MECH

VOL. 70, NO. 2
Fall | Winter 2025

TRUST, BUT VERIFY

Read the Procedures, Follow the Instructions

THE NEXT EVOLUTION IN MAINTENANCE

Wearable Technology - Augmented Reality and Additive Manufacturing

+ PERSONAL & OPERATIONAL RISK REDUCTION INFORMATION

Commander, Naval Safety Command

Maintainers,

As you dive into this edition of MECH, the articles highlights focus areas that reinforce the foundational principles of risk control, accountability and mitigation.

The article “Breaking the Silo Mentality” stresses a unified vision is essential for organizational effectiveness, while the “HERO” article reminds us that compliance is non-negotiable to ordnance handling. When the misuse of tools becomes routine, it sends the wrong message that shortcuts are acceptable and risk is secondary. NCOs are required to maintain a culture where precision and safety comes first.

These focus areas align directly with the tenets of a risk control system emphasizing:

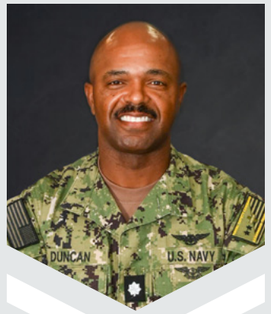
- Risk Identification: Proactively identifying potential hazards in all aspects of our operations.
- Risk Assessment: Thoroughly evaluating the likelihood and severity of identified hazards.
- Risk Mitigation: Implementing effective controls to eliminate or minimize the impact of risks.
- Communication and Accountability: Ensuring clear and transparent communication of risks and assigning accountability for risk management at all levels.
- Situational Awareness: Understanding one’s surroundings.

Deviating from established procedures, adhering to a silo mentality or losing that day-to-day vigilance that is all too important can bring us one step closer to a preventable mishap.

Maintenance officers and deckplate leaders: Take the time to communicate with your Sailors and Marines on the lessons learned and best practices brought forth within these pages. Safety is not simply a department or an individual role. It is a direct result of the entire team’s collective effort and leadership’s unwavering commitment to prioritize risk control, communication and procedural compliance at every level.

Avoiding unnecessary loss is paramount to maintaining the readiness of our force and preserving warfighting capability.

Rear Admiral Dan “Dino” Martin, USN
Commander, Naval Safety Command



Maintenance Officer, Naval Safety Command

Greetings from the Naval Safety Command,

As we move forward, I wanted to take a moment to address the importance of risk management within our community, building upon the critical themes identified in our risk assessment visits over my last two years onboard. Our shared goal is to reduce aviation ground mishaps, both in frequency and severity, across the Naval Aviation Enterprise. To achieve this, we must focus on three key interconnected areas: vigilance and adherence to standards, proactive training and qualification and fostering a culture of safety and communication. These areas directly support the Navy’s risk management framework, ensuring we identify, assess, and mitigate risks effectively.

Vigilance and adherence to standards are non-negotiable. Many incidents stem from deviations from standard operating procedures, shortcuts, or simply complacency. Never let the thought of saving time impact compliance and adherence to policy. Also, constantly review policies and procedures to ensure we are conducting operations the safest and most efficient way. If so, forge on; if not, communicate through the chain of command what may need to change and provide steps towards a better process or improved policy.

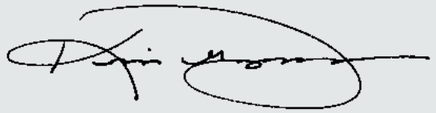
Proactive training and qualifications are vital investments in our people to ensure their competency and ability to execute to meet the daily demands. We must prioritize scenario-based training and effective, robust qualification programs to ensure personnel are thoroughly prepared to handle diverse situations. The “Turnaround Training Plans” (TTP) article highlights how a strategic TTP restores technical proficiency and provides a means to communicate “risk to personnel” that may impact operations. As technology evolves, as discussed in “Wearable Technology and Augmented Reality,” proper training on new systems becomes even more critical. Continuous investment in training is essential for preventing mishaps. Let’s recommit to developing expertise at all levels, ensuring everyone has the tools and knowledge to confidently perform their duties.

We must foster a culture of safety and communication where everyone is empowered to speak up. Silos undermine collaboration, weaken trust, and slow progress toward mission objectives; therefore, leaders at all levels must champion open communication and collaborative spirit. We highlight this through the PBED (Plan, Brief, Execute, Debrief) model across the maintenance departments with deliberate communications, especially during high-risk evolutions such as aircraft moves, jacking evolutions, etc., as well as through Organizational Level Maintenance Management (OLMM) implementation and utilization.

By embracing these behaviors and actively participating in our risk management programs, we strive to ensure that our commands are Safe to Operate (the as-designed safety for places, property, materiel, people, processes and procedures) and Operating Safely (executing the mission within the designed safety envelope, while controlling unforeseen anomalies as they arise) through proper risk identification, communication, and accountability at the appropriate level. Remember that this framework isn’t just about avoiding negative outcomes; it’s about proactively shaping a safer, more efficient and more reliable operational environment. It empowers everyone to be a safety advocate, ensuring our readiness and mission success.

I am committed to working alongside each of you to reinforce these principles. Please don’t hesitate to raise any concerns or insights you may have. Open communication is vital to our success and we must all act as one to ensure every member can safely perform their duties to the best of their abilities.

Your unwavering dedication is essential to our success in safeguarding personnel and assets! Thank you for your continued commitment to excellence.



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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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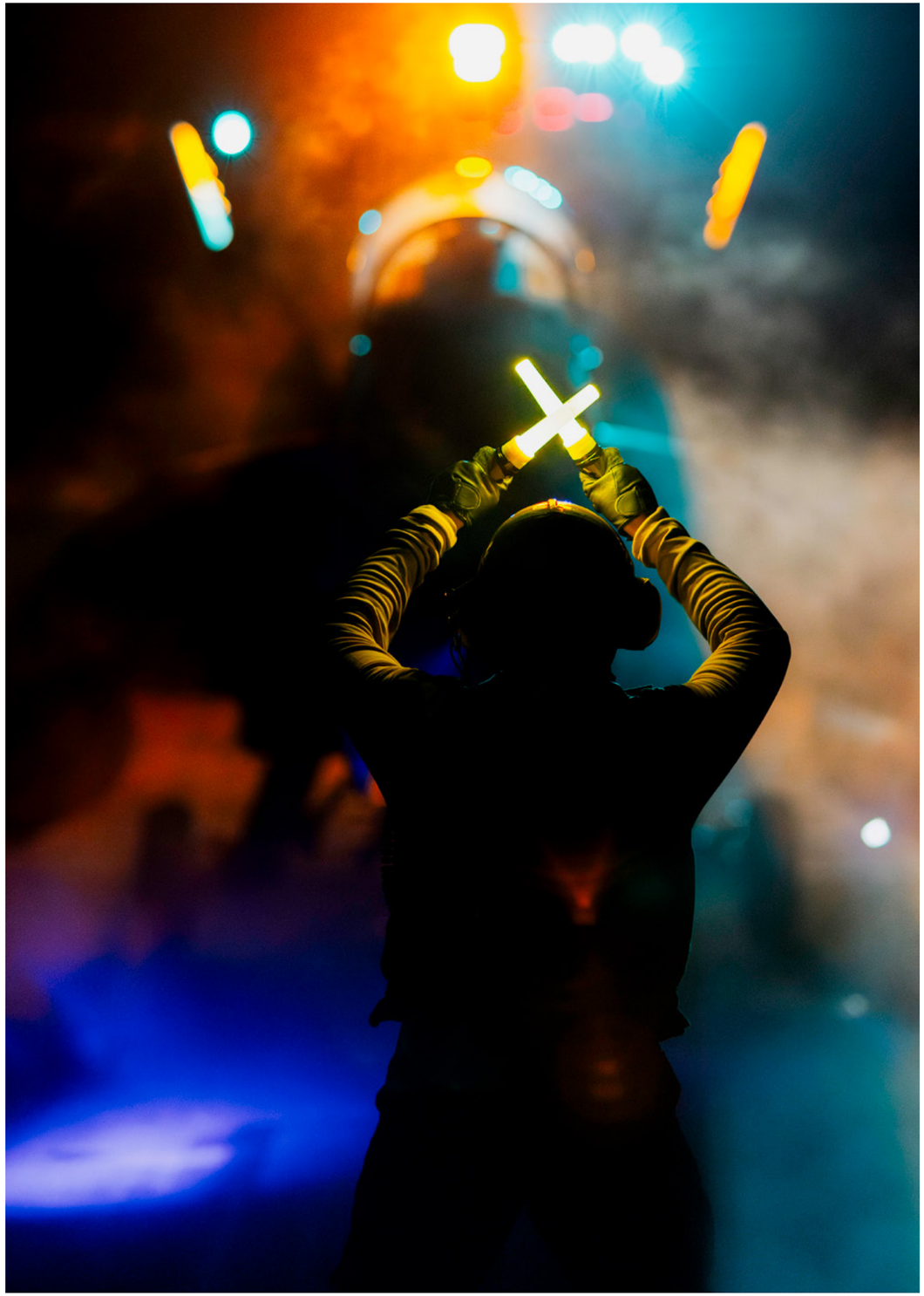

Aviation Boatswain's Mate Aircraft Handling 1st Class Jared Remsing, signals on the flight deck of USS George Washington (CVN 73) while underway in the Philippine Sea, June 12, 2024. (U.S. Navy photo by Mass Communication Specialist 2nd Class August Clawson)

MECH

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In This Issue

BREAK THE SILO MENTALITY

BY SENIOR CHIEF NAVAL AIRCREWMAN ERICA GIBSON

The Silo Mentality, in which departments or divisions operate in isolation rather than as parts of a unified whole, remains one of the most persistent challenges to organizational effectiveness. When left unchecked, it undermines collaboration, weakens trust and slows progress toward mission objectives.

We'll examine the root causes of silos, including competing priorities, leadership styles, accountability gaps, personality conflicts and unhealthy command climates. We will also explore the consequences of such fragmentation, including reduced innovation, inefficiency, low morale and diminished adaptability, and outline practical strategies for breaking down barriers. By aligning vision, fostering collaboration and promoting transparency, leaders can create a culture replacing division with unity and position their organizations for sustained success.

KEY CONTRIBUTORS TO THE SILO MENTALITY

Priorities and Leadership Style

- Different departments or divisions often prioritize their own goals over the larger organizational objectives. Leadership styles within these silos may also vary, causing inconsistency in how different personnel operate and collaborate.
- Leaders who focus too much on their own area of responsibility, without an eye on the broader picture, can unintentionally reinforce silos by not encouraging cross-functional communication.

Lack of Shared Vision or Expectations

- When departments have differing visions or unclear expectations, it can lead to confusion and a fragmented approach to achieving organizational goals.
- Without a shared mission or clear, aligned objectives, personnel tend to work on what they deem most important for their own functions, rather than what benefits the organization.

Personal Bias and Personality Conflicts

- Personal biases, whether based on personality, professional history or cultural differences, can obstruct collaboration and open communication.
- Personality conflicts or lack of respect between personnel can result in the avoidance of collaboration, further deepening the Silo Mentality.

Lack of Corporate Knowledge

- In siloed organizations, valuable information often stays with an individual or a group. As a result, personnel may not have access to critical data or expertise from other parts of the organization.
- This lack of shared knowledge not only creates barriers to effective decision-making but can also cause duplication of effort and inefficiencies.

Accountability Issues

- When there is no clear system of accountability connecting divisions and departments, it becomes easier for individuals or divisions to prioritize their own interests, leading to fragmentation.
- A lack of cross-functional accountability can allow divisions and departments to operate in a vacuum, with little regard for how their actions impact other parts of the organization.

Unhealthy Command Climate

- An unhealthy command climate, characterized by poor leadership, unclear communication and a lack of trust, often fosters silos. This environment can lead to departmental leaders guarding their turf, limiting interdepartmental collaboration.
- If leaders do not model cooperative behavior, or if there's a culture of competition rather than collaboration, silos are more likely to persist.

Failure to Understand the Needs of Others

- One of the most insidious aspects of the Silo Mentality is a lack of awareness of, or consideration for, the needs of other divisions or departments. When personnel are not aligned, they may fail to recognize how their actions impact others or how collaboration could help everyone meet broader organizational goals.
- For instance, one department may not consider the timing or resource requirements of another department, leading to conflicts and bottlenecks that could have been avoided with better communication.

CONSEQUENCES OF THE SILO MENTALITY

- Reduced Innovation: When personnel work in isolation, they miss opportunities for cross-pollination of ideas. Innovation thrives in environments where diverse perspectives come together.
- Decreased Efficiency: The duplication of effort and lack of resource sharing leads to inefficiencies. Personnel might unknowingly reinvent the wheel or fail to take advantage of existing solutions.
- Morale and Engagement Issues: When personnel feel disconnected from the broader organization, they are less likely to be engaged with the company's overall mission. The siloed environment can create a sense of "us vs. them," fostering disengagement and frustration.
- Mission Impact: In organizations with silos, the end user often suffers as internal divisions impede a seamless, unified approach to accomplishing the daily, weekly or monthly mission.
- Inability to Respond to Change: Siloed organizations are less adaptable. The lack of communication and coordination can be particularly damaging in both peacetime and war-time environments, where timeliness and agility are often critical to success. The inability to respond quickly to changing conditions, whether in a military, business or governmental context, can lead to missed opportunities, increased risks and a failure to meet strategic objectives.

BREAKING DOWN SILOS

Breaking down silos requires deliberate leadership and cultural change aligning all departments under a unified vision to strengthen collaboration and promote accountability. By fostering transparency, encouraging cross-functional teamwork and equipping personnel with the skills to communicate and resolve conflict effectively, organizations can build a cooperative culture improving efficiency, innovation and overall mission success.

1. Create a Unified Vision: Ensuring all departments align with a clear, unified organizational vision and set of goals can help break down silos. Everyone must to see how their work connects to the overall purpose of the organization.
2. Encourage Cross-Functional Collaboration: Regular cross-departmental meetings, collaborative projects and knowledge-sharing platforms can foster communication and understanding between personnel. Commanders and departmental leaders should model and incentivize collaborative behaviors.
3. Leadership Alignment: Strong, consistent leadership that understands the importance of cooperation across functions can help. Leaders must actively remove barriers and facilitate interdepartmental communication and collaboration.
4. Transparency and Information Sharing: Tools promoting transparency, like shared databases, collaborative project management software or internal knowledge bases, can help ensure information flows freely across departments.
5. Clarify Accountability: Setting up clear roles and expectations for cross-departmental collaboration can help to align personnel. Defining how different departments will work together on common objectives holds teams accountable to the others.
6. Promote a Collaborative Culture: Organizations can foster a culture of collaboration by rewarding teamwork, creating shared goals and making sure personnel at all levels understand the importance of working together.
7. Train and Develop our Sailors and Marines: Provide training on communication, teamwork and conflict resolution to equip personnel with the skills needed to work across departments and reduce friction.

The Silo Mentality poses a serious threat to organizational effectiveness, but it is not insurmountable. By addressing its root causes and implementing deliberate strategies (i.e., unifying vision, strengthening leadership alignment, fostering accountability and promoting collaboration) leaders can transform fragmented departments into cohesive teams. The result is a more innovative, resilient and mission-focused organization equipped to meet current and future challenges.

Sailors aboard USS Carl Vinson (CVN 70) prepare to launch an F/A-18E Growler during flight operations in the Philippine Sea, Dec. 8, 2024. (U.S. Navy photo by Mass Communication Specialist 3rd Class Nate Jordan)

ADDITIVE MANUFACTURING

BY GUNNERY SGT. ALEX THOMASON

In recent years, additive manufacturing (AM), often referred to as 3D printing, has become one of the most promising technological innovations across all industries. With its complex need for precision, durability and rapid adaptation, the military has quickly embraced AM. By enabling the production of highly customized components with less waste, faster production times and lower costs, AM is transforming all aspects of military aviation and redefining modern airpower capabilities.

UNDERSTANDING THE PROCESS

At its core, AM creates three-dimensional objects layer by layer from digital models. Unlike traditional subtractive manufacturing or the more commonly known process used in Computer Numerical Control machines, where materials are cut away from larger blocks, AM builds products by adding material only where it is needed. This results in minimal waste and the ability to produce complex geometries normally impossible or exceedingly expensive to achieve with traditional methods.

DESIGN OPTIMIZATION AND APPLICATION

The implications are significant for military aviation. Aircraft components must meet stringent weight, strength and performance standards. AM offers new pathways to design optimization, including lightweight parts, intricate shapes enhancing aerodynamics and internal lattice structures providing strength without adding bulk or excessive weight. As a result, AM is being applied in a range of uses, from small fittings to structural elements.

STREAMLINING MAINTENANCE AND SUPPLY CHAINS

One of the most impactful advantages of AM is its ability to streamline maintenance and supply chains. Many military aircraft require ongoing maintenance and repair to remain operational. In some cases, sourcing spare parts for aging platforms involves long lead times and high costs.

AM enables on-demand production of replacement parts, improving supply chain responsiveness. For example, in-theater production using 3D printers allows rapid turnaround, minimizing aircraft downtime. This capability enhances readiness and reduces the cost of maintaining legacy systems. COMNAVAIRFORINST 4790.2E outlines part requirements in Chapter 10, subparagraph 10.45.4.

Even in peacetime, there are situations where supplies and parts are unavailable. The ability to reverse engineer or redesign parts is essential to return an aircraft to a mission-capable status.

FLEET-WIDE APPLICATIONS AND SUCCESSES

Examples of AM's use can be seen across the fleet. From the T-6B Texan II trainer to the MV-22 Osprey and the F-35 Lightning II, AM closes critical readiness gaps. Parts such as the T-6B dorsal assembly ribs and the MV-22 titanium nacelle links have been successfully fabricated using AM. Lockheed Martin has also employed AM to enhance the guidance system of the hypersonic Mako missile, compatible with multiple aircraft platforms.

WEIGHT REDUCTION AND PERFORMANCE ENHANCEMENTS

Lightweight structures are essential in military aviation. Reduced weight improves fuel efficiency, extends range and increases payload capacity. Engineers can use AM to fabricate optimized parts while preserving structural integrity. Metal 3D printing technologies such as Selective Laser Melting and Electron Beam Melting are used to build high-strength components with complex internal structures.

Additionally, AM can improve part performance. Intricate cooling channels inside turbine blades are one example. These features are difficult or impossible to produce with traditional methods, but AM allows them to be built directly into components, improving efficiency and lifespan.

ADAPTABILITY AND RAPID PROTOTYPING

Military aviation also requires flexibility. AM enables rapid prototyping and the ability to adapt quickly to evolving operational needs. Engineers can produce customized parts, mission-specific tooling and even field repairs in real time.

In July 2024, Marine Aviation Logistics Squadron (MALS) 13 addressed a critical shortage of reamers and precision cutting tools. Staff Sgt. Nicholas Bevan and Sgt. Landon Boroday developed a solution using chopped carbon fiber strands and high-temperature resin to replace more expensive materials. Their redesigned three-fluted reamers offers enhanced durability.

With two Markforged X7 industrial 3D printers, MALS-13 produced aerospace-grade tools in-house. The result was a 300% improvement in tool lifespan, over 50% cost savings and reduced the production time from three months to same-day availability. The Marines also trained over 20 personnel in AM processes, expanding unit capability and saving more than $10,000 in tool procurement. Their innovation reduced aircraft downtime across Marine Aircraft Group 13 by nearly 20% over three months.

OPERATIONAL TESTING AND DEMONSTRATIONS

Also in July 2024, the Naval Postgraduate School Advanced Manufacturing team, supported by the Consortium for Advanced Manufacturing Research and Education and the Naval Innovation Exchange-Additive Manufacturing, participated in Trident Warrior 24. This event tested advanced manufacturing technologies in operational environments, both afloat and ashore. The goal was to determine the viability of these technologies for deployment and identify training and support requirements. The demonstration proved AM enhances logistical support in contested environments and can significantly improve readiness.

An additive-manufactured O-ring installation tool fulfilled a critical maintenance need for the F-35 Lightning II combat aircraft, manufactured by the Innovation Lab at Fleet Readiness Center at East, Marine Corps Air Station Cherry Point, North Carolina, April 10, 2025. (U.S. Navy photo by Heather Wilburn)

COST EFFICIENCY AND PRODUCTION FLEXIBILITY

AM also contributes to long-term cost savings. Although initial investments in AM equipment can be high, material efficiency, design flexibility and on-demand production reduce overall long-term expenses. AM supports low-volume production without the need for specialized tooling, making it ideal for military applications.

OVERCOMING IMPLEMENTATION CHALLENGES

However, implementing AM in military aviation presents challenges. Components must meet rigorous quality and safety standards. Aircraft operate under extreme stress, requiring parts to be consistently reliable. The certification processes and airworthiness approval are still evolving but NAVAIR has made considerable progress in streamlining these procedures.

EXPANDING MATERIAL CAPABILITIES

Material limitations are another concern. While progress has been made in printing titanium, aluminum and nickel-based alloys, some high-performance materials remain difficult to process. Ongoing research aims to expand the material base and improve reliability across all media, including composites. For example, AM has been used to print cockpit ventilation components for the F-35 using composite materials.

TRAINING AND WORKFORCE DEVELOPMENT

Training is critical to the successful adoption of AM. Maintenance personnel, engineers and designers must develop specialized knowledge in operating and supporting AM systems. The Naval Aviation School for Additive Manufacturing addresses this need by offering a six-week course hosted by the Institute for Advanced Learning and Research in Danville, Virginia. The program equips Navy and Marine Corps personnel with foundational AM skills and provides instruction on deployed technologies.

LOOKING AHEAD

The future of AM in military aviation is promising. As capabilities grow, AM will enhance operational flexibility, reduce dependency on external supply chains and enable more responsive maintenance strategies. Continued collaboration between government, industry and academia will be essential to overcome the remaining challenges and maintain technological leadership.

GET REAL, GET BETTER

Investments in research, certification standards, cybersecurity and workforce development will ensure AM meets the high expectations of military aviation. As operations become more agile and contested, AM will play a central role in improving combat readiness, enabling innovation and sustaining air superiority.

NEGLIGENT DISCHARGES

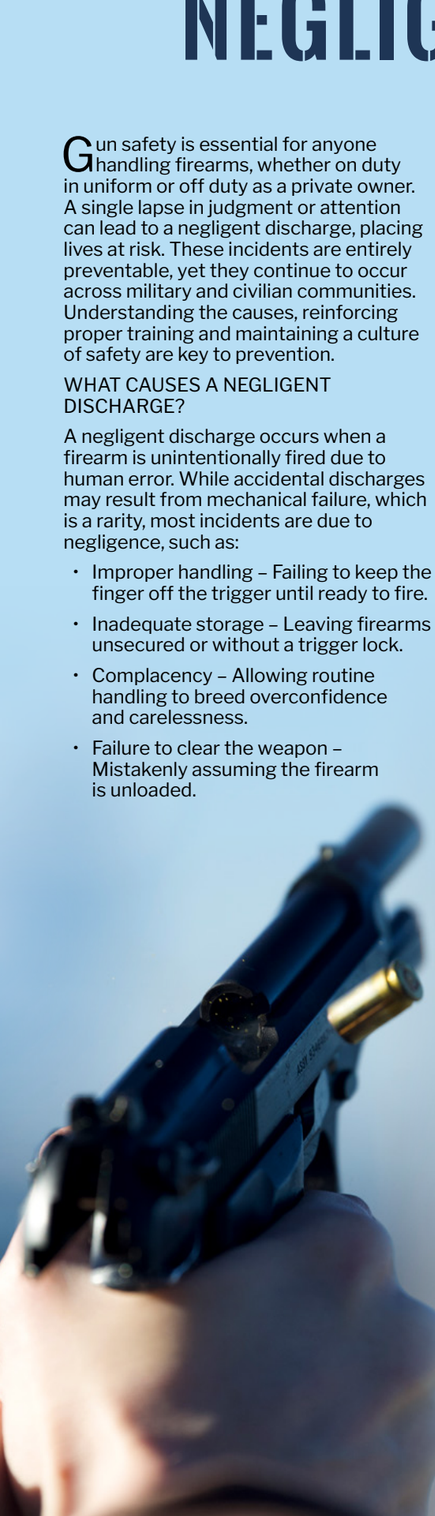
BY MR. AL BUDASZEWSKI

Gun safety is essential for anyone handling firearms, whether on duty in uniform or off duty as a private owner. A single lapse in judgment or attention can lead to a negligent discharge, placing lives at risk. These incidents are entirely preventable, yet they continue to occur across military and civilian communities. Understanding the causes, reinforcing proper training and maintaining a culture of safety are key to prevention.

WHAT CAUSES A NEGLIGENT DISCHARGE?

A negligent discharge occurs when a firearm is unintentionally fired due to human error. While accidental discharges may result from mechanical failure, which is a rarity, most incidents are due to negligence, such as:

- Improper handling – Failing to keep the finger off the trigger until ready to fire.
- Inadequate storage – Leaving firearms unsecured or without a trigger lock.
- Complacency – Allowing routine handling to breed overconfidence and carelessness.
- Failure to clear the weapon – Mistakenly assuming the firearm is unloaded.



Negligent discharges pose serious risk not just in operational settings but also in barracks, homes and shared living spaces, especially where residents are separated by thin walls.

TRAINING: THE BEST DEFENSE

The cornerstone of firearm safety is training. Not just initial qualification, but ongoing, scenario-based, hands-on training. A robust weapons safety program includes:

- Firearm fundamentals – Always treat every firearm as loaded, never point the weapon at anything you don't intend to destroy, keep your finger off the trigger until ready to fire and know your target and what lies beyond it.
- Safe-handling techniques – Practice clearing, loading, unloading, holstering and drawing under controlled conditions.
- Routine maintenance – Understand your weapon's mechanics and how to safely clean and inspect it.
- Stress-based drills – Train as you fight. Simulate real-world conditions to reinforce muscle memory and safety under pressure.

Most importantly, training must include clearing barrel procedures and repeated reinforcement of posted instructions to combat complacency.

LESSONS IN PREVENTION

Incident 1: Armory Negligent Discharge

Details: A civilian security officer negligently discharged a 9mm round from an M18 pistol while uploading the weapon at the start of a shift. The round struck inside the weapons vault. No injuries occurred.

Analysis: Critical failure to follow clearing procedures. Had the individual used a clearing barrel and followed posted safety steps, this discharge would not have occurred. Regular training and visible, enforced procedures are essential to preventing similar incidents.

Incident 2: Off-Duty Discharge into Neighbor's Home

Details: A service member mishandled a firearm off duty causing a round to discharge and penetrate a neighboring apartment. Thankfully, no one was injured. The local sheriff and NCIS responded.

Analysis: Risk of off-duty complacency. Likely a failing to clear the weapon before maintenance or cleaning, especially with a chambered round. Many service members store personal firearms in Condition 1 (loaded, with a round in the chamber), increasing the risk of negligent discharge. In densely populated housing, the results can be fatal. Sheetrock is not ballistic protection.

OFF-DUTY OWNERSHIP, ADDED RESPONSIBILITY

Personal firearm ownership comes with added responsibility, especially in shared spaces like base housing or apartment complexes. Key safety measures include:

- Store firearms unloaded and secured in a lockable gun safe or cabinet.
- Use approved trigger locks and maintain separation of ammunition and firearms.
- Always clear and inspect weapons before disassembly, cleaning or transport.
- Never mix firearms and alcohol — zero tolerance.
- Post and practice gun safety rules with every member of the household, especially children.

If you own a personal firearm, treat it with the same level of respect and discipline you would a service-issued weapon.

SAFETY IS A DAILY PRACTICE, NOT A ONE-TIME BRIEF

Negligent discharges are preventable. They are not flukes or equipment malfunctions. They are the result of human error, often compounded by complacency or a break from standard procedures. Whether you're arming up at the armory or field-stripping a weapon at home, safety must be the first and last step in everything you do.

Every Sailor and Marine has a duty to maintain proficiency with firearms and uphold the standards of safe handling. That means knowing and practicing clearing barrel procedures, adhering to posted guidance, securing weapons off-duty and engaging in continuous training. Firearm safety isn't a check-the-box requirement, it's a lifelong discipline.

Be the reason your command never files a negligent discharge report. Be the one who leads by example — on and off duty.

For further guidance on safe handling and storage of firearms, refer to OPNAVINST 5530.14E (Navy Physical Security and Law Enforcement), local armory Standard Operating Procedures and unit-level training resources. Always coordinate with your command's weapons officer or safety officer for questions about personal firearms storage and transport.

A Sailor fires a 9 mm service pistol during a naval handgun qualification course on the flight deck of USS Sampson (DDG 102) in the Pacific Ocean, Jan. 11, 2025. (U.S. Navy photo by Mass Communication Specialist 2nd Class Timothy Meyer)

HIGH-RISK MAINTENANCE

BY MASTER SGT. LOUIS R. TIBERIO

From aircraft jacking and towing to engine test cell runs and ordnance handling, these high-risk maintenance events demand detailed planning, command oversight and a strong safety culture. Preventing mishaps in these scenarios requires more than routine compliance; it calls for proactive risk management and constant vigilance.

WHO OWNS THE RISK?

COMNAVAIRFORINST 4790.2E outlines the responsibilities of various levels within the aviation maintenance community when managing high-risk maintenance events.

- Type Wings and Marine Aircraft Wings are responsible for identifying high-risk tasks applicable to their specific aircraft and environments. This includes developing detailed Risk Management (RM) worksheets to assess and mitigate hazards.
- At the intermediate level, maintenance officers must establish Local Command Procedures (LCP) for tasks not explicitly addressed in broader instructions. These tailored protocols ensure unit-specific risks such as those involved in Engine Test Facility operations are thoroughly mitigated through documented procedures.

Aviation Maintenance Advisory (AMA) 2025-08, emphasizes the existing policies for high-risk evolutions, and directs the implementation and documentation of the Plan, Brief, Execute, Debrief methodologies. The goal is not just compliance but the development of risk-informed practices matching the real-world conditions of each command.

RECOGNIZING HIGH-RISK MAINTENANCE

While every task should be approached with care, some inherently involve elevated risk. Common high-risk maintenance events include:

- Aircraft Towing: Maneuvering aircraft in confined spaces poses collision hazards and risks to ground personnel.
- Aircraft Jacking and Lowering: These operations require precise control and supervision to prevent structural damage or injury.
- Engine Testing (Test Cells or On-Aircraft): High-power engine runs introduce risks such as mechanical failure, debris hazards and noise exposure.
- Ordnance Handling: Loading, unloading or transporting ordnance — particularly in overhead situations — requires extreme caution and strict procedural control.
- Maintenance Not Covered by Publications: When technical manuals fall short, maintenance must pause until technical representatives provide guidance. Attempting unapproved procedures introduces unacceptable levels of risk.

These tasks represent just a portion of potential high-risk scenarios. Commands are expected to identify additional events based on their unique aircraft, maintenance structure and operational tempo.

REINFORCING SAFETY THROUGH COORDINATION

Managing high-risk maintenance evolutions requires coordination between several key players:

- Production Control must schedule and oversee these tasks, ensuring the appropriate supervision and documentation are in place.
- Maintenance control must verify personnel are properly trained, equipment is safe for use and the LCP or RM worksheet is followed.
- Work center supervisors must conduct pre-task briefs, verify readiness and maintain continuous oversight throughout the task.

This chain of responsibility ensures risk is managed at every level and complacency doesn't endanger lives or aircraft.

Additionally, high-risk evolutions should never be viewed as routine. Even commonly repeated tasks, such as jacking or towing, must be treated with the same care and scrutiny each time they are performed. Fatigue, time pressure or assumption can quickly erode safety margins if not actively mitigated.

RISK MANAGEMENT IS A SHARED RESPONSIBILITY

High-risk maintenance events will always be a part of naval aviation, but mishaps don't have to be. By implementing the guidance in COMNAVAIRFORINST 4790.2E, developing sound local procedures and encouraging open communication between all levels of maintenance personnel, we can continue to reduce risk and protect our most valuable assets: our people and aircraft.

Every Sailor and Marine in the maintenance community plays a role. Whether you're turning wrenches or signing the Maintenance Action Form, your vigilance makes the difference. Safety isn't a policy on paper; it's a mindset practiced in every evolution. Through structure, accountability and communication, we ensure high-risk doesn't become high-cost.

For further guidance, refer to COMNAVAIRFORINST 4790.2E, AMA 2025-08, your Type Wing's RM templates and local command safety instructions. Always consult your maintenance officer or quality assurance officer before initiating maintenance classified as high risk.

U.S. Navy Aviation Ordnancemen transport ordnance on the flight deck of the Nimitz-class aircraft carrier USS Harry S. Truman (CVN 75) in the U.S. 5th Fleet area of responsibility, March 22, 2025. (U.S. Navy photo by Mass Communication Specialist 2nd Class Darren Cordoviz)

KNOW YOUR HYDRAULIC SYSTEM

BY SENIOR CHIEF AVIATION STRUCTURAL MECHANIC BRYSON BOYD

Hydraulics are the lifeblood of modern military aviation. From flight control surfaces to landing gear, arresting hooks and cargo doors, hydraulic systems allow aircraft to perform complex mechanical tasks with precision and speed. These systems multiply force, operate smoothly in a wide temperature range and enable precise control at high speeds and altitudes.

Most military aircraft use two or more independent hydraulic systems to ensure redundancy and survivability. In critical operations, such as combat or carrier landings, backup systems are essential to maintaining control and avoiding catastrophic failure. Typically, at least one hydraulic system powers flight controls while the other may power utility systems like brakes, refueling probes or weapon bay doors.

Each system contains a dedicated reservoir, variable displacement pump, distribution manifold, filters and actuators. These components work together to pressurize, distribute and recover fluid in a continuous cycle powering the aircraft's mechanical functions.

HYDRAULIC SYSTEM PRESSURE AND PERFORMANCE

Standard hydraulic operating pressure in most legacy and current military aircraft is 3,000 psi, but newer platforms, including advanced fighters and unmanned systems, may operate in the 4,000 to 8,000 psi range. These higher pressures allow for smaller, lighter components and faster response times but also increase the risk of leaks, overheating and component fatigue.

The reservoir is more than just a holding tank. It serves as a thermal buffer, de-aerates returning fluid and maintains supply under all flight conditions. Depending on design, reservoirs may be:

- Air pressurized via bleed air or nitrogen to ensure constant pump feed pressure.
- Gravity-fed with boost pumps.
- Internally pressurized using piston-type configurations.

Fluid is drawn from the reservoir into a variable displacement axial piston pump, which modulates flow based on system demand using an internal compensator. When system demand decreases, the pump reduces flow output, saving energy and reducing heat generation. Fluid then flows through a manifold to pressure lines feeding actuators, servos and control valves throughout the aircraft.

THE ROLE OF FILTRATION

Filters are strategically placed throughout the system to protect critical components. These include:

- Pressure-line filters to catch contaminants before they reach actuators.
- Return-line filters to clean fluid before it reenters the reservoir.
- Case-drain filters to protect pump internals from foreign material.
- In-line filters on some actuators or servos.
- All filters include bypass valves, allowing fluid to continue flowing if a filter element becomes clogged. This protects the system from pressure loss or pump cavitation but also requires diligent maintenance to replace clogged filters before they become a liability.

HYDRAULIC CONTAMINATION: THE SILENT SABOTEUR

A systems performance and longevity are directly linked to fluid cleanliness, no matter how advanced it is. Hydraulic contamination is defined as any foreign substance in the fluid degrading system reliability or function. This includes solids, liquids or gases, but particulate contamination is the most common and damaging. Contaminants may include:

- Metallic debris from internal wear.
- Rubber or elastomer particles from degraded seals.
- Fibers or lint from rags, gloves or cleaning materials.
- Moisture or water from condensation or improper storage.
- Air bubbles pressure and cause erratic actuator performance.

Even unused, sealed hydraulic fluid is not perfectly clean. Particles can enter during shipping, storage or transfer. This is why every hydraulic system relies on a robust contamination control program to maintain fluid within acceptable limits.

CONTAMINATION CLASSIFICATIONS AND LIMITS

The class of contamination is determined by the total number of particles in defined size ranges per 100 milliliters of hydraulic fluid. These counts are used to assign a contamination class rating. Exceeding the particle count in any size range means the fluid contamination severity classification increases. For naval aircraft:

- Class 5 is the maximum acceptable contamination level for hydraulic systems in Naval aircraft.
- Class 3 or cleaner is required for support equipment servicing or testing aircraft systems.

Exceeding the established classification levels can lead to internal scoring, sluggish actuators, servo valve sticking and premature component failure.

MEASURING AND MONITORING CONTAMINATION

Two primary tools are used to measure hydraulic contamination:

- A Hydraulic Fluid Contamination Analysis Kit (Patch Test Kit) filters a sample through a membrane patch, which is then examined under magnification to assess contamination visually. The number and size of particles are compared against a standard chart to assign a class.
- A Portable Oil Diagnostic System provides a digital particle count using light-scattering technology. It offers faster, more consistent results and is ideal for fleet-wide contamination tracking.

Both tools play a vital role in predictive maintenance, helping teams catch contamination trends before they cause damage.

PREVENTING CONTAMINATION: PROCEDURES MATTER

Contaminants often enter systems due to improper handling, poor maintenance practices or environmental exposure. Preventive measures include:

- Using protective closures on all disconnected hydraulic lines.
- Wiping fittings and connectors before reassembly.
- Storing fluids in clean, sealed containers in temperature-controlled environments.
- Using filtered fluid dispensers and regularly calibrated servicing equipment.
- Training all personnel in contamination control fundamentals.

Failure to implement these practices can result in cascading failures, aircraft downtime and expensive repairs.

WHY KNOWING YOUR SYSTEM MATTERS

Maintainers must do more than follow procedures; they must understand how the system works, what each component does and how failures manifest. Knowledge enables quicker troubleshooting, smarter inspections and safer operations.

A general understanding of hydraulic system design also helps Sailors and Marines recognize symptoms of contamination early, such as sluggish actuators, noisy pumps or leaking seals. Addressing these issues before they escalate can prevent mishaps and mission delays. Every aircraft returning from the flight line with clean, properly functioning hydraulics represents the success of everyone who inspected, serviced or monitored the system.

Clean hydraulic fluid is critical to aircraft performance, crew safety and mission success. Knowing how the systems work — and how to maintain them — is a fundamental responsibility for every aviation maintainer. Hydraulic systems are robust, but they are not immune to damage. With proper contamination control, system knowledge and maintenance discipline, we can keep our aircraft flying longer and safer. Let's commit to doing the basics right: inspect thoroughly, close every line properly, store fluid correctly and know your system from reservoir to actuator.

For further guidance, consult applicable NAVAIR technical manuals, Maintenance Requirement Cards and CNAFINST 4790.2E.

Aviation Support Equipment Technician 2nd Class Jato Morris inspects hydraulic lines on a crane aboard USS George H.W. Bush (CVN 77) pierside at Naval Station Norfolk, Virginia, August 22, 2025. (U.S. Navy photo by Mass Communication Specialist Seaman Kayleigh Tucker)

ARE YOU A HERO?

BY SENIOR CHIEF AVIATION ORDNANCEMAN NIELS MYGIND

Electromagnetic radiation (EMR) is all around us. From handheld radios to cell phones and radar systems, nearly every modern electronic device emits invisible pulses or waves of energy. These emissions range across various frequencies, including radio frequency (RF), microwave, radar, ultraviolet and even X-rays. While generally harmless to humans, these emissions can be dangerous, catastrophic in fact, when near certain types of ordnance. The Hazards of Electromagnetic Radiation to Ordnance (HERO) program was created to prevent such incidents by establishing rules for safely operating transmitting devices near munitions.

HOW EMR AFFECTS ORDNANCE

Electromagnetic energy, particularly in the RF spectrum, can bypass safety and arming devices within ordnance. This can result in unintended ignition of propellants or premature detonation of warheads. RF energy can enter ordnance through gaps, seams or joints and couple into internal wiring or circuitry — especially systems containing electro-explosive devices (EEDs).

Conductive items such as tools, firing leads, bare wires or even human hands can act as channels for this energy. Ordnance is especially vulnerable during assembly, disassembly, handling, loading and unloading, when EEDs may be exposed and shielding may be removed. A single RF pulse at the wrong time could trigger a chain reaction of events with devastating results.

LESSON LEARNED: USS FORRESTAL

The risks of ignoring HERO protocols became tragically clear July 29, 1967, aboard USS Forrestal. A stray electrical discharge ignited the motor of a Zuni rocket under the wing of a staged aircraft. The rocket launched across the deck, striking an A-4 Skyhawk piloted by then-Lt. Cmdr. John McCain. The impact ruptured a fuel tank, spilling JP-5 fuel across the deck. Within seconds, the fuel ignited. A 500-pound bomb fell from the aircraft into the flames and exploded, triggering multiple secondary explosions.

A U.S. Sailor attempts to wet down an A-4 Skyhawk on fire immediately after its fuel tank is ruptured by a Zuni rocket on the flight deck of USS Forrestal (CVA-59) in the Tonkin Gulf, July 29, 1967. (U.S. Navy photo by Photographers Mate 2nd Class W. K. Mason)

The resulting fire claimed the lives of 134 Sailors, injured 161 more and nearly destroyed the ship.

This tragic event serves as a stark reminder of why HERO precautions exist — to protect lives, aircraft and missions.

EVERYDAY SOURCES OF EMR

EMR is not limited to shipboard radar or high-powered transmitters. Common devices found in work centers and on flight lines also emit EMR, including:

- Citizen Band radios
- Cell phones
- Handheld radios
- Portable antennas
- Shipboard communication systems
- High-voltage generation equipment

Even small, battery-powered devices can pose a serious risk in the wrong environment. This is the reason HERO warning signs are posted near magazines, flight lines and ordnance handling areas and why it's critical to read and obey them.

HOW ORDNANCE IS CLASSIFIED

Ordnance items and assemblies containing electro-explosive devices are assigned a HERO classification based on their vulnerability to EMR:

- HERO SAFE – Not affected by EMR under any conditions.
- HERO SUSCEPTIBLE – Safe under normal conditions but vulnerable during assembly, disassembly or when internal shielding is removed.
- HERO UNSAFE – Highly susceptible. EMR exposure can cause immediate unintended detonation or ignition.
- HERO UNRELIABLE – Cannot be confidently classified due to unknown or variable EMR sensitivity.

These classifications are published in NAVSEA OP 3565 and MCBO 3565, which outline specific separation distances, handling procedures and authorized frequencies for RF-emitting equipment.

HERO WARNING LABELS

Warning labels shall be affixed to portable and mobile radios and are used both on ship and shore stations. This warning label alerts the emitter operator to a potential hazard if the emitter is operated within the prescribed distance of ordnance operations. The label has blank spaces for inserting HERO SUSCEPTIBLE or HERO UNSAFE ORDNANCE Safe Separation Distances(SSDs) in feet. The distances are obtained by using the HERO Safe Separation Distance Calculator, which is available in the RADHAZ Tools on the Electromagnetic Environmental Effects (E3) Team Online Knowledge Management System (KMS) and is discussed in Chap. 2 VOL 2 of the OP 3565.

All portable RF transmitting devices must be:

- Authorized under HERO procedures.
- Clearly marked with a HERO sticker indicating the required minimum safe operating distance.
- Approved by the local explosives safety office before being purchased, relocated or used near ordnance.

Operating any RF-emitting equipment near ordnance without proper authorization and adherence to these guidelines can lead to unintentional ignition and severe consequences.

BE A HERO: FOLLOW THE RULES

Before operating or carrying a transmitting device near ordnance:

- Know what classification applies to the ordnance in your area.
- Observe all posted warning signs and standoff distances.
- Check your radio or transmitter for proper labeling and authorization.
- Coordinate with your explosive safety officer for any questions or operational changes.

The HERO program exists because history has shown what can happen when the danger of stray RF energy is underestimated. Whether you are handling ordnance, using a handheld radio or just passing through a HERO-controlled area, vigilance and compliance are non-negotiable.

Don't let complacency turn a routine task into a tragedy. Be the HERO who prevents the next mishap. It only takes one careless moment for EMR to cause a catastrophic event.

Every Sailor and Marine is responsible for understand HERO classifications, respecting standoff distances and following proper safety procedures.

Understand HERO classifications — because lives depend on it.

For further guidance, refer to NAVSEA OP 3565, MCBO 3565 and consult your local explosives safety officer to ensure full HERO compliance.

TRUST, BUT VERIFY

BY AVIATION MACHINIST'S MATE 3RD CLASS EMMERLEE DEPENBROCK,
NAVAL AIRCREWMAN-MECHANICAL 3RD CLASS EVAN STANDLEY,
AND AVIATION MACHINIST'S MATE 1ST CLASS EBONIE SMITH

In the U.S. naval aviation community, our mission readiness is built not only on the quality and capability of our aircraft but also on the integrity, discipline and vigilance of the professionals who maintain them. Each task, whether it involves servicing, repairing or configuring an aircraft, is governed by procedures outlined in approved publications. These procedures are more than instruction; they are the result of decades of experience, sometimes paid for with injuries, destroyed aircraft, or worst of all, lives. As the saying goes, "these procedures are written in blood."

Maintainers are the backbone of aviation fleet readiness. Our aircraft must be ready to launch at a moment's notice to support global operations, humanitarian relief efforts or combat missions. That urgency can sometimes bring about immense pressure. Deadlines are constant, operational commitments are unrelenting, and the mission often seems to demand speed over precision. But, the cost of cutting corners is far too high. We cannot let the pressures outweigh our responsibility to follow the process exactly as written—"by the book!"

Unfortunately, across the fleet, there is a growing trend threatening this standard: the development of timidity among junior maintainers. Fear of speaking up, fear of questioning instructions and fear of appearing slow or incapable has led many to accept questionable practices without objection. This culture of silence, combined with the desire to appear as a team player, can result in critical tasks being performed incorrectly or not at all.

Many Sailors and Marines, especially those new to the aviation community, are highly impressionable. When their first experiences in the fleet include watching seasoned maintainers deviate from authorized procedures or hearing technique statements like, "this is how we actually do it," they begin to normalize unsafe behavior. Over time, this leads to a slow erosion of quality and safety. The consequences of this mindset are not hypothetical; they are real and measurable.

One personal account from our team illustrates this vividly. As a junior Sailor, I was instructed to disregard the importance of taking fuel samples. It was portrayed as a nuisance, something to be skipped without consequence. That choice eventually led to a shutdown of our command and a formal investigation. We lost aircraft availability. Aircrew lost valuable training time. Another squadron had to shoulder our mission responsibilities. The price of that cultural misstep was paid by everyone, not just the individual involved. I carry that lesson with me now and use it to train others properly, so they don't have to learn it the hard way.

Another recent incident at VR-56 further emphasizes this point. Our Airframes and Power Plants work center reconfigured a C-40A Clipper from a combination (COMBI) configuration to all-passenger (PAX) configuration to support of an upcoming detachment. This re-rig is routine, but it involves precise installation of passenger seating, torquing bolts to specification and detailed inspections. On this occasion, the task was completed by an experienced maintainer and supervised by three others; however, during the flight, a row of seats, occupied by passengers, detached. Fortunately, no one was injured, but the event served as a stark reminder that assumption is the enemy of verification.

In this instance, each of the supervisors and quality assurance (QA) representatives assumed the other had completed the requisite in-process seat inspections to verify proper seat bolt torques were complete. Additionally, the overall QA representative who signed off the work order did not review every aspect of task documentation that would have revealed an incomplete in-process inspection. These failures to properly document the inspections coupled with poor communication nearly resulted in tragedy. We must internalize the mantra: "Trust, but verify." No matter how experienced the maintainer, every step must be documented, every torque verified and every installation inspected by the appropriate level QA representative. We do this not because we lack confidence in our Sailors and Marines but because the consequences of missed steps are too great.

Re-rigging the C-40A Clipper is a complex and essential task. The aircraft operates in three primary configurations: PAX, COMBI and all-cargo. Each rig has unique requirements. In the PAX configuration, technicians must vacuum seat tracks, bolt seats into designated holes, torque them to specification, install carpeting and connect electrical wiring. Even the partitions separating the galley from the seating area must be correctly installed to avoid injury in flight.

In the COMBI configuration, which is used most often, three 463L "Air Force" pallets are loaded in the forward section while 70 PAX occupy the rear. This setup involves installing ball decking, locks, stoppers and a main cargo net. If any component is installed incorrectly, the consequences can be dire. If locks are reversed or nets are improperly lashed, a pallet could become a deadly projectile during turbulence or hard braking.

All-cargo configurations, while less common, carry the greatest physical risk. These setups use the same locking and restraint systems as the COMBI configuration but carry far greater weight. A shifting load could tear through the fuselage, jeopardizing the flight crew's safety and integrity of the aircraft. There is no room for error. Sometimes the pressure, whether perceived or real, to complete maintenance without delay results in attempted shortcuts, such as using alternate tools, skipping steps when a part is missing or assuming a task was done, but deviating from publications, even slightly, leads to complacency. It becomes easier to justify the next deviation, and soon, those actions become the "norm."

(Continued on next page)

U.S. Marine Corps Cpl. Austin Potter, right, and Sgt. Ivandominick Uy, assigned to Marine Light Attack Helicopter Squadron (HMLA) 267, Marine Aircraft Group 39, 3D Marine Aircraft Wing, conduct maintenance on an AH-1Z Viper at Camp Wilson, Marine Corps Air-Ground Combat Center, Twentynine Palms, California, Feb. 19, 2024. (U.S. Marine Corps photo by Lance Cpl. Richard PerezGarcia)

(Continued from page 17)

This is where senior leadership must step in. We must create a command climate that values doing it right over doing it fast. We must encourage our Sailors and Marines to speak up, ask questions and refuse to accept substandard practices. Senior maintainers must model this behavior by holding themselves accountable and mentoring their junior maintainers with patience, precision and professionalism.

Training plays a vital role in this equation. A Sailor's first command will often set the tone for their entire career. If they are trained poorly or exposed to bad habits early on, they may never recover.

It is up to all of us, regardless of rank, to ensure training is accurate, complete and uncompromised. Mistakes will happen, but our goal is not perfection; it's continuous improvement.

From owning our errors, we must share what we learn and foster a culture of accountability. This is what is required to be an effective self-aware, self-learning and self-correcting unit. The aircraft we maintain are entrusted with lives and mission success. Every bolt torqued, every fuel sample taken and every configuration completed correctly ensures those aircraft return.

The citizens we serve and the Sailors and Marines we work alongside deserve nothing less. As maintainers, our duty extends beyond the hangar bay. It reaches into the skies with every mission we launch. Let's remember why we do this job, who we do it for and what is at stake.

Inspect what you expect. Trust, but verify; and never be afraid to speak up when safety is on the line.

U.S. Marine Corps Cpl. Austin Potter, assigned to Marine Light Attack Helicopter Squadron (HMLA) 267, Marine Aircraft Group 39, 3D Marine Aircraft Wing, conducts maintenance on an AH-1Z Viper at Camp Wilson, Marine Corps Air-Ground Combat Center, Twentynine Palms, California, Feb. 19, 2024. (U.S. Marine Corps photo by Lance Cpl. Richard PerezGarcia)

NALCOMIS CONTINGENCY

BY MASTER CHIEF AVIATION MAINTENANCE ADMINISTRATIONMAN ARLENE WILLIAMS

The Naval Aviation Logistics Command Management Information System (NALCOMIS) contingency process emerges as a vital component to ensure operational continuity and mission success.

UNDERSTANDING NALCOMIS

NALCOMIS, a cornerstone of naval aviation logistics management, facilitates maintenance, supply and financial functions for aircraft and related equipment. The contingency process encompasses measures to sustain operations in adverse conditions, such as system failures, cyber threats or natural disasters. It involves backup protocols, alternative communication channels and predefined procedures to mitigate disruptions and maintain operational effectiveness.

ENSURING OPERATIONAL CONTINUITY

The contingency process plays a pivotal role in ensuring operational continuity during unforeseen challenges. By establishing redundant systems and backup mechanisms,

the process minimizes downtime and enables seamless maintenance operation transitions during emergencies.
This resilience is necessary to sustain mission-critical functions, preserve situational awareness and safeguard personnel and assets in high-stakes environments.

ENHANCING MISSION READINESS

Mission readiness hinges on the ability to adapt and persevere in sub-optimal conditions. The contingency process bolsters readiness by fostering a culture of preparedness and responsiveness. Maintaining daily maintenance reports (i.e., aircraft and work center workloads, schedule inspections, component removal due reports and support equipment reports) can help maintenance and supply personnel navigate disruptions and execute their duties effectively, irrespective of the circumstances. This active approach not only enhances operational readiness but instills confidence in mission success.

CYBERSECURITY AND DATA PROTECTION

The contingency process serves as protection against risks and vulnerabilities, offering layered defenses and robust protocols to avert potential adversaries. One way to mitigate this risk is to have the system consistently incorporate all security patch updates. Additionally, the system administrator must assign and maintain personnel access according to their qualification. These measures mitigate the risk of unauthorized access by personnel, data breaches and compromises.

PROMOTING INTEROPERABILITY

The contingency process fosters interoperability by establishing common standards, protocols and interfaces for information exchange. This framework enables seamless integration of disparate systems, facilitates real-time data sharing and enhances situational awareness across joint and multinational operations. Due to the ability to transfer aircraft data, parts and components to other units, this interoperability strengthens the collective defense capabilities and unity of effort in achieving shared objectives.

EFFICIENT RESOURCE MANAGEMENT

Effective resource management is indispensable for sustaining operational tempo and optimizing mission outcomes. The contingency process enables efficient resource use by streamlining maintenance, logistics and supply chain operations. Through automated workflows, forecast analytics and resource optimization algorithms, resource management enhances asset visibility and minimizes downtime. These efforts maximize operational efficiency and ensure timely support to frontline units, thereby enhancing overall mission effectiveness.

FOSTERING RESILIENCE

Resilience is a cornerstone of organizational sustainability and mission success. The contingency process fosters resilience by cultivating a culture of adaptability, innovation and preparedness. By integrating these processes and lessons learned from past experiences, it enables organizations to anticipate, mitigate and recover from disruptions effectively. This resilience-centric approach not only builds operational agility but also instills confidence in the face of uncertainty, empowering military units to thrive in dynamic and challenging environments.

PLAN FOR SUCCESS

The NALCOMIS contingency process is indispensable for ensuring operational continuity, enhancing mission readiness and mitigating risks in military operations. By fostering resilience, interoperability and efficiency, the NALCOMIS process strengthens organizational capabilities and enables military forces to overcome adversity and achieve mission success.

As the operational landscape continues to evolve, robust contingency planning and preparedness becomes increasingly pronounced. Embracing the principles of this contingency process is essential for safeguarding national interests, protecting critical assets and preserving peace and security in an uncertain world.

U.S. Sailors conduct maintenance on a MH-60S Sea Hawk helicopter, attached to Helicopter Sea Combat Squadron (HSC) 6, on the flight deck of USS Nimitz (CVN 68) in the U.S. 5th Fleet area of responsibility, Aug. 27, 2025. (U.S. Navy photo by Seaman Chad Hughes)

BZ PR1 A LIFE SAVER

BY CHIEF AIRCREW SURVIVAL EQUIPMENTMAN SHANE GROVE

On an ordinary sunny San Diego work day in December 2024, Aircrew Survival Equipmentman (PR) 1st Class John Bayles arrived to perform his duties before attending the morning maintenance meeting for the SunHawks of Fleet Logistics Multi-Mission Squadron 50 (VRM-50), the Navy's CMV-22B fleet replacement squadron. Bayles set about the day as he normally would, performing the beginning of shift tool inventory to ensure all tools were accounted for, just as he had done many times before as a new day dawns in naval aviation, but this day would start differently from any others he had previously encountered. As he finished the tool inventory, Bayles walked past the work bench toward the shop exit when something strange caught his eye that he felt compelled to check on. On the work bench he noticed that one of the life preservers, the last link in the chain of survival, didn't look right and warranted further investigation.

Bayles had previously been assigned to the Aviation Life Support Systems Branch at Fleet Readiness Center (FRC) Northwest in Whidbey Island, Washington, where he served as a work center 81B Inflatables Shop collateral duty quality assurance (QA) inspector, performing maintenance on the LPU-37A/P Low Profile Flotation Collar, the very same life preserver model that was before him. He noticed the life preserver's inflation lobe was completely sealed, recalling from his previous experience it should be opened to the bottom of the lobe itself to ensure a vital QA step could be performed. This step is crucial to the inspection of the life preserver unit, as there is tacking -- needle and thread used to secure two pieces of fabric together -- through the life preserver casing that must be checked to ensure the life preserver bladder was not punctured. If the bladder was punctured, it could potentially cause the life preserver to leak and provide less than the 65 pounds of buoyancy pilots and aircrew would need to stay afloat in the event of a mishap. After noticing the tacking was not present, Bayles realized this was a major safety concern and immediately notified his chain of command and maintenance control. His suspicions were verified after consulting NAVAIR 13-1-6.1-2, which specifically calls for the inflation lobe to be open to verify the tacking was indeed not present. Dread began to seep over him as he began thoroughly examining all of the other life preservers present in the Paraloft, where he found one after another were closed and not in accordance with established publications.

This discovery of the missing tacking ultimately led to a chain of events that could not have been foreseen by Bayles after arriving at work that December morning. After finding multiple suspect LPUs within VRM-50, it was found many of the life preservers packed by the local intermediate level maintenance had the same discrepancy, which directly affected nearly every squadron on Naval Air Station North Island. Bayles' chain of command reached out to other squadrons in Virginia, Florida and Japan to share details of the potential situation that had been discovered. As a result of the Sailor's findings, a Category One Hazardous Material Report and Engineering Investigation was drafted and submitted through the Joint Discrepancy Reporting System to ensure the Program Office, PMA-202, was aware of the potentially life-threatening discrepancy. The result of the discrepancy report determined this was not an isolated problem and affected nearly all the FRCs across the Navy. PMA-202 quickly released guidance for all activities to check the life preservers and to turn any discrepant assets to the local FRCs for inspection and re-pack. From the initial findings by Bayles through the message release from PMA-202, this recall affected 17 different Type/Model/Series aircraft and thousands of life preservers were required to be inspected or recalled.

After the events of that December day, a deeper look was taken into how often this tacking is physically looked at and, upon further investigation, it was found the life preserver is only officially inspected by a qualified aircrew survival equipmentman once every 360 days. Even more alarming is this specific tacking is to be checked by the pilot or enlisted aircrewman during every pre- and post-flight inspection. The NAVAIR 00-80T-123 Aircrew Systems Naval Air Training and Operating Procedures Standardization (NATOPS) has a color photo included within to ensure the step is not missed and is performed correctly. Thousands of flights had taken place and not one instance was reported.

A Technical Publication Discrepancy Report (TPDR) was submitted referencing the skipped step, addressing the need for it to be re-written and changed to alter the procedures, making it easier to tack the casing while also ensuring the bladder was not punctured. The original step instructed the technician to tack the case, then inspect for bladder punctures after opening the case to the tacking. The problem with this procedure is the thread used to tack is size "A" and very easy to break. Also, the tacking was "blind"; meaning the technician cannot see or feel if the needle makes contact with the bladder until after the tacking is complete and a visual inspection is performed. The pressure and usage of the packed life preserver would cause the "A" thread to break and the lobe to open during normal operations, requiring the assets to have to be returned to the local FRC sometimes months before it was due for inspection. A TPDR should have been drafted and submitted when this trend was first identified but was not.

How did this happen? How did an established system of checks and balances not catch a potentially life-threatening situation across an entire service until months, perhaps years later? This is a clear example of an alarming trend in the survival equipment world. A trend of lack of reporting and procedural non-compliance highlighting the dangers of the "it's always been done this way" mentality. This situation highlights the need for true, proper and consistent reporting of all issues, no matter the size, to ensure the program office is aware and can release solutions before life-threatening situations occur. Luckily, outstanding Sailors and Marines like Bayles go above and beyond to keep our aircrew safe. Bravo Zulu PR1. The Aircrew Survival Equipmentman motto is "Last to Let You Down" but I would rather we be first in procedural compliance and reporting so we "Never Let You Down."

Aircrew Survival Equipmentman 1st Class John Bayles, performs a safety check on the life preserver for Lt. Cmdr. Ian Conte at the Fleet Logistics Multi-Mission Squadron 50 (VRM-50) at Naval Air Station North Island, San Diego, California, July 28, 2025. (Photo courtesy of Lt. Cmdr. Ian Conte)

CRANE OPS

BY MASTER GUNNERY SGT. JEROD WILLIAMS

From construction projects to military applications, the safe and efficient operation of cranes, specifically Category 2 and 3 cranes, is a critical aspect of many operations, from construction projects to military applications. To ensure these operations are conducted with the highest safety standards, the Navy and Marine Corps follow strict guidelines outlined in the NAVFAC P-307 Weight Handling Program Management publication.

This guide provides essential information for managing, maintaining, inspecting, testing, certifying, operating and using Weight Handling Equipment (WHE) to uphold safety, reliability and operational excellence. Understanding how to effectively manage and maintain a weight handling program for Category 2 and 3 cranes, the components of training, maintenance, inspection and safety procedures are a key to managing aviation maintenance.

KEY OBJECTIVES OF NAVFAC P-307

NAVFAC P-307 outlines the requirements and procedures necessary for maintaining and safely operating cranes. Its objectives focus on ensuring the safety and reliability of equipment, optimal service life and proper training for all personnel involved in crane operations. The purpose of the publication is to:

- Maintain safety and reliability standards: Ensure equipment is used within the guidelines set by the original equipment manufacturer to maintain operational integrity.
- Maximize service life: Implement practices to ensure equipment longevity and minimize costly repairs or replacements.
- Provide training and qualifications: Ensure all personnel involved in crane operation, inspection, maintenance and rigging are properly trained and qualified.
- Promote safe operating practices: Establish and enforce safety protocols to reduce the risk of accidents during crane operations.
- Guide overall program management: Outline procedures for managing and overseeing the weight-handling program effectively across all activities.

TRAINING AND QUALIFICATION REQUIREMENTS

Training is a cornerstone of crane operation safety and it is essential that personnel are qualified for their specific duties. The NAVFAC P-307 publication emphasizes the need for a structured training program to ensure all personnel possess the knowledge and skills necessary to safely operate Category 2 and 3 cranes.

Training courses: The Navy offers various training courses covering all aspects of crane operation, including rigging, maintenance, inspection, testing and certification. These courses are available via the Navy eLearning platform and provide foundational knowledge necessary for crane operations. However, it is important to note, these courses do not include hands-on training and are not sufficient to qualify personnel for specific crane operations.

Crane operator refresher training: Category 3 crane operators must complete a refresher safety course every three years. Supervisors should also participate in relevant training to ensure they are fully informed about their responsibilities.

Examinations: All personnel must pass an examination for each required course to demonstrate their proficiency. Web-based training platforms offer the flexibility of completing these exams online, with a minimum passing score of 80%. If web-based testing is not used, written tests must be administered to ensure adequate knowledge retention.

Recordkeeping: Each unit is responsible for maintaining accurate training records. These records, which include trainee names, training dates and examination results, should be kept in an accessible and organized manner.

EQUIPMENT HISTORY FILES AND LICENSING

To ensure proper crane maintenance, each unit must maintain an Equipment History File for every crane in use. This file includes all relevant documentation related to the crane's maintenance, inspections, repairs and certifications. The NAVFAC P-307 publication specifies the required documentation and how long each document must be retained. These files must be readily available to government oversight agencies, such as Occupational Safety and Health Administration and the Navy Crane Center, upon request. Electronic versions of the files are acceptable and may be stored in a central location or distributed across multiple sites for convenience.

While licensing is not required for operators of non-cab Category 3 cranes, operators must still demonstrate their competence in the safe operation of each specific crane. Since the Navy's crane fleet includes various crane types, makes, models and control mechanisms, licensing is generally focused on core functional characteristics rather than individual crane variations. Operators are expected to show they are qualified to operate cranes with similar capacities and functions.

PRE-USE CHECKS AND MAINTENANCE PROCEDURES

Crane operators must conduct a complete pre-use check of the crane before the first use of the crane each day, regardless of the crane's purpose, whether for production, maintenance, testing or relocation. The crane team shall assist the operator in performance of the operational check as necessary. This daily inspection is essential to identify any deficiencies before the crane is used. The operator must verify all load-bearing parts, load-controlling devices and safety features are in proper working condition.

For cranes used in construction, the pre-use check should be conducted before each shift. Any issues found during the check must be reported to the supervisor. The first operator on each subsequent shift is also required to perform an operational check to ensure the crane is safe for use.

If any deficiencies are observed during the check or while operating the crane, the operator must immediately stop the operation and notify the supervisor. This will ensure any issues are addressed before the crane is used again by, minimizing the risk of accidents or equipment failure.

CRANE TEAM ROLES AND RESPONSIBILITIES

Effective crane operation requires a coordinated effort from the entire crane team. The team typically includes the crane operator, the rigger-in-charge (RIC), riggers, signal persons and crane walkers. Each member has specific responsibilities contributing to the safe and efficient operation of the crane.

Rigger-in-Charge (RIC): The RIC has overall responsibility for the operation, including planning the lift, ensuring the crane's operating envelope is free of obstructions, and maintaining communication with the operator. The RIC must coordinate the activities of all team members to ensure safe operation.

Rigger: The rigger is responsible for carrying out tasks assigned by the RIC, including performing pre-use checks, rigging the load and keeping the RIC informed of any safety concerns during the operation.

Signal Person: The signal person communicates crane movements to the operator, ensuring the crane operates in a safe and controlled manner. This role may be filled by the RIC, a rigger or another qualified team member.

Crane Walker: The crane walker assists with the pre-use check, ensures the crane travels safely by monitoring for obstructions and is positioned to stop the operation if a problem arises.

Crane Operator: The crane operator is responsible for safely operating the crane, performing pre-use checks and ensuring they are fit to operate the crane physically, mentally and emotionally. Operators must assess their own readiness before starting their shift and ensure they are alert and capable of performing their duties.

RISK MANAGEMENT

OPNAVINST 3500.39 outlines the risk management (RM) process, which is a critical tool for managing risks in crane operations. RM helps teams identify potential hazards, assess risks and implement measures to minimize danger and enhance operational capability. This is an integral part of the planning and preparation process for all WHE lifts and must be applied at every stage of crane operation. Crane lifts should be considered high-risk maintenance events and should be identified on the Type Wing and Marine Air Wing high-risk local command procedures.

UNDERSTAND THE ENTIRE EVOLUTION

Effective management and maintenance of a Category 2 and 3 crane program is a complex, multi-faceted task requires a strict adherence to safety procedures, thorough training and consistent maintenance practices. By following the guidelines set forth in the NAVFAC P-307 publication and applying the RM principles, organizations can ensure their cranes are safe, reliable and ready for operation. Every team member, from the crane operator to the rigger, must understand their role and responsibilities in maintaining a safe working environment. With proper training, routine checks and teamwork, crane operations can be conducted with confidence, minimizing the risks associated with lifting operations and promoting a culture of safety.

Sailors operate a crane during an ammunitions onload on the flight deck of USS Nimitz (CVN 68) in the Pacific Ocean, April 1, 2025. (U.S. Navy photo by Mass Communication Specialist 2nd Class Tomas R. Valdes)

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 mobie 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 miss, hazards and dangerous conditions can increase awareness, provide leadership valuable feedback, and inform future investment decisions for a safer workplace.

WRONG TOOL FOR THE RIGHT JOB

BY SENIOR CHIEF AVIATION MACHINIST'S MATE WILLIAM K. HALL

At some point, nearly every technician has used the wrong tool out of convenience. Why climb down the ladder for a 6-point socket when a 12-point "will do" the job? This mindset, regardless of experience level, is a persistent challenge for aviation maintenance leadership and one having real consequences for safety and readiness. Improvising with tools may seem harmless in the moment, especially when the job "gets done," but consider the cost. Using tools outside their intended purpose (e.g., prying with a flathead, hammering with a wrench or forcing the wrong socket) can cause immediate or hidden damage affecting more than just the task at hand. In naval aviation, "by-the-book" maintenance isn't a suggestion. It's a requirement supporting mission readiness and protecting lives.

Let's explore the dangers of improper tool use and why returning to the fundamentals is more important than ever.

PHYSICAL INJURY TO PERSONNEL

Technicians work with heavy, sharp, pneumatic and electric tools, each with the potential to cause injury when misused. Common injuries include:

- Lacerations and punctures from misusing screwdrivers, scribes or pliers.
- Crushing injuries when handling large tools, like wrenches or jacks without support.
- Electrical shock from failing to properly secure or de-energize electrical systems.
- Repetitive motion injuries from poor ergonomics or failure to take breaks.
- Lifting injuries caused by ignoring proper techniques or skipping use of weight-handling equipment.

In every case, injuries occur more frequently when technicians use tools improperly or neglect safety procedures. Complacency is not a shortcut, it's a hazard.

DAMAGE TO AIRCRAFT AND EQUIPMENT

Aircraft systems are engineered with tight tolerances. Tools are matched to these tolerances for a reason. Misusing or improvising with tools increases the risk of costly, sometimes catastrophic, damage:

- Stripped hardware results from using the wrong socket or wrench size. A rounded bolt can delay repairs and require component replacement.
- Incorrect torque. Over or under torquing can lead to loose fittings, cracked surfaces or future failure under stress.
- Delicate component damage, especially in avionics or composite structures, occurs when unapproved tools (like a scribe or punch) are used instead of designated removal tools.

A real-world example: Technicians once used a scribe to remove fan blades from a turbofan engine instead of the proper tool. The result? Micro-scratches on the fan disk, leading to rejection and full replacement. The cost was measured not only in dollars but also in downtime and lost missions.

COMPROMISED MAINTENANCE INTEGRITY

Naval aviation maintenance is governed by strict adherence to Type/Model/Series (TMS) specifications and the Naval Aviation Maintenance Program. Using the wrong tool or the right tool incorrectly erodes aviation maintenance integrity.

- Inaccurate diagnosis or repairs can result from makeshift solutions that don't follow original equipment manufacturer (OEM) procedures.
- Worn or damaged tools cause more harm than good when left unchecked in tool inventories.
- Improvisation due to a missing tool teaches Sailors and Marines that non-compliance is acceptable.

Even with the best intentions, circumventing the Tool Control Program or substituting one tool for another puts technicians, aircrews and the mission at risk.

EROSION OF SAFETY CULTURE

Proper maintenance is more than a checklist; it's culture. When the misuse of tools becomes routine, it sends the wrong message – shortcuts are acceptable and safety is secondary.

New technicians model behavior from their supervisors. If leadership tolerates sloppy tool practices, bad habits spread and normalize. The result is a long-term degradation of safety standards, degraded trust between maintainers and aircrew and increased likelihood of avoidable incidents. Upholding maintenance integrity means never sending mixed messages. Safety must be the baseline.

OWN THE STANDARD, USE THE RIGHT TOOL

Tool safety begins with daily tool inspections, ensuring proper accountability and removing damaged tools from circulation. Every technician must be trained and empowered to:

- Use the correct tool for every task.
- Follow OEM and TMS guidelines, not guesswork.
- Report missing or unserviceable tools to the chain of command.

Maintenance isn't just about turning wrenches — it's about doing it right the first time. Aviation readiness, aircrew safety and unit reputation depend on it. Senior technicians must lead by example: enforcing standards, mentoring junior personnel and building a culture where precision and safety come first. Complacency may feel faster — but the consequences are always more expensive.

For further training on proper tool use, Sailors and Marines can access NAVEDTRA 14256A, 'Tools and Their Uses," through the Navy eLearning platform. This publication also supports advancement preparation for aviation maintenance ratings and is a valuable refresher for any Sailor who uses tools.

TURN-AROUND TRAINING PLANS

BY CHIEF WARRANT OFFICER RANDY JACKSON

The Turnaround Training Plan (TTP) is a strategic blueprint for rapidly restoring a squadron's readiness between deployments. By targeting skill gaps, boosting key qualifications and aligning training with operational demands, a well-executed TTP improves performance metrics, mitigates risk and builds depth in critical billets, ensuring the unit is ready to fight when called.

THE ROLE OF THE TTP

In naval aviation, mission readiness is not achieved by chance; it is the result of deliberate planning, structured training and proactive leadership. One of the most important, underutilized tools in that process is the TTP. Often misunderstood or mistaken for a routine training report, the TTP is a strategic command-level product designed to ensure a squadron emerges from its post-deployment or post-detachment "turnaround" period stronger, more capable and fully prepared for its next operational commitment.

STRATEGIC VALUE VS. ADMINISTRATIVE REPORTS

A TTP provides a detailed plan for rebuilding and reinforcing technical proficiency across the unit. It is tailored to the command's specific platform, personnel turnover, manning gaps and operational requirements. This plan is not about checking boxes, it is about restoring depth in qualifications, addressing skill gaps and ensuring critical billets such as plane captain, collateral duty inspector (CDI), collateral duty quality assurance representative (CDQAR) and safe-for-flight are filled with competent, trained personnel.

Unlike the Monthly Personnel Plan (MPP), which is a retrospective summary of training completed, the TTP is a forward-looking strategy. The MPP captures accomplishments and participation. The TTP identifies required training objectives, establishes deadlines and aligns those goals with the command's flight schedule and maintenance workload. The two documents serve different purposes. The MPP tells you where you've been while the TTP tells you where you need to go.

SHORTER TURNAROUNDS REQUIRE CONTINUAL PLANNING

Turnaround periods themselves have become shorter due to compressed deployment cycles and increased operational demands. This reality makes the planning and execution of a TTP more important than ever; the days when commands had months to prepare are gone. Today's squadrons must build readiness quickly and efficiently. That means TTP cannot be treated as a static or one-time document. It must be a continual process, monitored, refined and actively managed from the day a squadron returns home until the moment the next deployment begins.

REBUILDING READINESS THROUGH STRUCTURED TRAINING

Squadrons often face several challenges during the turnaround period. New check-ins arrive with little to no aircraft-specific experience and experienced technicians transfer, leaving gaps in key watch stations. Aircraft return to the hangar needing extensive inspection and rework. These transitions create a unique window of opportunity to train, before flight operations begin again. A well-structured TTP capitalizes on that window. It provides a systematic approach to bringing new Sailors and Marines up-to-speed by requalifying expired billets and correcting deficiencies identified during the last operational cycle. It also allows leaders to focus on the foundational elements of mission readiness like safety, procedural compliance and proper use of maintenance publications.

LINKING THE TTP TO AMEX SCORE IMPROVEMENT

A properly developed and executed TTP also plays a critical role in improving a command's Aviation Maintenance Experience (AMEX) score. The AMEX score is a metric used by U.S. Naval aviation units to measure the proficiency and overall experience level of their maintenance personnel. It includes components such as the percentage of qualified maintainers (i.e., CDIs, CDQARs, QARs, etc.), training completion rates, average maintainer experience and personnel stability. These factors are computed as weighted elements derived from aviation maintenance systems like Optimized Organizational Maintenance Activity/Naval Aviation Logistics Command Managed Information System or the Aviation Data Management and Control System. Commands using a TTP to align training milestones with billet requirements and qualification depth directly support improved AMEX scoring by increasing qualification percentages, reducing turnover impact and improving inspection readiness.

PRACTICAL ALIGNMENT OF TTP WITH AMEX COMPONENTS

By aligning the TTP with AMEX scoring criteria, units can systematically improve their readiness profile. For example, a command identifying and tracking every required qualification in its TTP — and holding work center supervisors accountable for timely certification — will naturally increase its CDI/CDQAR rates. Similarly, prioritizing the completion of mandatory courses and maintaining a structured onboarding program for new check-ins increases training completion percentages and enhances personnel stability, both of which are key elements in the AMEX algorithm. Additionally, when TTPs are reviewed during Maintenance Program Assessments or Aviation Maintenance Inspections, well-documented plans with clear progress tracking can positively influence inspection results.

RISK MITIGATION THROUGH TARGETED TRAINING

Another critical benefit of the TTP is its ability to drive risk mitigation and mishap prevention. Many mishaps can be traced back to failure to train properly. Whether it's an improperly torqued component, incorrect tool use or an expired qualification, the root cause often points to a breakdown in training continuity. TTPs provide the structure needed to prevent these types of errors. It ensures Sailors and Marines receive targeted training in electro-static discharge handling, tire and wheel safety, HAZMAT control, hydraulic contamination and aircraft-specific system operations.

LEADERSHIP OWNERSHIP AND EXECUTION

Command leadership plays a pivotal role in the success of a TTP. Maintenance control, quality assurance and work center supervisors must collaborate to assess what training is required, who needs it and how it will be delivered. Once published, the TTP should be reviewed weekly, routinely updated and integrated into the daily maintenance planning cycle. It should be visible in maintenance meetings, posted in work centers and briefed to the chain of command. Most importantly, the command must treat the TTP as a living document — a tool to drive progress, not paperwork to file away.

BUILDING REDUNDANCY AND RESILIENCE

One of the most tangible benefits of a strong TTP is its ability to build depth. Having only one engine turn or safe-for-flight signer per shift may be technically compliant, but it creates unnecessary risk. The turnaround period is the time to build in qualification redundancies. Commands should use the TTP to ensure each critical maintenance billet has at least two or more qualified Sailors and Marines, preventing operational delays and reducing dependency on a few over-tasked individuals.

A LIVING DOCUMENT FOR WARFIGHTING READINESS

TTPs are essential to rebuilding readiness and ensuring operational success. They are not administrative exercises, rather they are strategic frameworks protecting our aircraft, growing our Sailors and Marines and keeping our missions on track. Without a solid TTP, units risk entering high-tempo operations with training gaps, safety issues and reduced flexibility. With one, they create a culture of accountability, readiness and resilience. The TTP sets the tone for the next deployment cycle. Plan it, own it and execute it, because when the flight schedule drops, there's no time left to train.

For further guidance on developing or refining your command's TTP, refer to COMNAVAIRFORINST 4790.2E, your Type Wing training directives and local quality assurance recommendations. Collaboration between maintenance control, training, quality assurance and work center leadership is essential. Your future success depends on the groundwork you lay today.

Aviation Structural Mechanic Airman Semaj Johnson, installs fasteners on an FA-18F in the hangar bay aboard USS Abraham Lincoln (CVN 72) in the Pacific Ocean, August 9, 2025. (U.S. Navy photo by Mass Communication Specialist 3rd Class Jordan Steis)

BRAVO ZULU

SAILORS, MARINES & CIVILIANS PREVENTING MISHAPS

CHIEF AVIATION ELECTRICIAN'S MATE MATTHEW WEBBER & AVIATION ELECTRONICS TECHNICIAN 1ST CLASS PAUL TROILI

PATROL SQUADRON (VP) 45

NAVAL AIR STATION JACKSONVILLE, FLORIDA

Chief Webber and AT1 Troili were performing maintenance on aircraft 168855. They noticed a RQ-4 Global Hawk drone approaching a portable fire bottle while taxiing on the adjacent taxiway. They quickly got the attention of the RQ-4 operator who stopped the aircraft less than one yard from the fire bottle. If the RQ-4 had continued its taxi, it would have hit the fire bottle causing unknown damage. Their vigilance broke a chain of events which may have led to a mishap.

Bravo Zulu, Chief Webber and AT1 Troili!

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

BRAVO ZULU

SAILORS, MARINES & CIVILIANS
PREVENTING MISHAPS

AVIATION STRUCTURAL MECHANIC (SAFETY EQUIPMENT) 2ND CLASS ISAIAH GRIMSLEY
&
AVIATION MACHINIST'S MATE 3RD CLASS ANDREW TAYLOR
PATROL SQUADRON (VP) 26
NAVAL AIR STATION JACKSONVILLE, FLORIDA

During aircraft launch operations, AME2 Grimsley was serving as the plane captain and AD3 Taylor was the runner. Grimsley noticed a boom truck quickly driving behind the aircraft while it prepared to taxi out of the line and simultaneously recognized liquid was coming off the aircraft's wing. Grimsley directed the aircraft to stop, preventing the aircraft's thrust from damaging the truck, then he and Taylor verified the liquid was just water and not fuel leaking from the wing. Both individual's situational awareness and action led to the expert execution of their duties and kept the ground evolution safe.

Bravo Zulu, AME2 Isaiah Grimsley and AD3 Andrew Taylor!

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

HAZARDS IN THE HANGAR BAY, FLIGHT LINE & SUPPORT FACILITIES

BY SENIOR CHIEF AVIATION SUPPORT EQUIPMENT TECHNICIAN DEXTER G. RONQUILLO

Our people are our most valuable asset and their safety is essential. Every Sailor and Marine who operates in the hangar bay, on the flightline or in maintenance facilities must understand and follow the procedures established for those environments. Failure to do so can lead to serious injury, damage to equipment and degraded mission readiness. To prevent mishaps, the Department of the Navy has developed a comprehensive set of safety regulations covering nearly every activity. These regulations include both military instructions and applicable civilian safety codes to ensure maximum protection.

WHAT THE DATA TELLS US

The Naval Safety Command conducts Local Area Assessments (LAA) across the fleet to identify risks through direct observation, interviews, and data analysis. These assessments routinely uncover reoccurring issues putting personnel and equipment at risk. Here are some of the most common discrepancies observed during LAAs; issues that are preventable with the right awareness and action.

OBSTRUCTED OR UNINSPECTED EMERGENCY EYEWASH/SHOWER STATIONS

During assessments, we often find emergency eyewash/shower stations blocked by equipment or are not tested regularly, which may make them useless in an emergency. According to ANSI/ISEA Z358.1-2014, emergency eyewash/shower stations must be:

- Activated weekly to ensure proper flow and flush the pipes of any contaminants.
- Annually inspected for changes in the work environment or necessary repairs.

Additionally, OPNAV M-5100.23 and OPNAVINST 5100.19 (series) require emergency eyewash/shower stations to remain unobstructed and accessible within 10 seconds. Blocked or unmaintained emergency eyewash/shower delay emergency response can increase injury risk.

IMPROPER STORAGE OF PORTABLE FIRE EXTINGUISHERS

Portable fire extinguishers (PFE) are often found lying unsecured on the deck. This creates a serious projectile hazard as the high pressure in the cylinder can turn a tipped extinguisher into a deadly missile. Loose extinguishers may endanger nearby personnel and reduce response effectiveness during a fire emergency. Per 29 CFR 1910.157, PFEs must be:

- Stored in designated brackets or cabinets.
- Clearly marked.
- Easily accessible at all times.

UNSAFE OR UNMARKED AIRCRAFT GROUNDING POINTS

Hangar bay electrostatic grounding points have been observed to be improperly stenciled or in use despite being marked "do not use." According to MIL-HDBK-274A(AS), all aircraft grounding points must be:

- Clearly labeled with the last test date.
- Stamped or marked with the measured ohmic resistance.
- Visually identifiable to prevent misuse.

Failing to verify electrostatic grounding point integrity can result in electrical hazards during maintenance and servicing operations.

SLIP, TRIP AND FALL HAZARDS FROM DECK CONDITIONS

Uneven flooring, deck holes and water intrusion during rain creates frequent slip and trip hazards. These issues not only endanger personnel but also reduce the efficiency of movement within high-tempo workspaces. As outlined in 29 CFR 1910.22, walking surfaces must:

- Be free of protrusions, corrosion or loose components.
- Promptly repaired.
- Kept dry and clean to prevent injury.

Regular maintenance and reporting of facility deficiencies are key to hazard reduction. This includes submitting work orders in Maximo and if the hazard is significant, submitting hazard reports into RMI, the Risk Management Information reporting system.

POOR HOUSEKEEPING AND FOD RISKS

Some hangar bays are cluttered with debris, trash and loose items, creating a serious risk of Foreign Object Damage (FOD). According to 29 CFR 1910.22 and the Naval Aviation Maintenance Program, facilities must be:

- Kept clean, organized and in sanitary condition.
- Maintained with proper housekeeping standards.
- Routinely inspected for FOD hazards.

Poor housekeeping isn't just unsightly, it's dangerous and often leads to unnecessary rework, injuries and equipment failures.

DON'T LET FAMILIARITY LEAD TO COMPLACENCY

Complacency is the enemy of efficient and effective operations. Working in familiar environments every day can cause personnel to lower their guard. It only takes one missed inspection, one ignored warning or one blocked emergency station to turn a routine day into a tragic one.

Small oversights, such as a loose extension cord, a blocked extinguisher or an unmarked grounding point may seem minor at first. However, if left uncorrected, they compound into larger hazards, threating the safety of personnel, the integrity of critical equipment and the overall culture of professionalism.

CONCLUSION

Every Sailor and Marine must take ownership of their workspace and remain vigilant about hazards in the hangar bay, on the flightline and in all aviation support facilities. Following basic procedures isn't just about safety compliance, it's about protecting your shipmates, your mission and yourself. Take the time to inspect, clear the access path, check the grounding point, secure the extinguisher and never assume someone else will do it. Your attention to detail might be the one thing preventing the next mishap.

Further guidance, refer to OPNAVINST 5100.19, OPNAV M-5100.23, ANSI/ISEA Z358.1-2014, MIL-HDBK-274A(AS) and 29 CFR 1910. For facility-related safety issues, consult your command's Safety Officer or Facility Manager.

A Sailor transits the flight deck of the aircraft carrier USS Nimitz (CVN 68) in the South China Sea, May 28, 2025. (U.S. Navy Photo by Mass Communication Specialist Seaman Apprentice Franklyn M. Guage)

WEARABLE TECH - AUGMENTED REALITY

BY SENIOR CHIEF AVIATION MACHINIST'S MATE HAROLD MACK

Technological advances continue to redefine aviation maintenance, pushing the boundaries of safety, efficiency and mission readiness. Among the most promising innovations, wearable technology and augmented reality (AR) are transforming how maintenance teams operate. No longer just futuristic ideas, these tools are practical solutions already shaping the future of fleet support. They streamline operations, reduce errors and help maintainers meet the complex demands of modern aircraft systems.

WEARABLE TECHNOLOGY: ENHANCING EFFICIENCY AND SAFETY

Wearable technology — electronic devices worn on the body — gives maintenance teams a real-time edge in communication, monitoring and situational awareness. These tools improve precision, minimize risk and provide instant data, boosting both individual performance and team capability. One impactful application is the use of biometric sensors embedded in uniforms or helmets tracking vital signs like heart rate and fatigue. Supervisors can monitor this data in real time, identifying when a technician may need rest or relief, helping prevent accidents caused by exhaustion.

- Smart gloves with integrated sensors allow technicians to instantly detect temperature and pressure changes, offering precision and safety when maintaining heat or pressure-sensitive systems. These gloves can alert users to overheating components or pressure anomalies that, if undetected, could lead to system failures.
- Exoskeletons (powered wearable suits) are also gaining traction. They assist technicians in lifting heavy components such as engines or landing gear, reducing injury risk and fatigue. Exoskeletons enhance endurance and reduce strain from repetitive tasks, particularly during extended maintenance cycles on large aircraft.

AUGMENTED REALITY: TRANSFORMING MAINTENANCE PROCEDURES

AR is revolutionizing how technicians interact with their workspaces by overlaying digital information onto the physical world. This technology provides real-time data directly in the technician's line of sight, eliminating the need to refer to separate manuals or screens.

Technicians wearing AR glasses can view step-by-step repair instructions projected directly onto aircraft components. These visuals, which may include interactive diagrams, torque values and live-sensor data, allows for hands-free accessible information. This reduces task time and improves accuracy, particularly during complex or unfamiliar repairs. AR is also changing how we train. Immersive virtual simulations allow maintainers to rehearse procedures in realistic environments without requiring a live aircraft. This reduces operational disruption and offers repeatable practice for troubleshooting, emergency procedures and equipment familiarization.

In the field, remote expert assistance is another game-changer. Technicians can stream their AR display to remote subject matter experts, who provide real-time guidance and annotate directly onto the visual feed. This capability significantly reduces downtime and increases success during critical repairs or diagnostics.

IMPROVING COMMUNICATION AND COORDINATION

Clear communication is essential in the fast-paced world of aviation maintenance. Wearable devices and AR support seamless collaboration between team members, even across physical distances. AR tools allow multiple technicians to view the same digital overlay diagrams, schematics or inspection checklists in real time. This shared visibility ensures everyone is aligned to the task, reducing the chance of missteps.

- Smart helmets with AR displays allow workers to receive live updates, safety alerts or task modifications without interrupting their workflow. Supervisors can remotely track task progress and deliver immediate feedback. In time-sensitive scenarios, this ensures faster, more coordinated responses and minimizes delays.

OVERCOMING CHALLENGES

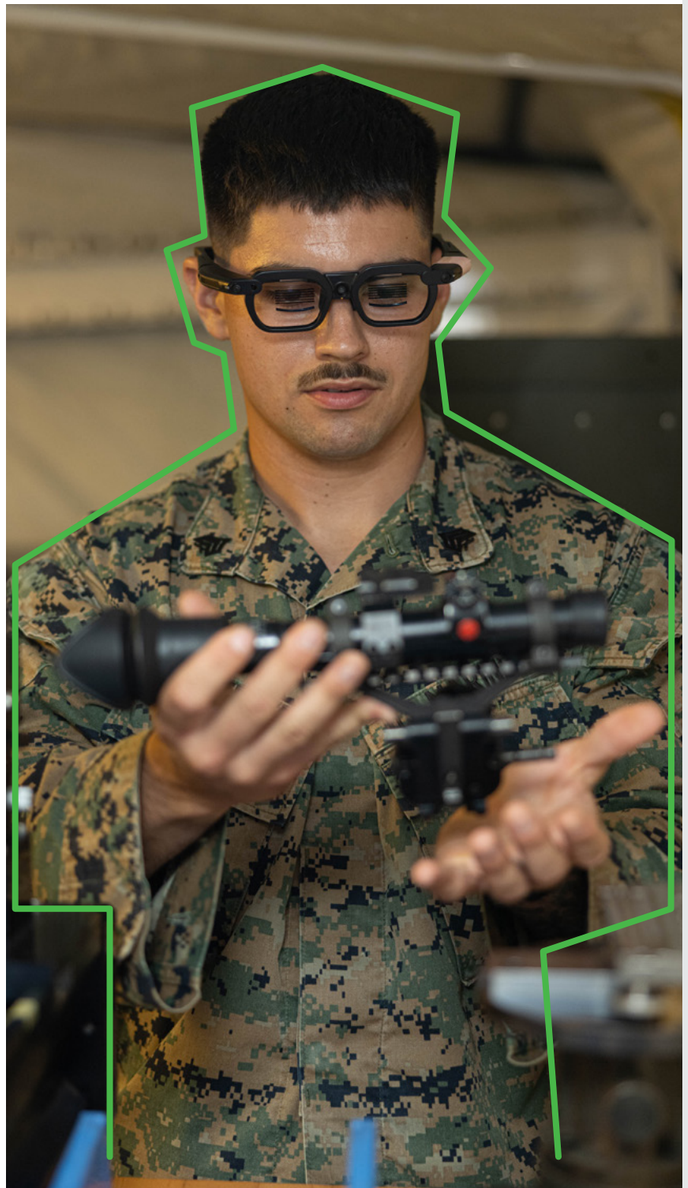
Despite their advantages, wearable and AR technologies face challenges that must be addressed before they become mainstream in aviation maintenance.

- Durability is a significant concern. These tools must withstand exposure to oil, fuel, high temperatures, vibration and rough handling. Manufacturers must develop ruggedized devices suitable for harsh operational environments.
- Cost and integration also present hurdles. Retrofitting facilities, purchasing hardware and training personnel requires an upfront investment. However, the long-term returns (i.e., fewer errors, faster turnarounds and reduced injury rates) make this investment worthwhile. Effective adoption also hinges on a robust training program to ensure technicians know how to use the technology to its full potential.
- Lastly, cybersecurity must remain a top priority. As more devices become connected, the risk of cyberattacks increases. Protecting sensitive maintenance data and operational systems requires strict access controls, data encryption and continuous monitoring.

LOOKING AHEAD: A CONNECTED FUTURE

The development of lightweight AR devices, such as AR-enabled contact lenses and more compact glasses, alongside improvements in battery life and wearability, signals an exciting future. These advancements will further integrate AR and wearable technology into everyday maintenance operations. As these innovations continue to mature, they will make aviation maintenance faster, safer and more precise. Maintenance teams will not only meet but exceed the evolving demands of readiness and operational excellence.

Wearable technology and AR are transforming how we approach aviation maintenance. By equipping maintainers with intelligent tools and immersive data, these innovations improve safety, reduce repair times and enhance mission readiness. The integration of these systems into our daily operations promises a future where Sailors and Marines work smarter, respond faster and maintain aircraft with greater precision. As we look toward the future of naval aviation, these technologies will play a critical role in ensuring our teams are ready for whatever challenges may come.



U.S. Marine Corps Sgt. Devin Gutierrez, an electro-optical ordnance repairer with 3rd Maintenance Battalion, Combat Logistics Regiment 35, 3rd Marine Logistics Group, performs maintenance on a Squad Day Optic with Augmented Reality Glasses at Camp Foster, Okinawa, Japan, Sept. 16, 2025. (U.S. Marine Corps photo by Lance Cpl. Weston Brown)

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SUBMISSION GUIDELINES

When submitting articles and photos, please include:

TITLE: Proposed headline.

AUTHOR INFO: Rank, first and last name, unit, squadron, command or organization.

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.

PHOTOS: All photos must be sent as separate files (not included in a word doc) and approved for public release. Images should adhere to established safety and security policies. Images should be the original file with minimum 1 MB size. Include a full description, photographer's rank, first and last name, unit, squadron, command or organization, the location and the date the photo was taken.

BRAVO ZULU: BZ submissions should include details about managing risks or a near miss. Include the rank, first and last name, unit, squadron, command or organization. Length should be 90-150 words and include a photo.

SEND TO: navsafecom_mech@us.navy.mil

We look forward to sharing your stories!

Stay Connected

Front Cover: Aviation Machinist's Mate 2nd Class Tristan York, performs maintenance on a F/A-18 jet engine aboard USS George Washington (CVN 73) while underway in the Pacific Ocean, Oct. 3, 2024. (U.S. Navy photo by Mass Communication Specialist 3rd Class Justin Lawson)

Back Cover: Aviation Electronics Technician Airman Zurial Jones, assigned to the "Nightdippers" of Helicopter Sea Combat Squadron (HSC) 5, performs maintenance on an MH-60S Sea Hawk helicopter aboard USS George H.W. Bush (CVN 77) in the Atlantic Ocean, Aug. 12, 2025. (U.S. Navy photo by Mass Communication Specialist 2nd Class Ceszar Villalbabaldonado)

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