

PLUS What can ATC do to help keep you clear of thunderstorms? Find out in this video.



KNOCKED

ONE PILOT'S ENCOUNTER WITH AN EMBEDDED THUNDERSTORM

SENSELESS

» By *Natalie Bingham Hoover*

ILLUSTRATION BY OLIVER BURSTON

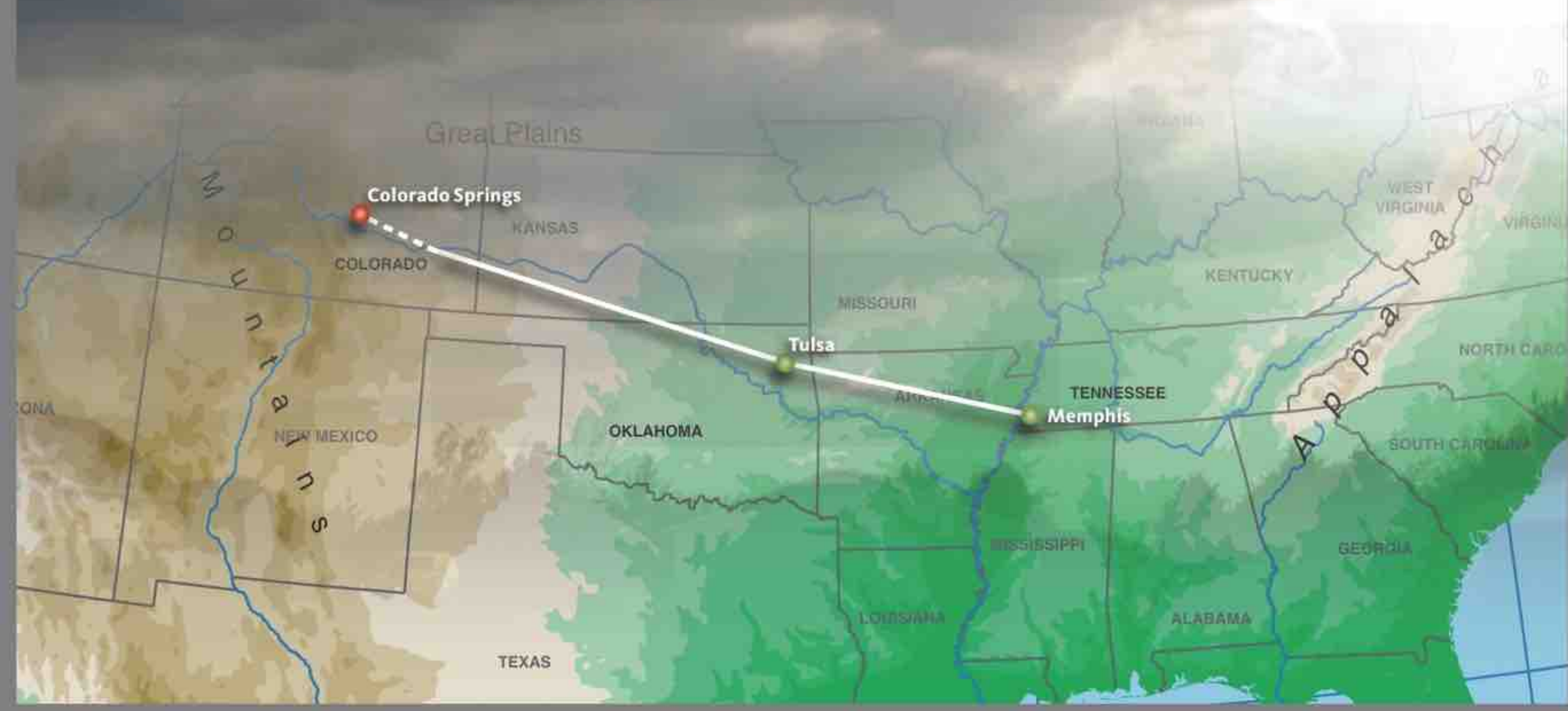
IT TURNS OUT THAT THE WEATHER SYSTEM PHILLIP ENCOUNTERED THAT DAY SPAWNED MORE THAN 20 TORNADOES IN ITS TRIP ACROSS THE COUNTRY.

A gentleman walked into the flight school looking to get some training in our glass panel simulator. I was available to work with him. Somewhere between partial panel approaches and holding practice, he told me a story that has had me steering clear of thunderstorms for years.

It was the summer of 1977. Phillip was a 21-year-old commercial pilot flying charter for a small company based in Memphis, Tennessee. With almost 1,500 hours and CFI, CFII, and MEI ratings, Phillip felt confident he could handle almost anything that the airplane or the weather threw at him. "There was no weather I couldn't fly in. I was Superman," he said. He had experienced more than his fair share of low ceilings and ugly weather and prided himself on the fact that he rarely turned down a flight.

So, when his company sold a Piper Cherokee Six to a buyer in Colorado Springs, Phillip offered to ferry the airplane. He had done some flying over the Smokies and Appalachians, but he was relatively inexperienced with the high terrain and weather conditions that could be present in a large mountain range like the Rockies, so Phillip's boss warned him to steer clear of any IFR weather once he made it west of the Plains. Phillip, however, ignored that advice, saying, "I just thought my boss was a worrier."

Phillip stopped to refuel in Tulsa, Oklahoma, before heading out to Colorado Springs. He called a briefer to file an IFR flight plan and check the weather one last time before heading to the higher elevations. The briefer mentioned a ceiling of



2,500 feet along the route and thunderstorms 60 miles south of the course Phillip would be taking. Compared to some of the flights he had made, a 2,500-foot ceiling and a route north of the thunderstorms sounded like smooth sailing. He set off for Colorado Springs anticipating a pleasant flight to the eastern edge of the Rockies.

Most of the flight was in instrument meteorological conditions. As he neared Colorado Springs, ATC offered to clear him direct to his destination, and Phillip gladly accepted. He remembers that "the clouds quickly went from light grey to a menacing shade of pitch black, but the ride was still eerily smooth so I continued on my heading." A few minutes later, he heard a loud bang, similar to the noise of a gunshot, followed by a sharp yawing motion to the right.

What in the world was that? he wondered, just before it happened again, this time on the left side of the airplane. He quickly referenced his charts to make sure he was above the minimum en route altitude, thinking that maybe he had hit some sort of obstacle. At 11,000 feet, he was almost 2,000 feet above the MEA for his route. The banging sounds became much more frequent, "almost like popcorn," and Phillip realized he was in the middle of a hailstorm.

At this point, the noise was so deafening, he couldn't even hear ATC well enough to ask for a vector out of the storm. The next thing he knew, a fist-sized piece of hail came through the front windshield, delivering a knockout punch to the side of Phillip's head. He was hit so hard that he temporarily lost his vision.

Phillip remembers, "I didn't think I was going to die. I was *certain* I was going to die." Just as he was sending up his final prayers, his vision returned, and Phillip found himself in a graveyard spiral, well below the MEA, with no front or side windscreens and the wings punctured with holes from the hail. Somehow, he was lucid enough to squawk 7700 and recover from the spiral just as he broke out of the clouds above a large meadow nestled in the valley of two higher peaks. He landed and brought the airplane to a stop about 20 yards from a fence that separated the field from another pasture.

He climbed out of the mangled Cherokee and came face to face with the farmer's 5-year-old daughter. Hands on her hips, she chided him, "You better be glad you didn't hit any of my horses!"

To which Phillip responded with a grateful laugh, "Sweetie, you don't know how glad I am."

After the farmer's family doctored Phillip's head in their kitchen and drove him to the emergency room, Phillip put in a call to ATC and the FAA to let them know he was safe on the ground and needed to report the accident. The controllers apologized profusely, explaining that the hail that had ripped apart the Cherokee Six appeared as only a light return on their radar. That is still a weakness in our radar system to this day; dry hail rising and descending in a thunderstorm can sometimes appear as light precipitation or does not show up at all. It turns out that the weather system Phillip encountered that day spawned more than 20 tornadoes in its trip across the country.



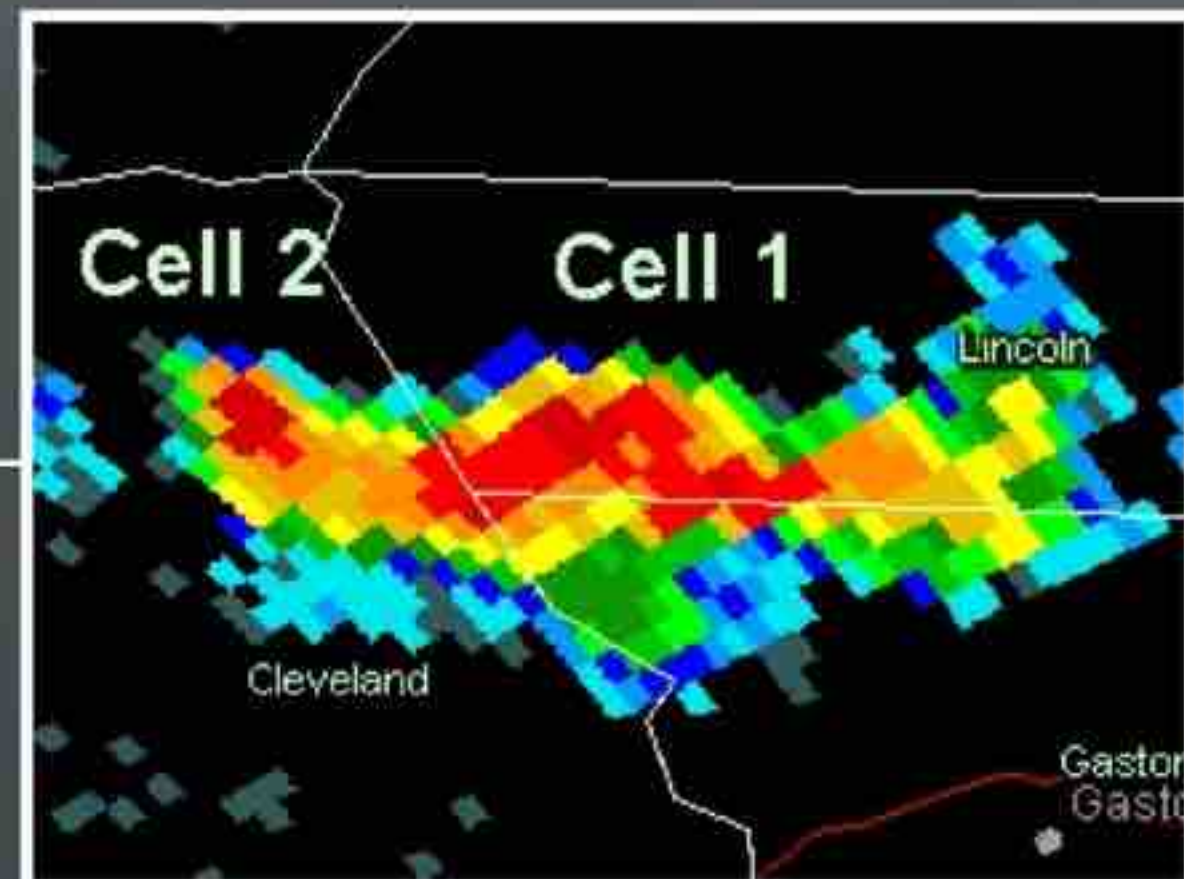
THE BOOM LIST

Meteorologists classify thunderstorms based on the type of atmospheric instability and relative wind conditions. There are four major types.

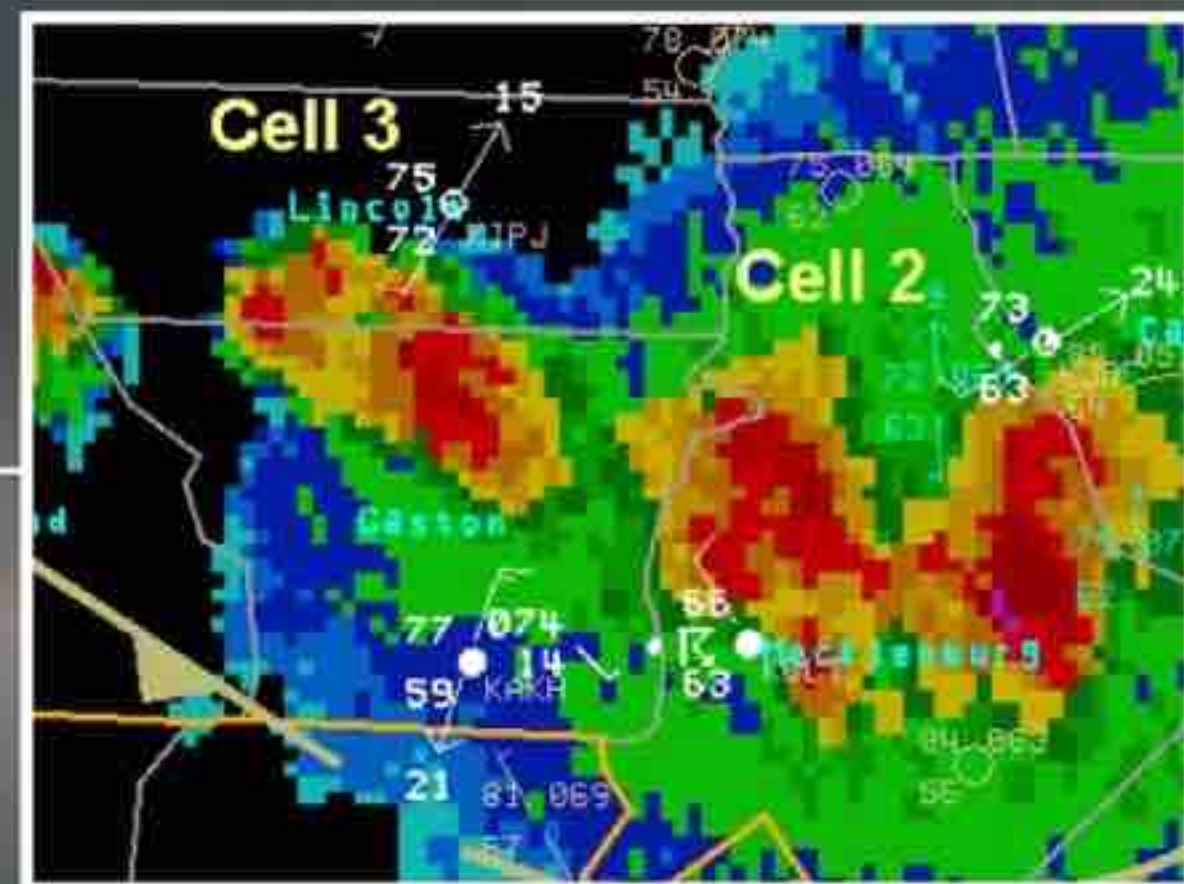
SINGLE CELL—Also called an air mass thunderstorm, these random, solitary beasts form where there is a pattern of local instability. Think Florida in the summer and you get the idea. They typically last 20 to 30 minutes.



MULTICELL CLUSTER—This is the most common and classic thunderstorm. They are often associated with weather fronts. Each individual cell develops and dissipates independently, although it may be situated within a larger grouping.



MULTICELL LINE—A classic squall line, the multicell line can form as a result of a multicell cluster. They generally occur along the leading edge of cold fronts, and can strengthen to a bow echo or derecho. Tornadoes, damaging winds, and hail are possible.



SUPERCCELL—These are the big daddies of the thunderstorm world. They are massive, self-generating monsters that spawn the majority of tornadoes and massive hailstones.



PHILLIP WILL TELL YOU that a lot of good has come out of his harrowing encounter with that thunderstorm. That hailstone actually helped knocked some sense into him because Phillip realized that his risky attitude toward flying had him flirting with disaster far too long. Also, because he survived the accident, Phillip felt he was being led out of a career in aviation and decided to act on a long-held desire to help people by practicing medicine. He is now a physician who helps cancer patients manage the pain of their disease. He still loves flying, although he's much more conservative.

As pilots, we can get some benefits from hearing Phillip's story. We can make sure we never ever have to go through as wild a ride as he did on that stormy summer afternoon.

So here are a few tips for avoiding an encounter like Phillip's: Become an avid chart-checker. Anytime there's a thunderstorm forecast for your area, take a minute to look at all of the weather charts associated with convective activity. See if you can decipher that composite moisture stability chart or learn some new symbols on a pilot report or terminal aerodrome forecast. Find out what the implications could be if a low pressure system is headed your way. If you can become familiar with what the charts look like when convective weather is approaching, maybe you can avoid close calls.

Also, remember, you always want to stay at least 20 miles away from any severe thunderstorm. Even if you aren't in or under the actual cumulonimbus cloud, you may still encounter hail and wind shear if you get too close.

Don't forget to leave yourself an out. You never want to fly between thunderstorms that are closer than 40 miles together because you may find that as they move, you will be stuck in the middle with no safe way out.

Especially if you are flying in instrument conditions, remember to take into account the movement of the storm. Just because the radar shows your route is clear right now doesn't mean that an hour or two into the flight, you won't encounter those storms as they track their way across your course. An embedded thunderstorm like the one Phillip encountered will be impossible to see until you are actually in the storm, feeling its effects.

So what do you do if you are in the air and the clouds ahead begin to look dark and ominous? Use all of your available resources. One of those helpful resources

could be onboard weather radar or a lightning detection system. Many pilots also use their iPad or other tablet to get satellite-based radar information. While this is great for preflight planning, it's not a very safe or effective way to pick your way through scattered thunderstorms, as the information you are receiving could be as much as 15 to 20 minutes old. Try calling a flight service station or en route flight advisory service for help. ATC can also provide some assistance by alerting you to areas of precipitation ahead, but keep in mind that this is not their primary responsibility. Their job is to keep you separated from other air traffic and terrain, but workload permitting, they can also be very helpful with thunderstorm avoidance.

If, by some unfortunate circumstance, you find yourself actually inside a thunderstorm, you need to do three things quickly. Ask ATC for help; they may be able to give you vectors that will keep you out of the most severe parts of the storm. At the same time, slow down to the published maneuvering speed for your airplane and maintain a level attitude. Do not try to force the airplane to hold exact headings or altitudes. Slowing your speed and allowing the airplane to ride out the inevitable wind shear and drafts will help reduce the possibility of structural damage to your airplane.

Perhaps the most important way to make sure you steer clear of an encounter with a thunderstorm is not only to have a clear understanding of weather patterns but also a healthy respect for their power. So next time you hear the weather briefer say words like "convective sigmet" or "pressure falling rapidly," you can have the knowledge and the good sense to keep your feet planted firmly on the ground, wondering what it would feel like to ride out a thunderstorm—and never actually have to find out for yourself. 🌀

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