

Cold Weather Blast

In Aviation we do a lot of actions over & over to become better pilots. We may get tired of reading the same material time & again, but we learn something new each time. A hidden gem making us a more aware pilot. So, the following is another verse of same song. Learn + Apply + Share.

Winter flying can be a lot of fun with an anticipated adventure or it can be a struggle. Cold dense air boosts engine power aids wing lift & is often stable & smooth (good time to take significant other(s) flying). After a winter front passes, we can get some great visibilities. However, aircraft aren't particularly fond of cold temps & require a bit of extra preparation. Taking the time to prepare yourself, passengers & aircraft will increase safety & comfort. Fortunately we have a hanger to keep our aircraft out of the harsh elements however it can get quite chilly inside the hanger.

If you are not familiar with our winter engine pre-heat operation, please ask. We use two (2) electric cords per aircraft plus a small heater with dryer vent tubing attached. The foam pads fit into air intake openings in nose cowling. One electric cord attaches to a plug found near the oil dip stick (64R has plug in left nose cowl). This plug is on a line coming from the oil sump pan heater. The other electric cord plugs into the small heater. Please keep the heater on a chair. A blanket is available to place over upper cowling keeping the warmth in while you do your usual thorough preflight. When you are ready to go experience a fun, safe flight PLEASE UNPLUG the heater. No reason to keep it running while the plane is gone. With power cords strung across hanger floor you & your passengers should tread cautiously. Also ensure electric power cords are not lying in a puddle of water on hanger floor especially if plugged into circuit.

Starting an aircraft engine even after some preheating can result in a discharged battery and unnecessary engine wear. This situation stems from too short a preheat and/or not enough heat. We have said before that hooking up the heaters and oil sump heat while you do a good preflight (of at least 30 minutes) should suffice. However, you may need to extend the time as our small heaters really don't put out that much heat. If OAT is below freezing why not use a separate heater for each opening in nose cowl. Perhaps one in cabin. Throw an extra blanket over cowling. All this of course is only good if each member is willing to take the extra time to ensure a good preheat & save Hobbs time. BTW 93F has heat to each cylinder when the sump heat is plugged in.

The damage that we do to an engine w/o preheat can occur in two common ways. The first is making lots of cold starts when the temps are below 40 F. Secondly a few cold starts when OATs are in the single digits can do even more damage that may not be readily apparent until next summer when you have low oil pressure or low compression. While the engine may run ok after it is warmed up, damage will become apparent at some point and shorten engine life. The amount of engine wear that one cold start costs in engine life can be beyond belief – and it doesn't have to be that cold. Avgas doesn't vaporize very well when cold especially below about 20 degrees F. Preheating helps to ensure adequate lubrication during the start, initial engine warm up phase & to aid better fuel vaporization.

Cold weather and moisture affect electrical systems & battery power output (even when fully charged) is reduced dramatically. We use sealed batteries which provide extra capacity cranking. A significantly discharged battery will take hours to recharge in flight, a potentially exciting situation should the charging system fail. Let maintenance know ASAP about low battery power. Leaving a discharged battery

remain in extreme cold battery literally swelling & did occur to one of our Good preheat will make the output is diminished freezing temps the battery long as it would at 70F. The engine makes for increased overcome, causing it to straining the starter. **Do Not Attempt a Start with a Low Battery.** This will only compound the situation. Notify maintenance to get battery charged up to capacity. Monitor alternator output (ammeter) especially after starting & during low RPM operations to verify system is charging properly.



conditions will result in the bursting at the seams. This batteries.

battery's life easier. Battery severely in cold weather. At will only crank about half as contracted metal of a cold resistance the battery must discharge more amperes &

Even with our pre-heating arrangements the engine block requires a bit of time to reach operating temp. Please allow for the needle to come off the bottom and approach the green before putting power to her. The engine will bless you with long life and continued safe flying. When you arrive at our hanger plug in oil pan & heater. Length of preheat will depend on how long engine has been exposed to OAT. Reach thru an access opening to touch engine block to determine if your amount of preheat has taken chill off engine. The time it takes to do a "good" preflight may be enough but not always. We have been using this method to preheat for several years & if done with patience/care has been sufficient. Have an "early" morning flight you might make arrangement to start preheat night before. During work week Aero Services if given enough notice will visit our hanger to accommodate.

With persistence & lots of priming aircraft engines can be started & run when cold-soaked. But the engine will be damaged for lack of lubrication as excessive priming dilutes & washes off existing oil film on cylinder walls & may cause a carburetor fire (providing opportunity to exercise your emergency egress procedure). As the engine warms up moisture from engine & oil vaporizes & is vented overboard through the breather tube. This tube may freeze shut causing the engine's internal pressures to increase until the crankcase oil seal is pushed out of position resulting in the speedy exit of engine oil as it flows aft over the cowling & windshield. Continental Engines (182) are particularly susceptible to have these tubes freeze. The tube exits engine case a few inches aft of prop flange & routed rearward along top of engine. This routing exposes the tube to cold air coming through the cowling. A hole located up from the exit end of the breather tube should be checked for blockage (especially if aircraft has taxied through snow or icy slush).

Any water in the fuel system can cause excitement you may not desire especially when OATs get near freezing. During your excellent preflight do the Cessna Wing Rock and be sure to check fuel drains & sump. Fuel selectors can freeze in position so move the selector thru all positions just remember to place in BOTH for T/O.

Allow engine to slowly warm up at 1,000 to 1,200 rpm unless it is necessary to reduce rpm to keep from exceeding oil pressure redline. As the engine oil warms up the rpm can be slowly increased.

Please Allow Plenty of Time For The Engine To Warm Up! Hydraulic lifters, which adjust the valve lash to compensate for engine expansion during warm up & operation, are dependent on oil to work correctly. We use Phillips XC 20W-50 which allows oil to circulate easier throughout the engine after start but still requires warm up. In no way does our use of multigrade oil constitute a mitigation of the potential engine damage since the problem is one of dissimilar

metal parts that heat at different rates. At cold temperatures you can literally have aluminum to steel contact. No oil will protect against that situation. The oil we use does make starting a bit easier however.

Don't Consider Taking Off Until Oil Temp Has Reached at Least the Bottom of the Green.

Just like all of us, aircraft engines are sensitive creatures. Reduce power gradually especially in cold weather. Just because the air is cold & dense doesn't mean you shouldn't lean. The scavenging agents in avgas require some heat, usually around 1,200 degrees F. to keep lead from depositing in the combustion chamber & on the plugs.

If landing & taxiing through snow/slush minimize brake usage (should do so year round). Warm brakes will melt any frozen material upon stopping then refreeze locking plane in position (could ruin your entire day). This is especially bad situation if parking outside for extended time (MYL?).

It is the responsibility of all T-Craft members to care and operate our aircraft in a responsible and safe manner. Please remember aircraft engine temps need to come off the bottom and indicate an upward movement BEFORE doing a power run up. Best to have it touching the "green". Winter flying is going to cost you additional time on the Hobbs (especially so if you don't preheat!). Learn to live with it. Be kind to your engine and it will provide you with many hours of safe flights!



Heaters have a safety switch on bottom which has tape over. If tape comes loose the heater may turn off so make sure tape is secure.

Winter flying requires the correct mental attitude, a commitment to pay extra attention to the care & maintenance of aircraft, & a willingness to wait out suspicious weather. These are minor inconveniences compared to the payoff. Slow the pace of your preflight so something important is neither skipped nor missed with your discomfort of the cold.

Have fun, be safe, pay attention to the little things, take care of our aircraft, and please don't do anything foolish (or stupid).

Thank you for taking your time to read all this.

Jim Eyre
Director of Maintenance
T-Craft Aero Club