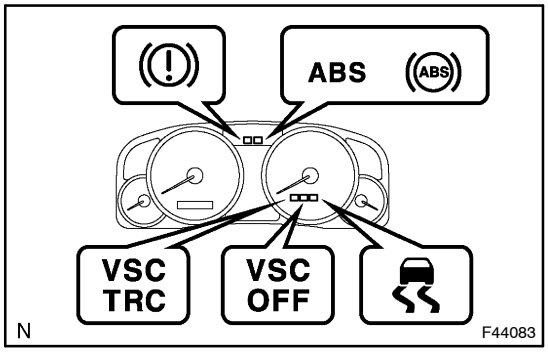
05AAP–01



PRE–CHECK

1. DIAGNOSIS SYSTEM

(a) Check the warning lights and buzzer.

(1) Release parking brake pedal.

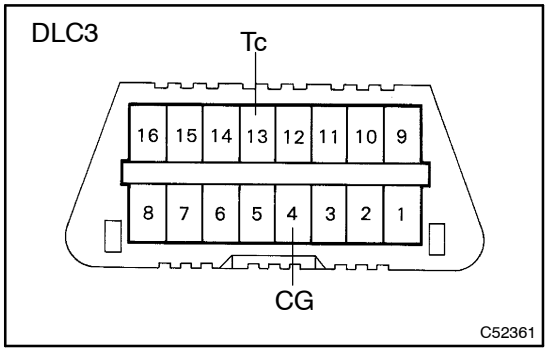
(2) When the ignition switch is turned ON, check that the ABS warning light, BRAKE warning light, VSC warning light, VSC OFF indicator light, SLIP indicator light and DAC indicator light goes on for approx. 3 seconds.

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

HINT:

- When the parking brake is applied or the level of the brake fluid is low, the BRAKE warning light is lit.
- If the ECU stores DTC, ABS warning light, VSC warning light and VSC OFF indicator light is ON.
- If the indicator check result is not normal, proceed to troubleshooting for the light circuit.

Trouble Area	See page
ABS warning light circuit	05–852
BRAKE warning light circuit	05–859
VSC warning light circuit	05–854
VSC OFF indicator light circuit	05–856
SLIP indicator light circuit	05–863
Skid control buzzer	05–865



(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

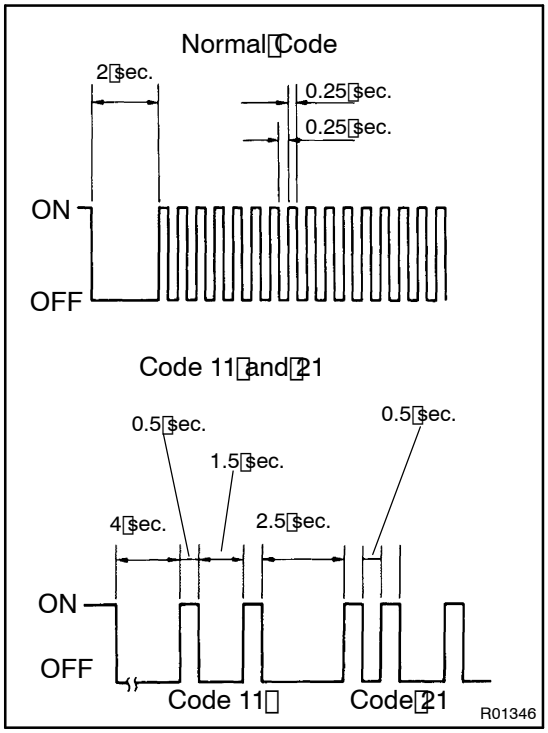
(2) Turn the ignition switch ON.

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

HINT:

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

Trouble Area	See page
Tc terminal circuit	05–867
ABS warning light circuit	05–852
VSC warning light circuit	05–854



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

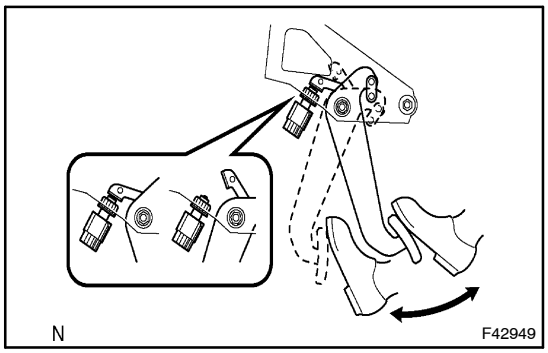
(4) Codes are explained in the code table on page 05–742.

(5) 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.

(c) In case of using the 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 the terminals Tc and CG of the DLC3.
SST 09843–18040
(2) Turn the ignition switch ON.
(3) Clear DTC stored in 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 the normal code.
(5) Remove the SST from the DLC3.
SST 09843–18040

HINT:
Disconnect the battery cable during repairs will not erase the DTC in the ECU.

(e) In case of using hand–held tester:
Clear the DTC.
(1) Turn the ignition switch ON.
(2) Operate the hand–held tester to erase the codes.

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

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
HB MOT RELAY	HB motor relay / ON or OFF		
ABS MOT RELAY	ABS motor relay / ON or OFF		
SOL RELAY	Solenoid relay / ON or OFF		
PRESS HIGH	HIGH hydraulic brake boost pressure / ON or OFF		
PRESS LOW	LOW hydraulic brake boost pressure / ON or OFF		
VSC / TRAC OFF SW	VSC 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	
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		
THROTTLE	Throttle position sensor reading / min.: 0 deg, max.: 125 deg		
ENGINE SPD	Maximum revolution sensor reading / min.: 0 rpm, max.: 6000 rpm	Actual vehicle speed	Speed indicated on speedometer
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
YAW RATE	Yaw rate sensor reading / min.: −128 deg, max.: 127 deg		

Item	Measurement Item / Range (Display	Normal Condition	Diagnostic Note
YAW ZERO VALUE	Yaw rate sensor reading / min.: –128 deg, max.: 127 deg		
STEERING ANG	Steering angle sensor reading / min.: –1152 deg, max.: 1150.875 deg		
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
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.

*1: For VSC equipped vehicles only

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

Item	Vehicle Condition / Test Details	Diagnostic Note
SRCF (SA1)	Turns TRC solenoid SRCF (SA1) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRCR (SA2)	Turns TRC solenoid SRCF (SA2) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRMF (SMCF, SA3)	Turns TRC solenoid SRMF (SMCF, SA3) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRMR (SMCR, STR)	Turns TRC solenoid SRMR (SMCR, STR) 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
TRAC MOT RELAY	Turns TRC 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 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
STP LIGHT RELAY	Turns stop light relay ON / OFF	Operation of motor can be heard

4. FREEZE FRAME DATA

(a) The vehicle (sensor) status memorized during ABS and/or VSC operation or at the time of error code detection can be displayed using the hand–held tester.

(b) Only one record of freeze frame data is stored and the freeze frame data generated during ABS and/or VSC operation are constantly updated. Also, the number of the ignition switch's "ON" after the freeze frame data is stored can be memorized up to 31 and it can be 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
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
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.

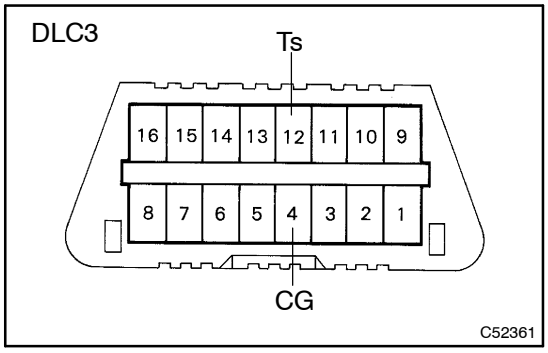
5. In case of not using hand–held tester: ABS SENSOR SIGNAL CHECK (TEST MODE)

NOTICE:

When having replaced the yaw rate sensor, deceleration sensor and/or ECU, perform zero point calibration of the yaw rate sensor 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) Using SST, connect terminals Ts and CG of DLC3.
SST 09843–18040
(3) Check that the steering wheel is in the straight–ahead position and shift the shift lever to P range.
(4) Turn the ignition switch ON.
(5) Check that the ABS warning light blinks.

HINT:
If the ABS warning light does not blinks, inspect the ABS warning light circuit or Ts terminal circuit.

Trouble area	See Page
Ts terminal circuit	05–870
ABS warning light circuit	05–852

(b) 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 quickly depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more for 1 sec. or more.

HINT:
At this time, the ABS warning light goes on for 3 sec.

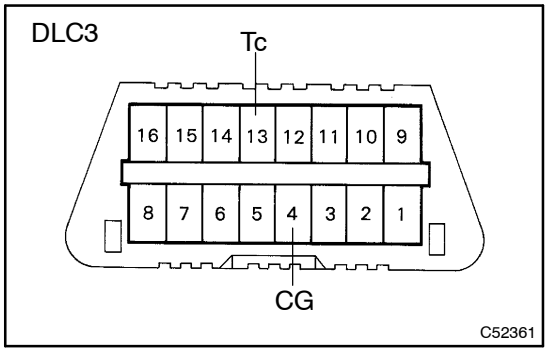
(c) Check the center diff. lock detecting switch.
(1) Push the center diff. lock switch to ON to put the vehicle in the center diff. lock condition.
(2) Push the center diff. lock switch to OFF to put the vehicle in the center diff. free condition.

(d) Check the L4 detection switch.
(1) Turn the H–L switch to L position to put the vehicle in the L4 mode.
(2) Turn the H–L switch to H position to put the vehicle in the H4 mode.

(e) Check the speed sensor signal.
(1) Drive the vehicle in reverse more than 1 sec. at 3 km/h (2mph) or higher.
(2) Drive the vehicle straight forward with the speed faster than 45 km/h (28 mph) for several seconds and check that the ABS warning light comes off.

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

(f) Stop the vehicle.

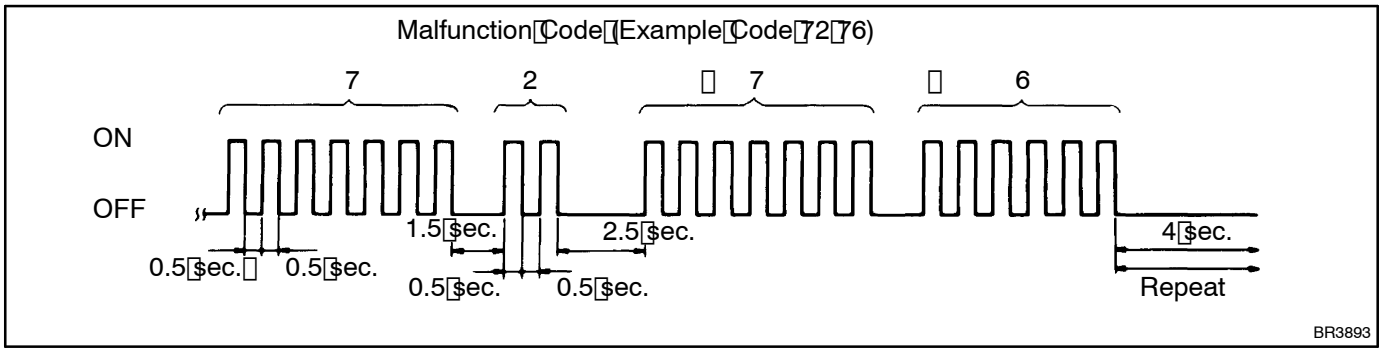


(g) Using SST, connect terminals Tc and CG of DLC3.
SST 09843–18040

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

HINT:

- See the list of DTC on page 05–742.
- If every sensor is normal, the normal code is output (A cycle of 0.25 sec. ON and 0.25 sec. OFF is repeated).
- If 2 of more malfunctions are detected at the same time, the lowest numbered will be displayed 1st.



(i) After doing the check, disconnect the SST from terminals Ts and CG, Tc and CG of DLC3 and turn the ignition switch OFF.
SST 09843–19040

6. In case of using 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 sensor 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 step 3. – (a) – (3) and from (b) to (d) 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.

7. In case of not using 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 sensor and deceleration sensors (See step 7.).

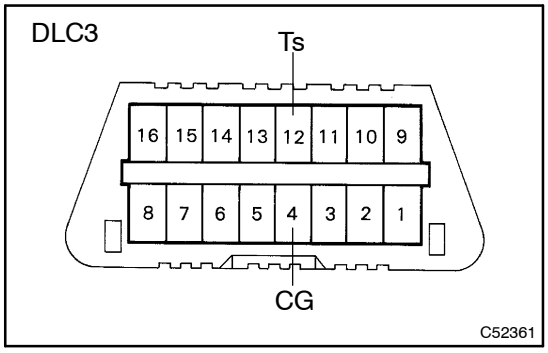
HINT:

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.



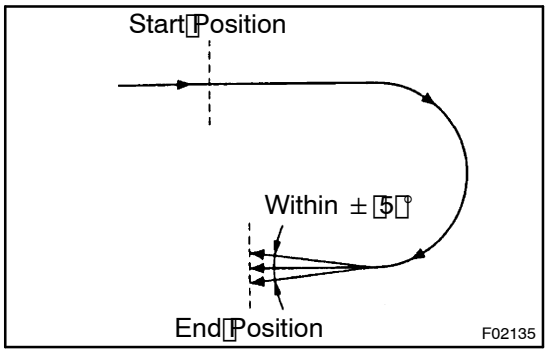
(3) Using SST, connect terminals Ts and CG of DLC3.
SST 09843–18040
(4) Start the engine and the VSC warning light blinks.

HINT:
If the VSC warning light does not blinks, inspect the VSC warning light circuit or Ts terminal circuit.

Trouble Area	See Page
Ts terminal circuit	05–870
VSC warning light circuit	05–854

(5) Keep the vehicle in a stationary on a level place for 1 sec. or more.

(b) Check the DAC operation switch.
(1) Push the DAC operation switch to ON.
(2) Push the DAC operation switch to OFF.

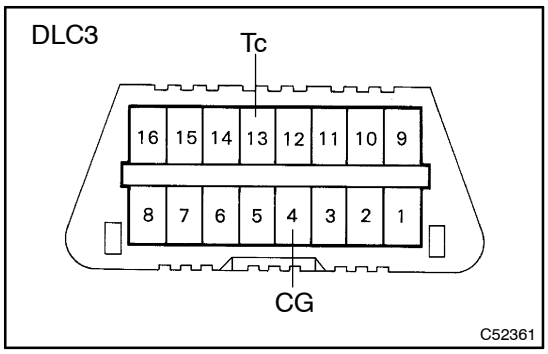


(c) Check the yaw rate sensor.
(1) Shift the shift lever to the D range and drive the vehicle at the vehicle speed of approx. 50 km/h (30 mph). Turn the steering wheel either to left or right for 90° or more, and maintain 180° circular drive for the vehicle.
(2) Stop the vehicle and shift the shift lever to the P range. 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 dose not sound, check the skid control buzzer circuit, then do the sensor check again.

Trouble Area	See Page
Skid control buzzer circuit	05–865

- If the skid control buzzer still does not sound, there is malfunction in the VSC sensor, so check the DTC.
- Drive the vehicle circularly by 180°. At the end of the turn, the direction of the vehicle should be within 180° ± 5° from its start position.
- Do not spin the wheels.



(d) Read the DTC.
(1) Using SST, connect terminals Tc and CG of DLC3.
SST 09843–18040
(2) Read the number of VSC warning light on the combination meter.

HINT:
- See the list of DTC on page 05–742.
- If every sensor is normal, the normal code is output (A cycle of 0.25 sec. ON and 0.25 sec. OFF is repeated).

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

(3) 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

8. In case of using 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 sensor 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 step 5. –(a) – (5), (b) and (c) on the previous page and this page.

(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.

9. IF NECESSARY, PERFORM ZERO POINT CALEBRATION 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 sensor's 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 ON in stationary condition.

(3) 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 VSC indicator light is lit indicating the recorded zero point is erased.

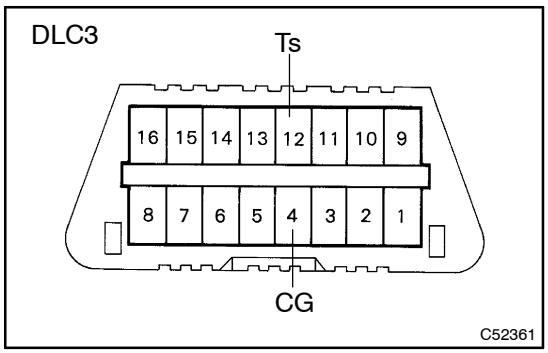
SST 09843–18040

(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 VSC warning light goes off about 15 sec. after the ignition switch is turned ON.

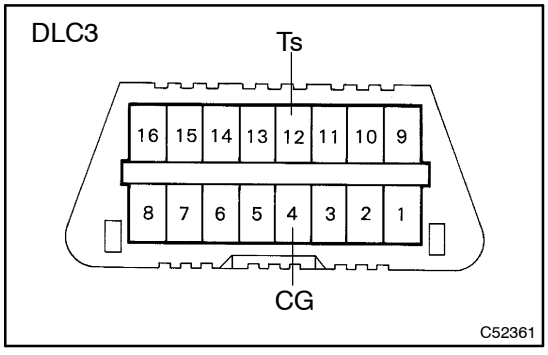
HINT:
Even if the ignition is not turned OFF in step (a) – (4) and remains ON, the yaw rate sensor zero point calibration can be completed. In this case, the VSC warning light is lit for about 15 sec. and then starts blinking. (Normal code)

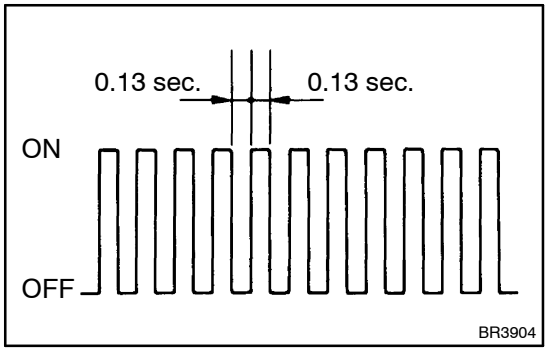
(4) After ensuring that the VSC warning light remains OFF for 2 sec., turn the ignition switch OFF.

HINT:
If the ignition switch is not turned OFF in step (a) – (4), make sure that the VSC warning 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 terminal 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 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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