TIPS ON WINTER FLYING

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Introduction

Winter flying in Ireland can adversely affect flight operations. Poor weather conditions with fast moving fronts, strong and gusty winds, blowing and drifting snow, and icing conditions are just some of the conditions that require careful planning in order to minimize their effects. Operation in this environment requires special winter operating procedures.

These pages are designed to refresh the pilot's memory in cold weather operations. Pilots should assure themselves that they have obtained adequate cold weather knowledge appropriate to the aircraft used and the geographical and weather environment. Winter flying is not particularly hazardous if the pilot will use a little extra caution and exercise good judgment in analyzing weather situations.

The material presented here has been taken from many discussions of winter flying techniques with highly qualified GA pilots around the world; experience gained in accident investigations has also been included in this guide.

Tips on Winter Flying

Most pilots are familiar with winter conditions in their particular area; however, often a distance of a few miles or a trip abroad may change the environment enough to present new problems to an inexperienced pilot. There are certain precautions that are significant to winter flying. Flight planning during winter months will require special knowledge in order to protect the aircraft as well as the pilot. Extra precautions should be used.

Often roads that are well travelled during the summer months will be abandoned in the winter. To be forced down far from civilization may create a serious problem of survival. Most flights in small aircraft would not be extended more than a few minutes if a well-travelled route were followed.

Even the vehicles on the road can give valuable information. You may see cars and trucks coming toward you with fresh snow adhering to the front of the vehicles. In most cases, you may as well start making a 180-degree turn due to reduced visibility ahead.

Of course file a flight plan. A flight plan, in conjunction with an ELT, and a little knowledge on winter survival may save your life. Experience has shown that the advice of operators who are located in the area where the operation is contemplated is invaluable, since they are in a position to judge requirements and limitations for operation in their particular area.

In making business appointments, always give yourself an out by informing your contact that you intend to fly and will arrive at a certain time, unless the weather conditions are unfavourable.

You, the pilot, have complete responsibility for the GO, NO-GO decision based on the best information available. Do not let 'Press-on-itis' impair your good judgment.

Aircraft Preparation

Familiarise yourself with the aircraft manufacturer's recommendations for winterizing your aircraft. Most mechanical equipment, including aircraft and their components, are designed by manufacturers to operate within certain temperature extremes. Manufacturers generally can predict their product's performance in temperature extremes and outline precautions to be taken to prevent premature failures.

Engine Oil: The oil is extremely important in low temperatures. Check your aircraft manual for proper grade of oil to be used in low temperature ranges.

Oil Breather: The crankcase breather deserves special consideration in cold weather preparation. A number of engine failures have resulted from a frozen crankcase breather line which caused pressure to build up, sometimes blowing the oil filler cap off or rupturing a case seal, which caused the loss of the oil supply. The water which causes the breather line freezing is a natural by-product of heating and cooling of engine parts. When the crankcase vapour cools, it condenses in the breather line subsequently freezing it closed. Special care is recommended during the pre-flight to assure that the breather system is free of ice. If a modification of the system is necessary, be certain that it is an approved change so as to eliminate a possible fire hazard.

Hose Clamps, Hoses, Hydraulic Fittings and Seals: An important phase of cold weather preparation is inspection of all hose-lines, flexible tubing, and seals for deterioration. After replacing all doubtful components, be certain that all clamps and fittings are properly torqued to the manufacturer's specifications for cold weather.

Cabin Heater: Many aircraft are equipped with cabin heater shrouds which enclose the muffler or portions of the exhaust system. It is imperative that a thorough inspection of the heater system be made to eliminate the possibility of carbon monoxide entering the cockpit or cabin area.

Each year accident investigations have revealed that carbon monoxide has been a probable cause in accidents that have occurred in cold weather operations. Use a CO detector, if the presence of CO is suspected to not underestimate the danger, shut off the source (heater off) and ventilate the cabin.

Care of Batteries: Wet cell batteries require some special consideration during cold weather. It is recommended that they be kept fully charged or removed from the aircraft when parked outside to prevent loss of power caused by cold temperatures and the possibility of freezing.

Wheel wells and Wheel Pants: During thawing conditions, mud and slush can be thrown into wheel wells during taxiing and takeoff. If frozen during flight, this mud and slush could create landing gear problems. Consideration should be given to removing wheel pants installed on fixed gear aircraft be removed to prevent the possibility of frozen substances locking the wheels or brakes.

Operation of Aircraft

The thoroughness of a preflight inspection is important in temperature extremes. It is natural to hurry over the preflight of the aircraft and equipment, particularly when the aircraft is outside in the cold. However, this is the time you should do your best preflight inspection.

Fuel Contamination: Fuel contamination is always a possibility in cold climates. Modern fuel pumping facilities are generally equipped with good filtration equipment. However, even with the best of fuel and precautions, if your aircraft has been warm and then is parked with half empty tanks in the cold, the possibility of condensation of water in the tanks exists.

Aircraft Preheat: Extremely low temperatures can change the viscosity of engine oil, batteries can lose a high percentage of their effectiveness, instruments can stick, and warning lights, when "pushed to test," can stick in the pushed position. Because of the above, preheat of engines as well as cockpit before starting is considered advisable in low temperatures. Extreme caution should be used in the preheat process to avoid fire.

The following precautions are recommended:

1. Preheat the aircraft by storing in a heated hangar, if possible.
2. Use only heaters that are in good condition and do not fuel the heater while it is running.
3. During the heating process, do not leave the aircraft unattended. Keep a fire extinguisher handy.
4. Do not heat directly on parts of the aircraft; such as flexible fuel, oil and hydraulic lines that may cause fires.

Engine Starts: In moderately cold weather, engines are sometimes started without preheat. Particular care is recommended during this type of start. Oil is partially congealed and turning the engines is difficult for the starter or by hand. There is a tendency to over-prime which results in harder starting. Sometimes aircraft fires have been started by over-priming, when the engine fires and the exhaust system contains raw fuel. Other fires can be are caused by backfires through the carburettor. It is good practice to have a fire guard handy during these starts.

Another cold start problem that plagues an un-preheated engine is icing over the spark plug electrodes. This happens when an engine only fires a few revolutions and then quits. There has been sufficient combustion to cause some water in the cylinders but insufficient combustion to heat them up. This little bit of water condenses on the spark plug electrodes, freezes to ice, and shorts them out. The only remedy is heat. When no large heat source is available, the plugs are removed from the engine and heated to the point where no more moisture is present.

Engines can stop during prolonged idling because sufficient heat is not produced to keep the plugs from fouling. Engines which refuse to run under these circumstances are frequently found to have iced-over plugs. After the engine starts, use of carburettor heat may assist in fuel vaporization until the engine obtains sufficient heat.

Removal of Ice, Snow, and Frost - A common cause of winter accidents is trying to take off with frost on the wing surface. All frost, snow, and ice must be removed before attempting flight. It is best to place the aircraft in a heated hangar. If so, make sure the water does not run into the control surface hinges or crevices and freeze when the aircraft is taken outside.

Don't count on the snow blowing off on the takeoff roll. There is often frost adhering to the wing surface below the snow. Alcohol or one of the ice removal compounds can be used. Caution should be used if an aircraft is taken from a heated hangar and allowed to sit outside for an extended length of time when it is snowing. The falling snow may melt on contact with the aircraft surfaces and then refreeze. It may look like freshly fallen snow but it usually will not blow away when the aircraft takes off.

Blowing Snow: If an aircraft is parked in an area of blowing snow, special attention should be given to openings in the aircraft where snow can enter, freeze solid, and obstruct operation. These openings should be free of snow and ice before flight.

Some of these areas are as follows:

1. Pitot Tubes
2. Heater intakes
3. Carburetor intakes
4. Anti torque and elevator controls
5. Main wheel and tail wheel wells, where snow can freeze around elevator and rudder controls.

Fuel Vents: Fuel tank vents should be checked before each flight. A vent plugged by ice or snow can cause engine stoppage, collapse of the tank, and possibly very expensive damage.

Taxiing: A pilot should keep in mind that braking action on ice or snow is generally poor. Short turns and quick stops should be avoided. Do not taxi through small snowdrifts or snow banks along the edge of the runway. Often there is solid ice under the snow. On a hard-packed or icy surface, the aircraft will slide sideways in a crosswind and directional control is minimal particularly during taxiing and landing roll when the control surfaces are ineffective.

TAKEOFF

Takeoffs in cold weather offer some distinct advantages, but they also offer some special problems. A few points to remember are as follows:

1. Do not over-boost supercharged engines. This is easy to do because at very low density altitude, the engine "thinks" it is operating as much as 8,000 feet below sea level in certain situations. Care should be exercised in operating normally aspirated engines. Power output increases at about 1 % for each ten degrees of temperature below that of standard air. At -40 degrees F an engine will develop 10% more than rated power even though RPM and MP limits are not exceeded.
2. If the temperature rises, do not expect the same performance from your aircraft as when it was operated at the lower density altitudes of cold weather.
3. If your aircraft is equipped with a heated pitot tube, turn it on prior to takeoff. It is wise to anticipate the loss of an airspeed indicator or most any other instrument during a cold weather takeoff-especially if the cabin section has not been preheated.

EN ROUTE

Weather: Winter weather is often very changeable; one pilot may give a good report and five or ten minutes later VFR may not be possible. Remember, mountain flying and bad weather don't mix. Set yourself some limits and stick to them.

Snow showers and Whiteouts: Snow showers are, of course, quite prevalent in winter. When penetration is made of a snow shower, the pilot may suddenly find himself without visibility and in IFR conditions. Snow showers will often start with light snow and build. Another hazard which has claimed as its victims some very competent pilots is the "whiteout." This condition is one where within the pilot's visibility range there are no contrasting ground features. Obviously the smaller the visibility range the more chance there is of a whiteout; however, whiteout can occur in good visibility conditions. A whiteout condition calls for an immediate shift to instrument flight. The pilot should be prepared for this both from the standpoint of training and aircraft equipment.

Carburettor Ice Three categories of carburettor ice are:

1. Impact ice formed by impact of moist air at temperatures between 15-32 degrees F on airscoops, throttle plates, heat valves, etc. Usually forms when visible moisture such as rain, snow, sleet, or clouds are present. Most rapid accumulation can be anticipated at 25 degrees F.
2. Fuel ice forms at and downstream from the point that fuel is introduced when the moisture content of the air freezes as a result of the cooling caused by vaporization. It generally occurs between 40 and 80 degrees F but may occur at even higher temperatures. It can occur whenever the relative humidity is more than 50%.
3. Throttle ice is formed at or near a partly closed throttle valve. The water vapour in the induction air condenses and freezes due to the venturi effect cooling as the air passes the throttle valve. Since the temperature drop is usually around 5 degrees F, the best temperatures for forming throttle ice would be 32 degrees to 37 degrees F although a combination of fuel and throttle ice could occur at higher ambient temperatures.

In general, carburettor ice will form in temperatures between 32 degrees and 50 degrees F when the relative humidity is 50% or more. If visible moisture is present, it will form at temperatures between 15 and 32 degrees F. Partial carburettor heat is not recommended. Partial throttle (cruise or letdown) is the most critical time for carburettor ice. It is recommended that carburettor heat be applied before reducing power and that partial power be used during letdown to prevent icing and overcooling the engine.

If it occurs - Warning signs:

- Loss of rpm (fixed pitch)
- Drop in manifold pressure (constant speed)
- rough running

Pilot response:

- Apply full carb heat immediately
- may run rough initially for short time while ice melts)

LANDING

A landing surface can be very treacherous in cold weather operations. In addition, caution is advised regarding other hazards such as snow banks on the sides of the runways and poorly marked runways. Advance information about the current conditions of the runway surface should be obtained. If it is not readily available, take the time to circle the field before landing to look for drifts or other obstacles. Be aware that tracks in the snow on a runway do not ensure safe landing conditions.

Post Flight

The following are a few items to consider before leaving the aircraft after the flight:

1. As soon as possible fill the tanks with the proper grade of clean aviation fuel, even if the aircraft is going into a heated hangar.
2. If the aircraft is to be left outside, put on engine covers and pitot covers.
3. If the weather forecast is for snow or "clear and colder," put on rotor or wing covers and save yourself from a snow or frost removal job in the morning.
4. Control locks or tied controls are suggested if the aircraft is left outside, and there is a chance of high wind conditions. Tie downs are, of course, also suggested in high winds.
5. During engine shutdown, a good practice is to turn off the fuel and run the carburettor dry. This lessens the fire hazard during preheat the next morning.

SURVIVAL

Survivor Priorities should be in the order:

Protection:

- Dress for the terrain you intend to overfly, wind-chill can cause critical body heat-loss if improper clothing is worn.
- Do not lose control if an off-airport landing is inevitable, a controlled arrival is always preferable.

Location: File a flight plan and have a transponder switched on – even if outside ATC radio coverage. Carry a fully-charged mobile phone. Consider a 406 ELT.

Water: Rarely a problem in Ireland. You can live without water for 4 – 6 days.

Food: The lowest priority, however, a 'bar' can be good for morale – remember 80% of survival is in the mind.

To use the chart, find the estimated or actual wind speed in the left-hand column and the actual temperature in degrees F. in the top row. The equivalent temperature is found where these two intersect. For example, with a wind speed of 10 mph and a temperature of -10 degrees F, the equivalent temperature is -33 degrees F.

This lies within the zone of increasing danger of frostbite, and protective measures should be taken. It is emphasized that the wind chill chart is of value in predicting frostbite only to exposed flesh. Outdoorsmen can easily be caught out in 30 degrees temperature. Winds of 30 mph will produce an equivalent wind chill temperature of -2 degrees

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