Storm Dodging: Tactics for Dealing with Thunderstorms

by John Fiscus

Editor's Note: With many Cirrus pilots heading off to Migration or Oshkosh, we asked John to refresh readers on one of the hazards that are very common in the Midwest during the summer months.

The majority of general aviation flying happens in the summer. Longer days and better weather make using your Cirrus much easier during this time of year. One of the challenges we all must deal with during this prime flying time, however, is convective activity.

Forming the Plan

It should be difficult for a thunderstorm to catch anybody off guard. Modern prediction techniques, convective SIGMETs, and NEXRAD on the MFD will tell a pilot where the severe weather is before the aircraft even leaves the ground. These are excellent sources for the pilot to utilize on the day of the flight to help ensure there aren't any surprises; but thunderstorm avoidance should begin well in advance. Start at least 48 hours prior to the intended time of flight. Review the weather along the predicted route and see if there are patterns which will help on the day of the trip. In some areas of the country, thunderstorms are more likely during a particular time of day (we can almost set a watch to them in Florida).

Looking at frontal movement several days in advance is another good way to avoid thunderstorms. It is common for fast moving cold fronts to provide the lifting for unstable air (air which tends to keep rising once pushed up), which can then turn into thunderstorms. If it appears obvious that a front will be crossing your route and the prog charts show a chance of thunderstorms, consider revising your route or time of departure. Knowing well in advance what you'll be dealing with will both improve the likelihood you'll make good decisions and allow you to make alternative plans if necessary.

Haven't read a prog chart in a while? Curious about why an occluded front is particularly nasty when it develops thunderstorms? Remember what a dry line is and when you ought to stay well clear of it? Attend a CPPP or do some training with an instructor. The information is very easy to use and available from many free sources (COPA has them under the Weather Links tab).

Many Cirrus pilots have heard of the "K" and "lifted" index as they relate to the likelihood of convective activity. These indices are a basic measure of the stability of the atmosphere (lifted index) and the amount of moisture in the air (K index). Unstable air with a lot of moisture is a thunderstorm mix waiting to happen … it just needs something to start lifting it such as the sun, sloping terrain, or a cold front. For those who have reviewed these charts, a brief reminder: The more negative the lifted index is, the more unstable the atmosphere. Instability begins around -1 and can go up beyond -6. Also remember the larger the K index, the greater the moisture content, and therefore the risk of a thunderstorm. Watch in particular for a K index higher than the mid 20s (they can go above 40). Pilots who have not received training in working with these kinds of charts should definitely seek instruction prior to attempting to utilize them in routine pre-flight decision-making.

Timing and Routing

Select a departure time and route which will help minimize a thunderstorm threat. If thunderstorms are expected, pilots should particularly avoid flying in the dark anywhere near them, as big buildups are not always visible on radar. The best way to dodge a nasty looking buildup is to see it and ask the controller if you can deviate left or right. Don't count on lightning to give away a dangerous cloud; it isn't always present, even when other conditions make the storm hostile.

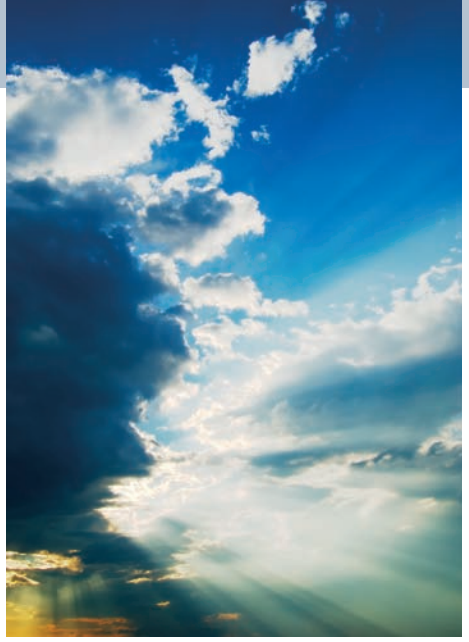
An early morning flight generally carries the least risk of thunderstorm encounters. Since solar heating plays a significant part in the development and sustenance of many kinds of thunderstorms, launching prior to the heat of the day will reduce the risk of an ugly encounter. This isn't fail-safe as there are other ways to lift unstable air, but it will hedge the bet.

Sometimes the routing is the least flexible part of a flight, but it is definitely an option in the arsenal of knowledge used to prevent thunderstorm encounters. Flying alongside the cool Pacific Ocean just slightly off shore might reduce the chances of a thunderstorm encounter, although it might not be the same story just a few miles inland. Flying over terrain with rapid vertical development increases the chances of thunderstorm encounters, especially downwind of any hills. If a pilot can avoid flying downwind of upward sloping ground, chances are better for avoiding unpleasantness.

En Route Tactics

While en route, pilots flying in the summer are sure to catch sight of convective activity. There are several tactics which can be used to help maintain a healthy safety margin.

File an IFR flight plan, but stay VFR as much as possible. The most reliable tool on board your Cirrus for avoiding a storm cell is your eyes. ATC will have no problem letting you deviate, just remember to ask, or if time is growing short, tell them of your intentions. To further aid the see-and-avoid tactic, fly at a high enough altitude that you're above the haze layer and the majority of surrounding lower clouds. One of the prime ingredients of a thunderstorm is high moisture content which can lead to quite poor visibility below the haze layer. Above it, however, seeing a storm is sometimes possible from even 80 miles away. Wise pilots will carry oxygen when they're flying across areas in which thunderstorms might be an issue. This allows for greater altitude flexibility when attempting to stay in VMC.



Stay clear of all thunderstorms by about 20 miles to avoid turbulence and shear problems associated with them. The downwind side of a thunderstorm should be cleared by a **minimum** of 20 miles, particularly a storm with an anvil top. Hail is commonly ejected out the top of a storm at high altitudes where winds are the strongest. The hail can then blow well ahead of the storm, falling on unsuspecting aircraft and making a mess of things in very short order.

An "overshooting top" is a bulge on the normally flat top of a thunderstorm. This is evidence of a very strong storm which ought to be given an extremely wide berth. Tornadoes, hail, and severe turbulence are all possibilities from a storm like this. If it looks like your destination will eventually be overrun by a storm after you've landed, it would be wise to call ahead to the FBO (check the Unicom frequencies) and see if they can put your aircraft in a hangar when you arrive.

Attempting to outrun a thunderstorm to your intended airport of landing is almost always a bad idea. Doing something like this normally involves flying too close to the storm, leaving little room for error and the potential of running into some of the bumpy forerunners of a thunderstorm. It also leads to rushing on the part of the pilot; exactly when mistakes happen and will have the greatest impact (we hope not literally).

Never try to outclimb a thunderstorm. Storms will outclimb even high performance jet aircraft and thus a Cirrus doesn't have a chance. Some strong storms will build as fast as 8,000 or 9,000 feet per minute.

Misconceptions and Pitfalls

Some Cirrus pilots may rely too heavily on their technology or may misunderstand tactics employed to avoid storms. Many of the misconceptions revolve around the NEXRAD radar and Stormscope use.

The NEXRAD seen on the MFD is an uplink of the composite reflectivity which is compiled, uploaded to a satellite, and then downloaded into the MFD. The information displayed could be nearly 20 minutes old by the time it updates and thus the areas displayed will likely have moved. Pilots should definitely not use the information to attempt maneuvering around cells at close range. Rather, use the radar returns at long range to figure out which areas to avoid and how best to deviate early.

NEXRAD is also limited to what ground based radar can "see". As such, there are numerous occasions in mountainous terrain where hidden thunderstorms might exist. The storm cell could be masked by terrain from the radar.

Stormscope data, while useful for gauging the actual intensity of a cell, will not necessarily display information about all active cells. Thunderstorms don't normally have lightning in them until they reach the mature stage, but prior to this there can still be significant turbulence and shear within the cloud.

Thunderstorms can pop up out of "nowhere" and build in and amongst other storms. Simply because an area looks clear at first glance does not mean the clouds will refrain from closing in and filling the gap. Always have an out available when flying in the vicinity of storms and don't hesitate to divert – this is better done sooner than later.

After a thunderstorm has passed over an airport, there can be invisible lurkers left behind called microbursts. These phenomena are very localized, but often result in amazing wind shear very close to the ground. It is not at all uncommon for a microburst to still be active 15 minutes after a thunderstorm has passed by an airport and they can even happen under cells which are producing little or no rain.

Better Part of Valor

Divert early, land and wait, or scrap a flight entirely. Having an "encounter" with a storm does not necessarily need an aircraft to pass through a cell … and those who have ventured too close will attest that it's a mistake they'll never make again. The good news is that such an experience isn't what it takes to be a savvy aviator around convective weather. Choose safety.

If you'd like to brush up on any of the subjects touched on here (and there are many more), attend a CPPP or get with an experienced instructor as soon as possible. As the summer flying season continues, we need to ensure our decision making skills maintain their edge. When in doubt, put it on the ground! There will always be tomorrow. COPA

About the Author: *John Fiscus is co-owner of The Flight Academy and has over 6,800 total hours, about 6,000 of those teaching in Cirrus aircraft. Before opening the Academy, John worked at Cirrus Design as a factory instructor and corporate pilot. He holds Commercial, CFII and CSIP ratings.*