



NAVAL SAFETY COMMAND

SAFETY AWARENESS DISPATCH



SA 24-19

Aviation Electrical Shocks

"Electricity is a great natural power, and we must learn to harness it, not play with it."

—Benjamin Franklin

During the Naval Safety Command's local area assessments, our teams note electrical safety deficiencies across the Fleet (*that's all of us*)¹, including aviation units. With hundreds of new electrical shock mishaps in our database each year, the deficiencies came as no "shock" here in the safety awareness division. Working around aircraft electricity carries risks, with many components remaining charged even when the power supply is off, and let's not forget the ever-lurking static electricity generated during flight! Here are a handful of selected examples to illustrate the many ways our aviators and maintainers are injuring themselves by not being careful around electricity. We hope they'll "spark" your memory the next time you're working with it.



- **Blinded by the Light.** An Aviation Electronics Technician (AT) was removing screws from the face of the electric standby indicator to reseal the "cannon plug" (power supply) while the aircraft generators were online. As he positioned himself with his back in the pilot's seat and head down by the rudder pedals (upside down) to reach behind the instrument panel, the Quality Assurance Representative (QAR) told him to "be careful back there, you can get shocked" (*because the QAR had been shocked while working behind the electrical panel before*), but he let the AT continue (*sigh*). Even the pilot and copilot were surprised by the position that the AT was attempting to conduct the troubleshooting but they too said nothing. The AT had performed this work before without being shocked, but his luck was about to run out. While he attempted to remove his arm from behind the panel, he felt a pulling force and his entire body went stiff. Additionally, a bright white light filled the air, and he couldn't move or talk. The pilot turned off the aircraft's starboard generator and engine to secure the power and the AT was safely removed from the aircraft. He was transported to the hospital, where he was monitored for 48 hours. —*There are a couple of lessons here: 1) Just because you've done it that way before (and lived) doesn't mean it's safe; and 2) If you see something unsafe, say something. Don't wait to confirm your suspicions by allowing your fellow Sailor or Marine to get shocked.*

- **Putting the Trouble in Troubleshooting.** A maintainer was tasked to troubleshoot electrical components in the cabin of an aircraft. He began troubleshooting specific electrical components—without pulling any circuit breakers—and quickly identified faulty items. During troubleshooting, he switched out some components to aid in diagnosing the problem areas. Once he had replacement parts in hand, he began putting all the components back in place. While plugging in an adapter, he grabbed a metal handhold with his free hand, which completed a circuit (*since the circuit breakers were still in*), giving him an electric shock. He was sent to medical for evaluation, where he was given an EKG and returned to full duty. —*The maintainer violated the procedure by not pulling circuit breakers while conducting maintenance with electrical power supplied to the aircraft. Tag-out procedures are not recommendations; they exist to keep you safe. Use them every time.*

- **The Job Isn't Finished Until...** A maintainer was cleaning the aircraft's lavatory when he noticed a cabinet was opened. The cabinet contained a small box that was not fastened to the inside. As the maintainer attempted to grab the box and attach it back to the cabinet door where it belonged, he was "electrocuted," according to the report. He immediately dropped the box and was taken to a hospital to be checked. Fortunately for this maintainer, he didn't suffer death by electrical shock (AKA "electrocution"), but he did suffer minor injuries from the electric shock. Why? The box wasn't correctly installed after a previous

¹By "Fleet" we mean all of us. The Fleet isn't just the big, gray floating things; it's the whole Navy-Marine Corps team — ashore and afloat, uniformed and civilian.

Aviation Electrical Shocks

maintenance action, shocking the maintainer when he touched it. Additionally, the maintenance action was also wrongfully signed off as complete, when it obviously wasn't. —*To complete this narrative's subtitle, "The job isn't finished until the paperwork is done," and "the paperwork isn't done until the job is finished."*

- *♪ I Need it, this Current Between Us ♪* An aircraft maintainer was testing a UHF Diplexer (used to connect two radios to two antennas), which requires power on the aircraft. While connecting cables to measure readings, his right wrist touched either the light ballast or terminal board and he received a 115-volt shock that traveled through his body to his left arm. Multiple maintainers witnessed the event and took him to medical, where he was examined and cleared to return to duty. —*Working on energized electrical equipment requires constant, focused attention by the maintainer and all observers present. Everyone on the team should know the procedure and provide forceful backup to the one with their hands in harm's way. The report notes "this is not the first time a maintainer has been shocked while working on the UHF Diplexer," so please learn from your predecessors.*
- **More than a Feeling.** Maintainer 1 (M1) was reinstalling an environmental control system duct in the avionics bay compartment of an aircraft when he dropped a mounting bolt inside the panel (*rats!*). While attempting to locate and recover the bolt, M1 used a "flexible metallic mechanical fingers" tool to search areas he couldn't reach with his hands. As he searched for the bolt, he was "shocked" to feel a sudden tingling feeling in his right fingers (*he was actually being shocked*) and quickly pulled his hand and tool free from the compartment. He immediately notified maintainer 2 of the shock. They saw white smoke coming from the area and a burn mark on the tool. The report notes that the maintainers had limited technical experience working in the aircraft's avionics compartments (*which may contain energized components even with the power secured*). —*This mishap could have been prevented if the two maintainers had better technical knowledge and awareness while working in an avionics compartment. With electrical components potentially energized and storing electrical voltage, using a metallic hand tool to recover an object wasn't a wise option. We couldn't find non-metal mechanical fingers on the web, so we recommend de-energizing the compartment before retrieving stray bolts—so you don't take stray volts.*
- **You're (Not) Grounded.** During the aircraft shutdown process after a routine training flight, the ground crew grounded the aircraft and used the static wand to discharge the static on the windscreen and canopy. As the pilot exited the aircraft, he placed his hand on the windscreen and was shocked by electrostatic discharge through his ring and pinky fingers. —*While the recommended practice is to not touch the windscreen when exiting the aircraft (which the pilot did), it begs a couple of questions worth asking: 1) Was the aircraft properly grounded, e.g., was the flightline ground port functioning correctly? And 2) Did the ground crew adequately discharge the static electricity with the wand? Asking those couple of extra questions may have revealed that the static grounding port on the flight line was faulty, or that the ground crew used inadequate technique with the grounding wand. Good investigations often reveal suitable lessons and big-picture fixes. Help us help you; investigate thoroughly. In the meantime...don't touch the canopy.*

Key Takeaways

Most electrical mishaps are preventable, including each example in this dispatch. If service members always followed procedures and warnings, we'd be out of a job. Help us make our jobs obsolete by recalling and avoiding the mistakes of those who've been shocked before you.

1. **Got PEMA?** The Navy didn't spend a lot of money on Portable Electronic Maintenance Aids (PEMA) for nothing. You have em, use em. The PEMA is packed with cautions and warnings along with the proper procedures to aid in doing the job correctly and safely, but you already know this, right? Still, many of our "warriors of wattage" chose not to use it. Follow the procedure and heed the warnings and cautions.

2. **If it doesn't look right, it probably isn't.** Put another way, "If you see something, say something." Aviation maintenance procedures usually involve more than one person. Whether the QAR, another tech, or a supervisor, there are opportunities for someone to speak up. It doesn't hurt to briefly stop a procedure to ensure safety, but it can hurt someone (*and has*) if you don't. Speak up!

And remember, "Let's be careful out there"