



Garmin G1000 software upgrade offers low-cost SVT

Technology from the Olathe, Kan. manufacturer likely to become the standard for light airplanes

by Stephen Pope

There's a lot to like about Garmin's synthetic-vision technology (SVT) upgrade for the G1000 avionics system, starting with a price that should attract plenty of buyers.

Cessna and Diamond Aircraft were the first OEMs to publicly commit to the technology after Garmin unveiled SVT last month at Sun 'n' Fun in Lakeland, Fla. Cessna said the optional upgrade will be added to the Citation Mustang's cockpit later this year and to all other G1000-equipped models within a year. Diamond, meanwhile, announced that SVT is available now to buyers of DA40 piston singles at a price of \$9,995.

Similar to the look and feel of the synthetic-vision system (SVS) offered by Honeywell in PlaneView-equipped Gulfstreams, Garmin's SVT combines position and terrain information to create a compelling 3-D view of the world ahead of the airplane on the primary flight display. But unlike the Honeywell system, SVT also provides terrain and obstacle warnings on the PFD, as well as real-time traffic information and highway-in-the-sky (HITS) guidance in the form of "flying rectangles"—all at a fraction of the price of the Honeywell synthetic-vision upgrade, which carries a price tag of around \$300,000.

Of course, certifying SVS in light airplanes under Part 23 is a far simpler task than similar exercises in transport-category airplanes approved under Part 25. SVT nonetheless offers a glimpse of what likely will emerge as the basic standard for such technology in airplanes of all sizes given the superb job Garmin has done integrating the 3-D presentation onto the G1000 system's large XGA displays and owing to the fact that so many of tomorrow's pilots will learn to fly behind the Garmin glass. Keeping the price comparatively low should en-

sure lots of G1000 airplanes receive the SVT software upgrade.

Only a handful of airplanes so far are flying with the system. These include the airplanes Garmin used to obtain the STC for the system and a few Diamond DA40 demonstrators in the stable of Premier Aircraft Sales, one of the world's largest Diamond distributors. Even though the Florida Everglades aren't exactly the ideal environment to put synthetic-vision technology to the test, a demo flight last month with Premier Aircraft regional sales manager Jeff Owen in a DA40 XLS from Fort Lauderdale Executive Airport

(FXE) made it clear that SVT offers features and capabilities pilots won't want to go without after they've seen the system firsthand.

Much of what appears on the SVT display was gleaned from a 2005 FAA advisory circular (AC 23-26) that spells out the acceptable means of certifying the technology in light airplanes. For example, terrain on the SVT display appears in sectional-chart-like color that changes to red or yellow to portray a potential threat; water is presented in shades of dark blue beneath a lighter-hued sky; and a bold white zero-pitch line runs the entire width of the display, indicating where the horizon is at all times. Each of these elements is included in the SVS advisory circular, which "clearly

Unlike the SVS in PlaneView-equipped Gulfstreams, the Garmin G1000 SVT includes highway-in-the-sky guidance, depicting active HITS legs in magenta and non-active legs in white.

was written by people at the FAA who understand the technology," Owen said.

SVT's Capabilities

Flying in South Florida's busy airspace along the coast from Fort Lauderdale north to Palm Beach, onscreen traffic targets stood out as perhaps the most beneficial of all the capabilities SVT has to offer. Based on transponder returns received by the DA40's Avidyne TAS 600 traffic-advisory system, targets appeared on the PFD as flying diamonds that grew larger the nearer they were and turned from white to yellow depending on their proximity. "To me that's

white to yellow, and then red followed by a near instantaneous "Obstacle, pull up!" callout from the warning system. When flying in mountainous terrain, even though nearly the entire MFD might be red to show the location of terrain above the airplane, only areas of terrain that pose an imminent threat change colors on the SVT display, Owen said.

Selecting a coupled ILS approach to FXE's Runway 8 brought up the HITS rectangles on the PFD, which can be toggled on and off using a menu softkey. The system takes advantage of a patent-pending system that relies on ILS signals to position the HITS pathway. This ensures that when pilots fly through the boxes they are flying the precision glideslope. WAAS approach capability isn't yet certified, but when it is vertical guidance will be presented on the PFD



The Garmin G1000 SVT is now available to buyers of Diamond's DA40. A recent flight in one of the demonstrators showcased the system's capabilities.

probably the number-one benefit of the system as far as GA airplanes are concerned," Owen said. "When you see a target on the display and then look out the windshield to where you think it should be, it's exactly in that spot every time."

Another benefit for GA pilots is the flight-path marker symbol, which displays the projected path of the airplane. Planting the marker on the touchdown zone of the synthetic runway while flying an approach guarantees that's where the airplane lands,

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as is the case when flying with a HUD. Landing runways are highlighted on the SVT display in white when an approach is activated and signposts showing the airport identifier leave little doubt in pilots' minds that they are where they should be. A grid-line drawn on the terrain surface enhances depth perception, particularly on an approach.

Although there weren't any hills or mountains to see on the display, a pair of 1,350-foot-tall radio antennas about 20 nm southwest of Palm Beach International Airport provided a good opportunity to demonstrate how TAWS alerts are integrated with SVT. Approaching the towers from the north at 1,000 feet, the one nearest to the DA40's course at first turned from

using WAAS LPV approach data. Cyclical updates to the SVT system are performed using the same card slot as for other system updating.

Engineers at Honeywell and Rockwell Collins have eschewed the use of HITS symbology, arguing that the technology is fine when pilots are flying through the boxes but can be confusing when they stray outside them. Garmin thinks it has solved this problem by adding a small tick mark to the corner of each HITS rectangle that points in the direction the track is headed. Active HITS legs appear in magenta and non-active in white, just as course lines do on the MFD. Garmin decided to use rectangles instead of boxes because the outline of an airplane is a rectangle and not a square.

Garmin said SVT is expected to be available for the G900X avionics system flying in experimental-category airplanes in time for EAA's Oshkosh airshow in July and in the G1000 King Air C90 retrofit next year. It's not clear when retrofit SVT upgrades for existing G1000 cockpits will be available, nor has Garmin announced prices. Owens said he has been told that upgrades for airplanes already in service will be slightly more expensive than the sub-\$10,000 price for SVT in new DA40s. He also said SVT in the Diamond D-Jet will cost more, but didn't have a firm figure available. Cessna hasn't announced SVT pricing, saying only that "in most cases" the system will be available to earlier production airplanes. □