

Cold Weather Light Aircraft Operations

Anyone who has flown up here on a 20 below day knows how beautiful the North really is, and how wonderful density altitude can be for performance too:

Justin Rogers came to a COPA meeting last fall to discuss winter operations. He provided us with Lycoming Service Instruction 1505 and Continental Service Information Letter SIL 03-1; These are the official references, but since they are already available on-line let me try to combine and summarize them both right here in plain English;

- 1 Damage is possible when starting at cold temperatures.
- 2 The engine will be stiff, and the battery weaker.
- 3 Somewhere just below 0 C we should begin pre-heating.
- 4 This should be done with forced air to warm the entire engine and the oil.
- 5 An engine blanket adds to effectiveness (leave an opening for air to leave).
- 6 Make sure you don't heat wiring etc. to the point of damage.
- 7 Heat until the entire engine is warm (include sump, oil lines, intakes, oil coolers, cylinders....)
- 8 Start without delay using recommended procedure, take care not to over-prime (hydraulic lock or fire).
- 9 Crank for shorter periods than normal.
- 10 Make sure you have oil pressure (above 30 psi and below 100 psi) within 30 seconds of start.
- 11 Engines have been known to start and quit, and not start again from moisture on spark plugs (reapply heat to engine).
- 12 Keep RPM low until oil temperature rises.
- 13 Cycle your constant speed prop several times.
- 14 Do regular runups and checks, watch for normal readings.
- 15 Always apply and reduce power smoothly and slowly, watch for roughness, surging, excessive manifold pressure, fuel flow etc. during operation.
- 16 Monitor temperatures more often.

My recommendations after years of winter flying in Yukon;

- Service the aircraft often and use winter oil
- Gasoline doesn't vaporize well at cold temperatures (at Minus 20 C (my personal cut-off temp.) small engines can have a real tough time just running).

- Expect leaner running, higher EGT's, especially when powering down following climb.
- In severe cold all of us have closed or restricted intakes or cowl vents to keep CHTs up and reduce shock cooling and raise engine oil temperatures; It is probably best to consult an AME if you plan on using much of the duct tape. Convention says try to reduce air movement at discharge openings first.
- OAT varies with altitude, watch for inversions or unexpected temps and climb, fly, and descend appropriately.

-Don't forget to close off unneeded cabin air vents, and other leaks too.

-Your windshield will fog or frost up, especially with a couple of sweaty heavy breathers in wet parkas on board. Hot defrost on a frozen plexi windshield will fog and craze it. Allow it to warm slowly, don't just open it full blast.

-Have a good (new) CO Detector.

-Do not use an ice scraper on any part of aircraft (break that little plastic weapon right off your snow brush to avoid temptation)!

-Look under your wings for ice too.....especially following big outside temperature changes.

-When you pre-heat do the inside (instruments especially) too.

-Gas Line Antifreeze, to use it or not; These days nothing will get a 'no comment' from your AME faster than asking about this. Good practices are best prevention. Keep all tanks full. Refuel only from clean and dry sources. (North 60 advises me that they put additives in when temperatures are very low.) Even with all this I have found tiny ice crystals floating in my tanks at extreme cold. I used ISOPROPYL ALCOHOL in each tank and the crystals disappeared. My AME said DO NOT use Methyl or Ethyl Alcohol!

-Wing Covers; use them. Get good tight ones that don't move and chafe in the wind. Get Tail covers too. Watch out for warm days when the melt will run into your elevator hinges and freeze again at night. Remove them and dry them occasionally. A little snow left on top prevents movement and blocks sunlight too.

-Keep the snow off your aircraft with a soft long bristle broom. All 172's will imitate a tail dragger once they have 6 inches of snow on the horizontal stabilizer. If your sweeping wing covers remember where your antennas and expensive bits are located. Do not bump windshields with hard objects. When the -40C comes Fabric is fragile too. Any direct pressure and movement will leave ringworm (spiral cracks) in your fabric.

-Plexi shrinks 1/8 inch per foot between -25C and +25C. If your windshield is 6 feet from end to end, it has shrunk 3/4 inch at this cold. And it is brittle as egg shell now, you don't want to move the plane excessively. A crack will appear and travel instantly.

-So, reduce aircraft movement with secure tie downs if you're outside. that will reduce wear and remember, if your plane can carry 800 pounds at 45 mph, it will do that without you in it too. A gust that high is not uncommon. I have a photo somewhere of a Chinook U/L on top of Doc Bamfords hanger; The owner argued with me that he had tied it down well enough? (If you can afford to replace your bird, can you afford to replace the IFR certified Beech with the new paint and engine you landed on?) And tie that tail down, (if you only have 1 piece of rope tie the tail instead of a wing.)

-Pay particular attention to your brakes in winter. During pre-flight clean all snow and ice away. When used in the cold the heat can melt any ice or snow on them which re-freezes in flight, effectively locking them on. And, at -30 or colder brake fluid remains

very thin and fittings shrink, resulting in lost fluid. Check for red spots under your wheels, and monitor that reservoir level.

****These are only our suggestions based on many years of experience and you should consult with your own AME for final word.***