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Flying with the Zaon XRX

Tools for avoiding other aircraft

FOR MANY PILOTS, A mid-air collision is among their worst fears, even though the odds of having one are slim. During the last 10 years, an average of 16 aircraft a year collided over the United States. But nearly half, 44 percent to be exact, landed with no fatalities. Overall, mid-air collisions represent only 3 percent of all fatal accidents. So your chances of having one are small, though that's of little comfort if you do. While the task of avoiding other aircraft remains challenging, technology exists that can prevent some, though not all, of these accidents.

Using flight following and onboard traffic systems can help in detecting and avoiding other aircraft, but it's not a cure-all. For example, a Cirrus SR22 involved in a mid-air over Wyoming was nearing an airport and had terminated flight following 90 seconds before impact. The air traffic controller had advised the pilot of the

The G1000 shows an aircraft 3.2 miles away and 700 feet higher. The XRX shows the same aircraft 4 miles away and a second aircraft 2,000 feet higher and 5 miles away. That second aircraft was probably farther out than the 6-mile range displayed on the G1000.

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conflicting traffic prior to instructing him to switch to the nontowered airport's common traffic advisory frequency. The aircraft had a traffic advisory system, though the National Transportation Safety Board was unable to determine if it was on at the time. Despite all of the technology—radar flight following, onboard traffic awareness system, and parachute—the pilot died. So technology alone is insufficient for preventing all mid-air collisions, but it can help.

I have known about Zaon's portable collision avoidance systems for a decade but had never flown with one. At the U.S. Sport Aviation Expo in January, I visited Zaon's booth and saw a demonstration of its XRX displaying traffic on external devices, including a Garmin Aera series GPS. Since I had an Aera 560 on loan from Garmin, I arranged to borrow an XRX and the appropriate interface to test the system. I fly in a variety of traffic-equipped aircraft, so it seemed like a great opportunity to compare the XRX's data with other traffic systems.

Zaon makes two models of what are essentially passive Mode-C receivers. Unlike more expensive traffic awareness systems (TAS) that transmit a signal, Mode-C receivers listen for the transponders of nearby aircraft responding to interrogations from either ground-based radar or aircraft equipped with active traffic systems. While receiver-based traffic systems are less expensive than active ones, they cannot detect an aircraft unless its transponder is being interrogated.

The basic MRX model shows the relative altitude and distance of other aircraft but gives no bearing information. The XRX model uses four separate built-in antennas and receivers to determine bearing. Arrows, indicating one of eight directions, point to where an aircraft is located. It also includes a built-in altimeter, compass, turn/bank sensor, and thermometer. Audio alerts, both beeps from the unit and voice alerts routed through the pilot's headset or intercom, notify you when aircraft are detected.

I tested the XRX standalone and with the Aera 560 in a variety of planes including both metal and composite aircraft. Some were equipped with TAS, some with traffic information service (TIS), and some with no traffic system.

TIS data is uplinked from one of about 100 approach radar sites around the United States. However, unless you are within 55 nautical miles and are in line of sight of the radar site, you won't receive traffic data. TIS—when it's available—is excellent for comparing other traffic devices, since the distances to other aircraft are radar-derived and fairly accurate. Other traffic systems, including TAS and the XRX, estimate distances based upon the strength of received transponder signals. But transponders are available in different power levels, one of several factors that make it difficult to estimate distance by signal strength.

At times, I found the distances estimated by the XRX to be remarkably accurate when compared against TIS data or reports I requested from an approach controller. Sometimes, though, the estimates were off by a few miles. While that might seem like a big issue, it really isn't as long as the system gets you to look outside in the correct direction.

Overall, I found the XRX to be quite capable, and I started bringing it with me on all flights.

The bearings displayed by the XRX were always accurate while flying in composite aircraft. In metal aircraft, bearings were accurate for aircraft in front of me. A few times in metal planes, a target behind me at 6 o'clock was displayed at 9 o'clock or vice versa. Reading the owner's manual I learned that, in metal planes, signals of aircraft behind you are attenuated (strength of signal reduced), though the direction should remain accurate. I confirmed the attenuation while monitoring an aircraft on TIS that remained a constant 4 miles away as it curved around me from 9 o'clock to 6 o'clock. The XRX correctly indicated 4 miles away at 9 o'clock, but indicated 6 miles when the aircraft was 4 miles at 6 o'clock. Again from an operational standpoint, the difference didn't matter.

What does matter is taking early evasive action when a converging target is near your altitude. The XRX displays up to three aircraft at a time and ranks the threats by how close each is to your present altitude or, in some cases, by which aircraft's altitude is

converging with yours. I generally consider any aircraft within 500 feet vertically to be a dire threat that I'll climb or descend to avoid if I'm unable to make visual contact. Air traffic control tells aircraft to stop squawking altitude whenever their altitude is off by 300 feet or more. Thus two converging aircraft, each with a 200-foot transponder error, could pass less than 100 feet from you anytime a traffic system indicates a 500-foot altitude difference.

Overall, I found the XRX to be quite capable, and I started bringing it with me on all flights. Thinking back, I realize I initially held three preconceived notions about the unit that were false:

First, I incorrectly assumed that using the XRX's built-in display would be far inferior to displaying data on an external device like the Aera 560. In fact, I found it easy to read the display and determine where to look for traffic. It may take slightly less time to identify the relative position of traffic when looking at a GPS, but there were other tradeoffs. For example, since the Aera places your aircraft near the bottom of the display, intruder aircraft located behind me were often not displayed. It was possible to see them, but it required bringing up the panning pointer and moving the map so that the aircraft symbol was temporarily placed near the center of the display. Given the choice, I would use an external display, but it's not essential.

Regardless of which Aera GPS page is displayed, when an aircraft gets close, a Traffic Warning Window appears in the lower left. Note it shows a second aircraft at 6 o'clock that doesn't appear on the main map, since the airplane symbol is placed near the bottom of the display.

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I also assumed the more expensive traffic systems I compared with the XRX would always be better, but that was not the case. For example, most G1000-equipped Cessna 172s use a Mode-S transponder to show TIS traffic on the aircraft's two large displays. Obviously the XRX is superior anytime you're more than 55 nautical miles from an approach radar site and cannot receive TIS data.

But the XRX also outperformed TIS in situations I hadn't anticipated. For example, flying over the Livermore, California, area, aircraft below about 2,500 feet don't show up on TIS data, since they are blocked by the hills between them and the Oakland approach radar site. However the Oakland "Center" radar located on nearby Mount Tamalpais illuminates aircraft as low as 1,000 feet over the Livermore airport. So even though I was higher and receiving TIS data, aircraft below 2,500 feet weren't displayed but did appear on the XRX.

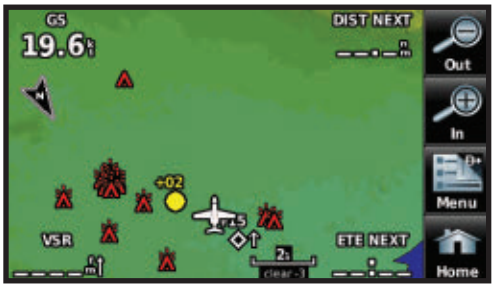
Another time I was flying along the beach at 2,000 feet over Half Moon Bay, California, when I went behind a hill and lost TIS traffic data. Yet the XRX still displayed two aircraft below, one making a left downwind departure and another waiting to take off. In this case, I suspect that one of the aircraft was equipped with a TAS that was actively interrogating the transponder of the other aircraft. So although both aircraft were below radar coverage, they were visible on the XRX.

You might think that a more expensive TAS would always show any traffic displayed on the XRX, but that also wasn't true. I tested the system in a TAS-equipped Cirrus SR22 and a Diamond DA40 and found that there were times when the Zaon XRX would see traffic not displayed by the TAS and vice versa.

Finally, I assumed that a pilot using a TAS- or TIS-equipped aircraft wouldn't benefit from using an XRX. Most of my test flights were in aircraft with a traffic system, and I was surprised at how well the XRX complemented these systems. None of the systems was always superior, but having two systems on board always provided a better overall picture, at least in the crowded San Francisco metro area.

Ultimately, the FAA plans to have all of us flying with automatic dependent surveillance-broadcast (ADS-B) equipment.

This otherwise well-equipped Cessna 172 lacked a traffic system. The Zaon XRX needs to be mounted level on the glare shield and at least 6 inches from the compass and other metal objects.



The XRX prioritizes aircraft primarily by their relative altitude. In this case, the 10 o'clock traffic triggered a traffic alert since it's 200 feet higher. The 4 o'clock traffic is closer but 1,500 feet higher and climbing.

Depending upon the level of equipment required in the final rule, all aircraft may be seeing each other by 2020. Until then, equipping yourself with any type of traffic avoidance system is a wise investment. EAA

Max Trescott, EAA 531980, is an aviation author, publisher, and the 2008 National CFI of the Year. Read more of his articles at *www.MaxTrescott.com*.

For a link to Max's full review of the Zaon XRS, visit *www.SportAviation.org*.

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