

Subject: Cold(er) Weather Flight Operations

After this weekend's snow and cold weather there is little doubt that winter is here! I've been known to say that the only good thing about winter is that it brings much lower density altitudes and thereby greatly improved aircraft performance. It is important to note however, that pre-flighting, starting and warming up the airplanes in these kinds of temperatures requires some different thought processes than flying in milder temperatures. A pilot must look at a number of variables so as to ascertain what steps might be necessary to properly engage in flying activity.

1. How cold is it? In Alaska pilots of piston powered aircraft do not fly when the temperatures get near minus 50F or so. Imagine that. Fortunately we don't have to worry about these extremes in Lancaster County, PA but we are sometimes faced with conditions that do require some form of pre-heat before our aircraft engines will even consider joining us on our flights. The benefits to preheat are better lubrication and reduced wear. In cold temperatures the engine oil thickens which reduces its lubricating abilities after start-up and the engine also becomes more difficult to start. **At Aero-Tech Services we prefer that the aircraft engines be pre-heated when the temperature drops below 30F.** This will reduce the chances of difficult starts, starter and engine wear, and fires caused by over-priming and subsequent backfires. The best way to preheat an aircraft is to put it in a heated hangar. This not only heats all the engine components equally but it also pre-heats the cockpit! If the hangar is full the next best option is an electric heating element installed on the engine oil sump which preheats the engine oil. We will soon have heating elements installed on all of our rental aircraft. You will find the plug near the engine oil filler tube/dipstick.

2. How much primer should I use? When we get in our cars, no matter what time of year it is, the start procedure is pretty much the same; we turn the key and it starts. I wish I could provide a magic bullet for starting an airplane but it just doesn't work that way. Some airplanes are fuel injected, some have longer primer strokes, and some are just more temperamental in colder weather. Each airplane has its own set of best practices for starting and what works in some aircraft doesn't work very well in others. There are however a few guidelines that can be applied universally as you learn your individual aircrafts' starting characteristics.

a. Always start with less prime and work your way toward adding more. Over-priming can lead to flooding which can lead to a different set of problems for starting.

b. Understand the engine and system. Many pilots don't understand that pumping the throttle puts fuel into the intake manifold whereas the primer injects fuel directly into the cylinders. Another miss-understood concept seems to be the priming function of the fuel pump on a fuel injected aircraft vs. a standby electric pump on an aircraft that isn't fuel injected. While we do run the pump prior to start on a carbureted engine it is more to verify that the pump is working than for any priming function. On a fuel injected aircraft the pump is the means of priming, or sending fuel into the cylinders for starting.

c. When you hit the starter, let the engine turn over a few times then stop. If it doesn't start under the current circumstances, continuing to crank the engine likely won't help matters. Stop cranking, perhaps add a bit more prime, try again. Remember that the starters have limitations too and should not be cranked more than six seconds with a ten second rest period between. After three such attempts a three minute rest period is required to prevent burning up the starter motor. Remember to turn off the Master Switch during this time to conserve battery power.

d. After engine start set the throttle at the lowest possible idle setting, not more than 1000 rpm. Although you should have adequate oil pressure within 30 seconds it can take longer for cold oil to reach all the important parts of the engine. Idling at the lowest possible power setting will also reduce the risk of damage to the prop when the aircraft is not moving.

3. Will there be frost? If you plan to fly early in the morning frost can cause a lot of delay. Without deicing fluid the only way to effectively deal with frost is to put the airplane in a heated hangar or wait until it melts or sublimates. We try to keep an eye on the schedule so that the "early birds" are hangared overnight but please feel free to call and discuss your planned flight with us if you have an early departure planned. Several pilots have already taken advantage of this option this year and were rewarded for their efforts with frost-free, warm aircraft! We welcome these kinds of calls as it helps us know how we can serve you. By the same token, if you find that you will not be taking your flight please amend Schedulebook asap so that we can plan accordingly.

4. What about parking and securing? One of my biggest pet peeves is to see an aircraft handled like an all terrain vehicle while on the ground. In flight an airplane is very rugged and can handle almost anything we pilots can dish out. On the ground however they are quite fragile and even the smallest of miss-handled situations can have expensive if not dangerous results.

a. Park into the wind. Aircraft are designed to have airflow in one direction; from nose to tail. Any pilot aspiring to any level of airmanship should *always* be mindful of surface wind direction and velocity. An airplane properly secured and headed into the wind will weather a storm quite well but when we park with the tail into the wind we face numerous possible consequences. Here are a few:

i. Broken door stays. How many times have you opened the aircraft door only to have it swept away from you? If the door stays do their job they will prevent the door from being ripped from its hinges or slamming against other parts of the aircraft. If the door stays are already broken they may do no good at all.

ii. Bent, broken or jammed flight control travel stops. Wind blowing from the tail of an airplane tends to be like petting my cat from the tail forward; things get crazy. Hopefully the control lock will be installed prior to exiting the aircraft but I routinely find aircraft parked without control locks installed. In gusty winds controls will be blown forcefully back and forth against the stops which can cause damage to the stops or to the

control surfaces themselves. By the way you should look for this kind of damage on your pre-flight inspections as well.

iii. Weathervane tendency. If you've ever been at the airport when the winds really kick up you will actually see airplanes begin to turn toward the wind while sitting on their parking spot. Understanding how to make a good tie-down knot is essential for properly securing an aircraft outdoors in the winter.

While winter weather poses a different type of challenge to us as pilots it is quite manageable and can lead to some of the most satisfying flying you may experience. At Aero-Tech Services we have taken many steps to accommodate your winter weather flying and we hope you will take advantage of them. If you have any questions or would like to take the opportunity to expand your comfort level we will be happy to take your call or e-mail. Better yet, stop by for a cup of coffee or hot chocolate!