THE MAGAZINE OF **THE LIGHT AIRCRAFT ASSOCIATION**

LIGHT Aviation

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UNUSUAL AUSTER

Reborn from a parts donor airframe to become a unique example of the type. Clive Davidson flies the Auster Kingsland…

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Rich Davies

Cruising at 90kt is fast enough for Cub fun…

LIGHT AVIATION MAGAZINE
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Perfect fun…

As part of my usual procrastination that occurs while I'm thinking about what I'm going to write here each month, I diverted my attention to updating the logbooks for my Super Cub. The full Permit for that dropped into my inbox on 8 August, and since then the aeroplane has added another dozen hours to the eight clocked up during the flight testing. I've done a big chunk of those… and so far it's proving to be perfect fun.

Touch wood, the O-200 is proving to be a strong performer, helped no doubt by the new set of Superior cylinders, overhauled Slick mags and new carburettor, which were fitted during the 'return-to-flight' efforts. It makes solid oil pressure and is right on the numbers for oil consumption. I'd be being economical with the truth if I said it wasn't leaky… the bottom seam between the two case halves releases the odd drop or two regularly enough that the throttle and mixture controls will never not be well lubricated, but that's a good thing, right? Meanwhile the Monkworkz generator is doing exactly what was promised of it, as is Julian Mills' adaptor for a full flow spin on oil filter.

For the money that's been spent on it – more than I planned, but a little less than I might have spent if I had wanted to buy one like it, it's feeling like a great aeroplane in return. Wearing my *FLYER* hat, I put together a video about the weight savings made during the project, and one commenter asked, "Isn't there a more modern simple Rotax plane that already weighs half and is twice as fast?"

Well yes, there are some modern Rotax-powered machines out there – but the Cub has been surprising me with a solid 90kt cruise, and I can't think of anything that's twice as fast that that wouldn't cost 6-7 times more. For that spend, I'm pretty sure they aren't having 6-7 times more fun than me.

While I was in the later stages of the Cub project, I was interested to watch videos of YouTuber Trent Palmer building his Rotax 916-powered Legend Nomad Cub. That aircraft, while fabulous, really isn't much faster than mine. OK, that turbo Rotax is an amazing piece of kit, but wasting some more of my time with the Legend Aircraft online configurator ticking boxes to make my own Trent Palmer-style Nomad Cub, the "order it today" price was $429,885…

Yeah, I think my Cub will do me just fine!

All the best for Christmas 2025… and roll on 2026!…

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News

Plenty more news is available on the LAA at *www.laa.uk.com* check it out every day!

Help us celebrate at the 2026 LAA Rally!

Join us for the 80th anniversary LAA Rally at Leicester Airport, on 4-6 September 2026! Rally organiser Nancy Lillington has more info…

As we look forward to celebrating 80 years of the Light Aircraft Association, we invite every member to be part of a very special milestone at the 2026 LAA Rally, returning to Leicester Airport on 4-6 September 2026.

This anniversary is more than a date, it marks eight decades of builders, pilots, engineers, innovators, volunteers and enthusiasts who have shaped grassroots aviation in the UK. The Rally gives us the perfect opportunity to honour that heritage, while looking confidently toward the future!

Since our earliest days in 1946, through the PFA years and into the modern LAA, our community has always been defined by the same spirit: a belief that ordinary people can achieve extraordinary things with their own hands, skills and passion. Thousands of aircraft built and maintained under LAA support and guidance, thousands more restored and preserved, and an unbroken line of aviators inspired along the way, all made possible by your dedication. The Rally gives us the opportunity to celebrate in 2026!

The 2026 Rally will feature an expanded 80th Anniversary Showcase, bringing together significant homebuilds from across the decades, engineering achievements, and stories from members who have kept the spirit of hands-on aviation alive!

Expect a busy weekend, a spectacle of aircraft arrivals and flying, an enhanced exhibition area, LAA Engineering and Coaching Scheme presence, speakers, workshops, and plenty of opportunities to meet fellow members, Struts – meet long-time friends and make new ones. There will be food, evening entertainment and birthday cake!

To celebrate our 80th year, we're also launching an LAA poster design competition, inviting members, their families, and friends to design a Rally poster inspired by '80 Years of LAA Innovation'. We will pick an entry to become the 80th anniversary Rally poster. Entries will be displayed at the Rally, adding an extra creative dimension to the celebrations.

We will be printing 80 limited edition posters, which can be purchased, and there will be prizes for the winning design. Details to follow soon on the LAA website. We're delighted to introduce a children's category, encouraging younger aviation fans, future builders and pilots among them, to get involved and share their ideas. All shortlisted posters will be proudly displayed at the Rally and there will be a prize for the artwork we choose in this category.

Your feedback from the 2025 event has shaped next year's planning. We want everyone to be part of the anniversary story. Whether you fly in, drive in, visit for a day, or volunteer, the Rally is your chance to reconnect with the community that makes the LAA what it is and have a great time!

If you would like to volunteer for next year's Rally we'd love to hear from you. Contact Nancy, Rally organiser, on *nancy.lillington@laa.uk.com* to register your interest.

We look forward to celebrating 80 years together and charting the next chapter of the LAA!

UK Flight Crew Licensing Regulations – Webinar Recordings

Following recent changes to UK Flight Crew Licensing Regulations, the CAA's General Aviation Unit has hosted a series of webinars to explain the updates.

Recordings of these webinars covering changes for aeroplanes and microlights, helicopters and gyroplanes, and sailplanes are now available to view at *www.caa.co.uk/general-aviation/pilot-licences/licensing-training-simplification*

Pilots who have any questions relating to recent licensing changes are invited to contact the CAA at *ga@caa.co.uk*.

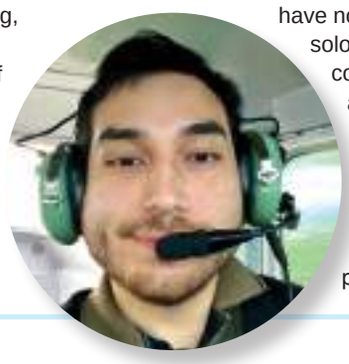
Armstrong-Isaacs update – plus scholarship reminder

A reminder that applications for the LAA Armstrong-Isaacs bursaries for 2026 are now open, with five bursaries of £1,500 being offered to support young pilots already in PPL training, and offering additional funding to help them complete their courses, at a time when, all too often, money starts to run out.

The bursaries offer support to young pilots who have reached the financially challenging latter stages of PPL training, with longer cross-country flights requiring greater outlay in aircraft rental costs. These bursaries have a demonstrated record of allowing students to complete their training, when perhaps they may otherwise have had to suspend or forgo the completion of their course. Applicants should complete a form which can be downloaded from the LAA website at *https://www.lightaircraftassociation.co.uk/*armstrong-isaacs-bursary-2025.

The closing date for applications is 1 March 2026.

Former bursary winner Simon Grainger sent us an update: "I have so far benefited from two hours of training, thanks to the LAA. In these two hours I have done a refresher lesson on general handling, as I last flew in August 2024. This has included stalls, spiral dive recovery, steep turns, speed control flight and practice forced landings. We also covered normal landings, flapless approaches, glide approaches in the circuit as well as PFLs on the downwind leg. The next lessons will be solo circuit consolidation and onwards to navigation.



Thanks to the LAA, I have now completed solo circuit consolidation and will be moving onwards to navigation, if the weather permits!"

Met Office launches MAVIS

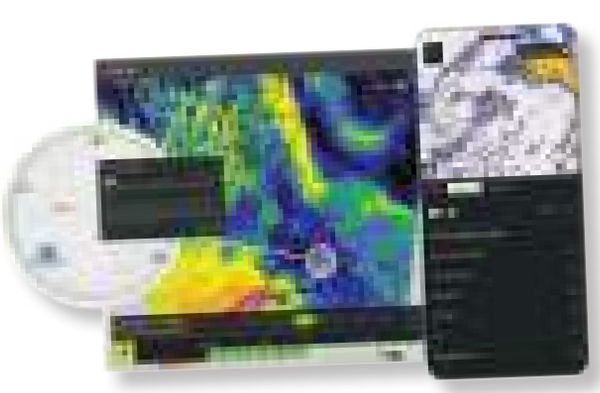
The UK Met Office has unveiled its new Aviation Visualisation Service called MAVIS. It's a single, streamlined platform designed to replace several of its existing aviation weather services.

MAVIS brings together the Aviation Briefing Service, Network Weather Resilience, HeliBrief and OpenRunway into one user-friendly system, offering pilots and operators a central access point for forecasts, observations, and weather map layers.

Pilots will now be able to find everything from Metars and TAFs to lightning data, SIGMETs, and customisable map views can now be found in one place. The service has been developed with direct input from users, aiming to create a more intuitive, consistent experience across the aviation sector.

Users visiting the new website at *mavis.metoffice.gov.uk* – will find a number of updates and features such as site pinning, new weather layers (including observed lightning and sea surface temperature), and customisable base maps that save across devices.

The Met Office says MAVIS is designed for all sectors of aviation, from airlines and airports through to GA pilots, balloonists and glider pilots. The goal is not only to simplify access but also to future-proof the system as aviation weather needs evolve.



The current Aviation Briefing Service will remain available until spring 2026 – but users are being encouraged to transition to MAVIS ahead of its retirement.

More information, including explainer videos, user guides, and FAQs, can be found at the *www.metoffice.gov.uk/services/transport/aviation/regulated/mavis/index*

Trig Avionics Launches TT23 Transponder

New from Trig Avionics is the TT23 Transponder, the newest addition to its compact Mode S transponder line that offers a smaller and lighter form factor along with optional integrated GPS for ADS-B Out. The TT23 is a certified Class 1 Mode S unit with ADS-B Out capability and includes a built-in altitude encoder plus a brighter, easier-to-read LCD screen. Fifteen per cent lighter than earlier designs, Trig says this makes the unit a great choice for aircraft where panel and installation space are tight.

Two models are available:

- **TT23G** (with internal GPS). Includes an integrated certified GPS position source, intended as a simple ADS-B Out solution
- **TT23** (without GPS). Designed for aircraft already equipped with a suitable GPS feed.

Trig says an STC is in development to allow integration with popular third-party navigators, as well as with its own TN70 remote GPS unit. For operators not planning to fit ADS-B Out, it functions as a straightforward Mode S transponder.

Trig emphasises that the TT23 keeps the same familiar control head used across its compact range, while adding updated internals and installation options.

Andy Davis, CEO of Trig, said the new model 'takes our compact avionics product line up a notch… By including our compliant ADS-B position source in a package that is even smaller and lighter than the previous transponder, we have created a complete solution that is simple to install, and easy to use'.

■ The TT23 costs £2,330 and the TT23G is £2,650. *trig-avionics.com*

LAA Office Christmas and New Year closure

The LAA will be closed from midday Wednesday 24 December until Monday 5 January 2026 for the Christmas and New year period. We would like to wish all our members a very Merry Christmas and a Happy New Year!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Letters

We are always pleased to receive your letters, photos of your flying, and your feedback. Please email the editor at *ed.hicks@laa.uk.com*

Company directors election

Dear Ed,

I'm writing to express outrage at the Board's sneaking little statement regarding Colin Hales in the candidate statements. Surely no candidate is endorsed by the Board. Why then is it necessary to publish a statement that a candidate is NOT endorsed by the Board. I question the legality, the value and the impartiality of this election. It should be voided and re-run without such stupid statements being published.

John Scott.

LAA Chairman Eryl Smith replies: *John, I note your comments. You were online for the AGM and heard, and have subsequently received, the Board statement. As I stated at the AGM the Board is entitled to express its view about a given candidate's nomination. It did not reject the nomination, merely did not endorse, and it was left to members to decide.*

As you are aware Mr Hales has the right of appeal and the Board respects this process and will make a full statement to members on all the facts when the appeal has been concluded.

DFB Obituary: Robinson Redwing

Hello Ed,

Following the obituary of the wonderful David Faulkner-Bryant, a very small point. It said the Robinson Redwing was a 1920s model, but in fact it first flew mid-1930. I am a recent ex-owner of the G-ABNX mentioned, and further, my grandfather owned G-ABMV pre-war, which became ZK-ADD.

Incidentally 'NX is just finishing a total restoration, being the only one of the type left.

Best,

Croydon Parry.

Event Report

RAeS Design Conference

The 2025 Royal Aeronautical Society General Aviation Group Conference was held on 10 November at the Society's HQ in London. Francis Donaldson **reports**

The day kicked off with LAA's own **Lucy Wootton** and **Miti Ghosh**, on the subject of 'Alternatives to Part 23'. Miti explained how, particularly for students, using CS-VLA gave an easier entry level and how BCAR Section S, for microlights, is simplified still further having been written for Permit to Fly rather than CofA aircraft. Lucy explained some of the benefits of designing and building an aircraft within the supporting Eco-system of the LAA.

Mark Shortman of the CAA Policy Department told us about developments with the Experimental category, of which he has been the main CAA manager/advocate and industry liaison for many years. Mark described how the several recommendations that had been the outcome of the AAIB investigation into the crash of a hydrogen-powered experimental aeroplane at Cranfield had been dealt with, mainly with improvements to the process and advice applicable to complex projects, but happily without impacting with undue burdens on the simpler projects underway.

A highlight of the day was a couple of online presentations about the winning entries for the 2024/2025 RAeS GAG design competition, hosted by the event organiser, **Mike Jump**, Professor of Aerospace Systems at the University of Liverpool. This time, the competition had involved designing amphibious aircraft that would be able to carry 10 people on a specified 750km mission. The winning individual entry, by **Marius Gobrecht**, a master's degree student of Aerospace Engineering at TU Braunschweig in Lower Saxony, was the more innovative of the two – being a gull-winged, twin-boom, twin-engine machine with a lifting rear cargo door at the back of the cabin, the idea being to back the seaplane up to a beach for loading directly from the shore. The team winner, **Team Bihongo** from the Aviation and Aerospace University of Bangladesh, was of a more conventional layout with a tee tail.

A joint presentation by **Chris Burleigh** and LAA Board Member **Al Seymour** described building and flight testing a new-build Sprint 160 airframe with a modified Rotax 916iS engine in place of the usual Lycoming 0-320, using 'E conditions' as a means of clearing the aircraft for flight test. The project had been undertaken primarily by CFS Aerospace, drawing on several other companies to carry out key functions, to tender for the RAF's requirement for a replacement trainer for the ageing fleet of Grob 115s.

David Chinn, former President of the RAeS, gave an update on the Society's 'Design, Build and Fly' initiative including a description of the German 'Akerflieg' system under which students and other young people gain hands-on experience of gliding and powered flying.

Dr Bill Brooks described the eVTOL Skyfly Axe project, from initial conception by Skyfly CEO Mike Thompson to the manned flying prototype by way of successively larger flying models and unmanned tethered flight. Bill discussed the challenges with cooling the electric motors and their speed controllers, and how the instrumentation had been improved after an over-temp failure of two motors powering one of the propellers had led to a successful unplanned demonstration of a power-off forced landing in the prototype.

Ivan Shaw presented his thoughts on aircraft design in an amusing and lively style, describing his progression from amateur-building some of the earliest Rutan types in the 1980s to designing the Europa, Liberty XL and most recently, the twin-boomed single seat Seeker. This he revealed he had designed ultimately with the idea of it going into production as a low-cost, optionally manned surveillance drone.

Stjohn Youngman rounded off the day's presentations with a description of the work involved in rebuilding his Laser aerobatic aircraft. This aircraft featured on the cover of the June issue of *Light Aviation*.

So ended a very full day of presentations and enthusiastic discussion created by this year's crop of projects under the spotlight.

Straight and Level

Updates from LAA HQ

Straight, from Simon

Simon Tilling CEO

As we come to the end of the year and the number of flying days are fewer – and shorter – it's a good time to look back over the past 12 months. Here at LAA HQ we have had a busy year, and you will have read in my article last month that the scope and scale of what we do is pretty amazing, considering the size of the team we have. I know members would always like us to move faster and do more for less cost, which is a natural reaction.

We have spent a lot of the past 12 months looking at how we can streamline processes, remove any non value-add steps, delegate decision making and so on.

The new Permit revalidation process has been a good example of what can be achieved. A simple online process, no unnecessary questions, no need to submit check flight data, three-year check flights for most aircraft, and automated processing. These changes mean the turnaround time is now consistently less than 24 hours, and also means that the data we collect is in digital format that allows for better recording.

The time saved by automating the process is now being used in developing our Airworthiness Occurrence Process to ensure we extract the maximum benefit from analysis of each and every occurrence including MORs, AAIB reports, Pilot and whistleblower reports. This analysis generates recommendations on technical, human factor, and procedural topics that we then share with the relevant owners and pilots. We also share data with the BMAA and BGA to help identify wider trends or issues.

Our next focus is the Mods and repair process, and I know Jon Viner will be communicating more on this in the near future.

Finally, on behalf of all the team at HQ, I would like to wish you and your families all a very Happy Christmas! ■

Chairman's chat

Eryl Smith Chairman

As we reach the end of the year I am delighted that the new LAA Board has met for the first time following the AGM. With six new directors this was an opportunity to meet together, share backgrounds and ensure that new directors were briefed on a range of topics, from governance, finances, engineering activities, membership and our grass roots Struts & Clubs activity in a full agenda. Back to a full cohort of directors, around the table we have a breadth of experience, which includes Inspectors, type knowledge, grassroot Strut members, sound business experience and a broad geographical spread of member representation – from Scotland to the West Country.

The day began with a briefing from the CAA's senior surveyor, John Davies, accompanied by Mark Shortman who briefed the Board on the A8-26 Exposition, which sets out the scope and detail of activity that the LAA undertakes in the derogation of engineering and airworthiness oversight on behalf of CAA. It sets the boundaries of what we can and can't do, against which we resource and conduct our engineering activity. It's important that both the Board and members have a clear understanding of the basis under which we conduct our activity. Needless to say it was both informative for the whole Board and prompted a lively Q&A session. We will include a report on the briefing and explanation of the Exposition in the February edition of *Light Aviation*.

Another important item on the Board's agenda was setting the Budget for 2026 and agreeing the membership fees and engineering charges for 2026. While we continue to exercise tight control on costs some elements remain outside our control, most notably the cost of LAA insurance cover, which all PtF aircraft owners benefit from. This saw a significant increase in 2025 as the market adjusted to changes and losses in the underwriting market. Regrettably, while these costs have been absorbed in our 2025 finances these increases will need to be reflected in fees for 2026. The new 2026 fees will be notified to members in early December.

At the AGM I reported on the Charge of Conduct Prejudicial to LAA involving a LAA member, Mr Colin Hales. There was much uninformed comment at the time as the Board was not able to comment further until such time as his appeal hearing had been concluded. At the request of Mr Hales, for personal reasons, the hearing has been deferred and it would be inappropriate to respond to the many unanswered questions raised at the AGM until such time as the President has concluded the appeal hearing.

As previously indicated once the appeal has been concluded the board will make a full statement to members.

In closing, and on behalf of the Board, my thanks to all members and staff for your contributions to 2025. I look forward to celebrating our 80th anniversary next year and wish you and your families a very happy Christmas and a prosperous new year.

Safe flying in 2026! ■

Inspiring members to take on their own aircraft build or restoration project

Compiled by **Mike Slaughter**

Project News

Finding an aircraft out there that's having some time off from flying because it needs a bit of TLC is a good alternative to an expensive new build, in fact it's usually a much quicker and much cheaper way of satisfying that creative aviation itch.

That's exactly what Damien Murphy did recently, and he details his restoration project very nicely in his report below.

His is no restoration of a classic factory-built aircraft, but a homebuilt that's probably unique in the UK and possibly Europe. It's a Flaglor Scooter. Never heard of one? No, neither had I.

The thing that grabbed my attention, looking carefully at the pictures, is that it is small and it has no doors, but the occupant sits inside. Yes, entry is basically through the window, challenging I'd imagine, when wearing a few layers of clothing to insulate against the slipstream. I did note from a bit of browsing that most of the North American examples out there have a larger 'window' so as to make life just that bit easier, but then they generally have higher air temperatures than we do – in the summer anyway.

An interesting project and such a unique aircraft, thank you to owner Damien for contacting *Project News*, unprompted!

What interesting restoration is in your workshop?

To get in touch with *Project News*, and tell your story, report a milestone or just to send a picture, email: *projectnews@laa.uk.com*. Please share your story!

G-BDWE (PFA 1332) Flaglor Scooter

By Damien Murphy

Above **The restoration project begins, when Whiskey Echo arrives at the hangar.**

This 1985 picture from Bill Teasdale of 'WE under construction, nicely shows the tubular method used to mount the engine above the cockpit.

In November 2023 I saw an advertisement on AFORS (often the start of an endeavour of questionable wisdom) for an unusual little aircraft. The machine in question was the Flaglor Scooter, which had been resting for a decade or so in darkest Ross-on-Wye. I was looking for a simple project to work on to increase my limited knowledge and skills. I'm a sucker for an underdog and once I'd actually found out a bit more about the Scooter I thought it was worth a look.

The Flaglor Scooter is a single-seat 1960s American plans-built aircraft which is relatively common in the US, but, as far as I can find out, G-BDWE is the only one in the UK and possibly in Europe. If you google the Scooter most of the pictures are of ones hanging in museums, but there are around 200 on the FAA register. It won a 1967 EAA award for Outstanding ultralight aircraft and the Champion spark plug award for outstanding Volkswagen-powered aircraft at the predecessor of Oshkosh. Tony Bingelis, of homebuilding books fame, built one which can be seen in his *Firewall Forward* book. Should you be

Above left **'WE started out needing a new windscreen, that'll be a simple job… won't it?**

Above **Unloaded into the hangar and ready to work on.**

Far left **This view starts to give an idea of just how small the airframe is.**

Left top **Rigging the wings for the first time, she's all wire braced, no struts.**

Left bottom **With Wot hangar mate.**

tempted to build one the plans are now available again in the US.

Its construction is unusual, being a wooden wing and airframe with a welded steel tube combination engine mount, wing centre section and upper cockpit frame. The power plant is a 1,600cc VW air cooled engine with a dual Slick magneto ignition, gear driven from the crankshaft into an accessory case on the back of the engine. I haven't been able to find any details about the Burden conversion, so if anyone knows about this, please let me know. The carb is a Solex sidedraft type previously fitted to an Austin JU van.

The gentleman who built the aircraft did a marvellous job – the quality of the construction is excellent. I have a letter from the builder to Ken Flaglor, the designer, ordering the plans in 1968. The aircraft first flew in 1991, which must make this one of the longest builds ever.

In early 2024 I wandered over to Eastbach Airfield near Ross-on-Wye for a look. Eastbach was new to me and has to be the least level airfield in the UK. The Scooter was under a tarp in the hangar and looked fascinating in an ugly-but-cute way. I took loads of pictures and went home for a think. Fortunately I'd just moved my Currie Wot to Ranston Farm, near Compton Abbas, and I could fit the Scooter into my hangar bay – so I didn't have to think too long.

The usual response to a picture of the Scooter is a more or less polite version of 'what the hell is that?' – but my Inspector, Charlie Huke, had actually seen the aircraft being built in Essex when he was a child, so he was supportive. My daughter's response was less charitable and refers to it as something Inspector Gadget would have or 'The Fugly', depending on her mood.

In May 2024, after four months of lousy weather and an impassable track at Eastbach, G-BDWE was loaded onto a trailer and the wings into a van for the trip up the M4 to Dorset. It was amusing to think that the first time that the Scooter moved in 13 years was backwards, in pieces, and at 50mph on the motorway. After a quick check at the services to ensure the straps were tight it was then a quick trip to Ranston. I wish I'd been able to photograph the expressions of some of the other drivers as they passed.

Once we had unloaded and shuffled the parts into the hangar it was time to start working on a plan to get airborne. I thought it was sensible to start with the engine first as if this was dead then this would become a much bigger project. The fuel system was bone dry and completely clogged with dried fuel residue. Taking the fuel tank out to inspect and internally clean involves ▶

Above **Wings on, cowling off, outside in the summer sun ready for a taxi test.**

removing the tank cover, windscreen and fuel piping. After stripping all the fuel system and cleaning the gunge out I replaced filters, gascolator screens and put it all back together. Being a sensible chap, I tried it out with a litre of fuel to check for leaks, boy did it leak!

While draining out everything that hadn't already leaked out of the fuel selector, I considered what good advice it had been to do this outside. It turns out that the leak was from the fuel cock, so I took the tank out again, which was no easier for my fat hands than the first time.

Taking the fuel cock apart was interesting as the previously referred to gunge had stopped the cam operated spring loaded ballbearings from seating on their O rings. So, all cleaned out and reassembled, tested with air and not leaking, I put it back in.

Outside again and with a very small amount of fuel in the tank I carefully checked for leaks. Hooray! Success I thought. After a celebratory cup of tea and all the tools tidied away for a change, I was about to head home when I spotted the puddle of fuel… I took it well, with only a little swearing and stamping of feet.

After some research it appears that the fuel cock is the same as that fitted to a large Cessna and a replacement could be mine for a mere $3,580 plus shipping. I declined Aircraft Spruce's kind offer and settled for all new O rings and gaskets.

Third time lucky? The tank, pipe work and selector were reassembled for another leak check and this time bingo – no leaks, however, also no fuel showing on the sight tube. After draining the tank again, and much fiddling about with safety wire probes and compressed air, the tube was cleared of gunge. Finally the fuel system was now working as intended.

The next thing was the engine. The previous owner had put new cylinders and pistons on the engine and it had been run at that point, albeit a few years ago. A good look inside the cylinders with an endoscope and everything looked good. The valves need to be set every 25 hours at most, so were checked for the correct gaps.

All the fixtures and controls were checked for security and we were ready for a start. I pushed the fuselage outside on a sunny day, stole some fuel from the Wot, chocked it down and tied the tail to the Volvo. The left mag has an impulse coupling and there is an electric pump to back up the mechanical engine driven pump… so it'll be easy to start, right? Well no, not easy to start.

After about 90 minutes of fruitless flipping, and no longer able to feel my right arm, I had established two things. One, the engine has really good compression and two, I know a lot of swear words. Not to be beaten, and after some physiotherapy, I was back… and this time I was serious. Electric pump on, half a pump on the primer, pump off, eight blades turned over, left mag on, goat sacrificed and off she went – and sounded good. Good oil pressure and temperature and no leaks. I can confess to some dad dancing and waving of arms… but I was very relieved.

On to the airframe, and there were a couple of failed glue joints to be fixed and then all the controls to be gone through. There were some minor fabric repairs to be done, which were very satisfying, and the smell reminded me of childhood model glider building. The tailwheel has previously seen service on a shopping trolley and needed a new bush and links.

The next big job was to put the wings back on. The steel tube birdcage frame links the fuselage, wings and engine with the wings being wire braced from above and below. The upper landing wires are connected to a pylon and the lower flying wires to the aircraft keel. With the help of a hangar mate, a bit of wood and two pairs of stepladders, the wings were back on in about an hour. It then took a couple of weeks to get a full set of matching spar nuts and bolts. It now looked as much like an aeroplane as it was going to. Reconnecting the aileron control cables was much harder than it had been to disconnect them. I assume there is some airworthiness requirement that states one job per type can only be done by a very small contortionist with long fingers.

An expensive crack…

One of the most frustrating jobs was replacing the cracked and broken screen. The drawing specified cast acrylic for the screen, curved to fit the top of the tank cover and bottom of the lower engine cowlings. After securing six of the eight fasteners there was an expensive crack – and I got to do it all again. This time I made a former and got the hot air gun out and heated up some samples to bend to shape. After hours of slowly heating and shaping the new blank it looked excellent and fitted pretty well. I carefully did up the fasteners gradually and evenly across the screen, and it still fitted nicely. As I stood back to enjoy the satisfaction of a job well done there was another expensive crack – and I got to make another screen. This time I made it from polycarbonate which is much more flexible and stronger. However, it is much easier to scratch and will craze if there is any ethanol in the fuel that will undoubtedly splash on it. That version fitted first time.

The next thing was the paperwork, weighing and inspection, which produced a few minor things to clear up. After inserting myself in the cockpit, I went for a little taxi

to see how much fun it was moving under its own power for the first time in many years. It was a lot of fun and with the slightly odd waddling gait I couldn't help chuckling as we wandered about. There is bags of power and lots of acceleration with the loud, but growly, engine note. Getting out again afterwards just proved how snug the Scooter is.

Allegedly it looked like someone trying to squeeze toothpaste back into a tube. My Inspector, Charlie, went for a little whizz about, and being much more skilled than me gave it all the power, and it hurtled down the runway.

Without the vital paperwork there wasn't much more we could do – but she was ready.

The LAA has been very helpful in issuing the release for a test flight – and then another one after the weather refused to co-operate. Interestingly, Francis Donaldson, who's also been very helpful, dealt with the builder in the 1990s while he was constructing the Scooter and has actually flown it.

While waiting for flyable weather and Charlie's availability to align, I made some more taxi trials and engine runs. It's a lot of fun with very sensitive rudder control, a high centre of gravity and narrow track undercarriage. It's definitely a 'calm evening' flying machine. After the interminable wait everything aligned and Charlie took her for the first flight in 14 years. A quick take-off and away into the required calm evening sun. The first flight was a mixture of pleasure seeing it fly and apprehension that there would be problems. I didn't get a picture of the landing as the sloping runway meant it happened out of sight. When Charlie and the Scooter reappeared there was a big grin and the comment that it was 'a hoot to fly'.

We are still in the process of extending the flights but the initial experience is great. It's amazingly cold, but so close to the ground that you can pull the chocks from the cockpit while strapped in. It's snug, but comfortable, once you're in and the checks take seconds as most things like flaps, trim, mixture, transponder or hatches aren't fitted.

Take-off is about 60mph, accelerate to 70mph for the climb at around 420fpm. Easy cruise speed is 80 to 85mph. Approach is 60mph and no slower as it loses energy rapidly and will sink quickly. Landing so far has been straightforward, although as your behind is only about eight inches off the grass it feels quite speedy. Control is interesting as the rudder is very light and powerful, ailerons have bags of adverse yaw and the elevators lose a lot of authority at low speed. The stall is gentle, albeit with a high sink rate before the nose drops. The rudder needs to lead the ailerons in all turns and its directional stability is quite weak.

The Permit check flight was completed at the end of September and submitted for LAA Engineering's scrutiny.

Shortly afterwards the Permit hit my email inbox with satisfying efficiency from the LAA. The Scooter is hugely entertaining and I'm really looking forward to getting more experience and then going places (slowly and noisily).

There is a great deal of pleasure in flying such a rare and simple machine with its outsize character. ■

Below top **Insulated against the chill of the airflow, Damien installed and ready for flight. There are no doors for entry, just a window!**

Bottom left and right **Flying in formation, Damien and the Scooter by Anna Huke from their Stampe.**

Unusual Auster

An Auster slowly stripped for parts that was reborn as a rather special 'bitsa'. Recently restored, **Clive Davidson** flies the unique Auster Kingsland…

Photography by **Ed Hicks**

Flight Test

I occasionally dip into a wistful corner of my memory to recall cutting my teeth with flights both testing and pleasurable. Back when I was building hours, it was in our black and orange Wasp Flying Group Auster Autocrat. Its colour scheme was rather jarring, but did nothing to impair my growing affection for its challenging, to me, qualities. I had the greatest respect for Derek, known as 'The Baron', who was definitely of the old school and a hugely experienced life-long instructor who guided, encouraged and helped in so many ways. The syndicate was based at Panshangar, then a large grass field without runways, just an open expanse to fly and settle into wind. Chasing an hour a week for three years to log 150 P1 hours was part of the plan, as I aimed for the first rung on the ladder of instructing ratings. I still greatly appreciate 'my' Auster with Derek's guidance for a marvellous grounding and airing of practical hands-on knowledge.

So, some 45 years later, I was delighted to fly Auster Kingsland, G-AJIT, nicknamed '*Gadget*' and meet restorer and owner, Steve Farrant. *Gadget* started life as an Autocrat, but was modified and enhanced to become an Auster Kingsland instead.

Outwardly she is handsome, beautifully restored by Steve, and finished in cream with dark red cheat lines and highlights… but has some major differences from her original Auster foundations.

History

Gadget came off the production line on 30 April 1947 and gained her first Certificate of Airworthiness three weeks later. She was then successfully operated by a variety of five flying clubs for 20 years, then stored in a Shobdon hangar where almost inevitably bits and pieces of her airframe wandered and disappeared. She languished for 12 years moving further from serviceability with each removed item. A fellow called Jock Kay came to the rescue in 1980 and acquired her wingless shell and brought her home to his purpose-built extended garage in Kingsland, Herefordshire. He worked for a number of years but unfortunately passed away in 1989, so the project was taken over by his son Andy and moved to Netherthorpe. The in-line four cylinder 100hp Blackburn Cirrus Minor, with a metal Fairey Reed prop that had long since gone, was replaced by a Cessna's Continental ▶

> "A less obvious feature are the wings. These look normal but were taken from an Auster AOP6. The AOP flaps weren't used though, and original split flaps were incorporated"

0-200 of 100hp, the same power as originally fitted, but using a new engine mount and prop. The fuselage was sandblasted, etch primed, topcoated and covered in Ceconite102 by Maurice Ridden. Steve Bryan constructed the firewall, and fettled a Taylorcraft nose bowl to create a cowling, and also made the engine baffles and plumbed the fuel system.

A less obvious feature are the wings. These look normal but were taken from an Auster AOP6, a later marque that had wing tanks with a combined capacity of 23 imperial gallons or 105 litres, as opposed to the original single tank in the fuselage of 15 imperial gallons or 68 litres. The siting of the fuel within the wings has the added advantage that the CofG changes little during its consumption, rarely calling for retrimming when established in the cruise. The AOP flaps were not used. These hung behind the wing trailing edge rather than being within the wing profile like the original split flaps, so were cut off, and original style spilt flaps were incorporated. Other changes, like using Cleveland wheels and brakes and Cessna rudder pedals with toe brakes, were also fitted by Jock.

Eventually, with the aeroplane complete and the paperwork submitted, G-AJIT took to the skies again on 6 May 1994 now on a Permit to fly. This time it flew renamed as an Auster Kingsland, (named after Jock's home). The project had taken nearly 16 years.

Gadget flew happily until late 2014, when she hit a hit a hedge at Netherthorpe and ended up on her nose. Sadly this was enough to see her written off. Eventually she passed into the hands of Auster enthusiast Tony Brier.

Enter Steve Farrant. Steve was already flying G-AKSY, an Auster V with an 0-290 that Tony Brier had rebuilt at Breighton. Steve was looking for a new project, so after some negotiations, *Gadget* moved south to Steve's workshop in Surrey.

Steve carried out a total 'nut and bolt' restoration on *Gadget* over a period of seven years, fitting a 160hp

Opposite **Aloft in the unique Auster Kingsland, enjoying upped performance and increased range.**

Left **Latest rebuild for *Gadget* saw it taken right back to a bare frame.**

Below left **With the change to a Lycoming, Steve had to fabricate all an all new cowling.**

Bottom **Dorsal fin was added during the second rebuild to counter 60 more hp that came with fitting the Lycoming O-320.**

Above **Comfortable cockpit for two has been brought right up to date with subtle panel upgrades. Hanging straps really help when climbing in.**

Lycoming, custom building new cowlings, and creating a modernised instrument panel along with fitting all new wiring. He also did all the fabric and paint work himself. It's a one man restoration tour de force, and the resulting aircraft is absolutely superb.

Distinguishing features

The shapely nose of this Auster gives a hint that things are different, as the engine cowling is altogether more rounded. The engine inside is a familiar 160hp Lycoming 0-320-B2B and sits on an extended engine mount that also has a bit of an offset. The increase of 60hp, from when she started life from the Auster Company works at Rearsby in Leicestershire, will heavily influence her performance, particularly her ascent towards heavenly clouds, while remaining VFR, of course. On the rear fuselage, an enlarged dorsal fin added during Steve's restoration helps with directional stability. The prop is a Hercules, 73" diameter with a pitch of 57". With the extended engine mount plus the space where previously the original fuel tank sat, this creates lots of space for working behind the engine. The oil may be dipped and the general condition of the engine easily inspected.

The frise ailerons have a generously deep hinge point set back in the aerodynamic bevel of the leading edge. This allows for a generous proportion to be lowered into the rushing air to create drag and lessen the effect of the nose yawing away from a turn. By eye, and by moving the ailerons up and down by hand, it seems that these are nominally differential as well.

Walking under the front of the broad wings, take care on the port side that you avoid walking into the enormous pitot/static head mounted on the front of the strut.

The undercarriage damping is by a classic bungee setup, and these are protected from errant oil drips and exhaust by an angular deflector directly in line with the twin exhaust pipes.

The whole tail is braced: fin to both tailplanes and again underneath to the fuselage. The rudder top is aerodynamically balanced to aid in reduced foot and rudder pressure for the pilot and the trim for pitch is on the left elevator.

The Maule tailwheel has a slightly broader tyre than standard, so this may be more capable of resisting shimmy. This is anchored to the last of sturdy leaf springs with chain and springs attached on arms connected to the base of the rudder. No matter which aircraft, it's worthwhile checking these connections for condition rather than just giving the assembly a casual glance. Losing directional control can be equally very expensive and gravely traumatic. The springs take up the tension as the rudder is pushed to one side and the wheel should follow via the 'telegraphed' chain links. These links are more than

> "The shapely nose of this Auster gives a hint that things are different, and inside the cowling is a 160hp Lycoming O-320-B2B"

adequate, but do always remind me of those attached to sink plugs or as old loo chains.

In the cockpit

Opening the pilot's door and peering under the instrument panel into the footwell, seasoned Auster pilots will spot two broad and distinctive Cessna rudder pedals, just like those from 150s. One of the Kingsland additions, they replace the original floor mounted heel brakes, which my memory suggests were each the size of perhaps half a crown? Awkward to initially find and operate, but, once learned, never forgotten. Toe brakes are definitely an improvement though! For parking, there is a pull and twist lock on the left of the cockpit.

Entrance is aided by grabbing a leather strap hanging at the inside, forward wing root to help both balance with one foot on the external step, bring the other foot up and through, while pulling yourself in, then settle onto the seat.

Best to make sure you've no mud on your boots before climbing in though, as the cockpit here is spotless.

The third, rear, sideways facing seat, has gone. That was always good for a lark, subjecting a passenger to looking at the sky as steep turns were flown, looking upwards as he lay on his back. The reduction in seating probably helps with a reduced insurance premium and creates a storage area capable of holding the same weight as a possible previous passenger. This space is now reserved for Dillon, Steve's faithful black Labrador, which sleeps inflight with his Mutt Muffs ear defenders on and wakes as soon as they land!

Above **Split flaps were built into the Auster AOP6 wings, that were fitted to G-AJIT.**

Left **Cleveland wheels and brakes are just one of a number of 'Kingsland' modifications…**

Below **…and are actuated by Cessna rudder pedals with toe brakes.**

Above **Proud restorer and owner, Steve Farrant.**

Top left **Loads of space to work on the the engine and accessories thanks to extended engine mount and no nose fuel tank.**

Left **Steve did all the fabric and paint work himself during the restoration.**

Panel

What had been a classically old instrument panel has been brought sensitively up to date in Steve's restoration. Directly in front of the P1 left seat is an MGL Extreme, a small EFIS that displays flight and engine data. A small Winter ASI and altimeter stack vertically, to the right of the MGL, are the only round instruments, and fitted as LAA required backups. An iPad for SkyDemon sits vertically to the right of these, and then there's a stack of Garmins – audio panel, radio and transponder. A digital carbon monoxide detector sits far right, while switches and circuit breakers run along the panel's lower edge. It's all very smartly executed.

The central and original throttle was a lever with a carb heat to one side and mixture the other, these have been swapped for vernier-type controls favoured by Cessna, and that is where they have, again, been sourced – another Kingsland change.

The fuel selector sits on the floor mounted between, and in front of, the two seats. The fuel is gravity fed and the thumb and finger tail rotary selection being: both, left, right and off. There is a detent for each position to ensure the fuel tubes are aligned to flow. There is a floor-mounted fire extinguisher with a pull up clasp to release.

Below **Plenty of aileron and a bootful of rudder will get a good break… revealing a clean belly!**

I don't have to go hunting for headset plugs, as there are already noise cancelling headsets plugged in. I admit to having a tiny amount of tinnitus, though fortunately it doesn't bother me. It's only when I stop and think of it that I can discern a gentle singing. I put it down to flying around in 'my' old Auster non-radio without a headset. Modern headsets really do make the cockpit a more enjoyable place to be – normal conversations, no shouting!

The stick, or rather both control columns, are free to move fully in a circle without restrictions. Ducking my head down below the level of the wings, the ailerons may be seen to deflect. I find myself saying 'Up' as the stick points at the aileron as a check, today the Auster's frise aileron leading edge is just discernible. The other aileron is down and confirms the correct rigging. I am reminded of how Derek, my Auster instructor, told the tale of his (1933) Siskin Squadron scramble… where he became airborne to find his ailerons reversed. Of course, highly motivated he promptly returned. Twisting around to our tail, elevator and rudder respond correctly. Facing forward, the huge flap lever is mounted in the left wing root, disengaged by lifting the end slightly up, pulling the lever out and lowering to either take-off or drag flap.

Fuel and spark for start

Our Lycoming was still warm and so we needn't prime, but the handbrake was pulled out and engaged. Master on, left sliding window open, a good look around, "Clear prop", left mag flipped up for on, stick back, foot brakes covered, and starter thumbed to see the prop turn… 1,000rpm, mags both and alternator on. Oil pressure rising to healthy 60+ psi, all set to taxy. The view over the nose is, of course, slightly restricted with the broader engine cowling so it's gentle unhurried progress, weaving to see the way ahead. When I had a turn at taxying, even with today's wind of only 8kt, without brakes on my side the tailwheel was reluctant to respond – so I quickly handed it back to Steve!

Ts and Ps satisfactory, a power check with mags, carb heat, and idle. Pre-take-off checks include the Captain's brief, leaving no doubt as to our actions should we have a problem on take-off. Expect the unexpected – it's good planning!

Airborne

We had a crosswind from the right, which helped counter the Lycoming's induced swing to the left, otherwise easily countered with a little right rudder. Keeping the tail on the ground initially as we rolled helped keep things straight, then slowly easing the stick forwards, to put the nose just beneath the horizon. *Gadget* flew herself off without a change in attitude before accelerating in ground effect, then raising the nose to the climb attitude for 60kt. The last Permit flight test showed a gain of 1,000ft in 62 seconds giving a healthy climb rate of 968ft per min. Back in the mists of time, the 100hp Cirrus-powered Auster, even with rose-tinted spectacles, climbed at around the 570ft mark.

As always for the flight test, we climb out loosely with the Freelance photoship. Two different types of aircraft with similar power and nominated climbing speeds can sometimes have varying angles of ascent. On some

Above **The crisp paint scheme really flatters the lines of this Auster.**

occasions the following aircraft has called 'Buster' (lead needs to slow down, reduce power and rate of climb) to have a chance to catch up, however, on this flight we quickly caught Patrick with some superior climb performance.

Photos done and departing from the formation on a gentle break, we had a look at the range of speeds *Gadget* could hold. The upper end saw 110kt/125mph, Vne is 126kt/145mph. Cruise is at 85kt/ 98mph at 2,150rpm, with hourly fuel burn around the leaned 26 to 27 litres.

The stalls, with and without flap, are just what you would want from loitering as an air observation 'post' to operating out of tight strips, and are indeed slow. Clean, the nose drops away with only a slight shudder at just under 36kt with aileron response up to the departure, and with full flap, stick hard held back having to work with sound and feel, she let's go with a slight left wing roll at 30kt. Recovery with stick forward is immediate and adding power, there is very little height loss. Although theoretically the approach speed could be 1.3 of stall speeds these might be rather impractical. Nominated approach speed is <60kt and over the hedge speed must be around 45kt for short field landings.

Straight and level again she proves to be longitudinally as well as directionally stable too, aided and abetted by that extended dorsal fin. Lateral stability isn't the most lively but it is positive. The control harmony is pleasant, but pressures in pitch on the stick at slow speeds are high until trimmed. But beware! The sensitivity of that trimmer means very little movement is needed to remove any stick force. I tend to wind these above head trim handles the wrong way when I try one for the first time. As the fuel and crew are close to the CofG and the centre of lift, there is very little retrimming needed throughout a flight. *Gadget* is docile here.

When it comes to the ailerons, roll very gently and no rudder is needed to balance and although the purist won't like it, it works. But, rapidly apply full deflection and even the deeply set frise ailerons will shrug 'their' shoulders and the nose will yaw wildly in the opposite direction.

Rudder is definitely needed in the same measured direction as the intended roll to bank. This trait is one that took me so many hours to overcome all those years ago. It was a lesson well learned and I'm sure Derek would come back to haunt me should I ever become lazy.

Trimmed out and with the stick held central, *Gadget* may be guided by gentle rudder inputs alone – it's not an approved manner of flying, but with a high-wing and pendulous stability, a fun musing. I recall a syndicate member who demonstrated that, by opening a door, the Auster would roll in the opposite direction. Open the left door, slight pause and she rolled right…

Steve's *Gadget* is a unique example of a practical and reworked and sympathetically upgraded classic aircraft that retains its character but has extended performance and capability that rewards his efforts. He's made good use of it too, touring extensively overseas.

For rekindling my love of Austers, I'm very grateful to Steve for sharing some time with his fine restoration of the lovely *Gadget*. ■

AUSTER KINGSLAND

SPECIFICATIONS

General characteristics

Length 23ft 5ins (7.14m)
Wingspan 36ft (10.97m)
Height 6ft 6ins (1.98m)

Empty Wt 1,052lb (477kg)
Gross Wt 1,850lb (839 kg)

Fuel capacity 23 imp galls (103 l)
Engine Lycoming 0-320-B2B
Propeller Hercules 7357846-5

Performance

Vne 126kt
Stall (clean) 35.5kt
Stall full flap 30kt
Cruise 75- 90kt
Rate of Climb 968ft per min

DH600

A fabulous two-day fly-in organised by the de Havilland Moth Club in conjunction with the Shuttleworth collection on 30 July and 1 August, 2025, attended by around 100 de Havilland aircraft and several other types.

The first flight of the de Havilland DH60 Moth was 22 February 1925 at Stag Lane, north London. Fifty years later the de Havilland Moth Club was formed by Stuart McKay. The club has gone from strength to strength, with many great events, culminating in the annual Moth Rally at Woburn Abbey, which was a highlight on the calendar for many years until Woburn became unavailable as a venue. A smaller version of the Moth Rally was then held at various other locations, including at the Shuttleworth Collection, Old Warden, Belvoir Castle and Bicester – with one small event at Turweston (after Bicester pulled out at the last moment) and lastly Oaksey Park. For 2025, the 100th anniversary of the first flight and the 50th anniversary of the club, it was decided to have a big two-day event again at Shuttleworth.

As well as providing the location, Shuttleworth also displayed its two DH60s, G-EBLV the world's oldest Moth, which was delivered to the Lancashire Aero Club on 29 August 1925, and G-EBWD, the Moth bought by Richard Shuttleworth in 1932, his first aircraft and the aircraft that has been based at the same airfield for the longest time in the world, 93 years and counting! It also displayed the forerunner of the Moth, the much larger DH.51 G-EBIR, which was parked next to Terry Pankhurst's diminutive DH53 Hummingbird G-EBQP, the other aircraft that very much shaped the Moth's future… at least showing what it wasn't going to be.

After the Lympne trials of 1923, where the DH53 Hummingbird took part, Geoffrey de Havilland could see that these aircraft weren't practical, their engines were too small, and what was needed was a practical two-seater aircraft with adequate power and performance – but an aircraft a lot smaller than the DH51. The DH51 was

This year, 2025, saw the 100th anniversary of the first flight of the DH60 Moth – and the 50th anniversary of the DH Moth Club. **Nigel Hitchman** reports on the celebrations that took place at Old Warden…

powered by a 90hp Airdisco V-8, which was built from the unused parts of WWI Renault V-8 engines. De Havilland and ADC's Frank Halford designed a new engine using four cylinders from the Renault V-8 with a new crankshaft and crankcase, this became the ADC Cirrus, initially producing 65hp and the world's first inline four-cylinder aircraft engine to go into production. This was the ideal engine for the DH60 Moth.

While the Royal Aero Club and Air Ministry continued with their pursuit of very light highly efficient aircraft, as the new 'light aeroplane' with which they would equip the newly former regional aero clubs, de Havilland converted a DH.51, G-EBIM into a smaller two-bay biplane (which also incorporated automatic flaps which weren't retained), therefore the configuration of the DH60 Moth was defined. The 1924 Lympne trials went ahead with more very light designs, there were winners and losers, but the Air Ministry shortly thereafter issued a statement which basically said none were suitable as an aircraft for the aero clubs, particularly with the engines used for the trials, which were limited to 1,100cc de Havillands only participation at the trials was to send the modified DH51 G-EBIM and give rides to a number of distinguished passengers.

Almost as soon as the first DH60 had flown, the press and aero clubs were invited to Stag Lane to see it fly and be taken up. The Air Ministry and Royal Aero Club became ▶

Above **A line of five folded DH60 Gipsy Moths and one DH60 G Moth Major.**

Left **Three DH60s - G-EBLV the oldest, G-EBWD Hermes Moth, and G-AAWO DH60G Gipsy Moth make a formation flypast during the DH600 event.**

Above **DH82 Tiger Moth G-AZZZ, well known for belonging to de Havilland Moth Club founder Stuart McKay.**

Right **Well known Shuttleworth Collection resident DH.51, G-EBIR.**

Far right **A surprise for many was Terry Pankhurst's DH53 Hummingbird.**

Below **Steve Jones' brilliant DH71 Tiger Moth replica.**

convinced, and orders were made for the first aero club aircraft. Production increased rapidly and sales started around the world, with the first aircraft arriving in Australia by early 1926. The Moth evolved in production with changes to the landing gear and then introduction of metal fuselage frames in the DH60M, some wooden DH60s even had their fuselages swapped for new metal ones, particularly in Canada, but production of the metal and wood fuselages continued in parallel. The Cirrus engines also evolved into higher horsepower versions, the 80hp Cirrus II and 90hp Cirrus III, but by 1928 the stock of surplus Renault parts was running out and ADC ceased production, although production was taken over by the Cirrus Engine Company.

Replacement engine

De Havilland had foreseen this scarcity of Renault parts and therefore, in early 1927, got Frank Halford to design a new replacement engine which would be built at a newly established de Havilland engine factory. This was to become the Gipsy engine, originally tested at 135hp, but derated to 100hp for production. De Havilland also built a new aircraft to test the Gipsy engine, the DH71 Tiger Moth (and there was Steve Jones' newly completed DH71 replica G-ECDX on display showing its part in the story). The Gipsy was a great success and Moths built with it became known as Gipsy Moths, and this included the majority of those built. Soon the Gipsy II was introduced – a development that produced 120hp. Later this was inverted as the Gipsy III and then further developed into the 130hp Gipsy Major. These were fitted into the last DH60 Moths produced, which became known as DH60G-III Moth Majors.

Around 1,500 DH60s were built from 1925 to 1933, with a few more assembled during the next years. As well as being built by de Havilland at Stag Lane, they were built under licence in Australia, France, Norway, Canada, USA and Finland.

At the fly-in there were 15 DH60s, including the two Shuttleworth examples. This is probably the largest gathering of DH60s since before WWII, and special thanks must be given to Aero Antiques who brought five DH60s up from their Durley/Malshangar base, mostly flown by

Right **Furthest travelled Moth was Morane Saulnier DH60 F-AYNY, flown from La Ferte Alais.**

Middle right **Another view of the 'folded' Gipsy Moth line-up at DH600.**

Bottom right **Fabulous Airco DH2 replica has been constructed by Flying Restorations.**

Charlie Huke and Anthony Elliot. Furthest travelled was F-AYNY, the Morane Saulnier DH60, flown by Eric Pinon from La Ferte Alais, near Paris, familiar to many as the former G-AANV based at Turweston for many years when owned by Richard Seeley and restored by Aero Antiques in the 1980s.

There might have been two more which were promised, but didn't come due to the weather. It's a pity there are also at least two complete DH60s in England that were airworthy in very good condition, but now haven't flown for quite a few years and sit in hangars, plus another that has had its engine removed and hung up, apparently, in a car showroom in Switzerland.

Hopefully we will get to see them fly again one day. There are also four more on restoration at Aero Antiques, which we look forward to seeing in the coming years.

The DH60s were all parked in a long line and on Thursday evening, the five with Aero Antiques plus G-AAJT, all had their wings folded lined up together, which was quite a sight.

Perhaps the biggest surprise of the event though was the appearance of the Airco DH2 reproduction which has been constructed by Flying Restorations (Steve Roberts and Martin Kimm) on the other side of Old Warden.

Although this is the third one they have built, it's the first time one has been on public display, with the other two currently in storage in Wellington, NZ owned by Peter Jackson/TVAL.

This example is for Tom Harris and was superb to see, displaying an amazing attention to detail and craftsmanship. Something to look forward to once it's completed and flying at Old Warden.

Two of the four UK-based airworthy DH80 Puss Moths attended: G-AAZP and G-ABLS.

G-ABLS was one of two DH80 Puss Moths that attended.

Top left **All three of the UK's airworthy DH83 Fox Moths gathered at Old Warden.**

Middle left **Lovely DH85 Leopard Moth G-AIYS, one of three that took part in DH600.**

Below left **Eight of eleven airworthy DH87B Hornet Moths attended, including newly restored G-ADKK.**

Fox Moth trio…

We were lucky to have all three airworthy UK-based DH83 Fox Moths present and parked next to each other on the Friday. This is the first time three Fox Moths have been together for a very long time in the UK – it happened in New Zealand 20-plus years ago – and it probably won't happen in the UK for quite a while, as G-CIPJ/ZK-AGM was flown from Old Warden to Audley End after the event to be dismantled to fit in a shipping container to finally go to New Zealand. We have been lucky to see it for the last 10 years since the restoration was completed by the Newbury Aeroplane Company for New Zealander, Bruce Broady, who decided to keep it here, well looked after and displayed by Mark Miller. The other two were G-AOJH, a long-time UK resident and famous joy rider when owned by John Lewery for many years from 1963 to 1990, and G-ECDF, recently restored by Aero Antiques for Steve Jones.

Three out of the four UK-based airworthy DH85 Leopard Moths attended: G-ACMA, G-ACUS and G-AIYS. Readers may be surprised to hear there are another six in the UK, at least one, G-CLSM, which is being very actively restored by Dave Reid.

Eight of the 11 airworthy DH87B Hornet Moths participated, there are another two with expired Permits to fly and one newly registered ex South African example which was imported as a project, but the current status unknown.

It was great to see the DH84 Dragon G-ECAN brought in by Henry Labouchere, but a pity that the other Dragon G-ACET doesn't have a current Permit to fly as it would have been great to see, following its restoration by Aero Antiques a few years ago. Sadly the DH90 Dragonfly G-AEDU didn't make it, presumably due to weather, and

The biggest type on display - DH89 Dragon Rapide, G-AHAG.

Above **Henry Labouchere brought DH84 Dragon G-ECAN.**

Far left **Thruxton Jackaroo G-ANZT.**

Left **DH82 Tiger Moth PH-CSL wearing Royal Netherlands Airforce markings.**

Below **Fabulous '100' formation flown by 16 Tiger Moths.**

there was just one DH89A Dragon Rapide, G-AHAG.

There were many DH82A Tiger Moths, probably around 50, including one from Germany and two from Holland. I had expected more foreign-based Tigers to attend, as there are many, but suspect the weather may have been a factor here. There was also one Thruxton Jackaroo G-ANZT.

Non-Moths included several Chipmunks, a Stampe, a Travel Air 4000 and a couple of Cubs.

Shuttleworth and the Moth club jointly organised a timeline flypast of representative types on the Friday afternoon, starting with the 1925 DH-51, followed by three DH60s, G-EBLV the oldest, G-EBWD Hermes Moth, and G-AAWO DH60G Gipsy Moth. Also significant was the DH71 replica, G-ECDX making only its second public display flight.

The highlight of the display though was the '100' flypast over the crowd, performed by 16 Tiger Moths, most of which were associated with the Tiger Nine display team which was also expanded to 11.

DH600 was an excellent event that was a real credit to the organisers from the DH Moth club and the Shuttleworth Collection.

Members and pilots had access to the aircraft park all day along with other interested visitors, who were given access to the aircraft park for a couple of hours each day. A marquee was provided by the Moth Club for pilots and members, with an excellent lunch and tea served each day, and was a great place to meet up with fellow enthusiasts and particularly welcome on Friday lunchtime when we had rain for a couple of hours, which ended up putting back the flying display, almost as soon as the display had finished, the sun came out, making for a pleasant trip home for everyone.

The next big celebration will probably be 100 years of the DH82 Tiger Moth in 2031! Perhaps that will see 100 Tiger Moths gathered together? We can but hope… ■

DH Moth Club *www.dhmothclub.co.uk*

Coaching Corner… Winter considerations

Flying in the winter months can be great fun but as PCS Head of Training, **Christine Carlin**, points out – that cold weather brings challenges as well performance benefits…

Winter flying holds a certain magic… the air is denser, the aircraft performs better, and visibility on a crisp, cold morning can seem endless.

Yet for all its allure, winter is also the most unforgiving season in aviation. Mistakes that might be barely noticeable in summer can prove challenging when the thermometer plunges.

For GA, winter demands a heightened level of preparation and awareness. Our inflight performance can be handicapped by cold, low light, and weather phenomena. Preparation is key!

The use of PAVE and I AM SAFE checklists provide an ordered procedure.

Pilot
- Licence and ratings – valid.
- Medical Certificate or Declaration – valid.
- 90 day rule – compliant (if taking passengers).
- Recency – are you current to fly under your club or group rules?
- Fitness to Fly – in good physical and mental health.
- Passengers – briefed.

Aircraft
- Airworthy – Permit to Fly or Certificate of Airworthiness valid, supported by a Certificate of Validity or Airworthiness Review Certificate.
- Aircraft Equipment – appropriate and working. Ensure that you have a working carbon monoxide detector on board, exhaust manifold leaks are always a possibility, and even more so with the use of cabin heat in the winter. CO poisoning is believed to have been a factor in several light aircraft incidents.
- Fuel and Oil – adequate for the flight including reserves for any diversions, planned or otherwise.
- Mass and Balance – within the aircraft limits.
- Documents – onboard if required.
- Insurance – valid.
- Pre-flight Inspection – complete.

En**V**ironment Weather
- A detailed weather brief is essential. Focus on freezing levels, temperature to dew point spread, frontal systems, cloud ceiling and visibility. The Met Office Aviation Briefing Service gives detailed weather information. The aim is to have a comprehensive understanding of the weather conditions you might experience.
- Notams, AIP & AICs – check for any notices relevant to your flight.
- Performance – aerodrome physical and weather related limitations.
- Terrain – does your route involve flight over high ground?

External pressure
- Time Pressures – avoid the pressure to commence or complete the flight at a certain time (get-home-ittis),
- Delays – consider what you will do if the flight is delayed?
- Passengers – manage the expectations of any passengers, they might not understand the impact of the weather or aircraft technical issues.

Review each letter in the I AM SAFE checklist before each flight and be honest with yourself. If you answer 'no' to any of the questions in the checklist, do not fly.

I **Illness** – assess if you have any illness that could impair your performance, for example: do you have a headache, a sinus issue, or an upset stomach?

A **Attitude** – check your emotional state, are you ready and fully focused on the flight ahead?

M **Medication** – are you taking any prescription or over-the-counter medication that could affect your faculties?

S **Safe** – are you under any pressures, anxieties or worries that might impact your ability to concentrate and make clear decisions?

A **Alcohol** – adhere to the '8 hours bottle-to-throttle' rule (or longer if necessary). Be aware that residual effects can linger, have you had a drink in the last 24 hours?

F **Fatigue** – ensure you are sufficiently rested. Fatigue, especially when combined with stress, is a hazardous situation. Are you fully rested?

E **Eating** – make sure you have eaten a healthy, moderate meal. Are you adequately nourished?

Preflight Inspection: Cold weather considerations
Low temperatures can influence every part of the aircraft. Oil and hydraulic fluids may thicken, batteries lose capacity, and seals can stiffen.

Contamination: Even a thin layer of frost on the wings or tail can reduce lift by up to 30% and increase drag by 40%, because of the ice etc., it will also increase the aircraft weight. All surface frost, ice or snow must be

removed prior to flight. Pay particular attention to wing and tailplane leading edges and upper surfaces, control surfaces and hinges, pitot tubes and static ports, fuel caps and vents. Small amounts of frost or snow can normally be brushed off with a broom but be careful not to scratch the aircraft. Moving the aircraft from shade into sunlight may help to remove small amounts of frost. Larger deposits may require the use of chemical de-icers. If the aircraft is kept outside the use of covers may help.

Fuel tanks: Condensation can form more readily in winter, so pay extra attention to draining and checking the fuel for water contamination. Check filler cap seals for deterioration which may allow water seepage into the tanks. Leaving the tanks full may help, however, be wary of aircraft performance.

Oil: Check oil viscosity (use winter-grade oil, as per the POH). If applicable, check the oil breather pipe is clear of ice. A blocked breather pipe will cause high oil pressure and can lead to a severe oil leak.

Battery voltage: Batteries may lose charge during cold weather. The use of a trickle charger may benefit a hangar based aircraft. If the aircraft is kept outside, consider removing the battery a day or two prior to a planned flight and charging it.

Carb Heat: If your aircraft has a carburettor, ensure the carb heat is working prior to take-off. Carb icing can occur with outside air temperatures as high as 20°C if humidity is sufficient. (See CAA Safety Sense Leaflet 14).

Cabin heater: Check that there are no cracks or holes on the exhaust or heat exchanger. A smell of smoke or fumes in the cabin and/or a large drop in RMP when applying carb heat may indicate that: detector when flying with passengers who do not hold a valid pilot licence. Open cockpit aircraft are exempt.

Undercarriage When operating off grass spats may trap mud which can later freeze and jam the wheels and or brakes. Make sure all mud is removed prior to and after flight. Inspect the wheel wells of aircraft that have retractable gear for slush or other winter contamination because if it freezes it can interfere with their operation. Check tyre pressures as this may fall during cold weather.

Engine start and warm-up

Cold starts are hard on engines, follow your POH.

Preheat: Consider preheating the engine as this will raise the oil temperature, aiding lubrication and will reduce any ice or condensation which might be present. If the aircraft is not fitted with a suitable preheating system, a portable heater may suffice.

Battery: Refrain from running the electrics for any length of time prior to start. Even after start-up it can help the battery to recover by keeping the electrical load low – and keep the engine above idle power.

Prime: Over priming can create a fire hazard, use the recommended amount of fuel priming as per the POH. Make sure that you are au fait with the procedure for clearing a flooded engine and how to deal with an engine fire on start up.

Above **There's good flying to be had in winter, but are you prepared for the challenges that the season brings?**

Taxying

Let the engine warm up fully before taxying. Avoid high power settings until the oil is sufficiently warm. If you are not sure if the surface is suitable to taxi on, inspect it on foot first. When taxying on snow or possible ice, taxi slowly. Use brake checks early on to gauge traction, thereafter use minimal braking. Keep ailerons and elevator positioned for wind direction – especially important in gusty conditions.

Take-off and landing considerations

Use the POH to calculate the take-off and landing distances required. CAA Safety Sense Leaflet 9 recommends using the following safety factors for take-off and landing calculations:

If calculating multiple factors, they should be multiplied together, e.g. 1.3 x 1.1

Consider how the surface conditions might change over the course of your flight. Hard frosty grass may thaw and become muddy. Towards the end of the day the temperatures will drop and thawed wet surfaces may become hard and slippery again. Avoid heavy braking on landing to prevent skidding and/or ground looping.

During the late afternoons in winter the low sun can pose a real threat during landing, obscuring the runway. If you are unable to delay landing until the sun has stopped being an issue, by either circling or flying to the local area, consider landing with a slight tailwind if conditions permit.

Do be aware of local sunset times and aim to be down about 20-30 minutes prior to that time, especially if you rely on daylight for your post-flight routine.

Post flight

Clean the aircraft, removing all mud or slush. Dry the wings as much as possible, ensure wheels and brakes are as free from contaminates as is practical.

Replace any aircraft covers and control locks, and if the aircraft is kept outside, make sure it is tied down securely (particularly if strong winds are forecast).

Next month I will look at airframe icing, as this poses a significant threat to GA pilots at this time of year. ■

Victor Bravo instrument panel… Mk. 2

A panel shouldn't be for life, suggests **Ruth Kelly**, who having done a panel upgrade to her RV-8 in 2020, felt there was still room for improvement five years later…

Readers with long memories will recall that I upgraded my Van's RV-8's instrument panel back in 2020. I wrote it up for *Light Aviation* and the article appeared in July that year. Back then I was concerned about the integrity of the panel wiring; some of the instruments didn't work too well and I hated both the ergonomics and aesthetics.

So it was that I found myself crouched in a cold cockpit in January 2020, wire cutters in hand, finding out how my aeroplane was wired up in the most committed possible way. It was a strange time: I had lost my partner William to cancer just a few months previously, and the first Covid lockdowns were just around the corner. I needed that project: it gave me something to focus on in a world turned upside down… and not in the aerobatic sense.

In most ways the project was a great success. The new panel looked much nicer, and ergonomically it was easier to use. The instruments all worked, the wiring was much better, I fully understood it and knew how to look after it. Result.

However, building a tablet computer into the panel turned out to be less than brilliant. I love SkyDemon, but I don't like having a loose phone or tablet in the cockpit, and putting one on a Ram mount, or some such, always looks horribly like an afterthought. But my homegrown panel mount was tricky to use: taking the tablet in and out was such a faff it was best not to try. And after a few years the damn thing passed some magical milestone and it became impossible to update; the operating system was just too old. It still worked but it felt like a liability. And that started the ball rolling towards 'Panel Upgrade Mk. 2'.

"The 2020 panel looked nicer and wiring was better. But, building a tablet computer into the panel turned out to be less than brilliant"

Planning

My first thought was to replace the tablet with the latest iPad mini, mounted in a Guardian Avionics docking station. But the RV-8 panel is quite small and I couldn't fit it in without radically changing the layout – which I was very happy with – or scrapping instruments I wanted to keep. I also had a nagging concern about building any kind of tablet into the panel. Did I want my primary navigation system to be dependent on a bit of consumer electronics? No. But I was struggling to find an affordable alternative.

While this was seething gently in the back of my brain more requirements started to appear. The Mk.1 panel had incorporated a Funke radio and transponder with Trig GPS to give me ADSB-out. This all worked, but they were fiddly to use, especially in turbulence. More than once I had been chased by ATC for my squawk, while I worked at the twiddle-push, twiddle-push, routine. I fancied a transponder with a numbered row of push-buttons, where you can key in the squawk as ATC reads it out. A Garmin GTX335 isn't cheap but it offered that desirable feature, along with an integrated GPS, which would eliminate another box behind the panel. And as a certified unit broadcasting ADSB-out with SIL=3 it would also make me visible to the widest possible range of traffic – a real plus in a world where it looks like we will have to 'share the air' with UAVs alongside established commercial traffic.

Trouble was, the Garmin was rectangular and my two little Funkes were round. So how about a new Trig TY96 radio as well? Anything else? Oh dear, yes. You know that nice Ian Fraser? He who writes useful technical articles for *Light Aviation*? We have a dangerous habit of flying together. I like to make his RV-6 do wingovers when he isn't entirely expecting it and in return he dreams up new features for Victor Bravo. He's an engineer you see, and finds the shortage of buttons to press in VB's back seat distressing. Thus we arrived at a requirement for some kind of rear-seat instrumentation. This would keep him quiet… But no.

"And why don't you fit an autopilot while you're at it?" mused the voice in the back seat. It was a good point. I wanted to start flying VB longer distances and flying alone a bit more often. An autopilot can be a great aid in

> "During my design process SkyDemon added Bluetooth connectivity, allowing interfacing with autopilots and radios"

managing cockpit workload when flying cross-country. When talking to ATC, messing around with the transponder and generally thinking about navigation and comms it's easy to amble off course – and in a fast aeroplane like an RV-8 you can stray miles off track in no time.

"It doesn't need to be complex," he added, "RVs trim out very nicely, so given that you're likely only to want the AP to hold course for a few minutes, you can manage without altitude hold. A simple wing-leveller will do; it won't cost too much and installation will be quite straightforward." A few flights in G-EYOR to play with Ian's AP convinced me. A single-axis AP was added to my list.

But where would it get its course data from? I still needed a solution to the tablet computer problem. Enter Mike Edwards, fellow RV-8 driver, who fortuitously advertised a suitable device on the RV Squadron forum at the crucial moment. The device was an AVMap EKP V navigator, complete with ADHARS unit, so that as well as a moving map it could function as a primary flight display. And it just happened to be very similar in size and shape to my old tablet computer. Dear reader, I bought it… and installed it on the back of VB's pilot seat so that Ian could try it out from the rear seat. If it proved successful I could perhaps build a second one into the panel.

Sometime during this process SkyDemon released the new version, which allowed it to interface with radios and autopilots via Bluetooth. Now, I know I said that I wasn't all that keen on using a phone or tablet as my primary navigation system. But as a backup? Hell yes. Or even as a primary system, with the built-in AvMap as the backup. I do like a bit of redundancy. It turned out to be very simple to design in an IRXON Bluetooth Low-Energy dongle, with RS232 connections to the new radio and to the autopilot via a source selector switch, giving me two possible nav sources for the AP. What joy: a thoroughly useful additional upgrade at little expense or inconvenience. How often does that happen?

Design and manufacture

With testing of the EKP V delegated to Ian I got on with design work. As before, I drew it up using Microsoft Visio and before long I had a pleasing 2D layout. The extra space consumed by the new radio, transponder and autopilot meant that half the switches on the old panel had to find new homes. So I decided to include the two side panels in the project, which I had avoided with the Mk.1 design. I had already acquired a blank for the main panel directly from Vans, but the side panels I made myself. The plan was to overlay the existing side panels so that I could reposition switches without stripping out the existing metalwork, which was firmly attached to the fuselage skin

Above **VB's panel from the 2020 revision.**

by numerous flush rivets. In parallel with all this I started work on the autopilot. Having reviewed options, I settled on the Trio EZPilot with 'gold standard' roll servo, which I bought directly from Trio in California.

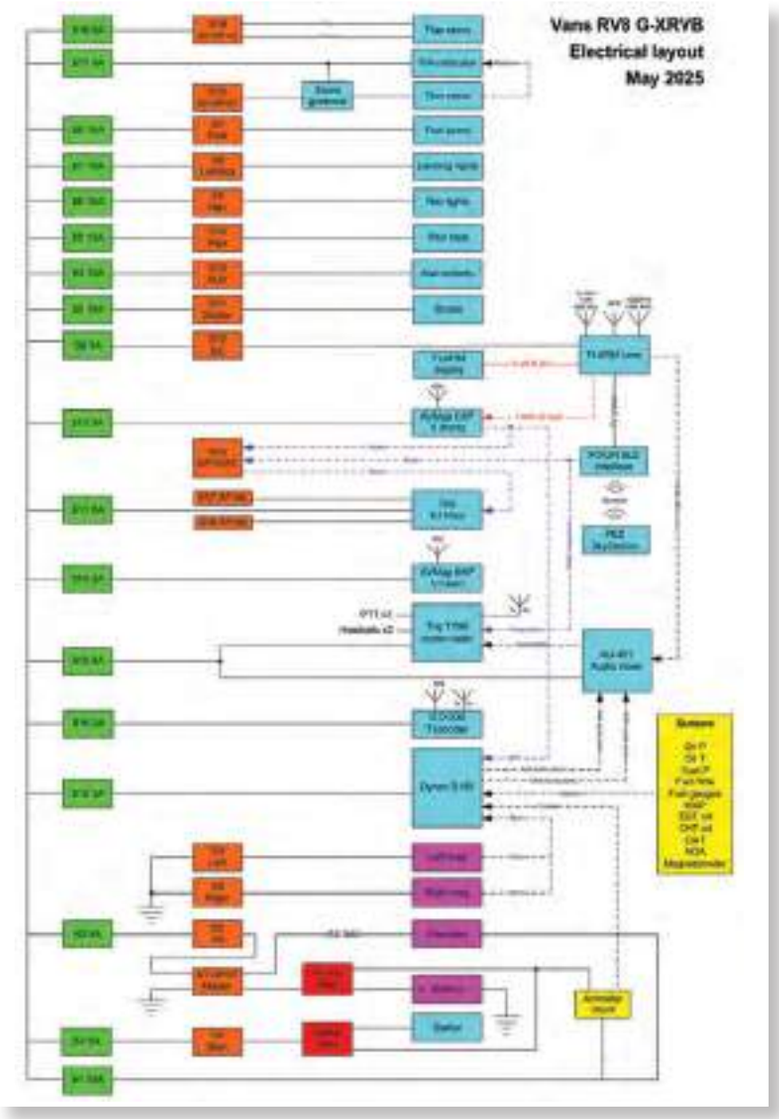
A quick search of previous Mod applications threw up a similar proposal in another RV-8, and LAA Engineering kindly supplied a copy of the Mod paperwork. I didn't precisely replicate the previous installation but it pointed me in the right direction: I designed my own mount for the servo and a crank arm to clamp onto the aileron torque tube, prevented from rotating by a locking screw drilled and tapped through the crank. The pushrod, connecting crank to servo, would pass through an existing hole in one of the cockpit floor longerons, which had been made for a (decommissioned) electric aileron trim system.

With a Mod 2 form safely lodged with the LAA (it's important to get into the queue) I started making the parts I needed, and finished up by completing the Mod 3 form, submitted just as the Mod 2 got signed off.

By now we had enough experience using the EKP V in the back seat that I was happy to go ahead and buy a second unit. And before I could finalise the panel layout I needed to buy the radio and transponder to fully understand how the panel cut-outs would mate up with the trays. An order was duly placed with Harry Mendelssohn and before long I had a pile of expensive cardboard boxes ▶

Below **The plan for the new panel.**

Bottom **The new panel painted and screenprinted.**



Left **Electrical layout for the new panel.**

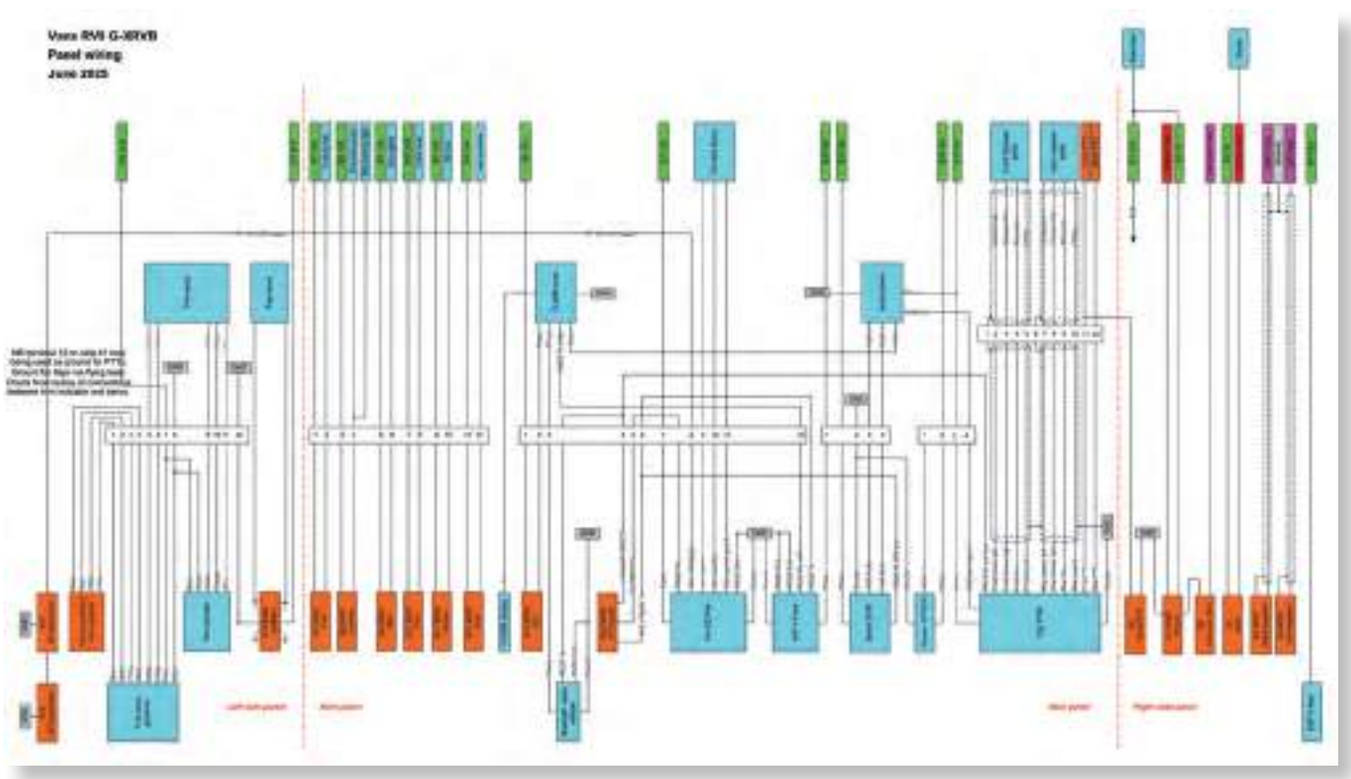
to play with. I then finalised the panel layout and generated the drawing for all the holes. I took this and the panel blank to Aerojet in Martock for laser cutting – the same company I used before. It was very quick and extremely reasonable and, apart from needing a bit of work with a file to de-bur the holes, the job was simplicity itself. The panels were finished in two-pack satin grey, and then taken for label and placard printing by Vendredi Screen Print in Christchurch.

Installation

Now for the hard part. One dank day in February I realised that I could procrastinate no longer… I had to strip out the old panel and get cracking. I really didn't want to. Back in 2020 it had been relatively easy – there were so many vital factors driving my desire to put in a new panel, and flying was curtailed by covid. This time I was decommissioning a panel that looked nice and worked well enough. Stress!

I consoled myself… the weather wasn't great and besides, I had done a vast amount of work and spent a lot of money. I needed to follow through and finish the job. I had hoped that the tidier wiring that resulted from the Mk.1 panel would make the wiring quite straightforward – and this time I knew what I was doing. I was wrong. The new radio and transponder were much deeper than the old ones and I realised that I would have to reposition most of the electrical connectors on the bulkhead to make room. So, I spent a considerable amount of time drawing up a new electrical block diagram and a detailed wiring diagram, so at least I was starting with a solid plan.

The doing of it was quite a task though. It's nothing



Above **Panel wiring schematic.**

> "The number of times you must climb in and out – to fetch tools, or materials – just adds to the pain"

really. But once you've taken out the old panel, and then the seats and cockpit floor, and opened up a few more panels to get access to things like audio jacks… it makes quite a mess. And although you now have access to things, finding places to crouch and balance while doing the work becomes quite a workout. And the number of times you must climb in and out – to fetch tools, or materials, or to adjust something, or simply to have a think or a cup of coffee – just adds to the pain. I was pretty much crippled by a bad back when I finished. And to add insult to injury the weather turned unexpectedly fine.

Remember 2024, when it rained continuously for about five months? I had expected a repeat of that. Oh no. Come March the weather cleared and it became dry and fine and eminently flyable… grrrr.

Ah well. Eventually I stopped pulling things to pieces and started rebuilding. Job lists were written and then ticked off; bits of the cockpit got closed up again and – come the day – the two side panels made their debut, rapidly followed by the main panel. Now I have learned, slightly to my surprise, that I am a bit of a pessimist – or perhaps it would be better to say that I have a more-than-healthy capacity for self-doubt. This can be a Good Thing, but it can also get in the way of doing stuff. Whatever… I was astonished to find that the great majority of what I had done simply worked first time, including the radio, which had to be the trickiest wiring job.

Three main problems emerged. One was the LED clock display for my FLARM system, which seemed not to work for no obvious reason. The FLARM core was obviously working OK because I could see traffic from it displayed on the new AvMap. I'm still not entirely sure if the problem was configuration of the clock display or wiring between the FLARM and the AvMap, but having pestered the life out of Navboys (which supplied the clock display) and FLARM itself, I eventually realised that I hadn't properly followed the instructions in a document I had received from AvMap. Ho hum. It all works now!

Above **The cockpiut interior laid bare…**

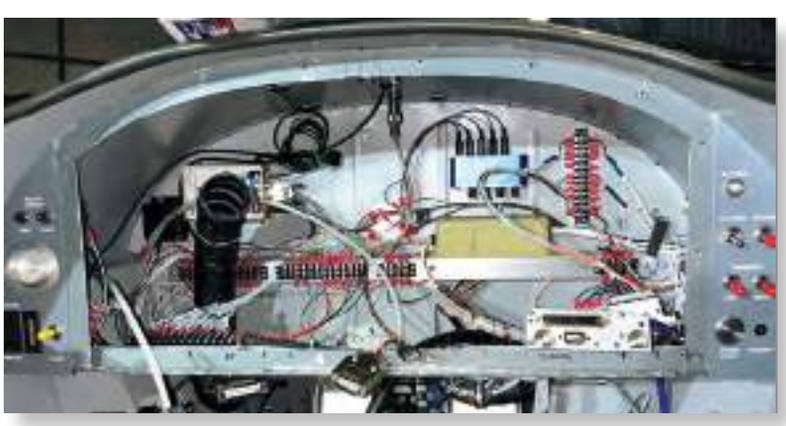
Below left **The new wiring is far, far tidier.**

Below right **Wiring loom connections and air pipes are long enough to allow connection with the panel tipped forwards.**

Thanks for your patience, everyone.

Problem number two concerned configuration of the Garmin transponder. Firstly it proved difficult to get hold of the correct version of the installation manual. When I finally got my hands on a copy it was a struggle to find the several relevant paragraphs among the staggering 276 pages of overly complex and largely irrelevant detail that it contains. Seriously, Garmin, you could easily reduce it to a dozen pages and put all the technical detail for features most people won't be using into an appendix (or 10). Part of the problem is that it is a fully certified unit with closely specified installation requirements, and one rather suspects that Garmin would prefer you to shell out several more arms and legs to get help from somebody in its network of professional installers.

In fact, my installation was very straightforward. Apart from the physical mount, all it needs is a power supply, two antenna connections and a static system connection to the ▶



Above **Trio Ez-Pilot autopilot hardware install and wiring.**

Below **The latest panel, completed!**

altitude encoder. With the installation signed off by my Inspector I then moved onto testing. For this I followed a suggestion in the LAA technical information leaflet TL3.03 Aircraft Avionics Installations and downloaded some free software called Transponder Report from *getyourwings.co.uk* onto my laptop computer. This uses a software-defined radio (SDR) dongle (£20 on Ebay) to receive and decode ADSB transmissions, filtered by aircraft ICAO code. Armed with this and with the transponder in ground test mode we could see that it was correctly set up and transmitting ADSB with SIL3 and SDR2. I then carried out a standard avionics flight test to check that the normal surveillance radar features (ident and squawk) and that the altitude encoder was properly configured. The reports were then sent off with my Mod 7 (avionics) and Mod 17 (certified ADSB-out) forms, I paid my £30 and settled back to await approval. Hopefully!

Finally, the autopilot. My Mod 3 hadn't been signed off yet but it was possible to complete a trial installation to check that everything was working. It wasn't. Mechanically it was fine; nothing interfered with anything and the servo arm couldn't go over centre. The control head powered up and received course data from the AvMap or SkyDemon.

But pressing the 'servo engage' button resulted in… nothing. The indicator lights came on – including the one in the back seat – and all the remote disengage buttons worked. But the servo itself refused to engage. Being a bit of a pessimist (see above) I assumed that it was my fault and I spent forever reopening the panel, dismantling connectors and tracing wires with my multimeter.

Eventually I put an oscilloscope on the output from the control head at the servo end (should have done this first!) and in time-delayed email conversation with Chuck at Trio confirmed that everything was working as it should. Just my blimmin' luck: the servo was faulty. Connecting the harness to a borrowed servo it powered up without trouble. Chuck was sure that the problem would be in the electronics, not the solenoid or servo motor itself. I confirmed that I didn't mind changing the board, so he express-couriered a replacement to me. Swapping the board was easy and – voila! – I had a working autopilot.

Completing the initial ground set-up I got my Inspector to check over the installation and sign off the LAA installation report. Then disabled the system by removing the pushrod linking the servo to the aileron torque tube, and sat back to wait for approval.

Testing

With the autopilot safely disabled pending Mod 3 approval there was no reason why I shouldn't go flying, was there?

And after four months out of the air I was feeling keen. Class rating instructor and good friend, Annabelle Burroughes, kindly hopped in the back for my first 30-minute flight. I wasn't especially concerned about flying after a break, but I knew that my attention would be focused on the new panel. Not only were several key things now in different places but there were shiny new toys to play with and I would be watching everything like a hawk to be sure it was all working. Having Annie's eyes firmly outside the cockpit while I goggled at my new creation seemed like a wise precaution.

Next day I bashed around the circuit to regain currency, and the day after I took Ian off to lunch at Dunkeswell, also taking the opportunity of the return flight to test and compare rear and front seat instruments. On return to Henstridge I then shot up for another quick local on my own, leaving Ian on the ground with the aforementioned laptop + SDR dongle to capture a further report on my transponder output. The cork was well and truly out of the bottle now, and by early June I had clocked up some 12 hours in the air, which for me is quite a lot.

After about four weeks LAA approval for testing the autopilot popped through by email. For the umpteenth time I took out the seats, opened up the cockpit floor and re-fitted the servo pushrod. Ran through the initial setup again; checked that all was well; managed by chance to grab my Inspector as he was passing through to sign off

Above **The new panel is a big step forward.**

Right **The AVMap EKP V makes flying from the rear seat far more practical.**

the Certificate of Clearance for test flying… and then put the aeroplane back together again… again. Then up we went for an initial air test. If you want to know more about that, look out for a forthcoming article about autopilots. Suffice to say that the task was finished in two flights and I was very pleased with the result.

Conclusion

In the shortest possible summary: slightly painful, but ultimately very pleasing. The new panel is a big step forward on the old one – it looks even better; the wiring is better; it's more easily maintained and has more functionality.

Although I don't expect to use the autopilot all that often, it's rather satisfying and certainly does a good job of aviating while I navigate and communicate. The new radio and transponder are a joy – especially the Bluetooth interface to the radio from SkyDemon. That makes life a lot easier. Certified ADSB-out will I am sure prove to be a real benefit.

The HSI on the AvMap was a revelation. I had never really used one before. My course keeping is now much more accurate (when desired!) even without the AP.

Ergonomically the panel is terrific too, the engine start switches are neatly grouped well out of the way, the flap and trim switches hover close to my throttle hand… and I can operate the AvMap using a finger from my stick hand.

Everything is in the right place… and visually it all makes me very happy. ■

Final note to self: Leave it alone now, and go flying!

The latest LAA Engineering topics and investigations
Compiled by Lucy Wootton

Engineering Matters

Including: Fire extinguishers, Mod system update, under-swaged cables, back up battery risks and trim tab trouble…

Welcome to Engineering Matters – the section of *Light Aviation* that is dedicated to discussing all manner of topics concerning both technical and operational aspects of the LAA fleet.

We all learn by sharing information, so if you have anything to say that you think would benefit others, or have experienced an interesting technical issue or component failure, then please contact us with a description of what you encountered and include accompanying pictures. Send your submissions to LAA Engineering at *engineering@laa.uk.com*.

Under-crimped swage found during inspection

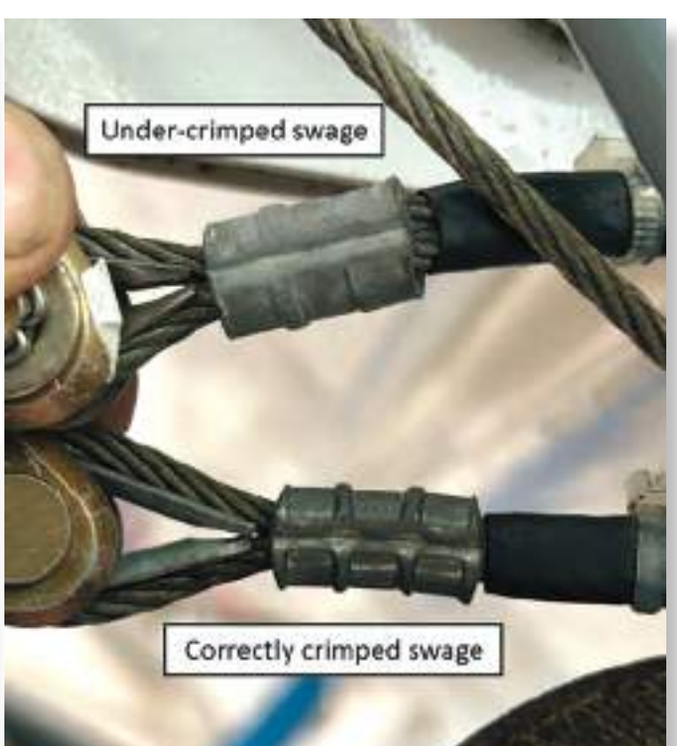
During a routine inspection of an aircraft's control system, one aileron cable swage was found to be under-crimped. A swaging gauge confirmed that all other swages were satisfactory, but the offending swage failed the go/no-go test.

While luckily the cable showed no signs of slippage, this finding most certainly raises concerns about build consistency and inspection diligence. It was unclear at which stage of the build process the under-crimping took place. However, the case highlights the importance of verifying every crimp with a swaging gauge at the time of installation.

This simple step ensures that the correct pressure has been applied and that the swage will hold under design loads.

Above **Gauge showing correctly crimped swage.**

Above **Gauge showing under-crimped swage.**



Above **Comparison of swages.**

Builder and inspection awareness
Builders should familiarise themselves with crimping tools and techniques, including some practice runs on sections of sacrificial cable, until they feel confident with the crimping workflow. Inspectors should pay close attention to swages during build inspections, especially when working with less experienced builders. If a faulty swage is found, it must be redone, and all other cables must be rechecked to ensure consistency across the aircraft.

Harness attachment cable failure
In a separate incident, an aircraft experienced a nose-over after landing. While the airframe only sustained minor damage, the pilot was thrown forward, despite correctly wearing the harness. Investigation revealed that the harness attachment cable assembly had come apart: the end of the cable had pulled through the swaged ferrule, freeing the shoulder harness from its attachment.

A properly swaged cable will break before the swage slips, proving that this cable assembly was understrength.


Cable failure and ferrule.

The swage had only been compressed twice, not the three times expected for a proper Nicopress swage. Additionally, it appears that the cable itself may have been of an incorrect type to be matched with the type of swage used. This failure, though very fortunately not catastrophic in this case, illustrates the real-world consequences of poor swaging practices and incorrect material selection.

Best practices for swaging

- Ensure familiarity with swaging techniques.
- Verify cable and swaging hardware compatibility.
- Follow manufacturer instructions for the number of compressions and tool settings.
- Use a go/no-go gauge on every swage during build.
- Inspectors: Check all swages during build inspections, especially in critical systems like controls and restraints.

Swaging may seem like a minor task in the broader scope of aircraft building, but its consequences can be significant. Whether it's a structural bracing wire, control cable or a harness restraint, consistent technique, proper hardware, and thorough inspection are key for ensuring safety. **Cris Fernandez**

Fire extinguishers

CAA has recently issued a reminder that halon-based handheld fire extinguishers must be removed from aircraft cabins and crew compartments by the end of 2025, in line with UK environmental requirements. It also notes that CAA is not responsible for enforcing these rules, but they fall in the jurisdiction of Defra and The Environment Agency.

Further information is available on the CAA website as to suitable alternatives. However, for Permit to Fly aircraft, it is not mandatory that 'approved' handheld fire extinguishers are used. The owner should consider the likely effects of discharging an extinguisher in the cockpit, e.g. whether it will affect vision/visibility, breathing, damage equipment, etc. Good advice can be found in FAA AC 20-42D.
Jon Viner

New Standard Modification for LED lighting

SM16770 has just been issued, which gives a straightforward route to installing various configurations of LED external lighting on LAA aircraft. The Standard Modification leaflet is available from the 'Info Library' on the website (Engineering – Standard Modifications – Equipment). Installations include navigation, strobe, anti-collision, landing, taxi and conspicuity lighting within certain parameters. The installation can be approved by an LAA Inspector, making the approval of these installations much quicker than a normal modification application. Further information on the Standard Modification process can be found in TL 3.06. **Jon Viner**

MOD system update

Thoughts continue to develop on the revised MOD system, and we've been engaging with some of the respondents to the earlier survey to test how our plans match up to expectations. The delivery of the changes is likely to be split into two streams: the first, those relating to additional capabilities of Inspectors to sign off a broader range of changes; the second, the IT changes to facilitate smoother application, tracking and administration of MOD and repair applications to LAA Engineering. The first stream is likely to start coming to fruition sooner than the second. **Jon Viner**

Aerodux alternatives

Those LAA members involved in building and repairing wooden aircraft will be aware that 'Aerodux' adhesive, under the name Prefere 4050/5750, is no longer available, as the manufacturer has ceased production.

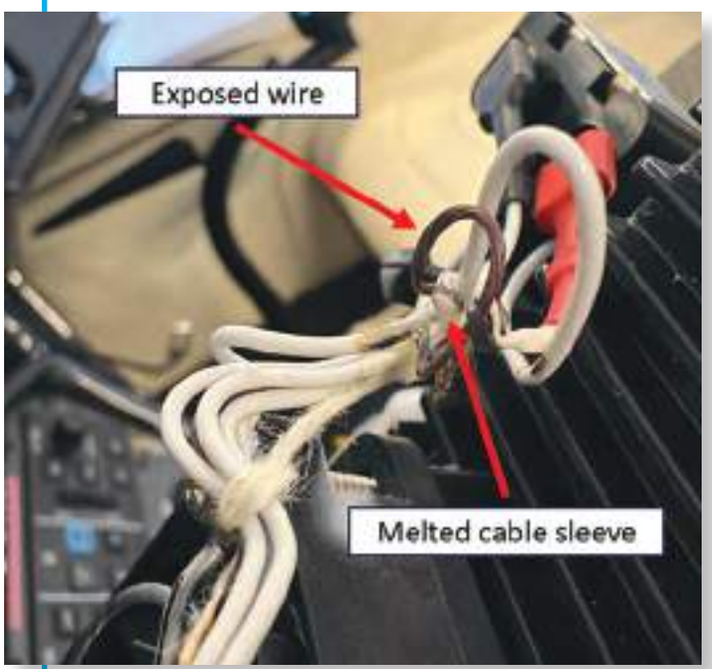
Aerodux is a phenol-resorcinol-formaldehyde (PRF) adhesive with a distinctive red colour. Along with Aerolite, Aerodux is one of the two 'standard' wooden aircraft adhesives. Fortunately, an alternative to Prefere 4050/5750 – Aerodux 185 – remains available.

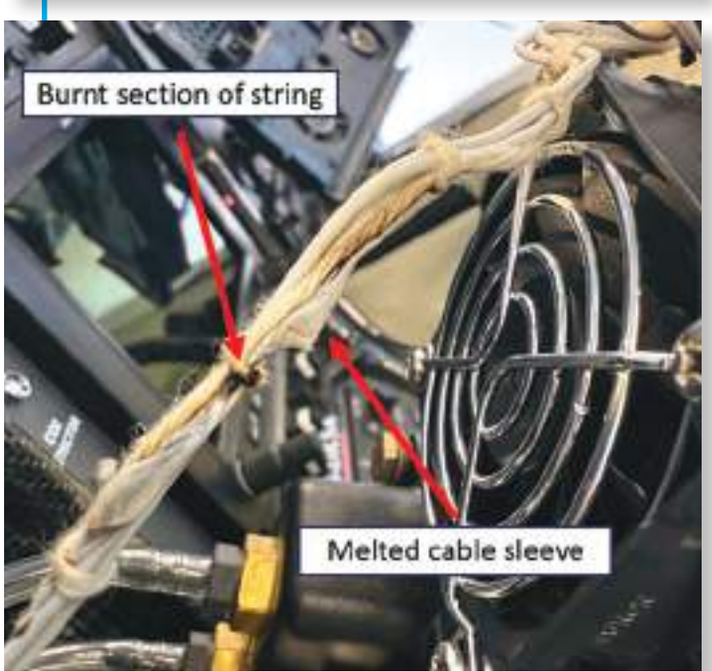
Unlike Prefere 4050/5750, where resin and hardener are both liquids, Aerodux 185 consists of a liquid resin and powder hardener.

Aerodux 185 has an LBA (German CAA) approval dating from 1959 (and updated in 2000). It also has a history in the UK as can be seen from the CIBA advertisement in *Sailplane and Gliding* in August 1960.

Aerodux 185 is now accepted by the LAA as a replacement for Prefere 4050/5750.
Ben Syson

Short in Sting S4 highlights backup battery risks





A Sting S4 aircraft recently experienced a ground incident involving smoke coming from behind the instrument panel while taxying. Worryingly, pulling the main fuse and disconnecting the battery had no effect. On inspection, a wiring loom was found partially melted due to a short. This was traced to an instrument backup battery, with no fusing or a circuit breaker, providing no protection against short circuits.

The inspection also revealed the concerning use of household string to bundle the individual wires into a loom, rather than waxed cord or any of the other proprietary aircraft wiring alternatives, such as Spiralwrap or tie-wraps. The string would likely ignite with very little difficulty.

Thankfully, this electrical incident took place while the aircraft was still on the ground. Electrical failures inflight are extremely serious, as they can result in, at best, key component failures, and at worst, poisonous fumes in the cockpit, cockpit fires or loss of the aircraft and crew.

Wiring protection

In an aircraft, wiring from a power source, whether primary or auxiliary, must be protected as close to the source as possible. A rule of thumb is to allow no more than 150mm (6 inches) of unprotected cable. This minimises the risk of a short circuit causing wiring to overheat, and if a short circuit does occur in the unprotected part of the wire, minimises the length of wire concerned, and as a result, the amount of heat and smoke that may be generated, reducing the fire hazard.

The only exception to this rule is the cable connecting the battery to the starter motor solenoid, where the currents under load may well exceed a couple of hundred amps – way too high for fuses or circuit breakers to be practical. In this case, to minimise the length of unprotected cable, the starter solenoid is often mounted on the battery box itself and extreme precautions taken to prevent shorts in this vulnerable area.

Backup battery systems often include internal fuses and may specify output protection in their documentation. However, wiring diagrams can be incomplete, omitting essential components like external fuses or circuit breakers. If in doubt, builders should consult with an Inspector who has a solid understanding of aircraft electronics.

While backup batteries offer some redundancy, they also introduce challenges:

- **Weight and mounting** These units are often heavy and require secure installation.
- **Maintenance Battery** health must be monitored, yet many systems lack clear indicators.
- **Switching logic** Automatic engagement can mask faults or create unexpected behaviours.

In complex systems, the temptation to add multiple backup batteries for different subsystems can lead to a difficult to maintain (and diagnose) electrical architecture. Builders must carefully select which components truly require backup power and ensure no conflicts with other parts of their electric system are introduced.

In simple aircraft, like the Sting S4, the design of electrical systems often receives minimal scrutiny on the basis that these systems are not essential for safe VFR flight in daylight. But as this incident shows, even auxiliary components can pose serious risks if improperly installed. Builders must follow documentation carefully and critically, and recruit the help of an Inspector when necessary. If in doubt, contact HQ! **Cris Fernandez**

Untouched vacuum filters

LAA Inspector, Ben Faulkner, reported that he found this disintegrating vacuum relief filter on an aircraft, and that the central air filter was in a similarly poor state. Items like this are not 'fit and forget', and Ben's find is a good reminder to check the condition of any filters on your aircraft!

Above **Vacuum system filters are not 'fit and forget' items!**

Woodcomp propeller white streaking

Following the distribution of *LAA Alert A-09-2025* on hairline cracks being found on Woodcomp composite propeller blades, an EV-97 owner let LAA Engineering know that while their propeller blades showed no signs of cracking, they were found to exhibit some white streaking and patching.

The main suspect is UV discolouring of the propeller's black gel coat from the aircraft having been stored outside by its previous owner, likely without prop covers. The owner has since opted to replace the propeller.

Have you experienced this type of discolouration on your props? If so, please drop us a line at *Engineering@laa.uk.com* with some pictures and general information on your propellers (manufacture date, storage conditions, etc…). In the meantime, LAA Engineering recommends that aircraft are stored in a dry hangar using prop covers, if possible, to protect them from the elements. **Cris Fernandez**

Above **Have you experienced this type of discolouration on Woodcomp propellers?**

Lucy Wootton: Chief Inspector notes

Updates from the LAA Chief Inspector.

More new Inspectors

In October, we welcomed two more new LAA Inspectors, and one returning Inspector.

Phil Hebdon

Phil previously worked as a commercial pilot, before moving into aircraft maintenance. Phil has been an LAA aircraft owner for many years – including a Taylor Monoplane, Pitts Special and a Miles Gemini. Phil has been maintaining his own aircraft, as well as those of others, and has significant experience maintaining and rebuilding gliders, specialising in wood repairs and fabric work.

Ben Davis

Ben has been an aircraft owner for about 20 years and has become something of a fan of the (mighty) Alpi Pioneer series. He's owned several and flown several more. He has also refurbished and upgraded a number of Pioneers with new avionics, autopilots, and instruments. Along the way, Ben has also owned and improved a Europa and a few other types, but he always seems to find his way back to a Pioneer! Ben also enjoys staring out of the front window of little biz jets!

Ben's background is in electronics, so moving into avionics was a natural step. He's a Rotax iRMT (Line & Heavy), a BMAA Inspector, and now also an LAA Inspector, combining his technical background with years of hands-on experience.

Ben is based at Finmere, just a short hop from LAA HQ, and is always happy to help other owners with maintenance, upgrades, or just a good aviation chat. You can find him sharing projects and flying adventures on social media as @benfly79.

Chris Norris

Chris returns as an LAA Inspector, following a few years away from the role. Chris is a licenced aircraft engineer, currently working at Vintage Fabrics at Audley End.

Trouble with trim tabs

Imagine the scenario: taking off in an elderly Auster, with a glider in tow. The aeroplane had been put back in the air a few months earlier following a thorough overhaul, and since carried out more than 1,000 launches without incident – the life of a glider tug can be a busy one. All is serene… or at least, as serene as it can ever be in the cockpit of an Auster which, with its fabric cover and pulsating engine up front, could never be described as quiet.

Passing over the airfield boundary, suddenly all hell breaks loose as the pilot finds the stick shaking wildly fore and aft – elevator flutter. Restraining the stick with more than a little difficulty, the tug pilot knows something is seriously wrong – flutter of any kind in an aeroplane can be extremely dangerous. He makes a quick decision to land immediately, straight ahead, pulling the tow release to free the glider to make its own way back to the field with a quick '180'. The precautionary landing in the next available field comes off OK. But what has happened?

Happily, it took mere seconds to diagnose that the problem had been caused by the twin piano wires that control the elevator tab having snapped at the point where they emerged from the curved guide tubes, which lead them through the elevators and protect them as they exit through the fabric elevator's surface. Freed of any restraint, with the aeroplane static, the trim tab flopped down under its own weight, and looked innocuous enough. But a freely moving tab hinged to the back of a freely moving elevator is a recipe for flutter, and in this case, clearly so even at the very modest 60 or so miles an hour climbing speed of an Auster.

Mass of the tab

The mechanism is simple. Due to the airflow over the tail surfaces, a tab that's downwards-deflected under gravity tends to push the elevator of the aeroplane rapidly in the upwards direction to a new raised equilibrium position. When the elevator stops momentarily in this new equilibrium position, due to the mass of the tab, the tab 'keeps going' and overshoots the elevator and swings to the 'up' position. This in turn forces the elevator to start to move rapidly downwards, the tab trailing behind it until the elevator reaches an equilibrium in the 'down' position, the tab overshoots again and forces the elevator to start upward… so a continuous cycle is set up, often with increasing amplitude and sometimes to the point where something breaks, for the forces can become violent in the extreme. And all prevented only by a pair of piano wires of little more than a millimetre in diameter, worked by an overhead lever in the cockpit and connected to back-to-back horns on the elevator tab at the back end.

Piano wire is extremely strong in tension, as it has to be in order to cope with the kind of tensions needed to get those high notes out of a piano. In applications where it suffers frequent repetitive bending, however, its life is far from infinite, and it may fracture as happened here – particularly if there is wear going on, and perhaps a little corrosion to encourage cracking.

Interestingly, most certified aircraft are designed to be tolerant of this kind of failure, for since the 1960s, design codes for what one might call 'club type' aircraft and above call for the control systems to be able to cope with any one single element coming adrift without causing a hazardous loss of control. This is why, for example, on the ARV Super Two there is a small mass balance on the elevator tab which negates the 'overshooting effect' should the tab become disconnected. Other certified aircraft use duplicated connections to their tabs.

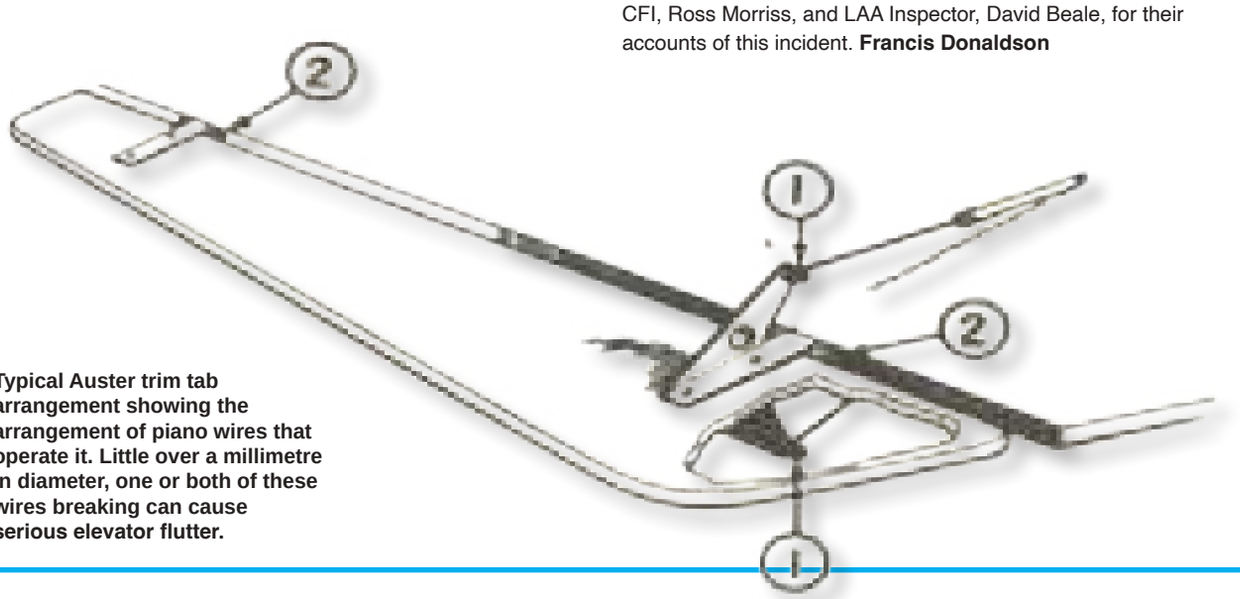
Extra vigilance

LAA aircraft are mostly not designed to provide this level of fail-safe systems design, either because they are vintage types that precede such niceties being introduced, or because they are amateur builds that don't have to comply with modern codes in their entirety. Another group are the microlights, for in the interests of simplicity, BCAR Section S has never included this requirement – perhaps because it was written initially for very basic 'rag and tube' types, long before it was dreamed that this code might grow to be applied to today's sleek, sophisticated 600kg machines costing upwards of quarter of a million pounds.

The fact that LAA aircraft generally aren't designed to cope with system disconnections means that extra vigilance is needed to ensure adequate safety levels – they need to be carefully pre-flighted, regularly inspected, properly lubricated and these and other essential parts kept free of corrosion, wear and other visible forms of distress.

Another important aspect of aircraft long-term maintenance is to consider the safe life of its components and when prudence might dictate that such elements as control cables, whether stranded or 'solid' wire, should be replaced. The same goes for bungees, flexible hoses and other perishables. The age of the piano wires on the Auster were unknown.

The fact that there's no defined life on an aeroplane's components doesn't mean they will last forever, and a certain amount of money needs to be put into an aeroplane's maintenance kitty each year for replacement of critical parts before they become a liability. Our thanks to Peterborough and Spalding Gliding Club CFI, Ross Morriss, and LAA Inspector, David Beale, for their accounts of this incident. **Francis Donaldson**

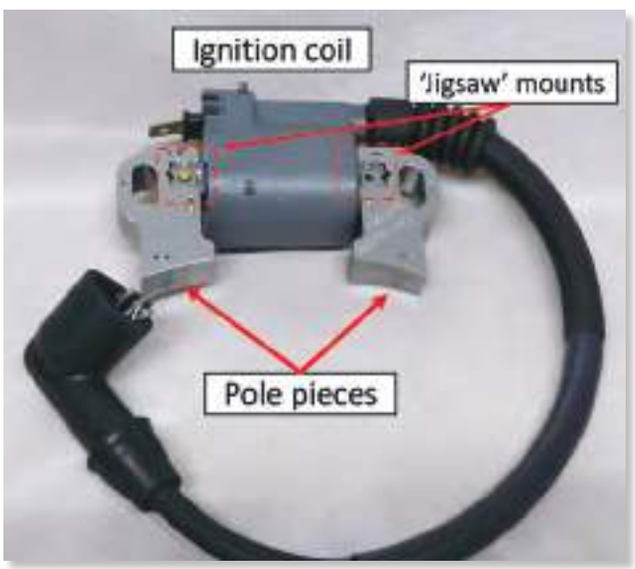


Typical Auster trim tab arrangement showing the arrangement of piano wires that operate it. Little over a millimetre in diameter, one or both of these wires breaking can cause serious elevator flutter.

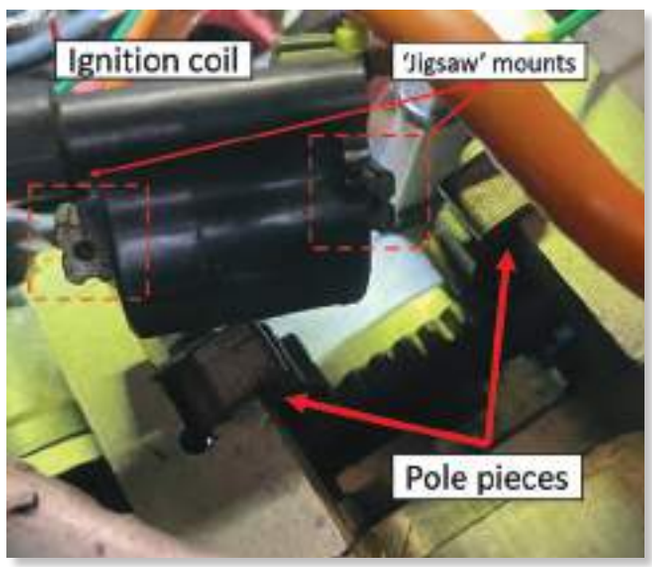
Loose ignition coil in a Jabiru 2200 engine

During a recent inspection of a non-LAA aircraft, an Inspector spotted a subtle, but potentially serious, issue on a Jabiru 2200 engine, one that could affect many light aircraft. One of the ignition coils felt slightly loose and, upon closer examination, slid out of the twin interlocking pole pieces, which also serve to attach it to the alternator mount at the rear of the engine. While the exact cause is unclear, prolonged engine vibration is a likely factor.

The implications are significant. A dislodged ignition coil can lead to reduced engine power, rough running, misfiring, and even engine failure. Many ignition coils used in light aircraft are adapted from automotive designs, where failure is less critical. In this case, the coil appeared to rely solely on metal-on-metal friction for retention, with no mechanical locking, raising concerns about its suitability for aviation use.



Above **Unknown coil found loose in Jabiru 2200 engine.**



Above right **Jabiru coil showing how coil is secured to the plates.** Image: Skycraft Ltd

This serves as a reminder for aircraft owners and Inspectors alike. Components should be sourced from reputable suppliers with a proven track record in aviation applications, and inspections should include careful checks of engine components. **Cris Fernandez**

Recent Alerts, Technical Service Bulletins & Mandatory Technical Directives

MTD-04-2025 Issue 2 – Replacement of all plastic control linkage rod end connector washers with metal washers.

During an inspection of an early Rans S6, all plastic washers between the bolt and bearing of the flap and aileron control linkage rod end connectors were found to be split or missing. This issue is identified in Rans' service bulletin 012390-03.

As plastic washers are susceptible to failure due to wear and embrittlement, this MTD is raised to mandate the replacement of all plastic control linkage rod end connector washers with metal washers. These washers prevent the rod end from disconnecting in the event of bearing failure. The washers fitted must be larger than the diameter of the bearing.

MTD-04-2025 Issue 1 was published to mandate the replacement of all plastic control linkage rod end connector washers with metal washers. It became apparent that the washers specified in this MTD were not suitable to replace the plastic washers due to their dimensions.

MTD-04-2025 Issue 2 was therefore raised in order to amend the specification of the metal washers that must be used to replace plastic washers. Issue 1 of this MTD is superceeded by Issue 2.

LAA Engineering charges

LAA Project Registration
Kit Built Aircraft **£360**
Plans Built Aircraft **£52**

Initial Permit issue
Up to 450kg **£725**
451-999kg **£828**
1,000kg and above **£931**

Permit Revalidation
Up to 450kg **£241**
451-999kg **£292**
1,000kg and above **£323**

***Gyros note:** if the last Renewal wasn't administered by the LAA, an extra fee of £155 applies

Modification application
Prototype modification minimum **£103**
Repeat modification minimum **£52**
Transfer (from C of A to Permit or CAA Permit to LAA Permit)
Up to 450kg **£288**
451 to 999kg **£330**
1,000kg and above **£371**

Category change
Group A to microlight **£206**
Microlight to Group A **£206**

Change of G-Registration fee
Issue of Permit documents following G-Reg change **£62**

Night/IFR Fee **£309**

Certified ADS-B Out fee **£31**

Replacement Documents
Lost, stolen etc (fee is per document **£26**

Struts 4U

Neville Parton compiles Strut news and views from around the UK

As Christmas draws closer, so do Strut Christmas dinners! Why not contact your local Strut and join fellow pilots, builders and LAA enthusiasts for some Christmastime flying-related bonhomie… details in the calendar.

Bristol Strut

Bristol Strut's October meeting introduced members to the Air Cadet Historic Flight (ACHF), an all-volunteer organisation aimed at preserving – in flying condition – former Air Training Corps gliders from the wood and fabric era. Dave Woolcock MBE, Chair of the ACHF, gave a potted history of how the organisation came into being, outlined its current operations at Nympsfield, and painted a vivid picture of its vision for the future. This involves securing the long-term prospects for the collection, by the building of a permanent home, to enable these aircraft to be operated long into the future.

The Strut also enjoyed the annual skittles match against the Bristol Aero Club, using the excellent facilities at BAWA.

The Strut maintained its unbroken record of losing – albeit by the slimmest of margins this time (three points)!

Above **Aerobatic aviatior Corinne Dennis entertained the Cornwall Strut.**

Cornwall Strut

Cornwall Strut and Bodmin Aeroclub members thoroughly appreciated their October meeting, where aerobatic aviator, Corinne Dennis, took the audience through her personal journey from being a skywatcher, to a PPL holder, through aerobatic training and competitions – culminating in her building a Pitts S1S Special known as *Tarquin*! A packed house was left in no doubt as to Corinne's commitment to her flying – and she has now added becoming a Director of the Cornwall Flying Club to her portfolio!

Above **Bristol Strut had a presentation from the Air Cadet Historic flight - this is their T21 glider.**

Right **Bristol Strut could not best the Bristol Aero Club in their annual skittles match.**

Above **The Devon Strut enjoyed a Met Office presentation from Rebecca Friendship.**

Devon Strut

Devon Strut enjoyed a most interesting presentation by aviation meteorologist, Rebecca Friendship, who is based at the Met Office in Exeter. Rebecca provided significant insights into the complexities of forecasting, with an introduction to some of the models used in generating weather predictions – but with the expert judgement of the meteorologist required to finalise the forecasts used for aviation decision making!

Redhill Strut relaunches!

The Redhill Strut is actively relaunching, and we're looking for LAA members based at Redhill Aerodrome (EGKR) or those for whom Redhill is the most convenient Strut to attend. Whether you're interested in joining our regular meetings, discussing projects, or simply want to be included in the new Strut WhatsApp group for news and chat, we would love to hear from you! Please contact the new Strut Coordinator, Jason Smith, at *trumpethilllodge@hotmail.com* to get involved.

Vintage Aircraft Club

The VAC held its AGM at the end of October, which saw Mark Young voted onto the committee as Vice Chair, supporting Anne Hughes as Chair. The VAC had enjoyed a busy year with a wide range of visits and activities, including a number to places where public access is not a given. Trevor Jarvis stepped down as the VAC Safety Officer, and a volunteer was being sought to fill this vital role.

Wessex Strut

Congratulations go to the Wessex Strut on not one but two awards at the recent LAA AGM. Firstly, the Strut was awarded The David Faulkner-Bryant Trophy for 'Services to the LAA Strut System', and then Ian Fraser for 'Services to Flight Safety and Navigation'.

The Strut kicked off the winter season of talks in great style with a talk by Andrew Cranfield on the Waterbird Project, and the series of test flights undertaken by this incredible replica at Lake Windermere over the last four years. ■

Strut Calendar

Please contact your local Strut to check the details before attending the calendar events.

Andover Strut: Meetings second Monday of the month. Spitfire Club, Popham Airfield, SO21 3BD. Contact Bob Howarth email: *bobhowarth99@btinternet.com* Phone 07719 156631
Bristol Strut: **2 Dec** – Christmas Meal at the Willy Wicket. **15 Jan 26** – Review of the Year! Regular meetings at BAWA, 589 Southmead Road, Filton, Bristol, BS34 7RF. Contact: *chairman@bristolstrut.uk www.bristolstrut.uk*.
Cornwall Strut: **1 Jan 26** – New Year's Day Fly-In. Meetings at The Clubhouse, Bodmin Airfield. Contact Pete White *pete@aeronca.co.uk* 01752 406660.
Devon Strut: **5 Dec** – Strut Christmas meal. **8 Jan 26** – 'From PPL to Hurricane Pilot' presentation, speaker Jeremy Lieber. Contact: *david.millin@sea-sea.com* Evening Events at the Exeter Court Hotel, Kennford, Exeter, from 1930.
East of Scotland Strut: Regular meetings at Harrow Hotel, Dalkeith. 2000. Contact: Tim Raynor *hipe@btinternet.com* Strut website at *www.eos-strut.org*
East Midlands Strut: Meeting at 1930 on the first Tuesday of the month at The Plough, Main St., Normanton on Soar, nr Loughborough, LE12 5HB. Contact Tony Razzell on 07484 873206 or email *tonyrazzell2@gmail.com* We also have a Facebook group and upload recordings of some meetings where we have speakers.
Gloster Strut: **9 Dec** – monthly meeting. **13 Jan 26** – Strut AGM. Meetings second Tuesday of the month, 1930, at the Victory Club, Cheltenham. Contact: Harry Hopkins phone 07902 650619 *harry.hopkins@talktalk.net*
Highlands & Islands: Contact: *laahighlandstrutnews@outlook.com*
Kent Strut: **13 Dec** – Christmas Dinner at the Black Pig. **29 Jan 26** – Quiz and AGM. Contact: Steve Hoskins *hoskinsltd@outlook.com* 07768 984507 or *laakentstrut@gmail.com*
LiNSY Trent Valley Strut: Trent Valley Gliding Club, Kirton Lindsey. *pilotbarry1951@gmail.com http://linsystrut.wixsite.com/website*
North East Strut: There are no meetings at present, but if you would like to help to get the NES operational again please get in touch with the Strut Coordinator, Neville Parton. *struts@laa.uk.com*
North Western Strut: **19 Dec** – Christmas Lunch. The Clubhouse, Barton Aerodrome. 1400. Third Thursday each month. Contact: *cliffmort@btinternet.com* 07813 497427.
North Wales Strut: Caernarfon Airport, Dinas Dinlle. First Sunday of the month – HEMS Bistro Café. 1300. Contact: Gareth Roberts *gtrwales@gmail.com* 07876 483414.
Oxford Group: **10 Dec** – Strut Christmas meal. **14 Jan** – AGM. Sturdy's Castle Country Inn, Banbury Road, Kidlington, OX5 3EP. Second Wednesday each month. Contact *LAAOxford@gmail.com* or *www.oxfordlaa.co.uk*.
Redhill Strut: The Bell, Outwood Lane, Outwood, Redhill RH1 5PN. Third Tuesday of each month, meet at 1915-1945. Contact: Jason Smith at *trumpethilllodge@hotmail.com*
Shobdon Strut: **11 Dec** – monthly meeting. Hotspur Café, Shobdon Airfield, Hereford HR6 9NR. 1930. Second Thursday of the month. Contact: Keith Taylor *bushebiggles@sky.com*
Southern Strut: First Wednesday of the month 1930 for 2000, at The Longshore, Brighton Road, Shoreham by Sea, BN43 5LD. Contact *palmersfarm@sky.com*
Strathtay Strut: Contact: *keith.boardman@peopleserve.co.uk* 07785 244146.
Suffolk Coastal Strut: Earl Stonham Village Hall, IP14 5HJ. *www.suffolkcoastalstrut.org.uk/flyin/* Contact: Martyn Steggalls *events@suffolkcoastalstrut.org.uk* 07790 925142.
The Joystick Club: Activities throughout the year. Contact: Mike Clews, *mgclews@gmail.com*. 07775 847914. *www.joystickclub.co.uk*
Vale of York Strut: Meetings are held at 1900 on the third Thursday of October-May in the Clubhouse at York Gliding Centre, Rufforth Airfield, YO23 3NA. Contact: Chris Holliday 07860 787801, *valeofyorkstrutlaa@gmail.com*, LAA Vale of York Strut on Facebook for meeting details.
Vintage Aircraft Club: **30 Dec** – Christmas Zoom meeting. General Contacts: Anne Hughes (*chair@vintageaircraftclub.org.uk*) or Jean Pooley (*events@vintageaircraftclub.org.uk*) Website *vintageaircraftclub.org.uk*
Wessex Strut: **12 Dec** – 'From PPL to Hurricane Pilot' presentation, speaker Jeremy Lieber. **20 Dec** – Annual Christmas Dinner at The Grange, Oborne. **18 Jan 26** – SkyDemon presentation. See *www.wessexstrut.org.uk* for details of upcoming events. Local fortnightly walks are also organised. Contact Neil Wilson at *chairman@wessexstrut.org.uk*.
West Midlands Strut: There are no meetings at present, but if you would like to help to get the WMS operational again please get in touch with the Strut Coordinator, Neville Parton. *struts@laa.uk.com*
West of Scotland Strut: **14 Dec** – Christmas lunch, Kingarth Hotel, Isle of Bute. Various locations in the Greater Glasgow area – contact Bob Logan to be added to the Strut events mailing list. Contact: *boblogan707@gmail.com*

- Please contact your local Strut to check the details before attending the calendar events.

A borescope for Christmas?

While they aren't a new thing, **Ian Fraser** and **Ruth Kelly** suggest that the advent of the affordable Borescope merits a place on your tool wishlist…

Winter is here, the weather is poor and for the most part our aircraft are tucked up under a cover or in a hangar longing for a bit of action, or failing that, a bit of attention. I am sitting at my desk writing that annual letter: *"Dear Santa, what I would like for Christmas is a new flight bag or a cockpit gadget mount thingy or even a new knee board,"* you know, one of the useful and exciting presents from the aviation 'shiny things' catalogue. However, I expect I will end up with a pair of socks or a cork screw. But, wait… here is an idea for an interesting, useful, and affordable Christmas present. *"Dear Santa, what I would really like for Christmas is a new borescope."*

What on Earth is that? In short, it's a miniature camera on a flexible stick that you can insert into any convenient small hole and see what's what on the other side. Permit aircraft seem to require more, and ever deeper, visual inspection these days, often requiring dismantling or removal of awkward inspection panels. A borescope can minimise this by non-intrusively viewing parts deep inside a wing, fuselage, engine or, in fact, anywhere – sometimes without even removing inspection panels. For example, RVs require inspections of the rivets securing the hinges for ailerons and the elevator. The aileron hinge rivets can be inspected with a normal phone camera, but the elevator hinge rivets are virtually impossible without a partial skin removal. A borescope, on the other hand, can be inserted into the tailplane through a small (extant) hole in the outer rib and show all you need to see. Just stick it in, press the button and there is a photograph for my Inspector and posterity. Older aircraft require extensive internal inspection for structural corrosion or decay often requiring skin or fabric removal and replacement. A very disruptive and often unnecessary process, particularly if there is nothing wrong. With a borescope I can peer in via any pre-existing small hole or gap.

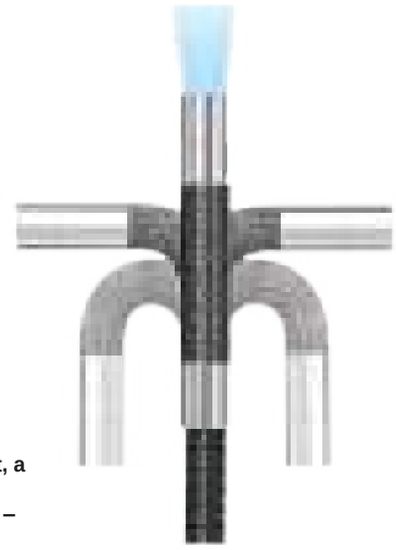
Above **This simple borescope is only three years old but already overtaken by technology. It can see quite effectively straight ahead from wherever you can feed the tip to, but it is practically impossible to see round corners.**

"A borescope can go inside a structure or space via a small hole and show all you need to see, plus you can take photographs…"

If my engine has a persistent compression problem or misfire, after the normal 'empirical remedial actions', I may have to go to an engineer who might suggest 'whipping the pot off' to inspect it (there goes a £1,000). Once it's off I might get the feedback '...it was a bit of carbon on the valve seat but while the cylinder is OK it's a bit marked so you may as well change it' (another £2,000+). All very expensive. Or, for an outlay of maybe £200 on a good borescope, I can photograph the bore, piston and valves and see much of what the engineer would by removing it and, if it's not broken, I don't need to fix it. If you are not ▶

Rigid head with side camera

2-way articulating head



4-way articulating head

Evolving camera technology. Left, combined forward and side camera; centre, the so-called two-axis scope can look from side to side; right, a four-axis camera. It is more flexible, can see everywhere and – once you've learned to use it – is the most effective.

Below **Ruth's Kentfaith four-axis borescope has a 6mm diameter and 1m long cable. It connects to a pistol grip with a joystick to steer the camera, buttons that change the LED brightness, zoom level and capture still images. The camera view is shown on the screen. Power comes from an internal rechargeable battery. A 'third' hand is needed to press the camera button.**

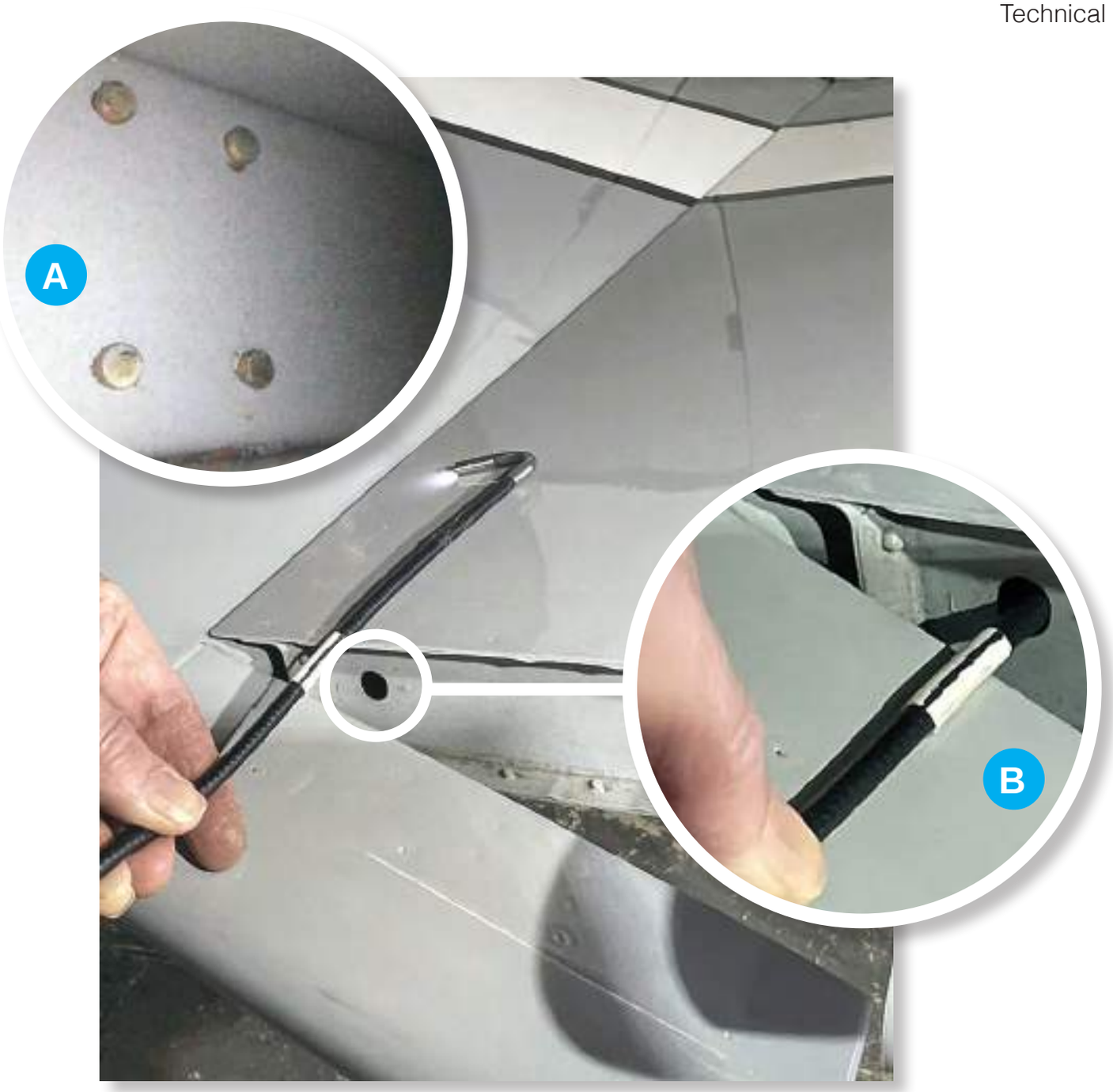
confident looking at an engine's internals there is an American company – Savvy Aviation, owned by well-known engineering writer Mike Busch – which will check the borescope pictures for you to assess the engines health for around £100 for four cylinders. You just take the pictures. Worth it if it identifies a problem early, and much more cost effective. And of course, once I have acquired a borescope I can do all manner of other useful things – like locating last year's Christmas socks that have fallen out of the back of the drawer.

Borescopes are not new in the aircraft industry, having been around since the 1920s. Then they were very specialised and expensive lens-and-mirror optical tools used only by manufacturers. In the 1970s with the invention of fibre optics they became more common, beginning to appear in well-funded engineering organisations. With the advent of robotic laparoscopy in the medical world, sophisticated steerable scopes started to be developed, and using digital electronics and

"The key development that has changed these devices from a toy to a tool is the articulating heat"

miniature video cameras viable Chinese versions have appeared priced from £25 for a very basic smart phone add-on through to around £200 up for a versatile 'four axis' freestanding tool and screen.

A modern borescope comprises a flexible cable as thin as 6mm with a miniature high-resolution camera and a



LED light at the end. Lengths vary from 500cm up to two or three metres. In basic form they can see quite effectively straight ahead from wherever you can feed the tip to – but it is impossible to see round corners. Not much use for anything challenging. Some have clip-on 90° mirrors, but our experience is that these are next to useless. Twin lens camera heads give some lateral view but, the key development which has changed these devices from a toy to a tool is the articulating head. This allows you to steer the tip using a joy stick. These come in two versions advertised as either 'two-axis' or for more money, 'four-axis'. While in theory a two-axis device can see everything a four-axis can simply by rotating its cable, in practice, if you can afford it, a four-axis is ultimately easier to use giving full spherical coverage from the end of the cable.

So, let's suppose that my carefully crafted letter to Santa has paid off and there under the Christmas tree is a shiny new borescope. What next? Can I really just poke the end down some suitable hole, wiggle the joystick and see exactly and photograph what I want?

Over to Ruth…

I bought a Kentfaith four-axis borescope a few months ago so that I could document the condition of my RV-8's engine – piston, bores, and valves – as part of a programme to test the engine on unleaded fuel. This is what I learned.

The first challenge: it can be hard to place the camera where you want it – especially if it needs to pass through a large void like that inside a fuselage – or even to be quite sure where it is. For some applications it pays to tape the cable onto something stiff like a bit of dowel to provide more positive control over position.

The next problem concerns knowing which way is 'up'. It is very easy to lose any sense of the camera's orientation once it has disappeared inside your engine or airframe. You can get even more confused when you use the joystick to steer the camera, and find that the picture pans in an unexpected direction. A couple of bits of masking tape wrapped around the cable with a line drawn on them to show 'up' in relation to the camera is a real help. If you've taped the cable onto something stiff then ▶

Above **Photographing the elevator hinge mounts on the rear tailplane spar of Ruth's RV-8. It is helpful to work out in advance how to position and steer the camera. Then feed the cable through the hole (**inset B**), up to the mark, move the joystick… and get the perfect picture (**inset A**).**

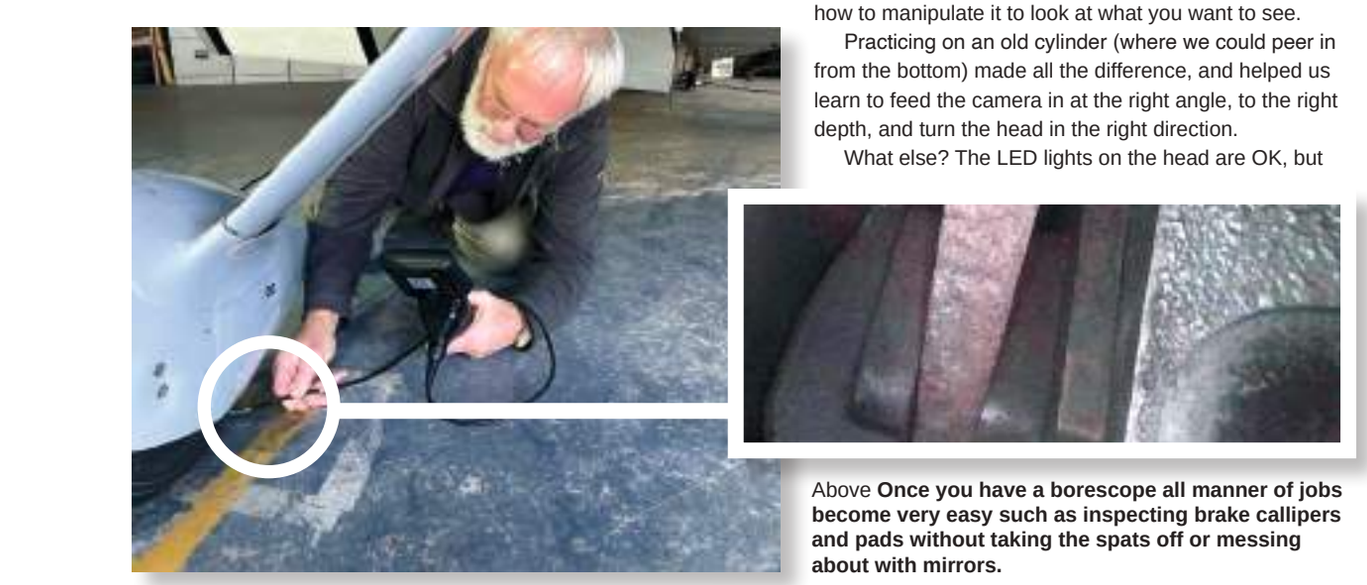
Above **Taking photographs inside the cylinders needs at least three hands. With the piston just past bottom dead centre there's room to photograph the pistons, bores, the valve faces and – with a bit of careful manipulation – the valve seats and stems.**

you can mark that too. Even so, using the joystick to steer the head takes a bit of getting used to. As you would expect, fore-and-aft movements of the joystick wiggle the head 'up' and 'down' and side-to-side movements turn it left and right. 'Stirring' the stick can, with care, make the head pan in a circle, although at the extremes it can be a little hard to control, and it's easy to get horribly lost. In some ways it's best to stick with simple up/down – left/right movements, and return the camera to straight ahead after each move. Ideally you should work out in advance where the thing you're trying to look at is actually located – and how you will position the camera in order to see it.

Taking photographs inside the cylinders was the source of much initial frustration. With the camera poked down one of the spark plug holes inspecting and photographing the piston crown and bore is not difficult. Getting the camera to look back up the bore to the cylinder head is easy enough but again, orientation can be hard to visualise and control. Photographing the valve seats can be tricky, not least because it's not obvious from the outside exactly where they are relative to the camera, nor how to manipulate it to look at what you want to see.

Practicing on an old cylinder (where we could peer in from the bottom) made all the difference, and helped us learn to feed the camera in at the right angle, to the right depth, and turn the head in the right direction.

What else? The LED lights on the head are OK, but



Above **Once you have a borescope all manner of jobs become very easy such as inspecting brake callipers and pads without taking the spats off or messing about with mirrors.**

they aren't super bright, and for the engine survey work it was helpful to provide an additional light source, basically just an LED on a wire poked down the other spark plug hole. Without the additional light the quality of the photographs really suffers. It's important to keep the camera lens clean too… poking around inside the engine it's very easy to pick up dirt (oil, carbon deposits), which degrades both the light source and the image quality.

The only other problem is simply one of not having enough hands. Holding the control head in one hand and the cable in the other you can get the camera into position… but then you can't capture a photo without taking your finger off the joystick and, unless you're lucky, the thing you're looking at (and may have struggled to find!) will then vanish from view. So have someone standing by to click the camera button. No big deal, but very frustrating if you're trying to use it on your own.

Finally, the Kentfaith came, as most of these things do, with a set of little 'tools' that you can attach to the camera head: a hook, some 'picks' and a magnet.

The idea is that if you've dropped something in an inaccessible place you feed the cable in, use the camera to find the missing thing, and then hook it out. It's not easy. It can be tricky to guide the head to the exact place (the camera loses focus when you get very close) and the magnet is not very powerful, so even if you do manage to pick something up, it's likely to get knocked off when you pull the cable back out.

Still: at least the device can help you find exactly where 'whatever-it-is' has gone, after which you might be able to reach in with a Mk. 1 arm and pick it up.

And as we commented earlier, once you have one, all sorts of jobs will offer themselves. Want to look at your brake calipers and pads without taking the spats off? Very easy with a borescope.

It's time to write to Santa… ■

Below **Ruth 'scopes' Annabelle's Stampe aileron control cable though an existing small gap. (**bottom left inset**). The camera head can be navigated through the ribs using the 4-way articulating head (a basic head will get stuck at the first rib) before being aimed at the cable. They surveyed the full length of the cable run in a few minutes (**right insets**), an otherwise impossible task without removal of fabric.**

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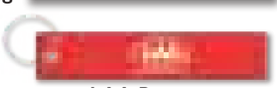
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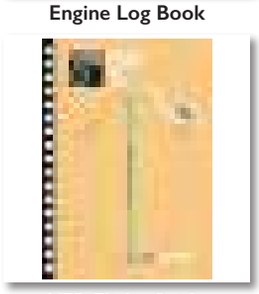
VFR Flight Guide

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Perfect presents for young aviators

Looking for the perfect gift for the young aviation enthusiast? These fab four from the LAA Shop will make any young flyer smile this Christmas…

I Am Amelia Earhart: £12

Celebrate the incredible story of Amelia Earhart with this beautifully illustrated children's book. It's an inspiring read for young adventurers, blending history with a message of courage and determination. A wonderful way to spark curiosity about aviation, while sharing an empowering tale.

Top Trumps Disney Planes edition: £12

Bring the fun of flight to family game night! These cards feature iconic aircraft from around the world, letting players battle it out on speed, size, and power. Easy to slip into a Christmas stocking, they're a guaranteed hit for all ages.

Horrible Histories: Up in the Air: £10

Packed with quirky facts and laugh-out-loud anecdotes, this book takes readers on a whirlwind tour of aviation history. From daring pioneers to bizarre flying machines, it's the perfect stocking filler for anyone who loves history with a humorous twist.

LEGO Creator 3-in-1 Aeroplane: £15

For hands-on fun, this clever LEGO set lets builders create not one, but three different aircraft models. It's a brilliant way to combine creativity with a love of aviation – and a great activity for those Christmas holiday afternoons.

Make this Christmas soar with gifts that celebrate the magic of flight. Order now and give your loved ones something truly uplifting! These items, and more, are available from the LAA shop *https://services.lightaircraftassociation.co.uk/catalog/327*, plus there's two full pages of gift ideas for all ages on pages 52 and 53. *https://services.lightaircraftassociation.co.uk/*

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LAA Engineering advice to buyers:

AIRCRAFT APPROVED? Members and readers should note that the inclusion of all advertisements in the commercial or classified sections of this magazine does not necessarily mean that the product or service is approved by the LAA. In particular, aircraft types, or examples of types advertised, may not, for a variety of reasons, be of a type or standard that is eligible for the issue of a LAA Permit to Fly. You should not assume that an aircraft type not currently on the LAA accepted type list will eventually be accepted.

IMPORTED AIRCRAFT? Due to unfavourable experiences, the purchase and import of completed homebuilt aircraft from abroad is especially discouraged.

TIME TO BUILD? When evaluating kits/designs, it should borne in mind that technical details, performance figures and handling characteristics are often quoted for a factory-produced aircraft flying under ideal conditions. It is wise, therefore, to seek the opinion of existing builders and owners of the type. You should also take your own skill and circumstances into consideration when calculating build times. The manufacturer's build time should be taken as a guide only.

AMATEUR BUILDING All LAA aircraft builders and potential builders are reminded that in order to qualify for a LAA Permit to Fly, homebuilt aircraft must be genuinely amateur built. For these purposes the CAA provide a definition of amateur built in their publication CAP 659, available from LAA. An extract from CAP 659 reads "The building and operation of the aircraft will be solely for the education and recreation of the amateur builder. This means that he would not be permitted to commission someone else to build his aircraft". An aircraft built outside the CAA's definition could result in an expensive garden ornament.

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WHERE TO GO

There's some great weather to enjoy, so pick an event from this month's listings and go have some fun!

Don't forget, GASCo is always running Safety Evenings up and down the country. We've got them listed here, plus it's worth keeping an eye on its website, *www.gasco.org.uk*, for further updates.

As always, check the Royal Aero Club Events website for the latest information and web links for many of the events: *http://events.royalaeroclub.org/events.htm*.

Our thanks to the RAeC and to Dave Wise for the use of their data. If you have an event you want to advertise on the list, please email the details to Dave at: *dave.wise@btinternet.com*.

December

6 **Compton Abbas** Christmas Fly-in (PPR)

Planning ahead - 2026

Feb 20 **Henstridge** GASCo Safety Evening
Feb 21 -22 **Old Warden** Shuttleworth Workshop Open Days
Apr 14-19 **Lakeland, Florida USA** Sun 'n Fun Aerospace Expo
April 18-19 **Popham** RRRA Get into Air Racing taster days
Apr 22-25 **Friedrichshafen, Germany** AERO
May 2-3 **Popham** Microlight Trade Fair
May 10 **Old Warden** Shuttleworth Season Premiere
May 16 **Bodmin** VAC fly-in (PPR)
May 16-17 **Wolverhampton Halfpenny Green** RRRA Air Race Season Opener
May 22-24 **Wolverhampton Halfpenny Green** Chipmunk 80th
June 19-20 **Tibenham** Festival of Flight
June 21 **Priory Farm** Festival of Flight
July 19 **Turweston** VAC Picnic fly-in (PPR)


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