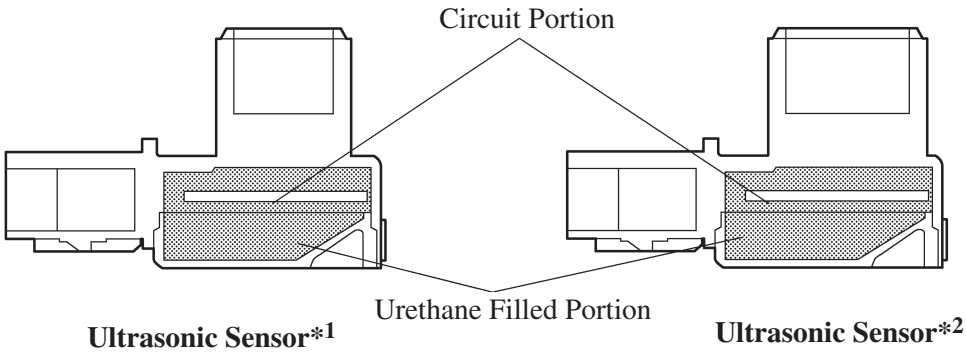
■CONSTRUCTION AND OPERATION

1. Ultrasonic Sensor

- The ultrasonic sensors are provided with a distance calculation function in order to digitize the signals between the clearance sonar ECU and the ultrasonic sensor. As a result, the number of wiring harnesses has been reduced.
- There are two different types of ultrasonic sensors, for the front and rear corners*1 and the rear center*2. Each ultrasonic sensor consists of a sensor portion that transmits and receives ultrasonic waves and a pre-amplifier that amplifies them. The distance calculation circuit calculates the distance between the vehicle and the obstacle based on the received ultrasonic waves. The ultrasonic sensors transmit the calculated distance signals to the clearance sonar ECU.
- The circuit portion is filled with urethane to prevent water from entering.



*1: Models with 4 sensor and 6 sensor type
*2: Models with 2 sensor and 6 sensor type

2. Clearance Warning Buzzer

- Depending on the detection distance and the detection area, the sound pattern of the clearance warning buzzer will vary.

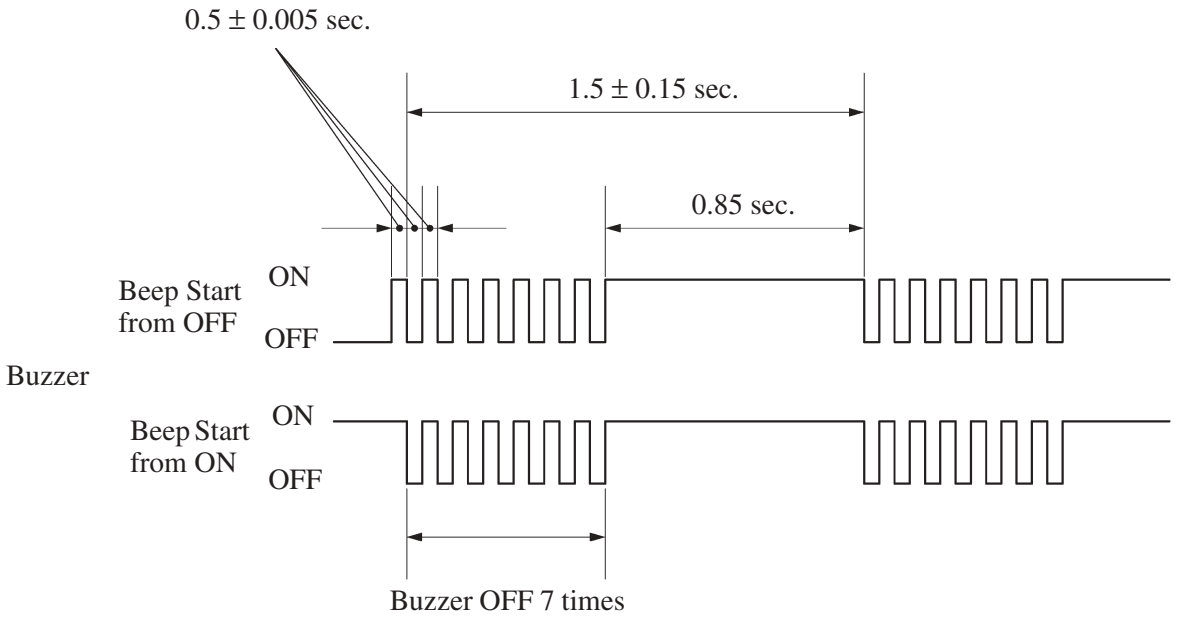
Detection Area	Detection Distance cm (in.)		Buzzer Sound Pattern ON/OFF Time (sec.)
Corner	Long	50 ± 5 to 37.5 ± 4 (19.7 ± 2 to 14.8 ± 2)	0.15/0.15
	Middle	37.5 ± 5 to 25 ± 3 (14.8 ± 2 to 9.8 ± 1.2)	0.075/0.075
	Short	25 ± 3 or less (9.8 ± 1.2 or less)	Continuous Sound/0
Rear Center	Longest	150 ± 15 to 60 ± 6 (59 ± 5.9 to 23.6 ± 2.4)	0.15/0.15
	Long	60 ± 6 to 45 ± 5 (23.6 ± 2.4 to 17.7 ± 2)	0.15/0.15
	Middle	45 ± 5 to 35 ± 4 (17.7 ± 2 to 13.8 ± 1.6)	0.075/0.075
	Short	35 ± 4 or less (13.8 ± 1.6 or less)	Continuous Sound/0

- When the front and rear sensors detect obstacles at the same time, the buzzer sounds as follows.

Buzzer Frequency (sec.)

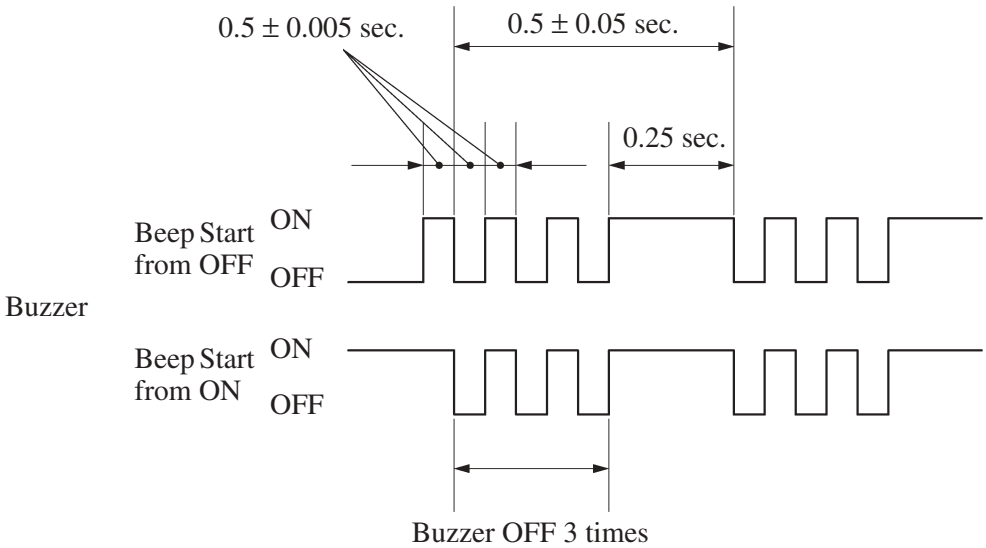
Front / Rear	Short	Middle	Long	Not detected
Short	Buzzer Timing 2	Buzzer Timing 1	Buzzer Timing 1	Continuous Sound/0
Middle	Buzzer Timing 1	0.15	0.15	0.15
Long	Buzzer Timing 1	0.15	0.3	0.3
Longest	Buzzer Timing 1	0.15	0.3	0.8
Not detected	Continuous Sound/0	0.15	0.3	None

▶ Buzzer Timing 1 ◀



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▶ Buzzer Timing 2 ◀

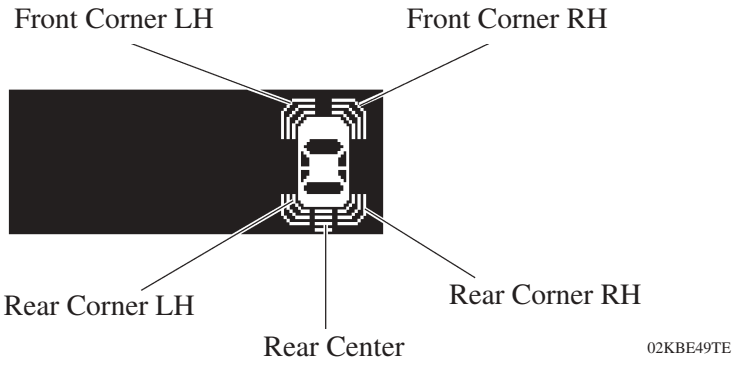


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3. Multi-information Display

- The items displayed by the multi-information display are the location of the obstacle, the approximate distance between the vehicle and the obstacle, and warning messages relating to sensor malfunction, sensor freezing, or presence of dirt on the sensor. When any warning messages are displayed, the master warning light illuminates and the clearance warning buzzer sounds.
- The multi-information warning display is provided only for models with 4 and 6 sensor types.
- The number of lines shown on the display changes based on the actual distance and flashes when the distance is short.



Detection Area	Detection Distance	Multi-information Display Condition
Corner	Long 50 ± 5 to 37.5 ± 4 (19.7 ± 2 to 14.8 ± 2)	 Line: Illuminates 02KBE50TE
	Middle 37.5 ± 5 to 25 ± 3 (14.8 ± 2 to 9.8 ± 1.2)	 Line: Illuminates 02KBE101TE
	Short 25 ± 3 or less (9.8 ± 1.2 or less)	 Line: Flashes 02KBE102TE
Rear Center	Longest 150 ± 15 to 60 ± 6 (59 ± 5.9 to 23.6 ± 2.4)	 Line: Illuminates 02KBE103TE
	Long 60 ± 6 to 45 ± 5 (23.6 ± 2.4 to 17.7 ± 2)	 Line: Illuminates 02KBE104TE
	Middle 45 ± 5 to 35 ± 4 (17.7 ± 2 to 13.8 ± 1.6)	 Line: Illuminates 02KBE105TE
	Short 35 ± 4 or less (13.8 ± 1.6 or less)	 Line: Flashes 02KBE106TE

▶ Warning Message ◀



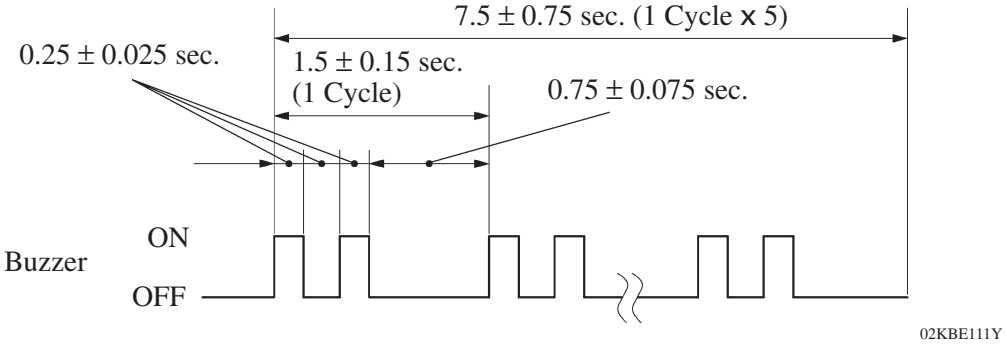
Ultrasonic Sensor Malfunction Warning



Ultrasonic Sensor Freeze/ Contamination Warning

02KBE110TE

▶ Buzzer Timing ◀



02KBE111Y