SUBJECTS FOR SCALE: FIAT CR.42 'FALCO'

WITH: CLOSE-UP DETAIL
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NEW LOOK >

# Flying Scale Models

THE WORLD'S ONLY SCALE MODEL MAGAZINE

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September 2012. No. 154. £4.20

FULL SIZE FREE PLAN
RUMPLER TAUBE

## BRISTOL BEAUFIGHTER

Andy Ward concludes the construction of his 86" span Bristol Beaufighter

PLUS: BEAUFIGHTER IN DETAIL

■ AERONCA C.3 'MASTER':
'Walk-Around' Wonderful 1930s survivor

■ THE BOXKITE PROJECT PART 4:
Gary Sunderland flies his Bristol Boxkite

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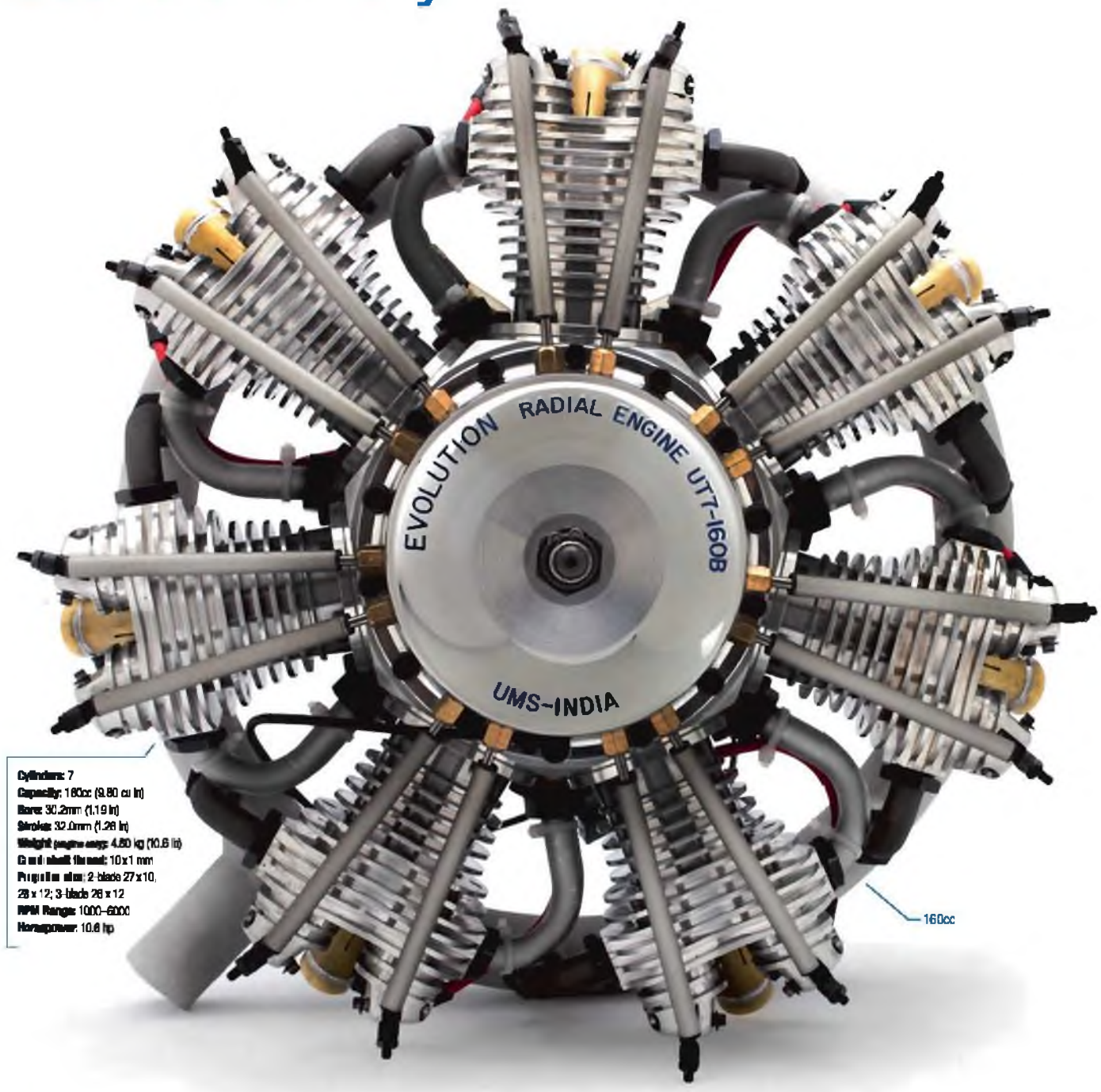


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## THE ISSUE AHEAD...

# FORMATION...

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### ON THE COVER

There's a distinctly bulldog-like tenacious look about the Bristol Beaufighter. This is Andy Ward's 86" span replica designed for .75-.80 cu.in four-stroke engines, for which Andy completes the building process in this issue.

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# CONTACT

Both July and August issues of FSM were devoid of the usual full size free plan - and in July issue, I did explain why, but it still drew a certain amount of 'chuntering' from a few quarters about the lack for the usual 'freebee'.

During more than fifty years in the business of producing model aircraft magazines, I've been on the 'inside, looking out' goldfish-style in which one of those burning questions, over the years has always been *"... how many readers REALLY build models from the free plans presented with the magazines..."?*

Perhaps one of the answers, lies in my own youth, way back in the Ice Age, when we avid readers of *AeroModeller* (coming back very soon now) would be immediately enthused when a free plan appeared in the magazine, and then stashed it away as a 'to-do' project for the future. Am I close to the reality of it here?

Well, with this issue, FSM Full Size Free Plan features are back, this month with Peter Rake's delightful 30" span electric powered Rumpler Taube; and we will go on from there to the October and November issues, which will feature Peter's Udet Flamingo in a two-part presentation, for which a set of laser-cut parts will back it up.

So stash those away for your eventual 'to-do' list.

## ANOTHER SCALE MODELLING CHALLENGE

Yes, we're full of them! And it seems these *'Subjects for Scale'* features really do strike a chord with FSM readers.

So here's another in this month's FSM. I recently called in at the RAF Museum, Hendon to get some close-up detail images of the their Bristol Beaufighter to back up the two-part feature on Andy Ward's model that we're concluding with this issue. But before I trotted off the IWM Duxford to get a few more pictures of The Fighter Collection's example, I put my head into Hendon's Battle of Britain annex to see if I could give their FIAT CR.42 'Falco' the close-up once-over.

The B-of-B annex is notoriously poorly lit, but it was worth a try and, yep, the good old Cannon 40D did the business, which has allowed us to present the type as our *'Subjects for Scale'* feature this month. For anyone into WW2 Warbirds, this is a very worth-while deviation from the mainstream monoplane crowd. It's virtually devoid of bracing wires, it's elegant, it's a fighter type and the full size was handsomely aerobatic.

So what are you waiting for?

**Editor**
**Tony Dowdeswell**
tony.dowdeswell@adhpublishing.com

**BELOW: The RAF Museum, Hendon's FIAT CR.42 'Falco' forced landed at Orfordness, Suffolk, in November 1940 during a combined Luftwaffe/Regia Aeronautica daylight raid, late on during the Battle of Britain. It was salvaged and evaluated at Duxford airfield in Cambridgeshire and now sits proudly in the Museum's, Battle of Britain annex in true Regia Aeronatica colours. It can be viewed there any day of the week.**

# FIRST INTO THE FIGHT

Exhaust, Intake and Gun Details

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## *NEW* Hangar 9™ P-40B Warhawk 50

During the attack on Pearl Harbour, a handful of U.S. fighter pilots did manage to get off the ground and into the fight. Among them were Army Air Corps lieutenants Ken Taylor and George Welch. The duo commandeered two P-40B Warhawks and flew into action against over 200 enemy planes, taking down six before returning to base. The story of their courage and skill in the face of such incredible odds has been immortalised in countless books and two Hollywood blockbusters.

The Hangar 9™ P-40B Warhawk is a great-flying tribute to Taylor and Welch that comes covered in the trim scheme of the planes they flew that fateful day. Two decal sets are included so you can finish your model with the specific markings of either pilot's plane. Assembly is a breeze and you have the option of using glow or electric power. In the air, though, is where this Warhawk really shines. Whether you're rolling, looping or strafing the runway, its smooth, precise control response makes you feel like you're flying on rails.

**SPECIFICATIONS | HAN2595**

| | |
|---|---|
| **Wingspan** | 141cm (55.5 in) |
| **Length** | 121cm (47.8 in) |
| **Wing Area** | 34.2 sq dm (530 sq in) |
| **Weight** | 3.10 – 3.60 kg (6.75 – 8.00 lb) |
| **Engine** | .46 – .55 2-stroke,<br>.72 – .82 4-stroke |
| **Electric Motor** | Power 52 |
| **Transmitter** | 4+ channel with 5 servos |
| **Servos** | (4 servos if electric power) |

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# RUMPLER TAUBE

**A 30" span, electric powered model designed by Peter Rake and built by Ulrich Schraudolph**

I've always had a bit of a thing about Taubes, ever since seeing an old free-flight plan for the Rumpler Taube back in the early 1970s. So, when asked to design a few more fairly small models, and since Taubes were a topic that had come up recently, I armed myself with the *Albatros Datafile* and set about drawing a plan for an electric powered, R/C model. In order to keep it relatively simple, the Rumpler Taube was the type chosen.

## The model

Although there is nothing particularly complicated about the build, there are rather a lot of wing ribs to cut. Therefore, I strongly suggest you arm yourself with the set of laser cut parts before starting to build the model. However, for those who insist on 'going it alone', the second sheet of the plan provides all the patterns that would appear as a cut part set laid out on wood size panels.

Copy this sheet, cut out the panels and LIGHTLY spray-mount them to the wood to create your own print-wood style kit. Once the parts are cut out, because you only lightly stuck the patterns in place, the paper can be peeled away.

The suggested motor, which I saw listed on the *Robot Birds* site, provides ample power for far greater-than-scale performance. It is inexpensive and fits into the nose nicely. So, beware of using a more powerful motor, the Taube didn't have unlimited vertical performance. By contrast, a slightly smaller motor would work just fine, but require more nose weight to be added.

So, with the preliminaries out of the way, let's see about building a model Taube.

## Wings

I always like to build the wings first because I find them a bit boring. In the case of the Taube, the wing panels are a little more interesting than an average wing, but till build very quickly.

The first task is to laminate that elegantly curved leading edge, and allow it to dry thoroughly before proceeding. While that dries, you might as well laminate the bass spars too.

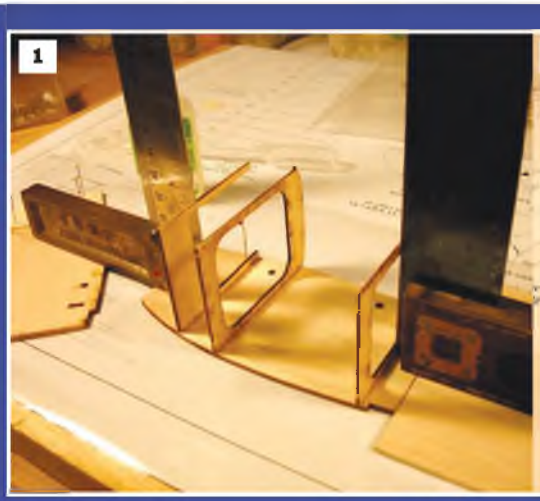
Identify, and mark, all the individual ribs and glue the reinforcing strips to those that require them. Pin down the spar and leading and trailing edge parts, gluing as required. Add part W1, laminate parts TE5 and prepare to start gluing in ribs.

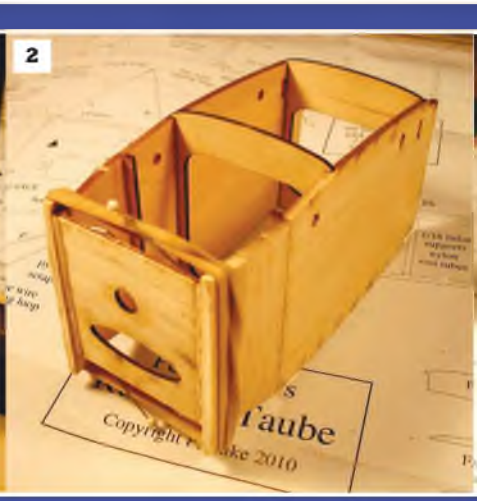
Once all the ribs are glued in, including the bass 'aileron' ribs, allow the wing to dry before adding the root bay sheeting and hard balsa rigging blocks. It's worth mentioning here that these rigging blocks should not have the grain vertical; that would be just asking the rigging cables to cut into the grain as it is pulled taut. Trim and sand the blocks to match the rib profile.

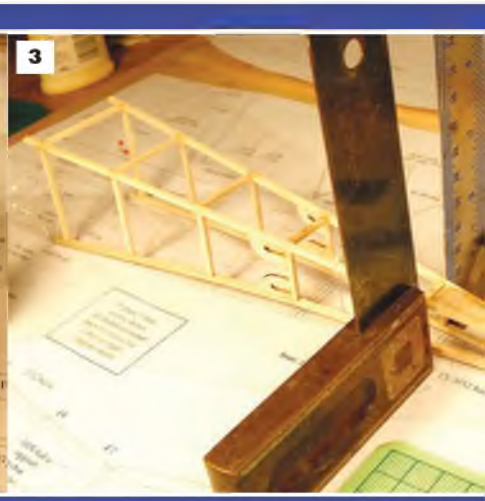
All that remains, then, is to trim and sand overall, drill the rigging blocks and set the wings safely to one side.

## Tail surfaces

Once again, building the tail surfaces is all very straightforward stuff. Laminate the

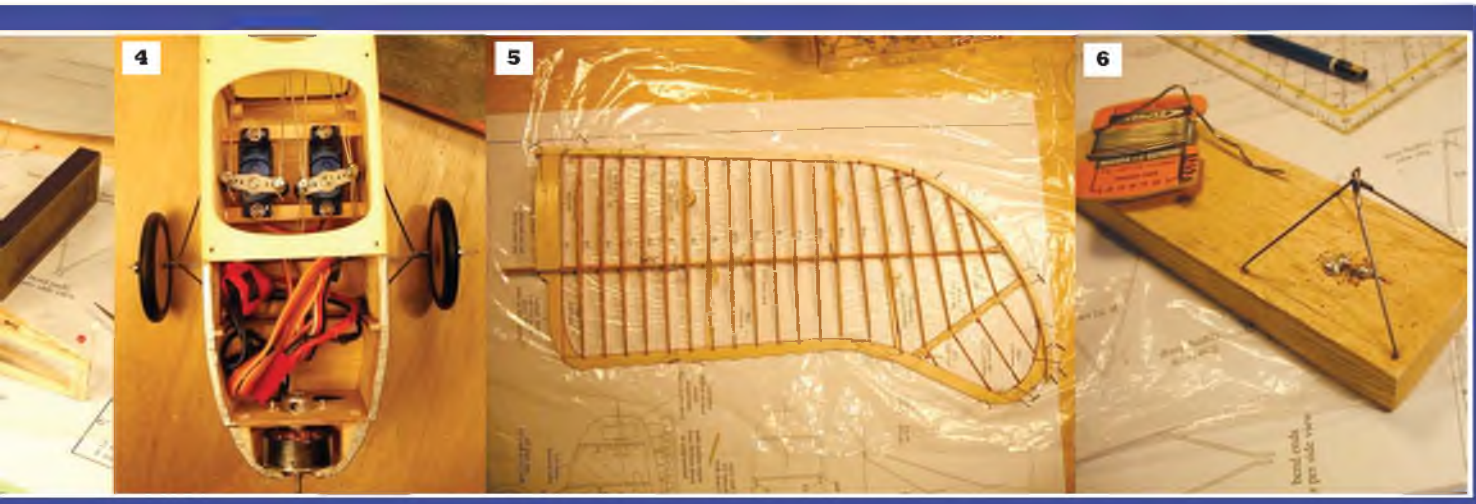


Drifting by overhead on just a whiff of power. Beware of using too powerful a motor - it won't make the model fly better.

1: Formers glued onto a side squarely help to ensure a completely square forward fuselage section. 2: With the second side added the nose is pulled in onto F1. (see text) 3: A square front end needs a square rear frame too. 4: Quite cramped in there, isn't it? Sub 5 gram servos are fine if you need a little more space. 5: Lots of different wing ribs but the wing structure is really quite simple to build. 6: A simple jig aids soldering up the wire parts and avoids the risk of scorch marks on the structure.



## Flying

Obviously Ulrich isn't that experienced a pilot because he forgot that on a model which uses the battery to help balance it, fitting a battery 1/2 an ounce lighter can lead to some 'interesting' moments.

Despite this, he managed the maiden flights very well, without damaging the model. Balanced at the point shown, the model will be a little nose heavy. However, that will make it easier to trim out and the balance point can gradually be moved back as you become more used to how the model flies - just don't take out half an ounce in one go. On a model that weighs little more than 8 ounces, that would seem to be a bit excessive.

Once the model was balanced correctly, at the point shown, it proved to be a very sedate, stable flying model that can be flown quite slowly. It still required a bit of up trim, and quite a bit of elevator to flare for landing, but Ulrich is very happy with it.

Bearing in mind what I said about power, it isn't surprising that the model climbs quite steeply at much over half throttle, but flies really well on minimal power - a bit like the full-size would have been if it actually had more power.

However, this type of model is absolutely at its best just gently puttering around the sky, making low, slow passes so you can enjoy watching it float by. So running at reduced throttle settings is perfect. Roll on those long, calm summer evenings.

outlines and build the surfaces over the plan from strip balsa and cut parts. Once dry, sand overall and round off the edges. Fit the control horns after covering is complete.

Note that the upper elevator cable passes through the tailplane if you use the scale exit position. Therefore, you will need reinforcing patches on the covering, or some internal guide. You could also cheat and exit the cables though the top of the fuselage.

## Fuselage

Now we finally come to the interesting part, the construction of the fuselage, which is build as two separate sections. The rear frame is built as one unit and the forward, sheet section as another assembly. The two are then joined, the longerons sanded flush and the decking added.

Begin by building two rear side frames over the plan. Use hard balsa for the longerons, but medium balsa is perfectly adequate for the uprights and cross-braces.

Once completely dry, join the sides with the cross-braces and TS, making sure you keep everything straight and square.

Join the vertical grain and horizontal grain forward sides and mark them with the positions of formers F2, F3 and F4. Join the sides with these formers, ensuring it all remains square. Pull in the nose and add F1. The vertical grain sections shown as a part are adjusted to allow for the curvature of the sides. To help ensure equal curvature, it is worthwhile making a template from the top view. Wet the outside of the vertical sheet, spot glue the template to F2 and clamp the curved sheet to the template. Allow that to dry and it should result in ready curved sides that are easy to glue to the bevelled edges of F1.

Fit the motor mount to F1, packing it to provide the specified down and side thrust.

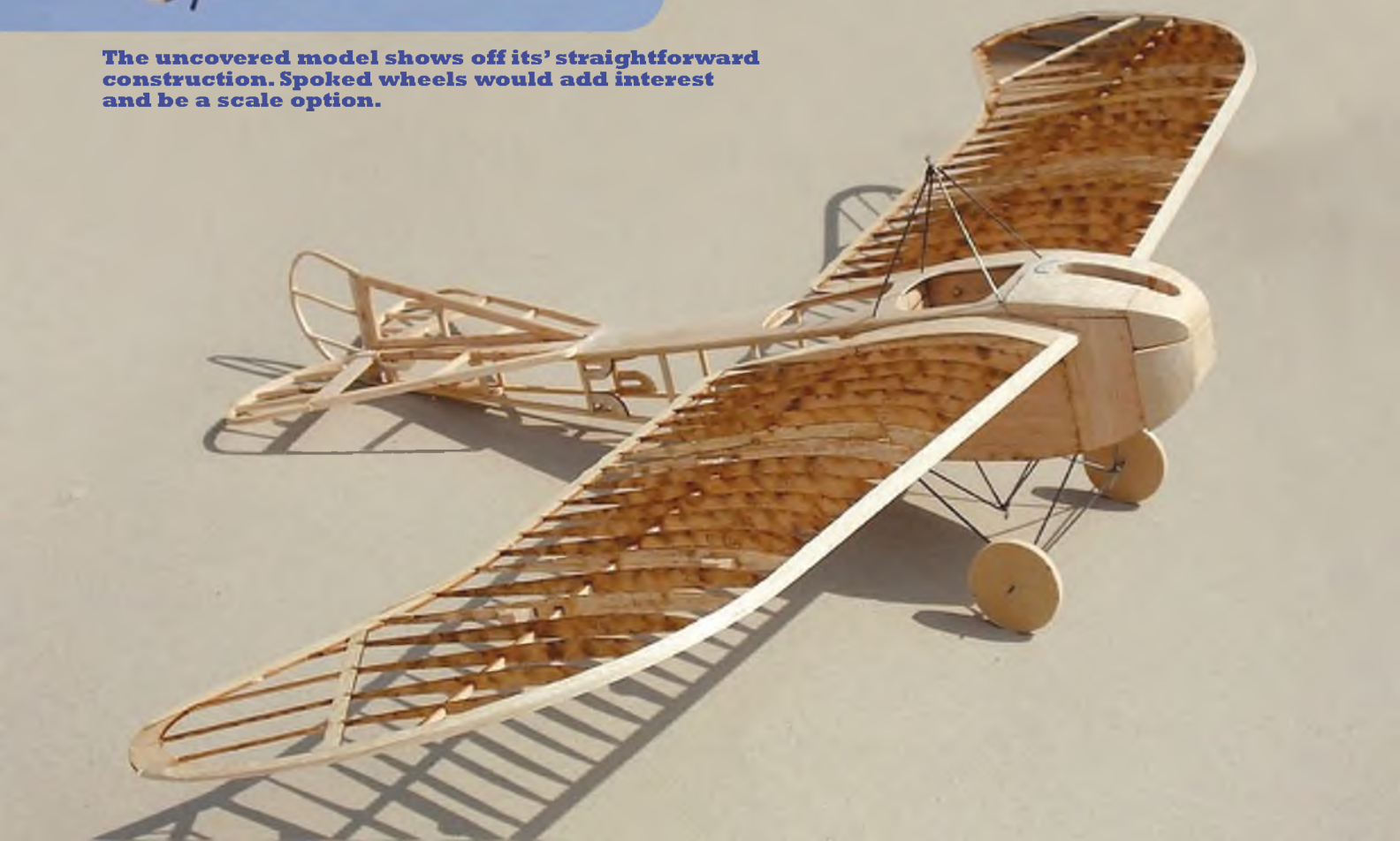
Laminate the undercarriage parts, glue these inside the fuselage and then join the front and rear fuselage sub-assemblies. Yet again, take care to ensure the structure remains straight and square.

Sand the longerons flush with the sheet parts and fit the 1/16" balsa fuselage bottom fill pieces. The grain should run across the fuselage and they should be cut to fit around parts UC. Fit the pylon blocks and, while the top is still open so you can see what you're doing more easily, drill the blocks for the pylons. If required, also drill out any glue that may have gotten into the openings in parts UC.

Now you can fit formers F5, F6 and F7, followed by the 1/32 balsa decking. There are some 'interesting' changes of curvature on the decking so I recommend making templates to get the shapes right, applying the panels wet and allowing them to dry to shape before finally gluing them in place.

Fit the cable exits, and a scrap piece to reinforce where the strip goes and then tack glue the nose blocks in position. Note that the front of the nose is split, with the

**The uncovered model shows off its' straightforward construction. Spoked wheels would add interest and be a scale option.**



upper section acting as part of the access hatch. After carving and sanding the blocks to shape, it is a good idea to cut a slot in the top so the dummy engine appears to fit into the nose, rather than being just stuck onto it. Just take care not to make the groove too deep because you still have to hollow out the nose to clear the motor. Once that task has been completed all that remains to be done is final sanding before cutting out the cockpits and moving on to the wire bending.

Since all the wire parts can be fitted after the model is covered, simply being glued in place, the wire bending is relatively painless. Shape the parts as shown on the plan and make up a simple jig to hold them while soldering. They could, of course, be soldered in situ on the model but that risks scorch marks if you drop solder on the structure.

## Covering and finishing

Ulrich covered his model using Graupner Ecospan, which appears to be yet another version of Litespan. For this type of model, it is the ideal covering, but any of the lightweight films will also work just as well. The wings aren't the easiest thing to cover, because of the shape, so be very careful not to induce warps as you stretch the covering around the tips. For this reason I would suggest you avoid any covering that shrinks too aggressively.

The nose area was covered using silver film, but may have been better treated to priming, sealing, sanding and painting. Ulrich found that the harsh handling needed to get the covering around the curves where the hatch fits onto the fuselage resulted in a less tidy join than he would have liked. If you do decide on this option, I find automotive filler-primer (two or three coats) will sand very smooth using 400 grade wet-or-dry paper and wheel paint gives a rather nice, durable finish.

The dummy engine can be as intricate, or not, as you like and is reasonably easy to produce from bits of dowel and various pieces of scrap. The style shown on the plan suits side radiators, but some Taubes used a header style radiator above the engine. As a point of interest, since the model will almost certainly need nose weight, the header radiator and hardwood, rather than balsa, dowel will add weight exactly where it's needed.

How you apply the markings is a matter of personal taste. Ulrich painted his using acrylic paints, but vinyl or homemade waterslide decals would be perfect for those not so skilled at accurate painting. If you do decide to paint them, do so before assembling the model so that you still have relatively flat, uncluttered surfaces to work on.

**Showing off that lovely wing shape that typifies all Taube types. Ulrich opted for a more angular cowl than some aircraft featured.**

## Assembly

Since access to the servos is via the cockpit opening, it is a good idea to fit the radio gear and install the basic closed loop cables before there are pylons and rigging cables in the way. I would suggest fitting the ESC to the front of F3 and the receiver to its' rear face. 1/4" square hard balsa rails are perfectly adequate for the tiny servos needed in a model of this kind. Note that, unless you chose the option mentioned earlier, both elevator cables exit through the upper tube.

Because it makes the model easier to handle, it's a reasonable idea to fit the wire parts first; so the model can sit stably on the undercarraige. These assemblies are simply glued into the holes drilled for them earlier.

Next, the wings can be glued in place. The spar extensions, along with former F4A, will set the dihedral and should ensure equal dihedral on both wings. Glue the root rib to the fuselage side and the spar extension securely to F4/F4A. Now use this assembly as a guide to alignment while you glue on the tail surfaces.

When connecting the closed loop cables to the control horns, remember to clamp both elevators together and level with the tailplane before adjusting the cable lengths. Also, make sure the servos are centred before connecting up the linkages.

The cables themselves, similarly the rigging, can be fine, nylon coated beading wire or simply 12 lb strain monofilament fishing line. On a model like this, the beading wire looks good but is definitely stronger than required. I have used monofilament line on 400 size models without problem, so it will be fine on this tiddler. The one down side with it is that it needs painting to hide its' humble origins.

I find the simplest way to rig these models, without inducing warps, is to use cables that run in a continuous length from the top pylon, through the rigging block and ending at the lower pylon. If you rig the entire model without gluing the cables into the blocks it is then possible to carefully adjust out any warps, or add wash-out, should you desire.

Once both wings are identical, the rigging can now be glued into the blocks, thereby locking your set up in position. A small spot of thin cyano in each hole does the job admirably ■

Business end with the Aeronca E-113C engine - note tiny, stubby, streamlined landing gear.

# Glamorous Glady's

## 1935 Aeronca C3 Master

*Bruce Corfe takes a close-up walk-around of a wonderful full-size 1930s aviation survivor*


A period advert for the British Aeronca-JAP 100, featuring the 1936 UK - S Africa flight.

## AERONCA HISTORY

Aeronca, the *Aeronautical Corporation of America*, was formed in 1928 in Cincinnati, Ohio. Its first production aeroplane was the C-2, a single-seat sport-plane, affectionately known as the *'Flying Bathtub'*. The C-2 proved a great success and was followed by a two-seat version, the C-3; these were both 'razorback' models, the term coming from the triangular section fuselage, where the top longeron ran from the rear of the cabin to the front of the fin, which gave it a pointy-backed look.

In 1935 the round-back C-3 Master was introduced; this in fact had the same triangular-shaped fuselage structure, but was given a rounder shape by adding plywood formers and wooden stringers. A total of 250 Masters was produced over the next two years.

The Master was powered by an improved Aeronca E-113 series engine developing 36-40 hp (27 kilowatt). The C-3 series was very popular, giving excellent value for money, combined with very good performance. It would carry two people at a cruising speed of 70 m.p.h. on 21/2 gal/hr. The Master was given a leather-upholstered, air-and-weather-tight cabin with improved forward visibility plus larger-diameter (5/16") flying wires.

The round-backed shape improved the airflow over the rear fuselage allowing a smaller, differently-shaped fin and rudder to be fitted. The landing gear, whilst still alarmingly short, was now of cantilever construction with suspension inside the fuselage. Doors could be fitted on either side or, rarely, both. Other improvements included a fire extinguisher with optional cabin heater, landing lights and brakes (it has been claimed that an enthusiastic pilot with gloves but no brakes could reach out of the cabin and slow the wheels down by grabbing them!)

In 1936 a C-3 was delivered from London to Johannesburg - 9,100 miles, solo, in 130 hours over 21 days, including a piston replacement involving 40 hours searching for a lost circlip in a hyena-infested jungle clearing! A fantastic story that would make a brilliant film.

Compared to offerings from this side of the Atlantic, for example the '30s DH Tiger Moth, the C-3 had a lot going for it - monoplane layout, enclosed cockpit and side-by-side seating which made flight training much easier. A contemporary advert for the C-3 shows a version on floats, and talks of "Light ship performance" but I'm sure that they were thinking of weight rather than Star Wars! In fact the C-3 is referred to as a 'ship' several times.

A version of the C-3 with fabric-covered ailerons (instead of duralumin), designated the Aeronca 100, was built in England under license by *Light Aircraft Ltd* of Hanworth, but the expected sales never materialized - only 27 Aeronca 100s were manufactured before production was halted. The 100 was powered by a version of the E-113C engine, with dual ignition, built under licence by *J A Prestwick Ltd* and known as the Aeronca JAP J-99. An air-speed gauge was fitted to the 100, with a pitot head above the parasol king-post. Three of the 100s had wider cabins and two doors fitted.

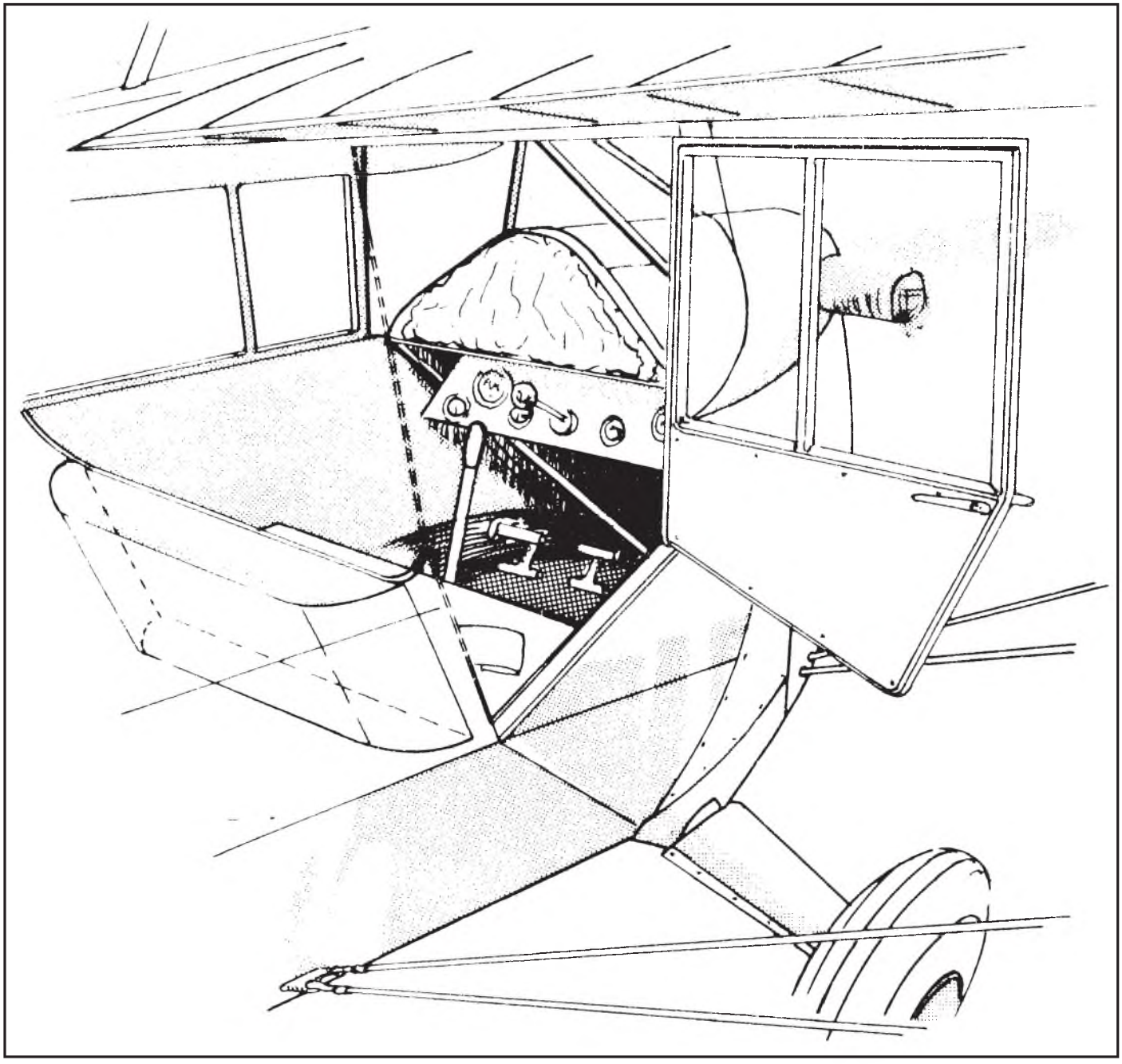
Production of the C-3 was halted in 1937 (when it was replaced by the Aeronca K) as the aircraft no longer met new US government standards for airworthiness. Many of the C-3's peculiarities - external wire braces, extensive fabric construction, single-ignition engine, and lack of an airspeed indicator - were no longer permitted. Fortunately for the legion of Aeronca owners, a 'grandfather' clause in the federal regulations allowed their planes to continue flying, although they could no longer be manufactured.

When production ended, Aeronca had sold 17,408 aircraft in 55 models with perhaps the most popular being the 7AC Champion, the famous 'Champ'. Between 1945 and 1951, nearly 8,000 Champs were manufactured. Aeronca ceased light aircraft production in 1951, but in 1954 sold the Champion design to the new *Champion Aircraft Corporation* of Osceola, Wisconsin, which continued building variants of the Champion as well as the derivative design, the Citabria. The venerable aircraft design was acquired again by the *Bellanca Aircraft Company* in 1970 and again to American Champion in 1988, where I believe it remains in production. Aeronca now builds components for aerospace companies including Boeing, Northrop Grumman, Lockheed and Airbus.

### C-3 GENERAL CHARACTERISTICS:

**Crew:** 1-2
**Length:** 20 ft 0 in (6.1 m)
**Wingspan:** 36 ft 0 in (10.98 m)
**Height:** 7 ft 10 in (2.39 m)
**Wing area:** 142.2 ft² (13.2 m²)
**Empty weight:** 569 lb (258 kg)
**Gross weight:** 1005 lb (456 kg)
**Power plant:** 1 x Aeronca E-113C horizontally opposed 2 cylinder piston engine, 36 hp (27 kW)

**Performance**
**Maximum speed:** 95 mph (152 km/h)
**Range:** 200 miles (322 km) Service ceiling: 12,000 ft (3659 m)



***Glamorous G-ADYS:***
The full-size subject of this profile, G-ADYS (or 'Gladys' as she has always been known), serial number A600, rolled off the production line on October 21st, 1935 and was finished in the standard yellow colour scheme with dark red leather upholstery. Gladys was imported by *Light Aircraft Limited* to Hanworth Aerodrome near London, and was one of 16 Masters purchased by the company.

The Master sold for £396 and was demonstrated to many flying clubs in the UK and in Europe. On arriving in the UK, Gladys was sprayed silver with blue lettering and 'London Airpark Flying Club' was written on her fin. Her first public appearance, on January 2, 1936, was in the Palm Court of Selfridges store in Oxford Street, London at an exhibition for the 'Modern Boy' organized by the School Boys' Club at Selfridges. It was opened by the famous racing pilot Tom Campbell Black, and also on display was Stephen Appleby's cross-Channel Flying Flea and a General Aircraft Monospar-Jubilee.

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**1:** The 1930s tail logo has been faithfully recreated. Note the tail bracing wire.

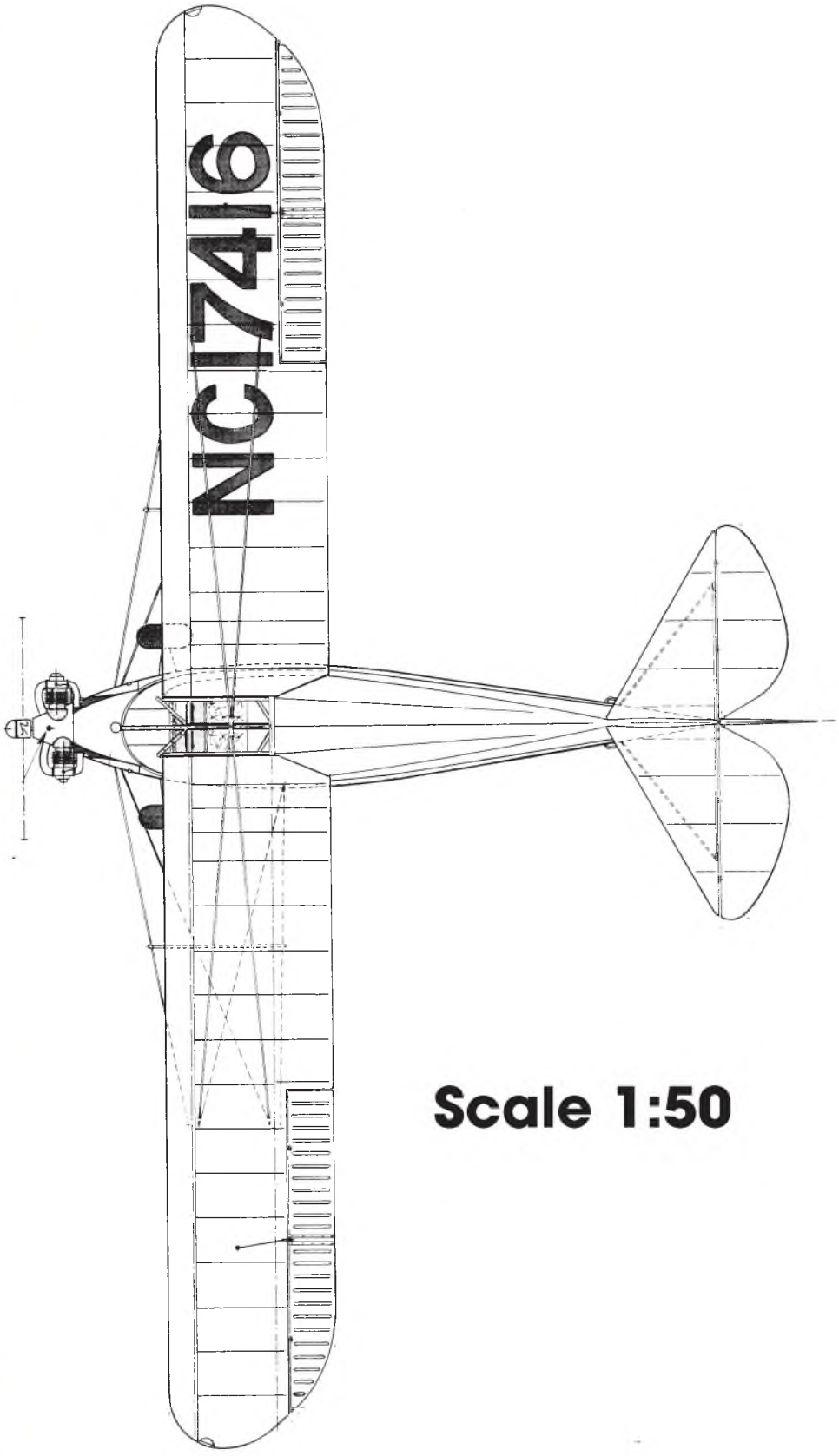
**2:** Looking at the exhaust system with intake heater. Note brass prop L/E protection.

**3:** American Aeronca E-113C two-cylinder engine and Sensenich prop.

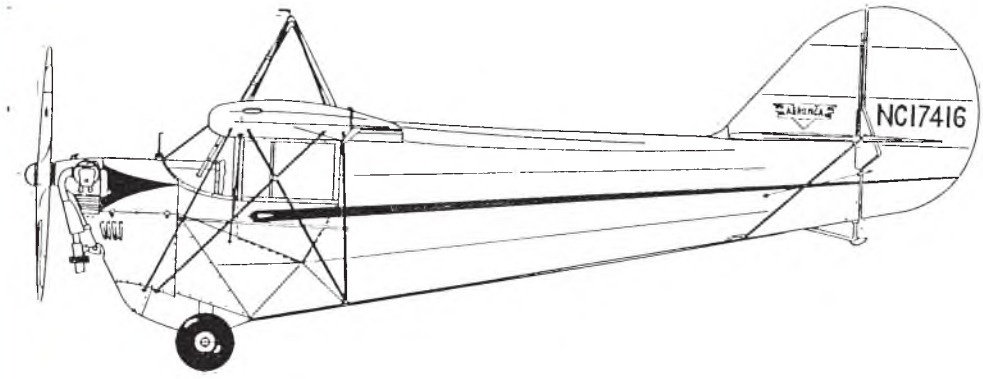
**4:** Wonderful art-deco winged oil-filler cap and Aeronca engine plate.

**5:** Port cylinder head with safety-pin rocker-cover retention!

**6:** The Sensenich prop logo - Paul believes the prop is original.




**Scale 1:50**



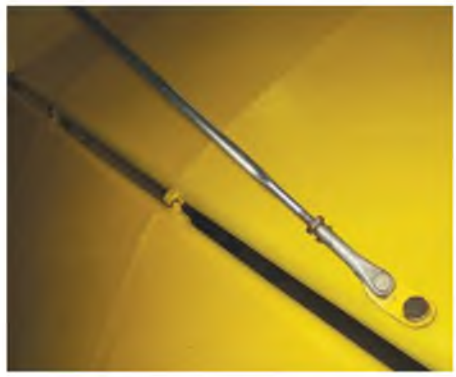
**King-post with pitot tube and flying wires attached.**

**The 'parasol' from inside the cockpit.**

**The port top aileron horn ('Pull-pull' is used throughout).**

**Port streamlined wing bracing wires and wooden dowel spacer (anti-vibration?).**

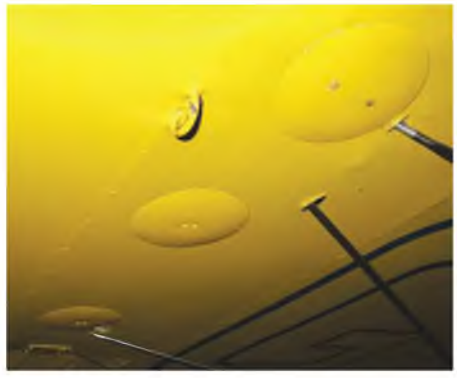
**Port rudder horn and control wire from below.**



**Starboard top tail bracing wire and attachment - note hinging (and gap!)**

**Streamlined 1930s cabin door handle in natural aluminium - note pinking-shears finish on Ceconite fabric overlap.**

**Starboard engine cover (sheet aluminium) with fastenings and louvres.**



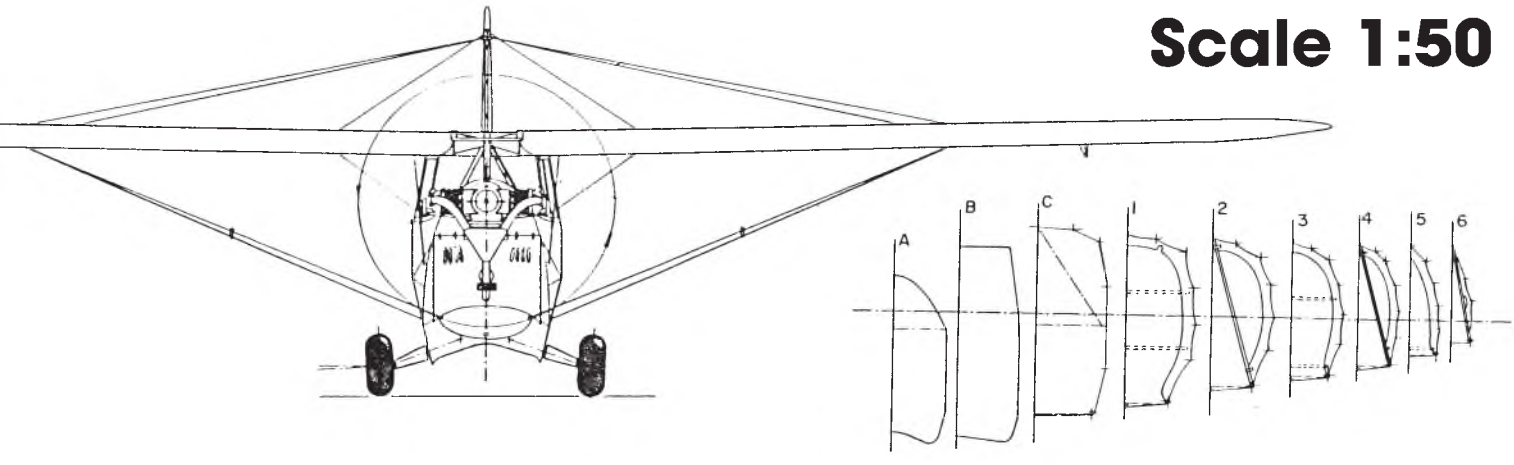
**Starboard wing from underneath showing tie-down loop and three flying wire inspection covers.**

Passing through several private ownerships after the Flying Club, including a titled owner, and visiting Brooklands racing circuit many times, Gladys made her last pre-war flight in September 1939 in the hands of Jack Willmot, an important figure in Gladys's life, for he stored and looked after her for the next 45 years!

In 1985 Gladys was acquired by Ben and Jan Cooper. She was still substantially original and in very good condition, having flown about 250 hours since manufacture. She was restored by the Coopers over the next 12 months (including a complete strip and re-covering with Ceconite) and flew again on September 30th, 1986, her first flight for 46 years.

G-ADYS's current owners are Paul and Liz Gliddon, who have maintained her in excellent flying condition and regularly make flights from a small grass farm runway on the North Yorkshire Moors. Paul graciously allowed me to photograph

**Scale 1:50**



**7: The office from the front - fuel gauge prominent.**
**8: The back of the fuel gauge and '8 Gallon' filler cap showing the wire pointer and 2-gallon markings - pit-stop needed, Paul!**
**9: Wing-tip hand-hold.**
**10: Rear fuselage hand-hold - starboard only.**
**11: Paul throttles up - note simple instrument layout.**
**12: Fuel switch on manufacturer's plate, engine temperature gauge and throttle.**
**13: Paul added the Air Speed indicator - look, it does 20mph standing still!**
**14: Plywood, chrome-moly steel and leather in abundance. You can see exactly how the control wires function. Optional brakes fitted - captain flies from left seat.**
**15: Red leather upholstery in the cabin - note map-holder and control yoke.**
**16: Original 1930s safety belt.**
**17: Main wheel and Goodyear tyre - note streamlined cantilever undercarriage leg.**
**18: Tail-skid with sprung tail-post.**













Gladys on two occasions (the latter, in June, on a filthy day in the bowels of the hangar, so apologies for the quality of some of the images!). Paul pointed out several features of the C-3 including the fuel gauge directly in front of the wind-shield - it's a piece of wire on a cork running up and down a vertical half-tube! Paul says it under-reads by two gallons so when it indicates 'empty', he knows he has an hour to find a garage with a suitable small field nearby - he reckons he would have no problems doing this in an emergency.

I asked Paul why the American-built Masters had dural ailerons as opposed to the British wood/ fabric ones - his response was *"you should feel the weight - they're like Baco-foil!"*, Paul has added an air-speed gauge with pitot tube on the parasol king-post, though he says it's not really necessary. One 1930s owner had a small weather-vane up there - he obviously had a sense of humour! I had always wondered why the C-3 had such a pot-bellied appearance up at the front. When I sat in Gladys I found out - that's where your feet are!

## *Modelling the C-3:*

From a scale modeller's point of view the C-3 is and always has been a delight type - quirky, but with all the attributes that make a fine flier. With the streamlined-sectioned rigging and exposed engine, there is plenty of opportunity for scale detail. The wing is huge and I thought the section looked just like the modellers' favourite, Clark Y - well it is! I hadn't realised it was originally a full-sized section! Generous flying surfaces and a works finish that looks just like Cub Yellow to my untrained eye all add up to a promising prototype. There is a huge range of plans and kits/ part kits out there in a welter of different scales - how about having a go at a Glamorous Gladys? You may want to find a strip with very short grass... anybody got a spare O.S. Gemini?!

# Techno Scale

Mike Evatt

Through common sense and good engineering, **Leading Edge Gliders** is 'raising the bar' on EPP scale gliders. Attention to detail separates their 'High Performance' EPP Slope Gliders from all others. Every Leading Edge High Performance EPP Slope Glider is designed to be the best in its class. You will be delighted to find that most of the hardware is pre-fabricated and ready to install.

The bottom line: With Leading Edge Gliders, you don't have to choose between scale fidelity and high performance—you can have both! Check them out at http://www.leadingedgegliders.com

Slope Soarers could also take a look at **California Sailplanes** who maintain a web presence at http://www.california-sailplanes.com Soaring a radio controlled model sailplane along the crest of a hill, riding on the wind and the rising ocean of air, has been enjoyed for many years by people of all ages in all parts of the world. California Sailplanes has evolved to the point of having the largest selection of virtually indestructible EPP foam slope sailplanes available. I was quite taken by their Lockheed F-104 Starfighter shown in the screen-shot.

**The Vintage Aviator Ltd.** at http://thevintageaviator.co.nz is a New Zealand Civil Aviation approved aircraft restoration and manufacturing company. On this website you can view details of several of their construction projects, as well as many image galleries presenting their many activities and resources. Their primary aim is to build WW1 aircraft, engines and propellers to the same exacting standards to which the originals were made over 90 years ago. It could be an excellent place to start the research for your next project.

If you are new to indoor flying then you could do worse that visit **Indoor Model Flying** at http://indoorflyingmodel.com Webmaster Tim has been involved with radio control model airplanes since 1970. Since then he has designed, built and flown many types of a radio control model aircraft. In all that time, he has not seen as rapid and dramatic a change in the sport since the recent advent of truly practical, well-flying indoor electric powered model aircraft. His website will help you make the most of these amazing models. Check out the lightweight Spoked Wheels shown in the screen-shot.

**Vulcan Hobbies** pride themselves on the knowledge and support they can provide you the customer, Being industry experts and regularly exhibiting at most of the large shows, means that they really know what they are talking about and their ability to ensure you are provided with expert back up is second to none. Not only do they have the latest models in stock at the most competitive prices, they can also supply you with the full range of accessories and tailored support so you get maximum enjoyment from your Vulcan Hobbies product. Check out this family run business at http://www.vulcanhobbies.co.uk

**Airshow RC** with a web presence at http://airshowrc.com in an on-line emporium which carries a truly amazing stock. 189 and counting is the number of scale models that you will find within from over a dozen manufacturers. Models such as the Panther F9F EDF ARF shown in the screen-shot. Step up from foam and micro jets!

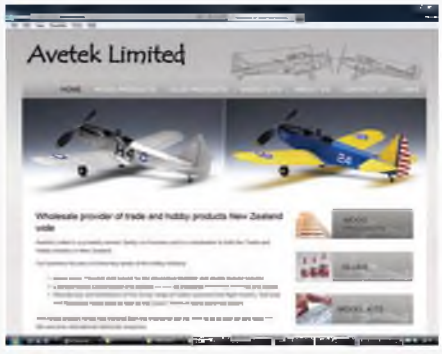
**With L E G, you don't have to choose between scale fidelity and high performance.**

**California Sailplanes' Lockheed F-104 Starfighter EPP Slope Soarer.**

**The Vintage Aviator Ltd is a NZ aircraft restoration and manufacturing company.**


**The Scale Flyers of Minnesota are dedicated to building/designing scale replicas.**


**Auckland's North Shore Model Aero Club host an impressive website.**




**The Airsail product range is now a fully laser cut product thanks to Avetek Limited.**

# taps hyperspace for more TechnoScale Topics...

Experience high performance electric jet performance with a model that is big, forgiving and fast. At speeds of over 120mph, the Panther is fast and fun with a performance envelope almost any experienced R/C pilot will enjoy.

**The Scale Flyers** of Minnesota are dedicated to building/designing scale radio controlled model aircraft replicas of historic full-sized aircraft. At their meetings, during the winter months, they share information on scale documentation, building and finishing techniques, newly available products as well as various discussions on flying skills required in scale modelling. Their club members have gained the reputation of designing/building some of the most unique Scale & Giant Scale R/C Model Aircraft in our hobby. This site at http://mnbigbirds.com captures that unique knowledge and presents it to you as a resource, reference and enjoyment.

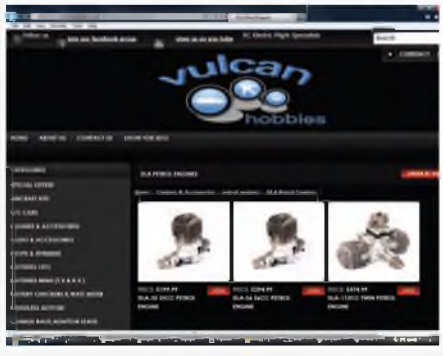
Auckland's North Shore Model Aero Club with a web presence at http://north-shore-model-aero-club.simnz.com has been in existence in various forms for nearly 50 years. This is a very impressive website with much to explore including significant scale content. Take a look at their excellent photo and video galleries and extensive archive section. The club has a steady membership of all ages and new flyers are always very welcome. They fly mostly R/C with a range of interests: sports, pattern, scale, gliders and helicopters. A typical nice summer Sunday would see about 15 - 20 fliers.

**Avetek Limited** at http://www.avetek.co.nz was formed a few years ago when Gwyn and Christina Avenell purchased a laser cutter, mainly as a hobby to assist *Airsail International Ltd* to bring their product range into the 21st century. When this part of the Airsail International Ltd was put up for sale in 2011, they saw the opportunity of continuing to manufacture and market these excellent kits. The Airsail product range has evolved from the traditional die cut style of kit to a fully laser cut product. They welcome international distributor enquiries.

One of the most impressive websites dedicated to scale helicopters has to be that of **East Coast Scale Helicopters** based in Franklin, Massachusetts at http://eastcoast-vario.com They have recently been appointed importers for the Jakadofsky range of turbines and will hold full stock of all models together with a full range of spares. One of the turbines they will hold in stock is the low cost unit made for the Starwood Lama. A large number of Starwood Lama's are being manufactured for them, so they will be selling both the turbine and the electric. They will also have a full range of super scale accessories for this model.

For those of us who fly helicopters, the advent of electronics made a big difference to the ease of flying. CSM was and still is one of the prime movers in the design and development of electronic control systems for model helicopters. All their helicopter products are distributed worldwide through **RC Models Distribution Ltd**, and should be available from your local model shop or mail order company. It is on the RC Models Distribution Ltd website at http://www.rcmodels.org/csm that the CSM story is told and their full range of products may be explored. ■


**Newcomers to indoor flying could do worse that visit indoorflyingmodel.com.**




**Vulcan Hobbies stock DLA Petrol Engines.**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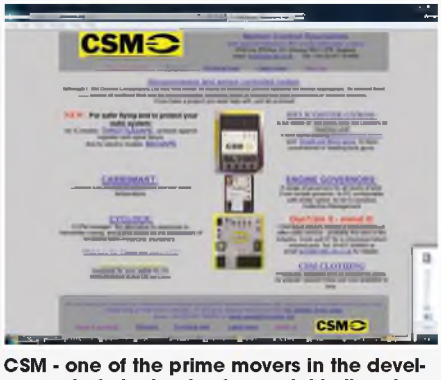
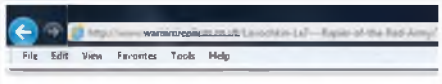



**CSM - one of the prime movers in the development of electronics for model helicopters.**




**That's all there is time for from me this month so tap that rodent and if you find something out there of interest that might be good to share, email me at:**

**mikeevatt@hotmail.com**

# BMFA FREE FLIGHT NATIONALS:

## Aeromodeller Free Flight Scale Contest

**At dusk on a lonely heath, Alex Whittaker observes the hard men of Free Flight Scale**

Almost dark, and the trim of the Tabloid was still causing Bernie Nicholls grief.

Brian Lever launching his Rapier powered Lightning.

This years's BMFA Free Flight Nats at RAF Barkston Heath, Lincolnshire suffered dreadful weather. However, a good decision was made: the *F/F Aeromodeller Scale Event* was brought forward by an hour. In truth, we were incredibly lucky to avoid the rain, and even the cruel wind relented for an hour or two. Nevertheless, the light was still very dull, with the ever present threat of precipitation, but we all felt that we had cheated the Gods of Gloom.

### Fokker E.IV

The tone of the comp was friendly, relaxed, and collegial. As is usually the case with Free Flight Scale, there was a pleasing variety of propulsion systems in evidence, from the traditional diesel sloggers, through electric urge, to the rather effervescent reaction (rocket) power. Bill Dennis showed up with an armful of models, all of which flew well, and were clearly in with a chance. However, it soon became clear that his Eindekker was the one to beat.

Besides all his other steeds, Bill also flew a very attractive Vultee Vigilant, which seemed to me to have perfect proportions for free flight scale. Besides a radial cowl, it was also a prominent size at 40" span. Certainly big enough for radio, if you wished to disgrace yourself. This high wing monoplane

Ron Smith's BE2e is 40" span.

was built to the famous Jim Bridgewood plan, apparently very popular in the 1950s. I'll take Bill's word for that, since I was at primary school at the time. Tee hee.

### Bird Dog

Another great flyer from the off was Gareth Tilston's Cessna L-19 Bird Dog, built from the venerable APS plan. This was exquisitely finished and looked spot-on in the air. Its flying characteristics matched its appearance, and Gareth got Third Place on the podium.

### Sopwith Tabloid

Bernie Nichols had rebuilt his electric powered Tabloid since last year, but he suffered irritating trimming problems all evening. However, for quite some seconds she did look very pretty flying straight and level along the line of a distant ridge. Bernie will have it all sorted out by the time you read these notes.

### Blackburn B2

Yet another first rate model was Ray Hall's Blackburn. It is a masterpiece with a truly immaculate finish and looked very convincing in the air. The chummy, side-by-side cockpit gives the Blackburn B2 a pleasantly broad-in-the beam appearance. A bit boatie in fact.

Ray had clearly done a lot of detailing all over the model, though I particularly noted the care taken around the cowl. In trade-mark fashion, his totally enclosed diesel engines are adjusted via a tube driver though a tiny hole, the better to preserve scale fidelity.

The Blackburn is PAW 1cc diesel powered and, by the way, the PAW 1cc is a sweet little gem. I hope to get more shots of this gem for you, in better light, later in the 'summer'.

### Supermarine Spiteful

In the story of the Spitfire, it is easy to overlook the chapter on the Spiteful that superceded it, but what a superbly aggressive and purposeful shape it is.

Derek Knight's version is electric and kitted out with an entire power train of his own design. Real-life distinguished Test Pilot, and sometime mandolinist, Andy Sephton was given the job of hand launching the Spiteful. Er ... OK, true, one launch was a bit dodgy, but the others were fine. By the way, Derek was still trimming his amazing new Gloster Meteor, which looked utterly spectacular. Watch this space.

### Puss Moth

Ian Lever arrived a bit tardy, with his famed Lancashire nonchalance. He came to fly his just-completed DH 80 Puss Moth - and very fine she is too. Ian had a bit of fun getting the needle valve setting right, but she RoG'd from the Barkston black stuff very well indeed. I thought she looked very realistic in the air. There was a bonus too: just before one flight, the beautifully tailored bespoke engine cowl blew off, revealing a cleverly inverted engine.

She's away! Gareth Tilston's Bird Dog from the Aeromodeller Plans Service.

Ray gets his Blackburn off with a great launch.

***"I loved it because attempting to photograph flying objects just before dark is a dodgy business"***

## BE2e

Ron Smith was campaigning his BE2e. It is powered by a Mills .75 and looked very appealing in the air. It is built to the Ken McDonough plan, and spans 40". Bill Dennis told me that Ron built this fine model in 1960. How's that for Free Flight longevity? Blimey, that must be older than John O'Donnell's bike.

## EE Lightning

Ian's elegant elder brother, the ever-genial Brian, had brought his English Electric Lightning. Brian is Chairman of the newly revitalised SAM 35. Now we have seen this Rapier powered reaction jet fly well before, and it handled the Lincolnshire gusts with aplomb and was originally designed for Jetex. Its flight trajectory on one flight was truly spectacular, describing a huge loop, which it then exited via a vertical dive, plunging in a wreath of fire and smoke into a group of innocent gongoozlers. It missed them of course, but lay fizzing and smoking in the grass like a tetchy meteorite. I noticed that, once they realised that they

**Bill Dennis launches whilst Judge Mike Smith makes a note.**

Textbook FF scale launch from Bill Dennis.

Andy Sephton and his new own designed ABC Robin.

were safe, a few of the group took up postures consistent with a compo claim. I said nothing.

## Intelligence gathering

Being a sharp-nosed news hound, I noticed ex-Bowden Winner and noted F/F scale man Terry Aydon on the fringes of the meeting. He was quietly recording models with an HD video camera and was so engrossed in his intelligence gathering mission, that he did not see me taking his picture. Hmmm. I wonder what will emerge from Geordieland next year?

## I am the Judge

F/F scale star Mike Smith was in attendance but did not fly, so his peers promptly made him Judge, while ubiquitous Brian Waterland served as Timekeeper, and the overall event was organised by FSM scale columnist Bill Dennis. Grateful thanks to them all. Also, a special thanks to Bill for some vital model and engine details, when my notebook perished in the torrential rain. It looked like soggy papier mache.

## Summary

The decision to bring forward the flying an hour earlier to 5.00pm was inspired. I loved it because attempting to shoot flying objects just before dark is a dodgy business at the best of times. Never mind dodging between Barkston monsoons! As it was, it was still very gloomy, but an hour later we would have had far worse. Bill Dennis did well to get the show on the road at all, given the dispiriting conditions. We had a great end to a foul day! ■

Ian Lever's new Puss Moth flew in a very scale-like manner.

Pushing on through the gloom, Derek Knight's electric powered Supermarine Spiteful.

**Results: 1.** Bill Dennis: Fokker E1V / ED Baby. **2.** Ray Hall: Blackburn B2 / PAW1cc. **3.** Gareth Tilston: Bird Dog / DC Dart

# PLANS and PARTS

## BE READY TO START BUILDING AS SOON AS YOU UNFOLD THE PLANS WITH THESE LASER-CUT PARTS SETS

### ELECTRIC CANBERRA B(I)8
**Plan price £29.50 Plan No.262**
**Component Pack £175.00**
From the building board of electric ducted fan scale expert Chris Golds, this 84" (2,134mm) span model is the 'Interdictor' version of the famous jet bomber. Prototype used two Hacker B50-16L motors and two ten-cell 3300 NiMH power packs. Four sheet plan shows retracts and flaps. Plans are supplied complete with step-by-step written construction sequence.

### PIPER SUPER CUB
**Plan price £16.50 Plan No.146**
**Component Pack £95.00**
**G/F Cowl price £17.50**
A great first-time scale model for novices and sport fliers who want real scale accuracy. 79 ins span 1:5.33 scale model suits a range of engines .40-.60. Two sheet plan. Glass fibre cowl available.

### CORBEN SUPER ACE
**PLAN PRICE £19.50 PLAN NO.275**
**COMPONENT PACK £65.00**
A 50" (1270mm) wing span sport-scale model of the delightful American homebuilt aircraft, this design is an excellent introduction to the world of radio control scale modelling, featuring simple airframe structure that will result in a scale replica ideally suited to regular club-field flying on a regular week-upon-week basis. 1/6th scale replica suits .26-.30 four stroke engines, or .20-.25 cu.in. two strokes. Four function radio systems required.

### HEINKEL HE 51
**PLAN PRICE £17.50 PLAN NO.80**
**COMPONENT PACK £125.00**
A 68" (1727mm) wingspan 1:6.4 scale model of the pre-WW2 German biplane fighter for 4-function radio control and .70-.90 cu.in. four-stroke motors. Can be built without recourse to glass fibre mouldings for items like engine cowl and wheel spats.
Two sheet plan.

### RUMPLER C.IV TAUBE
**PLAN PRICE: £19.50**
**PLAN NO. 269**
**COMPONENT PACK: £110.00**
A 1/7th scale 80" (2032mm) wing span sport-scale model of the early German WW1 aircraft designed for .60 cu.in. size four stroke engines and four function radio control operating rudder, elevators, ailerons and throttle.

### De HAVILLAND DH 82a TIGER MOTH
**PLAN PRICE £26.50 PLAN NO.051.**
**COMPONENT PACK £115.00**
An 80 inch (2032mm.) wingspan, 1:4.33 scale model for 1.20 cu.in. motors and four function radio control systems. No moulded cowl required - all wood construction. Three sheet plan.

### FE8
**PLAN PRICE £19.50**
**PLAN NO.267**
**COMPONENT PACK £88.00**
Accurate 1/5th scale 75.6" (1920mm) wing span replica of the British early WW1 pusher fighter. Requires .78-.91 four stroke engines and four function radio control system. Excellent for electric conversion.

### FELIXSTOWE F2A
**PLAN PRICE £19.50 PLAN NO.276**
**COMPONENT PACK £110.00**
An amazing 1/6th scale fully flyable replica of the British WW1 maritime patrol flying boat. Model spans 100.5" (2553mm) and suits two .25-.30 cu.in. two stroke engines. Can be flown from water, or from land using a take-off dolly to safely landing on its hull. Prototype model won "Best of Show" at the prestigious Toledo R/C Expo in USA. All the detail is there on the plans for an impressive model.

## FOKKER D.VII

**1/4 PLAN NO.241, 1/5 PLAN NO.242**
**PLAN PRICE (EITHER SCALE) £26.50**
**COMPONENT PACK 1/4 £125.00**
**COMPONENT PACK 1/5 £120.00**

1/4 scale spans 82.5" (2095mm) for 30cc (1.8 cu.in.) two stroke engines. 1/5th scale spans 65.7/8" (1673mm) and suits 15.cc (.90 cu.in.) four stroke engines. BE SURE TO QUOTE SCALE REQUIRED WHEN ORDERING!

## HAWKER FURY

**PLAN PRICE £17.50 PLAN NO.091**
**COMPONENT PACK £125.00**

A 1/6th scale replica of the RAF's most elegant 1930's biplane fighter 60" (1524mm) wing span model requires four function R/C gear and .60 cu.in. motor.

## D.H. 103 HORNET

**PLAN PRICE £22.50 PLAN NO.052**
**COMPONENT PACK £130.00**

80" wingspan sport-scale replica of the hottest production piston engined fighter ever. Suits engines .40-.53. Original retracting undercarriage unit included with the plans.

## BOEING PT-13 STEARMAN

**PLAN PRICE £19.50 PLAN NO.243**
**COMPONENT PACK £99.50**

A 58" (1473mm) wingspan replica of the famous bi-plane radical engined trainer aircraft of the WW2 era. Designed for 700 size electric motors, but with option of i.c.engine power using a .52-.60 four stroke engine, with modifications shown on a separate plan sheet. (Ready-cut wing ribs and fuselage formers available - see below) Three sheet plan.

## TIPSY JUNIOR

**PLAN PRICE £19.50 PLAN NO.286**
**COMPONENT PACK £95.00**

A 1:3.44 scale, 79" (2006mm) wingspan replica of the late 1940s Belgian light aircraft, designed to suit .90-1.20 cu.in engines. Designed by Philip S.Kent, the model features all built-up balsa/ply construction throughout and makes an excellent entry into R/C scale modelling. Rudder, elevator, aileron and throttle controls.

## AVRO AVIAN MONOPLANE

**PLAN PRICE £19.50 PLAN NO.278**
**COMPONENT PACK £110.00**

Designed by respected R/C scale expert Philip S.Kent, this quarter scale replica of the radial engined version of the 1930s air racer spans 96" (2438mm) is an ideal/introduction to the world of large scale. The model suits 1.50 cu. in. size four stroke engines and requires four function radio control operating the basic control functions of rudder, elevator, ailerons and throttle. Conventional wood airframe structure throughout.

## SOPWITH CAMEL

**PLAN PRICE £14.50 PLAN NO.188**
**COMPONENT PACK £79.50**

1/6th scale replica of the famous RFC WW1 fighter biplane, for .24-40 size motors and four function R/C. 56"(1422mm) wing span.

## SOPWITH PUP

**PLAN PRICE £16.50 G/F COWL PRICE £17.50**
**PLAN NO.177 COMPONENT PACK £135.00**

Superb, true-to-scale 1/5th scale replica, features accurate outlines and rib-for-rib reproduction of the full size wing structure.63 ins. (1600mm) span model is of manageable size for transport and offers realistic flight performance.For.60size motors and 4 function radio. Glass fibre engine cowl available.

## BUCKER BU180 STUDENT

**PLAN PRICE £26.50 PLAN NO.015**
**COMPONENT PACK £120.00**

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050/12

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# FIAT CR.42

**The world's last fighter biplane to enter service is a highly elegant machine that offers Warbirders a refreshing change from the mainstream**

# 2 'FALCO'

Quite naturally, fighter aircraft are the 'meat & potatoes' of the ever growing Warbird scale modelling scene. If it's a fighter, then a large part of the appeal is in elegance and sleekness of shape - AND, yes, aerobatic performance. If you are looking for a highly attractive WW2 era warbird to model and one that's severely overlooked, then dig no further folks, IT'S HERE!

The Fiat CR.42 'Falco' was the very last fighter biplane designed, that went into series production and front line combat service and it is interesting to note that its design and initial development stages actually post dated such contemporaries as the Supermarine Spitfire, Hawker Hurricane and Messerschmitt Bf 109. It also post-dated what one might, perhaps, consider its more obvious contemporary, the Gloster Gladiator, which was the last of the RAF's biplane fighters.

The CR.42 was a evolutionary design based on the earlier Fiat CR.32 (See FSM July 2008). That, in turn, derived from the Fiat CR.30 series created in 1932. As with Germany's Luftwaffe, Italy's Regia Aeronautica used the Spanish Civil war during the years 1936-1938 to test and prove their combat aircraft in a direct combat situation. Italy employed the CR.32 during this conflict with great success, which led to Fiat proposing a more advanced fighter based around the supercharged Fiat A.74R1C.38 air-cooled radial engine in lieu of the in-line engine used for the earlier aircraft of the Fiat line, to produce a robust, clean, sesquiplane design.

The result was a modern, aerodynamically clean (for a biplane type) design based around a strong steel and alloy frame. It incorporated a low-drag NACA cowling housing the radial engine, with fairings for the fixed main undercarriage and proved exceptionally manoeuvrable thanks to its very low wing loading, although at the expense of armour protection for the 'vitals' and radio equipment.

Thus, the CR.42 could deliver a top speed of 438 km/h (272 mph) at 5,300 m (17,400 ft) and 342 km/h (213 mph) at ground level. Climb rate was 1 minute and 25 seconds to 1,000 m (3,280 ft) and of 7 minutes and 20 seconds to 6,000 m (19,700 ft.

Although the age of the biplane was coming to an end, a number of other air forces expressed interest in the new fighter, and a number of early CR.42s were delivered to foreign customers, including Belgium, Hungary, iraq and even (later) the German Luftwaffe. Of these foreign operators, by far the most successful in combat was the air force of Hungary which operated the type alongside German forces on the European Eastern Front against USSR.

Soon after its combat introduction, Fiat developed a number of variants. The CR.42bis and CR.42ter had increased firepower, the CR.42N was a night fighter, the CR.42AS was optimised for ground attack, and the CR.42B Biposto was a two-seat trainer.(

The CR.42DB was an attempt to improve the type's performance by installing a Daimler-Benz DB 601 1,010 hp in-line V12 engine.

C.R.42 FALCO., 412 SQUADRIGLIA C.T., GURA, ERITREA AND ADDIS ABABA, ABYSSINIA, 1940-41

C.R.42 FALCO., 162 SQUADRIGLIA C.T., 161 GRUPPO C.T., AEGEAN ISLES, 1940

C.R.42 FALCO., 97 SQUADRIGLIA C.T., 9 GRUPPO C.T., 4 STORMO C.T., BENINA, LIBYA 1940

C.R.42 FALCO, 383 SQUADRIGLIA ASSALTO, ZARA, YUGOSLAVIA, 1942

C.R.42 FALCO., 1/4 FIGHTER SQUADRON, HUNGARIAN AIR FORCE

J II, FLOTTILJ E.9, 3RD DIVISION, SAVE, GOTEBORG ROYAL SWEDISH AIR FORCE

## First combats

The Fiat CR.42 entered service in May 1939, and by the time Italy entered World War II on 10 June 1940, about 300 aircraft had been delivered. The type continued in service with the Regia Aeronautica until the Italian armistice with the Allies on 8 September 1943. During that time, CR.42s fought against the British Gloster Gladiator over Malta and North Africa, and later against the British Hawker Hurricane, sometimes with unexpected success, largely thanks to its impressive manoeuvrability. When production was stopped in 1942, a total of 1,784 CR.42s had been built of which only around 60 of the aircraft were in flying condition.

Initial combat deployment commenced during the Battle of France during June 1940, when Italian forces invaded the French southern coastal areas. Over Malta, the CR.42 encountered Hurricanes for the first time on 3 July 1940.

## Battle of Britain

For political reasons, in September Benito Mussolini sent a contingent of Regia Aeronautic fighters and Bombers to collaborate with German Luftwaffe formations for the assault on the British Isles. Based in Belgium during November 1940, CR.42s of the Regia Aeronautic launched two raids against Great Britain in company with the German Luftwaffe aircraft that had difficulty flying in formation with the slower biplanes. Even though slower, with an open cockpit, no radio, and armed with only two machine guns, the CR 42s were able to survive the attentions of the RAF fighters, being able to easily out-turn the Hurricanes and the Spitfires and proved difficult to hit and so, against British

This large formation of standatd FIAT CR.42 fighters is mad up of aircraft of the 9th GRUPPO, 4th STORMO. Note the 'Prancing Horse fuselage motif on the rear fuselage, ahead of the tailplane.

monoplane fighters, the CR.42s were not always outclassed.

Even so, the northern European winter was really no place for an open cockpit, lightly armed biplane in a combat situation dominated by higher performance monoplane fighters. In any case, the depletion of combat strength in other 'spheres of influence' for Italy dictated that, during the winter of 1940-41, aircraft of the Regia Aeronatica, including the CR.42s were transferred back to Italy and the Mediterranean theatre.

## Middle East and North Africa

The Fiat CR42 played a significant role during the British campaigns to dislodge Italian control of territories held, pre-WW2, in Ethiopia, Eritrea, and Somaliland - territories that the Italians termed Africa Orientale Italiana (A.O.I). Here the nimble Italian biplane had more success. During that short campaign, from mid-1940 until the autumn of 1941, Fiat fighters destroyed a large number of Royal Air Force and South African Air Force aircraft, including successes against Hawker Hurricanes. Most of the encounters were however with British bombers and reconnaissance aircraft, mostly obsolescent Vickers Wellesleys.

During the 1940-42 to-and-fro, advance-and-retreat phases of the war along the North African coastline, the CR.42 was initially pitted against the contemporary Gloster Gladiator and Hawker Hart of the South African Air Force. Here, air combats highlighted the advantages of the Gladiator over the CR.42; especially in radio equipment that enabled the British fighters to co-ordinate tactics during attacks, using the Gladiator's superior low altitude performance, with markedly superior horizontal manoeuvrability.

## Foreign operators

The CR.42's first foreign purchaser was the Royal Hungarian Air Force (MKHL), which placed orders for 52 aircraft in mid-1938, accepting the outdated nature of the type


C.R.42 FALCO, 95 SQUADRIGLIA CACCIA TERRESTRE, 18 GRUPPO C.T., 56 STORMO C.T., CORPO AEREO ITALIANO, MALDEGEN, BELGUIM, 1940. ALSO DESIGNATED 18/JG56.


**A tightly formated pair of 162 Squadriglia CR 42s over the Aergean sea during 1940, display the clean lines of the type which was almost entirely devoid of bracing wires that are generally a feature of biplanes. That alone, has its own attraction for modellers!**

as an expediency to achieve the rapid re-equipment of their fighter formations and the Italian government released delivery positions destined for the Regia Aeronautica in order to expedite the re-equipment of Hungarian units.

When Hungary declared war on the Soviet Union on 27 June 1941, in concert with the German forces of Operation Barbarossa, their CR.42s were soon in successful action against Polikarpov I-15s and I-16s and continued in combat until 1944.

During 1939, similar considerations of expediency led to the acquisition of 40 CR.42s for Belgium's Aéronautique Militaire, the first arriving in March 1940, but not all had arrived before the German attack on May 10th. The Belgian CR.42s fought from the first day of the invasion, but the entire contingent of Fiats was soon overwhelmed by the attentions of Messerschmitt Bf 109s and by bombing attacks on airfields.

In an emergency measure prompted by the outbreak of war, the Swedish Air Force purchased various types of Italian combat aircraft during 1939-41 including CR.42s. Some of these, operated in the northern territories of the country, were equipped with ski undercarriage.

During their service in Swedish Air Force, the CR.42 suffered many accidents, sometimes because of the poor quality of materials used by the Fiat factory. Swedish pilots appreciated the CR.42s close-in dogfighting abilities, but they complained about low speed, insufficient armament and the open cockpits that were unsuited for the severe climate of Scandinavia.


**A large assembly of CR 42 Falcos of the 'Corpo Aero Italiana', the force sent to participate in the air assault on the British Isles, seen here in transit at Franfurt, Germany during October 1940, en route to based in Belgium.**

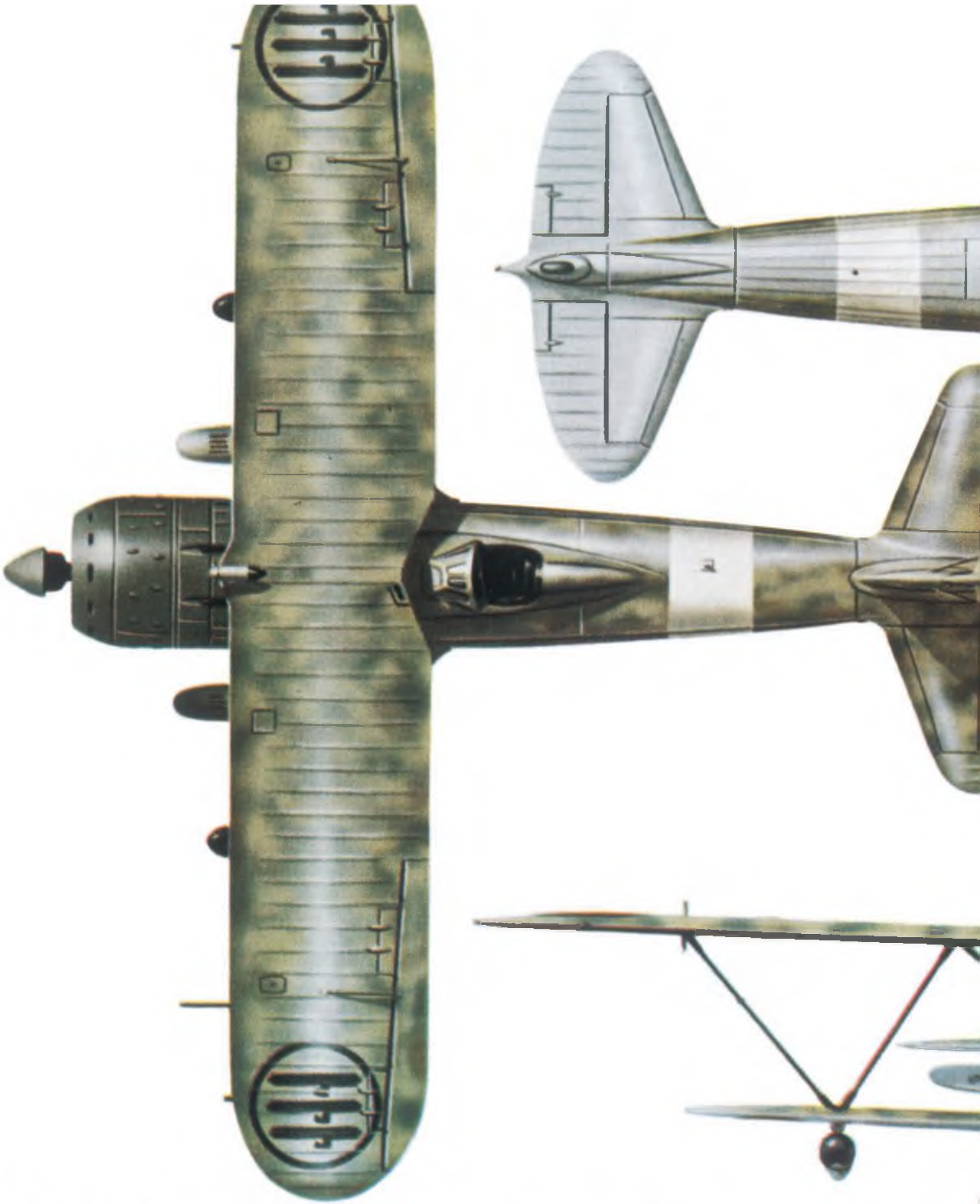
## Even with the Luftwaffe

After the Italian armistice in 1943, when Italy became a 'Co-Belligerent' on the Allied side, the Luftwaffe took over the majority of Regia Aeronautica aircraft, among them a number of CR.42s. The Germans also took control of Italy's northern aircraft industry, from which were ordered 200 CR.42LW (LW=Luftwaffe) from Fiat for use in night harassment and anti-partisan roles. ■

**A barren scene from the North African theatre of combat operations. Note the hole in the fuselage fabric at the rear, purhaps a squadron insignia removed by a trophy hunter - an indication that this may be an aircraft abondoned during one of the to-and-fro retreats that characteriesed the North African campaign.**

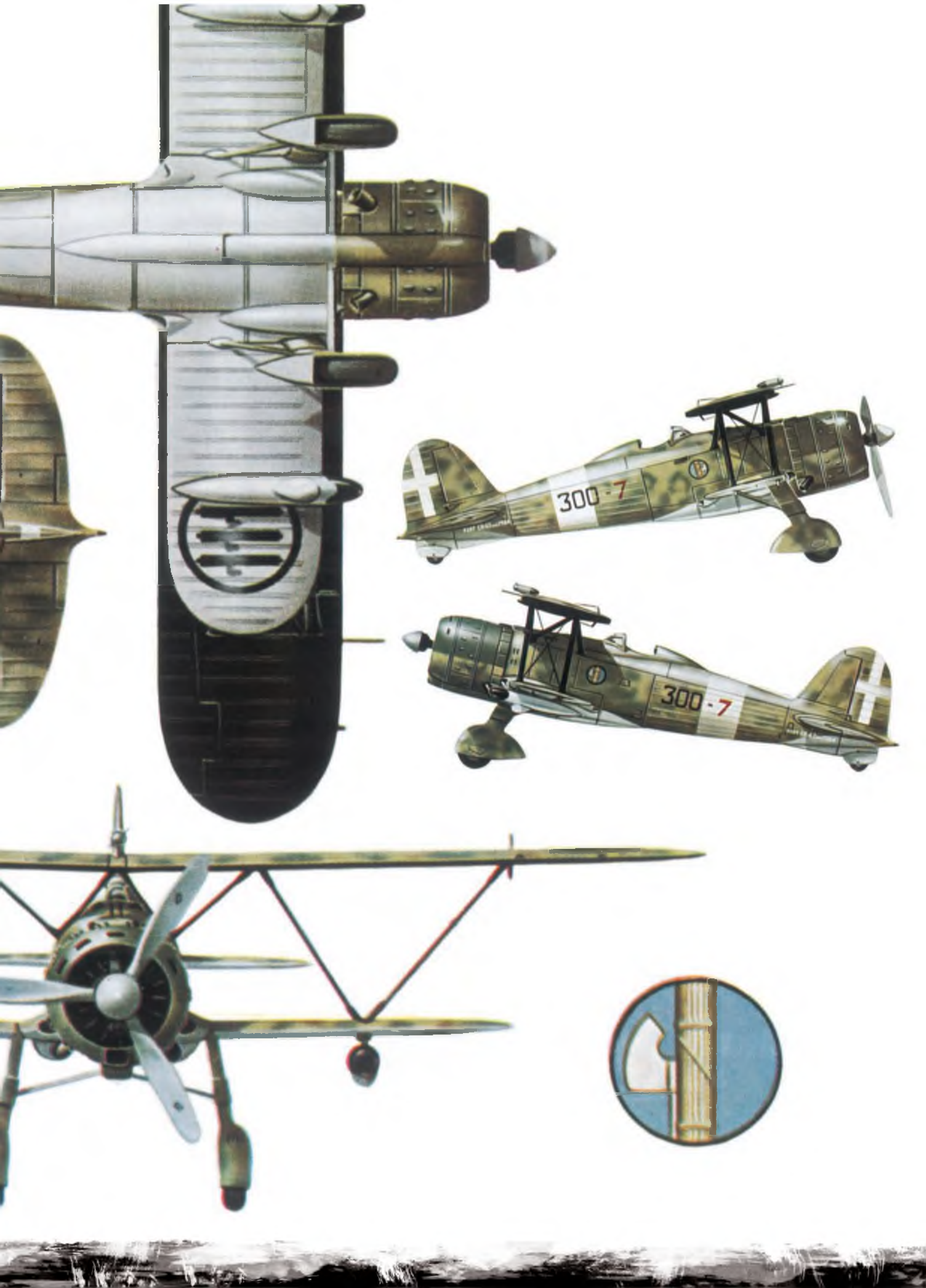
**This CR 42 is one supplied to the Hungarian Air Force and used in actions against the forces of USSR alongside German units involved in Operation Barbarossa, the German push into eastern Europe from summer 1941.**

**One of the CR 42s suppied to Sweden, where the type was given the Swedish designnation J.11. This aircraft was operated by the F9 Wing of the Swedish 1st Air Division.**



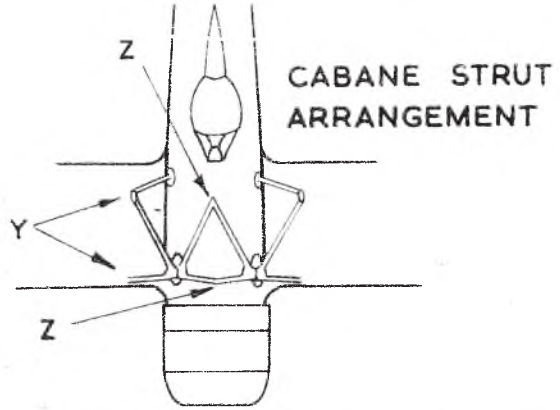
# FIAT C.R.42 C.N. FALCO

SERIAL MM 7584, OF THE 300A SQUADRIGLIA

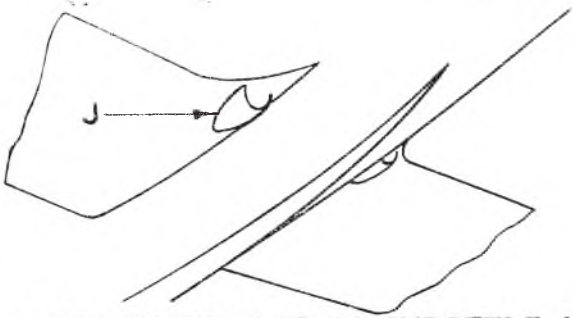

300-7
300-7

# FIAT CR 42 'Falco'

Scale 1:40

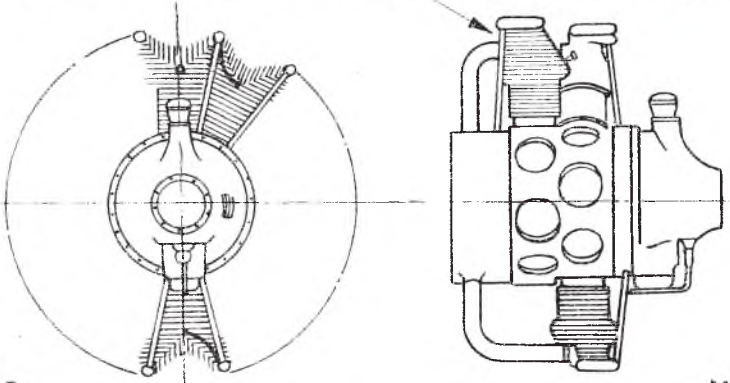



CABANE STRUT ARRANGEMENT

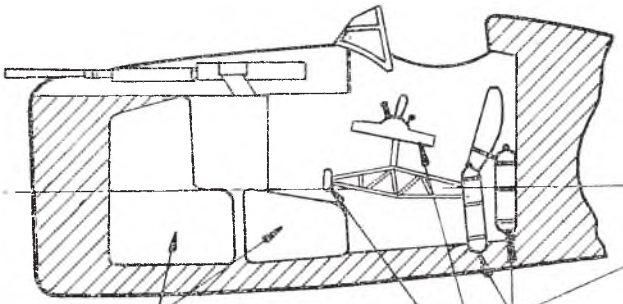


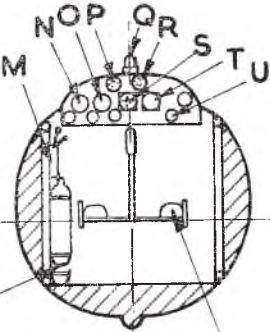

K. RUDDER PEDALS. L. OXYGEN BOTTLES. M. THROTTLE AND MIXTURE
N. MAGNETO SWITCH. O. REV. COUNTER.
P. AIR SPEED. Q COMPASS. R. RATE OF CLIMB.
S. TURN AND BANK. T. ALTIMETER. U. CLOCK.

PUSHRODS AT REAR OF BACK ROW CYLINDERS

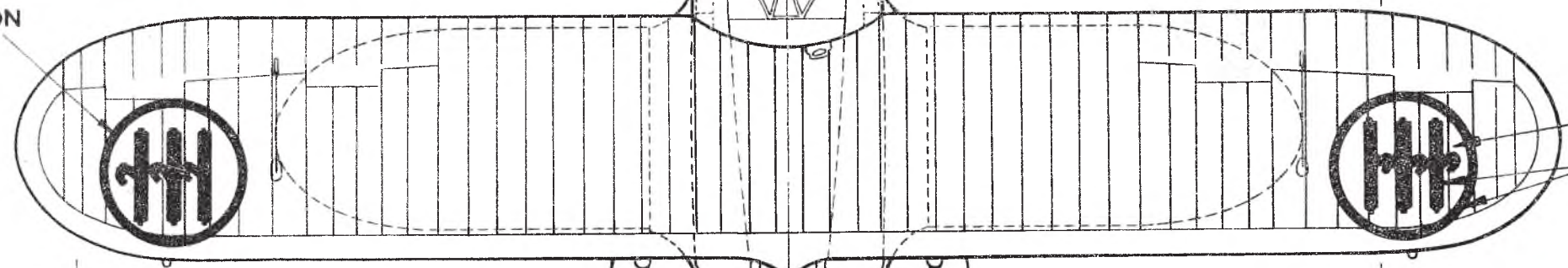


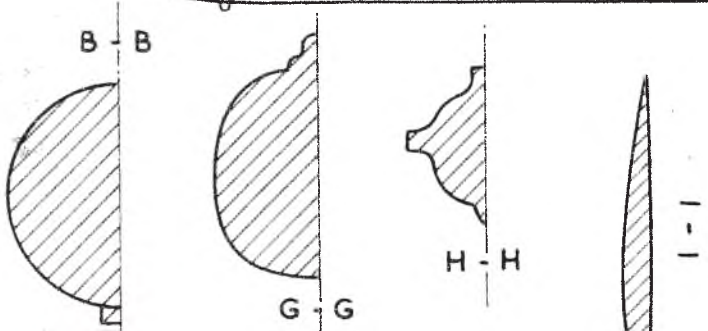
ENGINE DETAIL

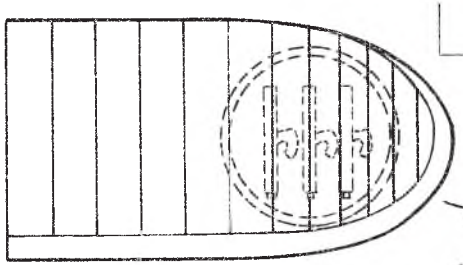


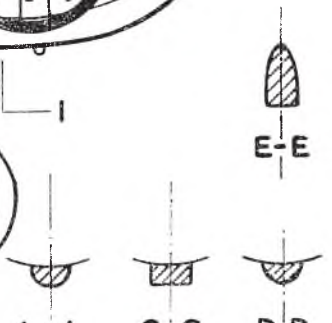

COLOURS REVERSED ON N.F. VERSION



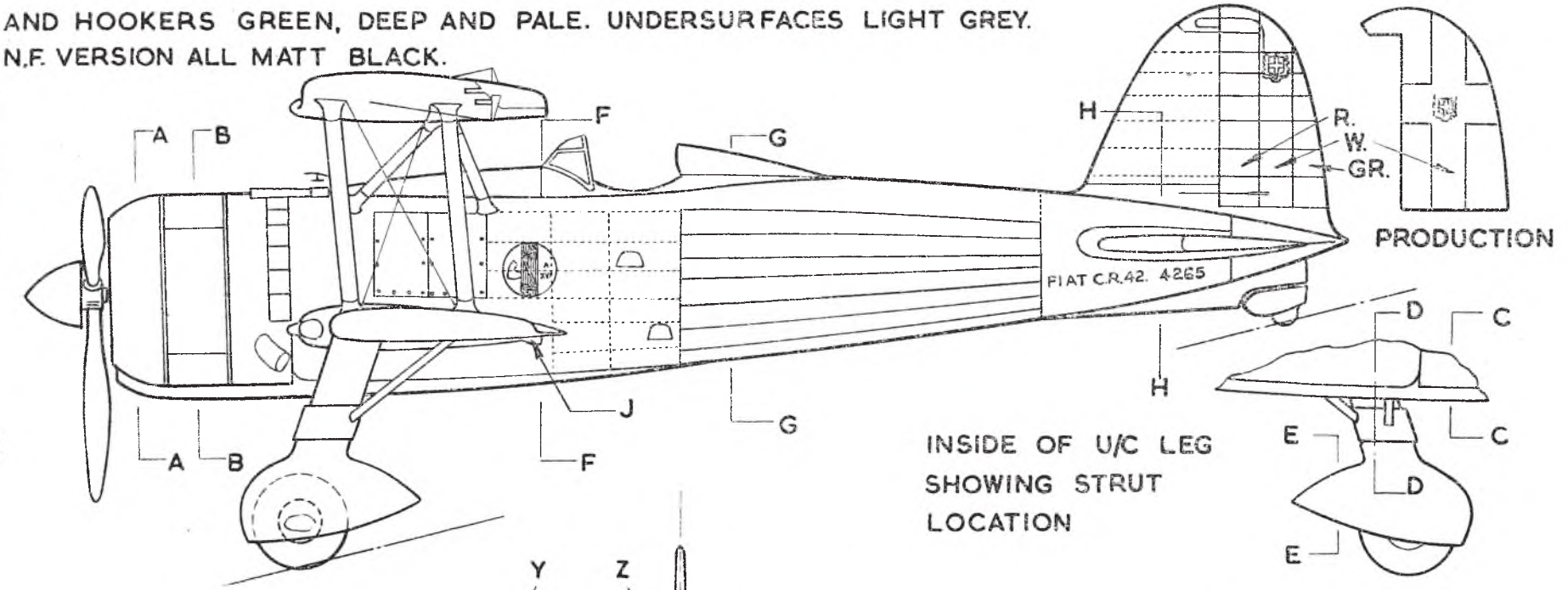
RIB SPACING



COLOURING PROTOTYPE ALL SILVER ILLUSTRATED
PRODUCTION MACHINES CAMOUFLAGED IN BURNT AND RAW SIENNA, AND HOOKERS GREEN, DEEP AND PALE. UNDERSURFACES LIGHT GREY.
N.F. VERSION ALL MATT BLACK.

CAMOUFLAGE PATTERN

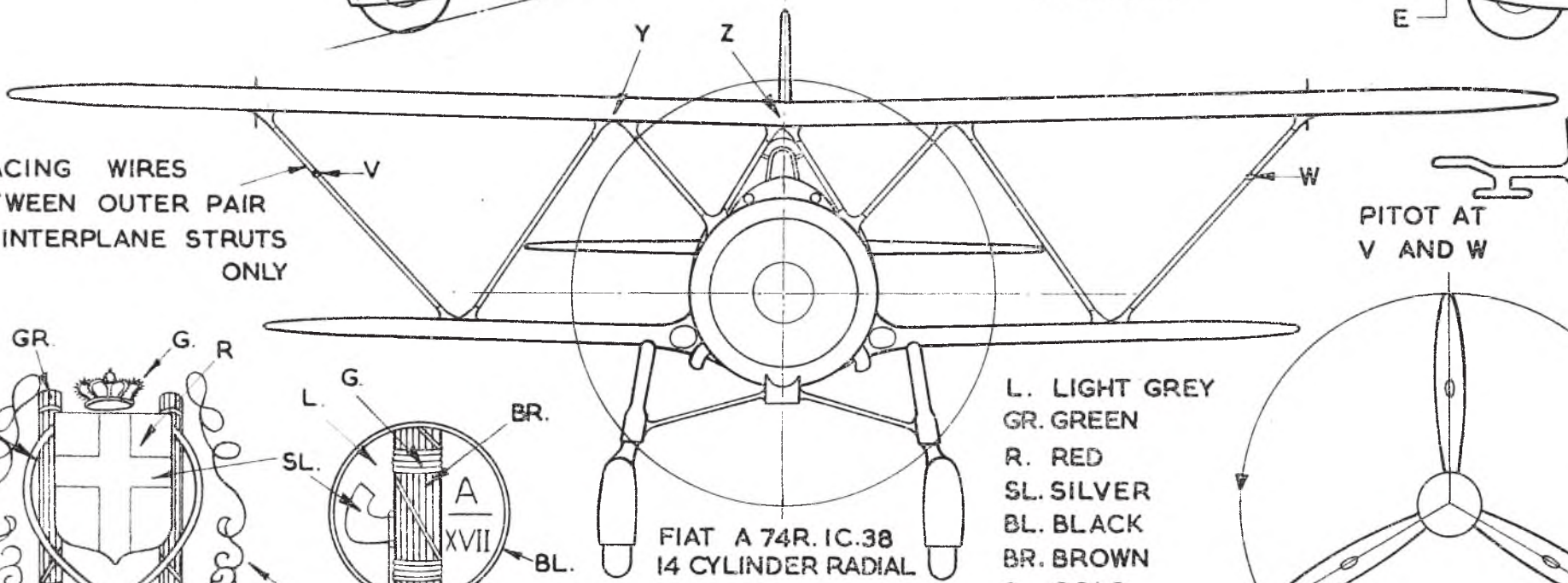
VENTURI AT X




PRODUCTION




INSIDE OF U/C LEG SHOWING STRUT LOCATION

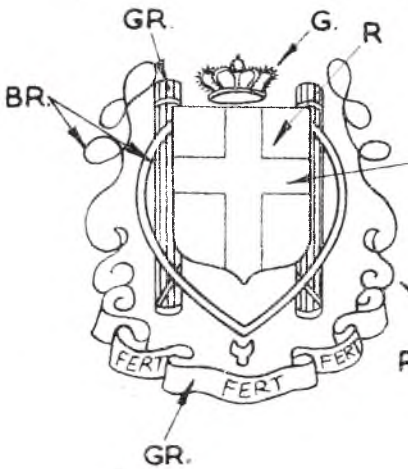



BRACING WIRES BETWEEN OUTER PAIR OF INTERPLANE STRUTS ONLY

FIAT A 74R. I.C.38
14 CYLINDER RADIAL



PITOT AT V AND W







RUDDER AND FUSELAGE BADGES

L. LIGHT GREY
GR. GREEN
R. RED
SL. SILVER
BL. BLACK
BR. BROWN
G. GOLD
W. WHITE

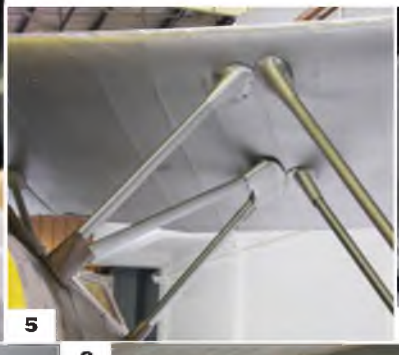
## ZOOM IN ON THE DETAIL

DOCUMENTATION CLOSE-UP

# FIAT CR.42 'FALCO'

**A close-up study of the example on view any day of the week at the Royal Air Force Museum, Hendon.**

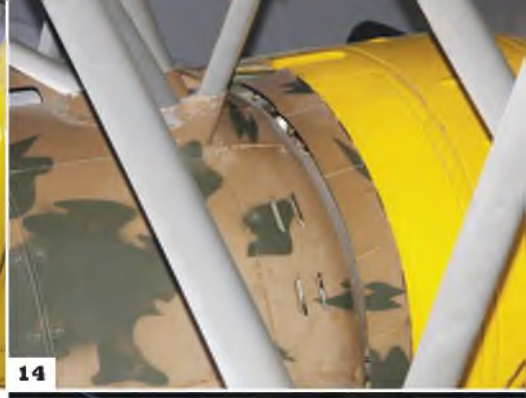
1: Centre section struts are fully streamlined and substantial.
2: Close-up of the centre section struts upper anchor-point showing the cuff fairings.
3: Lower centre section strut anchor-point.
4: Wing strut lower anchor point and cockpit windscreen.
5 & 6: Two views of the fully faired interplane struts.
7 & 8: Two views of the cockpit and windshield.



9: Detail of the wing underside showing the aileron hinge line.
10: Rear fuselage detail, showing the fully faired tailwheel.
11: Fuselage rear section. Fin & rudder unit has a graceful outline.


12

13



14

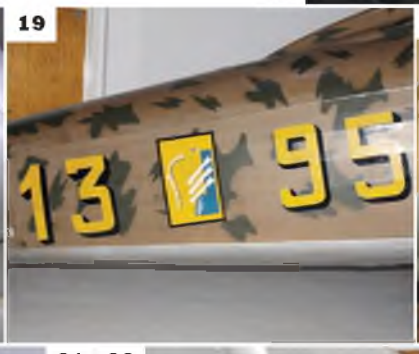
15

12 & 13: Two views of the engine cowl, showing panel lines and propeller spinner.
14: Rear view of the cowl, showing vent gills.
15 & 16: Close-up of the under-cowl air intake.
17: Spreader bars linking the main undercarriage legs.
18: Close-up of exhaust pipe, lower rear engine cowl.
19: Fuselage centre section, behint the cockpit.
20: Air-exit duct at wing root trailing edge .
21 & 22: Two views showing the wing strut geometry.
24: Detail of the outer wing strut lower anchor points. Note the substantial cuff fairings.

16

17

18




19

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21 22

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24; Upper wing strut anchor point.
25: Detail of the underside aileron control horn.
26 & 27: Lower wing strut anchor point cuffs.
28: Faired and spatted main undercarriage legs.
29: Air intake duct at the front lower wing root.
30: Main undercarriage rear bracing struts.


29


30

31 & 32: Rear views of the main undercarraige, showing oleo cuff.

33: Head-on view of a complete main undercarriage leg sjowing how tightly it is faired.

34: Detail of the fuselage underside showing the long air duct that ruds fron the engin cowl underside to the win trail-ing edge.

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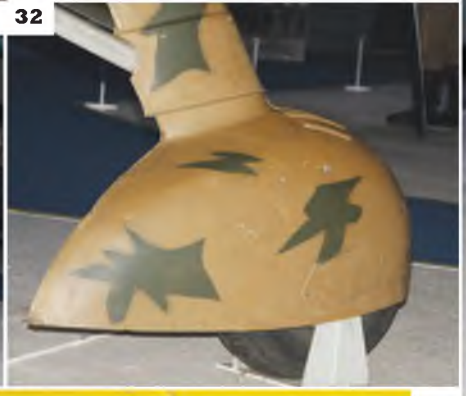
35: Close-up of the main undercarriage oleo cuff.


33


31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34


35

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A SCALE CHALLENGE BY GARY SUNDERLAND

# THE BOXKITE PROJECT

PART 4: SUCCESS AND FAILURE: GARY SUNDERLAND COMPLETES THE SAGA OF HIS DAWN-OF-AVIATION AEROPLANE STUDY THAT LED TO THE SUCCESSFUL COMPLETION AND FLYING OF HIS BRISTOL BOXKITE MODEL

"SWITCHES ON AND CONTACT". LT 'DICKY' WILLIAMS SHOWS THE CORRECT METHOD FOR STARTING A GROME PUSHER, HOLDING THE TAIL BOOM WITH THE LEFT HAND, WHILE PULLING THE PROPELLER WITH THE RIGHT.

After the photographic session, the model went back to the workshop to be put into flying trim. A check on the balance point showed that the model C of G (fore/aft balance point) was at about 50% wing chord, which indicated that the model weight distribution was much the same as the full size Boxkites.

From experience with my earlier model Voisin, I knew that this way too far aft for a flying model and set about adding weight to the nose. The first step was to make a new foreplane elevator. The original was already a fairly substantial structure of hardwood dowel, but the replacement had a 1/4" diameter steel spar and all the balsa ribs replaced with plywood. This was an improvement, but a check with some lumps of lead added showed that a lot of weight forward was still required to balance the model at about 30% chord, which I considered essential to obtain a reasonably flyable model.

In the meantime, a trial engine run demonstrated all sorts of problems with the inverted engine installation. This certainly kept the engine out of sight for scale appearance, but the difficulties of access for normal adjustments were considerable, added to which, this particular O.S.91S objected to being started and run inverted. (My other one has exhibited no such behaviour, which I put down to being normally stored upright. It is only inverted for starting. The Boxkite is kept on its wheels all the time, so any junk inside the engine will gravitate to the cylinder head.

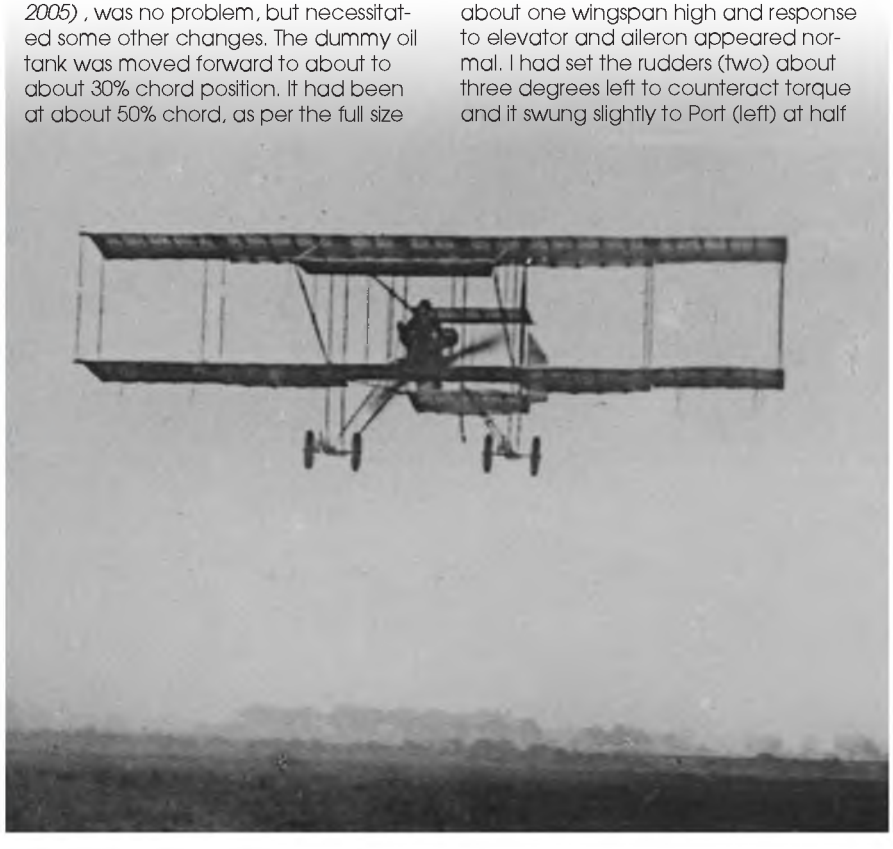
Mounting the engine upright, as it had been in my FE8 pusher *(see FSM March 2005)* , was no problem, but necessitated some other changes. The dummy oil tank was moved forward to about to about 30% chord position. It had been at about 50% chord, as per the full size Boxkites. The soldered tin tank was a fair weight and it is always a good idea to locate the fuel near the balance point on any aeroplane, full size or model, so that there are no trim changes as fuel is consumed.

With the battery mounted under the seat and my heavy 'Action Man' plastic pilot on top, we were nearly there. Four lengths of 6mm square-section steel were bolted inside the forward booms. These were painted brown and are hardly noticeable considering its size and all that wing area.

Down at the local flying field one early morning saw some engine runs and range checks with the radio. These are always a problem with wire-braced biplanes and with 'pushers' in particular, as these have wire braced tailboom structures.

The solution to this problem had already been developed for the FE8, where the receiver had to be located at one side of the lower centre section, providing a maximum length of aerial trailing under the tailboom. For the model Boxkite, the receiver and aerial were located the same way, with plastic ties used to suspend the aerial clear of the lower starboard tailboom. Ground tests showed the transmissions were at least as good as for the old FE8, the only 'glitches' were close to the model from the Port side, with the maximum amount of wire bracing between the transmitter and the aerial.

We were now ready for a trial 'hop', as is traditional for ancient aeroplanes. With full power, the Boxkite was airborne after a short run and power was reduced to half throttle. The model flew straight at about one wingspan high and response to elevator and aileron appeared normal. I had set the rudders (two) about three degrees left to counteract torque and it swung slightly to Port (left) at half



**The pioneer aeroplanes were not exactly 'skyhogs'. Low altitude was the usual flying environment, as with this Bristol Boxkite caught on camera.**

READY FOR THE FIRST FLIGHT AT BACCHUS MARSH CLUB FIELD. THE ENGINE IS NOW UPRIGHT AND THE FUEL TANK FORWARD. NOTE THE RECEIVER AERIAL AT LOWER LEFT, TRAILING BELOW THE TAILBOOM AND SUSPENDED FROM PLASTIC TIES.

power, which was easily corrected. Full power should be about right.

The trial was carried out with the foreplane elevator set at minus three degrees incidence, with the wings, tailplanes and rear elevator set a zero. my reasoning being that, in a normal climb, the wing angle-of-attack would be about three degrees and the foreplane would be at zero and not produce any destabilising forces.

With the end of the runway coming up, power was reduced further and the model settled lightly on the wheels. As it ran onto the grass, I cut the throttle completely and pulled full elevator as usual. I was then astounded to see the model take to the air again, with no engine or airspeed, and climb a foot or so before I could push the nose down for a bumpy landing in the grass and nosing onto the forward skids, tail in the air.

After a quick check, all seemed to be well and I resolved not to pull full up elevator in future.

Now for the first flight. The taxi out and the initial take-off run were normal, but, just as I began to ease the stick back, the whole undercarriage collapsed and bits of wood sprayed in all directions, mainly from my favourite Bolly wood pusher prop. Clearly, the 'quick check' had not been thorough enough!

I had always been sceptical of the 'all wood' original undercarriage. My usual practice is to build these from piano wire with wood fairings, which did not lend itself to the Boxkite geometry. As a compromise, the replacement gear was fabricated from carbon tube compression legs and brass tube for bracing and tension members.

So, with an old 'home-made' pusher prop installed, we were back at the field one early morning on March 13th 2012. Once again, Kevin was the only witness to proceedings, and his time, everything went to plan. The Boxkite climbed out majestically to about 100 feet, like a sailing ship under full canvas. I kept it in close to the strip, watching for 'glitches'. But all was smooth.

Three right-hand turns were executed without effort and there seemed to be little or no aileron drag, or need for any rudder input. Some slight up elevator produced a gentle climbing turn, while forward elevator made for a gentle descent. There was a very small amount of differential built into the aileron drive, which may account for


ABOVE: Author Gary Sunderland had previous experience of the twin-boom pusher-engine layout in his Royal Aircraft Factory FE8 which was featured in FSM March 2005 issue. There were useful lessons to fall back on when developing his Bristol Boxkite. INSET: The pusher layout with more rearward positioned engine is a challenge in achieving correct fore-aft balance. This view of Gary's FE8 shows the forward fuselage pod platform, positioned as a radio installation tray, well forward.

some of the response, but the aileron control was surprisingly good (much better than my big Albatros C.III two seater!).

Straight flight was also good and virtually 'hands-off'. However, the air was very still and I would expect the Boxkite to be a handful in turbulent air.

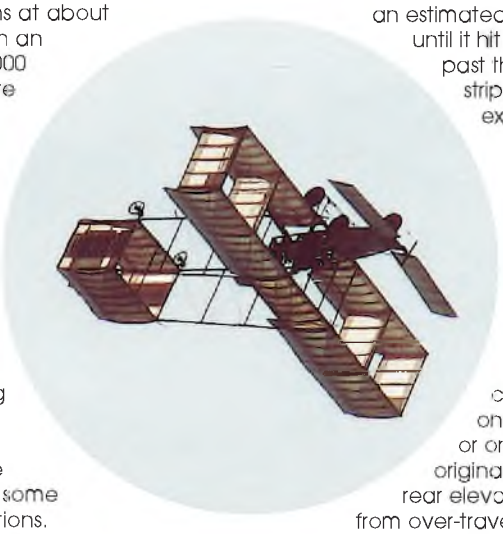
As expected, turns to the left, against propeller torque, were more difficult. More control was needed to roll to the left and left rudder was required to be held on to maintain the turn. At the same time, the aileron had to be eased off; otherwise the angle of bank would increase too much. After a couple of left turns, the third complete turn was quite steady and respectable.

The descent was carried out at half throttle, decreasing to quarter on finals. This was maintained until the model was next to me. With engine idle selected, it touched down as light as a feather.

Kevin remarked that the model flew realistically and the engine noise sounded right. The engine runs at about 6,000 rpm static, with an open exhaust, or 3,000 explosions per minute so he was exactly correct! (Four-stroke engines fire on very second revolution).

After a few minor adjustments to the engine idle, a light westerly breeze, perhaps five knots, had sprung up, favouring our alternate grass strip, so I thought it worthwhile to try the Boxkite out again in some more realistic conditions. Certainly the good results obtained from the first flights gave me confidence that the model should cope with this breeze without too many problems.

As expected, the model took off well and as it neared the end of the grass strip, at perhaps ten feet, it encountered a wind gust or minor turbulence. As it pitched up, I applied nose-down control, which worked, but the nose continued to fall from this point, despite full up stick applied at the transmitter. I had a clear impression that the rear elevator remained 'down', despite full back stick. The model continued in an estimated 15-degree dive until it hit the ground, just past the end of the mown strip. Damage was extensive.



There was sufficient fuel and the engine was delivering power on impact. The batteries had sufficient charge remaining and no parts had fallen off before impact.

There were no control stops installed on the original Boxkite or on my model. On the original aeroplanes, the rear elevator was restrained from over-travel by two control cables from each side of the forward elevator. My modification on the model was to halve the control arms on the rear elevator, so that it was geared to provide twice the angular travel of the front elevator. As it turned out, this, not-so-bright idea was to provide more control effort to the rear surface. As a result, the control in pitch was not a problem and only small control movements were required during the first flight, the combination of aerodynamic loads plus the inertia of the rear elevator possibly caused the latter to over-travel and lock fully down.

Could this accident have been avoided? Certainly yes, if I had fitted elevator stops, or kept to the original design, one-to-one, gearing of the elevators - preferably both!

Can the model be repaired? Yes again, although not just in the short term. The 100 Years Anniversary military aeroplane is not until 2014, so there is plenty of time to meet that deadline. No doubt, the memory of that magic first flight will eventually re-kindle my enthusiasm for Boxkites in a few months' time. ■

**ABOVE: Prior to his Bristol Boxkite, Gary produced a model of the Voisin 'Boxkite', that was features in the August and September 2010 issues of FSM. Some of the experiences with this model were carried over when developing his Bristol Boxkite.**

**LEFT: No photos of Gary's Bristol Boxkite were taken during the test flying, but this one shows his Voisin fully airborn**

**BELOW: This view of Gary's Voisin, illustrates the wing, uncovered on the top surface as per the full-size aircraft.**

# The BRISTOL BEAUFIGHTER

## Undercarriage

The undercarriage for the model took quite a time for me to develop and produce and not without the invaluable help of several other people. The system will be covered in more depth in a separate article for those wishing to go down the same route, but is basically as follows:

I initially thought the set of air-driven *Unitract* Chris Gold Lancaster retracts that I had acquired would be suitable for the Beaufighter as these were of excellent quality and I would only have to lengthen the legs! This was duly done, but then I had altered the basic geometry so much that they would not work! Back to square one!

A choice of alternatives presented itself; either to use a commercial heavy duty air retract unit and make up my own twin legged oleos, or I built my own units from scratch using full size geometry. (See separate article). If you choose the easy way out and use commercial retract units, the bearers for these would require building into the basic nacelle structure at an early stage.

## Covering and finishing

The model was to be covered in tissue using banana oil and thinned dope as adhesives. Having filled any imperfections with light-

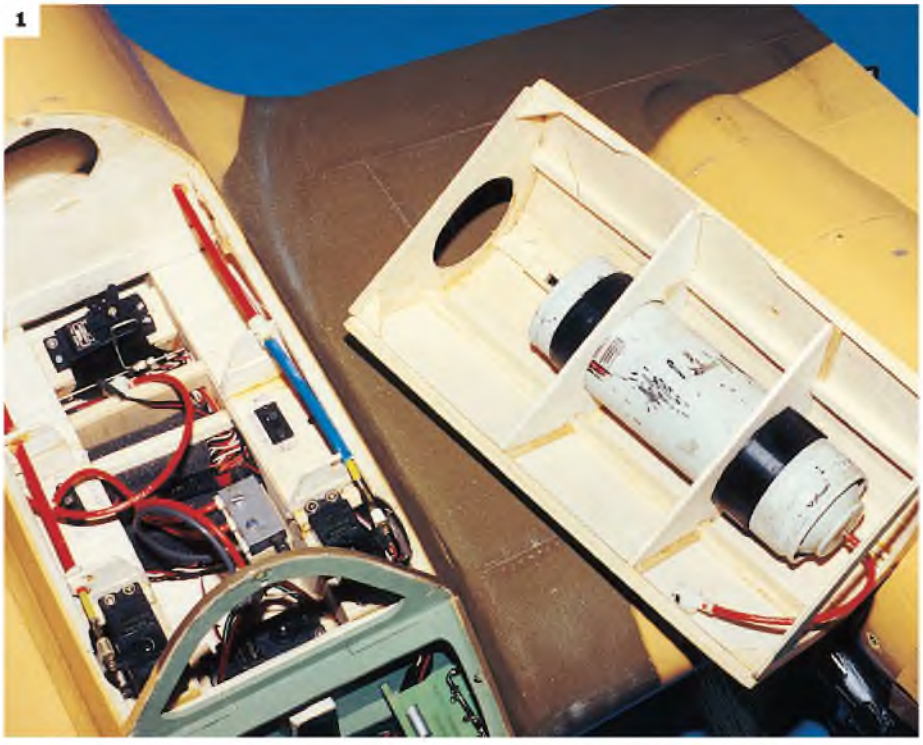
# BIG bruiser!

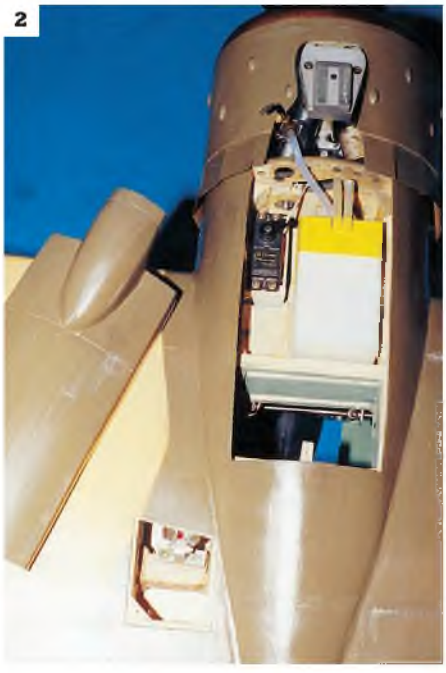
## Part 2: Andy Ward completes and flies his 86" wingspan moel of the Bristol Beaufighter, designes for .75-.80 cu.in. four stroke engines

weight filler, two coats of grain sealer, sanding between coats, were applied. I always make my own sealer by mixing ordinary talcum powder in with the dope or banana oil and brushing it on in the usual way. It's cheap, quick and easy and as a bonus really smells nice when you sand it back. I'm also pretty sure it's better at filling grain than commercial sanding sealers.

Lightweight tissue was then applied followed by as many coats of the sealer as necessary to obtain a smooth finish. I found three or four coats, sanded between each, to be enough. This may sound very labour intensive, but the banana oil dries very quickly and the sealer sands easily. Panel lines were scribed into the surface with a triangular file run along a plastic straightedge, being careful not to scrape through the tissue. Riveting was applied with a plastic star wheel from an old children's toy, very similar to a dressmakers one. This isn't strictly scale, but I think it's effective. I also used pieces of good quality note paper to simulate some hatches and panels. A coat of my sealer mix seals the surface for painting.

All major colours on my model were from cellulose paints, mixed by the local car paints supplier to the correct British Standard (BS) codes. I am able to supply a list of all BS





**1: Detail of the removable top hatch behind the cockpit, showing the air reservoir taht feeds the the air driven retracting undercarriage. The main radio installation is also seen here.**
**2: Hatch in the top surface of one of the engine nacelles reveals the fuel tank installation.**
**3: This view, with the cockpit canopy hatch removed shows that, for all its size, the pilot's cockpit was quite a tight fit for the pilot!**
**4: Although the Beaufighter had a retracting tailwheel, some were flown with the tail leg fixed in the down position - so it's 'scale'. Designer Andy Ward took advantage of this variation to keep things simple and to save weight at the back end of the fuselage! Here the steering tiller, linked to the rudder control 'loop', is revealed.**
**5 & 6: Further view of the main radio installation in the fuselage.**

numbers with their corresponding scale colours if anyone is interested. I chose to model a No.272 Squadron Beaufighter that flew from Malta. This machine was finished in the desert camouflage scheme depicted on the model. Roundels and lettering were painted using Humbrol enamels and a springbow compass and then the model was 'weathered' using aluminium paint and oil pastels applied by my finger tip. A coat of fuel proofer was sprayed over the model to seal the finish.

Finishing and detailing a model is my favourite part of scale modelling. I was fortunate on a visit to the Imperial War museum at Duxford to get access to the full size Beau being restored there to flying condition. My colleague, Mike Mennell was able to obtain many close-up photographs of this machine, especially the cockpit and I have used these photographs to detail my own model. A big vote of thanks goes to the guys at Duxford that day for giving us all the time we needed.

The pilot and observer seats were made from card and the observer's position was kitted out with various items including maps and even a bladder relief bottle! The main instrument panel was made in the usual way by sandwiching photocopied instruments between acetate, thin ply and a card backing. When painted black and slightly 'weathered', the effect is very good.

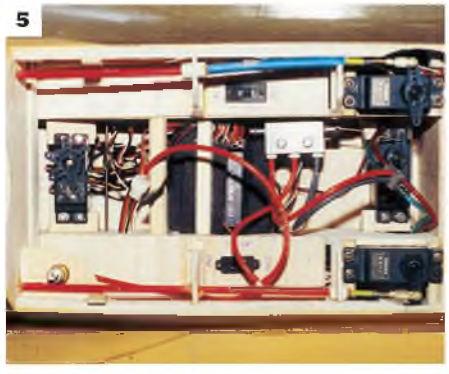
A control column and rudder pedals were made up from scrap materials, and the observers canopy was from an Easter Egg, believe it or not!

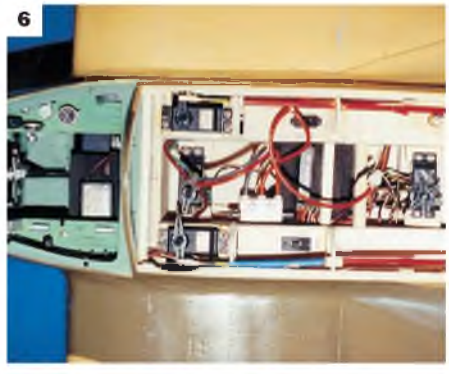
## Engine installation

I know from many years of operating the fine quality *Laser* engines that no matter which way up they are, they'll still run well. I mounted mine upright for two reasons. Firstly, the fuel tank height was somewhere near where it needed to be and secondly, if I used inverted engines and had occasion to belly-land the model, the carburettors and cylinder heads would sustain damage from the tarmac.

A lot of thought went into cooling the engines. At first, I had the silencers extended downwards with a length of stainless flexi-pipe, exiting near the scale position. However, much heat is generated by a four-stroke silencer and as the pipe was against the firewall, most of the heat would remain in the cowl. So I have simply used the stock silencers and turned them upwards - to hell with scale fidelity - let's go for reliability!

Also, I cut away former N3 quite considerably behind the cylinder head so a lot of heat would escape over the fuel tank and out of the wheel wells. Hot air can also escape through the cowl gills. To ensure that the cylinder received maximum cooling air, I made dummy engines from a circle of





**7: Cockpit instrument panel made by sandwiching photocopied instruments between clear accetate and 'authenticated' with a little application of 'wear-and-tear'. 8: Left wing leading edge showing dummy landing lights and gun ports. 9: Dummy radial engines made from bath overflow pipe. Crankcase centre from yoghurt pot. 10: Upright Laser engine installation. 11: Wing outer panel diheral braces and retainer bolt. 12: Detail of wing centre section ouer stub.**

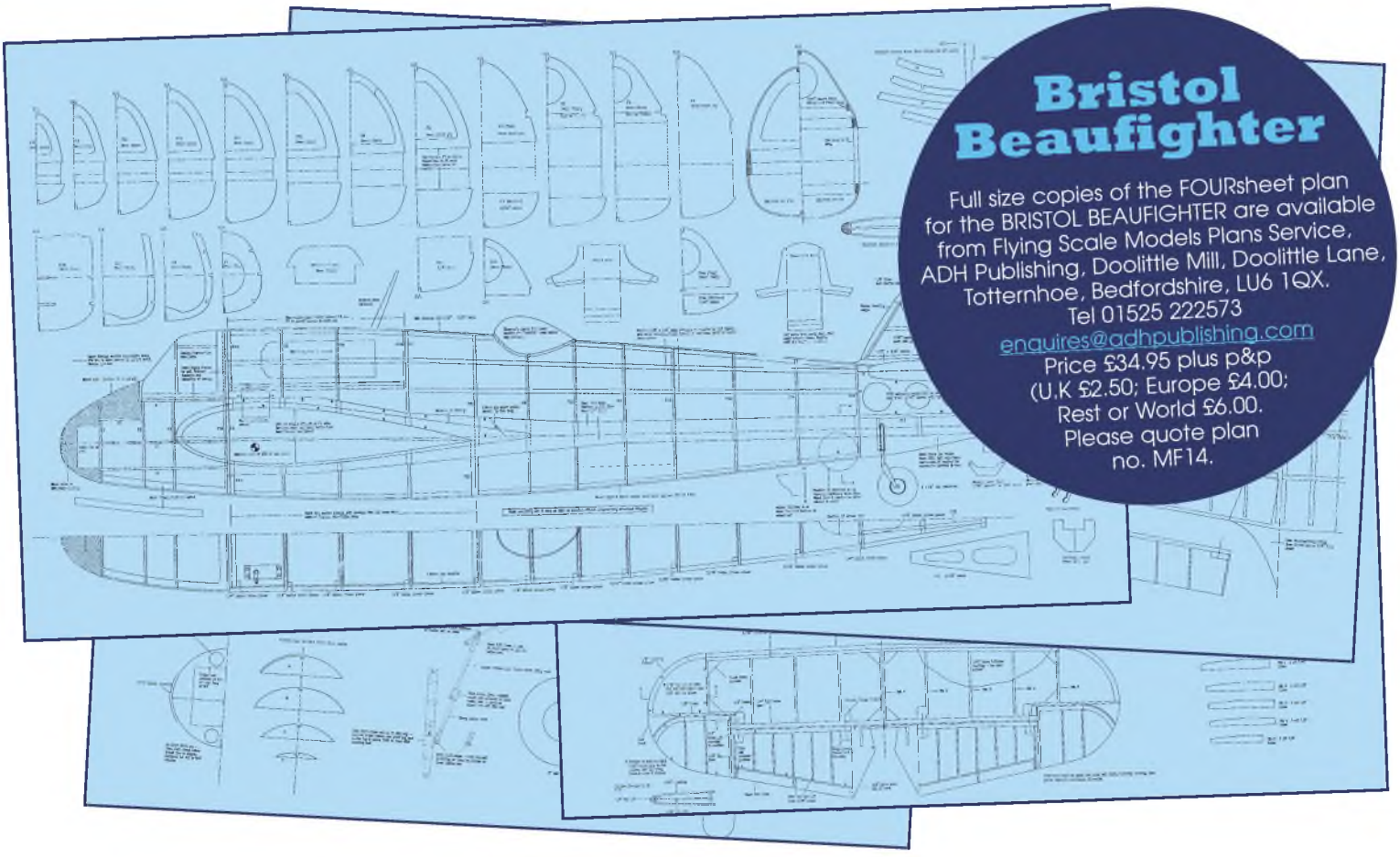
liteply, which was just the right size to go in the front of the cowl. The area in front of the engine was cut away so any incoming air had to pass over the cylinder fins. The dummy engines have crankcases made form yoghurt pot bottoms and dummy twin two cylinders from slices of bath overflow pipe. Painted and weathered, these are most effective and are secured in place by screws into the forward ends of the engine mounts.

With all these precautions, I was confident that overheating engines would not be a problem.

## Systems installation

My Field Force 7 transmitter was employed for this model as I required several of the

**Designer Andy Ward, prepares to test run and set up the twin Laser four-stroke engines. Note the model assembly cradle wade from lengths of plastic drainpipe.**



## Bristol Beaufighter

Full size copies of the FOURsheet plan for the BRISTOL BEAUFIGHTER are available from Flying Scale Models Plans Service, ADH Publishing, Doolittle Mill, Doolittle Lane, Totternhoe, Bedfordshire, LU6 1QX.
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no. MF14.

built-in functions such as electronic aileron differential and reduced servo throw on the retract valve servo. I know all of this can be arranged mechanically, but I was feeling lazy! Standard sized servos are employed throughout with one on each surface, and a 154 gyro was installed in the nose under the pilot's seat and is coupled up to the rudder to aid single engine situations and ground handling. Full access to most of the radio is via the large hatch over the top of the wing. Control throws are as follows:

**Ailerons:** 1/4in down and 1/2in up
**Rudder:** as much as possible either way
**Elevator:** 3/4in up and down
**Flaps:** 57 degrees maximum

An 1,800mAh nicad provided sufficient power for everything on board and was housed as far forward in the nose as possible. The centre of gravity of the model was placed at 25% of the root chord and to achieve this, I had to install 6oz of lead in the hollowed-out rear of the noseblock. This is despite the very forward position of the engines and emphasises the importance of building the back end as light as possible.

The finished model, ready to fly, weighed 17lbs - more than I'd hoped for, but not

frighteningly so. I reckon that if I built the model again, I could trim between 1 and 2 pounds off it by better wood selections and that would be quite achievable. My model had several weight-adding alterations carried out on it as I went along, which wouldn't be necessary second time around.

## Preparation for flight

It is essential on any twin-engined model that the performance of each engine is similar at idle, mid range and at full throttle. Using a tacho, I set the lower r.p.m. range of my Lasers. It's easy to tune at full throttle using ones ear, and what a lovely sound they make too. Each engine was treated to a new plug and new balanced Master Airscrew 13 x 6 propellers. It's also vital to perform a radio range check and on this occasion, it was a good job that I did. I had ducted the aerial down the inside of the fuselage inside drinking straw tubes, as I have done with countless models in the past. This time, the radio range was strangely short and now the aerial is taped under the fuselage bottom, restoring the range to normal - most strange!

The first flight took place one Sunday at RAF Binbrook in Lincolnshire.

The model was assembled and essential checks performed. After a prolonged photography session, it was time to start the engines. The reliable Laser engines sprang into life after a slight hiccup with the right one (the glow connector had come off the plug). A little final tuning saw the engines performing well and the model was taxied out onto the runway.

Facing into wind, the throttles were gradually opened and the Beaufighter was away, with not a trace of a swing in sight! After a run of perhaps 25 metres, the model took to the air and we were flying at last. I don't mind telling you that I was very nervous, but very pleased at the same time.

With the undercarriage retracted and some down trim wound in on the transmitter, the model was flying straight and level, looking quite majestic in the air. The controls seemed well harmonised and even roll control was good - something that was a little lacking on the full size Beau due to the ailerons being quite small.

All was looking good, and then it happened! - the left engine stopped. No problem, I thought - I throttled back on the right one and commenced gliding in for a landing, albeit downwind. The undercarriage was lowered and at around ten feet altitude, an airfield building jumped into the path of the Beau!

I had no choice but to turn into the dead engine to avoid hitting the building and the model spun in from around ten feet, becoming quite badly damaged in the process. It was an abrupt end to the day's proceedings, but I was strangely elated - my Beau had flown at last and would certainly fly again soon after repairs were done.

The engine failure was later traced to the carb top screws being loose in the carb body, causing the spray bar to revolve, stopping the engine. Those familiar with Laser engines will know what I mean. This was easily fixed, but the airframe was six weeks out of commission whilst repairs were undertaken, the model being returned to pristine condition. ■

### Flying the Beaufighter

Monday 3rd January dawned bright and clear. The model had been rebuilt since its September crash and, in fact, had been ready to fly again for over two months, but various circumstances dictated the delay.

The venue again was Binbrook airfield in Lincolnshire where, once, English Electric Lightenings flew. A light wind was blowing straight along the runway and so, after the usual checks, the two Laser engines were started and the model taxied to the runway. Ground handling with the steerable tailwheel is very good.

Upon opening the throttles cautiosly, the model accelerate briskly (with no swing at all - so much for all the horror stories!) and before long it was flying. Retracting the undercarriage resulted in a nose up trim, easily corrected using down elevator trim.

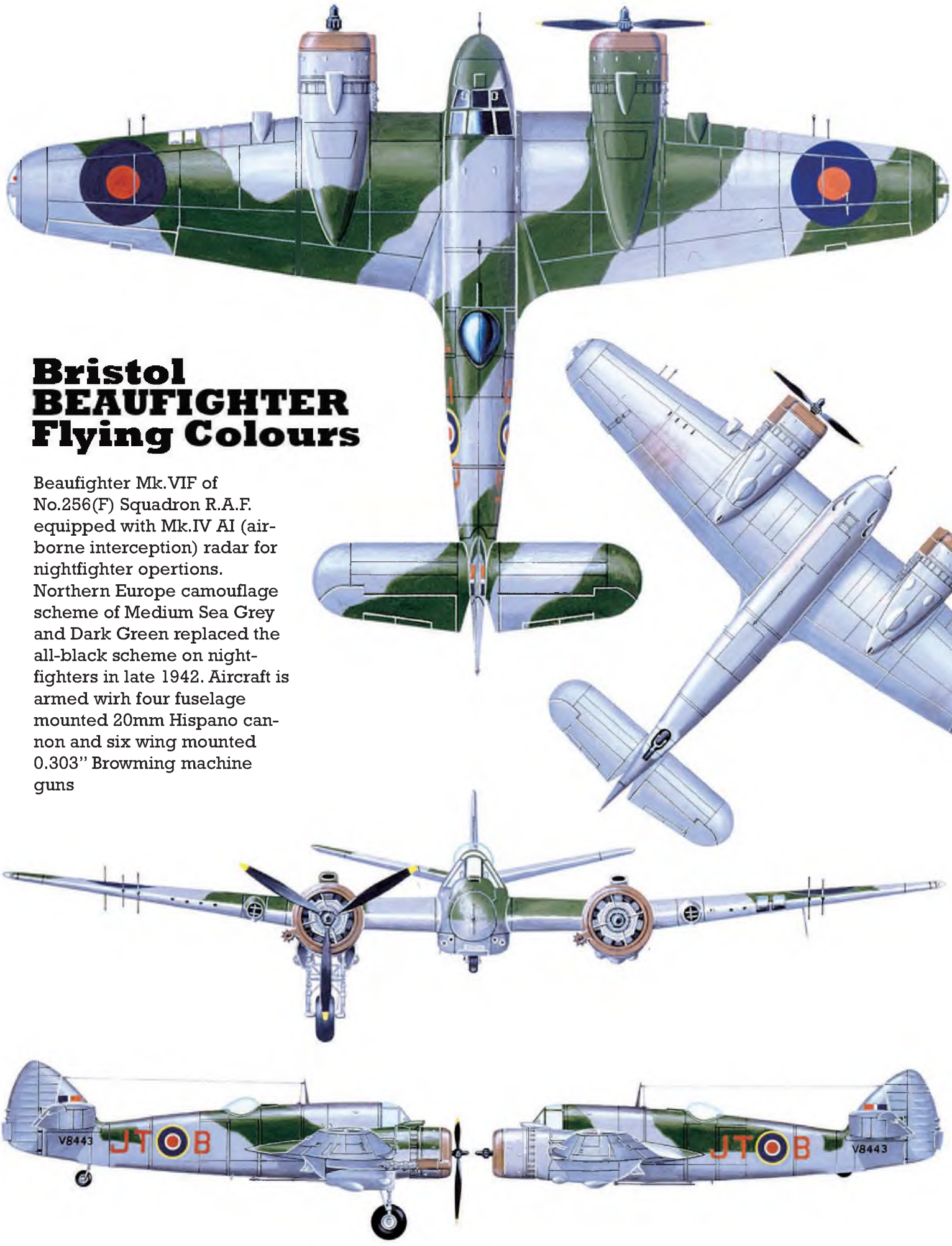
I'd been advised of this by Dr Keith Mitchell so was prepared for it to happen and was ready for it. Cruising around at two-thirds power, the Beaufighter was found to be rock steady in the air with all controls well harmonised. The model is a little slow in roll (as was the full-size) and the answer for that is to couple in the rudder. In any case, the Beaufighter is no aerobatic ship, so that is of no real concern.

I chose to make a flapless landing on this occasion as, by now, a stiff breeze was blowing. The landing presented no problem at all and in fact the actual touch-down was at quite a slow speed, so tip stalling should not rear its ugly head, thanks to the washout and choice of tip section used.

Needless to say, I was very pleased to finally prove the Beaufighter in the air.

# Bristol BEAUFIGHTER Flying Colours

Beaufighter Mk.VIF of No.256(F) Squadron R.A.F. equipped with Mk.IV AI (airborne interception) radar for nightfighter opertions. Northern Europe camouflage scheme of Medium Sea Grey and Dark Green replaced the all-black scheme on nightfighters in late 1942. Aircraft is armed wirh four fuselage mounted 20mm Hispano cannon and six wing mounted 0.303" Browming machine guns



1

# BEAUFIGHTER

A close-up study of the Beaufighter Mk.X, held on display at the Royal Air Force Museum, Hendon

2 3
4 5

**1:** The cockpit canopy o the Bristol Beaufighter held on display at the RAF Museum, Hendon, has substantially 'yellowed' with age.

**2-5:** Details of the exhaust stacks to the Bristol Hercules engines. Also shows the air-exit gills on the rear edge of the cowl ring.




6 7 8 9

10

6 & 7: Panel-line detail on the engine nacelles.
8: Front ring of the engine cowl and spinner.
9 & 10: Engine cowl panel lines and cowl gills.
11: The air intake scoop on top of the engine cowl.
12: Another view of the engine cowl gills, also shows the profile of the wing leading edge air intake just outboard of the engine cowl.

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13: The extreme rear of the engine cowl. 14: Fin & rudder, showing the hinge line and aerodynamic balance.
15: Rudder trim tab.
16: Rudder control horn.
17: Wing/fuselage root viewed from rear.
18 & 19: Gun ports in the fuselage nose underside. Note also the pilot's access hatch and ladder. 20: Flare chute behind the wing trailing edge. 21-23: The main undercarriage doors. Note the prominent blister.

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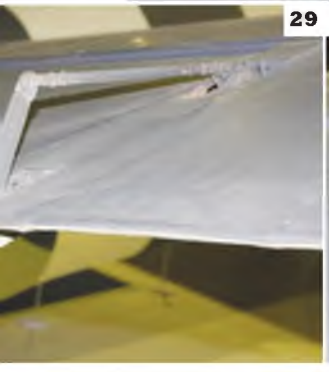
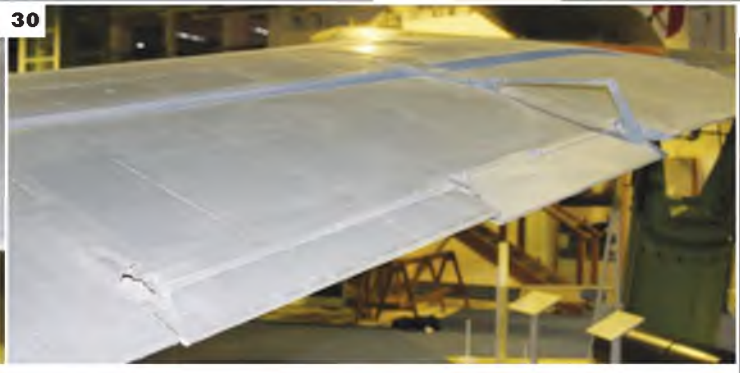
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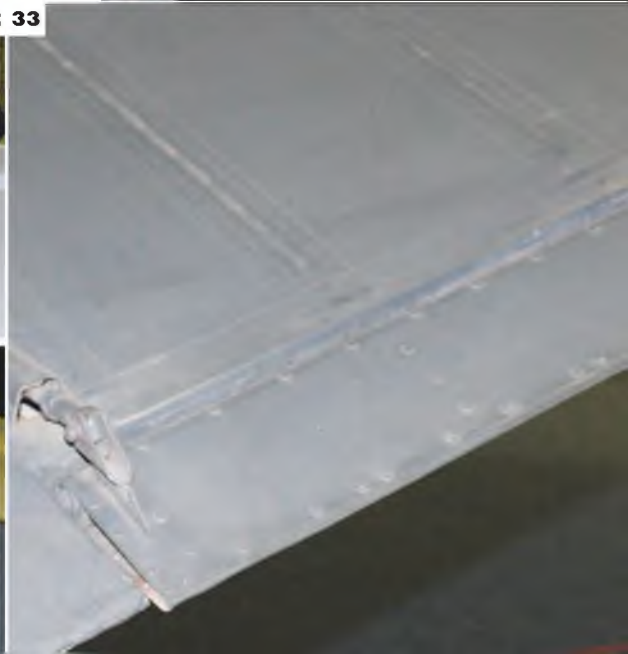
24: Main undercarriage, viewed directly from the rear. showing the cross-bracing.
25: Main undercarriage, viewed directly from the front.
26: Main undercarriage wheel and hub, also showing the oleo.
27 & 28: Front and rear views of the Observer's position canopy - no so badly 'yellowed' as the front canopy.
29: Aileron trim tab control horn and drive link.
30: Outer wing panel, showing the aileron.
31: Aileron trim tab link link and horn.
32 & 33: Tailplane and elevator, showing the trim tab control horn and link.


32 33



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37 38

**34 & 35:** The steerable tailwheel unit.
**36:** The wheel well into which the tailwheel unit retracts forward.
**37:** Underside view of the aileron, showing the trim tab and hinge
**38:** Flap hinge, viewed from wing underside.
**39:** The air intake positioned on the wing leading edge, just outboard of the engine nacelle.

39

40 41

42

**40:** Wing tip fairing at the trailing edge, contains wing tip light.

**41:** Landing lights installed in the left wing leading edge.

**42:** Underside view of the wing trailing edge fillet, at the wing root.

**43:** Pitot head, mounted on the left wing underside.

**44:** Detail of one of the aileron hinges.

**45:** Detail of aileron hinge line.

**46:** Another view of the wing-to-fuselage trailing edge fillet.

43 44

45

46

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On Silent Wings by Chris Williams

# SCALE SOARING

**Dreadful summer (so far), equals no lift for aerotow scale soaring, but there's still lift in them thar hills!**


John Bennetto with his SHK at the White Sheet fly-in.

## Events 2012...the story so far

The calendar, in its usual baffling way has quickly wound its way to almost the longest day as I write, yet, apart from the TVSA Aerotow previously covered, only two more scale soaring events have taken place, at least in my neck of the woods. The first scale fly-in at White Sheet came and went without any action thanks to the inclemency of the weather, and that was with a backup date, too.

The next had forecast conditions that were not of the best, but Event Director Steve Fraquet decided to make the best of it and declared the event on. With a NE wind of indeterminate strength, this involved a half-mile walk along the top of the plateau, complete with all the accoutrements necessary for flight; a chair for ageing pins; sustenance for the continuation of bodily functions; and a small portable kitchen sink for the washing up. Not surprisingly, this led to a thinning of the ranks, so it was a small (but perfectly formed) band of hardy souls that assembled at the appropriate time and place that Sunday morning.

I'm not sure who had travelled the furthest, but John Bennetto was visiting from the Midlands with his very nice

Compact, but happy bunch at the White Sheet event.

Relaxed scene at the Middle Wallop aerotow.

SHK, whilst Antonia Gigg had made the trip from the Far East, of England that is. Although not the most efficient of the White Sheet slopes, this particular example boasts acres and acres of smooth, short grass; and with a gentle initial incline, speculative launch-and-land manoeuvres were the order of the day, given the capriciousness of the light wind. Despite this, there were many excellent flights on the day, with Antonia winding her little DG1000m up to a speck in a passing thermal. (She swore she wasn't using the up-and-go).

On a personal note, I was able to prove my new Petrel mission-capable in challenging conditions, even to the extent of flying her three-quarters of the way back to car, a rite of passage for anyone flying this slope. It goes without saying, of course, that a week later on the event's backup date, the wind was a perfect south-westerly and would have been ideal...truly, an Event Director's lot is not a happy one.

Next up, a fortnight later, it was the turn of the Ghost Squadron's event at Middle Wallop. Due to a mistake by the Weather Gods, the Saturday saw a diminution of the ever-present winds, and a precious few hours without rain, surely the harbinger of a hosepipe ban? Consequently the turnout was a reasonable one, and would have been even better had there not been a clash with the Blackbushe show, which was not that far away.

Brian Sharp, on his annual visit from Scotland, had brought along his re-built BG 135 Gypsy, which had suffered a catastrophic incident at this same venue in a previous year in which we were treated to the very unusual spectacle of a broken 14mm steel wing joiner. The model, now restored to its previous pristine state, flies as well as it ever did, and took to the air many times over the weekend. Darren Maple's new 3rd scale Slingsby King Kite is now well sorted out, and with its immacu-

Ghost Squadron John Greenfield's GPS Triangle racer, the ASH 31.


Dave Pullingham with his 3rd scale Minimoa.

Ian Davis provides some final adjustments to his re-built Blohm & Voss BV 40.

late finish and sheer size, really looks the part in flight.

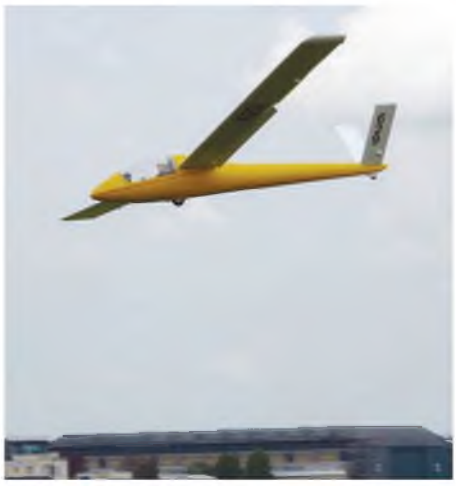
It was many years ago at the old Lords Hill club site that Ian Davis brought along his then new Blohm & Voss BV 40 for its maiden flight. Alas, this was to end in disaster, due to radio malfunction, and it was only now after this considerable period of time that he had repaired the airframe, ready for its second maiden flight. Needless to say, a certain nervousness abounded, and it was with some gratitude that Ian handed over the Tx over the John Greenfield, the weekend's Event Director. This time, the maiden went without a hitch, the model even showing some signs of being a bit of a thermal soarer during the extended flight. John was also getting to grips with his new passion, the art of scale GPS triangle racing. This involves flying a triangular course at some altitude, the course being delineated by waypoints specified in the on-board Global Positioning System. The model itself, an all-moulded ASH 31, also has an electric up-and-go power system, so it takes an eye-watering amount of money to take part.

There were plenty of Minimoas on offer and the one with the most striking colour scheme must surely be the one belonging to veteran aeromodeller Dave Pullinger. This is the Chinese version of the 'Moa, and comes ready-built at 3rd scale for a not unreasonable sum of money. There has been some criticism of the standard of the covering, so many have thus been re-clothed, which is good, because the generic red & white Swiss- style scheme adopted by most manufacturers is definitely getting a bit old. (Wait a minute, mine's finished in that scheme).

The following day saw a partial return to what is now normality in a British Summer, a cold, sharp wind had set in, the sun had disappeared and it was only the unusual absence of the rain that allowed the proceedings to continue. The Blackbushe show having run its course, we were joined by some of the participants in the guise of the chaps from the German Paritech concern, well known for their beautiful composite gliders, and Al Machinchy, whose turbine-powered Puchacz aerobatic sailplane put on several fine displays.

Over the weekend there were several take-off accidents, many of which had a common cause. The sequence of events is all too familiar; A glider will yaw as the

Event Director Steve Fraquet launches his old 1/4 scale Helios.



**Brian Sharp's BG 135 Gypsy on finals with the flaps down.**


**Darren Maple's o/d 3rd scale Slingsby King Kite at Middle Wallop.**

tug starts to accelerate; a wing will dig in; the glider will flip on to its back and begin the process of complete disintegration. This is something that tends to happen to the smaller machines, possibly because their wings are nearer to the ground to begin with, but the initial cause is often the same, which is that the guy holding the wing tries to match the speed of the tug before letting go. Sometimes this might work, but given the endless variety and size of both tugs and gliders, no standard technique is going to work every time. The general consensus of both experienced tug and glider pilots is this: as soon as the glider starts to move, let go of the wing... If a wing does touch the ground, it is now far less likely to end in disaster as the ailerons will by now have some 'bite' and the yawing force liable to be a gentle one.

There is another factor that comes into play in these circumstances. You might wonder "why doesn't someone release when thing start to go wrong?". This is of course the First Law of Aerotowing, and most times this is what happens, but every now and again, both releases fail to work. It has to be assumed that once things go divergent, the tension on the line increases dramatically, which leads to the Second Law of Aerotowing: always test the release system under tension, preferably a lot of tension, and for an arbitrary figure, let's say at least the AUW of the glider for starters.

All-in-all, given the sort of weather we can expect during the event season these days, the Ghost Squadron's first aerotow event at Middle Wallop was an undoubted success. Thanks must go to John Greenfield and the lads for their easy-going organisation, and the tug pilots for their usual strenuous efforts. There's one more event this year in September: may it be just as good as this one...

## And now for something different...

When I picked up a little electric soarer for a song at a club AGM last year, little did I know the profound effect it was going to have. It was some months before I got to fly her at my local power club, but I was well taken with the ability to power on and off at will, and with so little fuss and oily mess. I resolved to design my own model, and to use a scale glider as the experimental platform. The American home-built Duster, from California Sailplanes, seemed to fit the bill, as it has a long, tapered nose, ideally suited for blending into a prop spinner.

So, after firing up the PC and initiating some CAD drawing the project got underway. Choosing the necessary power train was a bit of a nightmare for this 'leccy newbie, as there is a vast array of stuff out there, but eventually I stuck a pin in a catalogue and ordered the doings. Having chosen a scale of 1/6th, about halfway through the project, doubts began to set in. It was too small, I told myself, and look, those wing joiner rods are too flimsy to take the in-flight forces: the wings are going to flap like a bird's. Well, you know how it is, having built up what you might call project momentum, I was completely unable to stop. So, some weeks later, the Duster and myself were at the County Model Flying Cub's peerless site in Wiltshire for the maiden flight.

To my surprise, the Duster flew extremely well; somewhat over-powered and capable of going at some extremely un-scale-like speeds, but with reasonable low-speed behaviour, given its diminutive size and relatively high wing loading. I'm sure you can see what's coming...hmmm, how much better would she be at 1/4 scale? ■

For those who like the details of things electric:
The Duster is:-
Scale: 1:6
Weighs: 1.36 Kg
E-Power 2810 1100kv brushless outrunner
Wing section HQ35/12
Hobbywing Pentium 60 Amp Brushless Motor ESC Speed Controller)

c_williams30@sky.com

**The electric Duster under construction.**

**The airframe, ready for covering.**


**Author prior to the maiden flight.**

# THE QUIET ZONE

R/C SCALE ELECTRICS BY PETER RAKE

Okay, try as you might, you are not going to escape another edition of my favourite electric flight column. Prejudiced? Who me? Not a bit of it - from which inane opening you'll have realised that it's time for another episode of *The Quiet Zone*. Can't be bad, can it?

As you can also probably tell, I'm in full waffle mode. Not really a bad thing since this time I have to write this all by myself. What am I going to be writing about? You just haven't been following the plot, have you? If there's one thing I can't stand its people who don't pay attention.

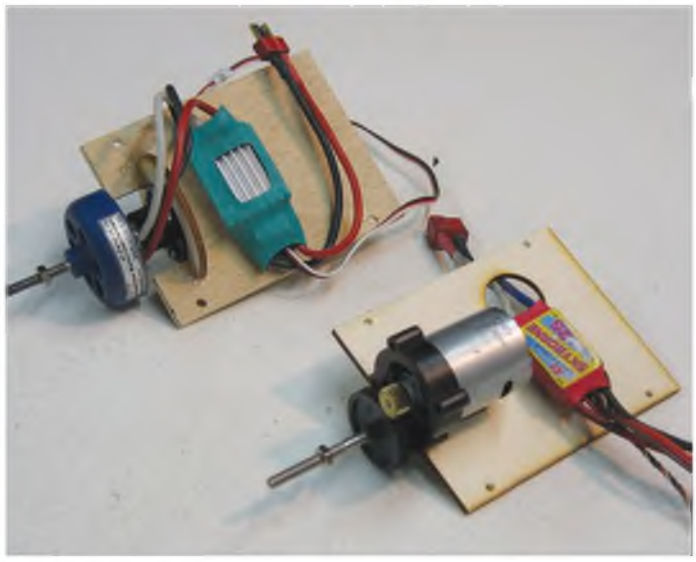
Now, don't faint, or anything else similarly embarrassing, but I'm actually going to be writing about what I promised you. No, don't expect this sort of treatment every month, it isn't going to happen. This month will see a continuation of our little 'back to basics' foray. This time however, we'll be taking a little closer look at various aspects of what you'll need to complete your very own scratch built model. Scratch built, kit built, it doesn't matter. The important thing is that it isn't a fly straight out of the box job. With those all the decisions are made for you but tend to be aimed solely at use in that particular model. My aim here is to somewhat broaden your horizons a little.

## MOTORS

Once upon a time, choosing a motor to suit your model was a simple affair, you either used a geared brushed motor or a direct-drive brushed motor. Although both came in a variety of sizes, you could easily choose the one you needed because they were all pretty standard. One 6-volt Speed 400 motor was very much like any other 6-volt Speed 400 motor. It would turn the same size prop at very similar revs and all were pretty much interchangeable. As such, if a design stated that you should fit a 3.3:1 geared, 7.2 volt motor of a given size, you didn't have to worry too much about which brand of motor you fitted, it would do precisely what you needed it to and would be exactly the same size as any other. The only thing that might change

SOME PEOPLE INSIST ON FITTING I.C. ENGINES TO MY DESIGNS, BUT AN ELECTRIC MOTOR IS MUCH NEATER THAN THIS.

**With a nose this restrictive, there is still a time when direct drive brushed motors have their advantages.**



**A good example of replacing a listed brushed motor with a brushless alternative. Two alternative installations for the same model.**

So, there we were in this state of bliss where we knew precisely what motor would do what. Then came the advent of the brushless motor and it all went to hell in a hand basket. Don't get me wrong, in my opinion brushless is THE way to go for our models, it's just that it's all a lot more confusing when you are first getting interested in electric flight. We now had motors that didn't need gearboxes to turn big props, were easier to fit and offered improved efficiency - as long as you knew precisely which motor to buy.

With brushless motors, you have two basic options; outrunner and inrunner. Confused already? Yes it does start to get that way. In its most basic terms an inrunner motor looks pretty much like a brushed motor. It has a stationary outer 'can' with a shaft sticking out of one end and wires leading out of the other end; so far, so good. However, most inrunner motors tend towards fairly high kv ratings.

Okay, don't panic, all that means is the rpm per volt. That means that, unless you fly little screamers, they need a gearbox to turn a useful sized prop. As you can probably visualise, a Sopwith Camel, with a 4" diameter cowling, isn't going to get an awful lot of puff from a 5" propeller; quite apart from the fact that it would look absolutely ridiculous. That, fortunately for us, is where the outrunner comes in.

An outrunner motor not only looks different, it works differently too. Unlike brushed motors and inrunners, the outer can is the part that rotates. The shaft is, not too surprisingly, attached to this can and rotates with it. So, when you try to mount your outrunner, it is important that you don't use clamp style mounts - unless you want your entire model to rotate.

The advantages of outrunner motors fitted to 'nomal' scale models begin with the fact that they don't need a gearbox in order to turn surprisingly large props for their size. Generally, they are simple to mount in the model because they either bolt from the front, or the rear and can usually have the shaft reversed to suit either method. Most come with some form of radial mount, or have one available as an extra, so firewall mounting becomes very straightforward.

## THE DOWN SIDE

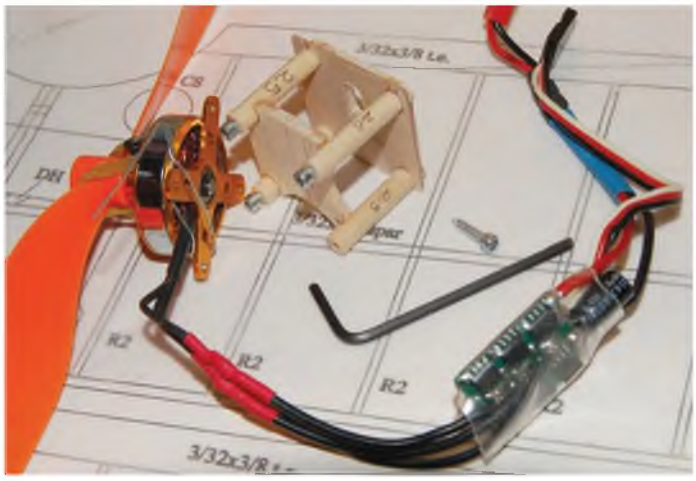
The first thing you'll notice about your new brushless motor, as compared to the brushed motors you were used to seeing, is that it has an extra wire coming from it. Yes, three wires, not the usual two. Not only that, but these three wires are probably all the same colour. With brushed motors, if the motor turned the wrong way you knew that changing around the red and black wires would make it run the other way. When your brushless motor runs backwards you simply perm any two from three. Change over any two wires and the motor will magically run in the desired direction.

So, it's worth pointing out at this stage that using good quality gold connectors between motor and speed controller is a very good idea indeed. Not only does it mean you can change the motor direction quickly and easily, it also means you only need a hole in the firewall sufficiently large for the wires (and connectors) to fit through, not that great lump of ESC.

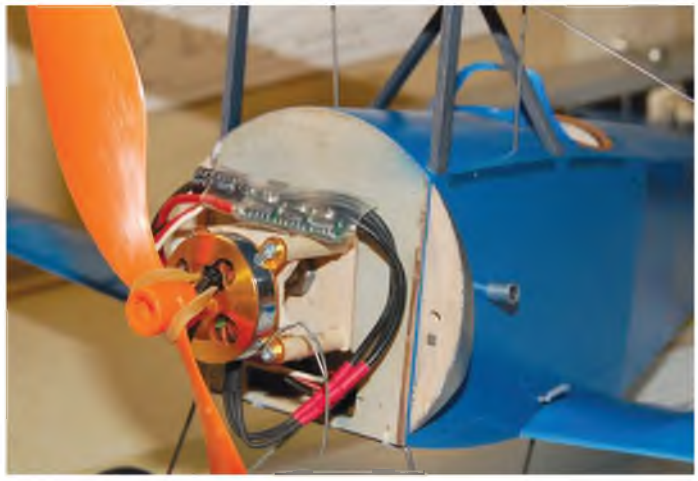
## EVEN FURTHER DOWN

Now the REALLY annoying thing about brushless motors is that they don't come labelled the same from every manufacturer. In the good old days, brushed motors all tended to use the same labelling system, so most manufacturers made 400,

**About as minimal, and cheap, as it gets to use salvaged gear. IR equipment installed in (on) an sub 10 gram indoor flier.**



**A prime example of what your set-up should look like. A small outrunner, ESC and custom made motor mount with thrust lines built in.**



**How it all fits onto the model. It's important to keep as much weight forward as possible on short nosed types.**

**One of those strangely labelled motors, but a good indication of an alternative style of radial mount.**

**The compact nature of outrunners make them ideal for concealing within dummy engines.**

540, 600 motors. Brushless motors, however, are not so easy to decide upon which one it is you need. A plan may state that a 4250 motor is required, but which one you actually need is another matter entirely. Some brands, notably AXI, list their motors according to the size of the actual armature assembly, while others use the outer dimensions. Therefore, an AXI 4250 would be a whole world different to a Turnigy 4250. Then again, (and there always have to be some manufacturers who like to be different), PJS motors label their products according to the maximum thrust they develop - the PJS 1500 being a motor that is capable of producing 1500 grams of thrust. So, when choosing a motor for your model, you have to look far more deeply than simply matching the numbers. Yes, it is B****Y frustrating.

To further complicate matters, not all 4250 motors from the same manufacturer are the same critter. Oh no, nothing as easy to understand as that. Come on now, you wouldn't really want life to be that simple, would you? This is where the second part of the motor label comes into its own. Depending on manufacture, this may indicate either the number of winds, or the kv rating. Either system equates to much the same information, but in a reverse manner. I don't blame you for being confused, I've been using brushless motors for years now and I'm only just beginning to get the hang of how it works

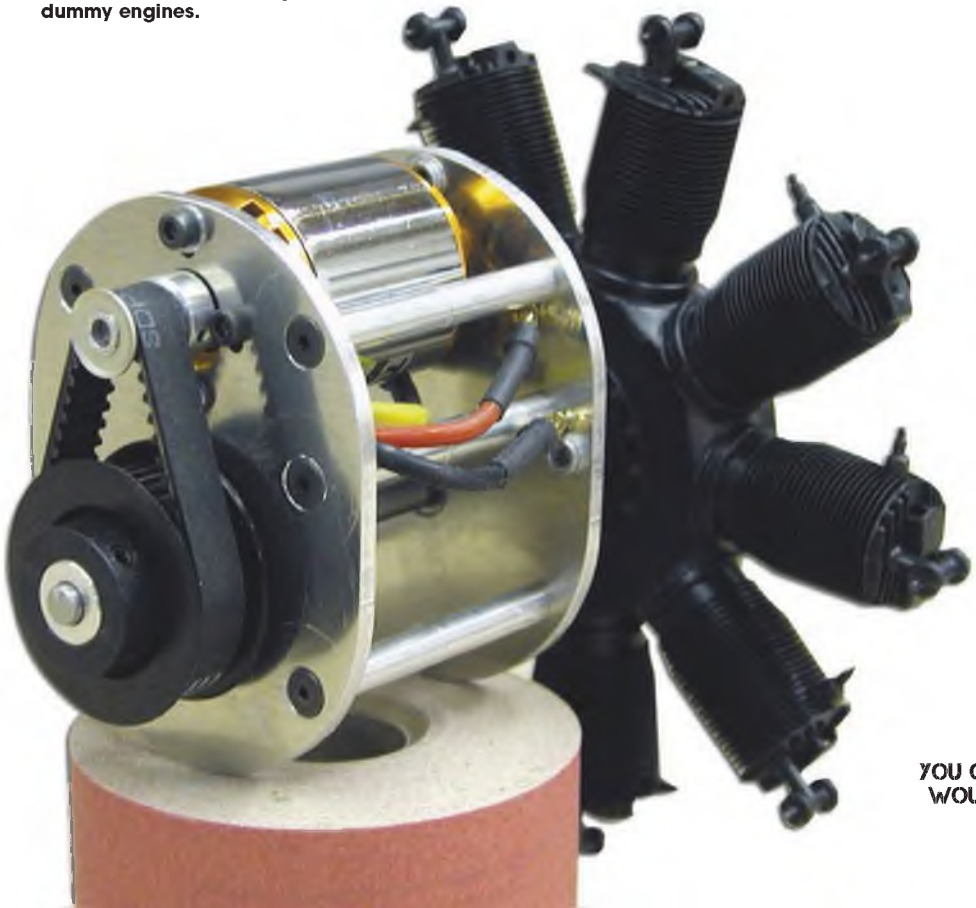
That being so, let's see if I can make your life any easier when you come to decide what motor to use in your model.

## LOOKING AT CASES

Okay then, so you have a 1/6th scale model of a Sopwith Camel fo which to find a powerplant. Please note, at this point, I'm not for one moment advocating that a novice flier should contemplate such a model, but I have to use something as an example. We want our model to weigh in at around 70 ounces ready to fly and to sport a roughly scale size propeller but don't want to spend a fortune on a motor. In such a scenario I'd suggest the aforementioned Turnigy 4250, which experience has shown is a motor that will provide ample power in this type of model. Also, if you choose the right version, it will turn a 15 or 16 inch prop - scale size on this sort of model.

So, how exactly DO you choose the right version of your given motor? You recall I said that some manufacturers list kv rating, while other list the number of winds? Basically, how this works is that the lower the kv rating (or the higher the number of winds) the 'softer' the motor is. A low kv motor will turn a bigger prop for roughly the same current draw as a higher kv motor. Don't just go by the motor size. Read the specs for all its incarnations and check how many amps it draws, on how many cells and turning what size prop.

Why is this important? Well, if a model such as the one under discussion is to fly in a scale-like fashion, you are going to be requiring roughly 50-60 watts of power for each pound of model weight. Experience has shown that such power levels aren't excessive for the model, but still allow you to hold some reserve for aerobatics or slightly breezier conditions. Too much more power than that and there's a more than fair chance the model will become almost



**YOU CAN PROBABLY IMAGINE HOW DIFFICULT IT WOULD BE TO FIT THIS INTO A NARROW NOSE. FORTUNATELY IT IS DESTINED FOR A REAR MOUNTED PUSHER SET-UP.**

impossible to fly, wanting to climb like a lunatic all the time. You very quickly learn that very draggy models don't fly faster with excess power, they just climb like mad without actually getting any faster.

Right, now we know what sort of power level we are looking for, and why. On this model, that is a total power availability of somewhere around 250-270 watts. Basic science proclaims that Volts times Amps equals watts, so a study of the motor specs is a big help in deciding what kv rating and cell-count produces the required amount of power. It really isn't half as complicated as it sounds, but is something you need to do before shelling out your hard earned cash on the wrong motor. Been there, done that, didn't like it one little bit.

I find three cells to be a good starting point, so you should be looking for a motor that will turn your chosen prop size on a 3s pack to give a current drain of around 24-25 Amps - 25 (Amps) multiplied by 11.1 (Volts) results in a power level of 277.5 watts; more than enough for our needs.

To sum up on motors; read before you buy. Work out the maths you glean from such reading and buy the correct motor first time. I still have unused motors from my first forays into brushless motor purchase.

## IT GETS BETTER NOW

Not only will you benefit from buying the right motor first time if you just spend a little time reading specs and working out a few simple sums, but it will save you money on the other items you'll be needing - speed control and LiPo packs. In terms of current draw, 25 Amps is really quite mild. Even 30 or 35 Amps is hardly excessive. What these figures mean to us is that we can buy cheaper speed controllers and batteries than would be needed for higher current levels. Since we're working our way back through the power system; starting with the prop we intend to use and using that to determine the most suitable motor, let's look at the next item in the chain. As you probably guessed, that means the speed controller; commonly known as an ESC (electronic speed controller).

The first thing you need to appreciate about brushless motors is that they need, surprise, surprise, a brushless speed controller. Also, although some advocate otherwise, it is best to use one controller for each motor (it's just simpler to get right).

Speed controllers fall into two basic types, those with BEC and those without. A BEC system allows you to run the radio gear from the same battery pack your motor uses. Personally, I like them and always use BEC equipped controllers. They limit the number of servos you can safely use, but I've never found that to be a problem for the models I fly since they never use more than four servos anyway. I've never crashed a model because of a BEC, but I've seen several crashes caused by low receiver packs. At least I know that each time I connect a battery to my model I'm flying with a freshly charged pack. For novice electrolytes, I would recommend BEC every time.

You'll notice that each ESC is given a rating in Amps, but you don't need to religiously match that rating to the current your motor will be drawing. All it means is that it's the safe maximum current the ESC will handle. I always like to use an ESC rated considerably higher than the expected Amp level because that means I'm never likely to come even close to its limits. If you aren't stressing it, there's far less likelihood of having problems. Remember, if you fry a BEC equipped ESC, there's always a possibility that it will fail completely. Since our radio gear gets its power from the ESC, the last thing we want is for our model to suddenly become free-flight.

Although virtually all ESCs I've owned proclaim themselves as programmable, don't let that worry you. Equally so, each one has proved itself to be 'plug-n-play'. All have worked precisely as needed straight from the packaging. About the only thing you'll need to be wary of is the voltage set-up. There will be instructions with your ESC regarding this and it is likely to be either auto-detect (it automatically senses the number of cells) or will have a little jumper plug to adjust between three and four cell set-ups.

The reason this is important is because of the low voltage cut-off (the point at which the BEC shuts down the motor and feeds power only to the radio gear). It does battery packs no good at all if the ESC takes the voltage of a three-cell pack down to that of a two-cell pack before shutting down the motor. Not only do you end up with a dead battery, the additional stress this places on the whole system is likely to result in a dead model too.

I can see I'll have to continue this another time. Meanwhile, if you want to contact me, I may be found at:-
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**Miles Hawk Speed 6,** Phil Kent design, 86" wing span, airframe only and all servos.

Price : £250 or VNO
Contact: 0151 486 2495. Liverpool.

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**Aeromodeller annual 1951,** original cost 5 shillings, average wage £7? i purchased two in the same year by mistake.

Price: £19.50
Contact: 01733 553745 marriottsolent@talktalk.net

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