



# Coming Soon

## To a Cockpit Near You



The following preview has been rated G-NA by the *NA*News content review board. It is suitable for viewing by all members of the Naval Aviation audience.

**Y**ou've paid your money, bought your popcorn, and now you're waiting for the latest thriller to light up the movie screen. The previews gave you a glimpse of the movie's story line, but you still can't wait to see the entire film. If the technical experts behind the scenes have done their jobs well, their individual contributions will blend seamlessly into the movie.

In Naval Aviation, a similar blending takes place with the technologies that allow aircrew to better perform their jobs. The development and testing of new technologies is often transparent to those using them in the fleet. For example, few people consider the depth of effort that went into designing the survival equipment they strap on before a flight; they just trust the equipment and the people who maintain it. They can also trust the behind-the-scenes work of the Crew Systems Department of the Naval Air Warfare Center Aircraft Division (NAWCAD) Patuxent River, Md.

The Crew Systems Department provides research, development, test and evaluation; engineering;

### By Wendy Karppi

acquisition; and product support for aircrew and maintainer systems. From personal equipment such as night vision goggles, laser eye protection, helmets and flight clothing, to cockpit and crew station systems such as ejection seats and cockpit air bag systems, most technology that affects how aircrew perform their jobs will find its way to the fleet via the Crew Systems Department. Read on for a sneak preview of some of the coming attractions the unit has in store.

### Environmental Impact

Here's a quick pop quiz. How are the on-deck danger zones for rotary wing and vertical takeoff and landing aircraft established? A) After a few deck crew members get blasted overboard someone finally figures out how to use the "Danger: Prop Wash" stencil; or B) Someone determines a new aircraft design's impact on the environment before it becomes operational.

The answer is B, and that someone is the Aircraft Environmental Hazards Laboratory in the Systems Engineering Division. For example, when the tilt-rotor V-22 *Osprey* enters the fleet, it will be the first of its kind; therefore, operating parameters will be developed from scratch—with the lab's help. Its research has shown that when the V-22 comes aboard an amphibious platform, one engine and rotor will hang over the water. With only one rotor rotating over the deck, the downwash will be similar to that of a standard rotary wing aircraft. However, in an environment where both rotors produce downwash over the landing area, such as on land or aboard an aircraft carrier, the airflow from the two opposing rotors will combine to create dangerously strong air movement in certain areas, such as front dead center. Plus, the heat produced by the two downward-facing exhausts will dictate procedures used in other scenarios, such as insertion and extraction of ground troops from a hover. Data developed by the Aircraft Environmental Hazards Lab will help establish parameters for safely operating this new aircraft in many environments.

## Helicopter Survival

A practical counterpart to the fixed wing community's ejection seat and related survival equipment has not yet been developed for the rotary wing community. But the Crew Systems Department is working to increase a helicopter aircrewman's chances of survival in the event of a mishap.

The Emergency Egress and Crashworthy Escape Systems Division is collaborating with the

Army on a new concept in helicopter survivability: the Cockpit Air Bag System (CABS). Much like the air bag system installed in most modern cars, a computer senses an impact and releases compressed gas

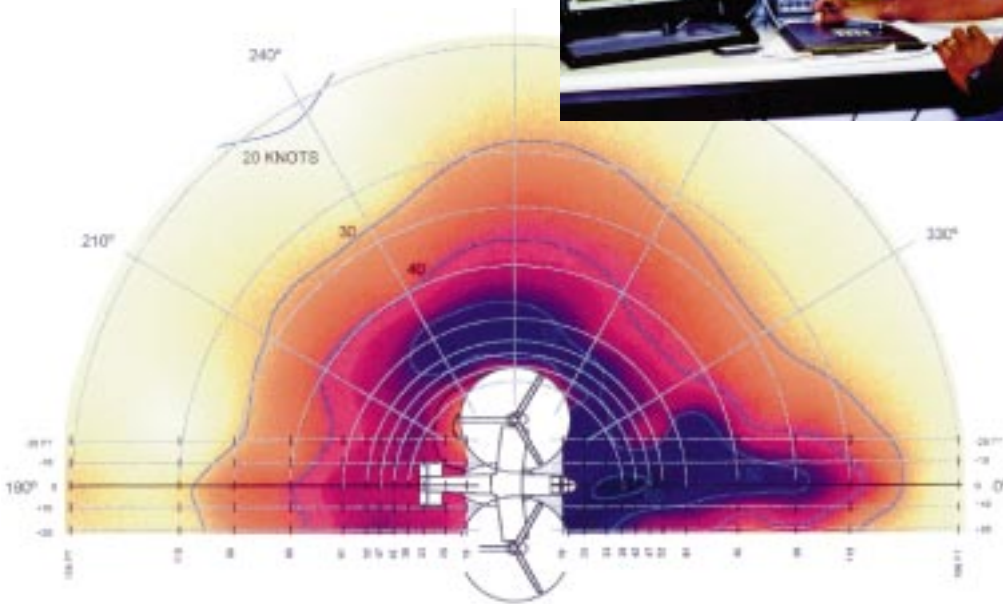


Mike McCabe

to inflate strategically placed bags. Straps holding the aircrew to their seats are the primary restraint system, keeping them from being thrown around the cockpit. Two air bags along the glare shield and one on each outboard side provide secondary protection for the pilot and copilot, mostly in preventing head strikes and flail injuries caused by unrestrained body parts striking solid objects in the cockpit upon impact. CABS may be integrated into the Navy's newest helicopter platform, the CH-60, currently under development (see article, p. 10).

Crashworthy helicopter seats with built-in absorbers to reduce the force of impact are not new, but a more sophisticated follow-on is in the works at Crew Systems. The first-generation energy absorber assumed a set weight for all occupants; the occupant's weight could be manually set in the second generation, but only within certain limits. The third generation, the Advanced Energy Absorber, is designed to adjust to an aviator's body weight automatically, and absorb the same amount of energy more quickly than earlier

Rocky Woodburn



A sensor sled measured the horizontal wind velocity generated by the V-22 Osprey in vertical-flight mode, producing data that the Aircraft Environmental Hazards Laboratory, top, analyzed and translated into this striking graphic, above.





Photos courtesy of Simula Safety Systems, Inc.

**A prototype of the Cockpit Air Bag System illustrates how it could prevent head strikes and flail injuries during an impact.**



versions. These and other survival technologies being researched at NAW-CAD may soon give the helo drivers of the future greater peace of mind.

## Flexible Flight Vest

Some aircrewmembers are used to making do with the standard flight vest, even if it doesn't fit. Enter AIRSAVE, technically designated CMU-33. Instead of a solid fabric or mesh material, this next-generation vest is designed in four pieces comprised of straps of one inch-wide webbing woven together like a mat, with the ends secured by hook-and-loop closures along the edges. The woven

design allows the vest to be made tighter or looser by adjusting the seams along the back and under the arms where the sections meet, providing a personalized fit. And the innovative design allows a variety of removable pockets to be attached to the vest simply by weaving the pocket's strap through the webbing of the vest. This

flexible system also allows hard and soft body armor to be easily inserted and removed as needed for use in rotary wing aircraft.

One of the removable pockets is specifically designed to hold the new SRU-40 Helicopter Aircrew Breathing Device (HABD), which resembles a miniature scuba air tank. During use, the compact aluminum air cylinder remains stowed securely in a vest pocket, and a second-stage regulator attached to a 20-inch hose delivers air while allowing the user hands-free operation and a full range of head movement. The operator can breathe with the HABD even if it is upside down, unlike the current SRU/36P Helicopter Emergency Egress Device.

## AMELIA

With today's protective flight clothing and equipment designed using the less diverse body dimension databases developed in the 1960s, some aviators are forced to accept flight equipment whose inad-

## Behind the Scenes

**F**our divisions of the Crew Systems Department work together to develop and implement new aircrew systems technology, and manage these systems throughout their operational life.

### Systems Engineering Division

Provides systems engineering and technical support focused on cockpit and operator crew stations; introduces new technologies to fleet operators.

### Emergency Egress and Crashworthy Escape Systems Division

Develops emergency escape systems, such as ejection seats, crashworthy systems, parachutes and seat survival kits; operates crashworthy escape testing facilities, including horizontal accelerator and ejection tower.

### Life Support and Personal Protection Division

Analyzes environmental and situational threats; develops both aircrew- and aircraft-mounted systems for life support, personal protection and performance enhancement. Product areas include laser eye protection, exposure protection, chemical/biological protection, head protection and aircraft oxygen systems.

### Human Systems Division

Studies situational awareness, aircrew performance, information management and crew sizing; includes the Aircrew Accommodation Expansion Program (see article, p. 20). Product areas include helmet-mounted displays, night vision goggles and aircraft lighting systems.





Above, the AIRSAVE flight vest will allow customized sizing and personalized pocket placement, and can be fitted with removeable armor, above right, for helicopter use. Right, the Helicopter Aircrew Breathing Device's air cylinder remains stowed in the flight vest and the user breathes through a second-stage regulator. Below, a redesigned antiexposure coverall and liner are two products of the AMELIA program, which aims to provide personal equipment that fits the physical dimensions of a wider range of users.

equate fit compromises their safety. An ongoing initiative in the Life Support and Personal Protection Division is providing better fitting personal equipment for fleet aviators

through the Aircrew Modified Equipment Leading to Increased Accommodation (AMELIA) program.

With the help of the Navy Clothing and Textile Research Facility, the AMELIA program determined the need for additional sizes of flight suits, and established a joint sizing system with the Air Force. Fit assessments revealed that a longer zipper would aid in the use of commercial relief products by both male and female aviators; otherwise, the suit is structurally the same as the old style CWU-27/P flight suit. The 36 new sizes will provide aviators with a total of 64 flight suit sizes to choose from, greatly enhancing the odds of an accurate fit.

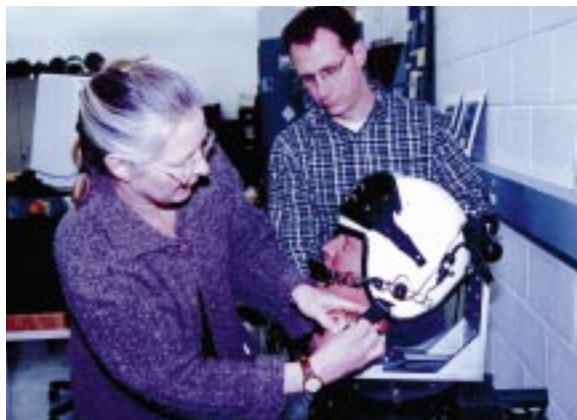


Similarly, AMELIA is also testing a new antiexposure coverall and liner system. A major improvement over the current coverall is a long, vertical zipper rather than a horizontal one that, in conjunction with built-in stretch panels, allows a better fit for a wider range of physical types. The

two-piece liner's stretch panels and adjustable hook-and-loop closures also accommodate many body types. Both the coverall's long zipper and the front closure of the liner bottoms are designed to facilitate the use of in-flight relief systems.

## Roll Credits

There is such a wide range of aircrew systems technologies in the development pipeline at NAWCAD that even a full-length feature film couldn't do it justice. But rest assured that *Naval Aviation News* will continue to preview coming attractions—technologies that may



The people of the Crew Systems Department provide the latest and greatest developments in personal equipment and cockpit and crewstation systems to the fleet.

soon be appearing in a cockpit near you. And if you stick around to read the closing credits, you'll notice the names of the men and women in the Aircrew Systems Department who made it possible. ✈

*For more information on these and other NAWCAD programs, log on to [www.nawcad.navy.mil](http://www.nawcad.navy.mil).*

Thanks to Margie Conlin Gauntt for her assistance with this article, and Mike McCabe for photo support.

# Who You Gonna Call? Fleet Support!

By Brian Smith and Margie Conlin Gauntt

**Y**ou're ready to taxi for an afternoon air combat maneuvering (ACM) training mission when your oxygen mask malfunctions. A troubleshooter double times to the flight equipment shop to get a spare so the mission can continue. You get back from your flight, find the parachute rigger and tell him what went wrong with your mask: the combination inhalation/exhalation valve seems to be sticking in a position that prevents oxygen from entering. This is not a problem you want to have in an intensive ACM environment under high Gs. It's definitely a safety-of-flight issue requiring the initiation of a Hazardous Material Report (HMR)/Engineering Investigation (EI). The result? An inherent design flaw which caused the valve

to chatter and stick is discovered, a fleet support project receives funding and a redesigned valve is on the way.

You've probably heard of HMRs and EIs, perhaps even initiated one yourself, but do they get the job done? Yes. Is this another paper drill? Yes. But ask the folks from the Life Support Systems Fleet Support Team at Naval Air Warfare Center Aircraft Division (NAWCAD) Patuxent River, Md., and you'll hear a resounding, "Just do it!"

The paperwork is what breaks funds loose to permanently fix problems you experience with flight gear, and not just at NAWCAD. Three other crew systems fleet support teams around the country

address problems with specific systems: parachutes and harnesses at Naval Air Warfare Center Weapons Division China Lake, Calif.; night vision systems at Naval Surface Warfare Center Division Crane, Ind.;





and escape systems at Naval Aviation Depot Cherry Point, N.C. Complaining about it to your squadromate won't fix the problem—reporting it to the proper fleet support team will.

That's fine, you say, but what do you do about a problem that doesn't fit the guidelines of an HMR? Well, remember the SPH-3 helmet, you helo bubbas? Big, bulky, heavy, lots of hot spots? Sure, it was great for building that massive Schwarzenegger neckline, but not for a four-hour mission while on goggles. Enter the HGU-84. Lighter and sleeker, with bungee visors and an integrated chin/nape strap—all good stuff that was reserved for the fast movers in the past. How did this new piece of equipment come to be? The venue for a totally new item of life support equipment like the HGU-84 is the Aircrew Systems Operators' Advisory Group or OAG. The OAG is held approximately every 18 months. Representatives from rotary wing, fixed wing ejection and fixed wing nonejection squadrons gather to define deficiencies and set requirements. The meeting generates a "Top 10" list which is used to justify the Aircrew Systems Program Manager's budget to Congress. It's the voice of the fleet, not some desk jockey randomly deciding what the fleet needs.

Another place to voice dissatisfaction is one of the In-Service Management Panels (IMPs). The OAG is primarily attended by aviators, but the crew systems IMPs are geared toward the maintenance



Lisa Lilley

## Who To Call

### Life Support Systems

Pax: Brian Smith, 301-342-8831, DSN prefix 342  
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China Lake (chutes and harnesses): Leo Grosbier,  
760-939-0805, DSN prefix 437  
leo\_grosbier@imdgw.chinalake.navy.mil

### Escape Systems

Steve Wickizer, 252-464-8734, DSN prefix 451  
wickizersd@elis.nadepcp.navy.mil

### Night Vision Systems

Brenda Hughes, 812-854-5797, DSN prefix 482  
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guys—riggers, seat mechs and avionics techs. Three IMPs are held every year: Life Support Systems, Escape Systems and Night Vision Systems. Proposed action chits delineating the problems and proposed solutions are submitted by

squadrons through their chain of command to the appropriate type commanders for sponsorship. If the executive committee accepts a chit, it is prioritized with other chits and funding is applied accordingly.

So you say you can't break away to attend those OAGs and IMPs? You never seem to hear about them soon enough to get a chit submitted? You have an idea for a simple mod, which, if someone would only listen, would make life a dream for us all? Well, my friend, there is a program for you. It's called RAMEC—Rapid Action Minor Engineering Change. It's the fleet's version of a self-help program. For a modification to be incorporated via RAMEC, the main requirements are that all parts and materials must be available through normal supply channels, the cost to modify a single item cannot exceed \$1,500 and there can be no kit required. If your idea meets the criteria, put it in writing and submit it through the chain to your type commander for sponsorship to the appropriate fleet support team. There it will be prototyped and evaluated, and if no obstacles are found, an Aircrew Systems Change will be generated for fleet-wide incorporation.

Now that you know how to work the system, when you have a problem with your aircrew equipment you don't have to settle for griping to your shipmates.

Instead, the next time you're in a fix, or you've discovered a fix, who are you gonna call?

Fleet Support! 

Brian Smith and Margie Conlin Gauntt are members of the Crew Systems Department of NAWCAD, Patuxent River, Md.