■CONSTRUCTION AND OPERATION

1. Cruise Control Switch

The cruise control switch consists of the ON-OFF button, RES/+, MODE, SET/- and CANCEL switches. RES/+, MODE, SET/- and CANCEL switches are operated by moving the lever in the four directions indicated.

• The cruise control switch is an automatic reset (normally open) type that turns on only when the switch is being operated and turns off as soon as the driver releases the switch. Furthermore, the functions of the control switch are active only when the cruise control system has been turned on using the ON-OFF button on the cruise control switch.



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2. Distance Control Switch

While the vehicle is being driven in vehicle-to-vehicle distance control mode, the vehicle-to-vehicle distance setting can be changed each time the distance control switch is pressed, as follows; long \rightarrow middle \rightarrow short.

- If the engine switch is turned off and back to on (IG), the system will default to "long".
- The vehicle-to-vehicle distance is set as follows:



Mode	Vehicle-to-Vehicle Distance*	
Long	Approx. 75 m (245 ft)	
Middle	Approx. 50 m (165 ft)	
Short	Approx. 30 m (100 ft)	

*: While driving at a vehicle speed of 90 km/h (55 mph).

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3. Millimeter Wave Radar Sensor

General

The millimeter wave radar sensor consists of a millimeter wave radar circuit, signal processing circuit, and CPU.

- The millimeter wave radar circuit consists of one transmission antenna and nine reception antennas.
- The millimeter wave radar outputs waves when the vehicle speed is above 0, and not when the vehicle speed is at 0. The millimeter wave radar uses frequencies in the 76 GHz band.
- The reception antennas receive the millimeter wave radar waves that have been reflected.
- The signal processing circuit detects the distance, relative speed, and the direction of the object by generating millimeter wave radar waves and calculating the signals received by the reception antennas. Then, it transmits this information to the distance control ECU assembly.



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Calculation Method

The distance to the object, azimuth (horizontal angle), and relative speed are calculated from the information that is provided by the reflection millimeter wave radar as described below.

Distance	Calculated from the length of time that has elapsed from the time the waves of the millimeter wave radar have been emitted, until the waves reflected by the millimeter wave radar are received.		
Azimuth	Calculated from the angle of the waves reflected by the millimeter wave radar that have been received.		
Relative Speed	Calculated by utilizing the changes (Doppler effect*) that occur in the frequencies of the reflected millimeter wave radar waves.		

*: The Doppler effect causes the observer to perceive the radio wave emitted by a moving object to be of higher frequencies as it approaches, and to be of lower frequencies at it recedes. This phenomenon is created because when an object is located far, the radio waves are perceived at higher frequencies than those of the radio source.





By applying the following formula, the vehicle speed \mathbf{B} of the target vehicle can be calculated.

Doppler Effect: F'= $\frac{\mathbf{V} + \mathbf{B}}{\mathbf{V} - \mathbf{A}}$ F

- Service Tip

After a millimeter wave radar sensor has been replaced or removed and reinstalled, SST (09870-60000) and an intelligent tester must be used to adjust the sensor angle. To ensure the proper precision, the sensor must be adjusted in the horizontal state. For this reason, the sensor is provided with an area for placing a level, as well as a horizontal adjusting bolt and a vertical adjusting bolt. For details, see the LEXUS IS F Repair Manual (Pub. No. RM08E0E).



Adjusting Bolt

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4. Combination Meter Assembly

The combination meter assembly provides a master warning light, CRUISE main indicator light, buzzer, and multi-information display to warn and indicate in the dynamic radar cruise control system.

- The multi-information display displays the set vehicle speed, constant speed mode mark, vehicle-to-vehicle distance mark, vehicle ahead mark, and warning message.
- Examples are shown below for the illumination or display of each indicator light, warning light or multi-information display.

Mode	Condition	Multi-information Display	CRUISE 0140BE96C	0150BE35C	Buzzer
Constant Speed Control	Being Controlled	NORM. 100 km/h	Illuminates	_	_
Vehicle-to -Vehicle Distance Control	Set Standby	RADAR READY 0140BE88C	Illuminates	_	-
	Under Constant Speed Control (No Vehicle Ahead)	100100100100100100LongMiddleShort08E0BE33C	Illuminates	-	_
	Under Follow-up Control (Vehicle Ahead)	100 100 100 100 100 100 Long Middle Short 0150BE42C 0150BE42C	Illuminates	_	_
	Deceleration Control/Vehicle Approach Warning (Vehicle Ahead)	The vehicles in the display are highlighted at 0.5-second intervals.	Illuminates	_	Sounds* ²
System Failure	Millimeter wave radar sensor is dirty.	CLEAN RADAR SENSOR 0140BE92C	Blinks	Illuminates	Sounds Once
	Poor Weather Conditions	CRUISE NOT AVAILABLE 0140BE93C	Blinks	Illuminates	Sounds Once
	System Check* ¹	CHECK CRUISE SYSTEM 0140BE94C	Blinks	Illuminates	Sounds Once
Beam Axis Adjustment		RADAR CRUISE BEAM AXIS ADJUSTMENT	Illuminates	_	Sounds for 1 second

*1: When a DTC (Diagnostic Trouble Code) is memorized.

*²: Sounds Continuously