



COLLISION

course

“My whole world became focused on a sleek oncoming low-wing light aircraft rapidly filling the wind-screen.”

Alan O'Donnell and Chris Malone

IT WAS A PERFECT DAY FOR FLYING: blue sky, zero turbulence, and visibility all the way to the horizon. The two of us, both AUF-certified pilots, were feeling relaxed and pleased with the way the flight from Murray Bridge to Renmark and return had progressed so far.

Although we had planned our flight at 4,500ft I remember being a little disappointed that I had let the altitude drift down to 4,300ft. I was just about to set the Jabiru up in a gentle climb to reclaim the lost height when an image suddenly appeared in front of me. My whole world became focused on a sleek oncoming low-wing light aircraft rapidly filling the windscreen. I recall the retracted landing gear of the aircraft as it flicked massively and directly overhead, on an exact reciprocal north-easterly route less than 200ft or so above us.

I had no time to move the stick, which surprised me because one would think that 2.5 seconds – which is my estimate of the duration of the visual contact – should be enough time to react. Well it wasn't, and it isn't if you are not expecting it, especially if you pause momentarily to assess what's happening.

I only had time to say “Chris, look at this” –

and then it was over.

We were moving at about 100kt, and I guess the other machine would have been doing at least 130kt.

My reaction was a mixture of disbelief and curious paralysis, almost a denial that it had happened, as here we were a few seconds or so later, still droning on in an aeroplane which was contentedly on course, and now smoothing back to 4,500ft.

Nor did we instantly make an indignant radio call – as you might otherwise expect. We were, after all, on the Melbourne monitored area frequency. How does one coolly and professionally (without appearing in the local paper, or spending a week filling in forms) advise another aircraft that it nearly caused a fatality?

We followed about two minutes later with a rather bland, and weak-voiced “all stations” call of our position, altitude and track, and no more.

There was no return call, no response, and in fact, nothing from the harbinger of death, still rushing on presumably in the opposite direction and still at the precisely incorrect altitude for a VFR aircraft flying east – below 5,000ft or otherwise.

At the time of the incident we were both visually scanning the airspace with what

could be considered reasonable interest, yet saw nothing.

Ironically, I had only recently been bemoaning the fact that so many local pilots seem to have the view that when OCTA, beneath 5,000ft, any altitude is acceptable, whereas there is an obligation, I think, to observe hemispherical altitudes where possible. It certainly had been possible on this particular afternoon.

Furthermore, we were operating a roof mounted strobe and a forward facing 50 watt spot light mounted on the front landing gear, which goes to show they are not worth much in bright lighting conditions.

For what it's worth, Chris and I suspect the other pilot never even saw us. It's likely that our aircraft disappeared beneath his cowlings and to this day he has no idea how close he came to us. The whole incident was acutely visible to us – right to the near-disastrous end. We have decided that there is wisdom in not telling our wives about this but equal wisdom in sharing this story with as many pilots as possible. For God's sake, please observe those hemispherical cruising levels.

Alan O'Donnell and Chris Malone win \$500 for their entry to What Went Wrong?

ANALYSIS

Here's Harry

Doug Edwards

"G'DAY, NAME'S HARBINGER. HARRY Harbinger. President of the Right to Fly at Any Height, Any Time, Any Direction, Association. Here's my card. See you out there."

He's out there alright, – and unfortunately neither God nor CASA is going to keep this bloke out of your windscreen. There are legitimate reasons for pilots (other than Harbinger and his ilk) to vary from hemispherical cruise levels. Climbing and descending are two obvious examples. Also, not all aircraft are fitted with radios, so, depending on the type of airspace you are flying in, you will not always be alerted to the presence of conflicting traffic. With that in mind, your last, and most reliable, line of defence against mid-air collisions is your eyes.

When stimulated we see better. When deeply relaxed, we are the opposite. Visual search patterns slow down, and image processing acuity is poor.

Unfortunately aircraft are most difficult to see when they are most likely to present a problem – when they are going to hit us. This is because our eyes are better at seeing moving objects and conflicting aircraft will always appear stationary. In flight – and especially on long flights – you must force yourself to scan rapidly and aggressively. Use every trick you know to stay aroused. Tell yourself that there will be other aircraft on conflicting headings at your altitude. Engage another person on board in the process of looking for other aircraft. Indeed, when you are travelling with another person, whether they are a trained pilot or not, pre-plan activities that will ensure you both remain alert. Relaxation in flight is nice, but staying alive is nicer still.

Even if Harry Harbinger is not coming your way, there are many reasons another aircraft might be flying at your height in the reciprocal direction. Plan and execute the sort of visual search that will ensure you see traffic before it becomes a problem. Keep your ears tuned to the radio, make the appropriate radio calls, make sure your transponder is on, and, as always, remember that you are the last line of defence.

Although it wouldn't have helped Alan and Chris in this situation we should also remember that an increasing number of aircraft are now fitted with traffic alert and collision avoidance systems (TCAS), a system which relies on transponder signals from other aircraft to create a picture of surrounding traffic. So if you have a transponder, turn it on before take-off and leave it on until after landing. For more information about transponder procedures see AIP ENR 1.6-8.

Doug Edwards is an executive committee member of the Aviation Safety Foundation Australia.

In plane view

1. Scan: Effective scanning is accomplished by a series of short, regularly-spaced eye movements that bring successive areas of the sky into the central visual field. Each movement should not exceed 10°, and each area should be observed for at least one second to enable detection. Although horizontal back-and-forth eye movements seem preferred by most pilots, each pilot should develop a scanning pattern that they find comfortable and stick to it.

You should concentrate your search on the areas most critical to you at any given time. In cruise, you can greatly minimise the risk of a mid-air collision by scanning an area at least 60° left and right of your flight path. Constant angle collisions often occur when the other aircraft initially appears motionless at about your ten o'clock or two o'clock positions. This does not mean you should forget the rest of the area in the 60° arc. You should also scan at least 10° above and below the projected flight path of your aircraft. This will allow you to spot any aircraft that are at an altitude that might prove hazardous to you, whether it is level with you, climbing from below or descending from above.

In the circuit, always look out before you turn and make sure your path is clear. On final approach pilots often fix their eyes on the point of

touchdown. Occasionally shift your focus to look for other aircraft on final approach and be prepared to take evasive action if an aircraft or airport vehicle crosses the runway in front of you.

To be most effective, the gaze should be shifted and re-focused at regular intervals.

Scan patterns. The two most commonly used scan patterns – side-to-side and centre-to-side – are based on the fact that our eyes are more likely to detect traffic when they are constantly being re-focused at different points in space. To make sure nothing is missed, the windshield is mentally divided into segments, and you scan each one in sequential order.

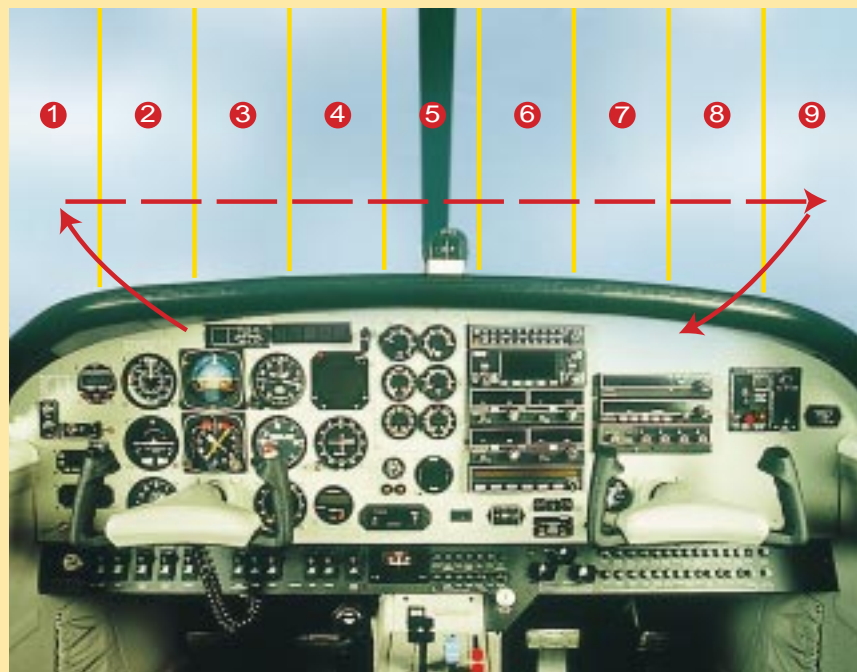
The side-to-side pattern involves moving methodically from the far left of the visual field to the far right, pausing very briefly in each block of the viewing area to focus the eyes. This is followed by a brief scan of the instrument panel and then the process is repeated.

The centre-to-side pattern starts in the centre and progressively moves left then returns to the centre and moves right.

Every attempt should be made to keep the head still – when the head is in motion vision is blurred and the mind will not register potential targets.

Time sharing. External scanning is just one part

Scan technique: The side-to-side pattern involves moving the eyes methodically from the far left of the visual field to the far right, pausing very briefly in each block of the viewing area to focus. This is followed by a brief scan of the instrument panel before the process is repeated.



ILLUSTRATIONS: P. MARKMANN

of the pilot's total visual work. A pilot also has to establish a good internal scan and learn to give each scan its proper share of time, depending on the work-load inside the cockpit and the density of traffic outside. Generally, the external scan will take considerably longer than the instrument scan.

Military research has found that the average time pilots need to maintain a steady state of flight was three seconds for the instrument panel scan and 18 to 20 seconds for the outside scan.

An efficient instrument scan is good practice, even when flying under the visual flight rules. The ability to scan the panel quickly permits more time to be allotted to exterior scanning, minimising the risk of collision.

When determining whether or not your current technique is adequate, you should consider that the closing speed of two Cessna 172s on reciprocal headings is around 240kt. That's one mile every 15 seconds. That doesn't sound too bad until you consider how difficult it can be to see a small aircraft from a mile away. And 15 seconds is likely to be the best-case scenario. Two Mooney 252s a mile apart will converge in around 10 seconds and two Citation Bravos will cover the same distance in less than five.

2. Check yourself: Your eyesight, and consequently your safety, depend on your mental and physical condition. Absent-mindedness and distraction are the main enemies of concentrated attention during flight. Age affects your eyes, so if you are a mature pilot have your eyes checked regularly. If you need glasses to correct your vision, wear them and ensure that you have a spare pair within reach

at all times.

3. Plan ahead: To minimise the time spent "head-down" in the cockpit plan your flight carefully. The more work you do on the ground the more time you will have to look outside during the flight. Check your maps, NOTAMS and ERSA in advance for potential hazards such as military low-level routes and areas of high traffic density.

4. Clean your windows: During pre-flight, make sure your windshield is clean and in good condition. If possible, keep all windows clear of obstructions such as opaque sun visors and curtains.

5. Follow procedures: Follow established operating procedures and regulations. Where possible fly at the relevant hemispherical altitude for your route and category and always follow published circuit entry and exit procedures. Some typical situations involving in-flight mishaps around airports include entering a left-hand circuit at an airport with right-hand traffic, or entering downwind so early that you interfere with departing traffic. Beware of pilots flying large circuits with long final approaches. In most in-flight collisions at least one of the pilots involved was not where he or she was supposed to be.

6. Avoid crowded airspace: Where possible minimise the time you spend in high-traffic areas. For example, VFR pilots may consider skirting around a radio beacon to avoid IFR traffic. (Aircraft can be training over navigation beacons, even in good weather.) If you cannot avoid overflying aerodromes enroute, fly at an altitude that will keep you

well clear of circuit traffic and, if appropriate, make a radio call stating your intentions.

7. Improve your view: If you are short, or the aircraft you fly has a high coaming, use a cushion to improve your view. All aircraft have blind spots: know where they are and establish strategies to counter them. In a Cessna, for example, the high wing makes it impossible to see the area you are turning towards. Lift the wing slightly before you turn and check that you are not moving into the path of another aircraft. One of the most critical mid-air collision situations exists when a faster low-wing aircraft is overtaking and descending onto a high-wing aircraft on final approach.

8. Equip to be seen: High intensity strobe lights increase your contrast and visibility considerably by day and even more by night. In areas of high traffic density, strobe lights are often the first indication another pilot receives of your presence.

Transponders, even outside radar coverage, can also play a significant role in reducing the potential for mid-air collisions. Increasing numbers of aircraft are fitted with TCAS and this system can only "see" other aircraft if they have their transponders switched on. If you have a Mode C transponder switch it to ALT when lining up for take-off and leave it on until after landing unless you are operating wholly within a GAAP CTR.

Outside controlled airspace civil IFR aircraft should use code 2000 and VFR aircraft should use code 1200. In controlled airspace or when using radar advisory service (RAS) you should use the assigned temporary discrete code.

9. Talk and listen: Listen to the radio and try to build a mental picture of surrounding traffic. Your job is much easier when you are alerted to the position, altitude and intentions of other aircraft. Once an aircraft is sighted, don't forget the rest of your scan. If the aircraft seems to be moving on the windshield, you're probably not on a collision course. If it has little relative motion you should watch it very carefully – the other pilot may not have seen you. Remember that the radio can only give you part of the picture: not all aircraft are radio equipped.

10. Use your passengers: If you normally fly with another pilot, establish crew procedures which ensure that an effective scan is maintained at all times. Otherwise, use passengers to look for traffic you have been made aware of, while you look for other aircraft.

Edited and adapted extract from Collision Avoidance published by the British Civil Aviation Authority.

Scan technique: The centre-to-side pattern involves moving the eyes methodically from the centre of the visual field to the far left. The eyes then return to the centre and move right. This is followed by a brief scan of the instrument panel before the process is repeated.

