Back Warning System
Objectives

To understand the concept of back warning system.
To understand the function of back warning system
To understand the troubleshooting method

Back warning system an auxiliary device for enhancing the convenience of driving condition using warning (buzzer) system sensing a object within 120㎝ in rear direction and 40㎝ in corner direction and then indicating how close with the object when the car is driven in less than 10km/h or when the driver is parking the car. However, this system does not exempt the driver from the duty of attention. In this system, as limited are the sensing range and sensible objects, the driver should not trust this system thoroughly and fully pay attention to all direction.
1. Components

1.1. Back warning system ECM
(1) When the vehicle is driven in rear direction if an object is found then it generates a various warning sound by receiving a signal of ultra-sonic wave sensor installed at the rear bumper.
(2) When the ultra-sonic wave sensor is malfunction, a warning sound relevant to the kinds of malfunction of the sensor is generated.

1.2 Ultra-sonic wave sensor
a. “Rear Left” sensor: Sensor installed at the left side from the center of bumper.

b. “Rear Right” sensor: Sensor installed at the right side from the center of bumper.
2. BWS sensing range and warning method

The warning is generated when the object is closed to the rear sensor of the car as follows.

<table>
<thead>
<tr>
<th>Step</th>
<th>Rear Left, Rear Right</th>
<th>Side LH, RH</th>
<th>Distance difference</th>
<th>Warning method (difference : ±10%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 step</td>
<td>81 - 120 (cm)</td>
<td>None</td>
<td>± 15cm</td>
<td>![Diagram]</td>
</tr>
<tr>
<td>2 step</td>
<td>41 - 80 (cm)</td>
<td></td>
<td>± 10cm</td>
<td>![Diagram]</td>
</tr>
<tr>
<td>3 step</td>
<td>below 40(cm)</td>
<td></td>
<td>± 10cm</td>
<td></td>
</tr>
</tbody>
</table>

3. Warning method when BWS ultra-sonic sensor is malfunction

After electric power is supplied, if the gear shift is set in the rear (“R”) position, the following warning sounds are generated in accordance with what sensor is malfunction.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Warning method (time difference : ± 10%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power ON</td>
<td>![Diagram]</td>
</tr>
<tr>
<td>Normal</td>
<td>![Diagram]</td>
</tr>
<tr>
<td>Rear left sensor failure</td>
<td>![Diagram]</td>
</tr>
<tr>
<td>Rear right sensor failure</td>
<td>![Diagram]</td>
</tr>
</tbody>
</table>
4. Other items

4.1 For the following cases, this system may work abnormally.
(1) When the sensor is frozen (If the system is unfrozen, then it will work normally)
(2) When foreign materials such as snow or water drop are covering the surface of the sensor.
   (If the foreign materials or any obstacles on the surface of the sensor are removed, the system will
    work normally)

4.2. For the following cases, the sensing range may be reduced.
(1) When foreign materials such as snow or water drop are covering the surface of the sensor.
   (If the foreign materials are removed, then the sensing range will be recovered)
(2) When the weather is severely hot or cold.
(3) When the object is smaller than 14 cm in diameter or 1 m in length

4.3. For the following cases, the system may work abnormally.
(1) When the car is driven in rear direction on the uneven roads, gravel roads, inclined roads, or in the
    cluster of grasses
(2) When closed is the object generating an ultra-sonic waves such as horn sound of vehicles, engine
    sound of bikes, air brake sound of the large vehicles.
(3) When it is heavy rain or water is spread.
(4) When a radio receiver is used near by the sensor.
(5) When the sensor is covered by snow.

4.4. The system may fail to sense the following objects.
(1) A sharp object or thin object such as rope.
(2) A material can absorb the sonic waves easily such as cotton cloth, sponge or snow.

4.5. Cautions for sensor test
(1) Do not supply a DC voltage at the RX and TX terminal of the sensor.
(2) Do not contact sharpen objects to the surface of the sensor or do not impact thereon.

4.6. Others
(1) The warning alert may not generated sequentially in according to the vehicle driving speed or the
    shape of the target objects.
(2) If the height of the bumper or the installing condition of the sensor is changed or if an additional
    accessory which is not enclosed when the car is delivered is installed at the sensing range of the
    sensor, then this system may work abnormally.
(3) Please be noticed that this system may not sense when the object is disposed within 30cm from the sensor.

(4) Please remove the foreign material on the sensor with smooth clothes if the sensor is indicated as in malfunction, it may be covered by snow or water, or it may be frozen.