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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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Front cover: Aviation electricians with VMFA-314 run a diagnostic of the electrical systems on an FA-18D Hornet at MCAS Miramar. Marine Corps photo by LCpl. Christopher O'Quin.

Marine photo by Sgt. Nathan LaForte.

Spinning the Head:

By Cpl. Adrian Thurman

Working around aircraft is dangerous, and I was reminded of that fact right before the morning's shift-change. I was at the tail end of a seven-month deployment with less than 45 days to go before my squadron left Al Taqaddum (usually referred to as "TQ"), Iraq.

It had been a quiet night with no calls for casualty evacuation (CASEVAC), for which I was on 60-minute standby. It was my first night back on nights. The shop had been on a two-week rotation: two weeks on days and two weeks on nights. As anyone who's ever shifted from days to nights knows, that first night back is always the hardest. Maintenance Control called down to the flight line and passed on that another aircraft was needed for the morning launch. Before I could go back to my rack for some much-needed rest, I had to pre-flight one more bird.

A handful of plane captains and I pre-flighted aircraft 13. I was on the aft pylon of the CH-46E, inspecting the aft-upper flight controls. The blades were folded up, so we had to unfold them. When the ground crew rotated the head to remove the blade ropes, I still had my hand on the bottom ring of the aft swash-plate. I heard the ground crew call out "Spinning the head!" Then I felt my right thumb being pulled in between the upper and bottom rings of the aft swash-plate. The head rotated a third of the way around before I could get my hand free. I was sure that my thumb was gone.

After freeing my hand from the swash plate, I saw that the skin—from the joint to the nail—had been

Marine maintainers working on a CH-46 flight controls. Marine photo by LCpl. Dengrier Baez.

Thumbs Down in TQ

I was sure that my thumb was gone.

removed; the bone was exposed completely. A fellow plane captain helped me off of the aircraft and I was rushed to TQ surgical where doctors determined that I also had severed my extensor tendon. Fortunately, the surgeon was able to reattach the tendon to the bone. However, as a result of my injury, I lost 60 percent of the motion of my thumb and 40 percent of the strength: a permanent partial-disability. I guess I'm lucky that I still have a thumb and not a stub.

Now, if this can happen to me, it can happen to anyone. I was a CH-46E flight-line mechanic, CDI, plane captain and an aerial gunner-observer. It was also my third deployment with the same squadron doing the same mission. Also, my squadron had an excellent safety record. I thought I was pretty much mishap-immune.

Several factors played a part in my mishap. The biggest contributor was rushed maintenance at the end of a 14-hour shift. There also was a breakdown in communication between the ground crew and the plane captains on the aircraft (that'd be me). Plus, towards the end of our deployment, complacency had set in, and that's why it is so important to slow down and focus on the task at hand, especially towards the end of a deployment. Just because Maintenance Control says to "Hurry up and get it done!" does not mean safety and SOPs go out the window. I have an impressive scar on my right thumb as a constant reminder.

Corporal Thurman worked for HMM-161 at the time of the incident.

TPOD Crunch: A Safety Officer's Perspective

The Mishap:
A Marine from VMA-513 was taking a 500-pound bomb off of an ordnance trailer. He backed an A/S32K-1E air-launched weapons-loader into an AN/AAQ-28 targeting pod (TPOD) which was mounted to a Harrier. The collision damaged the forward section of the TPOD.

By Capt. David Neely

He had been looking over his right shoulder, focused on clearing an LAU-7 launcher also mounted to the aircraft. A taxi director had yelled for him to stop, but, because of airfield noise, he didn't hear the director's commands. The result: The aft left-portion of the loader ran into the forward section of the TPOD. The damage, though superficial, easily could have been in the Class-C range if the loader had hit harder.

Background:

- The CO instructed maintenance not to store equipment near the aircraft because of the unique parking situation found at Kadena Air Force Base (AFB), Japan. The mishap aircraft was parked 21 feet from the bomb trailer; a 14-foot loader was used to transport bombs to the aircraft.
- The steady launch of aircraft near the live-ordnance loading-area hinders verbal communication.
- The driver was fatigued and had an acute illness developing at the time of the incident.
- The mishap QA safety observer had just been relieved from his 24-hour post two hours prior to the mishap.
- Post-mishap medical screening found that the driver should wear corrective lenses for all duties, especially when operating equipment.
- At the time of the incident, the driver wasn't licensed to drive and operate the loader because of a clerical error.
- During the loading evolution, Marines were changing a tire on the aircraft.

Discussion:
The CO had great foresight when he instructed the maintenance department to keep equipment away from the aircraft. A 14-foot trailer operating in a 21-foot space doesn't allow for a whole lot of wiggle room.

Kadena AFB is extremely busy. Given the proximity of the loading area to the runway environment, using whistles during this evolution could possibly have prevented the incident.
Every squadron member should understand that "sucking it up" is not always the best course of action. Assess yourself and speak up if something's not right. In this situation, the driver had multiple human factors affecting him. If the first line of defense is a self-assessment, then the second is engaged leadership. Unfortunately, the driver's leadership, the safety observer, also was fatigue-impaired.

During the ordnance loading-phase, there should be no unnecessary personnel around the aircraft during loading. This could distract ordnance personnel from their primary responsibility: handling explosives.

Recommendations:
1. Move equipment away from the aircraft or reposition aircraft so there is ample space between support equipment and aircraft.
2. Require safety observers to conduct loading evolutions with a whistle when ambient noise makes it hard to hear voices.
3. Uphold OPNAVINST 3710.7U NATOPS General Flight and Operating Instructions para.8.3.2.1.1., "Crew Rest for Flight Crew and Flight Support Personnel," which says, "Schedules will be made with due consideration for watch standing, collateral duties, training, and off-duty activities."
4. Because there are only a few maintainers with certain qualifications (such as QA safety observer), the duty schedule should be adjusted accordingly.

Captain Neely is the VMA-513 DOSS.

Stuck, in Pain, and Panicking

By AMAN Aaron Story

It was a typical Friday. Night check was the "stay" check. Like most end-of-shift Fridays, get-home-itis spread and work started to be rushed.

I had just come in from doing low-power turns on the flight line, when Maintenance Control called for the hangar-bay doors to be opened for a plane move. Per the squadron instruction, I took a safety observer with me for the job. Since it was getting colder by the minute—and I was in a hurry to get the job done—I began opening two doors at the same time.

The doors are a push-button, electric-type with controls at both ends. While I held the button for the inner door with my right hand, I used my left hand to work the button on the outer door. I didn't notice when the inner door stopped, and I continued to hold down the button for the outer door.

My reaction time was way too slow. By the time I let go of the button, momentum had carried the door a few inches closer to me, wedging my hand between the two doors. The impact crushed my hand, breaking my wrist. I was stuck, in pain, and panicking. I couldn't pull free, nor could I reach the buttons to move either door. My observer was quick to help, but he had to run outside—to the other end of the door—to get it to move. While I prayed, he pushed the right button and got me unstuck.

Soon, my hand was stuck a second time—in a cast. Meanwhile my shop was short-handed (literally) one more person. All of this could have been avoided if I just had taken a few extra minutes and followed the safety guidelines for operating the hangar-bay doors which read:

Multiple doors may be in movement together with one observer, as long as there is sufficient opening between the doors (5-10 feet). If multiple doors are being moved simultaneously, all operators shall be positioned on the same side, with the observer located on the opposite side of the operators and in a position that ensures continuous eye contact with all operators.

Airman Story works in the line division at VQ-3.

Door Meets TEF

File photo.

By AD2(AW) Rudy Paningbatan

Early one morning and towards the end of my shift, I set out to do a low-power turn (LPT) on aircraft 403. The power-plants shop had just replaced the No. 1 engine. As a QAR, I've often assisted the work centers with LPTs. This one seemed routine. After checking out all the required tools, I started my aircraft walk-around.

The CDI, AD3 Canseco, briefed the PC and me on the specifics of the job. After all of my checks were good, I jumped into the cockpit and did my internal-switch checks. I signaled to the PC that I was ready to start the APU and No. 2 engine. After the No. 2 was online, the CDI signaled me to put the flaps to AUTO. I signaled the PC that I was putting the flaps to AUTO and I flipped the switch (the flaps didn't go to the AUTO position, but no one bothered telling me). Then I verified there were no cautions preventing me from starting the No. 1 engine.

After completing my checks, I signaled the PC that I intended to shut off the APU and cross-bleed start. After the No. 1 engine was online, the PC signaled me to shut off the No. 2 and cross-bleed back to No. 1 in order to verify the primary bleed-regulators. Meanwhile, unknown to me, the CDI and his worker had opened the 64L door to leak check the No. 1.

While the No. 2 engine was coming back online, I felt the flight controls move as the flaps starting going to the AUTO position. As they did, the port trailing-edge-flap (TEF) collided with the open 64-door. The PC signaled me to hold, and I raised both hands, letting him know I was "hands-off." He then went to check on what had happened and reported back to me with the bad news: We had damaged the TEF and the 64-door hinges. The PC signaled me to shut off the engines; then, we notified Maintenance Control and QA.

Examining this LPT gone wrong, I can highlight several communications failures. The PC did not notify the turn operator (me) that the flaps did not go to AUTO when selected. As the turn operator, I failed to verify that the flaps went to AUTO before continuing. The CDI didn't verify that the flaps were in the correct position prior to opening the door. Perhaps the greatest lapse in communication was that the CDI (via the PC) never told the turn operator that maintenance personnel had opened a door. Compounding the breaks in communication, the turn crew was 13 hours into the work day and had not conducted an adequate pre-turn brief.

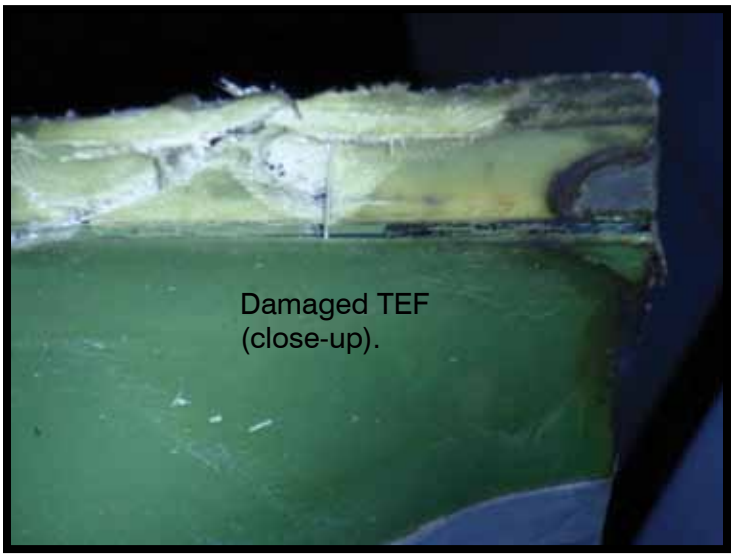
Petty Officer Paningbatan works in QA at VFA-147. Petty Officer Canseco helped write this article and works in the power-plants shop at VFA-147.

Maintenance Control's Perspective

By ADCS(AW) Mike Testa

Damaged 64L door hinge.

Damaged TEF.


Damaged TEF (close-up).

The mechs finished installing the No. 1 engine around 0200. We needed 403 "up" for the morning's flight schedule. I called my night-check shift supervisor and told him that we needed to turn 403 and op-check the No. 1 engine. The mechs came into Maintenance Control, read the ADB, grabbed the turn brief-sheet/checklist and headed out to the jet where they briefed. My line-shift supervisor, a PO3, was on the radio running everything. An airman served as the PC, and another airman carried the tools and closed-up panels.

I know many of you reading this are probably wondering why, with such a junior crew, was there was no PO1 or CPO present. In fact, our MMCPO commented to me before that he wanted at least a PO1, if not a CPO, running the flight line. But, as the night-check Maintenance Control supervisor, I chose my PO3 to run the radios and the line. He wanted the responsibility, and he was good at his job.

Around 0330, I called on the radio to check on 403's condition. The crew called back and told me that the door hinges were bent and the trailing-edge-flap was damaged severely. From that point on it was all statements and questions.

As the night-check Maintenance Control supervisor, I failed. I did not insist that all personnel involved in the turn evolution brief inside Maintenance Control under greater supervision. We all were tired. I just wanted to get the job done, produce an "up" jet for the flight schedule and go home. I should have listened to my MMCPO's advice regarding senior personnel running the flight line. I took his comment as a suggestion, not a direction. Not to hang my line-shift supervisor out to dry, but perhaps a more seasoned petty officer would have caught the TEF discrepancy before it turned ugly. We now require a PO1 or above to run the radio on nights, with a QAR present as a safety observer.

Senior Chief Testa works in Maintenance Control at VFA-147.

Maintainers in

ABHAN Derek Townsend and ASAN Quatin Robinson run clear as an MH-60S helicopter from HSC-25 lifts cargo pallets from the deck of USS *Denver* (LPD-9). Navy photo by MC3 Casey Kyhl.

AM3 Justin Petersik does routine maintenance on an SH-60F helicopter assigned to HS-5. Navy photo by MC3 Bradley Evans.

AO1 Miguel Trejo and AEAN Gregory Schroeder, both assigned to VFA-14, do pre-flight checks on an FA-18E aboard USS *Nimitz* (CVN-68). Navy photo by MC3 James Mitchell.

n the Trenches

Sgt. Caleb Bailey, left, refuels an AV-8B assigned to VMA-231 as Cpl. Nicholas Waters serves as plane captain. Marine Corps photo by LCpl. Samuel Nasso.

Sgt. Walter Walker of VMFA-312 inspects the wiring on an FA-18C aboard USS *Harry S. Truman* (CVN-75). Navy photo by MC2 Kilho Park.

AD2 Raynard Eugenio of VFA-97 does maintenance on an FA-18C aboard USS *Nimitz* (CVN-68). Navy photo by MC3 James Mitchell.

AEAN Jheri Blackwood of VFA-86 chains down an FA-18C aboard USS *Nimitz* (CVN-68). Navy photo by MC3 James Mitchell.

Got Energy Drink?

I Hope Not.

By Cdr. Don Delorey

In today's high-op tempo, fast-paced world, energy drinks have become the trendy beverage of choice for many people, including many in aviation maintenance. Their popularity clearly is evident by a visit to any convenience store or Navy geedunk. You find rows and rows of flashy cans, sporting names like "Rock Star," "Monster" and "Spike." Many people have bought into the lively image and down them like sodas. Is this just another harmless fad, or are real health risks associated with energy drinks?

The term "energy drink" refers to a beverage that contains caffeine and other ingredients, such as taurine, guarana, and B vitamins, that claim to provide you with extra energy. However, an energy drink is a can of soda on "steroids." Both are carbonated beverages containing caffeine and sugar. The big difference is the typical energy drink contains a lot more of both ingredients.

For example, the average soda has 25 to 40 milligrams of caffeine, whereas most energy drinks have double that amount. One new energy drink advertises a whopping 280 milligrams of caffeine per can. When this much caffeine lingers in our system too long, insomnia may follow. Insomnia is a risk with any caffeinated beverage, but the risk is greater with energy boosters because of the massive amounts of caffeine.

The main health risk associated with consuming these quantities of caffeine is its effect on heart rate and blood pressure. The caffeine content of a single serving of an energy drink (8 to 12 fluid ounces) can range from 72 to 150 mg; many bottles contain two to three servings, raising the caffeine content to as high as 294 mg per bottle (Table 1). In comparison, the caffeine content per serving of brewed coffee, tea, and cola beverages (8 fluid ounces) ranges from 134 to 240 mg, 48 to 175 mg, and 22 to 46 mg, respectively. Thus, with large doses of caffeine, the heart rate can become so accelerated it may lead to an irregular or quickened heart beat. This condition can last long after the initial effects of the drink, and for people with heart conditions, this can be very dangerous.

Table 1. Caffeine and sugar content of energy drinks.

Drink Serving (fl oz)	Serving (fl oz)	Servings Per Container	Sugar Per Serving (g)	Caffeine Per Serving/ Container (mg)
Diet Rockstar Energy Drink	8	2	0	80/160
Full Throttle	8	2	29	72/144
Go Girl Sugar Free	12	1	0	150/150
Lo-Carb Monster XXL	8	3	3	80/240
Monster Energy Assault	8	2	27	80/160
Red Bull 8.3	8.3	1	27	80/80
Red Bull Sugar Free	8.3	1	0	80/80
Rockstar Energy Drink	8	2	30	80/160
Rockstar Juiced	8	2	21	80/160
Wired 294 Caffeine	8	2	26	147/294

Caution also is warranted for healthy adults who consume energy beverages; the consumption of two or more in a single day can lead to excessive caffeine intake.

A synergistic effect also can occur, as other stimulants, such as guarana and ginseng, often are added to energy beverages and can enhance the effects of caffeine. Guarana contains caffeine (1 g of guarana nearly is equal to 40 mg of caffeine) and substantially may increase the total caffeine in an energy drink. Adverse effects associated with caffeine consumption in amounts of 400 mg or more include nervousness, irritability, sleeplessness, increased urination, abnormal heart rhythms (arrhythmia), decreased bone density, and stomach upset.

There is limited evidence that consumption of energy drinks significantly can improve physical and mental performance, driving ability when tired, and decrease mental fatigue during long periods of concentration. Unfortunately, the literature is limited, and we don't know whether these improvements are because of the caffeine, other herbal ingredients, or are a result of the combination of the ingredients found in the beverage. Tables 2 and 3 present the energy drinks' claims and the scientific evidence regarding these claims.

Commander Delorey is the aerospace physiologist at the Naval Safety Center.

Table 2. Energy drinks ingredients and claims.

Ingredient	Drink	Functional claims
Carnitine	Monster, Rockstar, Full Throttle	Improves endurance, increases fat metabolism, protects against cardiovascular disease
Glucuronlactone	Go Girl Sugar Free, Red Bull, Monster	Promotes excretion of toxins and protects against cancer
Guarana	Monster, Rockstar, Full Throttle	Increases energy, enhances physical performance, and promotes weight loss
Inositol	Go Girl Sugar Free, Red Bull, Monster, Rockstar, Wired B12 Rush	Decreaces triglyceride and cholesterol levels, lowering risk of cardiovascular disease
Panax Ginseng	Monster, Rockstar	Speeds illness recovery; improves mental, physical, and sexual performance; controls blood glucose and lowers blood pressure
Super Citramax (hydroxy citric acid, garcinia cambogia extract)	Go Girl Sugar Free	Suppresses appetite, resulting in weight loss
Taurine	Go Girl Sugar Free, Red Bull, Monster, Rockstar, Full Throttle	Lowers risk of diabetes, epilepsy, and high blood pressure
Yohimbine HCl	VPX Redline	Improves sexual performance and promotes weight loss

Table 3. Scientific evidence to support these claims.

Ingredient	Scientific evidence
carnitine	There is no clinical evidence that carnitine use is effective for increased endurance or weight loss, but it may protect against heart disease.
glucuronlactone	Scientific evidence does not exist to support claims regarding the efficacy of glucuronolactone.
guarana	A major component of guarana is caffeine. Caffeine consumption has been associated with increased energy, enhancement of physical performance, and suppressed appetite.
inositol	Scientific evidence does not exist to support claims regarding the efficacy of inositol.
panax ginseng	Scientific evidence does not exist to support claims regarding the efficacy of panax ginseng.
super citramax (hydroxy citric acid, garcinia cambogia extract)	There is scientific evidence that use of this supplement decreases food consumption.
taurine	Clinical evidence is insufficient to show that taurine is effective in treating diabetes or epilepsy, but it may lower blood pressure.
yohimbine HCl	Although yohimbine HCl may increase blood flow to sexual organs, there is no evidence that it increases sexual arousal. It may be effective at treating erectile dysfunction. Currently no evidence exists to support the claim that use of this supplement leads to weight loss.

Down Away

By AM3 Pawel Dorawa

Many personnel have been seriously injured by tire- and wheel-assembly explosions during inflation or deflation. An unregulated supply of nitrogen or air, unfamiliarity with publications, poor supervision, or outright carelessness can make maintenance on tires and wheels extremely dangerous and potentially deadly. That was the case in my shop, on my watch.

It had been shaping up to be just another busy day in 51E (tire shop) at Fleet Readiness Center Southeast (FRCSE) at NAS Jacksonville, Florida. I was six hours into a 10-hour day of tire build-ups. We had 23 tires (a mixture of P-3 main-mounts and H-60 tail-wheels) to build up and leak check. We had just assembled an H-60 tail-wheel. Meanwhile, an airman was inflating a P-3 tire in the inflator cage.

Once the P-3 tire was inflated and removed from the inflator cage, I placed the H-60 tire into the cage. Another maintainer placed the inflation adapter on the valve stem of the H-60 tire. Prior to placing the inflator

Figure 1.

Ref. NAVAIR 04-10-506, Section IV, Para. 4-14. f ... Using Table 4-1, locate the applicable aircraft and tire size. Inflate tire to the test pressure listed.

on the H-60 tire, I should have adjusted the air pressure for the H-60. However, I missed this step (see figure 1.) and began to inflate the tire with the same tire pressure as the P-3 tire. After several minutes, the airman assisting me noticed that the tire-pressure gauge wasn't showing an increase in air pressure. After conducting several inspections to determine the cause, I concluded that the valve-stem-core was bad; thus, the tire should be broken down and the tube replaced.

The airman removed the tire from the inflator cage and handed it back to the AM3 who had built it, explaining to the AM3 that we were not able to inflate the tire. The floor supervisor told another AM3 to remove the valve-stem-core prior to disassembly and place a deflated-tire tag on the assembly. The AM3 disassembling the wheel assembly failed to verify this step (see figure 2.) was complete, and we began to disassemble the H-60 wheel.

The H-60 tail-wheel-assembly has four bolts and four nuts securing the wheel halves together. As we were disassembling this particular wheel, the first two sets of nuts and bolts came off easily. However, as we removed the third nut and bolt, the inner tube exploded. The rim halves separated from the tire, and the entire wheel assembly came apart, hurling pieces of shrapnel throughout the work center.

Figure 2.

Ref. NAVAIR 04-10-506, Section IV, Para. 4-2. TIRE DEFLATION. All aircraft tires must be completely deflated and the valve core removed before any attempts are made to dismount tires and disassemble the wheels. Failure to do so has resulted in fatal injury to personnel.

As we removed the third nut and bolt, the inner tube exploded. The rim halves separated from the tire, and the entire wheel assembly came apart, hurling pieces of shrapnel ...

The AM3 assisting me with the tire and wheel disassembly suffered multiple fractures in both arms resulting in almost a month of lost work days. Fortunately, I had only one hand on the wheel assembly and sprained my wrist. I was placed on two weeks of LIMDU.

When the combined safety team from FRCSE levels two and three did their investigation, the phrase, "If only I would have" reverberated throughout the shop, much like the explosion had done earlier that day. Our shop learned a hard lesson that day, and we now are working to teach others from our mistakes.

Petty Officer Dorawa works in the tire shop at FRCSE.

Aircraft Tires, Tubes and Wheels

Ask yourself these questions before working on a tire and wheel assembly.

1. Have I read NAVAIR 04-10-506 Technical Manual for Aircraft Tires and Tubes, or NAVAIR 17-1-129, Support Equipment Tire and Wheel Assemblies, as applicable?
2. Have I read the Maintenance Instruction Manual for this particular assembly?
3. Have I read NAVAIR 17-1-123 Technical Manual for Operating and Maintaining the Tire Inflator Assembly?
4. Have I performed the pre-use inspection of the inflator-assembly kit in accordance with NAVAIR 17-600-174-6-1?
5. Do I understand the hazards of high-pressure gases?
6. Do I understand the procedures for inflating and deflating tires?
7. Am I fully qualified for the task in accordance with current directives?

Precautions for Inflation

- ❒ Inflate unmounted tires only in a tire cage.
- ❒ Do not inflate mounted tires until the axle nut is secured against the wheel bearings.
- ❒ High-pressure sources must be equipped with valves that limit pressure to 150 percent above maximum tire-inflation pressure or 600 psi, whichever is less.
- ❒ Do not modify hose couplings or valve-stem adapters, and do not

substitute adapter-valve cores.

- ❒ Handle remote-control inflator gauges gently.
- ❒ Use only the correct remote-inflator gauge after ensuring it has been calibrated within the last 12 months in accordance with the latest calibration directives. Note: Do not adjust relief-valve setting.
- ❒ Clear the tire-inflation area of loose objects within a 20-ft. radius.
- ❒ Clear the area of unneeded personnel (refer to NAVAIR 17-1-123, work package 03, page 10 for danger areas).
- ❒ Never set the regulator higher than 600 psi.
- ❒ Ensure all inflation-hose couplings are connected tightly.
- ❒ Stand as far away as the inflator hose will permit (10 ft.) in a line fore or aft of the wheel.
- ❒ Open the source valve slowly. Inflate tire in 10-psi increments to desired pressure—do not over-inflate. If over-inflation occurs, open bleeder valve on inflation gauge to release pressure. Allow tire pressure to stabilize a few minutes before disconnecting hose at valve stem.
- ❒ Replace valve cap on valve stem.

Note: Use water-pumped nitrogen to inflate tires.
Dry, oil-free air should be used only when nitrogen is not available.

Deflation, Removal and Disassembly

Before removing a wheel and tire assembly from an aircraft, completely deflate the tire with an approved tire-deflator tool. When deflated, remove the valve core and install a "deflated-tire flag" in accordance with NAVAIR 04-10-506. Break the tire beads before removing any wheel bolts.

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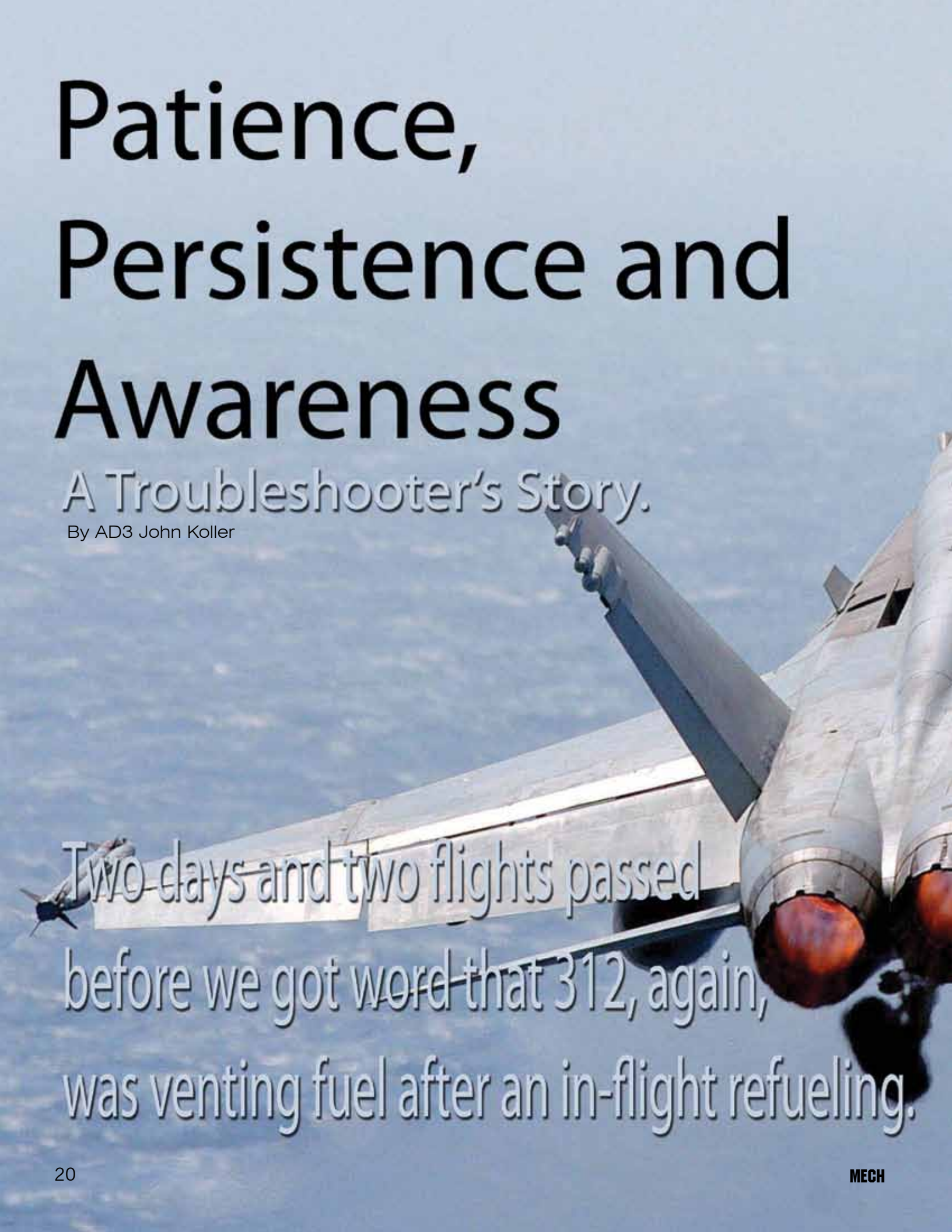
C12G1 1163 (REV. MAY 06)
THIS POSTER SUPERSEDES
C12G1 1163 (REV. MARCH 98)

Patience, Persistence and Awareness

A Troubleshooter's Story.

By AD3 John Koller



Two days and two flights passed before we got word that 312, again, was venting fuel after an in-flight refueling.

In November, VFA-83 left for a COMPTUEX detachment aboard USS *Dwight D. Eisenhower* (CVN-69) in preparation for an upcoming deployment. During the first week of the detachment, aircraft 312 started venting fuel after in-flight refueling.

After reviewing the A1-F18AE-460-200 troubleshooting-manual, we decided to run a test to troubleshoot the overfilling vent-tank. The test indicated that the right-wing high-level-pilot-valve and the refuel shut-off valve had failed, causing the wing tank to over-fill the internal cells. After removing and replacing the defective components, we repeated the test. This time, the internal cells did not overfill; we returned the aircraft to service.

The next day the aircraft flew two flights with no discrepancies. On the third flight, however, the problem returned. After passing the refuel test a second time, we decided to test the fuel-pressurization-system. This test showed that the left-wing motive-flow shut-off valve had failed. After replacing this component and successfully re-testing the system, maintenance returned 312 to service.

Two days later—after several component changes—we still had not identified the gripe's cause. Our tech reps were just as puzzled.

During our previous deployment, we had faced a similar issue and had developed troubleshooting procedures that will soon be incorporated into the troubleshooting manuals. We decided to apply some of the lessons learned from last deployment to our current head-scratcher of a problem.

First, we dropped the port-side motor to access the vent tank. An inspection of the area revealed that the y-line from the fuel dump was cracked and likely a contributing factor to our ongoing discrepancy. After replacing the automatic drain-valve in the vent tank—and repairing the y-line—we prepared to refuel the aircraft and check our work.

While refueling with electrical power, we noticed cell-4 was not pre-checking. Back into the fuel cell we

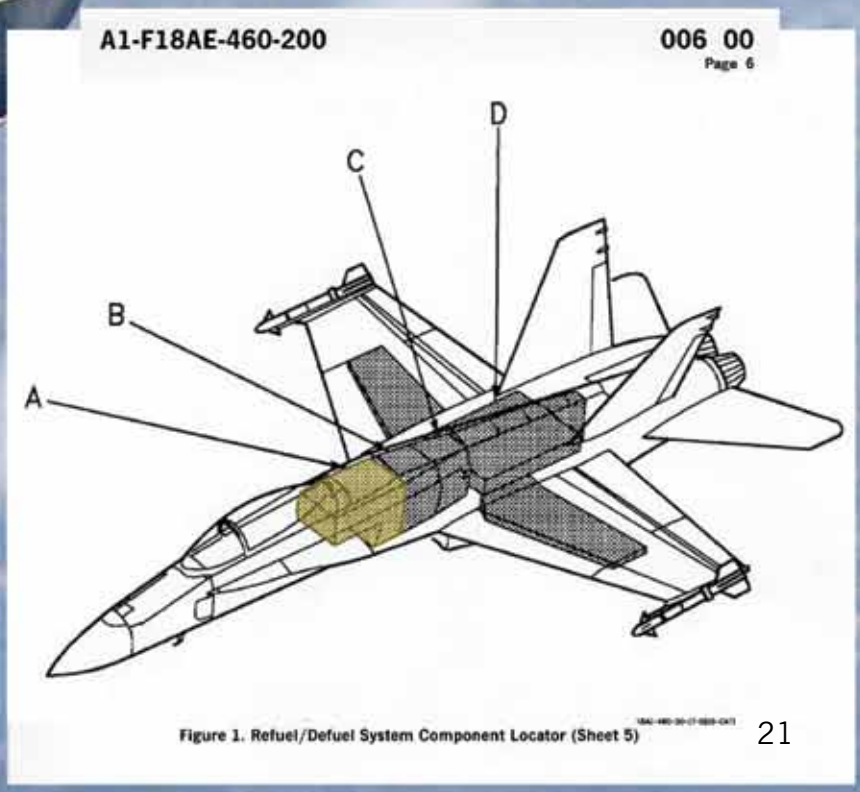


Figure 1. Refuel/Defuel System Component Locator (Sheet 5)

went. The automatic drain-valve in cell-4 had failed and was the apparent cause of our pre-check problem. After replacing it, we op-checked and leak checked 312, using both the refuel and transfer pressurization-tests. After successful completion of all, maintenance again returned aircraft 312 to service.

Two days and two flights passed before we got word that 312, again, was venting fuel after an in-flight refueling. The venting did not stop until the external tanks were empty.

This time, the discrepancy had shown us something new: Maintenance-management-panel (MMP) codes had popped for the internal-tank pressure-regulator (ITPR) and for the cell-1 and cell-4 transfer-manifold-groups. After troubleshooting these new codes, we returned to our troublesome aircraft to check our previous work. We found that the MMP-code 486 (tank-one transfer-manifold-group) kept setting. No matter what we did, the code would not clear.

We continued troubleshooting with the A1-F18AE-460-200, which led us to change the cell-4 turbine-transfer-pump. Once again, we were back to doing the refuel and pressurization tests, only this time we decided to use a set of clear, acrylic covers (which we had manufactured locally) to see what was happening inside our fuel cells. It turned out to be a great move—the refuel line (shown in yellow) in cell-1 was cracked along every weld. After repairing the line, the renowned 312 again checked good and was returned to service with no further issues.

I learned several lessons. The first, the most important: be patient. Even though we replaced several bad components, it took multiple attempts to fix this discrepancy. This often is the case with the Hornet fuel-system because of its redundant capabilities, which may (and, in this case, did) allow for multiple failures before a cause was found. We followed troubleshooting procedures for isolating the failed components step-by-step and did detect failed components. However, in the end, a simple cracked refuel-line was the final solution to a string of interwoven failures.

The second lesson: Go beyond the published procedures and inspect everything in the area of your work. This applies to more than just fuel systems. If we had inspected the fuel lines the first time we were in the cell, we might have noticed the cracks. If you spend a little extra time examining your working area, you never know what you might find that could end up saving you time and effort.

Petty Officer Koller works in the power-plants shop at VFA-83.

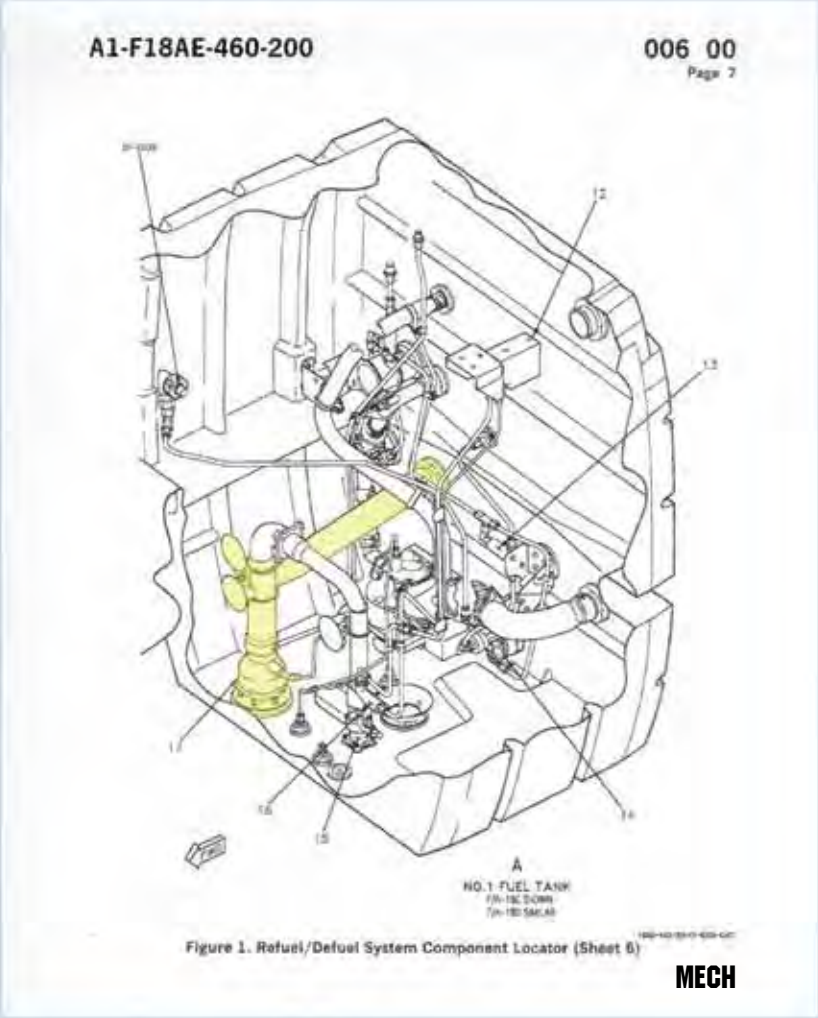


Figure 1. Refuel/Defuel System Component Locator (Sheet 6)

BRAVO Zulu

Sailors and Marines Preventing Mishaps

Send BZs to: SAFE-Mech@navy.mil

AWF2 Edward Stayton
VP-46

Petty Officer Stayton was scheduled to do high-power turns on a P-3C after a maintenance turn-crew finished low-power turns. As the crew wrapped up the low-power turns and secured the engine, Stayton noticed light smoke coming from the No. 4 engine. He notified the Maintenance Control CPO, who ordered an inspection of the engine. The inspection revealed that the igniter plugs had not been installed correctly. High-power turns with the igniter plug discrepancy could have led to catastrophic engine failure and airframe damage.

AMT2 David Mitchell
CGAS Savannah, GA

After completing a non-destructive inspection (NDI) on an MH-65C nose-landing-gear strut assembly, Petty Officer Mitchell went beyond the required inspection items and visually inspected the strut. He discovered that the port-side strut-attachment bearing had an unusual amount of lateral wear. Mitchell notified QA, who determined that the bearing was out of limits and needed replacing. A discrepancy of this nature could have affected nose-landing-gear extension or retraction, causing an unsafe landing or flight configuration.

AT2 Kenny Schreiner
HSL-49 Det. 5

While doing a daily inspection of Red Stinger 111, Petty Officer Schreiner noticed excessive wear on the main-rotor hub-liner. Going beyond the required items of the daily, he conducted a more in-depth examination of the area and found that the rotor-blade centering-socket was broken in half, causing extensive gouging of the elastomeric bearing. Petty Officer Schreiner's actions prevented a possible failure of the main-rotor-head assembly.

SSgt. Eric Groenendaal
HMH-366 HOA Det.

Staff Sergeant Groenendaal's attention to detail during a daily inspection revealed a damaged bushing in a collective flight-control bell-crank mount. Groenendaal knew something was wrong when he found only a small amount of wear grease accumulating under the mount. Examining more closly, he found that the main bell-crank mount bolt was worn close to the point of failure. Groenendaal informed Maintenance Control and initiated a MAF to correct the problem.

AM3 Jeremy Alberdas and AM3 Steven Zeiger VP-45

Petty Officers Alberdas and Zeiger were walking across the flight line when they noticed numerous large pieces of FOD where a P-3C had just taxied. They quickly picked up the FOD and reported the find to QA. After a thorough inspection of the FOD, the aircraft was notified and recalled to base for inspection. An investigation revealed that the FOD had come from the No. 1 engine rear-scavenge-pump insulation and cone. Alberdas and Zeiger saved the aircraft from further damage and, potentially, a three-engine landing.

AM3 Brandon Womack HSC-28

While changing the main-rotor-head accumulator on Bay Raider 52, Petty Officer Womack noticed that the damper lines were chafing on the accumulator's mounting-bracket. He conducted further inspections and found that the flex coupling had been installed incorrectly, resulting in the mis-positioning of the accumulator.

AM2 Fred Kalule
VAW-126

Petty Officer Kalule was standing prop guard between two E-2C Hawkeyes (aircraft 600 and 603) during a hot refueling. Once aircraft 600 was fueled and final checks were complete, the plane captain turned it over to the aircraft director who signaled the removal of chocks and chains. A blueshirt ran to remove the chocks from 600 and in doing so, unknowingly headed directly towards 603's port propeller. Petty Officer Kalule intervened quickly and stopped her before she ran into the prop.

What's the Origin of "Bravo Zulu"?

For years, *Mech* has run a section called "Bravo Zulu," a collection of short narratives telling about times when maintainers did something right. This feature, we feel, balances the rest of the magazine, which consists of just the opposite: maintainers talking mostly about errors, miscues, screw-ups and near-disasters. Every once in a while, someone asks about the origin of the term.

It originated as a naval signal, conveyed by flag hoist or voice radio, meaning "well done." It eventually passed into the spoken and written vocabulary, attracting some myths and legends along the way. The one most frequently heard has Admiral Halsey sending it to ships of Task Force 38 during World War II. However, he could not have done this, since the signal did not exist at that time.

"Bravo Zulu" actually comes from the Allied Naval Signal Book (ACP 175 series), an international naval signal code adopted in 1949 after the creation of NATO. Until then, each navy had used its own signal code and operational manuals. World War II experience had shown that it was difficult, or even impossible, for ships of different navies to operate together unless they could readily communicate, and ACP 175 was designed to remedy this.

In the U.S. Navy signal code, used before ACP 175, "well done" was signaled as TVG, or "Tare Victor George" in the U.S. phonetic alphabet of that time. ACP 175 was organized in the general manner of other signal books, that is, starting with 1-flag signals, then 2-flag and so on. The 2-flag signals were organized by general subject, starting with AA, AB, AC, ... AZ, BA, BB, BC, ... BZ, and so on. The B- signals were called "Administrative" signals, and dealt with miscellaneous matters of administration and housekeeping. The last signal on the "Administrative" page was BZ, standing for "well done."

At that time BZ was not rendered as "Bravo Zulu," but in each navy's particular phonetic alphabet. In the U.S. Navy, BZ was spoken as "Baker Zebra." In the meanwhile, the International Civil Aviation Organization (ICAO) had adopted English as the international air traffic control language. They developed a phonetic alphabet for international aviation use, designed to be as "pronounceable" as possible by flyers and traffic controllers speaking many different languages. This was the "Alfa, Bravo, Charlie, Delta..." alphabet used today. The Navy adopted this ICAO alphabet in March 1956. It was then that "Baker Zebra" finally became "Bravo Zulu." -- *Courtesy, Naval Historical Center*

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Airframes

Unique Identifier? What Unique Identifier?

By AMCS(AW/SW) Raymond Nichols

Problem: Has your hazardous material been identified uniquely for reference and retrieval? Maybe? You don't know? Ninety percent of the commands we've looked at since I've been at the Naval Safety Center are not using the unique-identifier system as required. Most commands I've surveyed have material-safety-data sheets (MSDS) located in a binder numbered in the order by which they appear in the authorized-user-list (AUL). Those same commands, though, have not put a unique identifier on individual hazmat containers, so there's no correlation between the hazmat and the MSDS/AUL.

Solutions: Your command, per OPNAVINST 5100.23G, chapter 7, para. 0702(g)(5), is responsible for maintaining a quick reference for retrieval. That quick reference needs to be organized so the AUL, MSDS, and individual hazmat containers all have the same numbering.

For example, if your MSDS for MIL-PRF-83282 is the first MSDS in binder No. 1, then you could make the unique identifier for MIL-PRF-83282, B1-1. B1-1 then must be on the AUL, the MSDS, and on all MIL-PRF-83282 containers. The idea is to keep it simple, so simple that anyone can understand the system and easily find an MSDS for a particular piece of hazmat.

Ask a maintainer to retrieve an MSDS for hazmat you've checked out, and then see how long it takes him or her to find it (if they can). Slap on a unique identifier, repeat the process, and then see if he or she can locate the correct MSDS any faster. Training your people how to use the reference system is important. A unique identifier is no good unless you've trained everyone how to use it.

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

Avionics

Are You Grounded?

By ATCS(AW/SW) Thomas Crook

Problem: During recent visits to squadrons, I've seen various methods of preventing electrostatic discharge (ESD). Most commands have good-to-excellent programs. But, there still are some misconceptions regarding proper grounding points. Of greatest concern: Using electrical outlets to ground ESD stations.

Both the NAVAIR 17-600-193-6-1 pre-op checklist for ESD protection-devices, and the NA 17-600-193-6-2 periodic-maintenance-requirements manual for the Pace soldering-station caution against connecting ESD grounds to AC outlet

ground-wires. If the electrical-distribution-system has a fault or if there is a system failure in building or shipboard circuitry, the power will "look for" the easiest path to ground. Once that ESD wrist-strap is on, whoever is wearing it may have unknowingly become the path of least resistance and could be shocked.

Solutions: If your work center does not have a dedicated ground available, contact your local Naval Facilities (NAVFAC) about installing one. If you have one, make sure it's been tested within the last 24 months. Other options: Use one of the grounds in the hangar-bay or a properly tested structural frame in a building. Also, per para. 40.1 of appendix F of the Mil-HDBK-263B, consider the following: "ESD protective materials and equipment that are to be grounded should be attached to the earth electrode subsystem of the facility (see MIL-HDBK-419) or attached to a ground constructed and tested in accordance with NFPA 70."

Senior Chief Crook is a maintenance analyst at the Naval Safety Center and coordinates the Crossfeed section of Mech.

Hydraulic Contamination

PPE: Poorly Protected Environment

By GySgt. Edward Rivera

Problem: Plenty of units we've surveyed have shown us how not to (and where not to) store a portable oil-diagnostic-system (PODS) machine. For instance, we've seen them placed next to the shop grinders and drill presses. Not a good idea—why would you contaminate a machine used to check for contaminants in oil?

Solutions and Best Practices: As maintainers, we need to recognize the importance of a clean work environment, especially when it comes to the PODS machine. You have to be creative and request the support of the maintenance department and QA for resources to purchase whatever you need to maintain this machine and the contamination-control program to the highest level of cleanliness. Recently, I visited VAW-125, here at Naval Station Norfolk. They had a model program. All the stuff they used to keep the PODs machine clean (shown in the photo) was manufactured locally by the work center.

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

Check Your Ordnance Pubs, Check 'Em Often

By MSgt. John Higgins

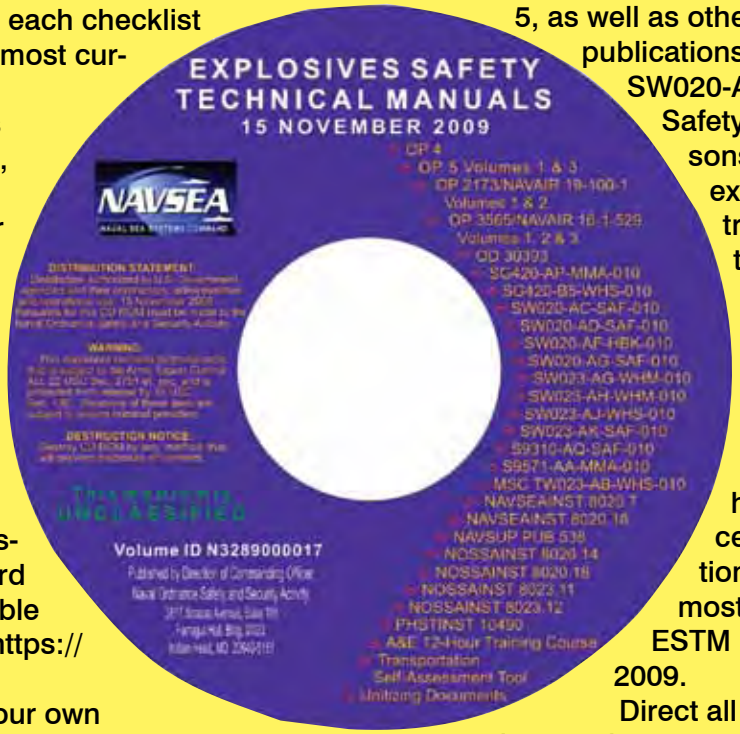
To stay safe, our Sailors and Marines have to use the most current checklists. The NAVAIR 01-700 "Airborne Weapons/Stores Manuals Checklists Publication Index" is a valuable tool in verifying that each checklist in the work center is the most current version.

Prior to this year, this publication was updated, printed, and distributed quarterly. Printing and/or distribution issues often have caused as much as a two-month delay in getting this valuable information to units. In order to fix this problem, the index is now available monthly and is no longer printed and distributed to the fleet in hard copy. Instead, it is available on the NATEC website: https://mynatec.navair.navy.mil.

If you want to print your own copies, you'll need to print the cover sheet, contact pages, and the pertinent pages related to your specific platform.

Even if your unit wants to save some trees and forego printing it, you still must use it. One suggestion: Place a locator sheet and a monthly verification log in the disbursed technical-publications library (DTPL) binder near the checklists. Teach Sailors and Marines how to find and use the 01-700 online and annotate their verifications monthly.

During our surveys, we continue to see squadrons with outdated copies of the explosive-safety technical-manual (ESTM) CD. The ESTM is an excellent consolidated source of NAVSEA publications. While these pubs are available online, limited internet connectivity (and operating out of remote locations) necessitates that explosive handlers maintain on-hand (updated) versions of the CD. It contains the NAVSEA OP 4 and NAVSEA OP 5, as well as other important and useful publications, including the NAVSEA SW020-AD-SAF-010 "Explosives Safety Accidents and Lessons Learned." This is an extremely useful tool when training our personnel on the dangers associated with handling ordnance. All work centers that handle explosives (PR, AME, flight equipment and seat shops) should have this CD or at least have it available in their central technical-publications library (CTPL). The most current version of the ESTM is dated 15 November 2009.



Direct all NAVAIR 01-700 questions and concerns to Patti Marquis, NAWCWD China Lake, CA, (760)939-1577 (DSN 437), email: patti.marquis@navy.mil; or, Mark Millis, NAWCWD China Lake, CA, (760)939-4501 (DSN 437), e-mail: mark.millis@navy.mil.

Questions or concerns about the ESTM? Contact Chris Chapin, NSWC Indian Head DET Earle, Code E421, (732)866-2851 (DSN 449), email: christopher.chapin@navy.mil.

To get copies of the ESTM CD, contact Dawn Lauer, Naval Packaging, Handling, Storage, and Transportation Center, (732)866-2980 (DSN 449), email: dawn.lauer@navy.mil.

Master Sergeant Higgins is an explosives/weapons analyst at the Naval Safety Center.

Safety Conference

Maintainer's Review of the Aviation Maintenance Safety Conference

By AMEC(AW) Eric Wickham

The Aircraft Maintenance and Material Division at the Naval Safety Center (NSC) recently hosted the 8th annual aviation-maintenance safety conference at Naval Station Norfolk. Gathering together multiple platforms and various maintenance professionals from across the Navy and Marine Corps team, the conference was another ideal opportunity to compare ideas, talk shop and discuss the current safety trends across the fleet.

More than 100 representatives from more than 70 commands attended the four-day conference, hearing presentations from NSC, NAVAIR and vendors. Discussions focused on aircraft maintenance and aviation programs, and included other pertinent topics such as fatigue awareness and PMV safety.

Commander, Naval Safety Center, Rear Admiral Arthur Johnson, kicked off this year's event

by emphasizing the way forward: a 75 percent reduction in mishaps by FY12. He challenged all in attendance to use time critical ORM not just on the job but also in off-duty activities.

The open-forum concept of this year's conference allowed for some great back-and-forth discussions on key safety concerns. Numerous attendees approached me afterwards and shared with me how surprised they were to see other commands facing similar safety and program issues.

NSC staff provided presentations on NAMP programs, human factors, mishap investigations, flight operations, risk management, and media products. Representatives from NAVAIR and NAE spoke about future directions/programs. CNAF/AMMT representatives gave a trend-analysis brief based on their fleet-wide inspections.

The following vendors attended this year's conference:

- SKYLOX, makers of aircraft circuit-breaker tag-out systems.
- Lubrication Engineering (featured in *Mech* articles about clear-grease guns)
- Little Giant Ladders, which unveiled a prototype of their new aircraft-maintenance ladder.

The conference could not have happened without the dedicated NSC team and the commands that attended and participated. A list of those attendees is included below.

The staff is planning to take next spring's conference to NAS North Island. I hope to see many of you there.

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

Class C Mishap

It's All About the Data

By MSgt. Michael Austin

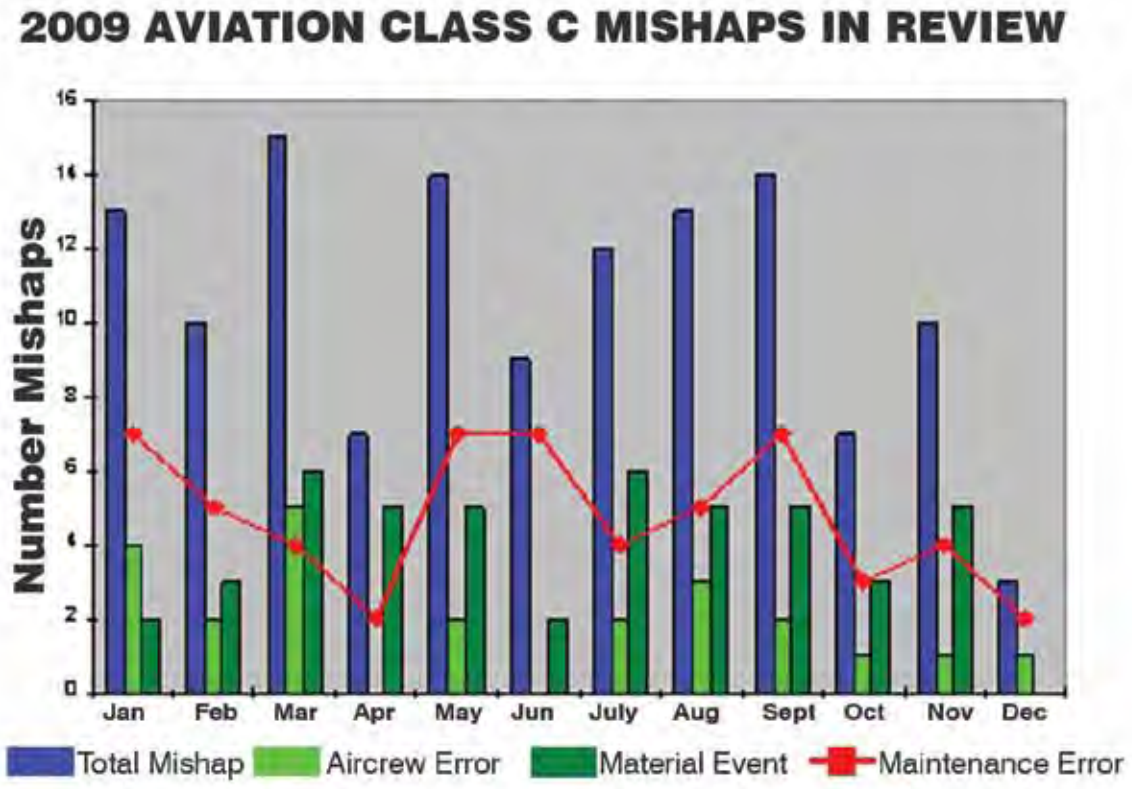
In CY09, the Navy and Marine Corps had 127 Class C mishaps involving aircraft, compared to 103 reported Class C events in CY08.

After reviewing all of last year's Class C mishaps and investigations, I find one common element: a lack of situational awareness (SA). Poor SA, coupled with learned habits (also known as practices) during ground-crew coordination (GCC), often damaged equipment or injured personnel during the time-critical phase of aircraft maintenance/movement. Tow and ground-support incidents alone accounted for more than a third (37 percent) of the CY09 Class Cs.

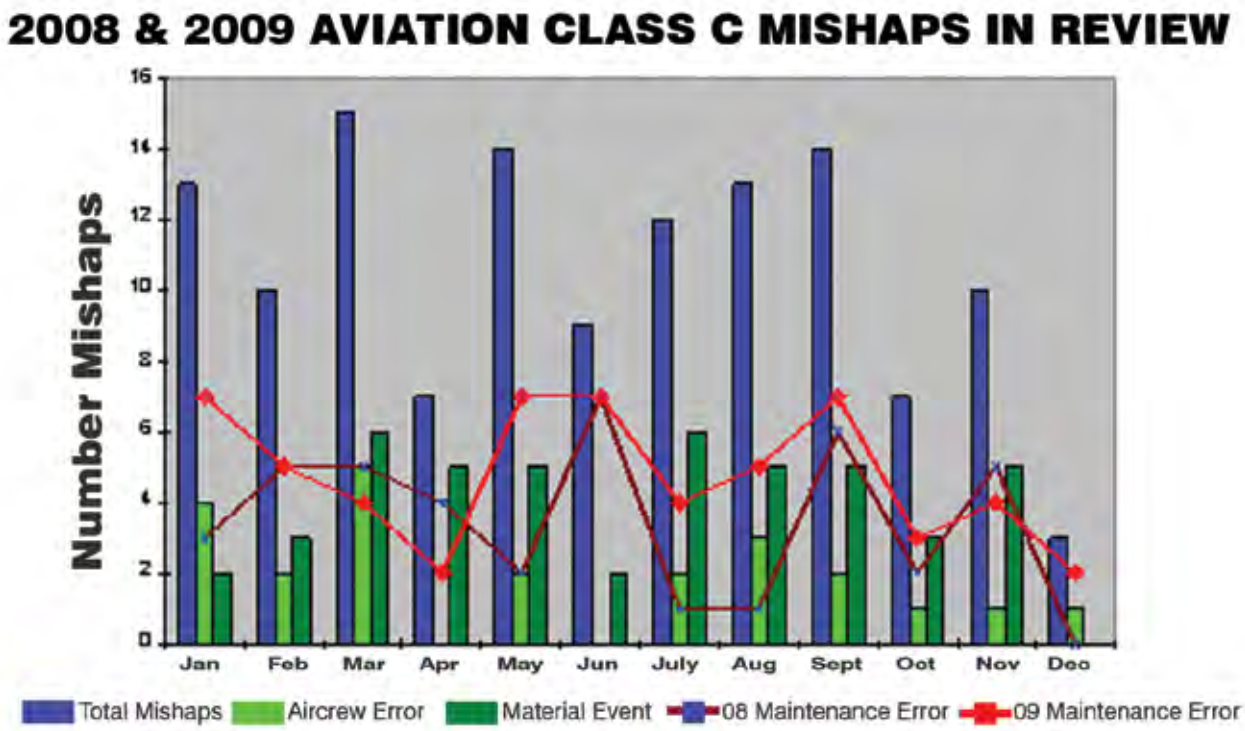
A detailed analysis of the events reveals that the primary causal factors, in addition to a lack of SA, include:

- lack of supervision
- procedures not followed
- poor judgment.

The graph (below) depicts reported Class C mishaps. The data is broken down into three mishap sub-categories: aircrew error, material event (which accounts for "no-fault" weather and component failure), and maintenance error. Twenty-three mishaps were attributed to aircrew error, 47 were attributed to a material event, and 57 (45 percent of all reported Class C mishaps for the year) were caused by maintenance error.



Summary



To keep things in perspective, let's compare the 2009 Class C data with that of 2008. A quick comparison of the two years (above) shows a slight increase in the total number of maintenance-related mishaps from 2008 to 2009. However, given the greater overall number of Class C mishaps in 2009, those attributed to maintenance error equate to roughly the same percentage as in 2008: 45 percent.

Drill down further into the 2009 data and divide it into the two main categories of naval aircraft, fixed wing and rotary wing (helicopter), and you'll find similar percentages of maintenance error. In 2009, the fixed-wing community submitted 100 Class C reports, whereas the rotary-wing community reported 27. Of the 100 mishaps reported by fixed-wing units, 44 (44 percent of them) were attributed to maintenance error. The rotary-wing mishap data: 13 of 27 mishaps (48 percent) caused by maintenance error.

So, if the aircraft are different but the incidents of maintenance-induced mishaps are relatively similar, what is the common mishap denominator? Could it perhaps be human factors? Yep. The bottom line is that during the past two years, almost half of the Class C mishaps were preventable incidents caused by maintainers. Let's work toward a better year in 2010.

Master Sergeant Austin is a maintenance analyst at the Naval Safety Center and coordinates the Crossfeed section of Mech.

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

Mishaps

11/08/2009 to 03/08/2010

Class A Mishaps

Date	Type Aircraft	Command
01/23/2010	T-34C	VT-6
Aircraft crashed into water during instrument approach.		
02/18/2010	MH-60S	HSC-26
Aircraft impacted ground.		

Class B Mishaps

Date	Type Aircraft	Command
11/13/2009	SH-60F	HS-14
Sonar transducer unseated and detached while transiting between dips.		
12/01/2009	FA-18E	VFA-136
Port and starboard engines damaged during defensive flight.		
12/18/2009	KC-130J	VX-20
In-flight refueling pod lost in flight.		
12/30/2009	FA-18F	VFA-103
Starboard engine damaged during low power turn.		
01/05/2010	CH-53E	HMH-462
Gearbox and main rotor damaged during gearbox removal.		
01/22/2010	FA-18C	VMFA-232
Aircraft struck runway edge lights upon landing.		
02/10/2010	SH-60B	HSL-44
Main rotor blade struck tail rotor drive shaft during FCF ground turn.		
02/18/2010	AV-8B	VMA-211
Aircraft ingested bird into port engine intake while on low level.		
03/01/2010	E-2C	VAW-116
In-flight fire in starboard engine.		

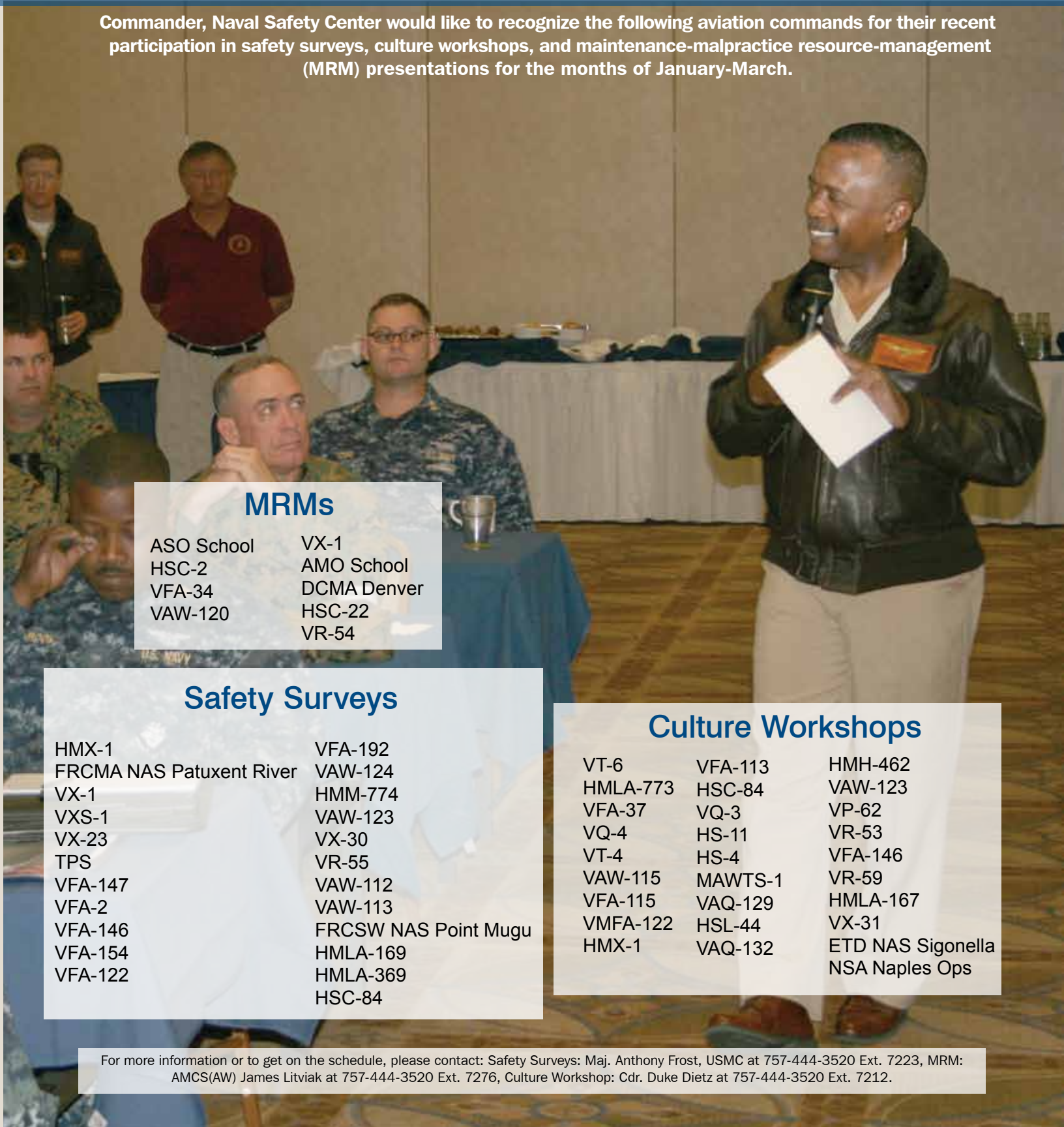
Printed as a supplement to *Mech* from
Naval Safety Center Data
Cdr. Paul Bunnell

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 January-March.



MRMs

ASO School
HSC-2
VFA-34
VAW-120
VX-1
AMO School
DCMA Denver
HSC-22
VR-54

Safety Surveys

HMX-1
FRCMA NAS Patuxent River
VX-1
VXS-1
VX-23
TPS
VFA-147
VFA-2
VFA-146
VFA-154
VFA-122
VFA-192
VAW-124
HMM-774
VAW-123
VX-30
VR-55
VAW-112
VAW-113
FRCSW NAS Point Mugu
HMLA-169
HMLA-369
HSC-84

Culture Workshops

VT-6
HMLA-773
VFA-37
VQ-4
VT-4
VAW-115
VFA-115
VMFA-122
HMX-1
VFA-113
HSC-84
VQ-3
HS-11
HS-4
MAWTS-1
VAQ-129
HSL-44
VAQ-132
HMH-462
VAW-123
VP-62
VR-53
VFA-146
VR-59
HMLA-167
VX-31
ETD NAS Sigonella
NSA Naples Ops

For more information or to get on the schedule, please contact: Safety Surveys: Maj. Anthony Frost, USMC at 757-444-3520 Ext. 7223, MRM: AMCS(AW) James Litviak at 757-444-3520 Ext. 7276, Culture Workshop: Cdr. Duke Dietz at 757-444-3520 Ext. 7212.

PPE

When is the last time

YOU

did your Pre-Op?

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Poster Idea: VFA-151