

CLRstereo ClearSpeech® ***Dual Noise Reduction Digital*** ***Signal Processor***



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

CLRstereo 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, lightning 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.

The CLRstereo uses the same Clearspeech® algorithm as the CLRdsp product. The CLRstereo can process two channels at once for use with two radios or a radio that can receive two frequencies at once, Be aware that the CLRstereo does not contain a power amplifier like the CLRdsp. The output is sufficient for a headphone or low level speaker. For additional audio level use an amplified speaker such as the COMspkr or PWRspkr.

The CLRstereo package includes these cables:

- (1) 6-ft. power cable with Powerpole® connectors
- (1) 1/8" Audio Cable, 6 ft.
- (1) 6-ft. audio cable with 3.5mm & stripped end

Choosing a Mounting Location

The CLRstereo should be placed nearby for easy operation and close to the radio, speaker, and power supply. The 6ft. cable can be lengthened with extensions.

This unit is not weather resistant and is suggested to use in a dry place out of direct sunlight.

Connections



AUDIO IN: 1/8" stereo jack that accepts audio from a low-impedance external speaker jack or headphone output jack typically found on Amateur transceivers. Use the supplied stereo patch cable to connect to the radio if the radio has a stereo output. If using two radios, use a right/left splitter adapter or audio splitter cable to connect to two radios/audio sources.

PTT: 1/8" mono jack that can be used to indicate when the radio is in transmit mode (active low). The CLRstereo uses the audio level drop to detect transmit. In a noisy environment where the audio level never drops completely out this can be used as a definitive indicator. If the CLRstereo does not properly detect transmit mode, when the transmit is complete, the CLRstereo may take an additional second to learn the receive noise before suppressing it.

AUDIO OUT: 1/8" stereo jack that contains both audio signals. It can drive a stereo headphone, amplified stereo speaker set or two small speakers.

Coaxial Power Jack: This is one of two possible sources of power for the CLRstereo. The CLRstereo comes with a 6ft. power cable. One end is a 2.1 mm power plug (center positive) 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 CLRstereo is protected from a reverse polarity power connection. A small 500mA, 12-volt, wall mount power supply (wall wart) may be used to power the CLRstereo. The plug required is 5.5mm OD with a 2.1 mm pin, and the pin is positive. West Mountain Radio carries

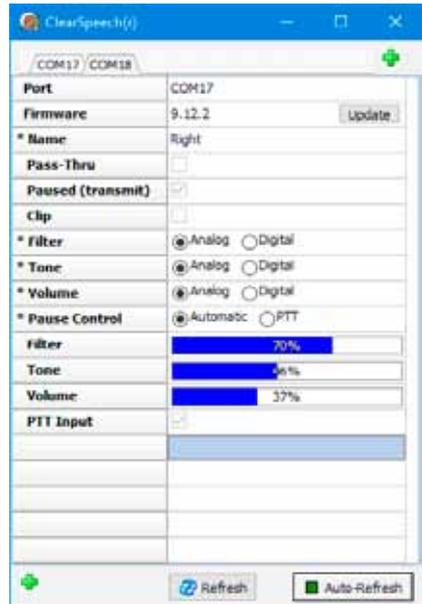
an appropriate supply for 117 VAC. The CLRstereo will operate correctly with any voltage from 9VDC to 15VDC. A quiet source will reduce noise in the audio.

USB Power: This is one of two possible sources of power for the CLRstereo. The USB jack may be connected to a PC or standard USB charger to power the CLRstereo.

USB Data: This is the same connector as “USB Power.” When connected to a PC two COM ports will appear at the PC. If they do not appear (usually due to an older version of Windows) you will need to install the WMR drivers. The USB drivers can be installed by using the WMR Device Diagnostic Utility. This utility can be found on the West Mountain Radio website under Support > Downloads (www.westmountainradio.com/content.php?page=wmr-downloads)

The CLRstereo has two CLRmodule units inside. The two COM ports can be used to monitor and control the two units. This is not required for normal operation. One use would be to update the firmware. The CLRmod PC Utility program can be downloaded from the aforementioned download page to monitor and control the CLRmodule. A hardware interface must be provided to interface the 0-3.3V signals on the CLRmodule to the PC RS232 port or a USB port.

The West Mountain Radio CLRstereo has two CLRmodules inside and it has a USB interface connected to those modules. This provides an easy-to-use development platform for the CLRmodule.



Controls



Power: Simple On/Off.

Power LED: Green on indicates the unit is powered.

Channel controls: For the right and left channels the following are on the front panel:

- **Volume Control:** The desired volume level from the radio may be controlled with the volume knob.
- **Tone Control:** Adjust the tone control for desired level of bass/treble response.
- **Filter Control:** Adjusts the amount of active DSP filtering. Clockwise increases filtering. A recommended setting is at the 10 - 12 o'clock position for typical HF channel conditions. When fully counter-clockwise no filtering is done and music may be listened to.
- **Clip LED:** Red on indicates the incoming audio level is too high. Reduce the input just below flashing. Clipping disrupts the noise reduction circuit.

Center switches: The left switch controls the left output channel. The right switch controls the right output channel. When a switch is up, that output channel is connected to the left audio. When a switch is down, the right audio is selected.

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 specialized algorithms. Note 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 moving heterodyne, it is greatly reduced as well, but not as much as a fixed 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.

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

CLRstereo 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 level inputs are via a coupling transformer. This helps reduce any ground loops.

Specifications

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| Enclosure | Metal, powder coat painted |
| Dimensions | 7.25" x 3.5" x 1.5" |
| Power Requirements | USB power or 9 to 15VDC, 212mA typical |
| Maximum Audio Output | 2Vpp into a high impedance load, 560mVpp into 8 Ohms |
| Input Clipping Level | 585mVpp (volume control full clockwise) |
| Noise Reduction Characteristics | Adaptive, single tone greater than 50 dB |

CLRstereo Warranty

CLRstereo 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 *CLRstereo* 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 *CLRstereo* 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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