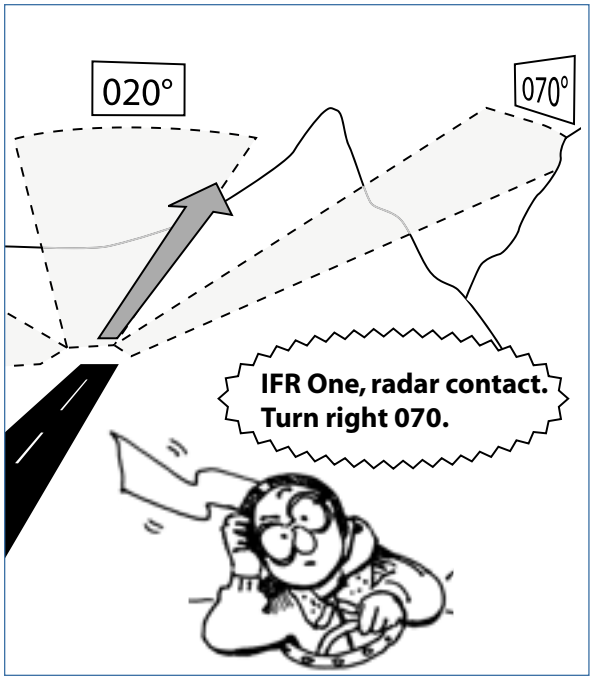
Volume 24 Number 1
January 2008

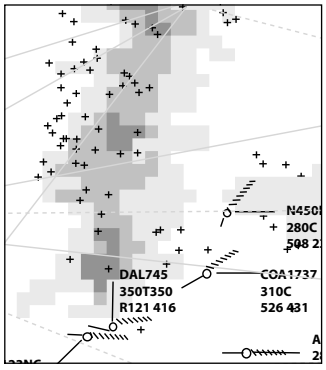
IFR

The Magazine for the Accomplished Pilot



Choose your departure from the list ... page 9

Use it early ... page 14



WX ATC sees ... page 6

GETTING NO WX FROM ATC

Thunderstorms can catch you sleeping any time of year. Don't expect the controller to give you a heads-up, either.

by Bob Miller

On October 19, 2005, a Cessna 337 penetrated an area of heavy precipitation and thunderstorms. The outcome was not good. The NTSB reported that a contributing factor was, "ATC's failure to provide information on depicted severe weather to the pilot."

Six months later, on April 19, 2006, a Cessna 210, piloted by legendary aviator Scott Crossfield, entered an area of severe thunderstorms. The outcome was just as bad and the NTSB again pointed to a contributing factor of, "ATC's failure to provide adverse weather-avoidance assistance."

Three months further down the road, a Mooney, M20J piloted by a 1300-hour CFI with a student aboard, penetrated active thunderstorms, didn't survive the encounter, and generated an NTSB finding that, "ATC's failure to issue hazardous weather information to the pilot," was a contributing factor.

All three of these findings were published by the NTSB in the same month: September 2007. Is the NTSB beginning to pin more responsibility on ATC for keeping us pilots from plundering into potentially lethal weather?

Thunderstorms continue to play a role in at least 25 percent of all weather-related accidents, according to AOPA's Air Safety Foundation. In most of these cases, pilots encounter weather while talking with ATC.

"There isn't a controller anywhere who doesn't understand what [he's] supposed to do ... because not doing it has contributed to many fatal accidents."

Pointing the Finger

Who is responsible for thunderstorm avoidance, ATC or the pilot? The Controller's Handbook (FAA Order 7110.65, Section 2-1-1) clearly states that the primary purpose of the ATC system is "to prevent a collision between aircraft operating in the system and to organize and expedite the flow of traffic."

Reading on in 7110.65, the controller is required to "use good judgment when prioritizing all other provisions of this order, based on the requirements of the situation at hand." It adds that the controller's capstone responsibility is to "first perform the action that is most critical from a safety standpoint."

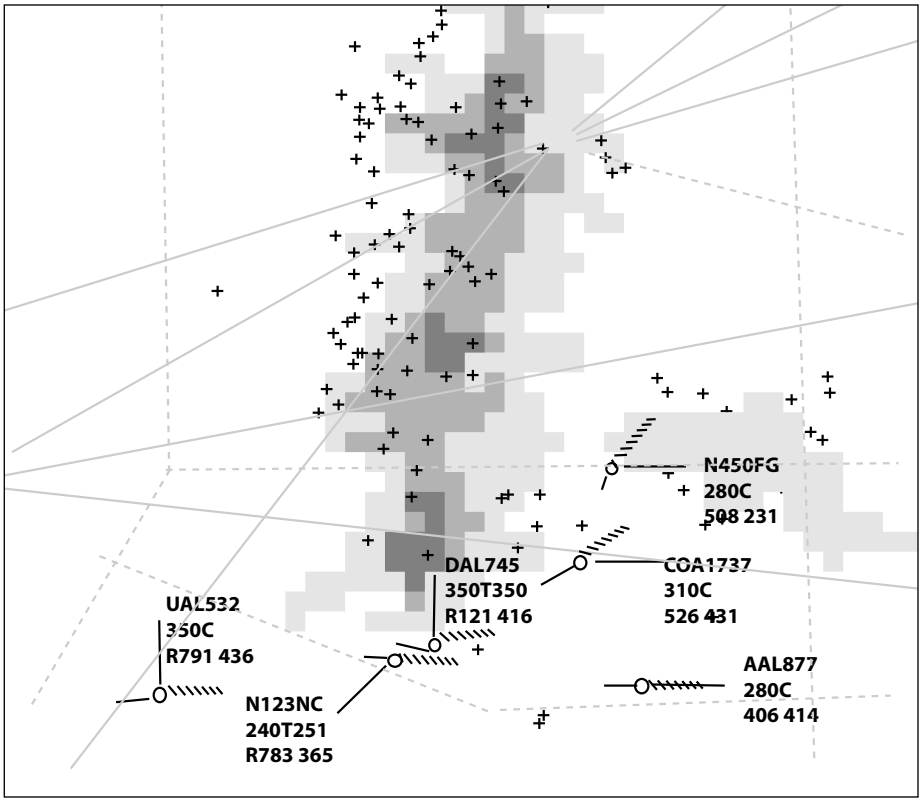
FAR 91.3 says that the PIC is the final authority as to the operation of the aircraft. This rule is reinforced by FAR 91.103, which requires that "each pilot in command shall, before beginning a flight, become familiar with all available information concerning that flight. This information must include: (a) For a flight under IFR ... weather reports and forecasts."

For argument's sake, let's assume that everybody in the national airspace system is focused on their work, is playing by the rules, and is personally committed to flight safety. What then can we expect from both ATC and the pilot in terms of thunderstorm avoidance?

What ATC Sees

At the TRACON (Approach) level, the Airport Surveillance Radar system (ASR-9 and ASR-11) provides the controller with real-time images of developing precipitation in scales of light, moderate, heavy, and extreme. In other words, the controller can see rain. He cannot see clouds or the turbulence and convection inside these clouds. With few exceptions, it is convection, not rain, that hurts us in airplanes.

Left: *Staying visual is the only safe option without on-board weather, and often a good idea even with gadgets when things get really nasty.*



Right: *Approach controllers can paint real-time percipition on their displays if they choose to, but the busy TRACON environment might not leave them much free time to weave you through the nasty stuff. Center controllers have the ATC equivalent of the datalink NEXRAD you might have in the cockpit, including all the time delays.*

While one might reasonably argue that heavy or extreme precipitation signals the presence of active thunderstorms, this doesn't hold true in all cases. Similarly, the absence of precipitation, extreme or otherwise, is no guarantee that thunderstorms are not present.

Air route traffic control center (ARTCC) controllers have even less-precise thunderstorm detection capability. Their system, known as Weather and Radar Processor, or WARP, functions much like the pilot's uplink NEXRAD. It compiles various NEXRAD images and overlays them on the controller's scope.

While a marked improvement over the cross-hatch depictions of precipitation that controllers used to see on their older screens, WARP still has some serious weaknesses. For example, there is a one- to six-minute delay in scope updates. Minutes matter in the fast-paced world of ATC and thunderstorm development.

WARP, like ASR-9 and ASR-11 in TRACONs, cannot see convection. WARP is unable to measure the tops of precipitation, nor can it see the entire sky at once. Instead, Center controllers must set their displays to measure specific vertical segments of the sky. These segments are from the surface to FL 240, from FL 240 to FL 330, and from FL 330 to FL 600. WARP isn't able to confirm the presence or absence of precipitation at or near the specific altitude of an aircraft in flight.

An example of WARP's altitude limitation occurred on August 25, 2006, near Bunnell, Fla., when a Mitsubishi MU-2 was maneuvering around thunderstorms at FL280. The Jacksonville Center controller's WARP weather display was set for FL240 to FL330. It depicted weak to moderate echoes above FL240. What the Center controller's scope did not display was very strong to intense weather radar echoes occurring at FL200.

The weather was changing rapidly and its severity apparently caught both controller and pilot by surprise. The pilot, however, did not survive the experience. The controller's actions were not included as a contributing factor in the NTSB probable -cause findings, but it illuminates how limitations of the system can lead to problems even when everyone is doing it right.

If a pilot doesn't like what he sees, based upon a thorough pre-flight weather briefing, he can stay on the ground. Let's assume, though, that the pilot is eager to complete his mission and, using all available weather information including graphic images displayed on the FBO's flight planning computer, feels there is a safe route to his destination. Once aloft, downlinked NEXRAD images displayed on his handheld and/or panel screens provides him with even more strategic weather information. He also listens on the radio for reports of what other pilots along the route are experiencing.

But these are still all imperfect tools. When buried in the clag with rapidly-changing weather, the pilot still may need ATC to help navigate through the troubled waters ahead.

So, we have a problem. ATC has a less-than-perfect way to detect the weather ahead. The pilot cannot see anything but grey out the window. Many pilots are flying without live weather radar, Stormscope capability or datalink NEXRAD so they truly are flying blind.

Rules to Live By

What do we do when we have less than a perfect system? We write a rule book to follow. Recall earlier that Section 2-1-1 of the 7110.65 makes it clear that the controller's primary job to separate traffic. A bit further into 7110.65 it says:

The ability to provide additional services is limited by many factors, such as the volume of traffic, frequency congestion, quality of radar, controller workload, higher priority

WEATHER FLYING ON STEAM GAUGES

Modern technology has made it possible to spot hazardous weather long before it's visible out the cockpit window. But what about pilots flying a venerable '76 Cessna 172? The answer falls into that single, catch-all phrase: It depends.

If our intrepid legacy Cessna or Piper pilot is knitting his way through troubled weather in IMC conditions outside of ATC radar coverage, he has quite literally cast his fate to the wind. His choices are to reduce to maneuvering speed and cinch up his seatbelt or land as soon as practical, the latter being the preferred choice. PIREPs from other folks operating along his route would be rare if he's far enough off the grid to be outside of radar coverage, and the usefulness of any thunderstorm information will have lapsed by the time our pilot has reached that point in the sky anyway.

In radar environments, we've seen that TRACON controllers have better tools than Center controllers for vectors around threatening weather.

So what is the proficient, legacy-gauge pilot to do when threatening weather occurs along his route of flight? As with most aviation risk assessment, the solution begins on the ground. A comprehensive pre-flight weather briefing that reveals embedded thunderstorms is a no-brainer. Either remain on the ground or find a VFR route around the nastiness. "See and avoid" is the foundation for all safe flight.

Going in the scud with thunderstorms present, absent any form of on-board weather avoidance equipment, is like crossing 42nd Street in New York City's Times Square blindfolded, hoping that the cabbies will blow their horns and fellow pedestrians will grab you by the arm. In short, don't do it!

And, remembering that even the cool on-board stuff can fail, make sure you know — or get ATC to help find — a way out. *— R.M.*

duties, and the pure physical inability to scan and detect those situations that fall in this category …

Consistent with the aforementioned conditions, controllers shall provide additional service procedures to the extent permitted by higher priority duties and other circumstances. The provision of additional services is not optional on the part of the controller, but rather is required when the work situation permits.

If those words leave any doubt as to a controller's weather reporting responsibilities, Section 2-6-4 nails it down by requiring controllers to provide pilots with information that includes "weather significant to the safety of aircraft [which] includes conditions, such as tornadoes, lines of thunderstorms, embedded thunderstorms, large hail, wind shear, microbursts, moderate-to-extreme turbulence (including clear air turbulence), and light-to-severe icing."

So, let's see. Controllers are told exactly what Job One is, but they are also instructed that Jobs Two, Three, and Four are not optional — but are only to be done when workload permits.

Still confused? Here's a bit more of the text of 7110.65, Section 2-1-2, mentioned earlier. A controller must, "Give first priority to separating aircraft and issuing safety alerts as required in this order. Good judgment shall be used in prioritizing all other provisions of this order based on the requirements of the situation at hand." The handbook throws in one final rule at the end of Section 2-1-2 that says "that action which is most critical from a safety standpoint is performed first."

In other words, the rule book tells the controller that aircraft separation comes first and, if workload permits, they should keep pilots informed of hazardous weather ahead. But since safety is involved with hazardous weather, do the latter regardless of workload. This is sort of like damned if you do and damned if you don't, right?

Not so, according to one NTSB accident investigator we talked with. He said, "Given the amount of energy that FAA has put into training, briefings and instructions on weather dissemination requirements over the past couple of years, there isn't a controller anywhere who doesn't understand what they're supposed to do or know that it's important to do it because not doing it has contributed to many fatal accidents."

He went on, "If a controller has 10 things to do and none of them are preventing an imminent collision or a CFIT accident, issuing hazardous weather is quite likely to be number one on the list. None of the stuff in 7110.65, Section 2-6-4 is 'voluntary.' "

Don Brown, a retired controller with 25 years at Atlanta Center and a former NATCA safety representative, sees it a bit differently. He says that people get bogged down in the technical issues and forget to look at what is getting people killed, like the human-factors issues.

"When it comes down to controllers advising you of weather, much less vectoring aircraft around it, the controller has to believe the weather display is accurate. That's not always the case," says Brown. "Many (controllers) don't trust the display. They've seen it wrong too many times. It's mostly a matter of misinterpretation of the display and that is mostly from a lack of training on the FAA's part."

Another controller put it this way: "When the alligators are about to jump up and grab the controller, he or she will revert to the survival mode, i.e., the separation of aircraft."

I recently asked William T. Butler, Professor of Aviation Technology, University of Alaska, who retired after 29 years in FAA air traffic as controller, supervisor, and facility manager, if there were occasions where he had observed controllers who were so pre-occupied separating traffic at a given moment that they did not have time to alert an aircraft that they were working of imminent hazardous weather ahead.

"Setting aside the statistical extremes and the occasional incompetent," he said, "I would have to say that it doesn't happen that way. A controller will incorporate the weather into his overall plan as simply one more element that has to be worked." He later added, "A separation plan that ignores the fact that there is level-four precipitation right where you are taking airplanes is no more acceptable than one that ignores the fact that you have just rerouted your normal flow into a mountain."

Don't think the law will sit on your (or your estate's) side, however. Case history where the FAA was sued over failing to provide weather info shows a clear tendency to side with the FAA, because weather is a secondary duty.

The Team Approach

Can we as pilots depend upon ATC to keep us clear of hazardous weather? Will controllers pull the irons out of the fire for every pilot who blunders into a sky full of boomers?

It's a combination of controller and pilot judgment that determines the safe outcome of flight through turbulent skies. In an ideal world, the controller and the pilot work together as a team to ascertain the best routing over, under, around, or through an area of hazardous weather.

Like everything else we do in aviation, individual judgment rather than any rule holds the trump card for safety. When controllers begin their shifts and look at their scopes, they assess their entire sector

(continued on page 23)

THE DEPARTURE MENU

Like Rodney used to lament, departures just "don't get no respect." Here's a simplified matrix to get up and out safely.

by Dog Brenneman

As winter rolls on, the IFR departure conundrum is with us again with predictable loss of life as its result (see "Spiral Up Departure," December 2006 *IFR*). We recently outlined the different ways TERPSters and ATC look at departures (see "Five-Headed Departure," October 2007 *IFR*), but the heart of this puzzle is to look at it from the pilot's perspective.

Because the existing departure system is so intricate, a pilot must be an educated, proactive, and downright adamant participant in the departure process. The old saw sums it up: When a pilot screws up, a pilot dies; when a controller screws up, a pilot dies; when TERPSters screw up … you get the idea. Presenting the idea for an IFR departure checklist is also an opportunity to highlight some existing departure rules of the road.

Wouldn't it be grand to have a checklist or menu to select a DP? If our new FAA chief were to put me in charge of flight plans, I would make selecting from a list of departure items the mandatory first step in filing IFR. The pilot would select his or her course of action for each departure. This would entail items placed at the beginning of the route of flight or via items placed in the Remarks section. Eventually, a future code system could identify each departure scenario.

Climb A La Carte

Pilots love pictures and that's why it's natural to first look for a standard instrument departure (SID). Maybe this explains why we commonly overlook the textual obstacle departure procedures (ODPs), which are neatly tucked in the beginning pages of the FAA approach plates. Additionally, SIDs (both pilot-nav and vector) and graphic ODPs all have names. Pilot-nav SIDs also have

Below: *It's the combination of Route and Remarks that tell ATC exactly what you plan to do on departure.*

23 approach." I had no clue where they were (short of within reception range) because they had spoken IFR.

Many writers have made this point, but since I still hear those kind of position reports on Unicom, it still needs to be said. Announce your position using terminology a low-time, VFR-only pilot can understand. Deliver it at a pace slower than an O'Hare final approach controller, too. For example, "Cessna Five Two Tango is seven miles south of Greeley at 7000 for a straight-in ILS approach to Runway 34."

With this report, no translation is needed for any pilot in the neighborhood. VFR pilots know where you are and IFR pilots can visualize your position on the procedure if they know it. The same tactic is a good idea at any uncontrolled field when arriving on the traffic frequency, as VFR traffic may be lurking under the deck.

Many uncontrolled fields have designated VFR practice areas. Watch out for approaches that wend through common VFR practice airspace. Find somewhere else to practice if you can. Be especially vigilant at VFR entry points, such as midfield downwind.

While not an exhaustive list, these suggestions can serve as a starting point to keeping up a better margin of safety not offered by a shroud of clouds and ATC. The whole point is enhancing safety by countering the malady of disuse. Let's not make the cure worse than the ailment it treats.

Mark Pestal is an attorney, with experience in aviation accident cases, and a Mooney pilot in Denver, Colo.

GETTING NO WX FROM ATC

continued from page 9

for traffic, terrain, and weather. The accuracy of this assessment depends upon training, experience, and the technical capabilities of their system. It's no different for pilots who begin each flight with an assessment and have the same limiting factors: training, experience, and technical capabilities of their airplane.

If your tools show a hazard that ATC seems blithely unaware of, exercise your PIC authority and say, "Unable." But for those times when you're dependent on someone at the scope to see what you can't, remember that they won't always be able to keep you clear.

Bob Miller is the editor of Over the Airwaves (overtheairwaves.com).

LOVE THOSE LONG LEGS

continued from page 17

GPS approach designers found was a sharp pilot in a fast bird could turn around so fast in a timed or four-mile-leg hold that their onboard GPS units would go full-scale deflection, even though the pilot was correctly flying inbound, because they were changing scale so quickly.

The solution: Make the legs longer so the scale would change slower. Approach designers have a chart that matches altitudes with hold lengths. At 11,700 feet the hold should be six miles long. But wait: this chart says seven miles. It does and it's wrong. Expect a NOTAM to be issued soon. There's just one more reason not to trust blindly without knowing the why behind it.

With the reason for the six-mile legs, you can make your own call as to how far out to go for a PT when separation isn't an issue. Fly outbound for six miles if you want, but if I was paying for the gas, I'd slow down and turn early. I'd just keep an eye on that GPS to make sure my quick reversal didn't toast my own approach.

Jeff Van West is editor of IFR.