

**IN AVIATION WE TEND TO** measure a pilot's level of experience by the number of hours logged at the controls of an airplane, but some of the greatest lessons are learned in seconds—and sometimes without even leaving the ground.

Standing atop the burned remains of my friend's hangar and beloved Cessna 172, I was amazed at the devastation that lay before me. The only remaining identifiable parts—the propeller, engine, cowl, and spinner—lay on the ground. "Richard" had fresh burns on his hand. As we sifted through the ashes trying to identify the various parts of the airplane, he explained to me what happened.

On that breezy afternoon, Richard decided to calibrate a new fuel dipstick. Since he didn't plan on flying, he parked his car in front of his hangar. Out of habit he set his phone and car keys on the desk behind his airplane. To get an accurate measurement, he decided to drain the remaining fuel out of one tank and into a small gas container. He grabbed a chair and rolled it under the wing to support a gas can. Using a rubber hose attached to a funnel, he locked open the fuel sump and began to drain the tank.

After several moments Richard looked up and was terrified to see a flame erupt in the funnel. Instinctively he dropped the funnel, tossing it away from the gas can. As the funnel hit the carpet his airplane was parked on, it too turned into a blanket of fire. The open fuel sump was now feeding the fire, and to make things worse the gas can fell on the floor. Richard could not get to his fire extinguisher because it was behind the fire, so he tried to extinguish the inferno with a garden hose—which is exactly the wrong thing to do, because water spreads a gasoline fire. With his car keys in the fire, and his vehicle parked in front of the hangar, there was no saving the airplane. Several airplanes and hangars were also lost.

Plenty of aircraft owners have drained fuel from an airplane without incident, so why did this happen? The circumstances that day conspired to create the conditions for a static charge to ignite the fuel. Grounding this aircraft most likely would not have prevented this fire. Grounding is only half the solution. By allowing fuel to freefall into a container that was not bonded to the aircraft,

**FUELING AND DEFUELING  
FIRE SAFETY TIPS**

*From the Aviation Maintenance Technician Handbook - Airframe*

- Always fuel and defuel outside, not in an enclosed area.
- Clothing should not promote static electricity buildup. Avoid synthetics, such as nylon.
- Eliminate potential sources of ignition: open flames, operation of electrical devices, radio, and radar use. Fuel vapors proliferate well beyond the fuel tank opening.
- Wipe up small spills immediately. Larger spills can be flooded with water to dissipate the fuel. Do not sweep fuel that has spilled onto the ramp.
- Keep Class B fire extinguishers charged and accessible nearby. Fueling personnel must know where they are and how to use them.

Richard allowed a difference in electrical potential between the aircraft, fuel, and gas can to build up, and this resulted in a spark that ignited the fuel. This is much more common than you might think.

Next time you gas up your car, look around and you will see a warning sticker instructing you to place gas containers on the ground before fueling them. This is because when you pump gas into a can that is in the bed of a truck that is not grounded, the static electricity generated by the gas sloshing and splashing into the container can create a different electrical potential than the pump dispensing the gas and a discharge can result, despite the gas pump itself being grounded. The best way to bond containers is to securely attach a special metal bonding strap of wire to both containers. Bonding can also be done by keeping a solid metal-to-metal contact between the containers, or between a metal container and grounded nozzle.

Pilots do not drain fuel often; however, this same principle applies to fueling an aircraft. Not only must we remember to ground our aircraft prior to fueling, but it

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is just as important to make sure the metal nozzle of the fueling pump stays in contact with the opening of the fuel tank. In the past I have held the nozzle above the tank and dripped the remaining fuel into the tank, just to give myself a better view and avoid spilling expensive 100LL on the airplane, but this practice was increasing the risk of a fire. Freefalling gasoline, like water within a thunderstorm, creates static electricity. The farther the fuel falls through air, the greater the static buildup and likelihood of fire.

Should you encounter a fire while fueling an aircraft, do not panic. There should always be fire extinguishers near fueling stations, and it is a good idea to note their location prior to fueling. Defueling fires can be more dangerous because the supply of fuel is typically locked open and will continue to feed a fire. If you must defuel an aircraft you should get assistance from trained professionals who have the tools, knowledge, and experience to do this safely, and you should never lock a fuel drain open. Sadly, one of the only recognizable objects we identified in Richard's hangar was a burned-up fire extinguisher. It was stored behind the aircraft and unreachable.

There are some good lessons we can learn from this fire. Don't become complacent, never panic, and when working around anything flammable keep a fire extinguisher accessible and always have an escape route. Don't hesitate to ask for guidance from the experts when working on airplanes, especially fuel systems. You may be surprised just how complicated the simplest tasks might be. A phone call to a trusted shop is always a good way to start any maintenance project; most respected shops will happily give out free advice. However, sometimes it is best to leave it to the professionals.

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