

CRUISE CONTROL SYSTEM

PRECAUTION

NOTICE:

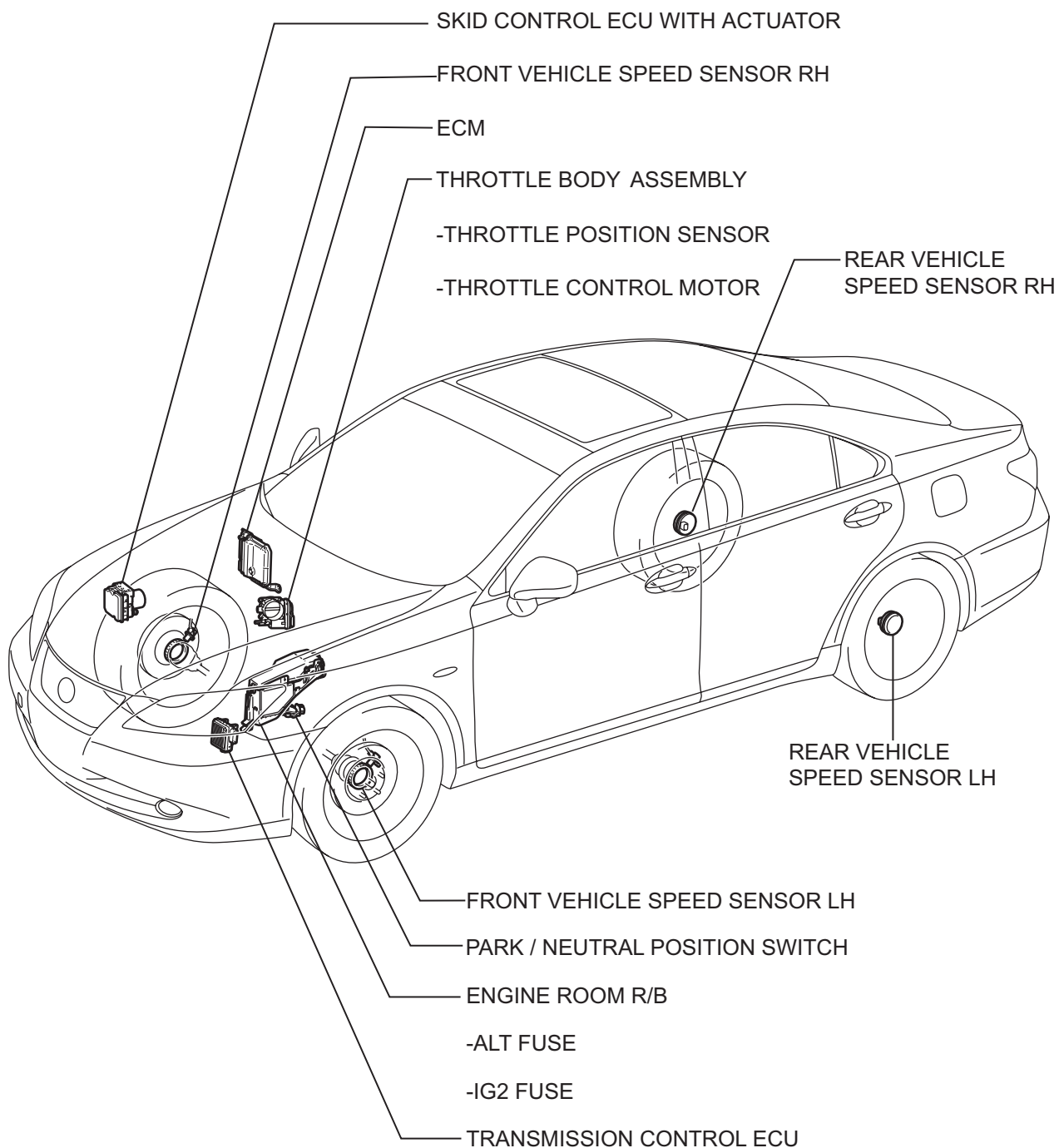
Some systems need to be initialized after reconnecting the negative (-) battery terminal (See page [IN-33](#)).

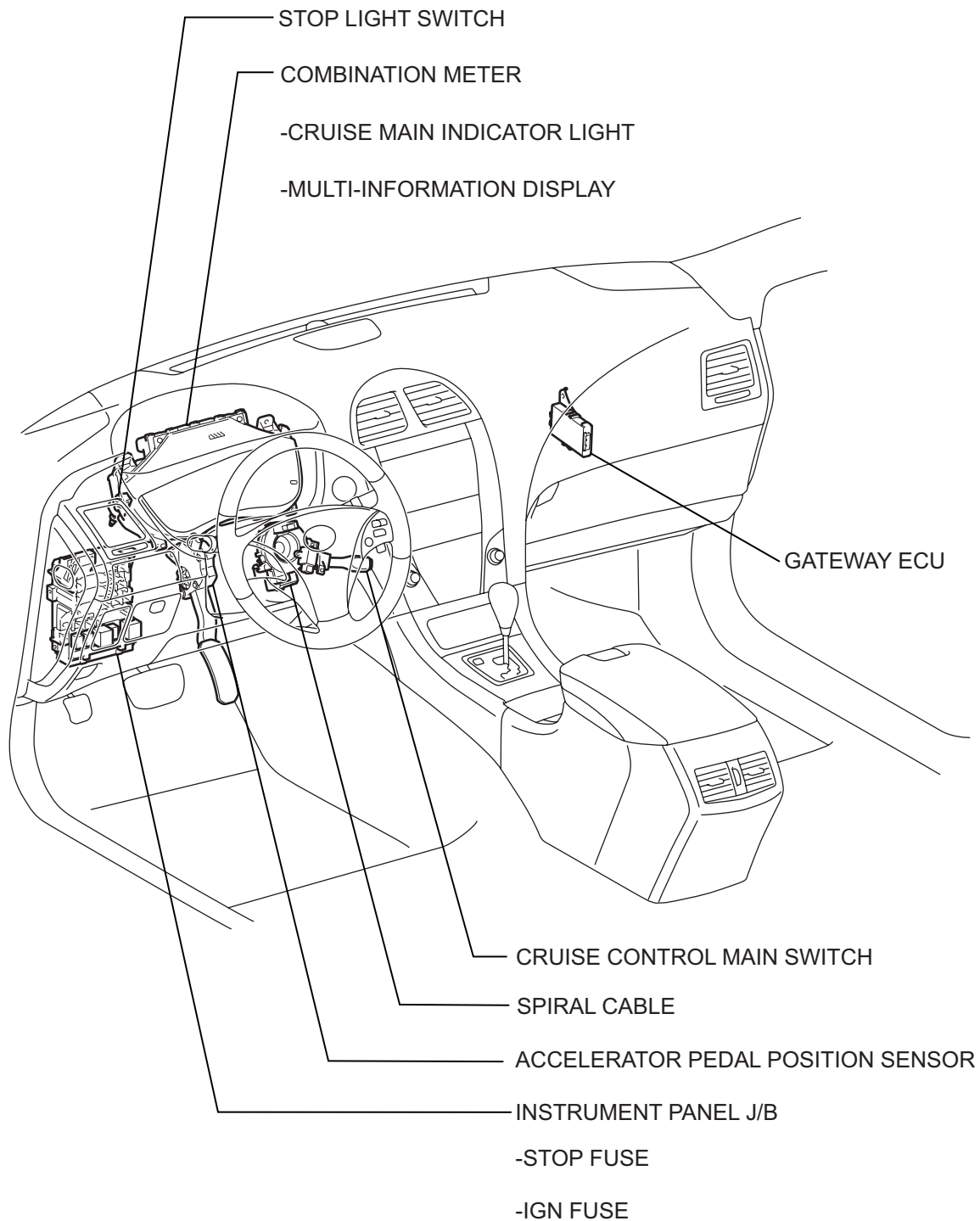
1. HANDLING PRECAUTION FOR CRUISE CONTROL SYSTEM

- (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 + (ACCEL)/RES (RESUME) operation changes according to the cruise control system status. When the cruise control system is operating, the + (ACCEL) function operates. When the cruise control system is not operating, the RES (RESUME) function operates.
- (d) If the CRUISE main indicator light blinks while the cruise control system is operating, 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 decline
 - Roads with sharp turns
 - Icy or snowy roads
 - Slippery roads

CC

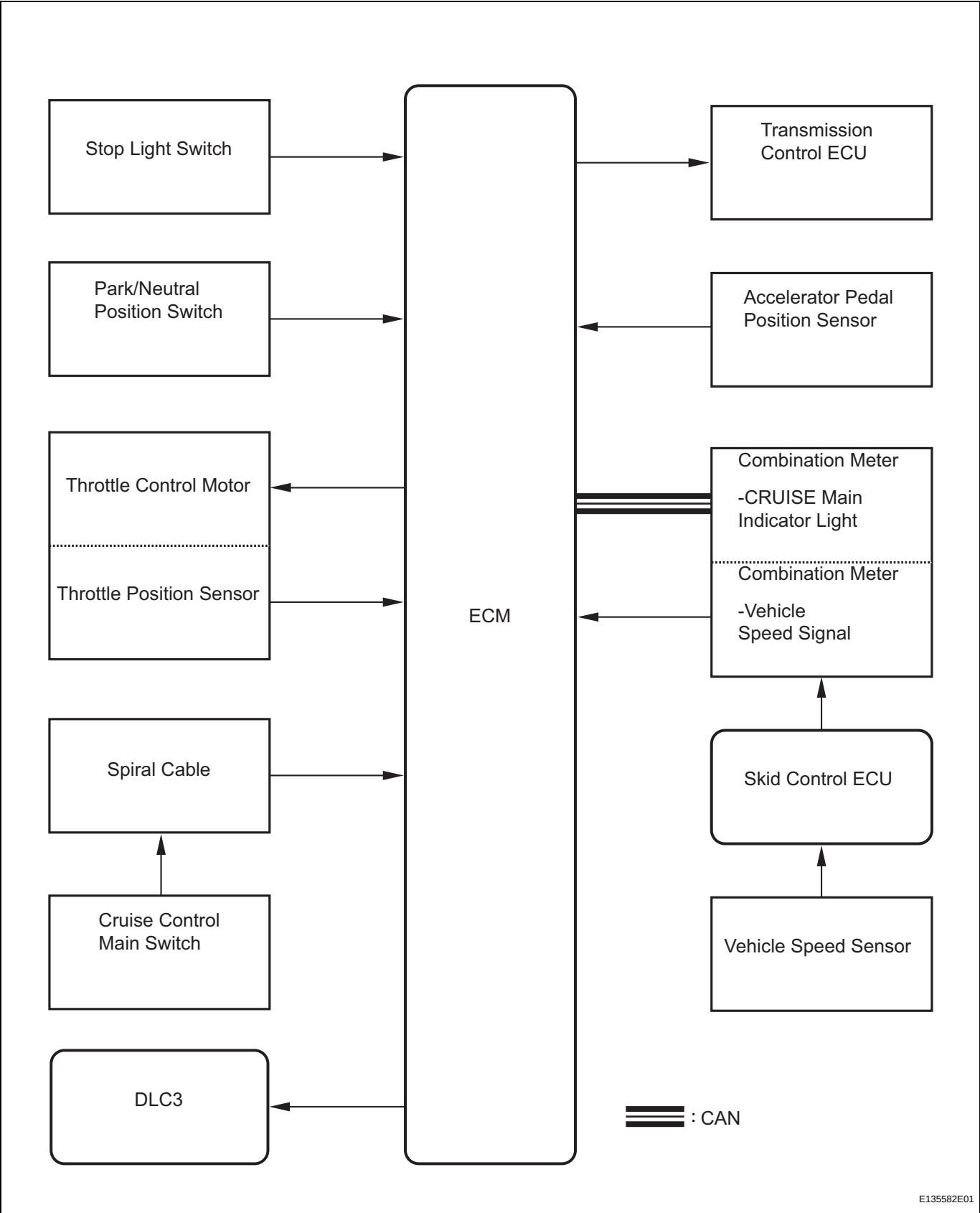
PARTS LOCATION





CC

SYSTEM DIAGRAM



Communication Table:

Sender	Receiver	Signal	Line
ECM	Combination Meter ECU	CRUISE main indicator operation signal	CAN (V Bus)

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, - (COAST)/SET, + (ACCEL)/RES (RESUME), CANCEL, vehicle speed operation, motor output control, and shift down control.

- The ECM compares the driving vehicle speed from the speed sensor with the stored vehicle speed set through the cruise control main switch. The ECM instructs the throttle valve motor of the throttle body assembly to close the valve when the driving speed is greater than the stored speed, and instructs it to open the valve when the driving speed is less than the stored speed.
- The ECM receives signals such as ON-OFF, - (COAST)/SET, + (ACCEL)/RES (RESUME), and CANCEL from the cruise control main switch and executes the command.
- The ECM illuminates the combination meter's CRUISE main indicator light when it receives a cruise control main switch ON signal.
- The ECM cancels the cruise control system when the brake pedal is depressed and the ECM receives a stop light switch signal.
- The ECM cancels the cruise control system when the shift lever is moved from the D to the N position or the transmission is shifted to the 3rd, 2nd, or 1st gear with the shift lever in the S position, and the ECM receives a park/neutral position 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 when the vehicle speed decreases below the low speed limit of 40 km/h (25 mph) while the cruise control is in operation.

(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, + (ACCEL)/RES (RESUME) 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, RES (RESUME), + (ACCEL), TAP-UP, and CANCEL. The SET, TAP-DOWN, and - (COAST) functions, and the RES (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 the direction of each arrow and turns off after releasing it.

(a) SET CONTROL

Vehicle speed is stored and constant speed control is maintained when pushing the cruise control main switch to - (COAST)/SET while driving with the 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 - (COAST)/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 - (COAST)/SET (for approximately 0.6 seconds) 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 - (COAST)/SET and the difference between the driving and stored vehicle speed is more than 5 km/h (3 mph), the driving vehicle speed is stored and constant speed control is maintained.

(d) ACCELERATION CONTROL

The throttle valve motor of the throttle body assembly is instructed by the ECM to open the throttle valve when + (ACCEL)/RES (RESUME) 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 + (ACCEL)/RES (RESUME), 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 + (ACCEL)/RES (RESUME) (for approximately 0.6 seconds) 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 mph), the stored vehicle speed will not be changed.

(f) RESUME CONTROL

If cruise control operation was canceled under any of the manual cancel conditions (other than turning the cruise control main switch off), and if driving speed is above the low speed limit, pushing the cruise control main switch to + (ACCEL)/RES (RESUME) 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).

- Pulling the cruise control main switch to CANCEL
- Depressing the brake pedal
- The shift lever is moved from the D to the N position or the transmission is shifted to the 3rd, 2nd, or 1st gear with the shift lever in the S position.
- Turning the cruise control main switch off (the stored vehicle speed in the ECM is not maintained).

4. AUTO CANCEL (FAIL-SAFE)

This system has an automatic cancellation function (fail-safe) (See page [CC-15](#)).

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the cruise control system.
- *: Use the intelligent tester.

1 VEHICLE BROUGHT TO WORKSHOP

NEXT

2 PROBLEM SYMPTOM CONFIRMATION

NEXT

3 CHECK CAN COMMUNICATION SYSTEM*

Refer to 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

4 DTC CHECK AND CLEAR*

Refer to DTC CHECK / CLEAR (See page [CC-15](#)).

NEXT

5 DTC CHECK (OTHER THAN CAN SYSTEM DTC)*

Result

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

A

GO TO STEP 7

B

6

DTC CHART

Refer to DIAGNOSTIC TROUBLE CODE CHART (See page [CC-17](#)).

NEXT

GO TO STEP 10

CC

7

PROBLEM SYMPTOM CONFIRMATION

Result

Result	Proceed to
Symptom occurs	A
Symptom does not occur	B

A

GO TO STEP 9

B

8

SYMPTOM SIMULATION

Refer to SYMPTOM SIMULATION (See page [IN-39](#)).

NEXT

Go to step 7

9

PROBLEM SYMPTOMS TABLE

Refer to PROBLEM SYMPTOMS TABLE (See page [CC-11](#)).

NEXT

10

CIRCUIT INSPECTION

NEXT

11

TERMINALS OF ECM

Refer to TERMINALS OF ECM (See page [CC-13](#)).

NEXT

12 IDENTIFICATION OF PROBLEM

NEXT

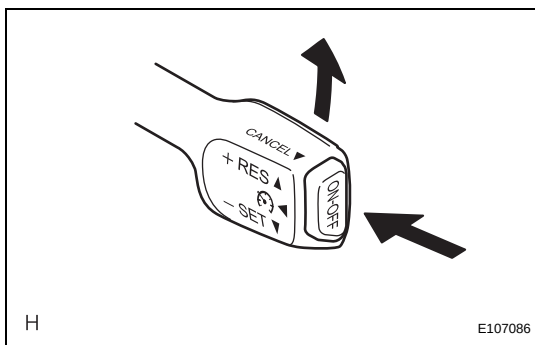
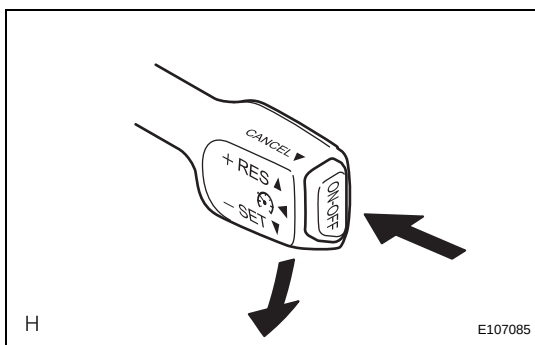
13 REPAIR OR REPLACE

NEXT

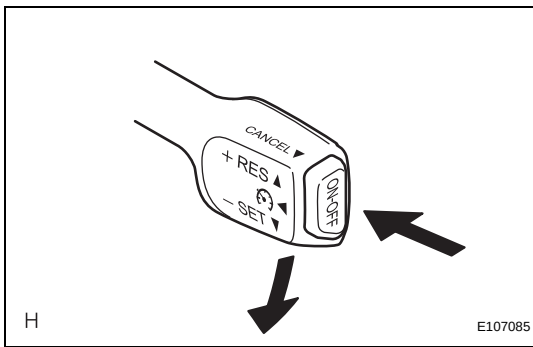
14 CONFIRMATION TEST

NEXT

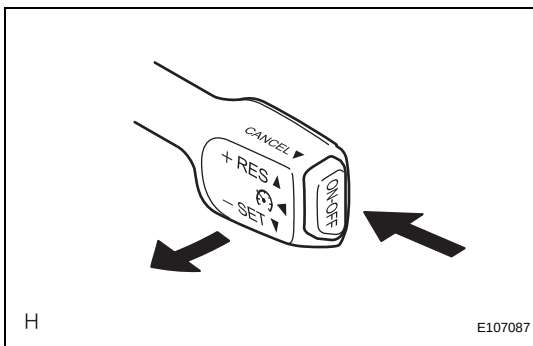
END

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

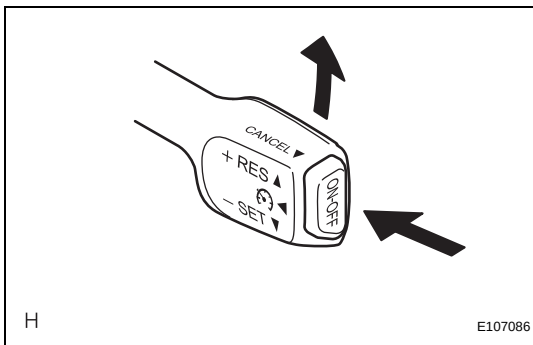
- (a) Inspect the SET function.
 - (1) Turn the cruise control main switch on.
 - (2) Drive at the required speed between 40 km/h (25 mph) and 200 km/h (125 mph).
 - (3) Push the cruise control main switch to - (COAST)/SET.
 - (4) After releasing the switch, check that the vehicle cruises at the set speed.
- (b) Inspect the ACCELERATION function.
 - (1) Turn the cruise control main switch on.
 - (2) Drive at the required speed between 40 km/h (25 mph) and 200 km/h (125 mph).
 - (3) Push the cruise control main switch to - (COAST)/SET.
 - (4) Check that vehicle speed increases while the cruise control main switch is pushed to + (ACCEL)/RES (RESUME), and that the vehicle cruises at the newly set speed when the switch is released.
 - (5) Push the cruise control main switch to + (ACCEL)/RES (RESUME) and then release it immediately. 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 cruise control main switch on.
 - (2) Drive at the required speed between 40 km/h (25 mph) and 200 km/h (125 mph).
 - (3) Push the cruise control main switch to - (COAST)/SET.
 - (4) Check that vehicle speed decreases while the cruise control main switch is pushed to - (COAST)/SET, and the vehicle cruises at the newly set speed when the switch is released.
 - (5) Push the cruise control main switch to - (COAST)/SET, and then release it immediately. 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 cruise control main switch on.
 - (2) Drive at the required speed between 40 km/h (25 mph) and 200 km/h (125 mph).
 - (3) Push the cruise control main switch to - (COAST)/SET.
 - (4) When performing any one of the following, check that the cruise control system is canceled and that the normal driving mode is reset.
 - Pulling the cruise control main switch to CANCEL
 - Depressing the brake pedal
 - The shift lever is moved from the D to the N position or the transaxle is shifted to the 3rd, 2nd, or 1st gear with the shift lever in the S position.
 - Turning the cruise control main switch off



- (e) Inspect the RES (RESUME) function.
- (1) Turn the cruise control main switch on.
 - (2) Drive at the required speed between 40 km/h (25 mph) and 200 km/h (125 mph).
 - (3) Push the cruise control main switch to - (COAST)/SET.
 - (4) Cancel the cruise control system by performing any of the above operations (other than turning the main switch off).
 - (5) After pushing the cruise control main switch to + (ACCEL)/RES (RESUME) at a driving speed of more than 40 km/h (25 mph), check that the vehicle resumes the speed set prior to the cancellation.

PROBLEM SYMPTOMS TABLE

HINT:

Be sure to perform the SYMPTOM SIMULATION procedure before replacing the ECM. If these symptoms do not persist, the cause of the problem may be a poor intermittent electrical contact (open or short) of a wire harness or connector.

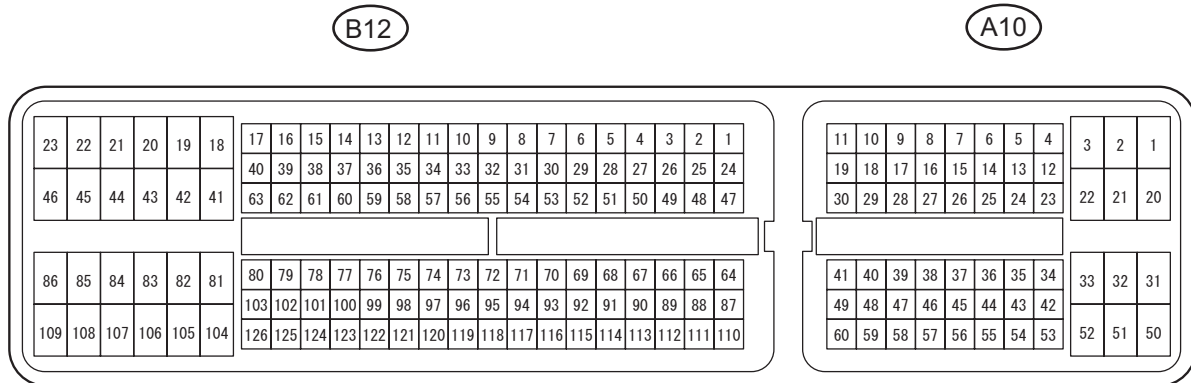
Cruise control system

Symptom	Suspected Area	See page
Vehicle speed cannot be set. (The CRUISE main indicator light comes on.)	1. Cruise control switch circuit	CC-23
	2. Combination meter	ME-14
	3. Vehicle speed sensor circuit	CC-18
	4. Stop light switch circuit	CC-19
	5. Park/Neutral position sensor circuit	AX-170
	6. If the symptoms still occur after the above areas have been inspected and have proven to be normal, replace the ECM.	ES-543
Pushing the ON-OFF button does not turn the cruise control system on. (Vehicle speed cannot be set.)	1. Stop light switch circuit	CC-19
	2. Vehicle speed sensor circuit	CC-18
	3. Cruise control switch circuit	CC-23
	4. Park/Neutral position sensor circuit	AX-170
	5. Combination meter	ME-14
	6. If the symptoms still occur after the above areas have been inspected and have proven to be normal, replace the ECM.	ES-543
Pushing the ON-OFF button does not turn the cruise control system on. (Vehicle speed can be set.)	1. Cruise main indicator light circuit	CC-29
	2. If the symptoms still occur after the above area has been inspected and has proven to be normal, replace the ECM.	ES-543
The cruise control is canceled while it is operating.	1. Stop light switch circuit	CC-19
	2. Park/Neutral position sensor circuit	AX-170
	3. Cruise control switch circuit	CC-23
	4. Vehicle speed sensor circuit	CC-18
	5. If the symptoms still occur after the above areas have been inspected and have proven to be normal, replace the ECM.	ES-543
Pulling back on the control main switch does not cancel the cruise control. (The CRUISE main indicator light remains on.)	1. Cruise control switch circuit	CC-23
	2. If the symptoms still occur after the above area has been inspected and has proven to be normal, replace the ECM.	ES-543
Pulling back on the control main switch does not cancel the cruise control. (The CRUISE main indicator light goes off.)	ECM	ES-543
The cruise control is not canceled when vehicle speed drops below the low speed limit. (The CRUISE main indicator light remains on.)	1. Vehicle speed sensor circuit	CC-18
	2. If the symptoms still occur after the above area has been inspected and has proven to be normal, replace the ECM.	ES-543
The cruise control is not canceled when vehicle speed drops below the low speed limit. (The CRUISE main indicator light goes off.)	ECM	ES-543
Depressing the brake pedal does not cancel the cruise control. (The CRUISE main indicator light remains on.)	1. Stop light switch circuit	CC-19
	2. If the symptoms still occur after the above area has been inspected and has proven to be normal, replace the ECM.	ES-543
Depressing the brake pedal does not cancel the cruise control. (The CRUISE main indicator light goes off.)	ECM	ES-543
Moving the shift lever does not cancel the cruise control.	1. Park/Neutral position switch circuit	AX-170
	2. If the symptoms still occur after the above area has been inspected and has proven to be normal, replace the ECM.	ES-543
Hunting (Speed is not constant.)	1. Vehicle speed sensor circuit	CC-18
	2. If the symptoms still occur after the above area has been inspected and has proven to be normal, replace the ECM.	ES-543

Symptom	Suspected Area	See page
The CRUISE main indicator light remains blinking.	1. TC and CG terminal circuit	CC-30
	2. If the symptoms still occur after the above area has been inspected and has proven to be normal, replace the ECM.	ES-543

TERMINALS OF ECM

1. CHECK ECM



A107881E57

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
A10-27 (TC) - B12-81 (E1)	P - W-B	Ground	Engine switch on (IG)	10 to 14 V
A10-27 (TC) - B12-81 (E1)	P - W-B	Ground	Connect terminals TC and CG of DLC3	Below 1 V
A10-36 (STP) - B12-81 (E1)	W - W-B	Stop light signal	Engine switch on (IG), Depress brake pedal	10 to 14 V
A10-36 (STP) - B12-81 (E1)	W - W-B	Stop light signal	Engine switch on (IG), Release brake pedal	Below 1 V
A10-35 (ST1-) - B12-81 (E1)	GR - W-B	Stop light signal	Engine switch on (IG), Depress brake pedal	Below 1 V
A10-35 (ST1-) - B12-81 (E1)	GR - W-B	Stop light signal	Engine switch on (IG), Release brake pedal	10 to 14 V
A10-40 (CCS) - B12-81 (E1)	W - W-B	Cruise control main switch circuit	Engine switch on (IG)	10 to 14 V
A10-40 (CCS) - B12-81 (E1)	W - W-B	Cruise control main switch circuit	Engine switch on (IG), CANCEL switch ON	6.6 to 10.1 V
A10-40 (CCS) - B12-81 (E1)	W - W-B	Cruise control main switch circuit	Engine switch on (IG), SET/COAST switch ON	4.5 to 7.1 V
A10-40 (CCS) - B12-81 (E1)	W - W-B	Cruise control main switch circuit	Engine switch on (IG), RES/ACC switch ON	2.3 to 4.0 V
A10-40 (CCS) - B12-81 (E1)	W - W-B	Cruise control main switch circuit	Engine switch on (IG), MAIN switch ON	Below 1 V

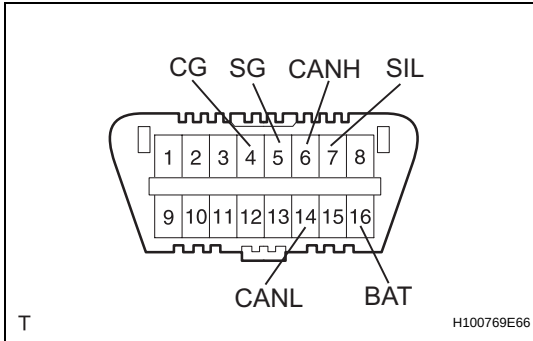
DIAGNOSIS SYSTEM

1. DESCRIPTION

The ECM 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 or CRUISE OK is not displayed on the multi-information display on the combination meter when checking for DTCs, there may be a problem with either the combination meter or the CAN communication system. Use the intelligent tester to check and solve the problem.

2. CHECK DLC3

- (a) The ECU uses ISO 15765-4 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.



Symbols (Terminals 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	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Engine switch off*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Engine switch off*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Engine switch off*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Engine switch off*	6 k Ω or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Engine switch off*	6 k Ω or higher

NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the engine switch, any other switches or the doors.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

HINT:

Connect the cable of the intelligent tester to the DLC3, turn the engine switch on (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.

Cruise Main Indicator Light Circuit

DESCRIPTION

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

INSPECTION PROCEDURE

1 PERFORM ACTIVE TEST USING INTELLIGENT TESTER

- (a) Connect the intelligent tester to the DLC3.
- (b) Check the CRUISE main indicator light by performing ACTIVE TEST.

Combination meter

Tester Display	Test Part	Control Range	Diagnostic Note
CRUISE INDIC	Turns CRUISE main indicator light	ON / OFF	-

OK:

Indicator light comes on / goes off.

NG

REPLACE COMBINATION METER ASSEMBLY (See page [ME-67](#))

OK

2 READ VALUE ON INTELLIGENT TESTER

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

ECM (Cruise control):

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

OK:

When the cruise control main switch is operated, the display changes as shown above.

NG

REPLACE ECM (See page [ES-543](#))

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

TC and CG Terminal Circuit

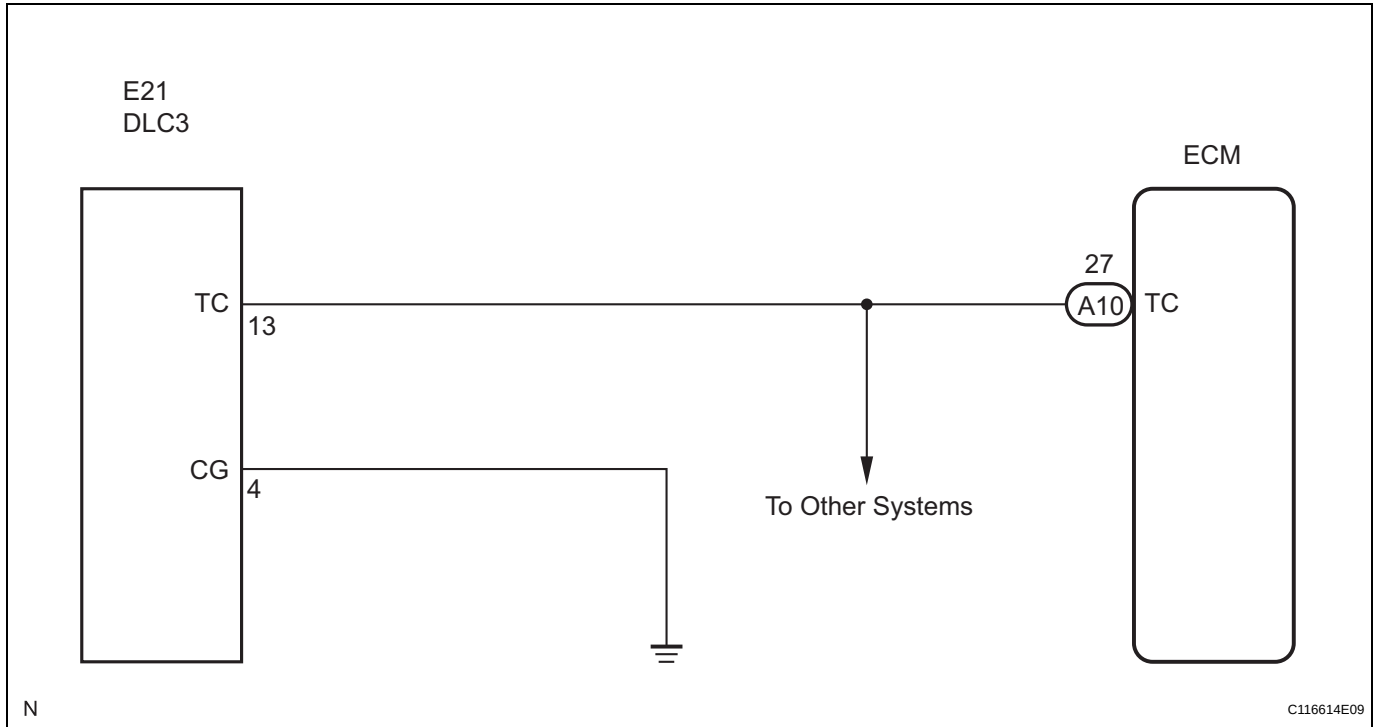
DESCRIPTION

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.

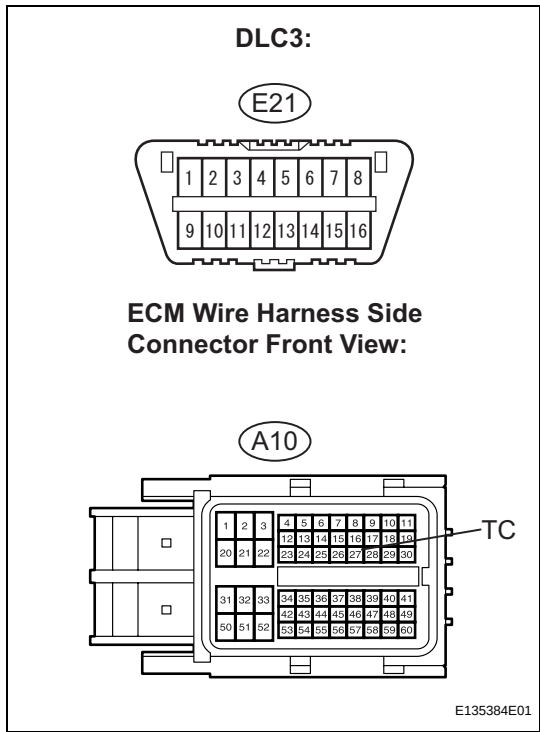
WIRING DIAGRAM

**CC**

INSPECTION PROCEDURE

1

CHECK WIRE HARNESS (TERMINAL TC of DLC3 - ECM)



- (a) Disconnect the A10 connector from the ECM.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A10-27 (TC) - E21-13 (TC)	Always	Below 1 Ω

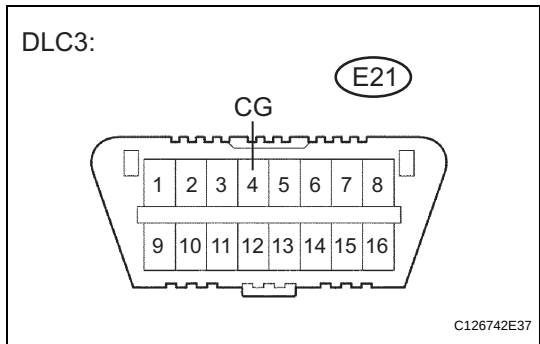
NG

REPAIR OR REPLACE HARNESS OR CONNECTOR (DLC3 - ECM)

OK

2

CHECK WIRE HARNESS (TERMINAL 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
E21-4 (CG) - Body ground	Always	Below 1 Ω

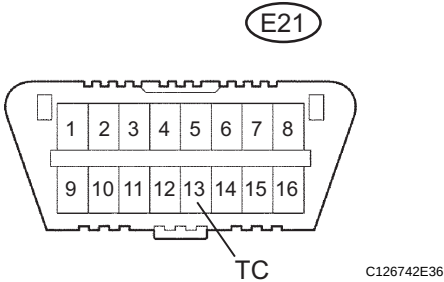
NG

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

OK

3 CHECK WIRE HARNESS (TERMINAL TC 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
E21-13 (TC) - Body ground	Always	10 kΩ or higher

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR OR EACH ECU

OK

CC

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

DYNAMIC RADAR CRUISE CONTROL SYSTEM

PRECAUTION

NOTICE:

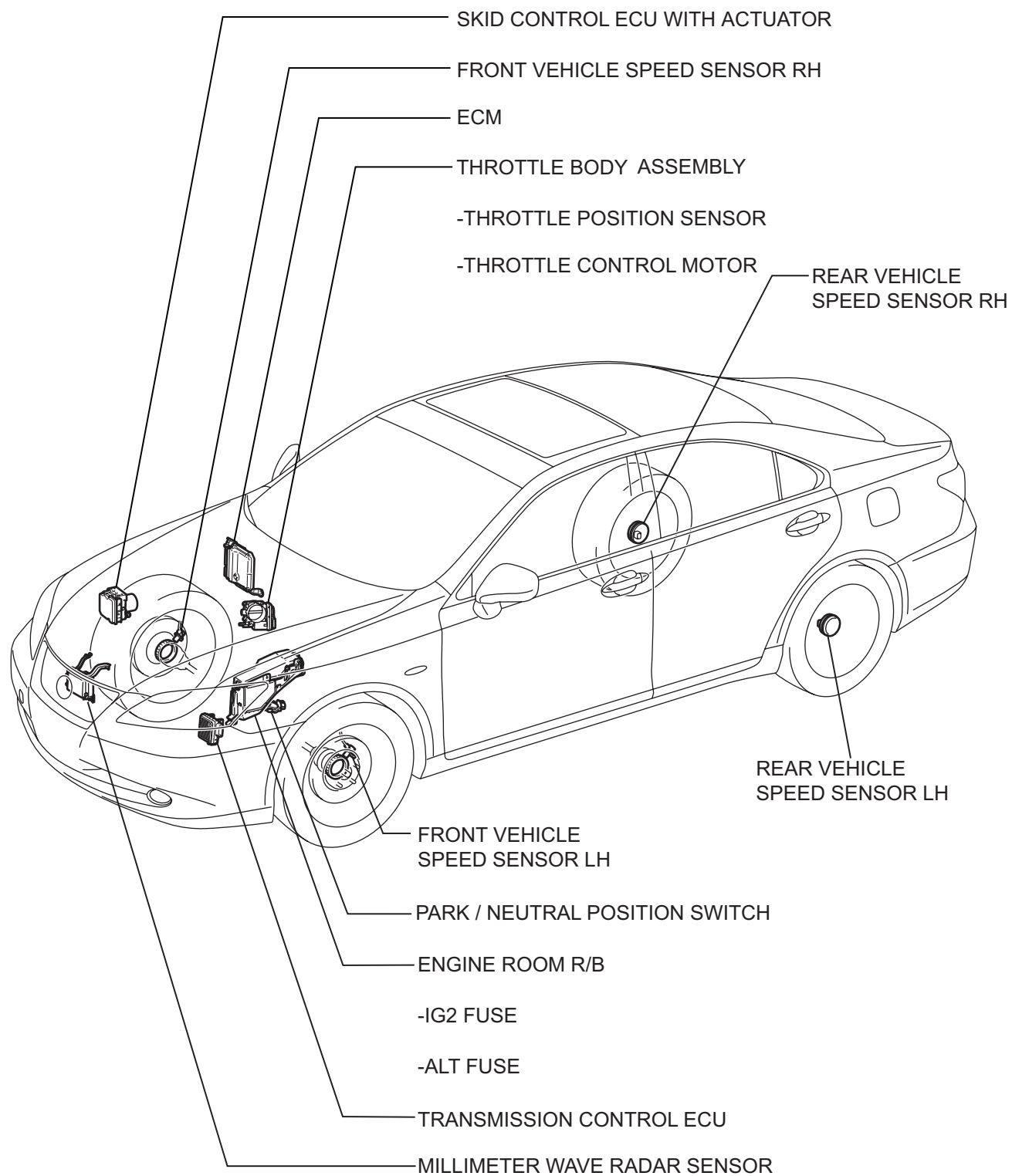
Some systems need to be initialized after reconnecting the negative (-) battery terminal (See page IN-33).

Keep in mind the following points when inspecting the dynamic radar 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 can automatically detect dirt on the sensor face and inform the driver, but dirt may not always be detected. 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.

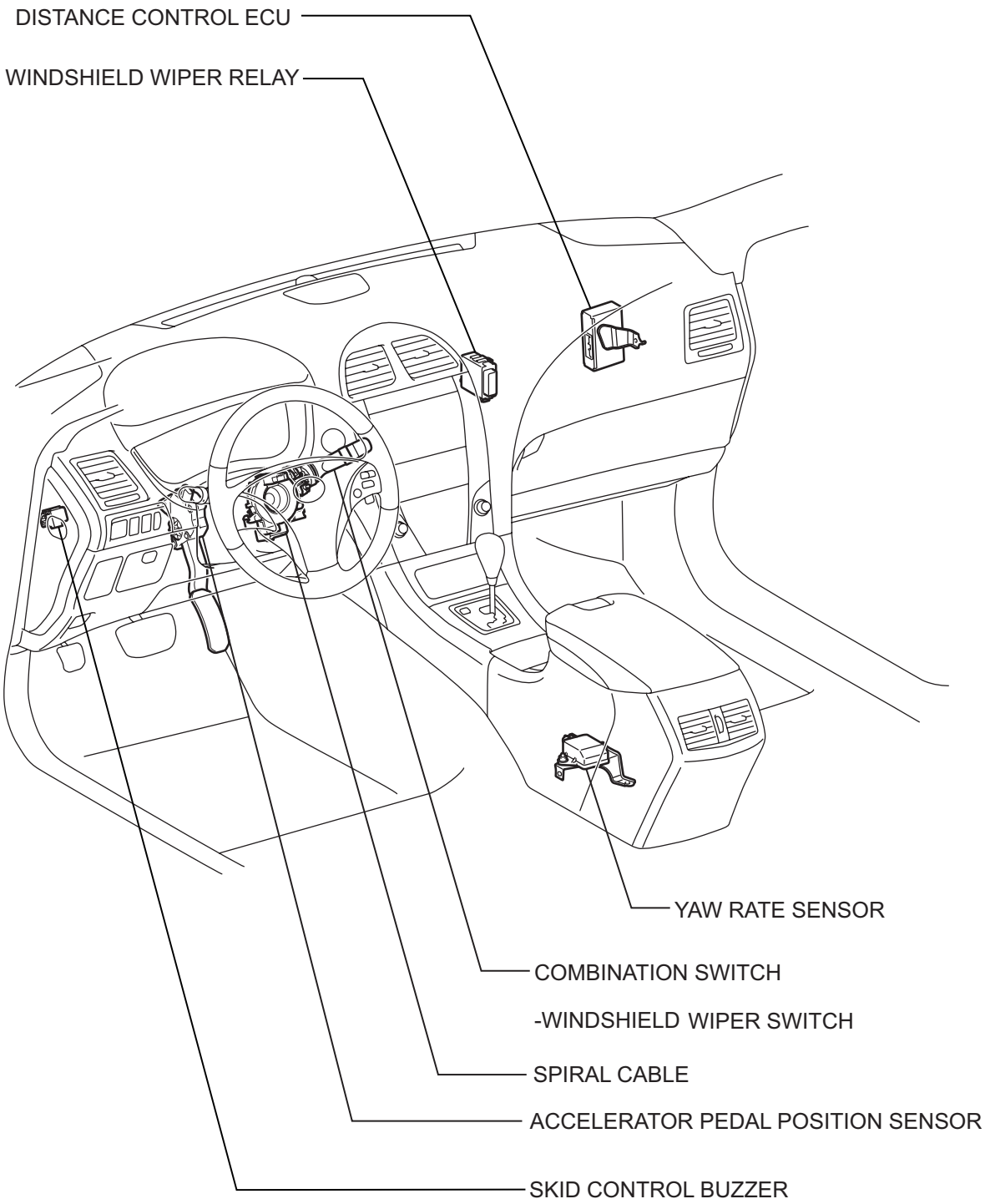
- The cruise control main switch must be turned OFF and then ON if all of the following occur: 1) the CRUISE main indicator light blinks, 2) the master warning light illuminates at the same time as a "pong" sound, and 3) the fail message is shown on the display.
- The vehicle-approaching warning buzzer 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.

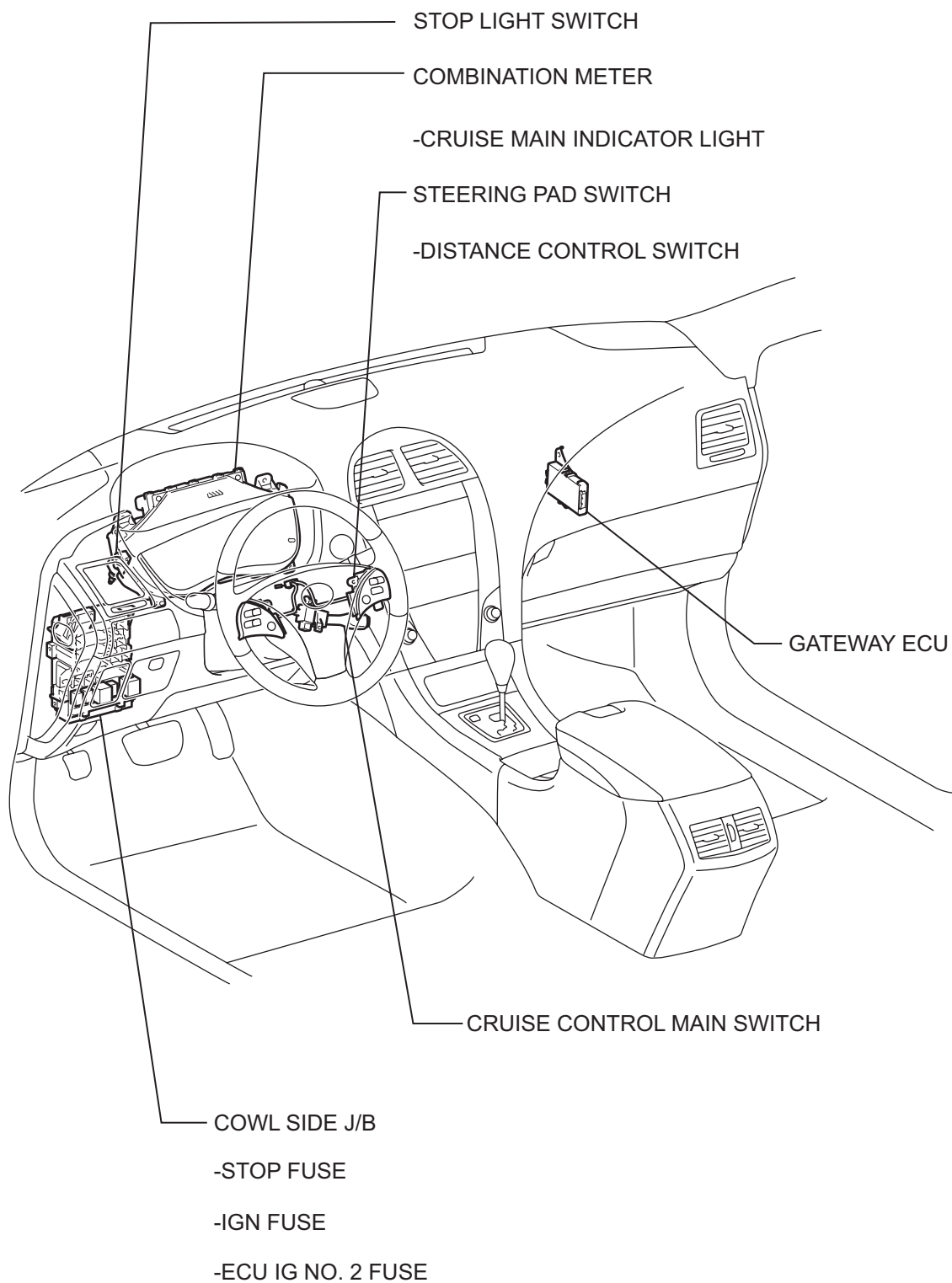
PARTS LOCATION



CC

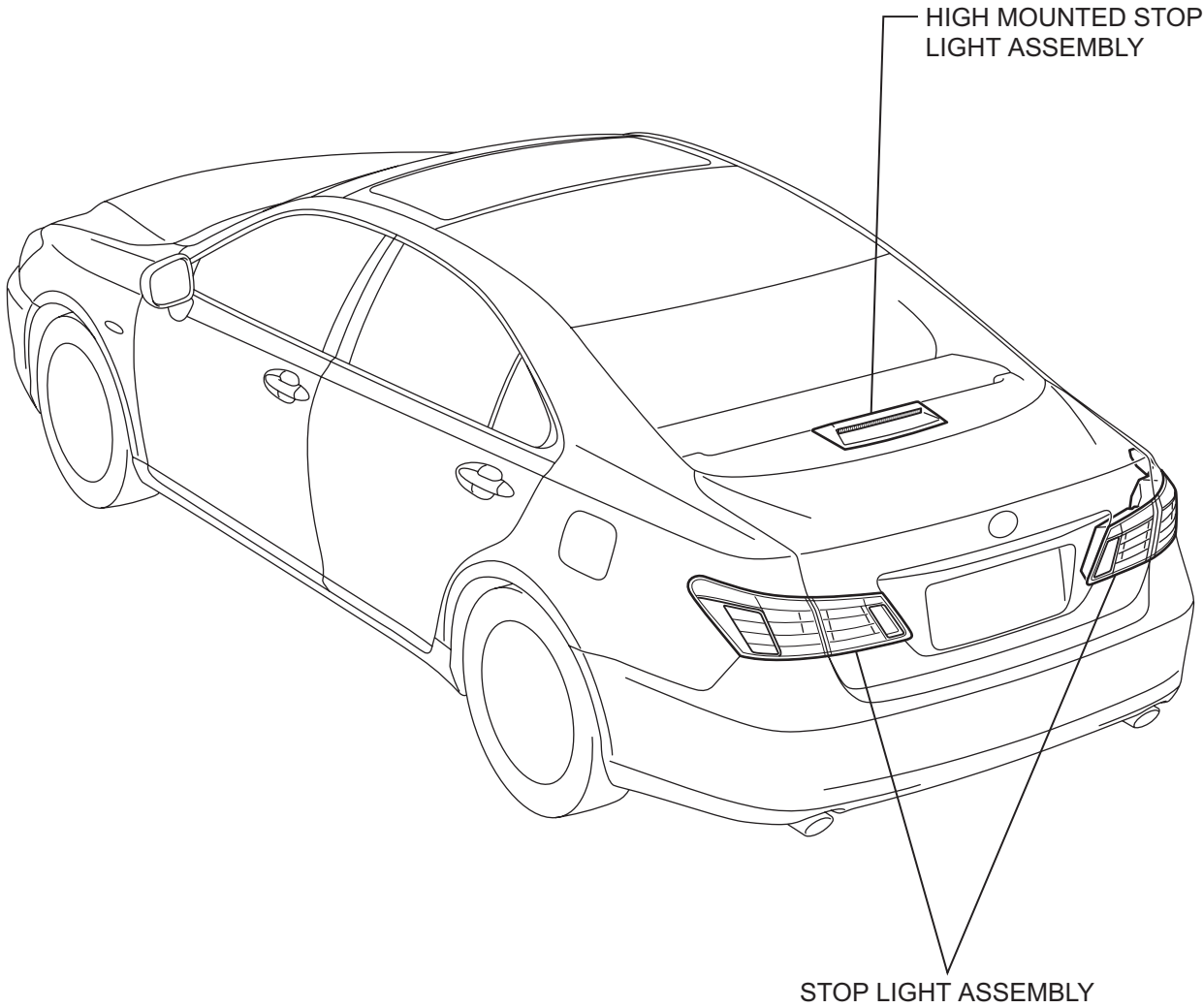
CC

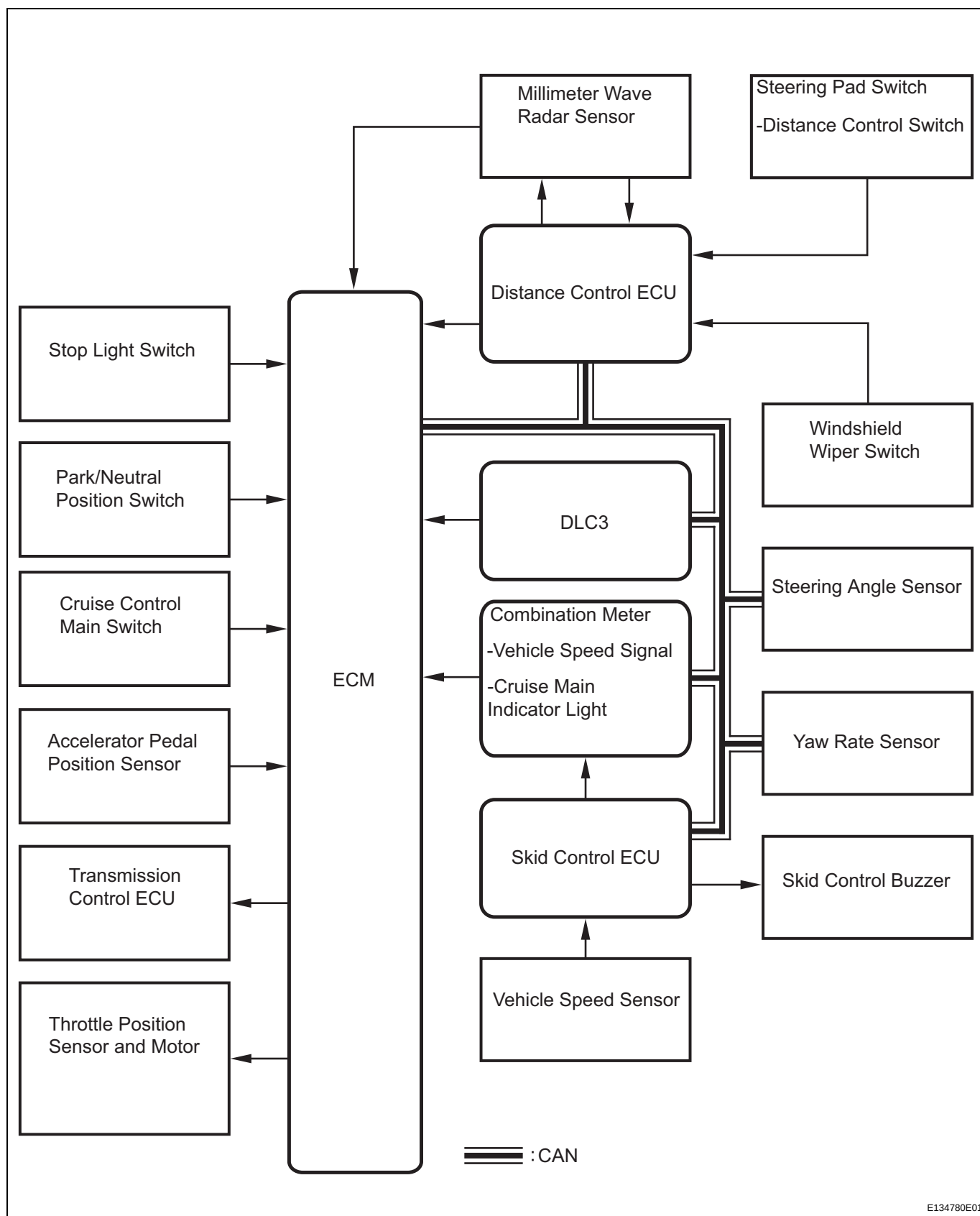




CC

CC





Communication table

Sender ECU	Receiver ECU	Signal	Line
ECM	Distance Control ECU	• A/T transmission signal • Cruise control operation signal • Accelerator pedal idle signal • Set vehicle distance signal • Brake demand response signal • Stored vehicle speed signal • Current vehicle speed signal • Cruise control switch signal • Brake control operation signal • Dynamic radar cruise designation signal • Brake control interrupting signal • Cruise control demand opening angle signal	CAN
Distance Control ECU	ECM	• Millimeter wave radar sensor beam axis deviation signal • Millimeter wave radar sensor malfunction signal • Dirt present on millimeter wave radar sensor signal • Bad weather detection signal • Communication error signal (from distance control ECU to millimeter wave radar sensor) • Communication error signal (from ECM to distance control ECU) • Communication error signal (from skid control ECU to distance control ECU) • Yaw rate communication error signal • Steering angle sensor communication error signal • Distance control ECU voltage signal • Dynamic radar cruise designation response signal • Estimated vehicle speed signal • Vehicle-to-vehicle distance signal • Vehicle-to-vehicle distance control signal • Brake control demand signal • Throttle fully closed demand signal • Approach warning signal (Skid control buzzer demand signal) • Cruise target deceleration gradient signal • Vehicle-to-vehicle distance control acceleration signal • Downshift demand signal	CAN
ECM	Skid Control ECU	• Cruise target deceleration gradient signal • Cruise target deceleration signal • Throttle fully closed demand signal • Brake control demand signal • Cruise control operation signal	CAN

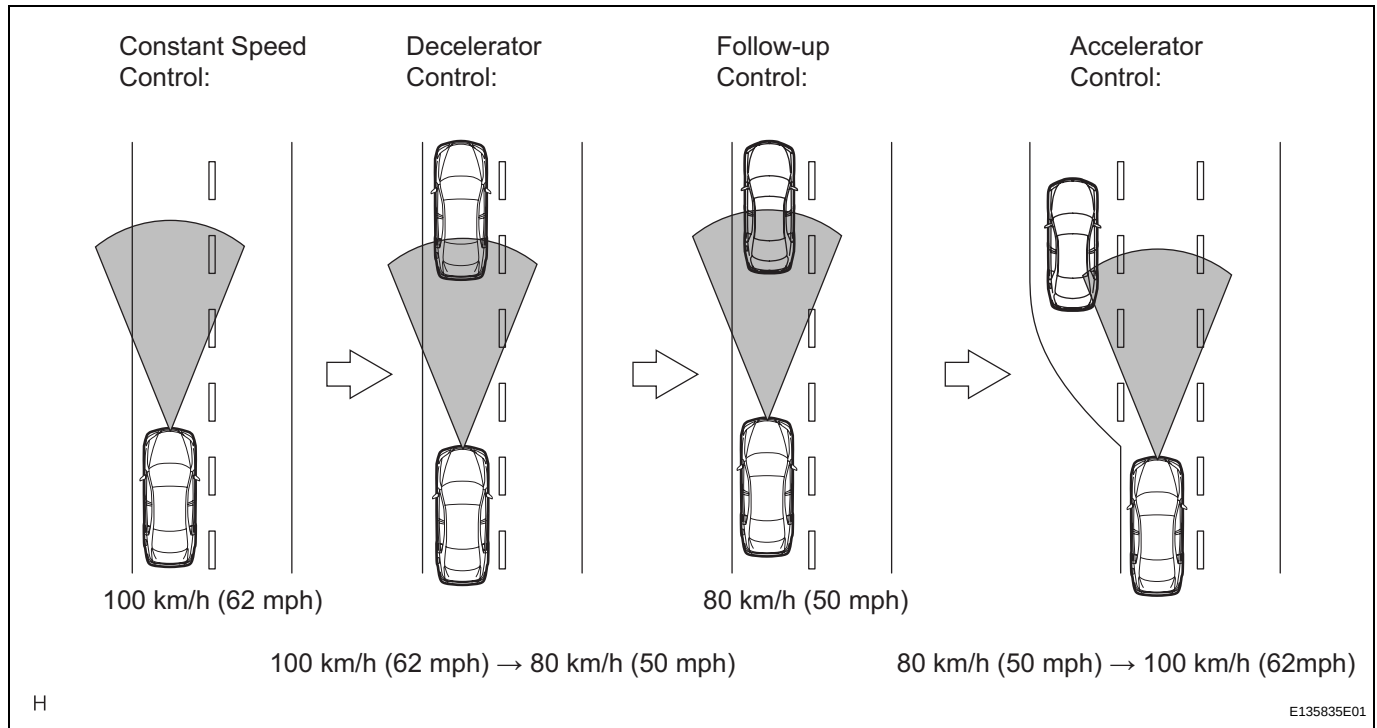
Sender ECU	Receiver ECU	Signal	Line
Skid Control ECU	Distance Control ECU	- Wheel speed signal - Speed sensor power drop signal - Speed sensor condition signal - Yaw rate sensor signal - Yaw rate sensor zero point error signal	CAN
Skid Control ECU	ECM	- Brake component malfunction signal - Brake control malfunction signal - Drive wheel slip signal - Cruise control cancel signal - Skid control buzzer malfunction signal - Communication logic error signal (from ECM to skid control ECU) - Brake demand response signal - Brake control interrupting signal - Brake control operation signal	CAN
Steering Angle Sensor	Distance Control ECU	+B open circuit signal - Sensor malfunction signal - Steering angle signal - Sensor zero point signal	CAN
Yaw Rate Sensor	Distance Control ECU	- Yaw rate sensor signal - Yaw rate sensor voltage signal	CAN
ECM	Combination Meter (Meter ECU)	- Cruise control diagnosis signal (DTC) - Preceding vehicle detection signal - Approach warning signal - Vehicle-to-vehicle distance signal - Dirt present on millimeter wave radar sensor 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 radar cruise warning signal - Cruise control vehicle speed signal	CAN
Distance Control ECU	Combination Meter (Meter ECU)	- Vehicle-to-vehicle distance signal - Preceding vehicle detection signal	CAN

SYSTEM DESCRIPTION

1. GENERAL

- (a) 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 the dynamic radar cruise control system.
 - Operation of the constant speed control mode is the same as that for a conventional 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 driving 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 constant speed cruising function, deceleration cruising function, follow-up cruising function, and acceleration cruising function.
- (d) The millimeter wave radar sensor and the distance 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 radar 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 presence of a vehicle in front and the distance to it based on the signals from the radar 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).



HINT:

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

2. FUNCTION OF MAIN COMPONENTS

Item	Outline
Combination Meter (CRUISE Main Indicator Light)	• Comes on when the main switch is ON • If the distance control ECU detects a malfunction, this light flashes to warn the driver
Combination Meter (Master Warning Light)	If the ECM or distance control ECU detects an automatic cancel signal while the vehicle is operating under cruise control, this light comes on to inform the driver
Combination Meter (Buzzer)	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 (Multi-information Display)	• While the system is in the vehicle-to-vehicle distance control mode, the multi-information display receives signals from the distance control ECU, in order to display system conditions in the graphic area • If the ECM or distance control ECU detects a malfunction signal while the vehicle is operating under cruise control, a warning message will be displayed in the warning area to inform the driver • While the system is in the radar sensor adjustment mode, the adjustment angle detected by the distance control ECU will be displayed in the warning area to inform the driver
Cruise Control Main Switch (Main Switch)	Turns the cruise control system ON/OFF
Cruise Control Main Switch (Control Switch)	• 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: constant speed control mode and vehicle-to-vehicle distance control mode

Item	Outline
Steering Pad Switch (Distance Control Switch)	While the system is in the vehicle-to-vehicle distance control mode, the driver can operate the steering pad switch (distance control switch) to select the vehicle-to-vehicle distance in three stages: long, middle, and short
Stop Light Switch	Detects the depression of the brake pedal and transmits its signal to the ECM
Combination Switch (Wiper Switch)	Transmits wiper control switch information to the distance control ECU
Millimeter Wave Radar Sensor	Radiates radar rays forward, uses the reflected rays for detecting the presence of a vehicle in front, vehicle-to-vehicle distance, and relative speed, and transmits this information to the distance control ECU
Steering Angle Sensor	Detects the angle and direction of steering and transmits its signal to the distance control ECU
Vehicle Speed Sensor (SP1)	A vehicle speed signal which is output from the skid control ECU is sent to the ECM via the meter
Yaw Rate Sensor	Detects the yaw rate of the vehicle and transmits its signal to the distance control ECU
Brake Actuator (Skid Control ECU)	• Actuates the brakes in accordance with signals from the skid control ECU • While the system is in the vehicle-to-vehicle distance control mode, the skid control ECU actuates the brake actuator in accordance with a brake request signal received from the distance control ECU • Upon receiving a signal from the distance control ECU, the skid control ECU sounds the skid control buzzer
Skid Control Buzzer	This buzzer sounds upon receiving a signal from the skid control ECU
ECM	• Controls the dynamic radar cruise control system in accordance with signals from switches, sensors, and the distance control ECU • If the ECM detects a malfunction in the dynamic radar cruise control system, it will output DTCs (Diagnostic Trouble Codes)
Throttle Position Sensor and Motor	Upon receiving a signal from the ECM, the throttle control motor actuates the throttle valve
Distance Control ECU	While the system is in the vehicle-to-vehicle distance control mode, the distance control ECU detects a vehicle in front based on a signal from the millimeter wave radar sensor. Then, the 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 (27 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 but the stored vehicle speed will be retained when the vehicle speed drops below the low speed limit of 40 km/h (25 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 will be set at the high speed limit when the cruise control is set and the vehicle speed is over the high speed limit. Also, + (ACCEL)/RES (RESUME) cannot be used to increase speed beyond the high speed limit.

- (c) High speed limit (vehicle-to-vehicle distance control mode)

The highest possible limit of the speed setting range is set at approximately 85 mph in USA and 135 km/h in Canada.

4. CRUISE CONTROL OPERATION

The cruise control main switch operates 8 functions: SET, - (COAST), TAP-DOWN, RES (RESUME), + (ACCEL), TAP-UP, CANCEL, and MODE. The SET, TAP-DOWN, and - (COAST) functions, and the RES (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 the direction of each arrow and turns off after releasing it. 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) 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)

The vehicle speed is stored and constant speed control is maintained when pushing the switch to - (COAST)/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)

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

- (d) - (COAST) CONTROL (Constant speed control mode)

When the cruise control main switch is set to - (COAST)/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.

- (e) - (COAST) CONTROL (Vehicle-to-vehicle distance control mode)

When - (COAST)/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 the cruise control main switch to - (COAST)/SET (for approximately 0.6 seconds) while the constant speed control mode is in operation, the stored vehicle speed decreases each time by approximately 1.6 km/h (1 mph). When the cruise control main switch is released from - (COAST)/SET and the difference between the driving and stored vehicle speed is more than 5 km/h (3 mph), the driving vehicle speed is stored and constant speed control is maintained.

- (g) TAP-DOWN CONTROL (Vehicle-to-vehicle distance control mode)

When tapping down the cruise control main switch to - (COAST)/SET (for approximately 0.6 seconds) 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) + (ACCEL) CONTROL (Constant speed control mode)

The throttle valve motor of the throttle position sensor and motor is instructed by the ECM to open the throttle valve when + (ACCEL)/RES (RESUME) on the cruise control main switch is pressed and held while the constant speed control mode is in operation. When the cruise control main switch is released from + (ACCEL)/RES (RESUME), the vehicle speed is stored and constant speed control is maintained.

- (i) + (ACCEL) CONTROL (Vehicle-to-vehicle distance control mode)
When + (ACCEL)/RES (RESUME) 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 + (ACCEL)/RES (RESUME) 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 the cruise control main switch to + (ACCEL)/RES (RESUME) (for approximately 0.6 seconds) 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 the cruise control main switch to + (ACCEL)/RES (RESUME) (for approximately 0.6 seconds) 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 ECM is maintained).
- Pulling the cruise control main switch to CANCEL
 - Depressing the brake pedal
 - The shift lever is moved from the D to the N position or the transaxle is shifted to the 3rd, 2nd, or 1st gear with the shift lever in the S position.
 - Turning the cruise control main switch off (the stored vehicle speed in the ECM is not maintained).
- (m) RES (RESUME) CONTROL (Constant speed control mode)
If cruise control operation was canceled under any of the manual cancel conditions (other than turning the cruise control main switch off and the driving vehicle speed is below the low speed limit), and if driving speed is above the low speed limit, pushing the cruise control main switch to + (ACCEL)/RES (RESUME) restores vehicle speed memorized at the time of cancellation, and maintains constant speed control.

- (n) RES (RESUME) CONTROL (Vehicle to vehicle distance control mode)

If cruise control operation was canceled under any of the manual cancel conditions (other than turning the cruise control main switch off), and if driving speed is above the low speed limit, pushing the cruise control main switch to + (ACCEL)/RES (RESUME) restores vehicle speed memorized at the time of cancellation, and maintains constant speed control.

5. BRAKE CONTROL

The distance control ECU determines the distance to the vehicle in front, relative speed, target decreasing speed, and deceleration rate. Based on these data, the ECU transmits a brake demand signal to the skid control ECU via the ECM.

6. DOWN SHIFT CONTROL

During uphill driving with cruise control, the transmission may downshift due to automatic transmission control. If the system determines that the uphill inclination has become smaller based on the throttle valve opening angle, the transmission will upshift automatically after a certain amount of time has elapsed.

7. AUTO CANCEL (FAIL-SAFE)

This system has an automatic cancellation function (fail-safe) (See page [CC-62](#)).

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the dynamic radar cruise control system.
- *: Use the intelligent tester.

1 VEHICLE BROUGHT TO WORKSHOP

NEXT

2 CUSTOMER PROBLEM ANALYSIS

NEXT

3 PROBLEM SYMPTOM CONFIRMATION

Result

Condition	Proceed to
Symptom occurs	A
Symptom does not occur	B

A

Go to step 4

B

SYMPTOM SIMULATION

4 INSPECT BATTERY VOLTAGE

Standard voltage:

11 to 14 V

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

NEXT

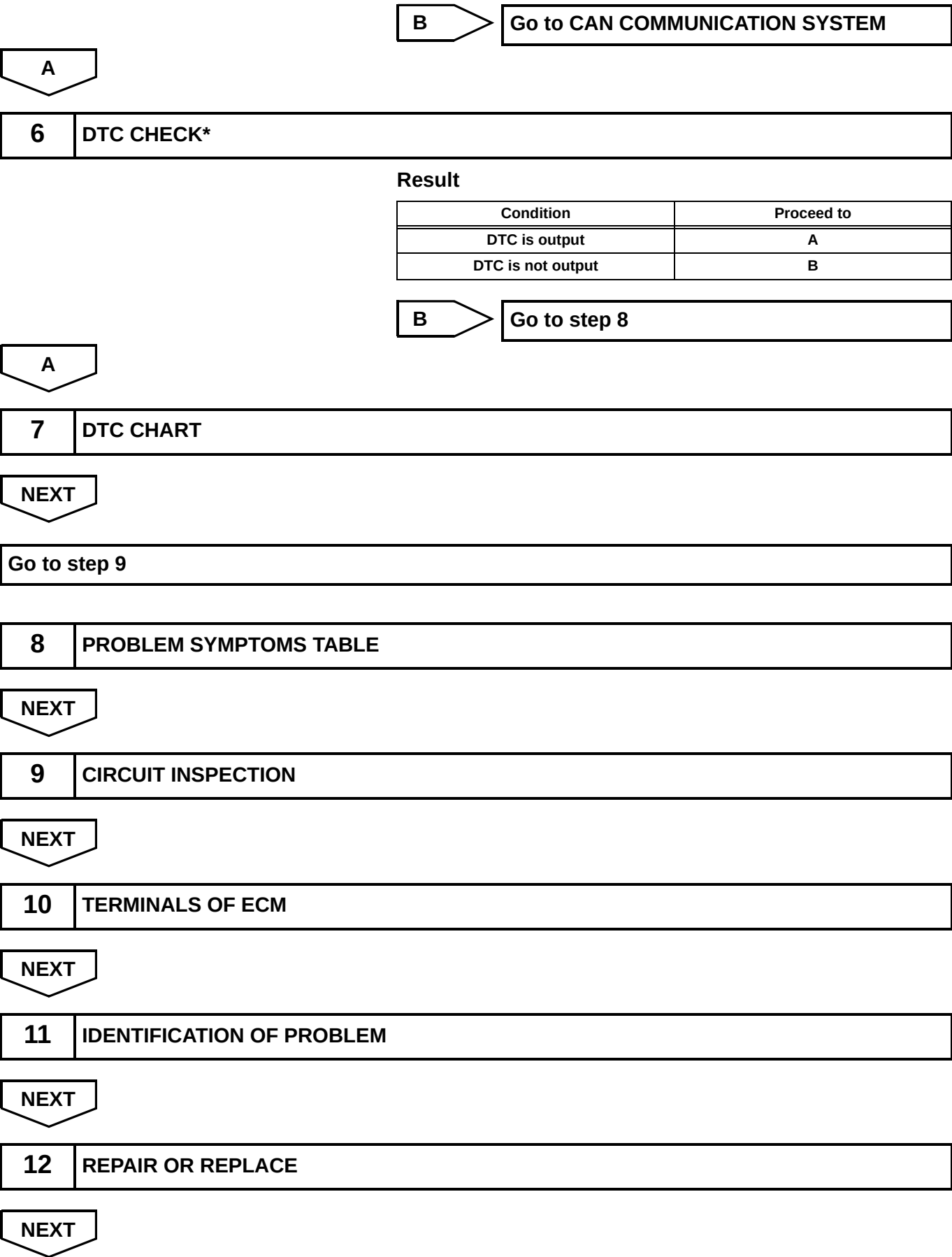
5 CHECK CAN COMMUNICATION SYSTEM*

- Use the intelligent tester to check for normal function of the CAN communication system.
- Check for DTCs.

Result

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

CC



13	CONFIRMATION TEST
----	-------------------

NEXT

END

ROAD TEST

1. PROBLEM SYMPTOM CONFIRMATION

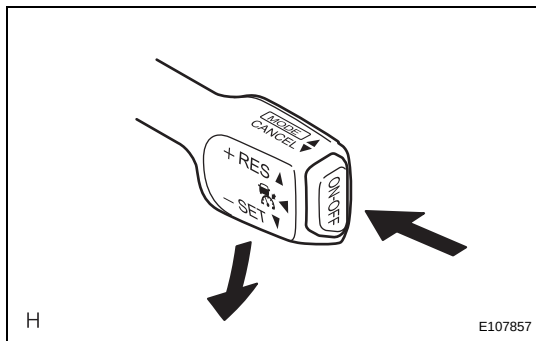
HINT:

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 between 45 km/h (27 mph) and 135 km/h (85 mph).
- (3) Push the cruise control main switch to - (COAST)/SET.
- (4) After releasing the switch, check that the vehicle cruises at the set speed.

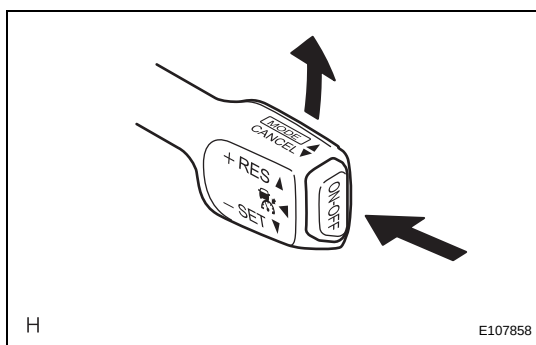


(b) Inspect the ACCELERATION function.

- (1) Turn the main switch on.
- (2) Drive at the required speed between 45 km/h (27 mph) and 135 km/h (85 mph).
- (3) Push the cruise control main switch to - (COAST)/SET.
- (4) Check that vehicle speed increases while the cruise control main switch is pushed to + (ACCEL)/RES (RESUME), and that the vehicle cruises at the newly set speed when the switch is released.
- (5) Push the cruise control main switch to + (ACCEL)/RES (RESUME) and then release it immediately. Check that vehicle speed increases* (tap-up control).

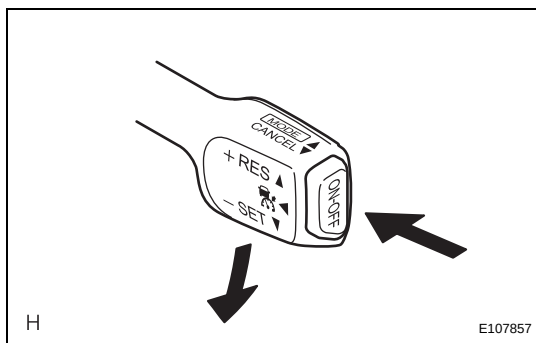
HINT:

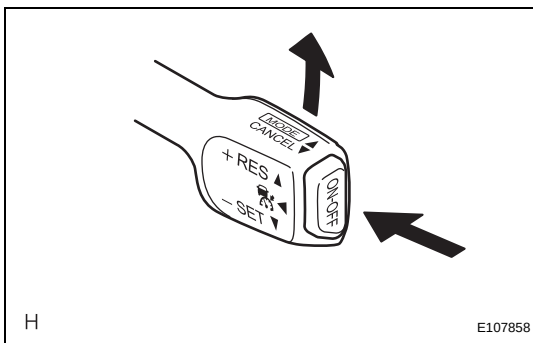
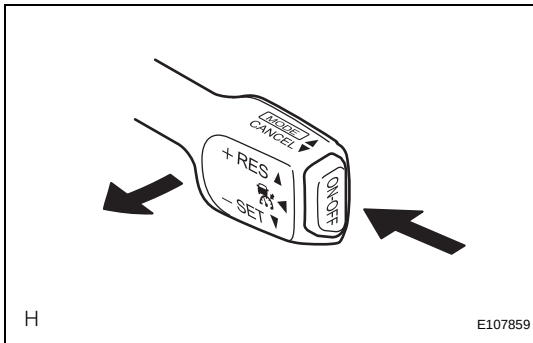
*: Constant speed control mode: increases by 1.6 km/h (1.0 mph); vehicle-to-vehicle distance control mode: increases by 5 km/h (5 mph)



(c) Inspect the - (COAST) function.

- (1) Turn the main switch on.
- (2) Drive at the required speed between 45 km/h (27 mph) and 135 km/h (85 mph).
- (3) Push the cruise control main switch to - (COAST)/SET.
- (4) Check that vehicle speed decreases while the cruise control main switch is pushed to - (COAST)/SET, and the vehicle cruises at the newly set speed when the switch is released.





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

HINT:

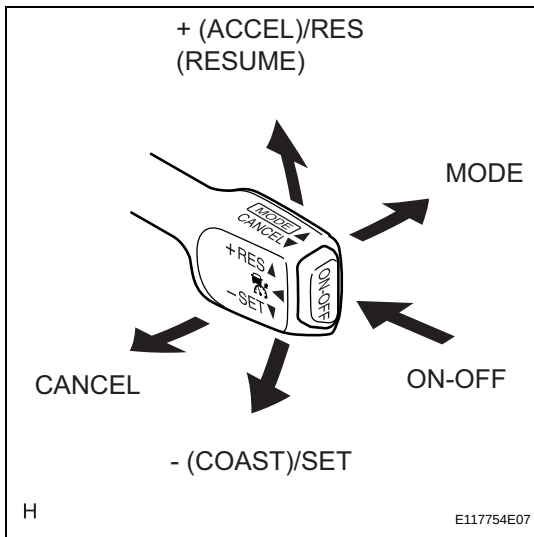
*: Constant speed control mode: decreases by 1.6 km/h (1.0 mph); vehicle-to-vehicle distance control mode: decreases by 5 km/h (5 mph).

- (d) Inspect the CANCEL function.
- (1) Turn the main switch on.
 - (2) Drive at the required speed between 45 km/h (27 mph) and 135 km/h (85 mph).
 - (3) Push the cruise control main switch to - (COAST)/SET.
 - (4) When performing any one of the following, check that the cruise control system is canceled and that the normal driving mode is reset.
 - Pulling the cruise control main switch to CANCEL
 - Depressing the brake pedal
 - The shift lever is moved from the D to the N position or the transmission is shifted to the 3rd, 2nd, or 1st gear with the shift lever in the S position
 - Turning the main switch off
- (e) Inspect the RES (RESUME) function.
- (1) Turn the main switch on.
 - (2) Drive at the required speed between 45 km/h (27 mph) and 135 km/h (85 mph).
 - (3) Push the cruise control main switch to - (COAST)/SET.
 - (4) Cancel the cruise control system by performing any of the above operations (other than turning the main switch off).
 - (5) After pushing the cruise control main switch to + (ACCEL)/RES (RESUME) at a driving speed of more than 40 km/h (25 mph), check that the vehicle resumes the speed set prior to the cancellation.
- HINT:
- The stored vehicle speed is retained even if vehicle speed drops below 40 km/h (25 mph) once. The previously stored vehicle speed can be resumed by pushing the cruise control main switch to + (ACCEL)/RES (RESUME) when vehicle speed returned to approximately 40 km/h (25 mph) or more.

OPERATION CHECK

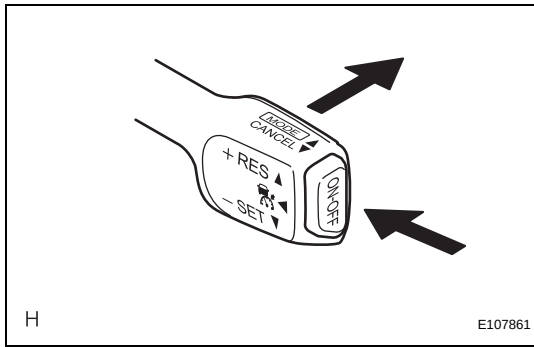
1. INPUT SIGNAL CHECK

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



2. INSPECT MODE SWITCH

- Turn the engine switch on (IG).



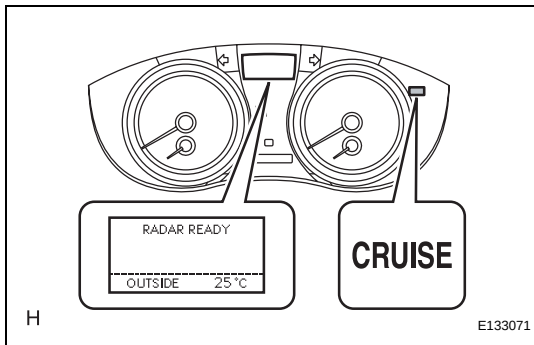
- Turn the cruise control main switch on. Then push the main switch to MODE for 1 second or more to change to the constant speed control mode.

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:

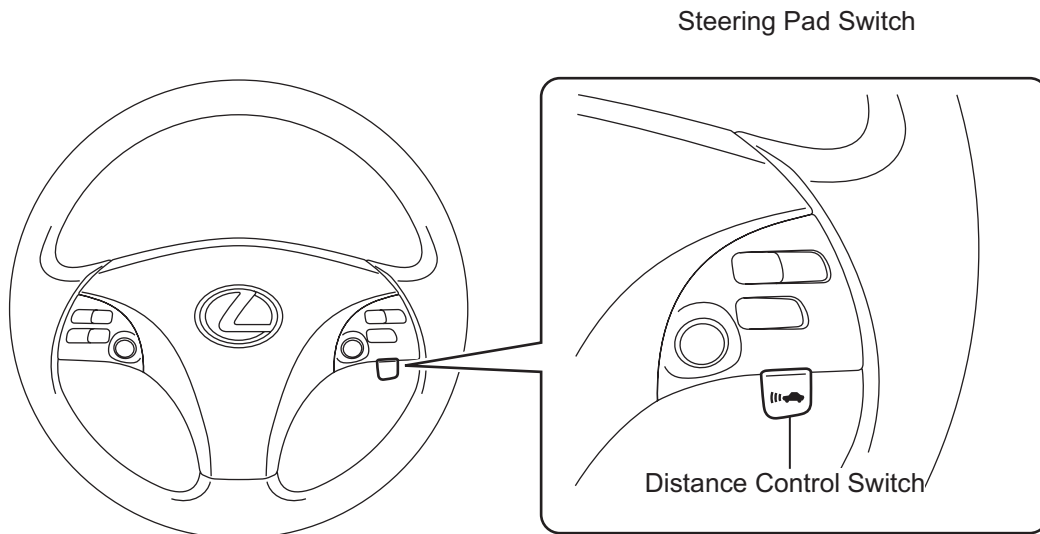
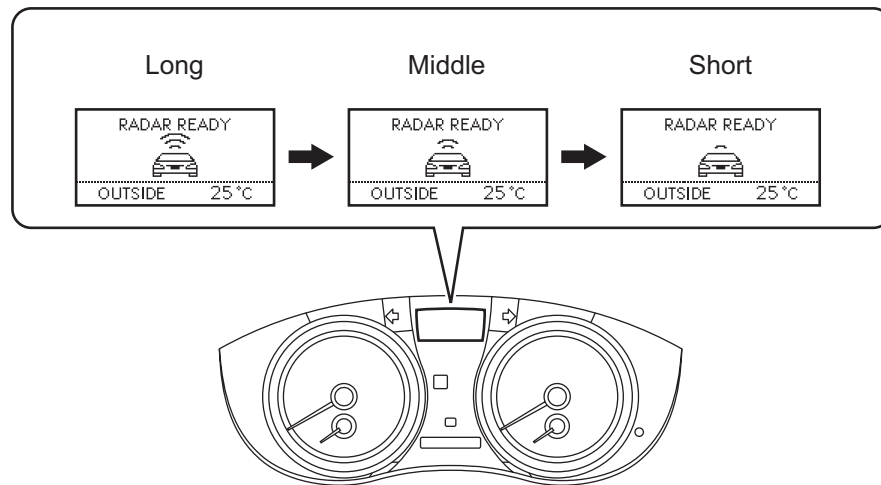
If a malfunction is detected, turn the engine switch off and repeat the procedure above.



3. INSPECT STEERING PAD SWITCH ASSEMBLY

- Turn the engine switch on (IG).
- Turn the cruise control main switch on.
- Turn on the distance control switch of the steering pad switch.

- (d) Check that the indication of the vehicle-to-vehicle distance, which is shown on the multi-information display on the combination meter, changes from long to middle to short in that order.

Steering Wheel**Combination Meter****Multi-information Display**

H

E133072E01

HINT:

The indication is automatically set to long each time the engine is started.

PROBLEM SYMPTOMS TABLE

NOTICE:

- When the distance control ECU and/or ECM are replaced with a new one, initialization must be performed.
- When the millimeter wave radar sensor is replaced with a new one, adjustment of the radar sensor beam axis must be performed.

HINT:

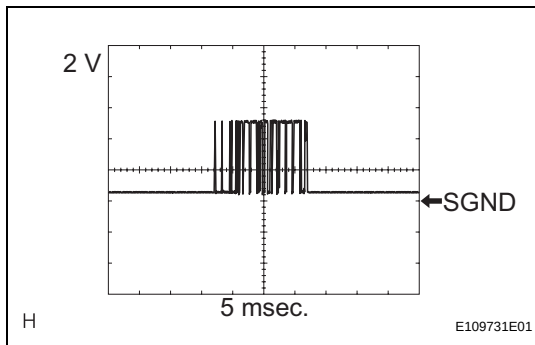
- Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuse and relay related to this system before inspecting the suspected areas below.

Dynamic Radar Cruise Control System

Symptom	Suspected Area	See page
Main switch cannot be turned ON. (CRUISE main indicator light on combination meter does not illuminate.)	1. Cruise control switch circuit	-
	2. CRUISE main indicator light circuit	-
	3. ECM	-
Vehicle speed setting cannot be done. (CRUISE main indicator light on combination meter illuminates when main switch is turned ON, but turns off when operating SET function.)	1. Cruise control switch circuit	-
	2. ECM	-
Vehicle speed setting cannot be done. (CRUISE main indicator light on combination meter illuminates when main switch is turned ON, and remains on when operating SET function.)	1. Cruise control switch circuit	-
	2. Stop light switch circuit	-
	3. Park/Neutral position switch circuit	-
	4. Vehicle speed sensor circuit	-
	5. Transmission control switch circuit	-
	6. Combination meter system	-
	7. ECM	-
While vehicle is driven with cruise control, the control is canceled. (CRUISE main indicator light remains on.)	1. Cruise control switch circuit	-
	2. Vehicle speed sensor circuit	-
	3. Stop light switch circuit	-
	4. Combination meter system	-
	5. Park/Neutral position switch circuit	-
	6. ECM	-
Hunting (Speed is not constant.)	1. Vehicle speed sensor circuit	-
	2. ECM	-
Vehicle speed setting cannot be canceled. (When coast, acceleration, resume, set speed change function is operated with control switch.)	1. Cruise control switch circuit	-
	2. ECM	-
Erroneous detection or lost sight of the vehicle ahead.	1. Clean radar sensor with soft cloth, etc.	-
	2. Improper aiming of sensor beam axis	-
Skid control buzzer does not sound.	1. Buzzer circuit	-
	2. VSC system	-
	3. Distance control ECU power source circuit	-
	4. Distance control ECU	-
	5. ECM	-

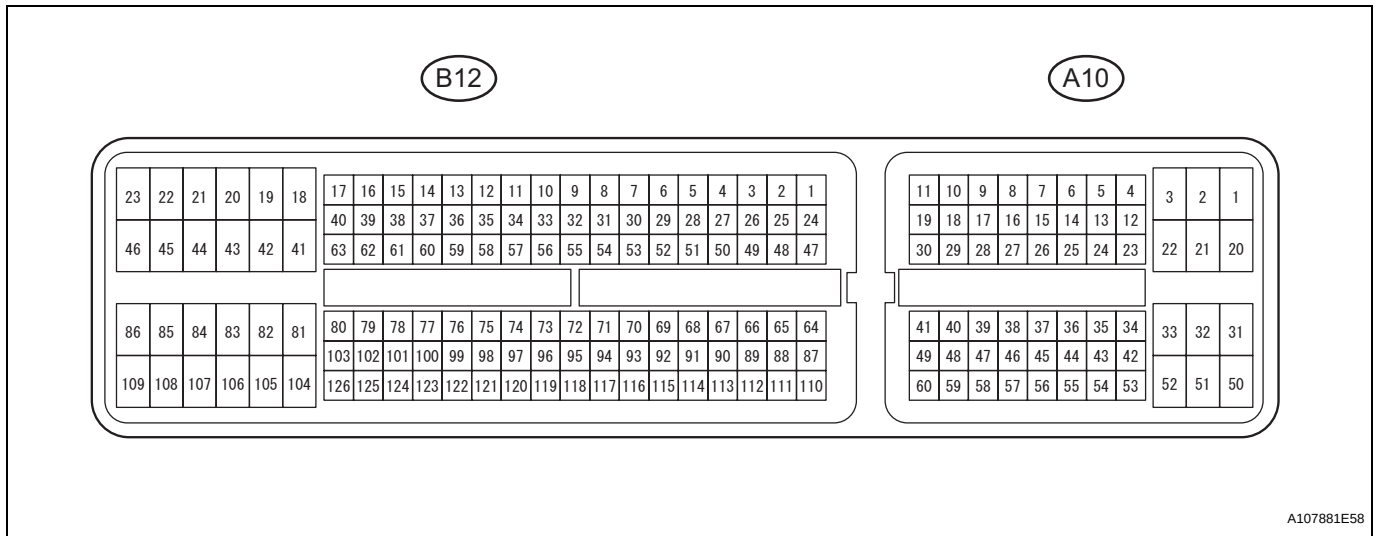
Symptom	Suspected Area	See page
Set distance cannot be changed.	1. Combination meter system	-
	2. Distance control switch circuit	-
	3. Distance control ECU	-
	4. ECM	-
No information on the display	1. Combination meter system	-
	2. ECM	-
No brake control (when decelerating)	1. VSC system	-
	2. Distance control ECU power source circuit	-
	3. Distance control ECU	-
	4. ECM	-
Constant speed mode cannot be turned on.	1. Cruise control switch circuit	-
	2. Combination meter system	-
	3. ECM	-
Vehicle speed cannot be canceled with wiper HI. (Including automatic wiper)	1. Wiper switch circuit	-
	2. Wiper signal circuit	-
	3. Washer signal circuit	-
	4. Distance control ECU	-
	5. ECM	-
When the washer is used, cruise control is canceled.	1. Washer motor circuit	-
	2. Washer signal circuit	-
	3. Distance control ECU	-
	4. ECM	-
Unable to adjust (complete) beam axis of millimeter wave radar sensor.	1. Check position, distance and angle of reflector	-
	2. Check installation of millimeter wave radar sensor	-
	3. Millimeter wave radar sensor	-
	4. Distance control ECU	-
	5. ECM	-
Cannot change from constant speed control mode to vehicle-to-vehicle distance control mode.	1. Cruise control switch circuit	-
	2. Millimeter wave radar sensor power source circuit	-
	3. Distance control ECU	-
	4. ECM	-
The CRUISE main indicator light remains blinking.	1. TC and CG terminal circuit	-
	2. If the symptoms still occur after the above area has been inspected and has proven to be normal, replace the ECM.	-

(b) Reference: waveform 2



Item	Contents
Terminal	LRRD - SGND
Tool setting	2 V/DIV., 5 msec./DIV.
Vehicle condition	Engine switch on (IG)

2. CHECK ECM

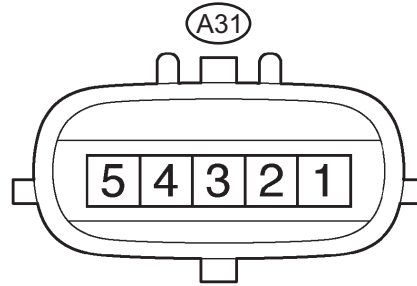


Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
A10-27 (TC) - B12-81 (E1)	P - W-B	Ground	Engine switch on (IG)	10 to 14 V
A10-27 (TC) - B12-81 (E1)	P - W-B	Ground	Connect terminals TC and CG of DLC3	Below 1 V
A10-35 (ST1-) - B12-81 (E1)	GR - W-B	Stop light signal	Engine switch on (IG), Brake pedal depressed (Stop light switch on)	Below 1 V
A10-35 (ST1-) - B12-81 (E1)	GR - W-B	Stop light signal	Engine switch on (IG), Brake pedal released (Stop light switch off)	10 to 14 V
A10-36 (STP) - B12-81 (E1)	W - W-B	Stop light signal	Engine switch on (IG), Brake pedal released (Stop light switch off)	Below 1 V
A10-36 (STP) - B12-81 (E1)	W - W-B	Stop light signal	Engine switch on (IG), Brake pedal depressed (Stop light switch on)	10 to 14 V
A10-37 (CCHG) - B12-81 (E1)	R - W-B	Distance control switch signal	Engine switch on (IG), Cruise control main switch on, MODE switch on	Below 1 V
A10-37 (CCHG) - B12-81 (E1)	R - W-B	Distance control switch signal	Engine switch on (IG), Cruise control main switch on, MODE switch off	10 to 14 V
A10-38 (LGND) - Body ground	BR - Body ground	Ground	Always	Below 1 Ω
A10-40 (CCS) - B12-81 (E1)	W - W-B	Cruise control main switch signal	Engine switch on (IG)	10 to 14 V
A10-40 (CCS) - B12-81 (E1)	W - W-B	Cruise control main switch signal	Engine switch on (IG), CANCEL switch on	6.6 to 10.1 V
A10-40 (CCS) - B12-81 (E1)	W - W-B	Cruise control main switch signal	Engine switch on (IG), - (COAST)/SET switch on	4.5 to 7.1 V

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
A10-40 (CCS) - B12-81 (E1)	W - W-B	Cruise control main switch signal	Engine switch on (IG), + (ACCEL)/RES (RESUME) switch on	2.3 to 4.0 V
A10-40 (CCS) - B12-81 (E1)	W - W-B	Cruise control main switch signal	Engine switch on (IG), Main switch on	Below 1 V
B12-81 (E1) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω

If the value is not within the specified range, the ECM may have a malfunction.

3. CHECK MILLIMETER WAVE RADAR SENSOR

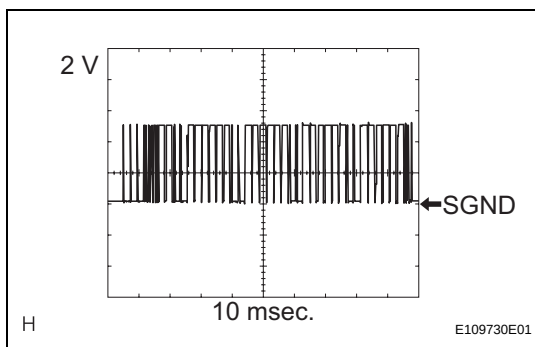


N

I039263E07

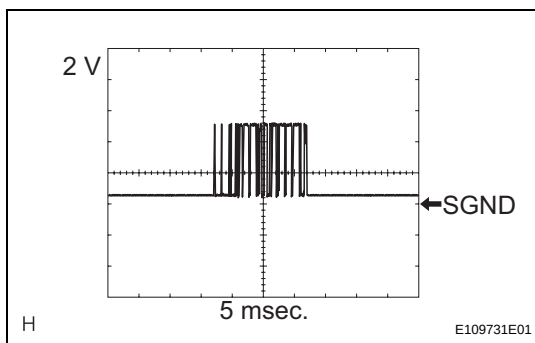
Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
A31-1 (LGND) - Body ground	BR - Body ground	Ground (Distance signal)	Always	Below 1 Ω
A31-2 (SGND) - Body ground	BR - Body ground	Ground	Always	Below 1 Ω
A31-3 (LRDD) - A31-2 (SGND)	L - BR	Millimeter wave radar sensor output signal	Engine switch on (IG)	Pulse generation (see waveform 1)
A31-4 (LRRD) - A31-2 (SGND)	G - BR	Millimeter wave radar sensor input signal	Engine switch on (IG)	Pulse generation (see waveform 2)
A31-5 (IGB) - A31-2 (SGND)	V - BR	Power source	Engine switch on (IG)	10 to 14 V

(a) Reference: waveform 1



Item	Contents
Terminal	LRDD - SGND
Tool setting	2 V/DIV., 10 msec./DIV.
Vehicle condition	Engine switch on (IG)

(b) Reference: waveform 2

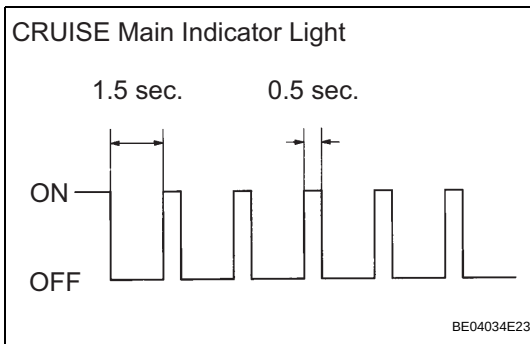
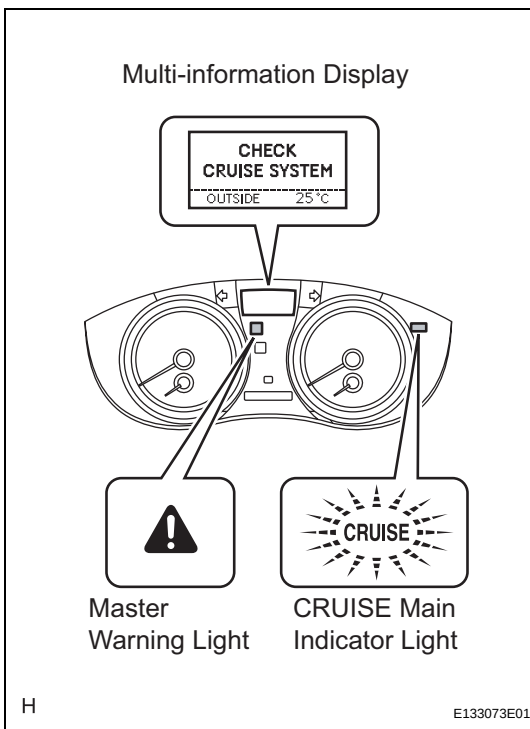


Item	Contents
Terminal	LRDD - Body ground
Tool setting	2 V/DIV., 10 msec./DIV.
Vehicle condition	Engine switch on (IG)

DIAGNOSIS SYSTEM

1. 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 as shown in the illustration. When a malfunction occurs in the dynamic radar cruise control system, the DTCs are stored in the ECM.



NOTICE:

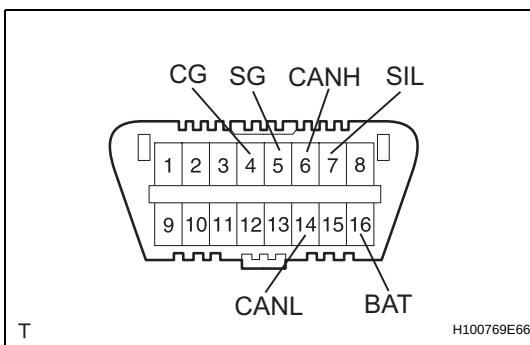
- The master warning light goes off if the system returns to normal condition.
- Since the stored data in the ECM is erased by disconnecting the EFI and ETCS fuses or the battery terminal, do not disconnect them until the inspection has been completed.

2. 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 on the multi-information display on the combination meter when checking for DTCs, there may be a problem with either the combination meter or the CAN communication systems. Use the intelligent tester to check and solve the problem.

3. CHECK DLC3

- (a) The ECM uses ISO 15765-4 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format. If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness or connector.



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

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
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)	CAN bus line	Engine switch off*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Engine switch off*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Engine switch off*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Engine switch off*	6 k Ω or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Engine switch off*	6 k Ω or higher

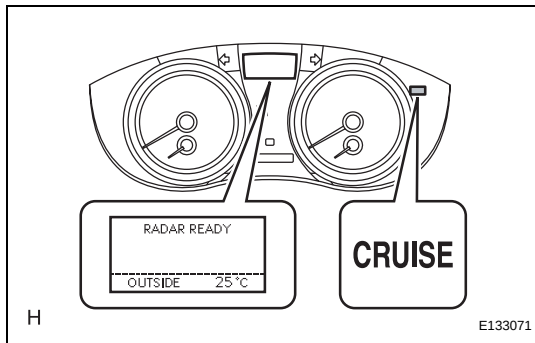
NOTICE:

*: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the engine switch, any other switches or the doors.

HINT:

Connect the cable of the intelligent tester to the DLC3, turn the engine switch on (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

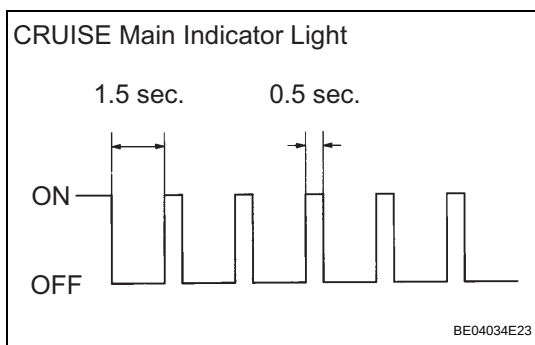
- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.

**4. CHECK INDICATOR**

- Turn the engine switch on (IG).
- 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 and the indicator go off when the ON-OFF button is pushed off.

HINT:

- If the indicator check result shows a problem, proceed to troubleshooting for the combination meter section (See page [ME-14](#)).
- 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. This indicator light informs the driver of the malfunction. At the same time, the malfunction is stored as a diagnostic trouble code.



Cruise Control Switch Circuit

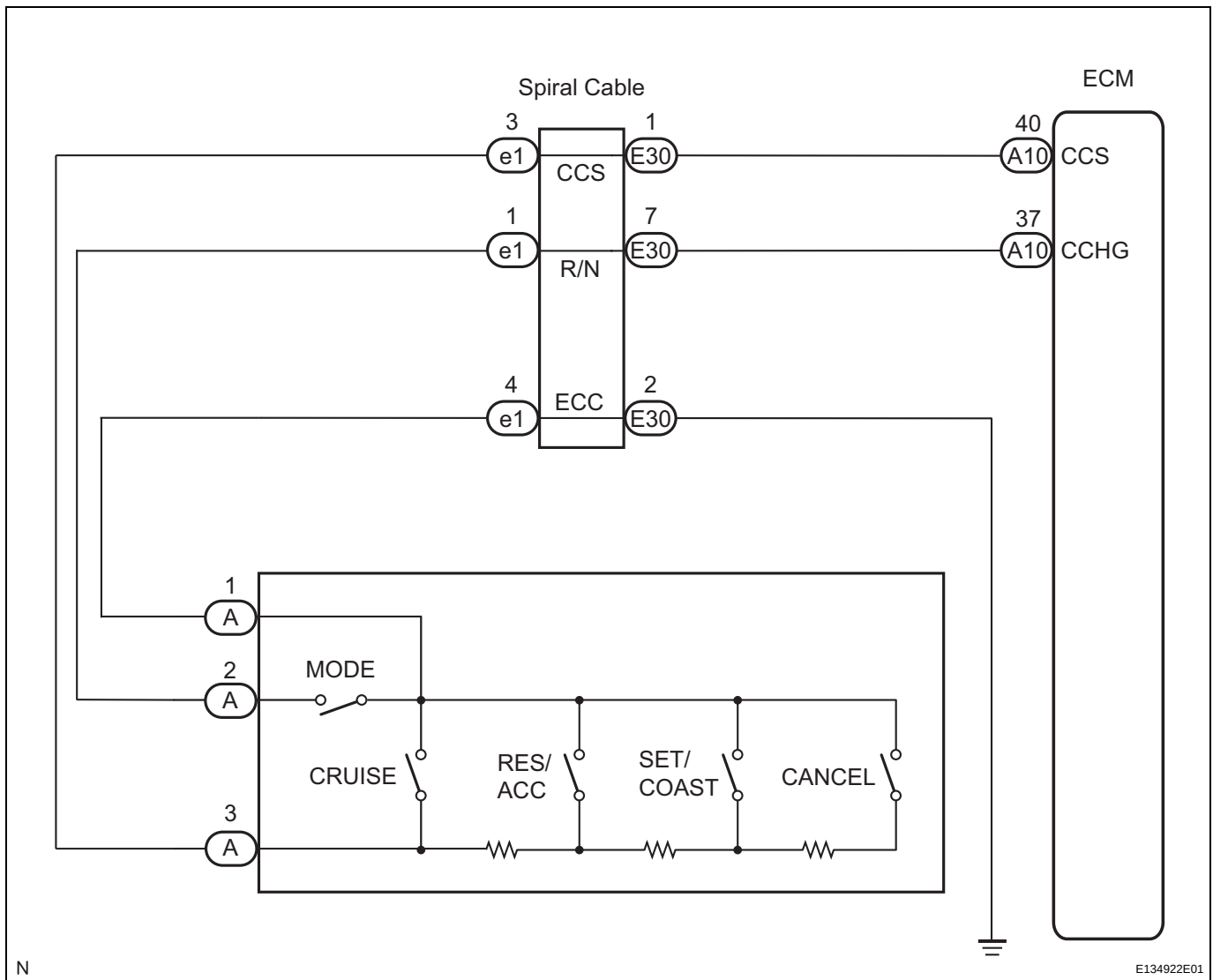
DESCRIPTION

The cruise control main switch operates 8 functions: SET, -(COAST), TAP-DOWN, RES (RESUME), + (ACCEL), TAP-UP, CANCEL, and MODE. The SET, TAP-DOWN, and -(COAST) functions, and the RES (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 the direction of each arrow and turns off after releasing it. The internal contact point of the cruise control main switch is turned on with the switch operation. The ECM then reads the voltage value that has been changed by the switch operation to control MODE, SET, -(COAST), RES (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.

CC

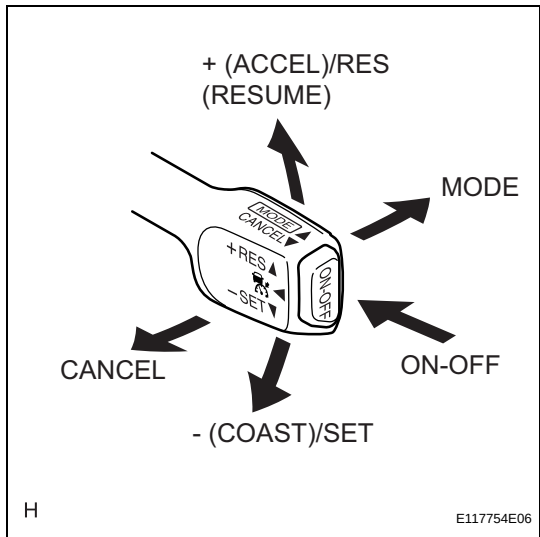
WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:
When the distance control ECU and/or ECM are replaced with a new one, initialization must be performed (See page [CC-119](#)).

1 READ VALUE ON INTELLIGENT TESTER



- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the engine 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.

ECM (Cruise control):

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

OK:
When the cruise control main switch is operated, the display changes as shown above.

Result

Result	Proceed to
OK	A
NG (all items are defective)	B
NG (1 to 3 items are defective)	C

A

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

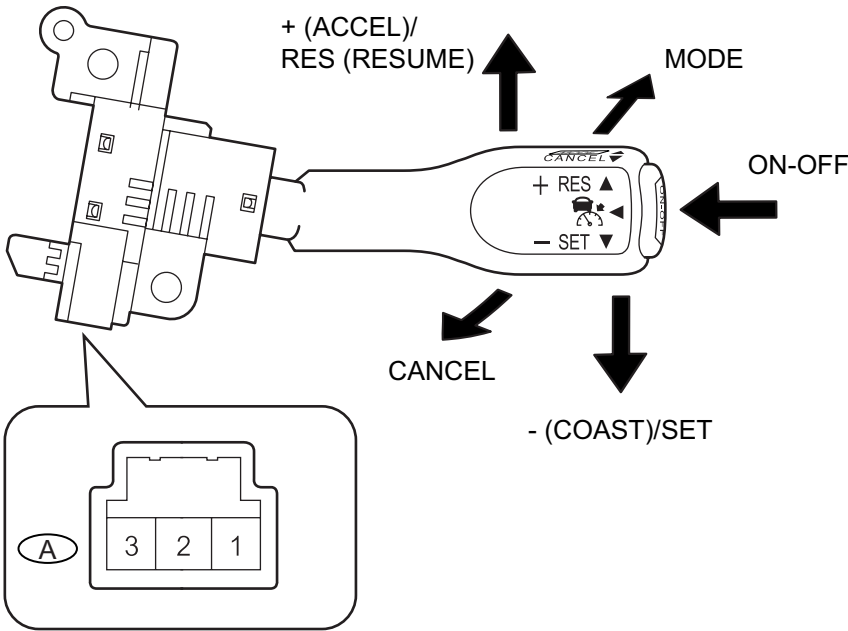
C

REPLACE CRUISE CONTROL MAIN SWITCH (See page [CC-114](#))

B

2 INSPECT CRUISE CONTROL MAIN SWITCH

(a) Disconnect the cruise control main switch connector.



CC

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

Standard resistance

Tester Connection	Switch Condition	Specified Condition
A-1 (ECC) - A-2 (R/N), A-1 (ECC) - A-3 (CCS)	Neutral	10 kΩ or higher
A-1 (ECC) - A-3 (CCS)	+ (ACCEL)/RES (RESUME)	216 to 264 Ω
	- (COAST)/SET	567 to 693 Ω
	CANCEL	1,386 to 1,694 Ω
	Main Switch on	Below 1 Ω
A-1 (ECC) - A-2 (R/N)	Main Switch on and MODE Switch on	Below 1 Ω

NG

REPLACE CRUISE CONTROL MAIN SWITCH
(See page [CC-114](#))

OK

3 INSPECT SPIRAL CABLE

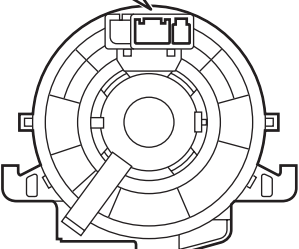
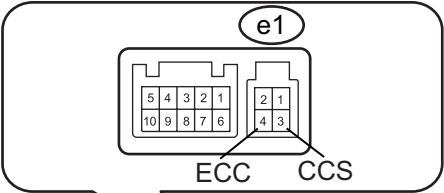
NOTICE:

The spiral cable is an important part of the SRS airbag system. Incorrect removal or installation of the spiral cable may cause airbag deployment. Be sure to read the page shown in the brackets.

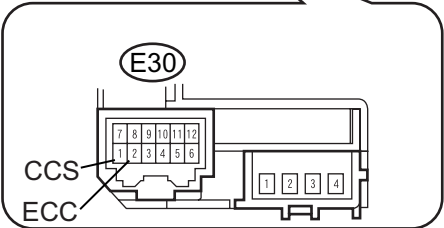
HINT:

- Removal (See page [RS-379](#))
- Installation (See page [RS-382](#))

Cruise Control Main Switch Side:



Vehicle Side:



H

E106780E30

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

Standard resistance

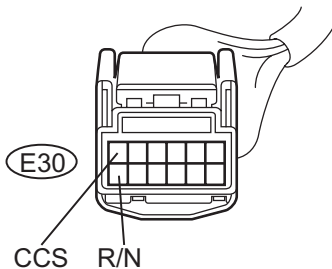
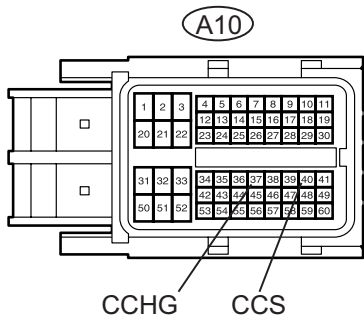
Tester Condition	Spiral Cable Position	Specified Condition
e1-1 - E30-7	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
e1-3 - E30-1	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
e1-4 - E30-2	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	

HINT:
The spiral cable makes a maximum of approximately 5 rotations.

NG

REPLACE SPIRAL CABLE (See page RS-379)

OK

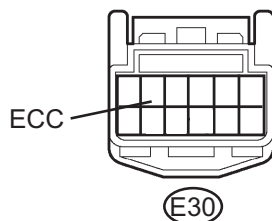
4 CHECK WIRE HARNESS (SPIRAL CABLE - ECM)**Spiral Cable Vehicle Side Connector Front View:****ECM Wire Harness Side Connector Front View:**

E135383E02

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

Standard resistance

Tester Connection	Condition	Specified Condition
E30-1 (CCS) - A10-40 (CCS)	Always	Below 1 Ω
E30-7 (R/N) - A10-37 (CCHG)	Always	Below 1 Ω
E30-1 (CCS) - Body ground	Always	10 k Ω or higher
E30-7 (R/N) - Body ground	Always	10 k Ω or higher

NG**REPAIR OR REPLACE HARNESS OR CONNECTOR****OK****5 CHECK WIRE HARNESS (SPIRAL CABLE - BODY GROUND)****Vehicle Side Connector Front View:**

N

E107092E11

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

Standard resistance

Tester Connection	Condition	Specified Condition
E30-2 - Body ground	Always	Below 1 Ω

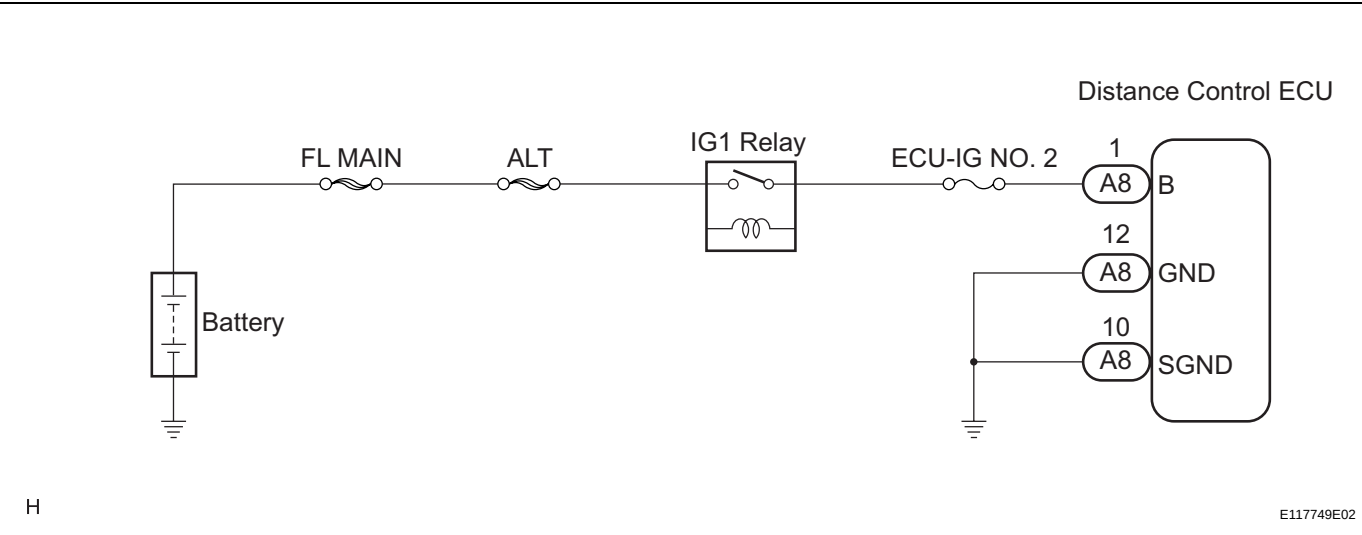
NG**REPAIR OR REPLACE HARNESS OR CONNECTOR****OK****PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

Distance Control ECU Power Source Circuit

DESCRIPTION

This circuit provides power to operate the distance control ECU. The distance control ECU determines information about the vehicle in front based on data from the radar sensor, and then decides how much acceleration and/or deceleration is needed to maintain the set distance. The distance control ECU also requests the skid control ECU to apply braking and to sound the buzzer.

WIRING DIAGRAM



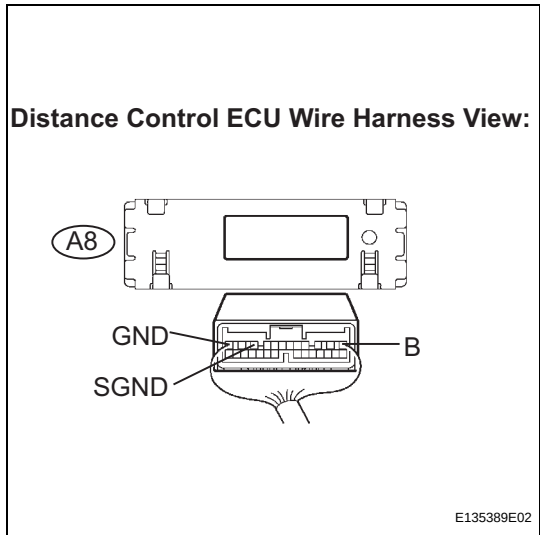
INSPECTION PROCEDURE

NOTICE:

When the distance control ECU and/or ECM are replaced with a new one, initialization must be performed (See page CC-119).

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
A8-1 (B) - Body ground	Engine switch on (IG)	10 to 14 V

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

Tester Connection	Condition	Specified Condition
A8-10 (SGND) - Body ground	Always	Below 1 Ω
A8-12 (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

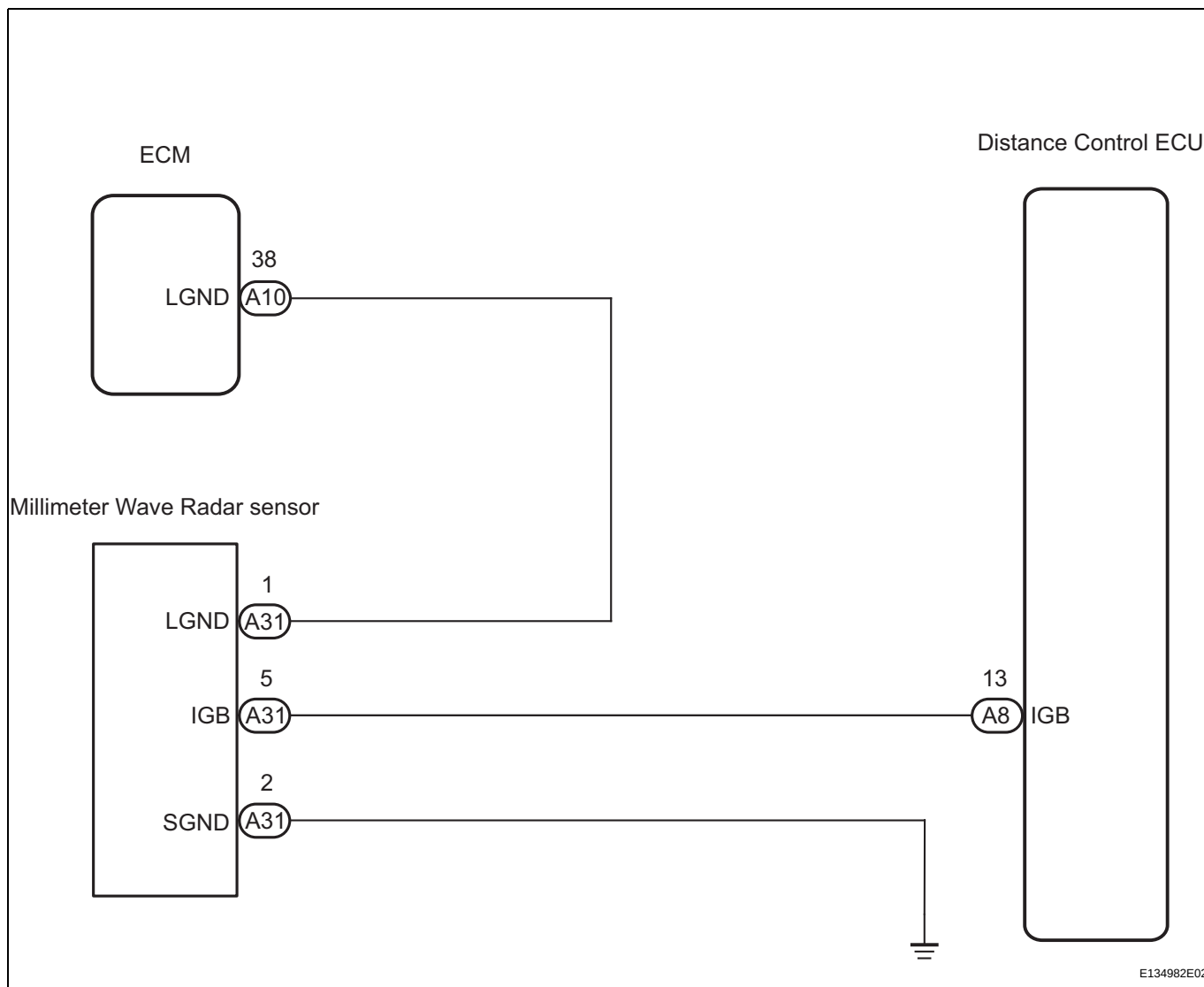
CC

Millimeter Wave Radar Sensor Power Source Circuit

DESCRIPTION

This circuit provides power to the millimeter wave radar sensor. The millimeter wave radar sensor emits radio waves towards an object in front and measures the distance and direction of the object by receiving the wave reflections. Based on the reflections, the sensor calculates the difference in speed between the vehicle and the object in front. This data is transmitted to the distance control ECU. The ECU recognizes the millimeter wave radar sensor via terminals LGND. If an open circuit occurs in the wire harness between terminals LGND, the ECM cannot recognize the millimeter wave radar sensor. The ECM will stop the control of the vehicle-to-vehicle distance control mode and only the constant speed control mode can be used.

CC WIRING DIAGRAM



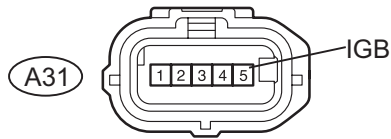
INSPECTION PROCEDURE

NOTICE:

- When the distance control ECU and/or ECM are replaced with a new one, initialization must be performed (See page [CC-119](#)).
- When the millimeter wave radar sensor is replaced with a new one, adjustment of the radar sensor beam axis must be performed (See page [CC-122](#)).

1 CHECK DISTANCE CONTROL ECU (IGB VOLTAGE)

Millimeter Wave Radar Sensor Wire Harness Side Connector Front View:



E135388E03

- Disconnect the A31 sensor connector.
- Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
A31-5 (IGB) - Body ground	Engine switch on (IG)	10 to 14 V

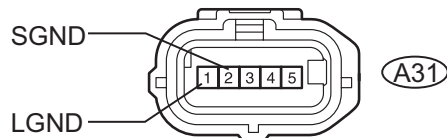
NG

Go to step 3

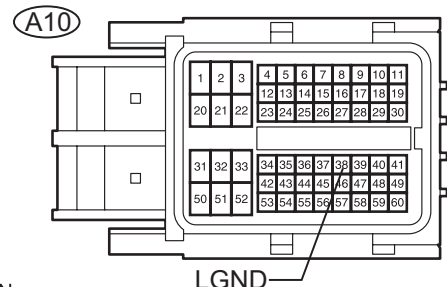
OK

2 CHECK WIRE HARNESS (MILLIMETER WAVE RADAR SENSOR - ECM AND BODY GROUND)

Millimeter Wave Radar Sensor Wire Harness Side Connector Front View:



ECM Wire Harness Side Connector Front View:



N

E133079E01

- Disconnect the A31 sensor connector.
- Disconnect the A10 ECM connector.
- Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A10-38 (LGND) - A31-1 (LGND)	Always	Below 1 Ω
A31-1 (LGND) - Body ground	Always	10 k Ω or higher
A31-2 (SGND) - Body ground	Always	Below 1 Ω

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

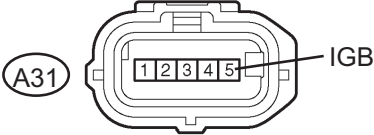
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

CC

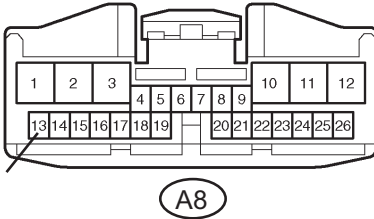
3

CHECK WIRE HARNESS (MILLIMETER WAVE RADAR SENSOR - DISTANCE CONTROL ECU)

Millimeter Wave Radar Sensor Wire Harness Side Connector Front View:



Distance Control ECU Wire Harness Side Connector Front View:



N

I044456E12

- (a) Disconnect the A31 sensor connector.
- (b) Disconnect the A8 ECU connector.
- (c) Measure the resistance according to the value(s) in the table below

Standard resistance

Tester Connection	Condition	Specified Condition
A31-5 (IGB) - A8-13 (IGB)	Always	Below 1 Ω
A8-13 (IGB) - Body ground	Always	10 kΩ or higher

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

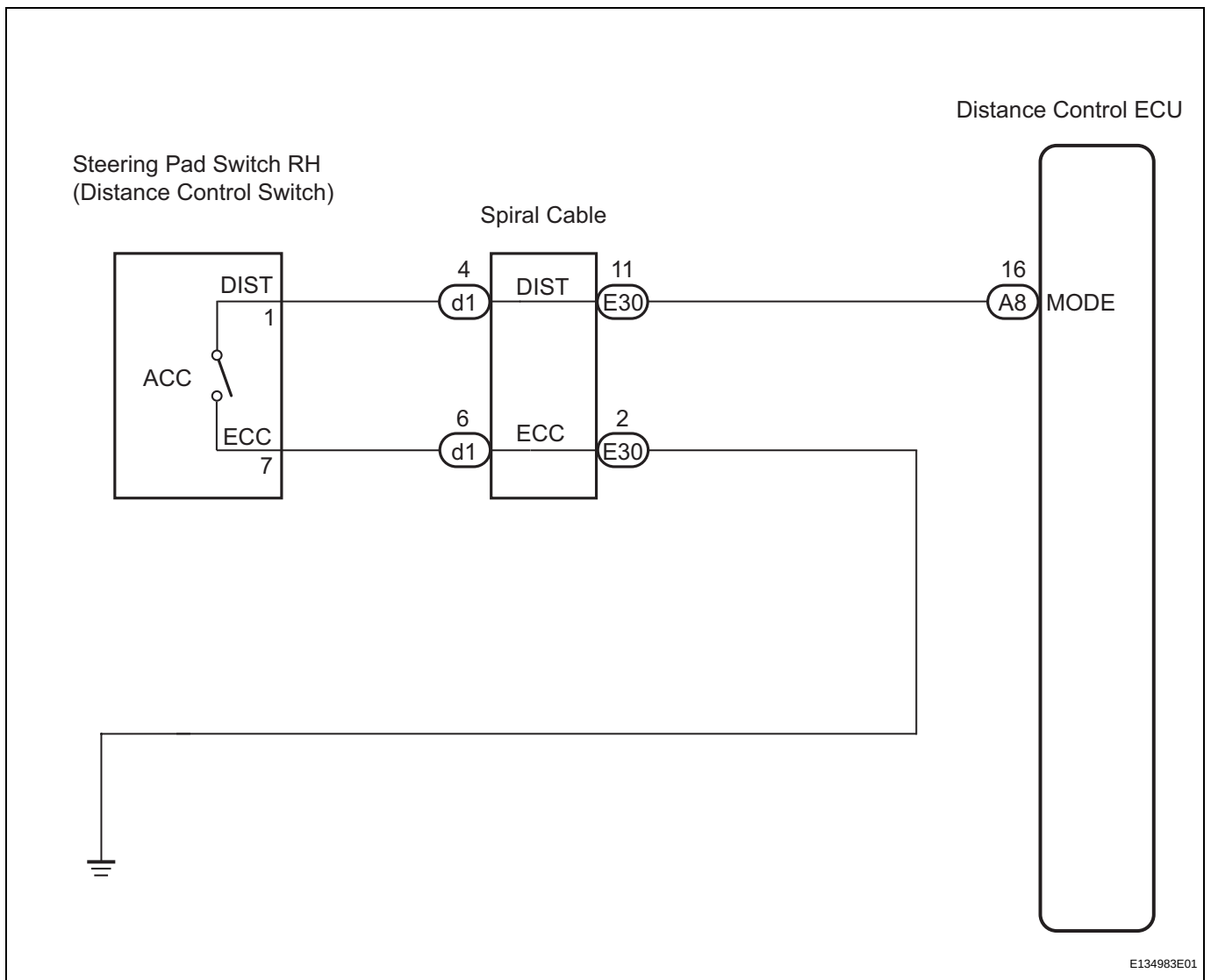
REPLACE DISTANCE CONTROL ECU (See page [CC-118](#))

Distance Control Switch Circuit

DESCRIPTION

The distance control switch sets the vehicle-to-vehicle distance control mode. The distance control switch is installed in the steering pad switch. The vehicle-to-vehicle distance set value can be changed by operating the steering pad switch (distance control switch) while the dynamic radar cruise control system is in operation.

WIRING DIAGRAM



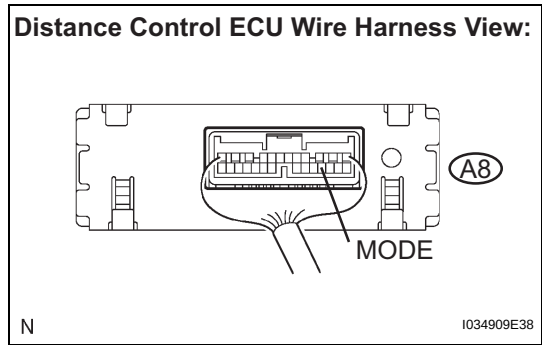
INSPECTION PROCEDURE

NOTICE:

When the distance control ECU and/or ECM are replaced with a new one, initialization must be performed (See page [CC-119](#)).

1

INSPECT DISTANCE CONTROL ECU



- (a) Turn the engine switch on (IG).
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
A8-16 (MODE) - Body ground	Distance control switch ON (pushed)	0 to 2 V
	Distance control switch OFF (not pushed)	10 to 14 V

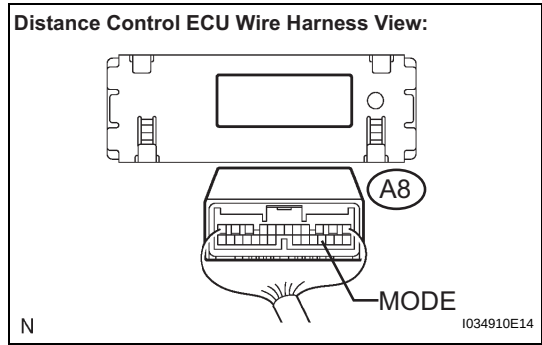
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

NG

2

INSPECT DISTANCE CONTROL ECU CIRCUIT



- (a) Disconnect the A8 connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
A8-16 (MODE) - Body ground	Distance control switch ON (pushed)	Below 1 Ω
	Distance control switch OFF (not pushed)	10 k Ω or higher

OK

REPLACE DISTANCE CONTROL ECU (See page [CC-118](#))

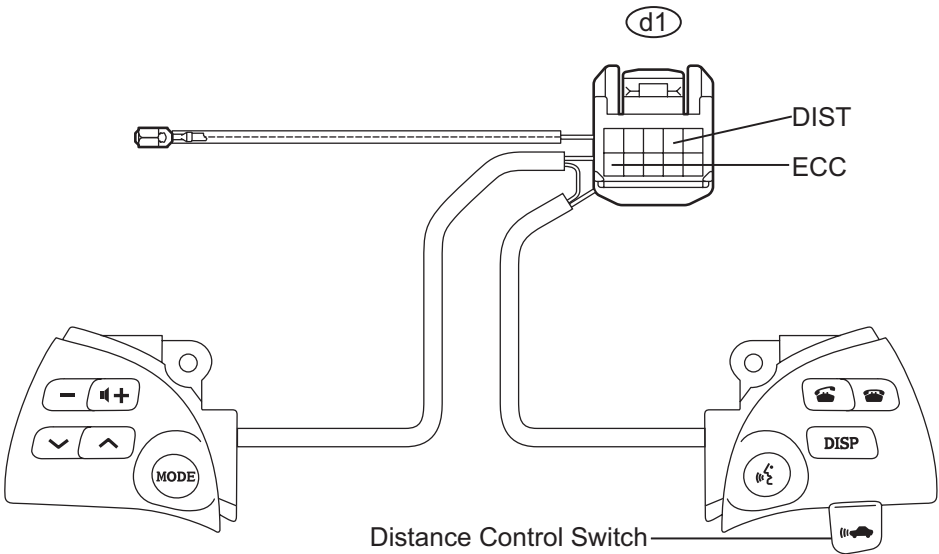
NG

3

INSPECT STEERING PAD SWITCH ASSEMBLY

- (a) Remove the steering pad (See page [RS-366](#)).

Steering Pad Switch:



H

E133076E01

- (b) Disconnect the d1 connector from the spiral cable.
- (c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
d1-4 (DIST) - d1-6 (ECC)	Distance control switch ON (pushed)	Below 2.5 Ω
d1-4 (DIST) - d1-6 (ECC)	Distance control switch OFF (not pushed)	10 k Ω or higher

NG

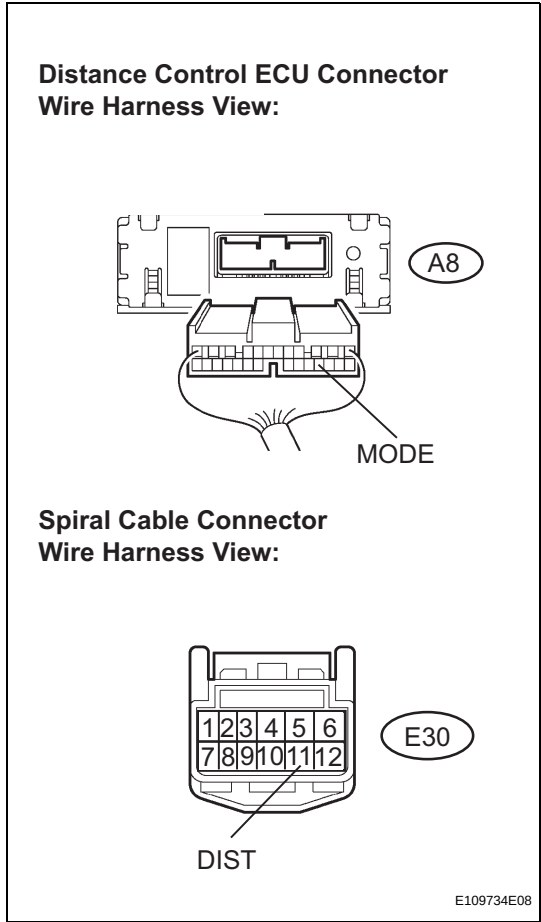
REPLACE STEERING PAD SWITCH (See page [AV-247](#))

OK

CC

4

CHECK HARNESS AND CONNECTOR (ECM - SPIRAL CABLE)



NOTICE:
The spiral cable is an important part of the SRS airbag system. Incorrect removal or installation of the spiral cable may cause airbag deployment. Be sure to read the page shown in the brackets.

- HINT:**
- Removal (See page RS-379)
 - Installation (See page RS-382)
- (a) Remove the spiral cable.
- (b) Disconnect the A8 connector from the distance control ECU.
- (c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E30-11 (DIST) - A8-16 (MODE)	Always	Below 1 Ω
A8-16 (MODE) - Body ground	Distance control switch off	10 kΩ or higher
	Distance control switch on	Below 1 Ω

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

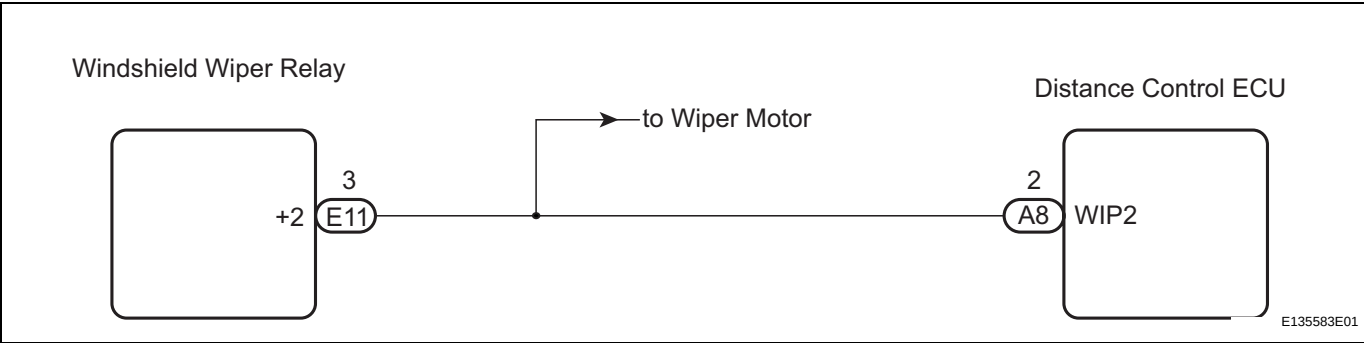
REPLACE SPIRAL CABLE (See page RS-379)

Wiper Signal Circuit

DESCRIPTION

The distance control ECU detects HI mode wiper operation. If the windshield wiper operate in HI mode for 5 seconds or more, the cruise control will be cancelled and "CRUISE NOT AVAILABLE" will be displayed on the multi-information display in the combination meter. Operating the cruise main switch after HI mode wiper operation stop sill start the cruise control again.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

When the distance control ECU and/or ECM are replaced with a new one, initialization must be performed (See page [CC-119](#)).

1 INSPECT WIPER SYSTEM

Refer to HOW TO PROCEED WITH TROUBLESHOOTING (See page [WW-7](#)).

OK:

Wiper function is normal.

NG GO TO WIPER AND WASHER SYSTEM

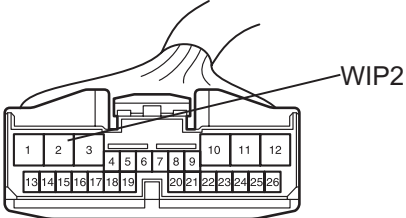
OK

2

CHECK HARNESS AND CONNECTOR

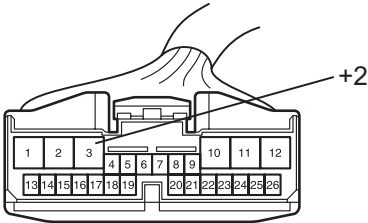
Distance Control ECU Wire Harness
Side Connector Front Side View:

A8



Windshield Wiper Relay Wire Harness
Side Connector Front Side View:

E11



N

E133077E01

- (a) Disconnect the A8 and E11 connectors.
- (b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A8-2 (WIP2) - E11-3 (+2)	Always	Below 1 Ω
E11-3 (+2) - Body ground	Always	10 kΩ or higher

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

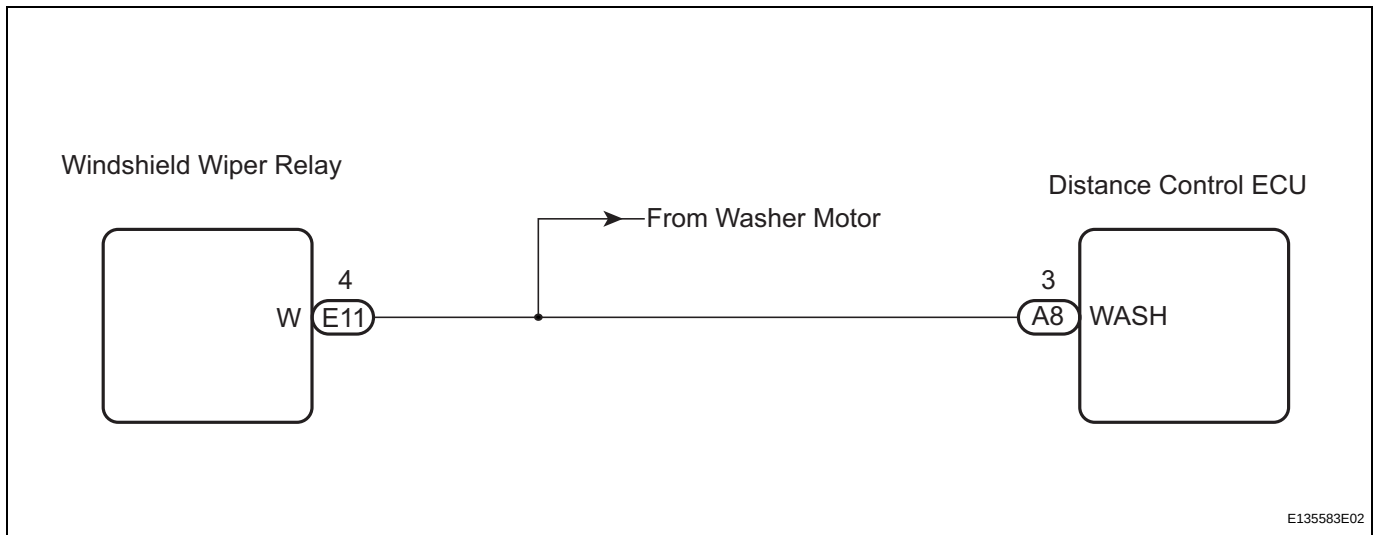
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Washer Signal Circuit

DESCRIPTION

The distance control ECU detects washer operation. The cruise control will be cancelled by the distance control ECU if the windshield wipers operate in HI mode for 5 seconds or more. By detecting washer operation, the distance control ECU allows the cruise control to continue even when the windshield wipers operate in HI mode.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

When the distance control ECU and/or ECM are replaced with a new one, initialization must be performed (See page [CC-119](#)).

1 INSPECT WASHER SYSTEM

- (a) Refer to HOW TO PROCEED WITH TROUBLESHOOTING (See page [WW-7](#)).

OK:

Washer function is normal.

NG

GO TO WIPER AND WASHER SYSTEM (See page [WW-7](#))

OK

2

CHECK HARNESS AND CONNECTOR

Distance Control ECU Wire Harness
Side Connector Front Side View:

A8

WASH

Windshield Wiper Relay Wire Harness
Side Connector Front Side View:

E11

W

N

E133077E02

- (a) Disconnect the A8 and E11 connectors.
- (b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A8-3 (WASH) - E11-4	Always	Below 1 Ω
E11-4 (W) - Body ground	Always	10 kΩ or higher

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

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, the CRUISE main indicator light and RADAR READY indicator 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 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 Ready" are displayed on the multi-information display on the combination meter when the ECM detects signals from each sensor and actuator and sends them to the combination meter via the CAN communication system.

HINT:

If the vehicle in front in the same lane significantly decreases vehicle speed or another vehicle moves 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 for communication. Therefore, if there are any malfunctions in this circuit, check for DTCs in the CAN communication system before troubleshooting this circuit.

CC

INSPECTION PROCEDURE

NOTICE:

When the distance control ECU and/or ECM are replaced with a new one, initialization must be performed (See page [CC-119](#)).

1 PERFORM ACTIVE TEST USING 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 CRUISE main indicator light comes on.

Tester Display	Test Part	Control Range	Diagnostic Note
CRUISE INDIC	Turns CRUISE main indicator light	ON / OFF	-

OK:

Indicator light comes on.

NG

REPLACE COMBINATION METER ASSEMBLY (See page [ME-67](#))

OK

2 READ VALUE ON INTELLIGENT TESTER

- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the engine switch on (IG), and turn the intelligent tester main switch on.

- (c) Check the DATA LIST for proper functioning of the CRUISE main indicator light.

ECM (Cruise control):

Tester Display	Measurement Item/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/OFF changes	1
CCS INDICATOR M	Cruise indicator signal (Main CPU) / ON or OFF	ON : "CCS READY" ON OFF : "CCS READY" OFF	2

OK:
When the cruise control main switch is operated, the display changes as shown above.

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

CC

NG → **REPLACE ECM (See page ES-543)**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

TC and CG Terminal Circuit

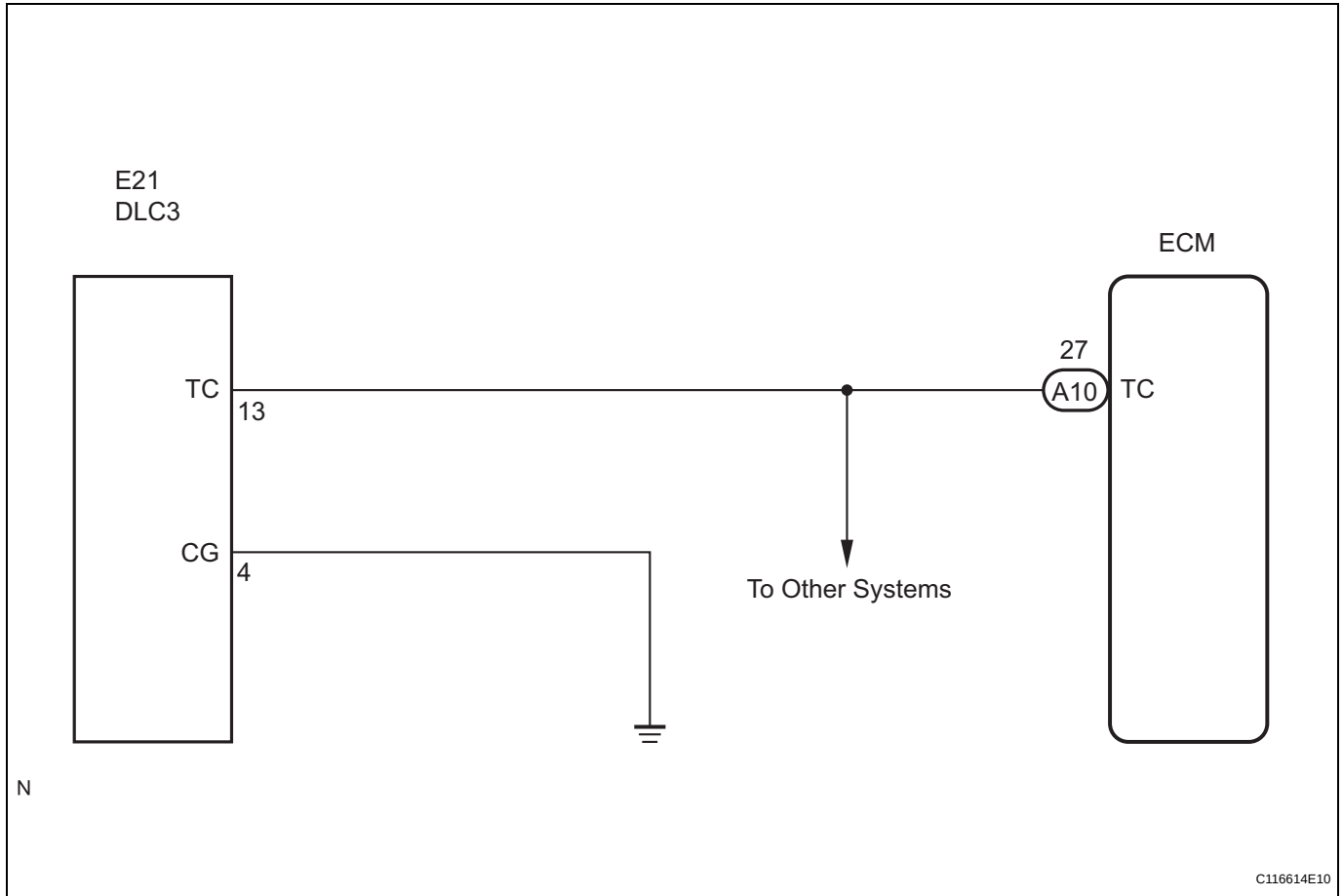
DESCRIPTION

Connecting terminals TC and CG of the DLC3 causes the system to enter the 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



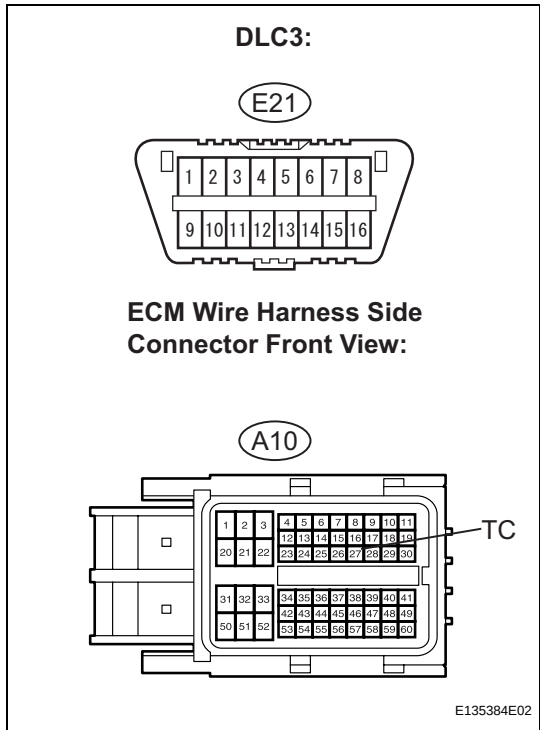
INSPECTION PROCEDURE

NOTICE:

When the distance control ECU and/or ECM are replaced with a new one, initialization must be performed (See page [CC-119](#)).

1

CHECK WIRE HARNESS (TERMINAL TC of DLC3 - ECM)



- (a) Disconnect the A10 connector from the ECM.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A10-27 (TC) - E21-13 (TC)	Always	Below 1 Ω

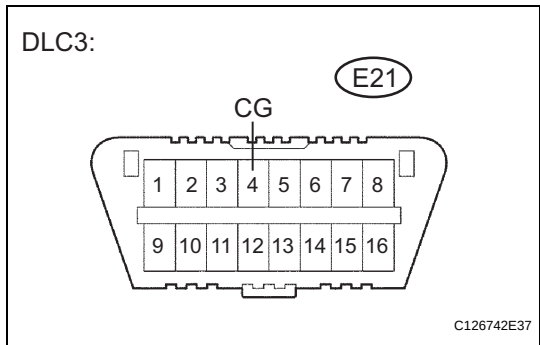
NG

REPAIR OR REPLACE HARNESS OR CONNECTOR (DLC3 - ECM)

OK

2

CHECK WIRE HARNESS (TERMINAL 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
E21-4 (CG) - Body ground	Always	Below 1 Ω

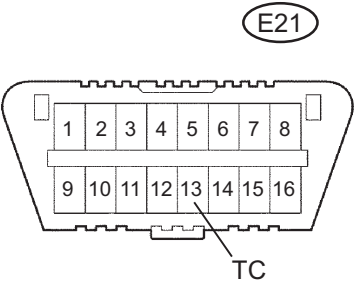
NG

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

OK

3 CHECK WIRE HARNESS (TERMINAL TC 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
E21-13 (TC) - Body ground	Always	10 kΩ or higher

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR OR EACH ECU

OK

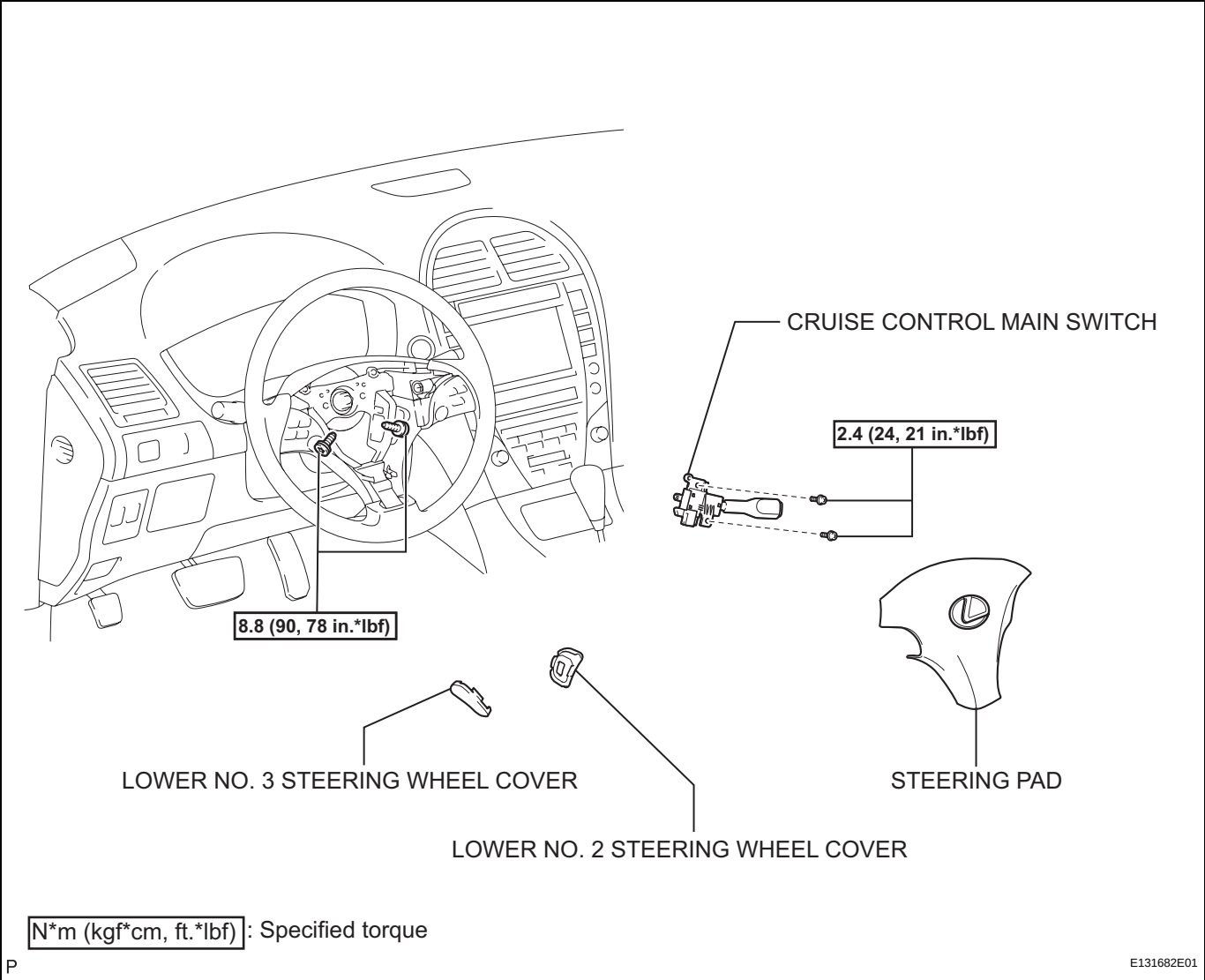
CC

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

CRUISE CONTROL MAIN SWITCH

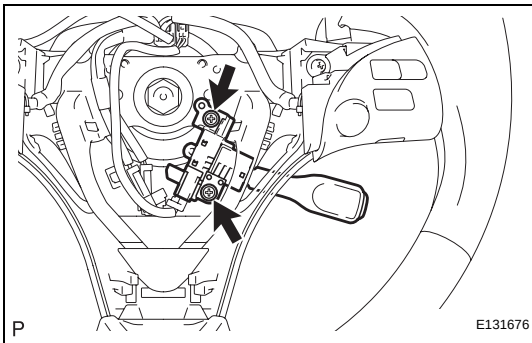
COMPONENTS

CC



REMOVAL

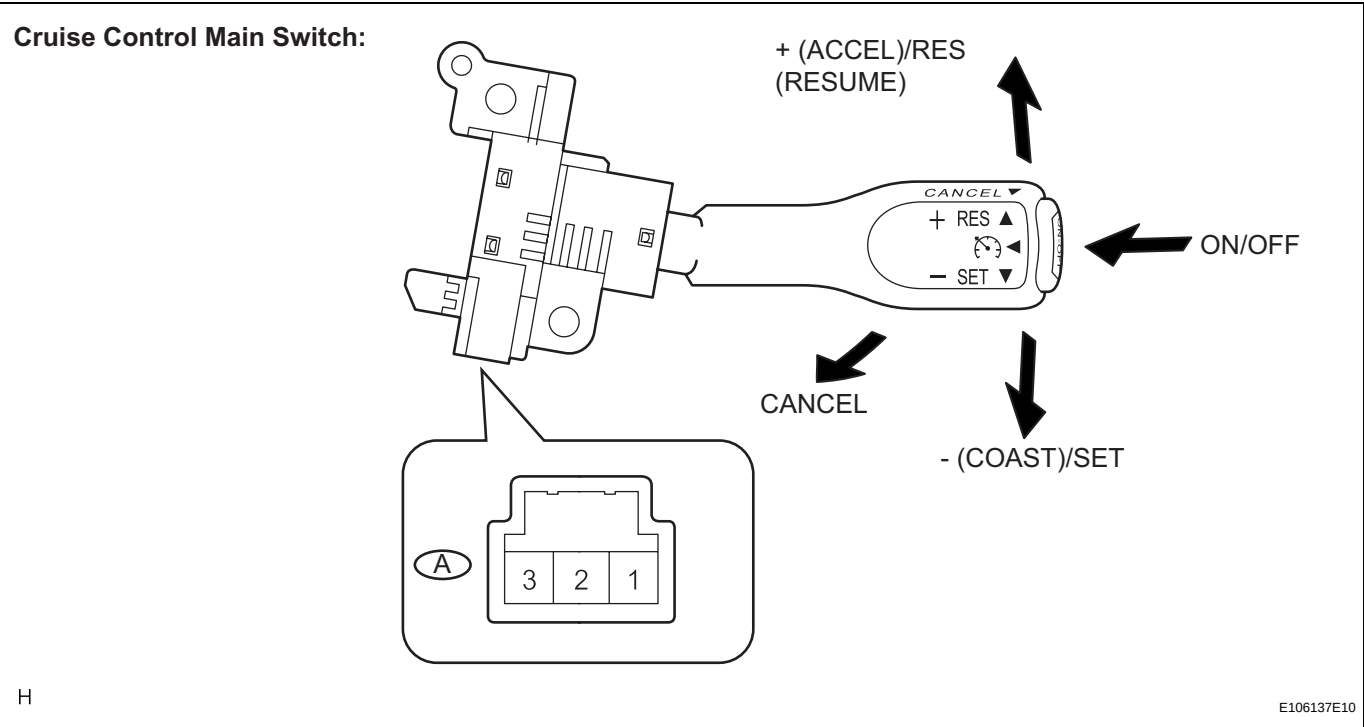
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent airbag deployment (See page [RS-1](#)).
2. **REMOVE LOWER NO. 3 STEERING WHEEL COVER**
(See page [RS-367](#))
3. **REMOVE LOWER NO. 2 STEERING WHEEL COVER**
(See page [RS-367](#))
4. **REMOVE STEERING PAD** (See page [RS-367](#))
5. **REMOVE CRUISE CONTROL MAIN SWITCH**
 - (a) Disconnect the connector.
 - (b) Remove the 2 screws and the cruise control main switch.



INSPECTION

1. INSPECT CRUISE CONTROL MAIN SWITCH

(a) Remove the cruise control main switch.



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

Standard resistance

Tester Connection	Switch Condition	Specified Condition
A-1 (CCS) - A-3 (ECC)	Neutral	10 kΩ or higher
	+ (ACCEL) / RES (RESUME)	216 to 264 Ω
	- (COAST) / SET	567 to 693 Ω
	CANCEL	1,386 to 1,694 Ω
	Main Switch on	Below 1 Ω

If the result is not as specified, replace the cruise control main switch

INSTALLATION

1. INSTALL CRUISE CONTROL MAIN SWITCH

(a) Install the cruise control main switch with the 2 screws.

Torque: 2.4 N*m (24 kgf*cm, 21 in.*lbf)

(b) Connect the connector.

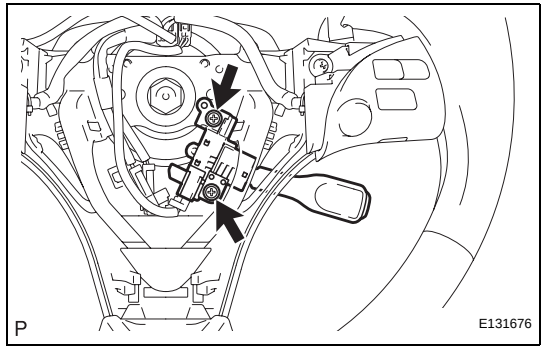
2. INSTALL STEERING PAD (See page RS-368)

3. INSTALL LOWER NO. 2 STEERING WHEEL COVER (See page RS-369)

4. INSTALL LOWER NO. 3 STEERING WHEEL COVER (See page RS-369)

5. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

6. INSPECT STEERING PAD (See page RS-369)



7. INSPECT SRS WARNING LIGHT

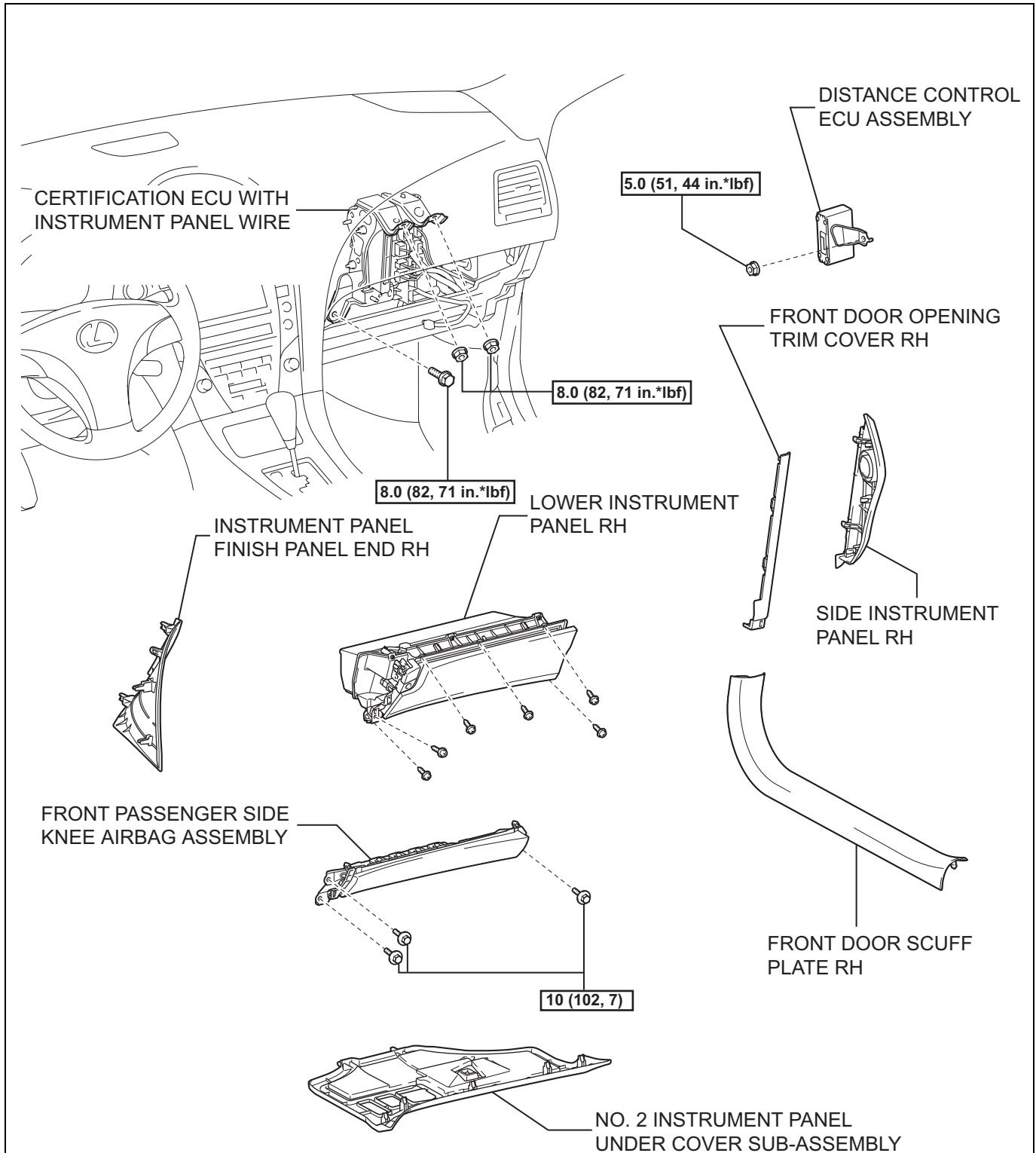
(See page [RS-37](#))

8. PERFORM INITIALIZATION**NOTICE:**

Some systems need initialization after reconnecting the cable to the negative battery terminal (See page [IN-33](#)).

DISTANCE CONTROL ECU

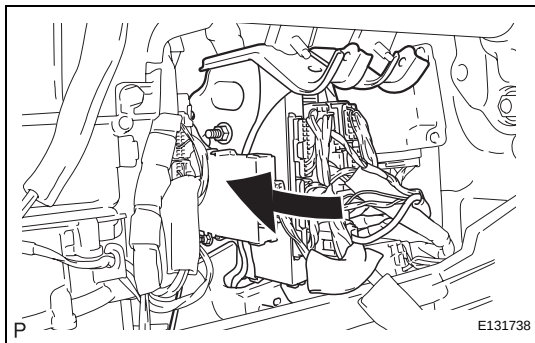
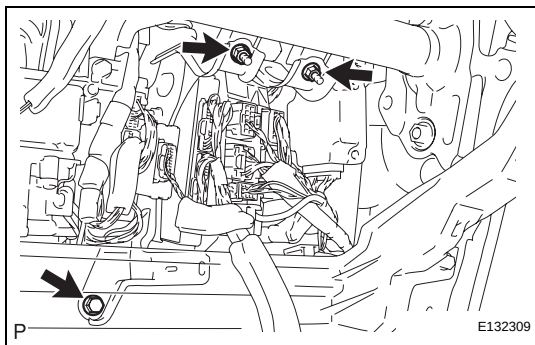
COMPONENTS



[N*m (kgf*cm, ft.*lbf)]: Specified torque

REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent airbag deployment (See page [RS-1](#)).
2. REMOVE INSTRUMENT PANEL FINISH PANEL END RH (See page [IP-15](#))
3. REMOVE FRONT DOOR SCUFF PLATE RH (See page [IR-42](#))
4. REMOVE FRONT DOOR OPENING TRIM COVER RH (See page [IR-42](#))
5. REMOVE NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (See page [IP-15](#))
6. REMOVE SIDE INSTRUMENT PANEL RH (See page [IP-15](#))
7. REMOVE FRONT PASSENGER SIDE KNEE AIRBAG ASSEMBLY (See page [RS-396](#))
8. REMOVE LOWER INSTRUMENT PANEL RH (See page [IP-16](#))
9. REMOVE DISTANCE CONTROL ECU ASSEMBLY
 - (a) Remove the 2 nuts and the bolt and disengage the certification ECU with instrument panel wire.

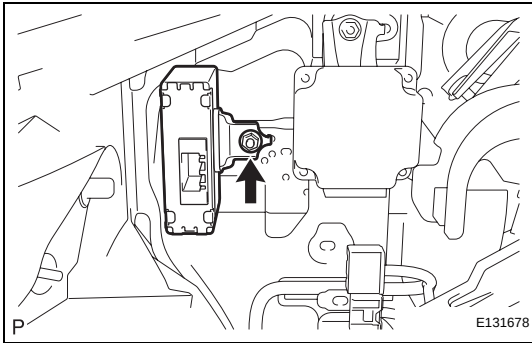


- (b) Turn the certification ECU with instrument panel wire in the direction indicated by the arrow.

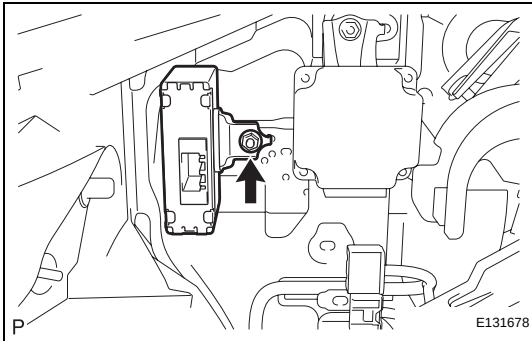
NOTICE:

Do not apply excessive force.

- (c) Disconnect the connectors.



- (d) Remove the nut and the distance control ECU assembly.



INSTALLATION

1. INSTALL DISTANCE CONTROL ECU ASSEMBLY

- (a) Install the distance control ECU assembly with the nut.

Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

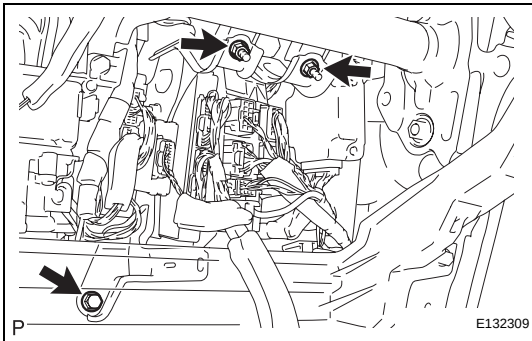
NOTICE:

Do not install the distance control ECU if it has been damaged or impacted in any way.

- (b) Connect the connector.

- (c) Install the certification ECU with instrument panel wire with the 2 nuts and bolt.

Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)



2. INSTALL LOWER INSTRUMENT PANEL RH (See page [IP-42](#))
3. INSTALL FRONT PASSENGER SIDE KNEE AIRBAG ASSEMBLY (See page [RS-396](#))
4. INSTALL SIDE INSTRUMENT PANEL RH (See page [IP-43](#))
5. INSTALL NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (See page [IP-44](#))
6. INSTALL FRONT DOOR OPENING TRIM COVER RH (See page [IR-65](#))
7. INSTALL FRONT DOOR SCUFF PLATE RH (See page [IR-65](#))
8. INSTALL INSTRUMENT PANEL FINISH PANEL END RH (See page [IP-44](#))
9. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL
10. INITIALIZE DISTANCE CONTROL ECU ASSEMBLY
NOTICE:
 After replacing the distance control ECU, it is necessary to initialize the distance control ECU so that the ECU can recognize the specification of the vehicle.
 - (a) Be sure to perform the following procedures after replacing the distance control ECU.
 - (1) Turn the engine switch on (IG).
 - (2) Turn the cruise control 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 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 may lead to an incorrect optical axis setting. If the headlight dimmer switch is turned on by mistake, readjust the optical axis (See page [CC-122](#)).

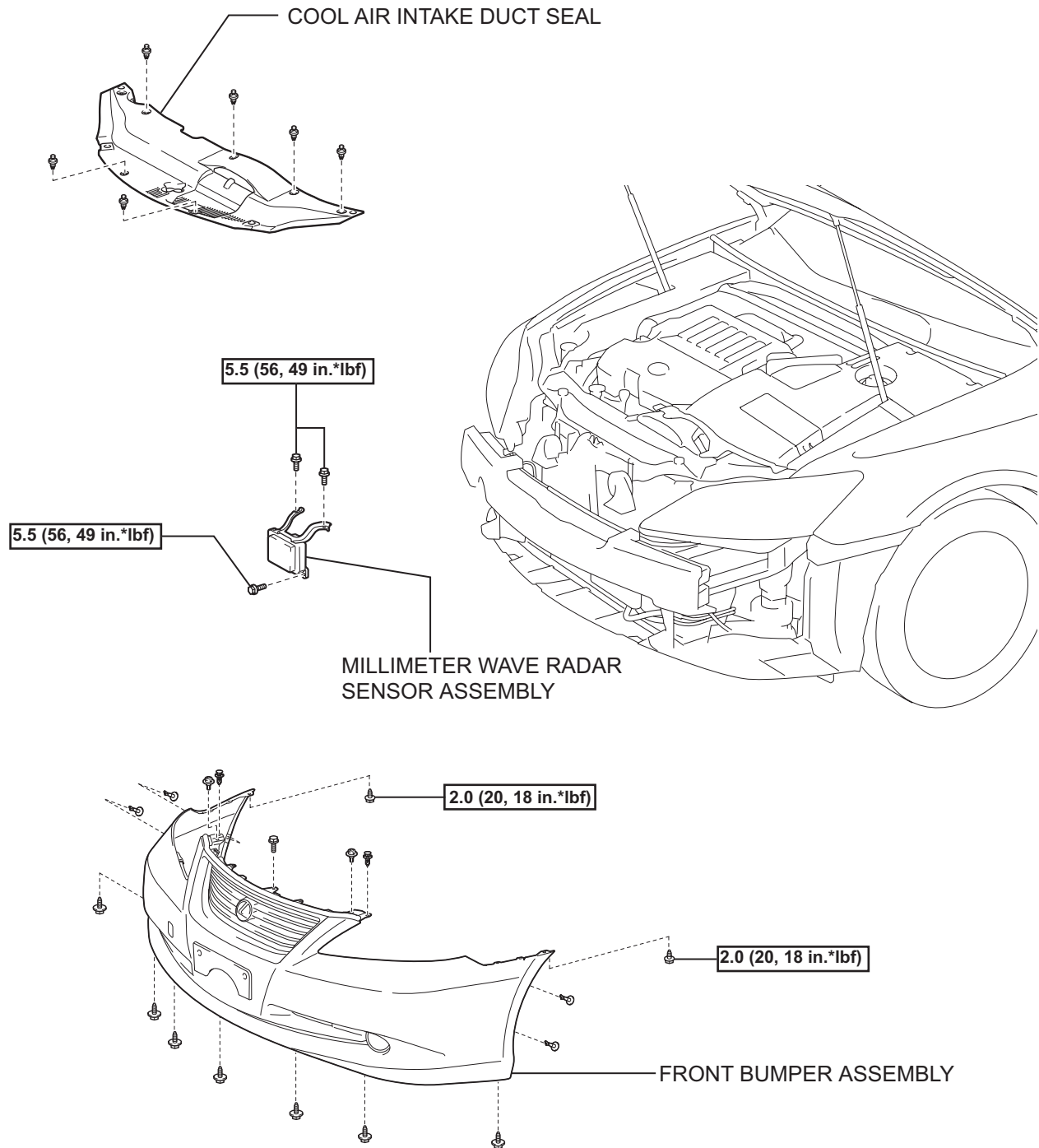
11. PERFORM INITIALIZATION**NOTICE:**

Some systems need initialization when disconnecting the cable from the negative battery terminal (See page [IN-33](#)).

12. INSPECT FRONT PASSENGER SIDE KNEE AIRBAG ASSEMBLY (See page [RS-395](#))**13. INSPECT SRS WARNING LIGHT (See page [RS-37](#))**

MILLIMETER WAVE RADAR SENSOR

COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque

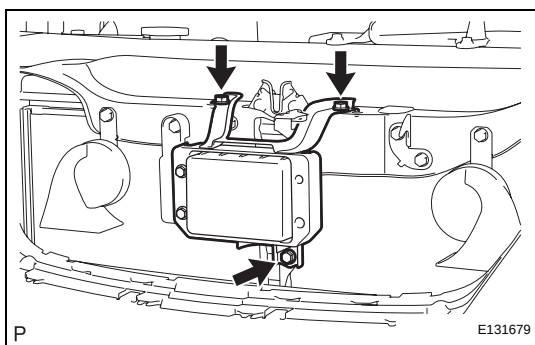
REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait for 90 seconds after disconnecting the cable to prevent airbag deployment (See page [RS-1](#)).

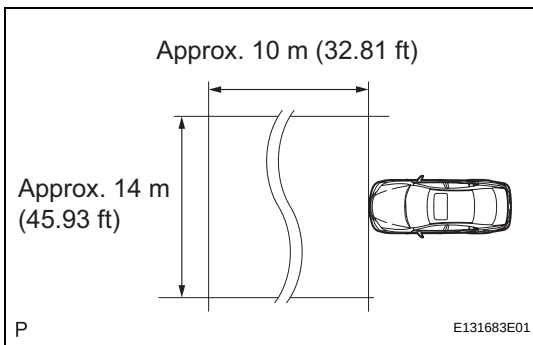
2. REMOVE COOL AIR INTAKE DUCT SEAL (See page [EM-22](#))
3. REMOVE FRONT BUMPER ASSEMBLY (See page [ET-5](#))
4. REMOVE MILLIMETER WAVE RADAR SENSOR ASSEMBLY
 - (a) Disconnect the connector.
 - (b) Remove the 3 bolts and the millimeter wave radar sensor assembly.



ADJUSTMENT

HINT:

- After replacing the ECM on vehicles with radar cruise control system, it is necessary to initialize the ECM so that the ECM can recognize the radar cruise control system (See page [ES-544](#))
- After replacing the distance control ECU, it is necessary to initialize the distance control ECU so that ECU can recognize the specification of the vehicle (See page [CC-119](#)).
- There is a limitation on radar beam axis adjustment.
- Since the radar sensor is installed in the radiator support upper and hood lock support sub-assembly, 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 radar beam axis after the operation.



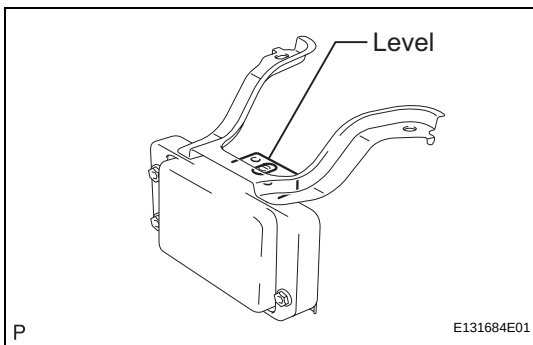
1. ADJUST MILLIMETER WAVE RADAR SENSOR

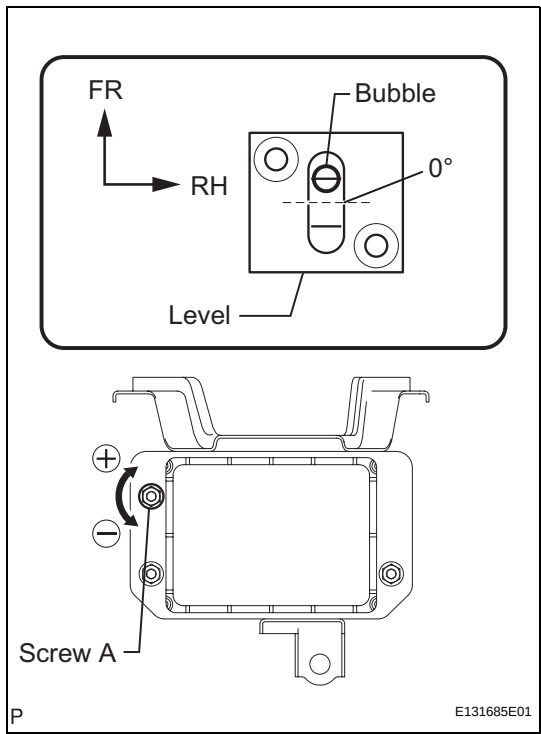
CAUTION:

Exposure to radio frequency emissions is hazardous to your health. It is hazardous to your health to be within 20 cm (7.9 in.) of the device's radio frequency aperture.

NOTICE:

- This device complies with FCC radio frequency emission regulations.
 - Perform measurements on a level surface.
 - Make sure that no large pieces of metal are within a 10 m (32.81 ft) x 14 m (45.93 ft) area in front of the vehicle. If possible, the surrounding area should also be free of large metal objects.
- (a) Before adjusting the radar beam axis, prepare the vehicle as follows:
 - (1) Check the tire pressure and adjust it if necessary.
 - (2) Remove all excess weight from the vehicle (luggage, heavy objects, etc.).
 - (b) Check and adjust the vertical direction of the radar sensor.
 - (1) Remove dust, oil, and foreign matter from the radar sensor's level rack.
 - (2) Set a level on the radar sensor's level rack.





- (3) Check that the air bubble is within the red frame on the level.

OK:

The air bubble is within the red frame on the level.

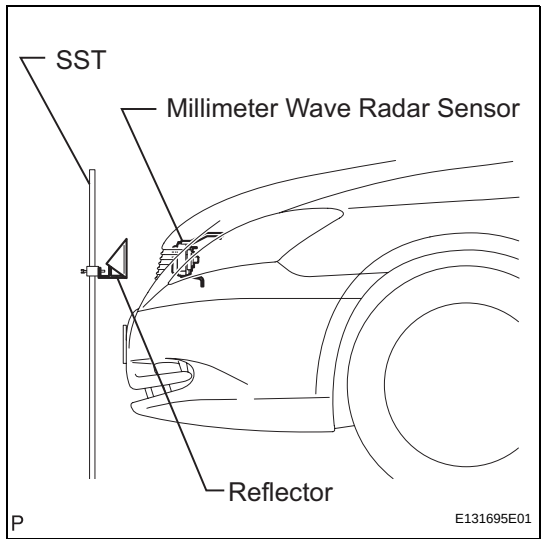
If the bubble is not indicated with the red frame, use a hexagon wrench to adjust screw A until the air bubble is within the red frame.

HINT:

- The adjustable range indicated with the red frame on the level is + - 0.2°.
- The target angle is +0.2° (upward angle of 0.2°).

Result

Adjustment Direction	Adjustment Procedure	Adjustment Angle
Vertical adjustment	• Upward direction: Turn screw A to negative (-) side • Downward direction: Turn screw A to positive (+) side	Approx. 1.0° per turn



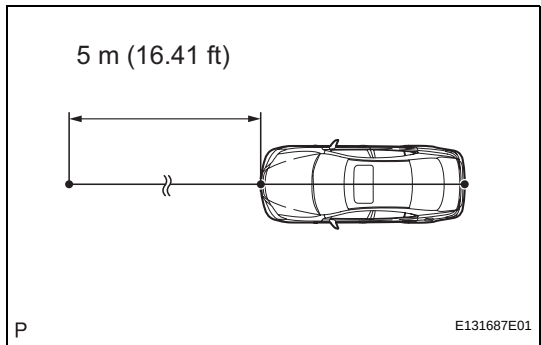
- (c) Adjust the reflector height.

- (1) Adjust the reflector so that the center of the SST reflector is the same height as the millimeter wave radar sensor.

SST 09870-60000 (09870-60010, 09870-60040)

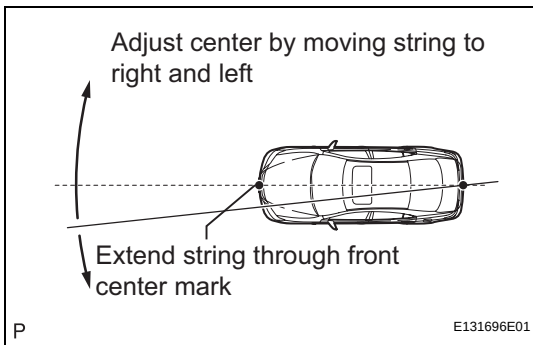
HINT:

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.

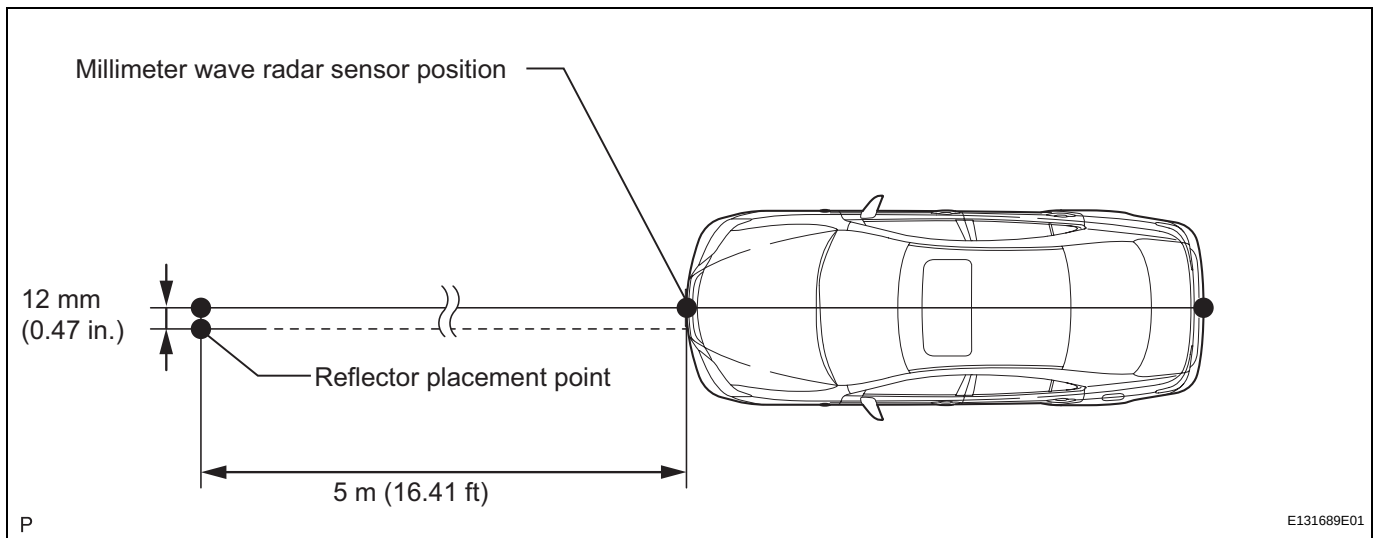


- (d) Place the reflector.

- (1) Hang the string (with weight) from the center of the vehicle's rear emblem. Mark the vehicle's rear center point on the ground. Repeat the same procedure for the front of the vehicle.



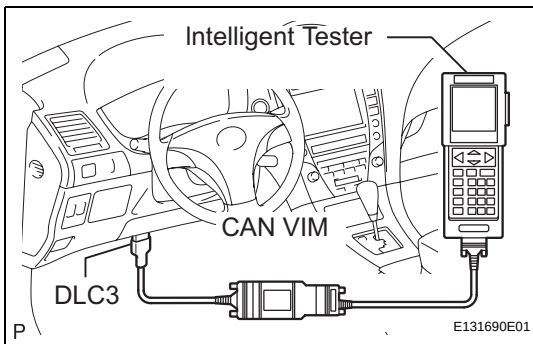
- (2) Set one end of the 10 m (32.82 ft) string on the vehicle's rear center point. Run the string over the vehicle's front center point to a position 5 m (16.41 ft) beyond the vehicle front center point, as shown in the illustration. Mark the 5 m (16.41 ft) position.
- (3) Using a tape measure, measure 12 mm (0.47 in.) to the left of the 5 m (16.41 ft) position. Place the reflector at that position.



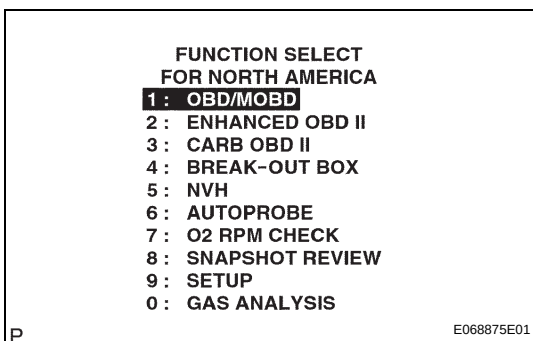
CC

NOTICE:

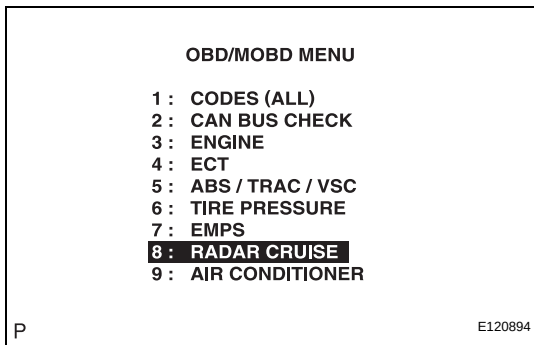
Perform the operation as precisely as possible.



- (e) Adjust the radar beam axis.
 - (1) Connect the intelligent tester to the Controller Area Network Vehicle Interface Module (CAN VIM). Then connect the CAN VIM to the Data Link Connectors 3 (DLC3).
 - (2) Turn the engine switch on (IG).
 - (3) Turn the intelligent tester main switch on, and turn the cruise control main switch on.

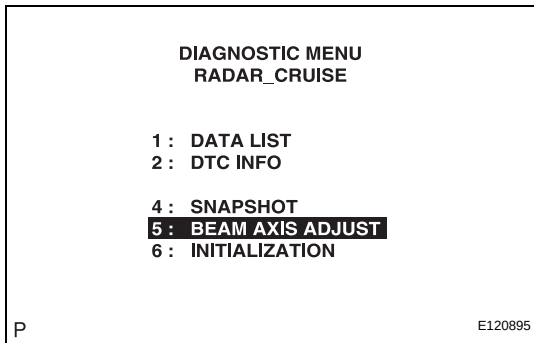


- (4) Select "1: OBD/MOBD".
- (5) Press the "ENTER" key.



(6) Select "8: RADAR CRUISE".

(7) Press the "ENTER" key.



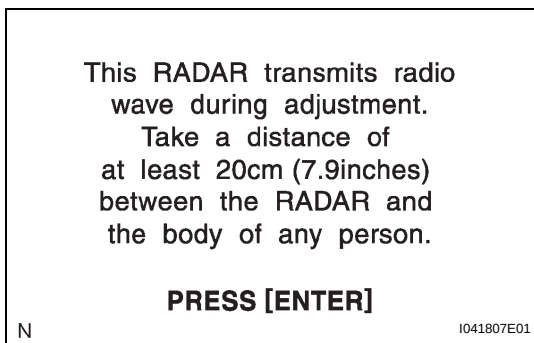
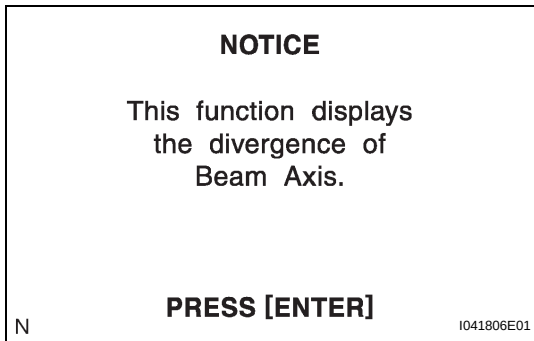
(8) Select "5: BEAM AXIS ADJUST".

(9) Press the "ENTER" key.

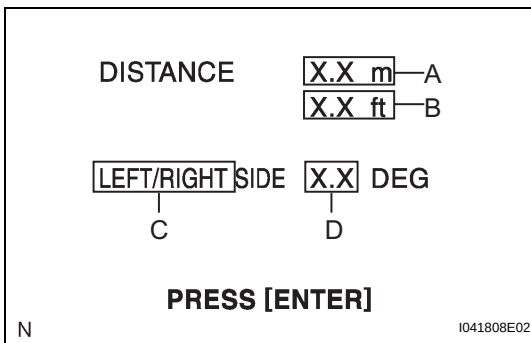
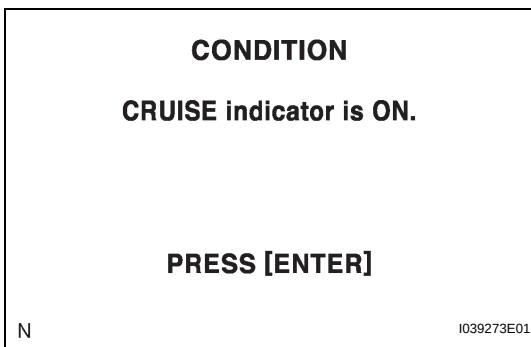
HINT:

- Pressing the "ENTER" key will make the ECM transfer to BEAM AXIS ADJUST MODE.
- If an error message is displayed on the screen, initialization of the distance control ECU may not be completed. Initialize the distance control ECU (See page [CC-119](#)).
- When the ECM transfers to BEAM AXIS ADJUST MODE, the buzzer sounds for 1 second.

(10) Press the "ENTER" key.



(11) Press the "ENTER" key.



(12) After the CRUISE main indicator light comes on, press the "ENTER" key.

(13) Press the "ENTER" key.

(14) Check that a distance of 5 m (16.41 ft) is displayed on the tester.

HINT:

If the distance is 0 m (0 ft), the sensor cannot detect the target. Reconfirm that there is no metal around the vehicle.

1. Check that a value between 0.0 and 6.3 is displayed in the meter display, area A.

2. Check that a value between 0.0 and 20.67 is displayed in the feet display, area B.

3. Check that LEFT or RIGHT is displayed in area C.

4. Check that an angle value between 0.0 and 6.3 is displayed in area D.

While using the intelligent tester BEAM AXIS ADJUST MODE, the actual direction and angle of the radar sensor may be different from the intelligent tester's data. In such a case, the deviation is displayed on the combination meter's multi-information display.

(f) Check and adjust the horizontal direction of the radar sensor.

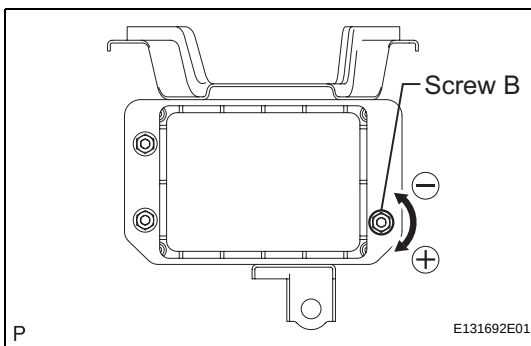
(1) Check that the divergence of the radar beam axis is 0°.

Standard:

0° (Both right and left)

If the axis is not as specified, use a hexagon wrench to adjust screw B until the divergence of the radar beam axis is 0°.

(2) Based on the measured divergence of the beam axis, turn and adjust screw B for horizontal adjustment of the millimeter wave radar sensor using a hexagon wrench.



Result

Adjustment Direction	Adjustment Procedure	Adjustment Angle
Horizontal adjustment	- Right direction: Turn screw B to positive (+) side. - Left direction: Turn screw B to negative (-) side.	Approx. 0.33° per turn

HINT:

- If "LEFT SIDE: 1.0°" is displayed, the divergence is 1.0° in the left direction. Turn screw B approximately 3 turns to the negative (-) side.
- If the value does not change to 0°, it is likely that the sensor is aiming at something different. Reconfirm that there are no reflective materials around the vehicle.

- (3) Reset the radar sensor's driving learning values. Prepare a type of metal that can block radio waves, such as aluminum foil. Cover the radar sensor's left half with the metal for 10 seconds.

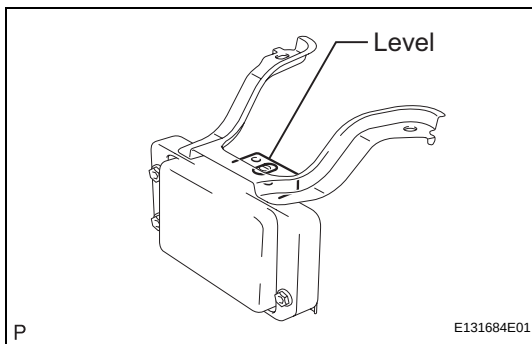
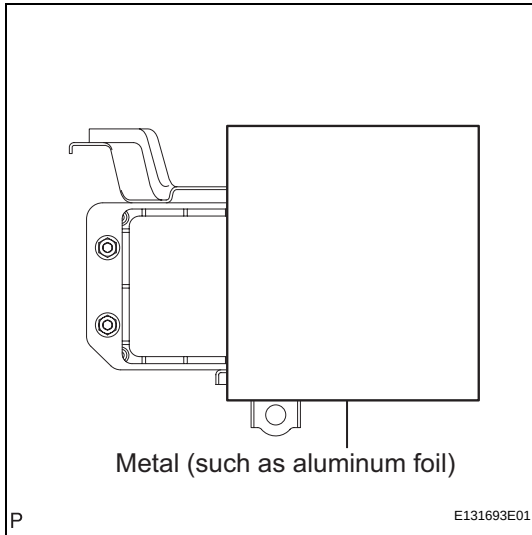
NOTICE:

Be sure to keep the reflector in place and make sure that there is nothing between the sensor's left half and the reflector.

HINT:

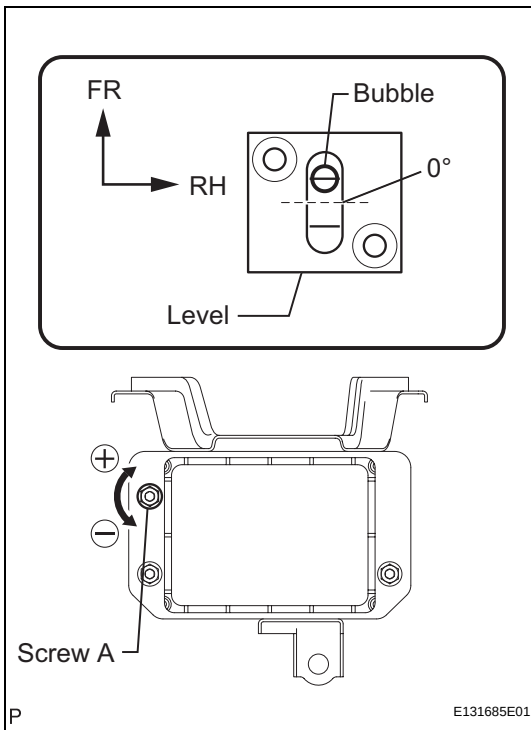
When the reset is completed, the buzzer sounds for 10 seconds.

- (4) Disconnect the intelligent tester from the DLC3.



- (g) Recheck and readjust the vertical direction of the radar sensor.

- (1) Set a level on the radar sensor's level rack.



- (2) Check that the level's air bubble is within the red frame.

OK:

Level's air bubble is within the red frame. If the bubble is not within the red frame, use a hexagon wrench to adjust screw A until the level's air bubble is within the red frame.

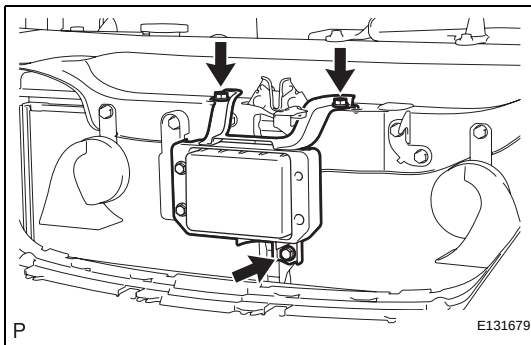
HINT:

- The adjustable range indicated with the red frame is $\pm 0.2^\circ$.
- The target angle is $+0.2^\circ$ (upward angle of 0.2°).

CC

Result

Adjustment Direction	Adjustment Procedure	Adjustment Angle
Vertical adjustment	- Upward direction: Turn screw A to negative (-) side - Downward direction: Turn screw A to positive (+) side	Approx. 1.0° per turn

**INSTALLATION****1. INSTALL MILLIMETER WAVE RADAR SENSOR ASSEMBLY**

- (a) Install the millimeter wave radar sensor assembly with the 3 bolts.

Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)

- (b) Connect the connector.

2. INSTALL FRONT BUMPER ASSEMBLY (See page [ET-14](#))**3. INSTALL COOL AIR INTAKE DUCT SEAL (See page [EM-50](#))****4. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL****5. ADJUST MILLIMETER WAVE RADAR SENSOR (See page [CC-122](#))****6. PERFORM INITIALIZATION****NOTICE:**

Some systems need initialization after reconnecting the cable to the negative battery terminal (See page [IN-33](#)).

7. VEHICLE PREPARATION FOR FOG LIGHT AIM (See page [LI-141](#))

8. PREPARATION FOR FOG LIGHT AIMING (See page [LI-142](#))
9. FOG LIGHT AIMING INSPECTION (See page [LI-143](#))
10. FOG LIGHT AIMING ADJUSTMENT (See page [LI-144](#))