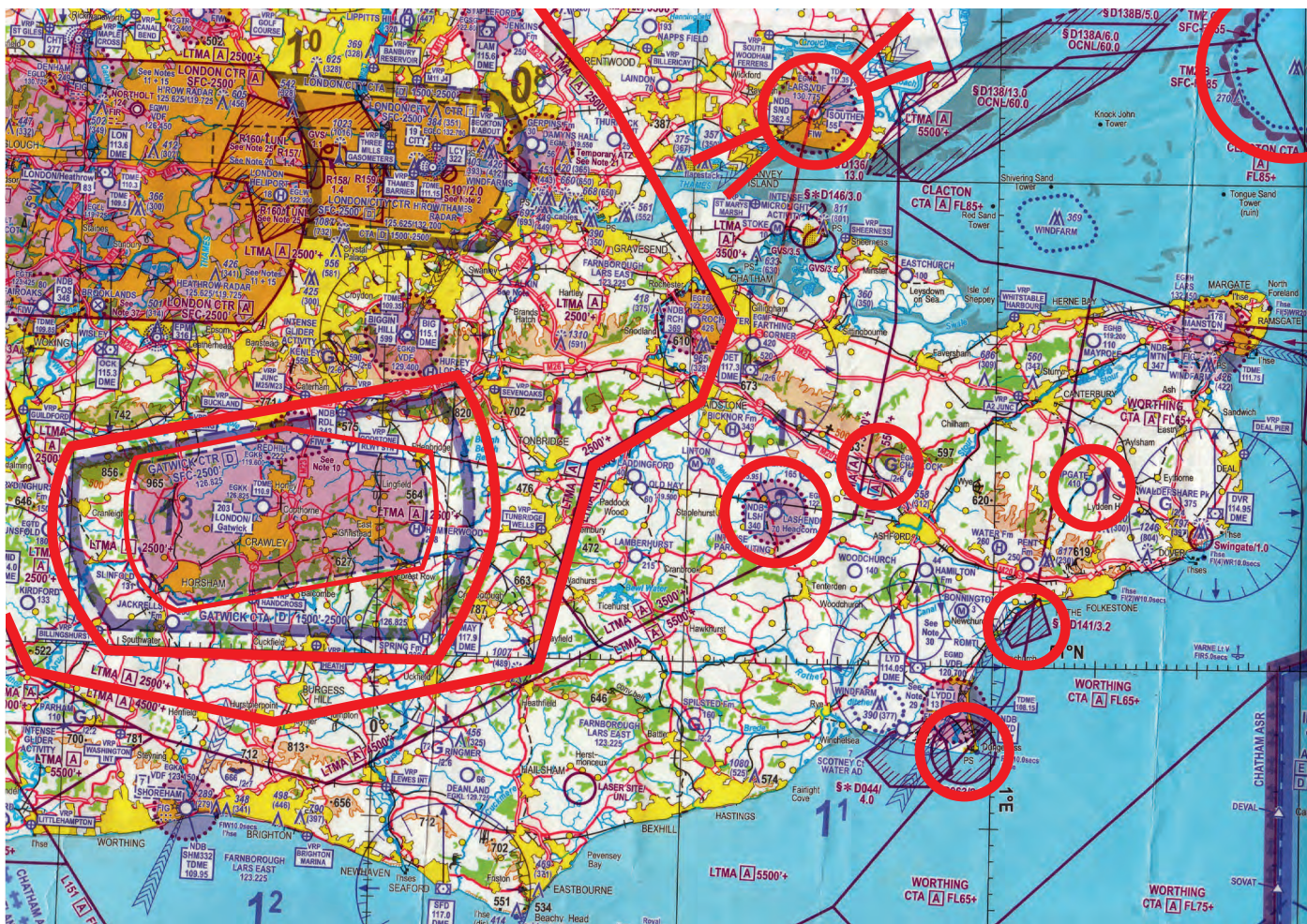


AIRSPACE

Infringement – more than just a controlled airspace issue

Words Mike Barnard



It would be easy to use this article to reiterate the classic advice on airspace infringement: stay away from Controlled Airspace on pain of incurring the wrath not only of ATC, but possibly also the Courts. With so much energy expended in communicating that message by a number of bodies, including the CAA and NATS, now is a good time to take a broader look at this perennial issue.

The need to be aware of airspace classifications, and to obtain permission to enter where necessary, is an essential element of pilot training and pre- and in-flight planning and execution, worldwide. It is the hallmark of a considerate pilot with a professional attitude. For GA pilots, particularly those in the sport and recreational sector who are regularly reminded of the headline numbers of infringements into controlled airspace, in-depth analysis is now providing better insight into aspects of this issue.

I'll start by discussing what I mean by 'airspace' and the risks associated with blundering into it. This is important because with the majority of infringement data promoted to GA coming via NATS, it would be easy to assume that theirs is the complete picture.

Infringement into an area where conflict may occur goes beyond controlled airspace. Examples of a range of conflict areas are outlined in red above.

While NATS's remit covers most, but not all, major regional UK airports, it does not extend to military control or danger zones, Aerodrome Traffic Zones, Temporary Controlled Airspace, gliding sites and so on. While other agencies also collect infringement data, without the size and resources of NATS much less of that information is consolidated or publicised.

Note that I don't at this stage state whether the airspace is 'controlled' or not, simply that users within it are, for the most part, concentrating on doing something other than flying altitudes and headings that they have personally elected to operate at. So, this definition would include airspace close to airports, aerodromes or airstrips (take-offs and landings), blocks of airspace within which users are flying at defined heights and headings (airways) or within which certain hazardous activities are taking place (firing ranges, military exercises, air displays etc).

Although airspace is defined by many different classifications, the essential message to the transiting pilot is that hazards exist if those operating within it are unaware of, or are unable to control their proximity to, that presence. The principal hazard of infringement is airborne collision, whether by air-to-air conflict between two aircraft or between an aircraft and a piece of high velocity ordnance; the principal mitigation is to create physical separation. The Rules of the Air contains numerous requirements to avoid airborne conflict and this is supplemented by additional information that can be passed by ground-based service providers to the pilot either to alert him to nearby traffic or to provide positive control of his heights and headings.

Within controlled airspace (Classes A to E), minimum separation distance between aircraft varies depending on the type of airspace, the relative tracks and speeds of pairs of aircraft, and the flight rules under which they are operating. An event in which two or more aircraft experience a loss of minimum separation is termed a 'conflict'; while this does not in itself suggest that the aircraft are at any risk of collision, the separation minima are set

for risk mitigation and therefore it is central to a controller's job to prevent this situation from occurring. These minima are generally 5 nm lateral / 1,000 feet vertical in airways and 3 nm in terminal areas.

It is easy to imagine that were a light aircraft to collide with a large passenger-carrying aircraft, especially in controlled airspace, the outcome would be catastrophic and may well create dire regulatory consequences. Even where no collision occurs, controller workload in having to delay commercial departures and/or reroute arrivals so as to avoid an unannounced infringer is significant, with the resultant safety and economic downsides. Were the true costs of such an exercise billed directly to the infringer they may well be crippling. However, at the other end of the spectrum, and often not attracting huge media or regulatory attention, the personal tragedy associated with an air-to-air collision within an aerodrome traffic circuit, especially if it were to occur due to an aircraft simply blundering through, would be no easier to bear for the friends and relatives of those involved.

The message is clear – airspace infringement, of all types, can lead to airborne conflict, and in turn to collision. All pilots, private and commercial alike, have a part to play in understanding and communicating this wider message, and doing all we can to help protect ourselves and others from this unnecessary hazard.

HOW CAN WE LEARN?

Having set the backdrop, it is worth looking at published infringements data to see what is being learned from it. Within the UK, CAP 382 requires 'any incident which endangers or which, if not corrected, would endanger an aircraft, its occupants or any other person' to be reported to the CAA using the Mandatory Occurrence Reporting System (MORS). Airspace infringement is very likely to fall into this category but although the CAA's MORS database has been in operation for many years, with a considerable volume of infringement data, this has never been subject to extensive statistical analysis. It was against a climate of rising infringements and CAA's expressions of concern, that led industry (including representation from the LAA) to seek a more detailed analysis of the problem. NATS responded by encouraging those who infringed NATS airspace to complete a post-infringement questionnaire, reasoning that the collection and use of more detailed data would enable them to better understand what caused the infringements and possibly see if there were any particular categories of pilots who were more prominent offenders. With a caveat of the accuracy of reports submitted by pilots facing potential prosecution aside, the infringement questionnaires were a great success in helping identify the 'human factors' associated with infringements. Details of NATS' public report can be found under the 'Statistics' tab on the excellent www.flyontrack.co.uk website, plus some thought-provoking video replays of actual infringements; both are well worth looking at.

The table to the right shows the total number of NATS infringements from 2005-2012, by classification:

Low risk – although airspace was infringed it did not result in a conflict. These could be termed 'technical infringements';

Medium risk – although avoiding action was instigated, no conflict occurred. This class

could be regarded as at least a nuisance, at worst an economic inconvenience;

High risk – despite avoiding action being instigated, a conflict occurred. Although not necessarily resulting in an Airprox (where, in the opinion of a pilot or a controller, the distance between aircraft as well as their relative positions and speed risked the safety of the aircraft involved) such infringements pose a genuine safety risk.

It is also worth noting that as soon as traffic is in two-way communication with ATC, the controller will be able to provide a radar control service to help achieve the lowest practical level of separation and minimise any infringement risk, reducing what was potentially a High risk to Medium or even Low risk. The video replays have a common theme in that the infringements with the greatest severity were also those where the infringer was not in communication with ATC, and in some instances not displaying at least a Mode C squawk – even when the aircraft was equipped with a fully functioning transponder. While these numbers are useful, it is only relatively recently that ATC software has been used to log most infringements. In earlier years it is likely that, certainly for low-risk infringements, many may not have been logged at all.

With total annual NATS infringements running in the hundreds, the percentage of those in the Medium and High risk categories, certainly of late, sit at around 6.5% and 0.5% respectively. Looked at another way, although 93% of reported infringements are of a technical nature, there is no cause for complacency. Risks of airborne conflict aside, airspace infringement can result in hefty actions. The CAA, like the police, has the power to prosecute but in addition also has power to summarily suspend a pilot's licence without the involvement of the courts. Looking at published CAA prosecution data for infringements of Class A and Class D airspace over the period 2005-2009, the percentage of prosecutions relative to Medium and High risk infringements were broadly consistent, with average fines of around £1,200 and average costs of around £600.

However, while overall numbers are one thing, the crucial question is whether the actual infringement rate (the number

of infringements compared to numbers of hours flown) is getting better or worse. As the economics of private flying head downwards, the incentive is to do less. Less flying means gradual erosion of skills and, some might argue, an increased likelihood to infringe.

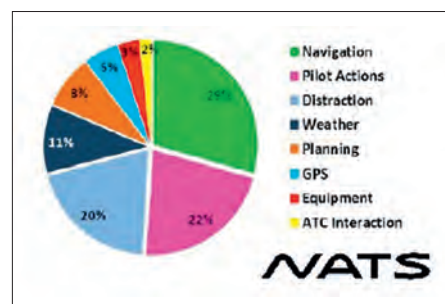
But even putting this issue to one side, take for example the Olympics airspace restrictions of 2012. One might assume, given the substantial communications effort and Atlas Control resource, that there would have been zero infringements into the Olympics Restricted and Prohibited zones. Remarkably, that was not the case. The 13 reported infringements clearly illustrated that regulation alone, even at Olympics levels, cannot solve the issue. To truly tackle the problem requires a better understanding of the human factors involved.

HUMAN FACTORS

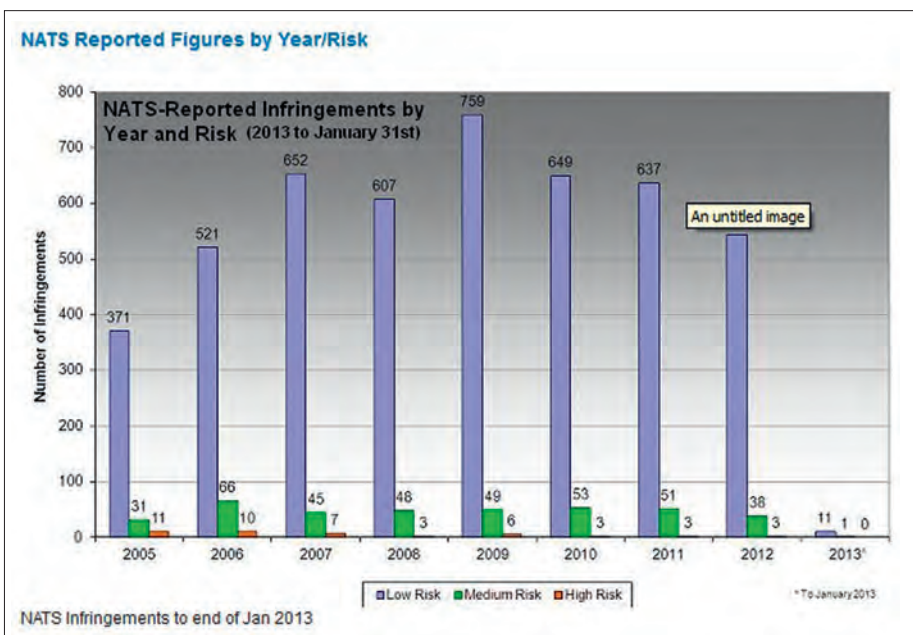
By the end of 2012 NATS had received and processed questionnaires for around 400 infringements. Of the 30 different 'human factors' identified, half of all infringements featured the same six factors:

- **Navigation** – Misidentification of land features
- **Distraction** – Pilot workload
- **Planning** – Poor/incorrect pre-flight briefing
- **Navigation** – Misread map
- **Pilot actions** – Pilot complacency
- **Pilot actions** – Unplanned change in route/altitude

It is not clear (at the time of writing) whether this 'top six' is representative across all



Data from NATS infringement survey



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levels of severity, however of the nine high risk infringements over the last three years, none was showing Mode C altitude and some were not transponding at all (but that didn't mean 'no transponder' or 'no Mode C' was available). As mentioned earlier, the Flyontrack videos bring this home very clearly. NATS has played a major role in helping bring to market improved pre-flight planning tools such as SkyDemon, and in-cockpit airspace alerting tools such as Aware. While these are probably starting to have a positive effect on overall infringement levels, the data does not suggest a significant downward trend in the stubborn few more serious infringements.

A couple of other points which have emerged from the study, and have been quite an eye-opener. A significant number of infringements were rented aircraft flying close to their home base; is this a knock-on effect of private pilots being able to afford less flying, as mentioned earlier? Rather disappointingly, a full 20% of infringements were piloted by CPL/ATPL-holders, roughly a third of whom were engaged in flight training at the time. Only 4% of infringements were using Traffic or a Radar Control service; the remainder were equally split between using a Basic Service and no service at all.

A small number of infringing aircraft were fitted with an airspace alerting device and also, despite its inherent accuracy, one infringement in 20 was attributed to over-reliance, unfamiliarity, misreading or incorrect use of GPS. As LAA members, we have been able to take advantage of advances in aviation electronic technology years ahead of our C of A cousins; let's hope that freedom helps keep the Permit

aircraft piloting fraternity out of the infringement statistics!

TYPES OF INFRINGEMENT

As discussed earlier, infringement into NATS controlled airspace is only one part of the overall subject. The LAA is working closely with the CAA to understand better ALL reported infringements over the last four years; we look forward to helping build a picture of infringements across all classes of airspace, and of the types of operations involved. Until then, it is worth looking at the various types of airspace, the consequences of infringement, and some of the mitigation factors which each of us can ensure we apply each time we fly:

Controlled airspace – this is airspace into which an aircraft may operate only when cleared to do so by the controlling civilian or military authority. In the UK this is generally Class A or D airspace around most major and regional airports, en route airspace (airways), and military Danger Zones. The reason for the size of these blocks of airspace is that they are required to contain ALL aircraft movements within them; take-off and departure, approach and landing, plus with some military airspace also ALL dangerous activities such as the firing of live ordnance. Because in the case of airports and airways the vast majority of users of this airspace do so under instrument flight rules (IFR), the flight paths are pre-determined and aircraft are vectored to achieve acceptable separation both from each other and from factors such as wake turbulence. The blocks of airspace take into consideration each of the Standard Instrument Departures (SIDs) and Standard Arrival Routes (STARs) for each of

the regulated runways, and generally extend upwards to connect with the surrounding airway structure. Only with exception will non-transponder equipped aircraft be cleared to enter and once inside such airspace ATC will require all aircraft to comply accurately with height and heading instructions.

Chartered airspace zones – by this I refer to zones of Class G airspace depicted on a published aviation chart. These include Aerodrome Traffic Zones (ATZ) of licensed aerodromes, Military Air Traffic Zone (MATZ) and Areas of Intense Military Activity (AIAA). Although it is not mandatory to request permission to enter such airspace, and the Rules of the Air provide guidance on exact details, it would be a foolish person who simply blundered through such chartered airspace without contacting anyone, even to simply announce their presence. Being struck by a \$65m 400kt 20 tonne Eurofighter while clipping through the Brize Zone could be just as fatal as colliding with another light aircraft in the Wellesbourne circuit! Despite this, there continue to be incidents reported where should-know-better commercial pilots have 'inadvertently' flown through active ATZs. While these infringements do not show up in the NATS figures, they are every bit as potentially lethal.

Chartered airspace locations – this refers to the multitude of non-licensed sites such as private airstrips, gliding sites, etc, and ranges from genuine in-the-middle-of-nowhere grass strips to often quite substantial aerodromes that for economic reasons alone have elected to become unlicensed. Although none of these locations will have an ATZ, Rule 12 still requires



SkyDemon offers planning and flight software to warn of infringement of controlled airspace

'a flying machine, glider or airship flying in the vicinity of what the commander of the aircraft knows, or ought reasonably to know, to be an aerodrome shall make all turns to the left unless ground signals otherwise indicate'. In other words, when flying close to any airfield treat it as an airfield! Additional dangers lurk at some gliding sites where a winch-launch cable can easily bring down a light aircraft.

Non-charted 'Be careful' airspace – I use this non-standard term for Class G airspace in which aircraft are flying to pre-determined heights and headings, most often associated with instrument approaches and departures at regional airports. While these airports are marked on the chart with a 'feather' showing the principal instrument runway, this only shows the final landing approach track. And here be dragons! Serious accidents have occurred due to the misconception popular among some instrument-qualified pilots that 'flying IFR' somehow provides a level of inferred traffic priority over VFR traffic in Class G airspace. While no such priority exists in practice, a prudent VFR pilot will take extra care in the vicinity of such aerodromes to avoid coming into conflict with head-in-the-cockpit IFR traffic that should know better and be keeping a good lookout. As an example, a number of regional airports outside controlled airspace are host to numerous large passenger-carrying aircraft flights. Although one might expect when operating outside controlled airspace, that one of the two ATPL-rated crew members would be formally allocated to keeping a good lookout, the pre-landing workload and limited cockpit visibility realities on a commercial flight deck, whose crew are more used to operating

wholly within controlled airspace, are unlikely to allow that to happen.

PHAT

Enough advice on how to avoid infringement, of all types of airspace, has been written to fill an entire bookshelf. Indeed, every aviation licence-holder will have learned about and answered questions on Air Law to obtain their licence. Whether by diligent pre-flight planning, accurate flying, making best use of the radio, GPS, or other in-cockpit equipment, the message is simply one of good airmanship. Having an airspace alerting device on board is no bad thing, so long as the pilot is not solely relying on it to keep him clear. UK aviation charts are for the most part pretty good; however in their attempt to include ever more detail, they can be less than easy to read.

A good example of taking this to heart is the recent simplification of the half-mile chart around the south side of the Birmingham zone, where many infringements of their 1,500ft Class D zone were occurring, coupled with a successful initiative between Birmingham ATC and local aerodromes to make more pilots aware of the complex airspace in this particular area.

Perhaps we're missing a trick here. Drawing a line on a chart is a great way of 'lateral planning'; however, how often do we consider the 'vertical profile' of our flights? We fly in a 3D environment but often spend most of our flight planning time in a flat, 2D, world. Come to think of it, how well does our in-flight log handle potential vertical incursions into CAS? One solution might be to add yet another mnemonic

to our already-saturated aviation brains along the lines of PHAT (Position/Heading/Altitude/Time). This would serve the dual purpose not only of providing a check that we are where we should be (both location and altitude) at the time we expect to be there, but also to check that our heading is correct and that we're not about to wander off to where we shouldn't be. I'll let you be the judge of whether a PHAT check is a good idea or not!

UK airspace is not inherently complex, however much of it, in particular the extensive use of low-level Class A, can present unique challenges. In countries where Class A begins at FL195, where airways are Class E, and where most Class D zones are an absolute pleasure to cross, there is a school of thought that suggests the UK's 'Keep Out' approach towards much of light GA simply places a magnifying glass on an already small problem. Arguably if an equivalent amount of energy and resource had over the years been targeted at solving some of GA's real killers, such as the regulatory costs of solving carb icing, the world of light aviation might well be a safer place.

The essential message in all of this is simple, and I'll be the first to apologise if this sounds like yet more 'holier than thou' preaching, which it really is not! Simply plan the flight, both laterally and vertically, fly the plan and while you're doing this consider what can go wrong even if you're doing the right thing. I'll be covering considerable use of the radio and the transponder, in a separate article, but in the meantime I hope that this has given you some food for thought. By the way, you do always fly with your transponder set to Alt or S, don't you? Until next time. ■



The Airbox Aware is a superb airspace warning device, but is not a substitute for careful planning