

Headsets

Aviation Headsets with NoiseGard™ Active Noise Compensation – Introduction

One of the greatest stress factors today is noise. Research has shown that noise affects the nervous system, and can cause tiredness, poor concentration, irritability and tension. Of even greater concern is the permanent damage to hearing that can result from noise at high levels.

How the NoiseGard™ active noise compensation system works

NoiseGard™ active noise compensation is based on the principle of phase inversion, where sound waves are cancelled out by their own 180° phase inversion (see diagram on the right). However, complete signal cancellation (represented in the diagram by a black line) is not desirable.

NoiseGard™ headsets contain a built-in electret microphone capsule and feedback circuitry in each earpiece. The sound picked up by the microphones includes both ambient noise and sounds that should continue to be audible. Most noise pollution occurs at lower frequencies, therefore the important middle and upper frequencies – which include those occurring in human speech – are filtered out of the signal. Electronic circuitry then processes the remaining ambient noise, phase inverting it by 180° and mixing this phase-inverted noise with the original ambient noise. The unwanted noise is thus significantly reduced, but the important speech-related frequencies are not affected by the compensation circuitry, and are reproduced with increased clarity.

The diagrams show NoiseGard™ noise compensation for both closed and open systems.

Passive hearing protectors effectively attenuate noise from the middle and upper frequency range, the effect decreasing sharply in the lower range. However, in the case of closed headphones, active noise compensation with NoiseGard™ combined with passive hearing protectors results in a reduction of noise of more than 25 dB in the 25 – 500 Hz frequency range. The total attenuation resulting from active and passive noise compensation is about 30 dB over the entire audio range.

Open headphone systems are more comfortable for extended periods of wear and the HMEC 45 boomset is well-suited for use by cabin crew on commercial flights. Noise is reduced by approximately 10 dB in the 400 to 1,000 Hz frequency range. The transmitted ATC signal can be decreased accordingly.

A 10 dB reduction in noise is perceived subjectively as a halving in volume. A further reduction in noise of 10 dB again results in a decrease in unwanted noise by 50 %.

NoiseGard™, Sennheiser’s active noise compensation system, contributes greatly towards improvements in cabin comfort and in flight safety. Communication with ATC is made considerably easier. NoiseGard™ headsets make a significant contribution to the improvement of the aircraft cabin as a work environment.

Signal cancellation

