

## Chapter 2: A Night To Remember . . .

*The Wright Brothers created the single greatest cultural force since the invention of writing. The airplane became the first World Wide Web, bringing people, languages, ideas, and values together.*

— Bill Gates, CEO, Microsoft Corporation.

I had mixed feelings about my planned flight that evening from Buffalo to Joplin, Missouri for several reasons. It was a long trip against the prevailing winter westerly winds and the weather was marginal. The route would cover 1,000 miles over Lake Erie, Ohio, Indiana, Illinois, and Missouri to the former iron mining town of Joplin.

Buffalo reported instrument meteorological (IMC) conditions with an indefinite ceiling and little better than one-quarter mile visibility. Not even birds were flying that cold day in February. Several low pressure areas along the route were causing poor visibility, low clouds, snow, fog, and ice from the Great Lakes down to the Gulf of Mexico. The thought of six to seven hours of solid instrument flying, mostly at night, dulled my normal level of joy for long distance flying. I was in no particular hurry to complete my weather briefing and pre-flight tasks.

Winds aloft at all altitudes would be directly on my nose at 60 knots or more resulting in a ground speed of less than 120 knots. If I elected to fly higher than my planned 16,000 feet to improve Two Zero Yankee's true airspeed, that would lift me into an even more detrimental jet stream flow then swinging south from Canada.

With those winds, it would take over eight hours of nonstop flying to complete the trip. With full fuel, 118 gallons, and operating at the best fuel economy power setting, my maximum duration was 8.7 hours. With required fuel reserves, I would barely have enough to make the trip nonstop. I would likely have to make an enroute fuel stop which would add another hour to my already long flight. I filed my planned routing from Buffalo to Joplin direct at 16,000 feet. I could always amend this plan along the way if a fuel stop became necessary.

Modern aviation technology allows pilots to be a bit more informal in their flight planning activities than in years past. Widespread air traffic control radar coverage eliminated most of the required position reporting required in the largely non-radar environment prior to 1970. More recently, global positioning system (GPS) technology enabled pilots to fly direct to their destination rather than by

circuitous electronic airways that linked ground-based navigation aids. The advent of onboard weather detection equipment also took much of the mystery out of weather forecasting. Flying has really become a get-in-and-go activity. While not quite like driving the family car, most of the flight planning can now be accomplished by cell phone while driving from home to the airport.

After making one last pit stop, I loaded the airplane with my suitcase, briefcase, two sandwiches, several bottles of water, and the local newspaper. The forecasted outside air temperature at 16,000 feet would be minus 25 degrees Fahrenheit so I threw in a lap blanket, a ski hat and gloves. Normally, Two Zero Yankee produced enough cabin heat to remain comfortable at any temperature above a minus 20. Below that, blankets would be required. With the pre-flight complete, including a visible check of the full fuel load, I cranked up the engine, picked up my instrument clearance, and taxied out to the active runway.

Taxiing from the ramp at Prior Aviation in Buffalo to the active runway was an adventure in and of itself. Lightly falling snow, hard-packed snow covered taxiways, and ground fog turned the otherwise simple taxi from the ramp to the active runway a real ordeal. Visibility was less than one-quarter mile, obscuring many of the runway and taxiway direction signs. The cloud base was less than 200 feet

The airport dropped below the required take off minimums for airlines and commercial charter operators. For some quirky reason, Federal Aviation Regulations (FARs) exempt private aircraft from the required takeoff minimum weather conditions required for airliners, charter operators, and air taxis. That meant I could takeoff into the blind and murky conditions overlying the runway. This is something I would not ordinarily do, however the reported top of the first cloud layer was only 2,000 feet suggested that I could safely launch, despite the poor visibility. At a 1,500 foot per minute takeoff climb rate, I knew I would be above the overlying cloud layer in less than two minutes. I taxied into the runup area along side the departure runway and reconsidered the weather situation. The only unknown was the presence or absence of icing in the clouds. I called the departure controller if he had any recent reports of icing on the climb out. He reported that a Beech Bonanza took off several minutes earlier and reported on a trace of ice and confirmed the cloud tops to be at 2,000 feet. That's all I needed to hear.

I advised the control tower that I was ready for takeoff. The tower cleared me on to the active runway. Only the first 1,500 foot portion of the 8,000 foot runway was visible. The nearby control tower, terminal buildings, and hangars were fully obscured by the falling snow and fog.

As the moments passed waiting for the takeoff clearance, I ran through the final departure checklist, set up the navigation radios, and dual GPS moving maps for an immediate return to the airport should that be necessary, though unlikely. The GPS maps displayed the New York State Thruway passing just north of the airport. I knew that in a worst case scenario, I could use the GPS to find the Thruway and use the center median between the traffic lanes as an emergency landing site, if absolutely necessary. Somewhat better weather conditions were being reported at the Niagara Falls Airport, 15 miles to the north. This would also make a suitable alternate should I encounter mechanical problems during the climb out.

The tower called with my take off clearance, requesting that I advise them when on the roll. This is where even the most experienced, jaded pilot bites his lower lip. Taking off in low visibility condition must be similar to what shuttle astronauts feel as they hear the roar of the rocket boosters lifting them off the pad. Once the candle is lit, there is no turning back.

I advanced the throttle and released the brakes. Outside visual references were peripheral only. As the ground roll approached the 67 knot lift-off speed I could see only the runway edge lights racing by at blurring speed. Stopping on the runway was no longer possible. My instrument scan was as rapid yet focused. Airspeed, directional gyro, oil pressure, fuel flow, ammeter, vacuum pressure, oil temperature, tachometer, both attitude indicators, and the turn coordinator. Everything was looking good.

A slight tug on the yoke lifted Two Zero Yankee slowly off the ground. I retracted the gear and lowered the nose somewhat to reduce drag and to build airspeed quickly. My plan was to “zoom” climb through the 1,000 foot thick cloud layer to the clear, dry, ice-free skies above. Visual contact with the ground was instantly gone.

This was the point where science and faith instantly merge, where everything one ever learns about instrument flight comes into play. Cross-checking the instruments, looking for confirmation of level wings, adequate airspeed, and proper climb rate were the business of the moment. Any distractions caused by engine roughness, low oil pressure, fluctuations in fuel flow, or high oil temperature must be put aside. Above all, *fly the airplane* was the mantra I repeated just as every basic instrument student is taught to do. I said it to myself over and over.

Life is good, I thought to myself. This was where years of training and practice get converted to productivity. No dress rehearsal here. This was the final performance. It was show time. I marveled at my own sense of concentration. For the moments between brake release and punching through the clouds, nothing else mattered.

Strangely, despite the complex tasks I was performing as Two Zero Yankee broke into the clear skies above, I wondered about the millions of people who experience few joys in life because they pursue few risks. They are the 60,000 football fans in the stands, desperately in need of exercise, who watch 22 football players, desperately in need of rest. Perhaps it's a modern society thing. Maybe we are raising a generation of people of ease, who would rather click the channel changer than risk the humiliation of failure. At that point, it did not matter. I had to return to the business of flying.

Breaking out on top of the underlying cloud layer always provides an instant sense of relief. It is a bit like SCUBA diving in underwater caves where quick access to the surface is not possible. Seeing the glistening surface above after a long swim through a cave is a great feeling - as is emerging out on top of the clouds. It was time to relax for the first time since engine start. Everything was running fine. I clicked on the autopilot and slid my seat rearward to give my bent knees a needed stretch.

A climb into the upper flight levels in a high performance single engine aircraft is not exactly a walk in the park. Proper engine management requires constant tweaking of the mixture control, adjusting the cowl flaps, and maintaining a climb rate that pushes you up through the icy clouds quickly

without overheating things.

Within minutes I penetrated the next cloud layer above. This one was much thicker than the first, rising upward beyond the 10,000 clearance limit given to me by Buffalo Departure Control. I resumed my vigilance for any ice accumulating on the wings and other portions of the airframe. The outside temperature was minus five degrees C. The presence of Lake Erie's 200 mile long moisture producing machine made for perfect icing perfect conditions. Strangely, however, no ice was evident.

Shortly after leveling at 10,000 feet, Cleveland Center cleared me up to my planned cruising altitude of 16,000 feet. As I powered up for the climb, I positioned the oxygen cannula, set the proper flow rate, and adjusted the autopilot to for a 600 foot per minute climb rate.

One hour passed into the next, and the next. Having reached my assigned cruising altitude, my only mandatory duties consisted of periodic responses to ATC queries as I was passed off from one ATC sector to the next. I also made fuel tank switches every hour or so to keep the airplane properly balanced. There was nothing visible outside the windows on this moonless night. Everything was black except for the glow of the wingtip lights and the blinking strobe lights.

The headwinds were worse than predicted. The GPS calculated the winds to be directly on the nose at 70 knots, thus reducing my actual ground speed to 110 knots. The estimated required time to destination was seven hours. Remaining fuel on board was 7.2 hours, thus making it unlikely that I would make Joplin without an enroute stop. No decision on this was required, however, for another several hours. I pondered the fuel situation. I gave Flight Watch a call.

Two Zero Yankee: *Cleveland Flight Watch, Centurian Four Seven Two Zero Yankee over Erie, 16,000 feet, over.*

Cleveland Flight Watch: *Centurian Four Seven Two Zero Yankee, Erie, say request.*

Two Zero Yankee: *Could you give me current and forecast weather conditions along my route of flight direct to Joplin, Missouri, please?*

A cheerful lady working at the Flight Watch desk at Cleveland Center responded with a note of caution in her voice.

*We've got a Center Weather Advisory (CWA) for light to moderate icing at all altitudes from Cleveland west through Indiana and central Illinois.*

This is the kind of news that no pilot flying wants to hear. Icing conditions have contributed to countless hundreds of airplane accidents. Unfortunately, such icing forecasts are not very precise. All they really mean is that atmospheric conditions at the forecast moment and location are conducive to moderate to severe icing.

I experienced only trace ice thus far in my trip. Trace ice presents no threat to flight, even to light aircraft with no anti-icing equipment on board. Light ice, on the other hand, accumulates at the rate of about one-quarter inch per minute. This is enough to justify an altitude change to escape the icing conditions. When icing worsens to the moderate level, it builds up on the wings at the rate of over one inch per minute. This necessitates an immediate altitude change to non-icing conditions. A delay of, say, five minutes in making this escape will result in the accumulation five or more inches of ice. This is enough to either overload or significantly alter the aerodynamics of the airplane.

In-flight anti-icing equipment such as a heated propeller or de-icing equipment such as inflatable leading edge boots provides partial relief by removing ice from the surfaces it protects as it accumulates. At best, de-icing equipment merely extends by 20 minutes or so the available to vacate the icing conditions. Severe icing represents nothing short of a genuine in-flight

emergency. Here, ice accumulates at the rate of several inches per minute and at a rate faster than any anti-icing or de-icing equipment can handle. It is as if people are standing along side of the airplane throwing shovel fulls of rapidly freezing slush all over the airframe.

The forecast of moderate icing along my route was certainly a thought provoking message. Do I continue, divert, change altitudes or land? I was in clear skies. Every thing outside looked as benign as a mid-summer night in July. Keeping in mind that icing occurs only in the clouds, as long as I could remain clear of clouds, icing would not be a problem. Thus I motored on hoping that I could remain high above the icy clouds below.

Somewhere between Cleveland and the Indiana border, things start to change as I passed through the frontal flow of Canadian air moving southeastward across the Great Lakes. The cloud tops in this area rose well above 32,000 feet, which was higher than my turbo-charged airplane could fly.

I could see ice forming on the outside temperature probe on the center of the windscreen. Switching on the ice light that illuminated the left wing, I noted that the normally black leading edge of the wing was beginning to turn white with a thin layer of rime ice. I gave Cleveland Center a call to report light ice build up. They asked if I wanted another altitude. "No, I'll stay here for a while," I replied, hoping for conditions to improve.

Listening to other radio traffic was not reassuring. Aircraft at all different altitudes were reporting icing encounters. The windscreen was now beginning to ice over. I was confident that the anti-ice hot place on the windshield would melt that when the time came to land. Before long, there appeared to be about one half inch of ice on the leading edge of the wings. I cycled the de-icing boots which blew them clean. Repeated cycling of the boots every five minutes or so in these light icing conditions kept the wings relatively ice free, but not for long.

Spat, splat, splat was the ugly sound I had come to hear only a few times earlier in my flying career. It was the sound of moderate to severe clear and milky white ice forming on the wings and the airframe. Ice was now accumulating on the leading edge faster than I could cycle it off with the boots. The radar pod hanging below the right wing looked as if a white basketball had attached itself to its forward end. The speed at which the airplane was passing through the air began to deteriorate. I had encountered a narrow band of severe icing conditions. Unless I escaped by either climbing or descending within the next 30 seconds or so, Two Zero Yankee would simply cease flying due to the enormous weight of ice it was carrying and the altered airflow over the wings and tail surfaces. I called Center.

Two Zero Yankee: *Centurian Four Seven Two Zero Yankee is in severe ice. Need higher immediately.*

If Center delayed issuing the necessary clearance for me to climb, I was spring-loaded to issue an emergency declaration and immediately commence the climb without an ATC clearance, hopefully, out of the severe icing conditions.

Cleveland Center: “Roger Two Zero Yankee. Climb to Flight Level 190. Advise when clear of ice. Say flight conditions.”

Two Zero Yankee: *We’re still in it,” was all I had time to say as I kept close tabs on the ice accumulating on the wings.*

Cleveland Center: *Understand, Two Zero Yankee. Keep me advised.*

Here again, as in the past, I wondered if I had pushed it too far. After all, moderate icing was in the forecast, yet I pressed on believing that bad things don’t happen to good pilots. Was it the pressure of tomorrow’s business appointment? Or was it simply my own *machismo*? Perhaps it was simply because I had bet and won on similar icing forecasts too many times in the past?

I had elected to climb up above the severe icing layer as long as I still had enough power to actually climb. I knew I could always descent, hopefully in a controlled fashion.

Severe icing conditions require a precise combination of temperature and moisture conditions to occur. Since temperature typically changes with altitude in a somewhat predictable fashion, I knew that an ice free altitude might only be several hundred feet higher or lower.

Two Zero Yankee was laboring under the additional weight of the unwanted icing enveloping the wings and airframe. All outside visibility was obscured by several inches of ice on the windscreen and frost building up on the inside of the side windows. I did not turn on the heated windshield panel in order to lessen the electrical demand. If we lost electrical power due to overloading the alternator, the pitot tube providing critical airspeed information would immediately freeze over. The propeller, too, would ice over thereby causing it to lose its effectiveness.

At this moment our fate was hanging solely upon a one-half inch wide alternator belt, similar to a fan belt on an automobile. If that broke, the battery would provide no more than 30 minutes of electrical power necessary to keep the instruments working. The only option then would be to literally dive airplane downward at its maximum descent rate of about 2,000 feet per minute until we reached either warmer air or clear air. From our present altitude of 19,000 feet, this could take upwards to nine full minutes to achieve. Thus, I had a *back door*, but a narrow one at best.

Two Zero Yankee: *Cleveland Center, Two Zero Yankee’s unable to climb. We need immediate lower.*

Cleveland Center: *Roger Two Zero Yankee, descend and maintain 12,000 feet. Say conditions.*

Two Zero Yankee: *I can’t get above the ice. My only choice is down. Do you have any other pilot reports of icing conditions lower.*

Cleveland Center: *Everybody’s reporting ice now. Let me know what you encounter on the way down.*

By now, the Center controller and I had become familiar friends. He knew full well the seriousness of my situation and was eager to offer whatever help he could. Unfortunately, aside from keeping me clear of conflicting traffic, there really wasn’t anything more that he could do. I was all alone. I had created this situation and now it was up to me to fix it.

I descended quickly to 12,000 feet and was now out of the severe icing conditions. Between cloud layers and free of any further ice build up, I surveyed the condition of Two Zero Yankee. I

scratched the thick frost off the inside of both left and right side windows and turned on the ice light. The wings looked like a couple of solid planks of ice.

It was a tribute to the airplane design that it was still flying. In the clear, I did not want to attempt a landing which would require another descent through icy clouds below. I decided to simply travel on waiting for the friction of the passing airflow to erode the wing and airframe

icing.

Another five, far less stressful, hours passed slowly by as I continued to wing westward over central Illinois towards Joplin. The strain of carrying the extra weight and several climbs and descents cut well into my remaining fuel load. I would have to land and refuel somewhere fairly soon. A quick glance at the chart suggested that Springfield, Illinois would be a good choice. The weather over Springfield was marginal but well within the legal and practical limits of my airplane. The only unknown factor was what I might encounter in the descent from my cruising altitude of 12,000 feet.

A quick call to ATC secured the necessary approval for my requested destination change to Springfield. I began to reprogram the GPSs. Suddenly, splat - splat, there was that sound again. Going up was no longer an option due to fuel concerns. The reported ceiling below me was 2,500 feet. This was well below the minimum vectoring altitude of 4,000 feet that ATC required me to remain above. So all I could hope for was warmer temperatures somewhere between 12,000 feet and my descent clearance limit of 4,000 feet.

I descended to 10,000 feet, then to 6,000 feet, then stopped at 4,000 feet. Moderate icing was encountered at all descending altitudes. By now, I had all the anti-icing turned on and the de-icing boots cycling every five minutes.

Ice building up at the various unprotected portions of the airplane was, again, becoming burdensome. The wing roots, where the wings attach to the fuselage were caked with at least four inches of ice. Ice had also encased the wing tip position and strobe lights, casting an strange glow that I had never seen before. The indicated airspeed was now down to 110 knots despite full power. The Center Controller handed me off to the Springfield Approach Controller.

Two Zero Yankee: *Springfield Approach, Four Seven Two Zero Yankee, 4,000 with Information Tango.*

Springfield Approach: *Good evening, Two Zero Yankee. Springfield altimeter is 29.67. I understand you've had quite a night with ice.*

Two Zero Yankee: *Ice, yes. I've still got a bit of a problem. Any suggestions?*

Springfield Approach: *Two Zero Yankee, descend and maintain 2,500 feet. You should be in the clear and in warmer air at that altitude.*

That was the very best news I had received in nearly seven hours of flying. Two Zero Yankee responded to the power reduction and lowered pitch angle like a child ponying up to an ice cream bar. The hot windshield plate created a six inch square opening for me to see ahead as I descended through the last remaining ice laden wedge of clouds below. Then, almost as if by magic I saw the twinkling lights of Illinois' state capital city below. Simultaneously, I could actually feeling the warming temperature of air flowing through the cockpit ventilation system. A quick glance out the windows

revealed the shedding ice, falling off the wings like a calving glacier.

My next concern was how best to land with a load of remaining melting ice on all unprotected areas. The darkness prevented me from viewing the aft section of the airplane. A condition known as "tailplane icing" can render an airplane uncontrollable, but I was confident that the stabilizer deicing boots prevented this from occurring. I kept the flaps fully retracted to prevent any unnecessary changes in the airfoil. Everything was running fine, albeit traveling

through the air a bit slower than the normally "clean" condition permits.

The runway in came in sight. *Keep the speed up*, I said to myself. Down we went. The gentle squeaks of the main tires touching the runway was the most welcomed sound of the entire night.

Arriving at my parking spot, I exited the airplane and marveled at the chunks of ice still adorning this beautiful bird. The radio and navigation antennae were encased in ice as was the radar pot and engine air intake openings. It reminded me of a closely cropped French Poodle with tufts of fur on its feet and tail.

*How much more could it have taken?* I asked myself. I did not know and, at this point, I didn't really care. Somehow, however, I thought things could not have gotten much worse. This much I did know, a traditional light aircraft without a "known ice" certification would have been in very serious trouble this particular evening. In my situation, the deicing/anti-icing equipment kept the important parts of the airplane reasonably clear of ice. And, in the final analysis, I always did have the necessary *back door* in the form of clear skies below 2,500 feet.

After taking a much needed stop in the restroom, I called Flight Service for an updated weather briefing for the remaining portion of my trip to Joplin. I still had about 300 miles to cover this night. I had already been in the air for nearly seven hours. The hour was getting late and I was growing quite weary. I generally limit my total work day including flying to 12 hours. I had been up since 7am and it was already 9:30pm.

The weather briefer's news was not good. She informed me of an advisory for severe icing that covered my remaining route of flight. With that news, I made what was the easiest decision of the entire day. I turned to the young lady behind the counter and asked, *Got any space in the hangar*, I asked?

*Sure*, was her welcomed reply.

*And can you help me get a room for the night*," was my next question.

*No problem*, she said.

It was a quick ride to the local Holiday Inn, followed by a much needed dinner, and a very sound sleep!

I was up early the next morning. My appointment in Joplin had been set for 9am and I had at least two more hours of flying to complete. With headwinds, this could be three more hours. I arrived back at the airport at 6:30am and checked the weather. Things were looking up. Yesterday's headwinds had subsided, the icing advisory had been cancelled.

Aside from low clouds hanging over the airport, the reported weather along my route was going to be solid VFR. I preflighted the airplane while it was still in the warm hangar and remained comfortably seated in the cockpit as the ground crew rolled the plane out onto the ramp.

I had filed Joplin direct, so flight planning was easy. All I had to do was enter Joplin's three letter identifier into the GPS, then launch.

The tower handed me off to Kansas City Center immediately after takeoff. I was still in the clouds. Center then directed me to intercept the 300 degree radial off a nearby VOR to an intersection I had never heard of before. This was the first time in many weeks that I was being directed by ATC to follow land based navigation aids. VORs (Very High Frequency Omni-directional Radio beacons) are 1943 technology, still in use to day by non-GPS certified airplanes.

Hmmmm. . . intercept a radial? Off of what VOR? To which intersection? Talk about a curve ball from ATC. I was unprepared for this unexpected bit of jockeying around the national airspace system. Where's the chart?

Two Zero Yankee: *Ahh. . . Center, this is Centurian 4720Y, can you give me the three letter identifier for the VOR you want me to navigate off of, I sheepishly requested? And while you're at it, could you spell the intersection for me.*

With that information, I could quickly reprogram the GPS, get a heading, and proceed on the requested course while I searched for the correct low altitude enroute chart.

I found the chart book and pulled out the chart covering my route of flight. I dialed in the VOR, adjusted VOR omni bearing selector (OBS) to 300 degrees. My track confirmed what I had previously programmed into the GPS, and I was now on the last leg to Joplin.

By now, I was in the clear. The rising sunrise to my back gave the cloud deck below the appearance of white cotton. And the stars above twinkled as the last vestige of night gave way to the dawning of a new day. Life is good, I thought to myself as I motored on to my destination.

The past nearly eight hours of difficult flying demonstrated to me once again that man has the ability to alter his circumstances despite what nature, or life for that matter, throws at him. The key word in this thought is *alter*. If I was resistant to changing altitudes when icing conditions worsened, I would have been defeated. In response to the higher the forecast headwinds, had I chose not to land short of my destination and refuel, these words likely would never have been written.

Inherent in this understanding of the relationship between me and the forces controlling my destiny, I meticulously created *back doors* of opportunity should my primary plan fail. Never allowing myself to become fully boxed in, without options, I could safely challenge the forces of nature in high altitude, wintertime night flight under instrument conditions.