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AOPA UK

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CANADIAN LANCASTER
Henry Simpson talks to the Canadians restoring a Lancaster to airworthiness

EXAM WORRIES
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CONSTANT IMPROVEMENT

IN MY LAST Chairman's Message, I took the theme of change and hence the opportunity to inform you of changes within AOPA. Philip Church was duly elected to the Board of Directors and we warmly welcome him to the AOPA team.

At the AGM the newly ennobled Lord Byron Davies of Gower was made an Honorary Life Vice President of AOPA. We're delighted that Lord Davies accepted our invitation. He has been a member and supporter of AOPA for nearly ten years. As the Member of Parliament for Gower, Lord Davies was the first chairman of the All-Party Parliamentary Group for General Aviation until the last snap election when he lost his seat. Following this he became the first UK General Aviation Champion and continued to work on behalf of the GA community. He is now back as co-chair of the APPG, and given this snap election we're guaranteed one person who will continue to work on GA's behalf in the House whatever the outcome.

While no doubt also alluding to the forthcoming election, Paul Maynard introduced himself at the British Business and General Aviation Association's recent 'Aviation Centres of Excellence' seminar – which I attended – as: "Your Aviation Minister for this week." You might also be interested to know that Paul's portfolio includes HS2, Crossrail and the Heathrow Expansion in addition to aviation.

At the last Members Working Group (MWG) I announced that the next MWG on Saturday 23 November will be my last. I've chaired the Working Group since July 2012, having attended for a few years previously, so I believe it's time for someone else to bring some fresh thinking to the Group. The MWG is a very active group of people who are passionate about their flying and want to help preserve their access to General Aviation – not just for themselves but on behalf of others. Over the years the MWG has nursed a number of initiatives such as electronic GAR, the AOPA Wings scheme, and the mentoring scheme. It also serves as a chance for members to meet the AOPA management team, including our CEO, Martin. It's conversely the forum where the management team gets to hear and understand the issues that are concerning our grass roots membership.

If you'd like to attend, either regularly, or when you can, the MWG meets around six times a year, usually at West London Aero Club at White Waltham, which means members can fly in (if you choose to; there will be no landing fee). The meeting goes to another airfield once a year and also meets at AOPA HQ once in the winter months. There's a free lunch, and refreshments when you arrive too. Please come along and try it.

Finally, I also promised to keep you updated as to the progress of the HQ move. To date a considerable amount of interest has been shown in 50a Cambridge Street, with a number of strategies being considered to enable us to maximise the benefit of selling the building for the future of AOPA. The management team has also initiated a project to build the business case for AOPA's new base location.

Fortunately, some things really don't change so I will take this opportunity to wish you all a very Merry Christmas and Happy New Year, whatever happens between now and then. ■

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Articles, photographs and news items from AOPA members and other readers are welcome. Please send to the Editor. Inclusion of material in AOPA Magazine cannot be guaranteed, however, and remains at the discretion of the Editor. Material for consideration for the February 2020 issue should be recieved no later than 6 January 2020.

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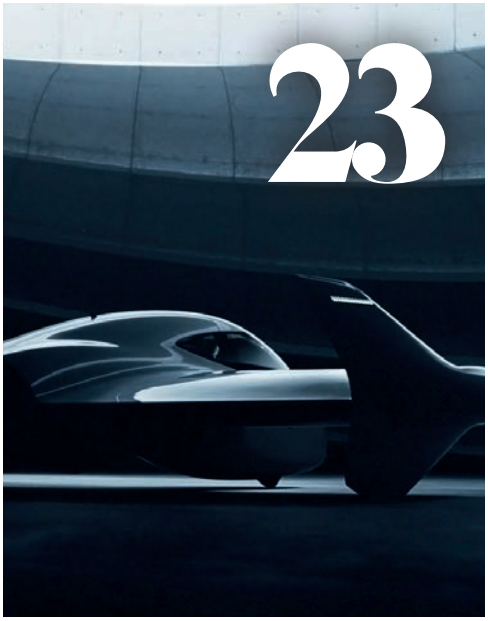

EDITOR'S MOMENT

Another year has gone and Brexit still isn't solved, but AOPA is still working hard to ensure pilots aren't left in the dark when it comes to their flying rights. The Community section is packed with useful information this month, ranging from the recent Aircrew Regulation Amendment, to advice on whether you're ready to buy your own aircraft.

Roving reporter Henry Simpson has been on the road, this time in Canada to discover the Lancaster being restored by the British Columbia Aviation Museum, which plans to bring it back to an airworthy condition.

For our main feature we delve into Pipistrel's Alpha Electro and how it could be a great addition for schools that are looking for a cheaper alternative when replacing their fleet.

With 2020 just around the corner, I would like to take this opportunity to wish you all a Merry Christmas and a happy New Year.

David Rawlings
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REGULATION NEEDS TO BE FAIR FOR ALL

THE SPITFIRE Mk9 has long been my favourite aircraft and the 'Silver Spitfire', G-IRTY, was recently seen by AOPA members in Taiwan China. I had a small input due to my understanding of flying in/through China. So, it doesn't surprise me that the eventual route only took in Taiwan and Hong Kong. The aircraft is scheduled to be back at Goodwood in December. AOPA sends its best wishes and congratulations to the team and Boultbee Flight Academy – a truly inspirational endeavour.

GOVERNMENT ISSUES

The Secretary of State for Transport, Grant Shapps, held a GA meeting which I attended and there were a number of announcements, including:

- The protection of airports, including potential DfT funding to help small businesses (grants/match funding etc).
- Planning Law changes to recognise airfields as national assets.
- A need for airspace for everyone.
- A challenge to the CAA to remove controlled airspace where it can.
- GNSS approaches: 50 UK aerodromes have been identified as possible beneficiaries of such approaches. The CAA may benefit from additional resources.
- Electronic Conspicuity was also highlighted as a future safety enabler.

I asked what the government was going to do to help reduce the costs associated with owning and operating certified aircraft? This end of GA pays all its costs to the CAA and underpins the existing infrastructure yet nothing is being done to reduce costs, whilst at the same time the CAA is providing more privileges and opportunity to non-certified aircraft. I am asking the CAA to look at what certified GA is required to pay for and why. If there is an equivalent level of safety then there should be a similar level of costs. However, as certified GA is mostly regulated under EASA rules the CAA has little chance of doing very much with regulations, but

"The cost of regulatory oversight is too high, therefore we need to cull those regulations that do not provide direct safety benefits"

EASA doesn't regulate the CAA's fees – the government does. Although the CAA has been involved a great deal in EASA rule-making tasks, certified GA is still in decline.

REGULATIONS NEED TO BE FAIR

If I were a manufacturer of two- and four-seat single-engine aeroplanes, I would show the regulators a red card, what with the CAA and EASA discussing the removal of the requirement for initial flight training to be done in certified aircraft. Eventually there will be no need for a manufacturing process as you will be able to do everything in a homebuilt aircraft. So much for safety standards! My point is that there is no level playing field between certified aircraft and permit aircraft. The regulators decided that certification was required and common standards were needed and over the last 30 years those standards continued to tighten until the advent of CS23 but even these standards are higher than those required for permit aircraft. So rather than reset the regulations they come up with removing restrictions on permit aircraft that have existed for good reason. I am not against permit aircraft, I have personally been very supportive of the BMAA system. However, since the new Basic Regulation was agreed I see very little activity around making the existing rules risk-based and proportionate which is a requirement under the changes. This UK-only approach to non-certified aircraft being used for ab initio pilot training will mean that the training market will be spread more thinly. GA will change over time, but when I was asked if GA is over-regulated, my reply was: "It depends who you ask". If you look at safety outcomes, and ours are pretty good, you could say that currently regulations are about right. If you ask if the regulations are cost effective, the answer is likely to be different. The cost of regulatory oversight is too high, therefore we need to cull those regulations that do not provide direct safety benefits, or remove the oversight requirement whilst retaining the regulation.

OFCOM

I received a message from an AOPA member who was approached by Ofcom. The member wrote: "I received an email from Ofcom in response to my complaint which said the reminder and invoice were emailed and may have gone into my spam folder. This is nonsense, as I check, but it's worth noting that the revocation was sent by post and dated one day after the fee due date. Was the aviation community warned of the change of management? It seems Ofcom have farmed out the job to a company called Spectrum, which seems like another private company screw up. Members should be aware that without being given a reference number and invoice number from Ofcom, Spectrum's website is impenetrable and payment will not be accepted over the phone. I waited on hold for a little over 15 minutes before speaking to someone who explained to me that I had to pay online and the process of how to do it. I think it shows that the original method of reminder and invoice by post needs to be reinstated."

Please get in touch at **info@aopa.co.uk** if you've received similar communications from companies on behalf of Ofcom. ■

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HELPING YOU STAY FLYING

Welcome to the **AOPA COMMUNITY** section of the magazine, bringing you all the **NEWS AND INSIGHTS** from the world of AOPA...

WORDS Pauline Vahey **IMAGES** Stock

NEWS FROM THE LATEST MWG MEETING

The Members Working Group is open to everyone – if you feel you have something to say, come to the next one. Here is what was discussed at the latest meeting ...

THE LATEST Members Working Group was held on Saturday 28 September at West London Aero Club, White Waltham. After welcoming those attending, the Chairman started the meeting with a report on the recent AOPA Annual General Meeting, giving the following briefing, originally given by the CEO Martin Robinson to the AGM. Martin started by thanking the board for all their hard work during the year then moved on to:

As for many months, the issue with dones and airspace has been high on the agenda

BREXIT

The main thing on peoples' minds is Basic Regulation 216 which was amended in 2019 and adopted into the Air Navigation Order. There could be a drift in the regulation depending on whether it benefits GA or not.

The biggest problem is freedom of movement. For example, the French are looking at the number of customs-designated airfields. We don't know yet if we will have to fly to a customs airfield before continuing a flight. We don't know if VAT will be affected.

Martin reported that German customs will become difficult to deal with as they will require all documents to be carried. Martin also pointed out that all UK licences are ICAO compliant and have the freedom to move between countries. AOPA UK is not looking for any change to existing privileges; however, GA interests are not at the forefront of the UK Government's priority list.

"AOPA was instrumental in getting en route charges in Europe reduced"

AERODROMES & AIRSPACE

Drones are becoming more of an issue; it is proper that the airspace is looked at to ensure the airspace is safe for all users. Tasks carried out by aeroplanes and helicopters can be carried out by drones at a considerably lower cost. We need to think about how to integrate all airspace users. In the UK it is estimated there are 170,000 drone users. Eventually there will be an autonomous ATM system so we need to think about how to integrate GA into the system. It is right that AOPA is involved in projects around surveillance. The next stage for drones is to go beyond the 'line of sight'. Newly elected board member Phil Church commented that the CAA has overestimated the number of drone users. Martin reported that the data on the number of drone users is more likely 130,000, which is the number reported by NATS. Martin reported that at a recent CAA meeting it had been suggested there would be a £16.50 charge for drone registration, and it was suggested that the British Model Flying Association would be the right association to administer this charge.

This last year the UK had been successful in getting funding for 8.33k radios.

AOPA was instrumental in getting en route charges in Europe reduced by requesting any Air Navigation Services Provider that wants to charge GA for en route charges separates the VFR part of the flight from the IFR part.

AOPA PROJECTS

- The GRIMASSE project

Airspace is another issue high on the agenda at AOPA meetings

looks at the next generation of ELTs. By using the Galileo satellite, it can track the ELT if there is a problem.

• The GAGA project looks at GNSS approaches at Haverford West, Gloucester Airport and Stapleford. GNSS approaches are a safety-of-life requirement, and as such should be funded by the government.

• The GAINS project looks at navigation and surveillance of approaches into airfields/airports. A number of flight trials have been carried out already.

All of these projects are EU funded. It looks increasingly likely that AOPA will also become involved in another consortium which is looking at integrating drones. In addition, Martin has been invited to sit on two boards at European level on drone integration.

OTHER NEWS

• We are supporting the APPG by offering them a room to work from at AOPA's offices.

• The future of regulation will depend on whether we stay a part of EASA.

• Finally, Martin stated that a viable and safe industry is an active industry, however it is apparent that the GA Unit does not look after a lot of AOPA members interests. Aerodromes do not fall within the GA Unit.

• The GA Unit is also still under-recovering costs and it appears that AOPA members are subsidising this.

The MWG chairman then took questions concerning the AGM, in particular questions on the accounts, which had this year shown a profit. The chairman reported that a new board member had been welcomed, Philip Church from Helios, who was already supporting the project work being carried out by AOPA. The previous chairman of the board, George Done, had retired from the board and had become an Honorary Life Vice President. Lord Byron Davies had also agreed to become an Honorary Life Vice President.

Following the update from the AGM there was a report on the work being achieved by the APPG for GA and Airfields. Nick Wilcock reported to the meeting on progress at EASA in connection with Flight Crew Licensing. Finally, George Done gave his report from the Maintenance and Engineering Working Group.

Concerns were raised from the members about the availability of crossing Southend Airport's Airspace. There had been reports of ATC denying VFR crossings. It was suggested that a record be made and sent to AOPA.

Then the final item of the meeting – the chairman of the MWG, Pauline Vahey, announced that the next meeting on 23 November would be her last and in accordance with the Terms of Reference of the MWG it was up to them to choose their next chairman. ■

WORDS Nick Wilcock

AIRCREW REGULATIONS AMENDMENT

Nick Wilcock unveils the latest changes to the laws from EASA

BACK IN 2014, EASA gave us a rather unwelcome Christmas present in the form of NPA 2014-29(A) and NPA 2014-29(B), amounting to some 293 pages of text proposing amendments to both 'hard law' Implementing Regulations and 'soft law' Acceptable Means of Compliance and Guidance Material.

On behalf of IAOPA (Europe), I submitted 12 pages of responses, which were subsequently included in the Comment Response Document (CRD). Then we waited... and waited... until June 2019, over four years later, when EASA finally voted in favour of the points agreed by EASA in the CRD. Then we waited... and waited... until finally on 22 October 2019, Commission Implementing Regulation (EU) 2019/1747 was published in the Official Journal of the European Union. The result of this is that the Aircrew Regulation amendment came into effect in November 2019.

Until recently, there was some doubt as to whether the UK would be leaving the EU, with or without a negotiated deal, by the end of October. Had that been the case, our continued membership of EASA, whether as an EU or non-EU Member State, would have been in doubt, as would the effect of the Aircrew Regulation amendment. Fortunately that threat has, for the moment, receded. Hence the provisions of the amendment will now apply to the UK, as will the associated Acceptable Means of Compliance and Guidance Material, the subject of the original NPA 2014-29(B), which should appear in the next revision of the EASA Easy Access Rules for Aircrew.

"The navigation exam is now a common subject for LAPL(A) and LAPL(H) applicants as it is for PPL(A) and PPL(H) applicants"

It would bore our readers even further if I attempted to list every single change to the Aircrew Regulation, so here are the main ones:

TRAINING

The 'six sittings' requirement for LAPL and PPL exams has been deleted. All other requirements remain in place and all exams must now be completed under the responsibility of one Member State. The navigation exam is now a common subject for LAPL(A) and LAPL(H) applicants, as it is for PPL(A) and PPL(H) applicants. Hence credits for holders of a licence in one category have been amended to apply to the other.

SEP (Sea) privileges are now available for the LAPL(A); the associated theoretical-knowledge exam must be in a 30-question multiple-choice written form.

LAPL

Training requirements for SEP (Sea) aeroplanes have been introduced; recency requirements for those who hold both SEP (land) and SEP (Sea) privileges have also been introduced. These require that at least six of the mandatory 12 take-offs and landings, and one hour of flight time of the two-year recency requirements must be flown in each class. It has also been made clear that LAPL holders who previously held higher level Part-FCL licences do not need to complete 10 hours flight time as PIC before carrying passengers.

Seaplane privileges are now available for the LAPL(A)

FLIGHT TRAINING ON ANNEX 1 'NON-EASA' AIRCRAFT

(a) Historic aircraft whose initial design was established before 1 January 1955, production of which ended before 1 January 1975; or those aircraft having a clear historical relevance, related to participation in a noteworthy historical event, a major step in the development of aviation, or a major role played in the armed forces of a Member State.
(b) Aircraft specifically designed or modified for research, experimental or scientific purposes, and likely to be produced in very limited numbers.
(c) Aircraft, including those supplied in kit form, where at least 51 per cent of the fabrication and assembly tasks are performed by an amateur, or a non-profit making association of amateurs, for their own purposes and without any commercial objective.
(d) Aircraft that have been in the service of military forces, unless the aircraft is of a type for which a design standard has been adopted by the Agency.

THE CONDITIONS WHICH MUST BE MET ARE:
Aircraft that fall under points (a), (b), (c) or (d) of Annex 1 to Regulation (EU) 2018/1139 may be used for training if all of the following conditions are met:
(1) during an evaluation process the competent authority has confirmed a level of safety comparable to the one defined by all essential requirements laid down in Annex II to Regulation (EU) 2018/1139;
(2) the competent authority has authorised the use of the aircraft for training in the ATO (or DTO).

PPL

PPL privileges now include LAPL privileges and the level of privileges which may be exercised depends upon the validity level of the Part-MED medical certificate held by the pilot. Thus if a Class 2 medical lapses but the LAPL medical element remains valid, there is no need to apply to the CAA to downgrade a PPL to a LAPL. A pilot may continue to fly but will be restricted to LAPL-level privileges only, provided that the pilot's SEP or TMG Class Rating remains valid.

NIGHT

After 11 November 2019, Night Rating courses must be completed within a six-month period. The CAA has kindly granted a dispensation to pilots who may already have started a Night Rating course earlier in the year, so that the six month criterion will not apply to them, provided that their training has been completed and application submitted by 31 March 2020. However, application for Night Rating issue does not need to be made within the six month period for courses which began after 11 November 2019.

DIFFERENCES TRAINING

Unless specified under OSD, differences training for TMG, SEP, SET or MEP aircraft conducted by a suitably qualified instructor does not need to be conducted at an ATO or DTO.

REVALIDATION & RENEWAL

If a pilot elects to revalidate an IR, Class or Type Rating earlier than three months before the validity expiry date, the new validity period will start on the date of the check. Pilots renewing an IR must hold either a valid Class or Type Rating unless the IR renewal is combined with a Class or Type Rating renewal proficiency check. The UK CAA's policy is that if the element of the expired rating is something which can be delivered at a DTO, then the refresher training assessment may also be made by the DTO. Training for a non-HPA SEP or TMG Class Rating which has expired by not more than three years may be conducted by an instructor and does not need to be conducted at an ATO or DTO.

FLIGHT INSTRUCTORS

Although FI certificates have a three-year validity, FIs who conduct advanced UPRT course training must also receive annual UPRT refresher training. EASA has introduced requirements for FIs conducting Class and Type Rating training on single pilot, non-HPA, non-complex aeroplanes in multi-pilot operations; rather perplexingly, these are listed in a new paragraph (c) of FCL.905.FI, which means that the former paragraphs (d)-(j) have now become (e)-(k). However, the CAA has advised me that this won't require existing FIs to apply for new licences incorporating the new paragraph referencing and the Authority will be releasing a statement to clarify this. Applicants for FI certificates who wish to provide flight instruction at PPL level may now take the CPL exams without needing to take a CPL course; however, exams taken in this way will not be valid for subsequent CPL issue.

"However, the CAA has advised me that this won't require existing FIs to apply for new licences"

CLASS RATING INSTRUCTORS

Three-yearly CRI revalidation now requires 'two out of three' requirements (instructional time, instructor refresher training or assessment of competence), except that an assessment of competence is required for at least each alternate revalidation. If a CRI certificate has expired, both refresher training and an assessment of competence will be required for renewal.

EXAMINERS

Examiners who have conducted a recommendation for an applicant to attempt a Skill Test are no longer barred from conducting the subsequent test themselves. Revalidation

requirements now require that the examiner must have conducted a minimum of six tests during the validity period of the certificate rather than a minimum of two tests in each of the three years; however, the assessed test and assessment of competence must be completed during the final year of the validity period.

TRAINING AIRCRAFT

Aircraft defined under Annex 1(a)-(d) of Regulation (EU) 2018/1139 may now be used for training, subject to certain conditions being met. See boxout on page 13.

HOW TO IMPLEMENT

The CAA is currently looking into the simplest method by which these conditions can legally be met without protracted investigation into the suitability of the aircraft's use for training. That should be reasonably straightforward for most well-known Annex 1 (a)-(e) aircraft, but evaluation of others may take time.

Recognition of flight time in Annex 1 (e) ('microlight') and (g) ('replica') aeroplanes for revalidation of Class and Type Ratings is expected to be confirmed in the AMC/GM included in the next revision of EASA's Easy Access Rules for Aircrew. These were proposed in NPA 2014-29(B) under FCL.740.A(b)(1)(ii) and stated that: "All hours flown on any aircraft registered in an ICAO Contracting State shall count in full towards fulfilling the hourly requirements of this Part as long as the aircraft matches the definition and criteria of the respective Part-FCL aircraft category as well as its class and type ratings". A three-axis microlight is a power-driven heavier-than-air aircraft, deriving its lift in flight chiefly from aerodynamic reactions on surfaces which remain fixed under given conditions of flight, which is the ICAO definition of the aeroplane category and as such clearly meets the criteria proposed in the NPA. Hence in future it should be possible for a pilot who flies three-axis microlight aeroplanes as well as SEP or TMG aeroplanes to use flight time on such aircraft towards the maintenance of SEP or TMG privileges, although revalidation refresher training requirements will need to be met either on EASA aircraft or non-EASA Annex 1(a)-(d) aircraft of the relevant class.

So there is plenty of welcome change in the Aircrew Regulation amendment; however, we will continue to press for further flexibility, such as the optional inclusion of Night Rating training during the hours required for PPL or LAPL courses, credit for LAPL training for applicants who change to a PPL course and of course for less onerous theoretical-knowledge requirements for PPL/FIs. Keep watching this space! ■

Night-rating courses must now be completed within six months

WORDS John Walker

THE LATEST NEWS ON UK AIRFIELDS

THERE ARE airfields across the UK currently under threat. Here are the latest developments, updated 7 November 2019

ANDREWSFIELD

Braintree, Colchester and Tendring Councils are jointly developing a Local Plan for North-East Essex with an area including Andrewsfield aerodrome earmarked for a garden community with ultimately 10,000 homes. The definitive Local Plan is the subject of Public Examination with the Planning Inspector raising concerns about the proposal which the Councils are addressing by a further public consultation and with additional public hearings in January 2020.

HULLAVINGTON

Aerodrome site has been sold to Dyson, which has renovated two existing Type D hangars as research centres, and obtained outline planning permission from Wiltshire Council for a site-wide masterplan excluding use of the main runway. A full planning application to extend the runway and construct a private hangar was withdrawn on 1 November 2019.

ABINGDON AERODROME 2024/25 BARRACKS 2029

Site earmarked for Garden Village style development with 1,200 homes in Vale of White Horse District Council 2031 Local Plan Part 2 adopted by the Council on 9 October 2019. Under the Plan, the development area is restricted to the south of the old runway 08/26.

OLD SARUM

Site owner's planning application for housing development and 10 additional hangars amongst other work, refused on appeal in a Planning Inspectorate decision letter dated 11 July 2019. The owners have applied for a Judicial Review of this decision and issued a letter dated 25 July 2019 giving notice of the termination of site licences from 31 October 2019, the date from which the aerodrome was notified as closed to all movements until 29 January 2020.

CAMBRIDGE

Marshall Group will be vacating the aerodrome by 2030 and relocating to either Cranfield, Duxford or Wyton (see below). The Group has stated its intent to the local authorities to put the site forward for development as part of the next Local Plan from 2030.

WYTON AERODROME

Defence Infrastructure Organisation (DIO) has a Land Sales Delivery Partnership Agreement with property developer Crest Nicholson, which proposed a 4,500 home development, on a site that is not included in the Huntingdonshire District Council 2036 Local Plan, but is in the Council's Housing and Economic Land Availability Assessment. Marshall Group is considering relocating from Cambridge to the site. ■

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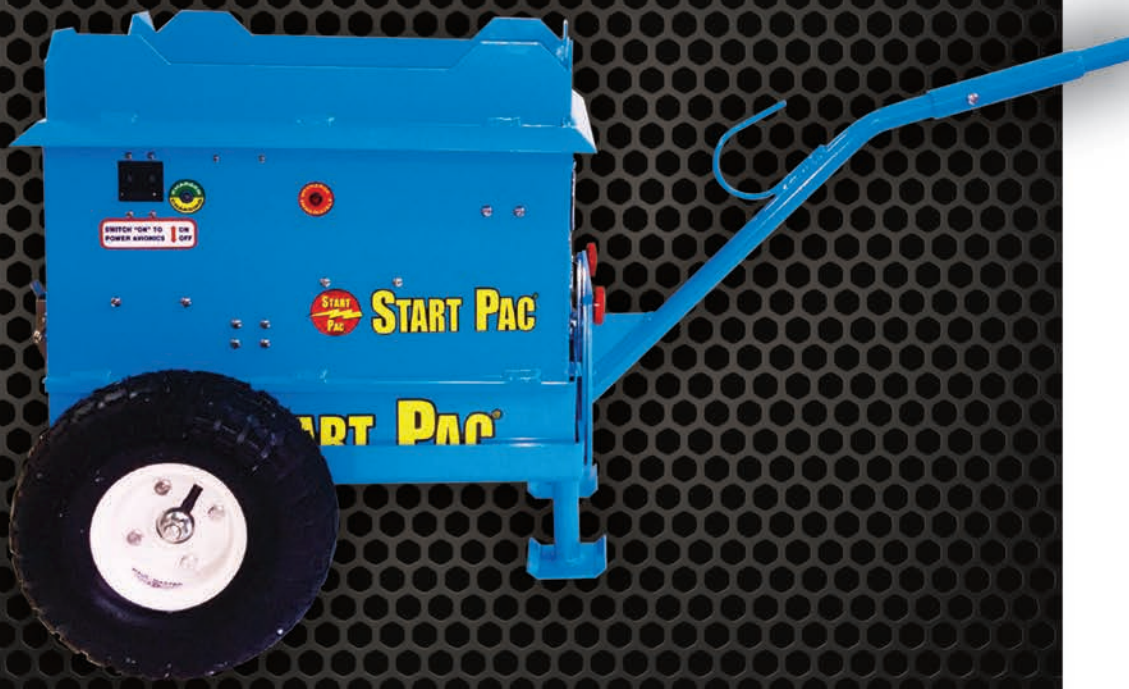

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WORDS Roger Kimbell **IMAGES** Stock

WORKING OUT IF YOU CAN AFFORD AN AIRCRAFT

You've got your PPL and you've worked hard for it. It's also cost a lot of money, but you now want your own aircraft... Roger Kimbell explains if you can justify it

PRIVATE PILOTS, having yearned to fly, will spend plenty of time and a fair chunk of money obtaining their PPL – taking anything up to a year or more to achieve this momentous goal – as life and funds permit.

In the past, most of their training will have been carried out in ubiquitous two-seat aircraft that would have seen better days in terms of interior trim and exterior finish.

However, these old workhorses will have been used regularly, suffer none of the usual problems that beset hangar queens (aircraft that are rarely used and spend most of their lives tucked in the corner of a hangar), and most will have run their engines to the maximum 'Time Before Overhaul' without major surgery during their lives.

"Club hire aircraft are often busy or undergoing maintenance, so the new aviator's thoughts turn to ownership"

Having obtained a Licence to Fly the new pilot is then faced with what to do with it! He or she will soon proudly take aloft any relative, friend, lover or mild acquaintance who can be persuaded – and is brave enough – to commit themselves into the hands of the new Sky God.

Soon, being only able to take one passenger palls somewhat and the new pilot then may decide to convert to and start hiring a four-seater – often Cessna 172 or Piper PA28 types, usually in not much better condition than the machines upon which they trained.

After that IMC, Aerobatic and Night Ratings, etc may follow, to ensure more time in the sky.

Club hire aircraft are often busy or in for maintenance, so the new aviator's thoughts turn to ownership; an aircraft that will be available for their personal use. Trawling through adverts in the flying press and elsewhere it occurs to them that they can actually afford to buy one.

There's plenty to think about when you're looking to purchase an aircraft

TIME TO BUY?

Having convinced the other half that this is the way to proceed and that life would be so boring without an aeroplane – "just think of the trips we can take" – they decide to take the plunge. As in most of life when seen through rose tinted spectacles, the purchase price is far from the end of the expenditure; it is just the starting point.

Having found their ideal craft, hopefully, at this point they will pay for a thorough inspection along the lines outlined in the AOPA Pre-Purchase Inspection (PPI) document. However, no PPI can thoroughly check every aspect of an aircraft's condition (i.e. main spar, crankshaft, camshaft, etc) as most buyers do not want to pay the costs involved, nor would the seller want their aeroplane taken to bits and perhaps not put back together properly!

MORE COSTS

As the purchase is concluded, the proud new owner(s) must insure the machine so they can fly it, and being relatively low time, they will perhaps be a little surprised at the difference between the cost for this compared to the premium for their car. These days a figure of

COST OF KEEPING AND RUNNING AN AIRCRAFT

Insurance	£2,000
Hangarage	£2,500
Annual	£3,000*
182-day check	£500
Fuel	£3,200
Oil	£50
TOTAL	£11,250 (£225 per hour)

**including paperwork, radio Annual etc*

£2,000 to £3,000 p.a. is not unusual.

Then having acquired their new pride and joy and flown it to their local airfield they will want to install it safely in a hangar – especially if the aircraft is constructed of wood and fabric. Costs vary but one should budget at least £2,500 p.a. at a licensed airfield. Farm-strip accommodation will be less but will still be £1,500 to £2,000 p.a. and may have few, if any, facilities.

Having swallowed all of the above then the subject of ongoing maintenance raises its head. Transferring the new acquisition to a new and more convenient Maintenance Organisation (CAMO if an EASA aircraft) – who will hopefully have signed up to the AOPA Maintainers Code of Practice – will start with a thorough going-over by that company, of both the aircraft and its paperwork, prior to an annual or 182-day inspection. This can often lead to the discovery that items which should have received attention previously had not been attended to, or not recorded as having been done (perhaps these issues are the reason why the previous owner put the aircraft up for sale in the first place?).

Assuming all is well mechanically and structurally, a budget for an Annual could well be in the region of £2,000 to £3,000 and a 182-day inspection around £400 to £500.

Hourly labour charges – currently £45 to 55 per hour (and are considerably less than those of a dealer servicing a car) – are often a bone of contention when unexpected and difficult work needs to be carried out before an ARC can be issued. Most older aeroplanes suffer from inaccessibility of items such as wing bolts etc and much time can be spent getting at, and repairing, those bits – especially where corrosion abounds.

The table above may give an idea of a typical year's running costs of a four-seat light aircraft in sole ownership, flown for 50 hours per year.

These sums do not include any unexpected charges for additional work required, e.g. engine overhaul c.£12,000, repainting c.£7,000, interior retrim £2,500, etc.

It becomes clear why it may behove the new owner to form a group of like-minded souls who would each contribute to the capital cost and, by monthly payments, build up a fund for the fixed and maintenance costs envisaged.

One should not be put off by the table above, however, as the privilege of being able to fly one's own aeroplane is priceless! More availability equals more flying, increased safety and definitely more pleasure out of life. We're only here once.

Roger Kimbell is the owner of a Robin DR400/180 Regent and a RotorSport MTOSport gyroplane. He is a long-standing member of the AOPA Maintenance Working Group and past owner of a CAMO based at Sibson. ■

AOPA FLYING INSTRUCTORS REFRESHER SEMINARS

For revalidation of an FI certificate, the holder shall fulfil two of the following three requirements:

1 At least 50 hours of flight instruction during certificate validity as FI, TRI, CTI, IRI, MI or Examiner;
2 Attend a Flight Instructor Refresher Seminar within the validity of the certificate; and
3 Pass an Assessment of Competence within the 12 months preceding the expiry of the certificate.

For at least each alternate subsequent revalidation, an assessment of competence must be undertaken. In the case of a renewal you should, within 12 months before renewal, attend a Flight Instructor Refresher Seminar and pass an assessment of competence.

NEXT DATES

The next dates for the seminars are

10-11 March 2020, 7-8 July 2020, 24-25 November 2020.

All seminars are now run at the AOPA offices at 50a Cambridge Street, London SW1V 4QQ – only 5 minutes' walk from Victoria Station.

To register for a place on any of the seminars please call the AOPA office on 020 7834 5631 or join online at WWW.AOPA.CO.UK.
The seminars start at 1100 and end at 1800 each day to facilitate travel.

AOPA NEWS

General Aviation news from around the world

The new DA50 with a retractable landing gear

RETRACTABLE GEAR DA50 TAKES FLIGHT

Diamond's in-development DA50 turbodiesel completes its maiden flight

by **AOPA News Team**

IN October Diamond Aircraft's single-engine 5-seater DA50, equipped with Continental CD-300 engine, made its first flight with retractable gear, piloted by Sören Pedersen and Niko Daroussis.

The DA50 programme was first announced at AERO Friedrichshafen in 2017 and this year at the show, Diamond announced changes to the DA50, including a new engine concept with the 300 hp Continental CD-300 and retractable gear.

The original mock-up of the new DA50

Sören Pedersen, Head of Flight Test, Diamond Aircraft Austria, said: "The first flight was conducted by the crew as planned and all systems were working as expected. Since all new elements are already well known from other aircraft out of the Diamond aircraft family, the DA50 made a very mature impression from the first lift-off. A first cruise performance test point showed that the expectation could be met easily. The retractable DA50 showed a good agility and an 'easy to fly' behaviour, meaning that the handling qualities were very satisfying on the first impression."

The all carbon fibre DA50, with an extra-large luxurious cabin and excellent payload will be ideal for single-piston pilots needing more seats and space and for charter operators looking for a low cost alternative.

"The retractable DA50 made a very mature impression from the first lift-off"

Diamond Aircraft is aiming for basic certification from the European Union Aviation Safety Agency (EASA) for the 5-seat version equipped with CD-300 engine and retractable gear in summer 2020. ■

MORE FRIENDS OF AOPA AWARDS HANDED OUT

by **George Done**

DUE TO Paul Layzell not being able to attend the AOPA Awards (held at AeroExpo at Wycombe Air Park back in June), former AOPA Chairman and current Vice President George Done took a trip to Norfolk to present the "Friend of AOPA" award to Paul.

Paul Layzell, owner of the maintenance organisation Touchdown Engineering Ltd. based at Old Buckenham airfield and is a founder member of the AOPA Maintenance Working Group from its earliest days in 2009.

George Done (L) presents Paul Layzell with his award

Over the past ten years, he and colleague engineers Mike Smart and Roger Kimbell – also awarded the same prize – have applied their specialist knowledge in the provision of valuable advice on a wide variety of AOPA members' engineering problems to the ultimate benefit of those members.

You can read how the Maintenance Working Group helps AOPA members on page 14, in the magazine advice section – in this issue the group looks at the issues of buying an aircraft. ■

8.33, WHY WAS THERE A RUSH?

by **Martin Robinson**

DESPITE the strict deadlines set by the CAA for everyone to be compliant on 8.33 radios, it has been reported that the current status of implementation and the remaining conversions of 8.33kHz radios into aircraft is planned to continue for another nine years, until 2028.

AOPA sees the potential impact of some local measures in granting exemptions.

We at AOPA would like to understand what the potential safety hazards are as they relate to non-harmonised equipage level for General Aviation airspace users.

In particular to our members who fly across borders where the safety impact must be taken into account.

In a report for the Single Sky Committee Network Manager, it asks what is the conversion planning, and what the level of achievement has been of the reported planning and exemption strategy changes in some states? And what will the potential impact on the network be, where there are local measures granting exemptions?

There seemed to be a huge rush to install the 8.33 radios

General Aviation was told that it had to become equipped due to the potential impact on the airline network, and that not having enough frequencies has an impact on airspace capacity. But this latest information seems to suggest that a number of EU member states do not see the need to rush ahead.

So if you plan to fly in Europe, you will need to keep a close eye on the frequencies needed because we have heard that the Dutch regulator had been issuing fines. ■

LOOK BACK... THIS MONTH 62 YEARS AGO

USAF RETIRES THE MUSTANG

On 27 January 1957 the last North American Aviation F-51D Mustang fighters in operational service with the United States Air Force were retired from the 167th Fighter Bomber Squadron, West Virginia Air National Guard. The aircraft 'Wham Bam' (F-51D-25 NA 44-72948) is considered to have been the last F-51D Mustang in US service. In 1957 it had just completed repairs and was returned to Charleston by the 167th commanding officer, Lieutenant Colonel Joseph T. Crane, Jr. 44-72948 had been delivered to the U.S. Army Air Corps at Mitchel Field, Long Island, New York, in February 1945, but with the war drawing to a close in Europe, this particular Mustang never flew in combat. During its service lifetime -948 was assigned to sixteen different units. It underwent nine engine changes and flew a total of 1,555 hours during nearly 12 years of service. More than 15,000 Mustangs were built and each cost $50,000 in 1945. Twenty-nine countries used the Mustang, and it remained operational until 1984, with the Dominican Air Force being the last to retire the aircraft.

White Lightning is the world's first electric race plane

FIRST ELECTRIC RACE PLANE UNVEILED

Condor Aviation display its new aircraft for the Air Race E series

by **David Rawlings**

THE WORLD'S first electric race plane was unveiled at the Dubai Airshow, built by the UK's Condor Aviation. The aircraft, named White Lightning will compete in Air Race E – a series beginning next year.

Air Race E is the first all-electric aeroplane race, and will feature eight aircraft racing wingtip-to-wingtip at speeds up to 250mph around an oval circuit.

Air Race E CEO and Founder Jeff Zaltman said, "This is a pivotal moment not only for Air Race E, but for the aviation industry as a whole. Our aim by establishing an electric racing series is to develop a unifying platform for the development of cleaner, faster and more technologically advanced electric aircraft. The racing series will provide a testbed for innovation and accelerate the journey towards electric commercial travel."

"The White Lightning is the first ever example of an electric race plane, built by Team Condor in their Yorkshire-based workshop using a highly-modified Cassutt aircraft, which has a rich history in formula air racing dating back to 1979. The custom Cassutt racer named was once a regular on the formula one racing circuit in Europe throughout the 80's and 90's, with owner and pilot Andrew Chadwick earning a number of podium finishes to add to White Lightning's racing pedigree. Chadwick has since donated the aircraft to Team Condor to compete in the upcoming Air Race E series.

Team Condor leader Martyn Wiseman and his crew have spent the past few months converting White Lightning into a fully-electric racing machine, utilising a Contra Electric twin motor and contra-rotating propeller powertrain.

The racer is based on a Cassutt F1 single-seater

The customised electric motor will enable the plane to race at speeds of around 300mph. During the races, the combined max continuous power will be set at 150kW, according to the electric formula. Over 100kg worth of lithium batteries installed under the fuselage of the plane will provide power for five minutes of high intensity racing and around 10 minutes of reserve flying at reduced power.

As Official Founding Partner, Airbus provides teams, including Team Condor, with industry insight and research as they build and modify their racing aircraft.

White Lightning is one of two electric race planes nearest to completion. The other is being built at the University of Nottingham's Aerospace Technology Centre in the UK as part of its £13M Propulsion Futures Beacons of Excellence research programme. ■

NEXT GENERATION PIPER M600SLS

by **AOPA News Team**

PIPER AIRCRAFT announced the next generation M Series aircraft – the M600/SLS, equipped as standard with the new HALO Safety System – enhancing safety, luxury, and support for one of the world's leading personal use aircraft.

It is now on track to be the first general aviation aircraft in the world to be certified with Autoland capability.

The HALO Safety System is a compilation of innovative technologies unique to the M600/SLS and the Garmin G3000 avionics suite. The system includes Auto-throttle, Emergency Descent Mode, Enhanced Stability and Protection, Surface Watch, Safe Taxi, Flight Stream connectivity and more. However, of greatest significance is the addition of Garmin Autoland – digital technology that safely lands the aircraft at the nearest suitable airport in the event that the pilot is incapacitated.

The new M600/SLS will have a price tag of $2.9 m

The HALO system, once engaged either automatically or by a passenger, gains immediate situational awareness and assumes control of all systems necessary to bring you and your passengers safely to the best-suited runway. During all phases of flight it communicates with passengers and appropriate air traffic control facilities regarding the new flight-plan route and estimated time until landing. HALO continually monitors all aircraft system parameters and real-time external inputs as if the pilot were at the controls. It takes into account runway size and orientation, wind, time, fuel range, glide path and considers weather conditions and terrain en route to the nearest suitable runway.

FAA certification of the M600/SLS is imminent with deliveries beginning this quarter and priced at $2.994 m. ■

JOHN DEERE AND VOLOCOPTER COOPERATE ON CARGO DRONE TECH

by **Lucy Field**

JOHN DEERE and Volocopter are presenting the first large drone adapted for agricultural use. A demonstrator model of the VoloDrone equipped with a John Deere crop protection sprayer, which is ready for its first field flight, was displayed at Agritechnica. Featuring a potential payload of 200kg, the VoloDrone is able to cover an enormous area, especially under difficult operating conditions.

Large drones are becoming increasingly important in the field of logistics. At the same time, small drones are already being used in agriculture for stock control and mapping, for example.

Both companies see great potential for the VoloDrone's use in agriculture, with capabilities ranging from difficult topography to increased efficiency in the use of crop protection agents, sowing seeds or frost control. The development of this demonstrator is a first step towards bringing this innovative technology closer to commercial application after full testing in the field.

The VoloDrone is powered by 18 rotors with an overall diameter of 9.2 m, and features a fully electric drive using exchangeable lithium-ion batteries.

One battery charge allows a flight time of up to 30 minutes, and the VoloDrone can be operated remotely or automatically on a pre-programmed route.

The drone frame is equipped with a flexible standardised payload attachment system. This means that different devices can be mounted on the frame depending on the application. For crop protection, the drone is equipped with two capacity tanks, a pump, and a spray bar.

Thanks to the drone's low flight altitude, an area coverage of up to 6 ha/hr can be achieved and spray management improved.

Appropriate flight and application tests will be carried out with the demonstrator VoloDrone sprayer over the next growing season. ■

John Deere and Volocopter are working in partnership

AOPA NEWS HIGHLIGHTS

MALAYSIA DOWNGRADE

The United States' Federal Aviation Authority has downgraded the Civil Aviation Authority of Malaysia to a Category 2 rating, saying it "does not meet International Civil Aviation Organisation (ICAO) safety standards." Malaysian airlines can continue to operate existing service in the U.S. but cannot add new flights, including those code-sharing with U.S. airlines. The downgrade follows in-country assessments in April 2019.

CRASH SITE PROTECTED

Wales has given protected status to a World War II crash site. Welsh government officials say the resting place of the Lockheed P-38 Lightning is the first military aircraft crash site in the UK to be protected for its historic and archaeological interest. The fighter aircraft is buried just below the seabed off the coast at Harlech, north Wales. When conditions are just right it becomes visible in the sand.

MOONEY SHUTS DOWN

Mooney Aircraft has reportedly shut down its headquarters in Texas and released all its staff. The company's current voicemail says: "At this time, all Mooney employees have been furloughed and therefore we cannot take your call." According to GAMA sales records, Mooney sold two Acclaim Ultras in each of the first two quarters, after selling 14 aircraft in 2018. For context, Cirrus sold 203 aircraft in the first half of 2019.

EPIC E100 RECEIVES FAA CERTIFICATION

After seven years of effort, Epic Aircraft has obtained an FAA type certificate for its speedy single-engine E1000 turboprop

by **David Rawlings**

EPIC AIRCRAFT announced the FAA has granted Type Certification for its E1000 all carbon fibre aircraft design, concluding a rigorous seven-year programme. "This is a remarkable accomplishment for our entire community," said Epic CEO, Doug King. "I want to thank our employees, who have worked so diligently to deliver this exceptional design, as well as our partners, suppliers, and customers, who have faithfully supported us each step of the way." The Epic E1000 is based on the company's experimental Epic LT model which was introduced to the market in 2005 through an owner-assist build programme based at Epic headquarters. "Transitioning that design into a certified version was the chance to offer a truly compelling product to the industry, a 'no compromises'

"Epic has over 80 confirmed E1000 reservations from around the US and the globe"

aircraft that customers would really want. And they do," added King. Epic has over 80 confirmed E1000 reservations from around the US and the globe. "We had some opportunities to speed things up along the way, to get certification earlier," said King. "But that would have required some trade-offs that we weren't willing to make. We consider performance to be our brand, so we decided to make it perform. And we did!" The first seven E1000 customer aircraft are in various stages of fabrication, bonding and assembly, with initial deliveries slated to begin this year. All Epic manufacturing, engineering and administration operations are based in the U.S. Epic has doubled its composite fabrication capacity, invested heavily in tooling, equipment, curing ovens, and refined workflows to accelerate the E1000 production ramp. The company is currently running two production shifts, with plans to further expand operations. Production Certification is targeted for the first quarter of 2020. "The FAA has a difficult job, overseeing a very challenging process, ultimately aimed at keeping us all safe," commented King. "They have been a great partner, collaborating with us throughout the program, and certainly contributing to the structural integrity and safety of the E1000. We are very excited to begin this new chapter in the Epic Aircraft story." Learn more at epicaircraft.com. ■

The E1000 is now certified

BOEING AND PORSCHE TO COLLABORATE ON FLYING CAR

by **AOPA News Team**

PORSCHE AND Boeing are developing a concept for a fully electric, vertical-take-off-and-landing vehicle. Engineers from both companies will implement and test a prototype.

"This collaboration builds on our efforts to develop a safe and efficient new mobility ecosystem, and provides an opportunity to investigate the development of a premium urban air mobility vehicle with a leading automotive brand," said Steve Nordlund, Vice President and General Manager of Boeing NeXt, an organisation that is laying the foundation for a next-generation mobility ecosystem in which autonomous and piloted vehicles can safely coexist. "Porsche and Boeing together bring precision engineering, style and innovation to accelerate urban air mobility worldwide."

A mock-up of the Boeing/Porsche electric flying car

A 2018 study by Porsche Consulting forecasts that the urban air mobility market will pick up speed after 2025. The study also indicates that urban air mobility solutions will transport passengers more quickly and efficiently than current conventional means of terrestrial transport, at a lower cost and with greater flexibility.

Boeing is the world's largest aerospace company and as the top U.S. exporter, the company supports commercial and government customers in more than 150 countries. Boeing employs more than 150,000 people worldwide and leverages the talents of a global supplier base. Building on a legacy of aerospace leadership, Boeing continues to lead in technology and innovation, deliver for its customers and invest in its people and future growth.

The two companies also sighed a Memorandum of Understanding to explore the premium urban air mobility market and the extension of urban traffic into airspace. With this partnership, both companies will leverage their unique market strengths and insights to study the future of premium personal urban air mobility vehicles.

As part of the partnership, the companies will create an international team to address various aspects of urban air mobility, including analysis of the market potential for premium vehicles and possible use cases. ■

PILATUS REVEALS THE PC-12 NGX

by **Robert Care**

THE BRAND-NEW PC-12 NGX incorporates an improved engine, smarter avionics and a completely redesigned cabin with larger windows, making this third generation of the PC-12 airframe the most advanced single-engine turboprop ever.

At the heart of the new PC-12 NGX is the PT6E-67XP turboprop engine by Pratt & Whitney Canada. This improved engine features an electronic propeller and Engine Control System including Full Authority Digital Engine Control (FADEC) — a worldwide first in this market segment. In addition, the new propeller-low-speed mode results in a significant reduction in cabin noise for greater passenger comfort. The new turboprop engine enables the PC-12 NGX to achieve a maximum cruise speed of 290 KTAS (537 kph).

The PC-12 NGX boasts a range of new features for the pilot: the Advanced Cockpit Environment (ACE) system by Honeywell, as inspired by the PC-24, provides enhanced avionics. In another first for the segment, Pilatus combines the power of a cursor control device with the versatility of a smart touch-screen controller in a truly professional flight deck. The digital autothrottle, i.e. automatic thrust adjustment, reduces pilot workload for greater safety and ensures automatic power optimisation in every phase of flight.

The latest version of the PC-12 will be ready by Q2 of 2020

With the new PC-12 NGX, scheduled maintenance intervals have been extended to 600 flight hours, which provides significant cost savings. The time-between-overhaul period has also been increased from 4,000 to 5,000 hours, thereby reducing the cost of operating the PC-12 NGX even further, making it a leader in its class.

The PC-12 NGX is certified, and deliveries will begin in the second quarter of 2020. ■

WORDS: Henry Simpson **IMAGES:** Author and British Columbia Aviation Museum

LANCASTER FOR BRITISH COLUMBIA

With few Avro Lancasters still operating around the world, Henry Simpson speaks to a group of Canadian aviation fanatics who are aiming not only to restore the beloved Lancaster, but also to make it airworthy

HENRY SIMPSON PPL HOLDER FOR FOUR YEARS **21 YEARS OLD** STUDYING FOR A DEGREE IN BIOLOGY AND PHYSICAL GEOGRAPHY

OF THE 7,000 plus Avro Lancaster bombers constructed, only 17 complete examples survive. One of them, FM104, has had a rather difficult post-war life, but now ambitious plans are afoot not only to restore the aircraft but to see it fly again.

With walls covered by old aviation photographs and shelves adorned with model aircraft, Mary's Bleue Moon Café proudly shows its history dating back to when Victoria International Airport (in British Columbia) was once RAF Patricia Bay, during the Second World War. It was a fitting venue for me to sit down and talk with John Lewis, president of the British Columbia Aviation Museum (BCAM), about their exciting new plans and the story behind their Lancaster.

Lancaster FM104 was built under licence by Victory Aircraft in Toronto in 1944, and it was flown across the Atlantic to

join No.428 Squadron RCAF where it was kept in reserve for the planned Tiger Force to fight against Japan. With the war in the East brought to an abrupt closure by the atomic bombings in August 1945, the aircraft finished the war having never seen combat. Upon its return to Canada, FM104 spent 20 years in service with the RCAF, operating on the east coast in a search and rescue role. Canada was the most extensive post-war user of the Lancaster, with the RAF quickly replacing the type with the Avro Lincoln. The RCAF, however, utilised the aircraft as a maritime patrol, reconnaissance, and search and rescue aircraft operating across vast swathes of the Atlantic and Pacific oceans right up to the high Arctic.

When the Lancaster was retired from service in 1964, FM104 was part of the type's decommissioning ceremony. The aircraft was then purchased by the RCAF association and restored to its WW2 configuration before being presented to the city of Toronto, where the aircraft was mounted on the lake shore, close to the entrance to the city's Exhibition Centre. After many years exposed to the elements, the aircraft was removed from its plinth and taken to the Canadian Air and Space Museum, in Toronto in 1999.

"Canada was the most extensive post-war user of the Lancaster, with the RAF quickly replacing the type with the Avro Lincoln"

The museum was evicted from its building in 2011 and the aircraft has since been dismantled and is in storage at Edenvale (Stayner) airport, now under the ownership of the city of Toronto. Unsurprisingly, with the aircraft left in storage, the city wanted it off its hands, and so proposals were requested from Canadian museums that did not have a Lancaster.

This is where BCAM entered the picture. Their proposal was successful and the aircraft has been entrusted to the museum. FM104 was transported to the museum by road and ferry and it arrived there on the 29 September 2018. The British Columbia Aviation Museum is

situated just outside Victoria, the major city on Vancouver Island, and BCAM itself was founded 30 years ago in 1988 with three aircraft. Their collection has now grown to 25, many of which were restored from wrecks by the museum. At present the museum is run completely by volunteers and is a not-for-profit organisation, but restoring the Lancaster will be a big challenge for them, requiring substantial fundraising, as well as changes to the operation of the museum. John stated that he expects a very different museum landscape in future, to support the Lancaster. They are a non-flying museum and it's a big step up to maintaining an airworthy Lancaster. He admits that fundraising will be the main issue and this is why they are keen to increase awareness of the project. One of the initial challenges will be housing the aircraft, as a third hangar will need to be constructed. However, Victoria Air Maintenance – a very important partner on the project – will help with the restoration of the aircraft. Both of the company's Principals are life members of the museum and were involved from the beginning in the bid for the Lancaster. Victoria Air Maintenance has experience with restoring a variety of warbirds including most notably the return to flight of a de Havilland Mosquito B.35 in 2014. They estimate the timescale of the restoration to be 10 to 15 years as substantial work will have to be done on the airframe after its years outside. The restoration will return the aircraft to its original post-war configuration which, according to John, was an attractive part of the proposal to acquire the aircraft, as no post-war configured Lancasters remain airworthy. They intend to progressively restore the aircraft from its dismantled state whilst it is on display to the public. Parallels can, therefore, be drawn to plans closer to home at East Kirkby in Lincolnshire where Lancaster NX611 'Just Jane' has been progressively restored to taxiable and now towards airworthy status in full view of the visiting public, with the aircraft hoped to be fully airworthy in a few years' time. The existence of other airworthy Lancaster operators, such as the Battle of Britain Memorial Flight and the Canadian Warplane Heritage Museum, also benefits the project as the required Lancaster expertise is present and the burden of producing new parts for the aircraft is often shared. The restoration of FM104 paves the way for four airworthy Lancaster bombers in the future.

"It's a non-flying museum and it's a big step up to maintaining an airworthy Lancaster"

Since I visited the museum work has begun on the Lancaster. Its nose section was restored so that it could be taken by trailer to airshows and events in order to raise money for the project.

I thank John Lewis for his time and wish BCAM the very best for their restoration of the aircraft, and encourage any readers to visit the museum should they be passing. ■

You can follow the project and give donations at bcam.net

BELOW CLOCKWISE: FM104 shown to the public in an attempt to raise money; a restored Lancaster; more parts arriving

After a long journy across water and land, FM104 arrives in Canada ready to begin the process of becoming airworthy once more

The bright spark for schools

WORDS David Rawlings
IMAGES Courtesy of Pipistrel

Aviation is under constant criticism over its carbon footprint. Electric aircraft appear to be the way forward and **manufacturers are working on producing such machines**, including Pipistrel with its Alpha Electro

IN THE world of aviation Pipistrel is a fairly new name, even though 2019 represents its 30th year of operation. But it has been an innovative force even since its early days.

The Slovenian-based company began by producing powered hang-gliders designed by company owner Ivo Boscarol. As the company moved forward it started to work with composite materials and ultralight aircraft, including the Sinus, which was considered one of the first composite ultralights.

The company kept growing, working on the Taurus, which became the world's first side-by-side, two-seat, self-launching glider. The company really began to gain a reputation for its use of

new materials and concepts in 2007, when it launched an electric version of the Taurus.

This is when the prestigious awards started to arrive at Pipistrel. The electric Taurus was listed as one of the greatest innovations of the year by Popular Science magazine. It was also awarded NASA's Centennial Challenges 'Personal Air Vehicle Challenge' in the same year, followed by the NASA General Aviation 'Technology Challenge' award in 2008. This was for a modified Virus (a side-by-side, two-seat, high-wing aircraft that is sold as an ultralight, homebuild or light-sport aircraft) that had the best safety features (it also won prizes for the shortest take-off distance and best angle of climb, and shared the lowest cabin-noise prize).

Since then Pipistrel has worked hard on advancing electric-powered aircraft, which brings us to the Alpha Electro.

The original Alpha was announced in 2011 and began production in 2012. It's a side-by-side, two-seat, high-wing composite powered by a Rotax 912. It has become a popular trainer since its launch, due to its low cost (when compared to more traditional training aircraft), and its economic engine and ease of flight.

BATTERY LIFE

Soon after the original launch of the Alpha, Pipistrel began work on the electric version.

The problems that arise with electric aircraft include the endurance of the battery pack and how long it takes to recharge. A busy school needs the aircraft to be available all day with very little downtime and it also needs to be sturdy.

The Alpha Electro has an hour's flight time, plus a 30-minute reserve on one charge, and the recharge time is between 30 and 40 minutes (depending on the strength of the power grid).

"When the aircraft is on the ground in between flights, it takes about one minute to unpin the battery, take it out and put another, full one, in its place"

This could work in schools' favour, as the aircraft is recharging whilst the trainee pilot is receiving their debrief with the instructor.

"Usually a training lesson takes about one hour, so this is ideal for a flight school. In the meantime, the instructor has two options. While the students are changing places, the batteries can either be charged – with our SkyCharge dedicated charging station the whole process is finished in less than 40 minutes – or they can simply swap the batteries," explained founder and owner of Pipistrel, Ivo Boscarol. "Alpha Electro can be equipped with two identical sets of batteries, so one is one the ground, charging, while the other one is being used high above the clouds. When the aircraft is on the ground in between flights, it takes about one minute to unpin the battery, take it out and put another, full one, in its place."

The Alpha Electro could become a familiar sight in schools with its reasonable purchase price, low running cost and the ability to swap out batteries in just five minutes to resume flying again

The Alpha Electro has been seven years in the making

With an endurance time of 60 minutes, plus reserve, the Alpha is perfect for lessons

RUNNING COSTS

When asked how much each charge costs, Boscarol said: "Of course it depends on the local cost of electric energy; the average in Europe is below one Euro."

With electric aircraft in their infancy, longevity is a big question on everyone's lips. Boscarol said that the lifetime of the batteries is: "between 800 and 1200 charges, depending on the way the aircraft has been flown; and the cost of the battery overhaul replacement costs €19,000."

Looking at Pipistrel's published running costs, investing in an Alpha Electro would seem to make a lot of sense. 'Fuel' costs run at less than €1 per hour and it also states that running costs are only €17 per hour – including battery replacement, maintenance and overhaul, which is 40 per cent cheaper when compared to the petrol-powered Pipistrel SW121.

"The cost of training a new pilot from start to finish can be up to 70 per cent lower than the cost of training on a fossil-fuel aircraft"

Pipistrel has spend many years working in the world of electric aviation, but is quick to say that the advancement of battery-cells is out of their hand. "Unfortunately Pipistrel is not a battery-cells producer. The endurance of batteries depends on the cells. Of course, we are following the progress and the aircraft is designed on the way that the batteries can be always replaced with the more capable, newer ones," explained Boscarol.

SCHOOLS TO BENEFIT

Boscarol believes there are several benefits to schools taking up the Alpha Electro when they are due to replace their fleet. "The first benefit is that the aircraft is not burning the so-called 'foreign energy', meaning petroleum fuels, which are produced only in some countries in the world. Electricity can be produced locally almost everywhere, so no adverse effects because of an oil crisis, political situations," he explained. "This means no price fluctuations. Electricity is also MUCH cheaper than petrol, especially if from sustainable production. The environment should also benefit – an electric motor produces no CO2 emissions in to the atmosphere during the flight, meaning a cooler atmosphere, cleaner air and better visibility. If the electricity is produced in a sustainable way, this means a zero carbon footprint flight. The cost of training a new pilot on such an aircraft from start to finish can be up to 70 per cent lower than the cost of training on a fossil fuel aircraft – completely without any CO2 emissions."

Another benefit for schools is that an electric motor is not sensitive to the air density (it has no carburettors). The engine, controller and the other components have a lifetime much longer than

Seventy Alpha Electros have already been sold, but there is currently a delay in bringing them to the UK. Pipistrel hopes to have that rectified by the middle of 2020

those on the piston engine, which would save schools money. The engine has a TBO of 2,000 hours and the only thing that needs replacing are the bearings, which would also save money. And with a price tag of €130,000, it's certainly something schools could consider.

"The engine, controller and other components have a lifetime much longer than those on a piston engine"

OH SO QUIET

Pipistrel also states that with an electric engine the cockpit is so quiet that you don't even need headsets. "This means communication is easier and the comfort of the crew is much higher than in a cockpit of a piston-engine aircraft. Because it is so quiet, it also doesn't disturb the people on the ground. It might even bring aviation back to urban areas, where because of noise, training has been banned in recent years," explained Boscarol.

This is promising news for schools on airfields near heavily populated, urban areas who are looking to renew their fleet. Handling noise complaints from local residents is something certain airfields have to do on a regular basis, and a quieter engine would reduce these.

IS IT POPULAR?

Since its introduction in 2015, 70 Alpha Electros have been sold across the globe, but none in the UK as yet. "Unfortunately the UK is not following the EASA Annex 1 Ultralight rules, on which the legislation for Alpha Electro is based," said Boscarol. "So officially Alpha Electro cannot fly with UK call signs but only with some European ones such as French, Italian and some others. But soon the EASA type-certified version called Velis Electro will be available, and as UK is (still) an EASA state member and we hope it will remain one also after Brexit, we adamantly hope that this model will be legal to fly in the UK in the first quarter of 2020 [If you want more information contact the UK's distributor of Pipistrel: www.flyaboutaviation.com."

It has received a special airworthiness certificate by the USA's FAA and Australia's CAA. It has also gained permits to fly in France, Canada, Italy Norway and Switzerland.

WHAT'S NEXT?

Pipistrel has been at the forefront of GA innovation for many years, and has the awards from NASA, Popular Science and many other leading authorities to prove it, so the obvious question to Boscarol was: 'What are you planning to do next?' to which the founder of Pipistrel replied: "We are head over heels in the design process of a VTOL for Uber. It was introduced to the general public during Uber's second Annual Elevate Summit. The new aircraft utilises dedicated propulsion systems for both cruising and vertical lift and embraces an aircraft-styled family approach of eVTOL able to carry between two and six passengers. At the current rate of progress, the prototype will start flying in 2020." ■

TECH SPEC Pipistrel Alpha Electro

PERFORMANCE
Power plant: Pipistrel PEM 60MVLC
Max power: 60 kW 1 min, Cruise 50 kW @ 2100–2400 rpm
Propeller: ground adjustable three-blade 1.64 m diameter propeller
Cruise speed: 85 KIAS; VNE: 135 KIAS
Max climb rate: 1,220 fpm
Take off run – grass: 555 ft
Service ceiling: 12,800 ft
Endurance: 60 min (plus 30 min reserve)

WEIGHTS
Basic empty weight with batteries: 368 kg
MTOW: 550 kg LSA
Payload: 182 kg

DIMENSIONS
Wing span: 34' 6" (10.5 m)
Length: 21' 4" (6.5 m)
Height: 6' 9" (2.05 m)
Wing area: 102.4 sqft (9.51 m_2)
Rudder area: 11.8 sqft (1.1 m_2)

A 40 minute charge time means the aircraft battery can recharge whilst the trainee pilot is having his or her debrief

IMAGES Various

TESTING TIMES!

Keeping your licence current so you can fly includes proficiency checks and examination flights. These can cause worry in a pilot, but Matt Lane is on hand to explain what you need to know and how to pass

MATT LANE **CPL/FI/FE/FICI** HEAD OF TRAINING FOR THE RAF BRIZE NORTON FLYING CLUB **RAF TUTOR STAFF PILOT**

WHETHER WE like it or not, all of us have to face examination or 'test' flights at some time in our flying career, and they are a necessary part of becoming and remaining a safe and competent pilot.

As pilots gain and maintain additional ratings and maybe instructor/examiner qualifications, the number of potential and recurrent examination flights increases – I can guarantee your examiner will have to face more regular tests than you, so we know how you are feeling! This article looks at some of the different examination flights you may have to tackle and gives some tips on how to be successful.

The first thing to say, is that the EASA terminology isn't always clear and many people colloquially use the wrong terms. For example, many people talk about 'doing a test to renew my PPL' when what they actually mean is 'doing a Proficiency Check to renew the SEP rating on my PPL' – confused yet?! There is no need to get too hung up, but the table on page 38 can help decode what you are doing. The most important thing is to ensure you have read the relevant Standards Document (available on the CAA website). It is also useful if you can read the test schedule form that the examiner will use, so you know what the test entails (also all on the CAA website). Ideally, your instructor should take you through all this when preparing you for test.

TEST FORMAT

All tests will follow a very similar format. You can read the 'Guidance to Examiners' in the Flight Examiner's Handbook – (also on the CAA website).

A. INITIAL BRIEFING The Examiner will try and put you at ease, and confirm who you are and what you are doing. They should outline the plan for the day and will normally examine your paperwork to confirm you are good to go for the test. It helps massively at this stage if you are well organised, with the required training records, forms, logbook, licences, or medical all well ordered and immediately available. Believe it or not, I have on occasion wasted literally hours while candidates attempt to find paperwork. The examiner may also wish to see or know where the aircraft documents are at this stage.

If appropriate, the examiner will now set you planning tasks such as route, weight and balance or booking approaches and so on. You should both agree a time to meet again for the main brief.

B. MAIN BRIEF The examiner will check your planning, ask any relevant questions and run through the flight and paperwork in detail. The examiner should run through the test structure, and make it clear who is responsible for what at the various phases of the flight. Don't be surprised if we ask questions about the aircraft we are about to use. Examiners fly a wide variety of aircraft which all vary and we may not be familiar with the exact avionics or configuration of the aircraft. This is also your time to ask any questions of clarification – do not wait until you are airborne if you are unsure about anything! At the end of the main brief make sure you have everything sorted, all the kit you need, and visit the toilets!

"Believe it or not, I have on occasion wasted literally hours while candidates attempt to find paperwork"

C. FLIGHT The flight should run as per the briefing, but if the examiner needs to modify the order of test events to fit in with ATC or weather, they may do that and should ensure you understand what is happening. The test should consist of everything you have previously been trained on and discussed, and there should be no attempts to trick you or introduce unknown exercises.

D. DEBRIEF Once you have safely shut down and are back in a suitable environment, the examiner will give you the test result and debrief any salient points. In most cases this will be a pass or partial pass, with some points of advice or observation. With your permission, your instructor is very welcome to sit in – for their benefit as well. In the unfortunate event of a fail, you may understandably be upset

TEST DECODER TYPES OF EXAMINATION FLIGHT

TYPES OF FLIGHT	APPLICABILITY	RELEVANT CAA STANDARDS DOCS	RELEVANT SCHEDULE
SKILLS TEST	Initial Issue of a Class Rating (e.g. SEP or MEP) or Licence (e.g. LAPL or PPL)	Doc 19 – PPL Doc 19 also is only current coverage for LAPL Doc 14 – Class Ratings	SRG1157 – Class Ratings SRG2127 – LAPL SRG2128 – PPL
PROFICIENCY CHECK	Revalidation or Renewal of a Rating	Doc 14 – Class Ratings Doc 1 – IR	SRG1157 – Class Ratings / IR
ASSESSMENT OF COMPETENCE	Issue, revalidation or Renewal of Instructor or Examiner Certificates	Doc 10 – FI/CRI/IRI Doc 21 – FE	SRG1169 – FI/CRI/IRI
FLIGHT TEST / PROFICIENCY CHECK	Issue or Revalidation of IR (Restricted)	Doc 25 – IMC Rating	SRG1176

"Take what you need and make sure it's secure, yet accessible during flight. Taking a mobile is a good idea, in case of a forced landing"

or confused. Don't be afraid to ask for a quick break, or to take notes if you are struggling to take in what the examiner will offer to cover with you – all of us want to give you the best advice and guidance to quickly revisit and get a pass. There will inevitably then be a mound of paperwork that needs to be completed, signed and probably copied/scanned – don't be surprised if this takes a while as it is important to get it right otherwise you risk rejection when applying to the CAA for your licence/rating.

TOP TIPS

So, now you know what you are doing and what will happen – what are my top ten tips for a relaxed and successful flight?

1. KNOW THE SKILLS TEST SCHEDULE Don't worry about remembering everything you need to do during the skills test – the examiner will brief you thoroughly and prompt you through the test items during the flight. However, it is important that you are confident and happy that you can fly all the test items that will be asked of you, so your pre-test work-up is the time to practise anything you are unsure about or rusty on. The test details are all available on the CAA website in various documents (listed in the table above), so read it through with your instructor and make sure you are happy with everything.

2. PREPARE YOURSELF If you are not physically prepared, you won't fly well. A good night's sleep, a drive to the airfield in plenty of time and being well fed/watered is as crucial as pre-flighting the aircraft. Don't be afraid to take a small sports bottle of water in the aircraft with you, especially in summer. Decent sunglasses and appropriate clothing for the conditions are also vital.

3. STUDY YOUR ROUTE When you have planned your route or operating area, take plenty of time to mentally fly round it and think out what fixes and features you are going to look for, when you will do checks and RT calls, what airspace is around you, where the weather is in relation to your route and what in-flight diversion options you may have. This will help prevent you from needing to spend excessive time with head down looking at your map during the flight, which will compromise your lookout and flying accuracy.

4. CUT OUT THE CP!** There is no need to take the entire contents of a pilot supplies catalogue flying with you – there is nothing worse than having pens and stuff drop everywhere when you are getting in – or worse, in flight. Take what you need and make sure it is secure, yet accessible, during flight. Taking a mobile is a good idea in case of a forced landing, but turn it off.

5. RELAX DURING THE FLIGHT Ha, easy for an examiner to say, you are thinking! The thing to remember is that we are not looking for perfection or trying to select the next Red Arrows pilot. All we want to see is a safe, competent and well-handled flight, as if you were solo or with a non-pilot passenger. If you make a mistake, let the examiner know and do your best to correct it. Equally, if you drift from your heading/speed/height etc, we want to see a prompt recognition and effective correction – it is not an immediate fail. Remember, test failures are rare and only in cases where there was a clear safety concern or repeated errors that the candidate failed to recognise and correct.

6. DON'T WORRY WHAT THE EXAMINER IS DOING Examiners are not supposed to distract the candidate, so don't worry if we are not chatting away and seem a bit quiet – we are just trying to give you some peace to concentrate on your flying. We will quite happily engage in conversation if you want to, but if you want to concentrate don't be afraid to ask the examiner to be quiet! After all, it is an essential skill once you have your licence to manage your passengers at important moments of the flight.

We will also usually bring a kneeboard and may scribble things down. Don't worry about that; we generally note things down to help in the debrief at the end, and these could be good or bad things, so don't stress about writing = errors!

7. AVIATE – NAVIGATE – COMMUNICATE! Prioritise your actions appropriately and don't overload yourself with trying to do too many things at once. It happens to us all – I failed my first PPL Nav test by trying to turn at a waypoint, talk to (then active) RAF Cottesmore ATC and descend below cloud all at once. I set off on the wrong heading and went the wrong side of Rutland Water through RAF Wittering MATZ, which convinced my examiner I had messed it up! Don't rush and set off on a nav leg before you have got the aircraft settled at your desired height, speed and heading, and

if the circumstance requires, don't be afraid to tell ATC to 'standby' while you sort out more pressing things. The adage is also great advice for dealing with emergencies, as failing to complete your mayday call won't hurt you, but getting slow and stalling certainly will!

8. GET YOUR RT SLICK There is nothing that will sap your capacity more than struggling to get your RT calls out or replies in. If you are confident and slick with what you are going to say it will make your flying a lot easier. FISO/ATCOs are usually very happy for Tower visits – take the opportunity to sit in and understand how things flow from their end of the microphone. If you can anticipate how the FISO/ATCO will respond to your calls, it gives your brain a head start for a slick reply. Don't be afraid to practise speaking out your RT calls on car journeys – it is a great way of running through a simulated flight.

9. KEEP THE WORK CYCLE GOING When airborne, your work cycle should be based around LOOKOUT – ATTITUDE – INSTRUMENTS, with the majority of the time spent on an all-round good lookout, with confirmatory checks of attitude and instruments. Spending excessive time looking at maps, instruments or PLOG is dangerous and will compromise your flying accuracy. If you need to look at charts or PLOG or do checks, make sure you break it up and keep the lookout going. The majority of problems during navigation stem from candidates staring at their map while the aircraft drifts off heading and/or height. An old RAF tip – hold checklists and maps up at canopy level to look at them rather than on your knees. It keeps your peripheral vision working on the aircraft attitude and and I guarantee you will fly more accurately.

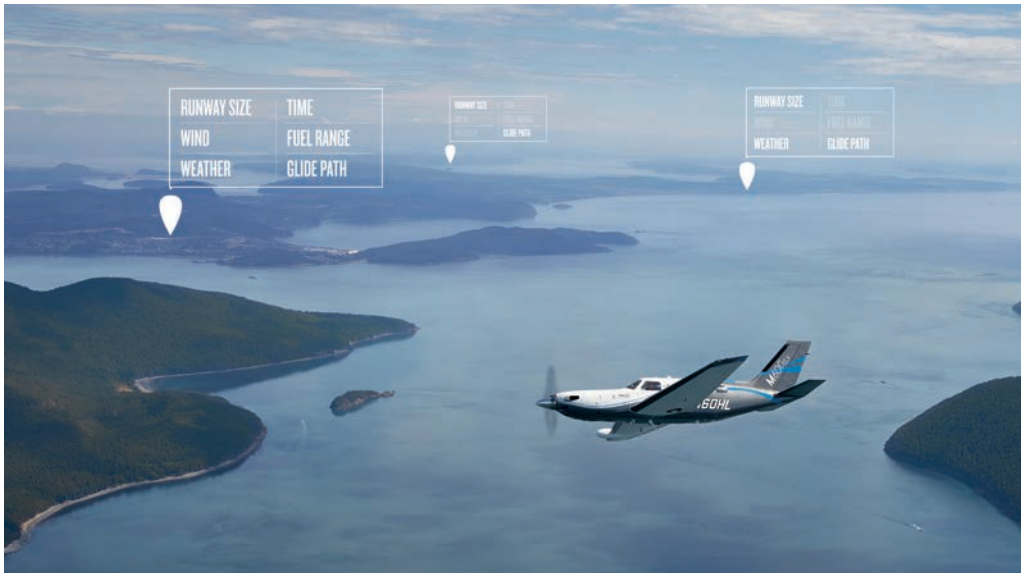
This is also true for instrument flying tests – the reason most candidates get themselves in trouble is because their instrument scan breaks down as they get overly focussed on one parameter.

10. DON'T BE AFRAID TO GO AROUND! Don't persist with a bad approach. An examiner will be far more impressed to see you make a timely and safe decision to go around rather than continuing a poor approach, which will inevitably result in an untidy or unacceptable landing. Everyone has an approach go a bit wrong at times; the real error is to let it develop rather than going around and repositioning for another go.

I hope this gives some useful information and tips for a successful flight. Above all, remember your examiner wants you to pass and you wouldn't have been recommended for test if you weren't ready. I have years of happy memories of giving the good news to successful candidates, many of whom are now sat in shiny Airbus or Boeing cockpits and one has even examined me for a revalidation! One final word – the days of grumpy/shouty/tricky examiners should be consigned to the history books, and if you do get a relic from the past it isn't acceptable and you don't have to put up with it – speak up and don't be afraid to ask for a change. All the best for your next test! ■

"Don't be afraid to tell ATC to 'standby' while you sort out more pressing things"

Once all this is out of the way, it's time to enjoy your success and go flying



SAFER FLYING WITH AUTOLAND

Garmin announces the latest feature to work with its G3000 integrated flight deck – the Autoland

Product Autoland
Maker Garmin

GARMIN HAS announced its first autoland system. Autoland will control and land the aircraft without human intervention.

The Autoland system determines the most optimal airport and runway, taking into account factors such as weather, terrain, obstacles and aircraft-performance statistics. It will soon be available on select general aviation aircraft with the Garmin G3000.

In the event of an emergency, the pilot or passengers on board can activate Autoland to land the aircraft with a simple press of a button. Autoland can also activate automatically if the system determines it necessary. Once activated, the system calculates a flight plan to the most suitable airport, initiates an approach to the runway and automatically lands the aircraft – without human intervention.

During an Autoland activation, the system takes into account a breadth of information and criteria. Factors taken into consideration when identifying the most suitable airport include weather, fuel on board, runway surface and length, terrain, obstacles and more. The availability of a GPS approach with lateral and vertical guidance to the runway is also examined when the system is considering various airports and runways. Even further, the system will automatically communicate with ATC, advising controllers and pilots operating near the aircraft of its location and its intentions.

Throughout an Autoland activation, the system provides simple visual and verbal communications in plain language so passengers in the aircraft know what to expect. The flight displays show the aircraft's location on a map alongside information such as the destination airport, estimated time of arrival, distance to the destination airport and fuel remaining. Airspeed, altitude and aircraft heading are also labelled in an easy-to-understand format.

At any time, a pilot can easily deactivate an activation, with a single press of the "AP" autopilot key. The flight display shows a message that confirms Autoland has been deactivated and in the event of an accidental deactivation, the system shows passengers how to reactivate Autoland if needed.

Autoland will soon be available as part of the G3000 on the Cirrus Vision Jet and the Piper M600, pending FAA certification. ■

Where garmin.com
Price £N/A

PS UPGRADES AUTO PANEL

PS Engineering has upgraded its PAR200 audio panel which controls a remote-mounted aviation transceiver.

The user interface has been overhauled using a brighter OLED display and three softkeys, which are said to make access to all the functionality of the PAR200B easier.

PS Engineering has also added IntelliAudio, which aids a pilot monitoring multiple radios to focus on the frequency that is most important at that point.

The audio panel has individual volume controls for the intercom and radio levels, along with various music distribution capabilities including Bluetooth.

A built-in speaker amplifier, split mode and frequency recall are all part of the PAR200B audio panel.

PS Engineering has partnered with Trig Avionics as a supplier of a remote transceiver. Trig's TY91L com radio has been designed to produce a minimum of 6 watts of output power and has selectable 8.33KHZ or 25KHZ spacing. PS Engineering said the PAR200B fits the requirements of aircraft owners – everyone from Stinsons to Taylorcrafts, Warriors to Archers, from the C152 to C172, and various other VFR aircraft.

Where ps-engineering.com
Price $3,495

SECRETS OF RESPECTED COLD WAR STRIKE JET

The world-famous Haynes Manual series has turned its attention to the Blackburn Buccaneer

Book The Blackburn/BAE Buccaneer Manual
Author Keith Wilson

THE SECRETS of one of the Cold War's most respected carrier-borne and overland strike jets, the Blackburn Buccaneer, are revealed in a new manual from Haynes. With the world currently facing heightened political tensions, the Blackburn/BAE Buccaneer manual, takes a timely look at this Cold War warrior which was at the peak of its service in the early 1980s.

There were even fewer aircraft that could fly as fast, as low, or as far as the amazing Buccaneer – and not one could do all three. The Blackburn jet even earned itself the nickname 'Easy Rider' with the South African Air Force thanks to its surprisingly stable ride at low level.

The Blackburn Buccaneer was designed and built in the 1950s at the height of the Cold War, and entered service with the Royal Navy in 1961 as a carrier-borne strike aircraft. The jets initially operated from Royal Navy aircraft carriers, to deliver nuclear weapons and conventional ordnance in anti-shipping strikes against Soviet warships in the North Sea area.

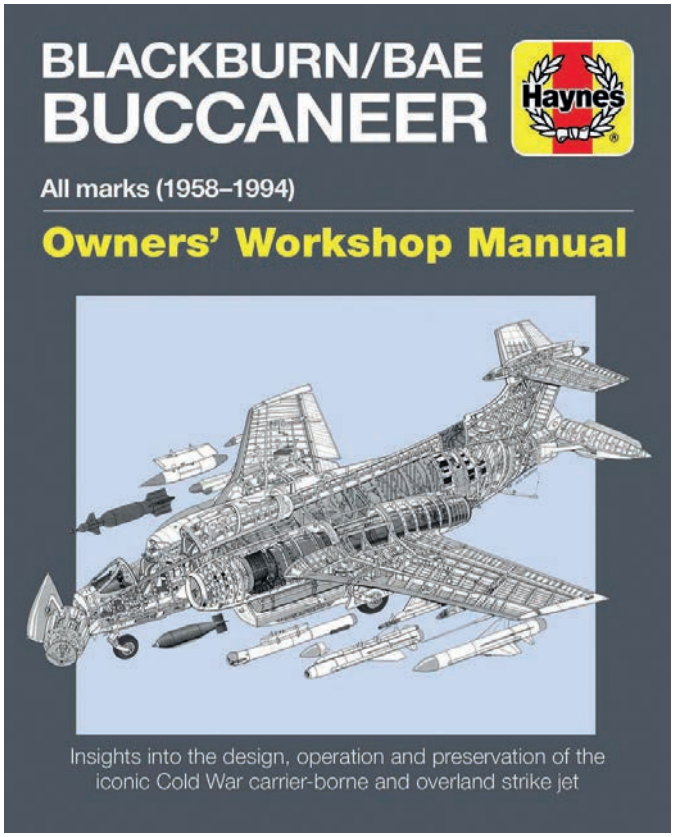
The Navy later transferred its Buccaneers in 1969 to the RAF, where they were used in the overland strike role. The aircraft saw combat during the first Gulf War in 1991, before the last Buccaneers were retired from service three years later.

Buccaneers were also operated by the South African Air Force from 1965 to 1991, seeing action in the South African Border War over Angola and Namibia, and launching attacks on SWAPO guerrilla camps during the 1970s and '80s.

The Blackburn/BAE Buccaneer Owners' Workshop Manual, written by air-to-air photographer and aerospace journalist Keith Wilson, features a detailed view of operational and maintenance procedures thanks to the help of The Buccaneer Aviation Group (TBAG) at Bruntingthorpe, who provided the author with rare and privileged access to TBAG's superb collection of Buccaneer jets, that are kept in taxiing condition.

The manual is supported by over 300 photographs and illustrations (including many previously unpublished) and offers an insight into the design, construction, operation and maintenance of the remarkable aeroplane. The book also features extensive interviews with Buccaneer aircrew. ■

Where haynes.com
Price £25



LIGHTNING IN A BOTTLE

Book The Men Who Flew The English Electric Lightning
Author Martin W. Bowman

THE EARLY 1950s were a boom time for British aviation. In Britain, jet engine technology led the world, while wartime developments into swept wing design in Germany and their transonic research programme were used to give western design teams a quantum leap in aircraft technology. At English Electric, 'Teddy' Petter's design team were keen to capitalise on the success of their Canberra jet bomber and rose to the challenge of providing a high speed interceptor for the RAF.

Martin W. Bowman describes the career of the Lightning in detail using first-hand accounts of what it was like to fly and service this thoroughbred. Illustrated with over 200 photographs, appendices listing Lightning squadrons, production totals and individual aircraft histories, alongside the first in-depth analysis into why a third of all Lightnings were lost, *The Men Who Flew the English Electric Lightning* is a fine record of the all-British fighter.

Where pen-and-sword.co.uk
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Contact **Bill Roberts** at 020 7564 5461
or at williameroberts2@aol.co.uk.

1978 Piper Navajo PA31-310C. ¼ equity share for sale, competitive price. Based North Weald. TTAF 4405. 100 hour check completed March 2019. Co-pilot panel. Extensive avionics including Garmin GNS430, Garmin MX20, King KLN90B second GPS, King RDR2000 weather radar, radio altimeter, Shadin fuel computer, altitude alert

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