

# Syndicate Installs Traffic Advisory System

By Dave Saggs

Thanks to Dave Saggs and the R44 syndicate for submitting this article. They have 'gone the extra mile' by having a traffic advisory system fitted to their helicopter, and we appreciate them sharing their experience with *Vector* readers.

**H**ave you ever looked out the windows of your aircraft and seen another aircraft flying closer to you than you are comfortable with and wished you had seen it earlier? Or perhaps given a position report and then immediately heard another aircraft giving the same position and maybe even a close altitude?

The theory is that it is a big sky. We are constrained, however, by various airspace limits and often want to fly to the same destinations. Classic examples of high traffic flows in the Auckland area are the transit lane off the East Coast Bays, and also around the Brookby area. And when the weather comes down we all head for the same small gaps.

*Over the last 11 years there have been four mid-air collisions in New Zealand airspace resulting in 15 fatalities. In the same period there have been 11 'near miss' or serious loss of separation incidents involving air transport aircraft. In several incidents pilots spotted the conflicting aircraft, but generally in insufficient time to enable effective avoidance action to be taken, the aircraft missing each other by good fortune.*

Quote from a CAA report, December 2001

With regard to the near misses, I believe that the CAA would be most likely be referring to events in controlled airspace where they would be reported more frequently. I expect there would be many more unreported near misses in general aviation. The US NTSB has 210 reports of midair collisions since 1990 and, although there is considerable light aircraft activity, it is also a huge country. That is one collision a month.

We all know that the other aircraft you are going to hit is the one that is not moving on your windscreen. And yet, as there



The author, Dave Saggs, and ZK-HOX. The upper aerial and front lower aerals (see left) are used by the TAS600 to give best coverage and aircraft detection.

is no relative motion, that is the hardest to see. There are real limitations on what you can detect visually – and whether you can detect it in time to take appropriate avoidance action.

All major airlines use a system called ACAS (Airborne Collision and Avoidance System), and pilots consider it to be one of the best safety advances to have occurred in the last few decades. The system uses signals from the aircraft's transponder to indicate its position to another aircraft. Similar technology, Traffic Advisory System (TAS), is available to light aircraft. The difference to ACAS is that it does not give Resolution Advisories, which are directions given to the pilot – either a pitch attitude, or rate of climb or descent, to avoid the collision.

## Technical Background

There are two types of TAS systems available. One system only 'listens', and so picks up the response from an aircraft transponder triggered by a ground-based radar, or commercial aircraft's ACAS. This is relatively cheap, as low as US\$500, and works okay in the US where there is extensive radar coverage. It would work in New Zealand in the areas with radar coverage.

The better system 'interrogates' other aircraft. It sends out a signal to trigger a response from the other aircraft's transponder, and therefore is more appropriate to the New Zealand environment. We chose the Avidyne TAS600 on price, and as it integrated with our Garmin 420 GPS display to provide full visual information.

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VFR flying is an 'eyes outside' operation, however, and so we saw the significant advantage of this system is that it gives an aural warning through our headsets. For example, "Traffic, three o'clock high, one mile".

The TAS600 will track 50 targets and display 9. It has a range of 7 NM. The display can be zoomed in to 2 NM or 1 NM to get a better indication of where the threat is. The volume is selectable in the setup menu, as are the triggers for the aural warning. We have these set to warn us of an aircraft approaching within 1 NM and 500 feet altitude.

The information displays on the Garmin Map page in a tiny threat window, and as text indicating range and altitude. If we had a heading input, we would get a full overlay of the threats on the Map page. However, in airspace we are familiar with, or when joining a circuit, we mostly bring up the Threats page, which gives a full display of the other aircraft in the vicinity.



Not a sight you ever want to see. This is another aircraft a very short distance away, 200 feet above, but descending.

our syndicate members it was agreed that we would like to have the protection that this system would add to our flying. Hopefully, as happens with most electronic equipment, the price will come down.

## Installation

South Pacific Avionics and Heliflite Pacific at Ardmore installed the box, wiring, two aerials, one above and one below the cockpit, and interface with the Garmin 420. We have an instant mute button on the cyclic that mutes an individual target, and a master mute on our intercom system so we can turn all the aural warnings off when in the circuit. If the instant mute button is pressed twice rapidly it will bring up all current aural warnings, even if you are sitting on the ground.

The installed equipment came to about \$25,000. Not cheap, but when shared among



Just another busy day at Ardmore. The two aircraft on the left showing +24 (2400 feet above) and +29 are departing from Runway 05 at Auckland International Airport.



The Map page, showing a Traffic Advisory (TA), which is traffic within 500 feet altitude and not diverging. The Proximity Advisory (PA) is traffic within 500 feet altitude but not as high a risk as a TA. On the bottom right is a thumbnail of the traffic's position.

## Does it Work?

The system will display threats after a short warm-up period on the ground. It changes to a flight mode after climbing through 400 feet from your departure elevation, and will then give aural warnings. It always gives accurate distances to the threat, and accurate relative altitudes and whether the other aircraft is climbing or descending. This is useful if you cannot readily see the aircraft, so you can climb or descend to ensure separation. Our system does not have a heading input, so the relative position is taken from the GPS track. This works well at speed, and in the cruise, but the GPS track is slow to update at lower speeds, and in the circuit the relative direction does not always display correctly.

The TAS 600 will always be a back-up to the 'mark one eyeball', but I have found on numerous occasions that it has given me an early warning of where to look, and indeed that traffic was there sometimes when I was not expecting it.

To give an example, I was approaching Whitford to land on some farm land. I was crossing the busy transit area that runs from Ardmore to the North Shore. The TAS 600 was showing a target approaching at my altitude and two miles away so I reported at Whitford, and waited. I still couldn't see the aircraft, so reported again and started to descend. Still no report so, in frustration I asked if anyone else was at Whitford. The other aircraft responded that he had the helicopter in sight and shortly after flew directly overhead. I have found a number of times over Auckland City when the TAS 600 shows that other aircraft are there, that they seem happy to hear where I am, but don't return the favour of letting me know where they are by reporting their position, even though they may be very close.

Another incident occurred over the southern end of the Firth of Thames when I was cutting the corner at about 3000 feet. Another aircraft was doing the same thing but going in the opposite direction. I don't think either of us expected another aircraft to be there, and the first we knew was through the

aural warning. There were three pilots in our R44 scanning to try to find the other aircraft. It was painted white, and on a white sky it was very hard to see until surprisingly close.

## Please Turn Your Transponders ON!

The main issue is that currently a lot of New Zealand airspace does not require pilots to turn their transponders on. Having operated in and out of Auckland in an Airbus, I was pleased to see always three to five targets in the Ardmore area and a number over the city and North Shore. I have found that most pilots turn their transponders on around the Auckland area, and also in busy airspace. For example, around Queenstown and the Franz Josef Glacier.

Please turn your transponder to at least ON (mode A), and preferably to ALT (mode C). In both cases you will then be protected from bumping into our red R44, ZK-HOX, the Police and Westpac helicopters, and other ACAS equipped aircraft. ATC may also have a better idea of where you went down, in the event of an engine failure.

Overall, I feel that the TAS600 offers significant additional protection and advice of the location of other aircraft in the vicinity. It is easy to use, and the aural warning works very well. It is surprising how much light aircraft traffic there is out there. ■

# Dangers of Static

The September/October 2005 issue of *Vector* featured an article, *Dangers of Static*, on a fuel explosion caused by static electricity. The consequences were severe, with a seriously-injured engineer, the loss of an aircraft, hangar damage, and estimated costs of over half a million dollars. Prominent in the article was the statement:

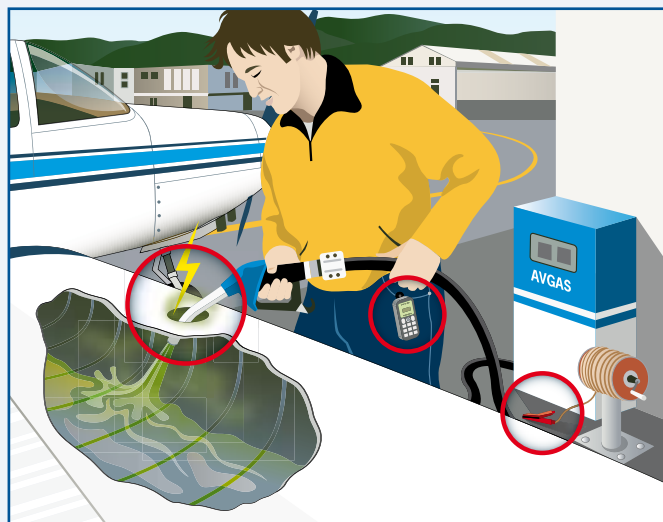
**The possibility of a fire or explosion created by static electricity is forever present – no matter how remote it may seem.**

Just a few weeks ago, a helicopter was being refuelled with avgas from a jerrycan described as a proper anti-static can with a non-splash filler. The pilot swung the can up to the tank filler hole, and as it got close, a static spark ignited the fuel vapour. Only prompt action with a fire extinguisher saved the aircraft and personnel from damage or injury.

The pilot was wearing cotton/polyester overalls and rubber-soled boots. He had not touched the helicopter to equalise any static charge before bringing the fuel can up to the filler hole.

The operator promptly reported the incident to the CAA, and was particularly concerned that a reminder on the dangers of static should be circulated as soon as possible to other operators.

The original *Vector* article is now posted as a stand-alone item on the CAA web site, under "Publications". If the dangers of static are not part of your risk management strategy or your health and safety plan, now would be a good time to rectify the situation.



Key points from the previous article:

- Refuel and defuel outdoors.
- Ensure electrical bonding is in place prior to removing any fuel caps.
- Use only approved containers.
- Use only approved filters.
- When in doubt, consult your fuel supplier.

And we can now add:

- Always have a fire extinguisher handy.