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ON THE COVER

The Comper Swift has long been a particular favourite among scale modellers, for all purposes from Indoor free flight to outdoor R/C. John Carpenter's 1/3rd scale example spans 96". John flew it at the 2013 BMFA Nationals and is reviewed in this issue.

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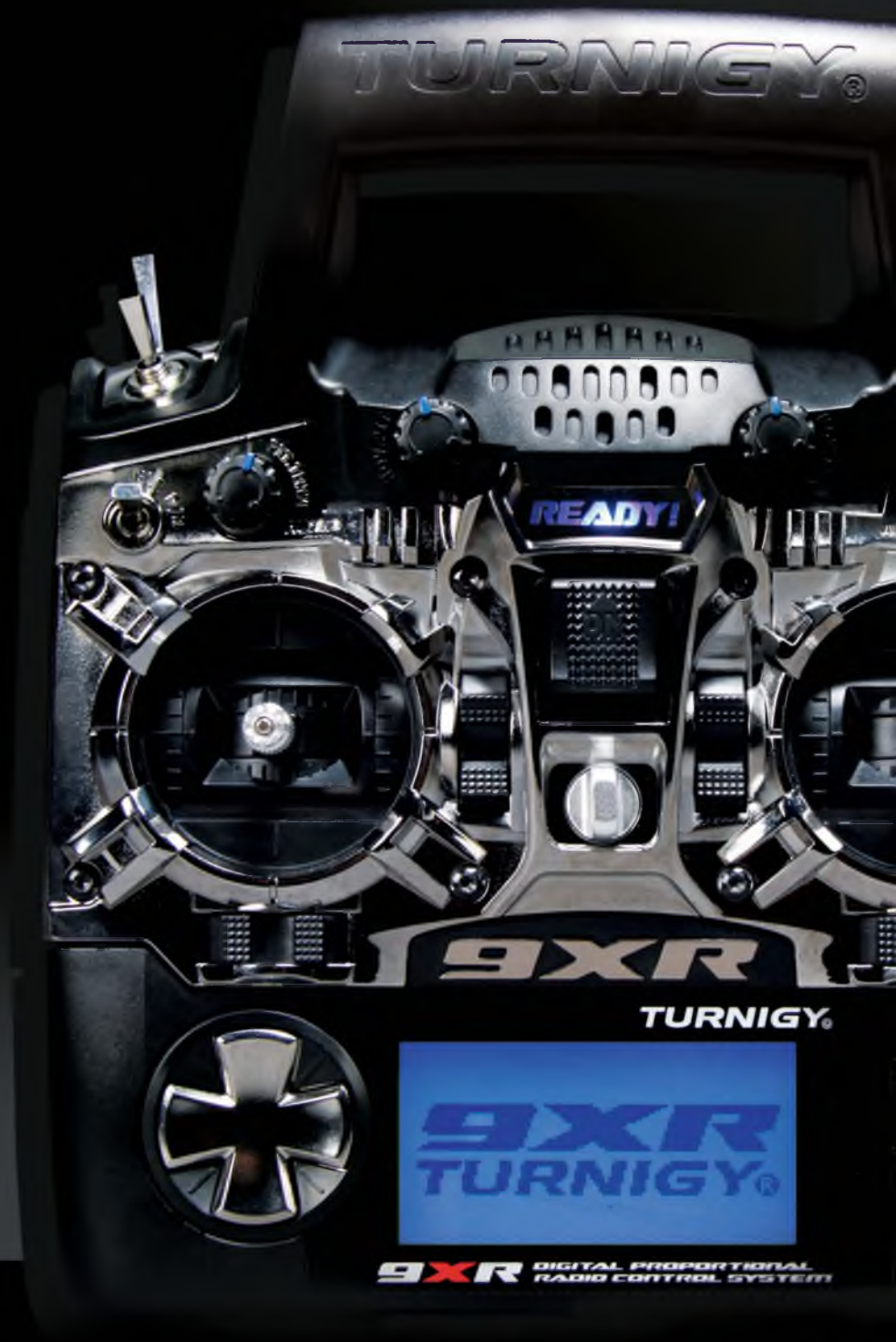

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FLYING SCALE MODELS is published monthly by ADH Publishing, Doolittle Mill, Doolittle Lane, Totternhoe, Beds, LU6 1QX.

EDITORIAL ADVERTISEMENT & CIRCULATION: Doolittle Mill, Doolittle Lane, Totternhoe, Beds, LU6 1QX.
Tel. 01525 222573 Fax. 01525 222574.
Email: enquiries@adhpublishing.com

CIRCULATION TRADE ENQUIRIES: Seymour Distribution, 2 East Poultry Avenue, London, EC1A 9PT
020 7429 4000.

NEWSTRADE: Select Publisher Services, 3 East Avenue, Bournemouth. BH3 7BW.
01202 586848
Email: tim@selectps.com

SUBSCRIPTIONS: Doolittle Mill, Doolittle Lane, Totternhoe, Beds, LU6 1QX.
Tel. 01525 222573. Fax. 01525 222574.

PRINTING: Symbian Print Intelligence, Calverley House, 45 Dane Street, Bishop's Stortford, Herts, CM23 3BT.
Tel: 0870 870 1670; Fax: 0870 870 1675

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CONTACT

Here at FSM we try to encourage scale fans to look beyond the perennial favourites in making choices for new modelling projects. The 'glamour' types attract us all, very often for a combination of achievement in the field of aviation, but at the same time on the principle of elegant appearance - *"... if it looks right, it'll fly right"*.

There are also many types that did not quite 'make the grade' in service, but which nonetheless are worth considering for the individuality that such types offer.

One such, we think, is the Boulton Paul Defiant, WW2 fighter type that made its combat debut during the Battle of Britain period. Unfortunately, as a fighter-to-fighter aircraft, it certainly did not meet with great success, but its individuality, designed to carry its firepower in a rotating four-gun powered turret, will certainly make it stand out in any line-up of model Spitfires, Mustangs etc.

Following this line of thought, we hotfooted off to the RAF Museum for a photo-shoot on what we believe to be the only example still surviving. There, in the gloom of the museum's Battle of Britain Hall, interrupted every hour, on the hour, by 'lights out' for a 20 minute film show, the Editor spent a frustrating morning struggling with the ultra-matt black finish of the Museum's Defiant Mk.1 in night fighter finish. At many angles, really close up, there was not enough light for the editorial camera to even function - but we got there in the end!

The Defiant is our 'Subject of Scale' this month - take a look.

CALLING ALL AEROMODELLER READERS!
CAN YOU HELP US?

At the ADH Publications office, we receive many calls and letters concerning the older issues of AeroModeller. Unfortunately, due to the previous transfers of ownership of the magazine, we do not have a full set of old AeroModeller magazines - but we want to start collecting a set!

We thought you, our readers, might be able to help. We often hear tales of lofts full of old magazines and sadly how many are thrown away because of lack or room, or when relatives are left to dispose of a modeller's possessions.

So, if you have any old AeroModellers surplus to requirement that you would consider donating to the AeroModeller office, we would like to hear from you - we would, of course, collect the magazines and you would be playing your part in the future of the magazine - and hopefully helping new modellers to our hobby!

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BUZZ ABOUT A BUZZARD

In FSM November issue, our chosen *'Subject for Scale'* feature dealt with the little known 1930s powered glider, the Luton Buzzard, which we hoped would fire interest in the type, of which only one was ever produced.

Little did we know at the time that long-time Scale man Martin Garnett has taken up the challenge as much as a year ago. Martin writes: -

"Your feature on the Luton Buzzard in the November issue of FSM caught my eye, as I have a 1/5 electric powered version, awaiting further test flying, when conditions permit. Initial ROG flights showed it has plenty of power, but was over-elevated and the high thrust line causes some interesting pitching problems. Flying weight is at present only 1.6kg.

I started researching the Buzzard about 12 month's ago, so the project has taken some time to get to the flying stage. As you say, there is little to go on apart from various articles that appeared in Flight in 1936, and a few photographs.

A three-view and article appeared in the June 1964 edition of Model Aircraft, plus the AeroModeller *drawing that you re-published (I have both the 1/72 and 1/36 versions available at the time). As you can see, it's been on my 'to-do' list for a long time. Let's hope I can trim it out and get it fly as well as it appears.*

I attach a couple of images, which you may find of interest."

We hope to feature Martin's Luton Buzzard in FSM when testing is complete.

DH MOSQUITO FROM PARKZONE

Here's an interesting translation - **Horizon Hobby's** latest R/C scale ARTF recreates the all-wood **De Havilland Mosquito** 'the wooden wonder' in injection moulded foam. With a wingspan of 49" (1245mm) it uses two 370 size 1300Kv brushless motors turning in opposite directions so as to negate torque and prop-wash effects that are one of the banes of two engine model flight, the motors running from a single 3S 2000-2200 mAh Li-Po power pack.

Ready to fly, with power pack installed, it typically weighs in at 1.2 Kg. (2.65 lbs), or a bit heavier if the optional wing flaps servos and E-flite 10-15 Main Electric Retracts - which are both options well worth considering.

The Mossie kit is supplied to two versions. The 'Plug 'n Play (PNP) comes complete except for radio, battery and charger for £189.99, while the Bind 'n Fly option is complete except for the transmitter for £209.99.

MAXFORD SCALE

MacGregor Industries R/C Division are the new importers for the American **Maxford USA** range of ARTF scale model kits, bringing is a wide variety of types that include a Nieuport 28 (70" span) a 50" wingspan Airco DH2, Antonov An-2 (62"), 59" span Gee Bee Model E, SPAD XIII (68") and a 50" span Boeing PT-17 Stearman.

This interesting collection offers a refreshing range of subjects, each of which are designed to suit a range of power sources including electric, glow i.c and petrol power.

MUSTANG RACER

Unlimited air racing is practiced annually in USA and Reno, Nevada where almost all the participating aircraft are modified, sometimes heavily modified WW2 fighter types. Among those, the P-51 Mustang has long been (numerically) dominant and among those heavily 'cleaned-up' examples is 'Strega'.

RocHobby offer a 1100mm (43.3") ARTF model, powered by a 3648-KV770 motor that runs on a 14.8v 2200 mAh battery, that requires six function radio operating all primary control functions plus flaps and retracts.

CML Distribution supply it to UK model shops and the cost is £184.99.

Nice to see an ARTF Mustang with the tailwheel in the right position!

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Comper Swift

Alex Whittaker puts the scale spotlight on John Carpenter's BMFA Scale Nats 2013 entry

John Carpenter is a well known UK scale modeller, and a regular BMFA Scale Nats entrant. As a 'Lord of Scale', keen FSM readers will be familiar with his fine Scottish Aviation Bulldog, and his equally impressive Percival Provost. His latest work is a very appealing replica of the Comper Swift, a scale subject beloved of generations of scale modellers.

Many UK modellers cut their scale teeth on the famous Veron Tru-Flite rubber version. However, make no mistake, John's beauty is a large model. It is built to 1/3rd scale, weighs 21 lbs, and packs a

30cc Laser glow engine but, since the original is so petite, John's comely Comper Swift comes out at a manageable 96" span.

The full size

The Comper Swift was conceived as a racer and was designed by Nicholas Comper in 1929. Comper had been an RAF pilot and aircraft designer, having previously designed a number of aircraft for the Cranwell Light Aeroplane Club. These were the C.L.A 2, C.L.A 3, and C.L.A 4. Seeing a commercial proposition, he set up the Comper Aircraft Company specifically to build and market this design, the prototype of which first flew in January 1930 from Hooton Park on The Wirral Peninsula. Registered G-AARX, it was powered by a 40hp ABC Scorpion piston engine. The result was a single seat, braced high wing monoplane with a pleasing appearance, constructed mainly of spruce, and fabric covered. It spanned 24 feet, weighed 540 lbs, and had a height of just 5' 3 1/2".

The Comper Swift proved a success and in total 45 aircraft were built, fitted with various engines. Some examples used the Pobjoy radial engine, and the later 'Gypsy Swifts' were fitted with DH Gypsy in-line engines.

One Swift was owned by the Prince of Wales, the future King Edward VIII. The Royal Comper won Second Place in the 1932 King's Cup Air Race, but not with the heir to the throne in the cockpit. A number of Swifts still raced as late as the 1950s.

1: Very nicely modelled: the distinctively scalloped Comper spats. 2: Despite appearing a simple aircraft, the Comper has lots of hatches, handles, apertures, and panels. 3: Rudder, fin and tail with scale rib tapes, hinges, struts and fastenings. Note accurate skid too. 4: I have examined the real one minutely at Old Warden, and John's rendition of the Pobjoy engine is excellent. 5: The pilot looks cheerful enough, but forward vision must have been dodgy. 6: John has executed the cockpit and instruments very crisply. Lovely cockpit edging, lacing, and grommets.

7: The Comper's prominent strut bracing. 8: Pretty tail assembly. Note rib tapes. 9: Convincing rendition of the Pobjoy's distinctive crankcase casting, as well as the impressive finning on the cylinders. 10: The opening rear locker was originally designed to take a set of golf clubs. 11: The model really does have the feel of a classic light aircraft. Laser 180 power.

There are eight examples extant, including one at Cosford, and one in the Shuttleworth Collection at Old Warden. There is even an airworthy replica, G-LCGL.

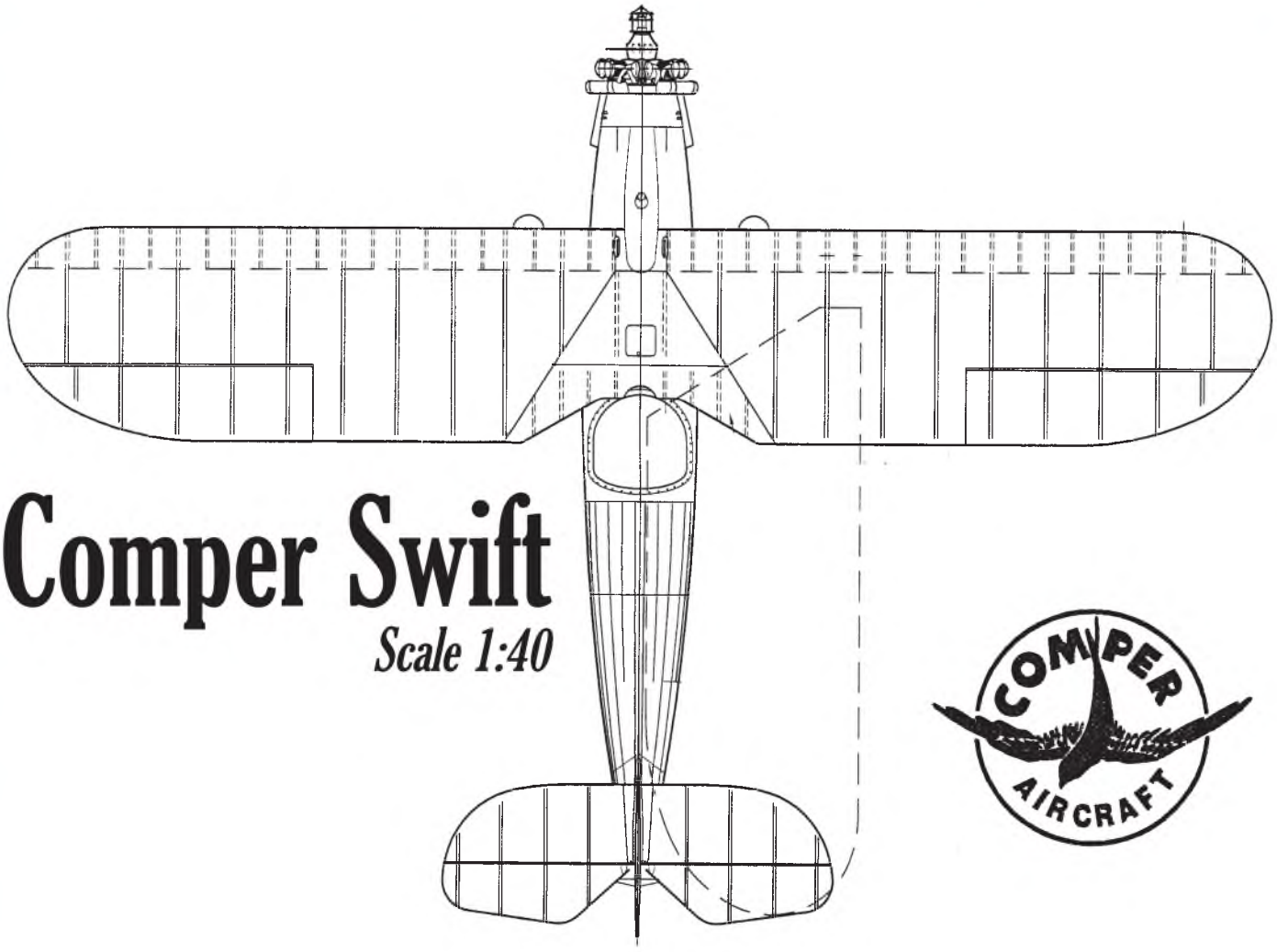
Plan

John based his plan on the full size example G-ACFT, kept at Old Warden. This Swift had an eventful career before joining the Collection, beginning life as the ninth to be built in 1932. Like all the Swifts, it was given a fifteen minute personal test flight by her designer, thereafter originally sold to Alban Ali as VY-ADO *'The Scarlet Angel'* in India. She joined the UK register in 1934, and had a number of owners who raced her, before being bought by the Shuttleworth Collection. This example has a Pobjoy Niagra piston engine.

Documentation

John's scale documentation is based on his own research and the many photographs of G-ACFT he took at The Shuttleworth Collection Old Warden.

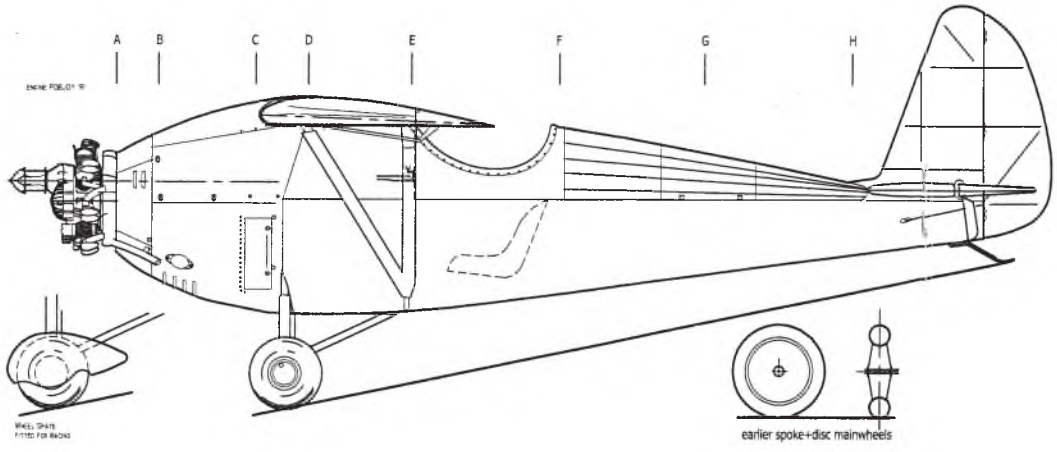
The Comper Swift is a compact but appealing airframe.

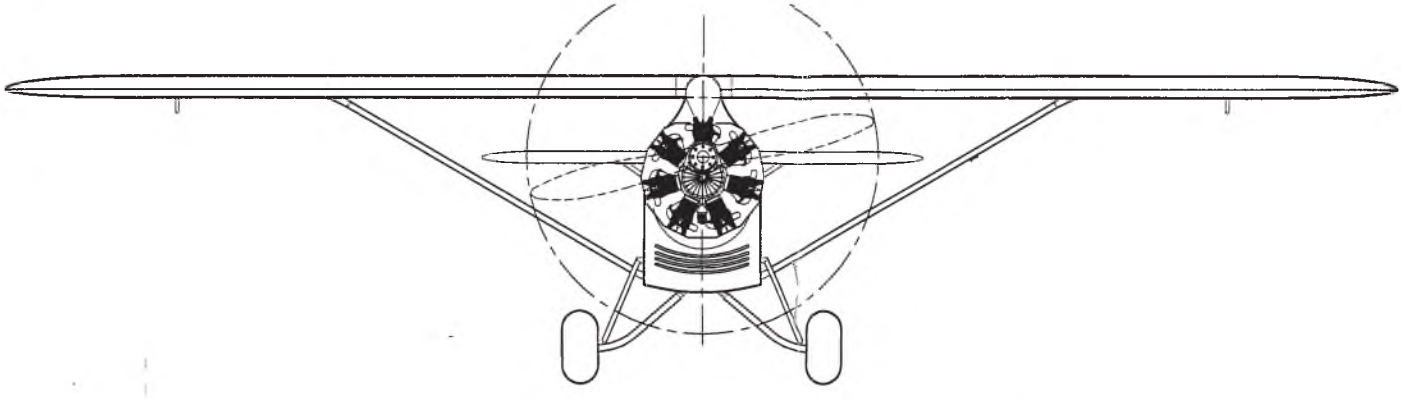


Comper Swift

Scale 1:40

COMPER AIRCRAFT





Light aircraft flying, Roaring Twenties style!

MODEL SPECIFICATION

Comper Swift - Designed by John Carpenter

Scale:	1:3
Wingspan:	96"
Weight:	21 lbs
Engine:	Glow 30cc
Prop:	Master 18"x8"

Construction

Throughout, the model is of traditional construction, with copious use of balsa, and some plywood. The fuselage is made up of Basswood longerons, with ply and balsa formers. Recycled printer's litho plate represents the metal panels of the aircraft forward fuselage.

John designed a two piece plug-in wing, with aluminium tube internal bracing. Wing struts are made up from aluminium tube, faired with wood, as per the full size.

The tail is balsa with a laminated outline in balsa, while the built-up balsa fin is located on a carbon fibre tube

Engine

John's model uses a *Laser 180* glow

engine driving a *Master* 18"x8" prop eller. Exhaust system is a standard Laser exhaust leading via flexi-tube through the front fuselage. It then exits through the fuselage and oil cooler on the underside.

Undercarriage

The model employs a scale lever type undercarriage, with bungee cable damping.

Surface finish

All the open frame areas are covered in Solartex, finished with Mick Reeves epoxy paints have been used throughout.
All legending and decals were hand painted. with some use made of Flightline Graphics masks.

Scale details

The original had a luggage hatch in the rear fuselage intended to ferry golf clubs and the like. This opens for access to the rudder and elevator servos located within. There is a scale wing locking on mechanism on the wing centre section. The rear part of centre section folds forward as per full size. The highly convincing dummy engine is removable, as is the front panel immediately behind it, for full access to the engine.

Pilot's notes:

The paint was still fresh on the Swift at the BMFA 2013 Scale Nats. In fact, John was still coming to terms with her handling, so his initial remarks are a bit tentative:

"The model is very new, having had only five flights prior to The 2013 BMFA Nationals. Although the basic trim is set, it will take a lot more flights to get comfortable with it. Nevertheless the Comper has proved surprisingly aerobatic, if a touch wayward at the moment ...".

Mind you, as the rest of us watched her fly we were totally unaware of these issues. She looked very historic and attractive in the air. ■

Climbing out over Lincolnshire.

PART 3:

THE TRIPLANE LAYOUT MAKES THIS APPEAR A QUITE COMPACT MODEL, BUT AT 1/6TH SCALE, IT REQUIRES THREE DOUBLE SIDE FULL SIZE PLAN SHEETS TO COMPLETE, SO THIS FEATURE WILL RUN OVER THREE PARTS

Impressive, isn't it. Just how realistic the model can be made to look with just a little care and a lot of knowhow.

As we left things last time, virtually all the basic building was done and we had a model ready to cover and detail. On Darrin's original Dr.1 model he went a little over the top with scale fittings and included quite a bit of metalwork that all conspired to push the weight up. Whilst nobody could deny the realism of the model here, he was a little more restrained with what went on and what didn't. The result is that this present model is over a pound lighter than his first attempt.

As we all know, if you don't want a Fokker Triplane that has to fly at the scale speed of an F-16, keep it as light as you can. I think that Darrin has demonstrated most admirably that with careful selection of what detail you include, and how you go about producing it, saving weight doesn't have to mean sacrificing scale

A good view of the weathering Darrin added to his model. No, those aren't real mud splatters on the lower wing.

FOKKER Dr.1

Concluding the construction article for the 1/6 scale model designed by Peter Rake and built by Darrin Covington.

realism. I've seen full size replicas that look less like the real thing than Darrin's model does.

The one place you won't need to save weight is at the front of the model. I've very seldom seen models of WW1 types that end up nose heavy, so extra weight here is no bad thing at all. By contrast, the metal mounted, sprung tailskid of Darrin's original model wasn't such a good idea and required quite a bit of dead weight adding to the front to counter it.

Installation

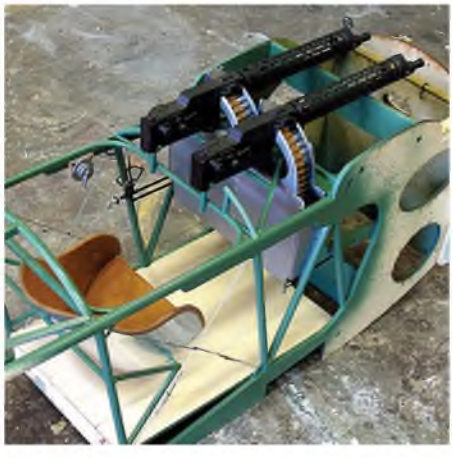
The model was deliberately designed to keep all the radio gear tucked out of sight. Darrin had made it quite clear that he wanted his cockpit interior to be as detailed as possible and this works well because it means all the servos are well forward in the fuselage. However, as mentioned last time, this does mean that it's far easier to fit them and arrange your cable runs before you have a fully detailed and covered fuselage to work around. Servo positions are indicated on the plan and those positions work well.

Because Darrin wanted scale type aileron linkages, with cables running from separate aileron servos mounted in the fuselage, the aileron servos are tucked away where they will be totally hidden by the ammunition boxes, should you decide to go to that level of detailing.

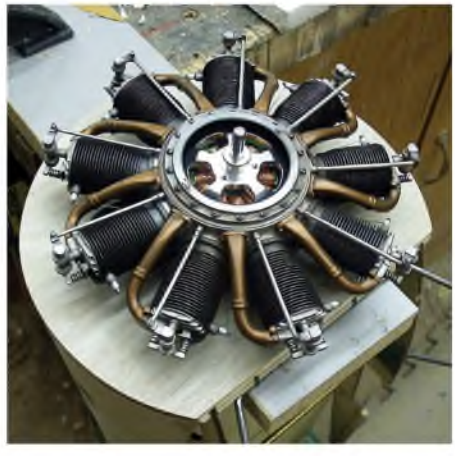
As you can see, the rudder and elevator servos are mounted low in the forward fuselage, in front of where your pilot's feet will come and inverted so the cables can run below the cockpit floor. Access to these, and the battery pack, is via the hatch under the nose. You'll also need to fit your receiver and ESC into this area, so make sure that you can still remove the battery without too much trouble. Of course, if you only intend to fit a partial dummy engine, the ESC can easily be fitted within the upper cowl area.

As regards the cables themselves, although the plan shows nylon tube cable guides, Darrin actually fitted some small

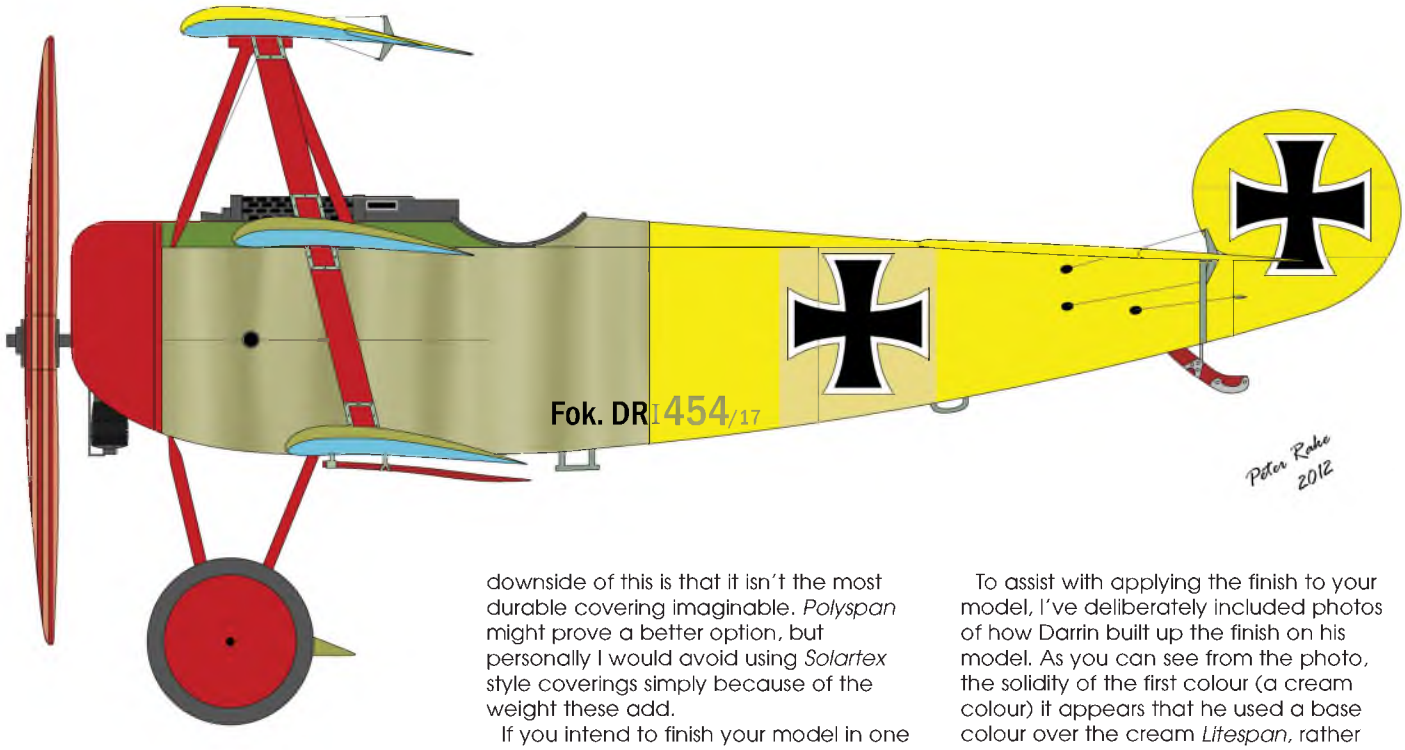
Here you can see how the vac-formed cowl Darrin used fits around the very realistic looking dummy engine. An all-wood cowl is aperfectly feasible alternative.



As well as showing off the partial cockpit interior, this shot also reveals how the ammo box will hide the aileron servos and the fairleads the remaining cables pass through. (Behind and below the seat.)



The centre of the Williams Bros. engine was removed to allow clearance, and cooling, for the motor.



fairleads on his model. At this sort of scale, nylon coated trace wire is really the only suitable choice for the cables.

As drawn, the cables use scale exit positions and you may want to incorporate some light reinforcing behind where they exit the covering, as well as the scale reinforcing patches on the outside.

Covering and finishing

In an attempt to save weight, Darrin covered his model using *Litespan*. The downside of this is that it isn't the most durable covering imaginable. *Polyspan* might prove a better option, but personally I would avoid using *Solartex* style coverings simply because of the weight these add.

If you intend to finish your model in one of the more colourful schemes, you won't have to worry about the 'streaky olive' finish. However, since it was normally evident somewhere on even the most colourful examples, a few words about it may be in order.

Contrary to popular belief, it isn't just green paint roughly brushed over clear doped fabric. It is actually a combination of colours, green, grey and even blue, brushed on in stages and in a particular fashion. Totally random is the last thing it was.

To assist with applying the finish to your model, I've deliberately included photos of how Darrin built up the finish on his model. As you can see from the photo, the solidity of the first colour (a cream colour) it appears that he used a base colour over the cream *Litespan*, rather than brushing directly onto its much more translucent finish. No single colour, apart from the base coat, provides total coverage. Each is brushed on with the brush practically dry to give the streaked effect and it's the combination of multiple applications that results in the finished colour.

Assembly

For the purpose of this section I'll assume you are building the model as designed, a one-piece assembly.

Although still missing its' cowling, Darrin's model reveals the intricate but not particularly complicated structure.

Because they are pretty much self -aligning, the lower and middle wings are the ones we need to fit first. However, because of how the wings fit around them, the centre-section strut and landing gear assemblies will need to go onto the fuselage, and have their fairings added before the wing panels are in the way.

Whether, or not, you have the interplane struts already installed in your centre wing panels is a matter of personal preference although, if you are intending the level of detail that Darrin included on his model, it pretty much eliminates the option of sliding them through the wing - the brackets get in the way. If I recall correctly, Darrin actually split his i/p struts into top and bottom struts so he could get them fully detailed before the assembly stage began. It isn't actually the way the model was designed to go together, but it is an option. Personally, I prefer the extra security of a single piece strut, slid into place, any detailing then added after they are installed on the model. Therefore, I'll base assembly on that arrangement. For all assembly I would suggest one of the slower setting epoxy adhesives, so you have ample time to get everything aligned correctly before it starts to go off.

The first task is to accurately mark the centre wing position onto the i/p struts and, without using so much glue that it makes a mess, slide them into the wing panels. Fit the wing panels to the fuselage, gluing if desired, and set the model on its' nose for the next step. This will help avoid the c/s struts sliding about while you fit the bottom wing. Glue the bottom wing in place, making sure it seats accurately into the cut-out, and as you fit it engage the strut ends into their sockets in the bottom wings. Throughout this assembly stage, and while the glue sets, keep checking that everything is aligned precisely as it should be. Epoxy is notorious for 'slipping' as it cures because it warms up and thins before it finally sets. Allow this assembly to dry completely before attempting to fit the top wing.

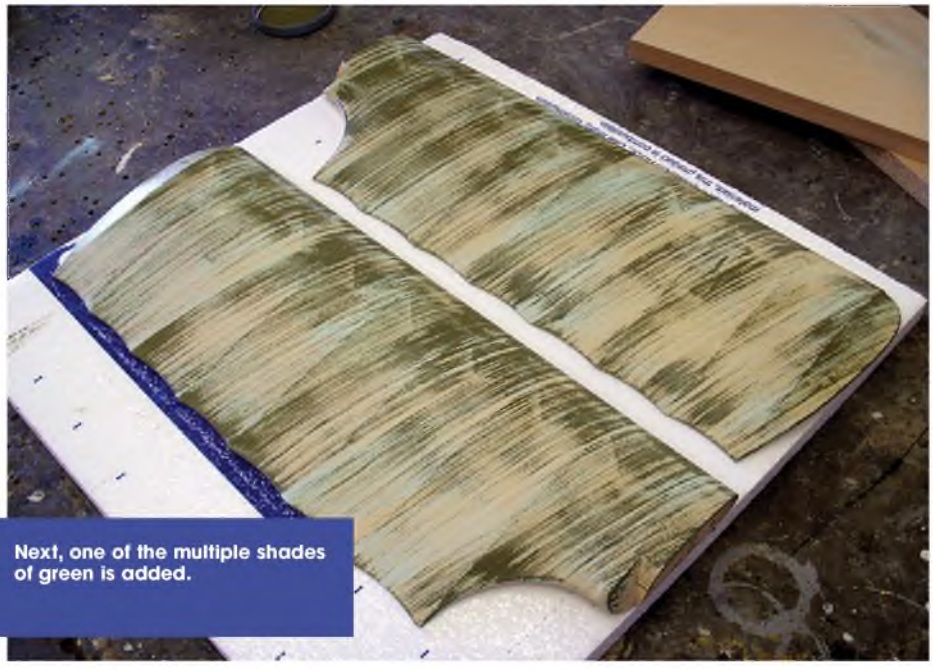
While fitting the top wing it is probably best to work with the model inverted, so the epoxy doesn't drip from the sockets into which the struts will fit. Apply epoxy to the slots, fit the wing onto the strut ends, including the i/p struts, and slip the guides back onto the wings, to hold the top wing at the correct incidence angle while the epoxy cures.

Use the wing/fuselage assembly as a guide to accurate alignment of the tail surfaces and complete the assembly

The litho plate panels Darrin made up to fair around the middle wings after the basic assembly was completed.

Test fitting the litho plate parts on the temporarily assembled structure. Note how the aileron cables exit.

With the base coat dry, the first of the streaky olive colours is applied.



Next, one of the multiple shades of green is added.

The final application of green finishes the effect. Even the scale ply skinning helps add realism to the finished item.

by making the linkages between the servos and control surface horns. Don't discount the ply horns, they are more than strong enough for the job and look infinitely better than commercial horns will.

The Triplane airbourne

Darrin reports that his model tracks nice and straight on the ground, only requiring minimal rudder correction to keep it on line. As such, take-off is pretty much straightforward. Just remember to let the model build up plenty of speed on the ground before easing it into the air. The surest route to disaster with this type of model is to haul it off the ground before adequate flying speed has been reached. Typical behaviour if you do is for the model to wobble a bit, drop a wing and perform an 'interesting', if somewhat destructive cartwheel as it hits the ground. Believe me, I know of what I speak. I had a 1/6 scale Nieuport 11 do just that when it found a molehill and launched itself prematurely, long before adequate flying speed had been reached. Remember, these models fly on the wing (s), not the prop. All an excess of power will produce is a model that wants to climb all the time. Bear in mind that the model uses a very close-to-scale wing section, and the original had pretty much one speed. Rotary engines didn't have a throttle as such, but relied on 'blipping' the engine to reduce power, so it was either full power or a stuttering reduced 'throttle'.

As regards the actual flying, the model responds well to control input and is quite smooth to fly. What, however, is likely to cause problems for the unwary is landing the beast. Fokker Triplane models are notorious for being awkward to land. Those very far forward wheels and overall tall nature of the aircraft require a fairly deft touch on the transmitter to prevent the sudden drag of touchdown resulting in the model resting on its' top wing. Not likely to cause damage if you fly from grass, although actually made worse by the grass itself because it is more drag inducing than a paved runway. Attempt to bring in the model tail low and touch down as gently as possible to avoid the problem. Easily said, but much more complicated to actually get right. Then again, if it was easy any fool could fly scale models. ■

Worth noting is the directions the various streaking takes on the entire structure. The axle fairing is deliberately left plain.

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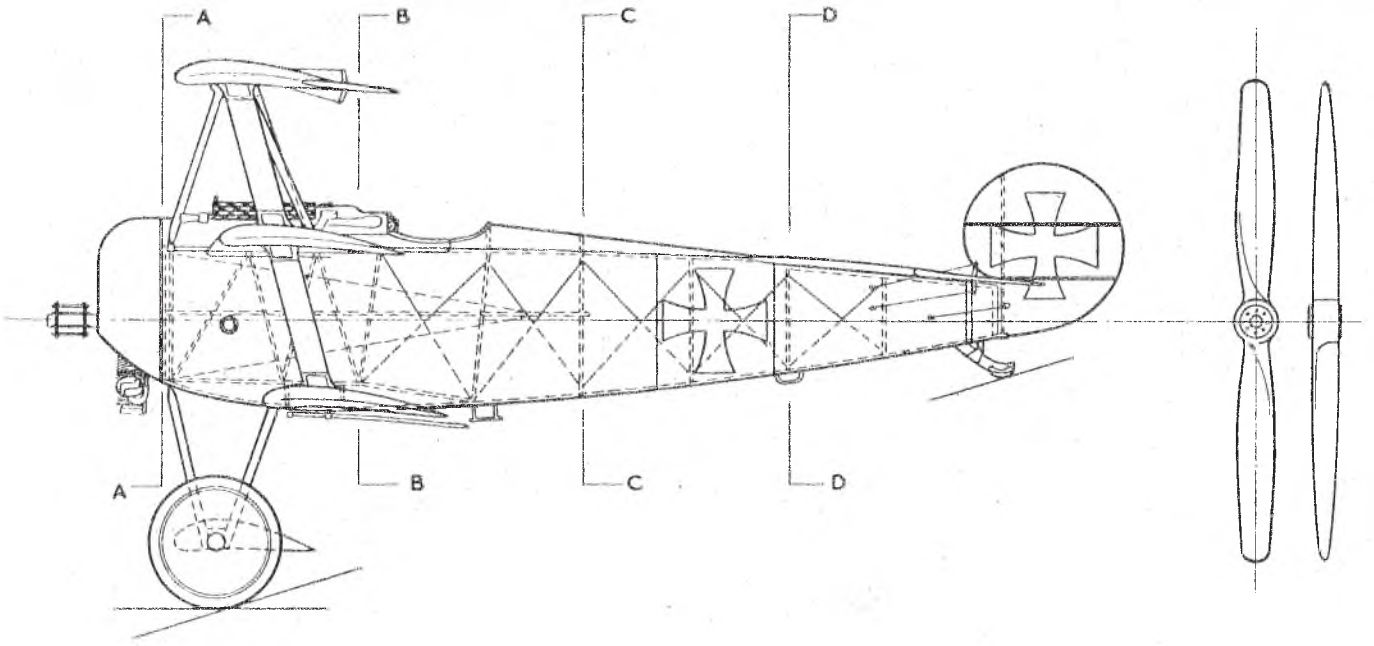
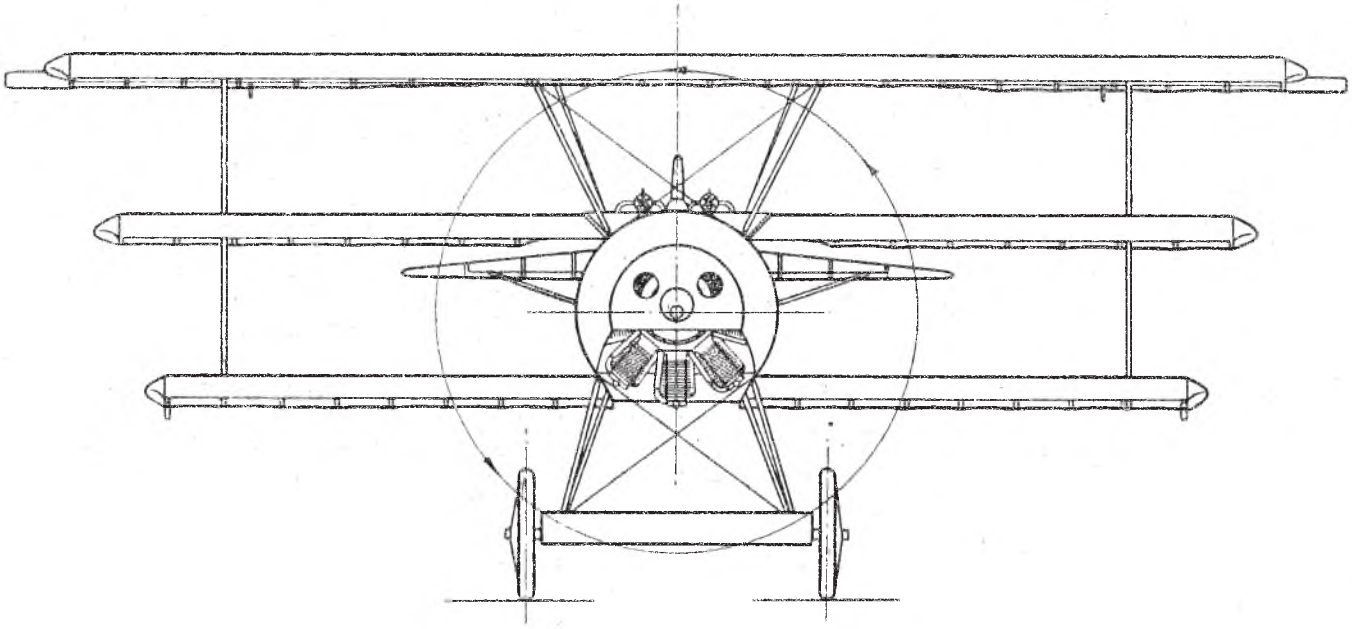
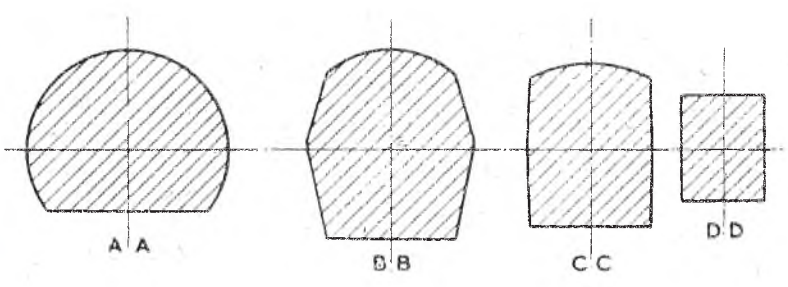
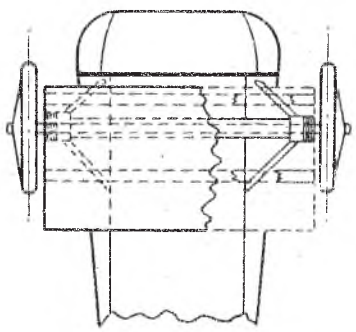




COLOUR DETAILS

Dr. Is first left the factory camouflaged in narrow streaks of dark greyish green and lightish brown on the top and sides, and a pale sky blue underneath, until the introduction of colour-printed 'lozenge' fabric at a later date, When first received by Staffeln, aircraft were considerably brightened up by the application of coloured identity bands, etc., to fuselage and/or tail.

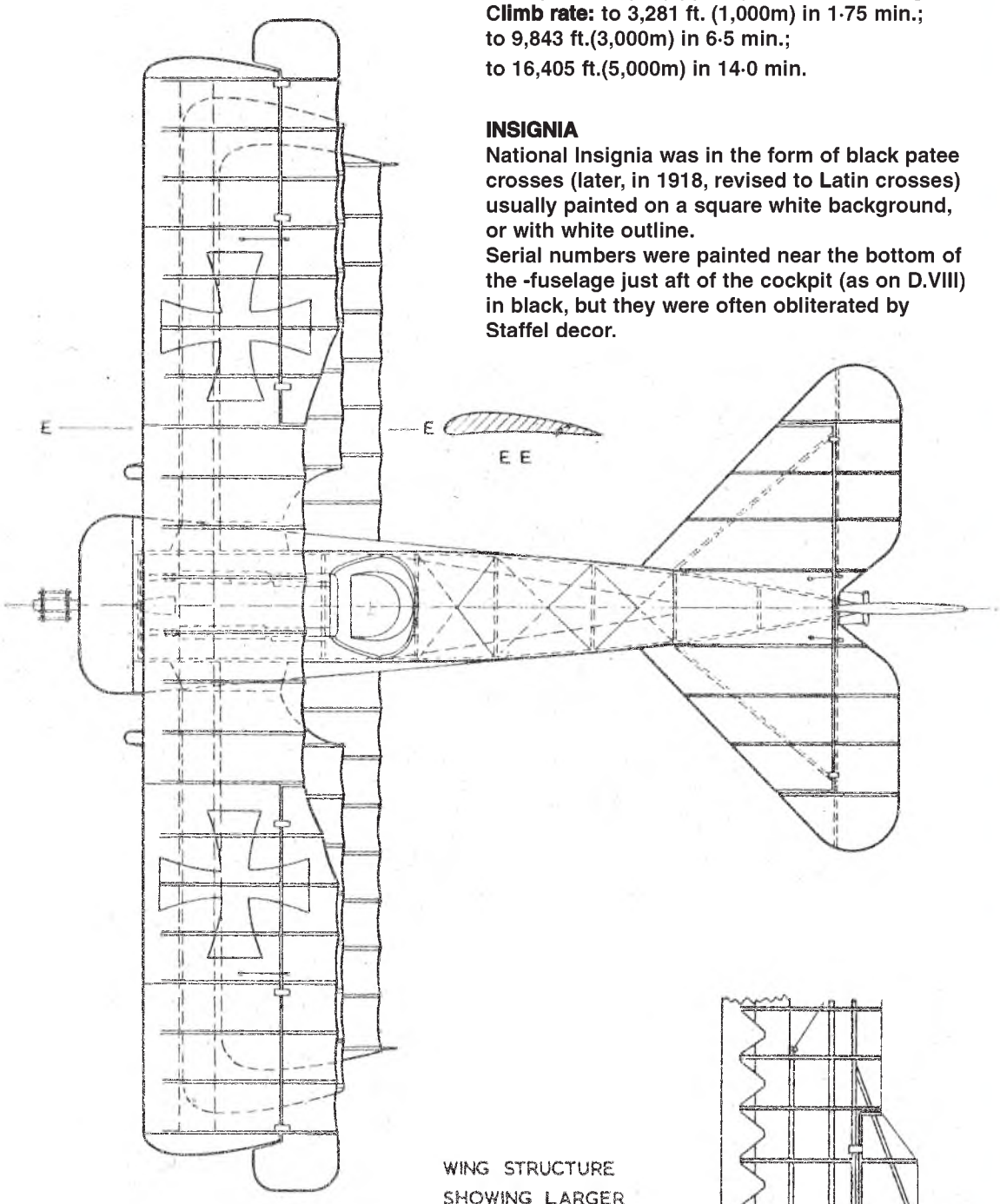


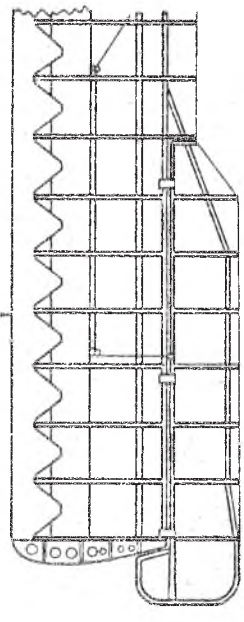


FOKKER Dr.1

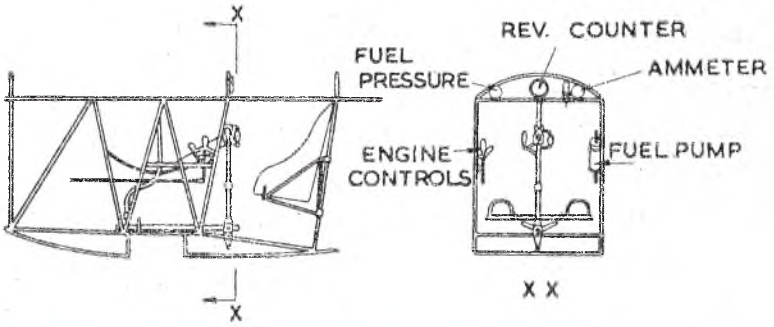
DATA
Engine: 110 h.p. Oberursel or Le Rhone.
Wingspan: 23 ft. 7 in. (7.19m)
Length: 19 ft. (5.59m)
Height: 9 ft. 9 in. (2.97m)
Weights: 1,259 lb. (572.3 Kg) loaded; 829 lb. (376.8 Kg) empty
Speed: 115 m.p.h. / 184 kph(approx.) sea level; 80 m.p.h./128kph (approx.) at service ceiling.
Climb rate: to 3,281 ft. (1,000m) in 1·75 min.; to 9,843 ft.(3,000m) in 6·5 min.; to 16,405 ft.(5,000m) in 14·0 min.

INSIGNIA
National Insignia was in the form of black patee crosses (later, in 1918, revised to Latin crosses) usually painted on a square white background, or with white outline.
Serial numbers were painted near the bottom of the -fuselage just aft of the cockpit (as on D.VIII) in black, but they were often obliterated by Staffel decor.





WING STRUCTURE SHOWING LARGER PORT AILERON ON SOME VERSIONS



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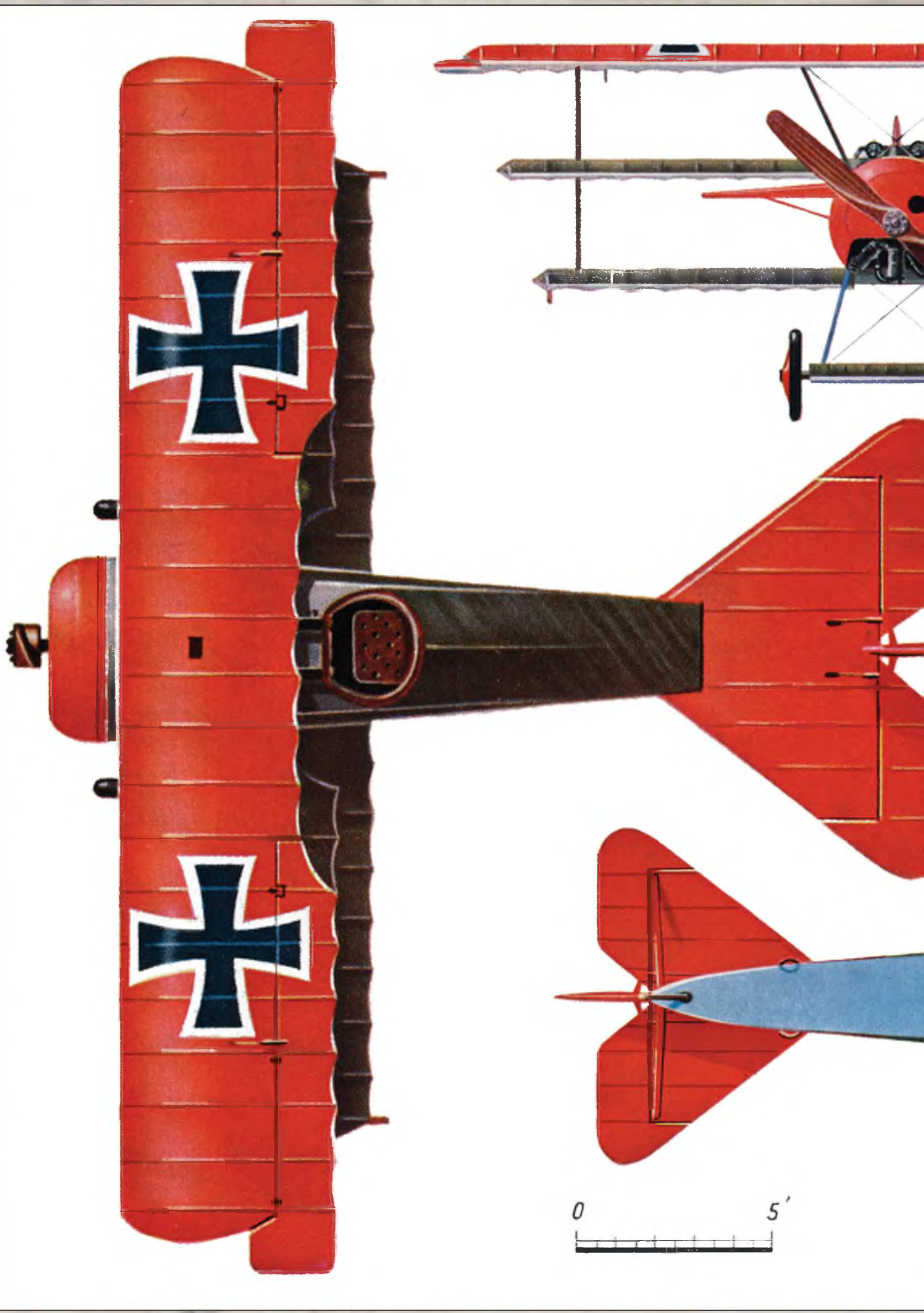
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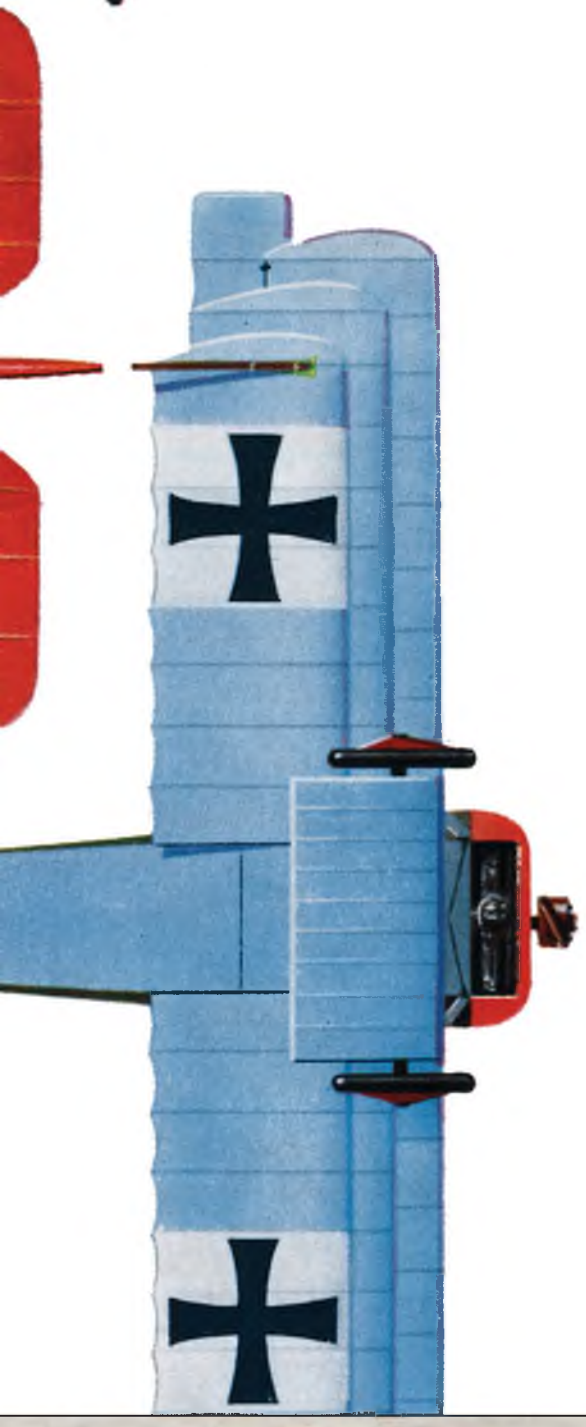
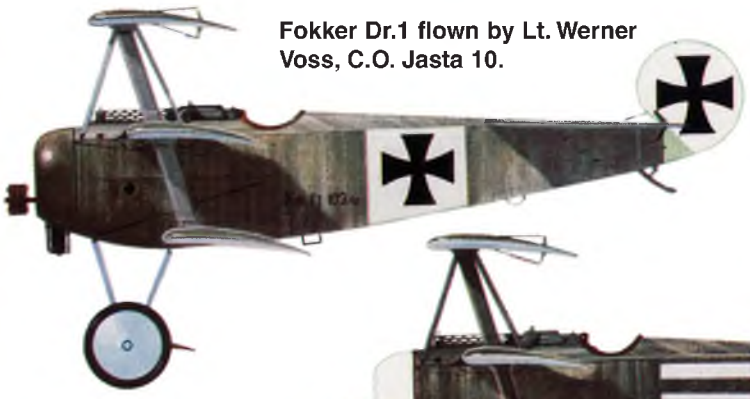
More FOKKER Dr.1

Flying Colours



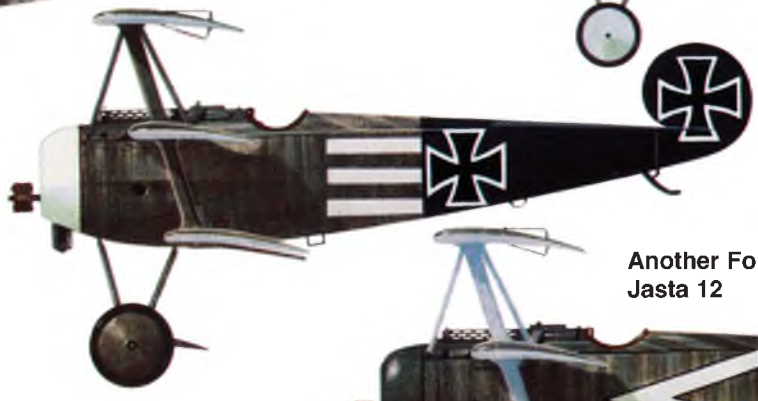
Fokker Dr.1 serial 152/17, as flown by Manfred von Richthofen, mid-March 1918

FOKKER Dr.1 *Flying Colours*



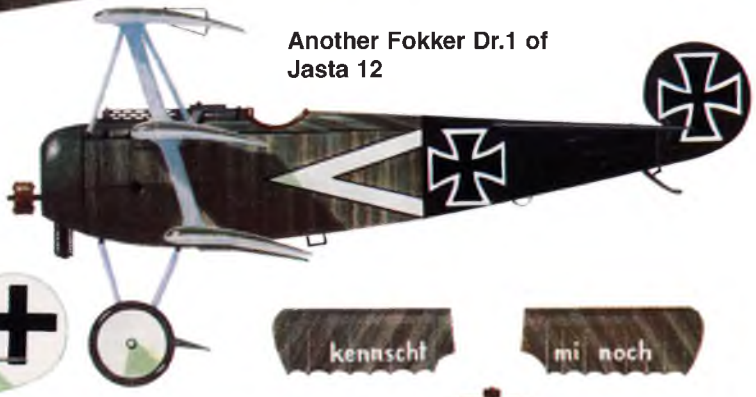
Fokker Dr.1 flown by Lt. Werner Voss, C.O. Jasta 10.

Fokker Dr.1 flown by Lt. von Linsingen, Jasta 11.

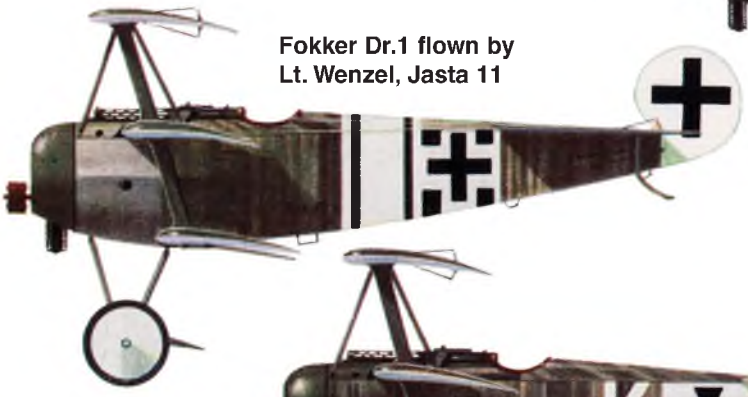


Fokker Dr.1, Jasta 12

Engine cowl of Lt. Werner Voss's Dr.1



Another Fokker Dr.1 of Jasta 12

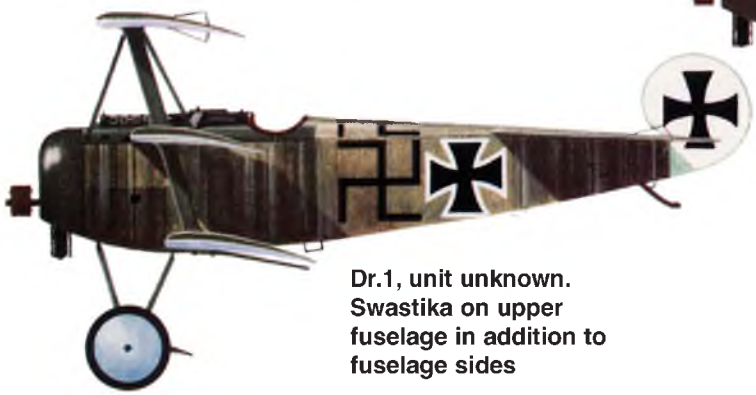


Fokker Dr.1 flown by Lt. Wenzel, Jasta 11

Upper wing surface detail on Lt.Kempf's Dr.1

Fokker Dr.1 flown by Lt. F.Kempf, Jasta 2 (Boelcke)

Dr.1, unit unknown. Unusual tailplane insignia.



Dr.1, unit unknown. Swastika on upper fuselage in addition to fuselage sides

Dr.1, unit unknown. with post April 1918 insignia

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Techno Scale

Mike Evatt sca

Walter 'Walt' Musciano is a legend in control line flying. An award winning designer and flyer, he is best known for the numerous great designs he created for the Scientific model Company in the 50s and 60s. Many veteran flyers first took to the air with one of Walt's great 1/2 A models. Black Hawk Models at www.blackhawkmodels.com offers a collection of these 1/2 A and other designs to the current control line flying community. The SE-5 Scale Flying Model designed by Walt in1957 has a span of just 12ins and may be powered by .049 -.074 engines. **Black Hawk Models** faithfully reproduces this historic aircraft. One of Walt Musciano's great designs, this colourful scale bird will turn heads at the flying field.

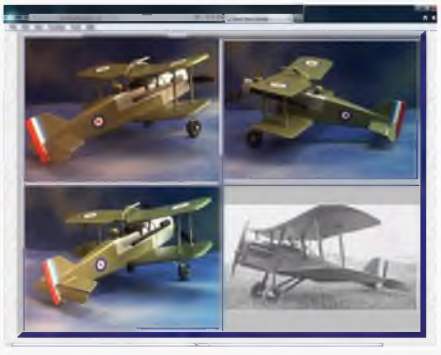
Looking for an engine for that next project? Then look no further than **Model Engine Corp of America** which claims to be the USA's largest supplier and manufacturer of precision model engines.

Its website at www.mecoa.com reveals a plethora of delights including the Kavan 50 cc Four Cycle Twin. The Kavan 3 Cubic Inch is one of the most outstanding engines available. Truly superb casting and impeccable German workmanship provide you with a true masterpiece. The FK50 is a scale version of the world famous continental engine that was used in many popular early light aircraft. This alternate firing 4 cycle twin is virtually vibration free, extremely fuel efficient and is available in both glow and spark versions.

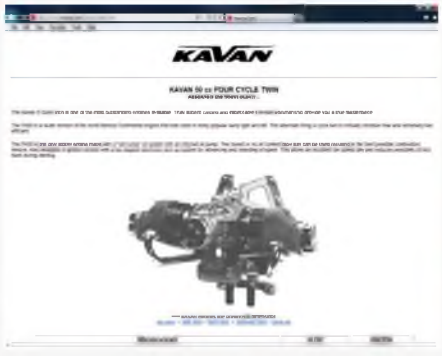
Atomic Workshop at www.atomicworkshop.co.uk specialise in the design of ultra-light electronic products for free flight aircraft. The Zombie Flight Profiler adds a new dimension to electric free flight modelling. Now you can pre-set both throttle and motor run times which are programmable over 2 unique phases. The Zombie features two user adjustable power/time phases, 4 amp speed controller, built-in battery charge indicator with low battery shut off to protect your lithium polymer cells from over discharge and on-board ON/OFF switch. Suitable for 3.6V - 10V.

I always enjoy visiting the web pages at http://peanut.scale.free.fr This is **Christophe Tardy's** French site devoted to Peanut scale models, with photos, plans, 3-views and a whole stack of interesting articles. It is in French, with some English translations, but you can always use an on-line translator such as the one available from Google. Here you will enter the fascinating world of aircraft models made with paper and balsa, flying without any noise. 13 "wingspan, a flying wieght 10 grams, and a loop of rubber for power they are an art-form as well as aerodynamic gems. This website displays some rare delights such as the Udet U12 Flamingo shown in the screen-shot.

Golden Age Reproductions has been producing model plane kits and plans for thirty years and has been promoting interest in the civilian and military planes of the Golden Age of Flight. In addition to producing 43 kits of the highest quality, they also offer 240 various model plane plans of that era. These kits are outstanding free flight scale rubber powered models. Some of them can be modified to electric or micro R/C. The models are contest-competitive but can also produce great flying for sport flyers. I like the lovely little Boeing F4B-4 22" wingspan shown in the



One of Walt Musciano's great designs a 1//2A C/L SE-5.



The FK50 is a scale version of the engine used in popular early light aircraft.

The Zombie Flight Profiler adds a new dimension to electric free flight modelling.

Christophe Tardy's French website is devoted to Peanut scale models.

Golden Age Reproductions has been producing model plane kits and plans for thirty years.

If you really want BIG! Falcon Aviation's new Fournier RF4-D is half full size!

ns hyperspace for more TechnoScale Topics...

screen-shot. Check it out at www.goldenagereproductions.com

If you really want BIG! Then visit **Falcon Aviation** at their new website and on-line shop at www.falcon-aviation.co.uk Their new Fournier RF4-D is half full size and has a span of 18.5ft! Following the success of the 1/3rd scale version they took the challenge to go a bit further - producing the BIGGEST KIT in the World! Falcon Aviation is dedicated to the Large Model market and brings the modeller many innovative designs and prototypes. For over 10 years has been the the UK's Leading Specialists in Large Models and Accessories and Laser Cutting for kits and one-offs.

If you really want something different then visit www.ladbrokehobbies.co.uk and drool over their autogyros. Their Arrow AC10 autogyro with a 3.2m rotor diameter is a very large scale model.

The structure has an aluminium frame precisely welded and fibreglass fuselage. The horizontal tail and vertical rudder are polystyrene and wood covered. All the major parts can be disassembled. The universal joint and the rotor head are CNC machined aluminium and equipped with bearings. The exceptional flight performances as well as the beautiful line and elegance of their Arrow AC.10 are the source of satisfaction for aero-modellers and pilots alike.

Seen on the **Jet Model Products** website at www.jetmodelproducts.com - the JMP Pneumatic Control Unit. This designed to control the brakes, retract gear cylinders and landing gear door cylinders of the most complex r/c model aircraft. The goal of the PCU is to eliminate the complexity and disorganized nature of model pneumatic systems. Most installations have many t-fittings that cause unavoidable pressure drops across the entire system. This problem is eliminated with the PCU.

Top Model are located approximately 15km from Romorantin - Lanthenay, in the Region Central in France. Their modern store, the largest of its kind in France, has more than 1300 sq. meters of floor space and the largest stock of RC model aircraft in the country. What caught my eye on their website at www.topmodel.fr was their L-39 ALBATROS by Spark Aviation Co. Ltd. This is a superb 1:5 scale model of the famous jet trainer of the Czech air force. This L-39 is very popular because it is pleasant to look at and it flies extremely well.

The magnificent Ventus 2 AX/CX is available in both 5.00m and 6.00m versions. Airtech is a French manufacturer of R/C gliders. They offer a wide range of models dedicated to thermal or slope modellers as well as a range of composite materials. Their website at www.airtech-rc.com describes the models they produce. Just click on the picture to get more information about the kit. They ship the models around the world by post. Ask them for a shipping cost.

Premier Pilots with a web address of http://premierpilots.net offer a range General Aviation pilots, WWI Pilots, WWII Pilots (USAAF, Luftwaffe and RAF) and 'Plane Jane' in 1:4 scale, loaded with the right accessories ready for your masterpiece and scale competitions. Premier Pilots are jointed and may be posed to suit your needs. Also available from them is a rather nicely engineered Canopy hinge designed for 1/3 and larger Sailplanes and is made from machined aluminium and stainless steel. This allows the canopy to be raised and removed to allow access to your sailplanes cockpit.

The Arrow AC10 scale autogyro with a 3.2m rotor diameter is truly something different!

The Jet Model Products Pneumatic Control Unit.

L-39 ALBATROS by Spark Aviation Co. Ltd available from Top Model.

This magnificent Ventus 2 AX/CX is available from Airtech.

A rather nicely engineered Canopy hinge from Premier Pilots.

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

mikeevatt@hotmail.com

THE QUIET ZONE

R/C SCALE ELECTRICS BY PETER RAKE

Yes, it's that time again, so it's no use you trying to hide. That b****y man is back again to bend your ear with more electric flight meanderings.

Now I'm trying to recall exactly when this will appear on your doorstep. Whenever that might be, it's likely to be some time after Christmas. Just about the right length of time after for you to be wondering just what you're going to do with that useful looking radio gear salvaged from the wreckage of your ARTF model you got as a gift. Even if was a rotary winged devil (helicopter) it won't matter. Four channel helicopters have very similar innards to ARTF aircraft so you should still be looking at a PC board with integral ESC and servos that can be used in a three channel, fixed wing model. If so, you're in luck because that is precisely what you're getting this month.

Unlike my usual practice of only presenting half the plan per issue (the construction article will continue next month), this time you get the entire plan and just a little waffle from me. Okay, I'll admit it; I'm fed up with forgetting which part of the plan you already have. Just put it down to deteriorating brain cells due to age. It comes to all of us eventually, so it's pointless you smirking. That being the case, it means I have limited space here, so I won't waste any more of it waffling.

The White 'sport' Monoplane

The original aircraft was sold as a kit of parts for home assembly. You provided your own engine, usually in the form of an ex-motorcycle item. Being American, it would probably be stripped from a Harley or Indian.

As such, there is precious little information about the full-size aircraft. That in itself isn't necessarily a disadvantage because it gives us a pretty much free hand with regards colour scheme. With that in mind, I finished my model as I might have done

NOTHING VERY COMPLICATED INVOLVED IN BUILDING THIS MODEL BUT FULL DETAILS WILL APPEAR NEXT MONTH.

a full size machine built with these fair hands. Whatever, I like the way it looks and that's really all that matters.

The model

As is usually the case with these small models, this one is a scaled down, and lightened, version of a previously successful design.

The equipment used is a *Vapor* 'brick' (receiver, servos and ESC all in a neat, convenient size block), an AEO 7 mm motor unit and 160 mAh LiPo cell. Pushrods are nothing more complicated than lengths of 1mm carbon rod with bent pins attached at each end using a short length of heat-shrink tube and a spot of CA glue. No adjustment is provided but getting the length correct isn't difficult if you don't CA the control horn end until you have everything connected.

Those rather fancy looking spoked wheels are typical of the prototype but in this instance are something of a cheat. I could have spent more money than the rest of the model cost and bought a pair of lovely, but delicate proper spoked wheels but I'm too mean for that. Alternatively I could have made my own spoked wheels but wasn't in the mood for that sort of thing at the time, so I compromised. The wheels you see on the model actually came from a toy cycle. You know, one of those things that are intended to be used with ramps and jumps. *Finger bikes* I believe they call them. Actually you'll probably need two of them, because the front and rear tyres are different. However you do end up with two sets of very serviceable wheels for less than half the price of one set of less serviceable proper spoked wheels. If you aren't worried about the spoke pattern they can be even cheaper. Quite often our local pound-shop has finger bikes in stock and sometimes they even include an extra, different style pair of wheels. Just bear in mine that even hideously non-scale wheels can always have card 'covers' fitted to turn them into more scale-like wheels. Definitely worth searching out because I assure you there will be other models of around this size in the not too distant future.

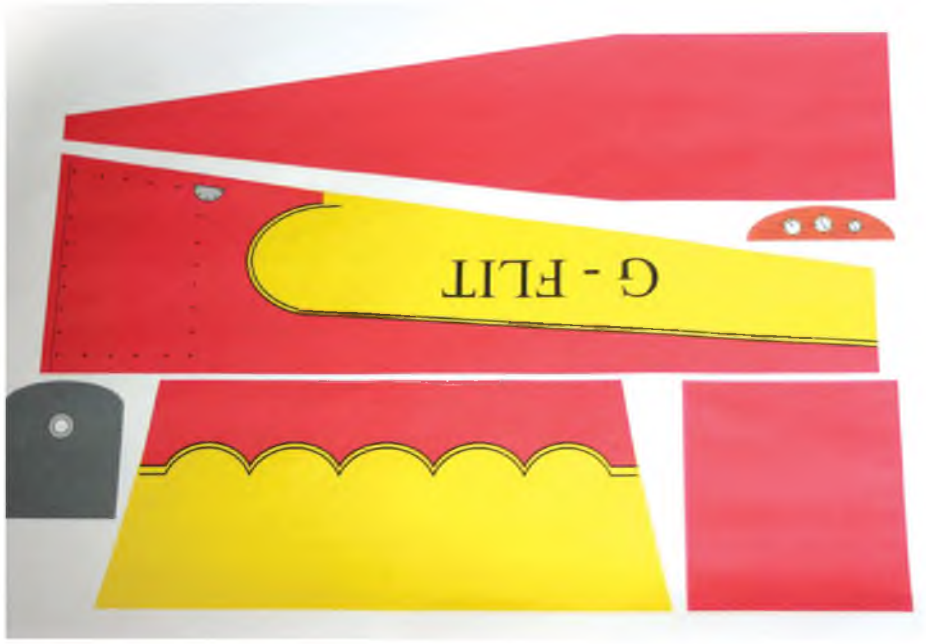
It's a cover up

Yes, pathetic isn't it? However, how my model was covered is worth looking at before I finish for this month.

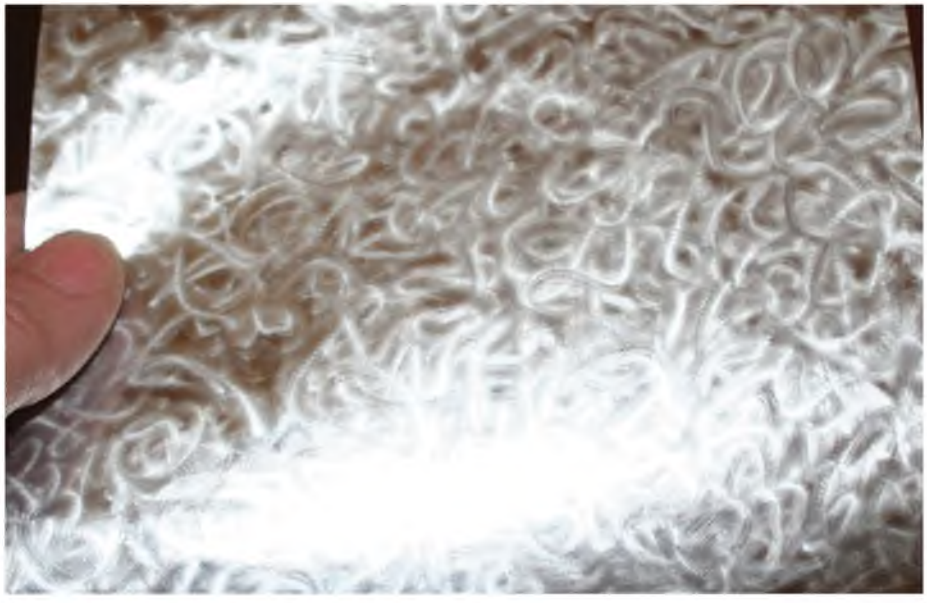
Just recently, I've been getting fairly heavily into printed tissue finishes for my small models. At my first attempts, it seemed awfully complicated and prone to problems. However, I think I've worked out a method that works well pretty much every time now, so I thought I'd pass on my findings.

The first thing you need to be aware of is that if you intend to water shrink your tissue after it's applied to the model, your inks will need to be waterproof. I use an *Epson* printer and *DuraBrite* inks, so that isn't an issue. Much the same applies if you like to apply your tissue wet; waterproof inks are essential.

Next we need a means of getting our printer to feed the tissue without gumming up the works. To do this, we



A test print, on plain paper, of some of the tissue patterns. Should you want them I can supply files for the tissue.



A sample of the swirled Oracover before it is applied to the model. I got carried away and now have enough for several more models.

The 'spoked' wheels, stolen from a toy cycle, are reasonably light and much stronger than more expensive model wheels.

need a carrier sheet to attach the tissue to. I've tried various methods, with equally varying results. I could never get Spray Mount right. It's so smelly that it has to be used outdoors, and out there either most of it blows away or I get too much on the carrier sheet. A carrier sheet from which you can't remove the printed tissue is worse than useless.

Another method is to tape the edges of the tissue to the carrier and this almost works for me. Unfortunately however, as the ink hits the tissue, which is unsupported in the centre, it swells and bubbles up sufficiently to foul the print head. The end result is random patches of smudging on the printing. For some strange reason, these smudges always seem to be black, even when there's no black printing involved.

Far and away the most successful method I've used is to attach the tissue to an A4 size sticky label with most of the stickiness removed. Since we only need it slightly tacky, I find the easiest way of removing the stickiness it to apply to and remove the label from a carpet a few times. Do this until there is just enough stick left to hold the tissue in place, but without making it difficult to remove.

With the label prepared it's just a case of smoothing the tissue onto the carrier, shiny side outermost, trimming to fit and feeding it into your printer. What I have found is that the ink will penetrate the tissue slightly and, to some extent reactivate the adhesive. Therefore, the less ink you use the less is the problem. I like the 'text and image' setting on my printer, with it set for envelopes to just slightly raise the print head.

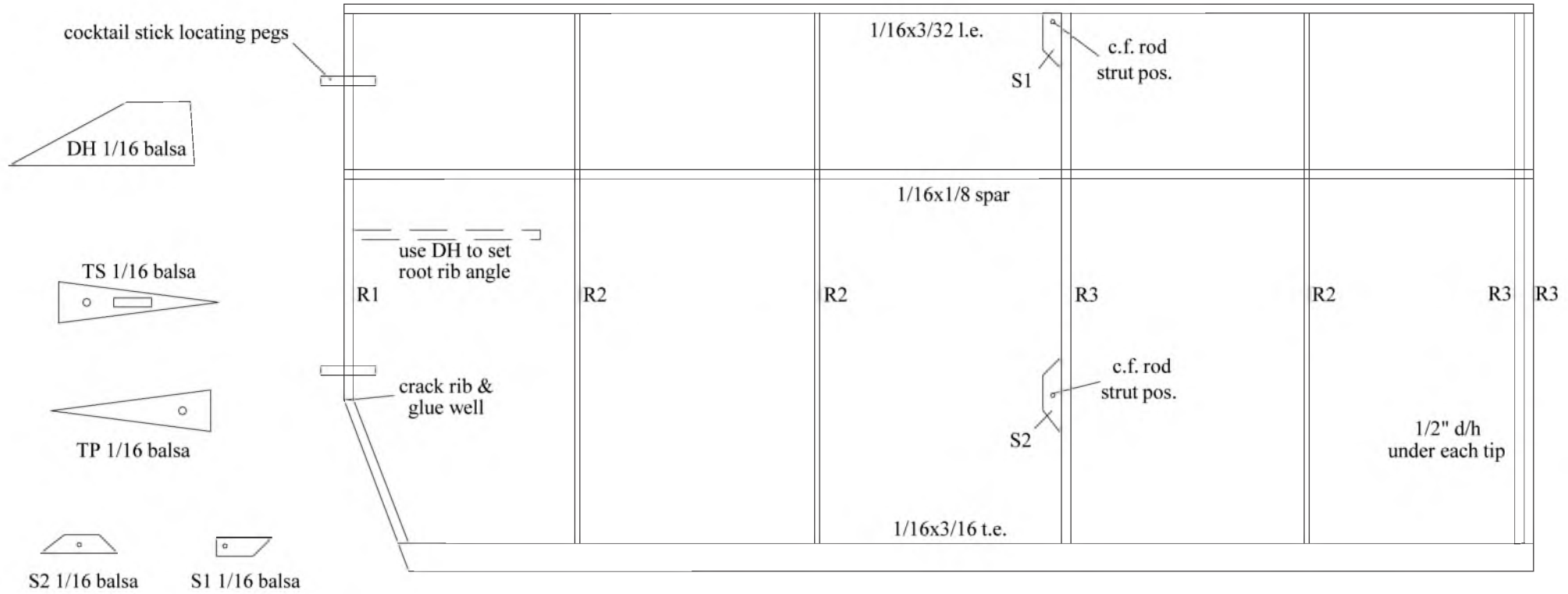
The *Oracover* ironed onto the nose gives a very good swirled aluminium effect. Cockpit coaming is just insulation stripped from electrical wire.

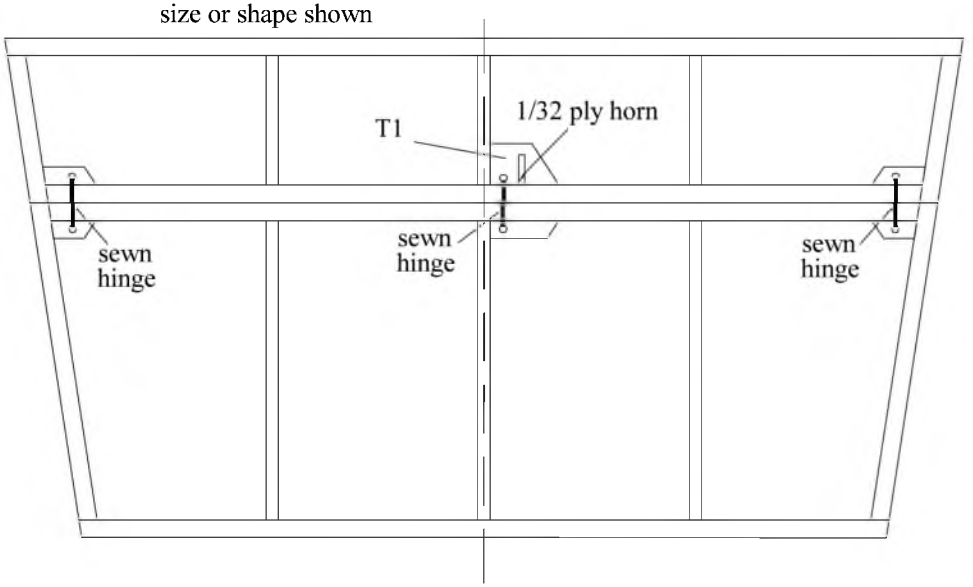
Once the printing is done, carefully peel off the tissue and smooth the next piece onto the carrier. I've found I can print at least an entire model's worth of tissue using the same label.

As regards the nose area, that is covered using chrome Oracover that has been 'swirled' using a piece of green scouring pad and Dremel. I just glue (CA) a small patch onto a little grinder and lightly move it over the Oracover prior to ironing it in position.

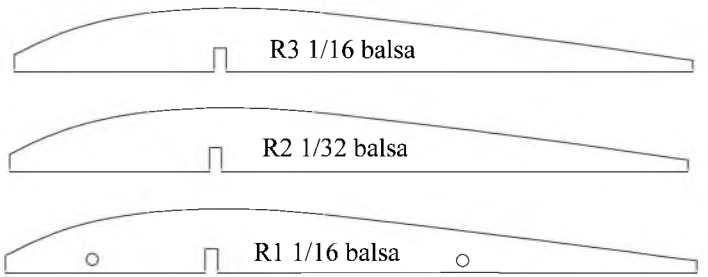
I can see I've run out of space again, but we can continue this next time, when we'll also deal with actually building the model. In the meantime, should you have any queries, you'll find me at PETERRAKE@aol.com ■

DOING HER AIRBORNE THING, THE LITTLE WHITE MONOPLANE MAKES AN ATTRACTIVE MODEL.





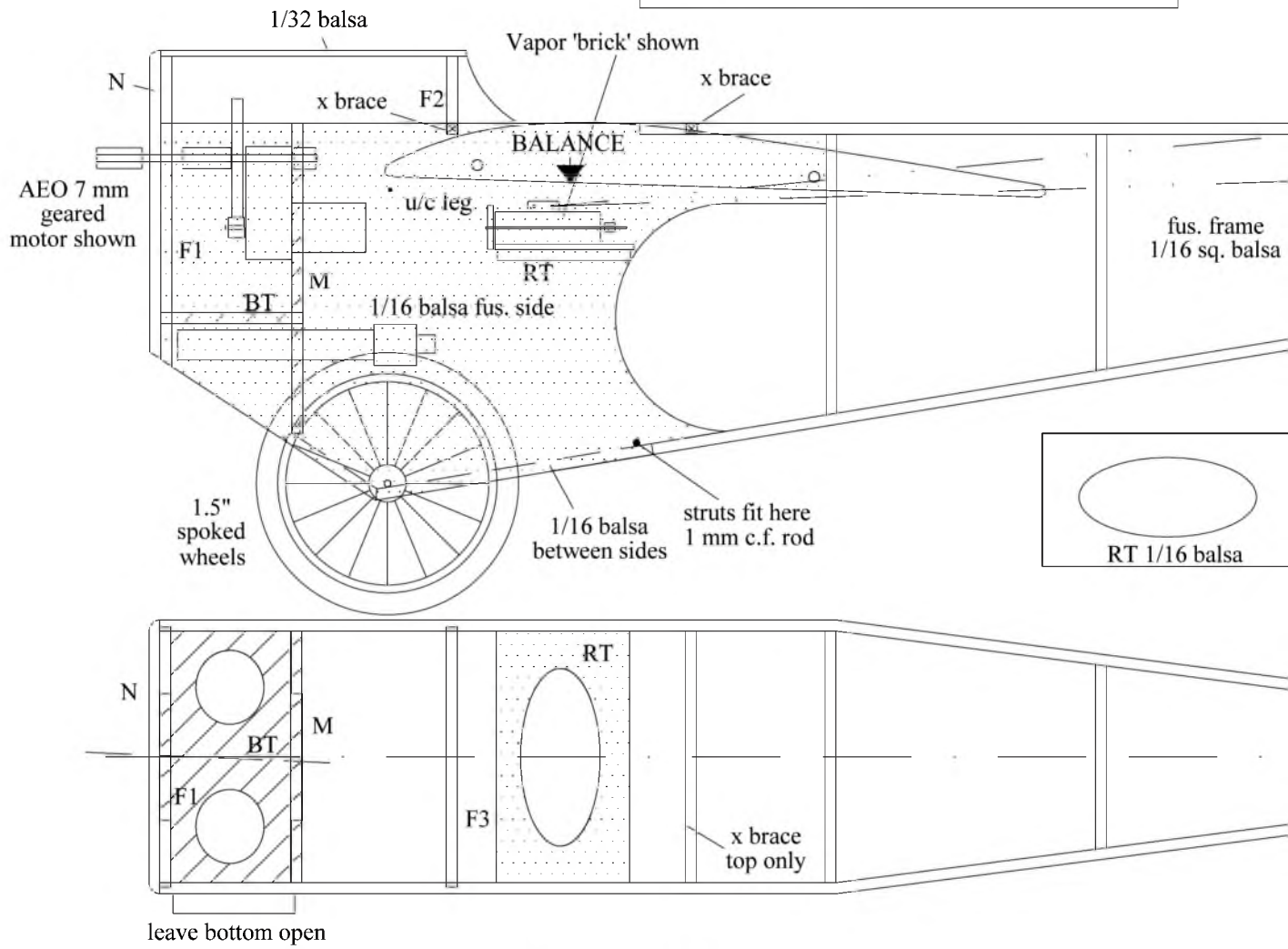
Peter Rake's
White Monoplane

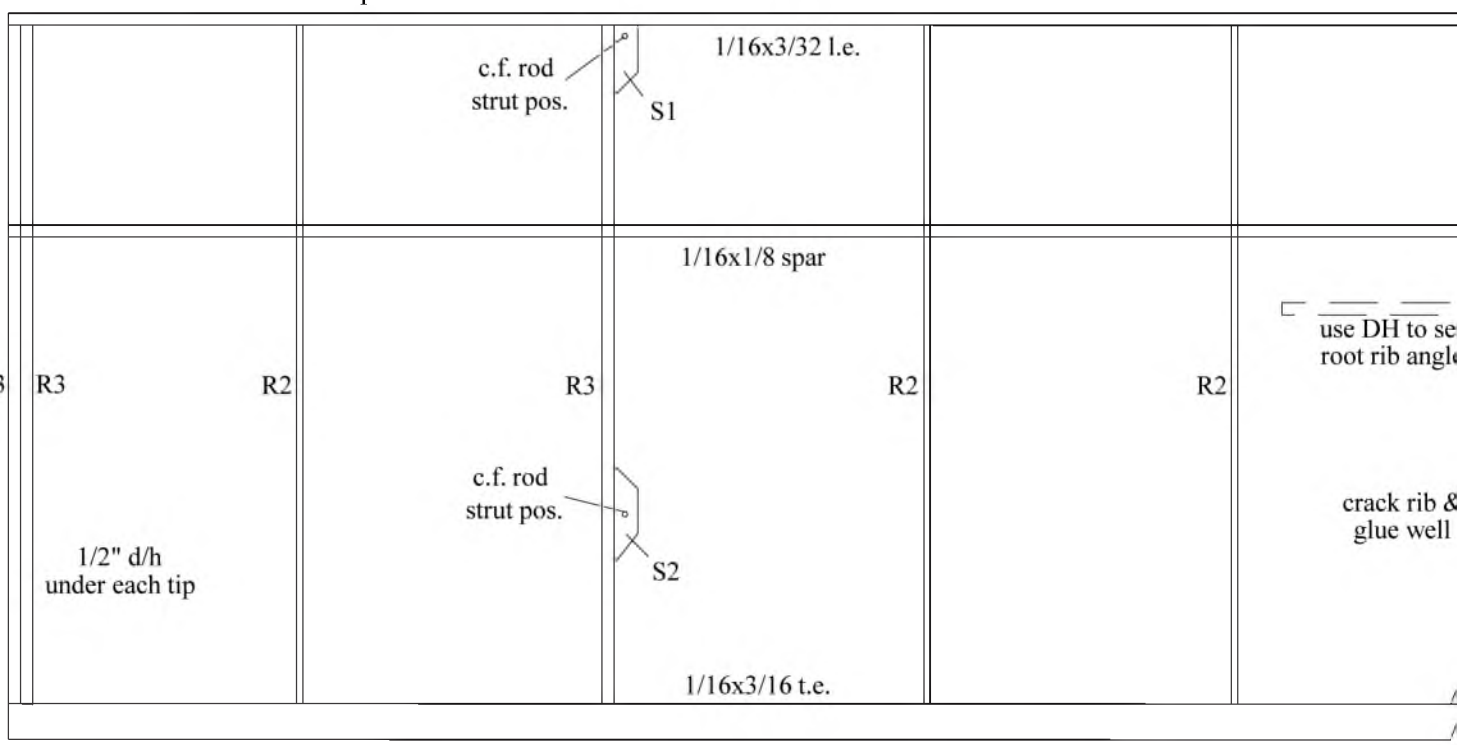


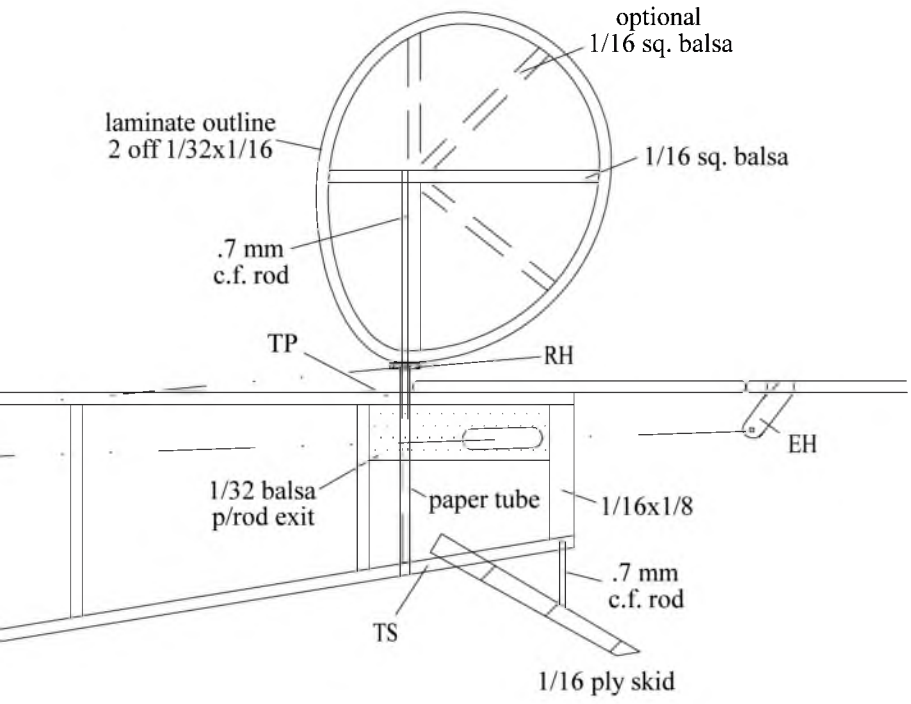
1/32 ply elevator horn

1/32 ply rudder horn

Peter Rake's
White Monoplane

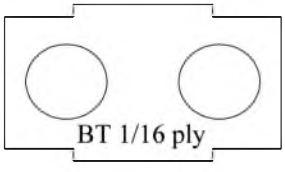


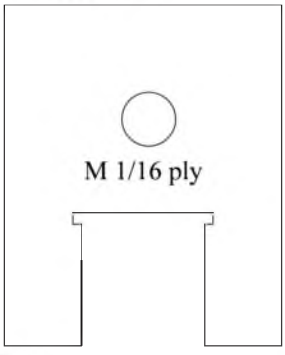


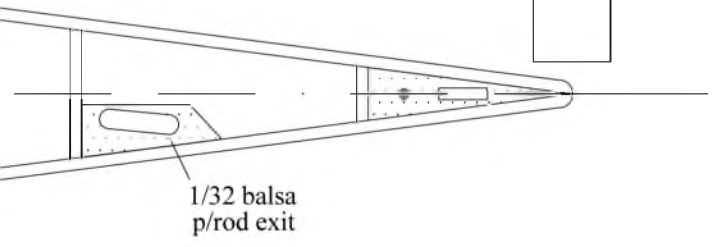

optional
1/16 sq. balsa
laminate outline
2 off 1/32x1/16
1/16 sq. balsa
.7 mm
c.f. rod
TP
RH
EH
1/32 balsa
p/rod exit
paper tube
1/16x1/8
.7 mm
c.f. rod
TS
1/16 ply skid

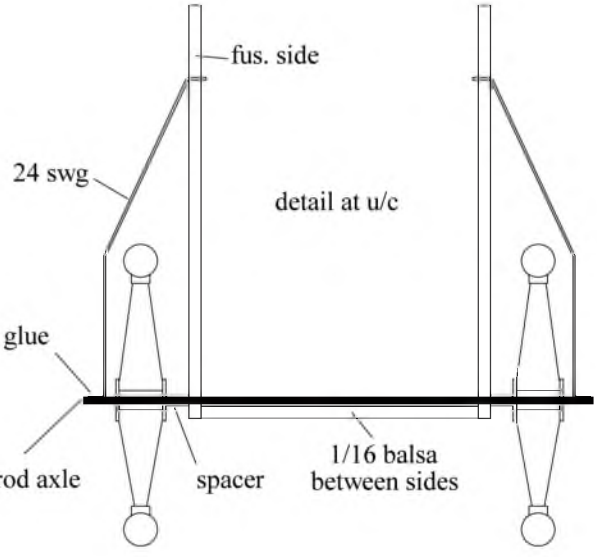

F1 1/16 balsa

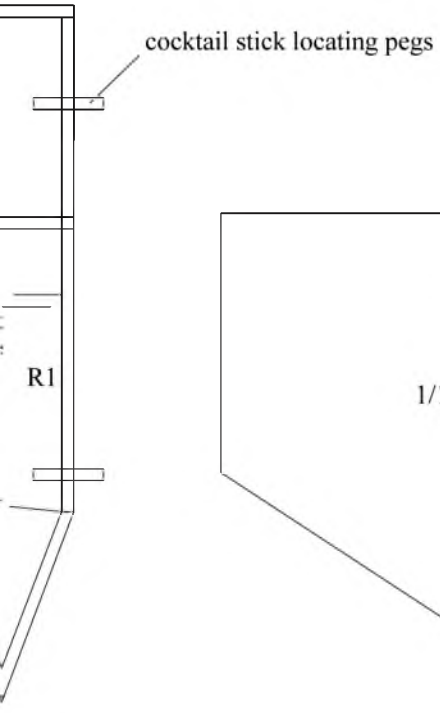

N 1/16 balsa

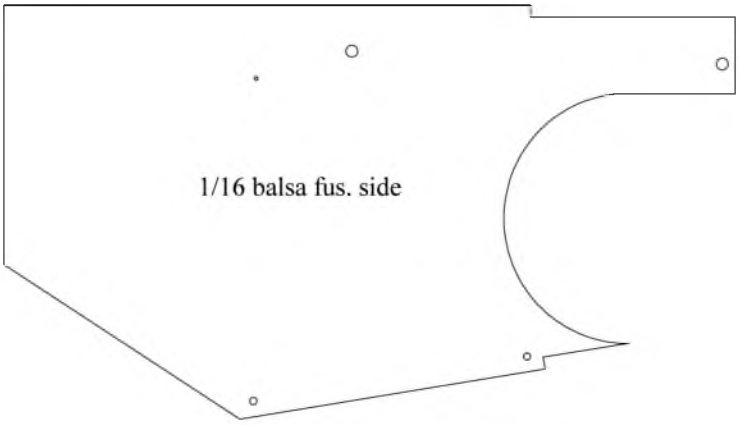

BT 1/16 ply

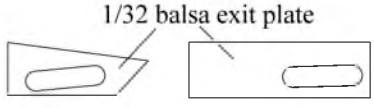

M 1/16 ply

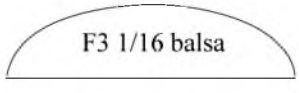

1/32 balsa
p/rod exit


fus. side
24 swg
detail at u/c
bind & glue
1 mm c.f. rod axle
spacer
1/16 balsa
between sides


cocktail stick locating pegs
R1


1/16 balsa fus. side


1/32 balsa exit plate


F3 1/16 balsa

BOEING PT-13 STEARMAN

A 58" (1473mm) span R/C model designed for 700 size electric power, with the option of i.c. power with a .52-.60 four stroke engine, designed by Trevor Hewson

For my 50th birthday my wife fixed it for me to fly in a Boeing Stearman. This was arranged through her brother, a BA pilot and on the day in question, both he and his son, an air-training cadet, were having a flight too. Our instructor was a Concorde pilot who obviously felt the need to do some real flying at weekends.

Preparation

It was a memorable experience, not least because of the instructor's words as we lined up on the end of the grass strip. True, we had all been given a full briefing on the controls and handling characteristics of the Stearman and I must admit, I had found it most interesting. I had even understood some of it well enough to ask what I thought were quite intelligent questions. But I had assumed that this briefing was really for the others who had of course flown before and, whilst I was hoping to be allowed to take the controls at some point, I was totally unprepared for what came crackling over the intercom as we sat there at the threshold:

"Okay, take off when you are ready"!

Concentration

The uneasy mix of anxiety and anticipation that I had been feeling during the taxiing stage instantly gave way to more urgent emotions (panic, I think, is the usual word for it) - has he got us mixed up? does he realise I have never sat in the cockpit of a plane before, let alone flown one?. Perhaps I shouldn't have tried so hard to ask those intelligent questions! Eventually the brain engaged a more constructive gear and, as I pushed open the throttle, extracts of the preflight briefing came swimming by: *"...push forward to get the tail up..."* Entirely against all my instincts as a model flyer, I gingerly eased the stick forward - *"Push forward!"* crackled the intercom *"What, more?"*, *"Yes, push hard!"*

Consternation

Up came the tail and up came the next installment of the preflight action replay - *"...the main thing is to keep it straight..."*.

Now this was no ordinary day at the airfield, it was the Grand Aerojumble and, as the horizon came into view over the throbbing cylinders of the Lycoming engine, I was confronted by the sight of light aircraft neatly parked three or four deep all down the left hand side of the runway. I felt my right foot tense - if I didn't manage to keep straight I was going to make damned sure we didn't swing left. I just hoped that my foot was on the rudder pedal, not the toe brake.

Elation

Easing off the forward pressure on the stick, and the briefing replay resumed *"... it takes off by itself, really..."*. At that point the bumping and jolting stopped and we were airborne - magic! The combined sense of elation and relief guaranteed that I was totally immersed in, and thoroughly enjoyed, the whole flight.

I was even persuaded to do a loop. So determined was I not to hang in the straps at the top that I quite forgot to throttle back on the way out. I am here to tell you that the Stearman will fly much faster and withstand considerably more 'g' than the notice in the cockpit says - oops! As I said, a memorable day.

Re-creation

No wonder then that the idea of building a model Stearman soon arose. Attempts to find a kit or plan to an appropriate scale drew a blank and, on-and-off over the next two years, I enquired at model shops and museums both in the UK and in America, wrote to magazines and got

1: The basic airframe assembled, but without the tailplane and fin/rudder. 2: The forward fuselage structure, showing the installation tube for the electric motor. 3: More airframe detail. Note that the wing ribs have centres removed to save weight. 4 & 5: Two views of the finished uncovered airframe - lots of stringers and spars to inspire those who like a 'good build'. 6: The dummy radial engine, based on Williams Bros. kit.

absolutely nowhere. Then, at a local model show, sitting on the grass, was a beautiful Stearman. It was somewhat larger than I had in mind, but it was at least a starting point and the owner kindly offered to lend me the plans. As we swapped addresses and phone numbers, I explained how I had come to be interested in the aircraft through my 50th birthday ride. He listened to my tale with a quizzical expression and at the end said simply, *"Yes, I flew in one for my 70th"* - spooky!

Contemplation

A few days later, I sat down to study the plan for the 64" Stearman and also with a *Guillows* kit for a 28" version for free flight, rubber or control line. After much deliberation, I settled on a wingspan of 58", and a target all-up weight of 6 - 7lb.

To keep the current draw within the 20 - 25amp capability of a cheap ferrite motor, the 50watts/lb rule of thumb led to a battery size of 14 or 15 cells. Various dimensions were then taken from the two plans and a full-size three-view and airframe design got underway.

Modification

Although I wanted to produce a reason-

7 & 8: The undercarriage fairing are balsa. To allow the wire to flex without breaking the fairings, a 1cm layer of EPP foam was introduced between the upper fairings and the trouser part, the latter being fixed to the wire with silicone to provide some 'give'. Masking tape over this provided a smooth base for the Profilm covering later. 9: The mainwheel. The Dummy drag link is simply a piece of aluminium tube, appropriately shaped.

ably true-to-scale model, I was most concerned that it should fly well. Having fixed the wing loading and power loading, my next concern was the wing section. Rather than stick with the scale airfoil, I opted for the NACA 2412, modified as recommended by Gordon Whitehead in his book *Radio Control Scale Aircraft*. This modification consists of flattening the underside to the rear of the maximum thickness point, to simplify building. Although this section is more cambered (i.e. less symmetrical) than the original, since the aim of the section change was to generate more low speed lift, I kept the wing rigging angles the same.

On the subject of rigging angles, I was surprised to see that the tailplane on the full size is rigged at three degrees positive angle of incidence. The only reason for this would appear to be that the tailplane is positioned in the downwash of the upper wing and so, presumably, will still be operating at a negative angle of attack relative to the local airflow. Interestingly, both of the model plan sheets show the tailplane rigged neutrally, so I did the same. More on this later!

Fabrication

After all the agonizing, it was a relief to buy a load of balsa, pick up the scalpel and glue pot and start building. Although there are two wings, each with a lot of ribs (38 each, to be precise), the wings are at least constant chord, so batch production is straightforward. The plan has a chart showing how the facings on the box spar are made up and it is a good idea to cut the ribs using the 'sandwich method' and cut the spar holes undersize initially.

Then, build the spars and use these as a guide as you finally open out the corresponding holes in the various wing ribs. Also, at this stage, make any detailed changes to individual ribs to accommodate aileron bellcranks (or

servo mounts), the interplane strut anchorages, aileron spars, centre section sheeting etc.

Acceleration

Although cutting out the ribs and making up the spars seems to take forever, once the ribs are slid onto the spars, suddenly a half built wing seems to appear out of nowhere. You may wish to go on to complete the lower wings, including aileron servo installation, but I would suggest that you keep the upper wing sections separate for now and leave off the centre section sheeting, until you have a fuselage to attach it to.

Cogitation

My project hit a bit of a problem with the fuselage in that none of the source documents had a set of compatible cross sections. However after much tracing, scaling and tweaking, I eventually came up with a set of formers. I used balsa for practically all of them, reinforcing the load bearing areas with 1/16" ply.

Shape the various wire parts and do make sure that you don't get too far into the fuselage assembly process before you attach them (don't ask!). The structure will feel fairly flimsy at this stage, but do resist the urge to beef it up, especially at the tail end - it is surprising how much stiffness is added by the balsa stringers.

Once you have a skeletal fuselage, now is the time to get the geometry sorted out. Fit the lower wing and use this as a reference to sort the top wing mounting, using just the centre section. When you are happy with this, make up the interplane struts and use them as a jig to dry-fit and align the outer wing panels. When satisfied all is true, glue the top wing panels together and complete the centre section sheeting.

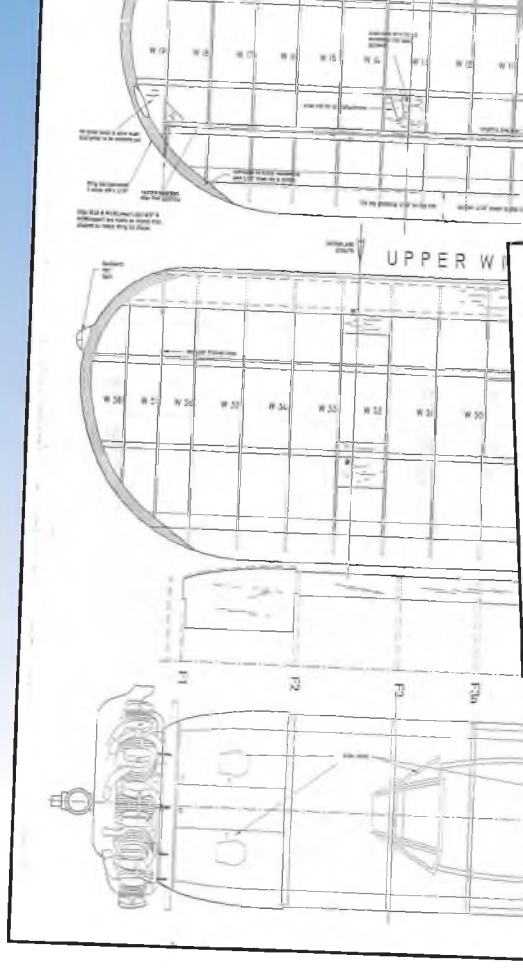
Elevation

Construction of the tail surfaces is pretty straightforward. If you prefer, you could relocate the rudder and elevator servos to the tail end but, before you decide to do so, do have a careful think about what it might mean for battery location and access - see below.

Motivation

The prototype was powered by a Speed 700 motor and planetary gearbox. I made up a rolled ply tube to take this

10: The cabane struts, showing the entry points at the fuselage. These are simply piano wire, faired with balsa.
11: Open cockpits simply cry out to be populated.



12: Radio and battery pack installation in the fuselage. The wing seat has a generous width. 13 & 14: Two views of the finished dummy engine. The PT-13 used a Lycoming radial, but the Wright radial replica represented by the Williams Bros kit can be translated into the shape of the Lycoming. 15: View of the twin cockpits showing the simplified dummy instrument panels. 16: Close-up of the pilot figure in the front cockpit. 17 & 18: Two further views of the cockpit area. The windshields were cut and folded from clear acetate Report covers.

power unit and fitted the tube into a laminated balsa and ply firewall. Liteply supports around the tube also served to mount the dummy engine. Now is the time to think about the balance point in order to decide where to mount the battery. The prototype balances with 14 cells up against the undercarriage bulkhead and, by using a suitably angled ramp, it was possible to arrange for the battery to be inserted through the front cockpit aperture (just!). If you take advantage of a more modern (and lighter) brushless motor, the battery will have to go further forward, as indicated on the plan. This will make access through the cockpit aperture impractical and you will need to decide whether to cut an access hatch on the top or bottom (or opt to charge the battery in situ).

Complication

The build of the prototype seemed almost to grind to a halt at this point. Looking back, it's hard to see where all the time went, but basically it was all down to two factors. The first was asking at every turn, *"Is there a lighter way of doing this?"* and the second was the work needed on those parts for which the kit builder usually has the benefit of plastic mouldings. In this latter category are the undercarriage fairings and, of course, that fully exposed radial engine! 'My' Stearman is a PT 13D, equipped with the nine-cylinder Lycoming engine. The dummy engine is based on the *Williams Bros.* Wright J5 engine cylinders. This engine though, differs from the Lycoming in a number of ways, the most obvious being the prominent exhaust collector ring on the front of the Lycoming. Much balsa sculpting was therefore needed, together with various pieces of wire insulation to produce a convincing engine.

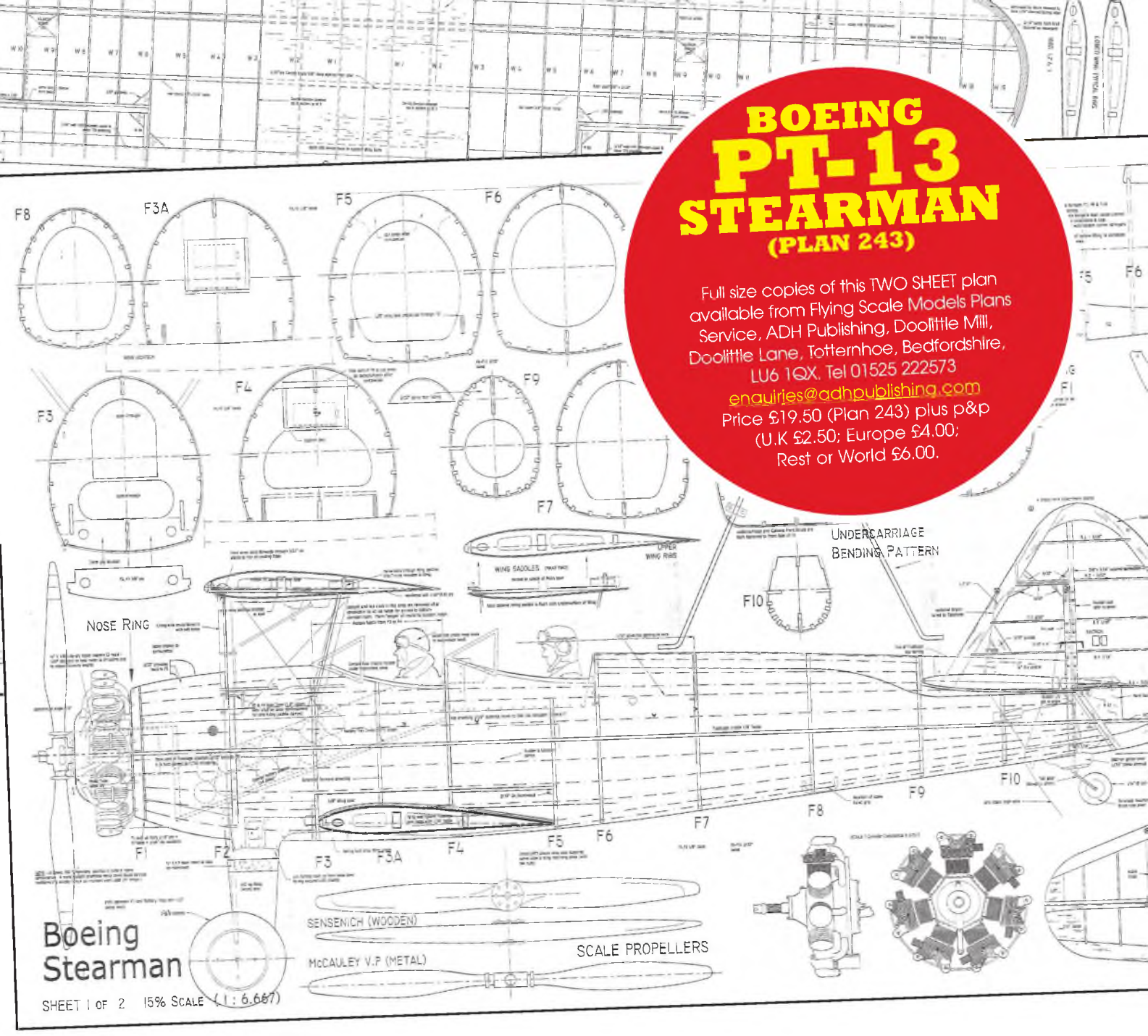
The undercarriage fairings are simply built up from balsa. There was though, the added complication of allowing the wire to flex without breaking the fairings. After much thought, a 1cm layer of EPP foam was introduced between the upper fairing and the trouser part, the latter being fixed to the wire with silicone in the hope of providing a little more give. A layer of masking tape was used to cover the foam to provide a smooth base for the *Profilm* later. As the photos show, after 80 flights over four years, this simple arrangement has held up remarkably well.

Elaboration

One of the areas of the Stearman, which intrigued me, was the tailwheel. There is in fact quite a void between the end of the fuselage and the rudder, which is closed by an aluminium fairing and a leather gaiter around the tailwheel pivot. I eventually managed a reasonable representation of the full size arrangement, but not without making a serious hole in my wallet - literally ... but the leather was just the right weight! Even so, I suspect that this modification more than wiped out all my previous weight savings at the rear end. Whether you want to spend your time on this largely invisible feature is up to you. You may choose instead to add rigging to your model, something that I avoided completely.

Improvisation

Finding suitable materials for the various details is always an interesting challenge and I was particularly impressed by the



versatility of electric cabling. Oil hoses and exhaust pipes on the dummy engine are from insulation sheathing, as is the black padding round the cockpit apertures. The ignition wiring on the engine is from telephone wire.

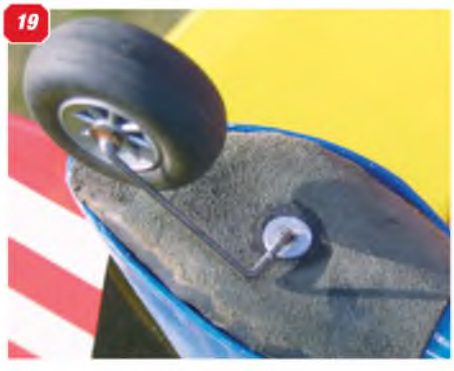
The windshields are cut from a clear acetate report cover and joined with silver trim tape - does anyone know a good way of securing this trim strip when it lifts? I now have two cockpits, which are suffering from peeling window frames.

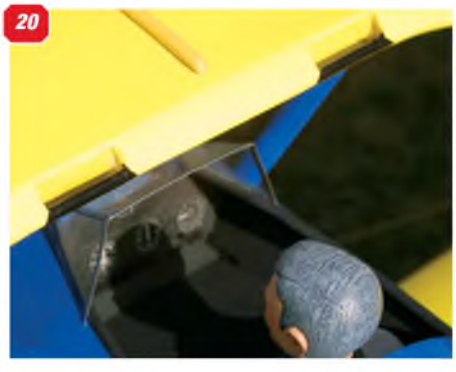
The wheels are proprietary plastic items, but I wondered for some time what to do about the painted wheel discs. I thought of screwing these to the wheel as per full size practice, but this posed a problem of how to retain the wheel, so I cheated and used standard wheel collets with 1/64" ply discs cyanoed onto the collets. Okay, so

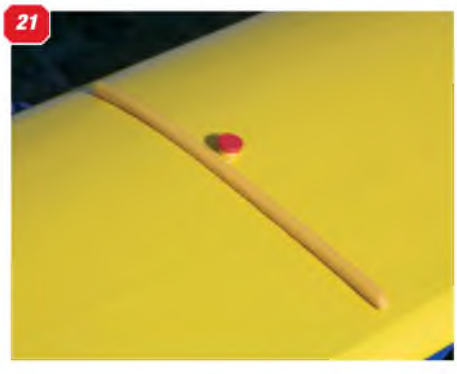
19: The author's wallet, doing what it was really made for - a really great investment! Leather proved to exactly right for the gaiter cover over the tailwheel well.

20: View of the upper wing centre section, showing the dummy handgrips, which are a feature of the full size.

21: Detail of the upper wing centre section upper surface.







the disc doesn't go round with the wheel, but the general effect is fine and I can slip an Allen key behind the disc to remove the wheel easily.

Decoration

Lettering and insignia were home made from *Solartrim* and *Protrim* and a few panel lines added later along with a fuel filler cap. The fin artwork is scanned from a photograph of the full size.

So far, I still haven't tackled the question of rigging, but even without it, the model has plenty of character, what with that engine, two open cockpits, two wings and struts etc. At present it is quite quick to rig and this is, first and foremost, a flying scale model after all.

In truth though, the story is getting a little out of sequence. Part way through this finishing process, I succumbed to impatience...

Determination

It was a Tuesday, about 4pm when I looked out of the office window. The sun was shining - itself a rarity for the June of 1998 - and the trees were relatively quiet. I took the decision there and then, this would be maiden flight evening. I would do it before the anxiety had a chance to build up.

I arrived home about 5.30pm and the wind was increasing. Never mind - the decision was made. With shaking hands, I assembled the model, trying hard not to put the screwdriver through the wing. The batteries were put on charge and I fitted a couple of ounces of lead inside the dummy engine for safety's sake. Only then did I realize that, in my nervous state, I had checked the balance point without fitting the flight pack!

Prevarication

I now set about recruiting some moral support. First Neil - message left on machine. Jim - no reply. Clive - *"A bit breezy isn't it? Okay, I'll come"*. Neil calls back *"Don't think I can make it"*. Jim calls back : *"What tonight, don't you realize England are playing Argentina?"* After a few more checks on things, which I had checked a dozen times before, I arrived at the park at 7.30pm to be greeted by Clive, Jim and Dave (I guess the football won with Neil). I took a few photos (another superstition) and we tested the air with a couple of familiar models. Not silky smooth, but not bad enough to provide an excuse. The wind was coming straight from the now sinking, red sun and the light was too poor for sunglasses, eliminating any chance of standing behind the model on take-off. After a range check, a fast taxi run seemed to be in order, to test the ground tracking, assess the power level, and hopefully get a feel for the trim. I also took Jim's advice and rated the elevators. I had barely got the throttle open fully when the right wing

22: The mounting of the interplane struts on the upper surface of the lower wing. 23: Hand-hold detail at the lower wing tip. Details like this are what generate realism. 24: The cabane struts carry these mounting 'shoes' for the upper wing. They slot into recesses in the upper wing undersurfaces. 25: The recess in the upper wing lower surface into which the mounting 'shoe' fits. Note the nylon bolt retainer in the corner. 26: Close-up of the upper wing mounting 'shoe'. Wire from the cabane strut is bent 90 degrees and keys into the wing leading edge. 27: The outer surface of the cabane mounting 'shoe'. Note the wire key-pin, which is the turned-over end of the front cabane strut.

lifted and the model veered left. The tail never came off the ground. Chop the throttle and think. There seemed to be plenty of power and so I fed in a few notches of right rudder and down elevator and carried the model back to the start point. No more excuses left.

Levitation

This time lift-off again took me by surprise. The Stearman literally leapt into the air, climbing far too steeply. A firm push on the elevator was needed to correct the climb and the model then obligingly settled into a right hand turn as I called for some assistance with the elevator trim. By the time Dave had fed enough down trim in for me to feel comfortable, the Stearman was on its third right hand circuit and, once I got to grips with the fact that it seemed to be flying okay, it was time to take control and to see if it would turn the other way. Aileron response was smooth and positive, and after a few more circuits to settle the pulse rate, I prepared for a landing.

Throttling back to begin the circuit, I was nearly caught out. Instead of dropping its nose, the aeroplane just slowed down and needed forward pressure on the elevator to be persuaded to descend and maintain flying speed. I have been told since that this is not uncommon with biplanes.

On finals, I progressively reduced the down elevator and then became concerned that I might not have enough speed to flair out. A quick burst of throttle arrested the descent and the Stearman floated by, eventually settling into a gentle touchdown, albeit on one wheel first. So relieved was I, that I was halfway to recovering the model before I realised that I could taxi back! On reflection, it is clear that, with all the first flight anxiety, I was trying to maintain a flying speed somewhat in excess of the model's natural approach speed. I have since learned to trust the model to settle into its own approach speed and only feel the need to push in down elevator if there is likely to be low-level turbulence.

Observations

After this first brief flight I reflected on the preflight briefing on the full size. *"Push forward to get the tail up or it will take off too soon."* AND *"Make sure you keep it straight"*. I also reflected on the down trim I needed to dial in - looks like the equivalent of about three degrees positive incidence on the tailplane. (You may recall that I had noted, but ignored this feature on the full size drawing. The plan has been adjusted accordingly). Conclusion? More like the real thing than I had bargained for - and well worth carrying on and finishing it!

Consolidation

It took a few more flights for me to realise just how slowly the Stearman will fly. At 6 lbs 40z, its wing loading is well under 16 oz / sq. ft., so it is really very well mannered. So much so, that I have flown it in a couple of Carrier Deck landing competitions and feel quite comfortable flying from restricted fields.

After about 50 flights, the original Speed 700 ferrite motor was becoming tired - the cooling arrangements are not really very good on the prototype and I suspect that the magnets may have overheated a bit. I replaced it with a Graupner Speed 700 Neodym and saw an immediate improvement in efficiency and performance. The model will now loop from level flight so, compared with the full-size, is now somewhat over-powered.

So far, somewhat to my surprise, the press-stud strut fixings have all remained in place throughout all typical scale manoeuvres. The studs are reasonably easy to pop out by hand so I think this must mean that the wing alignment is okay and that the wing spars are man enough for the job.

Culmination

You will have gathered by now that I am more than a little pleased with the Stearman. It is a pleasure to fly and it captures the spirit of the full size to a degree beyond my expectations. I have re-lived my 50th birthday flight many times over the last five years and, as you can see from the photos, one of the benefits of electric power is that it is still looking pretty clean - even if most of the panel lines have rubbed off! ■

BOEING PT-13/17 STEARMAN

Although it was not the last military biplane to be designed and built in USA, Boeing's Stearman 'Kaydet' will be remembered as the last to go into production. It was remarkable too, as the first aircraft to meet the specifications of both US Army and US Navy - never before had the two services, with their strong rivalries, completely reconciled their differences in requirements.

The 'Kaydet' was a biplane in the classic American style, with its radial engine (strange that it was never cowled, at least in military guise - maybe for serviceability considerations), minimum upper dihedral and heavy stagger.

Also characteristically American were the large cockpits with a high seat position, necessitating ample windscreens, long travel undercarriage and a beautifully smooth exterior and well finished.

Developed from the NS-1 of 1934, the Lycoming powered PT-13 appeared two years later. Twenty-six machines were delivered to the Army, followed, in 1937, by 92 PT-13As, with slightly increased power and different instrumentation. Another increase in power distinguished the PT-13B, 255 of which were built in 1940 to meet the demands of an expanding training programme. Six PT-13As were re-engined to become -13Cs. The same 220 h.p. Lycoming engine was chosen for the PT-13D (Navy N2S-5), of which 1,768 were built, the majority going to the Navy.

The PT-17 series all had Continental engines and were the most numerous, 3,519 of the basic model alone, plus 21 of the -A and -B variants fitted for blind flying and spraying.

The US Navy equivalents of the PT-17s were the N2S-1, 2,3 and 4. A few PT-18 and -18As with Jacobs engines completed the picture, except for 300 PT-27BW (Boeing-Wichita) Conti nental-powered winterised machines with cockpit canopies, which were supplied to Canada under Land-Lease agreement.

The best known air-show team of Boeing Super Stearman aircraft, charactcterised by their fully cowled engines is the one that originally 'did the rounds' as the 'Utterly Butterly team', before changes livery to "Guilot' and then finally to becomes the 'Beitling Wing Walkers'.

Other countries purchasing the 'Kaydet' were China, Brazil, Cuba, Bolivia, Colombia, Guatemala, Argentina, Venezuela, Peru, Dominican Republic and Philippines. For scale modellers, there's scope there for colour schemes ... if you can find them!

Of the enormous total of 10,346 machines manufactured up to February 1945, many are still being used for sport, aerobatic flying, air displays and possibly still as crop sprayers although there are probably few now with the advent of dedicated aircraft for that purpose.

Designed for rapid manufacture and maintenance, the Stearman has a fuselage and tail assembly of welded chrome-molybdenum steel tube. The fabric covering to the fuselage was supported by light alloy arches and stringers, while the cowl panels are dural.

The wings, fabric covered, have wooden spars and ribs, with alloy compression ribs. All struts were metal and the simple undercarriage assembly could be detached by removing just four bolts - an important feature for a basic trainer aircraft in which the undercarriage was likely to come in for some heavy strains.

Boeing/Hughes Super Stearman

The Super Stearman evolved from the hands and mind of Joe Hughes who wanted something even better than the standard 450 hp airshow Stearman, especially for movie work. The first Super Stearman, N21R, was built up and gradually refined by a host of engineering changes to meet the parameters set by Joe. Once all the bugs were worked out, the decision was made to build a second Super Stearman from the ground up using the information gained from the first aircraft.

Beginning with a 'new' Stearman airframe, work started on the second aircraft in January of 1977. Many people, too numerous to mention, participated in building of this plane with all its special refinements. Surprisingly, the basic Stearman airframe is close to stock, which says a great deal about the strength of the WW II trainer. The completed Super Stearman (N5051V) was rolled out on May 6, 1977, just four months after work started. ■

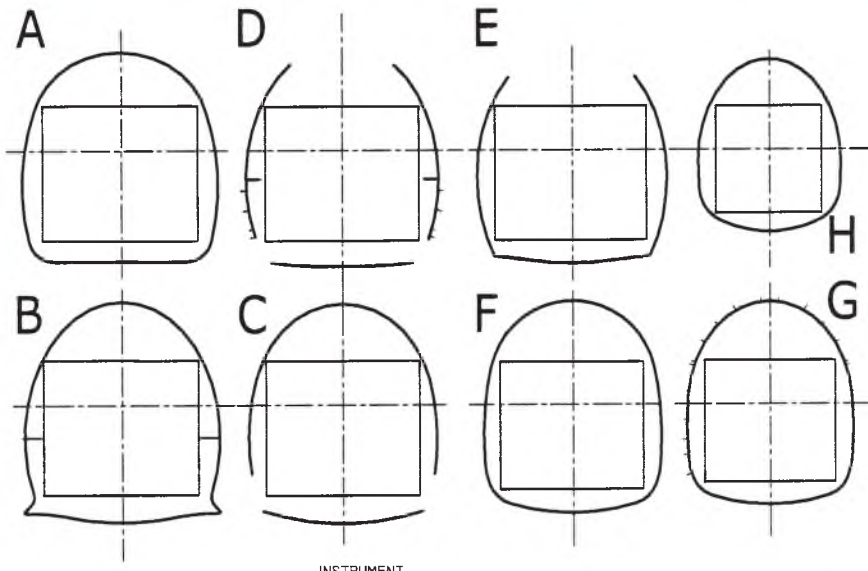
SPECIFICATION

Wing span: Upper 32ft 2 in. (9.804m) Lower 31 ft 2 in (9.450m)

Length: 25 ft (7.62m)

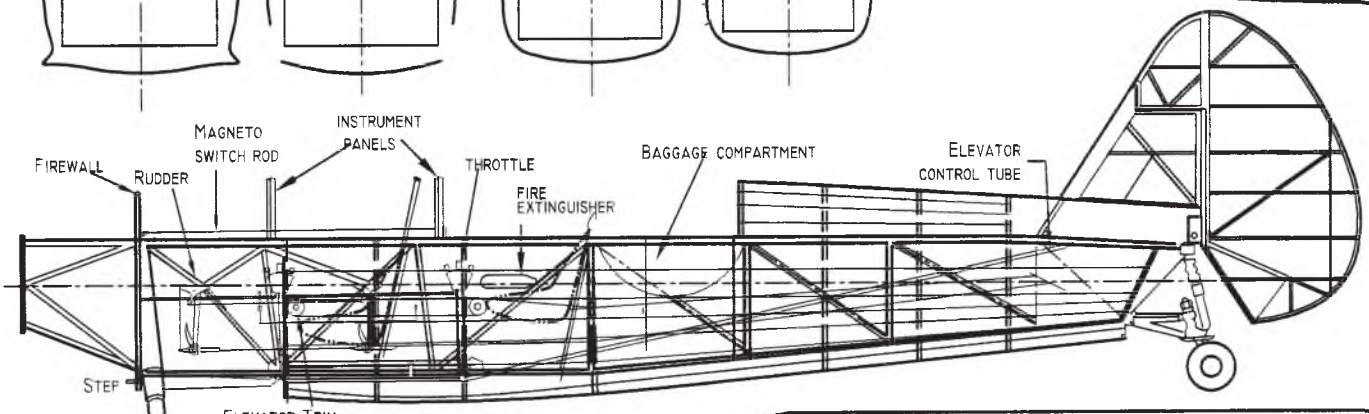
Wing chord: 5ft (1.27m)

Airfoil: NACA 2213



SENSENICH WOODEN PROPELLER

both Upper & Lower Wing
have same aerofoil



LYCOMIN
(PT-13B
COLLECT

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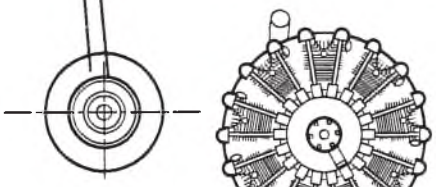
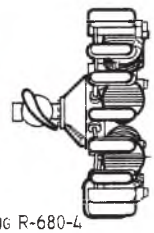
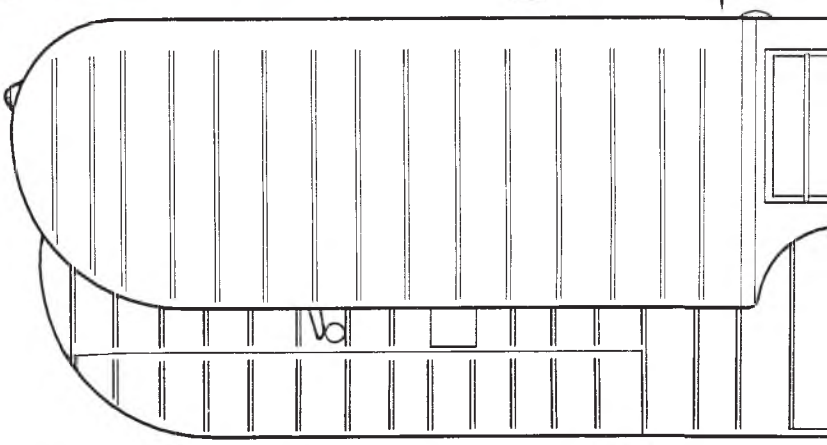
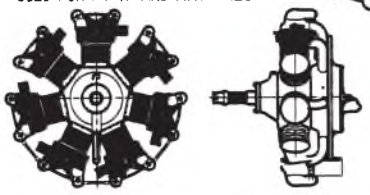


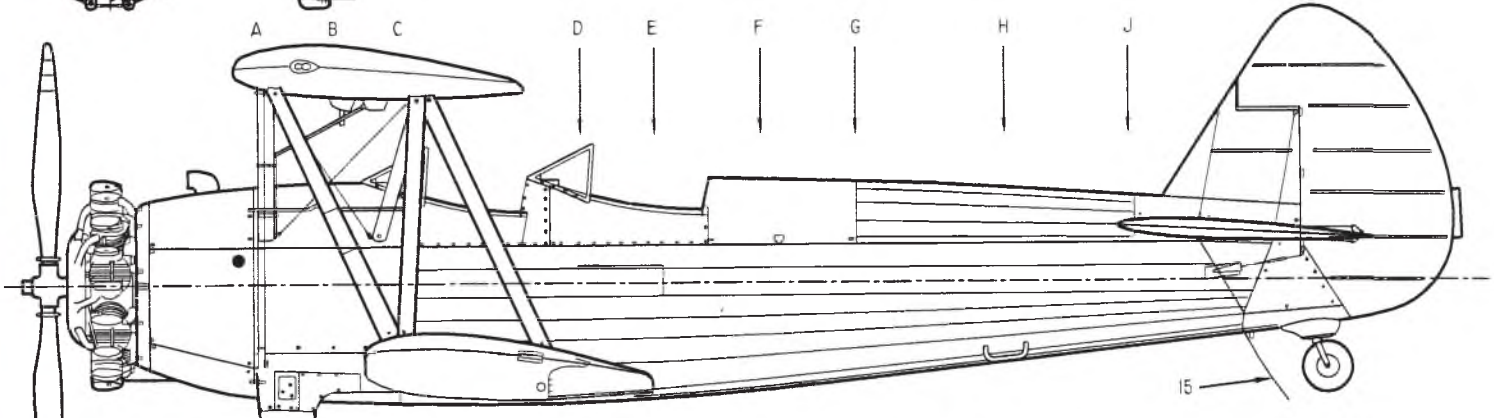
CONTINENTAL 7 CYL R-670-5
USED FOR PT-17 AND NAVY N2S-1



LYCOMING R-680-4
(PT-13) WITH LONGER
SHAFT HOUSING & NO
COLLECTOR RINGS



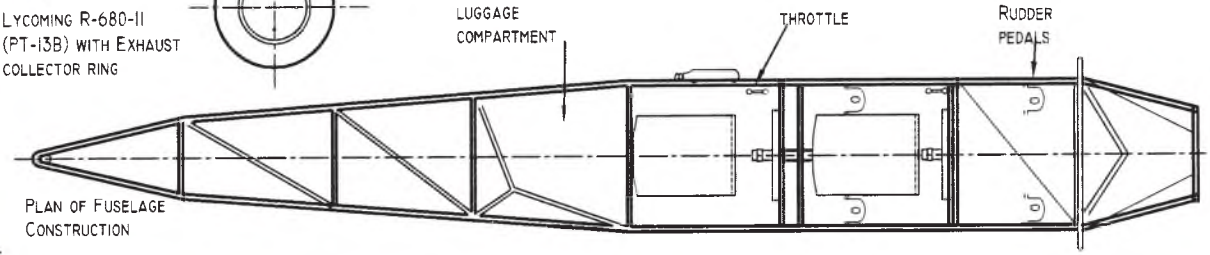




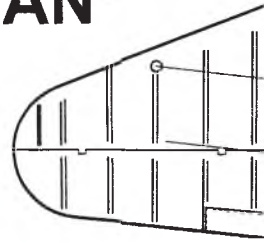
PORT SIDE VIEW

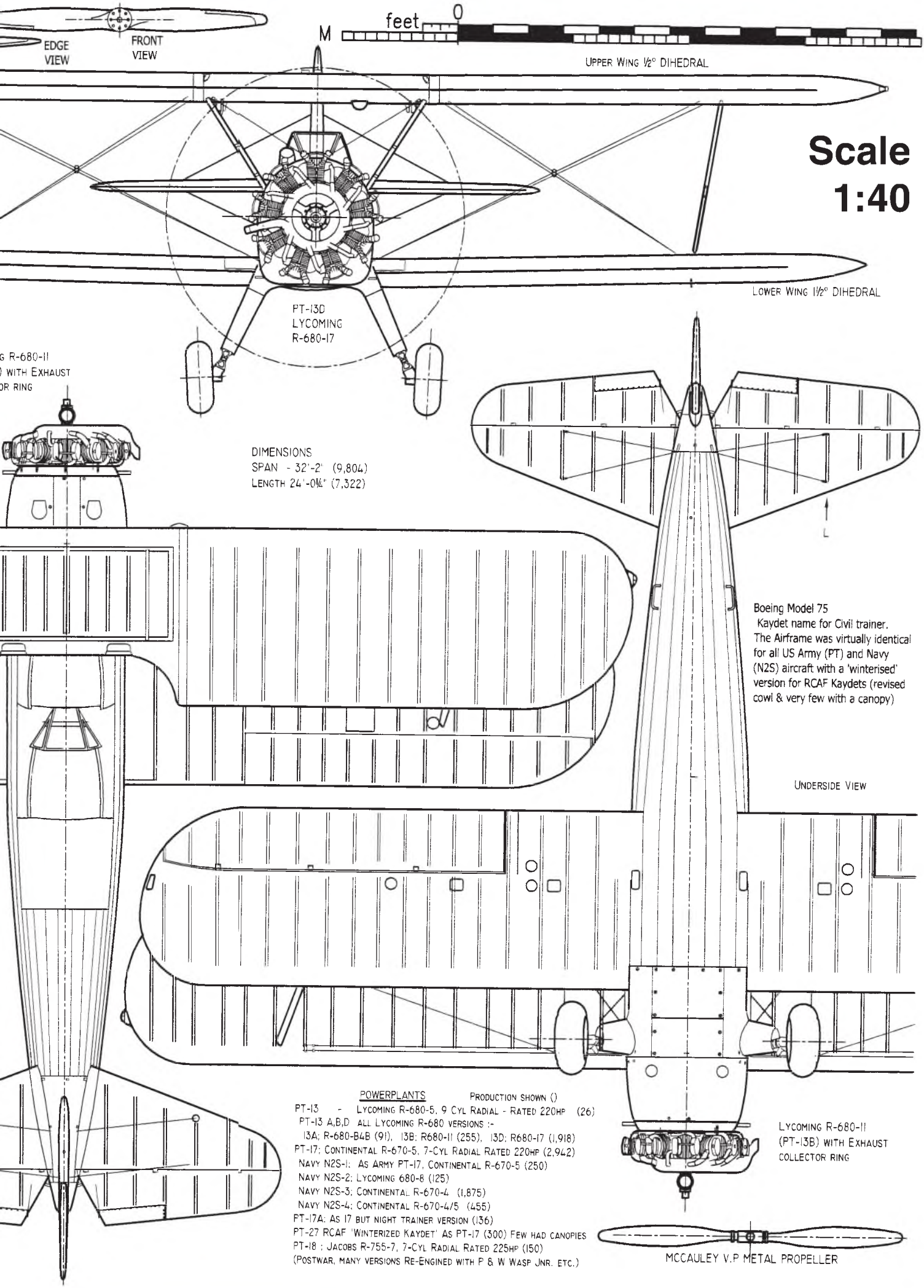
BOEING Model 75 "STEARMAN"

LYCOMING R-680-11
(PT-13B) WITH EXHAUST
COLLECTOR RING



PLAN OF FUSELAGE
CONSTRUCTION





Scale 1:40

Boeing Model 75
Kaydet name for Civil trainer.
The Airframe was virtually identical for all US Army (PT) and Navy (N2S) aircraft with a 'winterised' version for RCAF Kaydets (revised cowl & very few with a canopy)

POWERPLANTS PRODUCTION SHOWN ()

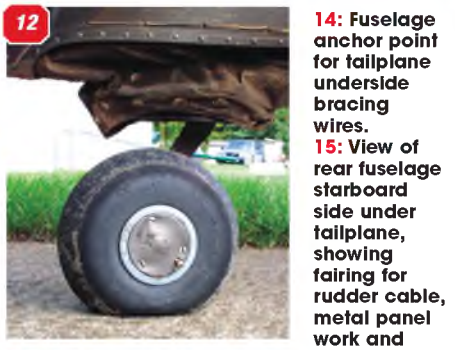
PT-13 - LYCOMING R-680-5, 9 CYL RADIAL - RATED 220HP (26)
PT-13 A,B,D ALL LYCOMING R-680 VERSIONS :-
13A; R-680-B4B (91), 13B; R680-11 (255), 13D; R680-17 (1,918)
PT-17; CONTINENTAL R-670-5, 7-CYL RADIAL RATED 220HP (2,942)
NAVY N2S-1: AS ARMY PT-17, CONTINENTAL R-670-5 (250)
NAVY N2S-2; LYCOMING 680-8 (125)
NAVY N2S-3; CONTINENTAL R-670-4 (1,875)
NAVY N2S-4; CONTINENTAL R-670-4/5 (455)
PT-17A: AS 17 BUT NIGHT TRAINER VERSION (136)
PT-27 RCAF 'WINTERIZED KAYDET' AS PT-17 (300) FEW HAD CANOPIES
PT-18 : JACOBS R-755-7, 7-CYL RADIAL RATED 225HP (150)
(POSTWAR, MANY VERSIONS RE-ENGINED WITH P & W WASP JNR. ETC.)

BOEING PT-13 STEARMAN

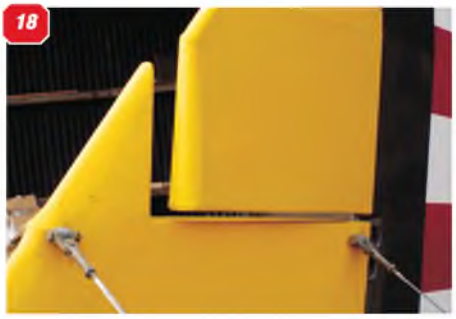
CLOSE-UP SURFACE DETAIL IS WHAT MAKES A MODEL SPECIAL

1 & 2: Cockpits showing windscreens and leather coaming.
3: Mirror under wing centre section.

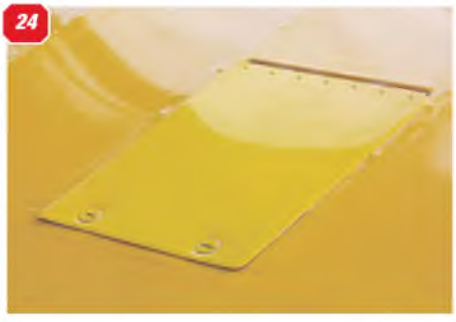
4: Undercarriage fairing with fuselage side. 5: Inner side view of wheel hub. 6: The full undercarriage fairing. 7: Pressed metal fairing at wing root leading edge just behind undercarriage fairing. 8: Hand grip rear lower fuselage. 9: Inspection hatch, rear upper fuselage, port side only. 10: The cabane struts, starboard side. 11: Close-up of cabane strut anchor points. 12: Tailwheel, showing the fabric cover to the fuselage fairing. 13: Metal tailplane/fin fairing. Starboard side folds over port.

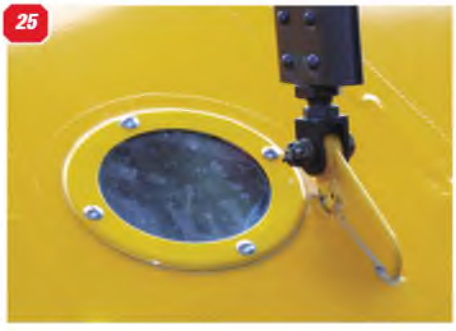


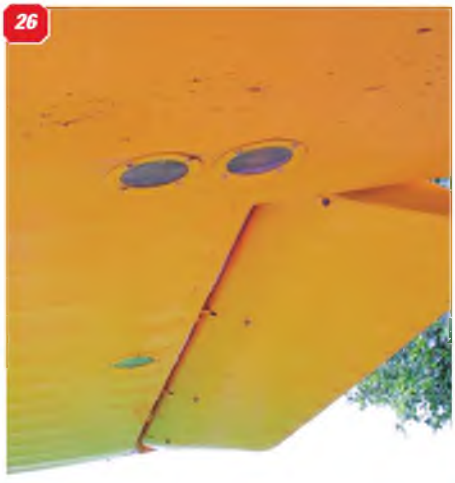
14: Fuselage anchor point for tailplane underside bracing wires. 15: View of rear fuselage starboard side under tailplane, showing fairing for rudder cable, metal panel work and tailplane bracing wires. 16: Metal panels behind the rear cockpit well and the radio aerial. 17: General view of tailcone.



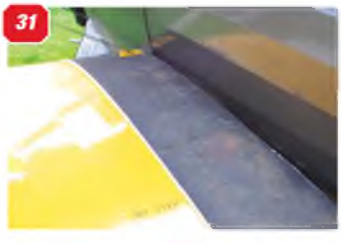
18: Rudder aerodynamic balance and the anchor points for wire braces. 19: Annotation at foot of rudder. 20: Detail of bracing wire anchor point at tailpost. 21: Tail light on rudder. 22: Bracing wire anchor point at fin leading edge. 23: View from rear showing the rudder control horn, angled down 45 degrees. 24: Access hatch on lowing wing. 25: Rear strut anchor, lower wing. 26 & 27: Lower wing undersides showing aileron in up and down positions. 28: Front strut anchor point, lower wing. 29: Hand grip upper wing centre section. 30: Wing tip hand grip, lower wing.

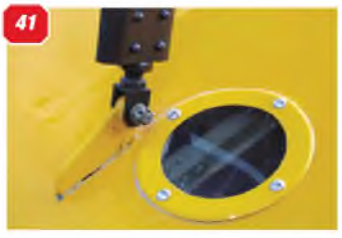






31: Wing-walk panel for cockpit access. Lower portside wing root. Starboard is similar. 32: The anchor points for wing bracing wires at lower wing root. 33 & 34: Two views off the uncowled, nine cylinder engine. 35: Close-up of the propeller hub.

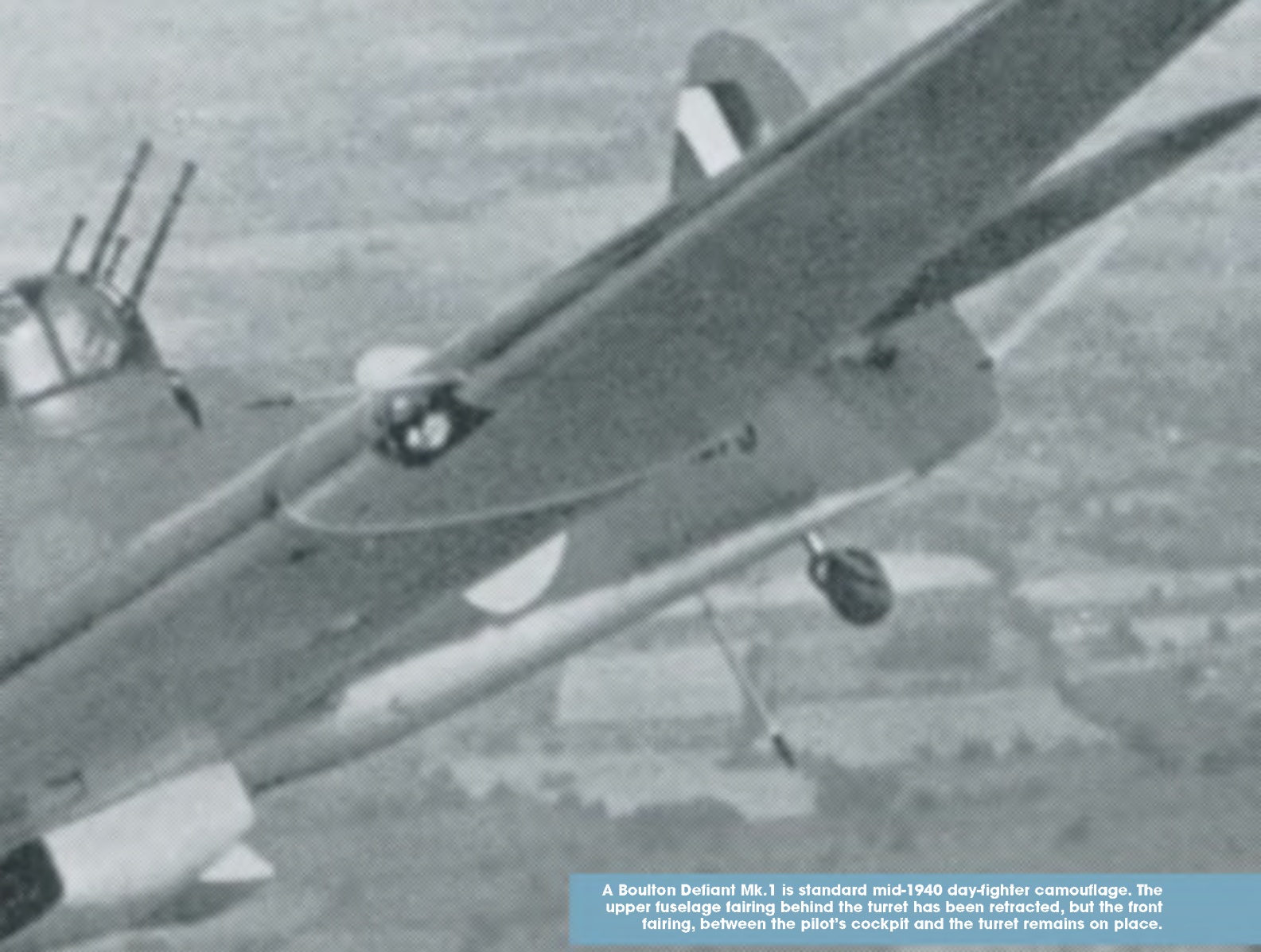




36 & 37: Wing strut and bracing wire anchor points, on upper wing lower surface. **38:** Full view of the interplane strut, starboard side. **39:** Pitot head on port interplane strut. **40:** Wooden bracing wire spacer between upper and lower wings. **41:** Anchor point for rear inter plane strut at lower wing trailingedge. **42:** Leading edge lower wing strut anchor point. **43:** Detail of bracing wire anchor on tailplane underside. **44 & 45:** Linkage to the elevator trim tab, top and bottom. It is hinged on the surface. **46 & 47:** Close up of elevator hinges. **48:** Elevator detail.

Boulton Paul DEFIANT

Based on a WW-era success story that really did not extrapolate entirely into the concept of concentrating all firepower in a powered gun turret, the Defiant was also defeated by late Service introduction that compromised the development of its tactical application



A Boulton Defiant Mk.1 is standard mid-1940 day-fighter camouflage. The upper fuselage fairing behind the turret has been retracted, but the front fairing, between the pilot's cockpit and the turret remains on place.

Aviation history is littered with types of which it might fairly said that "it seemed a good idea at the time". During the early 1930s period, military aviation thinking started to centre on the performance advances in fighter aircraft that could be achieved with the monoplane. Contemplation of greater speed tended to indicate that the timespan during which an aircraft could be held in the gunfight of a fighter aircraft would be greatly reduced - thus it followed that far greater 'hitting power' would be needed to achieve the required result of downing an enemy aircraft.

The result, in the case of the Royal Air Force, was the eight forward-firing, machine-gun equipped Supermarine Spitfire and Hawker Hurricane. However, as is the case even today, the 'forward thinking' that develops aircraft procurement specifications is, to varying degrees, theory.

In the aftermath of WW1 from the mid-1920s onwards, there was much speculation as to the value of the bomber aircraft as a key weapon in reducing an enemy's war effort by direct attack on industry and civilian population, so that much 'lateral thinking' was

A formation of three Defiant Mk.1s of No.264 Squadron, 1940. The object dangling below the rear fuselage ahead of the tailwheel on each aircraft is an aerial.

applied to effective counters to this 'bomber threat' beyond 'conventional' fighter aircraft, as bomber destroyers.

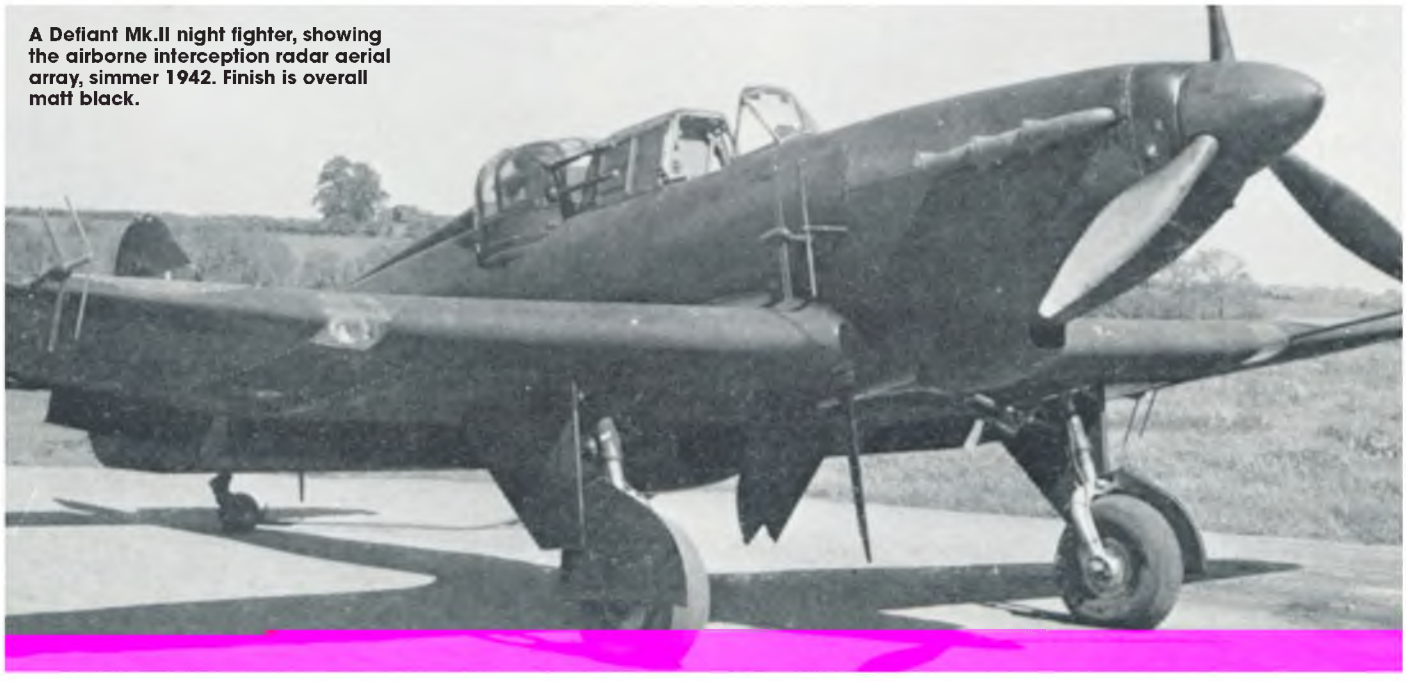
One such idea that gained credence was the concentration of firepower in a rotating gun turret, operated not by the aircraft's pilot in his forward firing position, but by a gunner separately firing the guns from a swivekkung gun turret and to make this effective, power drive was essential in order for the gunner to follow the target through the combat sequence.

Credence to the principle that formulated this air fighting principle was the success of the Bristol F2B 'Brisfit' which, during WW1, gained a high reputation as a fighter aircraft. What seems to have been forgotten is that in the case of the Bristol F2B, it packed both a forward firing gun, operated by the pilot and a flexibly mounted gun for the gunner's positioned behind, so that both could blast away at the enemy as opportunity presented itself.

The Operational Requirement that resulted in the Defiant was issued in April 1935, demanding a performance similar to that of the Hawker Hurricane and Spitfire, and a power operated turret with four 0.303" machine guns. The demand for only four guns seems a stark contrast to the eight guns specified for the Spit and Hurri. Also for included in Operational Requirement F.9/35, somewhat later than the one relevant to the Hurricane and Spitfire, was a request for sufficient fuel capacity to maintain standing combat patrols.

The Boulton & Paul Company had been involved in work on power turrets for some time, having previously obtained a licence to build the French S.A.M.M. Company's turrets with which to equip their *Overstand* twin-engine biplane bomber.

With this 'head start', they were



A Defiant Mk.II night fighter, showing the airborne interception radar aerial array, simmer 1942. Finish is overall matt black.

successful in obtaining a seven-aircraft prototype development contract. Development however was slow and it was not until August 1937 that the first prototype flew - without the turret, which was the basis for its existence and it was not until July 1939, only two months before the commencement of WW2, that the first production aircraft was delivered. By then, advancement in bomber and fighter aircraft performance since the formulation of the Defiant's specification over four years earlier, rendered the turret-fighter concept questionable.

The intention had originally been for the Defiant to equip seven RAF Fighter Command day fighter squadrons, but only two, No. 264 and No.141 were operational from May 1940 onward for the crucial Battle of Britain. Of these, No.264 was first to receive their new aircraft in December 1939. Without any prior experience of such an armament arrangement to fall back on, the squadron began the task of developing the very special combat techniques needed for effective use of the turret fighter in combat.

No.264 took the Defiant into combat for the first time over the Dunkirk area coastline on May 10th 1940 on the first day of *Operation Dynamo* (the BEF evacuation), successfully destroying a Junkers Ju88 caught attacking a British destroyer. On the following day their B-Flight aircraft patrolling the Dutch coastline, engaged a formation of Ju87 Stukas en-route to bomb the Dunkirk evacuation beachhead and destroyed four, before being 'bounced' by Messerschmitt 109Es. Five of the six Defiants were shot down in an

Defiant Mk.1 in standard day-fighter camouplage July 1940. No.264 Squadron

Defiant Mk.1 in night fighter finish early 1941. No.255 Squadron

Defiant Mk.II in night fighter finish, early 1942. No.151 Squadron

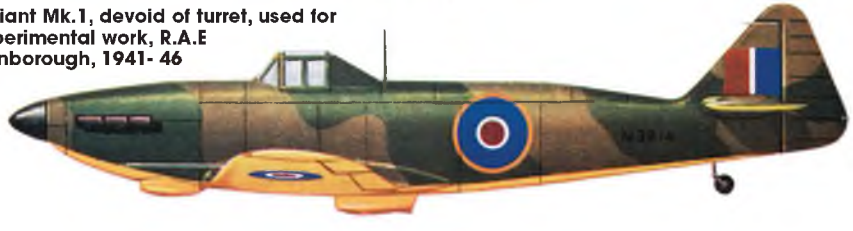
Defiant Mk.1 in night fighter finish, emplyoed in gunnery traning, late 1942

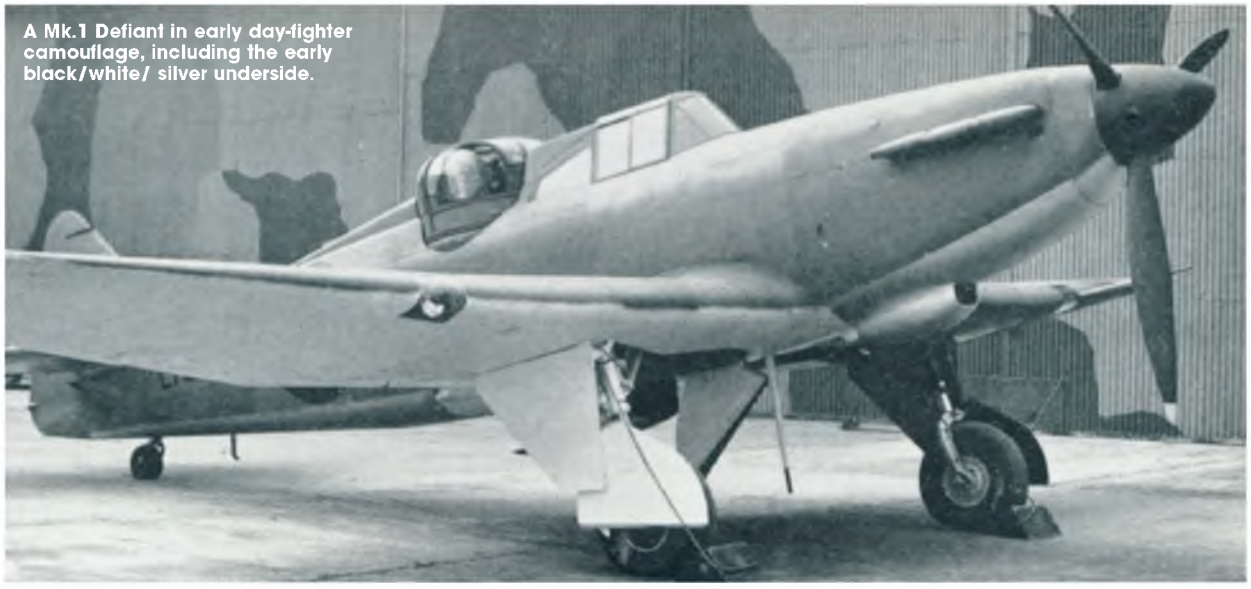
Defiant Mk.1, No.276 Squadron, use for Air-Sea rescue 1942

Defiant T.T. Mk.1, used for target towing, Middle East, 1945. Note tropical air filter

Defiant T.T. Mk.III, target tug aircraft, No.667 Sqdn, 1944

Defiant Mk.1, devoid of turret, used for experimental work, R.A.E Farnborough, 1941- 46





A Mk.1 Defiant in early day-fighter camouflage, including the early black/white/ silver underside.

engagement that demonstrated the difficulty in bringing the Defiant's armament to bear in fighter-to-fighter combat.

No.141 Squadron took their Defiants into action from July 1st and, responding to a Squadron scramble from their base at Hawkinge, near Folkestone, their formation of nine aircraft were bounced out of the sun by Me 109s and only one Defiant returned to home base. No.141 were immediately removed from the UK south coast combat zone.

Between early June and end of August 1940, some 120 Defiants were delivered, of which over half fell to the guns of the Luftwaffe. Despite the unsuitability that the Defiant demonstrated for fighter-to-fighter combat, the type was not without its successes during its day-fighting period, May - August 1940, given the right circumstances, but all too often, such circumstances were not there.

Thus taken out of the day-fighter front line, the immediate use of the Defiant came in the task of night fighter, commencing with a single aircraft sortie on the night of July 1st 1940 by a No.141 Sqdn aircraft. The other Defiant Sqdn, No.264 achieved a 'probable' on the night of August 15th and both units took on a more regular night fighting role from late September onwards as the Luftwaffe stepped up night raids in a prelude to an autumn and winter of night bombing operations.

At that stage, the Defiants, like the Spitfires and Hurricanes, sent aloft in darkness 'at risk' of actually finding the enemy by 'Mk.1 Eyeball' were entirely without airborne radar aid which, at that stage was too bulky and heavy to be fitted into such aircraft. By early 1941, a further five Defiant squadrons were regularly deployed for night fighter operations, flying long patrols in the long winter nights, for minimal tangible results in their pre airborne-interception radar period.

No.264 Sqdn, the first to take the Defiant into action in 1940, was the first to receive radar equipped Mk.II Defiants in September 1941, but by then, the short nights of summer months and the focus of Luftwaffe bomber operations in Russia and the Eastern Front had greatly reduced night incursions over UK.

Less belligerent roles

As the Bristol Beaufighter became available for the night fighter role, the Defiant was put to other less belligerent uses. One such was Air-Sea rescue, to supplement the Westland Lysanders and Avro Ansons already employed for the task.

However, modifications to fit the standard rescue equipment into the Defiant and the development of underwing carrier attachments for rescue dinghies, delayed service introduction, after which it became clear that the well worn examples thus modified were not suitable for the task, due to high stalling speed and wide turning circle - exactly the characteristics to be avoided for the task.

Major modifications were also required for the target-towing task, involving the removal of the turret and installation of a target stowage box under the rear fuselage, plus a wind-driven winch placed on the starboard fuselage side and revised cockpit canopy for the winch operator.

A question of what might have been?

The Defiant was one of three day-fighter aircraft types on which, pre-1939, the air defence of Great Britain was intended to wrest, once the danger represented by Nazi Germany emerged from the mid-1930s onward.

Of the three types, the Defiant was planned largely as a bomber destroyer. During the years leading up to 1939, there were few intelligent thinkers among the air planners of the Air Ministry and the RAF Air

Since only two Defiant day-fighter Squadrons were ever formed, out of a total of seven originally planned, it's not surprising that No.264 Squadron was much photographed. Here are six of their Defiants seen at Kirton-in-Lindsey, early in 1940.

A winteryscene in January 1942, shows a Defiant of No.410 (RCAF) Squadron in matt black night fighter finish,

Staff and in any case, it was anticipated that any Luftwaffe bombing attach would come diect from German soil and so, bombers would be unascorted. In such circomstances, the Defiant turret fighter was a plausible fighter destroyer. Not even the clearest thinkers of them all, the likes of Air Chief Marshall Dowding, C-in.C of Fighter Command and his second-in-command Keith Park (before the latter went to command No.11 Group Fighter Command in 1939), envisage the total collapse of France in the late Spring of 1940. But from Late May 1940, when German forces burst through the French border defences and achieved total victory in France in not much more than six weeks, the air defense of UK changed completely.

The development of combat tactics for a new fighter type, where no previous experience existed, takes time - which was sorely lacking for the RAF pre-1939, and exacerbated by the slow development and late introduction of the Defiant to Squadron service - only just prior to WW2. Had the Defiant reached the RAF Squadrons earlier, it may be that an effective means of applying its principle in combat might have been devised with more telling results.

But even so, like the Hawker Hurricane, the Boulton Paul Defiant also lacked the development potential of the Spitfire.

The Defiant as a model

Whilst the Boulton Paul Defiant lacks the 'glamour' of the successful fighter types like the Spitfire and Mustang, which are the perennial scale modellers' favourites, it does offer attractions, not least for the rarity of the times it's been done - your editor can only remember one.

The full size was aerobatic, so such can be flown with realism in a model. It features inward-folding retracting main undercarriage, but the tailwheel is fixed - which avoids a tail-end complication and unwelcome dead weight at the rear end.

Then there is the turret - which could be activated, thanks to modern R/C gear and the fairings front and rear of the turret can also be retracted with adaption of servos - there must certainly be something out there that suits.

Fancy the challenge? ■

Defiant

Flying Colours

Boulton Paul Defiant Mk.1 of No.264 Squadron, R.A.F. in 'B'- Scheme day-fighter colours as applied during Squadron workind-up period, March 1940.
This aircraft saw action over Dunkirk, May 1940 during the BEF evacuation, by which time, the underside finish had be overpained with Sky 'S'-type finish and with revised roundels.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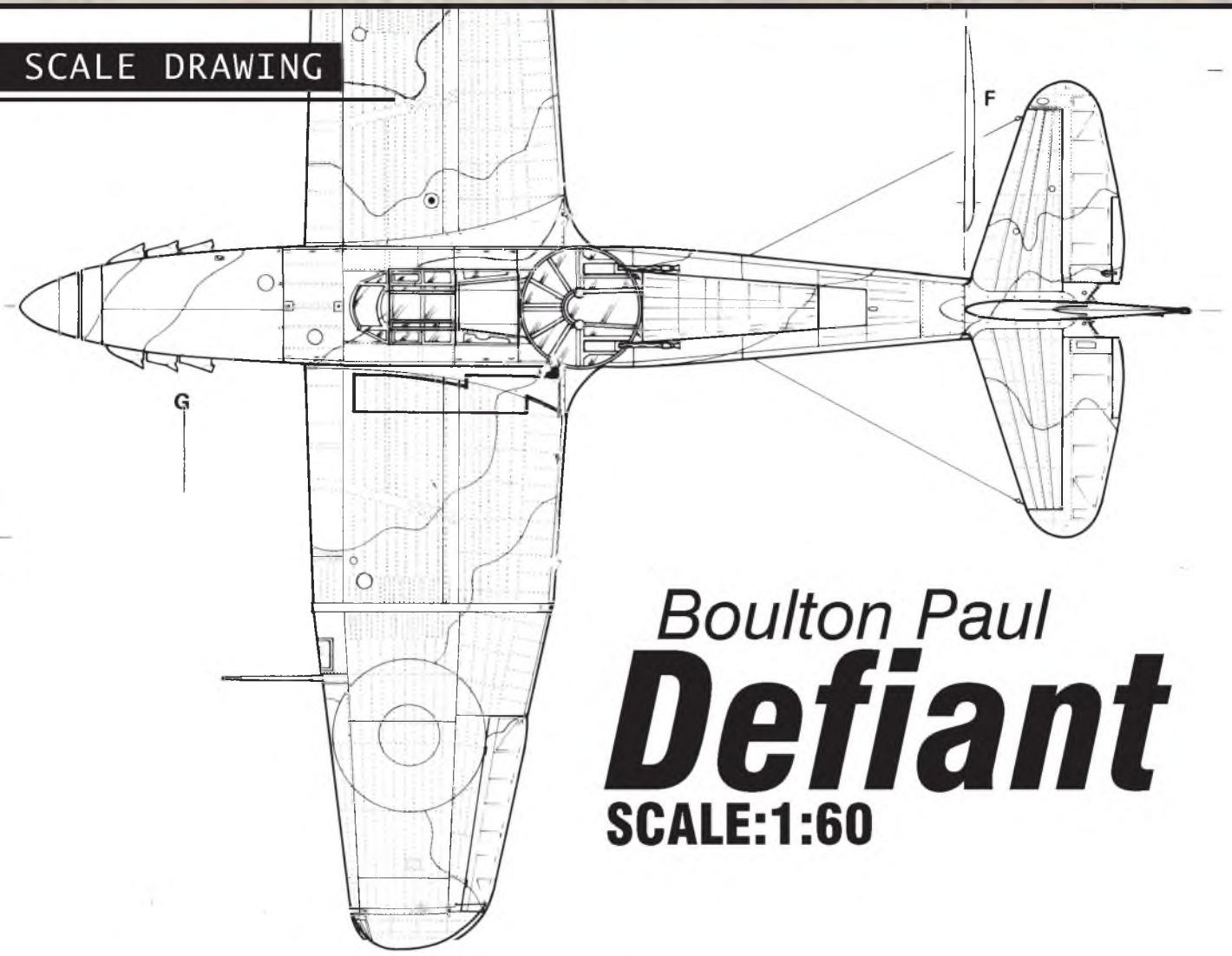
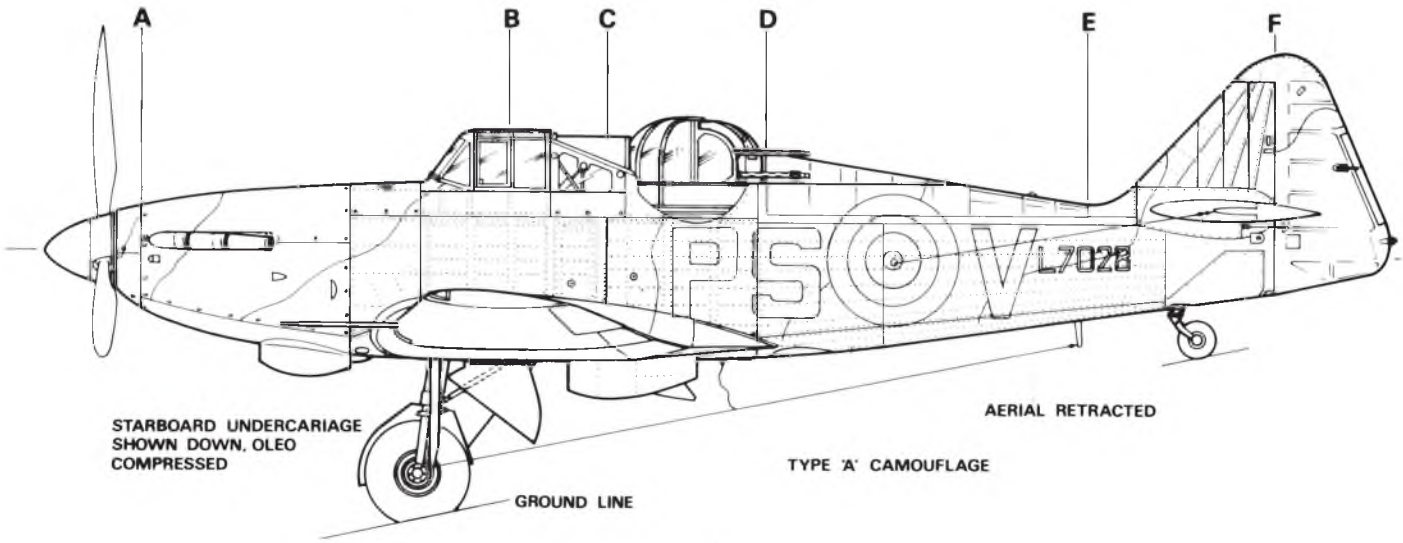
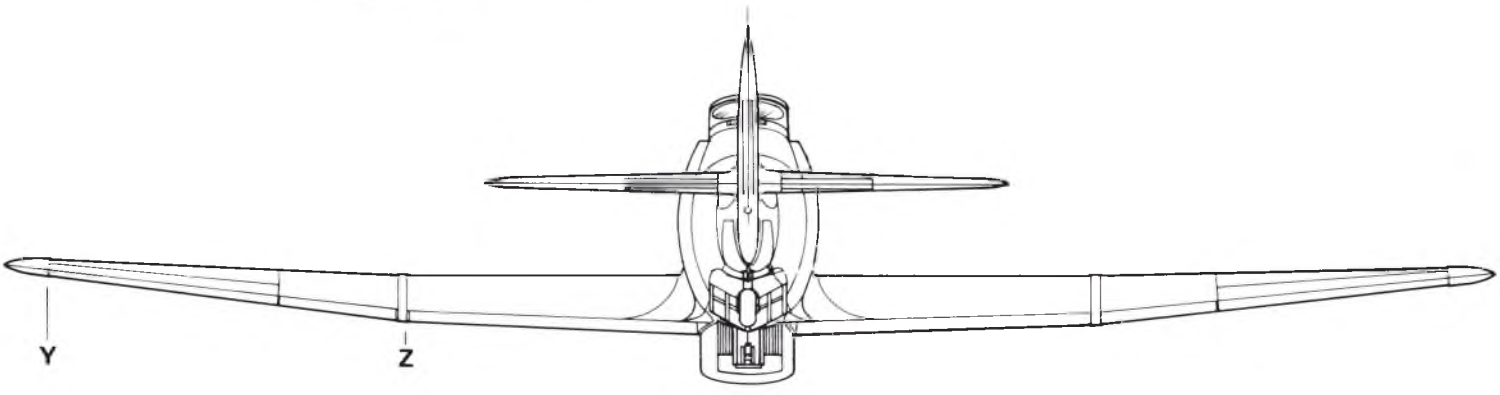
SCALE DRAWING

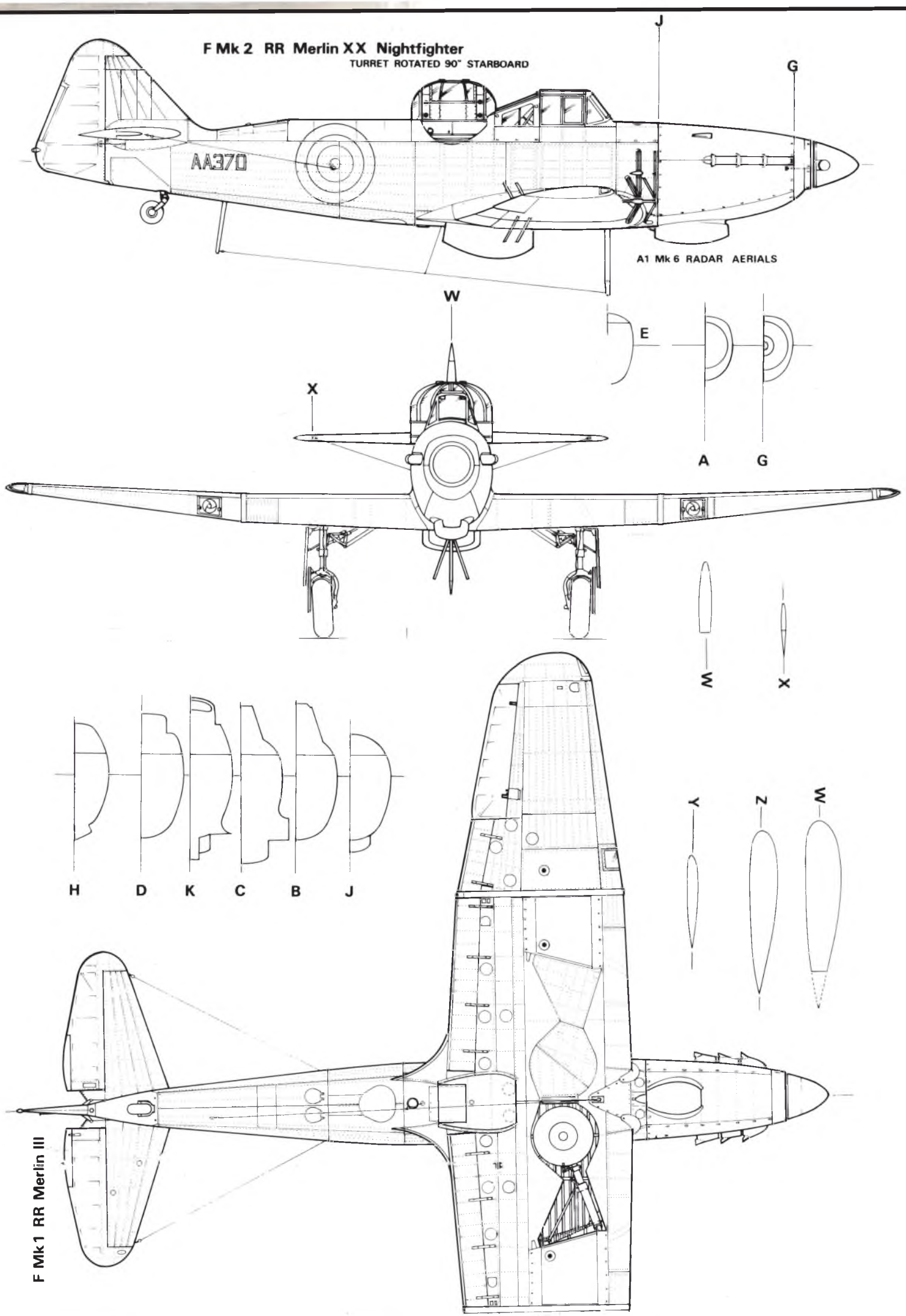


Boulton Paul Defiant

SCALE:1:60






F Mk 2 RR Merlin XX Nightfighter
TURRET ROTATED 90° STARBOARD
AA370
J
G
A1 Mk 6 RADAR AERIALS
W
E
X
A
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W
X
H
D
K
C
B
J
Y
N
M
F Mk1 RR Merlin III

Boulton Paul DEFIANT

CLOSE-UP SURFACE DETAIL IS WHAT MAKES A MODEL SPECIAL

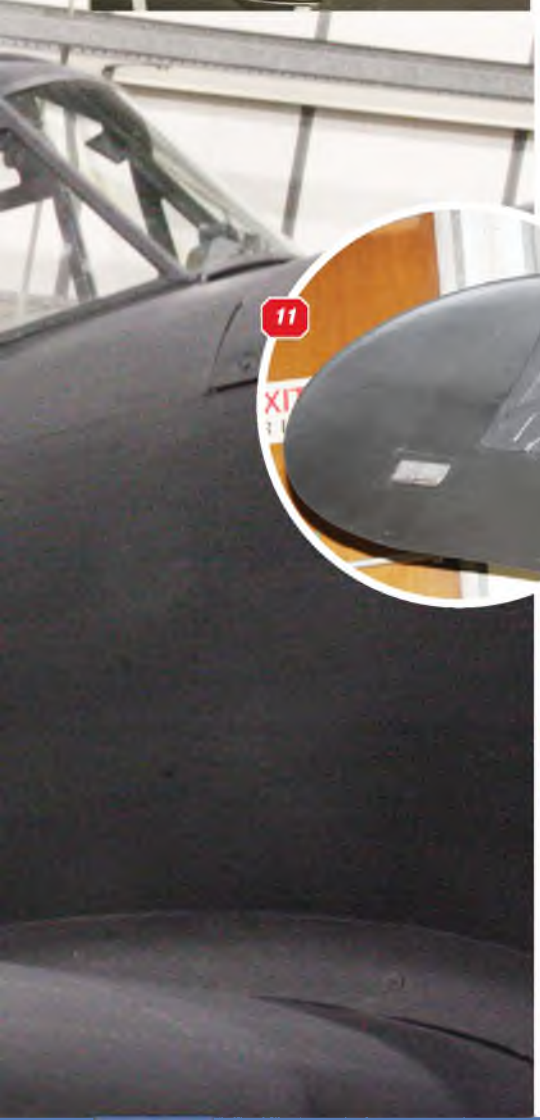

1

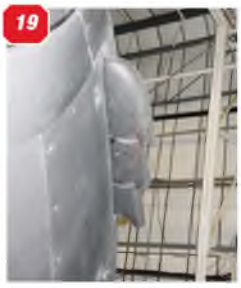

2


3


6

1 - 5: The major feature of the Boulton Paul defiant centres in the cockpit and the rotating gun turret behind it. **6-8:** Enlarged views of the cockpit and gun turret. The upper part of the faring between the cockpit and the turret retracts to allow a forward field of fire for the gunner. **9:** View of the rear upper fuselage behind the turret showing retracting panel behind the turret, seen here in the retracted position. **10:** General view of the tailcone. **11:** Tailplane tip, showing the aerodynamic balance. **12:** The fin and rudder, showing the aerodynamic balance. **13:** Tailplane-to-fuselage root, showing the metal cuff fairing. Note also the control link to the rudder control horn.





14: General view of the fuselage nose section, showing engine cowl panel lines. 15: Nose section close-up, showing the flash-damper exhaust stack as applied to night fighter aircraft. 16: Spinner and propeller. 17 & 18: Two views of the air scoop on the cowl underside, just ahead of the wing. 19 & 20: Two further views of the night fighter style damper exhaust stacks. 21: Wing, showing the metal strip covering the inner/outer panel joint. 22: The aileron, showing the hinge positions. 23: Wing root underside, showing the inner undercarriage doors. 24: Wing tip light, starboard side. 25: Wing-to-fuselage fairing. 26: Pilot head, Port wing. 27: Landing light, applied to both wings. 28: Forward section of the wing-to-fuselage fairing.

28 & 29: Two views of the main undercarriage leg. **31:** The Two-part main undercarriage outer doors. **32:** Close-up of the upper main undercarriage out door. **33:** Detail of the main undercarriage wheel. **34:** Undercarriage doors, viewed from under the wing trailing edge. **35:** Inner undercarriage doors, also viewed from under the wing trailing edge. **36:**Main undercarriage leg, showing the axle fork. **37.** The undercarriage lift/lock mechanism. **38:** The complete main undercarriage. **39:** Main undercarriage wheel well. **40:** Wing underside radiator, also showing the hinge points for the inner undercarriage doors. **41:** The underwing radiator, viewed from the rear. **42 & 43:** Two views of the fixed, non-retractable tailwheel.

Classifieds

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SPECIFICATIONS | HAN5035

Wingspan	1430mm (56.0 inch)
Overall Length	1260mm (49.5 inch)
Wing Area	36.14 sq. dm (560.0 sq. inch)
Flying Weight	2.8 – 3.1kg (6.25-6.75 lbs)
Engine Size (Glow)	.46-.52 two stroke .72-.82 4-stroke
Engine size (Petrol)	10cc 2-stroke
Motor Size (EP)	E-flite Power 46
Minimum Radio	4 + channel - 6 if using flaps/retracts
Servos	5 mini (4 for electric)
Prop Size	11x6 (glow 2-stroke) 13x6.5 (EP)
Spinner Size	82.6mm (3.25 inch)

HANGAR 9®

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