codeRED Dual Ear Muff Headset Overview

WHAT ARE THEY?

Dual Ear Muff headsets are typically used in high noise situations. You most likely have seen them on the tarmac at your local airport or in movies where the hero is riding in a helicopter. They come in a few different flavors and costs can vary wildly. Typically you get what you pay for, but it is difficult to see what features you are paying for. In this Tech Bulletin we will try to help sort it out.

DIFFERENT TYPES

I think of ear muff headsets as primarily for noise reduction. There are features available that differentiate the choices:

- Noise reduction only (Inexpensive)
- Noise reduction with ambient sound amplification/clipping (also called ”Hear Through” technology, or “Shooter’s Headsets”, Moderate Expense)
- Noise Reduction with external communication (either Aviation or 2-Way radio, Higher Cost)
- Noise Reduction with ambient sound amplification/clipping AND communication (Highest Cost)

FEATURES EXPLAINED

The combined features of the headset, along with the robustness of design and intended use, will drive the costs up. It is good to know what the features are and determine if you need to pay for them.

The earmuff feature is pretty straightforward. The earmuff cups do the noise insulation, usually rated as Noise Reduction Rating (NRR) and measured in decibels (dB). You can sort of think of this as how much noise they will eliminate. If you are in a 100 dB environment, a 22 dB NRR headset will lower it to about 78 dB, which is under the OSHA limit for continuous exposure. It is not exactly that and involves weighted averages and math, but let's keep this simple. For more info see OSHA Standard 1910.95 (drink some coffee beforehand, it is techy and boring!). Gunshots can be over 130 dB depending on caliber, so combining ear muffs with foam earplugs for extended shooting range visits is a good idea.

The communications feature is also pretty straightforward: you have speakers in each cup and a microphone, usually a boom microphone, which is the best choice for high noise environments. There can be some noise cancellation in the mic, but the dominant feature is the proximity of the mic to your mouth (see our Boom Mic Tech Bulletin for more details). Your voice will overcome the ambient sound, so keep the mic as close to your lips as practical. Usually, General Aviation headsets are a bad choice for 2-Way radio use, the electrical impedance (resistance, in Ohms) can be considerably different and many times will not work with a 2-Way radio.

The "Hear Through" feature is more complicated and deserves a little more discussion. I have seen this feature referred to as "Nose Cancelling" which is a little misleading. The noise cancellation, or reduction, is taken care of by the mechanical insulation of the earmuff. What these headsets do can be more accurately described as "Noise Clipping". Essentially what is going on with this feature is you have a microphone (not the boom mic) external to the earmuff cups. This microphone picks up the ambient sound and amplifies it to your ears inside the earmuff. Usually, these speakers are limited to how much sound they can transmit, and better designs keep it below the OSHA limits. It should be said that any amplified sound will be added to the sound that comes through the physical ear muff cups. When the ambient sound exceeds some predetermined design criteria the amplification will be clipped or shut off completely. Usually, clipping starts around 80 dB and happens in a few milliseconds. Restoration of ambient sound will have a small delay, something less than 1 second. If you are using them in a continuous high noise environment, it is best to turn the amplification down appropriately. Better designs will have settings that give you better than ambient sound amplification. This will give you a sense of "super hearing", great for stealth use and situational awareness in a quiet environment.

Some older technology or poorly designed headsets will completely shut off the speakers when ambient sound exceeds the threshold. This is not good because you become deaf to your radio communications. Be aware of this feature, because it can affect your ability to receive communications from your team. Comms sound and ambient sound should be separately controlled.

NOISE CANCELLATION FUNCTION EXPLAINED

The ambient sound amplification/clipping in tactical headsets is powered by batteries, which must be maintained and replaced when needed. A good design will include auto-shutoff when not in use, to extend battery life. If the batteries die, you still have the NRR rating, you just will not have the ambient sound amplification. No noise clipping will be necessary as the earmuffs will be working at their maximum NRR.

True electronic noise cancelling is where the external ambient sound microphone samples the ambient noise frequencies and generates sound waves of the same frequency (pitch) and amplitude (volume), but 180 degrees out of phase, to counteract the continuous ambient sound. Sometimes it works well, but that technology is not appropriate for tactical use. Maybe it would be better suited for industrial applications where you have machinery creating continuous rhythmic ambient sounds.

codeRED PRODUCT OFFERING

At codeRED we currently have a high noise ear muff headset offering for 2-Way radios, including Blue Tooth capability. It is more of an industrial product line and does not have the “Hear Through” technology.

We have been researching bringing a high-quality Dual Ear Muff Tactical Headset to market for several years. There is a desire in the marketplace for a full-featured design that is *robust* and *affordable*. We introduced a design about 8 years ago called the RHP+. It was more of a shooter’s style headset, and there was a blue tooth version, but not a 2-Way radio version. It was just okay. The ear cups were too large, it cut off sound instead of clipping it and the build quality was not up to our standards. Eventually, we discontinued the product and began looking for a better solution.

For new product development, the upfront costs of injection molds, circuit boards, and various tooling make it cost-prohibitive to undertake for a company our size. The better approach is to find an existing product that is close to what we want, partner directly with the factory that makes it, and have them make appropriate enhancements for quality, performance, and robustness. This involves a considerable amount of product sourcing, testing, and evaluation. Ideally, the design would fit seamlessly into our existing product offering. It would enhance the proven technology we already have. This is the path we have been on for the past 4 years, and we think we have found a solution.

Next comes the robustness of the design. For example, all of our products have Kevlar reinforcement in the cables. This is a feature we have to incorporate into our designs. It makes the difference between a product that can be counted on for years vs one that may fail on its “maiden voyage”. This is just one example of design consideration.

A final consideration is a cost. We could create the best design in the marketplace, but if we cannot compete directly on cost, it would never sell. Our target market is high quality, solid performance, reasonable cost.

So, it is with all of these constraints we began the journey. We wrote up a specification that had all of the features our customers needed including slim ear cup design, full functioning sound clipping, enhanced sound amplification, US NATO interface for communications, comfortable fit for all-day use, OSHA and ANSI compliance, and options including silicone gel ear pads, ARC/Team Wendy/M-LOK rail adapters, as well as others. We also required an ambidextrous boom mic,

dynamic boom mic option and we are modifying our field-proven Assault throat mic as an option for use with gas masks or SCBA. See our Tech Bulletin on Boom Mics for more info.

CONCLUSION

We are in the final testing of a design we think “ticks all of the boxes”. We expect to launch this design in early Q2 of 2021. The first launch will be SWAT team-specific and will complement our Pro series PTT family. Initially, it will be available only as a complete unit with the Pro series PTTs. If this initial launch goes well we will follow up with a headset-only version, and possibly an airsoft-specific design. Ideally, the airsoft version will be functionally identical to the SWAT version. If we cannot compete at the industry price point, we may have to offer a lower featured version to keep costs down, but that is not our preferred solution. Keep an eye on our social media and look on the website for announcements. We hope this product meets a need in the market place.

THANKS FOR READING!

***codeRED* Tech Support**