinking patterns.

(5) Remove the SST from the DLC3.

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HINT:

Cancellation cannot be preformed by removing the battery cable or the ECU–IG fuse.

3. DTC CHECK/CLEAR (USING HAND–HELD TESTER)

(a) Check DTCs.

(1) Connect the hand–held tester to the DLC3.

(2) Turn the ignition switch to the ON position.

(3) Read the DTCs following the prompts on the tester screen.

HINT:

Refer to the hand–held tester operator's manual for further details.

(b) Clear the DTCs.

(1) Connect the hand–held tester to the DLC3.

(2) Turn the ignition switch to the ON position.

(3) Operate the hand–held tester to erase the codes.

HINT:

Refer to the hand–held tester operator's manual for further details.

4. DATA LIST

HINT:

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

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

(b) Turn the ignition switch ON.

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

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
ABS MOT RELAY	ABS motor relay / ON or OFF	ON : Motor relay ON	–
SOL RELAY	Solenoid relay / ON or OFF	ON : Solenoid relay ON	–
VSC / TRC OFF SW	TRAC control switch / ON or OFF	ON : TRAC control switch ON	–
IDLE SW	Main idle switch / ON or OFF	ON : Accelerator pedal released OFF : Accelerator pedal depressed	–
STOP LIGHT SW	Stop lamp 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	–
STEP FORCE SW	Brake load sensing switch / ON or OFF	ON : Depressed brake pedal OFF : Released brake pedal	–
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	Similar speed as 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	Similar speed as 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	Similar speed as 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	Similar speed as 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 / TOO LOW / NORMAL	NORMAL: 9.5 V or over TOO LOW: Below 9.5 V	–
SFRR	ABS solenoid (SFRR) / ON or OFF	ON : Operate	–
SFRH	ABS solenoid (SFRH) / ON or OFF	ON : Operate	–
SFLR	ABS solenoid (SFLR) / ON or OFF	ON : Operate	–
SFLH	ABS solenoid (SFLH) / ON or OFF	ON : Operate	–
SRRR (SRR)	ABS solenoid (SRRR (SRR)) / ON or OFF	ON : Operate	–
SRRH (SRH)	ABS solenoid (SRRH (SRH)) / ON or OFF	ON : Operate	–
SRLR	ABS solenoid (SRLR) / ON or OFF	ON : Operate	–
SRLH	ABS solenoid (SRLH) / ON or OFF	ON : Operate	–
SMF (BA−SOL)	TRAC solenoid (SMF) / ON or OFF	ON : Operate	–
SMR	TRAC solenoid (SMR) / ON or OFF	ON : Operate	–
THROTTLE	Throttle position sensor/ Min.: 0 deg, Max.: 125 deg	Release accelerator pedal: Approx. 0 deg. Depress accelerator pedal: Approx. 90 deg.	–
ENGINE SPD	Engine Speed/ Min.: 0 rpm, Max.: 6,000 rpm	Actual engine speed	–
VEHICLE SPD	Maximum wheel speed sensor reading / min.: 0 km/h (0 MPH), max.: 326 km/h (202 MPH)	Actual vehicle speed	Similar speed as indicated on speedometer
YAW RATE	Yaw rate sensor/ Min.: −128 deg/s, Max.: 128 deg/s	Min.: −128 deg/s Max.: 128 deg/s	–
YAW ZERO VALUE	Memorized zero value/ Min.: −128 deg/s, Max.: 128 deg/s	Min.: −128 deg/s Max.: 128 deg/s	–
STEERING ANG	Steering sensor/ Min.: −1152 deg, Max.: 1150.875 deg	Left turn: Increase Right turn: Decrease	–

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
MAS CYL PRS 1	Master cylinder pressure sensor 1 reading / min.: 0 V, max.: 5 V	When brake pedal is released : 0.3 to 0.9 V	Reading increases when brake pedal is depressed
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	–

5. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the hand–held tester allows the relay and actuator, etc. to operate without removing any parts. Performing the ACTIVE TEST as the first step of troubleshooting is one of the methods to shorten 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 to the ON position.

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

HINT:

Ignition switch must be turned to the ON position to proceed to the ACTIVE TEST using the 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
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
SOL RELAY	Turns ABS solenoid relay ON / OFF	Operation of solenoid (clicking sound) can be heard

Item	Vehicle Condition / Test Details	Diagnostic Note
ABS MOT RELAY	Turns ABS motor relay ON / OFF	Operation sound 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
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

6. FREEZE FRAME DATA

HINT:

- Whenever a DTC is detected or the ABS operates, the skid control ECU stores the current vehicle (sensor) state as freeze frame data.
- The skid control ECU stores the number of times (maximum: 31) the ignition switch has been turned from off to the On position since the last time ABS was activated. However, if the vehicle was stopped or at low speed (4.3 mph (7 km/h) or less), or if a DTC is detected, the skid control ECU will not count the number since then.
- 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 when the ABS operated 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.

(a) Connect the Hand–held tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) From the display on the tester, select the ”FREEZE FRAME DATA”.

Hand–held tester display	Measurement Item	Reference Value
VEHICLE SPD	Wheel speed sensor reading	Speed indicated on speedometer
STOP LIGHT SW	Stop lamp switch signal	Stop lamp switch ON: ON, OFF: OFF
# IG ON	Number of operations of ignition switch ON after memorizing freeze frame data	0 to 31
MAS CYL PRESS	Master cylinder pressure sensor reading	Brake pedal release : 0.3 to 0.9 V Brake pedal depress: 0.8 to 4.5 V
MASS PRESS GRADE	Master cylinder pressure sensor change	–30 to 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 to 100
STEERING ANG	Steering sensor reading	Left turn: Increase Right turn: Decrease
G (RIGHT & LEFT)	Right and left G	–1.869 to 1.869
G (BACK & FORTH)	Back and forth G	–1.869 to 1.869

Hand–held tester display	Measurement Item	Reference Value
SHIFT POSITION	Shift lever position	FAIL P, N R D 4 3 2 L
THROTTLE	Throttle sensor reading	0 to 125 deg.

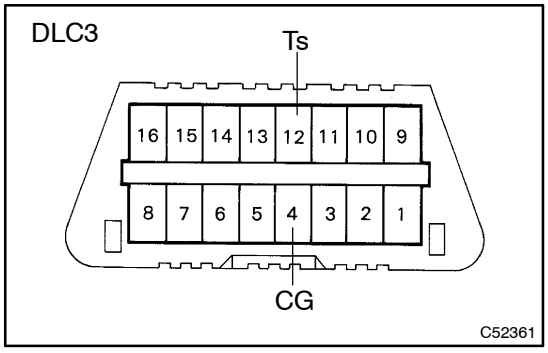
7. SENSOR SIGNAL CHECK (TEST MODE) (USING SST CHECK WIRE)

NOTICE:

After replacing the yaw rate sensor (deceleration sensor) and/or brake actuator assembly (skid control ECU), perform zero point calibration of the yaw rate sensor and deceleration sensor. (See step 9.)

HINT:

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



(a) Procedures for test mode:

(1) Turn the ignition switch off.

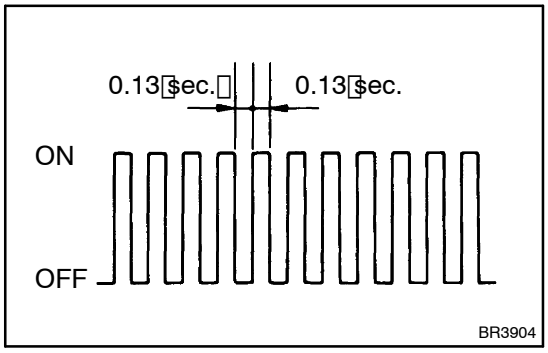
(2) Check that the steering wheel is in the straight–ahead position and shift the shift lever to the P position.

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

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(4) Turn the ignition switch to the ON position.

(5) Check that the ABS warning light and VSC warning light blink.



HINT:

If the ABS warning light and VSC warning light do not blink, inspect the ABS warning light circuit, VSC warning light and Ts terminal circuit.

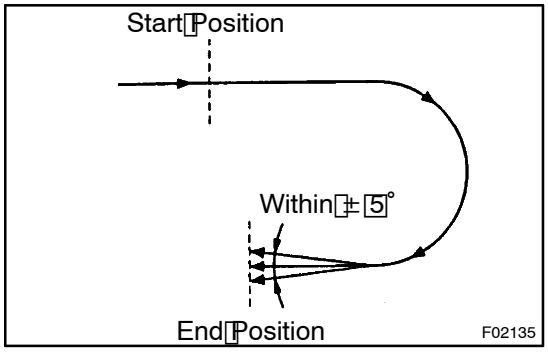
Trouble area	See Page
Ts and CG terminal circuit	05–333
ABS warning light circuit	05–304 or 05–308
VSC warning light circuit	05–311 or 05–315

(b) Check the master cylinder pressure sensor:

(1) Leave the vehicle in a stationary condition and the brake pedal in a free condition for 1 second or more, and quickly depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more for 1 second or more.

HINT:

- At this time, the ABS warning light remains on for 3 seconds.
- While the ABS warning light remains on, continue to depress the brake pedal with a force of 98 N (10 kgf) or more.
- The ABS warning light comes on for 3 seconds every time the brake pedal operation above is performed.
- If master cylinder pressure sensor check can not be completed, do not depress the brake pedal frequently. It may further reduce negative pressure and make the sensor check difficult to complete.
- If the negative pressure is insufficient, master cylinder pressure sensor check may not be completed. In this case, idle the engine to get enough negative pressure.
- If the brake pedal is depressed while engine is stopped, negative pressure may become insufficient and the BRL may come on. (It runs the motor and performs incorrect control.)



(c) Check the yaw rate sensor:

(1) Shift the shift lever to the D position and drive the vehicle at a speed of approx. 30 mph (50 km/h), turn the steering wheel either to the left or right 90° or more, and maintain a 180° circular drive for the vehicle.

(2) Stop the vehicle and shift the shift lever to the P position, and check that the skid control buzzer sounds for 3 sec.

NOTICE:

Deceleration sensor check should be completed before performing speed sensor check.

HINT:

- If the skid control buzzer sounds, the sensor check is completed normally.
- If the skid control buzzer does not sound, check the skid control buzzer circuit (See page 05–326), then perform the sensor check again. If the skid control buzzer still does not sound, there is a malfunction in the VSC sensor, so check for DTCs.
- Drive the vehicle in a 180° circle. At the end of the turn, ensure that the vehicle is exactly 180° within a tolerance of ± 5°, and facing the other direction from its original start position.
- Do not spin the wheels.

(d) Check the speed sensor signal:

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

HINT:

The sensor check may not be completed if the vehicle has its wheels spun or its steering wheel turned during this check.

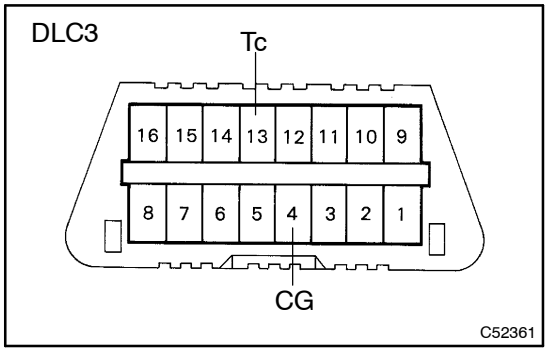
(2) Stop the vehicle.

NOTICE:

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

HINT:

When sensor check has been completed, the ABS warning light goes off while driving and blinks in the test mode pattern while standing.



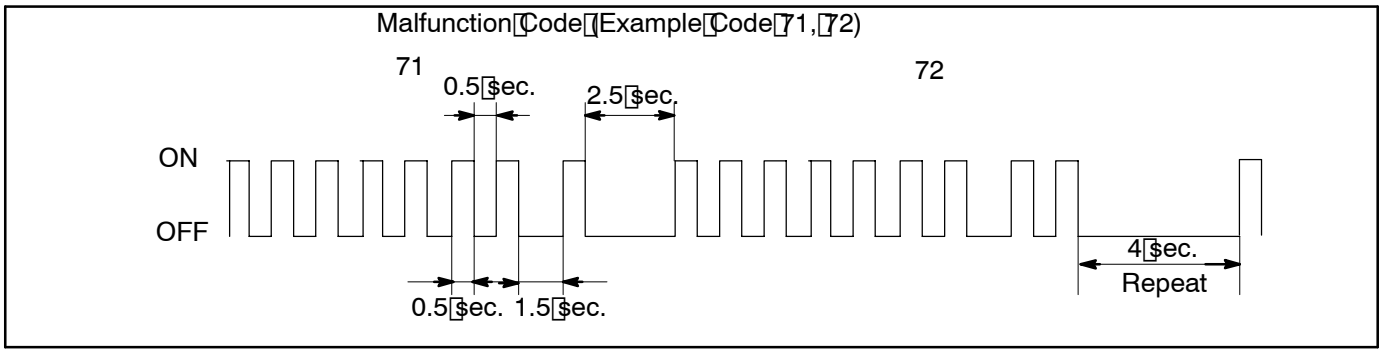
(3) Using SST, connect terminals Tc and CG of the DLC3.

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(4) Read the number of blinks of the ABS warning light and VSC warning light.

HINT:

- See the list of DTC. (See page 05–247)
- If the check result is OK, the ABS warning light link goes off when the brake pedal is once depressed.
- If every sensor is normal, the normal blinking patterns are output. (A cycle of 0.25 seconds ON and 0.25 seconds OFF is repeated.)
- If 2 or more malfunctions are detected at the same time, the lowest numbered code will be displayed first.



(5) After performing the check, disconnect the SST from terminals Ts and CG, Tc and CG of the DLC3 and turn the ignition switch to the off position.

8. SENSOR SIGNAL CHECK (TEST MODE) (USING HAND–HELD TESTER)

NOTICE:

After replacing the yaw rate sensor (deceleration sensor) and/or brake actuator assembly (skid control ECU), perform zero point calibration of the yaw rate sensor and deceleration sensor. (See step 10.)

HINT:

- If the ignition switch is turned from ON to the ACC or LOCK position 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 an abnormality was found.

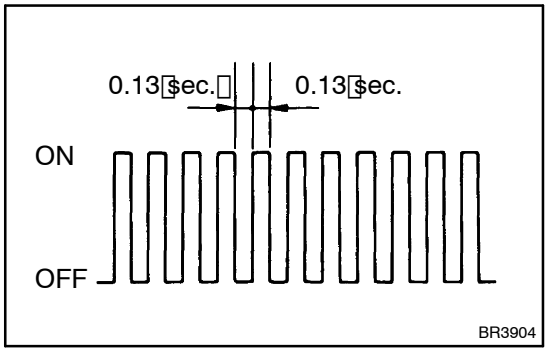
(a) Procedures for test mode:

(1) Turn the ignition switch off.

(2) Check that the shift lever position is in the P position.

(3) Connect the hand–held tester to the DLC3.

(4) Put the hand–held tester in test mode.



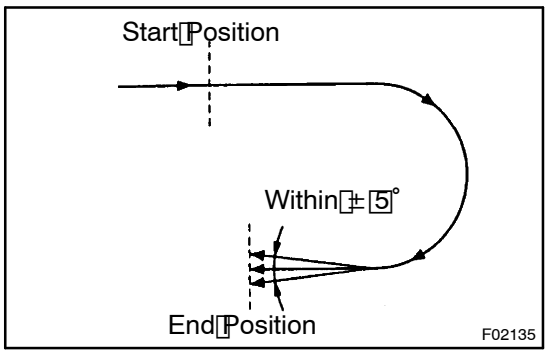
(5) Check that the ABS warning light and VSC warning light blink.

HINT:
If the ABS warning light and VSC warning light do not blink, inspect the ABS warning light circuit and VSC warning light circuit.

Trouble area	See Page
ABS warning light circuit	05–304 or 05–308
VSC warning light circuit	05–311 or 05–315

(b) Check the master cylinder pressure sensor:
(1) Leave the vehicle in a stationary condition and the brake pedal in a free condition for 1 second or more and quickly depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more for 1 second or more.

HINT:
At this time, the ABS warning light remains on for 3 seconds.



(c) Check the yaw rate:
(1) Shift the shift lever to the D position and drive the vehicle at a speed of approx. 3 mph (5 km/h), and maintain a 180° circular drive for the vehicle.
(2) Stop the vehicle and shift the shift lever to the P position, and check that the skid control buzzer sounds for 3 seconds.

HINT:
- If the skid control buzzer sounds, the sensor check is completed normally.
- If the skid control buzzer does not sound, check the skid control buzzer circuit (See page 05–326), then perform the sensor check again. If the skid control buzzer still does not sound, there is a malfunction in the VSC sensor, so check for DTC.
- Drive the vehicle in a 180° circle. At the end of the turn, ensure that the vehicle is exactly 180° within a tolerance of ± 5°, and facing the other direction from its original start position.
- Do not spin the wheels.

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

HINT:
The sensor check may not be completed if the vehicle has its wheels spun or its steering wheel turned during this check.
(2) Stop the vehicle.

(e) Read the DTC following the tester screen.

HINT:

- Refer to the hand–held tester operator's manual for further details.
- If the check result is OK, the ABS warning light link goes off when the brake pedal is once depressed.

9. IF NECESSARY, PERFORM ZERO POINT CALIBRATION OF YAW RATE SENSOR AND/OR BRAKE ACTUATOR ASSY (USING SST CHECK WIRE)

NOTICE:

- **While obtaining the zero point, do not tilt, move or shake the vehicle but keep it in a stationary condition. (Do not start the engine.)**
- **Be sure to perform the operation on a level surface (within an inclination of 1 %).**

(a) Check that the steering wheel is in the straight–ahead position and shift the shift lever to the P position.

(b) Clear the zero point calibration:

HINT:

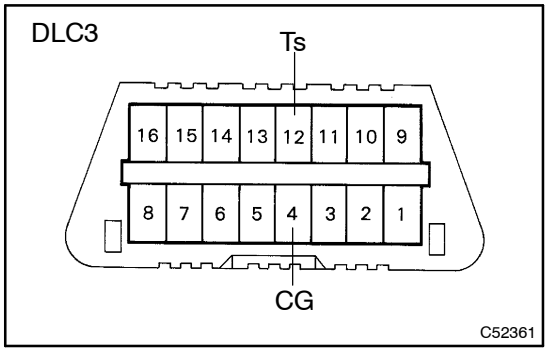
When replacing the yaw rate sensor only (not replace the brake actuator assy).

(1) Turn the ignition switch to the ON position.

(2) Using SST, connect and disconnect terminals Ts and CG of the DLC3 4 times or more within 8 seconds.

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(3) Remove the SST from the terminals of the DLC3.



(c) Obtain the zero point calibration:

(1) Turn the ignition switch off.

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

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(3) Turn the ignition switch to the ON position.

(4) Keep the vehicle in a stationary condition on a level surface for 2 seconds or more.

(5) Check that the VSC warning light blinks.

HINT:

If the VSC warning light does not blink, perform the zero point calibration again.

(d) Remove the SST from the terminals of the DLC3.

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(e) Turn the ignition switch off.

10. IF NECESSARY, PERFORM ZERO POINT CALIBRATION OF YAW RATE SENSOR AND/OR BRAKE ACTUATOR ASSY (USING HAND–HELD TESTER)

NOTICE:

- **While obtaining the zero point, do not tilt, move or shake the vehicle but keep it in a stationary condition. (Do not start the engine.)**
- **Be sure to perform the operation on a level surface (within an inclination of 1 %).**

(a) Check that the steering wheel is in the straight–ahead position and shift the shift lever to the P position.

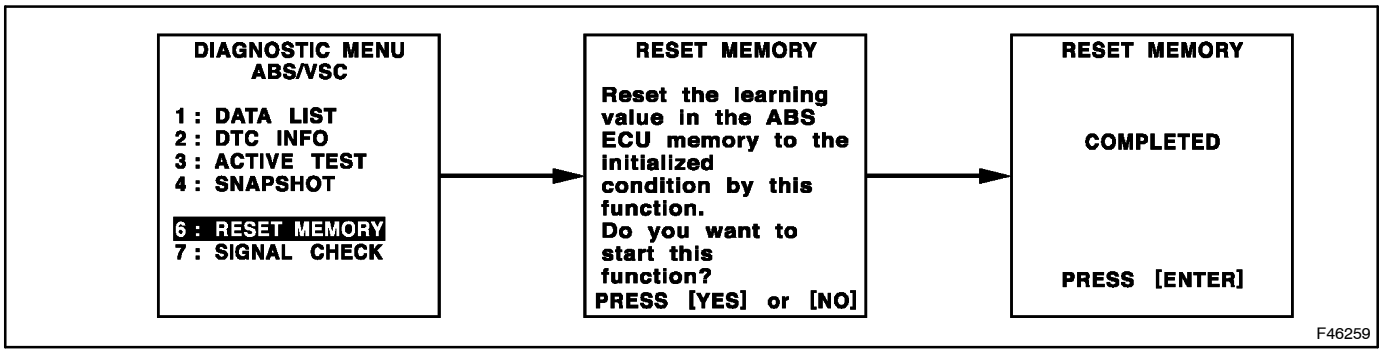
(b) Connect the hand–held tester to the DLC3.

(c) Turn the ignition switch to the ON position.

(d) Operate the hand–held tester to clear zero point calibration.

HINT:

When replace the yaw rate sensor only (not replace the brake actuator assy).



(e) Operate the hand–held tester to test mode.

(f) Obtain zero point of the yaw rate sensor and deceleration sensor:

(1) Keep the vehicle in a stationary condition on a level surface for 2 seconds or more.

(2) Check that the VSC warning light blinks.

HINT:

If the VSC warning light does not blink, perform the zero point calibration again.

(g) Turn the ignition switch off.