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

Clear Dope





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Thursday 12th January. Club evening: lecture by Alan Key – "Flying for fun".

Please send more articles for CD

Presentation of Trophies 2022

Vince Barlow Trophy - Open Electric Glider - Adrian Childs. Eric Gregory Trophy - Thermal gliding - Adrian Childs. Don Biles Trophy - Thermal flying - Remembrance Day - Declan Cousins. Electric flying -Remembrance Day - Adrian Childs. Precision Power Trophy - Jeff Cosford. Flying Scale Trophy - David Hayward. Gerry Devonish Bowl - Best builds - David Hayward.



A Rambling Tome

The first rule of a speech or, for that matter, a written piece is: "never start with an apology"; however, in this instance I feel that one may be necessary. If you read this article you will, I guarantee, be saying to yourself "that's 10 minutes of my life that I can never have back"!

So, dear reader, you have been warned; read on at your peril!

The germ of an idea for this article came from a recent purchase of mine; a Blade 230s "Smart" model helicopter.

About 25 years ago I dabbled in the world of model helicopters, flying Kyosho 30s (remember those?), and rapidly came to the conclusion that this was not a sound financial investment. Just about every visit to the flying field resulted in going home with a bent spider-like structure akin to a television aerial that had been blown down in a storm, rather than an aerodynamic machine. Stabilising gyros were in their infancy, and as a result of many "firm arrivals", successive tail booms were subject to the effect of "blade sail" on too many occasions! The results were always discouraging and expensive, so it wasn't long before I moved away from model helicopters in favour of fixed wing models, which fly in a conventional sense, and on which engine failures do not result in "instant death"!

My interest in model helicopters was thus quelled for decades, until recently, when it became apparent that new



models on the market have stabilisation systems and even "panic recovery" features that mean that not every take-off will end with a crash.

Armed with this knowledge, internet searches suggested that the Blade 230 is a good all-round helicopter which features all the stabilisation and "rescue" features that I might need. Hence my purchase of a secondhand "Smart" variant on eBay.

With invaluable help from Jeff Cosford the mighty beast has flown and, in spite of my best efforts, remains in one piece (at the time of writing)!

So, "where is this article going?" you ask.

During one of my first flights of the model in the local field I unexpectedly found myself being harassed by an out-of-control dog that had taken an unhealthy interest in the hovering wonder. I called out to the owner asking them to call back said mutt, as there was a risk of injury. Ultimately, of course, I could have cut the throttle to avoid injury; but this would have resulted in "falling brick syndrome", and the associated unwelcome repair bill.

In the event "Fido" exited stage right, and I landed without incident.



However, the whole affair had got me thinking; what if one of the blades had hit Fido; how much injury would have been caused? Just what is the tip velocity of a rotor blade on this model helicopter?

It transpires that the "Smart" version of the 230s incorporates a telemetry ESC which provides a host of information, including rotor head RPM. Given that in the hover the rotors were turning at about 3000rpm, and the diameter of the rotor disk is 21 inches, it was a simple mathematical calculation to work out that the tips of the blade would have been travelling at 21 x "Pi" x 3000/36 yards per minute, or in layman's terms, 187 mph. So, yes, enough to do some significant damage to an animal or person!



But that got me thinking; what is the propeller tip velocity on a model aircraft, and how does it compare with that on my Blade



230s? My e-flight Carbon Z T28 is a very powerful machine, which runs on a 6S battery. Where does it stand in the overall scheme? Equipped with a 500kv motor, powered by a 22 volt battery, its theoretical maximum rpm is 500 x 22.2 = 11100rpm. The 14.75 x 10 propeller has a radius of 7.375 inches, and the associated maths reveals that the tip speed at full power is a whopping 487 mph! Not a good prospect when in collision with soft tissue, such as a hand, or Fido's hide!

But, hang on, is 487 mph approaching the speed of sound?

Actually, the speed of sound at sea level is somewhat higher at 767.27 mph, so the answer is that there would be some way to

go for my humble T28's propeller tips to break the elusive sound barrier.

But this, in turn, got me thinking: "could an RC model's propeller actually break the sound barrier"?

Consider the E-flite V1200, the fastest commercially produced electric foam aircraft (which featured at our recent club evening).

This has an 800Kv engine, which on a 22.2 volt battery can theoretically produce 17600 rpm. The stock propeller is a 10 x 8 which, with a diameter of 10 inches, results in a theoretical tip speed of 523 mph. This is just under 7/10ths the speed of sound, and thus, using mathematics alone, it would only require a prop with a diameter of 14 inches for the tips to hit the mark! Maybe a 14 x 5 instead of that 10 x 8?



Given that the V1200 has a top speed of over 150 mph (and, as we saw on Ali Machinchy's video, can reach 201 mph!), which contributes to to the overall speed across the prop, we could well be in "supersonic country" with a smaller prop too.

Of course that word "thoeretical" keeps raising its ugly head, and in reality, drag and real-world performance along with a host of other effects probably contribute to the fact that breaking the sound barrier with your model aircraft's propeller is a pipe dream!

There is, however, some lively discussion about the topic on RC internet threads. Whilst some believe that a model aircraft propeller would "explode" if it surpassed the speed of sound, others point out that an aerodynamic surface actually can go supersonic "locally" before the airframe or propeller reaches the actual speed due to areas of accelerated flow across the surface. They point out that on fastcruising airliners, such as the Trident and Convair 990 Coronado (see right), mach waves could often be seen as a visual disturbance on top of the wing in the cruise because of the local acceleration of air. So, even if your prop is subsonic overall, parts of the



airflow could actually be supersonic! As an aside, there are also some curmudgeons out there who believe that even discussing the subject of supersonic RC propellers is a crime against humanity!

However, in the real world, are supersonic propellers a reality? The answer is "yes"; most noticeably on the Tupelov TU-95 "Bear" bomber, whose props can turn at Mach 1.08. As we all know, exceeding the speed of sound results in sonic booms, and allegedly pilots of allied fighters reported a deafening sound during intercepts of these aircraft, and their noise was even picked up by submarine sonars submerged in the waters below.





In theory, a supersonic propeller is inherently inefficient, if designed correctly at the tips, but this didn't stop the Americans experimenting with the idea in the 1950s using an aircraft named the Republic XF-84H; nicknamed it the "Thunderscreech". Results were not encouraging, and those that witnessed or worked on the project reported a that the sound was so intense the aircraft could not be approached; apparently it caused

people to faint, vomit, become slightly deaf, and reputedly soil themselves! It was the loudest aircraft ever built, and the project was soon abandoned!

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Finally, it was interesting to note that in jet aircraft it is not unusual for turbofan tip speeds to go supersonic. In fact, just about every modern turbofan does it at high thrust settings. Next time if you take a plane, sit at a window seat ahead of the engines where you can "see" the fan blades. During take-off you will hear an unmistakable buzz from the fan. That is characteristics of supersonic tip speeds. You will also notice that the latest designs have a sudden reverse sweep on the blades near the tips. That is for shock mitigation.





Back to the question about models. A YouTube search reveals some very,

very, very fast prop-driven models (check out this link: <u>https://youtu.be/</u> <u>LuDZF4IGUaw</u>) and, whilst the airframe noise is impressive, the aren't many sonic boom like noises or disintegrating propellers. So, I guess it's just a pipe dream, and I'll have to make do with listening to the Harvards with their supersonic propellers flying out of Goodwood. In the meantime, maybe there's a challenge in the offing for my recently acquired E-flite V1200; not sure that it'll be welcome at Thorney though!

So, there you have it; a rambling tome with no real conclusions except that spinning propellers go very fast, and are best avoided! But you knew that already!

Let's hope that dog owners get the message too.

ΤK

CADMAC and the A Certificate Test.

A few comments by lan Carby.

Having been guided by Ken Smith this summer through to taking the A Certificate test, we thought it would be worthwhile to make a few notes to help others progress with their training before forgetting what was like to return to the hobby.

I was fairly certain on the type of plane I wanted to use, but I did find setting up two transmitters for buddy box use daunting. I chose wireless instructor/student linking, but I could find no guidelines as to which switch to use for what function. I realise that any form of standardisation is contentious but having a preferred setup for throttle kill and student/teacher control would have been helpful. It would also have made supervised flying for the instructors easier.

Dealing with the wind at Portshole is just part of flying there, but I found the big problem was feeling lost in the sky. I could not relate the position of the plane to the hazards of the patch, which was particularly disconcerting. The site has very well-defined hedges and trees, and early emphasis on using these as markers would have been very helpful.

I had read all the BMFA material on taking the test, even watched the You-Tube videos, but the issue I had was again to do with the wind. For the BMFA, on the day of the test the wind always seemed to blow straight down the strip, not so at Portshole. Hence mapping rectangular circuits to ground markers was essential.

Passing from trainer to trainer was very beneficial. It was an opportunity to get to know more club members, pick up a variety of new tips, and helped one's confidence no end.

Maybe it was just me, but I found the thought of letting go of the sticks would immediately end with disaster. Trimming out a model is standard practise for the experienced pilot, but for a anyone not used to flying RC it's petrifying.

Finally, it would have been very useful in completing some formal mock tests before phoning Jeff and losing few nights sleep.

Reading through these notes and looking back at the summer, I realise now that a lot of these issues were of my own making. Every point could have been addressed just by asking, but of course being a newbie to the club I was unsure who to ask or even how to phrase my questions. The one lesson that will last is that everyone in the club has proved to be very approachable and asking is free!

These are very minor points, but with the pressure of the test looming at times became quite daunting.

Regards Ian Electronic newsletter of the Chichester and District Model Aero Club

Scratch-Built (almost) 72" Lancaster

Some of you saw the maiden flight of my 72" Lancaster at Thorney in November, and a couple of people asked me to write a construction article for CD ...

When Tony Nijhuis published his plans in RCME (2001), I bought the vac-formed parts and built one as per the plan (brushed motors with gearboxes, balsa construction, mechanical retracts, AUW 6.5lbs as advertised). It took a couple of years on & off, so I was a little disappointed when she tip-stalled and spun in on her maiden flight.

Some years later (after I finished crying!) I decided to have another go, but using my own - rather different - construction techniques.

Once again I opted to use the Nijhuis vac-formed parts, thus dictating the overall size at 72". By this time, brushless motors had become 'a thing', so I wanted to go brushless for the weight saving. I used four BL2208/14 (1100kv) budget motors from BRC hobbies (now Robotbirds), each with a 20A ESC. The BEC's were disabled by isolating their middle pins, and a 5A UBEC fitted to power the receiver/servos. Propellers are GWS 3-blade 8x4, rotating in opposing direction on each side. I saved the mechanical retracts from the first build, and used them again.

I decided to have separate wings that plugged into each side of the fuselage using a CF tube spar (the original Nijhuis plan uses a one-piece wing that mounts into a cutout underneath the fuselage). This would also allow scale full-length bomb doors.

The wings were hot-wire cut from polystyrene, the tubes for the CF spar inserted as far as the inboard engines, plus a balsa spar extending a little into the outer panels. The fuselage was formed from a central box/crutch of foamboard, full-length sides from depron sheet glued to the outside of the box, top & bottom formed from pink foam (partly hot-wire cut, partly sanded). Lastly everything was covered with newspaper and diluted PVA. The nacelles and engine mounts as per the Nijhuis plan proved to be difficult to align accurately in foam, so in the end I resorted to rather unorthodox 'stalk' mounts shoved into the leading edge of the wings (see photo). These were easy to fit, made it easy to get all the engines aligned correctly, and have proved more than strong enough! The nacelles were then simply built up from depron in place.

I use A123 batteries for all of my models; with linkages for working rudders and a steerable tailwheel, it required two 3S 2500mAh packs in the nose is to balance correctly. AUW came out at 5.5lbs, so I was pleased with the overall weight saving.

I carried out a test flight before embarking on painting; she flew well enough.

For various reasons I did not get to fly her again for several years. During that time, computer radio technology advanced considerably, with quite complex control mixing now easy to program. It occurred to me that I could save a significant amount of weight by replacing the rudders and tailwheel steering (plus their linkages) by programming differential thrust to the rudder stick! A bit of googling convinced me that it ought to work, so I took the plunge and built a new rear end. I figured on mixing about 15% differential thrust with rudder, and about 8% with aileron (to help create coordinated turns).

Well the result was way better than I expected: the tail end was now so much lighter that I needed only a single 3S pack to balance the aircraft! As a consequence, AUW dropped to 3.75lbs!

The maiden in this new configuration was an absolute joy: the differential thrust worked just as I hoped, and with such a low weight she flies at a very scale-like speed. For the tech-minded, each motor draws about 9.5A static (total 38A) for a total of 376W; she is certainly not over-powered, but at reduced throttle for pootling around in scale manner I get flight times of 8-9 pleasant minutes!

Happy flying! Fraser Dibden

Photographs of construction

















Subs for 2023, by Jeff Cosford

Club subs are unchanged, but BMFA fees have increased by £2, and the CAA Registration is up by £1.

Senior member - £46

Juniors (under 18) – nil

BMFA membership Senior - £42,

BMFA membership Junior - £20

CAA registration fee - £10

So, a Senior Member will pay £88, Senior Member (CAA), £98, Senior Member (Country) £46. Junior Member: Nil, or £20 if the club buys your BMFA membership.

The email asking for payment will come out automatically around 3rd December, so if you have not yet received that, await its arrival.

Updating your Membermojo database details.

If you change your email address, car, postal address or phone number etc, here is where you can update your club database record: <u>https://membermojo.co.uk/cadmac</u> or let me know and I will do it for you.

CAA Registration - Updating Membermojo.

If you fly, it is your responsibility to ensure you pay the £10 for CAA Registration, to comply with the law. This can be done via CAA, BMFA or the Club.

You are also required to enter your Operator ID onto the database. Many of you have not done so, or are showing the old number starting OP-KX****3.

To find out your number, go to <u>https://register-drones.caa.co.uk/my-registration</u> Or contact the CAA office: Email <u>drone.registration@caa.co.uk</u>, or telephon<u>If</u> e 0330 022 9930.

An email asking for payment was sent to all members in early December; hopefully you all received it. If not please contact me at: members@cadmac.co.uk

Pilots who registered with the CAA (rather than BMFA when the DMARES (Drone and model aircraft registration

<u>and education service</u>) went live in November 2019 will need to complete the Flyer ID process again by November 2023. The original CAA Flyer ID had a 3 year expiry date whereas pilots who registered from

December 2020 onwards will have a Flyer ID in the 'new format' that is valid for 5 years.

Arun & Chichester Air Enthusiasts Society

I was recently contacted by the Chairman of the "Arun & Chichester Air Enthusiasts Society" (AirACES) with a request to publicise its activities to the members of CADMAC.

The society's members meet on a Monday evening every month at 7.30pm in the Chichester Park Hotel (close the Sainsbury's) to attend lectures about "all things aviation". The subjects encompass the entire spectrum of full size flying; historic and modern.

As a regular attendee myself I can highly recommend the society to CADMAC, and I believe that many of the topics covered would be of great interest to our members. The lectures are presented by experts in their fields, and are of a very high standard.

AirACES membership costs just $\pounds10$ per year, and provides a reduced entry cost of $\pounds5$ to each talk ($\pounds7$ to non-members), as well as regular updates and reminders about forthcoming events.



In January there are actually two talks to commemorate the society's tenth anniversary.

January 9th: "The Red Arrows" - Squadron Leader Graeme Muscat - 'Red 10' & Team Leader".

January 23rd: "WW1 & WW2 medals" & "A Day at the Antiques Roadshow" - Mark Smith; the BBC TV Antiques Roadshow presenter, and expert on medals & memorabilia.

Normally, one simply "turns up" for talks, but the society is recommending that you pre-book for the two events in January due to the anticipated interest and attendance.

More information about these, and subsequent talks, can be found on the AirACES website: http://www.airaces.org.uk/index.htm

I will include a full list of the talks planned for 2023 in the next edition of Clear Dope. In the meantime, I recommend that you do take the time to check out the AirACES website, if only to see whether the topics covered "float your boat"!

Finally, it is worth mentioning that anyone that does attend can park in the nearby Sainsbury's car park free of charge for up to 3.5 hours.

Tim K.



Date:	Event:
Thursday 12 th January (2023)	Club evening: lecture by Alan Key - "Flying for fun".
Thursday 9 th February	Club evening: Auction or Talk - Details TBD
Thursday 9 th March	Club evening: lecture by Rod Dean - "Flying the Hunter and other things"
Thursday 13 th April	Club evening flying - Fishbourne Centre playing fields.

Flying alone on Thorney is now not allowed on the grounds of safety 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"

> 15 metres when taking off & landing, subject to mitigations

When driving around Thorney be aware of young children on bikes and 20mph speed limit

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

From 1 Jan 21

BMFA Article 16<u>is</u> law: know the separation minima!

> 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/