Airscrew

Facts, opinions, pictures and fun

https://northreppsmfc.com/ *December 2019*

To contact me send an email to peter@northreppsmfc.com

Contents

The BMFA remote pilot competency test	2
Top tip: Drilling out holes in propellor hubs	2
Model of the month:	4
Genius: Number 4:Trimming plastic screws	4
The People's Mosquito	5
Voltage is your friend, current is your enemy	7
Mike's memories	7
The Meredith principle	9
Pillock of the month: Me again	9
Deck the planes	10
Manoeuvre of the month: The Immelmann Turn, a turnaround maneuver	10
Caption competition	12
Christmas 2019 gift ideas: part 2 of 2	12
Spot the fault	12
Sources	13
Sales	13

(Click to jump to the page)

The BMFA remote pilot competency test

If you hold a BMFA A, B or C certificate you can stop reading and go on to the next item. If you haven't got any of them there is something urgent you MUST do on or before 30th November. That is to take the BMFA (or CAA) 'competency' test. If you don't pass it by then you will not be insured when you fly.

I haven't looked at the CAA test but I have done the BMFA one. Over the years I have designed hundreds of exams and other assessments and I think the BMFA has done a first class job. The test questions are only about model flying and ask sensible, practical questions in clear language. They are multiple choice where you tick what you think are the correct answers. Some questions ask you to tick more than one answer if you think they are correct. I believe that you can repeat the test as many times as needed. I don't know if the test always contains the same questions or takes a random set out of a question bank.

The questions are not designed to trick you. You should have no difficulty as long as you know information about the following themes:
1 You are responsible for safety and must only fly if reasonably satisfied that flight is safe including adequate energy.
2 You must keep visual contact with the model.
3 The default maximum height is 400 feet above the ground below the model.

When you have completed the test successfully you will get an email with the subject *Quiz results for Members Registration Competency Certificate Test.* This has two links in it. The first allows you to download your *Registration Competency Certificate (RCC)*. This is a file in pdf format ready for printing. The second link takes you to a how-to page telling you how to upload the certificate file to your achievements folder in your membership profile. Once you have uploaded the file you get a second email with the subject BMFA: Credential Upload which confirms that the file has been successfully uploaded, so you are now legal.

Note that it is not the job of the club or BMFA to police this. No-one will stop you flying but I don't need to tell you what potential damage a model might do, and what the resulting claim against you might be.

There are two problems that have not been thought through by the CAA. The first is for people under eighteen. They can take the test but cannot be an operator so must have someone eighteen or over to supervise them. This person must also take the test or have an achievement certificate. This might create a problem where a youngster has a non-flying parent or guardian. The second problem is for new flyers. As things stand a new flyer must pass the test before flying, which seems to me most unreasonable. No doubt this will be clarified.

Top tip: Drilling out holes in propellor hubs

In the past, on smallish props, I have used a tapered reamer or a hand held step drill. However faced with a large prop for the first time and the need to have a 10mm hole opened up to a 12mm one I thought about how to it accurately. After all you don't want a wonky or off-centre hole. I realised I must use my drill press. I thought of centring the prop hole with a 10 mm drill, clamping the prop into a machine vice, then swapping to a 12mm drill.

Then the light went on. I bought a new step drill that went up to 12mm. The next step down was 10mm and exactly fitted the

existing hole. I reasoned that if I hand-held the wood prop over the hole in the drill table, the step drill would centre as I lowered it into the prop hole. As long as I took it gently so the prop didn't snatch, all should be well. As so it was. I drilled down as far as the drill would go then turned the prop over and drilled the rest. Perfect hole, perfectly centred. No marks or damage.

Model of the month:

I blundered over the owner of last month's model. Too many Mikes. The owner is Mike Hallam not Mike Harrall. Apologies to both.

This month we celebrate another of Mark Jordan's war birds. This time it is a Grumman F9F Cougar electric ducted fan model. This one is scratch built, featuring an epoxy and glass fibre surface finish. The model flew beautifully and at scale speeds. Mark says he will be building another soon.

Photo: Dave Wilcox

Wikipedia photograph

It looks as though it is decorated as the 'Blue Jet' which is on display at the Town of Tonawanda Veterans Memorial near New York as shown below.

Genius: Number 4:Trimming plastic screws

The only thing I don't like about Chris Foss' Wot models are the wing screws. They are often 1/4" x 20 unified. The ones supplied with my Wot4 were too long and no-one now sells shorter ones as

they have been replaced with M6 long ago. When cutting nylon screws I have found it difficult to clean off the rough edges that could jam in the thread. Chatting with Mick Spencer about it he suggested I use a pencil sharpener. Stroke of genius. After cutting to length with a hacksaw, and filing the end smooth and flat, I turned the screws a few times in the sharpener until the threads were clear. They fitted smoothly and perfectly. And here they are:

Photo: Peter Scott

The People's Mosquito

I subscribe to the organisation that is building a new Mosquito. You never know, it might be flying before my model is. Here is the lastest news from their newsletter, The Buzz.

We are using this month's edition to share with you the latest exciting progress from our supplier Retrotec's workshop on the DH.98 Mosquito fuselage moulds. The bulkheads for Mould A and B have been procured and manufactured. These will be installed onto 1-ton box steel frames which are being made in 3 sections, so they can be painted in RAF yellow and moved to the new factory Retrotec are constructing.

We are still in need for further donations and support to complete the first UK Mosquito moulds for over 73 years. We will be offering you the chance to get your name on the mould - watch this space!

Kind regards

John Lilley
Chairman & Managing Director
https://www.peoplesmosquito.org.uk/

Voltage is your friend, current is your enemy

Occam's Razor is a law that says, 'the simplest is the most likely to be true'. I have been playing with electric motors of increasing power, making mistakes along the way. I finally think I've got it in my head - simply.

The underlying principle is:
Power = voltage times current

Current
Each motor has a maximum current.
Current causes heating, so too much will destroy the motor.
Current must be kept down.
Current is your enemy.

Voltage
Voltage does no harm (unless enough to electrocute you).
Voltage is your friend.
So to get more power out of a motor you increase the voltage, by going from 4 cell to 5, 6, 7, 8 cells and beyond.
Do not go beyond the maximum cells specified for the motor and ESC.

Now you choose a propellor.
More voltage means more rpm. A motor's kV, e.g. 500, means how many rpm for each volt.
If you fit too big a prop the motor won't run at enough revs and the current will rise.
So more voltage (cells) means use a smaller prop and/or pitch.

So what size propellor?
You can be guided by the motor maker's suggestions but they will play safe. If you want the maximum safe power you will need to use a power meter that shows current and then experiment with different props at full throttle.
For two blade props a good way of comparing them is load factor:
Load factor = diameter cubed x pitch.

The full formula is:
Load factor = diameter cubed x pitch x square root (number of blades minus 1)
This allows you to compare props with different numbers of blades.

What power can I expect?
Some makers specify maximum power for a motor, but many do not.
Remember: Power = voltage times current.
Voltage is the number of lipo cells x 4 roughly (this is the maximum cells specified for the motor).
For example 8S gives about 32V.
Current is the maximum specified for the motor.
If the motor can take 60A:
Maximum power = 32 x 60 = 1920W or about 2.5HP

And when you have done your experimenting share your data with club members and the rest of the world. Alternatively send it to me and I'll create a database.

Mike's memories

Reminiscing – Valiant Left Hand Seat

OK, Nikita has packed up and and taken his toys home with him. John FitzGerald Kennedy is feeling pleased with himself and we in the SACEUR assigned *(Supreme Allied Commander Europe)* V force are no longer shackled to a couple of American nukes in the bomb bay.

Photo: Wikipedia

It was decided that this young co-pilot should be sent to RAF Gaydon to do the Intermediate Co-pilots Course. Successful completion would mean flying squadron aircraft from the left hand seat so long as there was an experienced captain in the other seat. Back on the squadron, my captain, the squadron commander, told me that the next sortie would be with me in the left seat. Pre flight meal over, safety equipment checks completed and briefing over we were driven out to our all white aircraft.

Pre flight checks, pre and post start procedures completed we taxied out to the runway. Full power from the four Avons, slowly building up speed, V1, unstick call for gear up when safely airborne but alas no movement from the all electrically operated main or nose wheel. The check list wasn't much help so we were stuck with the gear down until we could get down to max landing weight. Both pilots took turns in flying both visual and instrument approaches . We had taken off with full internal and external fuel tanks. The two underwing tanks both held 12,500 lbs of avtur.

It was decided that we would jettison the underwing fuel in order to get the aircraft back on the ground for the engineers to fix. The jettison was accomplished using nitrogen gas under pressure and took very little time to accomplish. some farmer in West Norfolk was treated to a dose of free weed killer and we landed safely. The boss decided that I didn't get a fair crack of the whip on that flight so I was to sit in the lhs again on the next flight that we did.

The Valiant was an almost entirely electrically operated machine, undercarriage and flaps were both driven by a series of electric screw jacks, with back up smaller jacks in reserve. All the aircraft systems relied upon four generators, one driven by each engine, there was no auxiliary power unit to take over. Once again safely airborne, gear up then a shout from the Air Electronics Officer in the rear explaining that we had simultaneously lost all four generators.A silence from the rear ensued until after what must have been rapid switching unswitching, reswitching of the controls managed to get one of the four back online. Not knowing how long that particular generator would stay the boss decided to carry out another full underwing fuel jettison and we landed quite quickly. Not a good day for crops I'm afraid.

We flew mainly as constituted crews, only rarely did we fly with other members. My crew were beginning to consider my left hand seat attempts should be avoided.
Some time later I was given the opportunity to once again demonstrate my abilities! in the left hand seat. Hoping that at last I would get the opportunity to complete a whole five hour sortie we taxied out got airborne raised the undercarriage and started to settle down into the climb when the No3 engine fire warning light illuminated. As I recall the drills were carried without hesitation the fire warning light was pressed and the warning disappeared. Need I say another 25,000lbs of HM's jet fuel was jettisoned overboard.

On reflection I take my hat off to any farmer with land in the vicinity because he didn't have just the elements to battle. It was a considerable time before I was allowed into the left seat.

Mike Harrall

To learn more about this remarkable aeroplane see:
https://en.wikipedia.org/wiki/Vickers_Valiant

The Meredith principle

I am working on a P51 Mustang. Carving and shaping the oil cooler radiator housing under the wing made me realise how big it is. Surely this must have been a major drag inducer? It turns out not to be, due to the Meredith principle, which actually adds a modest amount of thrust.

F. W. Meredith at Farnborough saw that the heat energy in the radiator could be added to the air compressed by the radiator grill and thus generate thrust. The hot, pressurised air then exits through the exhaust duct which is shaped to be convergent, i.e. to narrow towards the rear. This accelerates the air backwards and the reaction of this acceleration against the housing provides a small forward thrust. The air expands and decreases temperature as it passes along the duct, before emerging to join the external air flow. In some ways this is similar to a ramjet. He published his ideas in 1936, which were used in the Spitfire, the Hurricane and the Mustang.

https://en.wikipedia.org/wiki/Meredith_effect

Pillock of the month: Me again

My new Wot4 was ready and raring to go on the starting bench. I connected up the wing servos and put the wing in position. I set the motor to off and connected the battery. I did the range check and then came back to try the fail-safe. Motor on. Throttle up. Oh no, the fuselage shot forward. I hadn't screwed in the wing bolts. Fortunately my reactions are quick and I throttled back just as the wing servo leads brought the fuselage to a stop. I was just in time to avoid damage apart from a couple of slots in the wing root sheet. Again I had broken my own rule, 'always finish'. I had allowed myself to think of the fail-safe before finishing the wing installation.

Don't forget to share your blunders so we can all learn from them. They can be anonymous if you want to avoid embarrassment.

Deck the planes

From RCSD

Manoeuvre of the month: The Immelmann Turn, a turnaround maneuver

From RCSD February 1998 with thanks

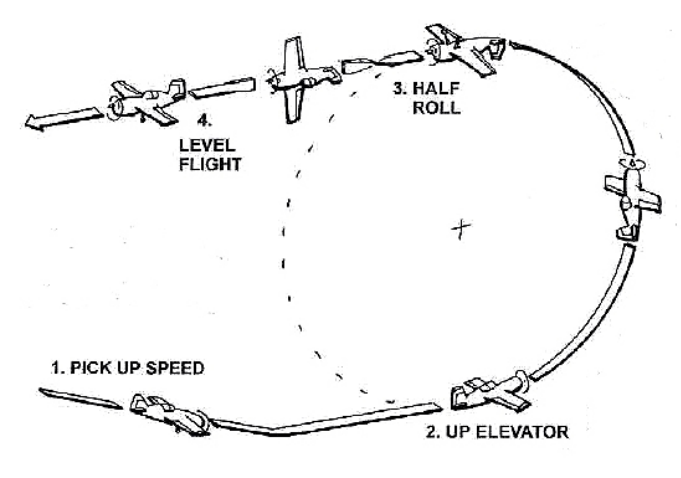
In the very early days of aviation, pilots were happy to be able to get airborne and back down on the ground in one piece alive, let alone do stunts! But little by little, as airframes were built stronger and pilots became more and more proficient, airplanes began to do much more than just fly straight and level.

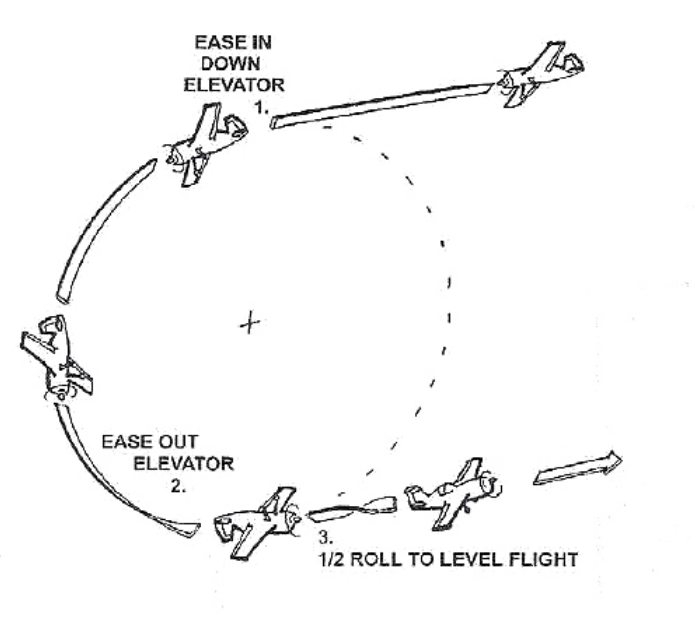
First used for surveillance during the first world war, aircraft quickly evolved into lethal killing machines. The pilots, locked in life and death struggles, quickly invented new maneuvers and pushed their flying machines to the limit. It was in this atmosphere that Herr Immelmann invented the first Immelmann Turn; this maneuver has borne his name ever since.

This is how you do it: "The model starts the Immelmann flying straight and level, pulls up into a 1/2 loop immediately followed by a 1/2 roll and finishes flying straight and level exactly 180 degrees from the heading at entry", (printed by permission from the AMA Rule Book).

The Immelmann is an easy maneuver for a powered aircraft, but somewhat more difficult for even the most aerobatic sailplanes. The reason is inertia, or energy management. You must point the glider's nose down to got a lot of airspeed, pull up elevator into a half loop and, when you are inverted at the top of the loop, give full ailerons until vou arc straight and level. Voila! There you have it! You've done an Immelmann. The key to this maneuver is getting enough airspeed for the ailerons "to bite" at the top of the loop. You might also need a little down elevator when inverted to keep the nose up.

As you would expect, the Immelmann is a very handy turnaround maneuver. What comes next is much easier for sailplanes (again because of energy management). Let's call it the Reverse Immelmann.





The Reverse Immelmann

The Reverse Immelmann is much easier to do than the Immelmann because now you're going down instead of up. The model starts the Reverse Immelmann flying straight and level, pushes down elevator down into a 1/2 outside loop, followed by a 1/2 roll, and finishes exactly 180 degrees from the heading of entry. Obviously, if you plan to try a Reverse Immelmann, you should have enough height for ground clearance.

Addition to last month.

Mike Harrall adds the following comment about the stall turn. ‘In order to get the airframe to “cartwheel “ a little blip of power often helps give the rudder authority. However a couple of points must be borne in mind. The prop will cause some torque effect, and because the wing describing the largest circle will create lift and the lower one definitely will not some aileron input maybe required to stop any roll.’

Caption competition

Thanks to RCSD for picture

My first go**:** What's that Skippy? You think you can give me a tow?

Your suggestions to me at peter@northreppsmfc.com

Christmas 2019 gift ideas: part 2 of 2

Either buy it and wrap it for yourself, or include it as part of your list to Santa.

Swann Morton scalpel handle and one hundred number 10 (curved) or 11 (straight) blades
SLEC balsa building board
SLEC fuselage jig
Small and medium size plastic spring clamps (lots)
Very long nose pliers
Magnet on a collapsible stick

Spot the fault

Problem
A flyer has been using an electric aerobatic model but is becoming dissatisfied with the power and flight duration he is getting. He decides to change from a three-cell 4Ah battery to a four-cell 5Ah one. Both the motor and the electronic speed controller can take the increased voltage so he makes no other changes. The new battery is only 100g heavier. Performance proves disappointing. He gets little or no increase in flight time. The battery and the ESC seem to be running hotter and though there is a small increase in vertical speed it seems too little for the change in voltage. What is the problem and what is the best solution?

Last month's answer
The model was originally designed to fly on two channels so had quite a lot of dihedral to allow turning using only rudder. Trying to turn a dihedral model using ailerons can be asking for trouble as it was here. If the builder had studied the now rather tatty plans more

carefully he would have found a recommendation to reduce the dihedral if using ailerons. He also needs to use hardened wing rods as the flexibility of the old 8 swg rods would have increased the dihedral under flight load anyway. Recommended heat treatment is to heat the rods to red heat and quench in oil. Then clean with sandpaper or steel wool and temper to light or dark straw colour to avoid them snapping.

Sources

Tracking down the FrSky devices needed to set up a Neuron ESC I came across a Polish site that has a good range of stuff at sensible prices. They include planes, boats, trains, tools, war gaming, materials and glues. They are mostly not much cheaper than buying from a UK site but the site seems to have things that are unobtainable here. Two examples are the full range of Vallejo acrylic paints and the less available FrSky devices. The S.Port Airlink USB device took 10 working days to arrive.

The sklep (shop) site is at https://emodele.net/, in Cracow. It is easy to navigate with good search facilities and you can increase the vowel count by setting it to translate everything into English. The current exchange rate is 5 zloty to the pound. It's the first time I have paid for anything in zlotys.

Sales

Don't forget to bring some money to the AGM so you can bid in the auction. Even better look on the shelves in your workshop for things to put into the sale for club funds.