The Navy & Marine Corps Aviation Maintenance Safety Magazine

Mech

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The Navy & Marine Corps
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Mishaps cost 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 magazine's goal is to help make sure that personnel can devote their time and energy to the mission. We believe there is only one way to do any task: the way that follows the rules and takes precautions against hazards. Combat is hazardous; the time to learn to do a job right is before combat starts.

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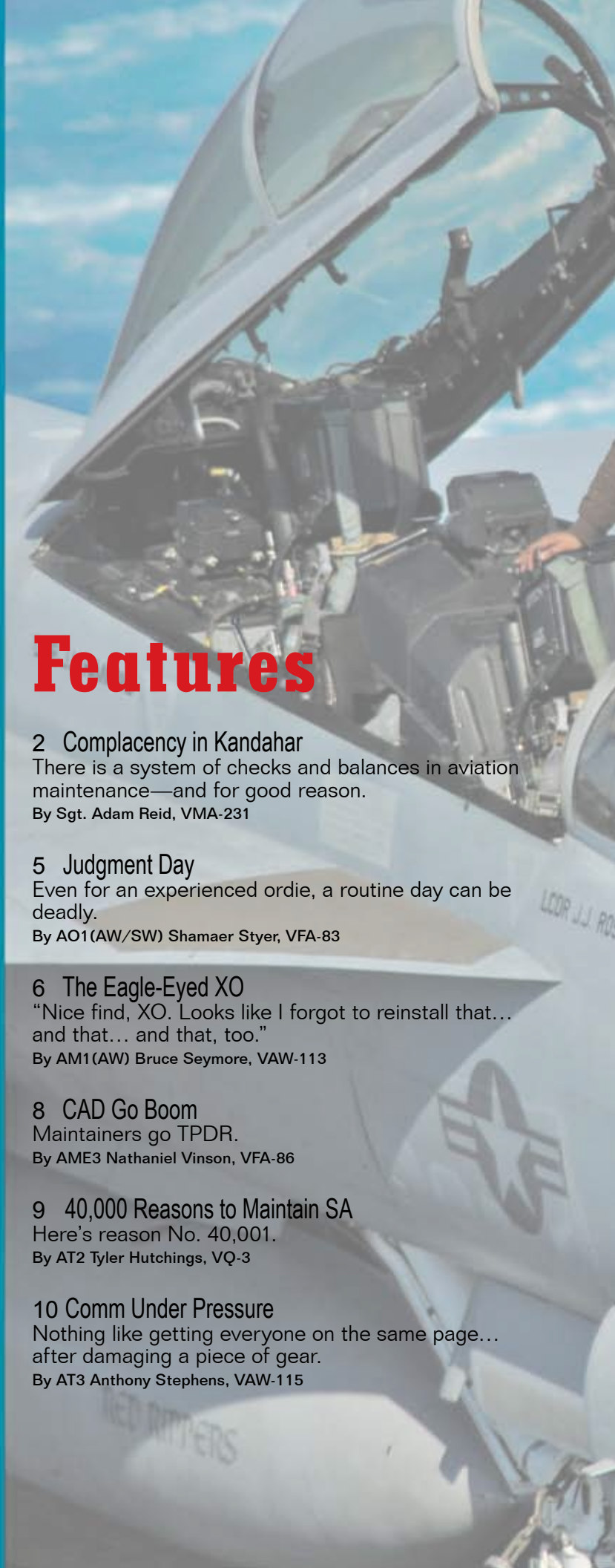

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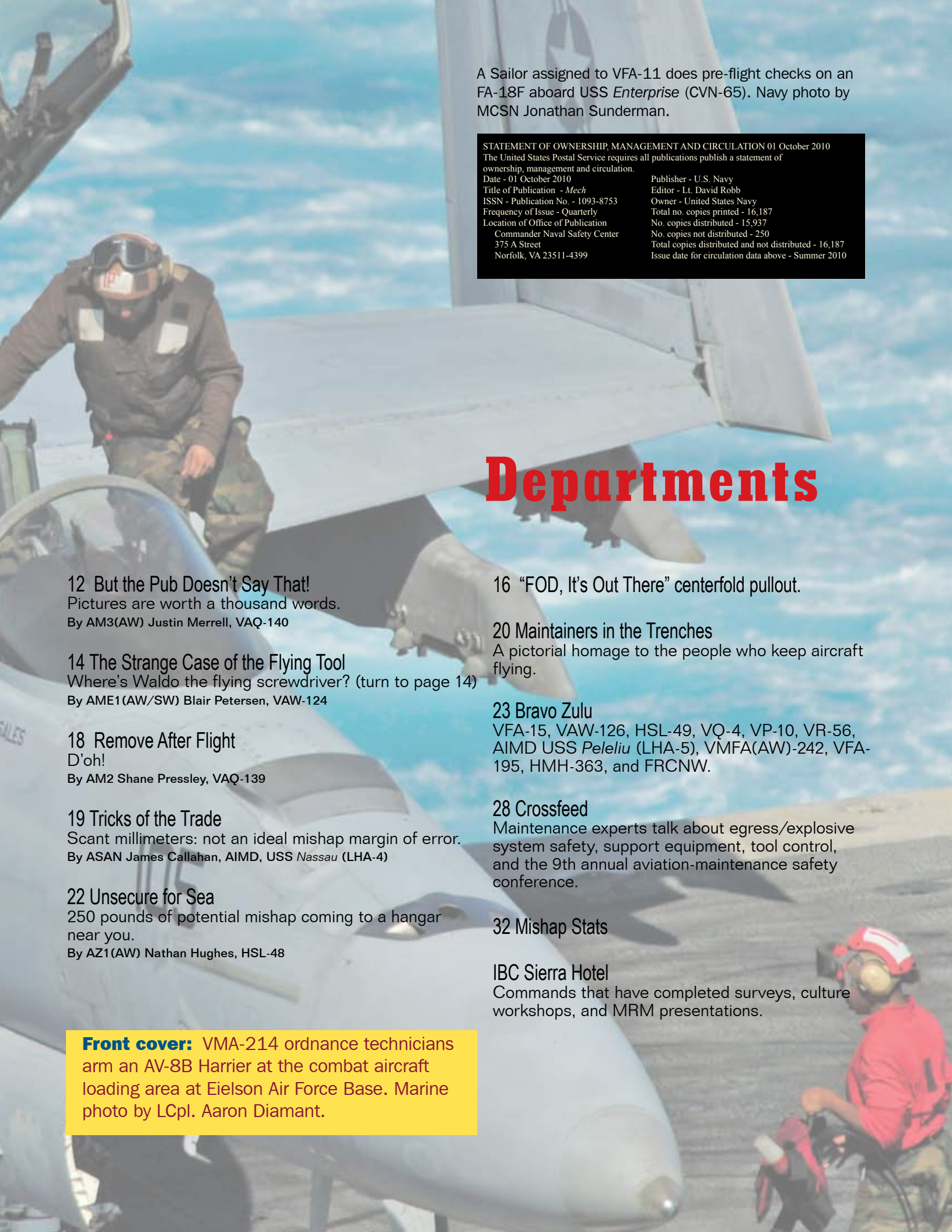

A Sailor assigned to VFA-11 does pre-flight checks on an FA-18F aboard USS *Enterprise* (CVN-65). Navy photo by MCSN Jonathan Sunderman.

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Departments

Front cover: VMA-214 ordnance technicians arm an AV-8B Harrier at the combat aircraft loading area at Eielson Air Force Base. Marine photo by LCpl. Aaron Diamant.

Complacency in Kandahar

By Sgt. Adam Reid

I can't recall how many times I have filled out a squadron safety survey during my military career. I do know that every time I come across a question about what I think will be the cause of the next mishap, I never have thought that it would be me. After all, I'm an E-5 CDQAR.

I've been a Harrier engine mechanic at VMA-231 since the spring of 2004. I have completed six-month deployments at sea and seven-month deployments to both Iraq and Afghanistan. I spent a year in QA, and when this story took place, I'd been back in the powerline shop for two months.

My squadron had successfully flown numerous combat missions out of Kandahar Air Field and FOB Dwyer in Afghanistan. We were on the homestretch of our deployment, with less than one month left before heading back to Cherry Point, N.C. Our advance party had just departed and morale was on the rise.

Since February, there had been a recurring issue with the engine abraidable coating on one of our aircraft. Abraidable coating is a thin black coating of hard resin at the very forward edge of a Harrier engine. It is designed to be worn away in the event that an engine is exposed to too many G's in flight. The coating is rubbed away by the tips of the compressor blades and exposes a second yellow coating below to alert the ground crew during postflight inspection.

It was obvious that the coating had been applied incorrectly in the past because when we first installed the engine, we noticed a small defect in the coating and had to repair it. Several weeks later, we fixed several more defects that were all within repairable limits. We knew this was going to be a reoccurring theme, and eventually it started to feel routine.

When one of our PCs came into the shop to tell me that there was more damage to the abraidable coating, I wasn't surprised. I looked at the defect spotted by the PC and determined it was repairable. I was frustrated because I knew this was just going to keep happening. When small amounts of the coating are worn away by the engine, the remnants are ingested into the engine without causing damage. "What would happen if a very large piece came off?" I wondered. I ran this scenario by several other experienced powerline Marines. We discussed changing out the engine, a more conservative approach, but in the end opted to repair the defect and monitor it more closely.

I took a corporal out to the aircraft to demonstrate how to conduct the repair (it was the third time I'd done this same job on this aircraft.) Between that and the other maintenance I had done over the years in Harrier engine intakes, I was confident that nothing could go wrong. I showed him how to sand down the coating to bare metal and taper the edges so that it would be less likely to peel up over time. Once I had finished sanding and felt that he had been trained adequately, I took some measurements. The two of us headed back to the shop to grab the rest of our supplies: a can of primer, some alcohol, rags, and tape.

Once we were back in

the shop, he was tasked with another job, so I selected another PC, a lance corporal, to come out and watch the second half of the repair. He had never watched this particular maintenance action; it would be a good experience, or so I thought. We checked out alcohol and primer from hazmat, grabbed some rags and a roll of tape, and went back to the flight line.

I showed him the work I had already done, briefly explained it, and told him why I had decided to do it. We then moved on to the final steps needed to complete the task. I thought we were home free. I soaked a rag in alcohol and wiped down the repair area in preparation for the primer. I then taped off around the bare metal areas of the repair, applied the primer, and peeled off the tape. Mission complete. We headed back to the shop, and on our walk back in, we checked that we had all the rags, the jug of alcohol, the can of primer, and a handful of used tape. See anything missing?

I knew that this aircraft was needed for one of the upcoming events in the day. Back home in Cherry Point, the op tempo rarely is on my mind. But in a combat environment, the missions we were flying were not training sorties. There were Marines on the ground who needed these aircraft in the air for support. I got into the "get it done" mentality and missed several critical steps because I rushed through the process.

A Harrier's engine intake is unique. There are two intakes, one on each side, both going to the aircraft's single engine. There are doors on the outer edges of the intake that open to provide extra airflow while the aircraft is in a hover. It's common knowledge that intake-FOD can end up behind the bottom auxiliary intake doors.

I waited a few hours for the primer to dry before I went back out to the aircraft to take a final look at the repair. The primer was good and dry, so I glanced around the intake and was convinced that the job was done. I went back into the shop ready to sign off the MAF.

I saw the corporal whom I had trained earlier in the day and asked him to sign the "corrected by" block on the MAF. He hadn't done any of the actual

work, but I thought "He was out there, right?" Then I signed the "inspected by" block even though I did the work and was the only CDI to ever look at the repair. The corporal signed off the turnaround inspection because he'd already looked at the whole aircraft and didn't think he needed to go behind a CDQAR and check the intake again. The intake isn't very big. What was he going to catch that I didn't?

A few hours later, the aircraft was getting ready to fly. The lance corporal who watched me do the latter part of the repair work on the abraidable coating went out to do a preflight inspection of the aircraft. He did a quick walk-around but never inspected the intake to ensure it was FOD-free. A preflight inspection of an aircraft is relatively simple but important: ensure all the panels and access doors are installed, check the tires and dive the intakes to check for FOD. That's what's supposed to happen. But, the turnaround already was signed off. The corporal PC must have known what he was doing. It must be good, right?

Soon after that the pilot came out to the aircraft, did his preflight of the jet and strapped into the cockpit. In a matter of minutes, the engine was running, all preflight checks were done and he was minutes from taxiing to the runway. I glanced over one last time from across the flight line and watched as the pilot shut down the aircraft. I had no idea why he shut it down or what the problem might have been. "There is no way it could be the coating that I just had applied," I thought.

A few minutes later, a fellow Marine told me that another PC, a sergeant, had signaled the pilot to shut down because he spotted a roll of tape lodged in one of the auxiliary intake doors in the intake. Luckily at least one person was on top of their game that day. The pilot jumped out of that aircraft and into the backup and was able to get to his mission on time.

What could have happened? If that roll of tape had made it down the engine we would have had to change the engine, which is no simple or cheap task on a Harrier. That's the best-case scenario. If the aircraft had made it off the ground before the tape went down the engine, we could have lost an aircraft in Afghanistan. A series of small mistakes could have cost a life.

The whole situation could have been avoided several times. There is a system of checks and balances in aviation maintenance: a second, third and fourth set of eyes that look at everything to prevent incidents like this. The system worked, ultimately. It wouldn't have gotten that far if I had properly accounted for all of my tools or gotten a second inspector out on the aircraft to check my work. If the corporal had gone back out to redo his turnaround instead of taking my word that the intake was good, he would have found the tape. If the lance corporal had done a thorough preflight inspection, he would have found the tape.

Sergeant Reid works in the powerline shop at VMA-231. Corporal Chadwick McCrary and Lance Corporal Zachary Stiles also work at VMA-231 and helped write this article.

Judgment Day

As the aircraft began to take tension for launch, one of my newest ordies tapped me on the shoulder and told me the practice bombs weren't armed.

By AO1(AW/SW) Shamaer Styer

The toughest but perhaps most rewarding part of deployment is getting your crew to the finish line safely. As the end of our deployment drew nearer, the hours seem longer and time almost seemed to stand still. It can be the most dangerous time of deployment, when Sailors get complacent.

This day had started out like any other day of flight operations aboard USS *Dwight D. Eisenhower* (CVN-69). The morning progressed smoothly as you might expect from a seasoned crew nearing the end of their second deployment in two years. With FOD walkdown and pre-flights completed, we had to do the standard tone checks and arm CATM-9M missiles and MK-76 practice bombs.

The weapon stations on one of our aircraft were over the catwalk, so the arming crew had to wait for the aircraft director to taxi the aircraft forward before we could arm the stations. With all systems go, one aircraft was released to the deck crew, who then began to prepare the aircraft for taxi.

Standard practice was for the aircraft director to pass control of the aircraft to the ordnance arming crew once it was clear and safe to conduct arming procedures. Unfortunately, time constraints dictated otherwise.

The aircraft director needed to get this particular aircraft to the catapult immediately for an on-time departure. Because of the rush, our arming team passed the TTU-304 (infrared pen) to the CVW ordnance arming-team so they could tone-check the missile and arm the practice bombs. Once the aircraft was positioned on the catapult, the CVW ordnance team handed me the nose cone from the missile.

With things apparently under control, I relaxed my focus on the aircraft positioned on the catapult. As the aircraft began to take tension for launch, one of my newest ordies tapped me on the shoulder and told me the practice bombs weren't armed. I turned, looked at the aircraft and realized this was true. I gave the suspend-launch signal immediately, crossed the shot line, and headed to the aircraft.

As a quality assurance safety observer (QASO), I had taken my focus off of the final stage of the arming evolution. That was my first mistake. A QASO is supposed to prevent oversights like this. Though the job was passed on to the CVW team, the responsibility to ensure our aircraft was armed belonged to me.

Quality assurance lapses aside, I had committed a major safety violation when I crossed the shot line with an aircraft in tension. Aircraft that are launching and recovering have injured and killed Sailors who got in their way. I could have become another one of these statistics. By trying to rectify my earlier mistake, I made a near-fatal error with only a month left to go on deployment.

Petty Officer Styer works in the ordnance shop at VFA-83.

The Eagle-Eyed XO

By AM1(AW) Bruce Seymore

For the airframers of the VAW-113 Black Eagles, it was another hot, high-tempo day of routine flight ops aboard USS *Ronald Reagan* (CVN-76) in support of Operation Enduring Freedom. Having just won the Battle "E" and the Air Wing Fourteen "Golden Wrench" award a few months back, and having been in the same piece of sea doing the same mission less than six months ago, we were ripe for complacency.

Black Eagle 602 was on final approach when the pilot tried to lower the landing gear. The right main gear failed to lower, remaining in the up-and-locked position. The pilot—using emergency procedures for a landing-gear failure—lowered the gear and landed the aircraft.

He told Maintenance Control about the discrepancy, and the aircraft was downed and scheduled to be moved to the hangar bay for a check of the landing gear system.

While doing operational checks in accordance with the MIMs, maintenance personnel couldn't duplicate the problem. The supervisor reported his findings to the Maintenance Control senior chief and said that he intended to sign the gripe off as "A-799," since the landing gear appeared to be operating 4.0 with the aircraft on jacks. Because the landing gear indicator had only been changed two days earlier, the senior chief directed the CDI to continue troubleshooting.

Following the senior chief's direction, the supervisor did another visual inspection of the right main-landing-gear hydraulic components and noticed the striker bolt on the timer check-valve was slightly worn, causing it to be out of adjustment.

The E-2C landing gear system is designed with a hydraulic timer check-valve mounted on the forward bulkhead of each main-landing-gear wheel well. The valve routes hydraulic fluid to the main-landing-gear

actuators when the forward-landing-gear doors are open fully. The timer check-valve is actuated by a striker bolt which is depressed by a cam assembly on the forward door linkage when the doors are open fully.

On Black Eagle 602, the worn striker bolt was not fully actuating the valve. This, the supervisor realized, was probably the reason why the landing gear did not extend when the pilot placed the landing gear handle in the down position during the previous flight.

The supervisor instructed his crew to remove and inspect the striker bolt and adjust the system rigging. After doing so, the striker bolt was reinstalled, but the corresponding washer, bolt, and cotter key (highlighted in the photos above), which secure the cam assembly to the timer check-valve, were left off in order to reduce the amount of time it would take to remove the striker bolt again if more adjustments were required.

The landing gear was checked again and everything worked 4.0. The supervisor—satisfied that the discrepancy had been fixed—told his crew to lower the aircraft off of the jacks so it could be moved back to the flight deck.

In his rush to ensure that Black Eagle 602 was ready for the first launch at 0500 the following morning, the supervisor violated the cardinal rule of QA: he didn't personally inspect all the work before signing off the discrepancy. If this critical inspection had been conducted, he would have discovered that the washer, nut, and cotter pin hadn't been reinstalled on the striker bolt.

With the job signed off and the bird spotted on the flight deck, the aircrew started their preflight inspection. The senior pilot and aircraft commander for this flight happened to be the squadron XO. As part of his preflight walk-around, he took a few extra seconds to inspect the cam assembly tucked up behind the gear linkage on the forward main-gear bulkhead. That's where he discovered that the hardware was missing.

Had the XO not taken the extra time to inspect the associated hardware, the bolt easily could have fallen out during the catapult shot or later in flight. A gear up or hung main-mount landing on the beach is risky enough; on the ship, it can be fatal.

I was that supervisor. It was my complacency that led me to believe we were infallible.

Petty Officer Seymore works in the airframes shop at VAW-113.

By AME3 Nathaniel Vinson

CAD Go Boom

It was a routine evening for the work-center 13B night-check crew. One of our tasks for the night was an 84-day inspection on aircraft 403, which involves removing and cleaning the seat-bucket assembly. For the two other AMEs and me, reinstalling the assembly (once we were done cleaning it) seemed like routine maintenance.

I climbed on top of the aircraft to install the assembly and stood on the leading-edge extension while the other two AMEs lifted the assembly up to me. I reached down and grabbed it from the back-pad adjustment mechanism and sat it on the canopy deck. Repositioning it, I checked for anything out of the ordinary. As I was checking over the assembly, I noticed the manual override handle was in the "down" position. Per installation instructions, I lifted the manual override handle to the "up-and-locked" position to prepare for installing the seat pan.

Raising the handle produced a loud "Bang!" The manual seat-man-separation CAD had fired, shooting the starboard trombone tubes up. They hit the roof of the hangar and fell about fifteen feet from the aircraft. The explosion startled and confused me, and I stood there trying to piece together (literally and figuratively) what had just happened.

Fortunately, when I had repositioned the assembly (prior to the explosion), I had set it on the canopy deck with the aft portion of the seat facing outboard of the jet. Had I set it facing inboard, it could have injured me and/or damaged the canopy, instead of just expending a CAD.

Investigators discovered that the pin-puller assembly—which prevents the manual override handle from traveling to its full aft position—had failed, resulting in the CAD firing when I pulled the handle. That pin should only be retracted when the ejection sequence is initiated, allowing the pilot to manually pull the handle to initiate seat-man separation. While on deck, if the pilot needs to exit the cockpit quickly and pulls the manual override handle, the pin (which should be fully extended) prevents the CAD from firing. This allows the pilot to exit the jet without having to unstrap from the ejection seat.

As a result of this near-mishap, our squadron submitted a TPDR for NAVAIR maintenance publication A1-F18AE-120-700. Our recommendation: Add a warning to the pub, requiring maintainers to visually inspect the pin in the pin-puller assembly prior to pulling the manual override handle. Within a week of the incident, an interim rapid action change (IRAC) was added to the pub.

Petty Officer Vinson works in the AME shop at VFA-86.

40,000 Reasons to Maintain SA

We were doing a precipitation-static (p-static) test on aircraft 782, an E-6B Mercury. This test checks electromagnetic interference (EMI), ensuring that all aircraft panels are properly bonded (un-bonded equipment can affect the aircraft's radios and communications gear).

The test involves inducing high voltages (up to 50,000 volts) near the skin of the aircraft, using an aircraft sprayer wand. The radios are then monitored for any excess static, popping, or unwanted noise.

We began our work on 782 by running through our set-up and pre-op checks on the p-static test set. We then positioned the man-lift under the starboard horizontal stabilizer with two personnel onboard: an AT3 holding the p-static sprayer wand and an ATAN driving the man-lift.

When the AT3 gave the "good for power" command, power was initiated by the two additional ATs manning the power supply on the deck. While checking a panel, the ATAN who was driving the man-lift reminded the AT3 to watch the gauge on the end of the sprayer wand as the meter needle began to rise past its nominal readings. When the ATAN raised his hand to point to the rising gauge, an arc of 40,000 volts jumped from the wand's head and struck his hand. He collapsed in the man-lift basket. The other ATs secured power immediately, and I ran to Maintenance Control.

We got the ATAN out of the basket, and to our surprise, he didn't appear to have any visible injuries. We took him to medical for a complete check up to make sure he didn't have any electrically-induced internal injuries. With a clean bill of health, he was cleared back to work the next day.

As the night-shift supervisor/CDI, I should have better prepared for the risks and hazards of running this kind of test. Situational awareness was not what it should have been. Had the ATAN maintained the mandatory one-meter standoff distance from the "hot" section of the wand, this whole incident could have been avoided. You can never be too careful when working around high voltage equipment.

Petty Officer Hutchings works in the AT shop at VQ-3.

Comm Under Pressure

By AT3 Anthony Stephens

As soon as I opened the servicing bottle, I heard a loud "Bang!" The test set had over-pressurized and exploded, spreading FOD everywhere inside the aircraft.

We had been on and off of the boat for three months with changing schedules and plans. I'd been working night check, and one night a fellow AT3 and I were assigned a 112-day inspection on Liberty 601, an E-2C Hawkeye. This inspection required an air-leak test on the bleed-air portion of the radar dome.

The test set used to check the dome pressure requires a NAN-4B nitrogen servicing cart (NAN cart) to provide the nitrogen pressure. In order to get accurate measurements, the test set has to remain vertical while pressurizing the system. Because of heavy winds, we decided to place the test set inside the aircraft instead of on the flight deck. We then hooked up the test box and continued to follow the steps in the pub.

When it was time to pressurize the test set to 50-100 psi using the nitrogen cart, we read the ominous "caution" in the publication: pressure higher than the 50-100 psi range could damage the equipment. Little did we know we'd soon be testing that limit.

Continuing the checks, we set the NAN cart to approximately 90 psi. The fittings used on the test set and NAN cart hose don't allow direct connection, so we used a standard regulator to join them. After opening the outside regulator and dialing the pressure on the test set, we began filling the dome with nitrogen.

The pressure coming into the test set suddenly dropped. My fellow AT3 stepped outside the aircraft to investigate the cause, and I reset the test set to be ready once the pressure was restored. The AT3 couldn't figure out the problem with the cart and called me to help troubleshoot. We swapped places, and I began to examine the NAN cart.

As he made his way back to the aircraft, I checked the valves on the cart. I soon realized that a boost-

pump bottle had been selected without opening the manifold bypass. The two bottles are set up to run the boost pump for high-pressure servicing but can be used for normal servicing if the bypass valve is opened. I could have opened the manifold bypass. Or I could have closed the high-pressure bottle and opened one of the four normal servicing bottles. The servicing bottles had more available pressure than the two boost-pump bottles, so I opted for the latter.

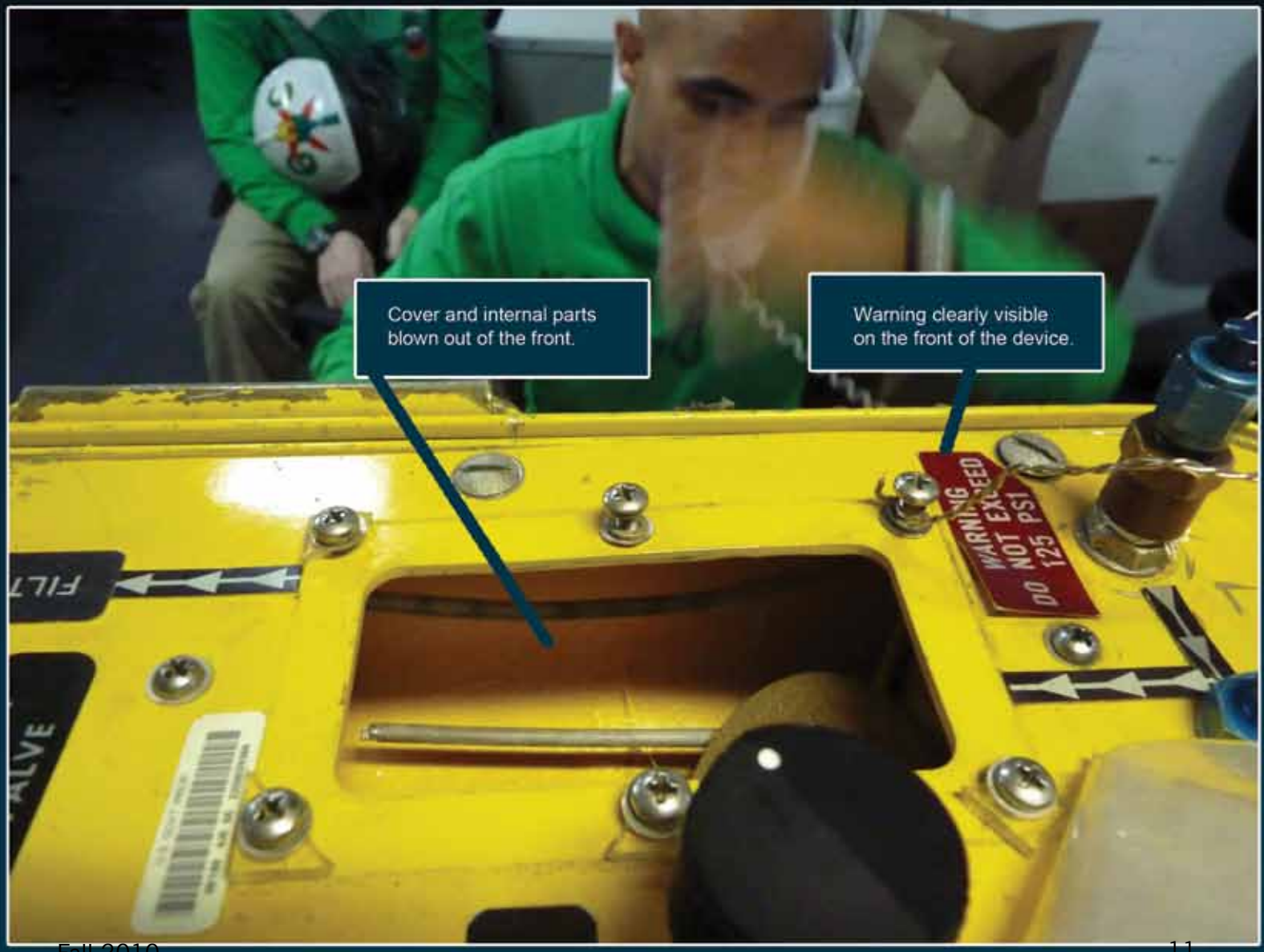
As soon as I opened the servicing bottle, I heard a loud "Bang!" The test set had over-pressurized and exploded, spreading FOD everywhere inside the aircraft. My co-worker was still outside of the aircraft when the set exploded, or he could have been injured. This was an aviation-maintenance nightmare: a large amount of small desiccant beads had spread everywhere in the equipment compartment.

It would take hours to de-FOD this E-2. Also, we had destroyed our only test set, an expensive piece of gear required to complete 112-day inspections and troubleshoot dome pressure issues.

When the nitrogen pressure initially failed, my coworker had tried to regain pressure by opening the low-pressure regulator. When we swapped spots, neither of us talked about where we were in the troubleshooting process. I didn't even think to ask or look at the standard regulator to verify whether it was set correctly. It was open fully, allowing 500 psi to enter the test set when I switched from the boost pump to the low-pressure side.

We weren't rushed, so why didn't we communicate better? Both of us had become complacent. I had used that cart many times and had done this test before—I thought I knew what was going on. Communication is always critical, even on jobs you have done many times. Pausing for a second to get everyone on the same page would have prevented this mishap.

Petty Officer Stephens works in the AT shop at VAW-115.



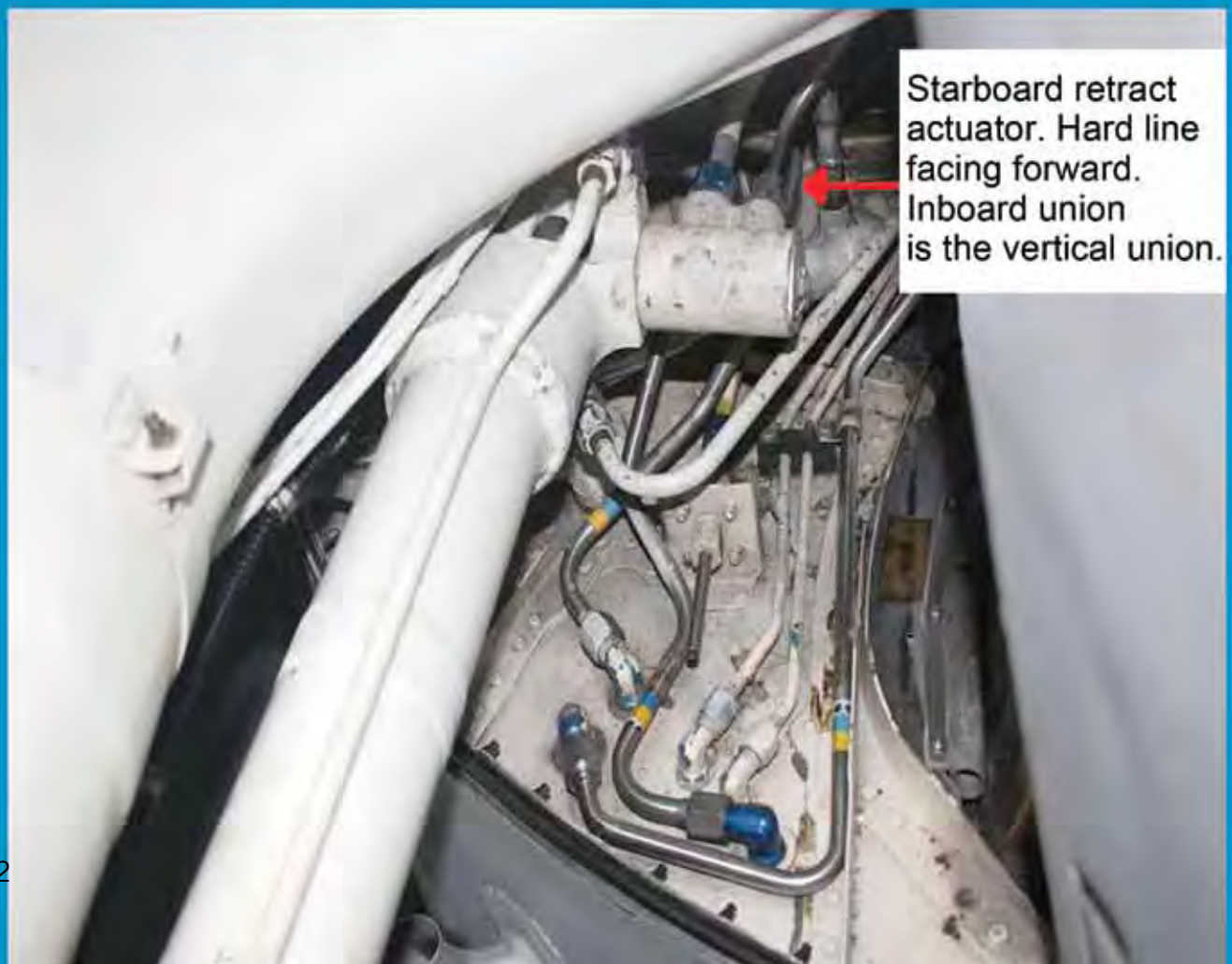
But the Pub Doesn't say That!

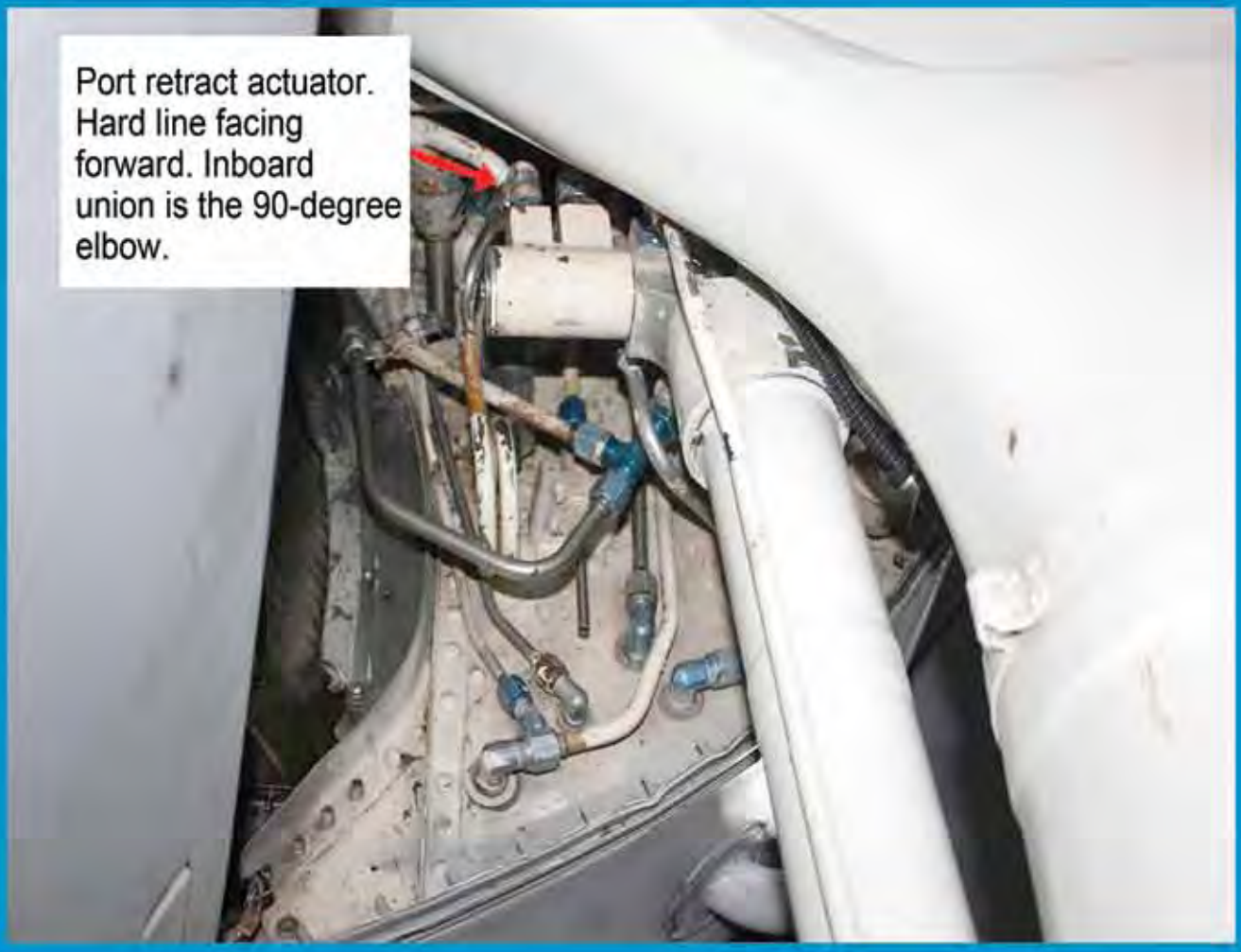
By AM3(AW) Justin Merrell

For the EA-6B Prowler, a 300-hour phase inspection is a critical maintenance inspection that preserves the life-cycle of the aircraft and ensures the safety of the aviators who fly it.

This inspection is extensive for the airframes work-center as it takes hundreds of man hours to complete. Overlooking any step (or illustration) in the MRCs or MIMs can cause significant problems for the aircraft.

Removing the main-landing-gear retract actuators should be an easy process for an experienced Prowler airframer: remove two bolts and two hydraulic lines, and the actuator is in your hands, ready to go. These





are removed from the aircraft during phase inspections in order to do an NDI of the actuator's upper attaching-lug. If the actuators fail NDI (when we find cracks), we replace them with new actuators. If they pass NDI, we reinstall the old actuators for another 300 flight hours.

In order to streamline the process of getting the hydraulic unions back in the event the actuators fail an NDI, we removed them from the actuators before turning them in. This initiative, however, turned a simple process into a huge—and dangerous—situation.

Each actuator (port and starboard) has two unions. Of those two, one is unique to that actuator. For example, the port actuator has a 90-degree elbow union, whereas the starboard actuator has a regular, No. 6 union. When our actuators returned from AIMD, we reinstalled the unions into what we thought were their correct actuators on aircraft 503. Unfortunately, we did the work from memory, not the MIMs.

What many of us didn't realize was that the actuators are, by all accounts, interchangeable. The only parts on the actuator that are required to change to make it either a port or a starboard actuator are the top and bottom cap. This makes it possible to put the port actuator on the starboard side and vice versa if the unions are on the wrong actuators.

At no point in the publication does it state that these actuators can be installed on the wrong side, or that the solid hydraulic line going down the length of the actuator has to face forward. However, there is a rear view of the actuator showing the "hard line" facing forward. I overlooked that illustration.

Still unaware of our mistake, we op-checked the main-landing-gear system and emergency-landing-gear system—everything checked "good." The MAF was signed off, and Maintenance Control cleared the jet for the flight schedule.

The actuators stayed this way on 503 for a week and a half. The aircraft flew nine OEF missions before a keen-eyed troubleshooter spotted the uniqueness of 503's actuators. He looked at every Prowler on the flight deck and noticed that 503 was the only aircraft with the actuator "hard line" facing aft. His attention to detail may have saved the lives of aircrew whom I had unintentionally put in harm's way.

Petty Officer Merrell works in the airframes shop at VAQ-140.

The Strange Case of the Flying Tool

By AME1(AW/SW) Blair Petersen

We were four months into our deployment onboard USS *Theodore Roosevelt* (CVN-71) and were preparing for the morning flight schedule. Shortly after aircraft 603 launched, the FDC told us that it was returning because of a pressurization issue.

Once 603 landed and was re-spotted on the flight deck, another AME and I checked out a toolbox and began troubleshooting. After a few hours, we discovered the ram-air duct had disconnected, making pressurization impossible. Normally this would be a relatively quick fix, but because of manning shortages, it took three of us nearly 12 hours to repair 603.

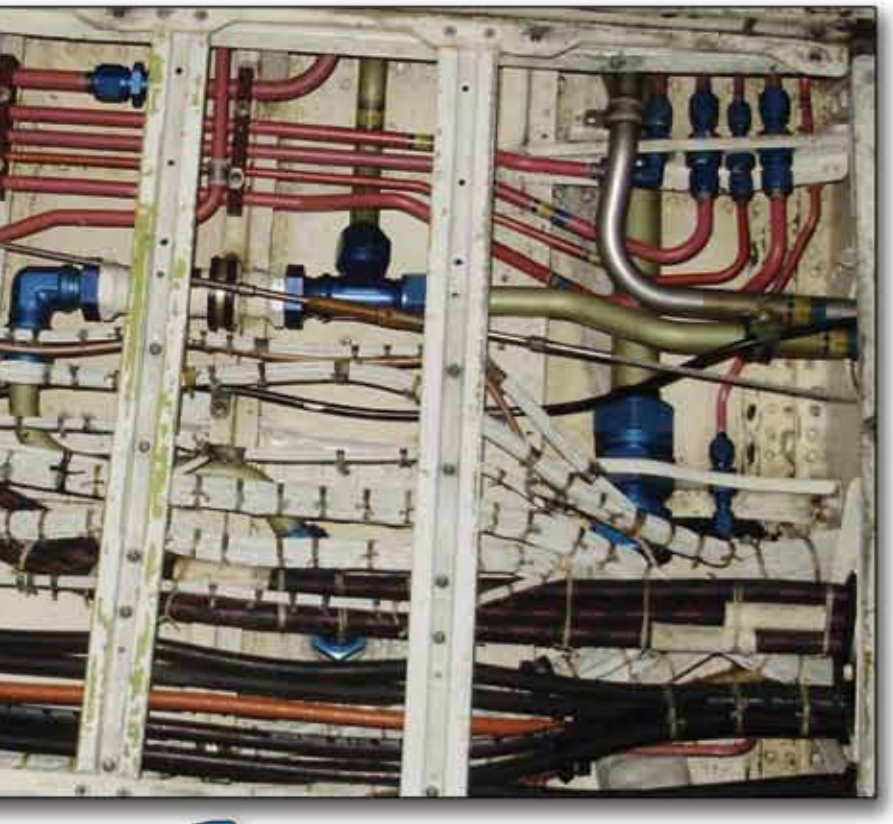
As we were getting ready to install the last few components that we had initially removed, we started placing our tools back into the toolbox—everything was ATAF'd. We continued on, doing an engine turn to leak check everything that had been reconnected. I then took the toolbox back to the shop where I again verified that all tools were accounted for.

Here is where things began to take a turn for the worse. After we signed off the MAF and submitted an in-flight evaluation request, the other AME from day shift and I went to bed. When I walked into the shop the next morning, we saw our maintenance master chief, and he looked like something was wrong. It was—we were missing a screwdriver from the toolbox we had used on 603.

We didn't know it at the time, but the night-check AME had used that same toolbox on aircraft 601 after we had turned it in and secured for the night. He hadn't signed out the toolbox, but he said that the toolbox had been inventoried prior to taking it out to aircraft 601. It wasn't until he had started working on 601 that he noticed the screwdriver was missing. He informed the FDC immediately and began the missing-tool investigation.

Since I had signed in the toolbox and had ATAF'd several times (before, during, and after working on 603), most of our attention was focused on 601, where the toolbox was last used. Both aircraft were searched by our shop and by QA. Four CDIs had looked at the toolbox after working on 603, and because of that, the aircraft was not looked at as thoroughly as it should have been (hint, hint). After completing the search with no joy, I gave my word to the MO that the screwdriver wasn't in any of our aircraft.

Nearly two weeks and ten flights later, 603 was in the hangar bay for a major special inspection. While working in the aircraft, an airframer spilled hydraulic fluid and had to pull up some of the floorboards to clean it up. Before putting the floorboards back down, QA was called to verify that the area was FOD-



free and that the flight controls were free of obstruction. That's where mystery of the missing tool was solved.

When the QAR told me he found the screwdriver, I got an empty feeling in the pit of my stomach. My first thought was to tell him to throw it overboard and pretend that he'd never found it. Then I thought about my last squadron, when I worked in QA. I was faced with the same situation he was now in. We both knew what we were tempted to do, but we also knew what we had to do.

I told the QAR to turn in the screwdriver and that we would deal with the repercussions. Integrity is a valuable trait to have and a harder one sometimes to practice.

That night the MO held an AME/QA meeting where he told us that 603 had made 10 shipboard flights with the screwdriver bouncing around freely inside the aircraft. There is no telling where the screwdriver started out, but it ended up under the floor board, next to hydraulic lines, wire bundles, and flight control cables.

In the E-2C Hawkeye, the aircrew doesn't have the luxury of ejection seats as a last resort should something go wrong. If the screwdriver had jammed the flight controls and the aircraft was not at a high enough altitude, the aircrew would have had almost no chance of bailing out.

COMNAVAIRFORINST 4790.2A spells out the tool control program in black and white, leaving nothing for interpretation. The only problem with the tool control program is that it involves human factors. Ultimately, it was my sloppy tool control at the end of an 18-hour day that could have put five aircrew lives at risk.

Petty Officer Petersen works in the AME shop at VAW-124.

Two weeks and ten flights later, 603 was in the hangar bay for a major special inspection.

Poster submitted by YNSN Ricardo Aguilar, VP-1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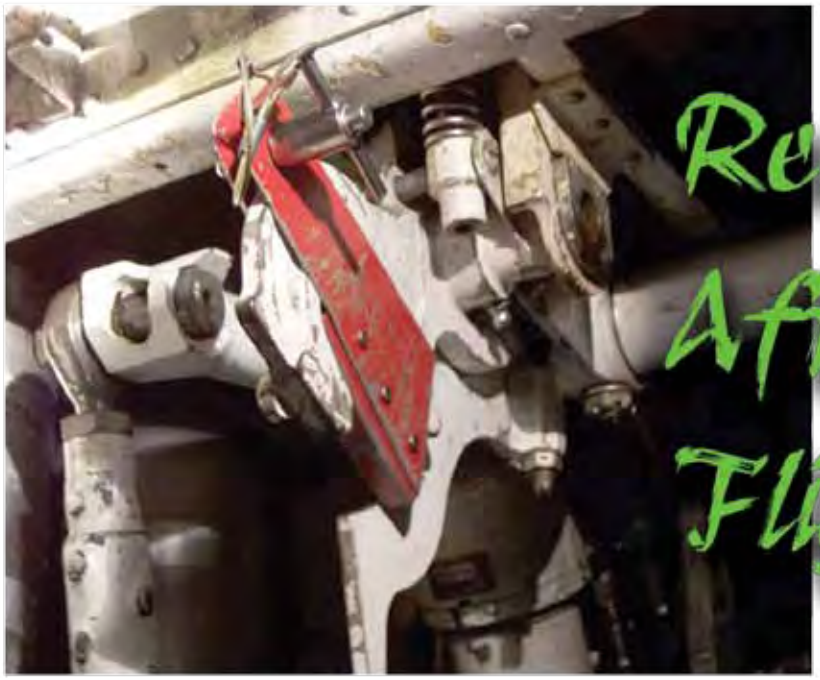


Remove After Flight

By AM2 Shane Pressley

Senior Chief: "500 is coming back."
Me: "Why?" Senior Chief: "Unsafe nose indication."

When you hear something like this, one of the first things you do is start thinking back through all the maintenance you did on the aircraft before it launched.

I was sitting in San Diego expecting to see four jets landing when I heard about aircraft 500. I thought, "What did we do that would cause such an indication?" Walking myself through all the possibilities, it clicked: We had recently rigged the cat gear, which required us to install a nose-up lock locator assembly. The tool is designed to keep the nose gear from fully retracting and tripping the up-lock hooks. "No, we didn't, we couldn't have left it in the jet," I thought.
Senior Chief: "They found a piece of IMRL in the nose wheel well."

I knew that I was to blame. Working my way through the previous day's events, I realized that, in the chaos of running from one jet to another, I had missed several steps in the pub. I hadn't done a tool inventory before leaving the aircraft, nor had I done an inventory after returning to the work center. Also, I did not op-check the landing gear.

Here's my recap of how things went wrong.

Sunday night rolls around and night check starts their shift. Tools are checked. The night concludes and tools are checked again. On Monday morning we once again "check" tools (although still not accounting for the locator assembly).

"Shooters to the line" comes across the intercom system, and dozens of maintainers head out to four aircraft scheduled to fly to NAS North Island. Flight-line chief: "Jet look-overs completed by all work centers."
Maintenance Control: "Rog. Walking crew."

Aircrew walk to their respective jets and do walk-around inspections. The locator assembly on 500 goes unnoticed. It is bright red (like most IMRL); however, it is not marked with a "remove before flight" flag because the flag interferes with the extension of the nose gear after rigging has been completed.

The huffer is hooked up and started on 500. All four aircrew are satisfied with the condition of the jet. Sitting in the cockpit, the pilot signals to start the motors. Launch procedure starts, and troubleshooters do their inspections. Both troubleshooters inspect the nose wheel well and, finding no discrepancies, give the PC thumbs up. He then releases the brakes and instructs the pilot to taxi forward. One last brake check then a salute is given.

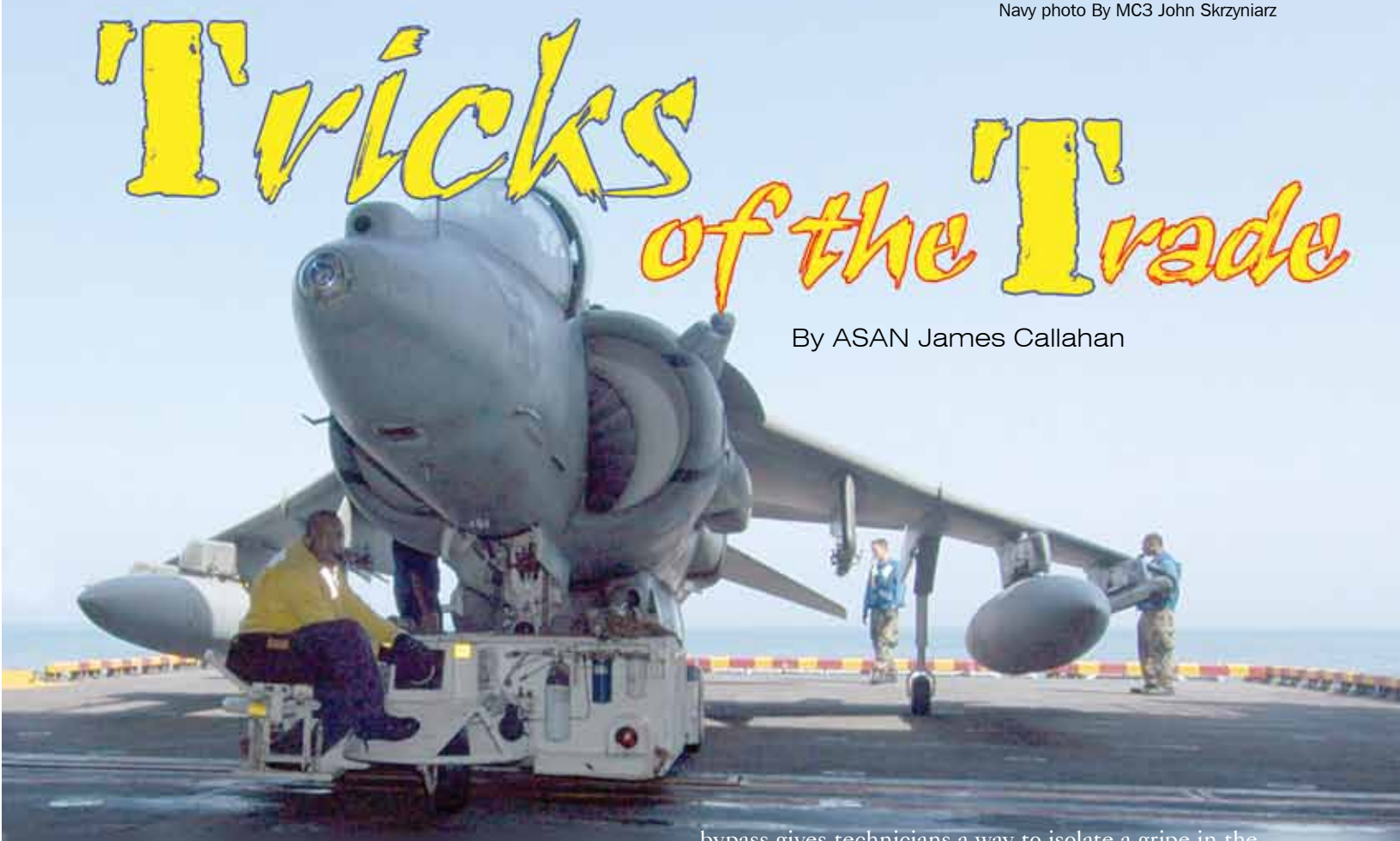
Thirty seconds into the flight, the pilot raises the gear handle. A call over ICS: "Mains up and locked, waiting on the nose." After a minute or so the CO calls back to the SDO: "500, unsafe nose indication—we are coming back."

The jet arrives at the flight line. An airframes troubleshooter climbs into the nosewheel well to investigate the problem and finds a tool in the up-lock hooks. The aircrew shuts down the jet and prepares it for a plane move to the hangar. Our CO climbs from the jet and is told that a tool was left in the jet.
CO: "How did this happen?"
Answer: Improper tool control.

Petty Officer Pressley works in the airframes shop at VAQ-139.

Tricks of the Trade

By ASAN James Callahan



Navy photo By MC3 John Skrzyniarz

While deployed to the 5th Fleet AOR in support of maritime operations in the Gulf of Aden, an A/S32A-32 spotting dolly, a familiar workhorse in shipboard aviation, crunched an embarked AV-8B Harrier.

This incident began as a routine bird move from the hangar bay to the flight deck. While maintainers were positioning the Harrier on the port elevator, the spotting dolly ceased responding to operator controls and stalled beneath the aircraft. SE personnel were contacted and quickly arrived to troubleshoot.

The proper course of action would have been to unlock the drive train of the dolly via disconnect pins and tow it clear of the aircraft. However, I had something else in mind. I tried to move the spotting dolly by using a work-around that I had observed in the past.

That kind of dolly has a manual control device located inside the engine compartment, which allows technicians to bypass the operator console and control the dolly's movement from under the hood. This bypass gives technicians a way to isolate a gripe in the mechanical drive train or in the electronic operator controls.

These manual controls are intended to be used with the spotting dolly on jack stands, not with the wheels on the ground. However, the manual bypass can be used to "trick" the unit to move without input from the operator controls. Since the aircraft was stranded on the elevator, and flight ops were quickly approaching, I thought I could speed things along.

Not noticing that the dolly's raised hood was only inches from the aircraft, I actuated the manual override. The dolly lurched backward, jamming the hood's edge into the lower leading edge of the aircraft's intake.

This incident missed being a reportable mishap by scant millimeters, the point of contact being fractions of an inch from key structural points of the intake. An inspection determined the damage was limited to a small indent and some scraped paint. Lack of monetary damages, though, does not render the lessons of this incident any less important.

Airman Callahan works in the IM-4 division, AIMD, USS Nassau *(LHA-4).*

Cpl. John Alday, assigned to VFMA-312, does troubleshooting during release and control checks on an FA-18C. Navy photo by MCSN Ryan McLearnon.

AM3 Donald Elder replaces an axle lever on the landing gear of an FA-18C aboard USS *Harry S. Truman* (CVN-75). Navy photo by MC2 Kilho Park.

AD3 John Heering and AM3 Michael Upton do troubleshooting on an MH-60 aboard USS *Peleliu* (LHA-5). Navy photo by MC2 Michael Russell.

Sgt. Lance Voiles, assigned to VMFA-312, chains down an FA-18C in the hangar bay of USS *Harry S. Truman* (CVN-75). Navy photo by MC3 Stuart Phillips.

Cpl. Kyle Storm, assigned to VFMA-312, does maintenance in the cockpit of an FA-18 aboard USS *Harry S. Truman* (CVN-75). Marine photo by Cpl. Kel Clark.

AD2 Scott Lister, assigned to HSC-28, does maintenance on the main rotor head of an MH-60S during a phase-A inspection. Navy photo by MC2 Felicito Rustique.

AD3 Timothy Kelly sands a panel on an EA-6B assigned to VAQ-136. Navy photo by MC3 Jacob Moore.

Unsecure for Sea

By AZ1(AW) Nathan Hughes

There are many orders that Sailors must follow, but few are as important as "Secure for sea!"

After 20 days underway, my ship was looking forward to liberty in a South American port. The seas were only around eight feet, but because of the ship's direction (perpendicular to the swells and the accompanying high winds), the ship was taking abnormally heavy rolls. As was standard, the night before we pulled into port, we secured the night shift and posted hangar security watches for the remainder of the night.

Around 0100, lying awake in my rack, I noticed the rolls had become much more severe, escalating to the point where most people couldn't sleep.

Around 0400, a self-contained breathing apparatus (SCBA) refill station came loose and slammed into the starboard stabilator of our hangared SH-60B helicopter. When I got to the hangar I could not believe what I saw: The corner of the 250-lb box had punctured the skin of the aircraft and had bent multiple support ribs on the outboard stab. The damage was irreparable and we did not have a replacement onboard.

During the next few hours, I recalled small but definite warning signs of the impending accident and began to realize that this event was easily avoidable. A week prior, the SCBA box had been removed for PMS while our helicopter was flying. It had been re-stowed but not in a manner that would withstand hours of heavy rolling. Also, a recent hazrep briefed to the det by the OIC just a few days prior cited a similar incident that damaged a high-dollar FLIR turret aboard a different ship. The email's subject line: "Secure for sea."

The escalating severity of the rolls should have prompted the detachment maintenance to get up and double check all the equipment in the hangar. A secure-for-sea check had been done every time we got underway for all of our gear, but the ship's SCBA box was not checked adequately after the PMS was done. I had read the hazrep and trusted that the secure-for-sea check had been sufficient.

"Secure for sea" applies to everything that can come loose and endanger equipment and/or injure personnel; it must be checked thoroughly (and repeatedly), regardless of who owns the equipment. Hazreps are there for a reason: to warn fellow Sailors not to make the same mistakes. When someone else comes into your workspace, know what they are doing and check that they secure their equipment after they are finished. Don't let your confidence in yourself or your personnel stop you from checking just one more time.

Petty Officer Hughes was the Det. 10 LPO at HSL-48.

BRAVO Zulu

AM1(AW) Brent Taylor
VFA-15

Petty Officer Taylor made the find of a lifetime while doing a functional check of the tailhook on a tail-over-water aircraft (an aircraft that has been parked on the flight deck with its tail section extending beyone the edge of the deck) that had been repositioned. Taylor discovered that the one and only hook-point bolt connecting the tailhook to the aircraft had sheared and fallen off. As Taylor soon realized, the castellated nut, now a piece of flight-deck FOD, also was missing. Taylor notified the FDC immediately while the FA-18 taxied back to a parking spot on elevator No. 4. The handler called for a combat FOD walkdown of the entire LA; someone found the castellated nut and bolt, along with a washer, next to an arresting-gear wire.

AT2 Steve Saxbury
VAW-126

Seahawk 601 had just recovered and was being taxied clear of the landing area. Once in position, the plane director signaled the E-2C to use reverse thrust to back into the aft "hummer hole", the parking spot between the island and elevator No. 3. Petty Officer Saxbury, one of the flight-deck propguards, saw a blueshirt trainee rush under the wing to chock the mainmount landing gear while the aircraft was still in reverse thrust, Saxbury ran in, grabbed him, and pulled him to safety. The blueshirt was only a few feet away from the turning propeller.

AWR3(AW) Michael Barboa
HSL-49 Det. 4

Petty Officer Barboa checked the aircraft refueling system after a routine hot-refueling evolution at sea. Barboa discovered the main fuel cap had not been secured. His discovery prevented a potential emergency from loss of fuel in flight.

AE2 Brandon Terzich
VQ-4

While an E-6B was taxiing across a flight line, its aft-lower-lobe cargo door opened inadvertently. Petty Officer Terzich alerted the PC, who signaled the aircraft to stop. The crew secured the door and continued with its mission. Had the door remained open during takeoff, it could have triggered a mishap.

AD1 Reynaldo Abundez
VP-10

While screening the ADB to prepare an acceptance FCF for Lancer 515, Petty Officer Abundez noticed an incorrect torque setting annotated on page No. 2 of a historical MAF. After removing the No. 1 prop dome, he discovered that the prop nut was broken and the pitch-lock regulator was installed improperly.

AWF2(AW) Luis Gonzalez
VR-56

While conducting a daily inspection, Petty Officer Gonzalez, the plane captain assigned to C-9B aircraft 159120, discovered a broken safety wire on the starboard main-landing-gear fixed-strut nut. Closer inspection revealed that the nut had been loosened considerably. In addition to preventing a catastrophic failure of the landing-gear system, Gonzalez's discovery led to a Fleet-wide inspection of this component.

Cpl. Isaac Alvarez
AIMD, USS *Peleliu* (LHA-5)

Corporal Alvarez was trying to inflate an LPU-34B/P life preserver when the nut that secures the pressurized actuation-device popped off of the pressurized unit. He researched the documentation of previous maintenance on this life preserver and deduced that the same discrepancy might exist on other life preservers. His findings eventually led to a one-time inspection, via an aircrew system bulletin, of all LPU-34B/P life preservers in service.

Cpl. Blake Cooper
VMFA(AW)-242

While supervising a final arming evolution, Corporal Cooper noticed that a captive-carry AIM-9X missile was not fully seated in the wingtip-mounted LAU-7 launcher. He ordered the aircraft back to the flight-line for missile download. The aircraft still managed to make its mission, but a potential TFOA mishap was avoided. Post-flight, Cooper and a tech-rep determined that the forward snubbers on the missile launcher were jammed in the unlocked position. Cooper inspected all squadron aircraft and found another launcher with the same problem. The squadron reported this discrepancy and recommended to higher headquarters that they mandate a Fleet-wide inspection.

AT3 Seth Pieper
VFA-195

Petty Officer Pieper was doing final checks on aircraft 404 when he noticed fuel leaking from the starboard engine-bay door. He suspended the launch immediately. Upon closer inspection, maintainers discovered that the packing for the main-fuel-control had ruptured. Had this gone undetected, fuel could have accumulated in the engine cavity and ignited, causing an engine-bay fire.

LCpl. Christopher Perkins
HMH-363

Lance Corporal Perkins was doing a preliminary inspection for a post-flight power recovery wash when he discovered a nick on one the T64-GE-416 engine's first-stage compressor blades. He notified the FOD investigation team at the MALS-16 FWD power-plants division immediately. They thoroughly examined the inlet section of the engine and determined that the damage to the blades was out of limits. The engine was removed and replaced.

AMAN Benjamin Ashley
FRCNW

While breaking down a main-mount wheel assembly on an EA-18G Growler, Airman Ashley discovered a deep circular groove worn into the inside of the assembly. Ashley knew that the freshly worn grooves were not normal and alerted his LPO. FRCNW QA conducted an inspection of the wheel assembly and found that the second main-mount assembly installed on the aircraft already exhibited circular gouging on the inside of the rim. QA removed the tire and discovered the aircraft's main-mount brake disc was warped, damaging the inner rims of both assemblies. Airman Ashley saved the aircraft from further damage and possibly from a catastrophic wheel failure.

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Egress/Environmental Systems

Putting Egress/Explosive System Safety to the Test

By PRCS(AW/SW/EXW/FPJ) Rich Young

Problem: While doing surveys, I've watched "seat checkout" training, and too often, the training comes up short because of barriers to effective communication. Flight-line noise, obstructed views in an aircraft crowded with students, and rushed training to get the "check in the block" detract from the vital safety message being conveyed. I wonder if the students have been fully prepared to do maintenance safely around egress and explosive systems for the next six months.

Solutions: There are many ways to enhance the training process, but here are two simple tips for improving knowledge retention:

- Give a PowerPoint presentation in a classroom environment with detailed pictures and instructions prior to touring the aircraft.
- Conclude training by giving written/graded tests.

Best Practices: VMAQ-4 does it the right way. Kudos to them for training their maintainers well.

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

Support Equipment

Maintenance Platforms: Be Careful Where You Stand

By ASCS(AW/SW) Mark Tangney

Problem: Nearly half of the commands we surveyed in FY10 had problems with their B-1, B-2, B-4, and B-5 maintenance platforms. Here are some of the most common discrepancies:

- Overloading the stand.
- Personnel hanging over the sides while working from them.
- Platform raised and not locked, including when not in use.
- Personnel working with hands, arms or feet extended through the scissors lift assembly (and unaware of the hazard if the platform were to come down).
- Safety rails missing (as shown in photo on the right).
- Equipment checked out with no pre-operational inspection.
- Stands in use with the lock pins missing, hydraulic hoses damaged, and/or structural corrosion.
- No PPE worn while using platform.

Solutions: Personnel need to know how to inspect, use, and care for maintenance platforms. Special emphasis should be taken to train Sailors and Marines on SE, including equipment

not requiring a license. Instructors should use the information found in the pre-op inspection cards and MIMs when conducting training.

Most of the items listed above have already been identified in the "Do's and Don'ts" section of the NA 00-80T-96 support-equipment NATOPS. Other reference publications for maintenance platforms are listed below.

EQUIPMENT	MIM	PRE-OP
B-1	NA 19-15-32	NA 19-600-433-6-2
B-2	NA 19-15-6	NA 19-600-434-6-2
B-4	NA 19-15-7	NA 19-600-435-6-2
B-5	NA 19-15-8	NA 19-600-436-6-2

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

Tools

Tool Control—Out of Control?

By GySgt. John Hess

Problem: During safety surveys I repeatedly find that tool inventories are not accomplished in a timely manner and/or are not documented on the controlled-equipage custody record (NAVSUP 306).

Solutions: Conduct semiannual/annual tool-container inventories with the work-center tool-control representatives or FRC equivalents. Reconcile and document semiannual/annual inventories with master inventories to ensure no unauthorized additions and/or deletions have been made to tool containers.

Also, issue tool containers to the work-center supervisors using a controlled-equipage custody record. Get their signatures for each tool container assigned.

Best Practices: A good practice for doing timely inventories is to come up with a yearly schedule and post it on the monthly maintenance plan. Divide each work center into different weeks or months so you don't overload yourself with multiple work centers all in the same day.

Another thing to consider: deployments. While most last around six months, it would be a good idea to have all inventories completed right before the deployment. If done beforehand, this will be one less thing you will have to do during the deployment.

Documentation of tools being signed for should be annotated on the front of custody record by the work-center supervisor. Semiannual inventories should be tracked on the back of the custody record card along with the tool control program coordinator's signature.

Gunnery Sergeant Hess is a maintenance analyst at the Naval Safety Center.

9th Annual Aviation-Maintenance Safety Conference

Calling all Navy and Marine Corps aviation-maintenance, quality assurance and safety professionals—consider this your invitation to the Ninth Annual Aviation-Maintenance Safety Conference. It will be held 3-6 May, 2011 at the C-9 conference center, 9475 Bacon Ave., on board Naval Station Norfolk, Virginia.

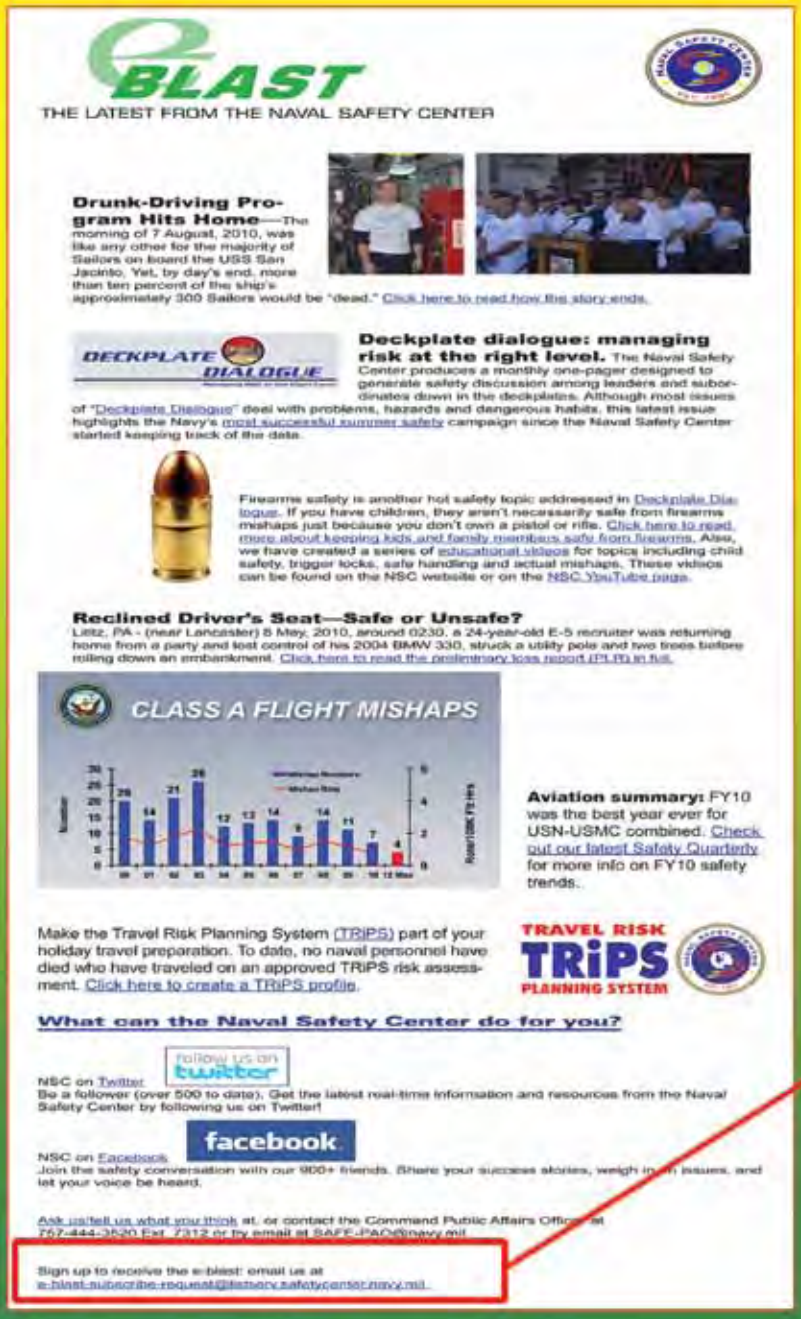
The goal of the conference is to raise safety awareness, which will in turn improve

readiness and mission accomplishment across the fleet. Besides showing NSC products and presentations, this conference offers one of the few opportunities to share and distribute a broad range of aviation-maintenance information to fleet professionals. Topics will include aviation-maintenance program feedback; future procurement updates; NAVOSH, WESS, and ORM program-guidance information; and suggested tools and best practices. Several vendors will showcase new products for the naval-aviation community.

During last year's conference, we hosted more than 100 personnel from various Navy and Marine Corps units worldwide. The conference will be limited to 150 seats, so reserve your seat as soon as possible. Registration can be made by logging onto www.public.navy.mil/navsafecen, click on the aviation menu in the top nav bar (maintenance link), and click on Register Here. You also can register by calling or emailing any Naval Safety Center Code 12 representative (staff directory listed in the Mech table of contents). My phone number is (757) 444-3520, (DSN 564), ext. 7190. The registration deadline is 3 April, 2011.

Hope to see you there. Keep your head on a swivel and be safe.

– GySgt. John Hess



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Flight, Flight-Related, and Ground Class A and B Mishaps

06/08/2010 to 09/06/2010

Class A Mishaps

Date	Type Aircraft	Command
06/10/2010	T-45C	VT-22

Aircraft departed the runway on landing rollout.

Date	Type Aircraft	Command
07/18/2010	AV-8B	VMM-266

Aircraft crashed into ground while conducting daytime CAS.

Date	Type Aircraft	Command
07/22/2010	AH-1W	HMLA-369

Aircraft crashed into field.

Class B Mishaps

Date	Type Aircraft	Command
06/30/2010	CH-53E	HMH-462

Aircraft experienced control malfunction during takeoff. Nose gear collapsed.

Date	Type Aircraft	Command
07/17/2010	AV-8B	HMM-165

Engine damaged by toolbox key ingested during low power test.

Date	Type Aircraft	Command
07/18/2010	FA-18E	VFA-105

While returning from mission, two aircraft collided in flight.

Date	Type Aircraft	Command
07/28/2010	T-6B	VT-3

After aerobatic solo, aircraft departed prepared surface during landing.

Date	Type Aircraft	Command
08/05/2010	FA-18E	VFA-137

Aircraft sustained significant damage during night aerial refueling evolution.

Date	Type Aircraft	Command
08/24/2010	FA-18E	VFA-106

Bird strike damage discovered during postflight.

Date	Type Aircraft	Command
08/30/2010	CH-53E	HMH-461

No. 3 engine FODed during start up.

Printed as a supplement to *Mech* from
Naval Safety Center Data

For questions or comments, call Lt. David Robb
(757) 444-3520 Ext. 7220 (DSN 564)

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 July-September.

MRMs

AMO School
ASO School
VMM-261
VR-54
MAG-49

Safety Surveys

VP-40
VP-69
VQ-2
VAQ-137
VQ-1
VAQ-129
VAQ-141
VFC-12
MALS-49
HSC-21
VMGR-452
AIMD Willow Grove
HMH-772
VR-64
VR-52
HM-15
VFA-204
VR-56
HMLA-773
USS *Enterprise* (CVN-65)
VMR Det. Belle Chase
VAW-77
HMM-163
VMM-161
HMMT-164
HSC-85
HSC-3
VRC-30
HMM-462
VFA-143

Culture Workshops

MALS-31
HMLA-169
AWSTS
VFA-87
HSL-49
VAW-112
VFA-204
VR-55
VR-61
VT-22
VMFA-115
HMLA-367
VFA-211
FACSFAC San Diego
HSL-51
VFA-192
VFC-12
VR-57
HR-18
VT-27
VMGR-252
VMA-513
VFA-86
HS-10
VAQ-135
VP-47
VR-52
VR-58
VT-21

For more information or to get on the schedule, please contact:
- Safety Surveys, Maj. Anthony Frost at 757-444-3520 Ext. 7223.
- MRM, GySgt. Edward Rivera at 757-444-3520 Ext. 7285.
- Culture Workshop, Cdr. Duke Dietz at 757-444-3520 Ext. 7212.

Navy photo by MC2 Brian Morales

This thin plastic shell absorbed the impact of a Marine's head-first fall from 15 feet and spared him from serious injury or death.

Wearing PPE is worth the discomfort and inconvenience, even in the harshest working environments.

VMM-365
Camp Leatherneck
Helmand Province, Afghanistan

www.public.navy.mil/navsafcen/