CROSSFEED

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AVIONICS

You're Not Supposed to Be Part of a Circuit!

By AVCM(AW/SW) Brian Clark

On numerous surveys, we have found modified equipment, and these unapproved items bring up a serious safety issue. No item stands out as unsafe more clearly than multimeter test leads.

The top photo on this page *[and the one in the Good, Bad and Ugly department—Ed.]* shows safety wire attached to the leads. It is done in such a way that it presents a clear hazard to personnel, not to mention a potential source of FOD. This item was found in an avionics shop, and another set—just like it—was found in the squadron's tool room.

These test leads are used with the ubiquitous Fluke-77 multimeters. It has a tip that is too large to probe many cannon plugs and test points. A resourceful technician, surely intent on solving his problem and fixing an aircraft, modified it to work. Good on initiative…bad on safety. Notice how the safety wire extends past the finger guard, creating a convenient opportunity for any technician to become part of the circuit. This loose attachment also could fall off, causing a serious FOD problem.

Does a fix for this problem exist? Sure! The supply system stocks a test-lead set with retractable tips. These points are small enough to probe the small contacts on most cannon plugs and can withstand everyday use. They cost less than $10 a set (NSN 6625-01-172-7860).

Innovative Sailors and Marines can be a great thing, but we must apply some common sense and ORM to keep these ideas safe.

Master Chief Clark is a maintenance analyst at the Naval Safety Center.

VAW-113 in 211735Z Jun 04 reported a maintainer was shocked because of the same problem mentioned in this story–Ed.

These modified test leads can be deadly. Order the right ones for cannon plugs.

"World-class organizations do not tolerate preventable accidents." –Donald Rumsfeld, SecDef

Soldering at O-Level: Led Down the Wrong Path

By AECS(AW) Todd Thompson

Analysts from our avionics branch have noticed a peculiar trend with Sailors and Marines who solder equipment at organizational-level activities. We frequently see two big problems during safety surveys: people not wearing PPE or not doing required safety training.

Solder is made of a tin and lead alloy, and, as we all should know, lead is dangerous to the human body in large quantities. The amount necessary to affect a person depends on an individual's body, and everyone is different.

We have noticed that most people do not know what type of PPE to wear, which kind of safety training to give, or how often that training should be held. The squadron's safety petty officer and workcenter supervisor, at the very least, should know these answers. They should spread the word and should enforce these procedures. The safety petty officer also should have a current copy of the latest industrial-hygiene (IH) survey. This document provides the necessary information on proper PPE and specific training required. But, as we also have noticed, the IH survey does not identify that avionics does any soldering. We all know that statement isn't reality. The workcenter supervisor should identify this problem as a discrepancy and ask the local industrial hygienist (who normally works at the base safety office) to come over to change the IH survey.

When working with solder, never put it or your hands into your mouth. After every soldering job, wash your hands thoroughly. Workcenter supervisors must make sure their people have all the necessary tools and training to do their jobs correctly. They need to take control of this growing fleet problem. It needs immediate attention. After all, our people are our greatest assets, and we can't lose them over a simple lack of safety awareness.

Senior Chief Thompson is an avionics analyst at the Naval Safety Center.

RF Hazards Can Kill

By ATCS(AW) Wallace Williams

If you have worked around military aviation very long, you probably have heard about HERO—hazardous electromagnetic radiation to ordnance. Stray EM can cause explosive-ignition devices to activate inadvertently, often with catastrophic consequences. But how many people know what HERP is? No, it's not some foreign disease. Most avionics technicians know that HERP is hazardous electromagnetic radiation to personnel. Because of the very nature of electromagnetic radiation, you may not know you're in danger until it's too late.

RF radiation is invisible and far-reaching. Immediate effects can be death, unconsciousness, or visible RF burns on exposed skin. However, many effects of exposure may not be immediate. The soft tissues of the body are the most susceptible to RF and are damaged easily. Cataracts are one of the most common signs of exposure. For males, the reproductive organs also are susceptible to damage. Long-term exposure to both sexes can cause degenerative diseases of internal organs and connective tissues in the joints.

A story in the morning message traffic recently caught my eye. A junior technician in a P-3 squadron was doing maintenance on an APS-115 radar system. He was exposed to the radar beam while only two feet from the antenna. Fortunately, the antenna was pointed 270 degrees away from him, and the duration of the exposure was approximately 30 seconds. Medical personnel determined that he did not exceed the maximum permissible exposure limit (PEL) for that radar, and his body suffered no damage [*the details of this incident can be found in the winter 2003/2004 issue—Ed*].

Three key factors were responsible for this incident: A light bulb was burned out, and it showed the radar was in antenna vice dummy load. Technicians were unfamiliar with control panels. A supervisor arrived late on the job and did not verify the switch selection before allowing a shipmate near the antenna. One conclusion in the mishap summarized it, "Failure to properly supervise an unqualified maintainer during a maintenance evolution may lead to improper maintenance practices, damage to aircraft, and injury to personnel."

As a safety surveyor, I routinely ask squadron

ATs about the hazards associated with their gear. I also review their training jackets to see if they receive mandatory RF safety training. MIMs contain warnings and cautions about RF emitting equipment that should be read and followed. Leaders must insist on this point. They also must ensure all interlocks and guards are in place and functional. Maintainers also must follow these five specific steps:

- Do a system pre-op and check the lights on a panel.
- Make sure all indicators are working.
- Develop and use a checklist of safety precautions before transmitting on deck and include it in squadron SOPs.
- Establish active communication with maintenance control, so the maintenance chief can let the other shops and other squadrons know what is happening on the flight line.
- Post safety observers in appropriate locations. Do not allow non-shop people into an area when the gear is transmitting.

If a situation occurs that the pubs don't cover, use ORM to minimize hazards. Do not accept unnecessary risk.

If your equipment is capable of transmitting on deck, you owe it to everyone working nearby to establish and enforce safeguards to the best of your ability.

Senior Chief Williams was a maintenance analyst at the Naval Safety Center. He recently transferred to the fleet reserve.

MAINTENANCE MANAGEMENT

Gambling With Maintenance Never Pays Off

ASCS(AW/SW) Joe Funderburk

Every week, I review dozens of messages concerning mishaps around the fleet. Not all are aviation-related, but they all have a common thread: People are willing to gamble with their lives and the lives of others. They don't do this out of spite or bravado; they simply assume they won't cause a mishap or be involved in one.

Traveling throughout the fleet to complete safety surveys, we do several in-process assessments of Sailors and Marines as they complete everyday tasks. I constantly am amazed at the little things our people are NOT doing and the lack of justification for their inaction. A prime example of this apathy was found in a simple pre-operational inspection. Our in-process review too often goes like this: Maintainers go to great pains to check out the pre-operational checklist and then put it in their pockets, completing the inspection from memory, not the book. That scenario is bad enough, but the Sailor or Marine does the inspection from the memory gained from watching another Sailor or Marine.

This approach is similar to whispering something in one person's ear and passing the word down a line of 20 people. When the information is repeated to the last person, the message completely has changed from the original whisper. The real procedures get lost.

This observation doesn't apply only to the line division, although it does happen often with plane captains. I have witnessed people doing pre-operational inspections on tow tractors, and they miss the very first step: Open the gas cap, and make sure it is at least half full. This is only one example. When was the last time you did a fluid sample on a coolant-servicing unit? I actually had an LPO tell me one wasn't required, despite the fact we were looking at the step on the checklist, and it said to inspect the fluid.

PON-6 oil-servicing units often are found covered in oil or whatever fluid was used last. The first step of that checklist is to wipe down the unit. Hydraulic-servicing units (HSUs) typically have the same problem.

A quick review of past *Mech* magazine issues will provide numerous examples of failed equipment because someone didn't inspect it. For example, the winter 2002-2003 issue contains an article on the subject from one of my fellow analysts. The spring 2003 issue describes a wheel falling off a

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tow tractor because no one did a pre-operational inspection. When maintainers fail to complete mundane, everyday tasks, they gamble unnecessarily.

The second principle of operational risk management (ORM) says, "Take no unnecessary risks." Don't gamble your life and the lives of others through a shortcut or the failure to follow a simple checklist.

Senior Chief Funderburk was a maintenance analyst at the Naval Safety Center. He recently transferred to USS Dwight D. Eisenhower *(CVN-69).*

Class C Mishap Summary

By ADCS(AW/SW) Gary Dennis

From March 23, 2004 to June 1, 2004, the Navy had 25 class C's that involved 29 aircraft. The damage total was $1,734,225. This loss is incredible when you look at this short period (nine weeks) and realize these "small mishaps" almost equal two Class A's! The dollar cost is just one part of the problem. While we're in a war footing, the loss of readiness, and the extra man-hours spent on repairs is unacceptable. We must do better and must realize Class C mishaps are important. We need leaders to step up efforts to reduce all classes of mishaps.

• While a mech was balancing the No. 1 propeller on a KC-130T, the prop spinner departed the aircraft. The squadron then did a conditional inspection on all its aircraft. Eighteen other props were damaged in and around the retaining-ring groove, which holds the spinner to the propeller. The one involved in the mishap had similar damage because the expansion-ring bolt had been overtorqued.

The MIMs include procedures on how to inspect and install a propeller. They also govern the amount of torque to be applied. These torque limitations exist because of lessons learned from earlier mishaps. However, it's a common practice in some squadrons to omit the torque specification when installing a spinner. Maintainers simply tighten the expansion ring bolt, rather than use a torque wrench. This technique can cause an overtorque, which could crack the spinner's retaining-ring groove or allow it to delaminate enough for the expansion ring to separate. *[This incident cost $143,563. This procedure was considered the norm for this squadron and its community. However, the norm often is not a "by the book" procedure, and reliance on it eventually will get you in trouble.—ADCS(AW) Gary Dennis, senior powerplants maintenance analyst, Naval Safety Center.]*

• Returning to base from a routine mission, the pilot of an FA-18C heard an audible warning about unsafe main landing gear. Shortly after lowering the gear handle, he heard another warning that the port main landing gear (PMLG) was not down and locked.

He called his wingman, who verified the PMLG was up and the gear doors were open partly. All efforts to lower the gear were unsuccessful. The pilot flew a full-flap, straight-in approach to an arrested landing on the runway. The aircraft landed, coming to rest just off the left side of the runway at the end of the arresting-gear rollout. The damage cost $170,955.

An investigation found that a maintainer had failed to secure the rigid connecting link with an RCL bolt. He also didn't document the maintenance done and didn't give a passdown for the next shift. This incident begs for an answer to the question, "Where was the supervision?"

Human error was involved in eight other Class C mishaps this period. These incidents involved parking, towing and taxiing aircraft and cost $526,821.

If you want more information on groundcrew coordination or human factors, visit the web at www.safetycenter.navy.mil and do a search for "human factors" and "groundcrew coordination" or click on the aviation link. While you're there, click on media and read current or back issues of *Mech*, look for maintenance-related human-error photos, or check out our video section. Remember to work, play, and live…safely.

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

Fight Like You Train

By Cdr. Allen Stephens

During our fleet visits to do safety surveys, risk-management presentations, and cultural workshops, we often encounter commands that have completed successful tours in support of real-world operational tasking. OIF is certainly one example, and the ongoing war on terrorism in Afghanistan (OEF), as well as other parts of the globe, is another. Chances are good that we will get involved in more events like these in the years to come, and our maintainers need to be prepared.

Not long ago, it wasn't uncommon to spend 20 to 30 years maintaining aircraft without being involved in armed conflict. This new and challenging environment has revitalized our collective sense of mission and purpose, and it tests the limits of our ability and professionalism on a daily basis. However, we should be reminded of one great fallacy in aviation maintenance: the notion that an exceptional world event merits exceptional practices, policies and deviations.

The business end of the sorties flown during OEF and in other parts of the world may change, but the maintainer's effort, in reality, is no different. We have strived for years to provide the best quality aircraft that time, money and expertise can attain. We have worked to satisfy flight schedules of all types and lengths, trying to prepare for the real-world tasking we are engaged in today.

My statement may seem obvious, but imagine the surprise when my teams come across activities that intentionally and willfully neglect necessary and required practices and policies. These squadrons try to rationalize their actions with the belief, "Now it's for real, so we don't have to do the paperwork." I'm even more surprised when seasoned maintenance managers not only buy into that premise but occasionally initiate it.

I know certain things change during the "heat of battle," such as the need for more crew rest, reduced ground responsibilities for pilots and NFOs, and fewer reports or paperwork not related directly to the operational mission. Some of these exceptions make sense.

Unfortunately, the idea of suspending responsibilities in program areas has crept into critical parts of the maintenance program in a number of commands. These programs are essential to operating aircraft effectively and safely; yet, they intentionally are being neglected and ignored in the name of perceived mission urgency.

This mindset serves three purposes, and none of them are good. It places aircrew and aircraft in jeopardy because we short circuit the very processes and programs intended to keep them safe and operationally ready. It sends a negative message to our youngest maintainers (e.g., that these issues are not as vital as leadership has made them seem). This comes after we have told them these steps are necessary for the safe and effective operation of the highly technical and advanced platforms that they support. My last point is that it results in an overwhelming backlog of program requirements, which may take months to correct. This "fix" is done after the fact, and it fosters errors, a lack of attention to the necessary details, and potentially leaves devastating gaps in critical tracking information.

Maintainers should understand these programs are in place to help with the "fixing" part of aircraft maintenance, and these paper trails and management issues are just as vital as "the fix" itself.

The phrase "Fight like you train" borders on cliché and may seem contrite to some, but it definitely applies to the business of naval-aviation maintenance. It reminds us that deviations from policy should be considered, approved and used only when absolutely necessary. These exceptions should follow the ORM model and be decided only at the appropriate level. A squadron isn't that level.

Providing the best quality aircraft possible is what maintainers do best, and we should do it following the rules, during times of war or peace. What the operators do with that quality product is up to them, and it often is transparent to us. That fact is OK, but we can't let loose rules overtake our commands. Maintenance leaders must be the last line of defense.

Cdr. Stephens is the maintenance officer at the Naval Safety Center.

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