

Chapter 7 - Big Airports and Big Weather

Great pilots are made not born. . . . A man may possess good eyesight, sensitive hands, and perfect coordination, but the end result is only fashioned by steady coaching, much practice, and experience.

Air Vice-Marshal J. E. 'Johnnie' Johnson, RAF.

Like roads and highways, there are basically three kinds of airports divided by size. The relatively small, general aviation airports like Akron and Dunkirk in Western New York are the most common. This is where over 90 percent of the general aviation fleet reside. Next in size are the many small city airports such as Buffalo, Albany, and Rochester International. Here, there is a mix of single engine and light twins and airliner traffic. Then there are the big guys such Chicago's O'Hare, Washington, D.C.'s Ronald Reagan (formerly Washington National), Boston Logan, and La Guardia in New York City where very few small aircraft are routinely based.

And like roads and highways where both cars and trucks have equal access, we general aviation drivers have equal access to the big guy airports as do airline jumbo jets. But you have to know what you are doing . . . with few exceptions, no student pilots are allowed.

Flying into the really big airports is one of my favorite aspects of business flying. Mixing it up with jumbo jets on global routes is, frankly, quite heady. These are the times when my childhood dreams of becoming an airline pilot filter up out of the deep recesses of my brain. I recall one of several recent trips into Washington's Dulles Airport with my friend Ken Condrell. My day's work in nearby Leesburg, Virginia had come to an end and I was returning to Dulles to meet Ken and fly back to Buffalo.

While not the busiest airport in the nation, Dulles is certainly one of the largest in terms of land mass. We had been parked at Piedmont-Hawthorne Aviation, which is on the far northwest side of the airport. Our departure taxi instructions were to take us south to the midfield point, then east across the field, to join a conga line of international departures, mostly jumbo jets, moving north for a takeoff back to the south. Just getting to this point required at least two miles of taxiing.

On this particularly day, we were the ONLY propeller driven, single engine airplane in the line of some 20 to 30 heavy jets from all over the world. Ground control instructed us to follow the Aeroflot (Russian) heavy jet. Behind us was a Northwest Airlines Boeing 777. We were all

told to keep the line tight as many other flights were still waiting at their gates for taxi clearance. As we inched forward, I turned around to see just how close the guy behind us was following.

"Ken, take a look behind us," I said. There, we both observed the gaping ten foot tall intake nozzle of the right engine of the 777 immediately behind us. "If that guy gooses his engine, we'll be sucked in like a fly through a kitchen fan," I said!

We eventually inched forward to the active runway "hold short" position. Within minutes, we were cleared onto the active runway as the Aeroflot jumbo began his takeoff roll on his long journey to Moscow or other Russian city.

"Centurian 4720Y, you are cleared for take off. Winds 140 at 12," came the tower controller's instructions.

"Hold it", I said to myself. The Aeroflot isn't even off the ground yet.

While I know we can't possibly catch up to him, I am concerned about his wake and its effect my small aircraft. Wake turbulence is a dangerous phenomenon that is drilled into every student pilot's head. It can roll a small and large aircraft totally around on their longitudinal axis. I wanted to delay my take off for at least three minutes to allow the wake turbulence to dissipate, however a quick glance to my right revealed the long line aircraft waiting to depart. Figuring 300 passengers per airplane, I figured there were about 9,000 people who were waiting impatiently for me to do something.

My concern about wake turbulence was increased by the fact that there was a left to right crosswind moving over the runway. This crosswind would serve to push the heavy jet's left wing wake directly across our departure course. I paused a moment longer, then advanced the throttle to full take off power. My aim was to lift off before reaching the point where the heavy Aeroflot lifted off. This would keep us well behind and above his wake turbulence. I advanced to full throttle, a notch of flaps, and lightened nose in accordance with the 210's published short field takeoff technique. The Aeroflot was still clearly visible in the evening sun as we rotated and began our climb.

Dulles Tower: Centurian Four Seven Two Zero Yankee, climb to 6,000, turn right on courses."

Centurian 4720Y: Up to 6,000, right on course, Two Zero Yank."

And off we flew home with nary a bump.

Another memorable trip into Dulles occurred two years ago as my family and I were traveling south along the eastern seaboard on a family vacation that was taking us from Buffalo to Philadelphia, to Washington, D.C., and on to Hilton Head, South Carolina. Erica was on Spring break from school and we were trying to enrich her with some historical perspectives that she could take back to school. Unfortunately, this was one of the worst weather vacations we had ever encountered. It had rained steadily the several days we were in Philadelphia and it was raining hard the morning we departed for Washington's Dulles Airport. The Philadelphia Airport was shrouded in low level fog, with visibility of less than one mile. Dulles was reporting no better. The temperature was in the mid 50s so icing would not be a problem. The only potential hazard to aviation was a slow moving line of thunderstorms traveling up the coast from the southern portions of Virginia.

I made one final check of weather before departing the Philadelphia Airport. Erica was

sitting up front with me. Jo was nestled comfortably in the far rear seat. Both appeared quite disinterested in the flight and positioned their heads for a snooze on soft pillows for the planned 45 minute flight down to Washington. We launched directly into the fog and drizzle. Ground contact was lost immediately as we climbed and turned in accordance with the departure controllers rapid fire instructions. I had hoped that we would be on top of the weather and into clear skies above before reaching our cruise altitude, but no such luck on this day. It would be hard instrument flying the whole way.

Thunderstorms pose serious threats to airplanes, but they are easy to spot and circumnavigate. However, they cannot be seen when they are embedded in surrounding cloud cover. Such was the case on this particular flight. Unlike most general aviation aircraft, N4720Y is equipped with an abundance of weather detection equipment. With the radar scope turned on, the WX500 Storm Scope powered up, and frequent checks with Flight Service by radio, I was confident that we could remain clear of embedded thunderstorms. What we could not avoid, however, was the heavy rain showers occurring along the entire route. Flying through heavy rain presents no particular risk to light aircraft, however it is noisy. The noise was so loud on this trip that it woke both Jo and Erica from their sleep. Heavy rain also has a way of finding any leaks in the aircraft hull. And it found a big one along the rear window seal immediately above Jo's head and shoulders!

Jo knew enough about aviation to realize that we were traveling in the busiest air corridor in the entire world. She also knew that I am at my busiest when flying in instrument conditions, and that my workload doubles when using weather avoidance equipment to maneuver around evolving thunderstorms. She reports the leak in the cabin and asks if everything is okay. "Sure, honey, go back to sleep," I suggest in my pre-programmed, most calm tone of voice. What Jo didn't realize at this point is that Washington's Dulles Airport, now just 20 minutes away, is sitting directly under an intense thunderstorm. The Washington approach controller called us on the radio.

"N4720Y, we have a level four convective cell directly over Dulles, fly heading 330 and plan on holding west on the Harrisburg 270 radial. Time now 1408, expect further clearance at 1435."

Translated, Air Traffic Control was putting us in a holding pattern about 90 miles north of the Dulles Airport with instructions to wait there until further advised. I plugged the location of the holding pattern into the GPS, and turned in that direction per the controller's instructions.

As I read back the holding instructions, I asked for a prognosis of the weather situation. The controller, now very busy and somewhat irritated by the suddenly deteriorating weather, mustered up a quick reply. "Don't know, Two Zero Yankee, we're putting everybody into holds north and east of the airport. Will advise."

With this, Erica wakes up. "What's going on, Dad?"

Erica sleeps with a headset turned on. She's understands most of the air to ground communications and now notes that there has been a change in plans. She's also perceptive enough to know that the beads of sweat on my forehead were not there moments before.

I do not like what I'm beginning to see. Having my family aboard makes this a bit more tense for me. Roaming around in instrument conditions midst embedded thunderstorms, even

with weather radar and lightning detection equipment, in very busy airspace with lots of heavy airliners both above and below in holding patterns, is not for the faint of heart. Turning around, I glance at Jo. She's staring back at me, her eyes are communicating trust in my judgement, but I know she is becoming anxious. I think the leak in the cabin spooked her as did the ominous dark, opaque skies outside. The increasing turbulence wasn't helping the situation. Other pilots have told me that if you scare your family one time, it could be a while before they fly with you again. I was worried about that, too. I gave Jo a reassuring smile and told her to relax and mentioned that we'll be on the ground in a few minutes. I hoped I was right, but I doubted it.

After making about three turns in the hold, the Washington approach controller called.

"N4720Y, it looks like we've got a hole in the weather over Dulles. We just got a couple of guys in. I think we can get you in. Say intentions."

The radar screen confirmed that the level 5 cell was moving slowly eastward with another one about 35 miles behind it. Cross checking this with the moving map GPS suggested that by the time I made the final approach I'd have enough space between the cells and us to make a safe landing.

"Okay, Washington, we'll give it a try," I replied.

Approach controlled cleared us out of the hold and gave me a vector direct to the Dulles Airport followed by descent instructions. Torrents of rain were still beating down on the windscreen and the visibility was nil. Looks of relief appeared on both Jo and Erica's faces as they heard the reduction in engine power that signaled our descent into the airport. Approach control gave similar instructions to the other mid-morning arrivals, many of which were foreign carriers that had been flying their jumbo jets all night from distant points around the world. You could distinctly hear the fatigue in the voices these other pilots . . . many with thick foreign accents and limited command of English. This is, indeed, where the buffalo roam!

The Dulles Airport had taken a direct hit from the level 5 thunderstorm. We could see lots of standing water on the runways and taxiways as we broke into the clear air about 300 feet above the runway. It was still raining quite hard. We taxied up to the general aviation terminal where we were met by a ramp serviceman in a van who guided us to a parking spot one hundred yards or so from the terminal entrance. Jo and Erica, with looks of rugged travelers, gladly exited the aircraft.

We climbed into our waiting taxi cab for the brief ride into town. As we drove away, I saw a huge flash of lightning and heard the crack of thunder, followed immediately by torrential rain as a second thunderstorm arrived over the airport. Nobody was happier to be on the ground than me on that particular morning at Dulles. I marveled at the wonderful freedom we have as general aviation pilots to arrive and depart in all kinds of weather right along with the big guys in the busiest airports in the world.

Like Dulles, its nearby sister airport, Ronald Reagan National (DCA), is another major league airport where relatively few single engine folks like me frequent. One reason for this is that DCA is one of only three airports in the U.S. that require an advance reservation to land or depart. The other two are O'Hare and La Guardia. This means that you must time your planned arrival and departure within 15 minutes of your confirmed reservation slot time. And like the other large airports, things happen very quickly.

My dozen or so arrivals into DCA have all occurred without incident, however each has been memorable in its own way. Landing to the south at DCA, for example, takes you down the Potomac River, directly over the Pentagon, and immediately to the west of the prohibited area over the White House and other government office buildings. You can look outside the left window on final approach into DCA and count the cars in the White House executive parking lot. Rumor among pilots has it that if you drift slightly east into this prohibited area, you'll see first hand what a Stinger missile looks like in flight pointed directly on your nose!

One of my early trips into DCA occurred with my family aboard. We were on a direct flight from Buffalo with weekend plans to visit the Smithsonian and other sites of interest in the Washington, D.C. area. I had a 1345Z (9:45am) arrival slot reservation and was right on time. The weather was clear at our cruising altitude but the Washington area was blanketed by a 1,000 foot high overcast ceiling and low level ground fog along the Potomac.

ATC vectored us east of the city, then south with a planned arrival on runway 01 to the north. I set up for the ILS approach to that runway and began descending through the clouds. As we broke into the clear at about 800 feet above the ground, the tower controller instructed me to "side step" right to runway 33, then land and hold short of the intersecting runway. This was a lot to accomplish within the final approach segment of an instrument landing.

The tower controller was simply trying to expedite his arrivals and departures by using two runways at once. Here again, I was the little guy being sequenced into the morning rush hour at DCA. Traffic was particularly heavy this morning and there was no time to ask questions of the controller. I had to hear it right and do it right . . . the first time. No retakes here! Again, this is where the Buffalos roam.

My next memorable encounter with a large airport took place at the "mother of all airports," Chicago's O'Hare Field. I was flying by myself to visit with a large hospital complex headquartered less than a mile from O'Hare. Thus, it made sense for me to use this airport rather than any number of surrounding smaller fields. And, of course, I welcomed the opportunity for another foray into major league flying.

The weather at O'Hare was hot and sticky. Thick haze up to around 10,000 feet reduced forward visibility to less than a mile. Coming from the east, my route of flight took me directly across Lake Michigan which, in a single engine aircraft, is anxiety producing in and of itself. At least the water is warm this time of year, I thought, as I contemplated the unlikely event of engine failure over the lake.

About midway across the 80 mile expanse of water, Chicago Center handed me off to Chicago Approach Control for the descent into the O'Hare area. I dialed in the Automatic Terminal Information Service (ATIS) on the radio for a recorded briefing of current weather conditions at O'Hare and any pertinent operational issues. Then things began to get busy.

Chicago Approach: "Centurian 4720Y, descend and maintain 4,000 feet, flying heading 270 degrees, contact O'Hare tower on 124.5."

Centurian 4720Y: "Two Zero Yankee leaving 10,000 for 4,000, heading 270, going to tower."

Centurian 4720Y: "Tower, Centurian Four Seven Two Zero Yankee, with Delta."

O'Hare Tower: "Two Zero Yankee, fly current heading, expect the ILS Runway 27 Right

Approach, and keep your speed up. You are number four the runway.

Centurian 4720Y: “Understand, current heading, number four for the ILS 27 Right, as fast as we can, Two Zero Yankee.”

O’Hare Tower: Centurian Four Seven Two Zero Yankee, you are cleared to land, runway 27 Right, winds 240 at 14, best forward speed.”

Centurian 4720Y: Cleared to land 27 Right, Two Zero Yankee.”

I could tell by the tower controller’s instructions and tone a voice that he was literally squeezing me into a string of airliner arrivals. His plan would work if I could maintain 150 knots across the ground on the final approach segment. I couldn’t.

I did my best to help the controller fulfill his objective, but not at the risk of me or my aircraft. With the 14 knot headwind, I’d have to maintain 164 knots indicated airspeed to maintain a 150 knot ground speed on final approach. My normal final approach airspeed is 120 knots indicated. The best I could achieve was 140 knots. In effect, I gave the problem of sequencing me in with arriving jet traffic right back to the controller. He solved it immediately.

O’Hare Tower: “Canadian Airbus Three Two Five, Go around, Go around.”

Now less than one mile from the runway, I looked up and witnessed a VERY large airplane pass directly overhead, from my rear, in a steep climb attitude, with wheels and flaps visibly being retracted. I now understood why Air Traffic Control was insisting that I keep my speed up. Canadian Airlines, unfortunately, incurred an additional three-tenths of an hour in flying expense at the rate of \$30,000 per hour or \$9,000 for that unsuccessful squeeze effort!

Yes, indeed, this is where the Buffalo roam and I loved it!

It was a routine flying day. Two staff members and I departed the Baltimore International Airport in the late afternoon last July. We had completed a busy day with a client and were anxious to get home. The weather briefing reported clear skies both at our departure and destination airports. There was, however, a line of thunderstorms moving northeastward from Northern Virginia. The line was not well developed. It was more like a series air mass thunderstorm cells, sometimes referred to as popcorn cells. It was hot on the ground, the humidity was high, and the dew point temperature was over 70 degrees. Conditions were right for spontaneous thunderstorm development.

These weather conditions triggered some concern in my mind as we made final preparations for departure. Lines of thunderstorms are not safely penetrable by either small or large aircraft. One must either go around or fly over them. Since most thunderstorms soar to well over 35,000 feet, not even my turbo-charged 210 can top them. Airmass thunderstorms, on the other hand, are convective cells that pop up in random order over large geographic regions. They are easily seen and a cinch to navigate around. Such was the case on this day.

We took off in normal fashion, climbed to our cruise altitude of 15,000 feet, and motored smoothly north to Buffalo. The only discomfort was the stifling cabin temperature, which was well over 95 degrees F. when we taxied to the runway. The outside air temperature naturally cools at the rate of about 3.9 degrees F. for each 1,000 of altitude, so that by the time we reached 10,000 the outside temperature had cooled to a comfortable 60 degrees F. Everything was running fine as I switched on the radar scope to scan the sky ahead. Nothing appeared all the

way out to the 180 mile range. The storm scope also reported negative convective activity ahead over the same range.

I sensed that our good fortune would soon end as we motored further on to where the thunderstorms were reported to be. Sure enough, the Storm Scope was the first to show an indication of weather ahead. It appeared as a series of small yellow “Zs” clustered close together about 200 miles ahead. It wasn’t until we traveled another 120 miles before the radar scope displayed the associated precipitation. Now within about 70 miles of the impending weather, both the Storm Scope and the radar displays were alive with cautionary information.

I gave Flight Watch a call on 122.5, advised them of our position and destination and requested a status report on the weather we were seeing on our detection equipment. Their information was not good. While not associated with a weather line or front, thunderstorm cells were beginning to pop up in all quadrants - to our front, sides, and rear. Given the temperature and due point, I knew this could happen anywhere along our route of flight. Fortunately, the visibility was unlimited. We could easily see the darkening skies all around us. We motored on knowing that we could make a break for any of a number of airports along our route should the weather worsen.

It wasn’t long before towering cumulonimbus clouds began to encircle our craft. The radar scope painted large, ugly red circles indicating heavy precipitation throughout the width of its scan. The Storm Scope confirmed that the rain cells ahead contained moderate to heavy convection inside them. We were, indeed, in the midst of a growing field of rapidly developing thunderstorms. The good news was that we could easily confirm their precise location both visually and with our weather detection equipment. I felt confident to proceed on course as long as I could remain at least 25 miles abeam any convective cell. But this was getting difficult to do.

One of my two passengers was fast asleep in the back. The other was sitting to my right with a look of anticipation on his face. Visible lightning was emerging from the dark clouds all around us.

“We okay, Bob,”

“Sure,” I replied with a bit of self-doubt creeping into my head. I wondered if we should cut our losses by finding a place to land. We were over Central Pennsylvania which, by the way, is one of the most heavily forested states in the nation. Our landing options were fewer than I originally thought.

We could no longer maintain to our current heading. I called New York Center for permission to begin deviating around emerging convective cells off our nose. Permission was immediately granted for a left 30 degree turn with instructions to call back when clear of the threatening cell ahead. Thor was beginning to raise its ugly head as I again called for further deviations.

We encountered heavy rain in the relatively smooth air we had been riding in. The noise woke up my rear seat passenger. The sky was a horrible shade of the darkest gray that typically accompanies thunderstorms. The rain had reduced our visibility to less than five miles. My eyes were now glued on both the radar screen and the Storm Scope. Feeling satisfied that both instruments were agreeing with each other, I began the delicate process of threading the needle.

That is, I began to maneuver through the numerous convective cells ahead. I called New York Center.

Centurian 4720Y: “New York, Two Zero Yankee needs further deviations either to the left and right around weather ahead.”

New York Center: “Roger, Two Zero Yankee, deviate as necessary. What are your current flight conditions?”

Centurian 4720Y: “We’re in heavy rain, the ride is smooth. We’re showing convective cells in all quadrants. Can you give us any weather conditions ahead, Two Zero Yankee?”

New York Center: “It doesn’t look good, sir. A line of thunderstorms containing numerous Level Five cells has developed from the Washington, DC area up through Northern New York. It appears that you are now in this line.”

Hmmmm . . . this was getting worse than predicted, I thought to myself.

Centurian 4720Y: “New York, we’re showing a small break in the weather to our west that I think we can sneak through. Request a turn to 270 degrees.”

New York Center: “Two Zero Yankee, turn to two seven zero degrees.”

While the radar scope was painting red throughout most of its screen, the Storm Scope displayed a marked reduction in convective activity to the west. With this information, we could snake ourselves west through a break in the line without encountering aircraft damaging thunderstorm activity.

New York Center: “Two Zero Yankee. What are your flight conditions now?”

Centurian 4720Y: We’re still in heavy rain, ride is bumpy, but we’re clear of the convective cells. It looks like we can return on course., Two Zero Yankee.”

New York Center: “Roger, Two Zero Yankee, fly heading 350. Keep us advised of your flight conditions.”

With that information, I heard New York Center issue vectors to a Buffalo bound Citation Jet about 50 miles behind us. This transmission went something like this:

New York Center: “Citation 4827, a Cessna 210, about 50 miles ahead of you, found a hole in the line. Suggest you follow him through by flying heading 270 degrees.”

Citation 4627: “Yes sir, we’ll do that. How’d that little guy find that hole, Six Two Seven?”

New York Center: “Beats me . . . but he did.”

And so goes the wonderful nature of Storm Scopes. Airlines and most business jets are not yet equipped with Storm Scopes. They all have weather radar, but that only depicts precipitation, not thunderstorms. Storm Scopes, on the other hand, display sparks caused by rapidly sliding vertical columns of air which signal the presence of thunderstorms. So when it is raining all over or when visibility is poor, the big guys must depend on Air Traffic Control to steer them through convective weather.

I do not wish to leave the impression that thunderstorms are to be toyed with, even with the most sophisticated weather avoidance gadgetry. A single thunderstorm over a major metropolitan area such as New York City can tie up the entire national airspace system for hours as traffic is rerouted around the offending weather. Having experienced about a dozen headline grabbing, thunderstorm related fatal accidents over the past quarter century, the airlines routinely

suspend arrivals and departures if a thunderstorm drifts within 10 miles of the airport.

Not long ago, I and a lady associate from my office were standing on the ramp at Hanscomb Field, located just outside of Boston. It was another hot August afternoon and we getting ready to depart for Buffalo after a long day of meetings. My weather briefing revealed the presence of a sharp line of thunderstorms moving northward from Albany, directly across our planned route of flight.

I glanced at my colleague and said, "Let's go to dinner."

"Dinner," she replied?

"Yes, we've got a line of thunderstorms passing right through our planned route home. It should pass by in another couple of hours," I said.

And off we went into town to kill some time while having a pleasant dinner. We returned to the airport around 7pm. The evening sky was clear and the pending sunset promised to be spectacular. A careful check of the weather suggested that we could maneuver south of Albany, around the southern end of the slow moving line of thunderstorms. This course would take us several hundred miles out of our way and would add at least an hour to the trip, but it was better than hanging out at the airport for another several hours.

My passenger climbed into the far rear seat where she was able to stretch out and go to sleep while I winged us safely home. Anyway, that was the plan. We launched into the setting sun and headed southwest on what would soon become another memorable flight. The Boston Departure controller quickly handed us off to Boston Center as we climbed to our cruising altitude of 14,000. While this altitude required us both to don oxygen canulas, it afforded me a better view of the sky and threatening thunderstorms, above the lower layers of haze that enveloped the eastern seaboard.

Both the radar screen and storm scope were quiet during the first hour of the trip. My 240 degree heading was certain to keep us well south of the advancing weather front. Flying south westward, we were racing with the sun, but at 170 knots we would soon be losing the race.

Darkness fell as we crossed the Hudson River at Kingston, NY, a small city about 60 miles south of Albany. The quietness of the flight was suddenly interrupted by New York Center broadcasting a Center Weather Advisory announcing a convective sigmet for a second line of severe thunderstorms developing about 100 miles southwest of the line we had been circumnavigating. A convective sigmet is the weather reporting equivalent to pulling the fire alarm. It references weather severe enough to pose a flight hazard to all aircraft in its defined area.

I plotted the reported coverage area of the convective sigment and determined that our course would take us above its northern boundary. We'd still be on its fringe, however. I woke up my passenger and advised her of our situation. We could land and spend the night somewhere around Albany, or we could endure what would likely be a bumpy ride home. She opted for the latter choice. I agreed, so we motored on.

Darkness adds an additional challenge to weather flying simply because it is more difficult to see developing thunderstorm clouds. There was little moonlight on this night. I began pondering my options or "back doors" as pilots sometimes call them. It is the "what if" thinking that one goes through to determine what course of action should be taken if the weather should

suddenly worsen. This is what I call a “Plan B” scenario. My “Plan B” would be to make a run to the southeast, down towards New York City. All the developing weather was occurring west and north of Albany, so New York would be the place to go. But who wants to go to New York City in the middle of the night?

It was not long before we found ourselves nestled in a weather trough between two advancing fronts. Our smooth ride began to feel like an automobile ride down a railroad track bed. The bumps quickly turned into pot holes and treacherous ruts in the road.

“We okay, Bob?”

“Cinch up your seatbelt,” I said. “We’re going to get knocked around a bit all the way to Buffalo.” That proved to be the understatement of the night.

The radar scope and storm scope both were reporting ominous weather ahead. Big ugly red blobs on the radar scope outline the shapes of heavy rain cells. Those cells that contained up and down drafts threw off hidden sparks that showed up on the storm scope. New York City was beginning to look a bit better to me. I called Flight Watch on 122.0.

Centurian 4720Y: “New York Flight Watch, Centurian 4720Y is 40 west of the Poughkeepsie VOR at 14,000 on 122.0, over.”

Flight Watch: “This is New York Flight Watch, Two Zero Yankee. Say your request.”

Centurian 4720Y: “This is Two Zero Yankee. We are en route to Buffalo and are trying to pick a route through a converging line of thunderstorms ahead. Got any suggestions?”

Flight Watch: “Two Zero Yankee, I’m not sure what to suggest. Our radar shows two lines thunderstorms stretching from Philadelphia northeastward to Montreal. Your position appears to be in between these two lines. What are your flight conditions now?”

Centurian 4720Y: “We’re seeing a lot of cloud to cloud lightening all around us. The ride is bumpy. Radar suggests we continue on this course, Two Zero Yankee.”

Flight Watch: “Two Zero Yankee, you might be able to climb above most of the convective activity if you can get to 20,000 to 22,000 feet. Are you turbocharged?”

Centurian 4720Y: “Affirmative. Okay, I’ll request higher. Thanks for your help. Two Zero Yankee out.”

Most single engine, propeller driven aircraft have a service ceiling of about 14,000 to 15,000 feet. This is because the air at higher altitudes thins to the point where it is unable to support combustion requirements of a conventional piston engine. Turbocharged aircraft, such as N4720Y, on the other hand, uses an exhaust driven compressor, to force high altitude thin air into the engine cylinders, thereby maintaining, in effect, sea level air pressure all the way up to 30,000 feet or higher depending upon the particular aircraft.

I gave New York Center a call and requested Flight Level 200 or 20,000 feet. They granted an immediate climb clearance as I simultaneously cranked up the oxygen flow to our canulas. N4720Y is like a fine race horse. Giving it full power and a tug on the yoke causes it to jump from the starting gate, even from 14,000 feet. We motored effortlessly up to are approved altitude, topping most of the clouds along the way. The ride suddenly smoothed out and life was, again, good.

Flying in the flight levels above 18,000 feet presents another set of concerns. The biggest concern being the maintenance of an adequate flow of life preserving oxygen to both my

passenger and me. This concern increases dramatically as one climbs above 18,000 feet where the ambient pressure is too low to enable available atmospheric oxygen to pass through the blood/gas barrier of in the lungs. At 20,000 feet and above, the average time of consciousness following a sudden loss of supplemental oxygen is less than 15 minutes. The higher one climbs beyond that, the less the average time of consciousness. It is for this reason that I carry a miniature emergency oxygen canister between the front seats. If the aircraft's internal oxygen system should fail, I can quickly grab my emergency bottle. Crash investigators suspect that golf pro, Payne Stewart and his traveling companions would be alive today had they had emergency oxygen nearby.

Our weather challenges were not over. The weather in the trough we were following between the two fronts began to spawn a field of "popcorn" convective cells. The radar reported that some of these cells were dry and some contained torrents of rain. The blackness of the night provided a dramatic backdrop to a spectacular light show that was taking place all around us. Lightning was jumping from cloud to cloud. It took on the appearance of a July 4th fireworks display. Towering cumulonimbus glowed brightly as lightning discharges illuminated their inner masses. Thor was beginning to stir like a sleeping bear disturbed by passing hikers. I sensed that he did not want us there!

My "back door" was beginning to close. I wasn't sure which way I'd run if things grew suddenly worse. An obvious risk was a lightning strike to the airplane. My mind began to imagine the worst. Actually, relatively few airplanes are ever hit by lightning. If they are, the damage is generally expensive, but not life threatening. The sudden surge in electrical current through the airframe can literally fry the radios and navigation equipment, leaving the hapless pilot to maneuver safely to the ground with only a non-electronic magnetic compass, airspeed indicator and altimeter to show him the way. I've heard that far worse can happen, however. Remote as it sounds, lightning strikes have been known to set up a static discharge between the metal safety chain that connects the gas cap to the fuel tank to the side of the tank. Boom! I've since changed my metal chains to nylon cords. . . .

Flight Level 200 wasn't going to do it. We had to go higher. I requested and received clearance up to 24,000 feet. The sky was still alive with sparks. Turbulence was beginning to approach the moderate to severe level. We both had our seatbelts cranked down tight. Then Thor stood up and growled. We were smacked with a thunderous punch. N4720Y was suddenly tossed downward in shearing vertical winds associated with what appeared to be a spontaneously developing thunderstorm close by. Anything not tied down in cabin was flying all over. I called the Center.

N4720Y: New York Center, 4720 Yankee has an URGENT PIREP for severe turbulence at Flight Level 240 over Binghamton."

"Pirep" is short for "Pilot Report." Pireps carry tremendous weight in the national airspace system. Keeping in mind that all weather reporting is based either on actual observations or forecasts derived from weather models. At higher altitudes, the only way to really know what the weather is doing is to rely on pilot observations, or pireps. Pireps come in two forms. Over 95% of all issued pireps are classified as "routine," meaning they are for advisory purposes only. Urgent pireps, on the other hand, require immediate action by both ATC and nearby aircraft.

Urgent pireps are shuttled through the ATC computers like Britney Spears being escorted through a crowd of screaming teenagers. They catch everybody's attention.

New York Center: "Roger, Two Zero Yankee, confirm severe turbulence. Say intentions."

N4720Y: "We're riding it out. Do you have any weather information for us?"

New York Center: "Suggest you deviate to the west. You appear to be through the worst of it. Standby, I'll get your weather ahead."

I was more angry with myself for getting into this situation than I was concerned about the safety of our flight - particularly with a colleague from my office on board. This was one of those times that I realized I may have pushed too hard to get home. After all, a night in New York City really would not have been that bad. And maybe I placed too much confidence on N4720Y's slick weather avoidance technology. But enough of that thinking. I had to get back to the business at hand.

I needed to open my "back door," but I didn't have one handy.

N4720Y: "I'm showing a path through the weather at my 210 degrees. Request that heading and clearance lower."

New York Center: "Two Zero Yankee, deviate as necessary, pilot's discretion down to 10,000, block 18,000. How's it going, sir?"

By giving me a block altitude and deviations as necessary, the controller had, in effect, given me a blank check to fly any heading and altitude I wanted from 18,000 down to the lower limit of his airspace at 10,000. "This guy is good," I said to myself. And I also appreciated his voice of concern.

Choosing not to waste any time getting to a lower altitude, I lowered the landing gear and put in 20 degrees of flaps to create a much drag as possible, pushed the nose over, and reduced power. This enabled a fast descent without over stressing the airframe. The altimeter unwound at the rate of 1,500 feet per minute all the way down to 12,000 feet where we broke through the undercast and witnessed lights on the ground. The ride smoothed out and, as predicted by the Center controller, we were clear of both lines of thunderstorms. The remaining ride to Buffalo was a refreshing break from the knuckle-biting two hours we had just endured.

I returned to the airport the next morning to check for any damage to the airplane. While we experienced no radio problems, I was concerned about lightning burns to the aircraft's out skin. Nothing was apparent. The cabin, however, was another story. It appeared as if a hurricane had blown through. Chart books resting on the backseat had opened leaving looseleaf approach plates scattered around like confetti. What a mess . . . but we walked away from the experience and the best news is, we can use the airplane again!

As I surveyed the mess in the cockpit, I began to wonder about the differences between summertime flying with its associated thunderstorms versus wintertime flying and its accompanying structural icing and freezing rain. Neither season presents a greater risk to aviation than the other, but the risks are different, and neither is particularly high if you pay attention to what you are doing. Paying attention requires, first, that the pilot has a clear understanding of weather phenomenon, winter and summer.

Second, the aircraft which he is piloting must be properly equipped for the weather

challenges ahead. Most general aviation aircraft are not approved for flight into known icing conditions. This means that if icing is in the forecast, they cannot legally launch. To be approved for flight into known icing conditions, aircraft, such as N4720Y, must be equipped with both de-icing and anti-icing devices. Typical de-icing equipment consists of inflatable rubber “boots” on the leading edge of the wings and tail feathers. Anti-icing equipment includes a heated propeller, windscreen, pitot tube, and stall warning indicator. Absent any of this equipment, the aircraft cannot legally enter known icing conditions.

As for summer flying, embedded thunderstorms represent a serious threat to aircraft not equipped to see them. The only way you can see embedded thunderstorms is either through the eyes of a radar controller who spots them on his radar or by having suitable sferics equipment or storm scope/strike finder in the cockpit. Without these options, flight around embedded thunderstorms is not recommended.

As I had just confirmed to myself in this bumpy ride back from Boston, having known ice certification and all the weather avoidance equipment in the world does not give one license to march into icing conditions or a line of thunderstorms with impunity. Like stepping on a sleeping rattle snake, it doesn't take much to get bit. Thus, the formula for long life as a pilot includes a measure of good judgement, combined with a capable aircraft, adequate training, and a big dose of good fortune.

I keep this bit of aviation wisdom close at hand whenever flying in or near hazardous weather conditions. Earlier this month my daughter, Erica, and I were flying back from our annual trek to Space Camp in Huntsville, Alabama. The pre-flight weather briefing revealed a solid line of severe thunderstorms running from Indianapolis eastward to the Atlantic coast. This line cut right through our planned direct routing to Buffalo. I launched with the intent of traveling as far north as possible, then sorting out my options along the way. One option was to snake around the western edge of the line, another was finding a hole in the line, and the third was to find a place to land along the way and for the line to pass out of the way.

Finding holes in lines of thunderstorms is the best choice as far as time is concerned, but it is the most hazardous. Unless the hole is at least 50 miles wide, one runs the risk of “stepping on the snake.” Making an end run around the line is a good choice, but it can take you hundreds of miles out of your way. Landing and waiting for storm passage is a great choice as far as safety is concerned, but it can be the most costly in terms of time, especially if it is either a long or slow moving frontal line.

Erica and I had been away from home for three days and we both were anxious to get back. I had appointments the next day and we were both fresh out of clothes. Thus, my first choice was to approach the line of thunderstorms, fire up the storm scope and radar units and begin searching for a hole large enough to sneak through. I checked in with Flight Watch for an updated status report of the weather along our route of flight. Sure enough, things were bad. The U.S. Weather Service had just issued a convective sigmet for severe thunderstorms containing two inch hail embedded in the cold front across our route of flight. These were the big guys - Thor and his army of soldiers were threatening to take out anything that crossed its path. Finding a hole was no longer an option. When hail enters the picture, the safe range around thunderstorms increases dramatically beyond the standard 25 miles.

Hail forms as rain drops falling through the air are picked up by rising air currents and are carried high up into the freezing altitudes above 18,000 feet where they freeze and fall again to earth as frozen droplets. These droplets pick up more moisture and are then lifted up again by rising air currents associated with thunderstorm activity where they re-freeze into larger ice pellets, now called hail. Depending upon the severity of the thunderstorm, this cycle of falling and rising ice pellets continues until the resultant hail is too heavy to be supported by the weather system. Hail as large as grapefruit has been known to form around severe thunderstorms. And these grapefruit hail can be tossed out from over 40,000 feet to points on the ground some 30 to 40 miles from the center of the storm!

My next option was the end run to the west. Over Louisville, KY and proceeding north to Buffalo, I again called Flight Watch.

N4720Y: "Flight Watch, this is Centurian 4720Y over Louisville on 122.00, over."

Flight Watch: "This is Indianapolis Flight Watch, say your request."

N4720Y: "How far west does the line of thunderstorms now over central Ohio extend?"

Flight Watch: "The line now extends westward into Illinois, with some breaks in the line just west of Indianapolis."

Hmmmm . . . my question was how far west was I willing to fly to get around behind the front. I called Indianapolis Center and requested a routing change that would take us westward, over Evansville, Indiana. I would go there, then make another assessment.

Erica was sound asleep in the back seat. Our weekend at Space Camp left her (and me) thoroughly exhausted. As I glanced to the rear of the cabin and watched her sleep, a strange feeling came over me. I flown thousands of hours, most of them by myself and many with friends and business associates. Safety is job one in every flight. But safety concerns are relative. When flying alone, one has a greater sense of bravado than when flying with passengers. Once you are entrusted with other people aboard, pilots or otherwise, the bravado leaves and safety issues again prevail. There is simply no excuse for putting somebody else's life at risk when flying. Strangely, there is an even higher level of safety that constrains a pilot. That occurs when the passengers are family members.