

Topic: N172-120

## Creare LLC

### Flight Head and Hearing Protection System

Vibration induced noise in propeller and rotary aircraft can exceed attenuation capabilities of flight helmet systems. Aircrew exposure to high vibration induced noise compromises safety and increases mission risk. Creare's Flight Head and Hearing Protection System (FHHPS) is a modular upgrade kit that provides substantial reduction in helmet vibration and noise. The kit consists of passive helmet vibration dampers and replacement ear cups. The vibration damper is tuned to the propeller or rotor blade pass frequency of the target airframe and placed on the outside of the helmet. Prop or rotor vibration is absorbed by the damper and cancelled in the helmet. The dampers and our high volume replacement ear cups add up to >15 dB of attenuation greatly reducing noise exposure, noise-related fatigue, and missed radio calls.

### Technology Category Alignment:

Biomedical (ASBREM)

Protection, Sustainment, and Warfighter Performance

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**SYSCOM:** NAVAIR

**Contract:** N68335-19-C-0265



Corporate Brochure: [https://navystp.com/vtm/open\\_file?type=brochure&id=N68335-19-C-0265](https://navystp.com/vtm/open_file?type=brochure&id=N68335-19-C-0265)



Tech Talk: <https://atsi.adobeconnect.com/py6yvobfcpdp/>

WHO

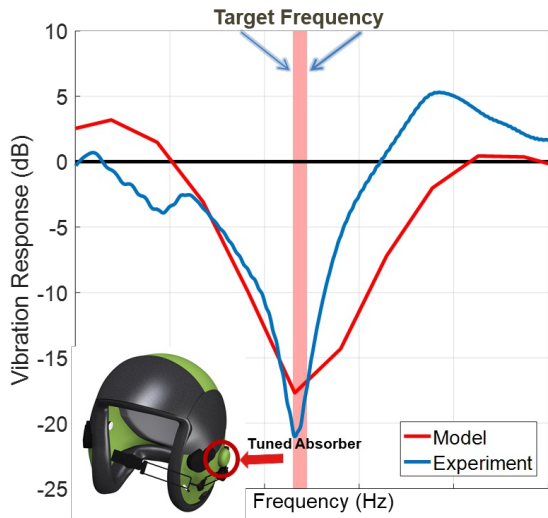
**SYSCOM:** NAVAIR

**Sponsoring Program:** PMA-231

**Transition Target:** E-2D Advanced Hawkeye

**TPOC:**  
(301)342-9213

**Other transition opportunities:** Once Flight Head and Hearing Protection System (FHHPS) performance has been demonstrated via flight test, Creare will support Low Rate Initial Production (LRIP) while transitioning the technology to another company for long term production, sales, and support. Creare's sister company, Edare, is well positioned for this role. Edare was founded by the Creare's owners and specializes in the production, sales, and support of low to moderate volume technologies. Edare has previously commercialized Creare-developed hearing health and protection technology. Creare's relationship with helmet Original Equipment Manufacturers (OEMs) and aftermarket military helmet component and accessories manufacturers are alternate commercialization paths.



Image, courtesy of Creare LLC (2019)

WHAT

**Operational Need and Improvement:** We designed the FHHPS to address a critical safety issue with the E-2D configured HGU-68/P helmet worn by E-2D aircrew. The helmet resonates near the E-2D's propeller blade pass frequency (BPF), excessively vibrating the heads of pilots and Naval Flight Officers. This vibration impedes crew communication and leads to distraction and fatigue. Aircrew noise exposure, particularly at low frequencies, is also a problem on the E-2D with the HGU-68/P.

**Specifications Required:** Demonstrate a low Size Weight and Power (SWaP) system that will reduce vibration induced noise in the HGU-68 flight helmet for the E-2D Advanced Hawkeye.

**Technology Developed:** Creare engineered a two part modular retrofit to the E-2D aircrew helmet. To address helmet vibration, we add passive vibration absorbers tuned to the E-2D's propeller blade pass frequency. We demonstrated that these absorbers reduce the overall helmet vibration by more than 15 dB while adding only 100 grams of mass. To further reduce the acoustic noise, we replace the ear cups with a high volume, low profile (HVLP) design that includes modern ear seals. These provide much better low frequency noise attenuation in the helmet.

**Warfighter Value:** The FHHPS offers a number of advantages over competing technologies. It is simple, passive, and inexpensive. The FHHPS attacks the vibration problem directly, independent of acoustic pathways. While hearing protection is an important component of the FHHPS, it is more than just a hearing protection system. As a retrofit kit installed at the squadron level with minimal modification to the helmet platform, it is simpler and significantly less expensive to qualify and field than an entirely new helmet system. As a purely passive device, it has fewer failure modes and less logistics footprint than an active noise or vibration isolation system—the FHHPS requires no batteries to operate. Finally, the solution requires no modifications to the airframe—it is an entirely helmet mounted product.

WHEN

Contract Number: N68335-19-C-0265

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Designed FHHPS as an aftermarket retrofit to the Hand Geometry Unit (HGU)-68 helmet shell tuned to the E-2D's propellers	Med	Complete Prototype Design	2	October 2018
Demonstrated FHHPS reduced overall helmet shell vibration by more than 15 dB while adding less than 100 grams of mass	Med	Vibration reduced by more than 15 dB while adding less than 100 grams of mass	3	November 2018
Expanded Design and Prototyping	Med	Tunable dampers for each helmet size available to evaluate in vibro-acoustic test facilities	4	February 2019
Fly test articles; Navy test pilots and aircrew evaluate in-flight performance	Med	Helmets demonstrate reduced levels of vibration in the operational environment	5	January 2020
Defined manufacturing process	Med	Dampers are manufactured in high quantities to determine	6	March 2020

HOW

**Projected Business Model:** We plan to develop and qualify the FHHPS for the HGU-68/P helmet in the E-2D Advanced Hawkeye through flight testing. The FHHPS will then be ready for commercial sales to the military with the first buy anticipated as retrofits to the helmets of aircrews already assigned to the E-2D. This could be followed by buys to retrofit E-2C, C-2A, and T-6 II aircrew helmets. After these initial buys, the sales will taper to a sustainment rate sufficient to cover aircrew turnover. Hearing protection only variants will supplement these sales. Sales will be additionally supplemented by commercial sales.

**Company Objectives:** Finalize the transition plan of the FHHPS to the E-2D platform and explore opportunities in the greater market. Our affiliate product company Edare Inc. will be our transition and commercialization partner. At the conclusion of flight testing and qualification we will transition the technology to Edare for full rate production (FRP) and supplying retrofit kits to the Navy during a follow on procurement program.

**Potential Commercial Applications:** With minimal tuning the vibration absorbers can be used on other platforms or integrated with other helmet systems to solve similar vibro acoustics issues. Significant helmet vibration reduction is possible on other Navy turboprop aircraft such as the E-2C Hawkeye, C-2A Greyhound, and T-6 Texan II.

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