Clued up

SUMMER 2018

Civil Aviation Authority

SAFETY MATTERS FOR GA PILOTS

This way ¿dn

It all depends on what your brain is telling you

INSIDE

PLUS / TECHNICAL / AIRSPACE / INNOVATION / ***MICROLIGHTS*** / HELICOPTERS / ***INCIDENT REPORTS***

When it all GOES A BIT ODD

With the better weather finally joining us after a less-than-kind spring, there should with luck be plenty of good flying to be had over the summer months. But even when the sun shines and the days are long, there are some issues that concern all pilots regardless of the type they fly, which is why we've taken a look in this issue of *Clued Up* at spatial disorientation. It's a phenomenon any pilot can experience given certain conditions. In some cases no amount of intuitive modern technology can improve the capability of the human eye, while with others you really have to trust your instruments rather than the seat of your pants.

Sure, avionics can help in all sorts of situations, but ultimately it's the coordination of hands, eyes and brain that really matters, so we explore how an aircraft can suffer an upset if the pilot becomes disorientated, and, perhaps more importantly, how it can be prevented in the first place.

Back on the ground we spend a day in the classroom on an airspace awareness course to find out what it's like. Run by the General Aviation Safety Council (GASCo) these new courses are designed to enlighten, educate and entertain those who have infringed airspace and are intended to be an alternative option for the more serious infringers – forestalling the need for potential licensing action. Similar to the speed awareness course for motorists, the premise is simple, if you don't want to end up on a course, don't infringe!

Also, in this edition we have taken an in-depth look at flaps and how they can, and have, caused serious problems if not used correctly. We also untangle some of the misconceptions around the term safety pilot.

Finally, with the rules around cost-sharing having now changed we examine the implications for private pilots. With a number of online cost-sharing platforms now matching pilots with passengers across Europe, how easy is it for pilots to sign-up and start subsiding their flying?

As always, please feel free to get in touch with ideas and comments.

Safe flying.

Tony Rapson
Head of the General Aviation Unit
Civil Aviation Authority

To keep up to date on all airspace safety issues, follow *@airspacesafety* on Twitter. General Aviation Unit – *ga@caa.co.uk*, caa.co.uk/skywise. Safety Regulation Group – CAA, Aviation House, Gatwick Airport South, West Sussex RH6 0YR. web: caa.co.uk

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What's inside

Clued Up magazine brings you the latest news in aviation safety, topical issues, advice and contribution from pilots, air traffic controllers and safety experts from across the UK's General Aviation community

Share & share alike

The rules covering cost-sharing have changed for private flying and pilots can even advertise their flights now – but what does it all really mean?

It wasn't long ago that cost-sharing flights in GA essentially meant flying with friends buying the bacon sarnies for lunch, stumping up for the landing fee perhaps, or paying towards the cost of the fuel and that was about it, but times have changed.

Now, a greater proportion of the costs can be shared between more people which, among other things, has led to the rise of cost-sharing flight websites rather like flying versions of Airbnb. You've probably seen the stories in the press, how it can be quicker and cheaper for people to take a private flight to Carlisle than let the train take the strain, or how they can get a bird's-eye view of the Jurassic coastline in a private aircraft for £60 or so.

It's all come about with the introduction of an EU regulation (EU Commission Regulation 379/2014) which says that costs no longer have to be shared equally. Although the legislation doesn't specifically allow the advertising of flights, it doesn't prohibit it. So pop 'flight-sharing' into Google and sites such as Wingly, and Coavmi are right at the top of the list offering all manner of seats on private flights and, unsurprisingly, thousands of UK PPLs have already signed up to take part.

All of which sounds good because everyone likes to fly more, particularly if someone else is helping to pick up the bills – and more flying increases currency and skills, benefiting safety.

Flying and cost-sharing with friends is still pretty straightforward and little apart from the proportion each person has to pay has changed; now, how much each individual person pays is not prescribed but the pilot must pay something.

For those flying with friends or flying club members, working out the actual cost-sharing between pilot and passengers (up to six including the pilot) is probably now much simpler. Direct costs, such as fuel, airfield charges and any aircraft rental fee, if it's hired, can be split between those on board, but anything not directly related to the flight, such as the annual cost of keeping, maintaining and operating an aircraft for example, cannot be shared and no profit can be made.

But how does it work under the new flight-sharing websites with someone you've never met, and what happens, say, if the weather doesn't quite turn out to match the forecast? Suppose the passenger doesn't turn up on time or the aircraft goes tech – and what about insurance, licences and, from the passenger's point of view, safety?


Flying more is one of the benefits


Weight and balance can be an issue


Passengers might be more nervous

This new world of cost-sharing could be something of a minefield with pilots of differing abilities flying people they've never met before, but EASA and the new websites have taken the idea quite seriously.

EASA has designed a Charter of best practices, to be signed by all of the web platforms, their individual charters will inform passengers and pilots not only on the different safety levels of a GA flight compared to a commercial air transport (CAT) flight, it also includes a safety-relevant tool box with a checklist for pilots on how to deal with passengers prior to and during the flight, as well as an online training module on passenger handling. As part of this Charter, web-based platforms commit themselves to share safety-related data with EASA and national authorities.

In 2016 a Europe-wide Working Group examined the ramifications of the new rules and perceived no additional safety risks were posed by advertising flights. The idea is that it should increase safety more widely by encouraging pilots to fly more frequently.

With pilots and aircraft now effectively being more available to a wider audience, one of the obvious questions is over licences, proficiency, hours and currency. None of the websites want to be party to falling foul of the law, so a pilot's licence,

AT A GLANCE

- *The changes apply to non-complex aeroplanes and helicopters, sailplanes and balloons, any aeroplane or helicopter that falls below the EASA definition of complex aircraft, which most GA type aeroplanes up to 5700kgs do.*
- *The maximum number of people who can share the direct costs of a flight has been increased from four to six, including the pilot.*
- *Direct costs include fuel, airfield charges and any aircraft rental fee.*
- *Any costs not directly related to the flight, for example the annual cost of keeping, maintaining and operating an aircraft, cannot be shared and no profit can be made.*
- *How much each individual person pays is not prescribed, but the pilot must pay something.*
- *Flights can be advertised in advance, but it must be made clear that it is a cost-sharing flight; it is an offence to advertise the sale of a public or commercial air transport flight without having an Air Operator's Certificate.*
- *Both EASA and non-EASA aircraft, including those on a Permit to Fly can be used, although if the aircraft is being hired for the flight, it must have either a Certificate of Airworthiness or be a type-approved Permit to Fly aircraft which is already permitted to be used for self-fly hire within the terms of the relevant exemptions.*
- *Pilots of aircraft on a Permit to Fly need to comply with the regulations and apply for any necessary permission from any territory outside the London and Scottish Flight Information Regions (FIRs) over/within which they intend to operate. This includes Jersey, Guernsey and the IoM and they should ensure that they have the permission of the relevant authority.*
- *Full details of what's permitted can be found at caa.co.uk/General-aviation/Aircraft-ownership-and-maintenance/Cost-sharing-flights/*
- *You can read EASA's rules at www.easa.europa.eu*

Distractions an issue?

medical and currency should be checked for validity before they can join any of the schemes.

In some cases, those with up to 100 hours total time are restricted to flying people to and from the departure airfield (the home airfield effectively) only. With more than 100 hours pilots can do A-B flights, but there still might be further restrictions on what they can do by the online platforms.

So what about the vagaries of the weather and the pressure that pilots might feel because they aren't used to flying people they've never met before?

It's crucial to understand that these flights are designed to be for leisure only, they aren't an air taxi service (despite some of what's been written in the press…) and pilots have the absolute right to cancel a flight even when in the air, whether that's down to the weather or for any other reason – there should be no commercial incentive for a pilot to fly.

Emeric de Waziers, a Co-founder of the booking site Wingly, says it's made very clear that a flight can be cancelled at any time due to weather or for other reasons. When booking with his company, for example, a pop-up warns people that there's a 50/50 chance of the flight being cancelled.

Pilots and passengers are put in touch with each other so that they can 'meet' each other and be aware of anything that might affect the flight; there should be a conversation 48 hours beforehand between the pilot and passenger.

To ease any pressures, both parties should be aware that if a flight is cancelled the passenger will get a refund. According to Wingly, out of 3,000 flights in the last 14 months there was only one turnaround in flight and that was weather-related.

Weight and balance is, of course, another issue especially for lower powered aircraft, and one that people used to flying in commercial aircraft might not understand fully.

Some of the sites ask people to enter their personal weight and the weight of any luggage when booking, but on the day it's up to the pilot to check that all is as claimed. If there are any doubts they can cancel the flight there and then.

When it comes to pre-flight briefing, a note should be sent to prospective passengers before the day explaining where they should arrive at the airfield and what to expect then they get there. If airfields have ground rules such as yellow jackets and access requirements, it's up to pilots to observe those for the passengers.

While some people taking up these offers will undoubtedly be interested in the technical aspects of their flight, anything safety related such as pre-flight checks should be done well before a passenger arrives to avoid distractions,

Baggage might be problematic…

and there should be a proper pre-flight briefing for all passengers on the day.

Another question that is being asked is whether the insurance companies accept the legality of the new cost-sharing regime. Pilots are advised to check with their insurers. Some of the sites offering cost-sharing flights will provide complementary civil liability insurance, it's worth checking.

It's also worth bearing in mind security issues, especially if flying to and from abroad. Pilots need to take responsibility for passengers' baggage and should always check to confirm they are not carrying anything illegal – and the best advice is if in doubt, leave the passenger behind.

To ensure that cost-sharing remains non-commercial (otherwise it would require an Air Operator's Certificate) on the flight-sharing platforms, some of the companies compare the cost of the flight put forward by the pilot against an average and if it doesn't match up the company is likely to discuss the issue with the pilot.

But while pilots can now pay less of the costs under the new cost-sharing rules, these flights shouldn't be seen as a back door into commercial flying – private pilots operating under such schemes can only share the direct costs of the flight and must not make a profit.

The intention of the regulation is that pilots will do more flying for fun and enjoy it while sharing a love of the skies with others.

What's it like to cost-share with people you've never met?

Richard Singleton is 54 and started flying fixed-wing aircraft in 2004, he then added helicopters in 2010. He has 400 fixed-wing hours and 250 rotary. He flies rented Warriors, Cherokees, a Lance, an Arrow and the Robinson range including the five-seat R66. He flies mostly in the UK and occasionally abroad.

While he tries to fly fixed and rotary at no more than three weekly intervals, staying current in such a range of aircraft is inevitably expensive and he wanted to find a way to ease the costs, then a friend suggested to him that he explore cost-sharing flights.

"I'd flown friends of friends and thought I'd give it a go and see if the person enjoyed the flight," he says. "They did and had a fabulous time. Everyone enjoyed it so it seemed to make good sense on the basis of the more you do, the better you get."

So he decided to try a cost-sharing platform which meant providing proof of his passport and the validity of his medical and licences before he could offer any flights. So far these have been mostly local and often in one of the Robinsons.

One was a birthday surprise for an 88-year-old and he flew her and her daughter over their local villages. On another outing he flew a fixed-wing pilot who was thinking of converting to helicopters to a hotel which gave Richard the opportunity to practise confined area landings.

As you might expect with the fickle British weather things haven't always gone according to plan. On one longer flight the weather turned sour ahead, so he explained the situation to the passengers and suggested a local sight-seeing trip instead, which they were happy to do.

Initially, there was a certain apprehension about flying with people he'd never met. "It was way outside my experience," he says, "so I wrote myself a little brief of things they'd like to know. We meet in the airfield café first and have a chat which gives me a chance to find out what they're like and if there are likely to be any issues.

"They are generally a bit nervous at first when we get in the aircraft and we'll taxi back if they want to, but I try to put them at their ease and once in the air they love it."

So far, he says, all the people he has flown have been extremely personable and communicative in the air and there have been no issues. Post flight he tends to ask whether there was anything he could have done to improve the flight for them.

While the percentage of the flight costs payable by him under the regulations could now actually be quite low, any flights made through a cost-sharing third-party platform that he occasionally uses tend to be on an equal percentage of the direct costs of the flight, so 50 percent if there's one passenger, but if he was flying the Lance with five others, then he'd only pay one-sixth.

"I enjoy doing it and it makes significant savings," he adds. "I fly more so it keeps things slick and fluid. This certainly helps maintain currency and I can't see any downside to cost-sharing, so I plan to keep doing it unless there's a legal issue that stops it."

FLAPS - a question of degree

Using them should be straightforward but sometimes it isn't, and that's led to incidents and accidents

It's a comment pilots have heard me say many, many times, "Check your flaps visually! Don't rely on the gauge or indicator". So let's have a look at why it's so important — and the possible consequences if you don't.

Unlike many of the other common types (Piper, for example) Cessna has made several changes over the years with the way in which the flaps are selected by the pilot.

Originally they were manually operated, but in the mid-Sixties Cessna changed to electric operation and as a result of this change the actual switch/lever mechanisms vary greatly and not just between different models (150/152/172/182 etc.) but even between aircraft of the same model.

In addition, the flap indicator has had several different designs and differing ➤

You need to take care of...

...how much flap


Flap lever and separate indicator

locations in the cockpit, all helping to lead to possible confusion in the heat of the moment. Another very significant change is that Cessna designed the 152 with only 30° of flap while all the other variants have 40°.

Take something like the Piper Cherokee range from the basic 140 through to the relatively complex Arrow — the flaps are mechanically operated and they all have a large hand-operated lever with a push-button lock that has a positive ratchet feel, visually very obvious and doesn't need a gauge or indicator; it's simple and relatively foolproof. Early Cessnas, some of which are still flying, had the same type of manual operation so why did Cessna change? Was it for the better?

It would appear that incidents have occurred with electric flaps that might well have not happened with good old manual flaps. That's why I want to talk about Cessna flaps operated by an electric motor.

Let's look at some of the different flap indicators first. The early 150s started with the indicator being a metal pointer moving along a scale situated above the pilot's door. Then they repositioned it to be a vertical gauge, similar to the previous, but now down the left front door post; generally these are fairly accurate, maybe occasionally a bit glitchy but okay.

Other Cessna variants have a flap indicator in an enclosed instrument case, usually on the right side of the panel, with a white needle that deflects up/down indicating the degree of deflection (0^0 - 40^0). This type of indicator is prone to 'hanging' and/or then 'jumping' so I generally recommend counting your flaps down, visually checking them, and glance at the indicator afterwards. Putting the flaps down takes approximately

'The most notable problem appears to arise with 150s and 152s'

2.5 seconds per 10° of flap, so count 'one thousand, two thousand, stop' per 10°, but be aware that the flaps come up a lot more quickly; 40^0 to 0^0 is about six seconds.

More recent Cessnas have a pre-select detent system, but this again varies from aircraft to aircraft so can still lead to misinterpretation or mis-setting.

So how are the flaps selected? Looking at the aircraft before detents were introduced, you have an up/down lever switch which, as a general rule, is spring-loaded while lowering the flaps so you have to hold the lever down to keep them moving; if you release the pressure the flaps stop. This makes it easy to put the flap down in stages when setting up an approach and particularly when using flaps during a PFL.

But beware, the lever is not spring-loaded when moved to the flaps-up position and all the flap will retract in one go unless you manually stop them. This can be potentially very dangerous with any slow speed, low level operation, especially with full flap due to the sink that can occur as all the flap is retracted in one go, for example, on go-arounds, low airspeed/stall recoveries etc. (I say 'as a general rule' because I have flown a 172 where the flap lever was not spring-loaded in either direction, so you had to manually centre the lever when lowering flap as well as when raising them). When it comes to the pre-select detent flaps confusion lies… some can have a detent every 10^0, some have a detent for just the first 10^0 and then you have to judge/guess the subsequent settings.

Some indicate you can lower the first 10^0 at a speed higher than Vfe but must be back into the white arc on your ASI (i.e. below Vfe), for further flap. Look out for worn detents too; after a lot of use the detent can become a little rounded and the lever not stop where you intend it to.

So you can start to see that simply lowering and raising the flaps needs due consideration and awareness. This leads to what's probably the biggest issue of all, the fact that the 152 only has a maximum of 30° flap whereas all the 150/172/182 models have 40° flap.

The most notable problem appears to arise with pilots who fly 150s and 152s. They look on them as being similar aeroplanes, but they most definitely aren't. That extra 10° of flap on the 150 makes it very different which is why you need to be very conscious of which you are about to fly in. This difference has been attributed to be the cause of three fatal accidents in Cessna 150s in recent years.

What happened? They had full flap (40°) down on take-off. With full 40° flap Cessnas would need a very long runway with no obstacles at the end just to get off the ground followed by a reluctant climb if you're lucky; if fully loaded and it's a hot day, there's no chance. But how can a take-off happen with full 40° of flap?

THE CHECKLIST

Most people have been taught to put the

flaps down for the pre-flight walk-round, but when does the checklist tell you to bring them up, if at all? Many official Cessna Pilot's Operating Handbooks (POH) don't put the flaps down for the walk-round checks and so don't have a need to raise them during/after the starting checks. The only reference is in the pre-take-off checks – 'Flaps set for take-off'.

There are commercially produced checklists available for each type of aircraft and they might have differences which include when you raise your flaps, some before starting the engine, some after starting to help save draining the battery. Flying schools/clubs often produce their own checklists for their members.

If you've been flying with manual flaps these are often raised before the master switch has been turned on, but it doesn't work in a Cessna with electric flaps, you need the master switch on. So be careful, don't amend a checklist to be similar/ familiar with a previous type of aeroplane, the flaps may well stay down.

DISTRACTIONS

It's a common issue. When passengers start talking and asking questions while you are doing your checks, items get missed. Likewise, if ATC calls or you're rushing because you're in a hurry. Or, you just missed it, we can all be guilty of occasionally missing a check and that's why we should double check. The number of times I have seen Cessnas taxying out with their flaps still fully down...

SETTING FLAPS FOR TAKE-OFF

Have you got the correct amount of flap? Do you actually need any for take-off? While the 150/152 POH recommend 10° flap for a short-field take-off, several 172 POHs say no flap for short-field take-offs because if you have an obstacle to clear the reduced climb performance outweighs the benefit of using flap. But, then some do recommend flap for a soft-field take-off with no obstacle issues.

Is the gauge reliable and accurate? Have you even thought about it or just assumed that they are where you think they should be? I've known a case where the pilot didn't hear the motor whirring, so he recycled the flaps a couple of times and accidentally left them fully down. He survived to tell the tale, the aeroplane didn't and the end hedge had a big hole in it.

If you've missed all the precautions and not visually checked your flaps are set correctly for take-off are there any further warning signs? Yes. During the attempt at taking off, the aircraft will be a lot slower to build airspeed, you'll be using a lot more runway, it just doesn't feel right... That's when to abandon the take-off — now! (Always do the take-off checks properly and always be prepared to abandon a take-off.)

Are there any further considerations with the flaps when flying? Yes, be aware of the handling characteristics when lowering or raising the flaps.

The pitch changes required to maintain airspeed are relatively small when lowering the first 20° of flap, but they increase significantly with more flap and going from 30° to 40° requires a very prompt and positive pitch nose down to avoid losing the speed. Your rate of descent will also be significantly greater.

Raising the flaps can also produce considerable pitch changes and the potential for a large amount of sink if all the flap is raised in one go. Hence bringing flaps up in stages.

On a go-around with full flap, having applied full power, as soon as the aircraft is stable bring the flaps back up to 20° and establish a positive climb. They will climb quite reasonably with 20°.

Touch-and-go's — yes, we all do circuits practicing different types of approaches that involve the flaps being brought up during the roll. Have they come up? it's a bit late to discover they haven't when you are airborne, staggering over the hedge and not climbing very well. An electric motor can fail at any time.

I mentioned earlier that the 152s having only 30° of flap is a significant change. I said at the time that the extra 10° on the 150 made it different; in reality it's the 152 that is different. If you learn on a 150 and go onto 172s the flap handling characteristics are similar. If you learn on a 152 and go onto a 172 the extra flap is usually emphasised on your checkout and it is a noticeably different aeroplane all round, bigger, four seats, so you are prepared for it to be different.

152 to 150? Not so, because, to all intents and purposes, they appear to be similar, just that one has a slightly bigger engine and is an inch or two wider in the cockpit, they are both basically a two-seater Cessna. But the flaps give them very different characteristics, a 152 will climb, although not brilliantly, with its full flap of 30°, will stagger off the ground on a touch-and-go and doesn't have the large pitch changes.... but will a 150? They are different and need to be treated and respected as such.

Finally, back to where we started "Check Your Flaps Visually!" – If you always visually check your flaps are set for take-off when doing your pre-take-off vital actions… If you always glance at the flaps when you raise the lever during a touch-and-go to make sure they are moving up before you get airborne… Again, if you always check they are on the way up during a full flap go around… Then you shouldn't have that unintentional full flap in any critical phase of flight. ■

Jennie Lyons has been actively involved in the aviation industry for more than 40 years and has owned and managed her own school. She gained her instructor's rating in 1975 and is both a Flight and RT Examiner.

Class D the easy way

NATS is experimenting with a simpler way to transit some airspace, Andy Amor explains

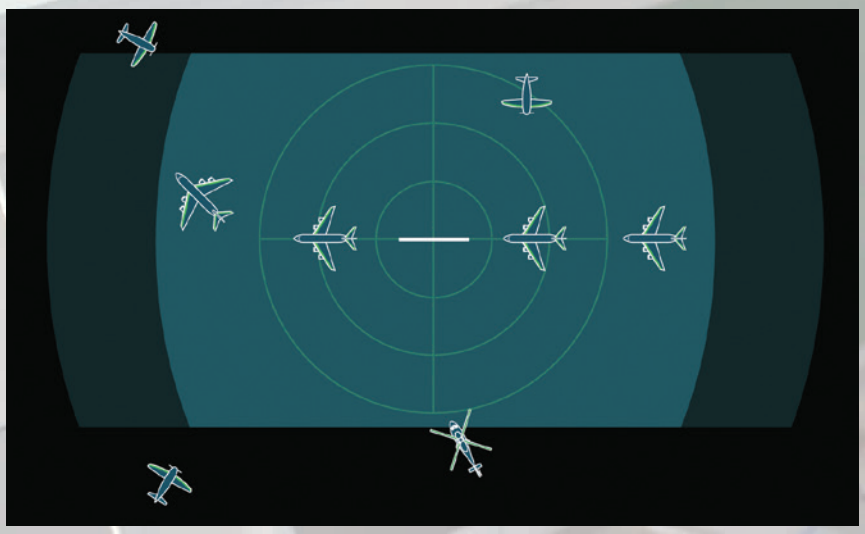
You might have heard that since January NATS has launched a new GA pre-notification tool as part of an online Airspace Users Portal for all non-standard flight applications.

It's been developed following a controller survey that identified room for improvement when handling entries into controlled airspace. It's initially being piloted for six months, but NATS hopes it will prove successful and remain in use for the foreseeable future.

So why's it been introduced? Previously, pilots simply 'free-called' on the appropriate frequency, giving their flight details to ATC and requesting a transit clearance. But this meant that controllers had no prior knowledge of GA pilots wanting to transit into controlled airspace, and so had little opportunity to formulate a potential plan for such a crossing.

Now you can submit a prior notification, much the same as that given on radio calls, on the Airspace Users Portal (https://aup.nats.aero) at least 60 minutes before your intended crossing time allowing controllers to prepare for your arrival and enabling more efficient use of the airspace.

The online details required for each flight are much the same as when using the radio — callsign, aircraft type, point of departure, destination and the type of clearance required (IFR/VFR). The CTA/CTR(s) through which you want clearance can be selected, and an approximate ETA (+/- 15 minutes) for each request should be entered; requests for transits of multiple regions for a single flight can also be made.



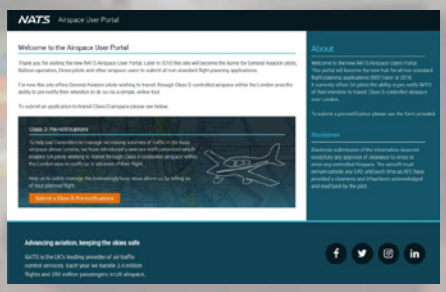
After submitting the form the information will be provided to the Air Traffic Control Unit(s) responsible and an email acknowledgement is sent to the user. It's worth noting, though, that submitting a form doesn't constitute any approval or clearance to cross or enter any controlled airspace. Once airborne pilots still have to request a transit of the airspace as normal, but the calls are more straightforward, something like: 'G-ABCD request transit, as filed' but you have to stay outside the airspace until ATC provides a clearance and it has been acknowledged and read back by you.

Initially, the new service will only available as an evaluation for the Class D airspace around London, but if successful it might be rolled out in other locations; at present it can be used for:

- *Stansted CTA/CTR*
- *Luton CTA/CTR*
- *London Heathrow CTR (outer)*
- *Gatwick CTA/CTR*
- *London City CTA/CTR*

The portal can be used for both IFR and VFR requests, and if you are planning to file a flightplan you're still encouraged to pre-notify.

To make things simple, if you file a transit request and then change your



plans and no longer want it you don't need to do anything, ATC will automatically discard the pre-notification if it isn't used.

The new online submission system, which is free, doesn't replace the old one, so you if you haven't filed you can still free-call as before by providing ATC with the details required by radio in flight.

Fundamentally, there's no real change from what has gone before, the new system simply means that instead of passing information in the air, it can be sent on the ground before take-off, reducing radio calls and enabling better planning by ATC benefitting everyone.

NATS says the online portal won't solve every transit issue and there will still be occasions when ATC will be unable to offer a clearance, but NATS believes it's a step in the right direction for airspace access and efficiency. So far the uptake of service has been good. 95% of pilots that pre-notified and called received their transit, and feedback has been very positive. If you'd like to read more about it, full details can be found in AIC Y 095/2017 ■

Andy Amor is a General Aviation Programme Coordinator with NATS.

So what is a safety pilot?

Ask that question in a clubroom or around an airfield and there are likely to be two or three genuine, but quite different answers, so here's the lowdown

To be fair and avoid confusion, it's worth acknowledging that to the average GA pilot the simple term 'safety pilot' might mean any one of three separate roles. Two of these neither expect, nor authorise, the accompanying so-called 'safety pilot' to fly the aircraft; the third, where a pilot has a medical restriction on their EASA medical certificate, certainly expects the safety pilot to take over flying the aircraft if necessary.

It's known as an 'Operational Safety Pilot Restriction' (abbreviated to 'OSL'), those flying as 'pilot in command' with such a medical annotation means they must have a 'qualified safety pilot' in an aircraft with duplicate controls.

The first of two examples, where a 'safety pilot' wouldn't be expected to touch the controls, has existed for many years and is often the first that comes to mind when the term is used. The scenario often involves a pilot wanting to practice 'instrument flying' in good visibility — assuming he or she meets the '90-day passenger' rule for the type or class of aircraft being flown.

There is no official logged role for the 'safety pilot' here other than 'supernumerary' and times do not count to official totals; they are merely a passenger. In this 'instrument practice' there's no prospect of the safety pilot taking over control, it's really more to do with providing 'eyes outside' and relevant verbal warnings while the pilot in command keeps their 'eyes inside'.

When it comes to a 'safety pilot' for instrument practice it's interesting to look at other countries – South Africa, for example, provides a succinct official definition of the role which has slightly more than the 'lookout' that a UK pilot would assume: "Safety pilot... means a pilot whose sole purpose during flight time is to maintain a visual lookout for threats to an aircraft during simulated instrument flight and to monitor the aircraft's engine ➤

How well set up is the cockpit for dual-control?

and navigation instruments to ensure exceedences do not occur."

The second possible meaning of 'safety pilot' in the UK that might be in use within a few syndicates came in relatively recently, and so isn't at the front of everyone's mind when 'safety pilots' are mentioned; it involves a UK modification of the standard '90-day passenger' rule, and only applies to non-EASA aircraft and licences.

Normally, a pilot needing to gain extra take-offs and landings in the class or type to take passengers would either 'top them up' to the three of each needed while flying alone or under dual training with an instructor. This recent UK-only amendment to national regulations was introduced to help pilots who would normally would not meet the 90-day passenger rule to legally make the flight with another (non-instructor) pilot alongside.

The so-called 'safety pilot' is one fully qualified to fly the aircraft themselves, but in this case, is not expected or authorised to take over control. There is no logging capacity for the 'safety pilot' in this case (other than a supernumerary record similar to a passenger flight, where times do not count into totals).

The third type of 'safety pilot' exists because of the 'OSL' restriction added to another pilot's medical, banning flight without another pilot. This is not an everyday common restriction and many pilots won't know it exists at all — which is where the danger lies, namely confusion with other roles colloquially known as 'safety pilots', should someone be asked to act as one.

An Operational Safety Pilot is very different role to the other two cases because the safety pilot must take control of the aircraft if medical circumstances require it. The UK CAA definition of a 'safety pilot' when it comes to the medical restriction is: "A safety pilot is a pilot who is current and qualified to act as Pilot In Command (PIC) on the class/type of aeroplane and carried on board the aeroplane for the purpose of taking over control should the person acting as the PIC become incapacitated."

Clearly the safety pilot has to briefed by the holder of the restricted medical of possible complications that could arise due to the condition, how to recognise any issues in good time, and the problems if control isn't passed to the safety pilot at the appropriate time. The concept of 'Threat & Error Management' analysis prior to a flight is clearly in play here, with relevant discussions on what should be a remote threat of the pilot with the 'OSL' restriction being unable to continue to fly or land the aircraft safely.

There are, though, many points the 'safety pilot' needs to consider.

Before even discussing the flight there are cockpit layout and licensing issues to consider; the aircraft must have dual controls, with each pilot ready to use their own set (similar to ab-intio training with an instructor) and the second pilot must be fully qualified, current and insured to fly the aircraft in the airspace, weather conditions, and all other relevant licensing aspects (e.g. IMC or Night, Differences Training, etc.). Basically, if, in theory, the 'safety pilot' could not make the whole flight as pilot in command with the other pilot as a passenger, he or she could not act as a 'safety pilot' for another pilot operating under the 'OSL' rules.

There are, though, many points the 'safety pilot' needs to consider. Although 'OSL' restrictions are not common, it can be on a medical certificate for so many different reasons it's impossible to cover each in detail in a simple article. Safety Pilots need to understand their personal role and responsibilities, but also enough about how symptoms of the pilot's problem present themselves, requiring roles to switch.

The pilot with the restriction should show the medical certificate as part of the briefing to ensure there's no doubt as to

Pilots under foggles need 'eyes outside'

Safety pilots can have a sub-role

Could you unload the brakes?

any additional requirements. For example, the medical problem might be 'permanent' such as a limb restriction and require special controls, and these need to be fitted. It's worth noting that even on normal dual-controlled training aircraft there is one control action that's not correctable by the other pilot or instructor even through physical strength, namely excessive unreleased pressure on the footbrakes. If this were even remotely possible due to the known medical condition, then clearly the pilot should not be expected to brake using normal foot controls.

Just as with any 'normal' flight with two qualified pilots, there is real benefit to discussing whether any sub-roles would be expected to be handled by the safety pilot for the whole flight to 'unload' the handling pilot; perhaps radio use, for example, or even something as simple as reading out checklists. However, clearly, in the 'OSL' situation, preflight discussions need to go much deeper and be based around the unlikely but genuine possibility of the 'safety pilot' needing to take control.

He or she needs to constantly monitor the flight and the pilot, and must know how any medical problem could manifest itself, how rapidly the detectable onset of the problem happens and, indeed, how to detect it.

As some parts of any flight — take-off, initial climb-out and the final part of the approach and landing — need a quicker

Two qualified pilots have each thought that the other was flying the aircraft

takeover of control than others, safety pilots need to be especially aware of the pilot's condition at these times, monitoring both the pilot, the aircraft and instruments for any issues; there needs to be a 'clean' pre-agreed rapid transfer of responsibilities and control if necessary, avoiding for example 'press-on-it is' in the latter stages of landing when a go-around would be preferable.

There also needs to be a way of ensuring both pilots know that the change of flying responsibilities has happened. Every UK-trained pilot should recognise "I have control, You have control" from their training days, and while this is adaptable to a safety pilot scenario, it's a tad more complicated than you might think.

Firstly, the difference is that while training there is never a 'switch' in roles from passenger to pilot, the instructor is clearly pilot in command, in charge, and fully responsible for decisions at all times and therefore, there is never any (need for) debate in flight.

Secondly, the onset of the medical condition might prevent the pilot from saying or responding to the standard words. Depending on the medical condition and how it might manifest, a clear and rapid way of transferring control needs to be established before flying, if both pilots think they have control it can only lead to major problems. If possible, whichever pilot is not flying the aircraft should keep their hands and feet well away from the controls to emphasise the point. There have also been incidents in the past, not necessarily involving medical conditions, where two qualified pilots have each thought the other was flying the aircraft. Both pilots, or neither, flying is clearly a recipe for problems…

The 'OSL' restriction allows people to enjoy flying for longer, and is something any one of us might face one day if our health diminishes to the point where flying is still thought safe if accompanied by a good 'safety pilot', so we owe it to our potentially future selves to understand fully the responsibilities of the role if asked to perform it.

Relevant Threat & Error management discussions including 'why, when and how' the Operational Safety Pilot would take control of the aircraft if needed should ensure the safety data never makes anyone regret the inclusion of 'OSL' as a possibility for pilots with certain medical conditions.

So there you have it, the roles of a 'safety pilot'.

Seat of the pants? Maybe not...

It's not just your eyes that can fool you, other forces are waiting to deceive the unwary — it's all down to spatial disorientation

Take-off in the Piper Saratoga that summer evening was scheduled for 6pm but one of the two passengers for the flight had been delayed and they didn't depart until 8.30pm. By this time the sun had set and the light was fading; there was, however, still some daylight but the atmospheric conditions were hazy.

The flight involved a transit to the coast and the pilot might have elected to follow the gently curving coastline. Instead, he chose to take the more direct route 30 miles over the sea and out of sight of land. The haze, the grey sea and the failing light combined to obscure any clear horizon – conditions that called for an ability to make good use of flight instruments even if visual flight rules still applied.

The Saratoga was still several miles

from landfall when the pilot appeared to become increasingly uncertain about the aircraft's roll attitude; the haze and gloom had deprived him of any useful external horizon. He had received a few hours of instrument training but was not IMC rated. The Saratoga began to descend. It entered a prolonged turn, first to the left then to the right. In the turn the descent rate rapidly increased and the aircraft flew into the sea with an estimated 30° nose down and 125° of bank. There were no survivors.

The pilot had, as you've probably already worked out, become disorientated. While there were several errors and misjudgements that led up to the tragedy, the final event was an increasing overbank leading to a spiral dive and rapid descent – the so called graveyard spiral.

If you have never experienced this it might come as a surprise to learn that despite the increasingly abnormal attitude of the aircraft, the pilot is likely to have continued to feel that the wings were level and there would have been no sense of the rotation or nose down attitude that a spiral dive might lead one to expect.

This is as much the result of the deceptiveness of the force environment of the aircraft as any limitation of the pilot's senses. A pilot manoeuvring in cloud at night who inadvertently allowed his aircraft to get into a similar attitude was only alerted to his predicament and able to recover by seeing street lights through the window in the cockpit roof…

You might know the well worn dictum in aviation — 'you cannot fly an aircraft by the seat of the pants' — in the absence of external visual information or the correct interpretation of attitude instruments, the feel of the aircraft will deceive you. More than likely it will falsely reassure you.

THE VISUAL ENVIRONMENT

On the ground we derive a sense of orientation from the earth-fixed world that surrounds us. The visual scene normally provides a wealth of sensory information to keep us orientated; there is much redundancy. From the moment an aircraft leaves the ground there is a gradual reduction in the visual detail. The earthbound world becomes increasingly remote and the pilot is more and more dependent on a clear visual horizon to maintain the desired attitude.

Problems arise when the true horizon is obscured by haze. Likewise, flying over snow or a grey sea, the terrain can merge with an overcast sky leaving no clear horizon. Worse, the visual scene can create false horizons such as a low cloudbank, or, at night, lines of light from street lights or a lit coastline. If the aircraft is aligned with such an oblique horizon, the pilot cannot rely on the feel of the aircraft to indicate the inappropriate roll attitude.

THE FORCE ENVIRONMENT

For most of the time an aircraft will tend to feel level whatever its actual attitude. With one wing low an aircraft will begin to turn. Every airline passenger can confirm that when the aircraft is in a banked turn everything feels level – the coffee cups stay

Figure 1 The environmental and some of pilot-related factors that can lead to disorientation in flight.

'The additional thrust will give a feeling of increased nose-up attitude'

put and people walk up and down the aisle as if the aircraft were in level flight.

Likewise an aircraft that becomes nose up or nose down will, if there is no change in the power setting, continue to feel level on account of the deceleration or acceleration generated by this change of attitude.

In contrast, if a pilot chooses to increase airspeed in level flight, the additional thrust will give him/her a sensation of an increased nose-up attitude. In the absence of a clear visual reference, the response may be to push forward on the control column. However, the pilot will not feel as though this action has had the effect of ➤

lowering the nose even though it has. The result may be an increasingly inappropriate control action leading to an excessive nose down attitude, sometimes with fatal consequences.

Although a banked aircraft can feel level, a pilot can develop a sensation of flying with one wing low despite the attitude indicator showing straight and level flight — 'the leans'. It's a frequent experience for instrument trained pilots manoeuvring in IMC. Occasionally, the sensation can be powerful enough to cause the pilot to mistrust the instruments and it might continue to distract the pilot until there is a clear view of the ground.

Figure 2, below, shows the, so-called, four forces of flight. Newton's third law states that all forces occur in equal and opposite pairs. Weight is the downward counterpart generated by the upward lift force on the wings, an increase in lift causes an apparent increase in weight.

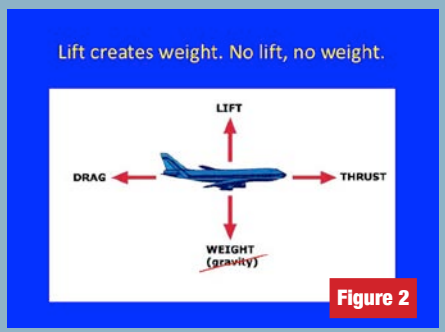


Figure 2

In flight, weight is not gravity. Too many pilots have died assuming that it is. The lift on the wings gives the pilot a sense of weight and this force feels the same as the effect of gravity when sitting stationary in a chair. But this force isn't gravity, gravity involves a force directed towards the centre of the earth and which is constant for any given mass.

The weight vector that results from aerodynamic lift on the wings is neither of these things. Both its intensity and its direction are under the control of the pilot. He/she uses the lift force not only to maintain altitude but also to manoeuvre the aircraft. Fore and aft movement of the control column will alter its intensity and a change in the aircraft attitude its direction. Pilots die by assuming that the force they feel is the result of gravity, and therefore earth vertical, when it is not.

DISTRACTION

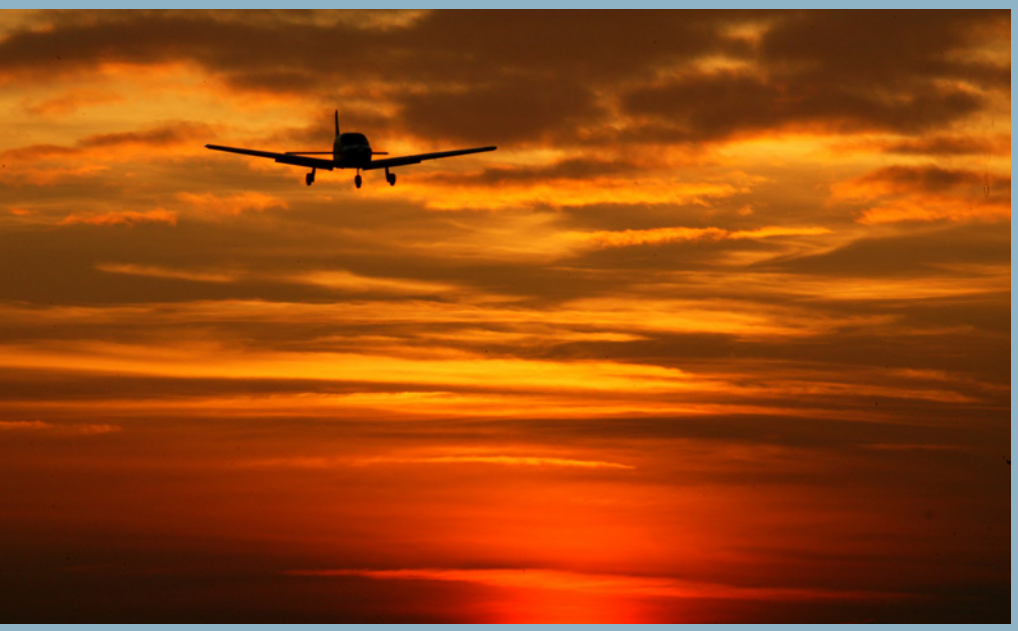
A fully instrument rated helicopter pilot encountered worsening weather over Dartmoor and decided to divert. He pulled up into cloud and started to make radio calls to his revised destination to inform them of his change of plan. The next thing he noticed, as he described it, was that the cockpit turned green; he had broken cloud and was heading down towards green fields. He was fortunate to have sufficient height to recover and continued, somewhat chastened, to his destination.

As he reflected, he could well have instructed his co-pilot to make the RT call, leaving him to concentrate on flying the aircraft. There would have been nothing about the feel of the aircraft that would have alerted him to his nose-down descent.

INEXPERIENCE

Flying the aircraft on instruments involves a considerable increase in workload and inexperienced pilots whose visual flying is approaching the limit of their capacity may be overwhelmed by the requirement for instrument flight if the aircraft inadvertently enters cloud.

What's more, if a pilot has been attempting to fly on external vision in deteriorating conditions, in the time between switching from the view outside to the instruments the aircraft might have departed from straight and level flight. The consequence of this is that the first glance at the artificial horizon might show an



attitude that doesn't conform to the pilot's current perception.

The interpretation of a conventional 'moving horizon' attitude indicator is not intuitive. In cloud, the mountings of the attitude ball appear fixed, as does the interior of the cockpit, and the attitude ball shows a horizon that appears to move with changes in roll or pitch attitude of the aircraft. Horizons don't move, but that is the perception.

When an unintended roll attitude becomes evident on instruments, the surprise might give rise to an impulsive reaction that leads the pilot to do the opposite of what is required – the roll reversal error. This error was responsible for an accident involving a 737 aircraft on the climb out at night from Sharm el Sheikh. The pilot, attempting to correct for an unanticipated 30 degree angle of bank, added a further 30 degrees of bank in the same direction with fatal consequences.

An impulsive response to an apparently abnormal aircraft attitude was the prelude to a cargo aircraft about to start its descent at night into an airport in northern Sweden. A fault in the inertial navigation system had given the handling pilot a false indication of the aircraft being 30 degrees nose up, though there was no indication of any change in the aircraft altitude or airspeed.

The abrupt stick forward action of the pilot bunted the aircraft to a state of weightlessness and objects started to float free in the cockpit. The co-pilot was so unnerved by the event that despite having fully functioning instruments on his side of the cockpit he was never able to assist the captain or take control and restore level flight. Within a minute the aircraft lost 30,000ft in altitude and crashed. There is seldom a crisis in the air that does not benefit from a few seconds delay to fully take stock of the situation before responding to it.

This accident should not encourage pilots to disbelieve their instruments. They will almost always be correct when the pilot is wrong. Believe your instruments and stick with them until there is an unambiguous view of the outside world. But note the plural – 'instruments'. The accident pilot had become fixated on the one faulty instrument, struggling to make it read correctly, to the exclusion of the many other sources of correct information.

THE URGE TO PRESS ON

Many light aircraft pilots will have experienced the following scenario:

It had been a good (alcohol-free) lunch following a land-away in northern France and it was time to make the return journey. As the English coastline appeared, so did the low cloud. 'Am I going to make it back to base, or should I divert? That will be awkward, the aircraft will be in the wrong place, my car will still be at base and I have another engagement this evening. Must press on. I know the visual flight rules, but it might just be okay.'

A pilot employed to fly a privately owned helicopter can find himself under a different pressure to press on. If the boss demands that we fly, it is not always easy to refuse to take off because of the weather.

It was this scenario that contributed to a fatal crash near Ipswich in 2014. The owner was late in arriving for the flight and fog and low cloud were increasing. Almost immediately after take-off the aircraft was enveloped in cloud. It remained airborne for less than a minute before it emerged from cloud in a nose down attitude and impacted the ground, killing all aboard.

Though the final event in any accident may involve disorientation, there is almost always a preceding sequence of errors or misjudgements. Recognising and breaking that chain can prevent a fatal outcome.

FURTHER ADVICE

- **Know your limitations; test them with caution**
- **The feel of the aircraft won't tell you what it is doing**
- **Trust your instruments; you will need an exceptionally good reason not to do so**
- **Anticipate loss of external vision by early transfer to instruments**
- **First fly the aircraft; distraction can lead to unrecognised disorientation**
- **Maintain logical thinking; avoid an impulsive control response to an unexpected attitude error**
- **Remain physically fit**
- **Beware fatigue**
- **Alcohol and flying don't mix**
- **Do not fly if you cannot leave your worries behind**

Dr Rollin Stott, MA MBBChir MRCP DAvMed, qualified in medicine from Cambridge University and studied engineering applied to medicine at Imperial College. After a variety of hospital appointments he joined the RAF Institute of Aviation Medicine working on the effects of motion on man, in particular, spatial disorientation in flight, airsickness in trainee aircrew, and the effects of whole body vibration. He has written many papers and is a contributing author on these subjects for the textbook 'Ernsting's Aviation Medicine'. He currently works as a trusted expert for QinetiQ plc and is an Honorary Senior Lecturer at King's College London. He has been a CAA Aeromedical Examiner since 1990.

Show stoppers

It's not just your day that busting summer airspace can ruin…

With the flying weather finally in full swing after a poor winter and spring, it's easy to forget that with the long summer days there are more potential airspace pitfalls than ever at this time in the sky.

Every year pilots infringe Temporary Restricted Airspace (RATs) set up to protect events such as festivals, shows, races and air displays — sometimes to their great cost. Take the case this March when a pilot admitted flying into the display airspace for last August's Eastbourne International Air Show: he said he had failed to check the NOTAMS properly and was fined £1,500 plus £500 costs and a victim charge of £150 by Brighton magistrates.

SIMPLE CHECKS

While most people who fly regularly have a pretty good idea of the 'usual' airspace to watch out for on their flights, temporary zones can crop up almost anywhere, sometimes in the least expected places such as the Little Snoring village fête which has managed to wangle a flypast by the Battle of Britain Memorial Flight. So, what can — and should — you do to avoid any surprise infringements?

First, checking the NOTAMS on the NATS website is crucial every time before you set off, even for a short flight over well-trodden (perhaps that should be flown..) ground to check for any new warnings that might have just cropped up. In addition, using a tablet or phone with commercially available apps can make checking, and flying, safe and easy, but ensure you get the current NOTAMS on the day of the flight rather than using a stored previous version.

Don't forget that tablet-based equipment can shut down in the event of an overheat so be aware that you could lose all flight data including the chart at anytime in a hot cockpit, so have a paper chart readily available. Of course, you can simply use the AIS phone line (0808 535 4802) for last-minute checking; it doesn't take long and calls are free. If RA(T)s are close to your route mark them on the chart as well as your device and on your log.

But just checking the NOTAMS isn't necessarily all there is to avoiding an airspace bust this summer. There are other underlying causes to be aware of:

- *Inadequate preflight planning*
- *Lack of airspace knowledge*
- *Lack of navigational competence*
- *Incorrect or inappropriate altimeter setting*
- *Lack of R/T proficiency or understanding*

Running through all these causes and driving them are the human factors of *Complacency, Distraction, Task saturation, Loss of situational awareness.*

The depth of preflight planning for each flight will vary depending on how familiar you are with the route, but some things must be done every time. So, draw the route on a chart (paper or electronic) and note where any airspace threats are, both laterally and vertically, and when you will arrive at those points. Note the radio frequencies of the airspace concerned and any frequency monitoring codes you might need (listening squawk codes).

Pick clearly identifiable features en route to check your progress, and if you're using a hand-held device think carefully about the map scale you are using; if it's too detailed you could arrive at notified airspace with too little warning.

Also decide how you will make sure you are using the same QNH as the controlled airspace you wish to under fly or transit. Inadvertent use of The Regional Pressure Setting (RPS) will result in you flying higher than if you are using the QNH in use by the ATC unit controlling the Class D CTA you want to under fly possibly resulting in a vertical infringement. Do be certain that your transponder is displaying your altitude/level particularly if you are not communicating with the ATC unit. Check your transponder is accurate, and squawking the correct code, and if you are using an FMC, ensure that the correct channel has been selected on the VHF radio.

STRATEGIES THAT WORK

Human factors can be more difficult to manage. Complacency is best overcome by self-discipline, using a checklist that works for you and following it. Saying things out loud can also be a surprisingly effective barrier to complacency… "airspace, Class D 4 miles to the west base 1500 on QNH 1020." It brings the specific details to the front of your mind more effectively than just thinking 'airspace over there'.

Distraction and task saturation can be managed in a similar way, by talking out loud to rationalise what the situation is and to keep you concentrating on the important stuff. A good log with a sequence of what will happen and when is very effective.

Most of the strategies to avoid infringements can be prepared on the ground, keeping task saturation and distraction at bay and it's a good way to maintain situational awareness.

If you do find you're not sure of where you are then avoid making a bad situation worse and contact Distress & Diversion on 121.5 and they'll sort you out.

Remember, it's not only the potential cost to you of an infringement — GA also gets a bad name among the public if a summer air display or show (particularly the Red Arrows) is cancelled because someone has blindly wandered into their temporarily restricted airspace.

WORDS MICHAEL BENSON, REGIONAL SAFETY OFFICER WEST, GASCO; PHOTOGRAPH: CROWN COPYRIGHT

Looking, but

Everyone checks their aircraft before flight, but just what do you actually see?

How many times have you checked over the aircraft at the start of the day or flight and thought — did I really check I that? A recent conversation went like this: "I looked at the exhaust manifold as I always do, but I simply didn't see the crack."

It's a common fault summed up well by human behaviour author Joe Navarro who characterises it like this: 'The problem is that most people spend their lives looking... but not truly seeing…'

According to the dictionary, the difference between the two is: 'looking means to direct your eyes in a particular direction, but to see you must notice or become aware of someone or something by using your eyes'. The psychology behind looking but not actually seeing is well-known.

As well as the exhaust shown below centre, the following pictures are just some of the defects found on aircraft, some might have been easy to spot with a quick look, but others really needed the pilot to be 'seeing' what he or she was looking at…

Picture 1 shows a failed Rotax 912 carburettor attachment fitting. The metal attaching plate is, or at least should be, bonded onto the formed rubber sleeve that attaches the carburettor; as evidenced from the corrosion on the metal plate, this fitting has been failed for some time. This type of failure has occurred before on 912 engine installations and Rotax have had several goes at improving the component over the years.

After checking just about everything else, a broken exhaust (Picture 2) was found to be the cause of a severe low rpm engine vibration on a Cessna 172. The left can supplies the carburettor heat on this installation and although heat was available its effectiveness could not be determined. Towards the later stages of failure it was evident that carbon monoxide contamination was a potential safety threat.

Of course, the complete engine installation on a 172, as with many aircraft these days, is difficult to inspect fully during a pre-flight inspection, so it's essential every now and then to take the cowls off so that early signs of this type of failure can be spotted and problems rectified before they become life-threatening.

When it's pointed out, you can see why the undercarriage bungee failed in Picture 3 – essentially it's a one-piece bungee with loops at each end to be secured to the lugs. The edge of the ferrule slowly cut its way through the adjacent bungee wrap and you can just see the 3/32in safety cable which, in this bungee failure, failed to keep the aircraft upright.

Here's an unusual picture (4). This tar-like substance was, after rather a lot of persuading, removed from the crankcase breather bottle of a Jabiru SK. It was clear that this bottle hadn't been cleaned out for quite some time and this lack of maintenance ended up with the pilot force-landing into a field.

Picture 1

Picture 2

not seeing


Picture 3


Picture 4


Picture 5


Picture 6


Picture 7

Guess what Picture 5 shows. No, it's not a petri dish full of the latest horror bug, though it does rather look as if it might be. The debris was found in a fuel funnel filter' after a recent re-fuel. The fuel system would have been compromised had this muck found its way into the tank. After finding the debris the pilot decided to check-out where it came from and, after a bit of detective work, he established that it was the remains of the glue from duct tape used to connect an extension to his fuel delivery pipe.

The oil filters in Picture (6) show a 'good' one (on the right) and a 'bad' one (left). The Jabiru J400 it came from became covered with oil during a post-maintenance ground run because the filter wasn't sealing correctly. Initially it was thought that the threads had been cut at an incorrect angle and the filter wasn't seating as it should but, on further inspection, it was discovered that the flange which connects the base to the bowl was faulty.

It's not just seeing that can alert you to issues, hearing plays its part too. The tailplane of an MCR 01 Banbi was removed to investigate why it sounded 'rattly' while manoeuvring it in the hangar.

The close-up (Picture 7) shows a failed port tailplane attachment bracket. Not only was the security of the tailplane attachment compromised, there was also a strong possibility that if the aircraft had been flown the tailplane could have fluttered at normal airspeeds, potentially leading to the loss of the tailplane.

Another carburettor issue featured on this Tecnam P92 Echo, powered by a Jabiru 2200, which suffered a failure of the attachment rubber. A hole in the rubber like this (Picture 8) is very difficult to spot without removing the rubber itself. Because of the reduced manifold pressure at this point in the induction system, fresh air can enter the manifold through the hole, weakening the mixture and causing loss of power and, under some

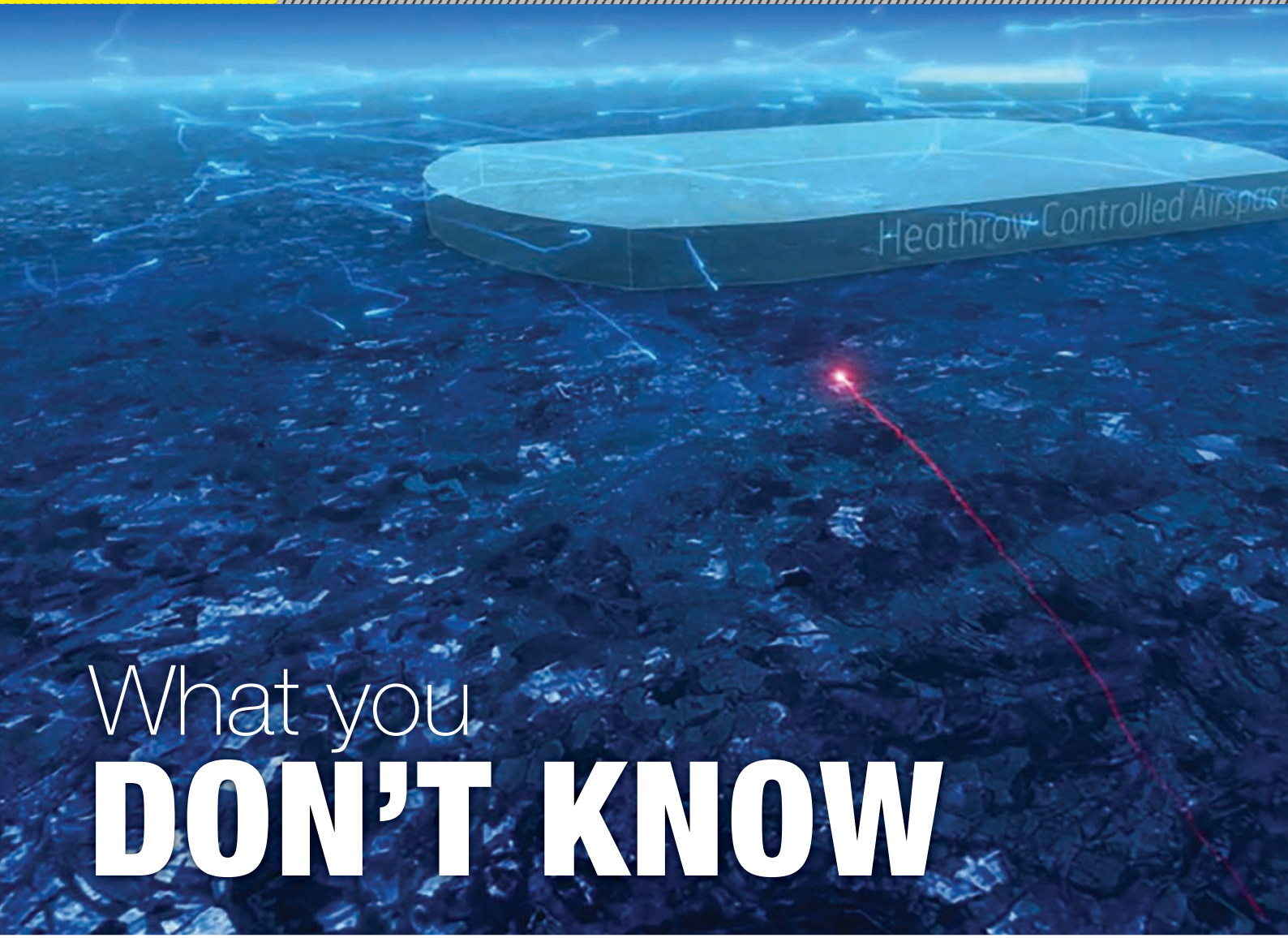

Picture 7

circumstances, higher than normal running temperatures.

Had this been on a two-stroke engine it would probably have caused an engine seizure. A tell-tale symptom for this kind of problem that's worth remembering is an increased idle rpm.

So next time you're checking things out, perhaps it's worth thinking, 'am I really seeing (and hearing) what I'm looking at'?

Thanks to Malcolm McBride, Airworthiness Engineer for the LAA, for his help with producing this article.



What you DON'T KNOW

Ever wondered what happens if you're 'invited' to attend the new Airspace Awareness course after an airspace bust? We went along to find out

I don't know about you, but I've always thought that Speed Awareness courses were a good idea if you got tugged by the police for being over the speed limit — after all, who wants to end up in front of the beak with all the hassle and costs that incurs for a small infraction of the law?

So it's always seemed a bit odd when it comes to flying that some inadvertent airspace busts potentially faced a fine and hefty court costs. There had to be a better way.

Since last August the CAA has approved a 'Airspace Infringements Awareness' course run by GASCo (the General Aviation Safety Council) which some pilots who have infringed controlled airspace could be asked to undertake as part of any licensing action rather than simply being placed at the mercy of M'Lud. To find out what they're like we went to the Chartridge Lodge, a hotel and conference centre near Chesham (rather appropriately, BOAC's training centre in the Sixties), on a very wet March Saturday morning where a group of 12 pilots had been brought together to 'fess up and, hopefully, learn from their experience.

As you'd expect this is a delicate matter — few of them want to be there, most are mortified that they are and one or two, if we're honest, are a tad aggrieved at having to attend; having listened to some of their accounts it's easy to understand why.

One pilot for example was preparing to land at an airfield and had to widen his circuit for traffic reasons and unwittingly infringed another Aerodrome Traffic Zone next door. Another pilot, not on this particular course, was flying the Manchester Low Level Route in contact with Manchester but, due to a line of thunderstorms, had routed slightly further east than planned and inadvertently infringed Barton's ATZ without even realising it.

So with those sort of thoughts and emotions in mind, the whole course structure has been set up with an easy, laid-back approach, though there's a touch of steel in the velvet glove right from the outset — you can't be late for the 10am start apart from force majeure (an M25 closure was an acceptable on this particular day…), you have to engage with the course rather than simply sitting back with your arms folded, watching the clock and waiting for going-home time (3.15pm on this day, since you ask).

From the outset there's no big telling off, quite the reverse in fact as Michael Benson — who has paired up with Keith Thomas as tutors for the day — points out, no one in the room has bust airspace intentionally (they'd be more likely to be explaining themselves to the bench in court if they had), they simply want to understand where the gaps might be in the attending pilots' knowledge and set about filling the holes.

So the approach is friendly rather than sermonising: "We don't want to go into what happened in your cases, today is about learning and perhaps finding out what you don't know you don't know," says Michael. "We're here to listen."

That latter point is fundamental to the course because it's so important to understand people's lack of knowledge, or perhaps simply remind them of things they might have forgotten over years of flying: "We all forget things," says Michael, "I know I do."

At work in groups

So, how good was the planning?

Reassuringly for those in the room (think hotel business seminar with tables and chairs in a semi-circle, a projector, sweets on the tables and bottled water) there's no 'pass' or 'fail' as such at the end of the day, but there are rules: in addition to being on time, you have to attend all of the day's sessions, complete the relevant exercises, make 'a positive contribution' and 'demonstrate a willingness to improve airspace management skills'. Essentially, if you don't join in and engage, further action could be taken.

As the morning rolls on, there's a lot of talk about general issues with airspace, aided by videos and charts. Surprisingly, as it turns out, one big issue is that pilots (and not necessarily those on the course…) still aren't even aware that flying through an airfield's Aerodrome Traffic Zone is an infringement that can land them in trouble.

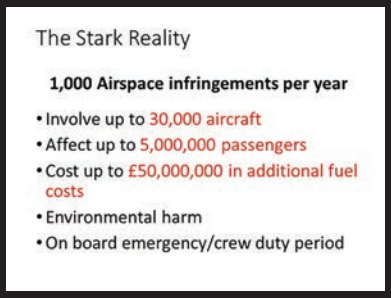
Other threats, are pointed out, too; for example, flying over, or through, a gliding or other flying site that doesn't have an ATZ ➤

THE COURSE

The CAA recommends, where appropriate, that pilots who have infringed controlled or notified airspace undertake these courses as part of any licensing action.

Each case is assessed individually based on the incident, the pilot's actions and whether the pilot has previously been involved in airspace infringements. Turning off the transponder and diving for the deck if you realise you've infringed is more likely to put you in court.

The courses, organised by GASCo, cost £200 to cover expenses (including lunch) and are held around the country; infringing pilots are given a date by which they must complete one to avoid further action.



Seeing airspace like this makes you think

isn't an infringement as such, but a pilot could still be prosecuted for 'endangering the safety of an aircraft' which can carry a heavy penalty.

While it's tempting to think that to some a 'minor' incursion on the edge of, say, Heathrow's CTR might be thought of as 'no real harm, no real foul', it's shown in a revealing video interview with a controller just what even a minor incursion there actually means.

Because an unknown infringing aircraft's intentions are unknown and it could make unpredictable manoeuvers, the second it crosses into the zone NATS' computers automatically highlight it with a purple 'bubble' and controllers have to manoeuvre other aircraft to avoid the bubble laterally by 5nm or vertically by 5,000ft, making a large portion of controlled airspace effectively unusable.

This means aircraft having to make avoidance manoeuvers and airports possibly ceasing operations while the infringement is sorted out. Not only that, the knock-on effects can be massive; some aircraft might not have much fuel remaining before they are into their reserves which means diverting "because they can't afford to hang around hoping for the situation to be resolved". On top of that, "What," asks Michael, "would happen then if a passenger fell ill or had a heart attack while in an unscheduled hold caused by an infringement?" It's a sobering thought.

Another airspace infringement surprise comes in the form of Hawarden (near Chester). It was infringed 71 times in three months since the beginning of April last year when it became the UK's first permanent RMZ (Radio Mandatory Zone) but many pilots still don't know about it which, it's pointed out, could be down to them flying with old charts.

As the day progresses multi-choice questions go up on the screen at various times covering different topics, either to establish people's knowledge (what they don't know…) or to see what they've absorbed through the day. It's all done with good humour using an anonymous Ombea electronic voting system that puts up the results onscreen so that everyone can see how much others in the group know, or don't know, without any finger-pointing.

Asked what the causes of infringements are produces an interesting response from the group: first comes distraction, followed by kit malfunction, traffic/airspace knowledge, misunderstanding and finally not keeping on top of up-to-date information. One attendee, for example, didn't know that there's an AIS (Aeronautical Information Service) phone line (08085 354802) to get the latest information on specific NOTAM, including RA(T)s (Restricted Areas Temporary), airspace upgrades and emergency restrictions of flying).

Another interesting point that comes out is transponders outputting incorrect height info, so it's well worth checking them. You'd think that flying 400ft below controlled airspace would be safe enough, but one pilot (not in this group) was thought to have infringed vertically because his transponder had a 450ft error which placed him in controlled airspace, and he didn't even know it.

By lunchtime tensions had eased considerably and people talked much more freely, perhaps because they were surprised to learn there really were things they didn't know or had, perhaps, simply forgotten over their years in the air.

During the afternoon there's much more of a 'workshop feel' to the day with quizzes and exercises (planning a flight and having it critiqued by their peers was interesting to watch…) and some humour, too — to underline distraction, one of the main causes of airspace busts, a video The Monkey Business Illusion was shown which surprised a number of people — if you've never seen it, you can find it on YouTube.

Finally as the day draws to a close, it's clear that most, if not all, have gained an understanding of some things they didn't know and the knowledge to help fill those gaps — the atmosphere is a more relaxed as completion certificates are handed out.

There's no doubt that few pilots want to be 'invited' to attend these courses, but the reality certainly on this day was far better and more enjoyable for most than expected. If you've got to be pulled up for something, there are worse ways to spend a day. ■

THE TUTORS

Michael Benson is GASCo's Regional Safety Officer West. He gained his PPL in 1968 and has continued to fly mostly SEPs ever since. Having started training in Terriers, seen the arrival of Pipers and Cessnas, and the emergence of microlights, his favourite aircraft is the Tiger Moth and he flies a Robin out of Exeter.

Keith Thomas is GASCo's Regional Safety Officer Eastern England. He first learnt to fly in gliders then completed Basic Flying Training at RAFC Cranwell on the JP3 & 5 before volunteering for rotary advanced training on Sioux and Whirlwind helicopters. This was followed by the Wessex OCU at RAF Shawbury and posting to 72 Sqn on the Wessex. This was followed by 10 more tours of duty and then a career with the CAA. He has held an ATPL(H) with Instructor, Examiner & Display pilot ratings, a CPL(A) with Instructor rating, a PPL Balloons & a FAA Seaplane rating.

Carb ice?

Given that it's summer, you might think that carb icing isn't going to be a problem – but you'd be wrong

Strangely, the most likely days for carb icing aren't in the winter as many people might expect, but tend to come in the warmer months of the year.

That's not to say it can't happen at any time, but with the amount of potential water vapour held in clear air being related directly to temperature, and carburettors being capable of reducing temperatures internally by well over 20°C, the most likely days for rapid carburettor icing in clear air are the warmer ones because in the UK's climate there will often be more water mass available to freeze out from any given volume of clear air.

Judging by the large number of successful flights in the UK using engines with carburettors we have shown that we can cope, but still the accident reports come in. Perhaps more dangerous than a total engine failure is the insidious problem of reduced power, especially while still at low level on the climb-out.

Engine failures happen too in the cruise, or a reduced power descent, often through a more rapid build up of carb ice than normal. This might come about due to local or widespread atmospheric conditions combined with the engine handling by the pilot.

The key to reducing carburettor icing incidents is to improve weaker areas of engine handling, perhaps through discussions with instructors either during initial or biennial training sessions, on improved engine handling.

EARLY DETECTION

Ice can be detected (and dealt with) by efficient checks long before late symptoms such as a rough-running engine. Applying the carburettor heat and watching the RPM drop (assuming a fixed-pitch propeller) is a check often carried out, but far too many pilots believe the RPM drop itself combined with a rough running engine is what they are looking for to detect ice. Such a situation indicates ice has been allowed to develop for far too long already.

The key to detecting ice early is to look for any subsequent rise in RPM after an initial drop, either dynamically during warm air application, or by comparing values before and after the process. Even a small rise in RPM indicates the ice build up has started, and that's the time to apply more heat to remove it all. Many pilots never look for the RPM rise, and miss the opportunity to recognise high risk icing conditions early and the need to reduce the time interval between checks significantly.

ICE BUILD-UP

As pointed out in the intro, with the amount of potential water vapour held in clear air being related directly to temperature, the most likely days for rapid carburettor icing in clear air are the warmer ones, because of the UK's climate.

The closer the outside air temperature is to its dewpoint, (and therefore the closer the relative humidity is to 100%), the easier it is for a carburettor to form ice rapidly, so care needs to be taken for example near the cloudbase itself, where by definition, temperature must equal dewpoint.

Although cold air cannot hold as much water vapour as warm air per given volume, a rapid ice build up can happen still happen, for example, after taxying across grass on cool mornings, the dew being stirred up as minute droplets into the atmosphere near ground level, perhaps more easily thought of as a form of super-saturation.

So after crossing wet or damp grass to line up, further ice removal should be attempted before take-off, and the attitude, speed, and power monitored carefully during the climb-out for any differences from normal.

Yet it only takes less than a second to apply carburettor heat

ENGINE FAILURE

Asked what they would do when an engine failure occurs, some pilots would rightly say 'control the aircraft, adjust the attitude for best glide, then trim', and sometime later include 'restart checks'.

Observing many pilots in practice engine failures, one hand adjusts the attitude, the other the trim control. Trimming can take a reasonable time because it requires the aircraft to be stable at the required speed, yet it takes less than a second to apply carburettor heat, so it would make sense for the carburettor heat to be applied before the hand moves to the trimmer. It is probably the only 'restart check' that has a time dependency for it to work.

For more on the subject there is a CAA Safety Sense Leaflet on Piston Engine Icing (No. 14), see ***www.caa.co.uk/safetysense*** *revised as recently as this year.*

PHOTOS BY KEITH WILSON/SFB PHOTOGRAPHIC - File images for illustrative purposes only

Pitch trim warning

EV-97 TEAMEUROSTAR UK
NR BUILTH WELLS
18 SEPTEMBER 2016

Pilots are being warned of a potential hazard following a double fatality after a left wing failure on an EV-97 Eurostar.

The pilot had arranged to fly from Arclid Airfield, Cheshire, to Swansea which should have taken around 80 minutes. Radar data later showed that the altitude during the flight varied but remained above 2,000ft amsl until the accident.

At 1045 hrs the Eurostar, which had been flown generally straight and level, started a descent followed by a climbing turn to the right, and then a climbing turn to the left, before turning right onto a course to intercept the original track between Arclid and Swansea.

At 1053 hrs, it started manoeuvring again, turning, descending and climbing before levelling off at 4,100ft. Three minutes later, it descended again, levelled at 2,400ft and then after half a minute started to climb again. Witnesses walking along a track half a mile to the east of the accident site in a field near Builth Wells said the Eurostar had flown over them in a normal level, or slightly climbing, attitude.

After it had passed they walked back down the track and one noticed that it now appeared to be in a vertical, climbing attitude. After glancing away, the person looked again and saw it nose-down and rotating in a spiralling descent.

As she watched she noticed that one wing had apparently 'turned' and was pointing towards the tail. The wreckage was found, about 360 metres from the last recorded radar return resting in its initial impact crater, indicating a high vertical speed and low forward speed on impact.

No pre-existing material defect, or significant design issue, was found. The left wing failure was therefore probably due to a high aerodynamic load in excess of the 4g limit, probably closer to and possibly exceeding 6g. It is most likely to have occurred as a result of an attempted recovery from an inadvertent manoeuvre inducing the structural overload. The weight of the aircraft at the time of the accident was probably between 471 and 496kg, at least 21kg above Max Take-Off Weight.

The cause of the manoeuvre couldn't be identified, but the AAIB has made a Safety Recommendation relating to the pitch trim mechanism, pointing out that there might have been an inadvertent trim operation because there is a potential for the pitch trim lever to be moved rapidly full-range by accident. The elevator trim tab was operated via a 'Bowden-type' cable and a lever between the seats, pushing it forward provides nose-down trim pulling it aft gave nose-up trim.

On the EV-97, the pitch trim lever friction is not adjustable in flight. It can only be adjusted during maintenance by tightening a nut beneath the floor. According to the maintenance manual the nut should be adjusted to ensure a minimum 1.0 kgf force is required at the lever's end to move it. Its position between the seats has resulted in occasions of inadvertent movement.

Other possible reasons for the manoeuvre include an event within the aircraft taking the pilot by surprise, a medical issue — blood tests indicated that carbon monoxide toxicity was not a factor — or incapacitation of either pilot or passenger, or avoiding a potential collision with an object or bird.

The AAIB recommended that "The Civil Aviation Authority require the Light Aircraft Association, the British Microlight Aircraft Association, Light Sport Aviation Ltd and Evektor to conduct a joint review of the design and location of the pitch trim mechanism on the EV-97 Teameurostar UK, and the amateur-built EV-97 Eurostar, to identify whether modification is required to prevent inadvertent, improper or abrupt input."

FOR FURTHER INFORMATION ON INCIDENT REPORTS, VISIT *AAIB.GOV.UK*

When trees are the only option

IKARUS C42
NR CASTLEWELLAN
29 MAY 2017

A pilot who had gained his NPPL a month before was planning a flight with a passenger around the Mourne Mountains, but the cloudbase was about 1,100 to 1,200ft above the Kernan microlight strip near Tandragee, Co Armagh, and an instructor advised him to stay in 'the local area'.

The pilot headed south towards Newry and said the cloudbase was just above 1,000ft approaching Warren Point, which is almost at sea-level, and he continued on to fly around the south of the mountains.

As he flew back, however, the ground rose and cloud lowered, reducing visibility and he decided to land in a field. He knew the C42 could be landed in a short distance and was prepared to trailer the aircraft back if the field was too small for take-off. He couldn't, however, spot a field and instead landed in trees on the top of a hill. The C42 was badly damaged, but he and his passenger were unhurt.

The accident happened about 1.5 nm north-west of Castlewellan where the terrain rises to 750ft and the pilot said he was caught out due to inexperience by the rising terrain and lowering cloud.

When the instructor had advised him to stay in the local area he thought this included Newry, 13nm south of Kernan. He didn't think he was doing anything risky by going beyond this distance because when he reached Newry the cloudbase was still above 1,000ft.

Another instructor at Kernan was asked how they would interpret the term 'local area' and they said about 4 to 5 nm from the airfield. The instructor who advised the pilot before the flight probably wanted him to stay within a few miles of the airfield due to the low cloudbase.

However, the pilot thought it was safe to fly further as long as the cloudbase remained above 1,000ft and he hadn't realised that he was heading towards terrain as high as 750ft.

Sinking into trouble with flaps

CESSNA F150L
RAF HENLOW, BEDFORDSHIRE
14 NOVEMBER 2017

When landing with flaps set to 30º a high rate of descent developed and, despite the instructor intervening, the F150 hit the ground nose-down. The nose leg detached, the propeller was damaged and the aircraft bounced and landed heavily on its main wheels before stopping on its nose.

In previous training the student had only landed with the flaps set to 20º and had not appreciated the effects of selecting idle power with the flaps set to 30º.

The instructor resolved to give future students more landing practice with the flaps set to 30º before trying to teach them short-field techniques.

Engine riddle

PIPER PA-28-140 CHEROKEE
NEAR PARBOLD, LANCASHIRE
28 AUGUST 2017

The Cherokee carried out two practice engine failures after leaving Liverpool for a training flight, then, at approximately 2,300ft while climbing at maximum engine rpm, the power suddenly reduced.

The instructor took control and set a glide attitude; the fuel pump was already on and the mixture rich, so the other fuel tank was selected and the carburettor heat set to hot, but the engine rpm didn't recover.

After touchdown in a field the instructor spotted a low fence and 'hopped' the Cherokee over it before stopping close to a second one. Unidentified debris was later found in the carburettor, but the examining engineer was unsure whether it was enough to have caused the engine failure.

How rain brought down a Saratoga

PIPER PA-32R
5M SOUTH OF LINTON-ON-OUSE
23 AUGUST 2017

A pilot flying a turbo-charged PA-32R early one morning from Gamston to Bagby in Instrument Meteorological Conditions (IMC) was rained on and saw a large number of returns on his Stormscope as he approached York.

Reducing power he descended to approximately 1,900ft above ground but the rain became very heavy below cloud and, as he was levelling off, the engine stopped. There weren't any unusual noises before it cut out, nor did it 'cough' as it might have from fuel starvation.

Unable to restart the engine the pilot set up a glide and aimed towards a group of small fields as he passed 1,000ft.

With an estimated 5kt wind he felt it better to accept a tailwind than to look for an alternative landing spot and selected landing gear down and full flap at around 200ft. The touchdown was relatively gentle but the pilot could see he was going to pass through an old hedge with numerous trees and bushes.

He steered towards a gap but the right wing and its landing gear broke off, while the outboard section of the left wing also hit a tree. The aircraft then skidded, losing the left landing gear leg in the process.

Despite this the nosewheel steering was still effective, so the pilot was able to direct the PA-32 between two ponds ahead, coming to a halt a metre from the edge of one of them. The pilot turn was unhurt.

Several days after the accident, engineers noted that the engine's paper air filter was swollen and puffy, indicating that it had been very wet. It was replaced and the engine subsequently started and ran normally. It was assessed that the extremely heavy rain had caused the paper element in the air filter to become saturated, starving the engine of air.

In 2010, Lycoming had written a 'Tech Tips' document and included the following concerning piston engines: "Several years ago, there was a reported loss of engine power in heavy rain. In that case, a paper air filter was being used. When saturated with water, the paper filter element became swollen so that airflow was impeded. In this case, the use of carburettor heat to bypass the filter and re-leaning to achieve a better fuel/air mixture were successful tactics that kept the aircraft flying until a safe, on-airport landing could be made. We should keep in mind that it is not the ingestion of water through the engine that causes a serious loss of power; it is the reduced airflow".

The aircraft in this accident had a turbo-charged engine not fitted with carburettor heat.

The wrong moment for electrical failure

PIPER PA-28RT-201
SANDTOFT AIRFIELD, LINCOLNSHIRE
22 JULY 2017

Forty-five minutes into a local flight from Sandtoft a passenger became unwell and the pilot returned. He decided on a straight-in approach, the landing checks were made and the gear was selected down, but two to three seconds later the aircraft lost all electrical power.

The pilot checked the circuit breakers, which were all in, and he was concerned that any faulty electrical circuit might still be live and could cause a fire. As he could see Sandtoft he continued even though the radio had stopped working following the power failure.

There were no gear down light indications but the landing gear lever was in the down position and the approach was normal until the propeller struck the ground after which the PA-28 slid to a halt on the runway. The electrical master switch was set to 'off' and the fuel cut off before the aircraft stopped. No one was hurt.

The landing gear is electrically actuated and it is most probable that it had not locked down before the failure occurred. The fault was traced to a faulty battery master switch.

Weld woes

MERCURY
OTHERTON AIRFIELD, STAFFORDSHIRE
2 JULY 2017

While landing on the grass runway the Mercury flexwing touched down on its main wheels followed by the nosewheel which then collapsed, tipping it onto its left side. It travelled a further 10ft before coming to rest and the pilot suffered minor injuries; the passenger was unhurt. An inspection by a third party organisation found a fatigue crack at the edge of a weld on the nose gear that failed under load during landing.

FOR FURTHER INFORMATION ON INCIDENT REPORTS, VISIT *AAIB.GOV.UK*

Sheared by a sheep

EUROFOX 912(1)
FARM STRIP, HARINGE COURT, EAST OF ASHFORD, KENT
16 SEPTEMBER 2017

Sheep were on this farm landing strip around two thirds along its length, however the pilot continued with the landing because they were moving away from the engine noise, and the first part of the runway was clear.

As the Eurofox touched down a sheep ran on to the runway so the pilot went around, but as the aircraft lifted off its left wheel struck the animal. The left gear leg sheared off and the pilot said that onlookers could see the leg and wheel hanging from the brake hose.

The pilot completed the circuit and, on landing, the aircraft slewed to the left, hit a fence and came to rest. The landing gear and left wing were damaged and there was minor damage to the spinner, cowlings and propeller. The pilot said that sheep normally ran away from the aircraft noise and in future he'd be prepared for the unexpected.

The latch catch

AIRBUS HELICOPTERS EC120B COLIBRI
WELLESBOURNE, WARWICKSHIRE
17 AUGUST 2017

The right engine cowling opened and struck the main rotor blades as the helicopter flared to land. The pilot didn't complete a walkaround inspection before the flight, which should have identified three unlocked latches. The fact that he left the helicopter for a short period before take-off, coupled with the recent completion of routine maintenance, probably introduced sufficient interruption and distraction to his normal pre-flight routine to cause him to forget to carry out a pre-flight walkaround.

Why two pairs of glasses?

LIBERTY XL-2
5 MILES WEST OF LONDON BIGGIN HILL AIRPORT
10 JANUARY 2018

As the pilot levelled off after climbing to his cruise altitude, he noticed a vibration getting louder. The left door then opened suddenly and the slipstream tore off his headset and glasses.

He put on his spare glasses quickly and tried to reach his spare headset and handheld transceiver, but was unable to. Realising that flying the aircraft was the greatest priority he concentrated on that before selecting 7700 on the transponder and returning to Biggin Hill.

A section of the door had detached after the door opened and the remains of the door were found (with no reports of injuries or damage to property).

The pilot was behind schedule although he didn't feel rushed, but was unable to say categorically that he had checked the left door's security before to take-off and considered that it had not been fully latched.

This incident highlights the importance of ensuring that spare glasses are within reach and concentrating on flying the aircraft following an unexpected event.

Running on empty

BULLDOG SERIES 120 MODEL 1210
EMBELTON, NORTHUMBERLAND
24 SEPTEMBER 2017

The Bulldog had been in for a prolonged period of engine maintenance, so the pilot took it on a test flight. He visually confirmed sufficient fuel for two hours and 45 minutes, but having been airborne for approximately 1hr 35min the engine lost power and could not be restarted.

The pilot checked that all of the engine controls, fuel and ignition selections were correct and noted that each fuel tank indicated 1/3 full. He was uninjured during the subsequent forced landing, but the Bulldog's nose landing gear, engine and propeller were damaged.

The engineering organisation that recovered the aircraft confirmed that the fuel tanks had run dry. The pilot considered that as the flight involved running-in the engine at various power settings and durations, the fuel had been used more quickly than he had calculated.

The Bulldog was not fitted with a fuel flow meter and CAP1535, The Skyway Code, details the importance of a good working knowledge of an aircraft's fuel burn at different power settings, as well as warning that fuel gauges in most types of GA aircraft are not very accurate and should not be considered a reliable indicator of fuel level.

FOR FURTHER INFORMATION ON INCIDENT REPORTS, VISIT *AAIB.GOV.UK*

INCIDENT REPORTS IN BRIEF

WHEN THE WARNING DOESN'T RING A BELL

Diamond DA42 TwinStar
22 August 2017
Coventry Airport

As part of a Multi-Engine Piston Flight Instructor's course the pilot under training was introduced to asymmetric handling. As one engine was operated at 10% of engine load to give zero thrust, the landing gear warning horn sounded continuously. The pilot under training then joined for a flapless landing with the engine still at zero thrust. Although, the commander believed he had verified the landing gear was down, the TwinStar landed gear-up. The commander noted that the landing gear warning horn had been operating for ten minutes prior to landing and, having grown accustomed to the sound, this might have led to his failure to recognise that the landing gear wasn't down.

LEFT BEHIND…

Nipper T.66 RA45 Series 3
17 October 2017
RAF Henlow, Bedfordshire

The pilot was stowing the restraining strap and chocks in the cockpit with the engine at idle, but as he leaned into the cockpit to secure them he inadvertently advanced the throttle and the Nipper moved forward. He attempted to stop it by holding the left wing and guided it onto a grassed area next to the hangars, but the Nipper completed three full rotations before the pilot had to let go and it struck the hangar doors damaging the propeller, wings, engine cowling and rudder.

STRESS OVERLOAD

Piper PA-32R-301 Saratoga SP
28 August 2017
Faversham Road, Seasalter, Kent

The pilot noticed that the alternator light was lit and troubleshooting the problem didn't resolve it as the electrical systems progressively failed. The pilot briefed his passengers and landed in a field. The right wheel 'stuck in the mud' before the landing gear detached. In hindsight, the pilot said he could have landed at an airfield but the number of problems restricted his thinking. *CAA Safety Sense Leaflet 23, Pilots – it's your decision* provides information on human performance limitations and there is a significant amount of published information regarding human factors, highlighting the decision-making limitations under high workload.

FIREFLY RIDDLE

Kolb FireFly
20 June 2017
Luffenhall, Hertfordshire

Approximately one mile from the runway after take-off the FireFly entered a steep descending left turn and hit the ground vertically. CCTV footage analysis confirmed that immediately before the final manoeuvre its speed was above the predicted stall speed. The investigation was unable to identify any defect which would have prevented the aircraft from responding normally to control inputs. It's highly unlikely, therefore, that a stall or spin entry was a factor. It is not known why the FireFly departed from what appeared to be level and controlled flight.

WHY CHECKLISTS MATTER

Eurofox 912(IS)
28 May 2017
Near Puddletown, Wareham, Dorset

The glider tug's engine stopped abruptly at about 300ft while launching a glider. The pilot released the towrope and turned back towards the airfield and despite two attempts, he was unsuccessful in restarting the engine. The Eurofox hit a tall shrub outside the airfield boundary and landed backwards in long grass. The electronic injection engine had recently been installed to replace a carburetted version and required a different restart procedure. The pilot said he had forgotten to perform one step of the restart checklist in the limited time available.

WHEN WELDS FAIL

Taylor Titch
14 October 2017
Ripe-Kittyhawk Farm Airfield, Sussex

The pilot was landing at an airfield he had flown into on numerous occasions and, after an apparently normal touchdown, the landing gear collapsed and the Titch slid along the ground on its underside for several metres. The landing gear collapse was due to the centre reinforcing bracket in the landing gear attachment breaking due to a failure in a welded joint. It had made 605 landings prior to the collapse so it's likely that fatigue within the weakened welds led to the eventual bracket failure.

TAXYING TROUBLES

Piper J3C-65 Cub
20 September 2017
Saltford, Bath

Following a short flight to a private grass airstrip the pilot completed a crosswind landing and taxied toward the hangar to the north of the runway. Still on the runway, the aircraft veered to the left and the left wing strut hit a fence post, damaging the strut, upper cockpit frame and propeller. The pilot thought the cause was a "mismanagement of rudder, brakes and throttle" during the taxi.

FOR FURTHER INFORMATION ON INCIDENT REPORTS, VISIT *AAIB.GOV.UK*