

LIGHTNING DETECTION

Enters a New Era

BY JAMES WYNBRANDT

Who care's about catching lightning in a bottle? For most avionics customers, seeing a representation displayed on a screen is plenty close enough. As Avidyne Corp.'s Tom Harper said, "The bottom line is, if you want to stay out of bad weather, you want to stay away from lightning."

This truism accounts for the high number of GA aircraft with lightning detection equipment aboard. For most GA consumers that's typically meant either a Stormscope or StrikeFinder. But now with the proliferation of multi-function displays (MFDs) and

uplinked weather information, end users have growing options in choosing a route to avoid lightning and the storms they accompany: Lightning detection or uplinked weather products; dedicated displays or MFDs for graphics; satellite- or ground-based data link service; and subscription or pay-as-you-go data providers.

According to shops and installers we talked to, most customers looking for lightning and storm avoidance solutions today have a good idea of what they want, and the products available, so avionics shops don't have to devote much energy to educat-

ing the consumer. But to remain successful, shops and avionics professionals have to continually re-educate themselves on these options.

"There's so much information," said Don Ginsberg, avionics manager at Ocean Aire in Toms River, N.J., "sometimes it's tough just to keep up with all of the facts."

Indeed, pilots can now get NEXRAD weather in the cockpit, data from NOAA's nationwide network of ground-based lightning sensors will soon be available in the air, and a selection of MFDs provide the overlay capability that allows weather information to be integrated into navigation as never before. Taken together, these options are significantly altering the weather avoidance—and weather equipment installation—picture.

"Until recently (lightning detectors) were the most accurate way to avoid severe turbulence and thunderstorms," said Tom Kraft, product manager for GA flight safety products at Honeywell. "But in the last two years, 18 months, data link has been changing that. Since people can now see storms very accurately, the need for lightning information has dropped off."



WSI's NEXRAD product on UPSAT's MX20 Bezel uses a broadcast satellite system to transmit every product they offer in about two minutes.

But not all the available weather avoidance and display products are compatible, and the lack of standards can be a jolt to shops and technicians trying to navigate around installation problems. Specific drivers need to go with certain MFDs. Adapters may be needed to display information from a certain sensor or receiver on one brand of MFD but not on another. And even slight differences in the models of a specific piece of equipment can change a simple installation into a complicated and costlier one.

“Installers definitely have to be careful that they do the research before trying to mate equipment,” said Dan Barks, Honeywell’s director of marketing.

With that in mind, let’s look at the basics of today’s lightning avoidance options.

Bolts from the Blue

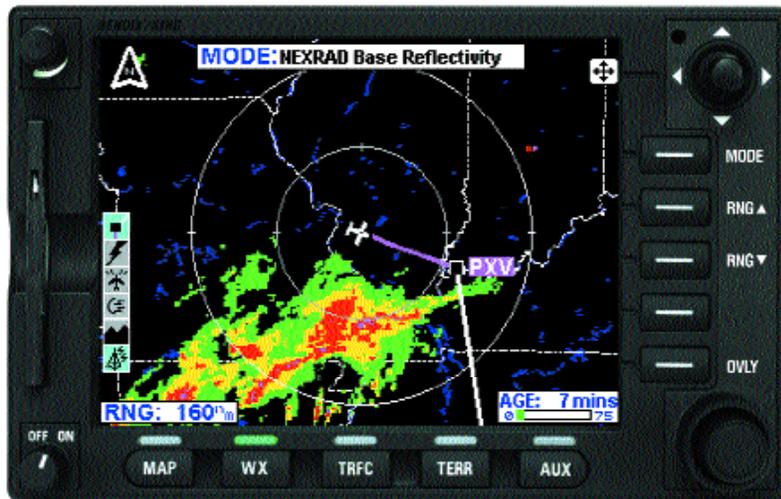
Whatever the benefits of MFDs and data linked weather information, the benefits of dedicated lightning detection equipment remain undiminished. In some cases the capabilities of these products have been enhanced. Boosters point out several advantages of dedicated lightning detection. For one thing, it’s real time, while weather data sent from the ground or satellite can be anywhere from five to almost 20 minutes old, a serious drawback when dealing with dynamic weather situations in the air. And the simplicity can equate with reliability.

“If you lose power momentarily, the StrikeFinder comes right back,” noted Brian Wrightman of Insight, maker of the StrikeFinder. “An MFD can hang up and freeze.”

To enhance cockpit readability, Insight has switched from a gas plasma display screen to an LED, making the output clear even in the bubble canopied military aircraft some StrikeFinders are installed in. Insight offers an upgrade program for



Avidyne's EX500 Map



Graphical NEXRAD A Bendix/King Data Link Weather subscription provides national NEXRAD—allowing you to pan and zoom to highlight areas of interest, no matter where you are in the air.

StrikeFinder owners who have gas plasma screen displays.

And as for the rush to MFDs, “A lot of people enjoy the dedicated display,” said Steve Rutherford, marketing communications manager at L3 Communications, which recently bought the Stormscope line of lightning detection equipment from Goodrich. “They can always glance right over at it, and it doesn’t take up much room.”

For customers who want an MFD solution, the output of Stormscope’s WX500, which unlike the rest of the company’s lightning detectors has no

display of its own, is meant to be displayed on an MFD.

But while lightning detection systems are simple and easy to operate, the installation doesn’t always match those qualities. RF (Radio Frequency) interference can play havoc with lightning detection sensors, something installers need to keep in mind.

“You’ve got to make sure you do skin mapping of the aircraft that you’re going to put the (lightning detection) system on,” said Ginsberg of Ocean Aire, which does lots of avionics installations. “The antenna

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has to go on a clean place on the airplane. That's probably more important than anything."

Strobe lights are a major source of RF interference, as is original wiring found in older aircraft, but other sources have to be considered as well.

"We had an airplane last week, they never turned the cabin heater on during skin mapping," said Ron Kivel, field service engineer at L3 Communications, who fields "a handful of calls a day," about installation problems. "It was installed in Arizona in the summer. As soon as they turn on the igniter it makes the Stormscope go nuts."

At the high end of the market, Honeywell's LSZ-860 (typically installed in larger business jets and transport aircraft) is virtually immune to RF interference.

"There's such a fantastic algorithm on our lightning detection system, we're very immune to other noises," said Ken Snodgrass, director of marketing for business and regional aviation at Honeywell. "It's listening for a specific signature. If other noises don't fit the signature, it just ignores it."

Snodgrass says the company has discussed putting this technology in products aimed at smaller aircraft, but has no immediate plans to do so.

Lightning detector manufacturers point to another advantage of their products over the data link weather services making inroads into their market: "You don't have to buy a subscription," said Rutherford. "A lot of people think the new technology is what's up and coming, but I certainly would not want to substitute it for a Stormscope."

Seeing Weather in New Ways: MFDs

Whether a substitute or complement, more end users are getting storm



Honeywell's LSZ Lightning Sensor System

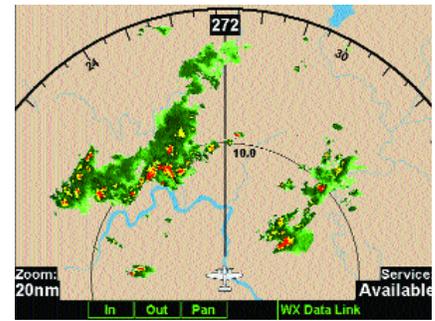
avoidance information from MFDs that display data collected from ground-based sensors. In addition to NEXRAD radar imagery, METAR, TAF, and other weather in both textual and graphic formats are available.

"This is the way we see things going, data link and the powerful NEXRAD radars in composite," said Barks of Honeywell. "There's nothing that compares to it. The lightning (detection) is pretty helpful, but those big (NEXRAD) radars identify where the cells are. I think that will challenge the Stormscope's position."

But before uplinked data can be used, there has to be an MFD installed on which to display it. Choices include Avidyne's FlightMax series and new EX500, the Bendix/King KMD-550/850, UPS Aviation Technology's MX20 and new Apollo CNX80, Garmin's GPS-430/530 display systems and L-3's new i-line MFD. Here again, potential problems lurk like imbedded thunderstorms for the unwary installer.

"Only some data links work with certain displays," Barks acknowledged. And those displays, sensors and receivers that can work with one another sometimes require adapters before they can communicate.

"You have to know which systems need the adapters and which don't," Ginsberg said. "If you're quoting a job, you have to quote the right adapters for it. Otherwise, you find out it doesn't work, then you have to tell



NEXRAD graphic as seen via the Capstone Universal Access Transceiver (UAT) data link system.

the customer it's going to cost another couple of thousand dollars and the plane has to be down another couple of weeks. Sometimes," he said of the extra costs this entails, "you wind up eating it."

Compatibility issues aren't the only potential downside of MFD selection. With all the information that can be overlaid on them, not all MFDs are physically big enough to present all the information a pilot might want to see simultaneously (moving map, data link weather, traffic conflicts) without appearing overcluttered. A smaller display might be capable of supporting these overlays, but may be physically challenged in such a role.

"You need a bigger (screen) display size to make (the data) effective," said Doug Helton, business development manager at UPS Aviation Technology. He also noted that an application that's coming tomorrow might not be compatible with an MFD a customer chooses today.

"In terms of limited panel space, check with the customer on other things they might want to grow into. If you pick a data link and display combo, and want to add an interface later on for a display it doesn't support, you could be looking at a swap-out or another MFD."

Though it detects water in the form of rain or snow rather than lightning, onboard radar, formerly considered the most sophisticated weather avoid-

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ance technology (certainly the costliest) retains its role as a valuable tool, particularly as their old displays are replaced by MFDs.

"MFDs are better screens for radar," said Barks. "First and foremost, you only use radar a fraction of the time. You can use the same space for moving maps. It is probably a little clearer and easier to see than the old CRTs, and it allows you to overlay" other information.

From the Ground Up: Data Link

Data link, the catch all phrase for the technology upon which information services are sent to cockpits, is revolutionizing weather avoidance.

"Data link weather is going to be the next GPS. It's going to be that revolutionary to general aviation flying," said Kraft. "I've flown with it multiple times in severe weather. It takes a lot of stress out of the flight."

However, data link can cause stress on the ground as customers try to choose which service to sign up with. As noted, some choices may be dictated by equipment. Bendix/King MFDs are designed to accommodate its IHAS (Integrated Hazard Awareness System), which provides traffic and terrain as well as weather information. Avidyne's units are designed to support WSI data products (though it will support others as well).

The data may be sent from the ground, from Low Earth Orbit (LEO) satellites, as with the Orbcom and Iridium satellites, or from geosynchronous satellites. Among these choices, the reception, speed of transmission and method of operation all differ. While some of these operational issues may be transparent to the end user (e.g., whether the transmission is a broadcast, or a request-reply model) the method of payment isn't. Subscription services charge a set fee,

typically in the \$50 per month range, for access to data link weather and other information. Avidyne uses a pay-as-you go system, billed on the amount of weather services used.

"On a typical IFR flight, you'll spend four to six dollars per hour if you're in real stuff," said Harper. "But for the majority of the time, you can just shut it off and spend none."

As noted above, the accessibility and age of the data will also be affected by its means of transmission. Data sent from the ground may not be available below certain altitudes, and not even all areas of the continental United States currently have coverage (a gap that's rapidly closing). But because ground stations can send more data in a given time, their weather data will not be as stale as weather information transmitted from satellites.

Standard Response

The array of lightning and storm avoidance choices, and the potential confusion that comes with them, are unlikely to end anytime soon, as manufacturers continue pushing envelopes with new avionics and services without architectural standards that would assure compatibility among products.

"I think the industry would encourage (standards) if it didn't slow anybody down," said Barks. "But there's no real mechanism to make it happen. Because in a competitive environment, everybody is trying to design new and better stuff at a rapid pace."

But some wonder if the speed of development has gotten too far ahead of itself.

"There seems to be more vendors than there is business," said Helton. "The risk right now is, what's going to happen in the long term, who's going to have the staying power?"

What's likely to happen in the near term, however, is that customers are going to continue wanting access to the newest lightning and weather

avoidance equipment and data. And given the rate of development, those who sell and install the products that deliver this information will have to move like lightning to stay on top of this quickly evolving technology. □