Airscrew

Facts, opinions, pictures and fun

December 2020

https://northreppsmfc.com/

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Model of the month: Christmas special

Yes it's a FrSky Taranis he's using on the Tundra. The bouncy wheels will be handy on the rough roofs. And of course he has registered with the CAA. Nick doesn't want to finish up in the nick. Out of respect for tradition I now present the NMFC version of 'The Night Before Christmas' . For those who are keen on poetic metre this is in Alexandrine form, which is iambic hexameter. There! Aren't you glad you know that?

The Day Before Christmas

'Tis the day before Christmas, and up at the 'drome
The weather is awful, so we all stay home.

The virus is rampant. Next lockdown is near.
So Santa is needed to bring us some cheer.

The Christmas list's texted – a glider, a charger.
Five litres of fuel and some batteries (larger).

All lipos in storage. The planes put away.
We're all of us wanting a calm flying day.

Forlorn in the hallway the flying suit hangs.
It's waiting to keep out the shivering pangs.

All models re-covered. There's nothing to do.
No servos to centre, nor tailplane to glue.

The model shop's shut and HK's out of stock.
The motor we're waiting for's stuck at the dock.

So hang up the holly and light up the tree.
We'll get the corks popping and eat merrily.

The New Year is waiting your Bix 1.1,
On Jan the third, ready for Climb and Glide fun.

Merry Christmas everyone! (And no, not 'Happy Holidays' – yuk.)

Pillock(s) of the month

It's an 'organisation' this month not a person. Guess which organisation? Got it in one - The Civil Aviation Authority. Which else deserves so profoundly to be called a bunch of pillocks? To be legal we must now have two or three documents **with us** when are flying. If we have a BMFA A, B or C award then we need our BMFA membership certificate. If we don't have an award then we also need the document that confirms our passing the competence test, the Registration Competency certificate. In addition we now need a CAA document called the ES5095 exemption document. And of course, as Dave has said in an email, we also must register again with the CAA before the end of December. There is no truth in the rumour that you will also need a bull-s**t-literacy certificate to prove that you are able to understand the CAA drivel documents. You can buy a modestly priced sack barrow from Machine Mart. You will need this before long to carry the increasing number of documents to your car.

For the two-page ES5095 download go to
http://publicapps.caa.co.uk/docs/33/ORS4No1395.pdf

And now another POTM

Those of you who fly an Acrowot foam-e will know that the motor has no internal cover. A Deans connector is fitted to the supplied ESC but I change that to an XT60 connector, which is larger. Therefore I use a ply battery cover instead of the foam one. The danger is that if I am not careful to keep the wires away from the motor they get chewed. So turning to land on November 4th I suddenly lost control and came in vertically. This time the wire had been chewed right through. At least it wasn't pilot error, just pillocky carelessness. Anyway I have bought a new fuselage. I'll be building a new model from the wings, motor and wheels of my first model and the tail surfaces of the second. I'll put some notes in a future newsletter.

The annoying part was that, having made my sacrifice to Prangus, the weather improved the next day, **which was in lockdown**, and stayed good for days. No doubt the god Illegitimatus and his mate Ironicus decided to deal us a body blow (or calm).

Bob's Tales: A new crop of jobs

After about twelve months on the police contract I had the wanderlust click in again and decided I wanted a break from the police work. I thought I'd try my hand at crop spraying. I joined a company called British Executive Air Services up at Coventry which was a company – all helicopters – formed by ex-pilots of the Army Air Corps. They had four or five Bell 47s, two JetRangers and a Bell 212. We used them for gas pipeline patrol and for agricultural work. The Bell 212 was used for off-shore work.

That winter I found myself super-spreading fertiliser over pine trees in plantations in the north of Scotland. This involved sling loading a hopper that would hold five hundredweight of fertiliser pellets. The bottom of the hopper went to a funnel and there was a Briggs and Stratton small engine running all the time. When you opened the throttle remotely from the cockpit via a cable it opened the hatch at the bottom of the hopper and spun this fan which then gave the falling fertiliser pellets a swirl. You may have seen it on TV or films. The helicopter is flying along and there's a bit swirl coming out of the bottom of the hopper, unlike water bombing where it all goes out in one hit.

We had four of those on a specially built trailer, one behind the other. We were using Bell 47s and you could look through the bubble between your feet see a mirror which showed the hook

underneath the helicopter. You had to hover a few feet above one of the hoppers which would be filled with fertiliser, then lift it off to one side then climb away, heavily overloaded of course so you were milking the collective pitch like crazy. As soon as you got translation lift at about thirty knots you could ease off the power a bit and climb away and do your run. You couldn't always get close to the plantation you were spraying so you might have a two or three minute flight to get there. Then you would run up and down the plantation, open the throttle and then out this swirl of fertiliser would go. The you would go back and do your next run, estimating your distance across to give you a decent coverage.

The thing is the forest officers were paying for all this through the Forestry Service. They wanted to be sure we covered the whole area we were supposed to cover. They had the bright idea of going out and buying a whole load of plastic washing up bowls, the big ones. They made the mistake of buying bright red plastic bowls. I think some were yellow but most were red. I think they had bought these as a job lot. They would put these bowls particularly round the edge of the plantation. Some in the middle but mainly round the edge to make sure we were going right up to the edges with the fertiliser.

Well of course we cottoned on to this and we would spot where the bowls were and we would virtually stop over them and dump a whole load of pellets into these bowls and then carry on. They would come along and pick up the bowls. "Gosh, they are doing a good job on this. Look at this the bowl's nearly full of them." They didn't know that we knew that this was going on. Probably still going on these days, still filling the bowls and making the forestry officers think, "Boy, these guys are doing a good job."

I did that in Scotland. Then that winter we moved over to Black Mountain in Wales and spent a few days up there on the very small new trees which were only about two or three feet high. This was a bit more comfortable in the event of engine failure, rather than going down into twenty to thirty foot high trees. At that time, on one particular occasion, we were quite some distance from the plantation so it was about a four or five minute flight to get back to reload. On my way back I'd climb up to maybe a couple of hundred feet AGL [Above Ground Level] just to relax a little bit having been at low level most of the time, and also light my pipe. I can't remember what it was, I think it was a Hunter, or something a bit later than that, a Gnat, coming through on the low level route. He was below me. I knew they were not supposed to be below two hundred and fifty feet AGL and he was below me. I had to keep my eyes open on that particular spot in case I got wiped out by the Royal Air Force.

Once that season finished we then had the liquid spraying season, which was quite a short season, June and July, depending on the aphids, how soon they arrived and how soon they went away. It was a two to three month period. Once again we were in the Bell 47. This time we had spray booms fitted and a couple of hoppers one each side. They took one of the fuel tanks off so we had just one fuel tank on the port side to save weight. We could get an hour and ten minutes out of a tank, so on spraying we would fly for an hour with ten minutes reserve.

We'd do a running refuel with engine and rotors running. The ground guys had a water tanker and the chemicals. They would mix up the chemicals and fill the hoppers, depending on the weight. Obviously you wouldn't fly on a full hoppers and a full tank of fuel, so you'd burn off some fuel then come back and the next time they'd put a few extra gallons in until you were almost down to reserve and you'd fly with full hoppers. We were spraying onions and potatoes, anything that grows and requires fertiliser.

My area of operations was Lincolnshire. We had five chaps working on the ground. One was detailed off to stop traffic if I was turning over a road at the end of a run. Wind direction was very important so this could not always be avoided. GPS was not invented so we had a device called Automatic Flag Man which replaced a chap on the ground with a flag to assist the pilot to space his runs to get full coverage.This was a metal box about one foot square and two feet deep mounted on the outside of the chopper. Inside were squares of cardboard with six feet of toilet paper, folded and attached to the cards. About a hundred of these would be packed inside and could be released remotely by the pilot, one at at time.These we would release one or two at a time as we did a pedal turn at the end of a run and hope to drape one over a hedge or fence. We could use this to line up on for the return run.

On one particular day I was spraying a field and needed to turn over a road, so our man was stopping traffic just while I was doing my turn. One gentleman decided to ignore our man and drove on but then decided to stop and watch me hurtling towards him at sixty knots, three feet above the ground. It was too late for any avoiding action by me so I carried on. During turns at edge of the field we always switched the spray off to safeguard adjacent crops, so as I turned over the top of his car, the spray was off but residual spray covered his car with a grey coating. I was so annoyed that I covered his car with about a dozen flags (toilet paper). When I next landed they told me that he got out of the car swearing, and used the paper to clear his windscreen enough to dash off at a rate of knots.

My last field on a particular day was a field of potatoes. I'd been covering this field which was quite a big field of about sixty acres. At the end of your runs you'd do cleanup runs along the top and bottom where you might have missed because that's where you did your turn. I thought I'll do a cleanup run along the edge of this field. There was only one tree in the vicinity and you know what I'm going to say. It's a bit like model flying. There's only one tree in the field and somebody has to hit it.

It was a big oak tree that leaned over into the field but it wasn't particularly low. I had been flying under telephone lines to get down low over the field. The telephone line ran close to the hedge. You needed to get down under that to cover the area. I was weighing up the height of this bough hanging over the field and I thought, "Well, I can get under that." But I was concentrating so much on getting under that that I didn't notice I was getting closer to the edge of the field and closer to the tree, which was right on the boundary. One of my blades caught the tree and it cut into the bark just as if you'd slashed it with a knife, but of course a helicopter with all those those bits twirling round became completely unstable. The blades started wrapping themselves round each other. I was only a few feet above the ground so I was straight into the ground and the perspex bubble shattered. I was wearing a bone dome [helmet] fortunately. Judging by the marks on the left hand side of it banging on the side of the cockpit I probably would have been dead without it. It wasn't exactly dented but the marks were quite significant and I had a bit of a headache.

So I am sitting there surrounded by bits of helicopter. I switched off everything and grabbed the fire extinguisher and went round to the engine which had caught fire round by the carburettor and gave that a good old spray. By that time the ground guys had come bowling across the field. They took me over to the farmhouse where the water tanker had arrived. I was absolutely soaked in fuel and insecticide which was burning my skin so I stripped off my flying suit. I only wore underpants underneath so I had to take those off as they were soaked as well. I am standing there completely starkers and the farmer's wife came out and gave me

an appraising look. Well, I think it was! She said, "Oh you poor dear. Would you like a bath?" I said yes and went in and had a bath and they found me some dry clothes to put on.

I went back to base. Everyone of us in the spraying department had a prang that year. The Chief Pilot was the only one that hadn't, Mike Cull. Lovely guy. Ex Blue Angels formation helicopter team. So he said, "Oh dear, oh dear. OK. Another one for the hangar." They gave me another helicopter and I went on doing some more spraying till the end of the season.

The irony of it was that Mike, on the very last day of the season was spraying a field of cereal crop, three or four feet high, and got just a little bit too low and the crop started to wrap itself over the booms on both sides and just pulled him down into the crop. He then just tipped over. He got out OK. He was safe and didn't get injured. You can imagine the reception he received in the crew room when he came back on that last day of the season. The Chief Pilot had kept our record going of every one of us having a prang that season. Anybody that's done a crop season knows all about that.

When I wasn't doing crop spraying it was general charter with the JetRanger or doing British Gas pipeline patrol. I used to do one week up the west coast in the Bell 47 for four or five days doing the gas pipeline patrol with an observer. The other week I used the JetRanger and went up the east side pipeline patrol. Nothing particularly interesting about that. You were flying at about two or three hundred feet checking to make sure than nobody was building a block of flats over the top of the gas pipeline. Mostly it was to prevent farmers trying to put another shed over the top or some sort of excavation work that might damage the pipe which was always underground. We'd have to land and stop them and point out the error of their ways.

When you are driving you may see a post in a hedgerow with an orange two sided marker. These were placed at about a quarter of a mile intervals to help us follow the line of the pipeline which we had marked on our Ordnance Survey map. All traces of the laying of the pipe had disappeared over the years. Contrary to popular opinion we were not looking for leaks. The boredom was broken one day when flying the Jetranger near Pickering in Yorkshire,we were buzzed by three Royal Navy Bucanneers on a low level mission. They came from behind and below us and split into a kind of bomb burst in front of us. My observer nearly soiled his pants. I nearly swallowed my well lit pipe!

Bell 47

Bell Jet Ranger

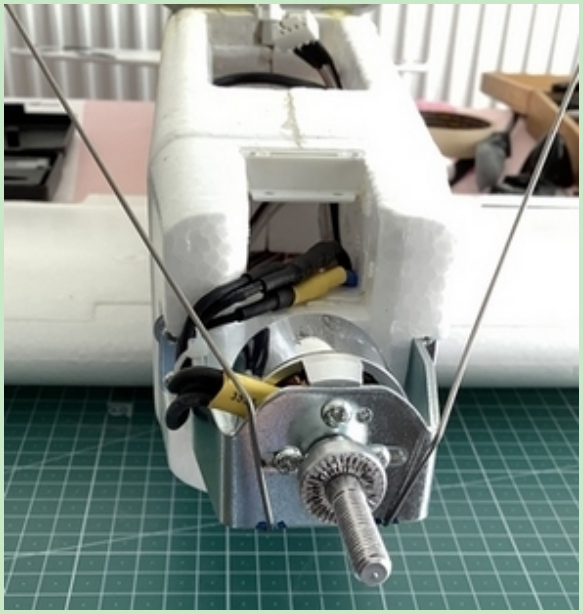
Don’t pick your nose!

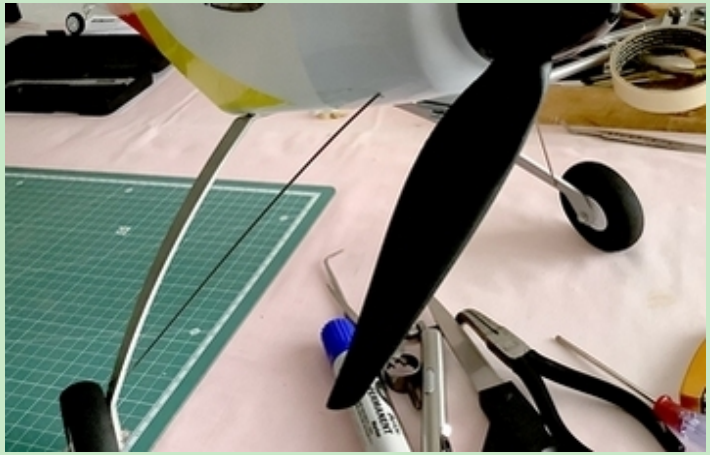
Kevin has done us proud. Here is a still from our new camera. The quality is good and the brightness better than the other camera aimed our way. We will all have to remember that we are on candid camera. And you can’t use flying as a cover for sliding off for some naughty nookie. As Dave said in the email, you can now find the camera on our home page, not the member’s page. Just click **The Club/Our Field**. Many thanks to Kevin.

Genius number fifteen: a wheely good idea

Keith kept up the universal tradition of knocking wheels off a foamie Wot during landings on grass. So he decided to see if he could brace them in some way that would not put the rest of fuselage at risk instead.

“I knew that bundle of long control rods would come in handy sometime. I couldn’t make them the same on both sides because of the motor wires. Had to make the bend in a slightly different place.”





Review: Anemometer – UNI-T UT363 BT

Anyone at the field watching me trying to use my old electronic anemometer will have learned a rich vocabulary. So I was in a mood to change it when I came across one on tomtop that looked better. It was about £14 so without another thought I sent off for it. What can I say about it? It works. No cussing. The buttons have very clear functions and the choices are intuitive. It is now available from UK suppliers such as those on eBay.

The meter can be set up on a tripod or fixed to a post. Strangely the threaded mounting hole is on the back rather than the bottom so the tripod head will have to be tilted over by 90º. Pointless anyway as you would normally want to hold it as high as you can, rather than on a tripod. The on-off button allows you to set up a bluetooth link with a nearby mobile phone running a phone app called iENV, though I haven't managed to get it to link so far.

Blast from the past

Here is the anemometer I used to use when slope soaring a looonngg time ago at Ivinghoe. It is a very simple device from Dwyer in the the US. A tiny ball is pulled up the tube by the wind going over the top of the tube. For very windy days, when you didn't dare raise your arms in case you took off as well, you put your finger over the top and the suction came from a tiny hole. I am going to test it against the new one. Oh yes, the pipe cleaner is to dry out the inside of the tube.

The Plug Place: Optimising your fuel system part 2

With thanks to Ray and to Flyrc at
https://www.flyrc.com/optimize-your-fuelsystem-for-best-performance/

To understand how the Uniflow system works, try to think of it as a balanced system whereas the conventional tank arrangement is inherently unbalanced. Remember how the fuel mass affects the pressure in the feed line? In a Uniflow system, the fuel mass does not directly affect the pressure in the feed line. It's not magic, it's physics.

All Uniflow systems require three lines. The line at the top of the tank is always plugged during normal operation. That leaves the two clunks for pressure and feed. Now, since both of them are at the same level in the tank (the bottom, whatever the aircrafts attitude) the fuel mass is exerting equal pressure on both of them. it's trying to push fuel out both of the lines, but atmospheric pressure is trying to push it back in. Remember for fuel to flow, there must be a pressure differential. Since the pressure on both lines is the same, no fuel will flow.

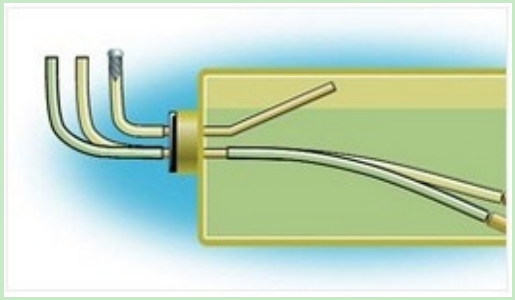


Figure 6: A pressurized Uniflow 3-line system in operation. The adjacent clunks of the pressure and feed lines are in the same position relative to the fuel mass. This ensures a consistency of pressure with respect to both lines. This, combined with the check valve shown in the second illustration, dramatically improves the consistent delivery of fuel to the engine in all attitudes.

Now, when the engine starts, the vacuum in the carburettor throat creates the pressure differential the same way it does with a conventional tank system. There is now atmospheric pressure on the pressure line and a vacuum on the feed line. Since the pressure always wants to be in a state of equilibrium, fuel will flow out of the feed line into the carburettor. If you apply muffler pressure to the pressure line, the pressure in the feed line is exactly the same! This is very different from the way the conventional tank arrangement works, due to one important thing: the fuel mass.

I'll say it again: in the Uniflow system, the pressure caused by the fuel mass does not affect the pressure in the feed line. The fuel mass is taken out of the equation. This means that you can set your needle valve for optimum performance (allowing for prop unloading of course) and still be assured that the level of fuel in the tank will not affect the mixture. No more rich/lean conditions during the flight. Well if it's so good, why isn't it as popular as the conventional two- and three-line systems? In all honesty, there are some trade-offs along with the good.

WHY A CHECK VALVE?

The most common problem you see with a Uniflow system is fuel in the muffler. It is very difficult for this to happen with a conventional tank setup because the pressure line is not submerged in the fuel (unless the airplane is inverted). This happens more easily in a Uniflow system because the pressure line is always submerged in fuel, and sometimes the pressure in the tank is higher than the muffler pressure. This condition occurs if you suddenly back off of the throttle. The easy solution

is to use a check valve in the pressure line between the tank and the muffler.

This has the added benefit of allowing you to place a between the tank and the check valve. Run the to a fuel dot and you've got a good way to fill and drain the tank. Of course if you do this, you will experience a slightly rich condition if you suddenly close the throttle. It's not a problem if you move the throttle stick as smoothly as you should.

Now if you've taken my advice on installing the check valve and the youll run into another issue. Filling the tank is no problem. The problem occurs when you try to empty the tank. The check valve opens and air leaks into the line, causing the fuel pump on your flight box to cavitate. This makes it nearly impossible to pump fuel out of the tank. To prevent this from happening I place a plastic or rubber cap over the muffler outlet when I drain the tank. This prevents air from entering the system and also keeps your plane from making a mess on the way home from the field.

MAKING THE RIGHT CHOICE

So now you're asking, ‘When should I install a conventional tank system and when should I use the Uniflow?’ Either one may be used in any application. There are, however, times when one would be the better choice. The conventional tank setup can be used on just about anything that has an upright or side-mounted motor. As long as the top of the tank is not any higher than the needle valve, you should have no problems with carburettor flooding, unreliable idle or any of the other common fuel-system maladies. You can even use it with an inverted motor where the fuel level may be higher than the carburettor at times (although this is not really ideal), but I wouldnt recommend doing this with an engine that has an air-bleed carburettor.

If you like to keep things simple, it doesn't get any better than the two-line conventional tank setup. that's probably why it's so popular. It does however suffer from the fact that as the fuel level becomes lower in the tank, the fuel pressure at the carburettor inlet decreases and thereby the fuel mixture will become leaner. If you're using a pump this is not an issue because the pump will supply enough pressure regardless of the level of fuel in the tank and this pressure should stay the same throughout the entire run. it's also possible to use a check valve in the pressure line to increase the system pressure. This works almost as well as having a pump and it's less expensive, but youll still see a slight mixture change as the flight progresses.

TIPS FOR SUCCESS

The Uniflow really helps with inverted engine installations. It is much more tolerant of the low carburettor position because the fuel mass does not create the potential for fuel to flow down toward the carburettor when the motor isn't running. It is not entirely immune to the dreaded siphoning effect but it is much more resilient. Because of the unique pressure conditions in a Uniflow system, some details need to be considered when you plan your installation.

First, I recommend using a check valve in the pressure line, but only if you're using an engine with a two-needle carburettor. An air-bleed carburettor has limited capabilities as far as controlling the idle mixture and youll end up with an extremely rich idle condition. This is because using the check valve really increases the system pressure. I have run inverted motors with an air-bleed carburettor with a Uniflow setup (no check valve) and they run much better than with a conventional two-line setup. The idle quality is improved tremendously. The only problem Ive

experienced has been fuel in the muffler (which translates into an over-rich condition/deadstick) after sudden throttle movements. Usually a combination of setting the idle speed a little bit higher and careful use of the throttle eliminates the condition.

So what's the best choice for your airplane? Hopefully now you have enough knowledge to make that decision on your own. The best advice I can give would be to make sure you understand everything discussed thus far. If you don't have confidence in something, then by all means don't use it.

If you're still undecided here are a few simple guidelines:

- Air-bleed-type carburettors should not be used in inverted-engine installations.
- If you must use an air-bleed carburettor on an inverted engine, the Uniflow system is the best choice.
- If the carburettor inlet is positioned higher than the fuel level, either type of fuel system may be used with good results.
- You may use a check valve in the pressure line on either a conventional tank system or the Uniflow system to increase the overall system pressure.
- The level of fuel in the tank affects the mixture in a conventional tank system. In a Uniflow system it does not.

The conventional two-line system is very simple to build and easy to install and operate. The Uniflow system requires more parts and careful installation. Don't be afraid to experiment with different things in order to achieve maximum performance. As always be safe as you don't want to lose a model because of something unexpected!

TUNING FOR MAXIMUM PERFORMANCE

Two-needle carburettors are preferred over air-bleed types, but either one should produce acceptable results provided it is properly tuned. Most engines will actually run quite well with the factory idle mixture settings if youve installed a conventional fuel tank system and the fuel level is not higher than the carburettor inlet. The Uniflow system usually requires more adjustments to make the engine happy. On any new installation, it's a good idea to check the mixture settings when you hold the airplane in every attitude (nose up, nose down, upright, inverted). Some people like to set the high-speed needle with the engine running at full throttle and the nose of the plane pointed straight up. This is a good idea because it helps to prevent an over-lean condition.

The high-speed needle valve should be set first because it affects the idle mixture. Adjust it to let the engine run a few hundred RPM less than peak. With a Uniflow system, you can set the needle a little bit leaner (higher RPM) than you would with a conventional system. If in doubt, start on the rich side, take off and fly. If you need more power, or the motor sounds burbly, set the needle slightly leaner and try again. it's better to be a little bit rich than too lean.

I have yet to see a motor that was damaged by running it too rich. OK, breaking in an ABC motor is an exception. Remember, if you make large adjustments to the high-speed needle valve, you will need to readjust the idle mixture as well. The idle should be smooth and just slightly rich. Not so rich that the engine loads up and quits, but rich enough to allow for the prop to unload when the airplane is flying. You want a clean transition from idle to mid range. If you've installed the fuel system properly and adjusted the carburettor correctly, you should be rewarded with reliable operation every time you fly. A dead stick condition should be an

indication that something has broken (a pin-hole leak in a fuel line for example) not an everyday occurrence. You should be able to fill the tank with fuel, attach the glow plug igniter and spin the prop. The engine should start easily and run reliably throughout every phase of the flight. If not, then you're doing something wrong even if you don't realize it. Maybe now you have enough knowledge to figure out what that is!

Batteries

Keith sent me details of excellent youtube reviews of dry and rechargeable cells. There is an intriguing ‘bounce test’ for the state of charge in AA dry cells. Well worth a watch, though you have to put up with adverts. The site has a huge range of tests - a bit like ‘Which?’ - of all kinds of things and that has to be paid for. They are all on a site called Project Farm. All kinds of goodies there.
https://www.youtube.com/channel/UC2rzsm1Qi6N1X-wuOg_p0Ng/videos

Conclusion for the AA dry cell survey was to avoid cheapos. Best for capacity and life were Energizer and best for value were Amazon Basics.
https://www.youtube.com/watch?v=V7-ghrTqA44&feature=youtu.be

Results for the 18650 rechargeables were striking. These cells are used in torches, cars and home storage batteries. Oh yes, in the latest Taranis transmitters too. The Chinese brands such as Ultrafire proved to be very poor. They stored a small fraction of the rated energy and had high internal resistance, which limits their current capacity. Brands such as Samsung, Panasonic, Sony, Sanyo and LG performed well with LG being best for value for money and ability to drive a load for longest. See Sources if you want some.

https://www.youtube.com/watch?v=qMZuHMlRw_0

Manoeuvre of the month: Flat spin

From: http://myflyingstuff.com/flat-spins/

UPRIGHT SPINS vs FLAT SPINS

I was recently asked by a private pilot student about the difference between a typical upright spin and a flat spin and how do you recover from a flat spin? Although I have done a reasonable amount of spins, I can’t say that I have had the pleasure of a flat spin, nor do I think I want to. Since I am not degreed in aerodynamics or an aeronautical engineer, had to do a bit of research. Here is some general information I have pieced together.

Most “Normal Category” airplanes that we all usually fly are not certified by the FAA to do intentional spins. They do, however, need to have spin testing done prior to certification. The FAA says in AC23-8D Section 23.221 that the basic objective of Normal category spin testing is to assure that the airplane will “not” become uncontrollable within one turn (or three seconds, whichever takes longer). For the Utility Category aircraft, it is the same as normal category, but can additionally be certified for spins if aerobatic spin requirements can be demonstrated. The Aerobatic category requires demonstration of six turns (or more) with recovery accomplished in 1.5 turns after anti-spin recovery controls are applied. There are no certification requirements for twin engine aircraft.

To refresh, the characteristics of an upright spin are:

- A sustained stall (Rectangular wings usually stall around 18°)

- Asymmetric lift, drag on the wings where one wing is higher inducing a rolling and yawing motion.
- Aircraft CG travels down along a helical (corkscrew) path.

Now to the differences in spins:

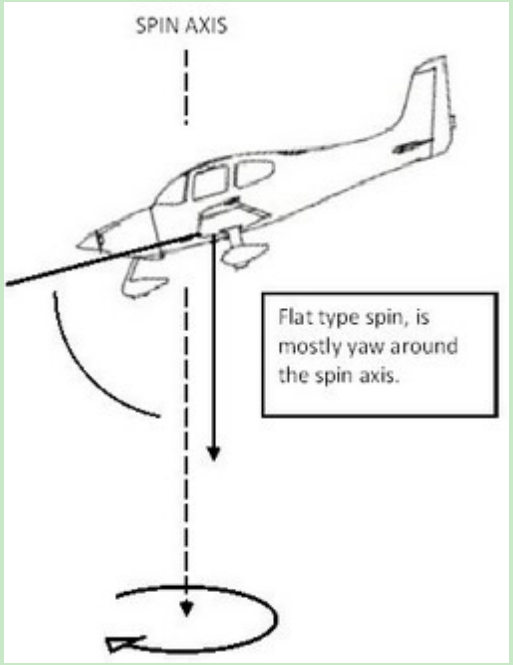
UPRIGHT SPIN (Moderate to Steep Spin)

A typical spin is stalled wings with nose pitched down and “rolling” to right or left. Some yaw but to a lesser degree. In a moderate to steep nose down spin there will be some rudder and elevator authority.

We use the recommended spin recovery technique listed in the POH which is usually similar to P.A.R.E.D. or Power to Idle – Ailerons Neutral (flaps up) – Rudder Opposite of Spin – Elevator Forward to reduce angle of attack – Recover from Dive. When rotation stops, rudder to neutral then add back pressure on the elevator and return to level or climbing flight.

FLAT SPIN

In the flat spin, the nose is pitched up to a more horizontal attitude, the CG is closer to the spin axis, the rotation is faster with a slower descent, the helical corkscrew pattern is more compressed and there is mostly yaw with little roll. This means the rudder and elevator are moving sideways through the air instead of forward, thus making them ineffective. Plus the wings are stalled causing minimal aileron control. In discussing the flat spin with an accomplished aerobatics pilot, they enter the spin and maintain power on with a normal CG. The rotation is caused largely by the engine torque and the more level attitude (to the horizon) with the power on situation. When the aerobatic pilot pulls power off, the nose will drop and rudder can be applied to stop rotation and recover. Should the CG be too far aft, it may be unrecoverable. Unfortunately it seems that many aircraft have been unable to recover from a flat spin. This could be caused by one or a combination of factors: an aft CG, the pilot not pulling power to idle or some aspect of the design/manufacture. I did hear of one pilot who released his seat belt and moved enough forward (in this instance) to change the CG and gain sufficient effectiveness in the control surfaces to recover.



Side note: NASA recommends various tail configurations and other strategies to eliminate the flatter of the two spin modes and make recovery from the steeper mode more reliable.

NASA Spin Mode Classification

Spin mode	Angle-of-attack range, degrees
Flat	65 to 90
Moderately flat	45 to 65
Moderately steep	30 to 45
Steep	20 to 30

Cartoon

Thanks to RCSD

Theory of flight

Whilst browsing around looking for material on aerodynamic drag I came across this site that has lots of articles about various aspects of flight science. Though intended for students and school pupils it does not over-simplify and is well worth a read.
http://www.aviation-history.com/theory/index-theory.html

Techie corner: Comparing energy stored in different lipo batteries

The EU doesn't understand the difference between energy and power which is why they made us all use low **power** vacuum cleaners to save **energy**. And sacked their chief science adviser. Der! We understand it of course, but comparing the energies in different batteries can be troublesome.

Though they are improving, lipo batteries still fall a bit short of what we would like. This is especially true for ducted fan models, which have flight times of three or four minutes. Even with a 5 Ah brick in my Wot4 I can only get 12 minutes, and less if imitate a 'flat-out Freddie'.

For a given model it is energy that mostly decides flight times. However no battery label shows us how much energy it holds when fully charged, only amp-hours and the number of cells. What I will do here is give two simple ways to compare the energy stored in different combinations of number of cells and capacity.

The formula is energy = voltage x current x time (volts x amps x seconds)
A fully charged lipo has about 4.2V per cell.
Current x time is shown on the battery as capacity.
However it is shown as amp-hours (or milliamp-hours, which we divide by 1000).
In the formula we need amp-seconds so we multiply the result by 3600.

If **N** is the number of cells in series e.g. 3S gives N = 3
And **C** is the capacity in Ah (mAh divided by 1000),
Then the final formula is:

Energy = N x 4.2 x C x 3600

For example a common 3S 2.2 Ah battery has:
3 x 4.2 x 2.2 x 3600 which is about 100,000 joules of energy
A 6S 5Ah has 6 x 42 x 5 x 3600 which is about 450,000 J

By the way a kWh 'unit' of mains electricity is 3,600,000 J.
As this costs about 16p you can work out how much it costs to charge your batteries.
Divide the number you get above by 3,600,000.
Then multiply by 16.
For the 2.2 this is 16*100,000/3,600,000 = 0.4 p

Of course batteries waste energy internally due to their resistance, which is why they get warm. And they lose capacity as they age, but using the above method will give you the chance to compare. As shown in a previous article, using more cells, giving higher voltage, reduces current which reduces heating and wasted energy, so will use the energy more efficiently.

An even easier way

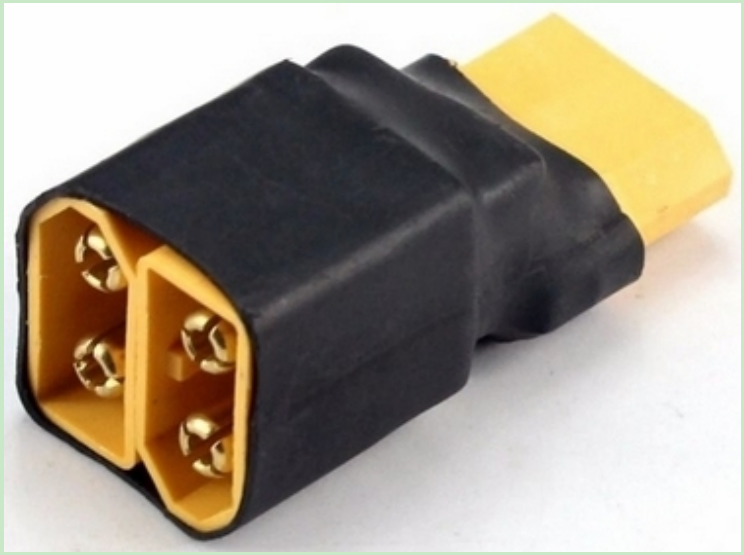
This method won't give you the energy in joules but it will allow you to compare energy content and so flight times.

Simple multiply (not times – yuk!) the number of cells by the capacity.

For example which has the highest energy, a 3S 6Ah, a 4S 4.5 Ah or an 8S combo with 2.5 Ah?

3S 6Ah	3 x 6	= 18
4S 4 Ah	4 x 4	= 16
8S 3 Ah	8 x 2.5	= 20

So the 8S wins and could well be even better as the lower current will waste less energy. Remember that the 8S could be two 4S batteries in series using an adaptor like this. Note that on a series adaptor the single connector is at right-angles to the other two.



RCSD reborn

As you will have noticed I use articles from Radio Control Soaring Digest in this newsletter, with permission and thanks of course. The printed magazine is no longer published but it will be reborn as a free on-line magazine in the near future (not 'going forward' – yuk!). I have told the editors, Bill and Bunny (bsquared) that they may reprint the material in our newsletters, so, who knows, your stuff might be broadcast all over the USA. I'll let you know when the new magazine is available. Don't forget that all past issues are available on the RCSD archive https://www.rcsoaringdigest.com/.

Christmas list part 2

ST8 servo tester
Heavy duty wire cutters
Dymo or Brother tape printer (for CAA numbers)

I searched my Dymo tape printer for some suitably obscene icon to add to each end of my numbers but there wasn't one. Not even the dog turd you can find on some emoticon lists. Come on Dymo there must be lots of other groups being fouled up by officialdom who need this tiny act of rebellion.

Covid newsletter: lockdown mark 2

Well it happened. Inevitable wasn't it? At least we'll get a sniff of freedom on the 3rd. North Norfolk, being populated with sensible, caring people is usually near the bottom of the list for infection rate. When I last looked at the government data on https://coronavirus.data.gov.uk/ only the Scottish Highlands and Islands had a lower rate per hundred thousand.

Perhaps unfairly we are in tier two. It doesn't stop us flying from the 3rd. Dave has revised the risk assessment and we must now wear masks. I have trouble with glasses steaming up outdoors in the cold, probably due to my cyclist's powerful lungs and my deep conk. I have tried all kinds of masks, and even adhesive foam used for door sealing to fill the gap. No good. I am working on solutions and will report when I find one. I am sure I am not the only one. Can't fly till I do.

We had a last fly on November 4th. The weather was superb but the wind was such that full-size aircraft used the runway next to ours. And there were lots of them, like Heathrow on an old Bank Holiday. So much so that we decided to abandon flying at about 13:00. Bob M explained that they had to fly that day for the sake of their logbooks as the lockdown period could cause them problems.

Rules of the Aerominati

I last described the rules in June last year. However we have had several new members and there are some new items, so I thought it was time to remind you of the hermetic secrets of our hobby.

If you are also a cyclist you will know of the book by the Velominati called 'The Rules – The Way of the Cycling Disciple'. This sets out, mostly jokingly, the rules for the serious rider, especially rules 5, 9, 12. (See end). For those who think that cycling is a serious waste of good flying time, I propose the following aeromodelling equivalent.

Rule 1: Never reveal the cost of a model to anyone who is not a modeller.
Rule 2: Obtain some 'half-price sale' stickers to attach to the box when you take it home.
Rule 3: Set your priorities. When the weather is right, flying is always more important.
Rule 4: Always be casually deliberate.
Rule 5: Free your mind and the sticks will follow.
Rule 6: Hats must be worn peak forward.
Rule 7: Never blame the crosswind.
Rule 8: It is never too cold to fly. Toughen up.
Rule 9: The correct number of models to own is N+1. N is how many you already own.
Rule 10: The models inside your car must be worth more than the car.
Rule 11: If the canopy is transparent there must be a pilot.
Rule 12: Never miss a chance to encourage newcomers.
Rule 13: Take your turn with help or training.
Rule 14: Never say the four letter word ending in 'k' - the one that starts with a 'w'.
Rule 15: Never say any variation of 'At my age…' or worse 'At your age...'
Rule 16: Never give up trying to improve.
Rule 17: Don't hit people who say, 'We've all done it'.
Rule 18: If you have any doubts about the model, don't fly.
Rule 19: Take-offs are optional. Landings are mandatory.
Rule 20: Fly the same circuit as everyone else.
Rule 21: There is no such thing as too many shelves.
Rule 22: Garages are for workshops not cars.
Rule 23: Accept the teasing. Those who give it must take it.
Rule 24: Always have the right tools, propellors and glue with you at the field.
Rule 25: You don't correct mistakes by doing it exactly the same way again.
Rule 26: Never show your dismay when you crash.
Rule 27: Don't litter. Always pick up all the bits.
Rule 28: Biscuits are for sharing, especially cinnamon waffles.

Rule 29: If two people give you opposite opinions they are probably both wrong.
Rule 30: A crashed model is always further away than you think.
Rule 31: Always finish, so you never leave an unfinished job to be forgotten.
Rule 32: Shout for help **before** it's too late.
Rule 33: Simplicate and add more lightness.
Rule 34: Don't talk to anyone while you assemble your model.
Rule 35: Never have a model as a present. It causes problems when you crash it.
Rule 36: Unless it is large or close, never take your eyes off your model.

Velominati rules
Rule 5: Harden the f*** up.
Rule 9: If you are out riding in bad weather, it means you are a badass. Period.
Rule 12: The correct number of bikes to own is n+1.

Jokes of the month

I heard this on a Goon Show, called 'Quatermass O.B.E.', that made fun of Quatermass and the Pit of hallowed memory. Professor Eccles was called in to speak and was announced as "The brains behind." Silence. Says it all really. Any candidates you can think of? Oh yes, 650 of them.

Barbed comment

From Round The Horne, with Julian looking critically at Ken's suit. Ken says, 'I keep this for special occasions.' 'Oh, like Halloween.'

And from Spitting Image

Did you see the trailer for the Spitting Images where Patel was dressed as a vampire? She is asked whether she is going to the Brexit meeting in Paris. 'No. Too much garlic.' Mind you by the time this newsletter goes out she might be Pritti much finished. Even the Barnard Castle optometrist went in the end.

Sports report

Da da, da da, da da, da da,da, da dee, dee dum de doo. Yes its back!

On the World Football Phone-in on November 3rd I heard a great story that started with a discussion about the Charlton comb-over. A Scots football team tried an unmanned robotic camera that was trained to follow the image of the white ball. Unfortunately one of the linesmen (Sorry - Assistant Referee) had a bald head and when they looked at the video it just followed the linesman running backwards and forwards for the whole match. Sorry, Bob M. It's that game you've never heard of.

Letters to the editor

About the article on visual acuity.

While the piece [last month] was really very interesting and informative I was puzzled why no mention is made of visual acuity and its dependence on illuminance (I think it's illuminance, one of those subject lighting terms) for the eye's performance. I vaguely remember there being a four thirds power proportionality involved. Or am I getting my exponents mixed up? But whatever, visual acuity is a function of how well the thing you're looking at is lit. Therefore, on a dull day you will lose sight of the model more easily than you will on a bright day. Common sense tells you that. So all that explanation about the chord thickness is fine but how well you can regain sight of it after glancing away will depend as

much on the conditions at the time. And too, on the background brightness and colours with respect to the colours of the model.

So, in my poorly informed opinion, there is much that is missing despite how informative the article otherwise is. My comments are based on a barely remembered OU tutorial on instrumentation and will not stand much close scrutiny but will stand ample correction.

Ed: Keith, I reckon you are right about brightness. Like you from memory, the effect is I think is caused by the iris contracting in bright light and only using the relatively less curved centre of the lens. The centre is also less likely to be affected by any faults in the eye. This is why we can sometimes focus better by squinting.

Reply from Keith

Squinting is what we do to enable vision when our eyes are struggling. But not if you suffer from wet macular degeneration. Then, I'm afraid, you're stuffed because you've lost your centre vision and you rely on what peripheral vision you have to get by. Life can be a bitch.

Back numbers of the newsletter

For club members these are available on the club website. Non-members need to go to my website at peterscott.website/flying.

Music miscellany

Yes, I know. We don't have music in the newsletter. But on Great Lives I heard a quote about Thelonius Monk that just has to be shared. For those who did not grow up in the era of cool bee bop, he was one of the greatest jazz piano players. I always admired his glasses with bamboo arms. The quote was, "I have heard people playing the white keys. I have heard people playing the black keys. Monk played the gaps in between.'

Sources

Don't forget I am not sponsored by any of my suggested suppliers. They are just ones that I have used and liked (not in the farcebook sense of 'Like'). Please let me have your suggestions for this item.

Shelf brackets

Remember Aeronimati rule 21: 'There is no such thing as too many shelves.' I started falling over boxes on the floor in my model making room. When I tried to find a shelf on which to put them I realised there was no space anywhere. Time for more shelves. The first step is the brackets. What used to be called 'Spur' is now called 'twin-slot'. It is surprisingly cheap and I have found an excellent supplier on eBay. Their prices are modest and delivery is very speedy. But perhaps most important of all, the barcode labels that they stick on can be removed easily and cleanly. No cursing and hunting round for the label removal spray. You can also buy twin-slot from such as Tool Station and Screwfix of course.

Here is a link to the slot-in brackets:
https://www.ebay.co.uk/itm/WHITE-Twin-Slot-Shelving-BRACKETS-Support-Adjustable-Rack-UK-SUPPLY/373133035187?ssPageName=STRK%3AMEBIDX%3AIT&var=641920318228&_trksid=p2057872.m2749.l2649

18650 cells

If you read the above item about batteries and want to buy some branded 18650s there is a UK seller that seem very competent. I got some LG ones from https://18650.uk/. They were heavy and took a long time to charge. Good signs I reckon.

Sales

I have for sale a FrSKY D8R-II Plus 8 channel receiver that is now surplus to my requirements. I am looking for £15 for it. Contact: Mike Morcher on 01692 581064 or email mikefm@btinternet.com

There are other items still for sale on the General Sales page on the website.