Please read this manual thoroughly before installation and use

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INTRODUCTION

The Park-Pro HD is a superior reverse parking system that provides a visual and audible alarm when close to large objects to aid the driver while parking in reverse.

Read this manual thoroughly before installation and operation of the system. Please pay attention to all of the precautions and instructions listed in this manual.

Installation by trained professionals is recommended.

This manual describes the functions, installation, use and precautions of the reverse parking system.

Designs and specifications are subject to change without prior notice and the diagrams or figures in this manual may differ slightly in appearance from the actual product.

This device is only a parking aid and should never be solely relied upon for safely backing up a vehicle. The use of this system should never replace normal operational and safety precautions needed for reversing a vehicle. Always use caution during any vehicle operation.

Model number

The model number and system description/features are listed on the box.

Features

- High sensitivity: Able to quickly detect large obstacles (car, wall, pole, etc.) up to 2.5M (98") behind the vehicle.
- Min. detection distance: 22cm (approx. 9").
- Wide detection angle with minimal blind areas.
- Adjustable alarm volume: high and low. Audible alarm starts approximately 1.7M (67") behind the vehicle.
- Diagnostic functions monitor and alert you of inoperable sensors.
- Small, unobtrusive sensor design and shape.
- Reliable performance, design and use of high-quality components ensure consistent operation.
- Ultrasonic sensing using triangulation detection technology to consistently and accurately detect object with fewer false alarms.
Parking Sensor System

* Automatic bypass of trailer tow hitch or rear mounted spare tire.

**Diagram-1: TECHNICAL DATA OF REVERSE PARKING SYSTEM**

<table>
<thead>
<tr>
<th>NO</th>
<th>ITEM</th>
<th>Rating</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Working Voltage (VDC)</td>
<td>10.5~16 (Rated Voltage=12)</td>
<td>1. Alarm distance is the detected distance from sensor to obstacle during operation at 25C.</td>
</tr>
<tr>
<td>2</td>
<td>Rated Current (max.)</td>
<td>200mA</td>
<td>2. The distance results from detecting a square wood plank of 1mx1m (39”x39”).</td>
</tr>
<tr>
<td>3</td>
<td>Alarm Distance: m (in.)</td>
<td>0.22 (9”)-2.5 (98”)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Blind Area: m (in.) at 25C</td>
<td>&lt;0.22 (9”)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Detection Tolerance: m (in.) at 25C</td>
<td>±0.03 (1”)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Alarm Volume</td>
<td>105dB</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Working Temperature(C)</td>
<td>-40~+75</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Storage Temperature(C)</td>
<td>-40~+90</td>
<td></td>
</tr>
</tbody>
</table>
**PRODUCT COMPOSITION**
The system consists of 3 basic components (see Fig.1):

- **Electronic Control Unit (ECU)**
- **Detection Units - Ultrasonic Sensors**
- **Warning Unit**

When the vehicle is placed in reverse, the warning unit warns drivers of obstacles by sounding an alarm.

Note: The warning unit has a High/Low switch for volume control.

**HOW TO USE**

- **System Startup**
  - Reverse Parking System
  - The system is fully automatic. It is active only when the vehicle is placed in reverse.
  - At system power-up (Vehicle ignition on, in reverse), you will hear a short, half-second 'beep'.

- **Diagnostics**
  - After the system is turned on, the Park-Pro HD will go into a self diagnostic mode for three seconds.
  - If, after three seconds a sensor malfunction is detected, the warning unit will warn you of a fault. The system will still operate, but **may not function normally**. (See troubleshooting section for explanation of diagnostics.)
Note: Sensors must be installed in order of serial number. If not, the diagnostic function may reference the wrong sensor. See Fig.2.

Warning Mode
See Fig.3 for the three detection zones.

Audible Warning: System beeps when an obstacle appears within the Warning zones, shown in Diagram 2.
**Diagram-2**

**AUDIBLE WARNING MODE FOR REAR DETECTION**

<table>
<thead>
<tr>
<th>WARNING ZONE</th>
<th>DISTANCE (D)</th>
<th>AUDIBLE WARNING MODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danger Zone M(in.)</td>
<td>00&quot;&lt;D≤09&quot;</td>
<td>Beep(Bi)</td>
</tr>
<tr>
<td></td>
<td>09&quot;&lt;D≤12&quot;</td>
<td>Bl.Bl.Bl</td>
</tr>
<tr>
<td></td>
<td>12&quot;&lt;D≤20&quot;</td>
<td>Bl. .Bl. .Bl</td>
</tr>
<tr>
<td>Caution Zone M(in.)</td>
<td>20&quot;&lt;D≤28&quot;</td>
<td>Bi...Bi...Bi</td>
</tr>
<tr>
<td></td>
<td>28&quot;&lt;D≤36&quot;</td>
<td>Bi....Bi....Bi</td>
</tr>
<tr>
<td></td>
<td>36&quot;&lt;D≤44&quot;</td>
<td>Bi.....Bi.....Bi</td>
</tr>
<tr>
<td>Safety Zone M(in.)</td>
<td>44&quot;&lt;D≤68&quot;</td>
<td>Bl.......Bl.......Bl</td>
</tr>
<tr>
<td></td>
<td>68&quot;&lt;D≤76&quot;</td>
<td>Bl........Bl.........Bl</td>
</tr>
<tr>
<td></td>
<td>76&quot;&lt;D≤98&quot;</td>
<td>Bl........Bl.........Bl</td>
</tr>
<tr>
<td>Outside</td>
<td>98&quot;&lt;D</td>
<td>-</td>
</tr>
</tbody>
</table>

Remark: When obstacles appear behind the 2 rear side sensors (serial numbers 1 and 4), system doesn’t beep unless the obstacles are within the Caution and Danger zones.

- **Warning Unit**
  This unit warns you with a built-in buzzer, enabling you to know the warning zone and distance to the obstacle.

- **About detection**
  Obstacle detection may vary due to object size, shape, density and environmental conditions. It is recommended to thoroughly check the system sensitivity before use.

  An unusual reflection angle of obstacles may cause an incorrect or unusual detection warning.

Refer to Fig.4 below: Point A may not be detected due to unsatisfactory reflection angle.
In Fig. 5, detection may be variable due to object size, height and density. Angled surfaces may give false distance measurements. Various surface angles may be detected at varying distances on the display.

- **Low obstacle standing before a tall one**
  As shown in Fig. 6, although Obstacle \( T_a \) is lower than the sensors, Part \( T_b \) will be detected and warned first. As you approach these obstacles, the warnings may vary in intensity.

- **Unusual condition of obstacle**
  Due to varying height, size, clothing type (absorption of signal), etc., a person may not be detected. This device is only a parking aid and should never be solely relied upon for safely backing up a vehicle. Always use caution during any vehicle operation.

- **Obstacles outside the detecting range**
  In Fig. 7, Surface B will be detected, while Surface A may never be detected.

- **Unusual road surface condition**
  When road surfaces are rough, the system may output a warning signal. See Fig. 8.

- **Obstacles in blind zone**
  The blind zone covers a range of 22cm (9”) behind the vehicle. Obstacles in the blind zone will never be detected. Therefore, it is normal if the warning unit provides incorrect detection results. See Fig. 9.
Parking Sensor System

**Precautions**

- When this system is working, the reverse speed must be under 5km/h (3 mph).
- Keep sensors clean. Remove dirt, ice or snow for proper operation.
- Make sure that sensors are mounted securely in the correct position.
- When sensors are found defective, they should be replaced immediately.
- After installation, testing should be conducted to verify proper operation before use.

**INSTALLATION**

It is recommended this system be installed by a trained installation professional.

**Installation Tools**

The tools listed in Fig.10 are required for installation.

- The kit includes two drill bits, electrical connectors, double-sided adhesive tape. In addition a file, flat head screwdriver, Philips head screwdriver and a pair of pliers will be required.

Fig.10 - List of Installation Tools
Fig. 11 gives a general layout showing where to install the components of the reverse parking system.

**Installation Procedure**

- **General Layout**
- **Sensor Installation**
- **Component Connection**
- **Power Connection**
- **Parts Inspection**
- **Test**

**General layout**
Determine where to install the ECU and warning unit according to the layout of your vehicle. Make sure the power cable of the ECU can be easily connected.

**Sensor installation**
For details, refer to "Tips on Sensor Installation" on page 10.

**Component Connection**

**See Fig. 12 for the connection between components of reverse parking system.**
Parking Sensor System

Fig. 12 - Connection between each unit of Reverse Parking System

- Control unit
  - The reverse parking system has 1 ECU that should be installed near the back-up lamp in the trunk.
- Warning unit
  - Install the warning unit using supplied adhesive strip in a location where the alarm can easily be heard by the driver of the vehicle.

- Powering up
  * For details, refer to “Powering up” on page 12.

- Test
  * For details, refer to “Test the System” on page 13.
  Note: Sensors and trunk harness connectors are serialized and must be connected in position and order as shown in Fig. 2; otherwise the diagnostic function will reference the wrong sensor.

- Tips on Sensor Installation
  * Width of different vehicle models varies; it is very important to choose the correct locations to install sensors.
  * Sensors need to be installed with the “Up” mark facing up as shown in Fig. 13.
  * Sensor must be fully inserted and fit flush to bumper face.
Parking Sensor System

- Area behind sensor must be open and not contact sensor body (bumper, mounting brackets, foam...etc.).
- The face of the sensor should be perpendicular to the ground. If the bumper surface is angled, use the supplied angled bezels to compensate.

Note: To use angled bezels, first, carefully remove bezel from sensor. Snap correct angled bezel on sensor with bezel angle in proper orientation.

- Horizontal and vertical positioning

See Fig.14, "L" is the width of vehicle. L1 is the horizontal distance between sensors (L1=16”±2”). For a wider detection angle, locate side sensors closer to the lateral sides of the vehicle. L2 is the height of sensors (L2=25”±5”).

- Installation steps
  - Mark the positions of each sensor on bumper with a marker to ensure proper location.
  - Drill holes using the included hole saw. (An M2/.079” drill bit can be used to drill pilot holes to aid in this process.)
  - Remove the burrs from the hole edge with a file.
  - Insert the sensor cables into the holes made in bumper according to serial number. Refer to Fig.2

**IMPORTANT**

- Use correct hole saw. Sensors may not function properly with holes that are too small or too large in diameter.
- Plastic bumpers require the 21.5mm hole saw.
Plastic bumpers do not require the rubber sleeves included in kit.

- Metal bumpers require the 24.5mm drill. Metal bumpers require rubber sleeves installed before installing sensors. (Note: The rubber sleeves must be oriented with "UP" notation mounted up).
- Sensors can be re-painted to match the color of your vehicle. Note: The painting layer must be symmetrical and less than 0.1mm (.004 in.) thick.

Under-Bumper Installation Steps
- Mark the positions of each sensor below the bumper with a marker to ensure proper location.
- Mount brackets using the supplied hardware.

Note: Brackets must be mounted to ensure the center axis of the sensor is parallel to the center line of the vehicle and perpendicular to the ground.

- Insert the rubber sleeves into the brackets.
- Insert the sensor cables into the holes made in bumper according to serial number. Refer to Fig.2

Powering Up
- Power connections of reverse parking system
The control module gets power from the reverse light circuit of the vehicle. Refer to Fig.15.

- It is recommended to solder all connections. If it is not possible to solder the connections, use the supplied
Parking Sensor System

electrical connectors.

- Press the metal part tightly to ensure cables are well connected. See Fig. 16.

**Fig. 16**

- Power connection steps:
  - Securely connect the red power cable of ECU to the +12V wire of the reverse light;
  - Securely connect the black ground cable of ECU to a vehicle ground point.

**Precautions**

- Vehicle engine must be off when installing the system.
- The ECU must not be installed near any potential sources of interference, e.g. exhaust pipe, other cables or groups of cables.
- Detection results may be affected if sensors are installed in steel bumpers without rubber sleeves.
- Ultrasonic and electromagnetic waves from other sources near the system may affect detection results.

**TEST THE SYSTEM**

**Test Subjects**

- Audible warning  Refer to Fig. 3 and 5
- Distance, direction and warning zones  Refer to Fig. 4 and 5
Parking Sensor System

- **Turning on reverse parking system**
  Once reverse is engaged, system is automatically activated; when vehicle is shifted out of reverse gear, system stops working.

- **Test Methods**
  - **Test tools**
    Conduct tests by using obstacles behind the vehicle.
    - Prepare a PVC tube of Ø75mmX1000mm (Ø3"X39") for short distance test. Fig.17.
    - Prepare a wood plank of 500X500X10mm (20"X20"X4") for long distance test: > 1.2M (47") . Fig.18.

- **Tests of rear detection**
  - Turn the vehicle key to “ON” position, don’t start the vehicle engine.
  - Put vehicle in reverse gear, move the 2 obstacles forward and backward 20~200cm (8”~79”) behind vehicle. System should beep and/or visually show the warning zones, distance to and direction of the obstacles.
  - Check the sensors one by one. Refer to Fig.17 & 18.

- **DISCLAIMER**
  - The system is designed and intended as a warning aid for parking only.
  - The supplier of this product accepts no responsibility for any accidents and/or damage caused during the use of this system.
  - Detection results may be affected by environmental conditions: i.e. rain, fog, snow, extreme temperature. Due to obstacle variability and road conditions, warning levels
Parking Sensor System

may vary or obstacles may be undetected. Ultrasonic and electromagnetic waves from other sources near the system may affect detection results.

● TROUBLESHOOTING

Fault-Warning mode The following chart shows what the alarm sequence during a diagnostic-fault:

Diagram 4: AUDIBLE WARNING MODE OF DIAGNOSTICS

<table>
<thead>
<tr>
<th>Serial No. of Defective Sensors</th>
<th>Audible Warning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bi</td>
</tr>
<tr>
<td>2</td>
<td>Bi.Bi</td>
</tr>
<tr>
<td>3</td>
<td>Bi.Bi.Bi</td>
</tr>
<tr>
<td>4</td>
<td>Bi.Bi.Bi.Bi</td>
</tr>
</tbody>
</table>

Note: Multiple sensor faults may be displayed in succession

Audible warning of diagnostics
If a sensor is found defective during diagnostics, the system will tell you its serial number by beeping per Diagram 4. If all sensors are defective, the system will beep a solid tone for 1.5 seconds.

Ex. 1: in case sensor No. 3 is abnormal
When powered on, system beeps once for 0.5 second (signal for diagnostics), then rapidly beeps 3 times (signal of sensor No. 3 that is abnormal). This alert will continue each time the system is started until the problem with sensor No. 3 is resolved.

Ex. 2: in case both sensors No. 2 and 4 are abnormal
When powered on, the system beeps once for 0.5 second, and then rapidly beeps 2 times, you should power off the system and solve the problem of sensor No. 2. When you re-start the system, after the beep of 0.5 second, the system will beep rapidly 4 times, indicating a problem with sensor No. 4.
The following chart provides you with solutions to a few simple problems:

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>REASON</th>
<th>SOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>System doesn't react when reverse is</td>
<td>1. System is not powered up or wrong connection of power cable.</td>
<td>1. Check the power and ground connections.</td>
</tr>
<tr>
<td>engaged.</td>
<td>2. Invalid connection between Warning Unit and ECU.</td>
<td>2. Check the connection between Warning Unit and ECU.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Afteractivation, system continuously</td>
<td>1. Invalid connection between sensors and ECU.</td>
<td>1. Check the connection between sensors and ECU.</td>
</tr>
<tr>
<td>beeps for 3 seconds.</td>
<td>2. All sensors are defective.</td>
<td>2. Replace the defective sensors.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Warning Unit distance remains the same</td>
<td>1. Incorrect installation direction of sensors.</td>
<td>1. Follow the &quot;UP&quot; mark and re-install sensors.</td>
</tr>
<tr>
<td>while distance to obstacle varies.</td>
<td>2. Incorrect installation angle of sensors.</td>
<td>2. Adjust the position of detecting angle to avoid downward detection.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In case no obstacle is found in the</td>
<td>1. Sensor(s) is loose.</td>
<td>1. Ensure sensor is fixed tightly in bumper.</td>
</tr>
<tr>
<td>detection range, Warning Unit continuously</td>
<td>2. System is detecting vehicle itself or its spare parts, for example</td>
<td>2. Adjust the position of sensors and the detection angle.</td>
</tr>
<tr>
<td>beeps.</td>
<td>the spare tire.</td>
<td></td>
</tr>
</tbody>
</table>
36,000 MILE/36 MONTH LIMITED WARRANTY

Rostra Precision Controls, Inc. (the Company) warrants to the original retail purchaser of this Product that should this product or any part thereof, under normal use and conditions, be proven defective material or workmanship within 36 months of the original purchase, such defect(s) will be repaired or replaced (at the Company’s option) without charge for the parts.

To obtain repair or replacement within the terms of this Warranty, the product is to be delivered with proof of warranty coverage (e.g. dated bill of sale), specification of defect(s), transportation prepaid, to the installing dealer and/or retailer.

This Warranty does not cover costs incurred for removal or reinstallation of the product, or damage to vehicle electrical systems.

This Warranty does not apply to any product or part thereof which in the opinion of the Company has been damaged through alteration, improper installation, mishandling, misuse, neglect, or accident.

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OWNER’S WARRANTY RECORD

To be completed by installer and retained by customer

Customer’s Name_________________________________________Part #________________

Dealer Name____________________________________________

Dealer Address____________________________________________

City________________________State______Zip______________

Phone#____________________Fax #______________________

Email__________________________________________________

Date Purchased__________Mileage__________Date Installed________

Make____________________Model____________Year____

Vin #____________________

Customer Complaint____________________________________

Description of Defect/Repair_______________________________

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