GA RISKS

Avoiding collisions

Key info

Unfortunately, there is at least one mid-air collision in the UK most years. More than 100 'airproxes' are reported to the UK Airprox Board every year.

Almost all mid-air collisions occur in good VMC at relatively low level, reflecting the areas in which the chances of aircraft being in close proximity to each other are highest. Around half of mid-air collisions in the UK happen near aerodromes, with many in the circuit.

It is a common observation that separation in uncontrolled airspace is achieved as much by the 'big sky' (i.e. by chance) as it is by 'see-and-avoid'. It is now well understood that even when operating a very effective visual scan, most pilots will not achieve a 100% detection rate, especially if the conflicting aircraft is outside the area normally visible from the cockpit. The risk of collisions can never be mitigated entirely; however by taking a number of precautions you can stack the odds in your favour.

GENERAL MITIGATIONS

Many GA pilots will have had close calls when flying in congested uncontrolled airspace – for example on a busy summer's day in the south east of England. Sometimes it is best to simply avoid busy areas and fly elsewhere.

There are some precautions you can take:

- Avoid obvious 'choke points' around VORs or other significant features commonly used for navigation – Bovingdon is a common one in the London area. By all means load them into your moving map device for planning purposes, but avoid directly overflying them and keep a very good look out when nearby.
- Avoid aerodromes or other hazardous airspace reservations like glider sites. Note the cable launch heights on your chart. Be aware gliders do not confine themselves to the overhead of their operating sites or the immediate vicinity of it. Gliders will often congregate around an area of thermals – if you see one, there will likely be others.
- Hang gliders and para gliders often launch from, and congregate around, hill sites facing into wind, often in large numbers. These sites are not always shown on charts, and some can be activated by NOTAM. An active site may contain tens of gliders circling in 'gaggles' and they are likely to depart on cross country routes, normally in a downwind direction.
- Randomise your cruising levels. There is no requirement in the UK for VFR flights to follow 'semi-circular' rules (although there may be in other states), so sometimes fly at different altitudes like 2200 ft instead of round figures like 2000 ft.
- Avoid crossing the final approach tracks of aerodromes outside controlled airspace, even if outside their ATZ. The feathered arrows on charts indicate the instrument approach paths of larger aerodromes – aircraft will generally descend at around 300 ft per NM along these.
- When operating at an aerodrome, be familiar with local procedures, particularly at uncontrolled ones.
- Be clear about your position and intentions – many airproxes at uncontrolled aerodromes result from a lack of clear communication as to the position and intentions of aircraft – do not be afraid to seek clarification on another aircraft's position or intentions.

For more information on collision avoidance, see the relevant safety sense leaflet at www.caa.co.uk/safetysense.

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THE VISUAL SCAN

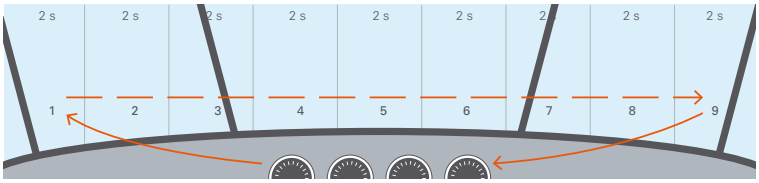
Despite the recognition of its flaws, an effective 'look out' will go a long way to mitigating the risk of collision. Ensuring the windscreen is clean and clear of dirt or dead insects which might obscure the dot of a conflicting aircraft is also important. It is usually easier to remove dead insects immediately after a flight, which also saves time for when you (or someone else) next go flying.

For VFR operations, you should aim to have your eyes inside the cockpit no more than 25% of the time. The rest of the time you should be looking outside. Provided you hold a steady visual attitude, there is no reason why the aircraft should climb or descend while you are looking outside. Adopting a systematic approach to scanning the view outside the cockpit will help you maintain an effective look out as well as giving you time to check direction and altitude on your instruments.

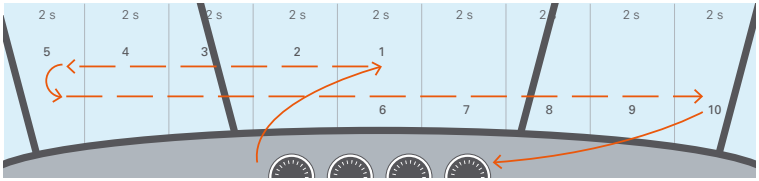
- In general you should move your eyes (and head as necessary) in short and regularly spaced movements that bring successive areas of the sky into the central visual field. You should pause for at least a second to refocus on the new area and detect any aircraft. The centre of focus should shift by about 10° per movement. 15° is around the normal width within which the eyes can focus on a particular area, so 10° allows for some overlap.

There is no single correct way to maintain an effective look out scan. There are however two methods that have been identified as being effective techniques:

- **Side to side scanning method:** Start at the far left of your visual area and make a methodical sweep to the right, pausing for a couple of seconds 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.
- **Front-to-side scanning method:** Start in the centre block of your visual field, move to the left, focusing very briefly on 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.



Side-to-side scanning method



Front-to-side scanning method

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- 'Block' means an area that can be focused on at one time in the normal field of view.
- Inevitably there will be times in which you will have to keep your eyes in the cockpit for longer than is ideal – for example, to change a radio frequency or if an engine gauge is causing concern. Try not to get fixated on this, and look back outside every few seconds. Consciously re-establish the scan once the interruption has passed.
- If you are flying with another pilot, or a passenger you have educated on 'looking out', tell them you are going 'eyes down' so that they know to keep an extra keen look out.
- Peripheral vision can be good at detecting movement, but the greatest collision risk often comes from aircraft that do not appear to move relative to you. If you detect an aircraft that does not appear to be moving but is getting larger, a collision may be imminent – alter course immediately in accordance with the Rules of the Air (see p.57).
- You should not turn or otherwise alter direction without looking in the relevant direction. In a high wing aircraft the wing should be lifted prior to turning to ensure there is no hidden traffic. Similarly, while climbing you should periodically 'weave' the nose of the aircraft to reveal any traffic hidden behind the raised nose attitude.

USE OF ATS

Talking to ATC and obtaining a Traffic Information Service will also reduce the risks. Remember that a Basic Service does not include guaranteed traffic information.

- You should always consider which of the nearby ATSUs will provide the best mitigation against other traffic – for example, if passing close to an aerodrome, it may be best to contact them.

ELECTRONIC CONSPICUITY

Electronic Conspicuity (EC) is technology by which the position of aircraft can be detected electronically, either by ATC surveillance systems (such as radar) or other aircraft. EC plays a fundamental role in allowing different aircraft to safely share airspace and prevent collisions. This page gives a brief introduction to the subject.

Transponders

The transponder is traditionally how aircraft emit their position electronically. Transponders work on the principle of transmitting a four-letter code after being 'interrogated' by a signal from a secondary radar station on the ground. Different levels of detail are included in this signal depending on the mode. 'A' is the most basic, 'C' includes altitude information and 'S' includes a more advanced 24-bit code that is unique to the aircraft. Enhanced Mode S also allows the transmission of information on the aircraft's flight path.

Most powered aircraft in the UK are equipped with a transponder, however the cost and electrical power requirement mean that many aircraft, particularly unpowered ones, are not equipped.

Guidance

It is a legal requirement that if your aircraft is equipped with a transponder, you should use it to its full capabilities. This allows ATC to get more information than via a primary contact, and also allows the Traffic Collision Avoidance Systems (TCAS) on larger aircraft to detect you.

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ADS-B

More recently, technologies such as ADS-B (Automatic Dependent Surveillance – Broadcast) have emerged that have the potential to bring forms of EC to a much wider audience than available with traditional transponder technologies, since they require less electrical power. ADS-B works on the principle of taking the aircraft's position from a navigation source (for example the aircraft's GPS) and then broadcasting it (known as ADS-B 'Out') for ADS-B receivers (known as ADS-B 'In') to detect. It has the advantage of potentially allowing low powered EC devices to share position information with each other.

In 2017 the CAA indicated that ADS-B using 1090 MHz is the preferred national system for improving EC equipage in the UK General Aviation fleet. More information is available in AIC Yellow 141/2019 published in December 2019 – *Enabling ADS-B Out in the UK General Aviation Fleet.*

EC for General Aviation

A range of measures and information has been made available by the CAA to facilitate the adoption of EC devices with the aim of reducing mid-air collisions.

EC Devices can be either permanently installed in an aircraft or portable. Many EC systems for GA transmit and/or receive ADS-B in some form, although there are other systems such as 'FLARM' and 'Pilot Aware' that can receive ADS-B on 1090 MHz but use different (non-aeronautical) bands to transmit position information.

Pilots using EC devices should be aware of their functionality and what they can, and cannot, do. Devices are not always interoperable with each other. This means that users of one type of device may or may not be electronically visible to each other, may have different standards of reliability and accuracy, and may use different parts of the radio spectrum for transmitting signals.

EC technology continues to evolve and expand. GA pilots are strongly encouraged to familiarise themselves with the subject.

Guidance

An EC device is a safety aide, it must not replace keeping a good lookout for other aircraft or proper preflight planning.

It is very important that you are familiar with how to use your EC device and its limitations. It must be correctly integrated into your flying such that it does not become a distraction or hazard.

Finding out more

- EC for General Aviation – www.caa.co.uk/ec
- Special Edition of 'Clued Up' Magazine on EC – www.caa.co.uk/cap2000
- Technical Standards for EC devices – www.caa.co.uk/cap1391

VISUAL CONSPICUITY

Use of lights and aircraft colour can have an influence on how effectively you can be seen by other aircraft. Strobes and anti-collision beacons should be on at all times after entering the runway environment. Landing lights should be on once approaching an airfield and at all times when in areas of high traffic density.

Colours like black are actually more likely to show up against the ground or sky, whereas white or patterns that break up the outline of the aircraft will tend to visually merge into a predominantly grey background. If you are based in an area of high traffic density, consider what impact the colour of your aircraft might be having on your visibility to other aircraft.