



A Ride with Avidyne:

Entegra Release 9 Ups the Ante for Cockpit Systems

STORY BY DAVE HIGDON



Avidyne delivered the first Entegra Release 9 in a customer-airplane installation to the owner of a Cirrus SR22 in mid-May.

Photo by Dave Higdon

LAKELAND, Fla. – Does it ever seem like watching general aviation glass cockpit advances sometimes resembles a child's game of leapfrog?

Someone starts the game by daringly going out in front — in the world of glass cockpits, the game started with companies introducing their new systems through the airplane homebuilders and experimental-category aircraft segments.

But then, someone leapfrogged those systems with improved units — simple cathode ray tube boxes serving as rudimentary moving-map displays — approved for certificated aircraft.

Then, someone else leapfrogged ahead of the prior leaders

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with full-color CRT moving-map navigation capabilities, followed by a shift to liquid-crystal displays from CRTs — these developments in technologies turning the screens into primary flight displays and driving the displays into fully integrated cockpit systems, which serve to deliver all the information of more than a dozen independent instruments and gauges, all on two photo-realistic display screens.

Across its history in general aviation cockpits, Avidyne Corp. held the lead position, then found itself leapfrogged, then leaped back into the lead once more only to see that spot go away again.

Thanks to its innovative new Entegra Release 9 integrated display system, Avidyne leaps ahead once again, delivering a package not only powerful and functional, but also as intuitive and easy to pick up as it is sweepingly capable.

Entegra Release 9 covers all the bases expected of modern digital flight-deck systems, and its interface works with the pilot to simplify use at a level of functionality that almost feels like it's consciously, proactively pitching to help with flight planning and flight monitoring.

The system's two boxes are wholly redundant in every system, and this redundancy-centric design goes to maintain all the same functions and display combinations should one box fail. The remaining display provides access to all the same information and serves as an input device controlled by the same "page-and-tab" filing-system interface, available when both boxes work.

The true test is the market's reaction among 4,200-plus owners of Cirrus aircraft eligible to retrofit Release 9 under an STC Avidyne received during the recent run of the Sun 'n Fun Fly-In.

With the system TSO'd on the opening day of Sun 'n Fun and the STC in hand, Avidyne made its initial shipments of Release 9 packages before the end of April. By mid-May, Avidyne had delivered the first customer-airplane installation to the owner of a Cirrus SR22, the first of what the company expects could be hundreds, even thousands of Release 9 packages to find their way into general aviation aircraft as Entegra upgrades, OEM factory installations, and outright replacement of old analog hardware in hosts of existing aircraft.

The First Dimensions of R9

Avidyne's latest Entegra incarnation requires production of only one box: the IFD5000 integrated flight display. Uno. Same software, too. And no line-replaceable unit.

A basic replacement system gets two boxes; some get three, along with the other elements rounding out Entegra R9.

The ACD215 control/display unit, a full alpha-numeric keypad and monochrome LCD display, supports direct entry of waypoints, airports, airways, approaches, SIDS, STARS and more — and does so remarkably quickly.

Avidyne can make the ACD215 CDU the pilot's choice because the control architecture of each IFD5000 provides the hardware to perform all the same functions. A pilot uses the control keys around the display by — for flight-planning as an example — pushing the "FMS" button and following the tabs, or calling up the map or the system's display to find the entire checklist logically arranged in series from pre-flight to shut-down.

As an upgrade to the Release

Continued on following page



Avidyne's new DFC100 digital autopilot

ENTEGRA RELEASE 9

Continued from page 39

9 package, owners can opt for a Release 9-specific variant of PS Engineering's flagship PMA8000B audio panel/intercom/marker beacon receiver as well as Avidyne's new DFC100 digital autopilot.

Each box contains its own air data, attitude heading and reference system (ADAHAR), including all the plumbing for the digital transducers that generate the air data. These two talk a lot, actively comparing the readings of the other.

Each IFD5000 in the R9 package also contains its own WAAS-approved GPS sensor and the DVX740 digital software aviation radio. The DVX740 delivers 8.33 MHz frequency spacing for a 16-watt, four-channel digital VHF com transceiver and digital nav/VOR/LOC/GS receiver. These are all-digital radios, with four channels each of voice and digital on the com side and four digital VOR/LOC/GS channels.

The digital channels on the com side make the R9 Entegra ready for the arrival of VDL Mode 2, 3 and 4

for future data-link communications. A particularly helpful feature on the com side is available only through the PMA8000B audio select panel: the R9 identifies the facility name that matches up with the frequency loaded in the active side of the com, then displays the name in a contrasting box placed along the upper-right edge of the display. In easy view of the pilot, this display eliminates any excuse for incorrectly calling for "Approach" when "Center" is to whom you're talking.

The package also can include Avidyne's color lightning sensor, active traffic and input for data-link weather and EVS — enhanced vision systems powered by the latest in infrared sensor technology. In addition, the R9 package includes redundant FMS900W flight management systems.

Only once installed does a pin order in the connector tell the two IFD5000s — or three, as might be the case — which serves as the PFD and which works as the MFD. Through dual redundant data busses, the two boxes share and compare all the sensor information read by both — so, both units know everything

the other knows. Should one fail completely, the other box picks up the load. Should components of any given box fail, the architecture of Entegra R9 precludes the problem from affecting any other part of the system.

The screens themselves are sharp, vibrant and more than 10 inches across, providing plenty of real estate for the totality of information available to display. Resolution of each LCD screen is at the XGA quality level, with the pixel density at 1024 x 768.

Avidyne also opted for backlit displays with three independent sources, each independently powered to give a maximum brightness level exceeding 13,000 NITS — sharp enough to read in fully exposed sunlight.

Gone Flying with R9: Be Back Soon

Part of my process for assessing a new product involves whether or not I can recall the entirety of the exposure an hour later — or whether my memory only recalls how the

Continued on page 42



A customer-owned Cirrus SR22 flies with the first installation of Avidyne's new Entegra Release 9 integrated display system, complete with the new control unit and the advanced PS Engineering audio-control panel, which also integrates with the R9 package.

ENTEGRA RELEASE 9

Continued from page 40

capabilities wowed me, but left me lacking any real memory of how to use the system.

No pilot wants to concede to being overwhelmed by technology. The degree of intuitiveness and simplicity of a product goes a long way for a pilot who primarily flies alone, often under IFR rules and many times in IMC. Put this pilot frequenting high-density air space, and the pilot of even technically advanced aircraft can find the airplane and circumstances are running ahead.

Not a comfortable feeling.

During the recent Sun 'n Fun event in Florida, I was given the opportunity for a hands-on demonstration of Entegra Release 9, and it was an experience that left me remembering most of how to tap its power, use the extensive checklists, bring up nearly all the requisite

frequencies (the exceptions being special frequencies for Sun 'n Fun and Plant City, Fla.), and move on through the process of flight planning and getting on with the flight itself.

An hour of introduction with Avidyne staff earlier in the week gave me just enough basis to feel somewhat comfortable using the system and allowed me to move ahead to flying the aircraft, the company's 2002 Cirrus SR22 test bed and certification platform, while tapping into the capabilities of Release 9.

Through the CDU, it was pretty simple and straight-forward to program a jagged flight plan from Plant City to the LAL VOR, south and then east to a point about 50 miles south of that LAL VOR.

The FMS window on the MFD displayed each entry programmed from data in the FMS900W system and back into it in the form of a flight plan. With each entry, the

FMS900W gave me the option of expanding the entry on the screen to show airport data; with an "Enter" push, the FMS provided the next line to the plan.

If you miss one and need to go back up a few waypoints, you just roll a green cursor up the display and it stops on each entry and highlights it before moving to a space between two entries. Roll the green line to the point where you needed a waypoint, type in the identifier and push the "Enter" again, and you're done. The flight plan lists changes, and the depiction on the map changes accordingly.

Whether using the CDU keypad or the bezel controls on the MFD, you can roll through lists of airports, nav aids, intersections, airways and jetways. The Entegra R9 system and its FMS900W help with the process by suggesting the next waypoint to enter.

Avidyne calls this function GeoFill, and it works like this:

When using the FMS database, you scroll through lists logically — according to proximity to the prior waypoint entered, instead of scrolling through in the alphabetic order of appearance in the database. When you dial in the first letter of the next point desired, GeoFill suggests the closest point that shares this character by automatically filling in the rest of the information and asking you to confirm.

GeoFill reduces the number of actions needed and pretty much eliminates the prospect of unintentionally confirming incorrect waypoints.

In fewer minutes than expected, our flight plan was loaded and we taxied to the end of Plant City's Runway 10 for a short a tour of central Florida.

DFC100 Autopilot

With a major fly-in under way, a NOTAM in effect regarding flight around LAL and arrivals to Sun 'n Fun's parallel Runway 9s, actually activating our flight plan and engaging the DFC100 autopilot to fly the route wasn't ever really in the cards.

Thanks to recent experience in Cirrus SR22s, bouncing between the autopilot and hand flying provided me an excellent opportunity to sample the interfaces between the flying machine, the electronic sensors and displays, and the human operation in demanding airspace.

For avoiding the show's air space after my takeoff, the DFC100 got the honor of flying on heading mode, through a knob dedicated to the purpose of controlling the heading big — I pushed the button, dialed in an altitude with another dedicated knob and engaged the autopilot to the flying machine. The experience made me feel slightly like a captain on a ship's bridge.

"Smooth" and "sure-handed"

come to mind as descriptions of how the DFC100 handled its share of my flight. Beyond its integration into the system as a whole, the advances represented in this autopilot system involve its full attitude-based operation — this integration starts at installation.

Avidyne designed the DFC100 as a so-called plug-and-play replacement for the S-TEC/Cobham System 55X employed in most of Cirrus airplanes flying with Avidyne hardware.

The new control head works with the existing servos and connects directly to the two ADAHARS of the two IFD5000s through a factory-supplied wiring harness. All sensor inputs to the DFC100 come from the R9 air-data, attitude and position sensors; so, even airways flying off VOR input bring the same smooth feel with seamless transitions whether on the VOR, a localizer or a GPS-commanded GPSS-driven course.

The context awareness of the FMS900W allows it to serve as the brains behind the dexterity of the DFC100 to sequence through arrivals without arming or disarming functions; it even transitions the next-leg depiction to the missed approach leg of published approaches — and, if flying on the DFC100, it executes the missed approach if you don't continue a descent past the minimum published altitude.

Smart system.

Installation Dreams

Shops and dealers should not fear the opportunity to enlighten customers about the potential of the Entegra R9 package — nor should customers fear the installation costs.

In most of the Cirrus flying with Avidyne equipment, installation is relatively simple, in part because of the forethought in the autopilot, the IFD5000 design, and even how the

system integrates with the upgraded PS Engineering PMA8000B audio select panel.

Avidyne produced a detailed installation diagram and it supplies harnesses tailored to the installation, from the IFDs and CDUs to the autopilot, as well as sensors and antenna for the WAAS GPS receivers. The pitot/static system plumbs directly to the two IFD5000 units and power sources are separate for the individual functions.

The user interface itself is, it seems to me, ultimately what will sell Entegra Release 9 to owners of eligible aircraft and what will continue to make converts out of aircraft owners yet to be STC'd for the system.

There seems to be no question many pilots of eligible aircraft — those 4,200-plus Cirrus owners, as well as the Piper Matrix/Malibu/Meridian and Extra 500, already targeted — will be attracted to the combination of functions and features, which exceed today's standard for top-of-the-line equipment in light general aviation aircraft, and also compare favorably to high-end systems for the cockpits of multimillion-dollar, business-turbine aircraft.

The base retail price of the Entegra Release 9 retrofit for Cirrus SR20 and SR22 includes dual XGA displays, FMS keyboard, dual GPS/FMS receivers, dual 16-watt VHF com radios, and MLB700 XM/Sirius broadcast data-link receiver.

In the right position, I'd already be talking to a shop. □

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