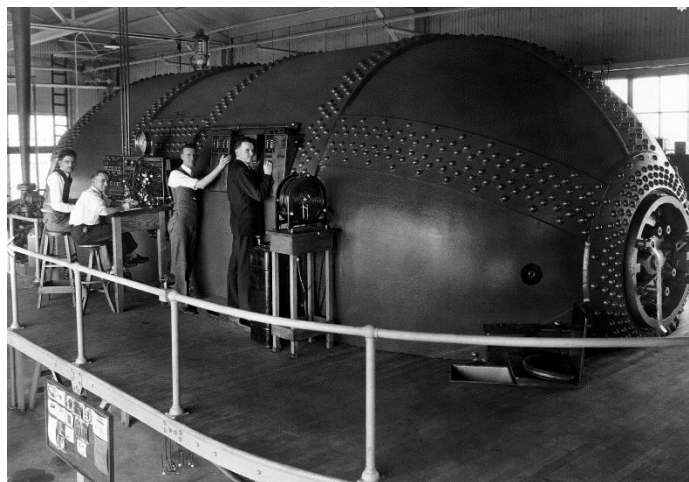




PORTMOAK *heritage* COLLECTION

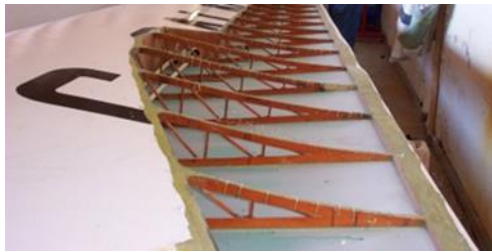


On a good soaring day at Portmoak there is usually an array of white single- and two-seat gliders which, to the uninitiated, all look the same. The uniformity of shape is due to the many years of aerodynamic research which has arrived at the most efficient shape to provide the high lift to drag ratios we desire. This efficient shape requires high aspect ratio (high span, low chord length) wings to reduce induced (lift dependent) drag and laminar flow aerofoil sections to reduce skin friction drag. The requirement for high aspect ratio was theorised by Lanchester in 1907 and proved analytically by Prandtl's lifting line theory in 1918. The development of laminar flow wing sections was carried out in the mid 1930s by Max Munk in the NACA Langley Variable-Density Wind Tunnel culminating in the five- and six-digit laminar flow aerofoils. One of the first beneficiaries of the laminar flow aerofoils was the North American P51 Mustang.



NACA Variable Density Wind tunnel March 15, 1929

The problem for designers was that, although the ideal aerodynamic shape for a glider was known, the material to manufacture an aircraft embodying these design features was not and they had to make do with the available materials - fabric, wood and metal. Examples of the wood and metal construction techniques may be seen in the following pictures:-



Fabric covered spruce and ply ribs



Fabric covered tubular steel fuselage



Plywood covered D box

The strength to weight ratio of the materials available limited the maximum aspect ratio possible. Whilst it was theoretically possible to create a reasonable approximation to a laminar flow aerofoil shape (see the image of the plywood D box) with a wooden wing, the manufacturing tolerances and

quality of surface finish possible limited how well the laminar flow wing sections could be reproduced and therefore the amount of laminar flow created. However, in 1957 Richard Eppler and Hermann Nägele of Akaflieg Stuttgart designed the Phoenix, the first all composite (fibreglass) glider.



Phoenix on display at the Deutsches Museum in Munich, Germany

The high strength to weight ratio of composite structures allowed the manufacture of high aspect ratio wings and the tight tolerances to which they can be manufactured and the smooth surface finish allowed the laminar flow aerofoils to work as predicted. The one downside is that the manufacturing process requires curing of the structure at about 50°C. Consequently, should the temperature of the airframe be raised to this temperature again the structural strength of the material would be compromised. Because of this temperature sensitivity we have all white gliders to reflect the sun's rays and prevent the structure heating up on hot, sunny, summer days.

However, at Portmoak, the monochromatic display is broken by a splash of colour and an unusual shaped glider. The colourful glider will be one of the many vintage gliders which reside at Portmoak. In fact, after the Gliding Heritage Centre at Lasham, Portmoak has the highest number of vintage gliders of any airfield in the UK. There is a Schleicher K2b (the only airworthy example in the UK), a Schleicher K8, a Bocian and a couple of Schleicher K6s but the majority of the vintage gliders at Portmoak belong to the Portmoak Heritage Collection.

The PHC was started by Jamie, Pete and Neil with the aim of collecting one example of each of Slingsby's wooden gliders. Not an easy task considering Slingsby produced 51 different wooden glider types between 1931 and 1965. The PHC was opened up to non-owners in 2012. To date the collection has 21 vintage gliders of 16 different types. The types in the collection are:-

- T5 Grunau Baby
- T6 Kirby Kite
- T8 Kirby Tutor
- T21 Sedburgh
- T31 Tandem Tutor (two examples)
- T30 Prefect (two examples. A type requires restoration and B type being restored)
- T38 Grasshopper
- T41 Skylark 2
- T42 Eagle
- T43 Skylark 3b (two examples)
- T45 Swallow (two examples. One in need of repair)
- T49 Capstan
- T50 Skylark 4
- T51 Dart 17R
- Elliotts of Newbury Olympia 2b (two examples. One in need of restoration)
- Elliotts of Newbury Olympia 460

For more information about the individual aircraft see <https://mattstickland38.wixsite.com/portmoak-heritage-co>

Most of the aircraft in the collection are airworthy. At the end of each year the PHC members get together and decide which aircraft are to have a C of A for the following year. We usually select four aircraft from the collection to have a current C of A; two two-seaters and two single-seaters. There are perennial favourites which fly most years; the T49 Capstan "Kermit" and the T50 Skylark 4. However, this past year, as well as Kermit we also



T43 Skylark 3b in Portmoak's south field following a delightful 2-hour thermal soaring flight – its first flight after 20 years in storage

had the open cockpit T21 Sedburgh, the T45 Swallow and the T43 Skylark 3b flyable. This was the first time that the Skylark 3b had flown for twenty years.

The Collection is fortunate to have three inspectors to get the aircraft through the annual inspections; Richard Lucas, Dominic Newton and Matt Stickland and also the lapsed RTO, Pete Benbow, so the workload to put the C of As in place is not too onerous. Two of the syndicate are BIs and can help with conversion to type.

As well as flying out of Portmoak the members of the collection regularly take the aircraft to the various vintage glider meetings which are held in the UK each year. We regularly attend the Capstan meet at Camphill, in Derbyshire, at the end of May each year and the Slingsby meet at Sutton Bank in August. 2023 was a particularly busy year for PHC expeditions with "Kermit" taken to the Vintage Glider Club rendezvous at Nympsfield and the VGC's 50th Anniversary International Rally at Aston Down.



Six T49 Capstans at Camphill. "Kermit" in pride of place

Sometimes we are invited to take our aircraft to airfields which have a special relationship with the aircraft or just to take the aircraft for display. In 2019 we were asked to take our T42 Eagle, "Odin", to Borders Gliding Club at Millfield for the club's 50th anniversary celebrations. "Odin" was the first aircraft to fly from Millfield and, after Matt and Richard had spent the day giving club members flights in it, the glider was moved into the main hanger to act as the centrepiece for the celebration dinner.

In 2023 we were invited to fly the T21 into the Scottish Torque Show at Broomhall House. Unfortunately the 30kt+ headwind would have made the aerotow through the Edinburgh zone rather interesting so it was decided it was best to leave the T21 in our hanger and

take the Kirby Kite, by road, for static display instead. Let's hope for another invite for 2024 and better weather.

Flying vintage aircraft is not difficult but does require a little consideration as they are, for the most part, over 60 years old. They are not as robust as fibreglass gliders so require careful handling on the ground and their performance in the air is not great when compared to their more modern counterparts. Flying vintage requires a different mindset



T42 Eagle "Odin" at BGC 50th Anniversary dinner

as, typically, the aircraft stall at about 30kts or lower and the best L/D can be at less than 40 kts. Best L/D will vary between about 18 for the T31 and 36 for the Skylark 4 so judging how far from the airfield you can be in order to get back safely will vary considerably between types. Also, as some of the aircraft have spoilers, rather than the effective airbrakes you are probably used to, learning to sideslip on the approach is a significant help. Conversion to vintage is carried out in the collection's Capstan and T21 with an instructor experienced in flying vintage aircraft. After successfully converting to both of the two seaters, flying our single seaters just requires a thorough briefing from a pilot experienced on the type to be flown.

If this article sparks an interest in working with and flying vintage aircraft then search out Richard, Matt or Dominic to have a chat. The aircraft are owned by Neil, Pete and Jamie. The rest of us pay an "insurance share". To fly the aircraft, you require Bronze and at least 50 hours. To join the collection, we ask that you be interested in participating fully and are willing to help out with the restoration and maintenance of the collection (and its trailers). When considering prospective syndicate members, we look for pilots who are interested in being a member of the syndicate for the long term and not those who just want join for a year to add new types to their log book.

Matt Stickland