The Electronic News letter of the Chichester and District Model Aero Club

Clear Dope

February 2021

Chichester and District Model Aero Club: Committee 2021

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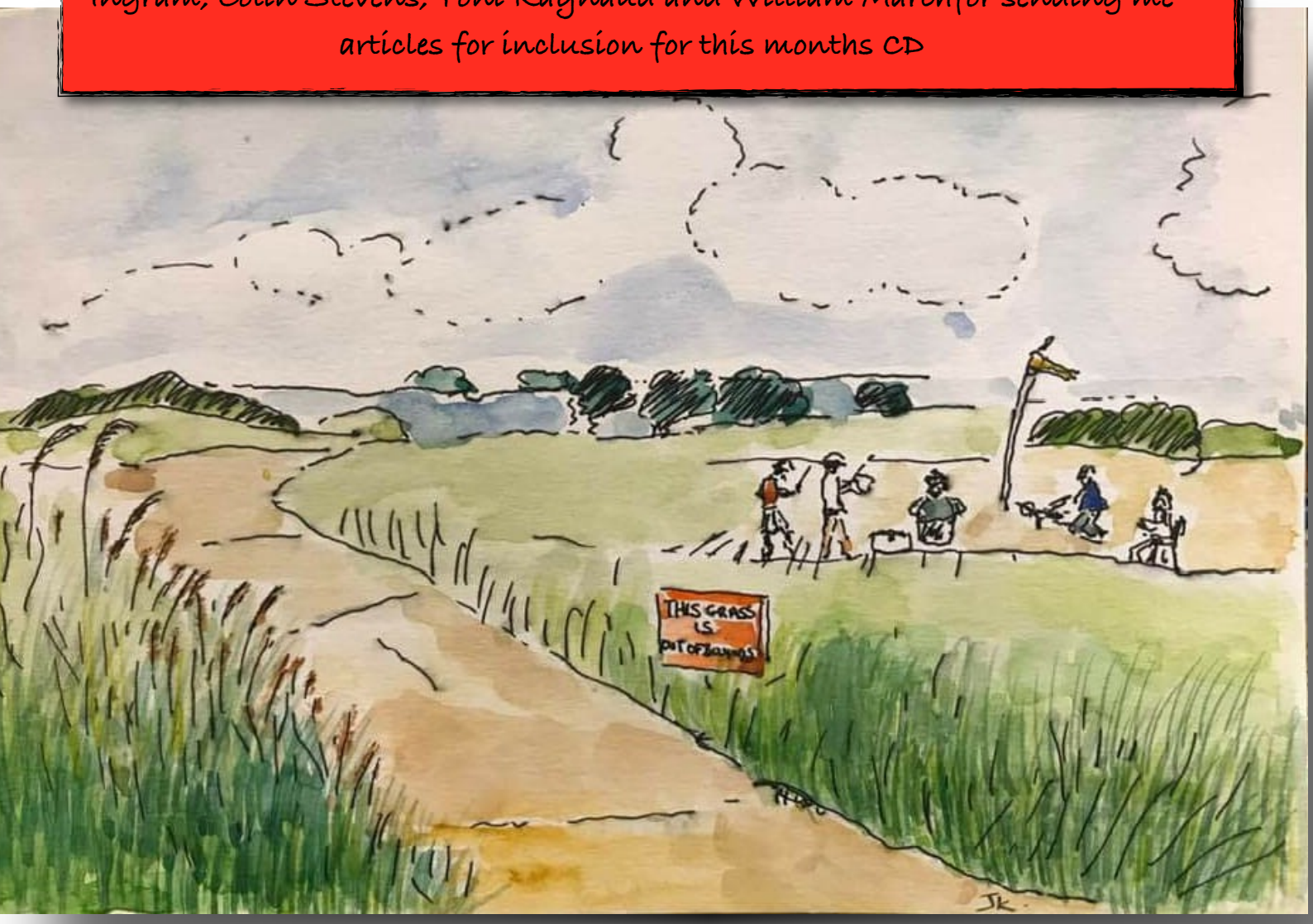
Hello everybody hope you are all well and active. Many thanks to Bill Ingram, Colin Stevens, Toni Raynaud and William Marchfor sending me articles for inclusion for this months CD

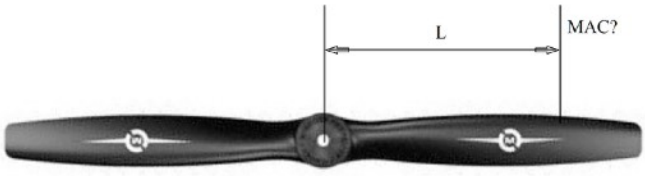


Some Thoughts on Propeller Loading

It was Terry Elvidge's question on our CADMAC Facebook page concerning the best choice of prop for his Double Diamond model that sparked-off my interest in pursuing this topic in a little more detail.

I've always been keen to obtain the best match of prop to model and engine characteristics, and the policy that has worked well for me is to first set the prop pitch to suit my best estimate of maximum required flying speed, then choose a diameter that that loads the engine to an optimum power/RPM point, not necessarily peak power, but that which results in acceptable noise and practicality. Terry has chosen to go a large prop on his 61 4-stroke, and I was surprised by the results when doing some estimates on how much the engine-loading can be increased when doing this, so I decided to comment on it here as an adjunct his question. No recourse to text-books, just first-principles off the top of the head, very open for comment or criticism as a result.

The way I've approached this is to examine how the engine is loaded by prop drag loads, in the form of what I propose to call the Blade Drag Moment (BDM), which when multiplied by the number of blades, matches the torque available from the engine. I'll define BDM as the moment created by blade drag at a point along the blade where blade thrust and drag can be considered to be concentrated at a single chord-line of the blade (as done for wings - Mean Aerodynamic Chord - MAC), multiplied by the distance from that point to the prop hub centre. I couldn't say where the MAC is on a prop blade, because the airspeed along the blade is not constant, but very slow near the blade hub, and rather rapid at the tip. Wings are so much easier to consider, but never mind, it doesn't matter here, because I'm going to be looking at things proportionately.



BDM = L x Drag at MAC

The objective is to illustrate how enlarging the prop affects the BDM, and then to see how to restore the BDM, thus keeping the engine load/RPM constant.

First, to set-out the stall, let's consider Terry's 13" prop, and compare it with what I know about my 12" x 6" RAM prop on the same engine. Let's say also that the 13" prop will have the same blade shape and aspect ratio, and the same aerofoil section and pitch as my 12" prop, to be able to make the comparison valid.

As I see it, three effects come into play -

1/ Increasing the blade length increases the BDM by the ratio 13/12.

2/ The blade area is increased as the square of 13/12, so thrust (lift) and blade drag are increased by the square too, being proportional to area.

3/ The airspeed at the new prop MAC point is increased by 13/12 due to the larger moment radius, and this multiplies the thrust and drag by the square of the airspeed.

Some Thoughts on Propeller Loading cont.

So, lots of things have happened, and prop load has increased by the product of one linear increase times two squared effects, thus has increased by 13/12 to the power 5, equals 1.49 times! Maybe the engine would tolerate that, running at lower RPM, but I find that 4-strokes can be unhappy and inconsistent loaded this way, due to overheating.

Time to do something about it then, so we have to restore the reduced loading, and we can only do this by reducing the pitch. At these pitch angles, thrust (lift) and drag are roughly proportional to pitch, so if we take 6" pitch and divide it by 1.49, we arrive at 4.03" pitch. But what would the Double Diamond think of 4" pitch? What Pitch Speed does this provide?

To calculate this, we need to multiply three conversions together -

1/ (RPM/60), to get revs/second
2/ (Pitch in inches/12) to get the distance the prop advances in one revolution, in feet. - - - (see footnote - no pun).
3/ (30/44) to convert feet/second to miles//hour

From my Fellowship/ASP61FS checks, I obtain 10,400RPM on its 12" x 6" RAM prop, on the ground. So with a 13" x 4" prop of the same format, we'd expect to see a pitch speed of (10,400/60) x (4/12) x (30/44) = 39.4mph. We normally like to allow about 15% margin of pitch speed over flying speed, so I would expect to see a flying speed of 33.5mph plus whatever prop-unloading in the air provides. Large diameter and adequate pitch always provide the best propulsion efficiency, so if I'm correct in believing the the Double Diamond to be a light slow-flying model, with a generous lifting-section used for the wing, then the 39mph pitch speed on the ground should be quiet sufficient for this class of model. For comparison, my Flair Cub uses a 12" x 4" RAM prop driven by a 42-sized 2-stroke, providing about 11,600RPM on the ground, but this model probably has a higher wing loading and flies faster than the Double Diamond, yet the 4" pitch still allows this model to perform outside loops and the occasional vertical-8. I have another smaller and faster model successfully running a 10" x 4", so this persuades me to believe that 4" pitch should suit the Double diamond well.

The above presupposes that a 13" x 4" prop matching the RAM geometry can be found, since I don't think the RAM are available in that size. We need RAM-type efficiency, and the best candidate is probably the APS. These are heavy, but that's all to the good in respect of 4-stroke idling. The final arbiter, as always, is to see how it works-out on the field. I'd like to test the theory using the OS25 2-stroke in my Colibrio, also currently using a 4" pitch prop, but this will have to wait, as the grass is soggy, and because of the noise issues that Management will find disquieting(!). This test could be done in more comfort using an electric motor and tacho only, current readings not being required.

All of the above is of course dependent on having got the amateur aerodynamics right, so I welcome correction or comment of any complexion.

Footnote: We should be cautious in using the marked pitch value on a prop if we trying to obtain precision in the absolute case. We don't know how the prop manufacturer has specified it in relation to its operating angle of attack, and the angle of attack is variable in flight. For the purpose of this note, we are making comparisons of like prop formats, so we are not concerned.)

Keep Safe,

Colin S.

MODEL PLANE PORTABLE FIELD STAND by William Marsh

I originally built a mark 1 version of this model plane stand but to give myself a new project decided to do a mark 2 version. I wanted this to be slightly bigger but also use thinner wood to save a bit on weight.
The basis of the design is a simple portable work bench which are readily available and inexpensive and then to build a plywood structure that bolted on top with folding end pieces for easy transport.
I am sure I don't need to go into any great detail about the construction, so I thought I would list the build as a series of bullet points, hopefully in the right order!

1. Assemble workbench as per the manufacturer's instruction sheet but omitting the two wooden top jaws.
2. Open both jaws fully then cut off both handle assemblies with a hacksaw.
3. Cut out the 12mm ply base and end pieces making the cut outs big enough to hold your largest model. Also cut out and slot the adjustable ply model clamp holder.
4. Cut out 4 pieces of suitable size strip softwood and glue/nail to ply base. Also cut out and glue 4 off 12mm ply packing pieces to fit underneath the base where it locates on the metal bench frame.
5. Cut 2 lengths of 25mm x 25mm aluminium angle and fasten with woodscrews to each end of the base.
7. Fasten a hinge to each end plate making sure that in the vertical position the bottom of the hinge is exactly level with the bottom of the end plate. I used 3" chrome hinges.
8. Now butt the end plates hard up against the L shaped angle section and drill and bolt/screw the hinges to the base. I used 5mm countersunk stainless steel bolts to give more strength.
9. Position the adjustable clamp holder on the end plate and drill a hole for the adjustment bolt.
10. Drill a 5mm hole in each L shaped angle and end plate and fit a 5mm nylon bolt and wing nut.
11. Attach a suitable chain between the bolt head and the base.
12. Add some 12mm wide stick-on foam to the areas that support the model.
13. Screw on 2 plastic coated hooks for holding transmitter.

This completes the build assembly. I decided to dis-assemble mine and give it 3 coats of gloss varnish for added protection and I think it improves the look.

Material costs: Bench - £20 approx
Wood - £13 approx
Hinges - £4.00 approx
Aluminium angle section - £8.00 approx
Chain, nuts, bolts and screws, etc - £5.00 approx

As well as a useful support for the model, I have found that the ply clamp arrangement holds the model securely enough for carrying out tests on electric motor installations - as long as you hold the bench down somehow!!
I realise that the above design is far from original but it may make an interesting project for a fellow modeller.

William's Stand

A Life Time in Modelling Bill Ingram recalls his story (Part 4)

Having managed to sort all my tools, electrical parts and other modelling bits and pieces from around the house, garage and shed into the new workshop, I could then carry out the work started on the Fw 190.

Oh, all the models planes are in the house keeping warm!.

The Brian TaylorT plan was a A3 but knowing the tendency for short nose designs to be tail heavy I decided to make it an A5 with a one inch longer nose and go for a monoque fuselage. I had a Aeromodeller magazine which had a detailed scale drawing in the middle pages which included all the fuselage formers shown, At the time A3 printers in the local newsagent had the facility to enlarge images. So the build started.

This is now about twenty five years since I bought the plan. I completed it in about 2012, it came out weighing about 12 lbs (lots of lead shot in the cowling) after about a year I decided that I could not fly it and I needed the space in the workshop. I had come to the conclusion over the years that although I still like to fly when it's quiet, a preference for building has developed. The finished FW below and on the floor in Tangmere museum where it was given and was was later suspended from the roof.

During this time frame I had a Mini Hype originally with an ASP40 but could not get the engine to perform properly with an intermittent pickup so I changed it to an OS. I also liked the look of a big 3D, so went to London to buy one and powered it with a OS 90 I liked flying this as it was reasonably slow, could cope with a good range of wind strengths, giving me time to think now my reactions are not in their prime.

And later on a Ruckus. I decided to find out about gyros and now fly with them installed. I was having a bit more time after doing house maintenance so I had started to think about what I could build, a Typhoon, a Tempest, a Hurricane and a Spitfire spent some time being tossed around in my brain, looking at videos etc, finally going for a long nosed Spitfire.

Next the last five years

Foam Hurricane build so far by Toni Reynauld

In 2009 I built a Hurricane in blue foam based on the Tony Nijhuis free plan. (https://www.modelflying.co.uk/forums/postings.asp?th=34350) It flew really well right up until I decided to adjust the retract servo – I didn't get itquiet right, sometimes it buzzed when retracted and sometimes it didn't. I flew it anyway, and the servo must have been buzzing on that flight because it drained the battery – no amps, no volts, no radio and no more Hurricane! That one ended up tail heavy so I decided to try again but using expanded polystyrene for lightness. Rather than use the spine, formers and skin method again, I decided to cut fuselage sections between each of the pairs of formers and glue them all together to get a complete foam fus. The basic principle is to cut sections of the fus between the formers, left and right halves, then glue it all together to get the shape approximately right and smooth.

Working from the Nijhuis plan, F3 is be enlarged downwards to the bottom of the fus, then the wing seat is to be hot wired out later on. The cowl area, F1 forward, will be made from blue foam blocks about 15 -25mm thick like the original foam Hurricane. It's a bit heavier than polystyrene, which will help with the balancing. The wing will be cut in four sections using the original templates. Electric servoless retracts will be used for the convenience. The Fin and tailplane to be cut/shaped from foam (either blue or white) with balsa leading and trailing edges. The whole will probably be covered with a combination of floor varnish and 23 gm glass cloth, and brown paper/PVA. Both methods work well, but I'll make the decisions based on how resistant to hangar rash the bare parts are.

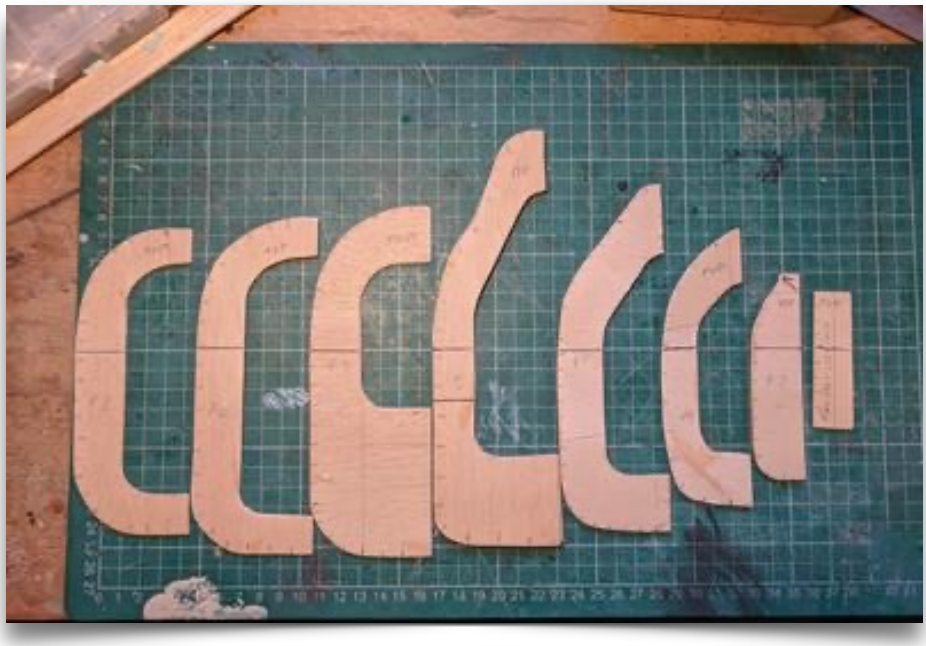


Fig.1 the formers

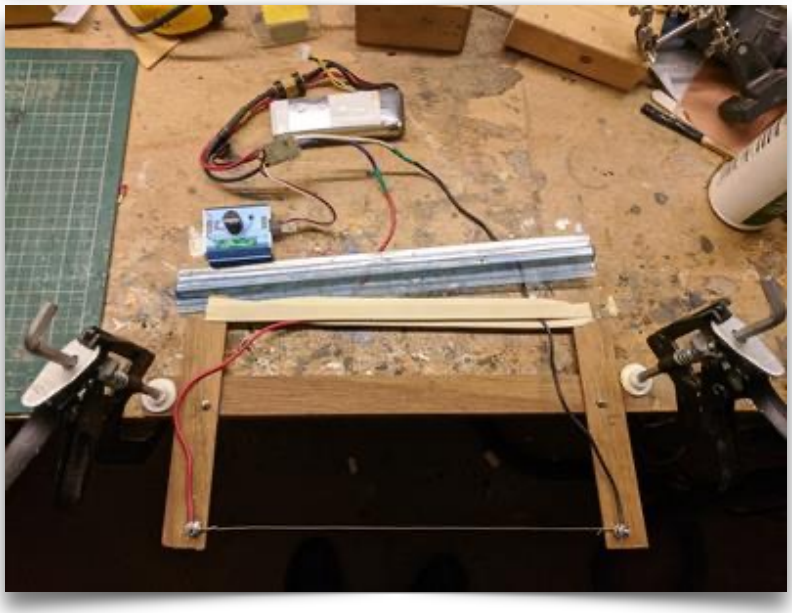


Fig.2 Small Battery powered hot wire cutter

Fig.3 F2 to F3 cut both sides

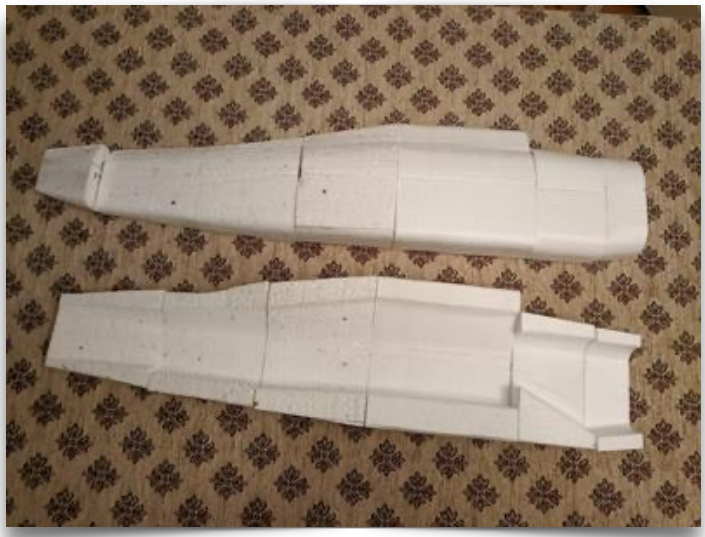
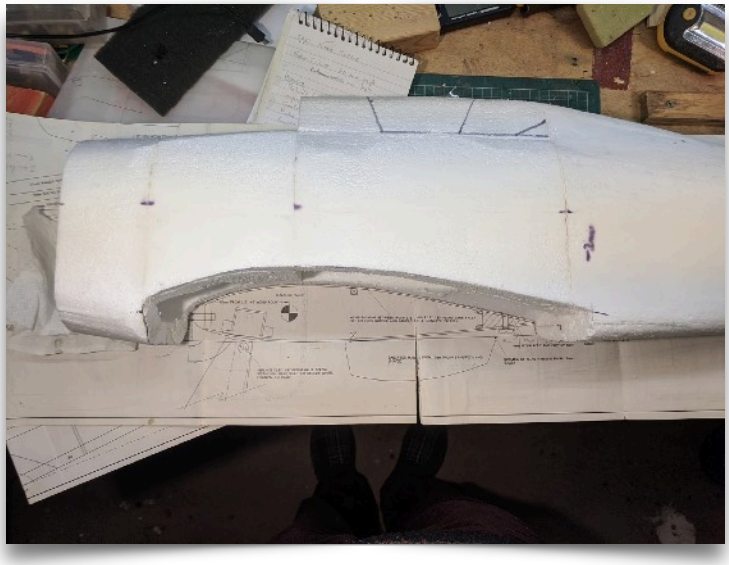


Fig.4 All section cut and lined up

Fig.5 Sections stuck together -inside view

Fig.6 Cockpit area with wing root template



Wing root against plan

A few of us who are members of CADMAC are also members of the BORDER MAC and Dave Mackey who is the clubs Chairman writes (I think this will be of interest to us all ed.)

One of our members James Rusby has decided to retire from the hobby. One of James's models was a beautiful Spitfire that has flown at Martinique and Puttenham on a few of occasions by Mike Dunkley. James has sent me a lovely report (below) on what has happened to the Spitfire, so I thought I would pass on to you all.

Regards, Dave.

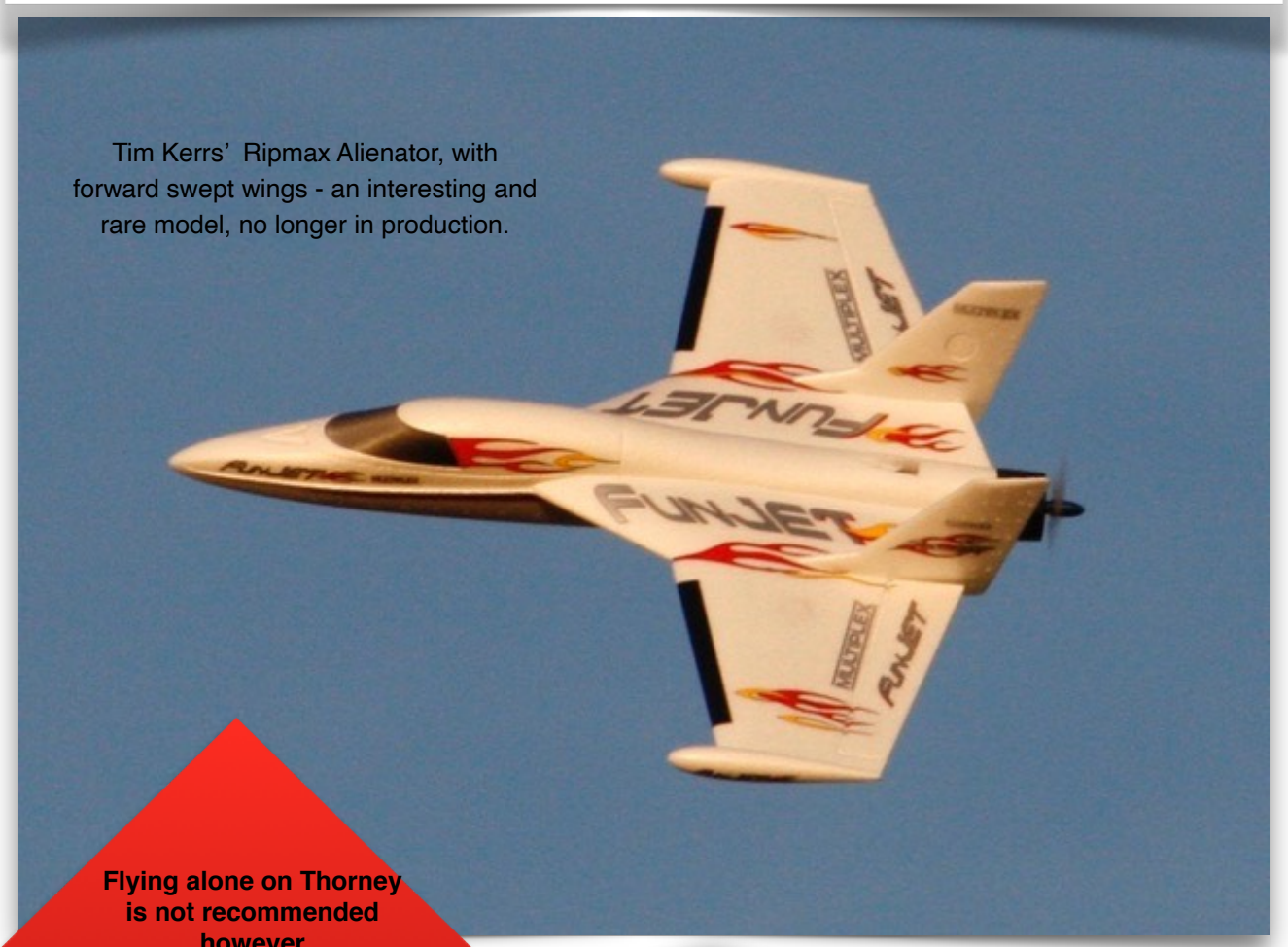
By pure chance on the web I happened to discover a Norwegian charity called the Norwegian Spitfire Trust (NSF). As you may remember my aircraft was finished in the colours of Wing Commander Rolf Arne Berg (RAB) who was in charge of the Norwegian Spitfire Wing of the RAF, particularly during the Normandy invasion and thereafter. Within three weeks of the end of World War 2 he lost his life when his Spitfire was down by Anti-aircraft fire in Northern Holland. My wife is Norwegian, hence my interest in this pilot and his aircraft. Anyway I decided to contact the NSF and said my model was available, were they interested? The Chairman came back to say 'Yes, they were as they had been looking for such a model to help them publicise their ambition to raise the funds to rebuild a Norwegian Spitfire to flying condition. To cut a long story short I sent them photos etc. They said they would like to have the model so I arranged in December to send it to them. They seem very pleased with it.
Amazingly they were lucky enough in 2017 to trace the remains of a crashed Norwegian Spitfire in Holland, which is being rebuilt for them in Duxford at the present. They will use this aircraft in displays to honour those Norwegian pilots who contributed to the allied victory in World War 2.

I have enclosed below a photo sent to me by the Chairman, Lars Essen, who is an SAS pilot, flying a Spitfire in 2017 finished (temporarily) in the colours of RAB lent by Duxford for a Norwegian airshow. I also enclose two pictures of my model taken in my garden in December.

Thanks for all you and the committee are doing to keep the club afloat in this difficult time.

Best wishes,

Stuart Rusby



Tim Kerrs' Ripmax Alienator, with forward swept wings - an interesting and rare model, no longer in production.

Flying alone on Thorney is not recommended however pilots are requested to concentrate on flying within the grass area to the west of the runway.

Please Try to leave Porthole as tidy as possible, making sure no fuel is left on site

When Driving Around Thorney be aware of young children on bikes

The Commander at Baker Barracks Thorney and the MOD have decreed that there shall be NO drone flying whatsoever

When flying at Thorney please keep an eye out for traffic(all kinds walkers, horses, bikes, runners, and low flying aircraft) coming from behind the flyers and inform them accordingly

The club Facebook page is now in its fourth year. It has over one hundred members. It contains many contemporary site reports, and has a wealth of photos in its archives.

Administered by Nick Gates. and David Hayward

Here is the link:-

https://www.facebook.com/groups/Chichesteraeromodellers/