

## How To Survive An Aircraft Electrical Fire

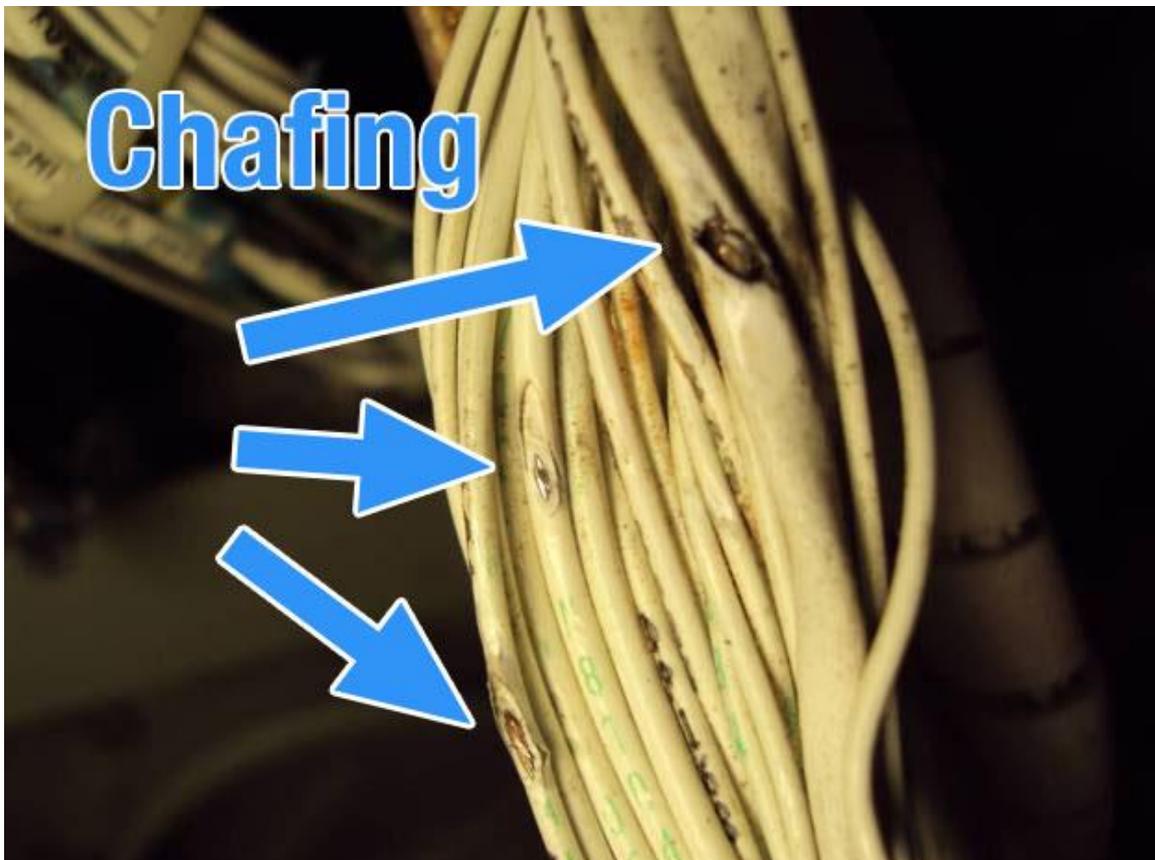
Ask an experienced pilot what's the worst in-flight emergency, and you'll probably hear "fire." Most pilots feel comfortable with their ability to land an airplane without power, but a fire can be truly terrifying.

Fires are exceptionally rare. Unless you're flying a vintage airplane with a radial engine, you'll probably never have an engine fire in a light aircraft. If an in-flight fire does occur, it's probably electrical.

In fact, an electrical fire brought down Swissair Flight 111 in 1998. With miles of wiring in modern aircraft, you've got plenty of sources for ignition.

### A Little Arcing's All It Takes

Electrical fires usually start when a short in your electrical system causes an arc. Over time, chafing can wear away the insulation on your wires. If two open wires touch, they'll arc.



The arc can ignite the surrounding wiring's insulation or other flammable material nearby. However, in the fire's early stages, it's fueled by electricity - remove that and you'll stop the fire.

## You'll Smell It First

The best way to identify an electrical fire is often through its smell - an acrid, sharp smell that's unique. It won't smell like burning oil or gasoline. Electrical fires generate a faint, white smoke. Often, you won't see anything as the fire starts, you'll simply smell it.

As the fire grows, circuit breakers may start to pop. Eventually, your avionics and electronics may start to shut down and you may feel heat. But, by that time, the fire's grown significantly.

## The Checklist

As for almost every emergency in aviation, *there's a checklist for that*. **Before you take any action, pull it out.** These emergencies don't happen every day and you'll be under stress. The ten seconds you take to grab the checklist will pay off in the end.

Every aircraft has a unique electrical fire checklist, but nearly all of them follow the same basic flow. Essentially, you want to:

- 1) Stop the fire, then
- 2) Clear the cabin of smoke and fumes, and
- 3) Land

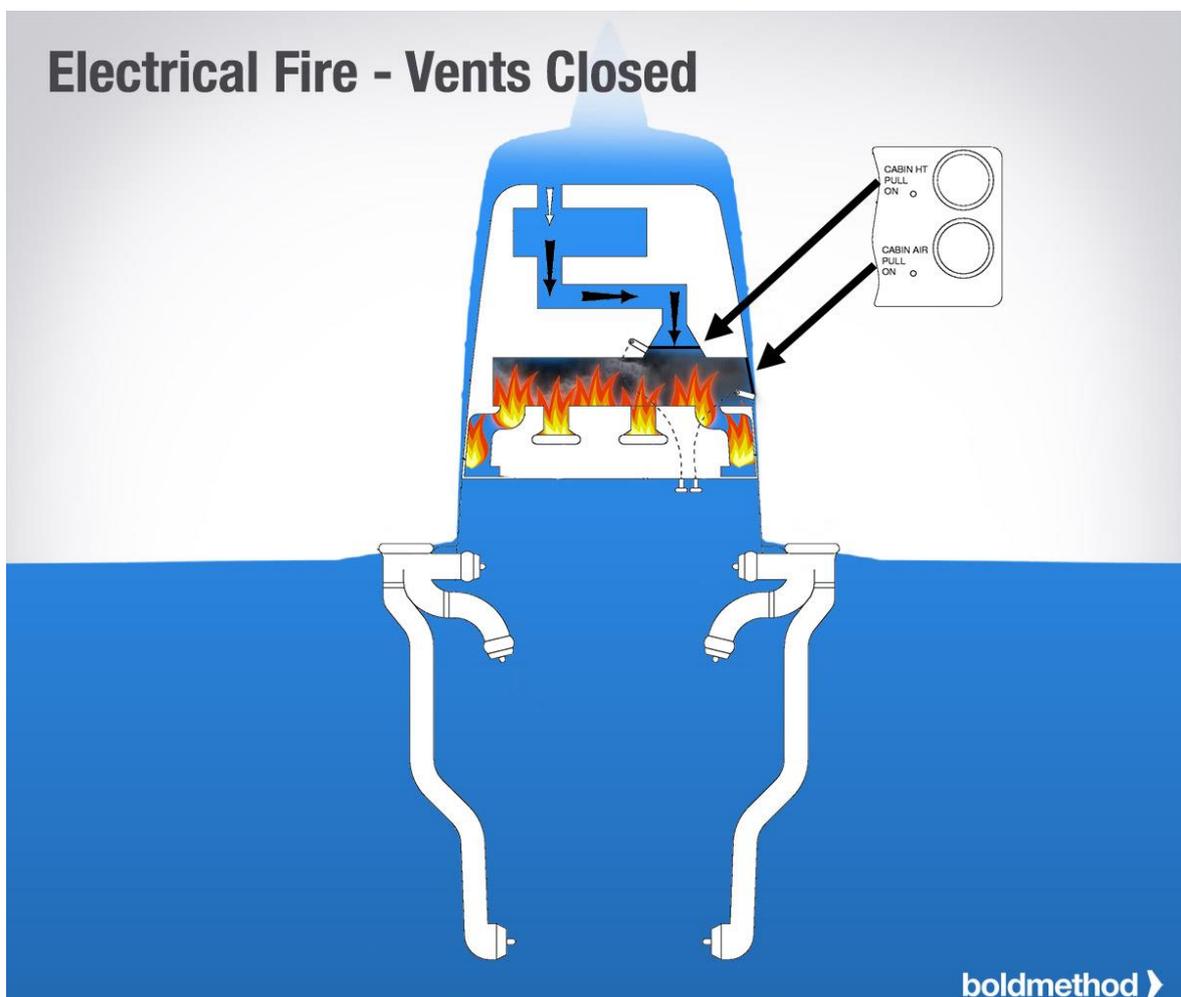
The Cessna 172S has a pretty typical flow; we'll use the checklist from its flight manual in this example. *(The lawyers would like me to remind you to use the checklist appropriate to your aircraft when you fly. But you already knew that...)*

## Stopping The Fire

This fire's fueled by electricity, but you can't be sure where that electricity is coming from. Turning off power will remove any fuel from the fire. So...

- **1. STBY BATT Switch - OFF:** This takes the standby battery offline and prevents it from fueling the fire
- **2. MASTER Switch (ALT and BAT) - OFF:** This cuts off power from both the main battery and the alternator. Again, you're removing all power from the electrical system, cutting off the fire's fuel

Next, you want to cut off oxygen from the fire and prevent fumes from blowing into the cabin. Often, electrical fires occur behind the panel, where air from the heater and vents can blow the smoke into the cabin. But, even if the fire is in the headboard or tail, you want to cut off airflow. Oxygen feeds a fire, and air flowing through your vents will help the fire grow. So...



- **3. Cabin Vents - CLOSED (to avoid drafts)**
- **4. Cabin HT and CABIN AIR Control Knobs - OFF (push full in)(to avoid drafts)**

And finally, with the source of the fire cut off, it's time to use your fire extinguisher.

- **5. Fire Extinguisher - ACTIVATE (if available)**

You've done everything you can to douse the fire and you've removed all electricity from the system. There are a few more steps you'll take. *These steps don't remove any more electrical power, because your batteries and alternator are already off-line.* However, they'll come into play if you have to power any electrical equipment back up later down the road.

- **6. AVIONICS Switch (BUS 1 and BUS 2) - OFF**
- **7. All Other Switches (except MAGNETOS switch) - OFF**

### **What About The Magnetos? Won't My Engine Quit?!?**

Your aircraft's electrical system and engine ignition system are **entirely** separate. The magnetos power your spark plugs and their wiring's contained to the engine itself.

The electrical system that powers your avionics and other equipment has nothing to do with your engine - except for powering your starter. Cutting power to your electrical system won't kill the engine. In fact, many vintage aircraft never had an electrical system, at all!

### **Is The Fire Out?**

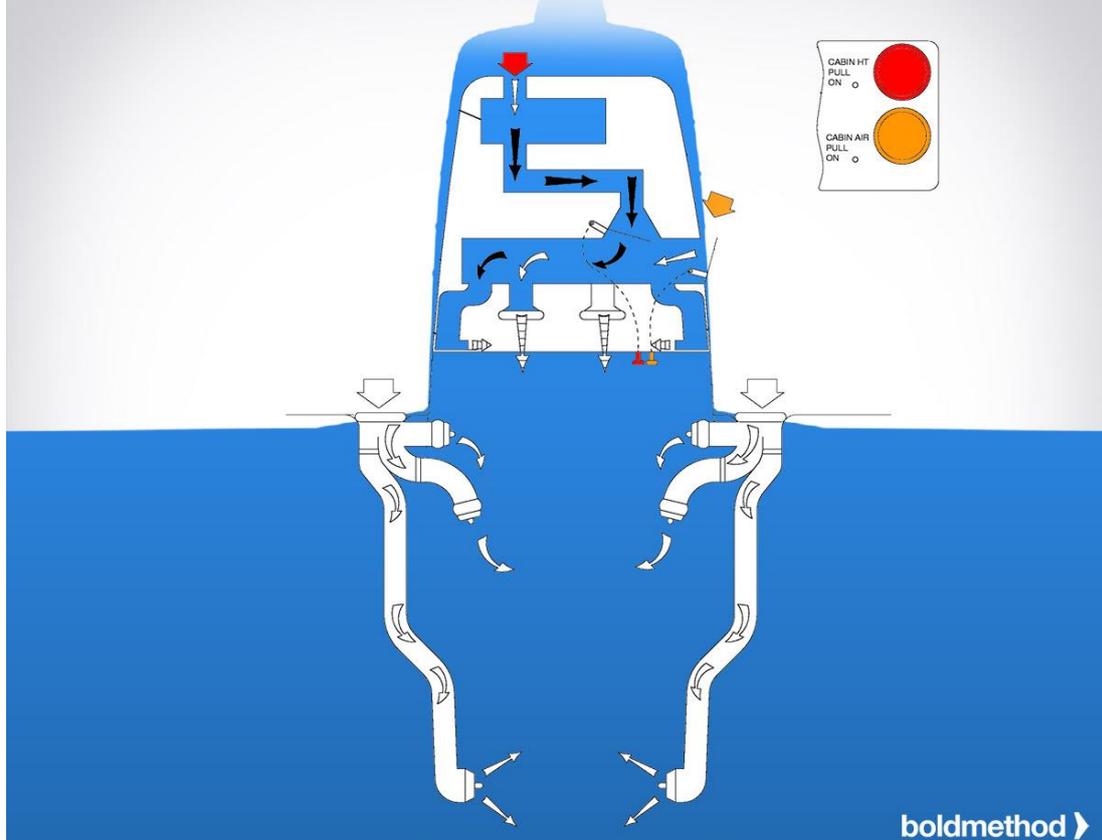
After the fire's out, you can clear the cabin air. But how do you know the fire's out? That's subjective - because the acrid smoke from the fire will linger in the air, and you may have fire retardant obscuring the fire.

First, give it time. The airplane flies fine without an electrical system - so wait it out. You may see the smoke begin to clear or the acrid smell begin to dissipate. Once the fire's out, continue on...

### **Clearing The Air**

These next steps help air circulate through the cabin, clearing the smoke from the air.

## Electrical Fire Extinguished - Vents Open



- **8. Cabin Vents - OPEN (when sure that the fire is completely extinguished)**
- **9. CABIN HT and CABIN AIR Control Knobs - ON (pull full out) (when sure that the fire is completely extinguished)**

Whether it's freezing or scorching outside, open both the heat and the fresh air vents. You want as much airflow as possible to clear smoke and fumes from the cabin.

### It's Time To Land

Now it's time to divert. Pick a close, safe airport to land at.

If you're in visual conditions, you may be able to continue the flight to a nearby airport without electrical equipment. Commercial aviation started with air mail pilots traversing the country - without electrical systems. Keep your pilotage and dead reckoning skills sharp and you can, too.

# Look Ma,



# No Electrical System!

*Tom Gill / Flickr*

If you need to contact ATC, use your mobile phone. And, if you need some GPS help along the way, your phone has that, too. ForeFlight sure helps out in a pinch!

But, if you're in instrument conditions or need electricity for aircraft systems, you may need to restore power. Take your time with this part of the checklist. Restoring power can re-ignite the fire, which you may not notice right away. Continuing with the checklist...

## **IF FIRE HAS BEEN EXTINGUISHED AND ELECTRICAL POWER IS NECESSARY FOR CONTINUED FLIGHT TO NEAREST SUITABLE AIRPORT OR LANDING AREA**

- **10. Circuit breakers - CHECK (for open circuit(s), do not reset):**  
This is important - don't reset any breakers that have popped. They could be the source of your fire. But, if more start popping, they could help you identify where the fire's at. Note which breakers are already out.
- **11. MASTER Switch (ALT and BAT) - ON:** This restores power to your electrical system.

- **12. STBY BATT Switch - ARM:** This brings your standby battery back on-line
- **13. AVIONICS Switch (BUS 1) - ON**
- **14. AVIONICS Switch (BUS 2) - ON**

Now you've restored power to your electrical system - but watch for the fire to restart. If you start to smell the fire again or another breaker pops, power the electrical system back down.

### **But I'm In Night IMC - I NEED IT BACK!**

Ok - this is a *bad* situation, and it's where your judgement really comes into play.



[Dan Tentler / Flickr](#)

If several breakers have popped, you can check the aircraft's manual to see if they're all on the same bus. If they are, you can remove power to that bus and try again.

But, you may have no idea where the fire's at. In this case, you can pull every breaker on your panel, power up the battery and alternator, and *SLOWLY* push only the *most essential* breakers back in. Wait

between each breaker to make sure you don't restart the fire. And, if you don't absolutely need a piece of equipment, leave it off.

## You Have Some Awesome Options In Your Pocket



### ForeFlight

Your mobile phone and iPad give you some amazing options that provide a great backup for your aircraft's avionics. Your phone can quickly replace your radio. And ForeFlight on the iPad, coupled with a Stratus, provides a great backup attitude and heading system.

If you needed some motivation to try out some new technology, this might just be it. And who can argue with a purchase in the name of safety?