

# Flying the



# FlightMax

This system is clear, upgradeable and fairly easy to use. Add a data link capability, and what more could you ask from a multifunction display?

By Harry Kraemer

**A**S A PROFESSIONAL PILOT, I look for a multifunction display (MFD) that is user friendly, presents information clearly and allows database updating with ease. I discovered all three characteristics while evaluating Avidyne's FlightMax system.

Avidyne Corp. offers two series of MFDs, the large-screen FlightMax EX5000 and the standard, mark-width FlightMax X50 series. I flew with the FlightMax 750, part of the X50 series, in a Pilatus PC12, which also was fitted with

the Bendix/King EFS 50 electronic flight instrument system (EFIS) and weather radar, as well as the Ryan 9900 traffic and collision alert device (TCAD).

#### FlightMax Features

The EFIS allows for overlays and some information to be displayed, but I turned to the FlightMax to find my safety-related information: weather radar, traffic, terrain and lightning data. The MFD provides more information than the older EFIS systems, such as the EFS 50, which typically display a stick map of the GPS/flight man-

agement system (FMS) flight plan and only the nine nearest airports or nine nearest nav aids. The FlightMax MFD shows the flight plan plus all nearby airports, nav aids, airways, jet routes, special-use airspace and terrain. It will interface with 21 different radars, most panel-mounted GPS receivers, some FMS, many traffic sensors (Skywatch, TCAD, integrated hazard avoidance systems, etc.) and Goodrich's Stormscope. Avidyne continually explores possibilities with vendors for interfacing capabilities.

The FlightMax X50 indicators—the 950, 850, 750, 650 and 450 models—are

## Big and Clear

**A**vidyne's newest multifunction display (MFD) series, the FlightMax EX5000, represents the company's next generation in MFD technology. Introduced in late 2001 and targeted for the business aircraft and general aviation markets, this active matrix liquid crystal display (AMLCD) has a large, 10.4-inch (26.4-cm) diagonal screen, with vertical and horizontal orientation options. The EX5000 provides impressive clarity, with 800-by-600-pixel resolution. And it is relatively compact—3.7 inches (9.4 cm) deep.

According to Avidyne, the EX5000 provides more than 65,000 colors to depict contour terrain and water base maps. The

EX5000 also includes Avidyne's terrain and obstacle clearance scale, and it interfaces with Goodrich's Skywatch and Stormscope sensors.



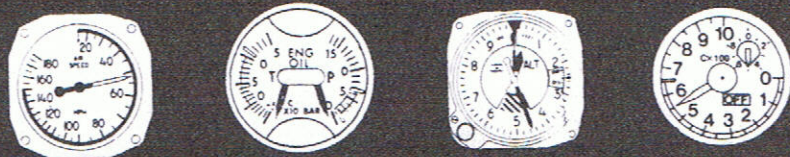
the size of most radar units in business and general aviation aircraft. They feature a 5-inch (12.7-cm) diagonal, active-matrix liquid crystal display (AMLCD) that can be installed without modification into most panels. All FlightMax models come standard with North American Jeppesen Nav-

Data. The Worldwide Jeppesen NavData is optional. They also will display all segments of a GPS approach, including holds, DME arcs and procedure turns, when interfaced with the Garmin 400 and 500 series GPS. This is Avidyne's newest enhancement to its FlightMax.

Avidyne added an obstacle database, so now pilots can overlay towers and other manmade obstacles on the map display. When a manmade obstacle is higher than the highest terrain being displayed, a blue "highest obstacle" altitude is added just above the terrain scale, providing a more accurate depiction of the minimum safe altitude.

FlightMax systems take advantage of the ARINC 429/GAMA graphics data bus of some newer GPS and FMS systems, allowing the display of curved approach paths, including DME arcs, holding patterns and procedure turns. Avidyne has priced its new display at just under \$13,000.

For terrain awareness, Avidyne has installed in the FlightMax a full terrain database along with a terrain clearance scale. (The company's newer, EX series also includes an obstacle database.) Using color, contour terrain data, this feature provides the pilot with a clear picture of near-



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by terrain, along with the minimum safe altitude for the area displayed on the MFD. It is a basic terrain awareness system, requiring some pilot interpretation. It receives no altitude sensor input and has no algorithms, so it does not substitute as a terrain awareness warning system (TAWS). However, FlightMax interfaces with several TAWS sensors which provide fully certified CFIT (controlled flight into terrain) protection.

In the corner of the FlightMax display, the color-coded terrain scale shows the mean sea level (MSL) altitude of the highest and lowest terrain displayed on the map. The color codes, plus numerical indication of hazardous terrain, help the pilot calculate a safe altitude along the route.

FlightMax also interfaces with Aviodyne's DX50 satellite-based data link system, introduced in late 2001, to provide NEXRAD (Next generation Radar) images and METAR (meteorological aeronautical) reports. Using the Orbcomm network of low Earth orbit satellites, the DX50 can provide data at any altitude, even on the ground.

Looking at the NEXRAD or a METAR report while en route, the pilot has about as complete a situational awareness as is possible on a MFD. The uplinked weather data allows the pilot to make strategic decisions, such as deviating to avoid weather well in advance, when there are options and plenty of fuel. With FlightMax, NEXRAD and graphical METAR information can be overlaid with other safety-related information regarding lightning, traffic, terrain and airspace.

NEXRAD and METAR data also can be delivered via Aviodyne's new FlightMax Datalink Weather Service, introduced in April at Sun 'n Fun 2002. This service provides information on airport precipitation, temperature, dew point, pressure, winds, visibility and ceilings.

### Flying with FlightMax

Flying the Pilatus PC12, I found the FlightMax 750 to be user friendly and straightforward. I performed 95 percent of its functions before reading the manual. The average pilot should have little problem adjusting to the display.

FlightMax proved to be beneficial in the terminal area, where I received traffic information via the Ryan TCAD. The MFD complemented the TCAD system, which normally has a small display and only shows one aircraft, using a pointer to indicate whether the aircraft is above, below, to the left or right of you.

The FlightMax display first would warn me of traffic, delivering a detailed message

on a yellow message bar at the bottom of the screen. The message might be something like "Traffic, 12 o'clock, 4.6 miles, 8,200 feet," indicating the intruding aircraft's position. This prompted me to call up a full page of traffic information, by simply pressing the "enter" key on the right side of the display.

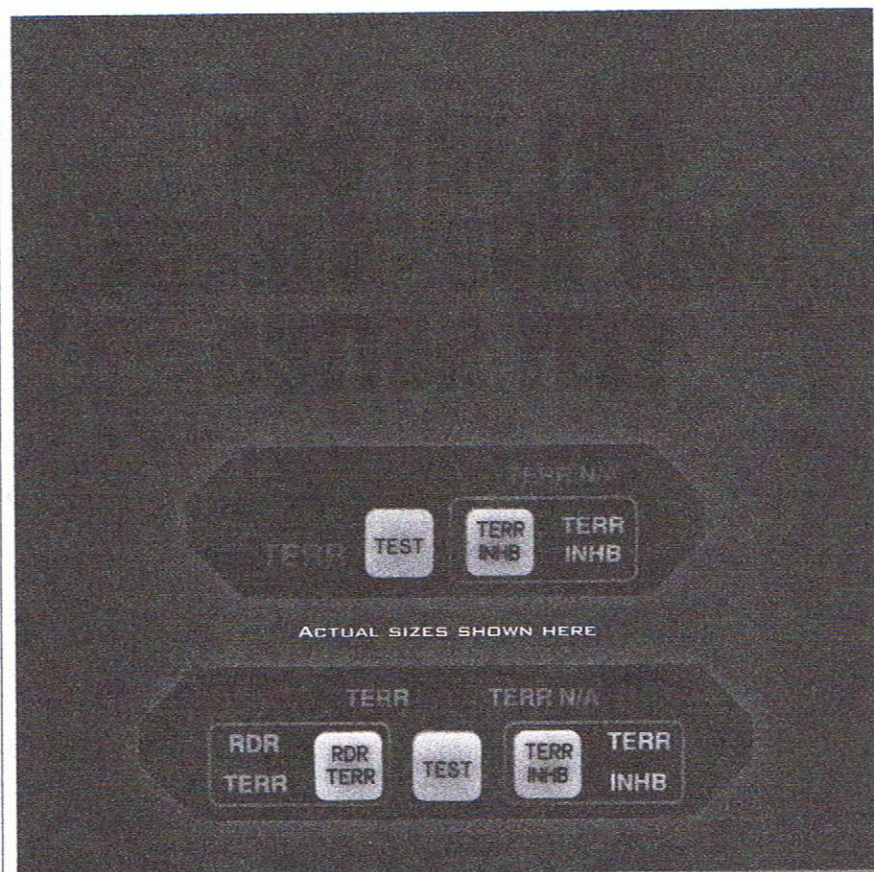
What appeared on the screen was an aircraft symbol in the center and symbols to indicate traffic all around it. A yellow circle (for another airplane) would appear within

a larger circle, representing the "shield parameter," or distance at which traffic might impose a threat. Aircraft outside of the shield parameter are represented as white diamonds.

This feature includes three modes:

- ▶ Terminal mode, showing 0.5- to 1.5-mile range;
- ▶ Standard mode, 1- to 3-mile range; and
- ▶ En-route mode, 2- to 6-mile range.

From Mode C transponder inputs, I could determine the altitudes of aircraft in



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## FlightMax as Standard Equipment

Increasingly, Avidyne Corp.'s FlightMax multifunction displays (MFDs) are making their way into aircraft as factory installations. The MFD is standard on several Piper aircraft, including the Seneca V and the Malibu Mirage.

For the Cirrus Design SR22, Avidyne developed the FlightMax EX5000C,

which also is an option for the SR20. Unlike the EX5000, the EX5000C incorporates a checklist function. Avidyne also is working to include engine monitoring capability for Cirrus aircraft.

Meanwhile, Lancair Co. will have FlightMax available in its Columbia 350 and 400 aircraft.



The FlightMax EX5000C is an option for the Cirrus SR20, shown here on its maiden flight, but is standard equipment on the Cirrus SR22.

the area. Mode S-equipped aircraft also show up on the screen with their registration numbers—a nice feature for keeping track of the aircraft being called out by air traffic control.

The FlightMax 750 that I flew also has a "charts" feature, which includes charts for visual flight rules (VFR) and both low-altitude and high-altitude instrument flight rules (IFR) operations. Using visual flight

rules, I could set the display to show the VFR sectional, world aeronautical chart (WAC), or terminal area chart. The digital chart gave me clarity as good as with a paper copy but without the hassle of folding and unfolding paper. En route, at altitude while on an IFR flight plan, I brought up the low en-route or high-altitude charts for added position awareness.

Unfortunately, I didn't have the opportunity to fly Avidyne's newer "map" function, which supersedes the "charts" and "navigator" functions and does not require a hard drive. It is similar to what was designed for the EX5000 and EX5000C. Avidyne still supports the "charts" function but no longer produces it.

The new "map" capability provides a fully vector-graphic moving map, which combines the best of the previous "navigator" function (also a vector-graphic moving map), a color-contoured terrain and water-base map, and an expanded Jeppesen database overlay, allowing it to present data in the same manner as VFR and IFR charts. This advancement in vector-graphic mapping eliminates the need for the older "charts" function, which used digitally scanned versions of National Ocean Service (NOS) paper charts. Removing the "charts" function eliminated the need for a

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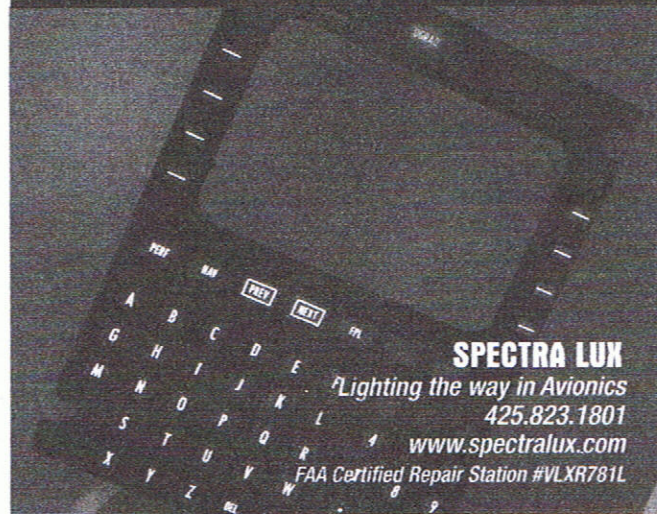
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## Tomorrow's Cockpits

**W**hat will the cockpits of the future look like? The engineers at Avidyne have a good idea. NASA's Advanced General Aviation Transport Experiments (AGATE) program awarded the "Highway in the Sky" (HITS) contract to a team led by Avidyne.

A primary goal of HITS is to "significantly increase the utility, safety and ease of flying," according to Avidyne. Using Avidyne's total-velocity vector (TVV) technology and an overlay depicting a skeletal corridor, HITS provides the pilot with safe, easy guidance. This new-generation cockpit display already has been flown in a Lancair Columbia 400 aircraft. Avidyne says its goal is to provide fully integrated glass cockpit displays for general aviation. The company has been named the flight deck display provider for the new Eclipse 500 personal jet.

Avidyne also is developing Next generation air/ground Communications (NEXCOM) air-to-ground com systems. The company is working with the Federal Aviation Administration and other government agencies to develop and certify VHF Digital Link Mode-3 (VDL-3) avionics. The VDL-3 system is designed to replace current air-to-ground communications.

mass storage device (i.e. hard drive), reducing system weight and improving data access time and performance.

### Replacing Radar

Avidyne's MFDs are made to replace most radar indicators—as was the case in the Pilatus PC12—and the company developed a new feature to resolve a possible dilemma. Having an on/off switch, a radar indicator clearly shows whether the radar is on or not, but the FlightMax has "soft" controls and menus, so a pilot could land his or her plane and inadvertently leave the radar on.

Avidyne thought of this and came up with a solution: the system monitors ground speed from the GPS, and when it falls below 20 knots, a message appears in the message bar that says "Speed Below 20 Knots—Turn Radar Off." This little message may save an operator thousands of dollars in a costly radar repair.

Although it has been replaced by an improved system, I found the "navigator" page on the FlightMax to be beneficial. I would use this feature on a long trip (1,000-plus miles). While talking with Flight Watch (122.0) for the latest weather information, I selected the map and zoomed out

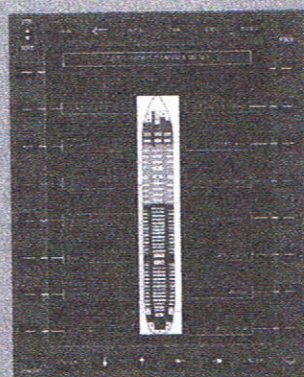
(pushing a button next to the display) until my destination was in view. Now, with my flight plan on the display, I could picture where the thunderstorms and hazardous weather were, compared to my route and, if needed, plan a "weather deviation." In the Pilatus, my weather information came from the onboard radar and Stormscope.

The FlightMax also has a trip page, which shows the flight plan—no doubt a handy feature when the pilot is on the ground, checking the route. But, while fly-

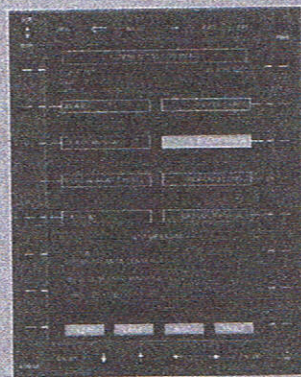
ing, I referred to other sources for that information, such as the GPS receiver. Other pages in the FlightMax would serve me better, such as the nearest airport page and those that depict airport diagrams and frequencies.

FlightMax customers will be able to receive upgrades and enhancements. When an upgrade becomes available, the MFD can be sent back to Avidyne (loaners are available), which typically provides a two-day turnaround. A

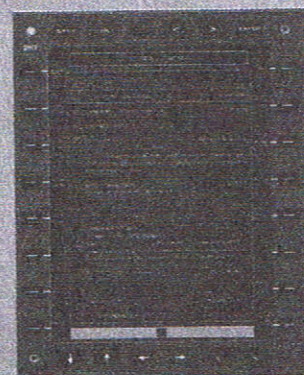
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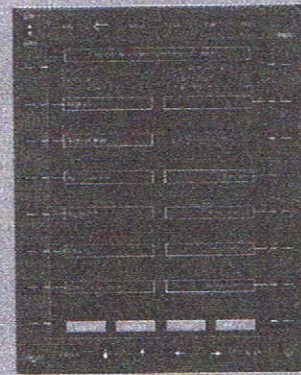
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