NAVAL AVIATION NEWS
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LIGHTNING STRIKE

WHAT'S INSIDE

MH-60R Seahawks assigned to Helicopter Maritime Strike Squadron (HSM) 77 fly in formation during an aerial change of command while embarked on USS Ronald Reagan (CVN 76). Cmdr. Charles McKissick relieved Cmdr. Robert G. Wickman during the ceremony-at-sea.

U.S. Navy photo by MC2 Kenneth Abbate

NAVAL AVIATION NEWS

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DEPARTMENTS

FEATURES

ALSO IN THIS ISSUE

ON THE COVER

On the cover: *CF-2, an F-35C Lightning II, is piloted by Lockheed Martin test pilot Billie Flynn April 4 during an external GBU-31 and AIM-9x buffet and flutter test flight from NAS Patuxent River, Md. (Lockheed Martin photo by Dane Wiedmann)*

This Spring issue is full of F-35 Lightning II success stories—from completing testing for the System Development and Demonstration phase April 11 (page 8) to the F-35B deploying with Marines on USS Wasp (LHD 1) in March (page 9) to the first flight, also in March, of Marine Fighter Attack Squadron (VMFA) 122 (page 10). Also featured is F-35B test pilot Maj. Robert Guyette, who received the Marine Corps Aviation Association's John Glenn Squadron 2018 Test Pilot Award, in part for his team's redesign of the F-35's night vision system and its subsequent test and evaluation (page 30).

Defining the root cause of physiological episodes (PEs) remains Naval Aviation's number one priority and this issue includes status updates from two leaders. In Flightline (page 4), Rear Adm. James Bynum, Chief of Naval Air Training (CNATRA), shares updates to the training schedule and training platforms and offers opportunities for becoming a flight instructor. Rear Adm. Sara Joyner, lead of the Physiological Episode Action Team, discusses the team's progress to date on page 23.

On the back cover: *Aviation Boatswain's Mate (Equipment) 3rd Class Damian Gusme, left, and 2nd Class Jordan Nelms confirm numbers with the central charging pad operator as an EA-18G Growler from the "Gray Wolves" of Electronic Attack Squadron (VAQ) 142 is launched from the flight deck of aircraft carrier USS Nimitz (CVN 68). (U.S. Navy photo by MC2 Holly L. Herline)*

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Flightline

CNATRA Mission

By Rear Adm. James Bynum, Chief of Naval Air Training

It has been my great privilege to serve as the Chief of Naval Air Training (CNATRA) for nearly a year. Our team, comprised of more than 8,000 Civilian-Sailors, active duty and reserve personnel, contract maintenance, simulator instructors and our students, is focused on one mission: building the future of Naval Aviation.

CNATRA serves as a steward of the Naval Aviation training pipeline that spans from our accession sources through the Naval Aviation Schools Command, continues through undergraduate flight training and a Fleet Replacement Squadron (FRS), and ends when aviators report to their first operational squadron. We sometimes refer to this as "street to fleet."

In my role as deputy for aviation training to Commander, Naval Air Forces, I ensure that our CNO-approved FRS syllabi deliver the right product to a Navy that is adapting and improving constantly. At the end of the day, the health of Naval Aviation is measured by its combat power, because the way we train impacts the fleet directly.

Performing our mission is resource intensive. We fly more than 650 aircraft to conduct more than 300,000 hours of flight training each year. That's approximately one-third of the Navy's yearly total. The work we do is demanding and is a total force effort. We provide hours of classroom and simulated flight instruction. We cover aviation basics, aircraft systems and flight syllabus academics. We teach flight procedures and rules to operate in national airspace. We develop students' professional methods and get them beyond their checklists, down to a systems level of knowledge. These skills will enable them to master their future aircraft and the warfighting missions they will conduct in the fleet.

Our mission also involves shaping and mentoring the aviation officer corps. At CNATRA, each young officer learns how to be a professional who is disciplined, self-scrutinizing and accountable. In line with CNO's emphasis on competence and character, we need to develop these young people not just to be competent in their aircraft, but to also be leaders of high character. They're with us so long at the Naval Air Training Command (NATRACOM); if we set the example, leading with integrity and moral courage, we will continue to build the Navy from the bottom up.

Throughout the last year, we have encountered some challenges within the NATRACOM. We took a training pause in 2017 to address some concerns with the T-45 Onboard Oxygen Generation System (OBOGS). Since that time, we have worked with Naval Air Systems Command and our aircrew to incorporate systems and engineering changes, as well as modified procedures to restore confidence in our aircraft. We are getting back on track as we move past the OBOGS issue but are now faced with a backlog of student aviators. I am confident, however, that CNATRA has the right team and the right approach to reduce time-to-train (TTT) in a standardized way that is transparent, understandable and repeatable.

As we work to train the world's next combat aviators, quality remains

U.S. Navy photos by Anne Owens

Capt. David Gonzalez (right), an instructor pilot with Training Squadron (VT) 31 at Naval Air Station Corpus Christi, Texas, walks a new student around the T-44A Pegasus during a familiarization walkthrough, in which the student is introduced to all aspects of the aircraft they will be flying as they entire the multi-engine pipeline.

Capt. David Gonzalez (right), a VT-31 instructor pilot, introduces a new student to the T-44A Pegasus, a training aircraft used for future pilots in the multi-engine pipeline.

a top priority. We can only accomplish our mission with challenging and competitive training that sharpens flying skills while identifying the best performers. Part of that mission includes managing risk and teaching our aviators to do the same. We will keep holding ourselves to a high standard and be accountable for the choices we make. The outcome is instilling toughness and training aggressively while maintaining the right margin of safety and oversight.

Training Updates

To ensure we're producing quality aviators that meet the needs of the fleet, we've made some changes to our training platforms. We recently retired the TC-12 Huron and now do all our multi-engine training in the T-44 Pegasus. We just finished re-capitalizing the T-44 with digital or "glass" cockpits that bring our training into the 21st century and will prepare our students for their fleet aircraft. We're working on the service life extension of the T-45 Goshawk as well as upgrades to help increase airspace awareness. We're bringing new simulators and support to the rotary wing pipeline, as well as purchasing new training helicopters to replace the old TH-57 Sea Ranger trainers in the next few years. As the Navy shifts from the C-2A Greyhound to the new CMV-22B Osprey, we've brought additional training to the rotary pipeline. We've harnessed the power of simulation to improve training for our naval flight officers (NFO), and we are looking for opportunities to do likewise in other areas of the NATRACOM. With the Navy's F-35C Lightning II coming on line, we'll begin selecting aviators for that platform this year.

Over the last year, we took a hard look at our processes in search of opportunities to improve. We took lessons from the Navy's comprehensive and strategic reviews to help evaluate ourselves. We consulted our instructor force to discuss quality, barrier removal and grading processes. Through this effort, we realized two things: first, the need for assessment earlier in the training pipeline, so we could make earlier decisions on student production and avoid expending resources we don't have; and second, the need to reduce TTT while maintaining our focus on quality and standardization.

To implement these changes, we're revamping our grading system to make it simpler for instructor pilots, flight students and squadron leadership. It will also be more efficient in helping us make earlier decisions regarding student ability. We've established Flight Instructor Training Units (FITU) across the NATRACOM that are owned by each training wing commander. The FITUs are modeled after our weapons and tactics programs in the fleet and will use our most talented, experienced instructors to ensure standardized, quality instruction throughout CNATRA.

Principally, our training process needs to be standardized, repeatable and

transparent. These initiatives will better prepare our students with the skills they need as they approach the FRS. Students can expect to be challenged. This training will be one of the toughest things they ever do. They will be evaluated at every turn, and strong performance will be required to continue forward—we are, after all, training the nation's future warfighters.

We also must instill trust throughout the entire process. Students need to be confident they will be evaluated fairly based on standardized methods and that they are prepared for the next level of training. Commanding officers in the fleet must be able to trust that the pilots and NFOs they receive are competent and confident in their aircraft. CNATRA will keep building on that trust as we implement improvements to ensure quality.

We will continue to apply the best concepts, techniques and technologies to accelerate learning as individuals and as an organization. We are making significant progress throughout the NATRACOM thanks to our incredible team. Ultimately, it's not our equipment and syllabus that get us to the end—it's the maintainers who keep us flying. It's the experienced simulator instructors, many of whom served our nation in uniform before taking on their current training responsibilities. It's the staff members who update those syllabi and training manuals and instructions. It's the Reserve instructor support. It's our program office partners who provide the engineering and systems support. It's the installations that allow us to operate at all our locations. And, it's the folks behind the curtain working hard each week who are the key to our success.

Aviation Opportunities

There's a new energy at CNATRA. It's an exciting time to be in Naval Aviation as we work to grow, adapt and modernize our Navy. The fleet—and therefore, opportunity—is growing, and more aviation personnel will be needed. For those who are interested in joining the Naval Aviation team and have the drive and work ethic to succeed, please give your recruiter a call. CNATRA instructor pilots will be relied on to train those who volunteer to become both professional officers and aviators. The current Air Boss, Vice Adm. DeWolfe Miller III, and Deputy CNO for Operations, Plans and Strategy (N3/N5) Vice Adm. Andrew Lewis, along with myself and many others, started our careers as CNATRA instructors. I guarantee there is no place in the fleet where you'll fly more than here, and there is no nobler calling than training our future aviators. If you're ready to fly and see your logbook fill up, give your detailer a call about CNATRA instructor pilot duty. You'll be surrounded by some fantastic people. It will be hard work, but it will be rewarding and will matter to the future of our naval forces and nation.

U.S. Navy photo

A native of Waco, Texas, **Rear Adm. James Bynum** was commissioned in 1985 via the Naval ROTC program at the University of Oklahoma and was designated a naval aviator in December 1986. A career F/A-18 pilot, he holds a Bachelor of Arts in database management and is a Georgetown University Capitol Hill Fellow. He is a graduate of the Armed Forces Staff College and the U.S. Air Force Air Command and Staff College. He also holds a subspecialty in financial management.

Bynum commanded Carrier Air Wing 3 and the "Royal Maces" of Strike Fighter Squadron (VFA) 27 while serving as part of forward-deployed U.S. Naval Forces in Japan.

His other operational assignments include tours with VFA-113, VFA-22 and a tour under the service's Personnel Exchange Program, where he flew with the U.S. Air Force's 94th Fighter Squadron. He also served as battle director, Combined Air Operations Center, Al Udeid Air Base, Qatar, in support of Operations Iraqi Freedom and Enduring Freedom. Most recently, Bynum served as commander, Carrier Strike Group 9, from June 2016 through June 2017.

Ashore, Bynum served as an instructor pilot, military legislative aide and Capitol Hill fellow on the staff of U.S. Sen. John S. McCain and as a senior readiness programmer/analyst for Navy issues and intelligence, surveillance and reconnaissance programs while attached to the Office of the Secretary of Defense. He later served in the Aviation Warfare Section of the Navy's Program Development Staff, was the executive assistant to commander, U.S. Naval Air Forces in San Diego and to the vice chief of naval operations, and served as the deputy director of the White House Military Office.

Bynum assumed command as Chief of Naval Air Training in June 2017.

Bynum has logged more than 4,500 hours in tactical aircraft and flown more than 90 combat missions with Navy and Air Force units. His decorations include the Legion of Merit, Defense and Meritorious Service Medals, individual and strike flight Air Medals, Defense, Navy and Air Force Commendation Medals, as well as other individual, campaign and unit awards.

Grampaw Pettibone

Gramps from Yesteryear: March-April 2008

Illustration by Ted Wilbur

Goshawk Goat Rope

A student Naval Aviator was piloting a T-45 on a night solo field carrier landing practice (FCLP) flight. The pilot had completed five touch-and-go landings and was directed by the landing signal officer at the field to full stop on his next pass.

The pilot touched down on runway centerline and tracked relatively straight down the runway, but after approximately 1,700 feet of landing rollout, the aircraft began a pronounced drift right of centerline. The pilot applied corrective controls, bringing the aircraft parallel to runway heading just right of centerline. The aircraft continued to track nearly parallel to runway centerline for approximately three seconds, whereupon the aircraft began a hard left swerve, bringing the nose of the aircraft about 20 degrees left of runway heading. Immediately following the hard left swerve, the pilot advanced the throttle to military in an attempt to execute a go-around.

The aircraft crossed runway centerline at military power and exited the left side of the runway. A couple of seconds after runway departure, the pilot retarded power to idle and shut down the engine.

Immediately following engine shutdown, the aircraft hit the first of three natural earthen berms and began a counterclockwise tumbling roll about its longitudinal axis. The aircraft rolled one and a half times before coming to rest inverted approximately 1,000 feet from the point of runway departure. Crash and salvage personnel witnessed the mishap and were first on the scene, shattering the front canopy and pulling the uninjured student from the aircraft wreckage. Luckily no fire occurred during the mishap.

Grampaw Pettibone says …

What's that ol' saying? "This runway ain't long but it sure is wide …" Pointing 20 degrees in the wrong direction is going to severely limit how much prepared surface a pilot has available to get airborne again. In this case, the decision to firewall this unruly Goshawk only made things worse.

As soon as he knew he was going "baja," this here student (do we still call 'em "coneheads"?) should have shut the motors down—not a couple of seconds after the fact. And then when he saw he was headed for rough sailing with those berms (assuming he could see at night) he should have ejected.

In this case, the student was lucky he survived the tumble and that the jet didn't burn. I'm thinking this cat is down to seven lives as he hits the fleet. Don't waste 'em, shipmate.

Airscoop

Compiled by Jeff Newman

F-35 Completes Most Comprehensive Flight Test Program in Aviation History

WASHINGTON—F-35 Lightning II test pilots concluded the final developmental test flight of the System Development and Demonstration (SDD) phase of the program April 11, clearing the way for the Block 3F capability to be delivered to the operational warfighter.

Block 3F provides 100 percent of the software required for full warfighting capability, including data link imagery, full weapons and embedded training.

"Completing F-35 SDD flight test is the culmination of years of hard work and dedication from the joint government and industry team," said Vice Adm. Mat Winter, F-35 program executive officer. "Since the first flight of AA-1 in 2006, the developmental flight test program has operated for more than 11 years mishap-free, conducting more than 9,200 sorties, accumulating more than 17,000 flight hours and executing more than 65,000 test points to verify the design, durability, software, sensors, weapons capability and performance for all three F-35 variants. Congratulations to our F-35 test team and the broader F-35 enterprise for delivering this new, powerful and decisive capability to the warfighter."

The final SDD flight occurred at Naval Air Station Patuxent River, Maryland, where Navy test aircraft CF-2 completed a mission to collect loads data while carrying external 2,000-pound GBU-31 Joint Direct Attack Munitions (JDAM) and AIM-9X Sidewinder heat-seeking missiles.

More than 1,000 SDD flight test engineers, maintainers, pilots and support personnel took the three variants through their full flight envelopes to test aircraft performance and flying qualities. The test team conducted six at-sea detachments and performed more than 1,500 vertical landing tests on the Marine Corps' F-35B variant. The developmental flight test team conducted 183 weapon separation tests, 46 weapons delivery accuracy tests and 33 mission effectiveness tests, which included numerous multi-ship missions of up to eight F-35s against advanced threats.

Lockheed Martin photo by Dane Wiedmann

Peter Wilson, Lockheed Martin test pilot, completes crosswind creeping short take off and vertical landing (STOVL) testing with BF-1, an F-35B, at Naval Air Station (NAS) Patuxent River, Md.

U. S. Navy photo by Arnel Parker

Lt. Cmdr. Christopher Tabert, F-35 Pax River Integrated Test Force test pilot, takes CF-5, a Navy F-35 variant, on one of the last system development and design tests with a 2,000 pound external weapons catapult at NAS Patuxent River.

"The F-35 flight test program represents the most comprehensive, rigorous and safest developmental flight test program in aviation history," said Greg Ulmer, Lockheed Martin's vice president and general manager of the F-35 program. "The joint government and industry team demonstrated exceptional collaboration and expertise, and the results have given the men and women who fly the F-35 great confidence in its transformational capability."

Developmental flight test is a key component of the F-35 program's SDD phase, which will be completed formally after an operational test and evaluation and a DOD decision to go into full-rate aircraft production.

F-35 flight testing will continue in support of phased capability improvements and modernization of the F-35 air system. This effort is part of the Joint Program Office's Continuous Capability Development and Delivery (C2D2) framework, which will provide timely, affordable incremental warfighting capability improvements to maintain joint air dominance against evolving threats to the U.S. and its allies.

Written by the F-35 Lightning II Joint Program Office.

F-35B Lands on Wasp, Deploys with Marines

EAST CHINA SEA—A detachment of F-35B Lightning IIs with Marine Fighter Attack Squadron (VMFA) 121 arrived March 5 aboard amphibious assault ship USS Wasp (LHD 1)—the first time the fifth-generation strike fighter has deployed aboard a U.S. Navy ship and with a Marine expeditionary unit (MEU) in the Indo-Pacific region.

VMFA-121 pilots flew a series of qualification flights on Wasp over several days. The F-35Bs and 2,300 Marines that constitute the 31st MEU—based in Okinawa, Japan—then deployed aboard ships of Wasp Expeditionary Strike Group (ESG) 7 for follow-on operations in the Indo-Pacific as part of a routine patrol to strengthen regional alliances, provide rapid-response capability and advance the "Up-gunned ESG" concept.

The Up-gunned ESG is a U.S. Pacific-fleet initiated concept that aims to provide lethality and survivability to a traditional three-ship amphibious ready group by integrating multi-mission surface combatants and the F-35B into amphibious operations.

"Pairing F-35Bs with the Wasp represents one of the most significant leaps in warfighting capability for the Navy-Marine Corps team in our lifetime," said Rear Adm. Brad Cooper, ESG-7 commander. "This fifth-generation stealth jet is extremely versatile and will greatly enhance and expand our operational capabilities."

"This is a historic deployment," said Col. Tye R. Wallace, 31st MEU Commanding Officer. "The F-35B is the most capable aircraft ever to support a Marine rifleman on the ground. It brings a range of new capabilities to the MEU that make us a more lethal and effective Marine Air-Ground Task Force."

The arrival of the F-35B culminates testing and shipboard structural modifications on Wasp that began in 2013. Wasp completed an overhaul in 2017 and subsequently departed Norfolk, Virginia, to forward-deploy to Sasebo, Japan, as part of a Department of Defense effort to place the most advanced capabilities in the Indo-Pacific.

"Deployment of the versatile F-35B enhances the full range of Expeditionary Strike Group capabilities with one of the world's most technologically-advanced air warfare platforms," said Capt. Colby Howard, Wasp Commanding Officer. "With the specific upgrades Wasp has received, the Navy-Marine Corps team in the Pacific is better positioned than ever before to support our commitment to the security of Japan and the region."

From Amphibious Force 7th Fleet Public Affairs.

U.S. Navy photo by MC3 Michael Molina

An F-35B Lightning II with Marine Fighter Attack Squadron 121 touches down on amphibious assault ship USS Wasp (LHD 1), marking the first time the aircraft has deployed aboard a U.S. Navy ship and with a Marine Expeditionary Unit in the Indo-Pacific region.

U.S. Marine Corps photo by Sgt. Allison Lotz

Lt. Col. John P. Price, Commanding Officer of Marine Fighter Attack Squadron (VMFA) 122, enters his aircraft in preparation for VMFA-122's first flight operations in an F-35B Lightning II at Marine Corps Air Station Yuma, Ariz.

Blasting into the future: VMFA-122 Conducts First Flight as F-35B Lightning II Squadron

YUMA, Ariz.—It was like a scene from "Top Gun" as pilots with Marine Fighter Attack Squadron (VMFA) 122 marched out to the flight line here March 29 to mount the metal beast known as the F-35B Lightning II.

Pilots entered their cockpits, started the engines and prepared for takeoff. As the final tests were completed, the jets taxied out, gained speed and took to the sky for the squadron's first flight operations in the fifth-generation fighter.

The flights marked the end of the first phase in VMFA-122's transition from the F/A-18C Hornet to the F-35B.

"This was a critical moment for us, because it got the ball rolling for us to have a fully operational squadron," said Lt. Col. John P. Price, VMFA-122 Commanding Officer.

Originally based at Marine Corps Air Station Beaufort, South Carolina, VMFA-122 relocated to Marine Corps Air Station Yuma in October.

"It highlights the flexibility and agility that we have inside the Marine Corps to accomplish the mission," Price said. "We have a lot of great Marines and Sailors here from Yuma and all over the Marine Corps. It's truly impressive how quickly it was put together."

Navy Seeks Savings, Releases Two-Carrier RFP

U.S. Navy photo courtesy of Huntington Ingalls Industries by Matt Hildreth

A 35-ton steel plate is displayed at Newport News Shipbuilding division during a ceremony to start advance construction of future aircraft carrier Enterprise (CVN 80).

WASHINGTON—The U.S. Navy issued a request for proposal to Huntington Ingalls Industries-Newport News Shipbuilding (HII-NNS) March 19 to further define the potential cost savings of buying the service's next two aircraft carriers under one contract.

With lethality and affordability top priorities, the Navy has been working with HII-NNS over the last several months to estimate the total savings associated with procuring CVN-80 and CVN-81 as a two-ship buy.

"In keeping with the National Defense Strategy, the Navy developed an acquisition strategy to combine the CVN-80 and CVN-81 procurements to better achieve the department's objectives of building a more lethal force with greater performance and affordability," said James F. Geurts, Assistant Secretary of the Navy, Research Development and Acquisition.

"This opportunity for a two-ship contract is dependent on significant savings that the shipbuilding industry and government must demonstrate," he said. "The Navy is requesting a proposal from

The "Flying Leathernecks" needed to conduct and pass various tests and procedures just to get to this stage of their transition, including the assumption of command and posting of the sergeant major.

"Starting over, all of our programs have to be rebuilt and reestablished here on MCAS Yuma with a whole new group of people," said Maj. John Dirk, VMFA-122 executive officer. "This is the culmination of that first part, and going forward, we get to maintain and improve them so we can make the squadron have full combat capability."

Commencing flight operations marked the successful transition of yet another Marine Corps squadron.

"It's validation of all the work we've done, and we finally got over that hurdle that was keeping us from finally becoming fully functional," Price said.

Written by Cpl. George Melendez.

HII-NNS in order to evaluate whether we can achieve significant savings."

The two-ship buy is a contracting strategy the Navy effectively used in the 1980s to procure Nimitz-class aircraft carriers and achieve significant acquisition cost savings compared to contracting for the ships individually. While the CVN-80/81 two-ship buy negotiations transpire, the Navy is pursuing contracting actions necessary to continue CVN-80 fabrication in fiscal 2018 and preserve the current schedule. The Navy plans to award the CVN-80 construction contract in early fiscal 2019 as a two-ship buy pending congressional approval and significant cost savings.

The future USS Enterprise, CVN-80 is the third ship of the Gerald R. Ford class and numerical replacement for USS Dwight D. Eisenhower (CVN 69). Not yet named, CVN-81 will be the fourth ship of the class and numerical replacement for USS Carl Vinson (CVN 70). Advanced planning and initial long lead time material procurement for CVN-80 began in May 2016.

From Naval Sea Systems Command Public Affairs.

French Naval Aviators to Train at NAS Oceana and Aboard USS Bush

NORFOLK, Va.—Approximately 350 French navy aviators and support personnel will train with U.S. Navy aviators this spring to hone their aircraft carrier qualifications.

Twenty-seven French pilots will arrive with 12 Marine Nationale Rafale-M multirole fighter jets and one E-2C Hawkeye airborne command-and-control aircraft to conduct air-to-air and air-to-ground training at Naval Air Station (NAS) Oceana and Naval Station Norfolk, and field carrier landing practice at Naval Auxiliary Landing Field Fentress. All three sites are in Virginia.

Carrier Air Wing (CVW) 8 will host and support the members of the 11F, 12F and 17F squadrons, flying the Rafales, and the 4F Squadron with its Hawkeye.

Following training, the squadrons will embark USS George H.W. Bush (CVN 77) for approximately two weeks of day- and night-flight operations.

"This integration is possible thanks to the extraordinarily strong and lasting bond we have established with the United States, our privileged partner," said Rear Adm. Guillaume Goutay, force commander of French Naval Aviation. "As on operations, this deployment will contribute to further enhance our interoperability with the United States Navy. I am grateful for this token of trust and for the support afforded to this deployment of unprecedented scale."

The training is being conducted aboard Bush because France's only aircraft carrier, Charles de Gaulle, is undergoing midlife overhaul. U.S. and French aircraft carriers have similar catapult and arresting gear systems.

While aboard the carrier, aircrews will operate as an integrated component of CVW-8, executing air-to-air and air-to-ground flight operations involving catapult launches and arrested landings. At the same time, maintenance personnel will hone their skills while operating in a carrier environment at sea.

"Embarking our French allies and 13 [French navy] aircraft demonstrates our interoperability to deliver sustained airpower from the sea. This underway is greater than two professional navies working together; rather, we are flying side by side as one team," said Capt. Sean Bailey, Bush's Commanding Officer.

The Rafale is a twin-engine, delta-wing, multirole fighter aircraft designed and built by Dassault Aviation. The single-seat jet can deliver a wide range of weapons.

Like the U.S. Navy, the French navy employs the E-2C Hawkeye as an all-weather, carrier-based, airborne early-warning command-and-control aircraft.

The three Rafale-M squadrons are based at NAS Landivisiau, while the 4F Squadron is stationed at NAS Lann Bihoué, both in western France.

From Commander, Naval Air Force Atlantic Public Affairs.

Rafale-M multirole fighter.

U.S. Navy photo

Final Japan-Based CVW-5 Jet Squadrons Fly-in to MCAS Iwakuni

YOKOSUKA, Japan—Strike Fighter Squadrons (VFA) 27 and 102 from Carrier Air Wing (CVW) 5 arrived at Marine Corps Air Station (MCAS) Iwakuni, Japan in late March, completing their relocation from Naval Air Facility Atsugi, Japan.

While the transfer of CVW-5's fixed-wing aircraft to MCAS Iwakuni is complete, both the U.S. and Japan continue to work together on other aspects of the relocation, including the transfer of additional CVW-5 personnel and completion of new facilities at Iwakuni. Personnel relocation is expected to be completed in the second half of 2018, while work on operational and community facilities will continue.

The transfer of CVW-5 is consistent with all Defense Policy Review Initiative (DPRI) requirements, and it supports the Navy's strategic vision for the Indo-Pacific region in which its most advanced units are forward deployed to support America's commitment to the defense of Japan and the security and stability of the region.

"The arrival of VFA-27 and 102 to Iwakuni completes CVW-5's phased relocation of our aircraft," said Capt. Forrest Young, CVW-5 commander. "After more than a decade of coordination and planning between the U.S. and Japanese governments, it is rewarding to complete the relocation of our fixed-wing aircraft."

Carrier Airborne Early Warning Squadron (VAW) 125, which flies the E-2D Advanced Hawkeye, was the first CVW squadron to transition to Iwakuni, arriving in February 2017. VFA-115 and 195, Electronic Attack Squadron (VAQ) 141 and Fleet Logistics Support Squadron (VRC) 30 Det. 5 completed relocation to Iwakuni in December.

At the completion of the DPRI process, MCAS Iwakuni will have undergone a 77-percent transformation, including the Iwakuni Runway Relocation project, many new services-related facilities, administrative buildings and a gas station. These improvements were led by the DPRI program team in close coordination with Japan's regional defense bureau in order to enable U.S. forces to fulfill their obligations under the Treaty of Mutual Security and Cooperation.

From Commander, Navy Region Japan Public Affairs Office.

U.S. Air Force photo by Staff Sgt. Peter Reft

A U.S. Air Force F-15 with 44th Fighter Squadron and U.S. Navy Super Hornets with Strike Fighter Squadrons (VFA) 27 and 102, assigned to Naval Air Facility Atsugi, Japan, fly in formation after a training sortie over the Pacific Ocean.

'Fighting Tigers' Rescue Fishermen Lost for Eight Days in South Pacific

ANDERSEN AIR FORCE BASE, Guam—Crewmembers assigned to the "Fighting Tigers" of Patrol Squadron (VP) 8 rescued Feb. 20 three fishermen whose vessel was adrift in the South Pacific for eight days.

The 19-foot skiff was first reported missing Feb. 12 after it failed to return from a fishing expedition near Chuuk Lagoon in the Federated States of Micronesia. According to the report, the boat carried food and water but no safety equipment or radios. Assets from U.S. Coast Guard Sector Guam searched for the vessel for several days before requesting assistance from the U.S. Navy.

The Fighting Tigers aircrew and maintenance team were tasked to support the search-and-rescue (SAR) operation, repositioning on short notice from Kadena Air Base, Japan, to Andersen Air Force Base, Guam. The crew flew the Navy's newest maritime patrol aircraft, the P-8A Poseidon, which is equipped with an advanced APY-10 multifunction radar and MX-20 camera system, ideal for searching the 2,100-square-mile area.

The vessel was located after only three hours, and the aircrew deployed a UNI-PAC II SAR kit, a new addition to the maritime patrol and reconnaissance aircraft (MPRA) fleet. It was the first time a P-8A deployed the kit successfully in real-world SAR operations.

SAR kits are deployed at approximately 500 feet with a 150-yard trailing lanyard to deliver equipment as accurately as possible to survivors in the water. Kits generally include medical supplies, food, water and communications and signaling equipment, but can be configured with additional supplies depending on the mission type.

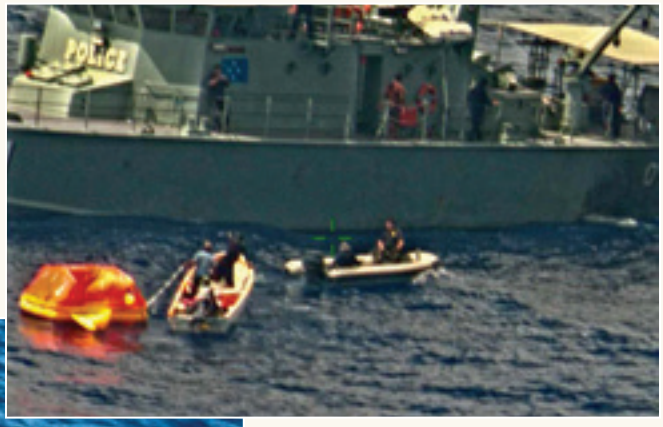
A nearby police vessel picked up the three survivors a few hours after they were located by VP-8.

"It was incredibly rewarding to be a part of saving lives—it's what everyone joins the Navy to do," said Lt. Miles Schumacher, tactical coordinator of the VP-8 aircrew. "This aircraft allows for a massive step forward in the ability of SAR units to search large areas quickly and effectively, and we were excited to have the SAR kit loaded and be able to prove its effectiveness. We successfully demonstrated the capability of the MPRA community to react quickly and effectively to operational requirements in the farthest corners of the globe. Hopefully, this is just the first of many successful rescues by P-8A Poseidon aircrews."

Written by Lt. j.g. Danielle Tatchio.

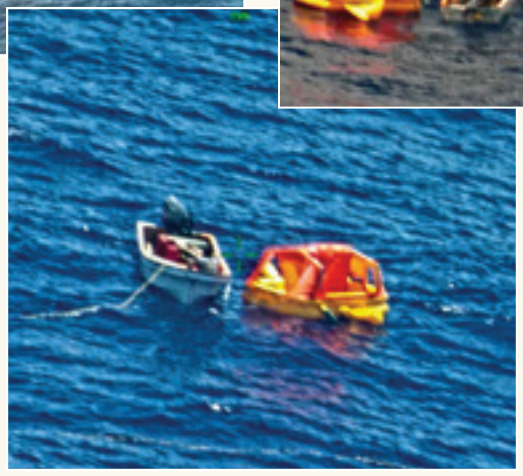
U.S. Navy photo

After locating three stranded fishermen, crewmembers of Patrol Squadron (VP) 8 deploy a UNI-PAC III search-and-rescue (SAR) kit from their P-8A Poseidon.



U.S. Navy photo

FSS Palikir rescues the three fishermen.



U.S. Navy photo

Tied up to the SAR kit, the three fishermen await rescue by the Pacific-class patrol boat FSS Palikir.

First Woman Blue Angels Pilot Shares 'Keys to Success'

LAKEHURST, N.J.—"Everybody wants to be awesome, but you're never going to be awesome if you don't take a look inside yourself and see how you can be better."

Those were the words of Capt. Katie Cook, a Marine Corps officer and the first woman to perform with the U.S. Navy Flight Demonstration Squadron—commonly known as the Blue Angels—during the March 13 Women's History Month observance at Naval Air Warfare Center Aircraft Division Lakehurst, New Jersey.

Cook shared her experience of breaking gender barriers and facing challenges and opportunities throughout her career.

"It was definitely a great time on the team," Cook said. "When you can change the perspective of little girls and little boys and show them they can do whatever they put their mind to, even if there's never been a woman that's done it before, that was a great experience."

Cook said finding motivation, paying attention to details and learning from her mistakes helped her advance in her career from a second lieutenant to her current role as commander of Airfield Operations Company, Marine Wing Support Squadron 271 at Marine Corps Auxiliary Landing Field Bogue, North Carolina.

A third-generation military aviator, Cook graduated from the U.S. Naval Academy in 2008 and flew the C-130 Hercules before joining the Blue Angels in 2014. In 2015, she became the first woman to perform with the legendary unit, piloting the C-130 lovingly known as "Fat Albert."

Cook shared the importance of having something to fight for as a way to keep herself and her Marines motivated. For Cook, that motivation is service to her country, an ideal passed down by her father.

"The military ended up being the path for me, and he instilled this idea of something greater than myself," she said.

Cook also urged doing your best even with tasks you don't want to do, because they may serve as an opportunity to prove yourself to leadership.

"If you can do excellence in everything you do, they know they can bet on you," she said.

Cook also advised it's OK to make mistakes as long as you learn from them and not to be paralyzed by fear of failure, something she said almost stopped her from applying to the Blue Angels.

"This is something we need to change in order to take more risks, and even if you fall on your face, you'll learn things you can apply, and next time, maybe you'll be more successful," she said.

Cook followed up her speech with a question-and-answer session, during which she underscored the importance of women and men supporting each other in the workplace.

"Thank you for sharing your engaging and personal journey with us today and for being so open and honest," said Kathleen P. Donnelly, director of the Naval Air Systems Command Support Equipment and Aircraft Launch and Recovery Equipment Department. "We all resonate with your message that if we see something wrong in the workplace, we shouldn't just let it happen. We should be that supportive network for each other."

Written by Allison Barrow, NAWCAD Lakehurst Public Affairs Officer.

U.S. Navy photos by Sherry Jacobs

Kathleen P. Donnelly, director of Naval Air System Command Support Equipment and Aircraft Launch and Recovery Equipment Department, presents Capt. Katie Cook with a letter of appreciation during a March 13 Women's History Month event at Naval Air Warfare Center Aircraft Division (NAWCAD) Lakehurst, N.J.

Guest speaker Capt. Katie Cook, the first woman pilot to perform with the Blue Angels, shares her keys to success during a March 13 Women's History Month event at NAWCAD Lakehurst.

U.S. Navy photos by MC3 Emily Johnston

A U.S. Navy aviation structural mechanic airman paints a practice panel in the Support Equipment Rework Facility at Naval Base Everett, Wash.

Nimitz Sailors Maintain Support Equipment to Aid in Successful Deployments

BREMERTON, Wash.—Keeping equipment in top shape is key to flight operations.

That's why after every deployment, Sailors assigned to the Aircraft Intermediate Maintenance Department (AIMD) aboard aircraft carrier USS Nimitz (CVN 68) move their equipment to the Support Equipment Rework Facility (SERF) in Everett, Washington, to disassemble, clean, paint and reassemble before the next deployment. Aircraft tow tractors, tow bars, spotting dollies and jack lifts are all moved to Everett via large trucks. A sending team stays on Nimitz in Bremerton, Washington, to load and deliver the equipment to a receiving team in Everett, which unloads and begins the maintenance process.

The majority of AIMD's aviation support equipment technicians (AS) stay in Everett for the bulk of the yard period to execute maintenance, and are scheduled to be in Everett through April 2019.

AIMD's support equipment divisions' main mission is to provide support equipment to the air department, supply department and embarked squadrons during deployment. Their equipment is vital to flight operations and the overall mission of the ship's deployments.

"Without our gear, they would not be able to do their jobs," said AS 1st Class Tania Hogan. "Our motto is 'no air support without ground support.'"

While at SERF, the technicians are split into five teams. The first four teams disassemble, clean and reassemble all the gear, while the fifth team is qualified through the Navy Aircraft Paint and Final Finish course to repaint the gear and create a final product.

"This maintenance period is important because during deployment the support equipment gets used and abused, not only by the Sailors working with it, but by the saltwater environment, which causes corrosion on the gear," said AS 1st Class Jay Corners.

A U.S. Navy chief aviation support equipment technician repairs a tow bar in the SERF.

This period also helps the Sailors working on the gear to learn new skills and step into leadership roles.

"Sailors temporarily assigned to Everett will become intimately knowledgeable of the gear during breakdown and buildup," Hogan said. "They will have to step up into the role of supervising a group of junior Sailors through every evolution involving the gear, set up work spaces for individual support equipment, manage their workload, as well as figure out ways to overcome any obstacles they may face."

Once the maintenance phase is complete, all support equipment will be transported back to the ship in good-as-new condition, along with its maintenance crew, ready to execute any tasks demanded by Nimitz on her next deployment.

Nimitz is preparing for a docking-planned incremental availability at the Puget Sound Naval Shipyard and Intermediate Maintenance Facility in Bremerton, where it will receive scheduled maintenance and upgrades.

An aviation support equipment maintenance chief removes screws from a tow bar in the SERF.

Written by Mass Communication Specialist 3rd Class Emily Johnston.

Naval Air Systems Command program managers and program executive officers took advantage of the Navy League's invitation to the 2018 Sea-Air-Space (SAS) Exposition to update the status of a range of platforms from weapons and unmanned systems to readiness improvements to the latest on the F-35 Lightning II joint program. Now in its 53rd year, Sea-Air-Space is the largest maritime exposition in North America.

Budget Increase Means More Aircraft, Better Systems for Naval Aviators

By Jeff Newman

The program executive officer (PEO) who oversees more than half of the U.S. Navy's aircraft inventory is putting recent budget increases to good use, dramatically increasing the number of aircraft the service will buy in fiscal 2018 and beyond.

During the 2018 SAS Expo April 10, Rear Adm. G. Dean Peters, PEO for air anti-submarine warfare, assault and special mission programs (PEO(A)), said his office had been planning to procure 41 aircraft in fiscal 2018 and 167 between fiscal 2019 and 2023. But after recent increases in federal defense spending, those figures have increased to 75 and 207, respectively.

"That's a fairly significant increase," Peters said. "During my time as a program manager since 2007, working programs or in the PEO, this is really the first time that we've been able to talk about increases in our programs as far as what we're procuring."

U.S. Navy photo by Fred Flerlage

Rear Adm. G. Dean Peters

"In the past, we've just been kind of surviving. Really, in '18 and '19, these budget years, we've seen a shift. There's been an inflection of increased support, and we absolutely have projects that need that funding, whether it's our procurement programs or our upgrade programs," he added. "It's not like we all of a sudden got a lot of money and are looking around for where to spend it. We've always had these requirements, and now we've actually got the money to execute and to do so more efficiently. When you can buy six CH-53K [heavy-lift helicopters] instead of four, that's much more efficient."

As for his programs, Peters shared several new developments. He said the V-22 Osprey program office is close to fielding a roll-on, roll-off kit that will allow the MV-22B to provide aerial refueling to Marine aircraft.

Meanwhile, the P-8A Poseidon is test-

Naval Aviation Depots Improving Aircraft Production

By Andrea Watters

The Naval Air Systems Command's Fleet Readiness Centers have eliminated the backlog of aircraft awaiting depot-level repairs and met production goals for the last two years, said Martin Ahmad, deputy Commander, Fleet Readiness Center (COMFRC).

Ahmad briefed the Naval Aviation Enterprise (NAE) and COMFRC's recent and future initiatives at the SAS Expo April 10.

Motivated by a sense of urgency and near-peer competitors, COMFRC is focused on delivering readiness, he said.

"We have to win the fight, and to win it, we have to have equipment on the field. To have equipment on the field, we have to get it repaired," Ahmad explained.

In fiscal 2017, COMFRC accomplished the following:

- Produced 485 aircraft
- Repaired 3,600 engines and modules
- Repaired more than 180,000 components
- Repaired more than 3,000 pieces of support equipment
- Manufactured more than 99,000 items to support supply base and in-house production
- Conducted more than 150,000 aircraft launch and recovery equipment (ALRE) activities

Ahmad attributed the increased throughput to three major initiatives: following Critical Chain Project Management (CCPM) principles; increasing accuracy of the bill of materials, which generates the demand signal for parts and materials; and accelerating the pace of engineering investigations.

Partnering with the Defense Logistics Agency and Navy Supply Systems Command, Weapon Systems Support, which supply materials and parts, along with type commanders and program manager, has also been beneficial, Ahmad said.

To clear the backlog, COMFRC focused primarily on improving aircraft maintenance and modification operations, he said.

CH-53K King Stallion.
U.S. Navy photo by Emanuel Cavallaro

U.S. Navy photo

The Harvest HAWK equipped KC-130J supports 2nd Marine Aircraft Wing (Forward) in providing close air support and surveillance for coalition troops on the ground in southwestern Afghanistan.

ing high-altitude torpedoes that take the anti-submarine warfare "problem set from 1,000 feet and below to approximately 12,000 feet," Peters said. "When you're up that high, it gives you a lot of advantages, but still being able to place a torpedo in the right spot was a technical challenge. We're very close to proving out that capability."

In addition, Peters said the C-130 Hercules recently tested its first shot of an AGM-114 Hellfire missile against a moving target using the modular Harvest HAWK weapons system. The system had already been tested with the AGM-176 Griffin missile, he added.

The Navy's C-130Ts are also getting new cockpits, which are in testing, and having their four-bladed propellers replaced with eight-bladed, NP2000 propellers, the same ones on the E-2D Advanced Hawkeye and C-2A Greyhound.

In replacing the propellers, the C-130 program office is leveraging work done by the Air Force, which has already installed NP2000 propellers on its National Guard aircraft, Peters said.

The Navy was originally planning to include the propeller upgrade in its fiscal 2019 budget, but $121 million earmarked for the program in fiscal 2018 "allowed us to accelerate it by a year, which is huge," Peters said. "And to be able to take advantage of work that's already been done with the Air Force and National Guard, there was really no reason to wait."

Jeff Newman is a staff writer and contributing editor to the Naval Aviation News magazine.

U.S. Navy photo by Clifford Davis

An F/A-18 Hornet was hoisted off its racks temporarily at Fleet Readiness Center Southeast.

"We have turned the corner. We have met our production goals for fiscal 2016 and 2017. The main reason we were able to do this is because we implemented elements of CCPM at the depots," Ahmad said.

CCPM is a project management philosophy that identifies and removes constraint and capacity issues.

"For example, two years ago, we were concerned about whether we would meet our F/A-18 production goals at one of our depots. We suspected they weren't following all the principles of CCPM, so we held a major review. Once they identified the constraints and stuck to CCPM principles, they not only met their production goal, but exceeded it," he said.

In addition, COMFRC is also focused on completing in-service repairs—repairs made to aircraft in the possession of a squadron—and increasing production of component repairs to decrease the number of in-reporting aircraft waiting for parts. To meet these production goals, COMFRC is hiring more artisans, engineers and logisticians, Ahmad said.

Ahmad also shared NAE's Sustainment Vision 2020, endorsed by NAE leadership in October 2016. The vision attacks the entire sustainment value stream, which has been organized into four major areas: supply, manpower, maintenance planning and infrastructure, he said.

Those four areas come together in a globally managed sustainment environment—an operations center—that is distributed and virtual, where leadership at different levels can view the same metrics and make decisions that affect readiness, he said.

"It's an exciting time to be part of the FRC; it's fun to be part of the bullseye. We are collaborating with our partners and looking inside our organization to continue to improve," Ahmad said.

Andrea Watters is the editor of Naval Aviation News.

U.S. Navy photo by Erik Hildebrandt

Navy to Field New Unmanned, Weapons Systems

By Jeff Newman

Several program managers under Program Executive Office for Unmanned Aviation and Strike Weapons (PEO(U&W)) shared their recent successes during the SAS Expo in National Harbor, Maryland, in April.

MQ-4C Triton to Begin Early Operational Capability

The unmanned MQ-4C Triton aircraft remains on schedule to arrive in Guam later this year to begin an early operational capability (EOC), said Capt. Dan Mackin, Triton program manager.

As the Navy's new persistent, high-altitude intelligence, surveillance and reconnaissance platform, Triton will ultimately operate continuously from five orbits, with four aircraft assigned to each. The concept is for one Triton to depart for orbit, one to return, one to remain on station, and one to be down for maintenance, Mackin explained.

The 7th Fleet orbit will be the first to stand up when two baseline Tritons arrive in Guam later this year. Guam will receive its full complement of Tritons when two upgraded variants arrive in 2021, which is when the program is scheduled to reach initial operational capability (IOC), Mackin said.

Whereas the two baseline aircraft come equipped with electronic support measures that pick up ships' radar signals, all successive Tritons will feature a more robust set of low- and high-band multi-intelligence signals receivers, a capability that will allow for the sundown of the EP-3E ARIES II as the Navy's signals-intelligence platform.

The Triton program has conducted operational test flights at Naval Air Station Patuxent River, Maryland, since February, but will soon transfer that testing to Point Mugu, California, which received the first operational Triton in November. The two baseline Tritons will depart for Guam after completing operational testing, Mackin said.

As of March 20, the Triton program had conducted 168 development and operational test flights, totaling 1,170 flight hours.

MQ-8C Fire Scout set for IOC in 2018

Halfway through production, the MQ-8C Fire Scout unmanned helicopter is ready to begin initial operational test and evaluation in April and on schedule to reach IOC by the end of 2018, said Capt. Jeff Dodge, Fire Scout program manager.

Dodge said the deployment history of the MQ-8B Fire Scout—more than 8,300 flight hours across 12 deployments since 2009—informed development of the MQ-8C, which has increased range and payload capacity and more than doubles the endurance of its predecessor.

"We've made a lot of improvements from those first airframes, and we've incorporated all of that into the MQ-8C to get the system that we have today," Dodge said.

The program also expects to demonstrate by the end of 2018 an ability to integrate with the Link 16 data network to send real-time targeting information to weapons already in flight "to allow for more precise targeting in those over-the-horizon scenarios," Dodge said.

Photo courtesy of Northrop Grumman

An MQ-8C Fire Scout lands on guided-missile destroyer USS Jason Dunham (DDG 109).

Italian Tests, Extended Range Make for 'Exciting' Time in AARGM Program

A partner in the Advanced Anti-Radiation Guided Missile (AARGM) program, the Italian air force recently completed testing of the AARGM on its Tornado ECR jet with two successful live fires at Naval Air Weapons Station China Lake, California. This is a major step toward finishing the initial operational test and evaluation of the missile system, said Capt. Matthew Commerford, program manager for the Direct and Time Sensitive Strike Program Office.

Italy will be the first foreign nation to use the AARGM.

"It's exciting for [the Italian air force] in that, after all this work with the cooperative development over these past years, AARGM is now an operational capability for them," Commerford said.

"The next exciting thing" in the AARGM program, according to Commerford, is the extended-range variant currently in development. Whereas current AARGMs are powered by the same rocket motor that has been used in the High-Speed Anti-Radiation Missile since the 1980s, the extended-range variant will boast a newly designed rocket motor and airframe.

Commerford said the plan is to have the extended-range AARGM integrate with the F/A-18E/F Super Hornet and EA-18G Growler. While the new missile will be able to fit inside the F-35C Lightning II's internal weapons carriage initially, it will not be integrated with the fifth-generation jet's software, he added.

"It's an exciting time for the AARGM program, with development of an extended-range capability to refresh that airframe and make it a capable weapon for the foreseeable future," Commerford said.

Italian Air Force Tornado ECR jet.

Photo courtesy of Italian Air Force

New Decoys, Weapons to Give Naval Aviators Upper Hand

In an effort to counter enemy air defenses and reduce the number of weapons needed to penetrate them, the Navy has begun developing a new system of decoy jammers that can be fired in tandem with armed missiles.

In addition to drawing enemy fire away from actual weapons, the Miniature Air-Launched Decoy (MALD-N) will also be equipped with jamming technology to further suppress enemy defenses, said Capt. John Dougherty, program manager for Precision Strike Weapons.

Photo courtesy of Raytheon

The MALD-N decoy will weigh less than 300 pounds and have a range of approximately 500 nautical miles.

"One of the problems all of our weapons have is that targets are very heavily defended these days with very sophisticated defense systems, and what that makes us do as operators is we're not in a one-shot, one-kill mindset, so we have to put multiple weapons downrange so that we can saturate the enemy defenses and achieve the effects we're looking for," Dougherty said. "MALD-N going to help with this problem."

MALD-N is scheduled for an EOC on the F/A-18 in 2021, with IOC set for 2022.

Between programs such as the MALD-N and the Navy's first two network-enabled weapons—the Joint Standoff Weapon (JSOW) C-1, which delivered last year, and Harpoon Block II+, which is scheduled for IOC on the F/A-18 in July—"it's an extremely exciting time to be in the weapons business," Dougherty said.

Dougherty was particularly pleased to discuss the outlook for the Long Range Anti-Ship Missile (LRASM), a new weapon set to reach EOC on the U.S. Air Force's B-1 Lancer in September and on the Super Hornet a year later.

"LRASM, to me, is by far the most exciting capability that we're about to roll out to our fleet aviators," he said. "It allows our aviators, both in the Navy and the Air Force, sanctuary employment from long-range against that high-end, capital-ship

Navy Considering Proposal for 17 Presidential Helicopters

By Emanuel Cavallaro

Four years into a $1.2 billion development contract for the new VH-92A presidential helicopter, the Navy has flown two initial test aircraft and is considering a proposal to acquire a full fleet of the new presidential helicopters.

That's according to Col. Eric J. Ropella, who became the new Marine Corps program manager for the Presidential Helicopters Program March 22. Ropella gave an update on the program April 9 during the first day of the SAS Expo.

The most notable recent news, according to Ropella, was the flying of the Navy's first two VH-92A test aircraft, engineering development models 1 and 2, last July and November, respectively. The aircraft are now in a Lockheed Martin facility in Owego, New York, for painting and interior installation.

"Once we get the aircraft this summer, we will conduct government tests, mostly validating and verifying the [aircraft's] unique requirements," Ropella said.

According to Ropella, the program office has pursued an acquisition strategy of identifying an in-use commercial helicopter and then working with the contractor to integrate a "government-defined and developed mission-systems package."

"[With Sikorsky's S-92A], that's exactly what we've done, and we're following that acquisition strategy very successfully," Ropella said.

In May 2014, the Navy awarded the contract for the VXX Presidential Helicopter Program to Sikorsky for six S-92A test aircraft and associated support equipment with production options. Sikorsky has since been acquired by Lockheed Martin.

Ever since the development contract was awarded, the VH-92A "has been on a fast track," said Rear Adm. G. Dean Peters April 10 during SAS. Peters oversees the Presidential Helicopters Program as program executive officer for air anti-submarine warfare, assault and special mission programs.

In 2016, the design passed its critical design review, clearing it for production. Now the Navy is working on a proposal to buy 17 production aircraft, for a total fleet of 23, which will ultimately replace the fleet of eight VH-60Ns and 11 VH-3Ds that currently support the president.

"The proposal that we have is for a

U.S. Navy photo

A U.S. Air Force B-1B Lancer releases the Navy's Long Range Anti-Ship Missile (LRASM) during a test event off the coast of California.

threat. It really is a change in the way we do business. It's a new operational concept."

Dougherty noted that, as a semi-autonomous weapon, LRASM can be taken downrange, employed and forgotten. Once a pilot fires LRASM, "they can turn around and go back home and enjoy sanctuary and safety from their ship," he said.

Dougherty also touched on development of the Small Diameter Bomb (SDB) II, the Navy's next-generation land-attack weapon. Expected to reach IOC on the F/A-18 in 2020 and the F-35B and C in 2022, SDB II will be able to pick up and seek moving land targets.

"So you can see there's a lot of new stuff that we're putting into the hands of our warfighters, and I really think it's going to tip the scale in our favor and really make our adversaries think twice before they start to challenge the international norms and order that we've all enjoyed for many years," Dougherty said.

Artist's rendering courtesy of Sikorsky

An artist's rendering of the future VH-92A presidential helicopter, which is under development and will replace the existing VH-3D and VH-60N helicopters.

total of 17 aircraft to be purchased in three years," Ropella said.

Toward the end of 2018, the first two test aircraft will undergo operational assessment by VH-92A operational test pilots from Marine Helicopter Squadron (HMX) 1. Findings from that assessment will inform the decision to procure the remaining production aircraft, known as Milestone C, which the program expects to reach in 2019, Peters said.

With the first two test aircraft now flown, the other four test aircraft are being transformed from S-92As into VH-92As in Stratford, Connecticut. Unlike the first two, these four will be fully configured for mission support.

In 2019, the Navy will also begin cadre training with a unique VH-92A training system of electronic courseware and simulators to get pilots up to speed.

"As you can see, there is a lot of stuff going on over the next year," Ropella said. "We were in the 'run' phase last year. Now we're in the 'sprint' phase."

He expects the four fully configured aircraft to be delivered in summer 2019. Eventually, those aircraft will become mission aircraft.

As for the program's in-service aircraft, both the VH-3D and VH-60N will "continue to support the White House for quite a few years," Peters said. Both aircraft have received engine upgrades, while the VH-3D has also received new rotor blades and is undergoing an interior cabin replacement, he said.

"The upgrades that we've put in these aircraft have really been a major performance improvement," Peters said.

Even so, the VH-3D and VH-60N have been in service for 44 and 29 years, respectively, which means "it's time to replace them also," Peters said.

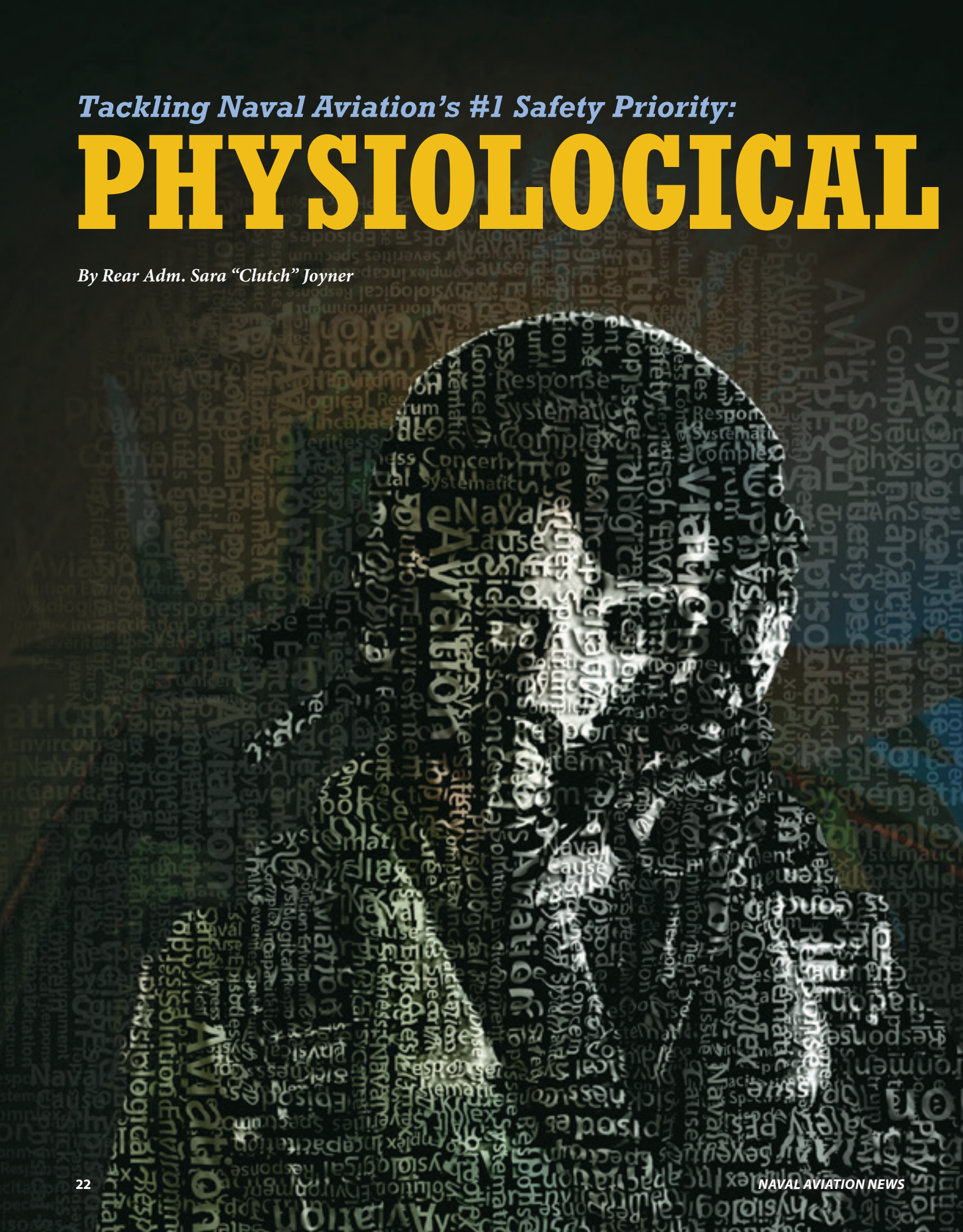
"As we get our production contract and then, within a couple years after that, we start delivering these, we'll work with the White House on a transition timeline for when we actually put the VH-92A in service.

Emanuel Cavallaro is a staff writer for Naval Air Systems Command Public Affairs.

Tackling Naval Aviation's #1 Safety Priority:

PHYSIOLOGICAL

By Rear Adm. Sara "Clutch" Joyner



EPISODES

Editor's Note: Rear Adm. Sara Joyner has served as the lead for the Physiological Episodes Action Team (PEAT) since its inception in August. As she transitions to her new role on the Joint Staff, she provides the Naval Aviation community with an update of the team's progress.

I thought I noticed movement in the mirror while taking off for an early morning functional check flight (FCF) in an A-4 Skyhawk out of Naval Station Roosevelt Roads in Ceiba, Puerto Rico. A short time later, I again caught movement and realized something with a large wingspan was alive in the back cockpit. A bat was hanging from the aft clock, flexing its wings in irritation at its rude awakening. In my time as a pilot, I have angered my share of naval flight officers and weapon systems officers, but never as much as I did this back-seater.

Passing through 8,000 feet, I made a plan. With the bat becoming increasingly agitated, I knew that attempting to land might encourage it to take flight. Part of the FCF profile involved climbing to a high altitude to check the cockpit pressurization and dump sequence. So I climbed to 40,000 feet, priming myself on oxygen, and dumped pressurization. As the pressure climbed in the cockpit, the bat slowly folded its wings and went still.

Waiting an extra minute just for good measure, I re-pressurized the cockpit, finished my profile and returned to the flight line with a now-rigid bat. The air crewman gave him a place of honor for years in the office preserved in a pickle jar. But if I had known then what I know today, I would have kept him nearby to remind me that my solution was a bad idea. While I hadn't experienced a physiological episode during the flight, I had nevertheless set myself up for one with the altitudes and depressurization my solution involved.

Today, physiological episodes (PEs) are the top safety concern for Naval Aviation, and I know far more about pressure than I ever knew for any Naval Air Training and Operating Procedures Standardization (NATOPS) check. Last August, on recommendations from the Comprehensive Review (CR), I undertook my assignment to lead the Physiological Episodes Action Team (PEAT), with a clear understanding that resolving the issue for our aircrew would take nonstop focus.

The engineering details and interfaces between our bleed air and oxygen systems, and the incredibly complex environmental control system (ECS) that manages the high-pressure air essential for F/A-18 critical life support systems and aircraft avionics—all have become my 24-hour-a-day obsession.

My position requires a rapidly expanding knowledge of all Navy and Marine Corps aircraft that employ a pressurized cockpit and oxygen system. Our portfolio includes the F/A-18 Super Hornet, T-45 Goshawk, F-35B/C Lighting II and T-6 Texan II, and we also assist with the AV-8B Harrier and small number of EA-6B Prowlers that experience PEs.

My team includes representatives from multiple organizations such as Naval Air Systems Command (NAVAIR), the Bureau of Medicine and Surgery (BUMED), and our Navy laboratories and aeromedical communities. Our operational branch under the Air Boss and our public affairs efforts allow us to engage with civilian leadership and request the resources we need to research and correct these issues.

It is my goal that every effort under my purview be squarely focused, from start to finish, on those individuals who brief and execute the mission, so they can always return safely to the flight line.

Today, we are addressing PEs by monitoring both the aircraft and the aviator. While collecting data directly from the aviator may seem a logical starting point, providing real-time monitoring equipment that performs well in the cockpit has proved challenging. For example, systems that measure breathing gas delivered to the pilot are still being tested and matured. Physiological monitoring systems—such as the Aircrew Mounted Physiological Sensor Suite (AMPSS)—attempt to accurately measure human performance in a way

Photo illustration by Fred Flerlage

that would be familiar to anyone who participates in the "Quantified Self" movement, which involves using biometric technology to gain insights into one's daily life. However, challenges abound due to the environmental factors experienced in naval aircraft.

We are nonetheless making progress with systems such as the CRU-123 solid-state oxygen monitor, which measures the Onboard Oxygen Generation System (OBOGS) pressure and oxygen percentage in the T-45. This equipment proved revolutionary in helping us understand the T-45 breathing system and has allowed us to make data-driven corrections to the aircraft. This fall, we will field an F/A-18 system called the Cabin Pressure OBOGS Monitoring System, phase one of which will allow data logging as well as provide indications and warnings of pressure anomalies in the cockpit. Phase two will automatically actuate emergency oxygen for the aircrew.

As an example of commercial-off-the-shelf (COTS) procurement, the Aircrew Systems Program Office has provided all F/A-18 aircrew with Garmin watches, which provide the air crew real-time haptic warnings of pressure fluctuations in the cockpit.

The "art" of data science may sound like a contradiction, but that art has been critical to our understanding of the problem and our development of the holistic solutions we need. Indeed, its application has been among the most challenging but also most rewarding of our efforts. Our small but talented team of data scientists continue to explore how we can best use data, big and small, to gain insight into both the human and systems aspects of the PE problem.

Last spring, a NAVAIR engineer discovered a COTS device called a SlamStick that was capable of measuring pressure changes with time, rate and amplitude. Knowing the Hornet's analog pressure gauge doesn't record data, the engineer pushed the SlamSticks out to the fleet as a potential data collection tool. That technology, which began as a potential new data source, has since turned into one of our most promising devices for measuring, predicting and correcting the pressure performance of our aircraft. With it, we can determine "good acting" and "bad acting" aircraft as measured by the amplitude of fluctuations in various flight regimes.

When paired with memory unit data, the data we collect from the SlamStick provide insight into the ECS stability of our systems and allow us to detect whether a system is deteriorating in performance. While the SlamStick doesn't serve as a real-time warning device, it does indicate to pilots post-flight whether pressure exceedances have occurred. These indications allow the pilot to self-evaluate and report to a flight surgeon if he or she experiences symptoms. In the near future, we expect this device to help us develop a prognostic cockpit health tool for the aircraft. This is just one example of the promising data efforts we are pursuing.

"We are nonetheless making progress with systems such as the CRU-123 solid-state oxygen monitor, which measures the Onboard Oxygen Generation System pressure and oxygen percentage in the T-45."

U.S. Navy photo by MC2 Rebecca Sunderland

Pushing the Limits

Our best military laboratories, such as the Naval Medical Research Unit and the Air Force's 711th Human Performance Wing, are conducting cutting-edge research into pressure and breathing gas events to enhance our understanding of the effects our aircraft systems have on aviators in the cockpit.

Physiological Episodes (PEs) are a physical response to the aviation environment and cover a broad spectrum of severity, from air sickness to incapacitation.

Due to our joint platforms and the opportunity they present for leveraging our research efforts, we work closely with the Air Force and have developed a unified path for both services. This relationship has already enabled us to develop joint solutions and achieve a better understanding of the cockpit environment and our oxygen systems.

The Physiological Episodes Action Team charter is definitive—the resolution of PEs across multiple platforms. My immediate team has been constructed from a wide range of talent. Working out of the NAVAIR Washington Liaison Office, it has been assembled from aerospace engineers, fleet operators, instructor pilots, medical professionals and fleet maintainers. Our daily focus is on how we can accelerate the research and procurement process, enabling rapid deployment of solutions to the warfighter and development of holistic and enduring solutions. Unlike legacy commands, it is our goal to find new ways to work ourselves out of a job.

—Rear Adm. Joyner

When I first began this assignment, I assumed we already had an understanding similar to that of the dive community regarding human requirements for pressure and breathing gas. Films like "The Right Stuff" and "Apollo 13" portray how our understanding of human physiology matured during the space program. In the decades since, we have built upon knowledge from that era and adapted it to fit the modern combat aircraft we fly today.

But even though our aviators of today aren't that different from the astronauts of the 1960s, that knowledge has proved incomplete—our aircraft have continued to push the limits of speed, endurance and altitude. Today, our research is surpassing the bounds of our knowledge of oxygen concentration and pressure fluctuations, and what we had once considered "cutting edge" in the 1960s has, understandably, become outdated.

"The F/A-18 has served as the backbone of the fleet for nearly two decades of sustained combat operations. While even the best designed systems can degrade and eventually fail over time, we're not content to accept this outcome."

U.S. Navy photo by MC3 J. Alexander Delgado

In close coordination with NAVAIR, our aeromedical laboratories, the dive community and academia, we are increasing our levels of understanding of the optimal human requirements for our life-support systems. Cross comparisons of OBOGS-delivered pressures and oxygen levels are showing us where the boundaries of human performance lie with our breathing gas systems, while also accelerating our understanding of existing system deficiencies, and guiding designs for our next-generation OBOGS.

For each type/model/series aircraft, we are using a methodology called root cause corrective action analysis to trace fault trees, allowing a thorough, data-driven and methodical approach to identifying causes of PE events. Because PEs happen to aircrew and not the aircraft, all root cause analysis efforts begin and end with the aircrew. To understand the interactions we take for granted as operators, we must understand this man-machine interfacing and its contribution to physiological events.

For the T-45, we are already well down the road toward a corrective action that will remedy the low bleed-air flow to the OBOGS system. The F/A-18 ECS is far more complex and is dynamic in nature, but we are making strides in cockpit characterization and steadily working toward a material solution. We owe it to the warfighter to ensure that we perform an end-to-end analysis of this system and apply corrections as fast as they are identified.

The F/A-18 has served as the backbone of the fleet for nearly two decades of sustained combat operations. While even the best designed systems can degrade and eventually fail over time, we're not content to accept this outcome. We have begun to show we can slow this trend, and strong data-driven analysis suggests we can reverse course and develop a better system that might serve as the model for all future combat platforms.

Underpinning all of these efforts are the infrastructure and people that we rely on to support our aircraft. Restoring the manpower, equipment and parts that were hit hardest by years of restricted budgets is a priority. To adequately support the warfighter, we must resuscitate a supply system and subcontractors that have been kept on life support. It will take time to reverse the mindset of Sailors who have been consistently told there are no resources or assistance. Meanwhile, we are restoring a holistic, system-level understanding of the ECS to our schools, training pipelines and flight lines, which is making a real difference in the PE rate and turning trends downward.

We can't expect our warriors on the front lines, our maintainers and aviators, to accept systems that perform sub-optimally, which means that PEAT, NAVAIR and Commander, Naval Air Forces must guarantee the tools and resources are on hand to ensure "good enough" is never the correct answer. By assisting us in identifying shortfalls on the flight line and in our supply system and our depots, our warriors will help us return these critical systems to their historically, highly reliable performance.

In time, we will reach a point when PEs have become history and aviators will man their aircraft with other important matters on their mind, such as how to avoid getting gunned during their next basic fighter maneuvers sortie, or how best to employ nine Joint Direct Attack Munition bombs on an Islamic State compound, or how not to look bad behind the boat.

Active duty and Reserve aircrew who wish to subscribe to the weekly PE IPT newsletter should contact Cmdr. Mike Burks, PE IPT lead, F/A-18 and EA-18G Program Office, at michael.j.burks@navy.mil.

For other physiological episode questions or issues, contact PEAT@navy.mil.

SMOO LANDI

By Jeff Newman and MC1 Josue L. Escobosa

Already safer than it has ever been thanks to new technology that reduces workload on naval aviators as they approach an aircraft carrier, the task of recovering Navy aircraft will only get easier following recent successful flight testing aboard USS Abraham Lincoln (CVN 72).

In conjunction with Lincoln's carrier qualifications, Naval Air Warfare Center Aircraft Division (NAWCAD) air vehicle engineers and pilots with Air Test and Evaluation Squadron (VX) 23 showcased two new developments during three days of testing beginning March 21, the first being a software update to the Precision Landing Modes (PLM) flight control system that accounts for failed aerodynamic surfaces.

Using the updated PLM software, VX-23 pilots successfully completed 157 touch-and-go approaches across 20 flights roughly split between F/A-18E-F Super Hornets and EA-18G Growlers. On each approach, the aircraft had a disabled horizontal tail surface, aileron, asymmetric leading edge flap or engine. In every case, the PLM software was able to account for the failed surface or engine while maintaining precision landing performance, said Buddy Denham, senior scientific technical manager for NAWCAD's air vehicle engineering division.

"The flight control computer basically redistributes control to the other flight control surfaces that are still healthy," he said.

The successful showing also came amidst rough sea states, with wave heights between 8 to 13 feet during testing. Naturally, Denham said, the test team treated the subsequent deck motion as an opportunity to further test PLM.

"It's not where you really want to start out. You want a smooth deck, but you get a test window that opens on certain days and you don't choose your weather, it chooses you," Denham said.

The test team flew approaches into wave-offs to make sure the aircraft weren't behaving differently than during shore testing. Once the team was confident the aircraft were performing as expected, they began touching down.

"The fact that we got all of that done in adverse conditions kind of answered all of our questions. If the ocean were just a mirrored lake out there with the ship on it, you'd wonder whether it could handle high sea states and weather," Denham said. "Well, we were out there with high sea states and weather and the airplane handled it very well, so in the end we were

U.S. Navy photo by Buddy Denham

U.S. Navy photos by MC1 Josue Escobosa

Aboard USS Abraham Lincoln (CVN 72), from left, Cmdr. Bryan Roberts, officer in charge of the U.S. Navy Landing Signal Officer School, and Air Test and Evaluation Squadron (VX) 23 test pilots Lts. Christopher Montague and William Bowen man the control station of the Aircraft Terminal Approach Remote Inceptor, or ATARI, during a March 22 demonstration of the system, one of several options being considered as a backup plan to recovering unmanned aircraft should their primary landing systems falter.

fortunate we had very rough conditions. It's like we went straight to the graduation exercise."

The testing was a key step toward the final PLM software release scheduled for next year, which will be fully redundant and allow the fleet to rely on the system during all approach failure conditions. Introduced to the fleet in fall 2016, the initial release of PLM software is programmed to shut down should any failed surfaces be detected.

Denham said VX-23 pilots told him after their flights that they would rather fly a degraded test aircraft with PLM than a healthy jet using manual stick and throttle control. Previously called MAGIC CARPET—short for Maritime Augmented Guidance with Integrated Controls for Carrier Approach and Recovery Precision Enabling Technologies—PLM allows an approaching pilot to focus on flight path while the software accounts for the myriad other aspects that cumulatively made landing on an aircraft carrier one of Naval Aviation's most daunting tasks.

LSOs Prove Capable of Remote Recovery

VX-23 pilots also demonstrated a potential alternative landing system that would allow landing signal officers (LSOs) on the flight deck to take remote control of an approaching unmanned aircraft should its primary landing system become degraded.

The primary recovery system for the future autonomous, carrier-based MQ-25 Stingray, the Joint Precision Approach and Landing System (JPALS) essentially draws a flight path for an aircraft to follow during approach, Denham said. JPALS is also installed on the manned F-35 Lightning II fighter, which was flown by Strike Fighter Squadron (VFA) 101 and VFA-125 pilots as part of Lincoln's carrier qualifications, he said.

In traditional manned aircraft, landing systems are there to aid the pilot. Autonomous, carrier-based aircraft will be fully flown by software, so contingencies are needed in case that system falters, Denham said.

"What we were looking at is, in the event we have a casualty with JPALS, what other options would we have to recover unmanned aircraft?" he added.

The first of several options tested, the non-coincidentally named Aircraft Terminal Approach Remote Inceptor—or ATARI, after the iconic video game company—would give LSOs the ability to remotely take over an aircraft from up to five miles away and land it on a carrier by observing and fixing errors in its glideslope and lineup.

Denham said LSOs make for a natural first option to take over a distressed aircraft because they already oversee carrier approaches from the time an aircraft is three-quarters of a mile away until it touches down. Working in teams of two, LSOs monitor a pilot's deviations from glideslope and centerline, call up corrections to the pilot as needed, and grade the pilot's performance during debrief.

"They're always working to improve touchdown performance and safety, so we can capitalize on the fact that they can see deviations and correct errors," Denham said.

Much like the gaming system it's named after, the ATARI features a joystick that an LSO uses to control an aircraft.

"You're effectively using small joystick controllers to guide a 40,000-pound airplane, and it's almost like you're playing a video game," Denham said.

Wanting to quickly demonstrate ATARI's capability, NAWCAD engineers worked with Boeing last year to outfit a VX-23 Super Hornet with a surrogate UAV capability, allowing the manned jet to receive the ATARI's flight-control signals from a carrier deck. It marked the first time a Super Hornet has had a full stick-and-throttle surrogate capability installed into its flight control system, Denham said.

This proved a quicker developmental option because the F/A-18s would have a safety pilot from VX-23 onboard who in the case of an emergency could take back control of the aircraft, Denham said.

"Being able to rely on the safety pilot

U.S. Navy photo by Buddy Denham

VX-23 test pilot Lt. Christopher Montague checks the control station of the ATARI prior to the March 22 demonstration of the system aboard USS Abraham Lincoln (CVN 72).

U.S. Navy photos by Buddy Denham

From left, VX-23 test pilots Lts. John Marino and Christopher Montague, who are also landing signal officers, monitor an F/A-18 Super Hornet with degraded ailerons as it successfully lands aboard USS Abraham Lincoln (CVN 72) during March 21 testing of the Precision Landing Modes flight control system, which has been updated to account for failing aerodynamic surfaces.

was integral," he added. "It allowed us to move more rapidly."

Originally tested in 2016 on a Learjet performing shore-based approaches, the ATARI system underwent further shore testing and quality assurance with the retrofitted Super Hornet, at which point VX-23 felt confident enough to test the system at sea.

Aboard Lincoln, the ATARI demonstration endured the same high sea states as the PLM testing.

"There was some nervousness because the sea state was so bad. Back on the airfield, testing was benign," said Lt. John Marino, the VX-23 pilot who flew the outfitted F/A-18, and the first aviator to land on a flight deck using ATARI. As during the PLM testing, Marino first had to perform three approach-to-wave-offs to ensure all conditions and surrogate systems were safe and that the ATARI system could indeed take over the aircraft while at sea. Beginning with the fourth approach, Marino and the LSOs performed roughly 40 touch-and-goes.

"I was really impressed with the LSO's ability to get me to touch down," Marino said. "The conditions were difficult, and it was impressive the system worked the way it did. On a calm day, it would have been a little bit boring, but this was definitely more challenging."

"The deck was pitching significantly and yawing and rolling," Denham said. "It was particularly difficult to land that day, and we showed it's possible to use this system even when the conditions aren't ideal. So I guess we were fortunate to end up in high sea states. All in all, a successful trial."

A fully self-contained van outfitted with the ATARI system and a data link up to the outfitted Super Hornet was brought aboard Lincoln and set up behind the LSO platform so engineers could watch the approaches in real-time, monitor safety-of-flight data and ensure passes were going smoothly. The van recorded flight data for engineers to analyze later and allowed VX-23 to test their systems without having to install them aboard the carrier.

Though not intended to be a primary method for recovering aircraft, ATARI would provide a relatively inexpensive backup system in the case an LSO needs to step in and use their expertise and training to safely guide an aircraft.

"We don't have unmanned carrier-based vehicles in the fleet today, but they are coming soon," said Dan Shafer, a NAWCAD air vehicle engineer. "This is a potential alternative landing method, and our system performed well."

Even though it tested well, Denham said the ATARI is merely the first alternative landing system his team has developed, and by no means the one that ultimately will be pursued for fleet-wide implementation. His engineers will now analyze the data collected aboard Lincoln and make adjustments for further at-sea testing.

"The question was, is it even feasible for the LSOs to land an aircraft from their location, and the answer was most definitely yes," Denham said. "We can put that in our options for emergency backups and say we know we can do it from the LSO station."

Denham called the ATARI system the "lowest-tech option" of those being considered, and said the others would aim for a more autonomous approach using aircraft sensors.

Jeff Newman is a staff writer for Naval Aviation News. Mass Communication Specialist 1st Class Josue L. Escobosa supports USS Abraham Lincoln Public Affairs.

NIGHT

How Maj. Robert Guyette Won 2018 Test Pilot of the Year

By Emanuel Cavallaro

F-35 Lightning II helmet.

U.S. Navy photo by Fred Flerlage

There's dark on shore; then there's dark at sea. There's no real comparison. So it wasn't entirely clear how well the F-35 Lightning II night vision system would perform during its first shipboard evaluation.

The 2016 Evaluation

In 2016, test pilot Maj. Robert Guyette wasn't the first one aboard USS America (LHA 6) to fly the night vision system at sea. Two other test pilots, one American and one British, had flown it over the two previous nights and reported decent results. But Guyette was the first to fly it at very low light.

"The system was actually performing fairly well at higher light levels," he said. "I was the third in the hopper for the test, and when I went out there and it got really dark, the system performed … unexpectedly bad."

The six deficiencies Guyette's test team identified during that

VISION

F-35B Lightning IIs from Marine Fighter Attack Squadron (VMFA) 211 sit on the deck of USS America (LHA 6) prior to a night helmet test conducted by the test pilots of Air Test and Evaluation Squadron (VX) 23.

Lockheed Martin photo by Darin Russell

initial evaluation meant that, until the system was fixed, pilots wouldn't be able to fly the aircraft at extremely low light levels. Indeed, the F-35 wouldn't be flown at low light again until Guyette's next shipboard test on USS Essex (LHD 2) in 2017.

In February, the 37-year-old Guyette received the Marine Corps Aviation Association's John Glenn Squadron 2018 Test Pilot Award, in part for his team's redesign of the night vision system and its subsequent test and evaluation.

Today their fix is being fielded—installed in the combat-coded F-35s belonging to the fleet and partner nations as well as new F-35s coming off the line—ensuring the fifth-generation strike fighter's capability to launch and recover at night on aircraft carriers and amphibious ships with covert lighting.

Thanks to Guyette and his team, F-35 pilots can now see in the blackest of night.

Drawing the Horizon

The most technologically advanced helmet out there, the F-35 helmet is a remarkable piece of technology, but the task of integrating its sophisticated systems with the jet's avionics and pilots' capabilities has proved so complex that it's taking the combined efforts of engineers, researchers and test pilots like Guyette to work out the kinks.

Above the wearer's forehead, the helmet bears a prominent circle. That's the lens of the mid-wave infrared camera system that captures the image that a projector inside the helmet uses to produce the helmet-mounted display for the wearer.

During initial 2016 tests, the camera and projector were working just fine, according to Guyette, but the software that performs the image post-processing for the projector wasn't fully optimized for the dynamic environment of the F-35 cockpit in low light situations. In short, it was having a hard time drawing the horizon.

"For a pilot, not being able to see the horizon is a major problem," Guyette said. "You can get disoriented. And some of the lights on the ship were not being filtered correctly, so it was obscuring the landing area—among other issues. It was just generally unsafe."

That's not a position Guyette likes to put himself in—flying blind over the sea. But his team regularly practices for such

contingencies. They run simulations, rehearse unexpected outcomes and practice emergency procedures. They identify the factors they can control and the factors they can't. In the cockpit, Guyette depends on that extensive planning and his experience as a test pilot.

"When you're in a situation where you have degraded visual cues, you transition to an instrument scan and you rely heavily on the airplane and what it's telling you," Guyette said. "You rely on the landing signal officer in the tower to talk you down to the deck. That's his job, to assist you and bring you back down safe."

'I thought for sure we were done'

Six months after the 2016 evaluation, Guyette was at Naval Air Station Patuxent River, Maryland, assisting with lab tests for a version of the F-35 helmet that used organic LED technology to resolve an ambient light—or "green glow"—issue.

One of the engineers there recognized him from the USS America. He told Guyette that he and the other engineers were working on new image post-processing software. In between test runs, he showed Guyette what the beta version could do for the F-35's night vision system. "I saw it," Guyette recalled. "And I knew these guys had pretty much solved a lot of the big problems."

Soon after, Guyette's team had an F-35B parked in a Pax River hangar running on ground power to test the software using some visual acuity boards at a variety of light levels. That was the first round of a series of tests—some on the Pax River airfield, others offshore in the Atlantic Test Ranges—that would prepare them for another at-sea shipboard evaluation.

"We took [the F-35B] offshore and flew around out in the ocean when it was light and when it was dark," Guyette said. "We had to do all of that before we felt comfortable going out to the ship again."

Eventually, with deck space on USS Essex off the West Coast coordinated, they borrowed an F-35B from Marine Operational Test & Evaluation Squadron (VMX) 1, loaded the experimental software onto the aircraft at Edwards Air Force Base, California, and flew it to Marine Corps Air Station (MCAS) Yuma, Arizona.

While still ashore, Guyette had to complete required

Lockheed Martin photo by Darin Russell

Maj. Robert Guyette, F-35 Pax River Integrated Test Force test pilot, during a developmental test at sea. Guyette was named Marine Corps Aviation Association John H. Glenn Squadron Test Pilot of the Year for 2017.

field carrier landing practice at a simulated aircraft carrier in the desert to qualify for landing on the ship. The night of Guyette's last practice landing, the plane captain pointed out a puddle of coolant underneath the aircraft.

"I shut the airplane down and climbed out," Guyette recalled, "and everybody's heart sank because it was not looking good for us. I thought for sure we were done."

Back in Yuma, the Marines of VMX-1 pulled together, loaded three flatbed semi-trucks with equipment, and rolled out 30 minutes into the desert to Guyette's location, MCAS Yuma's Auxiliary Landing Field Two. Within 24 hours, the Marines had the aircraft fixed and ready for testing.

"They pulled some magic," Guyette said.

Dramatic improvements

Unlike their testing in the hangar, Guyette's test team wouldn't be able to control light levels at sea. That meant they had to account in their planning for the latitude and longitude of the ship, ambient light from the sun and stars, and the phase of the moon and its angle above the horizon.

But in the months leading up to the final graduation exercise, one crucial factor Guyette's test team couldn't fully account for was the weather. USS Essex was returning from Fleet Week in San Francisco, sailing down the coast of California to San Diego for the Dawn Blitz exercise. Before Guyette could fly out, a huge storm developed over the ship. The first night was a no-go.

"They can't wait for us, so they're just still trucking south," Guyette said. "So I repositioned that airplane up to Edwards Air Force Base and then just waited for the next day. We basically had to get it all done that second night."

Ultimately, they would have to complete all their testing in a single three-hour window while the moon was setting. "It was one of those days when you see the moon at evening time, and it's way up high and huge," Guyette said. "And then the sun went down and we're testing through the moon. As the moon's going down we're basically going lower and lower and lower in light level."

As a rule, Guyette tries to stay agnostic about the results. The point of testing is to determine whether or not a system works, not to confirm your hopes that it will work.

"But in this case the improvements were dramatic," Guyette said. "We were able to clear all six category one deficiencies against it."

Team effort

The Test Pilot of the Year award came as something of a surprise. Guyette's commanding officer had put him up for it without telling him.

He learned he won when Col. Steve Girard, Commanding Officer of the Marine Corps Aviation Association John Glenn Squadron at Pax River, called him to offer congratulations in December. Guyette, who at the time was working at Pax River's Hazelrigg Hangar on further F-35 testing, received his trophy at a Feb. 8 dinner ceremony.

From left, Col. Steve Girard, Marine Corps Aviation Association John H. Glenn Squadron and Marine Aviation Detachment Commanding Officer; Lt. Gen. Steven Rudder, Deputy Commandant for Aviation; Maj. Robert Guyette, F-35 Pax River Integrated Test Force test pilot; and Harry Nahatis, GE Aviation, during the MCAA JGS annual awards ceremony at Naval Air Station Patuxent River, Md., Feb. 8, 2018.

His 7-year-old son called the trophy "a bird on a box" (a not inaccurate description). These days, it sits on the boy's bedroom dresser beside a Lego NASA Saturn V rocket. Guyette is the 13th test pilot to receive the honor since the association started giving out the award in 2005.

In April, the Marine Corps Aviation Association also recognized Guyette as the 2018 winner of the Michael A. Hough award for acquisition excellence. Guyette remains modest about all the recognition, calling himself "the most visible member of a big team."

"In reality, there's like 30 people—capable, talented, gifted engineers who were really doing a lot of work as well," he said.

Recently he has received several positive calls from squadrons who are deploying with the redesigned night vision system. One of them was from a pilot of the Marine Fighter Attack Squadron (VMFA) 121 "Green Knights," Guyette's old squadron and the first operational F-35 squadron. Their feedback on the night vision system will be invaluable.

"It's gone from a system that was unsafe to a system they can use operationally," he said. "And those guys are going to use it where it matters."

Emanuel Cavallaro is a staff writer for Naval Air Systems Command Public Affairs.

New Atlantic Test Ranges Facility Expands Flight Test Capacity

By Bob Kaper

A new, high-security operations center at the Atlantic Test Ranges (ATR) at Naval Air Station (NAS) Patuxent River, Maryland, is set to pave the way for further expansion of the Navy's flight testing and live, virtual and constructive (LVC) training capabilities.

U.S. Navy photo

Housed in a 17,000 square-foot addition to the ATR headquarters and opened March 27, the operations center will enhance ATR's capability to conduct extended flight tests and support networked, air-platform integration with other airborne assets, ships at sea, ground-test and simulation facilities and computer-generated environments.

"Threats are changing faster, and adversaries are gaining on the capabilities that the Navy has," said Leslie Taylor, executive director of the Naval Air Warfare Center Aircraft Division. "We must get better faster, and this facility will help us to do just that. No system is out there by itself, alone and unafraid. It is now a much more complicated battlespace. Our networks, platforms, weapons and sensors must work together."

The two-story facility is designed to advance and improve upon the Navy's current capacity to test multiple aircraft and onboard systems simultaneously, especially those requiring elevated security levels, according to Rob Vargo, ATR director, who estimated it could double ATR's capacity for classified testing with special security requirements.

Among the new programs expected to conduct flight tests from the operations center are the MQ-25A Stingray unmanned carrier aircraft, the CH-53K King Stallion heavy-lift helicopter, the Next Generation Jammer on the EA-18G Growler, and the conformal fuel tank upgrades for the F/A-18 Super Hornet.

Expanding the Navy's LVC battlespace capacity, the new facility will support the use of "live" elements, such as real aircraft; "virtual" elements, such as a pilot in a simulator; and "constructive" elements, such as a computer-operated simulation of enemy radar signals during an electronic warfare scenario.

"LVC brings all of the pieces into play to support the warfighter in the next generation of exercises, experimentation and wargames," Taylor explained. "This facility will be a significant enabler to LVC."

While the new facility's first floor contains office space and conference rooms, the operations center on the windowless

The Atlantic Test Ranges (ATR) complex lies on Cedar Point at the easternmost end of Naval Air Station Patuxent River. ATR headquarters and the new high security addition are in the group of beige buildings near the beachfront. The Chesapeake Bay is to the right, with the mouth of the Patuxent at top. Calvert Cliffs and Cove Point lie just beyond.

second floor comprises four reconfigurable, multipurpose mission test cells, along with two secure conference rooms. Employees will begin moving into the new structure this spring, and testing from the operations center should get underway this summer.

Three of the test cells will be outfitted as mission control rooms, adding capacity to the 10 existing project engineer stations (PES) in the main ATR headquarters building, according to Joe Eversole, ATR's project manager.

Engineers using the PES will see

U.S. Navy photo

The windowless second floor of the two-story addition houses the ATR's new high-security operations center.

real-time data from an aircraft's instruments during testing and will be able to view high-definition video of the aircraft in flight. They will have access to data streams at their own workstations and be able to display them on 84-inch wall monitors.

"The people in PES have access to a great deal of data that is not available to a pilot in the aircraft," Vargo said. "We provide the tools to allow test engineers to use that data to monitor critical parameters and respond to unexpected anomalies. This can increase flight test efficiency and reduce the need for follow-on flights based on post-flight discovery."

Each mission test cell will hold around 35 engineers. Two of the cells are separated by a partition that can be drawn back to make one large room that will support major exercises and fleet experiments—a new capability at ATR, Eversole said.

One test cell will be dedicated to the MQ-25A, the next generation unmanned carrier aircraft. "As the integrated test team begins work on the future of Naval Aviation, we will support them here at ATR," Eversole said. "We can provide specific shielding against electromagnetic interference and put their aircraft control team close at hand during testing."

Formally titled the P-155 Military Construction Atlantic Test Ranges Modernization Project, the new facility was constructed under the direction of the Navy Facilities Engineering Command at a cost of nearly $11 million.

Equipment, furniture and additional security features cost about $5 million more, Eversole said. However, he estimates the facility's construction will pay for itself in less than two years by reducing expensive delays from scheduling conflicts and limited facilities.

"The Navy's focus now is on speeding up execution," Vargo said. "If we were a bottleneck, we would be slowing them down. With this new capacity, we won't be."

Bob Kaper is a senior writer with the Atlantic Test Ranges Business Communications Team.

U.S. Navy photo

Project engineer stations in the new addition and in the existing headquarters building are equipped with ATR's latest, fifth-generation real-time processing system, RTPS V. It converts digital data from the aircraft to values such as airspeed, altitude and pressure and displays the results for test engineers to view in real time. Engineers also can view video feeds from high-power telescope cameras trained on the aircraft as well as from cameras at other locations on base or at other facilities.

Net Gain

By Jeff Newman

The Naval Air Warfare Center Aircraft Division's (NAWCAD) cargo and special operations team successfully demonstrated March 22 a new cargo net that could go a long way to helping Marines survive a crash.

U.S. Navy photo by Emanuel Cavallaro

U.S. Navy photos by Emanuel Cavallaro

Air Test and Evaluation Squadron (HX) 21 Staff Sgt. James Kerekanich straps down cargo inside an MV-22B Osprey March 22 at the hangar housing the Naval Air Warfare Center Aircraft Division's (NAWCAD) cargo and special operations team at Naval Air Station (NAS) Patuxent River, Md. The straps currently are the standard method for securing cargo inside Marine rotorcraft.

From left, NAWCAD cargo and special operations team members Trevor Grimes and Dave Hamm secure cargo using a Common Cargo Net inside an MV-22B Osprey at the team's hangar.

A crane swings the 6,400-pound Modular Egress Training Simulator (METS) over the pool inside the Aviation Survival Training Center at NAS Patuxent River. Loaded with cargo as part of the demonstration, the METS capsule is typically used for underwater egress training.

Following several incidents in recent years in which loose bags have injured Marines or, in the case of a water crash, blocked egress from the aircraft, the Navy tasked the NAWCAD cargo team with coming up with a more effective way for Marines to secure their gear.

The cargo team's solution is the Common Cargo Net, an altered version of a net that is already available but mostly unknown and unused by the fleet.

Designed to quickly and easily secure up to 2,500 pounds of cargo in the MV-22B Osprey tiltrotor and CH-53 heavy-lift helicopters, the net promises to keep bags from flying loose regardless of how the fuselage is oriented. The current standard method of securing cargo bags calls for strapping them down, but sea bags—the standard duffel used by Marines—and day packs can still easily become dislodged from beneath straps in the event the fuselage rolls over during a violent crash.

The cargo team showcased as much during a unique demonstration at the Aviation Survival Training Center (ASTC) at Naval Air Station Patuxent River, Maryland.

One of eight Navy training centers dedicated to aircrew water survival, the ASTC houses a large pool used to train Sailors and Marines on how to evacuate an aircraft in the event of a ditching. A crane is used to lower a 6,400-pound "dunk tank" designed to replicate a fuselage—officially known as a Modular Egress Training Simulator (METS)—into the pool and rotate it, simulating an aircraft ditching.

Typically, the METS capsule is filled with people who are undergoing survival training. But during the cargo team's demo, the dunk tank was instead stacked inside with up to 36 sea bags secured by a Common Cargo Net.

In two ditching simulations with the cargo assem-

bled in different configurations, the net succeeded in preventing the bags from flying loose once the capsule rolled over in the pool.

To make clear how the net improves on current procedure, the team then secured the bags using standard straps, only for the cargo to immediately roll loose once the METS flipped and the straps lost tension.

"That's pretty much what we were expecting to happen," said Michele Hoefer, a cargo team engineer.

During a ditching, not only can loose, floating bags become hazardous projectiles, but they can also present obstacles to disoriented Marines trying to escape a sinking fuselage.

"Just putting a strap over something doesn't mean it's tied down," said Todd Anderson, cargo team lead. "It might need another strap depending on the angle. With this net, I don't have to figure that out. I put it over, I zip it, reef it, and tighten it down, and I know that I can restrain 2,500 pounds in this net."

Several Marines with the Marine Corps Training and Education Command (TECOM) were on hand for the demonstration. Prior to the pool demo, the cargo team had displayed the net back at its hangar, where they took down one configuration and assembled and secured another in roughly 15 minutes.

Hoefer called the nets "a bridge" between functionality and something that would be quick and easy for Marines to use in combat zones.

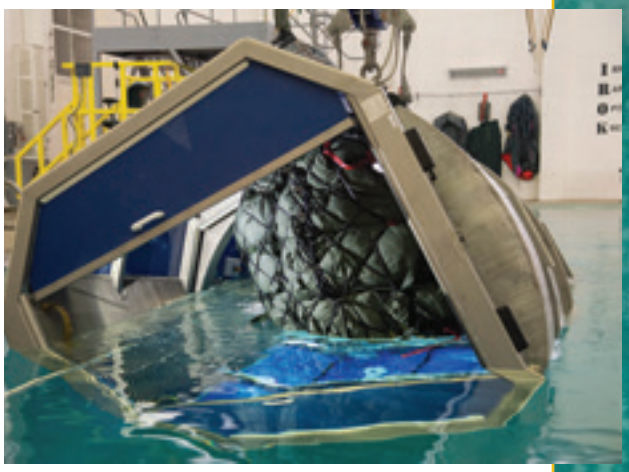
The nets have already received flight clearance for the V-22 and H-53, and the next step for the cargo team is to complete testing for some additional cargo configurations, Hoefer said.

The team plans to travel to fleet Marines and provide direct training, including as part of a "train-the-trainer" event with Marine Aviation Weapons and Tactics Squadron (MAWTS) 1 instructors at Marine Corps Air Station (MCAS) Yuma, Arizona, Hoefer said.

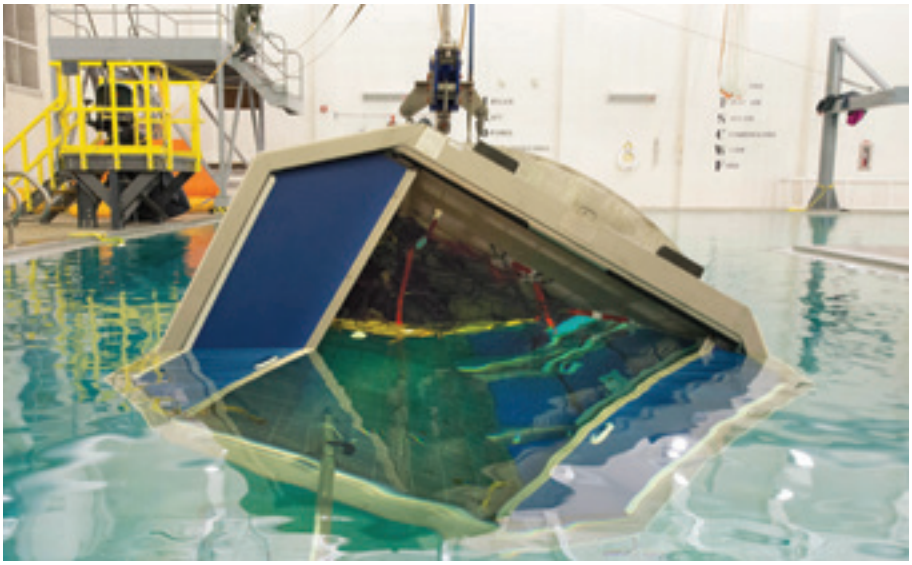
The team has already completed some initial testing with Marine Medium Tiltrotor Squadron (VMM) 166, which received a shipment of nets prior to its May deployment from MCAS Miramar, California.

Jeff Newman is a staff writer and contributing editor to the Naval Aviation News magazine.

Known as the "dunk tank" or "dunker," the METS was dropped several times into the pool as part of the demonstration. Each dunk was performed with the interior cargo arranged in a different configuration.



Capable of securing up to 2,500 pounds of cargo, the Common Cargo Net succeeded in holding the cargo bags steady during each demonstration.



Held in place by the Common Cargo Net, the cargo bags remained secured to the floor of the dunk tank, even as it rolled upside down in the pool.

FLEET READINESS CENTER SO

By Clifford Davis

FRCSE Primary Source for T-6 Texan II Repair

In a few years, every Navy and Marine Corps pilot to earn their wings will have flown an aircraft touched by the capable hands of Fleet Readiness Center Southeast (FRCSE) artisans.

The Chief of Naval Air Training, known as CNATRA, named FRCSE as the primary source of repair for the T-6 Texan II trainer aircraft in November.

"The T-6 is the primary trainer aircraft for CNATRA," said Daniel Simon, FRCSE's deputy integrated product team lead for the trainer aircraft program. "This is the first plane that a naval aviator will fly."

Regardless of whether pilots go on to fly helicopters, multi-engine planes or jet fighters, they all begin with the T-6. That means, not only will the massive new workload produce jobs, it's also crucial for national defense.

"This is the first thing they're going to fly and train on," Simon said. "So making sure that this fleet is up and running is basically laying the foundation for all the future aviators in the Navy and Marine Corps."

U.S. Navy photo by Victor Pitts

FRCSE artisans lower the fuselage of a T-6 Texan II onto its wing assembly Jan. 12. The Navy facility was awarded the maintenance contract for T-6 repairs in November.

FRCSE will be conducting aircraft condition inspections (ACIs) on the aircraft, during which engineers and artisans will determine what needs to be fixed on the aircraft and then carry out the necessary repairs.

But the ramp-up in workload won't happen all at once. In fiscal 2018 and 2019, for example, the facility will perform six and 12 ACIs respectively. However, by 2020, that number will jump to 33. By 2021, FRCSE will be inducting 57 of the aircraft per year.

The men and women of the new T-6 line at FRCSE have no doubt they will be able to handle the increased responsibility.

"I think we have a good plan in place to ramp up," said Todd Theobalt, a T-6 overhaul and repair supervisor. "The people we have now have the experience. They also have the expertise to start training the new hires and people we're going to bring over to transition into this program."

With the workforce of the facility's trainer team about to double, adding everything from engineers to sheet metal mechanics to production controllers, training will be important. However, taking in 57 aircraft per year also will require hangar space.

Fortunately, the phasing out of the venerable P-3C Orion is making room.

UTHEAST REPAIRS THE FLEET

"The infrastructure needs for the [T-6] line seem to be lining up perfectly with the P-3 sundown," Simon said. "So trainers have now started moving into that hangar."

Though the amount of work will be new to the FRCSE trainer team, trainer work is not. In fact, Simon said, that's one of the reasons they were tapped for the work in the first place.

"The reason why we got this workload is because of the guys on the floor," Simon said. "The work they did with the T-44 [Pegasus]was tremendous.

"The artisans on the floor are the rock of this program. As long as we get them the parts they need and the logistical elements, they'll produce these aircraft."

Clifford Davis is a communication specialist with Fleet Readiness Center Southeast Public Affairs.

U.S. Navy photo by Victor Pitts

Artisans of the trainer production line at FRCSE reattach a T-6 Texan II's wings after the plane was disassembled during an aircraft condition inspection on Jan. 12. The facility is currently the sole source of repair work for the aircraft, which the Navy and Marine Corps use to train pilots.

New Machine Cuts Metal with Laser Focus

It's not quite a lightsaber, but a new laser cutting machine is turning FRCSE's sheet metal mechanics into the Jedi of their trade.

The Amada Fiber Laser gives the Navy aviation maintenance, repair and overhaul facility an efficient new way to cut thin metals like aluminum that make up such a large part of its workload.

"Ninety percent of what we cut is aluminum," said John Montgomery, a sheet metal mechanic. "But [the new laser] can also cut cold-rolled steel, stainless steel and titanium."

Though the laser cutting machine is capable of cutting quickly—up to 1,000 parts per hour—it's also accurate.

"The cut quality is really good," said another sheet metal mechanic, Andrew Green. "The fiber laser cut-quality is better than our old laser cutter."

The usual margin of error on a part is 0.030 inches. The fiber laser cutter can cut down to 0.001 inches.

In addition, the machine also works well with some of FRCSE's milling processes. Chemical milling was introduced by the facility's materials lab in 2015. The process uses a

U.S. Navy photo by Clifford Davis

Sheet metal mechanic John Montgomery watches the progress of FRCSE's new fiber laser cutter on the machine's monitor.

chemical bath to eat away a desired portion of metal. However, any scratches on the metal can be exacerbated by the chemicals.

The new laser cutter doesn't produce such scratches.

"On our old [cutting] machine, the material moved and the cutting head was fixed," said Josh Brown, also a sheet metal mechanic. "That would sometimes cause scratches as the material was moved. On this machine, the material stays stationary and the cutting head moves."

The laser is also capable of varying its cutting depth.

"Now we can include the etching in with the program for the part and do the cutting and etching without ever taking it off the machine," Brown said.

Though there's always a learning curve with new technology, the laser cutter is already proving its worth to the artisans who operate it.

"I know this can handle anything we throw at it," Montgomery said.

Clifford Davis is a communication specialist with Fleet Readiness Center Southeast Public Affairs.

U.S. Navy photo by Clifford Davis

FRCSE sheet metal worker Josh Brown shows the etchings performed on the facility's new fiber laser cutter on a part template. What used to require two machines can now be done on a single laser cutter.

U.S. Navy photo

FRCSE tool designer Randy Meeker removes a part he printed on the plant's new Fortus 900 3-D printer Feb. 13.

FRCSE Doubles Down on 3-D Printing

The nozzle danced nimbly about as it dispensed a molten composite mixture behind a clear glass door. Lights flickered in the back of the machine's spacious inner chamber.

The sleek, newly installed 3-D printers at Fleet Readiness Center Southeast (FRCSE) expand on the burgeoning additive manufacturing capability of the Naval Aviation maintenance, repair and overhaul facility.

"This new machine is capable of printing parts that are more than twice as large as our old machine, which we'll still use for the smaller pieces," said FRCSE tool designer Randy Meeker.

The facility got its first 3-D printer in 2014. Since then, plant employees, engineers and supervisors have found more and more uses for its products.

"Demand for 3-D printed pieces has really taken off," Meeker said. "In just the last 15 months, I've printed more than 1,000 pieces."

Meeker has printed everything from a piece of air-duct tubing for a T-44 Pegasus trainer jet to a debris cover for the F414 engine that powers the F/A-18 Super Hornet. Whether it's printing a part for performance or safety, the new technology accelerates the manufacturing process.

"Turnaround time is the major improvement," he said. "You can print a part in a matter of hours and, if it doesn't fit or is designed wrong, you can just fix the design and print another one."

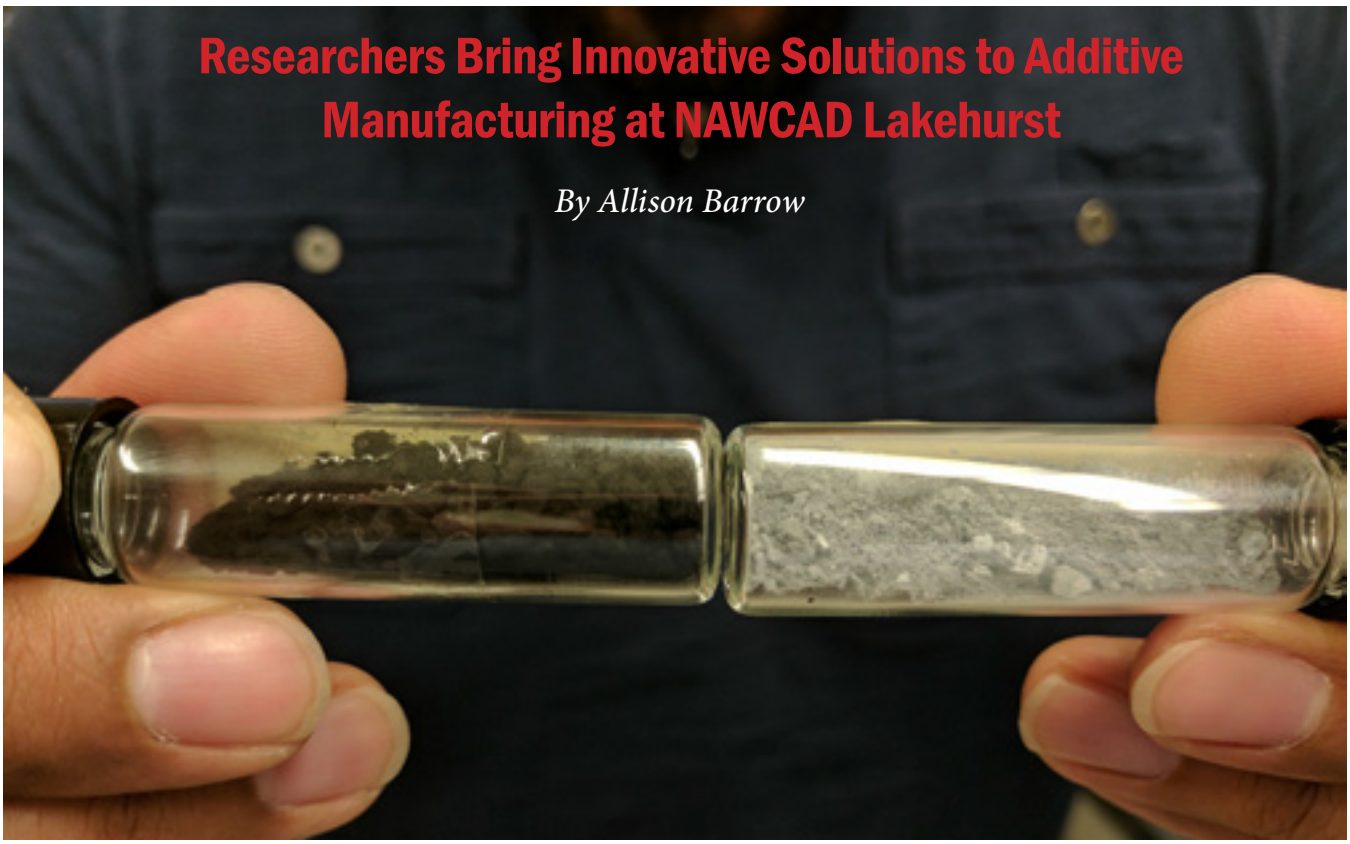
In front of the machines stands a table with examples of the different pieces Meeker has designed and printed. Behind each one is a story of a problem solved or process quickened.

"If you have to manually make a form block or a drill tooling or line a machine up on holes, I can print something that will make that process faster," he said.

Clifford Davis is a communication specialist with Fleet Readiness Center Southeast Public Affairs.

Additive Manufacturing:

Nanotubes Strengthen Composite Metals



U.S. Navy photo

A side-by-side comparison of the aluminum alloy powder with carbon nanotubes (CNTs) grown on the particle surfaces, left, and a virgin aluminum alloy powder, right.

A team of four engineers from Naval Air Warfare Center Aircraft Division (NAWCAD) Lakehurst have enhanced additive manufacturing (AM) capabilities at the base through their research into using a new type of metal-based powder to 3-D print composite aircraft parts.

"Team INCANTATION" conducted research and testing as part of the six-month Naval Air Systems Command (NAVAIR) Innovation Challenge to determine if composite metal powders could be used in AM, more commonly known as 3-D printing.

"With additive manufacturing we can explore new ways to produce and repair aviation parts in order to deliver those products more efficiently to our Sailors and Marines who need them to complete their missions," said Kathleen P. Donnelly, director of NAVAIR's Support Equipment (SE) and Aircraft Launch and Recovery Equipment (ALRE) Department. "I commend the team for their innovative thinking and dedication to finding new ways to bring speed to the fleet."

Traditionally, 3-D printed aircraft parts have been made using titanium metal powders, which are mechanically strong but dense and heavy compared to a lighter metals like aluminum, said Ron Poveda,

"The team's time and efforts resulted in the successful printing of a cohesive test build using the composite aluminum metal powder, supporting their theory that 3-D printing composite metals was possible."

U.S. Navy photo

A close-up of gas flow verification using water as part of the process to grow the CNTs.

NAWCAD Lakehurst Science and Technology (S&T) research engineer.

Poveda proposed a research project to look at introducing carbon nanotubes (CNTs), a nanomaterial, into an aluminum powder to potentially increase its mechanical strength, electrical conductivity and thermal stability.

"When you add carbon-based reinforcing materials to anything, it usually makes for a more thermally-stable structure," Poveda said. "That's beneficial due to the fact that the Navy uses their structures and systems in a variety of environments. If we can actually control the properties of a given printed part just by introducing these nanotubes, it would be of great advantage to the Navy."

An aluminum alloy-based composite would also be lighter and cheaper than the standard Aircraft Grade Titanium, said Patrick Thompson, NAWCAD Lakehurst mechanical engineer.

"If you could get the properties of the titanium out of aluminum, but keep it lighter and cheaper, then that's an advantage," he said.

The team used funding from the Innovation Challenge to establish a Cooperative Research and Development Agreement (CRADA) with a New Jersey Institute of Technology professor to grow the CNTs on an aluminum alloy powder.

Mixing of CNTs with metal powders has been done in the past through the use of chemical additives and mechanical mixing, said Mike Rossini, NAWCAD Lakehurst mechanical engineer. However, the team was able to grow the CNTs organically on the surface of aluminum alloy powder without using additives through a process called chemical vapor deposition.

"That in and of itself is very helpful in terms of obtaining more optimized properties because the distribution of CNTs is even throughout the entire material," Poveda said. "You don't have any small-scale stress points within the material itself that could cause early failure."

The team then set out to create test builds from the composite aluminum metal powder using a 3-D printer in the NAWCAD Lakehurst AM facility. However, since this was the first time a metal-matrix composite with CNTs grown directly on a metallic powder surface would be 3-D printed, the team had to first be sure the process adhered to government safety and environmental policy, said Igor Bezsonov, NAWCAD Lakehurst systems engineer.

"One of the things that we really had to overcome to even use the machine, is we had to basically explain to safety what these carbon nanotubes are, how they will affect the machine to the best of our knowledge, and what health hazards they posed," Bezsonov said.

The team had to verify that printing the composite aluminum powder wouldn't harm the printer, which had previously only printed in pure metallic alloys, such as titanium and steel.

"We worked very closely with them to make sure it wasn't going to harm the machine and what properties we should use to make sure it was all going to work out okay," Rossini said.

They worked with various government and academia partners to achieve the required safety, occupational health and environmental standards and made them part of a standard operating procedure.

What resulted not only allowed the team to conduct their research, but opened the door for the base to start experimenting with 3-D printing of aluminum alloys and metal-matrix composites.

Other research into using aluminum powder for AM has already started as a result of this added-base capability, Rossini said.

"This work is leading toward a fundamental grasp of these kinds of materials and getting more comfortable with them and being able to use them on a widespread level," Thompson said.

The team and AM group agree that as material properties and databases for AM parts continue to evolve, such research can expand on the fundamentals of metal composites and will inform their use-case on future parts, structures and systems.

The team's time and efforts resulted in the successful printing of a cohesive test build using the composite aluminum metal powder, supporting their theory that 3-D printing composite metals is possible.

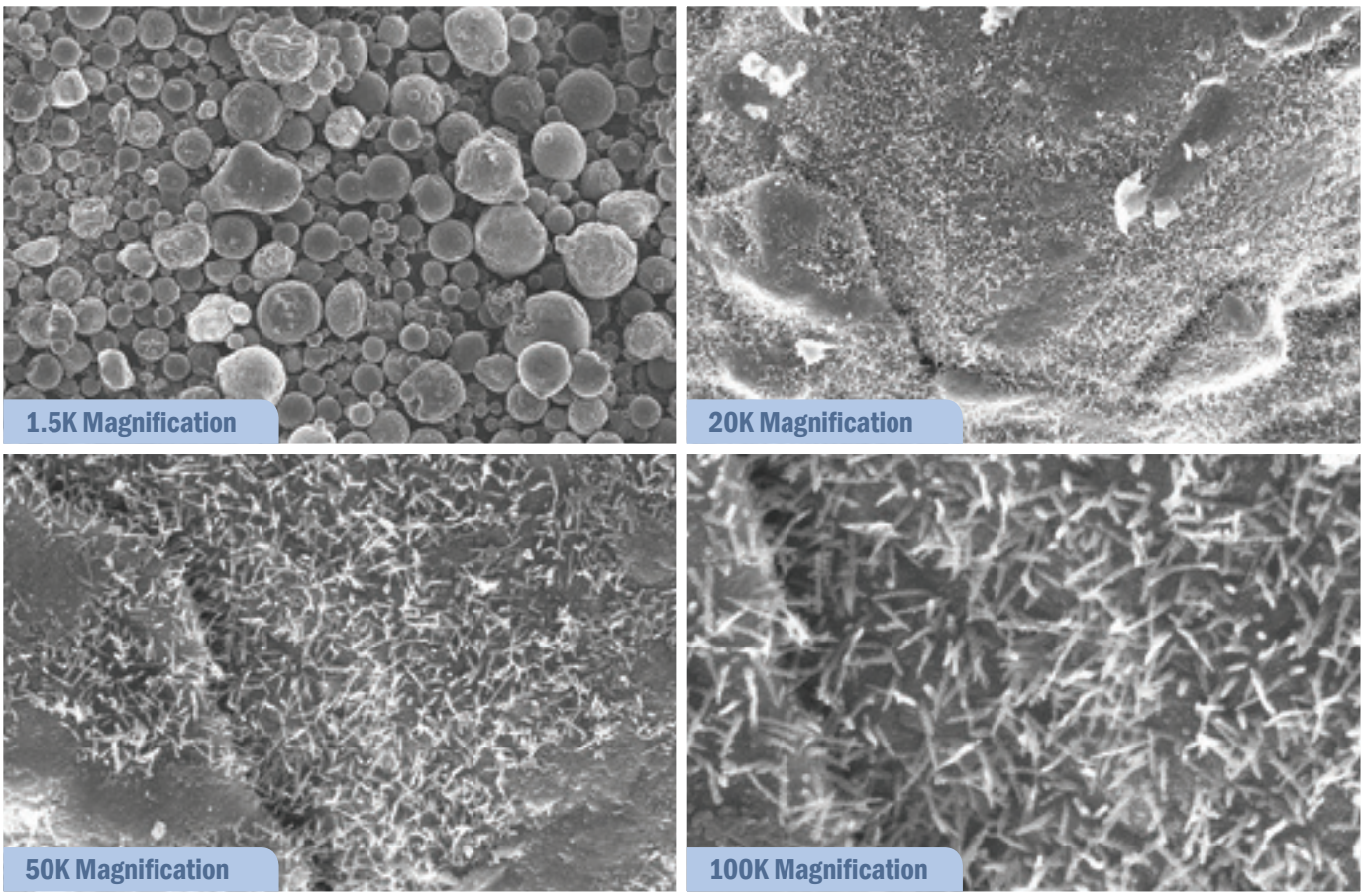
Now that the team has proven the feasibility of printing metal matrix composites through AM, they are planning to refine the process and conduct further studies through a three-year Section 219 project.

"One of the advantages that's easy to imagine is that by adding these carbon nanotubes—which are very strong and very light—to metal, they can make the metal stronger without adding much more weight. One can also reduce the amount of metal needed to create parts, and with the addition of carbon nanotubes, one can make the combination the same strength as the metal would be by itself," Bezsonov said.

The team is also expanding their network, working with labs across the DOD and academia to combine their knowledge in AM.

"Design requirements are becoming much more demanding these days. People, including the Navy, want lightweight with increased strength and allowing ourselves to have this mix of materials will help get us to that point," Poveda said.

Allison Barrow is the Naval Air Warfare Center Aircraft Division Lakehurst Public Affairs Officer.



U.S. Navy photo

Scanning electron microscope of AlSi10Mg powder with CNTs grown on surface.

Point Mugu Sailors Showcase Successes for NAE Leaders

By Mark Carpowich

Naval Aviation leaders joined forces at Naval Base Ventura County, California, March 7 with Sailors from Fleet Readiness Center Southwest Det. at Point Mugu for the first Boots-on-the-Ground (BoG) event of 2018.

The event was one of a handful of annual BoG site visits by senior leadership from the Naval Aviation Enterprise (NAE). They're meant to stimulate engagement between leadership and Sailors and Marines, promote awareness of readiness challenges and showcase the accomplishments of workers on site.

"All the Sailors were just so impressive, it just reinvigorates your confidence in our Navy," said Vice Adm. De Wolfe Miller, commander, Naval Air Forces. "To be here and interact with Sailors, it just pumps you up, because they're so good."

The event got under way at the command's power plants work center, which was recently tasked with doubling its production of engines for fiscal 2018. Petty Officer 1st Class Ada Jurado, an aviation machinist mate, presented the work center's challenges via storyboards, depicting possible solutions such as an increase in billets and a larger contract field team for leaders from the Navy, Marine Corps and Air Force to help bring to fruition.

"Having face-to-face communication with the folks, the process owners of all the things that are going on within the enterprise, is huge," said Brig. Gen. Linda Hurry, who as commander of Defense Logistics Agency-Aviation was attending her first BoG event. "The fact that folks who can actually make decisions are sitting side by side—I thought it was a great opportunity."

NAE leaders also visited a new composite shop, where Miller and Rear Adm. Michael Zarkowski, commander, Fleet Readiness Centers, cut the ribbon to make its opening official. At this building, Sailors will support the MQ-4C Triton unmanned aerial vehicle program, using equipment that includes curing ovens, deep freezers for hazardous-material storage and a sanding booth.

The command tour also included a stop at a work center dedicated to parts repair, where Petty Officer 2nd Class Jesus Mata, an aviation structural mechanic,

U.S. Navy photos by Mark Carpowich

Rear Adm. Duke Heinz, commander, Naval Supply System Command-Weapon Systems Support, was briefed by Aviation Machinist Mate Petty Officer 1st Class Ada Jurado at the power plants work center, which was recently tasked with doubling its engine production.

Brig. Gen. Linda Hurry, commander, Defense Logistics Agency-Aviation, was the highest ranking Air Force officer at the Boots-on-the-Ground event, where she and NAE leaders were briefed by Aviation Structural Mechanic Petty Officer 2nd Class Jesus Mata.

laid out the need for newer parts and tools as well as manpower. Working within current constraints, the Sailors here have achieved nearly $5 million in cost savings by refusing to discard parts to beyond-capable-maintenance (BCM) status.

"We want to be able to show that off—that's a lot of good stuff that's going on," said Cmdr. Shannon Thompson, the detachment's officer in charge. "Other facilities aren't doing that. These Sailors' mindset is, before they BCM it, they say, 'How do we get to yes?'"

At the new test cell facility, NAE leaders learned how Sailors used their ingenuity to somehow fit an eight-blade propeller through a doorway designed to accommodate a four-blade model. At the support equipment work center, Petty Officer 2nd Class Maria Ancho, an aviation support equipment technician, showed a new approach to corrosion control that could prolong the life of parts and equipment.

The NAE leadership also toured the flight line, where they got a firsthand look at E-2C Hawkeye aircraft attached to Carrier Airborne Early Warning Squadron (VAW) 115, which recently relocated from Japan to Point Mugu. Crews here are tackling two planes with major maintenance issues that have kept them grounded for years. Their hard work made an impact on the visitors.

"I was very impressed by those maintainers' Herculean effort, building those two aircraft," said Rear Adm. Duke Heinz, who leads Naval Supply System Command-Weapon Systems Support. "We've got the same effort at (Naval Air Station) Lemoore. So, this is another opportunity for the enterprise to learn collectively and apply those lessons."

By the time the event had ended, NAE leaders had already resolved some of the issues raised, and assigned action items for others that could not be handled on the spot. Miller, who was attending his first BoG event since becoming the Navy's Air Boss in January, was pleased but not surprised by what was accomplished.

"Working within current constraints, the Sailors here have achieved nearly $5 million in cost savings by refusing to discard parts to beyond-capable-maintenance (BCM) status."

Aviation Machinist Mate Petty Officer 1st Class Aurea Santos works at the command's test cell, where she told Vice Adm. De Wolfe Miller, commander, Naval Air Forces, about the four- and eight-blade propellers inside.

"Because we had the right people here, we were able to fix some problems, and then take others for action that we'll work on," he said. "And that is the whole idea of pushing away from your desk, getting boots on ground, and seeing and observing."

Miller said he could now see why the BoG program enjoys such an estimable reputation.

"I'm leaving here very pleased with what we accomplished," he said. "But I'm even more excited with some of the challenges that we're going to bring back and work on."

Mark Carpowich is a communications specialist supporting Naval Aviation Enterprise Public Affairs.

U.S. Navy photos by Mark Carpowich

Left, Rear Adm. Michael Zarkowski, commander, Fleet Readiness Centers, met Carrier Airborne Early Warning Squadron 115 maintainers who are rebuilding long-term-down aircraft.

Ancho Recognized for Making Impact

When she checked in at Naval Base Ventura County in 2015, AS2(AW) Maria Ancho couldn't believe her luck. With orders that did not specify a job at her new duty station, Ancho found herself with a leadership opportunity so rare for someone at her pay grade, she felt like she had struck gold.

"I'm from a gold-mining town, so during the summers I would work at the gold mine doing warehouse work, logistics," she said. "I was the supply person for everything."

The Nevada native eventually left the underground mines for the high seas, however, and six years after enlisting as an aviation support equipment technician was presented the Naval Aviation Enterprise (NAE) Excellence Award at a March 2018 Boots-on-the-Ground (BoG) event. The Navy's Air Boss, Vice Adm. DeWolfe Miller, presented the award in person, commending Ancho for "making a positive and lasting impact on the NAE."

In taking on a leadership role with the base's Continuous Process Improvement (CPI) office that's usually reserved for more senior Sailors, Ancho immediately showcased an impressive array of training and mentoring skills. Sharing her knowledge of CPI and its executable DoD-designated program, AIRSpeed, with hundreds of aviators and ground crews, Ancho created and instituted a training-timeline change that has since led to an 86-percent increase in green-belt certifications at the base's Fleet Readiness Center Southwest (FRCSW) detachment.

Vice Adm. DeWolfe Miller presented the NAE Excellence Award to Aviation Support Equipment Technician Petty Officer 1st Class Maria Ancho, who developed a successful training program for Sailors at the command.

"When I was put into that leadership role right off the bat, I kind of thought, 'OK, well either this can go down and it'll be my fault, or we can take AIRSpeed and make it into something much better,'" she said. "I really fell in love with everything that AIRSpeed and Continuous Process Improvement embodies, and my peers have told me that, because I love it so much, I kind of make other people fall in love with it too."

AD2(AW) Tessa Hood is one of them, having earned her green-belt certification under Ancho earlier this year. Noting her mentor's "ability to teach on the fly and demonstrate how failures are room for improvement," Hood is one of nearly 300 service members to complete training under Ancho's watch. Praise also comes from above—Ancho's division officer, Lt.j.g. Joshua Deitrick, credits her with leading a $4.6 million re-stock of unused test equipment, calling her "a Fortune 500 in a Navy billet."

Having once worked with gold, Ancho is hoping her next assignment will be with the blue-and-gold: she has submitted a package to work with the Blue Angels, and if successful will report to Naval Air Station Pensacola this summer. She also expects to finish her bachelor's degree by the end of the year and may soon add another chevron to her uniform: she is currently eligible for a promotion to first class petty officer. It could be a busy year, then, for Ancho—but if there's anything she loves more than CPI, it's a challenge.

Professional Reading

By Cmdr. Peter Mersky, USNR (Ret.)

MiG-21 Aces of the Vietnam War, By Istvan Toperczer Osprey Publishing, Ltd. 2017

When the Soviet Union's MiG-21 appeared in the early 1960s, very little was known in the west about the aircraft, which was typical of such designs from the USSR. Grainy, blurry photos of the aircraft in parades and aerial displays did little to shed light on the design and capabilities of this unique, delta-winged fighter.

In his opening paragraphs of "MiG-21 Aces of the Vietnam War," author Dr. Istvan Toperczer notes the aircraft was nicknamed "balalaika" after the iconic Russian string instrument. (I must admit, I had never heard the nickname applied to this MiG before, but a planform view of the fighter does bear some resemblance to the instrument's triangular body.)

A flight surgeon in the Hungarian Air Force, Toperczer has in recent years made a name for himself with his writing on the topic of North Vietnamese aviation during the Vietnam War. For this latest work, he was granted unique access to Vietnamese archives as well as veteran MiG pilots and aces.

In the text, Toperczer recounts how the MiG-21 was first brought to North Vietnam and how its use and tactics developed. At first, its North Vietnamese pilots were advised not to engage American F-8s and F-4s. Losing even one of the precious new fighters was to be avoided.

However, when pilots were given more leeway or simply found themselves forced to fight the redoubtable U.S. fighters, preliminary tactics quickly proved untenable, and they had to confront their enemy as best they could. It's amazing how many pilots made ejections after their MiGs were shot out from under them and yet still went on to score enough kills to become aces.

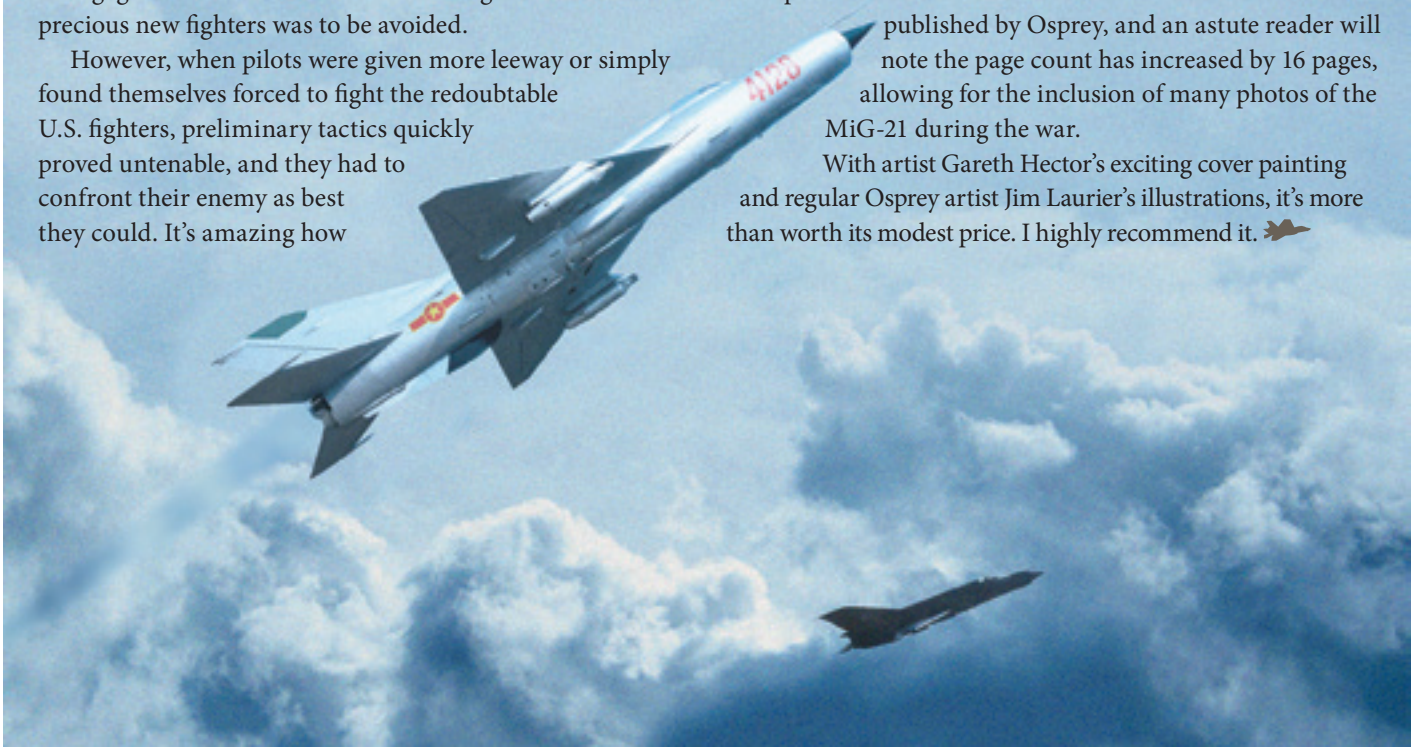
A number of those kills were, in all honesty, kills of Ryan Firebee drones, U.S. target drones developed by the Ryan Aeronautical Company, the unarmed predecessors of today's unmanned aerial vehicles. (Yet, given how difficult it is to shoot down an aerial target moving at high speed, they nonetheless deserve their due.)

Interestingly, many of the kills claimed by the North Vietnamese have not been corroborated by American records. Either the date was incorrect or the MiG encounter never happened—as far as the U.S. is concerned—or the American aircraft was downed by a surface-to-air-missile (SAM) or antiaircraft fire.

A large number of the kills claimed by MiG-21 pilots were of U.S. Air Force F-4s and F-105s, although the pilots of the MiG-21 claimed more than a few kills of U.S. Navy aircraft. (One Marine F-4J was destroyed by a MiG-21 in 1972.)

This new title could very well be the best of the books written by Toperczer about North Vietnamese MiGs and their pilots. The book is more than a rehash of earlier works published by Osprey, and an astute reader will note the page count has increased by 16 pages, allowing for the inclusion of many photos of the MiG-21 during the war.

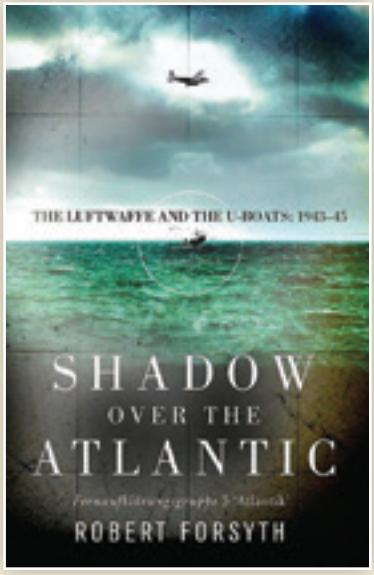
With artist Gareth Hector's exciting cover painting and regular Osprey artist Jim Laurier's illustrations, it's more than worth its modest price. I highly recommend it.



Shadow Over the Atlantic, the Luftwaffe and the U-Boats: 1943-45.

By Robert Forsyth

Osprey Publishing, UK. 2017



Many students of World War II history may assume that the U-Boat threat was over by 1943. It wasn't. Even after the so-called 1940-1942 Battle of the Atlantic, which pitted German submarines and their crews against the lightly defended Allied convoys, the German wolf packs were still operating and ready for the fight.

However, the Allied effort had indeed cut into the heart of the Nazi fleets, sinking 783 U-Boats. In the aftermath, Germany had to adopt new tactics and equipment. It is this resuscitation of the wolf packs that Robert Forsyth covers in his new book "Shadow Over the Atlantic, the Luftwaffe and the U-Boats: 1943-45."

In the first years of the war, the German Focke Wulf 200 Condor had caused the Allies, especially the British, much anguish, attacking Allied shipping convoys as they crossed the Atlantic. But by 1943, the convoys were protected by a better equipped armada of capable, long range American and British B-24s and B-17s and British Sunderlands.

Moreover, after the Battle of the Atlantic, the Germans could no longer rely on as great a number of U-Boats as they could early on, which meant they now required more accurate intelligence on the locations and routes of the convoys.

Germany's FW 200 served long and well but the aircraft reached the end of its usefulness by late 1943, although a few of the aircraft flew the occasional mission when not enough of the big Junkers that succeeded them were available. Like the FW 200, its successors, the Junkers 290 and 390, were huge, four-engine Luftwaffe aircraft conceived as heavy transports.

As Forsyth describes in his narrative, the missions undertaken by the various 290 and 390 units became increasingly difficult over the course of the war. They were even forced to deal with hardcore units of the French resistance that made sapper attacks against the German squadrons still operating on French territory.

Forsyth provides coverage of special ops missions, describing Geremany's introduction of the jet bomber and reconnaissance aircraft Ar 234 Blitz (Lightning) in the last months of the war. Forsyth focuses less on the individual missions than Germany's overall strategy of deploying jet technology in attacks against vital bridges to hinder Allied advances.

As the war approached its inevitable end, it became clear the Allies were on the continent to stay, and Germany's U-Boats were becoming obsolete. The end of the Junker 290 story was understandably disorganized as it took place as the German military unraveled in the final weeks of the war's conflict in the European theater.

Admittedly, this is a somewhat esoteric book, but it certainly bridges a significant gap in late-war aviation. The story has never been told in such detail. The book contains a folio of interesting photos, as well as several profiles of these unusual German aircraft and the men who flew them.

Squadron Spotlight

Electronic Attack Squadron (VAQ) 134 "Garudas"

Established: June 7, 1969

Based: Naval Air Station (NAS) Whidbey Island, Washington

Current Commanding Officer: Cmdr. Robert H. Eastman III

Mission(s): ***Provide world wide deployable, combat-ready aircraft to deliver airborne electronic attack effects in order to deny, degrade and destroy the enemy's use of the electromagnetic spectrum in support of joint and coalition forces and U.S. national interests.***

Brief History: According to Hindu legend, Garuda is the bird Vishnu rode on his quests to protect God's creation from evil forces that sought to destroy it. The Garudas originally flew the EA-3B Skywarrior until 1971. In 1972, they were reactivated as an EA-6B Prowler squadron and moved from NAS Alameda, California, to NAS Whidbey Island. Assigned to USS Constellation (CV 64), they embarked in 1973 on their inaugural EA-6B deployment to the Western Pacific. The squadron subsequently deployed aboard USS Forrestal (CV 59) in 1975, USS Enterprise (CV 65) in 1976, USS Nimitz (CVN 68) in 1980, again on Constellation in 1981 and USS Carl Vinson (CVN 70) in 1983. They supported operations Desert Shield and Desert Storm in 1990-1991, then joined USS Kitty Hawk (CV 63) supporting Operation Southern Watch. The Garudas transitioned into an expeditionary squadron in 1995, deploying to Marine Corps Air Station Iwakuni, Japan.

As an expeditionary unit, VAQ-134 supported operations Northern Watch, Southern Watch, Allied Force, Enduring Freedom and the global war on terror in 2004. From 2009 to 2012, they resumed carrier operations aboard Vinson and USS George H.W. Bush (CVN 77) in support of Operation Enduring Freedom.

In 2014, the Garudas deployed with Carrier Air Wing 8 in support of the historic Afghanistan elections, as well as multi national strikes in Syria. Following this successful deployment, VAQ-134 began the transition from the EA-6B to the EA-18G. The Garudas closed out the great history of the EA-6B in June 2015, culminating with a sunset celebration and the final Navy Prowler flight to Pt. Mugu, California.

After officially transitioning to the Growler, VAQ-134 commenced a workup cycle that included participation in multiple joint, large-force exercises. Last August, the Garudas embarked on their maiden Growler deployment to Misawa, Japan. While deployed, VAQ-134 took part in Exercise Vigilant Ace at Osan Air Base, Korea, one of the largest and most geopolitically significant exercises in recent years, with more than 250 joint and coalition aircraft participating. Between flight operations in Japan, South Korea and Guam, the Garudas enhanced their skills by integrating with multiple foreign assets over the course of their deployment. In February, the Garudas returned home to Whidbey Island, completing their first expeditionary Growler deployment, ushering in a new era for airborne electronic attack.

Aircraft Flown: EA-18G Growler

Number of People in Unit: 209 military personnel

Significant Accomplishments:

- 2017 Battle "E" Award
- 2017 Blue "M" Award
- 2017 Blue "H" Award
- 2017 Retention Excellence Award

U.S. Navy photo

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