

Reducing Mishaps—Saving Lives—Improving Readiness

Spring 2005

Mech

The Naval Safety Center's Aviation Maintenance Magazine



Mech

Vol. 44, No. 2 Spring 2005

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Mishaps waste our time and resources. They take our Sailors, Marines and civilian employees away from their units and workplaces and put them in hospitals, wheelchairs and coffins. Mishaps ruin equipment and weapons. They diminish our readiness. This command's goal is to help make sure that personnel can devote their time and energy to the mission, and that any losses are due to enemy action, not to our own errors, shortcuts or failure to manage risk. We believe there is only one way to do any task: the way that follows the rules and takes precautions against hazards. Combat is dangerous and demanding enough. The time to learn to do a job right is before combat starts.

Mech (ISSN 1093-8753) is published quarterly by Commander, Naval Safety Center, and is an authorized publication for members of the Department of Defense. Contents are not necessarily the official views of, or endorsed by, the U.S. Government, the Department of Defense, or the U.S. Navy. Photos and artwork are representative and do not necessarily show the people or equipment discussed. We reserve the right to edit all manuscripts. Reference to commercial products does not imply Navy endorsement. Unless otherwise stated, material in this magazine may be reprinted without permission; please credit the magazine and author. Periodicals postage paid at Norfolk, Va., and additional mailing offices.

POSTMASTER: Send address changes to *Mech*, Naval Safety Center, 375 A Street, Norfolk, VA 23511-4399.

Send articles, BZs and letters to the address above, or via e-mail to the *Mech* staff, SAFE-Mech@navy.mil. Visit us on-line at www.safetycenter.navy.mil.

On the Cover:

Aviation Ordnancemen transport MK-83 1,000-pound bombs across the flight deck of USS *George Washington* (CVN-73). Photo by PH3 Kristoffer White.

Features

4 It Can't Happen to Me!

A "routine" aircraft move goes wrong when a Sailor's hand gets in the way of an aircraft tire. Submitted by Safety Department aboard USS Harry S. Truman (CVN-75)

5 Respecting the Power of Electricity

External power unit gives this Sailor a shocking surprise. By AT3 Sean Smart

6 Big Surprises Can Come in Small Packages

Taking shortcuts to save 15 minutes can be life threatening. By AT3 Pedro Godinez

7 Be Sure to Read Between the Lines

Perform aircraft maintenance by the book, not from memory. By AE2 Ron Ellis

8 Super Hornet Smack Down!

There are many dangers on a flight deck at sea, and aircraft control surfaces are one of them. By AD1(AW) Joel Leaver

9 Stop Sucking Soap!

Poor leadership by example resulted in a swollen throat for this Sailor. By ABH3 (AW/SW) Travis M. Ward

10 Hellacious Huffer Hose in the Hush House

PPE saved this Sailor's vision and possibly his life during a high-power turn on a jet engine. By AT1(AW) Steven Tidwell

12 The Last Line of Defense

Failing to follow all maintenance procedures and a poor visual inspection by the CDQAR could have resulted in a loss of tail-rotor control. By AM2 James Cameron

13 Cruisin' for a Bruisin'

Adequate rest and hydration is an important part of enjoying a warm summer's day drive. By CWO3 Charlene Boucher

14 ORM Never Should Take a Holiday
Good advice on mitigating risk during unforeseen motor vehicle problems.
By AZ1 Aaron L. Chaney

15 Aircraft Tow Crunch
Nothing should be routine about nighttime aircraft moves in the rain.
By VMAT 203 Corrosion Control

16 Missing Nut Drives Me Nuts
Be sure to have the required number of personnel prior to conducting routine maintenance procedures.
By AE1(AW) Brian Roberts

18 Be Careful What You Ask For...
A CO's tale of how a simple request turned into a multiple mishap event.
By Cdr. Gary R. Schram and AM1(AW) Dawn L. Bryce

21 The Dreaded H-60 LCFCTC Factor
Accurate logs and record keeping can be confusing with different models of the H-60 aircraft.
By HS-2's Aviation Maintenance Administrators

22 An Uplifting Experience in the Hot Pits
Applying the lessons learned from safety training is critical to avoid becoming a mishap statistic.
By AN Travis Stillions

24 Naval Safety Center Accomplishments

25 Web-Enabled Safety System
An update on the status of WESS and feedback from the fleet.

Departments

2 Admiral's Corner — COs: You Can Prevent That "Knock on the Door"
The Commander, Naval Safety Center, discusses seven steps that will help COs improve safety within their command.
By RADM Dick Brooks

3 Good, Bad and Ugly
Three photos and captions about safety issues seen around the fleet.

26 Bravo Zulu
VR-52, VAQ-133, VFA-83, NAS JAX Base Operations, VAW-113, HM-15, VFC-12, VFA-122, VAQ-139, VP-10, and VFA-83

29 Work Zone
Critical Days of Summer—Plan of Action

30 Crossfeed
Maintenance experts sound off about the dangers of smoking near the workplace, vehicle incursions on runways, keeping track of rags, and maintaining a clean work center.

IBC Class C Mishap Summary



pg. 9



pg. 22

COMNAVAIRFORINST 4790.2 is coming!

By AZCS(AW) Al Linthicum, Patuxent River, Maryland

The first version of the Naval Aviation Maintenance Program (NAMP) issued as a Commander Naval Air Forces (COMNAVAIRFOR) instruction is scheduled for release in April 2005. The basic instruction will remain with OPNAV. The NAMP is sponsored by the Chief of Naval Operations (CNO) and shall be implemented by COMNAVAIRFOR per OPNAVINST 4790.2J.

A complete list of changes incorporated into the new NAMP is available on the Naval Safety Center website at the following address: <http://www.safetycenter.navy.mil/aviation/articles/namp.htm>



Admiral's Corner
From Commander, Naval Safety Center



COs: You Can Prevent That “Knock on the Door”

After countless portrayals on TV and in the movies, the scene is too well-known: A military vehicle stops in front of a home. One or two uniformed officers get out, walk somberly to the door, then knock or ring the doorbell. A mother, father, husband, wife, or other family member is about to learn the tragic news they have lost their beloved service member. Any loss is devastating but especially so when it’s from a preventable mishap.

Meanwhile, writing a letter to the family of that service member who died in a non-hostile mishap is one of the most difficult aspects of command. No commanding officer who has to write such a letter can avoid the silent frustration that comes with knowing, in most cases, the mishap could have and should have been prevented.

Today, commanding officers have access to many tools critical in greatly reducing, and one day eliminating, personnel losses from avoidable mishaps. Used with and incorporated into the routine operations of any afloat, aviation or ashore unit, actions like the following will help COs avoid having to write such letters and will spare families from that dreaded knock on the door.

1. Regularly visit the Naval Safety Center website and use the tools it offers at: www.safetycenter.navy.mil.

2. Schedule a baseline on-site safety survey, culture workshop, and/or online Command Safety Climate Assessment Survey (CSCAS). The CSCAS includes the Maintenance Climate Assessment Survey (MCAS) and the Command Safety Assessment (CSA), as appropriate for the command. A culture workshop helps unit COs better understand their command culture and provides outside risk-assessment data. The Command Safety Assessment survey looks at an organization’s operational practices from a safety perspective. For afloat units, the Afloat Safety Climate Assessment Survey (ASCAS) is a new tool that helps assess the shipboard safety climate. Ashore commands can use the ESCS or Employee Safety Climate Survey to assess the command’s overall safety climate and determine areas needing command attention.

3. Ensure the command has solid welcome-aboard, sponsorship, and mentorship programs, addressing both on- and off-duty safety issues. The programs must be updated regularly, and their successes must be measured by feedback from those members whom they are intended to serve. As you update your command mentorship program, ensure that embedded within the program are procedures to identify and track the command’s potential and known high-risk personnel. Some

members who might fall into this category include those who drive motorcycles, command members with a history of speeding tickets or other vehicular moving violations, known “thrill-seekers,” and those with a disciplinary record. Train all hands about the cold, hard consequences of misbehavior, not following the rules, and not adhering to safety best practices. Make appropriate page 13 entries, documenting training.

4. Leadership must maintain high visibility within the command and regularly demonstrate the chain of command’s commitment to safety. Take all mishaps seriously, and treat them the same.

5. Ensure all hands understand that each command member is held individually accountable for his or her actions and must follow regulations and established procedures.

6. Make operational risk management (ORM) work in the command; stress using it in all daily activities, both on and off the job. ORM is a proven decision-making tool that focuses on anticipating and identifying potential hazards and mitigating them. Doing so reduces potential injuries or equipment losses. ORM uses five steps for managing risk and is applied at one of three levels, depending on the situation. More ORM information is on the Naval Safety Center website at: www.safetycenter.navy.mil/orm.

7. In all communities, review how your team accomplishes crew resource management (CRM). With human error contributing to almost 90 percent of all mishaps, CRM focuses mishap-prevention efforts on people. Key CRM elements are situational awareness, assertiveness, decision-making, communication, leadership, adaptability and flexibility, and mission analysis.

All of these actions require proactive leadership and a safety cultural mindset that results in best practices 24/7. This safety mindset also must include family members. Safety education for dependents can be passed through familygrams, commanding officer “town hall” meetings, and command ombudsmen.

We can all take the steps necessary to prevent one of our families from having to face that dreaded “knock on the door.” The tools and leadership already exist; we just have to put the two together.

RADM Dick Brooks

Good

A large sign reminding drivers to buckle up is a good thing (the box isn't as bad as this photo shows).



Bad

Wearing rings in the workplace is a dangerous thing. Many Sailors and Marines lose or injure fingers every year. Take off unnecessary rings, watches and jewelry.



Ugly

Always keep your eye on landing aircraft, so you don't get caught by surprise!

It Can't Happen to Me!

Submitted by Safety Department aboard USS Harry S. Truman (CVN-75)

It was early on the morning of Nov. 26, 2004. The ship had been conducting normal operations in support of Operation Iraqi Freedom. We were starting another routine aircraft move, re-spotting the deck after normal flight operations. Thinking everything was “routine” should have been my first clue that something was not quite right.

We had been conducting cyclic operations from noon to midnight every day, and today was no different. We had settled into our routine since arriving in the area two weeks prior. We usually re-spotted the deck after the last recovery.

I had reported aboard in May 2004 and recently had completed 90 days TAD to the Supply Department as an FSA.

I only had been back on the flight deck as a blueshirt for a few weeks; yet, I felt comfortable on the flight deck and in my job.

The move crew was told to re-spot an S-3 Viking from the point to deck-edge elevator 1. After the tow bar and tow tractor were hooked up, the aircraft director gave the signal to pull the chocks and chains, and the aircraft was broken down and prepared for movement.

As the S-3 started to roll, I noticed a chain was in the way of the tire. Instead of blowing my whistle to stop the move, I incorrectly decided to fix the problem by trying to reach under the rolling S-3 and grab the chain. I misjudged the proximity of the tire to my hand and the “speed” of the slow-moving aircraft. My reaction was not as fast as I thought, and, as I grabbed the chain, the tire ran over my hand.

The pressure and weight of the aircraft blew open the palm of my hand. The pain was excruciating.



After being evacuated from the flight deck, I underwent emergency surgery on board to fix my wrist and to stitch up my hand. I then was flown to a local hospital for further surgery to repair my hand. I'm glad I was wearing my



Thinking everything was “routine” should have been my first clue that something was not quite right.



gloves, which gave me some protection and prevented oil, grease and dirt from getting into my open wounds. I feel extremely lucky to have only received broken bones in my wrist and fingers.

Had I followed wing-walker procedures, including blowing my whistle to stop the aircraft movement before reaching under the moving aircraft, I could have avoided this mishap. Had the aircraft run over the chain, there would not have been any damage to the chain or the plane's tire.

This mishap underlines the importance of PQS, OJT, and supervision by the move director. Follow the tried-and-true procedures that often have been written in blood, in this case, mine! ✨

Respecting the Power of Electricity

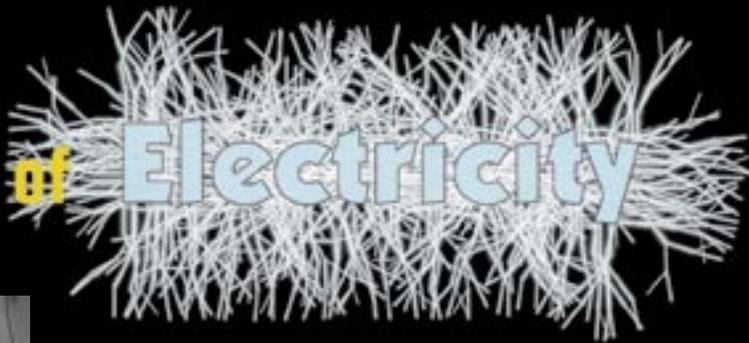


Photo by PHAN Ricardo J. Reyes

By AT3 Sean Smart

It was a beautiful day in Fallon, Nev. We had been operating for two weeks as an airwing det and finally were getting into the groove of things. That morning, I went out to aircraft 600 with an ATAN for a routine man-up. When we got to the power station, we pulled out both power cords to perform our pre-power application procedures. After pulling out the cords, we proceeded to the aircraft for our inspection. Inside the aircraft, we made sure all circuit breakers were pulled and all knobs and switches on our control boxes were in the proper positions. We exited the aircraft and made sure it was grounded before we applied power. The ATAN headed to the power station, which we thought was secured, and waited for me to insert the power cords into the aircraft-power receptacles.

I picked up the first power cord to insert it into external power receptacle No. 1. As soon as I inserted the plug, I heard a loud pop and saw a bright blue arc of electricity about the size of a basketball shoot out from the receptacle area. I was thrown back about four feet onto the starboard mainmount.

The ATAN rushed over to me and asked what had happened. After a moment of cursing at myself and kicking the ground, I told him I had been shocked. I

immediately walked over to the power unit and discovered that the power cord was energized—the power never had been secured! I secured power to the cord and inspected the cord leads and the aircraft receptacle leads. I saw that no damage had occurred to either. I plugged in the cord and turned on power to the unit and the aircraft. I instructed the ATAN to go on with the man-up as usual and that I would return in a few minutes. I dizzily walked back to my workcenter, informed my supervisor of the incident, and immediately was taken to medical.

My main error was that I did not inspect the external power unit before I attempted to plug in the external power cord. I always had assumed that the person using it last would not remove the cord from the aircraft unless it was de-energized. The process is somewhat similar to changing a light bulb. You need to make sure the switch is off before you try to screw or unscrew the light bulb. Had I taken a moment to notice the light on the power station was on, I easily could have pushed the off switch and avoided the shock. Instead I jeopardized my life and took up precious man-hours that could have been spent helping maintain aircraft.

The lessons learned go beyond simply making sure that power is secured before plugging in the cord. Attention to detail is the key. Overlooking minor details can cause big problems in the end, and vice-versa. Attention to minor details will help avert these problems. My mom always said, “A stitch in time saves nine.” Well, it really does. Had I been able to go about the man-up without being electrocuted, I wouldn’t have had to waste two hours being prodded in medical. I had to have an EKG performed to make sure my heart hadn’t been knocked out of beat. Also, my LPO wouldn’t have had to waste two hours waiting and worrying at medical.

The biggest lesson learned is to respect electricity: 115 volts does not sound like a lot to some people, but, believe me, it is. Keep that in mind when working with and around electronics in the Hawkeye community. 🍀

AT3 Sean Smart is with VAW-117.

Big Surprises Can Come in Small Packages



By AT3 Pedro Godinez

I have read about other mishaps in *Mech* magazine and thought to myself, “Well, that’s stupid. Weren’t they thinking?” Now you can read my story and learn how quickly you can hurt yourself when you don’t think about what you are doing.

Having worked all night on a college report, I dragged myself out of bed after only four hours of sleep and went to work. I began troubleshooting an electronic discrepancy for a radar transmitter used in the S-3 Viking. I set up the transmitter, and the support equipment flashed an advisory on the monitor, “WARNING! 17,000 volts will be present during final testing stage. Ensure safety covers are installed.” At this point, I just wanted to get this gear ready for issue (RFI) and finish the job. I thought to myself, “I’ve done this plenty of times; I can skip this step and save 15 minutes.”

I came to the last step of the troubleshooting process and finally got what I wanted; the screen read: Unit under test is RFI.

Yes! I had gotten it done. As I detached the grounding clip from the transmitter, full of pride, I forgot that the transmitter still was charged. There was enough charge on one of the contact points (that should have had safety covers) to arc through the air, enter my right hand, travel through my chest, exit my left forearm, and knock me back three feet—all within one second.

Fortunately, my co-worker was standing behind me and immediately called for help. I was stunned for a few



minutes as the paramedics looked me over and tried to determine the extent of my injuries. At this point, the whole shop had shut down for a safety inspection, and khakis were everywhere, investigating what had happened. Due to the nature of the injury, an ambulance carted me to the nearest trauma unit, where doctors monitored my vitals for the next two days.

Between the sirens blaring from the ambulance, paramedics inserting needles in every limb of my body, and the burnt smell from my skin; I thought to myself, "I should have taken those extra 15 minutes. I could have been having lunch right about now."

Please don't become complacent about safety procedures. The moment you start thinking it won't happen to you is when you just might find yourself lying in the trauma unit with a rectal thermometer measuring your vitals—I still can't figure out the purpose of that procedure. 🦋

AT3 Pedro Godinez was assigned to AIMD, NAS North Island, California, at the time of this incident.

What safety precautions do you or your shipmates routinely ignore in your haste to get the job done quickly? Are you willing to become the next mishap victim because of a shortcut that may save you 15 minutes?—Ed.

Be Sure to Read Between the Lines

By AE2 Ron Ellis

I had checked into my new command six months earlier. As a prior aviation electrician's mate collateral-duty inspector with more than six years of experience, I felt comfortable with my knowledge of the P-3C platform.

That comfort level led to this mishap.

It was a normal day. We were asked to assist the AMEs in reading out the electrical continuity to a primary cartridge-actuated device (CAD) for the engine fire-extinguishing system. They had replaced No. 1 primary CAD, and the maintenance manual requires a check of the system following installation.

I was inexperienced with this task, so I asked another electrician to guide me through the process. We went to the aircraft with the maintenance manual and the test set and connected the equipment, following the manual.

My first big mistake was adhering only to the steps related to the portion of the system being checked. In my haste, I disregarded a **WARNING** statement that read, "Failure to remove all cables can result in accidental activation of CAD."

Unlike most electrical systems, the CAD system is designed with an alternate path, which is activated upon loss of power to the primary path. I pulled the circuit breakers for the engines I was testing, but I didn't disconnect the harness leads. I effectively had prepared the system to fire off as soon as I tried to read the circuit.

I looked at it from an electrical standpoint: "Securing the circuit breaker to the alternate system would prevent the CAD from being energized," I thought. So I pulled the breakers and skipped ahead in the book to the steps I thought would test the system.



Bam! The explosive device (CAD) in the No. 2 extinguishing bottle suddenly activated and routed extinguishing agent to the No. 1 motor via the transfer circuitry.

I immediately stopped my work, secured aircraft power, and went into maintenance control to report the mishap. Quality assurance was notified expeditiously, and an investigation was conducted. The QA team concluded that my disregard of the warning, e.g., skipping an important step in the maintenance manual, directly led to the mishap.

It sounds basic, but I'll say it again: There is a reason for the **WARNING** notations written in our publications. People in the past have made similar mistakes that have caused loss of life and equipment. Under no circumstances should any step in a manual ever be disregarded for any reason.

Trust me: If it can happen to me, it can happen to anybody. 🦋

AE2 Ron Ellis is attached to VP-4 at MCAS Kaneohe Bay, Hawaii.

Super Hornet Smack *DOWN!*

By AD1(AW) Joel Leaver, VFA-102

It was a beautiful Saturday morning on the flight deck of USS *Kitty Hawk* (CV-63), and Diamondback 106 was getting ready to launch. As the plane captain gave the signal for the pilot to move the control stick to the right, a troubleshooter from another squadron tried to walk under the exhaust nozzles. The left horizontal stab hit the troubleshooter and knocked him down to the deck. His limp body came to rest against the deck-edge combing.

Our line LPO and two other ground-crew members helped the shipmate down into the catwalk. He was lucky; had he gone one more foot, the ground crew would have had to tend to injuries from both a “stab smack” and a six-foot fall to the grating of the fueling station in the catwalk below.

This incident was the result of a greater problem. For some reason, people do not give aircraft-control surfaces the respect they deserve. I spend more time preventing people from walking under the stabs than any other danger area around a jet. Any hydraulic-powered movable surface has an inherent risk that must be weighed. A Super Hornet horizontal stab has 3,000 psi of hydraulic pressure, and its trailing edge can move 10 feet per second. Also, the trailing edge is only 3 feet from the deck at full deflection. No one who works on the flight deck is small enough or fast enough to stand under and clear that hazard. So why do people continue to dart under this area?

Those of us who work in NAVAIR know that all of our publications and instructions are “written in blood.” Will it take the death or crippling injury of a hard-charging Sailor who was taking a shortcut under an aircraft-control surface to open everyone’s eyes?

Only trained and qualified flight-deck personnel should pass behind turning aircraft, and then only on a very limited basis. There are times when a shortcut may seem to be in order, but at what cost? Always weigh the risk-to-reward ratio. In this situation, the risk of being knocked unconscious by a horizontal stab to save 10 seconds by passing under the nozzles, rather than going around, is not an acceptable trade-off. ORM is not a catch phrase; it is not something to be used when it’s convenient.

This time, the troubleshooter wasn’t seriously injured, but he certainly could have been. A broken neck and paralysis for the rest of his life are just two of the thoughts that flash through my head each time I see someone go underneath the stabs while a jet is turning.

Is 10 seconds of saved time worth the possibility of missing the opportunity to teach your children how to dance, ride a bike, throw a football, shoot hoops, or swing a baseball bat?

“Never in a million years!” is my answer. What’s yours? 

A left horizontal stab hit the troubleshooter and knocked him down to the deck.

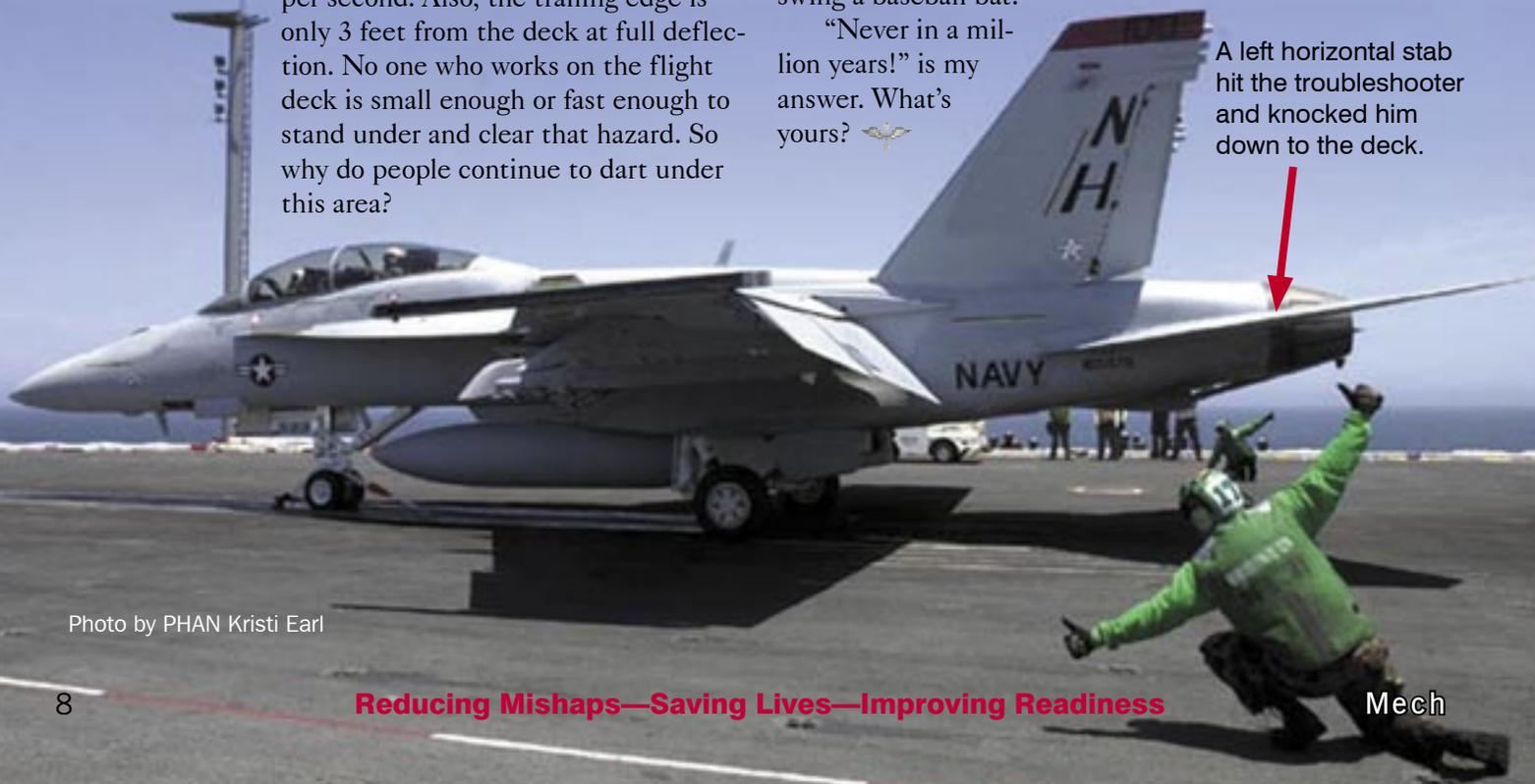


Photo by PHAN Kristi Earl

Stop Sucking Soap!

By ABH3(AW/SW) Travis M. Ward

While deployed on board an LHD, I was involved in a mishap with two junior Sailors, a hose, and a bucket of flight-deck soap. This soap, also known as Calijen Fast Clean, is a highly concentrated liquid detergent containing 4 to 5 percent potassium hydroxide. The MSDS (which I didn't read) lists potassium hydroxide as "highly corrosive" and "a severe poison." Unaware of these dangerous and potentially fatal characteristics, I was the first of three personnel who tried to siphon the soap by mouth with a hose.

While refueling a helicopter, a small fuel spill occurred. As part of the crash and salvage team (V-1), I was assigned the task of assisting the aviation fuels (V-4) personnel. I had to obtain some flight-deck soap to wash down the deck at the site of the spill.

The plastic hand pump normally used to siphon soap was broken. Thus, I felt I had to resort to the only other technique I knew for retrieving soap from the 55-gallon barrel. I led two impressionable, junior airmen over to the catwalk, where the soap barrel was secured. Considering the fact I had wrongly, yet successfully, siphoned flight-deck soap before, I wasn't aware of the harm in doing it "just one more time" would cause.

Like before, I started to suck the liquid detergent through the hose with my mouth and achieved more than the desired vacuum. I got soap in my mouth and



immediately dropped the hose to go rinse with water. In my absence, the two junior airmen picked up right where I left off. One was unsuccessful; the other airman, though, actually swallowed a mouthful of soap. His throat began to burn. The active ingredients of the soap were attacking the surface of his esophagus. In the meantime, someone showed up on the scene with an operating pump. We took our shipmate to medical, where doctors informed us flight-deck soap is toxic enough to burn right through an esophagus or even kill you.

Fortunately for all of us, the amount of fluid the airman swallowed was not enough to seriously injure him. The end result was one night in the medical ward and a weeklong bad taste in his mouth. A swollen esophagus and a week of painful swallowing sure beat going to a funeral.

Improper, unauthorized procedures are not only wrong; in this case, they could have been fatal. This incident demonstrates how junior personnel often will follow blindly the lead of someone in a senior position. I knew I was doing

something wrong; yet, I persisted, and someone else was harmed as a result. I learned from the experience why it's so important to train everyone the correct way. Be smart, and learn from my mistake. Don't cut corners; do things by the book, and stop sucking soap! 

ABH3(AW/SW) Travis M. Ward is assigned to USS *Essex*, V-1 Division.

Hellacious Huffer Hose

By AT1(AW) Steven Tidwell

I am not a random Sailor; I am your co-worker, the guy you see walking across the hangar bay, and this story is about a time when I was working as a QAR in the quality-assurance division at VF-143. This incident occurred in the hush house at NAS Oceana during a high-power turn.

We were conducting a leak check on an engine due to high oil consumption and had completed the normal safety brief and procedures review. At the hush house, the procedure is to leave the huffer hose connected to the aircraft in case of a tail-pipe fire. After we brought the engine on-line, we removed the aft fixed cowl and placed it outside the hush house because of the risk of it becoming a missile hazard. We then started the high-power turn.

The mech with me told the plane captain to throttle up the engines, and we clipped into the chain designed to keep us from being blown down the exhaust tunnel. We opened the daily door and started searching for the oil leak. The mech saw that I was looking at the forward part of the engine, so he turned to go aft. At this point, the huffer hose (which, unbeknownst to us, still was charged) separated approximately 12 inches below the nozzle used to connect the hose to the jet. I saw flames and was knocked backward into the mech. I rolled out from under the jet, and the mech followed.

At this point, I was on fire. In an effort to extinguish the flames, the mech rolled me over three times. I then pulled off my goggles and propped myself up on my left elbow to assess the damage. My right hand was peeling at the knuckles and was black and gray. My jacket had a spot of rubber about the size of a dime melted to the sleeve, and my embroidered nylon crow was beaded up.

My chief was in the observation booth with the hush-house operators. The turn person shut down the engine shortly after he saw the explosion. My chief ran out and saw that both the mech and I were burned and called 911. The base fire-department personnel arrived, and the only thing I heard was, "Get Nightingale [helicopter ambulance] here now!" My chief was saying, "They are just covered with soot. It isn't as bad as it looks."



It took three days to get the seal scrubbed out of my face, but, if I had not been wearing my goggles, I probably would have lost my left eye (and maybe the right one, too).

I was transported to Virginia Beach General Hospital, where they cleaned me up a little and dressed my burns. We were directed to Portsmouth Naval Hospital to see a plastic surgeon. They said the only thing I could do was to sit in the bathtub with a bar of soap and a washrag and scrub my face. This process hurt like hell, and I don't recommend standing if this has to be done to you because it will make your knees buckle.

The squadron found out that the airstart check valve had failed open, which allowed 1,100-degree-Fahrenheit engine bleed-air to charge the huffer hose in reverse.

🔥 in the Hush House



Eventually, the huffer hose, which was only designed to handle starter air at ambient temperatures, failed at a point roughly 36 inches from my head. I was able to examine my cranial two days after the incident, and the seal on the goggles was gone on the left side where it had melted to my face. It took three days to get the seal scrubbed out of my face, but, if I had not been wearing my goggles, I probably would have lost my left eye (and maybe the right one, too).

I hope this information gets your attention if you sometimes don't wear your PPE, because you never know when or where PPE will be the only thing between you and a lifetime of regret.

It is human nature to assume "it won't happen to me," but the fact is that "it" can and does happen to

somebody somewhere every day! Is it really worth the risk not to wear your PPE because it's "dirty," "uncomfortable," or "too scratched up?"

I represent Joe Sailor, you, and the maintainer next to you who are doing a hard job well every day. Because we're professionals, we follow the rules everyday. On this unfortunate day, though, when "it" couldn't possibly happen, it did. I'm thankful my cranial and goggles were in place to protect my eyesight, my ears, and possibly my hearing, as well. In addition, my jacket prevented serious burns to my upper body. 🦋

AT1 (AW) Steven Tidwell has made a full recovery and now serves as VF-143's IWT branch leading petty officer.

The Last Line of Defense

By AM2 James Cameron

What happens when a CDI or CDQAR gets too involved with a job? Some days, nothing happens, and everything goes just as planned. Then there are those days when things go very wrong, like this one...

It was a beautiful Sunday afternoon in Bahrain; it also was my duty weekend. We had an uncommon maintenance task: One of our UH-3H Sea King helicopters, Desert Duck 748, required a new tail-rotor cable. The daily maintenance meeting was scheduled at 1300 because the cable was not due in until around 1600. Following the maintenance meeting, we began the same old routine—daily and turn-around inspections, servicing, etc. It can all get a little boring sometimes. I can't speak for the other maintainers there that day, but when the senior chief told us the cable was in, I was excited about the project and was ready to work.

Three of us (two senior E-5s and one E-4) were assigned to install the cable. We got our tools and pubs and headed out to the bird. Having installed several of these tail-rotor cables on other aircraft, I felt I had the experience to get the job done right while passing on some of my knowledge. After a quick look through the book, I started routing the cable through the ribs and fairleads, answering questions while I worked. With the cable installed, we started tightening up the fairleads and re-installing the guide pins we had removed earlier. Here's where things went really wrong.

As it turned out, we hadn't removed all of the guide pins (as specified in the pub I carried out to the aircraft). So when I ran the cable over the pulleys, it also went over one of those guide pins. And wouldn't you know, it was the one in the very back that you can't see without a mirror. Oh, I thought the cable was under it because, when I tried to slide the pin back and forth in its mount, it moved. However, the reason the pin moved was because the cable didn't have tension on it yet. Thinking the cable was routed correctly and running smoothly along all of the pulleys, we completed the tension checks and "quick rig." With our job complete, we went to enjoy our Bahrain liberty.

Two days later, I got a call from the senior chief, telling me that the chief was on his way to pick me up to come into work. I couldn't imagine why they would need me to come in five hours early. The day before,



Desert Duck 748 had flown a 6.0-hour flight with my improperly installed control cable. After a scheduled tension check of my tail-rotor cable, they had discovered my "grave" mistake. Six flight hours with that cable rubbing against a guide pin progressively had broken about 15 or 20 wires. Had it not been for the required tension check at five to 17 hours, it might have launched again and not come home.

So where did I go wrong? Let me count the ways...

I had the book at the aircraft and went through the maintenance procedures but, obviously, not well enough, or I would have removed all of the guide pins. The MIMs clearly tells maintenance personnel to remove all

of the guide pins and reinstall them only after the cable is routed completely and tensioned.

I felt comfortable with the job, and overconfidence got the better of me. This job was supposed to have been a simple remove and replace. I got a little complacent with the task.

I should not have been in such a hurry. I would be lying if I said I didn't want to get out of there on a duty weekend.

It was hot that day, and the tail cone of an UH-3H can get miserable sitting in the flight-line sun.

Finally, I should have had someone else look at the installation. Even with my CDQAR designation, it doesn't hurt to get another pair of eyes on it.

So how do we prevent a recurrence? No matter how simple a job or how many times you've done it, read the pub thoroughly. It might be that one sentence or warn-

ing you skip over that could prevent something like this from happening. Maintenance control was not rushing us that day. Just take your time. Liberty is always nice, but getting the job done correctly is the top priority. One mistake can prevent a flight crew and passengers from returning from a mission. Probably the most important thing is to put your ego in check and not be overconfident. Ask someone else to look at your work. It does not mean you don't know what you're doing; it just means no one is perfect. ✨

AM2 James Cameron wrote this article while deployed with HC-2 Desert Ducks in Manama, Bahrain.

Attention to detail is the key to maintenance success, and the author recognizes the multiple factors that led up to this incident. However, asking someone else to look at your work is not a sign of weakness. It is required by NAMP 4790.2H: "CDQARs shall not inspect their own work and sign as inspector." —Ed.

Cruisin' for a Bruisin'

By CWO3 Charlene Boucher

"Hmmm, where am I?" I wondered, as I squinted into the sun. I heard a car door slam, then someone ran past me, and I heard a person laughing. For some reason, I was disoriented, and I couldn't seem to focus. I felt cool grass under my bare legs and sat up as another man hurried by and looked at me.

Suddenly, it hit me—the last thing I could remember was driving south on Interstate 15. "Where's my Jeep? Where are my wallet and keys? What have I done?" I wondered. I glanced at my watch and realized two hours had passed since I last checked the time.

Finally, my vision cleared, and I saw my Jeep parked—with my backpack and wallet on the passenger seat and the keys in the ignition. Here's what happened.

It was one of those really hot days, and I had been feeling good as I headed south to San Diego in my new

Jeep Wrangler. The top was down, and the hot wind was whipping through my hair. "I love this Jeep!" I said to myself.

There was only one problem: I had consumed my last root beer, no town was in sight, and my eyelids were getting heavy. "Maybe if I take an ice cube from the cooler... sheesh, it's hot; the ice is melted," I thought. "I'll splash some water on my face, instead."

Unfortunately, none of these efforts worked. I really was having trouble keeping my eyes on the road, my head off the steering wheel, and the Jeep between the lines. After slapping myself silly, I finally found a rest area 10 miles down the road. I pulled in, parked and sprawled on a nice patch of thick, green grass under a small shade tree. In no time, I passed out—never once thinking about the hazardous situation in which I had placed myself before I pulled off.

We hold safety and risk-management training at work all the time, and I'm always preaching these items to my junior troops. In this case, though, I took too long to heed my own advice. It was scary thinking about what could have happened to me. "What if I had fallen asleep at the wheel?" I thought. "What if I had been robbed, beaten and left stranded with no vehicle?" The reality is that we can't afford just to "talk the talk." We also have to "walk the walk." ✨

CWO3 Charlene Boucher was assigned to VAW-117 when she wrote this article.

ORM Never Should Take a Holiday

By AZ1 Aaron L. Chaney

Because I'm a member of the command's enlisted safety committee, I had hoped I'd never do anything that would become fodder for an article in a safety magazine. After all, I'm an E-5 with more than 10 years of service, and I've been both a student and a teacher during safety stand-downs.

My story is about a trip home I made before deployment. I completed my vehicle checklist and left Norfolk. Because it was a nice day, I decided to take the scenic route: a state highway, instead of the interstate.

At 2100, I was on a stretch of road through a beautiful national park when my right, front tire blew. I was traveling uphill, and I concentrated on steering while my car slowed. To quote many an aviator, "There I was..." stopped on a two-lane road on top of a mountain in the middle of a forest, with no ambient light other than what my car provided. Here is where I almost dropped the ball.

I unpacked my truck and removed the spare tire and jack, then moved to the front. At this point, I realized my luggage on the ground might prevent a passerby from seeing my vehicle until it was too late, so I repacked everything. I hate admitting I already had jacked up the front tire before that little voice spoke to me: "middle of the night, two-lane road, flat tire, no flares or lights, not exactly the best place to change tires."

With visions of a mishap report quickly forming in my mind, I lowered the truck, stowed my spare and jack in the passenger seat, and drove very slowly to a safer area. I found a stretch of road with a passing lane and a house nearby, so I changed tires and continued to a convenience store in the next town. I was lucky enough to find a Navy recruiter there who directed me to a motel and told me where I could get my tire repaired the next day.

What did I learn from this experience? First, don't forget to take your ORM training with you.



Second, the unexpected can and will hurt you. I have to wonder if the results would have been the same if my tire had blown on the interstate, with its 70-mph speed limit. The speed limit on the state highway was only 50 mph. The interstate would have provided a shoulder, but I know the faster speed would have increased the dangers. I'm glad my vehicle checklist included verifying the pressure in my spare tire.

Third, take your time. I started getting in a hurry because I knew the flat would put me behind schedule. Ensure your vehicle is back to 100 percent before continuing. "Better late than never," is a cliché but true.

Fourth, you find shipmates in the strangest places. What are the odds of finding a BM1 in uniform in a small mountain town in West Virginia? 

AZ1 Aaron L. Chaney was assigned to USS *Harry S. Truman* (CVN-75) when he wrote this article.

Every year, military personnel are killed when they are struck by traffic while alongside major roads and highways. If you have to stop on the side of the road, be sure to leave yourself plenty of room. —Ed.

Aircraft Tow Crunch

By VMAT 203 Corrosion Control



It was just another day for the Marines in corrosion control. Night-crew workers routinely assemble in the shop, and, on this day, all seven of us were present. The motivation was running high because this night was our last before the weekend began.

The shop NCOIC returned from the evening maintenance meeting and tasked us with moving a jet to the wash rack. All six tow-crew members required to move a Harrier were inside the shop and ready to go. We all grabbed our cranials and headed out toward the flight line. Everybody walked right past the whistles on their way out the hatch. This was mistake No. 1.

The flight line was wet because of the heavy rain that day, and Mother Nature kept pouring it on. Nevertheless, we ran out to the jet, pumped up the brake pressure, and took our positions to tow the jet. I was the starboard-side wing-walker. As the jet approached the taxiway, the other wing-walkers did an about face and began to walk back toward the hangar. It doesn't take an entire crew to tow an aircraft on the taxiway, but everyone is required to back the jet into its spot once it reaches the wash rack. This was mistake No. 2.

I ran up to the tug and got inside the cabin. Once we reached the wash rack, the tug driver began to back up the aircraft. At this point, there were no wing-walkers! This was the third and final mistake. I remained in the cabin of the tug to avoid the weather. The imaginary drill instructor I call "Sgt. ORM," who sits on my shoulder shouting orders to my conscience, was tied up and gagged. My poor judgment was the culprit. These mistakes were prerequisites to what unfolded next.

I heard a loud crunch, which prompted the driver to stop and try to pull the aircraft forward. When he did that, I jumped out of the cab and chocked the jet. The driver and I then surveyed the damage.

An I-beam supporting a shed near the wash rack had torn through the airframe on the starboard wing tip. The driver and I disconnected the towbar,

and he made his way back to the squadron. Maintenance control and quality assurance were not too happy with what they saw.

This particular mission was doomed from the moment the tow crew stepped out of the shop. Six Marines walked out to the jet without conducting a pre-move safety brief. No one recognized we didn't have the proper gear. Once everyone but the driver and I abandoned the jet, no one had the fortitude to halt the operation. Even when the job was in its final stages, the mishap still could have been prevented, but I decided the procedures in place did not apply to us. I put too much confidence in the driver and didn't even get out of the tug.

As a result, the entire squadron has lost confidence in our shop. Too many mistakes were made for an entire crew to ignore. A tow crew is responsible for the safety of one another, as well as the safety of the aircraft. When you skip command procedures or rush an operation, the consequences far exceed any possible benefits.

Laziness, complacency, and lack of judgment are things that happen to the best of us. However, we, as aircraft maintainers, must have the sense to know that those lapses in ORM are more hazardous than any intake or prop. There were signs that procedures were being skipped before this incident, but, in this case, it took a mishap for ORM to really hit home. The incident could have been worse had a Marine been between that I-beam and the jet. Nobody would've seen or heard anything because there was an incomplete crew and improper gear. That realization should make every Marine and Sailor think twice before skipping procedures. 🍀

Missing Nut D

By AE1(AW) Brian Roberts

It was a warm April day, and the ship was pier-side in Dubai, United Arab Emirates. I was the detachment's LPO and the duty-section leader for the day. We didn't have any major maintenance requirements, so it was a perfect chance to troubleshoot outstanding gripes—maybe too good a chance.

After duty-section muster, I scrubbed the workload report and passed out assignments. We started on our various tasks. One of the outstanding gripes was a blade-fold problem on one of our two helicopters. Since I was the only electrician on duty, I began to troubleshoot the problem. As I was working on the yellow blade-fold harness, I dropped a nut. Looking back on this incident, it is hard to believe this one nut would start a chain of events that nearly led to a mishap.

I immediately began a FOD search. Not finding the nut, I realized that aircraft panels would have to be removed to continue the search. I went inside and had maintenance cut a MAF to remove the No. 1 and No. 2 engine intakes. They were removed and placed on the base of the open engine-cowling doors. Soon, the nut was found in the "crotch" panel of the No. 2 engine.

With the FOD excitement over, I worked the rest of the morning and into the afternoon on the blade-fold system. Once I was done, it was time to see if the system worked. Everything went well when power was applied. Next, I had to see if the blades would spread automatically. I asked a duty-section maintainer to act as a safety observer. He promptly came out to help me spread the blades. As we walked to the flight deck, he noticed the No. 1 engine intake sitting upright on the engine-cowling door, where it might get in the way during the spread. We removed the intake and placed it on the flight deck.

I got in the left cockpit seat and reached over to move the blade-fold switch to the spread position. Everything seemed to work as advertised. Suddenly, I heard a loud crunch, followed by a loud thud. I immediately knew we had a problem



and stopped the spread. One glance to the right answered my question. I could see the No. 2 engine intake on the flight deck. It hadn't been there just a couple seconds ago, so this sight definitely was not good.

I got out of the cockpit, walked over to the starboard side of the aircraft, and, as I rounded the corner, realized what had caused the loud crunching sound. The No. 2 engine-access cowling had snapped near the hinges, dropping the

rives Me Nuts



intake to the ground. How could this have happened?

I quickly replayed the chain of events. After finding the nut, both engine intakes had been left upright on the engine cowlings. When we came out to the aircraft, we approached and remained on the port side. We viewed the No. 1 intake as a hazard and removed it, but we didn't check the other side of the aircraft. The No. 2 intake also was left standing upright on the

engine door. As the blue rotor blade started to spread, it hit the top of the intake cowling, which soon was overloaded.

That "door" is rated to hold up to 400 pounds, but it snapped and made the loud, crunching sound. With nothing to hold it off the deck, it fell to the ground with a loud thud. The bottom of the blue rotor blade revealed a deep but O-level-repairable gouge.

The SH-60 plane-captain manual requires a minimum of four people to spread rotor blades: a safety observer, two wing-walkers, and a tech-

As the detachment LPO, I should have known better but allowed myself to be lulled into a false sense of security.

nician to operate the system. I had only two people. As the detachment LPO, I should have known better but allowed myself to be lulled into a false sense of security. I had spread blades a hundred times without any problems. What could go wrong on a bright sunny day in port?

My failure to follow established procedures turned a routine, simple task into something much more complicated. I also turned a fully mission-capable SH-60B into a non-mission-capable helo, requiring a functional check flight. We have established procedures to account for the unpredictable, and, had I followed these procedures, we would have recognized the problem and prevented this incident. 🌿

AE1(AW) Brian Roberts is the LPO with HSL-48 Det 5.

Be Careful What Y

By Cdr. Gary R. Schram and AM1(AW) Dawn L. Bryce



What better place to have an incident than right in front of a couple of khakis from your own wing...

CO: *“Congratulations, you won the Battle E!” I told my squadron, “Awesome! Our hard work had paid off.” Formal recognition and a bit more chest candy; I love it. Since we had been so busy, I hardly had noticed that the aircraft at the front gate (which everyone passes on the way to work) still had the markings of last year’s Battle E winner. Other type-wing aircraft already had their aircraft painted, but not us. We had a good excuse—we were gone. But now that we were back, we needed to get that fixed—like now. I called in our MMCO and said to get a crew up to the front gate and paint that aircraft with our squadron colors. On reflection, this was the start of a series of events that resulted in three separate incidents, all in an attempt to “get that bird painted.” Now, let me turn over the story to our corrosion LPO.*

LPO: On Friday, after the morning maintenance meeting, I was called into my MMCO’s office. He said we had won the Battle “E” for 2003, and the skipper wanted my workcenter (corrosion control) to paint our squadron colors on the static-display aircraft located at the front gate. He also asked if we could have it painted before our MMCO’s retirement, which was scheduled for next Thursday. I responded by saying we would do our best, but I knew we would be pressed for time and personnel.

I returned to my workcenter and told my shop about the MMCO’s request. We already had

a challenging workload and very few people to accomplish the tasks at hand. After discussing our workload and our new project, we came up with a game plan.

I reported to my division chief to see if he could help us get the special paint needed for the static-display bird. Because the paint would not be available until after the weekend, we planned on doing the painting early the next week. It was not until Tuesday that we had everything we needed and were ready to start our project.

That morning, I told two of my personnel to check out a B-2 stand and take it down to the front gate, a



You Ask For...



two-mile trip. We could not check out a tow tractor from the line or AIMD–GSE because they were all being used or otherwise were unavailable.

My AO3 decided to use the squadron's ordnance truck to tow the B-2 stand to the gate. There were two people in the truck, so that one could drive and the other could act as an observer. They proceeded to pick up the B-2 stand and drive down the flight line from our hangar to the flight-line access gate.

CO: *O.K.—let me jump in here. So far, so good. This project was being handled as expeditiously as possible. Using ORM at this point probably would have prevented what was about to happen. Lesson learned No. 1—apply ORM to any unusual project. Back to the story...*

LPO: While crossing the main road, the B-2 stand hit the overhead traffic-light wire, causing the light to fall to the ground and shatter. The ordnance truck's tail end was lifted completely into the air as the towed B-2 stand fell on its side. Some onlookers, who just happened to be a couple of CPOs from our wing, called security to the scene. What better place to have an incident happen than right in front of a couple of khakis from your own wing...

CO: *I was thankful no one was hurt. Unfortunately, the story does not end there. I had said I wanted that bird painted—make it happen!*

LPO: After talking it over with my division senior chief, we decided to go to a local squadron that had a diesel man-lift (A/S48M-2) and ask if we could borrow it. At 0830 on Wednesday morning, my senior chief and I ventured down to the flight line to check out the man-lift. However, neither of us had a license for it.

CO: *Uh-oh. Warning, warning—don't do it. Never check out gear you are not qualified to use. Doesn't everyone know that?*

LPO: I had operated this type of equipment for the last 10 years, but my license just had expired. At that point, I should have found someone with a current license, but, instead, I checked out the man-lift and proceeded to the job site.

After completing most of the painting that day, we headed back to return the man-lift. On the way, the man-lift started making a funny noise. I stopped and gave it a rest. After letting it cool, I started it back up and proceeded to the gate leading to the flight line.

Once I went through the gate, the man-lift died and started leaking hydraulic fluid. We checked it back in



and told the first class petty officer that it was leaking. Before we secured for the day, I told my senior chief what had happened. It was Thursday morning before I found out the hydraulic motor on the man-lift was blown.

CO: *Well, it was blown because it hadn't been operated according to specs. My "can-do" LPO, while trying to satisfy my desire to paint the bird at the front gate, did indeed get most of the job done but at too high of cost. But remember, the painting job is not quite done, and neither is this story.*

LPO: It now was Thursday morning, the day of my MMCPO's retirement. At approximately 0900, I directed my AM3 to check out a B-2 stand and tow it to the main gate to finish painting the static-display aircraft. While he was towing the B-2 stand, I acted as a safety observer. Base security was following behind our tractor as an escort.

While the tractor was making a turn, I moved to the side of the stand and saw an obstruction that crossed high above the road. It was steel framing along some steam piping that formed an overpass (the sign said 14'7" for clearance).

I yelled to the driver of the tow tractor, and he stopped. However, it was too late. The stand hit the steel frame, which caused the safety bars on the B-2 stand to break at the welds.

I was interviewed and talked to nearly everyone in my chain of command that day. I felt horrible! Three incidents in three days! On Friday morning, I called GSE, which provided a driver, but, understandably, they would not check out any of their gear to me. They towed a B-2 stand to the front gate for us, and we finished painting the static-display aircraft.



I was a Sailor wanting to get the job done with a limited amount of time.

CO: *I know what you are thinking, "This incident never would happen in my squadron." I'll let my LPO finish her story.*

LPO: I learned a lot from this experience. I take full responsibility for what happened. I failed to adequately use the ORM process and did not follow regulations when using GSE. I did not have a license for the man-lift. I did not have enough personnel or preparation for the job. I was a Sailor wanting to get the job done with a limited amount of time. The price I paid was heavy—damage to my professional reputation.

CO: *The fault is mine. Even though we just had won the Battle "E" and Safety "S" and were busy patting ourselves on the back, this happened and made us look like a bunch of amateurs. In the end, this was a cheap series of lessons. No one was hurt, but we took a significant hit in the credibility department across all levels of the chain of command. We immediately set about to correct our clearly obvious deficiencies. One of those lessons was this article.*

How is your ORM process? Is it as solid as you think? Everyone involved in this incident is a good person, who was working hard to get the job done. However, you still have to do it the right way. 

Cdr. Gary R. Schram is the CO and AM1(AW)
Dawn L. Bryce is the corrosion control LPO at VS-22.



The Dreaded H-60 LCFCTC Factor

By HS-2's Aviation Maintenance Administrators

No, not some mystery illness, storyline for a science-fiction show, or tongue twister. The life-cycle fatigue component-time conversion factor (LCFCTC) is used to determine the life remaining on certain components. The formula is easy to use and should keep squadrons out of trouble. We say “should” because the slightest mistake can bring on the largest problems—like it did in our squadron.

While on a detachment to NAS Fallon, Nev., we discovered an HH-60 had the wrong calculated percentage of component-life remaining for the blade-fold hinges on the main-rotor blade. We had flown more than 100 hours over the limit and didn't know the component was even close to high time. Things got even worse when we contacted the contractor who manages the helicopter dynamic/finite life components tracking (DYCOM-TRAK) program to research the installation data for the suspect hinge. We found that a second hinge on the same aircraft also had been flown beyond its penalty life limit.

Logs and records clerks in the H-60 community have the unique responsibility of tracking component life cycles for numerous components that are interchangeable among three different series aircraft—all with extremely different life-cycle times. The conversion of life-cycle time has been a serious problem in the H-60 community and has led to the discovery of many life-cycle components that have been flown well past their penalized life cycles.

Here is an example from the H-60 Periodic Maintenance Information Cards (PMIC). The blade-fold hinge for a main-rotor blade that is installed on an SH-60F or SH-60B will have a high-time removal of 12,000 hrs. The same fold hinge on an HH-60H has a high-time limit of 3,000 hrs. The PMIC makes allowances to convert back and forth between each type, model and series. We simply must calculate the percentage of life usage after the conversion. Here is an example of this conversion formula:

Item: MRH Fold Hinge

Hours: C4500 (TSN)

Gripe: Removed for cause from an SH-60B, and now being installed in HH-60H.



Photo by PH2 Patricia R. Totemeier

Acronyms for formula: (TSN) = time since new; (nm) = new model; (pm) = previous model; (RET) = removal time.

Sample formula: $TSN (nm) = [TSN (pm)/RET (pm)] \times RET (nm)$

Formula for this case: $TSN (nm) = [4,500/12,000] \times 3,000$ or $1,125 = 0.375 \times 3,000$. In this case, 37.5 percent of the life usage of the component has expired. In other words, 4,500 hours on an SH-60B equals 1,125 hours on an HH-60H. Subtract this number from the HH-60H removal time (RET) of 3,000, and you have 1,875 hours remaining on the MRH fold hinge that can be used on the HH-60H.

For the logs and records AZ, tracking life-cycle components can become quite difficult as components are moved among HH-60H, SH-60F and SH-60Bs because of cannibalizations, turn-ins for repair, etc. Components removed and processed through depots for repair also have had omissions in component-life accounting. This problem can cause the next “owners” to fly over the component's limit because of incomplete or inaccurate component-life documentation.

Make sure you understand and use the PMIC correctly. The DYCOMTRAK program can help to screen the various components that fall into this life-limit penalty situation. 

Mech doesn't get a lot of stories from AZs or AKs, but this story reports on a common problem. It also shows how AZs can cause mishaps that damage aircraft or kill aircrew and passengers. Some people forget how important it is to screen logs and records for high-time components. The effort to reduce mishaps demands that all maintainers review their procedures, manuals and paperwork. It's the only way we'll reach our goals. —Ed.

An Uplifting Experience

in the **Hot** Pits

By AN Travis Stillions

How many times do you hear, “Safety is the most important factor when working on or around aircraft?” And how many times, when you are feeling a “sense of urgency,” do you take the time to evaluate all the hazards? Despite my exposure to working with jet aircraft on a daily basis, I recently failed to recognize one of these hazards as it developed. I inadvertently placed myself in danger, and an alert shipmate saved me from harm.

My incident occurred while on detachment to Mountain Home AFB, Idaho, with my EA-6B Prowler squadron, VAQ-134. During two weeks of



training, we performed several “hot pit” evolutions, which are carried out after an aircraft returns from a flight and requires more fuel for an immediate follow-on flight.

Prowlers taxi through the hot-brake area to check the wheels and to secure the starboard engine. The aircraft then taxis into an area next to the fueling hose and needs to be grounded before the fueling hose is attached. Throughout the fueling process, the port engine keeps turning. Upon completion of the refueling, the aircraft taxis to another area to change the flight crew and to reconfigure for the next flight.

I had little experience with the “hot pit” evolution before this training detachment, but I quickly became comfortable with the process. This time, as a Prowler approached from the hot-brake area, the ground crew took their places. I waited patiently as the plane captain taxied the aircraft toward us and commanded the pilot to halt the aircraft. The starboard engine had been secured, but the port motor was turning.

With the plane chocked, I approached the port boarding ladder, removed the grounding strap, and proceeded to ground the aircraft. Knowing that the aircrew was waiting to take off as soon as we finished, I hurried to unwind the tangled grounding strap to expedite the fueling. Kneeling down, I reached forward, toward the attachment point in the nose wheelwell. Suddenly, I felt my

**Suddenly,
I felt my
jacket lifted
up by the
suction from
the intake.**

jacket lifted up by the suction from the intake. It happened very quickly, and, by the time I realized my mistake, a fellow ground crewman had reacted and pulled me to safety.

Upon reflection, I remembered watching the video of a trainee being sucked into an A-6E port engine intake, demonstrating the reason for avoiding the inlet danger areas around aircraft. Despite having that graphic image lodged in my memory, I somehow forgot those danger areas.

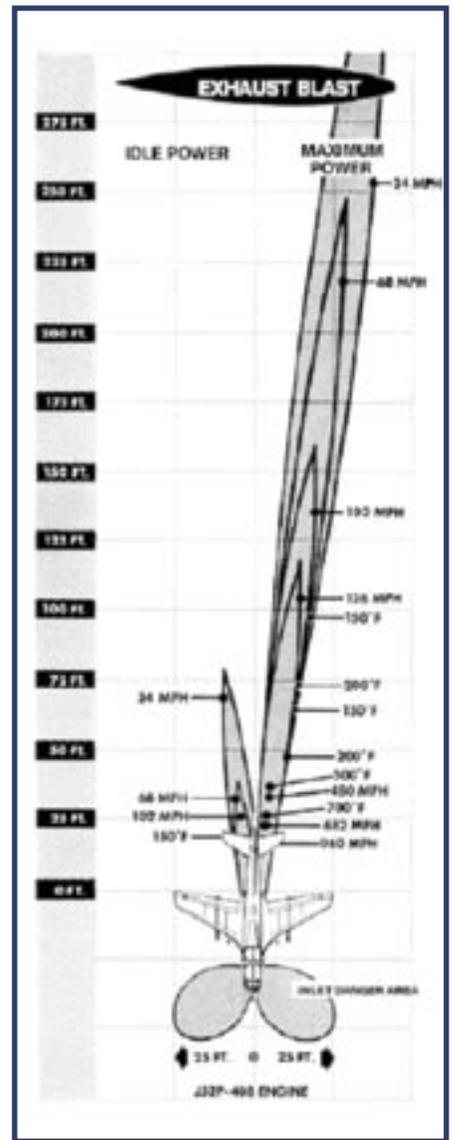
I wasn't injured, but the situation could have played out very differently. In addition to high-

lighting hazard-area avoidance, this incident taught me another valuable lesson: Under no circumstances should you allow yourself to become complacent while working around aircraft. The hair on the back of your neck should stand up whenever an aircraft's engines are turning and you need to work in the immediate vicinity.

As my maintenance officer told me during my check-in, “Nothing we do warrants losing a person or an asset. Safety is my most important concern.” This event was a vivid reminder of how important safety is on the job and will continue to be in my Navy career. 🌿

AN Travis Stillions has been in the Navy nine months. He is currently a plane-captain trainee in the line division, VAW-134.

Recognizing the similarities between a real-life event and an incident shown on videotape during training indicates that the safety training was on the right track. However, you still have to apply the lessons learned, whenever you go to work.
—Ed.



Naval Safety Center Accomplishments

2004 Victories

- ✓ ORM and High Risk Training OPNAV directives released December 04
- ✓ First Flag notification requirements for Class A mishaps
- ✓ *Traffic Safety Across America*—Road show and CD produced/distributed to the Fleet
- ✓ Institutionalized Culture Workshop program at NSC
- ✓ Launched upgraded version of WESS in July 2004 for improved fleet mishap reporting
- ✓ Agreement with Motorcycle Safety Foundation and Specialty Vehicle Institute of America
- ✓ Safety Campaign Plan
- ✓ Established the Navy/Marine Corps Safety Council (held meetings in March and September)

2005 Priorities

- Operational Risk Management**
 - Complete comprehensive review
 - Develop “cradle to grave” training
 - Implement OPNAVINST 3500.39B Operational Risk Management instruction
- Traffic Safety**
 - Complete baseline review
 - Further evaluate simulator use for Driver Improvement (AAA-DIP) and Emergency Vehicle (EVOC) training
- WESS**
 - Improve mishap reporting throughout Fleet
 - Aviation HAZREP reporting via WESS online April 2005
 - Aviation mishap reporting via WESS online December 2005
- Culture Workshop**
 - Introduce Culture Workshops throughout surface community
 - Increase use of available online safety surveys
 - Establish independent Culture Workshop division at Naval Safety Center



| FY05 through 27Mar2005 | Navy | | Marine Corps | |
|--|---------------------------|---------------------------|---------------------------|---------------------------|
| | FY04 Difference from Goal | FY05 Difference from Goal | FY04 Difference from Goal | FY05 Difference from Goal |
| GREEN indicates < goal; YELLOW indicates within 20% of goal; RED indicates > 20% of goal. | | | | |
| AVIATION CLASS A FLIGHT MISHAPS | <12% | >75% | >79% | <24% |
| SHORE/GROUND CLASS A MISHAPS (EXCLUDING MOTOR VEHICLE) | >22% | >22% | >76% | >144% |
| MV OPERATIONAL CLASS A MISHAPS | >8% | >34% | <2% | >60% |
| AFLOAT CLASS A MISHAPS | >10% | <32% | | |
| PMV FATALITIES | >31% | >39% | <8% | >3% |
| OFF-DUTY RECREATIONAL FATALITIES | >41% | >12% | >31% | <13% |
| TOTAL # OF MISHAPS | >20% | >61% | >34% | >64% |





Web-Enabled Safety System

WESS



Update: The WESS Reporting System

Background: The Web-Enabled Safety System 2 (WESS 2) for non-aviation mishaps and hazards (including aviation hazards) is on-line and ready for fleet users to enter data. WESS 2 was built to accommodate all the non-aviation reporting and record-keeping requirements of the revised instruction, as well as the current reporting and recording requirements in DODI 6055.7 and 29 CFR 1904. If you have to report mishaps or hazards, you can use WESS 2 (in lieu of a naval message or other means of timely reporting) to submit:

- currently reportable or recordable work-related injuries and illnesses
- all other on- and off-duty, non-flight-related Class B (or below) mishaps and hazards.

Any reports received via naval message or other means will be entered into WESS 2 at the Naval Safety Center to ensure the data is available for retrieval from WESS 2.

Feedback From the Users: Now that WESS is on-line, we've received valuable feedback from fleet users to help us get the bugs out. As with any new system, WESS has had problems with servers, displays, and a variety of other system processes. Bug fixes, enhancements and a number of new features recently have been added to WESS. Furthermore, we are always upgrading data-retrieval capabilities. A notice of these changes can be found at: www.safetycenter.navy.mil/wess/whatsnewwess.htm.

Here are a few of the enhancements and new features:

- USMC sections on the initial-notification report and database-insertion programs
- Additional training courses
- Improved search functions to find previous reports
- Upgraded and detailed motor-vehicle data entry
- More than a dozen new custom report sections for data retrieval and separate OSHA log reports.

For the full details on these and other fixes and upgrades, refer to ALSAFE 05-11, available on our secure website (<https://138.139.49.5>).

We're trying hard to make WESS work better as we all work toward reducing mishaps. Keep the feedback coming.

Coming: WESS for aviation mishap reporting will be available by December 2005.

For More Information: Details on this new system, a users' guide, feedback forms, help-desk link, frequently asked questions (FAQs), and information on getting a WESS account are available at: www.safetycenter.navy.mil/wess. You also can contact the WESS Help Desk using our Help Request Form, or by calling (757) 444-3520 (DSN 564), Ext. 7048, during normal business hours, Monday-Friday, 0800 to 1630 EST/EDT.

Sailors and Marines reducing mishaps

BRAVO Zulu



Send BZs to: SAFE-Mech@navy.mil

**AT1(AW) Larsen and AM2 Whetstone
VR-52**

During a routine inspection on a squadron aircraft, AT1(AW) Larsen and AM2 Whetstone went beyond the 18-inch rule and inspected the entire open area in the tail section. They noticed a cable-guard pin was worn on the elevator-cable sector.

This area is not on an inspection cycle, and the worn pin could have separated and led to jammed elevator flight controls. Their decision to look beyond the immediate area being inspected prevented a potential flight-control malfunction and possible loss of aircraft and aircrew.



**AMEAN Gary A. Baguio, Jr.
VAQ-133**

During a daily inspection on aircraft 532, AMEAN Baguio discovered the bolt-nut combination attaching the drogue shackle to the scissor shackle assembly on ECMO-1 seat drogue parachute was installed improperly. Had this gone unnoticed, it could have led to a malfunction of the ejection seat's drogue parachute preventing activation in an emergency situation.

AMEAN Baguio's keen eye and superb professional knowledge saved the day and potentially an aircrew life.



**AMAN Ishchuk
VFA-83**

While picking up cleaning gear following a 14-day special inspection, AMAN Ishchuk noticed the forward attaching nut on the starboard-main landing-gear planing-link assembly was in an abnormal position. Further investigation revealed the forward planing-link bolt had been sheared.

If gone unnoticed, this problem could have resulted in catastrophic failure of the starboard landing gear, serious damage to aircraft, and possible loss of aircrew.



**ABH3 William Tinsley
NAS JAX Base Operations**

After escorting an aircraft movement to the high power run-up area, ABH3 Tinsley noticed a large metal object while crossing runway 14/32. He notified tower personnel and retrieved the object.

The source of the FOD was a parking brake actuator from an A/S32A-42 tow tractor assigned to a local squadron. His awareness of his surroundings helped keep the flight line clear and aircraft and aircrew safe.

AN Adalberto Ramirez
VAW-113

AN Ramirez discovered a sheared bolt on the port main landing-gear strut while performing his plane captain preflight walk-around inspection. Further inspection revealed that the drag brace hard-point on the port, main landing-gear strut had departed during its last flight. AN Ramirez immediately notified his flight deck coordinator and downed the aircraft.

His decision prompted the launch crew to prepare another aircraft, allowing the squadron to meet its scheduled sortie. This particular discrepancy was almost undetectable in that it escaped the attention of the assigned qualified plane captain, airframes collateral duty inspector and Black Eagle troubleshooters. Had this discrepancy gone undetected, the potential existed for a catastrophic failure of the landing gear during take-off or landing. AN Ramirez's keen attention to detail saved the Navy potential loss of an aircraft, as well as the lives of the aircrew and shipmates on the flight deck.



AM1 Christopher C. Appling
HM-15

During a routine inspection of an MH-53E attached to HM-15 Det 2 in Bahrain, AM1 Appling noted that "Hurricane 10" had an engine-exhaust nozzle assembly installed on the No. 2 motor but "Hurricane 11" did not. He researched the correct configuration for the engine-exhaust nozzle on the No. 2 motor.

AM1 Appling determined that the nozzle assembly is required only on the No.1 and No. 3 engines, not on the No. 2 engine. In addition to "Hurricane 10," other home-guard aircraft had the same discrepancy, and maintainers corrected it immediately. The exhaust-nozzle assembly could affect proper cooling of the No. 2 engine compartment, which could lead to a possible No. 2 engine compartment fire.



PO3 Brown
VFC-12

While performing a daily and turnaround inspection on a squadron aircraft, Petty Officer Brown discovered a 1-inch long hairline crack in the port main-landing-gear uplock-support bracket. The crack was so slight that it could have easily been dismissed as a scratch in the paint. Had the crack gone undetected, the bracket most likely would have cracked through or broken off, possibly jamming the uplock mechanism and preventing gear extension.

Petty Officer Brown's keen attention to detail certainly prevented further damage and a possible in-flight emergency.



AN Gutzmer
VFA-122

During the final preflight inspection on squadron aircraft AN Gutzmer discovered a missing cotter pin and loose trailing edge flap-shroud bolt on the outboard aileron. He notified airframes personnel, who fixed the discrepancy.

AN Gutzmer also was doing a preflight inspection on another aircraft when the master brake servo-cable caught his attention. Closer review showed the cable was rubbing and misrouted.

In both occurrences, AN Gutzmer's judgment and attention to detail set an example all should follow.



**AO2 (AW) John Vincent and AN Ronald Spears
VAQ-139**

AO2 Vincent and AN Spears were assisting a sister squadron's beach detachment launch a newly accepted aircraft when they discovered two station pylons were extremely loose and unsafe for flight. They immediately notified the squadron's detachment maintenance CPO, who grounded the aircraft possibly preventing the catastrophic failure of both store stations and a Class-A mishap.

Not finished with the task at hand, AO2 Vincent and AN Spears organized a working party and expeditiously unloaded the pod and drop tank, properly torqued both pylons to specifications, and launched the aircraft to Navy Fallon less than two hours after its scheduled launch.



**AN Dan Ehren Bieder
VP-10**

Airman Bieder discovered a hydraulic leak in the aircraft's hydraulic-service center while doing a walkaround inspection of a squadron P-3C. He immediately notified the flight-station crew to secure hydraulic systems.

A closer look revealed the leak resulted from a failed "O" ring in the filter section of the No. 2 hydraulic pump. Airman Bieder's quick and correct response prevented a potential loss of the No. 2 hydraulic system in flight.



**AM3 James A. Royal
VFA-83**

While walking through the hangar bay, AM3 Royal noticed hydraulic fluid on the deck underneath the starboard brake of aircraft 301. Further investigation showed that a tie-down chain had been secured improperly to the hydraulic brake line. The line had become disconnected from the landing-gear axle, rendering the aircraft unsafe to move due to inoperative brakes.

He immediately notified his division chief, then both hangar and flight-deck controls. Upon investigation of other aircraft in the hangar bay, two Hornets were found improperly tied down. Had one of these jets been moved, the brake rider wouldn't have been able to stop the aircraft.

By using proper procedures and common sense, AM3 Royal took the necessary corrective actions to prevent a potential mishap.



**AT1(AW) Jeffrey Samuels
VAQ-139**

Petty Officer Samuels was working as a QAR on NK 501, supervising other maintenance personnel working inside the forward cockpit. Blowing exhaust from embarked aircraft caught the forward canopy knocking it off the guide rails, which began closing on the personnel in the cockpit. AT1 Samuels quickly alerted the other maintainers and together were able to slow the unfettered descent of the 400-pound canopy without injury or damage to the canopy. AT1 Samuels' quick thinking and decisive action was directly responsible for the prevention of a mishap and personal injury.

WORK ZONE

REDUCING MISHAPS BY 50%

Critical Days of Summer

Data: During the 2004 Critical Days (from May 28 through Sept. 6), 32 Sailors and 26 Marines died in off-duty (traffic and recreational) mishaps. Seven of the Navy and 11 of the Marine Corps deaths were in motorcycle wrecks. Both services lost 13 personnel to traffic mishaps. Eight Marines and Sailors drowned. Mishap rates increase between Memorial Day and Labor Day.

During the last decade, the Navy traffic fatality rate during the Critical Days is 25 percent higher than the annual average. The USMC rate is 14 percent higher. The Navy shore/recreational fatality rate rises 60 percent. In many years, between one-third and nearly half of a year's total Navy and Marine Corps traffic deaths occur during the Critical Days of Summer.

2005 Plan: On the first day of each week starting the week before Memorial Day and ending the week after Labor Day, a series of informative items will be sent out by NSC or posted on our website, sequentially addressing a specific "Critical Days of Summer" topic:

- Safetyline Newsletter — "Critical Days" status, links to articles and authoritative websites, and tips. Subscribe at www.safetycenter.navy.mil/safetyline/.
- Home Page Feature Article — Information, statistics, scenarios, precautions, and lessons learned.
- Photo of the Week — Linked to that week's topic; can be posted on bulletin boards.
- PowerPoint Brief — A 5-to-10-slide presentation you can use at a safety stand-down or in local briefs.
- Resource Page — A comprehensive list of resources on the subject, including tips, checklists, briefs, articles, links, and POD notes.

• Marketing Materials: Including sample Public Service Announcements for radio and television, press releases, and tips for publicizing local events.

Topics:

- Week 1 (May 23) — Overview
- Week 2 (May 31) — "Click It or Ticket"
- Week 3 (June 6) — Swimming, Diving
- Week 4 (June 13) — Motorcycle Safety
- Week 5 (June 20) — Severe Weather
- Week 6 (June 27) — DUI; Fireworks
- Week 7 (July 5) — Outdoor and Team Sports
- Week 8 (July 11) — Home Repair, Yard Work
- Week 9 (July 18) — Boating, Personal Watercraft
- Week 10 (July 25) — Fatigue, Speeding
- Week 11 (Aug. 1) — Camping, Hiking; Insect Bites
- Week 12 (Aug. 8) — Heat Stress, Jogging
- Week 13 (Aug. 15) — ATVs, Bicycling
- Week 14 (Aug. 23) — Fire, Food Preparation
- Week 15 (Aug. 29) — Distracted Driving, Road Rage
- Week 16 (Sept. 6) — Emergency Kits, Breakdowns
- Week 17 (Sept. 12) — Wrap Up

Media: The Safety Center will mail news releases about each topic to base newspapers and public affairs staffs three weeks in advance. These articles will also appear at the Safety Center newsroom: www.safetycenter.mil/pao/presskit/.

Overview of the 2005 Campaign:

www.safetycenter.navy.mil/presentations/seasonal/criticaldays.htm. After the 2005 Critical Days end, the entire collection will be available at www.safetycenter.navy.mil/toolbox/. 



Spring 2005



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Maintenance Management

Smokers Beware: There's More to Fear than Cancer

By AMC(AW) Paul Hofstad

Are smokers a dying breed? I believe so, especially after some of the things I have seen on surveys. No, it's not only because of the cancer-causing ingredients in cigarettes, but, as you'll see in the accompanying photos, personnel are smoking in areas that can provide quick access to the afterlife. All it takes is one stray ash or match to reduce a person's worry from getting cancer to being killed in an explosion. Medical examiners probably would be hard pressed to identify any cancerous cells.

I have found cigarette butts in these areas:

- Inside hazardous material (HAZMAT) storage areas
- Inside and directly outside of hazardous waste (HAZWASTE) sites
- Inside a remote test cell, beside a 5,000-gallon JP-5 tank
- In front of a line shack, where a 500-gallon JP-5 tank was stored
- Inside a storage room with fuel-sample bottles and PON-6 oil-servicing units
- Inside emergency reclamation (EREC) kits

In one command, the smoke pit was 23 feet from the HAZMAT lockers. Each locker had "No Smoking Within 50 Feet" labels on it.

The smoke pit accommodated all ranks, enlisted and officer. I suppose the warning signs simply are decorations to be ignored until an explosion occurs.

The flash point for JP-5 is 140 degrees Fahrenheit. HAZMAT, such as paint waste, thinner, and NAPHTHA, have considerably lower flashpoints. The odds of these chemicals catching fire or exploding are far greater than JP-5. There are reasons why ships turn off the smoking lamp during fuel movement and why they also set boundaries when doing hot-work. It's because mishaps have occurred in the past. Take off the blinders and look around; you'll be amazed at what you see.

Chief Hofstad is a maintenance analyst at the Naval Safety Center.



Runway Incursions

By ACCS(AW/SW) Leslee Mcpherson

RUNWAY INCURSION — Any occurrence at an airport involving an aircraft, vehicle, person, or object on the ground that creates a collision hazard with an aircraft taking off, intending to take off, landing, or intending to land.

Would you send your personnel out on the flight deck without being trained properly? Would you assign them to drive SE without proper qualifications? The answer to these questions is “no.” You want to keep your Sailors and Marines alive, and you know the risk of putting them in these dangerous situations without proper training. But do you check their airfield driver’s license before sending them on the airfield? Have they been through initial training? Have they had their annual re-certification?

Runway incursions are the most frequent type of ATC HAZREPs that I receive at the Safety Center. In FY04, there was a 136 percent increase in runway incursions from FY03. Besides safety of flight and damage to aircraft and equipment, the potential exists for significant loss of life.

The increase in runway incursions has led to repercussions that severely could hamper a squadron’s ability to perform routine operations. Here are some examples:

- Air Station No. 1 — Due to a sudden increase in runway incursions, all squadron airfield-drivers’ licenses were cancelled, and drivers had to be escorted until re-training was accomplished.
- Air Station No. 2 — After two incidents within five hours, the air station commanding officer revoked the entire squadron’s flight-line driving privileges until the squadron was retrained and qualified.

As supervisors and managers, our responsibility is to ensure personnel operate safely and are trained and qualified properly. An airfield is a dangerous environment. Allowing personnel to operate in that environment without proper training is an unnecessary risk that isn’t worth the consequences.

Senior Chief Mcpherson is a facility analyst at the Naval Safety Center.

HAZMAT

Those Dreaded Rags

By ADC(AW) Gary Eldridge

Every day, the Navy and Marine Corps face the challenge of operating and maintaining the fleet while complying with environmental regulations. This burden commonly falls on a new hazardous-material (HAZMAT) or tool-room petty officer who normally is overwhelmed with broken-tool reports (BTR) and many other things, including IMRL & CAL.

Often, the question is, “Why do I have to control some darn rags anyway?” Although most commands have switched to using the newer industrial rags, we still see some commands using the bales of rags we “old-timers” are used to. Both are authorized; however, many of the old-style rags are not well-managed. Bottom line: A clear problem with the accountability of all rags exists throughout the Navy and Marine Corps. Rags are not inventoried

on initial receipt, and tool tags are not used for rag checkout. Remember, rags are controlled items that require the same attention as a tool in your work-center. So why don’t we treat rags the same way?

Here are some of the most common responses we hear during safety surveys:

- “Why annotate rags in a Tool Control Log or an inventory sheet? Who cares as long as he/she brings it back?”
- “Monitoring hand-rag inventories takes too long. It’s a one-for-one swap, so what’s the problem?”

As a recommendation to reduce mishaps related to improper rag control, commands should establish a standard operating procedure (SOP) that specifies proper inventory and accountability procedures to be followed when handling rags. The

main point is to control your rags and help the Navy and Marine Corps save equipment and lives!

Remember, leadership determines the direction of the Navy and Marine Corps; organization determines the potential; and people determine the success of the command. Do the right thing. Proper rag control can save man-hours and lives while reducing avoidable mishaps. Numerous Class

B and C mishaps have occurred over the years involving rags that were ingested by engines. We also find rags in virtually every aircraft compartment imaginable (i.e., fuel cells, engine cavities, avionics bays, flight-control compartments, and cockpits). Rag control is vital to the operational commitment of each command.

Chief Eldridge is a maintenance analyst at the Naval Safety Center.

FOD

Is “Field Day” a Thing of the Past?

By ATCS(AW/SW) Denis Komornik

When I joined the Navy more than 24 years ago, the squadrons and AIMDs would shut down every Thursday at 1300 for two hours to hold field day, no matter how bad the backlog was. This weekly cleaning removed clutter, organized spaces, and, most importantly, presented them in a professional manner.

One thing I’ve noticed since arriving at the Safety Center and performing safety surveys is the lack of attention to organization and cleanliness of spaces. When I address these issues with supervisors, I receive the same replies, “We’re just too busy and don’t have the manpower,” or “Field day is a thing of the past, and we don’t do it unless an inspection is coming up.” These replies may sound familiar to you, and you may think they’re logical, but let me give you my insight on field day that I learned long ago from my first LPO.

The No. 1 reason we hold field day on a routine basis is to reduce FOD, which is the nemesis of all aircraft maintainers. From safety wire to nuts and bolts—FOD lays all over the shop, and no one knows where it will end up.

Another reason to hold field day is to eliminate trip and fall hazards. If we already are short of personnel, the last thing we need is someone getting injured in the workcenter!

The last issue is professionalism. A sharp-looking space goes a long way and instills a sense of pride and ownership in workcenter personnel. Performing field days may seem like a pain in the neck, but, in the long run, they will save you time. Who wants to do extra maintenance as the result of a FOD mishap caused by lack of cleanliness?

It’s time to remember how we used to do business. To repeat a cliché, “Practice what you preach.” Don’t be part of the problem; be part of the solution.

This...



Not This...



Senior Chief Komornik is a maintenance analyst at the Naval Safety Center

Photo by Matthew J. Thomas

Class C Mishap Summary

By ADCS(AW/SW) Gary Dennis

From Dec. 1, 2004, to Feb. 28, 2005, the Navy and Marine Corps had 25 Class Cs that involved 25 aircraft. The damage total was \$1,780,753.

A P-3C returned early from a mission after the crew suspected the No. 3 engine had ingested a bird. Maintenance control issued a bird-strike conditional inspection in accordance with the maintenance-instruction manuals. Two power-plants mechanics inspected the engine, but their results were inconclusive. Maintenance control then directed high-power maintenance turns, which revealed the No. 3 engine's efficiency had dropped from 101.2 percent to 94.8 percent.

Both power-plant mechanics were assigned to troubleshoot this problem. Knowing they would have to work the weekend if this aircraft wasn't fully mission capable (FMC) by Friday evening, the two worked from 0645 to 2200 that day and returned at 0645 the next morning to continue the same schedule.

Maintenance control directed them to borescope the No. 3 engine. The power-plants CDI found no damage in the turbine section of the engine, so the two decided to borescope the compressor section. The maintenance-instruction manual (MIM) does not contain guidance for this job.

The two mechs removed the fifth-stage poppet and discovered what they thought to be an abnormality on one of the compressor blades. They wanted to find the power-plants collateral-duty QAR to get a second opinion. The AD1 CDI left the borescope in the engine and directed the AD2 to remain outside with the gear while he went back to the hangar.

Unfortunately, the collateral-duty QAR had left for an appointment out in town, so maintenance

control directed a power-plants collateral-duty QAR assigned to the line division to assist the AD1. The QAR said he wanted to dive the intake. The AD1 objected, though, saying that he already had done that four or five times and that he wanted to look at what he had found on the borescope.

The collateral-duty QAR, however, told the AD1 that he still wanted to dive the intake himself. Frustrated, the AD1 walked off to take a smoke break. The QAR, meanwhile, proceeded outside to dive the intake. There, he met the AD2, who didn't mention the borescope still was inserted in the compressor.

The collateral-duty QAR tried to rotate the propeller, so he could gain access to the intake, which was blocked by one of the propeller blades. He was having difficulty getting a good footing because patches of ice were on the ramp. He asked the AD2 to help him rotate the propeller. Together, they only were able to rotate the propeller about an inch.

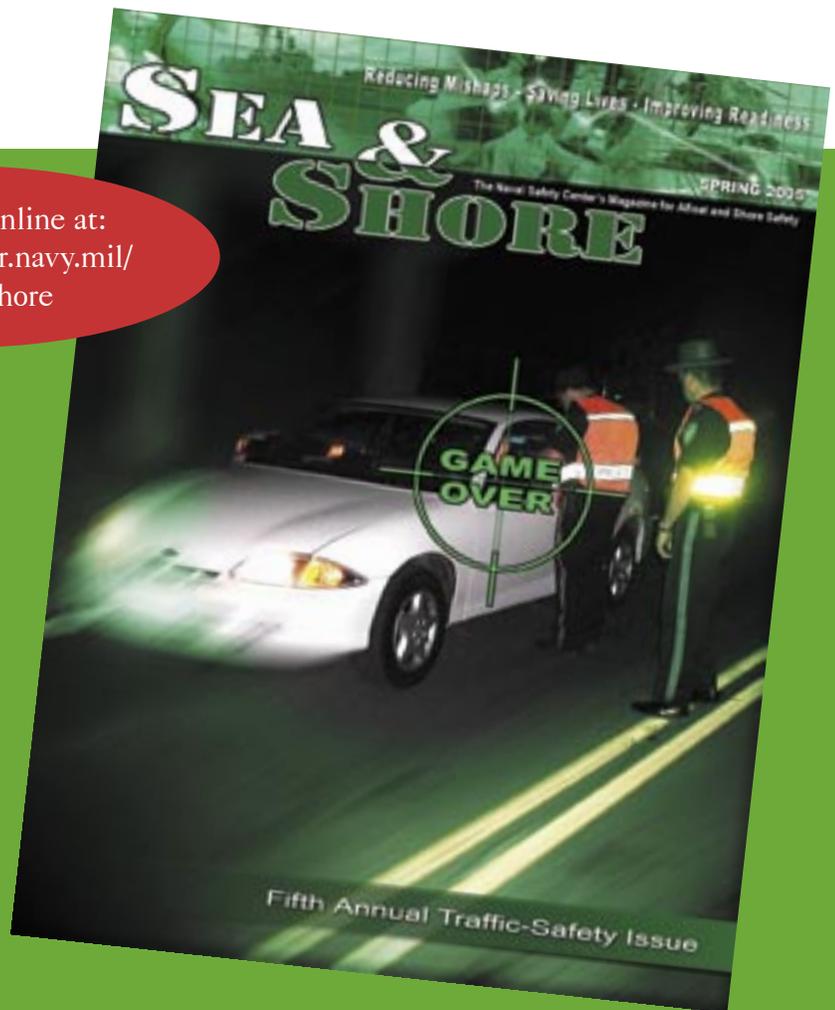
The collateral-duty QAR returned to the hangar to get a pair of ice cleats. When he returned to the aircraft, the AD finally told him that the borescope still was inserted in the compressor. When the two removed the borescope from the compressor, the tip of the borescope, which had been severed, remained inside the compressor.

After the QAR and AD2 notified maintenance control about the problem, the job was halted. The engine was removed and turned in to AIMD, so the borescope tip could be retrieved. AIMD found extensive damage to the fifth-stage blades of the compressor rotor. Obviously, pressure, fatigue and lack of situational awareness and communication were key factors in this incident.

Senior Chief Dennis is a maintenance analyst at the Naval Safety Center.

Feedback indicates some people haven't seen a copy of *Sea&Shore* magazine—with a new title and a new look, that's understandable. Most of you, though, likely are familiar with *Fathom* or *Ashore* magazines, which were combined into this newer publication dedicated to afloat, shore, recreational, and traffic safety. We attach special emphasis to this latter category, since motor vehicle accidents still rank as the No. 1 killer of our Sailors and Marines.

Also available online at:
[www.safetycenter.navy.mil/
media/seashore](http://www.safetycenter.navy.mil/media/seashore)



With the “Critical Days of Summer” on the horizon, I urge you to read the Spring 2005 *Sea&Shore*, which is the Naval Safety Center’s fifth annual traffic-safety issue. The period between Memorial Day and Labor Day weekends notoriously is a tragic time for Sailors, Marines, their families, and friends. In 2004, we lost 23 Sailors and 13 Marines in PMV mishaps during that period.

Start planning now to avoid fatalities this summer. As you look at the statistics, don’t just look at the numbers. Each number represents a spouse, a parent, a friend, and, in most cases, a preventable mishap.—*Ed.*

For more traffic-safety information, visit these websites:

<http://safetycenter.navy.mil/presentations/ashore/motorvehicle/traffic.htm>
<http://safetycenter.navy.mil/ashore/motorvehicle/toolbox>