



ROBERT N. ROSSIER
COMMENTARY / STICK AND RUDDER



What's So Dangerous About That?

The unknown hazards we carry onboard
BY ROBERT N. ROSSIER

MOST PEOPLE GIVE PRECIOUS little thought to the potential hazards of common products we find and use in our homes, garages, and basements. But as pilots we need to give these things some thought, especially when it comes to what we carry onboard our aircraft. What might be a mere mishap in an earthbound setting could easily spell disaster in the air. And sometimes it's the things we least suspect that pose the greatest danger.

HOUSEHOLD PRODUCTS

Most pilots have an acute awareness of hazardous materials that pose a threat when carried aboard aircraft. Among the many substances we concern ourselves with are products such as motor oil, bleach, brake fluid, propane tanks, oil-based paints, spray paint, charcoal lighter fluid, paint thinner, alcohol, butane lighters, cleaning supplies, and batteries. While the average person off the street might wonder what's so dangerous about these items, the answer is clear in the numerous reports that have been collected over the years regarding issues that have occurred in flight. Noxious fumes from solvents, lubricants, and fuels are one problem; chemical burns

are yet another. Just imagine what we might be splashed in should we make an otherwise survivable off-field landing. And then there's the long-term issue of what the corrosive effects to the airframe, various mechanisms, or wiring might be if a spill is not properly cleaned up.

MEDICAL EQUIPMENT

Whether we fly commercially or bring family and friends on trips with us, one hazard we might not recognize comes in the form of certain medical equipment. Certainly, we must take precautions whenever oxygen bottles are carried aboard, but other items can be of concern as well. These days, portable oxygen concentrators are common for those suffering from various breathing conditions, and the safety of

these devices for use on aircraft has been called into question. For commercial operations, FAR 135.91 — *Oxygen and Portable Oxygen Concentrators for Medical Use by Passengers* — lays out a strict set of criteria and operational guidelines that those of us flying under Part 91 should at least consider for our safety as well.

BATTERIES AND CONSUMER ELECTRONICS

One recurrent theme in air safety over the years has revolved around batteries. Generally, the types of batteries we are concerned with are of the automotive lead-acid variety, with their highly corrosive liquid electrolytes that can cause severe burns when spilled. Those are bad news, but they aren't the only batteries we need to worry about. Even some of the most innocuous batteries can present a hazard. Years ago I read about an incident that occurred when a person loading a bag into an aircraft noticed it was beginning to smolder. On closer inspection it was found that a 9-volt transistor battery had been packed in the bag, and the two terminals had shorted out across the metal zipper. The shorted battery quickly heated up, and the surrounding materials were approaching ignition temperature. Had the developing issue not been noticed on the ground, it might have become a serious problem in the air.

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Similar occurrences have been documented with other high-energy battery-powered items such as the high-powered lights used by scuba divers. As it turns out, the heat generated when these devices are left on can be enough to ignite a blaze. More modern dive lights typically use LED (light-emitting diode) technology that generates a fraction of the heat of older incandescent devices, but the power source is still there, and still potent.

These days, due to their high-energy density, lithium-ion batteries are favored for everything from wheelchairs and toys to electronic entertainment and cellphones. But they don't enjoy a perfect safety record.

Back in April, a woman from Wisconsin claimed that her Fitbit Flex 2 fitness tracker exploded on her wrist, leaving bits of melted plastic for doctors to pick out of the second-degree burns the incident caused. Fortunately, she wasn't on an airplane. But consider the Australian woman on a commercial flight from Beijing to Melbourne who got a shocking surprise when the headphones she was wearing suddenly and inexplicably began to sizzle and burn. She tore them off and tried desperately to stomp out the blaze. A fast-acting flight attendant found a bucket of water in which to douse the defective headgear. Imagine the chaos that could cause in a four-seat aircraft. And while these incidents appear to be isolated, there have been numerous instances of so-called hoverboards that have spontaneously combusted. Most carriers no longer allow them to be shipped by air, and that should be a warning to us all. And then there are the Samsung Galaxy Note 7 cellphones that have been banned from commercial flights due to their fiery personalities.

The common thread running through all these incidents seems to be the lithium-ion batteries that power the devices. The organic (meaning carbon-based) electrolyte inside lithium-ion batteries is typically quite volatile and flammable. An internal electrical short, whether it's caused by external damage or a manufacturing defect, can result in rapid overheating, a pressure build-up as gases are produced inside the battery, and eventual explosion and/or ignition of the fluid vapors. With millions of these devices being produced, even an extremely low rate of manufacturing defects can spell occasional disaster.

IMAGINING THE WORST

If our concern is over the flammability of materials in the cockpit, we might think the regulations have our back. The FAA is pretty cautious when it comes to the materials that can be used in the cabin of an aircraft and requires fabrics to meet "flame-resistant" criteria. So maybe we take solace in the FARs and feel like we have some measure of protection. But how about the items we bring aboard?

How about the cellphone that was stashed in a duffel bag and thrown in the baggage area behind the passenger seats?

The issue surrounding how we might extinguish a fire in the cockpit was driven home to me one day when a fellow pilot accidentally made a partial discharge of a chemical fire extinguisher in our yearly ground school classroom. This was a pretty big room — huge when compared to an aircraft cockpit — yet the products of that extinguisher made it impossible to breathe. Eyes stinging and choking breath, we had to evacuate the room. Now imagine trying to extinguish a burning duffel bag in the back of the airplane. This probably isn't going to end well. In fact, my attitude is that chemical extinguishers should be considered only for dealing with fires while on the ground. In the air, the only viable option might be a halon extinguisher. Or a parachute.

OTHER ELECTRONICS ISSUES

With the multitude of electronics in our daily lives, we might ponder their safe use in an aircraft. One area of concern is the potential for portable electronic devices (PEDs) to interfere with navigation and communication systems in the cockpit. Operations under FAR Part 135 and 121 prohibit the use of PEDs with certain exceptions such as pacemakers and hearing aids, and those of us flying under Part 91 might want to consider the potential risk to our operating safety as well. The regulations do permit the use of specified PEDs and other devices that the operator of the aircraft has determined will not interfere with the safe operation of that aircraft — at least from the navigation and communication perspective. How we power those devices and the risks they pose is another matter entirely — and perhaps one worthy of consideration.

The dangers associated with hazardous materials may not be a problem on every flight, but they do come up from time to time. If we pay close attention to what we bring on board our aircraft, we can likely avoid the worst case scenario. *EAA*

Robert N. Rossier, EAA 472091, has been flying for more than 30 years and has worked as a flight instructor, commercial pilot, chief pilot, and FAA flight check airman.