

# **CLRspkr ClearSpeech®**

## *Digital Signal Processor Noise Reduction Speaker*



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Thank you for choosing the CLRspkr ClearSpeech® Digital Signal Processor Noise Reduction Speaker. The CLRspkr connects directly to the radio. The unit is extremely effective in improving communication clarity. QSO's will be more enjoyable without the fatigue of background noise. In many cases, there will be a noticeable improvement in understanding weaker signals, making contacts, and general listening.

CLRspkr is ideal for mobile radio operation as noise reduction is superb due to the Digital Signal Processor (DSP) passing voice and CW sounds, while attenuating noise, such as atmospheric noise, hum, hiss, whistles, and static. It effectively removes heterodynes, ignition noise, lightening crashes, power line noise. The process is dynamic and changes with the interference and the signal, but the effect is rewarding. Mobile voice operation is more fun without all the background noise. The DSP recognizes the intermittent nature of CW and allows it to pass noise free.

CLRspkr may be mounted in any convenient location. The bracket permits tilt aiming. The included 6ft. audio cable plugs into the headphone or mono speaker output on the radio. The unit also includes a 6ft. power cable with Powerpole® connectors that will plug into a 13.8 volt supply. Extension cables available separately.

CLRspkr is a high-tech, low-cost solution to enhance the audio quality of communication for ham radio, mobile operation, car and truck fleets, emergency vehicles, and marine radio. The CLRspkr works well in the home station as well.

### **Choosing a Mounting Location**

The CLRspkr may be mounted in any convenient location. It can rest on a tabletop or mount to any surface. The bracket has two holes for mounting with the included screws. The two side knobs permit tilt aiming. This unit is not weather resistant and suggested to use in a dry place out of direct sunlight.

Anderson Power Products® and Powerpole® is a registered trademark of Anderson Power Products, Inc.

## Connections

### Audio Input Jack:

Audio input is via the 1/8-inch stereo jack. Use the supplied 6ft. stereo cable to plug into the headphone output or the mono speaker output on the radio.

**\*\*NOTE for Stereo Cables:** The CLRspkr is only one channel. The stereo jack cable uses only the tip and ground. If using a mono plug into a stereo jack, one channel gets shorted to ground and may damage the source. To prevent problems, a stereo cable is supplied. A stereo jack will use only one channel, but still works with a mono plug.

### Headphone Jack:

The front panel headphone jack works with stereo headphones only. Both left and right channels receive the same signal for equal reception in both ears. The high level audio works fine with modern 8 to 600 ohm headphones. The internal speaker will still output audio, but can be reduced to silence with the volume control. The volume control will not adjust the headphone output.

### Power:

The CLRspkr comes with a 6ft. power cable. One end is a 2.1 mm power plug (tip hot) and the other is a pair of Powerpole connectors. **RED is for PLUS 13.8 VDC and BLACK is for Ground.**

If using other connectors, just remove the Powerpole® and connect the **white striped wire to PLUS 13.8 VDC** and the other wire to ground.

The CLRspkr is protected from a reverse polarity power connection.

A 1-amp 12-volt, wall mount power supply (wall wart) may be used to power the CLRspkr. The plug required is 5mm OD with a 2.1 mm pin, and the pin is positive. West Mountain Radio carries an appropriate accessory power supply for 117 VAC.

### **Volume Control:**

The desired volume level from the loudspeaker may be controlled with the volume knob on the front of the CLRspkr unit. Headphone volume is controlled with the volume control of the radio. **NOTE:** If using headphones only, turn down the volume knob on the CLRspkr completely.

## **Operating**

CLRspkr is easy to operate. Turn the Volume knob to power ON. The LED will turn to GREEN when the speaker is properly operating. Adjust the radio's output volume control to produce a comfortable listening level. Use the Filter control to adjust the desired amount of noise reduction. The noise will reduce, leaving the voice/CW signal at a similar volume.

If the incoming audio level is too high the LED will flash orange in color. Reduce the input just below flashing. Clipping disrupts the noise reduction circuit.

The front panel "Filtering" control allows continuous DSP level adjustment. When turned fully counterclockwise, the DSP is bypassed. When turned fully clockwise, maximum DSP filtering is realized. Maximum filtering is rarely needed during use. A recommended setting is at the 10 - 12 o'clock position for typical HF channel conditions.

If the unit is powered up with the filtering knob full clockwise, the firmware version is reported in Morse Code.

## **Noise Reduction Performance**

The noise reduction is dynamic and adaptive. It senses the random character of the voice or CW and permits it to pass through. The repetitive nature of the noise is sensed and reduced according to the patented algorithms. Take notice of the DSP battling the difference between the voice and the noise when both are at equal level and the noise is constantly varying.

When the signal is CW, its intermittent character is sensed and the CW is passed through. The noise is attenuated. When the noise is steady, such as a heterodyne from a 40 meter broadcast station (carrier whistle), it is attenuated greatly to over 50 dB or about 0.003 times the original value. If the noise is a varying siren, it is greatly reduced as well, but not as much as a heterodyne.

Transient sounds are greatly reduced, especially if they are repetitious. The net effect of the Digital Signal Processor is to reduce atmospheric noise, static, hiss, ignition noise, power line noise, carriers, hum, and heterodynes, while passing voice and CW signals.

The adaptive nature of the noise reduction is apparent by observing its convergent time. A single audible tone will vanish in about 1 second. White noise diminishes in 1 to 2 seconds. Typical car noise and emergency alarms take about 2 seconds to reduce.

## **Power Amplifier**

CLRpkr contains a power amplifier integrated circuit. It produces 7.5 watts RMS maximum into 8 ohms, when connected to a 13.8 volt DC source. The voltage gain is 46 dB typically. The amplifier has protection from a shorted speaker.

## **ClearSpeech Adaptive Speech Filter**

The ClearSpeech Adaptive Speech Filter is an algorithm designed to filter noise from audio signals containing both speech and noise. It is implemented in a circuit board containing DSP circuitry and a small audio power amplifier.

### **Immunity from RF Interference**

CLRspkr contains circuitry to reduce interference from the transmitted radio signal. There are filters on all input wires, and decoupling capacitors at key points throughout the electronics. There is a ferrite inductor in series with the positive power lead.

Audio input is via a coupling transformer. The audio input ground is not connected to the power return. This helps reduce any ground loops.

### **Specifications**

<b>Dimensions</b>	5.5 x 4.3 x 2.5 inches
<b>Power Requirements</b>	9 to 16 Vdc; 1.1A typical before onset of clipping
<b>Audio Input</b>	High impedance, 0.01 VAC
<b>Voltage Gain</b>	46 dB
<b>Audio Output Power</b>	7.5 watts RMS maximum into 8 ohms @ 13.8 VDC
<b>Maximum Audio Output Voltage</b>	7.75 Vrms
<b>Input Clipping Level</b>	0.04 volts RMS
<b>Frequency Response</b>	300 Hz to 3400 Hz
<b>Noise Reduction Characteristics</b>	Adaptive, single tone greater than 50 dB

## FCC INFORMATION

Note: This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

Modifications not expressly approved by the manufacturer could void the user's authority to operate equipment under the FCC Rules.

## **CLRspkr Warranty**

*CLRspkr* is warranted against failure due to defects in workmanship or materials for one year after the date of purchase from West Mountain Radio. Warranty does not cover damage caused by abuse, accident, misuse, improper or abnormal usage, failure to follow instructions, improper installation, alteration, lightning, or other incidence of excessive voltage or current. If failure occurs within this period, return the *CLRspkr* or accessory to West Mountain Radio at your shipping expense. The device or accessory will be repaired or replaced, at our option, without charge, and returned to you at our shipping expense. Repaired or replaced items are warranted for the remainder of the original warranty period. You will be charged for repair or replacement of the *CLRspkr* or accessory made after the expiration of the warranty period.

West Mountain Radio shall have no liability or responsibility to customer or any other person or entity with respect to any liability, loss, or damage caused directly or indirectly by use or performance of the products or arising out of any breach of this warranty, including, but not limited to, any damages resulting from inconvenience, loss of time, data, property, revenue, or profit, or any indirect, special, incidental, or consequential damages, even if West Mountain Radio has been advised of such damages.

Except as provided herein, West Mountain Radio makes no express warranties and any implied warranties, including fitness for a particular purpose, are limited in duration to the stated duration provided herein.



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