J. MAC MCCLELLAN
BETTER PILOT / LEFT SEAT

When Synthetic Hills Are Rock Hard

Seeing (and avoiding) obstacles

TECHNOLOGICAL ADVANCEMENTS OFFER SAFETY improvements, and one of the latest pieces of technology that has become more common in general-aviation cockpits is synthetic vision. I have flown with synthetic vision presentations on flat glass primary flight displays (PFD) for several years in a variety of airplanes. For the past year I have had Garmin's G600 retrofit PFD with synthetic vision technology (SVT) in my Baron.

To see the first syn viz in action in December 2007, Gulfstream test pilots and I got up before dawn and flew up to Asheville, North Carolina, to watch the high terrain around that mountain airport rise up all around us even though darkness blocked our view of the real rocks. We flew at synthetic visions of hills until they turned red on the display and then pulled up over them. It was all very impressive.

The dual-screen Garmin G600 with synthetic vision technology uses sophisticated graphics modeling to create a 3-D topographic landscape.

Several times I have flown my Baron on close to minimum ILS (instrument landing system) approaches and have been blown away to see the synthetic runway appear ahead with the flight-path marker symbol that shows the airplane's actual trajectory through space right on the touchdown zone. I know the centered needles of the ILS or LPV (localizer performance with vertical guidance) approach will get me to that runway, but actually seeing the runway, and having the marker show you are right on target, is reassuring, to say the least.

But I really saw the best of syn viz not long ago on departure from the Lebanon, New Hampshire, airport. Lebanon is down in a hole alongside the Connecticut River, and the airport is surrounded by high terrain on all sides.

The mission was to visit *Flying* magazine columnist and surgeon Dick Karl and his wife, Cathy. When my wife, Stancie, and I were landing, we popped out of the overcast just outside the outer marker on the ILS approach to Runway 18, and we could see the tops of the hills all around the airport.

The next morning it was a different story. The overcast had lowered to just a few hundred feet above the runway. The visibility was pretty good at more than two miles, but all you could see in any direction were the bases of the hills hidden by the clouds.

The takeoff minimum and (obstacle) departure procedures chart for Lebanon is long and written in that tiny type favored by government chart makers. After donning the glasses to read all about "numerous trees and obstruction lights" and so on near the departure paths for any of the four runway ends, I concluded the bottom line of all of those warnings is that you must maintain a minimum climb gradient of 380 feet per

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nautical mile to 3,100 feet MSL. The airport elevation is 603 feet.

That didn't sound like a lot of required climb, until I did the simple math. Typical climb airspeed in a Baron is 120 knots, so that means you cover about two miles per minute. To achieve 380 feet positive gradient per mile I would need a climb rate of 760 fpm. That's a more interesting number. Many piston singles may not be capable of that rate at high weights, and my Baron sure couldn't climb that fast on one engine, even though we were 800 pounds below maximum takeoff weight.

If you can't make the required climb gradient, the chart says a ceiling of 2,000 overcast with one mile visibility is good enough to go. Under those conditions you can see the tops of the nearby ridges and have enough room to maneuver to avoid the higher hills. With the SVT picture on the G600 I did, in effect, have the "visual" conditions to see the hills and to maneuver to avoid them if an engine quit on climb-out.

The terrain presented on SVT is color-coded to alert you to your relative distance above, or below, the obstacles. As I rotated on takeoff from Runway 36 there were red-topped hills ahead on the G600 picture. But the flight-path marker was consistently above the highest peaks, showing that on the current angle of climb we would easily clear the hills ahead.

Stancie, who is usually pretty nonchalant even in low weather departures, was sitting up really straight and pointing out the hilltops on the SVT that showed hints of yellow or pink, indicating they were not far below. The controllers had no capability to help guide us because there is no radar coverage until about 4,000 feet, and they simply said we were cleared directly to Albany whenever we wanted to turn that direction.

Both engines ran just fine, our climb rate remained well above 1,000 fpm, and soon all of the hills turned that familiar shade of greenish brown to show that we were well above them. But Stancie gave the G600 another close examination before she agreed it was a good idea to turn toward the Albany VOR.

Without syn viz the departure would have gone exactly the same because I achieved the minimum required climb

Views from the G600 display: The view on approach.

A vertical obstacle, in this case a tower, in red indicating it is in the flight path.

gradient. But if something had gone wrong, the SVT gave me a fighting chance to make it. The hilltops are not uniform, and small heading changes can result in several hundred feet of extra clearance.

Even with both engines running perfectly, there was a new level of comfort in our cockpit thanks to the synthetic view of the terrain around us, and the flight-path marker showing we were climbing quickly above it. Just like on an approach, if you follow every altitude and procedure on the chart you will never hit the ground. But seeing the terrain ahead, and to either side, is a new level of reassurance, and a new backup in case you read the chart wrong, dialed an incorrect frequency or set the course wrong, or in some other way made a mistake. Synthetic vision is the final link in the avionics revolution that makes a PFD such an improvement when the weather goes down.

BEING SENT UPWIND

New Yorkers think of themselves as being among the most progressive people in the country. And that may be true in the arts and entertainment, and it's certainly true when it comes to inventing exotic investment vehicles, but the air traffic control system there is operating in the Stone Age.

This became apparent flying from my home base at Westchester County Airport (HPN) just a few miles north of New York City to Atlanta to attend the National Business Aviation Association convention. Atlanta sits pretty much in the middle of the state of Georgia, and a logical route from New York is to fly mostly parallel to the East Coast of the United States.

IMAGES COURTESY OF **GARMIN**

J. MAC MCCLELLAN

I filed a flight plan that would take us down the length of New Jersey, across a corner of Delaware and Maryland, then over Virginia, North and South Carolina, and into the northeast corner of the Atlanta area to land at DeKalb Peachtree Airport (PDK). This is exactly the route I would file to go to Raleigh-Durham, North Carolina, or to Charlotte, and New York controllers would approve it every time.

Even though this route, mostly down the V16 airway, would go right over Raleigh-Durham International Airport (RDU) and just east of Charlotte, it is not possible to fly the route under instrument flight rules when New York is handing out the clearance. Carved on some ancient stone tablet somewhere in the New York controllers' library is an edict that to go to Atlanta you have to first fly west around Washington Dulles International (IAD) airspace before you can turn south.

This really is an irritating routing because it is longer, but worse is that it takes you right over the spine of the eastern Allegheny Mountains, consistently the home of some of the worst weather and turbulence in the eastern United States.

Even more annoying, the winds were howling above 50 knots from the west-northwest in the New York and Washington areas before subsiding further south. *FltPlan.com* calculated that if I flew the V16 route I asked for, the wind would be on the right wingtip most of the way, and I would have a net loss of only 2 knots for the entire trip. It looked like a lucky break.

When clearance delivery read me the dreaded routing north of Washington and then down to Atlanta, I pleaded with the controller for my filed route. He said it was not possible. However, *FltPlan.com* shows you about an hour before expected departure time the actual clearance that comes out of the FAA's computer, and it was what I had filed. New York just wouldn't hear of it.

The weather, other than the winds, happened to be good for the trip, so I decided to accept the out-of-the-way route and depart. Flying into the 50-knot gale for the first two hours added 50 minutes to the trip time over the logical route. We were seeing ground-speeds as low as 142 knots with a true airspeed of 195 knots at 8,000 feet.

What I have done in the past, and should have done again this time, was to tell New York controllers my destination was RDU. They would have issued the clearance I wanted, and then when I got further south into Washington Center airspace, I could have changed my destination to PDK and everything would have been fine. But this time I told the truth, and paid the New York price. The Big Apple indeed.

HARTZELL HELPS KEEP AIRPLANES FLYING

A reliable source of replacement parts is essential to support the value of piston airplanes, and Hartzell Propeller's recent purchase of Kelly Energy Systems makes me confident that the stuff I need to keep my Baron flying will continue to be readily available. Kelly provides just about everything necessary to keep a piston engine operating including alternators, starters, ignition components, turbochargers, and so on. This is not a glamorous business, but I can't think of one more essential for piston-airplane owners.

Hartzell owner Jim Brown, EAA 390248, is a longtime member, former board member, and passionate SNJ owner. He and his family have demonstrated you can build a successful business in general aviation. Jim bought Hartzell Propeller from the conglomerate TRW during the dismal 1980s and sized it right to be profitable during a period of drastic cuts in new piston airplane production. He invested in the technology to design and produce advanced propeller airfoils and then to STC new "Top Props" so existing airplanes can reap the benefits of increased efficiency and smoothness.

Over the past several years Tailwind Technologies, the name of Brown's overall company, has acquired other aviation component makers that produce parts for both new production and existing airplanes. And the company also is a leading supplier to homebuilders. For those who say that you can't make money in general aviation, I say look at Jim Brown, his son, and the other young people who now run Tailwind and Hartzell. I sleep better knowing my airplane, and yours, will have the parts it needs to keep flying. EAA

J. Mac McClellan, EAA 747337, has been a pilot for more than 40 years, holds an ATP certificate, and owns a Beechcraft Baron.