

## Cold Weather Operations at Aerowood

In less than a minute, a single cold start without proper preheating can produce more wear on your piston aircraft engine than 500 hours of normal cruise operation. If it's cold enough, a single cold start can cause the catastrophic destruction of an engine shortly after takeoff. Does that get your attention? It's not just a matter of heating the oil, it's the dissimilar metals that cause the problem with cold starts. Read below to how we handle the issue at Aerowood.

### Cold Start

With winter just around the corner, it is time to review winter operations. A cold engine does not want to start, and if you DO get it started using incorrect procedures, you'll hurt it. Cold starts done wrong are really hard on the engine, the starter motor, and the battery (they are usually equally hard on the pilot's ego, but that's another issue). Avoid the embarrassment and inconvenience of an unsuccessful cold start, while at the same time saving wear and tear on the engines. Here's how to do it right.

### Plan Ahead

When forecast calls for nighttime temps **below 40F for more than two hours**, we need to heat the engines before start (see FOM 7.10.09). Most of our aircraft are equipped with engine heaters – in the 172s the heater is a pad bonded to the oil pan. In the Arrow (98JG) there are heating rings around the cylinders. For those aircraft, if cold temps are forecast overnight, after the last flight of the day they should be tied down at the Quonset Hut, hangar 4, 5, or 6 (Refer to Image 1 Below) and the engine heater plugged in using a drop cord. The yellow GFCI that STAYS WITH THE BLUE heater cord in the cargo compartment when not in use. Plug the blue cord in (inside the oil access door) after that last flight and in the 172s set the heater to "medium" with the white mark on the knob pointing toward the LED. The control box should be off the ground and under the wing to protect it from rain, dew, and frost (see Images 9 & 10 below). Ensure the lights on the plugs are illuminated, if they are not, be sure to check that the GFCI is not tripped. If it is tripped, hit the reset button on the yellow GFCI plug. The yellow GFCI end of the blue cord is plugged into the yellow drop cord. Ben has the rheostat clearly marked. 98JG has an engine heater that has no Control box/rheostat, just plug the drop cord into the plug found inside the left engine cowl opening. It can then be left on overnight. This process, keeping the engine warm rather than getting it warm, is better for the engine overall and reduces the risk of grinding the starter or running the battery down the morning of the flight. Below are attached images to help illustrate what we are referencing. The parking spots for plug ins are outside of the Quonset hut (Spots 71-75), Hangar 4 and Hangar 6 Spots 78-86 and there is one plug in spot available outside of the Maintenance Hangar (Hangar 5). Spot 71 outside of the Quonset hut is reserved for the Arrow, there is a yellow drop cord there that plugs directly into the Arrow without using the Blue Cord and Control box/Rheostat (Refer to Diagrams Below).

### Morning of the Flight

Leave the engine heater on during your preflight briefing and walk around. Try to plan your tasks so you minimize the time between heater disconnect and engine startup. These engines cool down very quickly. Once the airplane preflight is complete and engine heated, take the ropes and chocks off and saddle up. Now, to the cold start:

**This Procedure will nearly always work for nearly all aircraft engines:**

**Consult the POH – there you will find manufacturer approved cold start procedures. Here is some additional advice.**

**FLAPS:** You probably lowered the flaps for your walkaround. Leave 'em down until after you start the engine. The electric flap motor on Cessnas and Beech take a lot of juice, and you may need all of it to start the engine. Raise flaps after engine start.

**PRIME:** A cold engine needs lots of fuel. Give it four or five shots of prime. The normal two or three is not adequate. Turn the BATTERY side of the Master on and hit the starter. Some have expressed a fear of fire if they over prime the engine. Use what you think is the minimum amount of prime for the conditions. If it doesn't start on the first try, you can give it another shot of prime.

**Caution: Avoid “pumping” the throttle if the engine is not turning.** Carbureted Cessnas have an accelerator pump on the throttle. When you “pump” the throttle while the engine is not turning fuel will be sprayed into the carburetor throat. However, these Cessnas have an updraft carburetor. Air comes in the air intake, below the prop spinner, and then makes a 90 degree turn to go UP into the carburetor throat where the air is mixed with fuel and sent on to the cylinders. If you “pump” the throttle with the engine not turning, gravity takes over, that fuel that is sprayed into the carburetor throat will then run DOWN the carburetor throat and can pool up in the air intake or even (if you pumped a lot) run all the way out to the ground. If the engine is over primed and backfires, that excess fuel will catch on fire and it will be way more exciting than the pilot wants. The take-away? Simply crack the throttle and let the primer take care of getting fuel directly into the cylinders.

***A cold aircraft engine needs lots of fuel or it will not start!***

After the engine starts and stabilizes, adjust power to 1000-1200 rpm, turn on the Alternator side of the Master, and proceed with your piloting chores. Please do not taxi past the tie downs until the oil temperatures have warmed up to operating temperature.

## **Winter Flying Review**

Winter just around the corner, and some of you have not yet had the privilege of properly preparing the airplane in the cold. You need to keep in mind that winter flying takes more patience, more time, and more work than warmer days. Give yourself plenty of time to get the airplane ready.

There are weather conditions that affect every non-hangared airplane with ice, snow, and beautiful icicles dangling from wings and control surfaces. ALL that ice and snow MUST be removed COMPLETELY before attempting flight. Yes, it's not just a good idea but a regulation. FAR 91.527. And it is required by our FOM 7.10.10. So how to go about it?

First, **DO NOT scrape it off.** Those deice scrapers they sell at Walmart and NAPA are fine for your Ford windshield but will badly mar the plexiglass on any GA airplane and will damage the surface on wings, fuselage, empennage. Don't even use your driver's license or credit card. They will scratch the surface.

By far the safest and easiest way to deice the airplane is with sunshine. It is wonderful what a few minutes of sunlight will do for an ice-covered airplane, especially if the airplane is a dark color. Untie it, point the tail at the sunlight, plug in the heater, and by the time the rest of your preflight is completed the airplane may well be clean.

You can use the brush end of that deicer, or a good broom, to get the loose snow off. We have a pushbroom near the airplanes for this purpose. Given the large surfaces involved, it makes the job of cleaning a foot of snow off a lot quicker. Brush gently. The looser snow or frost you can get off, the quicker the sun will do its work.

Do not deice with hot water. It'll get the ice off, but water running down into the control surfaces could freeze, leaving you with no control once you're airborne. An old towel or two can help getting the frost off, especially after you have let the sun work a few minutes.

Don't forget the underside. Remember, lift is DOWN on the horizontal tail surfaces. Take off with frost on that nearly invisible spot and you are a test pilot. There's no telling what the airplane will do, but you are certain not to enjoy the ride.

So, you're deiced and heated the engine and cranked up. Now what? Well, that's the easy part. ALL your performance parameters improve when it's cold. Shorter takeoff roll, quicker climb, better fuel burn....but you knew that already.

What is there is ice or snow on the runway and taxiway? Sounds like a good day to leave the airplane tied down and do ground training instead.

If you arrive back at EQY (or a winter destination away from home) you may find that your only choice is to land on a runway that appears to have gotten some snow or ice contamination while you were in the air. Use a soft-field technique. Keep it flying as long as you can to maintain aerodynamic control as long as you can and avoid braking. If the runway is a solid sheet of ice, you won't have any braking action anyway; and if it's patchy ice, you may have braking action on one side but not the other. Even gentle braking under those circumstances could jerk you toward the dry side. Best to leave your feet off the brakes. Roll on past that nearby intersection and don't try to turn off until you know you've got traction.

### **Happy winter flying!**

If you have any questions, please give us a call at (980) 263-9025.

Take care and be safe during the wintry weather!

\*Below are images to help familiarize yourself with the Winter operations at Aerowood Aviation\*



Image 1.) Aerowood's tie down Locations

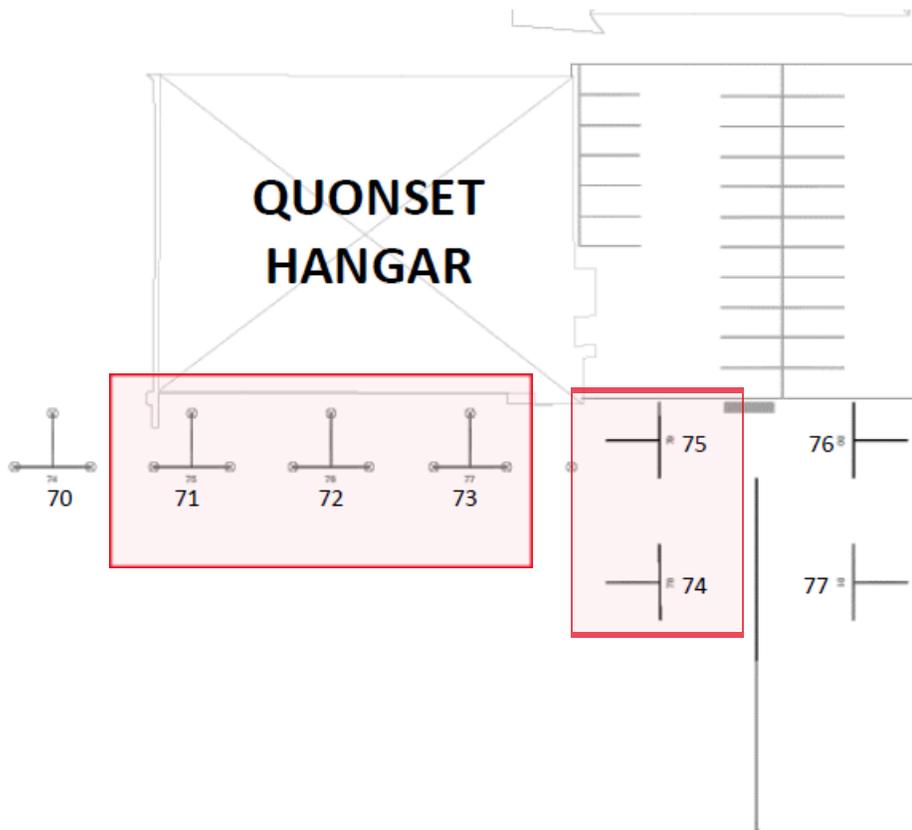


Image 2.) Aerowood's Tie Down Reference at Quonset hut Hangar (Spots 71-75)

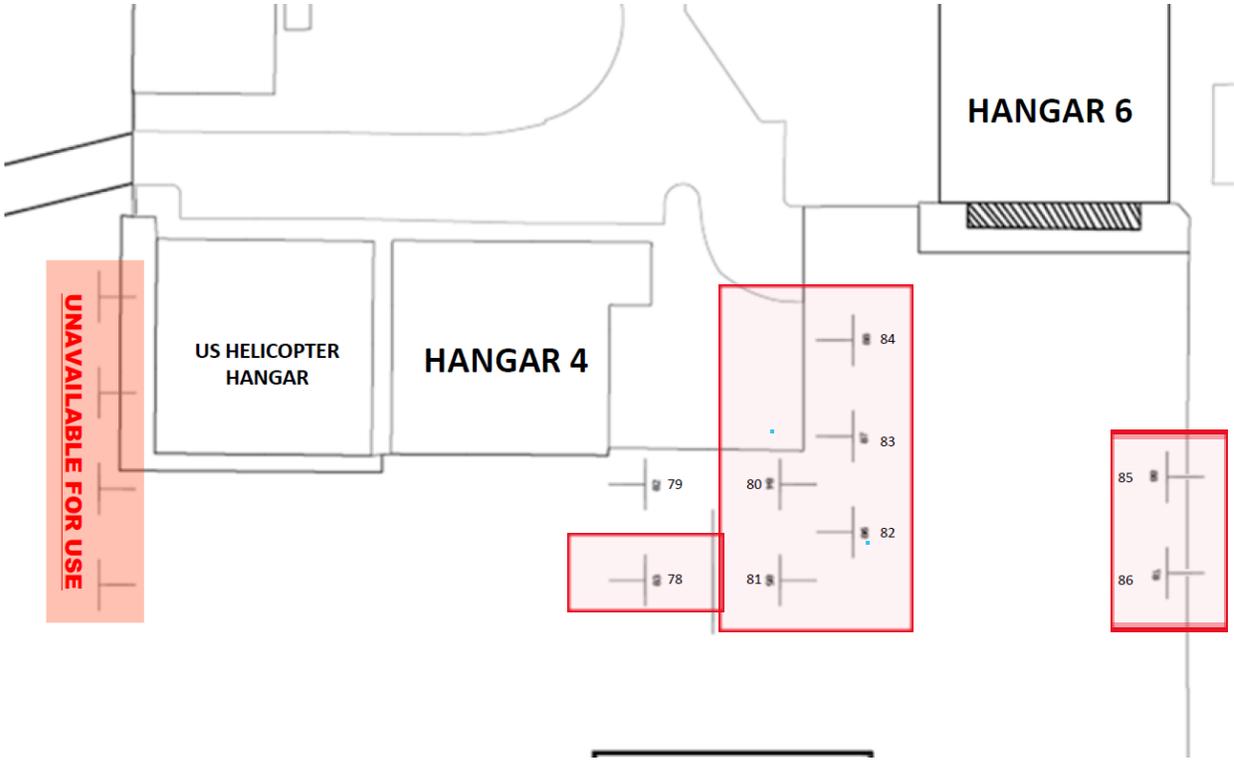


Image 3). Aerowood’s Heater Plug in locations at Hangars 4, 5, and 6 (78, 80-86)



Image 4). The Blue cord of the Rheostat/Control Box plugs into the GFCI





Image 7). Do NOT plug GFCI in between the yellow extension cord and the splitter.  
GFCI goes between blue cord and yellow extension cord



Image 8). Blue Cord Plugged into the Airplane - inside the oil access door  
notice LED in plug is illuminated



Image 9). Cord Draped on C172N model - control box is under wing



Image 10). Cord On C172H model - control box is under wing