



# Naval Safety Center

## LESSONS LEARNED



LL 21-07

### ELECTRICAL MISHAPS

Electric current is like the Star Wars Republic, it's all about the *resistance* — Anonymous

Our practical knowledge of electricity (*and the pain it can cause us*) has existed since Benjamin Franklin shocked himself during his experiments in the 1700s. Unfortunately, some of us are not satisfied with Franklin's discoveries and insist on reliving them first-hand. According to a five-year study by the Bureau of Labor Statistics, there was an average of 1,952 workplace electrical injuries from 2012-2016, including 739 fatalities. A quick look in our database showed the naval services certainly had our share of electrical mishaps. It didn't take long to find more than 200 mishaps attributed to electricity in just the last two years. If those numbers don't "*shock*" you, have a read and learn how quickly electricity can earn your respect, and hopefully, "*spark*" some thought and discussion about electrical safety.



- An offer he couldn't re-fuse. A Sailor was chatting with a shipmate outside the paint locker when his situational awareness radar must have malfunctioned, and he rested his hand on a 440-volt fuse box. He soon personally learned why resting hands on fuse boxes is unwise, when he accidentally put his thumb in a hole where a fuse was missing. The resulting electrical shock sent him to medical, where he was diagnosed with a first-degree electrical burn. — *They say it's the amps that kill you, not the voltage, but let's not find out how long it takes contact with 440 volts to kill you. Learn from this Sailor.*
- It's not as if you're docking the International Space Station. A Sailor was plugging in a charger for flashlights that had been electrically safety checked earlier that day. Ironically, the Sailor couldn't see the holes on the power strip and attempted to guide the plug into the power strip by feel (*we can only assume none of his flashlights were functional at that moment*). Suddenly, he felt a shock run through his body, but fortunately for our hard "*charging*" Sailor, the ground fault circuit interrupter (GFCI) tripped. — *We admit we've tried to plug into electrical outlets we can't see, but it wasn't smart for us either. Turn on the light or move what's blocking your view. The extra few seconds will save us pain.*
- Arcin' and sparkin'. A Sailor was working with an avionics test set. When he was done, he started disconnecting the power cable and unscrewed the cannon plug assembly (vice pulling the entire assembly out following written procedure), causing the internal wires to contact each other. When the wires touched, an arc of electricity reached out and burned the Sailor's hand. While this Sailor received only a minor injury, the outcome could've been much worse for him and the equipment. — *This incident likely "re-energized" our maintainer's will to follow the manual in the future.*
- Electricity and water don't mix. While in the shipyard, a junior Sailor discovered an exposed 440-volt live wire that had become submerged in water that accumulated in the well deck. Upon reporting the hazard, the shipyard personnel were contacted and arrived to remove the wire. The Sailor attempted to assist the workers and was shocked during the process - which came as no *shock* to us (*refer to the mishap subtitle above*). The report notes that the mishap was due to a "lack of proper PPE, lack of procedural compliance, and a lack of knowledge of the proper safety precautions." — *We'll add "lack of supervision" to the list as well. Our junior Sailor had no backup when he placed himself in harm's way. Kudos to the alert Sailor who noticed and reported the hazard, but a little supervision or forceful backup could have averted this mishap.*
- Say watt? A Sailor was changing out a light bulb in a supply space (*there's a bad joke opportunity here, but we'll refrain*), and the bulb broke while in the socket (*raise your hand if this has happened to you*). Thanks to the plethora of internet hacks, our Sailor had a few options like using a potato (*just look it up*) or a "broken light bulb extractor" (yes, *they exist*). Whatever the method, the critical first step

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is to Turn Off the Power. The Sailor opted for pliers (even more reason to secure the power), did not do the most-important first step, and (ZAP!) was shocked in her right hand. The report claims she didn't lose consciousness, which is a good thing, but it alludes to the severity of the shock. — *Secure the power first, folks. Every time.*

- Don't go to the light! A Marine was moving a dryer in the laundry room during a field day in the barracks. According to the report, when he attempted to unplug the dryer, it "shocked/electrocuted his left hand." The Marine stated that the shock "caused him to jump and temporarily locked his body, and he saw a bright light flash." — *We're thankful the shock didn't actually "electrocute" the Marine's hand, but the flash of light certainly may have given him that impression.\* This mishap is a lesson in barracks management. Ensure electrical equipment is up to standards so our Marines and Sailors can field day safely.*



- Anything but holiday routine. One Sunday morning, while the ship was in port, the unthinkable happened. A report of white smoke and sparks coming from the mess deck cappuccino machine was made to the ship's Central Control Station. Electrical isolation was immediately set, and the fire appeared to be out one minute later. In short order, the duty electrician completed the damaged equipment checklist and verified the fire was out (*whew!*). This mishap is a good news story of how such a response should go down. While we don't know if the duty section was motivated by the potential consequences of no cappuccino for brunch, they followed proper procedure to the letter and saved the day and the ship. — *If it helps to treat all electrical fires as if they are the cappuccino machine, then we approve. Joking aside, all fires are serious. Handle them professionally as this crew did. And report them in RMI! Reporting helps us all learn and be safer.*

- Going with the flow. While performing corrective maintenance on a flow switch, two Sailors received an electrical shock when they inadvertently touched an exposed wire. The system was tagged out in accordance with the ship's drawings, but the Sailors did not complete the required voltage verification to ensure all power was secured to the system before they started work. When they investigated further, they discovered a second power source, not listed in the ship's drawings (*Surprise!*), that was feeding the exposed wire. — *Verifying a "zero energy state" is an essential step in the Tagout process. Learn from these Sailors ... and from Ben Franklin. Make sure the power is off.*

*"I have lately made an experiment in electricity, that I desire never to repeat." — Benjamin Franklin, 1750*

### Key Takeaways / Lessons Learned

1. **Stay "current" on your electrical technical manuals and checklists.** Safety precautions and checks are the first paragraphs of the Electrical Maintenance section of the Electric Plant General Manual NSTM 300, and for good reason. Establish a safe working environment first, then get to work.
2. **Tagout, and verify.** If the work calls for securing power or de-energizing, make **sure** that's the case before starting your work. Think about it: Nearly all electric shocks could be prevented by simply turning the power off and verifying it's off (voltage verification) before you begin the work.
3. **Wear your PPE (yes, we said it...again).** It should come as no "*shock*" by now that we mention PPE in a lesson learned product. If the maintenance procedure calls for it, wear it. Plain and simple. You may not have control over all possible hazards, but you have the "*power*" to control most of them.
4. **"Your focus determines your reality"** — Qui-Gon Jinn, *The Phantom Menace*. This takeaway is a repeat from a previous sanitized report SSIR 20-12. Inattention is listed in NSTM 300 as one of the most common causes of electrical shock, which should, well, grab your attention. Even when you're not working on electrical equipment, be aware of your surroundings. In a military environment, electrical hazards exist that aren't present in our homes. Be mindful of where you reach and step, and always watch for potential hazards. Your attention will ensure you have a "*positive*" experience.

\*Bonus safety tip: "Electrocuted" officially means killed by electricity. If you live to tell the tale, you've been "shocked."