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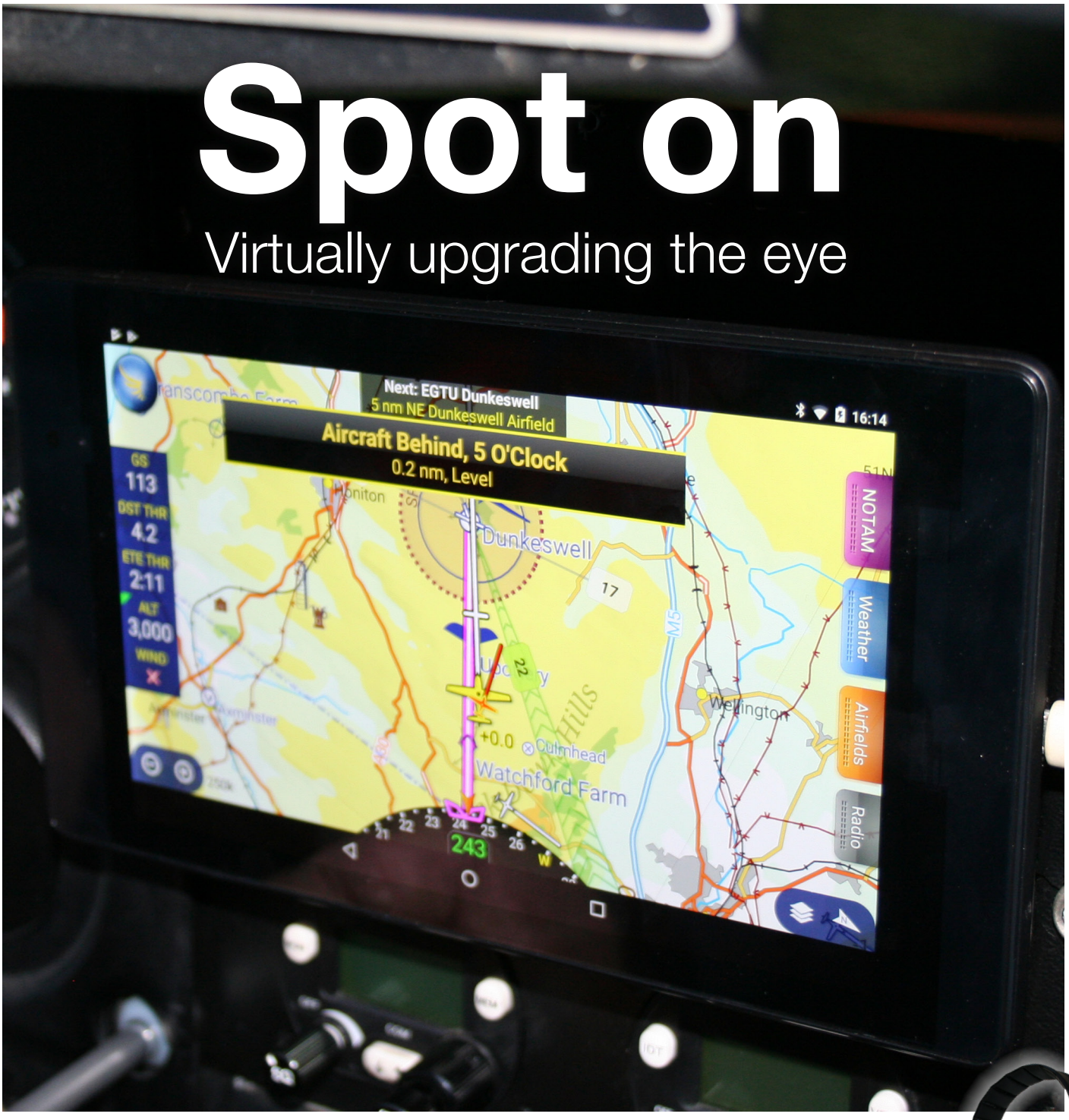
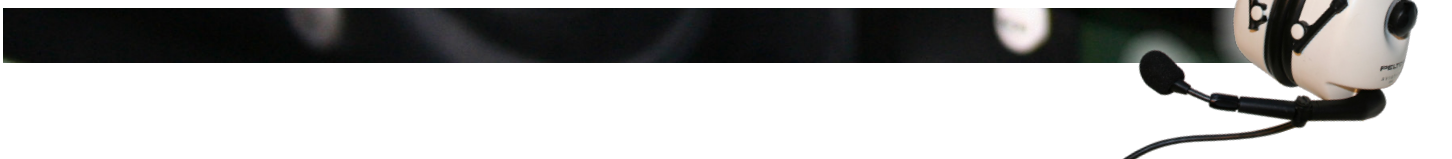
Virtually upgrading the eye



PLUS Communication – getting the full picture



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Welcome...

to the annual Airprox Magazine 2019

Welcome to the Seventh edition of our annual Airprox Magazine — and my last before I hand over to a new Director in the New Year.

It wasn't long after I first arrived that we commissioned a review of Class G Airprox to try to understand better where to focus our efforts to reduce the risk. The resulting work led to us developing a more systematic approach to Airprox analysis using mid-air collision (MAC) safety barriers and, while the associated barrier breakdown at the end of each report provides an interesting commentary for that Airprox, the real value has come from looking at each barrier's aggregate performance.

It's quite telling that, in 2018, the barrier of 'Situational Awareness and Action' was either ineffective or only partially effective in 70% of Airprox, and it's probably no coincidence that Collision Warning Systems (CWS) were either not present or ineffective (most often due to incompatibility of equipment) in 69%. Although the incidents don't all correlate exactly, there's a clue there I think – effective and interoperable collision warning systems are a clear route to achieving better situational awareness.

In other words, if we could get such useful information into the cockpit then we would at least give pilots the chance to do something to resolve most of the incidents we look at.

So, how can we do that? Air Traffic Control is an obvious source, and information from radio transmissions is also useful (especially in the visual circuit) but that relies on you assimilating what the other pilot is saying, and then applying it to your own circumstances. But technology can help, and that's why this magazine focuses on 'Electronic Conspicuity' (EC) as a means of providing all-important situational awareness. In the first article I've tried to highlight some things to think about regarding electronic conspicuity, and the following CAA article gives an idea of where they're trying to get to in all of this.

The CAA understands that what's required is probably not a one-system-fits-all solution, and they've been consulting widely for a few months now — the 'Share the Air' conference in the summer was useful to help crystalise thinking. Although it sometimes feels that progress is slow, it's quite a complex problem given the implications for future airspace and aviation stakeholders, so it's important that they get it right.

But we also mustn't neglect the other safety barriers and so the last article looks at how we can benefit from effective communication. There's nothing new in that, but even us old hands could do with thinking about what we're saying, listening-out and ditching 'smart-arse' calls that don't clearly articulate your intentions.

So that's me done. It's been a pleasure and privilege to have been in this role, and quite humbling to experience the altruistic way in which most pilots are eager for others to learn from incidents which might not reflect their finest hour. Suffering an Airprox doesn't make anyone a bad pilot, but failing to report it means that everyone else loses the opportunity to learn. I'm deeply grateful to those who do report, and I encourage you all to follow their example. We don't do 'blame' at UKAB, we just want to find out what happened and so help others avoid a similar fate. Safe flying!

Oh, and one last thing… click on the links below or go to the AppStore or Google Play and search for 'UKAB' or 'Airprox' and you can download our App that has a reporting section and useful functions where you can access previous reports and learn about our work.

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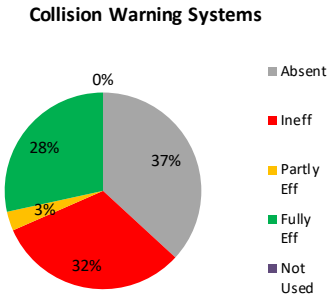
Now you see me

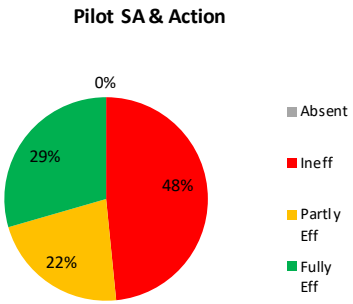
There are all sorts of myths and bar chats about electronic conspicuity, but some are well wide of its aims and ideas — so let's cut through the clutter to see what lies ahead

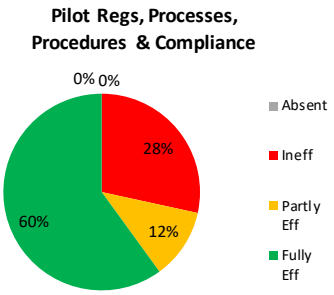
You've probably heard a lot about Electronic Conspicuity (EC) recently and might be wondering 'what's that all about…?'. Add in the associated debate about collision warning systems and there's a huge amount of uncertainty about what's available and whether you should buy something.

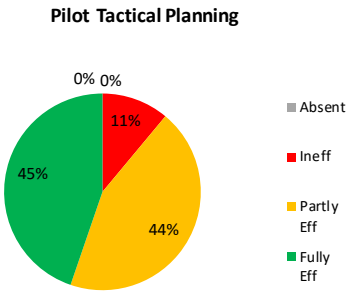
While it's not for me to recommend particular kit, let's first of all demystify electronic conspicuity and collision warning systems and then perhaps help to inform your buying decisions. I should add that I'm indebted to Ian Fraser from the LAA who has kindly let me quote (aka plagiarise) his excellent articles in *Light Aviation* (the LAA's magazine) February 2018 and January 2019. Both are well worth reading because they go into far more detail than I can here (you can find them on the UKAB website if you're interested).

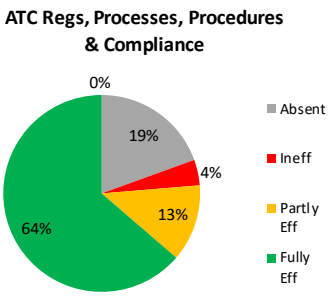
Would you spot this one without the identifying ring?

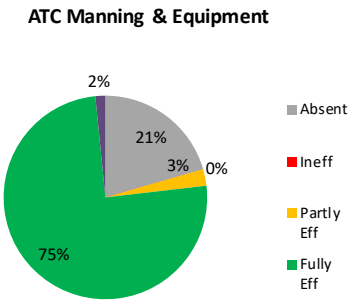


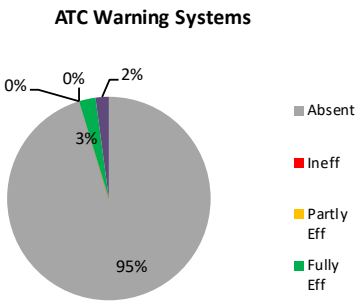


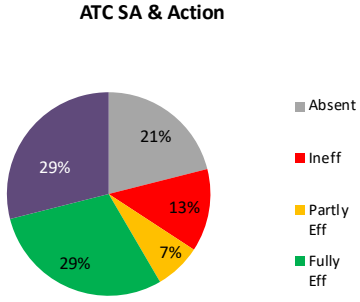












At its most basic, electronic conspicuity is any system that provides an electronic signal that broadcasts your presence to others using a combination of position, height, direction and speed. We're all familiar with transponders, and they're essentially one type of electronic conspicuity, although depending on your transponder they're not as sophisticated in their outputs as more modern methods that mostly employ GPS.

In its GPS form, the universal use of electronic conspicuity is seen as something of a Holy Grail for future integration of the growing mix of airspace users such as drones and sports aviation – and where, especially for drones, increased numbers of these aircraft may not fly predictable paths as they go about their free-routing parcel-delivery tasks.

But electronic conspicuity is much more than just enabling shared airspace without the need for segregation of different types, it's also a way of maximising situational awareness for all so that collision avoidance and airspace safety can be achieved for a diverse range of aircraft types without necessarily the need to talk to Air Traffic Controllers.

The UKAB 'Blue Book 34' analysis of the 2018 Airprox is available at airproxboard.org.uk (put Blue Book in the search box) and, at Page 11, this shows the overall performance of the associated mid-air collision (MAC) safety barriers. As the graphic shows, in respect of electronic conspicuity and collision warning systems it's interesting to note that the latter was absent in either aircraft in about 37% of incidents; was ineffective as a barrier in 32% (largely due to incompatibility of equipment), and only fully effective in 28% occurences. So that means that, assuming the pilots had acted on indications, a whopping 69% of Airprox in 2018 might

'In its GPS form, the universal use of electronic conspicuity is seen as something of a Holy Grail for the growing mix of airspace users'

have been avoided if there had been compatible electronic conspicuity/collision warning systems fitted.

That ties in nicely with the pilot Situational Awareness and Action barrier that also shows that situational awareness was either ineffective or at most partially effective in 70% of incidents. The latter barrier's scores do not translate exactly to the electronic conspicuity/collision warning systems barrier because they're also influenced by whether pilots' actually used the situational awareness they had, but it's no coincidence that electronic conspicuity/collision warning systems are a key provider of situational awareness.

If we could eliminate even just 50% of these Airprox by improving pilots' situational awareness then we could significantly reduce the risk of mid-air collisions. So, what's not to like about buying an electronic conspicuity/collision warning system? Many of those currently available are becoming increasingly affordable and some cost about the same as filling up with a tank of fuel these days.

Well, all this needs to be done by creating a common electronic environment that adapts to all preferences and does not impose expensive equipment requirements and there lies the rub — how do we develop interoperable and affordable systems that provide common, assured, peer-to-peer or broadcast interface protocols standards and specifications that are not equipment-dependant? Oh, and we also need to make sure that foreign users are also able to access our airspace so there has to be more than a nod to international standards as well.

Progress can sometimes be glacial, but the CAA is on the case (see its article later in this magazine). The CAA published a 'Call for evidence' early in 2019, from which its formal response (CAP 1837) recognised at Page 4 that:

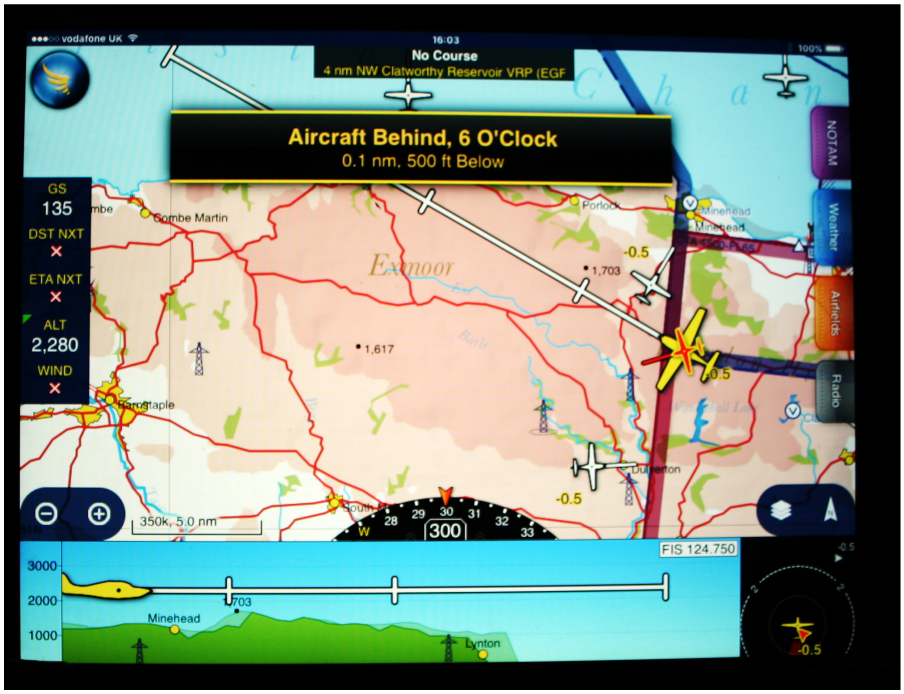
A key principle for EC to be effective, is that each aircraft should be conspicuous to all other relevant airspace users. It is acknowledged that there are several non-certified EC solutions in operation providing active assistance in collision avoidance. The CAA does not wish to see any existing solutions becoming prematurely obsolete. However, there is a need for interoperability, so that all airborne solutions provide a satisfactory level of conspicuity both to other aircraft and ground-based services with a legitimate interest in flight safety.

It remains the CAA's intention to bring forward proposals to require EC where its use reduces the likelihood of mid-air collisions and where such mid-air collisions are a serious risk to those people either engaged in flying or on the ground. EC is viewed as a means to enable the UK to take advantage of the opportunities that might be presented by new technologies, but at the same time allow the volume of commercial air transport to increase efficiently whilst enabling recreational aviation to continue to enjoy the activities they favour.

All well-and-good, but what's the current reality? The key issue for the overall effectiveness of electronic conspicuity/collision warning systems is compatibility – the more of us that can see one another, the better!

At the moment, the certified electronic conspicuity standard is ADS-B (Automatic Dependent Surveillance – Broadcast) which, as its name implies, automatically broadcasts GPS-derived data that can be received by ground stations (ATC) and also

PHOTOGRAPH: © FLARM Technology Ltd



suitably equipped aircraft. At the non-certified end of the market we have kit like FLARM (FLight alARM), which was originally developed for glider pilots, who regularly fly in close proximity to each other. FLARM transmits and receives position data in its own unique standard, and proximity warnings can only be received by other aircraft carrying FLARM equipment.

We also have PilotAware, which also transmits to its own standard (P3i) but can also receive Mode S, Mode A/C and ADS-B. SkyEcho II is another ADS-B system that can also be set up to see FLARM at extra cost. The table shows how these systems interact with each other (or not).

The U.S. is using a system known as UAT (Universal Access Transceiver), which transmits position data to a ground station that relays all know traffic information plus live weather, Notam, etc, back to your aircraft. Although some 'dual-band' transponders available in UK are equipped to do this, the UAT traffic service isn't available in Europe.

Broadcasting your location and track information is only one half of the story, the ability to receive signals and therefore 'see' similarly equipped aircraft is fundamental to collision warning and avoidance.

We all know that aircraft on a collision course are very often out to our front or approaching to the side, and we've developed lookout strategies and scans to help in spotting these aircraft. Electronic conspicuity/collision warning systems will certainly assist in these scenarios by perhaps alerting us sooner than we might otherwise see the aircraft, but one of the key features must also be to provide us with information on aircraft that might be approaching from areas that we can't easily see, such as from above and behind or below. Electronic conspicuity and collision warning system equipment must therefore have the potential to see all around, and to that end the performance and location of any antenna is critical.

Another key issue for receivers is how alerts and data are presented to the pilot. Some present it on a tablet or smart phone, others a permanent compass or radar-style display, and some give an audio alert through your headset.

Ultimately, to be effective, an electronic conspicuity/collision warning system must see-and-be-seen by the majority of threats at an adequate range for the pilot to do something about it.

Based on a one-minute warning, the Diagrams 1 and 2 indicate the sort of range and coverage required for a generic GA aircraft flying at 150kt (with the other aircraft at the same speed).

In general, the more sensitive the receiver or more powerful the transmitter, the greater the effective detection range between the two. But in in the real world there will be a hotchpotch of different transmitters and receivers contributing to conspicuity.

A low-power transmitter and low-sensitivity receiver will have a very short effective range so go for as much power and sensitivity as you can get to ensure the equipment works in all scenarios. But all of that power can easily be compromised by where and how you install your antenna.

Group	Response	FLARM	ADS-B	PilotAware
GA PPL(A)	135	22 (16%)	34 (25%)	22 (16%)
GA Gliders	42	26 (62%)	9 (21%)	6 (14%)
GA Microlights	24	5 (21%)	7 (29%)	8 (33%)
GA Others	21	3 (14%)	3 (14%)	1 (5%)
Overall GA Total	222	56 (25%)	53 (24%)	37 (17%)

IMAGE: PilotAware

IMAGE: PilotAware

It's important to understand that an antenna doesn't radiate or receive signals evenly in all directions (ie isotropic radiation), as would a lightbulb, but has a distinct pattern, meaning strong signals in some directions but almost non-existent in others. Antennae radiate or receive most efficiently in a disc or donut-shaped beam around their axis. The efficient zone of the beam widens with distance by 20-25° for a monopole or about 40-50° for a dipole.

Many basic electronic conspicuity systems have a small antenna sticking out of a box that you fit in the cockpit. Handy for portability but, theoretically, radio waves don't travel well through metal cockpits or wings, (although there is debate about the effect of such 'shadowing' and the mechanisms that allow some of the radio waves to get past).

Simplistically, because radio waves travel in straight lines and reflect off, rather than pass through, metal or carbon-fibre, the coverage provided by the box in the cockpit is very dependent on where you put it. Throwing it onto the spare seat or on the floor won't be very effective – in these circumstances the equipment might even only be 'seeing-and-being-seen' out of the windows if there's a lot of metal around, as shown in Diagram 3. And if you then place your iPad on top of the box/antenna, or have the antenna at an odd angle, then you're really on a hiding to nothing.

The ideal is an external top and bottom fuselage mounting for antenna, but that's not always possible or practical so, if you are mounting the box/antenna in the cockpit then try to go for a position with the antenna vertical and which is as unobstructed as possible by surrounding metalwork/ carbon-fibre.

So much for the theory about antennas, but what can each bit of kit detect? Table 1 from Ian Fraser's second article in the LAA's magazine shows some of the interoperability issues of each of the available versions at present. Note that most general aviation TCAS/TAS traffic warning devices cannot see ADS-B at all (they are reliant on an active transponder to see you) and that a Mode S transponder is not necessarily an ADS-B transponder, it requires extended squitter (Mode S ES) to work as one.

Table 1

Conspicuity Beacons ↓	Which traffic receivers can see them?					
	Pilot Aware	Sky Echo 2	Uncertified ADSB in Rx (e.g. GDL50)	Certified ABSB-in devices	TCAS & ACAS	FLARM
Sky Echo (Cap 1391 SIL-1 device)	Yes	Yes	Yes	Yes	No	No*4
ADSB out transponder cert GPS	Yes	Yes	Yes	Yes	Yes	No*4
ADSB out transponder uncert GPS (SIL 0)	Yes	Yes	Maybe*5	No *2	Yes	No*4
Pilot Aware	Yes	No	No	No	No	No
FLARM	No*1	Yes*3	No	No	No	Yes

*1 If you are close enough to one of PA's OGN R up links you might see it, (a fragile infrastructure).

*2 Certified traffic receivers normally exclude reports from transponders & beacons set to SIL 0.

*3 New development requires Sky Demon with FLARM decode license (£30 p.a.)

*4 ADSB in is an additional cost option to Power FLARM only.

*5 Transponders or beacons with a non-certified GPS (SIL 0) may not be detectable by a certified ADS-B-in device. SIL 1 and above can be seen.

So, who's got what? The truth is that we have no figures for the overall take-up of electronic conspicuity/collision warning systems in the GA community, nor for who has which system. In this respect, (and beware that it's only a small sample size so we need to be careful about making any deductions), the CAA's electronic conspicuity consultation response showed the spread of equipment in the GA world, which does perhaps give some idea of relative take-up of each version of electronic conspicuity within each community (see page 7).

I wouldn't like to translate these figures into GA-wide numbers but they do indicate for example that FLARM is very popular by percentage take-up within the gliding community (but perhaps does not have such an extensive take-up elsewhere) and that, overall, there appears to be a fairly even spread of the systems across all respondents.

All of this clearly shows that there's a real need for interoperability within any future electronic conspicuity/collision warning environment but, even if there was a common interface, that doesn't mean that once everyone has suitable equipment fitted then all our problems will be solved.

It would be great if electronic conspicuity/ collision warning systems were 100% reliable in detecting other aircraft but, unfortunately, they're not always effective and we see instances in Airprox where systems do not detect or alert when expected (probably due to the antenna issues previously discussed) or give unreliable or confusing indications. So, some thought is required when interpreting the displays and indications. It's clearly not practical for me to describe every display or circumstance but there are a couple of 'golden rules' to the use of electronic conspicuity/collision warning systems in general aviation.

Firstly, be very cautious about any bearing indications in transponder-based systems. Although GPS-based equipment should provide more reliable information, systems based on transponders are very prone to angle of arrival errors due to antenna limitations. On the other hand, they do generally provide good altitude information so think about manoeuvring in the vertical as the first course of action rather than laterally.

Second, although you should absolutely re-prioritise lookout focus on receipt of an alert or warning, don't just sit there and hope you're going to see the aircraft as it closes. Do something pro-active by manoeuvring to break the collision geometry rather than just watch the range ticking down on a constant bearing.

Third, if you get a really late alert ahead then an 'instinctive' pull-up to change height is more likely to generate separation than a turn. There are no guarantees of course, and you may be unlucky in that geometries

may well be unfavourable, but it generally takes longer to roll and turn than it does to just pull.

Fourth, don't fixate on the aircraft you can see as a result of a warning — it's very tempting to try to make the electronic conspicuity/collision warning display fit what you're seeing outside rather than maintaining a robust all-round lookout scan. We often see Airprox where a pilot gets a collision warning indication on one side of the aircraft, sees another aircraft on the other side (and perhaps assumes that his kit is giving an unreliable lateral indication) only to come close to the aircraft that was in fact being correctly displayed on the system when the other one didn't have a compatible electronic conspicuity system.

Finally, try to avoid pointing your aircraft at others, especially airliners, at close range (when holding in the visual circuit or transiting through Class D airspace, for instance). Their Traffic Alert and Collision Avoidance System (TCAS) reacts to any Mode A/C signals that are predicted to impinge on a safety footprint around the airliner and, if you come too close they will get a 'TCAS RA' (Resolution Advisory) warning that requires a mandatory avoiding manoeuvre.

Not only will that manoeuvre generally result in an Airprox being declared, but if the airliner is conducting an approach to an airfield then they'll generally have to go-around with all the attendant costs of extra fuel burn, ATC having to fit them back into the radar pattern, and knock-on delays or interactions with other airliners.

The safety envelope varies with speed (yours and theirs) but the examples shown in the graphics are for an 'interloper' GA aircraft at 90kt and an airliner at a representative approach speed of 160kt at 1000-2350ft and 200kt at 2350ft-FL50. The TCAS 'TA' (Traffic Advisory) larger blue circle (1.7nm/2.4nm ahead in the respective graphics) is a warning only, but if you go inside the TCAS 'RA' red circle (1.0nm/1.6nm ahead in the respective graphics) then they'll have to manoeuvre.

There's no hard-and-fast rule, but as a guide if you avoid pointing at airliners within about 2nm head-on and 1/2nm laterally then at least you'll probably avoid causing a resolution advisory.

So, there you have it — there's a lot to electronic conspicuity, but I hope this article has given you an insight into the challenges and ideas moving forward. ■

DIAGRAM 1

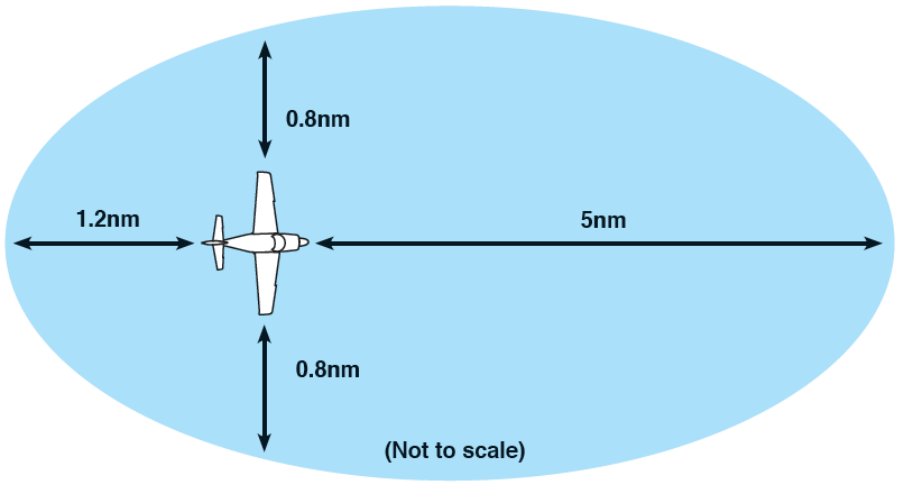


DIAGRAM 2

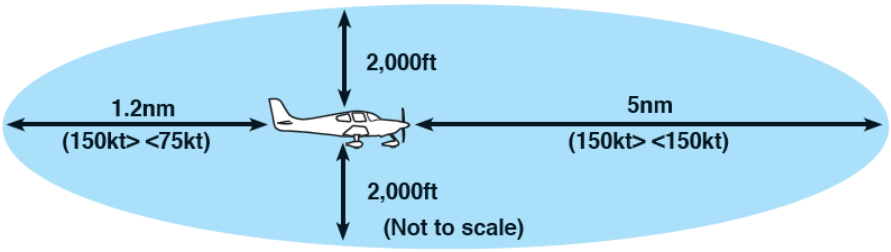
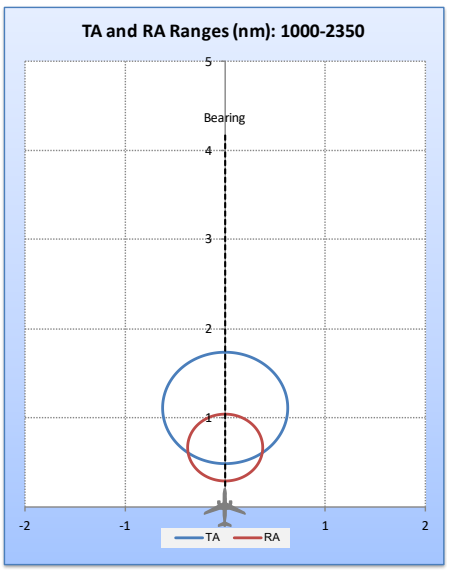
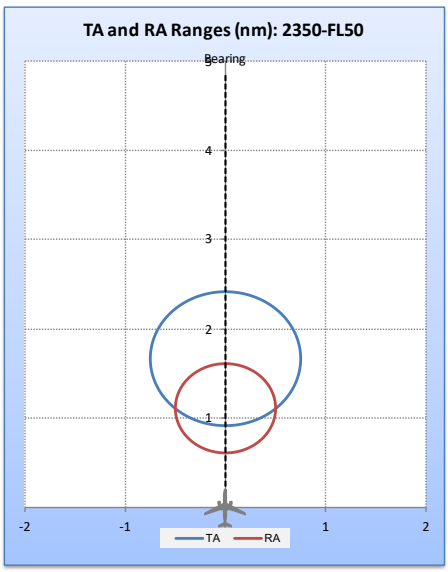


DIAGRAM 3

'The coverage that's provided by the box in the cockpit is very dependent on where you put it in the aircraft'





How the CAA views the future

You might think the rise in interest in electronic conspicuity is something new, but the deliberations about it actually aren't — the CAA began developing its ideas about ten years ago together with key partners of the Airspace Safety Initiative (ASI). The focus was to understand what could be done to reduce the risk of general aviation collisions within Class G airspace.

Working with stakeholders CAP 1391, which recognised the priorities that are almost universally held by operators of all of the 27,000 GA aircraft in this country — cost, power, weight, portability and interoperability, was published. It outlined standards to aid manufacturers of suitable devices. That work has helped both to enable entry to the electronic conspicuity market, and to raise awareness and greater discussion on the concept of aids to 'see and avoid'.

Since then we have explored how electronic conspicuity could play its part in safely accommodating existing and new airspace users under the Airspace Modernisation Strategy.

With the sustained growth of traffic and ever-evolving stakeholder requirements, along with the emergence of new entrants, a new level of risk and complexity has been introduced that must be considered as a key part of the airspace safety challenge.

Although traditional safety nets provide acceptable levels of protection for (primarily commercial) traffic in controlled airspace, the risk to GA and military users outside it are less-well mitigated. While 'see-and-avoid' is still the primary means of collision avoidance in Class G airspace, if everyone carried interoperable electronic conspicuity devices it would help to mitigate the higher level of risk to which all airspace users are exposed. It can also address other issues, so the choice of technology is pivotal.

One of the key challenges is the need for the acceptance and integration of new technologies and user requirements, and the opportunity to review how we deliver Air Traffic Services (ATS) in a modernised airspace structure.

The current airspace and its operation (segregation, not integration) limits airspace access and options for Flexible Use Airspace (FUA) — a key concept in the future, both at the upper and lower levels; it's often categorised in a way that (effectively) restricts use to some but might not allow an entirely efficient use of it for the bulk of the time.

Electronic conspicuity will be key to tackling those two issues — integration and Flexible Use Airspace. It seems obvious, then, to facilitate equipping as wide a range of the GA fleet (with an interoperable solution) as soon as possible to realise the safety benefits quickly and enable airspace structures to be simplified and Air Traffic Services developed.

With this in mind, the CAA established the Electronic Conspicuity Deployment Programme (ECDP) to develop and deliver a strategy to facilitate widespread uptake of electronic conspicuity.

The program aims to:

• Enhance safety by mitigating the risk of mid-air collisions alongside an increasing demand for use of airspace.

• Improve efficiency, by offering all users access to the airspace they require and enable innovative usage without further segregation.

• Enable Unmanned Aerial Systems integration by establishing a comprehensive foundation of electronic conspicuity that operators can rely on to detect and avoid other airspace users remotely or automatically using connected technologies.

Modernising airspace and implementing electronic conspicuity is how we will improve safety, welcome new entrants and make better use of this scarce resource.

CHALLENGES

We will face challenges and ensure they are addressed through a co-operative approach with all sectors of the aviation community. Some of these are grouped as follows:

Equipment performance

The widespread equipage of devices that don't utilise aviation-protected spectrum and do not conform to any qualitative emission indicators has been a low-cost way for pilots to enhance in-flight awareness of surrounding traffic. However, the lack of qualitative standards doesn't allow for aviation-grade systems to rely on their transmissions, thus making them invisible to many users.

This issue will magnify as new unmanned entrants (that require high quality and reliable emissions from their surrounding traffic to enable autonomy) enter commercial operations. There is a need for interoperability, so that all airborne solutions provide a satisfactory level of conspicuity both to other aircraft and ground-based services.

Frequency congestion

This might arise if an ADS-B Out solution, in its current form, is enforced for all air vehicles. This potential issue is being investigated and will be further tested during future proof-of-concept trials.

Human Factors

An unintended potential consequence of electronic conspicuity is pilots focusing on one visual area after a 'traffic warning' and potentially missing objects just outside the line of vision. They could also become over-reliant on in-cockpit information, leading to fixation and 'heads-in'.

A pilot might also falsely assume that all aircraft can be seen electronically, so it must be stressed that electronic conspicuity devices do not replace the need for effective visual scanning. The full benefits of electronic conspicuity can only be realised when everything and everyone is 'visible' to everything and everyone else and appropriate systems training is in place.

The CAA is committed to bringing forward proposals requiring electronic conspicuity where its use reduces the likelihood of mid-air collisions. Electronic conspicuity is an enabler for the UK to take advantage of future opportunities that will arise through the introduction of new technologies.

Ongoing work into performance standards and trials will help produce a comprehensive strategy for electronic conspicuity deployment. All of this will go-ahead with co-operation between the CAA and stakeholders and significant documentation or decisions will be subject to full consultation. You can find out more about matters related to mid-air collision at the Airspace Safety website airspacesafety.com.

LPAT (a Low Power ADS-B Transceiver) has been devised by NATS through a contract with Funke Avionics and trialled in tests by GA pilots

Never overfly gliding sites below the altitude shown on your chart

G/3.3

WINCH CABLES CAN KILL!

BRITISH GLIDING ASSOCIATION

Hear's the thing
(and so is speaking…)

While electronic conspicuity is an increasingly important aid to safer flying, good communication plays its part too

Using the radio doesn't seem to cut it for some pilots for various reasons — pride, nerves or preference, perhaps — and that's unfortunate because even if you're listening-out, you only get part of the picture about others near you, or heading your way; talking gets you even more situational awareness and also provides others with valuable information about you too. So let's have a look at the basics and yes it might be basic, but how well do you really know your radio, particularly since the old 25kHz unit you've been used to for years has given way to a shiny, new 8.33 version? If you're still using only its basic functions have a sit down over the winter with a cup of coffee and the manual to get up to speed; if you don't you'll never know what features, tips and shortcuts it has that might help your flying.

With that out of the way, ask yourself a question; if you're simply listening-out while flying, perhaps with the volume turned down low, have you heard what was really said or simply what you expected to hear? The same is true if you're in contact with someone else such as a controller — you know the feeling, you're flying along track comfortably and suddenly hear your call-sign, and with a start you think 'what was that…?'. If you

PHOTOGRAPHS: Keith Wilson/SFP Photographic

make assumptions or guesses the chances are you'll get it wrong, so if you're in any doubt ask for the message to be repeated.

Which neatly leads on to another factor; some pilots simply aren't comfortable or confident when it comes to speaking on the radio. If that's the case don't sweat it, controllers are human and would rather hear someone trying to talk to them rather than blindly flying silently by.

While any communication is better than none, accuracy is however essential, especially when it comes to position reports; quite a number of airprox have been caused by pilots incorrectly reporting their position, whether through confusion or simple carelessness, so make sure you really know where you are (or where you'll be by the time your transmission ends…) before you announce it to the world.

The stumbling block when speaking is often remembering what to say and in what order. Ideally, controllers prefer information in a common format because it makes life easier for all. Yes, it's basic stuff again, but give your call sign, aircraft type, where from and to, position, altitude, whether you're VFR/IFR/SVFR, your heading, and your request; for example, what sort of service you'd like; Basic, Traffic, Deconfliction or Procedural Service.

Think carefully, too, about which frequency is best for what you're doing – is LARS with an air traffic service better than simply using a listening frequency and a squawk; or perhaps use London/Scottish Info rather than a local airfield frequency, or VHF low-level common (in Scotland) or Safety Common; or even a gliding frequency to find out what's going on if you're near a gliding club? There's no single correct answer because it depends on the circumstances, but have a think about what best suits your activity/requirements at the time and how you might help others.

Naturally you need to know your air traffic services and there are a stack of services that can help improve situational awareness if pilots use them, but you need to know what you'll get from each (see the panel on page 14) and, perhaps more importantly, what you won't get. If you want traffic information, for example, then you must ask for it under a Traffic Service; don't expect traffic information from a Basic Service (you might get it, though, if the controller has the capacity and happens to be looking at that part of the screen, but the controller is under no mandate to monitor your aircraft under a Basic Service).

Ideally, ask for a Traffic Service where possible because, unlike a Basic Service, the controller will actively track your flight and provide radar derived traffic information to assist you in avoiding others, although responsibility for collision avoidance still remains with the pilot. The controller will pass information on traffic that will pass within 3nm and 3000ft, and should give that information before that traffic is within 5nm.

As mentioned before, though, if you're in any doubt about what's been said ask for more information or clarification, don't just press on and hope it'll all become clear eventually, the chances are it won't if you didn't get it the first time.

One of the areas that causes grief to pilots and controllers alike is around

'In its GPS form, the universal use of electronic conspicuity is seen as something of a Holy Grail for the growing mix of airspace users'

airfields and Air Traffic Zones when people transit blindly close to or above (and especially through the feathers) without speaking. At the very least, not knowing the pilot's intentions can cause uncertainty to the traffic patterns, so a quick call can do much to remove confusion or uncertainty and help improve everyone's situational awareness. Here's a thought, too, for glider pilots; your aircraft might not be radar significant and so ATC might not even know you're there unless you give them a call.

Calling an airfield as you pass by can have other benefits, too. Not only might you find out about an aircraft conducting aerobatics, for example, but you might also be given local information you'd otherwise have missed, such as that parachute drop at the village fête that slipped by when you were checking the Notams. It happens.

MATZ, and flying near, through or above them, are often contentious. Yes, legally, they are advisory for civilian traffic provided that aircraft stay outside of the actual ATZ (2000ft x 2.5nm), but fast or big jets can extend quite a way from the ATZ due to their performance and turning circles, so even though it's legal to fly through them 'blind', it's well worth calling the local ATC if you plan to transit through their MATZ or are in the local area.

When it comes to airfields this is one place where R/T discipline really does matter for everyone's situational awareness. Calls need to be made in the right place and with the right/appropriate phraseology in the visual circuit and radar patterns. It's especially the case at air/ground airfields where others will use the calls to formulate their own situational awareness and landing plans.

Doing something a bit out of the ordinary such as joining at an airfield on base leg or straight-in definitely calls for clarity and clearly stating what you'd like to do using standard phraseology, otherwise confusion reigns and no-one wants that in the circuit. So yes — and it's a golden rule for anything you want to transmit — think about what you're going to say first, keep transmissions short and listen before pressing the button to avoid drowning out anyone else. Don't forget, either, that a little tolerance is good, too; some pilots might not be as slick as you so if there is some bumbling "ers", and "ummms", from those less confident or experienced, try to give them a break.

Talking about airfields, here's a thought: when did you last think about radio fail procedures? While the worst might never happen, if it does you really need to know what to do, plus knowing the procedures can help you anticipate where other pilots might be and what they might do if they have a radio failure and are joining the circuit (think especially about potential confliction points in the circuit).

So, radio use - some might not be keen or confident in using it, but as with electronic conspicuity it's a valuable aid to situational awareness to all who fly, and even if you're an experienced pilot it's good to pick up the Radiotelephony manual CAP413 every once in a while to refresh your thoughts on communication so that you can be seen and heard...

Which service?

BASIC
This will be provided by all ATC Units (Callsign 'Radar' or 'Approach') that operate outside controlled airspace and all AFIS stations (callsign 'Information'), all you can realistically expect is probably the weather

Some units, especially those with full ATC, might be able to tell you about danger areas or closed aerodromes etc. but don't expect much more.

You should not expect specific traffic information. You might be told about generic information or intense activity nearby. At best, you might be told if another pilot is estimating the same position at the same or a similar time and altitude. Lookout and avoiding action remain your responsibility.

TRAFFIC
ATC will 'identify' you with a squawk or, in rare cases, a turn and generally give you traffic information on aircraft coming within 3nm and 3000ft. In theory, you'll be passed information in time to think about avoiding action; if it's needed, it's still your responsibility. You will not be given avoidance advice on a Traffic Service. On hazy days or in busy airspace, this is probably the right service.

DECONFLICTION
Only available to IFR flights, the controller will give headings and levels with a plan to achieve the appropriate 'deconfliction minima'. It's their job to try to assist you in not bumping into other aircraft by generally keeping you 3 or 5nm laterally and/or 1000 or 3000ft vertically from everyone else. This is the only service under which avoidance advice is given.

PROCEDURAL
This is now the domain of IFR flights only. The controller will allocate routes, timings and levels that provide standard deconfliction minima (most often 1000ft vertically) between other aircraft on a Procedural Service. You might also be given traffic information on other Basic Service traffic if a confliction exists, but collision avoidance is your responsibility.

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