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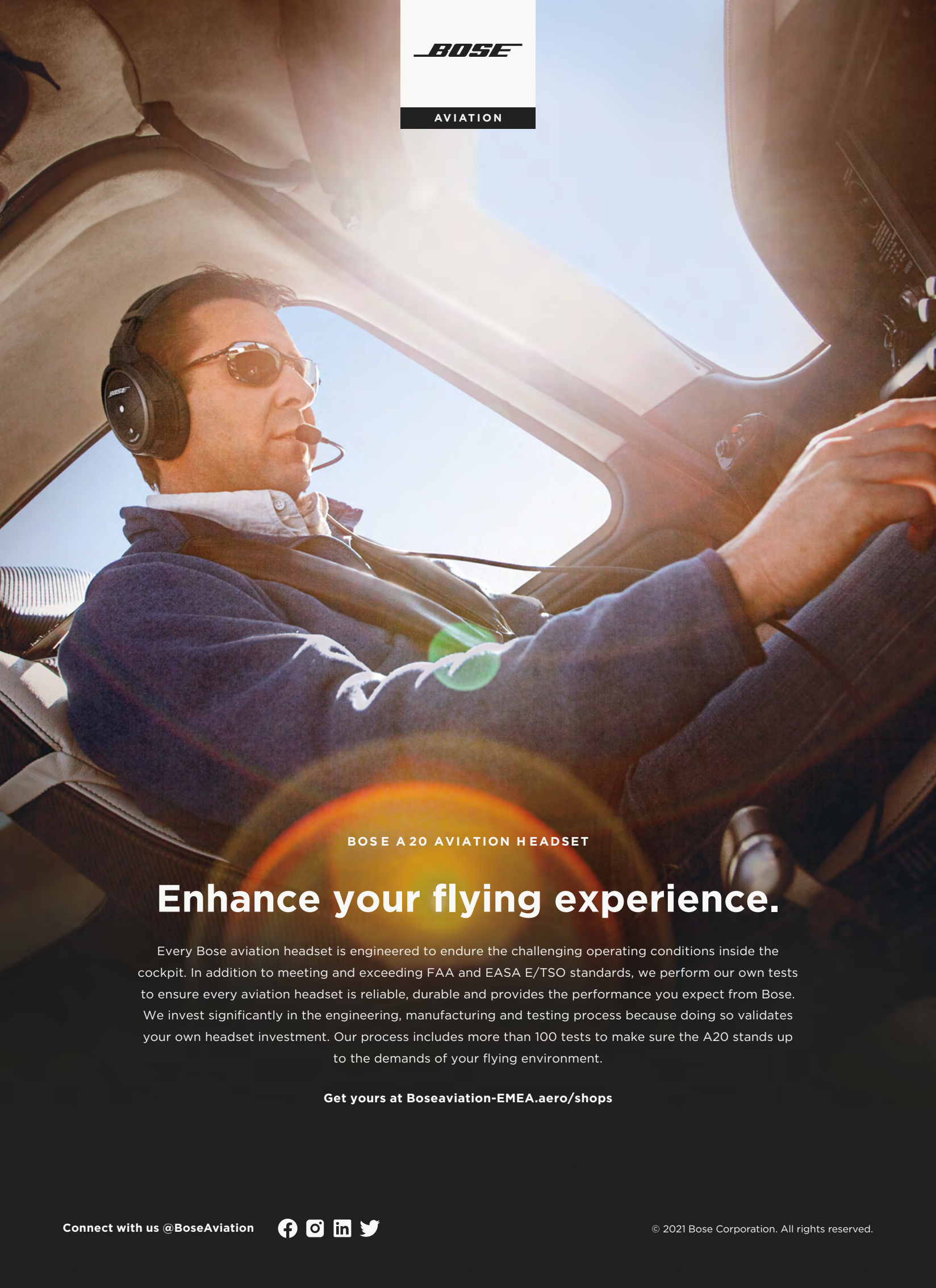

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Mark Mitchell

Editorial

ED HICKS

Well read…

Emails with a subject line like, 'A letter from the Aviation Minister' aren't an everyday occurrence, so always get my attention. Happily, Robert Courts was just enthusing about the Grob 109B Able flight test. "I was pleased to read the recent article in *FLYER* Magazine on Aerobility's Project Able… As the only UK charity offering this service, the Department for Transport was keen to support this project, and that is why we provided a charitable grant of £745,000 to refurbish the fleet of Vigilant T1 motor gliders to significantly increase Aerobility's capacity.

"The Department provided funding for this excellent project as it is absolutely in line with the objectives and ambitions of our Reach for the Sky programme. Reach for the Sky aims to attract under-represented groups, and particularly young people, to careers in aviation by addressing the financial and wider social barriers and creating new opportunities in the sector."

Good work DfT, and while we touched on it in the feature, I'm happy to remind readers of the great support for that project from the government. And, RC, while you're reading, can I make a rallying call in support of the protection of airfields before we lose too many to gigafactories and the like?

If you're a *FLYER* Livestream viewer, you might have heard that this is my last issue as Editor of the magazine. Stepping up to the role is our current News Editor, Dave Calderwood. Dave's been here before, and is far more experienced than me, so *FLYER* remains in great hands. I'm not leaving, just moving to the role of Editor at Large, so I'll still be active in the *FLYER* world. The move frees me up to take on the role of Editor of *Light Aviation*, the magazine of the Light Aircraft Association. As someone with a flying heart firmly rooted in the joy of aircraft homebuilding, I'm really looking forward to it.

It's been a real honour to deliver content to you all – our readers for nearly eight years, and I'd like to thank bossman Ian Seager for the opportunity, and the small but dedicated production team for all their help.

Thanks for reading, fly safe!

Click for video

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Regulars

Take-off

Aviation news from around the world – for the latest visit *www.flyer.co.uk*

Diamond Aircraft reveals eDA40 all-electric training aircraft

Main Plugged in! Diamond's electric eDA40 with fast charging system that takes under 20 mins to recharge
Inset A previous Diamond electric aircraft test aircraft, the DA-36 E-Star, flew in 2011

Diamond Aircraft has revealed it is developing an all-electric version of its popular four-seater, the DA40.

The Diamond eDA40 will be aimed at flight schools with full Part 23 type certification scheduled for 2023. First flight of the eDA40 is expected in Q2 2022. Diamond is partnering with US company Electric Power Systems to integrate its EPiC Ecosystem into the eDA40.

The Electric Power Systems' Battery Module will be equipped with a DC fast charging system, capable of turning around a depleted aircraft in under 20 minutes. Batteries will be installed in a custom designed belly pod and between the engine and the forward bulkhead.

Otherwise the aircraft is similar to the existing DA40, with a Garmin G1000 NXi glass cockpit and several avionics add-ons available.

Total flight time is expected to be up to 90 minutes as battery technologies evolve. The eDA40 is expected to reduce operating costs by up to 40% compared to traditional piston aircraft.

"The eDA40 will be the first EASA/FAA Part 23 certified electric airplane with DC fast charging and specifically tailored to the flight training market," said Liqun (Frank) Zhang, CEO of Diamond Aircraft Austria.

Diamond Aircraft has been researching and developing electric and hybrid electric platform solutions since 2011. At that year's Paris Airshow, Diamond Aircraft introduced the DA36 E-Star with a serial hybrid electric drive system based on the HK36 motor glider.

Two years later, the DA36 E-Star 2, was presented at the Paris Airshow, with improved performance and increased payload.

Further research of electric and hybrid solutions led to additional collaboration with Siemens and the introduction of the next milestone, called 'HEMEP' – the world's first hybrid-electric multi engine with lower fuel consumption (higher efficiency) and decreased noise pollution.

Nathan Millecam, CEO of Electric Power Systems, said, "Training aircraft set the stage for demonstrating that electric aircraft can meet the demands of high-paced, high-volume operations at a reduced cost basis."

Electric Power Systems has battery systems powering customer flight demonstrator vehicles such as the NASA X-57 and Bell Nexus. Investors in the company include Boeing and Safran.

CAA objects to Coventry Airport gigafactory plan

The CAA has filed an official objection to the planning proposal to build a gigafactory on Coventry Airport.

The objection was lodged with Warwickshire District Council on Monday, 4 October just as the planning consultation period ended.

It's the first public response from the CAA's newly established Airfield Advisory Team to a planning proposal and has been welcomed by businesses on the airport fighting to keep it open.

The CAA's objection, from the Airfield Advisory Team principal, James Head, says, "The many based operators located at Coventry play a part in the local economy and provide employment.

"They require the airport to remain operational for the purposes of their business. If the airport were to be closed, not only would these based operators be forced to move elsewhere or close, but a vital link for the next generation of aviation professionals will be lost from the region too.

"Airports like Coventry play a key role in providing access to the aviation industry for the next generation who are considering a career either in aviation or other STEM related professions.

"Closing Coventry Airport does nothing to support the aims and objectives of the NPPF in recognising the importance of our GA network of airfields. It would undermine DFT objectives of promoting and boosting the viability of UK General aviation.

"We, the Airfield Advisory Team object to the proposed scheme and hope to see aviation centric plans at the heart of a new, stable future for Coventry Airport and its based operators."

The CAA's objection also notes that 'it is a condition of the current lease that certain legacy infrastructure is maintained in an operational condition, even though the equipment is no longer utilised. This includes Radar, instrument landing system, non-directional-beacon and distance measuring equipment'.

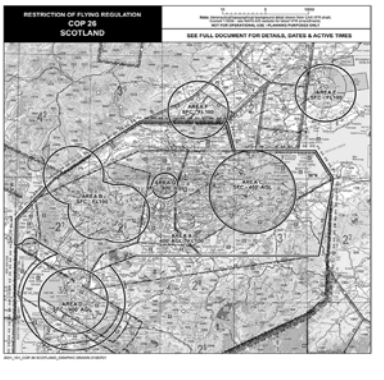
Click for video

COP26 closes huge area of Scotland's airspace

A large chunk of Scotland's airspace will be closed to General Aviation during the COP26 climate conference in Glasgow, being held from 30 October to 13 November.

A mauve Aeronautical Information Circular (AIC) has been issued detailing the restricted airspace. It covers an area stretching from Turnberry to Leuchars (south-west to north-east), and all of Glasgow and Edinburgh.

The AIC makes it clear that, "Unauthorised flight into this restricted airspace is



FORBIDDEN. Deviation from the rules for entry will result in INTERCEPTION." [Their caps]

Leaders from across the world are expected to fly in for the Conference of the Parties (COP) 26th Summit being held at the Scottish Event Campus (SEC).

Full details on AIC M 091/2021 can be found on the NATS AIS website.

■ A detailed guide to flying in the complicated airspace around London Luton Airport is now available free of charge from the Airspace & Safety Initiative website, along with several other VFR flight guides on avoiding infringements. Download *here*

Left That's one big chunk of airspace affected by COP26 restrictions

Take-off

Cessna Skywagon back in production with Bushliner

Above Two versions of the Cessna Skywagon as rebuilt by Bushliner. It's still a popular aircraft in Canada and Alaska

An American company has started 'remanufacturing' Cessna's 180/185 Skywagon single-engine bush aircraft.

Washington State based Bushliner is offering a certified Cessna 180/185 and also an Experimental 1800/1850 version.

Cessna's 180/185 Skywagon has a dedicated following and even now, 36 years after production of the big tailwheel single ended, it's still in use as a bush aircraft.

Some 10,500 Skywagons were produced between 1953 and 1985 when Cessna stopped production of its single engine range because of high liability costs. When Cessna restarted aircraft production in the 1990s, the Skywagon was not one of the chosen models.

However, pilots and operators keep them going, with a bunch of STCs available to make them even more useful, usually transporting cargo and/or passengers to remote strips, lakes and snowfields in Canada and Alaska.

Bushliner Aircraft specialises in complete airframe overhaul which starts with disassembly of the aircraft. Every component of the aircraft is inspected, with fasteners replaced, structural components replaced as required, primed and painted, assembled with new systems, engines and avionics installed.

"No current aircraft on the market offers the same performance or has the same reputation as the Cessna Skywagon family," said Bushliner. "Unfortunately the existing Cessna 180 and 185 fleet is deteriorating beyond economical repair.

"Cessna anticipated the aircraft would be needed for, and designed them to last for 15-20 years of normal use. Many of these aircraft are well beyond 40 years old and have been abused hard for that time."

Bushliner says its aircraft are designated 'equivalent to new', which gives the purchaser equity and confidence in the reliability of our aircraft.

However, it's not a cheap process! Complete aircraft overhauls start at $489,000 although they are covered by a five-year tip to tail warranty.

Bushliner are ***here.***

Fairoaks keeps operating despite developer challenges

Fairoaks Airport in Surrey is continuing to operate, with regular daily Pilatus PC-12 business flights, an active flight school and a loyal GA base of aircraft, despite the latest challenges posed by developers.

Westcore Europe, a property developer which has rights to some of the buildings at Fairoaks, is reported as leasing the tower and some office and hangar space to a film set company already based at the airport.

Tower staff and owners with aircraft in the hangar, have been told to vacate by the end of February 2022, though we understand that negotiations are continuing.

Fairoaks Airport lies within the Heathrow Class D as well as under the London TMA so some form of tower is required by the CAA. It's also one of the few airports in the south with a hard runway and hangar space, meaning it's going to be difficult for aircraft owners to relocate.

It appears the airport management is considering other ways to supply the tower function, possibly by erecting a temporary tower on the apron.

FLYER has contacted Westcore Europe for a briefing on its plans for the airport, but nothing is so far forthcoming.

Above Fairoaks Airport has fought off the developers before. Can it do so again?

We also understand that the CAA's new Airfield Advisory Team, set up by Secretary of State Grant Shapps, has also been contacted.

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Take-off

Norwegian team gets ready for first Air Race E flight

One of the teams preparing an aircraft for the first season of Air Race E (for Electric) is almost ready to carry out the maiden flight – the first racing aircraft to do so.

The Norwegian Nordic Air Racing Team is planning to fly its electric power Cassutt 111M aircraft at Jarlsberg Airport later this year.

Air Race E is aiming to launch the maiden season of the Open Class, which allows teams to produce their own powertrain, in 2023.

Nordic's Pierre Dussaux said, "This is such a big challenge. Building an electrical plane, and a race plane at that, is a process full of surprises.

"It is so exciting, and we are hoping to develop impressive performance levels from this incredibly light aircraft. It will be so light and so fast, so when we see this plane in the air for the first time we will be very, very excited. It has been such hard work for our dedicated team of volunteers."

The pilot will be Rein Inge Hoff, an aerobatic pilot with extensive experience flying a host of different aircraft.

Nordic Air Racing Team chose the Cassutt 111M for its racing pedigree, simplicity of construction and strength.

Main Team Nordic's electric Cassutt
Above Motor output is a claimed 170kW

The team's electric propulsion system is considerably more powerful at 170kW (about 228bhp) than the usual 100hp Continental engine fitted to the Cassutt, and will also have better aerodynamics thanks to smaller cooling air intakes.

"With a maximum weight of 407kg, we will reach speeds of up to 400kph, faster than any existing electric aircraft today!" said the team.

"Our goal is to build a strong base in 2021, to ensure that we can both race in 2022 and finish all our races safely. To maintain performance while de-risking our test programme, we mostly chose commercially available and well tested components.

Nordic Air Racing Team link: ***here***

Honeywell launches cloud-connected Anthem avionics

Hello clouds, meet cloud-connected aircraft… Honeywell has revealed its latest avionics suite, called Anthem, which has always-on connectivity.

Honeywell says Anthem can be customised for almost every type of aircraft and flying vehicle, including large passenger and cargo planes, business jets, helicopters, General Aviation aircraft, and the rapidly emerging class of air taxis such as eVTOLs.

"Honeywell is not just launching a new flight deck today – we are changing the way pilots operate aircraft and creating a more intuitive experience than ever," said Mike Madsen, president and CEO, Honeywell Aerospace.

Honeywell says Anthem is designed to solve two problems facing aviation.

First, it creates ways for increasingly complex aircraft to function with more autonomy, relieving stress on pilots and promoting safety and efficiency.

Second, it enables the disjointed systems that support an aircraft to work together more seamlessly to deliver critical information to pilots.

Anthem generates and transfers data to and from ground-based servers so those involved in a flight's operations have the information they always need.

Above Honeywell's new Anthem flightdeck can be huge like this for a business jet, or scaled down for smaller aircraft

Features include:

- Integration with flight planning apps and software
- Intuitive interface
- 3D Runway Overrun Alerting and Awareness System (ROASS) and 3D Airport Moving Maps.
- Track-based Synthetic Vision System
- Integrated Navigation Map and Vertical Situation Display
- Web browser that allows third-party applications and websites, i.e. live weather cameras at airfields.

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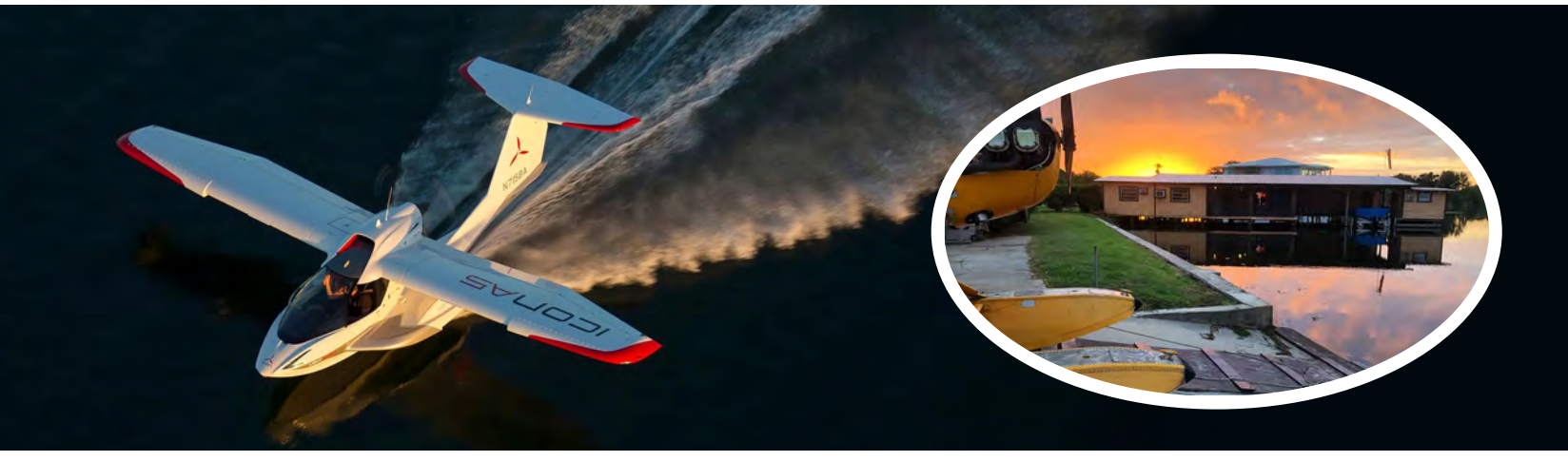
Take-off

Fly the ICON A5 at Jack Brown's



The ICON A5 amphibian is one of the most spectacular and fun new aircraft on the market but it's a lot of money and currently only available in North America*. However, it's now available to fly – and rent – from the famous Jack Brown's Seaplane Base in Winter Haven, Florida.

Hundreds of UK pilots have visited Jack Brown's base over the years, whether to train for a seaplane rating or just for the fun of flying off water. Up until now, the regular aircraft available have been a choice of five Piper Cubs and one Super Cub – and they are still on the fleet.

The ICON A5, with its stylish looks and high tech engineering, is a true amphibian though, rather than a land aircraft fitted with floats. The A5 is designed from the outset to be a water-based aircraft.

Above Fly the ICON A5 at Jack Brown's Seaplane Base in Florida (inset)

Click for video

The A5 is available at $300 (£217) an hour with an instructor. A full Single Engine (Sea) Rating (SES) costs $2,400 which includes groundschool, five hours dual instruction, ICON A5 rental for checkride and the FAA Examiner fee.

Once the pilot has completed the SES rating and been checked out, the A5 will be available for rental.

*A full certified ICON A5 for international sales is being developed by ICON.

In an ICON-supplied video (please click button left), ICON's Flight Training Network Manager travels to Jack Brown's to conduct annual standardisation flights, which all company and partner pilots are required to complete annually to maintain currency and standardisation.

Jack Brown's Seaplane Base ***here***

Junkers A50 Junior replica from April 2022

The first deliveries of the replica Junkers A50 Junior will start in April 2022, according to the German company behind the project, Junkers Flugzeugwerke AG.

The A50 Junior is built and approved to the new 600kg microlight category in Germany which means it should be available throughout Europe and the UK.

Below Is there a better retro-looking microlight? We don't think so...

The idea of recreating the Junkers A50 Junior came from Dieter Morszeck, who was behind the replica Junkers F13. Mr Morszeck used to own Rimowa, the iconic corrugated aluminium suitcase manufacturer.

The airframe of the modern A50 Junior has been engineered and will be built by Kaelin Aero, which also constructed the F13. Kaelin is a renowned aviation engineering company in Germany.

The new A50 Junior, despite looking like its 1929 original, is packed with modern tech including a Rotax 912iS engine, MT propeller, Beringer brakes, Garmin GI 275 flight instruments and a built-in Galaxy ballistic parachute rescue system.

"As a light sport aircraft, the A50 Junior combines the latest technology with the flair of the 30s," said the company. "This unique aircraft induces feelings of freedom for new adventures. We proudly look forward to the start of a new edition of this historic aircraft. Inspired by the actual birth of the A50 in 1929, the first 29 aircraft will be sold at an introductory price of 179,000 euros."

The original Junkers A50 Junior had its maiden flight in February 1929, after which 69 aircraft were made. They set a number of world records including one by Marga von Etzdorf, the first woman to fly from Berlin to Tokyo in 1930 with her Junior A50.

Model H10-13.4

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Keeping track of changes

Ed Bellamy looks at the CAA's 'Safety, Policy and Legislation tracker', and reflects on some key regulatory changes of 2021

Those of you who subscribe to the CAA's *Skywise* updates may have recently had one entitled 'Upcoming changes to aviation safety law' appear in the inbox, with a link provided to something called the 'Safety Policy and Legislation tracker'. The tracker looks like a sort of UK equivalent to the Rulemaking area of the EASA website. While the UK was in the EU, the EASA rulemaking programme covered most rule changes, but there were still national amendments for the Air Navigation Order and other non-EU legislation, and these would sometimes be a bit lost in the flow of notifications we're subjected to. So now having all the major legislative changes listed in one place is helpful.

Looking down the list, there is a selection of routine amendments relating to ICAO initiatives, drones and even space related regulation (the CAA now being the formal regulator for UK space flight). There are a few GA related changes from 2021 as well, some of which we have covered before but worth reviewing again:

Continuation of the Instrument Rating (Restricted)

Readers will almost certainly recall that when the EASA Aircrew Regulation first came out all those years ago, it was possible that the UK IMC rating would have to end. A compromise was reached whereby EASA Member States were permitted to issue national instrument ratings under a special provision of the Aircrew Regulation, which led to the IMC rating being issued as the 'Instrument Rating (Restricted)' on Part-FCL licences. Under EASA this was time limited until 8 September 2021, but in June that date was removed from the UK Aircrew Regulation, so that the IR(R) can continue to be issued and used on Part-21 aircraft indefinitely.

It now seems the UK will not be adopting the 'Basic Instrument Rating', which has recently come into force in EASA member states and potentially offers a greater proportion of the privileges of the full Instrument Rating, while keeping a GA focus. The CAA has stated reviewing the arrangements for instrument ratings more generally will form part of the wider licensing review, so watch this space.

Review of licensing

On 15 October an 'Opinion' document was published indicating that the date on which balloon and sailplane pilots will need a Part-FCL licence to fly Part-21 aircraft is to be further deferred until December 2023. The requirement for a Part-FCL licence is a hangover from EASA which continues as retained in UK law. While we were in EASA, it was repeatedly deferred for sailplanes and balloons, but this latest UK deferment suggests that rethinking it completely may be on the table. The rationale given for further deferral is the CAA/DfT intention to conduct a wide-ranging review of Flight Crew Licensing regulations. This is positive news, although at the time of writing the scope and timeline remains unknown.

Pilot medical declarations

January and additionally July saw amendments to the UK Aircrew Regulation and Air Navigation Order that make permanent the use of the pilot medical declaration (PMD) with a Part-FCL licence. You still need a Class 2 Medical for initial PPL issue, but the UK Part-MED regulation now allows the use of a Part-FCL PPL or LAPL with a medical declaration, albeit restricted to the privileges of the LAPL (VFR, aircraft not more than 2,000kg MTOW and not more than four people on board). There is still an exemption published regarding the wording of the ANO and the medical conditions under which it is possible to make a PMD, but hopefully this will be tidied up in a future amendment.

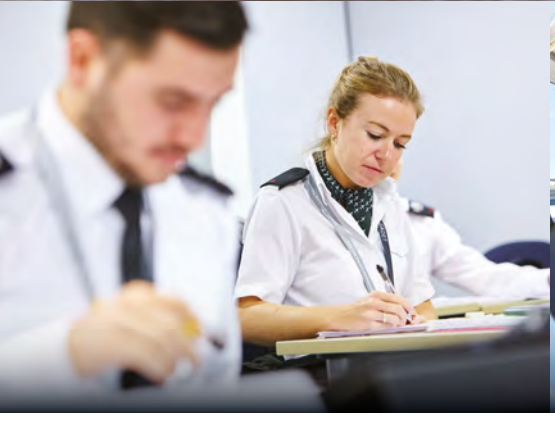
Use of national licences on Part-21 aircraft

This subject does not seem to be mentioned on the tracker, but it was part of a wider amendment that came into force in June and essentially renders UK licences issued under the ANO to be valid for Part-21 aircraft. To me it seems a somewhat complex amendment – the validation only extends for the SSEA, SEP and motor glider ratings and for flights conducted under the UK Part-NCO rules. While this probably captures 95% of the people who would want to fly Part-21 aircraft with a national licence (for example an NPPL flying a PA28), it is not clear why such limitations were considered necessary.

600kg microlights

As reported earlier in the year, the potential for factory-built microlights with a 600kg MTOW is now with us. The technical detail has been well covered elsewhere, but suffice to say that the relevant ANO amendments came into force in August. It will be interesting to see how this develops. One point of note is that differences training with an instructor will be required for existing microlight pilots to go to the heavier aircraft (and indeed the other way, should that scenario occur). Some have also noticed that a requirement for differences training for special features such as variable pitch propellers, turbochargers or autopilots has now also been added for all microlights, which previously only applied to larger GA aircraft outside the microlight weight class (check with the British Microlight Aircraft Association for the full list if features requiring training).

More information ***Safety Policy and Legislation tracker.***



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Sustainable Aviation Fuel takes two steps forwards to ease aviation towards net zero

All Airbus jets are certified for up to 30% SAF including the A330

Sustainable Aviation Fuel (SAF) is increasingly seen as a vital step forwards in achieving net zero carbon in aviation.

The problem is that there's not much of it about at the moment. However, the roll-out of SAF is gathering momentum with two recent announcements.

First, Rolls-Royce, Airbus and Shell said they are jointly investing in the technology required to scale-up production of sustainable aviation fuels.

Second, Sustainable Aviation Fuel is to be introduced for the first time at Gatwick Airport through a collaboration between Neste, Q8Aviation, easyJet and Gatwick Airport.

Under the UN's Race to Zero goals the current 'breakthrough' required for the decarbonisation of aviation is to achieve a minimum of 10% SAF use by 2030, with the proportion not reaching 100% earlier than 2050.

Rolls-Royce, Airbus and Shell say they are investing in the technology that could enable that to happen sooner, through a three-pronged initiative:

1 Rolls-Royce announced that by 2023 all its 'Trent' engines, used across a range of long-haul aircraft, will have been proven compatible with 100% SAF.

2 All Airbus aircraft are currently certified to operate on up to a 50% blend of SAF mixed with kerosene, and Airbus has the ambition to achieve certification of 100% unblended SAF by the end of this decade.

Above Neste's SAF tankers in operation

3 By 2025, Shell alone has committed to produce two million tonnes of SAF per year. That is more than 10 times the total amount of SAF produced globally today.

Warren East, Chief Executive, Rolls-Royce, said: "Flying generates between 2% and 3% of global emissions, but as easier-to-abate sectors decarbonise that proportion will increase, so shortening aviation's journey to net zero with action in the opening phase of this 'Decisive Decade' would be a huge win for the world.

"However, we will only create the focus and momentum required to achieve this if we ratchet our collective ambition beyond the current target of achieving 10% SAF usage by 2030. We need partners who share our vision for the use of SAFs as a solution for reducing emissions on long-haul flight, to help all of us successfully transition to a net zero carbon future."

SAF at Gatwick

Starting from 19 October, a total of 42 easyJet flights operating from Gatwick Airport are to be powered by a 30% Neste MY Sustainable Aviation Fuel blend – the first time a departing flight at Gatwick has used sustainable aviation fuel (SAF) – and the first by easyJet.

Of the 42 flights, 39 will be the easyJet flights operating from Gatwick to Glasgow throughout the COP26 Climate Change Conference, which runs from 31 October to 12 November.

Across all 42 flights, greenhouse gas emissions will be reduced by up to 70 tonnes.

Neste's sustainable aviation fuel, which is fully certified, is produced from 100% renewable and sustainable waste and residue raw materials, such as used cooking oil and animal fat waste.

UN Race to Zero

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I Get Paid for This...

Matt Lane

Examining, instructing and flying Air Cadets, Matt Lane helps other pilots to achieve their dreams. Interview by **Yayeri van Baarsen**

How did you get into flying?
I've always been interested in civil aviation. As a child, I'd visit airports to watch aircraft. When I was a teenager, I joined the local Air Cadets where I got the chance to fly in Chipmunks, and at 17 I received an RAF flying scholarship.

Tell us about your job?
I'm Head of Training for RAF Sport Aircraft. My main base is RAF Brize Norton, but I cover a wide area, promoting best practice standards across all RAF flying clubs. As an RAF Tutor Pilot 6 AEF, I fly Air Cadets in the Grob Tutor. For some it's the first time in an aircraft – introducing these youngsters to aviation is a real honour.

I'm also a civil flight instructor/examiner in Oxfordshire and Gloucestershire.

Nowadays, military and civil aviation are very aligned. The main difference when instructing is that in the military we wear a full flying suit with helmet, gloves and parachute, and in civil aviation it's more likely to be jeans and a polo shirt. Although I still instruct, most of my time is spent examining. One of the joys of examining is that you get to experience many different aircraft. I've flown almost 40 types.

An instructor's most important quality is empathy. You have to be able to put yourself in the mind of your student and see things through their eyes. Never assume anything, whether it's aviation-related or not. I once told a Spanish student we'd have to correct for the wind on an ILS approach, using English colloquialisms like '…take a punt at this'. Luckily, when walking to the aircraft he admitted to not understanding me. For me, this was a very important lesson.

What I love about my job is that it allows me to interact with a wide range of people. The social side is fascinating as all students are different. Often, they're nervous, so you put them at ease in order to get the best out of them. Some candidates fail, but the vast majority are ready for the test and it's up to me to give them the opportunity to display their skills. Flight examining lets me help other pilots to achieve their dreams and ambitions, which is a big privilege.

What training did you have?
In 1998, I became an RAF engineering officer and staff pilot, and since 2016 I've been flying the Grob Tutor. I'm one of the few engineering officers who also have RAF Reserve pilot wings. Alongside my RAF work and family life, I've gradually built up my civilian qualifications. I'm a big fan of the modular commercial training route as it allows you to add ratings as and when time and money allow.

Flying CV

Head of Training at RAF Brize Norton Flying Club, Matt Lane has just been named AOPA UK's instructor of the year.
Started current job: 2018
Now flying: Grob Tutor (for the RAF), plus a whole range of light aircraft
Favourite aircraft: Chipmunk. "Apart from being a fantastic aircraft, the Chipmunk holds a special place in my heart as it's what I flew when I started flying."
Hours at job start: Approx. 2,800
Hours now: Approx. 3,200

"Flight examining lets me help other pilots to achieve their dreams"

What's been your favourite flight?
Swapping the VC10 that was stationed on the Falkland Islands. We flew the new aircraft there with refuelling stops at the Canary Islands and Ascension Island. The other VC10 came from the Falklands and met us for air-to-air refuelling. Ascension Island – suddenly seeing this volcanic island appear in the middle of nowhere after the long flight over the ocean and seeing turtles nesting on the beach during our time there.

And your favourite airfield?
Gloucestershire Airport, as it's where I've done some important parts of my training. Apart from this personal connection, I also like that it has many student pilots, a brilliant museum, and a great ATC team. Gloucestershire is a vibrant place that shows how GA is thriving in the UK.

Do you get to fly much outside of work?
Not much, but I occasionally take my wife and children up for a scenic flight. Two years ago, we flew a Diamond DA42 around the Isle of Wight, which was very enjoyable.

What's your most valuable career advice?
Make the most of the people you know. While aviation is a big industry, it's also a small one. Everyone knows each other, which makes networking important. Luckily, the aviation community is a positive one with pilots always happy to help each other out.

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Unusual Attitude

Dave Hirschman

Wet and dry…

Amphibious floats are heavy, draggy, and costly – but they can be a blessing, even when you're not using them to take off or land on water. I recently completed a marathon journey in an amphibious Piper PA-18 Super Cub that stretched from Key West in Florida, to Bangor, Maine, and then on to Minnesota. The 2,000nm trip involved relatively few water landings using the aeroplane's Wipline 2100 amphibious floats, but I was glad to have them because they allowed for a far more interesting, scenic, and smooth route than I otherwise would have taken.

Leaving the Florida Keys, my pax and I skimmed the waves to the everglades, then overflew Lake Okeechobee at low altitude on our way to the Atlantic. Seeing dolphins, seabirds, fish, and lobster traps wouldn't have been possible from thousands of feet above.

Over the South Carolina and Georgia coasts, we avoided headwinds and bumps by flying at low altitude for hours as we made our way up the East Coast.

These amphibious floats add about 330lb to the Super Cub's empty weight – and that's significant for a roughly 1,400lb aeroplane.

The aeroplane pays a price for the additional weight in terms of take-off and landing distances, and its rate of climb and service ceiling are sharply reduced. A 160hp Super Cub on wheels climbs like a mountain goat to a maximum altitude of 18,000ft, but with amphibious floats it takes a major effort to reach 8,000ft. Somewhat surprisingly, however, the Cub's cruise speed is about 85kt, about 7-8kt less than the wheeled version.

Floats mean you can safely fly places you wouldn't otherwise go. Seeing the New Hampshire and Maine coasts at nearly eye level, for example, was a rare and invigorating experience, and it allowed us to avoid the heat and constant turbulence that had rocked the aeroplane over land.

The floats also contain internal lockers that allow for carrying bulky bags that don't easily fit into the Super Cub's fuselage, and stowing equipment in the floats has the benefit of lowering the tall aeroplane's centre of gravity. (Items stored in the floats can get wet during water landings, so keep electronics and undies elsewhere.)

After Maine, the floats turned into even more of a blessing. I was alone on this portion of the trip, and a soul-crushing headwind pushed ground speeds well below 60kt over the Adirondack Mountains of New York, and sharp jolts of turbulence made for a miserable ride. Over the south shore of Lake Ontario, however, cool and uniform water temperatures brought smooth air, and dropping down to 100ft or so above the surface eliminated much of the headwind. Ground speed increased about 20%, and the sights and sounds were novel and exhilarating.

After refuelling in Buffalo, New York, the summer heat and humidity created numerous – and powerful – thunderstorms along the south shore of Lake Erie. My planned route by Cleveland, Ohio, was blocked and would remain that way for the next couple of days. But the north side of the lake – the Canada side – was wide open with visual conditions. I filed a VFR flight plan (a requirement to pass through Canada) and was soon on my way across a 200-mile stretch of Canadian airspace.

Once over the water, conditions improved and ground speed increased, just as they had over Lake Ontario. I stayed about one mile off shore for most of the next two hours and well below gliding distance to shore. But who cares about gliding distance to shore in a floatplane? Wave heights were well under the Super Cub's limit of two feet, and I had a paddle.

I crossed the southern end of Lake Huron at relatively high altitude, about 4,500ft, just because it made me feel better to make sure I was radar identified and talking to an air traffic controller when re-entering US airspace. Then I dropped back down to avoid the worst of the headwind the rest of the way across the state of Michigan.

> "Floats mean you can safely fly places you wouldn't otherwise go"

Lake Michigan was my last water obstacle on my way to Minnesota, and unlike the other great lakes in which my path was mostly parallel to the shoreline, this time I would cross in the middle. At 75nm from just north of Muskegon, Michigan, to Green Bay, Wisconsin, the crossing would put the Super Cub over water for about one hour. Low clouds and fog blanketed western Michigan, but the air – and, more importantly, the surface of the lake itself – was glassy smooth. If a forced landing became necessary, the floats could handle it easily.

I was wary of this lake crossing. Once before I'd been fooled by glassy conditions and light winds on one side of the lake only to be confronted with rough water and high winds from the mid-point onward. This time, however, the water surface was remarkably placid throughout my transit.

Amphibious floats can be hard, perhaps impossible, to justify in economic terms. They reduce an aircraft's speed, range, and ceiling. They're expensive. And, if all that's not enough, they also raise insurance rates. But the ability to fly on and off the water opens up so many possibilities for adventure travel. And having floats can turn even mundane ferry flights into memorable and rewarding explorations.

RV-4 pilot, ATP/CFII, specialising in tailwheel and aerobatic instruction in the USA *dave.hirschman@flyer.co.uk*

Mark Mitchell

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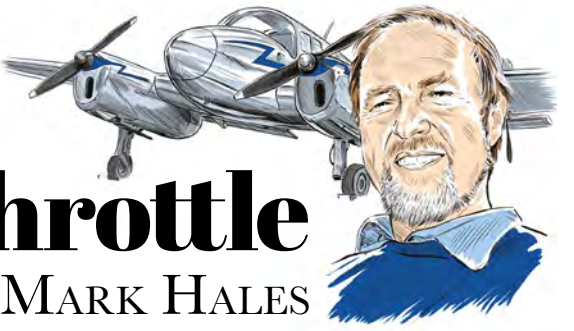

Full Throttle

MARK HALES

Prototyping… a trial and error process

I have just realised that it's been three years since I started the installation of a diesel engine in my Jodel. That's a fair amount of time for a near-serviceable Jodel to be sitting in the hangar, especially when the weather is good and there are events to be attended. Someone even recently asked me, 'why are you doing this…' There have been times when I've asked myself the same question, and I can't always think of a plausible answer because the obvious one – it will only cost me six quid an hour to fly in my retirement – is clearly a flawed calculation. The overall cost divided by the hourly rate over the three years it has taken so far would have paid the fuel bill several times over.

So I suppose the loftier reason is a desire to create something unique, and for it to be exclusively mine. The length of time it takes though is definitely an enthusiasm-sapping factor – just look at the number of part-finished projects you see advertised. But if you've never done anything like this, it's difficult to comprehend how long even an apparently simple task will take. And, equally important, whether it will work and whether a week's effort has to go in the bin and you start the task again. There are no bits on the shelf which are guaranteed to go straight on.

For example, I've previously mentioned the diesel's need to return surplus fuel from the injection pump back to the tank, and how I thought I'd solved that one by feeding it into the conveniently large breather port at the top of the tank. A neat solution which had presented itself, but when I finally got the engine running properly (which is a story in itself), on maybe the third or fourth run, a large pool of fuel appeared under the belly.

There was nothing on the fourth and fifth runs, but I know I can't leave it like that. It was siphoning via the breather and it will happen again at some point. You don't need to be a pilot to realise that pumping fuel overboard is a 'bad thing' for so many reasons. So, I'll have to heave out the tank and weld on another port, which is what I thought I needed right at the beginning.

Then, there's the quadrant cockpit power lever, a thing of beauty created exclusively for the task by Miles McCallum, because I could see the existing plunger wouldn't do the shutting off which is a requirement on the injection pump.

Now the engine is running, I discover that the lever on the pump only has an effect for a quarter of its rotation and the throw of the quadrant doesn't match the actuation on the pump. It's either too short – and the power response too quick – or not long enough to shut the engine off. The whole thing needs a complete rethink…

Little things, I know, and what did I expect? Prototyping is exactly that – whether you're a man in a shed like me, or Airbus.

The difference is that I have to be close to being operational to discover the more basic stuff because there's no army of computer operators running simulations. And as 'Alex the Professor' who is overseeing the project – more on him later – has pointed out, I can't taxi test unless the aircraft is capable of flight because taking to the air might be the safest option if something goes wrong on the runway. Which brings me nicely to the wonderful bonus that is E-Conditions.

Originally titled *The Professional Experimental Category*, this is a regime proposed by Royal Aero Society member John Edgley who was responsible for the Optica aircraft. There was also input from LAA's Francis Donaldson and in Edgley's words, this was a means to do 'lots of experimenting, as a precursor to approval'. That's a critical but subtle difference because hitherto, anything that was to be tested had to be approved first, which when written as a sentence, exposes the flaw in the requirement. Edgley was in a position to see that a need for prior certification was a significant barrier to new aviation development, adding hugely to the timescale and the cost, but the practical consequence is that people or companies simply won't bother because they can't promise delivery schedules or budget compliance.

> "E-Conditions allows the experimenter responsibility for all aspects of a design"

E-Conditions allows the experimenter to take responsibility for all aspects of a design – including flight – overseen by a 'competent person', which can be the same individual, but whoever it is has to be approved by an authority (either the Royal Aero Society, the BMAA, or the LAA). In my case it's Alex, a former Navy helicopter engineer-turned university lecturer.

This whole process is approved by the CAA, which given most people's experience of that body, might seem extraordinary, but it was, in Edgley's words, 'more than he expected', even if it wasn't the 'Experimental' category he really wanted. It will certainly do for me. It doesn't make the job itself any easier mind you – prototyping is still the same frustrating, time-consuming trial and error process – and it still has to be right if I want to stay alive, but E-Conditions means I can get on with everything then discuss the findings with Alex, rather than wait in a queue to ask permission to perform each step. I'll still have to do that eventually, but I'll be doing it with greater enthusiasm, and more evidence…

Working vintage aircraft and cars make Mark particularly happy
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Mark Mitchell

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Squawks

IAN SEAGER

Only time will tell…

At this year's LAA Rally Grant Shapps, the UK's Secretary of State for Transport (and a private pilot), dropped by the *FLYER* stand and invited me, along with a couple of other people, to 'come in and discuss the potential for further deregulation'. I wasn't sure the meeting would actually take place, but it did, and it happened yesterday.

I'm not aligned politically with the SoS, but he has positively engaged with GA more than any other politician since… well, probably since, forever. That's not to say that we all have to blindly agree with everything he does, thinks or proposes, but it's important to recognise the level of both support and ambition that's currently heading up the Department for Transport.

It's difficult to know what to expect of meetings like this – it's unlikely that an hour spent chatting to someone, even if they can pull most of the strings, will result in large scale instant improvements, but given the amount of time many of us spend complaining about things it would be churlish not to take the opportunity to try to make some things better when the opportunity arises.

It won't come as a surprise that the area of pilot licensing was raised. As far as I'm aware, nobody in GA, the DfT or the CAA thinks that the current arrangements are satisfactory, and there's work going on to simplify things while remaining (where necessary) aligned with ICAO. Personally, and I made this point, I think the CAA could have scored a couple of quick wins on the licensing front, for example by trusting its appointed examiners to ensure that candidates have the hours/experience required, rather than insisting that logboks are physically sent to the CAA. Surely if you trust the examiner to examine the flying you should be able to trust them with this?

The subject of RNP Approaches was also discussed – about half a million years ago, when the USA already had hundreds, if not thousands, of what were then called GPS approaches – the UK ran a trial, presumably to make sure that the magic worked in our air. It did, and ever so slowly the process of introducing them to the UK began. There's been lots of air under the wings since then and parts of the CAA has done lots of work on procedures for RNP approaches at airfields without a full air traffic control service. Literally millions has been spent by airfields and associated businesses to achieve not very much at all. Those few GA airfields that have managed to get approaches approved and in the databases have only managed to them over the line by restricting their use to the point where, practically speaking, the approaches are pretty much unavailable to general aviation pilots.

Kudos to Grant Shapps who managed to get significant refunds issued to some applicants basically as a result of the slow progress. The point was made that we need to cut through whatever bullshit is getting in the way (OK, I didn't actually say bullshit) and deliver the right outcome – RNP approaches, where they exist, must be easily available to general aviation. It seemed to me that the SoS shares the frustration here.

There's no avoiding Brexit in this discussion, and it should be clear to both leavers and remainers that the end of the transition period (and leaving EASA) brings both opportunities and problems. The mutual recognition of licences, particularly professional licences, is a significant and growing problem that sadly doesn't appear to have a near-term solution. In a similar vein, the issue of certification was also discussed. I personally think there's a big win to be had for the UK General Aviation world by accepting both EASA and FAA certification without requiring CAA validation, and by adopting things like CS-STAN where they bring advantages. It would mean that UK pilots have access to the latest equipment as soon as it becomes available, it would keep costs down for everyone, and unless you think that the FAA and EASA certification teams are a 'bunch of clowns who cannot possibly be trusted', it would not be detrimental to safety. It would also solve the problem of some manufacturers not certifying in the UK because the market for their goods is deemed to be too small. Unfortunately my view is not shared by Grant Shapps, and as an independent aviation nation it seems we will have our own certification standards and processes. I fear many hours will be spent on the reinvention of a better, less circular wheel and its subsequent inspections.

> "Hours spent on the reinvention of a better, less circular wheel…"

The new CAA independent dispute review process was also covered, with the official process of finding and appointing a Chair to begin soon. Airspace, Electronic Conspicuity, the environment – plus more topics were also covered. I also tried (and I think failed) to explain why the DfT's decision to require FAA certified pilots to hold equivalent UK licences to fly N reg aircraft in the UK from 21 December is indicative of old school bureaucratic thinking.

Only time will tell if the hour was a quick peek behind the curtain or the beginnings of something more productive. There were 13 different action points noted during the meeting, I'll report back on progress…. ➤

Publisher, pre C-19 often found flying something new and interesting
ics@seager.aero

Mark Mitchell


LI-ION
G-DGRN

Charging ahead…

With no hydrocarbons in sight, flying with just electric power is a whole new experience. Oh, and get ready to learn some new acronyms too…

WORDS Ian Seager. PHOTOGRAPHY Ed Hicks

We tried to get our hands on Pipistrel's Velis Electro after the Microlight Trade Fair at Popham earlier this year. The plan had been to fly the aircraft from Popham to Wadswick where, before flying, we'd take pictures of the all-electric Pipistrel while its batteries were being recharged using the three-phase power being generated from the handy solar farm next to the runway. It would have been all very green and virtuous. Admittedly, there was the small matter of needing to fly to Popham in the C182 to get the mobile charging unit (which weighs about the same as an adult), but the imagery would have been great…

Clearly that didn't happen. Apart from anything else, we perhaps hadn't fully appreciated the challenge of range/endurance that comes as standard with every electric aircraft, of which in the certified world there's just one, the Velis Electro (CS-LSA). Pilot Deepak Mahajan, the UK's Pipistrel dealer would have had his work cut out when returning from Wadswick to Damyns Hall, at least without some hefty tailwinds, not to mention the problem of transporting that mobile charger (which despite being mobile, obviously isn't intended to follow the aeroplane around).

During one of *FLYER*'s weekly Livestreams (what do you mean you haven't seen one yet? They're every Thursday at 1930 on our YouTube channel), Claire Bartlett, one of Deepak's instructors at Damyns Hall, brought the subject up again, so as soon as weather and availability holes aligned, Ed and I jumped in the avgas-burning C182 and headed east.

When we arrived, Deepak was busy taking the Velis out on a local demo. A great opportunity to hear how surprisingly quiet the aeroplane was on take-off, and how surprisingly noisy the process of recharging afterwards was (although we're talking Dyson hand dryer loud, not IO-540 at max rpm, loud).

While Deepak was doing his thing, we sat down with Claire to talk through both the similarities and differences between traditional GA and the modern Velis, and of course between petrol-fuelled piston

Above Charging is only permitted through Pipistrel charging units which need a three phase power supply
Left Unlike electric cars, the aeroplane is 'alive' during charging as pumps and fans keep the onboard systems at the right temperature
Below Instructor Claire Bartlett talks through State of Charge (SOC) usage. Think of SOC% in the same way as fuel remaining

power and the all-electric models. I'm going to assume that we're all far more interested in the electric powertrain side of things, so rather than any lengthy Velis vs Cessna/Piper comparisons, I'll just say that the Electro is a sleek low drag composite two-seater with a T-tail and cantilever high-wing that's equipped with pretty much full-span flaperons.

It's a sweet flying aeroplane that only really requires the lightest of fingertips on the stick. The only thing that might catch out the unwary from a handling point of view is the adverse yaw created by the flaperons, particularly if you have two stages selected at low speeds. Unlike the stick, the rudder pedals need a decent push to move them and counteract the yaw. During the cruise when no flaps are set, the rudder pedals are more footrests.

New acronyms...

Converting onto the Velis not only ends up with you learning a bunch of added acronyms (you'll get to know your SOC from your SOH, and your BMS from your RFT), but more importantly, you'll end up understanding that energy management (by which I mean electrical energy) is front and centre to pretty much everything you do with the aircraft, with maybe the exception of washing it at the end of the day. And even that helps keep things as efficient as possible.

To put this energy management into some kind of context, you can fill the petrol version with 100 litres of fuel, which is roughly 40 times more energy than you'll get in the batteries of the Electro, and even though converting all of that chemical energy into mechanical energy isn't hugely efficient (most of it is lost to heat), there's still a lot more energy in the fuel tanks than in the batteries.

Starting at the front of the aircraft you have a three blade fixed-pitch carbon fibre propeller that's driven by the snappily named Pipistrel E-81-268MVLC motor and its dedicated controller. The job of the power controller/inverter is to convert the battery's DC power to the AC required by the motor, and to modulate the frequency of that AC power, which basically changes the engine rpm when commanded by the fly-by-wire throttle, which of course is now a power lever. Given the aeroplane's powertrain is basically controlled by software (some emergencies are dealt with by a reset rather than re-start), it would be possible to have the fixed-pitch propeller behave as either a traditional fixed-pitch prop or as if it had a constant speed unit. This is not within the gift of the pilot, and Pipistrel has chosen to make it behave as a standard fixed pitch propeller. If all that sounds a bit complicated, the engine still turns faster if you advance the power lever and slower if you pull it back. When you're waiting at the hold, bringing the power lever all of the way back to zero stops the prop, which is a little strange the first time you do it. The motor provides a maximum 65kW of power for take-off (multiply kW by 1.34 to get hp – so this has just over 87hp).

To power the motor there are two lithium-Ion battery packs, one in the nose and the other in the rear fuselage, each delivering 11kWh, so a total of 22kW/h. For an electric car comparison, the Tesla model 3 has 50kWh or 75kWh. If you are interested in the detail, inside each battery's aluminium casing you'll find four separate layers. Each layer contains 288 individual battery cells making 1,152 per battery. Each battery pack also has an integral Battery Management System (BMS) which monitors, manages ▶

Top Electronic Powerplant Systems Interface (EPSI) is just underneath the GPS. It's crucial in the safe operation of the aircraft with its various pages providing key information **Above** Although not quite as simple as an electric car, charging is controlled from the mobile charger **Right** EPSI in charging information mode: both progress and temperatures are monitored

and balances the individual cells, the associated cooling system and the calculation of the all important State of Charge (SOC) and State of Health (SOH), of which more later. Critical numbers like voltage, SOC and SOH are all displayed on the Electronic Powerplant System Interface (EPSI), which is basically the electric equivalent of a sophisticated engine information system in a piston aeroplane. It's an instrument that gets a lot of pilot attention throughout any flight. To keep everything at the right temperature there are two liquid (50% automotive glycol, 50% water) cooling systems, one for the batteries and one for the motor/inverter, with the inverter being the piece of equipment most likely to get very hot very quickly should there be a cooling system malfunction.

Charge, versus health

Before talking about energy use it's worth covering off SOC and SOH. The first of these, State of Charge, is fairly simple and can be thought of as the electric equivalent of a fuel gauge. With a bit of luck you'll be starting off at 100%, but if it happens to read 50% or less, go directly to the charging point before going flying, and once you are flying, plan to land with at least 30% SOC. The second, State of Health, is not quite so straightforward. If we stick to the fuel analogy, it sort of means the fuel tank capacity, but, while you would expect the fuel tank to remain the same size through its life, a battery's capacity will gradually diminish, meaning that while you may be departing with 100% showing on the SOC, if your SOH is only reading say 40%, you will have considerably less range or endurance. Your 'fuel tank' gets smaller over time, so range and endurance planning and management requires knowledge of both figures.

The EPSI will also give your Remaining Flight Time (RFT) value, but this is (obviously) only calculated on the current power setting (which is why that number looks scary when you are climbing out under full power), so has to be treated appropriately.

Point of no return...

To make it easier to grasp these concepts for an electric newbie, Claire ran through some numbers. Assuming your SOH is 100%, a 1,000ft climb at Vy will use 7% of your SOC, but if you are flying around with an older set of batteries that have an SOH of 40%, that same climb will use 10% of your 100% SOC. Once you are up there and in the cruise with power set to 25kW (which translates to just under 80kt) every 10 minutes of flight will use up another 19% of your state of charge (or 28% if your SOH is 40%). From these numbers it should be pretty clear that when flying the Velis you need to be on top of your planning, and very situationally aware when it comes to energy levels. If you need any more persuasion, the fact that the aircraft has no heater (too many magic pixies required) and a section in the POH discussing Point of No Return (PNR) calculations should be enough of a clue. In flight there are of course enough cockpit warnings too…

With such a precious resource it pays to understand the systems so that you don't squander minutes in the air while on the ground. You know all of that faffing you do while the temperatures are coming up in an avgas aeroplane? You really want to get that done and out of the way before you touch any of the switches, although to be fair, the master and avionics switches only power on the small 12v battery, so up to that point at least you're not depleting that essential SOC number. Turning on the master sets a self-test in motion, and in the space of a few seconds various temperature warnings and lights are tested while you ▶

Electric learning

Converting onto the Velis Electro takes more than a bit of a briefing and a couple of times around the circuit. There are a few relatively small handling differences that you'll notice – speed control can be a challenge if you are used to a draggier airframe and there's a bunch of adverse yaw at slow speeds with both stages of flap deployed, but the main area is obviously the powertrain, its associated systems and the various new emergencies that might conspire to spoil your day.

Pipistrel-online.com is the portal that's been set up to offer various (paid) courses covering Pipistrel aeroplanes. I worked my way through the Velis Electro course before writing this and found it superb. There's lots of material (plan for five decent length sessions over perhaps five days) which explain, test and deliver course completion certificates should you reach the required pass mark. Top marks to Pipistrel and its course developers. You can buy permanent access for €300 (which will also cover all future updates), or two weeks of access for €150.

Above Electric motor is the round unit behind the prop and the power controller/inverter the larger box with orange power cables running into the top. Cooling system is pretty in pink
Left Prop will not turn if the power lever has not been initially returned to the cut off position
Right Rear battery can be accessed thorough a panel behind the P1 seat. Each battery has an integral Battery Management System
Below All important EPSI screen, this time in flight mode (although on the ground) and showing a 50% SOC – 26 minutes of flight

Above Physical flight characteristics don't change, but the Velis Electro is significantly quieter and smoother than its petrol-fuelled sibling
Left In common with other high-wing Pipistrel aircraft the spar box runs through the top of cabin and can feel a little intrusive when you first climb in
Below left Seats are fixed so the rudder pedals are easily adjustable. They are also quite heavily sprung!
Below Cockpit looks smaller here than it is. The W&B is very simple, MTOW is 600kg and empty eight is 425kg there's no baggage, and no change in weight with 'fuel' quantity

monitor progress. The haptic stall warner is also tested and feels similar to a giant text message arriving through the top of the joystick. No giggling at the back. Assuming nothing's failed (don't fly if it has), you are good to move on to the next two switches which engage the main batteries and the powertrain. This is where things start getting serious as the cooling pumps are brought online. So check the area, power on, check the area again and advance the power lever. If, like me, the power lever had been left open before engaging batteries and power, nothing would happen. To get things going, you first need to bring the lever back to zero power (it's not called idle as the prop's not turning) and advance it from there. Needless to say you use as little power as you can during the taxi, so none of that inadvertently riding the brakes malarkey.

Power test

There's a quick power test at the hold to ensure that you have more than 50kW available, and with one stage of flap deployed, it's full power smoothly applied and away we go. Acceleration is brisk without being urgent, noise levels are low and everything is so very smooth. After about 300ft the flaps are brought up and power adjusted to Maximum Continuous Power (MCP) which is 48kW. Less power and a slower climb doesn't deliver better endurance, and we level out at 1,000ft +/- a bit for my gash flying with the curved and visually misleading coaming. I fly around the local area enjoying the handling and experimenting with power settings and their effect on the RFT.

The endurance numbers in the POH for an A to A flight (which only requires a 10 minute reserve) range between 52 minutes with standard cruise power (25kW) and batteries that are fully charged with a 100% SOH to 13 minutes for the worse possible combination of a high power setting and a 0% SOH.

Our first circuit works out fine, speed control is critical, with such a slippery airframe it would be easy to be too fast, and that will obviously make for a long ▶

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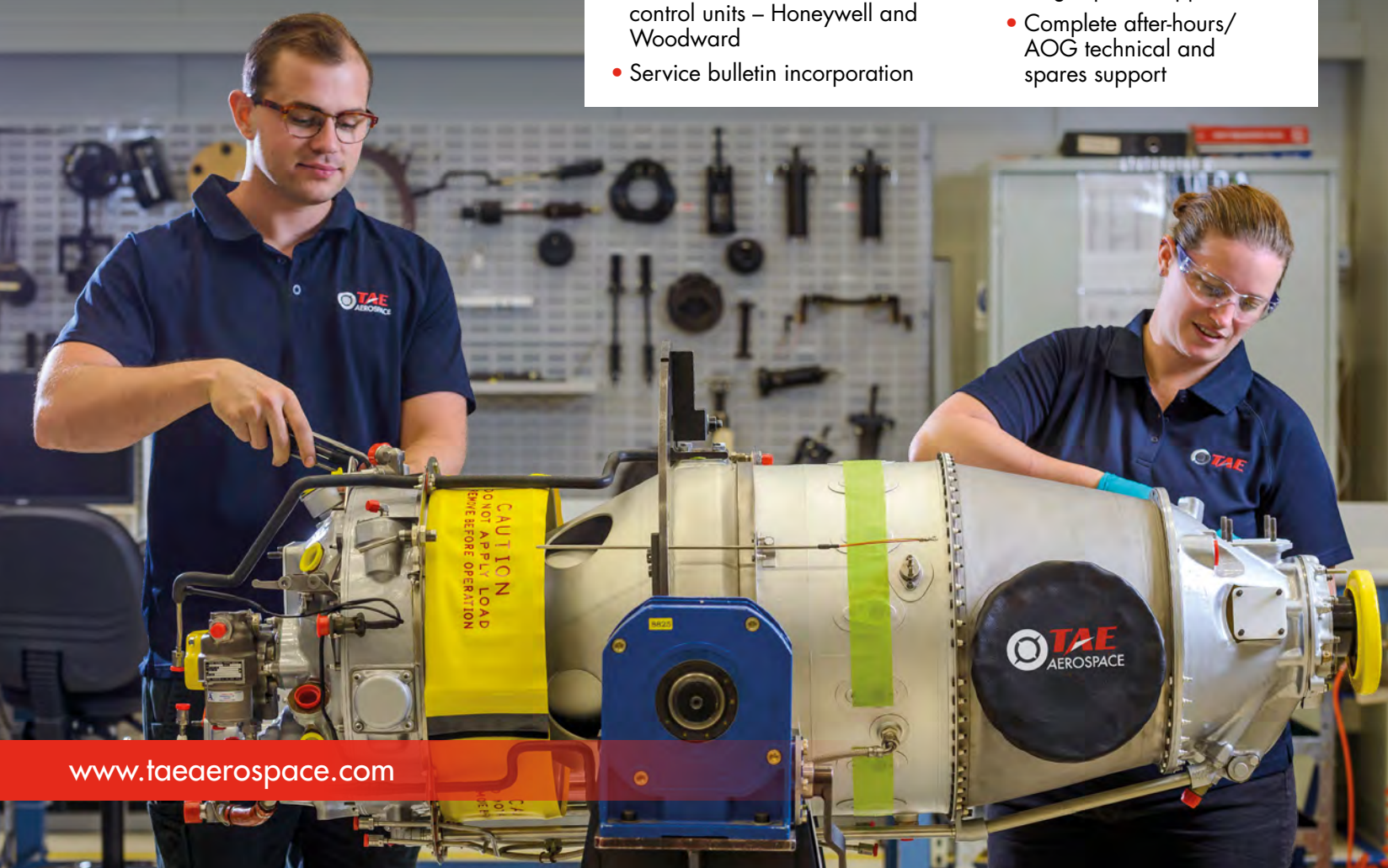

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Above UK's electric flying training pioneers... Deepak Mahajan and Claire Bartlett

landing. It is the landing performance that is critical with the Velis, so if there's enough room to land there's enough to take-off too (all things being equal).

Downwind for the last landing the RFT was reading 13 minutes, we were the only aircraft in the circuit so there wasn't a great deal of pressure and the landing and taxi back were relaxed. I can see how that might not be the case at a busy airfield, where a high stress situation might well lead to an approach that's sufficiently fast or ragged enough to require a go-around, the dwindling RFT and SOC only adding to the pressure during the second approach. According to the training manual, if your SOC is down at 30% there's enough battery for another circuit, and in extremis one more short one. While not the kindest thing for the battery, it is certainly better than re-arranging the undercarriage or running into the proverbial hedge…

As the training literature points out, you will be happiest when flying an electric aeroplane if you do not directly compare it to an avgas one. It's different and it's the start of a new class rather than the end. The Velis Electro is amazingly quiet, very smooth, comfortable and it should be very reliable while requiring minimal maintenance.

Less than £5 per hour

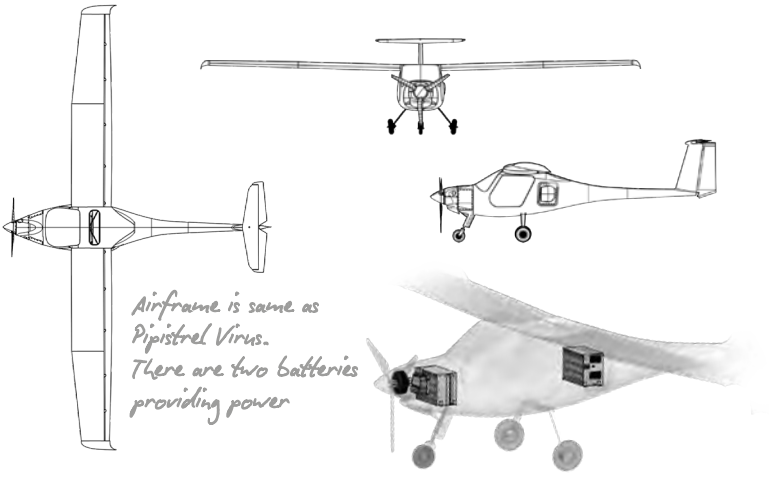
The cost of 'fuel' is less than £5/hr, against which you have to balance the capital investment (think €180,000) and the extra care that you'll want to lavish on the aeroplane. It can be operated in temperatures as low as -20C, but batteries should be stored between 0°C and 30°C meaning you are going to need some kind of plan for winter.

Realising that the high capital cost is a barrier for UK schools, Green Airside, a new aviation venture has been launched. It plans to buy up to 50 Velis Electro aircraft (the first 10 have been ordered) and to make them available on lease to flying schools. I think there is a niche for electric training aircraft, and integrating them will surely bring some operational challenges to overcome, but if the progress of electric aviation is anything like the progress I've seen in the automotive world (I've had three different electric cars over the last eight years), the future's very exciting.

TECH SPECS

Pipistrel Velis Electro

Flight training goes electric…



Performance
Max speed (Vne) 108kt
Cruise speed @ 35kW 90kt
Stall speed 45kt
Take-off distance 409m
Landing distance 450m
Rate of climb 647fpm
Endurance up to 50 mins
Glide Ratio 15:1

Weights & loading
Seats Two
Max take-off 600kg
Empty 428kg
Payload 172kg

Dimensions
Wingspan 35ft 1in (10.71m)
Wing area 102.4sq ft (9.51sqm)
Length 21ft 3in (6.47m)
Height 6ft 3in (1.9m)

Spec
Airframe Composite
Engine Pipistrel E-811
Max power 57.6kW
Propeller Three-blade, fixed-pitch
Avionics 5.7 inch LCD EPSI 570C
Undercarriage Fixed, tricycle

Manufacturer
Pipistrel Aircraft
www.pipistrel-aircraft.com

Contact
Fly About Aviation
Damyns Hall Aerodrome, Essex
T: 07540 899 690
www.flyaboutaviation.com

Price
Aircraft 175,000 euro +VAT
(includes M-20 charging box)

Above Velis Electro works well in the circuit where its low noise footprint brings significant advantages

My First Solo

Katherine Moloney

Helicopter pilot Katherine Moloney needed to get into a completely different mindset when learning to fly a fixed-wing. Interview by **Yayeri van Baarsen**

Solo stats

Helicopter and soon to be fixed-wing pilot Katherine Moloney has just been appointed as a UK Aviation Ambassador by the Department for Transport.
When 5 December 2017 (helicopter) / 16 August 2021 (fixed-wing)
Where Shoreham Airport (helicopter) / Shoreham Airport (fixed-wing)
Aircraft R44 (helicopter) / T67 Firefly (fixed-wing)
Hours at solo Approx. 30 (helicopter) / Approx. 11 (fixed-wing)
Hours now Approx. 300 (helicopter) /Approx. 20 (fixed-wing)

How did you get into aviation?
Even though aviation has always been in my life, with my dad being a prominent aviator, I had never considered learning to fly. It wasn't until I got a temporary job at Transair, picking and packing orders in the warehouse, that I developed an interest. When I was offered a trial lesson in an R44, I was hooked from the moment I touched the controls. Having been around airports for years, that flight gave me a new perspective on aviation and I suddenly realised what I was missing out on.

How did your flight training go?
It was an awesome challenge! I love learning something new and was lucky enough to have great instructors, who always made it fun. At the end of the day, that's what it's all about! Learning to fly was even more challenging than I anticipated. It's a real journey, also on a personal level. Passing each milestone as I progressed in my training was an amazing feeling.

Tell us about your first helicopter solo?
I was unlucky with the run-up to my solo, it kept getting delayed because of bad weather. On the other hand, this meant that when it did happen, on a freezing cold December day, I felt very ready for it. The one thing I wasn't quite prepared for, was the weight difference without an instructor. Although my instructor put 30lb in the heli to compensate, it's not the same feeling. However, I thoroughly enjoyed my solo and obtained my PPL(H) at the age of 19.

How's your transition from helicopter to fixed-wing PPL going?
Great! It's also been challenging, as I needed to get into a completely different mindset. The greatest difference was having to land at speed on a runway. In helicopters, you don't need the same forward movement to land. I do also sit down before take-off and have a good think about the type of aircraft I'm in.

Learning to fly a fixed-wing has also improved my helicopter flying. I now have a much better awareness of where fixed-wing aircraft are in the circuit.

My fixed-wing solo, which happened on a lovely summer evening, was also very enjoyable.

Although I already had experience flying a helicopter solo, I was still apprehensive because it was so different. It was like a first solo all over again and it felt absolutely awesome to be up there on my own!

> "Solo, the one thing I wasn't quite prepared for, was the weight difference without an instructor…"

What are your future flying plans?
There are so many different aspects to GA which I want to try after obtaining my PPL (A). I've already had a go at tailwheel flying in a Tiger Moth and have tried some aerobatics, which I love, so I'm planning to get these two ratings next. Afterwards, who knows, perhaps try gliding? There's so much to learn in aviation – I'd love to have a go at everything!

I also want to try and encourage more people to get into GA, especially women. This is something that's close to my heart. I already use social media to try and spread the word and show how much fun general aviation is. I have just been appointed Aviation Ambassador by the Department for Transport, I will continue to try and encourage others in this role.

What aircraft would you have in your fantasy hangar?
An MD 500E, which is the Ferrari of the helicopter world. It has loads of power and looks like so much fun to fly. I don't have enough experience yet to decide what fixed-wing aircraft I'd like, but definitely one that can fly upside-down.

What do you love most about flying?
Freedom, adventure and the challenges. Although freedom is such a clichéd answer, you do feel completely free in the air, there's nothing like it. Through GA, I've had some amazing experiences and I'm looking forward to future adventures.

Last, but not least, aviation is a challenge on many levels. You never stop learning and that's what I enjoy most.

Technical

There's never been a better time to upgrade your panel. We look at the brightest and the best across a wide range of functions... and costs

Panel Dreams

Whether you're browsing around on the internet, or checking out the latest equipment on a manufacturer's stand while visiting a show, the lure of the latest avionics for your instrument panel can be strong.

When it comes to significant panel work on some certified aircraft, a dream panel update could very easily end up costing more money than the aircraft is worth. The price of that tempting screen alone is never the whole story, as there'll be plenty of additional kit needed – and plenty of labour to turn plans into an installed reality – not to mention the inevitable mission creep (while I'm at it, I might as well…).

An appropriate avionics upgrade will add value to an aircraft and make it easier to sell, but you'll have to measure the result of a truly extravagant spend in satisfaction, rather than sterling or dollars. The good news is that most finance companies are happy to lend money for your must-have avionics upgrade.

It's worth a reminder that your shopping options will vary depending on the type of aircraft you operate, and the country where it is registered.

There's been massive progress in manufacturers developing AML STCs for the installation of modern avionics into certified aircraft, and for FAA-registered types, the choice is by far the largest, with Garmin and Dynon big screen systems going head-to-head. If you have a UK CAA-certified aircraft, then you'll need equipment which has gained the corresponding CAA or EASA approvals, and unfortunately, this is where you start to see your choices shrink, as not all manufacturers have pursued European approvals.

If you operate a UK Permit aircraft, the choices are much wider, and LAA Engineering has a technical leaflet to help with making choices when it comes to panel-mounted electronics, from big screen primary units to smaller backup units.

Opposite Garmin G3X Touch 10.6in landscape and 7in portrait screens, plus G5 backup with GTN650 Navigator and GFC500 Autopilot in a Grumman Tiger
Top left Triple-screen Dynon Skyview HDX, Dynon D-10A backup, with Avidyne IFD540, and remote control heads for radio and autopilot in a Beechcraft Bonanza
Top right Support for legacy systems in the Cirrus SR20/SR22 make this twin screen Garmin G500 TXIs upgrade possible, complemented by twin GTN650Xi, and a GI 275 standby horizon
Left New Avidyne Vantage offers dual 12in screen upgrade path for older Entegra-equipped Cirrus SR20 and SR22 aircraft

Big screen entertainment

Garmin G3X Touch/G500TXi: From $2,995/$11,995 – It's hard to ignore the relentless progress that Garmin has made in the battle of the big screens. At GA level, the systems that will get your attention are the G3X Touch and the G500TXI. Garmin is a favourite with pilots for its feature-filled units which are well thought out, well made and intuitive to operate.

The G3X touch is available in two sizes, 10.6in and 7in, both landscape displays. There's also a 7in portrait display. All have, as the name suggests, touchscreen controls. If you fancy an airliner-style display, you can have up to four displays working off the same back-end systems.

The G3X Touch displays can be used either as a Primary Flight Display or Multi-Function Display if you have two, or as a combined PFD/MFD with just one. There's a stack of options which can be integrated: engine info, ADS-B traffic and weather, transponder, wireless flight-plan transfer, synthetic vision and worldwide VFR charts.

It's easy to forget that before this avionics revolution the only way you could get glass screen greatness complete with 'bells and whistles' was to buy a new aircraft. Now pretty much everything can be retrofitted.

Dynon Avionics Skyview HDX: From $3,190 – is available in 7in and 10in landscape displays, with touchscreen and physical controls along a ledge at the bottom. It uses similar components and modules as previous Dynon systems, so existing users can upgrade fairly simply, or they can work alongside each other.

The displays on the Skyview HDX are superb with bright, strong colours, and packed with information. That takes some getting used to, but once you get familiar with the Dynon user-interface, everything is logically located.

Although there are some STCs for fitting Dynon avionics in certain certificated aircraft on the US FAA-register, there's nothing outside the homebuilt world that applies in the UK at the moment.

Avidyne Vantage: From $12,500 – Primarily targeted at owners of older model Cirrus aircraft, which featured the Entegra EFIS system, Avidyne's recently launched Vantage is a dual 12-inch diagonal PFD/MFD upgrade that will replace the Entegra system which was factory fitted to thousands of earlier Cirrus aircraft.

Navigate, communicate

Garmin GTN650 and GTN750Xi: From $12,695 / $18,245 – For years Garmin dominated the nav/com market with the ubiquitous GNS430 and GNS530 units. With well over 100,000 sold they're pretty common even in the rental fleet. As good as they are, the interface is not completely intuitive, so if you aren't a regular user it's worth spending some time with the manuals (or on YouTube) to get the hang of the buttonology. If your avionics refit is being done on a tight budget, it's worth considering the used market for one of these units.

Garmin replaced the GNS series with GTNs where the mainstays were the GTN650 and GTN750. They are not slide-in replacements for the GNS430 and GNS530, so if one of those was previously in the stack there's going to be some panel re-working for which you will need to budgeting.

The GTNs are great touchscreen navigators, but even they were replaced last year with upgraded versions which carry the Xi suffix. The upgrade added more computing capacity making it possible to add software-driven features such as the recently announced Smart Glide which uses the power of these units to automate tasks to reduce pilot workload during an engine failure.

Activated by either a dedicated button or by holding down the Direct-to button for two seconds, Smart Glide provides assistance to the pilot by recommending a suitable airport estimated to be within glide range, as well as providing critical

Left Garmin G5 twin stack set-up for attitude and DI
Below uAvionix AV20 (left) and AV30 are available in certified and experimental versions

Above left Stacking from the top down... Garmin GTN 750 Xi, GTN 650 Xi, and Garmin GFC 600 Autopilot
Above right Avidyne IFD540 at the top, IFD440 below

information to the pilot and optimising select avionics settings, helping save the pilot precious time and workload.

Add in a compatible Garmin autopilot, and Smart Glide can automatically engage the autopilot and pitch for the aircraft's best glide speed while navigating the aircraft within the vicinity of the selected airport so the pilot can execute an approach and landing. We suspect that the new Xi units will spawn all sorts of additional features as new software versions roll out.

Garmin also offer simpler gps/com units such as the GPS175, GNC355 and GNX375.

Avidyne IFD440/IFD540: From $11,599 / $15,999 – Alternatives to the Garmin GTN 650/750, using less panel space, are Avidyne's IFD540/IFD440 navcomm units. Designed to fit in the same space and trays as the venerable Garmin GNS 430/530 GPS, the IFD series is billed as a 'slide-out, slide-in' upgrade, which will not only bring extra capability, but should do so at a significantly lower install cost (assuming you had either a GNS430 or GNS530).

However, be warned that in many cases the details drive a bit more work than that, mostly to enable some of the advanced features of the IFD that never existed on the Garmin. Depending on the details of the previous installation, sometimes a new GPS aerial and coaxial must be fitted. Even considering this, the work required should be much less than completely re-working the panel.

The IFD 540/440 include built-in Wi-Fi and Bluetooth, allowing the IFD to fully and easily communicate with tablet devices. Two-way flight-plan transfer from participating apps, as well as the unique Avidyne IFD tablet app, allows the tablet to become an input and control point for the panel-mounted navigator. The units also offer synthetic vision capability when given an attitude input.

If you just want the GPS navigation capabilities without the nav/comm bits, then Avidyne also offer the IFD 545, 510 and 410 units. If you want to add an FMS bringing 3D Synthetic vision then by spending a bit more you can fit an IFD550.

Simpler refits

Garmin G5 - From $2,595 (certified) – If your budget or panel space is limited then the G5 provides an awful lot for the money and can be installed in a standard 3.125in space in the panel. The G5 has a 3.5in LCD screen and can be used as a primary flight indicator or as a standby.

The G5 is EASA approved for use as a directional indicator or a horizontal situation indicator in type certificated aircraft. Permit aircraft could already use this function.

The G5 can be paired with a navcomm unit or GPS to display magnetic heading, give VOR or GPS guidance, and provide distance and ground speed. It is independent of the vacuum system, and is installed on the basis of a Supplemental Type Certificate (STC), applicable to more than 600 aircraft types. Equally, with a GPS input the G5 can also be used with the certified GFC500, or the experimental GMC507 autopilot.

Installing two G5s means you can ditch your aircraft's old vacuum system, saving weight and increasing reliability in the process.

uAvionix AV20 and AV30: From $895 / $1,950 (certified) – The 3 1/8in uAvionix AV-30-C Electronic Flight Instrument System (EFIS), has been getting the attention of plenty of UK-pilots. This is primarily thanks to uAvionix having a Supplemental Type Certificate (STC) from the UK CAA for the AV-30-C that allows it to be installed on the FAA Approved Model List (AML). The AV-30-C is installed as a primary instrument, and can be configured as either an Attitude Indicator (AI) or a Directional Gyro (DG) indicator.

When installed as a non-required instrument (i.e., not replacing the existing approved AI or DG), the functional mode of the AV-30-C can be toggled between AI and DG, serving as a backup instrument. Multiple display presentations, including compass rose, GPS HSI, and GPS Arc views can be selected by the pilot. The AV-30-C also includes a probeless Angle of Attack system.

The AV-30-C is designated for installation as a

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ATTITUDE INDICATOR

PRIMARY
DIRECTIONAL GYRO

PRIMARY
SLIP

ANGLE OF ATTACK
DISPLAY

G-METER

+ MORE

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AV-30

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Above Garmin's GI 275 is a round electronic flight instrument that's available in a number of different variants, including attitude indicator, attitude-direction indicator (ADI), course deviation indicator (CDI), horizontal situation indicator (HSI), multi-function display (MFD), and engine indication system (EIS)
Below right Trig TY91 compact radio uses a control head unit and remote systems box to enable you to make the most of spare spaces in small panels
Bottom right Electronic engine monitors, like the Electronics International CGR30P, mean one round hole can now do the job of several engine instruments
Below The Evolution E5 from Aspen Avionics can be upgraded as budget allows

Working and playing together...

Beware, avionics components do not necessarily work or play well together, and if you are planning something that integrates, say nav/com with autopilot, plus traffic, and with engine information, you'll need to make sure that each individual component is able to communicate the required data in a language that can be understood for everything to work properly. This is the sort of information that is hard to come by without feeling that you're drowning in a sea of acronyms. Working with an installer at a reputable avionics shop will help make fundamental choices early enough in the process to save you money and angst later!

primary attitude indicator or directional gyro in piston single and twin aircraft weighing less than 6,000lb.

Both the AV30 and 20 can be connected to uAvionix's TailbeaconX transponder, which is a light, simple to install Mode S transponder, though its UK approval is still pending.

An add-on Wi-Fi bridge device for the AV-30 panel display enables it to connect to some traffic devices and display live airborne traffic.

Garmin GI 275: From $3.995 – Launched in early 2020, Garmin's GI 275 'round' electronic flight instrument has EASA approval. The GI 275 is available in a number of different variants, including attitude indicator, attitude-direction indicator (ADI), course deviation indicator (CDI), horizontal situation indicator (HSI), multi-function display (MFD), and engine indication system (EIS).

In addition, the GI 275 can also be installed as a standby attitude indicator when paired with large format electronic flight displays. Designed to fit in a standard aircraft panel and replace common 3.125in diameter flight instruments, the GI 275 means you can go high tech with the minimum of panel disruption.

GI 275 can also be integrated to directly control the basic settings of the GTX 345 or GTX 345R transponders, and drive the GFC 500 autopilot while serving as a standby attitude indicator interfaced with an original G500 series flight display.

Aspen Evolution E5: From $4.995 – Introduced in 2018, Aspen Avionics's Evolution E5 Dual Electronic Flight Instrument (EFI) has an FAA STC (Supplemental Type Certificate) for installation in VFR aircraft without a need for connection to another GPS system. The E5 can serve as the foundation in an Aspen-equipped panel as the display can be upgraded all the way to the top of the range IFR certified Aspen Pro Plus MAX PFD complete with Syn-Vis and Angle of Attack (AoA). It simply needs additional interfaces and software, but preserves the installation work already completed.

Aspen units can be doubled up, or even tripled, for added redundancy, additional features and to use more of the screen for individual functions. They are available for helicopters as well as many fixed-wing GA aircraft, and can be integrated with several autopilots, including the Avidyne DFC90.

Other kit to consider

Awkward spaces How do you go head-to-head with a giant like Garmin? In Trig's case it's by making radios and transponders with plenty of features that fit into both standard and awkward panels – and are beautifully designed for ease of use. So the TT31 transponder and TY96 are both slimline products that fit a standard panel, but if that's not possible then there's the compact TT21 transponder and TY91 transceiver, both with high-power versions if needed.

Autopilots – better than ever...

The good news is that modern digital autopilots are more capable than ever. Once fully understood, they're capable of flying the aeroplane with more accuracy and consistency than you or I will ever manage, and they free up that most valuable of things, mental capacity.

The bad news is that installing a fully integrated autopilot means wiring it into your other avionics as well as all sorts of mechanical control systems too.

From a feature and accuracy vs cost point of view they've never been better value, but by the time they are fitted the bill still has the potential to make your eyes water! That said, if your 'thing' is IFR or decent distance touring, a good autopilot will leverage your investment in the aeroplane and its shiny new avionics better than anything else.

There are of course decisions to be taken, some will be dictated by regulatory availability – does your autopilot of choice have an STC for your aeroplane? Some by capability – do you just want your autopilot to be able to hold wings level or follow a heading bug, or do you want something that's completely capable of vertical navigation and fully coupled instrument approaches?

The main competitors in the market for retro-fitted autopilots are Genesys (as S-TEC), Garmin and Avidyne. Without a doubt the S-TEC line has more approvals for its autopilots than any other manufacturer, but many are older rate-based systems with safe but legacy levels of performance.

Avidyne's DFC90 is an attitude-based digital autopilot that works well with already fitted S-TEC servos, so it can be a cost-effective way of upgrading an existing system in certain models without having to start from scratch, while Garmin's GFC500 and GFC600 are bringing fantastic capability to an increasingly large number of airframes at a cost of acquisition (if not installing) that's affordable (in aviation terms).

One feature of the newer digital autopilots is envelope protection. With the Garmins this runs in the background when the autopilot is off, so if you overbank, fly too fast or too slow, the autopilot will intervene, nudging things back where they belong. Worry not, it's easy to disengage, and can be switched off completely for certain kinds of training.

Below left With phone and tablet devices so prevalent in the cockpit now, any panel update should include some kind of USB charging outlet. A wide range are available, from certified to uncertified
Below right Consider your traffic options – electronic conspicuity can be achieved with a variety of built in products, and displayed on a wide array of screens. This is the traffic display on a Garmin GTN750
Bottom In the uncertified world, you'll find a number of AHRS options that can drive an instrument display and horizon on a tablet or phone. Prices and capabilities vary

Engine Monitors There are a couple of paths to follow and each has options. First, you must decide if you are going primary replacement or supplemental route. Primary replacement means you remove many or all the old, legacy gauges, as they will be replaced by the engine monitor. On the other hand, taking the supplemental route, while the engine monitor can indeed monitor many of the same functions as a primary unit, the traditional engine instruments are retained and according to the rules are the primary indication to be referred to.

Most of the primary systems come in a large screen size so this is usually best done as part of a major panel rework, or a smaller size usually designed to fit in a 3.125in instrument hole, more suited for an update without a complete panel redo.

The Electronics International CGR30P is a primary replacement engine monitor that fits in a 3.125in instrument hole. Typically this spot was formerly occupied by the tachometer, one of the many instruments the CGR30P can replace. The EI CGR-30P is the little brother of the large-screen MVP-50, so they share similar feature sets.

These monitors use a remote box, mounted separately from the display instrument, to interface with all of the various sensor inputs. In some cases, this remote box makes installation simpler, since there are only a few wires that need to be brought to the panel, but in others the work involved in mounting the remote box is more than saved by the simplified wiring.

In the supplemental engine monitor space, the JPI EDM-830 earns high marks in our book, mounting in the 3.125in instrument hole but still offering a big LCD screen.

Safety Accident Analysis

Pitot-static problems...

We tend to forget how much of what we do in the cockpit is derived from an accurate airspeed. So if that is lacking for whatever reason, then as **Steve Ayres** discovers, life can get very confusing

Many of us probably think identification of pitot-static problems begin and end during the take-off roll, but they can occur at any time, are usually insidious, difficult to analyse and have unpredictable outcomes. From the 'human-induced' failure to remove the pitot cover to leaks and blockages either from foreign matter or ice, can all manifest themselves in a variety of ways – and lead to serious confusion in the cockpit. When time is short for analysis, such as during take-off, premeditated action is essential, but given more time some diagnosis is possible although, as these incidents prove, don't expect to find it easy!

Accident 1

A Mooney M20J impacted a car after aborting a take-off from Freeway Airport (W00), Bowie, Maryland. The private pilot and pilot-rated passenger sustained minor injuries.

The aeroplane sustained substantial damage. According to the pilot, he performed a pre-flight inspection of the aeroplane with no anomalies noted. Then, he taxied to the active runway and initiated the take-off roll. He noted that the airspeed rose to 40mph, but when he looked again a few moments later, the airspeed was still 40mph.

The aeroplane was about one-third to halfway down the 2,420ft runway when the pilot elected to abort the take-off, and subsequently overran the departure end of the runway.

The aeroplane broke through the airport perimeter fence and struck a car on a road just off the airport property. The aeroplane's left wing sustained leading-edge impact damage and had separated from the airframe at the wing root. The right wing and fuselage were also substantially damaged.

A Federal Aviation Administration (FAA) inspector performed an examination of the aeroplane's pitot-static system. The tubing that supplied air to the airspeed indicator was secure to the back of the instrument. Uncalibrated pressurised air was applied to the fractured tubing at the left-wing root, and the airspeed indicator moved and indicated up to 95kt. The pitot tube was undamaged and remained attached to the left wing. It was removed and no debris was noted in the ram-air intake or drainage holes.

An attempt was made to run pressurised air from the pitot tube to the left-wing root, however, due to impact damage on the wing, air was unable to pass through the tubing.

Due to the wing's impact damage, investigators were unable to functionally test the portion of the pitot system between the pitot tube and the left-wing root. It is possible that the pitot static system was blocked during the accident flight, preventing the airspeed indicator from displaying airspeeds above 40mph and leading the pilot to decide to abort the take-off, then the blockage became dislodged during the accident sequence.

"The aircraft's indicated airspeed began to decay while its ground speed, remained steady"

Accident 2

The pilot of a Cessna 421B departed on a short cross-country flight in the twin-engine aeroplane. Instrument meteorological conditions (IMC) were present at the time. While en route at an altitude of 3,000ft msl, the pilot reported that the aeroplane was 'picking up icing' and that he needed to 'pick up speed'. The controller then cleared the pilot to descend, then to climb, in order to exit the icing conditions. Shortly thereafter, the controller issued a low altitude alert.

The pilot indicated that he was climbing, then radar and radio contact with the aeroplane was lost shortly thereafter. The aeroplane impacted a field about seven miles short of the destination airport.

Examination of the aeroplane was limited due to the fragmentation of the wreckage, however, no pre-impact anomalies were noted during the airframe and engine examinations. Extensive damage to the pitot-static and deicing systems precluded functional testing of the two systems.

A review of data recorded from onboard avionics units indicated that, about the time the pilot reported to the controller that the aeroplane was accumulating ice, the aeroplane's indicated airspeed had begun to diverge from its ground speed as calculated by position data. About 17 minutes after take-off, the aeroplane's indicated airspeed began to decay, while its ground speed, as calculated from position information, remained steady. About one minute later, fuel flow increased from 38 gallons per hour (gph) to 60 gph, consistent with an increase in engine power. At this time, the indicated airspeed had decayed to about 100kt, while the ground speed remained about 150kt.

For the final approx 2.5 minutes of the flight, the aeroplane was in a left turn. The aeroplane entered a climb to about 3,500ft msl, then began descending around 5,000ft per

Mark Mitchell

minute. The data recorded 'SINK RATE' and 'PULL UP PULL UP' annunciations, and the aeroplane's rate of descent was arrested about 300ft agl. The aeroplane subsequently entered two additional sets of climbs and descents, receiving the same annunciations. However, the pilot did not recover from the third descent.

During this time, the aeroplane's ground speed, and likely airspeed, exceeded the aeroplane's manoeuvring speed (Va) of 150kt, and during both the first and final 'SINK RATE' annunciations, the aeroplane's ground speed exceeded its maximum structural cruising speed (Vno) of 200kt. It is likely that the pilot became distracted by the erroneous airspeed indication due to icing of the pitot probe and subsequently lost control while manoeuvring.

Accident 3

A Royal Flying Doctor Service Pilatus PC-12/47E departed Jandakot Airport for Albany Airport WA.

About four minutes after commencing descent into Albany from flight level 210 and while in icing conditions, the pilot received an airspeed mis-compare indicated by an amber colouration on the airspeed tape on the primary flight displays (PFD). At this time the pilot reported that there was a light dusting of ice on the leading edge of the aircraft's wings and on the radome. The pilot did not deem this level of icing to be a concern and did not observe any issues or receive any alerts from the aircraft's anti-icing systems.

While continuing the descent the pilot compared the airspeeds displayed on the two PFDs with the airspeed indication on the electronic secondary instrument system (ESIS).

Based on the speed readings from the PFDs and the ESIS the pilot determined that the left PFD was likely displaying incorrect information. As the descent continued, the pilot observed the airspeed on the left PFD continuing to decrease. Having assessed that a blocked pitot tube was the likely cause of the issue, the pilot elected to climb the aircraft in an attempt to get clear of cloud. During this climb the pilot's indicated airspeed increased and exceeded the aircraft's maximum allowable speed accompanied by an overspeed alert. Consequently, he elected to discontinue the planned flight and return the aircraft to Jandakot. Unable to obtain visual conditions, the pilot again descended the aircraft at which point the left indicated airspeed reduced to zero – no stall warning was activated.

At 6,000ft visual conditions were obtained, however, the turbulence at this level was severe and the aircraft was climbed to 10,000ft. The pilot observed a heading mismatch on both the left and right PFDs, which continued to increase until there was reported 50-60° of indicated heading difference between them. Further, the pilot also reported that during this sequence the left PFD displayed an incorrect attitude, indicating that the aircraft was level when the nose was approximately 3° below the horizon.

Approaching Jandakot, the pilot reported all indications had returned to normal and remained that way until short final when an altitude mismatch and low airspeed warning was identified on the PFDs.

The ATSB determined that during the flight, water entered the aircraft's pitot tube either as rain or an accumulation of moisture from flying through cloud. Due to a blockage in the pitot tube drain the water had been unable to escape. This in turn obstructed the flow of air to the aircraft's air data attitude heading reference system, resulting in an incorrect airspeed being displayed on the left PFD and triggering mis-compare indications on both PFDs. Also, a heading mismatch was likely caused by the aircraft's movement through an area of moderate to severe turbulence during the return to Jandakot.

Spurious instrument readings can create a more complex scenario for flight crew than an instrument failure. In this case the pilot's recent training assisted in effectively assessing the situation, determining the likely failure mode and identifying the most accurate source of available data for a safe return to the departure airport.

Ayres' Analysis

Having experienced a 'pitot-static problem' first hand, I learned how seriously confusing and potentially hazardous such events can be. I describe it as a 'problem' because, to this day, I am uncertain of the exact cause. It was a relatively cold VMC day with isolated towering cumulus. Everything seemed normal until levelling around 7,000ft when the 'straight and level' attitude required increasing amounts of power to maintain speed and the aircraft wanted to climb. Turns felt really 'pitchy' suggesting an elevated TAS. With no GPS derived ground speed it was only through setting specific engine powers that I had a sense of spurious instrument indications, which appeared to be under-reading airspeed. However, it took time and some serious head-scratching to work it all out and even then I wasn't convinced I had it right. Being qualified in close formation helped, and it was only when comparing my aircraft's performance with that of another, did I have confidence in which instruments could be trusted.

These incidents further illustrate clearly the problems we can all face. There are, of course, those who have failed to remove the pitot cover and those who have yet to do so. In such circumstances identifying the no-go point on the take-off roll is key to making that snap decision to continue or to abort. And what will you do if you do get airborne? A 'pairs' approach in close formation is perahps not an option for most of us but using GPS ground speed. However, experience shows focusing on a GPS speed rather than the big 'ole ASI can be challenging and certainly adds to the 'pucker factor'.

You will want to be fast rather than slow on the approach, so an extended rollout on landing is almost inevitable. Diversion to a longer runway with a measured head wind component may also help to reduce some of the risk and make the cockpit workload less stressful. For me, though, the crew of the PC-12 made a really good point in that they felt it was an 'Operation Proficiency Check' (OPC) which helped them diagnose their problem. They state: "In the OPC, carried out about a month before the incident, the pilot, under the guidance of a check and training pilot, observed the aircraft's performance at various engine power settings and aircraft attitude combinations". That was mostly my experience, but expect the analysis to take time and to become discombobulated in the process! Having got the diagnosis sorted, you've just the landing to worry about!

Safety Accident Reports
Out-climbed by the surroundings...

Steve Ayres summarises and comments on accident reports from around the world and looks at a handy new personal carbon monoxide monitor

Manoeuvring limited

Robin DR400-140B
F-GHYQ
Albertville, France
Injuries: Two serious, two minor

After taking off from Albertville aerodrome, the pilot began the climb towards the Belledonne massif. He flew over the town of Aiton and then entered an orbit before approaching a pass near Fort Montgilbert.

He realised late on approaching the pass, while still climbing, that the aeroplane's altitude would not be enough to clear it.

Judging that he would not be able to turn around given the terrain, the pilot tried to gain altitude by further increasing the attitude of the aircraft. This had the consequences of reducing the speed towards the stall.

He then initiated a left turn to fly parallel to the ridgeline, thus reducing further the margin to the stall. He then found himself facing the western slope of the second ridgeline. The aeroplane collided with fir trees and ended up in the snow.

Comment Running out of performance is not something that happens often in the UK, but it does occur and the outcome is the same.

In this instance the pilot recognised the risks and did much to mitigate them, minimising fuel load and choosing a route over lower ground than had originally been planned.

However, it wasn't enough and the pilot was ultimately caught out by confusing a relatively high nose attitude with a flight path he thought would take them clear… All too easily done.

New gear unsettling

Kitfox Classic 4
N47KC
New Carlisle, Ohio
Injuries: Two minor

The pilot and his pilot-rated-passenger were conducting a local flight in the tailwheel-equipped experimental aeroplane. The accident occurred during the first landing after the original main landing gear, equipped with bungee-cord shock absorber, had been replaced with a main landing gear equipped with a steel-spring shock absorber.

The pilot reported that after a normal touchdown on the main landing gear he pushed the control stick slightly forward to keep the aeroplane from ballooning, but the aeroplane nosed over during the landing roll.

A witness reported seeing the aeroplane's tail continue to rise during the landing roll until the aeroplane nosed over on the runway.

A post-accident fire destroyed the aeroplane's cabin and the inboard halves of both wings.

A review of the aeroplane's weight-and-balance record indicated that the owner/builder had correctly recalculated the centre-of-gravity (CG) position after the main landing gear replacement, and although the CG location had not moved appreciably, the wheel axle position had moved aft about 2.75 inches, thus increasing the aeroplane's tendency to nose over during ground operations.

Comment I understand the undercarriage modification is fairly common in the UK and has the appropriate approvals, but it is worth noting that modifications can have implications for other handling aspects. Even if it is simply to make some of them slightly less forgiving.

"The pilot found himself facing the western slope of the ridgeline"

Intentions prove costly

Aeroprakt A32 Vixxen
G-CLEH
Rossall Airfield, Lancashire
Injuries: None

The aircraft has a fuel tank in each wing with a valve for each tank situated behind the seats, at shoulder level, on either side of the cockpit.

During the flight the pilot closed the left valve to balance the fuel, as more had been used from this tank.

After landing, the pilot decided to do a few circuits, and so immediately taxied back to the runway while configuring the aircraft. Just before commencing the take-off he remembered he had closed a fuel valve and reached behind the seat and moved a fuel valve handle.

Shortly after take-off, at about 100ft agl, the engine stopped and the pilot landed the aircraft in a field during which the nosewheel collapsed and the propeller was damaged. The pilot secured the aircraft and found that both fuel tank valves were in the closed position.

Comment An honest account of a slightly different take on poor fuel management. In this instance a change of intentions to get airborne once again probably meant that after-landing and pre-take-off checks were not completed fully. In any event, changing a tank selection just before take-off always carries additional risk.

Back to it...

Aviat A-1C-200 Husky Aircraft
N298WY
Grover, Wyoming
Injuries: One serious

The pilot in the experimental test aeroplane reported that the purpose

Safety Accident Reports

of the flight was to conduct spin testing, in support of future aeroplane type certification. Prior to the accident, he had completed seven power-on test spins in which all spins exhibited no unusual or flat tendency.

During the accident flight, the test condition called for a spin from level flight, with flaps up, and aft centre of gravity, heavy weight, to the left, with aileron opposite of the turn.

After one 360° rotation, the nose was much higher above the horizon than prior test conditions. The pilot applied corrective controls with no effect on any axis.

The pilot was not able to recover the aeroplane from the induced spin and subsequently disembarked the aeroplane about 10,180ft msl. The pilot deployed his emergency parachute and during his descent he noted that the aeroplane was in a flat spin to ground impact.

Comment This was a reminder, if one was needed, that not everything goes according to plan, even in the flight testing world.

The Husky aircraft has been around for a long time, but a significant increase in power and a change to the flight controls, meant spin testing of the new prototype required pre-certification.

'SA' loss outcome

Cessna 180
N4802
Denver, Colorado
Injuries: None

The pilot reported that he saw what appeared to be his intended landing runway and set up for landing.

During the landing touchdown, the pilot noticed that the aeroplane was difficult to control due to the soft soil. As the aeroplane continued the rollout, it drifted about 20ft off the pilot's intended direction into softer soil. Just before the aeroplane came to a stop, the right tyre sunk into the soft ground and the aeroplane nosed over coming to rest inverted. After the accident, the pilot reported that he had not landed on his intended runway but on an unimproved dirt road about 0.3 miles from the runway that ran parallel to the road.

The pilot reported that he had spent too much time looking for traffic in the landing pattern and lost situational awareness of his position relative to the runway.

Comment We've all lost 'SA' (situational awareness) at some time or another and it can be scary.

Usually the best remedy is a period of flying straight and level into a known safe area while getting one's 'act' back together. I don't know if it would have helped in this instance, but taking a break away from busy traffic patterns is sometimes the best option when things get too hectic.

"The flight instructor stated, 'let's show them what aviation is all about' "

Spectacular spectacle

Kolb Flyer SS
N38KF
Lutz, Florida
Injuries: Two minor

The purpose of the flight was to prepare the student pilot for a solo cross-country flight. After taxying to the end of the runway, the flight instructor told the student to perform a short field take-off.

The student pilot described that there was a crowd at the airport café, and that the flight instructor stated, 'let's show them what aviation is all about'. The student pilot said that the take-off roll was normal, and as he pulled back on the flight control stick and began to pitch for a best climb attitude, the aeroplane struggled to fly.

The student pilot then felt back pressure on the control stick and noted that the flight instructor was pulling the stick back more but had not initiated a positive transfer of controls. The aeroplane then veered to the left, the flight instructor pitched the nose down, and the aeroplane struck a berm off the left side of the runway before it 'cartwheeled' twice and came to rest.

During the accident sequence the aeroplane's left wing and empennage were substantially damaged.

Comment Well that certainly showed them. Clearly not the advert for aviation that was intended though. Students tend to mimic their instructors in later life so even the concept of 'showing them what aviation is about' rings alarm bells.

Safety kit

Sensorcon AV8 portable active CO monitor & CAA Trial

FROM £135 plus VAT FROM LAS Aerospace

A new active personal CO monitor arriving on the market for pilots is a good reason to first remind readers that the CAA is running a survey on the use of active CO detectors in general aviation. Anyone can register through here for a trial that runs until August next year and which will hopefully produce some useful safety feedback. Meanwhile, Sensorcon has introduced a couple of versions of their CO Monitors for aviation use. Their non-aviation versions are more widely available in the UK but the AV8 can be obtained through LAS Aerospace by searching with the Aircraft Spruce product code.

There are a number of models but buyers will probably make their decision based on a requirement for the vibration mode. Most, though, will probably choose to make use of the panel mount and cite it where it can be frequently scanned.

Glaciers of the Alps

Garrett Fisher spends an intense 83 hours flying his Cub in just 48 days, utterly entranced on a mission to photograph every non-polar glacier on Earth from an aerial perspective

The genesis for the project at hand has an origin that began some years ago, just before shipping my PA11 Cub to Europe. At the time, I was living in a residential airpark south of Jackson Hole, Wyoming, USA. My expectation was to continue living there for some years, so I held in the back of my mind that the first glaciers of the Rockies began within a 100-mile radius of the place, barring a few small ones in northern Colorado. It is logical that I did not expect to dive in and photograph every glacier I could find as soon as possible. I initially set a goal to visit the glaciers of Wyoming that year, which would be ambitious enough, given their locations near Yellowstone and Grand Teton National Parks, and two other profound wilderness areas. Montana, with her eponymous Glacier National Park, would just have to wait until another time.

While I was aware that summer offers a limited window where annual snows melt to reveal glaciers clearly below, I had not, until that point, ever laid eyes on a glacier from the air, nor had I made any attempts at completing a contrived list inside a limited season. As I made exploratory trips into the Wind River Range and the Teton Range, I was finally able to get started in early August… only to get blocked by thick wildfire smoke for almost three weeks. I had made two profound flights into the mountains, getting up close and personal like never before – and seeing for the first time the immensity of detail available when the surface of the glacier is visible. I call it 'centuries of snowfall', as layers and layers of seasons are visible much like tree rings. Did this snow fall before America was even a nation? Possibly…

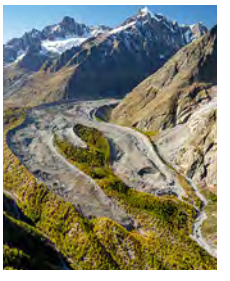
It confirmed that summer is, by far, the only season to photograph glaciers. Now with the wildfire smoke problem, I was approaching September with much more to do in the State of Wyoming. What further complicates things is that the property shenanigans that timed with the visit of the Germans in 2015 struck precisely during smoke season, which meant that when the air cleared, I had an informal plan to move to Europe later in the year. It would be my first and last season in Wyoming. Suffice it to say, the weather cooperated, and I decided to photograph every glacier in Montana as well. September 2015 remains my record for flying, clocking up 65 hours.

Glaciers do not reappear in my flying obsessions again until 2018. Germany, Spain, the Pyrenees, and flying in Europe in general was so much to comprehend that I was satisfied with my endeavours for a three-year period, until I came to Switzerland, where I first set out to photograph the 82 peaks over 4,000 metres (*FLYER* March 2021). What is fascinating is that, while I was appropriately awe-inspired by the immensity, length, depth, and amazing beauty of the large glaciers of the Alps, I was so single-mindedly focused on the peaks that I got a bit snooty… I said to myself that having seen the largest glaciers, what was the excitement about chasing the small ones? While I knew that if enough time was spent in the Alps, I would eventually photograph them all, I had to slap myself and recall that the 'small' glaciers of the Alps are immense compared to those of the American Rockies. In any case, it did not help that the time in Switzerland came to an end for almost a year.

In the summer of 2019, I was back at it and decided to photograph the glaciers of the Bernese Alps, plus write a book about it. It had taken some time to decide how to approach the glacier problem, as the simple fact was that there are enough for 10 books. I also did not want to binge consume them and have nothing left over, which is always an ironic – yet lingering – terror in the back of my mind that I would run out of things to explore.

I chose the Bernese Alps for a few reasons: the largest glaciers existed there, some of the most profound terrain in the Alps are in this range, it was closest to my

Opposite
Mer de Glace, Chamonix France, September 1



Above Glacier de la Pilatte, Parc National des Ecrins, France, September 1
Centre top Glacier du Miage, Italy, October 21
Centre middle Tongue of Glacier du Miage, Italy, October 21
Centre bottom Glacier du Tour, Chamonix France, August 23

base airport, and it contains some of the most recognisable tourist destinations. It also meant enhancing my skills around glacier flying. To fly a peak is one thing… they tend to be small at the top and can be viewed from above, laterally, or below, and usually from any side, which helps with the wind. Glaciers hug the slopes of mountains and follow gravity into profound terrain below, which means that clouds, shadows, and wind are a problem. One must be much more tenacious, patient, daring, and skilled to photograph each of the glaciers in an area than each of the peaks.

While the Bernese Alps season in 2019 was transcendental, it did not lead to much in the way of concerted glacier effort in 2020. Between Covid, poorly timed summer snows, and a dose of my own malaise, I merely worked on the glaciers of the Valais Alps (where the Matterhorn is located), which I had already photographed many of in 2018, 2019, and in the offseason.

Tall peaks

By the end of 2020, I had photographed the bulk of the glaciers of the Massif du Mont Blanc, the Bernese Alps, and the Valais Alps. This terrain, while it comprises possibly only 8% of the surface area of the Alps, contains the highest concentration of tall peaks and the largest glaciers. I had visited almost all glacial features in a combination of targeted effort, chipping away at it incrementally, and frolicking for pleasure because the mountains were pointy and big, while the glaciers were pretty (and I needed something to fly to). While there were already pre-tremors of what was coming in 2021, as I had articulated an early fear of 'flying to them all and then having nothing to do' in 2018, I still had no knowledge of what was brewing mentally.

I still do not fully recall each step of how the decision was made. I do know that I was evaluating my motivation behind flying and what I was hoping to accomplish. Glaciers featured high on the list as something that consistently was satisfying, and that I couldn't seem to get enough of. One evening in early February 2021, I decided that I was going to form a 'non-profit' and 'fly to every non-polar glacier on earth and photograph them'.

Months of project management ensued, including nonprofit applications and other such ephemera, before the realities of the pandemic restrictions set in – 'You're not going far in 2021, so you might as well get the Alps done'. Could it be done in one season? Or should I take it a bit slower? If it took two years to complete the Alps, then I dare say I would be dead before the glacier project would be completed. The Alps it would be.

I had started aeroplane shopping for a Super Cub, having decided in May 2021 that the PA-11 would not work for the glaciers of Norway and Sweden. It is 15 hours each way of flying with one tank, just to get there. Iceland was out of the question… even if I spent $10,000 or more to install a second wing tank. I couldn't get my head around the North Atlantic in that aircraft. I needed a Super Cub… which I still haven't found yet. The PA-11 would have to do.

At first glance, it seemed doable. Then when I thought about it in practical reality, imagining each flight, including the transit flights to get to various glacier areas, factoring the reality of alternating weather, fuel limitations, and sparse airports, it started to seem silly. My response was not to think about the specifics, but to instead dive right in and do what I could. I couldn't control the weather nor many other factors, so I got on with it.

Premature melting

In early July, I was wandering around the base of the Matterhorn to alleviate my boredom when I noticed that it appeared the Valais Alps glaciers had some premature melting. As the Bernese Alps had been utterly slammed with snow the prior winter, I figured that the ridges to the south might have had a lighter season, so perhaps I could knock off a few in that range that I had discovered I had missed. In mid-July, I set off for a three-hour flight, only to find that a recent rainstorm was a snowstorm over the glaciers, rendering the flight useless from a photography standpoint.

A week later, I was over Mont Blanc, again alleviating my boredom, when I noticed the glaciers to the south over Italy, where they looked much more visible. "That would make sense, it is closer to the Mediterranean and warmer," I thought to myself.

Below Übeltalferner, South Tyrol Italy, August 11

Venedigerkees, Höhe Tauern National Park, Austria, August 12

Grossvenediger, Höhe Tauern National Park, Austria, August 12

Convergence of Beichgletscher and Oberaletschgletscher, Switzerland, September 23

Pasterzenboden Glacier, Grossglockner Austria (highest peak in Austria), August 12

A few days later, at the end of July, I decided to take a flight from Switzerland to Italy and back. While I enjoyed knocking off quite a few glaciers, winds were 30kt, and I had to fight them with lots of added power as the glaciers were on the wrong side of the ridge. Roughly two hours into the flight, a glance at the fuel gauge induced a wave of panic, whereby I turned the nose back to Switzerland. After doing some calculations over Aosta, Italy, I determined I could make it, not back to base, but to Sion, which I did, breaking my European record for fuel consumption, although I still had the 30-minute reserve, despite unpleasant readings on the gauge.

Tolerable weather

The weather went south in early August, with a brief window where I could check out the snowpack on the Aletschgletscher. While it was not perfect, it was tolerable for glacier photography. It was time to begin. I did an oil change, timing check, plug clean and rotation, compression check, lubrication, brake fluid top off, comprehensive check of the Cub, and loaded a pile of tools and other materials in the back, at the ready for a batch of coming good weather. I considered diving into Italy and decided instead to head to Austria, to get the farthest glaciers completed first. The most distant glacier was almost 350 miles east. If I did not get it done now, I might never get it done…

It was off to St. Moritz, Switzerland for the first night, where I chipped away at many glaciers around Piz Bernina. The next morning, amid a passing rain shower, I climbed into the Ötzaler Alps of Austria, under an overcast deck, sandwiched in 30kt winds. "You'll never get it done if you wait for sunshine," I said to myself, and got to work.

It was quite gruelling, with more glaciers than I expected, lots of turbulence, and not enough fuel. I completed half of what I expected before landing in Innsbruck, Austria, for fuel, 10,500ft below. While I was painfully cold in the cockpit, it was 29°C on the ground. After a 45-minute climb, I was back up into the Alps, freezing cold and getting beaten up by the wind, for another three-hour photography binge. Back down to Innsbruck, up again to the few glaciers around the Zugspitze in Germany, and back to Innsbruck for the night. At this point, my backside hurt so much from the bumps and uncomfortable Cub seat, so a final large pothole on the taxi-ride back to the hotel had me thinking I might need a proctologist…

Above Care Alto Glacier, South Tyrol Italy – September 24
Centre top Tschiervagletscher, St. Moritz, Switzerland, August 22
Centre middle Tongue of the Aletschgletscher, Switzerland (longest in the Alps), September 23
Centre bottom Fellaria Est Glacier, Italy, August 21

The next day, it was a three-hour session getting half of the glaciers of the Höhe Tauern National Park in Austria, which contains the highest peaks in the country. The glaciers have nice coverage, though there is a rather strict zone where one must maintain 2,000ft agl, though it allows for some valley areas that work. The problem was that 2,000ft agl over most lower ridges was the altitude of the cumulus clouds, which made for some immensely difficult flying, photography, and calculations.

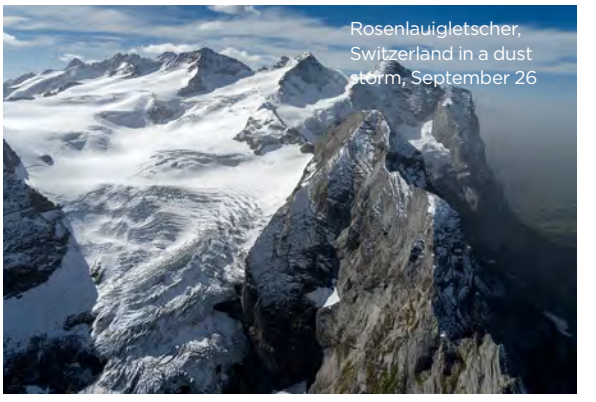
Small glaciers

Down to Zell am See, 10,000ft below, and back up again for the eastern half of the park and back down for more fuel. I had to fly back to Innsbruck due to hotel availability, so I sideswiped a few more glaciers on the way. The next morning, I had to return east as I ran out of opening hours the day before to get the few small glaciers farthest east in the Alps. I also needed to get a few in Berchtesgaden, Germany, where at that moment, the only thunderstorm in Central Europe was sitting. By the time I got there, it had moved on, so I was able to photograph some glaciers in lingering light rain, which was a first. Eastward I went to get the farthest one, then down to Zell am See for fuel.

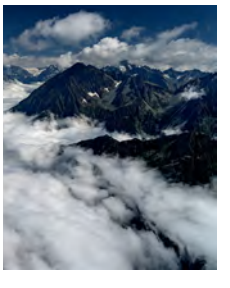
Annoyingly, headwinds, plus a closed airport in western Austria, meant that I had to land at Innsbruck again, roughly an hour away for fuel, which messed up the chance to get back to base. I decided to make the best of it, pick off a few glaciers in western Austria, and overnighted in St. Gallen, Switzerland. By the time I got back the next day, it had been 23 hours on the tach in four days which, in Europe, is much more complicated than flying the same number of hours in the US. I was extremely tired.

That didn't prevent a morning flight two days later to see Mont Blanc above the clouds in morning light, as I was up unusually early due to all the travel resetting my sleep cycle. Three days after that, I stayed three nights in St. Moritz, with the goal to pick off the

Below Persgletscher, Piz Bernina, St. Moritz, Switzerland, Aug 19


Rosenlauigletscher, Switzerland in a dust storm, September 26

Above Glacier de L'Inverneau, Glacier de la Martin, Glacier Sud de la Gurraz, France (front to back), July 29
Centre top Ghiacciaio dei Forni, Parco Nazionale dello Stelvio, Italy, August 21
Centre middle Hüfifirn, Glarus Alps, Switzerland, August 25
Centre bottom VFR on Top – Altdorf, Switzerland, August 25



remaining glaciers of the eastern Alps. While I was able to fight most of the Mediterranean and summer towering cumulus, the clouds were too petulant to get the few glaciers in South Tyrol, Italy, which meant I would have to come back and fly quite a lateral distance. Since there were so few and since they were so close to the Adriatic, I figured I could get them in late September, when a high-pressure zone forces the Italian haze down, even if there is a bit of snow on them. And that's exactly what happened.

The flight back involved some foul weather, to the point of MVFR flight in rain in the Alps to a diversion point on the Italian side of Switzerland, before sneaking over a windy pass, landing, and getting to the flat before the heavens unleashed a fury an hour later.

Five days later, I was in the air for a two-day flying binge all over the Alps of southern France, fighting clouds, French airspace, and park restricted areas, along with more petulant Mediterranean clouds, only to get 40% of the glaciers in the area. I had to return three more times, this time in brutally long day trips, involving customs aggravations, four landings per day, and Covid restrictions, to be able to chip away at these stubbornly difficult glaciers.

There was still the matter of the glaciers on the northern ridge of the Alps, east of the Bernese Alps. They were so close, and I had not yet done them, yet the cloud situation was not cooperating. I finally found a day where it would work. There was a solid cloud deck below, which was forecast to burn off, and some puffy clouds above. I took off, got halfway through my glacier flying sandwiched between the layers, until I realised that the clouds were not burning off… at all. "We have a situation now," I said to myself, calculating St Moritz as a back-up (fumes) and then checking the webcam, where I found Bad Ragaz would work. A runway is a runway when you need it. Fortunately, I found a hole over Canton Glarus, dived under, fuelled at Wangen-Lachen as planned, and returned, climbing through the same hole and doing the 'VFR on top' routine for two hours, with the Alps (and the glaciers I needed) sticking out above.

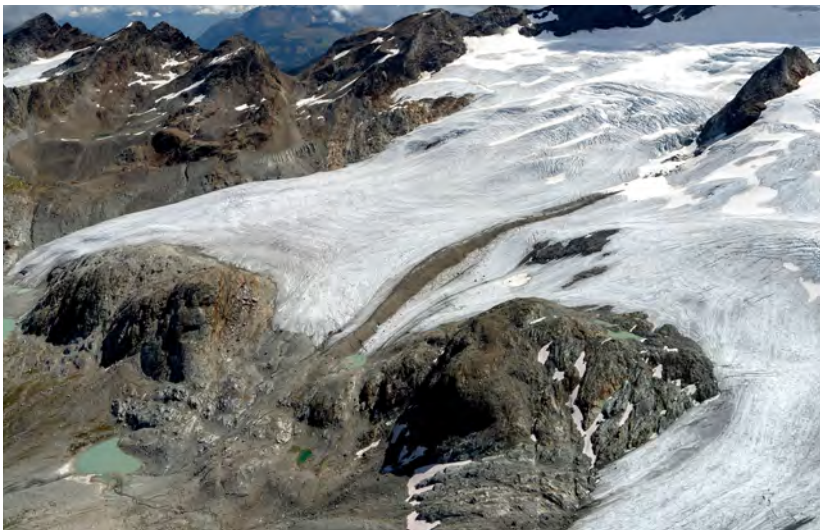
When time came for the final flight east, again to St Moritz, a high-pressure zone had arrived in late September, which cleared the clouds and brought in astonishing 170-mile visibility, while I frolicked in the skies over Cortina d'Ampezzo, Italy. On the flight back after two nights in St Moritz, I picked off a few small glaciers on the Continental Divide, happy as a lark that I had done it… That was, until I flew into a dust storm that had blown up from the Sahara. That was not in the forecast, though so be it, if one is in the air enough, interesting things happen.

The flying bender from 10 August 10 to 27 September was an unabated binge of 83 hours on the tach. Hopscotching from roughly 1,500ft for fuel to 12,000ft to photograph glaciers, with only 18 gallons of fuel and 70kt cruise was a tiring but rewarding feat, which turned out to be far more involved than I originally anticipated. What remains is a better aircraft to acquire, and continuing seasons of glacier photography.

Footnote: The Global Glacier Initiative was formed as a non-profit corporation in 2021 with a mission to photograph every non-polar glacier on Earth from an aerial perspective. Images will be shared for free for academic, scientific, climate, and glacier outreach purposes, to share a compelling, stirring, and personable view of these majestic features that are hard to reach, owned by the public, and disappearing rapidly. Future generations will not know what it is like to experience the glaciers as we have them now. More information at ***globalglacieriniative.org***.

Garrett Fisher has published 31 books, 27 of which relate to aviation. He blogs regularly about his glacier and non-glacier flying adventures at www.garrett fisher.me

Below Rutor Glacier, Italy, August 31



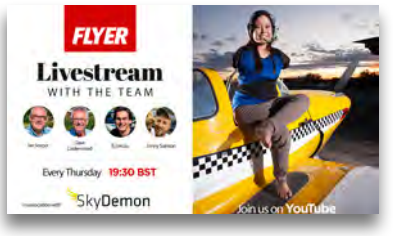
Eastern Massif du Mont Blanc,
Switzerland and France, August 23

Mer de Glace and Mont
Blanc, Chamonix
France, August 23

FLYER

Livestream

WITH THE TEAM



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AVIATION NEWS * FLYING WEATHER * FANTASY HANGAR * QUIZZES

Top Gear

The latest aviation kit, impartially tested and evaluated

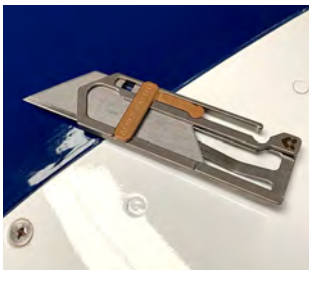
Aerocrafted Sideslip

★★★★★ **$98** | ***www.aerocrafted.com***

The Aerocrafted guys are a small team of aerospace engineers, fabricators and pilots who live and work on the Central Coast of California, and the Sideslip utility knife is their first product. Inspired by years of building and flying experimental aircraft, they say simple aerospace solutions are often the most reliable, so they make their products with the same materials and methods they use within aviation.

Created to be a minimal knife for the pilots' toolkit, Sideslip is made up of only two parts and uses a commonly available disposable utility blade. The unique design doesn't include any fasteners, which means no tools are needed to switch out the blade. The skeletonised frame is made from durable Grade 5 titanium, while the slider uses low-friction bronze. Total weight is 13grams…

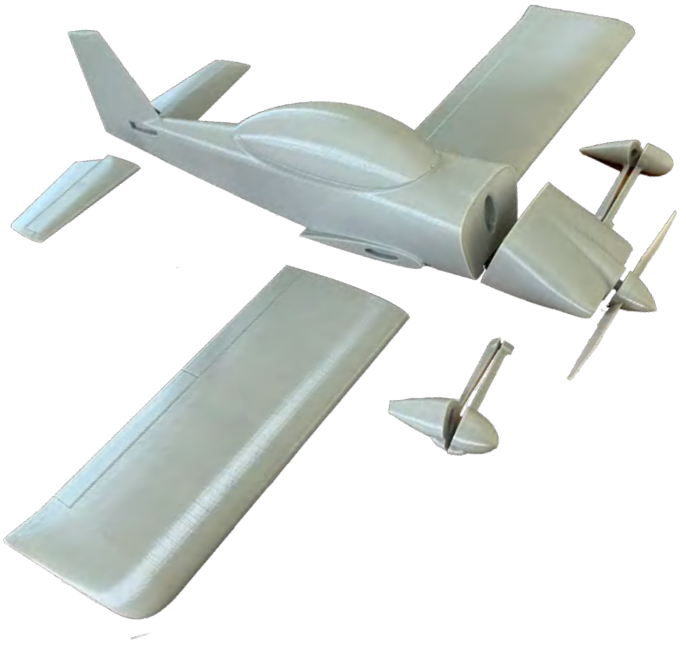
Available in right- or left-handed, versions, Sideslip also has a key ring and pocket clip. **EH**



Left Just over 2.5 inches long, and 13grams in weight, Sideslip is a very high-quality addition to a pilot's aircraft tools
Above Blade retracted
Below The blade extends using a bronze slider

Dimville Factory RV-8

From €15 | ***www.dimvillefactory.com***



An odd name I know, but some very cool aircraft model kits, with lots of general aviation bias.

The company caught my attention when I spotted their 3D-print of the Van's Aircraft RV-8.

You can either buy a set of parts, or if you have a 3D printer, buy the file to print the parts at home.

Parts are glued together with superglue, and there isn't too many of them… so it shouldn't take too long.

With a span of 30cm, it should make a great model for my desk.

These models have great eco-credentials too, being printed from PLA, a compostable bioplastic. **EH**

Straighten Up And Fly Right

£12.99 | ***www.amazon.co.uk***

Brian Smith joined British European Airways (BEA) as a steward in 1962, and retired as a Senior Training Captain with British Airways in 1991. This book is a collection of fun tales from what many call 'The Golden Age of Flying', including being part of the crew that landed a BOAC B707 at Heathrow without a nosewheel. **EH**

By Association

Looking after General Aviation The UK's flying associations at work

AOPA Better regulation?

The Civil Aviation Authority was established as an independent regulator by Parliament in 1972 and played a leading role in establishing the JAA and EASA, whose goal was a harmonised set of rules that improved safety.

Today the CAA is once again a national regulator, and I believe it must guard its independence if it wishes to maintain a global leadership position.

Where new laws are proposed that enable ministers to direct the CAA, I think this is a double-edged sword and should be avoided, as it could effectively tie the hands of the regulator. For example, the Government could direct the CAA to provide enough lower airspace to support Unmanned Aerial Vehicle (UAVs) operations, which could severely curtail GA's freedom to fly.

UAVs are seen as a big part of future development in the UK with promises of thousands of new jobs in a highly innovative industry, supported by huge investments. A big challenge over the next few years will be how to integrate manned and unmanned aviation in the air, but make no mistake, it's the money that talks the loudest, with billions of pounds being ploughed into UAVs, GA cannot compete. Today, there are 250,000 UAVs registered in the UK, and this figure is forecast to grow.

We need a strong independent safety regulator which has the correct competencies to enable it to regulate all airspace users on a fair and equitable basis. **Martin Robinson**

Aircraft Owners and Pilots Association
www.aopa.co.uk

BMAA Hello from the new CEO

I didn't quite expect to be here as the new BMAA CEO, but the lure of working full-time for British microlighting was too strong. It's also a very exciting period, getting to grips with all the opportunities that 600kg will bring.

A first win is to enable aircraft designed to 472.5kg with BRS to fly to that weight without a parachute fitted, thus adding a useful 22.5kg of payload. This modification is already available for some existing microlights with more to follow.

After several years of anticipation, we are now writing guides for owners, pilots and instructors to ensure they are fully aware of the regulations. Existing microlight pilots can continue to fly their aircraft with no change, but those looking to do something new may need differences training of some kind. This could range from a discussion with your instructor to some flying training.

Interest from potential suppliers of 600kg aircraft is high. We are now visiting the early adopters to complete the last steps of approval. Some 450kg+ microlights are already flying, using CS-VLA as their code, since we are still waiting for the CAA to agree the new 'Section S' design principles. We've been liaising with the Czech and German regulators to ensure the new Section S gives UK manufacturers an easier route into European markets.

I've inherited an Association in good health. It's time to build on past successes and look to the future. **Rob Hughes**

British Microlight Aircraft Association
www.bmaa.org

LAA Here there be Dragons...

The LAA reached a significant milestone last month, with the CAA enabling engineering oversight of the biggest aircraft on our fleet yet. The transition of two 1930s de Havilland DH 84 Dragon aircraft from CAA Certificates of Airworthiness to LAA Permits to Fly represents the first time we have become responsible for vintage airliners, albeit not for use on commercial operations.

Powered by two de Havilland Gipsy major engines, the Dragon dates from late 1932, and it proved perfect for the emerging domestic airline market of the time. Effectively it is a 'twin Tiger Moth' in terms of its engineering, so it naturally complements our knowledge base.

While modern types account for around new 70 homebuilt and kit-built aircraft built by their owners each year, our system also supports the restoration and operation of vintage and classic aircraft, factory-built aircraft for which demised manufacturers can no longer provide approval of replacement parts or repair schemes.

They include Jodels and Austers, other de Havilland types such as the DH82A Tiger Moth and DHC-1 Chipmunk, and Shuttleworth Collection aircraft including the iconic DH-88 Comet, Mew Gull and Hawk Speed Six racers as well as their WWI aircraft and the famed 'Edwardians'.

More esoteric are the sole Pilatus P3 Swiss military trainer, Reid and Sigrist Desford, and Soko Kraguj ground attack aircraft. Chinese Nanchang CJ-6s and Russian radial-engined YAKs are also supported, often requiring some head-scratching by the LAA engineers!

Ironically, we can't take on a regular Piper J3 or Luscombe, due to an arcane CAA ruling dating from the 1990s, which if an aircraft holds even an obsolete Type Certificate, it has to stay on a CofA. That, frankly daft, piece of regulation is one we hope will, at some time, come under scrutiny for change! **Steve Slater**

Light Aircraft Association
www.lightaircraftassociation.co.uk

Aviation associations Got something to say? You're welcome to contribute to this page, email editor@seager.aero

THE FLYER CLUB

A winter scene we all enjoy; cold and calm!

Winter wonderings...

When the days shorten we've got to get creative as to how we can maintain our skills and knowledge, ensuring that they remain sharp...

Welcome to the new *FLYER* Club members among you. We're into that time of the year now where flying seems rare and the dates between our logbook entries increase.

Also, there always seems to be a day on which the flies disappear from the leading edges of our wings and the mud first starts to coat our tyres and spats. It's as though the flying gods don't want to give us any rest from cleaning. I don't relish the idea of buckets of cold water and sponges in deepest winter but, alas, it is a good discipline.

Shorter days means we've all, inevitably, got to find other things to do when we're unable to fly. For me that's meant dusting off Microsoft's new flight simulator, as it offers a quick flying fix, in a very realistic world. I don't know how useful it really is at preventing skill fade, but I like to think that it has some benefits when the sun has set or the winter cloud is too low.

So, despite new members joining in these months, there are still plenty of ways to make use of your new membership.

We'll be sorting out more webinars from our experts and you can get yourself weather-savvy with Dr Simon Keeling's weather briefings, which he releases twice a week. They'll give you a really good forecast and you'll learn lots in the process. If you don't know (or have forgotten) what a Skew-T is, you soon will!

Jonny

jonny.salmon@seager.aero

THE FLYER CLUB

Out & About

We've had some great weather and it looks like you've been having fun all around the country! Thank you… and keep the photos coming!

Adam Parnell Turbulents to Rougham for lunch with friends

Jure Griljc Flying over Umag, Croatia

Sean Link Flying over Cardiff

Yakupcan Tuna Off the Causeway coast

Martin Lulham Heading into the sunset

Jon Hilton Flying a 97-year old former Avro Lancaster engineer in a CT.

Tom Wielkopolski No prizes for guessing where this is!

Steve Hornsby Heading to Project Propeller

Nick Stone Visiting Oaksey Park with another Leicester Eurostar

Maxime Compagnon Having fun at on a riverbed!

Simon Gregory Doing some formation photography with Tom Hay's Elevation Airsports

Adam Cubbing past Cowes

Richard Tyler Stearman in New Hampshire

Simon Wilson Soloing a Christen Eagle

In association with POOLEY'S FLIGHT EQUIPMENT

Free Landings

If you're a member of **The *FLYER* Club**, **click here** for your personalised vouchers and save over **£54** by claiming one **FREE** landing at each of these airfields valid for December 2021, although not at an aircraft's home field. No jets. Please contact the airfield before setting off.

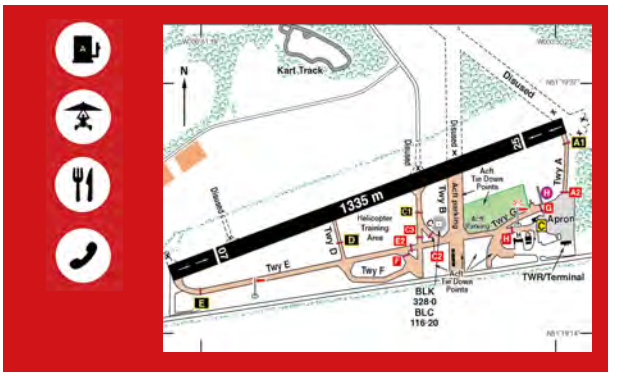
If you're not currently a member of the *FLYER* Club, but would like to receive six new free landing fees every four weeks plus other Club member benefits, then *click here to join!*

Blackbushe

01252 471300 | **EGLK** | *www.blackbusheairport.co.uk*

Blackbushe Airport is located on the border of Hampshire, Berkshire and Surrey and has a 1,102m asphalt runway. Microlights welcome. PPR is mandatory via the website, where you can also find details of local procedures. No non-radio light aircraft. Come and visit the new Pathfinder Café that opened this year with an extended patio and viewing area. You're sure of a warm welcome.

Nearby Attractions: Legoland, Ascot, Windsor and Newbury racecourses, as well as Wentworth Golf Club.
PPR: www.blackbusheairport.co.uk/ppr
Radio: 122.305

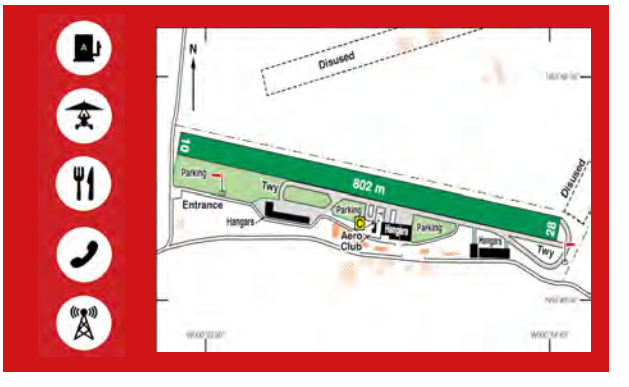


Breighton

01757 289065 | *www.realaero.com*

Breighton Airfield, formerly RAF Breighton, officially opened in 1942. Today it welcomes visitors by air – classic or vintage aircraft in particular. The aerodrome is 5.5nm north-east of Selby and has a single, 805m grass runway, 11/29. Avgas and Jet A1 are available self-service at any time. The cafe has been refurbished and serves hot and cold food. Check due to current restrictions. Noise Abatement: avoid villages of Bubwith, Wressle and Breighton.

Nearby Attractions: include the village of Breighton, a number of golf clubs and the city of York.
PPR: 01757 289065
Radio: 129.805



Radio
Accepts non-radio light aircraft, but PPR

PPR
Prior permission is required

Refreshments
Including restaurants and cafes etc

Microlights
are welcome

Fuel
Aviation fuel available **A** avgas, **UL** UL91, **M** mogas

While you're there

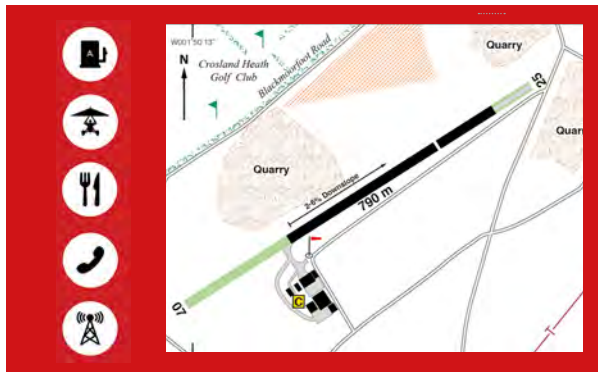
When you visit these six airfields, why not show your support by enjoying a meal in the cafe or filling up with fuel? It's good to support GA in the UK.

CroslandMoor

01484 645784 | *www.croslandmoor-airfield.co.uk*

Crosland Moor Airfield is a privately owned airfield built in the 1940s for David Brown (the DB in Aston Martin). Situated in the Pennines, the airfield has one runway, 07/25, which is part grass and part tarmac. The Terminal 2 building is a static caravan, offering tea and coffee facilities, a comfortable arrival/departure lounge, plus en suite bedroom if an overnight stay is required. All aircraft welcome – PPR essential – open seven days a week.

Nearby attractions: the beautiful Pennines! Walking and bike trails are nearby, as is a cafe where pilots get a 10% discount on food.
PPR: 01484 645784
Radio: 128.375

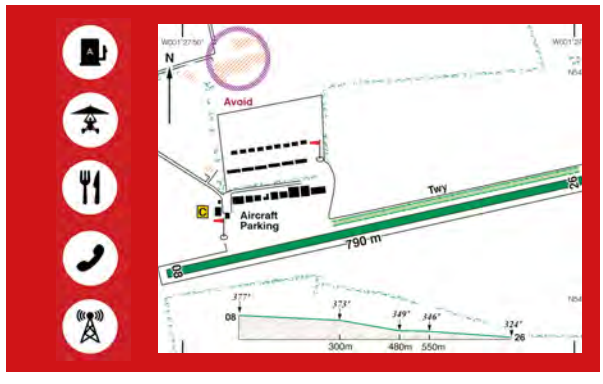


Fishburn

07877 118280 | *www.fishburnairfield.co.uk*

Fishburn is a pretty, unlicensed airfield with an 800m grass runway, three miles north of Durham Tees Valley CTR/CTA. Convenient for Durham and the university. Visiting pilots should join the circuit from the north. There is no deadside. Visitors welcome at any time and the Aviator Cafe is on site. Avgas 100LL self-service, pay at pump. Microlights are welcome, and hangarage is subject to availability.

Nearby attractions: The picturesque village of Sedgefield, Hardwick Hall Country Park and Durham city itself.
Radio: 118.280

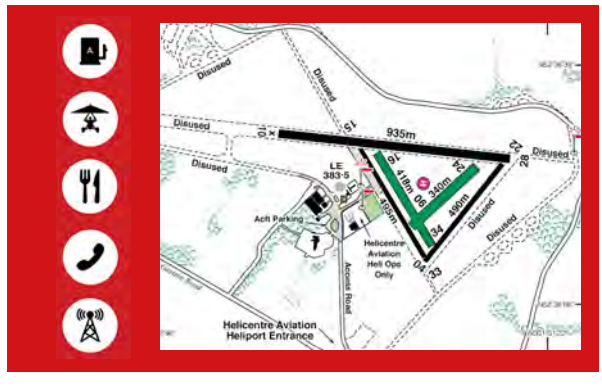


Leicester

0116 259 2360 | **EGBG** | *www.leicesterairport.com*

Leicester Airport is situated three miles outside the city centre and is operated by Leicestershire Aero Club, founded in 1909. There are many based aircraft, including historic types. Hard and grass runways allow year-round flying. Open 0900-1700 seven days a week, plus evening food and flying Tuesdays and Thursdays until 2000. Fuel is available and there is a popular cafe and lounge area.

Nearby attractions: Leicester Abbey, the National Space Centre, theatres, museums, restaurants, Welford Road Tiger's Stadium and racecourse, and the Richard III museum.
Radio: 122.130

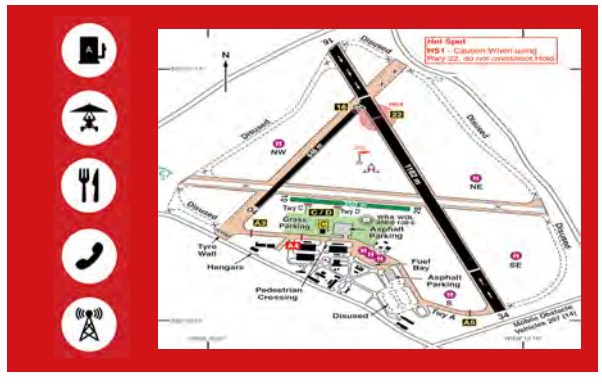


Wolverhampton

01384 221378 | **EGBO** | *www.wolverhamptonairport.co.uk*

Wolverhampton Halfpenny Green Airport is ideally situated in unrestricted airspace, in the middle of England. It has one operational tarmac runways plus one grass, with AFIS operating seven days a week. NDB and DME on the field helps to make Halfpenny Green easy to find. The welcoming cafe is equipped with free-wifi. Jet-A1 and avgas is available, but check Notams for UL91 availability.

Nearby attractions: Picturesque Bridgnorth, the Ironbridge Gorge (an UNESCO World Heritage Site), Halfpenny Green Vineyards and the RAF Museum Cosford.
Radio: 123.005



Win! A print or digital *Pooleys UK Flight Guide*

QUESTION: What is the distance between FIshburn and Leicester in nautical miles?

To enter, post your answer, name, address and email details to
Pooleys December Competition, *FLYER magazine*, PO Box 4261, Melksham, SN12 9BN or send an email to *competitions@seager.aero*
The closing date is 15 February 2022.

The winner's name and address will be passed to Pooleys, then deleted from Seager's database. Pooleys will send the winner their prize and, in order to do so, also offer to supply them with further information about the company's products and services.

The winner for October 2021 is:
Jon Webb, Emsworth, Hampshire

1 Blackbushe
2 Breighton
3 Crosland Moor
4 Fishburn
5 Leicester
6 Wolverhampton

Artist Jane Pearson showed of her painting skills at the LAA Rally – and now Club members can have a portrait of their beloved aircraft with a super 15% discount

Picture perfect

FLYER Club members can now enjoy an artistic benefit

There was lots to see at the LAA Rally in September, including, if you visited the Stein Pilot Insurance stand, a woman called Jane Pearson with some charming aircraft paintings. Jane has, very graciously, agreed to offer a **15% discount** for *FLYER* Club members on her Plane Portraits. All you have to do is send Jane a few photos of your aircraft and she'll get to work. Log into the Club area of the website to find out more.

Double delights...

We've also seen plenty of you tuning in to our Wednesday afternoon Livestream Extra series, where we have a much more informal look at what's coming up in the news, as well as sharing topical videos and other behind the scenes benefits. Of course, you may want to catch up on our Thursday evening Livestream? We've recently had some great guests, including former RAF pilot Mandy Hickson, RTW hopeful Zara Rutherford, who spoke to us live from Alaska, and a fascinating chat with Electroflight's managing director Stjohn Youngman. Catch up on them on our YouTube channel!

Jingle all the way...

With *that* festive season slowly approaching, don't forget that as a *FLYER* Club member you get other discounts as part of your membership, which might make present buying a bit easier!

Join the Club – it makes sense

If you're not a member of The *FLYER* Club and you're thinking, 'How do I join? Right now. This instant...!'

Well, good news, it's easy. Just ***follow this link***, complete the simple form, decide how you want to pay and start enjoying the **benefits** instantly.

Member benefits

- Extensive *FLYER* back issue library
- Save 5% whenever you shop at Pooleys (excludes Bose headsets)
- £10 off when you spend £40 at Transair (excludes Bose headsets)
- 10% Spitfires.com Simulator sessions
- 15% off an Ultimate High Top Gun Experience
- Free copy of *A View from the Hover*
- Get your club membership paid by Stein Pilot Insurance
- An initial conversation with Dr Frank Voeten, FAA & EASA AME
- Twice-weekly General Aviation weather briefings
- FREE Landing vouchers, available through the ***FLYER website***
- Mini weather webinar. Catch-up if you missed it.
- Exclusive written content from our archives – first pieces now published.
- Interviews with experts on a number of key topics.
- Our first members' Fly-in was a success! More events soon!

Coming soon

- Back issues – there's another FIVE years on the way with more to follow.

■ With all these great benefits, if you're not a member, it is most definitely well worth joining for just £7.50 per quarter! This great price won't last forever, so secure your membership before it is too late!

Training

Aircraft Registration

Pilot Medicals

Groundschool

Groundschool

Training

Insurance

Covers

NEXT MONTH'S ISSUE

Available from 23 November.

QSY

For the funny, the weird, the wonderful and the just plane strange...

Pilot and bikers work together for stem cell delivery

The UK's Civil Air Support (CAS) has released an account of its latest express delivery of blood stem cells from a donor in Salisbury District Hospital to a waiting patient in Newcastle-upon-Tyne.

CAS worked with SERV, part of a national network of motorcycle couriers known as Blood Bikes specialising in medical transfers.

SERV Wessex collected the stem cells from Salisbury and as the rider made his way to Thruxton Airfield, a Cessna 414 twin flown by CAS operations manager Graham Mountford headed from its Turweston base to Thruxton.

Handover completed, Graham flew to Newcastle International Airport in 1 hour and 47 minutes where he was met by a member of the Northumbria Blood Bikes. The stem cell package was whisked through Newcastle Airport and arrived at the Royal Victoria Infirmary within 14 minutes.

Above and inset Pilot Graham Mountford making the handover, and them being whisked away...

A spokesperson for Serv Wessex said, "CAS are the Blood Bikes of the air. Together, something that might take 6/7 hours to get across the country can be done in half the time."

During a busy week for the partnership between Blood Bikes and CAS, another urgent FMT (Faecal Microbiome Transplant) package had been relayed from the University of Birmingham Microbiome Treatment Centre to a Bournemouth hospital.

Heroes & Villains

HEROES The team at the Air League which saw 3,000 individuals from all parts of the UK take part in the League's Soaring to Success career workshops and gliding taster days. The scheme is supported by the Department for Transport and Boeing with the aims of inspiring, stimulating, and encouraging young individuals to consider a career within aviation and aerospace. More *here*

VILLAINS Property developers who have applied to demolish the last link to Woodley Airfield, near Reading. Part of the site is an art deco building that was home to the Miles Aircraft Company. 'Scores' of people have objected, with one saying, "I am shocked that the developers are allowed to pull down a historically important building, the last link to Woodley's aero engineering heritage."

HERO Former Goodwood Aerodrome manager Rob Wildeboer was hugely popular at the West Sussex airfield and a flying scholarship has been set up in his name. A calendar featuring Rob will be available soon. Meanwhile if you'd like to contribute to the scholarship, there's a crowdfunder page *here*

POD's winning helmet

Phill O'Dell, Director of Flight Operations at Rolls-Royce, will be flying the ACCEL electric aircraft on its record bid and he came up with the idea of a competition to involve primary and secondary schoolchildren. Rather than wear the flight helmet he had originally intended to don during the record attempt, he would wear one featuring a winning design inspired by children.
More than 600 entries flooded in and two of the winning entries, from Simrat and Chloe, have been combined to produce the helmet POD is wearing above.

747 comes home

Seattle and Boeing are interwoven, so when a flashy new downtown property was looking for a 'signature' display, the idea of recycling a Boeing 747 came to architects Henriquez Partners. The aircraft is a former United Airlines 1990 B747-400 which will be finished in bare aluminium and be suspended between the two 48-story buildings being built on Denny Triangle. It's reported that the interior will be a bar/café.

Send your QSY submissions to QSY, PO Box 4261, Melksham, SN12 9BN or to *qsy@seager.aero*

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