NAVAL AVIATION NEWS

THE FLAGSHIP PUBLICATION OF NAVAL AVIATION SINCE 1917 FALL 2021

PROPER GEAR FIT

Crucial for Aircrew Safety

WHAT'S INSIDE

The U.S. Navy Flight Demonstration Squadron, the Blue Angels, honored USS Constitution and the city of Boston by flying through Boston Harbor on a transit flight Aug. 30.

U.S. Navy photo by MC2 Cody Hendrix

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FALL 2021 VOLUME 103, NO. 4

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ALSO IN THIS ISSUE

ON THE COVER

On the cover: *Lt. Colin Locke, a test pilot with Air Test and Evaluation Squadron (VX 23), conducts his preflight checklist in an F/A-18E Super Hornet. (U.S. Navy photo illustration by Fred Flerlage; photographic image by Adam Skoczylas)*

As part of our continuing coverage of the Navy's No. 1 safety priority, this edition features an update on mask fitting protocols for jet pilots and how a proper fitting mask can prevent physiological episodes from occurring on page 28. On page 26, the "Air Wing of the Future" deployed with USS Carl Vinson (CVN 70) joined allies from the U.K. and Japan in a training exercise to demonstrate our continuing relationships with partner nations while highlighting the Navy's newest warfighting capabilities. Many acquisition programs have adapted to complete their mission during the COVID-19 pandemic, and we highlight a couple of success stories on page 38. On page 40, learn about research efforts at the Naval Air Warfare Center Weapons Division where scientists are collaborating with many partners to take bacteria and develop it into cleaner burning and more efficient jet fuel.

On the back cover: *Chief Explosive Ordnance Disposal Technician Evan Bruce, assigned to Explosive Ordnance Disposal Training and Evaluation Unit (EODTEU) 1, jumps from a KC-130 aircraft during the parachute phase of the Maritime Insertion Course run by EODTEU-1 in San Diego, July 29. (U.S. Navy photo by MC2 Jason Isaacs)*

The U.S. Navy's Oldest Periodical, Established 1917

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Airscoop

Compiled by Andrea Watters and Rob Perry

NAVAIR Change of Command: Peters Retires, Chebi Takes the Helm

U.S. Navy photo by Peter Fitzpatrick

After reading his orders from the podium, Vice Adm. Carl Chebi, right, salutes Vice Adm. Dean Peters and assumes duties as Commander, Naval Air Systems Command on Sept. 9 at Naval Air Station Patuxent River, Maryland.

PATUXENT RIVER, Md.—Vice Adm. Carl P. Chebi relieved Vice Adm. Dean Peters as Commander, Naval Air Systems Command (NAVAIR) during a change of command ceremony Sept. 9 at Naval Air Station Patuxent River, Maryland.

Chief of Naval Operations Adm. Mike Gilday presided over the ceremony after promoting Chebi to vice admiral. During his speech, Gilday highlighted the many achievements and traits that made Peters an effective and accomplished leader.

"It's a huge responsibility," Gilday said. "Our NAVAIR enterprise is foundational to generating American naval power where it matters most—overseas. Every day, over 45,000 dedicated Sailors and civilians and contractors support eight Fleet Readiness Centers and 34 program offices across our Navy. Over the past three years, NAVAIR has delivered hundreds of new aircraft, tens of thousands of new lethal weapons, hundreds of aerial unmanned vehicles, many ground support systems for unmanned naval aviation vehicles, over 200 innovative training capabilities, repaired thousands of aircraft, thousands of aircraft engines, and hundreds of thousands of critical components to keep our fleet forward," Gilday said.

For Peters, the ceremony marked his retirement following a 36-year Navy career.

As NAVAIR commander, Peters was instrumental in leading NAVAIR into a new organizational structure known as a Mission Aligned Organization. The concept brings broader and stronger support for acquisition

program managers and Fleet Readiness Centers, strengthens relationships throughout the Naval Aviation Enterprise (NAE) and supports the priorities of the Air Boss and Deputy Commandant for Aviation.

"This mission aligned approach, as it would come to be known, would be very difficult, but absolutely necessary. We prioritized the health of Naval Aviation quality, reliability, training, and set out to make our Fleet Readiness Centers world class. We prioritized capabilities, focusing our research and test facilities on cutting-edge technologies that could be rapidly delivered to the fleet. And we prioritized affordability to ensure Naval Aviation could afford its future," Peters said.

"Although there is still much work to do and opportunities for improvement in every area, significant progress has been made—better quality, high reliability, readiness, faster transactions, reduced costs and more equipment down range where it's needed. The credit is to you, our talented NAVAIR workforce and leadership teams."

Peters shared examples of the exemplary work, resilience and grit demonstrated by those under his command during two very trying events—the first being the response to back-to-back earthquakes that occurred in July 2019 at Naval Air Weapons Station China Lake, California, and the more recent challenges posed by the COVID-19 pandemic.

"In spite of COVID, you all met and exceeded all commitments and did it faster than ever before," he said.

Peters then introduced his successor saying, "I commend to you Vice Adm. Carl Chebi, an experienced aviator, acquisition professional, a gifted engineer and program manager. He will absolutely lead NAVAIR to the next level in support of Naval Aviation. I ask only that you give him the same support and responsiveness that you provided me."

"To the men and women of NAVAIR, I could not be happier rejoining this team," Chebi said.

"Our success is defined by delivering the right capability at the right cost, at the right time to ensure the fleet can successfully execute their mission and return home safely. Our job is clear, we must deliver integrated warfighting capability that is dominant, affordable and available. We must deliver that capability on an accelerated timeline.

"Our success depends on people and partnerships. Our combined military, civilian and industry teammates can and must work together with a sense of urgency to deliver the naval power our nation needs to fight and win today and into the future. We have a big job ahead of us and the right people on the team to get it done."

Written by Rob Perry, an editor and staff writer for Naval Aviation News.

U.S. Navy photo by Kaitlin Wicker

Air Test and Evaluation Squadron (HX) 21 Commanding Officer Cmdr. Daniel Short, and HX-21's TH-57 Platform Coordinator and Assistant Operations Officer Timothy Burke congratulate Vice Adm. Peters after his final flight as a naval aviator.

MQ-25 Conducts First Air-to-Air Refueling with F-35C

PATUXENT RIVER, Md.—The Navy's Unmanned Carrier Aviation program completed its first aerial refueling of an F-35C Lightning II aircraft by the Boeing-owned MQ-25 Stingray test asset, known as T1, as part of the Navy's broader initiative to field unmanned systems that transform and enhance the fleet's capability, capacity and lethality.

The integrated Navy and Boeing MQ-25 team, in coordination with the F-35 program, conducted the refueling flight Sept. 13 near MidAmerica St. Louis Airport in Mascoutah, Illinois.

"Every T1 flight with another type/model/series aircraft gets us one step closer to rapidly delivering a fully mission-capable MQ-25 to the fleet," said Capt. Chad Reed, the Navy's program manager. "Stingray's unmatched refueling capability is going to increase the Navy's power projection and provide operational flexibility to the carrier strike group commanders."

This event marked the third refueling flight for the T1 test aircraft. The second aerial refueling flight occurred on Aug. 18 when T1 transferred fuel to an E-2D, which was upgraded with an aerial refueling capability in 2019. Earlier this summer, the program completed unmanned refueling missions with an F/A-18F Super Hornet.

During the three-hour flight, a Navy F-35C pilot from Air Test and Evaluation Squadron (VX) 23 approached T1, performed formation evaluations, wake surveys and drogue tracking and plugged with the MQ-25 test asset at 225 knots calibrated airspeed (KCAS) and an altitude of 10,000 feet. From the ground control station, an air vehicle

Photo courtesy of The Boeing Company

MQ-25 test asset, known as T1, conducts its first aerial refueling test flight with an F-35C Lightning II Sept. 13 near MidAmerica St. Louis Airport in Mascoutah, Ill.

operator then initiated the fuel transfer from T1's aerial refueling store to the F-35C.

Once operational, MQ-25 will refuel every receiver-capable carrier-based aircraft. Each unique aircraft platform will have a different aerodynamic interaction in the wake of MQ-25. Conducting refueling test missions with various aircraft allows the program to analyze data and determine if any adjustments to guidance and control are required.

"Each aircraft platform is aerodynamically unique so how they respond in the wake of a tanker is different. Flying different aircraft behind the MQ-25 lets us assess how they will interact," Reed said.

Following this flight, T1 will enter into a modification period to integrate the deck handling system in preparation for a shipboard demonstration this winter. To date, T1 has conducted 36 flights, providing the program with valuable information on aerodynamics, propulsion, guidance and control in advance of the MQ-25 engineering and manufacturing development aircraft deliveries.

The MQ-25 will be the first operational carrier-based unmanned aircraft and will provide critical aerial refueling and intelligence, surveillance and reconnaissance capabilities to support the Air Wing of the Future—a mix of fourth- and fifth-generation aircraft, manned and unmanned platforms and netted sensors and weapons.

Written by Jamie Haynes, communications specialist with the Unmanned Carrier Aviation Program Office.

The MQ-25 Stingray test asset conducts its first aerial refueling flight with an E-2D Advanced Hawkeye Aug. 18 at MidAmerica Airport in Illinois.

Program Office Works Quickly to Purchase E-6B Trainer

PATUXENT RIVER, Md.—The Airborne Strategic Command, Control and Communications Program Office recently purchased a retired Royal Air Force E-3D for $15 million to use as an E-6B Mercury pilot training aircraft.

The program office had been looking to acquire a dedicated training aircraft for the fleet to take the strain off using the current mission-capable E-6 aircraft.

"The training flights expose mission aircraft to significant wear-and-tear and impact their readiness and availability," said Capt. Adam Scott, program manager. "This is a great chance to work with the United Kingdom and bring a much-needed aircraft to the fleet."

Since the E-6's inception over three decades ago, the Navy has looked for ways to train pilots and keep them up to date on the airframe. Those options have included leasing several different commercial aircraft as well as using mission-capable aircraft.

For the past several years, the program has been looking for a dedicated trainer and found one when the Royal Air Force decided to retire their fleet of E-3Ds.

Both the E-3 and E-6 are militarized versions of the Boeing 707. The E-6B is a communications relay and strategic airborne command post aircraft. It provides survivable, reliable and endurable airborne command, control and communications between the National Command Authority and U.S. strategic and non-strategic forces.

When the funds became available in the National Defense Authorization Act for Fiscal Year 2021, the team moved fast.

Members of the program office went to Louisiana at the end of February to inspect the condition of the aircraft as they moved closer to acquiring it.

"This team has done a great job of moving quickly and capitalizing on this opportunity," Scott said. "It's a big win for the entire E-6 community."

The aircraft will undergo a modification before coming to Naval Air Station Patuxent River for flight testing. The goal is to have it out to the fleet by 2024. The aircraft will help reduce an estimated 600 flight hours and 2,400 landings/cycles per year from the E-6 mission aircraft.

Written by Christopher Hurd, public affairs officer for Airborne Strategic Command, Control and Communications Program.

U.S. Navy photo

Members of Airborne Strategic Command, Control and Communications Program Office conduct a material inspection of a Royal Air Force E-3D aircraft.

Navy Establishes New Helicopter Squadron

NORFOLK, Va.—The Navy established a new helicopter squadron, Helicopter Maritime Strike Squadron (HSM) 50, Oct. 1 onboard Naval Air Station (NAS) Mayport, Florida.

Primarily, HSM-50 "Valkyries" will be fully equipped with MH-60R Seahawks and will provide expeditionary aviation detachments in support of littoral combat ships and expeditionary independent deployers to meet global force management missions.

"I'm honored and humbled to have the opportunity to serve as HSM-50's first commanding officer," said Cmdr. Carolyn Peterson. "Every member of Valkyries will have a major impact as we establish this squadron from the ground floor and create a strong, resilient, combat-ready unit prepared to deploy MH-60R detachments to fight and win at sea."

Peterson, a native of Nashville, Tennessee, served in a number of assignments including tours as an instructor pilot, a helicopter initial shore assignments officer, a carrier air wing MH-60R operational squadron department head, and a joint planning officer in Anchorage, Alaska. She is a graduate of Air Force Air Command and Staff College Joint Professional Military Education Phase One, and earned a Master of Science in aeronautics: safety systems.

The MH-60R Seahawk, a versatile multi-mission platform, is used to support a number of operations spanning anti-submarine warfare, electronic warfare, surface warfare, command and control, non-combat operations, and fleet support for operations and logistics. It can also integrate mission systems with other ships to provide early warning indications of surface contacts and longer range pursuit of subsurface contacts.

U.S. Navy photo by MCS Elisha Smith

An MH-60R Seahawk helicopter, attached to the "Easy Riders" of Helicopter Maritime Strike Squadron (HSM) 37, takes off from the flight deck of guided-missile destroyer USS O'Kane (DDG 77) during flight operations in the Arabian Sea, Sept. 27.

HSM-50 is expected to conduct a formal establishment ceremony in the summer of 2022 and the squadron will fall under Helicopter Maritime Strike Wing Atlantic.

From Commander, Naval Air Force Atlantic Public Affairs.

VRM-50 Working Toward Safe for Flight Certification

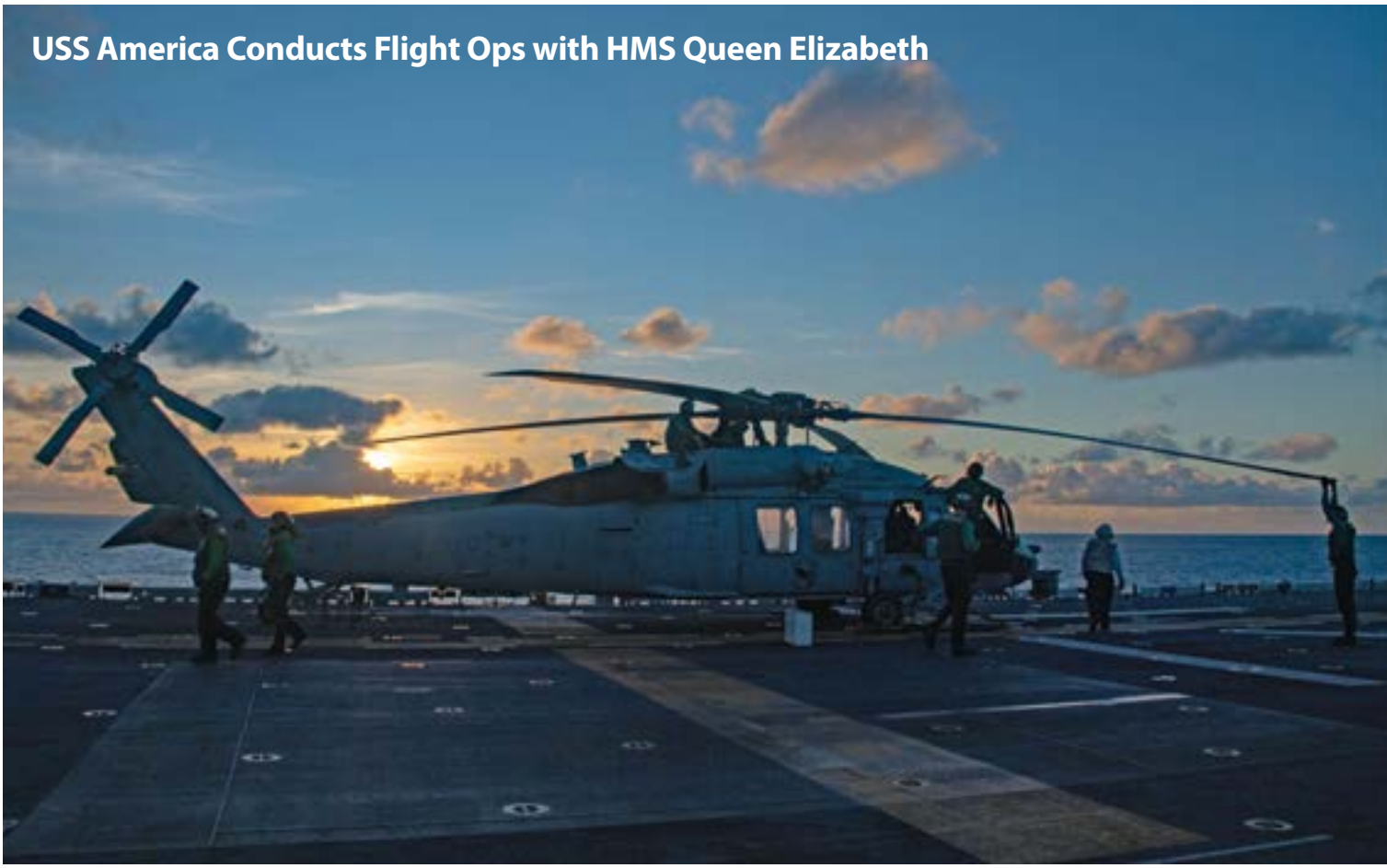
Fleet Logistics Multi-Mission Squadron (VRM) 50 is the Navy's first Osprey fleet replacement squadron whose mission is to provide Pacific and Atlantic VRM squadrons the ability to sustain lethality for carrier strike groups of the future through timely, persistent air logistics missions and by developing and delivering highly trained pilots and aircrew to the fleet. VRM-50 is currently working toward their Safe for Flight certification and expects their first class of student aviators to arrive in spring 2022.

U.S. Navy photos by MC2 Chelsea D. Meiller

Naval Aircrewman (Mechanical) 2nd Class Theo Bruno performs pre-flight before the squadron's CMV-22B Osprey inaugural flight from Naval Air Station North Island, Calif., on Sept. 21.

A CMV-22B Osprey assigned to VRM-50 prepares to launch on its inaugural flight.

USS America Conducts Flight Ops with HMS Queen Elizabeth



U.S. Navy photo by MC3 Jonathan D. Berlier

Sailors assigned to the forward-deployed amphibious assault ship USS America (LHA 6) conduct routine maintenance on an MH-60S Seahawk helicopter from Helicopter Sea Combat Squadron (HSC) 25.

PHILIPPINE SEA—USS America (LHA 6), the Navy's only forward-deployed amphibious assault ship, participated in cyclic flight operations with HMS Queen Elizabeth (R 08) in the Philippine Sea, Aug. 22-24.

The two ships conducted continuous flight operations for 48 hours, flexing dual-ship—and triple-F-35 squadron—capability, as the ships feature three F-35B Lightning II detachments.

"The two days of continuous flight operations were the culmination of several days of interoperability and maritime strike training with allied air power on America and Queen Elizabeth," said Capt. Ken Ward, America's Commanding Officer. "This interaction showcased how quickly and seamlessly the U.S. and U.K. can fold together our combined air power and execute highly intricate and sustained flight operations to devastatingly lethal effect."

America operates with a detachment of F-35s from Marine Fighter Attack Squadron (VMFA) 121, which reinforce rotary-wing and tiltrotor aircraft from Marine Medium Tiltrotor Squadron (VMM) 265 as part of the 31st Marine Expeditionary Unit (MEU). America also fields a detachment of MH-60S Seahawks from Helicopter Sea Combat Squadron (HSC) 25. Queen Elizabeth deployed with F-35s from U.S. Marine VMFA-211 and Royal Air Force No. 617 Squadron.

"Conducting exercises with ships of the U.S. Expeditionary Strike Group 7 is another milestone for HMS Queen Elizabeth," said Royal Navy Capt. Angus Essenhigh, Queen Elizabeth's Commanding Officer. "We have shown interoperability with our allies and as we get accustomed to operating in the Indo-Pacific again these relationships will be important for all future Royal Navy ships operating in the region."

The America Expeditionary Strike Group (ESG) and the Queen Elizabeth Strike Group (CSG-21) have been operating together in the Philippine Sea this month as part of Large-Scale Global Exercise (LSE) 21 and Noble Union.

America, flagship of the America Expeditionary Strike Group, along with the 31st Marine Expeditionary Unit, is operating in the U.S. 7th Fleet area of responsibility to enhance interoperability with allies and partners and serve as a ready response force to defend peace and stability in the Indo-Pacific region.

Written by Lt. John Stevens, USS America (LHA 6).

U.S. Navy photo

The Navy's Advanced Anti-Radiation Guided Missile-Extended Range (AARGM-ER) completes its first live-fire event July 19 off the coast of the Point Mugu Sea Test Range in California.

Navy's AARGM-ER to Enter Production

PATUXENT RIVER, Md.—The Navy's Advanced Anti-Radiation Guided Missile-Extended Range (AARGM-ER) received Milestone C (MS-C) approval Aug. 23, allowing the program to move into its first phase of production.

The Navy plans to award the first two Low-Rate Initial Production lots over the next several months.

"The combined government/industry team has worked tirelessly over the last few years to reach this milestone," said Capt. Alex Dutko, Direct and Time Sensitive Strike Program manager. "We look forward to getting this new weapon with its increased capability and lethality out to the fleet as soon as possible."

The MS-C decision comes two years after the Navy awarded the Engineering and Manufacturing Development contract to its prime contractor, Northrop Grumman. The team conducted the first live-fire event in July to verify system integration and rocket motor performance, as well as initiate modeling and simulation validation.

Captive and live-fire flight testing is planned to continue through 2022 and Initial Operational Capability is planned for 2023.

The Navy is integrating AARGM-ER on the F/A-18E/F Super Hornet and EA-18G Growler, and it will be compatible for integration on the F-35 Lightning II. By leveraging the Navy's AARGM program, the AARGM-ER with a new rocket motor and warhead will provide advanced capability to detect and engage enemy air defense systems.

From Program Executive Office (Unmanned Aviation & Strike Weapons) Public Affairs.

U.S. 5th Fleet Launches New Task Force to Integrate Unmanned Systems

BAHRAIN—U.S. Naval Forces Central Command (NAVCENT) established a new task force Sept. 9 to rapidly integrate unmanned systems and artificial intelligence (AI) with maritime operations in the 5th Fleet area of operations.

Task Force 59 is the first U.S. Navy task force of its kind.

The U.S. 5th Fleet region's unique geography, climate and strategic importance offer an ideal environment for innovation.

"The bottom line on why we're doing this is so that we can develop and integrate unmanned systems and AI as a means to do two things," said Vice Adm. Brad Cooper, commander of NAVCENT, U.S. 5th Fleet and Combined Maritime Forces. "One, enhance our maritime domain awareness, and two, increase deterrence."

Cooper also stated the task force would rely heavily on regional and coalition partnerships.

"The launch of Task Force 59 really invigorates our partnerships around this region as we expand our common operating picture."

Cooper appointed Capt. Michael D. Brasseur, an expert in maritime robotics, as Task Force 59's first commodore during a commissioning ceremony onboard Naval Support Activity Bahrain. Brasseur served as a founding member of the NATO Maritime Unmanned Systems Initiative prior to arriving in Bahrain.

"It's an honor to be named commander of this historic and innovative task force," Brasseur said. "As we continue to adapt and implement cutting edge technology, I fully expect our talented team will enrich and enhance the 5th Fleet mission."

Brasseur's staff includes experienced operators with region-specific expertise, including directors for unmanned systems, unmanned exercises, task force integration, cyber, AI and space, and partnership opportunities.

In the coming weeks, the task force aims to build trust and confidence in human-machine teaming through a series of operations at sea. International Maritime Exercise (IMX) 22, slated for next year, will provide NAVCENT a real-world opportunity to demonstrate the resiliency and scalability of human-machine teaming technologies.

IMX-22 will include more than 60 nations and international organizations and features the extensive use of unmanned systems in various operational scenarios designed to challenge the technology in a dynamic environment and ultimately enhance partner capabilities through manned and unmanned teaming.

The U.S. 5th Fleet area of operations encompasses nearly 2.5 million square miles of water area and includes the Arabian Gulf, Gulf of Oman, Red Sea and parts of the Indian Ocean. The region is comprised of 21 countries and includes three critical choke points at the Strait of Hormuz, the Suez Canal and the Strait of Bab-al-Mandeb at the southern tip of Yemen.

Written by Petty Officer 1st Class Roland Franklin, U.S. Naval Forces Central Command/U.S. 5th Fleet.

U.S. Navy photos by MC2 Dawson Roth

Left, Vice Adm. Brad Cooper, commander, U.S. Naval Forces Central Command, U.S. 5th Fleet and Combined Maritime Forces, shakes hands with Capt. Michael D. Brasseur, the first commodore of Task Force 59, during a commissioning ceremony onboard Naval Support Activity Bahrain.

U.S. Navy photo by Toiete Jackson

Fleet Readiness Center Southeast's first completed F-5N Tiger II takes flight from Naval Air Station Jacksonville, Fla.

Navy Upgrades F-5N Adversary Tactical Fighter

PATUXENT RIVER, Md.—The Navy's Specialized and Proven Aircraft Program Office recently delivered the first F-5N aircraft to Naval Air Station Patuxent River, Maryland, to begin ground and flight test of the F-5 block upgrade prototype project.

Aligned with the Navy's strategic imperative of increasing capability and enhancing lethality, the newly redesigned tactical fighters will include features found on modern aircraft that improve both safety and readiness.

The F-5 aircraft, performing for many years as a high altitude, high speed tactical fighter used by the Navy and Marine Corps as an adversary aggressor, lacks modern safety systems, avionics and common tactical capabilities found in modern aircraft. This F-5N aircraft is one of three F-5Ns that will be used as prototypes of the modernized cockpit, avionics and supporting aircraft architecture. These upgrades improve safety, capability and reliability, while resolving increasing obsolescence issues.

Upon successful completion of test, the program office will use these upgrades as a major element in the conversion of the 16 F-5E and six F-5F aircraft the Navy and Marine Corps recently acquired from the Swiss Air Force. The program office will convert these 22 aircraft under the Avionics Reconfiguration and Tactical Enhancement/Modernization for Inventory Standardization (ARTEMIS) program. The program office successfully completed the independent logistics assessment for the ARTEMIS Program in June and anticipates reaching a Milestone C decision in early fiscal year 2022.

"Constructive collaboration with our partners, the fleet and [the program office] team drove mission success despite the technical, schedule and management challenges of integrating 21st century technology into a 1970s airframe during the pandemic," said Boyd Forsythe, adversary team lead.

The F-5 aircraft receiving the prototype modifications will be designated F-5N+/F+. The potential risk of loss of a pilot and/or aircraft will be reduced by adding necessary instrumentation that provides air-to-ground warning, severe weather protection and fuel level warnings. This upgrade will also add tactical capabilities designed to improve "friendly" force air-to-air training.

Given the significant use of commercial-off-the-shelf components with well-defined maintenance and support equipment requirements for the prototype configured aircraft, the product support strategy will be organizational-level (O-level) to original equipment manufacturer. O-level preventive maintenance will consist of inspections, cleaning and scheduled maintenance tasks. Additionally, the O-level maintainers will load system software using currently fielded commercial off-the-shelf portable electronic maintenance aids.

From the Specialized and Proven Aircraft Program Office.

Navy Reserves Support First Osprey CSG Deployment

SAN DIEGO, Calif.—Commander, Naval Air Force Reserve (CNAFR) assisted the "Titans" of Fleet Logistics Multi-Mission Squadron (VRM) 30, Detachment (DET) 1, to become the first CMV-22B Osprey squadron to deploy with a carrier strike group (CSG) Aug. 2. The DET deployed from San Diego, California, as part of the Carl Vinson CSG.

This deployment marks a major milestone in the Navy's phased replacement of the C-2A Greyhound with the CMV-22B as its carrier onboard delivery platform.

To assist in the effort, CNAFR recruited prior active-duty Marine Corps MV-22B Osprey pilots into the Navy Reserve, specifically to help train and mentor VRM-30's active-duty pilots. These Reserve pilots also provided ground instruction and aviation logistics support.

"Our SELRES [Selected Reserve] pilots have been outstanding instructor pilots, and they've excelled in their ground jobs as well," said Cmdr. Sean Tingley, VRM-30 Reserve DET officer-in-charge. "I don't know where we'd be as a community without their ground instruction and just their overall augment to officer manning within the VRM community."

One of these SELRES pilots, Lt. Cmdr. Dan Frary, is deployed with VRM-30 DET 1 aboard Vinson.

"I feel very fortunate to be with VRM-30 and for the opportunity with DET 1," Frary said. "When I was nearing the end of my active-duty tour in the Marine Corps, I knew I wanted to continue to serve."

In addition to providing expertise in the form of experienced Osprey pilots, CNAFR is also assisting VRM-30's deployment by providing support from Navy Reserve squadrons of the Fleet Logistics Support Wing (FLSW). C-40 Clipper aircraft assigned to the "Conquistadors" of Fleet Logistics Support Squadron (VR) 57 and the "Islanders" of VR-6 transported much of the detachment's personnel and gear from San Diego to Joint Base Pearl Harbor-Hickam, Hawaii. The "Windjammers" of VR-51 and the "Globemasters" of VR-56 also provided logistics support from Hawaii to Kadena Air Base, Japan.

CNAFR's vital role in this deployment of a new Naval Aviation platform is an example of the critical support Reserve and Full Time Support Sailors provide to the Navy. According to Frary, the benefits of this relationship go the other way as well, providing Reserve Sailors with new challenges and opportunities.

"The biggest thing for me in choosing to join the Navy Reserve was learning about VRM-30's mission, and the opportunity to do something new with the V-22, as well as getting to know naval aviators," Frary said.

Written by Mass Communication Specialist 1st Class Chelsea Milburn, Commander, Naval Air Force Reserve.

U.S. Navy photo by MCS Chelsea Milburn

Sailors assigned to Fleet Logistics Multi-Mission Squadron (VRM) 30 Detachment 1 board a C-40 Clipper assigned to Fleet Logistics Support Squadron (VR) 61 at Brown Field Municipal Airport in San Diego.

A CMV-22B Osprey, assigned to VRM-30, sits on the tarmac of Kadena Air Base, Okinawa, Japan.

U.S. Navy photo by MCS David R. Krigbaum

Photo courtesy of The Boeing Company

The Navy's F/A-18F Block III Super Hornet takes to the skies over St. Louis, Mo., where 78 Block IIIs will be built.

Navy Continues Block III Super Hornet Testing, Accepts First New Production Jet

PATUXENT RIVER, Md.—The U.S. Navy accepted delivery of the first new-production Block III F/A-18 Super Hornet on Aug. 31.

The first of 78 new Super Hornets built by The Boeing Company was ferried to Air Test and Evaluation Squadron (VX) 23 at Naval Air Station Patuxent River, Maryland, for continued developmental testing. The next few Block III jets to leave the production line will head to VX-9 at Naval Air Weapons Station (NAWS) China Lake, California, to start training for operational testing, during which the aircraft will undergo evaluation in scenarios that mimic operational missions.

Since accepting delivery of Block III test jets last summer, VX-23 and VX-31, at NAWS China Lake, have put the latest configuration of the multi-mission strike fighter through its paces.

"The new aircraft has successfully completed carrier suitability testing, and a comprehensive evaluation of the new Block III mission system components is now underway," said Bob David, the F/A-18 & EA-18G Program Office's assistant program manager for test and evaluation.

VX-23 conducted shake, rattle and roll testing, which mimics the aircraft carrier environment to ensure the aircraft and each new system installed can withstand the intense forces of both a catapult-assisted launch and a ship-based arrested landing. The Block III test jet successfully completed this multi-test point in January.

"Scrutinizing these new systems in a test environment ahead of fielding to our warfighter is very important and allows the Navy to make sure the delivered system meets the requirements provided to the manufacturing contractor and that our fleet is receiving an effective, interoperable and sustainable aircraft that will support the mission," David said.

The comprehensive testing conducted by the Navy, to date, provides a high level of risk reduction, allowing refinements to be made and integrated into the production jets' hardware and software updates. Developmental and operational testing will continue through early summer next year. Boeing is contracted to deliver two Block III aircraft, per month, through the end of calendar year 2024.

Block III brings several new capabilities to the fleet and enables the F/A-18 to remain the backbone of carrier-based aviation power projection. Improvements that make Block III the most lethal and survivable F/A-18 in operation include an advanced cockpit with new, aircrew-configurable displays, advanced networking, radar signature enhancements, and a 10,000-hour service life. Additionally, the Block III's design provides expeditious growth capacity and enables ease of integration of future technologies, allowing the Super Hornet to outpace adversaries in today's dynamic threat environment.

"With the simultaneous efforts to integrate these capabilities into our new production aircraft as well as develop the retrofit kits and technical directives for incorporation into Block II aircraft during Service Life Modification, the Naval Aviation Enterprise team, as well as our industry partners, have performed tremendously to bring these capabilities online safely and efficiently," said Capt. Jason Denney, program manager.

Written by Carrie Munn, F/A-18 & EA-18G Program Office Communications.

Marine F-35B Conduct First Landing Aboard JS Izumo

IWAKUNI, Japan—At the request of the Japan Maritime Self-Defense Force (JMSDF), Marine Fighter Attack Squadron (VMFA) 242 successfully conducted the first landing of two F-35B Lightning II aircraft Oct. 3 aboard Japanese Ship Izumo (DDH 183).

Following a series of modifications to Izumo to enable short take-off and vertical landing (STOVL) operations, a capability that the B variant of the F-35 specializes in, U.S. Marines embarked aboard Izumo and worked directly with JMSDF personnel as part of a bilateral effort to ensure the capability test was both effective and safe.

"This trial has proved that Izumo has the capability to support takeoffs and landings of STOVL aircraft at sea, which will allow us to provide an additional option for air defense in the Pacific Ocean in the near future," said JMSDF Rear Adm. Shukaku Komuta, Commander of Escort Flotilla One.

Japan is one of 14 nations worldwide that participate in the Joint Strike Fighter program and announced in August 2019 that they would purchase 42 F-35B aircraft from the United States. This announcement was particularly significant since the last time Japan operated an aircraft carrier was over 75 years ago.

"We still have work to do until the day the JSDF can regularly employ STOVL aircraft at sea, but I am confident that the strong partnership and mutual trust between our two counties will result in its realization," Komuta said.

The F-35 includes the latest stealth technology and has an advanced suite of sensors that enables it to create a dynamic awareness of the battlespace. The F-35 is then able to rapidly share this information with other aircraft platforms and command centers, including those operated by multinational allies and partners, creating greater situational awareness for commanders.

"We have the utmost confidence in the Joint Strike Fighter and are eager for our Japanese allies to have the same capabilities in their hands, which ultimately contributes to our shared goal of maintaining a free and open Indo-Pacific," said Major Gen. Brian W. Cavanaugh, 1st Marine Aircraft Wing Commanding General.

VMFA-242 is one of two F-35B squadrons permanently stationed at Marine Corps Air Station Iwakuni and one of many forward-stationed units that routinely train with Japan Self-Defense Forces. The F-35B represents the United States' rebalance to the Indo-Pacific and commitment to the defense of Japan and regional security with the most capable and modern equipment in the U.S. inventory.

Written By Lance Cpl. Tyler Harmon, 1st Marine Aircraft Wing.

U.S. Marine Corps photos by Lance Cpl. Tyler Harmon

A U.S. Marine Corps F-35B Lightning II aircraft with Marine Fighter Attack Squadron (VMFA) 242 conducts a vertical landing aboard Japanese Ship Izumo (DDH 183) off the coast of Japan, Oct. 3.

Grampaw Pettibone

Gramps from Yesteryear: May-June 2001

Illustration by Ted Wilbur

Harrier harrier

Danger Zone

An AV-8B Harrier was engaged in practice close air support operations. On a previous flight that day, the pilot completed the bombing exercise without any sign of bird activity in the area. However, as he was pulling up off target after a run on the second flight, he observed a bird dead ahead of his aircraft, seemingly destined to impact his windscreen.

The pilot instantly increased his climb and the bird struck the radome instead of the windscreen. The pilot continued his climb, leveled off, turned directly toward the nearby air station and declared an emergency with approach control. Feeling vibrations in the aircraft, the pilot reduced power and signaled his wingman to check over his Harrier. The wingman reported damage to the radome and the right intake. This caused the vibrations but engine instruments were normal and the aircraft was flyable.

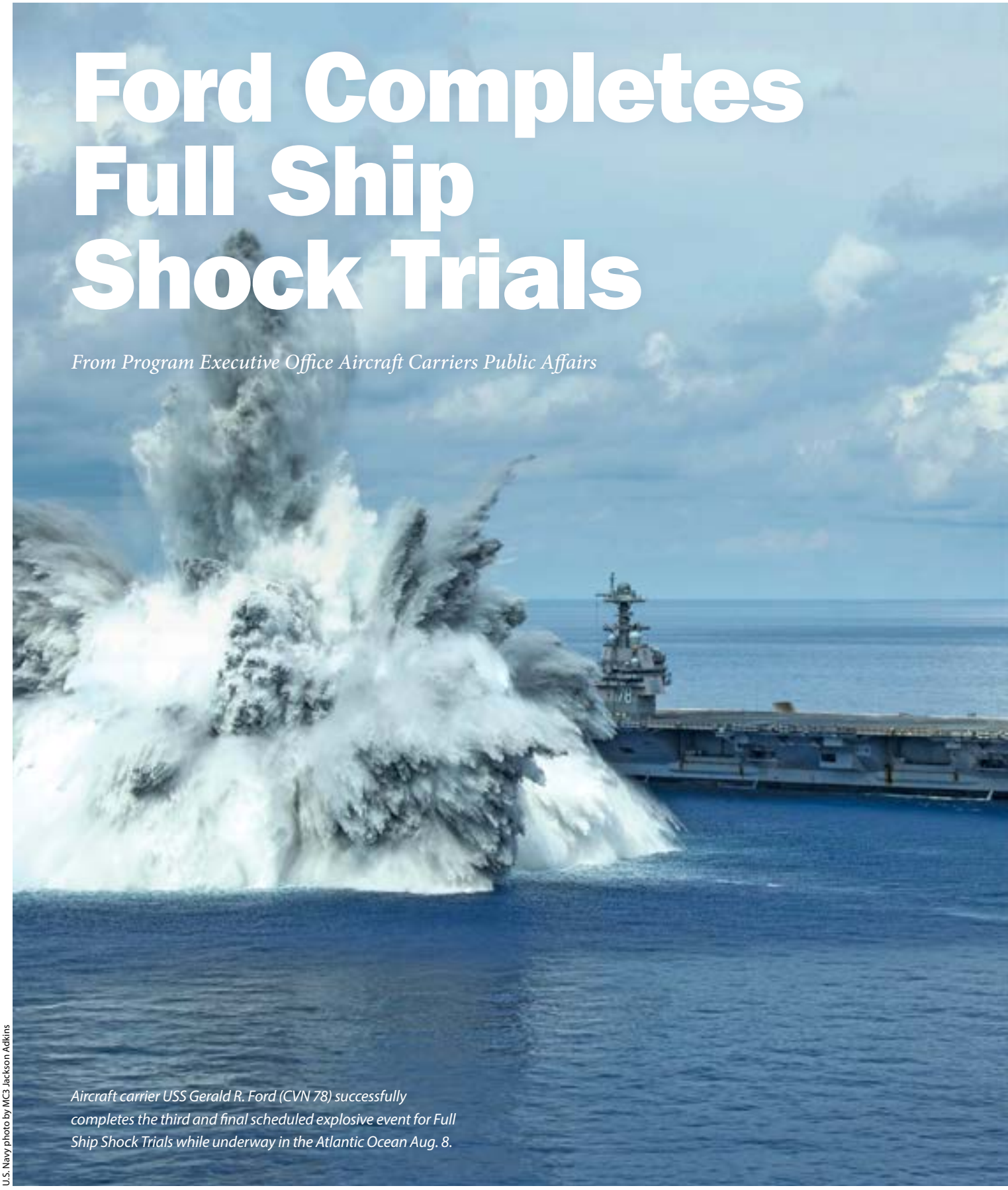
The pilot selected a fixed-power setting and successfully performed a fixed-throttle, variable-nozzle landing at the air station.

Grampaw Pettibone says . . .

David versus Goliath. But in this case Goliath won, even though David left his mark. Amazing what one of our feathered fliers can do to a big, heavy machine. The pilot did everything right, and it sure helped that his maneuver pitted the bird primarily against the radome rather than the windscreen.

Ford Completes Full Ship Shock Trials

From Program Executive Office Aircraft Carriers Public Affairs



Aircraft carrier USS Gerald R. Ford (CVN 78) successfully completes the third and final scheduled explosive event for Full Ship Shock Trials while underway in the Atlantic Ocean Aug. 8.

U.S. Navy photo by MC3 Jackson Adkins

USS Gerald R. Ford (CVN 78) successfully conducted a third explosive event Aug. 8 off the coast of Jacksonville, Florida, marking the completion of the ship's Full Ship Shock Trials (FSST).

Shock trials validate a ship's shock hardness and ability to sustain operations in a simulated combat environment using live ordnance. During the four-month testing evolution, the first-in-class aircraft carrier withstood the impact of three 40,000-pound underwater blasts, released at distances progressively closer to the ship.

"The Navy designed the Ford-class carrier using advanced computer modeling methods, testing and analysis to ensure the ships are hardened to withstand harsh battle conditions," said Capt. Brian Metcalf, manager of Future Aircraft Carrier Program Office. "These shock trials have tested the resiliency of Ford and her crew and provided extensive data used in the process of validating the shock hardness of the ship."

Metcalf said that the goal of the tests is to ensure that Ford's integrated combat systems perform as designed and added "the tests demonstrated—and proved to the crew, fairly dramatically—that the ship will be able to withstand formidable shocks and continue to operate under extreme conditions."

The Aircraft Launch and Recovery Equipment (ALRE) Program Office at Naval Air Station Patuxent River, Maryland, produces systems that touch many parts of Ford-class ships.

"We are always improving upon our systems and their interconnectivity so air operations can reliably continue in all manner of conditions—shock trials are an excellent way to prove our systems on Ford are deployment-ready," said Cmdr. Lindsey Buzzell, deputy program manager for Ford CVNs. "ALRE's 'system of systems' on Ford performed as expected during shock trials. There were no major disruptions to any ALRE systems that underwent testing."

CVN-78 returned to the Tidewater area for a six-month Planned Incremental Availability (PIA). As the PIA begins, teams will conduct additional detailed inspections, assess any damage sustained during the shots and continue modernization and maintenance work in advance of workups for the ship's deployment in 2022.

Rear Adm. James P. Downey, Program Executive Officer for Aircraft Carriers, rode the ship during the first and third shock evolutions and observed the historic trials first-hand.

"FSST has proven a critical investment in the Ford-class development," Downey said. "The ship and crew performed exceptionally in these very strenuous conditions and continued their operations throughout the shock events, demonstrating the ship's 'fight-through' capability.

"We're designing and building these aircraft carriers to sail in some of the world's most contested security environments. So, when you think about the threats to warships posed by non-contact blasts and the number of sea mines in the inventories of navies around the world, the

gravity and consequence of these shock trials really come into focus."

Downey added that the trial's ultimate success hinged on the extraordinary performance of ships' force, in coordination with crews on several surface and aviation platforms that support FSST.

"The countdown to the actual shot is choreographed down to the smallest detail, and the coordination between the ship and the other surface and aviation platforms, as well as the on-scene environmental scientists has been impressive," he said.

Balancing Combatant Testing and Environmental Mitigation

FSSTs are complex evolutions, conducted during a precise operating schedule in compliance with exacting environmental mitigation requirements, respecting known migration patterns of marine life and protected species. Ford's shock trials required exacting coordination across multiple Navy and Naval Sea Systems Command (NAVSEA) organizations and experienced FSST teams.

Prior to each shot, the FSST team notified mariners to avoid the test area and implemented extensive protocols to ensure the safety of military and civilian personnel participating in the operation. A team of more than a dozen scientists, biologists and observers was assigned to Ford, nearby support vessels and observation aircraft. Observers used high-powered lenses to detect marine life at great distances, through ocean waves and white caps.

During the sequence of events leading up to each shot, crews operated in a heightened state of watchful readiness in anticipation of the ultimate go/no-go decision, which had to be made between 4 a.m. and 8 a.m. on the day of the scheduled blast.

Ford's Commanding Officer, Capt. Paul Lanzilotta, was the tactical commander who ordered the go/no-go decision, based on the interplay of several crucial variables, such as ship and crew readiness, weather and sea state, as well as pre-set environmental mitigation measures, designed to protect any marine life spotted within the test area.

"Safety was always the driving consideration throughout the shock trials," Lanzilotta said. "So, once we were ready and in position, pausing the countdown to the shot could really test our focus and persistence."

"So many pieces had to fall into place to execute Ford's FSSTs within the testing window," Lanzilotta said. "Success required equal measures of technical expertise, trust and courage—traits you'll find in great supply on Warship 78 and throughout the entire Ford shock trial team. These shots have only strengthened my confidence in the durability of this ship, and the excellence of the crew who came out here to own it, and absolutely crushed it."

Gerald R. Ford, John F. Kennedy Sailors Team Up

By MC3 Robert Stamer

USS Gerald R. Ford (CVN 78) is a first-in-class ship with unique equipment and systems found exclusively on Ford-class aircraft carriers. The challenge of manning and operating these systems is not lost on Ford's Sailors, who routinely test the nuances and capabilities of these complex warfighting technologies.

In order to provide other Ford-class Sailors the opportunity to operate and to qualify on the new equipment, Sailors assigned to pre-commissioning unit (PCU) John F. Kennedy (CVN 79) are serving in temporarily assigned duty (TAD) billets aboard Ford in several different departments, including reactor, engineering, supply and aviation.

Sailors from Kennedy's reactor department comprised the first group sent to experience how the new systems operate and to qualify on Ford-class-specific watch stations.

"We started this partnership shortly after establishing the command by sending our reactor Sailors to train onboard Ford to gain valuable operating experience and earn qualifications," said Capt. Todd Marzano, Kennedy's Commanding Officer. "Not long after they reported, we received extremely positive feedback from those who spent time underway. And throughout the past year, we have sent many more Sailors from a number of different rates to do the same. Bottom line, we're definitely fortunate to le-

U.S. Navy photo by MC3 Zack Guth

verage first-in-class lessons learned and best practices to ensure we are fully qualified and ready to test and safely operate our equipment as we prepare JFK for delivery."

From the Electromagnetic Aircraft Launch System (EMALS) to the baking ovens in the galley, Ford-class ships boast 23 advanced technologies not found on legacy Nimitz-class aircraft carriers.

Several of the Sailors sent from Kennedy just completed accession training or "A" School, where they received technical training in their selected military occupational specialty and are now operating their equipment for the first time. Many others have years of experience working in engine rooms or on flight decks on various platforms.

Aviation Boatswain's Mate (Equipment) (ABE) 1st class Ryan Tillis, assigned to Kennedy's Air Department and previously served on USS Ronald Reagan (CVN 76), is fully qualified on steam-driven catapults, but had never launched aircraft using EMALS. He said he is working to learn the system and become fully qualified before leaving Ford.

"EMALS is completely different than what is used on other platforms," said Chief ABE Luis Linares, the catapults leading chief petty officer for Kennedy. "It's more complex in the sense that instead of using steam, we're use electromagnetic electricity to launch aircraft and there is no decreasing power from the catapult. It's a good system that is designed to be more efficient to launch aircraft faster and with less personnel during flight operations, and the aircraft maintain the same amount of speed from the beginning to the end of the launch."

The Sailors TAD from Kennedy are not merely ship-riders or trainees standing back taking notes and watching. They are launching and recovering aircraft from the flight deck, cooking meals in the conglomerate galley, and standing the watch rotation in engineering and reactor spaces, accumulating real-world, hands-on experience while working side-by-side with their Ford counterparts.

"Several of our Kennedy Sailors are on the watch bill supporting the Ford reactor department, where they are able to see technological advances that are on Ford and the differences between previous platforms," said Lt. j.g. Cheyenne Scarbrough, the reactor electrical technical assistant for Kennedy. "They are on the watch teams and are going through drills. They have also had the opportunity to go through a major inspection."

Scarbrough said she believes the experience will make Kennedy better prepared for operations.

"Every ship that comes after in this class can use Ford as the baseline," she said.

Kennedy's enlisted Sailors expressed the same sentiment and said they feel fortunate to be part of the Ford-class legacy.

"We will be part of that initial crew that started up Kennedy," Tillis said. "I'm blessed that I got picked for it because it's not often you actually get to commission a ship."

Ford and Kennedy are the first of four Ford-class ships procured by the Navy. Experience and hands-on training will continue to be essential to achieving operational readiness in the shortest amount of time as the ship class matures.

"It is great to have JFK Sailors aboard and be able to leverage our lessons learned," said Capt. Paul Lanzilotta, Ford's Commanding Officer. "It's an honor to serve alongside our Sailors who are paving the way for those that will serve on Ford-class carriers for generations to come."

Mass Communication Specialist 3rd Class Robert Stamer is temporarily assigned to USS Gerald R. Ford Public Affairs from USS George Washington (CVN 73).

Interior Communications Electrician 1st Class Jessica Mills, temporarily assigned to USS Gerald R. Ford's (CVN 78) air department, from USS John F. Kennedy (CVN 79), checks signal wires on a Jet propulsion (JP)-5 flow gate Aug. 5.

Aviation Boatswain's Mate (Equipment) 2nd Class Mario Davis, temporarily assigned to USS Gerald R. Ford's (CVN 78) air department, from USS John F. Kennedy (CVN 79), drains fluid from a barricade stanchion during routine maintenance in a barricade control room Aug. 7.

U.S. Navy photo by MC2 Zachary Melvin

CH-53K Completes First Fleet Mission

By Victoria Falcon

U.S. Marine Corps photo by Cpl. Therese Edwards

A Marine Corps CH-53K King Stallion is on the flight line at Marine Corps Air Ground Combat Center, Twentynine Palms, Calif., on Sept. 4 in preparation to recover a downed Navy MH-60S Seahawk helicopter on Mount Hogue in Calif.

U.S. Marine Corps photos by Lance Cpl. Colton Brownlee

A search for debris is conducted.

Marines, Sailors and civilians begin to disassemble the MH-60S.

The CH-53K King Stallion successfully completed its first official fleet mission by recovering a Navy MH-60S Seahawk helicopter from Mount Hogue in the White Mountains of California on Sept. 5.

U.S. Marine Corps photo by Cpl. Therese Edwards

The CH-53K prepares to takeoff from the Eastern Sierra Regional Airport in Bishop, Calif., to begin the recovery mission.

The request for assistance came from the Naval Safety Center to Marine Operational Test and Evaluation Squadron (VMX) 1 during Initial Operational Test and Evaluation (IOT&E) at Marine Corps Air Ground Combat Center (MCAGCC), Twentynine Palms, California.

The MH-60S was positioned on a high-altitude ridge in very rugged terrain following a hard landing on July 16. The aircraft had been supporting a search-and-rescue effort for a lost hiker. All four crewmembers survived without injury and were rescued the following day.

The Naval Safety Center had exhausted all other resources for recovery, including Army National Guard, Navy and Marine Corps fleet squadrons.

"They all lacked the capability to lift the aircraft without an extensive disassembly," said Lt. Col. Luke Frank, CH-53K detachment officer in charge for VMX-1. In preparation for the retrieval of the MH-60S, damaged and non-structural parts of the aircraft were disassembled by a team of Marines, Sailors and civilians to reduce weight and ensure a safe lift.

Designed to lift nearly 14 tons (27,000 pounds) at a mission radius of 110 nautical miles in high and hot environments, the CH-53K was able to easily lift the 15,200-pound MH-60S from a tight ravine at nearly 12,000 feet mean sea level. It then transported the aircraft over 23 nautical miles to a Bishop, California, airport.

"After six months of flight operations with the CH-53K, the detachment had every confidence in the aircraft's abilities to conduct the mission safely," Frank said.

King Stallion Deliveries

Marine Corps pilots began flying the first new helicopter in December 2020 following delivery of the first CH-53K in October. Two more aircraft arrived at Marine Corps Air Station (MCAS) New River, North Carolina, in March 2021, and a fourth was delivered in September.

VMX-1 began IOT&E in July 2021 with the first

U.S. Marine Corps photos by Lance Cpl. Colton Brownlee

The MH-60S is disassembled in preparation of the CH-53K lift.

U.S. Marine Corps photo by Cpl. Therese Edwards

A CH-53K King Stallion lifts the disassembled MH-60S from a draw in Mount Hogue, Calif., Sept. 5.

U.S. Marine Corps photo by Lance Cpl. Colton Brownlee

Mission complete, as the CH-53K lowers the MH-60S to the ground.

detachment to MCAGCC in August, allowing for the MH-60S recovery in September.

"This is exactly what the K is made to do," Frank said. "Heavy lift is a unique and invaluable mission for the Marine Corps. Horsepower is our weapons system and the CH-53K is armed to the teeth."

The King Stallion is the Marine Corps' heavy lift replacement for the CH-53E Super Stallion and can lift nearly three times as much as the CH-53E is capable of lifting.

"The biggest improvement that I've observed in the Kilo over the Echo is probably the flight control system," Frank said. "The ease of operating the CH-53K, with its fly-by-wire capability, enables pilots to do things they would have worked hard to achieve and monitor in the CH-53E."

"The entire team of Marines at VMX-1, 1st Landing Support Battalion and Naval Air Station Fallon Search and Rescue were extremely motivated to execute this mission and we are all very proud to have completed this one flawlessly," Frank said. "To be the first group of professionals to complete a real-world, heavy lift/high altitude mission in support of a unit who thought all options were off the table is extremely rewarding."

Foreign Military Sales

The U.S. Marines are not the only ones who will rely on the King Stallion.

The Israeli government has made the decision to purchase the CH-53K as its new heavy lift helicopter to replace the modified CH-53D Yasur helicopters, which the Israelis have been flying for more than50 years.

The German government is considering the CH-53K aircraft to replace their CH-53G/GA, and Switzerland and South Korea are also looking at the CH-53K for their country's needs.

As the CH-53K moves through IOT&E, the first Low-Rate Initial Production (LRIP) aircraft moved off the production line at Sikorsky in Stratford, Connecticut. This particular aircraft was delivered to MCAS New River in the fall, giving VMX-1 an additional aircraft for IOT&E. With 33 program aircraft either delivered or on contract, this LRIP helicopter brings the program one step closer to operational squadron deployment in fiscal year 2024 in alignment with Marine Corps schedules and requirements. The Marine Corps' procurement objective remains at 200 helicopters.

Victoria Falcon supports strategic communications for the H-53 Heavy Lift Helicopters Program Office.

U.S. Navy photo

The former CH-53K King Stallion structural test aircraft arrived in Maryland in March and will be restored before being used for cargo certification and qualification.

Structural Test Asset Finds New Role at Cargo Lab

After being dropped 36 times from various heights with a variety of loads at a test site in Texas, a CH-53K King Stallion test aircraft was nearly broken in half. But its work as a test asset is far from over.

A shell of its former self, the CH-53K will be used for certification and qualification of cargo and provide ongoing opportunities for time and cost savings to both the Heavy Lift Program Office and the Marine Corps.

The Naval Air Warfare Center Aircraft Division's Air Vehicle Engineering, Cargo/Special Operations (Cargo Lab) team acquired the aircraft in March after it fulfilled its original role as a structure test asset for the program's Integrated Test Team (ITT). Rather than pay for storage of this government asset, it was claimed by the Cargo Lab and hauled to Maryland on a flatbed to be restored.

"Having our own test article will allow us to quickly validate publications and document procedures and installations," said Todd Anderson, Cargo Lab team lead. "We'll be able to test and review systems integration and provide risk management. We'll also give Marines somewhere to be trained in loading cargo without risk to the actual fleet-owned aircraft."

But the main role of the test aircraft will be for certification and qualification efforts.

According to Anderson, almost everything that was qualified to be carried in the CH-53E Super Stallion must be recertified or requalified.

"We need to evaluate the loading and the integration of systems to see how it fits," Anderson said. "The fleet will need these certifications before they can do their job, so having the ability to quickly turn them around in-house is an amazing advantage."

In fact, the advantages to having an in-house test article are many, with the main one being reducing the time and risk to a flying test aircraft.

"The last thing we want to do is interrupt or interfere with flight test or maintenance," Anderson said. "Using a flight test aircraft for our testing requires prioritization from the ITT, including scheduling, paperwork, multiple people and permissions, etc."

It also costs money—either to a contracting company or to the government.

"At the cargo lab we can roll on and roll off and get the information we need in an hour," Anderson said. "We are the certification lab for the CH-53K and many other aircraft. Having our own test article will be a tremendous asset for the program office and the fleet."—*Victoria Falcon*

U.S. Navy photo

The structural integrity of the test asset is reinforced in the interior as it awaits restoration.

Multiple Allied Carrier Strike Groups Operate Together in 7th Fleet

From Commander, Task Force 70 Public Affairs

U.S. Navy carrier strike groups led by flagships USS Ronald Reagan (CVN 76) and USS Carl Vinson (CVN 70) joined with Japan Maritime Self-Defense Force's (JMSDF) Hyūga-class helicopter destroyer JS Ise (DDH 182) and the United Kingdom's Carrier Strike Group (CSG) 21 led by HMS Queen Elizabeth (R 08) Oct. 3 to conduct multiple carrier strike group operations in the Philippine Sea.

The integrated at-sea operations brought together more than 15,000 Sailors across six nations and demonstrates the U.S. Navy's ability to work closely with its unmatched network of alliances and partnerships in support of a free and open Indo-Pacific.

CSG-5 from Ronald Reagan is operating with CSG-1 from Carl Vinson for the first time during its 2021 deployment and marks the second time operating with UK CSG-21 and Ise this year.

"We are picking up right where we left off in 5th Fleet with the Queen Elizabeth team and building on what we started with the JMSDF after first leaving Japan," said Rear Adm. Will Pennington, commander, Carrier Strike Group 5/Task Force 70. "Adding the fantastic Vinson team to this potent force dynamically displays our capabilities across all domains, keeping us ready to respond to a range of maritime challenges."

The strike groups conducted flight operations and air defense exercise scenarios as well as simulated strikes against maritime targets. The operations brought together F/A-18 Super Hornets from Carrier Air Wing (CVW) 5 aboard Ronald Reagan, along with F-35B Lightning IIs from both Royal Air Force and U.S. Marines operating from Queen Elizabeth, and F-35Cs from CVW-2 aboard Carl Vinson.

"Interoperability across air platforms, to include the addition of the Air Wing of the Future, is just one way we have integrated operations for enhanced lethality, readiness and maneuverability across our collective forces," said Rear Adm. Dan Martin, commander, Carl Vinson Carrier Strike Group (VINCSG)/CSG-1. "This is Carl Vinson Strike Group's fourth exercise with allies and partners since entering 7th Fleet, and we have continued to improve our ability to conduct prompt and sustained operations at sea with a more mobile, agile and flexible force. Through alliances and partnerships, we have developed the right operational concepts, plans, proficiencies and capabilities to bolster our maritime advantage."

Vinson and UK CSG conducted joint interoperability flights together in 7th Fleet in August, the first time CSG-21

The United Kingdom's carrier strike group led by HMS Queen Elizabeth (R 08), and the Japan Maritime Self-Defense Force led by (JMSDF) Hyūga-class helicopter destroyer JS Ise (DDH 182) joined with U.S. Navy carrier strike groups led by flagships USS Ronald Reagan (CVN 76) and USS Carl Vinson (CVN 70) to conduct multiple carrier strike group operations in the Philippine Sea.

U.S. Navy photo by MC3 Gray Gibson

engaged with the F-35C model, assigned to CVW-2. The two F-35B squadrons have been deployed together aboard HMS Queen Elizabeth for her inaugural, global deployment, demonstrating the interoperability the F-35 provides.

"The U.K. Carrier Strike Group offers the largest fifth-generation air wing afloat today and working with our close allies to develop operating procedures and capabilities while concurrently showcasing the agility of land and carrier-based aviation in the Indo-Pacific demonstrates our commitment to the region," said Commodore Steve Moorhouse, OBE Royal Navy, Commander U.K .Carrier Strike Group.

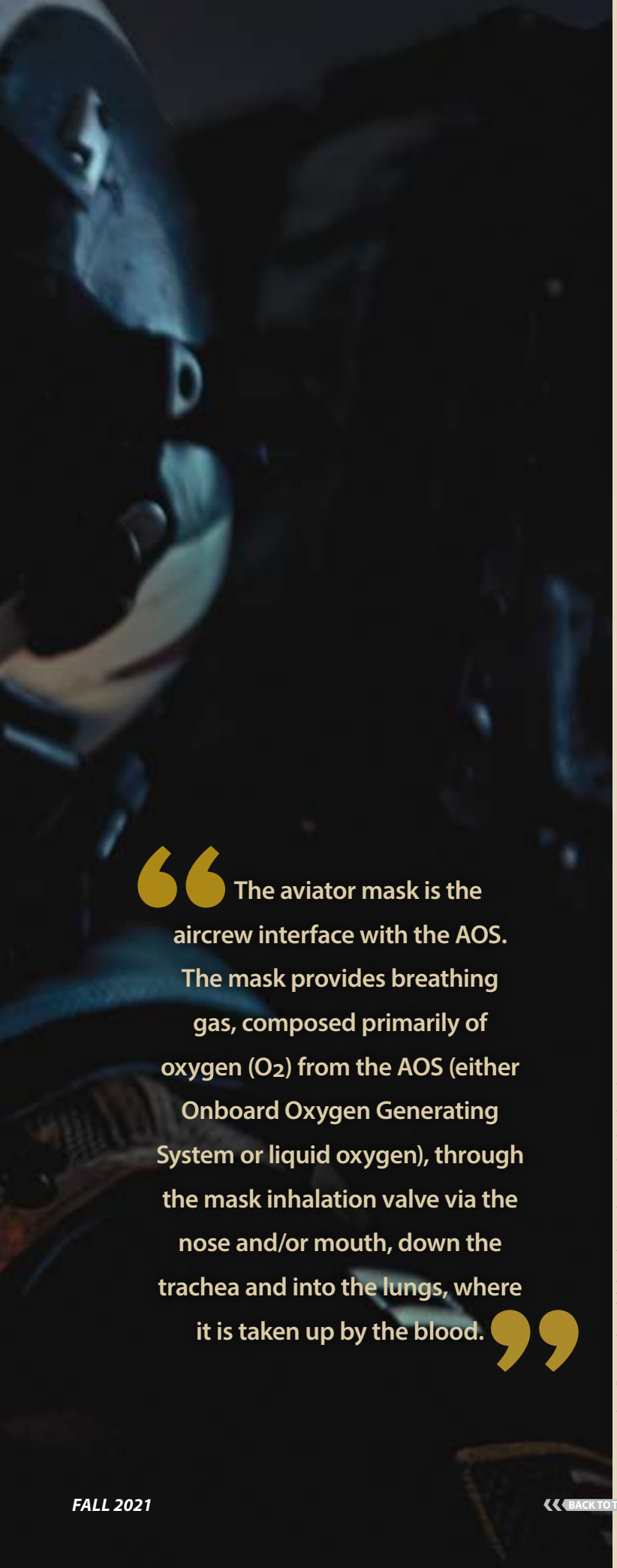
The training and events provided commanders the chance to practice capabilities across the maritime domain, as participating forces focused on anti-air, anti-surface and anti-submarine warfare tactics and procedures.

"In addition to the two carrier strike groups of the U.S. Navy, I feel very honored to be able to train with the Royal Navy's most advanced carrier strike group, which is an extremely valuable experience," said Rear Adm. Konno Yasushige, Commander of JMSDF Escort Flotilla 2. "Through this training, we enhanced our tactical skills and interoperability with the participating navies. In order to realize a free and open Indo-Pacific, the JMSDF will work closely with the naval forces of the U.S., Britain, the Netherlands and Canada, which share the same objectives, to respond to global challenges and defend maritime order based on the rule of law."

PROPER GEAR FIT

Crucial for Aircrew Safety

By Capt. J. Russell "Crazy Juice" Linderman



> The aviator mask is the aircrew interface with the AOS. The mask provides breathing gas, composed primarily of oxygen (O_2) from the AOS (either Onboard Oxygen Generating System or liquid oxygen), through the mask inhalation valve via the nose and/or mouth, down the trachea and into the lungs, where it is taken up by the blood.

U.S. Navy photo illustration by Fred Flerlage; photographic image by Adam Skoczylas

The mask is the most important part of the "human-aircraft interface" in the cockpit of a tactical jet—it is the proverbial aircrew lifeline from take-off to landing.

Recent research has found that leaky inhalation valves on aircrew masks can make it harder to exhale while breathing through a mask, which may in turn play a role in physiological events (PEs).

A PE involves an actual or suspected aircraft malfunction or an actual or suspected aircrew systems malfunction resulting in aircrew experiencing adverse physiological symptoms, such as headaches, cognitive impairment or a "tingling" sensation in the extremities. This article explains how a mask anomaly potentially could lead to a PE and how to mitigate that potential.

AOS and Breathing Dynamics

Breathing from an aircrew mask connected to an aircraft oxygen system (AOS) is unlike normal breathing. In normal breathing, the air supply is unlimited and at atmospheric pressure a mask is unnecessary. In contrast, when breathing from an AOS, the aircrew is connected to a flow-on-demand system via an aircrew mask and the air supply is limited to the output of the AOS. The AOS breathing gas provides the required oxygen concentration and breathing pressure through all envelopes of flight in order to sustain life and maintain human performance parameters.

The aviator mask is the aircrew interface with the AOS. The mask provides breathing gas, composed primarily of oxygen (O_2) from the AOS (either Onboard Oxygen Generating System or liquid oxygen), through the mask inhalation valve via the nose and/or mouth, down the trachea and into the lungs, where it is taken up by the blood. Upon exhalation, gaseous byproducts of cellular metabolism exit the blood into the lungs and are expelled through the trachea into the nose and mouth. When the expired breath reaches the mask, it is then allowed to exit to the cockpit via the exhalation valve. An added feature of the AOS is a slight positive pressure (approximately 3 mm Hg) which prevents ambient cockpit air from entering the AOS through the exhalation valve (or a poor mask fit).

In normal and AOS breathing, control of the breathing cycle is an automatic process that occurs without conscious intervention. The main driver of respiratory rate is carbon dioxide (CO_2), a byproduct of cellular metabolism. CO_2 levels are regulated by the specialized respiratory

> The report emphasized that, 'it cannot be overstated that the environment is unlike normal breathing and can induce subtle alterations to the respiratory patterns due to flight gear, safety pressures and the mask being donned in a high-performance environment.'

U.S. Navy photo of Lt. Colin Locke by Adam Skoczylas

center of the brainstem and fine-tuned by the chemoreceptors in the body. Increases in CO_2 in the blood lead to an increase in respiratory rate (for example, working out); decreases in CO_2 slow the rate of breathing. The levels of CO_2 in the body are tightly controlled as slight increases or decreases can lead to pH changes in the blood, which, left unchecked, can lead to serious physiological problems.

Conscious thoughts can override or modify automatic functions of the respiratory control system, but only for brief periods. For example, an individual can voluntarily speak, smell, blow up a balloon, or even hold their breath for a period of time, but eventually automatic control factors will drive a return to normal breathing. Environmental factors such as changes in temperature, an unexpected loud noise and increases in breathing resistance can also lead to automatic changes in breathing.

During the Navy's Root Cause Corrective Action (RCCA) investigation into the cause of PEs, respiratory mechanics and control were examined to determine which factors may interfere with breathing dynamics. The RCCA findings released in a June 2020 report demonstrated that breathing can be dramatically affected by issues such as poor flight gear fit, poor mask and regulator performance and maintenance, as well as breathing from a closed loop breathing system.[1] According to the report, these conditions can "alter the work-of-breathing required for the operator or induce disturbances that can be subtle and insidious. These can lead to alterations in breathing dynamics that manifest as hypoxia-like syndromes."[2]

The RCCA team identified a significant number of PEs related to "failures of the ensemble."[3] The ensemble includes the mask, regulator, the oxygen supply lines, system switches, etc. However, the team noted that in many PEs "there was no discernable equipment failure, but something was causing adverse physiological symptoms."[4]

The report emphasized "it cannot be overstated that the environment is unlike normal breathing and can induce subtle alterations to the respiratory patterns due to flight gear, safety pressures and the mask being donned in a high-performance environment."[5]

Current tactical aviation (TACAIR) masks are well-designed and operate as designed, but may be susceptible to transient failures. An anecdotal example is a leaky flapper valve in a toilet tank. Occasionally, when a toilet is flushed, the flapper valve may not reseat properly and when that happens you hear or see a small trickle of water into the toilet bowl. Often it can be fixed by "jiggling" the toilet handle which applies enough of a perturbation that allows the flapper to properly reseat and stop all water from leaking into the bowl. Does that mean

the flapper valve is bad? Most likely not, it just had a transient failure. In aircrew masks, a similar situation may occur, oftentimes without the aircrew realizing it.

Many transient mask failures may have occurred but may not have been reported for various reasons. For instance, a mask may be working within design specifications when an instantaneous perturbation (for example, hose pumping, G-forces affecting valve orientation, debris in the mask, etc.) temporarily causes a mask valve to malfunction; shortly thereafter the perturbation is corrected (for example by a forceful exhalation or taking the mask off) and then the mask resumes operating as designed. However, the aircrew breathing alterations that the perturbation created may have longer lasting effects due to the automatic control of the breathing cycle and the physiological responses which can take minutes to resolve (for example, the breathing response that ensues after completing a 100-meter sprint and the time it takes to resume normal breathing).

How Can a Transient Mask Problem Lead to A PE?

A team of researchers at the Naval Medical Research Unit-Dayton (NAMRU-D) examined mask valve faults (leaky inhalation and sticky exhalation valves) in two commonly used masks in Navy and Air Force tactical aircraft and the relationship the mask faults have with breathing changes. Their findings demonstrated that the leaky inhalation valves led to inspiratory threshold loading and increases in expiratory pressures making it harder for individuals to exhale while breathing through the mask.[6]

It has been reported that increases in inspiratory threshold loads may promote hyperpnea (deeper breathing) and hyperventilation, or over breathing, resulting in excessive loss of CO_2 from the body.[7] This is due to physiological reflexes in which the inspiratory muscles increase their firing in response to the increased loading. Once the load clears, the activated muscles cannot react quickly enough to moderate the increased activation and require time to moderate their activity. During that time, the muscles are still activated and working harder than required.[8]

Additionally, the increased expiration pressures cause a similar reflex in the expiratory muscles leading to more muscle activation and then consequently more time to moderate the activity.[9] It is like bending over to lift a box that looks very heavy, but is not; during the initial lift, maximal muscle recruitment and straining raises the box, unexpectedly and very quickly; the body reacts too late, and balance is lost. It then takes the next few seconds to regain balance.

What is Over Breathing or Hyperventilation?

When you manually inflated a swim float, beach ball or balloons you may have experienced over breathing. If you did it long enough, you probably even experienced the onset of dizziness and lightheadedness. In this example, you are consciously breathing at a rate faster than your body requires and expelling excessive levels of CO_2. If not resolved quickly, this loss of CO_2 from the blood (hypocapnia) causes respiratory alkalosis as well as increased blood pH (alkalemia). If aircrew overcompensate for challenges imposed by the mask and over breathe, they will begin to experience adverse physiological symptoms that include lightheadedness, dizziness and altered consciousness. If over breathing continues for an extended period, the individual may experience tingling in the extremities as alkalosis is extremely dangerous and the body tries to regulate the situation leading to a decrease in serum calcium levels (hypocalcemia).[10] Hypocalcemia can result in muscle tetany, neural irritability, seizures and loss of consciousness in extreme cases.[11]

In the faulty mask valve study, the

U.S. Navy photos by Adam Skoczylas

Lt. Nicholas Waugh, test pilot with Air Test and Evaluation Squadron (VX) 23, cleans his mask before checking the fit.

induced increase in inspiratory threshold loading and excessive expiratory pressure trigger an automatic breathing response leading to an insidious increase in rate and depth of breathing resulting in transient over breathing (hyperventilation) at a rate disproportionate to that needed for the activity.

Bottom line, when faced with a transient mask anomaly, the breathing centers in the brainstem can make a breathing rate change without the aircrew knowing it, and by the time it is realized, it may be at the serious problem stage—dizziness, tingling, impaired judgment, etc.

Another factor is that aircrew have learned to tolerate less than optimal breathing conditions and assume it is just part of the job, which is why the new Adverse Physiological Symptoms Emergency Procedure was recently incorporated into the FA-18/EA-18G and T-45 aircraft NATOPS. It gives aircrew the opportunity to take the mask off and reset their breathing by taking consciously controlled breaths. A secondary effect is that by taking the mask off, a mask valve issue may clear.

What Can You Do?

One of the best steps that aircrew can do to help mitigate mask issues is to confirm they have a proper fitting mask to ensure suitable airflow and mitigate leakage from the mask. It is important to perform proper pre- and post-flight mask checks to include regular cleaning and appropriate storage. If you suspect your mask is not performing correctly, discuss the issue with your flight gear maintainers and/or turn it in for maintenance.

If you have flight gear-related questions, ask your local Aeromedical Safety Officer (AMSO).

Capt. Russell Linderman, PhD, is a Naval Aerospace and Operational Physiologist and member of the Physiological Episode Action Team.

Footnotes

1) *F/A-18 & EA-18G Physiological Episodes Root Cause Corrective Action Final Report, PMA-265, June 2020, p. 8.*
2) *Id.*
3) *Id. at p. 37.*
4) *Id.*
5) *Id.*
6) *Shykoff, B.E., D.S. Horning, and M.A. Gallo, Effects of Known MBU 20-23/P Mask Valve Faults on Pressures and Flows with Human Breathing, NAMRU-D-D-20-132, 2020, pp. 1-38.*
7) *Yan S, Bates J. Breathing responses to small inspiratory threshold loads in humans. J Appl Physiol, Vol 86, No. 3, 1999, pp. 874–880.*
8) *Id.*
9) *Barrett J, Cerny F, Hirsch JA, Bishop B, Control of breathing patterns and abdominal muscles during graded loading and tilt. J Appl Physiol, Vol 76, No 6, 1994, pp 2473–2480.*
10) *Parasa, M., S.M. Saheb, and N.N. Vemuri. Cramps and tingling: A diagnostic Conundrum. Anesth Essays Res, May-Aug, 8(2), 2014, pp. 247-249.*
11) *Zeier, M.G., Editor, Seizures and Renal Failure: Is There a Link? Nephrol Dial Transplant. 20, 2005, pp. 2855-2857.*

Gear Fit: The Right Look and Feel

Many aviators have flown or are flying with flight gear that has not been optimally fit to the individual to achieve best performance margins. Unfortunately, most have not been briefed on what optimized fit looks or feels like, leading them to conclude a poor fit is normal. For example, many attribute mask leakages to their unique facial features rather than a poor-fitting mask.

What happens if my equipment isn't optimized?

Flight gear was designed to protect aviators in case of ejection and provide support for parachute opening shock. If the gear is not optimized, this could cause injury to shoulders, back, hips, legs, groin, chest, neck and head.

In addition, the fit of flight gear, especially harness and mask, has a tremendous effect on respiration and lung volumes. If the harness is too tight, it can reduce the capacity for inhalation. Reduced breathing capacity can create an environment ripe for pressure-related incidents or hypocapnia. The mask's inhalation and exhalation valve can directly contribute to hypercapnia or hypocapnia. Even slight insidious differences in the "stickiness" of the valves can have a marked effect on the body's respiration cycle. Leaky masks can also contribute to loss of mask pressure, loss of oxygen concentration at the mask and increased demand on the concentrator.

How can I tell if my equipment is right?

The Aircrew Systems Program Office's FAILSAFE team is touring Naval Aviation bases to conduct training for fleet PRs/Flight E to demonstrate proper fitting procedures. They are also observing aircrew donning and doffing flight gear to provide hands-on assistance.

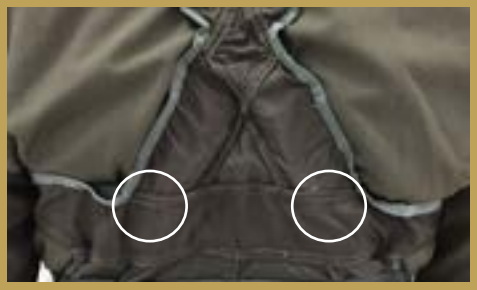
Wing/MAG Aeromedical Safety Officers (AMSOs) are available to evaluate gear fit to aircrew. All AMSOs have undergone professional training at the Naval Air Systems Command.

During PE Roadshows, FAILSAFE and Naval Safety Center AMSOs conduct spot checks on all Hornet/Super Hornet/Growler PR/FE Shops and observe aircrew gear fitment. During these roadshows, all aircrew are encouraged to ask questions or go to the PR/FE shop for professional fitting evaluations.

What can I do right now?

You can help by taking a look in the mirror. How does the gear fit on your body? Is it centered, cockeyed, loose or tight? Ask the PR/FE shop personnel if something doesn't look or feel right, or if you have a question about how your equipment is supposed to function. Don't accept a fit that causes pain or discomfort. Take the time to get your gear right to optimize your performance and comfort.

From Human Engineering Department, Naval Air Warfare Center Aircraft Division.

SUBOPTIMAL	OPTIMAL
	
Chest strap is too low, under "center of mass." Low, tight chest strap may impede breathing.	*Chest strap is at or above "center of mass." Chest strap has minimal impact on breathing.*
	
Back links that are too close may indicate that harness is too small. Consider larger size and shortening shoulder adjusting strap until appropriate fit.	*Webbing links on back are appropriate distance apart and are not on spine nor outside shoulder blades.*
	
Life preserver pulled too far forward/loose. Collar lobes resting on back of neck.	*Thinnest part of life preserver at side of neck with collar lobes pulled down flat with survival vest.*
	
Visor profile does not match oxygen mask profile. Oxygen mask is not aligned properly on face.	*Visor profile matches oxygen mask. Extension on mask adjustment straps. Helmet, visor, oxygen mask and bayonet fittings are centered and symmetrical on head.*

U.S. Navy photos by Kevin Dove

Navy's First TH-73A Thrasher

Story and Photography by Lt. Michelle Tucker

The first operational TH-73A Thrasher training helicopter landed at Naval Air Station (NAS) Whiting Field in Milton, Florida, Aug. 6.

The helicopter will be assigned to Training Air Wing (TW) 5 and will replace Chief of Naval Air Training's (CNATRA) TH-57B/C Sea Ranger as the undergraduate training helicopter for the U.S. Navy, Marine Corps and Coast Guard.

"The TH-73A teams in Maryland, Florida and Texas worked tirelessly to bring this aircraft to fruition in just over a year," said Christy Schumacher, rotary deputy program manager at Naval Undergraduate Flight Training Systems Program Office. "They remained committed to bringing our training systems into the 21st century, while navigating challenges on the road to the helicopter's first arrival. Our team, in collaboration with industry, delivered a higher standard of excellence to aviation training."

The helicopter made the two-day transit to the base from the Leonardo Helicopters facility in Philadelphia, where the aircraft was manufactured. CNATRA leadership welcomed the aircraft alongside industry representatives and local community leaders.

Leonardo Helicopters is contracted to deliver 31 additional Thrashers this calendar year for a total of 130 through 2024 before the Sea Ranger's scheduled sundown in 2025. This will provide the Navy the capacity to train several hundred aviation students per year.

The TH-73A incorporates a modern avionics suite with a fully integrated flight management system, automatic flight control system and independent, digital cockpit displays to both pilot stations. It boasts increased performance in power, speed, payload and endurance over the Sea Ranger, making it comparable to fleet aircraft. These upgrades will help bridge capability and capacity gaps to better prepare newly winged naval aviators as they transition to fleet replacement squadrons for postgraduate training.

In addition to new helicopters, the full Advanced Helicopter Training System (AHTS) includes aircrew training services that provide availability on new simulators, a modernized curriculum and a new contractor logistics support contract for Thrasher maintenance and flight line support.

"Using current cockpit technologies and a new training curriculum, AHTS will improve pilot training and skills and ensure

The Navy's first TH-73A Thrasher arrives at Naval Air Station Whiting Field in Milton, Fla., Aug. 6 and will replace the TH-57B/C Sea Ranger as the undergraduate rotary and tiltrotor helicopter trainer for the Navy, Marine Corps and Coast Guard.

Arrives at NAS Whiting Field

rotary wing and tilt-rotor aviators are produced more efficiently at a higher quality and are ready to meet the fleet's challenges," said CNATRA Rear Adm. Robert Westendorff. "AHTS will meet our advanced rotary-wing and intermediate tiltrotor training requirements through 2050."

The TH-73As will be housed in a temporary hangar at NAS Whiting Field while construction of a new helicopter maintenance hangar on base is slated to begin in 2023. Leonardo Helicopters also recently established a TH-73A maintenance support team at Santa Rosa County's new aviation customer service hangar at Peter Prince Airport in Milton.

"This delivery signifies a new era for Naval Aviation training," said Capt. Holly Shoger, program manager. "The combined government and contractor team set new standards to meet much needed requirements in the fleet. We are proud to develop and provide these new capabilities that will improve pilot training for many years to come."

The TH-73A Helicopter Instructor Training Unit (HITU) team under TW-5 will use the first Thrasher to validate the modernized curriculum efforts, which is a requirement prior to training student naval aviators with the new curriculum in the new system.

"The simple cockpit design and layout, pushbutton and toggle switch interface, advanced navigation and communication capabilities, and rapid control response make it the ideal training aircraft and the perfect steppingstone to any service rotary wing platform," said Cmdr. Dustin Robbins, TW-5 AHTS Fleet Integration Team officer in charge. "With its all-digital cockpit and fully integrated flight management system coupled with superior power and speed margins, the TH-73A is a lot of fun to fly."

The program office at NAS Patuxent River, Maryland, oversees the AHTS and TH-73A, and will determine the final disposition of the 35-year-old TH-57 Sea Ranger, which is scheduled to sundown in fiscal years 2022 through 2025.

The TH-73A Thrasher is named for the brown thrasher, a bird common to the skies over the Southeastern United States including Northwest Florida. The inconspicuous, yet territorial, bird is a fearless defender known for its low-level flying prowess.

TW-5 is comprised of three primary fixed-wing and three advanced helicopter squadrons and trains aviators from the Navy, Marine Corps, Coast Guard, Air Force and allied nations.

Lt. Michelle Tucker is CNATRA's public affairs officer. Connie Hempel, Program Executive Office for Tactical Aircraft Program public affairs officer, contributed to this article.

BLUE ANGELS SUCCESSFULLY TRANSITION

By Carrie Munn

The U.S. Navy Flight Demonstration Squadron (NFDS), or Blue Angels, has been soliciting "oohs" and "ahhs" from mesmerized crowds for 74 years—the past 34 of those with spectacular maneuvers in the F/A-18 Hornet. In 2021, the Blue Angels debuted their new platform, the F/A-18 Super Hornet.

U.S. Navy photo by MC2 Cody Hendrix

Aviation Support Equipment Technician 1st Class Ryan Johnson takes part in the ground demonstration during a training flight over Naval Air Facility (NAF) El Centro, Calif.

U.S. Navy photo by MC2 Cody Hendrix

Right wing pilot Lt. Cmdr. James Haley prepares for a training flight over NAF El Centro in preparation for the 2021 show season.

This, in large part, was due to the tremendous efforts of the F/A-18 and EA-18G Program Office Transition Team who completed an extraordinary amount of work on an extremely compressed timeline, while overcoming the unforeseen obstacles imposed by the coronavirus (COVID-19) pandemic.

As the program officially kicked off, the first modifications to prepare the Super Hornets for the demonstration team occurred in November 2019.

Around the time travel restrictions, office closures, lockdowns and overwhelming concern for personnel health became a force to be reckoned with in early 2020, the transition team was in the throes of an expedited effort to modify a squadron of F/A-18 E/F Super Hornets for the NFDS to fly during their 2021 air show season.

The goal was to deliver 11 modified jets to the Blue Angels by January 2021, thereby allowing adequate time for pilots to become familiar with the nuances of the new platform and practice their intricate routines during winter training at Naval Air Facility El Centro, California.

"These particular modifications had never been accomplished before on the Super Hornet, and would typically take roughly nine months, per jet," said Chuck DeLong, transition team lead.

To complete the Super Hornets on time, the team modified the initial 11 jets simultaneously. As the team was required to adhere to COVID-19 protocols during this time, the crew worked multiple shifts in multiple hangars, limited the personnel assigned to each jet, and engaged in intensive collaboration with numerous stakeholders to successfully navigate the resulting logistical and engineering challenges encountered.

TO SUPER BLUE DURING PANDEMIC

Routine and critical meetings were held virtually, essential travel was conducted via car instead of airline, and direct phone and video calls were frequently completed to provide troubleshooting in real time.

"This is a program that excites everyone, and each person involved demonstrated an 'all-in' approach to delivering the modified jets, ushering in a new era for the demo team," DeLong said.

He commended what he called "an astounding display of collaboration" between all stakeholders—Naval Air Systems Command, the program office, Fleet Readiness Center (FRC) Southeast, FRC Southwest, Naval Air Warfare Center Aircraft Division, Lakehurst Support Equipment Department, Boeing Cecil Field, Chief of Naval Air Training Command, the Blue Angels, Naval Supply Systems Command and Defense Contract Management Agency.

The transition team continues to work with industry and stakeholders to complete the first full delivery order, which will round out the squadron's 18 modified Super Hornets, while providing continued support to the pilots and maintenance crew throughout the 2021 season. The transition team has expeditiously solved a multitude of unforeseen issues stemming from a new aircraft performing a new mission during the show season.

Working together and overcoming the challenges of the pandemic have become part of doing business for the F/A-18 Team, but thanks to their dedication and adaptability, countless air show spectators have looked to the skies, awestruck, as the Blue Angels displayed impressive aerial feats in their Super Hornets.

Carrie Munn supports F/A-18 and EA-18G Program Office Communications.

U.S. Navy photo by MC3 Drew Verbis

The Blue Angels prepare to depart NAF El Centro for a training flight in their Super Hornets.

U.S. Navy photo by MC3 Drew Verbis

The Blue Angels fly in formation during their 2021 season training.

DESPITE PANDEMIC, TWO NEXT-GENERATION JAMMER PROGRAMS REACH MILESTONES

U.S. Navy photo by Katie Archibald

Air Test and Evaluation Squadron (VX) 31, located in China Lake, Calif., conducts a flight test with Next-Generation Jammer Mid-Band (NGJ-MB) and its host aircraft, EA-18G Growler.

By Kristine Wilcox

The Airborne Electronic Attack Systems Program Office achieved multiple acquisition milestones and was one of the first to establish processes and procedures for test and evaluation during the coronavirus (COVID-19) pandemic.

Test and Evaluation

The Next-Generation Jammer Low-Band (NGJ-LB) test team showed its resilience, dedication and creativity as one of the first to develop policies to conduct tests safely and efficiently while honoring Center for Disease Control (CDC) guidelines and protecting the workforce.

The team was ready to begin its final Demonstration of Existing Technologies testing when COVID-19 restrictions were put into place. After a quick reassessment, the team held teleconference meetings with Naval Test Wing Atlantic Chief Flight Surgeon, government and contractor participants to gain consensus on quarantine and test execution requirements. They made the required CDC and Naval Air Systems Command (NAVAIR) adjustments, such as wearing masks at all times and distancing, and were still able to complete testing with two contractors' prototype pods at two separate NAVAIR test facilities in less than two months.

"Our start was delayed two and a half weeks to comply with a request from one of the contractors to delay testing in order to self-quarantine their personnel," said Dan Doster, NGJ-LB assistant program manager for test and evaluation. "This started a cascading effect that resulted in our test execution days being reduced from 15 to 10 days for one of the test events for each contractor, but the team still managed to stay on schedule."

Other constraints included reducing staffing at the Facility for Antenna and Radar Cross Section Measurement (FARM) and Air Combat Environmental Test and Evaluation Facility (ACETEF) control rooms.

"Reducing staffing was a real concern for the FARM team because we were literally one-person deep in several key positions," said Greg Brannon, FARM lead. "If that one person or anyone on the team became infected and caused the rest of the team to be quarantined, or if the FARM had to be shut down for disinfecting, testing would have come to a halt, and it would have been very difficult, perhaps impossible, to recover."

Brannon said the team took mitigations to prevent that "doomsday" scenario very seriously. "We were very cautious about who people came in contact with on and off the job and performed daily health screenings for every person that entered the FARM. The precautions may have been overboard, but they worked."

He also said the reduction in personnel was in some ways a blessing.

"Limiting the number of people allowed on the FARM during testing reduced the security staff required to keep track of them. Further, the spaces in the FARM's test facilities are small, and the limitations to the number of people allowed in those spaces made it much more comfortable for those involved," Brannon said.

The team successfully completed the

U.S. Navy photo by Kristine Wilcox

From left to right, Aviation Ordnanceman (AO) Airman Raul Ramos, AO 2nd Class Kailey Neugebauer and AO 1st Class Tyler Jacobson connect the NGJ-MB pod to the support equipment cables that will detach it from the EA-18G Growler wing during a logistics demonstration held at Naval Air Station Patuxent River, Md.

U.S. Navy photo by Ryan Smith

Electronics Technician III Reginald Sinkfield and Jeremy Austad inspect a NGJ-MB pod before it's loaded onto a VX-31 EA-18G Growler host aircraft.

demonstrations within the scheduled two-week timeframe.

At the same time, NGJ Mid-Band (NGJ-MB) successfully completed its first test flight onboard an EA-18G Growler aircraft Aug. 7, 2020, and completed more than 170 developmental test flights and more than 3,000 hours of testing in the chamber and labs.

NGJ-MB and NGJ-LB are external jamming pods that will address advanced and emerging threats using the latest digital, software-based and Active Electronically Scanned Array technologies and will provide enhanced airborne electronic attack capabilities to disrupt, deny and degrade enemy air defense and ground communication systems. The systems will augment, and ultimately replace the legacy ALQ-99 Tactical Jamming System currently integrated on the EA-18G Growler.

Acquisition Milestones

Both programs were forced to create new strategies to successively navigate the imposed telework environment to both document and coordinate acquisition endeavors.

Within months of program initiation, the NGJ-LB program changed acquisition strategies from Middle Tier Acquisition to a more traditional Acquisition Category (ACAT) 1 Major Defense Acquisition Program (MDAP). This decision was made to ensure the lowest risk approach to delivering this critical capability to the fleet. The team implemented streamlined acquisition approaches into the traditional MDAP process by incorporating lessons learned from the NGJ-MB program Skunk Works charter thus paving the way for a reduced schedule and program success. As a result, NGJ-LB achieved Milestone B and ACAT 1B designation Dec. 8, 2020, three months after changing acquisition strategies.

Simultaneously, the NGJ-LB team managed extremely detailed technical and cost evaluations for the Engineering and Manufacturing Development (EMD) contract proposals and competitively awarded the EMD contract Dec. 18, 2020, to produce four test and eight operational prototype pods.

Additionally, the NGJ-MB program was preparing for a Milestone C decision, which was achieved June 28, 2021, and subsequent Low-Rate Initial Production contract awarded July 2, 2021. The amount of documentation and collaboration that needed to occur for these significant milestones was met with additional challenges as the meetings and coordination needed to be done virtually.

"The most significant hurdle we overcame was the ability to keep all stakeholders informed of the status for both programs and Deputy Assistant Secretary of the Navy (DASN) allowing us to challenge the norm," said Beccy Taylor, program office acquisition lead. "We found ways to make things happen by working with DASN, Navy Requirements office (OPNAV), and Program Executive Office for Tactical Aircraft Programs action officers to strategize paths forward and avoid challenges for leadership. From the program manager on down, we all had the same message going into every meeting or answering every data call and I believe this was the key to success."

Taylor said documentation was routed concurrently to minimize review time. Weekly teleconferences with the program manager and executive leadership team ensured everyone was up to speed with the major programs and their milestone status. She conducted weekly acquisition coordination team meetings with DASN, OPNAV and the program office via teleconference, which often included technical subject matter experts to review key acquisition documentation and allowed the teams to stay on schedule.

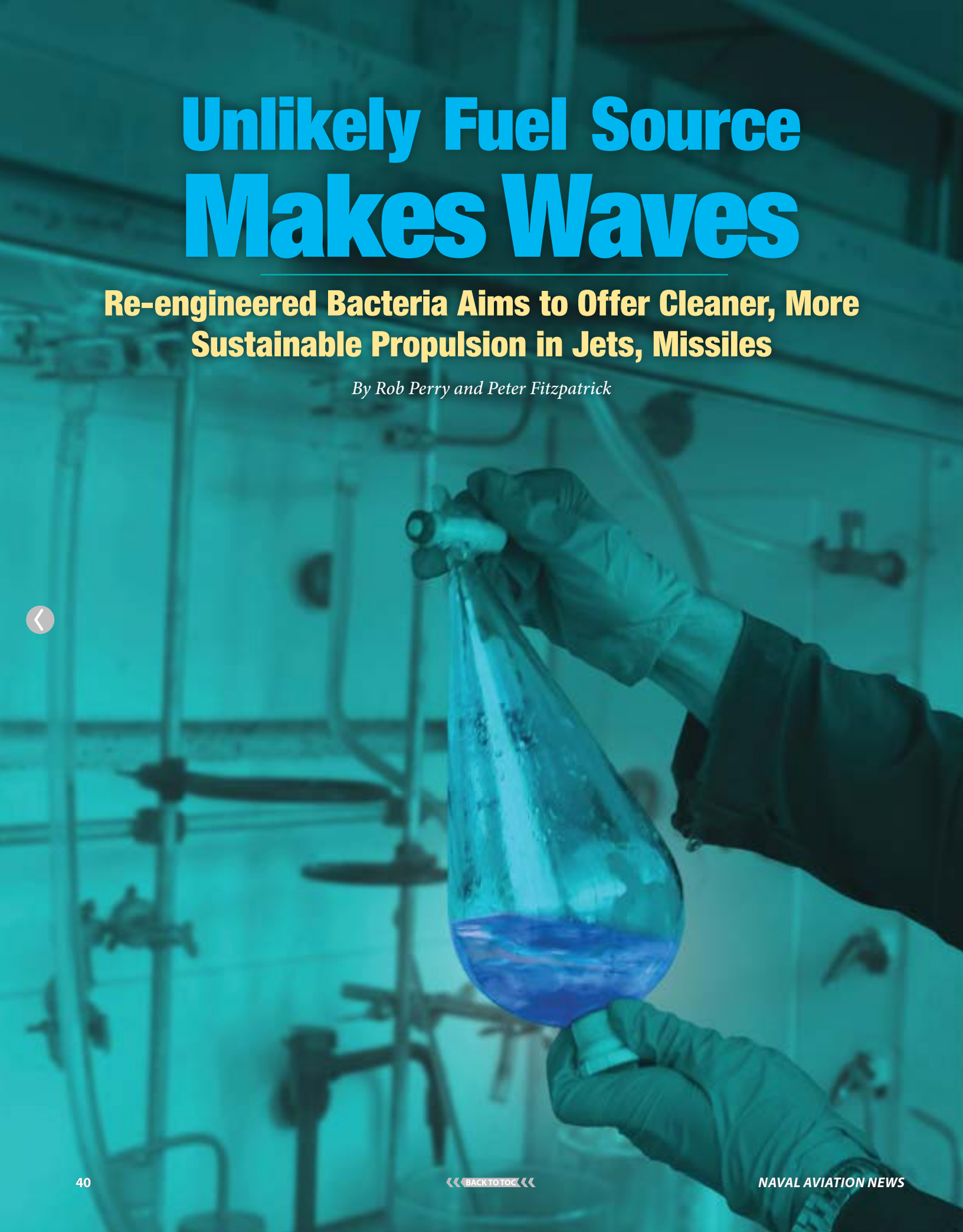
Taylor said one efficiency that resulted from the COVID environment was only one milestone pre-brief for each program was required. Additionally, more individuals were allowed to participate in the milestone event since they were able to provide a virtual meeting.

Kristine Wilcox supports Airborne Electronic Attack Systems Program Office Communications.

Unlikely Fuel Source Makes Waves

Re-engineered Bacteria Aims to Offer Cleaner, More Sustainable Propulsion in Jets, Missiles

By Rob Perry and Peter Fitzpatrick



Researchers at the Naval Air Warfare Center Weapons Division (NAWCWD) in China Lake, California, have developed a process to convert waste material into high-performance jet fuels.

With support from the Office of Naval Research (ONR), ONR Global (ONRG) and the U.K. Royal Air Force, Dr. Benjamin Harvey, a senior research chemist at NAWCWD, and scientists from the University of Manchester and C3 Biotech in the U.K., are developing a hybrid biological/chemical process that uses Halomonas—bacteria found in seawater—to generate a "platform" chemical, which can then be converted into jet, diesel, gasoline or even missile fuel.

Conventional biofuels require large tracts of land, carbon-intensive fertilizer and lots of fresh water. Whether it is a field of corn to make ethanol or palm trees to create palm oil, as many as 100 million acres would be required to generate enough material to satisfy the U.S. demand for jet fuel. In contrast, the use of waste biomass as a feedstock eliminates the need to plant additional acreage. Further, macroalgae (seaweed) can potentially be used as the carbon source for this technology.

Halomonas is salt-tolerant and can not only grow in solutions containing high salt and pollutants but is also able to grow at a wide range of temperatures and pH conditions, which can limit the growth of other microorganisms. Because of these characteristics, Halomonas provides a sustainable and robust "microbial chassis" that does not require potable water or expensive sterilization protocols.

"By re-engineering the microbe's genome to alter its metabolism, scientists can convert waste biomass into precursors for the production of different types of fuels," said Dr. Kristy Hentchel, ONR program officer for bioengineering and biomanufacturing. "For the fleet, the use of Halomonas makes conducting these processes possible at sea, forward operating bases or coastal locations."

Professor Nigel Scrutton and his team at the University of Manchester and C3 Biotech have engineered Halomonas to produce various molecules, including a sweet, floral-smelling terpenoid called linalool, which is also found in many flowers and spice plants.

"The equipment and process used for biosynthetic production of linalool is similar to that used for making beer," said Dr. Patrick Rose, the ONR Global science director for synthetic biology. "Sustainable production of linalool on an industrial scale will require two main components—large fermentation vessels and an accessible carbon-rich feedstock derived from agricultural, forestry or even solid municipal waste streams."

U.S. Navy photo by Deidre Patin

Dr. Luke Keller, a National Research Council postdoctoral fellow, synthesizes a biosynthetic fuel in his laboratory at the Naval Air Warfare Center Weapons Division (NAWCWD) in China Lake, Calif.

In parallel, Harvey and his team developed a method to convert linalool into jet fuel using various catalysts. One catalyst can produce a high-density fuel useful for missile or rocket propulsion; another process produces diesel fuel, while yet another generates a high-performance drop-in jet fuel—all from the same starting point of biomanufactured linalool.

"By integrating different catalysts and conditions we can exert exquisite control over the fuel product distribution, which means no changes to existing vehicles or platforms will be required," Harvey said. "We are creating designer, biosynthetic, drop-in fuels that have higher energy densities, lower viscosities, cleaner combustion profiles and reduced long-term maintenance costs compared to conventional jet fuels."

Much of the initial work on linalool was focused on the production of missile fuels, but in recent years the project has expanded to include high-performance jet fuels.

"We're packing more energy into the fuel tank, which allows the aircraft to go farther," Harvey said.

U.S. Navy photo illustration by Fred Flerlage; photographic image by Deidre Patin

U.S. Navy photos by Deidre Patin

Chris Walkling, a chemical engineer working in the NAWCWD research department, conducts a distillation of a biosynthetic fuel component.

"The benefits to the warfighter are clear. If we can provide them with biosynthetic fuels that outperform those derived from petroleum and can be produced domestically or in the field on-demand, we are giving them an advantage over their adversaries."

"We can optimize the properties of the final blend to enhance the capability of modern engines. These fuels have applications for jet aircraft, unmanned aerial vehicles (UAVs), helicopters and ground vehicles. We're not only interested in maintaining our capability but enhancing our capability with these fuels."

One of the fuel products generated by Harvey's team exhibits up to 17 percent higher volumetric energy density compared to conventional jet fuel, which can enhance the range of aircraft and UAVs. A flight test with a UAV using an optimized jet fuel derived from linalool is scheduled for December in the U.K.

Rising Potential in Cost Reduction, Deployment and Other Uses

The timeline to get to commercial production of the drop-in biosynthetic fuel largely depends on funding.

"The biotechnology is at an advanced stage and ready for scale-up. The chemical conversion process has been demonstrated at the laboratory scale and is ready for transition to a pilot plant," Harvey said. "Integrating the two components and optimizing the final fuel blend is the current focus. Once we are able to make significant quantities of fuel we can engage with Department of Defense (DoD) partners, the Federal Aviation Administration (FAA) and other stakeholders to qualify these fuels for use in both military and commercial aircraft."

Harvey says that at this stage of development, it is difficult to put a price tag on the linalool-derived jet fuel. The team and its partners are currently working to establish multi-year programs focused on transitioning this technology out of the laboratory and demonstrating a small footprint (shipping container), mobile and modular system with integrated synthetic biology and chemical catalysis process steps. These systems could be deployed to forward

operating bases or areas that import their fuel (e.g. Hawaii, Guam) and produce fuel continuously.

Since an aircraft carrier averages 3 million gallons of jet fuel in storage and the size of a facility needed to generate that much synthetic fuel would be enormous, Harvey said, rendering production of synthetic fuel at sea impractical. However, Harvey said deploying the modular systems at forward operating bases or remote locations and using locally sourced carbon-containing materials including seaweed, wood or waste biomass to constantly produce the synthetic biofuel is a more realistic scenario.

"One of the advantages of generating fuel in theater is the dramatically reduced logistics costs," Harvey said. "For example, in remote forward operating bases the cost of jet fuel is $400 a gallon just because of transportation costs, the security costs to get the fuel caravan out there, etc. By producing it in theater from local resources, you're saving a ton of money."

Although the current work with linalool is focused on producing fuels, Halomonas can also be engineered to produce chemicals, pharmaceuticals and polymers. The latter could be used in combination with additive manufacturing technologies such as 3D printing.

"As an example, consider when a component breaks on a system at a forward operating base and the technician needs a new part. The base is equipped with a biosynthetic reactor 'programmed' to make a recyclable polymer. The reactor produces the polymer, the technician takes that polymer to a 3D printer and prints a new part," Harvey said. "Under this paradigm, the whole process might take a day or two, while under a conventional scenario that part may have taken a month or more to arrive."

Current supply chain issues due to the COVID-19 pandemic highlight the need to develop a resilient and dynamic supply chain, particularly for the DoD.

Harvey sees a bright future for biosynthetic jet fuels.

"The benefits to the warfighter are clear. If we can provide them with biosynthetic fuels that outperform those derived from petroleum and can be produced domestically or in the field on-demand, we are giving them an advantage over their adversaries. Advanced development of this technology will simultaneously improve Naval readiness and capability while reducing net greenhouse gases and enabling sustainable operations around the world."

Rob Perry is editor and staff writer for Naval Aviation News. Peter Fitzpatrick is a writer and photographer with Naval Air Systems Command Public Affairs.

From left, Dr. Luke Keller, National Research Council postdoctoral fellow, Dr. Ben Harvey (team lead), senior research chemist and associate NAWCWD fellow, and Chris Walkling, NAWCWD chemical engineer, are working to produce a cleaner burning biosynthetic fuel that can be generated from waste biomass by a hybrid biological/chemical route utilizing bacteria found in seawater.

NAVAIR Provides Fleet Solutions: Improves CV-22 Osprey Nacelle

By Liz Mildenstein

An Air Force CV-22 Osprey arrived at Bell's Amarillo Assembly Center in Amarillo, Texas, Sept. 21 to undergo nacelle modifications based on the newly designed wiring harness and structure.

An MV-22 Osprey from Air Test and Evaluation Squadron (HX) 21 taxies out at Naval Air Station Patuxent River, Maryland, during its first functional flight test with the modified nacelles and wiring on April 23.

US Navy photos by Peter Fitzpatrick

"The Air Force expects to transform its entire fleet of CV-22 aircraft," said Col. Brian Clifford, who leads the CV-22 program under the V-22 Joint Program Office. "This is the first of many aircraft to come."

The V-22 nacelles house the power and propulsion components of the aircraft, and the conversion area includes complex wiring bundles routing from each nacelle, feeding power through various elements of the aircraft.

The landmark nacelle modifications, designed to increase readiness, ease maintenance and improve the wiring and structure reliability, is the largest nacelle redesign since fleet introduction in 2007.

Leading up to this milestone, a team

HX-21's MV-22 Osprey departs NAS Patuxent River during its first functional flight test with the modified nacelles and wiring.

of V-22 stakeholders from Naval Air Systems Command (NAVAIR) worked closely with the Air Force Special Operation Forces (AFSOC), Marines and V-22 industry team to determine the right solutions to improve nacelle design. From procurement, design, initial modification to flight test, the resources at Naval Air Station Patuxent River, Maryland, and its related sites were critical to the program's current and future success.

"The NAVAIR team is second to none," said Col. Brain Taylor, program manager. "This command, its assets and most importantly, its people, are delivering critical fleet needs."

Identifying the Challenge

During semi-annual fleet readiness engagement events between the program office and operational V-22 stakeholders, there was a common message among Air Force and Marine Corps maintainers—maintenance and sustainment of the nacelle wiring is cumbersome, difficult and affects readiness.

"There is no better way to find ideas for aircraft improvement than from the feedback of the individuals detailed to work on and fly the V-22," Taylor said. "We took their feedback and ran with it."

The program office and industry conducted focused data reviews of fleet maintenance and provided the quantitative proof that a large portion of V-22 maintenance was occurring just in the nacelles.

"Approximately 60 percent of maintenance hours are spent in the nacelles," Clifford said. "By refining the design for maintainability in these areas, we ultimately reduce repair time and improve readiness."

Working with engineers, program managers and the V-22 original equipment manufacturers, an initial list of improvements were drafted, including a new wire harness design and wiring-type for increased maintainability.

Throughout the design process, it was clear that maintainer involvement and feedback would be critical to ensuring changes would be focused on tangible benefits to the flight line. By using maintainers embedded in the program office, along with multiple feedback engagements at both Marine Corps and Air Force

locations, the design effort was well-informed of existing flight line challenges. The program office worked with fleet leadership to bring selected maintainers into the conversation leading up to and during the preliminary and critical design reviews as subject matter experts. In doing so, numerous design adjustments were made possible at the appropriate phases of development.

Putting the Solution to the Test

In 2020, NAVAIR awarded multiple contracts to develop, design and install nacelle modification kits and install conversion area harnesses on the CV-22.

To test and solidify the redesign, the program office worked with NAVAIR's Air Test and Evaluation Squadron (HX) 21 to modify one of its test aircraft, an MV-22, with the new nacelle improvement kits. Using a test asset allowed for greater flexibility to identify and accommodate any design changes prior to fleet inductions. Working with HX-21 also meant access to numerous pilots and maintainers trained specifically to improve aircraft capabilities through test and evaluation.

Over the five-month modification period, the program office worked alongside industry stakeholders, HX-21, the Naval Air Warfare Center Aircraft Division Wiring Systems Branch and the Fleet Support Team to update the aircraft based on real-time observations. In April 2021, the newly modified aircraft flew for the first time.

"Getting flight time was our first step in seeing the maintenance benefits of this program in real time," said Bob Lynch, MV-22 assistant maintenance officer at HX-21.

Following initial flights, the aircraft went into a two-week maintenance demonstration. Once again, Air Force and Marine Corps maintainers were brought in from operational units and asked to perform hundreds of maintenance procedures on the aircraft, provide observations and make recommendations throughout the exercise. Clifford said that this robust feedback drastically improved the value of the demonstration.

"The demonstration validated the improvements, but also made sure we didn't have any unintentional consequences or didn't make things harder," Clifford said. "It was unique in that maintainers for both the Air Force and Marine Corps joined in the exercise at HX-21."

Since the maintenance demonstration, the test aircraft continued to fly, complete multiple maintenance periods and recently completed electromagnetic environment testing.

The program office also leveraged the Wiring Systems Branch and their decades of lessons learned to perform wiring assessments during flight test to verify the new design meets airworthiness requirements and identify any changes resulting from aircraft operations. Any required engineering changes will then be incorporated in the CV-22 nacelle improvement modification line in Amarillo.

"These types of assessments have proven invaluable in verifying new designs, especially with respect to system clearance requirements," Clifford said.

The culmination of data, test flights and user feedback led to the Air Force and program decision to move forward with fleet inductions in Amarillo.

"I see so much possibility in the nacelle improvement program, it has the potential to make lasting changes to V-22 readiness rates within the Air Force and the other variants," Taylor said.

Liz Mildenstein is the V-22 Joint Program Office Public Affairs Specialist.

U.S. Air Force photo by Airman 1st Class Amanda A. Flower-Raschella

U.S. Air Force Airman 1st Class Brody Baublitz, right, and Senior Airman Trinity Simmons, 801st Special Operations Aircraft Maintenance Squadron crew chief, repair a CV-22 Osprey tiltrotor aircraft at Hurlburt Field, Fla., in September.

U.S. Navy photo

Maintainers from multiple operational squadrons perform maintenance on the newly modified MV-22 Osprey.

FRCE Takes on New V-22 Workload for HMX-1

U.S. Navy photo

Fleet Readiness Center East transportation specialists prepare to tow the first MV-22B Osprey, flown by Marine Helicopter Squadron (HMX) 1, inducted for service at the depot from the V-22 aircraft line to the clean and paint facility.

By Heather Wilburn

Fleet Readiness Center East (FRCE) opened a new chapter of service Aug. 11 as it completed work on the first fleet MV-22B Osprey aircraft flown by Marine Helicopter Squadron (HMX) 1, which is tasked with helicopter transport of the President of the United States.

FRCE has conducted modification and planned maintenance interval (PMI) events for Navy and Marine Corps V-22 aircraft since 2009 when the depot inducted its first Osprey. Now, the facility will provide that same support to the HMX-1 "Nighthawks" and their "Green Top" MV-22B aircraft, all of which are scheduled to receive PMI-2 service at FRCE in the coming months.

"These HMX-1 V-22s are national assets, performing a very visible and important mission," said FRCE Commanding Officer Col. Thomas A. Atkinson. "I'm very proud of the V-22 PMI line and our paint shop for a job well done and done so quickly; the aircraft looked really good and we delivered it a month ahead of schedule."

Long History of Presidential Helo Support

The new V-22 workload continues FRCE's long history of service to HMX-1, which is also the primary operational test and evaluation unit for Marine assault support helicopters and related equipment.

FRCE first began working with the presidential helicopter in 1967 and, in the past, the depot has serviced CH-46 and CH-53 helicopters for the squadron, as well as the T58-400B engine that powered the presidential VH-3D Sea King and the "White Top" VH-3D itself, also known as Marine One. The VH-92 Fleet Support Team, based at FRCE, provides engineering and logistics support and assistance for the new VH-92A White Top platform, which is scheduled to serve as the new Marine One.

When FRCE artisans completed maintenance on the first HMX-1 Osprey inducted into the facility, the depot beat the requested turnaround time by 28 days—returning the aircraft in just 122 days when the initial goal was set at 150, said Andrew Rock, the depot's V-22 branch head. The V-22 line was able to move from induction to functional check flight (FCF) within 74 days, which represents a successful effort that played a major role in FRCE beating the turnaround goal, he noted.

"For the aircraft to go from landing for induction to us flying it and having it deemed an FCF aircraft in 74 days is

U.S. Navy photo

Riley Lawrence, an artisan in the aircraft clean and strip shop, works with the first MV-22B Osprey flown by HMX-1 inducted for service at FRCE.

U.S. Navy photo

FRCE paint shop work leader Ron Gray inspects the finish on the new paint of the first HMX-1 MV-22B Osprey inducted for service at the depot.

absolutely incredible," Rock said. "I think this really shows what the team at FRCE is capable of."

According to Rock, the initial plan was to conduct the HMX-1 Osprey PMI-2 events at Marine Corps Base Quantico, Virginia, which presented several logistical challenges for the V-22 line at FRCE—including the prospect of sending Cherry Point-based artisans to Quantico for an extended period of time. Leaders reached an agreement to send the first V-22 to FRCE with a targeted turnaround time of 150 days; if FRCE could meet this goal, the depot could conduct the required maintenance on the remaining HMX-1 Ospreys at Cherry Point.

"It was a prototype, essentially," Rock said. "There's a certain schedule that has to be met. We didn't initially have an estimate on what the actual turnaround would be, because we had no idea what the aircraft was going to look like when it came in. We didn't know what we were going to find when we started disassembly for the PMI."

A PMI is a period of time prescribed for the execution of a maintenance event. In a PMI-1 event, artisans disassemble the aircraft, evaluate its condition, perform required maintenance, update systems and reassemble the aircraft. PMI-2 events include new paint for the aircraft in addition to the services provided during PMI-1. In both events, the aircraft fly into and out of the facility at FRCE. PMI events comprise the Navy's Integrated Maintenance Program, which targets the structural integrity of the airframe.

Maintenance and inspection conducted by the squadron at the organizational level (O-level) doesn't turn up the same issues found at the depot-level because O-level maintenance does not, by design, address the same needs.

"A lot of the things we find here at FRCE will only be found during PMI," Rock said. "For example, at the squadron level, they're not going to take out the sponson fuel cells and look at the frames in there. We will do that, and if we pull that sponson fuel cell out and find a bad frame inside, that could add weeks to the turnaround time."

The HMX-1 aircraft currently in process turned out to be especially "clean," meaning there were minimal hidden issues, Rock said. That contributed to the remarkable speed with which the team took the V-22 from induction to FCF. The next V-22 from HMX-1 is already scheduled for induction this fall—with the possibility of moving that induction date up, because the team completed the initial Osprey so far ahead of the initial 150-day goal.

"There was a lot of concern regarding the ability to complete a 150-day turnaround time at FRCE, so it's good for everybody out there to see us perform," he said. "We did it, and we did it well, and that's exactly what the (commanding officer) wants to show."

Heather Wilburn is a public affairs specialist with Fleet Readiness Center East.

FRCSE Reduces Turnaround Time on H-60 Aircraft

By Ashley Lombardo

Fleet Readiness Center Southeast (FRCSE) delivered its first two H-60 aircraft following full implementation of the Naval Sustainment System-Aviation (NSS-A) on its vertical lift aircraft production line.

"The Vertical Lift team has truly persevered," said FRCSE's Commanding Officer Capt. Grady Duffey. "Through the ongoing pandemic and other hurdles related to space constraints, our team quickly adapted to the new goals, utilizing the pillars of NSS-A and knocked it out of the park. Their dedication to the mission is evident by their efforts to meet the Navy's need for these aircraft."

On the heels of significantly reduced turnaround times (TATs) at FRCSE for the T-6 and F/A-18E/F aircraft, on Aug. 19, the vertical lift team completed a Planned Maintenance Interval-2N (PMI-2N), an in-depth inspection and maintenance event, on an MH-60R aircraft in only 135 days—a reduction in the overall TAT of 26 days.

Though the first H-60 with the reduced TAT was completed at Naval Air Station Jacksonville, Florida, the requirement was also met at FRCSE's vertical lift production line at Naval Station Mayport, Florida, where the first aircraft crossed the finish line in on Aug. 26, just seven days later.

In early April, the team was tasked by Naval Air Systems Command (NAVAIR) to reduce the TAT for PMI repairs because of an increased need to return H-60s to the fleet faster.

"The mandate for turnaround times for PMI events came from the NAVAIR Commander and applied to all H-60 production lines across the Fleet Readiness Centers," said Bruce Mobley, FRCSE's vertical lift production line director. "The TAT was previously set at 142 calendar days for a PMI-1N and 161 for a PMI-2N, but reduced to 120 and 135, respectively. We achieved those new requirements with the delivery of both aircraft."

The team focused on NSS-A tenants to meet this initiative designed to maximize workforce productivity by focusing on people, parts and processes.

Concepts such as utilizing a production control center (PCC), a designated space where experts from all areas of aircraft support meet to address concerns and track progress, helped streamline communications.

"Collaborative teamwork, positive attitudes, focus and communication have been the driving factors behind vertical lift's success," Mobley said. "The team has excellent chemistry and camaraderie. Everyone pulls their weight when faced with new challenges, starting with management and filtering down to production floor specialists. Our success is a true testament of our dedication to the mission despite challenges."

During the two daily meetings in the PCC, the team proposed and followed up on wildly important goals, which pushed urgency and challenged traditional modes of thinking. The production team achieved timely, top-quality depot-level maintenance under cost by implementing quick and visible changes that addressed barriers and incorporated resolutions.

"All future H-60 PMI events will require the reduction in turnaround time," Mobley said. "And FRCSE is currently leading that effort. We are also looking to deliver four additional aircraft shortly, which is a big deal for our artisans. I am really proud of all we've accomplished."

Ashley Lombardo is a public affairs specialist with Fleet Readiness Center Southeast.

U.S. Navy photos by Toiete Jackson

Aircraft mechanic Mario Orejudos (left) and aircraft mechanic apprentice Obeiean Pagaduan (right) install tail pylon swivel fittings on an MH-60 aircraft.

Clay Johnson, an aircraft mechanic apprentice with Fleet Readiness Center Southeast's vertical lift production line, performs maintenance on an H-60 tail rotor gear box.

FRCE Reduces UH-1N Huey Repair Time

By Heather Wilburn

Fleet Readiness Center East (FRCE) artisans recently completed work on the first UH-1N Huey helicopter to undergo service at the depot's facility in Kinston's North Carolina Global TransPark.

Logistical improvements brought about by the new location helped the team complete service on the aircraft more than 40 days ahead of the average turnaround times the H-1 line posted while based at FRCE's primary facility at Marine Corps Air Station Cherry Point, said Allen Broadway, the H-1 branch head. The Kinston location, which stood up in March, offers a dedicated space for the H-1 line while allowing the depot to reclaim hangar space at Cherry Point in support of the V-22 Osprey and H-53 Heavy-Lift Helicopter programs.

The recently completed aircraft was in repair phase for 91 days, while the last six H-1 aircraft at FRCE averaged 130-140 days in repair. Broadway said he could attribute the improvement to many factors but, above all, the success lies in having all of the H-1 line's logistical elements present in one place and the working partnership between FRCE and the Global TransPark.

"Our workforce has always had the skill to be able to do this," he said. "However, having a dedicated warehouse for material, having the production controllers full-kit each repair with all the parts needed, and not having non-essential items stored in the shadow of the artisans—all of this makes a difference.

"One of the other things that contributed is that the team at the Global TransPark have done a very good job of supporting our requirements," Broadway said. "They're Johnny-on-the-spot for anything we need from facility modifications to essential services."

Using these advantages to turn the H-1Ns quickly and get them back to the customer—the U.S. Air Force—makes a real-world impact in military aviation readiness, noted Matthew Pitts, the H-1 deputy branch head and test pilot. The H-1 is a Vietnam-era aircraft and the need for scheduled maintenance services remains high, as the Air Force uses the helicopter for a wide variety of missions.

"In the grand scheme of things, every day we take off of repair here puts that bird back in the fleet that much sooner," said Pitts, a former Marine Corps pilot. "That allows the customer's readiness to go up, their training to go up and their pilot proficiency to increase. Decreasing these turnaround times is going to be a really big force multiplier for the Air Force."

Heather Wilburn is a public affairs specialist with Fleet Readiness Center East.

U.S Navy photos

Fleet Readiness Center East (FRCE) artisans recently completed work on the first H-1N helicopter to undergo service at the depot's facility in Kinston's North Carolina Global TransPark.

Kyle Sadler, sheet metal mechanic, left, and William Petroff, sheet metal worker, conduct maintenance and repairs on a U.S. Air Force H-1N.

Zack Potter, left, and Allen Warden, both sheet metal workers, inspect maintenance and repairs conducted on a U.S. Air Force UH-1N helicopter.

U.S Navy photo

Fleet Readiness Center Southwest test line and support staff pose in front of the last E-2C Hawkeye to complete PMI-2 on Aug. 3.

FRCSW Returns Its Final PMI-2 E-2C to Fleet

By Jim Markle

The last E-2C Hawkeye to complete the planned maintenance interval two (PMI-2) procedure at Fleet Readiness Center Southwest (FRCSW) departed the command's test line Aug. 3 on its way to Airborne Command & Control Squadron (VAW) 116 stationed at Naval Base Ventura County, California.

The aircraft was inducted Sept. 21, 2020, from VAW-123.

Developed by the Grumman Aircraft Company in the mid-1960s, the twin turbo-propeller E-2 Hawkeye and its sister airframe, the C-2A Greyhound transport, still serve aboard aircraft carriers.

Production of the airborne early warning system (AEWS) E-2C variant began in 1973. With its detachable 24-foot diameter rotodome radar system, the Hawkeye's ability to guard against airborne threats remains the standard for protection of naval carrier battle groups to this day.

FRCSW performs two levels of scheduled maintenance on the airframe: PMI-1, or a light maintenance interval at FRCSW's Site Point Mugu and FRC Mid-Atlantic, and PMI-2, or a heavy maintenance which is handled at FRCSW's Building 460 onboard Naval Air Station North Island.

During PMI-1, artisans assess the attachment points of the flight control surfaces on the body of the aircraft, the engines and other areas identified in the maintenance specification. Sheet metal repairs are made and worn parts replaced.

FRCSW is the Navy's sole provider of PMI-2 events to the airframe and employs approximately 120 artisans and 53 indirect support personnel.

Though not a complete overhaul, PMI-2 is a substantial disassembly of the aircraft down to the fuselage. Artisans remove the aircraft's wings, engines, landing gear and tail.

By using chemical or physical means, the aircraft's corrosion preventive paint is removed and an in-depth metal assessment is performed to locate surface anomalies like cracks, corrosion, exfoliation and missing fasteners.

PMI-2 procedures are completed under a project management method called the Critical Chain Project Management (CCPM) program. CCPM designates resources—like people and equipment—needed to complete a task in a specific amount of time. A software program called "Concerto™" is used to manage the aircraft's throughput as well as multiple CCPM projects.

The E-2 CCPM throughput is divided into four procedures: induction, repair, assembly and test line. Each step has a targeted completion time for a total of about 220 days, depending on material availability.

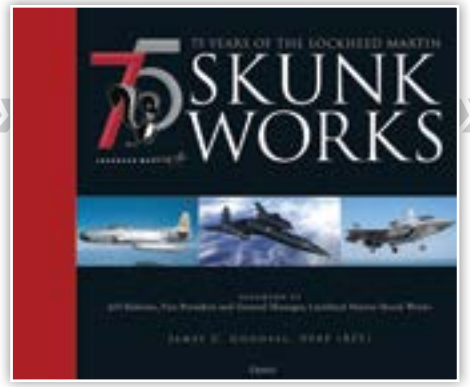
During fiscal 2020, FRCSW inducted five of the aircraft for PMI-2 and one for PMI-1. Approximately 29 E-2Cs remain in service.

The command will continue to support the maintenance requirements of the airframe as the Navy transitions to the technologically advanced E-2D Advanced Hawkeye.

Jim Markle is a public affairs specialist at Fleet Readiness Center Southwest.

Professional Reading

By Cmdr. Peter Mersky, USNR (Ret.)



75 Years of the Lockheed Martin Skunk Works

By James C. Goodall, Osprey Publishing, UK. 2021. 384 pp. Ill.

For those of you who want to combine a little workout with some great pleasure reading, this five-pound, 9 ¾ x 12 inch, large format book is just the thing. If you are a follower of the aircraft produced by Lockheed, or when it joined with Martin in 1995 this new compendium loving gathered and edited by a retired U.S.A.F. Master Sergeant (E-7), and might want to treat yourself to this pricey publication, again, this is a perfect outlet for you.

It's a pleasant journey, getting beyond the origination of its amusing and legendary name (actually it came direct from its director, Kelly Johnson, who might be considered the third leg of the troika of major American aircraft designers, the others being Ed Heinemann of Douglas, and Bill Northrop, whose far-seeing, often futuristic designs helped keep the American industry in its leadership position after World War II) with its "cute" little skunk caricature, which reminds me of the "Spook" mascot that accompanied all references to the F-4 Phantom and its manufacturer, McDonnell, then McDonnell Douglas in 1967.

Cruising through each chapter, taking as much time as desired to appreciate all the great photos, some familiar, but many maybe new to many readers, is time well spent, and truth be told, so is the money.

One of the busiest and most productive of aviation and military publishers in today's industry, and recently acquired by the large Bloomsbury concern, Osprey seems to be expanding its regular production of its very successful aviation books like Aces and Combat Aircraft series to big single-title books that allow major in-depth description of which Skunk Works is the latest example.

The book is a veritable plane-by-plane detailed chronological resume of Lockheed's memorable designs beginning with the P-80 Shooting Star jet fighter of late WWII that was just about ready to go operational and perhaps confront Germany's world-setting Me. 262. Of course, the P-80, later F-80, did see major combat in Korea as a fighter and occasional photo-reconnaissance aircraft and eventually evolved into the much used two-seat T-33 trainer—along with the Navy's TV-1 version that gave several of us Vietnam generation hopefuls their first jet hops--and F-94 Starfire radar-equipped interceptor. Each section or chapter has many of the best photos I have ever seen of the particular aircraft.

Other types, mainly USAF, include the futuristic XF-90 strategic fighter which the author notes, "was pretty much of a dog when it came to performance," mainly due to being underpowered with its two Westinghouse J-34 engines that offered barely 6,000 pounds of thrust.

Throughout the book, its large format allows the many photos to be displayed all to their advantage, something you don't always see today. But it is not all about famous, or well-known aircraft. Many pages are devoted to X-planes and various

Norway 1940, The Luftwaffe's Scandinavian Blitzkrieg

By James S. Corum, Osprey Bloomsbury Publishing, Oxford, UK. 2021. 96 pp. Ill.

A few books have been written on the Nazi invasion of Norway in April 1940, including an impressive two-volume treatment by Geirr H. Haarr, published by Seaforth in 2010. This latest book, no. 22 in Osprey's Air Campaign series, is certainly a worthy distillation of the larger work—although it is in no way from the same author or publisher--and includes much of what we have come to expect from Osprey in the way of authoritative text, excellent photos and artwork, and cartographic displays. The author is a Ph.D, a retired U.S. Army Reserve lieutenant colonel, and associate professor at the U.S. Army Command and General Staff College, Fort Leavenworth, Kansas.

Typical of this series, the book begins with an introduction and chronology of events of the invasion that detail the origination of the campaign that surprised the world reeling from the previous September's attack on Poland that began World War II in the new style of war, namely the German Blitzkrieg. As Germany was preparing to invade France and the so-called Low Countries of Belgium, the Netherlands and Luxembourg, it struck out against Scandinavia, notably Norway in search of places to install bases for its submarines to have easier access to the North Atlantic. Respecting Sweden's readiness to defend its neutrality throughout the war, the German onslaught seemed to stall as Britain, France and the few remaining countries still able to field their meager air and naval power prepared to meet the Nazi combination of air and sea power.

LtCol. Corum's narrative is very detailed and it may take a reader who is unfamiliar with this campaign extra time to stick with reading the book, but the work will be well worth it for an increased understanding of just how important this smaller campaign was—as it may be compared with perhaps the Battle

Photo courtesy of Lockheed Martin

A U-2R is prepared for launch from the USS America (CVA-66) during landing and takeoff trials in November 1969.

projects and designs. Such as the Navy's XFV Salmon (How many know its name?) VTOL design whose test pilot gave his last name to it. Several pages of great never-seen photos are a real treat.

Lockheed led the way in the 1950s with its high-speed fighters and contributed to the iconic century series with its F-104 Starfighter, quickly dubbed the "missile with a man in it." Serving with at least 12 countries, the F-104 only saw very limited combat with the USAF in Vietnam but served each nation well as a peace keeper, even appearing briefly in an episode of the epic television Sci-Fi series, "Star Trek" when a USAF Starfighter pilot spots the 23rd century Starship "Enterprise" in the 1960s skies, after having entered some kind of time warp.

And finally when Lockheed SR-71 test pilot and racing legend Darryl Greenamyer modified his Starfighter to achieve a world low altitude speed record of 988.26 mph.

Lockheed and the Skunk Works moved into the busy field of so-called "biz jet" with its JetStar in 1957, examples of which were designated the C-140. Two served as Kelly Johnson's personal transports. The field of supersonic airliners was briefly explored with the SST L-2000 design beginning in 1958 but was let go as the European Concorde captured the field and began it glamorous and expensive service.

The Skunk Works continued working on exotic designs, including the YF-12A strategic interceptor that morphed into the SR-71A strategic high-speed, high-altitude reconnaissance vehicle that has captured countless headlines and records for decades, and frankly, has yet to be matched by any subsequent manned design.

Other designs that came out of the bureau were the first true stealth fighter, the F-117, which was not actually a fighter, but more of a light attack aircraft, and the continuing upgrade of the U-2 that continues to serve the military and civilian intelligence agencies for whom it was originally designed in the mid-1950s.

I could go on but with limited space in this issue, the readers will have to find out for themselves the true expanse of this unique book. Go ahead, treat yourselves.

Photo courtesy of the James S. Corum Collection

A German bomber attacks a small merchant ship in the North Sea. The Allies used these small coastal ships to move troops and supplies into Norway during the invasion of April 1940. Luftwaffe strikes sunk more than two dozen naval trawlers and merchantmen while they were in Norwegian home waters.

of Britain that was to come soon afterward or the fighting in the Pacific right after Pearl Harbor.

Both sides struggled to bring enough weapons to prosecute their war, with the Germans probably eventually having enough men, aircraft and ship of various types to win. The British were just not able to field enough types of viable aircraft to fight off the German Blitzkrieg that had worked so well in the preceding months and would work so well for them in France in the late spring, and almost turn the tide in the Battle of Britain in the coming summer and early fall.

Norway 1940 contains the usual spread of archival photos as well as greatly detailed cartographic work and two-page illustrations that are the hallmark of this educational series that might be set apart from high-school text books of the 1950s and 1960s that often bored my generation to distraction. I wonder if some enterprising teachers aren't occasionally spending some of their department's quarterly funds to purchase these economically priced softcover books to interest a semester's classes for a specialized study of a particularly important conflict that eventually shaped our world nearly three-quarters of a century ago. Such well-placed monies could go a long way in stirring young minds toward further studying the course of modern world history.

Ju 87 Stuka vs Royal Navy Carriers Mediterranean

By Robert Forsyth, Osprey Bloomsbury Publishing, UK. 2021. 80 pp., Ill.

Perhaps one of the best of recent publications from this busy British publisher, this new book is number 111 of their trend-setting Duel series, which pits aircraft of one side against their opposition, whether another aircraft, or other form of weapon, perhaps ships or guns (such as anti-aircraft emplacements). It's a highly imaginative concept that presents two different types from two warring nations and has taken its compact design against other informative books such as Aircraft of the Aces and Combat Aircraft to form economical and encyclopedic references that can be found on bookshelves of enthusiasts and historians around the world.

The Junkers Ju 87 Stuka needs no introduction, to be sure, and quickly became one of the short-listed icons of World War II. With its cranked wings, solid fixed main landing gear and menacing long nose and characteristic scream in a dive, the Stuka became synonymous in the first years of the war, diving almost vertically over Polish and other European cities, its main bomb hanging out in the windstream, as well as ships caught in its attack as they struggled to bring supplies to hard-pressed countries. In the early months of the Battle of Britain in the summer and fall of 1940, Stuka literally fell upon the vital radar stations that were so important to the defense of the island.

As the war developed and British defenses rose to meet the increasing Nazi strength, especially in the Mediterranean theater, Britain small fleet of aircraft carriers met hordes of Stukas almost daily sending up what can only be reported as obsolete or obsolescent aircraft, such as Fairey Fulmars, or Blackburn Skuas, poorly designed or poorly armed types, ill-equipped to meet the German Luftwaffe on anything approaching equal terms. Occasional successes were never a true indication of how British defenses were holding out.

At one point, the British had but three carriers, all of which were much smaller and far less capable than those of the U.S., or the other main operator of that type of capital ship, the Japanese. And as I noted, the aircraft that flew from these ships were quite far behind the aircraft if the U.S. and Japan. However, the British flight crews tried their best as did the ship's companies who maintained and operated their vessels in the face of German and occasional Italian determined attacks. (The Italians flew Stukas as well.)

The author is an accomplished researcher and writer whose style quickly comes through in telling this sometimes desperate story. Many of the photos come from his collection, as well as other collector who occasionally help Osprey authors, and they definitely compliment his text. Artist Jim Laurier's work is definitely up to his usual standard, especially the cover illustration of a diving Stuka over a carrier as well as a surprising, never-shown depiction of how the Ju 87's unique centerline trapeze bomb rack placed its main bomb below the fuselage away from the spinning propeller. Also, interesting closeups of German bombs and their placement on Stukas add to the great details for modelers.

There are also biographical details of various British and German leaders, as well as the political and military aspects of the individual subject weapons and how they came together in this surprisingly brief but often intense campaign that is not always discussed so deeply. All in all, an excellent addition to Osprey's line.

Photo courtesy of EN Archive

Bomb-laden Ju 87s of StG 2 (Sturzkampfgeschwader [dive bomber wing] 2) head out for another mission possibly over the Mediterranean.

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- Rotary Wing
- Airborne/Unmanned Systems (NFO)

HOW TO APPLY

SUBMIT YOUR APPLICATION:
Navy Personnel Command
www.mynavyhr.navy.mil/Career-Management/Boards/Administrative/Test-Pilot/
Click on Boards – Administrative – Test Pilot

Mark these dates on your calendar

December Selection Board for July Class

- Application announcement Issued: August/September
- Applications accepted: Up to Late October
- Board convenes: Mid December
- Results posted: January/February

Dates subject to change

For more information on the U.S. Naval Test Pilot School visit:
www.navair.navy.mil/nawcad/usntps

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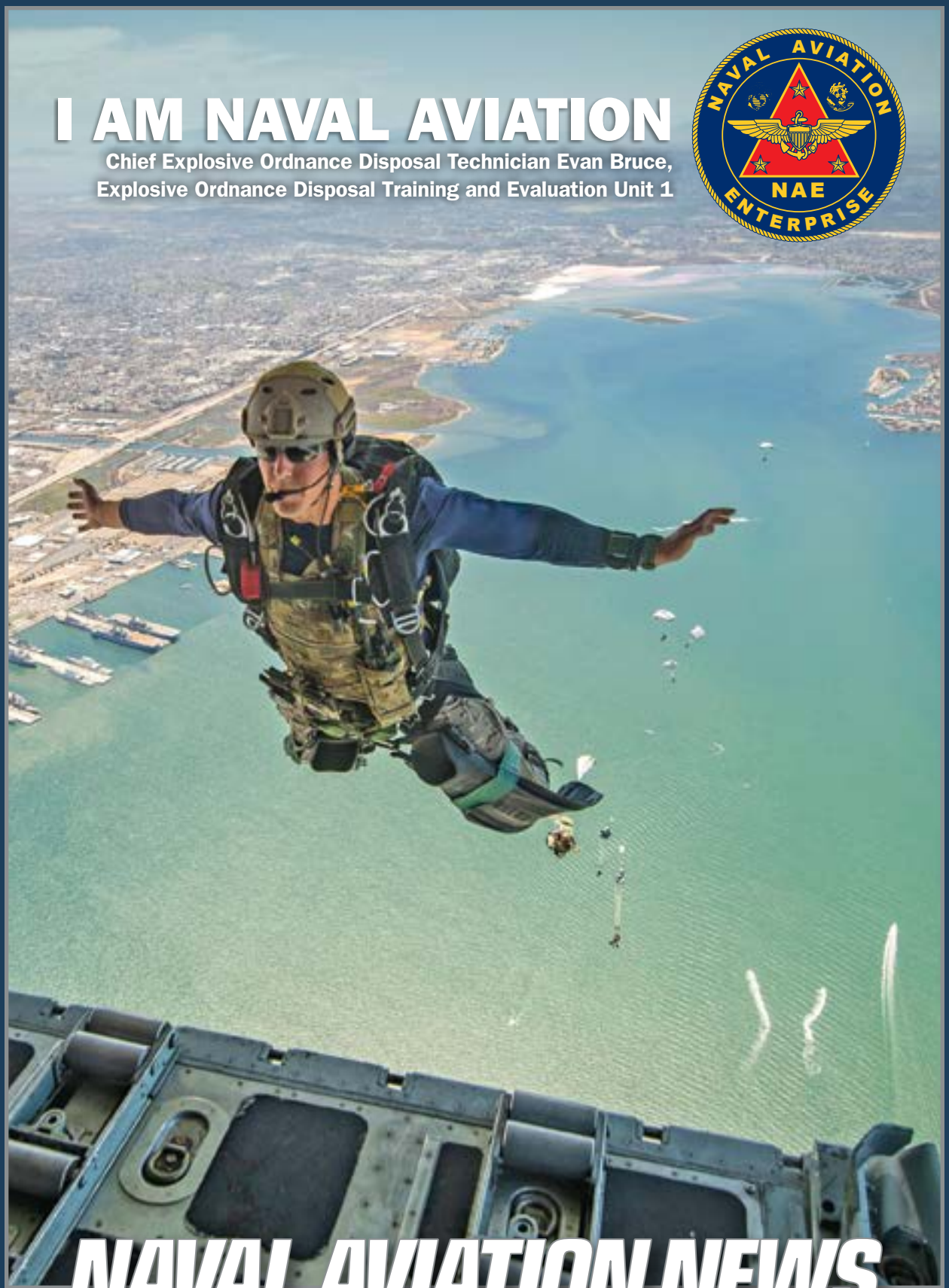

I AM NAVAL AVIATION

Chief Explosive Ordnance Disposal Technician Evan Bruce,
Explosive Ordnance Disposal Training and Evaluation Unit 1

NAVAL AVIATION NEWS

NAVAIR Command Communications Dept. ■ 47123 Buse Road, Suite 547 ■ Patuxent River, MD 20670 ■ NANNEWS@NAVY.MIL

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