5. Construction and Operation

Combination Meter

The master warning light and warning message of the multi-information display in the combination meter warns the driver of the abnormal or poor conditions of the pre-crash safety system.

- Two types of warning messages are used for the pre-crash safety system, as described below. The pre-crash safety system will not operate when these messages appear in the combination meter.

Warning Message	Detail	Master Warning Light	Repair	DTC
Check PCS System	This message appears when the seat belt control ECU detects a system malfunction.	Illuminate	○	○
PCS not Available Now	This message appears when the seat belt control ECU determines the following conditions: ● Dirty millimeter wave radar sensor ● Poor conditions for millimeter wave radar sensor ● Overheated seat belt control ECU After these conditions have been resolved, the system will operate normally.	Illuminate	×	×

○: Repair is required/ DTCs are output

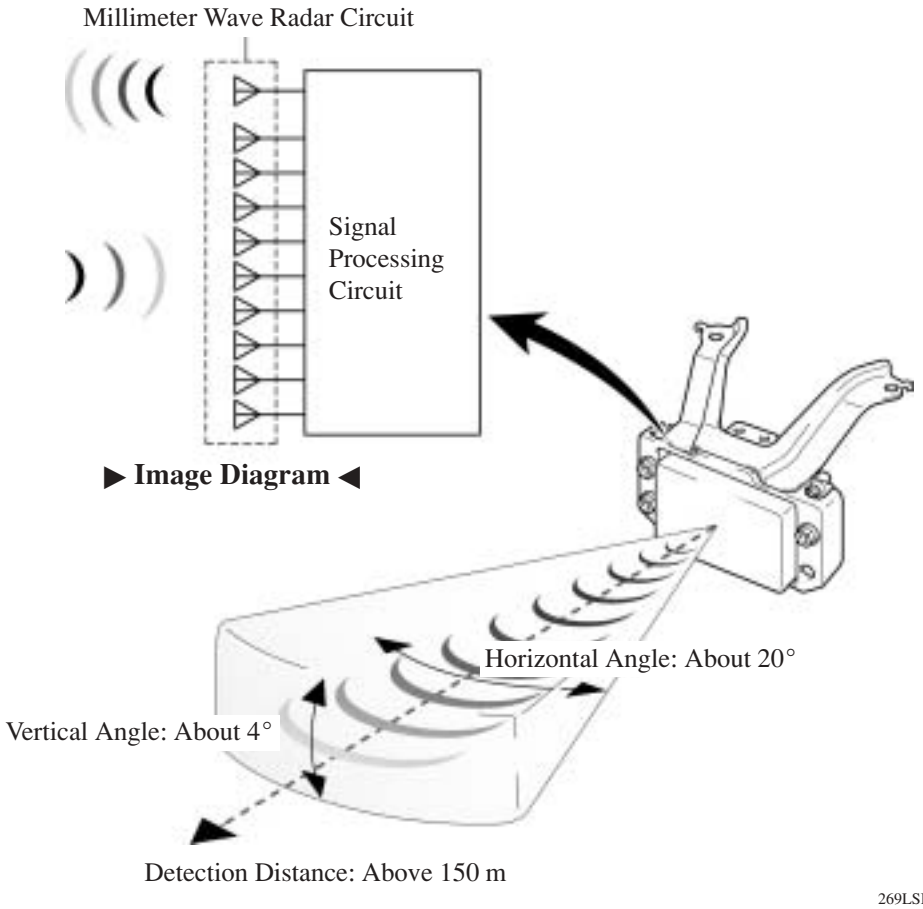
×: Repair is not required/DTCs are not output

Millimeter Wave Radar Sensor

1) General

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

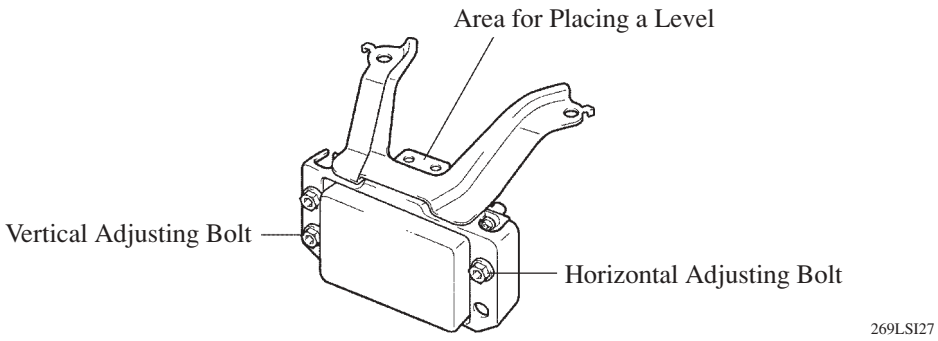
- The millimeter wave circuit consists of one transmission antenna and nine reception antennas.
- The millimeter wave outputs radio waves when ignition switch is ON. The millimeter radio wave uses frequencies in the 76 GHz band.
- The reception antennas receive the millimeter radio waves that have been reflected.
- The signal processing circuit detects the distance, relative speed, and the direction of the object by generating millimeter radio waves and calculating the signals received by the reception antennas. Then, it transmits this information to the distance control ECU.
- The millimeter wave radar sensor also functions as a radar sensor for the dynamic radar cruise control system.



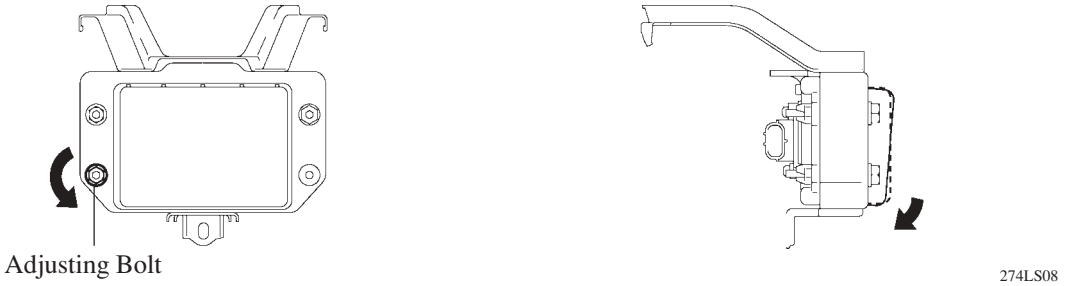
▶ **Image Diagram** ◀

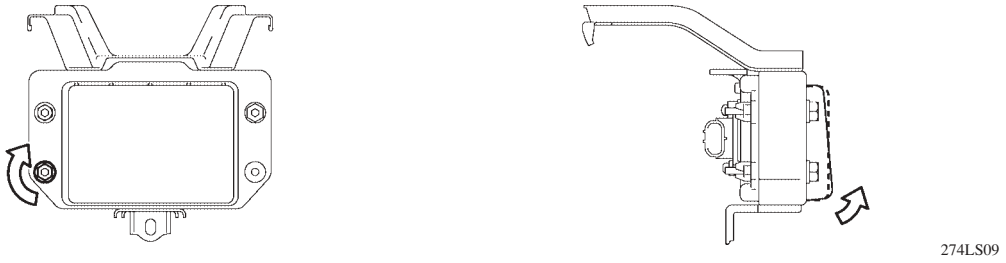
Service Tip

After a millimeter wave radar sensor has been replaced or removed, the SST (09870-60000) and an intelligent tester II 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 LS430 Repair Manual Supplement (Pub. No. RM1133E).

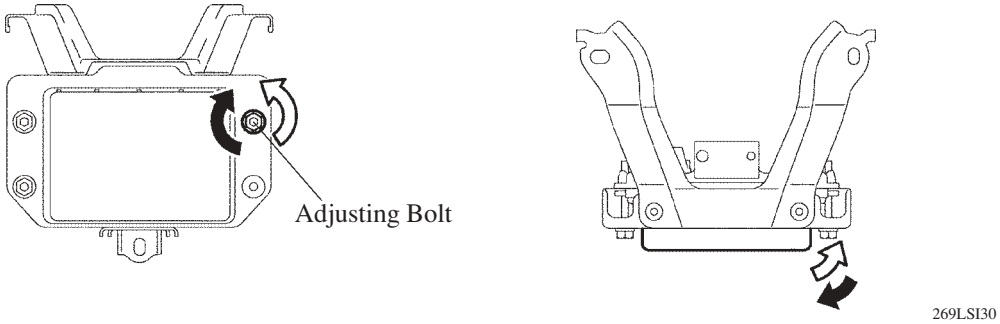


- Turn vertical adjusting bolt to adjust the vertical direction of the millimeter wave radar sensor.
  Reference: One turn of the bolt moves the sensor by approximately 0.67°.





- Turn horizontal adjusting bolt to adjust the horizontal direction of the millimeter wave radar sensor.
  Reference: One turn of the bolt moves the sensor by approximately 0.21°.

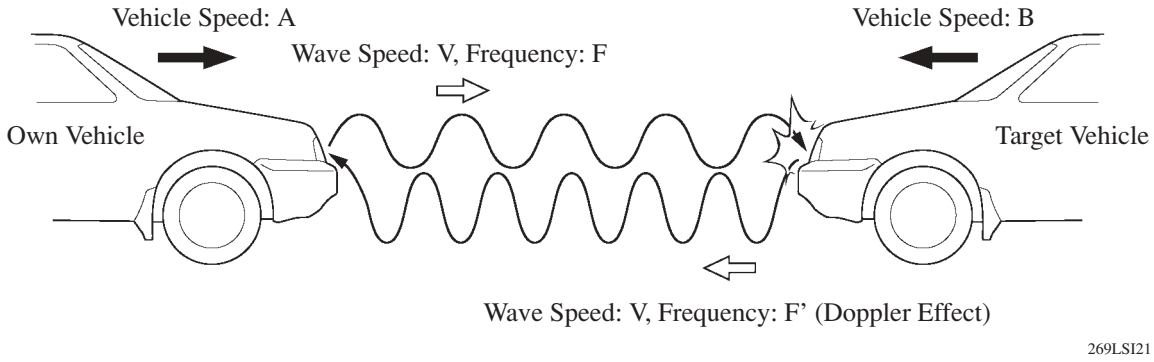


2) Calculation Method

The distance to the object, azimuth, 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 waves reflected by the millimeter wave radar.

*: *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.*



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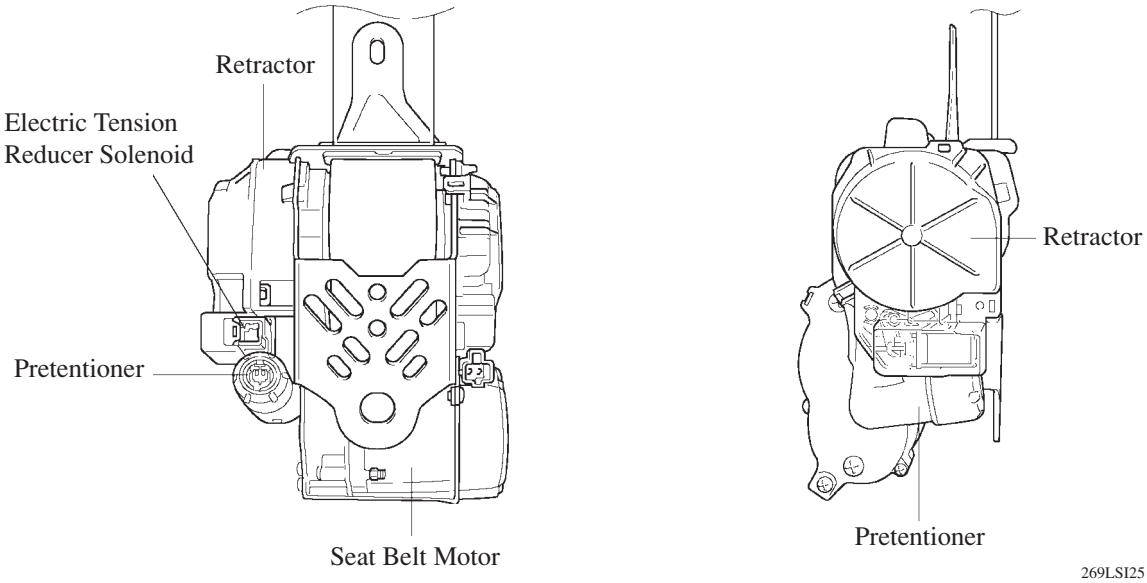
Front Seat Outer Belt

Front seat outer belt consists of the seat belt motor, the retractor, the electric tension reducer solenoid and pretentioner.



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