

MECH

VOL. 71, NO. 2
Fall | Winter 2026

A $7.2 BILLION DOLLAR CATCH

Save money and possibly save a life

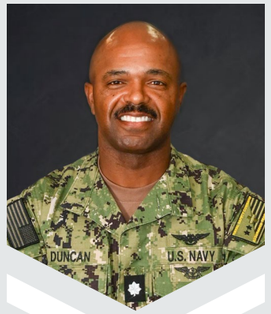
+ PERSONAL & OPERATIONAL RISK REDUCTION INFORMATION

RMI

ONLINE COURSES

MONTHLY ONLINE COURSES SPECIFIC TO YOUR RMI NEEDS

Hands-on training for the Risk Management Information (RMI) system is an absolute game-changer for your daily workflow. RMI is the official command center for tracking workplace hazards, mishap investigations and safety training records across the Navy and Marine Corps. These classes walk you step-by-step through the system. Sharpen your skill set and ensure your unit's safety data is accurate and ready for inspection.



Maintenance Officer, Naval Safety Command

Fleet Maintenance Teams,

Greetings from the Naval Safety Command. Every aircraft we return to the flight line carries the trust of its aircrew, the confidence of the commander and the readiness of the fleet. Naval aviation asks a great deal of you. You operate in demanding conditions, often under schedule pressure, with little room for error. That reality makes the fundamentals matter even more.

Across our force, we continue to see preventable events tied to the same underlying factors: a tool left where it should not be; a procedure performed from memory instead of from the technical publication; a battery stored without proper controls; a risk identified but not elevated; a debrief that ends before the real lessons are discussed. These are not minor matters. A cracked canopy, an inadvertent CAD firing, FOD, an electrostatic-discharge event or an untracked component can quickly become an unavailable aircraft, a damaged capability or a preventable injury. The equipment is often doing exactly what it was designed to do. Our job is to ensure we do ours with the same consistency. That means slowing down when the situation demands it. It means using the publications, reading the Warnings, Cautions and Notes, maintaining positive tool control and conducting a deliberate physical and visual sweep before closing a canopy or completing an evolution. It means treating lithium-ion batteries, explosives, armament systems, keys and life-limited components with the discipline their risks require. It means documenting hazards, assigning them to leaders who can act and following through until they are resolved.

Most importantly, it means communicating. A strong maintenance culture is one in which a junior maintainer can call a timeout without hesitation; an aircrew member and maintainer can raise a concern respectfully; and a high-risk evolution debrief is a genuine conversation, not a check in the box. Near-misses are not embarrassments to hide. They are lessons we receive before someone gets hurt or an aircraft is lost. Leaders have a particular responsibility. Production matters, but it can't come at the expense of procedural compliance, quality assurance or the people entrusted with the work. Our presence on the deckplates, our willingness to listen and our response when someone raises a concern establishes whether standards are merely written or truly lived.

Just remember, each of you has a direct role in preserving combat capability. The decisions made during routine maintenance, sometimes in the final minutes of a long shift, determine whether an aircraft is safe, reliable and ready when the fleet needs it. Do the maintenance by the book. Protect one another. Speak up early. Debrief honestly. Hold the line on standards. Our aircraft, our teammates and our mission depend on it!

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MECH

MECH provides stories, information, procedures and most of all, a place to raise safety awareness among our aviation maintainers. The safety information and risk awareness articles in MECH are credited as a critical part of a continually improving safety program in naval aviation.

Since 1961 MECH has been a supplementary publication of Approach magazine for the aviation maintenance community. With inputs from the fleet, Naval Safety Command staff and subject matter experts, MECH helps keep the aircraft mission ready and flying.

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Aviation Ordnanceman Airman Apprentice Adrianna Demory, assigned to Strike Fighter Squadron 31, stands by to chain down aircraft on the flight deck of USS Gerald R. Ford (CVN 78), while underway in the Mediterranean Sea, April 11, 2026. (U.S. Navy photo by Mass Communication Specialist 2nd Class Tajh Payne)

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KEEP IT SIMPLE, SHIPMATE

SENIOR CHIEF AVIATION ORDNANCEMAN MARIO SPENCER

As aviation ordnance professionals in fleet squadrons, you operate in high-tempo, condensed workspaces on the flight line and in hangars. Every decision during aircraft loading/unloading evolutions, weapons check-in/check-out and container processing impacts safety, readiness and mission success. Material Potentially Presenting an Explosive Hazard (MPPEH) and Material Documented as Safe (MDAS) are daily realities — not abstract concepts. Strictly adhering to procedures guards against mishaps, protects your shipmates and sustains our warfighting capabilities.

WHAT IS MPPEH?

MPPEH is Department of War-owned or controlled material that, before determining its explosives safety status, potentially contains explosives, munitions or high enough concentrations of explosive residues to present a hazard. In the squadron environment, this includes:

- Empty munitions containers and packaging
- Spent cartridge cases, links and expended rocket pods
- Debris from loading/unloading aircraft
- Old packing materials with ordnance markings
- Range-related debris and items from arming/de-arming or maintenance

WHERE DO YOU FIT IN?

Per DoDM 4140.72, 7 May 2021 and NAVSEA OP 5, treat every item as MPPEH from the moment you touch it. Do not assume it is safe just because it looks empty.

WHAT IS MDAS?

MDAS is MPPEH that has been properly assessed and documented as presenting no explosive hazard, with chain of custody maintained. This requires 100% visual inspection by one qualified person plus an independent 100% re-inspection by a second qualified person (or other DOW explosives safety-approved method), two independent signatures and proper markings.

WHO OWNS MDAS CERTIFICATION AND MARKINGS?

Command-designated qualified personnel, usually explosive ordnance disposal (EOD) technicians or unexploded ordnance (UXO)-qualified inspectors who have completed specific MPPEH/Military Munitions Rule training and are named in a commanding officer's letter. Aviation ordnancemen (AO) and ordnance Marines do not perform final MDAS certification or apply MDAS markings. Their role is to deliver clean, segregated, well-documented MPPEH so the qualified team can complete the process safely and efficiently. If they commingle items or lose custody, the material reverts to MPPEH and the entire process starts over.

GOVERNING REFERENCES:

The MPPEH and MDAS processes follow the official guidance below:

- NAVSEA OP 5, Rev. 9: Ammunition and Explosives Safety Ashore – foundational standards, especially Chapter 13 on MPPEH and empty container management.
- DoDM 4140.72, 7 May 2021: Primary manual on identification, assessment, chain of custody and disposition.
- OPNAVINST 8020.14 (series), 18 July 2022: Navy Explosives Safety Management Program Policy Manual.
- OPNAVINST 5530.13(series), 28 May 2021: Arms Ammunition & Explosives Physical Security Policy Manual.
- NAVSEA SW020 (series) (e.g., SW020-AC-SAF-010, SW020-AF-HBK-010): Transportation, Storage and Handling.

Always check the latest revisions via Naval Ordnance Safety and Security Activity or official channels before operations.

SQUADRON DAILY RESPONSIBILITIES:

AOs and ordnance Marines have a duty to ensure MPPEH and MDAS processes are accurate and complete. Here's what you can do to ensure daily success and adherence:

1. **IDENTIFY AND SEGREGATE IMMEDIATELY DURING AIRCRAFT DOWNLOAD OR CONTAINER EMPTYING**
   Place all potential MPPEH in its own clearly marked area or container, away from live ordnance. Use physical barriers, signs and separate carts. Never stage empties near live munitions or mix them with trash.
2. **WEAR THE CORRECT PPE**
   Always use safety goggles or face shield, cut-resistant and chemical-resistant gloves, cranial/helmet, hearing protection as needed, steel-toed boots and flame-resistant clothing, per squadron standard operating procedures and Hazardous Material requirements. Personal protective equipment protects you from sharp edges, residue and unexpected hazards. Treat every item as hazardous until the qualified team certifies it.
3. **OBLITERATE MARKINGS ON EMPTY CONTAINERS (THIS IS YOUR JOB)**
   Thoroughly spray out or remove all old ordnance markings (NSNs, lot numbers, hazard labels, etc.) on containers you confirm are empty. Do this only after proper segregation. This prevents mix-ups and supports the MDAS process later (per NAVSEA OP 5).
4. **START AND PROTECT CHAIN OF CUSTODY (DOCUMENTATION IS YOUR JOB)**
   - Use unique container identifiers, seals and waterproof tags/labels.
   - Fill out initial paperwork (DD Form 1348-1A or command forms) with description, source and handlers.
   - Always keep the paper trail with the material.
   - Never leave MPPEH unsecured or mixed. If custody breaks, reclassify as MPPEH and start over. Maintain legible records to support at least the last three years.
5. **APPLY IN YOUR DAY-TO-DAY TASKS**
   - Aircraft Loading/Unloading: Segregate expended items (empty pods, spent links, packaging) right away on the flight line or in the hangar. Conduct visual checks before movement.
   - Weapons Check-In/Check-Out: Inspect all containers and packaging when issuing or turning in small arms, guns or pylons. Segregate empties immediately in the armory or ready space.
   - Work Center Processing: Whether in the AO work center or ordnance ready room, collect and segregate in designated areas. Brief your team on MPPEH during every live evolution. Stop the job and call your supervisor if anything looks wrong or mixed.

WHAT YOU DO NOT DO:

- Decide or certify material as MDAS.
- Apply official MDAS markings or signs.
- Release MPPEH to the Defense Logistics Agency, recycling or outsiders without direction from qualified personnel.

SAFETY CULTURE:

Conducting business as ordnance professionals; High operational tempo is never an excuse for shortcuts. Rushing inspections, skipping PPE or sloppy segregation introduces unnecessary risk. Live "Every Weapon is Loaded" and "Trust but Verify."

Deckplate AOs and Ordnance Marines are to treat every expended item as MPPEH until the qualified team says otherwise. Double-check segregation in tight spaces, obliterate markings properly, use your PPE and guard the paperwork. Speak up immediately if you see commingling or problems; that is professional ordnance work.

Leaders must ensure every AO understands these steps, keep designation letters and training current for qualified inspectors, conduct spot audits of MPPEH areas and integrate MPPEH awareness into tool control, foreign object damage walks, HAZMAT programs and turnovers. Empower anyone to halt operations for safety. Bottom line, identify MPPEH, handle it safely with PPE, segregate it cleanly, obliterate markings on empties and maintain chain of custody. Owning your part of the process is your job! Qualified EOD/UXO teams will perform final inspections, dual signatures, MDAS certification and markings.

By doing your part right, with by-the-book maintenance, you protect your fellow Sailors and Marines, keep your squadron ready, minimize explosives risks and conduct business safely and efficiently as ordnance professionals.

Submit your real-world MPPEH lessons learned or Bravo Zulu stories to the MECH team at NAVSAFECOM_Code04_MECH@us.navy.mil. Deckplate input improves safety for all. Stay sharp, stay compliant and keep the ordnance chain strong. Your hard work and commitment to professional ordnance handling procedures makes a difference. Hooyah!

A U.S. Navy Aviation Ordnanceman transports ordnance on the flight deck of USS Carl Vinson (CVN 70) in the U.S. Central Command area of responsibility, April 16, 2025. (U.S. Navy photo by Mass Communication Specialist 3rd Class Nate Jordan)

FOD PREVENTION

MASTER SGT. DAVID COX



Foreign object damage represents one of the most persistent and preventable threats to naval aviation.

Defined as any damage to an aircraft, engine or system caused by a foreign objects, FOD compromises flight safety, degrades mission readiness and imposes significant financial burdens on the Department of the Navy. Foreign objects range from loose hardware and misplaced tools to natural debris. To combat this threat, the Naval Aviation Maintenance Program (NAMP) establishes a comprehensive framework for FOD prevention. Under this program, FOD prevention is not merely a set of guidelines; it is a fundamental pillar of aviation maintenance culture.

The consequences of FOD in a naval aviation environment are severe. A single misplaced fastener or piece of safety wire ingested into an engine can cause catastrophic internal failure, potentially leading to the loss of an aircraft and more tragically, loss of life. In the high-stakes environment of a flight deck or a forward-deployed expeditionary airfield, the margin for error is non-existent.

Financially, FOD costs the military millions of dollars annually in damaged engines, shredded tires and punctured airframes. The true cost is measured in degraded mission readiness. An aircraft grounded due to a preventable FOD incident is an asset unavailable to the warfighter, directly impacting the Navy and Marine Corps ability to project power and answer our nations call.

Beyond the immediate tactical and financial repercussions, the true impact of FOD lies in its direct threat to human life and the foundational safety culture of naval aviation. In the unforgiving, high-tempo environment of a flight deck where jet blast, moving aircraft and live ordnance create a constant matrix of hazards, even a seemingly small piece of debris can trigger a catastrophic chain of events. A FOD-induced engine failure during critical phases of flight, such as a catapult launch or arrested recovery, leaves aircrews with mere fractions of a second to react, often with fatal consequences.

Therefore, the emphasis on safety mandated by the NAMP establishes regulatory compliance; it cultivates an uncompromising risk management culture. Every Sailor, Marine and contractor is empowered, and explicitly expected, to halt flight operations immediately if a FOD hazard is identified, reinforcing the core principle of aviation safety and mission execution being inseparable. This ownership of the flight line ensures FOD prevention is treated not as a secondary administrative chore, but as a life-saving operational necessity protecting the force.

Additionally, the NAMP dictates FOD prevention be ingrained in every aspect of naval aviation. It designates the FOD Prevention Program as a mandatory command program requiring strict adherence at all chain of command levels. The commanding officer holds ultimate responsibility for the program's success, but the true success of an effective FOD Prevention Program lies with EVERY member of the command.

Ultimately, mitigating the FOD threat is an enduring operational requirement demanding unyielding commitment from every chain of command echelon. COMNAVAIRFORINST 4790.2E serves as the definitive blueprint for this effort, transforming individual accountability into a unified, fleet-wide defense mechanism. By strictly enforcing tool control, executing meticulous daily flight line inspections and fostering a culture where risk management and combat capability are inextricably linked, naval aviation professionals ensure their platforms remain lethal and reliable.

In the demanding arena of naval operations, FOD prevention is far more than a procedural checklist; it is a fundamental warfighting discipline. It directly preserves combat power, maximizes taxpayer resources, and most importantly, protects the lives of the warfighters executing our nation's global mission and preserving our way of life.

U.S. Sailors conduct a foreign object debris walkdown on the flight deck of USS George Washington (CVN 73) in the U.S. 5th Fleet area of operations, Aug. 27, 2026. (U.S. Navy photo)

BLANK BLIND SPOT

MASTER CHIEF AVIONICS TECHNICIAN DAVID BROOKS

You've done the work. The aircraft is back in service; the tools are accounted for and the paperwork is signed complete. The final box to check is the "Debrief" section on the High-Risk Evolution (HRE) sheet. It's tempting to just pencil in "Job went fine, no issues" and head home, but what if that blank space represents the biggest threat on your hangar floor?

In the last issue of MECH magazine, we covered the "5 Rights" of the job. ("Mastering Maintenance," Vol. 71, No. 1). Now, we close the loop with the single most important process for ensuring those rights lead to repeatable success: Plan, Brief, Execute and Debrief (PBED).

THE "CHECK-IN-THE-BOX" DEBRIEF

Across the fleet, a dangerous trend is emerging. HRE sheets with bone-dry, completely blank debrief sections. When we ask maintenance leaders why, the answer is always the same: "The job went fine, nothing to report."

In naval aviation, a blank debrief section isn't a sign of perfection; it's a sign of a missed opportunity! It conveys we are not getting real about the near misses, frustrations and small inefficiencies creating friction in our processes. If we don't talk about the time a wrench almost slipped or a manual was unclear, we are ensuring someone on the next shift will face that same hazard. Today's near miss is tomorrow's aviation ground mishap (AGM).

WHAT RIGHT LOOKS LIKE

The PBED is more than a checklist; it's a mindset that turns every task into a learning opportunity. Breaking down the cycle shows us exactly where we can anticipate friction and improve our execution.

PLAN (P)

- Goal: To establish clear understanding and minimize risks before execution by defining what success looks like while identifying potential hazards and building a flexible strategy allowing the team to adapt if conditions change. Anticipate the friction!
- Key Execution Steps: Define the mission to prevent mission creep before it starts. Identify hazards such as thinking about hazardous material, tight spaces and personnel conflicts. Allocate resources by ensuring the "5 Rights" are met before executing the first procedural steps.

BRIEF (B)

- Goal: To align the plan, evolution processes and goals ensuring a clear execution picture.
- Key Execution Steps: Huddle up to assign clear team member roles and equipment required (i.e., tool pouch, reader, safety observer, etc.), discuss contingencies and empower "Stop it" or "Knock it off" to ensure everyone, regardless of rank, knows their responsibility to halt unsafe jobs.

EXECUTE (E)

- Goal: To maintain disciplined action by safely completing the objective.
- Key Execution Steps: Execute by-the-book maintenance per the NAMP and NATMs. Leaders must actively supervise and monitor deviations while managing risks in real-time.

DEBRIEF (D)

- Goal: Turn experience into improvement with actionable lessons learned.
- Key Execution Steps: Get Real by acknowledging anything that did not go according to the briefed plan (e.g., awkward tools, confusing manuals or part hunting). Get Better by capturing and documenting small struggles to identify trends and systematically drive down AGMs.

LEADERSHIP'S GUIDE TO A SUCCESSFUL DEBRIEF

A successful debrief requires leaders who create a culture of radical honesty. Here's how deckplate leaders can foster the right environment to get meaningful and transparent feedback:

Ask Better Questions
Instead of asking simple questions like, "Did anything go wrong?", ask targeted questions, "What was the most frustrating part of that job?" or "Where did we almost trip up?"

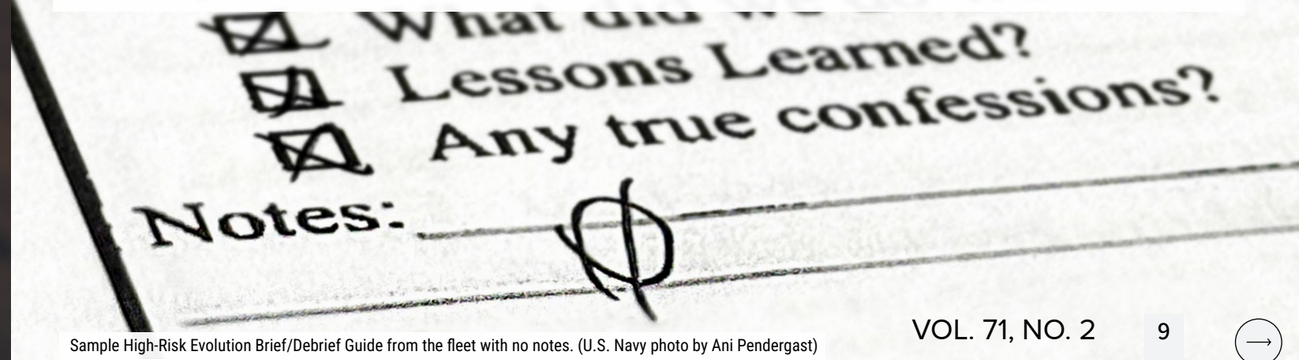
Leave Rank at the Door
During the debrief, an airman's observation is just as valuable as a quality assurance representative's. The sharpest eyes often have the freshest perspective.

Hunt for Process, Not People
If a mistake occurred, ask "why," not "who." The goal is to fix the underlying process, not to wring a neck.

Celebrate the Near Miss
When a maintainer speaks up about a potential disaster they averted, praise them publicly. They just saved the command from a future mishap.

THE BOTTOM LINE

PBED isn't just more paperwork. It drives excellence in a high-risk environment. If you finish a job and the debrief section is blank, you haven't truly finished the job. You've just passed the risk on to the next evolution. It's time to close the loop, report the small near misses every single time.



Sample High-Risk Evolution Brief/Debrief Guide from the fleet with no notes. (U.S. Navy photo by Ani Pendergast)

THE INVISIBLE THREAT

SENIOR CHIEF AVIATION ELECTRICIAN'S MATE MATTHEW FENNEWALD

The roar of jet engines, the whine of propellers starting to rotate and the constantly changing environment we call the flight deck can become highly familiar with aircraft maintainers. Among these visible dangers we train ourselves and those around us to navigate, the invisible dangers of electrostatic discharge (ESD) are often minimized and forgotten. In our drive to keep aircraft in the fight, quickly fixing a down bird on the flight deck or "roof" can cause technicians to forget the strict precautions required for electronic components. ESD failures represent an avoidable source of downtime for our aircraft because they are almost always self-induced.

PRESSURE OF THE FAST-PACED FLIGHT LINE

Naval aviation is a brutally fast-paced environment. I've seen this tension firsthand in many of the squadrons I have been attached to or worked around. External pressure to get the aircraft up can cause us, most of the time unwittingly, to bypass precautions meant to protect against ESD hazards. We tend to do this because it is harder to see the microscopic damage ESD inflicts on a sensitive device's circuitry. Conversely, physical damage to flight control surfaces is obvious when it is impacted during rushed, chaotic evolutions.

INVISIBLE THREAT

ESD can wreak havoc on the microscopic circuits and microelectronics in components technicians handle. The human body is a walking capacitor, capable of accumulating charges up to 35,000 volts and discharging them suddenly and unintentionally.

The disparity between what we feel and what a microchip can survive is stark:

ELECTRICAL METRIC	VOLTAGE THRESHOLD	OPERATIONAL CONTEXT
Human Sensation Limit	~3,000 to 4,000 volts	The physical "zap" we feel when touching a doorknob or ship's hatch.
Avionics Destruction Limit	Less than 20 volts	The tiny discharge that can destroy sensitive modern avionics weapon replaceable assembly.
Technician Accumulation	Up to 35,000 Volts	The massive charge built up by moving in dry, windy or synthetic environments.

A well-intentioned technician can easily fry a multi-thousand-dollar piece of gear without ever feeling, seeing or hearing a spark. We are walking lightning storms to these sensitive components, entirely oblivious to the voltage we carry.

CATASTROPHIC VS. LATENT FAILURE

What makes ESD a uniquely insidious human factors issue is how this unseen damage manifests. When a technician rushes and inadvertently zaps a component, one of two things happen:

- Catastrophic Failure: These are immediately apparent. The gear is installed; the system fails its built-in test and we pull the box right back out. It is frustrating, it wastes valuable parts and it eats up precious man-hours on the flight line, but the failure at least happens safely on the deck.
- Latent Failure (The "Ghost in the Machine"): This is the real operational threat. An ESD event might only weaken the circuit's internal microscopic structure, leaving it intact enough to pass the initial operational check. The aircraft launches, but hours later, under the stress of flight maneuvers, that weakened component finally gives out. The radar screen goes dark. A targeting system loses track. A critical navigation system drops offline in the middle of a night trap. All because we were in too much of a rush to hook up a grounding strap hours earlier.

PSYCHOLOGY OF NORMALIZING DEVIATIONS

Why do we let these oversights happen? As maintainers, our human factors are driven heavily by our dedication to the mission. When maintenance control is pushing for an "up" status and the aircrew is sitting in the cockpit waiting or about to walk for preflight, taking the extra couple of minutes to properly ESD-safe the aircraft or weapon replaceable assembly feels like a lifetime. We rationalize the risk, telling ourselves, "This is to make the launch" or "This won't cause any physical damage to just swap it out quickly."

When we skip using the ESD wrist strap 99 times and seemingly get away with it, largely thanks to those latent failures hiding our tracks, we falsely assume the 100th time will be fine, falling victim to normalized deviations. We trick our own brains into believing the invisible threat isn't real.

CULTIVATING A CULTURE OF ACCOUNTABILITY

Combating ESD damage isn't just about ordering the right gear; it requires a fundamental shift in our maintenance culture. We wouldn't dream of walking out onto the flight deck during flight ops without our cranial, float coat and double-hearing protection because we instinctively understand those visible, audible threats. We need to treat ESD precautions with the same strict discipline.

It starts with leadership and peer-to-peer accountability. Work center supervisors, collateral duty inspectors and quality assurance representatives must enforce the use of static-dissipative mats, proper grounding straps and electrostatic-shielding packaging as rigorously as they enforce tool control. If an ESD-sensitive item is out of its protective packaging, the maintainer handling it must be properly grounded. Period. No exceptions for a "quick swap."

MANAGING HOSTILE FLIGHT ENVIRONMENTS

Additionally, we need to recognize the environmental human factors at play. The flight deck and the hangar bay are inherently hostile to delicate electronics. High winds, dry air, salt spray and synthetic uniform items all contribute to massive static buildup.

Before opening a panel to access a sensitive component, technicians should intentionally ground themselves on bare metal on the airframe to dissipate any accumulated charge. When transporting components from the work center to the aircraft, keep them sealed in their shielding bags until the absolute last moment before installation.

KEY TAKEAWAY

At the day's end, naval aviation relies entirely on the integrity of our equipment and the uncompromising discipline of our maintainers. The roar of the jet engines and the chaotic dance of flight deck operations will always require our immediate physical attention. But in this demanding environment, we must remember keeping our aircraft in the fight requires vigilance against both the seen and the unseen.

The next time you find yourself rushing to fix a down bird, fighting the clock and the elements, take that extra pause. Grab that grounding strap. Remember protecting the microcircuitry is just as vital as depressurizing systems or certifying the seat is safe before performing work. Don't let the invisible threat cause our mission to fail.



Aviation Electrician's Mate 2nd Class Alexander Garcia, assigned to the "Wildcats" of Strike Fighter Squadron (VFA) 131, performs maintenance to the cockpit of an F/A-18E Super Hornet aboard USS George H.W. Bush (CVN 77) in the Atlantic Ocean, Feb. 7, 2026. (U.S. Navy photo by Mass Communication Specialist 2nd Class Jayden Brown)



Left to right: Chief Aircrew Survival Equipmentman Dave Lewinson, Aircrew Survival Equipmentman 2nd Class Gabrielle Rambhajan, Aircrew Survival Equipmentman 3rd Class Adrian Torres, Aircrew Survival Equipmentman 3rd Class Jose Vasquezsanchez, Aircrew Survival Equipmentman Airman Conrado Barahona. Not pictured: Aviation Structural Mechanic 3rd Class Colby Monta, Aviation Structural Mechanic Airman Mitchell Foster

COMMANDER, STRIKE FIGHTER WING PACIFIC

Commander, Strike Fighter Wing Pacific (CSFWP) is driving a low-cost, locally engineered solution to prevent F/A-18 canopy damage. This targeted investment of less than $4,000 aims to eliminate a recurring flight-line hazard that, according to OPNAV N832, has cost the Navy nearly $2 million in depot-level repairs.

Despite strict governing directives — including Interactive Electronic Technical Manual and Type Wing two-person closure requirements — F/A-18 canopies remain highly vulnerable during routine aircraft maintenance. Stray tools, ground support equipment and panel screws inadvertently contact the canopy, causing depot-level damage to a critical asset. These preventable "canopy crunches," coupled with the high-replacement demand, have severely strained supply chains, leaving the supply officer's shelves empty and threatening overall fleet readiness.

To combat this readiness detractor, Type Wing Maintenance Officer Cmdr. Michael Wilkens ordered the development of a localized solution, led by CSFWP staff member PRC Dave Lewinson. Rather than waiting on external solutions, Lewinson assembled a cross-functional team of Aviation Survival Equipmentmen and Aviation Structural Mechanics — Safety Equipmentmen directly from the flight line to engineer a protective cover.

Together, this joint-squadron team designed and prototyped a specialized canopy rail cover. The current prototype requires approximately two man-hours to manufacture with a material cost of just $63 per unit. The prototype has been presented to the Fleet Support Team to secure engineering concurrence ensuring the design is safe for aircraft use. Once approved, the type wing plans to share the finalized design with Commander, Strike Fighter Wing Atlantic and Commander, Electronic Attack Wing Pacific. Concurrently, CSFWP budgeting is providing the prototype design to commercial vendors to solicit quotes for the mass production of 70 initial units. Once procured, new standard operating procedures will mandate the installation of these covers on all aircraft undergoing maintenance whenever the canopy is open.

By investing approximately $3,843 upfront in a Sailor-developed solution, CSFWP and the Lemoore Flightline Team is taking decisive action to protect critical inventory, improve readiness and mitigate multi-million-dollar depot repair costs.

A $7.2 BILLION DOLLAR CATCH

AVIATION STRUCTURAL MECHANIC 1ST CLASS RICHARD WOODS, FLEET READINESS CENTER WEST DETACHMENT, POINT MUGU

The differences between a routine flight and a catastrophic aviation failure often come down to the smallest components. In December 2025, a series of events underscored this reality. The sharp eyes and decisive actions of Aviation Structural Mechanic 2nd Class Jason Elliott prevented a potential disaster of immense proportions, saving billions in assets and, most importantly, the lives of hundreds of aircrew members across the Navy and Air Force.

It began Dec. 3, 2025, with a seemingly routine delivery of main landing gear tire bolts to the Fleet Readiness Center West Detachment, Point Mugu, Tire Shop. Though the packaging appeared correct, the parts themselves looked and felt different than previous batches of tire bolts. Rather than ignoring the discrepancy or assuming the difference was only aesthetic, Elliott, the tire and wheel work center supervisor, brought the issue to the attention of a Naval Air Technical Data and Engineering Service Center technical representative. This simple act of diligent courage to speak up when something didn't look right set in motion a chain of events that would ripple across the Department of War.

The suspect hardware was immediately shipped to the fleet support team at Naval Air Station North Island, California, for strength testing. The results confirmed the initial suspicion: the bolts were indeed made of a different and much more brittle metal than required in the military standard and deemed not to be airworthy. A Product Quality Deficiency Report was swiftly submitted and the part number was stricken from use to be replaced by an authorized and verified alternate.

Because this hardware was used across multiple platforms, a one-time, fleet-wide inspection of all affected main tire and wheel assemblies was ordered, impacting not just naval aircraft, but Air Force aircraft as well. The critical find led to inspections across the E-2, C-2, C-130 and B-52 Type/Model/Series to ensure the faulty components hadn't already found their way onto the flight line.

Just days later, the value of this vigilance was doubly proven. Two new batches of nose landing gear tire nuts also showed signs of critical failure when, during routine installation checks, nuts from both batches split down the middle before reaching even 50% of their required torque value.

The response from leadership and the maintenance team was immediate and decisive. All affected nose tire and wheel assemblies stored in the supply pool were recalled to Point Mugu. In a display of efficiency and commitment to warfighting readiness, Elliott and his team inspected all recalled assemblies, replaced the defective nuts with an authorized and verified alternate and returned each assembly to ready-for-issue status on the same day, resulting in zero downtime across the fleet.

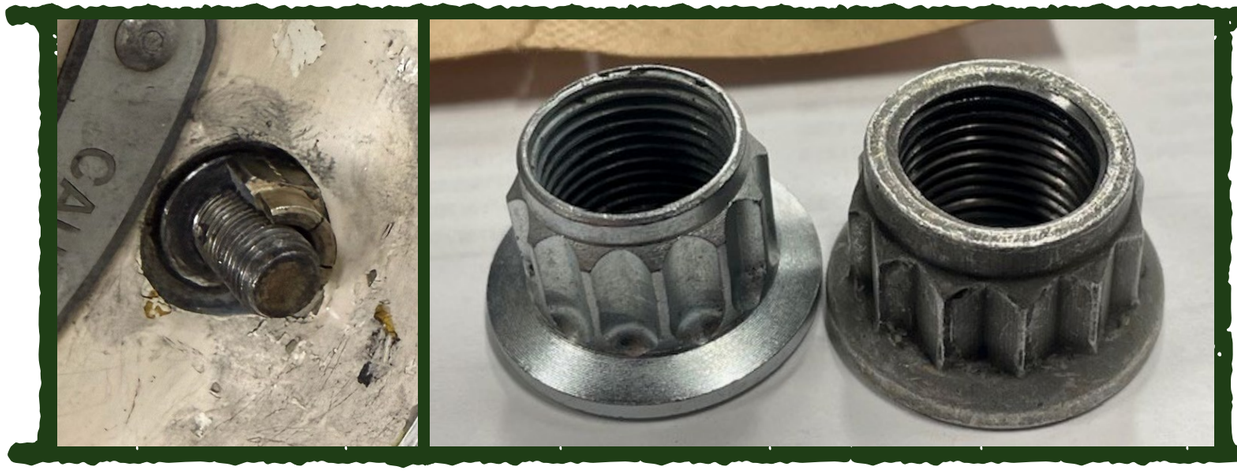
The subsequent engineering investigation confirmed multiple failures within the batch due to a similar case of metals in use that did not meet military standard strength requirements, leading to the suspect part number being permanently removed from the Illustrated Parts Breakdown.

The impact of these preemptive actions cannot be overstated. The diligent efforts of Elliott and his team of technicians prevented the incorporation of faulty, non-airworthy components onto mission-critical aircraft spanning joint forces. Their actions averted the potential loss of $7.2 billion worth of Navy and Air Force aircraft — specifically safeguarding the E-2, C-2, C-130 and B-52 fleets — and the aircrews inside.

By the numbers, their keen attention to detail provided:

- A direct cost avoidance of $472,857 per affected aircraft.
- The preservation of mission readiness across both Navy and Air Force fleets.
- Most critically, the safeguarding of the lives of over 330 aircrew members.

This event is a powerful testament to the military's culture of safety and the profound impact one person's commitment to excellence can have on the Naval Aviation Enterprise and the broader joint force. It is a stark reminder in the high-stakes, high operational tempo environment of military aviation, procedural compliance and attention to detail are core tenets of daily life. When something doesn't look right; stop, ask questions and report it! It just might save a life.



Left: Exploded tire nut. Right: Incorrect Material Tire Nut on the left and the correct material on the right. (Photos courtesy of Aviation Structural Mechanic 2nd Class Jason Elliott)

WARNINGS, CAUTIONS & NOTES!!!

SENIOR CHIEF AVIATION MACHINIST'S MATE KEVIN HALL

There are no shortages of hazards, high-pressure systems, moving components, electrical energy and hazardous materials on any given day in naval aviation maintenance. To manage these risks, technical publications include key hazard communication tools: Warnings, Cautions and Notes. These are standardized terms designed to make the technician and/or pilots pause and assess a situation.

These terms are not interchangeable. Ignoring them can lead to injuries, damage or even death. They are defined as:

- WARNINGS: Explanatory information about an operating procedure, practice or condition that may result in injury or death, if not carefully observed or followed.
- CAUTIONS: Explanatory information about an operating procedure, practice or condition that may result in damage to equipment, if not carefully observed and followed.
- NOTES: Explanatory information about an operating procedure, practice or condition that must be emphasized.

The hierarchy is crucial: WARNING is about people; CAUTION is about hardware and NOTE is about doing the job right.

Across maintenance evolutions, these critical markers are often skimmed, ignored or treated as background noise, which contradicts the core principles of naval aviation maintenance doctrine and increases the risk of mishaps. Technical publications are carefully written to identify and address real risks. They're based on lessons learned, engineering limitations and proven risk controls. Ignoring them isn't efficiency; it's unauthorized risk acceptance. It's a deviation from the norm with consequences we might not fully understand.

In maintenance assessments, quality assurance (QA) audits and safety investigations, a pattern emerges: maintainers are either skimming procedures, ignoring warnings or not using the publications at all. This behavior is learned and as leaders, if we don't correct it, we're silently accepting it. When allowed, shortcuts or technique risk setting "norms" for "how we do things," often without realizing the dangers.

Some of the excuses we hear are the publications are "poorly written." Sure, mistakes do happen in the publications, but if we don't properly address these issues through a Technical Publication Discrepancy Report, our Sailors and Marines are taught to disregard the manuals leading to bad habits, like using impact-resistant cranial goggles not suitable for tasks such as drawing fuel samples that require splash-resistant eye protection.

Common breakdowns include:

- Treating procedures as checklists, not risk controls.
- Skipping steps that seem like "common sense."
- Relying on memory over publications.
- Failing to brief hazards before maintenance evolutions.
- Assuming "I've done this before" means "nothing will go wrong."

This is how normalization of deviance occurs. Over time, cutting corners becomes standard.

What Could Happen: Warnings, Cautions and Notes exist because something either went wrong or almost did (near-miss).

- A WARNING addresses potential life-threatening risks.
- A CAUTION addresses equipment damage.
- A NOTE provides clarity on the procedure.

Ignoring them isn't a small deal. Here's what could happen if you do:

Ignoring a WARNING in a hydraulic task could lead to:

- High-pressure fluid injuries
- Loss of limbs or eyesight
- Permanent disability

Ignoring a CAUTION in engine maintenance could lead to:

- Foreign object damage
- Engine failure
- Loss of a multi-million-dollar asset

Ignoring a NOTE might seem minor, but it could result in:

- Improper system configurations
- Repeat maintenance actions
- Increased maintenance man-hours and reduced readiness

In short, small oversights can lead to major failures.

This isn't about intelligence or training, rather it's about mindset and culture. Some consistent drivers include overconfidence, time pressure, poor supervision, incomplete training and habit patterns.

1. Overconfidence: Experienced maintainers trust memory over manuals, which leads to mistakes.
2. Time Pressure: Operational tempo pushes to "get it done," but speed should never replace precision and attention to detail.
3. Poor Supervision: If work center supervisors or collateral duty inspectors (CDIs) aren't enforcing publication compliance, standards erode.
4. Incomplete Training: Junior personnel may not fully understand the importance of safety notifications. They see them as mere text.
5. Habit Patterns: Once shortcuts are taken without consequence, they become routine, leading to the "this is how we do it" mentality.

If we want to reduce mishaps, the corrections are straightforward but require consistency.

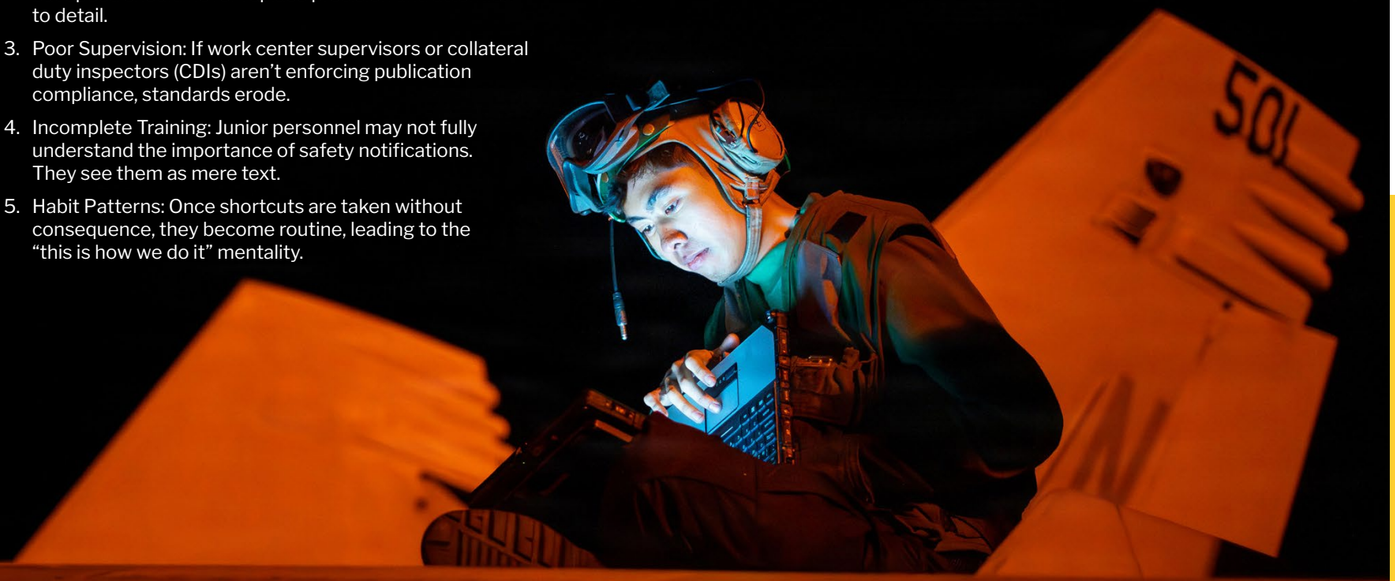
1. Treat publications like operational orders. Technical manuals are directives. Follow them step by step.
2. Slow down at hazard points. When you hit a WARNING or CAUTION, stop and process it. Ask yourself:
   - What hazard is being controlled?
   - What happens if I ignore this?
3. Integrate into maintenance briefs. Before starting a job:
   - Identify all warnings and cautions.
   - Brief them to the team.
   - Assign responsibility for compliance.
4. Enforce through QA oversight. QA and CDIs must:
   - Ensure publications are open and followed.
   - Verify critical steps aren't skipped.
   - Confirm hazards are being mitigated.
5. Train the "why," not just the "what." Junior maintainers need context. When they understand the consequences, they're more likely to comply.
6. Communicate with your leadership. If issues arise or there's conflict in the procedure, inform leadership. Don't assume responsibility of making decisions that should be made by the team. Leadership needs all the information to decide the best course forward.

The Maintainer's Responsibility:

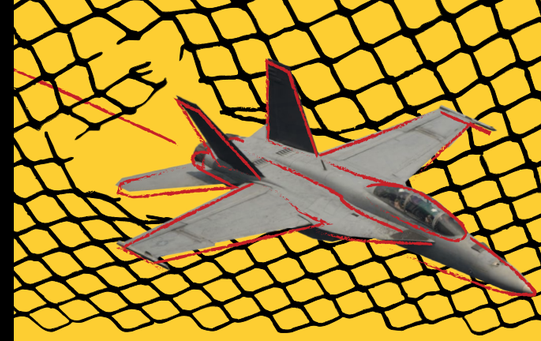
Every maintainer, regardless of rank or experience, is responsible.

- If you skip a WARNING, you accept the risk personally.
- If you allow others to skip it, you accept it as a leader.
- If you ignore it as a supervisor, you're institutionalizing failure.

There is no version of safe maintenance that excludes procedural compliance. Mishaps don't happen overnight. They're the result of small decisions, missed steps, ignored cautions and rushed execution. Warnings, cautions and notes exist to interrupt that chain. Use them because the alternative is predictable and preventable!



Aviation Electrician's Mate Airman Apprentice Roman Tanala, assigned to Strike Fighter Squadron (VFA) 25, performs maintenance on an F/A-18E Super Hornet on the flight deck of the Nimitz-class aircraft carrier USS Theodore Roosevelt (CVN 71), April 22, 2026. (U.S. Navy photo by Mass Communication Specialist Seaman Alexander Bussman)



Find a hole in your safety net?

Report ASAP

Report all hazards, near misses, dangerous conditions, errors and high-risk activities that could cause mishaps.

SAFEREP

Download to your mobile device or scan QR code for saferep.safety.af.mil/

The SAFEREP and All-hands Safety Action Program (ASAP) are web and app reporting tools that identify hazards before they contribute to a mishap.

Reporting your near misses, hazards and dangerous conditions can increase awareness, provide leadership valuable feedback and inform future investment decisions for a safer workplace.

REGISTER THAT RISK

SENIOR CHIEF AVIATION MAINTENANCE ADMINISTRATIONMAN JESSE MILLER

In naval aviation, where the margin for error is razor-thin and the cost of failure is measured in lives and mission readiness, a simple phrase has long echoed across the flight line: “If you see something, say something.” This fundamental principle of a Safety Management System (SMS) empowers every Sailor and Marine, from the newest recruit to the most seasoned officer, to be a guardian of safety.

But what happens after something is said? Where do these crucial observations go to prevent them from disappearing into the everyday droll of a busy command?

The Naval Safety Command (NAVSAFECOM), in its continuous effort to bolster war-fighting readiness, provides a powerful answer: “If you see something, say something and write it down.” This additional step marks the birth of a Risk Registry, a concept so vital yet often misunderstood at the supervisory and junior levels. It’s not just another administrative task or a box to be checked. It’s the very backbone of a proactive, resilient and effective risk identification culture. A Risk Registry is the bridge between seeing a problem and solving it, transforming a command’s safety posture from reactive to proactive.

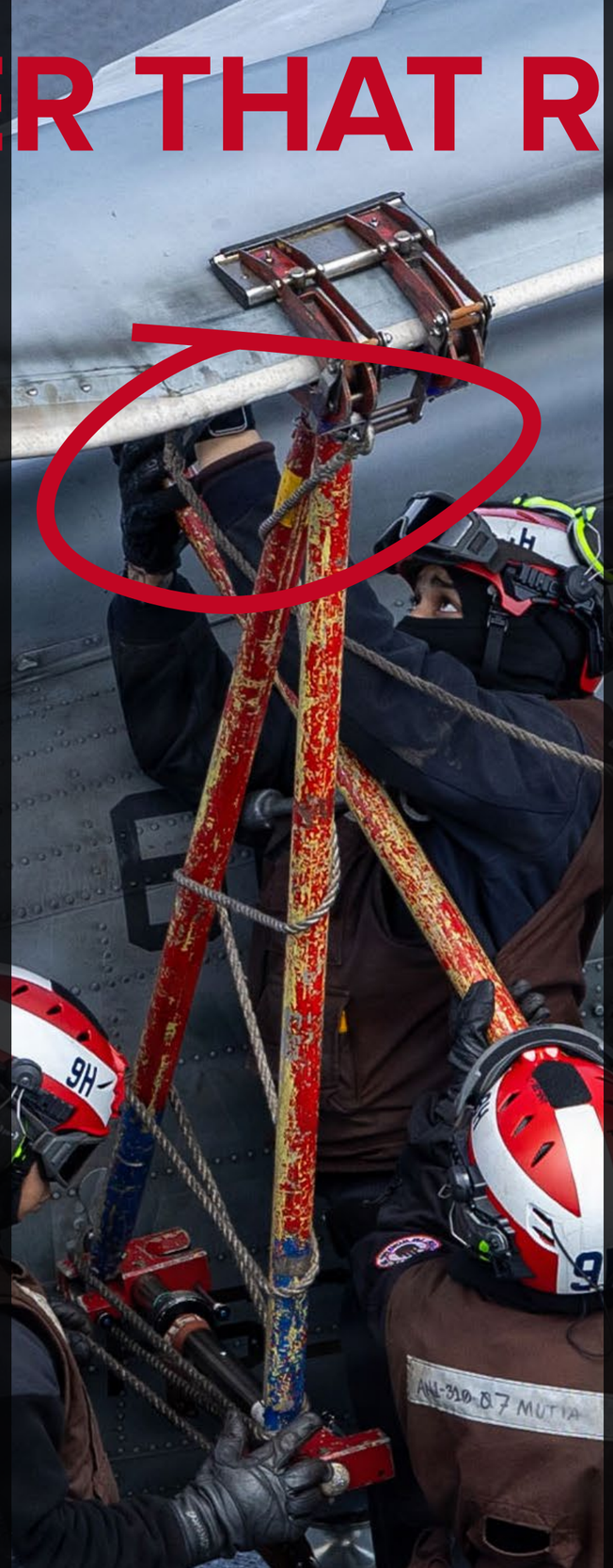
At its core, a Risk Registry is a living, centralized tool designed to formally document, track and share awareness of risks facing a command. There is no rigid, one-size-fits-all template. It can be as simple as a shared Word document, a meticulously organized Excel spreadsheet or a dynamic SharePoint application. The format is secondary to its function, which is to provide a clear, consolidated picture of the challenges that could impede the mission, compromise safety or damage resources.

The purpose is to move beyond institutional memory and hallway conversations. It provides a mechanism ensuring the collective awareness of risks is captured and communicated, especially to the leaders who can enact change. By collecting issues, a command begins to think critically and systematically about how to address them, and, just as importantly, determine who has the power to do so.

This brings us to one of the most critical concepts in the SMS framework: the Accountable Person (AP). The AP is the individual who “owns” the risk, meaning they possess the authority and resources to either fund a solution or fix the problem directly. This is almost always a commander at some level. A crucial takeaway from the NAVSAFECOM’s guidance is a simple but profound rule: you cannot own a risk you cannot fund or fix.

If a leader identifies a hazard but lacks the authority to resolve it, they are not the AP. Their responsibility is to mitigate the risk, document it in the registry and formally communicate it up the chain of command. This process is repeated at each level until the risk lands on the desk of the appropriate AP. This systematic escalation ensures problems don’t suffer in silence at a level incapable of addressing them.

This refines our safety mantra for those in leadership. For the maintainers or observers, it remains, “If you see something, say something.” For supervisors, it becomes “If you see something, say something and write it down.” For the AP, the one with the authority to act, it culminates in the final, crucial step: “If you see something, say something, write it down and do something about it.” This completes the cycle from identification to resolution.



Imagine a real-world scenario where you are your squadron’s commanding officer (CO) facing a trifecta of pressing issues. The main hangar doors’ operating system is broken, creating a hazardous manual workaround for maintainers to use a tow tractor. The command has several fall-protection equipment shortfalls requiring materiel solutions. To top it off, the squadron is critically undermanned, especially at the night shift supervisory level.

The CO can see the risks to personnel, equipment and mission capability. However, the CO cannot single-handedly fund a major hangar door repair, procure specialized equipment or change the Navy’s manning assignments. In this scenario, the CO is not the AP for these risks. This is where the Risk Registry becomes indispensable. Instead of juggling these different issues, the CO uses the registry to:

- Organize: Consolidate all known risks into a single, manageable tool.
- Analyze: Evaluate the probability and severity of each risk. The hangar door issue might be a high-priority safety risk, while the manning shortage is a critical operational risk.
- Prioritize: Rank the risks to determine where to focus the command’s limited internal resources for mitigation.
- Communicate: Formally present a clear, evidence-based case to the higher authority who is the AP. This elevates the problems with the necessary context, demonstrating the squadron has done its due diligence.
- Mitigate: While awaiting a permanent fix from the AP, the CO can develop and document interim mitigation plans, such as revised manual procedures for the hangar door or adjusted watch schedules.

Without the Risk Registry, these issues might be communicated in pieces, without the context or perceived urgency needed to secure a solution. With the Risk Registry, the CO provides a comprehensive and professional assessment empowering the higher command to act effectively.

Creating a Risk Registry is not a one-and-done event; it is a continuous process rooted in critical thinking. It requires a dedicated team of leaders to meet regularly, perhaps monthly or quarterly, to review, update and re-evaluate the command’s risk landscape.

The process mirrors the core steps of Risk Management (RM):

- Identify Risks: What is preventing us from accomplishing our mission safely and effectively? Consider the “4Ps”: Safe People, Places, Property/materiel and Processes/procedures.
- Analyze Risks: Assess the likelihood and potential impact of each identified risk.
- Evaluate & Rank Risks: Prioritize the risks. Which ones pose the greatest threat? The “top few” should receive the most attention.
- Mitigate Risks: For risks within your control, take action to reduce or eliminate them. For those you cannot fix, mitigate them using clear and effective communication up the chain of command.
- Monitor Risks: A Risk Registry is a snapshot in time. The operational environment is constantly changing, and so are the risks. Constant monitoring and regular updates ensure the registry remains a relevant and effective tool, not just another administrative burden.

An effective Risk Registry should, at minimum, categorize each risk, provide a clear description, analyze its probability and severity, assign a priority, document the command’s response or mitigation plan, and most importantly, identify Risk Ownership, the AP who can ultimately fund or fix the problem.

At the deck plate level, Safety Reporting (SAFEREP) and Aviation Safety Action Program (ASAP) submissions are essential inputs to this process. They give Sailors and Marines a formal avenue to document hazards, near-misses, procedural deficiencies and adverse trends before they become mishaps. A single report may identify a localized concern; multiple submissions can reveal a broader, recurring risk warranting entry into the Risk Registry. Command safety professionals and leaders should use those reports to identify patterns, assess severity and likelihood, establish interim controls and ensure the risk is visible to the AP. In this way, SAFEREP and ASAPs do more than capture lessons learned, they help turn deck plate observations into informed, sustained risk decisions that protect people, preserve resources and strengthen mission readiness.

Ultimately, a Risk Registry is more than a logbook of problems. It is a testament to a command’s commitment to risk management and operational excellence. It fosters a culture where problems are not hidden but illuminated, where leaders are not blamed but empowered and where every member of the organization, from the junior enlisted to the flag or general officer, understands their role in managing risk. It transforms risk identification from passive hope to an active team sport.

When risks are endured in silence because the true “owners” are unaware of the problem’s extent, we fail ourselves and the mission. A static Risk Registry is an ineffective one. Like a dental check-up, a single visit years ago offers no assurance of current health. The process must be living, breathing and integrated into the command’s operational rhythm.

By embracing the discipline of “writing it down,” we ensure every concern has a path to the person who can solve it. We help our bosses help us. In the complex and unforgiving environment of naval operations, the Risk Registry is the unseen anchor holding the line, ensuring we not only “Get Real” about our challenges but that we can “Get Better” together.

For more information on the SMS and Risk Registry, read NAVSAFECOM’s ‘Risk Register & IRM: How They Work Together” one-pager located under the resources tab at https://navalsafetycommand.navy.mil.

Sailors perform pre-flight checks on an MH-60S Sea Hawk attached to the “Nightdippers” of Helicopter Sea Combat Squadron (HSC) 5 aboard USS George H.W. Bush (CVN 77) in the Atlantic Ocean, Feb. 25, 2026. (U.S. Navy photo by Mass Communication Specialist Seaman Kyle Cooksey)

OPERATIONAL INTEGRITY

SENIOR CHIEF AVIATION ELECTRONICS TECHNICIAN KENNETH KING

The Original 'Dirty Dozen'

1. Lack of Communication: Failure to transmit or receive clear information.
2. Complacency: Overconfidence from repeated experience performing a task.
3. Lack of Knowledge: Shortage of training, technical data, or understanding.
4. Distraction: The #1 cause of forgetting where you are in a task.
5. Lack of Teamwork: Failure to work together and communicate as a cohesive unit.
6. Fatigue: Mental or physical exhaustion impairing performance.
7. Lack of Resources: Insufficient tools, equipment or approved parts.
8. Pressure: Unrealistic deadlines or expectations forcing high performance.
9. Lack of Assertiveness: Failure to speak up or voice safety concerns productively.
10. Stress: External or internal physical and mental tension.
11. Lack of Awareness: Failure to see the complete picture or recognize impending risks.
12. Norms: Unwritten, often unsafe behavioral rules ("the way we've always done it").

Three Additions 'Filthy Fifteen'

13. Not Admitting Limitations: Ignoring personal physical, emotional or technical boundaries out of ego, pride, or fear of consequences.
14. Lack of Operational Integrity: Cutting corners, knowingly violating standard operating procedures or concealing mistakes.
15. Lack of Professionalism: Failing to maintain proper emotional control, using unapproved tools or letting personal interests override safety standards.

Operational integrity is one of the Federal Aviation Administration's (FAA) "Filthy 15" of human factors contributing to maintenance errors and its importance is especially evident in naval aviation. Sailors entrusted with maintaining naval aircraft operate in demanding environments where mission readiness and flight safety must always remain balanced. Operational integrity is committing to performing maintenance correctly, following established procedures and upholding the highest professional standards regardless of operational tempo or external pressures.

Naval aviation maintenance professionals are responsible for ensuring aircraft are safe to accomplish missions worldwide. Whether operating from an aircraft carrier, expeditionary airfield or shore-based squadron, every maintenance action directly affects aircrew safety and mission success. For aviation maintenance personnel, operational integrity means using the proper publications, adhering to Naval Aviation Maintenance Program procedures, documenting maintenance accurately and never allowing convenience or schedule pressure to compromise quality.

The operational environment often presents significant challenges. High deployment tempos, limited resources and the urgency to generate mission-capable aircraft can create pressure to expedite maintenance actions. While these demands are part of military aviation, they must never justify shortcuts or deviations from approved procedures. A missed inspection, incomplete troubleshooting process or inaccurate maintenance record may have serious consequences, placing aircraft, crews and missions at unnecessary risk.

Operational integrity also requires the courage to identify discrepancies, admit mistakes and report hazards without hesitation. A strong maintenance culture encourages open communication and recognizes reporting errors is essential to prevent future mishaps. Every Sailor or Marine, regardless of rank or experience, is responsible for speaking up when something appears unsafe or inconsistent with established procedures. Protecting lives and preserving combat capability depend on this level of accountability.

Maintaining operational integrity requires continuous training, technical proficiency and personal discipline. Sailors must remain knowledgeable of current maintenance instructions, technical directives and safety programs while supporting one another through effective supervision and mentorship. Leaders set the standard by emphasizing quality maintenance over production metrics and reinforcing mission success begins with safe, reliable aircraft.

In naval aviation, operational integrity is more than a maintenance principle; it reflects the Navy's core values of Honor, Courage and Commitment. Every tool used, every maintenance action documented and every aircraft released safe for flight represents a promise to fellow Sailors, Marines and aircrew that the job was completed correctly. By maintaining operational integrity every day, naval aviation professionals preserve readiness, protect lives and ensure every aircraft is prepared to answer the nation's call.

This article includes elements of SI-generated content and has been reviewed and edited for accuracy by Senior Chief Aviation Electronics Technician Kenneth King to verify compliance with DOW and DON policies and guidance.



U.S. Navy Aviation Support Equipment Technician 1st Class, Zachary Barbour stands by for a E-2D Advanced Hawkeye aboard USS Dwight D. Eisenhower (CVN 69) while underway in the Atlantic Ocean, Aug. 26, 2026. (U.S. Navy photo by Mass Communication Specialist Seaman Kellen Landis)

A BAD BANG

ALBERT BUDASZEWSKI

You are walking across the hangar deck or the flight line when suddenly — *BANG!* The sharp, unmistakable crack of an explosive charge echoes off the bulkheads.

Work instantly stops. Heads turn. The immediate questions race through everyone's mind: Did someone get hurt? Was a store inadvertently jettisoned? You rush over to the aircraft, only to find a sheepish maintainer staring at an expended Cartridge Actuated Device (CAD). No one was hurt this time, but a system that was supposed to be safe just fired.

Unfortunately, this scenario is not a rare anomaly. Not a week goes by across the naval aviation enterprise without several inadvertent CAD actuations being reported. Release CADs, fire extinguisher cartridges, cable cutters and initiators are expended regularly without the person causing the expenditure's intention. Aircrew and maintenance personnel routinely contribute to these assets being unavailable when needed and the root cause almost always points back to one thing: failing to follow established procedures.

THE TRAP OF "MEMORY MAINTENANCE"

We've all seen it or perhaps even been guilty of it ourselves. Personnel engaging in routine maintenance actions, working purely from memory. Chances are a maintainer has performed a specific task so many times they feel it is permanently committed to muscle memory.

In the high operational tempo of today's flight lines, multiple maintenance actions are often taking place on a single aircraft simultaneously. When a maintainer skips the book or when cross-shop priorities collide during concurrent maintenance, the potential for a critical step to be missed skyrockets. The results are entirely predictable: a system that should be dead gets energized, causing an unintended CAD actuation. In most of these cases, the aircraft systems worked exactly as designed; the failure was the human.

THE RIPPLE EFFECT ON WARFIGHTING READINESS

This issue might seem like a minor inconvenience — a loud noise and a part replacement, but the reality is much more severe. Fire extinguisher CADs and rescue hoist cable cutters must be available in a life-or-death emergency. Stores and emergency release CADs operate with a massive amount of explosive power. If a store is jettisoned on the deck or around personnel due to an inadvertent firing, the results could be catastrophic, leading to severe injury, loss of life or millions of dollars in equipment damage. Furthermore, every inadvertently blown CAD represents wasted man-hours, depleted supply levels and an aircraft that is hard down instead of being fully mission capable for operational tasking.

THE FIX: GETTING BACK TO BASICS

The Navy and Marine Corps can significantly reduce this risk by ensuring systems using explosive assets are treated with the uncompromising attention to detail they require. Here is how we stop the bleeding at the deckplate level:

THE STANDARD	EXECUTION ON THE FLIGHT LINE
STRICT PROCEDURAL COMPLIANCE	Following the approved NAVAIR publication or checklist step-by-step is a must. This eliminates the risk of missing pulled circuit breakers, electrical safety pins, switch positioning and proper grounding when arming or de-arming an aircraft.
ENFORCING QUALIFICATIONS	Anyone handling or working near CADs must possess the required certifications, training and qualifications for those specific systems. These devices are explosives; they can kill, maim or destroy equipment if mishandled.
MANDATORY QA/SO OVERSIGHT	Collateral duty inspectors, quality assurance/safety observers and team leaders must always be used as required by the maintenance instruction. Their presence ensures all maintenance actions — especially arming and de-arming — are executed safely.
ACTIVE KHAKI SUPERVISION	Complex aircraft require complex de-confliction. Maintenance Control and senior squadron leadership must manage priorities so that different work centers can accomplish their tasks without endangering one another. Deckplate leadership and Khaki presence cannot be overstated.

A CAD is designed to do one job, one time, flawlessly. When we waste them on the hangar deck through complacency, we rob our aircrews of the emergency systems they may need tomorrow. Treat every explosive device with the respect it commands, pull out the pubs and keep our aircraft ready for the fight.

Sailors assigned to USS Bataan (LHD 5), conduct a Damage Control Material Assessment while pierside in Norfolk, Va., July 13, 2026. (U.S. Navy photo by Mass Communications Specialist Seaman Apprentice Renata Gonzalez)

AN ENEMY ON THE FLIGHT LINE

SENIOR CHIEF AVIATION STRUCTURAL MECHANIC ANTHONY ABRAHAM

The F/A-18 canopy is precision-engineered to withstand supersonic aerodynamic pressures, extreme weather and the brutal kinetic forces of carrier aviation. Yet, a review of recent mishap data reveals a sobering truth: the greatest threat to our canopies is not bird strikes or adversary action. It is us. Procedural non-compliance, poor tool control and lapses in situational awareness during routine flight line and hangar bay maintenance are systematically grounding our aircraft.

COST OF AN UNFORCED ERROR

When an F/A-18 canopy cracks on the deck, the immediate sound of shattering acrylic or structural frame damage is followed by the heavy toll of lost combat readiness. Replacing a canopy is not a quick swap, as any aviation structural mechanic – safety equipment or egress shop – will attest. It is a highly complex evolution requiring hundreds of man-hours, rigorous quality assurance inspections and repair costs ranging from the thousands into the millions. Throughout this process, the plane remains non-mission capable.

A review of Risk Management Information data over the past 10 years highlights 87 distinct canopy mishaps. This data tells a clear story: the root cause is rarely structural fatigue or unavoidable environmental hazards but rather preventable human error. To understand why we are breaking our own jets and how to stop it, we must look at the numbers, see Figure. 1.

THE 'BIG THREE': MAINTENANCE, PROCEDURES AND TOOLS

Accounting for 33 of the 87 reported incidents, routine maintenance and improper procedures are the leading causes of F/A-18 Hornet canopy failures.

The term "maintenance evolution" covers a broad spectrum of sins, but it usually translates to "complacency." When maintainers lean over the canopy sill, use the transparency as a resting post for heavy equipment or bypass Interactive Electronic Technical Manual warnings, the canopy structure suffers.

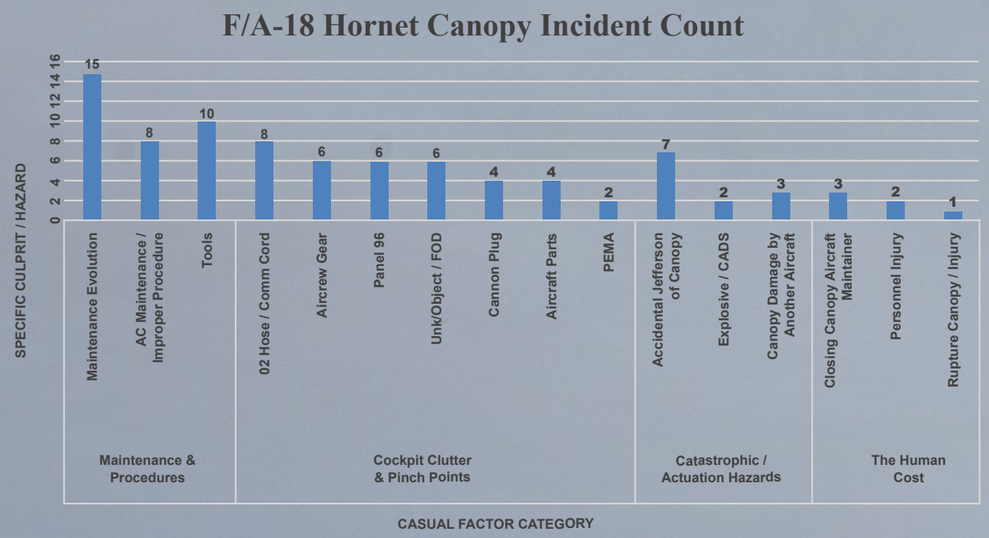
More alarming is the failure of basic tool control. With 10 incidents directly attributed to "tools," the fleet is failing at fundamental "account for tools and hardware" protocols. A wrench or screwdriver left on a canopy rail/sill turns into a high-leverage wedge the moment the canopy actuator pulls the canopy down. A battery-operated/manual system closes the F/A-18 canopy and has no tactile feedback; it will keep pulling until the mechanism locks or something breaks. When a tool is in the way, the canopy structure suffers damage every time.

THE PINCH POINT PERIL: GEAR ON THE RAILS

The modern F/A-18 cockpit is a tight, highly complex workspace. When pilots or aircrew strap in or maintainers perform cockpit checks, they bring gear with them. Unfortunately, they too often leave that gear in the bite of the canopy mechanism.

Data shows aircraft oxygen (O2) hoses and communication cords accounted for eight incidents, while aircrew gear caused another six. Add cannon plugs (4), aircraft parts (4), panel 96 interference (6) and portable electronic maintenance aids (PEMAs) (2), and a clear pattern emerges: *WE ARE FAILING TO CLEAR THE RAILS/SILL.*

When a pilot or maintainer reaches to actuate the canopy switch, they must deliberately sweep the canopy sill and hinge points with their eyes. A PEMA left resting on the canopy rail or an O2 hose draped carelessly over the side becomes a localized stress point. As the heavy canopy descends, concentrating force on a single object can cause immediate canopy structure delamination, cracking or catastrophic failure of the transparency or canopy frame/structures. Furthermore, the six incidents attributed to "unknown object/FOD" suggest even minor debris left in the tracks can cause extensive damage to the canopy seal and structures.



THE HIGH-STAKES HAZARD OF ACCIDENTAL JETTISON AND CARTRIDGE-ACTUATED DEVICES

The most concerning data points involve the accidental firing of the canopy jettison system. There were seven reports of accidental jettison and two incidents involving Explosives/ Cartridge-Actuated Devices (CADs).

An accidental canopy jettison on the flight line or hangar bay is a high-explosive mishap. It puts every Sailor or Marine within a 50-foot radius at risk of severe injury or death from rocket blast and falling debris. These incidents typically occur during seat maintenance, cockpit ingress/egress or improper safe-and-arm procedures. The sheer number of these events indicates a fleet-wide degradation in respect for the explosive hazards present in the F/A-18 cockpit. A canopy jettison on the deck is not just a broken piece of glass or canopy structures; it is a Class A or B mishap, potentially costing lives and/or millions of dollars.

Damage by another aircraft (three incidents) further highlights flight line situational awareness failures. Mishaps involving spreading aircraft wing/s and maintenance procedure errors that result in metal-on-glass contact are entirely avoidable with proper by-the-book maintenance and effective communication.

THE HUMAN COST: CRUSHING AND LACERATION

We cannot discuss aircraft damage without mentioning the direct threat to our people. The data shows three incidents in which the canopy was closed directly onto an aircraft maintainer.

This is an egregious breakdown in safety protocols and crew coordination. The canopy actuator exerts tremendous downward force. Closing it on a human being can cause severe crushing injuries, broken bones and permanent disability. Add to this the two general "personnel injuries" and one "rupture canopy/injury" and it becomes clear: the flight line environment is unforgiving to those who lose situational awareness.

REVERSING THE TREND

The F/A-18 Hornet is a lethal platform, but it cannot fight if it is sitting in the hangar missing its canopy because someone left a communication's cord or speed handle on the rail. As an aviation enterprise, we must immediately enforce the following deck-level corrections:

- Clear the Sill: Before actuating the canopy, conduct a physical and visual sweep of the rails and cockpit console. Ensure O2 hoses, comm cords and PEMAs are completely stowed.
- Enforce Strict Tool Control: Never rest tools on the aircraft skin or canopy rail. Maintain strict accountability of tools and hardware integrity.
- Respect the Cockpit: Treat the cockpit as a live ordnance area. Know the location of all canopy jettison handles and maintain absolute respect for the explosive egress systems and CADs.
- Positive Communication: Never actuate the canopy without positive visual confirmation and verbal coordination, ensuring all personnel are clear of the crush zone.
- Active Khaki Presence: Enforce visible, engaged leadership on the flight deck and hangar bay. Chiefs and officers must actively supervise maintenance evolutions, mentor junior Sailors and immediately correct procedural drift.

Every self-inflicted canopy crack directly undermines our warfighting capability. We are burning critical man-hours, wasting limited defense dollars, straining the naval supply chain, needlessly reducing aircraft availability and putting our people at risk. We must stop fighting ourselves on the flight line and in the hangar bay. It is time to get back to standard, by-the-book maintenance. The mission demands nothing less!



Lance Cpl. Justin McGraw, left, Lance Cpl. Alberto Marin, middle, and Lance Cpl. Robert Addo, aircraft maintenance Marines with Marine Fighter Attack Squadron 232, Marine Aircraft Group 12, 1st Marine Aircraft Wing, start maintenance on an F/A-18 Hornet at Gwangju Air Base, Gwangju, South Korea, April 23, 2026. (U.S. Marine Corps photo by Lance Cpl. Donald Dugger)

SAFE LIMITS, SMART SCHEDULES

STAFF SGT. DIONICIO CUEVAS

The foundation of aircraft safety in naval enterprise aviation is the acknowledgment every mechanical component has a finite lifespan. Our reliable Periodic Maintenance Information Card (PMIC) serves as an engineering authority guideline for dictating safe operating limits for finite parts, whether measured in flight hours, catapult launches, landing, cycles or calendar days. Ultimately, it's the definitive rulebook that prevents components from reaching the point of catastrophic fatigue and/or failure, thus, creating a safer and more efficient maintenance workflow.

Optimized Organizational Maintenance Activity (OOMA) is an operational nervous system, tracking the accumulated component wear on every serialized component installed on an aircraft. By using the static limits of the PMIC with the flight data logged daily, OOMA generates the Component Removal Due (CRD) report/Assembly Service Records (ASR)/Sub Assembly service records (SASR) reports. These reports are created by tasks acting as a "countdown" toward the structural life limit the PMIC provides. Essentially, this report acts as an early-warning mechanism helping aviation maintenance managers and administrators track components nearing their end of life limit. Overflying these limits is not merely an administrative error; it is a critical safety violation endangering the aircrew and potentially leading to squadron shutdowns.

CRD REPORT LIMITATION

When OOMA generates a CRD report, it displays key component data (i.e., Bureau Number, Part Number, Serial Number, Nomenclature, Work Unit Code (WUC), Current Interval, Due Limit and Remaining time) essential to tracking life-limited parts. However, a critical systemic vulnerability exists: OOMA does not automatically initiate tracking for these components. Instead, it relies on local aviation maintenance administrative personnel to manually activate the relevant task and input the correct numeric values.

This manual entry requirement may introduce a significant human-error factor. If maintenance personnel miss a step or fail to configure the task, the component's life limit will not be tracked or displayed. This failure directly leads to mistracked component life limits, presenting severe safety-of-flight risks, potential in-flight failures and a significant waste of maintenance man-hours to correct.

BRIDGING THE GAP

To address tracking gaps left by the CRD, a best practice for maintenance personnel and maintenance controllers is to use an Excel pivot table to ensure all applicable tasks are captured during aircraft screening. To generate this pivot table (Figure 1), extract the CRD and SASR reports as text files from the Configuration Management section in OOMA, paste the data into Excel, highlight the information (Figure 2) and insert a pivot table.

The best standard practice when using pivot tables is to cross-reference the target aircraft against your baseline, inspection-ready aircraft (specifically, those with the highest data integrity within OOMA) (see Figure 3). By aggregating the WUC counts, the pivot table displays the total number of tracked tasks allocated to each specific component. For example, if a comparative analysis reveals one aircraft has a count of four in a cell for a specific WUC while another has a count of three in a cell, this variance indicates an untracked task on the lagging aircraft that must be activated. Conversely, a blank cell in a WUC row indicates no active tasks are currently assigned to that component. Ultimately, leveraging this pivot table in conjunction with your CRD and SASR screenings provides a robust quality assurance mechanism to ensure zero safe-for-flight discrepancies.

Keeping our aircraft in the sky safely is as much a data management challenge as it is a mechanical one. The PMIC provides the firm boundaries of safety, while OOMA faithfully tracks the fleet's progression toward those boundaries. However, use of pivot tables in conjunction with CRD/ASR/Sub Assembly service records reports screening empowers maintenance leaders to act decisively. By filtering out the noise and highlighting immediate priorities, this analytical approach shifts a squadron's posture from reactive firefighting to proactive, synchronized planning. Ultimately, mastering this data workflow ensures when the mission calls, the aircraft are safe, ready and capable of answering.

See Figures 1-3 for PMIC and use of Pivot Tables for High Time Component Removal Due Reports/Assembly Service Records/Sub Assembly service records reports.

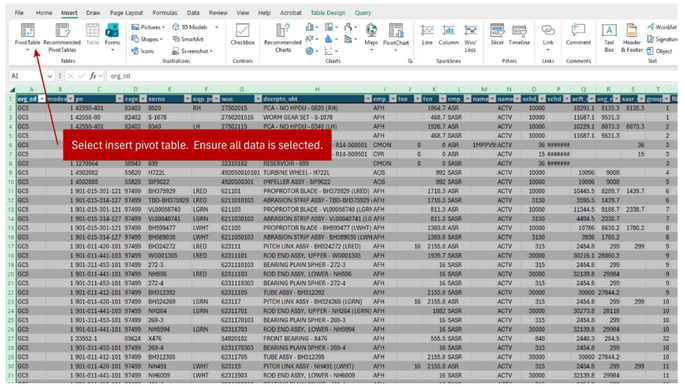


Figure 1.

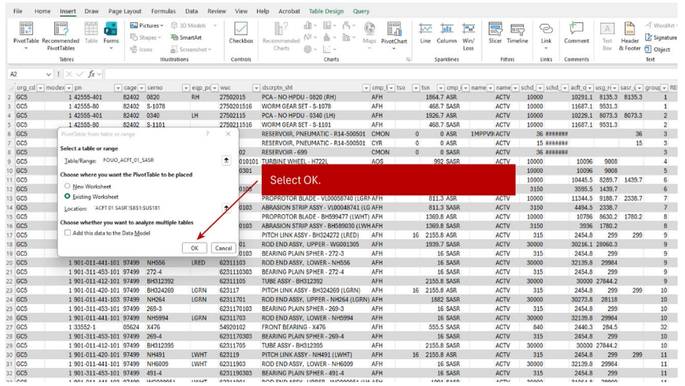


Figure 2.

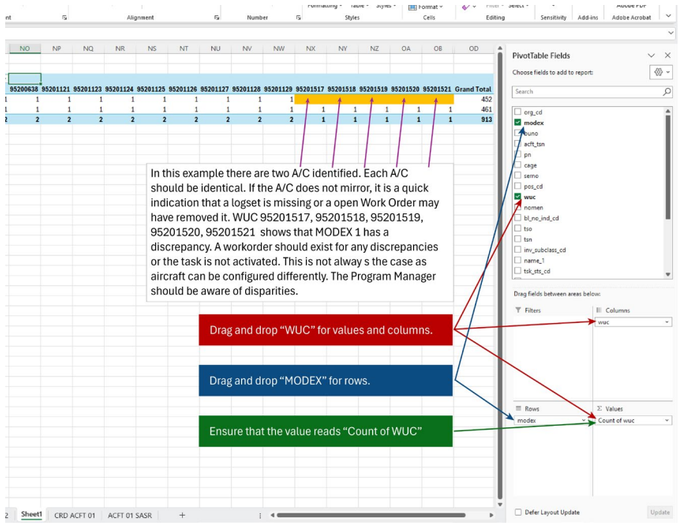


Figure 3.

NAVAL SAFETY EVERYWHERE

Risk Management Guide

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ROUTINE IS RISK

SENIOR CHIEF AVIATION STRUCTURAL MECHANIC JOEY CABRERA

Every aviation maintainer remembers the first time they signed off a maintenance action. Every step in the publication mattered. Every inspection was deliberate. Every torque value was verified twice. Fast forward a few years and that same task may have been performed hundreds of times. The publication stays in the toolbox because the procedure is committed to memory. The inspection moves a little faster. The confidence is well-earned. Then comes the day when routine becomes assumption.

In naval aviation, repetitive maintenance is essential to mission readiness. Daily, as well as turnaround inspections, phase maintenance, corrosion control, lubrication, servicing and scheduled component replacement account for thousands of maintenance actions performed every day across the fleet. While these tasks are routine, history has repeatedly shown repetitive maintenance carries a unique and often underestimated risk.

Most maintenance-related mishaps aren't because of a lack of technical knowledge. They occur when experienced maintainers become vulnerable to one of aviation maintenance's oldest adversaries: the human factor.

THE DIRTY DOZEN DOESN'T DISCRIMINATE

Transport Canada introduced the "Dirty Dozen" human factors over 30 years ago and today they remain a cornerstone of aviation maintenance safety across military and civilian organizations alike. Although all 12 factors influence maintenance performance, repetitive maintenance often magnifies several of them simultaneously.

Complacency is perhaps the most recognizable. Familiarity with a task can create confidence that slowly erodes into assumption. The thought of, "I've done this a hundred times," can quietly replace, "Let me verify this one more time."

Lack of communication often follows. During shift turnover, maintainers may assume work accomplished is fully understood without thoroughly discussing what has or hasn't been completed. An incomplete pass-down or undocumented deviation can set the stage for breakdowns that are only discovered after the aircraft has launched.

Distraction remains another constant threat. A phone call, a question from another work center, an unexpected Maintenance Control request or simply moving between multiple aircraft can interrupt a maintenance evolution. Without consciously returning to the exact point of work stoppage, it becomes surprisingly easy to miss a safety wire, overlook a connector or skip a final inspection step.

Fatigue, pressure, lack of teamwork, stress and even overconfidence often accompany these conditions, particularly during high operational tempo or deployment environments. Rarely does a mishap result from just one human factor. More often, several align at the wrong moment.

LESSONS WRITTEN IN MISHAP REPORTS

One of our greatest strengths in naval aviation is our willingness to learn from mistakes. Every Hazard Report, Quality Deficiency Report, Aviation Safety Awareness Program submission and mishap investigation exist for a reason: someone else shouldn't have to learn the same lesson the hard way.

A review of maintenance-related mishaps across naval aviation reveals familiar themes.

- Hardware left unsecured after an interruption.
- Inspection panels improperly fastened following multiple shift turnovers.
- Foreign object debris discovered inside aircraft after maintenance.
- Components installed correctly but not functionally checked before release.
- Publications not referenced because the task was considered routine.

Each event differs in detail, but the underlying causes frequently point back to the same human factors. Technical skills were present and the procedures existed. However, what failed was the discipline to recognize that routine work deserves the same level of attention as unfamiliar maintenance.

Every maintainer can benefit from asking one question before closing out a job:

"If this maintenance action becomes tomorrow's lessons learned message, what would the report say?"

REPETITION CHANGES HOW WE THINK

The human brain is remarkably efficient. When performing familiar tasks repeatedly, it begins operating on pattern recognition rather than deliberate analysis. Psychologists call this automaticity. For maintainers, it feels like experience. Most of the time, experience improves efficiency. Occasionally, it convinces us we've already verified something we haven't. We've all experienced it while walking back to an aircraft because we're not completely certain whether a connector was safetied or a panel was secured. That uncertainty is not weakness. It's a reminder human memory is not perfect. The publication never forgets. The checklist never assumes.

BREAKING THE CHAIN BEFORE IT STARTS

The good news is human factors are manageable because they are predictable. Maintainers can significantly reduce risk by adopting deliberate habits interrupting complacency before it develops. Use the publication, even when the procedures are familiar. Deliberately mark completed steps instead of relying on memory. When interrupted, verbally identify where your work stoppage occurs before walking away. Conduct independent inspections without hesitation, and even invite another maintainer to challenge assumptions. Most importantly, never confuse speed with proficiency. The fleet depends on maintainers who are consistently accurate and not merely efficient.

LEADERSHIP SHAPES MAINTENANCE CULTURE

Supervisors influence how junior maintainers perceive standards. When experienced mechanics openly reference publications, junior Sailors and Marines learn professionalism includes continuous verification. When collateral duty inspectors ask questions rather than simply sign off verification blocks, they reinforce accountability. When Maintenance Control pauses production to ensure a discrepancy is resolved correctly instead of quickly, they send the message readiness is built on quality — not shortcuts. Culture develops through repetition just as surely as complacency does. The difference is one strengthens readiness while the other slowly erodes it.

THE UNYIELDING STANDARD

Aircraft never know whether a task has been performed once or one thousand times. Every flight depends on the last maintenance action being completed exactly as required. The Marine climbing into a helicopter, the naval aviator launching from a carrier deck and the crew depending on their aircraft all trust every fastener was torqued correctly, every inspection completed thoroughly and every maintenance action signed only after verification.

Routine maintenance is the foundation of aviation readiness. It is also where discipline is tested most often. The Dirty Dozen reminds us human factors are unavoidable and lessons learned remind us they are survivable only when recognized. Experience makes maintainers faster, but professionalism ensures they never stop being precise.

In naval aviation, readiness is measured one maintenance action at a time. Every turn of the wrench, every checklist item, inspection and signature contributes to a chain of trust stretching from the hangar deck to the mission. That chain remains strong only when routine never becomes mundane.



U.S. Marine Corps Lance Cpl. Pedro Juarez, a weapons technician with Marine Medium Tiltrotor Squadron (VMM) 262, Marine Aircraft Group 36, 1st Marine Aircraft Wing, performs maintenance on an MV-22B Osprey on Japan Maritime Self-Defense Force Kanoya Air Base, Kagoshima, Japan, Sept. 9, 2025. (U.S. Marine Corps photo by Lance Cpl. Carlos Paz-Sosa)

LI-ION COMPLIANCE

MASTER GUNNERY SGT. JEROD WILLIAMS

Lithium batteries are commonly used in modern naval and aviation operations, providing reliable power for survival equipment, communication systems, tools and mission-critical assets. While these batteries offer operational advantages, they also present unique hazards, including thermal runaway events (also known as uncontrollable, self-heating chain reactions), resulting in fires, explosions and release of toxic gases when improperly stored, handled or disposed of.

An analysis of Naval Safety Command's (NAVSAFECOM) assessments from the last four years has identified recurring deficiencies associated with lithium battery management programs. These findings highlight areas where commands and battery safety program managers (BSPM) must improve compliance with requirements established in S9310-AQ-SAF-010 Rev. 3, Navy Lithium Battery Safety Program Responsibilities and Procedures.

KEY TRENDS AND PROGRAMMATIC CONCERNS.
The command analysis reveals three dominant trends across all discrepancies:

1. Improper storage practices remain the most significant concern, particularly involving storage in occupied spaces or hazardous material waste lockers.
2. Failure to segregate battery types continues to create unnecessary fire and explosion risks.
3. Deficient disposal tracking and documentation indicate weaknesses in oversight and program management.

The following review examines the most frequently observed deficiencies and the associated safety risks.

1. **Improper Storage of Lithium Batteries in Inhabited Areas.** The most identified deficiency involves the improper storage of lithium batteries in inhabited workspaces. In multiple assessments, lithium batteries were discovered stored in the aircrew personal/protective/survival equipment shop, egress/environmental systems shop, tool rooms, hazardous materials work centers and avionics work centers, contrary to the requirements of S9310-AQ-SAF-010, Chapter 9, Paragraph 9-1.8.

   This violation increases the risk of personnel exposure to fire, explosion and toxic smoke hazards if the lithium battery has a thermal runaway event. Designated storage areas are intended to isolate batteries from occupied spaces and reduce the consequences of such an event.

2. **Improper Storage of Batteries Awaiting Disposal.** Another recurring deficiency involved storing lithium batteries awaiting disposal in hazardous material waste lockers alongside combustible materials, such as used oil and saturated rags, which violates Chapter 9, Paragraphs 9-1.6 and 9-1.14(a).

   Lithium batteries awaiting disposal remain capable of generating heat if they have a thermal runaway event and initiate a fire. Storing them near flammable materials creates extremely hazardous conditions that could rapidly escalate a small battery incident into a major fire emergency.

3. **Improper Tracking of Lithium Batteries Awaiting Disposal.** Lithium batteries stored in hazardous material waste collection sites are not being tracked for Accumulation Time limits. BSPMs and hazardous material managers (HMM) on numerous occasions failed to understand the tracking requirements for the batteries. This deficiency violates Chapter 9 Paragraph 9-1.14(a-f) and Appendix F, Paragraph F-3.6.1 and Paragraph F-3.6.3 (a-f). Proper tracking is critical to ensure batteries are processed for disposal within required timelines and do not accumulate unnoticed.

   The improper tracking of lithium batteries awaiting disposal presents a significant safety risk because it allows hazardous batteries to remain in storage beyond required accumulation time limits, increasing the likelihood of degradation and instability.

   As lithium batteries age, especially if damaged or defective, they are increasingly susceptible to internal failure and thermal runaway events, which may result in fires, explosions and the release of toxic gases. When multiple batteries are stored together in a hazardous waste area, a single failure can quickly escalate into a larger fire event.

   Responsible managers who fail to understand and enforce tracking requirements neglect a critical control measure designed to prevent these hazards, creating a serious safety threat to personnel and facilities and violating established regulatory and procedural standards.

4. **Mixing Alkaline and Lithium Batteries.** Assessments repeatedly found alkaline batteries placed in containers designated for lithium battery disposal. This violates Chapter 9 Paragraph 9-1.2, which requires the shelter only to be used for storing lithium batteries and equipment containing lithium batteries.

   Different battery types have distinct electrical and chemical characteristics. Mixing them increases the likelihood of short circuits and thermal events; improper disposal practices can lead to fires or explosions.

5. **Improper Storage of Batteries Awaiting Disposal in New Battery Lockers.** Lithium batteries are commonly discovered awaiting disposal stored inside a locker designated for new batteries, in violation of Chapter 9 Paragraph 9-1.9.

   The manual requires batteries awaiting disposal to be stored separately from serviceable inventory and tracked appropriately. Failing to segregate these batteries can lead to inventory inaccuracies and the accumulation of hazardous waste beyond authorized limits.

6. **Improper or Missing Marking of Lithium Battery Storage Areas.** Another commonly identified deficiency involved lithium battery storage areas that were not properly marked, per Chapter 9 Paragraph 9-1.11. During multiple assessments, designated lithium battery storage locations lacked the required signage identifying the type of batteries stored, such as *"STORAGE OF NEW LITHIUM BATTERIES," "STORAGE OF PARTIALLY USED LITHIUM BATTERIES FOR REUSE," or "STORAGE OF USED LITHIUM BATTERIES AWAITING DISPOSAL."*

   Clear and accurate signage ensures personnel can readily identify the contents of the storage area, supports compliance with storage requirements and reduces the risk of mishandling that could contribute to fire, thermal runaway events or other safety hazards. Failure to properly mark lithium battery storage areas can lead to confusion regarding battery status, improper handling and incorrect storage or disposal practices.

7. **Unprotected Battery Terminals.** Assessors discovered a survival radio battery stored in a used lithium battery locker without terminal protection in violation of Chapter 9 Paragraph 9-1.13.

   Exposed battery terminals may touch conductive materials, creating a short circuit that can result in overheating, a thermal runaway event or fire. Simple measures such as taping terminals or using protective covers significantly reduce these risks.

RECOMMENDATIONS

The BSPMs must develop a deeper familiarity with the lithium battery program and the requirements outlined in applicable guidance to effectively identify and correct the discrepancies noted above. The current trend of recurring findings indicates a need to transition from reactive correction to proactive risk management through stronger governance, standardized processes and sustained oversight across the full battery lifecycle from receipt through disposal.

Work center supervisors must be properly trained and provide mentorship and training to their work centers. The recurrence of these findings suggests gaps in understanding or enforcement of established requirements. Training should be recurring, role-specific and reinforced at the supervisory level to ensure compliance is consistently enforced in daily operations. Supervisors must be held accountable for maintaining standards within their spaces and focus on building a controlled and enforceable system of segregation, tracking, labeling and oversight that prevents recurrence rather than reacting to individual findings.

Recurring deficiencies identified during NAVSAFECOM assessments indicate lithium battery safety remains a critical command risk area requiring sustained leadership attention. Compliance with S9310-AQ-SAF-010 Rev. 3 is essential to safeguarding personnel, protecting equipment and ensuring operational readiness.

BSPMs, HMMs and command leadership must ensure lithium batteries are properly stored, segregated by condition and chemistry, accurately tracked and protected from conditions that could result in a thermal runaway event or fire. Consistent enforcement of Navy Lithium Battery Safety Program requirements will significantly reduce risk and improve overall safety performance across all work centers.

COTS BATTERIES

GUNNERY SGT. BRIAN VAUGHN

Naval Safety Command (NAVSAFECOM) routinely engages fleet Navy and Marine Corps squadrons and intermediate-level maintenance activities during risk-assessment visits. One recurring finding is the improper identification and storage of commercially available or commercial, off-the-shelf (COTS), lithium-ion batteries.

This issue persists because these batteries may be subject to storage exceptions different from requirements for other lithium-ion batteries used by the fleet. However, a battery's commercial availability does not automatically make it exempt from standard lithium-ion battery storage requirements. Personnel must first identify the battery chemistry, determine whether the item meets the applicable COTS criteria and verify if it qualifies for a stated policy exception.

During assessments, NAVSAFECOM assessors often ask Sailors and Marines a basic question: What is a COTS battery? The responses commonly reveal two challenges. First, personnel may interpret one section of the governing policy without considering the full context or other applicable requirements. Second, high personnel turnover can disrupt program continuity. When responsibilities change hands without an effective turnover, lessons learned and local procedures may not be passed to the next program manager or custodian.

The first step toward correcting the problem is establishing a common understanding of COTS batteries and the applicable storage requirements. The Navy's governing policy for lithium-ion batteries is S9310-AQ-SAF-010, Revision 3. The policy addresses COTS batteries in several sections, including Chapter 4, which identifies exceptions for certain lithium-ion batteries. Before applying an exception, personnel should verify the battery's chemistry, whether it is rechargeable or non-rechargeable and if it meets the policy's criteria for commercial availability.

The policy addresses several categories, including coin-cell-style lithium-ion batteries, as well as rechargeable and non-rechargeable lithium-ion batteries. The command's designated lithium-ion battery program manager or custodian should review the applicable section and confirm whether a battery meets the requirements for an exception or must be stored in an approved lithium-ion battery locker.

Personnel should not rely on battery size, product appearance or a safety-certification mark alone. AA, AAA, C and D identify battery sizes, not battery chemistry. Batteries of the same size may use different chemistries. Likewise, an Underwriters Laboratories (UL) mark may provide product-safety information but does not by itself establish a battery is lithium-ion, COTS or eligible for a storage exception.

The key question is not simply, "Is this battery sold commercially?" Instead, personnel should ask:

1. What is the battery chemistry?
2. Is the battery rechargeable or non-rechargeable?
3. Does the item meet the applicable COTS criteria?
4. Does it meet the specific storage-exception requirements in S9310-AQ-SAF-010?

If the answer is unclear, personnel should not assume an exception applies. They should consult the applicable policy and coordinate with the command's designated program manager, safety representative or other responsible authority.

Proper identification is the first step toward proper storage. A consistent process verifies the chemistry, reviews the policy, confirms the exception and applies the required storage practice reducing repeat findings and improve lithium-ion battery safety across the fleet.

IMPROVING COMMUNICATION & TRUST

CHIEF AVIATION MACHINIST'S MATE MELVIN PARKER

Effective communication and trust between aircrew and aviation maintainers is essential to mission success and flight safety in military aviation. Aircrew in squadrons unquestioningly depend on maintainers to ensure aircraft are safe, mission-capable and fully operational. In contrast, maintainers rely on aircrews to provide accurate feedback on aircraft performance and discrepancies.

Neither maintainers nor aircrews should go about their daily duties blindly. What is meant by "going blindly" is when aircrews go to Maintenance Control and get assigned an aircraft, they sometimes only see the names of the people who completed work orders and haven't ever seen or met the maintainer, especially if they are new to the command. When communication breaks down, trust deteriorates and consequences can range from mission delays to catastrophic mishaps.

Communication is one of the most effective ways to improve trust. Maintenance discrepancy reporting should not rely solely on written logs or digital maintenance systems. Direct conversations between aircrew and maintainers regarding aircraft discrepancies allow for greater clarity and reduce the likelihood of misinterpretation.

For example, an aircrew member describing unusual vibrations, handling concerns or system irregularities directly to maintenance personnel can provide critical details written documentation may not otherwise capture. Likewise, maintainers who can explain corrective actions and limitations in maintenance publications, helping aircrew understand both perspectives, builds confidence in maintenance personnel. Communication breakdowns frequently happen because indirect methods strip away vital context, timing and nuances required for effective decision-making.

There's no better way for aircrew and maintainers to build a professional relationship than going on detachments. The atmosphere changes because there's a small group on both sides and everyone works together to complete the mission. Not to mention, with minimal aircraft, both sides learn the aircraft thoroughly. It's been found trust is built during detachments or deployments and more relaxed, honest conversations happen when issues or visions may not always align.

Joint training opportunities can also contribute significantly to trust-building. Aircrew who gain exposure to, and insight into, maintenance operations can sometimes better understand the complexity of aircraft upkeep and troubleshooting. The same can be said for maintainers who observe flight briefs, simulator observations or mission-planning sessions, gaining insight into operational requirements and aircrew decision-making. Such experiences provide valuable insight into each other's worlds and improve communication by helping both parties understand the operational challenges each faces. Safety research shows when team members share the same understanding, they perform better and make fewer mistakes in high-risk settings.

Lt. Cmdr. Abigail Ellis, H-60 analyst for the Naval Safety Command, said the actions from aviation maintainers that built the greatest level of trust and confidence as an aircrew before a detachment or mission was taking care of little things, like the admin paperwork and medical docs; all the small things that cause the most stress while underway or on detachment, taking focus away from the mission.

"When a Sailor can take care of those little things, it is a big indicator to me they really care about the details. If they care about the details in their paperwork, they are going to care about the details in their job," she said. "I cared about a lot while I was the officer in charge because I knew the Sailor was focused on the mission and having fun on detachment, not mad at the admin department for their pay not being right. It also showed they were more likely to do their maintenance paperwork correctly, which can be a slippery slope if not corrected early.

"[Something else I found was] their excitement for missions. When they were excited for the mission they didn't even get to fly in, I think it's a good indicator they were excited to see their hard work go out and come back successfully. Their excitement shows they are confident in the job they did and want to show it off. That's when it feels like a family, when you know you're in a good groove," said Ellis.

One of the primary barriers to effective aircrew-maintainer relationships is the difference in operational perspectives. Aircrews often focus on mission execution, tactical objectives and flight performance. In contrast, maintainers concentrate on aircraft systems, troubleshooting, inspections and long-term mechanical reliability. These differing priorities can create misunderstandings if either group fails to appreciate the demands and pressures of the other's role.

A review of Risk Management Information data suggests organizational communication failures and role misunderstandings frequently contribute to maintenance-related mishaps. Another area where aircrew and maintainers can misunderstand each other is in publications. The Naval Air Training and Operating Procedures Standardization may state an exceedance requiring aircrew to land immediately. In contrast, the same exceedance in the troubleshooting publication states there's no discrepancy or it is within limits. Who's right and who's wrong in this situation?

Trust is strengthened when both groups demonstrate professionalism and accountability. Aircrews must avoid minimizing aircraft discrepancies under operational pressure or mission urgency. Failing to report concerns accurately may place crews and aircraft at unnecessary risk. Similarly, maintainers must remain transparent regarding maintenance status, inspections and unresolved discrepancies. Concealing concerns or rushing repairs to meet operational demands erodes confidence and jeopardizes safety. In military aviation, mission accomplishment should never come at the expense of integrity or aircraft safety, a principle reinforced throughout the Naval Aviation Maintenance Program.

Aviation Machinist's Mate 1st Class Justin Brooks from HSM-35 said the quickest way to lose a maintainer's trust was for aircrews to fly recklessly, causing gripes and major maintenance that could easily have been avoided. "I've seen aircrews dismiss maintainers during troubleshooting or undercut a maintainer on a call. In my opinion, that's the quickest way to lose a maintainer's trust and, I'd say, you won't be able to earn that maintainer's trust back at all."

Ellis said, from her experience, the quickest way to lose an aircrew's trust is making irresponsible decisions out in town. "We all make mistakes but it's the dumb things that could get you arrested in town, as well as ignoring the things preached at every safety stand down. If I can't trust you to pause, think and be honest before taking the easy way out, I'm going to have a hard time with your decision-making process and honesty at work. But it can definitely be regained. You can't get mad when I ask you 100 questions and verify your work. If a Sailor makes a mistake, owns it, learns from it and can correct others or ensure it's not made again, that trust is going to be built a lot faster than a Sailor who doesn't," she said.

Leadership plays a critical role in fostering strong aircrew-maintainer relationships. Squadron and maintenance leaders should promote a culture of open communication without fear of blame or criticism. A healthy maintenance culture emphasizes collaboration rather than assigning fault when issues arise. Leaders can strengthen relationships by conducting regular maintenance debriefs, aircrew-maintainer forums and informal discussions to address concerns proactively. Organizations with an understanding of human factors, with strong reporting cultures, may experience fewer operational failures and improved safety outcomes.

Another key factor in strengthening trust is recognition of professional expertise. Aircrews and maintainers possess specialized knowledge directly contributing to aviation readiness. Successful organizations foster an environment where both voices are respected; mutual respect reinforces confidence and teamwork and supports operational effectiveness.

HSC-4 Chief Aviation Structural Mechanic Michael Hamilton said he found a way to improve communication and trust between maintainers. "Open lines of communication and a learning approach, when necessary, have helped tremendously with relationships between aircrew and maintainers," he said. "Understanding the 'why' tends to produce better results. Having operations understand the man-hours required to extend or add certain mission sets allow for a more complete picture and often leads to adjustments on both sides to complete the mission without killing morale or long-term maintenance plans."

Ultimately, effective communication and trust between aircrew and aviation maintainers are foundational to operational readiness and mission success in military aviation. By prioritizing direct communication, mutual respect, leadership involvement, joint training and accountability, military organizations can strengthen relationships between these two critical groups. When aircrew and maintainers operate as a cohesive team built on trust and shared responsibility, they enhance aircraft safety, mission effectiveness and overall combat readiness.

Naval aviators and aircrew at the Naval Aviation Warfighting Development Center conduct flight operations at Naval Air Station Fallon, Nev. March 16, 2025. (U.S. Navy photo by Photographer Edgar Montano)

CAN I BORROW YOUR GUN?

GUNNERY SGT. ANTHONY CURLESS

Imagine for a second a random person or someone you barely know approaches you and asks, "Hey, can I borrow your gun?" You'd probably look at them like they had two heads. You'd never just hand over your weapon to someone you don't know or trust. Yet, when we look at how we handle the security of our assets and keys, we sometimes do exactly that.

As an ordnance technician, this should apply to the weapons and explosives assigned to your custody and the keys securing them. You should never issue the keys out to someone without asking access questions, verifying they are authorized to have them and ensuring there is a paper trail documenting exactly when they left your possession and when they're coming back.

Over the past three years, Naval Safety Command Tier III assessments have documented a total of 51 physical security violations. Most of these aren't just administrative hiccups; they are serious vulnerabilities in how we secure our arms, ammunition and explosives (AA&E). Let's break down the top findings and how we can lock them down.

KEY SECURITY

One of the most frequent findings is improper ready service locker (RSL) key security and checkout procedures. Think about it: if large amounts of guns, ammo and explosives are protected by a lock, that lock is only as good as the control of its key. According to OPNAVINST 5530.13D, keys for AA&E spaces must be strictly controlled. Keys can't be left unattended, and keys for high-security items (Security Risk Category I and II) must be stored in a GSA-approved Class 5 container when not in use.

The process isn't just about storage; rather, it's about accountability. A key and combination control register must be maintained to ensure a continuous chain of custody. Every time a key is transferred, it must be recorded, documenting who received it, when it was received and who issued it. Failing to maintain this log is like leaving the door to the armory wide open. It's also critical to remember the person appointed as the AA&E key custodian cannot be an armorer or someone who has unescorted access to the storage areas. This separation of duties is a foundational security principle.

THE PAPER TRAIL

This leads directly to the next major issue: incomplete or missing historical RSL key checkout records. Assessors found key logs are either not filled out correctly or are discarded too soon. The instruction is clear: Key and Combination Control Registers must be retained for three years. These aren't just dusty old books; they are the primary evidence used during an investigation if a security incident occurs. Without these records, it is nearly impossible to determine who had access to a space and when. A complete and accurate log is your proof of due diligence and the command's first line of defense in an investigation.

WHO ARE YOU, AGAIN?

Another significant finding is the failure to maintain a current explosives storage authorized personnel access roster. You wouldn't let an unvetted stranger into your home, so why would you let them in explosives storage areas or gain access to the keys? OPNAVINST 5530.13D requires personnel with unescorted access to AA&E storage spaces be limited to only those needed for essential operations, and they must be designated in writing by the Commanding Officer. When personnel transfer or their duties change, the list must be updated immediately. Furthermore, a visitor's access log must be maintained for any escorted personnel, detailing who they are, who is escorting them and the purpose of their visit. This roster is not a "fire and forget" document; it must be kept current.

THE UNLOCKED LOCKER

Finally, and perhaps most alarmingly, is the issue of improperly secured explosives storage. This includes everything from a magazine or temporary storage door being left unlocked, and RSLs not being properly secured when work is complete due to incorrect or broken locks. The rule is simple: magazines and lockers must be kept closed and locked. Spaces protected by an intrusion detection system (IDS) must be armed. If there is no IDS, these spaces must be physically checked at random intervals depending on what is stored. These checks ensure a lock hasn't been tampered with or accidentally left open. Securing our AA&E is not just a final step after a maintenance check; it is an active, constant responsibility.

THE COST OF 'BORROWING'

In case you forgot just how high the stakes are, OPNAVINST 5530.13D is crystal clear: unauthorized possession, theft or sale of arms, ammunition and explosives isn't just a fast track to Captain's Mast or Non-Judicial Punishment, it's a federal offense. Violations are punishable by severe federal fines and lengthy imprisonment. Keep that in mind the next time someone asks or tries to bypass the checkout log.

Ultimately, the security of our AA&E is not just about following instructions; it's about maintaining a security-first mindset. Every key, logbook entry and locked door is a critical part of a system protecting our assets, personnel and nation. Let's make sure we never have to explain how an unauthorized person "borrowed" our guns.



U.S. Navy Aviation Ordnanceman 1st Class Kyle Evans inventories cartridge actuated devices on the flight deck of USS Abraham Lincoln (CVN 72), Sept. 13, 2026. (U.S. Navy photo by Mass Communication Specialist 3rd Class Shepard Fosdyke-Jackson)

Have a story for MECH Magazine?

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When submitting articles and photos, please include:

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ARTICLE: The Naval Safety Command is interested in stories from our readers of near misses, accidental adventures or "there I was" events from your perspective. By sharing stories of our misadventures, we can learn from each other and "Get Real, Get Better" together.

Authors should check facts and ensure statements are backed by references or sourced data. Spell out acronyms on first reference. Include and spell out all organizations and units, city, state or country. Authors should ask a team member and/or subject matter expert to review article before submitting. NAVSAFECOM and/or CMC SD will make additional changes for clarity and style during the review process. Article length should be 450-1600 words.

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We look forward to sharing your stories!

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Front Cover: A Sailor, assigned to Helicopter Sea Combat Squadron (HSC) 12, retracts the propellers of an MH-60S Seahawk on the flight deck of USS George Washington (CVN 73) while underway in the Indian Ocean, Aug. 15, 2026. (U.S. Navy photo by Mass Communication Specialist 3rd Class Nicolas Quezada)

Back Cover: Aviation Machinist's Mate 1st Class Austin Neff, assigned to the "Ghostriders" of Helicopter Sea Combat Squadron (HSC) 28, takes oil samples from the tail gear box of an MH-60S Seahawk helicopter on the flight deck of USS Mount Whitney (LCC 20) in the Atlantic Ocean, May 20, 2026. (U.S. Navy photo by Chief Mass Communication Specialist Chad M. Butler)





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