Reducing Mishaps by 50%

Fall 2004

Mech

The Naval Safety Center's Aviation Maintenance Magazine

In This Issue: Special 50-Percent Mishap-Reduction Pullout

THE NAVAL SAFETY CENTER'S AVIATION MAINTENANCE MAGAZINE

Mech

On the Cover:
Aviation Ordnancemen assigned to the "Warhawks" of Strike Fighter Squadron Nine Seven (VFA-97) reload 20mm bullets into the 20mm gun system (M61A1) on an F/A-18 Hornet during flight operations aboard USS *Nimitz*. Photo by PH2 Michael J. Pusnik Jr.

Vol. 43, No. 4 Fall 2004

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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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Admiral's Corner
From Commander, Naval Safety Center

Reducing Mishaps Is a Team Effort

I often get the chance to speak with maintainers, aviators, Sailors, and Marines around the fleet. Their enthusiasm to get the job done is evident, but I have to ask myself, "At what cost?"

Some of those costs are described in a special section of this issue, which provides the status of our efforts to reduce mishaps in all areas. We also explain what the Naval Safety Center is doing to help. This pullout gives an overview of FY04 statistics for aviation, afloat, and ashore. Our directorates address specific issues to make you more informed about the products and services that we offer, and how they can help you to reduce mishaps. These best-business or safety practices also can help to improve the culture and effectiveness of your commands.

For those areas where we missed the goal, you can be sure that a main cause was human error: A few maintainers didn't make sound risk decisions, simply lost focus, or were so busy they allowed mishaps to occur. We know human error is involved in 80 percent of our mishaps. We have people looking at ways to improve that problem, and this issue offers a few examples on how to avoid those related to maintenance. We can't ignore it and must find answers to nagging questions like: Why did a Sailor die on a spotting dolly moving around a hangar deck? Why do hundreds of Sailors and Marines die in their cars or trucks every year? Why do people who write stories, tell us they knew a procedure wasn't right, but they did it anyway? We need to get at the root of these problems, especially those involving off-duty PMV and recreational mishaps.

One goal that we missed was traffic deaths. I recently spoke to a group of safety professionals about my passion to reduce PMV mishaps and the dramatic increase in motorcycle fatalities. I told them that we have to get our arms around this problem. We have to get better. I am concerned about the deaths and injuries from traffic accidents and asked the editor to broaden a study he did on aviation ratings.

The Work Zone article on pages four and five gives some insight into who is at risk. It identifies those rates at higher risk on our roads. For example, a non-designated seaman has a three-times-greater chance of dying in a PMV accident than a non-designated airman. It's an interesting study, but it will be effective only if you look for your rating, review possible solutions, discuss it in your shops, and take action. We need efforts like this for us to meet the goals during the next year.

I always want to share and celebrate the good deeds our Sailors, Marines and civilians do each day. It's often hard to determine mishaps that we prevented, but the Bravo Zulu section shines the spotlight on people who saved the day and are helping us to meet the mishap goal. They have made mishap reduction a reality, and their efforts are checks in the good column.

At the last Joint Services Safety Conference, Director, Readiness Programming and Assessments, Mr. Joseph Angello, Jr. said, "Mishap reduction is not my job; it's our job. You must become the advocates, explain why our efforts are important and how we're going to get the job done. We must tell leadership why it's important. We can't sit on our hands and do just what we did last year." He added,"*[Accepting losses]* is not a position any of us wants to defend when we have to tell a parent, spouse or family member about a lost loved one."

Think about those words as we start the second half of the mishap-reduction campaign. We can make the goal, but everyone must work together, look at new ideas, and change our attitudes.

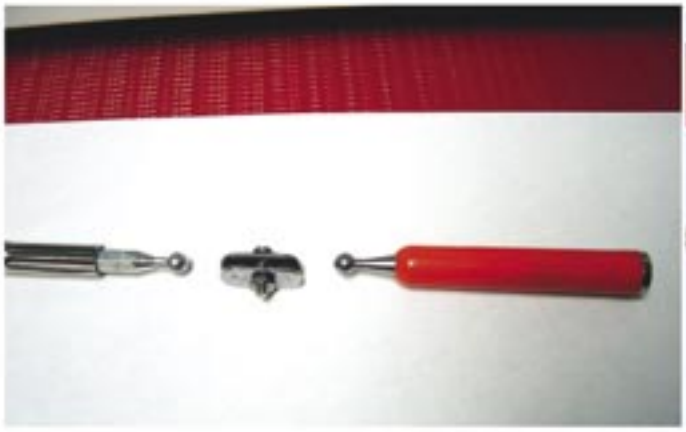
RADM Dick Brooks

Good, Bad and Ugly

Photos and captions by AVCM(AW) Dave Kennon, Naval Safety Center

Good: The central technical-publications librarian provided laminated hard copies of daily-and-turnaround-inspection MRCs, so plane captains can use them when the decks are converted from paper to electronic media. This step adds work, but it becomes a necessity when electronic versions are the only ones available. It's not practical for PCs to use laptops on the line.

Bad: The NAMP (Volume 5, Chapter 13, paragraph 13.4.2.d) outlines the requirements for multi-piece tools. This magnet shows a good example of improper peening. In this case, the bolt was too long for the "peening" to be effective (only the last couple of threads and bolt had been bent). The nut backed off, resulting in a three-piece tool. The best solution is either to spot-weld or cut and grind the bolt to length before peening.



Ugly: What's wrong with this picture? This weapons loader apparently is ready to go; however, a closer look shows the tread on the 12-ply tire has worn through four layers. How far can you go before the tire blows? Not too far, and I hope not while loading or carrying ordnance!

Navy Deaths and Injuries on Our Roads

This report is a follow-up to the story, "Reducing Maintainer Deaths and Injuries," in the spring 2004 issue. That study centered on aviation ratings only. Our boss, RADM Dick Brooks, asked us to study all Navy rates for similar trends.

As with the earlier study, the data (FY94 to FY04) shows we can identify and focus on ratings with higher-than-normal PMV mishap rates. Most of the high-risk rates are junior people in "dynamic" jobs. Eight senior rates had mishap levels almost two times higher than average (OSCS, ABHC, BMC, PC1, TM1, LN1, MN1, and BU1). Rates with fewer than 150 people were excluded to ensure a fair and statistically significant sample. Some gaps in data existed (mishaps reported but no rates assigned), so they were excluded. The complete study is available on our website at www.safetycenter.navy.mil/statistics/study/default.htm.

Top-16 Ratings (mishap and death rates are per 100,000 people, per year):

Rate	Pop	Deaths/Inj	Mishap Rate	Death Rate
DCFN	183	2/6	437.16	109.29
GSEFN	277	4/8	433.21	144.40
ENFN	372	3/10	349.46	80.65
AZAN	258	3/6	348.84	116.28
AW3	380	2/9	289.47	52.63
ICFN	391	6/5	281.33	153.45
SW3	187	2/3	267.38	106.95
GMSN	308	1/6	227.27	32.47
STG3	800	4/14	225.00	50.00
FCSN	357	1/5	196.08	28.01
OSSN	1,253	5/19	191.54	39.90
YNSN	473	1/7	190.27	21.14
PRAN	264	1/4	189.39	37.88
MMFN	1,225	10/10	187.76	81.63
HTFN	541	2/8	184.84	36.97
ADAN	1,417	5/21	183.49	35.29
TOTALS	8,686	52/141	222.20	59.87
Top-50	38,340	169/443	159.62	44.08
All Rates	328,235	611/1778	72.78	18.61

These 16 rates (3.5 percent of the total number of rates and 2.7 percent of the population) account for 8.2 percent of fleetwide deaths and injuries. If we look at the top-50 rates (those 50 percent or higher than the average, 11.1 percent of the total ratings or 11.7 percent of the population) account for 25.7 percent of combined deaths and injuries (27.5 percent of the deaths, alone).

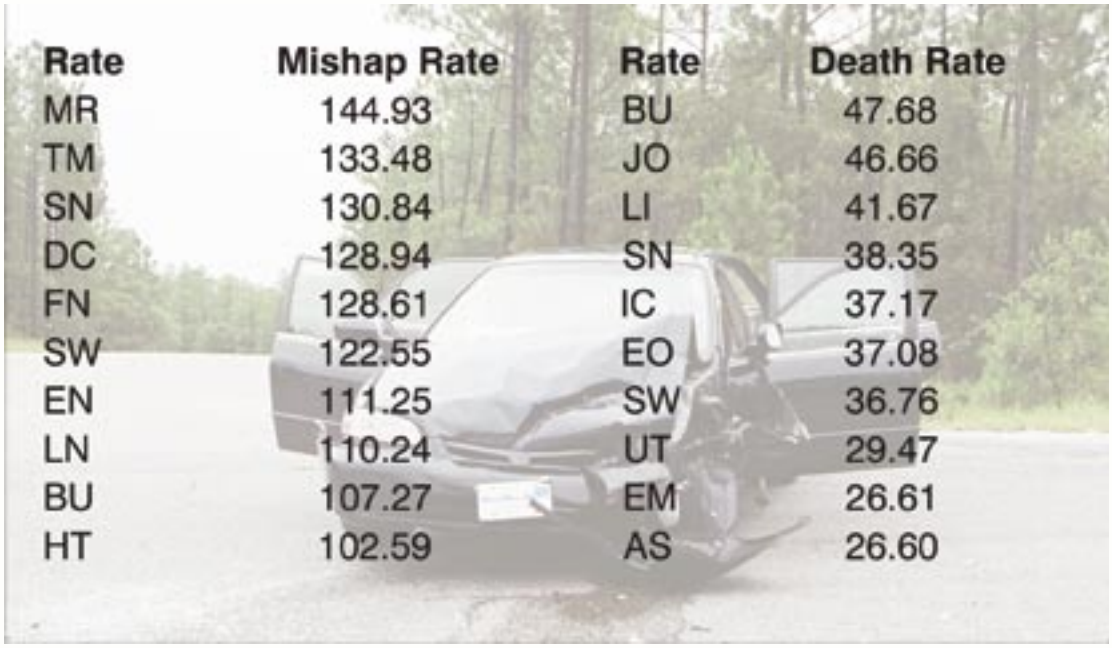
Top-10 Deaths (regardless of population)

Rate	Deaths	Population	Death Rate
SN	51	13,299	38.35
AN	16	14,108	11.34
MM3	14	5,330	26.27
FN	13	5,365	24.23
CSSN	12	2,010	59.70
ET3	11	4,663	23.59
EM3	11	2,641	41.65
CS3	11	2,782	39.54
MM2	11	5,051	21.78
AM3	10	2,129	46.97
EM2	10	2,771	36.09
MMFN	10	1,225	81.63

Top-10 Deaths (with population considered – avg. 18.61)

Rate	Deaths	Population	Death Rate
ICFN	6	391	153.45
GSEFN	4	277	144.40
AZAN	3	258	116.28
DCFN	2	183	109.29
SW3	2	187	106.95
BU3	5	549	91.07
EO2	3	361	83.10
MMFN	10	1,225	81.63
EO3	3	371	80.86
ENFN	3	372	80.65

Top-10 Ratings (avg. mishap rate: 72.78, death rate: 18.61)



Rate	Mishap Rate	Rate	Death Rate
MR	144.93	BU	47.68
TM	133.48	JO	46.66
SN	130.84	LI	41.67
DC	128.94	SN	38.35
FN	128.61	IC	37.17
SW	122.55	EO	37.08
EN	111.25	SW	36.76
LN	110.24	UT	29.47
BU	107.27	EM	26.61
HT	102.59	AS	26.60

What can be done to reduce these incidents?

- Immediate leadership intervention (CO, department heads, chiefs, and supervisors) on high-risk rates and ratings.
- Discuss possible reasons for abnormally high mishap rates.
- Review work schedules and fatigue issues.
- Check for boredom with non-mechanical rates or other issues that could cause abnormally high stats.
- Re-emphasize DUI dangers and DoD's current policies.
- Implement "Tipsy Taxi" or "Safe Ride" programs in your area.

Focusing on these high-risk groups will allow us to divide the larger problem of PMV mishaps into smaller subsets. As gains are made in these rates and ratings, we can focus efforts on the next group of 10, 25 or 50. We must work to keep our people from surviving the war or deployments only to die on our streets.

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Complacency on the Flight Deck

By ADC(AW) Bradley Cox

Complacency is a word we hear during safety training, GMT, and other briefs. It is the animal that will kill us when we stop thinking about our jobs and ignore the risks. No matter how many times we train or how many times we have done the job, when we stop thinking and go on autopilot, myriad things can happen to us. My helicopter detachment was reminded of the "C word" and its insidious danger. We found out how easily someone can get hurt doing a simple, routine task.

The detachment was deployed on board USNS *Niagara Falls* (T-AFS-3). We were off the coast of Japan, and our tasking was a routine vertrep to the USS *Kitty Hawk* (CV-63), which is a bread-and-butter mission for the HC community. After launching our first helicopter, we began to spot our other aircraft on the flight deck. It already had been pre-staged with approximately 100 external loads and was wet from a night's rain. Since dawn was still an hour-and-a-half away, only the ship's overhead lights illuminated the flight deck. The seas were rough, adding another level of excitement as the ship pitched and rolled. Needless to say, the conditions were not perfect, but we had done this mission countless times before.

Moving an aircraft on a small deck is an all-hands effort because the plane must be pushed out of the hangar. The "driver" manipulates a tilly bar, which is attached to the tail wheel. That person's job is to steer the helicopter, while other maintainers push on attached bars. The director and a safety observer are positioned in the back with the driver, and two more safety observers are positioned up front. These Sailors are in full view of the director and the brake driver.

At the start of our deployment, we always took a few extra minutes to brief the aircraft move. As time wore on, we became more proficient at the task, and the briefs became less frequent. After all, we were a well-trained and well-practiced team, who knew exactly what we were doing!

With everyone in position, the director called, "Chocks out." That command was the signal to begin the move, so the safety observers and director concentrated on the task. They had to make sure the aircraft was clear of the hangar and the loads were pre-staged on the deck. They did that part of the job but failed to notice the ship had started pitching and rolling, which caused the aircraft to accelerate. Once the tail wheel is moved away from centerline during a backward move, the motion of the helicopter tends to push the tail wheel farther from center. In order to keep the tail of the helicopter under control, the driver was working really hard to make adjustments to the "tilly bar." When the director finally noticed that problem, it was too late. The driver lost his struggle with the bar, slipped on the wet deck and fell, losing control of the bar and aircraft. The bar rotated to the port side of the aircraft, knocking down one of the "pushers." When

the rear safety observer and the director saw the driver fall, they blew their whistles but couldn't stop the move before the bar had hit the pusher.

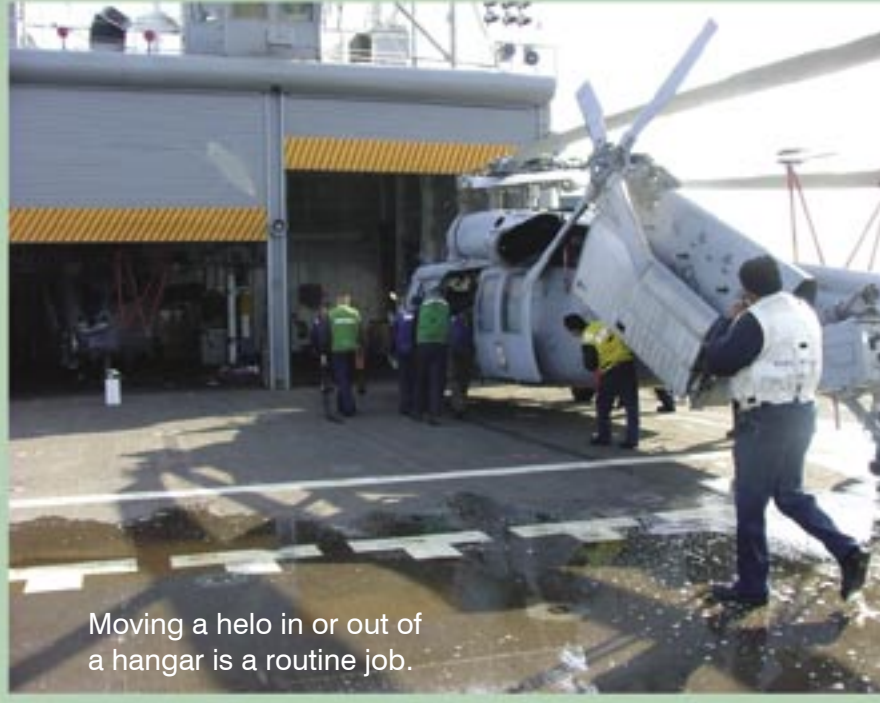
After escorting the pusher to medical and inspecting the aircraft for damage, the move continued, and air operations resumed without further incident.

So what went wrong? We had moved many aircraft at all times of the day and night, in both calm and rough seas. However, our vast experience got in the way when we neglected to hold a pre-move brief. We didn't emphasize the weather conditions or other factors placed on us to get the helicopter positioned for launch. The observers and the director were too concerned with the positions of the loads, not on the speed of the move. Past experience had taught us that excessive rolling and pitching of the ship quickly could cause the aircraft to gain unsafe speeds without any assistance from the pushers. During this move, we thought everything was under control, but our lax attitude had gotten the better of us.

Regardless of how many times a detachment moves aircraft, a pre-move brief always must be held. Had we taken just one extra minute to discuss and think about the environmental conditions, we would have prevented this incident. A spotting dolly is being tested that will make moving aircraft on single-spot ships safer and more controllable. Unfortunately, until it is delivered to the fleet, we still must move helos manually.

We got a bit lucky this time: No one was injured, and no aircraft were damaged. This near-mishap reminds us of the everyday dangers we face in our jobs. It is important to take time to preview our tasks and to give them our full attention; after all, any task done at sea has the potential to be dangerous.

Chief Cox is a det chief at HC-5.



Moving a helo in or out of a hangar is a routine job.

With enough people to help, it's an easy and relatively safe task.

The tilly-bar operator controls the steering. At sea, this job is more demanding.

The Day I Learned the

By AMEAN Jeremy Brend-Kirchmeier

Everyone has been young once—in mind, spirit, or age. That feeling of invincibility is great, until you figure out you're not made of steel.

I remember the day I received my ORM lesson. It was in the middle of winter, a simple case of human error, and an event that broke my finger. But the story begins the night before, and it shows why you should get a good night's sleep.

I had gone out with a shipmate to his hometown. He didn't live very far away, so I thought, "What the heck!" We had a good night driving around and visiting his friends and family. Few things compare with that feeling. At 2100, it was time to get back to the base to get some sleep before for next day's schedule, which promised to be hectic.

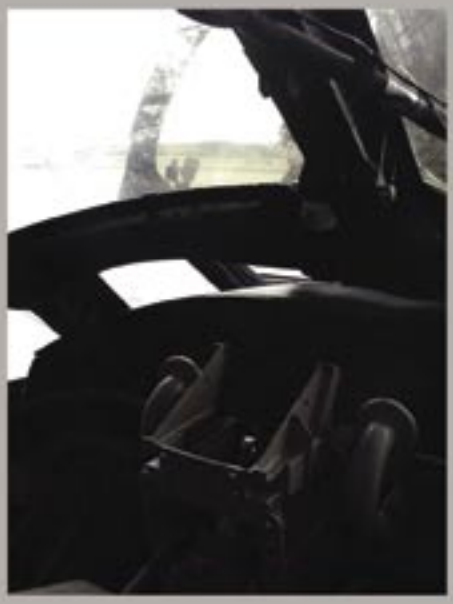
On the way home, I decided to get some sleep. My friend was driving, so I had full advantage to nap. How was I to know that we were to have car trouble that night? We were only 30 miles away from home when the car dropped its transmission. So much for getting some needed rest!

We finally got some help at 0300. Thirty miles later and after 40 minutes in a cramped tow truck, we finally got home. I went back to my room in the barracks and got a little sleep, but it was far too little.

The next day started as usual, except I was tired. We had our work cut out for us. One of our jets was ripped apart for an inspection, and another one needed usual work that's done on a daily basis. Later in the day, we had to take the ECMO-1 ejection seat out of a jet for our ATs. Any Prowler AME should know the procedure for removing and replacing the ejection seats. However, putting my index finger where it doesn't belong wasn't one of the steps.

First, we attached a crane to the canopy and lifted it to a point where we could remove the bolt that holds it in place. We then disconnected the electrical and pneumatic connections and removed the canopy, lowering the actuator so it wasn't in the way. We now could remove the ejection seat, and the ATs were able to do their maintenance. Once they were done, we replaced the seat and had the AME QAR verify that part of the job. Everything looked fine, and we were on schedule.

The last task was to re-attach the forward canopy, and we then could go home for the day. Little did I know that plan wasn't going to work. My shipmate, the one with whom I had gone out the night before, was operating the crane that carried the canopy. Another AME from my shop helped to rig the canopy. We lowered it into position and connected the pneumatic lines. We then lowered the canopy to a point where we could put the bolt through the frame and the lollipop on the canopy actuator.



Real Meaning of ORM

For those who don't know, a "lollipop" is a piece of metal at the end of the actuator, with a hole in the center for the bolt to go through. To do this step, I had to put the actuator back up and guide it into a slot in the canopy frame. I lifted the canopy lever to make the actuator move up and then guided the lollipop toward the slot. I never will forget, for years to come, what happened next.

While guiding the actuator toward the slot in the canopy, I had a feeling that something was wrong. When I noticed the problem, it already was too late. I had my index finger next to the lollipop, which sits on a ledge, and it was crushed between the ledge and the frame of the canopy. I heard a crunch and then my voice screaming, "Get it off, get it off!"

I remember jumping off the boarding ladder, going to maintenance control, and having someone take me to medical. After 12 mg of morphine, lots of fluids through an IV, and the benefit of three hours' rest, I almost felt normal again. Our skipper stopped in to check on my condition and to hear about how I had gotten myself into this situation. The doctor told me to relax, get some bed rest, and take 30 days of light and limited duty.

It is ironic that I didn't get enough rest the night before, and I now ended up on bed rest. Sleep is one thing that some people don't get enough of. Rest is vital to do your job safely and dictates how you handle yourself during the day. I know I'm not the only Sailor who doesn't take sleeping habits seriously enough, and that fact scares me.

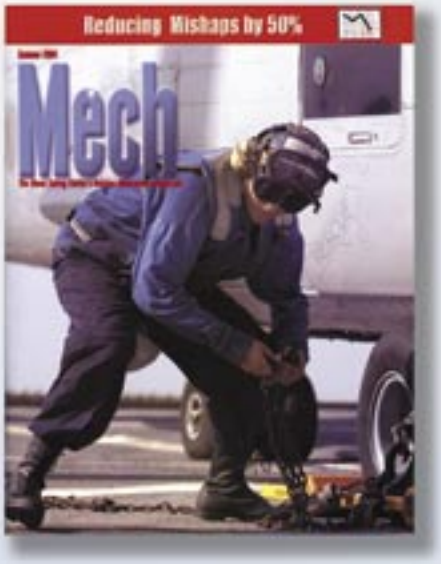
Lessons learned? I never will put my hand in the way of a canopy actuator when installing a canopy. I also now know how to use the ORM process, just as the Navy has taught us. I learned to listen to our supervisors because they often have good information to pass on. This is because they have seen similar problems before or have read stories like this one in *Mech*. I'm not the only person to have learned a lesson the hard way, but I should be the last one. Follow the rules, use ORM, and listen to your supervisors to avoid being injured or killed.

AMEAN Brend-Kirchmeier works in the AME Shop at VAQ-135.

Sleep and fatigue issues are important. They often are cited in mishaps and are preventable. Read "I Was Zoned Out" and "A Lack of Sleep Equals a Lack of Good Judgment" in the summer 2003 issue. Also visit our Aeromedical Department's website at www.safetycenter.navy.mil/aviation/aeromedical/default.htm to read more about sleep and fatigue in a study of performance during continual flight ops.—Ed.

As shown in this sequence, reinstalling a canopy is a relatively safe process; however, you must be alert at all times.

Letters



***Mech* Summer 2004**

My shared shop (VAQ-132 and VFA-34 QA on board USS *John F. Kennedy*) noticed the back cover showed an ordie (CAG ordnance) ducking under a wingtip missile after arming it. That step violates the rule never to pass under weapons stores. We also noticed the blueshirt on the cover with two pairs of goggles. I don't think there's a rule against the extra pair, but they could be a FOD hazard. We think it's bad practice to use two sets of goggles.

AT1(AW) David Lind
VAQ-132 and VFA-34 QA Departments

It's great to have eagle-eyed readers like you and your shipmates. The back cover may be a bit deceiving because of the camera angle, but your point is well taken. The front cover is a bit tougher because we don't have a rule. However, it's an excellent point to share with ship's safety or CAG. Maybe your action will change the safety or CV NATOPS manual.—Ed.

***Mech* Summer 2004**

I'm surprised, being an ex-Air Force guy and having worked with the Army, that the Navy allows their people to work without gloves. The cover shows a chock-and-chains person handling equipment without gloves. These flight-deck workers easily could get cut from nicks or burrs. Gloves were required equipment when I tied down equipment inside Air Force aircraft. I'm sure you want to set the right example in the photos you choose.

Again, a good catch, but, after talking with our maintenance staff, gloves are considered optional. Some ships, air wings or squadrons will make them mandatory, but it's not a specific requirement. A comparable issue would be cranials on Air Force folks working on top of aircraft. It makes sense, but I seldom have seen those maintainers wearing head protection, which is mandatory in the Navy. Good food for thought—Ed.

***Mech* Summer 2004 and Others**

I was in the Army in the '60s and retired from the Navy as an HT. I'm now a health-and-safety trainer for a non-profit COSH group in Syracuse, N.Y. The Admiral's Corner and other articles speak of human factors being involved in 80 to 85 percent of mishaps, a number based on an old study, but I hate to blame the individual. We need improved systems engineering to eliminate problems. I heard the UAW deputy director for health and safety say, "You've never cooked your arm in a microwave because it's designed so you can't." Let's fix systems first.

Jack Quinlan, Health Safety Trainer
Syracuse, N.Y.

The Navy has done a good job with systems safety and design. However, it's impossible or too costly to design away every conceivable hazard. Our stats clearly show, not rumor or old facts, that mishaps—across the board—involve human factors in about 80 percent of our cases. We constantly are looking at ways to improve systems safety and to raise awareness with our people. It's not one idea over another; we do both. This magazine shares the good, bad and ugly that happens in the fleet, so our workers will know about hazards and how they can stay safe, avoiding the injuries or deaths described in the pages of this magazine. Thanks for your input.—Ed.

TOO MUCH LIBATION AT A GRADUATION

Adapted by AM1 Sylvia Edwards

At 10 o'clock in the morning, my nephew, Henry, was helping his cousin, Kevin, finish setting up for a graduation party. These two are close—like brothers—which isn't a surprise, since Henry is only a year older and lives on the same road, less than a mile away.

The first order of business for Henry when he arrived was to re-ice a keg, tap it, and, of course, sample the brew. By the time the first guests arrived, both Henry and Kevin already were "glowing." The day was filled with guests playing cards and drinking beer, eating and drinking beer, or, as in Henry's case, just drinking beer.

By 11 p.m., Henry's dad, who had been at the party for 10 hours, was getting tired, so Henry offered him a ride home. Henry helped his dad into the passenger seat of his nearly new, red, Dodge Ram 4X4, then drove the mile to their farm. His dad got out of the truck and walked to the house. Meanwhile, Henry went back to the party.

It was 2 o'clock the next morning—14 hours after he had started drinking—before Henry headed home. Did I mention he always has to be the last one to leave a party?

After pouring himself into his truck, Henry started toward his house. He got about halfway there before he passed out while driving 40 to 50 mph and hit the only tree along the route big enough to do any damage. The crash severed the engine compartment from the firewall. Because Henry wasn't wearing a seat belt, he was thrown through the windshield and landed in the middle of the road. He awoke moments later to the ticking sound of an exhaust manifold cooling.

It was so dark Henry thought he had hit another car and was lying next to it. He later learned the sound he heard came from his own engine, which had landed next to him in the road. He was so close to the engine he could feel the heat radiating from it. If it had rolled one more time, the engine would have landed on top of him.

Henry couldn't move his legs, and he didn't have the strength to pull himself out of the road. Thankfully, his neighbor, Dave, had been awakened by the noise from the crash and came to investigate. When Dave yelled and asked if anyone was hurt, Henry managed to tell him to call 911 before passing out again. Dave asked his wife to make the call, and he returned to the scene to stay with Henry until the paramedics arrived.

Henry suffered a broken hip that caused a trauma to his lower back, and he was paralyzed for three weeks. Doctors had predicted he never would walk again, but feeling returned to his legs, and he made a full recovery.

In a later analysis of the wreck, it was determined that had the crash occurred when Henry's dad was in the truck, the stick shift would have been driven into his chest just before the dashboard pinned him against the back of the seat. His dad would have bled to death before help could have arrived. Had Henry been wearing a seat belt, his injuries would have been minor, and he wouldn't have had to spend three weeks in the hospital.

If you've been drinking and are at the house of a friend or relative, stay where you are and sleep it off, or have someone drive you home. If nothing else, sleep in your vehicle. Just remember to open the window a bit for ventilation and have a blanket available—in case it's cold. If you hold a party at your house, plan on having some guests stay the night, especially at graduation time.

Original story by PR1 Daniel Niles, VQ-3.

To Err Is Human

By AT2(AW) John Grau

Has the memory of a mistake ever haunted you? Did you ever make an error that almost caused a serious injury to a shipmate? I have, and the thought often turns my dreams into nightmares.

Everyone who works on or around jet aircraft should be reminded that vigilance, risk management, and communication are crucial elements to safely execute even the most routine tasks.

At the time of my incident, I was an avionics troubleshooter assigned to VAQ-136 in Atsugi, Japan. The launch crew was setting up one of our Prowlers for a night sortie. This launch didn't involve anything unusual.

The plane captain, aircrew and other troubleshooters had finished their preflight inspections of the aircraft, and the power-plants shop was setting up for a leak check on the port engine. Everything looked good for a safe and routine flight. As a troubleshooter, I was in position to final check the port side. This function is important because our aviators rely on us to make sure the aircraft works correctly.

Troubleshooters must be very attentive, watching everything going on around the aircraft. We check for leaks and abnormalities during flight-control checks, make sure people stay out of danger areas, and act as the last line of defense before an aircraft takes off. This responsibility is awesome and occasionally difficult, especially at night. Throw a trainee into the mix, and the responsibility increases even more. We now have someone else's life in our hands. On this night, I would throw my trainee a curve that he couldn't handle.

He had shadowed me on numerous day and night launches and was very attentive and motivated, so I believed this launch was a good time for him to take the reins. I felt confident in his abilities and would be right behind him to cover his back. Like any other launch, we started the starboard engine first, and it lit off without a hitch. We got ready to remove external electrical power and to pull the landing-gear pins.

Mishap Reduction Opportunity

Panel- and Door-Related Injuries/Deaths and TFOAs
1 January 1980 to 24 September 2004

Twenty-seven injuries and one death were attributable to panels, doors or moveable flight surfaces (maintainers fell when these items collapsed, walked into them when open, drove into them, or nearly were crushed by them). We also had 464 events where these items fell off aircraft, either because of corrosion, poor maintenance, aircrew error, or inattention to detail. That damage cost $15,625,481 or $653,785 each year.

Breakdown by aircraft

Acft	No. Events	Dollar Cost
FA-18	65	2,656,512
CH-46	30	247,058
F-14	30	1,801,458
P-3	29	0
A-6	24	614,685
H-2	23	261,330
EA-6	20	638,599
AV-8B	19	306,585
HH-60	18	2,722,139
CH-53	17	24,700
H-3	17	20,995
SH-60	17	104,659
S-3	16	231,444
TA-4	16	429,912
C-2	12	221,538
E-2	11	665,443
F-4	10	94,585
UH-1	10	0
A-7	9	13,065
KC-130	7	139,907
A-4	6	2,122,000
T-2	6	472,778
C-12	6	0
RH-53	4	96,742
UH-46	4	53,488
AH-1	3	0
E-6A	3	0
MH-53	3	0
EP-3	2	0
OA-4	2	25,699
OV-10	2	10,840
RF-4	2	1,560,000
TAV-8	2	0
TH-1	2	0
TH-57	2	0
UH-3	2	89,320
Others	13	0

Working in the engine bay is safe, unless...

someone makes a mistake and closes the gear door, forcing the engine doors and your body against a turning engine.

During this task, you normally close the forward, main landing-gear doors, which are open for preflight inspections and servicing. Because of a unique maintenance requirement, we didn't follow the normal sequence.

Power plants had to do a leak check on the port engine, and they needed the engine-bay door to be open to prevent anyone from closing the forward, main landing-gear door. I had not briefed my trainee on this point before the starts, and that error was my first mistake. I had assumed my trainee knew this process.

It didn't take long for a second mistake. Trying simultaneously to keep my eyes on the PC and my trainee, I had missed the signal to pull pins. As I tried to flag down the PC to verify the signal, my trainee went to pull the pins and then to close the door. By the time I realized what my trainee was doing, the door had been shut. This step normally would have been right, and I would have been proud of him. However, this time, we were the victims of circumstance. When he actuated the switch, hydraulic power closed the door and forced the forward, main landing-gear door to drive the engine-bay door shut. That door rapidly closed, pinning a mech to the turning engine. After seeing what had happened, I ran toward the landing-gear-door actuator; however, my trainee quickly had realized his mistake and reopened the door before the technician was crushed. His quick reaction prevented a catastrophe.

The landing-gear door left an eight-inch gash in the engine-bay door, and the startled mech got a pit stop at medical before returning to work with some bruises and a few sore spots. We lost that launch and a little face, but I'm grateful it wasn't a life or an aircraft.

We could have prevented this problem with better communication, situational awareness, and ORM. I should have told my trainee about the leak check and dangers of closing the forward, main landing-gear door with the engine-bay door open. Had my situational awareness been better, I would have noticed the hand signal and could have prevented my trainee from closing the door. Had I implemented ORM, I would have considered how a leak check alters the course of actions for the launch crew and briefed everyone ahead of time. I could have saved a shipmate from a trip to medical, prevented unnecessary repairs, and left my pride undamaged. Learn the lessons I did, so you don't experience the nightmares I have faced.

Petty Officer Grau is a troubleshooter assigned to VAQ-136.

Mech *recently visited the Navy's senior greenshirt—Assistant Commander for Logistics, RDML Michael Bachmann—to check on the Navy's progress in developing "smart" aircraft systems and to review their potential safety benefits.*

"The Future Actually Is Here"

By Dan Steber

Those were RDML Mike Bachmann's first words when asked when the Navy would field MFOQA and maintenance-diagnostic systems, like those tested with FA-18 Automated Maintenance Environment (AME), H-60 Integrated Maintenance-Diagnostics Systems (IMDS), Joint Advanced Health-and-Usage Monitoring Systems (JAHUMS), and Joint Strike Fighter (JSF). The Navy already has progressed toward diagnostic and replay tools, and the Star Wars generation will see more dramatic changes as naval aviation progresses into the 21st century.

Bob Dylan wrote, "The times they are a-changin'," and RDML Bachmann outlined several maintenance and flight operation programs that show the dramatic transformation the Navy and Marine Corps already have made and see in the future. For example, we will have onboard sensors and recorders that capture many different types of maintenance and operational data. That information will be sent back to base via datalink *[early demos have used Link-16 to move data off the aircraft]*. Maintainers will be aware of airborne equipment problems. NALCOMIS will have a gripe generated, and IETMS can be opened to the correct repair or troubleshooting pages…all before a pilot lands.

Once on deck, aviators then will be able to replay critical moments in a sortie and will be able to critique any part of that flight. Should maintainers want to see how the aircraft and systems behaved, they both can sit and watch the "tape."

RDML Bachmann mentioned that integrated maintenance diagnostics testing on Hornets dates back to 1994. "Although it's been 10 years, we've been marching down that path. This work will facilitate and improve the support of these programs. It will increase sortie generation and will allow maintainers to be on deck with the necessary tools and equipment when the aircraft returns for a fast turnaround."

I asked the admiral if he is concerned about reliability problems with the IMDS/JAHUMS recorders. After all, no maintainer wants to spend time chasing "gremlins." "Program managers gauge reliability by looking at trends, doing cost analysis, and using modeling and reliability projections," he said. "We pay close attention to that potential problem." He went on to explain the fleet's participation in the Initial Operational Capability and Supportability Review (IOCSR) process, which includes "program folks," OPNAV N78 and N43, NAVICP, and fleet TYCOM reps (N42 and N421).

The conversation moved toward logistics, and the admiral said, "We make sure that all the integrated logistics support (ILS) items are in place before the equipment is released to the fleet." The combined efforts to identify reliability issues, solve them, and ensure logistics integrity should put maintainer doubts at ease. He spoke about the Joint Helmet-Mounted Cueing System (JHMCS) that went through the IOCSR process and required changes because it couldn't meet the required logistics hurdles. The admi-

ral added, "We use that process *[verifying a program's integrity]* to enforce change."

RDML Bachmann went on to explain the ILS process in fielding such a program. "We have to factor items such as system reliability on the flight-hour program. Collectively, these steps and our ILS efforts force manufacturers to work on improving reliability." He declared, "We will not let a product go out of here that is not ready for use in the fleet!"

How will these programs make a Sailor or Marine's life easier, better, cleaner, or safer? RDML Bachmann explained that the integration of onboard sensors, maintenance diagnostics, data downlink, advanced notification of discrepancies, and electronic media will work to reduce maintenance requirements. They also will provide warnings of critical failure and will give a post-flight review of data collected in flight, allowing us to refine the maintenance process. "Anytime we can reduce maintenance actions, we reduce risk and improve safety," he said. "This technology exists, but, with some people, it will require a paradigm shift." He added that a training advantage is available. "No longer will we have to haphazardly change boxes to look for a problem. We won't waste time and effort hunting for solutions." He explained that these programs should reduce the number of skill-based errors because onboard diagnostics will narrow the hunt for faults and will highlight the maintenance that needs to be done.


Photo by Fred Klinkenberger

RDML Bachmann also discussed MFOQA and its relationship to IMDS, mentioning that commercial airlines have focused on flight-operations quality assurance for years. "MFOQA has been advertised and acknowledged not just for its safety benefits but also from a cost-wise readiness perspective," he said. "It decreases operating and support costs. IMDS and MFOQA complement each other, and both can use the advantage of this new technology."

I asked RDML Bachman to share an experience where MFOQA or IMDS/JAHUMS would have been beneficial earlier in his career. He immediately mentioned vibration analysis on helos when he was assigned to USS *New Orleans* (LPH-11). "Vibe analysis was such a burdensome process," he explained. "I had to obtain NAESU *[now NATEC]* support to get blades balanced. Technology will enable us to make the corrections and minimize the need for tech reps to deploy to a site. It will allow us to save TDY costs because we can ship the data home using a tele-maintenance system."

RDML Bachmann pointed out that these systems have shown great potential, and tests continue to show success. He mentioned the work being done at HSL-41 in San Diego with IMDS/JAHUMS. "Most of the feedback has been positive. Capt. Williamson of PMA-209 says they are prepared for OPEVAL on the SH-60B, and it already has shown value in automating rotor track and balance and vibration-analysis tasks," he offered. "When you have to maintain an aircraft—and it's only one—and they want to fly it, which you typically do about 100 hours a month, you can't afford much down time. They also have seen reduced FCF requirements and have worked to bring in T-700 engine-diagnostics data."

When asked about the most significant benefit of data recorders, he mentioned the replay function. "For example, take an exhaust-gas temperature spike. The maintainer has the ability to see it on replay," he responded. "We didn't even conceptualize that process. But it's a great capability for the maintenance team." I asked him how the integration of these systems could help maintainers, and he said, "It will eliminate excessive troubleshooting, focus the maintainer on the problem, and then have IETMs interface with that data. That approach will give the maintainers clear procedures on how to make the repair."

Thanks to RDML Bachmann and Capt. Gordon Coward (his chief of staff) for taking time to make Mech *readers aware of these promising new programs. I also want to thank Betsy Haley and Rob Koon, NAVAIR PAOs, for their help with this interview.—Ed.*

When Stubbornness Rules

By AZAN Timothy Clark

A local newspaper called it one of the worst days on record for traffic accidents; the rain caused more than 400 accidents—in one county alone. Despite the bad conditions, we decided to trek the 400 miles to my parents' house so they could meet my soon-to-be wife for the first time.

We packed the car, discussed our travel plans, put on our seat belts, and started our journey, with my fiancée driving. We were on a road known for its numerous traffic accidents, so we were being cautious. We already had seen three accidents, including two rear-end collisions and a car that had gone out of control and ended up in a ditch. The rain was getting worse, but we weren't going to let it stop us.

As we came to one of a few stoplights on this road, my fiancée applied the brakes, but the car didn't stop. It slid about 100 feet, and we nearly rear-ended another car stopped at the intersection. Despite this close call, we still pressed on.

When we reached the freeway, the rain had slowed down, and we thought the worst was behind us. Traffic was flowing, with the exception of a few older, wiser couples driving in the slow lane. We merged into the fast lane, traveling 70 mph—much slower than my fiancée usually drove.

Fifteen minutes later, the rain returned with a vengeance, and my fiancée reduced her speed to 55 or 60 mph. We still were in the fast lane when we came to a slight bend in the freeway and hydroplaned on a large puddle of water. We knew we were in for the ride of our lives.

The rear end first turned completely sideways—not a big problem, I thought, as long as we stayed in the fast lane and no one hit us from behind. Then, I saw an embankment. We still were sliding sideways when the wheels caught the embankment's soft dirt, and the car rolled onto its roof. Immediately, the roof collapsed, and mud, dirt, glass, and other items started flying around inside the car.

We slid on the roof more than 100 feet before coming to rest in the fast lane. Hanging upside down, my fiancée was gripping the steering wheel as tightly as she could, unable to move. I unbuckled my seat belt, climbed into the back of the car, and unbuckled her. She fell and hit the car's roof.

We then climbed out the rear window and went to the side of the freeway. Within minutes, emergency personnel were on the scene, and they rushed us to a hospital. Doctors checked and released us, with only a few scrapes and bruises. The highway-patrol officer couldn't believe we had survived, especially with such minor injuries. We were grateful we had worn our seat belts.

A few days later, we went to the junkyard, where our wrecked car had been towed. We wanted to pick up some personal items we had left behind the day of our wreck. The car looked worse than we could have imagined. The front part of the roof was flattened to the same height as the hood, and every window was smashed and every panel dented. The driver's side door was mangled, and the left, front wheel was bent under the car. Dealing with the insurance company and medical bills was a headache that lasted more than six months.

I realize we made some bad mistakes. We should have rescheduled our trip to a day when it wasn't raining. We also should have reduced our speed and gotten in the slow lane—like the older, wiser couples. We should have been more aware of our situation. A month later, my parents finally got to meet my bride-to-be.

Airman Clark wrote this story while assigned to VR-55.


Photo by PH2 Chad McNeeley

LEARNING A FLIGHT-DECK LESSON

By JO3 Megan Moline

It took only a glance for ABEAN Jorge Linarez to see something was wrong. This at-sea period was the first time USS *Ronald Reagan* (CVN-76) was landing and launching aircraft. While on watch and working on the port side of the ship, one deck below the flight deck, the airman did routine inspections. Moments later, smoke and metal shavings appeared from the fairlead sheave—an area that houses the wires used for landing aircraft. He alerted his supervisor, and all landings were stopped. Linarez's actions made sure that the malfunctioning gear injured no one.

Ltjg. Kyle Caldwell, *Reagan's* air boatswain, explained the sheave wasn't working right. "When an aircraft lands on the flight deck, the cable feeds out from the sheave. What happened here was the sheave wasn't turning," Caldwell said. "That made the cable saw into the hub. If it hadn't been noticed as soon as it was, the cable might have cut right through the hub and could have been severed. If a cable breaks on the flight deck, it's like a rubber band snapping, and the force can cut through almost anything."

The ship returned home to adjust the arresting-gear system, requiring all 58 sheaves to be removed. We removed, lubricated and then reassembled their seals—a job that takes about four hours per sheave, according to Caldwell. The ship was back at sea less than two days later to continue the certification process.

"Flight-Deck Certification went well. The rotation of the sheaves improved 80 percent," Caldwell said. "It was a lot of hard work."

After passing this critical milestone, the ship made several short trips out to sea to allow the new crew a chance to recover aircraft. The sea time also gave new pilots a chance to gain experience landing and taking off on a moving ship.

While recovering aircraft during one of the underway periods, two sheaves seized due to corrosion build-up from the rain while sitting pierside, according to Caldwell.

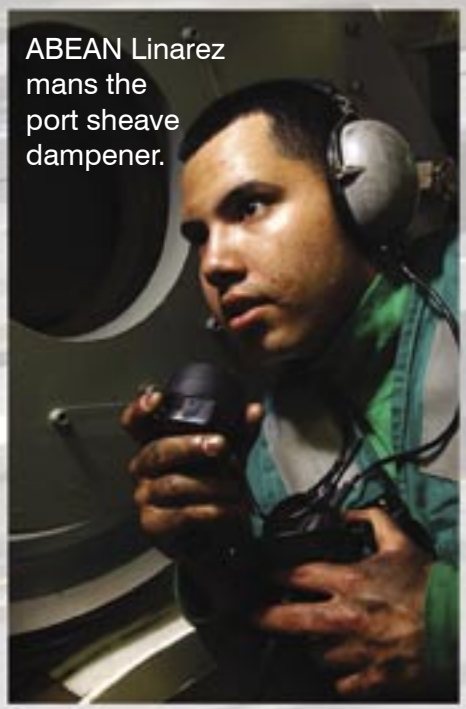
"During our first incident, the grease seal didn't allow the lubricant to escape while doing preventive maintenance (PMS), causing the sheave to seize," said Caldwell. "The corrosion attacked the sheaves because the grease seal had been removed. We took it off to correct one problem, not knowing it would cause another type of problem."

Caldwell explained the problem was corrected with minimal disruption to the ship's schedule, and training will be done on the proper maintenance of the arresting-gear system.

"We are incorporating new PMS standards that will change the type of grease we use for our new sheaves. We also will change how much grease we put into the sheaves," Caldwell said. "It's going to be pretty tough to get Sailors to use less grease when they've been trained that more is better."

The lessons learned on USS *Ronald Reagan* will help with the design and effectiveness of an improved flight deck on the future *Nimitz*-class carrier USS *George H. W. Bush* (CVN-77), and help us to meet the mishap-reduction goal.

Petty Officer Moline works in the public-affairs office aboard USS *Ronald Reagan* (CVN-76).


ABEAN Linarez mans the port sheave dampener.

Background photo by PH3 LaMon Bradford

By AD2 Luciana Erdmann

It was a late, dark, desert night on the Fallon flight line, and the hangar was a good distance away. We were well into a month-long air-wing detachment, and the op-tempo was beginning to take its toll on all of us. We had flown three weeks straight without a single day off and were scheduled for a squadron picnic the following day. I was tired to say the least and looking forward to the end of this shift, so I could enjoy some well-deserved liberty. That was the plan.

The power-plants workcenter had been troubleshooting a fuel-system discrepancy on one of our jets for several hours. We eventually changed out a main

Photo modified

fuel control and an auxiliary-power unit, and then towed the aircraft to the line for an engine turn. While waiting for the turn-man to do his preflight, we looked over everything one last time before proceeding.

The time was about 0200, and the temperature was as cold as I ever can remember. The engines fired up, and, once online, the APU shut off. We then opened the engine-bay doors. The plane captain was waiting for my LPO to signal for a power increase. I was under the jet, looking for leaks with the LPO and a QAR. We needed the power advanced, so the LPO signaled the PC with three fingers sideways, meaning advance the engine power to 80-percent rpm. This action would allow us to check other fuel lines. I moved a little to get into position for the leak check. I knew the APU was close but didn't realize how close I was to its exhaust pipe.

The plane captain misunderstood the LPO's hand signal, and he gave the cockpit three fingers down, meaning fire up the APU. My LPO and QA tried to get the PC to stop, but it was too late. The APU came online, and a big ball of fire engulfed my upper body. I ran out from underneath the jet, and a chief from a sister squadron came from nowhere and scooped me up like Superman. I was taken to medical, and they said I had first-degree burns over my entire face and neck. Besides looking like I had a good sunburn, my nose hairs and eyebrows were singed, but it could have been worse. I suddenly realized, after the fact, that in the cold, dark night and in my exhausted state, I had forgotten to put on my cranial and goggles.

I learned a tough lesson. We broke several rules, and our hand signals needed work. Our squadron has a very strict policy on using PPE, and pre-turn briefs are part of SOP. The steps leading up to my injury were a good example of how the holes in Swiss cheese must align for a mishap to occur. One simple change, and I wouldn't have been hurt. I also learned how important the environment, op-tempo, personal distractions, and other human factors are to safe maintenance. They should be acknowledged and even briefed before we "light the fires." A little ORM would have gone a long way that night.

I'm thankful I wasn't injured more severely, and I'm grateful for that chief petty officer who carried me to safety. Experience is a powerful teacher, and I hope my lessons won't have to be re-learned.

Petty Officer Erdmann works in the power-plants shop at VFA-15.

Ouch! I appreciate the honesty in this story, but I can't help thinking about leadership, or the lack of it in this incident. I know how fatigue can set in after a long detachment or after long hours on the flight deck, but where were the supervisors? We never will reduce mishaps when Sailors or leaders lower their standards. Why did an LPO and QAR allow another worker around the aircraft without a cranial or goggles? The aircraft was going to be turned. This one was easy: noise and eye hazard, and now hair and face hazard! The PC should not have started the aircraft with people not wearing PPE. It takes only one person to question something that doesn't look right. We blew this one…it wasn't even close. I hope the readers and leaders will learn from Petty Officer Erdmann's mistake. It's time for supervisors to step in and to keep this or similar incidents from ever happening again.—Ed.

Air Wing TOOLBOX

A New Look at Wiring Problems

By Ed Taylor

The Naval Air Systems Command has taken a direct path to identify and fix wiring problems: They are sending out teams around the fleet to do material-condition assessments and inspection-techniques training.

These assessment teams are made up of representatives from NAVAIR, the TYCOM, MALS or AIMD, and squadron. Their work is twofold: Inspect aircraft for wiring problems, and give three segments of training. The material condition part looks at wiring, connectors, clamps, and grounding. The team takes photos of all problem areas to aid a command debrief and to provide tools for the training segments. An example of a recent assessment was a West Coast, Marine H-53 squadron. The team spent one week looking at wire-and-cable integrity, connectors and structural-support devices, equipment installations, maintenance issues and repairs, and safety-of-flight issues.

That assessment revealed wiring on the aircraft inspected was in good condition, with a few exceptions. The team found many in-line splices—most were old window type, and some were corroded. They also found the wrong size and type of splices (one connecting two different gauges of wiring). The wrong wire also was found, as were supply issues for ordering replacement rolls. They found wrong-size clamps in the cabin overhead, allowing the harness to lie on structure. Other clamps were attached to fluid lines in "butterfly" technique that could allow clamps to slip from their original positions and chafe the wires. Many block, strap or zip ties were broken. NAVAIR suggests using approved string tie (lacing) to replace broken strap ties used for secondary support to hold open wire harnesses together. Connectors were corroded, had loose wires, or were strap-tied to hydraulic lines, which can induce chafing. Connectors not being used were found "bagged" in plastic bags, which promotes condensation *[Read the story and look at the photos in the arictle, "Smokin'!," in the winter 2002/2003 issue.—Ed.]*

The team at this squadron also found two engineering issues: wire routing and chafing that cause the harness to be pulled into the structure at several flight stations (522, 544, and 566) and an AFCS closet near the No. 2 generator that is a natural stepping spot for maintainers. The problem with this item is the harness, connectors and hardware are pushed down onto the underlying servos and hydraulic tubing.

Three segments of wire-inspection-technique training are done in conjunction with the material assessment. This opportunity allows the squadron maintainers to see the problems found, learn how to prevent them in the future, and produce a more reliable and safe aircraft.

The first segment explains MIL-W-5088: how it relates to the aircraft and to the NAVAIR 01-1A-505 manual. It also gives examples of discrepancies to look for while doing maintenance or zonal inspections, as well as the benefits of these steps and preventive maintenance.

The second segment shows the photos taken during the assessment, allowing maintainers to identify and discuss the problems found. They get a "What's wrong with this picture?" approach.

The third segment is a "hands on" session to show maintainers correct techniques to do a thorough wiring inspection.

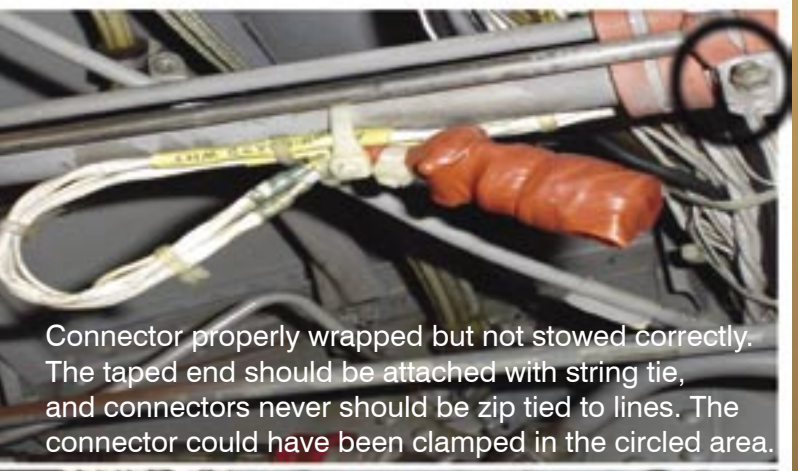
Critique sheets are handed out after every session,

and that feedback has shown that the training "opened their eyes." Most feel the photos that show problems in their own aircraft were effective tools and made a big impression. One pilot who attended the training said, "This was one of the best and only presentations I've seen on how to preflight electrical wiring."

Mr. Taylor is a contractor with Eagle Systems, Inc. and works for NAVAIR 4.4.4.3

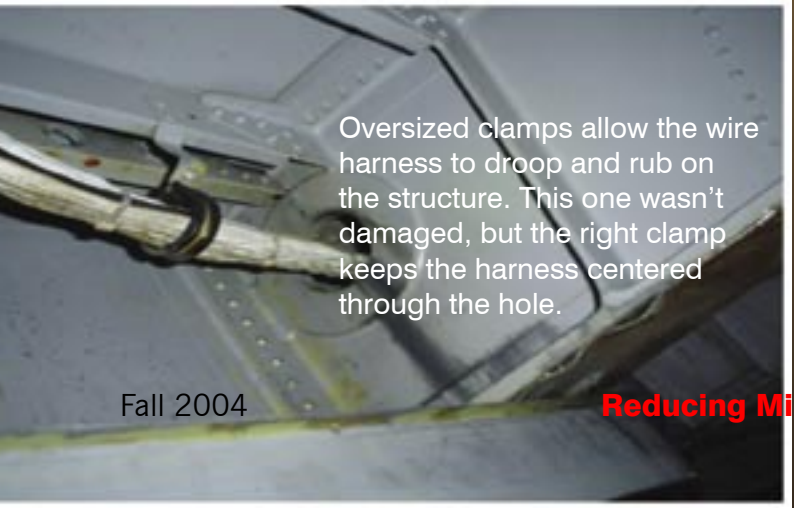
For more info...

Call Mark Thomas at (301) 342-0885 or Mike Bingham at (301) 757-2502. Another POC is Nancy Heisley, AIR-3.2.6, at (301) 757-3084 or nancy.heisley@navy.mil. A material condition assessment and training visit just might fix some problems and open your eyes.



Connector properly wrapped but not stowed correctly. The taped end should be attached with string tie, and connectors never should be zip tied to lines. The connector could have been clamped in the circled area.

An old-style window splice (middle one) is green from corrosion. Zip ties should not be used over splices because they induce strain. Many old splices recently were used.



Oversized clamps allow the wire harness to droop and rub on the structure. This one wasn't damaged, but the right clamp keeps the harness centered through the hole.

Flight, Flight-Related, and Ground Class A Mishaps 06/01/2004 to 08/31/2004

Aircraft	Command	Date	Fatalities
C-130T	VMGR 452	06/01/2004	0
C-130T	VR-62	06/01/2004	

Severe storm and winds damaged aircraft at a Navy field.

FA-18A	VMFA-115	06/27/2004	1

Aircraft lost at sea during night carrier operations.

FA-18C	VMFA-122	06/28/2004	1

Aircraft departed runway on landing and overturned. Pilot did not eject.

T-45C	VT-7	07/12/2004	0

Student pilot on solo departed runway on landing and ejected.

FA-18A	VMFA-134	07/21/2004	2
FA-18B	VMFA-134	07/21/2004	

Midair collision during unit-level training. Two aircraft destroyed.

S-3B	VS-35	08/10/2004	4

Aircraft crashed into terrain on WestPac island.

MH-53E	HC-4	08/10/2004	0

Helo became airborne during stop on taxiway and struck the ground.

CH-53E	HMM-166	08/11/2004

Helo crashed (destroyed) during night combat-logistics run. Two crew MIA.

CH-53D	HMM-265	08/13/2004	0

Helo crashed near MCAS while landing. Aircraft destroyed. Three major injuries.

FA-18C	VFA-151	08/26/2004	0

Aircraft departed end of runway. Pilot successfully ejected.

Class B Mishaps 06/01/2004 to 08/31/2004

Aircraft	Command	Date
FA-18F	NWTS CHINA LAKE	06/16/2004

Canopy closed on hand-held radio.

MV-22	VX-21	06/28/2004

Engine nacelle blower failed during shipboard wind-interaction testing.

FA-18C	VFA-25	06/28/2004

Aircraft had multiple AMAD related cautions after catapult shot.

SH-60B	HSL-47	07/24/2004
SH-60B	HSL-47 SEA COMP	07/24/2004

Overhead AFFF deluge system discharged on helos and equipment in hangar.

E-6B	VQ-4	07/31/2004

During engine turn, ramp pavement collapsed aft of engines and damaged aircraft.

FA-18F	VFA-2	08/02/2004

Left main landing-gear door departed aircraft in flight.

F-14D	VF-101	08/09/2004

During aircraft ground checks, port engine ingested an MLG down-lock pin.

T-44A	VT-31	08/20/2004

Intentional gear-up landing because port MLG tire had departed aircraft.

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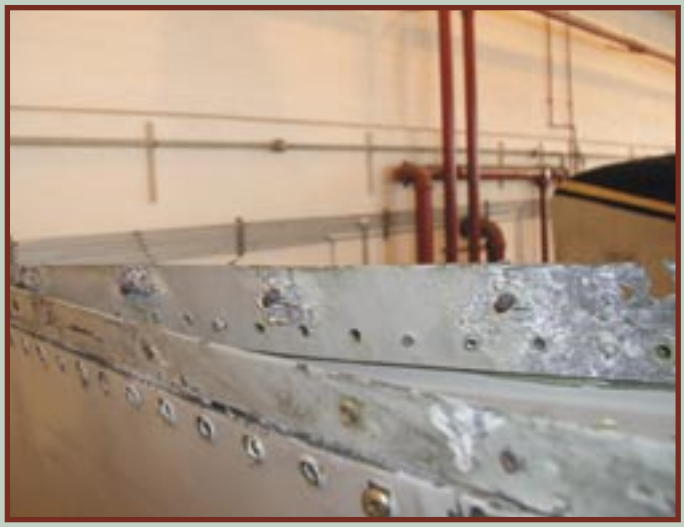
Preventing Corrosio

What you don't see can hurt you!



The corrosion types are evident, including exfoliation.

By AM1(AW) Vener Maranan

Corrosion is a menace wherever it lurks. Many people take this problem too lightly, but professionals know about or have seen the mishaps caused from this cancerous beast. We must fight corrosion to prevent the loss of an aircraft or shipmate. We ran into this old foe in my Hawkeye squadron and ended up with another lesson learned.

VAW-116 is in the process of transitioning to the new Hawkeye 2000 aircraft. My team and I were preparing good, old Hawkeye 602—one of the many workhorses of the E-2 community—for a trip to SDLM. The maintenance department had been tasked to take a hard look at her and to make sure that every corrosion discrepancy was identified and corrected before it left on its journey. Yes, our thoughts were to get rid of these old planes as fast as we could, so we could get the new ones. These old E-2Cs are not maintenance-friendly.

During the QA walkaround inspection, we found numerous corroded fasteners (screws and rivets) on the vertical-stab assembly, specifically on the port, upper and inboard side. Quality assurance wrote a VIDS/MAF for airframes to remove and replace the fasteners. Because they were covered with heavy paint and sealants, we had difficulty identifying the extent of the corrosion, until the airframers began to remove some of the screws. That's when AM3 Cervantes and AM3 Manuel Garcia discovered the problem was migrating along the metal surfaces.

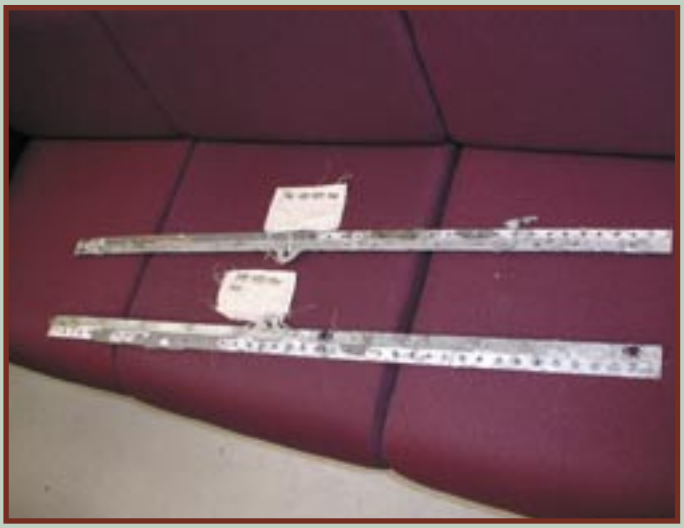
It wasn't an easy task to remove all the screws and rivets because most of them were stripped and corroded. Petty Officer Garcia decided to remove all the fasteners from the upper cap assembly, which is attached to the vertical stab. This step would allow him to find out how far the corrosion had migrated.

The photos in this story show the damage, and most of the maintainers reading this story quickly can identify the corrosion types. What appeared as a small area of surface corrosion actually turned out to be the most severe and deadliest form of corrosion: exfoliation! That category means it is so bad that most of the metal is destroyed. The doublers that support or attach the cap to the vertical-stab assembly were affected badly. We removed the doublers and sent them to AIMD to be remanufactured.

How could a problem this bad go undetected for so long? Was it because of poor maintenance practices or procedures that do not exist in the MRC decks? For one thing, no conditional inspection exists to remove this cap assembly to see what is hiding behind or

on-Related Mishaps

The upper cap assembly is not a corrosion-prone area.



The doublers show the extent of damage.

underneath it. The corrosion manual (NAVAIR 01-1A-509) does not list this area as corrosion prone. During 800-hour inspections, we remove all movable rudders and tabs to inspect the bushings and bearings. They then are replaced. However, the Hawkeye's port, upper, inboard, vertical fin is not a movable rudder. It has no bushings or bearings to replace, and it is not subject to this inspection. We often treat this area with the saying, "If it isn't broke, don't fix it."

We learned this answer isn't quite accurate. If you see something that is not right, investigate the situation or inform your supervisor, a chief, or the folks in maintenance control and QA. In this case, our extraordinary airframers, who like to take things apart anyway, got more than they bargained for and a lot more work. They took the initiative to look beyond the surface and didn't take a shortcut.

Using good maintenance practices and taking pride in an aircraft are two ways to help combat these types of corrosion. Everyone has the responsibility to detect and report any type of this insidious problem to maintenance control. Corrosion will appear where and when you least expect it. Fortunately, the only real damage was to the doublers. The other areas were made out of fiberglass.

Petty Officer Maranan is an airframe QAR at VAW-116.

Mishap Reduction Opportunity

Corrosion-Related Mishaps and Hazreps
1 January 1980 to 24 September 2004

We had 45 reports in the SIMS/WESS database where corrosion was reported as a causal factor. Those events included two Class A, eight Class B, and nine Class C mishaps. The damage from those incidents totaled $48,196,195. We expend hundreds of thousands of hours on corrosion prevention and repair each year. These mishap numbers would be worse were it not for our vigilant efforts, but we need to do even better.

Breakdown By Type Aircraft

Acft	No. Events	Mishap Cost
H-53	8	1,127,076
H-60	8	1,978,510
FA-18	7	1,060,382
S-3	7	937,782
T-45	3	1,000,000
E-2	2	0
P-3	2	103,600
F-14	2	42,678,749
H-1	2	0
H-46	1	36,768
C-2	1	0
C-12	1	0
H-3	1	0

BRAVO Zulu

Sailors and Marines reducing mishaps

AD3(AW) Dustin Davis and AT3 Antwan Shumpert

HSL-44

Petty Officers Davis and Shumpert discovered a hairline crack in the upper elastomeric bearing of the black-blade, pitch-control rod. They found it during a critical inspection of main-rotor-head components on a phase B inspection. This spot barely was visible to the naked eye.

Their inspection yielded two ready-to-fail elastomeric bearings on the pitch-control rod. Their keen attention to detail and solid maintenance experience prevented the possible loss of the aircraft and aircrew.

AD3 Steven Croxton

HSL-44

On a daily inspection of Magnum 450, AD3 Croxton discovered a chafed and charred fuel manifold on the No. 1 engine. He immediately informed his shift supervisor of the discrepancy. Citing the inspection criteria in the appropriate SH-60B maintenance manual, Petty Officer Croxton helped to inspect the manifold more closely. He discovered the charring had damaged the silicone fire sleeve and had contacted the inner fuel line.

He immediately downed the aircraft, and it was removed from the flight schedule. The possibility of an in-flight fire existed and could have been catastrophic.

AD1(AW/SW) Jonathan Rothman

HSL-44

Working on a scheduled calendar inspection of the inboard retention plate on the tail rotor, Petty Officer Rothman found a washer that was hidden inside the de-ice housing assembly. This item posed a dangerous foreign object debris (FOD) hazard.

Using a borescope, Petty Officer Rothman then discovered two more washers that previously had gone undetected. His keen attention to detail and excellent maintenance skills prevented the potential loss of aircraft and aircrew.

AD2 Aaron Smith and AM2 Shawn Barnes

VAQ-133

While installing an engine on Raygun 531, an aft hoist-attachment bolt suddenly stripped, leaving a J52-P408 engine suspended and supported only by a cotter pin. With the EA-6B's engine in danger of dropping from the hoist, Petty Officer Smith quickly stopped the task. He and Petty Officer Barnes placed an aircraft nose jack underneath the turbine casing to support the engine until the bolt could be replaced.

Their rapid response to a dangerous situation prevented serious injury to nearby personnel and catastrophic damage to the engine.

AO2 Mattie Hackney

VAQ-138

While preparing for a morning launch, Petty Officer Hackney spotted fuel spilling out the starboard side of a sister squadron's EA-6B. A maintainer, who had been working on the aircraft, was crawling away drenched in flammable, toxic jet fuel. She knew it was a dangerous situation and quickly summoned the fire department and emergency-medical personnel.

Before assistance arrived on the scene, Petty Officer Hackney and two other line personnel took the initiative. They retrieved the fuel-spill kit and began to contain the dangerous fuel pooling on the ground underneath the aircraft. Another shipmate quickly secured electrical power on the aircraft, stopping the discharge of fuel.

Petty Officer Hackney's actions went above and beyond the call of duty. The drenched Sailor was treated and released without serious injury.

AN Phil Flores

VFA-105

While doing a daily inspection on Gunslinger 412, Airman Flores discovered a broken pin for the universal-joint assembly on the leading-edge flap of the starboard wing. He took a closer look and noticed this pin held the assembly together. He then immediately notified the flight-deck coordinator.

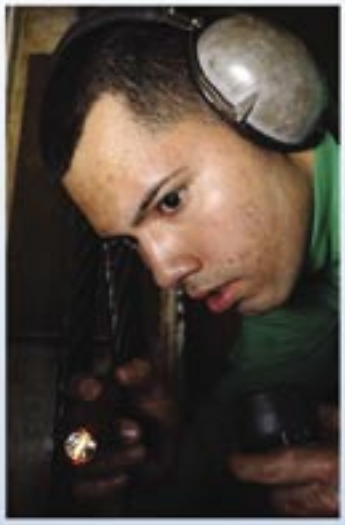
This item easily can be missed, but Airman Flore's attention to detail caught a downing discrepancy and prevented a failure in the flight controls, which could have caused serious damage and possibly death.

AE2 James Wood

VAW-124

During deck certification on board USS *Harry S. Truman* (CVN-75), Petty Officer Wood saved the life of an inexperienced blueshirt. While preparing for a night launch of aircraft 602, which had both engines turning, a young Sailor rushed to get his job done and broke the safety chain. Petty Officer Wood reacted immediately, grabbing the wayward flight-deck worker and keeping him from getting killed by the Hawkeye's prop.

ABEAN Jorge Linarez



USS Ronald Reagan (CVN-76)

During an at-sea period aboard USS *Ronald Reagan* (CVN-76), Airman Linarez noticed something didn't look right. This trip was the first time the ship was landing and launching aircraft, and he was on watch. Working on the port side of the ship and one deck below the flight deck, he was doing routine inspections. Moments later, smoke and metal shavings appeared from the fairlead sheave—an area that houses the wires used for landing aircraft.

Airman Linarez immediately alerted his supervisor, and all landings were stopped. They found the cable had cut into the hub. If this problem hadn't been noticed, the cable might have cut right through, severing it and causing damage and mass casualties on the flight deck. His prompt action made sure the malfunctioning gear injured no one.

See "Learning a Flight-Deck Lesson" in this issue for the whole story.—Ed.

ADC James Schultz

VP-94

Chief Schultz found a hairline crack on a propeller-blade cuff during a preflight inspection. While looking at the cuff more closely, he found it had a significant crack along the trailing edge. Had this defect gone undetected, the propeller-blade cuff could have separated, causing an engine failure from foreign object damage. The discrepancy was corrected, and the aircraft was returned to FMC status.

AN Patrick Mills

VFA-86

On his second launch as a final checker in training, Airman Mills displayed his impressive knowledge of the FA-18, finding door 14R on aircraft 410 open. He notified the plane captain and properly secured the door.

Moving farther down the starboard side of the aircraft, while checking the starboard main landing-gear tire, he saw a wheel-rim bolt spinning freely. He immediately notified the airframes troubleshooter, who downed the aircraft until the tire could be changed.

Airman Mills reacted like a seasoned vet, preventing a possible engine FOD and an explosive failure of the starboard main landing-gear wheel.

AM2(AW) Thomas Delatte

VR-54

Petty Officer Delatte discovered the safety wire on the quick-disconnect coupling for the vertical torque shaft was broken and had uncoupled. This condition would have made the port main landing gear inoperative. This unsafe situation could have damaged the aircraft and put the flight crew in jeopardy.

Petty Officer Delatte found a problem that was not part of the daily inspection and enabled a critical logistics mission the next morning.

AT2 Hugo Divers

VP-8

During a crew training flight on aircraft LD-210, Petty Officer Divers noticed what appeared to be an oil leak on the No. 4 engine. He immediately notified the flight station, and the flight engineer inspected the engine from an aft aircraft window. They determined the oil leak was excessive, and it posed a possible fire hazard because of its proximity to the engine exhaust. The flight-station crew did an emergency shutdown.

Had it not been for AT2 Divers' keen attention to detail and overall situational awareness, the leak could have resulted in an engine fire, endangering the entire crew and aircraft.

ADAN Kenneth Matthews

HSL-46

During a daily and turnaround inspection (DTA), Airman Matthews found a one-and-a-half-inch gouge in one of the main rotor blades of Cutlass 477. Further inspection revealed the gouge was one-quarter-inch deep. Even though an inspection of the main rotor blades is not part of a DTA, ADAN Matthews did one anyway.

The gouge was repaired, minimal down time resulted, and Airman Matthews saved the Navy $44,100. More importantly, he prevented the injury and possible loss of the aircrew.

AM3 Chad Albee

VP-94

During an aircraft wash, Petty Officer Albee discovered a brown stain on the actuator support for the nose landing gear. A closer look showed the stain was severe corrosion from water entrapment. Had this defect gone undetected, serious damage to the aircraft structure and nose landing gear was inevitable, and it may have resulted in an aircraft mishap. The discrepancy was corrected, and the aircraft returned to FMC status.

AMAA Jesse Ferguson

VFA-122

Airman Apprentice Ferguson was working as a plane-captain trainee when he found three coins in the forward cockpit of aircraft 131. He simply was checking the fuel load in the hot pits, but his keen attention to detail led to the discovery of this hazard. His prompt action may have prevented jammed flight controls and potentially a major mishap.

Getting Jacked-Up

By ASCS(AW) Philip LeCroy

Safety surveys have proven to be an excellent tool to identify trends, both good and bad, throughout the fleet. However, one of those bad trends is growing too fast.

Support equipment change (SEC) 3943, issued in 1981, directed that grease fittings be installed on the foot assemblies of specific aircraft tripod jacks with spring-loaded caster assemblies. This SEC was incorporated in the aircraft jack manual, NA 19-70-521, in December 1989. Therein lies the problem.

Whenever a foot assembly is replaced, for whatever reason, the lubrication fitting is not being installed. When I asked one maintainer where the grease fitting was, he said it comes with the foot assembly when ordered through the supply system. Not so. An easy way to prove this point is to go to the appropriate tripod-jack work package. Review the applicable technical directive page to see if SEC 3943 is applicable to this jack. For example, the 12-ton jack (T12-2VH2, part number 1112AS100) listed in work package 020 00 lists SEC 3943 as applicable. A check of the illustrated parts breakdown (IPB) shows that the foot assembly and the grease fitting have different part numbers. This fact means they are ordered separately, and the grease fitting must be installed. Page 13, paragraph 35, step (b) of the IPB also confirms this point. A quick review of the MRC—NA 19-600-135-6-2, card 10.3, step 7.C directs a security check of the fitting, and card 11.1, step 2.2, shows three fittings to grease the foot-assembly spring.

Even with all this information available to technicians, many jacks still are missing these grease fittings. This discovery means technicians are not using the MIMs for repairs or the MRCs for periodic maintenance on the equipment. CDIs aren't referring to the MIMs or the MRC when inspecting the equipment.

Supervisors need to read this information and to teach their people how to use the manuals every time they do a maintenance action, no matter how simple.

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MAINTENANCE MANAGEMENT

The Answer Is Just a Click Away

By AMCS(AW/SW) Cheryl Poirier

I've seen one problem on surveys: a lack of knowledge about the Naval Safety Center website. Whether it's reading our favorite funnies, checking out the sports scores, looking for the latest and greatest in electronics and cars, or finding the symptoms for a common cold, the web helps us to find answers. Kick back and relax; I'm going to show you a few things you can find about safety on our website at www.safetycenter.navy.mil.

Aviation Program Guides: The aviation maintenance-division web page contains several self-assessment tools for supervisors and maintainers. These guides are an example, and maintenance analysts have written them to detail fleetwide discrepancies, areas of concern, and program elements that the team looks for during surveys. These tools are great aids for quality assurance, program managers, and workcenter supervisors. They allow each shop to fine-tune their respective programs.

Survey Checklists: Our teams use I- and O-level checklists to do safety surveys. This site also provides examples of ORM checklists that have been discovered on various visits and are offered to help your command to develop similar ones.

Process Observation Evaluation Checklists: These self-assessment tools enable squadrons to do a self-evaluation during the execution phase of a process and can be incorporated into any ORM program. They cover 31 areas considered to be "basic" to all aviation-maintenance activities and enable activities to get a feel for program effectiveness.

Aviation-Maintenance FAQs: We field a lot of questions, and this section was developed to provide answers. What is the 18-inch rule? What cordless drills are authorized for aircraft maintenance? Is there an instruction on wearing jewelry near aircraft? The answers are just a few mouse clicks away.

Maintenance Mishap Summary: The aviation maintenance division's answer to the Friday Funnies. Our goal is to raise awareness about maintenance-safety practices and to share the consequences for not following procedures.

Our website contains a treasure trove of safety information, with separate sections for shore, afloat, OSH, and Marine safety. Here are a few other good web pages to check out.

Safety Magazines: *Approach*, *Mech* and *Sea&Shore* are online. These sites include sections with clip art, safety posters, video clips, mishap photos, more stories, and art work that can be downloaded for your briefs or training sessions.

Traffic-Safety Toolbox: A web page full of great information and checklists that all hands can use. This information just might help to prevent a motor-vehicle mishap in your command.

The Safetyline e-Newsletter: Published electronically on a weekly basis for 16 weeks during the critical days of summer, it addresses a specific summer safety-related topic each week.

50-Percent Mishap-Reduction Information: Navy and Marine Corps commands are working hard to comply with the Secretary of Defense's challenge to reduce mishaps by 50 percent over the next two years. It contains news, policy, tools, and data on the effort.

Make a pit stop at the Naval Safety Center website the next time you're surfing the web, and check out the tools you can use and answers you can get. We're just a mouse click away.

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

Stop the Fadness

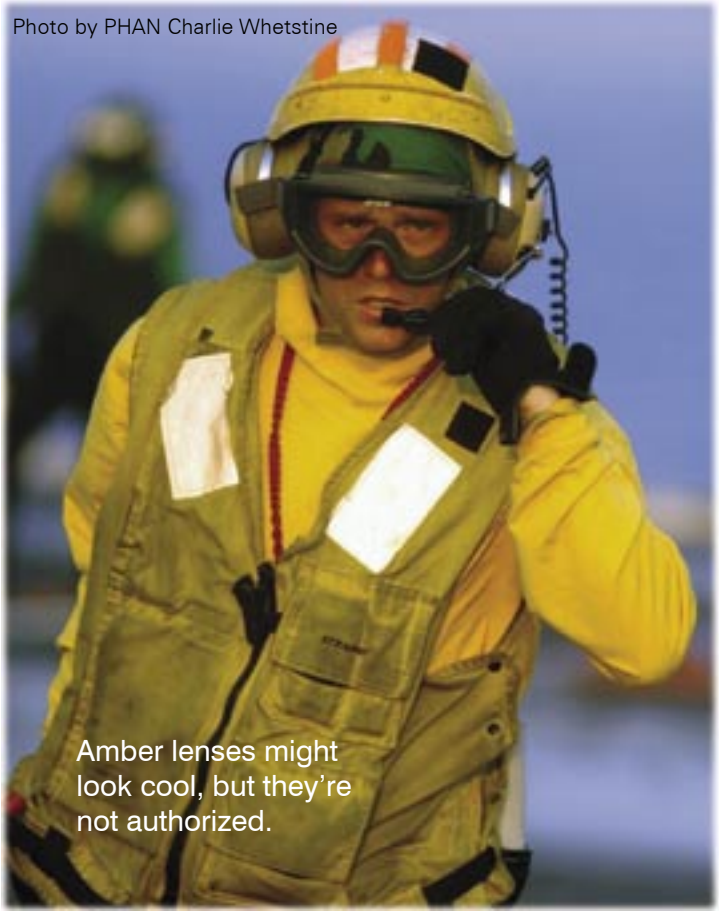
By ASCS(AW) Phil LeCroy

Sailors and Marines, like all young adults, try to express their individuality in a variety of ways. This isn't so easy when you have the Uniform Regulations to contend with. During safety surveys, it is increasingly common to see the line division's cranials "dressed up" and personalized with everything from the skull and crossbones to a Dallas Cowboy's "Star" or the University of Tennessee "T." But that problem is a different issue and has been addressed many times. I want to talk about a new fashion trend: amber-colored, safety-goggle lenses.

The ESS flight-deck goggles (NSN 4210-01-492-5720), available through the supply system, come with clear and smoke 26mm polycarbonate lenses, with 99.9 percent UVA and UVB protection. The company also offers an amber lens as an aftermarket product procured via open purchase. These lenses meet all the same ANSI standards as the clear and smoke lenses. The Navy Clothing and Textile Research Facility is ready to induct the amber lenses into the supply system, and individual commands will be able to procure them in lots of 50. However, there is a little holdup...NAVAIR hasn't tested them.

Pilots wanted amber-colored visors, which prompted numerous tests before being authorized. One important point came to light: Pilots had better visual acuity looking outside the aircraft, but they lost certain colors and hues when they looked back into the cockpit. As a result of these findings, the amber visor was authorized for day flights only.

Photo by PHAN Charlie Whetstine



Amber lenses might look cool, but they're not authorized.

Losing certain colors and hues on the flight deck can be just as dangerous.

Until NAVAIR's tests on the ESS lenses are complete and their findings are analyzed, amber lenses are **not** authorized for flight deck or line use. Better safe, than fashionable.

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

Class "C" Mishap Summary

By ADCS(AW/SW) Gary Dennis

From June 02, 2004, to Aug. 03, 2004, the Navy and Marine Corps had 19 Class C mishaps that involved 19 aircraft. The damage total was $2,876,284.

The uplock support fitting broke on an EA-6B's nose landing gear. Departing pieces struck the station No. 3 pod's RAT, damaging the blades. The nose gear doors were bent, hydraulic lines were chafed, and the shrink cable on the nose landing gear was broken.

During an NVG training evolution, a CH-46E lost an engine and landed in a culvert. The aircraft remained upright and shut down in the landing zone.

A C-2A departed the runway during a full-stop landing, damaging the port wing flap, two propeller blades, and two landing wheels.

While taxiing a T-34C into position for ground run-up checks, the propeller struck a taxiway light, damaging the prop. Also, a taxiing F-18F hit a sun shelter, damaging an ARDS pod on the port wing tip.

During engine turns on a P-3C, the No. 2 engine's forward, outboard after-body bolt departed the after body, damaging the No. 2 blade on the No. 2 propeller. It also punctured the fuselage skin

between the D-1 and D-2 racks.

Six other Class C mishaps reported for this period were due to human error. They all involved support equipment that damaged aircraft, causing damage that totaled $337,390. Visit our website at www.safetycenter.navy.mil, and read information about Groundcrew Coordination (GCC). It might help to reduce mishaps.

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

QUALITY ASSURANCE

Eyewash Station Becomes an Eye Hazard

By AVCM(AW/SW) Brian Clark

Survey team members often have to "step away" from the checklist and gauge a command's safety environment, using methods that often uncover some pretty unsettling things. One method is to simply ask a few safety-related questions of the more junior folks in the shop. These questions serve two purposes: lets us gauge the training people have received, and often provides the opportunity to do some ad-hoc training.

One of my favorite methods is to ask young Sailors or Marines to lead me to the nearest eyewash station. They often will lead me directly to it, demonstrating they've been trained. If not, I hold an impromptu training session with the workcenter to make sure everyone knows the location. I always add a little sight-conservation training, as well.

On one such occasion, I asked a young maintainer if he could show me the nearest eyewash station. He responded, "Yes, senior, it's right outside!" And he took me to the site. His enthusiasm quickly withered when he and I both saw the station—a portable unit that was covered in bird guano. His next words were, "Uh, senior chief, I wouldn't use this if I were you." He could read my thoughts!

After pondering how it got in such condition, I asked when it last was inspected. OPNAVINST 5100.23F, Chapter 19, says quarterly, and I don't doubt it had been done properly. The birds in the hangar were a bit more active with their contributions, making it necessary to inspect on a more frequent basis. The shop supervisor admitted he didn't perform the inspections—the squadron safety team inspects and cleans the units. The squadron safety POs or NCOs should have discovered this problem during their daily walkarounds.

I recommended two things: Relocate the station away from the birds, or the workcenter should clean the station more often. Either way, I'm sure the unit would stay cleaner between quarterly maintenance and servicing.

Master Chief Clark was a maintenance analyst at the Naval Safety Center. He recently transferred to AIMD, Patuxent River, Md.

LINE

How You Can *Change* Your FOD Walkdown

By ATCS(AW/SW) Denis Komornik

It's that time of the day again; bright and early in the morning, and the entire command is getting ready for another busy day. But wait! Before we get to the maintenance actions of the day, our first order of business is the morning FOD walkdown.

During our trips around the fleet, the survey

team does numerous in-process actions. One of our checklist items is the morning FOD walkdown. While observing, I often am asked, "Why are you here watching this mundane task?" This is a fair question, and the answer is it allows us to see how the command can come together as a team. It shows us how that team can overcome one of our major safety concerns—FOD. Many people may think, "I've done this a hundred times, and nothing you are going to tell me will be new." You might have noticed that the word "change" was italicized in the title, and it was for good reason.

During FOD walkdown, try this technique: Ask your shipmates if they have change for a dollar so you can buy a cold drink after you're done. Do they have it on them? Probably so. I've had more than one shipmate prove this to me on the flight line. We have been taught from the beginning of our careers that nothing should be brought out to the flight line that hasn't been accounted for. Pocket change is just one example. Pens are another major concern. I have seen enough pens in shirt pockets during the walkdown and recently on a launch evolution to fill a notepad.

Another way to change your FOD walkdown is to separate FOD collection zones between the hangar bay and flight line. This action enables QA, the line division, and maintenance control to pinpoint specific FOD-problem areas in your command. Get on board with your command's FOD program. Empty all of your pockets before you head out to the flight line. Be innovative and try new techniques. The lives of your shipmates and pilots depend on you.

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

AIRFRAMES/CORROSION

Small Things Usually Kill Us

By AMC(AW) Paul Hofstad

Maintenance managers often are challenged to make the impossible happen. We are tasked to solve complex problems with minimal notice and limited time. The last thing we need in our arsenal of solutions is a broken tool or one so neglected it hinders, rather than supports, our mission. One such problem is the emergency-reclamation kit.

Is your squadron's kit ready for action? Does your manager or monitor ensure that tool is available to quickly combat man-made or natural hazards–the ones that always seem to hit when our assets are at absolute bare minimums?

During surveys, I often find these indicators of poor readiness:

- ERT kits had no current, up-to-date inventories.
- Program managers were not aware of the requirement to do quarterly inventories. (Usually accomplished when emergency-reclamation drills are done, so the readers know how often drills were being done as well.)
- ERT kits are stored outside, and contents are not secured with a breakable seal, zip-tie, or similar product.
- ERT kits are stored outside, and the environment damaged or destroyed the contents.
- Respirators not stored or cleaned properly.
- Respirator fit tests or physicals are expired.

This program is important when an ill-timed AFFF sprinkler system goes off, and we need the proper tools to get an aircraft back to combat-ready status in minimal time. An old saying in naval aviation goes, "It's the small things that usually kill you." An overlooked ERT kit is one of those small details that always seem to be forgotten until we actually need it. Don't let an overlooked ERT kit be the item that affects your squadron's safety and readiness.

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E^3 The Mission May Depend on It!

Electromagnetic Environmental Effects

For more info: www.safetycenter.navy.mil
www.asemicap.net

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Background photo by PH2 Aaron Ansarov