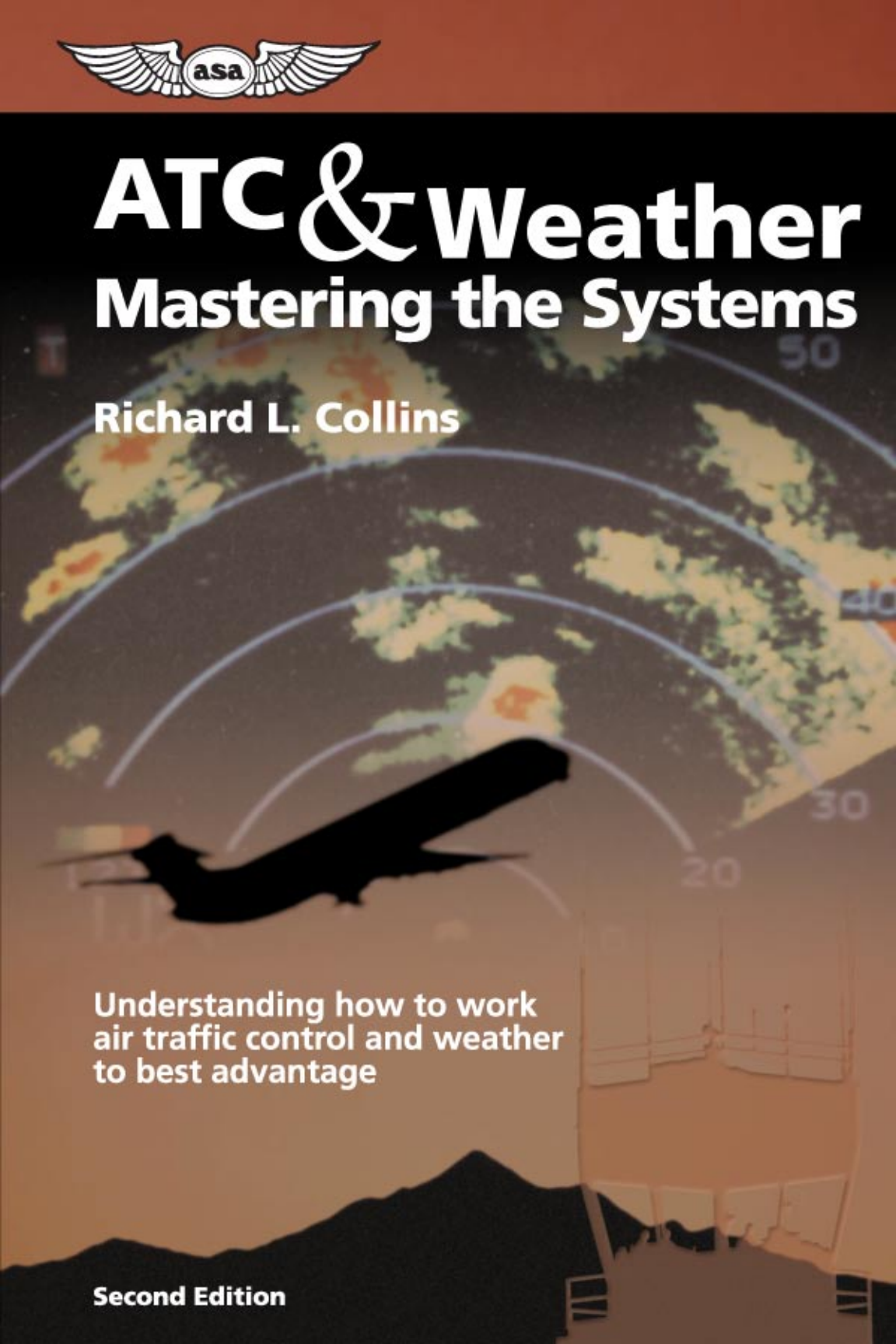
ATC & Weather
Mastering the Systems
Richard L. Collins
Understanding how to work
air traffic control and weather
to best advantage
Second Edition

ATC & Weather: Mastering the Systems
Second Edition
by Richard L. Collins

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Chapter 1
The Myths

Aviation, as much as any other activity, is beset by myths—things people will to be true even though there is no basis for them. I will always remember an old codger looking through the window of my Cessna Cardinal RG, seeing one of the first Stormscopes residing in the panel, and saying, "That will get you in trouble, boy." The implication being that more information is bad, that it can only lead you down the primrose path. The information has to be correct, even precise, but the simple fact is that the more information we have, the better. Flight itself might be a pure thing, driven by the controls of the airplane and the relationship between man and machine, but we live in a modern world. The airplanes we fly have to reflect this if we are to take full advantage of what is out there. There is still a place for the VFR stick and rudder pilot who marvels in the myths of flight past, and the basic skills can't be neglected, but there is so much more opportunity now. Anyone who doesn't immerse himself in the full array of what is available is truly missing out—just as a pilot who doesn't master the basic skills is missing out. And one of the keys to full participation is found in trashing the myths—the things that some generations of pilots have willed to be true.

Ocean of Air

One myth that has always been fun is about how the airplane flies in an ocean of air and only the ground track and ground speed are affected by wind. When I was working full-time for *AOPA Pilot* we printed a story in which a pilot related an increased rate of climb as he ascended into an increasing headwind. Letters, we got letters. "Don't you dumb bunnies

know that an airplane in flight is unaffected by wind?" That is one of the older myths, one that has cost lives over the years.

The air, like the ocean to which it is compared, ebbs and flows. One of the most important things we learn as pilots is that this is true. Flying a high-performance jet we don't see it much when going fast, but it can have a profound effect when we are flying slowly, as on approach or just after takeoff. Flying slower airplanes we can see it in wider phases of flight. I have flown my Cessna P210 for more than 8,000 hours. Because it is pressurized I fly it in the 19,000 to 21,000 (Flight Level 190 to FL210) area often. And the air up there can be strange indeed.

Flying it at FL190 from Little Rock, Arkansas, to Maryland one winter day, with a tailwind of over 100 knots, I don't think I ever saw what could be called a stable indicated airspeed. There was a jet stream core above, with winds well in excess of 100 knots. All the air carrier crews were complaining mightily about turbulence above FL210, and many were slumming with me below FL200. The turbulence wasn't bad, light at most, but there was an almost continuous jiggle and the indicated airspeed would range from 120 to 150. That was a result of changes in wind at my level, as the effect of the even stronger wind above undulated.

How it Works

It is true that an airplane in flight is basically unaffected by a steady wind. Changing wind does have an effect, however, and wind almost always changes with altitude and often with distance. On the flight back from Little Rock just related, I was storming along with that tailwind, and when over Elkins, West Virginia, I started thinking about the descent. There would be two strong factors working: One was a high ground speed; the other would be a decreasing tailwind on the descent. Coming down is more difficult with a decreasing tailwind. Why? If the airplane is moving across the ground at 270 knots, as mine was that day, with a true airspeed of 170 knots, and is descending to a level where, with less tailwind, it will have a ground speed of 200 knots, the airplane actually has to decelerate by 70 knots. That is almost heresy, saying that in this sense the airplane is ground referenced, but this is how it works. If it is going to go 70 knots slower across the ground, the simple fact is that it has to decelerate. That day, with the power slowly reduced to be kind to the engine, and with the power as low (20 inches of manifold pressure) as I like, the airplane would descend only at 500 feet per minute with the airspeed at the top of the green arc. Normally it will descend at 800 to 900 feet per minute.

Interface

In a situation like this the interface between the air and the airspace becomes a definite factor. Having flown in from this direction many times, I knew the controller would come at me with a clearance to cross either 20 or 30 miles southwest of Martinsburg at 9,000 feet, so I would have 10,000 feet to lose. Usually I figure five miles per 1,000 feet for a normal descent, but with the ground speed high and with the decreasing tailwind I figured I would need a lot more distance. When I was 100 miles from Martinsburg, I explained the predicament to the controller. At first he couldn't comprehend that I would want to start down so far out, but he came through with a clearance to cross 20 from Martinsburg at 9,000. And it took every inch of the distance to nurse the airplane down.

Other Places

You can see the effect of changing wind on the airplane in a lot of other places. The notorious downburst airliner accidents are clear evidence. It has happened dramatically both on approach, to the Eastern 727 at JFK, the Delta L-1011 at DFW, and the US Airways DC-9 at Charlotte; and on departure, to the Pan Am 727 at New Orleans. A rapidly decreasing headwind or increasing tailwind means the aircraft has to accelerate just to maintain airspeed; in both cases the combination of the downdraft from a storm and the decreasing headwind or increasing tailwind can exceed the ability of the airplane to accelerate.

Not Necessarily Wild

In some references to downburst and the effects of thunderstorms, pretty wild numbers are used. I have seen a downdraft of 5,000 to 6,000 feet per minute mentioned. Perhaps this is possible on a one in a million basis; it sure doesn't take that much to get the best of an airplane, though, and the Eastern 727 accident at JFK, which was widely studied, is a perfect example.

The aircraft was on approach, following other aircraft whose crews had reported hazardous wind conditions. The crew heard the report from one of the other aircraft; there was quite obviously a thunderstorm on the final approach course, yet they continued. The 727 penetrated the storm when it was between 500 and 600 feet above the ground, on final.

From the NTSB report: "The increase in headwind of about 15 knots and possibly an updraft produced a reduction in the rate of descent and the airplane moved slightly above the glidepath as it descended between

600 feet and 500 feet. When the flight descended through 500 feet, about 8,000 feet from the runway threshold, the airplane was passing into the most severe part of the storm. The vertical draft changed to a downdraft of about 16 fps (960 feet per minute) and the headwind diminished about five knots. As the airplane descended through 400 feet, the downdraft velocity increased to about 21 fps (1,260 feet per minute) and the airplane began to descend rapidly below the glide slope. Almost simultaneously, the change in the direction of the horizontal outflow produced a 15 knot decrease in the airplane's headwind component, which caused the airplane to lose more lift and to pitch nose down. Consequently, the descent rate increased."

The report went on to state that preceding aircraft encountered similar but perhaps less severe conditions and that one captain needed near-maximum thrust to keep his aircraft from losing altitude, was not sure of his aircraft's missed approach capability, and felt compelled to continue to a landing.

In this case the downdraft strength was nowhere near that quoted when trying to scare folks about downdrafts, and the wind change was a relatively mild total of 20 knots. Yet it was labeled a "very strong thunderstorm," and it bested this crew.

Bigger Not Better

Another significant myth was addressed in the report on the accident at JFK. When discussing the effect on other aircraft making the approach, the report stated "…the pilot of N240V, a Beechcraft Baron, was able to limit the altitude loss caused by the wind condition with less difficulty because of the different flight characteristics of the smaller aircraft and because he was flying at a higher-than-normal approach speed." The 727 was at a higher speed, too, but the significance of this is that light airplanes do better at adjusting to wind changes because, in the approach configuration, they are operating at a lower relative power setting than a heavy jet and have better acceleration characteristics. The reason a 727 can approach as slowly as it does is because of all those high-lift devices that unfold from the front and rear of the wing. You don't make lift without creating drag. The pilot of a Baron or other light airplane uses quite a low percentage of power to track a glide slope; a 727 pilot uses a substantial percentage of power while flying the approach because of the increase in drag.

ATC & Weather
Mastering the Systems

by Richard L. Collins

"There are always two systems out there – air traffic control and weather – and the responsibility and the challenge come from fitting the airplane into both of them as smoothly as possible."

In this book, Richard Collins highlights and stresses the importance of negotiating the systems of air traffic control and weather services to maximum advantage. The emphasis is on pilot judgment. Yes, a flight is affected by winds, and storms are always a risk. Visibility is an area where the regulations desert us; a blanket rule that sets the VFR minimums in miles does not take into account differences in speed. A regulation's legality does not guarantee pilot and passenger safety. Yet Richard Collins demystifies the art of aviation, and dexterously guides the pilot through common misconceptions with solid advice and accurate examples for improvement.

From flight planning on through to arrival, approach, and landing, Collins encourages all pilots to be a critic of their own performance, with an example of his own flight self-analysis. A basic weather course is provided, which serves as the backbone for learning how to read the signs:

- What kind of weather breeds the labels from which flight decisions are based: VFR, IFR, MVFR, CVFR (continued VFR)?
- How do you glean the necessary information during preflight, analyze the conditions experienced in flight, and calculate your own forecast based on new information?
- When does it makes sense to fly above the cloud deck, and when should you try to stay down below?

In this newly revised Second Edition of his book, Collins teaches you how to use ATC to your benefit, whether flying VFR or IFR. The factors you need to consider when making these decisions are outlined, supplemented with examples from personal experience and accident reports. He explains the most frequent decisions pilots made when they were caught in weather, laying all the factors on the table so you have enough information to develop pilot and airplane limitations that make sense for you – so you know exactly what you can and should ask of ATC for help out of there. But regardless of weather factors or services available en route, Collins is confident in his craft. He never lets his more than 40 years of flying relax his judgment. It is with this drive toward excellence that you can learn from his experiences.

Richard L. Collins has spent his life in aviation, logging over 19,500 flight hours in almost every type of aircraft, including Concorde, and writing about it in over 900 magazine articles and 11 books for pilots – plus many video productions. He has been editor-in-chief of Flying magazine, and publisher and editor-in-chief of AOPA Pilot magazine. Collins has won many aviation awards and continues to do extensive research in aviation safety. He is currently an editor-at-large for Flying and editorial consultant to Sporty's Academy.

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