

With increasingly sophisticated electronic equipment dominating Navy navigation, fire control, and other systems, the potential for electric shock is always present. Operators and technicians must be extra cautious and strictly follow guidelines to guard against being “zapped” when operating or working on any electronic gear.

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Mishaps involving electricity kill more than 1,000 people a year in the United States. Countless thousands are injured, including hundreds of Sailors.

If you get shocked, the seriousness of your injury depends on the type of voltage involved, the resistance of your body at the point of contact, the current's path, and how long the current flows through your body.

Volt for volt, direct current (DC) is less damaging than alternating current (AC). The former often produces muscle contractions that knock the victim away from the current source. However, alternating current can cause victims to clench their hands, which fixes them to the current source. Consequently, AC is about three times more dangerous than DC.

Electrical shock victims may immediately show the effects. Common signs include a tingling sensation, burn marks or an irregular heartbeat. In other cases, though, these effects are delayed.

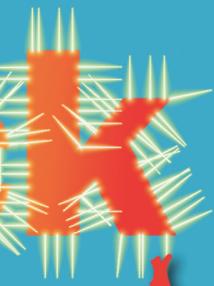
For example, a food-service attendant was cleaning a drink machine and nearby surfaces with a wet sponge. A bulkhead behind the beverage-line equipment had been removed a few days before. Cables and junction boxes were hanging from the overhead

at eye level. While the FSA was wiping one of the cables, water from the sponge ran into a 25-amp, 440-volt, circuit-connection box, causing an electrical shock.

He went to sick bay, complaining of sore hands. A doctor treated and released him, but he returned two hours later, saying his arms and hands were bothering him. During this exam, the doctor found an irregular heartbeat and ordered an ambulance to take the FSA to a medical center for follow-up treatment. Released a few hours later, he returned to full duty.

Anytime an electrical shock triggers an abnormal heartbeat, the victim can suffer a heart attack, and CPR may be necessary to save the victim's life. Alternating current of 60Hz at 110 to 220 volts traveling across a person's chest for less than one second can trigger a heart attack. You find this kind of current in buffers, tools and personal appliances, and in galley equipment like toasters, grills and deep-fat fryers.

Electrical shocks can burn the body at the point of contact. A burn mark also may appear at the exit (or grounding) point. Following are the stories of Sailors who suffered such injuries and required treatment.



Injuries Are Not Always Just Skin-Deep

- A PO2 suffered second-degree burns to his arm when he was shocked by 440 volts during PMS checks. To complete the job, he had to reach deep inside an energized cabinet. He wore the prescribed PPE (1,000-volt electrical gloves), but much of his arm was exposed because the gloves were too short. After this mishap, suggestions surfaced to redesign the cabinet, to design an electrically insulated tool for the job, or to design gloves that would offer more protection.

- A PO1 was helping a tech rep troubleshoot a casualty in a piece of equipment. While removing part of the unit, the PO1 became concerned that cables attached to it might get entangled. He went to the back of the unit to guide the cables. During this process, his hand must have touched (although he swears it didn't) a 440-volt, input power terminal, which shocked him. At sick bay, doctors found a third-degree burn that began on the bottom of his hand and ended as a red mark on his shoulder. They took him to a clinic where he received an EKG and further evaluation.

Other damage can occur to the body during an electrical shock. Tissues inside the body can be damaged as the current flows along nerves and blood vessels, which, like muscles, are much more sensitive to electrical-shock injuries than are other tissues.

Electrical current can “cook” muscles in parts of the body far removed from the injury site; the amount of damage is proportional to how resistant the tissue is. Bone is a poor conductor but retains heat a long time, often causing severe damage to deep tissues, while the surrounding layers are less affected. Because of all the harmful substances pro-

Doing PMS and paying attention to detail when troubleshooting electronic equipment go a long way in preventing electrical shock.



Navy photo courtesy USS Bataan Public Affairs Office

duced when muscle is cooked and destroyed, shock victims are also at risk for kidney failure, and they also can injure muscles and bones because of violent muscle contraction resulting from an electrical shock. If victims are working on a platform, they can injure themselves when they fall.

These unexpected and invisible injuries are why victims of electrical shock always should hustle to medical. They may require hospital observation before it can be safely determined they are fit to return to duty. ☺

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