

CRUISE CONTROL SYSTEM

PRECAUTION

NOTICE:

When disconnecting the negative (-) battery terminal, initialize the following system after the terminal is reconnected.

System Name	See procedure
Sliding Roof Control System	IN-29
Power Window Control System	

CC

1. EXPRESSIONS OF IGNITION SWITCH

The type of ignition switch used on this model differs according to the specifications of the vehicle. The expressions Listed in the table below are used in this section.

Switch Type Expression	Ignition Switch (position)	Engine Switch (condition)
Ignition Switch off	LOCK	Off
Ignition Switch on (IG)	ON	On (IG)
Ignition Switch on (ACC)	ACC	On (ACC)
Engine Start	START	Start

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2. HANDLING PRECAUTION FOR CRUISE CONTROL SYSTEM

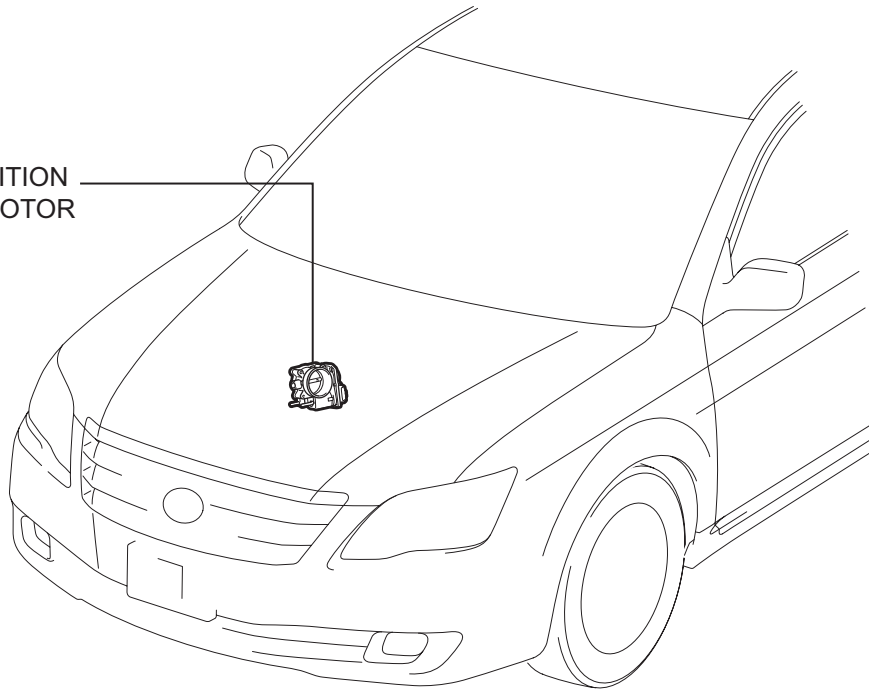
- (a) Turn the cruise control main switch OFF when not using the cruise control system.
- (b) Be careful as the vehicle speed increases when driving downhill with the cruise control system on.
- (c) The RESUME/ACCEL operation changes according to the cruise control system status. When the cruise control system is operating, ACCEL operates. When the cruise control system is not operating, RESUME operates.

- (d) When the cruise control system is operating and the CRUISE main indicator light blinks, turn the cruise control main switch OFF to reset the cruise control system. After the reset, if the cruise control main switch cannot be turned ON, or the cruise control system is canceled immediately after turning the cruise control main switch ON, the system may have a malfunction.
- (e) Do not use the cruise control system where the road conditions are as follows:
- Heavy traffic
 - Steep downhill
 - Roads with sharp turns
 - Icy or snowy roads
 - Slippery roads

PARTS LOCATION

CC

THROTTLE POSITION
SENSOR AND MOTOR



SPIRAL CABLE

COMBINATION METER

CRUISE CONTROL MAIN SWITCH

DRIVER SIDE J/B

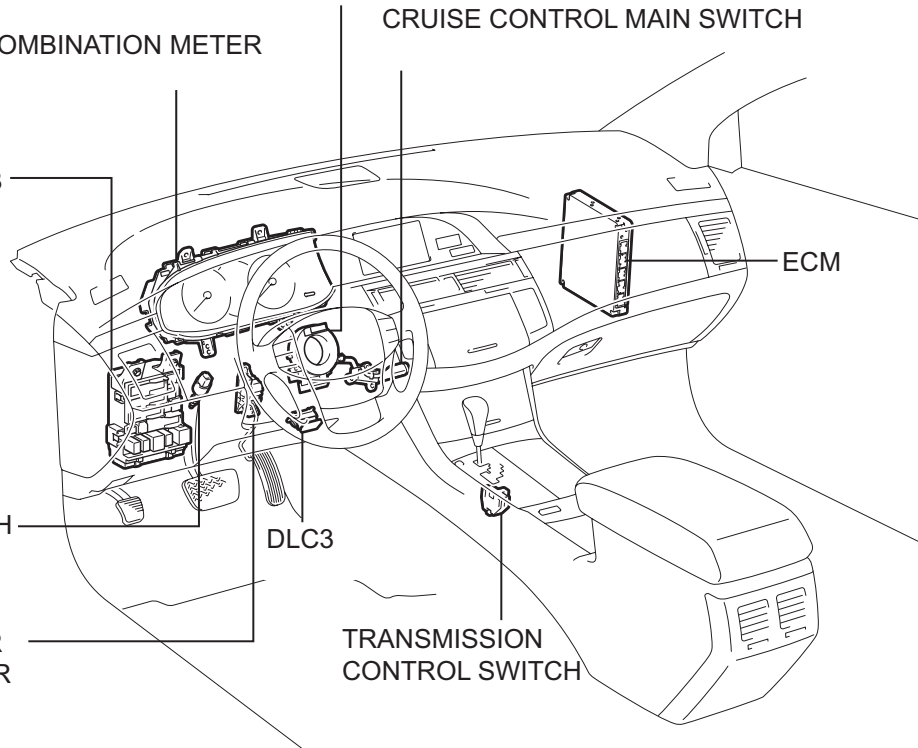
ECM

STOP LIGHT SWITCH

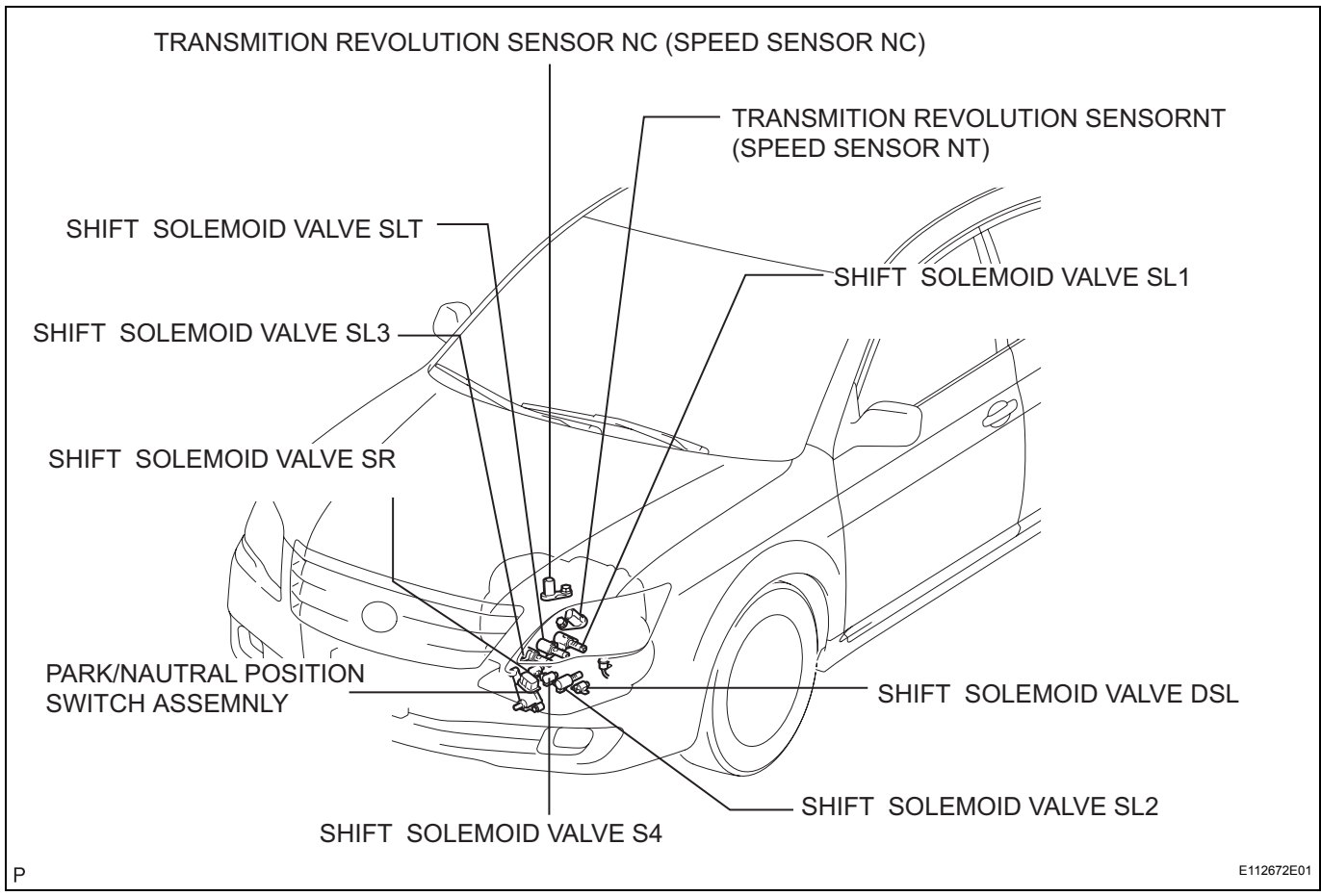
DLC3

ACCELERATOR
PEDAL SENSOR

TRANSMISSION
CONTROL SWITCH



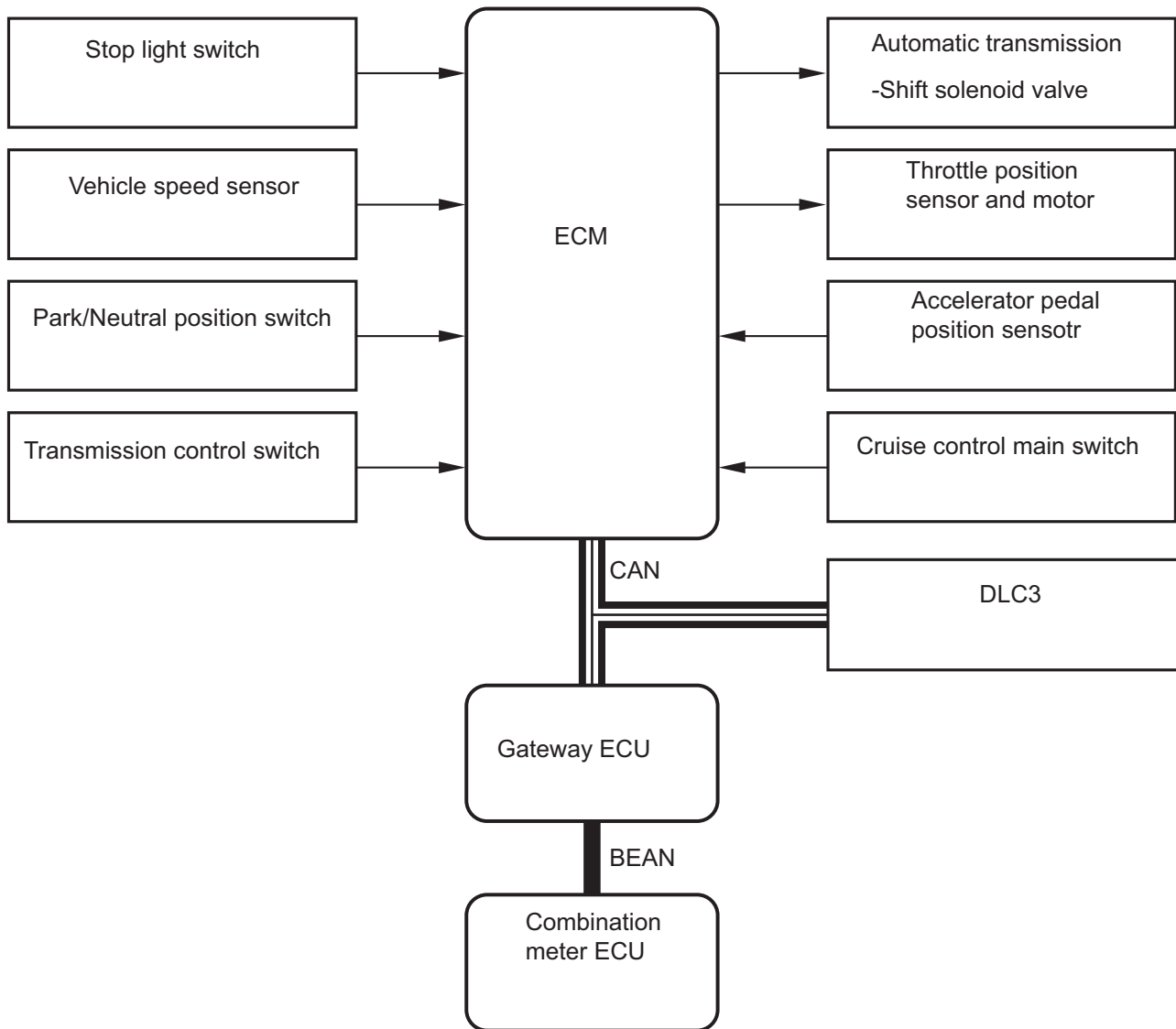
CC



SYSTEM DIAGRAM

Transmitting ECU (transmitter)	Receiving ECU	Signals	Communication method
ECM	Combination meter ECU	CRUISE indicator operation signal	CAN BEAN (Instrument Panel Bus)

CC



SYSTEM DESCRIPTION

1. CRUISE CONTROL SYSTEM

This system is controlled by the ECM, and is activated by the throttle position sensor and motor. The ECM controls the following functions: ON-OFF, -/SET, +/-RES, CANCEL, vehicle speed operation, motor output control, and overdrive control.

- The ECM compares the driving vehicle speed from the speed sensor with the stored vehicle speed set through the cruise control main switch assembly. The ECM controls the throttle valve motor of the throttle position sensor and motor to close the valve when the driving speed is less than the stored speed.
- The ECM receives signals such as ON-OFF, -/SET, +/-RES, and CANCEL from the cruise control main switch assembly and executes them.
- The ECM illuminates the combination meter's CRUISE main indicator light when it receives the cruise control main switch ON signal.
- The ECM cancels the cruise control system when the brake pedal is depressed and the ECM receives the stop light switch signal.
- The ECM cancels the cruise control system when the shift lever is moved from D (5th or 4th gear) to N (3rd, 2nd or 1st gear), and the ECM receives the PNP switch signal.

2. LIMIT CONTROL

(a) Low speed limit

The lowest possible limit of the speed setting range is set at approximately 40 km/h (25 mph). The cruise control system cannot be set when the driving vehicle speed is below the low speed limit. Cruise control operation will be automatically canceled.

(b) High speed limit

The highest possible limit of the speed setting range is set at approximately 200 km/h (125 mph). The cruise control system cannot be set when the driving vehicle speed is over the high speed limit. Also, +/-RES cannot be used to increase speed beyond the high speed limit.

3. OPERATION OF CRUISE CONTROL

The cruise control main switch operates 7 functions: SET, COAST, TAP-DOWN, RESUME, ACCEL, TAP-UP, and CANCEL. The SET, TAP-DOWN and COAST functions, and the RESUME, TAP-UP and ACCEL functions are operated with the same switch. The cruise control main switch assembly is an automatic return type switch which turns on only while operating it in each arrow direction and turns off after releasing it.

(a) SET CONTROL

Vehicle speed is stored and constant speed control is maintained when pushing the switch to -/SET while driving with the cruise control main switch ON (the CRUISE main indicator light is on), and the vehicle speed is within the set speed range (between the low and high speed limits).

(b) COAST CONTROL

When the cruise control main switch is set to -/SET and held in that position while the cruise control system is operating, the ECM sends a "throttle valve opening angle 0°" demand signal to the cruise control system. Then the vehicle speed, when the cruise control main switch is released, is stored and maintained.

HINT:

An actual throttle valve opening angle of 0° is not possible due to the idle speed control, etc.

(c) TAP-DOWN CONTROL

When tapping down the cruise control main switch to -/SET (for approximately 0.5 second) while the cruise control system is in operation, the stored vehicle speed decreases each time by approximately 1.6 km/h (1.0 mph). When the cruise control main switch is released from -/SET and the difference between the driving and stored vehicle speed is more than 5 km/h (3 mph), the vehicle speed is stored and constant speed control is maintained.

(d) ACCELERATION CONTROL

The throttle valve motor of the throttle position sensor and motor is instructed by the ECM to open the throttle valve when +/RES on the cruise control main switch is pressed and held while the cruise control system is in operation. When the cruise control main switch is released from +/RES, the vehicle speed is stored and the vehicle is controlled at a constant speed.

(e) TAP-UP CONTROL

When tapping up the cruise control main switch to +/RES (for approximately 0.5 second) while the cruise control system is in operation, the stored vehicle speed increases each time by approximately 1.6 km/h (1.0 mph). However, when the difference between the driving and the stored vehicle speed is more than 5 km/h (approximately 3.1 mph), the stored vehicle speed will not be changed.

(f) RESUME CONTROL

If cruise control operation was canceled with the stop light switch or the CANCEL switch, and if driving speed is within the limit range, pushing the cruise control main switch to +/RES restores vehicle speed memorized at the time of cancellation, and maintains constant speed control.

(g) MANUAL CANCEL CONTROL

Performing any of the following cancels the cruise control system while in operation (the stored vehicle speed in the ECM is maintained).

- Depressing the brake pedal
- Moving the shift lever to any position except D (5th and 4th gears)
- Pushing the cruise control main switch to CANCEL
- Turning the cruise control main switch OFF (the stored vehicle speed in the hybrid vehicle control ECU is not maintained).

4. AUTO CANCEL (FAIL-SAFE)

This system has an automatic cancellation function (fail-safe) (See page [CC-16](#)).

HOW TO PROCEED WITH TROUBLESHOOTING

1 VEHICLE BROUGHT TO WORKSHOP

NEXT

2 PROBLEM SYMPTOM CONFIRMATION

NEXT

3 CHECK MULTIPLEX COMMUNICATION SYSTEM

Refer to the how to proceed with troubleshooting (See page [MP-10](#)).

(a) Check for output DTCs.

Result

Result	Proceed to
MPX DTC is not output	A
MPX DTC is output	B

HINT:

The ECM of this system is connected to the multiplex communication system. Therefore, before starting troubleshooting, make sure to check that there is no trouble in the multiplex communication system.

B

PROCEED TO "MULTIPLEX COMMUNICATION SYSTEM"

A

4 CHECK CAN COMMUNICATION SYSTEM

Refer to the precaution (See page [CA-1](#)).

(a) Check for output DTCs.

Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

HINT:

The ECM of this system is connected to the CAN communication system. Therefore, before starting troubleshooting, make sure to check that there is no trouble in the CAN communication system.

B

PROCEED TO "CAN COMMUNICATION SYSTEM"

A

5 DTC CHECK AND CLEAR

Refer to the DTC check/clear (See page [CC-15](#)).

NEXT

6 DTC CHECK (OTHER THAN MPX AND CAN SYSTEM DTC)

CC

Refer to the DTC check/clear (See page [CC-15](#)).

Result

Result	Proceed to
DTC is not output	A
DTC is output	B

A **GO TO STEP 8**

B

7 DTC CHART

Refer to the diagnostic trouble code chart (See page [CC-17](#)).

NEXT

GO TO STEP 11

8 PROBLEM SYMPTOM SIMULATION

Result

Result	Proceed to
Fault is not listed in problem symptoms table	A
Fault is listed in problem symptoms table	B

B **GO TO STEP 10**

A

9 SYMPTOM SIMULATION

Refer to the electronic circuit inspection procedure (See page [IN-31](#)).

NEXT

10 PROBLEM SYMPTOMS TABLE

Refer to the problem symptoms table (See page [CC-12](#)).

NEXT

11 CIRCUIT INSPECTION

NEXT

12 TERMINALS OF ECU

Refer to the terminals of ECU (See page [CC-13](#)).

NEXT

13 IDENTIFICATION OF PROBLEM

NEXT

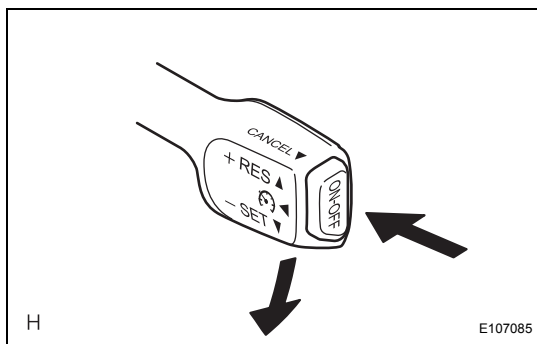
14 REPAIR OR REPLACE

NEXT

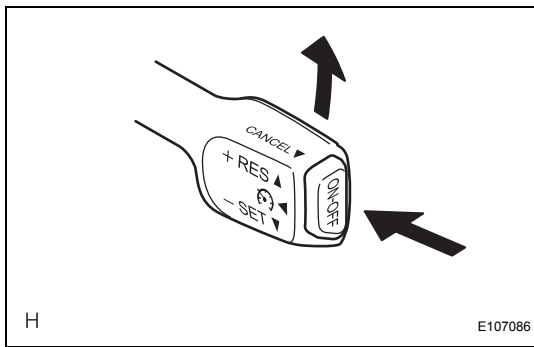
15 CONFIRMATION TEST

NEXT

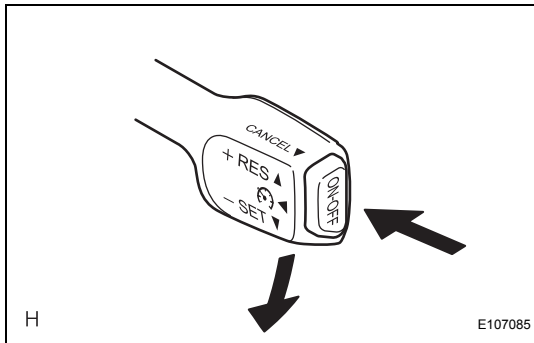
END

**ROAD TEST****1. PROBLEM SYMPTOM CONFIRMATION**

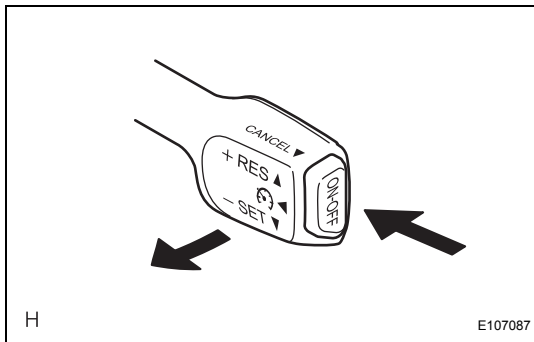
- (a) Inspect SET function.
 - (1) Turn the main switch ON.
 - (2) Drive at the required speed (40 km/h (25 mph) or higher).
 - (3) Push the cruise control main switch to -/SET.
 - (4) After releasing the switch, check that the vehicle cruises at the set speed.



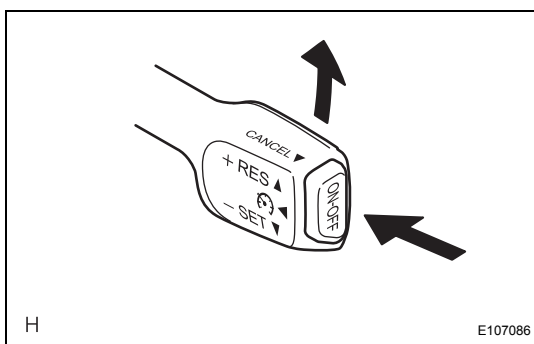
- (b) Inspect the ACC (ACCEL) switch.
- (1) Turn the main switch ON.
 - (2) Drive at the required speed (40 km/h (25 mph) or higher).
 - (3) Push the cruise control main switch to -/SET.
 - (4) Check that vehicle speed increases while the cruise control main switch is pushed to +/RES, and that the vehicle cruises at the newly set speed when the switch is released.
 - (5) Momentarily push the cruise control main switch to +/RES and then immediately release it. Check that vehicle speed increases by approximately 1.6 km/h (1.0 mph) (tap-up control).



- (c) Inspect the COAST function.
- (1) Turn the main switch ON.
 - (2) Drive at the required speed (40 km/h (25 mph) or higher).
 - (3) Push the cruise control main switch to -/SET.
 - (4) Check that vehicle speed decreases while the cruise control main switch is pushed to -/SET, and the vehicle cruises at the newly set speed when the switch is released.
 - (5) Momentarily push the cruise control main switch to -/SET, and then immediately release it. Check that vehicle speed decreases by approximately 1.6 km/h (1.0 mph) (tap-down control).



- (d) Inspect the CANCEL function.
- (1) Turn the main switch ON.
 - (2) Drive at the required speed (40 km/h (25 mph) or higher).
 - (3) Push the cruise control main switch to -/SET.
 - (4) When performing one of the following, check that the cruise control system is canceled and that the normal driving mode is reset.
 - Depressing the brake pedal
 - Moving the shift lever to any position except D (5th, and 4th gears)
 - Turning the main switch ON
 - Pulling the cruise control main switch to CANCEL



- (e) Inspect the RES (RESUME) function.
- (1) Turn the main switch ON.
 - (2) Drive at the required speed (40 km/h (25 mph) or higher).
 - (3) Push the cruise control main switch to -/SET.
 - (4) Cancel the cruise control system according to any of the above operations (other than turning the main switch OFF).
 - (5) After pushing the cruise control main switch to +/RES at a driving speed of more than 40 km/h (25 mph), check that the vehicle drives at the set speed.

PROBLEM SYMPTOMS TABLE

If a normal system code is displayed during the DTC check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

HINT:

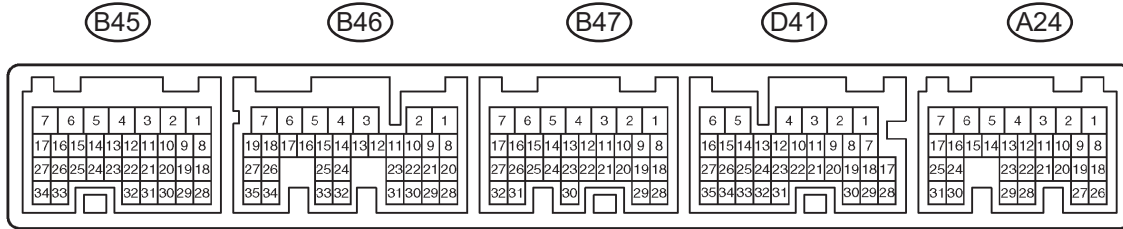
Inspect the "Fuse" and "Relay" before confirming the suspected areas as shown in the chart below. Inspect each malfunction circuit in numerical order for the corresponding symptom.

CRUISE CONTROL SYSTEM

Symptom	Suspected area	See page
Main switch cannot be turned ON. (Cruise indicator light in combination meter does not come on.)	1. Cruise control switch circuit	CC-23
	2. CRUISE main indicator light circuit	CC-28
	3. ECM	CC-13
Vehicle speed setting cannot be done. (Although indicator light in combination meter comes on when the main switch is turned ON, it goes off when vehicle speed is set.)	1. Cruise control switch circuit	CC-23
	2. ECM	CC-13
Setting cannot be done (Indicator light in combination meter comes on when the main switch is turned ON and they remain ON while setting.)	1. Cruise control switch circuit	CC-23
	2. Stop light switch circuit	CC-19
	3. Park/neutral position switch circuit (DTC P0705)	AX-36
	4. Transmission control switch circuit	AX-115
	5. Combination meter system	ME-13
	6. ECM	CC-13
While the vehicle is driven with cruise control, the set control is canceled. (Indicator light and CRUISE remains ON.)	1. Cruise control switch circuit	CC-23
	2. Vehicle speed sensor circuit	CC-18
	3. Stop light switch circuit	CC-19
	4. CRUISE main indicator light circuit	CC-28
	5. Park/neutral position switch circuit (DTC P0705)	AX-36
	6. ECM	CC-13
Hunting (Speed is not constant.)	1. Vehicle speed sensor circuit	CC-18
	2. ECM	CC-13
Setting cannot be cancelled. (When Coast, Acceleration, Resume, Set speed change and Control switch are operated.)	1. Cruise control switch circuit	CC-23
	2. ECM	CC-13
DTC is not output, or is output when it should not be.	1. Diagnosis circuit	CC-29
	2. ECM	CC-13
CRUISE main indicator light does not come on.	1. Cruise control switch circuit	CC-23
	2. CRUISE main indicator light circuit	CC-28
	3. ECM	CC-13
	4. Combination meter	ME-13

TERMINALS OF ECU

1. CHECK ECM



N

G035759E01

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
TC - E1 (A24-23 - B47-1)	P - BR	Ground	Ignition switch on (IG) → Connect terminals TC and CG of DLC3	10 to 14 V → Below 1 V
STP - E1 (A24-15 - B47-1)	W - BR	Stop light signal	Ignition switch on (IG) Depress brake pedal → Release brake pedal	10 to 14 V → Below 1 V
CCS - E1 (D41-2 - B47-1)	B - BR	Cruise control main switch circuit	Ignition switch on (IG)	10 to 14 V
CCS - E1 (D41-2 - B47-1)	B - BR	Cruise control main switch circuit	CANCEL switch hold ON	6.6 to 10.1 V
CCS - E1 (D41-2 - B47-1)	B - BR	Cruise control main switch circuit	SET/- switch hold ON	4.5 to 7.1 V
CCS - E1 (D41-2 - B47-1)	B - BR	Cruise control main switch circuit	RES/+ switch hold ON	2.3 to 4.0 V
CCS - E1 (D41-2 - B47-1)	B - BR	Cruise control main switch circuit	MAIN switch hold ON	Below 1 V

CC

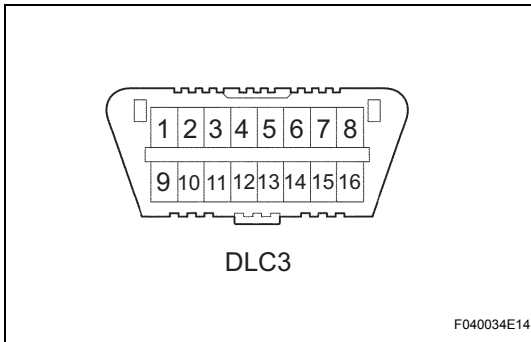
DIAGNOSIS SYSTEM

1. DESCRIPTION

The ECU controls the cruise control system of the vehicle. The data and DTCs relating to the cruise control system can be read from the DLC3 of the vehicle. If either DTC is not displayed when checking for DTCs, there may be a problem with the combination meter or the CAN communication and multiplex communication system. Use the intelligent tester to check and solve the problem.

2. CHECK DLC3

- (a) The vehicle's ECM uses ISO 9141-2 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.

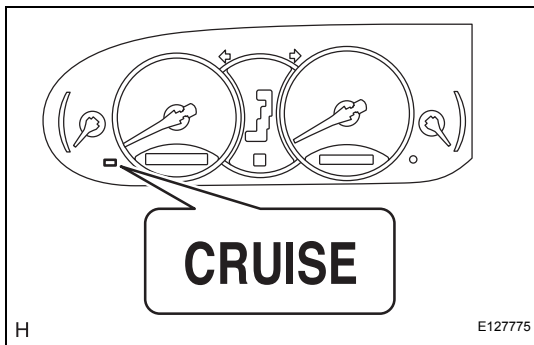


Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL(7) - SG(5)	Bus "+" line	During transmission	Pulse generation
CG(4) - Body ground	Chassis ground	Always	Below 1 Ω
SG(5) - Body ground	signal ground	Always	Below 1 Ω
BAT(16) - Body ground	Battery positive	Always	11 to 14 V
CANH(6) - CANL(14)	HIGH-level CAN bus line	Ignition switch off	54 to 67 Ω
CANH(6) - Body ground	HIGH-level CAN bus line	Ignition switch off	1M Ω or higher
CANH(6) - CG(4)	HIGH-level CAN bus line	Ignition switch off	3k Ω or higher
CANL(14) - Body ground	LOW-level CAN bus line	Ignition switch off	1M Ω or higher
CANL(14) - CG(4)	LOW-level CAN bus line	Ignition switch off	3k Ω or higher

HINT:

If the display shows a communication error message when you have connected the intelligent tester to the DLC3, turned the ignition switch to the on (IG) position and operated the tester, there is a problem on either the vehicle side or the tool side.

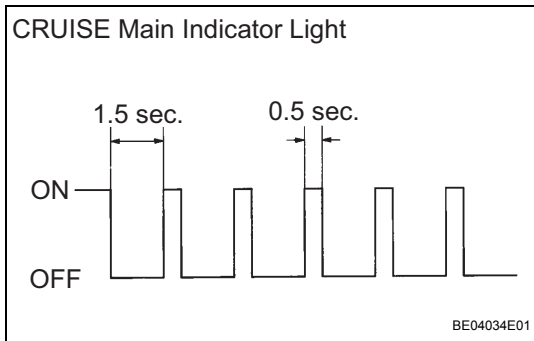
- If communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.



3. CHECK INDICATOR

(a) Turn the ignition switch on (IG).

CC



(b) Check that the CRUISE main indicator light illuminates when the cruise control main switch is turned ON, and that the indicator light turns off when the main switch is turned OFF. If the results are not as specified, inspect the CRUISE main indicator light circuit (See page [CC-28](#)).

HINT:

- While driving with cruise control, the hybrid vehicle control ECU activates AUTO CANCEL of the cruise control system when a malfunction in one of the following occurs: vehicle speed sensors, stop light switch or other related parts. When AUTO CANCEL is activated, the CRUISE main indicator light outputs the blinking pattern shown to the left. At the same time, data of the malfunction is stored as a DTC.

DTC CHECK / CLEAR

1. DTC CHECK

(a) Connect the intelligent tester to the DLC3.

(1) Connect the intelligent tester to the Controller Area Network Vehicle Interface Module (CAN VIM). Then connect the CAN VIM to the Data Link Connector 3 (DLC3).

(b) Turn the ignition switch on (IG).

(c) Read the DTCs by following the prompts on the tester screen.

HINT:

Refer to the intelligent tester operator's manual for further details.

2. DTC CLEAR

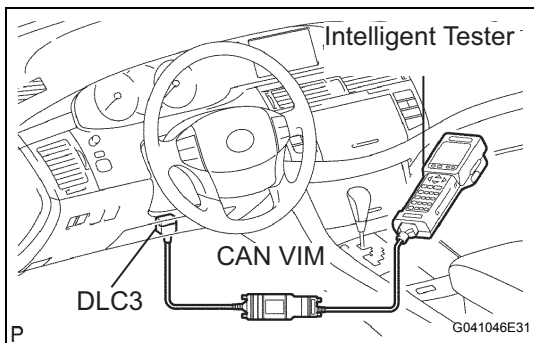
(a) Connect the intelligent tester to the DLC3.

(b) Turn the ignition switch on (IG).

(c) Operate the intelligent tester to erase the codes.

HINT:

Refer to the intelligent tester operator's manual for further details.



FAIL-SAFE CHART

1. If the following conditions are detected while the cruise control is in operation, the system clears the stored vehicle speed in the hybrid vehicle control ECU and cancels the cruise control operation.

Vehicle Condition	Auto Cancel Condition	Re-operation Condition
CRUISE main indicator light blinks	<ul style="list-style-type: none"> • There is open or short in stop light switch circuit • There is problem with vehicle speed signal • There is problem with throttle position sensor and motor 	Turn cruise control main switch on again
CRUISE main indicator light blinks	<ul style="list-style-type: none"> • There is problem with input circuit of stop light switch circuit • There is problem with cancel circuit 	<ul style="list-style-type: none"> • Turn cruise control main switch on again • Turn engine switch off
CRUISE main indicator light goes off	<ul style="list-style-type: none"> • Vehicle speed is lower than low speed limit (approx. 40 km/h (25 mph)) while running with cruise control on • Vehicle speed is lower than stored speed by approx. 16 km/h (9.9 mph) or more 	Push cruise control main switch to RESUME/ACCEL

CC

DATA LIST / ACTIVE TEST

1. READ DATA LIST

- (a) While the intelligent tester is connected to the DLC3 with the ignition switch turned on (IG), the CRUISE CONTROL data list can be displayed. Follow the prompts on the tester screen to access the data list.

CC (ECM):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
VEHICLE SPD	Vehicle speed / min.: 0 km/h (0 mph), max.: 255 km/h (158 mph)	Actual vehicle speed	-
MEMORY SPD	Cruise control memorized speed / min.: 0 km/h (0 mph), max.: 255 km/h (158 mph)	Actual stored vehicle speed	-
RQST TORQUE	Cruise request torque / min.: -1,024 N*m, max.: 1016 N*m	Actual torque	-
CRUISE CONTROL	Cruise control system active condition / ON or OFF	ON: Cruise control activated OFF: Cruise control inactivated	-
MAIN SW (MAIN)	Main switch signal (Main CPU) / ON or OFF	ON: Main switch ON (Pushed on) OFF: Main switch OFF (Pushed off)	"3"
CCS READY M	Cruise control system standby condition (Main CPU) / ON or OFF	ON ←→ OFF: Change ON/OFF each time Main SW is pushed in.	"1"
CCS INDICATOR M	Cruise indicator signal (Main CPU) / ON or OFF	ON: "CCS READY" ON OFF: "CCS READY" OFF	"2"
CANCEL SW	CANCEL switch signal / ON or OFF	ON: CANCEL switch ON OFF: CANCEL switch OFF	-
SET/- SW	SET/- SW signal / ON or OFF	ON: SET/- SW ON OFF: SET/- SW OFF	-
RES/+ SW	RES/+ SW signal / ON or OFF	ON: RES/+ SW ON OFF: RES/+ SW OFF	-
STP LIGHT SW M	Stop light SW signal (Main CPU) / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
SHIFT D POS	PNP SW signal (D position) / ON or OFF	ON: Shift position D OFF: Any shift position except D	-

HINT:

"3" is OK but "1" is NG → ECM failure

"1" is OK but "2" is NG → DTC output or ECM failure

"3" is OK but cruise indicator not turn on → CRUISE MAIN indicator or wire harness or ECM failure

2. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the intelligent tester allows components such as the relay, VSV, and actuator to operate with out parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one way to shorten labor time.

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

- (a) Connect the intelligent tester to the DLC3.
(b) turn the ignition switch on (IG).

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

HINT:

The ignition switch must be turned on (IG) to proceed with the ACTIVE TEST using the intelligent tester.

COMBINATION METER ASSEMBLY:

Item	Vehicle Condition / Test Details	Diagnostic Note
CRUISE INDIC	"CRUISE" indicator is ON / OFF	-

DIAGNOSTIC TROUBLE CODE CHART

HINT:

If a trouble code is displayed during the DTC check, check the circuit listed for that code. For details of each code, refer to the "See page" in the DTC chart.

DTC No.	Detection Item	Trouble Area	See page
P0571	Brake Switch "A" Circuit	- Stop light switch assembly - Stop light switch assembly circuit - Driver side J/B ECU - ECM	CC-19
P0607	Control Module Performance	- ECM	CC-22
P0500	Vehicle Speed Sensor Malfunction	- Vehicle speed sensor - Vehicle speed sensor signal circuit - ECM	CC-18
P0503	Vehicle Speed Sensor Circuit Malfunction	- Vehicle speed sensor - Vehicle speed sensor signal circuit - ECM	CC-18

CC

DTC	P0500	Vehicle Speed Sensor Malfunction
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DTC	P0503	Vehicle Speed Sensor Circuit Malfunction
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DESCRIPTION

See page [ES-262](#).

DTC No.	DTC Detection Condition	Trouble Area
P0500	This trouble code is output when the vehicle speed signal from the vehicle speed sensor is cut for 0.14 sec. or more while the cruise control is in operation.	<ul style="list-style-type: none"> • Vehicle speed sensor • Vehicle speed sensor signal circuit • ECM
P0503	Momentary interruption and noise are detected when a rapid change of vehicle speed occurs while the cruise control is in operation.	<ul style="list-style-type: none"> • Vehicle speed sensor • Vehicle speed sensor signal circuit • ECM

CC

WIRING DIAGRAM

See page [ES-262](#).

INSPECTION PROCEDURE

See page [ES-262](#).

DTC	P0571	Brake Switch "A" Circuit
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DESCRIPTION

When the brake pedal is depressed, the stop light switch assembly sends a signal to the ECM. When the ECM receives this signal, it cancels the cruise control.

Fail-safe function operates to enable normal driving even if there is a malfunction in the stop light signal circuit.

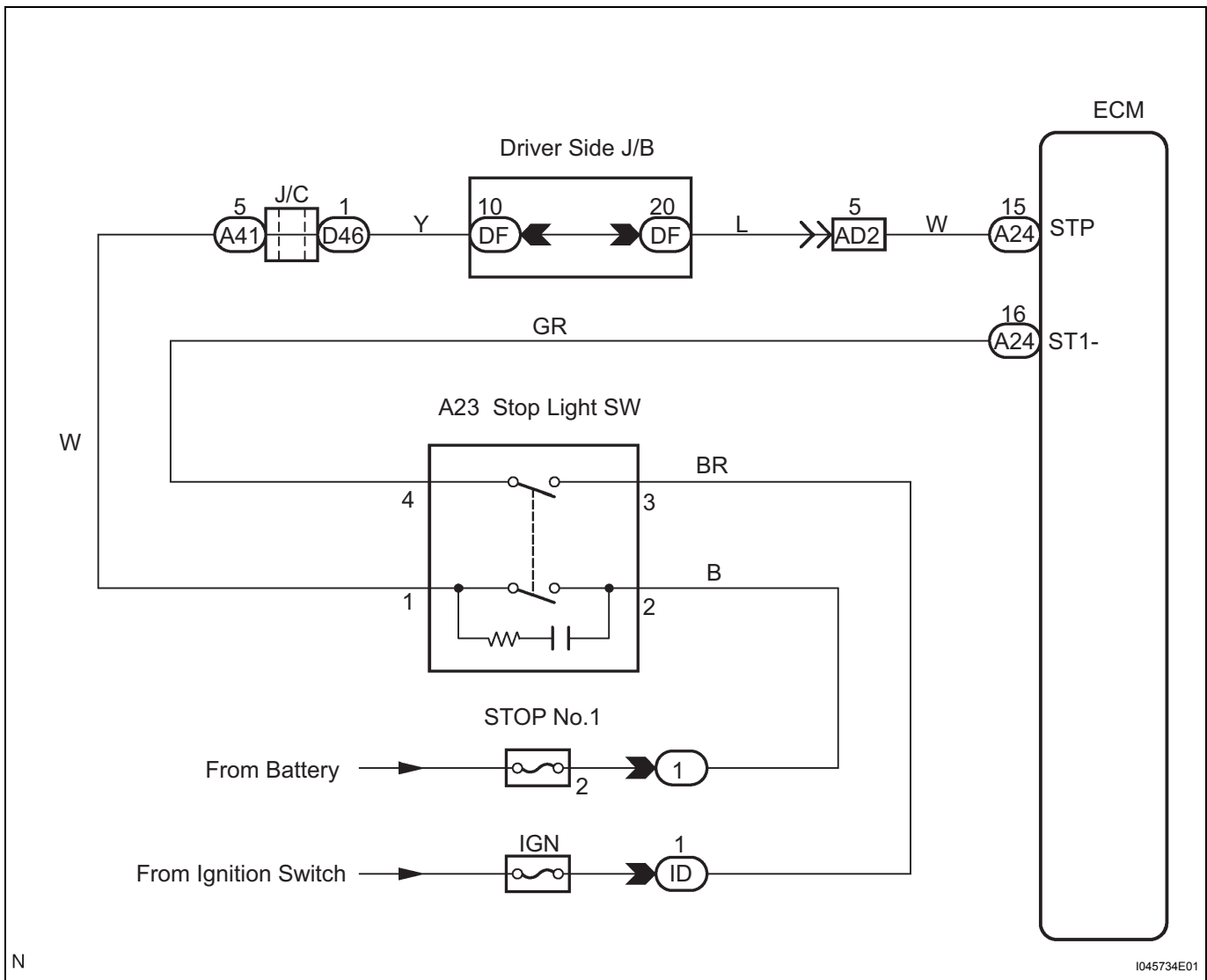
The cancel condition occurs when positive battery voltage is applied to terminal STP.

When the brake is applied, positive battery voltage is normally applied to terminal STP of the ECM through the STOP fuse and the stop light switch assembly, and the ECM turns the cruise control off.



DTC No.	DTC Detection Condition	Trouble Area
P0571	The malfunction code is output when the voltage of the STP terminal and that of the ST1- terminal on the ECM are less than 1 V for 0.5 sec. or more.	<ul style="list-style-type: none"> • Stop light switch assembly • Stop light switch assembly circuit • Driver side J/B ECU • ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1 READ VALUE OF INTELLIGENT TESTER

- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the ignition switch on, and turn the intelligent tester main switch on.
- (c) Check the DATA LIST for proper functioning of the stop light switch.

CC (ECM):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
STP LIGHT SW M	Stop light switch signal (Main CPU) / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-

CC

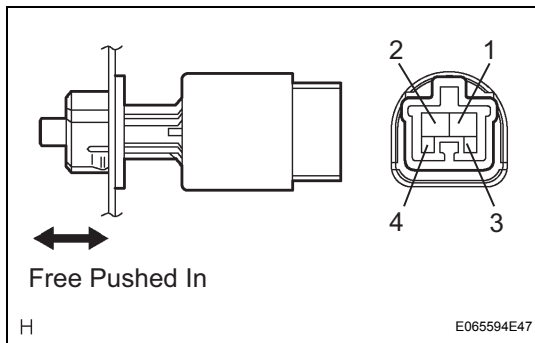
OK:

When brake pedal operation is performed the results will be same as above.

OK → **REPLACE ECM**

NG

2 INSPECT STOP LIGHT SWITCH



- (a) Disconnect the stop light switch connector.
- (b) Measure the resistance according to the value(s) in the table below.

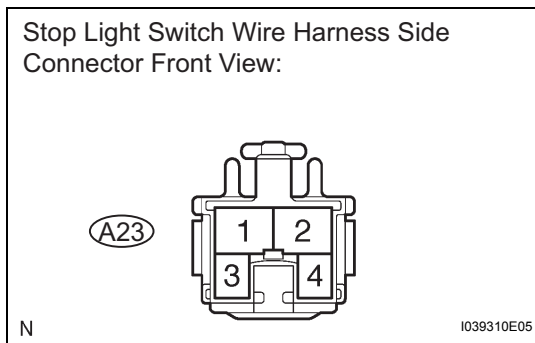
Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - 2	Switch pin not pushed	Below 1 Ω
3 - 4	Switch pin not pushed	10 kΩ or higher
1 - 2	Switch pin pushed	10 kΩ or higher
3 - 4	Switch pin pushed	Below 1 Ω

NG → **REPLACE STOP LIGHT SWITCH**

OK

3 CHECK WIRE HARNESS (STOP LIGHT SWITCH - BATTERY)



- (a) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
A23-2 - Body ground	Always	10 to 14 V
A23-3 - Body ground	Engine switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

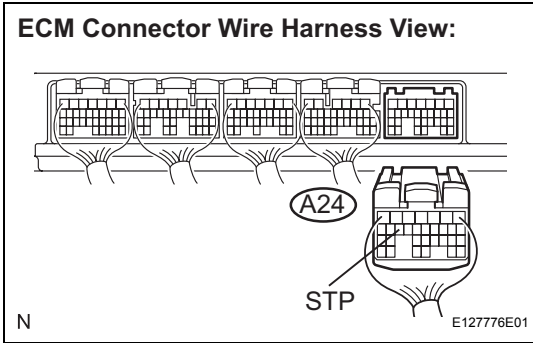
N

OK

4 CHECK ECM

- (a) Reconnect the stop light switch connector.
- (b) Disconnect the A24 connectors from the ECM.
- (c) Turn the ignition switch on.
- (d) Measure the voltage according to the value(s) in the table below.

ECM Connector Wire Harness View:



Standard resistance

Pedal condition	Tester connection	Specification
Depressed	A24-15 (STP) - Body ground	10 to 14 V
Released	A24-15 (STP) - Body ground	Below 1 V

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LIGHT SWITCH - ECM)

OK

REPLACE ECM

CC

DTC**P0607****Control Module Performance****DESCRIPTION**

This DTC indicates the internal abnormalities of the ECM.

DTC No.	DTC Detection Condition	Trouble Area
P0607	The ECM has a supervisory CPU and a control ECU inside. When each input STP signal is different for 0.15 sec. or more, this trouble code is output. This trouble code is output after 0.4 sec. has passed from the time the cruise cancel input signal (STP input) is input into the ECM.	<ul style="list-style-type: none"> • ECM

HINT:

The ECM receives signals from each sensor to control all the functions of the cruise control with the microcomputer.

When a trouble code is detected, fail-safe remains on until the ignition switch is turned off.

INSPECTION PROCEDURE**1****REPLACE ECM****CC**

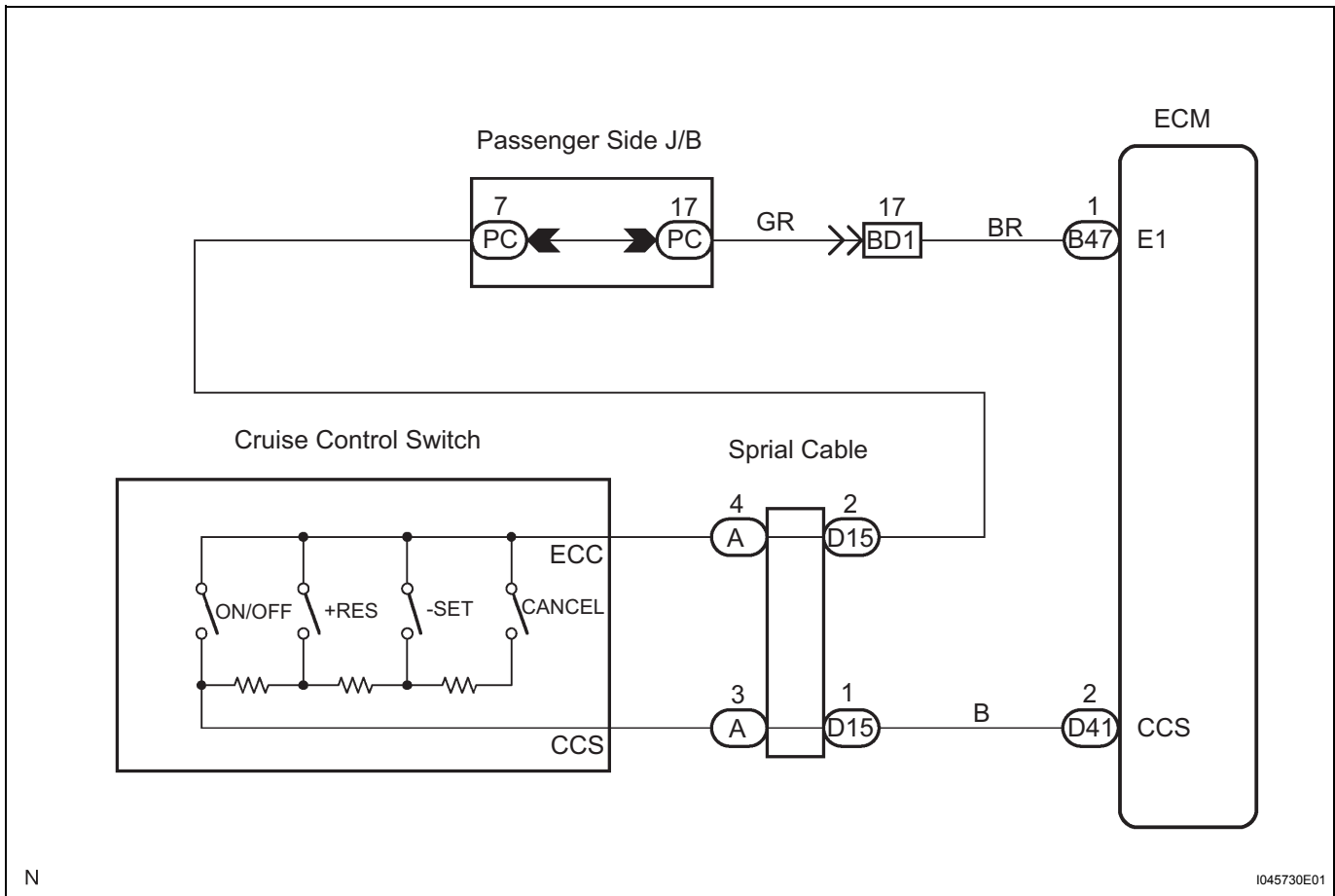
Cruise Control Switch Circuit

DESCRIPTION

The cruise control main switch operates 7 functions: SET, COAST, TAP-DOWN, RESUME, ACCEL, TAP-UP, and CANCEL. The SET, TAP-DOWN and COAST functions, and the RESUME, TAP-UP and ACCEL functions are operated with the same switch. The cruise control main switch is an automatic return type switch which turns on only while operating it in each arrow direction and turns off after releasing it. The internal contact point of the cruise control main switch is turned on with the switch operation. Then the ECM reads the resistance value that has been changed by the switch operation to control SET, COAST, RESUME, ACCEL and CANCEL.

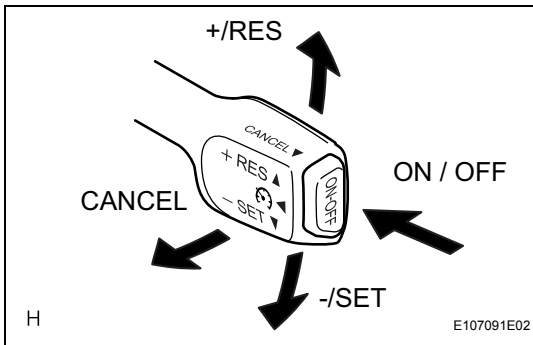
CC

WIRING DIAGRAM



INSPECTION PROCEDURE

1 READ VALUE OF INTELLIGENT TESTER



- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the ignition switch on, and turn the intelligent tester main switch on.
- (c) Check the DATA LIST for proper functioning of the cruise control main switch.

CC

CC (ECM):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
MAIN SW (MAIN)	Main SW signal (Main CPU) / ON or OFF	ON: Main SW ON (Pushed on) OFF: Main SW OFF (Pushed off)	-
CANCEL SW	CANCEL SW signal / ON or OFF	ON: CANCEL SW ON OFF: CANCEL SW OFF	-
SET/COAST SW	SET/- SW signal / ON or OFF	ON: SET/- SW ON OFF: SET/- SW OFF	-
RES/ACC SW	RES/+ SW signal / ON or OFF	ON: RES/+ SW ON OFF: RES/+ SW OFF	-

OK:

When cruise control main switch operation is performed the results will be same as above.

Result:

Result	Proceed to
OK	A
NG (All items are defective.)	B
NG (One to four items are defective.)	C

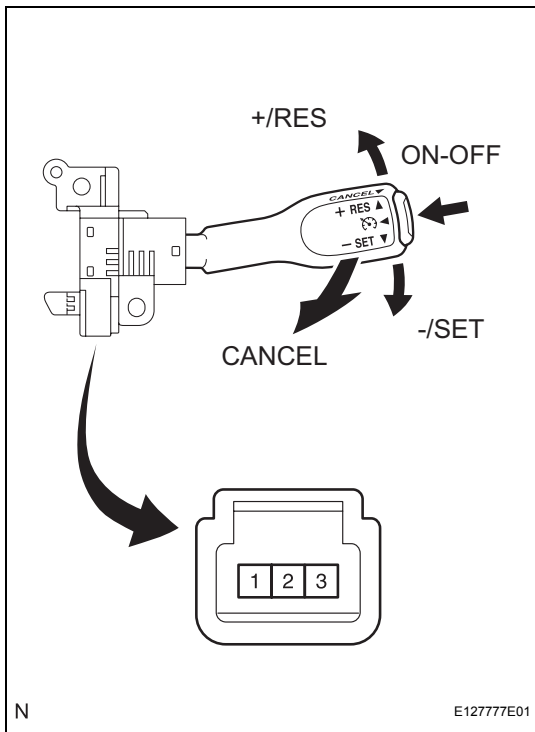
A → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **REPLACE CRUISE CONTROL MAIN SWITCH**

B

2 INSPECT CRUISE CONTROL MAIN SWITCH

- (a) Disconnect the cruise control main switch connector.



(b) Measure the resistance according to the value(s) in the table below.

CC

Standard resistance

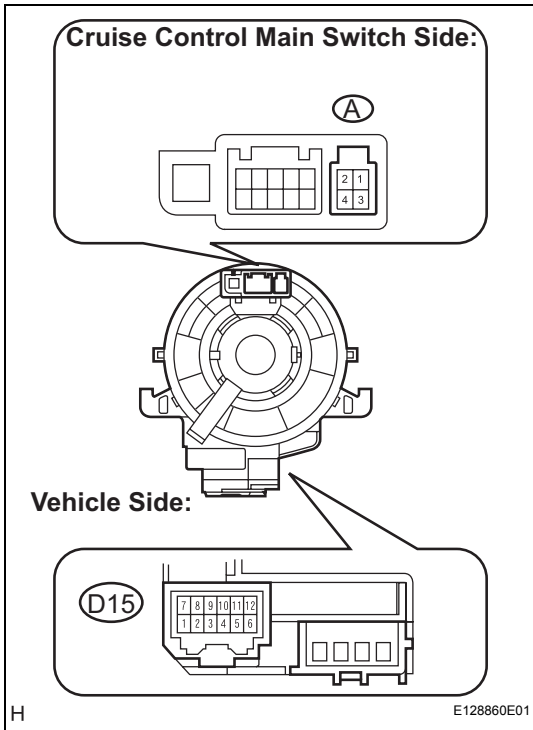
Switch Condition	Tester Connection	Specified Condition
Neutral	1 - 3	10 kΩ or higher
+ /RES	1 - 3	210 to 270 Ω
- /SET	1 - 3	560 to 700 Ω
CANCEL	1 - 3	1,380 to 1,700 Ω
Main Switch OFF	1 - 3	10 kΩ or higher
Main Switch ON	1 - 3	Below 1 Ω

NG

REPLACE CRUISE CONTROL MAIN SWITCH

OK

3 INSPECT SPIRAL CABLE



- (a) Disconnect the spiral cable connector.
- (b) Measure the resistance according to the value(s) in the table below.

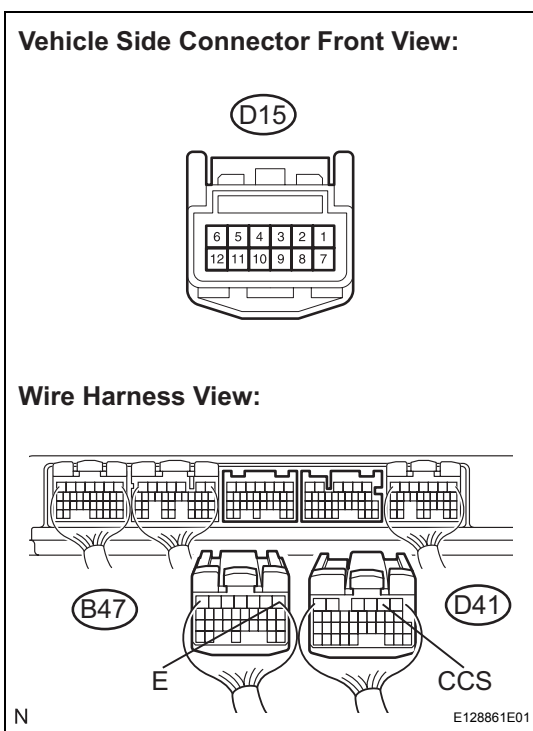
Standard resistance

Tester Connection	Specified Condition
A-3 - D15-1	Below 1 Ω
A-4 - D15-2	Below 1 Ω

NG → **REPLACE SPIRAL CABLE**

OK

4 CHECK WIRE HARNESS (SPIRAL CABLE - ECM AND BODY GROUND)



- (a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
Spiral cable (D15-1) - CCS (D41-2)	Always	Below 1 Ω
CCS (D41-2) - Body ground	Always	10 kΩ or higher
Spiral cable (D15-2) - E1 (B47-1)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Cruise Main Indicator Light Circuit

DESCRIPTION

- The ECM detects a cruise control switch signal and sends it to the combination meter via CAN and BEAN. Then the CRUISE main indicator light comes on.
- The CRUISE main indicator light circuit uses CAN and BEAN for communication. If there is a malfunction in this circuit, check for DTCs in the CAN communication system and multiplex communication system before troubleshooting this circuit.

INSPECTION PROCEDURE

1 PERFORM ACTIVE TEST BY INTELLIGENT TESTER

- Connect the intelligent tester to the DLC3.
- Check the CRUISE main indicator light by using ACTIVE TEST.

Combination Meter:

Item	Test Details	Diagnostic Note
CRUISE INDIC	"CRUISE" indicator is ON/OFF	-

OK:

Indicator light comes on / goes off.

NG

REPLACE COMBINATION METER

OK

2 READ VALUE OF INTELLIGENT TESTER

- Connect the intelligent tester to the DLC3.
- Turn the ignition switch on (IG), and turn the intelligent tester main switch on.
- Check the DATA LIST for proper functioning of the CRUISE main indicator light.

CC (ECM):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
CCS INDICATOR M	Cruise indicator signal (Main CPU) / ON or OFF	ON: "CCS READY" ON OFF: "CCS READY" OFF	-

OK:

When cruise control main switch operation is performed, the result will be same as above.

NG

REPLACE ECM

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

TC and CG Terminal Circuit

DESCRIPTION

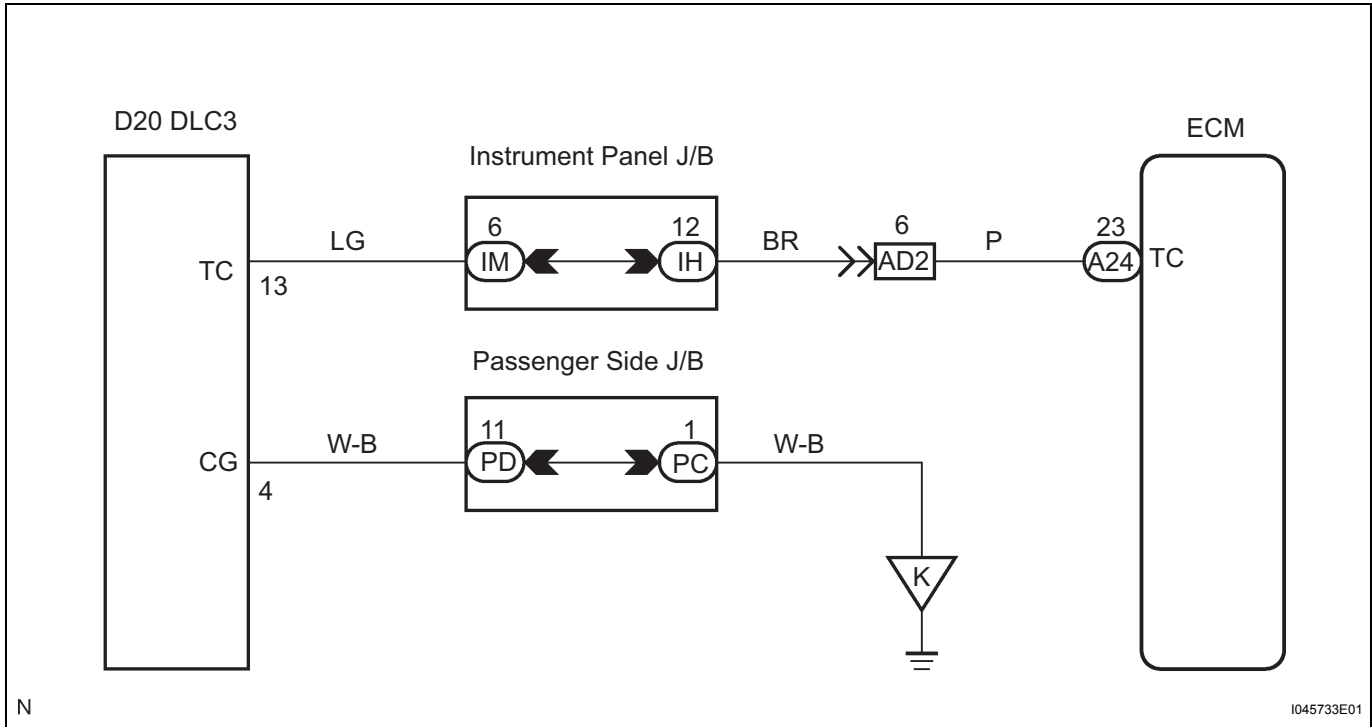
Connecting terminals TC and CG of the DLC3 causes the system to enter self-diagnostic mode. If a malfunction is present, DTCs will be output.

HINT:

When a particular warning light remains blinking, a ground short in the wiring of terminal TC of the DLC3 or an internal ground short in the relevant ECU is suspected.

WIRING DIAGRAM

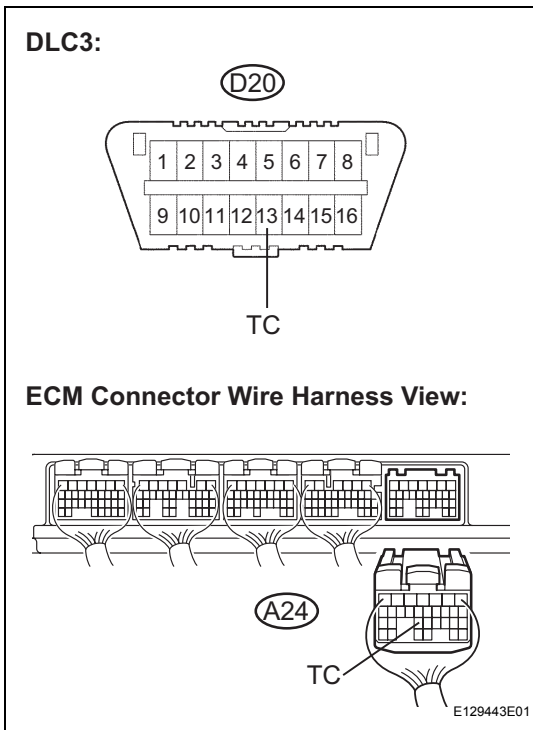
CC



INSPECTION PROCEDURE

1 CHECK WIRE HARNESS (TC of DLC3 - ECM)

(a) Disconnect the A24 connector from the ECM.



(b) Measure the resistance according to the value(s) in the table below.

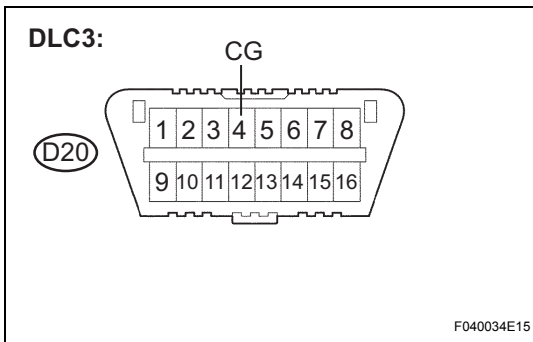
Standard resistance

Tester Connection	Condition	Specified Condition
TC (A24-23) - TC (D20-13)	Always	Below 1 Ω

NG REPAIR OR REPLACE HARNESS OR CONNECTOR (DLC3 - ECM)

OK

2 CHECK WIRE HARNESS (CG of DLC3 - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

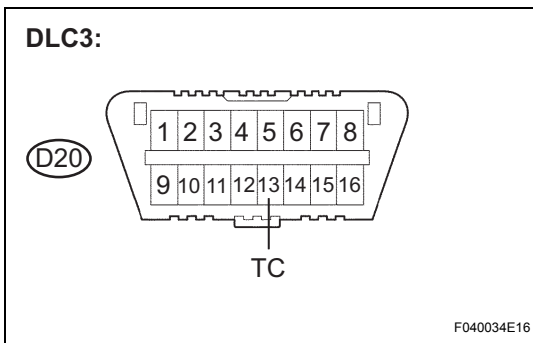
Standard resistance

Tester connection	Condition	Specified condition
CG (D20-4) - Body ground	Always	Below 1 Ω

NG REPAIR OR REPLACE HARNESS OR CONNECTOR (DLC3 - BODY GROUND)

OK

3 CHECK WIRE HARNESS (TC of DLC3 - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Condition	Condition	Specified Condition
CG (D20-13) - Body ground	Always	10 kΩ or higher

NG REPAIR OR REPLACE WIRE HARNESS OR EACH ECU

OK

REPLACE ECM

DYNAMIC LASER CRUISE CONTROL SYSTEM

PRECAUTION

NOTICE:

When disconnecting the negative (-) battery terminal, initialize the following system after the terminal is reconnected.

System Name	See procedure
Sliding Roof Control System	IN-29
Power Window Control System	

1. EXPRESSIONS OF IGNITION SWITCH

The type of ignition switch used on this model differs according to the specifications of the vehicle.

The expressions listed in the table below are used in this section.

Expression / Switch Type	Ignition Switch (position)	Engine Switch (condition)
Ignition Switch off	LOCK	Off
Ignition Switch on (IG)	ON	On (IG)
Ignition Switch on (ACC)	ACC	On (ACC)
Engine Start	START	Start

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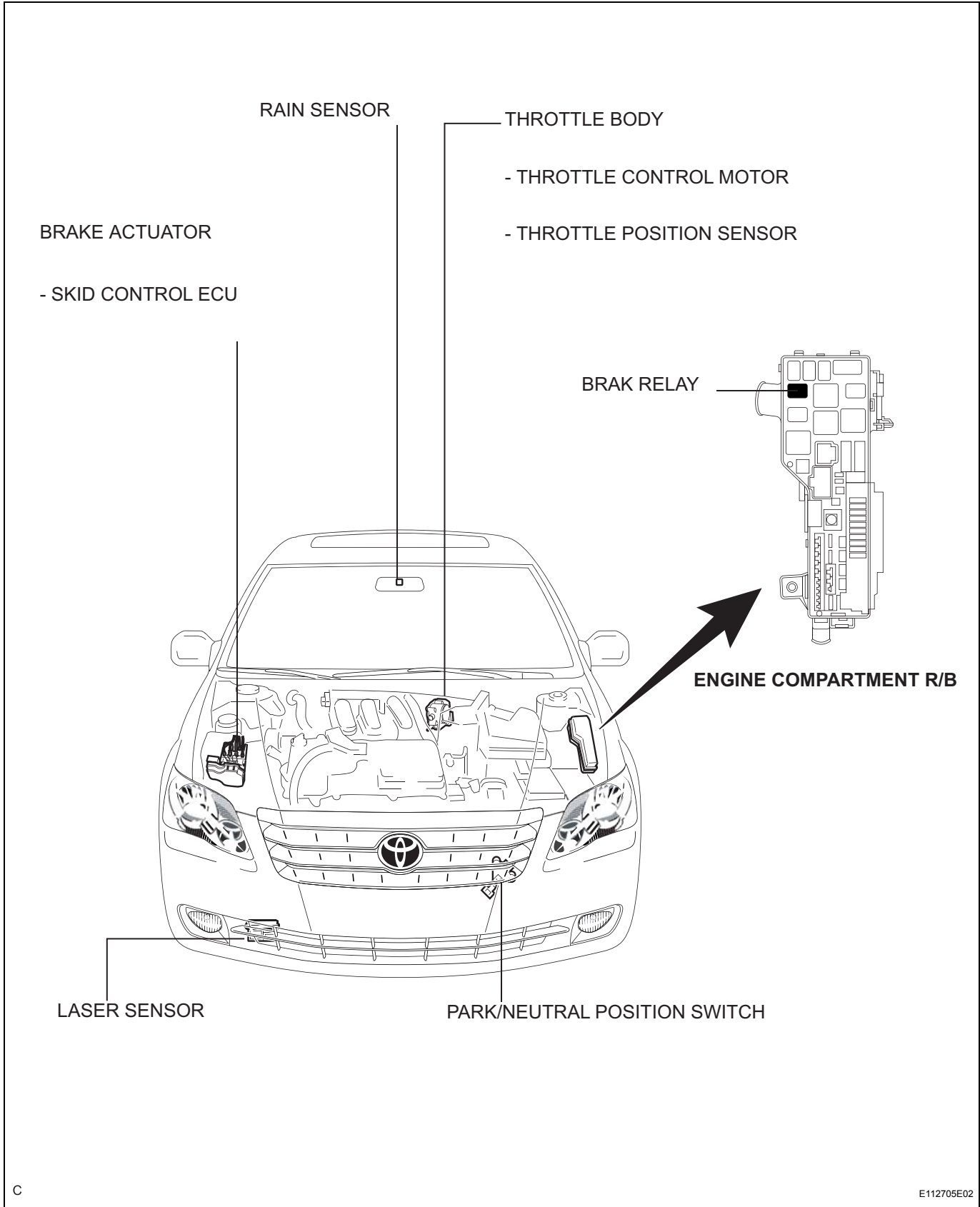
2. KEEP IN MIND THE FOLLOWING POINTS WHEN INSPECTING THE DYNAMIC LASER CRUISE CONTROL SYSTEM

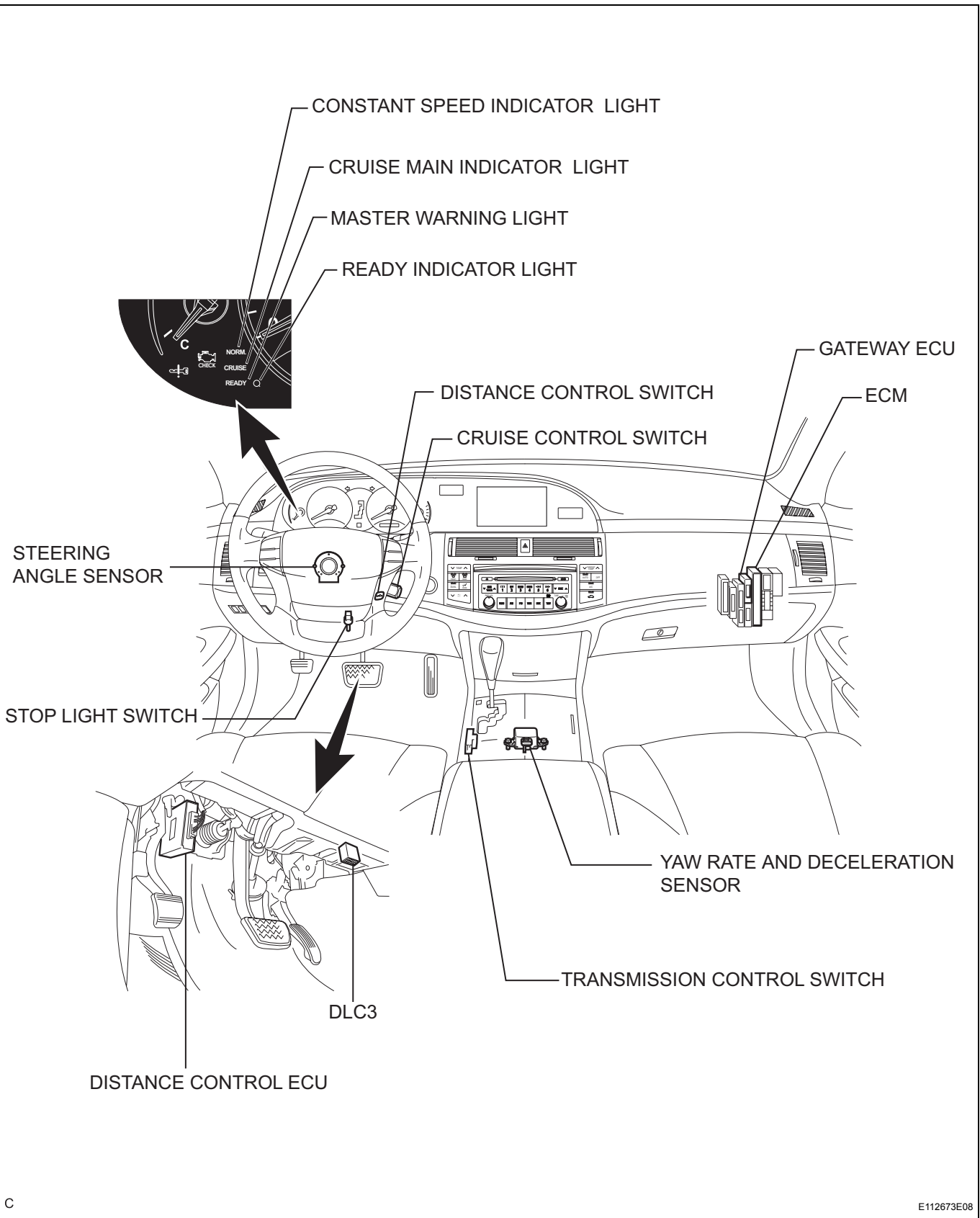
- As there is a limitation on the vehicle-to-vehicle distance controlling capability, do not overly rely on the dynamic radar cruise control system.
- Do not neglect to pay constant attention to the vehicle-to-vehicle distance and the traffic conditions when using the dynamic radar cruise control system. Decelerate with the brake pedal, or accelerate with the accelerator pedal, according to the situation, to keep an appropriate distance with the vehicle in front.

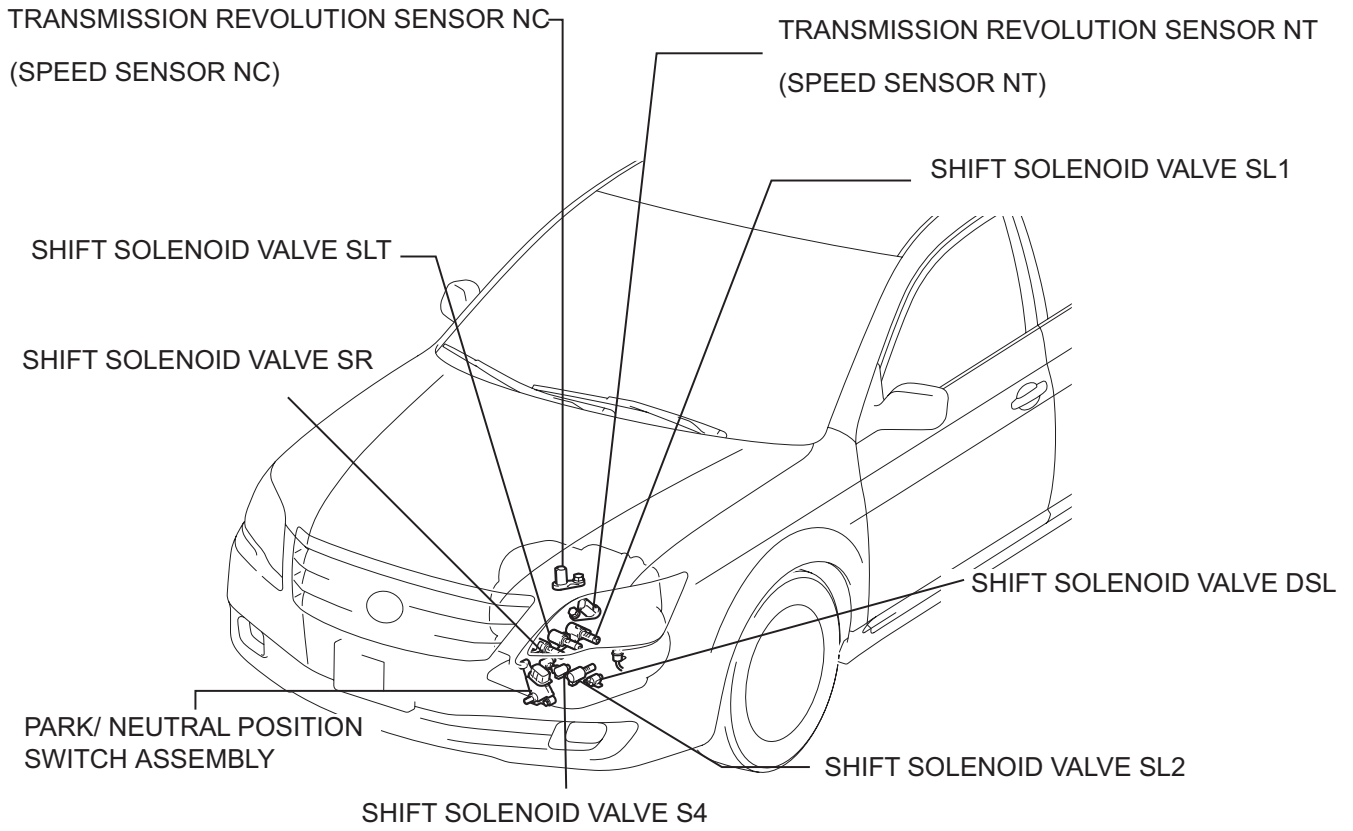
- When the vehicle in front decelerates rapidly or another vehicle moves in front of the vehicle, decelerating in time to avoid a collision may not be possible without additional braking.
- The dynamic radar cruise control system is designed to assist in maintaining an appropriate distance with the vehicle in front. However, the system alone is not sufficient. It is imperative that the driver pays attention at all times.
- The millimeter wave radar sensor has functions to automatically detect dirt on the sensor face and inform the driver, but is not perfect. Keep the sensor face clean.
- The dynamic radar cruise control system does not work, or give vehicle-approaching warning, for vehicles which are stopped or driving at significantly slower speeds. Always pay attention to those other vehicles.
- The millimeter wave radar sensor detection area is narrow at close range, so detection of a vehicle moving just in front may be delayed, or a motorcycle running on the side of the same lane may not be detected. The distance to the vehicle in front may not be maintained properly due to these reasons.
- Even if ACCEL is operated to increase the set vehicle speed, the vehicle does not accelerate because the speed is controlled in accordance with the speed of the vehicle in front while driving with the vehicle-to-vehicle distance control mode on (follow-up cruising). However, as the set vehicle speed has been increased by ACCEL operation, the vehicle keeps accelerating when there is no vehicle in front. Check the set speed with the set vehicle speed indication on the display.
- The controlled vehicle distance may be shorter than the set vehicle distance when cruising on a long downhill road.
- The cruise control main switch must be turned OFF and then ON if all of the following occur: 1) the CRUISE main indicator light blinks, 2) the master warning light illuminates at the same time as a "pong" sound, and 3) the fail message is shown on the display.
- The vehicle-approaching warning buzzer does not sound in the constant speed control mode because the presence of the vehicle in front and the distance to it are not judged as in the vehicle-to-vehicle distance control mode. Pay attention to the distance to the vehicle in front.
- The dynamic radar cruise control system has 2 cruise control modes: the constant speed control mode and vehicle-to-vehicle distance control mode. Confirm which mode is selected when using the dynamic radar cruise control system.

PARTS LOCATION

CC



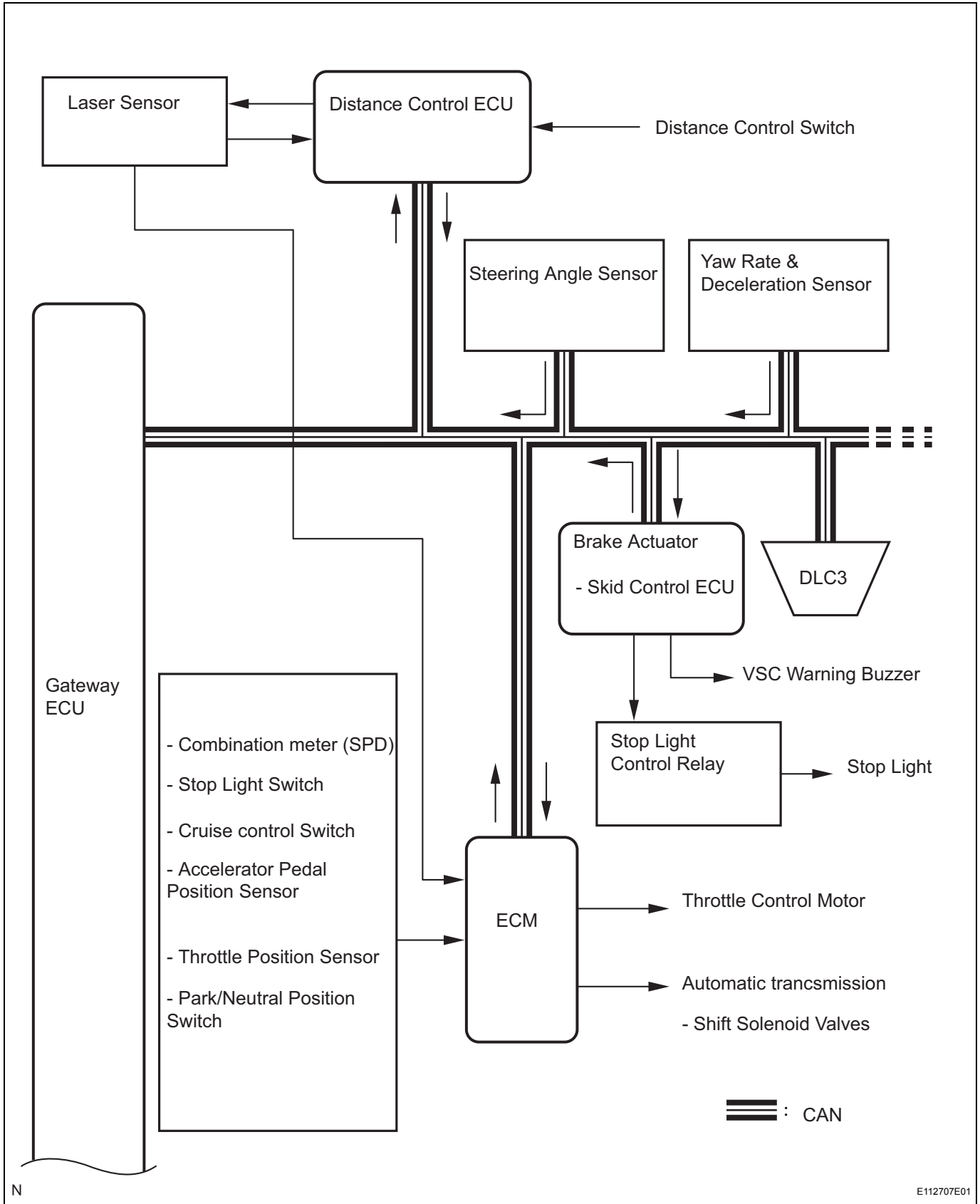




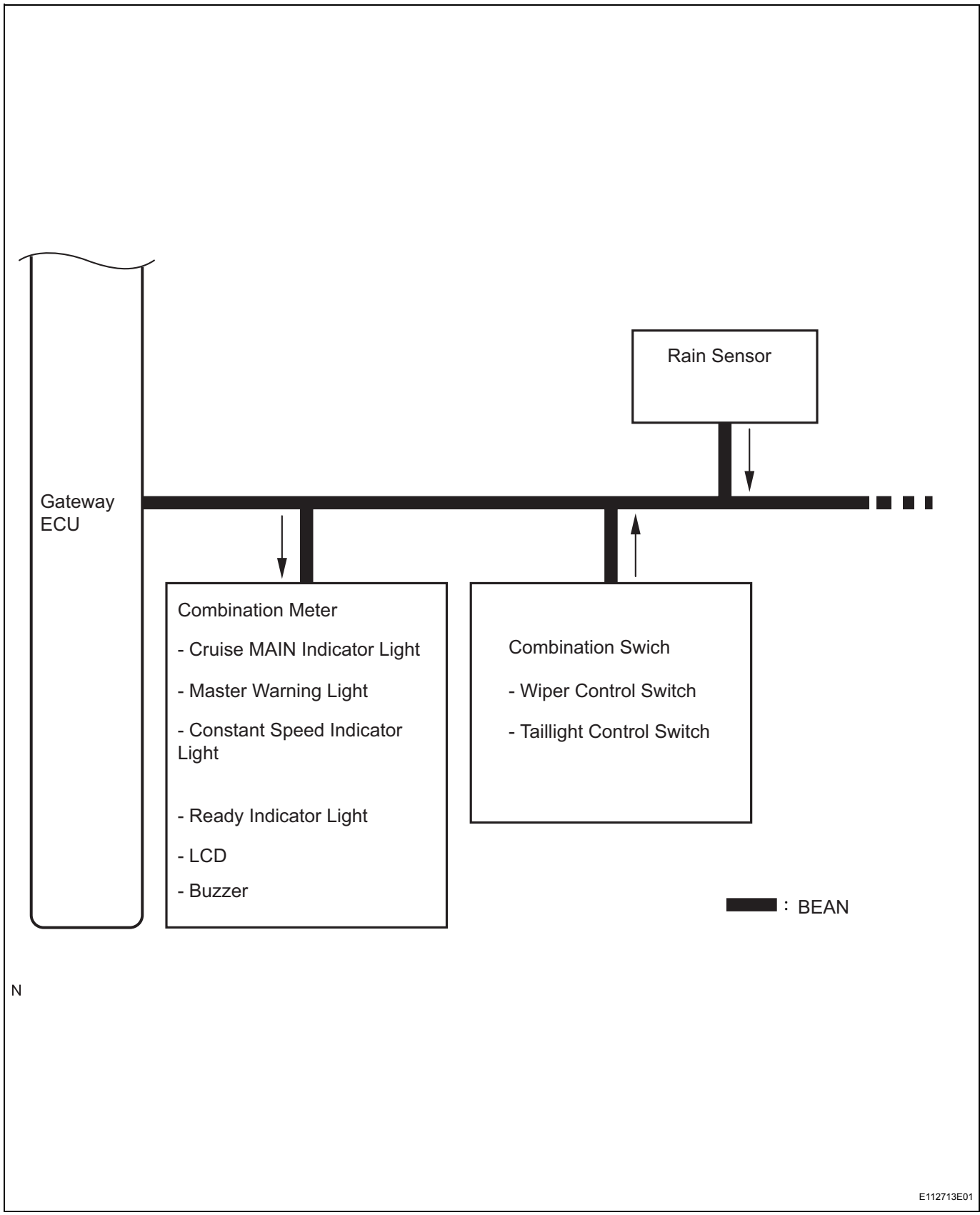
CC

SYSTEM DIAGRAM

CC



CC



Communication table:

Transmitting ECU (transmitter)	Receiving ECU	Signals	Communication method
Laser Sensor	Distance Control ECU (Cruise Control ECU)	<ul style="list-style-type: none"> Vehicle-to-vehicle distance signal Preceding vehicle detection signal Relative acceleration rate signal Relative vehicle speed signal Width and position of object ahead signal Diagnosis data signal 	Serial
Laser Sensor	ECM	<ul style="list-style-type: none"> Laser sensor operation signal 	Wire
Distance Control ECU (Cruise Control ECU)	Laser Sensor	<ul style="list-style-type: none"> Actual vehicle speed signal Estimated curve radius signal Laser sensor illumination request signal Wiper condition signal Cruise control switch signal Set distance signal Beam axis adjustment data signal 	Serial
Distance Control ECU (Cruise Control ECU)	ECM	<ul style="list-style-type: none"> Target acceleration rate signal Target deceleration rate signal Vehicle-to-vehicle distance signal Preceding vehicle detection signal Brake axis deviation signal Laser sensor grime signal Bad weather detection signal Gear request signal Diagnosis data signal 	CAN
Distance Control ECU (Cruise Control ECU)	Combination Meter	<ul style="list-style-type: none"> Display data signal 	BEAN and CAN
Distance Control Switch	Distance Control ECU	<ul style="list-style-type: none"> Distance control switch 	Wire
Yaw Rate & Deceleration Sensor	Distance Control ECU	<ul style="list-style-type: none"> Yaw rate signal 	CAN
Steering Angle Sensor	Distance Control ECU	<ul style="list-style-type: none"> Steering angle signal 	CAN
ECM	Distance Control ECU	<ul style="list-style-type: none"> Setting vehicle speed signal Actual vehicle speed signal Cruise control switch (main switch) signal Set distance signal Brake request response signal Accelerator pedal idle signal Stop light signal Transmission information signal 	CAN
ECM	Skid Control ECU	<ul style="list-style-type: none"> Target deceleration rate signal Target deceleration rate gradient signal Brake request signal 	CAN
ECM	Combination meter	<ul style="list-style-type: none"> Cruise control switch signal 	BEAN and CAN
Skid Control ECU	Distance Control ECU (Cruise Control ECU)	<ul style="list-style-type: none"> Yaw rate zero point information signal 	CAN
Skid Control ECU	ECM	<ul style="list-style-type: none"> Cruise control cancel request signal Brake request response signal 	CAN
Rain Sensor	Combination Switch	<ul style="list-style-type: none"> Raindrop volume signal 	Wire
Combination Switch	Distance Control ECU (Cruise Control ECU)	<ul style="list-style-type: none"> Wiper operation signal Wiper control switch signal Taillight control switch signal 	CAN
Combination Switch	ECM	<ul style="list-style-type: none"> Wiper control switch signal 	CAN

Transmitting ECU (transmitter)	Receiving ECU	Signals	Communication method
ECM	Combination Meter ECU	<ul style="list-style-type: none"> • Cruise control diagnosis signal (DTC) • Preceding vehicle detection signal • Approach warning signal • Vehicle-to-vehicle distance signal • Laser sensor grime signal • Bad weather detection signal • Vehicle-to-vehicle distance control signal • Vehicle-to-vehicle distance control check mode signal • Vehicle-to-vehicle distance control standby condition signal • Constant speed cruise signal • CRUISE indicator operation signal • Cruise control warning signal • Dynamic laser cruise warning signal • Cruise control vehicle speed signal 	<ul style="list-style-type: none"> • CAN • BEAN (Instrument Panel Bus)
Distance Control ECU (Cruise Control ECU)	Combination Meter ECU	<ul style="list-style-type: none"> • Laser sensor optical axis deviation signal • Vehicle-to-vehicle distance signal • Preceding vehicle detection signal 	<ul style="list-style-type: none"> • CAN • BEAN (Instrument Panel Bus)
Passenger Side J/B ECU	ECM	<ul style="list-style-type: none"> • ECT SNOW mode switch signal 	<ul style="list-style-type: none"> • CAN • BEAN (Instrument Panel Bus)
Rain Sensor	Distance Control ECU (Cruise Control ECU)	<ul style="list-style-type: none"> • LO operation signal • HI operation signal 	<ul style="list-style-type: none"> • CAN • BEAN (Door Bus)
Combination Switch	Distance Control ECU (Cruise Control ECU)	<ul style="list-style-type: none"> • Turn switch signal • Wiper switch position signal 	<ul style="list-style-type: none"> • CAN • BEAN (Instrument Panel Bus)
Steering Pad Switch (DISP 2)	ECM	<ul style="list-style-type: none"> • Steering pad switch (DISP 2) signal 	<ul style="list-style-type: none"> • CAN • BEAN (Instrument Panel Bus)
Luggage Compartment J/B ECU	<ul style="list-style-type: none"> • ECM • Distance Control ECU (Cruise Control ECU) 	<ul style="list-style-type: none"> • Stop light operating condition signal 	<ul style="list-style-type: none"> • CAN • BEAN (Instrument Panel Bus)

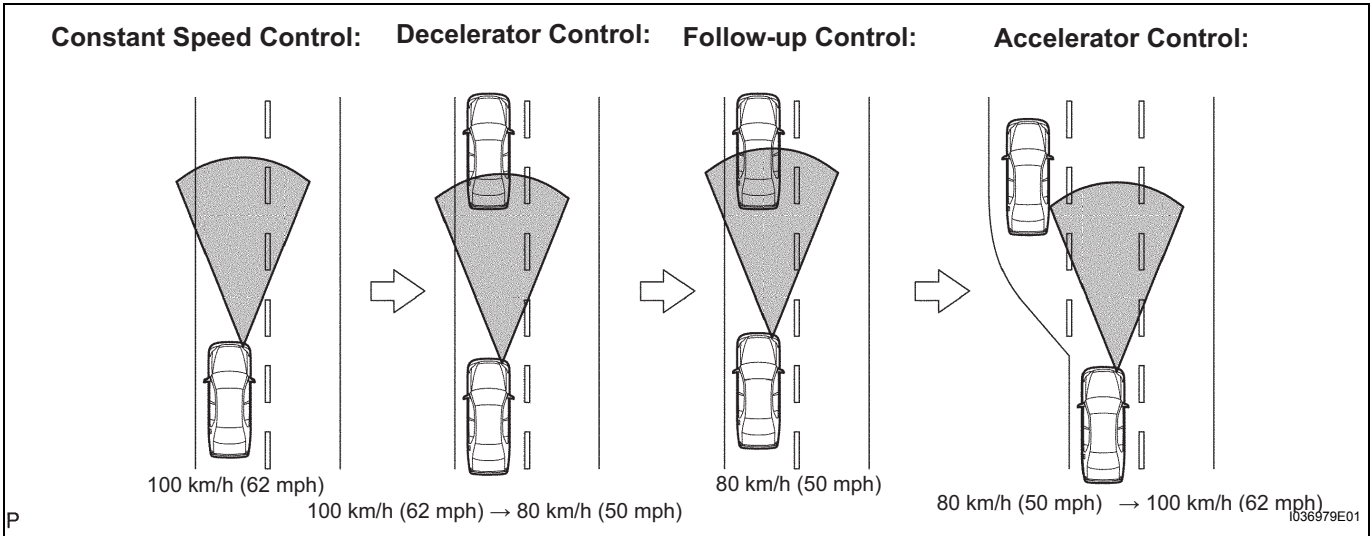
SYSTEM DESCRIPTION

1. GENERAL

- (a) The dynamic laser cruise control system has two cruise control modes: the constant speed control mode and vehicle-to-vehicle distance control mode.
 - The vehicle-to-vehicle distance control mode is always selected when starting up the dynamic laser cruise control system.
 - Operation of the constant speed control mode is the same as that for the conventional type cruise control system.
- (b) This system maintains the vehicle running at the speed that the driver has set, as long as there are no vehicles ahead in the same lane. Then, the system maintains the vehicle distance that has been set by the driver.

If the system detects a vehicle moving at a slower speed ahead while the driver is driving at a constant speed, it closes the throttle valve to decelerate. If further deceleration is required, the system controls the brake actuator in order to apply the brakes. Thereafter, if there are no vehicles ahead within the set vehicle-to-vehicle distance because either the vehicle ahead or the driver has changed lanes, the system accelerates slowly to reach the set vehicle speed and resumes driving at the constant speed.
- (c) The constant speed control mode is designed to maintain a constant cruising speed. The vehicle-to-vehicle distance control mode is designed to control cruising at a constant speed function, deceleration cruising function, follow-up cruising function and acceleration cruising function.
- (d) The laser sensor and the distance control ECU (cruise control ECU) control the system while the vehicle-to-vehicle distance control mode is in operation, and send signals to each actuator and ECU.
- (e) In vehicle-to-vehicle distance control mode, the dynamic laser cruise control system receives signals from the yaw rate & deceleration sensor and the steering angle sensor. Based on these signals, it then estimates curve radius and compensates for information on the preceding vehicle while turning. It can also compensate for the brake control when approaching another vehicle.
- (f) This system judges the existence of a vehicle in front and the distance to it based on the signals from the laser sensor while the vehicle-to-vehicle distance control mode is in operation. Using this information, the system informs the driver of any danger with the warning buzzer, performs brake control, and turns on the stop light when approaching the vehicle in front.

(g) The following illustration shows a control example under the following conditions: own vehicle speed is 100 km/h (62 mph) and the speed of the vehicle in front is 80 km/h (50 mph).



Setting of the vehicle distance can be changed to 3 distances by operating the distance control switch (DISP2 button): long (approximately 75 m (246 ft)), middle (approximately 50 m (164 ft)), and short (approximately 30 m (98 ft)) when vehicle speed is approximately 90 km/h (55 mph).

HINT:

- Vehicle distance increases and decreases in accordance with vehicle speed.
- Controlling condition is indicated on the combination meter multi-information display.

2. FUNCTION OF MAIN COMPONENTS

Item	Outline
Cruise Control Switch (Main Switch)	<ul style="list-style-type: none"> • Turns on/off the power to the cruise control system
Cruise Control Switch (Control Switch)	<ul style="list-style-type: none"> • The vehicle speed setting, deceleration setting, preset speed resumption, acceleration setting, and canceling signals are output to the ECM through the operation of this switch. • Switches the control mode: the constant speed control mode and vehicle-to-vehicle distance mode.
Distance Control Switch	<ul style="list-style-type: none"> • While the system is in the vehicle-to-vehicle distance control mode, the driver can operate the distance control switch to select the vehicle-to-vehicle distance in three stages: long, middle, and short.
Stop Light Switch	<ul style="list-style-type: none"> • Detects the pressing of the brake pedal and transmits its signal to the ECM.
Wiper Control Switch	<ul style="list-style-type: none"> • Switches to the beam axis adjustment mode for the laser sensor.
Laser Sensor	<ul style="list-style-type: none"> • Radiates laser rays forward, uses the reflected rays for detecting the presence of a vehicle being driven ahead, the vehicle-to-vehicle distance, and the relative speed, and transmits these pieces of information to distance control ECU.
Combination Meter	<ul style="list-style-type: none"> • Transmits the vehicle speed signal (SPD) to the ECM.
Combination Meter (Cruise Main Indicator Light)	<ul style="list-style-type: none"> • Illuminates when the main switch is on. • If distance control ECU detects a malfunction, this light flashes to warn the driver.
Combination Meter (Master Warning Light)	<ul style="list-style-type: none"> • Illuminates when there is a malfunction in the system.
Combination Meter (Constant Speed Indicator Light)	<ul style="list-style-type: none"> • Illuminates during constant speed control mode.

Item	Outline
Combination Meter (Ready Indicator Light)	<ul style="list-style-type: none"> • Illuminates when the main switch is on.
Combination Meter (Buzzer)	<ul style="list-style-type: none"> • If the ECM or distance control ECU detects an automatic cancel signal while the vehicle is operating under cruise control, this buzzer sounds only once to inform the driver.
Combination Meter (LCD)	<ul style="list-style-type: none"> • While the system is in the vehicle-to-vehicle distance control mode, the combination meter receives signals from distance control ECU, in order to display the system conditions.
Steering Angle Sensor	<ul style="list-style-type: none"> • Detects the angle and direction of steering and transmits its signal to skid control ECU and distance control ECU.
Vehicle Speed Sensor (4)	<ul style="list-style-type: none"> • Detects the rotation speed of four wheels and transmits its signal to skid control ECU.
Yaw Rate & Deceleration Sensor	<ul style="list-style-type: none"> • Detects the yaw rate of the vehicle and transmits its signal to skid control ECU and distance control ECU.
Rain Sensor	<ul style="list-style-type: none"> • This sensor detects raindrops, and when the wiper operates at LO or HI, it requests the ECM to provide a cruise control cancel signal.
Brake Actuator	<ul style="list-style-type: none"> • Actuates the brakes in accordance with the signals from skid control ECU.
Brake Actuator (Skid Control ECU)	<ul style="list-style-type: none"> • Receives four vehicle speed sensor signals and outputs a vehicle speed signal to the combination meter. • While the system is in the vehicle-to-vehicle distance control mode, skid control ECU actuates the brake actuator in accordance with the brake request signal received from distance control ECU. • Upon receiving a signal from distance control ECU, skid control ECU sounds a VSC warning buzzer.
VSC Warning Buzzer	<ul style="list-style-type: none"> • This buzzer sounds upon receiving a signal from skid control ECU.
ECM	<ul style="list-style-type: none"> • Controls the cruise control system in accordance with the signals from the switches, sensors, skid control ECU and distance control ECU. • If the ECM detects a malfunction in the cruise control system, it will output DTCs (Diagnostic Trouble Codes).
Throttle Control Motor	<ul style="list-style-type: none"> • Upon receiving a signal from the ECM, the throttle control motor actuates the throttle valve.
Distance Control ECU	<ul style="list-style-type: none"> • While the system is in the vehicle-to-vehicle distance control mode, distance control ECU detects the follow up vehicle based on a signal from the laser sensor. Then, distance control ECU calculates the acceleration or deceleration rate in order to attain the target vehicle-to-vehicle distance, and outputs a request signal to the ECM and skid control ECU.

3. LIMIT CONTROL

(a) Low speed limit

The lowest possible limit of the speed setting range is set at approximately 45 km/h (28 mph). The cruise control system cannot be set when the driving vehicle speed is below the low speed limit. Cruise control operation will be automatically canceled when the vehicle speed goes below the low speed limit (45 km/h (28 mph)) while the cruise control is in operation.

(b) High speed limit (Constant speed control mode)

The highest possible limit of the speed setting range is set at approximately 200 km/h (125 mph). The cruise control system cannot be set when the driving vehicle speed is over the high speed limit. Speed up using +/-REC with the cruise control main switch assembly also cannot be set beyond the high speed limit.

- (c) Upper speed limit (Vehicle-to-vehicle distance control mode)

The set vehicle speed can be increased up to approximately 85 mph in USA and 135 km/h in Canada.

4. CRUISE CONTROL OPERATION

The cruise control main switch operates eight functions: SET, COAST, TAP-DOWN, RESUME, ACCEL, TAP-UP, CANCEL, and MODE. The SET, TAP-DOWN and COAST functions, and the RESUME, TAP-UP and ACCEL functions are operated with the same switch.

The cruise control main switch assembly is an automatic return type switch which turns on only while operating it in each arrow direction and turns off after releasing it.

The dynamic laser cruise control system has two cruise control modes: the constant speed control mode and vehicle-to-vehicle distance control mode.

- The vehicle-to-vehicle distance control mode is always selected when starting up the dynamic laser cruise control system.
- Operation of the constant speed control mode is the same as that for the conventional type cruise control system.

(a) MODE CONTROL

Pushing the switch to MODE for more than 1 second while driving with the cruise control main switch ON-OFF button on (RADAR READY is on) switches the mode to the constant speed control mode.

(b) SET CONTROL (Constant speed control mode)

Vehicle speed is stored and constant speed control is maintained when pushing the switch to -/SET while driving with the vehicle speed within the set speed range (between the low and high speed limits) after pushing the cruise control main switch ON-OFF button on, and entering the constant speed control mode.

(c) SET CONTROL (Vehicle-to-vehicle distance control mode)

Vehicle speed is stored and vehicle-to-vehicle control is maintained when pushing the switch to -/SET while driving with the cruise control main switch ON-OFF button on, and vehicle speed is within the set speed range (between the low and high speed limits).

- (d) **COAST CONTROL (Constant speed control mode)**
The ECM tells the cruise control to close the throttle opening angle zero degrees and decelerates the vehicle (the throttle valve is not fully closed due to the idle speed control, etc.) when -/SET on the cruise control main switch is pressed and held while the constant speed control mode is in operation. Vehicle speed, when the cruise control main switch is released from -/SET, is stored and constant speed control is maintained.
- (e) **COAST CONTROL (Vehicle-to-vehicle distance control mode)**
When -/SET on the cruise control main switch is pressed and held while the vehicle-to-vehicle distance control mode is in operation, the stored vehicle speed decreases by approximately 5 km/h (CANADA) or 5 mph (USA) per second.
- (f) **TAP-DOWN CONTROL (Constant speed control mode)**
When tapping down on the cruise control main switch to -/SET (for approximately 0.6 second) while the constant speed control mode is in operation, the stored vehicle speed decreases each time by approximately 1.6 km/h (1 mph). However, in case the difference between the driving and the stored vehicle speeds is more than 5 km/h (3 mph), the vehicle speed will be stored and constant speed control will be maintained when the cruise control main switch is released from -/SET.
- (g) **TAP-DOWN CONTROL (Vehicle-to-vehicle distance control mode)**
When tapping down on the cruise control main switch to -/SET (for approximately 0.6 second) while the vehicle-to-vehicle distance control mode is in operation, the stored vehicle speed decreases each time by approximately 5 km/h (CANADA) or 5 mph (USA).
- (h) **ACCELERATION CONTROL (Constant speed control mode)**
The throttle valve motor of the throttle position sensor and motor is instructed by the ECM to open the valve when +/REC on the cruise control main switch is pressed and held while the constant speed control mode is in operation. Vehicle speed is stored and constant speed control is maintained when the cruise control main switch is released from +/RES.

- (i) **ACCELERATION CONTROL (Vehicle-to-vehicle distance control mode)**
When +/-REC on the cruise control main switch is pressed and held while the vehicle-to-vehicle distance control mode is in operation, the stored vehicle speed increases by approximately 5 km/h (CANADA) or 5 mph (USA) per second. Pushing the cruise control main switch to +/-REC while following the vehicle in front with the vehicle-to-vehicle distance control mode does not increase the actual vehicle speed, but changes only the set vehicle speed.
- (j) **TAP-UP CONTROL (Constant speed control mode)**
When tapping up on the cruise control main switch to +/-REC (for approximately 0.6 second) while the constant speed control mode is in operation, the stored vehicle speed increases each time by approximately 1.6 km/h (1 mph). However, when the difference between the driving and the stored vehicle speeds is more than 5 km/h (3 mph), the stored vehicle speed will not be changed.
- (k) **TAP-UP CONTROL (Vehicle-to-vehicle distance control mode)**
When tapping up on the cruise control main switch to +/-REC (for approximately 0.6 second) while the vehicle-to-vehicle distance control mode is in operation, the stored vehicle speed increases each time by approximately 5 km/h (CANADA) or 5 mph (USA).
- (l) **MANUAL CANCEL CONTROL**
Performing any of the following cancels the cruise control system while it is in operation (the stored vehicle speed in the hybrid vehicle control ECU is maintained).
- Depressing the brake pedal
 - Moving the shift lever to any position except D (5th and 4th gears)
 - Pushing the cruise control main switch to CANCEL
 - Pushing the cruise control main switch ON-OFF button off (The stored vehicle speed in the ECM is not maintained.)
- (m) **RESUME CONTROL**
If the cruise control operation was cancelled with the stop light switch or the CANCEL switch, and if driving speed is within the limit range, pushing the cruise control main switch to +/-REC restores vehicle speed memorized at the time of cancellation, and maintains constant speed control. In constant speed mode, once vehicle speed goes below the low speed limit, RESUME operation is not possible even if accelerating up to the low speed limit, or more, again.

5. LASER BEAM AXIS ADJUSTMENT

The dynamic laser cruise control system has an automatic adjustment function of the optical axis. Perform the adjustment of the laser sensor optical axis with the intelligent tester (See page [CC-121](#) for the optical axis adjustment).

6. BRAKE CONTROL

The distance control ECU (cruise control ECU) determines the distance between a vehicle in front and your own, relative speed, target decreasing speed and deceleration rate to transmit a brake demand signal to the skid control ECU via the ECM.

7. DOWNSHIFT CONTROL

While the cruise control system is in operation, the gear may downshift from overdrive (5th) to 4th on an uphill road. After the gear is shifted down to 4th, if the system determines that the uphill inclination has become smaller based on throttle opening angle information, the gear automatically returns to overdrive (5th).

8. AUTO CANCEL (FAIL-SAFE)

This system has an automatic cancellation function (fail-safe) (for details, See page [CC-59](#)).

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use these procedures to troubleshoot the dynamic radar cruise control system.
- The intelligent tester should be used at steps 3, 4, 5, and 9.

CC

1 VEHICLE BROUGHT TO WORKSHOP

NEXT

2 INSPECT BATTERY VOLTAGE

Standard:

11 to 14 V

If the voltage is below 11 V, replace or recharge the battery before proceeding.

NEXT

3 CHECK COMMUNICATION FUNCTION OF MULTIPLEX COMMUNICATION SYSTEM (BEAN)

- (a) Use the intelligent tester to check if the Multiplex Communication System (MPX) is functioning normally.

Result

Result	Proceed to
MPX DTC is not output	A
MPX DTC is output	B

B Go to MULTIPLEX COMMUNICATION SYSTEM

A

4 CHECK COMMUNICATION FUNCTION OF CONTROLLER AREA NETWORK (CAN)

- (a) Use the intelligent tester to check for normal function of CAN communication system.

- (1) Perform bus check (communication malfunction DTC).
- (2) Perform bus check (communication bus check).

Result

Result	Proceed to
DTC is not output	A
DTC is output	B

B Go to CAN COMMUNICATION SYSTEM

A

5 CHECK FOR DTC

Refer to the DTC check/clear (See page [CC-58](#)).

- (a) Check for DTC and note any codes that are output.
- (b) Delete the DTC.
- (c) Recheck for DTC. Try to prompt the DTC by simulating the original activity that the DTC suggests.

Result

Result	Proceed to
DTC does not reoccur	A
DTC reoccur	B

B **Go to step 8**

A

6 PROBLEM SYMPTOMS TABLE

Refer to the problem symptoms table (See page [CC-52](#)).

Result

Result	Proceed to
Fault is not listed in problem symptoms table	A
Fault is listed in problem symptoms table	B

B **Go to step 8**

A

7 OVERALL ANALYSIS AND TROUBLESHOOTING

- (a) Terminal of ECU (See page [CC-54](#)).
- (b) Data List/Active Test (See page [CC-60](#)).

NEXT

8 REPAIR OR REPLACE

NEXT

9 CONFIRMATION TEST

NEXT

END

ROAD TEST

1. PROBLEM SYMPTOM CONFIRMATION

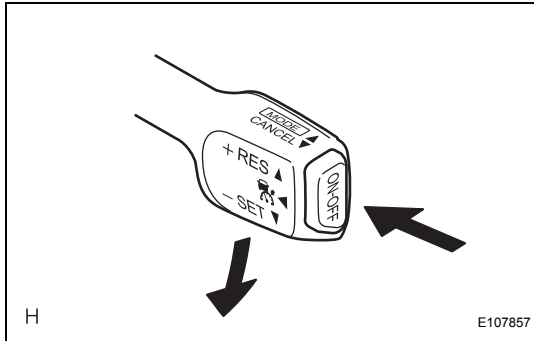
HINT:

The dynamic radar cruise control system has two cruise control modes: the constant speed control mode and vehicle-to-vehicle distance control mode.

- The vehicle-to-vehicle distance control mode is always selected when starting up the dynamic radar cruise control system.
- Operation of the constant speed control mode is the same as that for a conventional cruise control system.

(a) Inspect the SET function.

- (1) Turn the main switch ON.
- (2) Drive at the required speed (45 km/h (28 mph) or higher).
- (3) Push the cruise control main switch to -/SET.
- (4) After releasing the switch, check that the vehicle cruises at the set speed.

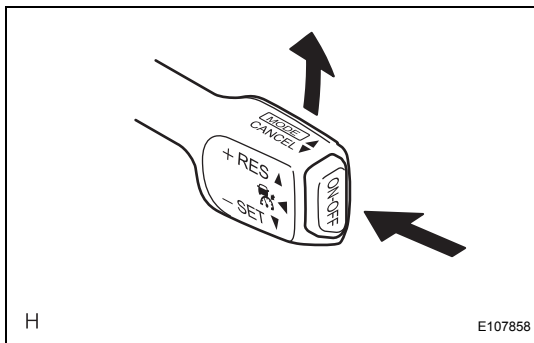


(b) Inspect the ACC (ACCEL) function.

- (1) Turn the main switch ON.
- (2) Drive at the required speed (45 km/h (28 mph) or higher).
- (3) Push the cruise control main switch to -/SET.
- (4) Check that vehicle speed increases while the cruise control main switch is pushed to +/RES, and that the vehicle cruises at the newly set speed when the switch is released.
- (5) Momentarily push the cruise control main switch +/RES and then immediately release it. Check that vehicle speed increases* (tap-up control).

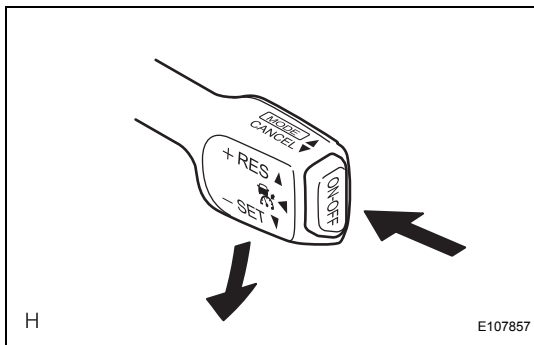
HINT:

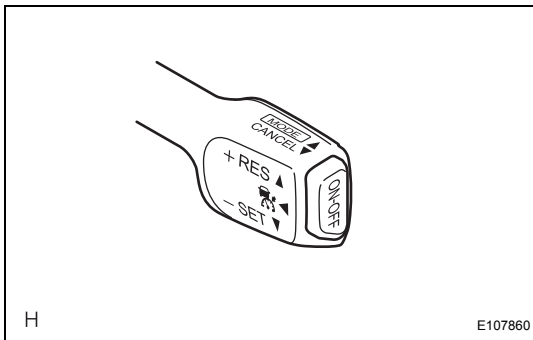
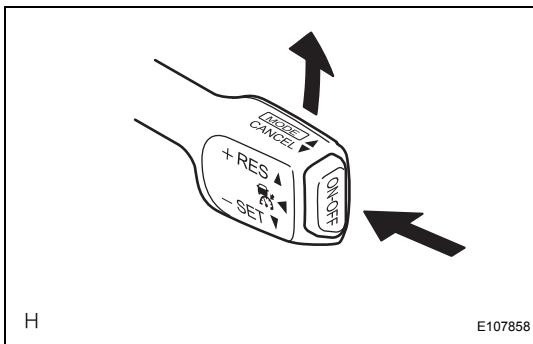
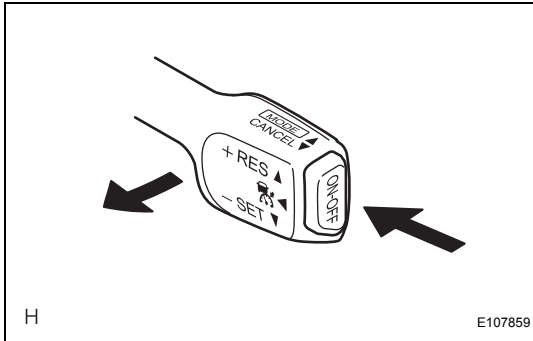
*: Constant speed control mode: increases by 1.6 km/h (1.0 mph); vehicle-to-vehicle distance control mode: increases by 5 km/h (3 mph)



(c) Inspect the COAST function.

- (1) Turn the main switch ON.
- (2) Drive at the required speed (45 km/h (28 mph) or higher).
- (3) Push the cruise control main switch to -/SET.
- (4) Check that vehicle speed decreases while the cruise control main switch is pushed to -/SET, and the vehicle cruises at the newly set speed when the switch is released.





- (5) Momentarily push the cruise control main switch to -/SET, and then immediately release it. Check that vehicle speed decreases* (tap-down control).

HINT:

*: Constant speed control mode: decreases by 1.6 km/h (1.0 mph); vehicle-to-vehicle distance control mode: decreases by 5 km/h (3 mph).

- (d) Inspect the CANCEL function.
- (1) Turn the main switch ON.
 - (2) Drive at the required speed (45 km/h (28 mph) or higher).
 - (3) Push the cruise control main switch to -/SET.
 - (4) When performing one of the following, check that the cruise control system is cancelled and that the normal driving mode is reset.
 - Depressing the brake pedal
 - Moving the shift lever to any position except D (5th and 4th gears)
 - Turning the main switch OFF
 - Pulling the cruise control main switch to CANCEL

- (e) Inspect the RES (RESUME) function.
- (1) Turn the main switch ON.
 - (2) Drive at the required speed (45 km/h (28 mph) or higher).
 - (3) Push the cruise control main switch to -/SET.
 - (4) Cancel the cruise control system according to any of the above operations (other than turning the main switch OFF).
 - (5) After pushing the cruise control main switch to +/RES at a driving speed of more than 45 km/h (28 mph), check that the vehicle drives at the set speed.

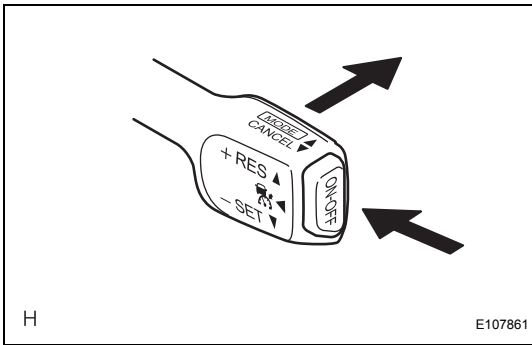
HINT:

The stored vehicle speed is retained even if vehicle speed goes below 45 km/h (28 mph) once. The previously stored vehicle speed can be resumed by pushing the cruise control main switch to +/RES when vehicle speed returned to approximately 45 km/h (28 mph) or more.

OPERATION CHECK

1. INPUT SIGNAL CHECK

- (a) Connect the intelligent tester to the DLC3.
- (b) Check the cruise control main switch using the DATA LIST function in the intelligent tester (ON-OFF, CANCEL, -/SET, +/RES, and MODE).

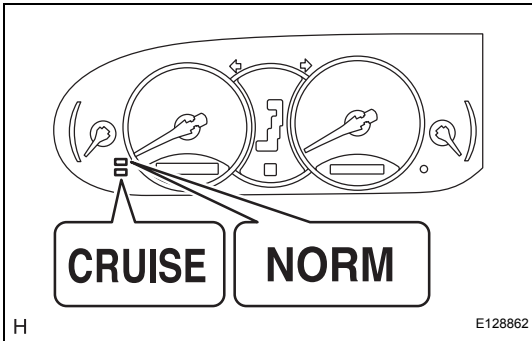


2. INSPECT MODE SWITCH

- (a) Turn the ignition switch on (IG).

HINT:

Dynamic laser cruise is default mode.



- (b) After pushing the ON-OFF button on, push the cruise control main switch to MODE for at least 1 second without any other control. Make sure that "NORMAL." is indicated and no indication is shown in the display.

NOTICE:

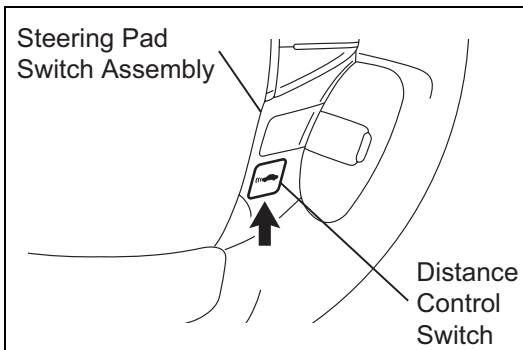
Do not push any other switches before pushing the main switch to MODE. If another switch is pushed, turn the main switch OFF and repeat the procedure above.

HINT:

If the system cannot switch to the constant speed control mode, push the ON-OFF button off once, and perform the same procedures as shown above. If a malfunction is still detected in the system, and then start the engine and perform the above procedure.

3. INSPECT STEERING PAD SWITCH ASSEMBLY

- (a) Turn the switch on.
 (b) Push on the ON-OFF button of the cruise control main switch.
 (c) Push on the distance control switch of the steering pad switch.

**Multi-information Display:**

N

E128863E01

- (d) Check the the indication multi-information display of the combination meter, changes from "LONG", "MIDDLE" to "SHORT" in order.

HINT:

The indication is immediately set to "LONG" each time the engine is started.

PROBLEM SYMPTOMS TABLE

If a normal system code is displayed during the DTC check but the problem still occurs, check the suspected areas for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

HINT:

Inspect the "Fuse" and "Relay" before confirming the suspected areas as shown in the chart below. Inspect each suspected area for the corresponding symptom in numerical order.

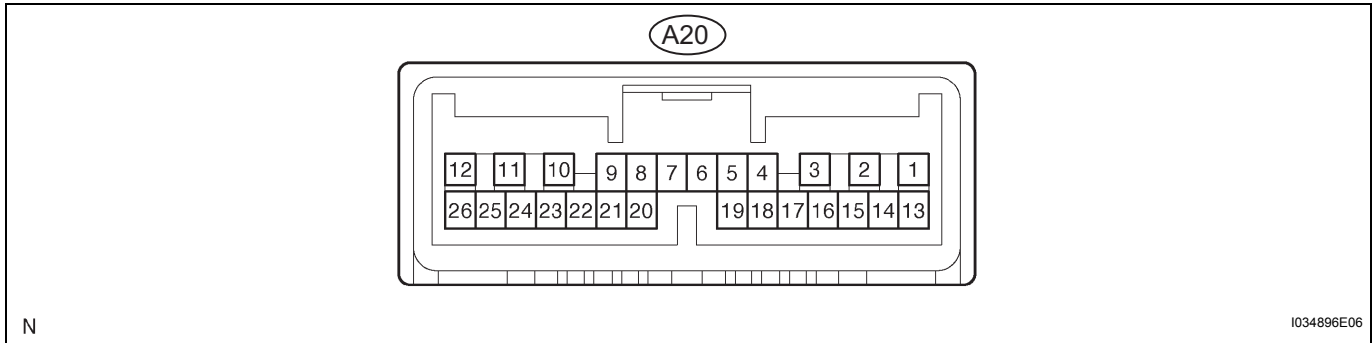
DYNAMIC LASER CRUISE CONTROL SYSTEM

Symptom	Suspected area	See page
Main switch cannot be turned ON. (Cruise indicator light in combination meter does not come on.)	1. Cruise control switch circuit	CC-91
	2. CRUISE main indicator light circuit	CC-108
	3. ECM	CC-54
Vehicle speed setting cannot be done. (Although indicator light in combination meter comes on when the main switch is turned ON, it goes off when vehicle speed is set.)	1. Cruise control switch circuit	CC-91
	2. ECM	CC-54
Setting cannot be done. (Indicator light in combination meter comes on when the main switch is turned ON and it remains ON while setting.)	1. Cruise control switch circuit	CC-91
	2. Stop light switch circuit	CC-66
	3. Park/Neutral position switch circuit (DTC P0705)	AX-36
	4. Transmission control switch circuit	AX-115
	5. Combination meter system	ME-13
	6. ECM	CC-54
While the vehicle is driven with cruise control, the set control is cancelled. (Indicator light and CRUISE remain ON.)	1. Cruise control switch circuit	CC-91
	2. Vehicle speed sensor circuit	CC-65
	3. Stop light switch circuit	CC-66
	4. Cruise main indicator light circuit	CC-108
	5. Park/Neutral position switch circuit (DTC P0705)	AX-36
	6. ECM	CC-54
Hunting (Speed is not constant.)	1. Vehicle speed sensor circuit	CC-65
	2. Malfunction in speed meter circuit	ME-13
	3. Laser sensor power source circuit	CC-103
	4. Distance control ECU power source circuit	CC-96
	5. Distance control ECU	CC-54
	6. ECM	CC-54
Setting cannot be cancelled. (When Coast, Acceleration, Resume, Set speed change and Control switch are operated.)	1. Cruise control switch circuit	CC-91
	2. ECM	CC-54
Erroneous detection or lost sight of the vehicle ahead.	1. Clean laser sensor with soft cloth, etc.	CC-121
	2. Improper aiming of sensor beam axis	CC-121
Alarm buzzer does not sound.	1. Buzzer circuit	BC-229
	2. VSC system	BC-100
	3. Laser sensor power source circuit	CC-103
	4. Distance control ECU power source circuit	CC-96
	5. Distance control ECU	CC-54
	6. ECM	CC-54
Set distance cannot be changed.	1. Combination meter system	ME-13
	2. Distance control switch circuit	CC-98
	3. Cruise control switch circuit	CC-91
	4. ECM	CC-54

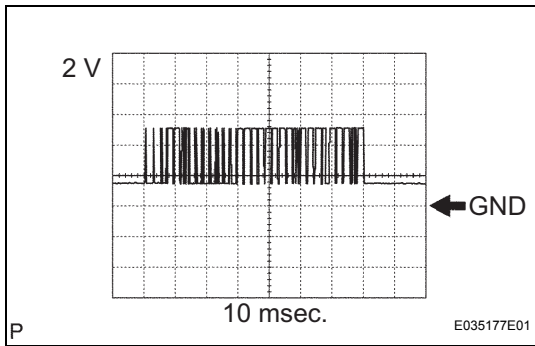
Symptom	Suspected area	See page
No display	1. Combination meter system	ME-13
	2. ECM	CC-54
No brake control (when decelerating)	1. VSC system	BC-100
	2. Distance control ECU power source circuit	CC-96
	3. Distance control ECU	CC-54
	4. ECM	CC-54
Constant speed mode cannot be turned on.	1. Cruise control switch circuit	CC-91
	2. Combination meter system	ME-13
	3. ECM	CC-54
Vehicle speed setting cannot be cancelled with wiper LO/HI. (Including automatic wiper)	1. Rain sensor circuit	MP-63
	2. Wiper switch circuit	CC-107
	3. Distance control ECU	CC-54
	4. ECM	CC-54
Unable to adjust (complete) beam axis of millimeter wave radar sensor.	1. Check for DTC P1570	CC-74
	2. Check position, distance and angle of reflector	CC-121
	3. Check installation of laser sensor	CC-121
	4. Laser sensor	CC-103
	5. ECM	CC-54

TERMINALS OF ECU

1. CHECK DISTANCE CONTROL ECU



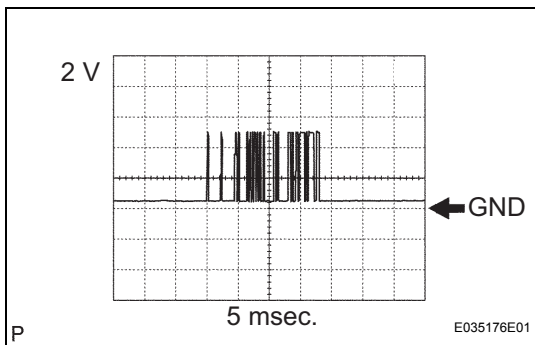
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
B - GND (A20-1 - A20-12)	BR - R	Battery	Always	10 to 14 V
CANH (A20 - 8)	L	CAN communication signal	CAN communication circuit	-
CANL (A20 - 9)	W	CAN communication signal	CAN communication circuit	-
SGND - Body ground (A20-10 - Body ground)	R - Body ground	Ground	Always	Below 1 V
GND - Body ground (A20-12 - Body ground)	R - Body ground	Ground	Always	Below 1 V
IGB - GND (A20-13 - A20-12)	V - R	Ignition switch ON signal	Ignition switch OFF → ON (IG)	Below 1 V → 10 to 14 V
LRDD - GND (A20-22 - A20-12)	B - R	Laser sensor input signal	Ignition switch ON (IG)	Pulse generation (see waveform 1)
LRRD - GND (A20-23 - A20-12)	G - R	Laser sensor output signal	Ignition switch ON (IG)	Pulse generation (see waveform 2)



(a) Reference: waveform 1

HINT:

- Terminal: LRDD - GND
- Gauge set: 2 V/DIV, 10 msec./DIV
- Condition: Ignition switch ON

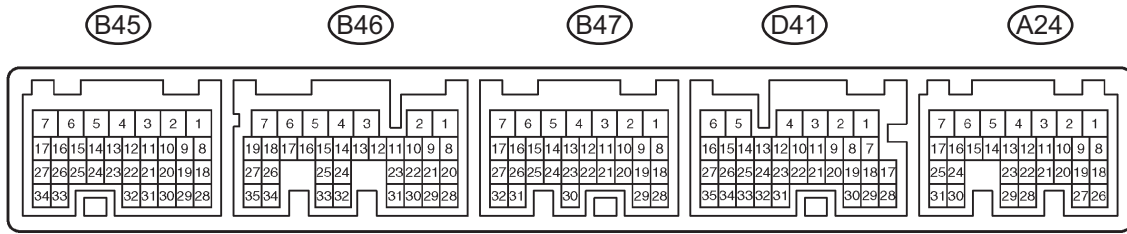


(b) Reference: waveform 2

HINT:

- Terminal: LRRD - GND
- Gauge set: 2 V/DIV, 5 msec./DIV
- Condition: Ignition switch ON

2. CHECK ECM



N

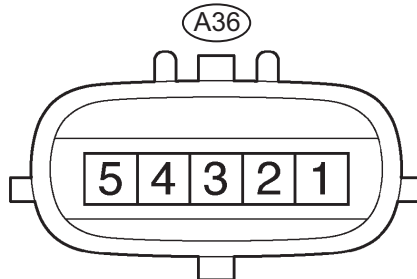
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CC

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
STP - E1 (A24-15 - B47-1)	W - BR	Stop light signal	Brake pedal released (Stop light switch OFF) → Brake pedal depressed (Stop light switch ON)	Below 1 V → 10 to 14 V
CCS - E1 (D41-2 - B47-1)	B - BR	Cruise control main switch signal	Ignition switch ON (IG) CANCEL switch ON SET / COAST switch ON RES / ACC switch ON Main switch ON	10 to 16 V 6.6 to 10.1 V 4.5 to 7.1 V 2.3 to 4.0 V Below 1 V
ST1- - E1 (A24-16 - B47-1)	GR - BR	Stop light signal	Ignition switch ON (IG) Brake pedal depressed (Stop light switch ON) → Brake pedal released (Stop light switch OFF)	Below 1 V → 10 to 14 V
CCHG - E1 (D41-4 - B47-1)	Y - BR	Distance control switch signal	Ignition switch ON (IG) Cruise control main switch ON MODE switch ON → MODE switch OFF	Below 1 V → 10 to 14 V
LGND - Body ground (A24-31 - Body ground)	BR - Body ground	Ground	Always	Below 1 V
E1 - Body ground (B47-1 - Body ground)	BR - Body ground	Ground	Always	Below 1 V

If the value is not within the standard range, some defects on the vehicle is suspected.

3. CHECK LASER SENSOR

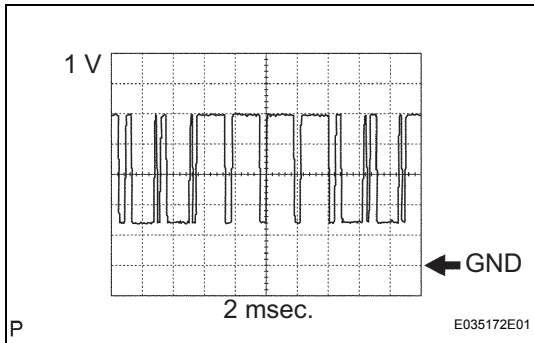


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Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
LGND - Body ground (A36-1 - Body ground)	BR - Body ground	Distance signal	Always	Below 1 Ω
SGND - Body ground (A36-2 - Body ground)	R - Body ground	Ground	Always	Below 1 Ω
LRDD - SGND (A36-3 - A36-2)	B - R	Laser radar sensor output signal	Ignition switch: ON (IG)	Pulse generation (see waveform 1)
LRRD - SGND (L1-4 - L1-2)	G - R	Laser radar sensor input signal	Ignition switch: ON (IG)	Pulse generation (see waveform 2)
IGB - SGND (L1-5 - L1-2)	V - R	Ignition switch signal	Ignition switch: ON (IG)	10 to 14 V

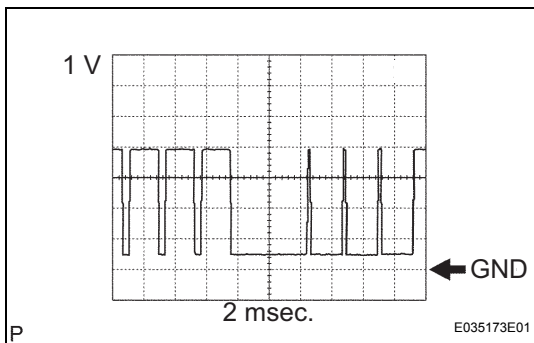
CC



(a) Reference: waveform 1

HINT:

- Terminal: LRDD - SGND
- Gauge set: 1 V/DIV, 2 msec./DIV
- Condition: Ignition switch on (IG)



(b) Reference: waveform 2

HINT:

- Terminal: LRRD - SGND
- Gauge set: 1 V/DIV, 2 msec./DIV
- Condition: Ignition switch on (IG)

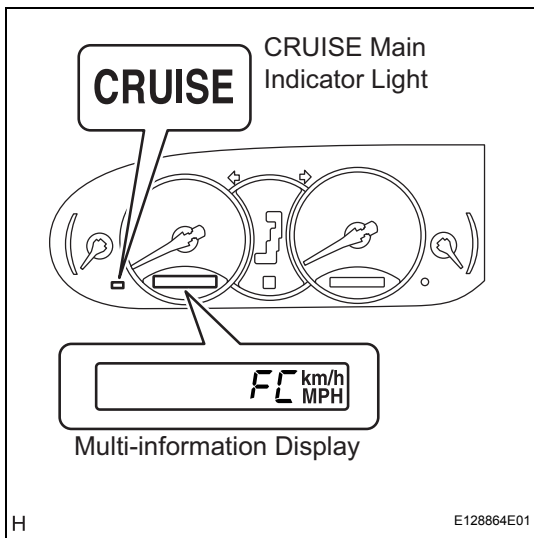
DIAGNOSIS SYSTEM

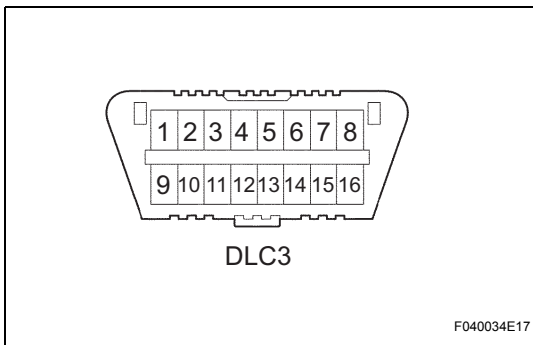
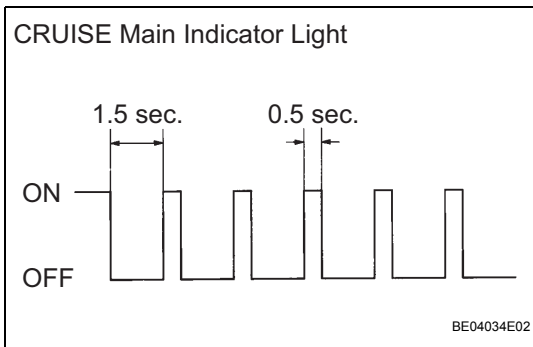
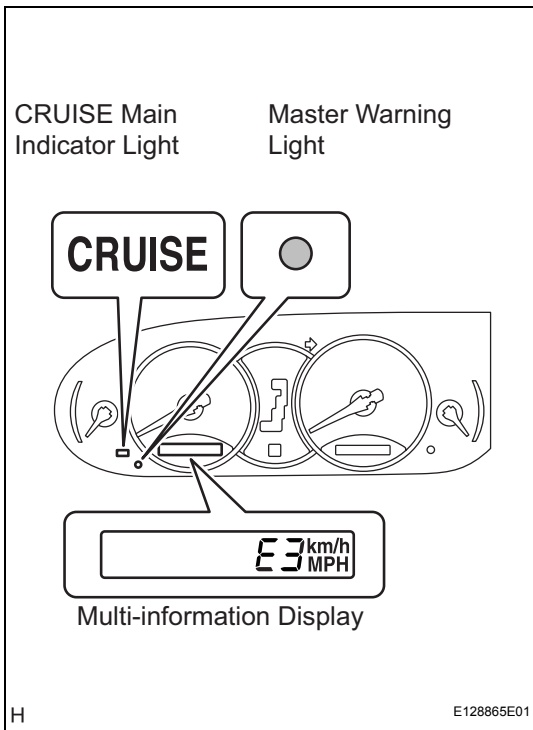
1. LASER BEAM AXIS ADJUSTMENT

(a) Use the intelligent tester to adjust the optical axis (See page [CC-121](#) for the optical axis adjusting operation).

HINT:

While adjusting the optical axis of the laser radar sensor, the CRUISE main indicator light illuminates and FC is displayed on the multi-information display.





2. DIAGNOSIS FUNCTION

- (a) The diagnosis function makes the master warning light and the multi-information display come on, and the CRUISE main indicator light blinks. When a malfunction occurs in the dynamic laser cruise control system, the DTCs are stored in the ECM.

NOTICE:

- The master warning light goes off if the system returns to normal condition.

- Since the stored data in the ECM is erased by disconnecting the EFI and ETCS fuses or the battery terminal, do not disconnect them until the inspection has been completed.

3. DESCRIPTION

- (a) The ECM controls the dynamic radar cruise control system of the vehicle. The data and DTCs relating to the dynamic radar cruise control system can be read from the DLC3 of the vehicle. If either DTC or CRUISE OK is not displayed in the multi-information display on the combination meter when checking for DTCs, there may be a problem with the combination meter or the CAN communication and multiplex communication system. Use the intelligent tester to check and solve the problem.

4. CHECK DLC3

- (a) The vehicle's ECM uses ISO 9141-2 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL(7) - SG(5)	Bus "+" line	During transmission	Pulse generation
CG(4) - Body ground	Chassis ground	Always	Below 1 Ω
SG(5) - Body ground	Signal ground	Always	Below 1 Ω
BAT(16) - Body ground	Battery positive	Always	11 to 14 V
CANH(6) - CANL(14)	HIGH-level CAN bus line	IG switch OFF	54 to 67 Ω

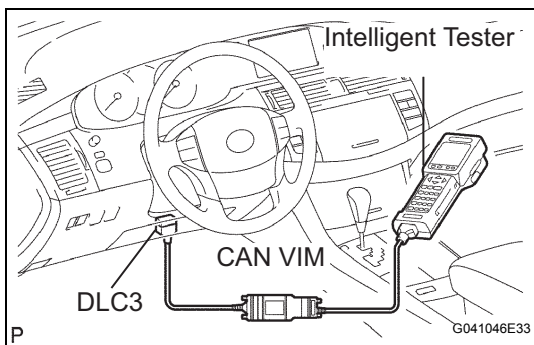
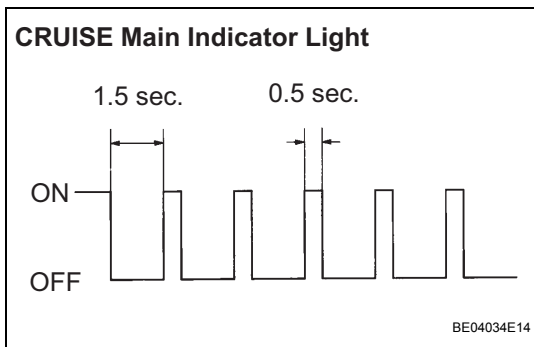
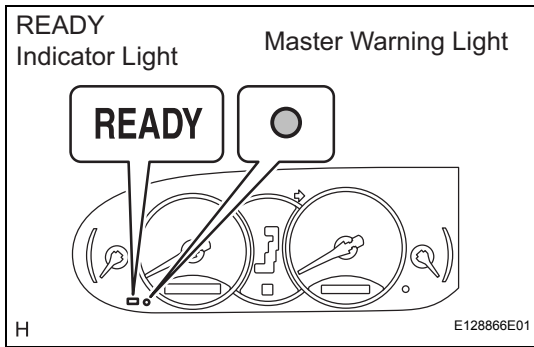
Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
CANH(6) - Battery positive	HIGH-level CAN bus line	IG switch OFF	1 MΩ or higher
CANH(6) - CG(4)	HIGH-level CAN bus line	IG switch OFF	3 kΩ or higher
CANL(14) - Battery positive	LOW-level CAN bus line	IG switch OFF	1 MΩ or higher
CANL(14) - CG(4)	LOW-level CAN bus line	IG switch OFF	3 kΩ or higher

CC

HINT:

If the display shows a communication error message when you have connected the intelligent tester of the DLC3, turned the ignition switch on (IG) and operated the tester, there is a problem on either the vehicle side or the tool side.

- If communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool' instruction manual.



5. CHECK INDICATOR

- Turn the ignition switch on.
- Check that the CRUISE main indicator light and RADAR READY indicator come on when the main switch ON-OFF button is pushed on, and that the indicator light goes off when the ON-OFF button is pushed off.

HINT:

- If the indicator check result shows a problem, proceed to troubleshooting (See page ME-13) for the combination meter section.
- If a malfunction occurs in the vehicle speed sensors, the stop light switch, or other related parts during cruise control driving, the ECU actuates AUTO CANCEL of the cruise control and blinks the CRUISE main indicator light. During constant speed control, the master warning light blinks. During vehicle-to-vehicle distance control, the master warning light comes on. This indicator light informs the driver of the malfunction. At the same time, the malfunction is stored as a diagnostic trouble code.

DTC CHECK / CLEAR

1. CHECK DTC

- Connect the intelligent tester to the DLC3.
- Turn the ignition switch on (IG).
- Read the DTCs by following the prompts on the tester screen.

2. CLEAR DTC

- Connect the intelligent tester to the DLC3.
- Turn the ignition switch on (IG).

- (c) Clear the DTCs following the prompts on the tester screen.

HINT:

Refer to the intelligent tester operator's manual for further details.

FAIL-SAFE CHART

1. AUTO CANCEL FUNCTION (FAIL-SAFE FUNCTION)

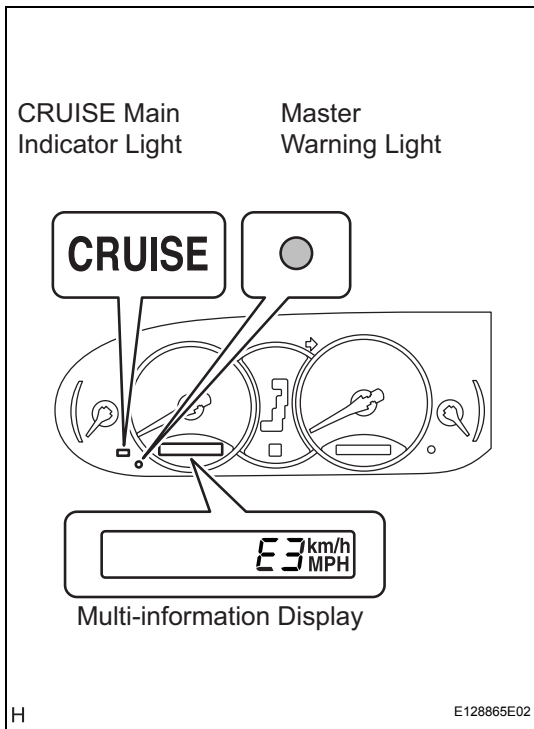
HINT:

If a system malfunction occurs, the applicable DTCs will appear on the multi-information display.

- (a) The CRUISE main indicator light keeps blinking until the main switch is turned off, the master warning light comes on with a popping sound, and the display shows "E3". The cruise control operation is suspended until turning the main switch ON again. The auto cancel function deletes the stored vehicle speed and cancels the cruise control operation in the following conditions.

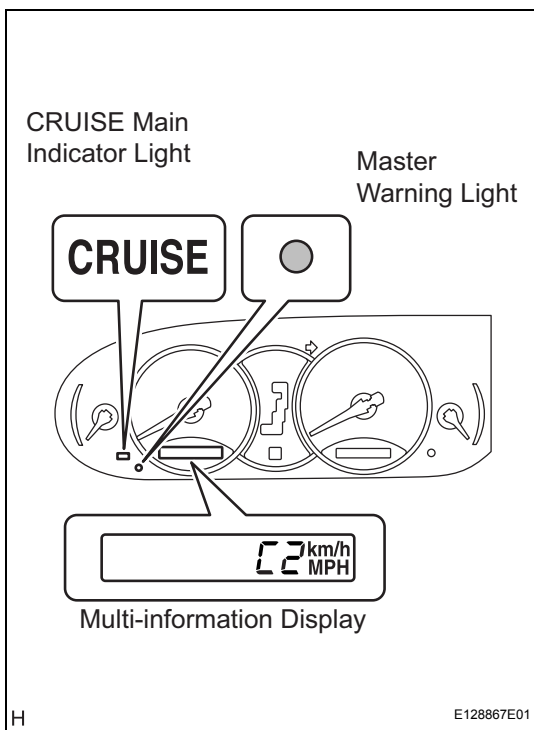
- (1) When the vehicle speed signal malfunctions.
- (2) When the electronic throttle parts malfunction.
- (3) When the stop light switch has an open or short circuit.
- (4) When the laser radar sensor malfunctions. (*1)
- (5) When the light axis of the laser radar sensor is off position. (*1)

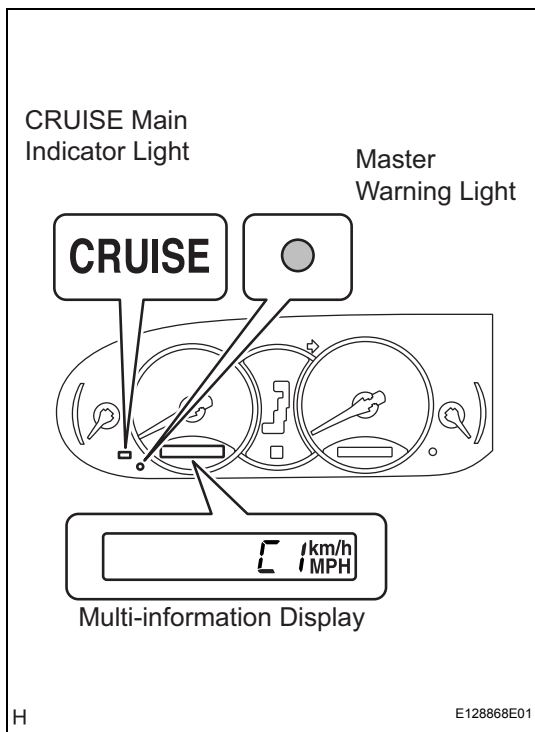
*1: Only in the vehicle-to-vehicle distance control mode.



- (b) The CRUISE main indicator light blinks, the master warning light comes on with a popping sound, and the display shows "C2". The cruise control operation is suspended until the canceling condition is resolved (in the vehicle-to-vehicle distance control mode only). The auto cancel function cancels the cruise control operation in the following conditions.

- (1) When the wipers (Hi, Lo) operate (including the auto wiper).
- (2) When the laser radar sensor receives strong light, such as sunlight, from the front side.
- (3) When the vehicle-to-vehicle distance measurement is extremely unstable because of bad weather.





(c) The auto cancel function cancels the cruise control operation in the following condition. At this time, the CRUISE main indicator light blinks, the master warning light comes on with a popping sound and the display shows "C1". The cruise control operation is suspended until the canceling condition is resolved (in the vehicle-to-vehicle distance control mode only).

(1) When the laser radar sensor has dirt on it.

HINT:

While the dynamic laser cruise control is operated, the ECM outputs a malfunction code for 0.15 sec. or more when it detects dirt.

CC

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the intelligent tester's DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.

- Connect the intelligent tester to the DLC3.
- Turn the ignition switch on (IG).
- Read the DATA LIST according to the display on the tester.



CC (ECM):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
ACCEL REQUEST	Accelerator request signal / min.: -2621.44 k/h/s, max.: 2621.36 k/h/s	No vehicle in front	-
VEHICLE DISTANCE	Laser radar sensor / min.: 0 m (0 ft), max.: 255 m (836.65 ft)	Distance to the vehicle in front	-
L/C OPTION FLAG	Laser cruise option flag / NO, YES	YES: Vehicle-to-vehicle distance mode	-
DISTANCE TIME	Car distance time setting condition /SHRT, MID, LONG, NO	The vehicle selected by distance control switch	-
O/D CUT RQST	O/D cut request / NOT REQ, REQUEST	NOT REQ: Idling	-
3RD SHIFT DOWN	Shift down request to 3rd gear / NOT REQ, REQUEST	NOT REQ: Idling	-
4TH SHIFT DOWN	Shift down request to 4th gear / NOT REQ, REQUEST	NOT REQ: Idling	-
ALARM RQST	Alarm request signal / NOT REQ, REQUEST	REQUEST: When beeping NOT REQ: When not beeping	-
THROTTLE CLOSE	All throttle close request / NOT REQ, REQUEST	ON : REQUEST OFF : NOT REQUEST	-
BRAKE CTRL RQST	Brake control request / NOT REQ, REQUEST	ON : REQUEST OFF : NOT REQUEST	-
TARG DECL SLOPE	Cruise target deceleration slope / 0.03, 0.06, 0.11, 0.16	0.03, 0.06, 0.11, 0.16	-
VEHICLE SPD	Vehicle speed sensor/ min.: 0 km/h (0 mph), max.: 255 km/h (158 mph)	Actual vehicle speed	-
MEMORY SPD	Cruise control memorized speed / min.: 0 km/h (0 mph), max.: 255 km/h (158 mph)	Memorized speed : Cruise control activated	-
RQST TORQUE	Cruise request torque/ min.: -1024 Nm, max.: 1016 Nm	-	-
CRUISE CONTROL	Cruise control system active condition / ON or OFF	ON: Cruise control activated OFF: Cruise control inactivated	-
MAIN SW (MAIN)	Main SW signal (Main CPU) / ON or OFF	ON : Main SW ON (Pushed on) OFF: Main SW OFF (Pushed off)	*3
CCS READY M	Cruise control system standby condition (Main CPU) / ON or OFF	ON ←→ OFF : Change ON/OFF each time Main SW is pushed.	*1
CCS INDICATOR M	Cruise indicator signal (Main CPU) / ON or OFF	ON : "CCS READY" ON OFF : "CCS READY" OFF	*2
CANCEL SW	CANCEL SW signal / ON or OFF	ON : SET/- SW ON OFF : SET/- SW OFF	-
SET/- SW	SET/- SW signal / ON or OFF	ON : SET/- SW ON OFF : SET/- SW OFF	-

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
RES/+ SW	RES/+ SW signal / ON or OFF	ON : RES/+ SW ON OFF : RES/+ OFF	-
STP LIGHT SW M	Stop light SW signal (Main CPU) / ON or OFF	ON : Brake pedal depressed OFF : Brake pedal released	-
SHIFT D POS	PNP SW signal (D position) / ON or OFF	ON : Shift position D OFF : Any shift position except D	-
VSC FAIL SAFE	VSC fail-safe flag/ ON or OFF	-	-

HINT:

*3 is OK, but *1 is NG → ECM failure

*1 is OK, but *2 is NG → DTC output or ECM failure

*3 is OK, but CRUISE main indicator light does not come on → Indicator, wire harness, or ECM failure



2. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the intelligent tester allows components such as the relay, VSV, and actuator to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one way to shorten labor time.

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

- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the ignition switch on (IG).
- (c) According to the display on the tester, perform the "ACTIVE TEST".

HINT:

The ignition switch must be turned on (IG) to proceed to the ACTIVE TEST using the intelligent tester.

COMBINATION METER:

Item	Vehicle Condition / Test Details	Diagnostic Note
CRUISE INDIC	"CRUISE" indicator is ON / OFF	-
L-CRUISE DISP	Graphic area is ON / OFF	-
L-CRS CHECK IND	"CHECK CRUISE SYSTEM" indicator is ON / OFF	-
L-CRS READY IND	"RADAR READY" indicator is ON / OFF	-

DIAGNOSTIC TROUBLE CODE CHART

HINT:

If a trouble code is displayed during the DTC check, check the circuit listed for that code. For details of each code, refer to the "See page" in the DTC chart.

DYNAMIC LASER CRUISE CONTROL SYSTEM

DTC No.	Detection Item	Trouble Area	See page
P0500	Vehicle Speed Sensor Malfunction	- Combination meter - Vehicle speed sensor - Vehicle speed sensor signal circuit - ECM	CC-65
P0571	Brake Switch "A" Circuit	- Stop light switch assembly - Stop light switch signal assembly circuit - ECM	CC-66
P0571	Stop Light Switch Circuit Malfunction	- BRK relay - BRK relay circuit - ABS & traction actuator assembly (Skid control ECU) - Communication circuit - Cruise control ECU (Distance control ECU) - ECM	CC-69
P0607	Control Module Performance	- ECM (This DTC indicates a malfunction in the ECM. When this DTC is output, it is necessary to replace the ECM.)	CC-73
P1570	Radar Sensor Malfunction	- Laser sensor	CC-74
P1572	Improper Aiming of Radar Sensor Beam Axis	- Laser sensor	CC-75
P1575	Warning Buzzer Malfunction	- Skid control buzzer assembly - Skid control buzzer circuit - ABS & traction actuator assembly (Skid control ECU)	CC-76
P1578	Brake System Malfunction	- VSC system	CC-77
P1615	Communication Error from Distance Control ECU to ECM	- Communication circuit - Cruise control ECU (Distance control ECU) - ECM	CC-78
P1616	Communication Error from ECM to Distance Control ECU	- Communication circuit - Cruise control ECU (Distance control ECU) - ECM	CC-79
U0100	Lost Communication with ECM/PCM "A"	- Communication circuit - Cruise control ECU (Distance control ECU) - ECM	CC-79
P0503	Vehicle Speed Sensor Circuit Malfunction	- Combination meter - Vehicle speed sensor - Vehicle speed sensor signal circuit - ECM	CC-65
P1617	Distance Control ECU Malfunction	- Cruise control ECU (Distance control ECU)	CC-80
P1630	Communication Error from VSC to ECM	- Communication circuit - ABS & traction actuator assembly (Skid control ECU) - ECM	CC-81

DTC No.	Detection Item	Trouble Area	See page
P1631	Communication Error from ECM to VSC	- Communication circuit - ABS & traction actuator assembly (Skid control ECU) - ECM	CC-82
U0100	Lost Communication with ECM/PCM "A"	- Communication circuit - ABS & traction actuator assembly (Skid control ECU) - ECM	CC-82
U0122	Lost Communication with Vehicle Dynamics Control Module	- Communication circuit - ABS & traction actuator assembly (Skid control ECU) - ECM	CC-81
U0123	Communication Error of Yaw Rate Sensor	- Communication circuit - Yaw rate sensor - Cruise control ECU (Distance control ECU) - ECM	CC-83
U0126	Lost Communication with Steering Angle Sensor Module	- Communication circuit - Steering sensor - Cruise control ECU (Distance control ECU) - ECM	CC-84
U0235	Lost Communication with Cruise Control Front Distance Range Sensor	- Communication circuit - Laser sensor - Cruise control ECU (Distance control ECU)	CC-85
U1101	Lost Communication with Distance Control ECU	- Communication circuit - Cruise control ECU (Distance control ECU) - ECM	CC-78
U1102	Lost Communication with Radar Sensor	- Communication circuit - Laser sensor - Cruise control ECU (Distance control ECU)	CC-88

CC

HINT:

*1: DTC 52 is output during DTC check using a SST check wire.

*2: DTC 76 is output during DTC check using a SST check wire.

*3: When DTC P1578 is output, check for DTCs on the skid control ECU in the diagnosis mode. Only when any code is output, inspect the trouble area based on the DTC.

DTC	P0500	Vehicle Speed Sensor Malfunction
DTC	P0503	Vehicle Speed Sensor Circuit Malfunction

DESCRIPTIONSee page [ES-262](#).

DTC No.	DTC Detection Condition	Trouble Area
P0500	This trouble code is output when the vehicle speed signal from the vehicle speed sensor is cut for 0.14 sec. or more while the cruise control is in operation.	<ul style="list-style-type: none"> • Combination meter • Vehicle speed sensor • Vehicle speed sensor signal circuit • ECM
P0503	Momentary interruption and noise are detected when a rapid change of vehicle speed occurs while the cruise control is in operation.	<ul style="list-style-type: none"> • Combination meter • Vehicle speed sensor • Vehicle speed sensor signal circuit • ECM

WIRING DIAGRAMSee page [ES-262](#).**INSPECTION PROCEDURE**See page [ES-262](#).

CC

DTC	P0571	Brake Switch "A" Circuit
------------	--------------	---------------------------------

DESCRIPTION

When the brake pedal is depressed, the stop light switch assembly sends a signal to the ECM. When the ECM receives this signal, it cancels the cruise control.

The fail-safe function operates to enable normal driving even if there is a malfunction in the stop light signal circuit.

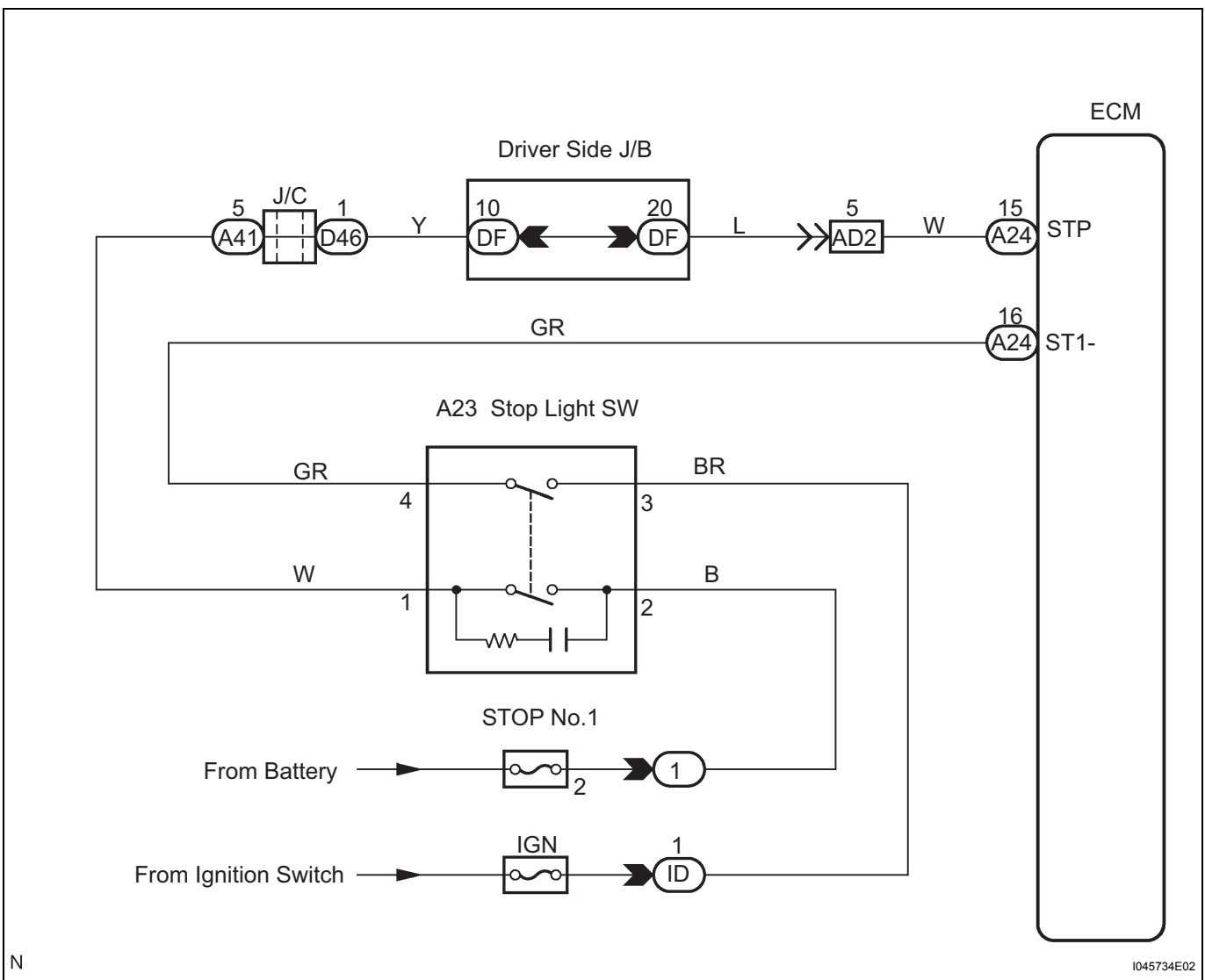
The cancel condition occurs when positive battery voltage is applied to terminal STP.

When the brake is applied, battery positive voltage is normally applied to terminal STP of the ECM through the STOP fuse and the stop light switch assembly, and the ECM turns the cruise control off.

DTC No.	DTC Detection Condition	Trouble Area
P0571	The malfunction code is output when the voltage of STP terminal and that of ST1- terminal on the ECM are less than 1 V for 0.5 sec. or more.	<ul style="list-style-type: none"> • Stop light switch assembly • Stop light switch assembly circuit • ECM

CC

WIRING DIAGRAM



N

I045734E02

INSPECTION PROCEDURE

1 READ VALUE OF INTELLIGENT TESTER

- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the ignition switch on, and turn the intelligent tester main switch on.
- (c) Check the DATA LIST for proper functioning of the stop light switch.

CC (ECM):

CC

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
STP LIGHT SW M	Stop light switch signal (Main CPU) / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-

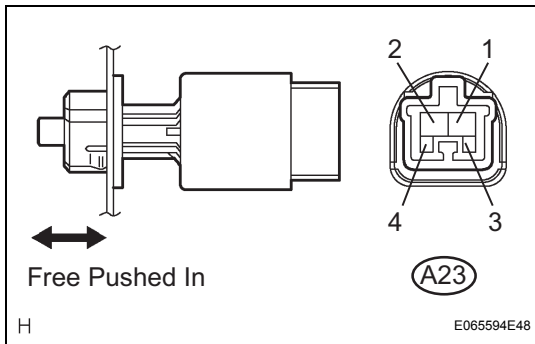
OK:

When brake pedal operation is performed, the result will be same as above.

OK → **REPLACE ECM**

NG

2 INSPECT STOP LIGHT SWITCH



- (a) Disconnect the stop light switch assembly connector.
- (b) Measure the resistance according to the values in the table below.

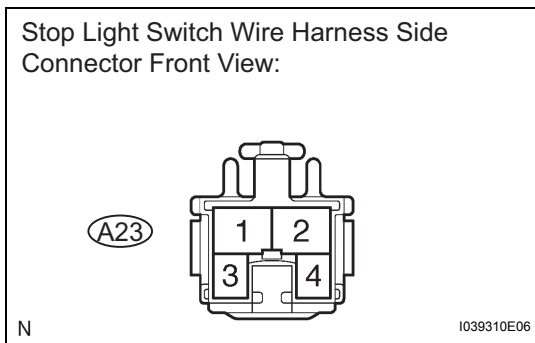
Standard resistance

Switch Condition	Tester Connection	Specified Condition
Switch pin free	1 - 2	Below 1 Ω
Switch pin free	3 - 4	10 kΩ or higher
Switch pin pushed	1 - 2	10 kΩ or higher
Switch pin pushed	3 - 4	Below 1 Ω

NG → **REPLACE STOP LIGHT SWITCH**

OK

3 CHECK WIRE HARNESS (STOP LIGHT SWITCH - BATTERY)



- (a) Measure the voltage according to the value(s) in the table below.

Standard voltage

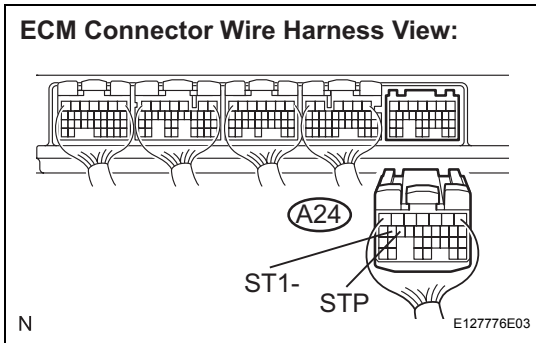
Tester Connection	Condition	Specified Condition
A23-2 - Body ground	Always	10 to 14 V
A23-3 - Body ground	Engine switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

N

OK

4 CHECK HYBRID VEHICLE CONTROL ECU



- (a) Reconnect the stop light switch connector.
- (b) Disconnect the A24 connector from the ECM.
- (c) Turn the ignition switch on (IG).
- (d) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Brake Pedal Condition	Specified Condition
A24-15 (STP) - Body ground	Depressed	10 to 14 V
A24-15 (STP) - Body ground	Released	Below 1 V
A24-16 (ST1-) - Body ground	Depressed	Below 1 V
A24-16 (ST1-) - Body ground	Released	10 to 14 V

CC

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LIGHT SWITCH - ECM)

OK

REPLACE ECM

DTC**P0571****Stop Light Switch Circuit Malfunction****DESCRIPTION**

The ECM receives the brake demand signal from the cruise control ECU (distance control ECU) and transmits it to the skid control ECU.

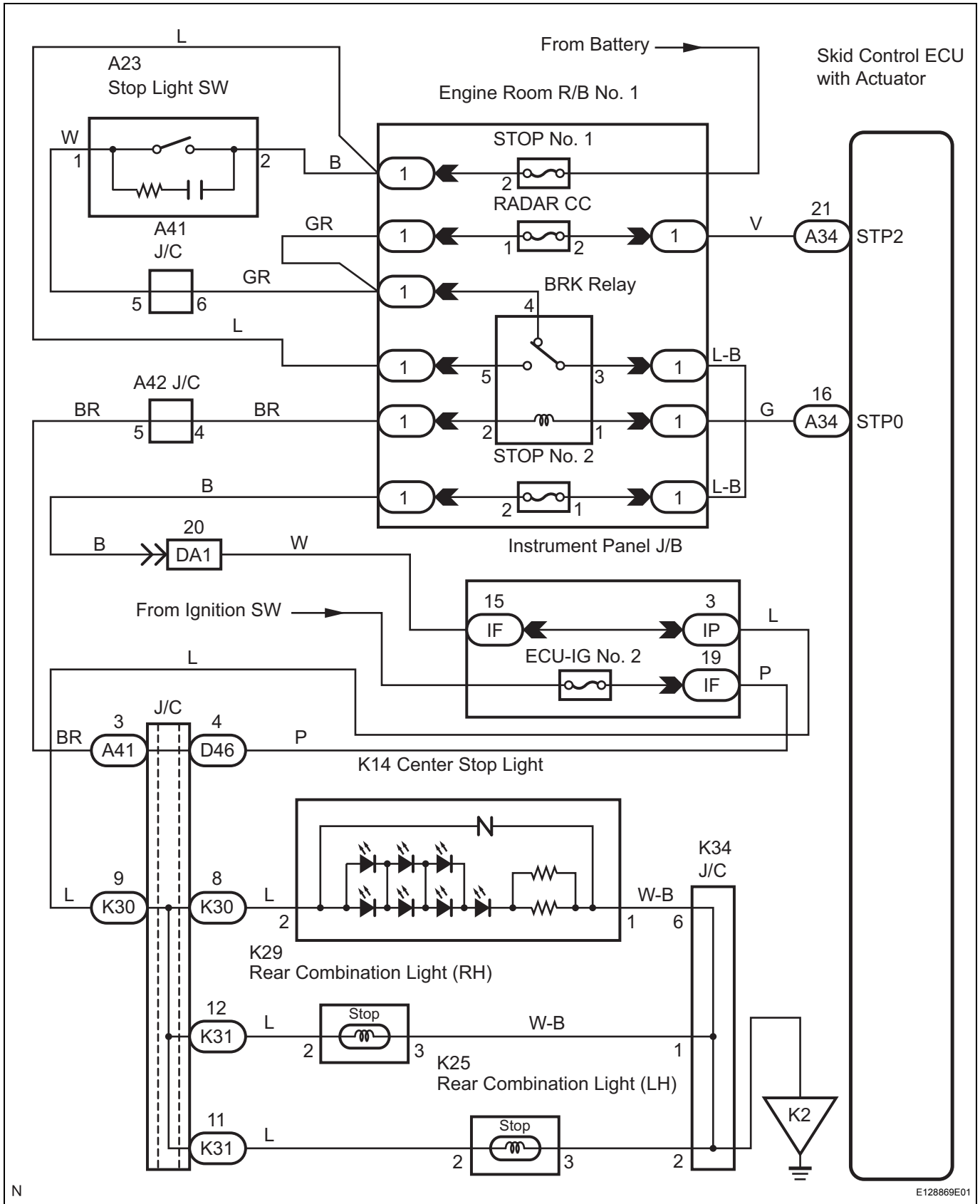
The skid control ECU receives a signal from the ECM and operates the brake actuator.

The skid control ECU operates the brake actuator and illuminates the stop light by operating the BRK relay at the same time.

DTC No.	DTC Detection Condition	Trouble Area
P0571	This trouble code is output when the ECM detects the BRK relay error signal from the ABS & traction actuator assembly (skid control ECU) for 0.2 sec. or more while the dynamic cruise control is in operation.	<ul style="list-style-type: none"> • BRK relay • BRK relay circuit • ABS & traction actuator assembly (Skid control ECU) • Distance control ECU • ECM

CC

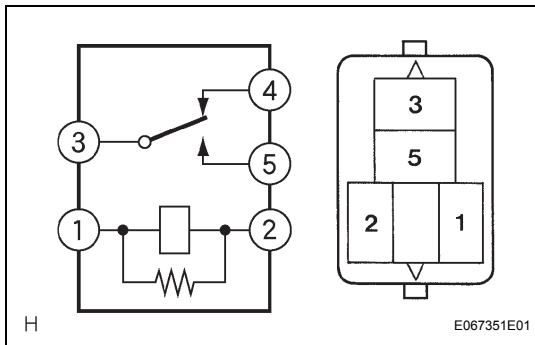
WIRING DIAGRAM



CC

INSPECTION PROCEDURE

1 CHECK BRK RELAY



- (a) Remove the BRK relay from the engine room R/B No.1.
- (b) Check operation of the BRK relay.

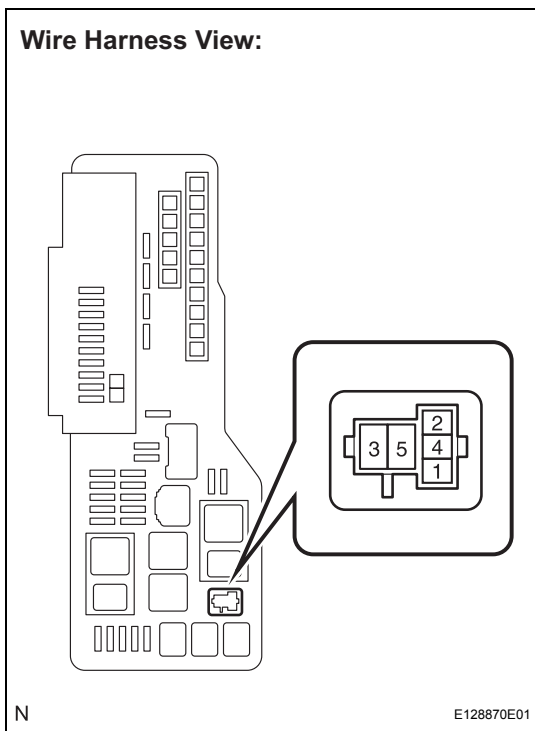
Standard resistance

Terminal No.	Condition	Specified value
3 - 5	Always	10 kΩ or higher
3 - 5	When battery voltage is applied to terminal 1 and 2.	Below 1 Ω

OK

NG → **REPLACE BRK RELAY**

2 CHECK WIRE HARNESS AND CONNECTOR (BRK RELAY - BATTERY)



- (a) Disconnect the connector from the engine room R/B No. 1.
- (b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Terminal No.	Condition	Specification
5 - Body ground	Ignition switch on (IG)	10 to 14 V
5 - Body ground	Ignition switch off	Below 1 V
2 - Body ground	Ignition switch on (IG)	10 to 14 V
2 - Body ground	Ignition switch off	Below 1 V

OK

NG → **CHECK FOR SHORT IN ALL HARNESS AND COMPONENTS CONNECTED FAILURE RELAY (BRK RELAY)**

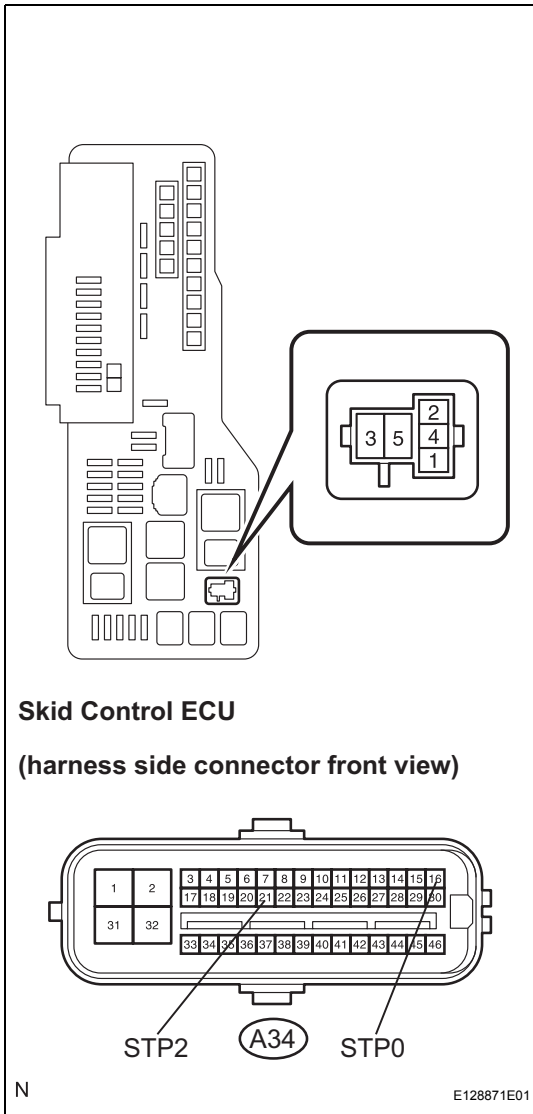
CC

3 CHECK WIRE HARNESS AND CONNECTOR (BRK RELAY - SKID CONTROL ECU)

- (a) Disconnect the connector from the skid control ECU.
- (b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminal No.	Condition	Specification
1 - A34-16 (STP0)	Always	Below 1 Ω
A34-16 (STP0) - Body ground	Always	10 kΩ or higher
4 - A34-21 (STP2)	Always	Below 1 Ω
A34-21 (STP2) - Body ground	Always	10 kΩ or higher



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE SKID CONTROL ECU

CC

DTC**P0607****Control Module Performance****DESCRIPTION**

This DTC indicates a malfunction in the ECM.

HINT:

The hybrid vehicle control ECU receives signals from each sensor to control all the functions of the cruise control with the microcomputer. When a malfunction is detected, fail-safe remains on until the ignition switch is turned off.

DTC No.	DTC Detection Condition	Trouble Area
P0607	<p>The ECM has a supervisory CPU and a control ECU inside. When each input STP signal is different for 0.15 sec. or more, this trouble code is output.</p> <p>This trouble code is output after 0.4 sec. has passed from the time the cruise cancel input signal (STP input) is input into the ECM.</p>	<ul style="list-style-type: none"> • ECM

INSPECTION PROCEDURE

1	REPLACE ECM
---	-------------

DTC	P1570	Radar Sensor Malfunction
------------	--------------	---------------------------------

DESCRIPTION

The laser sensor emits laser beams towards an object in front and measures the distance and direction of the object by receiving the beam reflections. Based on the reflections, the sensor calculates the difference in speed between your own vehicle and an object in front. This data is transmitted to the cruise control ECU (distance control ECU).

DTC No.	DTC Detection Condition	Trouble Area
P1570	The ECM outputs this trouble code when it detects the communication error signal (from the cruise control ECU (distance control ECU) to the laser sensor) for 0.15 sec. or more while the dynamic laser cruise control is in operation.	<ul style="list-style-type: none"> • Laser sensor

CC

HINT:

The laser sensor monitors the laser emission and reception by itself. This DTC is detected when it cannot monitor.

When rain drops or snowflakes strike the laser sensor face, the distance between the vehicle in front and your own vehicle cannot be measured correctly.

The dynamic laser cruise control system functions by detecting the reflector of the vehicle directly in front. In the following cases, the system may not be able to detect the vehicle in front and may not properly maintain the correct vehicle-to-vehicle distance.

- The vehicle in front is a tall trailer.
- The back of the vehicle in front is extremely dirty.
- Emission from the vehicle in front or from other lanes are heavy.
- The vehicle in front has no reflector.
- The laser sensor is receiving a strong flash of light (sunlight, etc.).

INSPECTION PROCEDURE

1	ADJUST LASER SENSOR
----------	----------------------------

HINT:

It is necessary to make the ECM recognize spec information (whether the vehicle is equipped with the dynamic laser or not). When this procedure has not been carried out, this DTC may be output.

- (a) Clear the DTC and then recheck for DTCs.

OK:

DTC is not output.

HINT:

If DTC P1570 is still output after performing the above procedures, replace the laser sensor.

NG

REPLACE LASER SENSOR

OK

SYSTEM OK

DTC	P1572	Improper Aiming of Radar Sensor Beam Axis
------------	--------------	--

DESCRIPTION

This DTC is output when the scanning angle of the laser sensor is incorrect.
 This DTC is also output when the laser sensor optical axis is in an incorrect position is detected.

DTC No.	DTC Detection Condition	Trouble Area
P1572	The ECM outputs this trouble code when the ECU detects that the laser sensor optical axis is in an incorrect position (0.15 sec. or more) while dynamic laser cruise control is in operation.	<ul style="list-style-type: none"> • Laser sensor



HINT:

If the optical axis deviates to the upper/lower side +/- 2° or more and/or the right/left side +/- 4° or more, this DTC is detected.

INSPECTION PROCEDURE

1	ADJUST LASER SENSOR
----------	----------------------------

1	ADJUST LASER SENSOR
----------	----------------------------

HINT:
 See page [CC-121](#)

NEXT

END

DTC**P1575****Warning Buzzer Malfunction****DESCRIPTION**

The Skid control ECU receives the alarm demand signal from the ECU and operates the skid control buzzer. The buzzer sounds to warn that the distance between the vehicle in front and your own vehicle is shortening.

DTC No.	DTC Detection Condition	Trouble Area
P1575	This trouble code is output when the ECM receives the buzzer abnormal signal for 0.2 sec. or more while the dynamic laser cruise control is in operation.	<ul style="list-style-type: none"> • Skid control buzzer assembly • Skid control buzzer circuit • ABS & traction actuator assembly (Skid control ECU)

HINT:

If the vehicle ahead in the same lane significantly decreases its speed or another vehicle moves in front of your own vehicle, adequate deceleration cannot be applied and the vehicle-to-vehicle distance will shorten. At this time, the system sounds the buzzer and the master warning light blinks to inform the driver. This circuit uses CAN communication. Therefore, if there are any malfunctions in the communication circuit, one or more DTCs in the CAN communication system are output.

WIRING DIAGRAM

Refer to the skid control buzzer circuit (See page [BC-229](#)).

INSPECTION PROCEDURE

Refer to the skid control buzzer circuit (See page [BC-229](#)).

DTC**P1578****Brake System Malfunction****DESCRIPTION**

This DTC is output when the VSC system has a problem. Check the VSC system when this DTC is output.

DTC No.	DTC Detection Condition	Trouble Area
P1578	This trouble code is output when the ECM receives the brake system error signal for 0.2 sec. or more while the dynamic laser cruise control is in operation.	<ul style="list-style-type: none"> • VSC system

CC**INSPECTION PROCEDURE**

HINT:

This circuit uses CAN communication. Therefore, if there are any malfunctions in the communication circuit, one or more DTCs in the CAN communication system are output.

1**CHECK BRAKE SYSTEM**

DTC	P1615	Communication Error from Distance Control ECU to ECM
DTC	U1101	Lost Communication with Distance Control ECU

DESCRIPTION

The distance control ECU receives information about the area in front of the vehicle from the laser sensor and then sends a brake control demand signal (deceleration demand) and diagnosis signals, such as laser sensor grime or laser sensor malfunction, to the ECM.

CC

DTC No.	DTC Detection Condition	Trouble Area
P1615	While the dynamic laser cruise control is either preparing for operation or operating, if communication data from the distance control ECU is inconsistent logically for a certain amount of time or more, the ECM records the logical error code.	<ul style="list-style-type: none"> • Communication circuit • Distance control ECU (Cruise control ECU) • ECM
U1101	While the dynamic laser cruise control is either preparing for operation or operating, if communication data from the distance control ECU is invalid for a certain amount of time or more, the ECM records the communication cut off code.	<ul style="list-style-type: none"> • Communication circuit • Distance control ECU (Cruise control ECU) • ECM

INSPECTION PROCEDURE

HINT:

This circuit uses CAN communication. Therefore, one or more DTCs in the CAN communication system are output if there are any malfunctions in the communication circuit.

1	GO TO CAN COMMUNICATION SYSTEM
----------	---------------------------------------

DTC	P1616	Communication Error from ECM to Distance Control ECU
------------	--------------	---

DTC	U0100	Lost Communication with ECM/PCM "A"
------------	--------------	--

DESCRIPTION

The ECM receives signals from each sensor and ECU, then sends signals such as the A/T signal, cruise control operation signal, low speed operation signal, brake control operation signal and laser light emission prohibiting signal, etc. to the distance control ECU.

The ECM is the only component that has a function to record and output the DTCs in the dynamic laser cruise control system. Therefore if the distance control ECU detects a communication error from the ECM, it sends the malfunction signal back to the ECM.

DTC No.	DTC Detection Condition	Trouble Area
P1616	While the dynamic laser cruise control is either preparing for operation or operating, if the ECM continuously receives the logical error signal from the distance control ECU for a certain amount of time, the ECM records the logical error code.	<ul style="list-style-type: none"> • Communication circuit • ECM • Distance control ECU (Cruise control ECU)
U0100	While the dynamic laser cruise control is either preparing for operation or operating, if the ECM continuously receives a communication cut off signal from the distance control ECU for a certain amount of time, the ECM records the communication cut off code.	<ul style="list-style-type: none"> • Communication circuit • ECM • Distance control ECU (Cruise control ECU)

INSPECTION PROCEDURE

HINT:

This circuit uses CAN communication. Therefore, if there are any malfunction in the communication circuit, one or more DTCs in the CAN communication system are output.

1	GO TO CAN COMMUNICATION SYSTEM
----------	---------------------------------------

DTC

P1617

Distance Control ECU Malfunction

DESCRIPTION

In the dynamic laser cruise control system, the ECM and the distance control ECU communicate with one another to control the system based on some designation information. If the designation information of the ECM and distance control ECU is different from each other, this DTC is recorded.

DTC No.	DTC Detection Condition	Trouble Area
P1617	While the dynamic laser cruise control is either preparing for operation or operating, if the designation signal from the ECM and the designation return signal from the distance control ECU do not match one another for a certain amount of time or more, the ECM records this trouble code.	<ul style="list-style-type: none"> Cruise control ECU (Distance control ECU)

CC

INSPECTION PROCEDURE

1

CONFIRM THE DESIGNATION INFORMATION

(a) If this DTC is output, confirm the designation information by following the procedures below.

- (1) Turn the ignition switch on (IG).
- (2) Push the ON-OFF button of the cruise main switch on.
- (3) With the brake pedal depressed, push the cruise control main switch to RES / ACC 3 times within 3 seconds. Check that the VSC buzzer sounds at this time.

NOTICE:

Do not turn the headlight dimmer switch on at this time because the optical axis automatic adjustment mode has already started, which could lead to incorrect optical axis. If the light control switch is turned on by mistake, readjust the optical axis (refer to See page CC-121 for optical axis adjustment).

- (4) Clear the DTC and then recheck for DTCs.

OK:

DTC is not output.

HINT:

If DTC P1617 is still output after performing the above procedures, replace the distance control ECU.

- If the DTC P1617 is still output after replacing the distance control ECU, replace the ECM.

NG

REPLACE CRUISE CONTROL ECU

OK

SYSTEM OK

DTC	P1630	Communication Error from VSC to ECM
DTC	U0122	Lost Communication with Vehicle Dynamics Control Module

DESCRIPTION

The skid control ECU sends signals such as cruise control cancel demand signal, brake operation demand response signal from the ECM, etc. to the ECM when the dynamic laser cruise control system is in operation.

CC

DTC No.	DTC Detection Condition	Trouble Area
P1630	While the dynamic laser cruise control is either preparing for operation or operating, if the communication data from the skid control ECU is inconsistent logically for a certain amount of time or more, the ECM records the logical error code.	<ul style="list-style-type: none"> • Communication circuit • ABS & traction actuator assembly (Skid control ECU) • ECM
U0122	While the dynamic laser cruise control is either preparing for operation or operating, if the communication data from the skid control ECU is invalid for a certain amount of time or more, the ECM records the communication cut off code.	<ul style="list-style-type: none"> • Communication circuit • ABS & traction actuator assembly (Skid control ECU) • ECM

INSPECTION PROCEDURE

HINT:

This circuit uses CAN for communication. Therefore, if there are any malfunctions in the communication circuit, one or more DTCs in the CAN communication system is / are output.

1	GO TO CAN COMMUNICATION SYSTEM
----------	---------------------------------------

DTC	P1631	Communication Error from ECM to VSC
DTC	U0100	Lost Communication with ECM/PCM "A"

DESCRIPTION

The ECM sends signals such as A/T information signal, dynamic laser cruise control operation signal, brake operation demand signal, buzzer operation demand signal and low speed mode signal, etc. to the skid control ECU when the dynamic laser cruise control is in operation.

The ECM is the only component that has a function to record and output the DTCs in the dynamic laser cruise control system. Therefore if the skid control ECU detects a communication error from the ECM, it sends the malfunction signal back to the ECM.

DTC No.	DTC Detection Condition	Trouble Area
P1631	While the dynamic laser cruise control is either preparing for operation or operating, if the ECM continuously receives the logical error signal from the skid control ECU for a certain amount of time, the ECM records the logical error code.	<ul style="list-style-type: none"> • Communication circuit • ECM • ABS & traction actuator assembly (Skid control ECU)
U0100	While the dynamic laser cruise control is either preparing for operation or operating, if the ECM continuously receives a communication cut off signal from the skid control ECU for a certain amount of time, the ECM records the communication cut off code.	<ul style="list-style-type: none"> • Communication circuit • ECM • ABS & traction actuator assembly (Skid control ECU)

INSPECTION PROCEDURE

HINT:

This circuit uses CAN for communication. Therefore, if there are any malfunctions in the communication circuit, one or more DTCs in the CAN communication system is / are output.

1	GO TO CAN COMMUNICATION SYSTEM
----------	---------------------------------------

DTC**U0123****Communication Error of Yaw Rate Sensor****DESCRIPTION**

This circuit detects the yaw rate of the vehicle and transmits its signal to the skid control ECU and distance control ECU.

DTC No.	DTC Detection Condition	Trouble Area
U0123	While the dynamic laser cruise control is either preparing for operation or operating, if the ECM continuously receives a yaw rate sensor malfunction signal for a certain amount of time, distance control ECU sends a signal to the ECM to record this trouble code.	<ul style="list-style-type: none"> • Communication circuit • Yaw rate sensor • Cruise control ECU (Distance control ECU) • ECM

CC**INSPECTION PROCEDURE**

HINT:

This circuit uses CAN for communication. Therefore, if there are any malfunctions in the communication circuit, one or more DTCs in the CAN communication system is / are output.

1**GO TO CAN COMMUNICATION SYSTEM**

DTC	U0126	Lost Communication with Steering Angle Sensor Module
------------	--------------	---

DESCRIPTION

This circuit detects the angle and direction of steering and automatically transmits its signal to the skid control ECU and distance control ECU.

DTC No.	DTC Detection Condition	Trouble Area
U0126	While the dynamic laser cruise control is either preparing for operation or operating, if the ECM continuously receives a steering sensor communication error signal for a certain amount of time, distance control ECU sends a signal to the ECM to record this trouble code.	<ul style="list-style-type: none"> • Communication circuit • Steering sensor • Cruise control ECU (Distance control ECU) • ECM

CC**INSPECTION PROCEDURE**

HINT:

This circuit uses CAN for communication. Therefore, if there are any malfunctions in the communication circuit, one or more DTCs in the CAN communication system is / are output.

1	GO TO CAN COMMUNICATION SYSTEM
----------	---------------------------------------

DTC	U0235	Lost Communication with Cruise Control Front Distance Range Sensor
------------	--------------	---

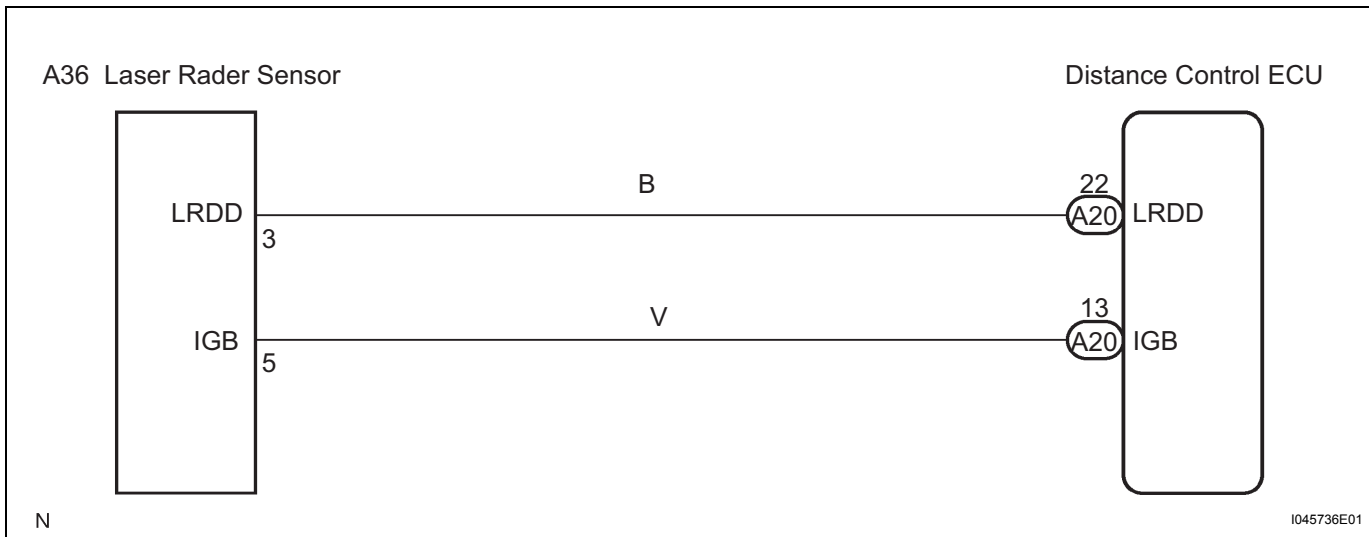
DESCRIPTION

The laser sensor and cruise control ECU (distance control ECU) transmit the data for general vehicle control and diagnosis function along the communication line.

The laser sensor transmits information about the vehicle in front to the cruise control ECU (distance control ECU).

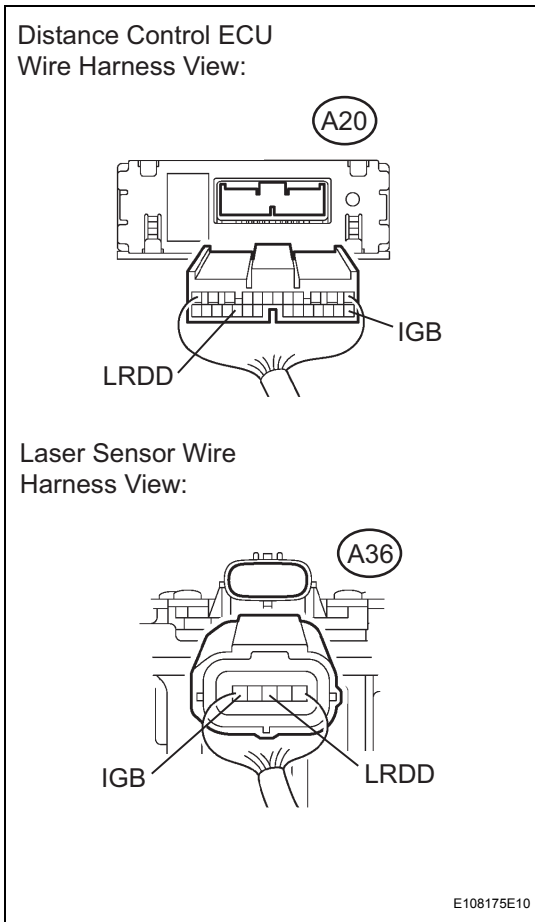
DTC No.	DTC Detection Condition	Trouble Area
U0235	This trouble code is output when the ECM detects the communication error signal (from the laser sensor to the cruise control ECU (distance control ECU)) for 0.15 sec. or more while the dynamic laser cruise control is in operation.	<ul style="list-style-type: none"> • Communication circuit • Laser sensor • Cruise control ECU (Distance control ECU)

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK WIRE HARNESS (DISTANCE CONTROL ECU - LASER RADAR SENSOR)



- (a) Disconnect the distance control ECU and millimeter wave radar sensor connectors.
- (b) Measure the resistance according to the value(s) in the table below.

Standard resistance

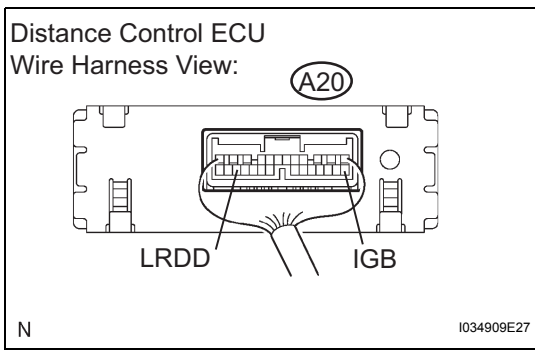
Tester Connection	Condition	Specified Condition
A20-22 (LRDD) - A36-3 (LRDD)	Always	Below 1 Ω
A20-13 (IGB) - A36-5 (IGB)	Always	Below 1 Ω
A20-22 (LRDD) - Body ground	Always	10 kΩ or higher
A20-13 (IGB) - Body ground	Always	10 kΩ or higher

CC

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

2 CHECK DISTANCE CONTROL ECU



- (a) Reconnect the distance control ECU (cruise control ECU) connector. Not reconnect the millimeter wave radar sensor connector.
- (b) Turn the ignition switch on (IG).
- (c) Measure the voltage according to the value(s) in the table below.

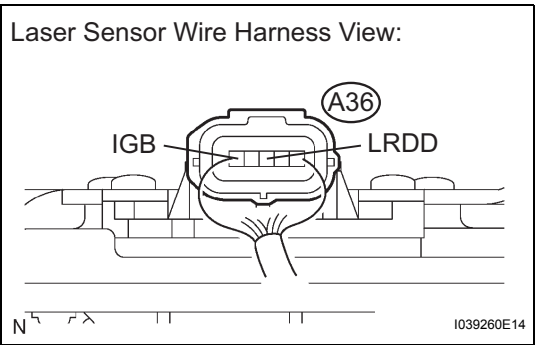
Standard voltage

Tester Connection	Condition	Specified Condition
A20-13 (IGB) - Body ground	Ignition switch on (IG)	10 to 16 V
A20-22 (LRDD) - Body ground	Ignition switch on (IG)	4.5 to 5.5 V

NG REPLACE DISTANCE CONTROL ECU

OK

3 CHECK LASER RADAR SENSOR

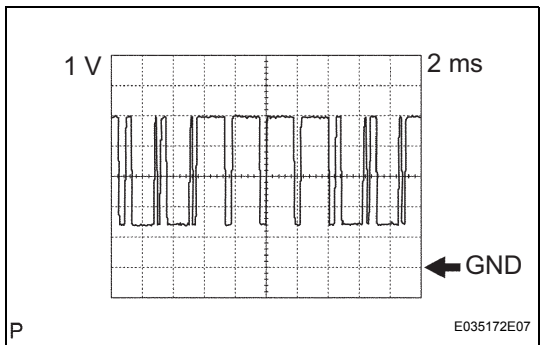


- (a) Reconnect the laser sensor connector.
- (b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
A36-5 (IGB) - Body ground	Ignition switch on (IG)	10 to 14 V

CC



- (c) Check the signal waveform between terminal LRDD (A36-3) of the laser sensor and body ground.

OK:

A waveform similar to that in the illustration on the left is output.

HINT:

- Gauge set: 2 V/DIV, 10 msec./DIV
- Condition: Ignition switch on

NG **REPLACE LASER RADAR SENSOR**

OK

CHECK FOR INTERMITTENT PROBLEMS

DTC	U1102	Lost Communication with Radar Sensor
------------	--------------	---

DESCRIPTION

The laser sensor and cruise control ECU (distance control ECU) transmit the data for general vehicle control and diagnosis function along the communication line.

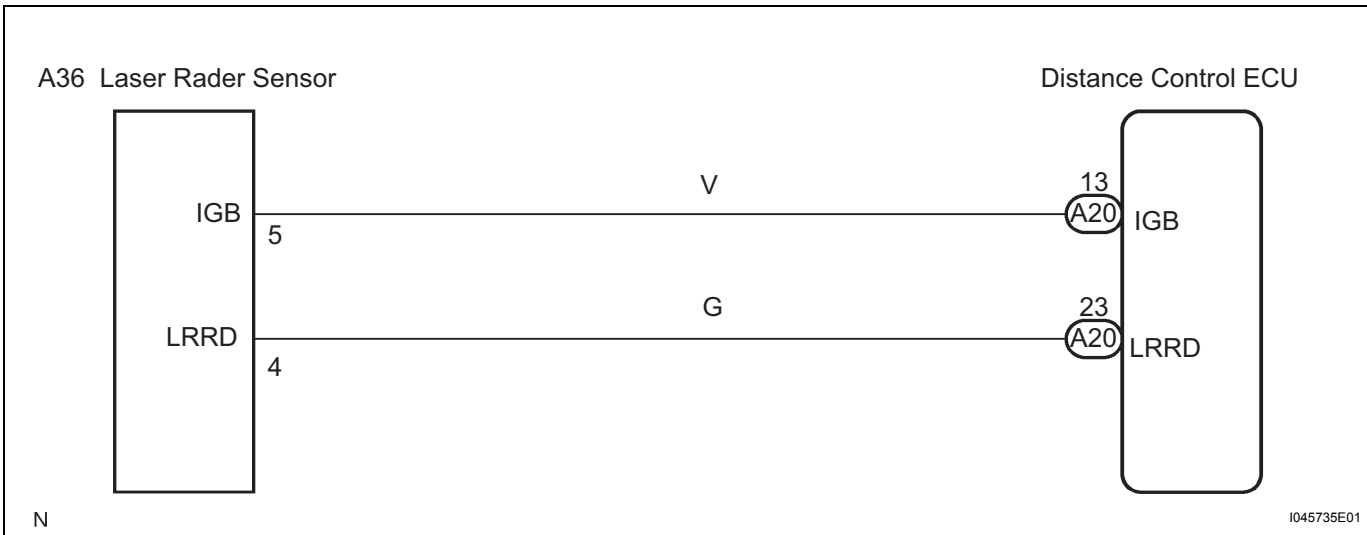
The cruise control ECU (distance control ECU) determines the presumed R information based on the signal from the steering wheel and yaw rate sensor.

The cruise control ECU (distance control ECU) transmits the current vehicle speed and presumed R information to the laser sensor.

DTC No.	DTC Detection Condition	Trouble Area
U1102	This trouble code is output when the ECM detects the communication error signal (from the cruise control ECU (distance control ECU) to the laser sensor) for 0.15 sec. or more while the dynamic laser cruise control is in operation.	<ul style="list-style-type: none"> • Communication circuit • Laser sensor • Cruise control ECU (Distance control ECU)

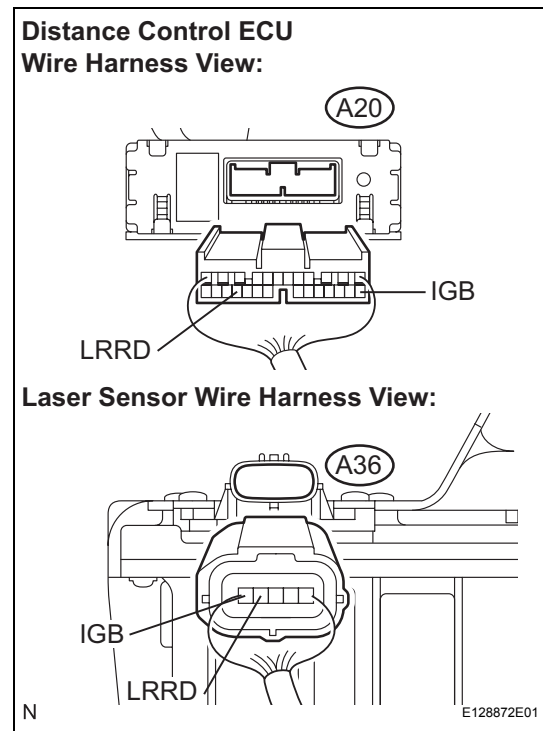
CC

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK WIRE HARNESS AND CONNECTOR (DISTANCE CONTROL ECU - LASER SENSOR)



- (a) Disconnect the distance control ECU and laser sensor connectors.
- (b) Measure the resistance according to the value(s) in the table below.

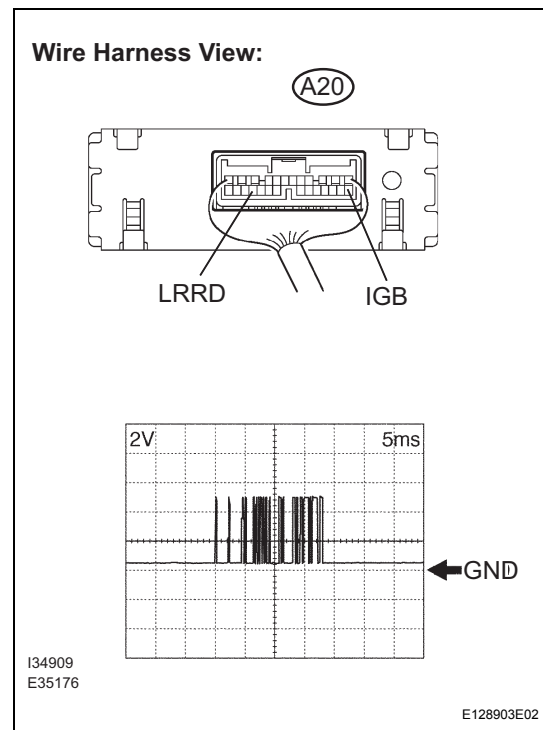
Standard resistance

Tester Connections	Condition	Specified value
A20-23 (LRRD) - A36-4 (LRRD)	Always	Below 1 Ω
A20-13 (IGB) - A36-5 (IGB)	Always	Below 1 Ω
A20-23 (LRRD) - Body ground	Always	10 kΩ or higher
A20-13 (IGB) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

NO

2 INSPECT CRUISE CONTROL ECU (DISTANCE CONTROL ECU)



- (a) Reconnect the cruise control ECU (distance control ECU) connector.
- (b) Turn the ignition switch on (IG).
- (c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connections	Condition	Specified value
A20-13 (IGB) - Body ground	Ignition SW ON (IG)	10 to 14 V

- (d) Check the signal waveform between terminal LRRD (A20-23) of the cruise control ECU (distance control ECU) and body ground.

OK:

A waveform similar to that in the illustration to the left is output.

HINT:

- Gauge set: 2 V/DIV, 5 ms/DIV
- Condition: Ignition switch on (IG)

NG → **REPLACE CRUISE CONTROL ECU**

NO

REPLACE LASER SENSOR

CC

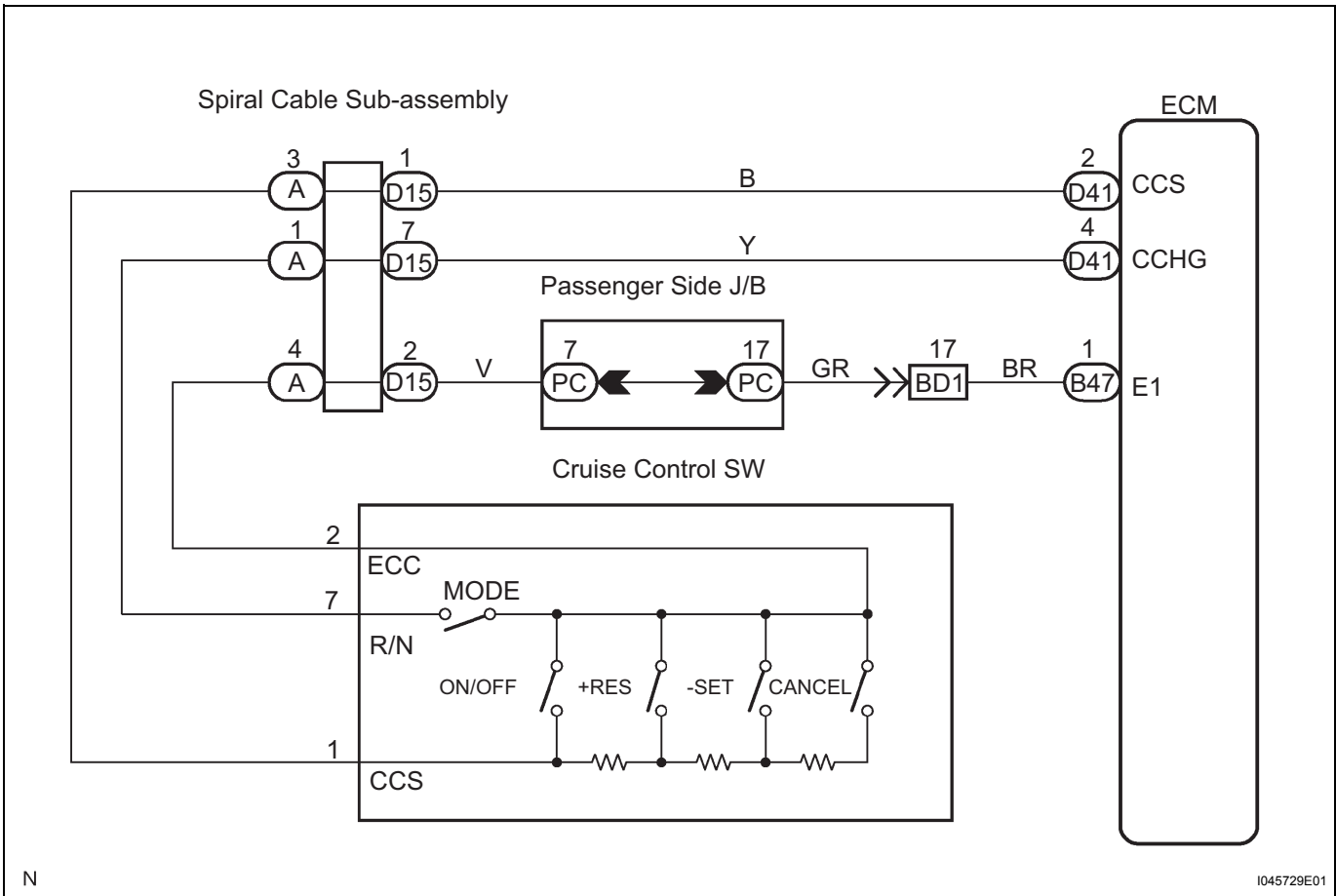
Cruise Control Switch Circuit

DESCRIPTION

The cruise control main switch operates 8 functions: SET, COAST, TAP-DOWN, RESUME, ACCEL, TAP-UP, CANCEL and MODE. The SET, TAP-DOWN and COAST functions, and the RESUME, TAP-UP and ACCEL functions are operated with the same switch. The cruise control main switch is an automatic return type switch which turns on only while operating it in each arrow direction and turns off after releasing it. The internal contact point of the cruise control main switch is turned on with the switch operation. The hybrid vehicle control ECU then reads the resistance value that has been changed by the switch operation to control MODE, SET, COAST, RESUME, ACCEL and CANCEL. The dynamic radar cruise control system has two cruise control modes: the constant speed control mode and vehicle-to-vehicle distance control mode.

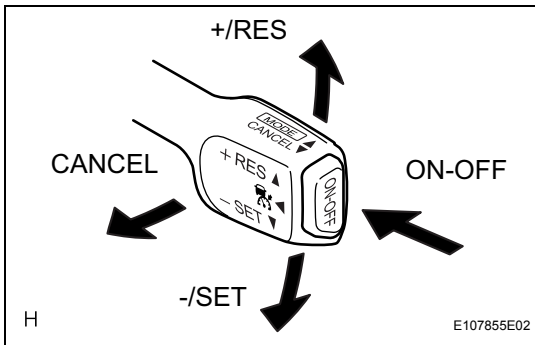
- The vehicle-to-vehicle distance control mode is always selected when starting up the dynamic radar cruise control system.
- The operation of the constant speed control mode is the same as that for a conventional cruise control system.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 READ VALUE OF INTELLIGENT TESTER



- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the ignition switch on (IG), and turn the intelligent tester main switch on.
- (c) Check the DATA LIST for proper functioning of the cruise control main switch.

CC

CC (ECM):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
MAIN SW (MAIN)	Main switch signal (Main CPU) / ON or OFF	ON: Main switch ON (Pushed on) OFF: Main switch OFF (Pushed off)	-
CANCEL SW	CANCEL switch signal / ON or OFF	ON: CANCEL switch ON OFF: CANCEL switch OFF	-
SET/COAST SW	-/SET switch signal / ON or OFF	ON: -/SET switch ON OFF: -/SET switch OFF	-
RES/ACC SW	+/RES switch signal / ON or OFF	ON: +/RES switch ON OFF: +/RES switch OFF	-

OK:

When cruise control main switch operation is performed, the result will be same as above.

Result:

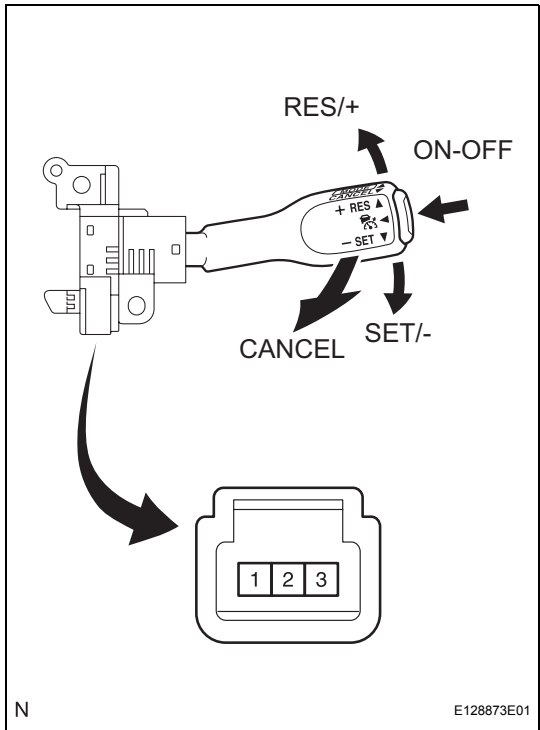
Result	Proceed to
OK	A
NG (all items are defective)	B
NG (one to four items are defective)	C

A → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **REPLACE CRUISE CONTROL MAIN SWITCH**

B

2 INSPECT CRUISE CONTROL MAIN SWITCH



- (a) Disconnect the cruise control main switch connector.
- (b) Measure the resistance according to the value(s) in the table below.

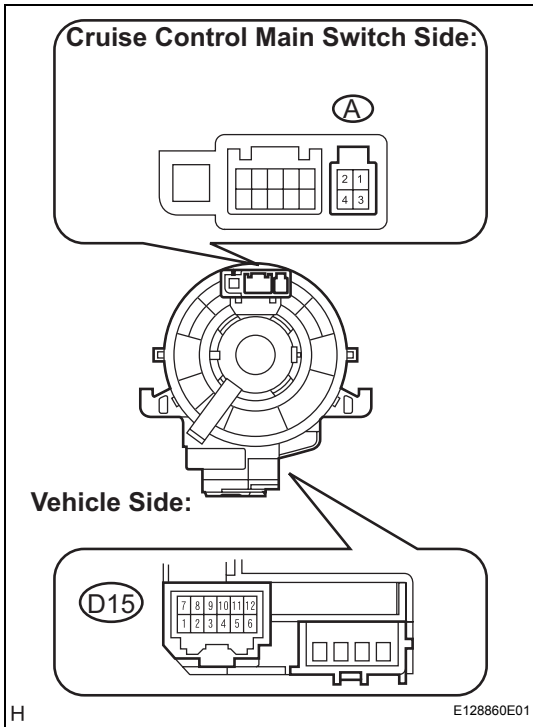
Standard resistance

Switch Condition	Tester Connection	Specified Condition
Neutral	1 - 3	10 kΩ or higher
RES/+	1 - 3	210 to 270 Ω
SET/-	1 - 3	560 to 700 Ω
CANCEL	1 - 3	1,380 to 1,700 Ω
Main Switch OFF	1 - 3	10 kΩ or higher
Main Switch OFF	1 - 3	Below 1 Ω

NG → **REPLACE CRUISE CONTROL MAIN SWITCH**

OK

3 INSPECT SPIRAL CABLE



- (a) Disconnect the spiral cable sub-assembly connector.
- (b) Measure the resistance according to the value(s) in the table below.

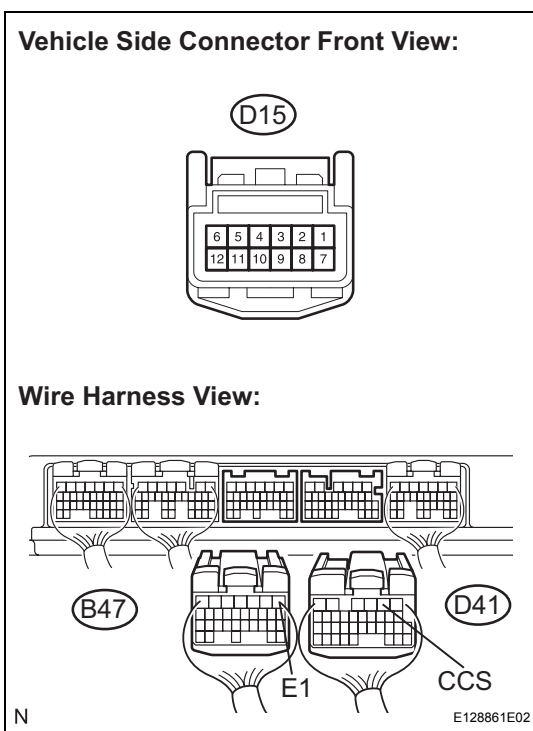
Standard resistance

Tester Condition	Specified Condition
A-1 - D15-7	Below 1 Ω
A-3 - D15-1	Below 1 Ω
A-4 - D15-2	Below 1 Ω

NG → **REPLACE SPIRAL CABLE**

OK

4 CHECK WIRE HARNESS (SPIRAL CABLE - ECM)



- (a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
Spiral cable (D15-1) - CCS (D41-2)	Always	Below 1 Ω
CCS (D41-2) - Body ground	Always	10 kΩ or higher
Spiral cable (D15-2) - E1 (B47-1)	Always	Below 1 Ω
Spiral cable (D15-7) - Body ground	Always	10 kΩ or higher
Spiral cable (D15-7) - CCHG (D41-4)	Always	Below 1 Ω
CCHG (D41-4) - Body ground	Always	10 kΩ or higher

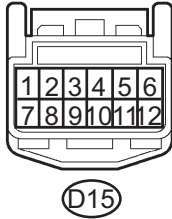
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

CC

5 CHECK WIRE HARNESS (SPIRAL CABLE - BODY GROUND)

Vehicle Side Connector Front View:



N

E107092E08

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
D15-2 - Body ground	Always	Below 1 Ω

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM

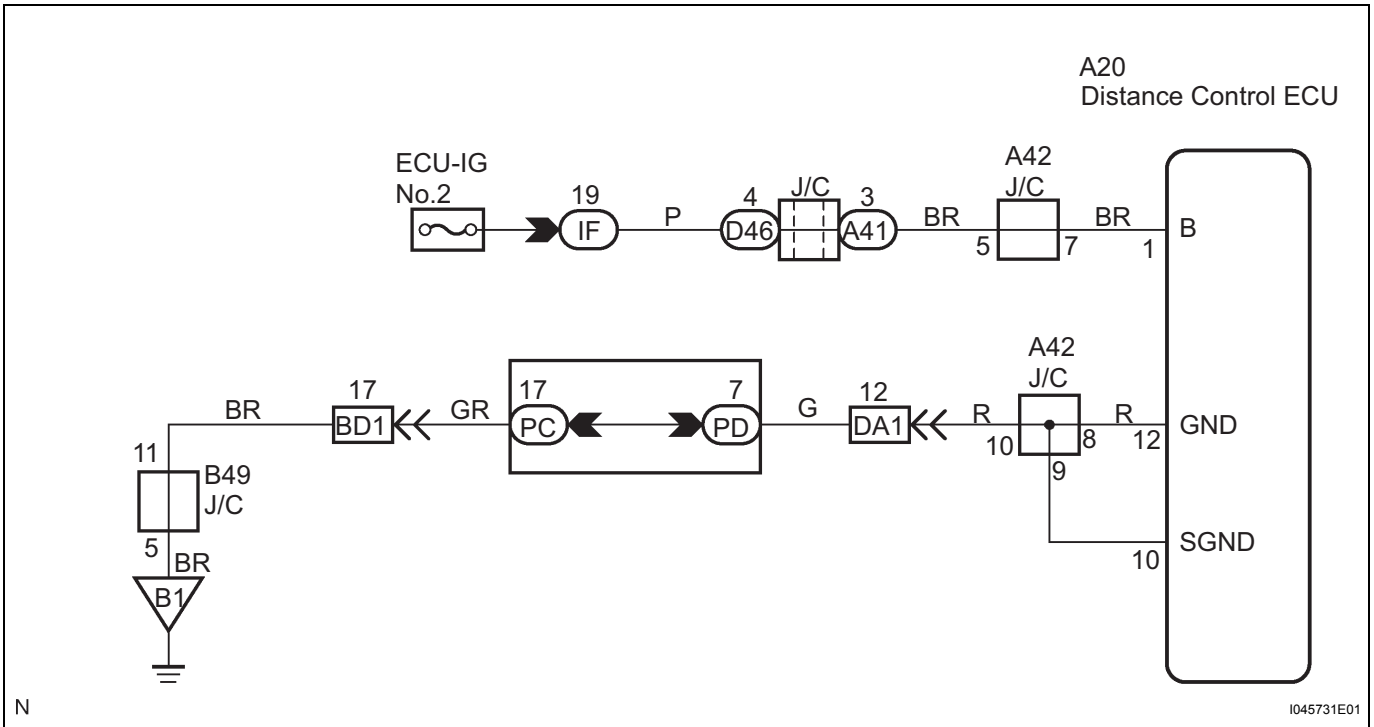
CC

Distance Control ECU Power Source Circuit

DESCRIPTION

This circuit provides power to operate the cruise control ECU (distance control ECU). The distance control ECU determines the vehicle that you are following based on data from the laser sensor and then decides how much acceleration and / or deceleration is needed to maintain the set distance. It also requests the skid control ECU to apply braking and sound the buzzer.

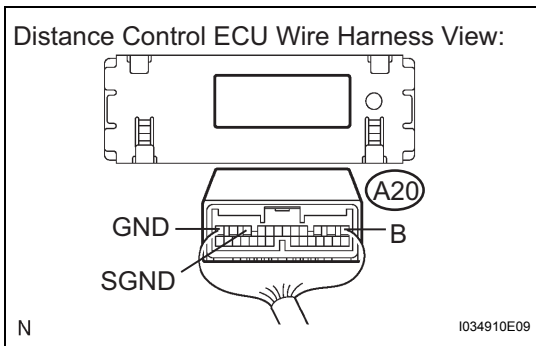
WIRING DIAGRAM



CC

INSPECTION PROCEDURE

1 CHECK DISTANCE CONTROL ECU



- (a) Disconnect the distance control ECU connector.
- (b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
A20-1 (B) - Body ground	Ignition switch on	10 to 14 V

- (c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A20-10 (SGND) - Body ground	Always	Below 1 Ω
A20-12 (GND) - Body ground	Always	Below 1 Ω

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

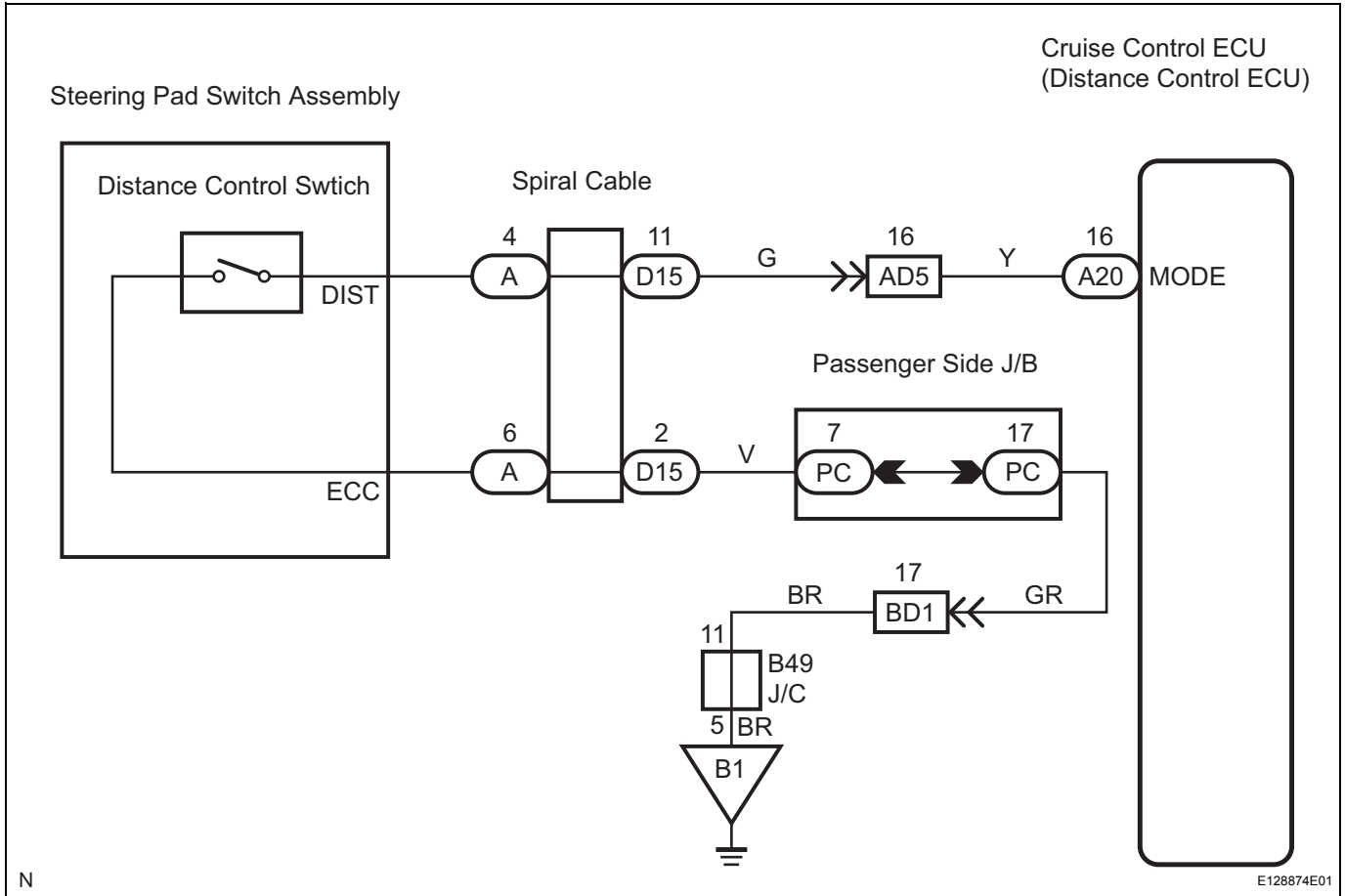
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Distance Control Switch Circuit

DESCRIPTION

This switch sets the vehicle-to-vehicle distance mode.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 READ VALUE ON INTELLIGENT TESTER

- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the ignition switch on (IG), and turn the intelligent tester main switch on.
- (c) According to the display on the tester, read the "DATA LIST".

CC (ECM):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
DISTANCE TIME	Car distance time setting condition /SHRT, MID, LONG, NO	Distance selected by distance control switch	-

OK:

Distance selected by the distance control switch is shown on the display.

NG

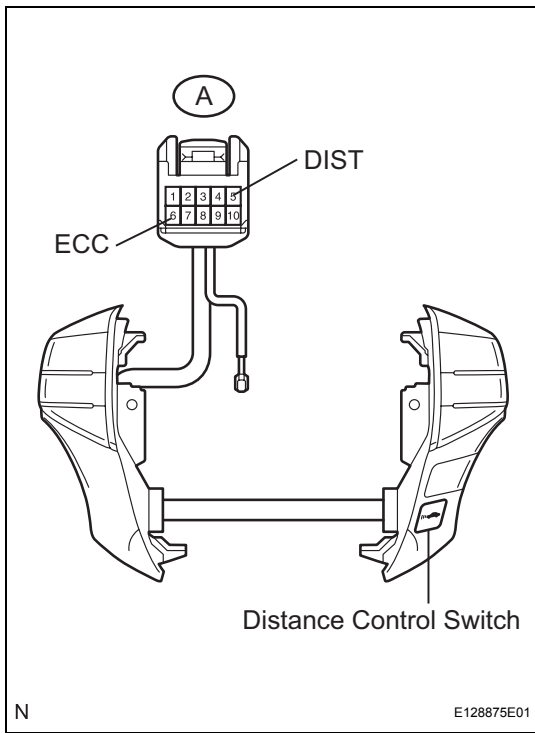
Go to step 2

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

2 INSPECT STEERING PAD SWITCH ASSEMBLY

CC



- (a) Remove the steering pad switch assembly.
- (b) Measure the resistance between terminals 4 (DIST) and 6 (ECC) of the steering pad switch assembly connector when the distance control switch is operated.

Standard resistance

Switch position	Specified value
Distance control switch is ON	Below 2.5 Ω
Distance control switch is OFF	100 kΩ or higher

HINT:

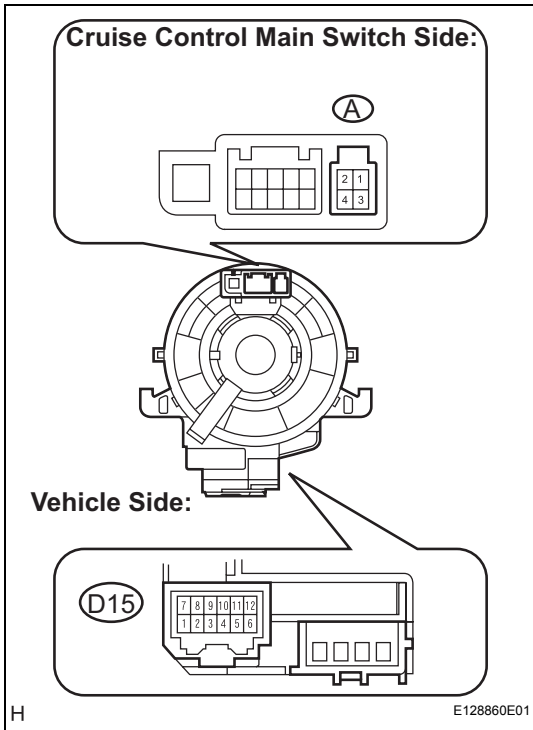
When a malfunction is detected in the distance control switch, replace the steering pad switch assembly.

NG

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

OK

3 INSPECT SPIRAL CABLE



H

E128860E01

- (a) Disconnect the spiral cable connector.
- (b) Measure the resistance between terminals A and C13 of the spiral cable.

Standard resistance

Tester No.	Specified value
A-4 - D15-11	Below 1 Ω
A-6 - D15-2	Below 1 Ω

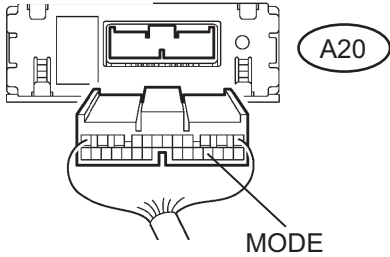
NG → **REPLACE STEERING PAD SWITCH ASSEMBLY**

OK

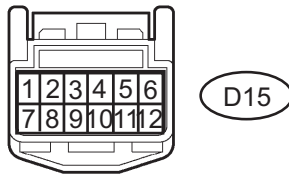
CC

4 CHECK WIRE HARNESS (DISTANCE CONTROL ECU - SPIRAL CABLE)

Distance Control ECU Connector
Wire Harness View:



Spiral Cable Connector
Wire Harness View:



E109734E06

- (a) Disconnect the distance control ECU connector.
- (b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
D15-11 - A20-16 (MODE)	Always	Below 1 Ω
A20-16 (MODE) - Body ground	Always	10 kΩ or higher

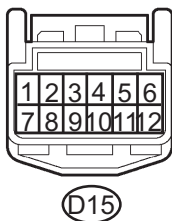
NG

REPLACE SPIRAL CABLE

OK

5 CHECK WIRE HARNESS (SPIRAL CABLE - BODY GROUND)

Vehicle Side Connector Front View:



N

E107092E09

- (a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
D15-2 - Body ground	Always	Below 1 Ω

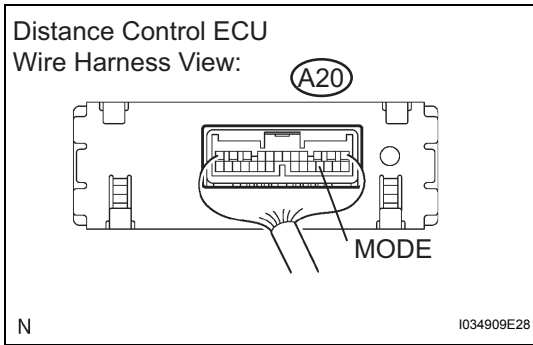
NG

REPLACE SPIRAL CABLE

OK

CC

6 INSPECT DISTANCE CONTROL ECU



- (a) Remove the distance control ECU (cruise control ECU) with the connector.
- (b) Turn the ignition switch on (IG).
- (c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
A20-16 (MODE) - Body ground	Distance control switch ON	0 to 2 V
A20-16 (MODE) - Body ground	Distance control switch OFF	9 to 16 V

CC

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Laser Sensor Power Source Circuit

DESCRIPTION

This circuit provides power to operate the laser sensor. The laser sensor emits laser beams towards an object in front and measures the distance and direction of the object by receiving the beam reflections. Based on the reflections, the sensor calculates the difference in speed between your own vehicle and the object in front. This data is transmitted to the distance control ECU (cruise control ECU).

HINT:

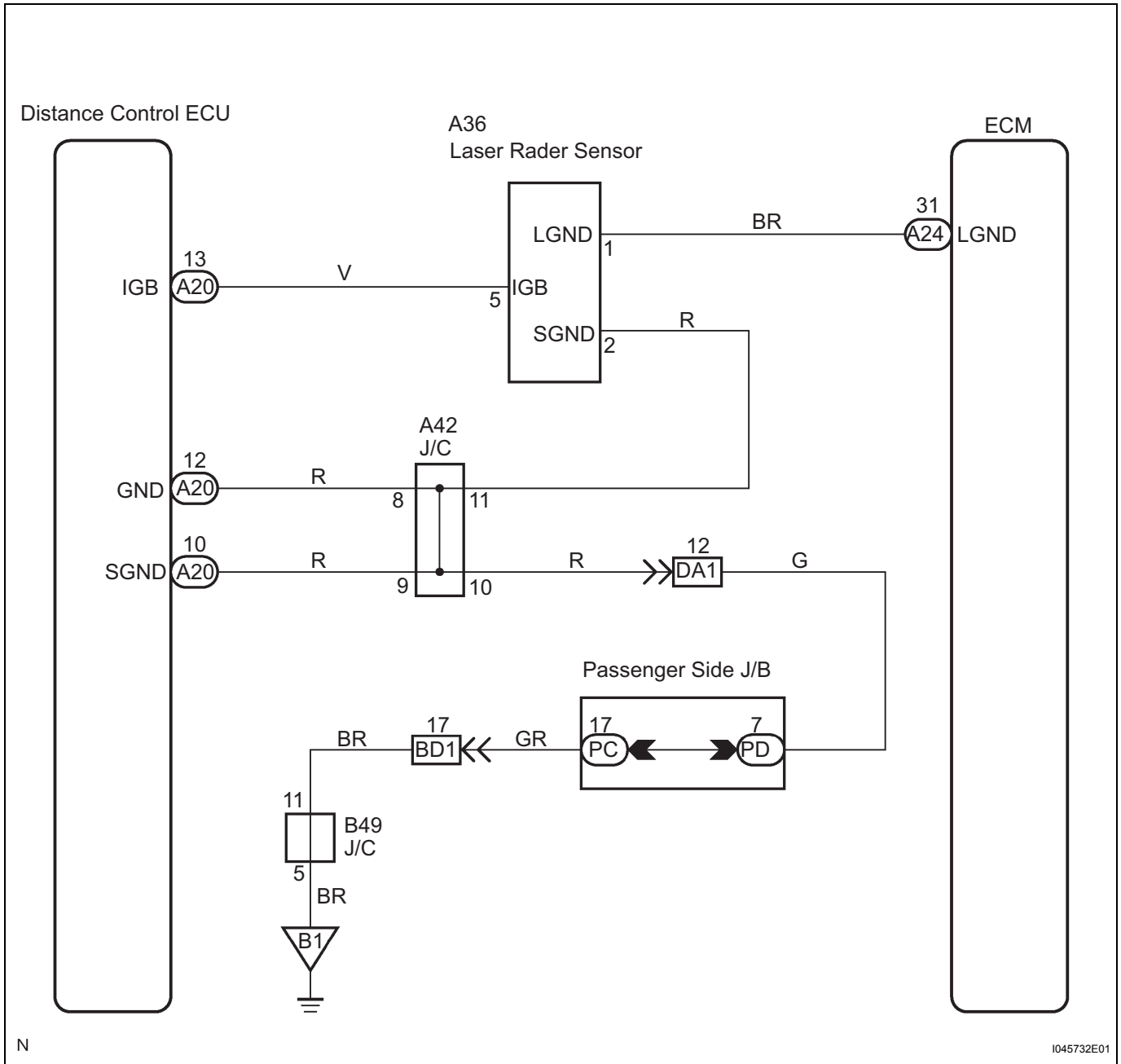
The laser sensor monitors the laser emission and reception by itself. This DTC is detected when it cannot monitor.

CC When rain drops or snowflakes strike the laser sensor face, the distance between the vehicle in front and your own vehicle cannot be measured correctly.

The dynamic laser cruise control system may not be able to detect the vehicle in front and may not properly maintain the correct vehicle-to-vehicle distance.

- The vehicle in front is a tall trailer.
- The back of the vehicle in front is extremely dirty.
- Emissions from the vehicle in from other lanes are heavy.
- The vehicle in front has no reflector.
- The laser sensor is receiving a strong flash of light (sunlight, etc.).

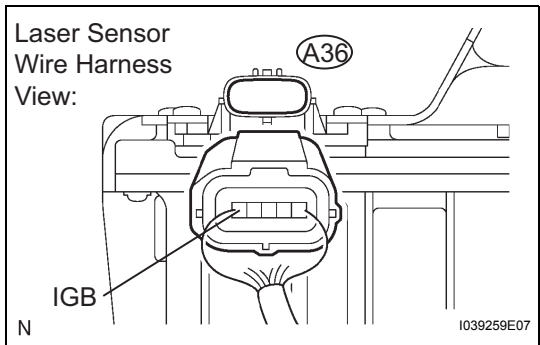
WIRING DIAGRAM



CC

INSPECTION PROCEDURE

1 CHECK CRUISE CONTROL ECU ASSEMBLY (IGB VOLTAGE)



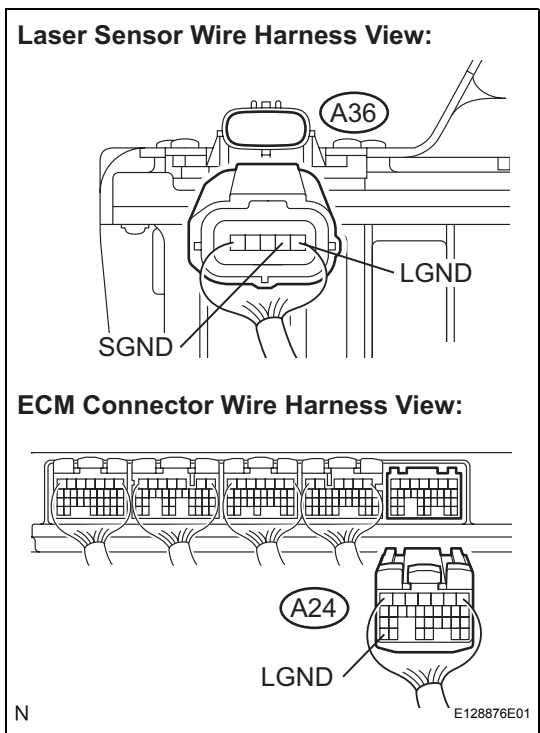
- (a) Disconnect the A36 sensor connector.
 - (b) Measure the voltage of the wire harness side connector.
- Standard voltage**

Tester Connection	Condition	Specified Condition
A36-5 (IGB) - Body ground	Ignition switch on	10 to 14 V

NG → **Go to step 3**

OK

2 CHECK WIRE HARNESS (LASER RADAR SENSOR - HYBRID CONTROL ECU AND BODY GROUND)



- (a) Disconnect the ECM A24 connector.
 - (b) Measure the resistance according to the value(s) in the table below.
- Standard resistance**

Tester Connection	Condition	Specified Condition
A36-1 (LGND) - A24-31 (LGND)	Always	Below 1 Ω
A36-1 (LGND) - Body ground	Always	10 kΩ or higher
A36-2(SGND) - Body ground	Always	Below 1 Ω

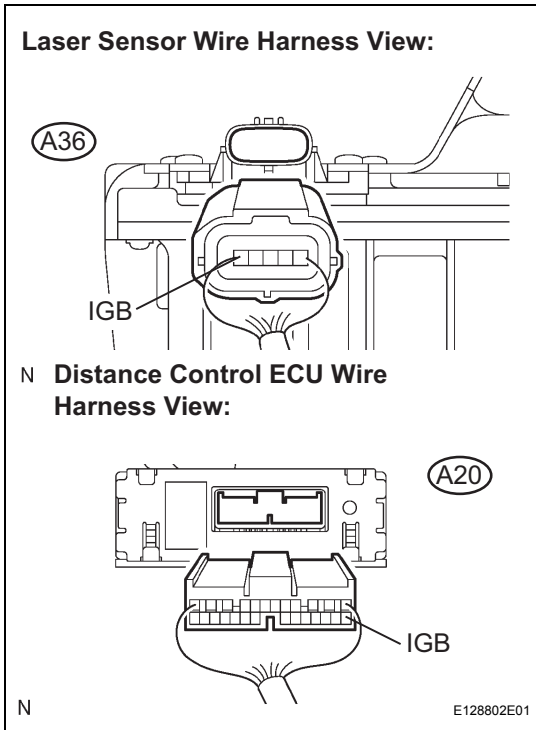
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

CC

3 CHECK WIRE HARNESS (LASER RADAR SENSOR - DISTANCE CONTROL ECU)



- (a) Disconnect the cruise control ECU (distance control ECU) connector.
- (b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A20-13 (IGB) - A36-5 (IGB)	Always	Below 1 Ω
A20-13 (IGB) - Body ground	Always	10 kΩ or higher

CC

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Wiper Signal Circuit

DESCRIPTION

When the distance control ECU (cruise control ECU) detects that the wipers are operating, the dynamic radar cruise control system will be canceled.

HINT:

A wiper switch signal is sent to the distance control ECU via the CAN and BEAN. If there are any malfunctions in this circuit, check for DTCs in the CAN communication and multiplex communication systems. When the wiper is in the HI mode, the dynamic radar cruise control is automatically canceled and goes into the standby mode.

CC

INSPECTION PROCEDURE

1 INSPECT WIPER AND WASHER SYSTEM

OK:

Wiper function is normal.

NG

GO TO WIPER AND WASHER SYSTEM

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Cruise Main Indicator Light Circuit

DESCRIPTION

When the cruise control main switch is on, CRUISE main indicator light come on. This indicates the control condition (presence or absence of a vehicle in front, vehicle-to-vehicle distance, and set vehicle speed) and fail-safe state through the multiplex communication system and CAN communication system. The master warning light and CRUISE main indicator light come on and vehicle-to-vehicle distance information is displayed on the combination meter as the alarm buzzer sounds. Items such as "Clean Radar Sensor", "Cruise not Available", "Check Cruise System" and "Radar Cruise Ready" are displayed in the multi-information display on the combination meter when the hybrid vehicle control ECU detects signals from each sensor and actuator and sends them to the combination meter via CAN and BEAN.

HINT:

If the vehicle in front in the same lane significantly decreases vehicle speed or another vehicle pulls in front of your vehicle, adequate deceleration cannot be applied and the vehicle-to-vehicle distance will shorten. At this time, the system sounds the buzzer and the master warning light blinks to warn the driver. Each indicator in the dynamic radar cruise control uses CAN and BEAN for communication. Therefore if there are any malfunctions in this circuit, check for DTCs in the CAN communication and multiplex communication systems before troubleshooting this circuit.

CC

INSPECTION PROCEDURE

1 PERFORM ACTIVE TEST BY INTELLIGENT TESTER

- (a) Connect the intelligent tester to the DLC3.
- (b) Select the ACTIVE TEST, use the intelligent tester to generate a control command, and then check that the combination meter operates.

COMBINATION METER:

Tester Display	Description	Check Condition
CRUISE INDIC	"CRUISE" indicator is ON / OFF	ON - OFF

OK:

Indicator light comes on.

NG

REPLACE COMBINATION METER

OK

2 READ VALUE OF INTELLIGENT TESTER

- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the ignition switch on, and turn the intelligent tester main switch on (IG).
- (c) Check the DATA LIST for proper functioning of the CRUISE main indicator light.

CC (ECM):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
CCS READY M	Cruise control system standby condition (Main CPU) / ON or OFF	Each time main switch is pushed, ON is displayed and then OFF is displayed	A
CCS INDICATOR M	Cruise indicator signal (Main CPU) / ON or OFF	ON : "CCS READY" ON OFF : "CCS READY" OFF	B

OK:

When cruise control main switch operation is performed, the result will be same as above.

HINT:

A is OK, but B is NG → DTC output or hybrid vehicle control ECU failure

NG**REPLACE ECM****OK****CC****PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

TC and CG Terminal Circuit

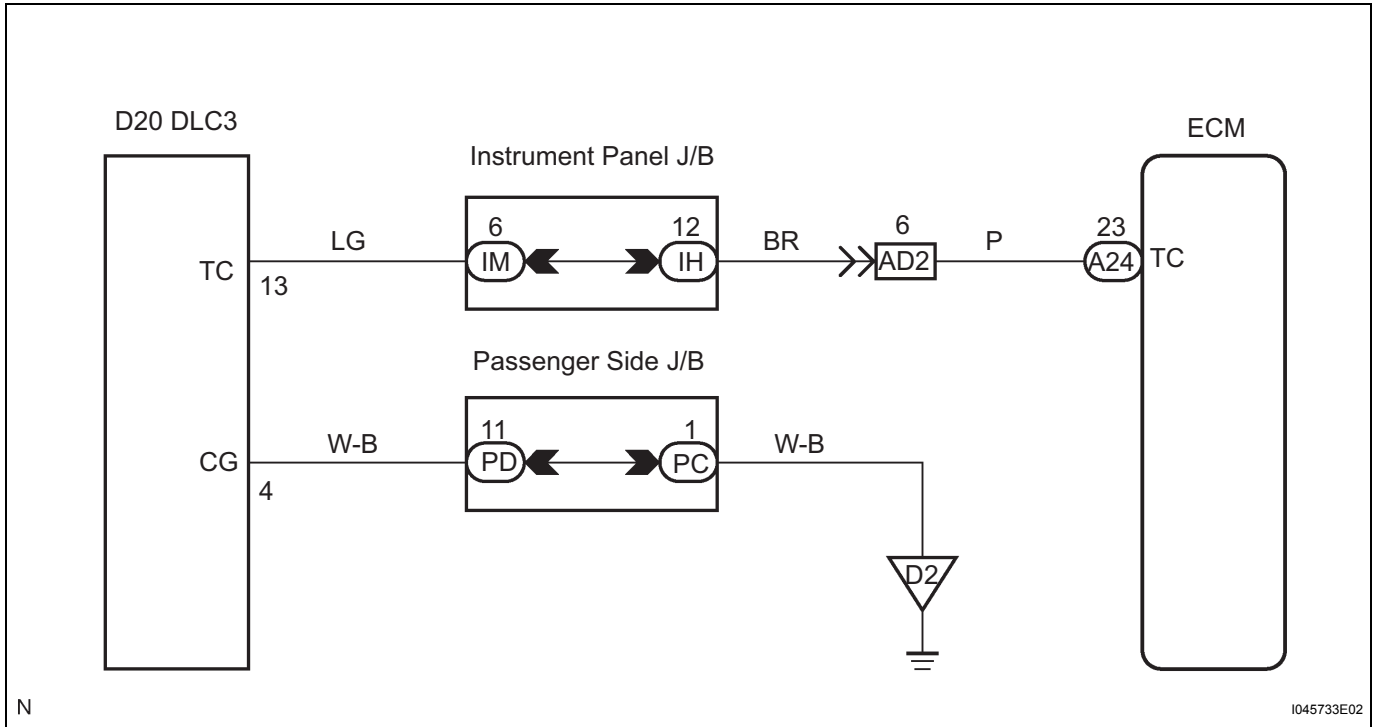
DESCRIPTION

Connecting terminals TC and CG of the DLC3 causes the system to enter self-diagnostic mode. If a malfunction is present, DTCs will be output.

HINT:

When a particular warning light remains blinking, a ground short in the wiring of terminal TC of the DLC3 or an internal ground short in the relevant ECU is suspected.

WIRING DIAGRAM

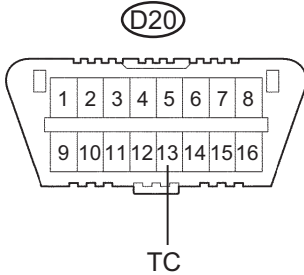


CC

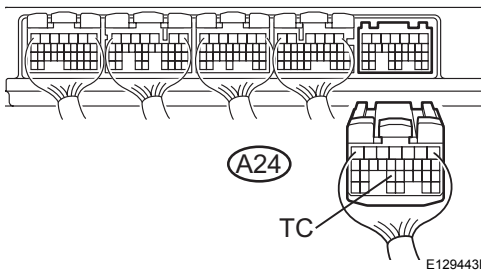
INSPECTION PROCEDURE

1 CHECK WIRE HARNESS (TC of DLC3 - ECM)

DLC3:



ECM Connector Wire Harness View:



- (a) Disconnect the A24 connector from the ECM.
- (b) Measure the resistance according to the value(s) in the table below.

Standard resistance

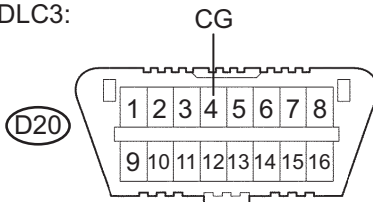
Tester Connection	Condition	Specified Condition
TC (A24-23) - TC (D20 - 13)	Always	Below 1 Ω

NG REPAIR OR REPLACE HARNESS OR CONNECTOR (DLC3 - ECM)

OK

2 CHECK WIRE HARNESS (CG of DLC3 - BODY GROUND)

DLC3:



- (a) Measure the resistance according to the value(s) in the table below.

Standard resistance

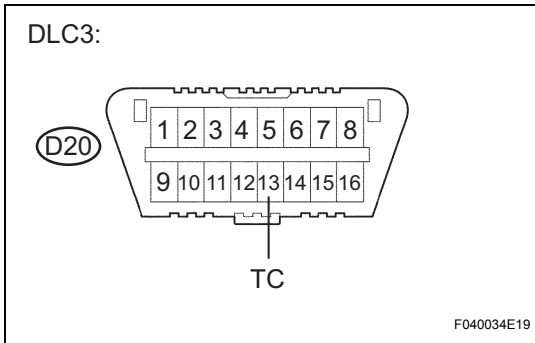
Tester Connection	Condition	Specified Condition
D20-4 (CG) - Body ground	Always	Below 1 Ω

NG REPAIR OR REPLACE HARNESS OR CONNECTOR (DLC3 - BODY GROUND)

OK

CC

3 CHECK WIRE HARNESS (TC of DLC3 - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
D20-13 (TC) - Body ground	Always	10 kΩ or higher

NG

REPAIR OR REPLACE WIRE HARNESS OR ECU

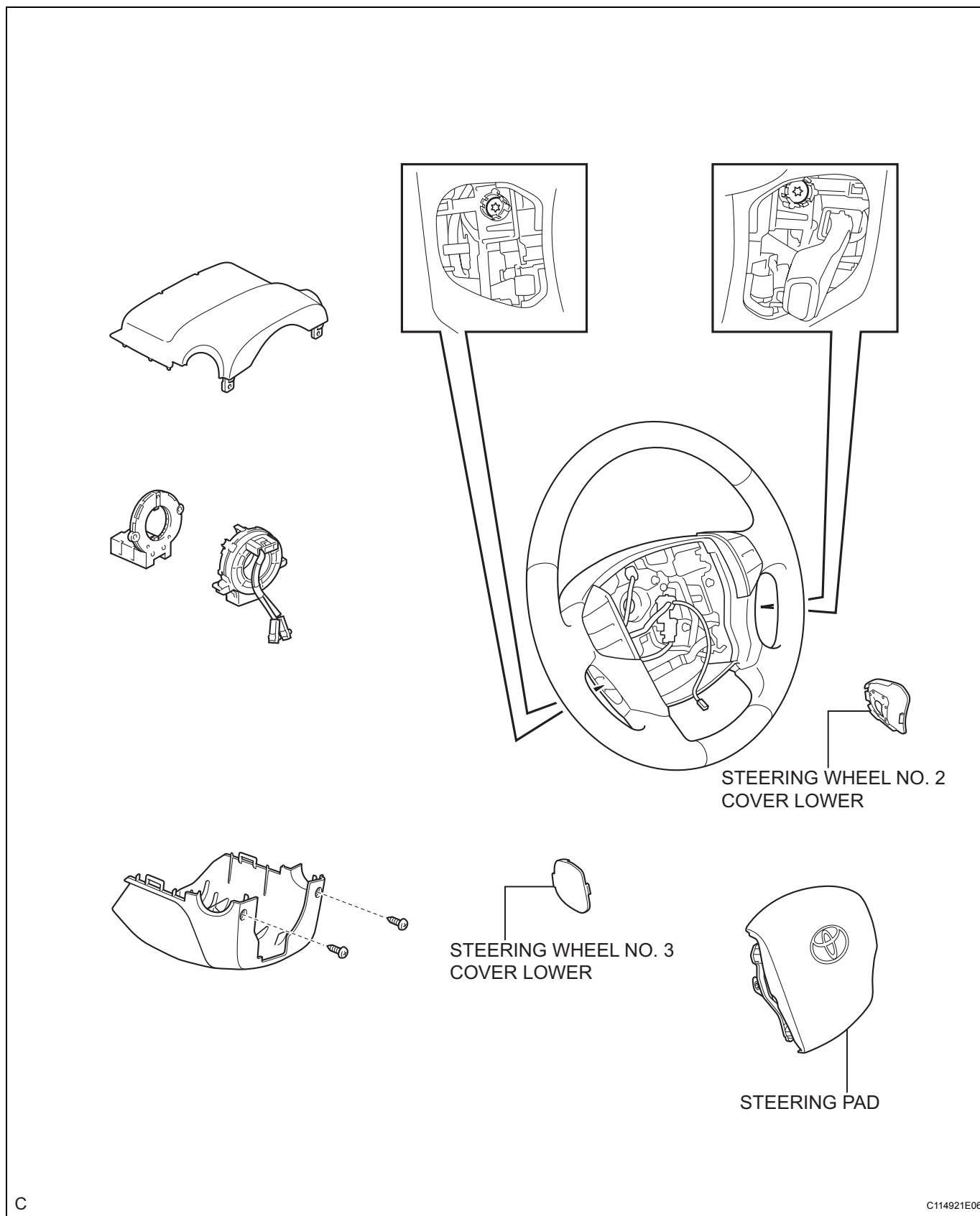
CC

OK

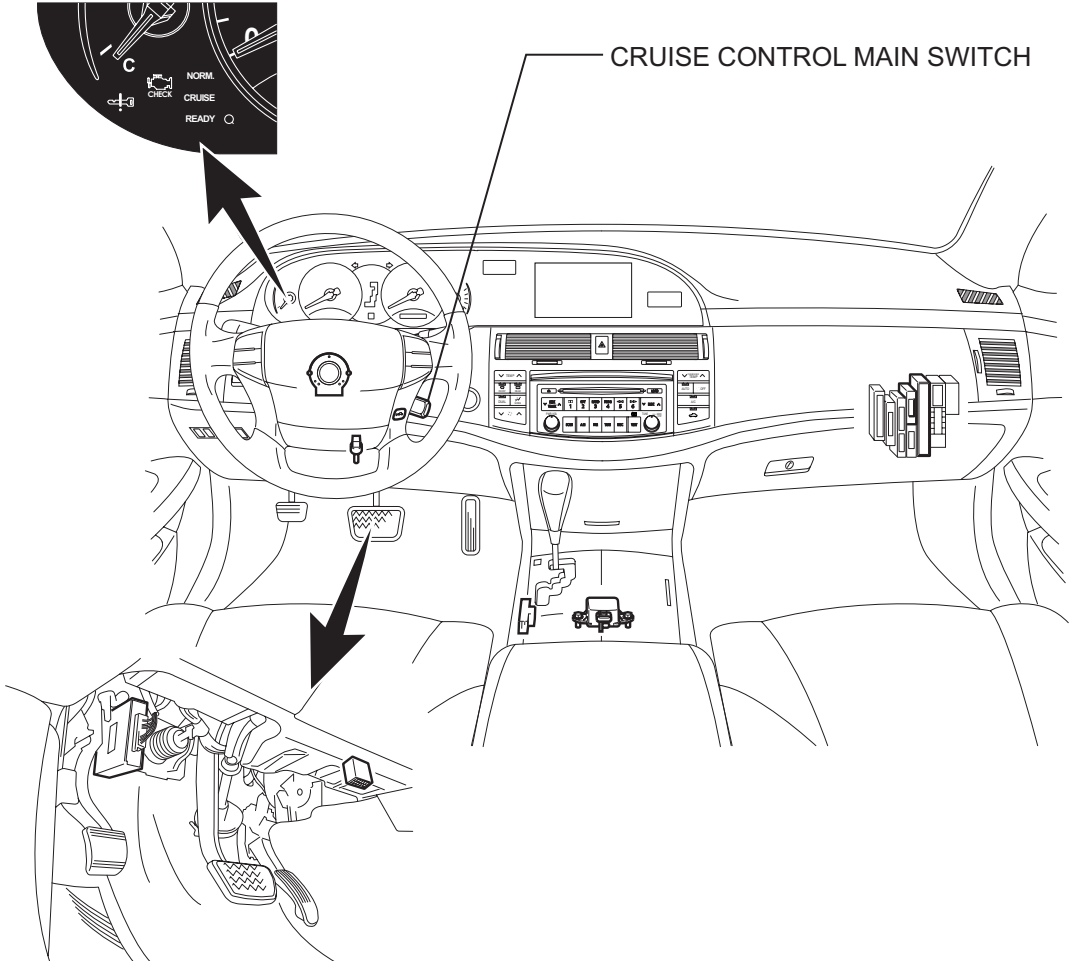
REPLACE ECM

CRUISE CONTROL MAIN SWITCH

COMPONENTS



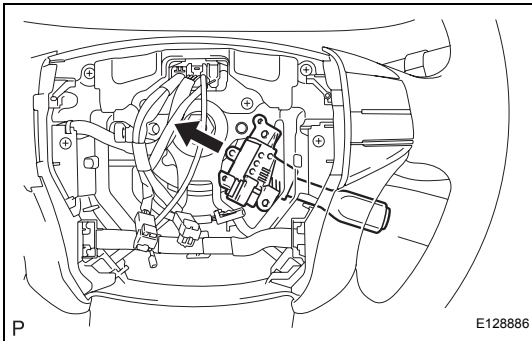
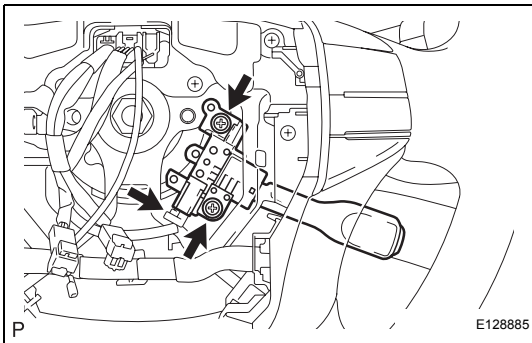
CC



REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent the airbag working (See page [RS-1](#)).
2. **REMOVE STEERING WHEEL NO. 3 COVER LOWER**
(See page [RS-304](#))
3. **REMOVE STEERING WHEEL NO. 2 COVER LOWER**
(See page [RS-304](#))
4. **REMOVE STEERING PAD** (See page [RS-304](#))
5. **REMOVE CRUISE CONTROL MAIN SWITCH**
 - (a) Disconnect the connector.
 - (b) Remove the 2 screws.

CC



- (c) Pull out the cruise control main switch assembly in the direction shown by the arrow in the illustration.

INSTALLATION

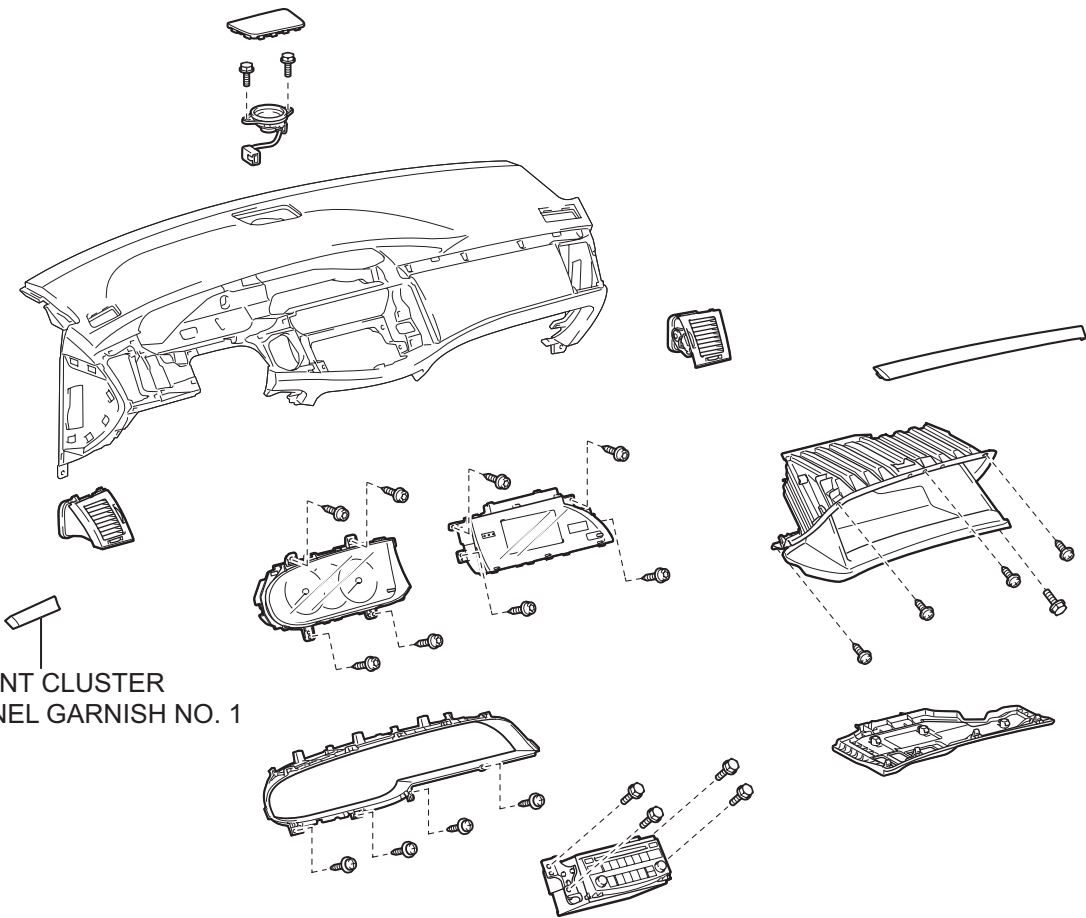
1. **INSTALL CRUISE CONTROL MAIN SWITCH**
 - (a) Install the cruise control main switch assembly with the 2 screws.
Torque: 2.35 N*m (24 kgf*cm, 21 in.*lbf)
 - (b) Connect the connector.
2. **INSTALL STEERING PAD (See page [RS-305](#))**
3. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
4. **PERFORM INITIALIZATION**

NOTICE:
Some systems need initialization when disconnecting the cable from the negative battery terminal (See page [IN-29](#)).
5. **INSPECT STEERING PAD (See page [RS-305](#))**
6. **INSPECT SRS WARNING LIGHT**
(See page [RS-37](#))

DISTANCE CONTROL ECU

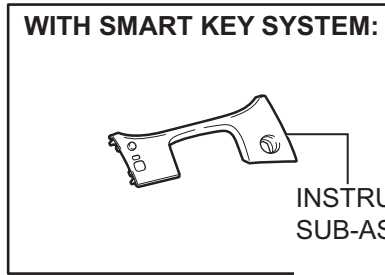
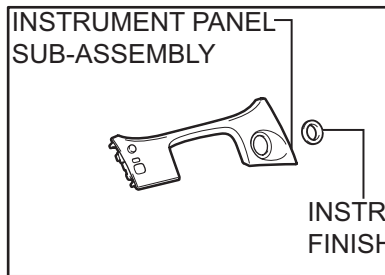
COMPONENTS

CC



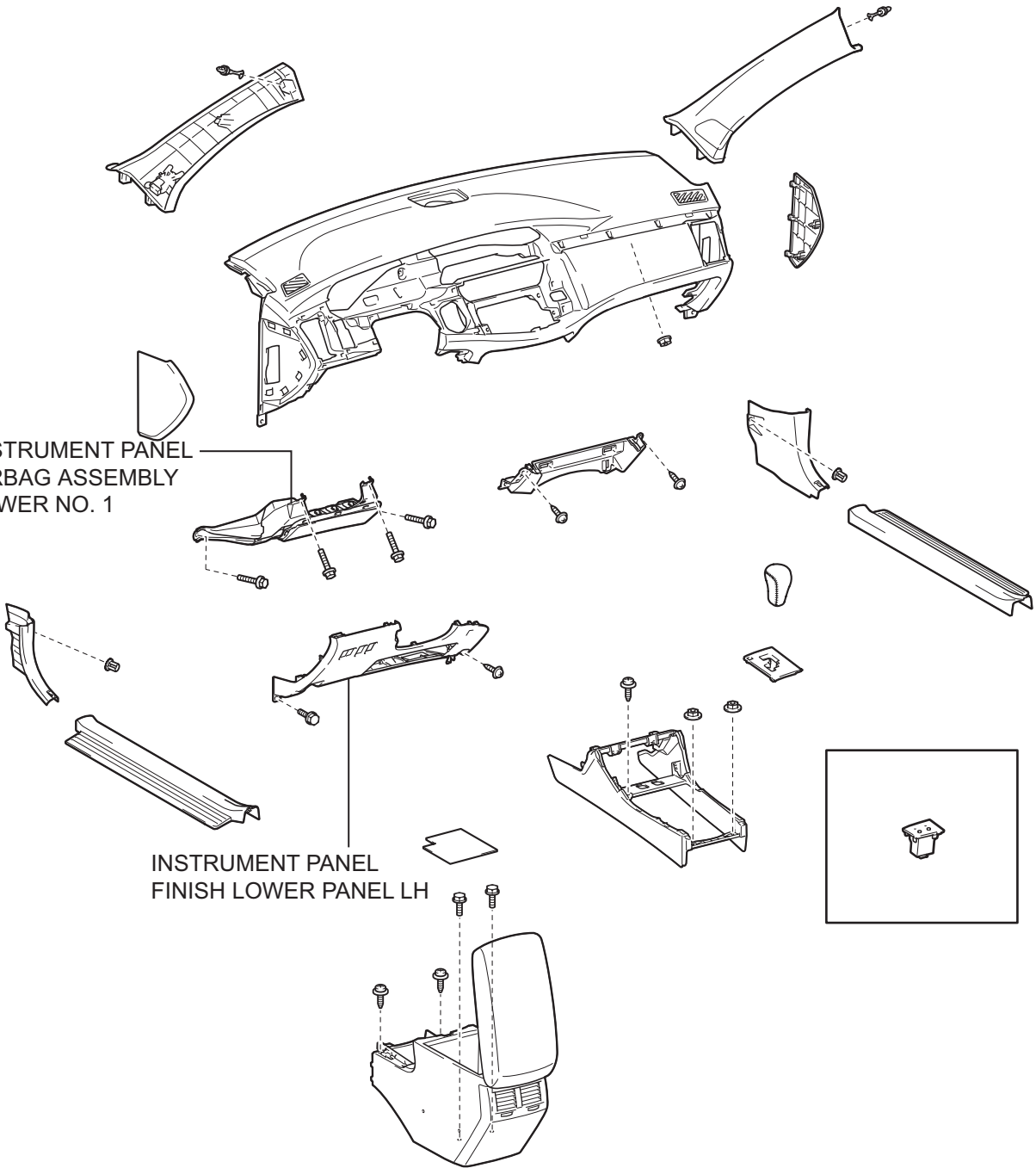
INSTRUMENT CLUSTER
FINISH PANEL GARNISH NO. 1

WITH OUT SMART KEY SYSTEM:

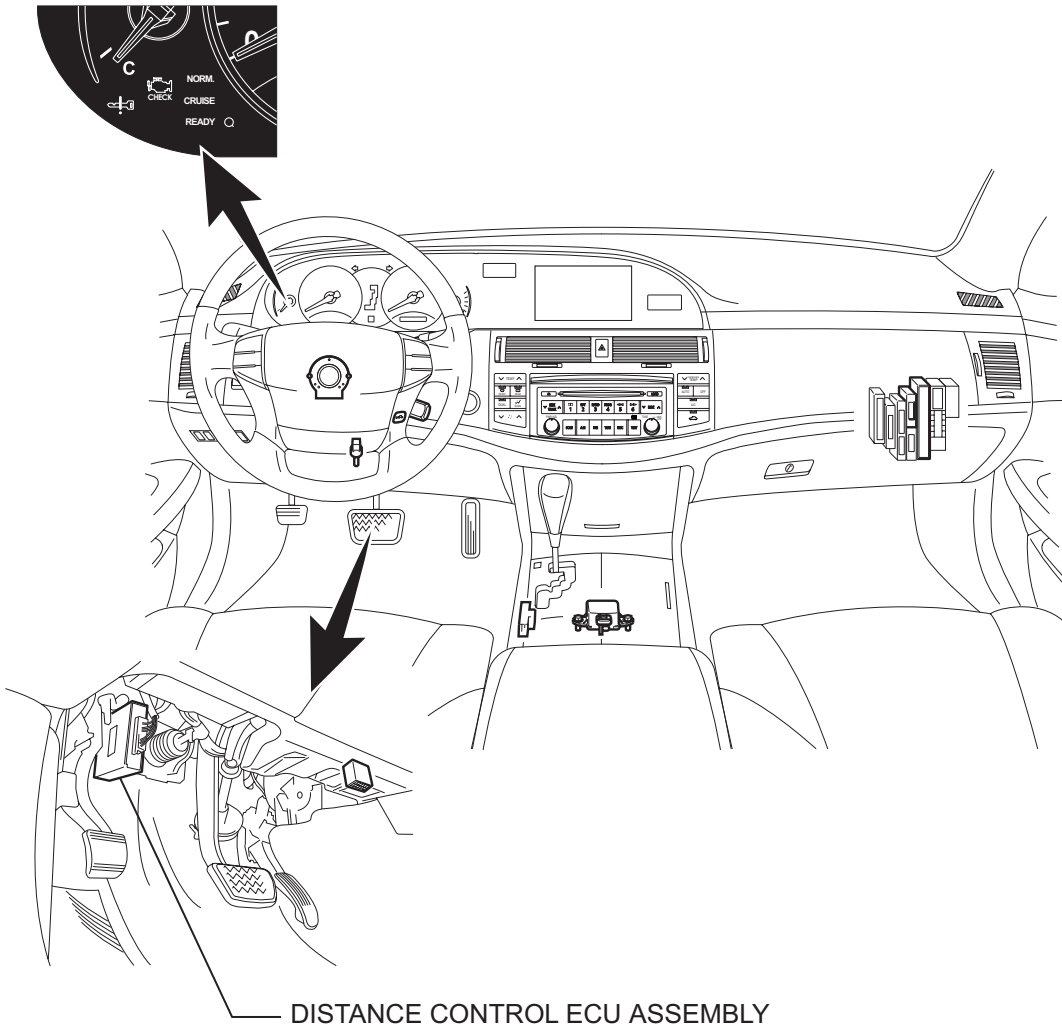


INSTRUMENT PANEL
AIRBAG ASSEMBLY
LOWER NO. 1

INSTRUMENT PANEL
FINISH LOWER PANEL LH



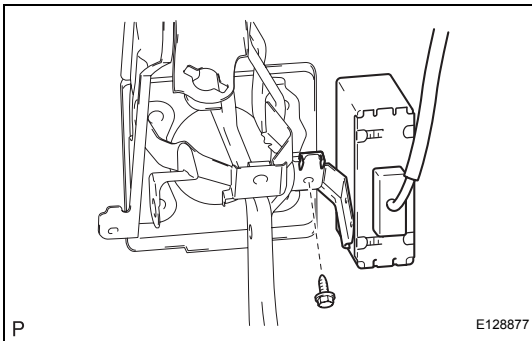
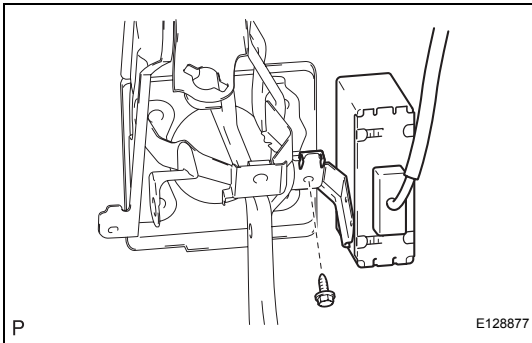
CC



REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
CAUTION:
 Wait for 90 seconds after disconnecting the cable to prevent the airbag working (See page [RS-1](#)).
2. **REMOVE INSTRUMENT CLUSTER FINISH PANEL GARNISH NO. 1** (See page [IP-9](#))
3. **REMOVE INSTRUMENT PANEL FINISH PLATE** (See page [IP-9](#))
4. **REMOVE INSTRUMENT PANEL SUB-ASSEMBLY** (See page [IP-9](#))
5. **REMOVE INSTRUMENT PANEL FINISH LOWER PANEL LH** (See page [IP-12](#))
6. **REMOVE INSTRUMENT PANEL AIRBAG ASSEMBLY LOWER NO. 1** (See page [RS-320](#))
7. **REMOVE DISTANCE CONTROL ECU ASSEMBLY**
 - (a) Disconnect the connector.
 - (b) Remove the bolt and the distance control ECU assembly.

CC

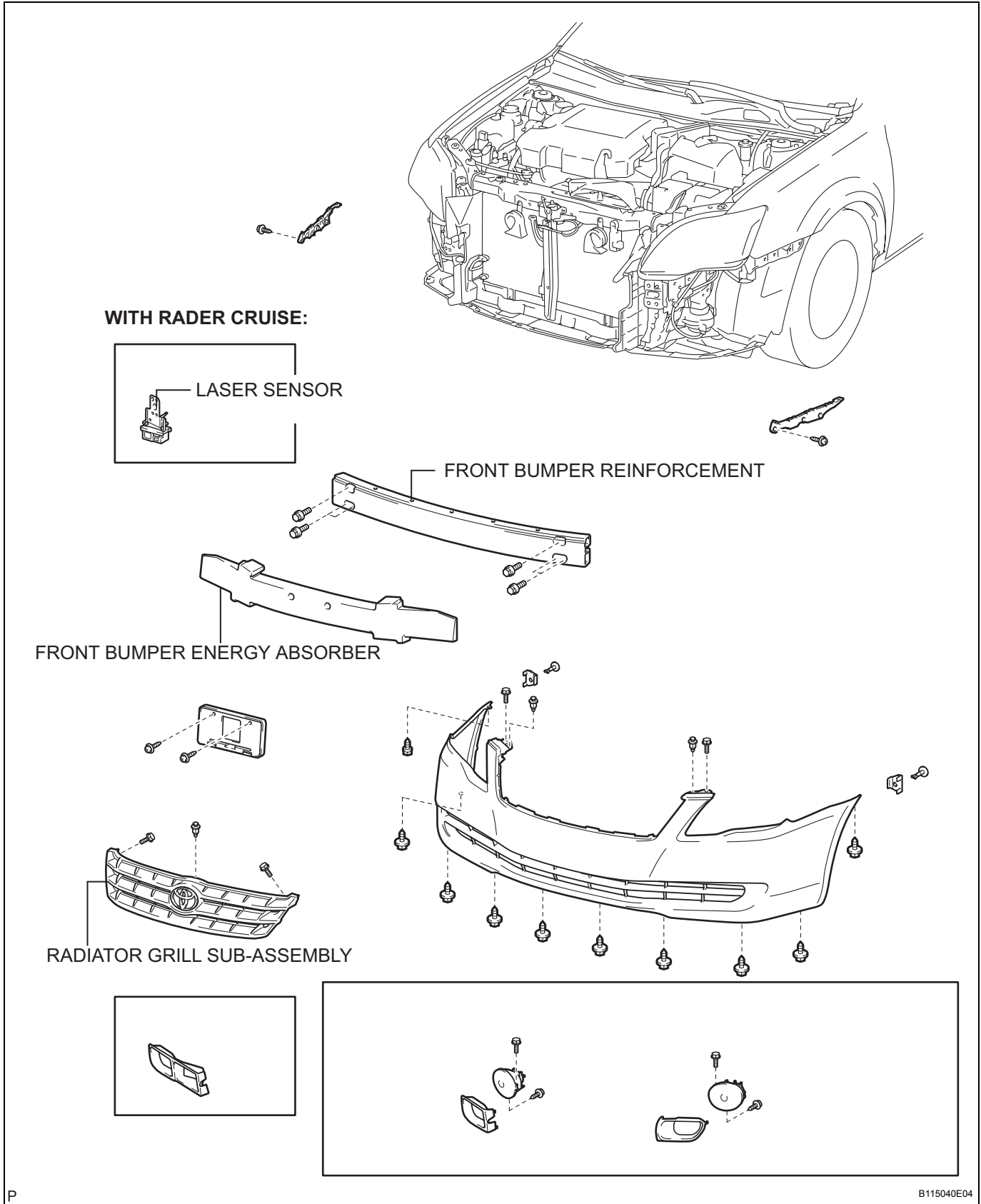


INSTALLATION

1. **INSTALL DISTANCE CONTROL ECU ASSEMBLY**
 - (a) Install the bolt.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)
 - (b) Connect the connector.
2. **INSTALL INSTRUMENT PANEL AIRBAG ASSEMBLY LOWER NO. 1** (See page [RS-330](#))
3. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
4. **PERFORM INITIALIZATION**
NOTICE:
 Some systems need initialization when disconnecting the cable from the negative battery terminal (See page [IN-29](#)).
5. **INSPECT SRS WARNING LIGHT** (See page [RS-37](#))

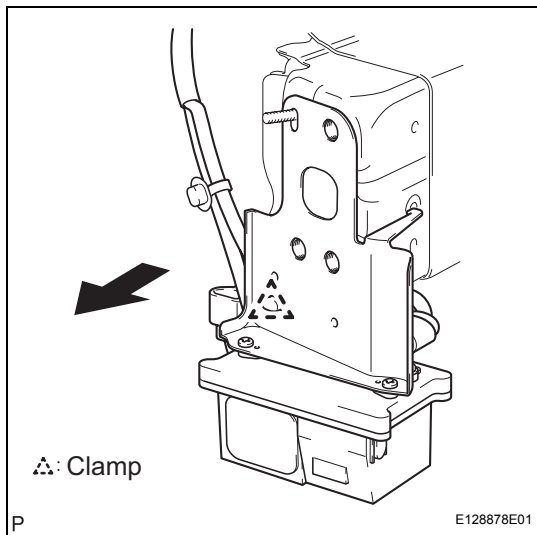
LASER SENSOR COMPONENTS

CC



REMOVAL

1. REMOVE RADIATOR GRILL SUB-ASSEMBLY (See page [ET-2](#))
2. REMOVE FRONT BUMPER ASSEMBLY (See page [ET-2](#))
3. REMOVE FRONT BUMPER ENERGY ABSORBER (See page [ET-3](#))
4. REMOVE FRONT BUMPER REINFORCEMENT (See page [ET-3](#))
5. REMOVE LASER SENSOR
 - (a) Disengage the clamp, then remove the laser sensor.



ADJUSTMENT

CAUTION:

- Do not stare at the luminous portion of the laser during adjustment. The intensity of the laser light is low, but it may result in loss of sight.
- If the operation is not carried out as specified, there may be a risk of exposure to hazardous radiation.

HINT:

- If replacing the ECM of the vehicle with laser cruise control with a new one, perform procedure (*1) to (*5) in step "A" so that the ECM recognizes that the vehicle is equipped with laser cruise control.
- There is a limitation on laser beam axis adjustment.
- Since the laser sensor is installed in the bumper reinforcement, it is important that the laser sensor, bumper reinforcement, and other related parts are installed properly.
- When the sensor is removed from the vehicle for trouble diagnosis or repair, it is necessary to adjust the laser beam axis after the operation.

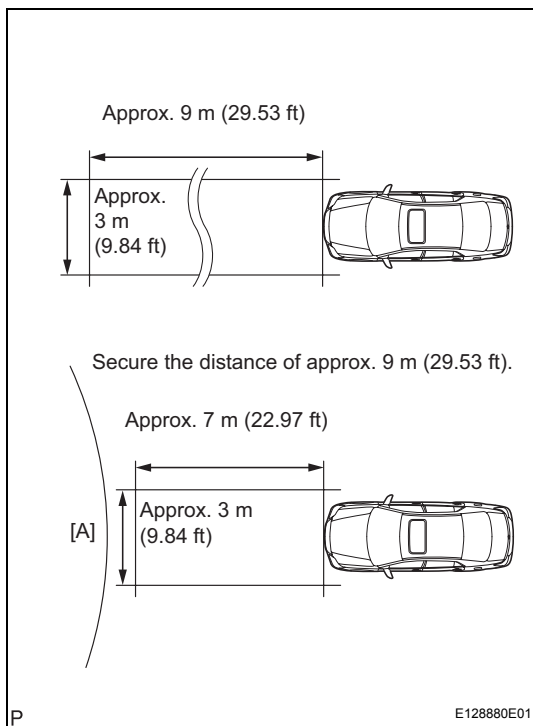
1. ADJUST LASER SENSOR

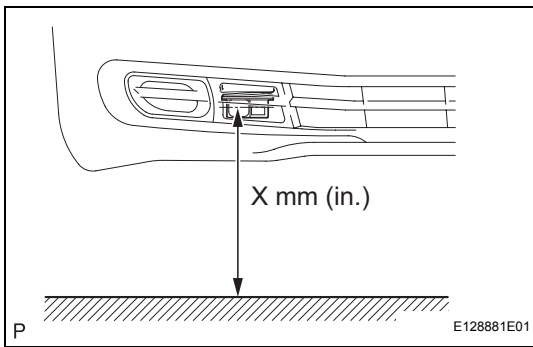
NOTICE:

- Perform measurement indoors on a level ground and in front of a blank wall. Park the vehicle at least 9 m (29.53 ft) from the wall. When performing adjustment outdoors, make sure that it is not raining or snowing.
- Check that there are no reflective materials in the surroundings or on the ground.
- If it is impossible to secure a distance of approximately 9 m (29.53 ft) in front of the vehicle, be sure to secure at least 7 m (22.97 ft) from the vehicle, and cover the area marked [A] with a black cloth. If not covered with a black cloth, the laser sensor may detect something other than the target and it will fail to adjust properly.

(a) Preparation for adjusting the laser beam axis

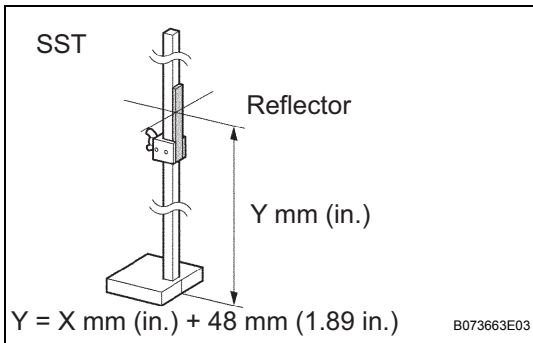
- (1) Adjust the tire pressure properly.
(See page [TW-2](#))
- (2) Luggage in the vehicle, such as in the trunk, should be unloaded.
- (3) Clean the light-luminous and light-receiving portions of the laser sensor.
- (4) Prepare a 10 m (32.81 ft) string, a string with a sharp-pointed weight (plumb bob), and a 5 m (16.41 ft) tape measure.





(b) Reflector (SST) placement

- (1) Measure the height to the center of the laser luminous portion.

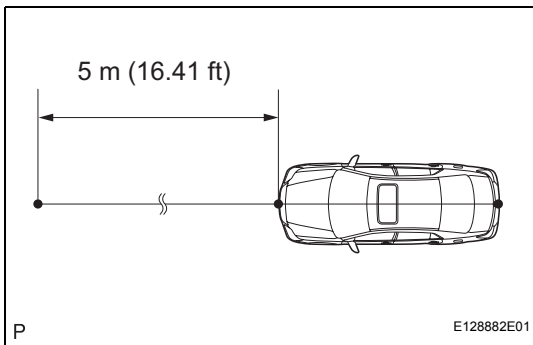


- (2) Adjust the center height of the reflector 48mm(1.89 in.) higher than the center of the luminous portion.

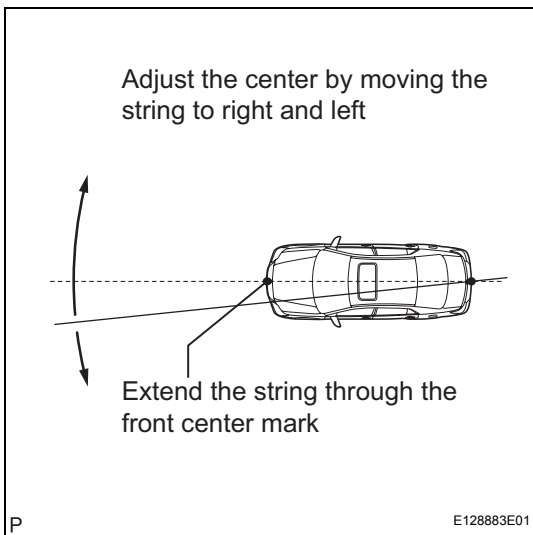
SST 09870-60000 (09870-60010, 09870-60020)

NOTICE:

Adjust it as precise as possible.



- (3) From the center (center of the emblem) of the front and rear bumpers, hang down the string with the plumb bob and mark the center points (both front and rear) of the vehicle on the ground.



- (4) Extend the 10m string from the rear center mark forward through the front center mark. Make a mark 5 m (16.41 ft) forward of the front marked point.

HINT:

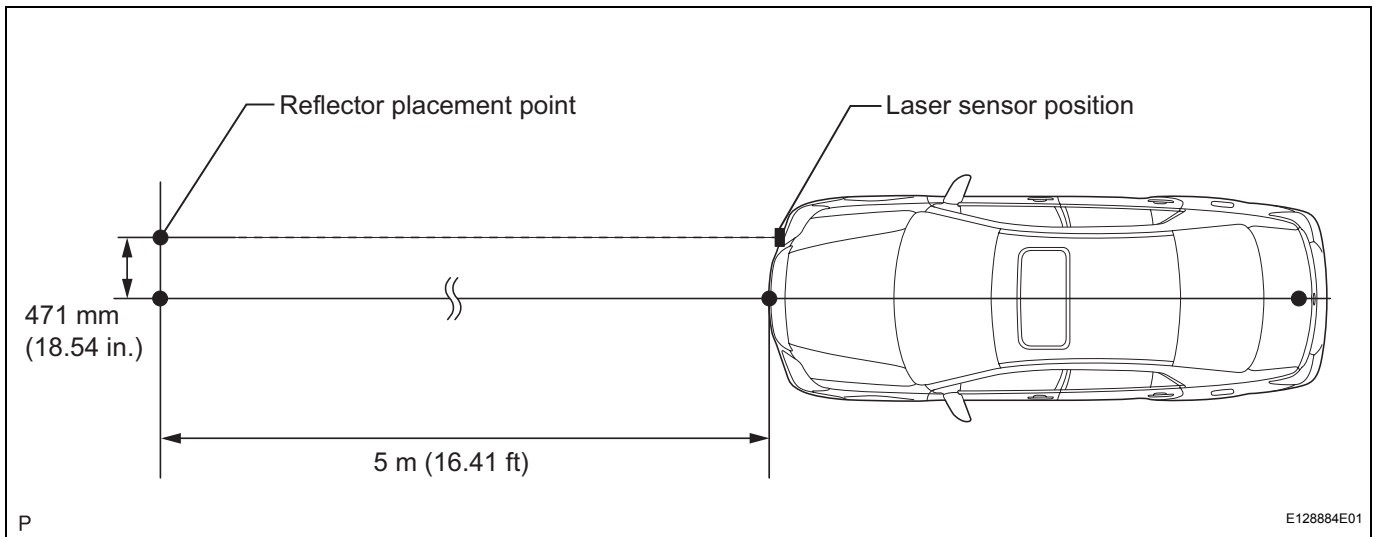
Fix one end of the string to the rear center mark and move the other end right and left at a point 5 m (16.41 ft) from the front of the vehicle. Make a 5 m (16.41 ft) mark when the string and the front vehicle center mark intersect.

- (5) From the 5 m (16.41 ft) marked position, measure 471 mm (18.54 in.) to the right and place the reflector there.

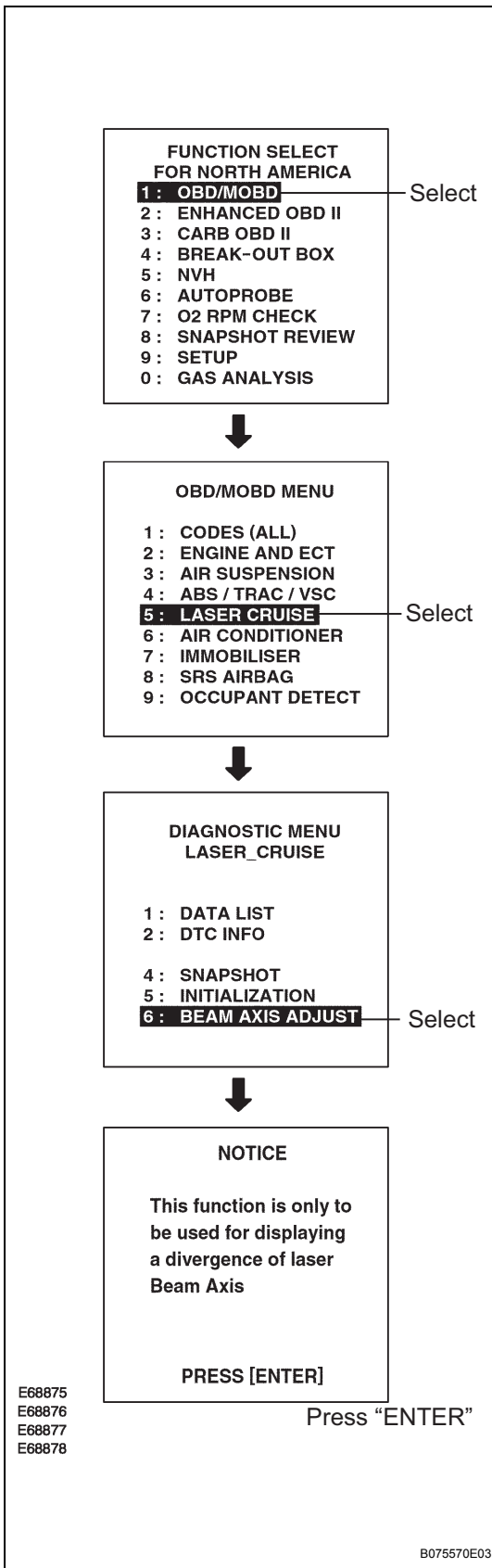
NOTICE:

Perform it as precise as possible.





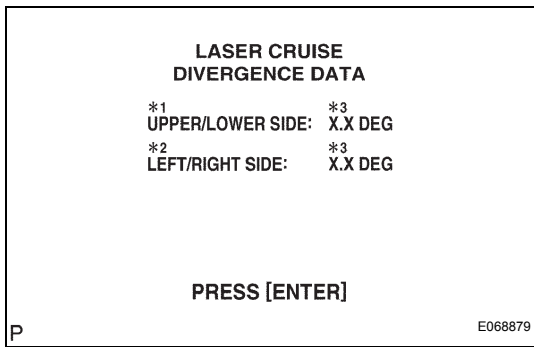
- (c) Adjust the laser beam axis (step "A")
- (1) Turn the ignition switch on (IG) (*1).
 - (2) Push the cruise control main switch button on (*2).
 - (3) Connect the intelligent tester to the DLC3, and turn the power on (*3).



(4) Operate by following the screen menu and select "BEAM AXIS ADJUST" of the Laser Cruise Control, then press the "ENTER" key (*4).

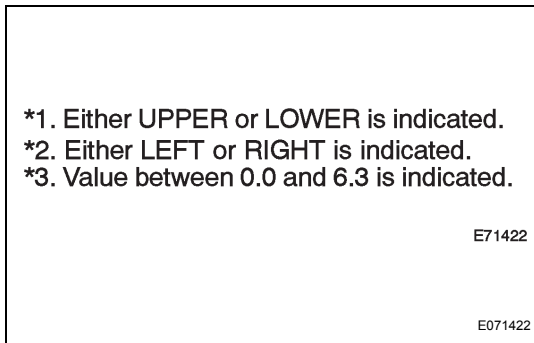
HINT:

- Pressing the "ENTER" key will make the ECM transfer to BEAM AXIS ADJUSTMENT MODE.
- The buzzer sounds for 1 second after transfer.



- (5) Confirm the current value of the laser beam (The default reading is 6.3° when the reflector position is out of range.) (*5).

CC



- (6) Move the reflector either right or left by 100 mm (3.94 in.) and check that the value changes.

NOTICE:

When the values do not change, it is possible that the direction of the laser radar sensor is greatly off target, and that the laser radar sensor is aiming at something different. Check the installation condition of the laser radar sensor.

- (7) Return the reflector to the original position and read the current angle.

Standard

Display	Angle
UPPER/LOWER SIDE	Below 2°
RIGHT/LEFT SIDE	Below 4°

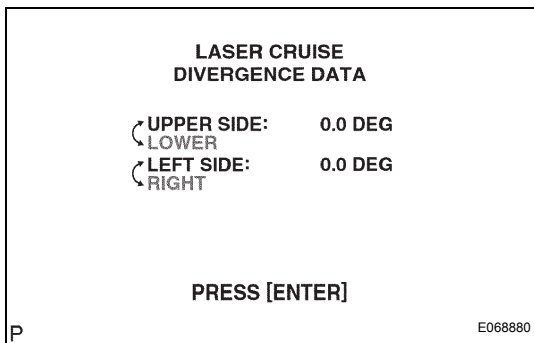
HINT:

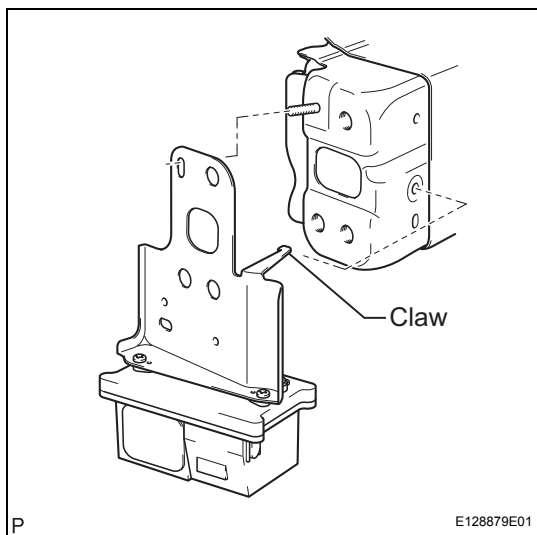
When the values displayed on the screen are normal, the values should be within the above standard value ranges. If any value is out of the range, check the installation condition of the bumper reinforcement, etc. as it cannot be adjusted automatically.

- (8) Turn the headlight dimmer switch to the TAIL position.
- (9) Beam axis adjustment will be performed automatically.
- (10) When the adjustment is completed, the UPPER/ LOWER SIDE and RIGHT/LEFT SIDE indicators show 0 and the system beeps for 10 seconds. During this time, UPPER and LOWER flash alternately on the screen, and LEFT and RIGHT flash alternately on the screen.

NOTICE:

Adjustment values are calculated and then stored in the laser sensor. As the system is not controlled mechanically, the same value as before is displayed to adjust the beam axis.





INSTALLATION

1. INSTALL LASER SENSOR

- (a) Install the laser sensor so that the claw contacts the flat surface around the hole on the front bumper mounting reinforcement.

NOTICE:

Do not insert the claw into the hole on the front bumper mounting reinforcement.

- (b) Engage the clamp.

2. INSTALL FRONT BUMPER REINFORCEMENT (See page [ET-4](#))