P R N D 3 2 1

USER'S MANUAL

PARKING SENSOR SYSTEM

Please read this manual thoroughly before installation and use

CONTENT

• PREFACE

Thank you for purchasing our parking sensor system, with this system, you can park your car with confidence and peace of mind. Activated automatically, it alerts you when you are close to another vehicle, a wall or a person, providing a safe, easy and enjoyable parking experience in all situations.

➡ Suggestion

➲ Read this manual thoroughly before installation and use, please pay attention to all the precautions and instructions listed in the manual and marked on the product

➲ It is recommended the system is installed by professional personnel

➡ Notice

➲ This manual describes only in principle the functions, installation, usage and precautions of the parking sensor system

➲ Designs and specifications are subject to change without prior notice

➲ The diagrams or figures in the manual may differ from the real products

• PRODUCT PROFILE

➡ Overview

This parking sensor system is a safety aid that is an integration of functional piezo-ceramic, ultrasonic, electronic, computer data processing and other technologies. Incorporating the principle of ultrasonic distance measurement and the technology of fuzzy processing of computer data, it correctly detects obstacles behind and/or in front of the vehicle and warns the driver with clear audio and/or visual signals, thus prevents the vehicle bumping into obstacles.

➡ Features

◆ High sensitivity: a person around 1.3~1.7m behind vehicle can be detected with fast reaction

◆ Min. display distance: 15cm for front sensors and 22cm for rear sensors

◆ Wide detection angle with minimal blind area

◆ 0° viewing angle of jitter-free LCD display for minimized false alarm, showing warning zones, distance to and direction of obstacles.

◆ Audible alarm volume adjustable: high, low and/or off. Audible alarm generated by the 2 rear central sensors starts from 1.7 meters behind, 1 meter for the 2 rear side sensors, 0.75 meter for the 2 front central sensors, and 0.50 meter for the 2 front side sensors. It's a perfect eco-friendly design

◆ Diagnostic function alerts you of defective sensors, if any.

◆ Workable under very bad weather conditions (e.g. heavy rain, snow, strong wind, very low or high temperature)

◆ Latest design of fashionable shapes

◆ Highly reliable and highly interference-resistant based on optimized design and the use of high-quality components, so the system typically outlives the vehicle

● SPECIFICATION

➧ Category

The parking sensor system has the 2 following types:

◆ Parking Aid System

With 6~8 sensors, this type has both rear and front detection functions. When the vehicle runs forward, front sensors work automatically for 10 seconds after each brake; when the reverse is engaged, both front and rear sensors work simultaneously.

◆ Reverse Aid System

With 2~4 sensors, this type only has a rear detection function.

➧ Model number

The model number is marked on the gift box.

Diagram-1: TECHNICAL DATA OF REVERSE AID SYSTEM

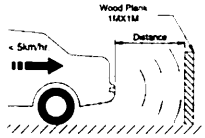
NO	ITEM		PRODUCT SERIES				REMARKS
			BUZZER	LED	LCD	TFT	
1	Working Voltage (VDC)		10.5~28 (Rated Voltage=12)			10.5~16	1. Display distance It is the detected distance from sensor to obstacle, when system works at 25℃ 2. The display distance results from detecting a square wood plank of 1 x 1m.  3. Refer to the remarks in Diagram 2 for the relationship between detection accuracy and environmental temperature
2	Rated Current (max.)		100mA	200mA	150mA	800mA	
3	Display Distance (m)		-	0.2~2.5	0.22~2.5	0.22~2.5	
4	Blind Area (m)		<0.22 (at 25℃)				
5	Detection Tolerance (m)		±0.02 (at 25℃)				
6	Warning Mode	Sound	☑	☑	☑	☑	
		Distance	-	☑	☑	☑	
		Zone	-	☑	☑	-	
		Direction	-	☑	☑	☑	
		Video	-	-	-	☑	
7	Display Type		-	LED	LCD	TFT	
8	Working Temperature(℃)		-30~+80		-30~+70	-20~+70	
9	Storage Temperature(℃)		-35~+85		-35~+80	-30~+80	

Diagram-2: TECHNICAL DATA OF PARKING AID SYSTEM

NO	ITEM		ECU OF FRONT DETECTION	ECU OF REAR DETECTION	REMARKS
1	Working Voltage (VDC)		10.5~28 (Rated Voltage=12)		1. Refer to the remarks in Diagram 1 for the details of test conditions 2. The accuracy of detected distance is related to the environmental temperature, when distance is fixed, the higher the temperature, the shorter the detected distance, and vice versa. 3. The distance tolerance caused by the change of temperature is 0.17%
2	Rated Current (max.)		150mA	150mA	
3	Display Distance (m)		0.15~0.75	0.22~2.50	
4	Blind Area (m)		<0.15 (at 25℃)	<0.22 (at 25℃)	
5	Detection Tolerance (m)		±0.02 (at 25℃)		
6	Warning Mode	Sound	☑	☑	
		Distance	☑	☑	
		Zone	☑	☑	
		Direction	☑	☑	
		Video	-	-	
7	Display Type		LCD		
8	Working Temperature(℃)		-30~+70	-30~+70	
9	Storage Temperature(℃)		-35~+80	-35~+80	

- **PRODUCT COMPOSITION**

The system mainly consists of the 3 units as follows:

➡ **Electronic Control Unit (ECU)**

It includes a micro-computer control system and a signal processing circuit.

- Parking Aid System has an ECU for front detection and another for rear detection

- Reverse Aid System has only 1 ECU for rear detection

➡ **Detecting Unit**

- 6~8 ultrasonic sensors for Parking Aid System
- 2~4 ultrasonic sensors for Reverse Aid System

➡ **Warning Unit**

When car reverses or runs forward, this unit warns drivers of obstacles in different ways: sound and/or display of warning zones, distance to and direction of obstacles etc.

Refer to Diagram-3.

Diagram-3

WARNING MODE	TYPE OF WARNING UNIT			
	BUZZER	LED	LCD	TFT
Sound	☑	☑	☑	☑
Distance	-	☑	☑	☑
Zone	-	☑	☑	-
Direction	-	☑	☑	☑
Video	-	-	-	☑

Fig. 1 and Fig. 2 show respectively the composition of Parking Aid System and Reverse Aid System

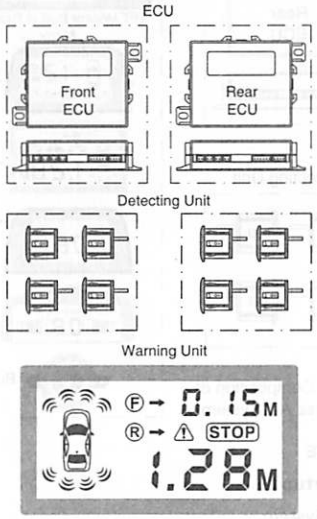


Fig.1 - Composition of Parking Aid System

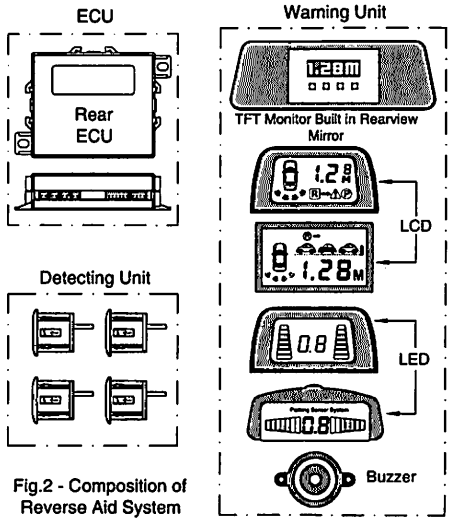


Fig.2 - Composition of Reverse Aid System

- **HOW TO USE**

➡ **System Startup**

➲ Parking Aid System

◆ When reverse is engaged, system will be automatically powered on and beep once, informing you that system is in diagnostic mode, then both rear and front sensors start to work.

◆ Once reverse gear is shifted, rear sensors stop working, but front sensors keep working for 10s.

◆ When vehicle runs forward, rear sensors never work, but after each brake, the front sensors work for 10s, and report the obstacles only if they are located in the display distance.

➲ Reverse Aid System

When reverse is engaged, system is automatically activated and beep once before diagnostics and detection.

➡ **Diagnostics**

➲ How it works

◆ When powered on, the system detects its sensors first. If some sensor is working abnormally, the warning unit will tell you its serial number.

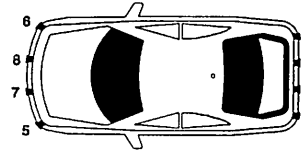


Fig.3 - Definition of Sensor's Serial Numbers

Serial numbers of sensor are defined as Fig.3

◆ After 3 seconds of diagnostics and possible failure warning, system assumes working mode, although with abnormal sensors, if any.

Note: Warning unit will never alert you of any obstacles behind the abnormal sensor(s).

➲ Warning Mode of Diagnostics

· No matter if any sensor is found defective or not, system

always beeps once for 0.5 second, then audibly and/or visually tells you the serial number of the abnormal sensor. Refer to Diagram-4.

Diagram-4 AUDIBLE & VISUAL WARNING MODE

SYSTEM	SN	Audible Warning	Display
Reverse Aid System	1	Bi	E 1
	2	Bi.Bi	E 2
	3	Bi.Bi.Bi	E 3
	4	Bi.Bi.Bi.Bi	E 4
Parking Aid System	1~8	Bi(1.0 second)	E n

Remark: each beep lasts 0.2 second
SN: Serial No. of sensors
EN: Serial No. of defective sensors

◆ Audible warning of diagnostics

When some sensor is found defective during diagnostics, the system will tell you its serial number by beeping discontinuously as per Diagram 4. But system continuously beeps for 1.5 seconds, if all sensors are defective.

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). In this case, you should solve the problem of sensor No. 3, otherwise, you have to face the same situation next time when you start the system.

Ex. 2: in case both sensors No. 4 and 6 are abnormal

When powered on, system beeps once for 0.5 second, then rapidly beeps 4 times, you should power off the system and solve the problem of sensor No.4. When you re-start the system, after the beep of 0.5 second, system rapidly beeps 6 times.

◆ Visual warning of diagnostics

· Only systems with display (LED/LCD/TFT) have this function. When diagnostics are over, the display shows you the serial number of abnormal sensor. Refer to Diagram-4.

· Display mode

Once some sensor is found abnormal, "EX" will be displayed for less than 3 seconds, "X" is the serial number (1~8) of the abnormal sensor

Ex 1: If "E4" is displayed, it tells you the sensor No. 4 doesn't work.

Ex 2: If neither sensor No. 4 nor No. 6 works, "E4" and "E6" will appear in the display successively.

If none of the sensors works, "EE" will be displayed, and the system beeps continuously for 1.5 seconds.

◆ About direction signal for defective sensor

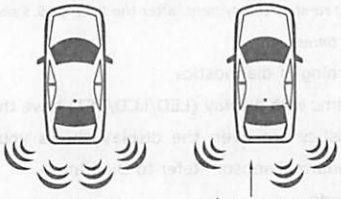
· Only systems with indication of over 4 directions (LCD/TFT)

have this function

· When system is powered on, the display doesn't show the direction signal of the defective sensor.

Ex: when sensor No. 2 refuses to work, its direction signal will disappear as shown in Fig. 4.

Fig.4 - Direction Signal



Normal status

In case sensor No.2 is defective

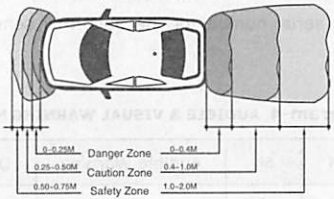
➡ **Warning Mode**

➲ Warning Zone

Diagram-5: DEFINITION OF WARNING ZONES

WARNING ZONE	FRONT	REAR
Danger Zone	D≤0.25M	D≤0.4M
Caution Zone	0.25M<D≤0.50M	0.4M<D≤1.0M
Safety Zone	0.50M<D≤0.75M	1.0M<D≤2.0M
Remark: "D" is the distance from obstacle to sensor		

Fig.5 - Warning Zone



When an obstacle appears in different warning zones, system warns you accordingly in different modes as shown in Fig.5.

➲ Audible Warning

System beeps when an obstacle appears in the Warning zones.

Diagram-6

AUDIBLE WARNING MODE FOR REAR DETECTION

WARNING ZONE	DISTANCE (D)	AUDIBLE WARNING MODE
Danger Zone (M)	D≤0.30	Bi
	0.3<D≤0.4	Bi.Bi.Bi
Caution Zone (M)	0.4<D≤0.6	Bi...Bi...Bi
	0.6<D≤0.8	Bi....Bi....Bi
	0.8<D≤1.0	Bi.....Bi.....Bi
Safety Zone (M)	1.0<D≤1.7	Bi.....Bi.....Bi
	1.7<D≤2.0	-

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

Diagram-7

AUDIBLE WARNING MODE FOR FRONT DETECTION

WARNING ZONE	DISTANCE (D) (M)	AUDIBLE WARNING MODE
Danger Zone	D≤0.25	Bi
Caution Zone	0.25<D≤0.50	Bi.Bi.Bi
Safety Zone	0.50<D≤0.75	Bi..Bi..Bi

Remark: when obstacles appear in front of the 2 front side sensors (serial numbers 5 and 6), system doesn't beep unless they are in Caution and Danger zones

◆ When front and rear sensors work simultaneously (for parking aid system), system audibly alarms in the following order: **Danger Zone ⇨ Caution Zone ⇨ Safety Zone**

EX: while an obstacle is detected in rear Caution Zone, meantime, another obstacle is found in front Danger Zone, system only audibly warns you of the obstacle located in front Danger Zone.

➲ Indication of Distance and Zones

Diagram-8: INDICATION OF DISTANCE AND ZONE FOR REAR DETECTION

WARNING ZONE	DISTANCE(D) (M)	DISTANCE INDICATION	ZONE MARK
Blind Zone	D<0.22	-P- STOP	Ⓟ STOP
Danger Zone	0.22≤D≤0.4	Digits	
Caution Zone	0.4<D≤1.0M	Digits	⚠ For LCD
Safety Zone	1.0<D≤2.0	Digits	➧ For LCD
	2.0<D≤2.5	Digits	

· The display shows distance only when an obstacle is detected in the range of 2.5m from the sensor

· When an obstacle enters Danger Zone, the Zone Mark will be shown in the display (for LCD type only), make sure to get ready to brake your car; when the obstacle enters Blind Zone, "-P-" or "STOP" will appear in the display, you must duly brake your car.

Diagram-9: INDICATION OF DISTANCE AND ZONE FOR FRONT DETECTION

WARNING ZONE	DISTANCE(D) (M)	INDICATION OF DISTANCE	ZONE MARK
Danger Zone	D≤0.15	-P-	STOP
	0.15<D≤0.25	Digits	
Caution Zone	0.25<D≤.50	Digits	⚠
Safety Zone	0.50<D≤0.75	Digits	➡

· As soon as an obstacle enters Danger Zone, we suggest you brake your car to avoid collision.

· When front and rear sensors work simultaneously (for parking aid system), Zone Marks will be displayed in the following order:

Danger Zone ⇨ Caution Zone ⇨ Safety Zone

EX: while an obstacle is detected in rear Caution Zone, meantime, another obstacle is found in front Danger Zone, system only audibly warns you of the obstacle located in front Danger Zone.

➡ **Warning Unit**

➲ Parking Aid System

This system warns you with an LCD display that visually shows the warning zones, distance to and direction of the obstacle. Moreover, the LCD with a built-in buzzer has audible alarm function.

◆ Warning Modes - Please refer to Fig.6

◆ Instruction to Warning Mode

· Reverse and forward Signals – They tell you system is working in rear or front detection mode.

· Direction signal – It tells you by gleaming that the relative sensor is detecting an obstacle, it visually shows the exact direction of the nearest obstacle, if there are more than one obstacles.

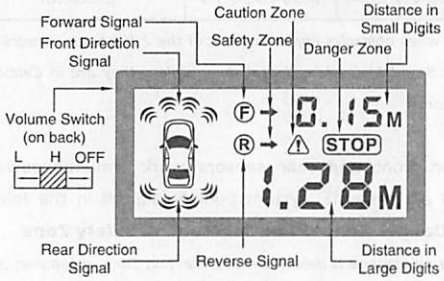


Fig.6-LCD Dispaly for Parking Aid System

· Zone indication – It tells you the obstacle is found in Safety, Caution or Danger Zone, please refer to Diagram 8 and Diagram 9.

· Distance indication - It shows the relative distance between obstacle and sensor.

The distance to rear obstacle is displayed in large digits, and the distance to front obstacle is shown in small digits.

· Sound alarm – refer to Diagram 6 and Diagram 7 for details

System doesn't beep, unless some obstacle is found in Caution or Danger Zones of the 2 rear or front side sensors (serial No. 1, 4, 5 and 6). The warning volume of the built-in buzzer is adjustable with the switch.

➲ Reverse Aid System

There are different types of warning unit for option: buzzer only, LED, LCD and TFT monitor.

◆ Warning mode of Buzzer series

This series only warns you audibly with a buzzer. No visual information on warning zones, direction or distance is given.

· Refer to Diagram 6 for audible warning mode

· About the buzzer

The warning volume is adjustable with a switch on the lateral of buzzer. See Fig.7.

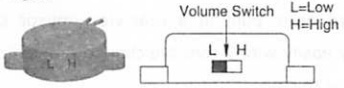


Fig.7 - About the Buzzer

◆ Warning mode of LED series

This series warns you with a tricolor (or bicolor), double wave band and digital LED display, plus a built-in buzzer, enabling you to know the warning zone, direction of and distance to the obstacle.

See Fig. 8 and Fig. 9

· Indication of direction - The left and right wave bands show drivers if the obstacle is on the left or right, behind or in front of the vehicle.

· Indication of zone - The wave bands are in (green), yellow or red, color changes as vehicle moves closer to the obstacle, telling drivers the warning zone where the obstacle is located.

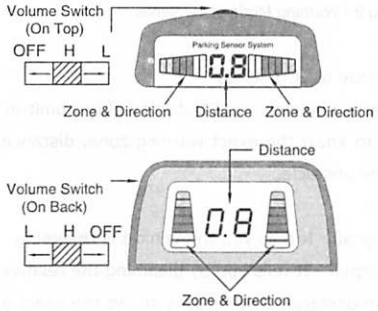


Fig.8-LED Display for Reverse Aid System

· Sound alarm – Refer to Diagram 6 for audible warning mode. The warning volume is adjustable with the switch.

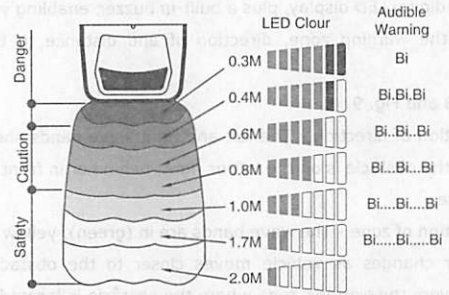


Fig.9 - Warning Mode of LE Series

◆ Warning mode of LCD series

This series warns you with an LCD display plus a built-in buzzer, enabling you to know the exact warning zone, distance to and direction of the obstacle.

Refer to Fig.10.

· Reverse signal – It tells you the vehicle is reversing

· Direction signal - It tells you by gleaming the relative sensor is detecting an obstacle, thus visually shows the exact direction of the nearest obstacle, if there are more than one obstacles.

· Zone indication - It tells you whether the obstacle is found in Safety, Caution or Danger Zone. Refer to Diagram 7 and Diagram 8.

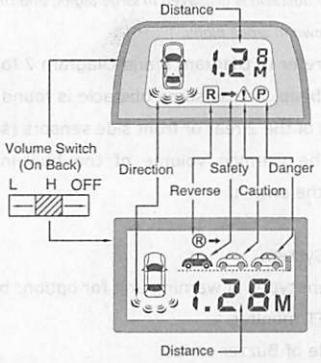


Fig.10-LCD Display for Reverse Aid System

· Sound alarm – Refer to Diagram 6 and Diagram 7 for audible warning mode. The warning volume is adjustable with a switch on the back of display.

◆ Warning mode of TFT series

This system warns you with a TFT monitor that can be fixed on the dashboard or is built in a rear-view mirror that can be attached very easily with 2 tensible clips to the vehicle's original inside rearview mirror.

When reverse is engaged, the monitor shows not only the image from camera, but also the distance to and direction of obstacle. Moreover, it also has an audible alarm function. See Fig. 11.

As Fig.11 shows, use MENU button to tune the monitor's brightness, contrast, colour and volume; Use VIDEO button to select between the 2 video channels: video-2 for the rearview camera, Video-1 for other visual equipments such as DVD.

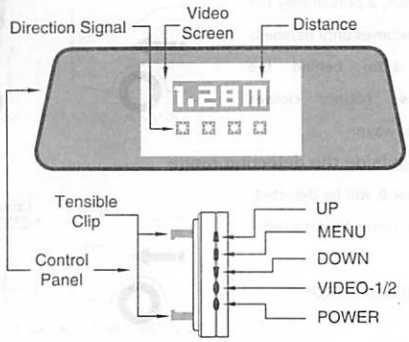


Fig.11 - TFT Monitor of TFT Series

· In case the monitor is powered on - When reverse is engaged, the monitor automatically shifts to show the information from the camera (Video-2) and ultrasonic sensors, after reverse, it returns to show the images from the channel of Video-1.

· In case the monitor is powered off - When reverse is engaged, the monitor is automatically activated to show the situation behind vehicle, and turns off automatically after reverse.

· Features of rearview mirror – Using optical glass with specially plated layer for anti-glare function, the mirror serves as an excellent inside rearview mirror.

· Direction signal – It tells you by gleaming that the relative sensor is detecting an obstacle, thus visually shows the exact direction of the nearest obstacle, when there are more than one obstacles.

· Indication of distance – Refer to Diagram 8. "STOP" will be displayed when obstacle enters Blind Zone.

Remark: TFT series has no indication of warning zone.

· Sound alarm – Refer to Diagram 7 for audible alarm mode. Sound volume is adjustable with the MENU button.

➧ **About detection**

Incorporating highly sensitive ultrasonic sensors and computer data fuzzy processing technology, this system features minimal blind area and long detection range. However, the detection result is the distance from sensor to the wave reflection surface of an obstacle, so the detected distance and the alarm signals may describe a different picture from the actual situation, since

they result from the positions of the installed sensors, the shapes and locations of obstacle, the reflecting angle and other factors. Therefore it is suggested to visually inspect the situation around vehicle before use of the system.

The following results are some examples of abnormal detection:

➲ An unusual reflection angle of obstacle may give rise to a distorted detection reading.

(1) Refer to Fig. 12 below, Point A may not be detected, due to unsatisfactory reflection angle.

Fig.12

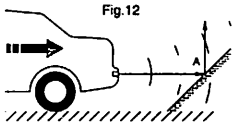
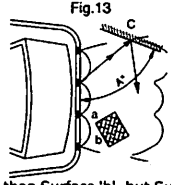


Fig.13

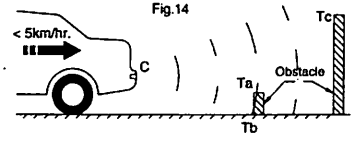


(2) In Fig.13, Surface 'a' is closer to sensors than Surface 'b', but Surface 'b' has a better reflection. As a result, Surface 'b' is detected first, whereas Surface 'a' may not be detected. If Obstacle 'C' has a smooth, glass-like surface and Angle "A" is very wide, such obstacle may not be detected.

➲ Low obstacle standing before a tall one

As shown in Fig. 14, although Obstacle T_{a-b} is lower than the sensors, Part T_b will be detected and warned first, because the reflection received by the sensors from this part is the strongest. But when Obstacle T_c comes closer to vehicle and its reflection becomes stronger than that of ObstacleT_{a-b}, the system starts to warn you of Obstacle T_c.

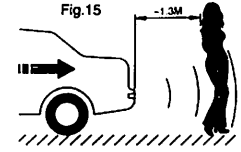
Fig.14



➲ Unusual surface condition of obstacle

See Fig.15, it is hard for the system to detect obstacles that strongly absorb sound wave, such as sponge and fabric. For instance, a person may not be detected sometimes until he/she is approximately 1.3m behind the vehicle, because his/her clothes absorb ultrasonic wave.

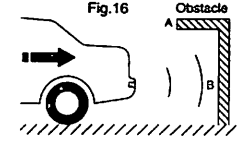
Fig.15



➲ Obstacles outside the detecting range

In Fig.16, Surface B will be detected, while Part A may never be detected.

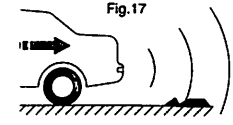
Fig.16



➲ Unusual road surface condition

When road surface is very rough, system may output warning signal. See Fig. 17.

Fig.17



➲ Obstacles in blind zone

The blind zone covers a range of 22cm behind vehicle or 15cm in front of vehicle. Obstacles in the blind zone can never be detected, but it's normal if sometimes the warning unit provides incorrect detection results. See Fig. 18.

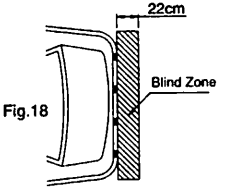


Fig.18

➧ **Precaution**

- When this system is working, the reverse speed must be under 5 km/h
- Keep sensors clean, and remove the dirt, if any, from their surface.
- Make sure that sensors are kept stably in the right position.
- When sensors are found defective, they should be duly replaced.
- After-installation tests are necessary before use.

● **HOW TO INSTALL**

➧ **Installation Tools**

The tools listed in Fig. 19 are required for installation.

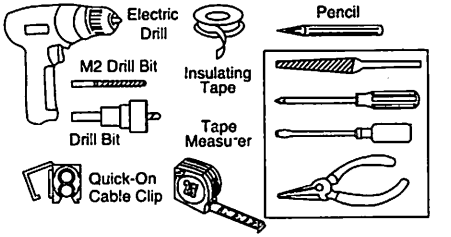


Fig.19 - List of Installing Tools

Note:

- The drill bit, quick-on cable clips and double-sided adhesive tapes are included in the gift box.
- The 4 tools in the above rectangular pane are a triangle file, a flat and a Philip head screwdrivers and a pair of pliers.

➧ **Where to Install**

Fig. 20 and Fig. 21 are the broad outline about where to install different units of parking aid system and reverse aid system.

➲ Control unit

- Reverse aid system has only 1 ECU that should be installed near reverse light in the trunk;
- Parking aid system has 2 ECUs respectively for rear and front detection. The ECU for rear detection should be installed near

reverse light in the trunk; that for front detection should be installed near the fuse assembly in the cab.

➲ Warning unit

◆ Buzzer series – Install the buzzer near ECU in the trunk;

◆ LED & LCD series – Install the LED or LCD display in a corner above dashboard.

◆ TFT series – Fix the TFT monitor in a corner above dashboard or attach the mirror with built-in TFT monitor with its tensible clips to the original inside rearview mirror.

➲ Detecting unit – Install sensors in rear or front bumpers

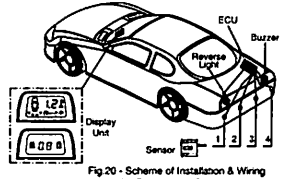


Fig.20 - Scheme of Installation & Wiring for Reverse Aid System

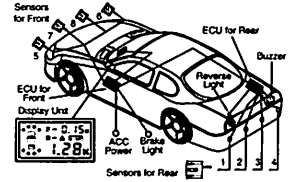
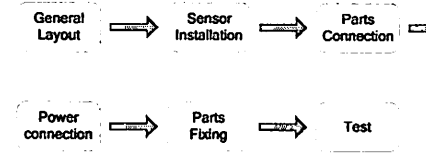


Fig.21 - Scheme of Installation & Wiring for Parking Aid System

➧ **Installation Procedure**



➲ General layout

Determine where to install ECU and warning unit according to your vehicle installation drawings or your experience. Make sure the power cable of ECU should be easily connected.

➲ Sensor installation

For details, refer to "Tips on Sensor Installation" on page 17.

➲ Connection between units

◆ Fig. 22 and 23 are for the connection between each unit of reverse aid system, and that of parking aid system. Fig. 24 is for connection of TFT series.

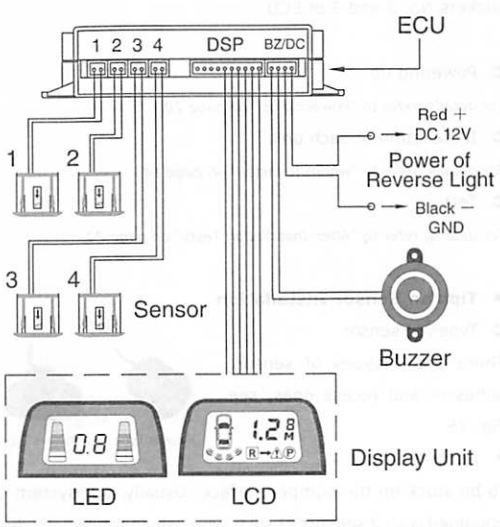


Fig.22 - Connection between each unit of Reverse Aid System

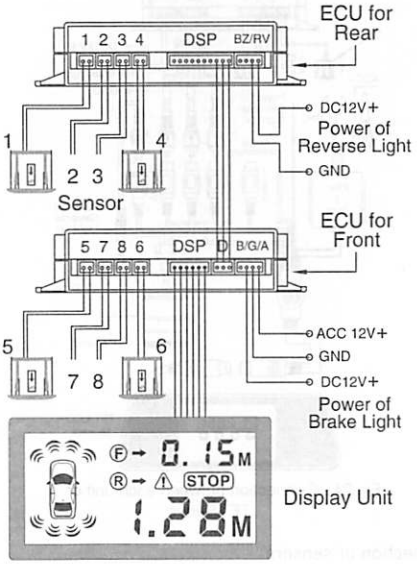


Fig.23 - Connection between each unit of Parking Aid System

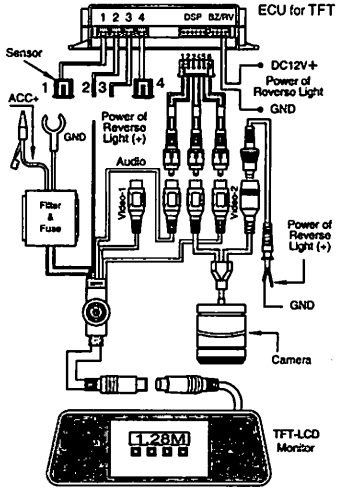


Fig.24 - Connection between each unit of TFT Series

◆ Connection of sensors

In the order of serial number shown in Fig. 3, insert plugs of sensor cable to the sockets of ECU. Make sure that each pair of the connected plug and socket are marked with the same serial number, otherwise the display may show wrong direction.

For systems with only 2 sensors, connect sensors with the sockets No. 2 and 3 of ECU.

➲ Powering up

For details, refer to "Powering up" on page 20.

➲ Installation of each unit

For details, refer to "where to install" on page 14

➲ Test

For details, refer to "After-Installation Tests" on page 21.

➧ Tips on Sensor Installation

➲ Types of sensor

There are 2 types of sensor: adhesive and recess ones, see Fig. 25.

Fig.25

◆ Adhesive type:

To be stuck on the bumper surface. Usually, our system can be equipped with 2 sensors of such type, which is specially designed for easy and fast DIY installation.

◆ Recess type: To be installed inside the bumper. This tight and stable mounting ensures sensors to be highly interference resistant, and sensors can work perfectly under bad weather conditions.

➲ About sensor positioning

Since the width of different vehicle models varies, it is very important to choose right places to install sensors.

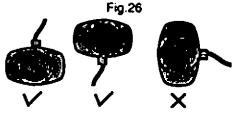
➲ Installation of adhesive sensor

Just stick sensors on the lower part of trunk's lid, as long as the mounting can guarantee a correct detecting angle. It is not required to make holes for such sensors, enabling a very easy and fast installation.

◆ Mounting direction of sensors

The longitude direction of sensors must be parallel to the ground, see Fig. 26.

Fig.26



◆ Installing position and level

Sensors must be installed at the same level and over 50cm above the ground. See Fig. 27 below.

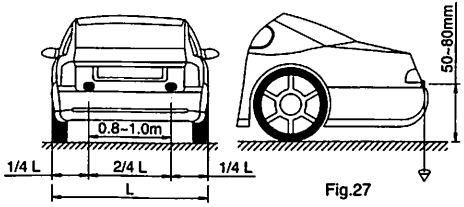


Fig.27

◆ About angle for installing sensors

Install sensors somewhere appropriate to avoid detecting any part of your vehicle itself. Refer to Fig. 28.

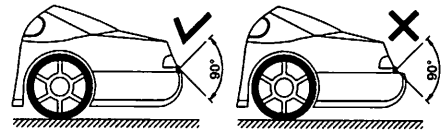
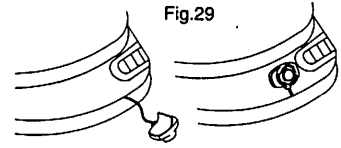


Fig.28

◆ Installing steps

See Fig. 29. sensor cables can be leaded into trunk along the edge of rear light cover or trunk lid.

Fig.29



• Determine where to install sensors.

• Remove the protective layer of sensor's adhesive tape, and stick sensors tightly on trunk lid in right direction.

• Avoid any impact to the sensors within 48 hours after installation.

• Never pull sensor cables with too much force, because you may damage the connection between sensor and its cable.

➲ Installation of recess sensors

It is required to make holes on bumper for recess sensors.

◆ Installation direction of sensors

Follow the "UP" mark on sensors and insert sensors into the holes made in bumper as Fig. 30 shows.

Fig.30

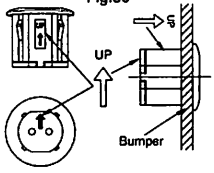
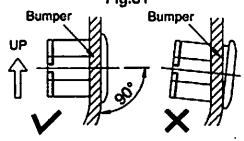


Fig.31



◆ About angle for installing sensors

The central axis of sensor should be perpendicular to bumper surface. See Fig. 31.

◆ Horizontal and vertical positioning

See Fig. 32 and 33, "L" is the width of vehicle. The horizontal distance between sensors is decided by the width of vehicle. It is recommended to install the side sensors slightly closer to the lateral sides of vehicle for wider detection angle, when needed.

Fig.32

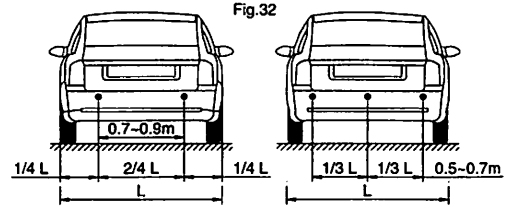
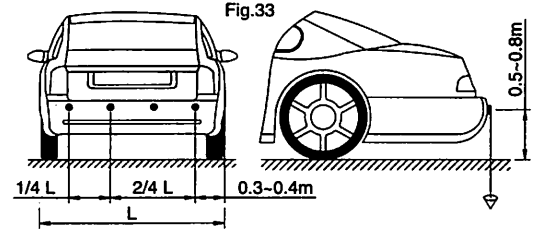


Fig.33



◆ Installing steps

· Mark with a pencil the installing positions for sensors on bumper.

· Make holes one by one with a drill and the included drill bit. Before that, it is recommended that smaller holes are made with a M2 drill bit, for better positioning of sensors

- Remove the burrs from the hole edge with a round file
- Insert the cables with sensors into the holes made in bumper

◆ Remarks

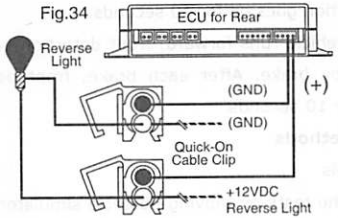
- Use drill bit in appropriate diameter, sensors may not perform perfectly in holes made by drill bits in too small or large diameter
- Sensors can be re-painted to match the colour of your vehicle, but the painting layer must be symmetrical and below 0.1mm thick.

➡ **Powering Up**

➲ Power connection of reverse aid system

The system gets power from the reverse light of vehicle. Refer to Fig. 34 below.

Fig.34



➲ Power connection of parking aid system

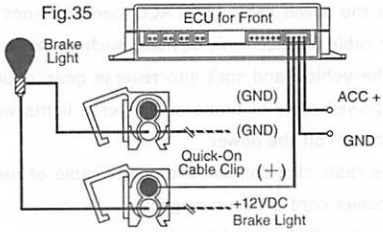
◆ Power connection of rear ECU

The rear ECU gets power from the reverse light of vehicle, as shown in Fig. 34.

◆ Power connection of front ECU

Front ECU has 2 power cables, one is connected to ACC for power, the other is connected to the brake light cable for the signal that activates the system. See Fig. 35.

Fig.35

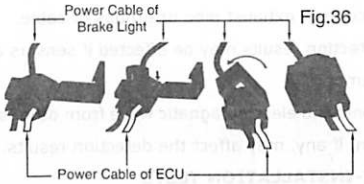


➲ How to use the cable clip

With the enclosed quick-on cable clips, system's power cable can be connected easily and perfectly with those of ACC, reverse or brake lights.

Press the metal part tightly until you are sure that cables are well connected. See Fig.36.

Fig.36



➲ Power connection steps:

◆ Turn vehicle key to "ON" position without starting the vehicle engine.

◆ Connect the power cable (with ACC mark) of front ECU with ACC power cable for electronic devices, such as car radio.

◆ Brake the vehicle and shift into reverse gear, double check the +12V power cable of brake and reverse lights with a test pencil, then turn off the power.

◆ With the cable clip, connect the power cable of rear ECU to the +12V power cord of reverse light;

◆ With the cable clip, connect the power cable (with Brake mark) of front ECU to the +12V cable of brake light.

➧ **Precaution**

◆ Make sure the 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 or groups of cable.

◆ The detection results may be affected if sensors are installed in steel bumpers.

◆ Ultrasonic and electromagnetic wave from other sources near the system, if any, may affect the detection results.

● **AFTER-INSTALLATION TESTS**

➧ **Test Subjects**

➲ Audible warning

Refer to Diagrams 5 and 6

➲ Distance, direction and warning zones

Refer to Diagrams 7 and 8

➲ Startup of reverse aid system

Once reverse is engaged, system is automatically activated; when reverse gear is shifted, system stops working.

➲ Startup of parking aid system

◆ Once reverse is engaged, rear and front detection starts at the same time; when reverse is shifted, rear detection stops, but front detection goes on for 10 seconds.

◆ When vehicle runs forward, front detection is automatically activated by brake. After each brake, front detection keeps working for 10 seconds.

➧ **Test Methods**

➲ Test tools

Try to do the tests by moving obstacle simulators behind or in front of vehicle.

◆ Prepare a PVC tube of Φ75mmX1000mm for short distance test.

◆ Prepare a wood plank of 500X500X10mm for long distance test: >1.2M.

➲ Tests of front detection

◆ Turn the vehicle key to "ON" position, don't start the vehicle engine.

◆ Brake the vehicle, move forward and backword either of the 2 obstacle simulators 15~75cm in front of vehicle, system should beep and visually show the warning zones, distance to and direction of the simulator.

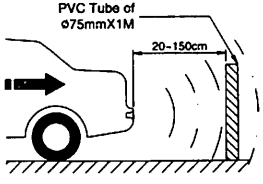
◆ Check the sensors one by one

➲ Tests of rear detection

◆ Turn the vehicle key to "ON" position, don't start the vehicle engine.

◆ Go into reverse gear, move forward and backword the 2 obstacle simulators 20~200cm behind vehicle, system should beep and/or visually show the warning zones, distance to and direction of the simulator.

◆ Check the sensors one by one. Refer to Fig. 37.



· Fig.37

● **DISCLAIMER**

🔔 The system is designed and intended as a warning aid for vehicle reverse and parking, and it should be used as such.

🔔 Our company shall accept no responsibility for any accidents and/or damage caused during the usage of this system.

🔔 The detection results may be affected when system works under very bad weather conditions (e.g. strong wind, heavy rain, snow, very low or high temperature) or on complicated roads (such as rugged roads or roads with slope).

🔔 Ultrasonic and electromagnetic wave from other sources near the system, if any, may affect the detection results.

- **TROUBLE SHOOTING**

The following chart only provides you with solutions to a few simple problems

PROBLEM	REASON	SOLUTION
System doesn't react when reverse is engaged	1. System is not powered up, or wrong connection of power cable 2. Invalid connection between display and ECU	1. Check if the power cable of ECU is well connected to that of reverse light. 2. Check the connection between display and ECU
After activated, system continuously beeps for 3 seconds	1. Invalid connection between sensors and ECU 2. All sensors are defective	1. Check the connection between sensors and ECU 2. Replace the defective sensors
The display distance remains the same while distance to obstacle varies	1. Wrong intalling direction of sensors 2. Wrong installing angle of sensors	1. Follow the "UP" mark and re-install sensors 2. Adjust the position of detecting angle to avoid downward detection
In case no obstacle is found in the detection range, display always shows "-P-" or "STOP", and system beeps	1. Some sensor is not tightly fixed. 2. System is detecting vehicle itself or its spare parts, for example the spare tyre	1. Check if the sensor is well fixed in bumper 2. Adjust the position of sensors and the detection angle
Wrong indication of direction	The serial number of the sensor plug is different from that of the ECU socket when they were connected	Re-connect sensor plugs to ECU sockets by following the serial numbers
The display refuses to work when vehicle's other lights are on	Wrong connection of ECU's ground power cable	Connect correctly the ground power cable of ECU