Things You Should Know About Noise and Your Hearing

- You shouldn’t be exposed to noise above 85 dB for more than 8 hours a day. Exposure to noise (8 hrs.) should be followed by 16 hours of quiet recovery time.
  - External Naval jet aircraft noise ranges from 130 to 150 dB (measured 50 ft from aircraft, 45 degrees off the nose).
  - Cockpit noise in jet aircraft ranges from 115 to 130 dB.
  - Today’s double protection of earplugs and earcups provides approximately 30 dB of attenuation.
  - There are few quiet spaces (below 85 dB) on an aircraft carrier for hearing to recover.
- Most Fleet earplugs and earcups are nearly the same design worn 30 to 50 years ago.
- The No. 1 most prevalent Veteran Administration disability claim is hearing loss. All services combined, claims totaled over $633 million in 2004, over $6.7 billion since 1977, and the trend is upward.
- Navy jet-noise-induced hearing loss generally starts in the frequencies you need to hear speech. Your ability to discriminate consonants, as opposed to vowels, goes first. Loss of the ability to discriminate between consonant sounds like “s” and “f” make it more difficult to understand what is being communicated.
Comm Goes Both Ways -- When you think about radio comm quality, you need to think in terms of “the talker” and “the listener.” Noise getting into the comm system at either or both ends, coupled with any hearing loss at either or both ends, increases the chance for missed calls, misinterpretations, and mishaps. Anything that can be done to reduce or block undesirable noise from getting into the comm system and to protect against hearing loss will make Naval Aviation that much safer and efficient.

Double Protection -- DoD wide, earplugs worn along with earcups (as earmuffs or in a helmet) are required for hearing conservation in high-noise environments above 104 dB. Unfortunately, the addition of earplugs under helmet earcups decreases the ability to communicate since the earplugs attenuate speech signals from the earcup earphones at the same time as they attenuate undesirable noises coming in from outside the earcups. A new earplug is now available to help fix this problem.

Mini-CEP Reduces Undesirable Noise while Channeling Thru Speech Sounds -- The Mini-CEP was developed under the Navy’s Small Business Innovation Research Program (SBIR) by improving upon an Army communications earplug, CEP. The Mini-CEP is smaller, more comfortable, and more rugged. These devices provide the hearing protection of an expanding foam earplug while passing the clearest speech signal attainable in to the ear canal. The Mini-CEP consists of a miniature receiver encapsulated in a plastic housing that screws in to a semi-rigid threaded hollow core that’s glued inside a replaceable earplug. The speech signal is delivered directly from the receiver into the occluded portion of the ear canal. When properly inserted into the ear canal, the Mini-CEP transducer fits completely inside the external ear. The small wires used to connect the Mini-CEP to the communications system are highly flexible for comfort and small enough to minimize the potential for noise leaks as they route between the earcup cushion and the user’s head.

Mini-CEP Performance in the Lab and in the Fleet -- Naval Air Systems Command leveraged Army CEP studies and sponsored additional laboratory and environmental tests to ensure the Mini-CEP was ready for operational flight testing and fielding. The Mini-CEP integrates safely with helo, prop, and jet helmets, comm and life support systems, and emergency egress procedures such as ejection. The composite noise attenuation and speech intelligibility of the Mini-CEP and aviator helmet rivals that of more costly Active Noise Reduction (ANR) headsets but without the added weight and
system complexity. Additionally, when ancillary devices such as spectacles or chemical and biological protective masks are worn, Mini-CEP sound attenuation and speech intelligibility is significantly greater than when standard and ANR headset are worn alone. This is because items such as these interfere with the seal of the earcup against the head and thus allow a noise leak pathway – this is not a problem for earplugs.

Laboratory testing showed the Mini-CEP provides about 30 dB of noise attenuation when worn alone. When worn under a helmet with earcups, Mini-CEPs add an additional 10 dB noise attenuation (average) to the helmet/earcup attenuation.

Fleet rotary, prop, and jet crews who flight tested the Mini-CEP all reported reduced noise levels and increased speech clarity compared to their experience wearing regular aviator helmets alone.

**Logistics Tail** The Mini-CEP requires no aircraft modification. Mini-CEPs are integrated into the existing rotary and fixed wing helmets and add <1oz. to the helmet. The Mini-CEP mod kits cost about $120 each and include assorted earplug sizes and fitting instructions. Training manuals and videos are also available. The Mini-CEP comm is wired in parallel with the existing helmet communication system, which continues to work even if the Mini-CEP fails.

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**Mini-CEP**

**Comments from the Fleet**

*Testing by VS-31, MAG-11, MAG-39, MAWTS-1, VFA-122, and VX-23*

- Radio/ICS thru Mini-CEP was “incredibly clear”
- Reduced volume levels for radio/ICS
- Significant reduction in ambient noise
- “Excellent noise attenuation in all parts of the envelope”

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Ms. Bjorn and Mr. Wilt are with Naval Air Systems Command.
Analyst’s Note:

The Mini-CEP has only recently been authorized for use. The change authorizing it for use is IRAC 20 to NAVAIR 13-1-6.7-3 (NAVAIR MSG 171923Z MAR 05). This message provides the ordering information your PRs need to get this new earplug for you. If you need a copy of the message, check the NavAir State of the Art Survival Items webpage, under “Messages 2005.” For more information, contact your local aeromedical safety officer (AMSO). – Lt. Greg Ostrander, aeromedical analyst at the Naval Safety Center.

References


Lead Photo: 041226-N-2984R-105 Persian Gulf (Dec. 26, 2004) - Landing Signal Officers (LSO) recover an F-14B Tomcat during evening flight operations aboard the Nimitz-class aircraft carrier USS Harry S. Truman (CVN 75). Embarked Carrier Air Wing Three (CVW-3) is providing close air support and conducting intelligence, surveillance, and reconnaissance missions over Iraq. The Truman Strike Group and CVW-3 are on a regularly scheduled deployment in support of the Global War on Terrorism. U.S. Navy photo by Photographer's Mate 2nd Class Michael Sandberg. (RELEASED)

Safe noise exposure and hearing conservation instructions can be located online
- OPNAVINST 5100.23 Navy Occupational Safety and Health Program Manual
- NAVMEDCOMINST 6260.5 Occupational Noise Control & Hearing Conservation
- DoD Instr 6055.12 Hearing Conservation Program

Mozo, B.T. and Murphy, B.A. 1997a. The assessment of sound attenuation and
speech intelligibility of selected active noise reduction devices and the communications earplug when used with the HGU-56/P aviator helmet. Fort Rucker, AL: U.S. Army Aeromedical Research Laboratory. USAARL Report No. 97-08.


050126-N-5781F-031 Pacific Ocean (Jan. 26, 2005) – Safety Checkers gives the okay to launch an F/A-18C Hornet off the flight deck of USS Kitty Hawk (CV 63). Currently under way in the 7th Fleet area of responsibility (AOR), Kitty Hawk demonstrates power projection and sea control as the U.S. Navy's only permanently forward-deployed aircraft carrier, operating from Yokosuka, Japan. U.S. Navy photo by Photographer's mate 3rd Class Bo J. Flannigan (RELEASED)