NEWSLETTER May 2026

Hello Everyone. Welcome to our May edition of the PEEMS Newsletter. As someone mentioned this week, this year is the 25th Anniversary (or is that the 26th?... a fact lost in the midst of time) of PEEMS. That will call for some sort of celebration, so watch this space.

As can be seen below, a "Summer Social and BBQ" is planned for Sunday the 5th July at Croft House. Help from members for setting up on the day will be required, and a model display has been suggested, so be prepared. It's early days of planning but more will be revealed at the next Club meeting on Wednesday June 3rd .

It was good to see Jonathan at this month's Club meeting, and Ivan Shaw as usual, gave us a glimpse into the "excitement" of running a small light aircraft company in a competitive world. A task, it seems, not for the faint hearted, but a thoroughly rewarding one when looking back.

As can be seen in the "*Forthcoming Events*" below, our next Club meeting will be the Summer "Bring and Brag". Our Spring "Bring and Brag" in March was a very interesting evening with some good projects displayed and some good discussions had. See you there,

Nevile

□ Forthcoming Events.

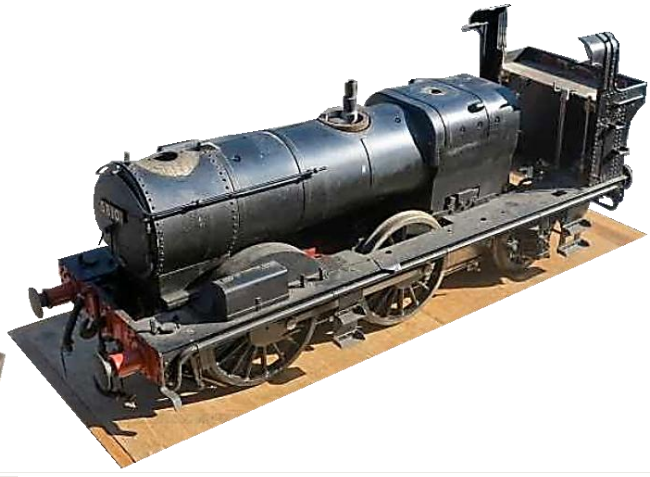
- **Wednesday June 3rd** **Summer *Bring and Brag.***
- **Tuesday June 16th** **Workshop Morning.**
- **Wednesday July 1st** **The Rosedale Hill Climb. A talk by Paul Hayward.**
- **Sunday July 5th** **Summer Social and Barbeque at Croft House.**
- **Tuesday July 21st** **Workshop Morning.**

□ For Sale ~ A 0-4-2T Great Western 5800 Class Tank Engine Number 5810. 5-inch gauge. Live Steam.

This is a repeat of the advert for a partially dismantled 5-inch gauge live steam locomotive from the estate of late member George Gibbs, which was first presented in last month's newsletter with more photos.

The engine is an 0-4-2T GWR 5800 Class tank engine. It was not built by George, but purchased as a running locomotive. It ran for a short time at the Ryedale Society of Model Engineers' track in Gilling East, before being partially disassembled by George, for what was believed to be minor works. As far as we are aware, all parts removed are still with the loco, but the purchaser should be prepared to undertake the sourcing or making of any missing parts, if this is required.

It does NOT currently have any boiler certificate paperwork, so the purchaser will also have to take responsibility for having the boiler examined and tested in accordance with current tests codes applicable to model boilers of this class.



Having sought opinion, we believe it would be reasonable to expect offers in excess of £1000 for the locomotive as it stands. Offers of interest should be made to Colin Bainbridge. All monies raised will go to George's family.

Club Evening Wednesday 6th May ~ An Update On Ivan Shaw's Aeronautical Adventures.

Colin welcomed everyone to the meeting which was well attended with some visitors. It was also great to see Jonathan again. Before Ivan's talk there were some notices:

- **PEEMS Club Visits.**

PEEMS would ideally like to visit two sites of engineering interest every year, maybe a local visit in the Ryedale - Scarborough - York area, and one further afield, (but no more than one and a half hours away).

PEEMS is currently looking at three sites for the "further afield" visit, which were mentioned at the April Club meeting (see April newsletter):

- **The Bradford Industrial Museum** which is an excellent "time capsule" of the industries which used to operate in that area. Press on the link to see the website (press on back arrow to return to the newsletter).

  https://bradfordmuseums.org/venue/bradford-industrial-museum/

  There is a YouTube video here:

  https://www.youtube.com/watch?v=vpEXHcu544U

- **The National Coal Mining Museum For England** at Caphouse Colliery in Wakefield. A great feature of this museum is a trip to an underground section. Underground tours have now resumed after some industrial action.

  https://www.ncm.org.uk/

- **The Barrow Hill Roundhouse Railway Centre** near Chesterfield. It's an old loco depot which houses the *Deltic Preservation Group*. In addition to the Deltics, there are many preserved locomotives.

  https://www.barrowhill.org/

  The Official Deltic Preservation Society (DPS) YouTube channel is here:

  https://www.thedps.co.uk/post/official-dps-youtube-channel

The Club is open to other suggestions for visits. There will be a 'show of hands' vote at a future meeting. With regards to travelling to these sites, in recent years it's tended to be car sharing on PEEMS visits. Coaches have been used in the past, before COVID, and since then there hasn't been the numbers of members and guests to justify a coach.

- **Club Workshop.**

PEEMS has a Club Workshop, and in the past, Jonathan and our late member George Gibbs used to act as both "the points of contact" and the workshop supervisors for anyone who wanted to use it. Currently, because of circumstances, the Club has been covering the supervision on a 'ad hoc' basis. The workshop rules state that no one can operate in the workshop alone, for health and safety reasons and also to be compliant with the PEEMS insurance. Also, because the workshop is sited at Mike Sayers' home, it is inappropriate for members to try and use the workshop on a random basis.

What is currently proposed is that the workshop is only available for use on Workshop Day, which is the third Tuesday of the month.

Members usually turn up on the Tuesday morning and then leave around noon, and there is a Committee meeting in the afternoon until around 4pm. So, if anyone needs to work in the workshop during the morning, and then would like to extend their time into the afternoon, that can be done by arrangement with Colin Bainbridge who can arrange for someone to be present to supervise.

- **Cutter Grinder (for flutes only):** The cutter grinder in the workshop is now ready for use by members. Paul still needs to do a little work on the air-line. The cutter grinder has recently been refurbished by Paul Gammon and Doug Pickering. Before members can use the cutter grinder, they need to be given tuition by Paul. Paul said that cutters with up to ⅝" (16mm) shanks can be ground. **Please Note:** This cutter grinder is only for grinding cutter flutes. Work is in progress on the other cutter grinder which can grind the cutter ends. Watch this space.

- ***Scarborough Mates* Open Day.** https://scarboroughmates.org.uk/

Scarborough Mates, which PEEMS visited in December 2021 (and featured in that month's PEEMS newsletter), is a charity which provides many craft resources to the community, such as a machine shop and a ceramic workshop with a kiln. They are normally open from 10am to 4pm Monday to Friday.

If you would like to visit, they are having an Open Day on Saturday 6th June, starting at 10am. See website for location and other details.

- **Cream Scones and Bakewell Tart**: PEEMS thanks Andy and Lisa Wilson for providing the cream scones and Bakewell tart for our tea break on the Club evening.

- **PEEMS Annual Lunch at Kirkbymoorside Golf Club.**

Whilst the number of members and guests was reduced from previous years, fourteen members and guests had an excellent time with good food and conversation, (as reported).

PEEMS thanks Colin for organising this event with the distribution of menus and liaison with the restaurant.

A Gauge 1 Model of a An Isle-Of-Man "Wickman Maintenance Crew Trolley" by Paul Gammon.

Paul brought along a model to the meeting of a Gauge 1 "Wickham" maintenance crew trolley which used to operate up and down Snaefell on the Isle Of Man. The trolley would take equipment and maintenance crews to the top of Snafell to service the CAA transmitter mast at the top. The full-size trolley was 3ft 6" gauge and was powered by a petrol ICE.

In the 1970s these were converted to public transport operating out of Ramsey. "People Carrier" No. 22's details can be found at this website:

https://www.iomsrsa.org/the-railway/locomotives/non-steam/no-22-wickham

- **My Life In Aviation ~ A Talk By Ivan Shaw.**

- **Introduction.**

Ivan came to talk to PEEMS in September 2018 and October 2022 about the build progress and flight testing of his single seat "personal aircraft" G-SEKR called "*The Seeker*". Those talks have been written up in those month's PEEMS newsletters. Ivan also kindly invited us up to his workshop in Hutton-le-Hole in April 2019 to see build progress on "*The Seeker*". Once "*The Seeker*" was certificated for test flights, Ivan started flying from Leeds East Airport which used to be RAF Church Fenton.

This is a promo that Ivan had filmed flying G-SEKR to and from Leeds East:

https://drive.google.com/file/d/1V4UuGv9LA28H3Iwx2unGakWC_QN9oS5N/view?usp=drivesdk

Press on the link to view video and the back arrow to return to the newsletter.

Please note: *Ivan Shaw owns the copyright of this video, and it should not be used without his permission.*

Here is Ivan in an interview with Ed Hicks of *Flyer Magazine*:

https://www.youtube.com/watch?v=9Y9fdcvmk00&t=75s

- **Prologue.**

Ivan started off by saying that he had gone through the conceptual design, technical design, build process and flight testing of G-SEKR in his previous talks to PEEMS, so he would like to make this talk nice and simple, and talk about the lighter side of his aviation experiences. He also wanted to talk about some of the problems with designing an aircraft that Joe and Joan Public could build and fly themselves, that is, a home build kit aircraft.

It's one thing designing an aircraft, but it's quite another building and testing it, both on the ground and in the air. When we are talking about a home build kit aircraft that is yet another complication.

When Ivan started building aircraft, you would buy a set of blue prints from the designer, and a materials list, and that was it, off you went. However, if you are designing a kit build aircraft these days, you also have to produce an instructional build manual. To put that in context, imagine writing instructions for someone who had never seen a shoe before, detailing how to tie a shoe lace. It's not that easy. This is what you are faced with when you decide to go into the kit-built aircraft business.

- **A Brief History.**

Whilst Ivan recognised several faces at the meeting, there were several he didn't know, so he thought it would be a good idea to retrace some of his early history of how he got into the aviation business.

So, the talk will deal with

- Designing an aircraft.
- Building and testing an aircraft.
- Selling an aircraft.

Last year Ivan was invited down to The Royal Aeronautical Society (RAES) in London (of which he is now a Fellow), to give a talk on designing aircraft. He told 'the great and good' there that we shouldn't just be "designing aircraft", but we should be building them and selling them too. That's what Great Britain plc. is all about, (and used to be).

- **A Progression Of Projects**.

i) The Twin-EZ G-IVAN.

This is the aircraft that got Ivan into the aircraft “design, build, test, and sell” business. This year (2026) marks 58 years of Ivan flying aircraft continuously. He started as a private pilot, progressed to a commercial airline pilot, and then he became a test pilot which got him into aircraft development.

The Twin-EZ is the first aircraft that Ivan built from scratch, and this was the first twin engined amateur build aircraft in Europe at the time. This was flown by Ivan in the mid-1980s.

It was based on a Rutan VariEze fuselage, Rutan Long-EZ wings, twin engines,(twin *Hewland* engines at the beginning, and then twin *Norton Wankel* rotary engines), a retractable landing gear and greater fuel capacity. The VariEze was the first Rutan aircraft Ivan flew.

Ivan got head hunted into the aviation business from the teaching profession.

This is in California where Ivan was collaborating with Burt Rutan, who later developed the Virgin Galactic.

The 1980s was the period when Ivan really got into test flying aircraft.

It was during this period that Ivan became familiar with aircraft design, composite aircraft, canards, and with flight test development.

ii) The Europa

While he was an airline pilot, he designed the Europa. This was Ivan’s first commercial aircraft of which he sold 1000 (see below).

The photo shows the first flight of the prototype from Gamston airfield in Nottinghamshire.

This is a kit build aircraft, and it was successful, being a marvellous 10 years of Ivan’s life, mostly because of his customers.

iii) Europa G-ODTI

Ivan had a lot of support from the Government's Department of Trade and Industry (DTI). At the time, Michael Heseltine headed the DTI.

As Ivan was receiving grant money, two people came up from Leeds to make sure the money was being spent wisely. The DTI was based in London but Ivan dealt with the Leeds office.

One of the people was a technical officer, and the other an accountant. The technical officer was keen to fly, but the accountant seemed reluctant, but Ivan could see he had to do it although he was quite nervous.

This area of the North Yorkshire Moors is an area of quite intense military air activity. It is 'uncontrolled airspace' so it's a 'see and be seen' collision avoidance system. Ivan flew over Hutton-le-Hole with the accountant, going North, and in the West he saw a Tornado which turned towards them. Ivan waggled his wings to make sure the pilot had seen him and he waggled his wings back to say yes. The Tornado then came 200ft below them. Ivan did a half Immelmann turn over the top of it and pulled down on it inverted. Ivan said that the look on the accountant's face was certainly different to say the least! Eventually the accountant wrote up about the Europa in the DTI magazine and the Europa became a Millennium Project. It eventually got back to Michael Heseltine that Ivan was the man who had flown one of his officers upside down. This Europa has the G-ODTI registration. Ivan knows how to 'creep for a grant'.

iv) A Normal Europa or A Motor-Glider Europa?

Ivan then produced long wings to fit on the Europa. On the day, you can decide whether you want to fly in a normal Europa, or a long endurance Europa Motor-Glider, just by interchanging the wings.

Ivan is developing a long wing/short wing option for "*The Seeker*" as well.

v) The Europa 'Family'.

This is the 'family' of Europa aircraft.

There is the monowheel (glider wheel) version and the conventional tri-cycle landing gear version.

In the foreground is the monowheel version with the long (long endurance) wing.

Ivan calls the monowheel version "the thinking man's" aircraft. It will do a lot of things and can take off and land on grass. Once cleaned up, it is very efficient. Other aircraft that can take off and land on grass, like the *Piper Cub* are 'one trick ponies'. They may have stall performance, but they don't fly very fast ~ 65 kts cruise speed. The Europa will cruise at 120 kts on 80 hp. A typical Cessna will fly at 90 kts on a typical 115 hp.

So, the Europa is much more efficient. Ivan was told that the monowheel would not be acceptable to the American customers, so Ivan hastily designed a tri-cycle landing gear. However, the Americans liked the monowheel and a lot of monowheel Europas were sold there.

vi) The Liberty XL2 (a scaled-up Europa).

Ivan then went on to develop the Liberty XL2 aircraft. The photo shows a Liberty and a Europa flying over Florida. This photo was taken during the Liberty's flight test programme and if you zoom up on the photo, you can see tufts stuck on the Liberty's wing which act as visualisation aids to capture the airflow over the wing during low flight speeds, close to stall.

When Ivan went to the annual Oshkosh airshow in Wisconsin for the first time with Europa, an American came up with a cheque book and said he would love to buy one, but he was well over 6 feet and would find it difficult to get in. Ivan was disappointed to have lost the sale, so he developed the Liberty, a scaled-up version of the Europa.

He modelled it around the seats in a Range-Rover, so at least the Americans can get into it.
This is a fully certificated aircraft on the civilian register. It is not available as kit build.

Ivan sold his own personal Liberty a few years ago in 2019, He has recently bought it back, and has been refurbishing it. He has been flight testing it a few days before the PEEMS Club meeting. It is the first time it has flown in five years. He flies out of a local airfield so you might see him flying overhead in Pickering.

The Liberty has been designed with folding wings so it can be stored in a garage or in a 30-foot-long shipping container. The wings can be folded like those on "*The Seeker"* in 3 minutes.

Ivan was working in Colorado when he was developing the Liberty, and the photo above shows him flying in the Rockies where there are 52 peaks over 13,000 feet. He is probably flying at 10,000 feet in the photo. It's not a good place to be if the engine goes quiet!

vii) *"The Seeker"* (G-SEKR).

This is G-SEKR ("*The Seeker"*). PEEMS visited Ivan's workshop when he was developing it.

Originally he developed this as a 'personal aircraft', but he also designed it to be an "optionally piloted vehicle", that means it can be flown by a human pilot or as a drone.

The idea here was that it could be operated by the military or the police in either mode.

Unfortunately, as of the meeting Ivan couldn't speak any further about this project as it was being assessed by the military.

Ivan would love to see this go into production. He has a complete 'turn key' operation on this aircraft. This means all the paperwork to enable full certification is available, including drawings and stress calculations. He also has all the moulds and tooling. The aircraft has also undergone a full flight test programme. "Turn Key" means that you just have to hire some premises, turn the key, and the business can start up.

As he mentioned earlier, "*The Seeker*" has folding wings, like The Liberty, and can be stored in a garage or shipping container. There will also be a long wing (like Europa's), for long endurances.

- **Aircraft Design.**

What Ivan told the RAES is that one of the lovely things about designing a product is that everything works! You can have an idea for an aircraft, and you can sketch it out and everything is fine. You can design it in the privacy of your own home with your favourite tipple by your side. That is the nicest part!

With respect to design in the aviation business, Ivan has visited many companies and universities where they have engineers, particularly "CAD drivers" (Computer Aided Design operators) in the design office. Ivan always maintains that you cannot design anything properly unless you can build it. Unless you have an understanding of how things go together, it's difficult to design things properly. Building things yourself gives you a much better appreciation of the design process.

Trying to get a working design via scrap.

You will have heard of "Cosworth Engineering" founded by Mike Costin and Keith Duckworth. It is a British high-performance automotive engineering company founded in London in 1958, specialising in high-performance internal combustion engines, powertrain, and electronics for automobile racing (motorsport) and mainstream automotive industries.

Mike is still alive and in his 90s. Mike and Keith came up to Europa Aircraft Ltd. and Mike bought a Europa and flew it into his nineties. He had the monowheel version. He flew it out of Rufforth in York.

They spent the day with Ivan, talking about development work and he took both of them flying. Mike bought a kit and built it and flew it for many years.

Ivan said that development work is all about how cheaply you can put something into the scrap bin. He said that when he has an idea, he goes into the workshop and he does a sketch, he then makes the part, and at lunchtime it's finished. He then tests it in the afternoon and at close of business it's in the scrap bin! He said if that had been a large company, they would have had meetings, and meetings about meetings, and in three month's time it would have cost a £million and would be put in the scrap bin.

Keith Duckworth then said something very perceptive; "What you put in the scrap bin was only the difference between what you thought you knew and what you did know". Ivan said, "that's really perceptive Keith, is your scrap bin empty?" and he said " it's full like everybody else's". Mike said "Oh I don't know, what about that engine that was almost perfect straight out of the box?" Ivan walked over to the window, looked out and said; "The last time that happened there was a star in the East, and I don't want to miss it this time!"

Cost.

Ivan said that so often in the aviation business, when you talk to the "CAD driver" and ask him how much something weighs, or where the centre of gravity is, he can answer straight away, because the computer can derive it. If you ask him how much something will cost, he can't tell you.

Aviation design often begins with; "We are going to design something, but we need some "*unobtainium*" before we start". A lot of work in aviation is for the military, and cost isn't always a top consideration. For the kit-built aircraft designer, cost is a top consideration.

Ivan remembers having a stand at an American airshow when he took the Europa over there. Cessna were on the next stand, and he was talking to the salesman. At the time, Ivan was selling separate kits for each of the main components, wing, fuselage and tailplane. He told the salesman he might have sold five tailplane, wing and fuselage kits. At that time a full Europa kit would be about $25,000. The Cessna salesman said they had sold five aircraft too. Ivan said "that's good" and the salesman said they had sold three *Citations*, a couple of *Caravans* and he had done $20 million of business, while Ivan had done £50,000 of business. That's the difference. The hotel costs for the sales teams and the pitch cost were the same for each company. That shows how difficult it is to exist as a company in the kit-build business, or at the bottom of the food chain.

There is a saying "*The only way to make a small fortune in the aviation business is to start with a large one".* Fortunately, being a Yorkshireman, Ivan has applied "native cunning" and avoided that trap.

Build.

You design your aircraft, and build the components, and then you have to instruct the constructors how to assemble it. This means you have to produce a constructer's manual so someone can assemble the kits 'from scratch'. So, not just a set of engineering drawings, and a materials list, but a full set of comprehensive build instructions. Burt Rutan was an inspiration here, because he had a book which took the constructor by the hand and showed them "*what to do*", "*how to do*" and "*when to do*". This is the logic that Europa followed. For example, "*take a piece of metal, draw a line 2" from here, and drill a hole here".* Then constructors will say "you haven't put the size of the hole", "what size bolt is it?"

Then for the European market, drawing and manuals have to be written in German or French. The Americans have the biggest aviation market in the world, and they deal in Dollars and the Europeans deal in Euros and the British in Pounds Sterling.

Germany was Europa's biggest export market before Ivan opened an American office. For mixing resins, the instructions would say "*This is a big fibreglass layup, and this is going to take several hours. Get everything ready (because once you start mixing epoxy resin, and wetting the cloth, you can't stop half way through, you have to keep going)."* Ivan put in the instructions; *"make sure you have a cuppa before you start".* A German doesn't know what "*a cuppa*" is. He had a German ringing him up because he couldn't find the word "*cuppa*" in any book or dictionary. Even in America, language was an issue.

Regarding 1/4" and 3/16" bolts for light aircraft, if a bolt is in tension, you would provide a torque setting. If it was in shear, Ivan would write in the instructions "*just snug it*". The Germans would ring up and say "how many Newton Metres is a "*snug*"?"

One German Europa customer asked Ivan if the aircraft could have three seats, the third seat being a baby seat. Ivan said that as a home builder he would be working under the German Aviation Authority and he could probably get it cleared under them. He would need to adjust the seating and move the fuel tank to fit a baby seat. Ivan thought the build would be two or three years, so he asked "how old is the baby?" The reply was that they hadn't had the baby yet. First they would build the aircraft and then they would have the baby! A few years later they sent Ivan a photo of the completed aircraft with the baby in it.

Testing.

When Ivan comes to testing, things start to get more serious, particularly in aviation. Ivan has known people who have built aircraft and then been too frightened to fly them when they realised that they hadn't strictly followed the materials list or sourced the correct bolts.

Ivan remembers when he was looking for investors for Europa, he was talking to a very wealthy man. He asked Ivan "What is the risk in this investment?" Ivan said " Let's think about risk for a moment. Aviation is a very risky business, and I'm trying to make an aircraft with one wheel out of composites, which is going to fly fast and slow, and the aircraft is going to be "progressive" and is not going to be like any other aircraft. It's quite technical, there's a financial risk and there is no precedent for this type of aircraft. If you buy a business like a shop, you can check the books, the previous business plan, the customer base and perform your normal business calculations. With Europa, there was a technical risk, as I'm going to improve aircraft aerodynamics, advance light weight structures and going to use a new fuel-efficient engine. There is also a personal risk, it could be dangerous. When I come to test the aircraft, I could kill myself". Ivan then said; "Remember this, you're putting your cheque on the line, I'm putting my neck on the line". The investor said; "Thanks for your honesty Ivan, count me in!".

Ivan has over a thousand hours of test flight experience, and has had a lot of "hairy" moments. He's even had two double engine failures with the Twin-EZ aircraft he built. Whilst flight testing a Long-EZ, he had a double magneto failure (yes, some aircraft flying today still have magnetos). A double magneto failure is unheard of, because there's two separate systems with two plugs/cylinder. He had gone down to Staverton in Gloucestershire to do the Long-EZ flight testing. This was in the 1980s. He went up to 5,000 feet, and as the air got thinner, the engines stopped. He called the tower, but didn't want to declare an emergency or "Mayday". He made a "Pan-Pan-Pan" emergency call (one level below "Mayday"). It means "*I need help, but I am not in immediate danger".* (Pan comes from the French: *panne* meaning "breakdown". "Mayday" means reporting the incident to the CAA).

The tower said "use any runway you like for an emergency landing". As he was coming in to land from 5000 feet 'deadsticking' (gliding), he came over the runway threshold and saw there were the fire, police and ambulance services. As he stopped on the runway, two fire engines pulled up in front of him and ambulances too. As he looked, a fireman was coming towards him with a big axe to chop him out of the cockpit. Ivan opened the canopy very quickly! He later found out they were having an exercise day and had been in Cheltenham discussing how they would respond if there was a big air disaster. They had the Fire, Police and Ambulance already on the airfield, and they were monitoring the tower frequency, so if there was an emergency they heard it at the same time as the tower.

Crash Video.

Ivan had recorded his 'wheels up' landing at Leeds East with his Go-Pro camera on his helmet, and so he showed this video along with a video of how a good landing should be (similar to the one at the beginning of this article).

Sometimes people think that when you're test flying you would wear a parachute. Well, you do, but in a flight test programme, before you go in the air, everything is done on the ground. You only go in the air once you run out of excuses not to fly it. On the ground, if something goes wrong, you can fix it. Something not quite right with the weather, you wait. Ivan always sets out to fly on Wednesday 10am, but he's not saying which Wednesday. You never work all day on an aircraft and then fly it at 4 o'clock in the afternoon. You only fly it when you are fresh. People have been killed by test flying under pressure.

You start by testing all the systems on the ground, by "taxi-testing", and then high speed "taxi-trials" and "crow-hopping", just lifting a few feet off the ground. The aircraft doesn't know if it is at 10,000 feet or a few feet above ground. By just lifting off, you can get a good feel of how the stable the aircraft is airborne. You can tell if anything is wrong, if it's out of trim, wanting to roll, not enough control. If anything is wrong you can just chop the throttle, and put the aircraft back on the deck. Once you are happy everything is OK, you can commit yourself to first flight.

Ivan did all that on G-SEKR, and he showed us two video clips, one where everything went right, and a later flight where things didn't go right. This clip was important because it showed how things can quickly go wrong with problems combining with each other.

The first clip showed the view inside the cockpit with the Go-Pro camera on Ivan's helmet and a normal take off. This was one of the two initial flights during which the nose and main landing gears remained down. The flight was from Leeds East Airport (ex RAF Church Fenton). It's a very stable aircraft, that is, it's not "twitchy", but still responsive. The good thing about "*The Seeker*" is its 'birds-eye' view of the world, enhanced because the propellor is behind the pilot. The landing was on runway 24, approaching at 70 to 75 kts.

The second clip showed the third flight of the aircraft where Ivan retracted both the main gear and the nose gear (separate operations). The information that Ivan has on his digital display is more than he had when he flew as an airline pilot. Then he was navigating by using radio beacons, now he has a moving map display. The big question Ivan had when he was flying was. "Where am I?"

Up to this point it was early days and he had only flown the aircraft for an hour. The retract gear lever is at his right-hand side. The first thing to check when flying, is the radio and comms, and the other things are the engine cylinder head temperatures and oil pressures. What you don't want as an aircraft designer is 'cooling drag', which is the drag associated with cooling the engine of a propeller driven aircraft. You are always trying to reduce "cooling drag" by having a smaller air inlet, and you rarely get it right.

The oil temperature started to go up slowly. The nose gear door had closed, and looking through the nose gear window, it was seen that the nose gear couldn't be retracted fully, but could only be brought back to contact the gear door. Ivan hadn't retracted the main gear yet. The first two flights were with the nose and main gear down, in case there were other emergencies , and the aircraft flew in the environs of Leeds East Airport. When he retracted the main gear for the first time, the aircraft "leapt forward" because the drag from the main gear and attached doors had been removed. The main gear is cantilevered and rubber bungees had been incorporated to relieve the weight of the gear when deployed. Ivan felt that if the main gear was allowed to be lowered under its own weight, it would be difficult to balance, and without the bungees it would be difficult to get the main gear up again.

By now, Ivan had been watching the oil temperature, and suddenly he got a warning light and half the engine electrics had gone. He wanted to get the main gear back down, but the wind was pushing on the gear doors while they were being lowered. He tried with two hands, but the main gear would not go the whole way down because the bungees were acting against him. He was getting very hot and realised there was not enough ventilation in the cockpit. The warning light could still be seen on the panel and he had lost one ignition system and one fuel injection system.

Ivan thought the oil temperature would come down. It didn't, it kept going up. The gear still wouldn't come down all the way, and the cylinder head temperature was rising. The thought of performing a "wheels up landing" wasn't very attractive in a new aircraft. He spent a lot of time trying to get the gear down. He slowed the aircraft down to reduce

the drag on the gear doors. Ivan had never done minimum speed on this aircraft before, and he was trying not to stall it. He couldn't climb and he was only at 1000 feet. If he put more power on the engine to climb he was going to 'boil' the engine quicker. Once again, he tried getting the gear down with two hands, after trimming the aircraft to allow him to take his hands off the stick. He then tried to 'bump' the aircraft in order to increase the G forces on the gear, to get the wheels down. He was trying everything.

At this time, the warning lights were flashing on the oil temperature and the cylinder head temperatures which were going to maximum. Ivan himself wasn't getting enough oxygen and was hyperventilating with the canopy steaming up and reducing visibility. Ivan told the tower he was having an emergency. It became apparent that one of two things might happen; the pilot might expire, or the engine might expire. So, he retracted the main gear (the nose gear was partially retracted). The oil temperature was above 140°C. He didn't want to land in a field, and it would be better to land back on the runway "wheels up". It was not a nice decision, as Ivan had spent years building the aircraft. He told Leeds East tower what he was going to do.

When he landed "wheels up" on the runway there were about eight fire engines there from Selby, York, and all around, as the airfield had declared an emergency. As he didn't want to damage the propeller, he switched the engine off. When the engine stopped all the lights on the panel went out. Ivan was flying at 80 to 90 kts when he flew onto the runway. Any landing you walk away from is a good landing!

Post Script.

It wasn't a pleasant experience, but Ivan got away with minimal damage. It was quite a smooth landing. It landed on the two 'bump stops' under the lower fins (which are made from foam and Kevlar and are sacrificial), and the air intake duct under the fuselage belly which was ground away. The fourth point of contact was the nosewheel which shredded the tyre. It was only tertiary damage. A full inspection was carried out on the airframe with no further damage evident.

Ivan had stopped the engine, so the propeller wasn't 'windmilling'. The only damage was on one blade, at the tip which was an area 5/8" x 5/8" and looked like it had been filed. That was repaired with a scarf joint. It meant Ivan didn't have to buy a new propeller from America, writing a big cheque.

There was no damage to the engine, and the oil temperature problem was solved by increasing the size of the oil cooler and radiator and relocating them into the inlet duct, where inlet air provided direct cooling. This solved the cooling problems. The cockpit ventilation system was also improved. Lessons learnt.

This meant that flight testing could resume without the problems of the third flight. The main gear was locked down for subsequent flights, and was provided with spats and leggings to reduce drag. The nose gear is still retractable.

Questions and Answers.

Q: Are you conscious of the fact that you have 'nerves of steel'. Do you feel fear like the rest of us? What emotions are going through your mind in that situation?

Ivan: I was thinking how much this was going to cost me! I was thinking about how to minimise any damage by putting the aircraft down as gently as possible. I got away with it. Because the engine was stopped, the only damage was a small corner removed from one blade, which was easily repairable. The aircraft also landed on the underside air inlet scoop which was also easily repaired.

People ask me why don't you land on grass. It will be soft. It isn't. It could break your back. If you land on smooth tarmac, you can see what you are landing on. However, if you land on grass that looks flat, it could be undulating by up to 4". That's like a kerb. Imagine hitting a kerb at 100 feet/second. It will be a sudden shock. Always land on a smooth runway if you can.

You're more nervous in an aircraft you have designed yourself. When I've flight tested other people's aeroplanes, I've felt more comfortable. The last time I flew G-SEKR I quite enjoyed flying it, because I'd forgotten about all the things that could go wrong. On the first flight you are thinking of every nut and bolt. Actually, once you get in the aircraft and open the throttle, all your attention is focussed on flying the aircraft and the job in hand.

I've done a lot of test flying especially developmental test flying. The first engine failure I had was in an aircraft I had built myself and also flew out of Church Fenton. It was a Rutan VariEze (which was before the Twin-EZ seen in the photo). I had carburettor icing. Can you believe that we have aircraft engines that are legally allowed to ice up and stop, unless the pilot has judicious use of his carburettor heating. If you are on reduced power, you use carburettor heating. On early cars the manifold would ice up because it wasn't heated. I had to put my VariEze down, and I had only held a PPL for 100 hours at that time. I had to put it down in a field, and the Air Speed Indicator (ASI) said 100kts (115mph), and I thought I had got away with it, but the landing gear folded. I landed with the brakes on because there was a stone wall in front of me. The aircraft swerved around and missed the wall.

My neighbour was a passenger in the back (it was the first time in an aircraft since being in the Airforce). There was a cushion in the back, and when we lifted the cushion there was grass underneath it.

That meant he had been travelling over the grass sitting on a cushion! I have had more engine failures than anyone I know. I must have had a dozen engine failures. Statistically, I'm the safest pilot to fly with, as my next engine failure is in the year 4047, but that doesn't mean I won't have an engine failure tomorrow.

Q: How have you modified the landing gear to get over the problem on the third flight?

Ivan: The main gear was originally designed to retract into the main booms. Then I thought "do I repair it, do I start modifying it to change it?" I'd simply got the tension wrong in the bungees. The air pressure on the gear doors and the lack of mechanical advantage in the system, all served to create the problem. It was so close to working. I thought "shall I spend time redesigning this" and thought it would take too long while the aircraft still needed checking out. So, I've locked the main gear down, and put spats and leggings on to reduce drag and that's what we have now. The nose gear still retracts as before.

The gear could be redesigned to retract correctly. If someone came to me and said speed is of the essence, then the fix would be done. There are three things that are important for the aircraft: speed, range and endurance. For endurance it could fly over the Atlantic in 24 hours. It's got less speed now, it won't fly at 200mph currently. The imperative was to get it flying in order to check out all the systems, and to see if I had a "goer" rather than spend time and money on a redesign.

Before


After

Q: You originally said you were intending to circumnavigate the world in *The Seeker.* Although the current political situation would make that difficult to do, the question is how long a hop can you do?

Ivan: People say to me "what is the range of the aircraft? I say "forget that, it's my bladder range that is the limitation". Three-hour legs are my range. Technically I was figuring on doing 1000-mile legs. At the original 200 mph that would be 5-hour legs daily.

Q: How much fuel takes you 1000 miles?

Ivan: The calculations were showing it could do 80 to 90 mpg. Mike Arnold achieved that in a racing aircraft with fixed main gear, so I thought I should get that. To do that, you need a very efficient engine. Two strokes and Wankel engines are no good.

The Rotax engine, which *The Seeker* has, is fuel injected, with specifics of 0.41 to 0.43 lbs/hr/hp. Typically a petrol engine is 0.5 lbs/hr/hp. Two strokes are about 0.7 lbs/hr/hp and a Wankel engine is the same.

You also need a "clean airframe" which *The Seeker* has, and the world's most efficient engine, which the Rotax 912iS is. I did have this idea of flying around the world. At the time, Russia was opening up for aviation. You had never been able to fly across Russia, but Putin wanted to make Russia more like Europe. The first time I went to Russia 30 years ago, it was difficult, but the last time I went to St Petersburg, it was becoming very European.

I had already flown my Liberty back from Dubai which was quite an adventure. The actual flying was fun, flying over the Red Sea and Saudi Arabia. I demonstrated the aircraft in Saudi and Bahrain. I was going to come back over Iraq, Turkey and Lebanon, but the Israelis had bombed the runway there. They told me I could land between bomb craters!

Flying across the Middle East and Mediterranean was great, but as soon as you land it's a "rip-off". I went into Al-Medina where Muhammad the prophet is buried. I left there to go to Luxor. The Red Sea didn't part for me! The headwinds were a bit more than forecasted. When I got to Egypt, it was a barren and empty landscape. In Saudi, if you had an engine failure, it's more populated.

I had never been into Luxor before, and I was running low on fuel. I thought they would put me into a holding pattern. I made a decision to divert to Marsa Alam on the Red Sea. I called them giving my flight details. They replied "Yes Captain, how are you going to pay for the landing?" I said "US dollars cash". They replied "That's OK , continue your approach Captain". As soon as you land, someone runs out with chocks and said "That's $200". If you land in Luxor that's $800. You land there. You stop. You can't get out of the aircraft. I was only 50 yards from the terminal. They send a bus for you and that's $50.

They wanted to see “the ship’s papers”, registration, insurance etc. I said “the papers are in the aircraft”, and so yet another bus journey and dollars spent. They wanted more money for “ a handling agent” and also a nightwatchman, which I refused.

When I came to leave to go to Cairo, Alexandria then Paphos, Cyprus, I had to file a flight plan. I went in early to file the plan and they asked for the landing fee. “Where do I pay it?” “At the kiosk, we’ll get you a bus”. When I got to the kiosk they didn’t have any change! Back in the aircraft after paying for the bus, I asked for start clearance. “We don’t have your flight plan”. I said “yes you do I’ve just filed it in your office ten minutes ago”. “Yes, but your agents have cancelled it”. “Get the agents!”. “They’ve gone!”.

I was fuming, and I jumped out of the aircraft, and stormed across to the office, filed the flight plan again and stormed back to the aircraft. They let me go.

I landed in Cairo at the *6th October* airfield in the desert and wanted to fly on to Alexandria and then Cyprus. Flying to Alexandria, I flew over the pyramids which was a wonderful experience.

I told Alexandria that I wanted a quick turnaround. I taxied in, and luckily this time they put me 20 to 30 metres from the tower. I dismissed the handler because he wanted paying. The security man came with a Glock pistol on his side. And I strode straight into the tower to see the air traffic controller. I wanted to pay my landing fees.

They had no change. “Where’s the bank?” ”In the terminal”. I went to the bank and they’d gone to prayers, so I went back to the terminal and paid the fee without change.

So, there’s no way I’m going to fly around the world now. The flying is great, but the thought of all the hassle puts me off. At the time Russia was opening up, I thought that if I was going to fly over Russia, I had the idea of first flying into Bornholm, an island just east of Denmark, where I have a friend. From there I could fly to Moscow where I have some more friends, and then “fly the latitude” all the way across Russia. That would mean, just one country, one clearance and one-thousand-mile legs.

Russia goes way beyond 180° longitude. You can then fly over Alaska, where in terms of flight clearances you’ve “died and gone to heaven” relatively speaking. Flying in America and Canada is just fabulous. If you are going for a Global Circumnavigation Record, there is a minimum number of miles you have to fly. This means you have to Zig-Zag over America, which is fine as I have a lot of friends there.

With current geo-politics the dream has gone “belly up”. I’m too old now, but if I’d done it, I’d have been the oldest pilot in the smallest “own designed and built” aircraft in the world to have circumnavigated the globe.

Here’s another story about airport experiences. When I finally left Alexandria after my Cairo experience, I flew into Paphos. After I landed, a “Follow Me” truck came out so I followed him. He parked me between a 767 and a 757. An irate woman came out in a van and said “that will be 250 euros for handling”. I said “I don’t need handling, I’m just someone in a little aeroplane”. Then an even more irate CAA woman came out in a van and said “you can’t stop here!” I said “I just followed your “Follow Me” truck”. She said “We thought you were a big aeroplane!” I said “do you employ blind drivers?”

I then had to get back in the aircraft and taxi over to the Flying Club General Aviation building, which is where I should have been taken in the first place. It was getting dark, and as soon as I stopped the engine, the “Follow Me” truck, the two women and the handler went and I was just left with my cases. I had to get back in the aircraft, and ring the ATC tower and they said they would send a bus. A bendy-bus turned up and I had to pay 70 euros for that. This is what you’re up against. The fuel there was the most expensive around at the time at $4/litre. That was Cyprus, but once you get into Europe proper, everything runs like clockwork.

The first time I didn’t follow a flight plan I had an engine failure. I’d come all the way across the Mediterranean, and from Rhodes I flew to Athens and then Corfu. I intended to fly through Albania but they wouldn’t let me. Then they told me I had to cross the Adriatic to Brindisi, Italy and then fly back across to Croatia.

At the time the Balkans were supposed to be “war torn”, but I had the nicest reception. I landed at Split and a guy came out with a truck and concrete weights to anchor the aircraft down because there was going to be strong winds. The weights were big enough to hold a 767 down. A lady came out, put me in a car and whisked me through the terminal. I said “What about payment?”, she said, “Oh we’ll sort that out when you come back.” There were some thunder storms and I stayed with friends for a few days. When I came back, the landing fees were about 4 euros and they gave me a free map of Croatia.

In Al-Medina in Saudi, they told me I had to have a military clearance to land, which I had been given. All the Saudis had been trained in America until 9/11, after which they were not welcome, and had to do their own training. I was demonstrating the aircraft with the prospect of them buying it for training. The Prince (who was the first Saudi into space), invited me there. The airfield I went to wasn’t on any maps. They gave me vectors from Cairo. It was August in Saudi and it was very hot. When you started the engine, it was like someone was blowing a hair-drier in your face.

In the hangar, it was 100°F, even with eight or nine air-conditioning units working. I had already been given a military clearance number before flying in, but before landing they said they didn’t have it. I said “we’d better talk about that when I’m on the ground.” Even the King’s sister coming into Mecca on a 747 was refused landing permission. The Captain declared a fuel emergency and only then were they allowed to land.

I thought, if the King's sister can't land, there's no hope for Ivan Shaw from Hutton-le-Hole. But when I landed, they were fine.

I had taken on 40 to 50 litres of fuel in jerry cans when I left Riyadh, and when I got into Al-Medina (which had no Avgas), I jumped out before anyone could stop me putting fuel in the aircraft from the cans. I was starting to fuel the aircraft, when a truck turned up and someone said "can I help you?" They were also very helpful in the tower. When you're flying on your own, it can be difficult and tiring.. A passenger can do the refuelling while you are filing a flight plan. If you are flying over there, it is advantageous to wear a uniform with four stripes on it denoting Captain's rank which I did. Over there it's "Yes Captain, No Captain".

Colin: Britain used to have a great heritage in building aircraft. I come from the south and didn't live far from Hatfield and the DeHavilland factory. DeHavilland was one of the major aircraft companies in this country. It is now a housing estate.

Ivan: It's gone. When I flew in there, it was closing, all the factory real estate is gone. Don Dykins, who helped me design the Europa was Chief Aerodynamicist there on the Airbus. It's like Clydeside when we had all the skills. There was a massive amount of aircraft experience at Hatfield. All gone.

Colin: It's quite a common story for this country. All that experience and skill has been scattered to the four winds. It's like breaking up a university.

Ivan: Big companies eat little companies. I still think that the Britain is the most innovative nation on earth. The trouble is that if you get good ideas, and they get going, they "get eaten" by some big American company.

Colin: We seem to have got rid of the manufacturing behind all the technology we develop.

Ivan: Airbus as a conglomerate is doing well because they have got government backing.

Colin: I'm not suggesting nationalisation, but I think innovative engineering in this country should be supported by the government. We've done the opposite, scattering it all out. You're right, we're great innovators and I certainly get the impression we are fantastic at making "one-offs". Other people see that and then buy the company. We were talking during the tea break about China taking off. You can't blame China. Britain has been beating a path to all these countries to take on our manufacturing. Now we can't compete with other countries with the cost of manufacturing. Are there any aircraft manufacturers in this country?

Ivan: There was a time, a few years ago when Slingsby Aviation and Europa in Kirkbymoorside was the centre of light aircraft and general aviation manufacture in Britain. A lot of light aircraft manufacture is now in Europe, especially eastern Europe.

Paul: When I was an apprentice, the company I worked at built three Cassutt racing planes which were French home build kits, American designed. I did all the hinge pins for them. I repaired quite a lot.

Ivan: On each Europa aileron there were two hinges, one 4" long and the other 3" long. So, in the kit there were two 7" long lengths of MS20001-5 extruded hinges. A builder would ring up and say "I've run out of a hinge". "I cut two 3" lengths out of one 7" length and a 4" length out of the other, and I'm 1" short".

In the assembly book I would write *"Think three times, measure twice and cut once"*.

Colin: When you sell around the world, are safety standards universal or do they vary from country to country?

Ivan: Safety standards are pretty universal. FAR 23 (Federal Aviation Requirements) relate to the light aircraft that Europa and Slingsby dealt with. The Americans really set the standards. FAR 23 is what the Liberty aircraft is designed to. It's the 'proof of compliance' that costs the aircraft designer the money, such as structural and flight testing.

The British and European standards are very similar with BCAR 23 (British Civil Airworthiness Requirements), and EASA CS23 (European Aviation Safety Agency).

Q: I know you can't talk about G-SEKR because it is currently under military review, but the original proposition was that "*The Seeker*", would be a "personal single seat aircraft" that would be a fast, very efficient and have low fuel cost. This would be because it would not be carrying around the weight of empty passenger seats like two-seater aircraft do much of the time. Do you still see *"The Seeker"* as a potential contender in that niche of the marketplace?

Ivan: No, there is no money in single seat aeroplanes because the cost of a single seater is 85% of the cost of a two-seater.

Q: Yes, but the original ethos was that you and your friends were flying about in two-seaters, each with an empty passenger seat, and were in effect wasting fuel by flying in an aircraft heavier than it needed to be.

Ivan: That is right, but if you came to me and said "Will you design me a two-seat aircraft with a Rotax engine?" I'd say "Forget it". The market is absolutely swamped with two-seat aircraft and it's very difficult to sell

these types of aircraft for a decent profit. I've always said that with *"The Seeker",* whatever the market was, I had a unique aircraft. You can fold the wings, and put it in a garage or shipping container.

In the past, when I was younger, I had the enthusiasm, but I had some very experienced people to help me, Don Dykins from Airbus for Aerodynamics, and Barry Mellers from Slingsby for structures for example. When you are young, you start gaining knowledge.

When I was 50, I had the knowledge and the experience, and knowledge multiplied by experience is wisdom. At 80, the only thing I don't have is a young set of legs.

With regards to marketing *"The Seeker",* I need someone younger to pick it up and run with it. I've built so many aircraft and I started selling aircraft too, with the Europa and then the Liberty. I'm still trying to retire.

PEEMS thanked Ivan for an excellent and informative evening and some heart stopping video.

The photographs in this article are owned by Ivan Shaw and should not be used without Ivan's permission.

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G-SEKR Over Castle Howard

G-SEKR Entering A Spin

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