The official magazine of the Aircraft Owner and Pilots Association www.aopa.co.uk

AOPA UK

The sharp Shark

Zara Rutherford is rightly being lauded for her epic round-the-world flight, so **what's the Shark she flew like to fly?**

A BRAVE NEW WORLD
Airspace changes under the spotlight could make the UK best place in the world to fly

RETURNING TO BASE
Unique collection of Spitfires muster at Duxford thanks to warbird owners' generosity

HEAD IN THE CLOUDS
With longer days and more chances to fly, pilot Martin Leusby reveals his days out

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A BRAVE NEW WORLD

THE CONSULTATION on the Airspace Modernisation Strategy (AMS) update is now with us. It extends the strategy out from 2024 to 2040 and describes a brave new world with the integration of all airspace users from low level drones to spacecraft, and everyone in between; a world of interoperability and communications using modern and new technologies while also aiming for simpler airspace design and supporting regulations. It expresses a desire to achieve this sustainably with a commitment to the Government's net zero emissions targets. It acknowledges that the structure of the UK's airspace has remained the same for decades and needs to innovate to meet increasing demand not only in the volumes of users but also in the type of users. As we come out of the pandemic the traffic volume of not only commercial air transport, but also General Aviation and the military sectors is increasing again. Optimistic forecasts suggest we'll be back to pre-pandemic levels next year. All the while not forgetting that the number one objective of maintaining a high level of safety is above all else.

If the CAA delivers on this, the UK certainly will be the best place in the world for aviation. In my opinion it's aspirational and ambitious which as always means the 'devil will be in the detail' of implementation. As a stakeholder using UK airspace you are being invited to respond and have until 4th April 2022 to do so. Although it includes all airspace users there is much to interest a GA pilot in the sections on navigation and air traffic management and specifically Use case 5: which describes the vision for a GA flight between two small airfields in class G airspace. Responses from all users are encouraged and AOPA will be one of them. AOPA has considerable in-house expertise on the subject of airspace and is working on a substantial and detailed response. I will be asking the Members Working Group which meets on 29th January for their input too. If you, too, want to contribute either go to the CAA website https://consultations.caa.co.uk/policy-development/draft-airspace-modernisation-strategy-2022-2040/ or get in touch at info@aopa.co.uk.

A refresh for AOPA too. All of the Board members participated in a strategy review last year, the outcome of which is imminent. It's also important that as an organisation we modernise to meet the changing demands of the membership and the work that it undertakes.

Finally, there will also be a refresh at the Members Working Group. I want to thank David Chambers for his efforts as Chairman of the Group for the past two years. The Members Working Group is an important body that keeps the Executive and Board of AOPA in touch with its grass roots membership. It provides a forum to listen to their concerns but also takes on initiatives that benefit the wider membership; electronic submission of GAR forms being one that I recall, something we probably all take for granted now.

It is open to all members and you will be very welcome. I hope the forthcoming meeting will be the last one using Zoom and that at we will all be meeting in person in the Spring. Check out the AOPA website for dates and locations. https://www.aopa.co.uk/community/members-working-group.html. I hope to see you there. ■

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INSIDE THIS MONTH

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FEBRUARY 2021

EDITOR'S COMMENT

The incredible achievement of teenage pilot Zara Rutherford who, at the age of just 19, has circumnavigated the world is to be celebrated.

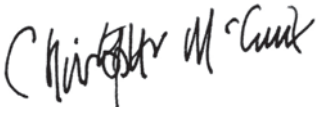
What skill, what courage and what fun, swooping down to watch camels in the desert like a weekend pilot peering out for the PAPIs.

Our congratulations to Zara, who joins women pioneers such as Amelia Earhart, Amy Johnson and Sheila Scott and Polly Vacher.

She is now the youngest woman to fly solo around the world and the youngest to complete the feat in a microlight.

What a time to be flying the flag for aviation with the spotlight on the future of UK airspace. As AOPA chairman Pauline Vahey observes, the UK could well become the best place in the world for aviation.

Please find the time to respond either to CAA consultations issued or by contacting AOPA with your opinions.



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CHANGES MUST BRING BENEFITS FOR MEMBERS

AS WE move further into 2022 I would like to wish all our members a belated happy new year and to thank you for your continued support.

As we progress with the refurbishment of the new headquarters in Kemsing we will be looking at new and exciting media opportunities that will enhance your membership, we are considering how we can engage more directly with you through the use of new technology such as MS Teams or Zoom platforms.

I hope we are able to bring specialist topics live directly to you that will be of great benefit and your flying as well as the operation of your aircraft. We will ask you over the course of the year what subjects you particularly want to listen to and we will find the right experts.

The pandemic has allowed us to look at how we can engage on more subjects that interest you and to hear from you on what you think are the most important. This will help to inform us as we lobby on your behalf and while the term lobbying may be tarnished from those making millions of from the activity I can assure you AOPA is not in that league.

However, it is the combined subscriptions that provide the resources to lobby on behalf of the membership and the more members we have, the more resource we have and the more we can represent your interests. As President Kennedy said: "Ask not what your country can do for you, ask what you can do for your country."

So I'm asking members to engage with us when necessary, please find the time to respond either to the consultations issued by CAA or by dropping us a line expressing your views.

I can't guarantee that everyone's views will be incorporated into our response but they will help us to formulate our reply.(Needless to say we would treat all responses confidentially) With such a widespread GA interests from a wide range of pilots, the responses we normally get are equally far-ranging and that's fine, as we would rather hear from you about what you think on the various subjects that the CAA is consulting on. However, consultation doesn't mean the CAA or Government will act on what we tell them but it is our opportunity to provide some input to the process and perhaps achieve a different outcome.

Change is always difficult some people reject it while others embrace it. However, from an AOPA perspective, change must be beneficial; that's to say through either improved safety at an affordable price or it supports growth in general aviation.

Recently, the CAA launched a 12-week consultation about the modernisation of the UK's airspace. It's a large document and, as you might expect following recent Government activities, one of the goals is to achieve carbon net zero by 2050.

As far as I understand the current position, the Government has not directed the CAA to prioritise carbon reduction over capacity or safety however capacity and carbon reduction are both peas in the same pod.

Too little capacity to support the airline world will not help to reduce carbon emissions while overcapacity means the airspace is not being used efficiently. The extent to which changes are made to controlled airspace may have significant impacts for general aviation even though the Government has promised better sharing of the airspace between the different users. There is a lot of discussion about performance based navigation and how greater accuracy will allow airspace structures potentially to be reduced.

As you may have seen, the Government and CAA continue to support the voluntary equipage of electronic conspicuity devices which is aimed at improving situational awareness amongst GA users.

Of course, these devices are not collision avoidance systems and therefore the requirement remains to see and avoid where the pilot (based on the information that is presented to them) determines if avoiding action is required. See and avoid remains the primary collision avoidance system for VFR operations. There is a growing concern because where more technology is in the cockpit, such as GPS with moving maps and traffic display systems, pilots' heads maybe more often in the cockpit rather than eyes out scanning the horizon. Given the rise in airprox events I think this may be an issue that needs to be addressed if we are to avoid mid-air collisions.

The next challenge in my view is likely to be the use of the lower airspace because we are aware that drones want to start commercial operations and fly beyond visual line of sight. The ultimate goal for drones is for their operations to be fully autonomous which means very few humans in the loop.

However, in my humble opinion it is likely to be at least 20 to 30 years away before this begins although there will be those that disagree. But there is a push to start operating now, not autonomously but through the use of existing systems. I think this poses a problem for GA and for the regulator which places safety as its first priority however the Government is equally investing millions of pounds to support the development of drones.

Depending on how much interest you take, you may have noticed the number of restricted airspace change proposals (ACPs) being looked at in support of beyond visual line of sight operations albeit they are temporary. However once they have demonstrated their abilities to operate beyond official line of sight, the CAA will be faced with having to structure the airspace in such a way to enable these new platforms to operate. In my opinion, before new technology can be relied on completely, the CAA is likely to maintain segregated airspace for these operations until such time there was a high level of confidence in the technology (safety) that would enable the regulator to remove that segregated airspace.

I fully understand there can be some societal benefits and I am aware of a project which is under development in Scotland where the plan is to serve the NHS through the use of drones.

These drones would deliver amongst other things much needed medical supplies as well as blood and organs.

"Even where GA carries electronic conspicuity devices, trying to spot a drone and decide how to take avoiding action will, in my humble opinion, increase the risks for GA operating in Golf airspace"

The NHS is trying out drone deliveries of medical supplies in Scotland but how can a segregated airspace below 500 feet be put in place without affecting general aviation?

I can see how this would be of benefit particularly when dealing with remote regions but I fear it is going to be quite a task to put in place segregated airspace below 500 feet that doesn't have an impact on general aviation.

Even where GA carries electronic conspicuity devices, trying to spot a drone and decide how to take avoiding action will, in my humble opinion, increase the risks for GA operating in Golf airspace. While we do not want to stop the deployment of new platforms, the CAA has to make sure that safety is maintained without disadvantaging any airspace user.

If new technologies are required, then we would urge both the Government and the Civil Aviation Authority to continue to support new equipment requirements with funding mechanisms where the airspace is the beneficiary, safety is improved and carbon is reduced.

The CAA is also looking at future funding options as it tries to restructure its income as the pandemic has focused the mind of the regulator on how it can be more resilient in the future.

But I am not convinced at this moment that CAA fees will reduce significantly whatever is determined because of the requirement for the regulator to recover its costs from those that it regulates. However, as I have pointed out, the general public is also the beneficiary of CAA safety regulation and perhaps there is a degree of funding that should come from the public purse.

For example, work that the CAA does which is not directly related to services to the regulated community. At this time the CAA is consulting on fees and charges and there is a proposal to increase them although I can see no justification for the increase, given the entire aviation community is still trying to get back to pre-pandemic levels of activity.

Of course, there are some changes that relate to the UK leaving the EASA system as the CAA has taken back responsibility such as certification.

Another challenge that's facing us right now is the future of 100LL; we are aware of what's happening in the United States as some airports in California have recently banned the sale of 100LL.

AOPA is on the case and is continuing to liaise with both Government and the CAA in the search for solutions; more to come on this in the future.

I know that we all hope that we see an end to the restrictions caused by Covid-19 and I'm sure I don't need to remind everybody of the need to remain vigilant. Over these past few years we know but many families have suffered as a result of this terrible pandemic, losing loved ones as a result. I know I have. So remain safe and enjoy your flying. ■

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WORDS Chris McGine

CAP 1781 DETAILS ROUTE FOR AIRSPACE CHANGES

NATS has produced proposals for airspace changes in Scotland, the North of England and the South-East of England

CAP 1781 is the CAA Guidance for the Use of RNAV Substitution and has been produced in support of a programme of airspace modernisation in the UK.

NATS has embarked on proposals for significant airspace changes in Scotland, the North of England and the South-East of England, and aerodromes are developing complementary plans providing connectivity with the Network.

Ahead of airports introducing permanent airspace changes utilising PBN, CAP 1781 details a method of mitigation for continued use of conventional instrument flight procedures, in lieu of radiating navigation facilities as well as suggestions of other mitigating actions.

CAP 1781b is a companion to the guidance outlined in CAP 1781 and contains an Example Safety Approach which may be considered in the application of RNAV Substitution.

ARE PDRS OR SDRS CANDIDATES FOR RNAV SUBSTITUTION AS DETAILED IN CAP 1781?

No. Preferential Routes (PDR) and Standard Routes (SDR) are not considered as being part of the Instrument Flight Procedures (IFP) family. Therefore, these procedures have not been designed or obstacle assessed using PANS-OPS design criteria nor are they periodically reviewed as per the IFP safeguarding and Periodic Review process and requirements defined by the CAA. As these procedures are not provided as coded overlay procedures within a generic navigation database, they are not considered to be in scope of RNAV Substitution and the next version of CAP 1781 will be updated to reflect this.

Aerodromes with PDRs and SDRs should investigate all possible and available options including but not limited to reliance on different navaids or implementation of Omnidirectional Departures or Standard Instrument Departures (SIDs), to ensure their operations will remain safe for aircraft. To implement any new departure procedures, a sponsor would need to go through the airspace change process (as detailed in CAP 1616) to ensure that the best solution for the circumstances is proposed.

"Ahead of airports introducing permanent airspace changes CAP 1781 details a method of mitigation for continued use of conventional instrument flights"

CAN A SID BE REPLACED BY AN OMNIDIRECTIONAL DEPARTURE TO REMOVE A DEPENDENCY FROM A GROUND-BASED NAVAID?

Yes, an Omnidirectional Departure could be used to replace a SID, if it is an appropriate solution for the circumstances. As SIDs create a connected route between an aerodrome and an ATS route, it is recommended that a sponsor engage with the CAA to discuss the potential implications of replacing a SID with an Omnidirectional

Aerodromes are developing complementary plans as part of airspace modernisation in the UK

Departure.

To implement any new departure procedures, a sponsor would need to go through the airspace change process (as detailed in CAP 1616) to ensure that the best solution for the circumstances is proposed.

WHAT IS THE MECHANISM TO REDEFINE AN EXISTING INSTRUMENT FLIGHT PROCEDURE USING A DIFFERENT CONVENTIONAL NAVAID?

Aerodromes will have to contract an Instrument Flight Procedure Design Service Provider, (referred to as Approved Procedure Design Organisation [APDO] in the UK), to assess whether it is feasible to redefine the procedure using a different conventional navigation aid. If there is a negligeable impact at the aerodrome, we consider that a Periodic Review (as part of the IFP review process) may be used as the mechanism to amend the procedure.

WHAT HAPPENS IF AN AIRSPACE CHANGE PROPOSAL (ACP) OR OTHER MITIGATING ACTION CANNOT BE COMPLETED IN TIME TO REMOVE THE DEPENDENCY FROM THE NAVAID THAT IS BEING REMOVED?

In the letter to aerodromes affected by the DVOR rationalisation programme, NATS enroute Ltd. (NERL) indicated that they would have removed all enroute dependencies from the affected NAVAIDs by the end of 2022 and that they are willing to engage on potential service extension of these NAVAIDS through appropriate commercial arrangements. NERL highlighted that as many facilities are at, beyond, or reaching, their declared end of life any commercial arrangements outside of replacement would be limited to a 'reasonable endeavours' basis.

IS CAP 1781 AN ALTERNATIVE TO THE AIRSPACE CHANGE PROCESS (CAP 1616)?

No, CAP 1781 provides guidance to sponsors on what options there are to mitigate the removal of a NAVAID on which they have instrument flight procedures predicated. If a potential solution to remove the dependency from a NAVAID is one that requires a change to the published airspace design, a sponsor will need to either go through the IFP Periodic Review process or the CAP 1616 process to enable this change to be made. This includes proposals for RNAV Substitution which will be scaled as a Level 2C change in the CAP 1616 Airspace Change Process as the proposed change should not change aircraft behaviour or tracks over the ground.

WHAT NEEDS TO BE CONSIDERED WHEN LOOKING AT DEPENDENCIES ON A NAVAID?

"To implement any new departure procedures, a sponsor would need to go through the airspace change process"

An Impact Assessment will be required to assess the potential impacts of the removal of the NAVAID. Page 16 of CAP 1781 provides a summary of the materials that will need to be reviewed as part of the Impact Assessment of the removal of the NAVAID.

WHEN IS CAP 1926 GOING TO BE PUBLISHED?

This CAP is planned to be published before the end of January 2022 which will detail guidance to operators on the use of RNAV Substitution.

THE PROCEDURE WE ARE CONSIDERING FOR RNAV SUBSTITUTION PASSES THROUGH A NAVIGATION AID SCHEDULED TO BE DECOMMISSIONED AND NOT USED BY ANY OTHER AERODROME. CAN THE WAYPOINT BE RENAMED USING A 5LNC AS PART OF THE RNAV SUBSTITUTION PROCEDURE?

No, this is outside the scope of CAP1781 and another ACP will be required to amend the 3 letter code to 5LNC with a redesign of the IFPs based on PBN. ■

CAP 1781 provides guidance on what options there are to mitigate the removal of a NAVAID

WORDS CAA

SUSTAINING OUR FUTURE

THE CAA is creating a new Environmental Sustainability Panel. The panel will act as an expert 'critical friend' of the organisation and will provide technical advice to make sure environmental and sustainability interests are properly considered when the CAA is working to improve aviation's sustainability.

The CAA has begun an open application process to select members for the new panel. The panel's key activities include:

- Provision of expert technical advice to support the CAA's environmental roles, or on specific tasks as requested by the CAA
- Helping the CAA to understand and take account of environmental interests and impacts in its regulatory policy and framework.
- Supporting progress towards the CAA's strategic focus on improving environmental performance, including informing delivery of the CAA's forthcoming environmental sustainability strategy
- Providing advice or critique on research undertaken by the CAA, or helping identify where further research may be needed to inform the CAA's sustainability agenda

The CAA has a number of roles, one of which is to support the aviation industry as it looks to manage and reduce its negative environmental impacts, including emissions and noise. Following the Government's decision to wind down the Independent Commission on Civil Aviation Noise at the end of September 2021, the CAA is now also set to take on several new functions on noise by 1 April 2022.

Nic Stevenson, Head of Strategy for the Civil Aviation Authority said, "The Environmental Sustainability Panel will play an important role in helping us understand and address the important environmental issues facing aviation, including our new functions on noise.

"The success of this panel will depend on the quality of its membership, and through this recruitment process we hope to find panel members who are informed, in touch and expert. We look forward to working with the Panel members in a constructive and collegiate way."

The Panel, which will follow the model of the CAA's existing Consumer Panel. ■

The panel will address environmental issues such as noise

WORDS Malcolm Bird

MEMBERS WELCOME CAA BACKING FOR NEW GUIDE

The Maintenance Working Group has succeeded in introducing a Skyway Code for maintainence which is now in draft form

THE MAINTENANCE Working Group has reduced its meetings during the Covid times but we were delighted to hear that the CAA had decided to take on board our suggestion to create the equivalent to the Skyway Code but for Maintenance topics. This was last year and by the end of the year we were even more delighted to receive an early draft of such a document. Wonderful.

Pulling together all the various issues of maintenance organisations, authorised engineers, our links with EASA and the FAA, Maintenance Programmes, pre-purchase inspections, Owner-maintenance, etc. is no mean feat and yet it has been tackled and the signs are very encouraging. AOPA has provided a first round of feedback and we look forward to being involved as the document develops and gets ready for publication. So far a good big thumbs up to the CAA on this one.

PROJECT TEL

In the second half of last year a group of AOPA members with the support of Pooleys helped compile a comprehensive contact database for airfields in the UK, we identified contact points for 496 UK based airfields as an aid to the DfT as they issued surveys to gather information regarding fuel types available and the appetite for moving to unleaded fuels. AOPA is very grateful to the members who tackled this task which involved detective work in many cases, particularly at the large and small ends of the airfield size spectrum.

"Armed with a rather more comprehensive database ,we believe the DfT was able to gather a rather more representative sample"

However, armed with a rather more comprehensive database we believe the DfT was able to gather a rather more representative sample than they might otherwise have achieved.

In the meantime, AOPA continues to be keen to promote the use of unleaded fuels:

- Make unleaded aviation fuel more generally available and at an attractive price. Gain DfT support to encourage airfield installations, national fuel distribution and a temporary tax break.
- Make it easy for pilots to know whether their aircraft can use unleaded aviation fuel. eg placards by fuel filler caps and new information added to G-INFO to facilitate lookup.
- Encourage people buying new aircraft to only consider models that are clearly capable of running on unleaded fuel.
- Pursue the authorisation of a higher octane unleaded fuel for those aircraft not able to run on the current unleaded variants. A leading European contender is under trials and should be prioritised.
- Encourage the introduction of electric aircraft charging facilities widely at airfields.

It is interesting to note that in California, concerns about toxicity of using 100LL has caused several airfields to recently impose a ban on the storage and sale of 100LL on site. ■

AOPA members and Pooleys helped compile a comprehensive contact database for UK airfields

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WORDS John Walker

THE LATEST NEWS ON UK AIRFIELDS

Protestors have lost their campaign to save Coventry aerodrome with planning consent granted for an electric vehicle battery gigafactory

THERE ARE airfields across the UK currently under threat from developers and local councils. Here are the latest development, updated 14 January.

BOURN

Site earmarked for some 3,500 homes in 2031 Local Plan adopted by South Cambridgeshire District Council on 27 September 2018. The Council approved a planning application for the development on 19 February 2021 subject to the completion of prior conditions.

CAMBRIDGE

Marshall Aerospace and Defence Group will be vacating the aerodrome by 2030 and have signed an option to lease land at Cranfield. A final decision on a new location has not been made but it is expected that a planning application for the new facility will be submitted in autumn 2022. The aerodrome site has been put forward for a major housing development in the First Proposals for the new Greater Cambridge Local Plan issued for public consultation that ended on 13 December 2021.

CHALGROVE

Site included in South Oxfordshire District Council 2034 Local Plan adopted on 10 December 2020 for a 3,000-home development with a new runway for Martin-Baker Aircraft (MBA) operations for which development a planning application was submitted by Homes England (HE) the land owner. The application was withdrawn pending a review of the plans after the CAA recommended that the proposed development be discontinued as it was incompatible with MBA's current site operations. HE has stated that they will use their CPO powers if negotiations about the development with MBA (their tenant) are unsuccessful.

COVENTRY

Outline planning applications for an electric vehicle battery gigafactory on the aerodrome site were approved by Warwick District Council on 11 January 2022 and Coventry City Council on 13 January 2022. The proposed development will result in the closure of the aerodrome.

DEENETHORPE

Central Government has accepted the site for development as a 1,500 home Garden Village. East Northamptonshire Council (now part of the new North Northamptonshire Council) approved the site masterplan on 15 October 2018. A planning application for the development is awaited.

DUNSFOLD

Planning application for mixed use development with 1,800 homes on site approved by Waverley Borough Council on 14 December 2016 but called in for a public inquiry, the result of which was Central Government approval for the application on 29 March 2018. Protest groups appealed these decisions in the High Court but the court rejected these challenges on 5 November 2018. The development has now been granted Government Garden Village status. A public consultation on a draft Supplementary Planning Document for the development ended on 20 December 2021.

Dunsfold has been granted Government Garden Village status

ELVINGTON

York City Council draft Local Plan submitted for Public Examination on 25 May 2018 with public hearings commencing on 10 December 2019 includes a development of up to 3,330 homes occupying the middle section of the runway. Public consultation on major modifications to the Local Plan ended on 7 July 2021 and additional public hearings are scheduled for February to June 2022.

FAIROAKS

Land owner of part of the site has given notices to vacant by February 2022 to some hangar and aerodrome building tenants which action does not affect the operation of the taxiways and runway which are in separate ownership. Public consultation ended on 30 July 2018 on Surrey Heath Borough Council's draft Local Plan options document which states that for Chobham "Employment and Retail - Sets out that development at Fairoaks Airport should be guided by a development brief masterplan."

FENLAND

Due to the landowner's impending retirement and move abroad, the aerodrome is up for sale.

LONG MARSTON

Aerodrome is designated in Stratford-on-Avon District Council Local Plan adopted Core Strategy for housing and has Government Garden Village approval for which a planning application has been submitted. Developer is Cala Homes in conjunction with site owner. ■

WORDS Chris McGine

NEW ALERT OVER WAKE TURBULENCE

WAKE TURBULENCE separation minima are based on a grouping of aircraft types into categories, according to their maximum certificated take-off mass (MCTOM).

The United Kingdom conforms, in general, to the ICAO standards on wake turbulence. However, experience at those UK aerodromes where an air traffic control service is provided and wake turbulence separation minima are applied, has shown that certain modifications to the relationship between the MCTOM of an aircraft and the wake turbulence separation are advisable for the safety of operations.

The UK wake turbulence categories are detailed within Appendix B to the MATS Part 1 (CAP 493) and AIC Pink 'Wake Turbulence'. These wake turbulence categories are used in the application of wake turbulence separation minima as detailed within Section 1 Chapter 3 of the MATS Part 1 (CAP 493).

The CAA has developed a database that includes those aircraft types most commonly provided with air traffic services in the UK, their MCTOM, and their ICAO and UK wake turbulence categories.

• In 2019, the crash of a Diamond DA62 aircraft in Dubai was caused by wake turbulence from a landing Airbus A350, investigators said. Vortices drifted with the crosswind at about 4.5m/s and respectively reached the 30L approach path after 74 seconds and 87 seconds.■

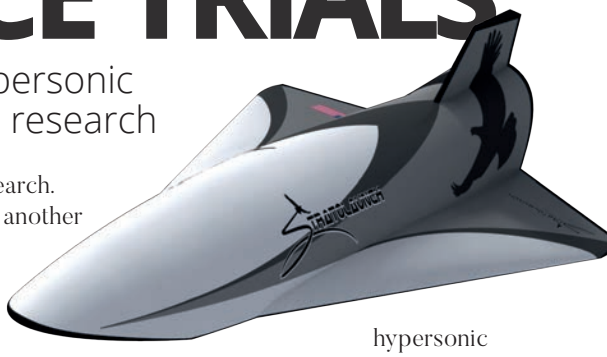
"The CAA has developed a database that includes those aircraft types most commonly provided with air traffic services"

Modifications to the relationship between an aircraft's MCTOM and wake turbulence separation are advisable for safety

AOPA NEWS

GIANT OF THE SKIES WILL LAUNCH DEFENCE TRIALS

The six-engined workhorse is designed to launch hypersonic rocket-powered vehicles for military and commercial research



STAY AWAY from the centre line... not words you normally hear in the cockpit but when pilots flying the world's largest aircraft from one of its two fuselages, they train on the sim to offset the airplane to the right side of the runway.

Stratolaunch's Roc, which incorporates parts from two Boeing 747 jumbo jets and has a world-record wingspan of 385 feet. It completed a successful test flight at California's Mojave Air & Space Port, reached a maximum altitude of 23,500 feet and a an indicated air speed of 180 kts, Stratolaunch said.

"Aircraft is made of two Boeing 747s and has a record wingspan of 385 feet"

The six-engined Roc - named after a mythical giant bird - is designed to launch hypersonic test vehicles for military and commercial research.

The flight was another step towards preparing the mammoth aircraft to support launches of its upcoming hypersonic testbed vehicle, Talon-A. Launched from the Roc carrier aircraft, Talon-A vehicles are rocket-powered, autonomous, reusable testbeds carrying customisable payloads at speeds above Mach 5. This capability enables routine access to the hypersonic flight environment, which is critical for scientific research, technological development and component demonstration.

Hypersonic flight has become a national security priority in the US, amid development of hypersonic weapons by Russia and China that could evade American defences. ■

Hpersonic flight has become a national security pri ority in the US

NEW PILOTS JOIN MOST ELITE FLYING CLUB IN THE WORLD

Three new pilots have joined the Royal Air Force Aerobatic Team for its 2022 season.

They will fly with the Red Arrows in a year which will see the team perform across the United Kingdom and beyond.

Squadron Leader Graeme Muscat and Flight Lieutenants Stuart Roberts and Patrick Kershaw have begun preparations for the team's 58th display season.

Each is an experienced RAF officer, having all previously flown Typhoon or Tornado aircraft operationally.

One of the key criteria needed before an RAF fast-jet pilot can apply to be selected for the Red Arrows is to have completed frontline tours such as these. A Red Arrows display season traditionally starts around May and spans the summer months and early-autumn, with the team performing more than 60 times to millions of people. ■

The Red Arrows display season is expected to start around May

HUDSON CRASH SURVIVOR'S MILLON-DOLLAR THANK YOU

AN aviation museum will reopen its doors with a new name honouring Captain Chesley 'Sully' Sullenburger.

The pilot became a household name in January 2009 when he and first officer Jeffrey Skiles safely landed US Airways Flight 1549 in the Hudson River in New York with 155 passengers and crew.

The aircraft's engines suffered catastrophic failure and in-flight shutdown following a series of bird strikes, forcing the flight to ditch in the river.

One of the passengers on board the flight to Charlotte, North Carolina was Ric Elias who has donated $1m towards the new museum citing his gratitude for a second chance of life.

The museum will stage a permanent exhibition honouring Captain Sully and the crew. The salvaged airframe was transported by lorry on a seven-day journey and has been reassembled.

"The landing gear pins, fire axe and manuals were still in the cockpit and Coke cans still on the drinks trolley"

It was on display from 2011 to 2019 in the same configuration as it was when it was pulled out of the river in January 2009.

The airframe is being conserved as opposed to restored with dents from the birds and tugboats. In addition to the airframe, Captain Sully and First Officer Skiles have donated their uniforms to the museum's Flight 1549 exhibition. Virtually everything except the passengers' personal belongings are still in the aircraft.

The gear pins, fire axe and flight manuals were still in the cockpit and Coke cans still on the drinks trolley.

With the museum set top reopen next year, it appears that while Flight 1549 did make it to Charlotte but not by the usual means.

As for Captain Sully, he and his crew received international praise. He is now working with the US Mission to ICAO (USICAO) which is focused on the safety, security and sustainability of civil aviation. ■

AOPA NEWS HIGHLIGHTS

A paraplegic pilot has become the first to earn a type-rating in a Cirrus SF50 Vision Jet. Clayton Smeltz lost the use of his legs when he was just 16 months old in a vehicle accident and earned his private certificate in a Cherokee 10 years ago.

He earned his type-rating in the jet using hand controls to manipulate the pedals and other controls.

"I feel like I just cheated being disabled! As a boy I dreamed of being a jet pilot but of course that would never happen.

"Now, after a year in the making, we've developed adaptive controls that allow the jet to be flown by hand!!," he tweeted, after completing the life-changing ride.

United Arab Emirates investigators have disclosed that an Air Arabia Airbus A320 lifted off beyond the end of a Sharjah runway, after the captain opted to continue a take-off, despite the jet's turning onto the wrong runway for departure.

It has a BMW petrol engine, four wheels and a C of A...the two-seat AirCar is powered by a 160bhp 1.6-litre BMW engine. It can fly at up to 8,200ft and cruise at 118mph. A new version with a more powerful engine is in the works too.

That should allow for 186mph cruising and will be certified in 12 months. The wings and tail fold away automatically for road driving, which is handy if you plan to park it on the drive.

Board the eVTOL taxi for the airport and beat the jams

AVIATION EXPERTS WILL KEEP AIR TAXIS ON TRACK

With eVTOL aircraft predicted to be in regular serice within five years, a safety panel is working with the CAA to oversee the future of exciting new technology

WITH ELECTRIC vertical take-off and landing aircraft expected to launch commercial operations in the UK within five years, eVTOL industry leaders have joined the CAA in a consortium to tackle safety challenges.

The eVTOL Safety Leadership Group (eVSLG) consortium includes potential operators, existing rotorcraft experts and aviation companies, including the Bristow Helicopters and Virgin Atlantic, as well as eVTOL manufacturers such as Joby and Vertical Aerospace.

While eVTOL aircraft are not yet in operation, these vehicles have the potential to launch commercially in the UK by 2027.

In order to begin operations and receive regulatory approval, any aircraft needs to stand up to the strictest standards of aviation safety.

The group is co-chaired by the Head of the UK Civil Aviation Authority's Rapid Capabilities Office, Rick Newson, and Matt Rhodes from Bristow Helicopters who is also co-Chair of the Offshore Helicopter Safety Leadership Group.

Mr Newson said: "The formation of the eVSLG consortium is a significant milestone toward a future of eVTOL aircraft and drone taxis becoming a reality in UK airspace.

"With commercial operations potentially starting in the next five years, it is vital that a strong safety culture is built into the heart of eVTOL operations."

"The formation of the eVSLG consortium is a significant milestone toward s a future of eVTOL aircraft"

• Skyports, the world-leading designer, developer and operator of vertiports for electric vertical take-off and landing (eVTOL) aircraft, has announced its acquisition of a heliport, previously known as the Falcon Heliport, which is located in East London and only minutes away from Canary Wharf financial district. It is one of only two operational heliports in London.

The deal forms part of Skyports' acquisition strategy in securing, developing and operating a network of vertiports to enable the transition to emission-free aviation in the UK. Skyports foresees the launch of fully-electric commercial air taxis in the UK within the next few years and the heliport site will form an integral part of Skyports' ground infrastructure network.

Passengers travelling from Canary Wharf will be able to hop on an eVTOL and reach all of London's airports within 20 minutes, or fly to Bristol in under 50 minutes. ■

HONOURS LIST RECOGNISES SENIOR FIGURES IN AVIATION

Senior figures in the transport sector were recognised in the Queen's New Year's Honours List.

The CBE was awarded to: Gareth Neil Davies, Director General, Aviation, Maritime, International and Security Group, Department for Transport for Public Service (London, Greater London)

The MBE was awarded to: Matthew Bolshaw, Member, Secretariat for the General Aviation, All-Party Parliamentary Group for services to Aviation Safety (Letchmore Heath, Hertfordshire)

Phillip Dawe, Team Leader, Sir Keith Park Building Restoration Project, RAF Northolt for voluntary service to Military Aviation Heritage (London, Greater London)

Thomas Dunn, founder and chairman, Aeros Holdings Ltd. for services to Aviation (Henley in Arden, Warwickshire)

Joanna Salter, Pilot and Aviation Ambassador, Department for Transport for services to Aviation (London, Greater London) ■

SURFACE WORK ON RUNWAYS

CONSTRUCTION work has started at Gloucestershire Airport to resurface runways, replace lighting and upgrade signage and drainage. The project also includes the installation of below ground infrastructure in readiness for a new radar system.

One of the airport's three runways will remain open while works are carried out, albeit operating at reduced capacity. When all work is complete, the airport's existing 'north/south' runway will permanently close to make way for the development of the new business park, CGX Connect. Phase one works, which started in November 2021, will see the crosswind runway resurfaced.

Phases two and three will follow in Spring 2022, with work taking place during the day and throughout the night to ensure work is completed as quickly as possible. This phase will see the resurfacing of the main runway, new runway lighting installed, upgrades to signage and drainage, and the installation of below ground infrastructure.

Phase four will be the testing and commissioning phase of the project in readiness for anticipated completion and resumption of normal operations by Summer 2022.

Gloucestershire Airport Managing Director. Karen Taylor said: "To reduce disruption during phase one, we plan to work on the crosswind runway at night." ■

Airport managing director Karen Taylor aims to keep disruption to minimum during works

AOPA NEWS HIGHLIGHTS

Enstrom Helicopter Corporation has delivered its final helicopters following bankruptcy. Technical support has also ended.

Founded in 1959, Enstrom designs and produces light single-engine helicopters for various missions including helicopter training, police and wildlife patrol, aerial photography and tours, ag spray and livestock management, and personal transportation.

Rolls-Royce has announced the all-electric *Spirit of Innovation* aircraft is officially the world's fastest all-electric aircraft, having set two new world records which have now been confirmed.

The aircraft reached 555.9 km/h (345.4 mph) over 3 kilometres and 532.1km/h (330 mph) over 15 kilometres – 292.8km/h (182 mph) faster than the previous record. Both records have been verified by the Fédération Aéronautique Internationale (FAI).

EASA has refused to lift the ban imposed on Pakistan International Airlines from flying to the UK and European countries.

EASA suspended the authorisation for PIA to operate for six months then indefinitely in the wake of the PK8303 crash in Karachi two years ago. It also emerged that many PIA pilots had "dubious" licences with many crew members having paid others yo take flying exams for them.

BACK TO BASE... SPIRITUAL HOME OF THE SPITFIRE IS HOST TO RARE REUNION

Private owners answer call to hand over their aircraft for 12-strong exhibition at Duxford, the historic airfield where first RAF squadron received the warbird

A COLLECTION of 12 Spitfires has been brought together at Duxford's historic airfield, the spiritual home of the iconic warbird and the base from which the first RAF squadron received the aircraft in 1938. Evolution Of A Icon includes 12 Spitfires of varying marks and demonstrates how the aircraft evolved during the Second World War to keep pace with German aircraft development. The Imperial War Museum's exhibition will be accompanied by a programme of tours, talks, events and family activities which will delve deeper into the Spitfire's history.

Alongside IWM's own iconic Mk Ia Spitfire – one of few remaining airworthy Spitfires to have seen conflict in the Second World War – there will also be Mk V, Mk IX and Mk XIV among the most noteworthy. Visitors will also find information about each aircraft and how the Spitfire cemented its place in history as one of the greatest fighter aircraft of all time. This exhibition has been made possible thanks to a number of private owners who have loaned their Spitfire to IWM for the duration of the exhibit.

Curator Adrian Kerrison, said, "The Spitfire captured the hearts of the home front to such an extent that members of the public from across Britain and the Commonwealth would dig deep into their own pockets to fund their production, and the love for them has not subsided since they were first produced."

Spitfire: Evolution of An Icon will be open to general admission visitors to IWM Duxford until February 20. ■

Evolution of An Icon: brings together 12 much-loved Spitfires of different marks at Duxford

ZARA BECOMES THE YOUNGEST WOMAN TO AROUND THE WORLD SOLO AT JUST 19

WHEN pilot Zara Rutherford touched down after her round-the-world flight, she landed in the record books.

The 19-year-old British-Belgian pilot is now the youngest woman to fly solo around the world and the youngest ever to circumnavigate the globe in a microlight. Her epic 32,000-mile flight was expected to last for around three months, But bad weather and pandemic restrictions meant she ultimately flew through 41 countries.

Zara promoted two charities during her global charities Girls Who Code, which supports young women studying computer science and Dreams Soar, which campaigns for girls in the field of science, technology, engineering and maths. Having tackled the globe, she is looking to the skies for her next inspiration as space beckons.

"Having tackled the globe, she is looking to the skies for her next inspiration as space beckons"

Full story on p34

AMERICAN MADE GROUND POWER SOLUTIONS

With more than 70 products to choose from, we have mobile and portable ground power solutions to meet all of your engine starting and maintenance needs.

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WORD AND IMAGES Martin Leusby

FLYING THROUGH THE PANDEMIC

Pilot Martin Leusby is the proud owner of what is probably the best performing 172 in the UK and that's where you'll find him most days

THE THIRD UK lockdown commenced on January 3 2021, and it was already a month since I'd flown as Rochester is often waterlogged in winter.

As soon as the airfield allowed, I could get aloft for my engine health flight, as allowed by the restrictions and fortunately Mr Lycoming said it had to be at least an hour every 28 days. Southend Airport (with not much else to do) generously allowed people to come and do five touch and goes for the princely sum of £5 – it all fitted together perfectly.

We were then restricted to just Engine Health time or flights to maintenance facilities until aviation opened up again on March 29, unless flying for work purposes. Fortunately, as I fly for Air Search on behalf of Kent Voluntary Services Emergency Group, they had some necessary jobs to be done - photographing the new Inland Border Facilities being constructed near Ashford, M20 Junctions including the new junction for the site, and a potential location for a Covid reception area. Naturally, I didn't want to rush the work, so it took three separate flying days to achieve, before I could do my next health flight again assisted by Southend's offer. Then we were free!

Although still restricted to solo for some time, some longer flights were called for and Goodwood, Sleap, Sandown, Holmbeck Farm, Llanbedr, Turweston, Middlezoy, Lower Withial Farm, Wing Farm and Sandown again (Dan has got a great pizza oven!) all went into the logbook in April. Importantly three were new places and therefore helped me edge nearer towards my target of landing on 500 airfields. I particularly enjoy unusual strips and often find some real gems. At Middlezoy there was a Fairchild Argus being restored (reputedly for

"Longer flights were called for and new places helped me edge nearer towards my target of landing on 500 airfields"

Adobe Stock

'There was a delightful fly-in at Branscombe supposed to be limited to 60 aircraft but I'm certain there were more'

U2 pilot who had bought it unseen), and Wing Farm was completely deserted except for a beautiful Tiger Moth left in the open with a leather flying helmet hung on the rear cabin.

While Sandown has become one of the best places to visit (they even have a small museum with a Bulldog painted up as the prototype), don't forget Beccles who have also invested in some stylish accommodation and a new tarmac runway – and some food that is outstanding value – I'd highly recommend the Fish Platter! So the month of May brought me to Beccles, Shipdham (who knew the Kaiser kept his aircraft there?), Earls Colne, my old stomping ground Wellesbourne, and a new annual for Delta India at Thurrock.

June brought more new strips including Sittles Farm (where the residents have to push their aircraft across a country road to reach the hangars), and Whitwell (a smashing 400m strip on the Isle of Wight that I never knew existed – I had already landed on the strip at Binfield where the NHS drones delivered their goods, the previous year). Bembridge, Beccles (again), Turweston, Wellesbourne to renew my IR(R) and a very soggy parking area at Hinderclay Meadows Fly-in all featured.

Fortunately, I didn't need the tractor to pull me out as did the Beech Duchess. Among the Air Search type of work was locating a downed microlight – found near Cooling Castle, and fortunately there were no serious injuries.

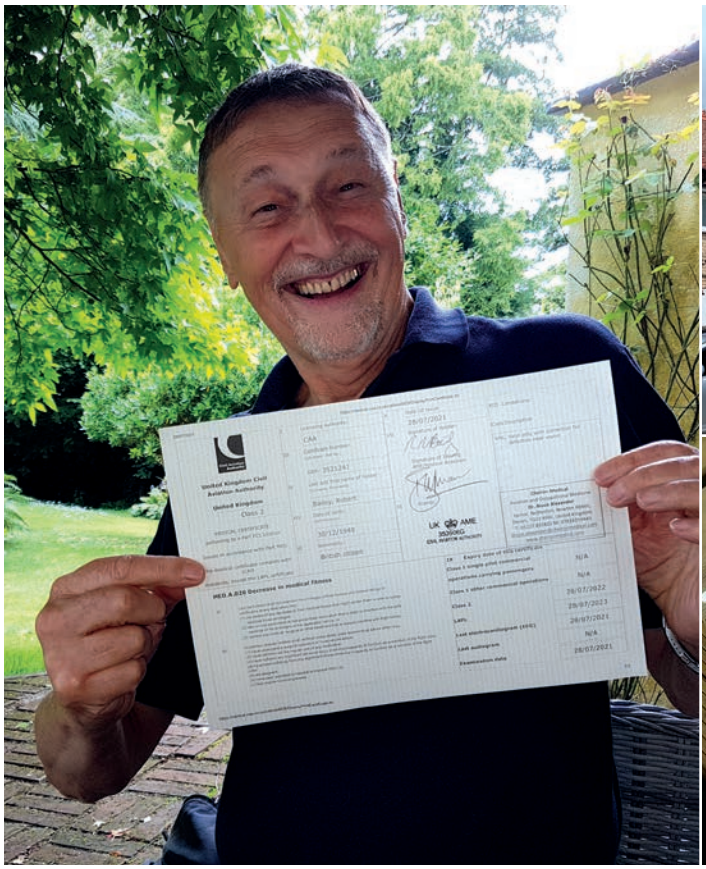
Fowlmere has a billiard-table smooth runway, and it's a short walk to the 15th Century Chequers Inn (another great menu) and was a perfect venue for a Rochester July fly-out.

Normally we'd go to Boxted at this time of year, but lorries had chewed up the runway, so the fly-in transferred to Monewden, and there was an appropriate logbook stamp, to be had. Another fish platter was consumed at Beccles, but then there was a delightful fly-in at Branscombe, Devon supposed to be limited to 60 aircraft but I'm certain there were more.

"Among the Air Search work was locating a downed microlight – found near Cooling Castle and fortunately there were no serious injuries"

One difficulty caused by the pandemic had been the inability to visit AMEs and renew medicals. Most of us could get around the problem by self-declaring and flying on a PMD, but that isn't allowed if flying an N-reg aircraft in UK. Before the end of July, I flew three of us (Air Search members) to Dunkeswell to visit our favourite AME in nearby Newton Abbot. The delight can be seen on Bob's face when he finally had the paperwork so he could fly his beloved Liberty XL again! The other recipient was somewhat less respectful on our return to the aircraft. A good July was rounded off with the ***Flyer*** magazine fly-in at Sleap.

August brought an Air Search meeting at Headcorn to spruce up our Minimax fuselage ready



1: With AME visits hampered by the pandemic, we piled into Delta India for a visit to renew medicals which pleased Bob
2: The runway at Fowlmere is like a billiard table but the real bonus is the short walk to the 15th century Chequers Inn
3: If only every landing was followed by a hearty lunch, personally I would recommend the fish platter every time

With an uprated 172 from 145HP to 180HP and a performance prop, Delta India is a joy to fly

Beer Head on the Jurassic Coast makes for some fantastic flying

for exhibition at the Kent Police Open Day, a Rochester fly-out to historic RAF Upavon, and an open day at Monewden, but the highlight of the month was a second invitation to fly into Brooklands Air Day. In 2019 the grass area between Mercedes World and the Museum was in pretty good condition, but this year much less so as Mercedes had been running vehicles up and down it. It's a challenging strip at the best of times, and if you go to https://youtu.be/wYrdurTxsYs you can watch the result (many thanks to www.andysvideo.com for letting me clip his sequences to go with those of my passenger – full videos of the events can be seen on that site).

By September my buddy Rob (Rochester Arrow pilot) had been researching disused wartime RAF stations that might have a little usable concrete left, and after negotiation with owners we landed on RAF Thorpe Abbots to visit the nearby control tower museum and then RAF Hardwick. Sywell held the 75th Anniversary LAA Rally, and Booker (High Wycombe) the Private Flyer Show – all went into the book alongside Kittyhawk (the one near the South Coast), and Lasham. Normally not GA friendly, as they are so busy with gliders, we organised a Rochester fly-out to there to visit the Heritage Gliding Centre and had a wonderful reception, and who knew that gliders could be so interesting? Quirky airfield rules as you are not allowed to use the fabulous runway and must land on the grass in front of their clubhouse! Another Sandown pizza (Dan had now been awarded the Pooley Sword by AOPA as best UK airfield) and we rolled into October.

Compton Abbas, a now compulsory Sandown, Popham and Fenland all featured, but one new adventure was St Athan (ex-RAF and now controlled by Cardiff) – my first

"After negotiation with owners, we landed on RAF Thorpe Abbots to visit the nearby control tower museum"

venture outside England since lockdown. The engineering organisation there is restoring an eclectic collection of all types, including Gnat, Harrier, Strikemaster, Pembroke, and even an Australian Pilatus PC-9. I'd never seen a workshop full of so many interesting types. Another visit needs to be arranged to also take in the museum on the other side of the airfield. A local (to me) strip owner welcomed me into Fridd Farm to round off the month.

November days were getting shorter and to keep up the impetus, I had to find reasonably close strips and having been to most nearby, had to worm my way into some microlight venues. All of them needed to be reassured that I could get in and out okay and comply with their noise abatement procedures. One day I found myself with audiences at both Sandy and Willingale (ex-RAF Chipping Ongar, but no concrete left) they were 365m and 360m

1: Wing Farm was completely deserted except for a Tiger Moth left in the open with a leather flying helmet hung on the rear
2: Circuits at Fowlmere are always to the north of the field to avoid conflict with circuits at Duxford, which fly to the south
3: Neat parking at Branscombe as the fly-in attracted many pilots; camping facilities add to the area's popularity with trippers

respectively, but I only need about 130m to get out so didn't disappoint anyone (or did I?). Clench Common in Wiltshire was a little further and had nearly 400m. We also reached Enstone, which is unusual in that there are three parallel runways with different operators, so best to ensure you have PPR'd with where you intend to land. If you choose the northern grass, you can taxi to Enstone Flying Club where they have a superb Spitfire simulator with full surround screen and sound – and guns! There's a dogfight programme on the computer, so if you've ever wanted to down an ME109.....

Other stuff that happened in the month included the "Passing Out Parade" of Air Search members who had become Community Policing Volunteers (Aviation), when regalia, certificates and documents were handed out by Matthew Scott, the PCC. Not long after, I witnessed the lowest flying aircraft ever over my house. For some reason a Hercules did a figure of eight over me at a GPS height of 275 feet – my house is 220 feet according to my Skyecho/Skydemon, and I was in an upstairs bedroom to watch his second pass – and ducked! His trace on www.adsbexchange.com showed him down as low as 100 feet near Ashford – what fun!

With the year drawing to a close, Rochester began to be sodden halfway through December, but not before some quick visits to Peterborough Conington, North Weald, Leicester and Halfpenny Green. Knowing I would not fly again in the month, I updated my Moving Annual Total of Flying Hours (I'm a bit of a nerd) and was gratified to see I'd managed to creep up to 100 hours for 2021. As soon as Rochester dries out, it all starts again!

As I write, in the next few weeks reconstruction of Rochester Airport should be complete, with new tower, café, briefing rooms, schools, refurbished and new hangars including one for the Medway Aircraft Preservation Society. There's a lot to look forward to, and we await the next attempt to get a hard runway!

"For some reason a Hercules did a figure of eight over me at 275 feet – my house is 220 feet. I was in an upstairs bedroom to watch his second pass – and ducked"

EDITOR'S NOTE: From excited 16-year-olds queuing to fly their first circuit to the charming veterans I encountered at a Bembridge Fly-in, there's no doubt that flyers come in all ages and sizes.

But the one standout characteristic they share is an unbridled and relentless enthusiasm for aviation.

Martin Leusby, who compiled this travelog, has it in spades and has written a charming book about his flying life. It's a brilliant read and well worth a go..

Pilots Progress can be bought from martinleusby@outlook.com priced £7.50 plus £1.50 postage.■

1: Surveying the M20 junction near Ashford, part of rewarding Air Search work for Kent Voluntary Services Emergency Group
2: Pride on show at the 'passing out parade' of Air Search members appointed as Community Policing Volunteers (Aviation)
3: The former RAF base at Shipdham was the first US heavy bomber base in Norfolk, who knew the kaiser hangared here?

I could get aloft for my engine health flight as allowed by the restrictions

WORDS Nick Wilcock **IMAGES** Shutterstock

GETTING THE BALANCE RIGHT

With more opportunies to fly coming our way, become expert in your aircraft's performance to stay within the limits

MY INTRODUCTION to the world of light aircraft flight instruction came when I was serving at the University of London Air Squadron, the RAF's premier UAS, at RAF Abingdon. We used the excellent Scottish Aviation Bulldog and operated from nice long tarmac runways. The Bulldog had quite decent performance even with two chunky occupants and full tanks, so take-off performance was never really much of an issue, even in the few days the UK thinks of as summer.

After I'd obtained my R/BCPL/FI rating through the CAA crediting system which was available to RAF QFIs in those days, I applied to instruct for the flying club at a nearby RAF aerodrome, which operated the PA28 Warrior II and Cherokee 140C from a 10,000ft tarmac runway. My only previous experience of the PA28 had been 23 years earlier at Weston-super Mare aerodrome; it had seemed much bigger than the Cessna 150 on which I obtained my PPL,

"We used the excellent Scottish Aviation Bulldog and operated from nice long tarmac runways"

but I did recall that flying it with three on board and ¾ tanks had resulted in one landing being a bit firmer than I'd expected, but that was about all. My PA28 FI conversion consisted of a trip to the maintenance aerodrome and back in the Warrior, then another trip in the Cherokee a few days later. 'Standardisation' consisted of "Just teach the way you did in the Bulldog" and that was it.

My first day instructing came some 10 days later, involving slow flight, stalling and circuits in the Cherokee. RAF Benson was happy to take me for circuits as the resident UASs were on block summer leave, so the aerodrome was very quiet. I'd been told to take a couple of students, neither of whom was exactly 'petite', but that didn't seem an issue to me – I'd do the slow flight and stalling with the first chap, then some circuit work before landing, switching students and doing some circuits with the other one. "Oh – and pop into Oxford to fill it up on the way home, would you", were the CFIs parting words as I walked to the aircraft.

"Blissfully unaware of the effect a hot day, full tanks and 3 adults would have, I summoned full noise from the mighty Lycoming and set off."

All went well for both students, the refuelling was done pretty quickly and it was time to set off home. In those days, Oxford had RW27, an 880m grass runway, which was the one which the wind was favouring. Blissfully unaware of the effect a hot day, full tanks and 3 adults would have, I summoned full noise from the mighty Lycoming and set off. Acceleration was somewhat pedestrian and we were still on the ground as we crossed RW 01/19, before eventually struggling into the sky. Querying this with the CFI when I got back, he said "Oh, sorry – I thought you realised that I meant 'tabs' fuel!" I'd no idea what that meant, until he showed me, so then I thought that I'd better look into the mass and balance and performance graphs before flying in limiting conditions again.

Which brings me to the point of this article. It is absolutely essential that pilots are aware of not just the mass and balance limits of their aircraft, but also the take-off and landing performance values and how these are affected by wind, temperature, atmospheric pressure, aerodrome elevation, runway slope and runway surface. To which I would add the nature of terrain in the immediate vicinity of the aerodrome.

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MASS AND BALANCE

Although you might find various 'apps' appearing on sale for working out the total mass and CG for your aircraft, the only definitive source is the graph published in the aeroplane POH. Be careful not to confuse metric, imperial and US units! You'll probably be sold fuel in litres, but will need to convert the volume into mass for the mass and balance calculation and there are a few gotchas to be had if you confuse density and specific gravity, particularly when using US gallons. Just remember that there are 3.7854 litres to a US gallon, which has a mass of approximately 6.0 lb when using 100LL or UL91. If you find that your total mass or CG would be outside the envelope shown in the POH, it is essential that you take the necessary action to rectify the situation. Defuelling is not normal an easy option, so to avoid disappointed passengers, if your aeroplane is operated by others I recommend that you instigate a prudent refuelling policy within the group. For example, if your group owns a Cherokee 140 which hasn't been too laden down with extra toys, if at the end of the day you refuel to 'tab' level on one side and 'full' the other, you'll probably be just within mass and balance limits to fly it the next day with 3 PoB, assuming that they're no more than 80 kg each and have no luggage. You won't notice any asymmetry, particularly if the 3rd occupant sits on the 'tab' side. I read somewhere recently that a pilot on a CAA test had been refused the examiner's weight; not only was that inexcusable but it also put the candidate under unreasonable stress. Anyone who refuses to give you their weight when they're going flying in your aeroplane stays firmly on the ground, in my book, no matter who they might be!

I recommend CAA Safety Sense Leaflet 09 and the excellent SkyWay Code for further reading on the topic of mass and balance; see the link at the end of this article.

PERFORMANCE

When I was learning to fly the VC10, as part of the course we had a fortnight of hell, graphs and exams being taught all about scheduled aircraft performance. Planning a flight from take-off to destination could involve a number of limiting factors; as well as the take-off distance available, landing distance available and en-route obstacle clearance in the event of an engine failure all had to be considered.

"Anyone who refuses to give you their weight when they're going flying in your aeroplane stays firmly on the ground"

For single-engined light aeroplanes things are rather simpler, but no less important. Usually it is the take-off distance available which is the limiting factor, but if you're intending to land somewhere on short, wet grass you could perhaps find that more limiting.

Once again the POH is the bible to use and any 'app' you might be tempted to use will be unofficial unless the manufacturer has approved its use. The CAA has another excellent Safety Sense Leaflet on this topic, SSL 07C.

There are a few general points to be made when using the POH graphs. Firstly, make sure that the graph you're using is the correct one for the variant and configuration you intend to use. Not just flap setting and assumed technique, but also the type of propeller fitted.

Some aeroplanes may have been fitted with coarse pitch 'cruise' propellers; not only will they probably not be the same as the type fitted when the POH graphs were originally drawn up, they can also have a significantly deleterious effect on acceleration during take-off.

Even if the propeller is of the same type, the condition of both engine and propeller may have deteriorated over the years.

For this reason, the CAA advise the use of a 1.33 safety factor when calculating take-off distance required, once all other calculations have been completed. SSL 07C and probably also the aeroplane POH provide the factors to be applied for runway condition, elevation and slope and atmospheric conditions to which pilots should always refer, rather than trying to commit them to memory.

When using the POH ensure any CAA Change Sheets or Supplements have been included

TO FLAP OR NOT TO FLAP, THAT IS THE QUESTION

Not all POH include performance information for 'short field' take-off or landings. For example, nothing official has been published for take-off with flap for the Cherokee 140. Most of us know that use of some flap will reduce the take-off ground roll, but cannot quantify the actual benefit. My original brief when I first flew the Cherokee was to use 10° flap, for take-off, but there was nothing in the POH when I was instructing to substantiate this. If you elect to use anything other than the criteria stated for the POH graphs, you're on your own!

HE GOT IT IN, BUT COULD I GET IT OUT?

Some years ago, one of our flying club members was conducting a solo PFL. When he tried his final engine response check, nothing happened. So he applied what he'd been taught and converted his PFL into a well-executed actual forced landing, then rang me to tell me what had happened. I drove to the site, to find the aeroplane sitting totally undamaged in the field he'd used. Although there was nothing immediately obvious to indicate the cause of the failure, we resisted the temptation to try to start the engine and went to find the farmer. A genial son of the soil, he told us that he and 'Pup', his rather impressive Rottweiler, would happily keep watch on the aeroplane whilst we decided what to do. After a check over by our LAEs, it was thought that there might have been an obstruction in the carburettor air intake filter, which they changed before running the engine and passing it fit in wind and limb.

So now came the question of getting the aircraft out of the field. Could we take-off, or would we have to recover it by truck with the wings off? Time was of the essence as the weather was due to turn nasty and the wind was forecast to back to an unfavourable direction. Nevertheless, after an hour or so spent poring over the POH and a chat with the met man, I'd calculated the take-off distance required for the expected conditions. Although the field had recently been mowed and had a beneficial downhill slope, at the far end it fell away into a small valley. It looked quite doable, so over we went to meet the farmer and 'Pup' before I paced out the take-off distance available. That was greater than the calculated TODR, so I was soon taxying to the very edge of the field before lining up for take-off.

Acceleration was entirely normal and I'd also remembered the rule of thumb of achieving 2/3 of the rotate speed by half the available distance, so was looking for 48 mph by halfway. But the rattling and bouncing on the field surface made the ASI needle rather unsteady and the downhill section was rapidly approaching. So down with one click of flap before some gentle back pressure had me safely airborne, albeit slightly further down the field than I'd anticipated and with a nagging flicker or two from the stall warning light. Which was something of a surprise as I'd been very careful with my calculations and the aircraft had a good engine and propeller, so why had it taken longer to become airborne than expected?

The probable answer came a week later. We received a CAA Supplement advising that, for this particular model of Cherokee, the POH figures are 10 percent in error! Which is something else described in SSL 07C; when using the POH make sure that any CAA Change Sheets or Supplements have been included.

When Nick was learning to fly the VC10, his course was a fortnight of hell, graphs and exams

"Although there was nothing immediately obvious to indicate the cause of the failure, we resisted the temptation to try to start the engine and went to find the farmer"

IN CONCLUSION

With the days beginning to get lighter and opportunities for touring hopefully increasing, it's worth reminding yourself about mass, balance and performance calculations, particularly when visiting an unfamiliar aerodrome. There have been quite a few far too many accidents caused by light aircraft either being overloaded or attempting to take-off from runways which weren't long enough. Remember that 'Prior Planning Prevents Poor Performance', so spend a little time checking your figures before flight and don't become an accident statistic! ■

The Shark is capable of 162kt out of 100hp which makes it one of the fastest in its category

WORDS Dave Hirschman **IMAGES** FlyZolo

The sharp Shark

Zara Rutherford is rightly being lauded for her epic round-the-world flight, **so what's her Shark like to fly?**

AS IT'S A tandem rather than the more common side-by-side two-seater, the Shark is, perhaps, a little more unusual than some other new machines coming onto the market.

First of all this is a 600kg microlight/ultralight (for those unfamiliar with what that means, the CAA brought in new regulations last year raising the weight limit and stalling speed for single and two-seat factory-built light aircraft to 600kg, 650kg for amphibians or floatplanes).

It's built by Czech-Slovak manufacturer Shark.Aero and has a glass and carbon-fibre/epoxy airframe, with a PVC foam and aramid honeycomb core in sandwich panels. The wing has a carbon-fibre main spar and an auxiliary spar carrying the flap levers and aileron hinges; 60 percent of the trailing edge is occupied by powerful, single-slotted flaps. The wings and horizontal tail can be detached quickly for transportation or storage.

The interior has integrated armrests and seatbacks with sidesticks on the right and throttles and flap levers on the left; the trim is controlled by electric switch on the sidestick and there's a 'glass' panel with standard EFIS/EMS displays for both pilots, plus classic fuel gauges and secondary airspeed indicators and altimeters, a transceiver, transponder and GPS.

The single-piece cockpit canopy opens upwards to the right, supported by gas struts. As you'd expect, baggage space is aft of the seats.

The landing gear is retractable

and this is quite a 'slippery' aircraft (more on that later) capable of 162kt out of 100hp, making it one of the fastest in its category; it holds two FAI world speed records unbeaten for ten years. Maximum range is just over 2,000 miles and endurance is up to 12 hours.

From the cooling "gills" on the side of its engine cowl to the highly swept and pointy vertical tail, the Shark has design elements to fit its name. But the diminutive airplane hardly seems like a fearsome predator.

The trailing-link main landing gear looks particularly forgiving, and the wide chord of its low wings seems designed to tolerate a broad range of loads that can shift the airplane's centre of gravity fore and aft.

The 100hp Rotax 912 ULS engine is a thoroughly known quantity. The Italian-made FP Propeller is a variable-pitch, composite model that the pilot treats as if it were a fixed-pitch prop. There's no separate propeller control, and blade pitch adjusts automatically for optimum engine rpm during take-off, climb, cruise and descent.

The pilot occupies the front seat when flying solo, but the rear seat has a full set of dual controls and a primary flight display that's cleverly attached to the canopy frame.

The wing is so low to the ground that it's easy to step directly onto the wing walk. Climbing into the cockpit is a simple matter of swinging a leg over the side rail, then lowering yourself into the carbon-fibre seat. Once buckled into the four-point harness, the side-hinged canopy folds over and latches securely into position. A sliding window on the left side of the canopy supplies ventilation on the ground.

"The pilot sits in the front seat when flying solo, but the rear seat has a full set of dual controls and a primary flight display"

The seat is incredibly comfortable and the Kevlar cockpit is surprisingly roomy. The rudder pedals are adjustable and the sidestick control with the hat-style trim switch falls neatly into my right hand, as does the left-hand throttle.

Engine start is normal for a Rotax. Just turn on the electrical master, fuel pump, and dual electronic ignitions, then press the start button. There's no mixture knob.

Engine information is displayed on a ten-inch Dynon

Skyview with a split screen for the primary flight display and moving map. A lightweight Becker com radio is clear and easy to hear, along with the voice-activated intercom.

Ground steering requires differential braking, and soon we're aligned with the runway for take-off. Even at nearly maximum gross weight on a 29C day, take-off acceleration is smooth and quick. With a light back-pressure at about 25 KIAS, then holding a shallow nose-up attitude with the nosewheel off the ground Shark lifts off at about 40 KIAS after an eight-second ground roll that covers about 600ft against a five-knot headwind.

I pitch for 80 KIAS and bring up the landing gear with a toggle switch on the top left corner of the instrument panel. The gear cycles in about three seconds, and we accelerate to a cruise climb of 110 KIAS. At 3,000ft I level off and let the airspeed rise to 140 KIAS while fuel consumption is steady at 5.5 gph. When flying at 110 KIAS, the Rotax sips fuel at less than 4 gph.

This particular aircraft is set up to be a trainer, so it's rigged for relatively heavy aileron breakout forces that damp the ailerons, but it creates an artificial feel that I find objectionable. It takes significant force to break the ailerons out of the neutral position, and they get lighter as deflection increases. Other Shark models aren't rigged this way, and I'd much prefer lighter and more linear aileron forces in non-trainer models. Pitch forces are light but linear, and they're just about ideal.

Steep turns, lazy eights, and chandelles are precise and thoroughly enjoyable with the expansive view.

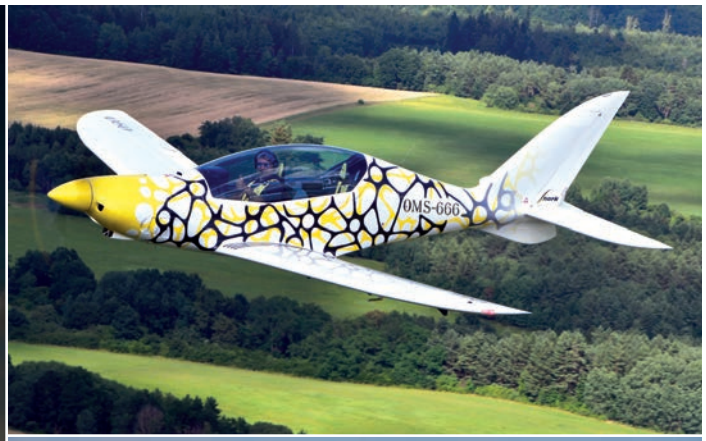
The electrically actuated flaps have three positions, and slowing the Shark down to flap speed requires planning. The aircraft is so aerodynamically clean a slight climb might be necessary on downwind to slow down enough to deploy them.

"Steep turns, lazy eights, and chandelles are precise and thoroughly enjoyable with the expansive view"

Making an overhead approach we decelerate to 70 KIAS on downwind, then lower the landing gear and flaps. Once fully down the flaps supply ample drag, and holding the recommended 60kt approach speed at a descent rate of 500fpm requires slightly more than idle power.

The elevator has enough authority to hold the nosewheel off the ground well after the mains have touched down, and doing so provides aerodynamic braking. We touch down on the hard runway at about 55 KIAS and roll about 500ft with light braking during rollout with no wind.

The Shark is a revelation because it shows that vast improvements in speed and efficiency are available at the light end of the general aviation market squeezing more out of 100hp than I would have thought possible — and even more performance is sure to become available.



1: The Shark's parachute recovery system is pulled out by a specially designed rocket engine in between 0.6 to 1.2 seconds
2: There's no separate propeller control, and blade pitch adjusts automatically for optimum engine rpm during take-off
3: Even at nearly maximum gross weight on a 29C day, the aircraft's take-off acceleration is very smooth and very swift

The Shark is built by Czech-Slovak manufacturer Shark. Aero and has a glass and carbon-fibre and epoxy airframe

Zara is now the youngest woman to fly solo around the world and the youngest ever to complete the feat in a microlight

ZARA AND HER SHARK: AROUND THE WORLD IN FIVE MONTHS...

SHE SAID SHE "wanted to sleep for a week" after arriving — and who can blame her. After five months that covered more than 32,000 miles with some 200 hours in the air, 19-year-old Zara Rutherford's flight around the world certainly deserves the epithet epic.

By landing back in Kotrijk, Belgium, on January 20 she broke the Guinness World Record as the youngest woman to fly solo around the world, and the youngest ever to circumnavigate the world solo in a microlight.

It was a heck of a journey — 31 countries and five continents, a trip originally planned to take just three months took five, mostly due to struggling against unfavourable weather. There was snow in Alaska and Russia, heavy rains in Colombia, a race against a super-typhoon evolving off the east coast of the Philippines and thunderstorms near Singapore.

Then there were smoggy areas with limited visibility in South Korea and India, and strong gusting winds that prevented a landing in Dubai. Temperatures ranged from -25°C in freezing Ayan in Russia and soared to +36°C in Monterrey, Mexico.

Amazingly, through all of this she had neither an Instrument Rating nor Night Rating and her Shark microlight/ultralight was VFR only.

Zara, who is British/Belgian, took off from Belgium on August 18 last year and first headed west over the North Atlantic to North America, reaching her first antipodal point (a point on the Earth diametrically opposite to a second point to make it a proper circumnavigation) in Quibdo, Colombia. She then flew north up to Alaska.

After a month's wait for a weather window she crossed the Bering Strait to Russia, but it took another month to get to Vladivostok before continuing to East and South-East Asia where she reached the second antipodal point, required by Guinness World Records' rules, in Jakarta. New Year's Eve and Day were spent in India with the next stops being in the Middle East.

After flying through the Middle East she left Egypt to head back to Europe, flying to Greece, Bulgaria and Slovakia where she landed next to the Shark factory in Senica. Just four hours' flying then remained to return to hr start point at Kotrijk and secure the record, but on a flight such as this there are, of course, sponsorship and PR commitments along the way and these necessitated a stop in Czechia, the Shark's second home country, and Germany.

The statistics are quite amazing with 71 take-offs and landings from all kinds of airports — an unpaved runway in Greenland for example,

1: After landing in Anchorage, Zara was welcomed by the Alaska Airmen's Association after the challenging Greenland leg
2: When flying at 110 KIAS, the Rotax sips fuel at less than 4 gph...Zara used what a Boeing burns in around 10 minutes
3: Excited fans greeted Zara at Costa Rica's Tobías Bolaños International Airport, in Pavas, her 12th global destination

where she also recorded her highest altitude take-off at 12,750ft, but also at some of the busiest airports in the world including JFK International in New York after circling around the Statue of Liberty.

As you'll have gathered from the extra two months the journey took, there were quite a few difficulties along the way. She was, for example, stuck for a month in Siberia with very few inhabitants around and virtually no-one who spoke English.

Due to changes in Covid regulations Zara couldn't enter China's airspace, so she had to fly through one of the busiest air routes in the world on the way from Vladivostok to South Korea, and at the same time to carry out a major detour over the Sea of Japan to avoid North Korean airspace. During that time she could fly at only 7000ft which precluded direct radio calls to land, so she needed a KLM pilot's assistance to relay her messages to air traffic controllers and to help find appropriate frequencies.

Then there was an unscheduled stop in Indonesia where she had to sleep for two nights in an airport terminal because she lacked the paperwork necessary to leave the airport... Her difficulties and achievements were summed up during a stopover in the British Virgin Islands with Richard Branson, one of her sponsors, who related in his blog: "I was blown away by how brave and inspiring Zara is. She's flying on her own, in a tiny aircraft that can't fly above thunderstorms.

"At times, she has to fly very low to avoid bad weather and she sometimes loses access to communications. She has experienced optical illusions when flying over large stretches of ocean, and battled against intense turbulence while navigating a storm over Scotland.

"Zara also told me about a situation in the U.S. where it became dark much quicker than she expected and she had to land at a contingency airport, which had already closed for the evening. She had to climb over the fence and hitchhike into town!"

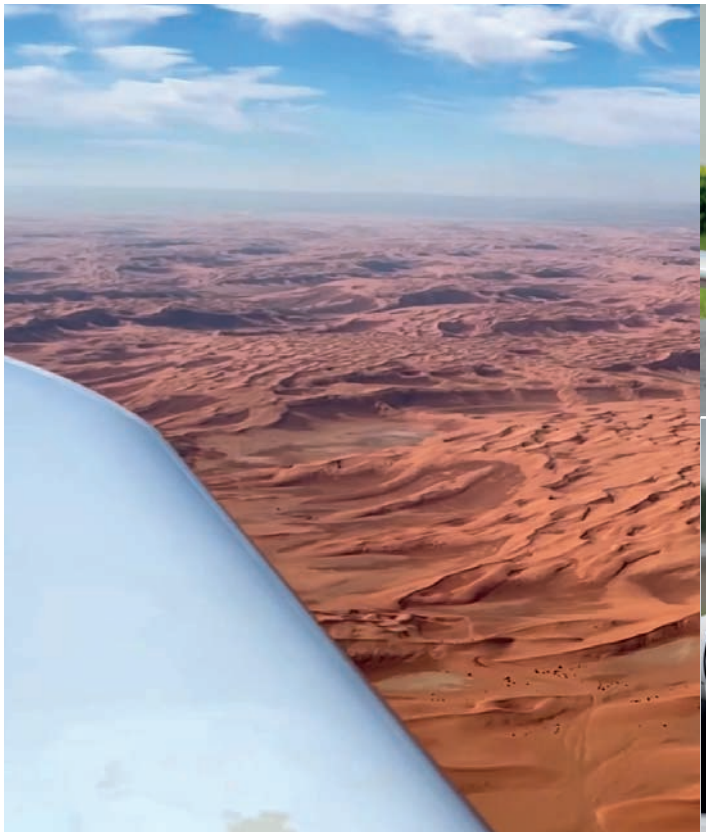
"When her contingency airport was closed, Zara had to climb over the fence and hitchhike into town"

Terrific achievement though it is, Zara's flight was always designed to be more than just record-breaking, it was also aimed at inspiring and motivating girls and young women to enter the field of aviation and, generally, science, technology, engineering and mathematics (STEM).

"Only 5 percent of commercial pilots and 15 percent of computer scientists are women," she says. "In both areas – aviation and STEM – the gender gap is huge. With my flight I want to show young women that they can be bold, ambitious and make their dreams come true."

With her epic flight she's certainly done that — and started to make her own dreams come true. ■

Thanks to Tom Horne, Editor-at-Large, and author Dave Hirschman of AOPA (U.S.) for their help in producing this feature.



1: Zara's view of Saudi Arabian deserts – flying from Dubai to Bahrain and swooping down low to watch the camel trains
2: After her last landing at Kortrijk-Wevelgem airport in Flanders, the intrepid pilot's new ambition was to sleep for a week
3: Parents Beatrice and Sam are pilots and raised Zara in and around aircraft, helping her gain her pilot's licence in 2020

The seat is incredibly comfortable and the Kevlar cockpit is surprisingly roomy – just as well on an epic five-month journey

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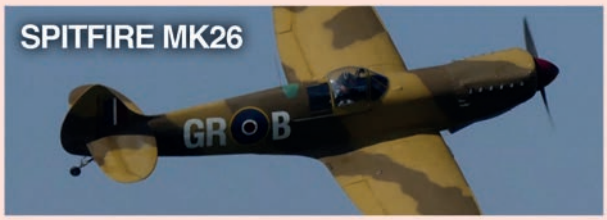

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