

JUNE 2022

Flypaper



It's a Gnat!

*John Ivory's latest build: a ducted fan
Tony Nijhuis Gnat – see page 28*

BMFA Centenary Record Attempt

Report – see page 18

JUBILEE FLYING EVENT!
3rd JUNE – ALL YOU NEED TO KNOW
See page 3



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Contents

Contents and Contact	2
Queen's Platinum Jubilee Flying Event	3
Chairman's Report, Les Crane	4
Diary dates	5
Power Competition dates	6
Membership News, Mark Vale	6
Power Competitions at Coombes, John Ivory	7
Helicopter Flying at Poling, Jerry Hansen	12
"Wot! No wheels?" Acro Wot retracts, Derek Woodley	14
BMFA Centenary World Record Attempt, George Evans	18
Slope Soaring at Long Mynd, Keith Miles	20
Model Air Festival of Flight, Old Warden, Clive Upperton	22
EDF Red Arrows Gnat, John Ivory	28
Repairing a Foamie Wot 4, Alex Blok	32
Lack of Progress! Les Crane	38
3D Printed Tucano, Marco Cucinotta	40
What's App Groups, Mark Vale	45
"It's a Mirage!", Clive Upperton	46
Aviation Quiz	52
Aviation Quiz, answers	54
FlyPaper online	55
SRFC Committee	56

Cover: John Ivory with his 25" wingspan Tony Nijhuis Folland Gnat. See page 28. Photo: Mark Vale

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Text for articles should either be in a Word document attachment or simply as plain text within the email message. Photos should be high-resolution JPGs.

FlyPaper back-issues may be downloaded from the SRFC website: srfc.bmfa.org

If you would prefer your name not to be in the website version please notify the Editor when submitting your article.

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Friday 3rd June Queen's Platinum Jubilee Flying Event



Replacing our summer Fun Fly event, this one-day Jubilee event is just a few days away!

The SRFC Queen's Platinum Jubilee Event is one not to be missed! The plan is to start flying about 10.30 with some open flying and then have themed 45-minute slots related to types of aircraft that have been built or flown by UK companies or the military during the Queen's 70-year reign.

We will also have a few competitions thrown in for good measure.

Below is the provisional schedule. This may change on the day if categories are over- or under-represented.

As with our summer Fun Fly events, families are invited.

With all the pomp of a royal garden party (and a little imagination) we will have the barbecue out at around 12.45 for luncheon and then crown the event with another palatial barbecue from about 16.30-18.00. Please bring your own thrones and goblets.

Let's hope the weather is jubilant and we can royally enjoy ourselves!

Schedule

- | | |
|-------|---|
| 10.25 | Initial briefing, no-fly zones, etc |
| 10.30 | Open flying |
| 11.15 | Propeller-driven planes from HM Queen's reign |
| 12.00 | Gliding Competition |
| 12.45 | Lunch Barbecue |
| 13.25 | Repeat Briefing |
| 13.30 | Jet planes from HM Queen's reign |
| 14.15 | Helicopters |
| 15.00 | Power Competition |
| 15.45 | Open Flying |
| 16.30 | Tea Barbecue |
| 17.10 | Repeat Briefing |
| 17.15 | Scale Competition |
| 18.00 | Pack up |

Competition rules (précis)

Gliding. Fixed time motor run, fixed overall duration to a spot landing, deductions for early/late arrival and distance from mark.

Power. 60 seconds take off to spot landing, deductions for early/late arrival and distance from mark to wheels on first touchdown.

Scale. Flying in a scale fashion judged on scale appearance and realistic looking manoeuvres, potential for scale effects.

Chairman's Report

Les Crane gives his first report as SRFC Chairman

This is the first *FlyPaper* since I became Chairman. Although my personal active role is limited members should be aware of (and appreciate) the vast amount of work being done by Committee members with specific responsibilities. At the AGM the questions of recruitment and training to halt declining numbers were discussed. Very quickly an advertisement was drafted and placed on the BMFA website which has resulted in regular membership enquiries and some new members. At the same time a much larger article on the club itself was written and we are told will appear in the *Club Corner* section of the next edition of the *BMFA News* and will hopefully garner some more interest.

Equally, Marc Bowden, our Training Co-ordinator, has been actively busy sorting out trainers and training for those existing/new members who are in need.

Sadly, I am told that the new regulations introduced by the BMFA for examiners has resulted in some not renewing their examiner status.

Work is ongoing on organising the club's summer programme and members are receiving e-mails on events as they get close (I don't know how George finds the time to fit all the work in!) The fixed-wing Glider and Power competitions have already

started and if you have not competed for one of the magnificent prizes on offer (e.g. a pack of Jaffa Cakes – which don't last long when shared with the other competitors) then please have a go, you will be welcome and will enjoy it.

We are managing to cut the strip at Coombes regularly but the team is small, although often supplemented by members taking part in the immediately preceding Glider Competition, so a few extra hands would be welcome. The work is not onerous and usually takes between 1 and 1.5 hours depending on numbers available.

Let's hope the summer weather and other factors allow us to have a full programme this year.

Left: Les at Coombes with his AeroVan twin



Diary dates 2022

Make a note of these dates for meetings at Coombes

3rd June

Queen's Platinum Jubilee Flying Event

10am-5pm

This event replaces our annual Fun Fly weekend. Flying throughout the day including themed slots relating to aircraft flown during the Queen's reign. Barbecue at 12.30pm and again at 4.30pm. All families invited to come along and Royally enjoy the occasion!

1st July

Club Evening

6.30-10pm

Our second club evening at Coombes in 2022. Come along and enjoy the company of club members and bring your models to show them off and fly. Enjoy a burger from the barbecue and a tea or coffee.

5th August

Club Evening

6.30-10pm

Our third club evening at Coombes in 2022. Details as per 1st July.

2nd September **Club Evening**

6.30-10pm

Our final club evening at Coombes in 2022, from October all club nights will be indoors – see below. Details as per 1st July.

Make a note of these dates for meetings at Hill Barn Golf Club

7th October

Club Night

7.30-9.30pm

Our first autumn indoor club night. Details TBC.

4th November

Club Night

7.30-9.30pm

Our second autumn indoor club night. Details TBC.

2nd December

Club Night

7.30-9.30pm

Come along to our pre-Christmas get-together and party with buffet supper, raffle and prize-giving.

Power Competition dates 2022

Power Competition Secretary John Ivory invites members to have a go this spring and summer!

Monthly competitions:	First	8th April
	Second	20th May (postponed from 13th)
	Third	17th June
	Fourth	8th July
	Fifth	12th August
	Sixth	9th September

All are on Friday and start at 1pm at Coombes.

The Power Competitions will follow the same format as run in 2021 with a small prize awarded to the winner on the day. Additional Power Competitions may be arranged for fun-day flying, barbecues, etc. As always, weather dependent!

Membership News

Mark Vale gives his first report as SRFC Membership Secretary

The club has had seven new members in the last month and paid-up membership now stands at 121 members.

The response from our ad in the BMFA online Classified section has slowed up. However, it is well worthwhile continuing with especially as it's free. Overall I get one or two enquires a week about membership.

You could be here!

Well, not here exactly... but perhaps in the next issue!

FlyPaper seems to be really taking off; this issue has 56 pages! Not sure if this is an SRFC record but it could not have happened without the prolific contributions of members, albeit often the same members each issue. We have many active members in the club, responsible for some amazing models seen at our flying sites.

If you have not yet contributed to *FlyPaper* how about sharing your latest build, or a more general article, with the rest of us? Literary quality is not important (the editor will correct any spelling or grammatical errors and will email a proof); it's the content that matters! It's your club... and it's your *FlyPaper!* *Grahame Pearson, Editor*

Power Competitions at Coombes

Power Competition Secretary John Ivory reports on the first and second competitions of 2022

Power Competition Report 8th April

A good start for the Power Competition in dry and not too windy conditions. With six competitors taking part and the briefing and paperwork completed it was time to start.

Round 1: Fly 100 seconds and guess the time then land, the time difference being your score.

Round 2: Take off, do three rolls and three loops and land, recording the time taken. The times from both rounds were then added together to give an overall score.

As I was running the event I felt I should go first, all I can say is my estimate of a 100 seconds needs to be improved. The other competitors each took their turn. What a result for Grahame Pearson who judged his 100 seconds to the second! Round 2 started in the same order as round one, Chris Foss showing how it should be done but not good enough to knock Grahame off his winning position.



*Left to right: John Ivory, George Evans, Keith Miles, Chris Foss, Marc Bowden, Alan Caldecourt and Grahame Pearson.
Photo: Mark Vale*

RESULTS – 8th April

First	Grahame Pearson	23 seconds
Second	Chris Foss	28 seconds
Third	John Ivory	37 seconds
Forth	Alan Caldecourt	41 seconds
Fifth	George Evans	51 seconds
Sixth	Keith Miles	55 seconds

Grahame being the overall winner for the first power competition of 2022 was awarded with a prize of a packet of Jaffa Cakes.

I would like to say thank you to everyone who took part and hope to see you all again for the second competition.



Power Competition Report 20th May

The second Power Competition which was cancelled from the previous Friday nearly didn't happen again. Forecast was for heavy rain until midday then clearing up for a sunny spell in the afternoon but with increasing winds.

I turned up at Coombes 12 noon and the rain had reduced to a very light drizzle; by 12.30 pm the drizzle had stopped and blue sky could be seen in the south-west. The Power Competition was on, we just need the competitors to turn up and to my amazement they did.

After some test flying, issuing of paperwork, a quick briefing on what was required it was time to start.

The object of the competition

To take-off from a **simulated aircraft carrier** (marked out by black/yellow tape), fly a circuit and land back onto the carrier's deck. Three rounds were to be taken.

Scoring

A point is given for every foot from the start of the aircraft carrier's deck to the point where the model stops with both wheels still on the deck up to 60 feet.

If the model stops with one wheel still on the deck it will score 75 points.

If the model stops with both wheels outside the deck it will score 100 points.

(Note: If the model lands or stops outside the aircraft carrier's deck at any time at take-off or landing it will be deemed to have gone over the side and score 100 points.

The person with the least points wins.

Pim Smith was the first to have a go with his very light 3D model. What a start to the competition, landing only five feet from the edge of the carrier deck.

Next to have a go was Chris Foss – with Pim throwing the gauntlet down in round one, the pressure was on. Chris had a very interesting style in this competition: he



Pim's 3D lightweight was a good choice but had technical issues.
Photo: Robin Strange



Chris chose to fly his Wot 4 Pro.
Photo: Robin Strange

took off, climbed, a couple of rolls, a loop, finishing off with a stall turn, then landing.

Clive Upperton was next. Interestingly, he used a delta ducted fan model saying it was more in keeping with landing on a carrier deck. Unfortunately I haven't got a picture of this model but after landing in the drink in round one and two he decided to change models (a 3D Blade) for round three.

It was now George Evans' go. The model he was going to use was an old electric



George floats his Wot 4 in, watched by Judge John.
Photo: Robin Strange



Clive swapped his delta for this 3D Blade
Photo: Robin Strange



John prepares to leave the 'deck'
Photo: Robin Strange

fun fly. However, while Clive and I were talking to George we both asked, "Why does the model have so much up thrust?" George replied, "It hasn't." "Look again, George." It was then he discovered that the motor bulkhead had been broken making the motor point upwards. It was time to change models. Out came the trusty old Wot 4.

The time had come for Robin Strange to have an attempt with his very nice balsa Wot 4. By now the wind had increased, coming from a more southerly direction meaning it was more an angled landing approach. Robin's first two attempts were outside the deck, in the drink, but with a great bit of flying on his final attempt he landed and stopped at nine feet.

Now it was my turn, in the first round I landed just outside the deck, in the drink, Round two was a bit more interesting, approaching nice and steady, just about to touch down then somehow nudged the throttle giving a very hard landing, in the drink again, very near Robin. Robin must have played rugby at school from the speed he moved. My last attempt was my best landing on the deck at a distance of 15 feet.



Pim brings his Acro Wot in, gently does it...
Photo: Robin Strange



...She's down!
Photo: Robin Strange

Conclusions

Pim, Chris and George were very consistent as they never landed in the drink, Clive's attempts using the delta ducted fan really looked the part but a model that was very demanding to take-off and land. If Pim didn't have technical issues with his very light 3D model (reverting to his Acro Wot) he would have been a force to be reckoned with.

RESULTS – 20th May

1st	Chris Foss	36 points
2nd	Pim Smith	45 points
3rd	George Evans	95 points
4th	Clive Upperton	202 points
5th	Robin Strange	209 points
6th	John Ivory	215 points

Chris Foss was awarded a pack of mini rolls for being the winner on the day.

I would like to thank everyone for taking the time and making the effort on a day when the weather was so unpredictable.

Left to right: Robin Strange, Chris Foss, John Ivory, Pim Smith, Clive Upperton and George Evans.
Photo: Dave Hawkins



Helicopter flying at Poling

Jerry Hansen (Helicopter and fixed-wing trainer) reports on an influx of new (to us) helicopter flyers joining the club, so that's good news

Although they will have read the rules a little reminder for us all and a clarification would not go amiss...

Some of the important items are:

- The farmer has a gate at the start of his farm track, so remember the Country Code and leave gates as you find them – open or closed – and take your rubbish home with you.
- The Farmer is very protective of the village and the villagers so keep speeds low and be respectful.
- As you drive down the farm track look in your rear-view mirror to see if you are leaving a large dust plume behind you; please slow down to avoid this as the locals won't appreciate it.
- If you see horses approaching or passing the field you are required to land. Most of the farmer's family ride so it may be one of them and we don't want to frighten the horses.
- Drone FPV flying is not permitted but line-of-sight flying is.
- Hovering closer than 17 metres from the south boundary fence is also not permitted (to avoid scaring the locals) and to comply with the law. (20-metre rule.)
- A reminder that landing or taking off (or hovering) is not permitted within 20 metres of uninvolved persons, see above.
- We are also required to remain 30 metres clear of uninvolved people at all times so be aware and do not overfly the footpath when people or vehicles are on it below that height.

I'm sure you will agree that apart from complying with the law it is important that we don't cause concern to the public passing by and risking the future of our field.

Are you legal?

Just a reminder that by law you must have your CAA registration number on or easily accessible in your plane or helicopter / drone.

To our new or old members, if you would like to gain your 'A' or 'B' certificate we have helicopter examiners within the club that can assist you with that.

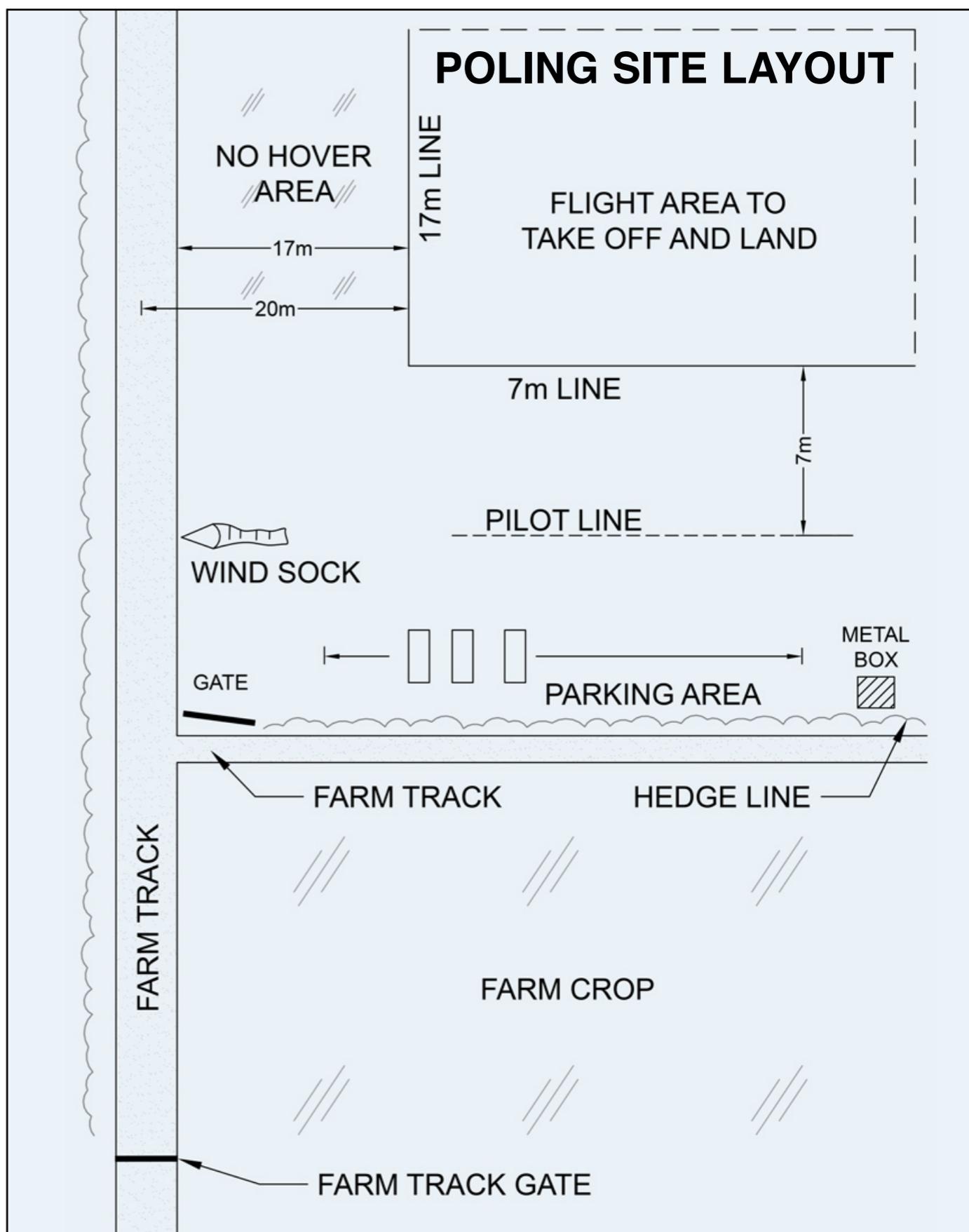
You will see that vehicles are required to park near the hedge and set up behind the cars; this is to allow a little more protection in the event of a helicopter incident.

During wet conditions we have had the occasional van getting stuck; if you park at an angle towards the gate we can pull you out more easily without running over the strip and leaving ruts.

We mow the field ourselves with our rather nice ride-on mower. If you would like to help with that or other maintenance items that would be much appreciated.

We are not able to mark the flight line, the 7-metre safety lines, or the 17-metre line at present but be aware and fly safely.

Finally have fun!



"Wot! No wheels?"

Derek Woodley explains how he fitted retracts to his Acro Wot

The Chris Foss Acro Wot design is without doubt an icon in the UK model flying world.

Whereas the equally iconic Wot 4 was very much a 'fly anywhere, do anything, easy to fly' model it was in the category I would describe as Utilitarian. Simple outline, easy to repair, and thanks to the thick wing section, very forgiving in the air.

The Acro Wot, on the other hand, is a much more sophisticated aircraft. Chris managed to blend aesthetically good looks into a model that was suitable as a first low-wing model for progressing RC model fliers.

Equally the Acro Wot is a design that allows both intermediate and advanced pilots to explore and perfect more demanding aerobatic manoeuvres. Indeed, it is a joy to fly and retains a well deserved following among the most experienced of flyers. Move the Centre of Gravity back a bit and you can have a real 'wild horse' of a model!

I digress...

This article is supposed to be about fitting retracts to a 'foamie' Acro Wot although the story really starts long before foam ARTF models became available.

Many years ago, in the days when we were all flying IC-powered aircraft I built a new wooden wing incorporating mechanical retracts for my Acro Wot. The result, in my view, produced a different and better looking model that flew well. The reduction in drag with the gear up meant less engine power was needed and I was able to 'do the book' with the Webra .61 motor running at half throttle. This resulted in a considerable reduction in noise levels which was quite a consideration in those days.

As you can imagine, the advent of electric-powered models took away the noise



Where it all began: Derek's IC Acro Wot with retracts.
Photos: Derek Woodley

problems that had plagued model flying in the past, losing many clubs their flying sites, so I purchased a 'foamie' Acro Wot as soon as the opportunity arose.

I still hankered after the 'retract look' of my previous Acro Wot and it wasn't long before I took the plunge, scalpel in hand, and modified the foam Acro Wot's wing to take retracts. The result was the model many of you will have seen at Coombes during the last few years.

In my opinion the model's flying qualities are improved, again generally less power is needed, rolls are more axial and it looks nicer!

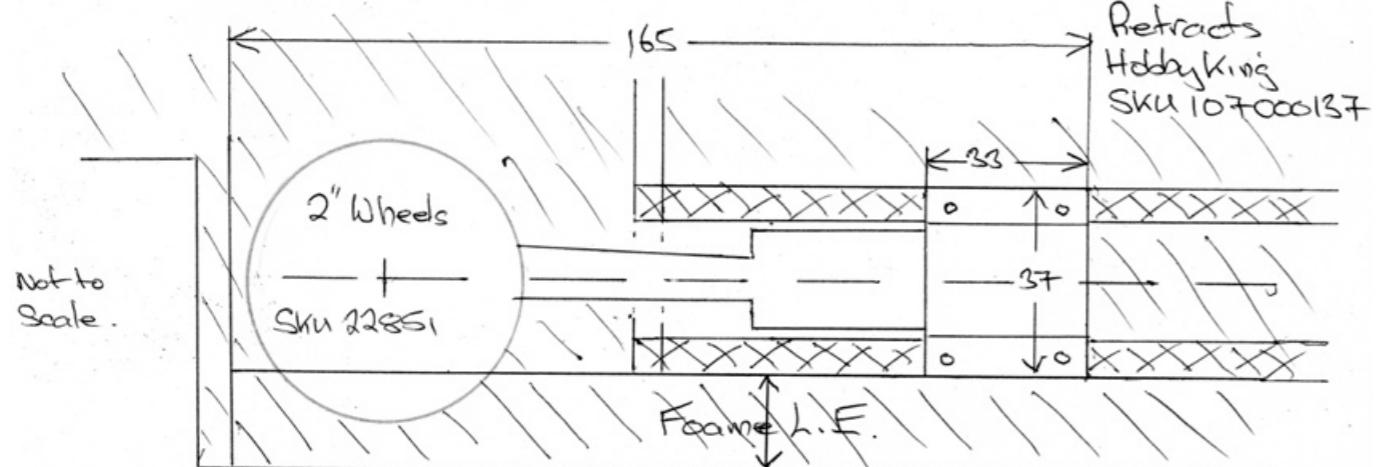
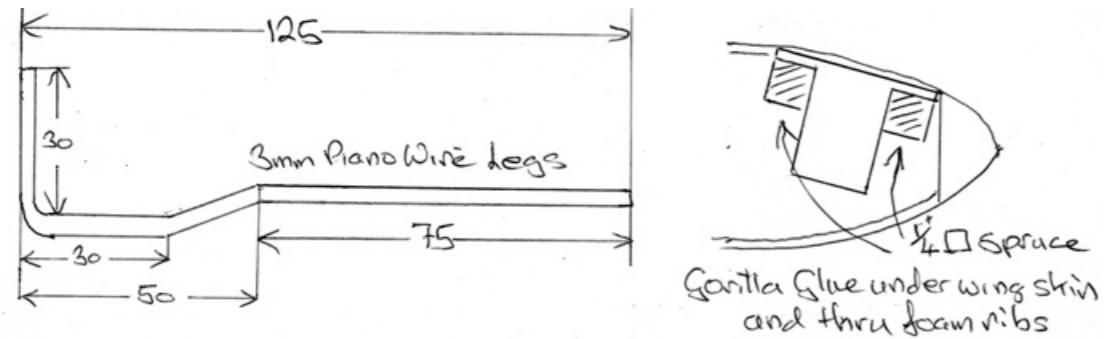
I have drawn out the modifications as best I can to accompany this article. (See next page. Ed.) The drawing is not to exact scale but it should give a starting point and show the general arrangement.



Derek's 'Foamie' Acro Wot with retracts.
Flying photos: Robin Strange



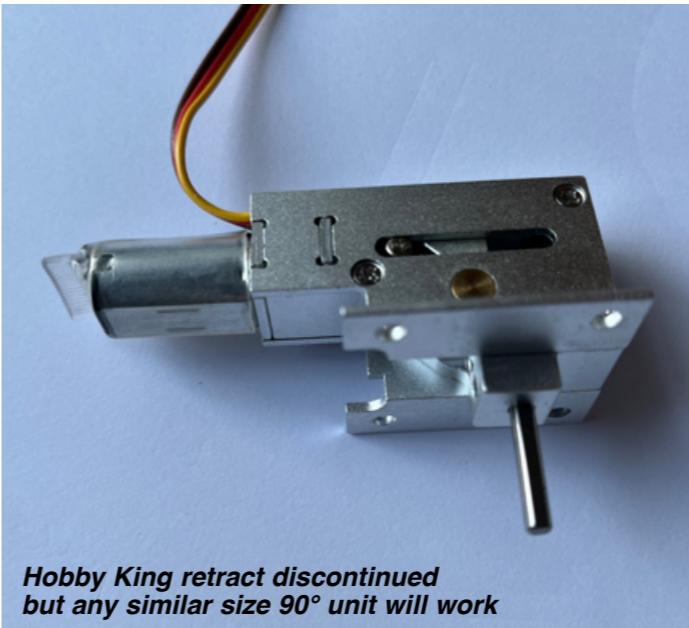
AcroWot
Retracts



It is really not too difficult and once you have plucked up the courage to cut into the virgin foam all will become clear I'm sure. The important part is to bond the $\frac{1}{4}$ " square spruce (or similar hardwood) bearers firmly to the foam. I used epoxy on one wing and Gorilla glue on the other and both have proved successful. I cut the square grooves that the bearers sit in using the hot wire technique (some heated nichrome wire bent to the required shape and powered by a 2 Volt battery) but you could just use a knife with a new blade.



Going down!



It should be possible to slip the bearers under the foam skin but where this is not possible (the skin is quite thin in places) just place a sliver of foam on top of any exposed bearers to finish and smooth the wing profile. The most important thing is to ensure that the forward bearer is firmly glued to the thick leading edge foam as this is where the most stress is likely to be.

The retracts I used are electric units from Hobby King, part number SKU: 107000137. These have proved robust and reliable. Sadly this particular unit is discontinued but you should be able to find something suitable, either from Hobby King or SMC. Basically you need a metal servoless retract assembly (90°) suitable for models weighing up to 2 or 3 Kg (an Acro Wot weighs 1.2 Kg with a 3S 2200 mAh battery).



The undercarriage legs are bent from 3mm piano wire. I use a 12 x 6" prop on my Acro Wot and the retracts give adequate ground clearance for this larger propeller.

One last thing to mention is to take careful note of the rake angle that the retract units are mounted in the wing. This is important as it allows the wheels to project forward when lowered and this will help prevent 'nose overs' when landing.

So there you have it. Get that knife and Gorilla glue out and have a go. You will not be disappointed!

BMFA World Record Attempt

George Evans reports on the BMFA's 'Planes in the Air' world record attempt at 12 noon on 15th May 2022 to celebrate the Association's centenary

When the BMFA announced that they were going to attempt a world record as part of their centenary celebrations we thought that SRFC should be involved and registered our interest quite early on. The BMFA were really on top of it and sent out a steady stream of briefings. But it would be up to members to step up and fly on the day!

After much preparation, and last-minute concerns about the weather, 15 of us turned up at Coombes in the (light) drizzle for the briefing, three more at Ashurst and one at Poling. With the various planes having differing durations ranging from five to twelve minutes-plus we sorted out who was going in which take-off wave at Coombes. Those not confident to fly in a mass event (or who arrived without a plane!) were handed rubber band planes with the added task of building them! After all, the record attempt was not about the complexity of the models, only that they must be in the air at 12 noon.

With less than ten minutes to go the rain eased off and the wind speed dropped – the weather gods at least were on our side! We started launching at 11.55 and continued in waves until 11.59.55 when the rubber-powered free fighters were set off. All were aloft at the specified time of 12.00. Result!

Then we had the really tricky bit, let's all get down again, hopefully in one piece.



What Pilots' Box?
SRFC rules were relaxed with
18 models airborne!
Photo: Gary Beaven

Breaking news! BMFA's Andy Symons has announced on 24th May that the Record Attempt was successful with 3109 models airborne at 12 noon at 263 flying sites across the UK. SRFC is proud to have been part of this achievement

**Left to right: Chris Foss, Alan Norton, John Norton, Grahame Pearson, Phil Benzie, John Ivory, Clive Upperton, Tom Gaskin, Alan Caldecourt, George Evans, Ivan Thomas, Pim Smith and Ed Dilley. Missing are David Morris, Gary Beaven and Stuart Duncan. Gliderers were Mark Vale, Robin Strange and Ian Evans. Lone helicopter flyer at Poling was Ken Harmer. Les Crane supported by calling time.
Photo: Gary Beaven (with Grahame Pearson's camera)**



Landing was in reverse order to take off, again a result, all intact, no bin bags required. Good flying discipline was maintained by all.

We flew all sorts of models but Wot 4s and Acro Wots of various marks were common at Coombes (Chris was taking part after all!) as were fun flies. We were predominantly electric-powered but with a couple of I/C planes included. Ages (of flyers not planes) were mostly at the upper end with a few of our most senior members taking part.

I understand that the weather did not let up at Ashurst and they flew in the light rain and then quickly packed up to join us for the barbecue.

It was time to celebrate; the urn was put on, the barbecue was lit and a traditional UK barbie ensued with water running down our necks but good conversation with a good bunch kept us there for another couple of hours.

Thanks to Andy Symons and Simon Vaitkevicius from the BMFA for organising this; we are still waiting the final numbers but let's hope the record lasts for a few years!



A well deserved post-record barbecue!
Left to right: Pim Smith, Ivan Thomas, Gary Beaven, Clive Upperton, John Norton, George Evans, Chef Tom Gaskin, Chris Foss, John Ivory, Jim Leach and Mark Vale.
Photo: Robin Strange

The Long Mynd, Shropshire

Keith Miles samples the slope soaring delights of The Long Mynd

Many people have said to me, "If you are going to Shropshire then you can't miss the chance to fly on The Long Mynd." With a holiday planned in Shropshire it seemed the perfect opportunity to see what I had been missing.

The Long Mynd is a heath and moorland plateau that forms part of the Shropshire Hills. The high ground is common land and designated as an Area of Outstanding Natural Beauty (AONB). Much of it is owned by the National Trust and is managed by The Long Mynd Commoners.

The Long Mynd Soaring Association (LMSA) has permission to fly at eight sites covering all wind directions. They ask that anyone wishing to fly at these sites pay an annual fee of £5.

The Long Mynd is about seven miles long x three miles wide with the highest point at about 1600ft.

Pole Cottage has a slope ideal for westerly winds and is actually at 1500ft and about 200 metres from the car park.

Having flown on a few occasions, this particular day when the wind was 18mph gusting to 25 I decided to try Pole Cottage and met up with about seven other flyers.

My Wildthing and Phase 6 flew beautifully and the slope, together with the thermals, achieved lift I had never experienced before and one could be forgiven for thinking that the models had electric motors to gain height so quickly.

I met with Mike Evans, a slope soaring racer, who competes all over the UK and Europe. He had just returned from a competition in Madrid where he came 3rd. He was a very nice and informative person. Mike knew of the Wildthing and its designer, Alan Head, and was familiar with the names of Colin Lucas and Chris Foss.

About a mile to the left was Midland Gliding Club (full-size). Gliders were either catapulted or winched into the air with the slope of the hill at the end of the runway.

All in all the flying was something that will leave lasting memories and I feel sure a return visit will be made one day.



*Keith about to launch his Phase 6.
Photo: Sue Miles*



*Keith's Wildthing flew superbly
in the strong lift off the slope.
Photo: Sue Miles*

Model Air Festival of Flight

Clive Upperton enjoys a relaxing day at Old Warden, 8th May

If, like me, you like to plan ahead, you may well have entered in your electronic diaries the model aircraft events at Old Warden, Bedfordshire, home of the Shuttleworth Collection, and organised by Model Air.

The previous year's three events were held in May, July and September but this year only two were scheduled: May and September.

Being somewhat undecided whether to visit or not I was persuaded by another SRFC member to join him and a friend in sharing a car. This, however, was not to be as on the Friday immediately before I received an apologetic call cancelling the trip. Oh, bother, what to do now?

Being conscious of fuel costs as it's a 210-mile round journey I was reluctant to go



The visiting model flyers waiting, keen to enter the flying areas once the airfield is closed to full-size aircraft movements from 10.00 hrs to 18.00 hrs



This Cessna 152 landed AFTER the airfield was closed to full-size aircraft, forcing all model flying to cease while it landed and parked. The young pilot was clearly in contravention of the NOTAM and was upset that he couldn't take off again until 18.00 hrs



The day began with a 'bring and buy', seen here in full swing. There were bargains galore if you knew where to look



A view of the free flight and radio-assist flying areas. Flightline control is minimal to say the least with every variety of model likely to fly overhead. Some even do low-level circuits ready whack your lower limbs. It is all taken with good humour

alone but with promising weather forecast over Bedfordshire it was worth the drive.

It was a decision I did not regret and I trust the photographs and captions provide a good insight into my day out. I was there as a spectator this year, not a flyer. This was no hardship as there was so many wonderful models to see and it meant I could concentrate on taking photographs.

Many of the models flying were free flight, i.e. no radio control. However, there was an interesting 'hybrid' category called Free Flight RTM (radio trimmed model).



Early starters setting up for the control line carrier deck landing competitions. Note the two foamie ducted fans jets



An assortment of 'Ebenezers': fun free flight sheet balsa models, flown with mass launches

SRFC member Glen Tennant enjoying the great weather, about to fly his 'Pete' free flight diesel-powered biplane



Glen launches his 'Pete' biplane

Intended for inherently stable vintage models which of course were designed as free flight models, the model is flown as a free flight model, i.e. no touching the transmitter! (Marshalls are on patrol to ensure no cheating!) The transmitter may ONLY be used to avoid the model from straying beyond the field boundary. This 'safety net' encourages many to have a go at free flight who would otherwise be put off by the prospect of losing their model.

I was pleased to see another SRFC there: Glen Tennant. Glen was very much there as a flyer.

Perhaps I can encourage more of our members to enjoy the delights of Old Warden at the Model Air Scale Weekend on 17th/18th September. Camping is available. (www.modelair.info/events-2). Entry for a single day is just £9 with BMFA, LMA or SVAS membership and gives access to the model flying and the Shuttleworth Collection. An 'A' certificate is required for vintage models and a 'B' for all other types.

Free flight heaven!



Sorcerer, a 1956 design similar to the Flying Banjo of 1964. An updated plan build was in RCM&E, July 2020



Is there a better way to spend a warm spring day?

Well known to long-serving SRFC members who knew him from the time Sussex Model Centre was located in Teville Gate is Ali Machinchy Senior



Another niche area of our hobby is the control line carrier deck landing which is run to specific rules using models based on real carrier-based aircraft. Covering all types and ages, models can be I/C or electric. Shown above is the Fairy Flycatcher and Fairy Gannet, photo below shows the carrier with a Hellcat flying off



What did you get for Christmas?

John Ivory received a Tony Nijhuis Folland Gnat EDF kit from Santa – lucky boy!

Picture the scene... it's Christmas morning and you have just come downstairs and there is a collection of cards, wrapped presents and two large brown cardboard boxes. "All for me?" I said to Heather. "Yes," she replied.

Well, it didn't take long to open all the lovely cards and unwrap the presents. Now, what's in the two large brown cardboard boxes? On investigation the first box contained a laser-cut balsa kit for a 2.5-metre electric glider and the second a Tony Nijhuis laser-cut balsa kit for a 25" wingspan 50mm electric ducted fan Folland Gnat. Now they are going to be interesting to build.

Fast-forward to a bright but cold day in late February at Coombes. I was talking to Clive Upperton about what Father Christmas had brought me and confessed I was a bit reluctant to build the Gnat. "Why?" asked Clive. "They fly really well."

That reassurance was all I needed to commence the build. I had all the hardware parts from the Tony Nijhuis Jet Provost that I had built the year before – it has had a bit of a hard life so I decided to retire it and cannibalise it for parts.

With the weather turning wet and cold, scuppering any plans for external DIY I decided to make a start on the Gnat. This kit is not for beginners as you need to be quite skilled in the various aspects of modelling with balsa. The first week of construction



seemed to go quickly and the model was starting to take shape. Construction slowed down because there was a lot of shaping and sanding to be done but speeded up again with landmark moments of gluing the fin, tailplane and wings in position.



*The finished model.
Photos: John Ivory*

Before covering I needed to fit the 50mm ducted fan, 40A ESC, elevator and aileron servos, cut the canopy to size, construct the pilot seats, paint the cockpit area and fit the two pilots.

The Gnat was now ready to be covered. I decided it would represent a Royal Air Force Red Arrow with the decals to depict a Gnat based at RAF Kimble, Gloucestershire *circa* 1978/’79.

This model is not the easiest to cover with film with many areas of double curvature; it took 18 pieces but finally I got it all covered.

The decals were drawn on my computer, printed on self-adhesive printable inkjet vinyl film and applied to the model making sure that the background red of the lettering decals matched the red covering film.



On a cold but sunny day with a 10 mph wind blowing at Coombes it was time for its test flight.

After taking advice from Clive and Pim (who both own the same model), checking CG position, control surfaces including setting-up a reduced throw rate switch on the transmitter it was time. With a nod from me, Pim launched it. Off it went. Wow! I didn't expect it to be quite so fast. It climbed quickly but was very manoeuvrable. Thank goodness I was on low rates. Soon it was time to land and as luck would have it came in without any problems.

Later in the week I decided to give the Gnat another go; the wind was a little stronger than on the first test flight but not overwhelming. Pim again launched the Gnat and with the control throws reduced the Gnat was much easier to fly.

All went well and I had a very enjoyable flight until I came in to land. A slight crosswind and a little too fast on approach... the Gnat touched down, bounced and flipped over, cracking the fin at the fuselage. Thankfully a fairly easy repair but it spelt the end of flying for that day.



*Top: Energetic launch by Pim.
Photos: Grahame Pearson*



*What could be better than a Gnat? FOUR of them... GNATurally!
Left to right: Clive Upperton, Paul Gladstone, Pim Smith
and John Ivory with their Tony Nijhuis Gnats. Photo: Mark Vale*

Repairing a Wot 4 Foam-E

Alex Blok shows that even a ‘repairer novice’ can, with common sense, carbon-fibre rods and epoxy, soon be airborne again

A friend was flying his Wot 4 Foam-E when, just after take off, it proceeded to suddenly return to Earth at speed, ending up in more pieces than the original kit included. When the owner said he would bin her, I offered to try to rebuild her, so he said I could keep the model if I was successful. I did, and this how...

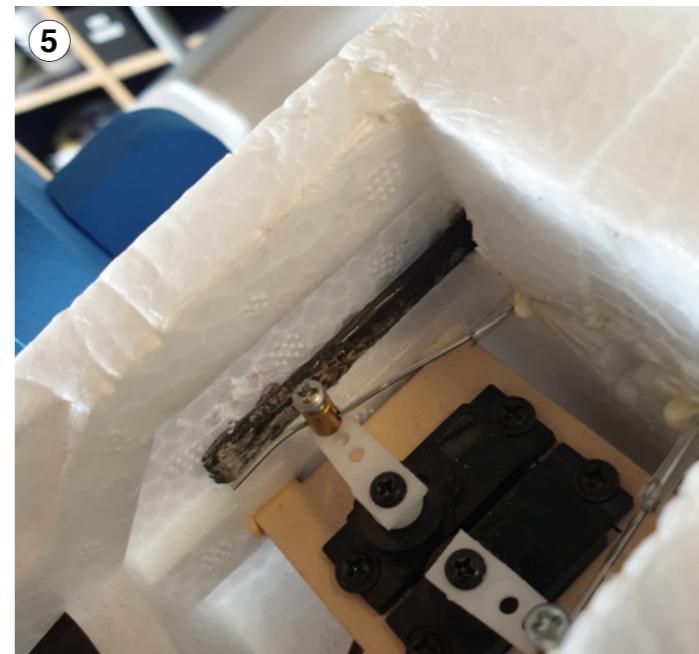
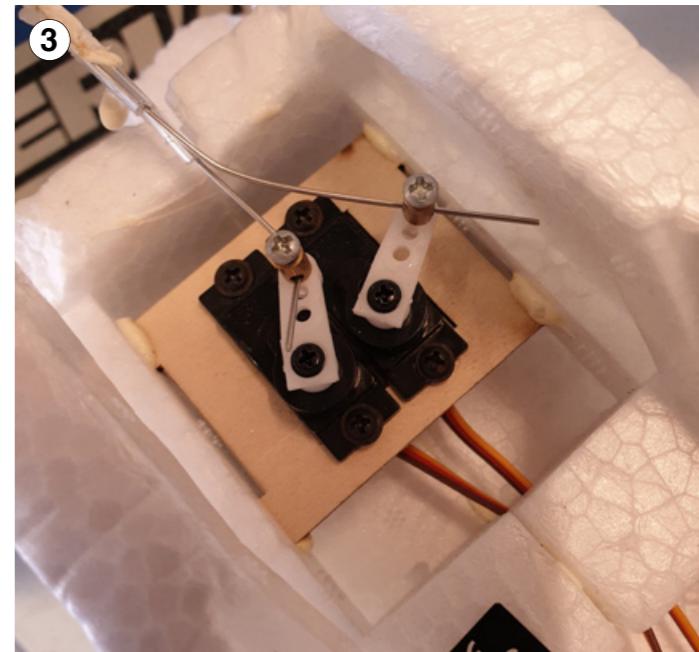
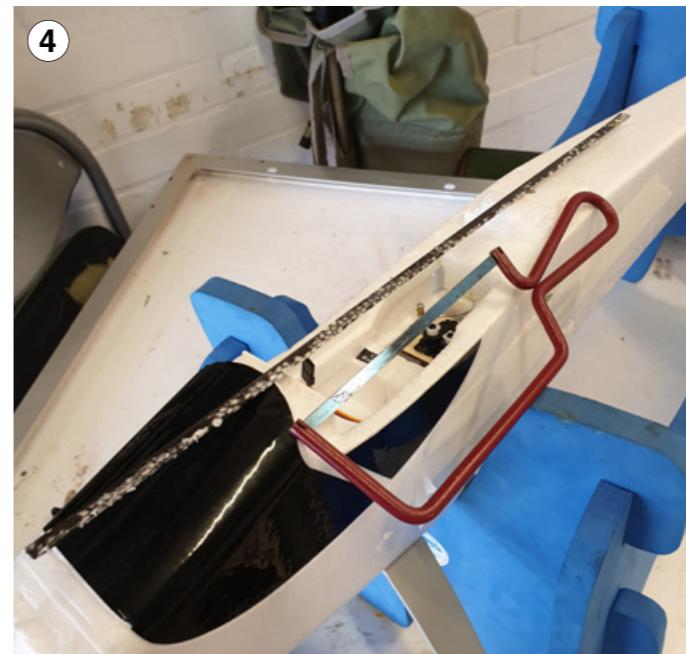
The damage consisted of a broken nose and propeller, the fuselage snapped in half with a gaping hole in it, the servo rods bent, the wing mount ripped out, the tail wheel and rudder mechanism broken, the rudder snapped off, a wheel strut bent, the battery bay cover AWOL and some minor cosmetic damage to the wing (Photos 1 & 2).



But, hey, it could have been worse – though not by much!

The first task was to test and, if necessary, fix the servos. While doing this, I discovered that the elevator servo was faulty, no doubt the cause of the crash (Photo 3). I replaced that and did my best to straighten out the servo rods that run down the centre of the fuselage. They each pass through a plastic tube such that they can move freely. However, the tubes were glued deep inside the fuselage making them fiddly to straighten fully, so there is still some resistance. If I had more time, I would have ordered replacements and would advise anyone to do so who has more time and resources available. Although the elevator and rudder operate fine during after repair testing, only a maiden will prove if the surfaces will respond effectively in flight and the servos will hold up. (*Any resistance between the rod and tube in a ‘snake’ control system will necessitate additional battery power to overcome. Slight resistance is OK. Ed*)

Next up I was about to join the two fuselage parts back together in the usual way by drilling holes or cutting slots in the fuselage and inserting carbon-fibre rods to replace and even improve rigidity (Photos 4 & 5). However, even without the crash

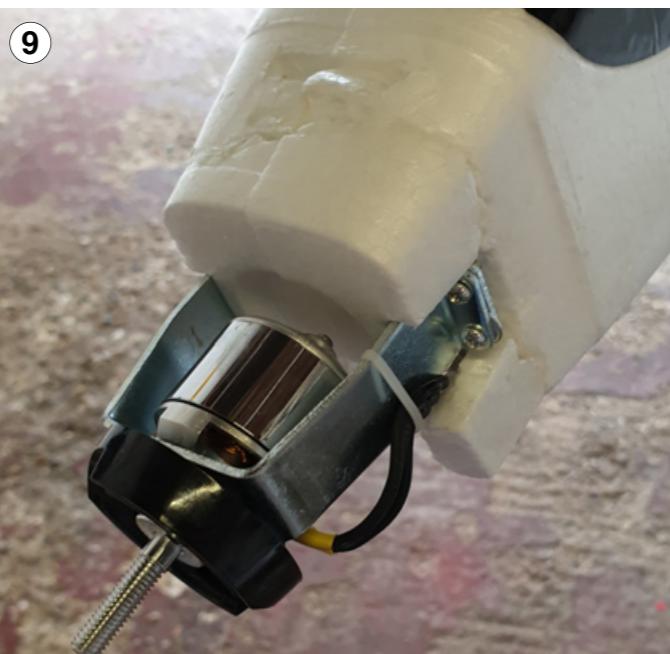
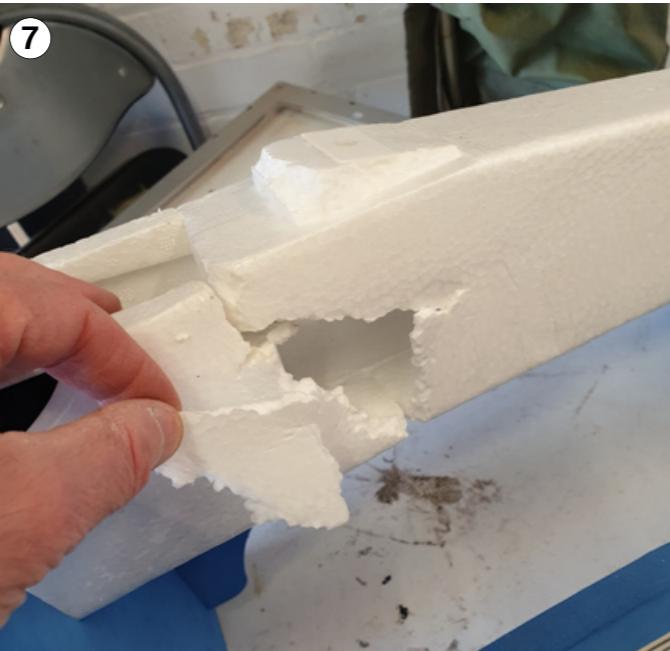


damage, the fuselage foam is so thin in places that making holes or slots would be very risky. So I used a lazy technique I have successfully used before on other larger heavier models and epoxied two flat rectangular rods onto the *inside* of the servo bay area. The little G clamps I won in an SRFC auction among a large collection of ‘these could come in useful one day’ bits and bobs proved invaluable holding the rods in place while the glue set (Photo 6). The clamps are also great for keeping computer cables on my desk tidy!

The repair is more robust than it looks in the photos and held up during my attempts to stress the fuselage by hand. That said, only pulling some G during a maiden will ascertain if my repair is adequate!

Having hit the ground hard during the crash, the undercarriage mount had become loose – a weak point on this model – so I applied some epoxy and used glass-fibre tape (the reinforced tape used for parcels, etc) to hold it in place while it dried.

I then repaired the hole in the fuselage by gluing the broken piece of foam back in place (Photos 7 & 8), filled in the gaps with Model Lite filler, smoothing it to get rid of

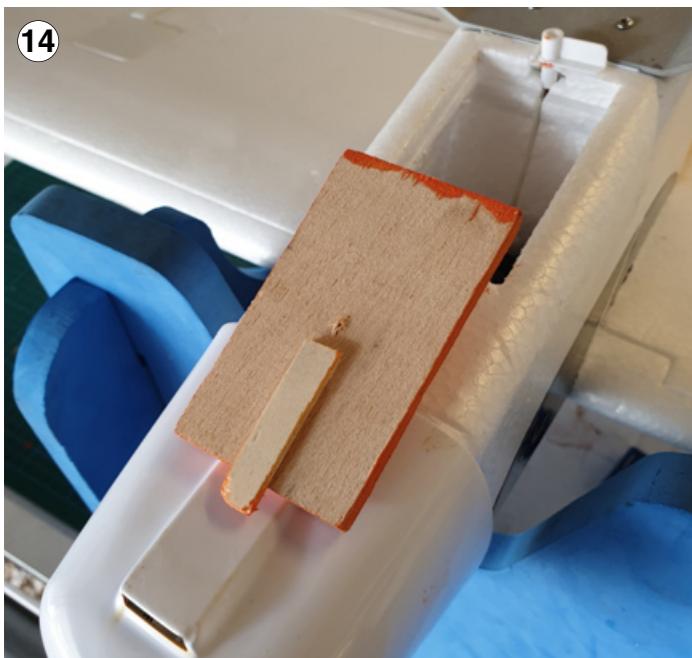


any unsightly lumps. Annoyingly, it does not look like I took any photos of the completed repair to the hole in the fuselage before covering it in yellow film as part of the new livery.

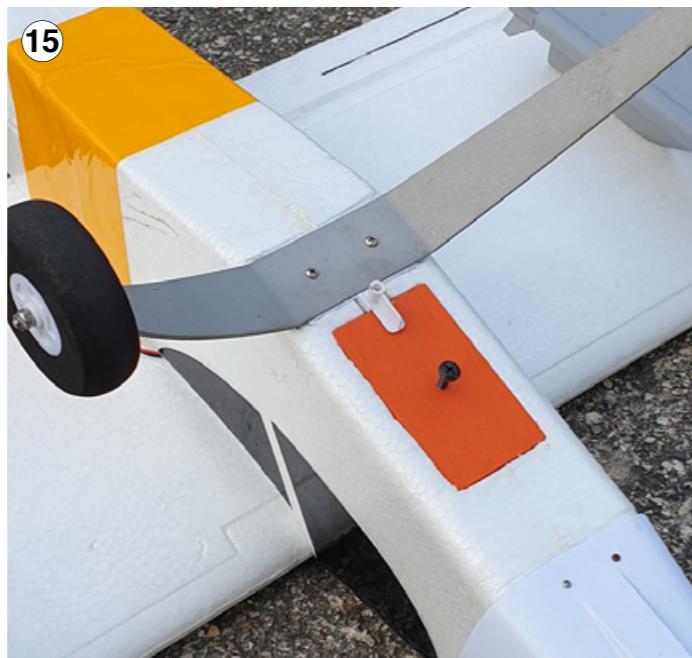
The nose was repaired using epoxy (Photo 9) and held in place to dry, again using glass fibre tape. CA was used to glue the cowling mountings back in place. I noticed that the cowling and whole prop mount is angled slightly to one side. I assume this side thrust is intentional so as to counter propeller pull, or ‘P factor’. I made sure to retain this side thrust.

I cannot over-emphasise how useful glass fibre tape is. It is not only reliable enough to hold parts in place while glue sets, but can also be used as an alternative to glue if you do not have any on hand. It can also be placed along leading edges to protect them from damage when landing in fields where sun-dried crops will rip into foam. However, bear in mind that over several years, in particular under sunshine, glass-fibre tape will slowly harden and become brittle, so will require periodic replacing.





14



15

The plastic piece that the wing mount screw fits through had been ripped out, leaving a gap in the wing. Repairing that was quick and easy (Photos 10-12). However, with the structural integrity of the centre wing section critical, I cut to size and glued a 2mm thick rectangular carbon-fibre strip to the top. Being a fan of functional engineering detail, I did not cover the carbon fibre strip, rather, left it exposed. Think Pompidou Centre!

The infamous Wot 4 Foam-E battery hatch cover had indeed been ejected. I cut some plywood to size (Photo 13), glued a prong to hold it in place (Photo 14) and fitted a protruding screw to use as a grip for ease of removal (Photo 15). I understand from fellow Wot 4 fliers that the battery hatch cover has a habit of flying off in the air, even without a crash. This is due to the rotating catch becomes loose over time. My plywood cover is thick enough such that the plastic lever that holds it in place requires a lot of force to move. But as usual, only some enforced G forces will tell! (*The rotating catch must be checked frequently for any sign of looseness. Strong neo-magnets or even traditional rubber bands are alternative methods of securing the hatch. Ed*)

Finally, decoration. Other than warbird roundels and such, I am not keen on overly decorated models. In the case of the Wot 4 Foam-E, they look quite attractive with plenty of exposed white foam, so am keeping the livery to a minimum, with just enough to help with orientation. Update: Subsequent flight tests indicate the white is quite hard to see in some orientations and skies, so I will probably add some more colour to the wings at some point. (*Day-glo orange panels on the wings and along the leading edges is highly effective. Ed*)

I wanted to see how involved it would be to use film to colour the rudder because I didn't have any blue paint in the workshop. When I last decorated a Wot 4 Foam-E, some of the film came off mid-flight, the sticky not being strong enough to handle the airflow. Therefore, this time I applied some CA to the film before affixing it to the model.

After Russia invaded Ukraine, I fitted some missiles to the Wot 4 wings from my F-18 (RIP). She's ready for battle! (Photo 16).



16

FLIGHT TEST

At the time of the rebuild, I had left the club, BMFA and CAA due to lockdown and family matters, so although I carried out the very first take-off at the Gap (Photo 17), I had a friend properly test fly the rebuilt model, including pulling some loops. The repaired model has had about seven flights now, including a few bumpy landings and has held up well!

FOOTNOTE

I cut some corners during this rebuild, but would not have done if she was a warbird or other heavier scale model where I could justify more time and resources.



17

Lack of progress!

Les Crane reports on a hopefully temporary lull to his usually prolific output!

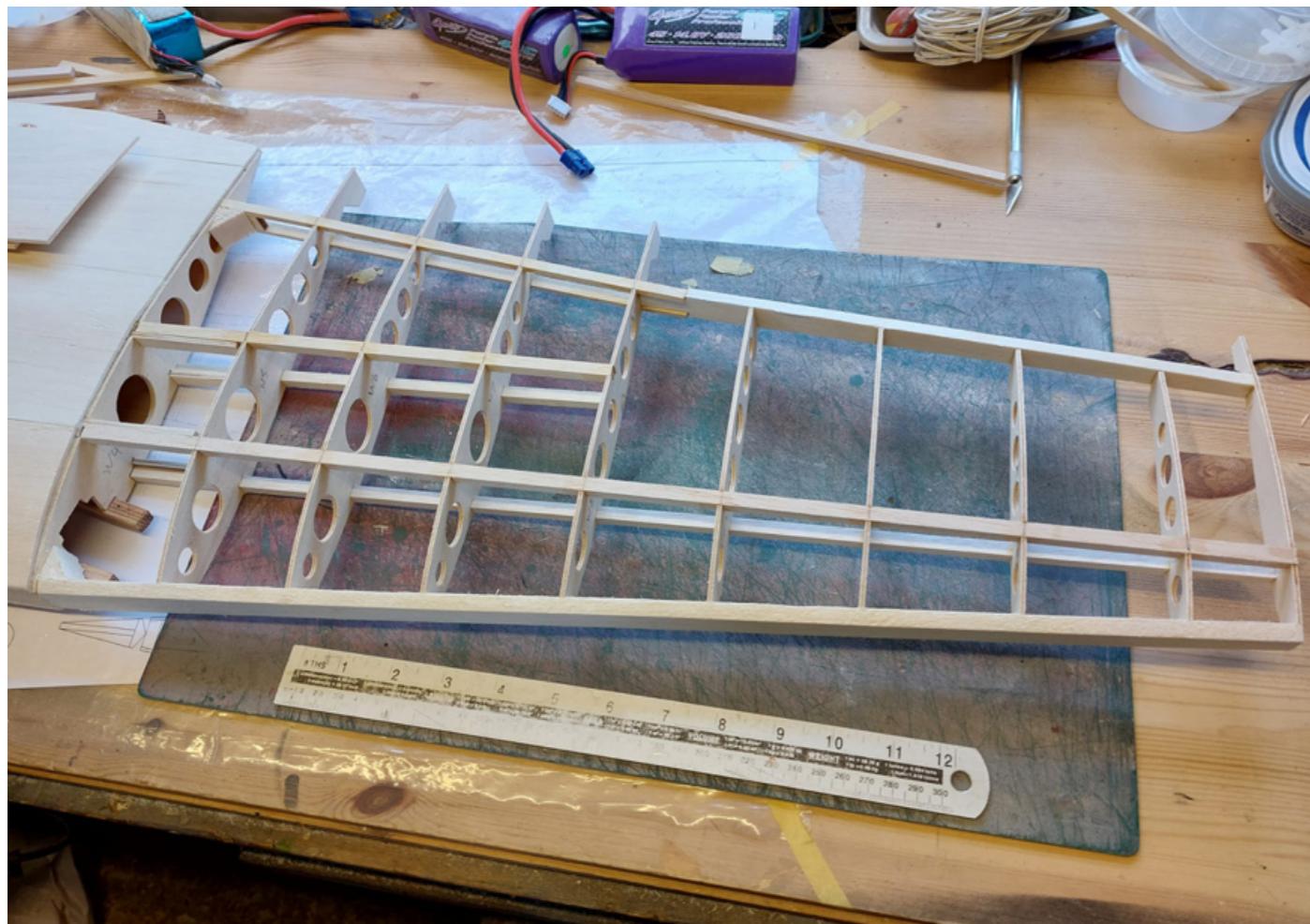
Very little to report on the building front. Some progress has been made on the Tony Nijhuis Hurricane main wing which is about 60% complete. The photos show how far I have got and the basic construction.

I did try to maiden the 60" RBC Tempest V (see June 2021 *FlyPaper* for details and photos) in April but stupidity prevented this. Experience tells me I should always check the set-up on a model I have not touched in months but, of course, I could remember everything, couldn't I?

Anyway, I took it to Coombes only to remember before putting it together that the Tempest was on a different transmitter to that I had taken with me for other models.

Next time up I made sure I took the right transmitter, assembled everything, but nothing happened when I switched on. A check quickly revealed that it was set up for a separate receiver battery which my infallible memory had forgotten.

I have three models to maiden and you can bet that I will do a dry run at home before taking them to the strip. Fortunately the only person to witness my errors was the British Scale Champion who was going to maiden it! Embarrassing or what!



3D printing a Tucano

Marco Cucinotta embraces the new technology of 3D printing

Over the last few years I have built both conventional balsa models, Depron foam models and more recently foamboard models (using the popular Flite Test plans). It is fair to say I just enjoy making things, whether that may be model planes or in fact anything. So when a friend generously gave me his 3D printer I could not resist using it for our great hobby.

The technology behind 3D printing has advanced greatly over the last few years and has resulted in relatively cheap machines, suitable for home use, being readily available. While the whole concept may seem like a new weird science, involving computer models, software, slicing and a whole range of new terminology, the basic principle is fairly simple. In its basic form, a 3D printer takes a solid plastic filament, heats it to melting point and ‘prints’ (deposits) it on a glass plate in a similar manner to the way a chef may pipe someone’s name in icing on a cake. Moving the heated nozzle around will cause the molten plastic to be extruded onto the build plate and form a shape. This shape however will only be around 1/5 of a millimetre high. If the build plate moves down fractionally and the nozzle deposits another bead of plastic directly on top of the one beneath, squishing the two to fuse them together, you can form another layer. Repeating this process over and over will result in a plastic part, made up of many fused-together layers. (These are the fine lines you can see when



#3DPrinted #RCAirplane #ItFlies

How to Assemble RC 3D Printed Tucano - Planeprint

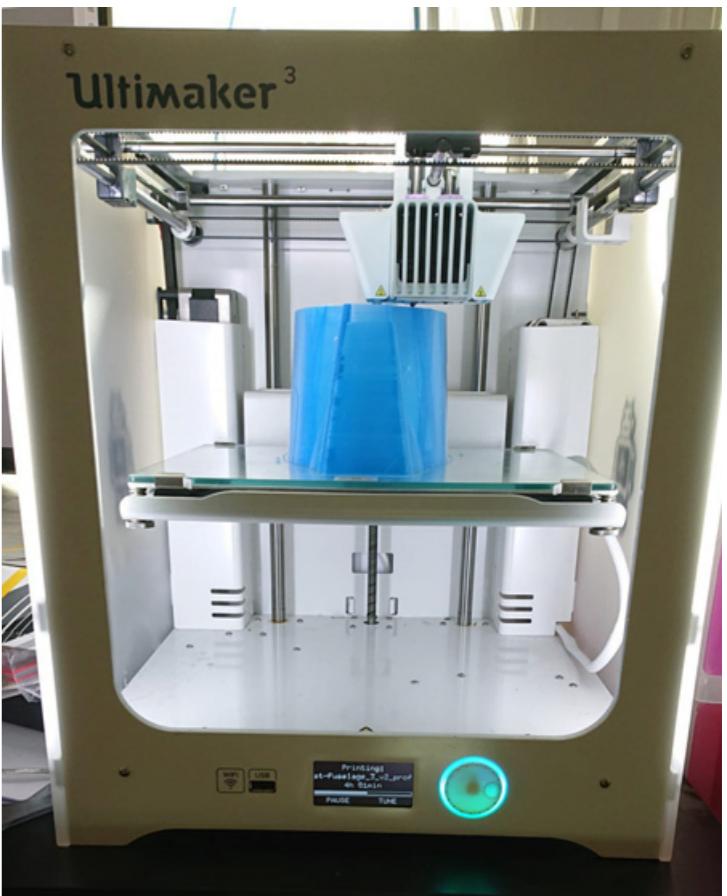
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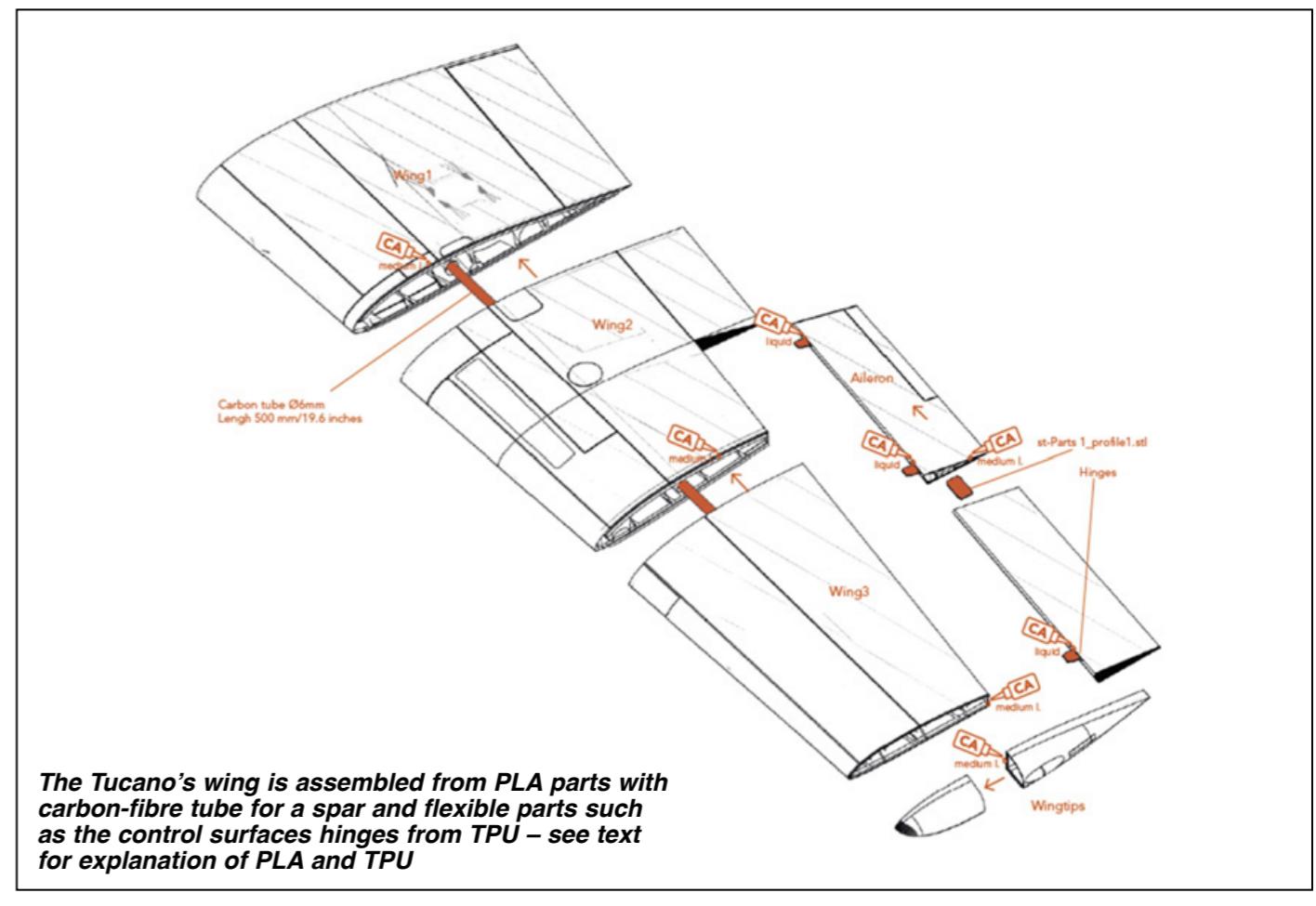
closely examining a 3D-printed item.) In a similar way you could cut out, in cardboard, a wing rib template. Do this a few times and then stick the whole lot together. You would have a solid cardboard rib made of layers ('slices' in 3D printing speak). This is the final piece to the puzzle. If you have a computer representation of the part you want (a computer model), then you can use software to slice this model into layers and the 3D printer will print these layers to produce your part.

With my gifted 3D printer I obviously wanted to print a complete model. I realised that, just as with a balsa kit, quality of what plans were available varied hugely.

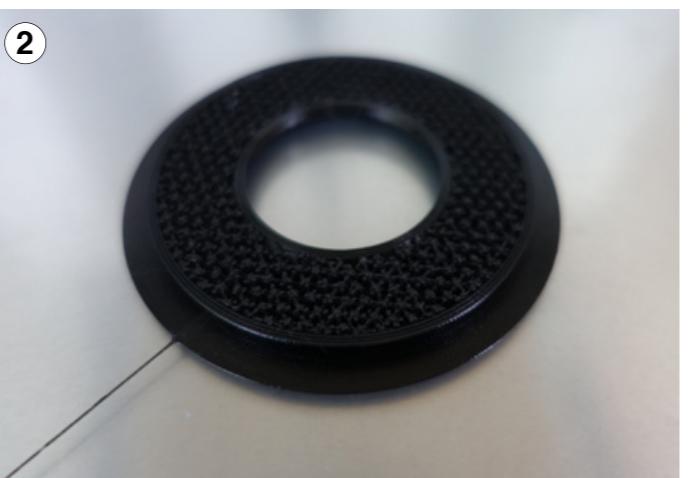
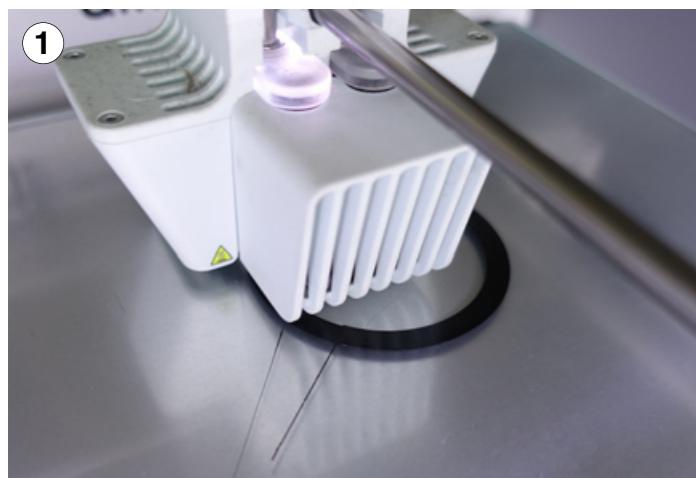
To maximise my chances of success I spent considerable time finding what looked liked a sound, well engineered model. I discovered Planeprint who produce some great looking models



Marco's Ultimaker 3 3D printer, seen here printing the Tucano's cowl. Not a quick process, many layers, or 'slices' being required. Best plan is to print large parts overnight



The Tucano's wing is assembled from PLA parts with carbon-fibre tube for a spar and flexible parts such as the control surfaces hinges from TPU – see text for explanation of PLA and TPU



Making the undercarriage: the tyre being printed, gradually the slices are added (1). Close up shows the hollow structure of the tyre made from flexible TPU filament (2). Eventually a bag of parts is accumulated (3). The finished undercarriage leg is reinforced with a carbon-fibre rod (4)

including a Tucano – a subject I have long wanted to model – and having watched a YouTube build video by Tony McMillan (search for ‘How to Assemble RC 3D Printed Tucano - Planeprint’) I purchased Planeprint’s Super Tucano computer model of the plane for around £30. I then used free software to slice it and print it out. The plastic filament for the whole model probably cost the same amount. Depending on how it is sliced the printer can produce strong solid plastic parts or hollow lightweight ones with internal ribs for support. As the wingspan is 1300mm both the wings and the fuselage are printed in sections and superglued together.

I started by printing the undercarriage and other solid parts as I am more familiar with printing this type of part. (3D printing is often done as part of my day job, making plastic prototypes prior to making the parts in metal.) These printed out nicely, so I turned my attention to the hollow-section fuselage. The outer skin is effectively a single layer, around 0.4mm thick. Some tuning is needed to set the printing parameters correctly to achieve a strong consistent print. I must admit these parts scared me slightly. 3D prints are weakest where the layers join each other and the layers run nose to tail on the fuselage. While there is some internal structure for stiffness there is still the fear that the whole tail could fall off! The wing is not such a worry as it has a carbon-fibre tube running through the printed parts. As I write this I have not yet flown my Tucano so I could be wrong about this weakness, though the aforementioned Tony McMillan has made a YouTube video of his model flying and all seems well (‘Maiden Flight RC 3D Printed Tucano - Planeprint’). Others have

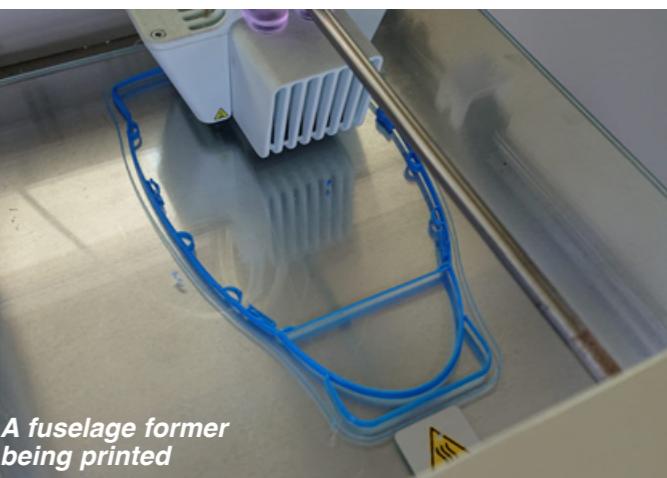
successfully made and flown this model but I still think a nose-to-tail carbon-fibre tube would make me feel better.

Once the parts were all printed they needed to be glued together. In total the printing took well over 100 hours. This sounds a long time but you do not need to be present for the printing. The machine is quiet, odour-free (if using PLA – Polylactic Acid) and can be left to print. Medium CA is advised for assembly. The filament used here is PLA which is a general purpose plastic. I have noticed with other 3D printed parts in PLA that sanding the joints to produce a slightly rough surface makes the bond much stronger.

The majority of the plane is produced from PLA. An interesting design feature is the use of flexible materials for the undercarriage mounts. Here a flexible square top hat is printed with the undercarriage leg fixed into the hat and the brim screwed into the fuselage. This flexible material (TPU – Thermoplastic Polyurethane) is also used for the tyres and the control surface hinges. Carbon rods are used through the wings and tail fins. These removable parts are held together with M2 self-tapping screws.

One thing I have noticed is that you need to be very careful with the temperature that the model is stored in. I was mindful when I set the model up in the conservatory to keep the windows open to limit the ambient temperature. At some point I must have handled the canopy while hot and there is clearly a thumb shaped depression in it now! Like many plastics PLA is a thermoplastic – as opposed to thermosetting – so will always wake up again in the presence of enough heat.

This model is still a work in progress, the fuselage is glued together and the wings are ready to be assembled. The model has been designed for HS-55-size servos. A



A fuselage former being printed



Table tennis net gives an idea of scale – it's big!

number of options were provided and all you had to do was print the mounts for the servos you prefer. Fitting the servos and control rods should be easy as tiny tubes are printed into the model for elevator and rudder control. In a similar way a larger tube is produced through the wing to carry the servo cables back to the fuselage.



So far this has been a fun experiment. On YouTube you can see proof that 3D printed planes are functional and viable. I don't think in any way it will replace more conventional model-making methods. It will, however, be fun for those who try it, and that is the main thing. I do believe that the use of individual 3D printed parts in models will definitely increase. For those prepared to take the time to learn 3D computer modelling, using a free package like Fusion 360, the possibilities are endless. Strong, complex, accurately shaped parts can be made cleanly with minimal effort. Take the carbon reinforced Tucano undercarriage shown here as an example.

Technology is always evolving – who knows what the future will bring? Already there are 3D printers that can lay carbon filaments within a plastic print. I will continue with this model and hopefully you will see it flying up at Coombes soon!



Airframe complete but still a lot of work to be done fitting the motor, ESC, radio gear and linkages, etc. Paintjob and markings will be applied after the maiden flight!

WhatsApp groups

New member? Mark Vale and Les Crane on how joining a WhatsApp group can help your flying!

The SRFC Committee believe that R/C flying is so much better when you can do it with others. This can be especially true if you are a new member.

However, it can take a long time to form important social relationships and build a camaraderie.



alone I would be much less likely to make the effort to come to Coombes.

The following are some WhatsApp groups covering fixed-wing power and gliding.

SRFC Gliding. This group covers people who have an interest in gliding be it electric, bungee or slope. The group fly at Coombes and Ashurst (club sites) and also at various slopes which are not club sites.

The initial contact for this group is **Robin Strange** whose SRFC e-mail address is robin.srfc@gmail.com.

Coombes Flyers. Robin is again the initial contact. This group generally consists of power/gliding fixed-wing aircraft, but who mainly fly from mid-morning to early/mid-afternoon. In general, it is used by the members to see if anyone is intending to fly on a particular day.

Flying Today. This is a smaller group who normally fly from around 2pm and during the afternoon. In the summer months this extends into the evening until dark.

The main admin contact for Flying Today is not on a Committee member but you can make contact with the group via **Les Crane** or **Grahame Pearson** whose SRFC contact e-mails are les.crane1946@gmail.com and grahame.pearson.srfc@gmail.com respectively.

To join a group your mobile number will be needed to enable the administrator to invite you to join the group.

You are welcome to join these groups at any time although they will, obviously, be more useful if you have your passed your club solo – until that stage you will of course be communicating primarily with your instructor.

"It must be a Mirage!"

Clive Upperton converts a Jet Hangar Hobbies Kfir to Electric Ducted Fan

I was asked by our esteemed *FlyPaper* Editor who, having seen a couple of short video clips of the above model (links at end of article), asked if I would write an article regarding its construction and conversion. As I did not actually build the airframe, I am a little short of details and photos so will begin with how I obtained the model, which occurred because of a tenuous link with another model converted from I/C power to electric.

Way back in 2004 I happened upon a large Grumman Panther hanging from the ceiling of Sussex Model Centre and took an instant liking to it. Being around the Christmas period it became an obvious present to myself and so with pounds exchanged I became its next owner.

Moving forward to 2016 I was browsing eBay and found an identical Panther but unbuilt which I thought an ideal purchase as a spare for the one already in my possession. Entering the bidding I discovered the vendor also had the Kfir for sale. I bid for both models, lost out on the Panther but won the Kfir.

The model was constructed from a Jet Hangar Hobbies kit, comprising of a glass-fibre fuselage, balsa fin and canards with a balsa-covered foam wing. Obtained in its current air superiority grey scheme, originally it was painted in a desert scheme of green, brown and sand upper surfaces with light grey/blue undersides. Designed to

Israel Aircraft Industries F-21A Kfir

The full size Kfir (meaning 'Lion Cub') was created by Israel as a cost-effective warplane to defend its airspace and in essence was a development of the French Dassault-Breguet Mirage III and the later Mirage 5. The Mirage originated in the mid-fifties; it was fast but not ideally suited as a 'dog-fighter' at the time of the 1967 Six-Day War. However, the superior



flying skills of the Israeli pilots overcame its limitations.

To improve the type IAI, the Israeli defence contractor, set about modifying the aircraft by replacing the engine, and from the C-2 model onwards, adding the canards (miniature wings ahead of the main wings), extending the wing chord and increasing the strength and travel of the undercarriage. These changes brought about significant improvements in take-off and landing distances, the ability to carry greater weapon loads and improved radius of turn all with updated electronics and a reduction of black smoke from the GE-derived jet turbine. The converted aircraft were also sold to foreign air forces as a cost-effective platform with a number being used by the US Navy as Aggressor aircraft, designated F-21A.

Today many of these aircraft remain in service and continue to be updated. Not bad for a near-70-year-old design!

be powered by a .46 to .90 cu.in. high-performance two-stroke tuned pipe-equipped glow engine driving a 5" (127mm) diameter fan at 20,000-plus rpm these were noisy beasts. The Kfir is of delta wing configuration with small, fixed canards and was purchased with a full set of servos and fuel tanks but no retracts or radio gear. The Hangar Hobby kit can be obtained with either a scale (small) or a sport (large) wing, mine has the latter with controls comprising of inboard elevators and outboard ailerons. However, on the advice of Pim Smith the controls were joined to give elevons controlled by a single powerful digital servo in each wing.

Having collected the model from Telford and closely examined it was time to decide what and how to return it to flying condition. The two options other than fitting the obligatory retracts was a return to either OS91 VRDF power i.e. 15cc I/C engine or go down the electric route with a 12S 5000 mAh Li-Po battery and brushless motor both of which could power the 5" Ramtec fan. With many 'jet' flyers adopting various sizes of electric ducted fan jet models, this seemed the way to go despite the penalty of flying around with the dead weight of the batteries, most notable with the larger airframes.

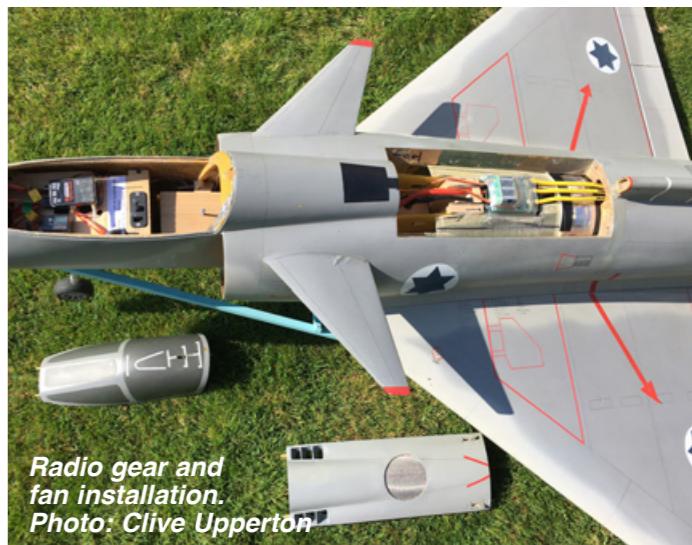
This decision was made easier by the fact I had a spare 5" fan and motor from a previous crashed airframe that was very much beyond repair. The Royal Navy Phantom in the accompanying photo illustrates how the fan unit was removed for which I take full credit!

The overall flying weight is always important and generally a .90-sized I/C-powered 5" ducted fan complete with accessories and fuel will weigh less than one powered by a large electric motor, ESC and two large capacity batteries. The aim is therefore to minimise the airframe weight so as not to be significantly different from the power package weight. The selection of the fan power system is another subject; and with the many ARTF models supplied complete this problem is solved by the manufacturer. For those building from scratch and for the first time, kit suppliers will usually advise of a suitable combination of fan with motor installed, ESC size and battery cell count and capacity.

I return now to the Kfir and the critical factor of overall weight. The requirement was for the maximum weight to be 7 kg (15.4 lbs) to allow flying at Coombes with no additional pilot or flight restrictions. Using the rule above, the airframe including all



'Re-kitted' Phantom provided fan unit.
Photo: Clive Upperton



Radio gear and fan installation.
Photo: Clive Upperton

radio gear including servos, receiver, retractable undercarriage, and Rx flight battery needed to be no more than 3.5 kg and the complete power system comprising of two Li-Po batteries, fan with motor and 120A ESC likewise no more than 3.5 kg.

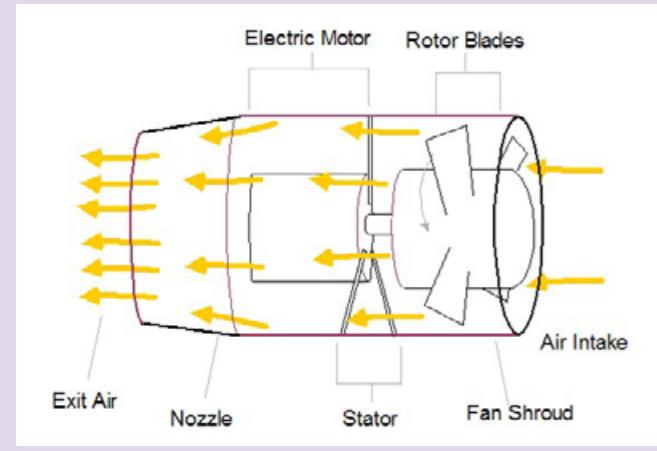
One further complication was the weight distribution and it was obvious from the outset than with 1.64 kg of batteries to house in the cockpit area and the original fan situated virtually on the CG that it would be nose heavy. This led to new formers being cut from ply and the engine mounting moving aft to the rearmost position under the existing top hatch. The inlet ducts were increased in cross-section by removing the scale inlet cones and a battery box fitted between the inlet ducts under the cockpit area leaving room in the nose, just, to fit the steerable retracting nose and modified servo tray including Rx battery and receiver with flight switch. The rudder servo was moved to the fin. With the location of the heavy items in the only – but hopefully optimum – location within the fuselage it was time to attend to the wing and add pneumatic retracts and fit digital servos for elevon control.

Once the equipment was thus installed it was time to check the CG position. This part of the process took some head scratching and several sources of information were researched including an original Jet Hangar Hobby Mirage III plan (remember the full-size Kfir was derived from this aircraft), an internet search for the model Kfir, an on-line CG calculator and an old faithful publication: Gordon Whitehead's *Scale Models* magazine. A scale drawing was produced and a few differing dimensions for the CG were calculated and checked on a balancer. However, I remained unsure of which was ideal. The maiden flight would hopefully confirm my choice – or otherwise

How does a ducted fan work?

Stating the obvious, ducted fans operate as their name implies. They are fitted with an internally ducted high-performance fan which takes air from an inlet opening then blows it out of an exhaust tube to generate forward thrust.

The air enters the impeller (fan) spinning at high revolutions propelling the now pressurised air out of its exhaust at increased pressure and velocity. The key to optimum performance means we will need to know several of the basic requirements. Firstly, they



thrive on the air fed into the fan – too little air will starve the fan and grossly oversize inlets will provide too much air for the fan to process as well as increasing drag from the larger size. An established rule is that inlets should be sized to 95% to 110% of the Fan Swept Area (FSA) with the exhaust outlet (thrust tube) sized to 75% to 85% FSA; as on a full-size jet, having the outlet smaller than the inlet compresses and accelerates the air, thus further increasing thrust. The fan swept area is the fan shroud area minus the impeller hub area. The exhaust outlet percentages provide a good compromise between static thrust and exhaust velocity.

One further point to note is that air entering a duct with the correct profile will have a quietening impact on the noise levels. The ideal inlet shape is a 2 x 1 ellipse profile. For scale like performance a thrust ratio of 0.8-to-1 is ideal. Therefore, to ensure the best performance we need efficient ducting, motor and fan matched for optimum power and duration; the fan inlet lip must be aerodynamic to ensure maximum thrust and quietness.

– although I was certain that with a delta canard the centre of gravity moves forward towards the main plane leading edge.

Once the model was completed it was weighed to see if it met my 7 kg weight limit. Well, true to form when scratch-building it was heavier at 7.2 kg and therefore outside my target weight. The weight proportion was 40% power system and 60% airframe and ancillaries, loosely in the right ball-park assuming the thrust-to-weight ratio was acceptable.

With the selected power system of an Extreme RC Ramtec 127 mm fan fitted with a HET Typhoon 800-73 590 kV inrunner and a YEP 120A HV Opto ESC, a combination capable of delivering in the order of 7.3 kg of thrust with an input current of 100 Amps and 4.1 kW of power, therefore meeting the 0.8-to-1.0 weight to thrust requirement.

The exact date of the first attempt at flight escapes me but it was pre-COVID and resulted in little more than a fast taxi on Coombes' grass strip and analysis of the photos (below) shows a number of reasons why take-off was denied the model. Firstly, the trailing link nosewheel compresses causing a marked negative incidence of the mainplane and even once accelerating at full leg extension there is insufficient angle of attack to take off. Secondly, the narrow main wheels and soft ground supporting 7 kg of weight created a high rolling resistance meaning insufficient take off speed which coupled to the first issue of wing incidence meant no first flight. Thirdly, the fan 'howled' as though it was cavitating with insufficient air being drawn through the ducts and so reducing the thrust. So it was 'back to the drawing board' as they say.

Further work was put on hold but meanwhile our club's MOU with Shoreham Airport in its first version introduced a weight restriction of 7 kg meaning the Kfir was overweight. However, with COVID restrictions in force from March 2020 the spare time was available to evaluate reducing the weight of the model and improvements to its ability to get off the ground. I quickly concluded that the only weight I could readily reduce was removal of the retracting undercarriage and at the same time increase wing incidence with the use of a dolly. The retracts were easily removed saving 0.7 kg and an existing dolly modified to take larger and wider main wheels





while retaining the original front wheel assembly. Additional ducts were formed in the top engine hatch. Taxying trials were conducted in my garden and all seemed to work well, so once we were free to again fly at Coombes a further attempt was made...

There was an improvement to ground speed but the model would still not rotate. I rechecked the wing incidence against a scale drawing and realised that the incidence was still too low so changed the nosewheel for one with a longer extension. Time went by and the model was stored in the loft until March of this year when I decided it was time to give this latest iteration what I hoped would be a maiden flight rather than its third fast ground run.



The finished model. Note increased wing incidence provided by dolly.
Photos: Clive Upperton

It was with some forward planning on weather conditions for early April this year that a window of opportunity arose on a dry day, with a south-westerly wind and a moderate breeze making it ideal for the proposed maiden flight. This short flight proved to be trouble-free and vindicated all the effort, albeit work spread over a six-year period.

YouTube links:

Maiden flight: Simply type ‘Maiden Flight of RC Ducted Fan Kfir Mirage’ in the YouTube search box).

Landing: Simply type ‘Maiden Flight of RC Ducted Fan Kfir Mirage. Approach and Landing’).

Videos by Mark Vale.

On final approach following a successful flight.
'Still' from YouTube video by Mark Vale



The smile says it all! Clive with his Kfir following a successful maiden flight.
Photo: Mark Vale

Aviation Quiz

**This time our (mostly) aviation quiz is all about NAMES.
By two anonymous SRFC members**

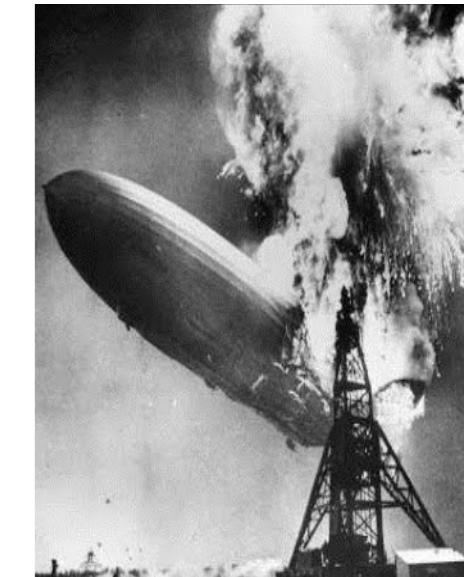
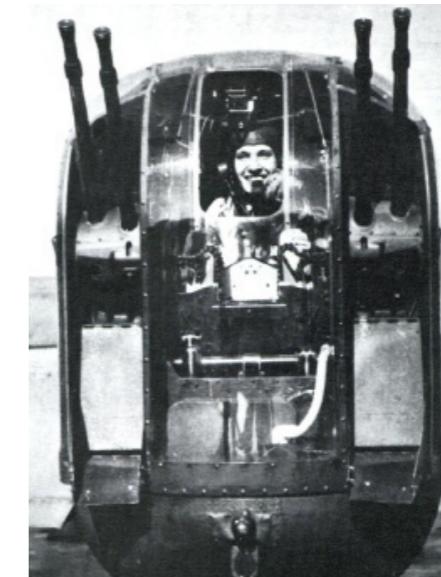
You can Google the answers but we urge you not to

Answers on page 54

1. What was the name of the German airborne operation on 1st January 1945 designed to destroy the allied airforce?
2. What was the name of the proposed German invasion of Britain in 1940?
3. What was the name given by the Germans to the air attacks on Britain on 13th August 1940?
4. What was the name given by the Germans to Russian female night bomber pilots?
5. What was the name given to the allied plan to destroy the road and rail communication systems as part of the D Day preparations?
6. What were the names given to the Heinkel He177, the Messerschmitt Me262 and the Russian Ilyushin IL-2?
7. Who was Enola Gay?
8. What was the name given to the *Tirpitz* by Winston Churchill?
9. What was the collective name given to the three RAF squadrons manned by US pilots during the Battle of Britain?



10. Name the two main RAF airfields used to fly SOE agents to Europe in WW2.
11. Name the main aircraft used for these flights.
12. What was the name of the first Canadian built Lancaster to fly operations over Europe in WW2?
13. What was the name of the operation to deliver food to Holland at the end of WW2?
14. What was the nickname for the German SC1000 bomb?
15. What was the name of the centre on the Baltic coast where the V1 and V2 were being developed?
16. What was the name of the German admiral who became leader of the German people after the death of Adolf Hitler?
17. What was the name of the German actor who died in January 2022 who served in the SS and was condemned to death by the Germans, accused of cowardice for refusing to shoot at an American squad?
18. What was the name given to the strips of aluminium foil dropped from RAF bombers to jam German radar?
19. What was the nickname given to those unfortunate to serve as rear gunners in bombers?
20. Name the actor who played Spitfire designer RJ Mitchell in *The First of the Few*.
21. What was the name of the seaplane racing trophy won for Britain outright (for three consecutive wins) by Supermarine with their S6B in 1931?
22. Name the British airship which crashed on 5th October 1930, effectively ending British airship development.



Aviation Quiz – answers

Quiz is on page 52

1. Bodenplatte.
2. Sea Lion.
3. Eagle Day.
4. Night Witches.
5. The Transportation Plan.
6. He 177 *Grief*
Me262 *Schwalbe*
IL2 *Sturmovik*.
7. The mother of pilot Colonel Paul Tibbets who named his B29 which dropped the atomic bomb on Hiroshima 'ENOLA GAY'.
8. The Beast.
9. Eagle Squadrons.
10. RAF Tangmere and RAF Tempsford.



FlyPaper online

Did you know you can now access FlyPaper via the SRFC website?

- The club's website is our 'shop window' for prospective club members and is being constantly improved thanks to the efforts of Robin Strange. In conjunction with the frequently updated photo gallery (when did you look at it last?), the addition of *FlyPaper* showcases the high level of modelling skills within our club.
- Perhaps you are a new SRFC member and enjoyed reading the latest issue of *FlyPaper* that was e-mailed to you when you joined as part of your New Member Package. Now you can catch up on previous issues.
- Have you kicked yourself for accidentally deleting an issue of *FlyPaper*? Maybe it was the victim of a computer crash (backing-up your hard drive really is a Good Idea!) or you forgot to copy them across when you bought that shiny new PC? Now you can download any missing issues with a few clicks of your mouse!
- Don't worry, you will still be e-mailed new issues in the normal way every three months.
- At present, issues available are only of the latest generation, i.e. from June 2021. In time, with the assistance of previous editors, we may consider adding older issues.
- You can either read an issue online or download it to read offline at your leisure.

How to access FlyPaper online...

- Launch the club website on your browser: srfc.bmfa.org
- Click on the FLYPAPERS tab.
- Click on the hyperlink of the desired issue.
- Using your mouse or arrow keys you can view the issue on your screen. (You may need to adjust the view size to get the page to fit the screen.)
- Right-click with your mouse to open the issue offline in Acrobat, Preview, etc.
- Save the PDF file to your computer's hard drive. It is recommended you make a dedicated *FlyPaper* folder within your Documents folder.

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Les



George



Shaun



Mark



Robin



John



Grahame



Marc

Non-Committee Positions

Poling Representative (Helicopter Rep & Field Maintenance)

VACANT*

Field Maintenance (Coombes)

Ken Hamer

Social Events

VACANT*

Website & Data

Robin Strange

Safety Adviser

Dave Knott

Safety Marshall 1

Paul Gladstone

Safety Marshall 2

John Wase

Safety Marshall 3

VACANT*

**If you feel you can fill a vacant position please contact the Secretary for details*