Weather Awareness – an article written for Sportsman's Market Inc.

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Thoughtful Weather Awareness:

The IFR instrument rated commercial pilot conducted a limited weather briefing, filed an IFR flight plan, and was cleared by ATC. He was the sole occupant of the Beech Baron. The flight was in IMC. Thirteen minutes after departure the pilot reported ice accumulation at 5,000 feet and subsequently requested a lower altitude which ATC granted. Without any further communication, the airplane impacted trees and terrain approximately 17 miles south of the airport. Local authorities reported at the time of the accident a ceiling of 300 feet overcast with a temperature of 35°F. During the pilot's weather briefing, the briefer informed him about the existing AIRMET for icing and turbulence. The NTSB concluded that the pilot's inadvertent flight into severe icing conditions was the major cause of the fatal accident. A contributing factor was the pilot's inadequate preflight planning.*

The proficient IFR pilot has a decided advantage over the VFR pilot when it comes to making a go or no go decision. The IFR pilot can easily fly in many weather conditions that a VFR pilot need not even contemplate, let alone attempt. A little morning fog or a low ceiling will stop the VFR pilot. The IFR pilot is able to fly into more weather conditions with potential hazards– as in the above example – and thus needs a better understanding of weather phenomena and certainly a more complete and thorough weather briefing. Let's examine some of the more dangerous weather conditions the single pilot flying in IMC might encounter.

Wind Shear:

Wind Shear is defined as a change in wind speed and/or wind direction in a short distance. The direction of wind shear can be either vertical, horizontal, or both. It can occur at any altitude. Its greatest significance for the pilot is when it happens close to the ground on takeoff or landing. As an example, if your airplane is on final approach with a

good headwind, and suddenly the wind changes to a tailwind, the airspeed will drop and the nose pitch down causing the airplane to lose altitude.

Be alert to the possible existence of wind shear when flying through a front, in the vicinity of a thunderstorm, or low-level temperature inversion. Controllers are on the look out for any weather condition that might produce wind shear, especially microbursts, because of all the serious and even fatal accidents that have occurred and been attributed to microbursts. A good source of information for the presence of wind shear is the PIREP. Check also the appropriate METARs for your flight – they contain wind shear information as well.

Turbulence:

Turbulence is comprised of up and down air currents that create bumpiness in the airplane. Avoiding turbulence should be one of a pilot's great concerns when flying IMC. Moderate turbulence is not just uncomfortable, it can make single pilot IFR more difficult. It is tricky to write or even turn the various dials when the airplane is jumping like a bucking horse.

There are many weather tools that can be obtained during the preflight weather briefing that contain information on the existence of turbulence. Severe Weather Warnings (WW), SIGMETs (WS), Convective SIGMETs (WST), AIRMETs (WA), Severe Weather Outlook (AC), Center Weather Advisory (CWA), Area Forecast (FA), and the PIREP (pilot report) will all help you determine where, when, and how severe the turbulence is. En route, monitor HIWAS or contact the nearest AFSS or EFAS to obtain the latest PIREPs.

In order to avoid turbulence it is necessary to develop an eye for the conditions that spawn it. This a broad subject and better discussed in another article. However, there are some obvious signs that you can key in on. Cumulus, towering cumulous, and cumulonimbus clouds indicate atmospheric instability with the possibility of turbulence. Standing lenticular clouds signify the presence of strong mountain wave turbulence. To avoid moderate to severe turbulence, stay 20 miles from a strong thunderstorm. Even above the thunderstorm there can be clear air turbulence. To avoid it, the rule of thumb is to fly 1,000 feet above the tops for every 10 knots of wind at that level. Flying under a severe thunderstorm can be deadly – don't attempt it.

Icing:

PIREPs are the best source of icing information. Forecasters can attempt a prediction of icing conditions but the only sure way to know where, at what altitude, the type of ice, and its severity, is by a pilot reporting it.

Flying in the clouds, at or near the freezing level, causes moisture to freeze on the airplane. Ice causes an increase of weight, lowers performance, and brings about unpredictable aerodynamic characteristics. When rain, falling through colder air becomes supercooled, it freezes on impact as freezing rain or drizzle. It is the absolute worst form of airframe ice. It forms quickly and is difficult to clear.

How can you best stay away from ice? If your airplane is not equipped with appropriate deicing equipment and you must fly in the clouds en route with temperatures at your flight level at or below freezing, then it is a no go situation. On the other hand, if you can stay out of the clouds or they are thin enough to climb or descend through without appreciable ice accumulation – without freezing rain around – then it might be a go decision. METARs and PIREPs are good sources of information for predicting if icing may be a problem along your intended route.

Fog:

Ground fog can be a real problem for the IFR pilot, reducing visibilities to zero. Fog, for the most part, forms in stable air. The air, cooled by the cold ground, condenses and fog forms. When the temperature/dew point spread is 5° or less, expect fog to form. If your flight is going to arrive in the evening and the air temperature is falling, look out, fog could form. In any case, when en route, obtain weather updates from ATIS, EFAS, and ASOS/AWOS sites.

Thunderstorms:

It goes without saying; thunderstorms incorporate the most dangerous weather phenomena possible. It is the one weather condition that embraces not only our previous topics – wind shear, turbulence, and icing – but also includes hail, rain, snow, and lightning. All thunderstorms are dangerous. Thunderstorms whose tops exceed 35,000 feet are extremely hazardous. The best advice regarding thunderstorms and the single pilot flying IMC is AVOIDANCE.

To circumvent these baddies, stay at least 20 miles from any thunderstorm. Why mess up a perfectly good flight.

Being able to fly single pilot IFR is a wonderful skill that provides a pilot much latitude in weather flying. It also demands thorough preparation – a complete weather briefing, an in-depth knowledge of weather phenomena, and the sense to make well informed decisions as to ones ability to attempt the flight. You will not become the subject of an NTSB weather related accident report if you follow these simple directives – thoughtfully study the weather, receive a thorough weather briefing, and stay current. Good flying to you.

*NOTE: NTSB accident report #FTW03FA064 - 14 CFR Part 91: General Aviation. Accident occurred Tuesday, December 24, 2002 in Egypt, AR. Probable Cause Approval Date: 3/30/2004. Aircraft: Beech BE-58, registration: N5TV. Injuries: 1 Fatal.