

# ***CLRdsp ClearSpeech®***

## ***Noise Reduction Digital Signal Processor***



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Thank you for choosing the CLRDsp ClearSpeech® Noise Reduction Digital Signal Processor. The noise reduction circuit and audio amplifier in CLRDsp is extremely effective in improving communication clarity. Mobile and base operation is less fatiguing and much more fun!

CLRDsp 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. QSO's are more fun without all the background noise. The DSP recognizes the intermittent nature of CW and allows it to pass noise free.

CLRDsp may be mounted in any convenient location, such as under a station speaker. It fits perfectly under the West Mountain Radio COMspkr. Included are two (2) 6ft. cables with 1/8-inch stereo audio connectors for audio input and external speaker output. Volume, tone and DSP filtering levels may be adjusted by use of the front panel controls. A headphone connector on the front may be used with any mono or stereo headphone set. The unit also includes a 6ft. power cable with Powerpole® connectors that will plug into a 13.8 volt supply.

### Choosing a Mounting Location

The CLRDsp should be placed nearby for easy operation and close to the radio, speaker, and power supply. The 6ft. cables can be lengthened with extensions. This unit is not weather resistant and suggested to use in a dry place out of direct sunlight.

### Connections

#### Rear Panel

**SPKR LEVEL IN:** 1/8" jack that accepts audio from a low-impedance external speaker jack or headphone output jack typically found on Amateur transceivers. Use one of the supplied stereo patch cables to connect to the radio. If a radio has a stereo output, the CLRDsp will only receive the left audio channel (tip). A stereo cable is supplied because they are always safe to use even in mono jacks. The audio input is transformer coupled within the CLRDsp to reduce the chance of ground loops.

**LINE IN:** 1/8" jack that accepts audio from a low-level source, typically found on the headphone jack of portable Shortwave receivers. If using such a radio, use this jack instead of the SPKR LEVEL IN jack.

**LINE OUT:** 1/8" jack provides a line-level filtered audio output suitable for recording. It can be connected to the LINE-IN (or MIC-IN) jack on a computer using a stereo patch cable for digital recording using suitable software. Only the left audio channel (tip) is passed.

**SPKR OUT:** This 1/8" jack connects to a low-impedance external speaker. The CLRDsp uses a bridge amp type output which means it is important that your external speaker is not grounded. The tip is positive and the sleeve is negative. Use one of the 6ft. stereo cables provided to connect to the external speaker. Recommended for a 4 or 8-ohm external speaker. Do not use a powered external speaker with this jack as these typically have grounded sleeves.

**Power Jack:** The CLRDsp 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 CLRDsp is protected from a reverse polarity power connection. A small 1-amp 12 or 15-volt, wall mount power supply (wall wart) may be used to power the CLRDsp. The plug required is 5mm OD with a 2.1 mm pin, and the pin is positive. West Mountain Radio carries an appropriate supply for 117 VAC.

### Front Panel

**Headphone Jack:** The front panel headphone jack can work with mono or stereo headphones. A jumper (J8) is provided on the main circuit board to select which type of headphones will be used with the CLRDsp. Remove the case screws carefully and locate jumper J8.

Jumper J8 ON: Stereo headphones (audio fed to both tip and ring)

Jumper J8 OFF: Mono headphones (audio on the tip only)

*Warning: Do not connect shield contact on HDPH or Spkr Out to DC ground.*

The high level audio works fine with modern 8 to 600 ohm headphones. Plugging in headphones will mute the external speaker.

**Important:** The headphone jack should only be used with headphones. Do not make a connection here that would cause the sleeve to be grounded, for example a connection to external equipment.

### Controls

**Volume Control:** The desired volume level from the external speaker may be controlled with the volume knob on the front of the CLRDsp unit. Headphone volume will also be affected. Adjust the radio's volume control and this control to achieve the desired audio output.

**Tone Control:** Adjust the tone control for desired level of bass/treble response.

**Filter Control:** Adjusts the amount of active DSP filtering.

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## Operating

CLRdsp is easy to operate. When power is supplied to the CLRdsp, the CLIP LED will turn green to indicate the unit is on.

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 and the filtering knob is fully clockwise, the firmware version is reported in Morse Code.

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

### 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

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

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## 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

CLRDsp 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.

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

## Specifications

Enclosure	Aluminum, powder coat painted
Dimensions	5.75 x 4.25 x 1.25 inches
Power Requirements	9 to 16 VDC; 1.1A typical before onset of clipping. Protected by internal 2A ATC fuse
Audio Input	High impedance, 0.01 VAC
Voltage Gain	46 dB
Audio Output Power	11 watts RMS into 4 ohms @ 13.8 VDC
Maximum Audio Output Voltage	7.75 Vrms
Input Clipping Level	0.04 volts RMS
Noise Reduction Characteristics	Adaptive, single tone greater than 50 dB

Powerpole® is a registered trademark of [Anderson Power Products](#)

## 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.

## CLRDsp Warranty

*CLRDsp* 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 *CLRDsp* 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 *CLRDsp* 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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