Clear Dope

May 2020



Chichester and District Model Aero Club: Committee 2020

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Hello everybody hope you are all well and active Any Comments on Articles or additions please do contact me All the Best Ken Knox



Dear members,

I thought I'd give you an update on things at the Club.

Of course, this wasn't how any of us expected the 2020 season to go, but I hope you are well and staying in as much as possible.

Naturally, we continue to follow the Government and BMFA guidance and the Club remains closed to all activities, sadly.

How and when the lock-down situation may ease we simply don't know, but the Club is in a great position to reopen (in some form) when we can. If the Government and BMFA advice changes in the meantime, such that flying could be allowed sooner, then we could adjust accordingly and are in a position to do so quite quickly.

And to all members, thanks for your continued support. Let's keep some activity going on the Facebook page with your photos of your new builds and memories of your time at the Club.

We will return and I'm sure and we will appreciate our Club even more!

Stay well and Safe.

Tony Chant

This is Ray Shivjee way of keeping active and sane during this very odd time in all our lives

In between home schooling an 8 and a 10 year old, I've kept myself busy during lockdown with a couple of simultaneous builds; a Tony Nijhuis F86 mini jet, which is now complete and a Chris Foss Phase 6 sport which is nearly ready for covering. Working on the Phase 6 has been quite difficult with such a tiny hobby room (see picture), but I'm almost there.

With all the family confined to our house at the moment, I'm thinking of organising a roster for the use of the dining table! Seeing my frustration, my good wife had suggested that we knock down our leaky 1950s garage and get



a workshop built, but the current situation, being on 55% basic pay for at least a few months and the uncertainty for the future have put paid to that.

Starting with the Sabre, I purchased the plan, wood pack and moulding direct from Nijhuis designs. The wood all seemed good quality, and fit for purpose, and the laser cut parts were very accurate. Build followed the usual Nijhuis small design formula of all sheet wings and tail and a hell of a lot of planing/ sanding. Not having built a model for over 12 years , I'm relatively pleased with the result, although the canopy looks best from a distance!

The fan is a FMS unit sourced from 4max along with the esc and micro servos.

I went for the 3s version as opposed to the 4s- my thinking being that the sabre has a much lighter wing loading than the other mini jets in the series.

For the ducting, rather than source some clear acetate sheet as suggested, I ran a laminating pouch through the laminator and rolled that. Seemed to work ok.

Only thing I don't like are the very non scale looking SLEC air scoops either side of the fuselage.

Unfortunately, I had to go with them as the fan is located directly behind the trailing edge and putting a cheater hole in would have reduced the structural integrity of the wing I think.

Model was covered in Easycoat seconds which are a bargain at less than a tenner for 5 metres.

My wife did a great job of producing the Pakistani Air Force roundels and other decals on the home computer and printing them on sticky clear decal paper.

Finally , my 8 year old kindly donated the pilot- "Major Osama Bin Liner" from his Lego collection! **On to the Phase 6**.

I was going to get myself a blingy composite sailplane, but not being a massively experienced slope soarer, it was suggested I get something wooden and easier to repair first (good advice Jeff).

Not a lot to say about a Chris Foss build. Having knocked together a few Wot 4s, there were no massive surprises. Draw a few datum lines and it seems to go together relatively true(ish)!

On advice from the club Facebook site, I've gone for a 2 servo wing to keep things simple. I can still mess with aileron reflex if I'm so inclined.

Covering will be Easycoat seconds again because it's cheap, and I can't see any obvious imperfections in the rolls that I have.

Hopefully she will be finished before my wife's Homebase delivery arrives and I get roped in to decorating the kitchen!

Roll on the end of this virus nightmare so we can all test fly our new creations!







SPECIFICATION:

MOVEMENTS-	ELEVATOR-8mm AILERON-4mm
WEIGHT-	16oz (0.45kg)
WING SPAN-	25.5" (650mm)
LENGHTH-	24.5" (625mm)
WING LOAD-	16oz/ft*(3.9kg/m²)
3-FUNCTION	MICRO RADIO

Designed by - Tony Nijhuis

Starlings hitching a ride ?

In response to Ken's request for articles for Clear Dope I decided to submit this, a description of an unusual project that I undertook a couple of months ago, just before the current lockdown was imposed.

At this point I should add a health warning; this is not an article for the purists amongst you! It involves a "foamy" and technology designed to assist flying, so it will undoubtedly heighten the blood pressure of any dyed-in-the-wool RC modeller and flyer. You have been warned!

The story comes about because for the best part of 10 years I've had, lying in a drawer, an "autopilot" that was designed for RC models. I bought it at a time when such technology was seen to be "cutting-edge", and I found the concept fascinating. However, unfortunately another concept known as "work" got in the way of me taking it further at that time!

Compared to the technology now available, and the autonomy of modern-day drones, this particular unit is rudimentary and archaic. Indeed, the manufacturer now specialises solely in camera stabilisation, and has pulled out of the RC model business altogether.

Nevertheless, rather than put it in the bin, I felt compelled to try the unit out and it is now fitted in my trusty E-flite Opterra flying-wing that some of you may remember seeing at last year's Remembrance Day gliding competition at Thorney Island.



The autopilot unit is a "Foxtech FY31AP", which came with an associated GPS receiver, and On-Screen Display (OSD) unit for FPV flying.

I fitted all three, although I haven't gone as far is fitting a camera and transmitter required for remote flying. The autopilot itself requires the use of two extra receiver channels, both of which are controlled by 3-position switches.

The first switch controls model stabilisation, with a selectable wing-levelling function akin to Horizon Hobby's "SAFE" system.

The second switch controls the "navigation" functions which are: "off", return-to-home" and "circle current position".

There is also a "path navigation" feature in which a pre-programmed route can be uploaded from a PC; however, for obvious reasons, that is not one that I intend to use! The unit can actually adjust



the throttle channel, but this a feature I'd rather control myself to ensure that the aircraft maintains enough energy to stay airborne!

It is perhaps worth mentioning that, yes, all the technology can be turned off, and the model flown conventionally.

The set-up in the transmitter is as for a conventional fixed-wing model, and all the elevon mixing is done by the unit via a set of dip-switches.

Luckily, I was able to test-fly the mighty beast on the day before the world stopped, and I'm pleased to report that it worked surprisingly well!

By now you are, no doubt wondering "why fit an autopilot at all?" and you have a point!

RC flying is all about the skill of "stick and rudder" handling, striving to improve your skills and meeting your own exacting standards. I share these views, and to that end the Opterra is purely an "interest-only" project.

However, for all that, there really is something magical about flicking a switch on the transmitter and watching, after a moment's hesitation, the great white bird autonomously start a graceful wide-sweeping arc to point back towards you, and then come running back home like a dog to its master. Passing through the overhead it circles, patiently waiting to be released on its next mission!

Similarly, it was interesting to watch the system vary the aircraft's bank angle in the wind to maintain a circular track when the "circle current position mode" was engaged. Just like modern-day airliners in a holding pattern it strives to maintain a track over the ground. Full-scale pilots of yesteryear will fondly remember the "good times" when holds required mental aptitude and skill by flying a calculated drift correction on the downwind leg to achieve a correct pattern based on "rate 1" turns, rather than a geometric track. Those were the days!

In summary, this was an RC project with a difference. If you'd like to know more, try typing "FY31AP" into Google. There are plenty of videos on YouTube which show the autopilot in action.

Personally, my intention will be to always to keep the model close at hand in the air, just in case all that Chinese technology gets homesick and decides to make a dash for the Motherland, rather than return to it's computed start point in the the UK!

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K W I Z

Clues Across

- (1) Best RAF WW11 gun platform (9)
- (6) Wernher Von Braun (6,3)
- (7) Aeronautical Height (8)
- (9) Don't add this to 11 across fuel (3)
- (11) Cox diesel engine marque (2)
- (12) Don't admit it (4)
- (13) 35 MHz operating system (1,1,1)
- (15) Regal Fusiliers (abbreviation) (1,1)
- (16) Transmitter (abbreviation) (1,1)
- (17) Slang term for 16 across (6)

Clues Down

from Bruce

- (1) A British Texan (7)
- (2) The Red Barron (9)
- (3) Needed to access Thorney (8)
- (4) Star Wars Fleet (6)
- (5) Ages (4)
- (8) Lauded Vickers Biplane (5)
- (10) British engine marque (1,1)
- (13) Across the piper (3)
- (14) International ARTF firm (1,1)
- (15) Sun God (2)

If you can't print this from the CD file then email me at send you a pdf of this page.

and I'll



A cautionary lock-down tale!

Well I got the Concept in the garden with fresh battery and a pair of "New" (unused original packaging, but probably 25 years blades

I set the throttle limiter to about 60%, gain at 50% and brought the collective to neutral. It all spun up, running smoothly with some more collective it gently settled around 6 foot up. Stable, flying happily responding nicely to the controls with a of tail trim. I was just thinking about moving off up the garden when BANG!!! Something flew over my head and the model did its finest brick impression:

The damage isn't actually too bad boom, the blades, one cracked holder and the complete annihilation the tailplane. But the worrying thing was what had caused the crash. The thing that whizzed over my was one of the main blades. It just up and set off for Frensham, doing reasonably well until a tree reminded it that under the lockrules it wasn't allowed to leave the property. These blades have a foam with a 2.5mm steel wire leading and moulded nylon root, with plastic shells bonded over the top in a (I think). I had always assumed the end of the steel leading edge was into a U=shape that wrapped around the attachment bolt, but it seems that I was wrong. It's actually rolled thread that is self-tapped into nylon root fitting. What seems to

happened is the root fitting has split – the material doesn't seem very strong, and I wonder if it's degraded due to age. Whatever the reason, the blade just pulled out and ran away

A very lucky escape, although my practice of not doing sustained hovering below 6' in case it throws anything seems to have been justified here!

I do have the spares to rebuild, but I no longer trust the stock blades so I will need to find something else to use instead before I try...

Regards,

Pete Rieden

Pete is an active member of the Border Club. Border MAC has three sites in and around the Borden area all three sites all owned by the MOD The club is very active in normal times.







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Here's an article that my brother sent to me, It's been downloaded from the model flying website.

You may find some of it interesting. Andy Ellison has advice on getting that model set-up just right!

So you've flown your latest ARTF or scratch-built pride and joy for the very first time. How did it go? A few beeps of up trim and a couple of left? A click of the needle valve, maybe? Job's a good 'un! Are you happy to leave it at that, or would you like to try and get the best from the model with a little tweak here and there?

It's true that many of us are very happy to leave well alone after the first flight of our latest toy, never quite getting the time to explore its true flight characteristics with a view to optimising its aerodynamic trim. Having lectured on this subject at various club nights over the years I also know it to be true that even the term 'Aerodynamic Optimisation' is well over the heads of many club fliers - increasingly



so in this ARTF age, as we lose the basic skills that 'old school' aeromodelling used to provide. You may think that such optimisation only really applies to aerobatic aircraft where ultimate precision is being sought, but this isn't the case. All R/C model aircraft can benefit from an optimised aerodynamic set-up. The objective is to make the flying experience even more enjoyable at the Tx end by reducing the pilot's battle against the airframe, and with computer radios now being the norm there aren't really any excuses for not doing at least a little bit of work in this area. Whilst it would be impossible to elaborate for every model type in this increasingly diverse hobby of ours, you can apply or adapt the following for your own requirements.

RADIO RE-VISIT

The first and most basic step following completion of a model's initial flights is to re-visit the radio installation. This is primarily to make mechanical adjustments, re-centring the output arms and optimising the torque ratings. Let me explain. When connected to a control surface, a servo generally translates its rotary action into the linear movement of a control linkage.

Consider a servo arm that's set square across the servo. Given that the movement of the arm is equal in both directions, the linear distance the linkage moves will also be the same. Now if you add some trim in flight, therefore moving the servo position from central to offset, there will be unequal linear movement to the linkage and hence the control surface (Fig. 1).



Fia.1

This 'differential' throw is sometimes very useful on an aileron, and you might choose to purposefully offset your servo arms in order to get it, but it's much less desirable on, say, a rudder. True, you can mix it out using the Adjustable Travel Volumes (ATVs) on your Tx, but the rate at which the control surface reaches a given point will then be different for both sides of the deflection, and the control surface response will 'feel' different in the air. It might take you a few flights to get the linkage lengths correct or the servo arms to an acceptable position but stick at it, as getting the basic steps right is very important to the rest of the set-up process. The second reason for re-visiting the installation is to optimise the useful torque of the servos. Servo torque is usually rated in 'kilograms per

centimetre' (kg/cm), e.g. a 3kg/cm rated servo will provide 3kg of force to the control surface from a point 1 centimetre out along the servo arm. Attach your pushrod at 2cm from the centre of the hub and the servo can only apply 1.5kg of torque. Put an overly long, 3D-type arm on your servo at 4cm from the hub and you'll only get 0.75kg of torque - not much for driving a massive control surface (Fig. 2).

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So, servo selection can be a key factor when building a model. For the purposes of this article I'll assume you already have the right servos for the job, so let's set about optimising their torque. If you found the elevator to be a little twitchy for your liking during flight you probably either rated it down or reduced the throw using ATV. In order to maximise the torque available to deflect the control surface, the correct course of post-flight action would be to move the position of the mechanical linkage: either inwards on the servo or, if this isn't possible, outwards at the control surface horn. You would, of course, then have to reprogram your Tx to increase the rate or ATV (maybe to their maximum levels if the linkages don't bind up) in order to facilitate the same deflection at the control surface for 'best torque' from the servo.

Another thing to assess in this area is control centring and the 'feel' of the model. For example, does the elevator always come back to neutral after a 180° turn or reversal? Do the ailerons 'hunt' a little after a rolling sequence? If you're unsure then fly the model again, getting your mate to make notes if you think it will help. Poor centring of a control surface is due to problems either with the mechanics (binding servos, stiff linkages, etc.) or the electronics (bad servo resolution or 'dead band' in the radio system). Whatever the problems are, don't continue the set-up until they've been corrected.

MOTOR AND PROP

The last step to look at before we get on to the 'heavy' set-up areas is to reassess the motor / prop combination. Selection of the correct propeller will fundamentally affect your model's performance. Many pilots want some level of 3D or 'Fun Fly' performance from their models, coupled with good airbraking and fast acceleration, which generally demands a prop of large diameter but shallow pitch. However, if you're after high top-end speed then you need a smaller diameter prop that's relatively high in pitch (for example, my British speed record-holding model used a carbon 8 x 10" prop turning at 20,000+rpm to achieve its 234mph).

Spend some time deliberating over the way in which your model performed on the initial flights, and if it suits you, then great! Don't overlook the ever-present noise issues, though. On most conventional models the main noise producer is actually the propeller, so if you fly from a noise-sensitive site you'll need to drop the tip speed somewhat. It's important to settle on the prop early, as any changes here will affect the thrust line steps that we'll look at later. When you're happy with your prop choice make sure it's well balanced and stick with it, buying spares of the same make and size. Before we start with the trimming proper, something to bear in mind: trimming is a bit like squeezing a balloon. Change a bit here and something somewhere else will be affected!

C OF G

It's best to start with the C of G (Centre of Gravity), and indeed you might have had to do a little work here to get your new acquisition to fly half decently in the first place. Most kit instructions give a good indication as to where the balance point should be, but this position isn't sacred; it only represents the point where the prototype handled in the way the designer thought it should.

Testing the C of G is fairly simple, its effectiveness being demonstrated best on models with fully symmetrical wing sections set at low incidence angles. With the model at height, observe a flight path where you're viewing from the side and flying into wind. Slow the engine to idle (or motor off if you're flying electric) and push the model into a vertical dive. Release the elevator stick and observe the descent of the model. If it begins to pull out of the dive as if up elevator was applied then this indicates

a forward C of G. Conversely, a tuck-under as if down elevator was applied indicates a rearward C of G. Many F3A aerobatic pilots set the C of G slightly rearwards to help the model fly 'hands off' down line.

3D models also usually exploit a very rearward C of G, and it's not unusual to have to apply slight up elevator on these to hold the dive straight (Fig. 3).



FIG 3When applying this test to a glider, observe the model in a long, steep descent of say 45 - 60° rather than a vertical dive. A good proving test for a glider is to fly inverted. Hands-off inverted is often desirable for a racing set-up and is often referred to as a 'pitch neutral' C of G position. Some pilots prefer to prove the C of G position in a vertical climb rather than a dive, observing if the model falls backwards or tucks under as it begins to slow. Personally I find this method unreliable as the motor's running flat out here, and any thrust line inaccuracies will create a similar effect. We'll come to those later. In the meantime let's look at the other balance issue.

LATERAL BALANCE

This is an aspect of trimming that's often overlooked. I've read of many 'old school' modellers adding weight to wingtips after a session of balancing the wing on the workbench or hanging the model from strings attached to the roof. Whilst the latter method may get you somewhere near, the former is totally wrong; the model must be balanced as a whole assembly, and the best way to prove it, is in flight.

To determine if your model has a heavy side, fly it into wind straight and level and directly away from you. At a reasonable throttle setting pull tight consecutive inside loops without using any other control except elevator, and leave the throttle alone. Watch carefully to see whether the model begins to track off to one side, as if it had a heavier wing (it will track towards the heavier wing). Note the direction carefully, then bring the model around the circuit to the same position, throttle setting and heading as before. This time roll to inverted and push down elevator to fly tight, consecutive outside loops. Again note the direction of any drift. If the model has a heavy side it will now track in the opposite direction to before. A drift in the same direction is indicative of a warped wing rather than a heavy one (Fig. 4).

Obviously the lateral balance of models with side-mounted engines is going to be off from the start, so you might expect this side to be heavy. Lateral balance can be corrected by adding small weights to the lighter wing, as near the tip as possible, until the model tracks straight both upright and inverted. On moulded glider wings the weight can be added to the outboard aileron servo bay or under a gap seal near the tip. If you're unlucky enough to have a warped wing and decide to stick with it, you might consider lessening the effect by adding a trim tab on the underside made from trailing edge stock, or experimenting with the mixing on your Tx. Mind you, this is really a compromise and you'll probably never get it perfect.

THRUST LINE

It's quite common these days (especially on high-end ARTFs) to find the front bulkhead factory-fixed with an offset for motor side-thrust and down-thrust. Whilst these might seem like they're set with intent,



any variations in motor or prop size relegates them to the position of 'best starting point'. The spiralling slipstream from a propeller hits the model's fin at an angle, and the yaw force this generates is dependent on the motor rpm and forward speed of the aircraft. To a small extent this effect can be mixed out with rudder trim but this will constantly vary as the rpm of the motor changes.

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SIDE-THRUST



This is perhaps the easier of the two to determine, but be aware that anomalies with lateral balance and any fin / rudder misalignment can create similar effects. Fly the model at full throttle, straight and level into wind and then pull vertical at the end of the circuit, as if for a stall turn; it's important to establish the up line quickly without the use of rudder inputs. Be wary of pulling too sharply as any lateral balance inaccuracies will immediately drop the heavy wing and throw the model off the vertical. The model should hold steady for a short while before yawing off to one side.If it yaws to the right thrust. Aim to have the model hold a vertical up line for at least four seconds before a slight yaw to the left begins (Fig. 5). It may take you a few flights to get this and the lateral balance nearer to the mark, but patience will pay dividends so keep at it. Fig.5

DOWN-THRUST

Again, fly the model at full throttle, straight and level into wind. Abruptly shut the throttle to idle and observe the flight path. If she climbs then the motor is pulling the

nose down when under power and you'll need to reduce down-thrust. The correct thrust line should see the model continuing straight and level before slowly starting to sink as speed decays. A more abrupt dive is a result of not enough down-thrust and you should alter the motor angle accordingly (Fig. 6). High lift wings (as used on electricpowered gliders) result in a motor installation that has large amounts of down-thrust, whilst side-



thrust may not be such an issue. Models with the motor mounted on a pod above the fuselage will need large amounts of up-thrust to work effectively.

If you've a cowling to cut then make sure your thrust lines have been established before getting the knife out, note also that most F3A aerobatic engine mounts are now fully adjustable with side- and down-thrust trimming in mind.

DIHEDRAL ANGLE

This is the last area where big gains can be made towards perfecting a model's performance. It's really aimed at obtaining purity of yaw axis and rudder control, i.e. when applying rudder the yaw is optimised and any associated pitching or rolling is minimal. Whilst this really only applies to aerobatic models, an insight into what's going on can help us understand some aspects of model behaviour. In order to obtain pure rudder input a low-wing model will generally need dihedral (wingtips elevated above the root), a high-wing model will need anhedral (wingtips below the root) and a mid-wing model might need none at all. Let's look at this in practice.

 An F3A pattern ship is designed to track straight, roll pure, and knife-edge forever. Its low-wing design incorporates slight dihedral to achieve purity of the rudder control whilst retaining some stability.

- A very aerobatic high-wing design such as the Wot 4 usually has a flat wing that's mounted way above the datum line. If rudder is applied in flight then yaw is induced, but there'll also be a large pitch downwards and a rolling motion in the direction of the rudder. To eliminate this mechanically the Wot 4 would need an anhedral wing for purity of roll control, but then the model would lose the stability that's made it a classic design.
- Scale aerobatic models like the Extra 300 generally have a mid-wing configuration with little or no dihedral, as they're designed with control purity and some level of instability from the off.
- The test for correct dihedral is made with the model in knife-edge flight. With the aeroplane flying at a decent speed, roll to knife-edge and apply top rudder. If you rolled 'left wing low' with right top rudder and the model slowly starts to roll in that direction (i.e. with the rudder input) then the dihedral angle of the wing is too great. Likewise if the model rolls against the rudder then the dihedral angle is insufficient (Fig. 7).



You'll need to try this on both sides to be really sure, and the remedy is to cut the wings in half and re-join! Once upon a time, maybe, but not so these days. Most modern transmitters with freely programmable mixers will have a dedicated knife-edge mix that applies a little aileron as a slave channel to the rudder input. Experimentation with rudder rate switches for straight and level knifeedge at full throw may result in slightly different figures in the mix for both sides. Models like the Wot 4 will need a great

deal of aileron compensation for a given rudder input, whereas a low-winged aerobat might need only 2 - 3% aileron offset in the mix. An additional free mixer will deal with any pitching induced by the rudder.

Most models will pull towards the undercarriage in knife-edge due to the increased drag it produces about the datum, and of course you'll need to set this up for both sides; but the result could easily be effortless knife-edge flight from horizon to horizon with a model that you'd otherwise struggle with.

FIT AND READYSo there you have the basic areas where the biggest improvements can be made. Other aspects can be explored if you really start getting into this kind of model set-up, e.g. equalising elevator throws on split surfaces or raising / lowering ailerons to provide correct tracking - these are areas where smaller gains can be achieved. The level to which you choose to take this is entirely dependant on both your model and your ability, plus of course the way in which you fly. Don't forget to revisit some of the earlier steps as you go through the process to see how the latter changes affect the earlier ones. Go ahead, experiment. It's a lot easier than you might think!

If you've got this far you have done very well Stay safe and keep well. Dave



Hi Ken,

Bought the WOT 4 ARTF kit from SMC last last year, the Twister 40 motor, I bought two from the late Frank Bucklan of PAM, when he retired from aeromodelling. The Twister 40 is rated at 600w and runs on a 4S, need to check the C/G as to which size of battery it will take 4S 2200mAh or 4S 3300mAh.

Its almost ready tor first flight please Derek.

My next project is finishing off the Phase 6 that I got from Don Eades, PAM president. plan to fit two Aileron servos and contact Chris Foss to see if I can buy a self adhesive decal kit.

Hope that will do.

Regards

Peter

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.

> When Driving Around Thorney be aware of young children on bikes

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

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/