THE NAVY AND MARINE CORPS AVIATION SAFETY MAGAZINE

Approach

VOL. 65, NO. 2

Combating Real & Perceived Pressures in Naval Aviation

Examining how some communities may be especially vulnerable to the adverse effects of pressure

Naval Safety Command's *New* Approach to Assessments

Ensuring commands are Safe-to-Operate and Operating Safely

+ *MORE*

Our Team

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Let's Stay Connected

U.S. Navy photo by Mass Communication Specialist 2nd Class Javier Reyes

Naval Safety Command's New Approach to Assessments

I'd like to take this opportunity to discuss the Naval Safety Command's (NAVSAFECOM) new approach to safety assessments, some of the changes you may see and our goal outcomes.

By Cmdr. Gary M. Shelley

Since its re-designation in February 2022, NAVSAFECOM developed a new assessment process with a new focus on risk management as it relates to the updated **Safety Management System (SMS)**. The Navy Safety and Occupational Health Manual, *OPNAV-M 5100.23 CH-2*, signed by the Chief of Naval Operations (CNO) on Sept. 5, 2022, outlines and establishes the framework and requirements for instituting an SMS or Safety Management Plan (SMP) for Echelon II or III organizations and their subordinate commands.

The Navy SMS is the system-of-systems for risk management and assessing the effectiveness of risk controls. A critical part of the SMS framework is that it requires each level of command to consistently perform self-assessment and implement corrections and improvements, communicate risk up and down the chain of command, and account for risk at the appropriate level. It includes systematic procedures, practices and policies for risk management, with assurance and regulatory processes built into it.

Safety assurance involves the routine and formal assessment processes necessary to ensure safety requirements and standards are met. The NAVSAFECOM Assessment process is the assurance function under the Navy's SMS.

NAVSAFECOM's assessment process will determine whether an assessed command has effectively instilled behaviors of self-awareness, self-assessment, self-correction, and continual learning to enable a defense-in-depth that ensures the command is **Safe-to-Operate** and **Operating Safely** through proper risk identification, communication and accountability at the appropriate level.

The Safe-to-Operate envelope includes all operating limits, procedures, training and operating conditions for all activities including routine, day-to-day operations; high hazard or special operations or crisis and emergency event operations. To Operate Safely is to operate within established boundaries of the Safe-to-Operate envelope, also known as the "safety envelope." Organizations that develop assurance processes to identify and address risks when they are operating outside of the Safe-to-Operate envelope are executing an effective SMS.

As a key proponent of the CNO's "Get Real, Get Better" initiative, NAVSAFECOM has a significant impact because we now send assessment reports up to the CNO, ensuring transparent communication of risk at the highest levels of Navy leadership.

Our assessments adhere to the following principles:

- Risk identification focuses on risk awareness throughout an organization or unit, as well as the organization's awareness of normalized risk.
- Risk communication looks at effectiveness of tracking and communicating risk up and down the chain of command.
- Risk accountability evaluates how risk is assigned and if it is assigned at the correct level (normally the correct level is the level of the chain of command that can correct the risk – normally through policy or resourcing changes). Although risk accountability may be held above the unit level, the unit is still responsible to mitigate the risk to the best of their ability.

Historically, NAVSAFECOM's mandate included regular assessments at the Echelon IV and V-levels. To conduct the additional level of assessments (Echelon II and III), NAVSAFECOM formed the Assurance Directorate, comprised of senior military and civilian employees tasked with assessing the overall effectiveness of risk and safety management practices across the Naval Enterprise.

One area of focus is conducting local area assessments at the unit level (squadrons, ships and submarines), similar to what we have done in the past; but we are now also looking at facilities and infrastructure from a base operating services-standpoint. Again, we are looking at a command's ability to be self-aware, self-assess and self-correct to better measure if that command is safe to operate and operating safely.

The best units build on an exceptional self-assessment competency with "Get Better" self-correcting behavior: fixing small problems before they become larger issues; addressing root causes, not symptoms of problems; applying world-class problem-solving tools and best practices; setting clear cadences for accountability; and working collaboratively and quickly, elevating barriers to progress that cannot be resolved at the unit level. Simply put, this is what NAVSAFECOM is evaluating as our assessment teams make their way around the fleet.

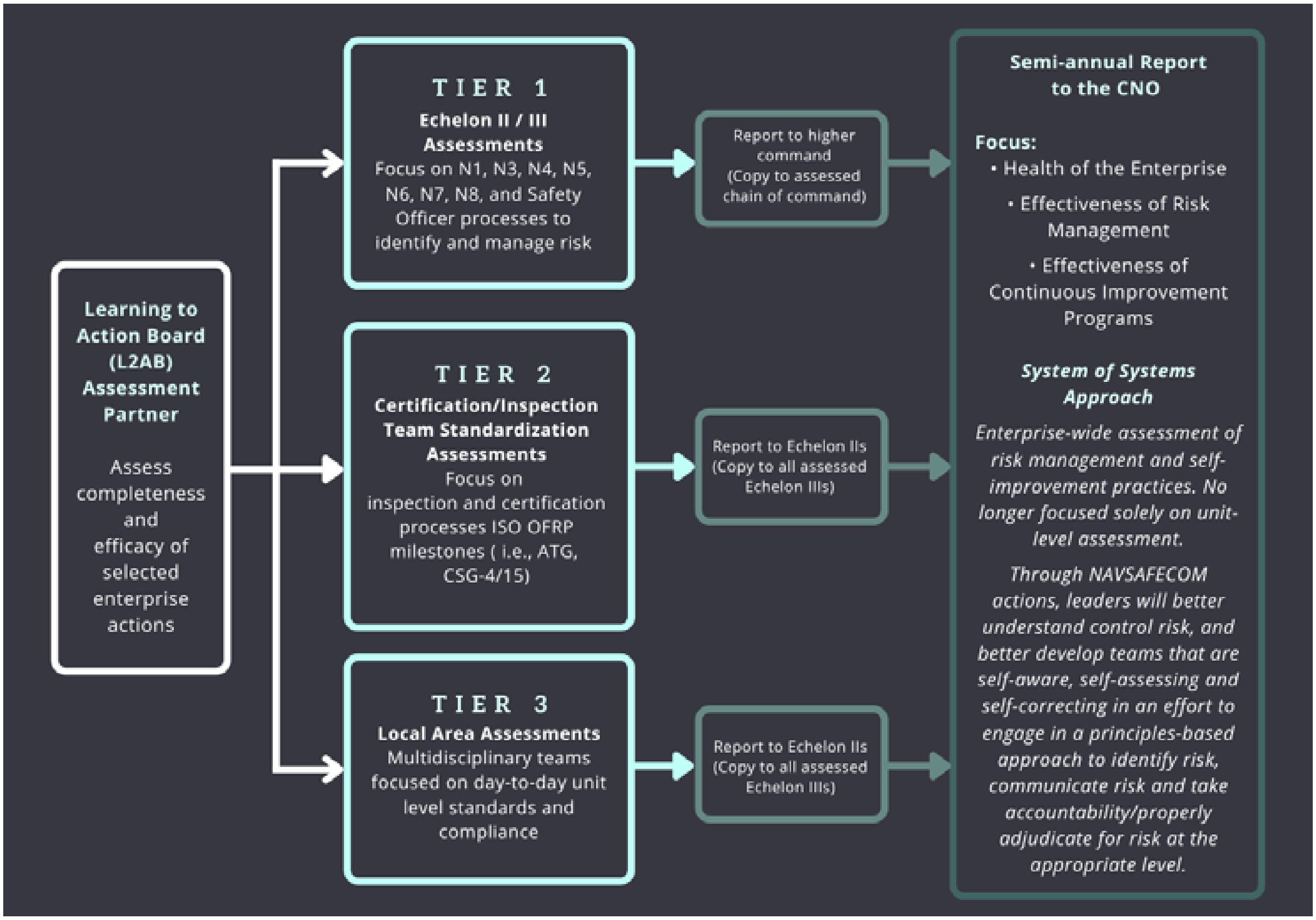
Additionally, the assessment teams are evaluating commands' ability to instill behaviors that facilitate these principles and ensure the command is managing, mitigating and communicating risk effectively. This includes accurately identifying risk, communicating risk, taking accountability of risk at the right level.

The NAVSAFECOM mandate includes unannounced visits to 18 major fleet concentration areas annually to assess risk management behavior and compliance with established policy. Non-compliance inherently introduces risk of materiel failure and personnel injury.

The end goal is to ensure unit level commands have proper risk identification measures, good communication and appropriate risk accountability at the appropriate level within the chain of command.

While this new assessment process is a departure from how we conducted business in the past where only unit-level commands were assessed, the fact that higher echelon levels in the chain of command are also assessed will only further strengthen our Navy while fully supporting the CNO's, "Get Real, Get Better" initiative.

Our assessment teams look forward to seeing you around the fleet. Strive to ensure you are self-assessing, self-correcting, identifying and communicating your risk effectively to ensure accountability is held at the appropriate level.



This poster illustrates how the NAVSAFECOM assessment program works for naval enterprise organizations to ensure they are safe to operate and operating safely. Graphic created by Stephanie Slater.

Team Jackpot: Reinforcing a Cu

By USS George H. W. Bush (CVN 77) Public Affairs

USS George H.W. Bush (CVN 77) and Carrier Air Wing (CVW) 7 – Team Jackpot (77+7) made strides in a performance campaign to drive warfighting readiness and reinforce a culture of self-assessment and improvement with safety and procedural compliance at the core while deployed in the Naval Forces Europe-Africa area of operations.

The 2nd Quarter Performance Campaign Plan - started during the second quarter of the ship's regularly scheduled deployment - is a sports analogy that references the need to make critical, in-game assessments of performance that further enable planning, briefing and operational execution. The best teams are those that rapidly assess, learn, adapt and grow as a team more quickly than their opponents. Leadership recognized that there was no requirement to wait for an artificial deadline like halftime, and so the team started the concerted effort in the second quarter of the deployment.

"The best teams in any competition are able to critically self-assess in stride to make the small changes required to excel in the second half of the game," said Capt. Dave Pollard, commanding officer of George H.W. Bush. "Our combined teams perform at a higher level than any World Cup or Super Bowl winning team, and to keep our warfighting edges sharp, this ongoing effort is essential."

The performance campaign plan is led by Cmdr. Dylan Beyer, the ship's safety officer, and Lt. Cmdr. Daniel Landerholm, the air wing safety officer. Although more than 70% of the carrier's crew is comprised of first-term Sailors, the leadership team embarked aboard the ship recognized that Sailors are adapting well to deployment routines. Steady routines in complex aircraft carrier operations, maintenance, and safety can morph into complacency, increasing risk and degrading readiness. The aim of the performance campaign plan is not only to keep individual Sailors focused, but to develop a culture where Sailors do not normalize deviation from established standards and procedures, while completing continuous and rigorous self and team assessment.

Complacency commonly shows up in the adoption of shortcuts and workarounds that deviate—apparently harmlessly—from safe practices and procedures. These micro-deviations lined up across multiple Sailors' routines and create what is often termed the Swiss-cheese model, whereby a series of seemingly small deviations lead to a mishap.

"The work Sailors do below decks, in the hangar, on the roof, and in our work centers around the ship, all have an impact on safety and operations," said Beyer. "We're taking a critical look at processes and procedures that span the air wing and ship teams

U.S. Navy photo by Mass Communication Specialist 2nd Class Brandon Roberson

lture of Performance & Safety

to make sure we have the rigor, data, and information we need to drive safety, and ultimately, the warfighting capability our nation needs to deter and defend against our adversaries."

Landerholm, the air wing safety officer and landing signal officer agreed.

"We work in a dangerous environment and profession," he said. "Team Jackpot is an outstanding team, and we want to ensure that all Sailors are mindful and vigilant while they are completing their assigned mission. It's not hyperbole to say that the equipment and operations out here can cause serious injury or death when we are deviating from processes and procedures. We can't afford injuries to Sailors simply because we weren't willing to make the concerted effort to deliberately reinforce our culture of safety."

The performance campaign took a holistic approach to looking at safety and readiness across Team Jackpot and leveraged a number of key initiatives to help reinforce a positive safety culture. An important aspect of the work was providing teams and units the latitude to do extensive assessment of their own programs in order to develop strategies to solve them. In some cases, the solutions were not as fruitful as they would have hoped, though in others cases, they were successful. This sort of organic team development, driven by a culture of information sharing, is a benefit to the entire carrier, air wing, and carrier strike group team.

"Many of our aviators throughout the air wing are TOPGUN graduates – a school that drives tactical proficiency across all warfare areas enabling our squadrons' mission to deliver decisive combat victories as part of the carrier strike group weapons system," said Capt. Tom Bodine, commander, CVW-7. "What we're doing is taking a similar approach across Team Jackpot to further develop our culture through rigorous self-assessment and qualitative and quantitative assessment."

First, a hotline was established in the ship's safety department to provide an avenue for Sailors to voice concerns anonymously. All were encouraged to report normalized problems and what they thought the next mishap would look like. The Daily Avenger – the ship's daily news publication - advertised the hotline and published call-in subjects and the steps taken to address issues. This extended throughout multiple ship-force departments, embarked staff and CVW-7. For transparency, all solutions to the unresolved issues were clearly explained or defined.

Beyer and Landerholm also collaborated with the ship's media department to create a video which was broadcasted to

Continued on Page 8»

all-hands, explaining the concept of the normalization of deviation through case studies and literature. The normalization of deviation is a commonly used phrase in the Navy in recent years, essentially referring to accepting what was once unacceptable. This could involve shortcuts or workaround violations that come from overdependence on self-knowledge or a desire to finish tasks more quickly, which can lead to mishaps. The broadcast also included Chief of Naval Operations Adm. Mike Gilday's Get Real, Get Better video.

George H.W. Bush heads of department were also required to temporarily pause under-instruction training for all watch stations, and provide the commanding officer with honest, constructive feedback to establish guidelines for training newly qualifying watch standers. This had immediate qualitative impact, led to fruitful discussion and ensured that all personnel – from the most senior qualified to the most junior under instruction watch standers – were on the same page.

"The performance campaign gave us the latitude to pull back on the reigns, acknowledge our blind spots, and refocus on the basics - with excellent results," said Lt. Cmdr. Andrew Whelan, assistant navigator on board George H.W. Bush. "It was energizing to hear both qualified and unqualified Sailors discuss their concerns so candidly and confidently with their chain of command. This enabled us to put controls in place that improved our processes and renewed consistency throughout our training pipelines."

Hangar bay walk-downs schedules and processes were formalized and conducted four times each day led by the ship's Aircraft Intermediate Maintenance (AIMD), Air and Safety Departments along with khaki representatives from each of the squadrons within CVW-7. Their main objective was to detect safety deficiencies, provide on the spot correction, and further identify processes that lead to the normalization of deviation. Findings were reported immediately to squadron maintenance master chief petty officers and published daily on the air wing's Safety Officer of the Day (SOOD) report for ship-wide stakeholder awareness.

"It's great to see Team Jackpot coming together and holding each other accountable for results from the formalized hangar bay walk downs," said Lt. Sarah Huston, who was formerly the V-3 division officer within the ship's air department, now serving as the V-1 division officer. "Khaki supervision increased in the hangar bays, and compliance deficiencies decreased immediately."

Additionally, khaki leaders from various departments and squadrons were selected as panel members for a live Sailor 360 event on the ship's mess decks in November. Sailors asked questions, made comments and heard from senior leaders about how normalizing deviations, the "Renter's Mindset," and Fighting Drift affects their shipmates, work centers, and departments and puts their effectiveness and safety at risk.

"Working in an up-tempo environment constantly, day in and day out, is extremely dangerous on all levels. Complacency can easily set in because every day feels like Groundhog Day on a deployment," said event panelist Senior Chief Aviation Boatswain's Mate Dequon Smith, who is also the V-2 division leading chief petty officer within the ship's air department. "Leadership should continue to push to our troops that no two days are ever the same, and must continue to learn how to better communicate to junior troops."

The goal of the Sailor 360 event was not only to achieve exceptional performance, but to showcase the leadership's raw, honest self-assessment of the crew's mindset in an effort to self-correct, problem solve, and prevent mishaps to the pursuit of achieving excellence among every Sailor.

Leaving no stone unturned, they also rallied the support of the Carrier Strike Group 10 Center for Naval Analyses (CNA) representative, Dr. Simca Bouma. Landerholm and Beyer worked with Bouma to review non-compliance events and code CVW-7 SOOD reports throughout deployment. Further, Bouma analyzed data from previously deploying aircraft carriers to compare data sets and look for trends and statistically significant data points to act on. After combing through the data, the picture around carrier air wing and aircraft carrier safety started to come in more clearly.

"Although it is possible to compare aviation mishaps to other CVN/CVW teams, the comparison gives rise to few actionable recommendations due to the infrequency of aviation mishaps: mishaps are 'the tip of the iceberg,' so to speak," said Bouma. "However, collecting concrete instances of normalization of deviation from Safety Officer of the Day reports helps measure the rest of the proverbial iceberg, and we see that many of these instances can be rectified through on the spot training which decreases risk and fends off complacency."

"Every time normalized deviation is recognized, elevated, discussed, and resolved before it contributes to a mishap, Team Jackpot wins both by shrinking the 'iceberg' and by reinforcing a safety culture where Sailors look out for each other and speak up when they see something amiss," she continued.

The combined effort throughout the performance campaign led to a Team Jackpot safety council meeting in November where leaders across the aircraft carrier and carrier air wing team came together to discuss the qualitative and quantitative findings, and to bring up areas of concern that could be addressed through teamwork and leadership.

"We spend a lot of time talking about safety, processes, and procedural compliance to keep our Sailors safe and equipment in good condition," said Lt. Cmdr. Jason Hosler, the ship's aircraft handling officer. "The most important part of this is the communication between pilots, maintainers, air wing reps, and the ship's crew. Humility on all sides is at the core. When issues arise, the better we can make corrections on the spot driven by critical feedback, the more successful we can be. I am incredibly proud of my team and the work they do to keep an open, safe deck for flight operations."

The Team Jackpot 2nd Quarter Performance Campaign Plan's immediate impact to daily operations aboard the ship, the renewed focus on the deliberate development of a culture of safety, and the identifications of areas for further growth and development in reporting reflect the teamwork that both Pollard and Bodine look favorably upon. The teams across the departments and divisions aboard George H.W. Bush and the squadrons of CVW-7 already collected data and will continue to do so throughout the remainder of deployment. This information will not only inform Team Jackpot's self-assessment, but also provide insight for future carrier and carrier air wing teams to hold standards and increase performance across multiple organizations.

"In my entire time in the Navy, I've never seen a closer air wing and carrier team," said Bodine. "It is a reflection on all of the leaders in this room and the effort you put into taking care of our Sailors with a focus on mission readiness that is the difference between us and our competitors."

U.S. Navy photo by Mass Communication Specialist 2nd Class Brandon Roberson

The Battle for Engine & Rotor Control

By Lt. Cmdr. Dave Vasquez, HSM-73

Amidst an Engine High-Side Failure under an Instrument Flight Rules (IFR) Flight Plan, an Aircrew Found Themselves Battling Engine and Rotor Speed Fluctuations Above the Foothills in Southern California.

The day's sortie was supposed to be an easy, good-deal bag – a daytime instrument fundamental flight for a new check in, from NAS North Island (KNZY) to MCAS Camp Pendleton (KNFG). Weather was standard for Southern California in early spring – clear skies and moderate temperatures with no forecasted phenomena. The plan was simple: file a stereo route to KNFG for multiple instrument approaches, cancel IFR and return to KNZY along the coast. We conducted a thorough airway and approach study and our risk management and NATOPS briefs identified no significant risks. During our hot-seat and helicopter aircraft commander (HAC) turnover, the off-going HAC had no gripes to pass – good helicopter overall.

Takeoff and en route operations were uneventful with the occasional traffic calls from air traffic control. Within 12 miles of the airfield, we were cleared for the COPTER TACAN 21 approach at KNFG. As soon as we turned to final at nine miles out, my co-pilot said, "Uh, what is happening?" I looked down and noticed the No. 1 engine turbine gas temperature (TGT) was spiking/fluctuating and redlined to max, main rotor speed (Nr) rose to 105%; the No. 1 Torque indications were fluctuating and No. 1 gas generator speed (Ng) was unknown (we failed to look at it). Our scan was glued to TGT, Nr and Torque because they're grouped together on our flight display, while Ng is located on the adjacent mission display. This missed review is a central debrief point later.

After onset, we immediately declared an emergency while simultaneously executing our engine malfunction in flight (EMIF) emergency procedure. Every engine malfunction in the H-60 family begins with EMIF – the first step which is control Nr and the sixth step is identify the malfunction. Naturally in the troubleshooting process, we started a controlled descent from nine miles out to set up for landing; however, our Nr excessively rose to 117%. Normal Nr is 100% and our max continuous (with exception of functional check flight) is 120%, so it was high. Even though we had verbalized EMIF, we were not executing it. We eventually got Nr under control by adding power and arresting our descent thus allowing us to identify the malfunction – No. 1 engine high-side failure.

Following EMIF, the next critical memory item for engine high-side failure is to retard the malfunctioning power control lever (PCL) and set torque 10% below the good engine or match Ng or match TGT. My co-pilot retarded the No. 1 PCL and paused to determine which engine instrument to balance against the No. 2 (good) engine. No. 1 Torque was still erroneous, but No. 1 TGT stabilized following PCL reduction so we elected to use TGT as our matching criteria. We broke out our pocket checklist, re-read the critical memory items and verbalized the non-memory items which was land as soon as practicable. I couldn't remember if we read the notes, but if we did and comprehended them, it would have cued us NOT to rely on TGT matching and instead use Ng matching (debrief point #1).

Following stabilization of our engine instruments, Nr control slipped away again – this time below 100%. The lowest observed was 95% so we corrected it by adding power to get back to 100% Nr (debrief point #2). Assuming the worst case scenario and as a precaution, we elected to perform the single engine landing checklist.

KNFG was ready to catch us and emergency vehicles were standing by. We told tower we'd perform a running landing which provided us the best landing profile in a power-limited situation. My co-pilot continued to manually manipulate the No. 1 PCL to preserve TGT matching. Despite the engine still producing power (albeit degraded), I felt a self-perceived urgency to land the aircraft. As a result, my running landing was sloppy. I applied firm brake pressure while simultaneously managing directional control after collective reduction which caused pilot-induced yaw oscillations. As ground speed reduced, I was able to get the oscillations under control and taxi off the runway without incident (debrief point #3).

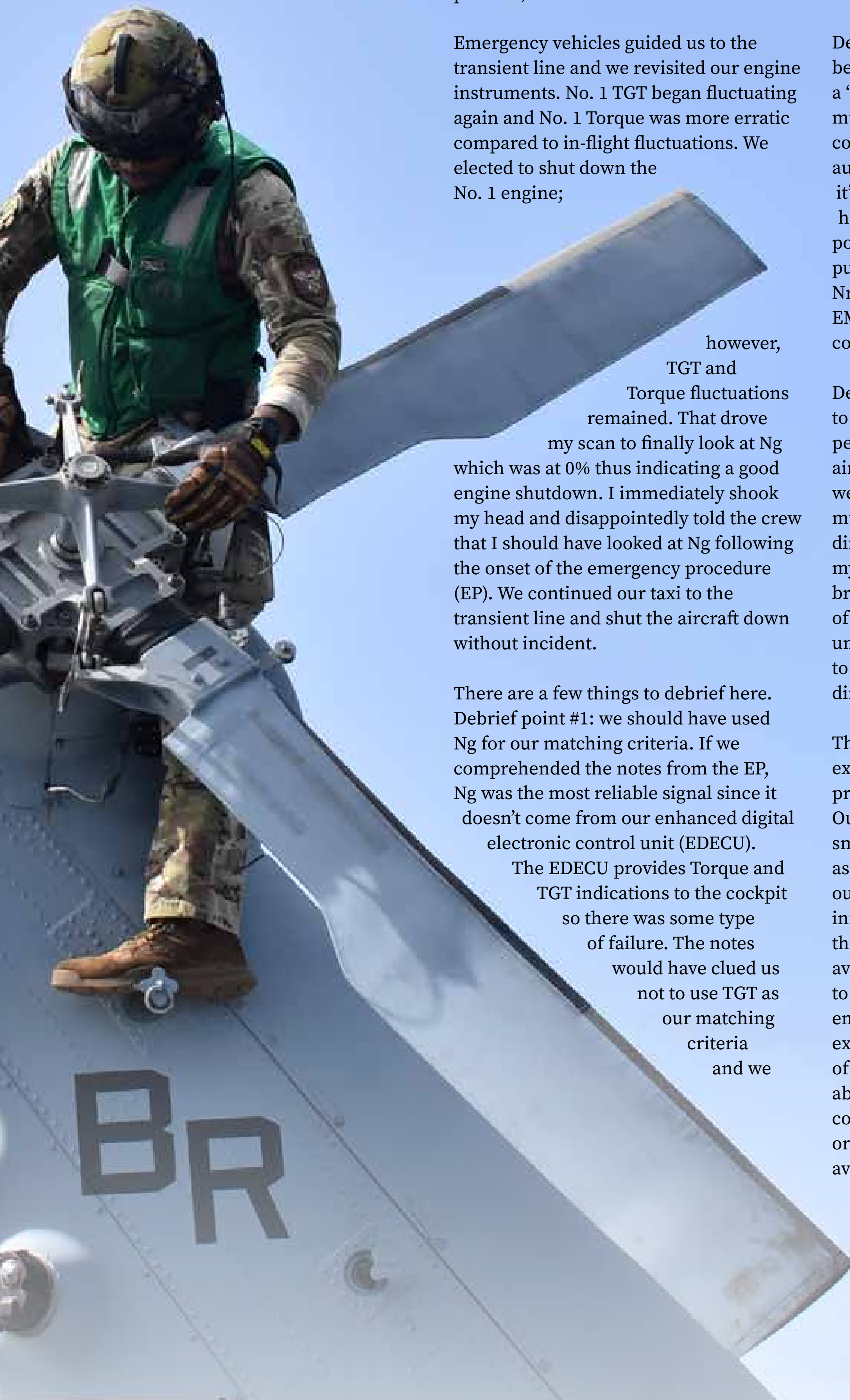
Emergency vehicles guided us to the transient line and we revisited our engine instruments. No. 1 TGT began fluctuating again and No. 1 Torque was more erratic compared to in-flight fluctuations. We elected to shut down the No. 1 engine; however, TGT and Torque fluctuations remained. That drove my scan to finally look at Ng which was at 0% thus indicating a good engine shutdown. I immediately shook my head and disappointedly told the crew that I should have looked at Ng following the onset of the emergency procedure (EP). We continued our taxi to the transient line and shut the aircraft down without incident.

There are a few things to debrief here. Debrief point #1: we should have used Ng for our matching criteria. If we comprehended the notes from the EP, Ng was the most reliable signal since it doesn't come from our enhanced digital electronic control unit (EDECU). The EDECU provides Torque and TGT indications to the cockpit so there was some type of failure. The notes would have clued us not to use TGT as our matching criteria and we should have questioned TGT's accuracy following its massive fluctuations after onset. Luckily TGT settled, but we bit off on it. Bottom line, always keep Ng in your scan as it's the most reliable engine instrument when TGT and Torque are erroneous.

Debrief point #2: Managing Nr must be performed until landing. It's not a "set it and forget it" movement – it must constantly be managed. Nr control is obvious when performing an autorotation, but it's easy to forget once it's under control following an engine high-side failure. I didn't take enough power out following my initial collective pull to get Nr under control. As a result, Nr dropped to 95%. Controlling Nr during EMIF isn't a one-step process; it must constantly be managed.

Debrief point #3: Fly the aircraft safely to a complete stop. There was a self-perceived pressure to land and stop the aircraft. Airspeed and rate of descent were by the book, but I applied too much brake pressure while managing directional control. I should have gotten my lineup straight and applied less brake pressure since we had plenty of runway remaining. Again, it wasn't unsafe, but the self-perceived urgency to stop the aircraft made for sloppy directional control.

This emergency procedure was an exercise in fundamental aviation principles and checklist discipline. Our real-world EP wasn't executed as smoothly compared to the simulator as our aviation principles were slightly out of order and we missed valuable information in the checklist. We learned the value of preserving the order of aviate, navigate, communicate and to read/comprehend the notes in the emergency procedure. No actual EP is executed flawlessly yet we had control of the aircraft and landed it safely. We'll absorb the lessons learned and continue to practice the learning organization principles of the naval aviation enterprise.



U.S. Navy photo by Mineman 2nd Class Justin Hovarter

Expect the Unexpected

By Lt. Carter McKenzie, HSM-74

Being a new guy at the squadron, I was still fresh to the standards and procedures of an operational squadron. My eyes and ears were open to anything and everything I could learn. With myself and our two newest aircrewmen in the cabin, our crew was young, but very eager.

From left, Naval Aircrewman Tactical Helicopter (AWR) Mateo Apodaca, Naval Aircrewman Tactical Helicopter (AWR) Bree Flinn-Johnson, Lt. Cmdr. Mark Hlousek, and Lt. Carter McKenzie, were crew from the flight that night.

Our assignment was a low-level, landing zone training flight. We dove into the brief, outlining the points of a very standard local route with a commonly used outlying landing field (OLF) for the landing zone training. Our Naval Air and Training Operating Procedures Standardization (NATOPS) brief was incredibly thorough. Apart from our helicopter aircraft commander (HAC), our crew was junior but excited for the training ahead.

Our preflight was standard and methodical, with no outlying discrepancies and a full pressurized damper system. Startup and takeoff proceeded with no issues. As we trekked to our first checkpoint, the flight felt normal in regard to aircraft vibrations. The route was uneventful, with bank angles not exceeding 30 degrees. Upon reaching the final checkpoint, we headed south to our OLF. The HAC elected to take the first landing, executing a standard approach to a hover on the western end of the runway.

Within one second of a smooth touchdown, we began to experience unusual lateral vibrations. The lateral motion progressed to the point where our helmets were nearly impacting the doors of the cockpit. As he held the collective down, my HAC yelled from the right seat, “PCLs, PCLs, PCLs!” I reached up; however, due to our nighttime environment and night vision device equipment, searching with my eyes was next to impossible. The battering motion of the aircraft made it exceedingly difficult to take hold of the PCLs, or pitch control levers. My first few attempts resulted in the handles slipping out of my hands due to the aggressive rocking of the frame. After another few seconds I finally caught both levers. I immediately pulled them off, and the aircraft began to settle. The HAC smoothly and expeditiously applied the rotor brake. The total time, from touchdown to rotor head stop, was roughly 30 seconds.

U.S. Navy photo by Lt. Emma O'Donnell

After the dust settled, we checked to see that everyone in the aircraft was alright. Upon further inspection, we discovered a broken hydraulic line on a single blade. The line had frayed at the connection to the rotor head. Hydraulic fluid gradually drained from the damper system as we flew our route, rendering the damper system useless. Pure aggressive jumping of the frame shifted aircraft position to a 45-degree heading change and 30-foot lateral shift down the runway.

U.S. Navy photo by Lt. Carter McKenzie

I took a number of different elements from this experience. Nothing can substitute for a good preflight. Catching issues early is the No. 1 way to ensure mission success and crew safety. More than anything, expect the unexpected. Unusual vibes on deck was the last emergency I was prepared for. I'm grateful that we were able to handle the situation before it got out of hand, and I'm happy to be able to take this experience forward and teach others what can happen at any time.

Grampaw Pettibone Says . . .

Congratulations to the 2022 Grampaw Pettibone award winners. Organizations and individual winners of this award contribute the most toward aviation safety awareness through publications and media resources.

AWSCS Aaron Hutchinson, NAVSAFECOM
Individual Award

Hutchinson (left) conducts a local area inspection in Bahrain. Hutchinson contributed multiple articles this year to *Approach* and *MECH* Magazines. These articles highlighted common safety concerns and lessons learned for pilots, aircrew and maintainers. Additionally he wrote several articles in support of the Commander, Naval Air Forces Aviation Safety Campaign. His contributions amplify a culture where self-aware, self-critical and self-improving organizations focus on people and processes to eliminate mishaps.

PE Corner

By Lt. Cmdr. Philip DeNicola

In this edition of the PE Corner, we continue to develop the intended go-to location for PE information. We begin with an update from the Physiological Episodes Action Team (PEAT), located at the Naval Safety Command (NAVSAFECOM), comprised of tactical aircraft aviation analysts and aeromedical professionals on staff. Our intent is to briefly cover items to provide relevant information to the fleet. We will end with our main article, which in this edition covers what to do if you think you had a physiologic event (PE).

PEAT Update

U.S. Navy photo

Navy Hospital Corpsman 1st Class Marcus K. Billingsley provides training on the newly installed Mask on Breathing Device (MOBD) at the Aviation Survival Training Center.

The Root Cause Corrective Action (RCCA) team meets monthly to discuss updates to ongoing efforts to improve aircrew breathing systems, aircraft systems and components, and aircrew and maintainer training. The team is comprised of experts from PMA-202, 205, 265, 273, NAWCAD, BUMED, CNATRA, CNAF and the PEAT. The RCCA team was formed in 2017 when the PEAT was created and has been working on 466 corrective action items to reduce the occurrence and severity of PEs in aircraft. January's meeting included updates on Aircrew Survival Equipmentman (PR) "C" School being reviewed by the Naval Air Warfare Center Training Systems Division, with a curriculum design being finalized and pilot course established with full implementation slated for early fiscal year 2024. This effort aims to provide higher quality and consistent PR training to improve aircrew gear operation and maintenance. Another update included the installation of the new Mask on Breathing Device which will replace the reduced oxygen breathing device at all Aviation Survival Training Centers to provide more realistic representation of symptoms.

Read more about mask on breathing devices

Watch video about mask on breathing devices

Lastly, please send comments and suggestions to us at: PEAT@us.navy.mil.

A Reminder

Physiologic episodes (PHYSEP) occur when aircrew experience adverse physiological, psychological, pathological or physical problems that manifest during or after flight. While not a comprehensive list, examples include airsickness, spatial disorientation, GLOC/ALOC/black-out/grey-out, manifest bowel or bladder dysfunction, autonomic response to physiological stress, hypo/hypercapnia (typically hyper/hypoventilation) and hypoxia that are not due to a known or suspected aircraft or aircrew systems malfunction. The PHYSEPs exclude any symptoms due to a known or suspected aircraft or aircrew systems malfunction.

A PE is a subset of PHYSEPs and occurs when aircrew experience adverse physiological symptoms during or after flight and these are attributed to a known or suspected aircraft and/or aircrew systems malfunction. While not a comprehensive list, examples include hypo/hypercapnia (typically hyper/hypoventilation), hypoxia, pressure related illness, autonomic response to physiological stress, decompression illness, carbon monoxide poisoning, symptoms due to smoke or fumes in the cockpit due to a known or suspected aircraft and/or aircrew systems malfunction. The PEs exclude any symptoms that are not due to a known or suspected aircraft or aircrew systems malfunction.

Slam Sticks

Each edition will highlight the top three Slam Stick data-matching squadrons. For this edition, bravo zulu to the following:

November

1. TPS – 100% (*Nerds!*)
2. VAQ-132 – 98.8%
3. VFA-86 and VAQ-136 – 97.6%

U.S. Navy photo by Mass Communication Specialist 2nd Class Zack Guth

December

1. TPS – 100% (*Nerds!*)
2. VAQ-134 – 97.6%
3. VAQ-131 – 97.6%

Slam Sticks record cabin pressurization changes; they are the little orange bricks you bring into the cockpit each time you fly. Capt. Luke Davis sends safety officers monthly emails on this data, which allows for malfunction analysis when aircrew report a PE or PHYSEP once the slam stick is matched to the naval aviation flight record (NAVFLIR). Both sets of information get uploaded to HhART (Hornet Health Assessment and Readiness Tool) which has been developed and tested as a predictive analytics tool for identifying components for repair or replacement before failure, reducing environmental control system (ECS) malfunctions and chances of a PE occurring. This tool has greatly reduced in-flight failures of components and is a major reason why there has been a decrease in PEs over the past few years. As CPOMS (Cabin Pressure and OBOGS Monitoring System) comes online, Slam Sticks will be phased out as this new cabin altimeter will record the data automatically. We ask for a push by all aircrew to continue carrying Slam Sticks, remember to turn them on and match them to your NAVFLIR post flight. The data gathering is important to continue improving aircraft systems' health!

Request for Assistance from F-35 Pilots

What is the Navy's solutions for solving problems? Meetings and lots of them. Twice a year, the F-35 community holds the Aeromedical Community of Interest Forum (ACOI). This is a conference that occurs typically each May and November to discuss flight gear, cockpit life support systems, PEs/PHYSEPs and ways to improve all of these. As the joint program office (JPO) executive level leadership team gets direct feedback from this influential group, the issues discussed can directly impact the broader F-35 program. This past November, the U.S. Air Force had pilot representatives at the meeting to voice their specific concerns and perspectives. If you're an F-35 pilot and are interested in representing Naval Aviation, looking at you VX-9 Det, Edwards, contact the PEAT for information. Additionally, once a year the Crew System's Working Group holds a conference as a cross between a System Safety Working Group, where we could always use more fleet reps, and an Enabler NARG (Naval Aviation Requirements Group). Contact the PEAT if interested.

Continued on Page 16»

So You Just Had a PE...

You are transiting at FL280 and hear a loud bang…you've just lost your cabin pressurization. Because of your training, your brain immediately begins to react to the situation and you execute the bold face. You still feel an adrenaline rush which is a completely normal reaction to the unexpected. This reaction is part of your fight or flight response. With your descent to a safe altitude complete, you begin to think back to your Level A aeromedical training. Your aeromedical safety officer (AMSO) discussed monitoring your symptoms after any OBOGS or ECS failure. Shortly after receiving vectors to your home field, you notice you are having issues understanding air traffic control. You can hear them, but you are having to work harder to truly understand their directions. You declare an emergency and request a straight-in approach. After successfully landing, taxiing and shutting down the aircraft, you walk into maintenance control. You have no recollection of landing or taxiing the aircraft. At this point, it is imperative you tell someone about your condition immediately.

The first step is for you to be seen by your aeromedical provider as soon as possible. Ideally, they will meet you at your squadron to begin the medical assessment. If your aeromedical provider cannot meet you at the squadron and you need to go to the base clinic, ***DO NOT*** drive yourself. A member of your squadron needs to drive you to ensure your safety in the event your symptoms worsen. Regardless of how the event is later administratively classified, the medical response is the same and most important priority. The next step is for your squadron to activate the local Physiological Event Rapid Response Team (PERRT). This team is led by the Wing or Marine aircraft group AMSO and comprised of your squadron aviation safety officer (ASO), your aeromedical provider and the local Naval Air Technical Data and Engineering Service Command (NATEC) rep. Their job is to gather data and analyze what just happened to help eventually determine whether this is a PE or a PHYSEP. To be classified as a PE, there must be an aircraft or aircrew systems malfunction in conjunction with aircrew symptoms. In the event of a suspected or known PE, the PERRT will commence an investigation.

When meeting with the aeromedical provider, they will use clinical practice guidelines specifically established for PEs. These peer-reviewed guidelines are derived from years of research and real-world instances and have vastly improved the quality of care and outcomes for aircrew. Simultaneously, your aeromedical provider will fill out Evidence Data Sheet (EDS) Part C. The EDS is required for every PE investigation and drives a standardized data collection effort. This information helps in the analysis of an event and is ultimately used to support engineering, policy or procedural improvements. There are four distinct EDSs that help paint the overall picture of what happened during a PE. The aircrew interview is in EDS Part A and will be conducted by your squadron ASO. If you were in a two-seat aircraft, both aircrew must fill out separate EDSs. Squadron maintenance and the NATEC rep will be responsible for EDS Part B which helps diagnose the suspected aircraft or aircrew system malfunction. Slam Stick data will be used to corroborate aircraft diagnoses in Part B, so ensure you are following Slam Stick standard operating procedures. The EDS Part C is completed by your aeromedical provider and will be supported by any additional labs, diagnostic testing or treatment notes. Finally, EDS Part D will be an assessment for the overall

fit of your flight equipment. This assessment will be conducted by your AMSO, parachute riggers and/or flight equipment Marines. Your flight equipment will be quarantined until this assessment can be accomplished to help preserve perishable information.

Once the local PERRT determines a suspected or known PE took place, the AMSO will schedule a Quick Look Meeting with the PEAT within 72 hours. The PEAT provides support to each PERRT. During the Quick Look Meeting, the local PERRT and PEAT, with the support of technical representatives, will review the available information to determine whether to continue investigating the event as a PE. It is ideal to get a firsthand account from the pilot or aircrew during this meeting to help provide clarity, any additional information and avoid delays. Once the PEAT and the PERRT have determined to continue the investigation as a PE, the squadron and PERRT are responsible for the following items:

1. Initial PE notification within 96 hours of PE determination. The PE Operating Guide has the format and distribution list for this email notification.

2. Complete EDS Parts A-D and submit within 30 days in RMI.

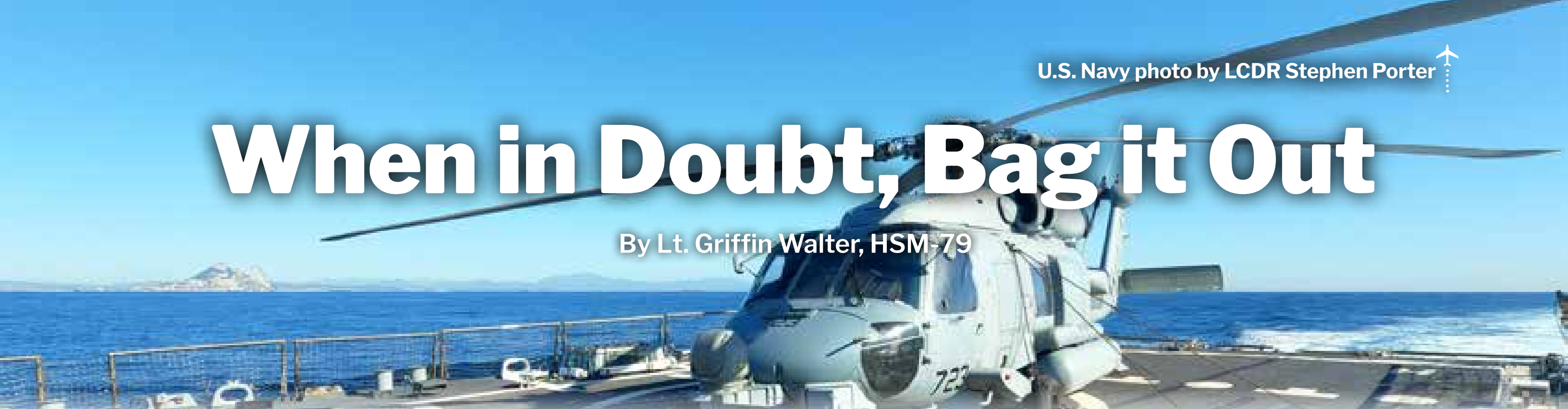
3. Final Summary Report within 30 days. This final report is provided to each PE aviator/crew to explain what happened during the PE and any potential corrective actions that will take place.

4. RMI report within 30 days. Please ensure this report matches the information in the Final Summary Report.

Note: At any point during the investigation, a PE can be reclassified as a PHYSEP. This does not mean it is any less important. NAVSAFECOM collects data on both PEs and PHYSEPs, all of which is used to improve or update aircrew survivability, policies, training and aeromedical curriculum or guide future aircraft/aircrew systems requirements. The PE timelines listed above are guidelines but can change based on specific factors associated with an event such as ongoing data analysis or engineering investigation.

The process is slightly different for the F-35. The F-35 JPO defines a PE as any symptomatic event encountered during a flight or maintenance procedure that compromises human performance and results in an unsafe or potentially unsafe situation. The JPO does not require the tripwire of an aircraft malfunction for reporting. Within 96 hours of a suspected or known PE, the squadron shall submit an Action Request (AR) to the F-35 Operations Center at Fort Worth, Texas. The ARs are submitted via the Customer Relationship Management application of the Autonomic Logistics Information System. This action will notify the JPO PE Action Team (PET). The PET performs an administratively similar meeting to the Quick Look Meeting, but it is called a Hot Wash. The goal is to determine what happened and if anything needs to be changed. The F-35 EDSs from the investigation, the Final Summary Report and an RMI report are still due to the Navy PEAT at the conclusion of the Hot Wash and JPO investigation.

U.S. Navy photo by Chief Mass Communication Specialist Julie R. Matyascik



U.S. Navy photo by LCDR Stephen Porter

When in Doubt, Bag it Out

By Lt. Griffin Walter, HSM-79

We all rely on fuel in the Navy, whether it is for a generator to run the lights, a truck to move pallets, a ship to travel across the vast ocean, or to turn rotors on a helicopter during flight. Fuel leads us to do math over and over again in flight, constantly weighing options when they are available. I recently learned the importance of planning and keeping all options on the table while flying during an underway replenishment. We were operating off the coast of North Carolina with several guided missile destroyers (DDGs) and a replenishment-at-sea (RAS) ship. Each DDG was taking on fuel and stores. Our flight schedule was tightly coordinated with the RAS schedule to allow our aircraft time to be airborne for the length of the evolution.

We were warned before the flight the schedule was going a little long. We had factored in enough time for a 45-minute buffer, as well as a planned divert ship in the operating area. We launched as scheduled and began to conduct unit-level training and cleared the local area at max conserve airspeed to allow as much time aloft as possible. Our DDG was now second in line for its RAS. With this updated information, we recalculated our running bingo fuel to our shore divert, which was about 70 miles away. We also established communication with our ready DDG 10 miles away. When we checked in with our ready deck we were informed the deck was fouled due to a propulsion issue. The controller also told us there was a part drop aircraft inbound scheduled to land around the same time we would need a hot pump in case our DDG was not complete with its RAS. We then coordinated with our anti-submarine/anti-surface warfare tactical air controller (ASTAC) on the progress of our ship's RAS. We received unclear information on the progress and a vague estimated time of completion.

We voiced our fuel concern and requested the Air Boss be called to combat. We knew that having Air Boss present in combat would help bridge the communication gap and severity of the problem between the ASTAC, tactical action officer and our aircrew.

With the lack of a ready deck, we were looking for other options for fuel. We were provided an optional ready deck 80 miles to the south, out of communication range. We quickly ruled out that option since a land-based fuel site was now only 65 miles away and we did not have good comms or a specific location for the pop-up ready deck. We continued loitering, favoring heading toward land as we constantly ran a fuel calculation with wind corrections to the land site with an added 10 minute buffer for airfield unfamiliarity. The weather in our current area was starting to deteriorate and the sea state was starting to pick up. We still had good visibility but there was an added sense of urgency to determine a course of action. As we were approaching our divert bingo with approximately 45 minutes of fuel remaining to land with our minimum fuel required, we received word that the fouled ready deck had fixed its maintenance issue and was now ready to receive us. As we were coordinating our hot pump, the part drop aircraft checked on station. We immediately requested their fuel state. They checked in with three hours and 15 minutes of fuel remaining. After explaining our situation, they agreed we should fuel up prior to them dropping their part off and returning shore side. We grabbed gas on the ready deck while our ship was still conducting its RAS. We began a discussion internal to the aircraft about taking a full 3,800 lbs or taking less to minimize power required for our final landing on our ship or if another tasking requiring hovering arose. The risk decision for our situation was solely based on time aloft, remaining flexible if there happened to be another unforeseen delay in the RAS, and maintaining the capability to close shore if required for poor weather. The aircraft configuration and tasking would not require us to enter a Dip (an out-of-ground effect hover to lower our airborne sonar) where we would want to be lighter to reduce our power required so we ruled out a half fill up. The helicopter aircraft commander said, "Bag it out, who knows if we are going to encounter any more delays today." We took 3,800 lbs which proved to be a good call because the ship took another 45 minutes to recover us on deck just as the ceilings began to come down, rain began to fall and the seas picked up even more.

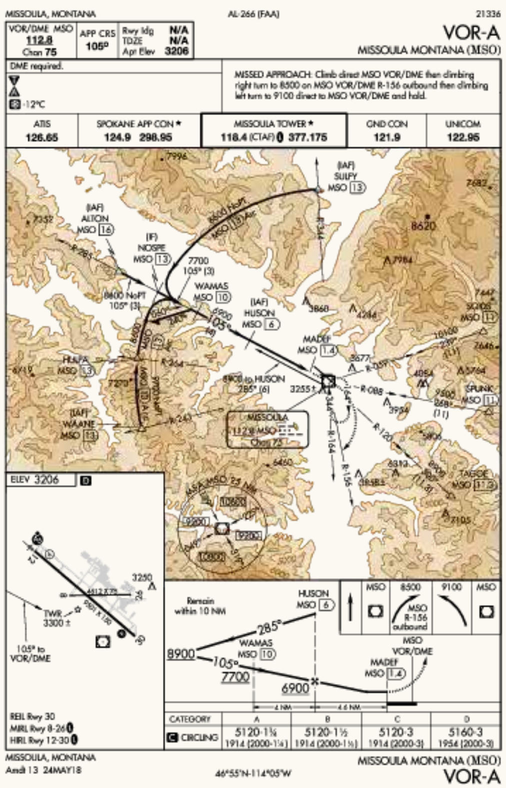
After the flight, we had a thorough debrief among the air department. In our debrief, the air boss reassured us the ship's captain offered to execute an emergency breakaway from the RAS ship, stand up emergency flight quarters and get us on deck in 10 minutes of our request. Though it felt like we were given unclear information by the ASTAC and we couldn't count on anyone to track our fuel situation, it was reassuring there were serious conversations about our immediate recovery if needed. If there would have been more clear communication from our ship, we could have severely reduced the perceived stressors in the aircrew. We tried to keep as many options on the table by remaining communicative with all possibilities and our current state. I learned that planning for delays is a requirement. When in doubt, over plan. When dealing with complex evolutions such as a RAS, stay flexible. And when given the option and your operating area, risk management assessments and weather allow, always "Bag it out."

When Circling Goes Wrong

By Lt. Adam Etheridge, VQ-1

Throughout our aviation careers, we conduct hundreds of approaches and landings. In turn, briefing the approach in a multi-piloted aircraft becomes almost second nature. However, it only takes one instance of uncertainty regarding the approach for the situation to quickly deteriorate.

On a night currency flight, we decided to conduct an approach into Missoula International Airport (MSO), Montana. There was little natural illumination due to a fairly substantial cloud layer, but visibility around the field was satisfactory. We requested and were cleared for the Very High Frequency Omni-Directional Range (VOR) for circling, VOR-A, circle to land runway 30. I read the published missed approach instructions to the other pilot as part of my approach brief (climb direct MSO VOR/DME, then climbing right turn to 8,500 feet, proceed outbound on the R-156, climbing left turn to 9,100 feet back to the MSO VOR/DME and hold as published). I visually picked up the runway and entered a left downwind for a touch-and-go on runway 30.



The instrument approach procedure chart for MSO.

Following the touch-and-go, I initiated a climbing right turn in accordance with the published missed approach with the intent to intercept the R-156. During the turn, my copilot questioned the radial that I was intending to intercept. The dim cockpit lighting and low moonlight illumination made it difficult to see the paper approach plates.

However, we both reviewed the published missed approach and determined that it made more sense to make a climbing left turn following the touch-and-go in order to remain southwest of the field. As I initiated the left turn, approach gave us an immediate climb to 14,000 feet and a new heading followed by a Brasher Warning. It turns out, our northbound turn put us in a 9,800 feet minimum vectoring altitude at 8,100 feet. Thankfully, we were in visual meteorological conditions the entire time and able to visually maintain separation from terrain.

As I thought over the details of this event for the next several days, I identified some key takeaways to share with the aviation community:

- Identifying and understanding a unique situation.
- Importance of a detailed plan to execute missed approach instructions during different phases of flight – approach versus on-the-go.
- How quickly a situation can deteriorate given the perfect set of circumstances – the Swiss cheese model.

Admittedly, our community does not conduct circling approaches at the same volume as standard precision or nonprecision approaches. We did not use time-critical risk management to identify and discuss hazards associated with a circling approach prior to requesting it.

I should have developed a detailed plan of how I intended to fly the missed approach during each phase of flight and addressed it during my approach brief. I briefed the published missed as depicted on the approach plate, which began at the missed approach point (MADEF MSO). A more specific approach would have included the direction of turn toward the landing runway if I needed to go missed after starting to circle.

Additionally, I did not consider the aircraft's position and altitude following a touch-and-go and feasibility of flying the published missed from that location. The circling minimum descent altitude (MDA) is 5,160 feet for a category D aircraft. After our touch-and-go, the aircraft was approximately 2,000 feet below the MDA and northwest of the VOR. We should have asked for updated departure instructions or clarified our intent to make a climbing right turn northbound to intercept the R-156 with approach.

At the end of the day, the plane and the crew were safe, but events like this show how quickly the accumulation of several factors – nighttime, poor luminosity, dim cockpit lighting and failure to clarify the intent of air traffic control instructions – can lead to an unfavorable situation. Circling approaches can be extremely dangerous and require a high level of situational awareness. Flying the published missed from a touch-and-go is even more hazardous. It is my hope that reminders like this will benefit other aviators before they find themselves confronted with the situation in the air.

U.S. Navy photo by Mass Communication Specialist 3rd Class Matthew Bakerian

The CRM Test

By Lt. Phillip A. Exner, HSC-25

They are the golden principles, the sacred rules, and tirelessly memorized by pilots regardless of platform: Crew Resource Management (CRM) skills. At the beginning of flight school, CRM is so stressed that it becomes a subconscious thought with young aviators. The instructors try to instill those skills' importance, but we often fail to understand their true value until we see them in our own mistakes. Departing the amphibious assault ship USS America (LHA 6), I've learned some hard lessons and identified a CRM skill that, had I used, may have prevented a potentially life-threatening situation for my crew and those aboard the ship.

My story begins with something no helicopter aircraft commander (HAC) scenario prepares you for: a beautiful, sunny day. It was clear in a million as some would say. The flight deck was empty. As an H2P, this is the perfect time to do bounces and gain proficiency. Although not new to the America, my HAC was newly qualified as the aircraft commander.

We decide to take turns for each landing. With each pass we make, I notice that my HAC slowly increases how much he wraps up his turn. One after another, we take landings just as we planned. With each pass we make, my HAC is faster and harder on his turns until his turns are extremely tight. Our turns get so aggressive that our airspeed is not really burning off on final and we have to bring our nose up so much that we can barely see the Landing Signal Enlisted (LSE) Sailor. Being fast on final can cause you to lose sight of the LSE, which is an instant wave-off criterion. This is pre-briefed as a safety issue before every flight.

It's one thing to wrap up your turn, but it's another to be unsafe and dangerous for no reason. Before I could say something, the aircrewmen in the back said, "That one was a little fast, don't you think?" The HAC just kind of laughed. It's his turn again and I know I'm going to have to wave him off if it's anything like the last one.

We transition, clear from the deck, report "ops normal," and turn hard for the downwind. I'm hawking the airspeed when I notice that we're faster than before. At this point, I'm frustrated and even a little mad. I am mad that he's putting me in this position and frustrated with myself for not calling him out earlier and letting it get this far. I want to call wave-off. It's right on the tip of my tongue. Instead, I'm saved, and not from my utility aircrewman. Tower calls, "Knight Rider 11 wave off." After the wave off, tower has us come back around and land. Once safely on deck, tower asks us to widen the pattern and slow it down. A sigh of relief for me, or was it? I could feel a knot in my stomach because I didn't have the assertiveness to call it myself.

Out of all the CRM skills, I drop assertiveness? How? I stewed about the event for the rest of the flight. Beating myself up and asking myself, "Why didn't anyone else call it?" Was I just uncomfortable with this? I've always been able to convey safety procedures to anyone. Maybe it's because I work with him and don't want to create a poor working relationship? After the flight was conducted, I asked everyone to meet in the briefing space. We discussed the events and actions. It was clear at the time that everyone was very uncomfortable with the landings and yet no one in the crew said anything. I realized that everyone accepted what was happening and hoped someone else would say something.

The crew pointed out the obvious mistakes with the pattern, airspeed and the potentially dangerous situation of losing sight of the LSE. The HAC seemed to understand the crew's concerns. I think he realized how unsafe the flight had gotten. He would later add talking points to his future briefs about such scenarios, and I liked that he added this. It makes the crew more likely to speak up in uncomfortable situations and sets clear boundaries for the entire crew. It creates left and right lateral limits on what's acceptable and what's not acceptable. I intend to use these points as well for my future briefs.

This experience was all but 25 minutes and I can remember every second of it. It makes me think about many "what ifs" and "what abouts." What about the next flight? What would it have been like at night? I think we must keep each other safe by acknowledging these scenarios. Addressing the scenario affected the next flight with clear boundaries established and also made me a better pilot for doing so. The last thing I'll leave you with is this: What would have happened if the tower didn't call wave-off? Would you have called it?

Under Pressure:

JP-5 Raining Down on Me

By Lt. Teddy Schopf, VAW-125

Tiger 61, side number 600, pulled into the fuel pits at MCAS Iwakuni following a fantastic form flight and was prepared to hot refuel. As the three naval flight officers in the back of the E-2D Hawkeye waited for the refueling to finish, they gazed outside their snack-plate-sized windows to see the shining sun, a few birds and gallons of JP-5 running down the starboard flaps.

The E-2D has two fuel tanks with a combined max capacity of 12.4k pounds of JP-5 and receives fuel at 50 gallons per minute. Three safety measures are in place to prevent damage to the tanks from overpressurization. The first measure is a pilot-standard technique to signal the cut of refueling at 12.1k. The second measure is a hydro-mechanical float switch in each fuel tank which provides automatic fuel shutoff when the volume of fuel in the tanks reaches max capacity. The last measure is a one-way pressure relief valve on top of each fuel tank designed to open and eject fuel if the fuel float switch fails or a late signal to cut fueling occurs. On a chilly day in November, the pilots noticed the fuel tanks were filling faster than usual. They signaled to cut fuel at 12k, but the fuel shutoff was delayed on the ground. Seconds later, fuel began spraying out of the starboard nacelle and raining over the aircraft and fueling area.

At this time-critical moment, the crew considered the following information. First, the port engine was still turning; second, the aircraft was now sitting in an expanding fuel puddle. While the 'fuelies' secured flow, the unique situation would need effective and expeditious crew resource management (CRM). The plane commander assessed that although fuel was raining over the aircraft, neither the aircrew nor the maintainers were in pressing danger due to JP-5's extremely high flashpoint. At the point of overpressurization, the aircrew had already performed the hot-refuel checklist, which secured internal ignition hazards such as high-radiation components. There were no threats outside the aircraft.

In this scenario, E-2D NATOPS allows the crew to determine whether they should secure or leave the engine running. If the fueling area had caught fire, there would be no safe region outside the aircraft to egress safely. Deciding to keep the engine online meant the aircraft could move out of danger should the situation devolve rapidly. After the fuel flow was secured, JP-5 ceased spraying out of 600. The pilot taxied the aircraft out of the hazard area and shut down the spinning engine without further incident.

How did this happen? VAW-125 maintenance speculated the fuel float switches failed or the fuel began foaming in the tanks, triggering the pressure relief valves to open before the float switches reached the auto-shutoff threshold. Regardless, the unexpected and undesirable situation demanded quick and decisive CRM.

Not every emergency is spelled out specifically in NATOPS or can be briefed in meticulous detail before a crew flies or maintainers man up or recover an aircraft. However, sustaining high situational awareness after completing critical phases of the flight and while on the ever-dangerous flight deck of an aircraft carrier ensures an unplanned situation on the ground (such as a fuel spill from the top of the aircraft) is met with the same attention to detail as an in-flight emergency. In other words, aircrew must maintain a safety mindset from flight gear on to flight gear off. In fewer words, THINK SAFETY.

U.S. Navy photo by Mass Communication Specialist Seaman Mason Congleton

Runway Incursions & Hot Spots

By Lt. Dexter Clark, VP-45

Everybody knows the feeling. You're in an unfamiliar area trying to make it to your destination on time and your navigator is not being as helpful as you'd like it to be. Then it happens. You take a wrong turn and suddenly your ETA ticks to the right and you're going to be late. Now, imagine that instead of driving your car, you're taxiing a 170,000-pound aircraft trying to make an on-time departure. Suddenly, the stakes are raised. No longer is it as easy as waiting for your GPS to reroute you, now you're faced with possibly turning the wrong way down a one-way taxiway, turning down a taxiway that may not support your aircraft weight, or in the worst case scenario: creating a runway incursion.

Airfield managers wanted to try and alleviate some of the concerns of unfamiliar airfield operations; thus, the "Hot Spots" concept was born.

The International Civil Aviation Organization's Procedures for Air Navigation Services-Air Traffic Management (ICAO PANS-ATM) Doc 4444 defines a runway incursion as "any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and takeoff of aircraft." Accidents like the 1977 Tenerife airport disaster come to mind when hearing a definition like this. It becomes immediately obvious that knowing one's location on an airfield at all times is of the utmost importance. That seems easy enough, but often airfield designs can be challenging to navigate. It doesn't stop there either. Many locations around the country airports are packed close together and runways are in similar layouts. Continental Airlines landed at Cabaniss NOLF (Naval Outlying Field) instead of Corpus Christi International Airport because of similar runways. Naval Air Station Key West and Key West International Airport are only three miles apart and have runways on similar headings. At Naval Air Station Whiting Field, the primary flight training field and the advanced helicopter training field are separated by only a few roads between them, and many students have lined up for the wrong field. A careful chart study can help alleviate these concerns and prevent runway incursions by landing on the incorrect runway.

Runway incursions have always been a severe issue in aviation. Still, as the industry has grown exponentially over the past few decades, runway incursions have increased at almost an equal rate. One of the solutions that was identified as a countermeasure was the hot spot. The ICAO PANS-ATM defines a hot spot as "a location on an aerodrome movement area with a history or potential risk of collision or runway incursion and where heightened attention by pilots and drivers is necessary." The Federal Aviation Administration (FAA) mirrors that statement by saying, "Typically, a hot spot is a complex or confusing taxiway-taxiway or taxiway-runway intersection." The program started at Las Vegas McCarran International Airport and Phoenix Sky Harbor International Airport. There are now 154 airports with identified hot spots. Hot spots have paid dividends in the airports that have adopted them. At McCarran International Airport, a hot spot was added at the departure end of runways 1L and 7L to help identify areas that risked wrong runway departures and were easily confused by pilots. Reports

Did You Know?

As of May 19, 2022, the FAA has standardized the Hot Spot symbols to three shapes with two distinct meanings: a circle or ellipse for ground movement hot spots and a cylinder for wrong surface hot spots.

following the addition of the hot spot indicate there is no longer confusion. In San Francisco, a hot spot was added to an intersection where turns were missed, leading to aircraft proceeding up a high-speed taxiway and coming nose-to-nose with traffic on runway 28L. The hot spot has been so successful without repeat issues for so long that they are considering removing it from the airfield diagram. A third success story occurred at Tucson International Airport. Two sets of intersections were responsible for 20% of pilot deviations at the airfield; due to the addition of hot spots in the diagram plus updated signage, those intersections no longer cause issues.

The FAA's Runway Safety Program Resources

Hot spots don't just pertain to pilots either. Air traffic controllers and airfield drivers should also be wary around these locations on airfields. The FAA has compiled resources for each of these groups regarding runway safety which can be found on their website, www.faa.gov/airport/runway_safety/. From that website are links to online courses, videos and other publications that can help everyone more safely operate on the airfield. As professionals, it's important to exhaust the resources given to hone one's craft and improve the industry.

As a long-range multi-mission aircraft, the P-8A Poseidon crews frequently operate at unfamiliar airfields. Whether flying to a new city to display aircraft at an air show or departing home base for deployment, the number of airfields to stop at is nearly limitless. Although that kind of flexibility pays dividends for flight planning and the ability to make it anywhere very efficiently, it also comes with great responsibility as a flight crew to thoroughly flight plan and identify where issues may arise. NAS Jacksonville, where half of the P-8A fleet resides, is a relatively simple airfield. Usually, it has only one active runway and one main taxiway. Going from operating at a field like that to a place like Honolulu International Airport can be daunting. But proper chart review can alleviate those stresses. The FAA created hot spots to help pilots locate common hazards and prevent incidents like runway incursions from happening. Even though these are new in the grand scheme of aviation, they've made a considerable difference in aviation safety and will continue to improve airfield operations for years to come.

U.S. Navy photo by Mass Communication Specialist 1st Class Juan S. Sua

BRAVO ZULU

SAILORS AND MARINES PREVENTING MISHAPS

Lieutenant Sadler Alexander
VSE, Patrol and Reconnaissance Squadron VP-30

While on duty as command duty officer, Lt. Sadler Alexander received a call that triggered a suicide prevention response. The Sailor in need was exhibiting suicidal thoughts and required treatment. Alexander executed the suicide prevention crisis response plan by dispatching the command duty driver to the Sailor in need for transportation to the Naval Air Station Jacksonville hospital. Alexander accompanied the endangered Sailor during the medical evaluation process. Alexander's physical presence demonstrated his personal care for the VP-30 family.

Bravo Zulu Submissions Needed

Please use the following guidelines when submitting BZ nominations for *Approach* Magazine to the email the address below:

SAFE-Approach@navy.mil

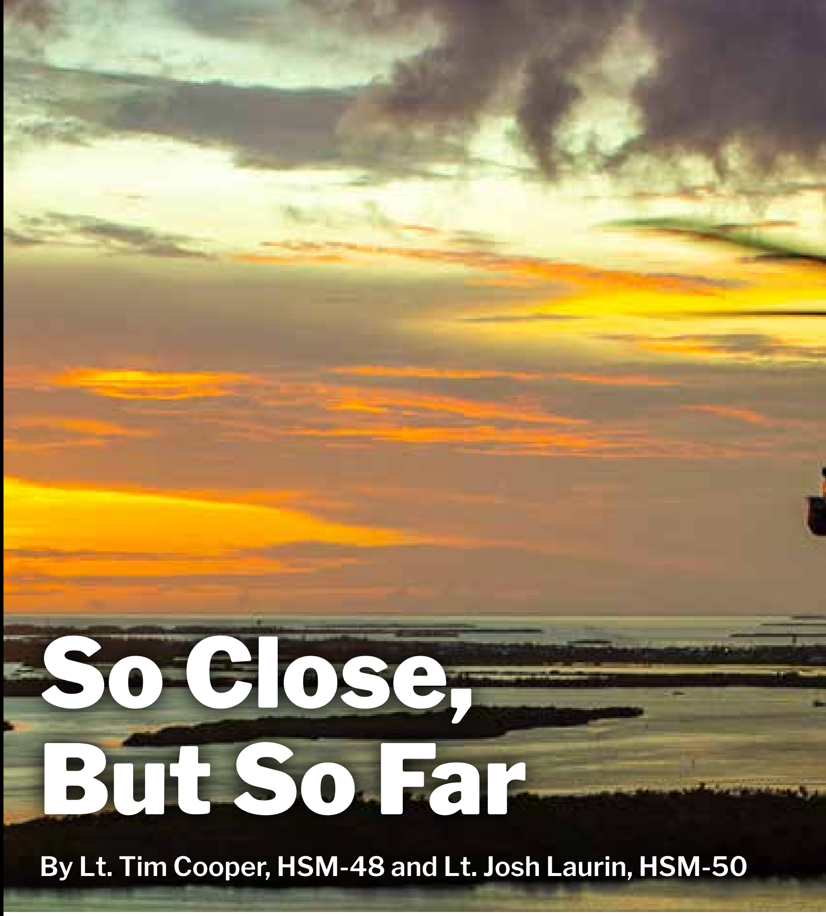
Length
90-150 words

Photos
All photos must be high resolution (a minimum of 300 dpi) in JPEG or JPG format. Please ensure the photographer (include first and last name and rank if applicable) or source is credited in your BZ submission.

When you email your BZ nomination, use the author's last name and first initial as the file name. For example: Lastname-F.doc.

We look forward to receiving your submissions!

Bravo Zulu is a naval signal originally sent by semaphore flags and in English, simply means "Well done."



So Close, But So Far

By Lt. Tim Cooper, HSM-48 and Lt. Josh Laurin, HSM-50

During the month of May 2022, HSM-48 Detachment Three "Intimidators" were tasked to embark USS James E. Williams (DDG 95) to conduct Initial Ship Aviation Team Training (ISATT) before supporting Submarine Commander's Course (SCC). The aircrew and maintenance team consisted of members from both HSM-48 Vipers and the recently established HSM-50 "Valkyries" from Naval Station Mayport, Florida. Operations such as ISATT and SCC are routine for our experienced aviators and maintainers; however incessant hurdles such as weather, mission system integration, aircraft and ship degradations made the three-week operation feel more like two months.

A testament to the ship-air team's problem-solving skills and ability to remain flexible, the final flight to meet ISATT requirements was underway one night and our crew was scheduled to fly a "double bag" starting in the late afternoon, rolling into evening. Our pre-mission planning called for scattered thunderstorms closer to the coast, low illumination on night vision goggles and surface winds out of the west between 15 and 25 knots toward the coast of Florida. Three hours later, as some of the aircrew were taking a quick break to fill up on water and such before the next flight, I was thinking about how the first flight was completed without a hitch. We had satisfied all the hard-to-get requirements and all we had to do now was fly as a crew for a few more hours and make one free deck landing to the ship to report ISATT complete and celebrate the hard work. With nothing else on our minds except to focus on the next three-hour flight and last required landing for ISATT, we strapped in and took off into the dark.


U.S. Navy photo by Mass Communication Specialist 2nd Class Novalee Manzella

To fill the three hours we had scheduled, it was briefed we would practice our Surface Surveillance & Control mission and conduct a few proficiency drills with our tactical air controllers. Just as we were getting into our rhythm at altitude, all the flight controls snapped to center, followed by several caution advisories and the master caution. Once the aircraft was under control and confirmed the crew was locked and strapped into their seats, we investigated our screens and switches to see an emergency procedure all MH-60 aircrew are familiar with through training.

The first stages of our No. 2 Hydraulic System Leak Detection and Isolation (LDI) logic had triggered. A brilliant function of our hydraulic system is to isolate leaks and prevent further loss of fluid. The system accomplishes this by shutting down specific systems in order and checks for further loss of fluid to identify where the leak may be coming from. We typically tailor training to this emergency as a rapid loss of hydraulic fluid, in which we memorize the flow of systems that will shut down and the sequence of caution lights associated. Surprisingly, there was no evidence of further fluid loss, meaning we were not getting back our Boost Servos nor the Stability Augmentation System (SAS). Even with those systems secured by LDI, flying the aircraft safely doesn't require much more than extra focus and sweat from well-trained pilots as control forces on the collective and pedals have significantly increased. Landing the aircraft on a DDG flight deck at night, with pitch and roll halfway to limits is a different story entirely.

My first thought after getting the aircraft under control and notifying the crew and ship of our situation was, "Thankfully this happened so close to our takeoff, we actually have the gas to return to land." The first option for a runway happened to be our home field, NS Mayport, approximately 76 nm due west. The issues were the 22 knot headwind, isolated thunderstorms in our way and lack of a clear horizon. All MH-60 aircrew regularly practice flying SAS/BOOST secured for proficiency. What we don't do is fly in that condition for over an hour, with little horizon, at several thousand feet, dodging thunderstorms, on our fourth hour of flight. After some time-critical risk management amongst aircrew, we started reviewing critical memory items in case the emergency progressed. We controlled airspeed and altitude with the cyclic to allow the collective to stay centered which will reduce fatigue. We received weather reports over the radio from the ship and climbed to several thousand feet AGL to communicate with FACSFAC Jacksonville early. Lastly, we recommended the ship follow our RADAR track until safe on deck in case the weather got too bad at the closed tower of NS Mayport or our weather divert of NAS Jacksonville to shoot an approach.

The weather wasn't bad enough to turn around. The hour-long transit was long and tiring, with constant pressure on the right pedal to keep the tail behind us. Front to back CRM, good BAW, and communication with controlling agencies kept the aircraft safe and the landing uneventful. Maintenance was performed the following day and the aircraft was returned to a fully mission capable status.

This emergency was a good reminder for our detachment to stay on our toes and play to the whistle. These situations can arise when you least expect it and sometimes when within reach of the goal line. I believe our naval aviation community does a fine job at outwitting complacency and implementing techniques to stay focused until we see the mission to completion.

Sailors assigned to Nimitz-class aircraft carrier USS Carl Vinson (CVN 70) place chocks around the wheels of a recently landed MH-60S.

Crossing Swim Lanes:
Education & Communication on the Flight Deck

By Lt. Jonathan Blume, CVN 70

On the flight deck, we as leaders (from ship's CO, CAG and air boss down to squadron work center supervisors and fly petty officers) constantly beat the flight deck safety drum. "Starts Calls" reminds us to wear proper flight deck gear and be aware of aircraft turning. Daily Yellow Shirt briefs stress the safety of aircraft and flight deck personnel. The 5MC calls give us situational awareness of aircraft, launch gear and recovery gear movement. Respective instructions and personnel qualification standards (PQS) for flight deck and air wing personnel standardize flight deck education for new personnel. The publications and speeches are out there, yet officers and Sailors display poor practices, habits and the lack of flight deck education. From my perspective, some of these problems stem from low cooperation and communication between the flight deck crew and the air wing. The flight deck and air wing leaders need to re-emphasize coordinating and educating together to revive a safety-first culture in the most hazardous work environment, the flight deck.

The near misses, hazards and the colorful verbal corrections from Handler were seen countless times during USS Carl Vinson's 2021 WESTPAC deployment with CVW 2 and, more recently, during carrier qualifications with CVW 11, VFA-122 and VAQ-129. Some examples include:

- Fouling lead aircraft Landing Area (LA) during recovery due to negligence of the foul line
- Crossing the bow catapult while the aircraft was in tension
- Improperly crossing the LA without permission
- Improper flight deck gear (especially at night)
- Misinterpreting director signals and general hand and wand signals
- Walking between a director and their aircraft

The Carl Vinson Safety Department reported 12 injuries caused by general inattentiveness. Air Wing would report injuries for their personnel, including a Sailor getting their legs hit by a retracting wire.

Two of these hazardous moments happened firsthand. While shooting an F-18 on Catapult 2, an Aviation Ordnanceman Sailor ran across the catapult track as I commanded the aircraft to combat power. A suspend immediately followed and the launch halted. The second occurred while recovering aircraft at night. An individual misinterpreted my wand signal (chopping the deck for landing) and led their fellow Sailors across the LA while the aircraft was on final to land, resulting in a wave off. Without the vigilance of others on the flight deck, multiple Sailors would have lost their lives during these two moments. Did these examples happen on your deployment for those who have sea time under their belt? Do any other examples come to mind?

Human error presents itself in every example above. The errors put personnel at risk and erode the flight deck's efficiency and effectiveness. To reduce errors, the Navy creates instructions and training. From that training, Sailors' hands-on experience grows as they work for the flight deck in real time, usually attached to a mentor. The method exists and works overall. However, within the directives, training and experience, flight deck crews and air wing personnel enforce them separately. Both groups have different perspectives of what is essential on the flight deck, which creates friction and increased potential for harm during operations, a real "us versus them" vibe.

Separate conversations with one of our Aviation Boatwain's Mate - Aircraft Handler 1st Class (ABH1) from Carl Vinson and Aviation Structural Mechanic - Hydraulics 1st Class (AM1) from VAQ-129 illustrate the disconnect between the two entities. On the one hand, ABH1 touted flight deck safety was the priority, and proper training starts immediately as a blue shirt. However, squadron personnel have tunnel vision on maintenance and disregard direction from flight deck crew. On the other hand, AM1 stresses how seriously he takes mentoring new maintainers on flight deck familiarization and safety. Still, his frustrations arise when the flight deck crew presses air wing personnel to move aircraft to meet their ramp times. The pressure, he believes, results in rushed procedures and reduced situational awareness, creating unnecessary mistakes and hazards. Both ABH1 and AM1 care deeply about safe execution on the flight deck but blame each entity for prioritizing their mission over safe execution.

U.S. Navy photo by Mass Communication Specialist 2nd Class Nolan Pennington

Aviation Ordnanceman 3rd Class Kimani Clayton acts as safety for a F/A-18E Super Hornet to transit the flight deck.

Air department uses PQS and air wing uses ASM to track and educate newer personnel, yet another disconnect exsits because both groups prioritize different aspects of the flight deck. Efforts to integrate exist. I observed a flight deck safety brief from the flight deck division. Though informative, the ABH rushed the brief and spoke with an assumption that the air wing personnel were experienced on the flight deck. For most of the Sailors in attendance, the detachment was their first and they were left with more questions than answers — a missed opportunity to integrate. Talking with fleet replacement squadron pilots, none of them knew director signals until they saw it live before launch. These gaps in knowledge are low-hanging fruit for the yellow shirts to teach and train fresh minds on how the flight deck works.

We are on the same team. Simply talk. I acknowledge that communicating is easier said than done. There are two sides to every story or practice; simply talking can give education and perspective without the need to rewrite directives or training syllabi. An immediate change to create a safer flight deck begins with improving how we educate as a team. From seeing both the air wing perspective on my first tour and the air department perspective on this Shooter tour, many problems can be solved by simply keeping an open line of communication to establish trust. The air department should be the first to establish open communication. On the ship, they are the landlords and the air wing rents the property; both should not be afraid to hold one another accountable and work together to coordinate expectations and standards without rewriting or combining established systems. Syncing flight deck education can be a significant first step to establishing that trust.

Photo courtesy of Erik Hildebrant

Old Jets, Real Threats

By Lt. Jake Flack, VQ-4

> *"This will work out perfectly."*

Or so I thought, as we throttled back the engines after climb out, slowing down to max endurance speed for the last hours of flight. At 12 hours into our crew day, and having just completed an important mission, we waited for the slowly setting sun to turn over and let us reset our night landing pilot currency. The first mission of my deployment was off to a strong start. The air was smooth at FL200 as the intense heat of a humid summer day slowly dissipated.

An acidic smell similar to a Sharpie began to waft through the flight deck; our flight engineer trainee must be taking notes.

"Do you guys smell that?" I asked.

Everyone glanced at each other, collectively recognizing the mysterious odor. While this was unusual, it wasn't cause for concern yet. Most of our aircraft components have a particular scent attached to them when burning, so the smell of markers didn't fit any particular profile that would indicate burning.

As I mulled over the unusual scent, it morphed from tangy, permanent ink to an almost pleasant, warm, woody cedar. It was time to investigate while also requesting a direct flight path to our main operating base, Tinker Air Force Base, Oklahoma.

As the flight engineer immediately began surveying his panels with a flashlight, the sweet smell of fresh cedar began to smolder. A moment later, he froze.

"We have smoke."

While the events I am about to describe took place over approximately 10 minutes, they somehow felt like an hour. Parts of this experience are still wildly vivid and memorable, but much is a muddled blur.

I turned to my co-pilot, the most junior on our crew. "Alright man, I need you to hop out. Joe, you're getting in."

If my training has taught me anything, it is to use the most experienced crew members I have in a troubling situation, so getting the second pilot in the seat was the proper course of action.

As Joe settled in, I glanced back at the flight engineer, who confirmed it was getting worse. It was time to activate the fire bill, a procedure to identify and properly fight a fire in the air.

"Crew, activate the fire bill, first positions report up on oxygen." I announced on the PA for the entire crew to hear.

10 seconds later, Joe and I were masked with a good communications check. A descent had already been requested to air traffic control (ATC) and we were cleared to 5,000 feet. I have dealt with electrical components "smoke checking" themselves, which had little impact after securing power; however, this situation seemed to be unfolding differently and deteriorating rapidly.

As the fire bill played out behind us, the crew's voices on the intercom system (ICS) built an ever-increasing sense of urgency to locate the smoke's source. Reports of extremely thick smoke rolled

U.S. Navy photo

in from the forward lower lobe, an area below the flight deck housing the bulk of our avionics and mission electrical components. I was later told the smoke was so thick you couldn't see your hands in front of you in the lobe.

Multiple portable emergency oxygen bottles had been used and the problem's origin had yet to be identified. The dense black smoke began seeping through the grate at my feet from the lower lobe up into the flight deck, obscuring the vision of my co-pilot and me. The forward outflow valve was inoperative on this particular aircraft, a maintenance discrepancy that does not down the aircraft from flying. When operable, the outflow valve can clear smoke from the forward lower lobe, exiting it from the aircraft. However, without it functioning, it felt like a fog machine was going full blast in a car without circulation while driving on a freeway. I held onto the hope that we would identify the source of the smoke, secure power, relay our intentions to ATC and land safely. I quickly realized time was of the essence and I needed to declare an emergency.

Without warning, all of the communications capabilities from my second pilot's oxygen mask malfunctioned, leaving us unable to speak with each other for the remainder of the flight. The last thing he heard was "GARBO50 state souls and fuel remaining".

As the cockpit filled with smoke, I continued to hand fly the mighty E-6B Mercury, a Boeing 707 jet born in the golden era of big wing design, 340,000 pounds of metal, fuel and cable-driven flight controls.

Internally, my frustrations were mounting. The communications failures between myself and my co-pilot likely meant he had no idea I was in full contact with ATC. I was flying silently through an emergency situation with only my wits and protocols intact.

I could still hear my determined crew on ICS franticly searching for the source of the unidentified smoke. Suddenly, everything went quiet. All of my digital screens and indicators were blank. You've got to be kidding me, I thought, before quickly re-caging and getting back to work. Power had been secured to the jet and I was left flying with the electrical power from my two aircraft batteries, standby instrument, and a single radio. Still 40 minutes away from Tinker, I knew we no longer had time for that option.

"I need the nearest airfield with at least 6,000 feet of runway," I called out to ATC while doing 350 knots and descending through 8,000 feet altitude.

At this point I had lost all normal means of communication with my crew. No more troubleshooting and no more triage. It was an oddly surreal situation, as the lack of ICS and the jet's ambient sound at a fast speed somehow made it easier to concentrate. The only means left to communicate with the rest of the flight deck at this point was to lower my headset off my left ear, move my mask to the side, and yell, but doing so would expose me to the smoke and fumes that continued to billow up from the lobe.

To increase our already hazardous situation, I lost communication with ATC, likely due to my expedited descent, requiring me to operate "lost commas." A nearby United Airlines pilot contacted us with a new frequency, helping us reestablish a connection with ATC. As I checked in with the new controller, the loud ringing of the cargo fire alarm sounded, indicating a worsening situation in the forward lower lobe.

Joe pulled his mask up next to me and yelled, "Cargo fire!"

It was an intense moment when the alarm went off, having never seen or heard it outside of our pre-flight checks. The approach controller's voice helped me refocus as they went through their usual questions, asking us to IDENT, verifying we had current information at the field, amount of fuel, and so forth. "Here's the flash, unable to get current information, just need to get on deck ASAP." Given our current situation, I was surprised and irritated they were asking normal questions,. ATC suggested landing at nearby Wichita, Kansas' Dwight D. Eisenhower Airport, the first good proposal I had heard since the ordeal began. I was ready to set this bird and all her smoke down on the deck and get my crew home safely.

Just before committing to Wichita, I looked out the window to my left, saw a beautiful long runway and immediately queried ATC about it. It turned out to be McConnell Air Force Base, which would normally be ideal. However, it was Saturday and McConnell was closed with little to no fire fighting and emergency support.

With us currently stuck between McConnell and Wichita, a new challenge

Continued on Page 30»

appeared. The combination of smoke and the haze of the setting sun made for increasingly poor visibility. Joe instinctively backed me up on the controls and called out runway lengths and approaches as best he could, still unaware ATC was actively steering me.

Inching closer to Wichita, the cargo fire alarm sounded again. A wave of emotions tore through me: I still had no way to confirm an active fire and no real sense of time left to solve the problem. Joe and I briefly glanced at each other through our masks after he silenced the alarm again and ATC continued to guide us to Wichita.

I finally spotted the runway but it was too fast to configure for and stick the landing. I requested a right 360 degree turn to bleed off speed in the descending turn. With most of our electrical power secured, I had to pop the manual trim handle out on the trim wheel located on the center console and roll that thing like a madman to get us properly trimmed.

Joe and I screamed at each other through every checklist item amid the dense smoke to best position us to land safely. I calculated our final approach speed in my head based on our weight and winds being reported as 350 degrees at 18 knots, gusting 28 knots. With our main aircraft power secured, we had no inboard spoilers, rudder boost, thrust reversers or antiskid braking. Aircraft response to turns and rudder input were severely degraded and being on airspeed and glideslope had never been so critical.

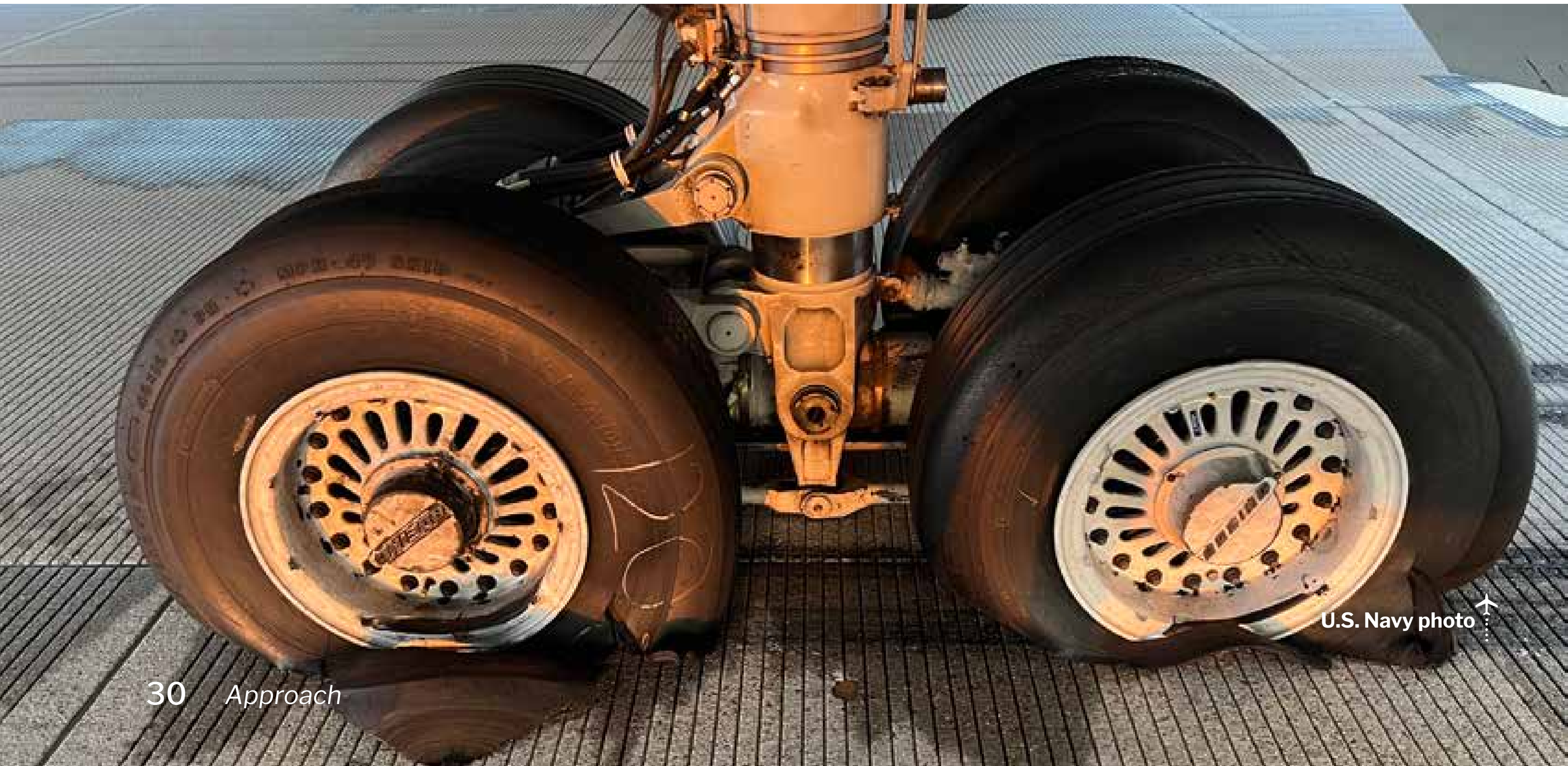
Finally, I set the aircraft down and started to apply brakes. Tower quickly called out to us and reported a large amount of smoke coming from the aircraft. Only a moment later, I felt a thud under the seat, and all four of the left main mount tires burst one by one. I could feel the jet leaning left while beginning to veer to the right. I corrected with the left rudder as Joe took the controls, a standard procedure decelerating through 100 knots.

We skidded to a halt and I immediately announced the ground evacuation checklist to the crew over the PA. A few seconds later, the crew safely evacuated, deploying one of our emergency escape slides.

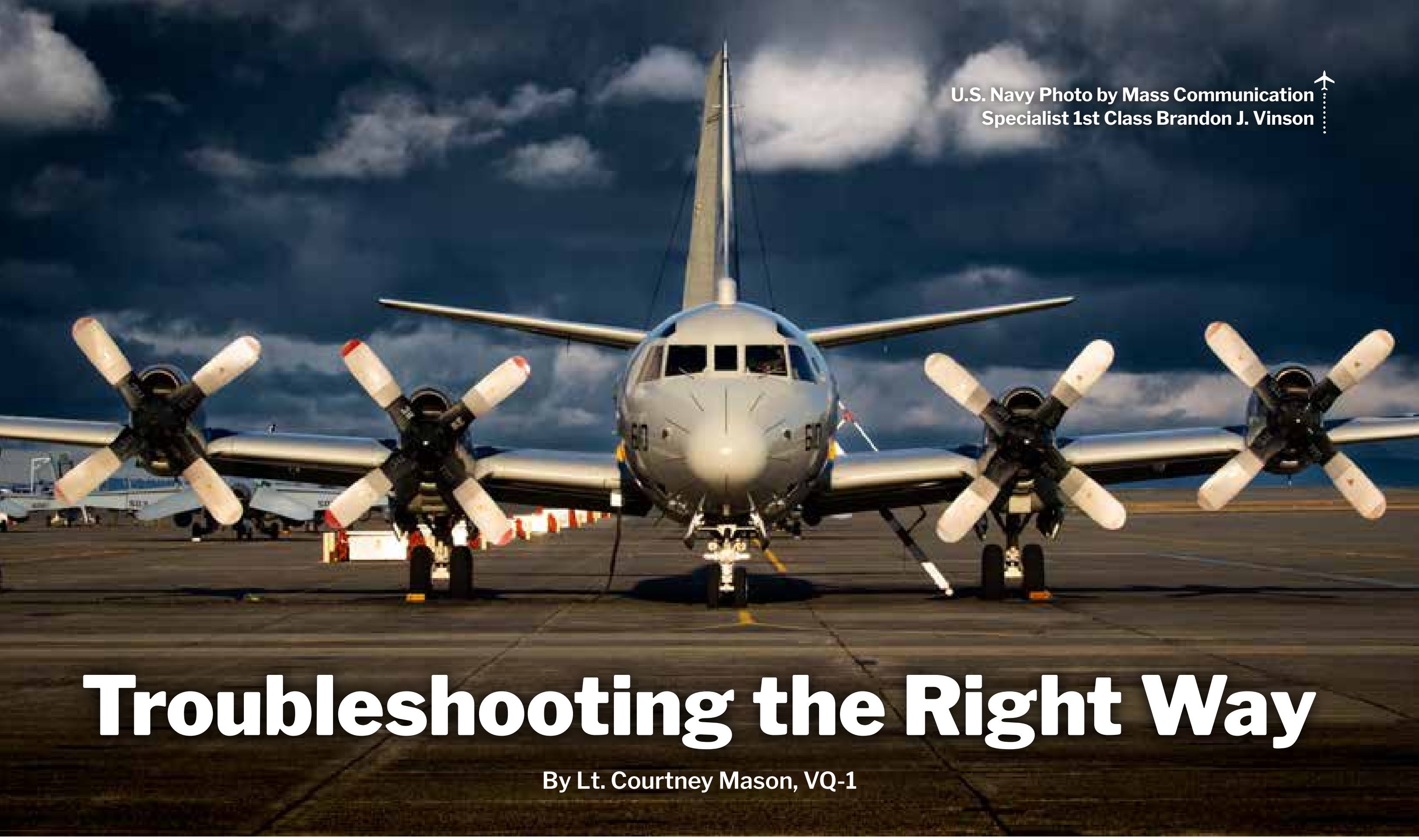
This marks my third in-flight emergency since qualifying as an aircraft commander about six months ago. Those previous experiences have led me to believe you have time, you have control, and you have options. No checklist in the back of NATOPS tells you what to do when your jet fills with smoke, you lose ICS with your co-pilot and the aircraft's outflow valve is inoperable. There is no gouge answer for where to go and what to do. To quote NATOPS, "No manual can cover every situation or be a substitute for sound judgment; operational situations may require modification of the procedures contained therein."

I would be lying if I said I haven't thought about this incident often since it happened. In truth, all of the emergencies you walk away from are learning experiences that add to your confidence as a pilot. I safely landed a smoke-filled aircraft due to my continued training and support from my steadfast crew. Each of the 13 crewmembers walked away with their own unique experience and I am grateful for every one of them.

This immensely valuable lesson has taught me a lot about myself and how I operate under pressure. There is something to be said about the tenacity of a pilot — any pilot — under the heavy burden of stress and crisis management. My new set of rules might include the banning of Sharpies on all flights under my control, but that is still up for debate. In the end, I remember looking at those melted tires and the faces of the emergency personnel as I walked away safely, taking in the scene through the haze of an adrenaline crash, feeling connected to others who have gone through similar experiences.



U.S. Navy photo



U.S. Navy Photo by Mass Communication Specialist 1st Class Brandon J. Vinson

Troubleshooting the Right Way

By Lt. Courtney Mason, VQ-1

As the EP-3E Aries approaches its sundown date, we have seen a rise in uncommon electrical malfunctions that require extensive systematic troubleshooting. More often than not, we replace multiple parts and never pinpoint the actual failure, attributing it to gremlins. During detachment to Kadena Air Base, Japan, our crew's electrical gremlin was a mysterious FLAP ASYM light that illuminated when the aircraft boarding ladder was retracted on the deck.

The first time our crew faced the FLAP ASYM light, it illuminated as the flight station called for the ladder up to begin the Before Start Checklist. Maintenance was called and discovered the flap brake in the port wheel well had popped. They reset the flap asymmetry valve in the hydraulic service center and the port flap brake, and we tried again.

Again, during the Before Start Checklist, as the ladder was raised, the FLAP ASYM light illuminated. Maintenance conducted troubleshooting, noting only the starboard flap brake popped this time. The initial determination was to replace the flap brakes. As this was the second time, we began to develop another theory that somehow power for the ladder (Main DC/ BUS A) was tripping the flap asymmetry system (Main DC). After the flap brakes were replaced, the aircraft successfully taxied for a plane wash with the ladder raised – and without the FLAP ASYM light illuminating during the Before Start Checklist.

Believing the issue was fixed, we decided to take the aircraft for a mission flight the next day. When we began the Before Start Checklist, the FLAP ASYM light illuminated again, with the ladder down. Our flight engineers and maintenance department were determined to find the gremlin to avoid canceling additional missions.

The flight engineers decided to recreate the scenario to determine the exact point the FLAP ASYM light would illuminate during a normal preflight initially, but it was to no avail. They then used a multi-meter to test the current flowing through each line from the terminal to the asymmetry switches located in our hydraulic service center. Expecting to see 28-volt DC power, the normal rated DC power for the FLAP ASYM system, they were shocked to see 105-volt AC power. They systematically turned each electrical AC bus off to determine which one was supplying the power, and the culprit was Main AC Bus A.

With that knowledge, they worked through the Before Start Checklist to see if a particular step was powering the FLAP ASYM system with Bus A power. When the No. 1 boost pump was turned on, the flap asymmetry system went from 28-volt DC to 105-volt AC. The No. 1 boost pump and the flap asymmetry system circuitry flows through the same cannon plug in the port flap well. The cannon plug was completely corroded, and it was also the cause of the wrong power flow to the flap asymmetry system.

The P-3 community has experienced multiple fires of unknown origin due to this particular cannon plug. Through diligent and tireless systematic troubleshooting, our flight engineers and maintenance team prevented a situation which could have led to another hazard report, or worse.

Super Hornet Surprise

By Cmdr. Benjamin Orloff, VFA-83

Extended training flights, or cross countries, are an excellent opportunity for aviators to build confidence in their airframe and aviation skills while away from the support network of a full maintenance team, fellow aviators, familiar airfields and routine habit patterns. While on the road, you also meet other aviation enthusiasts during stop-overs at civilian airports. If even briefly, you feel a little bit like a celebrity. While on a recent cross-country flight, I was so out of my normal habit patterns that I made a grave mistake that nearly resulted in tragedy.

The squadron was returning to NAS Oceana, Virginia, following a very successful A/S Strike Fighter Advanced Readiness Program (SFARP) at NAS Fallon, Nevada. Most of the jets stopped in St. Louis before the final leg home. I coordinated to stop at Dekalb Peachtree (KPDK) in Atlanta to have dinner with some family. Maintenance was kind enough to issue me aircraft 202, the jet recently painted with my name above the title "XO." I knew my family would get a kick out of seeing it.

When I landed, the fixed base operator (FBO) brought my family to the flight line. I secured the aircraft and closed the canopy with the external electrical switch. All buttoned up. While walking into the FBO facility, everyone seemed a little star-struck, and I felt like there was a spotlight on me. One pilot even asked if I had just made all that noise. Tactical jets are rare at KPDK, and my aircraft's audible arrival was big news. I quickly changed into inconspicuous civilian clothes in the crew lounge, then went to dinner with my family at the airport's historical 57th Fighter Group Restaurant. I informed them I needed to return to the jet in about two hours to make my scheduled land time in Oceana. The stay-back crew was working a late shift to catch all the returning jets and I didn't want them waiting late on my account.

After a great dinner, my family and I returned to the FBO right on schedule. As we walked in from the parking lot, I saw a group of Civil Air Patrol cadets walking out with looks of disappointment on their faces. Arriving at the desk, the manager informed me that I had just missed a youth group, hoping to get a closer look at the fighter jet. I contemplated for a moment. I didn't have time for this, but I also remember being a 13-year-old and being given a tour of an F-14 aboard an aircraft carrier during Seattle's Sea Fair. My decision was obvious; I ran to the parking lot and the cadets. "Any of you want to see a fighter jet?"

The tour of the jet was a blast. After ensuring everyone had earplugs (thanks to Atlantic Aviation), the cadets saw an F/A 18E up close. After my standard spiel about the RADAR, Advanced Targeting FLIR, wing pylons, control surfaces and tail hook, they asked some very insightful questions. Can you maneuver like a Su 57? Sort of. Is this better than an F 22? Yes. How fast have you gone? Very. My family watched as my passion for my profession came out; I was honestly having a blast. After a quick group photo, they told me they would watch my takeoff from the adjacent airport viewing area. I looked at my watch; I was behind my timeline.

I walked back inside to change, check the weather and file. Walking out of the crew lounge, I was greeted by another young aviation enthusiast. He wasn't part of the cadet group and had missed the tour. He asked if I could show him the jet. I apologized and told him I had a schedule to keep. The frown on his face was sincere and heartbreaking. I removed my squadron patch and handed it to him. His eyes lit up as he accepted my consolation prize while he opened his phone to show me photos of his extensive military patch collection. I gave my patch to the right person! After five minutes, I thanked him for showing me his collection, quickly said family goodbyes, signed for the fuel and checked my watch; I was behind my timeline.

Walking to the jet, I noticed a sizable crowd had gathered at the viewing area to watch my departure. During my preflight, I checked the fasteners for the avionics bay doors along the forward fuselage, using a mantra learned in the fleet replacement squadron 14 years ago, "13 on the left, 11 on the right." Preflight complete, it was time to climb in and start-up. I flipped the switch to open the canopy, nothing happened. I was locked out of my aircraft. I turned to the lineman, "That's a new one."

Photo courtesy of Matt Cochran

I knew the canopy circuit breaker was in one of the avionics bays. Perhaps it needed to be reset. I got to work checking bay-by-bay. After unsuccessful attempts to find it, I secured each panel door when I was done with it. After some texts with other pilots and the maintenance professionals back home, I determined it was either a dead battery or the canopy motor. After being directed to the correct location of the canopy circuit breaker on the right side, I undid the fasteners, opened the panel, found the elusive circuit breaker and cycled it. Enthusiastically, I returned to the aircraft's left side and tried the canopy switch, nothing. I would have to crank open the canopy manually. I turned again to the lineman, "You don't happen to have a three-eighths-inch drive tool?"

I climbed on top of the aircraft and began hand-cranking the 150-pound canopy. After 30 turns, the canopy was open! I climbed in and checked the battery; it was good. I tried closing the canopy electrically from the internal switch, nothing. I was going to have to crank the canopy closed using the internal manual canopy hand crank. I began the very awkward task of cranking the canopy down in the confined cockpit. A quick look to my right showed that my extended time on the deck had allowed more onlookers to gather. Word travels fast. I looked at my watch again; I was very behind my timeline.

Dripping in sweat, I started the aircraft and taxied to the runway. I was relieved to be on my way home finally. Taxiing over a bump, I got a MASTER CAUTION light: the LADDER caution. This particular jet was notorious for having a problematic ladder to stow and it must not have been properly latched. I advised the ground that I would be turning around. I returned to the ramp, shut down, and tried opening the canopy electrically. Now it worked! (It remains a mystery as to why the canopy didn't work earlier.) After shutting down and climbing out, the crowd directed my attention to the other side of the aircraft. I walked around to the right side to see in horror the avionics panel dangling unsecured in front of my right engine intake. My heart sank, and a combination of shock, fear, anger and personal disappointment hit me all at once. I never closed that panel after cycling the canopy circuit breaker!

I got my ratchet out and secured the fasteners in place. The now very sizable crowd behind me gave a loud cheer. I turned around and waved, not realizing they had all observed the open panel earlier and were desperately calling the airfield tower on their phones to alert me. I will forever be grateful to them for that. After taking a moment to collect myself from my shame, I did another preflight of my aircraft. I checked all fasteners, "13 on the left, 11 on the right." We properly secured the aircraft ladder and I entered the cockpit using a common utility ladder the lineman kindly provided. Seated in my aircraft, I opened my NATOPS PCL to Pre-Start Checks and went line-by-line.

The subsequent start, taxi, takeoff and return to Oceana were uneventful for me, but a thrill for the aviation enthusiasts and now deputized safety observers, who had waited patiently to see a fighter jet take off from their airport in full afterburner. There is no reason the universe shouldn't have punished me dearly for my preflight buffoonery. At best, I would have been looking at a FOD'ed right engine on takeoff and been trying to fly single-engine at night to Robins Air Force Base, Georgia, for an arrested landing. In this case, dumb luck, the LADDER caution and the Good Samaritan efforts of my watch party prevented a mishap.

Self-imposed rush, broken habit patterns resulting from canopy troubleshooting, and, if I'm being honest, trying to look professional in front of my new friends all contributed to taxiing the aircraft in an unsafe condition. In the Rampagers, we acknowledge people make mistakes. We task one another to learn from those mistakes and teach others. I am an experienced aviator with 2,400 flight hours, a U.S. Naval Test Pilot School graduate who has flown over 23 different aircraft types and a fighter squadron executive officer. I let circumstances break the time-tested habit patterns aviators in this community use to operate safely in an unforgiving environment. After breaking the integrity of my initial preflight checks, I should have executed another one. Going forward, whether flying at home, afloat or cross country, I will endeavor to honor my aviation habit patterns, especially preflight ones.

Hazards of Lightning Strikes in Aviation

By Lt. Jason Whiteman, VP-45

Lightning is a well-known weather phenomenon that needs to be fully understood. While the specifics are still a mystery, the general idea is that collisions between particles cause them to ionize. Lighter particles, such as ice crystals, become positively charged and are lifted by updrafts toward the tops of a cloud or storm cell. Heavier particles, like graupel and hail, gain a negative charge and remain around the bottom and middle of the cloud because they are harder to lift. These particles allow for a charge separation, which along with the atmosphere's resistance to a free flow of current, satisfies the two main conditions necessary for lightning to occur. An aircraft flying through the atmosphere also collides with particles, ionizing the air and becoming potentially attractive to lightning "leaders," which are the initial stages of a lightning strike.

There are strong correlations between certain flight conditions and lightning strikes. Most strikes are reported during the flight's climb and descent phases, between 5,000 and 15,000 feet, with the chance of a strike drastically reduced above 20,000 feet. Lightning strike reports are also primarily associated with rain, temperatures around freezing and while flying inside a cloud. The most typical seasons associated with an aircraft being struck by lightning are spring and summer. It is important to note lightning strikes do not require convective activity or thunderstorms. Almost half of all lightning strikes reported by airline pilots occurred without thunderstorms in the immediate area.

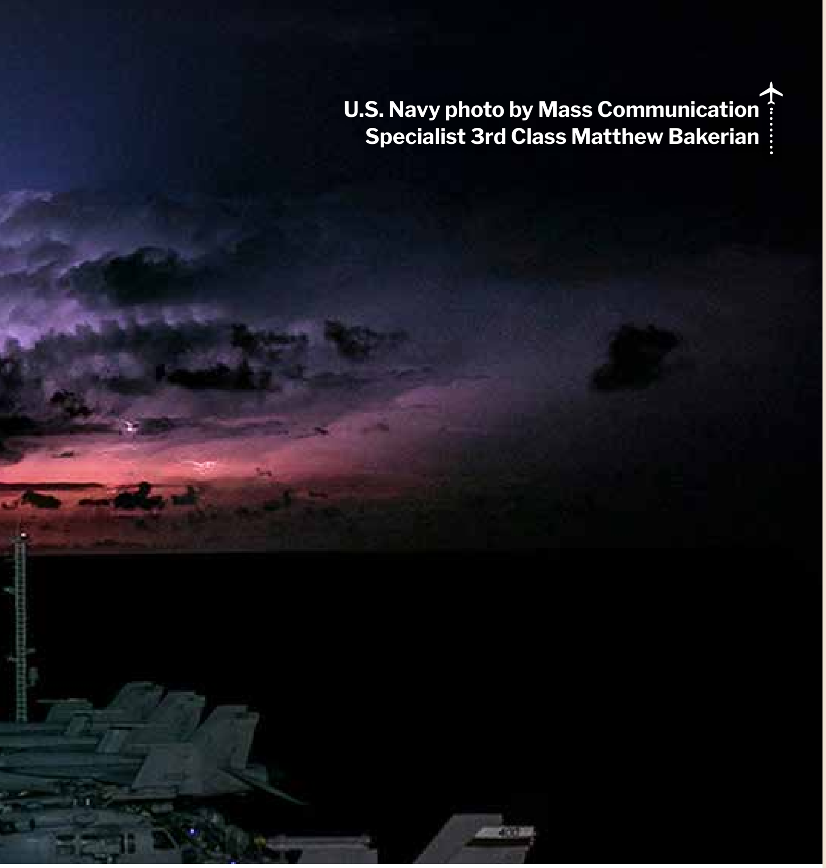
Some lightning strikes can deliver up to 1 gigajoule of energy, enough to power a standard refrigerator for up to 30 weeks. This energy can be destructive to an aircraft's internal components, melting metal components, sparking fuel vapors or frying electronics. The Federal Aviation Administration has regulations governing how well aircraft can withstand lightning strikes; however, we could experience a lightning strike in flight and not even realize it.

The P-8 has a composite skin with a built-in conductive layer to help redirect that energy from a strike. Inner components are built with shielding to prevent induced currents and surges and to keep the lightning from sparking fires. Since the radar would not be able to work properly if surrounded by the conductive layer in the rest of the aircraft's skin, the radome is designed with special strips on the outside that act as lightning rods, so the radome is protected and still radiates correctly. Radar can be used in the weather radar (WXR) mode to detect cells of convective activity to help crews avoid lightning. Pilots can also gain situational awareness by communicating with air traffic control (ATC) for their radar coverage and pilot reports or contacting a flight service station for more detailed information.

Unfortunately, even with these tools available, P-8s are still at risk of being struck by lightning. Previous hazard reports (HAZREPs) cite various causal factors leading to lightning strikes. Some of the lessons learned from those HAZREPs:

- ATC was looking at a different picture than the flight deck. Some crews requested multiple times for deviations to avoid weather, but clearance was too late due to a lack of urgency or confusion, resulting in a lightning strike. Crews should make every effort to clarify what they need and why they need it.

- Some hazard flight decks should have checked their weather radar. If there is no mission crew with a dedicated radar sensor operator, flight decks should have the WXR



U.S. Navy photo by Mass Communication Specialist 3rd Class Matthew Bakerian

mode up to identify areas of convective activity. If there is a radar sensor operator, the flight deck should work closely with them to help avoid lightning.

- Perceived pressure may have kept some crews in the vicinity of weather capable of producing lightning longer than they should have stayed. Whether continuing to bounce for pilot proficiency or out on station for a mission, "the juice may not be worth the squeeze," as a lightning strike can potentially down aircraft for weeks as maintenance personnel must then inspect for damage.

- The P-8's capability to download weather data and produce some sort of overlay in-flight would greatly increase situational awareness. Ideally, data would still be able to be downloaded without a mission crew, so pilots on a bounce flight can still access the information.

To help determine if there was a lightning strike, crews have previously noted visual flashes of light or balls of fire, and audible pops, cracks and booms. Lightning typically enters at a point on the extremities of the aircraft: either the nose radome, wingtips, engine nacelles or the tips of the tail's vertical and horizontal stabilizers. It then exits somewhere in those same regions and can manifest as scorch marks, pits and small holes on the fuselage skin. Post-flight inspections of those areas can help identify lightning strikes. To help avoid lightning strikes, crews should stay clear of clouds or climb above 20,000 feet if possible. They should also identify potential lightning conditions early and communicate among themselves and with ATC to remain clear of those conditions if they can.

Grampaw Pettibone Says ...

Congratulations to the 2022 Grampaw Pettibone award winners. Organizations and individual winners of this award contribute the most toward aviation safety awareness through publications and media resources.

HSM-48
Organization Award

Squadron crewmembers react to learning of their selection for the Grampaw Pettibone award. The Vipers continued their outstanding record of sustained safety excellence in Naval Rotary Wing Aviation throughout the year. The squadron maintained a positive safety climate and shared information and experience through *Approach*, *MECH* Magazine, *Rotor Review*, Aviation Safety Awareness Program and Aviation Hazard Reports. Additionally, the Vipers continued publication of its monthly *Viper Safety Gram*. This product draws attention to recent Viper Safety Pro awardees and spotlights ASAP data and lessons learned.

U.S. Navy photo by Mass Communication Specialist 2nd Class Juel Foster

Combating Real & Perceived Pressures in Naval Aviation

By Lt. Ben Smart and Lt. j.g. Sage Sale, HSM-50

The aviation community is a high-pressure environment. Sometimes that pressure, real or perceived, results in pilots taking unnecessary risks. Real pressures stand the test of reason; they demand a higher risk tolerance and sometimes fall within the guidelines of operational necessity. However, pressures can also be internal in nature and self-imposed, such as "get-home-itis" and are known as perceived pressures. Unlike real pressures, perceived pressures can be emotionally charged and especially dangerous without controls. Without logically sorting through these internal influences, pilots can establish a false equivalence between real and perceived pressures, adding unnecessary stress and risk to themselves and their crew. Distinguishing between real and perceived pressure is critical to maintaining safe practices and making sound decisions.

We aim to bridge the knowledge gap of real and perceived pressures by discussing the effects of pressure as a whole, examining how some communities may be especially vulnerable to the adverse effects of pressure and explaining how establishing a solid organizational safety culture is an incredibly effective tool for mitigating these risks in the future.

Understanding the causal relationship between stress and pressure, mainly how it influences our ability to manage risk, is crucial in discussing the effects of real and perceived pressure in the aviation community. A United Kingdom Defence Science and Technology Lab study compared how military service members fared against their civilian counterparts in managing impulsive sensation seeking, a "model of how people seek or avoid physiological and psychological sensation." This study found that the military demographic – a community that arguably faces more pressure, real and perceived, in the workplace – was more likely to make riskier decisions than the civilian group. Interestingly, the study also found the sensation-seeking behavior that drove this higher risk tolerance was higher among military personnel in combat roles than in support roles. These takeaways are worth noting in Naval aviation, where we often find ourselves in high-pressure environments. According to these findings, not only is the Navy as a whole more likely to attract personalities that accept more risk than the civilian world, but those communities closer to the tip of the spear may be even more susceptible to higher risk-taking behaviors due to their proximity to potential conflict.

Because our position as naval aviators on this risk tolerance spectrum sits opposite the general population, it is especially worthwhile to look toward the civilian sector for an outside perspective on using the RM process and fortifying our safety culture optimally. A case study from the Emergency Medical Services (EMS) helicopter community illustrates how the industry implemented controls to combat risks from real and perceived pressures in critical situations. The National Transportation Safety Board found that, before recent policy changes, EMS pilots took unnecessary risks leading to accidents with perceived pressure as the potential cause. For example, when pilots were informed the patients had time-critical, life-threatening injuries or that patients were infants, they would take off without due regard to risks posed by foul weather. Coupling this with an overestimation of their proficiency in flying in instrument conditions despite limited training, accident rates in the community rose significantly. To reduce these kinds of accidents, a new policy was adopted in which pilots were not given any amplifying information about patient's condition before takeoff; doing so helped eliminate the emotional, perceived pressure of wanting to complete their mission so badly that they would accept unnecessary risk and fail to consider other courses of action. The pilots were now left solely to deal with the real pressures of their mission, such as the potential consequences of bad weather and possible harm to themselves and bystanders on the ground should a mishap occur. This change allowed them to use the deliberate operational risk management (RM) process more effectively to identify and assess the risks brought on by these real pressures that were out of the crew's control.

In this case study, the EMS industry's controls amount to external compartmentalization to defeat the perceived pressures associated with patient knowing information, enhancing industry safety culture in the process. This practice is not unfamiliar to the naval aviation community at the individual level and is often used to deal with the pressures facing aircrew. However, there is always room for improvement. Although compartmentalizing distractions have utility across all of aviation, the things we must compartmentalize are unique, given our operational considerations. Collateral duties can produce some of the most notable distractions within naval aviation and requirements we must meet to maintain currency, quotas, and so on. At the same time, naval aviators are equally subject to the same human factors stemming from their personal lives as anybody else. Given the many personal and professional distractions inherent to our profession, addressing weaknesses in practicing effective compartmentalization should be a top priority for our community. Nonetheless, strengthening our skill of compartmentalization should not be allowed to breed overconfidence. It should also be a priority to make an honest assessment of where each individual draws their line and understand when it is necessary to make the call that the success of the given mission or the safety of the crew would be better left to another aviator or asset.

Crew resource management has also proven a useful tool in mitigating the effects of perceived pressure in the airline industry during emergency situations. A study published in the Harvard Business Review comparing airline crews' handling of different emergencies found that after completing memory items, crews performed "consistently better under intense time pressure" when captains involved their copilots in the decision-making process throughout the landing process. The crews that performed best in this study had captains inviting in-flight discussion of how to complete their landing criteria when the situation allowed. On the other hand, the weaker crews of this study were those whose leadership either simply gave direction or whose junior crewmembers failed to provide any forceful backup if they questioned their captain's decision-making, often due to perceived pressure. In this case, time-critical RM proved effective at combating the effects of perceived pressure, allowing pilots to operate solely in the face of real pressures. One of the four RM principles is to accept no unnecessary risk. By taking crew input into account, applying the "no rank in the cockpit" principle, and using strong CRM, these airline captains refused to take on the risk of shutting out their copilot.

Although naval aviation trains to a strict standard of handling emergency procedures expeditiously and methodically, there is still room within the community to practice leadership that drives crew engagement to the maximum extent possible, as in the airline case study.

This practice starts during preflight planning by soliciting meaningful participation. The most effective NATOPS briefs and RM discussions break down crew roles and conditions with purpose, much like when a quarterback calls a play in the huddle. Aircraft commander that speak to their crew as individual players take a much more engaged and alert crew into the air than one who simply talks at the crew in a mundane fashion. Breaking down the roles of the different crew members in both routine and critical flight regimes is a more efficient way to help prepare the crew to handle a time-critical situation. This kind of leadership applies to preflight RM discussions as well. Before every flight, determining and discussing what real and perceived pressures the crew faces helps ensure sound decision-making throughout the day's flight. An aircraft commander that shines a light on pressures facing the crew in these terms and offers suggestions of meaningful controls may allow for the shedding of self-imposed pressures, revealing real pressures that should be addressed through RM before takeoff. However, real pressures are not always remedied so easily. Suppose external pressures from outside the crew's control, like the chain of command, are placing undue risk onto a flight. In that case, it becomes time to elevate these concerns and ensure risk decisions are made appropriately. Crew leadership that recognizes and acts on this can go a long way toward optimizing risk management and enhancing safety culture.

As shown in the previous case studies, the processes we currently employ are effective in mitigating the risk associated with pressures faced inside and outside of the military aviation community and contribute to an effective safety culture. However, maintaining an effective safety culture requires aviators to revisit the basics from time to time. The lessons from the case studies illustrate the need for us all to practice better compartmentalization and continue to develop as leaders. Analyzing the origins of our pressures will allow for the ability to break out what is real, which could then be elevated to the appropriate level for reconsideration, and what is perceived, which could be further mitigated through strong crew leadership and individual compartmentalization. By emphasizing measures such as these, aviators can be holistically more effective at defeating real and perceived pressures.
Just as we cannot eliminate risk entirely, we cannot totally eliminate the effects of the pressures they derive from. Yet, as professionals, we must manage them to the best of our ability in the never-ending pursuit of safer operations.

U.S. Navy photo by Lt. Gabe McCarthy

FOD or FOE

By Lt. Gabe McCarthy

Foreign object debris (FOD), is an inevitable hazard the aviation profession experiences on a daily basis. FOD presents itself in many forms on the flight line, whether it be loose rocks, pens that have fallen out of pockets, or metal objects that could be ingested into aircraft engines. All of these objects pose threats to personnel and aircraft operating on an airfield. During our 2022 deployment, the "World Famous Golden Eagles" of VP-9 discovered that foreign airfields do not all manage the prevention of FOD the same. The countries we operated out of during deployment all practice different FOD prevention and reporting programs. This, combined with high-tempo operations, created hazards for our aircraft and personnel, some of which were discovered much too late.

During a portion of our deployment, our squadron operated out of Lajes, Portugal. On the airfield, it was discovered that a nearby taxiway with known FOD issues was consistently being used to ease the flow of civilian traffic in and out of the airfield. Due to these operations, FOD was being distributed onto the runway in use. This road use was not apparent to us until an antenna on the fuselage of one of our aircraft was struck by a loose rock on the takeoff roll and then later separated from the aircraft. It only took one rock to take our P-8A Poseidon out of the fight. Due to the importance of the antenna, the aircraft had to be repaired (which took it out of the rotation for a significant period of time) and was unable to return to Naval Air Station Sigonella, Sicily, our main site during deployment. Shortly after this event, we discovered that a handful of our tires were being gouged by rocks during either takeoff or landing. This issue eventually became serious enough for our safety team to request a ride along FOD sweep with airfield management and, as a result, a ramp closure NOTAM was issued. Coincidentally, abnormal scarring on tires also ceased! Thanks to the work of our superb maintenance team, VP-9 was still able to meet the operational demand even with FOD fighting against us.

As a squadron, we initially assumed that this issue was isolated to last-minute detachment sites where it was not practical to conduct proactive FOD research before commencing operations. However, we soon discovered that this was not the case. As we returned to our squadron's main deployment site in Italy, we were burdened by similar issues. While most of our planes had been scattered to different detachment sites, construction was ongoing at NAS Sigonella. The construction had loosened up numerous rocks that now littered the ramps and taxiways we used daily. Similar to our Portuguese excursion, we found that these rocks were gouging our tires and leading to increased tire replacements. This tire issue was a problem that we had not experienced in our previous four months operating out of the airfield and all came to light thanks to a timely submitted

Sigonella daily FOD display.

Airman Safety Action Program (ASAP) report from a maintainer. After a brief investigation, it was clear the construction was having a direct effect on our operational capabilities and that our daily FOD walk downs were turning up an increased number of loose rocks. Recently updated guidance to ASAP submission requirements have favorably reduced erroneous reports, but situations like this highlight the importance of the program as a whole.

"After post flight inspection of the starboard main mount tire of the aircraft parked at the hazardous cargo loading area at NAS Sigonella, a nickel-sized puncture was identified and was about 1/2 inch in depth protruding through two layers of chord. It is believed to have occurred on landing or taxi at 2220Z on the night of 04 Sep 2022. This was the second occurrence with the initial occurrence on or around 01 Sep 2022. Both instances required a tire change. One tire was new and showed no additional wear (requiring a tire change) and the second had minimal wear as well."

- *ASAP Report ID 21132*

Members of the Maritime Patrol and Reconnaissance Force are used to training at military airfields in the United States that perform methodical FOD inspections every day, however, as an expeditionary force, we often find ourselves operating at airfields that do not maintain the same standards. Through the use of the ASAP program, VP-9 was able to readily identify airfield areas of concern and advocate for more extensive FOD management. My recommendation to future shore-based aviation assets is to make sure FOD prevention and reporting is included in your site surveys of airfields before arriving; this survey swill help ensure you identify these issues before dynamic operations are underway. Take note of the hazards associated with specific airfield regulations and try to mitigate them the best you can by reaching out to airfield authorities. Using proactive communication, anyone can be the leader to turn an airfield's FOD program around and make our mission a success!

5-Wet Catapult Shots: A Renewed Understanding

By Lt. Cmdr. Mark Van Orden, VFA-103

During a Tailored Ship's Training Availability (TSTA) in February and March of 2022, members of the CVW-7 tanking cadre found themselves experiencing less-than-desirable 5-wet tanker catapult shots. Although the majority of the team hadn't been to sea in at least a couple of years, several experienced pilots, including department heads and squadron commanders, noted fly-away profiles that seemed different than previously experienced. After extensive research and coordination with the VX-23 Carrier Suitability Team and NAS Lakehurst catapult professionals, we determined the causes of these less-than-desirable flyaway profiles were due to several factors: high natural wind over the deck, MORIAH sensor assignment and tanker trim settings. Several important lessons were learned and VFA-103 has subsequently instituted renewed tanker trim settings that have proved beneficial.

Most of the catapult shots in question were first noticed due to a flat flyaway profile. Several tanker pilots noted the waterline symbol immediately shot up to 10-12 degrees with a full slow chevron. It took two to four seconds for the angle of attack (AOA) bracket to catch up to the velocity vector and the same amount of time for a positive rate of climb to be established. Thankfully, there was never a negative vertical speed indicator (VSI) post-launch. After several aircrew noticed the aggressive initial flyaway, a study of memory unit (MU) data began, along with coordination with the gurus mentioned above.

The first issue the Carrier Suitability Team noted was high natural wind over the deck (WOD). Throughout TSTA, the carrier routinely experienced high wild wind days, often over 30 knots, while the ship made minimal speed through the water. A bow

U.S. Navy photo by Mass Communication Specialist Seaman Christopher Spaulding burble is created when the carrier experiences high WOD, especially natural wind. All carrier aircrew are familiar with the burble created by the tower structure during landing operations. Still, the burble created upon launch is rarely discussed and arguably not widely understood. When there is high WOD, the bow burble creates a pocket of unstable air right in front of the bow. The bow burble will typically begin forming around 20-25 knots and build in size as WOD increases. It shrinks with the bow moving up and expands in size with the bow moving down. Simply put, the higher the WOD, the larger the burble effect can be. Therefore, if the air mass directly at the end of the stroke is unstable or slower than what the launch was calculated for, you could have a flatter flight profile or have a couple of feet of settle.

Although there is no way to avoid this, aircrews and shooters should be aware of high WOD days and how it could subsequently affect launches. The bow burble effects will likely not be seen with a single centerline fighter-configured aircraft that jumps off the deck. However, 5-wet tanker aircrew should be prepared for a flatter flight profile or a slight settle on high WOD days. Rest assured; the MIN+15 knot endspeed that shooters calculate should ultimately account for this.

The second major lesson from this experience surrounded the importance of MORIAH and its associated settings. MORIAH is the wind-sensing system aboard all aircraft carriers and normally takes wind readings via three Wind Sensor Units (WSU) arranged in different spots on the carrier deck: Port (PORT), Starboard (STBD) and Forward (FWD). Each sensor has a specific angle range at which it is designed to capture the most accurate wind. The FWD has an angle range of 315-45 degrees, STBD 46 to 180 degrees and PORT 181 to 314 degrees. The following is taken directly from Landing Signal Officer (LSO) NATOPS, July 30, 2021, pages 4-17:

"In AUTO mode, MORIAH selects the windward-most sensor thereby achieving the most non-turbulent wind measurements. In MANUAL mode, the operator manually selects either the PORT, STBD, or FWD WSU from which to obtain wind measurements. Manual WSU selection and selection between MANUAL and AUTO can only be accomplished on the Flight Critical High End Display (FCHED) located in PriFly."

Most importantly, a warning follows this paragraph which states:

WARNING

Failure to leave MORIAH in AUTO may result in inaccurate or out-of-limits winds for launches and recoveries.

Throughout TSTA, CVW-7 LSOs noted issues regarding the accuracy of the wind data in both direction and speed. Discussions with CAG paddles (LSOs) post detachment revealed USS George H.W. Bush had operated exclusively in the STBD mode of operation throughout the underway. Therefore, the ship was likely not receiving the most accurate wind data for launches and recoveries. In emails with the Carrier Suitability Team, they further explained that by always using the STBD wind sensor, the potential for the wind data not reflecting the wind at the deck level is a concern and could lead to a cat setting for a higher WOD than the aircraft is seeing. Would it be grossly off? Not likely. But it could be off just enough to see a slightly flatter flight profile off the cat stroke.

Further discussions with the ship revealed the STBD sensor was the only sensor that was working during that time. Post TSTA, George H.W. Bush did an excellent job acquiring the necessary equipment to allow MORIAH to function in the AUTO mode. All carriers and their respective air departments should take the steps needed to ensure MORIAH is working correctly, using all three sensors, before any underway period.

The third and arguably most crucial finding during our research involved the proper trim settings on 5-wet tankers. In true aviator fashion, we love to live and die by the gouge. The gouge has always been that a trim setting of about 10 worked for most 5-wet tankers. However, a closer analysis of NATOPS reveals 10 degrees is likely too much trim. Turning to pages 8.2-5 of the Big Book (NATOPS A1-EFG18-NFM-000), we can walk through the Rhino catapult trim calculations.

In steps 1 and 2, the standard assumption or gouge is that we will launch at 66k with 0 asymmetry, requiring max power.

RHINO CATAPULT TRIM CALCULATIONS

3. Using Gross Weight and Lateral Asymmetry, determine expected symmetric or the higher endspeed of Table B and C if asymmetric.

<table>
<tr><th colspan="3">CATAPULT LAUNCH ENDSPEED
(SYMMETRICAL LOADING 0-2,500 FT-LB)</th></tr>
<tr><th rowspan="2">GW
(1,000)</th><th colspan="2">Endspeed (MIN +15)
(KCAS)</th></tr>
<tr><th>MIL</th><th>MAX</th></tr>
<tr><td>66.8*</td><td>-</td><td>164*</td></tr>
<tr><td>66</td><td>-</td><td>161</td></tr>
<tr><td>65</td><td>-</td><td rowspan="6">160</td></tr>
<tr><td>64</td><td>-</td></tr>
<tr><td>63</td><td>165</td></tr>
<tr><td>62</td><td>163</td></tr>
<tr><td>61</td><td>161</td></tr>
<tr><td>51–60</td><td>160</td></tr>
<tr><td>≤50</td><td>153</td><td>153</td></tr>
</table>

* 5 Wet Tanker only.

Table B

In Step 3, referencing Table B, we determine our catapult launch endspeed. It is important to note here that the lines from 61k to 66.8k are separated individually. One must pay special attention to the fact that launching at 66k, which would likely only occur with a fully fueled 5-wet taxiing to the cat immediately post fueling, has a 161-knot endspeed, while a 64k or 65k endspeed is actually 160. This invalidates our previous assumption of launching at 66k and is a mere precursor to the next step.

RHINO CATAPULT TRIM CALCULATIONS

4. Determine required baseline longitudinal trim using Table D (MIL Power) and Table E (MAX Power). Enter with launch endspeed from Table B or C and Form-F CG. Determine longitudinal trim setting, interpolating between CG columns if required. The trim settings contained in Tables D and E are set up for 15 knot excess endspeed launches. Launches with greater than 15 knots excess will have higher pitch rates but will maintain the same capture AOA target.

Continued on Page 42»

LONGITUDINAL TRIM — MAX POWER							
Endspeed (KCAS)	Form-F CG (%MAC)						
	18	19	20	21	22	23	≥24
153	22	20	17	14	12	9	7
160	19	16	13	11	8	7	
161	18	15	13	10	7		
163	17	14	11	8			
164	16	13	10	8			
165	15	12	10	7			
170	11	9	7				
174	8	7					

Note: A 10 knot excess endspeed launch would require 4° additional nose up trim from the nominal settings.

Catapult Launch Trim MAX Power — Table E

In Step 4, we now determine the required baseline longitudinal trim. This step introduced a vital learning point during our analysis and discussions with the Carrier Suitability Team.

Not long after our inquiries, a squadron commander from CVW-8, embarked on USS Gerald R. Ford, reached out to the team with concerns that almost directly mirrored ours: seasoned tanker pilots experiencing less-than-desirable cat shots. After his initial review, he determined unrealistic Form-Fs promoted a higher trim setting than required. He then instructed his squadron to use 7 degrees nose up for 64k and 8 degrees nose up for 65k+. These much smaller trim settings were surprising compared to the historical gouge many were used to.

Upon further analysis, we realized that our Form-Fs were calculated using only a 300-pound fuel burn for start, taxi and takeoff. That is unrealistic in the carrier environment. Therefore, we adjusted the fuel burn to a more realistic number of around 1,000 pounds and began a study of what the average center of gravity (CG) the Form-F would then produce.

On average, a 5-wet foxtrot will have a CG of between 21% and 22% when adjusted appropriately for the fuel burn on deck. Therefore, a 65k shot with a 160-knot endspeed and 22% CG would produce a trim setting of 8 degrees nose up.

Step 5 is unquestionably the most revealing step that is widely misunderstood or unknown throughout the fleet.

RHINO CATAPULT TRIM CALCULATIONS

5. Longitudinal trim MUST be adjusted for the aft CG shift that occurs during normal fuel burn. The CG can shift as much as 3% MAC (F/A-18E) or 1% MAC (F/A-18F) when Tank 2 fuel drops to approximately 2,200 lb and Tank 1 fuel drops to approximately 1,000 lb. This CG shift can affect longitudinal trim by as much as 7° and must be accounted for to prevent catapult launch with a significant over-trim. Once Tank 1 has dropped to approximately 1,000 lb, fuel scheduling maintains the CG at an essentially neutral position. Table F is a rule-of-thumb for decreasing longitudinal trim based solely on Tank 1 fuel quantity. Decrease baseline longitudinal trim by the "Trim Delta" value down to but in no case less than 7° TEU stabilator.

LONGITUDINAL TRIM ADJUSTMENTS FOR NORMAL FUEL BURN (NLT 7° TEU STABILATOR)		
Tank 1 Fuel Quantity (lb)	Trim Delta — (°)	
	F/A-18E	F/A-18F
2,100	-3	-
1,500	-5	-
1,000	-7	-2

Table F

Longitudinal trim must be adjusted for the aft CG shift during normal fuel burn on deck. Following Step 5, aircrew must adjust their longitudinal trim by noting their Tank 1 fuel quantity and must adjust differently for an echo and foxtrot. However, you will NEVER trim less than 7 degrees. This step essentially considers what we were doing by adjusting to a more realistic fuel burn on our Form-F's.

This step is again the most important information I can submit to the fleet in this article. Upon reviewing and incorporating this step, VFA-103 has seen a marked improvement in fly away characteristics of the 5-wet tankers. Looking at our Form-Fs, we have established a baseline trim setting across all our tankers whose CG's are relatively similar. As a general rule of thumb, 66k will require 9 degrees nose up, 65k 8 degrees nose up and ≤ 64k 7 degrees nose up. However, the 1000-pound Tank 1 caveat always exists.

While our experiences on TSTA were a combination of the three primary factors mentioned above, they allowed us to learn a lot more about the 5-wet in the carrier environment. Most notably, tanker aircrew should expect potentially flatter fly away characteristics due to the Bow Burble if the WOD is high, especially when combined with a pitching deck. Secondly, carrier air departments should ensure MORIAH is

always functioning properly in AUTO mode. Finally, tanker aircrew must diligently calculate their trim setting and adjust for on-deck fuel burn.

We wrote this article to give the fleet a better understanding to hopefully provide smooth 5-wet cat shots that won't scare anyone as they launch into the dark abyss to do our nation's bidding overhead at 6,000, 8,000 and 10,000 feet.

A huge thank you goes out to all the specialists answering our seemingly elementary questions. A special thank you to the Carrier Suitability Team onboard NAS Patuxent River, Maryland, especially Jacques Romano and Charles Trost. Also, a thank you to the air department aboard George H.W. Bush for handling our constant inquiries and their catapult shot data compilation.

U.S. Navy photo by Mass Communication Specialist 3rd Class Nicholas Avis

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Our cover features a hidden raven.
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