Mech

Summer 2007

FOD: *Searching for Answers*

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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.

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Features

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Navy photo by MC2 Jay Pugh

Departments

Front cover: Air department and Carrier Air Wing Nine (CVW-9) personnel conduct a foreign object debris (FOD) walkdown on the flight deck of the *Nimitz*-class aircraft carrier USS *John C. Stennis* (CVN-74) prior to nighttime flight operations. *Navy photo by MC3 Ron Reeves.*

Final Launch: *Time for the Flyoff*

As I get ready to transition to civilian life, I wanted one last chance to thank maintainers for the work you did for and with me, now and in past years with various squadrons and commands.

I'm an aviator and grateful for the fine maintenance done to keep me and my fellow aviators safe. I always had the utmost faith that maintainers would give me the best jet possible.

In the spring issue, I praised you for the fine work you did in keeping maintenance-related and off-duty mishaps to a minimum. However, I'd be less than honest if I didn't mention that we've had a turn in the wrong direction.

I urge you to help with the problems that continue to plague us, including this quarter, an aircraft-handling error, MLG door that fell off an aircraft, dropped flare on deck, aileron crunch to a TE flap, and four FODs (a good example of why we featured that topic in this issue).

On the off-duty side, after a great start, traffic mishaps unfortunately are up again. As usual, most of them were preventable. Too often, drinking and driving, not wearing seatbelts, and speed killed a number of shipmates. Why are families suffering for these stupid mistakes? Why are Sailors and Marines not getting the message? Why do some people continue to ignore risk and not take the steps to mitigate it? I'd be lying if I said the answers to these questions don't frustrate me. We have wonderful, smart maintainers who get it right, most of the time, at work. Yet, off-duty, many throw caution to the wind.

The Naval Safety Center is seeking answers to all the "whys." We are taking steps to identify behavioral issues, better understand the reasons behind poor performance, and improve our numbers. But it will take each of you to look at each other and to work together to end the senseless damage and loss of life.

My time is up, but the Navy, Marine Corps, and RADM Artie Johnson, my successor, need your help. Troubleshoot the problem like you do aircraft, search for answers, and fix it. Your life and that of your shipmates hang in the balance. Thank you.

RADM George Mayer

Fight FOD to Save Lives

By Dan Steber

FOD Kills! Those two words appeared on an old FOD poster in *Mech* magazine. This simple statement is as true today as it was in the '60s when the poster came out.

This issue features a series of stories on the FOD problem we all face, and the battle we engage in every day. And one tool, the FOD walkdown, is part of a process that maintainers around the fleet do, whether in California, Hawaii, Japan, or a carrier off the coast of Iraq.

Incredibly, the Navy and Marine Corps spends about $90 million dollars on FOD-related damage every year, tens of thousands of hours fighting FOD or repairing its damage, and countless time worrying about this problem.

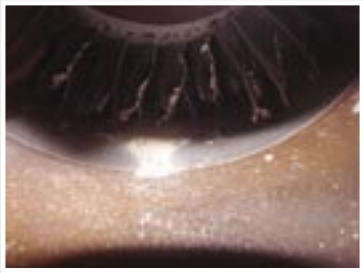
With FOD, it's important to think about new ways to attack the problem. Take action to mitigate the risk FOD poses and make it a challenge to improve the program. We have seen a wide range of products from the FOD Boss to the Tarsier FOD radar. Technology can and will help, but it's still the determined work ethic and keen eyes of maintainers that can make a big difference.

Look at the information and stories available in this issue and work to refocus your efforts at making your aircraft, hangar, flight line, or flight deck FOD free. We can save a lot of time, money and aircraft damage with the right mindset. You must make it a challenge that FOD won't happen in your workplace, taking action to make it true.

FOD IN THE DESERT

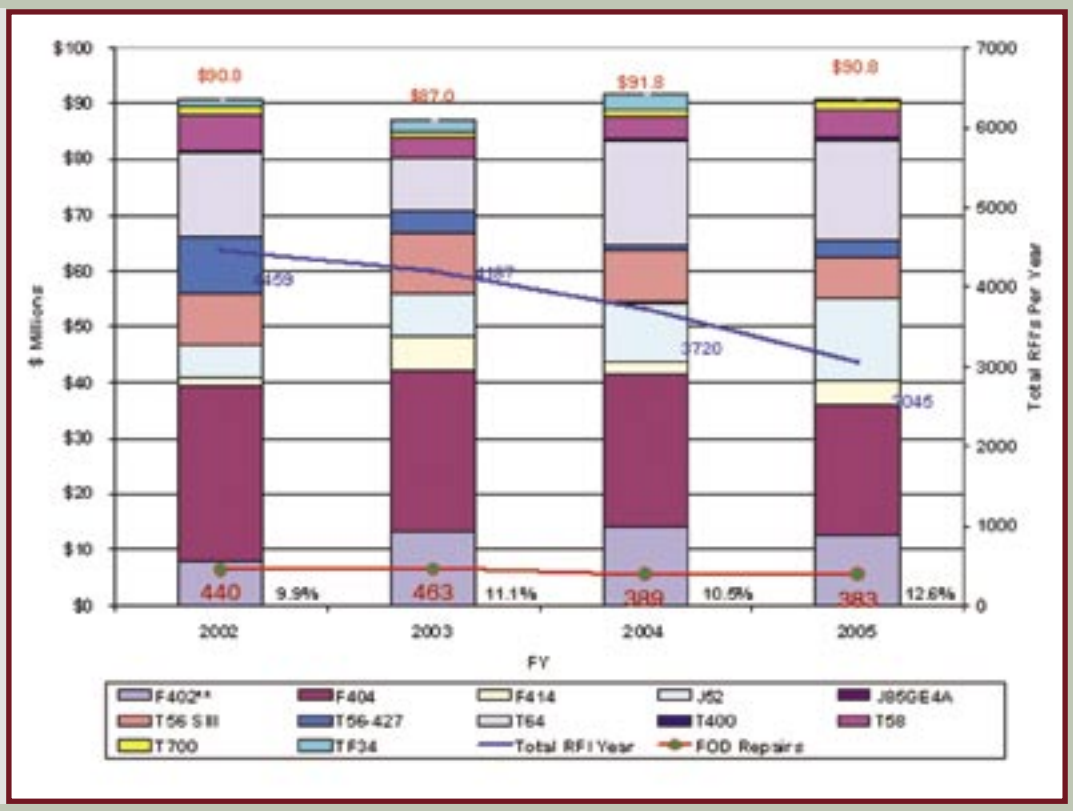
AVCM (AW/SW) Dave Clark, AIMD MMCPO, USS *Bataan*, sent these photos of FOD found in a T-58 engine from an H-46.

Dave commented, "We dropped off the Marines, and well…the sand seems to have won a round with the engine. Notice the peeling of the leading edges, and how the blades bent as the problem progressed. Notice the sand still in the intake. FOD wins."



FOD Cost and Repair Chart Captures the Scale of the FOD Problem and the Challenge for the Way Ahead

The overall number of repairs has decreased (blue line) because of reliability improvements and "build goals" that have been implemented over the last few years. FOD repairs (red line) also have decreased, but the percent of repairs has remained fairly constant. The number of engines repaired after a reported FOD event does not include the engines that are still awaiting repair or have been stricken. At the end of FY-06, 103 engines and/or modules reported as removed for FOD were awaiting repair or disposition. Another 109 had been stricken. A new effort called FOD forensics holds great promise as a way to breakthrough and make a big difference in the fight against FOD.



FOD Forensics

By Alex Lusk

CSI Miami, CSI NY and CSI (Crime Scene Investigator) are popular television shows, but have you heard about CSI FOD? It's a term that many use for FOD forensics. An ongoing effort to find the root causes of FOD incidents.

The crime scene: a multi-million dollar aircraft unable to perform its mission. The criminal, in this case, is foreign object debris—a.k.a. FOD. The innocent victim is a very expensive aircraft engine that has been damaged by an unknown or unidentified assailant—a foreign object. The FOD CSI team needs to identify the suspect and eliminate the source, so another expensive aircraft engine doesn't fall prey to this indiscriminate criminal.

The victim may have suffered only a small nick to a blade, requiring just a minimal amount of blending, or it could lead to a Class A mishap or any category between. FOD endangers the aircraft, the crew, and even people or property on the ground.

FOD or foreign object debris causes a lot of damage each year to engines. In fact, about 400 engine repairs are done each year because of FOD. This number doesn't include those mysterious "compressor internal failures."

FOD costs Naval aviation about $90 million each year, and that amount only includes the engine repair costs, not organizational labor hours to remove and replace the engines, labor for conditional inspections usually required as a result of an engine change, cost of readiness or labor hours spent cannibalizing parts from a down aircraft to make another one RFT (ready for tasking).

Other victims include maintainers, QA and safety personnel, who spend hours filling out reports and doing investigations. The list of reports involved: engine FOD incident reports (mandatory report…regardless of other reports submitted), hazardous material reports, engineering investigations, BASH reports, hazard reports, safety incident report's, mishap data reports, and JAG investigations. On the maintenance side, more paperwork and time is required: VIDS/MAFs or work-orders to remove and replace the engines, conditional inspections required as a result of the engine change, and man-hours expended to replace and repair the engine. Squadron readiness suffers with the aircraft down for an unscheduled engine change, along with the impact unscheduled maintenance will have on your scheduled maintenance plan and operational commitments.

Naval aviation FOD-prevention efforts include: Daily flight line or deck FOD walk-downs, monthly or quarterly air station base-wide FOD walk-downs, tool-control programs, fastener awareness/integrity programs, piece-part-and-rag accountability programs, clean-bird inspections, FOD squads, vacuum and sweeper trucks, and some commands and stations have purchased the FOD BOSS. Yet with all that we do, the assailant that causes FOD often goes unidentified and can continue to inflict damage.

FOD forensics can help our FOD detectives identify these culprits. Historically 70-to-75 percent of FOD reports are reported as "cause/source unknown." The problem is obvious: If we don't know the source, how can we eliminate it?

One company, FAST—Failure Analysis Service Technology, Inc., has been working with NAVAIR to identify the offending criminals that cause FOD damage. The company has perfected a non-destructive method to identify the source material. The procedure uses a DNA sample or fingerprint, of sorts, that the offending debris leaves behind as it travels through the engine. The FAST FOD procedure looks at the microscopic bits left at the impact site. It exploits the chemical differences between various materials. For example, engine materials are different than aircraft materials, which are different than non-aircraft materials.

Just as in the CSI television shows, we start with pictures of the crime scene. We get the "big picture" photos of the damaged area and then move in for the close-ups. A ruler or other measuring tool is used to establish the scale of the damage for the photos. We then start looking for the most forward damage to the engine. This part can be tricky because that damage may not be obvious or even possible to see looking down the intake. Depending on the size of the engine or extent of the damage, the first impacts may not be accessible or even visible until the victim is examined and disassembled at the intermediate maintenance activity or Fleet Readiness Center. The first visible impact may actually be on the aft side or pressure face (concave side) of the blade. Using a special replicating tape supplied with the FAST FOD sample kit, a control sample is taken from an undamaged area. Samples, called replicas, then are taken from the most forward damaged areas. Usually about four samples from the damaged areas are sufficient. The replicating sample will remove microscopic particles that the offending object leaves in the damaged area. The most forward area of damage is important because as the foreign object or objects travel down the engine, bits of blade and/or vane material also will travel down the engine, causing more damage and leaving secondary trace particles. After the sample replicas are taken, they are sent to FAST for intensive analysis, using a scanning electron microscope to identify the chemical properties or forensic evidence of the FOD. Photographic evidence then is used to evaluate the geometric characteristics of the physical damage, which reflects the geometry or shape of the FOD at the time of contact. FAST will then provide analysis results, usually in about five working days. The crime lab (FAST) identifies the suspect; however, our FOD CSI team must do the detective work to determine the source.

NAVAIR's propulsion and power engineering group (AIR 4.4) is funding a fleet FOD forensics demonstration program, in coordination with CNAF N422, to evaluate the effectiveness of the FAST procedure in identifying the source of unknown FOD.

Although this technology sounds new, it actually has been around for almost 15 years. FOD forensics provides another tool in our FOD prevention toolbox and a scientific approach to fight the FOD problem.

Alex Lusk works at NAVAIR (AIR 4.4.7.2) at Patuxent River, MD.

Useful FOD links:
www.safetycenter.navy.mil/aviation/default.htm
www.safetycenter.navy.mil/media/mech/vault/categories/FOD.htm
www.fod.com/FAST
www.nafpi.com National Aerospace FOD Prevention.Inc. (non-profit)
www.fodcontrol.com/
www.fodnews.com/
(This listing doesn't reflect endorsement of any company or product.)

10 Wrongs Don't Make a Right

By AT1 (AW/SW) Sanchez

Following procedures in any job is very important. Regardless of how large or small each step of a job may seem, there are several reasons why they must be followed. Skipping procedures can lead to some terrible consequences. In this case "10 wrongs," or missed procedures, unfortunately led to a missing tool, but could have been more serious.

The day began much like any other while deployed on the carrier in the Arabian Gulf for an AT1 of 14 years. I supervised a busy group of highly motivated Sailors, checking tools day in and day out, making every day feel like Groundhog Day. Toward the end of the day, the maintenance-desk chief called to take a 450 lb. ATFLIR pod and exchange it with another ATFLIR pod. Aircraft 403 was scheduled for down traffic to the hangar but had an operational ATFLIR pod. Aircraft 402 had a non-operational pod, but the aircraft was ready to fly. The pod exchange needed to happen quickly, which was no problem for my well-disciplined and experienced crew.

After discussing the problem with maintenance control, my second class CDI grabbed a tool pouch, checked the tools and signed them out in the tool log to an AT3. When the AT3 accepted the pouch, she failed to inventory it, trusting instead that the CDI had verified the pouch. Two technicians and I checked out all required support equipment and proceeded to the flight deck. We crossed the landing area and started to work on removing aircraft 403's pod, but soon realized the job would not be that simple.

Eight technicians and one anxious flight-deck coordinator surrounded aircraft 403. Their only mission in life was to turn the aircraft before sending it to the hangar, which meant negotiations between the work-center LPOs. After a short

He must have noticed the commotion because he yelled out, "Calm down! I have the screwdriver."

debate, we concluded that the pod exchange was more important, so we did a quick ATAF and started the job.

We accomplished download effortlessly because everyone knew how to do the job. With the pod on the skid and ATAF complete, we departed for aircraft 402, making it across the landing area before the next recovery cycle. Once safely across the flight deck, we inventoried the tool pouch again. We began the pod-exchange process all over again, but, this time, a few more technicians assisted. Instead of maintaining positive control of the tool pouch, we placed it on the deck so that everyone could access the tools. During the installation process, I decided to check the tool pouch again. I noticed that a flathead screwdriver was missing and immediately questioned my technicians. No one confessed to using the tool.

A QAR had taken the flathead screwdriver out of the pouch to help technicians on another task. He must have noticed the commotion because he yelled out, "Calm down! I have the screwdriver." He returned the tool and the pouch was inventoried again. I thought to myself, "that was pretty scary," but with everything back in place and accounted for, I felt relieved.

We finally finished the pod removal and installation. I inspected the job and yelled out, "Check Tools!" I checked the tool pouch on the deck, grabbed some of the IMRL gear and returned to the work center. A second class assisted with the IMRL gear, while the other technicians stowed the pods and skids in the "junkyard," and the AT3 returned the tool pouch to the work center.

After finishing, I entered the work center and immediately began signing off the MAFs before making sure the AT3 had ATAF'd the tool pouch upon her return, which she had not. Minutes later, the night-check supervisor came in and started checking tools for shift change. As I was talking to him about the day's events, he pulled out the tool pouch that we had used

on the ATFLIR pod changes and discovered a 7/16-inch wrench missing. I could not believe it. I had just witnessed all the tools just a little earlier; there is no way that wrench could be missing.

I emptied out the pouch and checked every pocket. Nothing! I returned to the roof with others and checked the area round aircraft 402 and the route the AT3 had taken to get downstairs. Again, nothing! I ran downstairs and called the maintenance desk chief to report the bad news. Even though the search took only five minutes, it seemed like an eternity. We wrote a missing-tool report, and an investigation began. I had inspected the job, so I knew the tool wasn't in the pod. The evening FOD walk-down just had been completed, but we kept searching for the tool. Once again, nothing! The tool never was found.

A good tool pouch and inventory procedures keep tools from becoming FOD.

A few days later and a three-hour visit with the CO reminded us that hindsight is very clear. Too many tool-control procedures weren't followed. The entire evolution could have been more serious than just a missing tool. Upon reflection, here are the 10 "wrongs" I've taken away from this incident:

- The AT3 never checked her tools when they were signed out. Only the AT2 CDI checked them, and as a supervisor, I failed to ensure the technician also ATAF'd the pouch.
- I did not have to explain how I kept the MIMs from blowing down the flight deck because manuals were not used during the maintenance procedure. When you are doing a complicated job, always bring the required manual for reference.
- Our tool pouch was placed on the deck, instead of the technician keeping it strapped to his waist. Always maintain positive control of your tools.
- Someone was able to take a tool without our knowledge or permission. Again, this would not have occurred if we had kept control of the tool pouch.
- I failed to identify a primary CDI for the job. Even though I inspected the final installation, I also helped out with the maintenance action, which is a direct violation of the NAMP. As a supervisor, you always should directly assign roles before beginning a job.
- I failed as a supervisor to ensure the tool pouch came back into the work center and received a final inspection before signing off the MAF.
- The tool pouch was not inventoried immediately upon arrival in the shop.
- The desk chief was not immediately notified of the missing tool.
- It took the night-check supervisor to discover the missing tool.
- The tool never was recovered.

In this situation, 10 wrongs definitely do not make a right! Tool-control procedures and maintenance instruction manuals are here for a reason. Use them all the time and follow procedures.

Petty Officer Sanchez works in the AT shop at VFA-86.

FOD, No Matter How Small

By PRAN Joshua St. Amand

Around 2300 one night and half way through COMPTUEX, I was in my shop doing four 30-day inspections on oxygen-mask assemblies. My supervisor got a call from maintenance control for a turn on one of our aircraft, so he asked me to speed it up. I did but I wish I had taken my time.

I wanted to help, so I rushed through the four inspections, signing off the VIDS/MAFS and updating SEATS. My supervisor then CDI'd the masks, and I put them back on the pilots' gear.

The next day, one of the pilots put on his gear and went up on deck. As he walked across the flight deck, his oxygen mask fell apart right where the bayonet fittings attach to the mask. Screws fell on the deck next to turning jets. Flight operations were shut down, and a combat FOD walkdown was called away.

I was surprised when a PR2 woke me up. Since I usually didn't get a personal wake up, I knew something was wrong. He told me to get dressed and get to the shop. When I got there, my LPO told me what had happened. I suddenly got a sick feeling in my gut, and my heart felt like lead.

I couldn't believe what I had done. I really thought I had done all the inspections completely and correctly, like I had done a thousand times. But it was true, and one of the screws never was found. QA believes it was blown overboard, but we don't know for sure.

Despite this bad situation, it could have been worse. Had the pilot made it to the aircraft:

- The mask could have come apart while at high altitude, causing hypoxia.
- The screws could have jammed the flight controls, resulting in the loss of the aircraft and possibly the pilot.
- During high-speed combat maneuvers, the mask could have become a missile hazard inside the cockpit.

I should have used the pubs, taken my time, and re-checked the work *[CDI blew it too.—Ed.]*. Not following established maintenance procedures affected a lot of people and put many at risk.

I am glad that it wasn't worse, but I learned an age-old lesson about publications. I also repeated a mistake made too often: I was too comfortable with a routine task. I believed I didn't need the book anymore but was reminded to use it every time we do maintenance.

Airman St. Amand works in the PR shop at VFA-86.

Top: pilot mask correct. **Bottom:** bayonet off

Analyst comment: Unfortunately, I don't feel this is an isolated case. Complacency in the work place is detrimental to aviation safety and affects all aspects of naval aviation. We take these simple tasks with a grain of salt and often think they aren't important. Too many PRs just wipe out the mask with alcohol and call it a day. This mental process will get riggers in trouble, just as this story describes. The book is specific and says to inspect the self-locking screws or T-nuts for damage. We all need to learn from this story because the safety of our shipmates and aviators is in our hands. PRC(AW/SW) Brian Westcott, Maintenance Analyst, Naval Safety Center.

The previous story, this one, and a third one on page 22, all from from VFA-86, show their efforts to share mistakes and a commitment to do better. Thanks.—Ed.

Interrupted Routine

Navy photo by PHAN Charles Whetstine

By AN Candice Flanders

Everyone who ever has worked aboard ship knows how repetitive things can get. You get in a routine, despite all the warnings about complacency. Well, I continued to follow a simple routine until I made a very costly mistake.

Each day was the same: Get up, grab a snack, go to work, and suit up with my float coat, cranial, leather gloves, and then head off to the flight deck to man up my jet. It was about 1815, and I was a night checker. I was getting ready to recover my airborne jet and set it up for the Alert 30.

Recovery went well, the deck crew parked the aircraft, and I helped the blueshirts chain it down. I then started working on my turn-around inspection. Part way through my inspection routine, my jet had to be moved from the fantail to elevator No. 3. At that point, I was nearly done with the inspection. I already had dove the starboard intake, walked the top of the jet, checked my APU numbers, and just was finishing up the lower aircraft walk. All I had left was to dive the port intake duct. But I had to stop the inspection, climb into the cockpit, and wait for the move to be completed.

After my jet was parked, I got out and helped the blueshirts tie it down. I then finished what I thought was the rest of the turn-around inspection. The next step was to sign my name in the required places, stating that I had gone through the A1-F18AE-MRC-100 turn-around-inspection deck, and no discrepancies existed on my jet. I took my paperwork to maintenance control and went back to my jet, standing by in case the Alert 30 was launched.

At that point, I knew I had to do a daily inspection after the Alert-30 watch was over for the night, so I decided to begin working on it. I grabbed the strut X-dimensions and my tire pressures. At that point, I realized I had forgotten to dive the port intake, keeping in mind I already had turned in my turn-around-inspection card and had stated that this jet was ready.

I then "dove" the port intake duct and suddenly noticed the port engine had damaged blades from FOD!

I couldn't leave my jet because it could be launched at any time, so I told the assistant lead plane captain about what I had found. I asked him to dive the port duct, too, to look at the first-stage fan blades. He then

Downs the Alert

went to get the leading plane captain. They both agreed my Alert-30 aircraft probably was a down jet for FOD, so they told the flight-deck coordinator. The chief then called the mechs to look at it.

After all this happened, the jet was downed for a FODed engine. I was in quite a situation. I already had signed my turn-around card, which stated both my intakes were good. Maintenance control had processed the card and had put it in the aircraft-discrepancy book.

My PC qualification was suspended for a week, and I had to take the 4790 portion of the CDI test again before I could get back my qual. The lesson I learned was not to let things become routine. Double-check the things you are being held accountable for. In this scenario, it was the MRC-100, the turn-around inspection I had completed.

If you are interrupted for any reason in middle of your work, start over to make sure you don't overlook anything. Had I followed that advice, this whole situation could have been avoided. Now, I just have to keep my head up, and look forward to working as a plane captain again.

The insert photo shows the damaged blade.

My jet already had been set as the alert aircraft for a couple hours, and now my squadron had to cancel the alert and set it on a different jet.

A lot of maintenance had to happen to compensate for the mistake I had made. We had to wake up a pilot to turn the new alert aircraft, so it could be set as the alert. The ordies had to download the ordnance from aircraft 305 and move it to the new alert, requiring the jet to be respotted for a wing spread—a difficult task during flight operations.

The whole division learned a lesson about the dangers of complacency. We learned to be consistent, to follow the pubs step by step, and to remember personal accountability is critical.

Airman Flanders works in the line division at VFA-146.

Best Practice

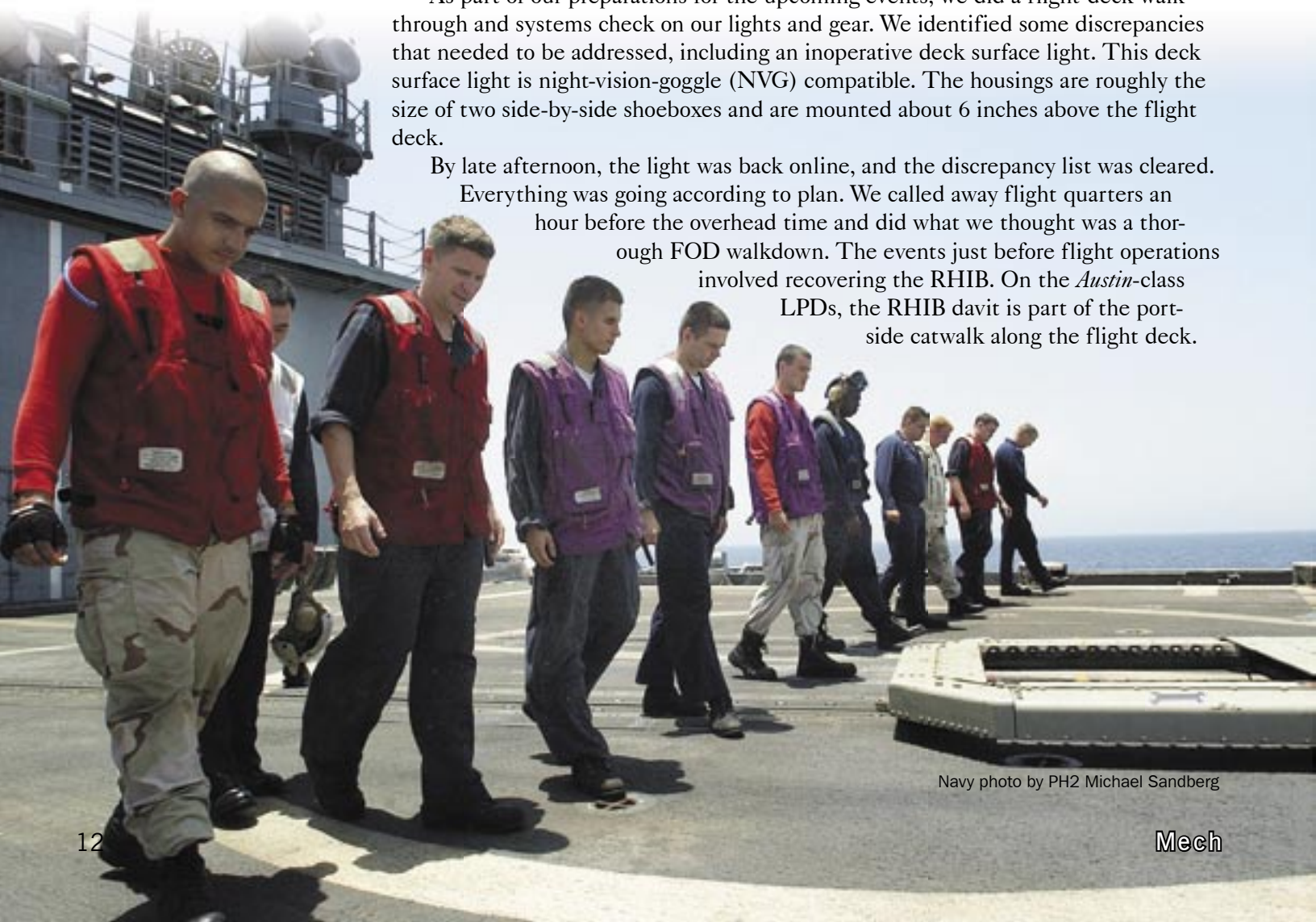
Preflight Your Flight Deck

By LCdr. Jeff Rogers

We were sailing with the expeditionary strike group off the coast of North Carolina, doing a series of operations with amphibious-assault vehicles, landing craft, small boats, and aircraft. The plan for the night was to work deck-landing quals (DLQs) with two Army MH-47E helicopters. It would turn into an interesting evening.

As part of our preparations for the upcoming events, we did a flight-deck walk-through and systems check on our lights and gear. We identified some discrepancies that needed to be addressed, including an inoperative deck surface light. This deck surface light is night-vision-goggle (NVG) compatible. The housings are roughly the size of two side-by-side shoeboxes and are mounted about 6 inches above the flight deck.

By late afternoon, the light was back online, and the discrepancy list was cleared. Everything was going according to plan. We called away flight quarters an hour before the overhead time and did what we thought was a thorough FOD walkdown. The events just before flight operations involved recovering the RHIB. On the *Austin*-class LPDs, the RHIB davit is part of the port-side catwalk along the flight deck.



Navy photo by PH2 Michael Sandberg

A FOD check should include security of gear on and around the deck. A close look shows the latch on this light housing can be critical.

After the RHIB was secured for sea, we spent extra time in the catwalks looking for loose gear that would blow around in the MH-47E's rotor downwash. We completed our FOD walkdown and finished our flight-quarters checklist soon afterward. The two MH-47E helicopters arrived overhead on time, and we took them individually to spot No. 2.

Although we were capable of taking both simultaneously, we did single landing-spot operations to mitigate the lack of experience with DLQs for the Army pilots and because of my crew's inexperience with the H-47 airframe. After the last of the two helicopters offloaded its passengers and launched, I noticed a light that had not been there earlier during the FOD walkdown. The suspicious light was seen through my night-vision goggles and appeared to be in the area of the deck surface light, which was the one repaired earlier that day.

I held off the two helicopters into the Delta holding pattern until my deck crew could investigate. They found that the unsecured light cover had been blown off by the H-47's rotor downwash during the initial landings. The missing cover allowed light to escape the housing and reflect off the deck coaming. Once the deck crew was able to secure the light cover and check the security of the other lights, we restarted the DLQs.

We did several things right: using ORM in the planning phase of the flight operations, doing an operational test of the flight gear before flight operations, and paying extra attention to the RHIB davit after boat-recovery operations. However, we did not notice the unsecured light cover. We knew maintenance on the light had been done, so we should have done an in-depth, post-maintenance check. The rotor wash easily could have blown the light cover into one of my crewmen or on-deck equipment.

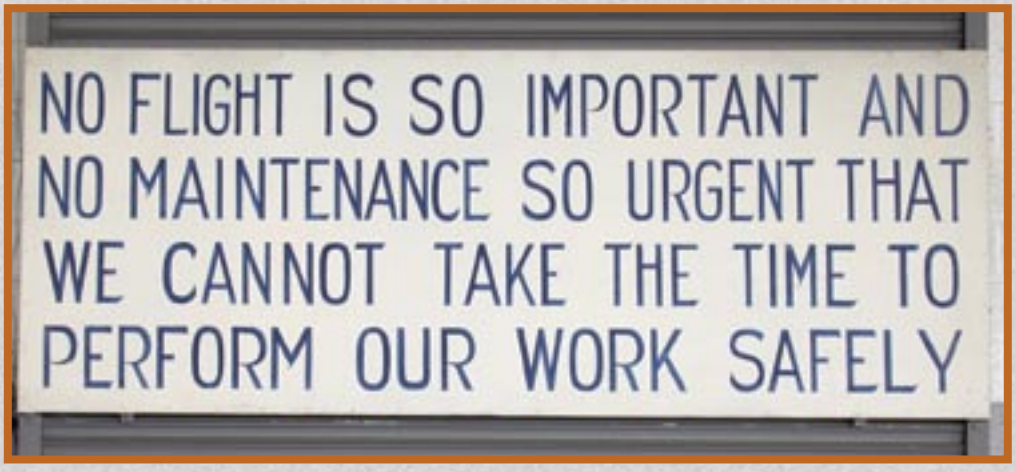
We learned a cheap lesson that night because nobody was hurt and nothing was damaged. We since have added a security "pull" on these light covers as part of our FOD walkdown. This security step was adopted because the latches on the light covers may appear to be secured when they merely are resting in the down position. Therefore, a visual inspection is not enough, especially if the check is done in low-light conditions. Finally, I have relearned a lesson I was taught back in the FRS about preflighting an aircraft and applied it to the flight deck. I now will make sure a QA check is done on the gear and surrounding area whenever maintenance occurs. This simple step will help to ensure security and proper operation. It also will give me peace of mind that everything on deck is ready to go.

LCdr. Rogers was the air boss in USS Ponce *(LPD-15) when this story was written.*

We identified this FOD story as a Best Practice because FOD walkdowns often involve just looking for loose items on the deck. That step is important, but it is necessary to look at items that can cause FOD, like light covers, loose fasteners on SE gear, bearings on sliding doors or huffer hoses, and countless other equipment. This story also was interesting because it introduced a broader view of FOD: unsecured latch that allowed a foreign object—the bright light—to pose a safety problem. In this story, a simple tug would have ensured the light cover was secured and wouldn't have had the potential to blind the crew on deck or the aircrew in helicopters.—Ed.

Good

Aptly said, and no further comment necessary.



Bad

FOD, this issue's feature subject, is a real problem that deserves attention.

Ugly

This hydraulic line found laying on the ground and in dirt is a serious problem.

Maintainers in the Trenches

Sailors and Marines do a push back on an FA-18A Hornet assigned to the "Red Devils" of VMFA-232 on the flight deck of the USS *Nimitz* (CVN-68). Navy photo by MCSN Joseph Pol Sebastian Gocong.

Three aviation electronics technicians assigned to the "Fist of the Fleet" of VFA-25 do maintenance checks on an FA-18C Hornet aboard USS *Ronald Reagan* (CVN-76). Navy photo by MCSN Joshua Scott.

Marine Sgt. Jesus Rivera, a quality assurance representative (QAR) from Fleet Readiness Center (FRC) Northwest, reviews maintenance history records with AZ2 Lorenzo Carter aboard *Nimitz*-class aircraft carrier USS *Abraham Lincoln* (CVN-72). Navy photo by MC3 James Evans.

Airplane director, AE2 Leanne McCollum of VP-47, directs AM3 Brandon Haag as they tow the P-3C Orion during a competitive exercise known as the Flight Line Rodeo. Navy photo by MC3 Kevin Beauchamp.

MFOQA

Military Flight Operations Quality Assurance Program

By Dan Steber and Jack Stewart

The following scenario for aircrew may sound familiar: The mission is over, and the debrief begins. The LSO breaks out a shopping list of problems observed with your approach and landing. You listen to his sage observations as he critiques your airspeed, altitude, and even your dance with centerline. You often think, "Is he talking about the same approach I just nailed?"

In the past, you accepted the critical review. Now, you and the LSO can play back the approach, not just through a PLAT camera, but rather with detailed information gathered from a flight-data recorder. Welcome to MFOQA.

NAVAIR is developing this program to provide timely feedback, not only for the aircrew debrief, but for the maintainers. The program will use new software with existing hardware, in multiple platforms, to record data and provide feedback to aviators and maintenance on factual performance.

Another after-flight exercise is the visit to maintenance control to write gripes. Was there really a fuel-flow split? Exactly how long did you have an EGT spike? No longer will there be questions about specific events occurring during a flight. MFOQA will show the aviators and maintainers exactly what happened and when. Specific aircrew actions (throttle and stick movements) and cockpit indications will be available for review, reducing miscommunication and improving fact-based troubleshooting.

Getting specific data to the aircrew on airspeed, altitudes, and headings will improve their learning curve and will result

Flight Data Analysis

This event is detected when the aircraft experiences high positive vertical accelerations that are greater than 6 g's.

Date	StartTime	EndTime	Duration	Min.	Max.	Avg.	Max. Exceed	Avg. Exceed
11/13/2002	00:26:45	00:26:47	00:00:02	6.01	6.84	6.44	0.84	0.44
11/14/2002	00:20:14	00:20:16	00:00:02	6.09	6.46	6.30	0.46	0.30
11/14/2002	00:24:31	00:24:34	00:00:03	6.34	6.71	6.50	0.71	0.50
11/14/2002	00:34:25	00:34:30	00:00:05	6.28	7.09	6.70	1.09	0.70
11/18/2002	00:16:24	00:16:26	00:00:02	6.09	6.22	6.17	0.22	0.17
11/18/2002	00:29:16	00:29:18	00:00:02	6.22	6.34	6.30	0.34	0.30
11/19/2002	00:27:03	00:27:04	00:00:01	6.22	6.59	6.40	0.59	0.40
11/21/2002	00:54:47	00:54:52	00:00:05	5.97	6.59	6.26	0.59	0.26
11/21/2002	00:55:34	00:55:40	00:00:06	6.09	6.46	6.27	0.46	0.27

MFOQA data records will provide feedback to aviators and maintainers.

MFOQA personnel include from left to right: Chip Brown, Bill Wescoe and Tom Matthews

Photo by Dan Steber

Playback of the mission, instrumentation, and flight performance is possible with MFOQA.

in increased proficiency—a better pilot. For maintainers, postflight information readily will be available to diagnose data on engine performance, fuel flow, navigation, G forces, and many other parameters collected on recorders.

PMA209's Director of Flight Operations, Bill Wescoe, says MFOQA will "give the aircrew and maintainers the tools to help troubleshoot discrepancies and improve performance. The postflight debrief will include data to give a snapshot of pilot and aircraft performance." This data won't be limited to helping just the aircrew and maintenance, but will also assist the operations, safety and training departments. To reflect the broad spectrum of beneficiaries, Wescoe used the acronym "MOST," meaning maintenance, ops, safety and training. An operations officer could use the information to look for efficiencies in fuel usage, flight time, and mission profiles. Critical data could be sent fleetwide to notify other squadrons of maintenance mods, inspection requirements, or servicing.

"Several years ago, we did a study on Class A flight mishaps. For the five year period ending in the fall of 2003, we had more than 200 Class A mishaps, and we believe at least 21 of them (10 percent) could have been prevented had a tool such as MFOQA been in place," said Chip Brown, the program's lead engineer and former flight-data analyst at the Naval Safety Center, who initiated the study. The intent of MFOQA is to identify human factors and trends to head off potential mishaps. Perceived performance can be contrasted to actual performance through MFOQA.

Two squadrons, one FA-18C/D and one SH-60B, currently are doing a fleet demo or "bridge" program with MFOQA. The initial results have been very positive. The *Mech* Spring 2006 issue has a feature article on HSl-41's MFOQA's efforts and can be viewed at: http://www.safetycenter.navy.mil/media/mech/issues/spring06/pdf/hsl-41leads.pdf.

The *Mech* Fall 2003 issue also included an article that provides an overview and background for the program. View this article at: http://www.safetycenter.navy.mil/media/mech/issues/fall03/pdf/mfoqa.PDF.

MFOQA became a program of record last year with passage of milestone B, which made MFOQA mandatory. The program has full funding and will be introduced to the fleet in a staggered implementation scheduled in early 2010.

MFOQA POCs are:

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Tom Matthews, Integrated Project Team Lead, 301-757-6706, email: Thomas.matthews@navy.mil.
Chip Brown, 301-757-7693, email: chip-brown@navy.mil.
Visit the PMA209 website at: http://pma209.navair.navy.mil/home.asp

Flight, Flight-Related, and Ground Class A and B Mishaps 03/05/2007 to 06/27/2007

Class A Mishaps: 6
Class B Mishaps: 17

For a detailed description visit the statistics page at www.safetycenter.navy.mil

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Naval Safety Center Data
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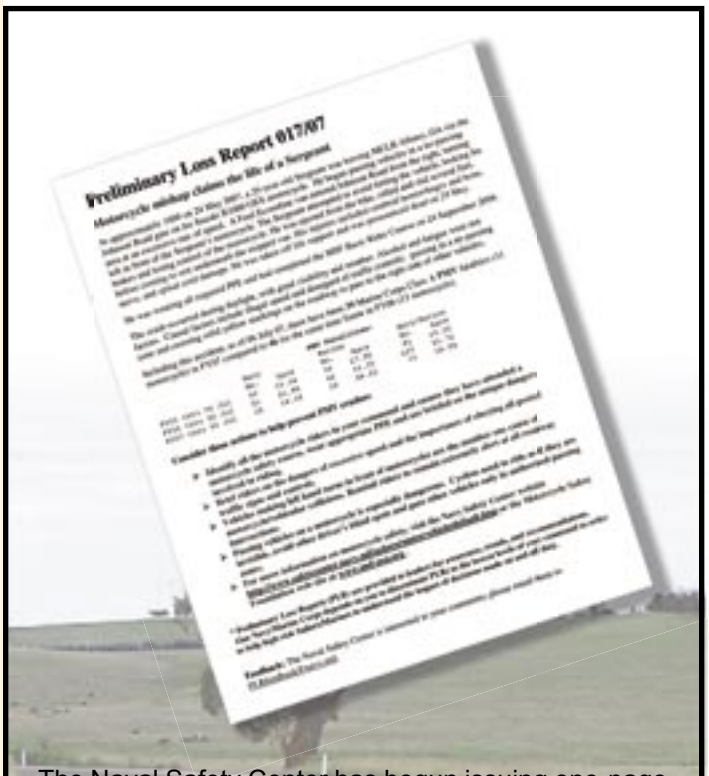


The Naval Safety Center has begun issuing one-page Preliminary Loss Reports (PLRs) for all off-duty and traffic fatalities. The goal is to increase awareness of these costly (and preventable) mishaps and to help high-risk Sailors/Marines to understand the impact of decisions made on- and off-duty.

Each PLR contains a brief narrative about the mishaps, updated trends comparing Navy, Marine and combined rates for the past three years, and a series of suggested actions to help avoid similar mishaps.

If you'd like to automatically receive these PLRs, email our public affairs officer at safe-pao@navy.mil.

Big Bang Is Not Theory

By AM3 William Allenbaugh

I came to work and found the usual heavy workload. We checked tools in the morning and got started with maintenance. We just had received three new airmen in the shop, and they were tasked with cleaning access panels on aircraft 603. My job was to supervise the new airmen and help clean out the aircraft panels as well. Before the day was done, I could have used some help.

Once we started, we quickly discovered a shortage of cleaning bottles because other shops were cleaning the aircraft, too. Sharing only one spray bottle of alcohol-based cleaner between four people was not good enough, and the bottle soon would be empty. I let the guys continue the job, and I went to find more spray bottles.

I planned to fill bottles with water to flush out the dirt to make our one bottle of cleaner last. I went to the first lieutenant to get some empty spray bottles, but all I found were full bottles of Spray-Nine cleaner. I grabbed two bottles and took them to my shop. Knowing the Spray Nine would run out quickly, I decided to dilute the chemical with a half-bottle of water. I looked for an empty container to pour out half of the Spray Nine. I'd use the rest of it later—that was the plan anyway.

The only thing I could find was my Jolt Cola bottle, which is made of aluminum and has a screw-on type cap. I drank all the cola in the bottle and shook out the remaining drops into the trash. I poured the Spray Nine into the soda bottle and labeled the side of that bottle "Spray Nine, Do Not Drink." I then left the shop to check on the new guys. When I reached the aircraft, they were gone. Knowing the importance of finishing the job, I continued to clean the panels. I was about to use the remainder of the Spray-Nine cleaner that I had left in the shop, when I was told to wrap it up because the next shift was here.

While the supervisors were checking tools, I cleaned up my work area and went to the shop, completely forgetting about the Spray Nine I had left in the soda bottle. The tools were accounted for, and they let us go for the day. As we all headed out, I thought everything was OK.

A Jolt Cola can isn't the right container for hazmat.

At some point during the night, someone moved the hazmat-filled container near a radio on top of a shelf that was at eye level. The shipmate who moved the bottle said when he opened it; there was a big release of pressure, along with a peculiar odor. Despite this warning, he didn't think it was abnormal. Later that night, when I was home and about to go to sleep, a knock came at the door, and I heard words that no one really wants to hear. They came from an airman who had worked with me on the day shift. He told me that an explosion had occurred at work, and some people were hurt and in the hospital. He also said that I needed to come in right away.

I couldn't believe what I just had heard and almost dismissed it as a joke. He was persistent and explained it was no joke. Even while I was driving back to work, I had a problem believing the situation was real.

When I arrived at work, I found out it was very much true, and a lot of eyes were looking at me! I then got

that sinking feeling and found out my day was getting worse.

After answering a gauntlet of questions, I found out that little soda bottle, which I had thought was harmless, actually had exploded in the shop. It blew up with so much force that it knocked a five-pound radio off the shelf, sprayed hazmat all over the shop, and actually got into mouths, eyes and noses of three people. It barely missed hitting another shipmate in the head when it exploded.

The only good news was that the guys who went to the hospital were OK. In fact, they were back at work the next day.

My pride took a huge hit, but I was thankful no one was injured seriously in this incident. This event is something I never will forget; neither will my shipmates—they remind me regularly.

I learned two valuable lessons: Spray-Nine doesn't have any warning about transferring the chemical into other containers, but anytime you transfer hazmat into a temporary container, it should be an approved one. I hope my near-tragic, big-bang mistake will make others aware of this danger.

Petty Officer Allenbaugh works in the airframes shop at VAW-124.

Tire Change Gone Bad

By AD1 David Coffelt

How does a simple tire change become the most embarrassing and potentially deadly mishap in my 15-year career as a flight engineer? The answer is found in one very simple three-letter acronym: ORM (operational risk management) or better yet, the lack of ORM.

A routine four-day NALO mission in our C-130T from the East Coast to the Mediterranean to drop off cargo and personnel seemed like a piece of cake. After the first 10-hour day of flying, we landed in Lajes, Azores. The following morning, the transient alert sergeant called to tell me that our C-130T was leaning right wing down and a little aft. I immediately thought about the preflight I had done with my trainee before leaving home base. Did I miss something that could have been fixed at that point? After a short ride to the aircraft, we discovered our starboard, aft main-mount tire was flat.

Normally, this situation would not pose a problem. However, we were at an airfield with no tools or parts

How much damage can be done when jacks fall? These photos show the damage, but it could have been worse.

support, and we had 30,000 pounds of cargo on board, which meant it was a problem! We needed a game plan to fix the flat tire.

First, the plane needed to be as light a possible to change the tire. The cargo handlers in Lajes were kind enough to download and store the cargo. Second, the aircraft needed to be stabilized. The "milk stool," a wooden stool used to stabilize the ramp while loading and unloading cargo, was placed under the cargo door to prevent the aircraft from settling further. Third, we called the squadron to send a new tire and a crew to change it. Three days later, we had our parts and pit crew to change the tire. The crew arrived at 2330 local time, but they were tired and had jet lag.

We had anticipated the crew's arrival and were ready with two jacks capable of supporting a C-130T, as well as a nitrogen cart to inflate the new tire. At this point, the job was looking good. My two primary concerns were that it was nighttime and that the crew were very fatigued. We should have used ORM and let everyone rest, taking a fresh look at the problem in the light of day. But we didn't do that, so consider that mistake strike No. 1!

We had all the parts we needed to remove and replace the tire, but we did not have the proper publication for jacking. Rarely, no…never in our training were we ever taught to do any job without the publications. Had we used a little ORM, we would have realized the missing pub should have been a showstopper. But we decided to press on-call that strike No. 2!

We positioned the jack under the jack pad near the starboard aft strut and began to lift. With the jack fully extended, the tire still was not high enough off the ground to remove it from the aircraft. We retrieved a second jack and tow fitting from the cargo compartment of our plane (which would give us an additional four inches of clearance) and attached it to the back of the affected strut. We still did not have enough clearance to remove the tire. In retrospect, this problem should have told us to stop. Two hours had elapsed, everyone involved was thoroughly exhausted, all of our gear was being used, and we still were not in a position to complete the job. However, we decided to press on. The umpire could have yelled, "Strike No. 3!"

We decided to improperly rig the jacks to get the job done. Again, you won't find this "technique" in any manual, nor would I recommend it to anyone in a similar position. We connected the jack to a part of the landing gear that was not a jacking point and began to raise the aircraft. This improvised method failed under the weight of the aircraft.

My trainee's head happened to be next to the jack at the time of failure, and I know he'll never forget the sound. As bad as it was, we were lucky no one was injured or killed when the torque strut gave way, and the aircraft fell to the ground.

Many times during this simple tire change, we simply should have stopped the task. I also believe we could have identified pitfalls and prevented the strut from breaking had we given the pit crew time to rest. We clearly should have used the proper tools and publications for the task, too.

Petty Officer Coffelt is a flight engineer with VR-53.

3,000 PSI Is Unforgiving

By AM2 (AW) Shawn Hayes

Navy photo by PH3 Danny Ewing, Jr.

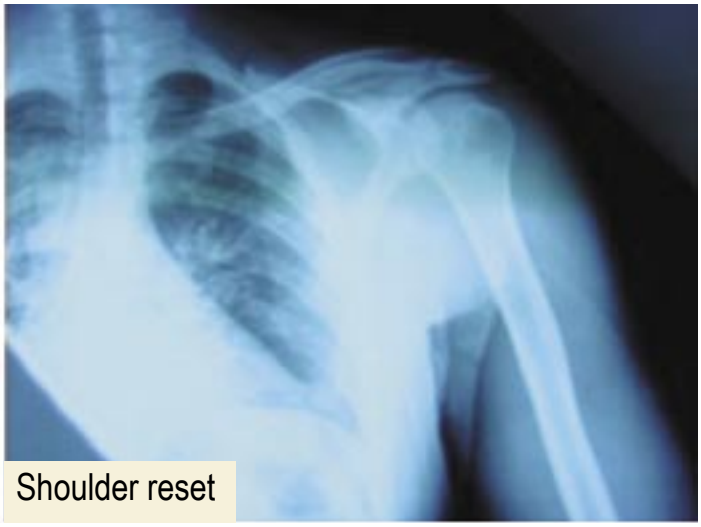
Unlike most days at sea, this one actually was going to be an easy one. No flights were scheduled, which meant we would focus on FA-18 aircraft maintenance to prepare the jets for the next day. After getting the daily pass down from the leading petty officer (LPO) of the airframes shop, I was tasked to troubleshoot aircraft 400. Little did I know that my quiet day was about to get very exciting.

This particular aircraft had two leaking servo-cylinder discrepancies: a leaking starboard stab servo and starboard aileron servo. After gathering the necessary tools, my fellow worker and I proceeded to the flight deck to remove the panels and prepare the aircraft for a low-power turn to investigate the leaks.

Everyone was in place: We had a flight-deck coordinator, low-power-turn operator, plane captain, my assistant, and me—the CDI. The plane captain gave the turn operator the signal to start the No. 2 engine. After an uneventful engine start, I positioned myself across the back of the aircraft, with my left hand on the starboard stab to support my upper body. This position put my left arm and shoulder between the starboard rudder and airframe and allowed me to get a close look at the leak as soon as the No. 1 engine came online. What I did not consider was that the rudder would move to the streamlined position when that engine started because it runs from the 3,000-psi, No. 1 hydraulic system.

With that being said, the PC gave the signal to fire up the No. 1 engine. The rudder moved into the streamlined position as advertised. Instant disaster occurred because my arm was between the rudder and stabilizer servo cylinder! My left arm and shoulder were wedged,

Separated shoulder



Shoulder reset

with pressure from the rudder rapidly increasing. I yelled and screamed for help. My shipmate quickly signaled the PC and FDC to shut down the aircraft, and a "medical emergency" quickly was called away. Several people pushed the rudder back to free my arm.

I spent the next three days in medical and more than 70 days on light and limited duty, nursing a dislocated shoulder. My X-rays clearly showed the dislocated shoulder before and after it was popped back in place—quite an experience.

I could have avoided this situation had I simply used ORM and followed safety procedures already in place with the command's maintenance SOP. I will admit I let down my guard and became complacent during this routine maintenance evolution. I should have waited for both engines to come online and then requested a "hands off" signal from the PC before going near any flight-control surface with hydraulic power applied. We also violated the squadron's maintenance SOP; we didn't do a brief of the evolution with all involved persons. We all were so familiar with our duties that we went right to work. We only briefed the turn with the maintenance-desk chief, FDC, and turn-qualified guy.

Had we done a simple brief of the job, we could have discussed roles and responsibilities, answered any questions, and highlighted this hazard. A periodic review of squadron maintenance SOPs would be a good step to incorporate into regular training and would remind the entire maintenance department of the need to brief before any action.

Hindsight always is 20/20, and I am very fortunate I didn't lose my arm because 3,000 psi can be unforgiving. I depended on luck, rather than good, professional maintenance practice. Despite a bad decision, I'm grateful to have come away with only a little pain and great lesson.

Best Practice: Since this incident, my command has implemented a policy that no maintainers are allowed on top of the aircraft until both engines are started and the auxiliary power unit (APU) is shut down.

Petty Officer Hayes works in the airframes shop at VFA-86.

BRAVO Zulu

Sailors and Marines Preventing Mishaps

Send BZs to: SAFE-Mech@navy.mil

AM1 Dusty Tucker
VAQ-137

During a QA inspection of Rook 501, Petty Officer Tucker noticed the wing interlock switch had been installed incorrectly on both wings. Realizing both wing sections were new, he was inquisitive about other aircraft. He checked the rest of the squadron's aircraft and found the same discrepancy on Rook 500.

The command told the wing about the problem, and it was found in a VAQ-131 aircraft, too. Had this problem gone undiscovered, fuel-transfer problems may have caused the loss of multiple aircraft and aircrew.

BZ of the Quarter

ATAN Matthew Ehrman
VR-59

Airman Ehrman noticed a large amount of gray smoke coming from the No. 2 engine cowling upon engine start. He immediately radioed for maintenance control and QA and then contacted the aircraft commander to tell him of the maintenance problem. After troubleshooting the engine, work center 100 found that the engine starter had failed internally and was spraying engine oil onto the engine as it was started. The aircraft was repaired and returned to an up status for flight scheduling.

Airman Ehrman's keen attention to detail during the evolution potentially saved the lives of aircrew, passengers and aircraft 833.

AD2(AW) John Tipton
VR-56

After a routine daily inspection of a C-9B Skytrain II, Petty Officer Tipton took a few extra minutes to check for corrosion. Climbing a ladder near the engine pylon, he noticed a seemingly insignificant area of chipped paint. Knowing this area experiences very high stress during flight, he continued to investigate until he found that the chipped paint actually concealed a three-inch crack in the aircraft skin.

Petty Officer Tipton's assertiveness led maintenance control to remove the aircraft from service before the crack got any worse. Pressurization of the cabin could have been affected, leading to catastrophic loss of the aircraft.

AD2 Juan Salazar
HSL-46

While doing a daily and turnaround inspection on Cutlass 460, Petty Officer Salazar found a piece of metal in the aft hydraulics bay. Realizing it was made of copper beryllium, he diligently searched the rotor head for damage. He found the pitch-lock liner on the red pitch-change horn was cracked and broken inspected more closely. He determined that had the rotor head been engaged, the results could have been catastrophic. He informed the night-check CPO, and the aircraft was downed immediately.

AT3 Juan Canizalez
VAW-115

As the deck crew moved his Hawkeye, Petty Officer Canizales noticed that the plane would strike an FA-18. He quickly notified a QA and safety representative about the impending crash, got the attention of the move-crew director, and signaled to halt the move. The aircraft was stopped as the horizontal stabilizer came to rest against the Hornet, leaving only a slight dent in the Hawkeye's tail and saving an estimated repair cost of 800 man-hours and $50,000.

AM3(AW) Robert Briggs
VAQ-132

While doing a preflight inspection for a functional check flight on Scorpion 501, Petty Officer Briggs discovered that the slat fingers were installed incorrectly. Had this discrepancy gone unnoticed and hadn't been fixed before flight, the aircraft could have experienced binding slats or controllability issues, leading to an aircraft crash.

AN Lindsey Newcomer
VAQ-133

During a daily and turnaround inspection on a newly received aircraft, Airman Newcomer found a major discrepancy. She was inspecting the ram-air turbine (RAT) cavity, when she noticed that the RAT dump valve (part of the pneumatic system and similar to the buttons checked during preflight on the main landing gear) was open. Had the aircraft flown in this condition and had a gear malfunction, the crew would not have been able to blow down the gear—a critical back-up and safety capability.

ADAN Steven Wagner
VAW-115

During the man-up of an E-2C, Airman Wagner, a plane captain, noticed that the hydraulic pump handle was missing. He quickly informed the flight-deck coordinator and initiated a FOD search. He found the handle under the pilot's rudder pedals, where it had been lodged during the aircraft's last carrier landing.

Airman Wagner prevented the pump handle from jamming the rudder pedals and causing the loss of the aircraft and crew.

AN Justin Draughn
HSL-46

During a daily and turn-around inspection on Cutlass 464, Airman Draughn discovered corrosion underneath the sealant on the oil jacket plug of the No. 2 input module. He immediately notified his supervisor and maintenance control of his discovery and the detachment AD CDQAR did a corrosion inspection, which revealed the corrosion was beyond repair. The input module was replaced.

Airman Draughn found a hard-to-see problem and one that could have led to water contamination of the oil in the main-gear-box, internal failure of the main transmission gears, and loss of aircraft and crew.

AN Todd King
VAQ-132

During a Pilot and ECMO-1 seat-arming evolution on aircraft 500, Airman King found that the lanyard for the personnel services quick disconnect (PSQD) had been severed. Had this problem not been discovered, the ejection sequence would not have worked correctly, hanging the seat halfway up the rail, because the PSQD, which supposed to detach during ejection, didn't separate.

Cpl. Samuel Chaisson
HMH-464

While doing a daily inspection on Condor 12 as part of his plane-captain training syllabus, Cpl. Chaisson found a crack in the compressor section of the No. 1 engine. The severity of the crack and its location seriously jeopardized the structural integrity of the engine and could have caused a complete engine failure. Without delay, he notified QA.

Cpl. Chassion's attention to detail and keen eye led to the immediate removal and replacement of the engine, preventing a life threatening situation.

AD3 Danny Figueroa and AE2 Bret Galloway
VAQ-133

While fuel poured from aircraft 532, Petty Officer Figueroa's quick thinking and rapid action prevented a more serious spill. He shut off the manual switch for the fuel-dump valve, which is located in the extendable-platform area. AE2 Galloway assisted and prevented the fuel from spreading; he grabbed a recycling bin and placed it under the tail dump to keep additional fuel off the hangar floor.

AM1(AW/SW) Aristile Guidry
HSL-46

Petty Officer Guidry helped another squadron's aircraft overcome a serious problem. An SH-60F had declared an emergency with a hung transducer and was 98 nautical miles from Mayport. Guidry took control of the situation, found out how much cable was hanging out, and gathered enough people to take care of the situation. Having dealt with a hung cable before, he ensured a grass strip between a runway and taxiway would be used to drop the transducer and cable, hoping to minimize damage.

Making sure everyone was ready for the event, Petty Officer Guidry deployed people along the taxiway to receive the transducer and 240 feet of cable. He also made sure the path was free of obstacles. The drop went as planned, and, when the helo was on deck, he cut the tangled cable from the reel.

AE3 John Neal, AE1(AW) Jamal Davis, and AEAN Daniel Hart HSL-44, Det 2

While troubleshooting Magnum 447's blade-fold system, Petty Officers Davis and Neal and Airman Hart discovered several broken ground wires on the lateral blade-fold transducer. They were able to repair the automatic blade-fold system, returning it to FMC status after it had been inoperative for more than 18 months. Their discovery and subsequent repair saved valuable time for spreading and folding blades while deployed.

GySgt. Tad Still HMM-265 (Rein)

While modifying an aircraft, GySgt. Still discovered a wire bundle was rubbing on the No. 2 engine's throttle-control tube. The plastic shielding of the wires had been rubbed down and abraded as a result of repeated contact. If this problem had gone undetected and uncorrected, the wire bundle would have abraded completely, causing an electrical fire that severely would have damaged the aircraft.

Gunnery Sergeant Still alerted QA, so they could inspect all the Cobras on the line for similar discrepancies. They found abraded wire bundles on two of four aircraft, which also required minor repairs because of early detection. Although not a part of the assigned job, his find prevented serious damage and possible injuries.

Maintenance Department HSL-47

The squadron maintainers were recipients of two notable awards: The Lockheed-Martin Maintenance Excellence Award and the Secretary of Defense Maintenance Award (commonly known as the Phoenix Award).

To receive one award is exceptional; to win both just weeks apart is phenomenal. *Mech* wants to congratulate the maintainers at HSL-47 for being recognized and for their excellent maintenance performance and practices. A BZ is the least we can do to recognize your success.

CROSSFEED

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Airframes

Hydraulic Contamination Program Changes

By AMCS(AW) Robert Chenard

Problem: Not every command knows that NA 17-15E-52, Hydraulic Fluid Contamination Analysis Kit, was deleted in October 2006.

Solution: The contents of this manual were transferred to NA 01-1A-17, Aviation Hydraulics Manual. This change created more work packages in the dash 17 manual, so you need to make sure your people are up to speed and review this updated publication.

Highlights of the changes include:

- NA 01-1A-17 is in work package format.
- Increased from 14 sections to 17 work packages.
- Description of hydraulic systems and fluids is in WP 003 00, vice section I, introduction.
- WP 005 00, paragraph 26 contains information on the HACH Ultra Analytics Portable Oil Diagnostic System (PODS). You should note that the PODS eventually will replace the UCC CM20.9090 and the HIAC/ROYCO 8011-3, becoming the only particle counter for O and I level.
- WP 017 00 is the patch-test kit (P/N 57L414), and it includes an illustrated parts breakdown.

Best Practice: Numerous commands are on board and have discovered the changes mentioned. They also have made sure program references, cross-reference locators sheets, and CTPL/DTPL are up to date. These steps show that they are on top of the game.

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

Hydraulic Analysis Cleanliness Is Critical

By AMCS(AW) Robert Chenard

Problem: We still find too many squadrons and commands with patch-test kits that are dirty, contain residual fluid, or have built up sludge and sediment.

Solution: We need to tighten up procedures. The Navy no longer has AMHs to specialize in hydraulics systems, so it's up to all AMs who have the hydraulic contamination qualification to make sure hydraulic systems stay clean. Too often we find patch-test kits that are unsat. The electronic particle counter (EPC) is the primary method, but sometimes you have to go "old school" and use a test kit. You must conduct periodic refresher training, using the test kit. The hydraulics manual, NA 01-1A-17, stresses the need to use proper sampling techniques and to use equipment and materials known to be clean to avoid foreign matter that can contaminate the sample fluid or testing equipment that can cause erroneous results.

If your system fails to meet the minimum standards (Class 5 for aircraft and Class 3 for SE), you must initiate a VIDS/MAF to decontaminate that system. Chapter six of this reference provides an excellent basic description of the various processes used. Read it. However, you also must look at your MIMs for specific details on your aircraft's systems.

ECP bottle drain

Patch test bottle drain

NA 01-1A-17 also says the EPC bottles "shall be cleaned only with hydraulic fluid." If you use MIL-PRF-680 to clean them, it will cause a false contamination level. However, PRF-680 is the preferred solvent for cleaning patch-test bottles. Younger Sailors need to know the difference.

Best Practice: We've seen several squadrons using a locally manufactured draining rack to drain excess hydraulic fluid for EPC bottles and from patch-test bottles cleaned with PRF-680. It appears to work well; however, it's necessary to have separate racks or to keep the bottles separate to prevent PRF-680 vapors away from the EPC bottles. Some commands cap them to prevent this problem.

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

Maintenance Management

Maintenance Risk Management: An Overview

By AEC(AW/SW) Matthew Cooper

The Naval Safety Center provides a variety of services in an effort to raise fleet awareness and improve focus on a strong safety culture and readiness. Among our most successful and well-received services is the Maintenance Risk Management Presentation (MRM).

Naval Safety Center personnel provide this training upon request from individual commands. The MRM is a 60-minute program and uses a mix of PowerPoint slides, pictures, videos, and real-world experiences to emphasize concepts, practices, procedures, and pitfalls associated with aviation maintenance.

This presentation targets the "deck plate" maintainer and all maintenance managers. It is an outstanding tool that aids the recalibration of organizational culture. Included in this presentation are the concepts of operational risk management (ORM), ground crew coordination (GCC), human factors (HFAC) and traffic-safety overviews. This presentation is best suited for large audiences, like aviation squadrons, organizational and intermediate level activities, air stations, aviation facilities, and detachments.

The MRM presentation is available to all interested units and is automatically scheduled in conjunction with an aviation safety survey team visit. Activities may request a presentation outside of this schedule, but those requests are considered on a case-by-case basis only. A request must be received at least three weeks in advance of the desired date. Contact the Aviation Directorate at (757) 444-3520 for more information or visit our website at http://www.safetycenter.navy.mil.

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

PPE: Will It Really Protect You?

By PRC(AW/SW) Brian Westcott

As I travel the globe and visit squadrons, AIMDs and MALs, I often notice that PPE is in poor condition and not always used correctly. This gear is designed to protect us from environmental hazards, and one of the most important pieces is the cranial.

How many times has your cranial been thrown in a cruise box or tossed across the room? We all know it happens. I also have seen problems with LOX coveralls, aprons, face shields, and gloves. This equipment is crucial to safety and mishap reduction. You can use ORM to mitigate the risks posed from poorly maintained PPE.

1. **Identify the hazards:** If a publication or other document states to wear PPE, you can be certain hazards exist, and your gear is the first line of defense. Make sure to look at all hazards in the work area.

2. **Assess hazards:** Look over your equipment. For cranials, make sure the back shell isn't on upside down; it can cause neck and spinal injuries. Make sure spare lenses aren't stored between the plastic back shell…it's a FOD hazard. Check the ear pads to make sure they aren't hard, brittle or sticky. They won't work correctly if they're in bad shape. Make sure the front and back shells aren't cracked or missing pieces. You want the cranial to save your head and not create FOD. Check the reflective tape for the right size. Too much tape might hide cracked shells. Also look at the goggles for condition. For LOX, make sure aprons are used. I often find them folded and unused. Check LOX coveralls for frayed legs, dirt, or other conditions that make them unserviceable. Make sure face shields aren't cracked or broken, and don't wear LOX gloves that have holes or are dirty.

3. **Make risk decisions:** Make the decision to have and use serviceable PPE. One drop of LOX on your skin can leave a lifetime scar, and bad cranials can leave you injured or affect your hearing. Use the risk-assessment matrix, if needed, to identify a risk-assessment code. Then make a plan to reduce the hazards.

4. **Implement controls:** Take time to inspect PPE before using it. Replace worn equipment, and use proactive steps to enhance safety.

5. **Supervise:** Take care of your people, and make them take care of their PPE. Monitor each task, and stop maintenance when people aren't wearing good, safe gear.

I ask that each of you start now. Take a look at your gear right after you've read this story. Make sure your PPE is working for you and doing its assigned job: **keeping you safe.**

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

Security of Arms, Ammunition and Explosives (AA&E)

By AOCS(AW/SW) Ron Carpenter

I have found that AA&E security, record-keeping, and personnel designations are inconsistent. In particular, I see recurring problems with appointing people to manage AA&E security/accountability programs, taking care of the control register, keeping records, conducting inventories, doing security surveys, and training.

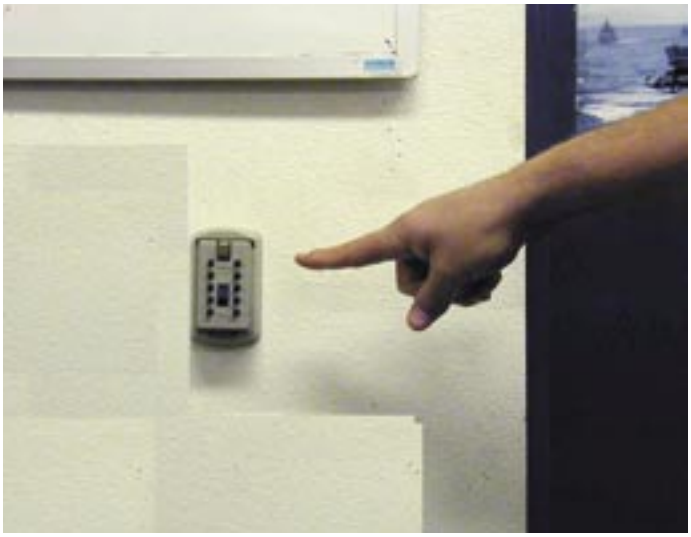
The commanding officer must designate, in writing, an AA&E accountability officer and a key-and-lock custodian or access-control officer. These people assist the CO and make sure that security, access to ammo, and record-keeping is in accordance with current directives. For AA&E, OPNAVINST 5530.13C, is the instruction that mandates the requirements an activity must follow when AA&E is held within their spaces.

Squadron spaces and the ready-service locker must be designated as a restricted area when risk category AA&E is stored there. Typically, this ammunition is security-risk category three or four, and it is stated in the squadron's security plan. The keys for the RSL are required to be stored in a separate key container from non-AA&E keys. That box must be made of 12-gauge steel and secured with an approved locking device. If a command has security-risk category 1 or 2 ammunition, the keys must be stored in a GSA-approved class 5 container.

The CO must appoint a person to do an annual security survey. These surveys must be retained for three years. Magazine key-and-lock inventories must be done semi-annually and retained for three years, too. Whenever a key-and-lock custodian is relieved, a 100-percent inventory of the ammunition and explosives must be completed.

I often find that the AA&E accountability officer and the key-and-lock custodian are the same person. The 5530.13C states that the duties of the key-and-lock custodian cannot be assigned to a person responsible for AA&E storage facilities.

Access lists must be maintained for people who have unescorted access to AA&E, and these lists



must be kept out of public view. Anyone with AA&E duties are required to have an annual screening, which is recorded on the record of screening. This form must be kept for six months after the person leaves the command.

The key-control register and the RSL access list provide continuous accountability of AA&E keys. The register must be filled out completely (all required elements or entries). The log is kept for three years after the date of the last entry.

Key chapters in the 5530.13C are Chapter 2 for risk categories, key security, storage requirements, key-control register requirements, and form retention times. Chapter 5 contains the duties and responsibilities of the AA&E accountability officer. Appendix F provides the AA&E physical-security checklist for forces ashore.

AA&E security is serious business. The procedures found in the 5530.13C must be followed to ensure ammo stays locked up. It doesn't take a lot of explosives in the wrong hands to cause death, injury or damage.

Senior Chief Carpenter is an explosives and weapons-system analyst at the Naval Safety Center.

Technical Directives

Screening Logbooks for Technical Directives

By SSgt. Cristina McWilliams, USMC

Problem: Too many TD documentation problems are being found with logbooks when screened.

Solution: To eliminate this problem, you should make sure all the requirements outlined in the CNARFINST 4790.2, Vol V, Chapter 11 are being met. Squadrons cannot let operational pressure minimize the attention to detail given to a thorough screening of logbooks or to the necessary corrective actions needed to fix discrepancies found.

I often find that the responsibilities listed in Volume V, Paragraph 11.3e are not being adequately completed. Commands must validate the incorporation of all applicable TDs using a current NA-500C. For any TDs that have exceeded compliance times because of reasons beyond the activity's control, a waiver or deviation request must be submitted to the ACC/TYCOM via the chain of command. Volume V, Paragraph 11.3c says aircraft and equipment can't be used if TDs are not incorporated within the required compliance time without that approval paperwork.

Consistent screening of the logbooks and the NA-500C is needed to prevent this serious problem.

Best Practice: MALS-31 at MCAS Beaufort, SC, had an excellent program. They regularly review required documents and have a checklist of all TDs. They use a screening sheet that ensures complete control over the TD process. It's easy to use and very effective.

SSgt. McWilliams was a maintenance analyst at the Naval Safety Center.

Class C Mishap Summary

By ADCS(AW) Michael Tate

From February 15, 2007 to June 15, 2007, the Navy and Marine Corps had 46 Class C mishaps involving 46 aircraft. Dollar amounts still are being tallied, but, as of 15 June, it was over $2.9 million.

To say the least, this has been a bad quarter. We're not sure of the reasons; maybe it was the start of the summer. Whatever the underlying causes, we must do better.

Most of the reports still are under investigation, so specific incidents can't be discussed. However, a trend on the maintenance side is TFOAs and a new one, TFOS—things falling off ships.

We had several items that went swimming this quarter. We need to make sure that loose items are secured, so tie them down.

The same goes for TFOAs. Too many reports attribute the problem on corrosion or dirty surfaces. We have the planned maintenance system and 18-inch rule that should help prevent the senseless loss of items from the aircraft. We always try to blame a situation on material failure, rather than the reason the item failed. Too often, it's poor PMS.

Analyze the situation; look for steps that would have prevented a TFOA, and fix maintenance practices to keep them from happening again. If we simply accept a TFOA as material failure without review, we're doomed to repeat them.

Our day-to-day procedures need to be tightened up, and we need to get back to the basics. It's the only steps that will help.

Senior Chief Tate is a maintenance analyst at the Naval Safety Center and coordinator of the Cross-feed section of Mech.

Helping Sailors and Marines Help Themselves

Sierra Hotel

Commander, Naval Safety Center would like to recognize the following aviation commands for their recent participation in safety surveys, culture workshops, and maintenance malpractice resource management (MRM) presentations for the months of April-June.

Safety Surveys

HSL-47	NAWSC
HMLA-775	VFA-31
HMM-268	USS *Wasp* AIMD
HMM-166	FRC NW (Whidbey Island)
VAQ-133	SFWSL, Oceana
VAQ-137	VP-1

MRMs

VR-53	VR-62
AMO	VR-92
HMM-264	VP-26
VPU-1	

Culture Workshops

VT-7	Navy Flight Demonstration Squadron
VT-3	VR-57
VFC-111	VAW-120
VAQ-209	VP-40
NASA Langley	MALS-42

Navy photo by MC1 Michael Kennedy

For more information or to get on the schedule, please contact: Safety Surveys: Capt Chris Foley, USMC at 757-444-3520 Ext. 7223, MRM: AEC Matthew Cooper at 757-444-3520 Ext. 7275, Culture Workshop: Cdr. John Morrison at 757-444-3520 Ext. 7213.

www.safetycenter.navy.mil