



## COLLISION AVOIDANCE

### AIM

To remind all pilots operating at Nordicflite to maintain a good lookout and to develop their visual scanning techniques in order to avoid a mid-air collision.

### INTRODUCTION

'See-and-avoid' is recognised as the main method that a pilot uses to minimise the risk of collision when flying under the Visual Flight Rules. 'See-and-avoid' is directly linked with a pilot's skill at looking outside the cockpit or flight deck and becoming aware of what is happening in his/her surrounding. Its effectiveness can be greatly improved if the pilot can acquire skills to compensate for the limitations of the human eye. These skills include the application of:

- Effective visual scanning,
- The ability to listen selectively to radio transmissions from ground stations and other aircraft, creating a mental picture of the traffic situation, and
- The development of 'good airmanship'.

Experienced or inexperienced pilots can be involved in a mid-air collision. While a novice pilot has much to think about and so may forget to maintain an adequate lookout, the experienced pilot, having flown many hours of routine flight without spotting any hazardous traffic, may grow complacent and forget to scan. There appears to be little difference in mid-air collision risk between high-wing and low wing aircraft.

If you learn to use your eyes and maintain vigilance, you can reduce the risk of mid-air collisions.

### VISUAL SCANNING TECHNIQUE

The best way to develop effective scanning is by eliminating bad habits. Naturally, not looking out at all is the poorest scan technique! Glancing out at intervals of five minutes or so is also poor when considering that it takes only seconds for a disaster to happen. Glancing out and 'giving the old once-around' without stopping to focus on anything is practically useless; so is staring out into one spot for long periods of time. There is no one technique that is best for all pilots. The most important thing is for each pilot to develop a scan that is both comfortable and workable.

- To avoid collisions you must scan effectively from the moment the aircraft moves until it comes to a stop at the end of the flight. Collision threats are present on the ground, at low altitudes in the vicinity of aerodromes, and at cruising levels.
- Before take-off, check the runway visually to ensure that there are no aircraft or other objects in the take-off area. Check the approach and circuit to be sure of the position of other aircraft. Assess the traffic situation from radio reports. After take-off, continue to scan to ensure that there will be no obstacles to your safe departure.
- During the climb and descent beware of the blind spot under the nose – manoeuvre the aircraft so that you can check this area.
- When doing airwork, such as stalling, always have a good lookout prior to completing the manoeuvre, especially below the aircraft.
- Learn how to scan properly by knowing where and how to concentrate your search on the areas most critical to you at any given time. In the circuit especially, always look out before you turn and make sure your path is clear. Look out for traffic making an improper entry into the circuit. Be aware of high density traffic areas such as reporting points (e.g. Nokka, Deger) and radio navigation beacons (e.g. PVO, HEK).
- During that very critical final approach stage, do not forget to scan all around to avoid tunnel vision. Pilots often fix their eyes on the point of touchdown. For example, when joining final runway 36 via Nokka, keep a good lookout for aircraft joining right base 36 or aircraft already in the circuit.
- In normal flight, you can generally avoid the risk of a mid-air collision by scanning an area at least 60° left and right of your flight path. Be aware that constant angle collisions often occur when the other aircraft initially appears motionless at about your 10 o'clock or 2 o'clock positions. This does not mean you should forget the rest of the area you can see. 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 is at an altitude that might prove hazardous to you, whether it is level with you, climbing from below or descending from above.
- The more you look outside, the less the risk of a collision. Certain techniques may be used to increase the effectiveness of the scan. To be most effective, the gaze should be shifted and refocused at regular intervals. Most pilots do this in the process of scanning the instrument panel but it is also important to focus outside the cockpit or flight deck to set up the visual system for effective target acquisition. Looking well ahead for weather and pre-planned navigation features can help. Proper scanning requires the constant sharing of attention with other piloting tasks, thus it is easily degraded by such conditions as distraction, fatigue, boredom, illness, anxiety or preoccupation. When flying VFR, try to establish a routine, such as "Lookout, Attitude, Instruments". Lookout for traffic, check the correct attitude for the phase of flight using the external horizon and then glance inside to check both the flight and engine instruments. Your eyes should only be inside for a few seconds. Keep repeating this pattern.
- 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

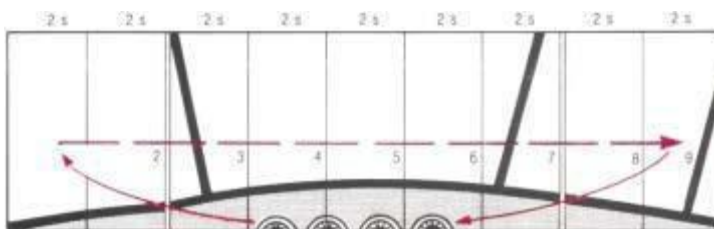
detection. Although horizontal back and forth eye movements seem preferred by most pilots, each pilot should develop the scanning pattern that is most comfortable and then keep to it. Peripheral vision can be useful in spotting collision risks. It is essential to remember, however, that if another aircraft appears to have no relative motion, it is likely to be on a collision course with you. If the other aircraft shows no horizontal or vertical motion on the windshield, but is increasing in size, take immediate evasive action.

## SCAN PATTERNS

The two scanning patterns described below have proved to be very effective for pilots and involve the 'block' system of scanning. This system is based on the premise that traffic detection can be made only through a series of eye fixations at different points in space. In application, the viewing area (windshield) is divided into segments, and the pilot methodically scans for traffic in each block in sequential order.

### 1. Side-to-side scanning method

Start at the far left of your visual area and make a methodical sweep to the right, pausing very briefly in each block of the viewing area to focus your eyes. At the end of the scan, return to and scan the instrument panel and then repeat the external scan.



### 2. Front-to-side scanning method

Start in the centre block of your visual field (centre of front windshield); move to the left, focusing very briefly in each block, then swing quickly back to the centre block after reaching the last block on the left and repeat the action to the right. Then, after scanning the instrument panel, repeat the external scan.





There are other methods of scanning, of course, some of which may be as effective as the two described above. However, unless some series of fixations is made, there is little likelihood that you will be able to detect all targets in your scan area. When the head is in motion, vision is blurred and the mind will not register potential targets.

## KEY POINTS

### *Windshield/ canopy*

Ensure that the windshield/ canopy is clean prior to flight.

### *Compensate for blind spots*

Compensate for your aircraft's design limitations. If you are short, or the aircraft has a high coaming, a suitable cushion can be helpful. All aircraft have blind spots; know where they are in yours. For example, a high-wing aircraft has a wing down in a turn that blocks the view of the area you are turning into, so lift the wing slightly for a good look before turning. One of the most critical potential mid-air collision situations exists when a faster low-wing aircraft is overtaking and descending onto a high-wing aircraft on final approach.

### *Aircraft lights*

Aircraft lights can help avoid collisions. High intensity strobe lights increase your contrast and conspicuity 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. Consider the use of landing lights, especially in crowded airspace and in poor visibility. Follow company SOPs.

### *Transponder*

Transponders, especially with altitude encoding (Mode C), allow radar controllers to identify your aircraft in relation to other traffic and provide you with traffic information. They also highlight your aircraft's presence to other, mainly commercial, aircraft which carry ACAS (aircraft collision avoidance systems). If you show mode C, ACAS may be able to guide the other aircraft away from you. The carriage of transponders is now mandatory in some airspace, even when operating VFR. If ATC do not allocate you a code, use code 2000 (with Mode C), and only switch it off in flight if instructed.



### *Make use of information*

Since detecting a small aircraft at a distance is not the easiest thing to do, make use of any hints you get over the radio. Your job is much easier when you are told that traffic is 'three miles at one o'clock'. Once that particular traffic is sighted, do not forget the rest of the sky. If the traffic seems to be moving on the windshield, you're most probably not on a collision course, so continue your scan but watch the traffic from time to time. If it has little relative motion you should watch it very carefully – he may not have seen you. When operating in the training area, use the company radio frequency to inform other company aircraft of your intentions. Try to build up a mental picture of where the other aircraft are and where they are proceeding. But, remember that aircraft without radios do operate and always keep a good lookout.

### *Avoid crowded airspace*

Avoid crowded airspace, for example, flying close to VRP's, radio navigation beacons and uncontrolled airfields. Aircraft can be training over navigation beacons, even in good weather. If you cannot avoid uncontrolled aerodromes en route, fly over them well above circuit height and make radio calls stating your position, altitude and intentions. If flying close to a CTR, contact the appropriate ATC unit for traffic information. If following a GPS track to a database waypoint, consider keeping to the right of the direct track, as you do for a line feature on the ground. The area around a glider launching site is also likely to be very busy. Apart from the hazard of colliding with a launch cable up to its notified maximum height, many gliders tend to congregate in their local area. Aeroplanes towing gliders are less manoeuvrable than individual aircraft.

### *Reporting points*

CTR entry and exit points should, wherever possible, be kept on the left side of the aircraft, unless a different procedure is published. This allows the left seat pilot to view the point while providing separation between opposite traffic. Do not trust all aircraft to follow this procedure and maintain a very good lookout whenever near such points.

### *Scan*

The most important item, of course, is to keep looking out at where you are going and to watch for other traffic. Make use of your scan constantly. Stick to good airmanship; if you keep yourself and your aircraft in good condition and plan your route carefully, including avoiding likely busy areas, and develop an effective scan time-sharing system, you will have the basic tools for avoiding a mid-air collision.



# LOOK OUT!

## References:

UK CAA Safety Sense Leaflet no. 13