

# Merlin's Magic

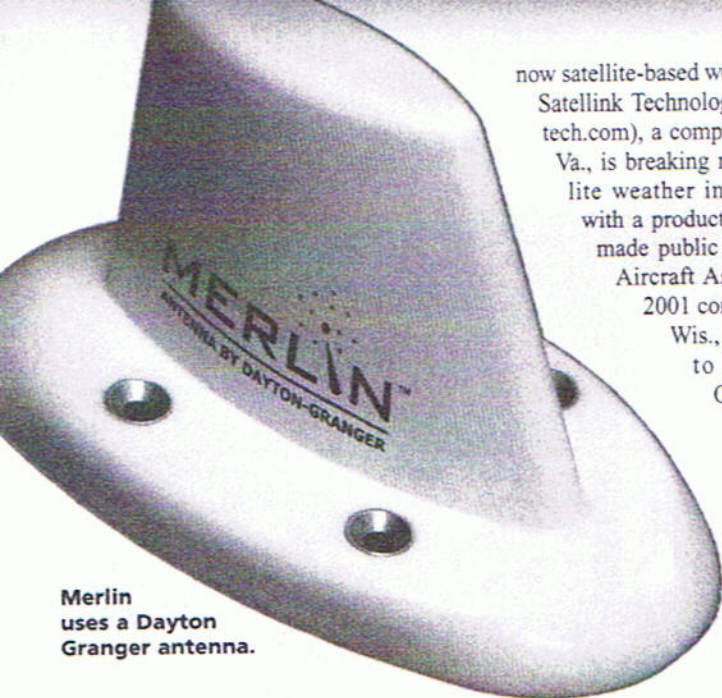


Graphical weather, overlaid on a map page, appears on a MX20 MFD, which zooms out as far as 250 nm.

Whether you fly a small Cessna or a fully outfitted Gulfstream, you no longer need to receive your weather information through voice communications. A Virginia firm offers affordable, graphical weather via satellite.

By Harry Kraemer

**W**HEN I STARTED FLYING in the early 1980s, my best resource for up-to-date weather information was someone at the other end of my VHF communications radio—a person on the ground. But in recent demonstration flights, I discovered that my best



**Merlin uses a Dayton Granger antenna.**

now satellite-based weather information. Satellink Technologies ([www.satellink-tech.com](http://www.satellink-tech.com)), a company based in Dulles, Va., is breaking new ground in satellite weather information systems with a product called Merlin. First made public at the Experimental Aircraft Association's (EAA's) 2001 convention in Oshkosh, Wis., Merlin was expected to hit the market in October. Merlin includes a lightweight receiver and omnidirectional antenna, accompanied by a subscription-based service that provides long-range graphical and textual weather information. It is designed to

display hazardous weather areas and temporary flight restrictions (TFRs) in a timely manner.

Merlin works like satellite TV. The service provider broadcasts all channels continuously, and the viewer selects the desired channel or information source. All

information is broadcast continuously from geostationary satellites via high-bandwidth transmissions, sending huge volumes of digital data. Older systems, including VHF radio communications, operated on a request/reply basis—the pilot requested information and waited for a reply. Merlin is constantly receiving and refreshing data, so the pilot sees the most up-to-date information.

Merlin's weather data can be presented on a multifunction display (MFD), electronic flight bag (EFB), personal data assistant (PDA) or other portable device. The system stores the weather data on board, allowing instant access to the current atmospheric conditions.

Merlin interfaces with UPS Aviation Technologies' MX20 panel-mounted MFD, but Satellink is developing interfaces to other vendors' systems, as well. Realizing that interfaces to portable displays can create a tangle of wires, the company has developed a single-wire interface to provide power, GPS capability, and weather information, as well as an uncluttered cockpit.

Satellink Technologies chose Jeppesen as the primary provider of Merlin's weather information. Initially Merlin will be available only in North America, but Satellink

resource could come from space, via satellite. Whether for small general aviation aircraft, large corporate jets or commercial airliners, satellite-based information delivery is becoming more and more popular. Call it the new space race. In aviation, we went from voice communications to data link and

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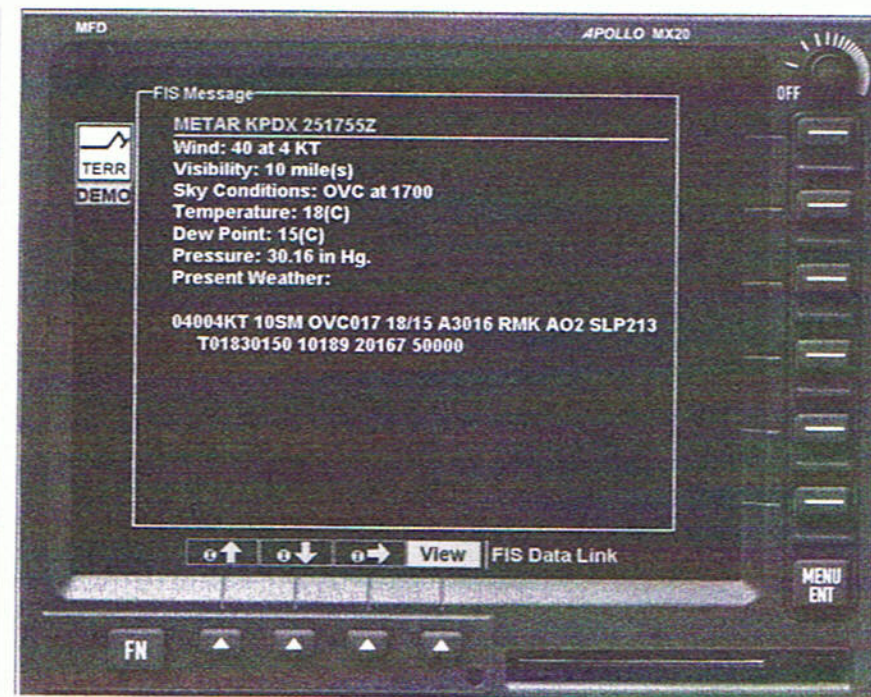
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plans to announce worldwide coverage soon. The company has just signed an agreement with AirNav.com, so now Merlin can provide a pilot with a listing of fuel locations, including prices and brands, as well as the fixed base operator's (FBO's) business hours.

Access to Merlin service is available to general aviation aircraft at a \$45-per-month subscription rate. Other subscription packages are to be announced. There are no per-request air time or per-page fees. A single fee provides access to a host of weather data services (see list, page 42).

#### Picture Worth 1,000 Words

The most widely used method for receiving up-to-date weather information—the 122-MHz Flight Watch or Flight Service—is antiquated and limited. First, it's not visual. Pilots typically must ask to leave their assigned frequencies and then contact Flight Watch. After establishing radio contact, they must give their positions and then request the desired weather information—all of which takes time. Pilots can only hope they hear the weather information clearly, without interruptions or interference. They must then write the information down while maintaining control of the air-



The text-only METARs can be accessed on Merlin by pushing the "FIS" button.

craft and then transfer (either visually or mentally) this information to a map, on which their flight plan routes are overlaid, to conjure a visual picture of the weather.

With Merlin, pilots can receive a clear and vivid weather picture with the touch of a few soft keys on the MFD.

Flight Watch has other limitations.

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Because it operates on VHF frequencies, it's limited to line of sight. Aircraft altitude and the terrain can affect reception. Also, depending on the amount of traffic in the area, the controller may not be able to authorize the pilot to leave the assigned air traffic control (ATC) frequency to call Flight Watch—a situation that normally occurs when the weather is bad and many aircraft are trying to deviate. Right when Flight Watch is needed most.

#### User Friendly

Merlin eliminates those shortcomings. During two demonstration flights—in a Piper Comanche and Beech Baron, both equipped with the UPS Technologies MX20 MFD—I found it to be user friendly, too. Merlin's menus are straightforward and easy to navigate. After five minutes of coaching, I could easily peruse my options. Most features are accessible by means of just two buttons. I used the soft keys located horizontally across the bottom and vertically down the right side of the MX20.

Merlin's features are accessed through the "FN," or function button, in the display's lower left-hand corner. This pulls up a menu from which selections can be made, using the soft keys across the bottom of the

### Merlin's Content

#### AIRMETS

(airman's meteorological information)

#### Fuel Information (location, price, brand)

#### Icing Reports

#### Weather Depiction Charts—showing IFR

(instrument flight rules) and MVFR

(marginal visual flight rules) areas

#### Lightning Forecasts

#### METARs (aviation routine weather reports)

#### NEXRAD (next-generation radar)

#### NOTAMS (notices to airmen)

#### PIREPs (pilot reports)

#### SIGMETs

(significant meteorological information)

#### TAFs (terminal aerodrome forecasts)

#### TFRs (temporary flight restrictions)

#### Traffic Information

#### Turbulence Forecasts

#### Winds Aloft

MFD. From here you can access next-generation radar (NEXRAD) images through the "WX," or weather button. The "FIS," or

flight information service button, will bring up the menu of Merlin's other, text-only products, including METARs, TAFs, AIRMETS, SIGMETs, NOTAMS and TFRs. These can all be accessed with reference to the nearest destination, the next waypoint, or by alphabetical order. (METARs are aviation routine weather reports; TAFs, terminal aerodrome forecasts; AIRMETS, airman's meteorological information; SIGMETs, significant meteorological information; and NOTAMS, notices to airmen.)

TFRs can be shown not only in text format, via a NOTAM, but also graphically, courtesy of chart and flight data provider AeroPlanner, on the MX20's map page, which the user can customize. A black line (with hatched marks) outlines the TFRs, which can be overlaid on a map. Merlin is said to be the first system to show TFRs graphically, live, in the cockpit. The TFR's valid time and altitude are presented in text format.

Merlin even beats air traffic control in announcing TFRs. During our demo flight, a TFR appeared on the MFD upon becoming valid. I immediately questioned air traffic control and found that I had the information before the controllers did.

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This is a major advancement, especially for the GA pilot normally flying by visual flight rules (VFR), as TFRs can pop up while you're in the air, long after your pre-flight briefing.

Prior to 9/11, most pilots had never heard of a TFR. But they have become common with every standard weather briefing.

NEXRAD can be overlaid on a basic map page showing a symbol of your aircraft, your flight plan and waypoints. The MX20 currently displays up to 250 nautical miles (nm) on the screen with the NEXRAD overlay; future MFD software will display greater distances. You also can use the zoom feature to pan out and look at other areas of coverage (the United States currently). This feature is especially useful to plan ahead. With NEXRAD data, you can alter your flight plan to circumvent thunderstorms.

The pan feature also helps determine the movement or trend of severe weather. By panning the area ahead during the flight, the pilot can easily see which way a thunderstorm is moving and whether the storm is building or dissipating.

#### Merlin vs. Radar

Merlin is not a replacement for on-board radar. Nor can radar replace Merlin, which is an excellent long-range strategic flight-planning tool. Radar displays a real-time picture of precipitation in front of the antenna, while Merlin displays NEXRAD, a mosaic or composite image of multiple sites.

NEXRAD is not real time, although its data is usually no more than 10 minutes old. During flight testing, Satelink Technologies found that the average age of the NEXRAD images is no more than six minutes.

Radar is best for tactical decision making or picking your way around thunderstorms. (The maximum range of an on-board radar for a light, private airplane is about 240 nm, although pilots would set the range at 40 to 50 nm for negotiating thunderstorms.) Merlin's ability to pan ahead makes it an excellent long-range planning tool. Viewing weather patterns that are 500 or even 1,500 miles ahead allows the pilot ample time to make decisions on course deviations.


Although Merlin was not designed to replace radar, it is ideal for aircraft—such as home-builts, vintage craft, sport and aerobatic planes—that cannot support radar because of a lack of space to mount the antenna. Merlin will fill that void.

Merlin can store up to several hours' worth of data it receives. While most MFDs do not support the display of stored

data for weather recorded five or 15 minutes earlier, Satelink Technologies says it will incorporate this capability in future versions of Merlin, with upgrades to the MFD. Then the pilot can gain a clearer view of weather trends and movement by viewing stored NEXRAD images, METARs and other weather data.

Satelink Technologies also offers a version of Merlin designed especially for marine use. Future applications will

include a smaller, self-contained portable unit designed for hikers and campers.

Satelink Technologies planned to complete initial testing and officially start sales of Merlin in early October. With Merlin's low acquisition cost (\$3,500 for general aviation aircraft, including the receiver and antenna, as well as the first year of service), Merlin will be a worthy addition to platforms ranging from the light sport or recreational aircraft to large corporate jets. 



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