

# The Fundamentals of TCAS

by John Fiscus

Photos by Mike Radomsky

As Cirrus pilots, many of us are fortunate enough to have a traffic sensing device as part of our avionics suite. The situational awareness this TAS affords us goes miles beyond simple traffic advisories that ATC can offer (though such services are still highly recommended to go along with our technological wonders).

Before discussing utilization of these devices, it is important to understand the distinction between various acronyms that many pilots mistakenly use synonymously. Those acronyms are TCAS, TAS, TIS, and TCAD. Most Cirrus aircraft are equipped with a TAS or Mode S TIS.

**TAS:** By far the most common, the factory-installed Traffic Advisory System is the Skywatch 497; the Ryan 9900BX is a common after market add-on. These devices are meant to help the pilot acquire traffic visually – they should never be used as the sole means of evasion. When in doubt, pilots should ask ATC for help. The TAS will commonly display a graphic representation of targets relative to itself (seen on the moving map or in the range rings on the Garmin 430's Nav group, page 3).

**TIS:** The Traffic Information System is also commonly referred to as the Mode S traffic system. A TIS needs compliant ATC radar systems which actually upload their data to the aircraft. The caveat here is that only terminal type radar systems will upload their data to the TIS (areas in which the pilot is talking to a controller with the label "Approach"). Center's radar system does not have the capacity or update rate to handle TIS and thus this traffic information will not be available over the majority of the United States. Further, the FAA has

decommissioned 22 TIS-capable facilities and doesn't have plans to expand the service in the foreseeable future.

**TCAS:** Various levels of this Traffic Collision Avoidance System exist (types I-III). TCAS II and III will issue suggested evasive actions to the crew such as climb, descend, or turn. TCAS equipment on two converging aircraft will actually communicate with each other to coordinate the evasion (for example: one will climb, the other will descend). TCAS I does not issue those commands (called Resolution Advisories or RAs) but a pilot who is issued a traffic alert by TCAS I is required to ask ATC for assistance.

**TCAD:** The Traffic/Collision Alerting Device is similar to the TCAS I and TAS systems with the exception that it does not normally depict a graphic of the traffic on a moving map. Rather, the TCAD will issue range

and bearing information to the pilot such as: "Traffic, one o'clock, two miles, 300 feet low."

## Utilization

The standard TAS with which most Cirrus aircraft are equipped is the Goodrich Skywatch system, displayed through the Garmin 430 and on the MFD. While nearly every pilot who owns this system makes use of it, many are unaware of the full functionality available.

There are four different vertical range views the pilot can choose from. The different ranges are Above, Below, Normal, and Unrestricted. Note that these altitudes are relative to the aircraft, not MSL or AGL.

**Above:** Skywatch shows targets 9,900 feet above the aircraft and 2,700 feet below it.

**Below:** Skywatch shows targets 9,900 feet below the aircraft and 2,700 feet above it.



With the range rings visible, it is possible to see that the aircraft 900 feet below the Cirrus is just outside two miles away (outer ring is six miles, inner ring is two miles). While it isn't a definite threat yet, it would be a good idea for the pilot to visually acquire that traffic and determine its direction of travel.

**Normal:** Skywatch shows aircraft 2,700 feet above or below.

**Unrestricted:** Skywatch shows aircraft 9,900 feet above or below the aircraft.

Switching between these display modes is relatively easy. On the Garmin, scroll over to the Nav group, page three. Turn on the cursor (press the right-hand knob) and the present altitude mode will be highlighted. Twist the small right-hand knob to cycle through the four display modes. When the desired range is visible, it isn't necessary to press the ENT key, simply turn off the cursor the same way you turned it on.

Switching the display mode on the Avidyne MFD is even easier. The present range is shown on the upper-left side of the display across from the top-most button. Press the corresponding button to cycle through the display modes.

It is important to note that changing the view range on one display does not affect the view range on any of the others. If the Below range is desired and the pilot references both the Garmin and MFD, both must be set.

Finally, the horizontal view range on the Garmin display can be adjusted with the same key used to adjust the range on the map (Nav group page two). The outer limit of this range is 12 miles, the minimum is two miles.

### Recommendations

Skywatch initializes in the ABV mode and stays there until the pilot commands otherwise. Pilots who leave this mode operating might be surprised by aircraft below them should a relatively quick descent be needed.

Utilize Skywatch as pertinent for nearby airspace. For example, a VFR flight under a busy class B could have the screen full of targets if left in the ABV mode. Numerous targets are not pertinent to the pilot since they are quite probably jets climbing quickly through altitudes that make them a non-factor. A cluttered screen that shows too many targets will make it hard to discern the VFR aircraft which are also flying under the B (and a definite concern to the pilot). This kind of flight should have the Skywatch in Normal range. When flying over relatively

remote areas (mostly devoid of other traffic), switching to UNR mode will keep the pilot aware of the occasional traffic. Trying to find the Cessna 5,000 feet below or the turboprop 8,000 feet above could provide welcome activity on a long cross-country flight.

While the targets displayed on the MFD are useful for situational awareness, the display range most pilots have the MFD set to (20 or more miles) makes it difficult to positively identify aircraft that are relatively nearby. For example, a target that is four miles away, when viewed on the MFD which is in a 50-mile range, looks like it is almost on top of the Cirrus. On numerous occasions I have observed a great deal of unneeded stress caused by these false alarms. Instead, it is quite useful to switch one of the Garmins to the traffic page where more precise ranges are clear, thanks to the range-rings.

These are just a few examples of the Cirrus' Traffic System capabilities. For a more thorough understanding and experience in using these practical applications, pilots should seek out an instructor well-versed in the Cirrus' avionics.

Fly safely! 



About the Author: *John Fiscus is co-owner of The Flight Academy and has over 5,700 total hours, about 5,000 of those teaching in Cirrus aircraft. Before opening the Academy, John worked at Cirrus Design as a factory instructor and corporate pilot. He holds Commercial, CFII and CSIP ratings.*

*Even with the MFD zoomed down to 10 miles, it is difficult to tell how close the aircraft actually are. The aircraft 900 feet below the Cirrus could potentially be quite close. If this MFD were zoomed out even farther, it would be much more difficult to tell.*