Impington
Model Aeroplane Club
Founded in 1946 by Ray Malmström

March 2016
www.impmac.co.uk

Edited by Bryan Gostlow
Distributed by Tony Harper

A job well done

Club secretary Margaret steps aside

If you were at the Christmas bash you'll have seen Club Chairman John Wynn present Margaret with a bunch of flowers to mark the occasion as she stepped aside from the role of Club Secretary. Michael Marshall has also surrendered the finance portfolio after, well no one is quite sure how many years, but we thank him too. It is members such as these two who are the glue holding the club together and we thank them for all their hard work.

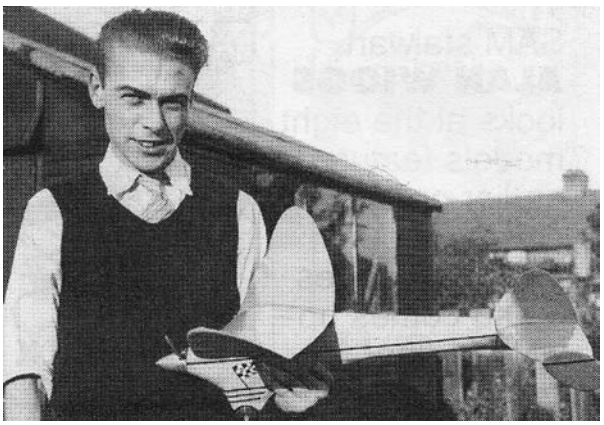
An Old Warden encounter

Tim Gray's Scarab at Old Warden

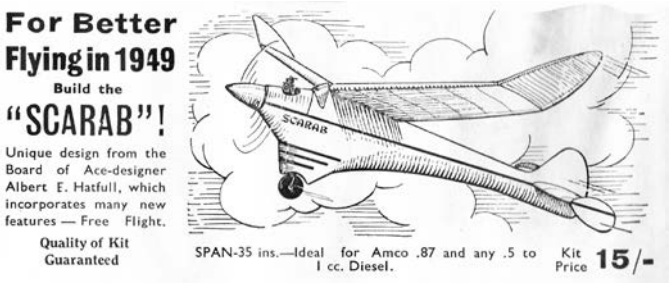
I bumped into Tim Gray at Old Warden back in May 2014. He was flying a Scarab, a model quite new to me then, and I was immediately intrigued. Narrow, with a deep fuselage it looked organic and seemed to flow from spinner to tail. You see so many derivative designs, but this one stands out. Tim has added a D/T for FF and flies with a Dart up front. It seemed too that there was something *right* about this model and a perfect fit with the spirit of Old Warden.

Do you remember the first time you saw an E-type and thinking that you'd seen nothing like it? Well, for me, the experience was a bit like that! On getting back home I looked for the plan on Outerzone and found not only the plan but also a print wood scan. Clearly a builder's model and, with a characteristic banana fuselage, quite a challenge to cover too no doubt.

Designed by Albert Hatfull of the Keil Kraft Achilles, Ajax, Senator and Junior 60 fame, it dated to 1949 when Albert was no longer designing for Eddie Keil but freelancing for Elite and Worcraft. In an interview given to SAM35 he says the Scarab began as a design exercise and wasn't intended for kitting. "*But I sent the design to Worcraft and to my surprise they kitted it. The design took a long while to work out. I mean, the old Junior 60 is a bit of a workhorse. You couldn't say it was pretty. But I can still look at the Scarab and say to myself, "Yes, I like that."*



Albert with *his* Scarab

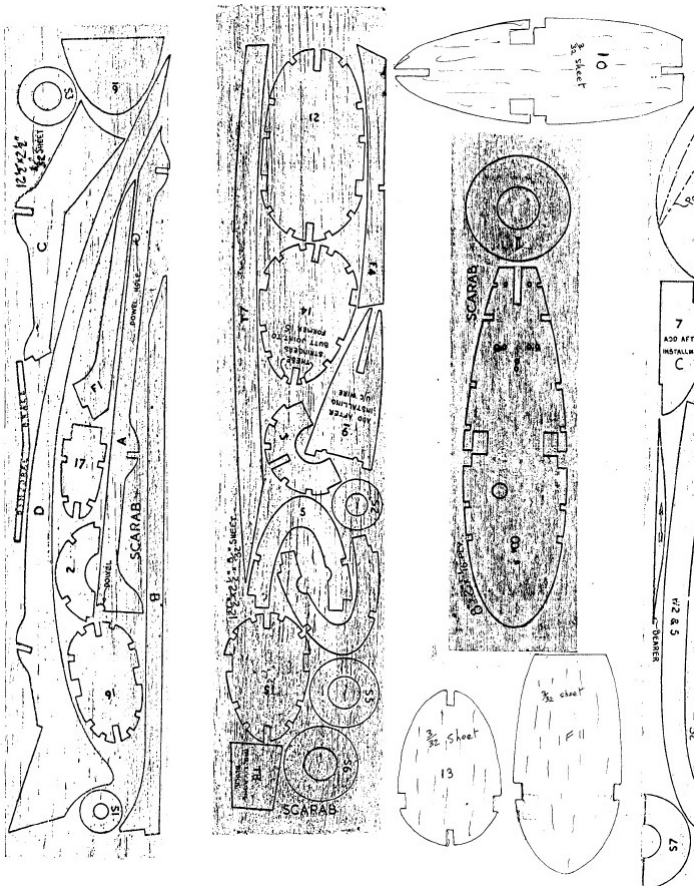


The makings of a plan

Over a period of weeks I kept returning to the plan. Of typical AH quality, it is a delight and contains a *lot* of detail, an AH characteristic. But would it convert to electric power and could it be flown *guided* rather than FF? Yes, probably, but I looked at the print wood scan and was struck by just how many pieces there were and the image quality wasn't up to much. It looked as though at least three formers were missing and had later been roughly sketched in.

The thought occurred that I could redraw it and create a drawing to complement the original. With the new files I could get the pieces laser cut and have nice crisp formers and ribs to work with.

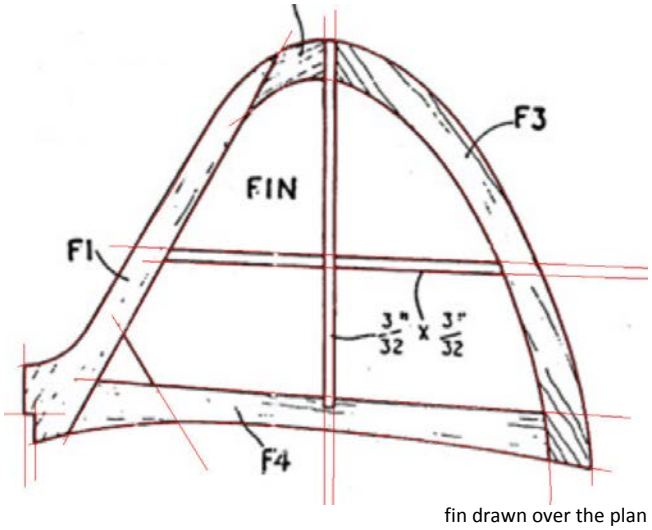
Looking round for a drawing package I found DraftSight from Dassault Systèmes. It is free to download and from the people behind SolidWorks a package I'd used and knew to be superb. There's always a *frustration* in learning to use new software because you know it can do all these fancy things, but you don't quite know how to drive it. So I set aside just half an hour a day to fiddle about and learn the tools. By the end of a fortnight I felt ready to begin in earnest.



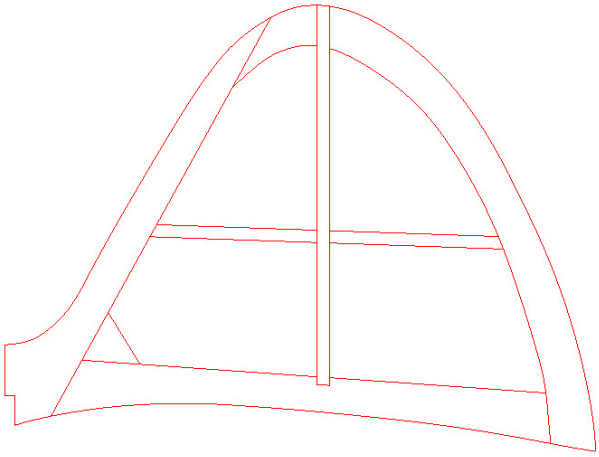
Printwood scan as it appears on Outerzone

There's a useful trick you can do with DraftSight and that is to drag in a .pdf or .jpg as a background image or layer. From then on you're able to draw over it, as though you'd placed a piece of tracing paper on top. In this way I was able to sketch some key lines and begin to make measurements. Later on, you can hide the background and once more see the wood for the trees.

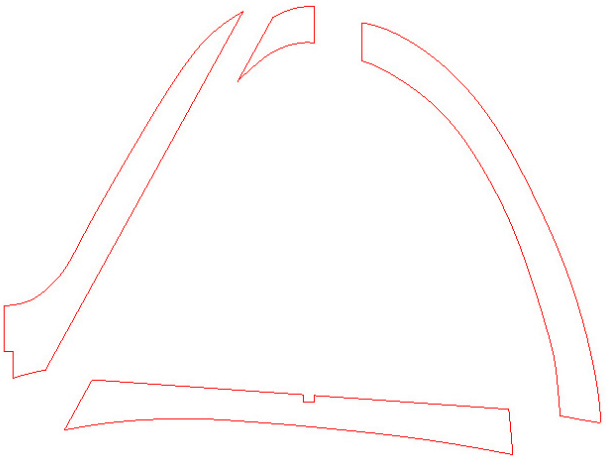
The process at a glance



fin drawn over the plan



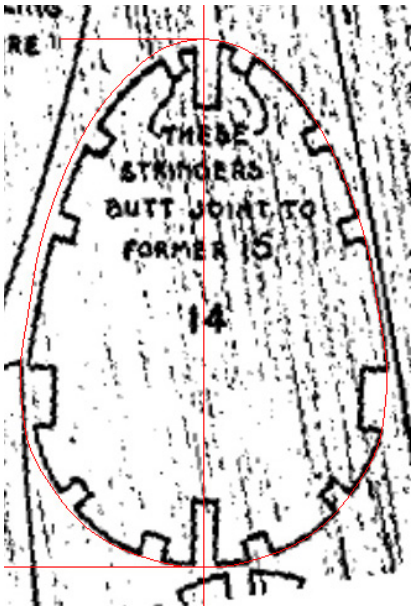
fin cleaned up, background hidden



printwood bits extracted for the laser cut file

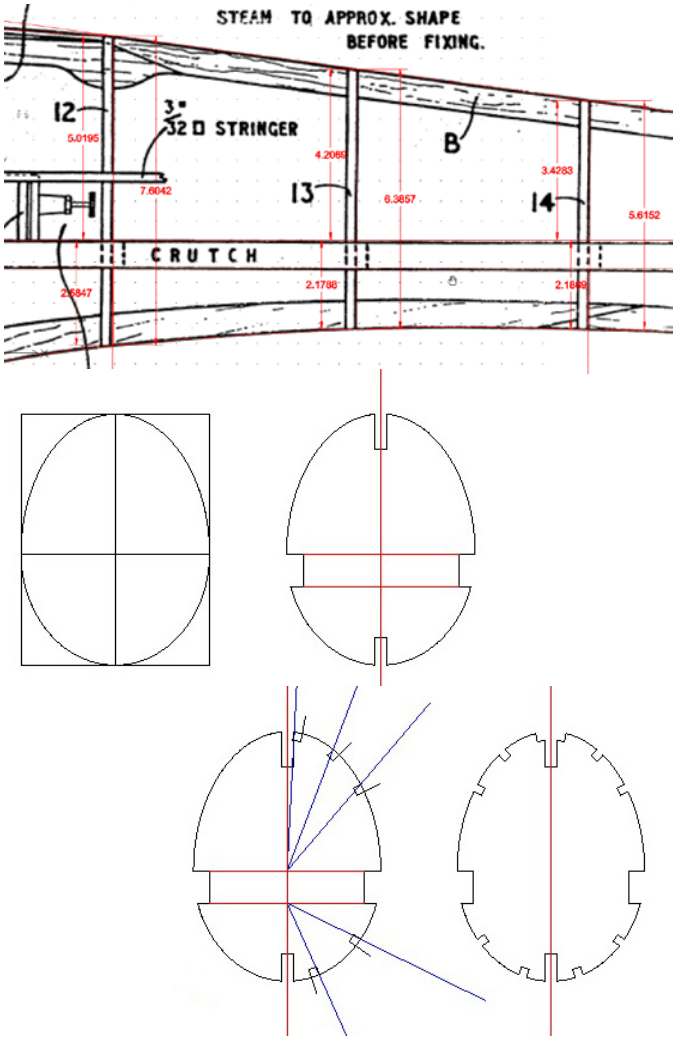
Recreating the formers

Former F14 isn't untypical. At odd angles to fit the print wood and sketchy in places, I guessed that as I copied each of the formers I'd be adding small errors.



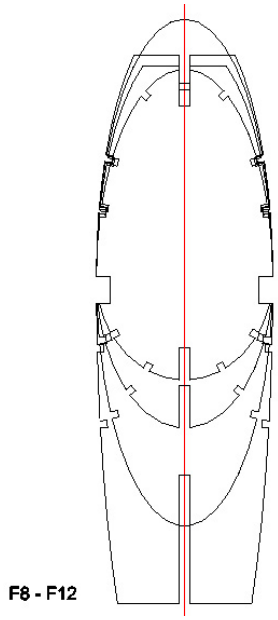
former 14

Though there was an alternative. I could grab the size of each from the plan and re-create the formers, rather as Albert must have done in the first place.
The first step in this process is to draw a fair outline over the original using the Spline tool and straight lines - not that there are many of those. Then, measuring the height and width of each, the formers themselves could be drawn as elliptical arcs, one above the other.

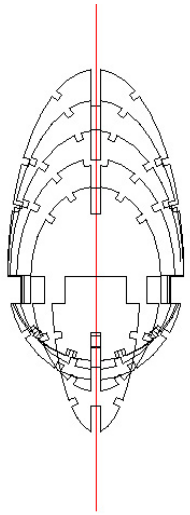


stages in recreating a former

Placing the stringers proved a real headache. There were clues on the *cut wood* scan even though some formers were missing. I felt the stringers should be concentrated where the curvature was greater and reflect the banana shape of the model. In the end I looked at the angles formed by the stringer notches on four key formers and worked from them, interpolating for the missing formers



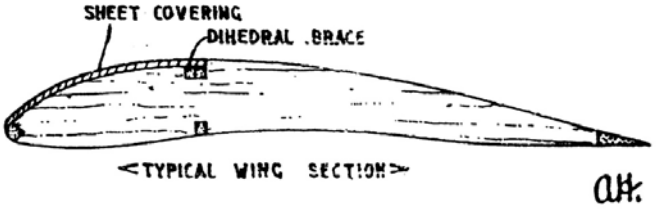
F8 - F12



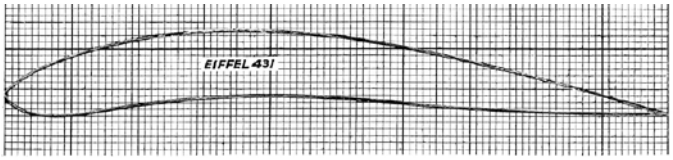
F12 - F17

Wing ribs

AH draws this *typical wing section*, but what is it?



Well, it's under cambered, but has an unusual flat section leading to the trailing edge.
Could it be the Eiffel 431 from R H Warring's Airfoil Sections?

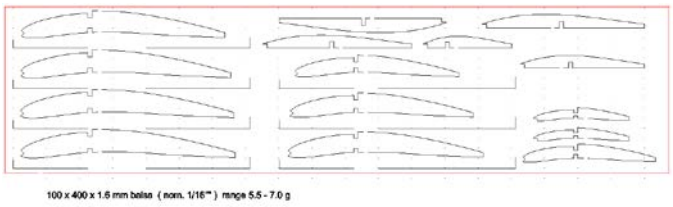


Eiffel 431

This is what Warring has to say about the section:
It is surprising that the Eiffel sections are not used more widely by modellers for they give extremely good results at low Reynolds Numbers. The Eiffel 431 is similar to the Eiffel 400 but has a higher value of C_L maximum and so should appeal. C_L maximum is about 1.28 at 14 degrees angle of attack. C_D minimum is, unfortunately, rather high at 0.0193 and occurs at -5 degrees angle of attack. L/D maximum is 21.4, at 0 degree angle of attack when the lift coefficient is 0.5. The centre of pressure travel is quite reasonable, 45 per cent of the chord from the leading edge at L/D maximum moving to 31 per cent at C_L maximum.

Final preparations

Once all the bits are drawn they can be pulled together into panels, ready for the files to be sent off. Several panels are needed: 1/16” for ribs, 3/32” for formers and 1/8” for trailing edges. There’s a panel for ply parts too.

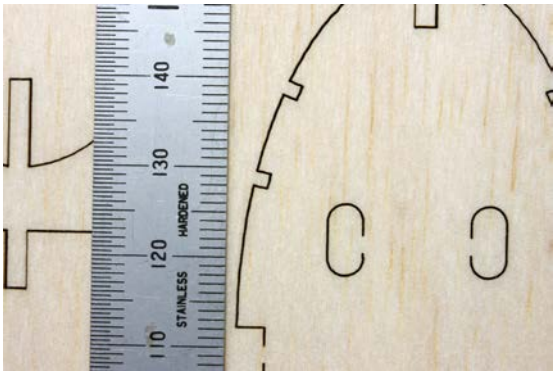


The panel is outlined in red and below it I’ve added a comment about how much the selected panel might weigh. Wood selection is time consuming and expensive for the laser guys and not everyone is willing to take it on. The endplate rudders, for example, really need to be from C-grain balsa to provide stiffness, but it is unlikely you’ll be able to specify this.

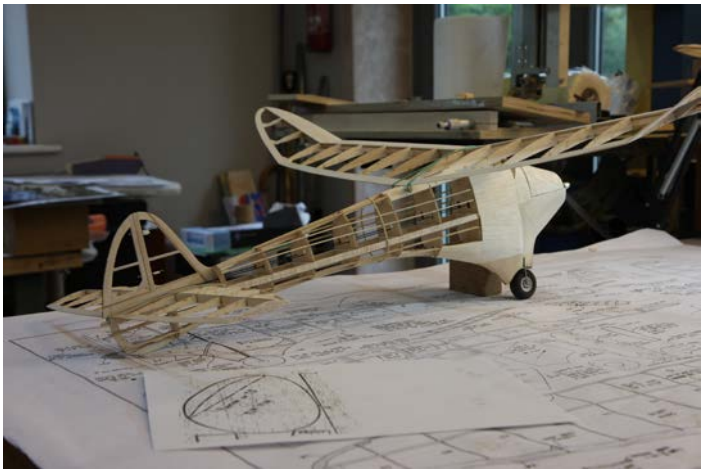
The last stage - Laser Cutting

The drawing process took a while: first, learning to use DraftSight and later struggling with ribs and stringer placement. At the back of my mind I thought, “this is all worthwhile because getting the bits laser cut will be easy.”

I found a US laser company *Manzano laser* who would cut panels from my drawings. Typically I email them, attaching the DraftSight files and got an email back next day to say they’re with USPS, here’s the link for parcel tracking and the bill will be so much. I use PayPal. After one to three weeks (customs can be the bottle neck) the panels arrive. Cut from Bud Nosen balsa the quality is good and the precision excellent.



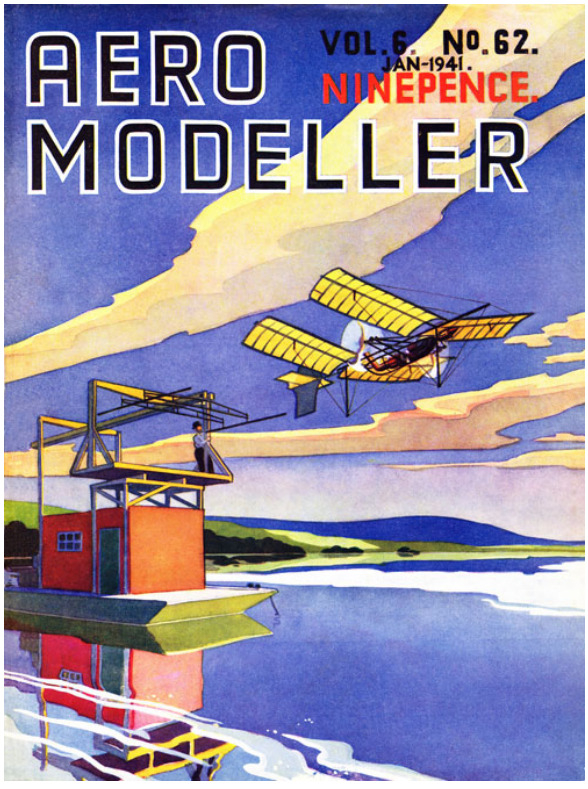
nice crisp lasercut formers



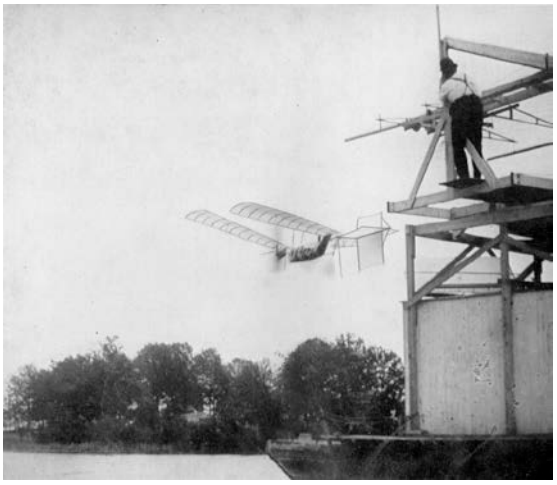
I get away with flying mine on throttle and rudder only but Richard has managed to add elevator and so can fly even when the wind gets up a bit. Bryan Gostlow

Great Covers

Aeromodeller January 1941



This month’s Great Cover has been chosen by John McIntyre and depicts Langley’s ‘Aerodrome’ flying in May 1896



Langley coined the word "Aerodrome" and applied it to a series of engine-driven unmanned and manned tandem wing aircraft that were built under his supervision by Smithsonian staff in the 1890s and early 1900s. After a series of unsuccessful tests beginning in 1894, Langley's unmanned steam-driven model "number 5" made a successful 90-second flight of over half a mile at about 25 miles per hour at a height of 80 to 100 feet on May 6, 1896

You'll never guess . .

Before Christmas our chairman, John Wynn, dropped me an email to point out that 2016 would mark 70 years of IVCMAC. I got to thinking about all the great aeromodellers who had been connected with the club since 1946: Doug McHard, Ron Moulton and many more.
Like many of you I've returned to aeromodelling after a break. In the 80's I was into gliding [highlights: an Asteroid from St Leonards Models designed by Jim Bagulay; scale RTP with a scratch built Airco DH2 and a DH10 'Amiens' in competition with Dick Staines]
Back then I was helping John McIntyre and his brother Mark to build their human powered aircraft, Airglow. It is still around flying as well as ever and yet to be out performed.
On Friday evenings John and I would break off from flying to have a cup of tea in the Community Wing [remember those days?]. A number of times we met up with Steve Furber and I remember him saying that as an undergraduate he'd investigated, from a theoretical point of view, the flight of sparrows. Have you noticed how they flap for a bit before folding their wings and literally going ballistic for a while?

load testing the spar: me, pilot and engine Nick Weston and Mark McIntyre

To be fair, John and I knew a bit about Steve. He worked for Acorn the microcomputer people and famously helped to design the BBC Microcomputer in a week!
I was teaching physics then and at break times friend and work colleague Bev Stoye would tell me snippets about a hush hush project her husband was working on at Acorn. Will Stoye was in charge of the team writing an operating system for the new generation of micros - later to be known as the Archimedes.

I contacted Steve and he writes: *It was, in fact, my fascination with flying that led to my involvement with computers. I came to Cambridge to 'read' maths, and I did the work on the intermittent flight of birds as part of my Part III maths in 1974-5, but then I moved to Engineering for a PhD in aerodynamics (based, it turned out, on applying principles from insect flight to jet engines). During my PhD I started to think about pursuing my flying hobby through simulation, and joined the Cambridge University Processor Group (a student society) precisely to see if this might be a route to building my own flight simulator. From there I was approached by Hermann Hauser to get involved in the embryonic Acorn, and I have been in computers ever since! The flight simulation circle was completed when "Aviator" was released for the BBC Micro.*

Of his time flying at Impington Steve writes*: I remember my Friday evenings at Impington fondly. I'm afraid that the aeromodelling didn't survive my move north, though I've had a few goes here and there, and occasionally tinker with drones and such like. I even bought a tiny (5 gram all-up) radio controlled electric powered plane ten or so years ago, but it's only had one, not very successful, outing!*

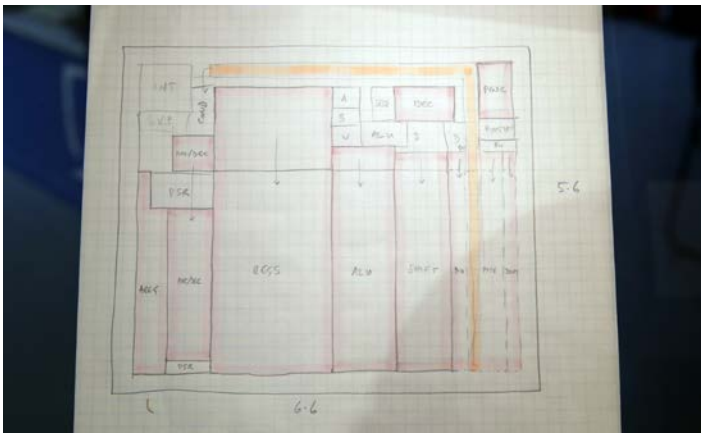
I still have the radio control gear I used at Impington, slowly rusting in the garage, and though most of the planes have gone I still have the mini-phase that I flew at Impington with a motor on an over-wing pylon. I'm not sure that I have any photos of my planes from that time - this was before digital photography - so I'd have to do some more garage archaeology to find anything!

A pity about the photo, but you can understand what he says about photography in a pre digital age, and then next day he attached a photo with the comment:
Here is an attempt at "old self with old mini-phase", with suitable aviation themes in the background! The old plane is looking a bit battered and faded these days, but then so is the old self!

Steve Furber with Chris Foss 'mini – phase'

Steve left to go to Manchester and take up the post of Professor of Computer Engineering, but there's something else you should know about him.
Although the BBC Model B computer was a great success, over 1.5 million were sold, it was clear that the 6502 processor just wasn't what was needed for the next generation of 'micros'. A small group from Acorn, including Steve, went to the US to meet the chip manufacturers and to see what was in the pipeline.

They came back not with a spec sheet but with the idea of designing their own processor.



Steve's original sketch – in The Centre for *Computing* History

You remember how two people had, in a week, come up with the BBC micro computer and had a version to demonstrate when the BBC came to Acorn to see for themselves? Well it was the same two, Steve Furber and Sophie Wilson who this time came up with a groundbreaking approach to processor design. Instead of having many powerful instructions their processor would manage with just a few [Reduced Instruction Set or RISC] but running through them very fast.
All this led to the Acorn RISC Machine or ARM

Has the penny dropped?

Steve and Sophie's work led to the processor currently in 95% of mobile phones including Apple's iPhone and it doesn't end there. As of 2014 over 50 billion ARM processors have been produced. That's 7 for every member of the planet, so the chances are you own a few.
So for me, that makes Steve Furber IVCMAC's most famous member by a long chalk.

A Close Shave

Talk to Richard Staines and he'll tell you that much good practice isn't shared because the people in the know assume that, well, "everyone knows that!"
Recently I've been building a "Sweet P30" from a kit bought through Mike Woodhouse at FF Supplies. It's the one with the rolled tube balsa fuselage. I'm hoping to take part in the Ren Cup on Newmarket Heath later this year.
The kit wood is carefully chosen and the model is going together no problem. The TE for the wing is sectioned but the TE piece for the tail is supplied 'square'.
Sometime last year I read about razor planes, Graupner in particular, and sent off to Sussex Model Centre for one. Well here was the perfect opportunity to try it out.
Hardly any force was needed and I could concentrate on removing material from just where it wasn't wanted and without damaging the ribs. Out of interest I measured a few shavings and we're talking of removing just .005" at a time. No dust either. On the box it says:
Graupner Balsa-Klein-Hobel #737
Sussex Model Centre £9.99

Aeromodelling & Three Dimensional Printing

by Phil Bailey

The majority of us have heard of 3D Printing, or to give its correct name Additive Manufacturing. Over the last couple of years there has been a big hype in the media, stating 3D printing is the next big thing, and it is, a very exciting technology that will/is transforming the way we think and manufacture products now and into the future. 3D Printing is nothing new it's been around since the early 1980's, though there is some confusion as to who invented the process, Hideo Kodama invented a method of fabricating a three dimensional plastic model using a Photo Hardening Polymer, and Chuck Hull produced the first commercial rapid prototype technology and the STL file format, which is the file format that most 3D Printer software use today.

Within our hobby there are thousands of applications we can use 3D printing for - dummy engines, wheels, cowlings, and any number of scale detail parts for your latest scale project. Search the web for 3D printed flying models and you will see examples of what has been achieved from small catapult gliders to full RC flying wings.
So how does 3D Printing work? Firstly you will require a digital 3D design; this can be produce in various ways.

- Designing a 3D model using one of the many 3D modelling software packages such as Solid works, Pro Engineer, Autodesk Inventor, these are the more professional design software tools and cost a few

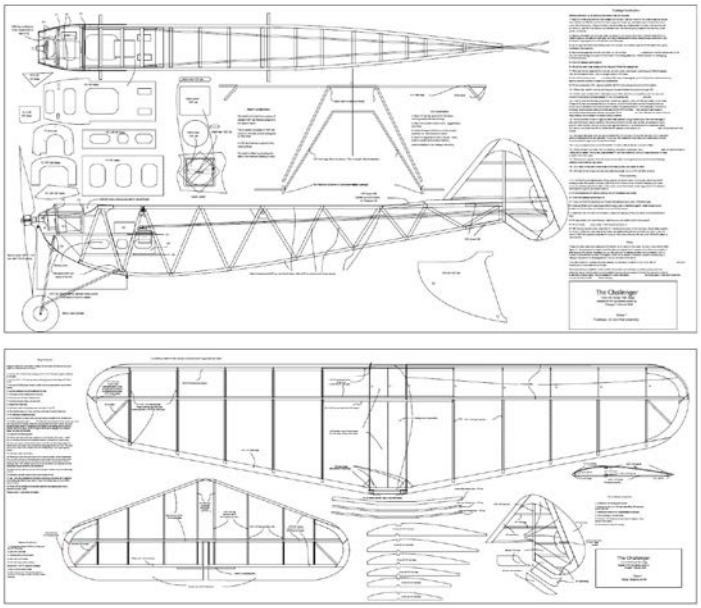
thousand pounds, Turbo CAD is more affordable for the hobbyist or you can scan the web for free downloads such as Sketch Up. You then have to convert the 3D CAD data into a STL file.

- 3D Scanning an object, scanners can cost thousands of pounds, and is ok if you want to copy something, Autodesk 123D is a free download, it allows you to take many digital photos of an object, you then upload the images, you then receive a STL file back which you can then send directly to a 3D printer (how about a 3D pilot of yourself for your next project).
- Download a 3D STL file from the web, there are hundreds of sites offering free downloads.

You then Download you STL file to the 3d Printer, the printer software automatically divides the STL file into hundreds of slices, the printer then reads these slices and a three dimensional solid is produced by adding successive layers of material, each layer is a thin slice of the horizontal cross section of the finished object, a bit like a sliced loaf of bread, glue the slices on top of each other and you have a solid loaf.
There are many types of 3D Printers, which printer suites your needs depends upon several factors like material, tolerance, definition, cost, etc., but the fundamentals of how an object is produced in successive layers remains the same, some of the more common types are -

- Extrusion – Fused Deposition Modelling (FDM) or Fused Filament Fabrication (FFF), a thermo plastic such as ABS is fed into a heated extruder nozzle which melts the plastic, the molten plastic is then deposited on a table layer by layer until the complete object is built up. These printers tend to be at the lower end, in terms of accuracy, definition and cost, (as low as £300), which puts them into the realm of hobbyist and DIY enthusiasts.
- Powder Beds – Selective Laser Sintering (SLS), a thin layer of powdered material is laid down on the build table, a laser is then used to fuse the powder to form the cross sectional shape or slice, this process continues until the complete object is build up.
- Light Polymerization – Stereolithography (SLA), a thin layer of photopolymer liquid is exposed above a platform, a UV Laser draws out the shape of the slice of the object being printed, and the liquid instantly hardens under the UV Laser forming the first layer. The platform is lowered exposing another layer of photopolymer and the process is repeated until the complete object has been formed. Another similar system is called Polyjet, this is not to dissimilar to Ink Jet Printing, a multi nozzle head draws the slice shape in liquid polymer onto a table and a UV curing lamp is passed over and hardens the polymer, the table is lowered and the process is repeated for the next slice until the model is completed.

The Challenger



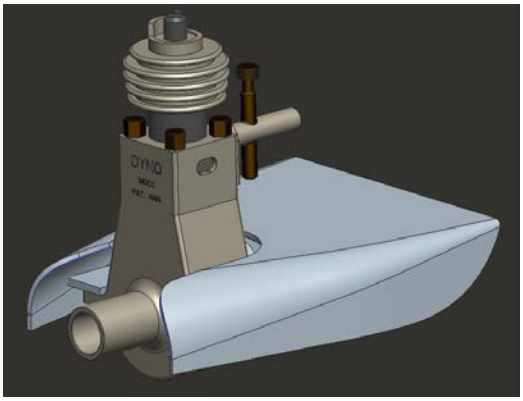
The Challenger

My latest build project, The Challenger (H A Thomas) a vintage design from 1941. The Ben Buckle plan shows a 2cc Swiss Dyno Diesel engine and aluminium cowling. As I wanted to convert the design to electric power, it left me with a problem of how to maintain the vintage appearance with a large diesel up front. Fortunately, at the time, I was working with a 3D company (Stratasys), so an easy decision was made, look into 3D printing the engine incorporating the electric motor into the crankcase, also print the cowling and an engine mount incorporating the two degrees of engine side thrust.

The 2cc Swiss Dyno of 1940 was the first commercial model aero diesel engine

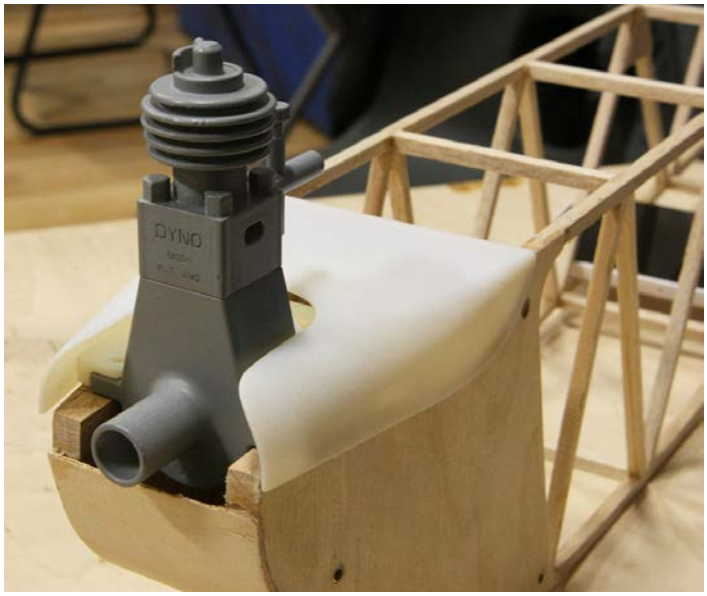
I already had a full set of drawings for the Dyno engine, so it was fairly straight forward to produce the necessary 3D CAD model, I also designed the cowling and engine mount, using pro-engineer design software, the CAD data was then saved as an STL file. The 3D Models were produced on an Stratasys Objet 24 Polyjet printer, this is a mid-range professional printer.

I was very pleased with the outcome, from the photos I think you will agree, even at close quarters it's difficult to notice the difference between the real Dyno and the 3D Printed one, the only thing missing is that sound and the smell of a real engine, something's you just can't replicate!

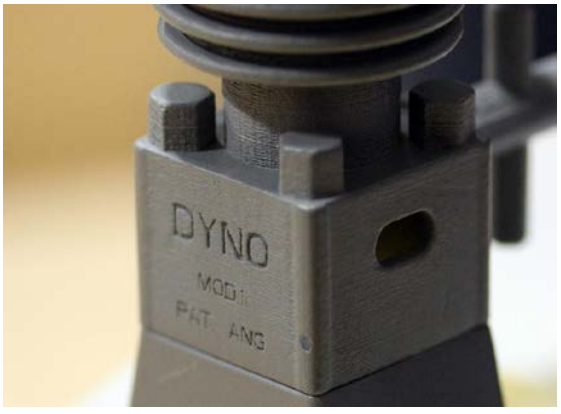


Pro-engineer 3D CAD model of engine/cowling/mount assembly

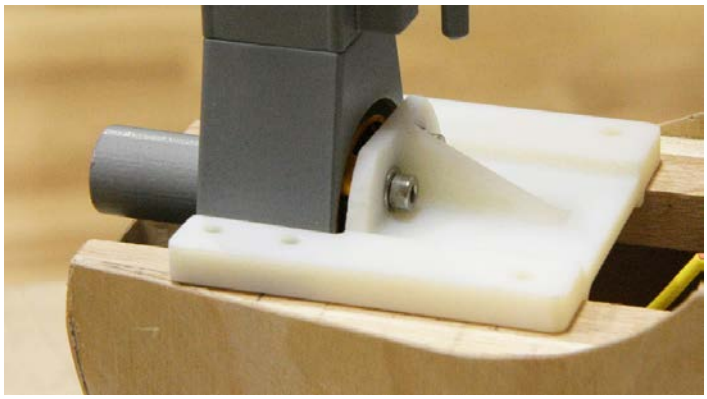
For the average aero modeller the limiting factor is cost, unless you have access to a 3d printer, associated design software, training and the necessary skill, then unfortunately for the time being the realms of 3D printing is out of reach to most of us. This not to say we can't benefit from 3D Printing, I have noticed companies now advertising 3D Printing services in the modelling magazines, still not as cheap alternative to scratch building something out of balsa and card!



Complete engine, cowling and mount fitted to airframe

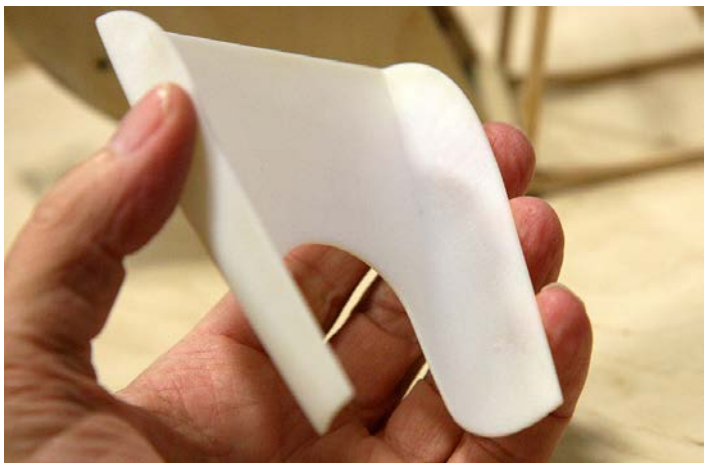


See for yourself how crisp the printing is



Engine installed on mount with electric motor

I hope this has given you some basic understanding of 3D printing and how we may use this technology in the not too distant future, if you want to discuss further then come and find me on a Thursday night or just search the web.



Cowling

I have listed some links that may be of interest.

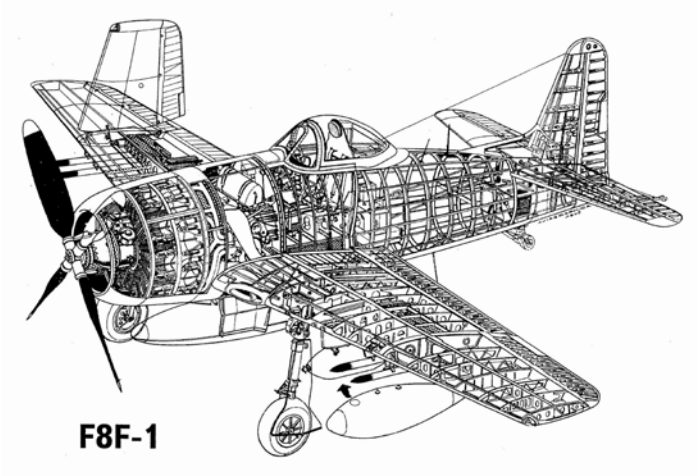
http://www.stratasys.com/3d-printers
http://3dprint.com/82272/what-3d-printing-works/
https://www.facebook.com/scalemedown/
http://3dprint.com/46348/openswift-flying-wing/
http://3dprintingsystems.com/3d-printing-model-aircraft-scale-parts/
http://www.modelaviation.com/3Dprinting

Grumman Bearcat

and why aeromodellers shouldn't design 'full size'

Flying the Grumman Bearcat the pilot was allowed to apply 7.5 positive 'g' and 3.7 negative 'g'. In *Wings of the Weird & Wonderful* Eric 'Winckle' Brown writes, "*The wings of the early F8Fs were provided with safety tips, designed to fail when the wings were inadvertently overloaded in flight, thereby resulting in an aircraft with reduced span and greater ability to withstand high flight loads."* but this wasn't without risk and he goes on, "*Because of fatal accidents, resulting from violent uncontrolled motions after loss of only one of the wing tips, a wing jettisoning device was developed for service installation and was intended to ensure that when one wing tip failed the other wing tip would be shed explosively, immediately after the initial tip failure."*

This safety wing tip feature was eventually eliminated because of the impossibility of making and maintaining a continuously reliable installation of the explosive wing tip shedding device in service aircraft.



Wikipedia sheds light on how this came about, *"The wings were designed to fold at a point about ⅔ out along the span, reducing the space taken up on the carrier. Normally the hinge system would have to be built very strong in order to transmit loads from the outer portions of the wing to the main spar in the inner section, which adds considerable weight. Instead of building the entire wing to be able to withstand high-g loads, only the inner portion of the wing was able to do this. The outer portions were more lightly constructed, and designed to snap off at the hinge line if the g-force exceeded 7.5 g. In this case the aircraft would still be flyable and could be repaired after returning to the carrier. This saved 230 pounds of weight."*

[I can't help thinking that it was an aeromodeller who first came up with idea - basically, they're 'knock off wingtips' – Ed]

Burt Rutan

another aeromodeller

Did you know that Burt Rutan began, like so many, with aeromodelling before going onto 'full size' design?
There are a series of eight YouTube clips with Burt talking about his early days in aeromodelling.

Burt in 1956 with 9' span CL endurance model

He designed the model shown here to set a control line record for endurance . . . he quickly realised that the endurance part applied to both plane and pilot!

Ride into space with Virgin Galactic and your re-entry vehicle will probably look something like this. Burt says the idea may have been seeded as a boy when he flew models fitted with dethermalizers.

You can Google to find the first clip or try **CTRL +click** to follow this link:

https://www.youtube.com/watch?v=TwDMAPwa8p8

A girl no longer?

Mam'selle at 28

Raymond's Mam'selle in 1988 at Old Warden

Vic Smeed's much loved Mam'selle first saw the light of day in the AeroModeller back in Dec 1955. It took Raymond Fella a little while to get around to building one but here's his model pictured at Old Warden in 1988.
Powered by an Albon Dart of 0.5 cc it gave Raymond a great deal of pleasure.

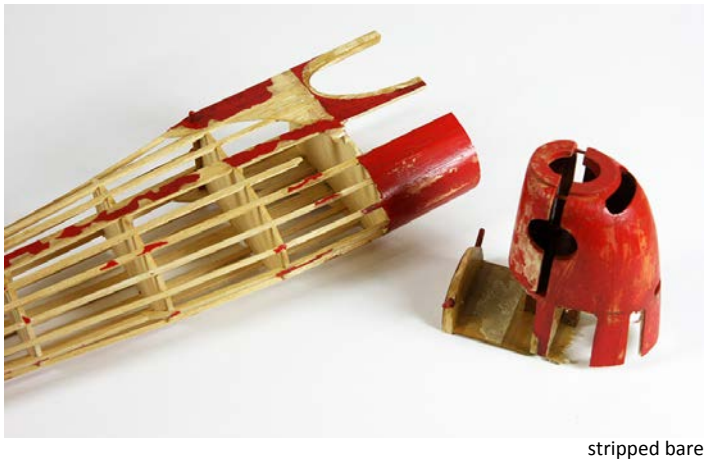
the original Albon Dart

Since then the model had been honourably retired and hung from the ceiling in Raymond's workshop.

hanging from the ceiling

As sites suitable for free flight were lost the Modelspan became brittle and a once *concours* mam'selle began to look tired.

Meanwhile Raymond had bitten the bullet and taken up RC combined with electric powered flight . . . might the Mam'selle have another lease on life? He stripped off the old tissue and gave the model a long hard look.



stripped bare

There was no way to fit an outrunner plus receiver and servos, not to mention LiPo, but the rest of the model wasn't in bad nick.

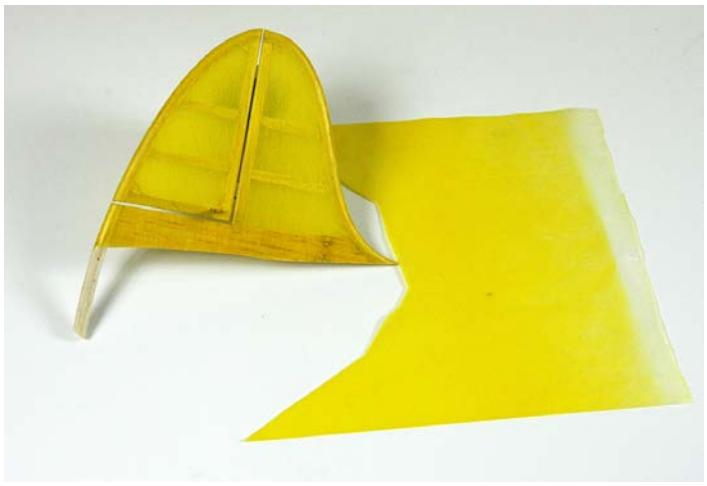
A new fuselage was begun and space found for everything, just!

a crisp new fuselage

Turning attention to the tailplane Raymond decided he could re-use the elevator, adding not much more than a trim tab. The Rudder would need to be rebuilt, but once again the control surface was made unobtrusive.

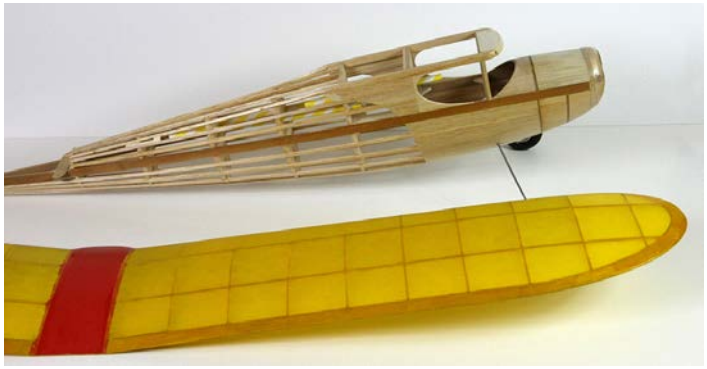
control surfaces added

The refurbished Mam'selle would be covered in Polyspan which is not only tough but looks remarkably like Modelspan when the model is in the air. Just one snag: it comes in white only.



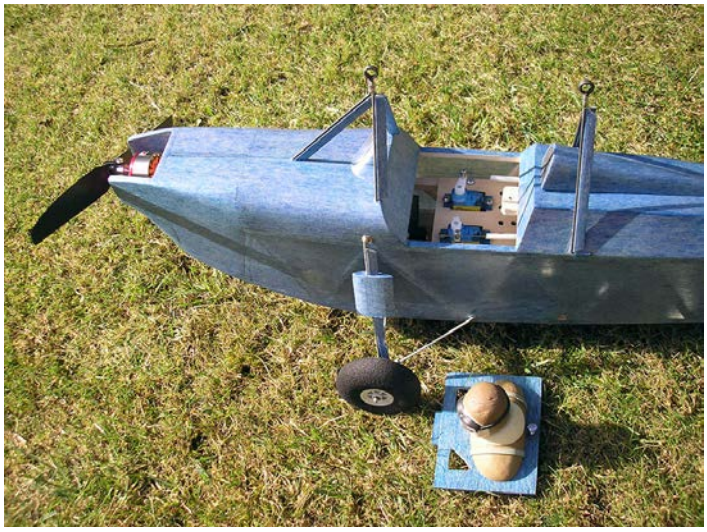
rudder covered with Polyspan

The chosen solution was to take a piece of the material large enough to cover the wing and tail stretch it lightly over a frame before spraying with Daler Rowney Acrylic Artists Ink. The plan is to keep closely to the original colour scheme, masking and spraying red over yellow.



original wing ready to take trim detail

All the radio gear plus LiPo and brushless motor have been test installed and the C of G checked, but then removed before covering.



John Valiant's Luton Minor

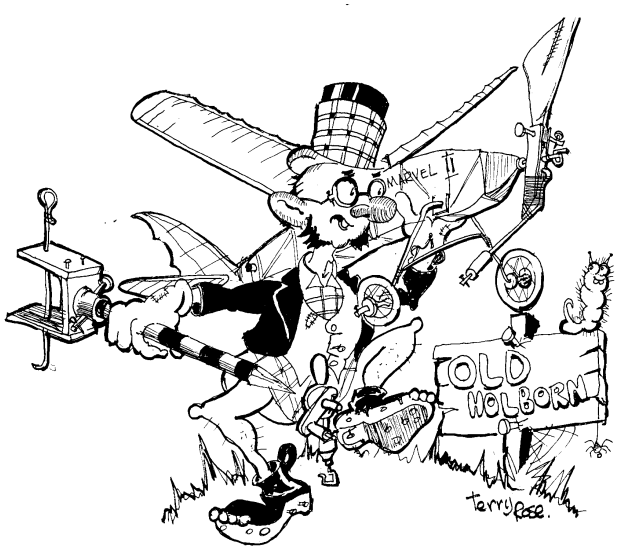
Back in January 2014 this newsletter featured John Valiant's build of a Luton Minor. The model has performed faultlessly with power in reserve and Raymond made the decision to go with the same choice of motor and LiPo:

Motor/Esc Combo EMax CF2822 and 20A ESC
Prop – GWS Hyper Drive 8 x 4 Electric Prop
LiPo – Overlander Sport 25C – 1000 – 11.1v – 3S.
all were purchased from BRC Hobbies

This has been an impressive regeneration and we'll be sure to follow progress in upcoming newsletters.

Hamish McGillicuddy

recreated by John Ashmole and Terry Rose

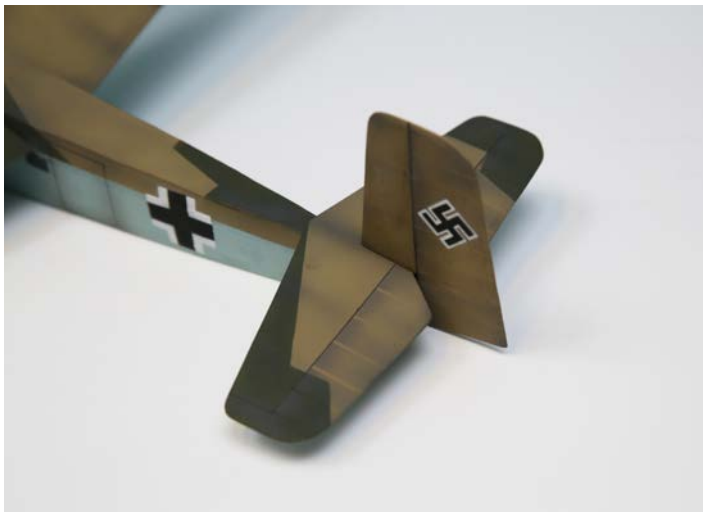


Richard Staines wanted you to be reminded of this wonderful series which appeared in the AeroModeller.

mea culpa – I can't be *sure* if we sought permission from AeroModeller to reproduce these here . .

Fabric covered control surfaces?

a question you've always wanted to ask



DFS 230 Glider by Dave Banks

Dave Banks has shown his customary skill here in *suggesting* the fabric covering of the elevators, but have you thought why they were fabric covered in the first place?
At a time when aircraft were largely metal or ply skinned control surfaces were often still fabric covered, even the early Spitfire. A reasonable guess is that it has something to do with saving weight, but why guess? For a definitive answer I contacted former IVCMAC member Mark Miller with a couple of questions:

i - fabric covering of surfaces such as elevators and rudders persisted long after metal or ply was adopted for covering the rest of the airframe - was this just a measure to minimise weight?

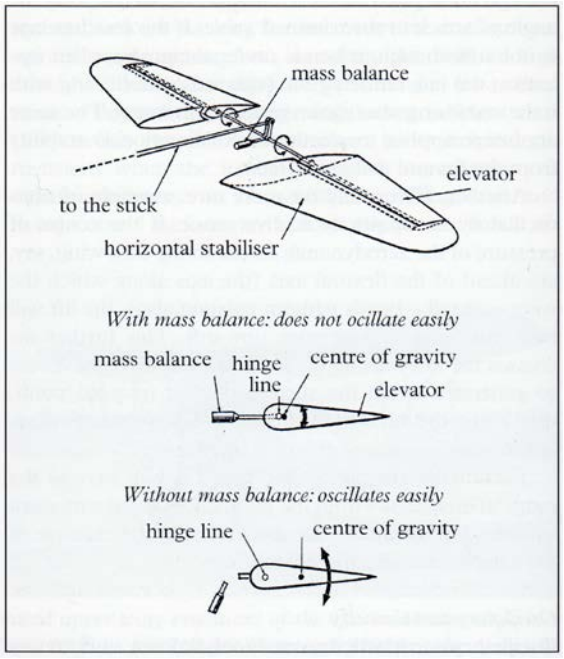
Mark replies - Exactly so, given that flying control surfaces have in general to be balanced for prevention of flutter. A heavier surface would require more mass balancing… the usual vicious circle. Unwanted mass outboard can be bad for spin recovery – cf. Tiger Moths with bomb racks – though handy for wing bending moment relief!

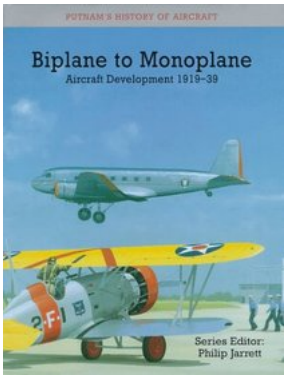
ii - with mass balancing of control surfaces is it the rule to have the C of M on the hinge or does it depend?

Mark replies - That's more or less the rule, though maintenance data will always give tolerances and this often caters both for slight underbalance and overbalance.

The extreme situation to be avoided is obviously the destructive situation of flutter. Well short of such catastrophes though, imagine a control surface attached to an airframe which is penetrating gusts. If an aileron (say) is underbalanced and the parent wing jerks upward, the TE of the heavy aileron will tend to deflect downward, imposing an unwanted control input. A statically balanced surface should be more stable in this respect.

There's a superb book published by Putnam called, "Biplane to Monoplane – Aircraft Development 1919-39":
Mass-balancing to prevent flutter by oscillation of control surfaces about their hinges is attributed to two Dutchmen, A G von Baumhauer and C Konig, who advocated it in a paper published in 1923.
The Supermarine S.4 Schneider Trophy cantilever monoplane racer of 1924 was lost through aileron flutter.
The diagram below shows what can happen when a mass-balance weight is lost, in this case that fitted to the elevator of the Japanese Mitsubishi A6M1 (which, designed in 1938, became the Zero). Possibly on account of fatigue, the cantilever arm supporting the weight failed and the aeroplane disintegrated during a flight test in 1940





recommended

Nearly down

it was all going so well . .

nearly down, safe and sound

wait a minute, what's this?

thanks go to Margaret for the sequence of photos

not going quite so well now

---

impmac.co.uk

useful calculator

I've added this calculator to the website – you'll find it on the Indigo page. You only need to measure the size and weight of a sheet of balsa before entering the details and clicking ***calculate***

balsa density calculator

enter values for size and weight

76	width mm
915	length mm
2.4	thickness mm
15	weight g

calculate reset

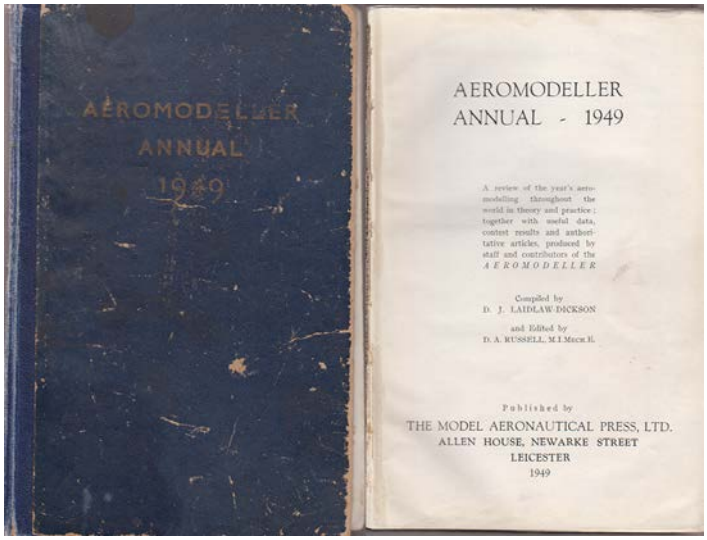
5.61 lb/cu ft

example: a 3" sheet of 3/32" balsa weighs 15g
when measured it is 76mm wide, 915mm long and 2.4mm thick
entering those values into the claculator and clicking on 'calculate' we get 5.61 lb/cuft

light or *soft* is anything between 4 and 5.5 lb/cuft
medium goes from 5.5 to 6.5 lb/cuft
heavy or *hard* ranges from 6.5 to 9.5 lb/cuft though some is more dense still

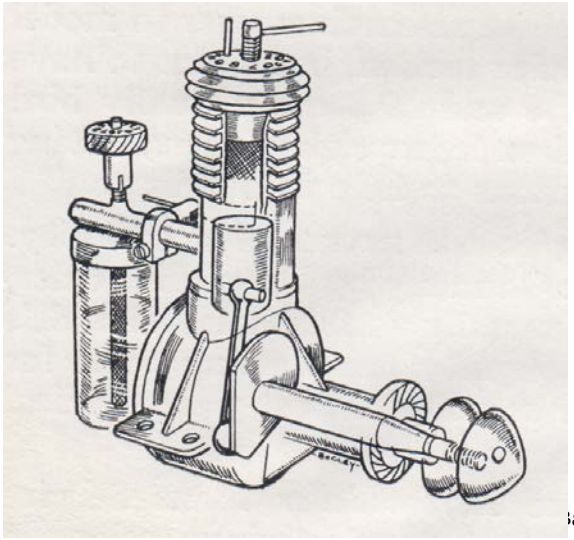
Old Warden bargain

engines and airofoils



You may remember me mentioning in the January newsletter that I'd picked up a bargain: AeroModeller Annual for 1949
In there are a series of illustrations and descriptions of engines

part 2 – **"AMCO .87" cc. DIESEL MARK I.**



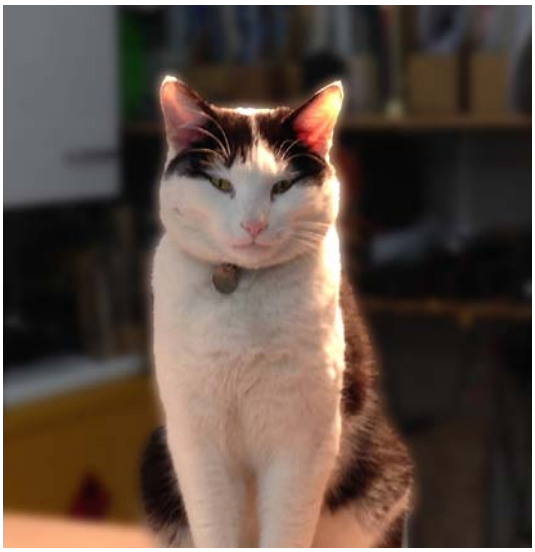
Sagley

Manufacturer's Name and Address. Anchor Motor Co., Ltd., The Newgate, Chester.
Retail Price. 72s. 6d.
Delivery. Ex stock from stockists.
Spares. 100 per cent. at works, 1 to 7 days, according to extent of repairs.
Type. Compression Ignition two stroke.
Specified Fuel. 50 per cent. "Amco." 50 per cent. Ether Meth. 40 per cent. Redex. 60 per cent. Ether Meth., or any recognised fuel.
Capacity. .87 cubic cms..05 cubic ins.
Weight. Bare 1 oz 15 drms.
Compression Ratio. 16-1, 20-1.
Power/Weight Ratio. .376 b.h.p./lb
Mounting. Beam, upright or inverted.
Recommended Airscrews. Free flight 9 by 4. Control line 6 by 8.
Recommended Flywheel. 4½ oz., 1¾ins. dia.
Tank. Injection moulding. Capacity 3 c.cms. .199 cubic in. Running time 1½ mins.
Bore. .375 in.
Stroke. .412 in.
Cylinder. Screwed to crankcase . Of S.14 material, hardened ground and honed, round and parallel to .00005. No. of Ports : 1 inlet, 1 transfer, 2 exhaust.
Cylinder Head. Dural bar. Screwed to cylinder. 3 fins.
Contra Piston. S.14. Hardened and ground.
Crankcase. Die cast. Screw in crankcase cover. Pressure die casting LAC.112 12 per cent. Si 9 per cent. Copper.
Piston. Flat top. S.14. Hardened ground and honed. Reamed and parallel to .00005. Cylinder clearance .0001 to .00015
Connecting Rod. S.11. Hardened, tempered, spherical ended. Bearings reamed and lapped.
Crankpin Bearing. Plain S.11. Hardened, tempered and ground.
Main Bearing. Plain, reamed and honed. 12 per cent. Si casting ±.00015. Equivalent Phos. Bronze self lubricating.
Little End Bearing. Plain.
Special Features. All main parts are mated. No nuts and bolts, no excess metal giving ultra lightweight. Highly developed port timing giving peak of power curve at highest possible r.p.m. with standard prop. Angular Transfer port. Snap action, patent plunger cut-out requiring minimum effort for operation and immediate effect. Runs in either direction with efficiency. Strong carburettor clamp. No thread. Will run upright or inverted. Extension needle available 2s. 6d. high angle tank. Climb vertically. Comp. and Mixt. controls numbered for easy reference. Easily dismantled with combination tool provided with engine. *Aeromodeller Analysis, August*, 1948.

Butters goes 'viral'

truth be told, he does have the odd flea!

Colin Hutchinson, who edits SAM 35 SPEAKS, asked if he could include the snap of Butters asleep on my workbench in his January edition. Could this be a first step in Butters going 'viral'?



‘Billy’ Mitchell

a far seeing airman

Although at the beginning of the Spanish American War in 1898 William "Billy" Mitchell had enlisted in the army as a private, by 1912 he was a captain assigned to the Army General Staff in Washington, D.C. with fourteen years of remarkable and exciting service under his belt. In 1905 Mitchell had written an article that was published in Cavalry Journal predicting that future wars would be waged "in the air, on the surface of the earth and water, and under the earth and water." Following up on this prescient thought, Mitchell learned how to fly, gained his wings, and transferred to the aviation section of the Signal Corps in 1917. whereupon he was sent to Europe as an observer. When the United States entered the war in April 1917, Mitchell was appointed the air officer of the American Expeditionary Force (AEF). In May 1918 Colonel Mitchell became the first American officer to fly over enemy lines and subsequently led a bombing raid of fifteen hundred planes—the largest number of aircraft that had ever been assembled for one mission. After the war he became assistant chief of the Army Air Service and began his campaign for the creation of an independent air force and unified command of all U.S. military air power.

Mitchell enraged the Navy with his claims that the bomber had made the battleship obsolete and then, in May 1921, proceeded to make his point by sinking a German prize-of-war battleship in twenty-one-and-a-half minutes using a group of then still primitive Army Air Service bombers.

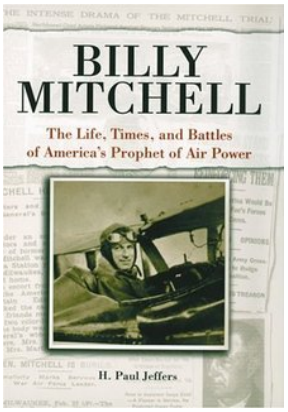
Following the dramatic crash of the naval airship USS Shenandoah (ZR-1) on September 3, 1925, Colonel Mitchell publicly accused both the War and Navy Departments of "incompetency, criminal negligence, and almost treasonable administration of the National Defence." Not surprisingly, Mitchell was tried by an Army court martial and convicted of insubordination with a sentence of five years suspension from duty without pay. He resigned his commission shortly afterwards in February 1926 and continued to speak and write in support of his crusade for American military airpower up to his death in New York City in February 1936. Mitchell was a visionary theorist who believed that a strong, independent air force was vital to American security.

Many of his hypotheses concerning the development of air warfare were proven correct by World War II:

• strategic bombardment, • massive airborne (paratrooper) operations, and perhaps most significantly, • that the Hawaiian Islands were vulnerable to attack by carrier-based, Japanese aircraft.

Abrasive and often caustic, he was a true American aviation pioneer and the father of the United States Air Force.

Billy Mitchell: The Life, Times and Battles of America's Prophet of Air Power



recommended

In 1924 he presented a 323 page report to General Patrick who dismissively said he would review it, “in due course.” In the report Mitchell forecast that a war between Japan and the United States would begin with a Japanese sneak attack on the U.S. naval, air, and army bases at Pearl Harbor, “ *in perfect Hawaiian weather, starting at half past seven o’clock on a quiet Sunday morning*”, with a concurrent invasion of the Philippines and attacks on British and French colonies to quickly eliminate all opposition to the conquest of the Pacific and ensure ultimate Japanese domination of the Pacific and the Far East.

Talk about wilful blindness of men in positions of power who didn’t want the battleship rocking and who stated “The Navy doesn’t need airplanes. Aviation is just a lot of noise.”! - **Ed**

While clearing the loft

a chance re-discovery

About twenty years ago, while Lewis Stone was working in the education dept at Duxford, he somehow stumbled on an unusual garage which, on closer investigation, turned out to be made substantially from four wing panels.

We went over one day to have a closer look - he wondered if they could be retrieved, maybe I could identify the aircraft . . the landowner was the NT or some such body and when contacted said he could take the 'garage' away only if he replaced it!

Poking around inside it was clear that someone had got hold of a set of four wing panels: one either side and two to form the roof with roofing felt over . . my guess was that, in the early 20’s someone had a car in need of a garage and knew about the Aircraft Disposal Co Ltd in Croydon.

I came away with a panel of fabric covering [re-discovered in the loft this morning] - now a bit brittle but with original, unfaded dope. Reading old copies of the newsletter, someone once interviewed Mick Staples and “granted one wish” as a true scale modeller he said that he'd like to re-visit those time to see for himself just what colour PC10/PC11 was back then. Well, I might just be able to help there Mick . .

IVCMAC 1946 - 2016

John Wynn has plans for Flyer Phil

Make a note that IVCMAC will be marking 70 years on Saturday June 11th

Flyer Phil

Coach Trip

Margaret is organising a coach trip to Cosford RAF museum on 5th March 2016. She wonders if you would be interested in going? Cost will be in the region of £23 depending on numbers.

Talk by Andrew Hewitt

On Thursday March 10th top FFscale modeller Andrew Hewitt will be giving a talk.

Andrew fixing his Camel at the FF Nats

news of the website

impmac.co.uk

After working on a regenerated version of our website for a while we 'launched' in late October. For about three months the daily count of 'visits' was in single figures, but now we're up to 29 a day average. Altogether some 1153 people have visited the new website and downloaded 4.8 Gigabyte of plans, newsletters and what have you.

The January2016 newsletter is the most popular download but there's a lot of interest in the catalogue of Ray's creations and the book "Ray Malmström 60 years of IVCMAC" which has been out of print but can now be downloaded free.

When I send out this newsletter as an attachment it goes to 52 club members plus a few 'friends of IVCMAC'. Tony prints off another twenty or so. Clearly many *more* people are now reading it online. If you are one of those from Sheffield to Chicago, but also Sweden, Brazil, the Czech Republic, Egypt, Norway or Moscow even, and reading this – we'd be very pleased to hear from you.

The search engines are catching up and only today, by chance, searching on Google I've started to come across photos taken for the newsletter – like this one:

turned up by chance – a relaxed looking Ivan

Mailbag

a postcard from North Wales

Mrs Trellis asks why, if aerofoils perform best and have the highest L/D around 8°, how come no modeller would dream of including that much incidence?

[see Göttingen 500 on p13 of the Jan2016 newsletter]

Well Mrs T, we think we know why but an explanation will have to wait until another time.

Footnote

a comment or two from the editor

In the January newsletter we included a colourised photo of Rufina and Nataly, two very brave "Night Witches". But then we realised that those twenty or so who get the B&W printout from Tony would miss out. So we hatched a cunning plan with the printer to include just that one page in glorious colour . . . *no one* noticed.

As always, if you've contributed in any way to this edition, thank you.