Thomas P. Turner's
Mastery of Flight

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FLYING LESSONS for May 30, 2024

FLYING LESSONS uses recent mishap reports to consider what *might* have contributed to accidents, so you can make better decisions if you face similar circumstances. In most cases design characteristics of a specific airplane have little direct bearing on the possible causes of aircraft accidents—but knowing how your airplane's systems respond can make the difference in your success as the scenario unfolds. So apply these *FLYING LESSONS* to the specific airplane you fly. Verify all technical information before applying it to your aircraft or operation, with manufacturers' data and recommendations taking precedence. **You are pilot in command and are ultimately responsible for the decisions you make.**

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This week's LESSONS:

Decision Points, Part II

The pilot of a high-performance, experimental/amateur-built aircraft (E/AB) departed VFR from western Kansas shortly after nightfall. His intended destination was Santa Fe, New Mexico. The National Transportation Safety Board reports:

> The pilot [of a Velocity experimental/amateur built aircraft] was conducting a **cross-country** flight in **night**, visual meteorological conditions when he **inadvertently entered an area of instrument meteorological conditions (IMC) and icing,** and the airplane subsequently began accruing ice. The experimental airplane was **not equipped for flight in known icing conditions**. **The pilot reported** to an air traffic controller **that the airplane had entered IMC and had accumulated icing.** The pilot then saw a 1-ft-diameter, gelatinous supercooled water mass on the windshield, and **5 seconds later, the entire windshield became crystalized with ice**. Several seconds later, **the airplane entered an uncommanded dive**.
>
> **The pilot was able to recover from the dive, but he was unable to maintain altitude and declared an emergency** with air traffic control. Subsequently, **he conducted a forced landing on rough terrain**, which resulted in **substantial damage** to the fuselage and left elevator and **serious injury** to the pilot.
>
> Ice accumulation was observed on the airframe at the accident site, and several pieces of ice were observed along the wreckage debris path. The observed ice accumulation would have precluded smooth airflow over the wing during the flight and resulted in degraded performance.
>
> Meteorological data indicated that **the airplane flew into an area of unforecast icing conditions**. It is likely the airplane entered **supercooled liquid water clouds**, which resulted in a sudden accretion of airframe ice. **Supplemental satellite weather data indicated a local potential for icing at the accident site; however, without any corroborating pilot reports of icing, *an advisory was not issued for the area*** around the accident site. **The pilot stated that he did not review weather data before departure or while en route**; however, **even if he had** he reviewed weather data, **it would not have shown that icing conditions were present or forecast**.
>
> **Probable Cause and Findings**
> The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The airplane's inadvertent encounter with unforecasted icing conditions during cruise flight, which resulted in the accumulation of airframe icing, the airplane's inability to maintain altitude, and a subsequent forced landing on rough terrain.

See https://thomaspturner.com/wp-content/uploads/2024/05/2018.0115-Velocity-NM.pdf

The flight track of the airplane was blocked on public sites at the direction of the airplane's owner. A direct route, however, would take the pilot over gradually rising flatlands until within less than 50 miles from the destination, then require a climb to over 14,000 feet to clear terrain. From the information provided it appears the pilot may have made a slight detour to the southwest, then through a pass that permits entry into the Santa Fe area at a much lower altitude. I've flown that route several times myself, and it's easy in a normally aspirated airplane at the 10,000-foot Minimum Enroute Altitude (MEA)…*unless* that airplane's wings are contaminated by ice.

It's reasonable to assume isolated clouds near mountains at almost any time. If the temperatures aloft support it, it's almost certain that any clouds in areas of mountains will contain ice. So while conditions in the pilot's preflight weather briefing (if he had obtained one) might have reported clear skies at all reporting points along the planned route of the night flight, that doesn't tell the entire story…especially in ***the microclimates of mountainous terrain***.

Remember that METARs and TAFs—the reports that show up as little green (VMC), blue (Marginal), red (IMC) or pink (Low IFR) on tablet-based flight planners—are ***only valid within five miles of the reporting point***. The Graphical Area Forecast charts (might suggest cloudiness between reporting points.

More telling might be the Visible Satellite imagery, although it shows cloud tops, not bases. Once the sun's down the view is useless. I've never had much luck getting usable information from the Infrared satellite information at night.

Even better are the Current Icing Potential (CIP) and Forecast Icing Potential (FIP) charts. These products take the almost cult-status Skew-T Diagram information and add to it the temperature, humidity and other factors needed to generate a good idea of where icing might exist, and if so, at what intensity.

See:
https://www.aviationweather.gov/icing?gis=off
https://en.wikipedia.org/wiki/Skew-T_log-P_diagram

With all this information and the raw data behind it at its disposal the Aviation Weather Center still had not forecast ice in the night, mountainous skies of New Mexico. That doesn't mean a pilot planning a flight in that area shouldn't thoroughly brief the weather, or that he/she doesn't need to at least consider the possibility of localized clouds and icing that would not be visible in the dark skies.

The airplane in question is a canard-type airplane with a high-performance, laminar flow wing. Both these design characteristics are known to be more susceptible to disturbed airflow with even minor accumulations of ice than more conventional airplanes. I suspect, however, that given the evidence found the next morning by Federal investigators the ice load was sufficient to have created very hazardous conditions even in a conventional, type-certificated airplane…**even if** that airplane was certificated for flight in icing conditions.

As we've seen so many times before, the pilot's proximity to his destination airport at the time he encountered an inflight hazard may have enticed him to continue inbound when he unexpectedly entered instrument meteorological conditions. That may be the ultimate *LESSON* of this event:

> **Execution of your plan for escaping airframe ice or an unexpected instrument conditions encounter is independent of how close you are to your ultimate goal. *If you say you'll turn around at the first sign of hazardous conditions, you have to***

turn around even if you encounter those conditions* very near *your planned destination.

Don't try to "sneak it in" if you're close to where you want to be. It didn't work for this pilot, and it probably would not work for you.

Questions? Comments? Supportable opinions? Let us know at mastery.flight.training@cox.net.

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Thomas P. Turner, M.S. Aviation Safety
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