How To Avoid Terrain

An enhanced GPWS with GPS database will prevent CFIT accidents.

By Wally Roberts

I RECENTLY HAD THE OPPORtunity to fly Allied Signal's new enhanced ground proximity warning system (EGPWS) in that company's Beechcraft King Air C-90. I got to fly twice because the first flight was cut a bit short due to scheduling problems. This ultimately served to my benefit because the second day was a repeat and reinforced what I learned the first day, plus everything else the experts wanted me to see.

GPS database

This new, state-of-the-art electronic wizardry contains a terrain database for the entire U.S. and most of the rest of the world. This enhanced GPWS retains the radar altimeter modes of its predecessor GPWS, but the addition of a reliable GPS-driven terrain database enhances it by so many magnitudes of capability, I would hesitate to assign a finite safety-factor value to it.

Terrain information is displayed on a conventional weather radar color display, when it isn't needed for weather avoidance. The terrain information is color coded: green for terrain below you, yellow for terrain just above you to a couple of thousand feet higher, and red for terrain that probably cannot be out-climbed, even with an early warning and lots of climb performance.

Unlike the 20 year-old GPWS, which goes from quiet directly to the dire warning mode, the EGPWS has first an advisory/cautionary verbal and visual annunciation, which progresses to an outright warning if the pilot takes no action based on the advisory of critical terrain. Even when it becomes an outright warning, there's still time to turn or climb (or both) to avoid the critical terrain.

Allied Signal's pilot let me select the scenarios I wanted to see. I boarded the King Air at my local airport (Carlsbad - CRQ), north of San Diego. I put on my TERPs thinking cap and flew the airplane into eastern San Diego County's Pauma Valley where we could aim at the world-famous observatory, Mt. Palomar. Several test runs convinced me beyond a doubt that radar vectors into high terrain would be a thing of the past with the EGPWS. In this situation, the pilot wouldn't have to yell "uncle!" when the vector is tight, but not unsafe.

We then flew east to Borrego Springs Airport (L08) and flew a simulated GPS IAP to Runway 25, where a tight turning missed approach would be necessary to escape high terrain to the west. I went into the "dummy" mode and missed straight-ahead. Again, this magic device saved the day well before it was hopeless.

Tight missed

In those unusual cases where the weather radar is needed in a mountainous terminal area, the terrain information isn't on the display, but the caution and warning annunciations are still alive. In any case, the wary crew can switch back and forth between weather and terrain modes, which isn't more workload than switching between radar range scales.

Mandate necessary

After the TWA 514 crash in the hills west of Washington Dulles International Airport in 1974, the FAA mandated the basic GPWS for all airliners. Based on the American Airlines crash at Cali, Colombia and other world-wide controlled flight into terrain (CFIT) crashes, the FAA has every bit as much of a compelling need today to mandate airline enhanced GPWS as they did basic GPWS in 1975.

Given sufficient interest, I suspect an affordable light airplane version of this wonderful device will become available within a few years. Everyone in the industry should push hard for such noble and very practical safety objectives.