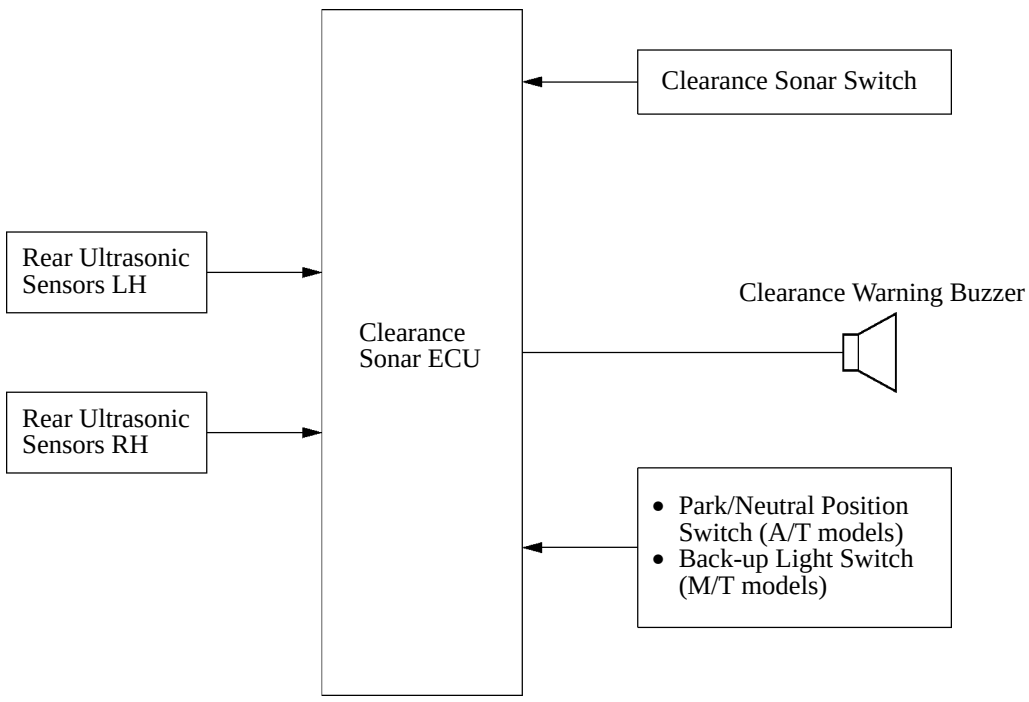
TOYOTA PARKING ASSIST SYSTEM

■DESCRIPTION

- The TOYOTA parking assist system is adopted as optional equipment.
- This system uses ultrasonic sensors and is equipped with beeping alarm. It can detect obstacles at the rear of the vehicle, and provide information to the driver regarding the distance.
- When an obstacle is detected by the TOYOTA parking assist system, the clearance warning buzzer sounds to alert the driver.
- The conditions required to operate are as shown in the table below:

Operating Condition
• Ignition switch is ON. • Clearance sonar switch is ON. • A/T shift lever is in the R position. (A/T models) • Back-up light switch is ON. (M/T models)

■SYSTEM DIAGRAM



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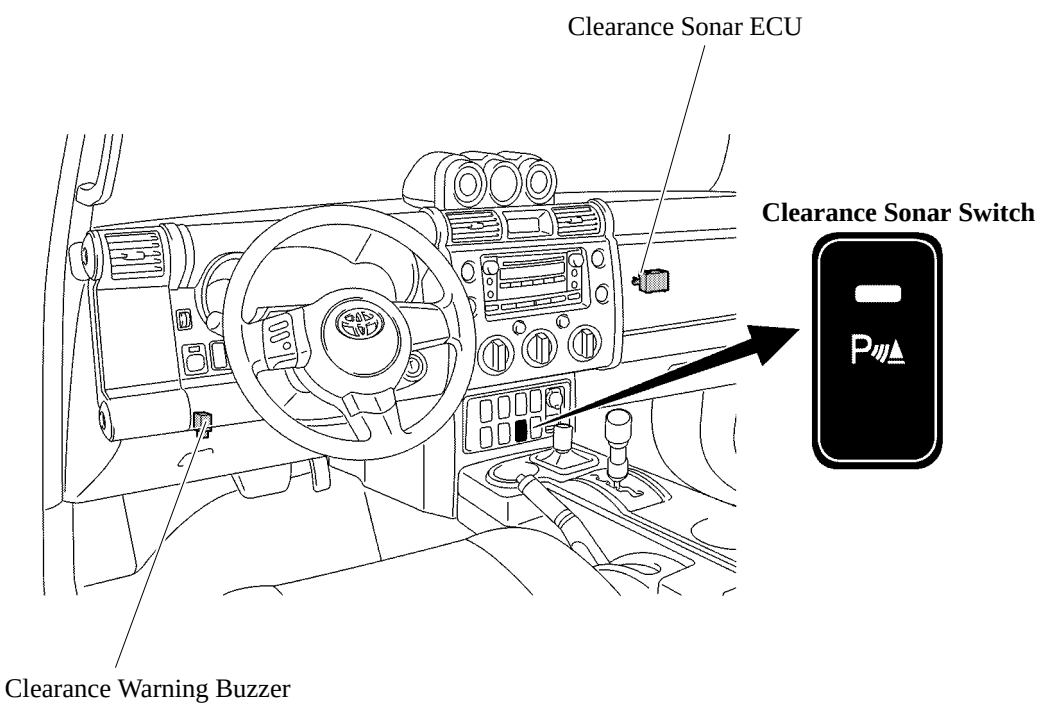
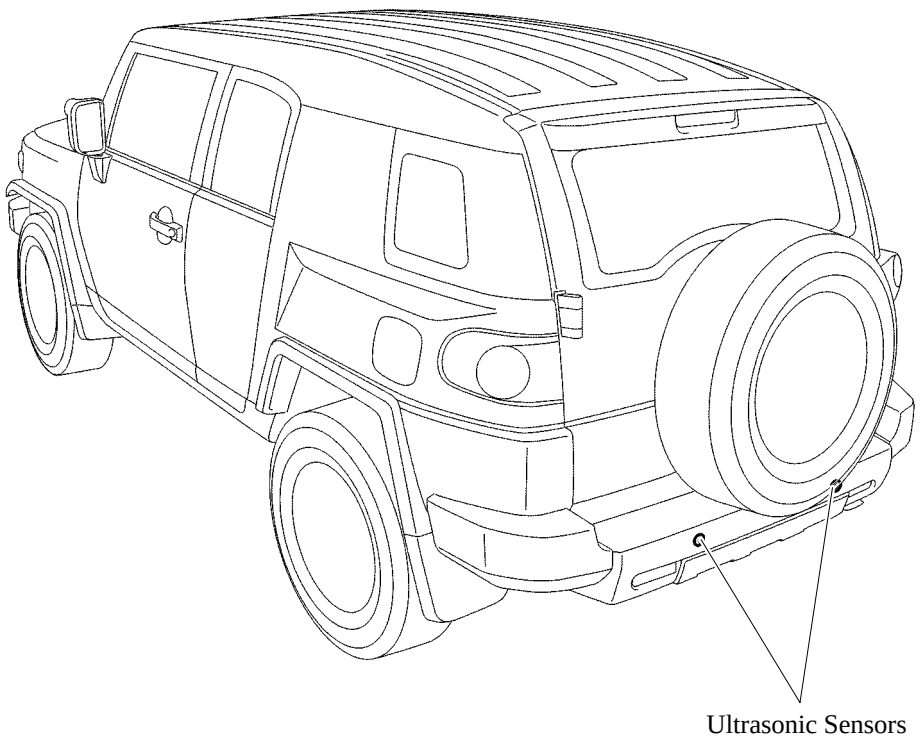
■LAYOUT OF MAIN COMPONENTS





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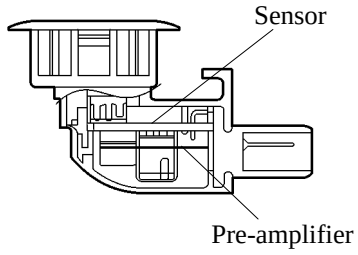
■FUNCTION

Component	Function
Ultrasonic Sensor	Detects the distance between the vehicle and the obstacle.
Clearance Warning Buzzer	Emits an intermittent sound to inform the driver that the Clearance Sonar ECU has detected an obstacle within the prescribed range.
Clearance Sonar Switch	A switch that turns the power of the clearance sonar system on/off.
Clearance Sonar ECU	Judges the approximate distance between the vehicle and obstacle based on the signals from the ultrasonic sensors and sends the buzzer signal to the clearance warning buzzer. Additionally ECU has buzzer sound volume adjusting knob.

■CONSTRUCTION

1. Ultrasonic Sensor

This vehicle is equipped with two ultrasonic sensors. Each ultrasonic sensor consists of a sensor portion that transmits and receives ultrasonic waves and a pre-amplifier that amplifies them. Each ultrasonic sensor transmits ultrasonic waves, receives the reflected waves from an obstacle behind the vehicle, and transmits a signal to the clearance sonar regarding the distance to the obstacle (approximately 1.5 m or less).



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2. Clearance Warning Buzzer

When the ultrasonic sensor transmits ultrasonic waves and receives the reflected waves from an obstacle, the buzzer sounds in stages according to the distance to the obstacle.

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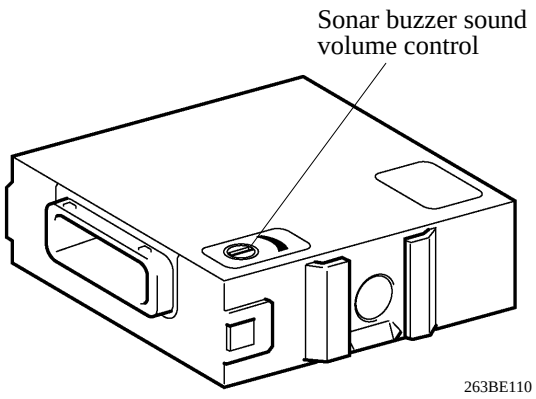
3. Clearance Sonar ECU

- The Clearance Sonar ECU effects overall control of the system, including the switching of the transmission and reception of the ultrasonic sensor signals, processing the received wave signals, determining the presence of obstacles, actuating the buzzer, and determining the presence of an open circuit in the sensors.
- The sound volume of the clearance warning buzzer can be adjusted at the Clearance Sonar ECU.



■SYSTEM OPERATION

1. Detection Activation

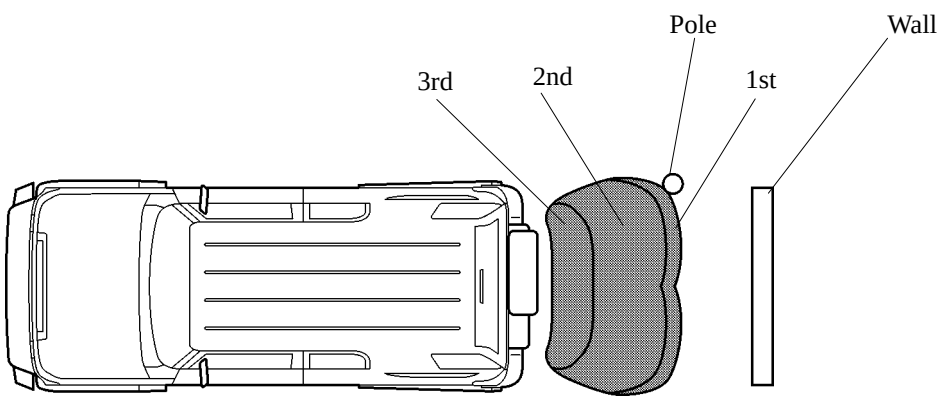
The ON/OFF times of the clearance warning buzzer vary in accordance with the distance to the obstacle as given in the following table:

Detection Level	Obstacle Distance [cm (in.)]	OFF Time (ms)	ON Time (ms)
1st	Approx. 100 (39.4) to 150 (59.1) *	225	75
2nd	Approx. 50 (19.7) to 100 (39.4)	75	75
3rd	Approx. 50 (19.7) or less	0	Continuous

*: The maximum detection range will vary depending on the type of obstacles:

- The maximum detection range will be 150 cm (59.1 in.) for large obstacles such as a wall.
- The maximum detection range will be 110 cm (43.3 in.) for obstacles such as a pole.

▶ Detection Range ◀



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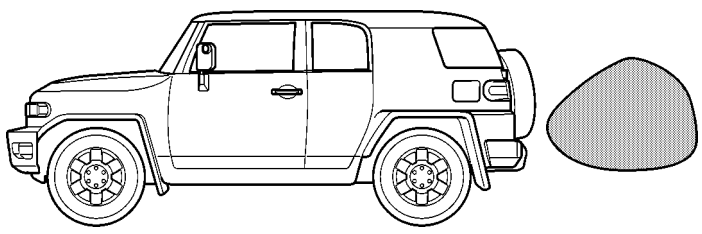

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2. Initial Check (Self-Diagnosis)

After the clearance sonar system has started its activation, sounds the clearance warning buzzer for about 1 second, while checking for any malfunction in the ultrasonic sensors.
If the system cannot activate its detection function due to a malfunction in an ultrasonic sensor, it alerts the driver of the malfunction by the sounding the buzzer. For details, refer to the 2007 FJ Cruiser Repair Manual (Pub. No. RM0240U).

■HANDLING PRECAUTIONS

The detection function of this system may not operate properly in the following conditions:
- When ice, snow or mud gets on the sensors. If removed, the system will work properly.
- When a sensor is frozen. If the sensor is no longer frozen, the system will work properly.
- When the sensor is covered with something. If the material is removed, the system will work properly.

NOTES:
Especially in cold weather, a malfunction warning may occur (the buzzer may sound) due to frozen sensors. If the malfunction warning occurs, be sure to check the sensors. If the malfunction warning occurs and there is no mud, ice or snow on the sensors, a sensor may be malfunctioning.

In the following conditions, the detection range may be affected:
- Foreign matter such as snow or mud get on the sensors.
- When the vehicle is operated under a scorching sun or in a freezing climate.

The system may improperly detect obstacles in the following conditions:
- When the vehicle is being driven on bumpy road, gravel road, or on grass.
- When the sound of horns from other vehicles, the sound of a motorcycle engine, the sound of the air brakes of a large truck, or an object that generates ultrasonic waves is in the vicinity.
- When there is a downpour, or water is splashing on the vehicle.
- When the vehicle posture tilts significantly.
- When an antenna for a wireless transmitter is mounted on the vehicle.
- When the sensors are covered with mud, ice, or snow.
- When the vehicle travels in the direction of a tall curb or square curb.
- When other vehicles with sonar are near.
- When a towing hitch is mounted on the vehicle.

There are cases in which the objects listed below cannot be detected:
- Thin objects such as wire or rope.
- Objects with surfaces that are too small to reflect ultrasonic waves such as wire gauze or fence.
- Objects that absorb sound waves such as cotton or snow.
- Objects that have sharp edges.
- Objects that are short in height.
- Objects that are tall and protrude at the top.

Others
- Objects directly underneath the bumpers cannot be detected. The detection of some objects that are located lower than the sensors, or thin stakes, may stop as the vehicle comes closer to these objects.
- An object might not be detected if the vehicle is too close.
- The sensors might not detect properly if they are exposed to strong shocks such as when being struck or having objects thrown at them.