Clear Dope

April 2025

The Chair

Derek Honeysett

Welcome to the April edition of Clear Dope.

As I sit typing this on a Sunday afternoon it is trying to rain, however the good news is spring is finally here so hopefully the weather should start warming up nicely and give us some great flying sessions.

My flying this season has not been that successful so far having damaged a vintage model that I bought at January's club night, and my Cresent Bullet seems to be plagued with tank or engine problems. Being a very determined aeromodeller, the vintage model is now repaired and ready to fly again, and I will keep trying to sort out the Bullet's engine issues as this model is great fun to fly.

My next project is to get my recently acquired Topmodel Grafas CZ 3m thermal glider ready; this very light thermal soarer should be a delight to fly especially as it will have Vario telemetry on board to help seek out the thermals. Having lost two thermal gliders last year I am hoping this is third time lucky.

I have recently reviewed the Thorney Island risk assessment as part of our license renewal process and looking at all of the possible hazards included within this document I found myself asking 'am I doing everything possible to avoid an accident and a subsequent insurance claim?'

1. Am I insured?
2. Are my models safe to fly?
3. Are my models range checked?
4. Do I fly within the site rules?
5. Do I have a valid flyer ID?
6. Do my models display an operator ID?
7. Do I check the failsafe before flying?
8. Do I fly within my capabilities including weather?

Tim's Skysword after its first flight: a scary looking model that actually flew well.

If you read through this list and can answer yes to all points then you can do no more than fly safely and enjoy your flying.

However if there is a 'no' to any of these points, do you need to put measures in place before your next flying session?

Safe flying everybody and hopefully I will see you on one of our sites in the near future.

Editors notes

Either winter has taken it's toll, or our first issue of CD has been well received – certainly it seems people have been moved to put pen to paper! In this bumper issue we have no less than *eleven* articles for you: a huge "Thank You" to all those who have contributed!

In particular, we start with three interesting views about the use of stabilisation – often a very controversial subject! What are your views on stabilisation? Please write in and let us know how you feel about it. And if you want to know how wings create lift – all is revealed!

Congratulations to Ashley Hatton, Simon Woodhead, and Paul Cohen on passing their A-Test!

BMFA

The recent table top sale and presentations were a great success - we believe that the sale of Malcolm Farrington's equipment and models alone raised over £900 - a great result! From the BMFA, Dave Durnford gave us a rundown on the Achievement Scheme, followed by a short presentation by Terry Weeks about thermal gliding. Rod Dean gave a fascinating lecture on the history of the Grumman Avenger. Both evenings were well-attended and enjoyed by all.

Rod Dean

Fishbourne Reminder

The first flying evening of the year on the Fishbourne playing fields on Thursday 10th April, starting at 6.30pm. Normal rules will apply.

The next issue of CD is scheduled for early June.

May we point out that the deadline for submission of articles for the next issue is **30th May 2025**!

Articles may be sent in any format to:

fsdibden@gmail.com
robin.colbourne0@gmail.com and/or
editor@cadmac.co.uk

As well as written articles, please send in your *photos* of activity at our flying locations. We look forward to hearing from you!

Best, Fraser Dibden & Robin Colbourne

Stabilisation for RC planes — Jeff Cosford

Why do most show pilots use stabilization? Most likely to make their jets fly more smoothly and their warbirds fly in strong wind and in a more scale-like manner. And land safely in a crosswind, when these devices can make 45 flight adjustments in the time a pilot takes to make one. Show pilots fly in conditions we would never contemplate.

My interest was piqued watching “Two Brothers RC” on YouTube – they have perfected the use of “AS3X Plus” to enable the latest foam jets to fly better, with a massively rearward CG, making them unflyable without the gyro, thus replicating “fly by wire” of the full size.

Why do so few in the club use them? I know only two who always use them. Most of us embrace the latest tech, why not this?

Maybe because it is thought to be cheating, not proper flying, “it wasn’t necessary in my day!” “New pilots shouldn’t need it!” You see that a lot when the subject is aired on Facebook.

Many of our instructors advise against them because “they will slow down learning”. And of course, the A test completely prohibits stabilisation.

In my view AS3X should be permitted for the A test – all it does is make a plane easier to fly in a wind - it is undetectable on a calm day, and gives no benefit at all. Now, some of our trainees will only take the A test on completely calm days. Very sensible. They pass, but next week they are all over the place because they can’t fly in the wind! Allowing the use of an Apprentice or Timber with AS3X would level the playing field.

More important, it would demonstrate the benefits of flight stabilisation to use in their larger and faster models – the ability to fly in winds that would ground the non-stabilised. They make any plane fly like the next size up, and we know bigger is better.

Can of worms officially open…..

Transient and Gyro stabilisation — Alan Cozens

I would like to make a few points about using gyro stabilisation in training that might be interesting. I started RC training so late in life (now 89) that I knew I might not have the cognitive ability or speed of response to cope with the control inputs required for safe flight. (One circuit at Goodwood takes about 6 minutes, at Thorney it takes about 60 seconds). In consequence I have Spektrum AR631 gyro receivers, which allow 3 choices:-

1. Fully gyro controlled straight and level flight when sticks released (SAFE),
2. OR assistance with very short/transient disturbances such as gusts (AS3X),
3. OR no stability input at all.

The AS3X transient stabilisation is not really noticeable in flight but does presumably smooth out flight path in gusty conditions. My FMS models such as the Ranger 1.8 come with Reflex, a separate gyro module which has the same 3 choices, and work well with basic sport receivers.

During landing, the trainee is faced with need for multiple control inputs in a very brief moment, particularly in gusty conditions. Apart from positioning for approach and land, at the moment before touchdown there is lateral control, height, power reduction, and the round out all to be dealt with simultaneously. NOT easy! During training I tried gyro during landings which I found gave remarkable improvement and big saving in props and engine

mounts. Lateral control seemed to be the biggest plus. Understandably Jeremy was not entirely in accordance! However there is a sad YouTube video showing RC crashes, and one can see some beautiful models wrecked due LOC (loss of control) in those final moments, often gusty, which in my opinion would not occur if gyro stability had been switched in for landing. It would seem that gyro stabilisation could be of assistance in the early part of a training programme, and would reduce the amount of damage that the model suffers. I have to say that I have the same trainers that I started with, but that is only due to Jeremy's incredibly sharp monitoring and amazing 'saves'.

You have control

Tony Parrott

In the relatively short time I've been a member of this club I seem to have gained a reputation of being something of a gyro hater. Tish and nonsense. I love 'em. They make flying that much easier and as a result their very existence has surely encouraged more people into the sport we all love. More experienced flyers are enjoying them for the very same reason and, for some, it could be argued it's keeping them more active. Of the frequent flyers at the field nobody would benefit more than me from having a high-end, electronic co-pilot. My rolling manoeuvres would become more axial while the rest of my limited repertoire would receive a much-needed tidy up. Display level aerobatics, a possible sponsorship deal and potentially free entry to model air shows around the world. Where do I sign up?

However, despite the seeming obvious benefits, and having tried a number, it's still not for me. Over the years I've invested huge amounts of time and money into my bigger planes making sure they fly the best they can. And yet the control surfaces on my planes only move when I tell them to. To my mind one of the most enjoyable aspects of model flying is the challenge of flying well. Especially in challenging conditions. Why would I want to dilute that?

Now I can imagine a number of club members reading this over breakfast, choking on their cornflakes while screaming into their laptop, 'Noooo!!!!! It just smooths out the gusts!!!'. And yet in the minds of many, somehow, that doesn't make it any easier. Well that's cleared that up.

Meanwhile, for a second opinion you could check out Matt Takhar's rather splendid YouTube channel. On one video you'll find him fitting a budget gyro to a previously crashed plane to see if it would help with windy landings. Come the day of the test it didn't appear that blowy but he did demonstrate, and commentate, that the plane performed better in roll and needed less stick movement in knife edge. And that, I imagine, surprised no one. However, what even I wasn't expecting was hands-off prop hanging at the flick of switch! You could practice forever and not be able to do that. But, as challenges go, this option ranks alongside breathing in terms of difficulty. What next? I know, how about the Nepalese government installing a cable car on the backside of Everest. This would enable armchair mountaineers to have their picture taken at the summit entirely risk and effort free. Then back to an airconditioned, pressurised base camp in time for tea, medals and a certificate.

For me, model flying and AI have merged. I can no longer believe what I see and sadly, much like AI, it is probably the future. Or, maybe, it's already here. At the Popham airshow last year you may remember the commentator singling out one of the aerobatic pilots for flying his display without a gyro. Probably not much point in doing that if said talented individual had been one of many. Maybe the saying 'No risk, no reward' should soon be struck from the English language.

So, there we have it and my opinion remains unaltered. If you want to become a better pilot you're gonna have to keep practicing, but if you're happy to just look like a better pilot your path forward is clear. And stabilised.

Model Review: The Durafly Auto G2 V2

Tim Kerss

Time for a confession: in spite of a calm exterior, I have, very occasionally, been known to lose my cool with inanimate objects and, in an entirely futile gesture, have forcefully vented my frustration on said object in an act of mindless vandalism.

One only has to think of the iconic scene from Fawlty Towers in which Basil thrashes his broken down car with a branch to know what I mean. For me, the most recent occasion involved an HP printer that gave so much grief during its sorry life that It was ceremonially transported to the local skip where it was forcefully thrown into one of the containers accompanied by similar utterances to those made by Basil when he hits the car. Yes, it was an utterly futile and childish gesture, but it felt good, and seemed like divine retribution for all the angst and frustration that it had given me over the years.

Now, in general, I don't harbour such feelings towards my model aircraft. As many of you know, it's true that I do get disappointed when I crash one, but there is usually a logical explanation and, more often than not, that explanation is a lack of ability rather than a fault with the model itself. In any event, lessons are learned and these are filed away for future reference.

There is, however, one model that tried my patience to the extreme, and came very close to suffering the same fate as the HP printer and Basil's car. That model was the original Durafly Auto G autogyro.

The "quandary" is my fascination with autogyros. A cross between an aircraft and helicopter, they generate lift from a freewheeling rotor driven by the airflow created by the model's forward motion. There is no collective control on the rotors; extra lift is generated by speed combined with an input from a conventional elevator. The machine cannot stall, and in the event of a power failure, will safely descend to Earth subject, of course, to sensible handling. It can fly ridiculously slow, and landing rolls can be virtually non-existent.

That's all I want to say about the aerodynamics - suffice to say that they are fascinating machines, and there's loads of information about them on the internet.

Since taking up the hobby I always wanted an autogyro model, and was particularly taken by the Robbe Whopper (shown left), which I first saw flying at Sandown (those were the days!). However, there were two problems; firstly, it was rumoured to be quite a handful to fly and, secondly, and more importantly, it was way out of my price bracket!

So, it seemed that my aspiration to own an affordable model autogyro would remain a pipe dream until, about 10 years ago, Hobbyking released the Durafly Auto G. This was a mass-produced, comparatively cheap model and I immediately invested in one.

However, this was the model that almost suffered the same fate as my HP printer! Whilst the publicity videos made flying it look easy, the reality was very, very different; it was an utter pig! Getting it airborne was always a challenge as the rotors had to be manually spun up prior to take-off, at which point the rotor disc would only just support the weight, leading to some very hairy departures! However, the most frustrating aspect was that every flight would invariably end up in a "death spiral" into the ground, resulting in instant "disassembly" of the rotors and their supporting head. In the air it didn't take much rotor displacement from the horizontal for the spiral to begin, and once entered, it was impossible to recover!

The Auto G was not my favourite model, and it was soon constrained to the back of the man cave.

My interest was sparked again with the release of the Auto G2. This variant was much the same as the first, but incorporated a "spin up" motor (shown left) to get the rotor blades turning before the take-off roll. Again I bought one, and found that this feature made a lot of difference to ease getting the beast into the air and, with Derek's help, we got it flying well.

Having sort of mastered the art of getting airborne I was able to explore the nuances of its handling, and even managed to get it down in one piece - occasionally! The death spirals still happened, but were mainly caused by the natural urge to "bank and yank" when entering a turn. The secret to turning the beast was to use rudder primarily, and roll control to prevent the model banking beyond about 20 degrees. Often I found myself in a turn "cross-controlled" to achieve this aim. Orientation, from virtually all angles, was a real problem; so keeping the model close was a must. To help alleviate the issue I fitted LEDs on the fuselage and tailplane, but it was still a model that needed to be monitored all the time, and any "natural" control inputs to establish orientation could so easily result in the dreaded spiral of death, from which there is no recovery.

The Auto G2 last flew at Goodwood in 2023, where it staggered around the sky in Derek's capable hands - not helped by the fact that by then it had numerous repairs and modifications, and was carrying a 2200mAh battery, rather than the recommended 1300mAh. After this, it too was consigned to the back of the man cave whilst my attention was dragged onto other projects.

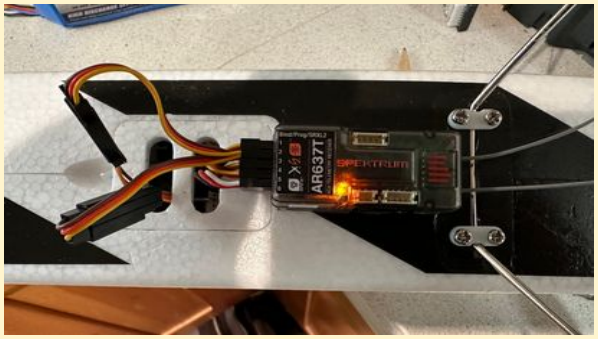
The status quo was maintained until recently, when Hobbyking announced the release of a "much improved" variant; the Durafly Auto G2 V2. Like its predecessor it comes with a rotor spin-up motor but also

sports a new, larger and stronger undercarriage, a mast fairing, a strengthened rotor head and, of course, a new colour scheme. Hobbyking claim that its handling characteristics are much improved and, it was with this in mind that I took the plunge.

Not surprisingly, the model itself is literally very much from the same mould as the earlier one, and on unpacking one feels that the components per £ are somewhat lacking. However, I guess that's the price you pay for a unique model.

I won't say much about the assembly or control settings. It goes together easily and can be ready to fly in a couple of hours. The "instruction sheet" is simply a QR code link to the online manual, which is clear and well written. What I will cover are the modifications that I incorporated as a result of my previous experiences, and from reading online about of those of others.

Although the rotor head mechanism has been beefed up, I still chose to glue wooden fillets close to the rotors' roots and stuck white duct tape along the entire leading edges to provide additional strength. I mounted the rotors themselves onto the head mechanism using just one screw, rather than two, with a toothpick inserted into the second (inner) hole to act as a frangible weak point in the event of a ground strike. Other flyers have used nylon screws instead. In any event this modification is an absolute must in the quest to minimise crash damage, and save having to replace blades after every unconventional arrival.



The second major modification that I made was to fit a Spektrum AR637T receiver, which I mounted on the outside of the fuselage. It was a bit of a faff getting the leads to pass through the vent holes on the underside, but it freed up extremely valuable space in the fuselage's very small battery compartment.

Now to the controversial bit; my choice of receiver was deliberate because it features AS3X and programmable stabilisation. My hope was that by having the receiver actively restrict the bank angle the chances of entering the death dive would be greatly reduced. The receiver permits 3 programmable stabilisation settings. I chose the following:

Position 1: Stabilisation off.

Position 2: Bank angle limited to 20 degrees. Pitch 30 degrees.

Position 3: Bank angle limited to 15 degrees. Pitch 20 degrees.

My intention was to try and fly in Positions 1 and 2, with Position 3 being a "panic recovery" mode in the event of losing orientation.

The recommended power source is a 3S 1300mAh battery, but I decided instead to fit two 900mAh batteries connected in parallel because they slipped easily into the battery compartment, and afforded some extra flight time. When fully set for flight the model hung nose down at an angle of about 12 degrees when supported by the rotor head button. This is greater than the 5 degrees recommended in the instructions, but accords with recommendations made by many others on the web.

And so to the field. I deliberately picked a day with light winds and chose Thorney as the venue to facilitate rolling take-offs.

Pointing into wind, with rotor blades spun up and stabilisation off, I started the take-off run.

As predicted by others on the net, just a blip of right roll control was required to counter the rotor torque on lift-off, but thereafter the model climbed away straight and smoothly. The rotor drive motor was switched off with no change in flight characteristics, and I started my first turn - to the left. Rudder leading aileron, and all the time using roll control to keep the rotor disc at less than about 20 degrees of bank. Throttle set to about half, the beast required a little down elevator trim.

Next I engaged the stabiliser to position 1; the effect of the stabilisation was very noticeable, and I was able to fly around the sky using rudder alone, with just the occasional roll input to kick-start a turn.

I noticed that when turned downwind the model began to sink, which was logical because the airspeed over the rotors must have dropped. This required power and elevator to correct. However, the most noticeable adverse flight characteristic was the model's reluctance to turn right on rudder alone.

I can only think that this is down to the centrifugal force of the main rotor blade - Colin would probably understand!

Anyway, initially my right turns ended up as reversals to the left before the model got out of sight, and subsequent right turns definitely required a positive roll input to get going. That said, conscious of the angle of bank once established in the turn I again found myself cross-controlled, using left "aileron" to restrict the bank and right rudder to hold the turn.

As an aside, an internet search revealed that this is a common observation about the Auto G; left turns are a lot easier than those to the right!

It was during the aborted right turns that I was reminded of how easy it is to lose orientation of this model. It really has to be kept close to you, and turning, to mitigate against this. Also, you can't take your eyes off it, and need to be actively on the controls at all times.

Having successfully flown around for while it was time to set up for the landing. Turning into wind, and reducing power the model gently descends at very slow forward speed. With practice and a flare I know that it can be "plonked" onto the ground. However, my first landing wasn't to be so smooth. Having touched down, a gust of wind from the side caught it, resulting in a dreaded rotor strike with the tarmac, and the destruction of two of the three rotor blades despite of the toothpicks that were supposed to mitigate against such damage. The resulting look was all too familiar, resembling a contorted crane fly with twisted and broken limbs; not a pretty picture!

However, was I disheartened? Was the model in for beating like Basil's car? Nope, actually I was really pleased. Flying it had been a challenge, but this version definitely felt more stable and handled better than the previous ones. What's more; the unique "wokka wokka" sound when it flies past you is mesmerising.

Would I recommend it? No and yes.

No, this is not a beginner's model and it is not relaxing to fly, but yes, if you accept its foibles it's a fascinating model which I think, at just £99 from Hobbyking (at the time of writing), is a bargain!

If you want to know more about the Auto G2 V2 all the information and a video are available on the Hobbyking website. Alternatively, simply do a Google search - there are loads of YouTube videos and associated information out there! Finally, of course, I'd be happy to share my experiences with anyone who's interested.

LiPo Storage & Charging Facility — Steve Newman

I'm sure we all have an occasional need to do some tidying whether it's the building board, hanger or in my case, my battery storage/charging facility. Here's some history of how it's evolved.

When I came back to the hobby, as a result of being furloughed during the pandemic, I started out with a WOT-4 Foam-e and a couple of 3S 2200 mAh batteries. These were charged on a single port Overlander RC6-VSR charger in my attached garage. As I suppose is normal for most any hobby, things accumulate and maybe, just maybe, we upgrade a few things. In October 2023, after hearing of several model flyers suffering LiPo initiated house fires, I decided to invest in an outdoor storage bin in which to keep and charge batteries (see https://www.ebay.co.uk/itm/). As an insurance policy to negate the risk of loosing my house I figured this was money well spent. I had also by this time bought a SkyRC Q200 4 port charger.

Charging Facility

To guard against the cold I added a thermostatically controlled, 60W, greenhouse tube heater that runs over the winter months and also (not shown in the pictures) a chemical dehumidifier which actually collects very little moisture. The floor of the box is covered with fire proof cement board and provides some guard against shorting batteries on the metal of the box.

Power Supply

Well, having used this setup for more than a year and having acquired (Thank you Tony P.) some heavier duty charging items it was time to tidy up. The original Overlander charger now sits indoors for use only on NiMh batteries. The outdoor facility can now charge 7 batteries at a time, 4 on the SkyRC Q200 and the rest on 3 Turnigy Accucell 8150's each powered from a 30A/415W 13.8V power supply. I happened to have some left over silvered bubble insulation material so this has been added though doesn't fully line the box. I'm hopeful this set up will need no further upgrades for a considerable time.

It seems I've collected a few batteries along the way too.

The accompanying pictures should be self-explanatory. Oh, and yes, that's a WiFi camera in the top corner, so I can see what's going on from indoors, though I mainly use this for the audio to hear when charging completes.

CCTV View

I still have the original 3S 2200 mAh batteries that are now approaching 5 years old. All are in excellent condition with no signs of puffing. I put this down to my charging regime. Only ever balance charge in the morning prior to flying at no more than 1C. Aim to fly them down to 30% capacity and when I get home always put them on a charger set to Storage mode. Simples!

The Avoidance Manoeuvre — Robin Colbourne

CADMAC's March lecture by the BMFA included mention of a change to the 'B' Test, namely replacing the 'go around' with the 'avoidance manoeuvre', the latter being a manoeuvre specifically to avoid a hazard.

The scenario described by the BMFA reps was of an unexpected obstruction on the runway. This could be child on a bicycle, a horse rider, or a fellow modeller who set out to retrieve their model without checking if anyone was landing. Accidents are always a case of the holes in the Swiss cheese lining up, so we've got to assume that all the precautions we usually take to avoid these scenarios from occurring, have already failed.

What really concerned me, was that, if alerted to the danger by the spotter, the pilot, with a hazard still out of sight to him, might slam his throttle open, thus making a bad situation potentially much worse. A small child on bicycle, or a horse, could be alarmed by the sudden noise, and, with the motor or engine going from idle to potentially full throttle, the propeller is suddenly a whole lot more hazardous if it were to contact anything.

Another issue, in a real world scenario, is that at the end of a flight, an engine low on fuel could very easily lean cut if suddenly pushed to full throttle, or a speed controller, in an electric model with a largely depleted battery, may just stop the motor, so the manoeuvre needs to put the model where it will do minimal damage if it does 'dead stick'.

Reading the actual wording of the 'B' test document, it transpires that the story is rather different to what we were lead to believe at the meeting. It describes 'turning to an angle of 30° to 45° away from the flight line' and taking the model back up to circuit height 'with appropriate use of the throttle to avoid stalling'. So it is not a case of 'throttle to the wall, yank and bank', as may have been inferred.

If the avoidance manoeuvre is really to demonstrate a safe recovery from a potential collision with someone, or something, on the ground, it is imperative that the throttle is only opened when the pilot can clearly see that the area in front of their model is unobstructed. Assuming the pilot keeps their eyes on the model throughout the manoeuvre, this can only be after the model has turned sufficiently to be heading away from the pilot so he can see a good way ahead of the model.

John Farley, the Harrier test pilot, said that practising for emergencies only works if your actions in the practice are identical to your actions when it happens for real. If the avoidance manoeuvre is to be of real benefit, instructors need to ensure their pupils fly the manoeuvre correctly and understand the danger their model and their actions pose, and how the sequence of their actions mitigates this - Turn, Look, Power.

Even ‘foamies’ can be brought back to life. Lee Seaman

Whether you want to is of course very subjective.

Of course the experienced, purists and traditionalists amongst us choose admirable routes and skills in building and flying incredible RC aircraft from scratch and in some very interesting materials and finishes now to include model printing. For those of us that have time and budget constraints, a good number of us do love our ‘foamies’ and many of us have them in our fleet battle scars and all.

Taking off and just twenty foot away who would know that the picture-less jigsaw of pieces once collected, then occupying the bottom of a large bin bag, would just days later return to fly again. Gorilla glue, UHU por, along with umpteen repair products all feature in keeping our models flying.

My good flying RC friend Paul Meston has just collected what after many spills, thrills and repairs and five – yes, five - previous CADMAC owners is an early Wots Wot ‘foamie’. It has now left the club and this picture shows Paul’s amazing artistic and rebuilding skills in bringing it back to a bright new looking model.

He now offers these many skills in all manner of printing, matching and customising RC model finish needs and much more. He has just advertised his RC services with BMFA: https://classifieds.bmfa.uk/acadp_listings/freezatronic-art-f-x-custom-graphics-service-want-to-stand-out-better-call-paulbmfa.uk/

Do check him out if you are searching for that missing look or finishing item you just cannot find.

Easy Aerodynamics - Lift Generation — Colin Stevens

I've headed this item "Easy Aerodynamics" because for some time I've been trying to put across the point in CD that for our purposes, much of it is indeed the case, and only requires imagination, the power to visualise, and a basic understanding of Newton's Laws of Motion - which are common-sense when studied calmly. We now know so much from wind-tunnel testing, that all we have to do is to ask how aerodynamic effects occur.

Probably the most important topic to be pursued in understanding our models is stability in flight, but since this can get more complex, I'd first like to look at something more basic - how lift is produced - and try convince you that the subject is not difficult to grasp. Let's put it to the test.

First, to dispose of early discredited theory: For most of the 20th century, academics were content to assume without any justification that air dividing over-and-under a wing would meet again at the trailing edge at exactly the same time (Equal Transit Time). They also hinged their arguments on the misapplication of Bernoulli's Principle (air speeded-up reduces in pressure), citing just the additional airspeed needed to cover the longer distance over the curved top surface of a wing, and thus couldn't explain how it is that an aircraft can fly upside-down or obtain lift from a symmetrical wing section.

More attention is now given to the application of Newton's laws, but my assertion here is that it's not being done in the best way by merely noting that the downwash behind the wing demonstrates the generation of lift by reaction, according to Newton's 3rd Law. It sells us short in failing to show how lift is initiated and then acted-on by important factors. I am indebted to Don Farrer, who wrote a little-seen but revealing explanation many years ago in RCM&E, that gives proper attention to the application of Newtonian theory, which I'll try to simplify here.

First, to see what wind-tunnel tests show -

1/ The flow passing over the top-side of the wing does not arrive at the trailing edge at same time as the underside flow - it arrives sooner, whereas the underside flow slows a little. Prandtl discovered this in the early 20th

century, when he hit upon the idea of adding pulsed smoke to wind-tunnel tests, and we see the time-related result below.

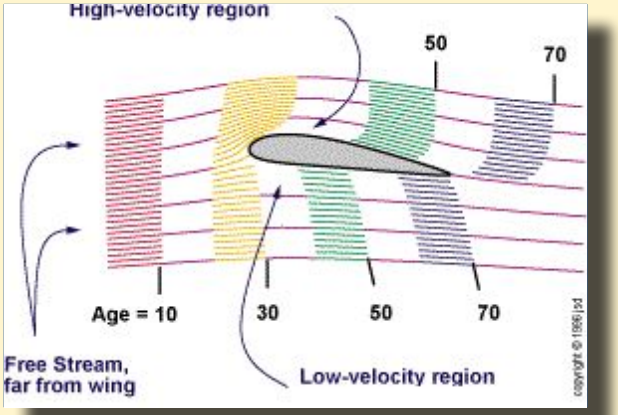


Fig. 1 Pulsed smoke test - acknowledgement to John S. Denker

2/ At the trailing edge we see downwash, representing the reaction to lift generation according to Newton's 3rd Law. Ahead of the leading edge we see upflow of the arriving air resulting from the lowered pressure over the wing and slower-moving air from the underside.

That sets the stage then, so let's see how lift is initiated in the first place, making better use of Newton's laws and starting with the top-side properties.

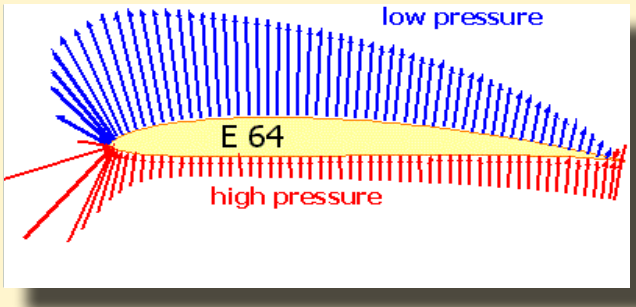
3/ The flow follows the curved surface under the Coanda Effect, unless the wing is stalled.

4/ The air has momentum because of its velocity and mass, so when it is made to change direction to follow the curve or change speed, a force has to be applied to it - Newton's 1st Law. (An aside, for the purist: The flow is subjected to centripetal acceleration, meaning that it is being forced into a curved flow being part of an imaginary circle, the acceleration being in the direction of the centre of this circle).

5/ It is only the wing that can apply this force - as it were, pulling on the moving air.

6/ If the wing is pulling against the air, then the air is pulling back against the wing, from Newton's 3rd Law (tug-of-war). We have Lift! - at least, the initiating process.

7/ In Fig. 2 we can see the forces surrounding the aerofoil shown as vectors. Note the direction of the vectors. Being in accordance with Newton (Note 4), they are perpendicular (normal) to the surface, apart for effects taking place at the stagnation point at the leading-edge. It can be seen that the greater curvature behind the leading edge creates the greater force, as the the flow velocity at this region is reaching its maximum.



Fig, 2 Pressure profile - acknowledgement to Martin Hepperle

That's enough to explain the basic principle, but other effects arise from this, and they are most important. We now need to take a look at the pressure issues.

An aircraft devoid of other lifting devices cannot be suspended in air without being supported by a vertical pressure-differential, primarily a region of low pressure above it, which is usually accompanied by slightly increased pressure on the under-surface of the wing. We now need to know how these pressure differences arise.

8/ Firstly, the force existing between the wing and the air mass passing over its curved surface lowers the pressure, perhaps a good analogy being a blocked bicycle pump being pulled.

9/ The lowered pressure creates a pressure-gradient that draws-in and accelerates the arriving air to a speed above that of the surrounding (free-stream) air.

10/ Thus with augmented speed, the air's momentum is augmented too, magnifying the force and reducing pressure still further.

Thus the Newtonian process enhances the Bernoullian condition that would have existed with equal transit time. Note that since it is the Newtonian reaction that creates the lowered pressure on the top-side, thus the Bernouillian effect does not contribute extra lift to that generated by reaction.

I think this now ties it up, showing that these processes are not hugely difficult to understand, and that the Bernoullian calculation based on equal transit time ignores the basic physics of Newton's laws and the augmentation of the flow. Illustrating the latter point, someone clever enough to do the maths was able to show that a Cessna 150 would have to fly at about 470mph to sustain its own weight under equal transit time theory!

We really cannot argue against the fundamentals of Newton. Just to think that in the 1920's, academics could have deduced much of this by swinging a brick around their heads.

The Underside Flow:

Not being the main thrust of my submission, I append this for completeness. This topic seems to excite little interest in the text-books, maybe because it's not the main contributor to overall lift.

What we do know from wind-tunnel testing is that here the pressure is raised a little, and the flow velocity is lower than the passing free-stream air, meaning that there is an apparent movement of air forwards. This combines with the arriving flow at the leading edge and adds to the upflow (Fig. 1).

Once again, how do these effects come-about?

We have a positive pressure derived from air being depressed due to the wing's angle of attack. This is enough to slow the flow a little - thank you, Mr. Bernoulli. Its movement is a more difficult visualisation, and I think it's best tackled by considering the static air mass from a fixed position as the wing passes overhead. Given the means, we would see a moving band of depressed air having raised pressure, headed by air that has built-up due to the slowed flow, and which then augments the upflow.

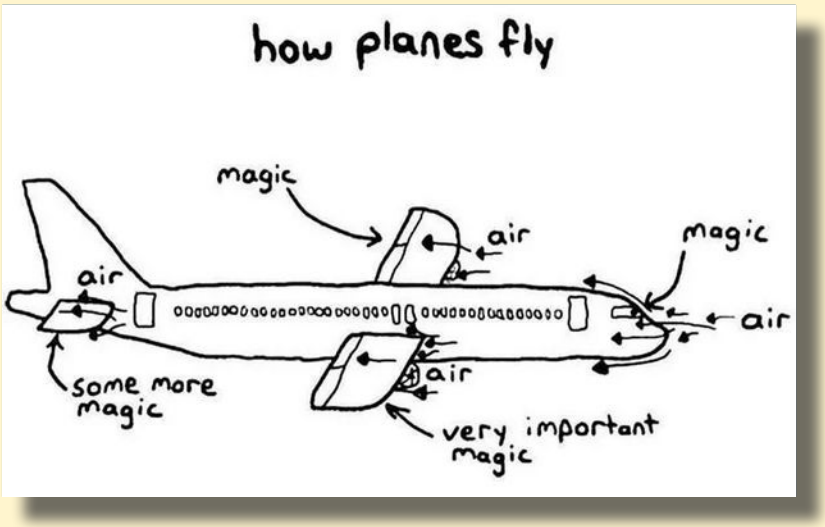
When now coupled with the topside downwash, it has created an apparent circulating airflow effect around the wing, but which is not continuous. i.e. a molecule of air at the trailing edge does not progress forwards to flow over the top - it gets left behind, having only advanced forward in the receding air-stream. Exploring this further plunges into the complexities of Circulation Theory, something that I didn't want to face for years, and thankfully not of the greatest importance at this level. If you have found this underside process hard to visualise, then I'll admit, so did I. Excellent material then, on which to hone the powers of visualisation.

Perhaps now is a good time to sign-off.

I have no formal qualifications in this subject, but at this level none are needed. Such knowledge I've accumulated has come from much reading and the pain coming from inevitable mistakes. I've been trying to make model aeroplanes fly well since schooldays, and those mistakes must have yielded something. For half of that time I was

merely asking questions and copying others - "monkey-see, monkey-do", as our departed friend Pete Dear used to say, but eventually curiosity intervened.

Believe me, aerodynamics can be really absorbing, but its charm is that no matter how diligently we pursue it, most never totally capture it. But that's a bonus, as understanding all from the beginning would rob us of much of the fun in our hobby. Thank you to those who have managed to battle-through to the end. Your comments, adverse or not, are most welcome.



Design Classics - 'Das Ugly Stick'

Robin Colbourne

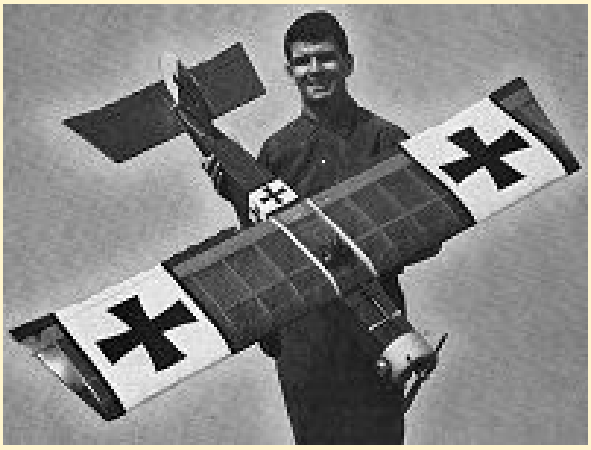
First in a series looking at trendsetting models.

One single design stands out worldwide in R/C modelling, having been copied, enlarged and shrunk more than any other. Now in its sixty-first year, its styling cues have inspired everything from the indoor GWS Pico Stick, through biplane, multi-engined, and glider versions, right up to chainsaw-engined giants.

Background: 1964 - Phil Kraft, a pioneer manufacturer of proportional radio control equipment, urgently needed a model that could be built quickly treated as expendable and be used as a hack to test and demonstrate new versions of his R/C equipment. It was also to let potential customers get 'hands on sticks.'

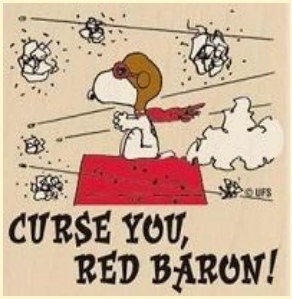
The original Box Fli, "Too ugly to be flown in a crowd of three"

The original concept, with its flat bottom fuselage, straight outlines on the fuselage and 62” wing was driven by speed and accuracy of construction. Designed, built and finished in three evenings; it was known as the 'Box-Fli',as a take on Phil's highly successful 'Kwik-Fli' design. The crude, square-cut shape led to it being said, 'Phil was too ashamed to fly it in a crowd of three'.



A Fokker fin, scalloped trailing edges, rotary cowl, pilot and gun transformed the ugly duckling - slightly.

Enter George A. Walker, a close associate of Phil's. George took the Box-Fli plan and doodled a Fokker inspired fin & rudder, scalloped ailerons and elevators, pilot, machine gun and rotary engine-type cowl to add some 'kerb appeal'. It has got to be more than a coincidence that Charlie Brown's dog, Snoopy, had the first of his long-running imagined dogfights with the Red Baron in the same year. Red paint, white bands and Iron Crosses were on everything, including the newly christened 'Das Ugly Stick'.



By 1966, the plan had been published in early R/C magazine 'Grid Leaks', and kits were available from American manufacturer, Jensen. Even back then, wheel brakes and a steerable nosewheel were standard features. The pilot, gun and cowl were soon dropped (probably too vulnerable), however the signature fin and trailing edge scallops remained.

Across the Pond: In 1970, German manufacturer, Graupner, sold the first production Wankel rotary engine for model use. Designed in conjunction with rotary gurus, NSU, and built for them by OS of Japan, they wanted a model to showcase it. The Ugly Stick-inspired 'Middle Stick' was perfect. Having the engine out in the breeze was no bad thing for the hot-running Wankel rotary. Even now, replica Middle Stick kits, although intended for electric flight, include a dummy Wankel engine to hide the real propulsion. The Middle Stick remained a firm favourite in Europe, even if the Wankel engine has been consigned to the engine collector's cabinet.

Graupner's Middle Stick brought the genre to Europe.

Some ARTFs have dropped the signature fin, however the lineage is unmistakable

Renaissance: The explosion of almost ready to fly models in the 1990s saw Stick-inspired models from just about every manufacturer, VMAR, Seagull, Hangar 9, Great Planes, you name it, none could afford to miss out on the 'What you need next is an Ugly Stick' market.

In the Air and on the Ground: So what makes an Ugly Stick (or Stik) so good?

Aerobatic capability not far short of the era's pattern ships plus a benign stall from the thick, untapered wing allows the post-trainer pilot to explore low speed handling without fear of snapping into a spin. Should

things go pear-shaped, the (often) banded-on wing offers trainer-like survivability after the more 'interesting' of arrivals. 'Das Ugly Stick' did pretty much everything that, over a decade later, Chris Foss's Wot 4 did here in the UK.

The tricycle undercarriage and steerable nosewheel make landings and taxiing a doddle on hard surfaces, converting easily to taildragger if flying from grass. Accessible servos, fuel tank and engine make pits area maintenance a breeze.

Last but not least, that notch at the bottom of the Fokker-inspired fin is perfect for holding one's model restraining cord. No waving the model around with a running engine whilst attempting to untangle the cord from the tailplane of 'Das Ugly Stick'!

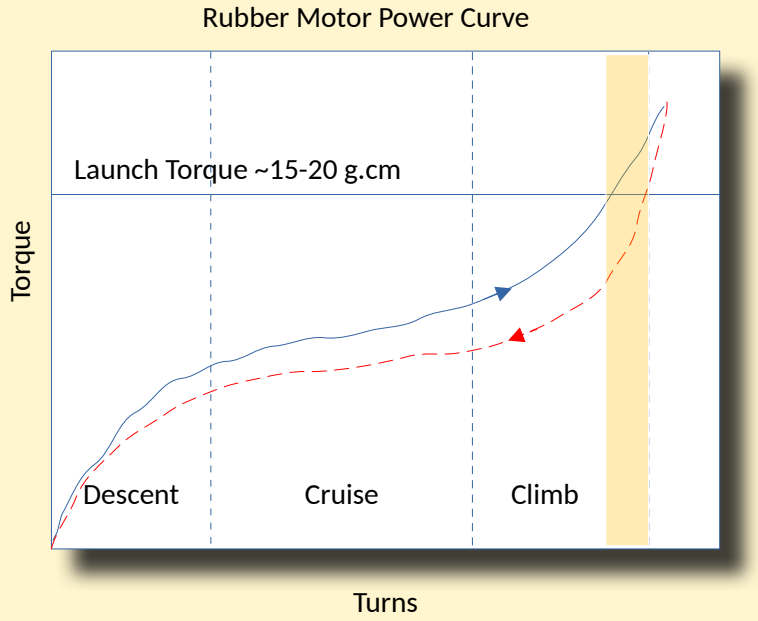
46th BMFA SE Area Indoor Free Flight meeting: Robert Horton

This annual indoor Free Flight meeting was hosted by the Crawley club and held at the Triangle Centre in Burgess Hill on Sunday 23rd February 2025. The meeting was held in one half of the main sports hall. The other half had basket ball sessions going on but luckily there was a big curtain in- between which prevented any airspace incursions from fast moving heavy basket balls.

There were several sessions for fun flying throughout the day and also competitions for duration (EZB, Gyminie Cricket and Living Room Stick) and scale (Open scale and Peanut scale). In the first funfly session I flew a couple of very old BMFA darts and tried out a new hand launch glider which I finished building the night before. The darts flew well but the glider was too heavy and just wouldn't transition from the launch into the glide properly.

I entered an old EZB model in the duration class which is for rubber powered models with 18" wingspan and 3" chord and with a minimum weight of 1.2g. The idea is to fly for as long as possible and the only method for steering is to use a long carp pole to nudge the aircraft away from the walls. The challenge then is to get the model to climb slowly to just below the ceiling which was about 9m high and then for it to cruise around for as long as possible at that height. The way to do this without hitting the ceiling is to gradually build up the number turns at launch to see how far the model climbs and then you can get an idea for the optimal torque for launch (about 14 to 15 g.cm for my model).

There are quite a few factors that influence the time in the air e.g. the weight of the model (lighter the better), the quality, thickness and length of the rubber motor, the efficiency of the prop blades and the height of the ceiling. Thickness of the rubber motor is similar to engine size and length of the rubber is similar to fuel tank size. Obviously you want to put as many turns on as possible without hitting the ceiling but also you want the model to use all the turns otherwise the model is carrying unnecessary extra weight. You can gain a bit more time by taking advantage of the way rubber unwinds (hysteresis). If you consider the power curve for an ideal rubber motor, you can see that the way the power increases as you add more turns (blue curve) is different from how the power decays as the rubber unwinds (red dotted curve).



So you can gain a bit more time in the air by winding beyond the optimal launch torque and then unwinding back to this power level before launch, the difference is that you now have some extra turns for the same power setting (coloured box). I used a home made torque meter made from guitar wire to estimate the power for launch and was fortunate enough to get three flights each just over 6 minutes without any hang ups on the girders in the roof.

The Legal Eagle class is a heavier duration cabin type of model. This class originated in the USA and gets its name from the rule that the entire plan has to fit onto one sheet of American legal paper (8.5"x 14") without overlap of wing, tail or fuselage. There are no minimum weight limits but the structure has to be built from 1/16 square balsa. The model entered was a Piper Paperchase, again quite old and on the heavy side at just over 5g. Despite its age (>9 years) it still flies very steadily but not long enough to be competitive. I need to build a new, lighter one for next year!

There were also some amazing free flight scale models being flown by the experts, some of which were flown in last years indoor scale nationals. The full SE Area BMFA report for the meeting can be found here https://southeast.bmfa.uk/se-area-fun-fly-competition-day-22nd-sept. The next meeting is booked for Feb 22nd 2026.

Two photos of my EZB and other models from left to right White Bronco (Legal Eagle), Hangar Rat, Piper Paper-chase (Legal Eagle) and a Nesmith Cougar (13" wingspan Peanut scale).

The CAA Flyer ID

Jeff Cosford

Since Derek's email, there has been a flurry of activity with members taking the BMFA's RCC 40 question test, with some meeting up to help one another get through. Especially those without a PC. Thank you.

The numbers are as follows, as at Feb 25 th :

Category 1 – no "A" Test, not taken the RCC. – 9 members

Category 2 - Has A' or 'B' test - November deadline, but no RCC uploaded – 28 members.

Category 3 - No RCC uploaded, but has a Flyer ID number in Membermojo. (DMARES test?) – 8 members

Category 4 - RCC uploaded to the BMFA Portal (74)

I have written individually to Category 1 and Category 3 members. If you are in Category 2, you will need to take the test before the November deadline. This is the date your Grandfather rights conferred by your A or B test expire. As Derek has said, insurance cover may be in doubt if you fly in breach of the law in this regard.

If you do not feel confident about taking it, can you meet up with someone who has passed, who can help? I will do it! Just don't let this bit of unwelcome bureaucracy stop you flying!

For 5 years I have refrained from monitoring this, but it has now become unavoidable.

Arun & Chichester (Air) Enthusiasts Society

AirACES

www.airaces.org.uk

Patrons – Sqn Ldr Richard (Dick) Kharegat RAF (Ret'd) – ex Vulcan, Victor, B52 Pilot
Sqn Ldr Rod Dean RAF (Ret'd) – ex Hawker Hunter Pilot and Display Pilot

PRESS RELEASE

Monday 28th April 2025 - 1845 for 1930 hrs
Boxgrove Village Hall, PO18 0EE

'An Introduction to the Pipistrel Velis Electro Aircraft and its Role in the Decarbonisation of Pilot Training'

Presented by Kerry Wilmot

Kerry Wilmot will be explaining about a new concept in Aviation. Electric aviation is on many aviators' minds at present, as something that will probably become the norm over the next decade.

She will be introducing us to the fully electric Pipistrel Velis Electro aircraft, the world's first aircraft with UK CAA type certification which is powered entirely by electric propulsion.

Kerry will explain how NeboAir have a mission to advance the Decarbonisation of Pilot Training and Experience Flights whilst supporting Sustainable Aviation in the UK with the introduction of the Velis Electro to Flying Schools and Clubs.

AirACES is an aviation talk society, providing its members with regular talks, given by experts in many different fields related to the world of aviation.
VENUE – Boxgrove Village Hall, The Street, Boxgrove, Chichester, PO18 0EE
6.45 pm for 7.30 start. Members £5, Non-members £10 and under 16s FREE.
Doors open at 6.45 no pre-booking, no reserved seating

For further information about AirACES, please see www.airaces.org.uk
or call David Batcock on 07502 400657

BMFA SOUTHERN AREA
ACHIEVEMENT SCHEME MEET
SUNDAY 18th MAY 2025
Pilot Briefing 09:30 Flying From 10:00

Event Hosted By Kind Permission Of Basingstoke Model Aero Club

IMPORTANT NOTE: PRIOR REGISTRATION REQUIRED

Fixed Wing, Silent Flight, Heli & MR ONLY – No Jet Turbines

BMFA AS 'BPC', 'A', 'B' & Examiner Demo & Testing
For Fixed Wing, Silent Flight, Helicopter & MR Types
Refreshments Provided – On Site WC

FOR ESSENTIAL REGISTRATION TO ATTEND CONTACT:
Dave Durnford, BMFA Southern Area, AS Co-Ordinator For Further Details
Include: Full Name / Contact Address, e-mail & Phone No. / Club Representing
BMFA No. / AS Test Requested / Misc. Other Info e.g. FW Examiner, Observer
e-mail: dmcmrd@clara.co.uk
*****SUNDAY 18th MAY 2025 *****

Safety Corner

Prior to taking off, pilots should always look around 360° to check for hazards!

This applies to all take-offs – including “stop & go” take-offs (obviously the pilot should not take their eyes off their model during a “touch & go”).

A Sweet Reminder …

S	Sun	What actions will you take if you accidentally fly ‘through’ the sun?
W	Wind	Consider the wind strength and direction.
E	Eventualities	What will you do if a nearby footpath suddenly has walkers or horses?
E	Emergencies (Inc. Failsafes)	How will you warn other field users if you have an emergency?
T	Transmitter Control	Is the site pegboard in operation?
S	Site Rules	Where are the no-fly zones or dead airspace areas on the site?

When should we use SWEETS? - When you arrive at a flying field and before you start flying.

2025 Dates for your Diary

For the most up-to-date details, please check the CADMAC website.

April	Thursday 10th	Fishbourne	Light Flight & Electric on the field
April	Thursday 24th	Trundle	Evening fly-in
May	Thursday 8th	Fishbourne	Light Flight & Electric on the field
May	Wednesday 14th	Portshole	Fun Fly
May	Thursday 29th	Trundle	Evening fly-in
June	Thursday 12th	Fishbourne	Light Flight & Electric on the field
June	Sunday 22nd	Thorney	Scale Comp (flying only. Competitors to decide winner)
July	Thursday 10th	Fishbourne	Light Flight & Electric on the field
July	Sunday 13th	Thorney	Pre 2000 design Fly-In
July	Wednesday 16th	Portshole	Electric Gliding Portshole + Barbeque
July	Thursday 24th	Trundle	Evening fly-in
August	Saturday 9th	Thorney	Gliding Competition
August	Thursday 14th	Fishbourne	Light Flight & Electric on the field
August	Sunday 24th	Thorney	Aerobatic Competition
September	Thursday 11th	Fishbourne	Light Flight & Electric on the field
September	Thursday 18th	Trundle	Evening fly-in
September	Saturday 20th	Thorney	Gliding Competition
October	Thursday 9th	Fishbourne	Talk by Jon Porter from Microaces
October	Thursday 16th	Trundle	Evening fly-in
October	Saturday 18th	Thorney	Gliding Competition
November	Sunday 9th	Thorney	Remembrance Gliding Competition
November	*Wednesday 12th*	Fishbourne	Talk by Chris Foss
December	Thursday 11th	Fishbourne	AGM

CD Quiz

The Wall:

Readers familiar with 'Only Connect' on TV, will need no introduction to 'The Wall'. If you've not seen it, the way it works is the grid contains four sets of words. In this case all are Full-size or model related. Group four sets of four words together to complete the wall.

Magician	**Chipmunk**	**Caribou**	**Hustler**
Fiesta	**Delta Dart**	**Playboy**	**Twin Otter**
Gold Cloud	**Pirate**	**Escort**	**Cadet**
Beaver	**Peacemaker**	**Bandit**	**Coronado**

Quiz Answers – from CD February 2025				
		Name	**Full-size Manufacturer**	**Model Manufacturer**
1	B	Chief	Aeronca	KeilKraft
2	K	Boomerang	Commonwealth	Seagull
3	F	TwinStar	Diamond	Multiplex
4	H	Impala	Atlas	Veron
5	D	Invader	Douglas	KeilKraft
6	E	Lightning	English Electric	Max Thrust
7	C	Phantom	McDonnell Douglas	KeilKraft
8	G	Explorer	McDonnell Douglas	FMS
9	A	Valiant	Vickers	Hangar 9
10	J	Nipper	Tipsy	Veron

Your CADMAC Committee

Chairman: Derek Honeysett	***chairman@cadmac.co.uk***
Hon Secretary & Treasurer: Tim Kerss	***secretary@cadmac.co.uk***
Thorney Rep/Safety Officer: Derek Honeysett	***thorneyrep@cadmac.co.uk***
Deputy Thorney Rep/CD: Fraser Dibden	***thorneyrep-2@cadmac.co.uk***
Portshole Rep/Safety Officer: Ken Smith	***portholerep@cadmac.co.uk***
Deputy Portshole Rep: George Gilchrist	***portholerep-2@cadmac.co.uk***
Slope Rep/Safety officer Trundle: Steve Newman	***sloperep@cadmac.co.uk***
Webmaster: David Hayward	***webmaster@cadmac.co.uk***
Junior/Welfare Rep: Ray Shivjee	***juniorrep@cadmac.co.uk***
BMFA Rep: Ken Knox	***bmfa@cadmac.co.uk***
CD Co-Editor: Robin Colbourne	***editor@cadmac.co.uk***
Membership Secretary: Jeff Cosford	***membership@cadmac.co.uk***
Competitions Secretary: Ray Shivjee	***compsec@cadmac.co.uk***
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