
SERVICE DATA

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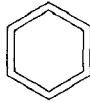
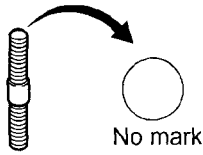
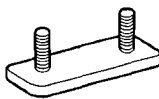
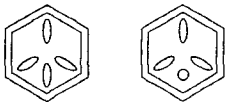
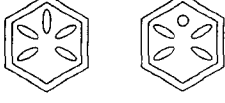
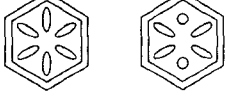
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STANDARD BOLTS

HOW TO DETERMINE BOLT STRENGTH

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Bolt types				Strength class
Hexagon bolt		Stud bolt	Welded bolt	
Standard recess bolt	Tape recess bolt			
 No mark	 No mark	 No mark		4T
 No mark	 No mark			5T
 w/Washer	 w/Washer			6T
 No mark	 No mark			7T
 No mark	 No mark	 		8T
 No mark	 No mark			9T
 No mark	 No mark			10T
 No mark	 No mark			11T

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SPECIFIED TORQUE FOR STANDARD BOLTS

1. Standard torque

<HINT>

Torque for tightening zinc plating bolts with no lubricant applied.

Strength category	Nominal diameter [mm]	Pitch [mm]	Standard bearing surface (with or without a washer) [N*m(kgf*cm)]	Bearing surface with collar [N*m(kgf*cm)]
4T	6	1.0	5{55}	6{60}
↑	8	1.25	12.5{130}	14{145}
↑	10	1.25	26{260}	29{290}
↑	12	1.25	47{480}	53{540}
↑	14	1.5	74{760}	84{850}
↑	16	1.5	115{1150}	127{1300}
5T	6	1.0	6.5{65}	7.5{75}
↑	8	1.25	15.5{160}	17.5{175}
↑	10	1.25	32{330}	36{360}
↑	12	1.25	59{600}	65{670}
↑	14	1.5	91{930}	100{1050}
↑	16	1.5	140{1400}	157{1600}
6T	6	1.0	8{80}	9{90}
↑	8	1.25	19{195}	21{210}
↑	10	1.25	39{400}	44{440}
↑	12	1.25	71{730}	80{810}
↑	14	1.5	110{1100}	125{1250}
↑	16	1.5	170{1750}	191{1950}
7T	6	1.0	10.5{110}	12{120}
↑	8	1.25	25{260}	28{290}
↑	10	1.25	52{530}	58{590}
↑	12	1.25	95{970}	105{1050}
↑	14	1.5	145{1500}	165{1700}
↑	16	1.5	230{2300}	255{2600}
8T	6	1.0	12{125}	14{145}
↑	8	1.25	29{300}	33{330}
↑	10	1.25	61{620}	68{690}
↑	12	1.25	110{1100}	120{1250}
↑	14	1.5	170{1750}	195{2000}
↑	16	1.5	260{2700}	299{3050}
9T	8	1.25	34{340}	37{380}
↑	10	1.25	70{710}	78{790}
↑	12	1.25	125{1300}	140{1450}
10T	8	1.25	38{390}	42{430}
↑	10	1.25	78{800}	88{890}
↑	12	1.25	140{1450}	155{1600}
11T	8	1.25	42{430}	47{480}
↑	10	1.25	87{890}	97{990}
↑	12	1.25	155{1600}	175{1800}

HOW TO DETERMINE NUT STRENGTH

Nut types			Strength class
Standard hexagon nut	Ready-made standard hexagon nut		
	Cold forging nut	Cut-processed nut	
 No mark			4N
 No mark (w/Washer)	 No mark (w/Washer)	 No mark	5N(4T)
  			6N
	 	  *	7N(5T)
 			8N
 	 	 No mark	10N(7T)
 			11N
 			12N

*:More than one marks are put on a nut.

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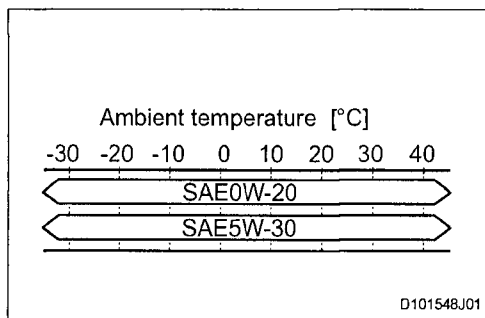
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<HINT>

When replacing a nut, use a new nut with the same strength category number, or higher tier number than the strength category number of the other bolt (Example: bolts = 4T, nuts = 4N or above).

LUBRICANTS AND COOLANTS

SPECIFIED LUBRICANTS AND CAPACITY



1. Engine oil

Engine type	Oil replacement only Filling amount [L]	Oil and Oil filter replacement Filling amount [L]
3SZ-VE	2.8	3.1
K3-VE	2.8	3.1

<HINT>

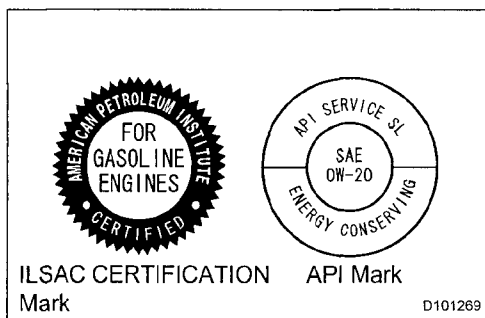
Filling amount for oil replacement should be equal to the amount of oil that has been withdrawn from the drain plug.

<CAUTION>

- > With reference to the information in the diagram, select oil whose viscosity is suitable for outside air temperature.
- > Make sure that oil is completely withdrawn, and then tighten the drain plug.
- > Be sure to make a final check of the oil amount using an oil level gage (Stop the vehicle on level ground. After warming up the engine, stop the engine and leave as it is for five minutes. Then check if the oil level is at level F on the gage).

(1) Gasoline engine oil

Grade: SAE 0W-20 or 5W-30, API SG or Higherer



2. Grease other than engine oil/ cooling fluids

Item [model]	Capacity [L] (reference value)	Specified grease
Engine coolant [3SZ-VE]	4.4	Ethylene glycol based anti-freeze solution
Engine coolant [K3-VE]	4.15	↑
Manual transmission oil	2.2	Manual Transmission Gear Oil (API GL-3 or GL-4, SAE 75W-90, 75W-85 or 75W-80)
Automatic transaxle fluid	5.0 (including differential)	ATF DEXRON-III
Transfer oil	0.57	Manual Transmission Gear Oil (API GL-3 or GL-4, SAE 75W-90, 75W-85 or 75W-80)
Rear differential oil	1.20	Differential Gear Oil (API GL-5, SAE 80W-90)
Brake fluid	-	Brake fluid (DOT3 or equivalent)
A/C compressor oil	-	ND-OIL8

REFERENCE VALUES FOR PERIODIC MAINTENANCE

ENGINE

1. Engine-related

Specified value

Item	3SZ-VE	K3-VE
Alternator belt flexible volume (thrust force 100 N {10.2kgf}) [mm]: Installation	4.0 - 5.0	6.0 - 7.0
Alternator belt flexible volume (thrust force 100 N {10.2kgf}) [mm]: Inspection	8.0 - 11.0	7.0 - 9.5
Alternator belt tension [N {kgf}]: Installation	834 - 932 {85 - 95}	585 - 686 {60 - 70}
Alternator belt tension [N {kgf}]: Inspection	343 - 539 {35 - 55}	←
Battery specific gravity (fluid temperature 20°C): Specified value	1.25 - 1.29	←
Battery specific gravity (fluid temperature 20°C): Tank difference	0.04 or below	←
Ignition timing [°BTDC]/[r/min]: EFI-T terminal short-circuited (*1)	4 - 8/650 - 800	←
Ignition timing [°BTDC]/[r/min]: EFI-T terminal open (*1)	0 - 15/650 - 800	←
Ignition timing (check using DS-II): EFI-T terminal ON	BTDC 4 - 8°C	←
Ignition timing (check using DS-II): EFI-T terminal OFF	BTDC 0-15°C	←
Idle speed (N and P range) [r/min]	600 - 750 (Manual transaxle) 650 - 800 (Automatic transaxle)	←
IN valve clearance (when the engine is cold) [mm]	0.145 - 0.235	←
EX valve clearance (when the engine is cold) [mm]	0.275 - 0.365	←
Cylinder head torque [N*m {kgf*cm}]	No check required because of plastic region clamping	←
IN manifold torque [N*m {kgf*cm}]	19 {194}	←
EX manifold torque [N*m {kgf*cm}]	25 {255}	←
Compression pressure [MPa {kgf/cm ² }] : Specified value	1.47 {15.0} (for 330 r/min)	←
Compression pressure [MPa {kgf/cm ² }] : Limit	1.08 {11.0} (for 330 r/min)	←
Compression pressure [MPa {kgf/cm ² }] : Variation between cylinders	0.147 {1.5} (for 330 r/min)	←
Spark plug gap [mm]: Specified value	0.8 - 0.9 (*2)	←
Radiator cap opening pressure [kPa {kgf/cm ² }] : Specified value	93.3 - 122.7 {0.95 - 1.25}	←

(*1): Between the DLC EFI↔T and E terminal

(*2): No adjustment required because an iridium plug is used

APPARATUS FOR PREVENTING RELEASE OF HARMFUL GASES SUCH AS FUMES AND ODOROUS GASES

1. Emission control system-related

Specified value

Item	3SZ-VE	K3-VE
Level of idle CO [%]	0.2 or below	←
Level of idle HC [ppm]	200 or below	←

SUSPENSION

1. Front suspension-related

Specified value

Item	M401LS	M402LS	M402RS	M412LS
Front side slip (per 1m) [mm]	0 +/- 5	←	←	←
Front toe in [mm]	0 +/- 2 (inspection) 0 +/- 1 (adjustment)	←	←	←
Front camber [degrees]	0° +/- 45'	←	←	←

Item	M401LS	M402LS	M402RS	M412LS
Front caster [degrees]	3°28' +/- 1° (Tire size 175/65R14) 3°30' +/- 1° (Tire size 185/55R15)	←	←	←
Front kingpin angle [degrees]	10°36' +/- 1°	←	←	←

2. Rear suspension-related

Specified value

Item	M401LS	M402LS	M402RS	M412LS
Rear toe in [mm]	3 +/- 3	←	←	0 +/- 2
Rear camber [degrees]	-0°45' +/- 45'	←	←	0° +/- 45'

03

DRIVING APPARATUS

1. Driving apparatus

Specified value

Item	M401LS M402LS M402RS	M412LS
Front axle hub backlash in the axial direction [mm]	0.05 or below	←
Rear axle hub backlash in the axial direction [mm]	0.05 or below	0.9 or below
Wheel nut torque [N*m {kgf*cm}]	103 {1050}	←
Tire groove depth [mm]	1.6 or above	←

2. Air pressure

(1) No difference between general and high speed

Specified value

Tire size	Application	Front wheel [kPa {kgf/cm ² }]	Rear wheel [kPa {kgf/cm ² }]
175/65R14 82T	M401LS/ M402LS/ M402RS/ M412LS	220 {2.2}	←
175/65R14 82S	M402RS (for Europe)	220 {2.2}	←
185/55R15 81V	M401LS/ M402LS/ M402RS/ M412LS	200 {2.0}	←

BRAKE APPARATUS

1. Brake-related

Specified value

Item	M401LS M402LS M402RS	M412LS
Brake pedal free play (under no negative pressure) [mm]	0.5 - 3.0	←
Brake pedal reserve distance (Engine ON, pedal force 294 N {30 kgf}) [mm]	70 or above	←
Parking brake pedal travel (Operating force 245 N {25 kgf}) [number of notches]	4 - 7	←
Braking effectiveness of the parking brake: braking force	20% or more of vehicle weight at the time of inspection	←
Thickness of the rear drum brake lining [mm]: Limit	1.0 (Reference: new one 4.0)	1.0 (Reference: new one 4.5)
Inner diameter of the rear brake drum [mm]: Limit	181.0 (Reference: new one 180.0)	201.0 (Reference: new one 200.0)
Thickness of the front disc brake pad [mm]: Limit	1.5 (Reference: new one 9.5)	←
Thickness of the front disc rotor [mm]: Limit	16.0 (Reference: new one 17.0)	←
Braking effectiveness (braking force) (*): Sum of rear wheels	10% or more of axle load	←

Item	M401LS M402LS M402RS	M412LS
Braking effectiveness (braking force): Each wheel lateral difference	8% or below of axle load	←
Braking effectiveness (braking force): Summation	50% or more of vehicle weight at the time of inspection	←

(*): If all the front wheels are locked and measurement is difficult, it is assumed that the current state conforms to summation.

03 STEERING SYSTEM

1. Chassis-related

Specified value

Item	M401LS M402LS M402RS	M412LS
Steering wheel free play (At the wheel periphery) [mm]	0 - 10	←

OPERATION SETTINGS WHEN INSTALLING, REMOVING AND REPLACING PARTS

LIST OF WORK

1. List of replacement parts

Replacement parts	Necessary work	Phenomena before implementation / disabled functions
> Automatic transaxle assembly > Valve body assembly > Each solenoid	1. AT learning value initialization 2. AT initial learning	> Shift shock is great
> Brake actuator assembly [with ABS]	1. Test mode check	> ABS warning lamp on > ABS control prohibition or malfunction
> ABS & traction actuator assembly [with VSC] > Yaw rate sensor (built-in G sensor) [with VSC]	1. Test mode check	> Slip indicator lamp on > VSC warning lamp on > ABS warning lamp on > Buzzer sounding > VSC control prohibition or malfunction
> Steering column assembly (built-in torque sensor)	1. Initialization of torque sensor zero-point correction signal 2. Torque sensor zero-point correction	> Lateral difference in steering force > EPS warning lamp on > Torque sensor error diagnosis memory
> Power steering computer assembly	1. Torque sensor zero-point correction	> EPS warning lamp on > EPS control
> Engine control computer (engine ECU) > Transponder transmitter (main key, sub key)	1. Identification code registration	> Wireless function > Engine start
> Combination meter assembly	1. CAN communication destination information setting	> VSC warning lamp malfunction > ABS warning lamp malfunction > Slip indicator lamp malfunction > O/D OFF indicator lamp malfunction

03

2. AT learning value initialization

(1) Erase by DS-II

<HINT>

Mere removal of the battery does not automatically initialize learning values.

(a) Connect DS-II to DLC.

(b) Turn IG on (Do not start the engine).

(c) According to the instructions on the screen, use DS-II to go to the main menu [OBD] → [A/T] screen and select [DTC].

(d) Select [Clear] on the screen to initialize AT learning values.

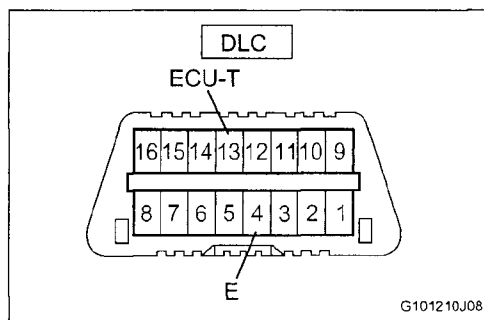
(e) Turn IG off.

(2) Erase by DLC short circuit

<HINT>

Mere removal of the battery does not automatically initialize learning values.

SST 09991-87403, 09991-87404



(a) Short-circuit between the terminals 13 (ECU-T) ↔ 4 (E) of DLC using SST.

<CAUTION>

Never confuse the short circuit positions. Otherwise a failure may occur.

(b) Turn IG on (Do not start the engine). Step on the brake pedal within three seconds and hold it down until erasing is complete.

(c) Move the shift lever from P → R → P within one second (The whole operation of moving from P → R → P should be complete within one second).

- (d) Repeat the above operation (c) eight times (When erasing is complete, the O/D OFF indicator lamp quickly flashes for 2.5 seconds).
- (e) Break the DLC short circuit.
- (f) Turn IG off.

3. AT initial learning

- (1) Start the engine and fully warm up the engine and the automatic transaxle.

<HINT>

AT initial learning begins when the transmission oil temperature reaches 50°C or above.

- (2) Implement initial learning (driving in an urban area for approx. 15 minutes) (Run through all gear changes and kickdown operations).

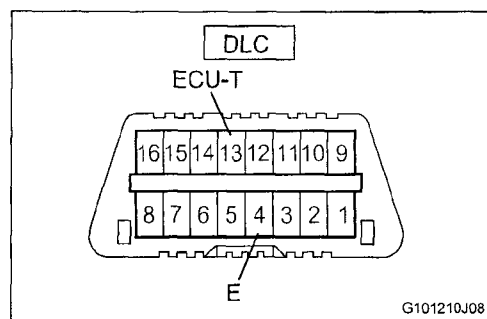
4. Test mode check (ABS installed car)

<HINT>

- > Turning IG on for the first time after replacing the brake actuator assembly with a new one automatically enables the test mode.
- > When the test mode is entered, all the test mode codes are stored in memory. The computer checks for the codes and erases normal codes from the memory.
- > When the normal mode is entered again, all the test mode codes are erased.
- > If the sensor has an error, the ABS warning lamp lights up and ABS does not operate.

(1) Test mode start procedure (DS-II)

- (a) Turn IG off.
- (b) Connect DS-II to DLC.
- (c) Turn IG on.
- (d) According to the instructions on the DS-II screen, enter into the test mode.



(2) Test mode start procedure (DLC terminal short circuit)

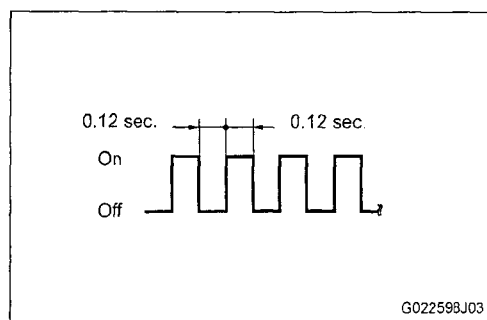
- (a) Turn IG on.
- (b) Erase diagnostic trouble codes by DLC terminal short circuit.
- (c) Break the short circuit between the terminals 13 (ECU-T) ↔ 4 (E) of DLC. Make sure that the ABS warning lamp begins to flash to show that the test mode is entered.

<CAUTION>

- > Replacing the brake actuator assembly with a new one and turning the IG switch "on" for the first time also enables the test mode automatically.
- > If the ABS warning lamp remains lighted, the system may have an error. Check the diagnostic trouble codes.

(3) Test mode display check

- (a) Make sure that the test mode is entered by checking if the ABS warning lamp is lighted for approx. three seconds at initial check and then begins pulse flashing.



ABS warning lamp display conditions

System state	State of 13 (ECU-T) terminal	Vehicle not moving (Vehicle speed 10 km/h or below)	Vehicle running (Vehicle speed 10 km/h or above)
Normal	OFF (open)	Test mode codes displayed	Test mode codes displayed
	ON (short-circuit)	Diagnostic trouble codes displayed	Test mode codes displayed
Error	OFF (open)	Lights up	Lights up
	ON (short-circuit)	Diagnostic trouble codes displayed	Lights up

(4) Speed sensor check (output voltage and output cycle)

- (a) Make sure that the ABS warning lamp is flashing to display that the test mode is enabled. Then turn the IG switch "off".
- (b) Start the engine. Set the steering wheel for direct advance, and start the vehicle without a wheel spin (with even wheel speed).
- (c) With the vehicle moving straight at 4-7 km/h, the skid control computer checks each wheel speed sensor.
- (d) With the vehicle moving straight at 10-40 km/h for at least five seconds or with the vehicle moving straight until the vehicle speed reaches 40 km/h, the skid control computer checks the signal cycle at each wheel speed sensor.
- (e) After check, the computer erases the registered test mode codes of the items that have been recognized as "without errors".

(5) G sensor output voltage check (4WD vehicle only)

<HINT>

For 4WD vehicle, also check G sensor output voltage.

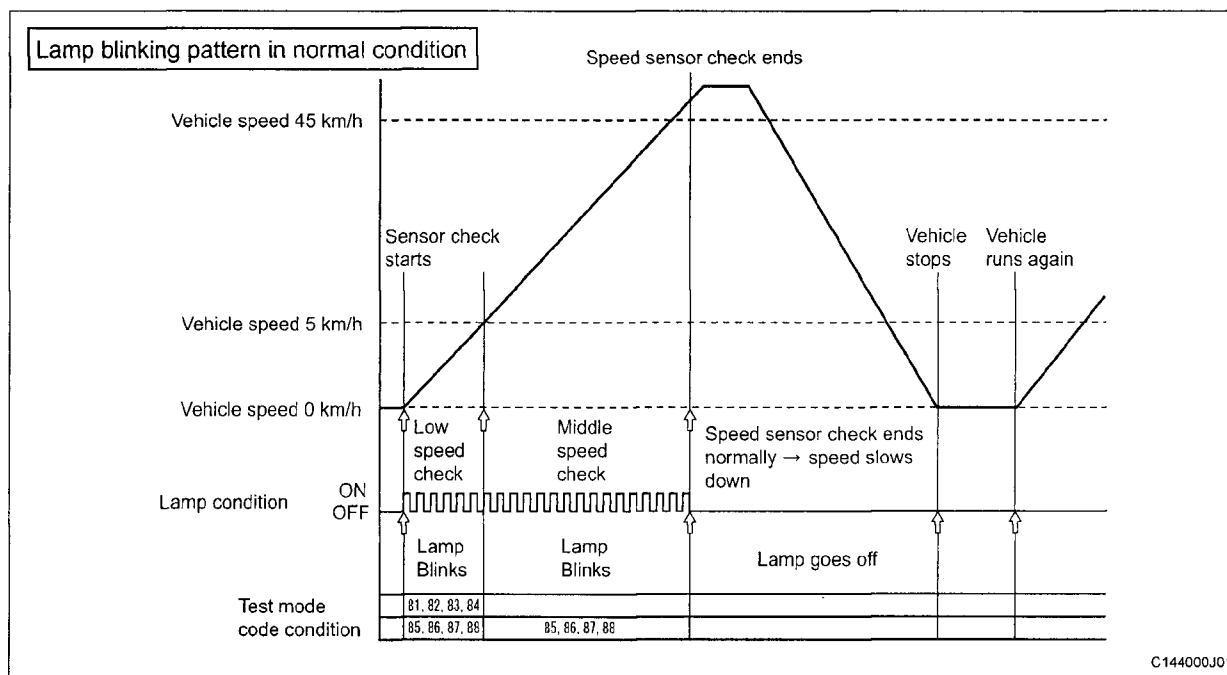
- (a) When turning the IG switch "on" and then apply normal braking while the vehicle is moving, the skid control computer checks G sensor output voltage.
- (b) After check, the computer erases the registered test mode codes of the items that have been recognized as "without errors".

(6) Sensor check completion

- (a) If satisfactory results are gained for all the check items, the test mode codes are automatically erased and the ABS warning lamp goes out.

<CAUTION>

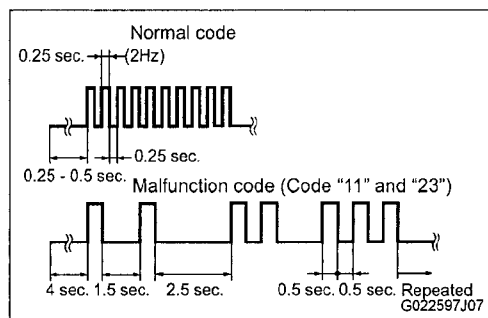
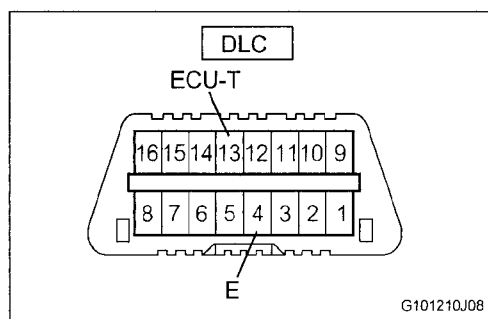
If the vehicle does not move or if acceptance criteria of the test mode check are not met, the stored test mode codes are not erased and the ABS warning lamp stays flashing to display that the test mode is still enabled.



- (b) Stop the vehicle.

(7) Test mode code reading (DS-II)

- (a) In test mode, read the test mode codes according to the instructions on the DS-II screen.



(8) Test mode code reading (DLC terminal short circuit)

(a) Turn IG off.

(b) Short-circuit between the terminals 13 (ECU-T) ↔ 4 (E) of DLC using SST.

SST 09991-87403, 09991-87404

<CAUTION>

- > Be sure to use the specified SST to short-circuit DLC terminals.
- > Never confuse the connection position of the connector. Otherwise a failure may occur.
- > Make sure that the vehicle is not moving.

(c) Turn IG on.

(d) Read the number of flashes of the ABS warning lamp.

<CAUTION>

- > If only diagnostic trouble codes are displayed, solve the trouble to erase the diagnostic trouble codes.
- > If only test mode codes are displayed, enter into the test mode again.
- > If both diagnostic trouble codes and test mode codes are displayed, solve the trouble to erase the diagnostic trouble codes and then implement test mode check again.

<HINT>

- > Both test mode codes and diagnostic trouble codes are displayed.
- > If the system operates properly, the warning lamp lights up and goes out repeatedly at an interval of 0.25 seconds.
- > If there is one error code, the warning lamp displays the same code at an interval of four seconds. If there are two or more error codes, the warning lamp displays different codes in series at an interval of 2.5 seconds. When all the codes are displayed once, the second output begins in four seconds.
- > When two or more codes are output, they are displayed in ascending order of the code numbers.

(9) Test mode termination procedure (DS-II)

(a) Make sure that sensor check is successfully complete. According to the instructions on the DS-II screen, switch the mode from test to normal to terminate the test mode.

(b) Turn IG off and remove DS-II.

(10) Test mode termination procedure (DLC terminal short circuit)

(a) Make sure that sensor check is successfully complete and terminate the test mode.

5. Test mode check (VSC installed car)

<CAUTION>

- > During ABS and traction actuator assembly replacement, VSC, ABS, TRC, and BA control is prohibited until test mode check is complete.
- > Once stored in memory, the zero point is not captured again until the data is overwritten. If the yaw rate sensor has been replaced, enter into the test mode check zero-point capture mode.
- > Zero-point capture should be implemented on level ground (gradient ratio of 1% or below). During implementation, do not swing the vehicle and do not open or close the doors. To prevent idling vibration, do not start the engine.

<HINT>

- > Turning IG on for the first time after replacing the ABS and traction actuator assembly with a new one automatically enables the test mode.
- > When the test mode is entered, all the test mode codes are stored in memory. The computer checks for the codes and erases normal codes from the memory.
- > In test mode, VSC does not operate regardless of the sensor check results.
- > When the normal mode is entered again, all the test mode codes are erased.
- > If the sensor has an error, the ABS warning lamp or the VSC warning lamp lights up.

(1) Test mode start procedure (DS-II)

<CAUTION>

During the test mode, ABS, VSC, TRC, and BA control is prohibited (EBD control is allowed).

(a) Turn IG off and connect DS-II to DLC.

(b) Turn IG on. According to the instructions on the DS-II screen, select [OBD] → [VSC] → [Utility] → [Sensor Check Function] and enter into the test mode.

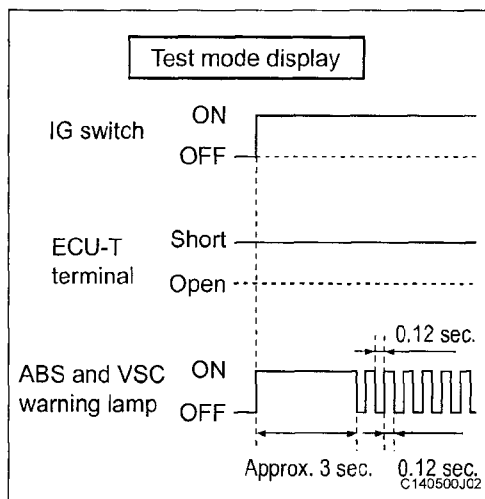
(2) Test mode start procedure (DLC short circuit)

<CAUTION>

During the test mode, ABS, VSC, TRC, and BA control is prohibited (EBD control is allowed).

(a) Erase the diagnostic trouble codes with DLC short circuit.

(b) Turn IG on.



(3) Test mode display check

(a) During the test mode, the VSC warning lamp and the ABS warning lamp light up for approx. three seconds and then go out and light up repeatedly at an interval of 0.12 seconds to show that the test mode is entered.

03

(4) Zero-point capture mode start

<CAUTION>

- > During the zero-point capture mode, the control total prohibition mode is entered and the VSC system is totally out of control.
- > If the traction control switch is turned off or IG is turned off during the zero-point capture mode, the zero-point capture mode is terminated but the VSC system does not operate because the control total prohibition mode of the VSC system remains enabled.
- > Zero-point capture should be implemented on level ground (gradient ratio of 1% or below). During implementation, do not swing the vehicle and do not open or close the doors. To prevent idling vibration, do not start the engine.

(a) With the vehicle stopped (engine stopped), turn on the traction control switch to enter into the zero-point capture mode.

(b) When turning on the traction control switch, make sure that the slip indicator lights up and the buzzer sounds at an interval of 80ms to show that the zero-point capture mode is entered.

(5) Master pressure sensor zero-point capture

(a) Release the brake pedal for at least one second. Make sure that the buzzer stops sounding and that zero-point capture is successfully complete.

<HINT>

- > If master pressure sensor zero-point capture fails, the buzzer does not stop sounding.
- > If master pressure sensor zero-point capture is complete, the buzzer stops sounding but the slip indicator remains lighted.

(6) Master pressure sensor output check

(a) When master pressure sensor zero-point capture is complete, step on the brake pedal with the pedal force that increases hydraulic pressure to 1MPa or above.

(b) When master pressure sensor output check is complete, make sure that the buzzer sounds for one second and then the slip indicator lamp goes out.

<HINT>

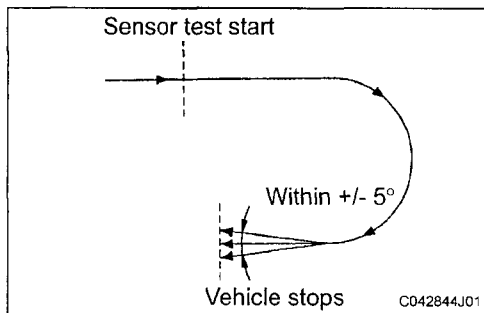
- > While the slip indicator lamp is on, hold down the brake pedal with the pedal force of 98 N {10 kgf} or more.
- > If master cylinder pressure sensor check fails to be complete, do not indiscriminately step on the brake. Negative pressure may further decrease, which causes difficulty in sensor check completion.

- > If negative pressure is not enough, master cylinder pressure sensor check may fail to be complete. In this case, idle the engine to get enough negative pressure.
- > Even if master pressure sensor check is successfully complete, the VSC warning lamp dose not change.

(7) Yaw rate sensor and deceleration sensor zero-point capture

<HINT>

Yaw rate sensor zero-point capture is automatically implemented during master pressure sensor zero-point capture and output check.



(8) Yaw rate sensor output check

- (a) At vehicle speed of 5 km/h or above, turn the steering wheel 90° or more without a wheel spin, hold the steering wheel for at least one second, and turn the steering wheel 180°.

<CAUTION>

- > Vehicle directions at start and end of the turning should form within 180 +/- 5°.
- > During the turn, do not set the shift lever to P range and do not turn IG off (Automatic transaxle).

<HINT>

- > Turning direction does not matter.
 - > Vehicle speed change, stop, and reverse is allowed during the turn, as long as the turn is complete within 20 seconds.
- (b) Make sure that the VSC warning lamp goes out and that yaw rate sensor and deceleration sensor output check is complete.

<CAUTION>

- > If the buzzer does not sound, check test mode codes.
- > If test mode codes have no error and several attempts of sensor check do not cause the buzzer to sound, check the buzzer circuit.

(9) Speed sensor check

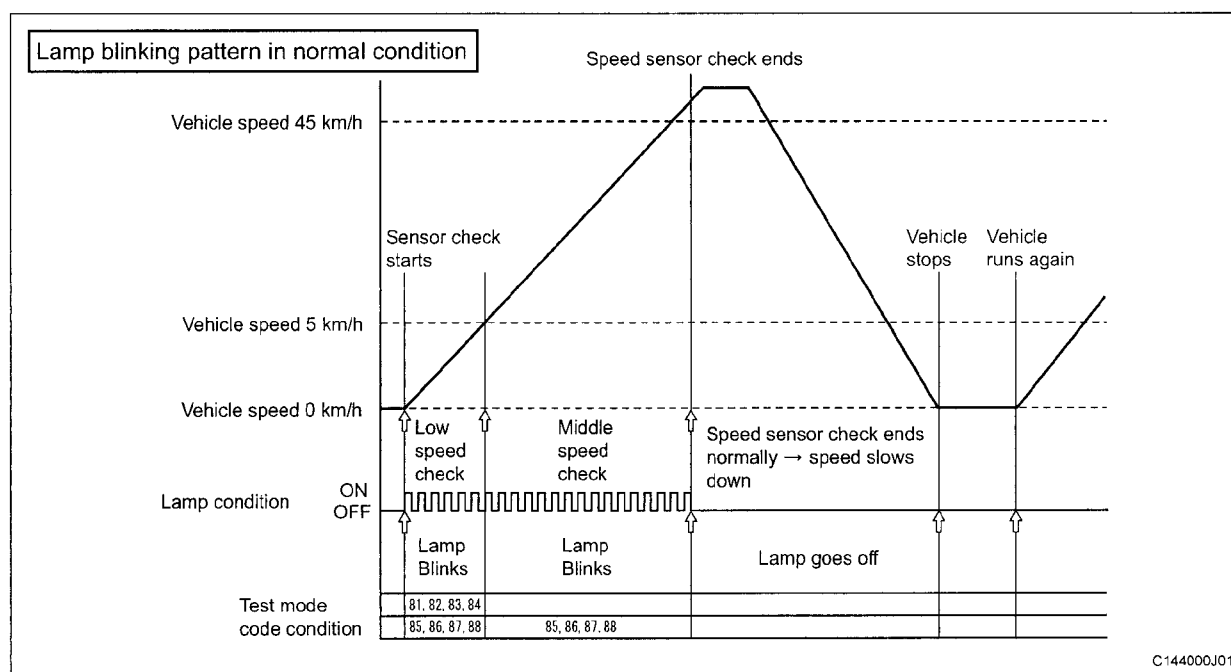
- (a) Set the steering wheel for direct advance, and start the vehicle without a wheel spin. Increase the vehicle speed to 40 km/h or above and make sure that the ABS warning lamp goes out.

<CAUTION>

- > If sensor check is started with the steering wheel turned or if a wheel spins, speed sensor check may fail to be complete.
- > If sensor check is not complete, the ABS warning lamp flashes even the vehicle is moving and ABS does not operate.
- > If sensor check is started with the steering wheel turned, the ABS warning lamp may fail to go out.

<HINT>

When speed sensor check is successfully complete, the ABS warning lamp goes out.



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(10) Sensor check completion

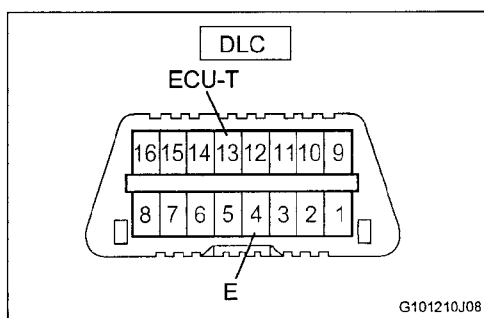
(a) When sensor check is successfully complete, the VSC warning lamp and the ABS warning lamp go out.

<CAUTION>

- > When yaw rate sensor check, G sensor check, speed sensor check, and master cylinder pressure sensor check are successfully complete, sensor check is over.
- > If speed sensor check is not complete, the ABS warning lamp flashes even the vehicle is moving and ABS does not operate.
- > When the diagnostic trouble code is detected in test mode, the ABS warning lamp or the VSC warning lamp lights up

(11) Test mode code reading (DS-II)

(a) Check diagnostic trouble codes in test mode using DS-II.



(12) Test mode code reading (DLC short circuit)

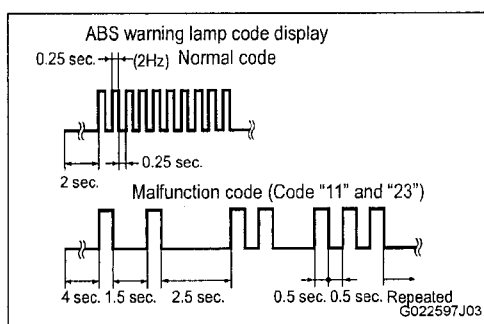
(a) Turn IG off.

(b) Short-circuit between the terminals 13 (ECU-T) ↔ 4 (E) of DLC using SST.

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<CAUTION>

- > Never confuse the connection position of the connector. Otherwise a failure may occur.
- > Make sure that the vehicle is not moving.



(c) Turn IG on. Read the test mode codes and diagnostic trouble codes from the number of ABS warning lamp flashes.

<CAUTION>

- > If only diagnostic trouble codes are displayed, solve the trouble to erase the diagnostic trouble codes.
- > If only test mode codes are displayed, enter into the test mode again.
- > If both diagnostic trouble codes and test mode codes are displayed, solve the trouble to erase the diagnostic trouble codes and then implement test mode check again.

<HINT>

- > Both test mode codes and diagnostic trouble codes are displayed.

- > If the system operates properly, the warning lamp lights up and goes out repeatedly at an interval of 0.25 seconds.
- > If there is one error code, the warning lamp displays the same code at an interval of four seconds. If there are two or more error codes, the warning lamp displays different codes in series at an interval of 2.5 seconds. When all the codes are displayed once, the second output begins in four seconds.
- > When two or more codes are output, they are displayed in ascending order of the code numbers.

(13) Test mode termination procedure (DS-II)

- (a) According to the instructions on the DS-II screen, switch the mode from test to normal to terminate the test mode.
- (b) Turn IG off and remove DS-II.

(14) Test mode termination procedure (DLC short circuit)

- (a) Make sure that sensor check is successfully complete.
 - (b) Turn IG off. Break the short circuit between the terminals 13 (ECU-T) ↔ 4 (E) of DLC and terminate the test mode.
- <HINT>
- > If the short circuit between ECU-T ↔ E terminals is broken with IG on, the test mode continues.
 - > If IG is turned on with the ECU-T ↔ E terminals short-circuited, the test mode continues from the previous.

6. Initialization of torque sensor zero-point correction signal (power steering)

(1) If DS-II is used:

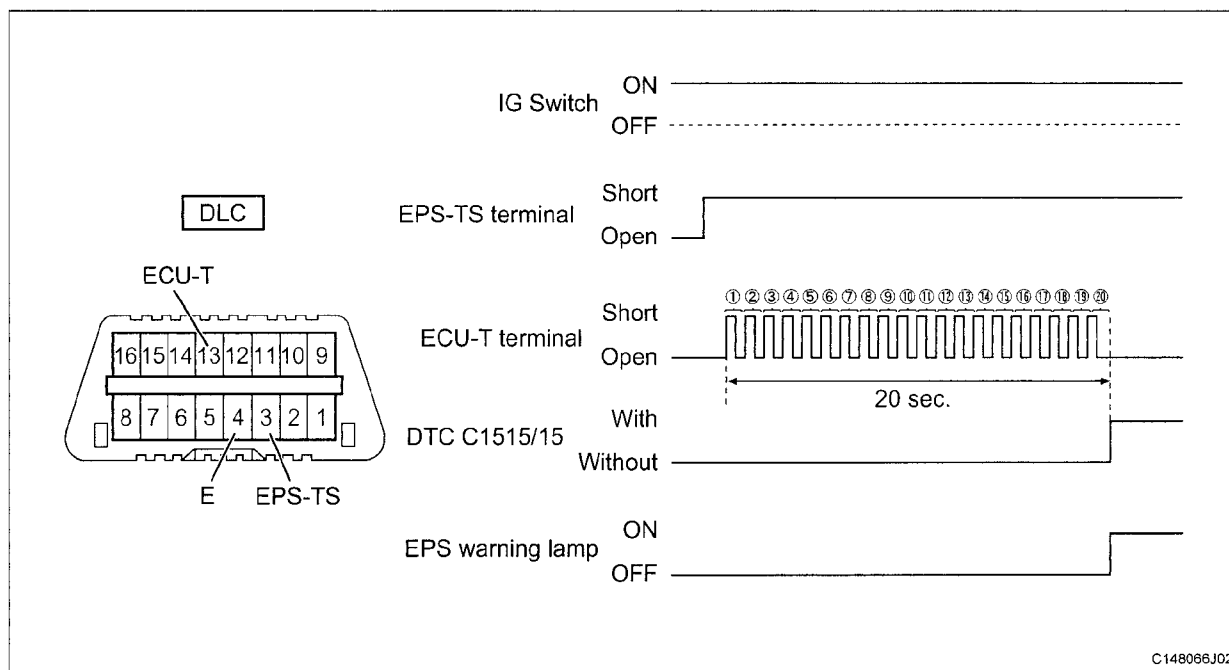
- (a) Stop the vehicle on level ground. Set the steering wheel and the front tire for direct advance.
 - (b) Connect DS-II to DLC.
 - (c) Turn IG on (with the engine stopped). Select [OBD] → [EPS] → [Utility] → [Torque Sensor Adjustment] and initialize the power steering zero-point correction signal.
- <CAUTION>
- > Do not start the engine. While the engine is running, initialization of zero-point correction signal can not be implemented.
 - > During initialization of zero-point correction signal, do not touch the steering wheel.
- (d) When initialization is complete, implement torque sensor zero-point correction according to the instructions on the screen.

(2) If DS-II is not used:

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- (a) Stop the vehicle on level ground. Set the steering wheel and the front tire for direct advance.
- (b) Turn IG off.
- (c) Turn IG on (with the engine stopped). Leave as it is for approx. five seconds.
- (d) Short-circuit between the terminals 3 (EPS-TS) ↔ 4 (E) of the DLC connector using SST.
- (e) With the short circuit between the terminals 3 (EPS-TS) ↔ 4 (E) of the DLC connector left as it is, short-circuit and break the short circuit between the terminals 13 (ECU-T) ↔ 4 (E) 20 times or more for 20 seconds.

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<CAUTION>

Never confuse the connection positions of the connector. Otherwise a failure may occur.

(f) Make sure that the EPS warning lamp lights up and that the diagnostic trouble code C1515/15 is stored.

(g) Turn IG off, and then implement torque sensor zero-point correction.

<CAUTION>

Zero-point correction can not be implemented with IG on after initialization of zero-point correction signal.

7. Torque sensor zero-point correction (power steering)

<CAUTION>

- > If the steering column assembly (built-in torque sensor) has been replaced or there is lateral difference in steering force, initialize the torque sensor zero-point correction signal of the power steering computer assembly, turn the IG switch off, and then implement steering zero-point correction again.
- > If the power steering computer has been replaced with a new one, be sure to do the following in order to store the steering neutral position (torque sensor zero-point) in computer memory.

(1) If DS-II is used:

- (a) Set the steering wheel and the front tire for direct advance.
- (b) Connect DS-II to DLC.
- (c) Turn IG on. Select [OBD] → [EPS] → [Utility] → [Torque Sensor Adjustment] and implement power steering zero-point correction.

<CAUTION>

- > Do not start the engine
- > Do not touch the steering wheel during zero-point correction.

<HINT>

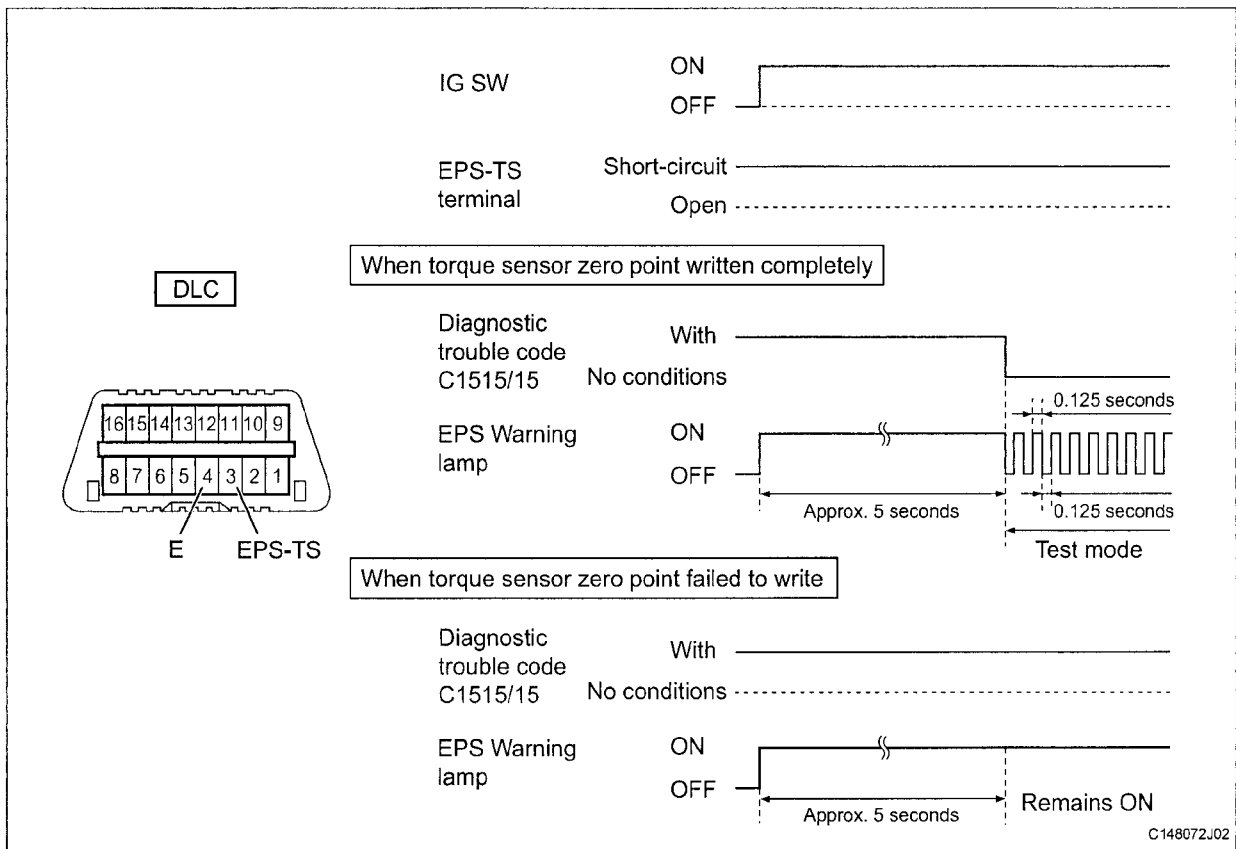
The EPS warning lamp flashes when torque sensor zero-point correction begins and goes out when it is complete.

(2) If DS-II is not used:

- (a) Set the steering wheel and the front tire for direct advance.
- (b) Short-circuit between the terminals 3 (EPS-TS) ↔ 4 (E) of the DLC connector using SST.

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<CAUTION>

- > Do not start the engine.
- > Never confuse the connection positions of the connector. Otherwise a failure may occur.
- > Do not touch the steering wheel during a change into test mode and for approx. five seconds after the test mode is entered.
- > The EPS warning lamp lights up but this is not due to an error.

<HINT>

- > Changing into test mode automatically results in torque sensor zero-point correction.
- > When the test mode is entered, the EPS warning lamp lights up. When torque sensor zero-point correction is successfully complete in approx. five seconds, the EPS warning lamp lights up and goes out repeatedly at an interval of 0.125 seconds (flashes at 4Hz).
- > If torque sensor zero-point correction fails, the diagnostic trouble code C1515/15 is not erased and the EPS warning lamp remains lighted.

(c) Make sure that torque sensor zero-point correction is complete with the flashing EPS warning lamp, and terminate the test mode.

(3) Diagnostic trouble code check

<CAUTION>

If torque sensor zero-point correction is implemented, make sure that diagnostic trouble codes are normal when correction is complete.

(4) If the diagnostic trouble code C1515/15 is output:

<HINT>

The diagnostic trouble code C1515/15 is output when torque sensor zero-point correction is not implemented or failed.

(a) The diagnostic trouble code C1515/15 is output when torque sensor zero-point correction is not implemented or failed.

<CAUTION>

If the diagnostic trouble code (C1515/15) is output even after three or more attempts of torque sensor zero-point correction, replace the steering column assembly with a new one.

(b) After work, check if the diagnostic trouble code is not output.

(5) If the diagnostic trouble code C1516/16 is output:

<HINT>

The diagnostic trouble code C1516/16 is output when torque sensor zero-point correction failed.

- (a) Erase the diagnostic trouble code.
- (b) Implement initialization of torque sensor zero-point correction signal.
- (c) Implement torque sensor zero-point correction again.

<CAUTION>

If the diagnostic trouble code (C1516/16) is output despite three or more attempts of the procedure [Diagnostic trouble code erase] → [Initialization of torque sensor zero-point correction signal] → [Torque sensor zero-point correction] after the first output of the diagnostic trouble code, replace the steering column assembly with a new one.

- (6) If the diagnostic trouble code C1534/34 is output:

<HINT>

The diagnostic trouble code C1534/34 is output when torque sensor zero-point correction failed due to ECU internal error.

- (a) Replace power steering computer assembly with a new one.
- (b) Implement torque sensor zero-point correction.
- (c) After work, check if the diagnostic trouble code is not output.

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8. CAN communication destination information setting

<CAUTION>

When the combination meter assembly is replaced, it is necessary to set up CAN communication destinations except for a M/T vehicle without ABS/VSC.

<HINT>

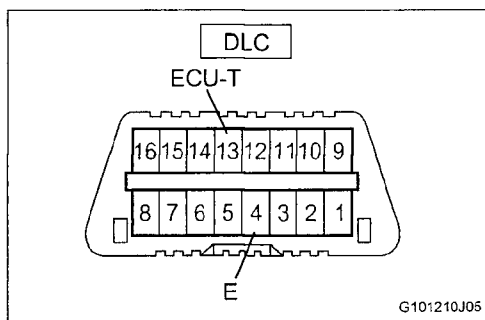
- > The CAN communication destination information that combination meter assembly stores is to recognize whether engine control computer, transmission control computer assembly, and brake actuator assembly are present.
- > The combination meter assembly, based on this CAN communication destination information, determines which indicator and/or warning lamp should be turned on.
- > The CAN communication destination information is not erased even if the battery or the connector of the combination meter assembly is removed.

- (1) Check vehicle specifications.

<HINT>

Check vehicle specifications as to whether the transmission and ABS/VSC exist or not.

- (2) Set the IG switch to LOCK.



- (3) Use SST to short-circuit the ECU-T terminal and E terminal of DLC located beneath the instrument panel.

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<CAUTION>

Connecting the connector in the wrong location could cause a malfunction. Therefore, make sure the connection is correct.

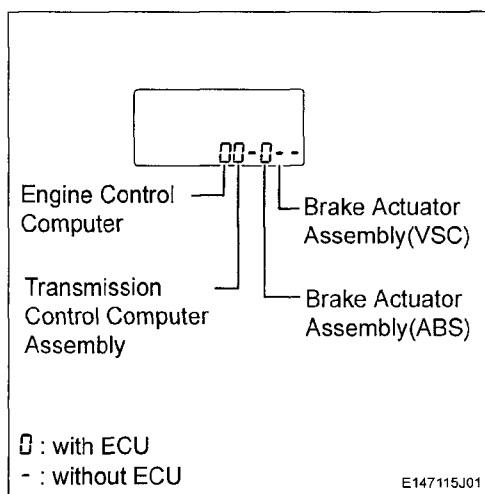
- (4) Turn the IG switch ON, while the odometer/trip selection switch remains ON.
- (5) Set the odometer/trip selection switch to OFF.
- (6) Set the odometer/trip selection switch to ON again and hold more than 3 seconds.

<HINT>

When held for more than 3 seconds, the LCD display will indicate "b-0000" and blinks.

- (7) A buzzer sounds in about 6 seconds, CAN communication destination information is stored, and the setup is complete.

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- (8) The CAN communication destination information is displayed on the LCD display. Check whether the vehicle specification matches the information displayed.

<HINT>

- > The factory setting for CAN communication destination of the combination meter assembly is that the vehicle is a M/T vehicle without ABS/VSC equipped.
- > If "-FAIL-" is displayed, it suggests that the combination meter assembly is faulty.