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

Clear Dope

April 2021

Chichester and District Model Aero Club: Committee 2021

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Hello everybody hope you are all well and active and getting your aircraft ready for when we are let loose again. Many thanks to Colin Stevens, Bruce Smith, Toni Raynaud and Peter Rieden for sending me articles for inclusion for this months CD, please keep the articles coming all welcome

WHAT MADE IT BREAK?

I offer this to those in our club who enjoy a little sleuthing, with a view to postulating "what went wrong here"?

A startling video on YouTube appeared on my PC recently. The link is impossibly long to type-out in a browser address window, so my suggestion is to search "46% ultimate exsplosion" (their spelling, not mine) in YouTube - much quicker.

It shows a 46% Hanger 9 Ultimate biplane breaking-up in mid air on its maiden flight. The model is on a fast downwind leg after performing vigorous rolls on climb-out after take-off, when the rear fuselage suddenly detaches. The model then proceeds to disintegrate, servos and odd debris falling from the skies.

I think there's every benefit to try to learn what might have gone wrong in this kind of incident, to avoid going the same route, so I'd like to try to analyse on a stage-by-stage basis what the issues of concern might be.

Prior to Take-Off: All looks well. The fin and rudder areas look huge, which could be of significance. The fin is braced to the tailplane halves by double wires, hardly discernible in the picture. Was there any hidden fus. damage? As with many other ARTFs, seen in other pictures, the fus. construction looks very flimsy. Maybe glue was missing from the joints?

Take-Off and Climb-Out: Straight into vigorous climbing rolls on its maiden flight, max. power. Well, most of us wouldn't.

Here we should observe one important feature of model design that is easily overlooked, that of the forces generated on the structure when the model is aileron-rolling.

As the roll starts, the strip-stream along the fus becomes more spiral, greatly augmenting the small spiral flow from the prop. The tailplane and fin now find themselves operating at a substantial angle of attack to the flow, and operating like wings, the forces they generate try to resist the roll. This is well-known in full-size circles, and so fin to tail bracing is fitted to highly stressed aeroplanes, and is duplicated on this model.

BUT! - having sorted the tail-end components, the problem hasn't gone away but has transferred to the fus., because the wing mountings are twisting the fus. against the restraining force at the tail. If something is going to break, it's now likely it will be the fus at its weakest point - probably the cockpit - and in the video, you can this location of the fracture clearly. So, was the fuselage weakened by this manoeuvre?

The Turn to Downwind: This was done at about 45 deg. bank angle, so the tail will be providing moderate down-force, putting the cockpit area under a stretching force. All seems well though, as the exit from the turn appears normal.

The Downwind Leg: Goodnight Vienna! The model accelerates to a high speed, then pitches up slightly, then slightly down, at which point the rear fus. separates. Two scenarios spring to mind -

1/ An already weakened fus. succumbed to increased drag forces, maybe aggravated by increased engine vibration as the prop unloads.

2/ Something happened at the tail, indicated by the pitch movements, putting terminal bending stresses on the fus. A servo fault? Pilot error?

Far more likely is the onset of elevator flutter, and we know how destructive and sudden that can be. The Hawker Typhoon was a notable example of this, with aircraft being lost regularly until a fix was found. Only one pilot survived to tell the tale. Rudder flutter could have destructive consequences, too.

Why the flutter? High speed and large unbalanced control surface areas and deflections, allied with flexibility in the control linkages are a sure recipe for this. This model seems to embody these criteria.

I thought this a good time to look at the various forums to see if flutter is a problem with this model, and my first hit, FlyingGiants, showed elevator flutter at full throttle to be a definite issue, in this case stripping the gears off both elevator servos.

It seems that flutter is the most likely candidate, but this has also been an opportunity to mention the dynamics of the aileron roll forces. This kind of flying is not in my experience, but I would have thought that a prop of low pitch, unable to produce excessive flying speeds, and of large diameter, would have produced the high thrust needed to pull the model through the exaggerated manoeuvres intended for it.

That's about as far as I can take it, but I'd be most interested if anyone has anything to add.

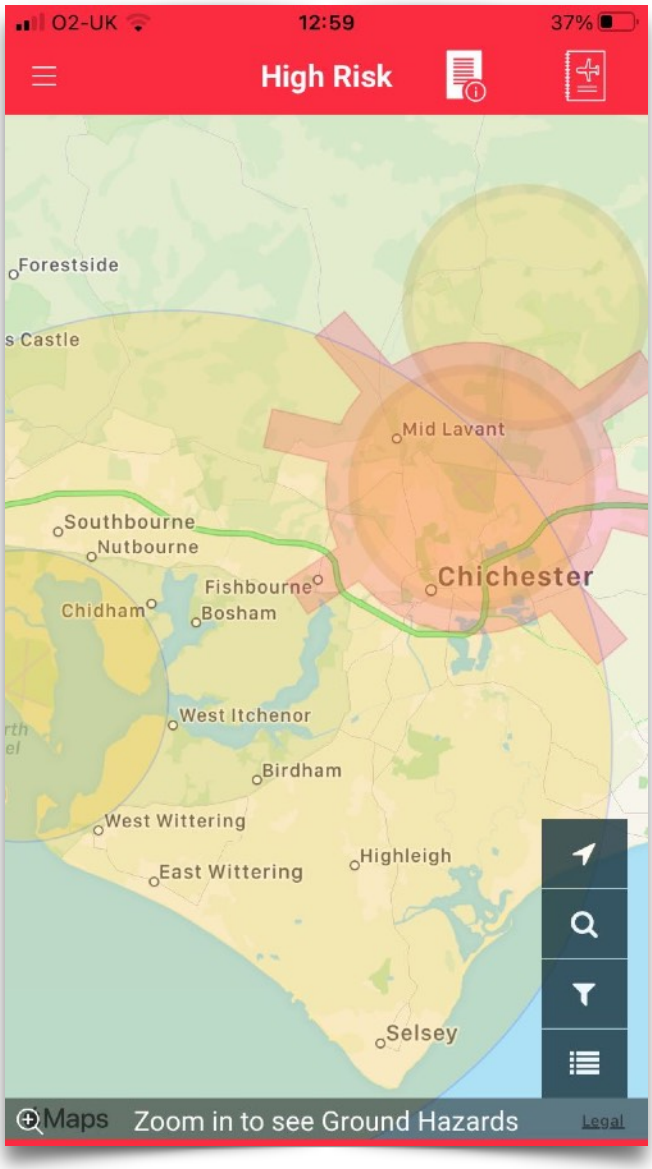
Colin S.

CD CONGRATULATIONS … AND MORE from Bruce

I'd very much like to add my name to the list of members who took the time to register their appreciation of last month's bumper Clear Dope edition.

I found all the articles excellent, which is only to be expected when people talk about their interest with passion. In particular, though, I'd like to single out Jeff Owen's article on his Mavic camera drone for three reasons:

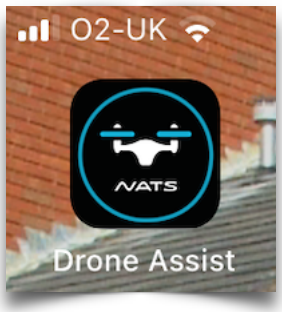
(1) For writing such an interesting and readable article on the subject without resorting to baffling tech talk;
(2) For sharing his magnificent photography which surely must whet the appetite of many members; and
(3) For raising his head above the parapet and daring to exult the pleasures of drone flying at a time when the mere mention of the sport can evoke an extremely hostile response.



Like Jeff I've been a keen photographer for many years and the temptation to get a camera up in the air for those stunning aerial shots got the better of me in 2018 when I bought my camera drone. This was a few months before the notorious Gatwick Drone Spoof and the onset of drone paranoia which has in part resulted in the extra tiers of CAA administration and additional flying fees we all must bear.

Against that background of continued mistrust amongst the general public and media, drone video and still photography has never-the-less become a staple and the norm amongst all film, TV and news producers and is, in itself, a wonderful hobby. To paraphrase the erudite Kiwi, Bruce Simpson, on his excellent 'X Jet' Youtube channel, 'Drone flying isn't a Crime.'

HOWEVER, as with our fixed wing flying, safety and the law must always be our first consideration before we head out to enjoy ourselves. In his article, Jeff drew our attention to the 'Crown Estates' website which thankfully (and conditionally) welcomes the use of drone photography over its sites. I'd just like to tag on the end a particular soap box theme of mine…….



It's the NATS free to download Drone Assist app

This is a fantastic tool for **fixed wing** fliers just as much as it is for quadcopter pilots. It has a great array of useful features to ensure you're always flying in a safe location.

To find out more about how the app can help you, look up the 'Droning On' (DO 04) download which you can find in the 'Files" section on our excellent FaceBook Page.

A cheap High-Current Charger Power Supply

[Based on an article I originally wrote in 2012]

One of the few downsides of being one of god's own electric flyers is that batteries need charging, and whilst there is a plentiful supply of cheap, effective chargers they need high-current DC power to drive them. It is typical of the repressive behaviour of the UK governments that they seize upon this opportunity to further torture model flyers by ensuring that domestic homes are supplied only with low-current AC power, forcing us to find ways to convert it into something more usable. Some chargers come with mains inputs, but they are much more expensive, especially in the larger sizes. A few years ago this wasn't a problem because most electric flight involved small models and small batteries, but these days the kilowatt model is common and 2-3kW ones aren't unusual. These need bigger batteries, which need bigger chargers and much bigger power supplies, and that starts to get rather expensive.

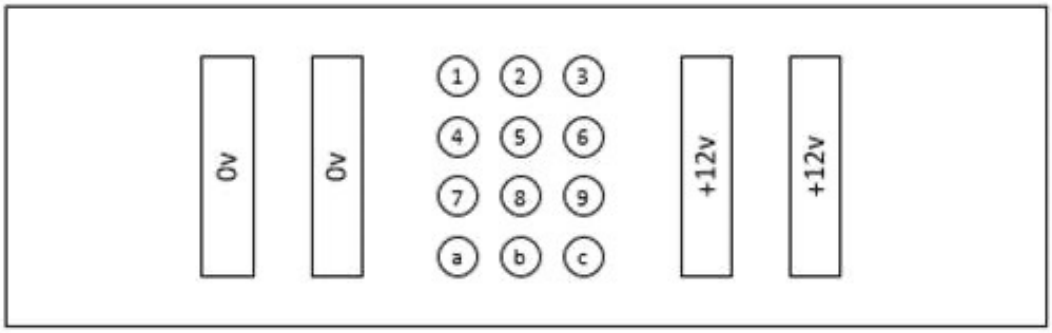
Commercial power supplies are offered through the trade, but they are (IMHO) extremely over-priced and many have poor reliability records. A common solution is to use a converted power supply from a desktop computer - I have several of these myself, but they have significant limitations. They usually need loading resistors on the 5v rail to work at all, but the main problem is that they wimp-out at higher currents, often dropping half a volt and delivering very "lumpy" DC. They are also not that reliable because pulling huge currents from the 12v output without putting a similar load on the 5v and 3.3v outputs causes them problems.

There are far better PSUs available - those intended for commercial computer servers. These are far more sophisticated devices, designed to run at full power for months at a time with very high reliability. Those designed to run the vast disk arrays in datacentres have a massive current capacity on the 12v output, and that makes them very suitable for our application. Bought new, they are very expensive. But the tend to out-last the servers they were built for and so there are lots floating around with the computer recyclers as a quick ebay search shows. The only problem with them is usually that they need special interlock connections and signals from the server rack to get them to start up. Getting around these involves messing with mains and high-current DC circuits in a way that's not for the feint-hearted.

I've been tinkering with server supplies for several years with varying success, and I've now found one that can be adapted for our use with no modifications and just some simple external wiring. It is intended for a large HP RAID array and as such has a huge 12v capacity (a whopping 47A) but minimal 5v capacity and no 3.3v output at all, It also has an integral cooling fan, a socket for a standard mains lead. If 47A isn't enough(!) then they have specific provision for connecting in parallel by just connecting a single sensing wire between them.

The unit in question is the HP DPS-600PB (also known as the "Proliant DL380-G4") 575W server supply. They are readily available 2nd-hand (ebay etc) for around £20. At one end it has the mains socket for a standard IEC mains lead.

The first thing to attend to is the connections at the end. There are two pairs of high-current blade connectors for the +12v and 0v (or "positive and negative" if you prefer) plus a 3*4 grid of small signal pins which I've labelled 1 to c in the picture below:

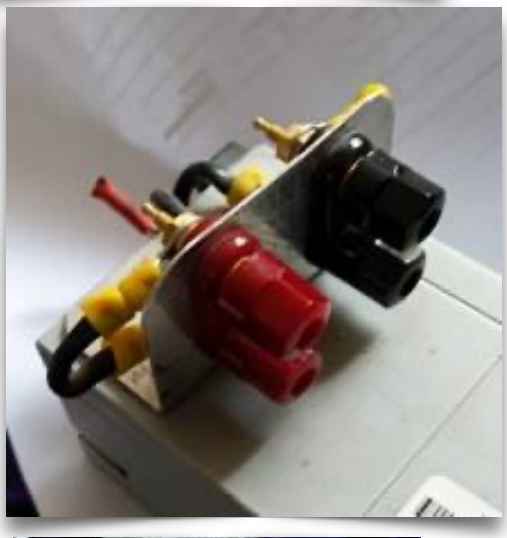


Pin	Function
1	+5V (0.5A Max)
2	+5V (0.5A Max)
3	+5V (0.5A Max)
4	Controls Fan Speed
5	-12V (0.5A Max)
6	PSKill
7	Power Supply Good (Output signal)
8	0V Ground
9	Voltage sence
a	PSon
b	Current Share
c	Server Fault (input signal)

These signal pins can do various things - a couple of them can be used to tweak the output voltage up a bit (about 3/4 of a volt) if you wish, and another couple can slow the fan down to reduce noise, but more of that later. The important signals are the "PSON" (Power Supply On)

which is used to remotely switch on a server, and the "PSKill" signal which is an emergency shut-down facility. These are pins 6 and a, and if they are connected to Ground (pin 8) the power supply will switch on (if you wanted to have a simple on-off switch you could insert it in these connections). In its simplest form that's all you have to do.

You don't even need to do anything clever to make these connections because the pins are a good fit in the contacts used in a standard servo plug. So if you take an old servo plug, pull the contacts out of the plastic housing and cover them with a bit of heatshrink (optional, but very tasty) you just need to then solder all three wires together to make the required lead. Again, I covered to soldered joint with heatshrink to keep it neat and tidy.



The sockets are just pushed over pins 6, 8 and 'a

Alternatively you can just solder cables, tinned copper wire etc between the pins. If you want to incorporate an on/off switch just put between the ground pin and the other two.

The main power comes out on the four pairs of flat brass terminals (two 0v and two 12v) either side of the pin grid. You can connect to these however you wish – even crocodile clips if you must. I like to have proper sockets on things. Rummaging through my bits&bobs box I found some old speaker connectors and then spent a few minutes making an alloy bracket to mount them on.

This was just stuck on-top of the unit with numberplate tape (like servotape but much, much stronger).

Obviously the proof is in the sachertorte. An initial test using a charger pulling 2A to charge a 3s pack confirmed a healthy 12.68v at the output. After that I added more chargers until I had six chargers each drawing between 5 and 10 amps, and the supply didn't even get warm. I've also tested it driving a 70A ESC in model drawing 51A, and the output was STILL 12.68volts, just like the other server supplies I've tried.

If you want to keep it simple, then that's it - a 47Amp charger power-supply for under twenty squids, and one that will probably be far more reliable than the units sold through the trade for over five times the price. But there are a couple of bells and whistles that might be of interest...

Bells and Whistles

I mentioned that some of the other pins can do useful things:

Cooling Fan Speed

If you've gone this far you will have found that the tiny fan is rather noisy. If you also connect pin 4 to 0v (ie include it in the bunch with the others) the default fan speed drops to a much quieter level, but it will still ramp up the fan if it needs more cooling. I suspect that in the server rack it's connected to a PTC thermistor in to cooling duct, but we don't need to be that sophisticated.

Output Voltage

This power supply has the ability to compensate of cable resistance and ensure a precise voltage is maintained at the load using the "Voltage Sense" pin. We don't need that amount of precision, but we can use it to trick the supply into delivering a different voltage. A 1kΩ variable resistor wired between the voltage sense pin (pin 9) and any of the 5v ins (pins 1-3) will tweak the output – at 500Ω the output goes up to around 13.3v. Be careful about going much higher than that because the unit has an over-voltage shutdown that triggers at higher voltages when there's a decent current flowing.

What if a mere 47Amps just isn't enough?

Some people are never satisfied! But if you need more then these units have a neat feature. You can connect the outputs in parallel and then connect the two "Current Share" pins (pin b) together. This makes the two power supplies share the current equally, and stops the two regulators fighting each other. In their intended use in server racks there are usually three or four of these units running in parallel in this way.

In principle you can also connect them in series to make 24v power supplies, but I'm not going to say any more about that because it involves "floating" one of the supplies. Floating removes the earth protection and if not done properly it's easy to create a lethal electric shock hazard if you don't know what you're doing!

Anyway that's it – Enjoy...

Peter D Rieden (March 2021)

Peter is a member of the Border club

The Hurricane progresses: Toni Reynaud's story continues:

The tailplane/elevator has been cut from white foam and blue foam tips added. The elevator halves were cut off from, then spars stuck on to the joint area, chamfered to allow the elevator movement. The tailplane has also been covered with 25gm/sq.M glasscloth using water-based clear varnish. A single coat of this confers stiffness and a good relatively hard surface and adds very little weight. A few more coats and perhaps some filler (white emulsion?) will improve things and give a good finish.

The wing parts were cut from lightweight polystyrene, and balsa leading and trailing edges glued on. The two centre sections were glued together, then the U/C bays were hot wired out and the retract mounting boxes (6mm ply) were glued in place. The retracts were fitted and tried then removed. A 0.8mm ply plate was fitted on the top surface of the centre section because the foam is not very dense and I thought needed a bit of reinforcement to take landing shocks. The outer sections of the wing were then glued in place, and blue foam tips cut to rough shape, added in place, and sanded to section. A 10 x 3 mm hard balsa spar was fitted, one piece each on the outer wing sections and an overlapping piece across the centre section. The ailerons will be cut out and the servos fitted after the wings have been glassed.

A motor mounting box was fabricated from 5mm balsa, of a size which fits snugly inside the front of the fus. The motor and mount were fitted to check for wiring access, then with much reference to the plan, this assembly was glued in place. The cowling was then fabricated from blue foam, carved and sanded to shape, and has had one coat of lightweight glass strand mat applied with varnish. A ply former was fitted to the front to match as closely as possible with the 70mm spinner.

The cockpit area has been roughly cut out to suit the canopy (saved from the first Hurricane!). The control snake runs have been fitted, then removed to allow other internal work to go forward with no obstructions in place, and the servo tray for rudder and elevator made and trial fitted.

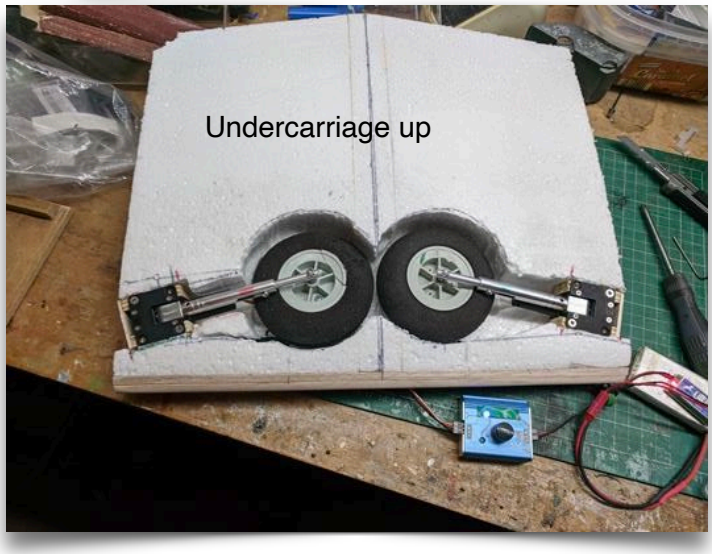
Two 5mm dowels were let into the LE of the centre section to locate the wing onto the fus, then the locating plate made and drilled to match. This was glued into the fus at the front of the wing opening with copious amounts of Gorilla Glue, with a touch of dampness added to the foam to encourage the foaming properties of the glue to ensure it filled all the gaps. So far, so good, but still plenty left to do (as soon as

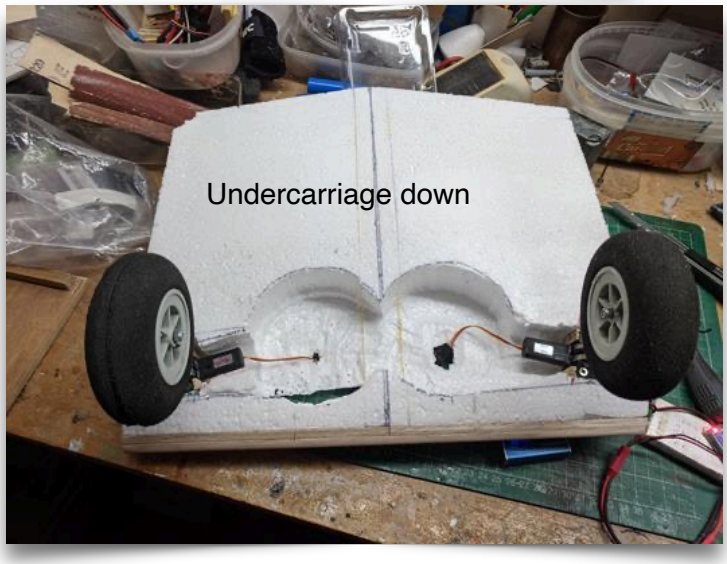

11. Center section

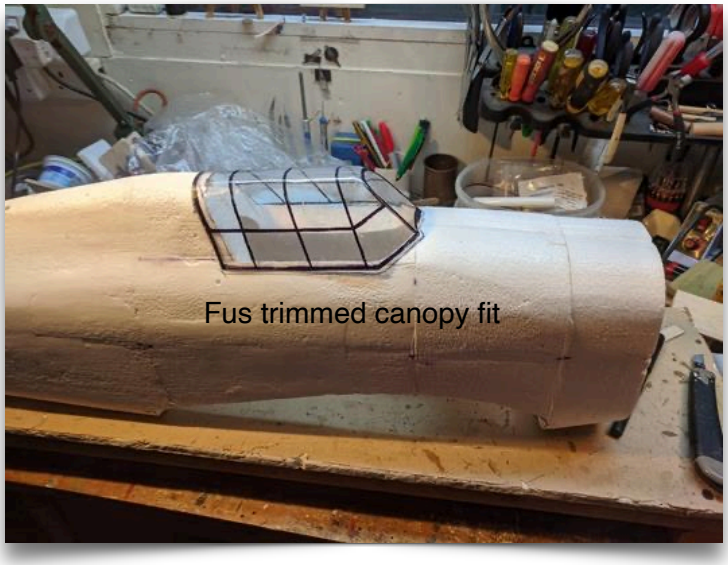

Leading edge glued on


Center section LE glued on


Centre Section marked for UC


Undercarriage up

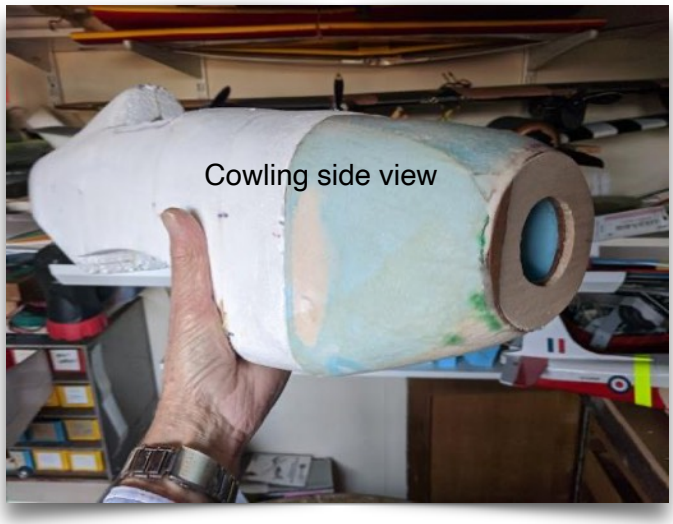

Undercarriage down


Fus trimmed canopy fit


Wing trial fit


Tailplane marked up


Cowling front view


Cowling side view


Wing front locating plate


Wing Fitted


Coming together

The 'CADMAC' trailer for Sale:

CADMAC are the proud owners of a small trailer which is stored in a barn at Oakhurst Farm near Portshole. It was formerly used to transport the large mower to and from the flying field but has not been used for a few years so is now surplus to our requirements.

The Committee is open to reasonable offers from any member who would like to buy the trailer. It seems to be in good condition with good wheels and tyres. There is a number plate/light board with it but that has not been tested. Having been in the barn for a few years it is pretty dirty but we are sure it would clean up well.

If you are interested please contact the Portshole Rep: Ken Smith.

Magnificent Wing-tip streamers!
A CADMAC Member's Typhoon 3D in flight!

Please Try to leave Porthole as tidy as possible, making sure no fuel is left on site & lock the gate.

30 metres from "uninvolved" persons"

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.

From 1 Jan 21 BMFA Article 16 is law: know the separation minima!

15 metres when taking off & landing, subject to mitigations

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 fifth 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. David Hayward & Ken Knox
Here is the link:-
https://www.facebook.com/groups/Chichesteraeromodellers/