



**SOUNDSOURCE™**  
NO.8-NA-US



## Radio Earmuffs & Noise Exposure

Some earmuff models have built-in AM/FM radios and audio inputs. When using these earmuffs in industrial settings, doesn't listening to the radio or a music player just add more noise to damage hearing?

When headset radios first appeared in stores several decades ago, they were not marketed as hearing protectors—they offered very little attenuation of noise, and even amplified some of the background noise due to resonance in the earcup. To be an effective hearing protector, an earmuff must be designed to be a hearing protector from the start.

In an official interpretation letter on the topic of music players in noisy work environments, OSHA reported typical noise levels of 81 dBA at 50% volume setting, 91 dBA at 75% volume, and 96 dBA at 100% volume<sup>1</sup>—a hazardous noise level if listened to continuously for several hours. Ideally, a radio headset would allow the enjoyment of music at safe levels, but also provide adequate hearing protection in a noisy environment.

Some electronic earmuffs do just that. These earmuffs have built-in AM/FM radios and/or line input jacks to plug in personal music players. But they also contain circuitry that limits their electronic output; the sound output of the radio or personal music player is limited to a generally safe level under the ear cups.

## Total Effective Exposure for a Radio Earmuff Worn in 90 & 95 dBA of Noise

Noise Level	90 dBA	Noise Level	95 dBA
Attenuation of Earmuff	25 dB	Attenuation of Earmuff	25 dB
Passive Exposure	= 65 dBA	Passive Exposure	= 70 dBA
Plus Radio Noise	+82 dBA	Plus Radio Noise	+82 dBA
Effective Exposure	= 82 dBA	Effective Exposure	= 82 dBA

The above example demonstrates how a radio earmuff can still offer effective hearing protection in loud background noise. In our example, a worker is using a radio earmuff with the sound management technology described above. The noise level of the music through the headphones (either from the built-in AM/FM radio or from an attached personal music player) will certainly fluctuate, but for the sake of this example, let's assume the music is at maximum output (a constant level of 82 dBA) and the electronic earmuff is worn in environmental noise of 90 and 95 dBA. When two noise sources are added together, the decibels are added logarithmically, not arithmetically. Using a logarithmic calculator<sup>2</sup>, let's determine the effective exposure for this worker.

Since the output of the AM/FM radio or personal music player is limited to a safe 82 dBA maximum, the overall effective noise exposure for this worker would still be just 82 dBA for an 8-hour work shift, even when working in background noise of 90 or 95 dBA.

Radio earmuffs are not recommended in noisy settings where moving equipment or other safety hazards require good situational awareness. But in a high-noise job that is repetitive or tedious, a radio earmuff can add significantly to worker satisfaction and enjoyment, without sacrificing hearing protection.

*Sound Source is a periodic publication of the Hearing Conservation team of Honeywell Safety Products USA, Inc., addressing questions and topics relating to hearing conservation and hearing protection.*

*WARNING: This document does not provide important product warnings and instructions. Honeywell recommends all users of its products undergo thorough training and that all warnings and instructions provided with the products be thoroughly read and understood prior to use. It is necessary to assess hazards in the work environment and to match the appropriate personal protective equipment to particular hazards that may exist. At a minimum, a complete and thorough hazard assessment must be conducted to properly identify the appropriate personal protective equipment to be used in a particular work environment. FAILURE TO READ AND FOLLOW ALL PRODUCT WARNINGS AND INSTRUCTIONS AND TO PROPERLY PERFORM A HAZARD ASSESSMENT MAY RESULT IN SERIOUS PERSONAL INJURY.*

### References:

1. Cited in Occupational Safety & Health Administration: Standards Interpretation; Use of Walkman Radio, Tape, or CD Players and Their Effect When Hearing Protection is in Use (April 1987), [www.osha.gov/pls/oshaweb/owadis.show\\_document?p\\_table=INTERPRETATIONS&p\\_id=19542](http://www.osha.gov/pls/oshaweb/owadis.show_document?p_table=INTERPRETATIONS&p_id=19542), accessed 2004.
2. There are several decibel calculators available on-line, such as [www.csgnetwork.com/decibelamplificationcalc.html](http://www.csgnetwork.com/decibelamplificationcalc.html)

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