Newsletter

No.36: February 2024

Welcome to your Newsletter

In this edition: entertaining and informative articles from members, a brief update from the flying field for December and January and events coming up for 2024.

Please let me know of anything you would like to see included in forthcoming newsletters. All feedback and contributions are welcomed. Remember to play your part and if anything, interesting (or even better, funny) happens whilst you are visiting the flying field then drop me an email (with pictures) for the Activities at the Field section.

Members are particularly interested in how you got into the hobby, what planes you have owned, technical expertise etc...

Send any newsletter related matters and articles to me at: neilgrayson@sky.com

Club Business

Kinross Radio Model Flying Club Annual General Meeting

To be held at: Orwell Bowling Club, Milnathort Wester Loan, Kinross KY13 9YH *(Click Here for Map)*

Thursday 15th February 2024

Doors Open at 19:00

AGM Starts 19:15

Please email me any items which you want considered for adding to the agenda as soon as possible, and no later than 4 February 2024.

This year's fees will be set at the AGM but are expected to remain at £65. You are reminded that fees must be paid before 31st March.

A message from the Committee: Please note that the Chairman, Secretary and Treasurer are willing to continue in their office bearer roles, however the committee would welcome new blood and ideas. If anyone is interested in joining the committee, particularly in the role of Chairman or in any other way to support the organisation of the club, then please put your name forward at the AGM.

Seaplanes at Loch Leven - advance notice

We've booked August 24th and 25th for the annual 'Waterplanes at Kirkgate Park, Kinross' event. KRMFC took over this event after Covid, having originally set it up over 25 years ago. It's quite special to see up to 40 flyers with everything from foamies to 1/4-scale biplanes, so make a note in your diary! Help wanted on the days - does anyone fancy setting up a burgers, tea and coffee stand? That hasn't happened in recent years but it makes for good social if we could re-introduce it.

Events at KRMFC for the Coming Year

The club now has quite a few new members, some of them very enthusiastic about organising both social and flying events at the flying field and perhaps externally of model flying. More than one member has questioned why, whenever they go down the field to fly their planes there is no one there even when the weather is warm, there is no wind and it is dry. Surely it is time we got back to making model flying at KRMFC more fun and more sociable. Since Covid the social side of model flying at KRMFC seems to have disappeared. More than one new member has not renewed their membership over recent years due to losing interest because of lack of support at the club.

With this in mind please email me or speak to any member of the committee and suggest ideas which can get us back to being a thriving and social club with things happening at the field.

Some suggestions:

- Fly in/Open day (with or without other clubs invited)
- Flying competitions (Combat, spot landing, circuits, limbo etc…)
- Visits to other clubs
- Training and testing days – already offered by the SAA
- Lunch/drinks at a local restaurant/pub
- Maintenance Days

- Barbeque
- Raffle
- Bring and buy

Here is to glorious weather this year and lots of activity at the KRMFC flying field.

Upcoming Events in Scotland

The UK Youth Rocketry Challenge (UKROC) Scotland Regional Final will be held at KRMFC on Tuesday 23rd April 2024.

Transmitter Survey

Douglas Fulton put together a survey in regard to members preferred manufacturers for transmitter equipment and it was passed to members on 2nd January 2024. Responses were rather disappointing so I am unable to publish any details in this month's newsletter. It will probably be in your inbox somewhere so if you can find it and find the time to fill it in then please return it to Douglas at adrfcsec@gmail.com.

BMFA Scotland Area Meeting 5th January 2024

Unfortunately, I registered for this meeting to represent KRMFC but then failed to attend as I didn't make a note in my diary. Apologies for my non-attendance but here are the minutes and I will ensure that I attend the next meeting. Did anyone else attend?

Minutes of ZOOM MEETING OF THE SCOTTISH BMFA CLUB REPRESENTATIVES- 5/1/24

In attendance:

CHAIRMAN: SIR BRIAN DONOHOE

CLUB REPRESENTATIVES IN ATTENDANCE:

- Iain Bell – Angus MFC
- David Fisher – Warrix Flying Group
- Neil Grayson – Kinross RMFC – not actually there!
- Roger Thompson – Dornoch MFC
- Mike Gilfillan- Country Member representative

Apologies for absence:

- Roger Tomlin
- Ken Weatherstone
- Nick Reeves
- Al Carmichael

Items Outstanding:

NONE

Examiners Expenses:

The following was put to the committee as the recommendation from the officers (meeting 3rd January 2024)

1. Mileage reimbursement for BMFA Examiners based on reasonable travel distance upon proof of receipts for fuel within mainland Scotland.
2. BMFA Examiners can travel to clubs and have expenses reimbursed so long as the examiner / requesting club have informed the Achievement Scheme Co-ordinator (Currently Andy Pirie) and subsequently the Treasurer

is advised that an expense claim is to be submitted. (The Achievement Scheme Co-ordinator will, as long as reasonably practical, co-ordinate the closest examiner(s) to the requesting club to attend to make best use of available resources.)

3. Expenses do not cover meals for standard agreed training days, meals will only be included in the 'Special events' per point 5 below.
4. Expenses do not cover accommodation for standard agreed training days, accommodation will only be included in the 'Special events' per point 5 below.
5. For non-mainland Scotland locations (e.g. Isle of Lewis club), clubs will be required to request 'special events' as these will require BMFA Scotland to request additional 'special funds' by BMFA Scotland to BMFA central committee due to the remote nature of the Scottish Geography.

This was accepted unanimously.

BMFA /SAA DUAL INSURANCE

This is to be discussed at the next SAA/BMFA meeting on the 17th January

Our representative in attendance will be Alasdair Sutherland(Vice Chairman).

ANY OTHER BUSINESS

None

CORRESPONDENCE FROM OFFICERS

None

COMMENTS ON ANY OFFICERS REPORTS

None

DATE OF NEXT MEETING:

13th February 2024 at 7pm

Member Articles

Telemetry Musings *by Ian McLuckie*

I recently tried to buy a Spektrum AR 630 receiver (Rx) on-line. No luck. They were sold out across the UK. They must be popular or is Spektrum phasing them out? You never know. Of course, you have to buy the next model up, the Spektrum AR 631T, and it is more expensive. It has an external wire aerial, unlike the AR 630, and it is long enough to stretch outside the fuselage away from all the internal gubbins (a technical term for mechanical and electrical components). That means the Rx can be set 'centre stage' on the C of G for the gyros and accelerometers to work efficiently, if you want to use them.

I asked what the 'T' stood for at the end of the AR631T. They said telemetry. I thought that was strange because the radio link from the transmitter (Tx) to the receive (Rx) was, in any case, pure telemetry so why the 'T'? Apparently, the Rx sends data to the Tx. I asked… does that not mean the Tx and Rx are technically 'transceivers', and how does a transmitter become a receiver? It cannot be both at ***exactly*** the same time, given there is only one active channel, and even that channel is 'spread' or 'hopped'? No answers, except …why are you asking these questions? It works fine.

Fair enough.

Let's see what Wiki says about telemetry. Wiki says - *"Telemetry is the in situ collection of measurements or other data at remote points and their automatic transmission to receiving equipment (telecommunication) for monitoring. The word is derived from the Greek roots tele, 'remote', and metron, 'measure'."* You'll remember your Greek roots from your school days!!

I suppose, according to that definition, the 'up' link (Tx to Rx) is not strictly telemetry, it is 'command and control' stuff. Whereas, the down link (Rx to Tx) is purely information or data. OK, that's sorted … that is what the 'T' stands for, it's the downlink. But, how does it work, what is going on?

Apparently, it was 'Seagull' which started this off a while ago. It was easy to understand, they had a self-standing Tx in the aeroplane and compatible Rx on the ground solely for data (telemetry) and separate to the aeroplane control system. Then Spektrum, JR and Hitec produced their own kit but it seems to have been Spektrum which integrated the downlink telemetry into the command 2.4GHz channel. I suppose they all provide integrated telemetry these days. But how does it work?

There seems to be two main telemetry systems. They call one Duplex. It has two distinct channels and they work simultaneously over two different frequencies. The other is Half Duplex (Simplex). It uses one frequency and shuts down the transmitter turning it into a receiver, and vice versa in the aeroplane. Unless this switch-over is really fast the command-and-control system might suffer, but we are talking milliseconds or even microseconds, I suppose.

Jeti produced a system using 2.4GHz and 200MHz with a separate screen attached to the transmitter to display the incoming data. It seems to have worked well, full Duplex. But what does Spektrum do? The answer is I don't know and they will not tell me, or rather the dealers just don't know, so we are all in the dark. We do know that they are only using 2.4GHz so does that make it Half Duplex? Are they using a separate channel in the 2.4GHz band for Rx to Tx data using a printed circuit board Rx internal aerial? It's possible, but there is only one aerial that I can see, so I guess Half Duplex. I'll probably be wrong. Do we care I hear you say? … if it works fine.

It's hard enough flying a model aeroplane without having to absorb avalanches of downlink data. A couple of aural messages and a quick look at the Tx screen now and again might be all I can manage. I say this because the amount of possible downlink data is vast. They say it arrives at the Tx fifty times a second. That data looks as if it might be divided into two parts 1) preventative information such as stall warning, altitude (vario) which includes VSI vertical speed indications, battery voltage, rpm etc. and 2) post flight / landing (*and crash, I suppose*) information.

Post flight data analysis on a lap top or on your smart phone would be a real treat. There is an 'App' available from Spektrum but it needs a lot of study involving downloading '. TML' files from your transmitter SD card. I am assured that other manufacturers also provide this kind of technology.

Fig 1 shows post flight data for airspeed, rpm, and altitude. The Fig was produced by Ron* after flying his low wing Space Walker to a successful landing.

I see Tim Knowles uses aural barometric data (vario) from his gliders and that works well, in fact it is an essential tool. He also has a GPS downlink telemetry module in his magnificent 'top of the range' glider. I could have done with a GPS module in my lost glider a few months back.

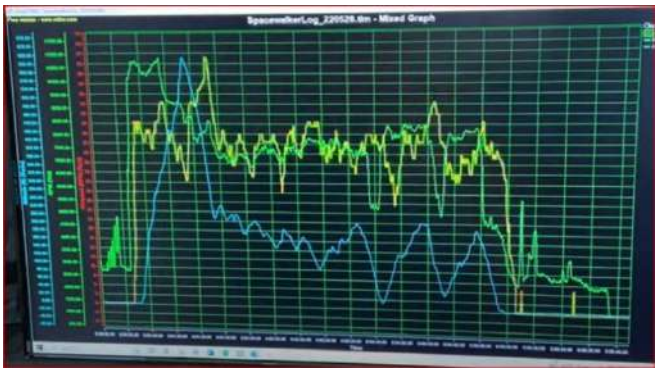


Figure 1

My AR631T already tells me the aeroplane busbar voltage on the Tx screen and that is helpful. A stall warning on my lumbering Decathlon would be an interesting project but it would mean boring through the wings to fit a sensor on a leading edge. Not keen on that!

But there is other stuff on my Spektrum Tx screen, see Fig 2. They say that the Flight Log screen was originally designed by Spektrum to aid testing but has proved useful to all users post flight. It has nothing to do with flying the aeroplane, it is all about monitoring the radio systems performance. It tells us at top left (the six vertical bar sign) that the telemetry is working, essentially a signal strength meter. That's straight forward, but the counters associated with F:0 and H:0 plus the A:1, B:0, L:0, and R: ---- are not intuitive.

There seems to be three key terms associated with these counters namely **Fade**, **Frame loss** (F) and **Hold** (H). It looks like the system can cope with up to four aerials on an aeroplane, say two on the main Rx, and two from remote or satellite receivers ***on board***…nothing to do with satellites.

Figure 2

A "**fade**" is when one of the aerials does not fully receive a full frame of data i.e. there is a loss of a 'bit' of information on a specific aerial (a frame is a complete packet of data). These fades or data errors are clocked up on A, B, L and R display. I can't find out why these letters have been used but it may just be to identify each aerial. I only have one aerial on my aeroplane so only A is active. Typically, it's normal to have as many as 50 – 100 aerial fades on any one of the aerials during a flight. They say that if any single aerial experiences over 500 fades in a single flight, the aerial should be repositioned to optimize the RF link. That's a frightening number of fades in anybody's language. However, that's very handy to know. Normally you never know if the aerial position is any good until it is too late.

A "**frame loss**" (‘**F**’) clocks up when ALL the aerials do not receive the SAME frame. They say that you will most likely sense a single or even several **‘Fs’** clocked-up, but if you have a large number of ‘**Fs’** you may want to consider relocating your aerial(s), see Fig 3.

A "**hold**" (‘**H’**) is when ALL aerials miss the same 44 (same say 45) consecutive frames, see Fig 4. Essentially, that is 1 second of ‘no control’. Will the system pick up again after an avalanche of H’s if comms is re-established? Yes, tests show it will**. If you lose *continuous* control because of a comms failure then it’s back to whatever ‘failsafe’ is set up on the receiver, say, nose down with slight turn…if that facility is available, remembering I am using Spektrum kit with Forward Programming. Forward Programming allows some features in the receiver to be set-up from the transmitter (*but it is not easy to understand*), other manufactures will have different terminology. If there is a crash, a bundle of Hs might point to a comms failure…and it wasn’t the pilot’s fault…for once!!

So, with all the above we should be able to see, post flight, if the RF link is robust or if any aerial or receiver positions need changed. That’s good, it saves guessing.

Figure 3 Lots of Fade

Figure 4 Fade then Hold

Finally, dBm (decibel-milliwatts) on the screen indicates the power level being received expressed in decibels, but this can be changed to RSSI (receiver signal strength indicator) on some Spektrum receivers, which is more meaningful, certainly for me. If you are using dBm then you might see the following numbers -33, -85 etc. against it. We will need to demystify these, next time.

Most telemetry suppliers say the telemetry can be used to track a lost aeroplane; I’ll definitely have to look into that, maybe in the next newsletter.

Of course, all the above fades in the background when you see, or rather don’t see, the electronic complexity running in the background of quad drones, and to some extent, FPV equipment. With all this phenomenal electronic engineering, are we in danger of forgetting the fun of flying the aeroplane? Just a thought.

Finally, if you wish to make your own exciting RX sensors for the downlink telemetry, Spektrum has published a 24-page document entitled ‘*Specification for Spektrum X-Bus Telemetry Sensors’.* It’s free on the internet. They have included 820 lines of software code and set out how the bits and bytes are arranged. So, it’s a doodle, I hear you say, we can now make our own sensors (rpm etc.) then adjust and load the code. Then again, another way forward is to buy a sensor which comes in a small poly bag and plug it in, but it’s good to have a choice!!!

***** On YouTube, Tim McKay - ‘*RC Airplanes for Newbies’* introduces ‘Ron’, a Scot, who is a satellite engineer and master builder of model aircraft, explains how telemetry works.

****** Tests showed that it is quite difficult to kill the receiver’s reception. Even with the receiver inside a faraday cage and the transmitter at full power sending through 3 brick walls, comms can be viable. Of course, the wires going into the faraday cage to power the RX may have acted as parasitic aerials. The faraday cage? That was my better half’s car key RFI (radio frequency interference) safe pouch with the Rx inside and all the wires hanging out, just for fun.

Electric Rookie Conversion *by Neil Grayson*

As most of you will know I have been flying my Rookie glider for a number of years now with a Cox 0.049 glow engine. It has taken some time to get it flying well and for the engine to run reliably and long enough to get it to a sufficient height for a decent glide time once the engine stops. The Cox engine was bought around 1975 when I was flying control line planes whilst I was at school in Cyprus and was fitted to a Cox PT19 plastic control line plane, like the one below. No, it isn't mine, mine didn't survive the 70s.

Cox Control Line PT19 Circa 1975

Eventually I ended up with three Cox engines and various spare parts which were stored in various garages, sheds and attics until I dug them out at the start of 2021 when I started building the Rookie. I was surprise to find that I could still get Cox engines and parts from Dens Model Supplies on the Isle of Wight.

Initially I fitted a DC Dart diesel engine to the Rookie but it was very underpowered and it wouldn't gain any height at all. Again, the DC Dart engine was from the mid-70s and was in a small profile balsa and ply control line model which was consigned to the great hangar in the sky many decades ago.

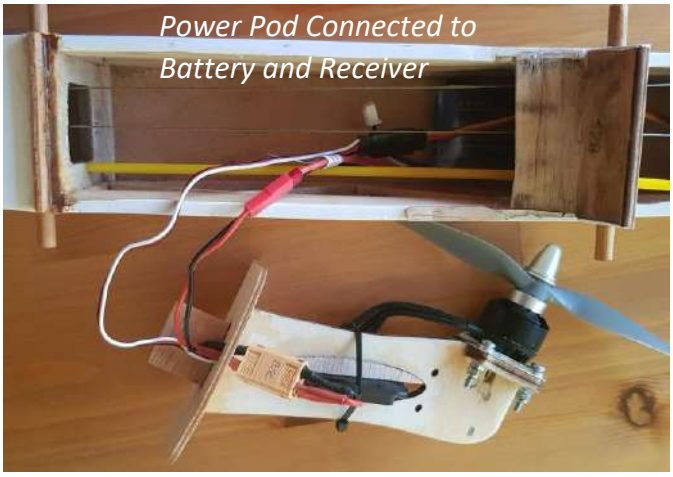
After a number of years of experimentation with the Rookie, and it being lost in a tree for a month (it is a long story but in Newsletter 19, dated September 2021), it started flying well. I combined the different parts of the three Cox engines together until I had one complete unit that ran consistently and had a number of great flights with a record, so far, of 13 minutes and 28 seconds flying time after the engine runs out of fuel.

Now that it is flying well, is in a good state of repair and I enjoy flying it - I decided to convert it to electric!

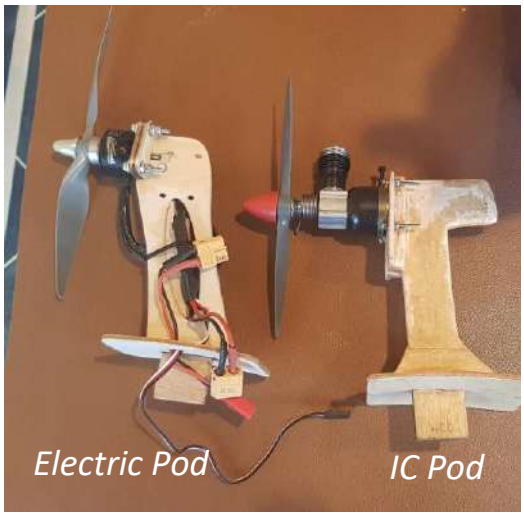
The first thing I bought for the conversion was a ply power pod which ironically is advertised as for the Cox 0.049. It cost £15.99 from Flight Plan Models. A bit expensive and perhaps I should have made my own by copying the original from the Rookie Kit which would have been far cheaper. The electric motor I got at Elvington LMA show from Al's Hobbies who had a stall there. It is an Overlander Tornado Thumper 2826/09 Outrunner for £19.99. Whilst in York I nipped over to Model Shop Leeds to save postage (and left my wife in the B&B!) where I bought a 2S 1000 mAh LiPo for £11.24, a Hobbywing 20A ESC for £13.49 and finally a 7" X 5" APC electric prop for £2.75.

The first thing to do was to weigh all the electrical version components and IC engine components and it turned out that the electrical setup would be 15g lighter than the IC version. In the end however, I had to remove the AA NiMh battery from the nose of the plane and site the replacement 2S LiPo under the wings as it wouldn't fit in the nose. This meant that I had to add 10g to the nose to get the C of G in the correct place. So eventually a saving of 5g! Glide testing at the field will show if the C of G is in the correct place.

More wiring was obviously required now there was an electric motor powering the plane. To get the wires running to the receiver and LiPo battery I had to make a hole through the baseplate of the power pod and in the top of the sheeting on the wing. Another hole was required from the receiver in the front of the plane for the wire of the BEC* to the ESC. A quick drill with my cheapo, nasty Aldi version of a Dremel and the holes were done. **Battery Eliminator Circuit*



Power Pod Connected to Battery and Receiver

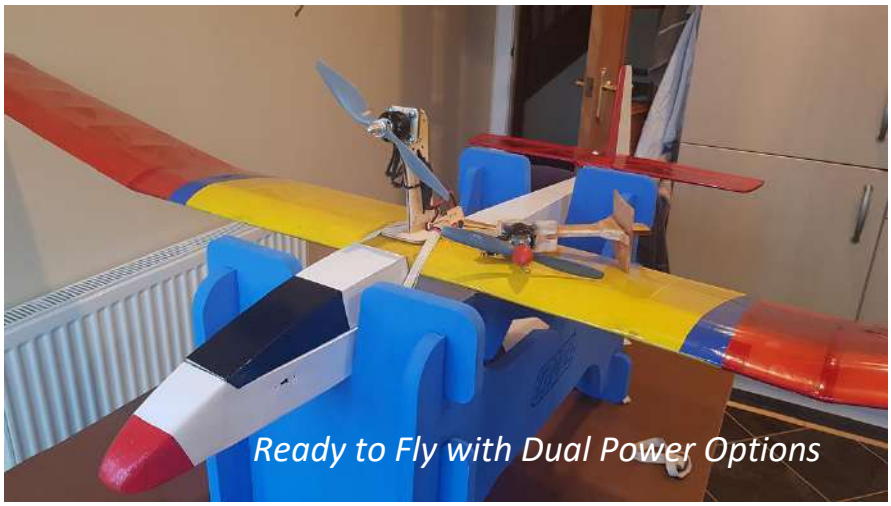


Electric Pod *IC Pod*

I replaced the basic AR620 aerial less Spektrum receiver with a much larger AR6610T Spektrum telemetry receiver so that I could obtain altitude and vario data onto the memory card in my transmitter. (*See Ian McLuckie's article above).* There was very little difference in weight between the receivers but it was a struggle to get the larger AR6610T into the front of the plane so I had to remove the power switch on the side of the fuselage. I am uncertain if I will need the switch refitted when I go back to the Cox 0.049 during the summer months.

The LiPo battery under the wings is now quite difficult to remove for charging and the balance cable is only about 4 cm long so it will need an extension lead connected to it. Kevin Scott has kindly 3D printed off a mount that will come out of the side of the fuselage so that a lead can reach my charger.

Kevin's 3D Printed Balance Socket Mount



Ready to Fly with Dual Power Options

Polish Air Museum at Krakow *by Richard Blanski*

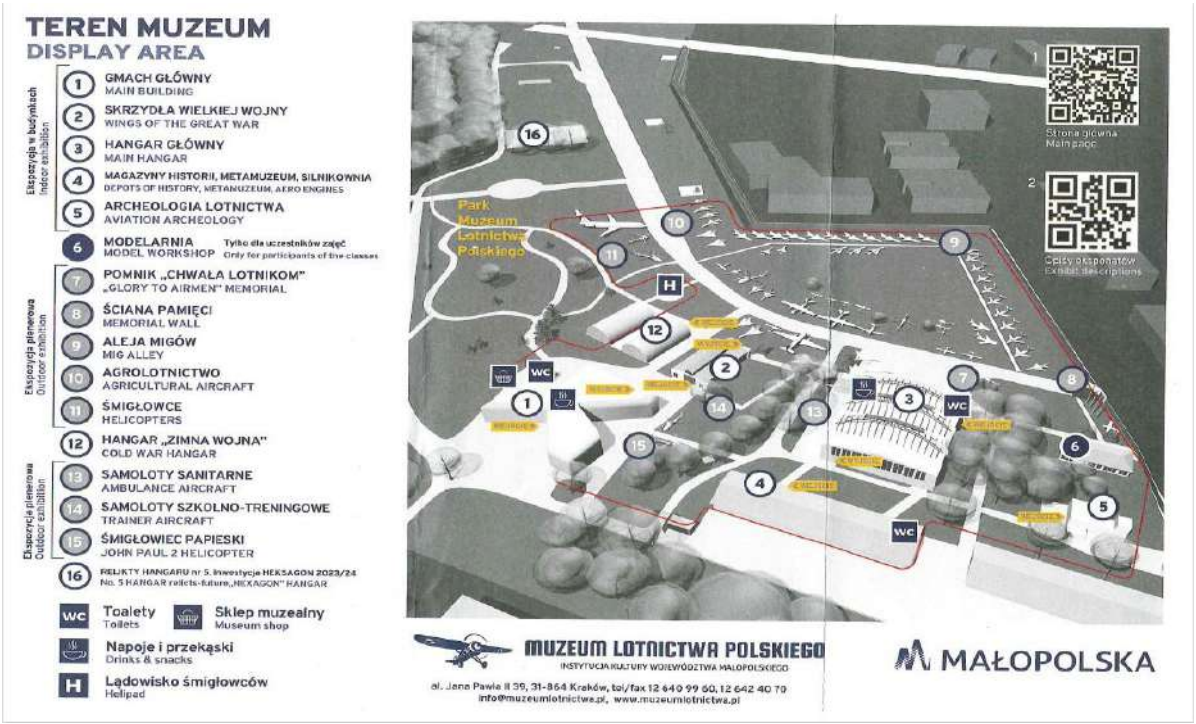
Richard is the former Treasurer and Director of the SAA. He is also a club member at Kinross, Linlithgow and Glenrothes. He has provided an interesting report based on his recent visit to the Polish Air Museum at Krakow. He visited in early January 2024.

The Aircraft Museum in Poland is located on the outskirts of Krakow at the former Krakow Airport. It's a very worthwhile place to visit if you are in the area. Krakow is a great city to visit and my taxi ride to the museum using the Bolt App was approximately £3 from the Old Town in Krakow.

This has been my second visit, I was there at the same time last year, however, I had an injury to my ankle which made walking around uncomfortable, and I didn't get the chance to see it all, so I went back again this year to find out what I had missed.

Entry to the Polish Aircraft Museum is approximately £5, and being a tight Scotsman, if you go on a Tuesday, which I did for a second time, you can get in for free. I have no idea why this is the case as there appears to be no difference in what you can see on a Tuesday as opposed to other days.
The Museum opening hours are Tuesday to Sunday 9am – 5pm, so don't try to visit on a Monday as its closed.

It's a massive site and has over 250 fixed wing aircraft on display from the early days of flight to more current aircraft, which makes it certainly interesting to all aviation enthusiasts. As you would imagine, there are a large number of Soviet and Eastern European aircraft, some of which I had never seen before and there are also a number of helicopters. The layout of the site is below.



It is mainly military and private aircraft, however, there are a few commercial aircraft as well. If you're interested in MiG's, there are a good number to see, the brochure above shows just how many there is. Although they are not available to touch, (according to the signage), you are so close to the exhibits

sometimes it is difficult not to want to get hands on. During my walk down what I called MiG Alley, I did have a headfirst look in some of the exhaust outlets.

There are various display rooms within the Museum, one of which had a mock up 1st World War type trench environment with various aircraft and interactive displays and videos taking place. There is also lots of memorabilia, there is surface to air missiles and associated vehicles, uniforms, weaponry for both infantry and aircraft, and a huge room with over 100 various engines from 1908 to current date, jet, and piston powered. Another room houses some battle-damaged aircraft, many of which were shot down and later recovered. These are set out with their unique history displayed alongside.

All signage was generally in Polish and English, with most exhibits on display within the modern building, so it was a very interesting few hours. Also, as you will see in the photographs there was a number of model aircraft engines. There was also a display of ejector seats and some aircraft cockpits.

Overall, it was a really enjoyable day. Some of the history displayed on the exhibits was extremely interesting and there was even the Pope John Paul II helicopter on display.

In conclusion, I would highly recommend Krakow as a place to visit for its historic buildings and culture. You can visit Auschwitz and Birkenau from there and the Salt Mines. There are a number of shooting ranges close by and I took advantage of one of the shooting ranges and enjoyed a 30-minute session firing three pistols and three rifles at an indoor range for approximately £60.

Flights are available from Scotland via EasyJet and Ryanair with Ryanair generally having the most flights.

First Attempt at 3D Printing a Plane *by Kevin Scott* Part 1

While I have owned a 3D printer for a number of years, it would be fair to say that most of the things I have printed with it have either been box shaped or tube shaped and certainly not aircraft shaped! However, seeing a report on the 3D printed plane Marmalade that Stuart Houston posted a few newsletters ago made me realise what was possible and I decided to make one as well; this article gives some thoughts on how it went – this is part 1 describing the general process of 3D printing aircraft, part 2 in the next edition of the newsletter will cover the specifics of the build.

Overview of 3d printing

I have owned a 3D printer since 2019, the one I have is the Anycubic i3 Mega and at the time the cost of it was around £200.

This is what is called an FDM (Fused Deposition Modelling) printer, you can think of it as being a bit like a baker decorating a cake, a nozzle moves around squirting out molten plastic in whatever shape you program it to do. My printer is also called a "bed slinger" type, the bed that it prints onto moves backwards and forwards. To carry on the cake decorating analogy, rather than the cake staying still and the nozzle moving, the nozzle can only move left and right and the cake will need to be moved backwards and forwards to finish the job!

There are other types of 3D printers called SLA (Stereolithography) printers which draw a plate out of a resin bath with the plate being scanned by a laser or projector. These produce extremely precise models but the downside is it is a resin so there is a lot of cleaning to be done afterwards. They also won't work with some of the 3D printing approaches like LW-PLA that aeromodellers can potentially use, more on that later.

Up to now, I have found it an incredibly useful tool, but the sort of things I have been doing with it have mainly been things around the house, like making brackets for holding my spirit levels or making an adaptor to go from a power tool to a dust extractor. I have also used it to make enclosures for some of my electronic projects, an example of that is shown.

There are two key pieces of software you will typically need when working with a 3D printer (both of these are free):

1) A slicer – this program takes a design file which is usually an .stl file but lots of other formats are also supported. An stl file is just thousands of triangles that represent the object you want to print. The slicer does what its title suggests, it takes the file and slices it up (like slicing an onion!) into each of the layers that the 3D printer will print. The output from the slicer is usually a .gcode file . 3D printers know what to do with a gcode file and just follow the instructions in there. I use UltiMaker Cura to do this but there are a number of other programs available.

2) A CAD (Computer Aided Design) program – you will only need this if you want to create your own designs. The idea of this program is you create the design you want then it outputs the .stl file that

the slicer will use. I use Fusion 360 which is very powerful but maybe not the easiest program to learn, see screen image below. There are other programs such as TinkerCAD which are a bit easier to learn if you are starting out in CAD.

At the danger of sounding like a Perth & Kinross library ambassador (I ain't!) it would be remiss of me not to point out that there is access to top of the range 3D printers at P&K libraries for the princely sum of £2/hour. These may also be available in Fife libraries but information is short.

Printing Aircraft

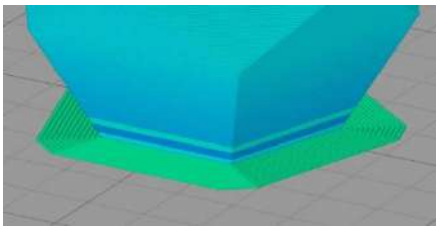
There are a number of companies online offering 3D printed planes, some of the key ones are Eclipson, 3D Lab Print and PlanePrint . Eclipson and 3D Lab Print offer a free design to cut your teeth on and I chose the Eclipson Gö 1 Wolf as my starting model. You can see it below, as represented on their website, I chose to do it in a slightly different colour scheme.

You don't have to look at 3D printed planes for very long before the different types of materials become a factor. The materials that will come up are as follows:

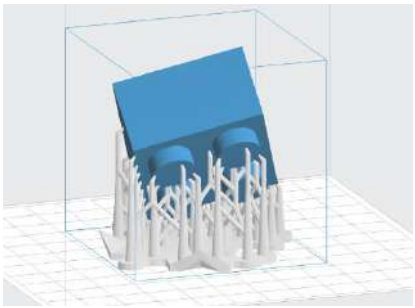
- PLA (Polylactic Acid). This is the typical go to material for people starting out 3D printing, it can be printed to a precise shape, is straightforward to use and is the most economical at typically £15 for 1kg of material. Its only downside for plane building is that it is heavier than some of the alternatives listed below.
- LW-PLA (Lightweight PLA). This as the title suggests is lighter than standard PLA and is hence ideal for plane building. It comes in two flavours
    - Active foaming LW-PLA – this is heated up in the 3D printer to a point where it starts to foam. This typically results in a weight reduction of 50 to 60% over regular PLA. It has the downside that you need to calibrate your 3D printer by printing different test blocks to establish its exact foaming point.
    - Pre foamed LW-PLA – already foamed and no calibration required. Prints like normal PLA. Not as great a weight reduction but still significant.

  Both of these are more expensive than regular PLA with the price being more like £35 per kg, but note that you do use less. The strength of LW-PLA is less than regular PLA as well.
- TPU – Thermoplastic Polyurethane. This is a rubbery type material and is used on the model aircraft to make tyres and control surface hinges as a result of its high flexibility. If you have a 3D printer like mine with a Bowden extruder (toothed wheels that push the filament through a pipe to the heated head) it can be difficult to print TPU because its flexibility becomes a problem. TPU can generally be bought for around £30 per kg but is available on reels of 0.5kg as you don't tend to use so much. Because of the printer I have I have taken a different approach to avoid using TPU, more on that in part 2.
- ABS (Acrylonitrile Butadiene Styrene) and PETG (Polyethylene Terephthalate Glycol) – These are especially useful for making harder parts or for parts that need to stand up to higher temperatures, like motor mounts. Bit more difficult to print due to potential warping. Similar price to PLA.

There are also some unique considerations that tend to be associated with printing aircraft.



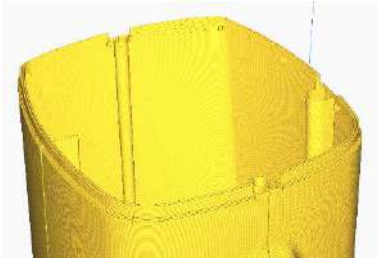
- To keep weight down, the walls of the items being printed are very thin, typically 0.4mm. They also tend to be tall, typically up to 200mm in height. This means that the stability of the part as it is being printed is very important, no swaying of the part can be tolerated at all. To help with this, any gcode you send to your printer will typically print something called a brim, which can be seen in the picture alongside. This helps with the stability, but when it comes to removing it, it can be difficult to get all of the material off without some work.



- Quite often when 3D printing something other than an aircraft, there is a need to add support material, see the picture alongside for an example. This will happen anywhere the design needs to move more horizontally than vertically as the plastic will just collapse under its own weight unless supported. The interesting thing is that plastic can usually be printed at up to 45 degrees without needing any support material – this is used to good effect by the designers of aircraft models. Nevertheless, the use of support material is a complete no-no

as far as the aircraft prints are concerned as the thin walls will make it pretty well impossible to get the support material off.

- Given that a wing or fuselage will be made up of a number of printed sections, there needs to be a way to join them together and also to ensure good alignment. One technique used is to step inwards for the last few layers (remember that if the stepping is limited to 45 degrees, then no support material will be needed) and provide a nice lip for the next layer to be glued to.



Another technique is to print a tongue that can be interlocked with a slot in the next piece, although this works best with smaller parts like ailerons.

A message from Stuart Houston...

"It is a hobby of mine to collect and restore old engines. If anyone is looking to buy or sell engines or to have engines overhauled (bearings changed etc) then I am happy to discuss the work required. I am also prepared to make them offers for buying or selling old unwanted engines." Stuart's Email Address is: flightsoffancy356@gmail.com

Activity at the Field – December/January

Not a great deal to report from the field over the last two months due to it being cold, wet and windy. Just a roundup of who has been visiting the field recently.

Billy Wilkie – Has returned to the club and has been setting up and flying two new helicopters.

Charles Malcolm – Had a maiden flight of his new Autogyro. A successful brief flight but some adjustments to make. His large Vulcan is almost complete but he is having problems with the retracts.

Ian McLuckie – Has been flying his Kingfisher and Bixler after successfully flying his two Mascots. Now a competent flyer (most of the time!).

Tim Knowles – He has visited the field quite often during December and January flying his large gliders and gaining experience on use of flaps, ailerons and elevator mixes.

Paul Wasik – Flew his Precedent Funfly and Magnatila over the last few months when the rain and wind eased up. The Magnatila engine, a Thunder Tiger 54s four stroke had a problem with the rocker arms which Paul had got repaired previously. Unfortunately, it is impossible to get spares these days so Paul purchased an OS 56 four stroke from Scoonies Hobbies. His Moonglow, which crashed some months ago is also nearing completion.

Bill McDiarmid – Appeared at the field a few times briefly during December and January, had a quick flight with a foamy then he was off. Sensible really as it does get very cold when you are stood around talking.

Douglas Fulton – He can almost see the field from his house so he knows exactly what the weather is doing so he has been having the odd flight over the last two months whenever he can.

Tuesday 30th January

A cold, sunny day with a nagging westerly breeze which just made it feel even colder. Even with the cold weather there was good attendance at the field today.

Neil Grayson, Kevin Scott, Billy Hatley, Ian McLuckie, Bill McDiarmid and Paul Wasik.

Neil and Kevin did a couple of buddy flights with Neil's tatty and well-worn Apprentice with Kevin practicing rectangular circuits which were made more difficult by the stiff breeze coming from the west and the sun low in the sky. The third flight was abandoned after a few minutes as the wind seemed to have picked up and hands were freezing cold.

Neil attempted to fly his electrically converted Rookie however, things didn't go to plan! It took off but then cartwheeled to the left and the end of the left wing snapped off all within 30 seconds. It is thought that the C of G must be too far back. It will fly again once the wind is lighter and it has been test glided into long grass (as I said I would do in the article above!).


Neil's Rookie


Kevin's 3D Printed Go Wolf

Kevin Scott decided to fly his Eclipson 3D printed Go Wolf for its maiden flight having been rather hesitant earlier due to the wind. He was using an old 35MHz transmitter and receiver which he had got cheap on the internet. Kevin launched it and Neil was at the controls. It flew well considering the stiff breeze and the size and weight of the model but had trouble making headway into the wind. After a couple of circuits a landing was attempted but the wind made it difficult to control close to the ground and it hit the runway quite hard. The only damage was a snapped wing which Kevin has already fixed with a bit of superglue and acetate film. A successful flight!

Billy Hatley was visiting the field for the first time since last September and was running in a new 35cc petrol engine which he intends to fit into a new plane. He had a workbench with a metal rod anchored securely to the ground and he was running in his new engine. There were a couple of quips about it never being able to fly but the engine ran well.

Paul Wasik was test running his new OS 56 four stroke in his Magnatila which he purchased through Scoonie Hobbies. It eventually ran well but was difficult to start, possibly due to the cold weather. He decided not to fly it due to the breezy conditions but flew his Precedent Funfly instead.

Bill had a couple of flights with his electric foamy then said he was leaving however, 45 minutes later he was still there having engaged in conversation with Ian.

Web Links and Shops

Some useful links below. If you can suggest any other shops or websites, please send me the details.

Model Shop Leeds - www.modelshopleeds.co.uk/

Wheelspin Models - wheelspinmodels.co.uk. Free postage for orders over £100

Sussex Model Centre - www.sussex-model-centre.co.uk

The Vintage Model Company - www.vintagemodelcompany.com

Kings Lynn Model Shop - www.kingslynnmodelshop.co.uk

Scoonies - www.scoonie-hobbies.co.uk. Don't bother with the website. Visit the shop in Kirkcaldy.
87 St Clair St, Kirkcaldy KY1 2NW. Tel No: 01592 651792

Dens Model Supplies - www.densmodelsupplies.co.uk. Excellent for spares for vintage Cox engines.

Hobby King - hobbyking.com/

WestonUK – www.westonuk.co.uk Good value fuel in large quantities. Over 20 Litres (4 Gallons) gives you free postage.

ACCU – www.accu.co.uk. Excellent for bolts, screws and washers. Will take requests for bespoke items.

RCM&E - RCM&E Home Page. The website of the best aeromodelling magazine. If you have a question the forum is bound to have an answer.

RC Thoughts - https://www.rc-thoughts.com/ Finnish website of Tero Salminen. Phoenix Simulator Downloads and updates.

RC World - www.rcworld.co.uk. Located in South Wales between Cardiff and Newport. Stock values on each product are displayed which reflect what are physically in stock, not held at a supplier's warehouse. Derek Grater has used and recommends.

Carbon Copy - Carbon Copy (carboncopyuk.com). Located in Stevenage. A wide selection of Carbon and Fibreglass parts. Ideal for undercarriages, cowlings and canopies.

Just Engines - https://www.justengines.co.uk/. Located in Shaftesbury, Dorset. A wide range of engines and spares. If you can't find what you want on the website send them an email or call.

SLEC Manufacturing (Sun Lane Engineer Company) - SLEC UK Ltd. A good range of accessories but also a large range of balsa and hardwoods. Also available is a laser cutting and CNC milling service.

Component Shop - Home page (componentshop.co.uk). Based in North Wales. A great range of batteries, leads and electronics.

Flight Plan Models - Flight Plan Models Online UK. Based in Tamworth. Bespoke RC Plane Accessories. I find them a little overpriced but they have interesting stuff.

Here's a link to the glider field weather station data at Portmoak gliding club which is just a few miles east of our field. It gives a lot of information including wind, temperature and air pressure. ***Portmoak Weather Station***

Who's Who

KRMFC current committee members are:

Tom Wilson – Chairman

Neil Grayson – Secretary

Mike Hill – Treasurer

Bill McDiarmid – Committee Member

Jim Walsh – Committee Member

Neil Gourlay – Committee Member

Bob Gadd – Honorary Committee Member

Current Members of KRMFC

We are currently approximately **48** in number

It is planned to post an up-to-date members list in the next newsletter when a more accurate list can be compiled.

A membership application form can be found here.

Contacting the Committee

An email address has been created for members to contact the Committee about Club matters. If you have any questions, suggestions or general comments, then please send them to the following email address:

KRMFCcommittee@gmail.com