ClearCell + Plus

Gives your cell a booster shot

Introduction

Congratulations on your purchase of the ClearCell + Plus Cellular Signal Booster. Designed to improve and enhance cellular telephone performance, the Signal Booster will attract and strengthen cellular signals in homes with little or no service. As a result, you will experience fewer dropped and miss calls, less audio breakup while talking, and an increase in your phone's battery life between charges.

With only two major components—the Patch Antenna and the Base Amplifier--the Cellular Signal Booster is easy to install and requires no attic, outdoor, or roof access. Tools are necessary only if you want to wall-mount the Booster Base. RANGE and SIGNAL indicators on the Base Amplifier's display will aid you in the installation process and ensure the Cellular Signal Booster reaches and maintains optimal performance.

The following pages provide further information on how the ClearCell + Plus Cellular Signal Booster functions, as well as a detailed guide to its proper installation and use.

IMPORTANT NOTE: It is critical that you perform the **Site Evaluation** before you proceed any further. This evaluation determines if you have a minimum signal level from your Cellular Service Provider, which is required for the Cellular Signal Booster to function properly. If you have virtually no signal and cannot place a phone call from anywhere in your home, the Cellular Signal Booster cannot solve your problem.

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Site Evaluation

It is critical to pre-evaluate the home in which you are planning to install the ClearCell + Plus Cellular Signal Booster. This is to determine whether or not an adequate signal from your cellular telephone carrier's system base station is reaching your home, which is necessary to allow the Cellular Signal Booster to do its job. The evaluation involves a simple 2-step process and your cellular handset.

Using your handset, walk around the home in which you plan to install the product. Specifically, walk to each window of your home.

1. By at least one window in your home, does the display on your cellular handset indicate you have "service" (not a "no service" or "searching for system" indication) or at least 1 signal bar?

2. If yes, can you make a phone call at this window?

<u>If you answered yes to both questions, you can continue to install the Cellular Signal Booster.</u>

The Patch Antenna should be installed on the window with the strongest signal (most bars on your phone).

Packing Contents

The following items are included in the Cellular Signal Booster box along with optional mounting hardware.

Base Amplifier

Service Antenna

Patch Antenna

Wall Mount Bracket

Wall Mount Hardware

AC Adapter

Patch Antenna Mounting Bracket

Figure 1

Installation and Setup Overview

The following is an overview of the installation process. To ensure the product's best operation, we highly recommend following the "Detailed Installation Procedure" on page 12.

1. Find the strongest signal near a window a window in your home with your own cellular handset's signal bars.

2. Attach the included Patch Antenna approximately 12 inches from the top of the window with the strongest signal.

3. Adjust the Patch Antenna until you see the strongest SIGNAL reading on the Base Amplifier.

4. Place the Base Amplifier in the area of your home with the weakest cellular signal. The Base Amplifier can either be set on a tabletop or wall mounted.

5. Adjust the Base Amplifier's Service Antenna to get the largest RANGE meter reading.

NOTE: Be sure to install the Patch Antenna at least 25 feet away from Base Amplifier and its Service Antenna to avoid oscillation. Having walls between the Antennas also help. If the two antennas are too close, the red ALARM light will flash on the Base Amplifier indicating oscillation and shutdown.

How Does It Work?

The Problem

If you have poor cellular service within your home—if you frequently have no service and repeatedly experience dropped and missed calls—it could be because the walls in your home are disrupting the cellular signals traveling to and from your cellular handset. When your home is not located close enough to your cellular carrier's system base station, materials such as cement, plaster, wood, and metal embedded in your home's structure often serve as cellular signal barriers, reducing their strength as they try to penetrate exterior walls (Fig. 2.) The Cellular Signal Booster is a device and system created to combat weak cellular signals by concentrating them at an unobstructed point on a home's exterior (i.e., a window) and transmitting them to a compact base station installed in the home's interior.

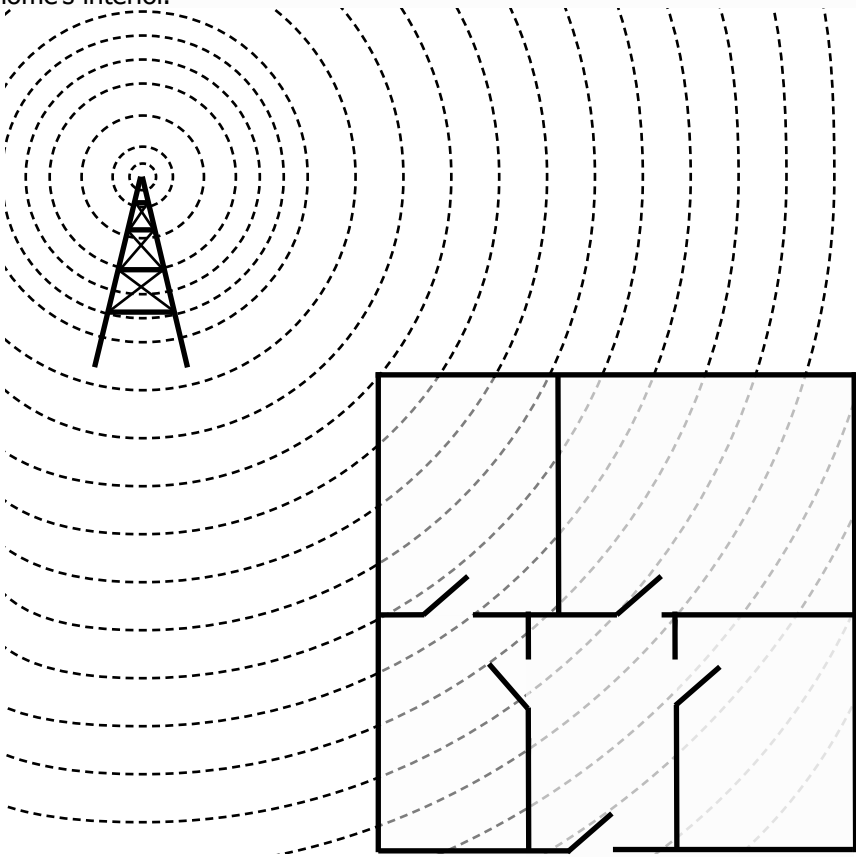

Figure 2
Signal Reduction Through Walls

The Solution

How Does the Cellular Signal Booster Work?

The Cellular Signal Booster has two antennas, one that links to your cellular carrier's system base station (Patch Antenna), and another that links to the cellular telephone handset within your home (Service Antenna.) Between these two antennas are two directional amplifiers that boost both cellular carrier system base station signals and your cellular telephone handset signals (Fig. 3.)

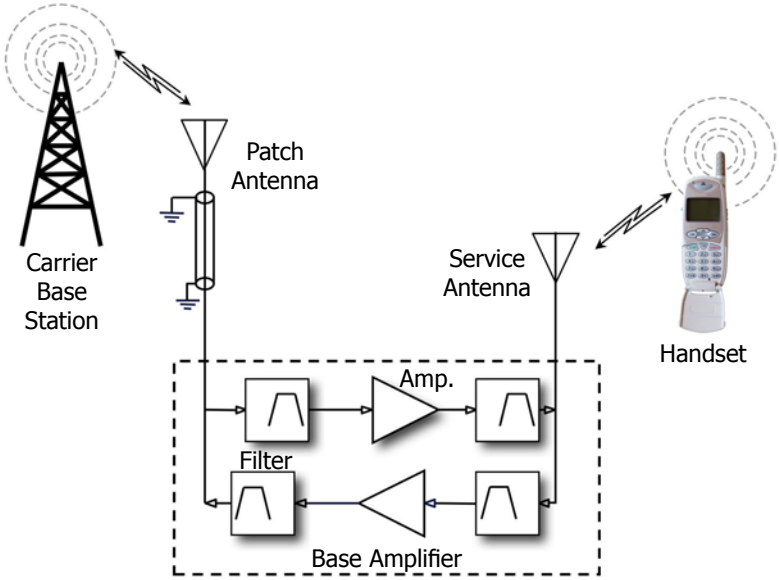

Figure 3
Cellular Signal Booster System Block Diagram

To install the Cellular Signal Booster System properly, the Patch Antenna should be mounted on the window in your home closest to your cellular carrier's system base station. Since windows have little to no signal degradation, the Patch Antenna can receive cellular signals and route them into your home through a Radio Frequency Coaxial Cable that leads to the Base Amplifier. The Amplifier then augments incoming signals to improve their quality, and, finally, emits them through its attached Service Antenna to your handset. Install the Base Amplifier in the place in your home where cellular reception is the weakest. A basic topographical view of this configuration is shown in Fig. 4.

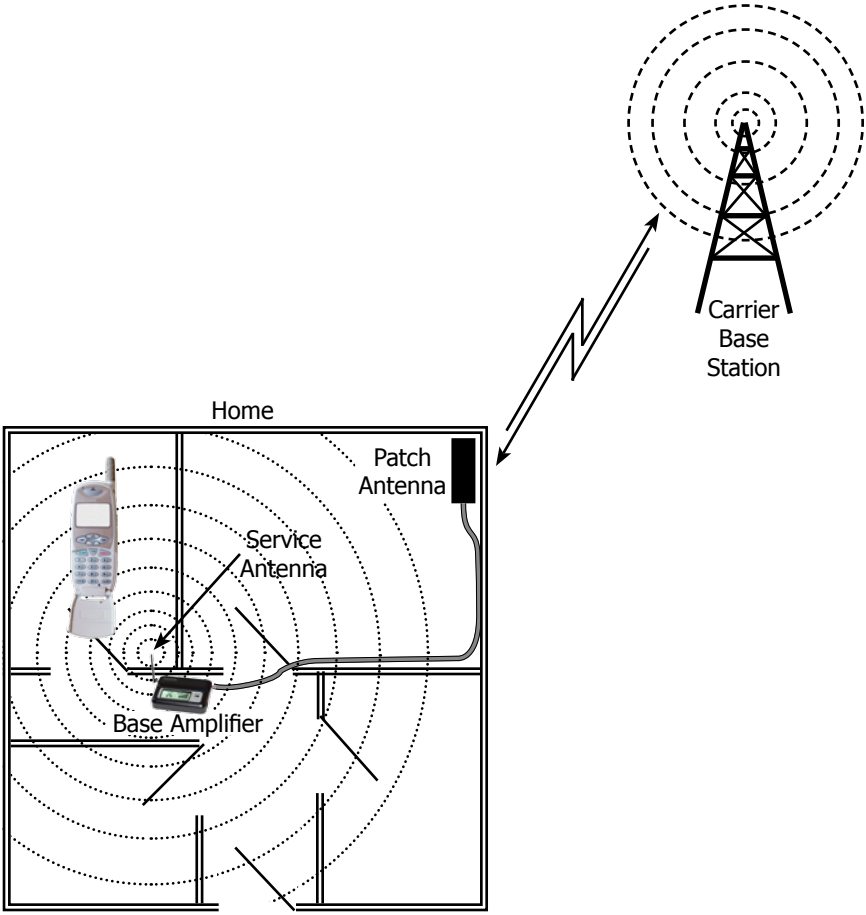

Figure 4
Topographical View of Cellular Signal Booster Installation

Note that because the amplifiers in the Cellular Signal Booster's input and output ports are tuned to the same frequency, oscillation (feedback) between the Patch and Service Antennas can occur if they are placed too close together (Fig. 5.) The effect is similar to that of a microphone that is held too close to its output speaker; you will hear a loud whistling (oscillation) noise. If a Cellular Signal Booster system experiences this oscillation, it will jam the cellular system near your home and disrupt the operation of both your and other cellular phones in the area.

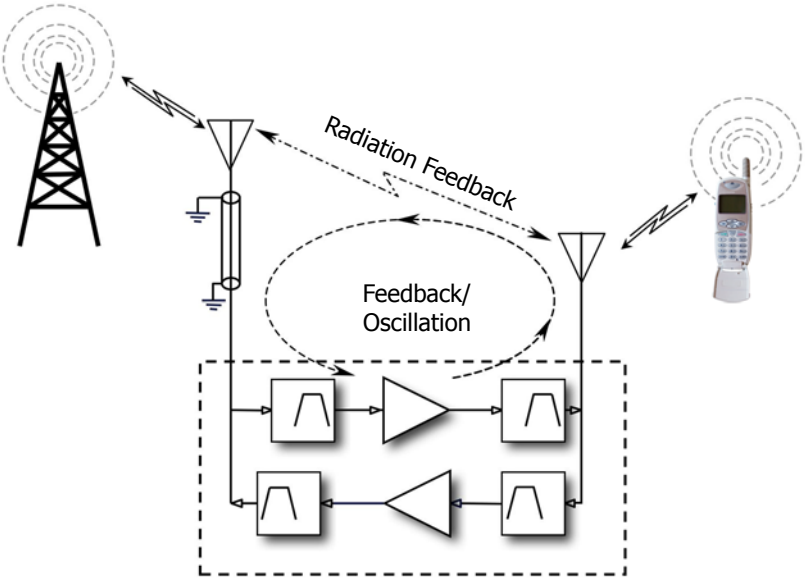

Figure 5
Feedback Loop

There are three ways to prevent oscillation between the Patch and Service Antennas. The first involves increasing the distance between the antennas (just as you would move the microphone away from its speaker to stop the feedback.) The second entails reducing the amplification level of the Base Amplifier (similar to lowering the volume of the microphone's speaker.) The third is simple: turn the system off.

All three of these methods have been built in to the ClearCell + Plus Cellular Signal Booster to prevent feedback. During installation, an ALARM indicator on the Base Amplifier lets you know if you are too close to the Patch Antenna. Once installation is complete, oscillation detectors inside the Base Amplifier alert the Booster when potential oscillations are present so that it can automatically reduce the Amplifier's amplification level. Finally, if the Cellular Signal Booster cannot sufficiently reduce the level of amplification, it turns itself off.

The circuitry that reduces amplification levels and shuts down the system is known as Automatic Gain Control (AGC.) Fig. 6 shows both the feedback loop and additional circuitry used to avoid problems with feedback/ oscillation.

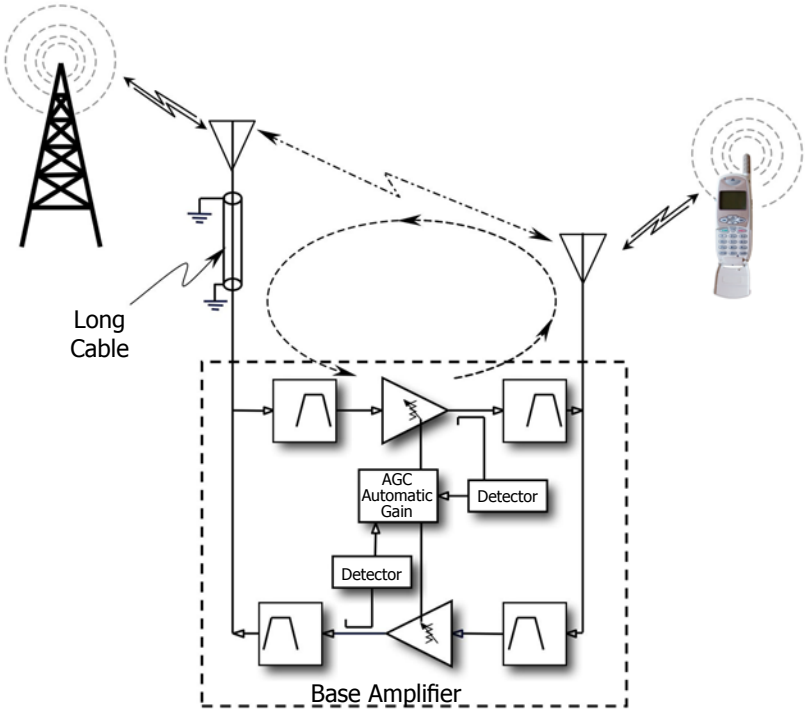

Figure 6
Automatic Gain Control

Note, however, that if the AGC activates and reduces the amplification level of the Cellular Signal Booster amplifiers, the Cellular Signal Booster system will not perform at its peak because the output signals emitted by the antennas will be weaker reducing the signal levels received by both your handset and the Carrier Base Station.

It is possible to control the level of AGC deployed by making sure the Patch and Service Antennas are installed at a sufficient distance apart. Using patent pending Fastall™ circuitry, the ClearCell + Plus Cellular Signal Booster's RANGE and SIGNAL LCD indicators (Fig. 7) will aid you in the placement of the antennas and ensure the product's best possible performance.

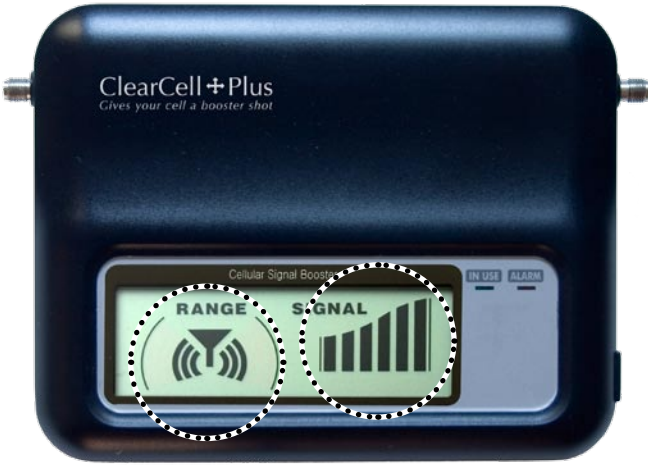

Figure 7
ClearCell Plus Cellular Signal Booster
Amplifier Indicators

The SIGNAL meter on the right helps you locate and tune the Patch Antenna that links to your carrier's base station. The RANGE meter on the left helps you optimize the location and orientation of the Service Antenna attached to the side of the Base Amplifier.

Detailed Installation Procedure

1. As was done during the Site Evaluation earlier, using your cellular handset, find the window that gives you the strongest signal as indicated by the bars on your handset.

2. Attach the rectangular Patch Antenna to the mounting bracket by sliding it on the square post at the end of the bracket (Figs. 8 and 9.) Loosen the Adjustment Nut and make sure you have the latch in the Open position. The ClearCell + Plus label faces away from the Bracket (Fig. 10.)

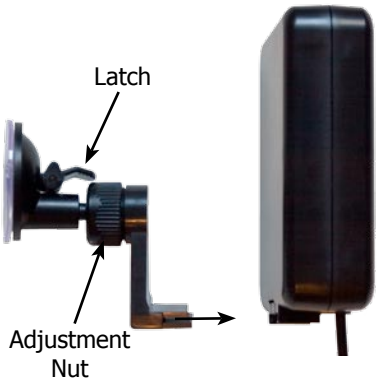

Figure 8

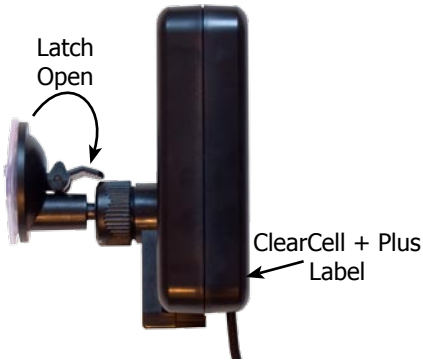

Figure 9

Figure 10
Patch Antenna Front View

3. Clean the inside of the window at the location you will be mounting the Patch Antenna, preferably about 12 inches from the top. Use a cleaning liquid that does not leave residue, such as rubbing alcohol.

4. With the locking latch in the open position (Fig. 9) press the clear suction cup against the clean glass and lock the latch into place as shown (Fig. 11.) The Patch Antenna will be loose on the bracket, but it will be tightened in a later step.

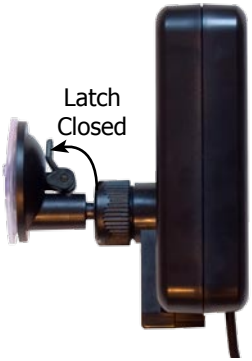

Figure 11

5. With the Base Amplifier near the Patch Antenna, connect the Patch Antenna's cable to the Base Amplifier at the right side top threaded connector (Fig. 12.) **DO NOT CONNECT** the Service Antenna to the unit at this stage.

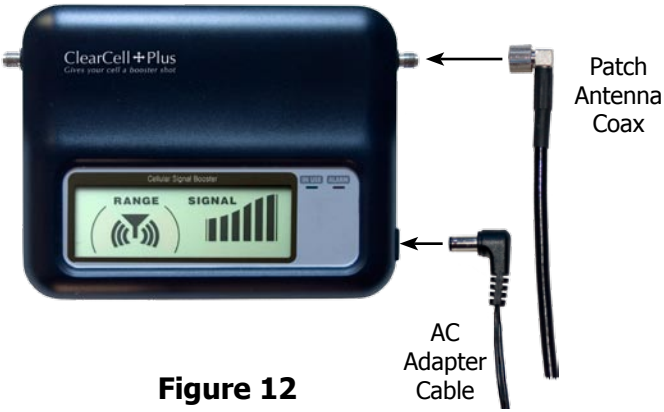

Figure 12

6. Connect the AC Adapter to the Base Amplifier and plug it into an AC outlet near the Patch Antenna (Fig. 12.)

7. The unit will initialize itself in approximately 5 seconds. The blinking CHECKING indicator will disappear when it is okay to proceed.

8. Once the initialization process is completed, adjust the Patch Antenna direction such that it yields the maximum number of bars on the SIGNAL meter shown in the circle below (Fig. 13.) Then tighten the Adjustment Nut to lock the antenna in that position. This process tunes the antenna for the best possible link with your carrier's base station.

Figure 13

9. Disconnect the AC Adapter from the AC outlet and move the Base Amplifier to a location centralized in the area you would like to improve coverage. In most cases, this location should be at least 25 feet from the Patch Antenna you just installed and near an AC outlet.

10. Connect the small Service Antenna to the Cellular Signal Booster Base as shown below (Fig. 14.)

Figure 14

11. Orient the Service Antenna upward and the Base Amplifier in one of the two positions shown below. Fig. 15 is the proper orientation for a wall-mounted unit, Fig. 16 for tabletop placement.

Wall Mount Configuration

Figure 15

Table Top Configuration

Figure 16

12. Connect the AC Adapter to the Base Amplifier and plug it into an AC outlet in the location where you plan to install the Base Amplifier.

13. Once the unit has initialized itself (as in Step 8) adjust the position of the Base Amplifier to achieve the highest number of concentric bars in the RANGE indicator, circled below (Fig. 17.) The RANGE indicator shows the size of the area the Cellular Signal Booster will cover in your home. The more bars showing, the better the coverage and performance.

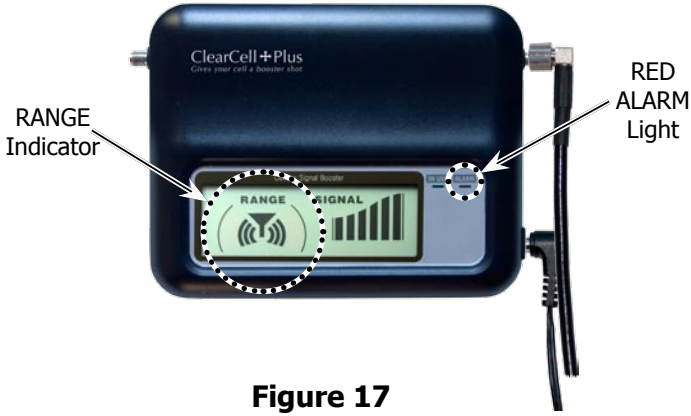

Figure 17

NOTE: If at any time the red ALARM light, circled above (Fig. 17), comes on, and the display flashes, you are too close to the window-mounted Patch Antenna and will need to move the Base Amplifier farther away from that window. Once you have done this, unplug the AC Adapter from the Base Amplifier for 5 seconds to reset the unit, move Base Amplifier to a new location, and then plug it back in. Repeat step 14.

14. Once optimized, place the Base Amplifier on a table or use steps 16 and 17 to mount the unit on a wall with the included mounting bracket.

15. Periodically monitor the LCD indicators to ensure the installation remains stable. If any of the indicators experiences a drastic reduction in bars, inspect the complete installation and correct any problems.

Note: Over time your Cellular Carrier may have system outages, will add, or modify a Base Stations in your area. This may cause a change in the performance of your Cellular Signal Booster System. If you notice drastic changes in signal readings or your performance of your handset has changed, please contact your Carrier to find out if there were changes. If the problem is a System Outage simple wait for the problem to be corrected. If the carrier has made changes to base station in your area, repeat the Site Evaluation to see if the window with the strongest signal has changed. You may need to reinstall the system again to compensate for these Carrier changes.

Wall Mount Option

16. To mount the Base Amplifier on a wall, secure the wall mount bracket (Fig. 18) in your desired location using the provided plastic anchors and screws. Since the Base Amplifier is lightweight, only 2 screws are needed. The top 2 holes are recommended for the screws.

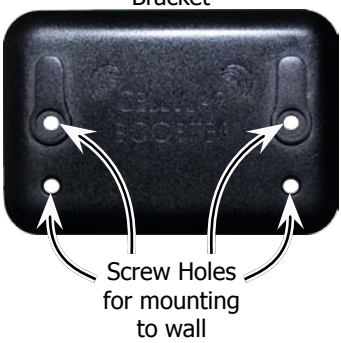

Figure 18

17. After the wall-mounting bracket is installed, simply slide the Base Amplifier over the hooks as shown below (Figs. 19, 20, and 21)

Figure 19

Figure 20

Figure 21

Troubleshooting

Symptom	Possible Solution
No power light	Make Sure AC Adapter is plugged into working AC outlet.
	Make sure AC Adapter plug is fully seated into repeater base.
Cannot turn off ALARM Mode	The ALARM can only be turned off by disconnecting the power and reconnecting it after you have adjusted the antenna distances.
ALARM comes on when tuning the Patch Antenna	The small Service Antenna must be disconnected during the tuning of the Patch Antenna.
Cannot get maximum bars on SIGNAL indicator	This is normal. If your location is far away from the nearest Carrier Base Station, you will have a relatively weak signal entering the Patch Antenna. It would be a good idea to verify that the location you have chosen for the Patch Antenna is the strongest. Do so by following the guidelines in Step 1 of this guides's Detailed Installation Procedure
Cannot get maximum level on the RANGE Meter	This may be normal. If the incoming signal from your carrier's base station does not give you the maximum number of bars on the SIGNAL meter you will not get the maximum level on the RANGE indicator. If you are getting a full set of bars on the SIGNAL indicator, your antennas are likely too close and/or need further adjustment to peak the RANGE indicator.
Cellular handset is not functioning	The Patch and Service Antennas may have been installed too close together. The Cellular Signal Booster system may be in ALARM Mode. You need to unplug the AC Adapter from the Base Amplifier and readjust the Antennas.
	Your handset may be defective. Take your handset to a local Carrier or Carrier Agent to check out your handset.

Troubleshooting - Continued

Symptom	Possible Solution
The RANGE and/or SIGNAL Indicators have changed their number of bars.	A plus or minus one bar change is normal. Environmental conditions and changes in your home (objects being moved or people movement) can change these levels.
	If the change is more drastic: 1) Something has changed in your installation. Inspect the Antennas and correct any changes. See step 15 of the Detailed Installation Procedure. 2) Your Carrier may a system outage, added, or modified a Base Station in your area. Please contact your Carrier about any system problems or changes. If so, go to step 17 of the Detailed Installation Procedure.
My handset performance has dramatically changed.	See Symptom "The RANGE and/or SIGNAL Indicators have changed their number of bars." above.
	Your handset may be defective. Take your handset to a local Carrier or Carrier Agent to check out your handset.

FCC RF Radiation Exposure Statement

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body. The transmitter must not be co-located or operating with any antenna of transmitter.