

An Angle Of Attack On Flying Safety

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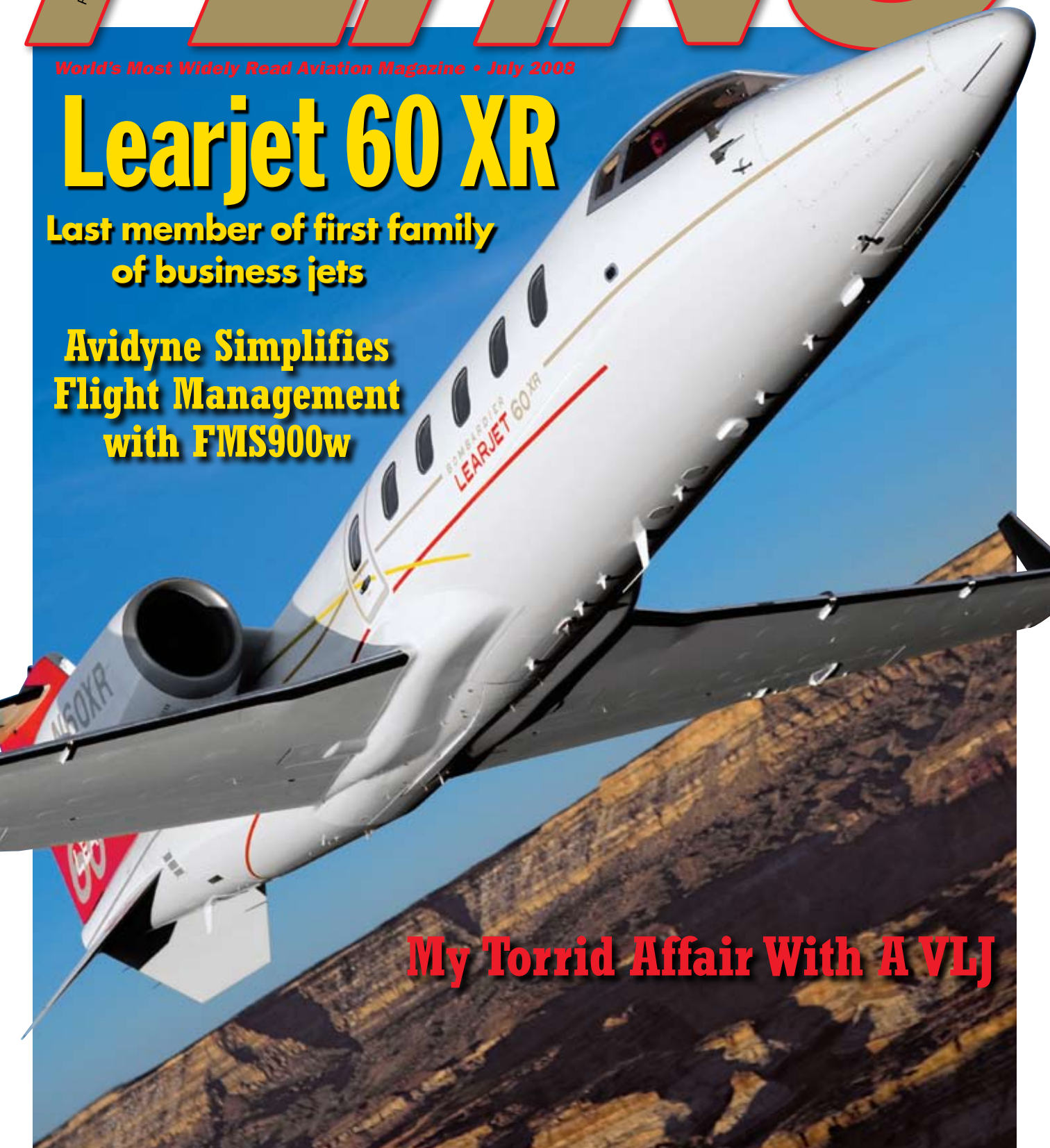
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Learjet 60 XR

Last member of first family
of business jets

Avidyne Simplifies
Flight Management
with FMS900w



My Torrid Affair With A VLJ

Entegra
FMS900w
promises
jet-level
performance,
and more, to
piston singles
and up.



New Flight Management System From Avidyne

Avidyne pioneered development of flat glass multi-function displays (MFD) and primary flight displays (PFD) for general aviation airplanes but had left the actual navigation and flight management chores to others, but that is changing. Avidyne is now showing its new Entegra FMS900w that will bring many of the best business jet FMS features, and several new capabilities, to airplanes ranging from piston singles to turboprops to light jets.

The FMS900w is far along in flight test development after several years of work by Avidyne, but the company is not yet announcing when first deliveries will be made or in what airplanes initial certification will be obtained. But as with other Avidyne products the new FMS will become available first in airplanes already equipped with the company's Entegra flat glass display system.

The heart of the FMS900w is, of course, a com-

puter operating with proprietary software. The "M" in FMS stands for management, and it takes a powerful computer core to accomplish that task. Feeding information to the computer is a WAAS-capable GPS receiver, plus a digital VOR-ILS receiver that can track up to four stations simultaneously. With that raw data coming in the FMS calculates navigation guidance for any and all phases of flight with the accuracy to meet the latest required navigation performance (RNP) standards that are just now coming to jets. The FMS900w is controlled by the knobs and buttons on the Entegra flat-panel display that is already in many airplanes, and there is an optional keyboard control unit.

The most important feature of the FMS900w is its ease of use for everything from departure to en route to approach and missed approach. Since Avidyne launched development of the system with a clean

sheet of paper it had none of the legacy constraints, either in hardware-software or in pilot use experience, to deal with. Active instrument-rated pilots at Avidyne thought about how the real ATC system operates, and then did their best to devise an FMS that, to a large extent, anticipates what a pilot will need next. Making IFR flying easier is the primary design objective.

This ability for the FMS to anticipate what a pilot wants next is called “context sensitive,” meaning the system attempts—almost always correctly—to know what is coming next as an IFR flight progresses. For example, the system will show you a menu for departures or arrivals at the appropriate spot without you having to change menus. The cursor is also context sensitive and goes to the spot in the flight plan where you are most

likely to make a change or insert a new procedure. In each case I was able to enter an entire flight plan without moving my fingers from the data entry knob to change menus or use other buttons.

A really big help in entering data in the FMS900w is a technique that Avidyne calls GeoFill that anticipates the next fix you are about to enter. GeoFill looks

at fixes along the route from the departure to destination airport and calls up those points after you have entered only one or two of the possible five letters. For example, I often cross BREZY intersection on my way home to Westchester County. With other nav systems I need to enter all five letters because there is a BREZE intersection in the

western United States and that comes up first since fixes appear in alphabetical, instead of geographically near, order. But with the FMS900w BREZY appeared after entering only “BR” because the system knew my general path to



The map display clearly shows the path the FMS900w will guide the airplane over for an RNP arc approach to Palm Springs, including the possible missed approach path and holding. The flight plan information to the right of the map display describes each point in the procedure, including the crossing altitudes for the fix. Note the layout of the keys on the optional control display unit above.



Westchester would take me near that intersection.

GeoFill cannot anticipate every possible fix with only one or two letters entered, but in my time with the system I couldn't trick it into needing more than two letters entered. It's amazing how much time GeoFill saves in knob twisting or button pushing on the optional keyboard compared to conventional nav systems.

The FMS900w also handles airway entry as easily or better as any FMS I've flown, including those in the large business jets. When you enter a fix to fly to, the system asks "via" what method. A click of the entry knob calls up airways proceeding from that fix. Click on the airway and fixes along the route appear and you can click on the terminating fix with no additional entries. If you already have two fixes on an airway entered, the system will automatically fill in all points along the airway or jet route.

Avidyne estimates that the FMS900w saves up to 75 percent of the data entry time compared to conventional GPS navigators that require entry of every fix along a route. For those of us on the coasts who are still routinely cleared along airways, I believe this estimate is accurate. For example, my clearance from Westchester just north of New York City to North Myrtle Beach, South Carolina, is always JFK VOR, V16 Dixie, V1 to CRE. With the FMS900w that is only five data entries for JFK, V16, Dixie, V1 and CRE, and with GeoFill I didn't need to enter all the letters for any fix. With a conventional navigator that route requires 13 individual fixes to be entered.

Though the FMS900w can be

operated using only the concentric knobs and soft keys on the Entegra flat-panel display, Avidyne also has created a control display unit (CDU) with a full keyboard. The CDU is ideal in airplanes that have cockpit space to mount the unit off the vertical. It is very difficult to use keyboards mounted vertically in the instrument panel because your hand bounces around in turbulence. The CDU also has something I had not seen in an FMS before—a "qwerty" keyboard layout. Other FMS keyboards have the keys in alphabetical order, but Avidyne believes the standard computer "qwerty" keyboard layout is easier to use even though you can't get both hands on it as you do a full-size keyboard. Some handheld communication devices use the same layout with good acceptance so Avidyne isn't inventing something new—except in aviation.

Once up and flying, the FMS900w shows you the fixes in the flight plan with a host of additional information such as time en route, arrival time for each fix, fuel remaining, crossing altitude if applicable and so on. Graphical metar flags show airport conditions along the route, and clicking on a flag brings up the full metar decoded in plain English.

In flight the system feeds wind corrected roll steering commands to the autopilot so that it can automatically intercept and fly any procedure, including holds, arcs, procedure turns and curved approaches. When on an assigned vector the system draws a dotted magenta line ahead of the airplane showing your track over the moving map. When intercepting a course or approach leg the dotted magenta line shows the system's calculated path to accomplish the

intercept even when transitioning from a GPS computed course to raw data guidance, such as an ILS.

Another helpful display technique is a dashed magenta and white line that shows the next active leg on the moving map. This is particularly useful in the terminal environment where arrival procedures and approaches can have many legs close together. The dashed line visually confirms what the system intends to do next so you are not surprised.

The digital nav-com is also a smart system that anticipates your next move. Based on your flight plan and position the radio suggests the ATC frequencies you will probably be changed to next and they can be activated with a single button press. The nav portion of the radio tracks and identifies automatically up to four VOR or ILS signals, typically looking ahead of and behind the airplane.

I had a chance to fly the FMS900w in a Cirrus SR22 that Avidyne has been using for development work and can report that the system is more intuitive to use than any FMS I have encountered. I used the vector line to intercept an airway, watched the system fly a full procedure to an ILS, and then a missed approach and hold. The map presentation is very easy to understand, and the flight plan list kept me totally informed on the sequence of legs in each procedure.

The FMS900w combines many great concepts that build on Avidyne's goal to make real life IFR flying easy for the single pilot. If development stays on track the system should be available next year, but Avidyne hasn't dropped any hints yet about pricing or in which airplane it will be certified first. 