

KEEP CLEAR

Rob Liddell describes how to spot other traffic in a classic reprint from Aviation Safety Digest.

A 747 viewed from 100 m cannot escape attention. However, the same aircraft at 8 km will not be so obvious. Yet at jet aircraft closing speeds of 1000 kt or one mile in four seconds the observer has only 20 seconds to see the other aircraft, decide that there could be a conflict and take avoiding action.

In light aircraft with closing speeds of 200 kt, there is more time available to see another aircraft; however, the target size is much smaller – especially if the aircraft are approaching head on (see figure 1). The contrast with the surrounding environment has a big effect upon visibility. The white contrails from jet engines seen against a blue sky are highly visible. However, set against a backdrop of white overcast sky the contrails virtually disappear.

Equally, trying to sight another aircraft below the horizon can be very difficult as it becomes lost in the background of earth colours or the shapes and confusion of suburbia. Combat pilots are trained to understand the importance of the sun; targets between the observer and the sun are virtually invisible because of the sun's brightness. Flashing strobe lights use two mechanisms to attract attention: the contrast of the light's colour against the background; and the brilliance of the light as it flashes.

Optics: Objects that move across the visual field stimulate more nerve endings in the eye and are noticed sooner. The unfortunate aspect of this is that a target that moves relative to the observer is not generally a collision risk. If two aircraft flying on a constant heading and at constant speed are going to collide, they will maintain a constant relative bearing to one another and appear to remain stationary in the windscreen (see figure 2).

There is little point searching the sky if your windscreen is covered in small dots of dead insects and dirt. Keep your windscreen and glasses clean.

The optics of the eye determine how clearly you can focus on distant objects. The standard for normal distant vision is 6/6. This means that you can see clearly the 6/6 line of a chart at a distance of 6 m. Vision at 6/9 or 6/12 means that you see clearly at 6 m what

the normal eye sees at 9 or 12 m. If you can improve your vision to normal 6/6 or better with glasses or contact lenses, you should wear them.

The difference in visual ability between 6/6 and 6/12 could mean the difference between seeing an aircraft in time to take avoiding action.

The best vision in the world is of no value if it is not used. The pilot who does not look out of the cockpit will never know about the traffic until the sound of impact. Seeing involves looking and looking involves expectation; the expectation of finding a target. If you think you are the only aircraft in your airspace, then you will not see the other traffic. You should also ask yourself how you can make your aircraft more visible to other traffic.

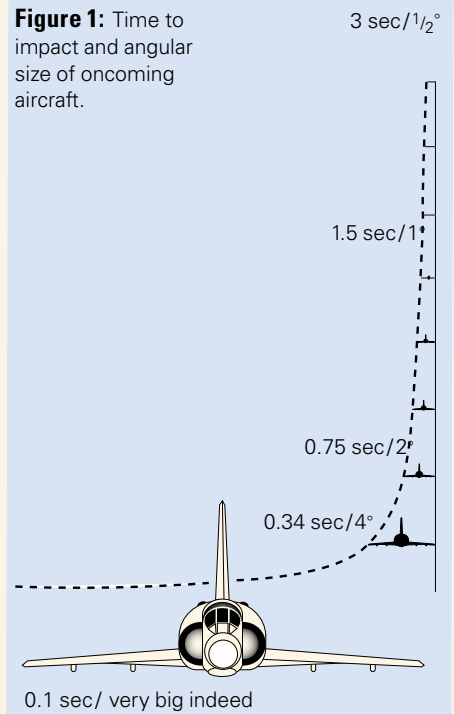
The optics of the eye are such that to see a small target such as a distant aircraft the eye must be looking straight at the target. To achieve this the eye must scan each area of the sky in a systematic fashion so that all quadrants are covered.

Nothing will be gained by sweeping the gaze rapidly across the areas of search, as the eye only sees when it is stationary. When the eye is moving from one point of fixation to the next it is functionally blind. You should divide the sky into quadrants and move your gaze across the quadrants stopping every few degrees of eye travel for a moment to search that area for traffic.

Myopia is a term used to describe short-sightedness. Empty field myopia is what happens to all individuals when looking out of a cockpit at the empty sky. As there is nothing at infinity on which to focus, the eyes focus at a point 1-2 metres away. This is made worse by the effect of window frames and posts as they tend to contribute to dragging the focusing point in from infinity. The effect of this is that whilst searching the empty sky the eye may be focused on a point 1-2 metres outside the aircraft with the result that a target at a distance will at best be blurred and probably invisible.

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Figure 1: Time to impact and angular size of oncoming aircraft.



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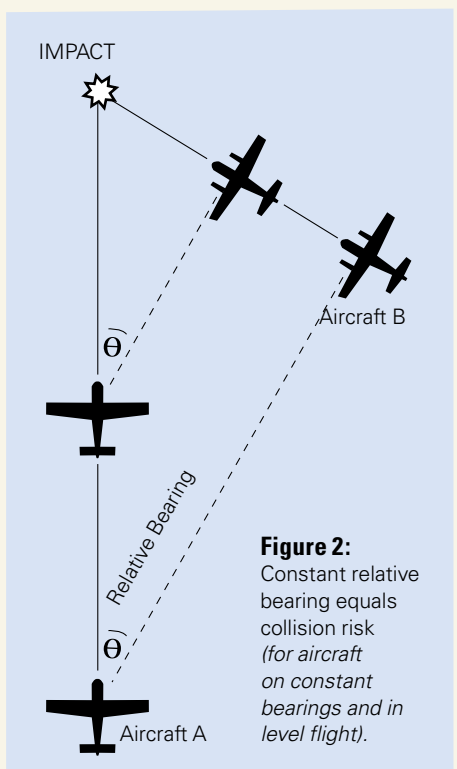


Figure 2: Constant relative bearing equals collision risk (for aircraft on constant bearings and in level flight).