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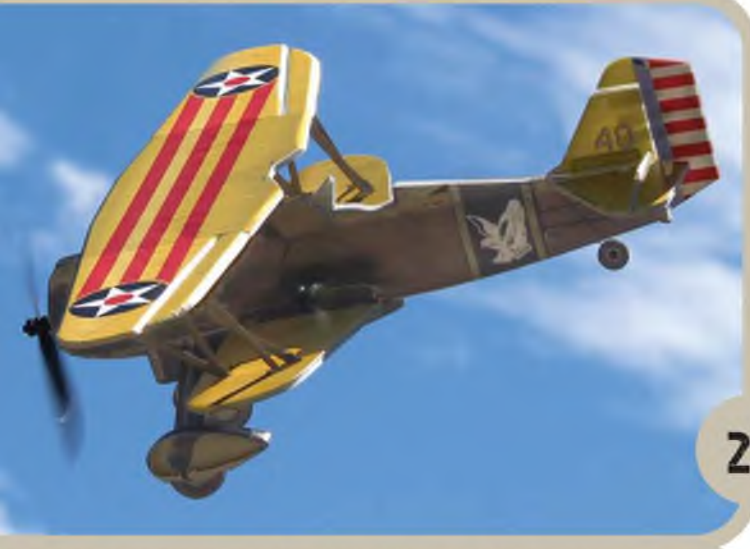

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ON THE COVER

The Ryan PT-22 served during WW2 as an ab-initio trainer with the US Army Air Corps and US Navy, Many thousands for trainee pilots took their first flights in one. This month we start a new full size free plan construction series for a 52" wingspan model of the type, designed by Peter Rake.

OCTOBER 2015 NO.191

Editor: Tony Dowdeswell
Publisher: Alan Harman
Design: Peter Hutchinson
Website: ADH Webteam
Advertising Manager: Sean Leslie
Admin Manager: Hannah McLaurie
Office Manager: Paula Gray

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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

CONTACT

A piston engine primary trainer aircraft with swept wings? Hardly one would have thought - since swept-back wings have long been commonly associated with high-speed flight!

But there it is, admittedly with very modest wing sweep in the Ryan PT-22 'Recruit', which forms the subject of the three-part full size free plan series that commences with this issue.

Peter Rake mentioned some time ago that he had this one projected as a free plan feature - but the completion of a prototype model with adequate stage-by-stage construction pictures has been a bit tortuous.

Meanwhile, movie star Harrison Ford momentarily highlighted the PT-22 earlier this year when he pranged his full size restored example out in California. He walked away from it, more or less, but for the aircraft it was a different story. Hope it can be put back together - it's amazing what professional aircraft restorers can do these days, given the time and the money!

So what is it that sparks the appeal of a particular aircraft for scale modelling? It's all a matter of personal taste. For a large majority, the glamour of the famous warbirds with shapely lines, like the Spitfire and Mustang have it all. However, back in the days when pylon racing was my primary aeromodelling interest (and when the model had to be tailored within the rules to take the shape of full size racers) I saw a picture in the US mag, *Model Airplane News* of a right little wart of what we used to call 'Goodyear' or Formula 1 racers (they were all Continental flat-four engined). The picture caption ended with the throw-away line "...so ugly, it's beautiful..."). Perhaps that says it all?

Point is, the appeal is squarely with the individual and the PT-22, with its wing-sweep and dominating, almost garden-gate undercarriage, has a definite appeal and 'personality' all of its own.

Hope you like it!

ABC ROBIN CUT PARTS

Looming press date for last month's issue of FSM, beat us to the draw in getting a price for the laser-cut wood parts set for the ABC Robin, which was one of our construction features.

The pack includes wing ribs, wing trailing edges, tailplane and fin, fuselage formers, cowl, sides and 0.4mm ply deckings.

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Our intention had been to run this piece to accompany last month's features on Ken Marsh's Lockheed Sirius and Paul Rice's Supermarine S6B, but lack of space dictated that it be held over

COPPA SCHNEIDER ITALIA

The editor recalls the ambitious and highly successful Schneider Trophy model series run at lake Varese from 1979 until the mid-1980s.

The late Ron Moulton gave me my first job in publishing when, back in October 1960, he took me on as Editorial Assistant on *AeroModeller* magazine - I was just 18. It was the start of a lifelong career in model hobby and specialist interest publishing - and since then, I've never had a proper job!

When Ron passed away in 2010, I inherited some valuable reference books, plus a huge collection of aircraft photos from virtually all era of aviation and these have been a valuable source of illustrations for some of the *Type Histories* in FSM. So, when I needed photos for the Supermarine S6B for a historical back-up of the Master Models feature for last month's issue, a trip up the loft ladder to thumb through the RGM Collection was required. There I found a large, bulging envelope marked 'Schneider' in the immediately recognisable Moulton hurried handwriting.

It is was not what I was looking for, but it did prompt a trip down memory lane, for

Giovanni Bighardo's Savoia S.51 placed 2nd at the 3rd Coppa Schneider event in 1981.

Superb model of one of the three Macchi M.39s flown in the 1926 event at Hampton Roads, USA. Carlo Bergamaschi won the 1981 Coppa Schneider with this Webra Speed 60 powered model. Iy handled water take-ffs and landings perfectly.

here was all the paperwork, plus to-and-fro correspondence of what must have been the first-time British modellers' participation, plus the photographic results of Ron's trip to Italy way back in 1981, for what was most certainly a very special and ambitious scale model aircraft event.

Back then, the *Aero Club Varese* (Sezione Aeromodellisti) had instigated an annual series of scale *'Coppa Schneider'* events held at Lake Varese in the northwest Italian Lakes district. The first had taken place as early as 1979, attracting international participation, including a goodly contingent of Brits in 1981.

My own visit to the annual series

In for foreground is the Short-Bristow Crusader model flown at the 1981 event by (I believe) Dudley Pattison, back then proprietor of Flair Products). The Crusader was built for the 1927 Race at Venice but was wrecked in practice during take-off caused by reverse-direction aileron connection - something many of us modellers know all about - c'mon, admit it!!!

Two models of the Nieuport Type VI as flown by Dr Gabriel Espanet at the inaugural Schneider Trophy Race, held at Monaco 8n 1912. One of these is Brian Peckham's Irvine .40 powered example flown at Varese in 1981.

No detail of whose this is, but it's a model of the Supermarine Sea Lion II that won the 1922 Schneider event held at Naples and demonstrates the variety of models encouraged by the Cappa Schneider series - not just super sleak floatplanes.

By far and away the most radical and ambitious aircraft built for the Schneider Trophy series was the Italian Piaggio-Pegna P.c.7 which dispensed with floats in favour of hydrofoils to minimise aerodynamic drag. It featured a tractor airscrew at the nose and a boat type water screw at the rear so that the machine commenced take-off run with the airscrew stationary, moving forward initially driven by the rear water screw until the forward motion enabled the twin hyrodofoils to raised the fuselage out of the water. The front airscrew was then engaged via clutch to get the aircraft airborne. Intended as an entrant for the 1929 Race at Calshot, U.K., the Piaggio was, not surprisingly, beset with development problems and did not make it to Calshot, nor did it ever get further off the water than the height of the hydrofoils and the project was abandoned.

The model was an equally ambitious. Not sure now how its power train worked, but appears to employ a rear exhaust Super Tigre or OPS engine mounted well back in the forward fuselage, driving the airscrew via an extension shaft. Presumably the waterscrew was the initial mover for takeoff. Unlike the full size, the model did actually fly as photos I have of it on take-off, at height and then finally aquaplaning back to the shoreline attest, One must salute the guy for having a go - and making it work. Eh!

occurred in 1985, which must have been very close to the final year. We stayed at Schianna, just outside Varese centre, at a lakeside hotel where the walls of the common areas were covered with photographs of the full size Italian Schneider Trophy aircraft - a veritable aviation time capsule. It turned out that the hotel, right on the lake edge, had been headquarters for the Italian Schneider Trophy team when testing their aircraft and for course-flying practice. Right next door to the hotel was a big hangar-style shed for storage of the aircraft and there also still remained the rails in the concrete slipway that led from the shed to the lake edge for launching the aircraft into the water.

The 1985 event was the only one I attended, but it was typical of the entire Italian 'Coppa Schneider' series that produced some superb examples of the scale modellers' art - and all with the added complication of rise-off-water flying, which is a specialist technique in its own right - as anyone who has given it a try will attest.

The full size Schneider series was first run at Monaco in 1913 where a French Deperdussin Monoplane won it. It was not really a 'race' with multiple aircraft heats, but really a time trial. The following year a British Sopwith 'Baby' (also called 'Schneider) biplane won, and the series was put to bed with a final British walkover 'win' at Spithead in 1931.

The Coppa Schneider model series in Italy followed the same format, with

Between 1923 and 1927, USA fielded a series of very sleek biplane floatplane racers for the Schneider series. Built by Curtiss, these entries being fielded under the auspecies of the US Army. For the 1925 event, their aircraft were all Curtiss R3C-2 biplanes, one of which (No.3 as modelled here), won the Trophy that year flown my Lt. James Doolittle, whose name has become internationally renowned in aviation circles to this day. This model of 'No.3' appeared at the 1981 Coppa Schneider.

Carlo Bergamaschi won the 2nd of the Coppa Schneider series (1980) most appropriately with his Sopwith Baby/Schneider, since the full size Sopwith won the 2nd of the full size series in 1914!

models of aircraft flown in the full size Schneider 'races' in all era of the series. I know I photographed models at the 1985 event, but these have long gone, but Ron Moulton's photographs seen here illustrate the models of the 1981 contest and aptly record the series at the height of its achievement.

Writing this a full 36 years since the Coppa Schneider Italia first took place and 30 years since my own visit there, my memory remains of a uniquely enjoyable event, although not now in enough detail to provide caption information for the accompanying photos beyond what I've managed to cobble together here - for which I beg your indulgence!

Sadly, long gone, but never forgotten, as of course is the case for 'RGM' himself. ■

Two of the British entries flown at Varese in 1981; in the foreground, Supermarine S.5, winner of the penultimate Schneider Trophy event at Calshot in 1929, plus Gloster VI, also prepared for the 1929 event but, in the end, did not compete.

Autographed BUTCH-III

"The scheme is "White 14" flown by Oscar Boesch of Sturnstaffel 1"

ER BIRD

Keith Durkin's superbly presented Fw 190 bears the signature of its Luftwaffe pilot. Alex Whitakker reports.

The Focke Wulf Fw 190A was designed by the famous team at the Focke Wulf bureau, led by the illustrious Kurt Tank. It first entered combat service in 1941, and quickly demonstrated its ascenency over the British Spitfire Mk. V, which was the RAF's standard front line fighter type in northern Europe at the time. The '190A series was unusual for a fighter in the European combat theatre in having a radial engine. Apart from its prowess as the supreme Axis fighter - at least for low and medium altitude combat, it was also noted for the voluminous con-

trails its radial engine produced at higher altitudes. Even when later marques adopted an in-line engine, the trade-mark radial cowling was retained to house the radiator.

In all, over 20,000 Fw 190s were built in an extensive number of variants. She was dubbed both 'Wurger' ('Butcher Bird') in it's original radio engine A-series, and 'Dora' for the D-series in-line Junkers Jumo powered variant, applied to provide better higher altitude performance. The final variant was the long-winged Ta 152, also Jumo powered, the 'Ta' prefix in honour of Kurt Tank.

The Model

Keith Durkin was well into the building of his 1:4.5 scale Focke Wulf 190A, when he decided he must choose a scale scheme. Wandering the internet one fateful day, he stopped at a plastic modeller's site. It had a fine scheme of a 'White 14' the mount of a certain Feldwebel Boesch, of

1: Cockpit framing has a great amount of detailing. 2: 1/4 scale pilot, full figure, sourced from Fighteraces UK. 3: This shows the thick 'panzer' armoured glass in its oversized frames. 4: Keith purchased a complete cockpit instrumentation from Popagteam in the Czech Republic. 5: Horizontal stabiliser / tailplane has all hinges in place. 6: Tail treatment is very faithful to original. Note retracting tailwheel assembly, aerial, and subtle legending.

The Roy Vaillancourt plan really captures the aggressive stance of the Fw 190.

The Fw's wide track undercarriage was a great advance on the Me 109 narrow arrangement... an advantage that translates to model size!

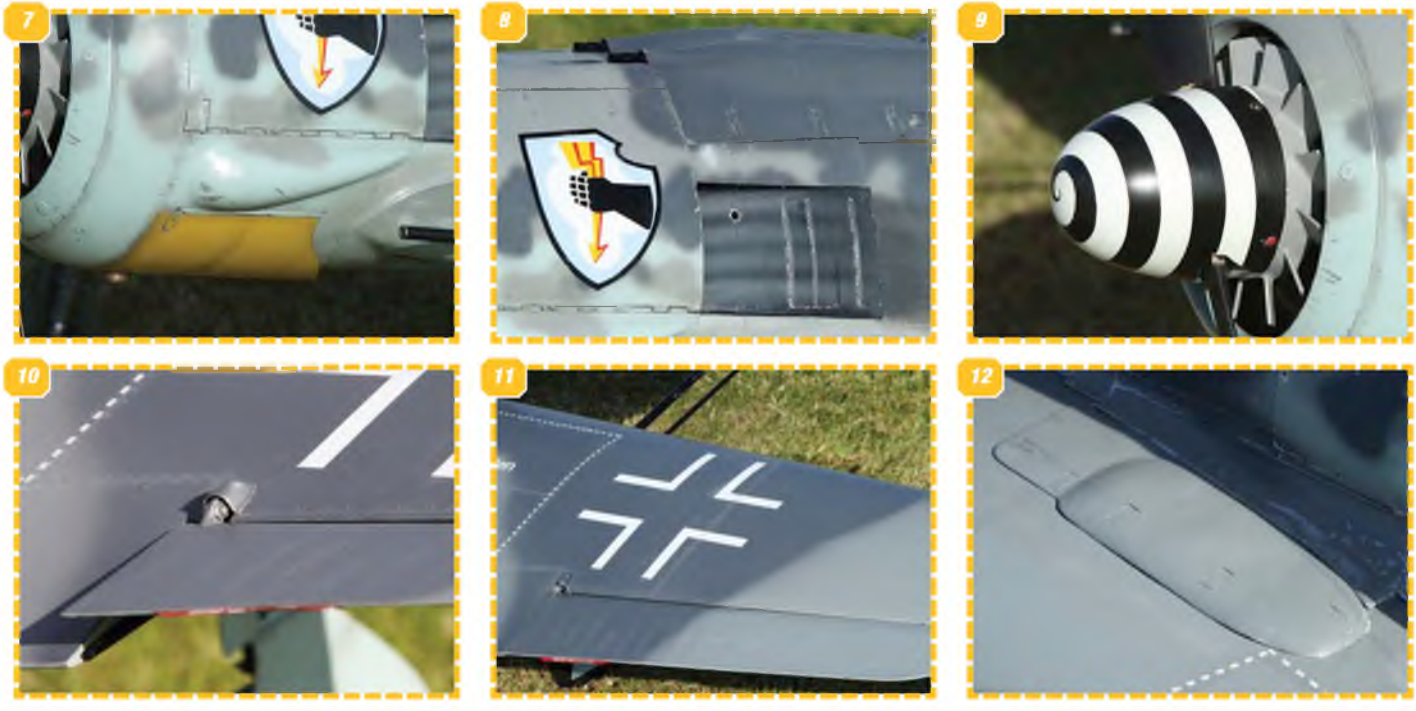
Luftwaffe Sturmstaffel 1. 'Feldwebel' is a senior German non-commission rank roughly equivalent to Sergeant.

Keith liked the scheme and did a bit more building whilst continuing his on-line researches. By a twist of fate intertwined with internet technology, Keith was eventually able to make contact with Oscar, who miraculously, was still alive and living in Canada. They corresponded by email and by transatlantic telephone and eventually Keith flew to Canada and was able to meet Oscar. Keith even took a rear panel from his model, which Oscar kindly signed. This means that this particular Fw190 flies with a personal memento of Oscar on board.

Keith's Fw190A is a traditionally constructed model built to a scale of 1:4.5. It has a wingspan of 92.5" (2350mm) and weighs 36lbs (79.2 Kg.). She is fitted with a Zenoah GT 80 petrol engine with its standard silencer. The Z80 drives a Menz 24"x20 prop. Keith chose a Sierra Precision retractable undercarriage and wheels, including their retractable tailwheel system.

Plan

This model is built from the well-known Roy Vaillancourt (Vailly Aviation) plan. There are two versions available and this one is the original, smaller version. Nominally, it is 90" in span, 76" long, and has a wing area of 1305 sq.in. The key thing for scale



7: This view gives some idea of the realistic scale patina Keith has achieved. Note hinges and fastenings. Also crisply modelled wing cannon. 8: These panels are superb, they look like items from a Luftwaffe aircraft in front line service. 9: It took Keith a while to get the spiral spinner paint correct. Note engine fan, a Vailly part. 10: Scale control horns correctly observed. 11: Car paints were used with Tuffcote fuel proofer sprayed on after the weathering process. 12: Nicely modelled covers at wing root. Vailly supplied basic item, cleverly worked by Keith.

13: Fw 190 uses Sierra Precision wheels. 14: Keith used Sierra retracts and wheels. Note superb struts and oleos. 15: Wheel covers modelled in two parts, nicely stencilled and weathered.

builders is that the cowl diameter demanded by the plan is 11 inches.

Documentation

Keith was guided by the well-known Arthur Bentley drawings, from Osprey Publications, and also a number of scale items collated from the internet. These included *www.hyperscale.com* and other on-line sources.

Construction

The model uses balsa wood, lite-ply, and cyparis within a traditional construction. No foam is used on the plan, and the model is sheeted with 1/8" or 3/32" balsa. However, Keith did use a small amount of blue foam in the wing seating.

Full size templates are shown on the plan for all ribs, and formers etcetera, so this Fw 190 is eminently suitable for modern CNC-cut parts. Keith chose the Roy Vaillancourt CNC parts pack.

Fuselage

The model uses the well-known crutch system to deliver what amounts to a monocoque construction. Lite-ply formers support

a light balsa construction, skinned with balsa sheet. Keith elected to fit a retracting tailwheel unit, which had to be planned into the fuselage building sequence. Side fitting servo mounts were used in the fuselage and these were supplied by *Fighteraces UK*.

Wings

Again this is all built-up with balsa wood ribs and cyparis spars. The finished wing is sheeted, so decisions have to be made about access to undercarriage hard points and the like as the building proceeded. The CNC parts included a wing washout jig to give the finished wings the required slight downward twist towards the tips. Washout is introduced to enhance stability, particularly when flying near the stall.

Tail

Fin, rudder, and horizontal stabiliser are all balsa built-up construction, then sheeted in balsa. Again, allowances had to be made during the building for the final tailwheel assembly, plus the closed-loop control exits.

Cowl

A big feature of any radial-engined scale subject, Keith sourced the 11" diameter fibreglass moulded cowl direct from Roy Vaillancourt.

Engine

Keith fitted a Zenoah GT 80 petrol engine since he considered that the smaller Zenoah 62 would deilver insufficient power. This involved some simple surgery to the plywood firewall, cutting out the centre, and adding a new plywood plate. The cowl needed a new hatch aperture to be cut for access to the carburettor. Keith was able to combine this with a refuelling point. But other than that, the Z80 fitted like a glove with the stanard Zenoah GT 80 silencer.

"Brian Cooper's slow pass with the gear down for the camera"

Prop
A Menz 24"x10 flying propeller was chosen to best suit the Z80 engone

Spinner and cooling fan
These were Roy Vaillancourt items, the flying spinner being made of aluminium, but a scale static spinner is also available. Painting was a challenge, given the spiral finish.

Surface panelling
This was achieved with litho plate secured with contact adhesive. The Fw's distinctive armoured side panels were made from 1.5mm plastic card.

Undercarriage
Keith purchased Sierra Precision Retracts and wheels.

Cockpit canopy
Keith used the Vailly Aviation supplied part, and added his own litho plate framing, carefully finished and weathered.

Gun hood
The gun hood is a key part of the Fw 190A's personality. No scale part was offered by Vailly Aviation at the time of building, so Keith used a Don Smith item. It was slightly smaller than required, but Keith finessed it to fit by adding some litho panelling.

Covering, painting and finishing
Elevators and rudder were covered in *Solartex*, with rib tapes applied. The rest of the model was finished in lightweight glass cloth and resin and the entire model was painted in car paints.

Stencils and masks for Feldwebel Oscar Boesch's 'White 14' of Sturmstaffel 1 were supplied by *Flightline Graphics* and after weathering, the whole airframe was fuel proofed with TuffCote.

Pilot
Keith used a 1/4 scale full figure, sourced from *FighterAces UK*.

Cockpit detail
Keith purchased a complete cockpit from *Popagteam* in the Czech Republic.

Port fin access panel
This scale panel was taken to Canada by Keith Durkin and was personally autographed by Oscar Boesch.

Drop tanks
Vailly Aviation moulded plastic parts were used.

Ammunition hatches
Once more, Keith used Vailly Aviation moulded plastic parts.

Flying notes
Noted scale pilot Brian Cooper was asked to conduct the maiden flight. Brian flew her and pronounced here 'viceless'.

Keith then took his turn at the sticks. With flap selected flap and a hint of right rudder, he opened the throttle. He reports that the flight was delightfully uneventful, lifting off gently and flew very accurately. Landing was similarly unfussed: She trundled in with flaps deployed, one-third throttle applied.

Subsequently, I first saw the model take the air at Fenlands Warbirds. InBrian Cooper's capable hands. The model was given a good combat thrashing, incorporating large loops, snap rolls, and aggressive low beat-ups. Every inch a Butcher Bird.

SPECIFICATIONS:
Focke Wulf Fw 190

Wingspan:	92.5"
Scale:	1:4.5
Weight:	36lbs
Engine:	Zenoah GT 80 petrol
Prop:	Menz 24"x10
Retracts:	Sierra

"Flaps down, wheels down, over the boundary. This is why we do it!"

NORTH BERKS

SCALE DAY

The North Berkshire Club is well into scale modelling. Previously, their Annual Scale had been trophy-sponsored by *R/C Model Flyer* magazine, but with the closure of 'Flyer', FSM has taken over the 'baton'.

This is very much a show-and-fly event, but with trophies for three classes, i.e.:- **'Scratchbuilt'**: from either conventional kit or plan **'ARTF Makeover'**: where a degree of individuality has been applied - incorporating anything from adding a few external details to maybe a case where the original film covering has been replaced with fabric covering/sheet

Fascinating Westland Interceptor, i930s monoplane fighter one-off, scaled to 78" wingspan from Chris Golds original plans. Electric powered, it featured working oleo undercarriage. Dummy cylinder head moulds made from dental false-gum compound. Bill Broughton is the builder.

skinning and an extensive re-finish depicting that carried by an individual example of the full size.

'Clubman Scale': for a well flown, well finished and built, practical scale model that flies well.

This year's event drew a gathering of widely different scale models covering the timespan of aviation from WW1 to current combat jets - and with some fascinating scale subjects injected into that lengthy time-frame.

At the early-aviation end of the spectrum was Richard Ginger's veteran and reliable 1/4-scale Bristol M.1C built from the Jerry Bates plan. Laser 180 powered, it featured on-board glow for reliable engine idle and tipped the scale at 16 lbs - not a bad weight for such a large model.

Richard is clearly a fan of Jerry Bates designs, for he also flew his equally well-performing Hawker Tempest Mk.II. This, to 1:5.5 scale, spans 88" and is Laser 300V powered. The Tempest is finished in common-or-garden tissue-and-dope, with Halfords spray-can automotive finish and uses Sierra retracts, tipping the scale at 21 lbs. Flown throughout the day, coping well with variable wind conditions, it was quite impressive.

Electric power was well to the fore. Adrian Reid's YT International Messerschmitt Me109E is a 1/5th scale replica that spans 74". Power is a Hacker 14/10L motor, powered from an eight-cell 500mAh pack - and has air driven retracts.

Anyone heavily into scale aerobatics cannot fail to have been impressed by the huge 55%-of-full-size YAK 54 flow by Steve Carr, who put one a fine series of Spoke-accompanied displays thoughout.

Bucker Jungmann, 54" span, with O.S. 65FS flown throughout the day by Alan Miles.

'Shark-nose' Curtiss P-40 Warhawk from YT International kit.

Busy pit area was active thoughout the day

Richard Ginger's Hawker Tempest Mk.II drops in to the landing patch on one of many flights throughout the day.

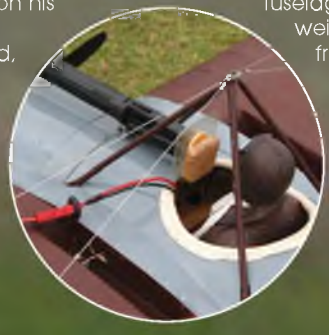
Ken Sheppard demonstrated rise-off-ground from floats with Ken Marsh's Lockheed Sirius.

ABOVE LEFT & RIGHT: Howling De Havilland Vampire from HobbyKing Durafly kit flown by Dave Chinnery.

BELOW & INSET: Richard Ginger seems to liek Jerry Bates designs. His quarter full size Bristol M.1c tips the scales at 16lbs with Laser 180 power. Uses on-board glow.

The YAK spans 5 meters (197"). Even more impressive is the fact that the model is powered by a multi-cylinder engine that Steve made himself, based on his own crankcase, with 3W cylinders. Multiplex equipped, it weighs all of 63 Kg (139 lbs).

So what about the jets? Well, how's about this for a contrast? Colin Garner fielded a *ComArf Composite* kit for the BAe. Typhoon. With glass fibre moulded fuselage and Merlin 160 turbine, it weighs in at 28 lbs, controlled from Futaba radio, with JR servos and *Eurokit* retracts. Flown several times during the day, it handled the short mown grass



ABOVE: Steve Carr showed the way in 3D aerobatics with his superbly presented YAK 54. Model is 55% of full size and weighs a hefty 63 kg. (139 lbs). Steve craeted his own engine, machining his own crankcase and matching it to 3W cylinders. Multiplex radio.

BELOW: Impressive BAe. Typhoon flown by Colin Gardner buil;t from ComArf kit with glass fibre moulded fuselage. 28 lbs model uses Merlin 160 turbine from Spain and features Eurokit retracts.

field impeccably.

Far simpler in concept, but an equally reliable flier, was Dave Chinnery's De Havilland Vampire, assembled from the *HobbyKing* Durafly ARTF kit. This little model looked very quick in the air, perhaps not least because of its small size, and with its Doctor Mad Thrust motor/fan unit screaming away, soaking up the juice from its 4S/2650 power pack, it had all the high-pitch sound of the full-size Vamp's DH Goblin engine.

So what of the Editor's personal choice? Well, it really is nothing more that a PERSONAL choice, and it's always prompted by one's own personal aviation interests. But Broughton's Westland Interceptor, scaled from a Chris Golds design got it for originality of subject. Electric powered, using an e-Flite 110 motor driven from an eight-cell 3600 mAh pack, this 78" model utilised lithoplate, worked to reproduce metal forward fuselage panelling and had working oleo damped undercarriage, while exposed cylinder heads has been produced from a wooden plug and dental false-gum material.

In all, a great day out! ■

MICROACES CURTISS P-6E HAWK

SOMETHING SIMPLE TO KEEP IN THE BACK OF THE CAR FOR A QUICK BIT OF FLYING, WHEN A SPUR-OF-THE-MOMENT OPPORTUNITY ARISES ON A REALLY CALM SUMMER EVENING, OR INDOOR CLUB NIGHT! REVIEWED BY BRUCE CORFE

Allow me to start by summarising: the Microaces Curtiss P-6E Hawk kit featured here which builds into a great-looking and very flyable micro model that provides some enjoyable challenges en-route. This may well be one of the smallest kits ever featured in FSM - the model is 1:22 scale with a wingspan of just 40cm/ 15.75 inches.

The Microaces Curtiss P-6E Hawk

Microaces is a recently-formed operation producing a range of WWII single-engined monoplane fighters - two Fw190s, two Mustangs, a Spitfire and a Messerschmitt Bf109 - using a common design philosophy: die-cut Depron parts, flat-plate flying surfaces, highly-detailed and accurate laser-cut stickers, a brushless motor plus one-cell LiPo, reliant on a donor (or new) Spektrum Rx/ servo 'brick' module as fitted to Horizon/ Eflite micro models.

The P-6E Hawk kit featured here is a departure - Microaces polled the

Finished! No denying it's a very smart little aircraft which disguises its flat-plate construction cleverly.

The manual, protective foam sheet, stickers, ply and Depron galore.

These are the laser cut Depron sheets with all the foam parts apart from the wheels.

The results of my first evening's labours - chamfering, hinging, gluing and stickering.

The fuselage comes together with aileron servo, Rx mount and push-rods. Note the quality of the manual graphics.

It's beginning to look like an aeroplane! Tricky aileron push-rods installed OK.

RCGroups forum to find the most popular prototype for a new kit. The striking Curtiss P-6E Hawk won and became the Company's next product and first biplane. Other innovations include laser-cut Depron parts (the hot cutting adds strength to edges) and new thinner/ lighter all-over sticker material, plus of course it is pre-WWII, Golden Age in fact - a very elegant prototype to model.

Having just checked my Microaces newsletter, I see that the company are not standing still and have added three 1940s Cessna high-wing cabin models and a MiG 3 to their range, as well as wartime twin packs and an Airfix-type display stand. Even more recent introductions are two new Hawker Hurricanes - for five channels, with flaps!

Microaces partners Jon Porter and Simon Barr, based in Poole, Dorset, have careers in design and IT and this is evident in their kits. Part of the philosophy is to model actual aircraft in authentic markings and to provide details of the history of the prototype and its pilot. As the kit info explains, the Curtiss P-6E Hawk was the definitive biplane of the P-series developed by Curtiss during the 1920s and 30s. With a state-of-the-art Curtiss Conqueror V12 power-plant turning a three-bladed adjustable prop, its looks and performance were certainly impressive for the time.

Of the 47 delivered to the USAAC in 1932, only one original aircraft survives to this day, on display at the National Museum of the USAF in Ohio, USA, painted in the livery of the aircraft flown by Capt. Ross G. Hoyt, commanding officer of the 17th Pursuit Squadron in 1933 - this is the prototype modelled here.

What's in the box?

In this case, quite a lot! The sturdy box contains a comprehensive instruction manual, four laser-cut parts-sheets (one is dark grey, with wheel components), six sheets of coloured self-adhesive stickers, foam wheels, a sheet of thin ply parts, plus a foam strengthener with cut-outs containing sundry plastic, carbon, lead(!) and wire parts, all bagged and secured in place. A micro aileron servo and custom horn are supplied along with a propeller. There is even a celluloid chamfer-angle guide and emery board. As the review model came as the Deluxe kit, the AP05 5000Kv brushless motor and XP-7A speed controller were included.

All that is required to complete the model from the Deluxe kit is a suitable 300 mAh LiPo cell, available from Microaces, a Spektrum AR6400/ 6400L/ 6410/ or 6410L receiver, a few simple tools and glue. Note that all the kits are designed to allow removal of the motor/ ESC/ receiver so that you can swap them into other Microaces models.

Assembling the P-6E Hawk

First off, the assembly instructions contain hardly a word of English. They don't need to! The 50-step instructions are exquisitely rendered in computer-designed 3D monochrome graphics showing every stage of construction in superb detail - top marks there straight away. The manual obviates the need for a detailed account here so we will look at a few highlights in the process instead.

Construction begins by sanding the correct 45% chamfer in the tail-plane parts and ailerons, using the supplied celluloid chamfer-angle sanding guide and emery board. The foam tail parts press easily from the laser-cut sheets and lightening holes press out ditto. There are then a total of 14 stickers plus hinges to attach to the tail-feathers. I hope the quality of the stickers with their accurate colour, markings, weathering and rib effects are evident in some of the photos.

The clear tube housing the push-rods with my cut-away foam modification.

Aaargh! A giant (well, 6 gram) lump of lead in the nose!

Look at all those stickers! This is just for the u/c, wheels and pants.

The electronics from the Deluxe kit. Brushless motor at top, speed controller and 1S LiPo cell.

They are very sticky and once peeled off the backing, a pair of tweezers is useful to position them on the foam.

By the end of my first evening's work I had managed to chamfer, hinge, cover and glue (UHU-Por foam-safe adhesive as recommended) just the fin, rudder, tail-plane and elevator assembly. Phew! It became evident that this build was not going to be an 'instant' job!

Construction continues with the laser-cut 1mm ply undercarriage and wing cabane struts. The former is glued to the pre-formed wire undercarriage; the latter is bent and glued into shape using a jig, then both parts are fully stickered up - all the ply parts are covered in this way. Fuselage assembly follows - this is a multi-layered foam construction with many lightening holes plus plastic mouldings supporting the radio and motor. The supplied aileron micro-servo is embedded in the fuz, after connecting it up to ensure it is installed with the arm centered (important). Pushrods are also installed before the fuselage is covered.

The build continues with the lower wing which incorporates dihedral and houses the aileron torque-rods and ply push rods. When attached to the partly-covered fuselage and empennage an aeroplane shape finally begins to emerge. At this point I nearly had heart failure as a long strip of lead, weighing a hefty 6g(!) is coiled up and added to the pointy end. As an indoor flyer of some years' experience I've always tried to build as light as humanly possible; as we all know, more mass exquals more speed and hits the walls harder!

The undercarriage and brushless motor are next up, the latter having a plastic mounting shroud that gives 3D shape to the fuz front. Adding the wheels, spats (pants?) and many more stickers sees us ready to add the top wing with its aileron connections, plus the electronics.

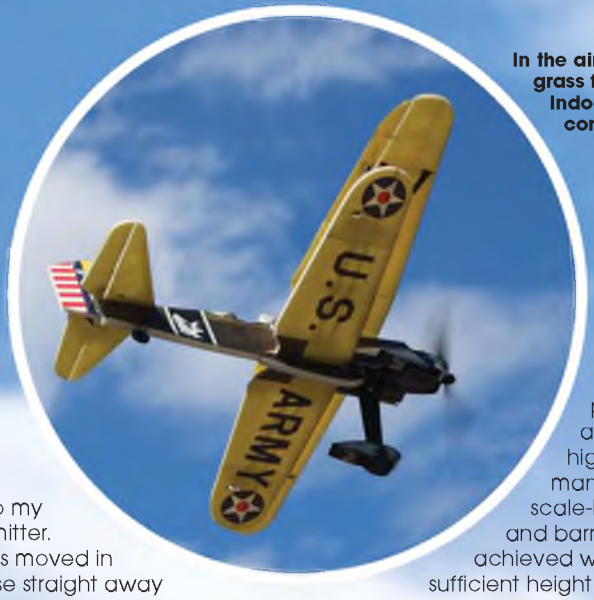
These stages looked tricky to me so I

Time to have a go at installing the micro-electronics.

Nose region with my Spektrum Rx brick installed.

Under the 'bonnet' you can see the rudder and elevator servos/ pushrods plus motor connector (centre right) and aileron servo plug at bottom.

In close for the camera with mild aerobatics and scale fly-bys on the menu.



In the air at last - over grass for safety. Indoor flying can come later.

sought further help. The website (but not the instructions) suggest a look at Microaces *Youtube* build videos - having been keen to get building I had skipped these up to now.

Big mistake; the videos are very detailed and informative and cover lots of points that I'd had to work out for myself. There are also several additions to the instructions - for example the suggestion to round off the leading/trailing edges of the tail surfaces and 'camber' the top surface of the flat-plate wings. As I'd already covered most of these with stickers I was only able to camber the large top wing as described in the video. I was also unhappy with the way the port fuselage side pressed on the tube holding the tail surface push rods so I cut away a large bit of foam prior to covering - the video shows an alternative work-round.

I started looking at the videos when I was ready to install the ailerons and the electronics as these stages looked tricky. Disappointingly there was no video covering this that I could find and the series stops short of these somewhat challenging steps.

The donor Spektrum brick (from an e-Flite Micro Sukhoi Su26) was particularly fiddly to fit correctly. However it all went together after quite a bit of head-scratching and it was with quite a feeling of satisfaction that I was able to hook the battery up and bind the bipe to my Spektrum transmitter.

All the surfaces moved in the correct sense straight away and I was able to true-up the tail end using the bendable push rods. There is no adjustment available on the ailerons however, so centre that servo before fitting and follow the instructions re. dihedral, torque rods and push rods carefully! A few final stickers and it was time to fly...

Flying the Hawk

Only it wasn't! The weather in the Perth Hills in Summer is always windy, and this Summer seemed to be worse than usual for outdoor flying. I was keen to test the Hawk over grass as opposed to the unforgiving parquet of the sports hall, so it sat on the building board for some time. Luckily the Ed. gave me an extension on the deadline due to other circumstances - this was very useful! Out on the patch and later in the big gym, I found that the Hawk will fly at a reasonable lick and will do mild aerobatics out-of-doors where there is more room. It is not a 3D machine (unlike the donor e-Flite Su26) and there is not the power available to pull high-G manoeuvers, but scale-like flying, loops and barrel-rolls are achieved with ease, given sufficient height.

One disappointment was that I couldn't balance the Hawk at the recommended fore/aft balance point without adding a very large lump of Blu-Tak at the front, despite mounting the battery as far forward as possible. I think I've managed to avoid showing this in the flight shots! I suspect the extra nose weight has compromised the flying somewhat, though I can't see that I made the tail any heavier than necessary.

Conclusions:

If you want an interestingly different and occasionally challenging build experience, resulting in a great-looking and accurate profile scale model with very cool markings and a good flight envelope indoors and out, then a Microaces kit may very well be right up your alley! The Curtiss P-6E Hawk does all of the above and is cute enough to put up on the mantelpiece too. Top job Microaces! ■

RYAN PT-22

PART 1: A three-part full size free plan construction feature for an electric powered, 52" (1320mm) span sport scale model of an early 1940s basic trainer, designed by Peter Rake and built by Pat Lynch

First off, I must point out that Pat never actually intended this to be a typical 'prototype' build. He simply wanted a rugged, low wing model for his own use and, since I had the plans available, decided that this would be that model - albeit slightly modified. Since none of the volunteers to actually prototype the model completed their build (shame on you - Ed!), Pat came to the rescue by adding the finishing touches to his model so that it could appear here.

He apologises for the slightly 'worn' appearance of his model, but it had been flown, pranged, repaired, flown again (several times) and was no longer the pristine sort of example usually seen in these articles (...and particularly those produced

"It had been flown, pranged, repaired and flown again several times"

Although far from finished, this is how Pat's model looked at the time of the test flights.

EDITOR'S NOTE:

Due to the manner in which the three plan sheets of the Ryan PT-22 had to be laid out, the double sided plan sheet of Part 1 here, carries the front fuselage and one of the wings. The rear fuselage and the opposite wing panel will come with Part 2 next month and the final sheet in Part 3 will include the tailplane, undercarriage etc.

Nothing too complicated about building the wing panels. Just ensure you don't build in any warps, the covering won't remove them from a D-box structure.

Obviously Pat likes to make sure absolutely nothing is going to move when he's joining wing panels.

by Pat - Ed!).

Also, since time was pressing, it doesn't contain the level of detail we have come to expect from Pat. That said, however, Pat's model still manages to look pretty good to me and I'm more than grateful that he took the effort to help out, especially so since every other month there would be an enquiring e-mail about the PT-22 progress from our esteemed editor.

THOSE MODIFICATIONS

As I said, this was only ever intended as a sport scale model from the outset and the rear fuselage shape isn't 100% scale. Pat decided he would like to change that, so made new side keels and some modified formers. This does nothing to change the basic design, or affect the way in which the model flies, but it does give any other potential builders food for thought should they wish to follow a similar path.

I'll illustrate the alterations Pat made, so you can see how he approached it, but describe how the standard model is built. Construction remains basically the same, with only the shape of a few parts being different.

THE MODEL

As you can see from the drawings and illustrations, this is another of my 'clam shell' style assemblies. The fuselage is assembled as two separate halves (top and bottom) that can either be joined and then sheeted (it's a fairly robust structure), or the two shells can be sheeted and then joined. The possible advantage of the latter route is that since the frameworks are still securely pinned to a flat surface (your building board) it's practically impossible to distort them while applying the sheeting.

Initially, Pat tried flying his model using a e-Flite Power 25 and 3,600 mAh, 3S pack with which the model was both nose heavy and well over powered. Later flights were made using an O.S. 3815-1000 (roughly on a par with a Power 10/15 size motor), a 2,600 mAh pack and APC 11x8 e-prop which was a much better arrangement. This resulted in a model capable of hands off flight (after trimming), but still having ample power for loops and rolls.

Because of the ply in the nose, this is one model that you don't need to watch how much weight you add at the tail. Being the lightweight builder that Pat is, he needed to move the servos further aft than the position shown on the plan, so he could get his battery pack further back. So, be warned, don't overdo weight at the nose and be wary of building the tail end too light. Now there's something novel, a model to which you might actually need to add tail weight.

In an attempt to keep its assembly simple, the undercarriage is rigid, without any springing at all. I think most of us can, given a little practice, successfully shape and solder a few bits of piano wire, but not everyone has the facilities to produce a more accurate, functioning set of undercarriage legs.

WINGS

Before going into the actual construction of the wings there are a few points worth making before you get too deeply into the build. The first point is that the wings do not need functional struts or rigging, therefore these detail items are for cosmetic purposes only. There's absolutely nothing preventing you making them functional should you wish, but it will probably mean that you have to leave the model fully assembled at all times - not always the most convenient solution if storage space or transporting a complete model may give problems. It's a matter of a very few minutes spent fitting the struts into their tubes and hooking up elastic thread rigging cables, so the choice is yours.

The next point to consider involves the aileron servos, and how/where these are mounted. Since access to them is likely to be quite restricted once the model is covered, the last thing you want to risk is a servo extension lead coming adrift inside the wing. To avoid this possibility, I strongly recommend that you extend the servo leads by soldering the extension to the existing servo lead. It should be almost impossible to inadvertently pull that apart while disassembling the model.

Remember, there will be a slight load placed on the leads each time you remove the wing because they will exit the wing through the top centre section sheeting, but still be plugged into the receiver or Y-lead. Sticking with the subject of accessibility, only use high quality servos for this application. The last thing you want is an inaccessible servo failing on you. So please, no cheap, well used servos buried in the wing, it just isn't worth the risk to your model.

We all know that new, high quality servos CAN fail, but it far less likely to happen than with an older, cheapo servo. Making the bay next to the exit plate an access hatch is a possible option, but that's for you to decide if it's something you want to do.

Finally, please ensure that the cut-out in R8 matches the size of the servo you will be using BEFORE the rib is firmly built into the wing. Easy to alter before, while it's still just a rib, but a real pain to sort out after the rib is glued in place.

Okay then, with the pre-assembly points raised, it must be time to actually get on with building the wings for our miniature PT-22. Although at first glance the wing

Note how the front undercarriage blocks have been trimmed to match the wing section, and how the u/c legs fit into the grooves.

As close as you're going to get to a naked model in this article.

construction may appear quite complex, it really isn't any more than fairly basic aeromodelling. It is undeniably aeromodelling with a lot of different parts, but it is basic aeromodelling nonetheless.

There are two options when building the wing panels; you can either build them over the lower sheeting and cap-strips, or pack up everything and add the said sheeting and cap-strips later. Either will work, but there are some complications with either. You HAVE to pack up everything so the trailing edge parts sit at the correct level (unless you particularly want to add extra wood below them and have more to sand away on the top surface) if adding these items after the basic wing is built.

Conversely, if fitting them over the plan and then building over the top, then not only will you obscure where things are supposed to go, it will make shaping the spars at the tips somewhat fraught. So, whilst the choice is yours (I know some people prefer to work that way), I'll assume that you go the route where all the parts are packed up and the sheeting added later.

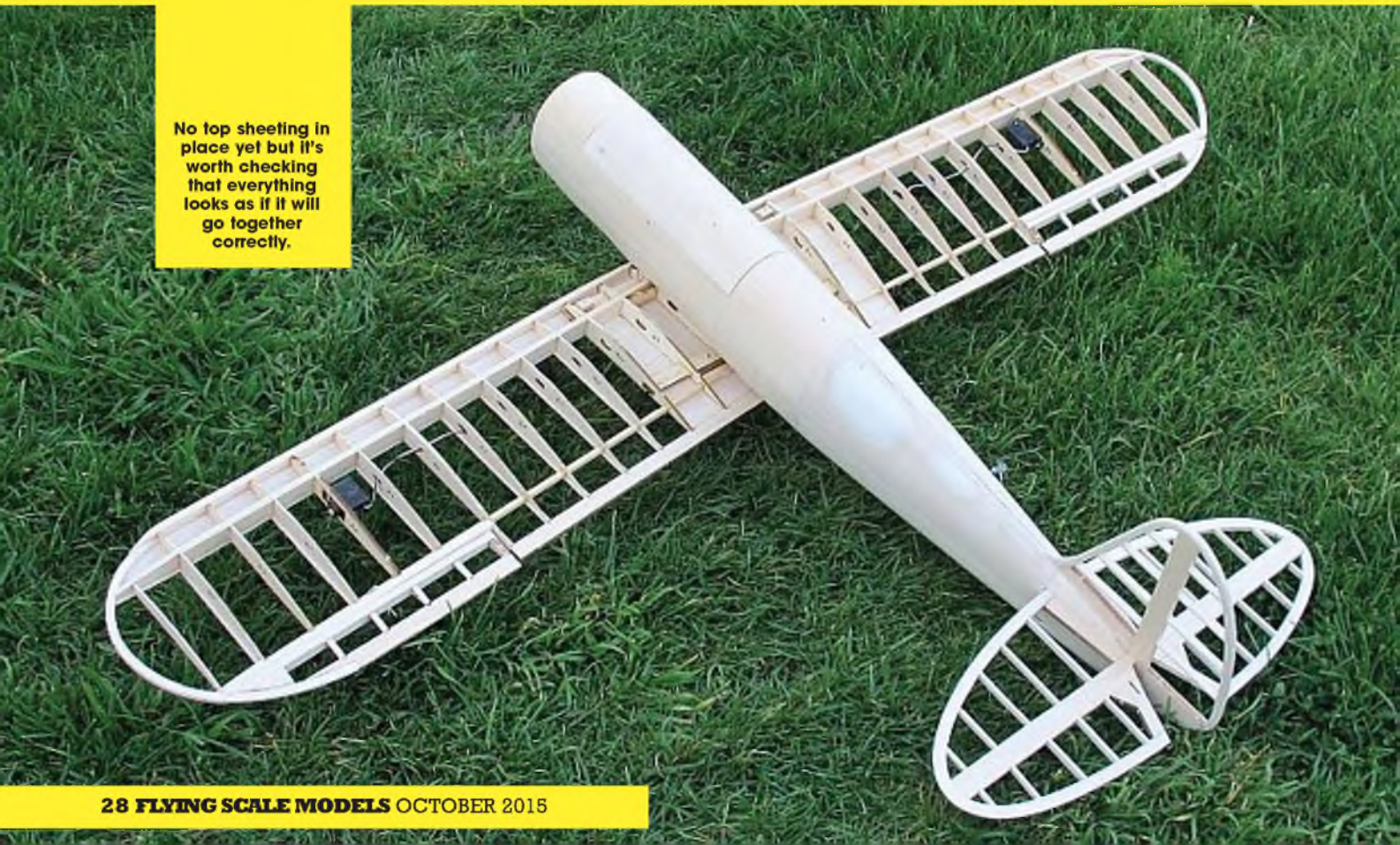
Since the ribs will also be packed up there's no reason why all but the cap-strips on the outermost rib (the one 'made in-situ'), and the lower surface sheeting aft of the front spar couldn't form that packing. You'll need to mark the rib and spar positions and cut away the area where the rear undercarriage block will fit, but it will work well and ensure that the ribs are glued firmly to said cap-strips/sheeting.

So, with the centre section sheet and cap-strips pinned down over the plan, and the rib and spar positions marked onto them we can finally begin the actually building.

Begin by making up the rear undercarriage block and gluing that into the space cut into the lower surface sheet. Pin down the rear spar (gluing it to the sheet and cap-strips), the lower front spar (packed up), leading edge and TE1 and TE2. Leading edge and trailing edge parts pin directly to the board without being packed up.

Next, fit the aileron bay false trailing edge (glued only to the rear spar) and the aileron leading edge (glued only to the aileron cap-strips). Both parts go direct to the board without packing. The laminated parts at the tip are only required if using the scale aileron hinge line and also go flat onto the board. Glue in HP and the rear hard balsa rigging block flat against the board.

With the basic outline ready, the wing ribs can be glued in place. Use the angle guide to lean in rib R1B and the R1A/R1C assembly for dihedral. Fit the top front spar. Note that the front spars extend to the tip bow and from R9 outboard have the gap filled with 3/16" balsa. This will allow you to plane down upper and lower spars to provide the curve to the tip bow. Laminate the wingtip bow and glue in place so that it provides a curve to both top and bottom spars - it glues centrally to the 3/16" balsa rather than to the



No top sheeting in place yet but it's worth checking that everything looks as if it will go together correctly.

bottom spar.

Now we can finish adding the internal bits and pieces. Laminate parts DH1A and DH2A and glue them securely to both the lower sheet and the spars. Make especially sure they are very securely glued to the spars. Fit the 1/16", vertical grain balsa shear webs between the upper and lower front spars. This only extends as far as the cap-strips top and bottom, not flush with the outer surface.

Now, fit exit plate E, the front rigging block and bolt plate WX. Please pay attention to the note about making sure it is very securely glued to the wing ribs. The last thing you need is for it to come adrift as you tighten the wing bolt. Glue in the dihedral braces DH1 and DH2, ensuring the sit snugly against the lower sheet and are securely glued to the laminated wedges. Pat experienced a problem in this area after a stalled-in landing when one brace came loose from the wedge, so you have been warned.

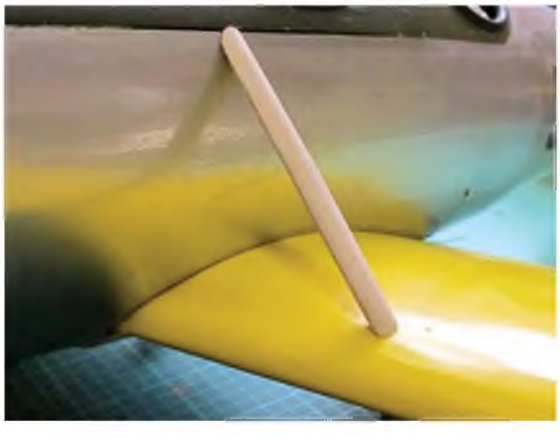
Plane the top spar to match the wing section, curve it down to the wingtip bow and make up and fit the 'made in-situ' tip rib. Now, while you still have everything securely pinned to your totally flat building board, it is a good idea to fit the top surface sheeting and cap-strips. Doing it now will ensure you can't induce any warps as the sheeting is applied and result in a very rigid structure to which to apply the remaining lower surface sheet. However, do ensure that your servo extension leads are in place, so you can sheet around where they exit the wing, rather than having to cut holes in your sheeting later on.

Remove the wing from the board glue in the front undercarriage block and fit the remaining sheet/cap-strips. Now you can plane off any excess on the forward undercarriage block trim your leading edge, trailing edge and tip bow to shape and sand the wing overall. Now you just have to repeat the whole process for the other wing and the panels can be joined. However, it's easier to get good dihedral brace joints if you omit the upper centre section sheet on the second panel until after the wings are joined. Be careful when joining them because whilst you need them securely glued together, you don't want the dowel location filled with hardened epoxy. Not only does it make it impossible to get the dowel in, it's also a real pain to try to drill out without destroying the adjoining ribs.

As you'll see from the photo, you will need to make a small hole in one rib so that you have screwdriver access to the servo arm screws - unless you secure them first (on a servo that is known to be centred) and swing them out of the way while you build the wings. Once the covering is done it's a relatively easy task to cut away the covering from the exit plate and switch on the radio gear to re-centre the servos - the arms of which will pop neatly through the exit plates.

Right, we'll leave things there for the moment. Next month we'll see about getting that fuselage built, and the minor modifications Pat made. ■

If you leave the output arms until after the wing is built you'll need to provide screwdriver access to tighten the screws.



How the basic wire strut fits, and is faired with balsa. It's purely cosmetic and only required for scale detail.

RYAN PT-22

MAKING THE SEAMLESS TRANSITION FROM CIVILIAN SPORTSTER TO MILITARY TRAINER

Developed over the course of some five years from the sleek Ryan S-T (Sport Trainer) prototype which first flew in June 1934, the Ryan PT-22 (Primary Trainer) was in widespread service in that role with the US Army Air Corps across the United States throughout WW2. Like its civilian cousin, it offered high performance, coupled with ease of maintenance and, for its day, also looked very good indeed.

Of largely metal construction, the popular Ryan S-T underwent a number of rapid improvements that included the usual increases in engine size and associated performance enhancements and, by the time war clouds had started

Peter Holloway's beautifully prepared Ryan PT-22. Peter is seen in the rear cockpit preparing to take-off during one of Shuttleworth's 'Military Air Pageants'.

The main visual difference between the PT-21 seen above and the PT-22 (right and below) was the streamlined cover over the main undercrriage legs, applied to the earlier marque.

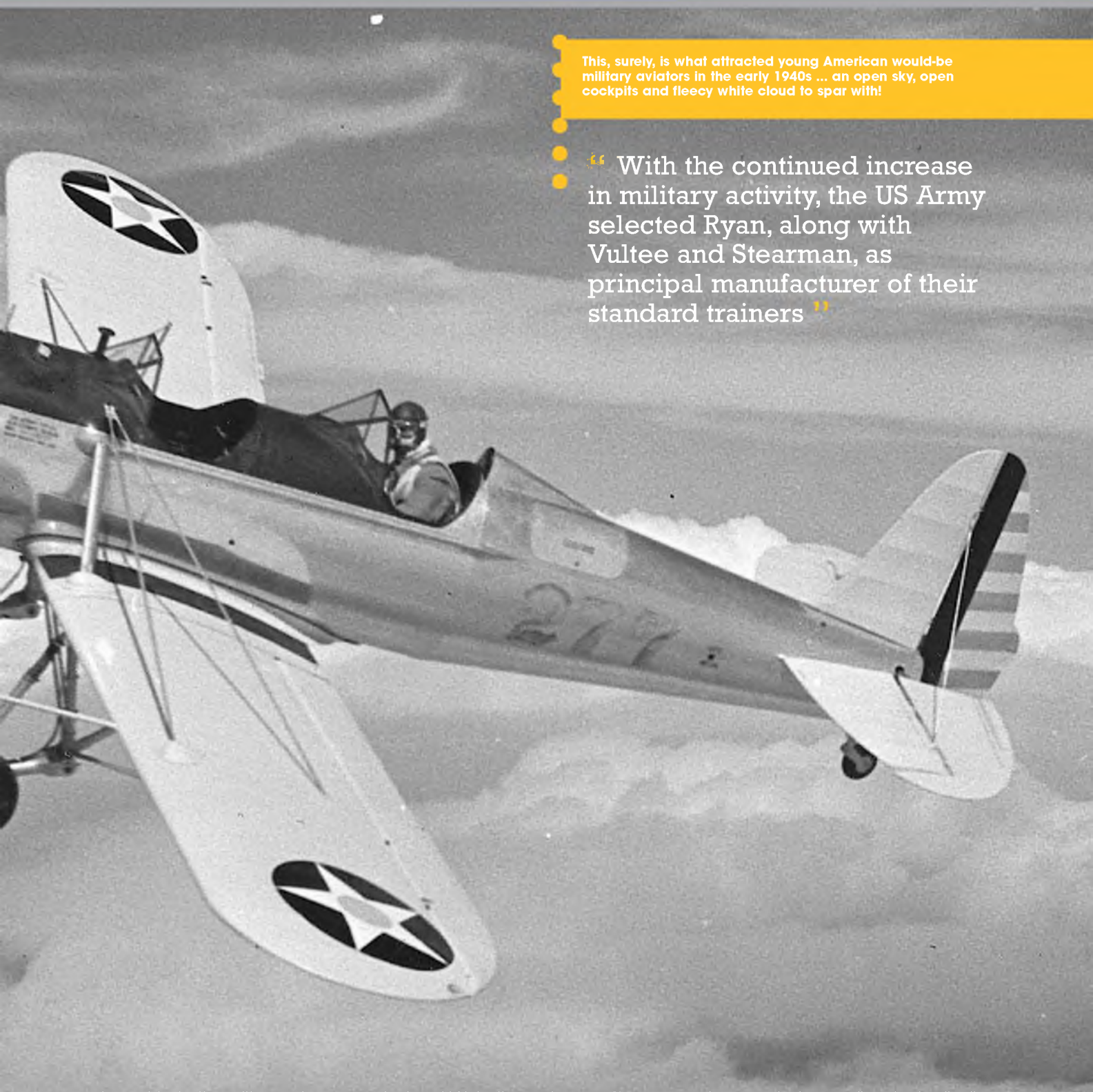
to gather in 1939, the ST series were obvious candidates for military application. Consequently, the Ryan Aeronautical Company of San Diego, California, was awarded a contract for its STA-1 model, a military trainer version of its successful basic civilian S-T-A 'Sportsman's Airplane'. This was designated XPT-16 and, after evaluation, the 125 h.p. Menasco L-365-1-powered aircraft became Ryan's entry into the US military training programme - the first ever monoplane to be used as a primary trainer by the US Army. With the continued increase in military activity, the Army selected Ryan, along with Vultee and Stearman, as principal manufacturers of their standard trainers.

Now designated YPT-16, the aircraft first saw military service in August 1939 at Lindbergh Field, San Diego, when the Ryan School of Aeronautics became the first of numerous Civilian Pilot Training (CPT) Schools to operate in America throughout WW2.

During the first years of war, the YPT-16 quickly metamorphosed through a series of detail improvements to become the PT-20, PT-21 and, by 1941, the most widely produced version - the PT-22 'Recruit'. The improvements included larger cockpits with external longerons and increased space for parachutes, and installation of the Kinner R-540-1 engine of 160 h.p. in a streamlined fairing with uncowled projecting cylinders. The smart metal

wheel spats and undercarriage strut fairings, which had proved vulnerable to the rigours of primary training school service, were removed.

By 1942 the PT-22 was in service at most of the CPT schools across the United States. 100 of the virtually identical PT-21s were produced for the US Navy, designated NR-1s, and a consignment of PT-22s ordered by the Netherlands prior to Nazi invasion were taken over by the US Army as PT-22As. The final version of the aircraft was the PT-22C which had the upgraded Kinner R-540-3 series engine. Unlike its civilian cousins the S-Ts, which



This, surely, is what attracted young American would-be military aviators in the early 1940s ... an open sky, open cockpits and fleecy white cloud to spar with!

> “With the continued increase in military activity, the US Army selected Ryan, along with Vultee and Stearman, as principal manufacturer of their standard trainers”

were stressed for both positive and negative ‘G’, the PT-22 was restricted to positive manoeuvres only.

The fuselage of the PT-22 was of oval metal monocoque construction comprising nine aluminium-alloy bulkheads and six segments of pre-formed ‘Alclad’ skin. The wing section was NACA 2412 and the wings had 4° 10’ sweepback, 3° incidence and 4° 30’ dihedral. They featured metal-covered, riveted aluminium-alloy wing-stubs with strut-braced front spar and cantilever rear spar. The outer wing panels had stamped aluminium-alloy ribs and spruce spars and featured ‘Alclad’ covering over the leading edge back to the front spar. The entire wing was fabric-covered, as were the aluminium-alloy frames of the ailerons and flaps. Wing bracing to fuselage and undercarriage was by means of streamline tie-rods.

The tail surfaces consisted of aluminium alloy frames covered with fabric, and the fixed portion of the treadle-type undercarriage served as an anchor point for the flying wires. Main wheel oleo shock absorber struts were of long-stroke configuration and the steerable tail wheel was also oleo-sprung. Wheel brakes could be operated manually or hydraulically.

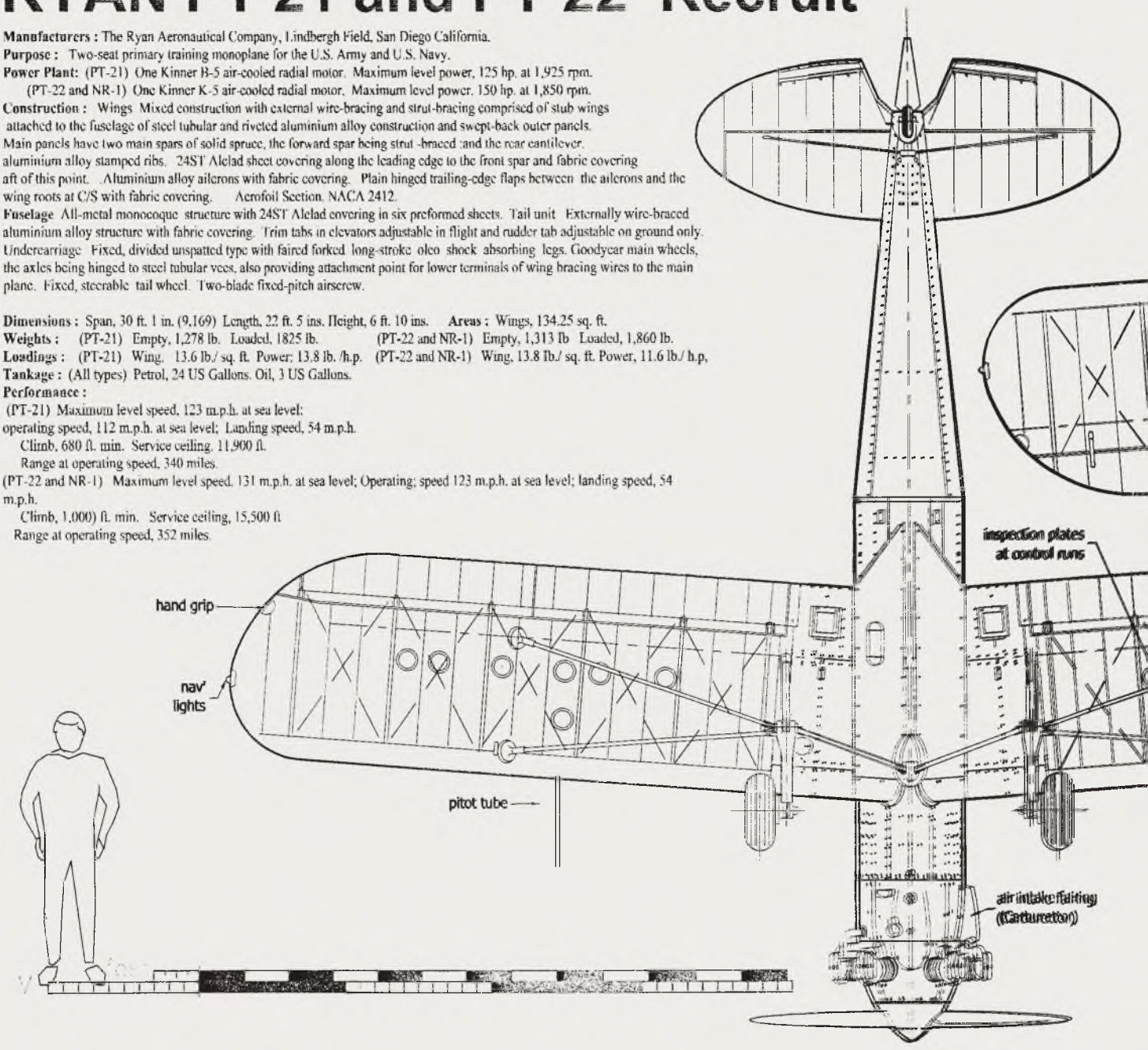
The tandem open cockpits featured full dual controls and duplicated instrumentation. The seats were specially designed to accept the standard US Army-type parachute.

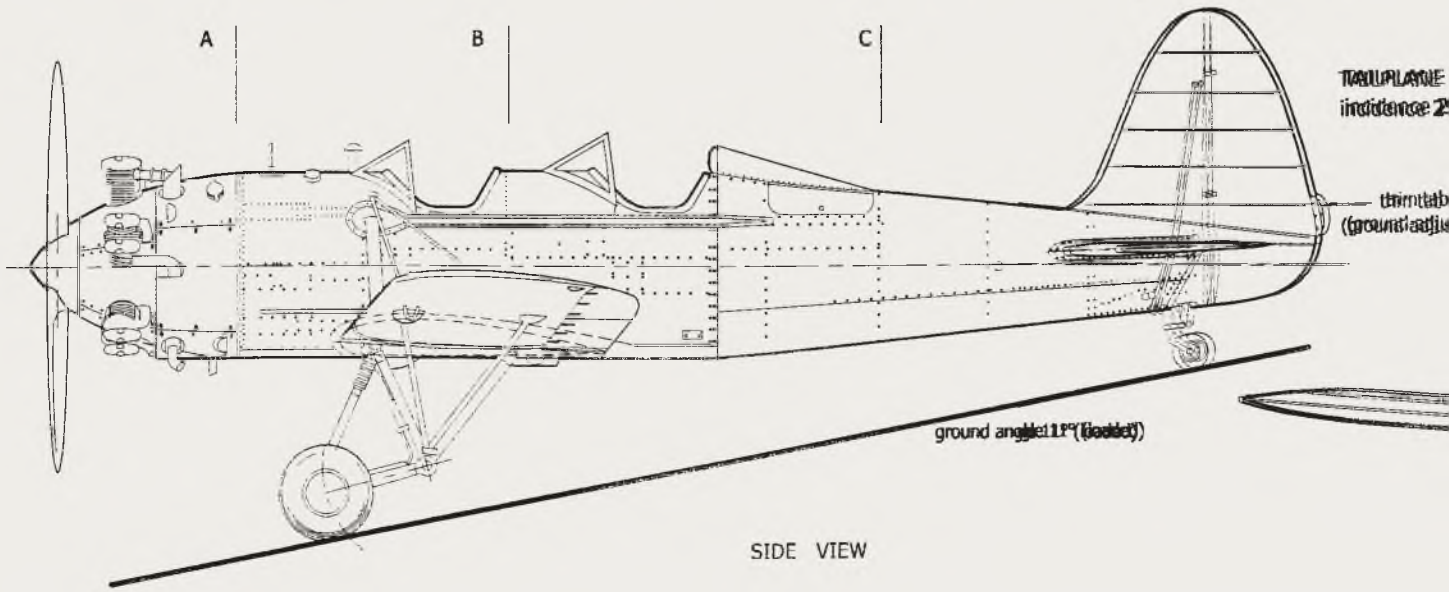
Ahead of its time when it first appeared in 1934, Ryan’s pretty two-seater was a success in both civilian and military roles; its big, open cockpits afforded excellent visibility, it proved a highly effective sport-trainer and its streamlined good looks are as appealing today as they were some seventy years ago. ■

RYAN PT 21 and PT 22 'Recruit'

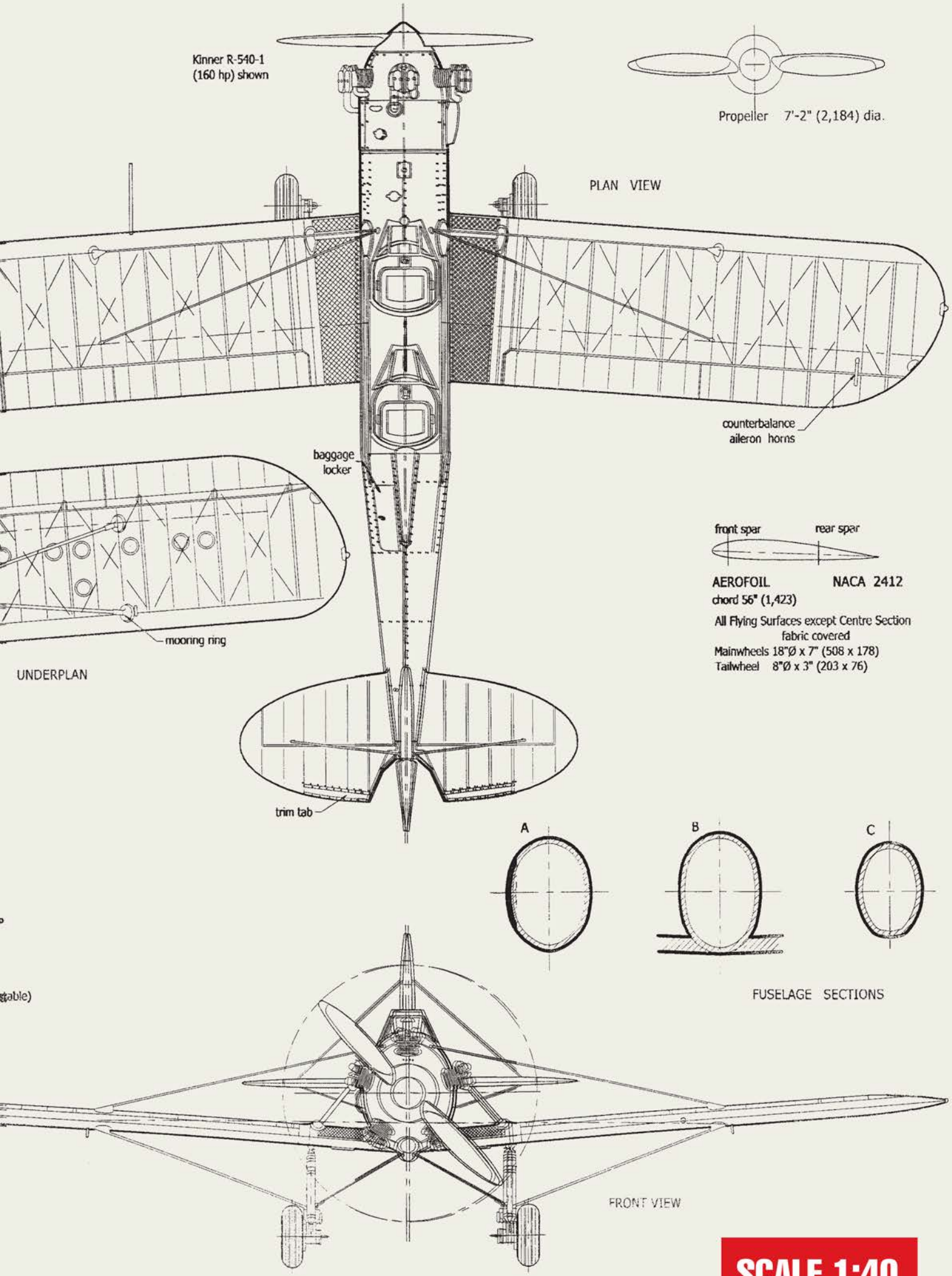
Manufacturers : The Ryan Aeronautical Company, Lindbergh Field, San Diego California.
Purpose : Two-seat primary training monoplane for the U.S. Army and U.S. Navy.
Power Plant: (PT-21) One Kinner B-5 air-cooled radial motor. Maximum level power, 125 hp. at 1,925 rpm.
(PT-22 and NR-1) One Kinner K-5 air-cooled radial motor. Maximum level power. 150 hp. at 1,850 rpm.
Construction : Wings Mixed construction with external wire-bracing and strut-bracing comprised of stub wings attached to the fuselage of steel tubular and riveted aluminium alloy construction and swept-back outer panels. Main panels have two main spars of solid spruce, the forward spar being strut -braced :and the rear cantilever. aluminium alloy stamped ribs. 24ST Alclad sheet covering along the leading edge to the front spar and fabric covering aft of this point. .Aluminium alloy ailcrons with fabric covering. Plain hinged trailing-edge flaps between the ailerons and the wing roots at C/S with fabric covering. Aerofoil Section. NACA 2412.
Fuselage All-metal monocoque structure with 24ST Alclad covering in six preformed sheets. Tail unit Externally wire-braced aluminium alloy structure with fabric covering. Trim tabs in elevators adjustable in flight and rudder tab adjustable on ground only. Undercarriage Fixed, divided unspatted type with faired forked long-stroke oleo shock absorbing legs. Goodyear main wheels, the axles being hinged to steel tubular vees, also providing attachment point for lower terminals of wing bracing wires to the main plane. Fixed, steerable tail wheel. Two-blade fixed-pitch airscrew.

Dimensions : Span, 30 ft. 1 in. (9,169) Length, 22 ft. 5 ins. Height, 6 ft. 10 ins. **Areas :** Wings, 134.25 sq. ft.
Weights : (PT-21) Empty, 1,278 lb. Loaded, 1825 lb. (PT-22 and NR-1) Empty, 1,313 lb Loaded, 1,860 lb.
Loadings : (PT-21) Wing. 13.6 lb./ sq. ft. Power; 13.8 lb. /h.p. (PT-22 and NR-1) Wing, 13.8 lb./ sq. ft. Power, 11.6 lb./ h.p,
Tankage : (All types) Petrol, 24 US Gallons. Oil, 3 US Gallons.
Performance :
(PT-21) Maximum level speed, 123 m.p.h. at sea level:
operating speed, 112 m.p.h. at sea level; Landing speed, 54 m.p.h.
Climb, 680 ft. min. Service ceiling. 11,900 ft.
Range at operating speed, 340 miles.
(PT-22 and NR-1) Maximum level speed. 131 m.p.h. at sea level; Operating; speed 123 m.p.h. at sea level; landing speed, 54 m.p.h.
Climb, 1,000) ft. min. Service ceiling, 15,500 ft
Range at operating speed, 352 miles.





SIDE VIEW


Kinner R-540-1
(160 hp) shown
Propeller 7'-2" (2,184) dia.
PLAN VIEW
counterbalance
aileron horns
baggage
locker
front spar
rear spar
AEROFOIL NACA 2412
chord 56" (1,423)
All Flying Surfaces except Centre Section
fabric covered
Mainwheels 18"Ø x 7" (508 x 178)
Tailwheel 8"Ø x 3" (203 x 76)
mooring ring
UNDERPLAN
trim tab
A
B
C
FUSELAGE SECTIONS
FRONT VIEW

SCALE 1:40

BUCKER BU.133 JUNGMEISTER

John Watters' 1:11 scale 23.5" wingspan began life on the brawing board as a free flight model, but by building-board stage, it emerged for lightweight R/C with aileron and elevator controls

The inspiration to build this model came from looking at the cover of the September 1960 *Aeromodeller.* Depicted there are two eminently well known free flight scale modellers from the 1960s. John Simmance is seen holding his Sopwith Snipe and Mr. R.Hackett of Chichester his Bucker Jungmeister: The Snipe is well documented and *Aeromodeller* published the plans , but I never did see the plan for the Jungmeister.

My version originally started out to be a small free flight model, either for electric or Co2 power.

But a visit to the Model Engineer Exhibition at Olympia in 1996 changed all that. After seeing the Cox powered pylon racers performing, the model had to be converted to radio control. As I had already started to build the model, some structural changes had to be made, but these were not too drastic. The construction method follows all the normal practices and should not give any problems.

Tail and fin

Starting with the easy bits first, the outline laminations are formed around templates of 1/8" sheet balsa. This should be done carefully using well soaked straight grained strips of 1/32" balsa. Both the tail and fin construction are the same.

Position the centre spars over the plan and add the laminated outline to them, packing up the outline to the required height. The 1/16" ribs should now be added along with the 1/4" centre sheet and the 1/8" elevator strips.

When both items have been completed, final shaping should be done with the aid of a sandpaper block, taking care to keep both sides of equal shape.

Finally, split the parts to obtain the elevators and rudder, sand the main spars to shape the hinge line and slot to accept the hinges. The control horns were made from thin plywood and can be fitted before or after covering.

Wings

All the wing ribs were shaped by using the sandwich method. As there are so many ribs, it may be best to shape the upper and lower wing ribs as separate groups. After shaping and slotting for the spars is complete, the ribs should be cut to length and further slotted to accept the dihedral braces, remembering that RI, R2 & R3 are thinner - to allow for the 1/32" sheeting.

The wing tip outlines are constructed using the same method as the tailplane. In the uncovered photographs of the wing, aileron spars can be seen. These were left in, but never used, as it was the intention at the time to make the model with aileron and elevator controls. It would have been an interesting exercise and if you wish to go that route, by all means do it. The model will probably have a good roll rate!

Upper and lower wings have the same outline except for the centre section. Wing construction should be done in three parts, the centre section constructed first including the dihedral braces, followed by each outer panel.

Rib R4 should only be fitted when the outer panels are propped-up to the dihedral angle and being attached to the centre section. To finish the wing, the strut position strips should be added, along with the 1/32" centre section top and bottom sheeting. Final wing shaping should be done with light sand paper.

Fuselage

As I have already said, the model was going to be designed for free flight. You can see from the photographs of the uncovered model, that there are longerons and spacers that do not appear on the plan. It was obvious that if the model was to be fitted with radio, some beefing up had to be done from the original free flight structure. This was done by sheeting the inside of the fuselage with 1/16" sheet balsa.

For this radio design there is no need for the longerons and spacers.

Starting from scratch for the radio version, you can begin by cutting two identical 1/16" sheet sides, to the arrow markers on the plan. The bottom wing doublers are cut from hard 1/8" sheet balsa and glued to the inside of the fuselage side sheets. It would be best at this stage to score or crack the inside faces of the sheeting, forward of F3 and behind the bottom wing trailing edge, up to position of F6. This is to obtain a parallel section in the area of the cockpit.

Having done that, the side sheet halves can be glued to former F3 and the spacers behind the bottom wing trailing edge and cabane strut positioner added. This structure should now be allowed to set thoroughly.

Spread of components tell the full story. It should appeal to all builders of small scale models. Both Cox Pee Wee and Tee Dee .020 have long since ceased production but there will be many still lurking around - including one somewhere is the FSM editorial loft - but there are also diesel substitutes.

Cox Pee Wee .020, as first used on the prototype model, mounts to the firewall via integral backplate fuel tank. Alternative engines may require installation of wooden bearers or one of the small plastic beam-to-radial mounts.

All the other formers and spacers can now be added, fitting each one into the slots. Former F2 has thin slots in it to locate square onto the side sheets. Care should be taken to ensure that the plan shape of the fuselage is followed and it may be best to make balsa or card templates to achieve this.

With the formers in position, the hard 1/16" sq stringers can be added, along with the nose area blocks. The tail block can also be added, remembering to cut a slot in it to take the tailplane.

This is now the stage to fit the servo mounts and cut provisions in the side sheets for either push rods or closed loop systems.

Before sheeting in between the front stringers, position the pre-shaped cabane wires and spot glue these in position with small drops of cyano. After sheeting in the front fuselage area, the pre-formed cabane profiles can be attached to the wires and the wires permanently epoxied to former F3 and the cross pieces. This can be done through the bottm of the fuselage access hole.

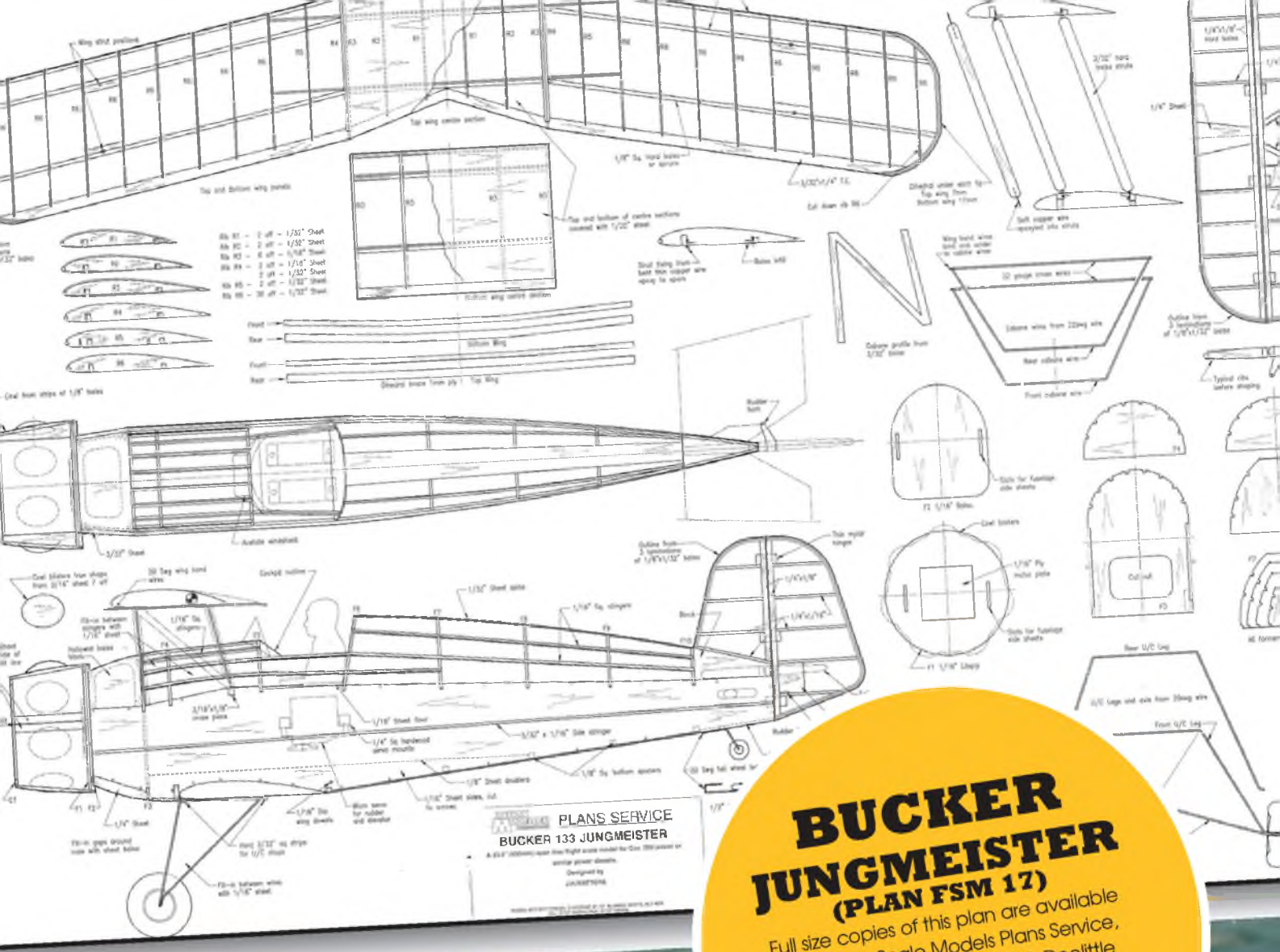
The whole fuselage can now be sanded smooth and the nose area carved and shaped.

The engine cowl is built up as a separate item. Cut out C1 and F1 from liteply or whatever material you wish. Then, using a jig either from card or balsa, position former C1 in the correct position to FI and add between them strips of 31/6" balsa forming the split line. Then, from strips of 1/8" balsa, plank between the two formers to get the cone shape of the cowl.

With the cowl structure thoroughly set, sand to shape to obtain the slight barrel curve required. I was not at all satisfied with my first cowl effort and made a second one which turned out much better.

When you are happy with your cowl, add the seven balsa blisters and give it a coat of sanding sealer. Now split the cowl at the split line and sand smooth all over.

Before fitting the cowl to the fuselage, you may find it best to cover the body at this stage, as the nose area has a number of compound curves. I caution this having fitted the cowl before covering and did experience some difficulty covering the



BUCKER JUNGMEISTER (PLAN FSM 17)

Full size copies of this plan are available from Flying Scale Models Plans Service, ADH Publishing, Doolittle Mill, Doolittle Lane, Totternhoe, Bedfordshire, LU6 1QX. Tel 01525 222573 enquiries@adhpublishing.com Price £11.75 plus p&p (U.K £2.50; Europe £4.00; Rest or World £6.00.

The complete, fully assembled bare airframe, with the engine cowl in place.

front end.

It then only remains to add the side stringers and tail wheel wire to the body.

Undercarriage

This is a separate unit, formed from 20 gauge wire with balsa infill between the front and rear leg struts. The unit is held in position by the bottom wing rubber support bands and fit into place between the stop piece on the fuselage and the underside of the bottom wing.

You could, if you wish, attach the wire to the bottom wing, but I felt that it was simpler all coming apart, in the event of a rough landing. The wheels were made up from balsa, simply to keep the weight down.

Covering and finishing.

Prior to covering, the nose area and fuselage, back to the cockpit, was given a coat of *Solarlac* proofer. The whole model was then covered in Yellow *Solarfilm Airspan*. Colour markings were applied with Red *Solartrim*, while other parts were covered with lightweight tissue, doped and then painted with the appropriate coloured enamel. Finally, the cowl and fuselage were given a coat of clear polyurethane varnish.

For this small model you will of course need small sized radio equipment. I installed a pair of *Hitec* HS80 servos, a *Micron* mini receiver and a 100mAh battery pack, but there is plenty of choice available when to comes to selecting suitable lightweight R/C equipment .

This brought the all up flying weight of the model to 255 grammes (9ozs).

Flying

A rough balance point was established for the assembled model, which required a small amount of nose weight. The motor was run up (something we always do at home before venturing to the flying field), and the radio tested.

This is a small model, not requiring a long runway and is capable of being easily hand launched. The test flying was carried out in the corner of a local park which, luckily for us, never has the grass cut - the grass in places can be over two feet tall!

Having range tested the radio, we filled up the tank, knowing from experience that the average run for a Cox Pee Wee .020 is about 90 seconds. The motor was started with a small home made electric starter (i.e. a 540 motor, micro switch and some rechargeable cells) and the model was given a reasonable heave into the air.

The Jungmeister flew straight and level but did not appear to want to climb and tried to turn, resulting in a snapping downward spiral. Cushioned by the long grass, the model survived!

Undeterred, tweeks and adjustments were progressively applied including a bit more nose weight - all accompanied by the attention of some rather large bugs and flies trying to feed off us. The price you pay for invading their long grass habitat!

Finally, having managed to coax the model around the sky (wind by the way was minimal and temperature warm), the conclusion was that surface control movements had been set too high.

Adjusting the transmitter rates to give quite small movements, produced very controllable manoeuvres, although power still seemed marginal. The power provided by the Cox Pee Wee motor was not quite powerful enough for this type of model and the more powerful Cox Tee Dee 020 was substituted with excellent results.

We found that after a bit of practice, the control throws could be increased, particularly for aerobatics. With a bit of minor structure revision any small motor can be used (such as the small PAW diesels and longer flights obtained.

If you like a bit of a challenge, with a model that can be both docile and also keep you on your toes, then this is for you, not only that - you don't have to take it apart to get it in your car! ■

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COSFORD SCALE 2015

Alex Whittaker visits a thoughtfully upgraded and even more vital LMA Cosford

The LMA is famous for punching above its weight. Last time I heard any figures, they had just over a thousand members. Yet, they put on a full summer schedule of big displays up and down the country. Their shows are always excellent value for money, well attended, and attract the top pilots.

The thing I most like about LMA Cosford is its dedication to the celebration of hand-built flying scale models. I also greatly appreciate the sheer variety of aircraft on display. Furthermore, the extent of the well-stocked Cosford Trade Village

Toby Newton's Skymaster Grumman Cougar. 85" span, Merlin 160 gas turbine power, weighs 18.5 kgs. Slick, baby, slick.

always gladdens the heart.

The only thing I ever found to dislike about LMA Cosford was the position of the sun! It was in our eyes most of the day. This could be annoying to the pilots, and made for very restricted photography until the late afternoon. Anyway, this year I was both surprised and delighted to see that the LMA had re-orientated the entire show by 180 degrees. This meant that we were now on the other side of the airfield, near the historic grass-covered hangars. This was a hack's dream come true. No more black, backlit flying photos, and no whingeing about the light.

DHC-2 Beaver

A brisk walk through the pits revealed a very large DHC-2 Beaver - such a sweet aeroplane. I remember taking shots of a real one at Middle Wallop (the Army Air Museum is there) a couple of years ago. Anyhow, this model example, at Cosford, was brought by a team of German modellers.

Built to a scale of 1:2.5, this gave a massive span of 5.85 metres. She was flown there by Andreas Engel, and was powered by a superb Vallach R-5 420 radial. She was built by Manfried Schimmel from the German MHM kit and he kindly gave me some details. There is has a lot of metal in her construction, and weighs 92kgs. And the model is reputed to have 12,000 rivets. On take-off there was a tricky crosswind which Andreas had to overcome, but once airborne, she looked utterly convincing in the air. Full FSM photo report soon.

Pitts Prometheus

For may of us, a Pitts is a scale itch that one day will have to be scratched. So, when I saw Robbie Skipton's highly impressive new aerobatic mount, the old urge reasserted itself. She is a splendid 68% scale model Prometheus - a modified Pitts Special. She is immaculately finished in the fiery Skip Stewart scheme, all the way from the US of A. She looks a knock-out. Now, Our Robbie is an ace showman, so it was a case of right model, right pilot, right place, and right time. An agile Pitts with a powerful engine streaming smoke is an ideal platform for his skills. Robbie gave an awe-inspiring display, very scale-like and genuinely exciting, not needlessly flash, or irritatingly unrealistic.

Yak 54

Cosford is the show for scale `show beasts', and one of the biggest in the jungle is Steve Carr's new 180 inch span Yak 54. This is from the *Pilot RC* kit. These large Pilot kits are starting to become more evident. She weighs 138lbs, and is fitted with a very special 550cc boxer

The Flying Bishops' Reds Duo of Bae Hawks gave a superb display.

Steve Holland's 3.35 metre span Avro Anson on a lazy, low pass. Built by noted designer Sid King many moons ago.

Don Billingham's HP W-10 Airliner, built to 1/4 scale, spans 15 feet, 2xLaser 360V Twin power.

engine, driving a Biela 43"x16" prop. Steve built the engine himself. He also gave a very assured smoke-on display, and the crowd adored it.

Hellcat and Skyraider

Nigel I'Anson brought his Nick Ziroli Hellcat, which he has finished in a very rare Target Drone scheme. Very colourful. She is Evo 80 petrol powered, and spans 106". Nick Ziroli is one of aermodelling's 'Greats' and all his designs seem to fly better than the pack. Full details soon.

Nigel I'Anson also flew his impressive new 1/4 scale Douglass Skyraider. I happen to like Skyraiders, though apparently some radio modellers retain a cool indifference to their late piston era charm. That matter of taste notwithstanding, this is an exquisite model in a great US scheme. I was able to get a full set of shots, but I am awaiting further details. It was too hectic on the day to stop the whole flying slot just to make

Steve Carr's astounding 55% Yak 54 from the Pilot RC kit. 180" span, weighs 138lbs, clever 550cc boxer engine. Biela 43"x16" prop.

Twin Lancasters Display, one in RAF scheme with the 1943 Dams Raid 'U keep' weapon sling in the bomb bay, and one in Canadian squadron markings. They gave a measured but moving tribute.

further enquiries! Fret not, there will be a complete FSM photo report in due course.

Grumman Cougar

There a few things more disappointing than a jet scale subject that lacks power. Then there are those scale jets that have the power, but have a finish that resembles woodchip. Happily, sometimes a jet turbine model looks and sounds exactly right.

Toby Newton's Skymaster Grumman Cougar definitely falls into this 'seriously slick' category. She has all that magnificent US Navy bustle about her. (I admit, I do like Yankee military schemes). Surface finish and cockpit detailing is superb. In the air, I thought that she was indistinguishable from a full size jet. She is 85" span, Merlin 160 gas turbine powered, weighs 18.5 kgs. A jet-jockey's delight.

Thunderbolt

Of the types of Jug, I prefer Razorbacks. Indeed Dave Pearson's beautifully prepared Thunderbolt Snafu, was my favourite British-built model of the show. She may be a bit 'roll-out fresh at the moment, but she possesses an authentic presence in the air. She also sports that

Robbie Skipton's new aerobatic mount: 68% scale model Prometheus, a modified Pitts Special.

As usual Dawn Patrol UK put up a huge group of 1/3rd scale aircraft, including this fine Albatros D.Va.

John Townsend's venerable Magister on a slow fly-by.

Dave Pearson's immaculate Thunderbolt. Moki 250cc radial power.

Trevor Wood's admired and well-known F4U-1a Corsair, Moki 250cc radial powered.

Dave Jones's 140" span C-47 Skytrain from the Nick Ziroli plan. Two Zenoah 38s on 18"x10 three bladers. Weighs 55lbs.

Keep the kettle boiling! Non-stop activity in the pits all day.

All the way from Germany, the Harald Müller designed DHC2 Beaver. Flown by Andreas Engel. Vallach R-5 420 radial.

Warbirder Extraordinaire, Ozyray Peters' new Moki 250cc radial engined Thunderbolt.

Jim Orr's colourful 40% Citabria Decathlon. DLE 170 power, weighs 23 kgs. From the Pilot kit.

Magisterial DHC2 Beaver, from the MHM Scale kit. Built by Manfried Schimmel. 5.85 metres in span, weighs 92kgs.

Smokey Razorback revving up!

wonderfully exuberant All-American Snafu scheme, complete with that glorious chequered cowl. Built from the much admired CARF kit, she really is something special. On banked passes, I thought she looked sublime, and just cop that four bladed prop. She spans 110", and has a stunning Moki 250cc % cylinder radial. Needles to say with this exquisite power source, she sounds as good as she looks. Stay tuned for a full photo-report in these pages.

Handley Page W-10 Airliner

Part of his scratch-built / own design Air Refuelling Pair, Don Billingham's HP W-10 Airliner always impresses. This magnificent display model has had many, many, hours in the air. Real 'Wind in the Wires' stuff. She is built to 1/4 scale, spans a full 15 feet, and has 2 x Laser 360V Twin power.

The rumour in the pits was that she was scheduled for refurbishment over the winter. Apparently, her doughty Laser engines are going to be given a brush-up too. Not that I thought she needed any of this from the quality of her Cosford display. However, it nice that the old girl will still be on the circuit next year. Such show aircraft get a lot of use and need constant maintenance. She was accompanied by her partner aircraft, a 1/4 scale Airspeed AS5 Courier. This is 11'6" span, has Zenoah 80 Twin power, and weighs 38lbs. Their Air Refuelling ballet is fascinating to watch.

Boston III

There was an unexpected treat for scale fans. Scale maestro Steve Rickett was flying his new Douglas Boston III. As we might expect from Steve, this is a very meticulous scale model of the famous WWII twin. I managed to get a full set of pictures and a walk-around. Full coverage in FSM soon.

Tiger Moth

Genial Gerhard Reinsch was visiting from his native Germany. Now Gerhard is a very skilful scale modeller and an excellent R/C pilot. Indeed, Gerhard likes to astound British crowds with his aerobatic manoeuvres. Today he had brought two models, the first was an enormous yellow Tiger Moth from the Toni Clark kit. This is 3.19 metres in span and powered by an exotic Vallach VM 120i2-4T In-Line four-stroke twin. The Tiggy weighs 23.4 kgs. I ribbed Gerhard's about the absence of a pilot in the office. He told me he has managed to source one, of the correct scale, whilst here in the UK.

I thought the Tiger looked exactly right in the air, and the engine sound was utterly fabulous. I remaked upon on the low rev-rate and high torque output. Gerhard giggled at our English concept of "one bang per lamp post".

Fokker E.III

Gerhard also flew his amazing Fokker EIII. This was built by the great Paolo Severin of Italy, and is now a Severin kit.

She too is designed to 1:2.5 scale. She spans 4 metres. Most authentically, she dispenses with ailerons, and relies upon authentic wing warping. On long, low passes I could see the warping in action through my telephoto lens. Incredible! She is fitted with Vallach 120cc power. To describe her display as fully aerobatic hardly does this tough-and-taut airframe justice. Gerhard's party-piece is to take her up to a great height, and then plunge her nose towards the ground. The speed and stored energy builds up and you begin to worry if she can survive the pull-out.

In the Cosford Big Raid this Mustang just missed a ground to air rocket.

Tiny part of the massive TJD Models Display Team's pits presence all weekend.

When it comes, it is a frighteningly low and tight 90 degree crank and .... she flies on! Her stainless steel main spar helps of course.

Citabria

Airbatic backwards, of course. Citabrias have delighted aeromodellers for generations, though it is rare to see them larger than quarter scale at Club dos. However Jim Orr's colourful 40% Citabria Decathlon, broke this unwritten rule. At 40% scale she was rather large! She has DLE 170 petrol power, and weighs 23 kgs. She flew very well and that scheme really "pops" in bright sunlight. Note that she is from the Pilot kit.

Vulcan

LMA Head Honcho Dave Johnson's (new last season) Vulcan was giving him a few issues. One of the jet turbines caused a burn on taxying out, so that flight was aborted. Later, when it looked like the issue had been cleared, the same engine suffered a burn mid-flight. It looked pretty graphic through my telephoto lens. Cool Hand Johnson turned off the taps, and brought her round in a smooth circuit to a fine landing. Technical investigations proceed.

Dornier Do 335 Pfeil

As before, The Legendary Fighters Display Team's WWII display was immaculate and entertaining. Once again I was able to renew my long-distance / on-off love affair with their Pfantastic Pfeil. To my auld eyes, the Dornier DO335 Pfeil (Arrow) is one of the most compelling aircraft of WWII, I reckon it is one of the most remarkable piston-engined aircraft of all time. I find this melding of Teutonic

Dave Johnson's new Vulcan had problems with one of its gas turbines.

Dave Johnson had to curtail his Vulcan's flight after a second engine burn.

LMA Cosford is always well attended, plus a great Trade Village.

One of the big stars of the show, Steve Rickett's new Douglass Boston III. Full details and photos soon.

Gerhard Reinsch's huge Tiger Moth from the Toni Clark kit. 3.19 metres in span, Valach VM 120i2-4T In-Line four stroke twin power. Weighs 23.4 kgs.

Dave Peet's YT International Stinson Voyager. 108" span, NGH 38cc petrol engine. Very smart.

Druine Turbulent by Dave Lowe. 97" span, 26.5 lbs, Zenoah 38cc petrol power.

Nigel I'Anson's Nick Ziroli Hellcat, in a very rare Experimental Drone scheme.

Gerhard Reinsch's lovely Paolo Severin designed 1:2.5 scale / 4 metre span Fokker EIII. Wing warping and Vallach 120cc power. Fully aerobatic.

Superb Dornier Do 335 Pfeil (Arrow) from the German 'Legendary Fighters' Team.

THE VERDICT

I am not a member of the LMA, and I do not fly many larger models. However, I am an admirer of how the LMA get things down. They continue to punch above their weight.The LMA are not afraid to think new thoughts, and most significantly, they have the operational expertise to make significant changes happen. Moving the camping ground, re-siting the Trade Village, and re-orientating the flight line of a well-loved and familiar show could have been problematical. I thought it worked very well.

technik and sheer design flair utterly impressive. Apparently the real thing is huge. I believe that there is one example left in the USA. Now I have some previous with this model. I have observed this Pfeil and pilot before, and I know she rotates rather quickly. Therefore I left the pack of magazine photographers and ran upwind. Pure jam, but she lifted off just near me, even as I was still running. She looked magnificent and just cop that exhaust smoke from her rear engine!!! ■

Pfantastic! The Do 335 Pfeil is a stunning design, all these years on.

AeroDetail series

Making a scale model?

Finding the detail needed to finish a scale model can be difficult and getting full size images is not always practical. Our range of detail photo collections provides extensive close ups of a wide range of popular aircraft all on CD in J-peg format

Whitman Tailwind CD106
Two examples shown of this U.S. homebuilt lightplane, with boxey shape ideal for modellers. Complete close-up detail. (62 images)

Westland Lysander CD105
The Shuttleworth Museum's airworthy example shown in both camouflage and Special Operations black finishes. Full close-up detail. (62 images)

Waco Ymf-5 CD104
Beautiful and graceful spatted undercarriage biplane of the 1930s 'golden aviation era'. Example photographed is an accurate-in-every-detail modern replica. (130 images)

Vickers Supermarine Walrus CD103
The famous 'Shagbag' biplane seaplane, used during WW2 as an air-sea rescue craft and fleet gunnery spotter. (80 images)

Tipsy Belfair CD102
Highly attractive Belgian low wing light aircraft from the era of simple, open cockpit private flying. Machine offers scale modellers pleasant lines and simple shape. (35 images)

Thulin Tummelisa CD101
Swedish 1919-era fighter trainer that served the Swedish air arm for many years. Example depicted is a faithful reproduction. (55 images)

Supermarine Spitfire MK.XVI CD100
Last of the Merlin-engined Spifires. This collection depicts the cut-down fuselage, bubble cockpit canopy later version. (116 images)

Supermarine Spitfire MK.IX CD99
The most numerous version of the classic Spitfire that turned the tables on the Luftwaffe's Focke Wulf Fw 190. (90 images)

Supermarine Spitfire MK XIV CD98
2nd of the Griffon-engined Spits (Mk.XII was first), the bigger engine forced a change of the classic Spifire shape. (58 images)

Supermarine Spitfire MK Vc CD97
Shuttleworth Museum's airworthy example presented in it's latest form with classic rounded wingtip planform. (160 plus images)

Supermarine Seafire Mk17 CD96
The Seafire 17 was no navalised Spit. A true ground-up naval fighter. (64 images)

Stinson 105 CD95
Light, private aircraft of the 1940-50s era, with lots of character. (75 images)

Steen Skybolt CD94
Attractive U.S. aerobatic biplane, presented in full detail. (89 images)

Sopwith Triplane CD93
The last example of the 'Tripehound' is the one built (in 1980!) from original Sopwith drawings by Northern Aero Works and given sequential manufacturer's number by Sir Thomas Sopwith himself in recognition of the outstanding workmanship. Extensive detail. (120 images)

Sopwith Pup CD92
The charismatic Sopwith Scout (to give its correct designation) is a great scale modellers' favourite. Example depicted is the one preserved and regularly flown at the Shuttleworth Collection, Old Warden. (50 images)

S.E.5A CD91
Shuttleworth Museum's airworthy example presented in full detail. (100 plus images)

Ryan Pt-22 CD90
US military primary trainer aircraft that served with both US Army and Navy, thus providing ab-initio flight training for the majority of US airmen of the WW2 period. A highly attractive aircraft. 90 images of the preserved, airworthy aircraft, hangared at the Shutleworth Collection, Old Warden.

Republic P-47D CD89
Bubble-canopy version of the much loved 'Jug', photographed in fine detail. (105 images)

Polikarpov Po-2 CD88
The world's most numerously produced aircraft of all time, the P0-2 was a great maid-of-all-work used by both military and civil groups in the old Soviet Union and its satellite states. Example depicted is pristine, and now in storage at Old Warden. (170 images)

Polikarpov I-15 CD87
The ultra agile Russian biplane fighter aircraft that saw widespread service prior to and in the early years of WW2 and during the Spanish civil war. Example illustrated is a superbly restored machine. (100 images)

Pitts S.1 CD86
Homebuilt example by Bob Millinchip, as seen at 2002 PFA Rally. Complete detail study. (36 images)

Piper Tomahawk CD85
Cranfield Flying School example of this civil ab-initio trainer aircraft. (54 images)

Piper Super Cub CD84
The later, 'cleaned-up' version of the famous Piper J-3, with more elegant engine cowl. Two examples shown. (80 images)

Piper L-4 Grasshopper CD83
Military version of the famous Piper J-3 Cub used during WW2 and close reconnaissance and spotter aircraft and for many other tasks. (80 images)

Percival Provost CD82
Airworthy, preserved example of the RAF piston engined basic trainer used in the 1950s. Full detail. (30 images)

Percival Mew Gull CD81
Famous 1930s racing and record setting aircraft that will forever linked with the achievements of British aviator Alex Henshaw. (35 images)

North American T28 CD80
The advanced trainer aircraft that served in many air arms worldwide and also became a counter-insurgency ground attack aircraft. Examples illustrated are from France, where the type served for many years as the 'Fenec'. (100 plus images)

North American P51D Mustang CD79
The definitive bubble canopy Merlin Mustang. In detail, showing several restored examples. This is the Fantasy of Flight Museum's overpolished example, but the close-up detail is all there. (102 images)

North American P51B/C CD78
First of the Rolls Royce Merlin engined Mustangs, this collection depicts the Fantasy of Flight Museum's restored example, with overly polished plain metal surfaces. Much detail. (102 images) Also, 41 images of The Fighter Collection's P-51C in bare metal restoration, showing much surface and internal airframe detail. A real bumper bundle! (over 140 images)

North American B25 Mitchell CD77
Fantasy of Flight Museum's example. Photographed soon after superb restoration. Full nose to tail detail. (74 images)

North American AT6 Harvard CD76
AT-6, SNJ, Texan, Harvard – call it what you will. 55,000 were built – this example is in U.S. Army colours, with comprehensive close-up detail, nose to tail. (76 images)

North American A36 Invader CD75
The ground attack variant of the Alison engined P-51A. Photos, in detail, of the world's only airworthy example. (69 images)

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SCALE FROM SCRATCH

WANT TO TAKE A STEP BEYOND KITS AND ARTFS? KEN SHEPPARD CONTINUES HIS SERIES TO ENCOURAGE OWN-DESIGN SCALE MODELS

PART 8: FIDDLY BITS AND FINISHING

Last month saw the first run of the outrunner motor, the Twister 19, on its mount at the rear of the fuselage and the worrying amount of fuselage twist generated by its awesome torque. Since then the fuselage has been skinned, increasing its torsional strength considerably.

Attempts to set the IC and EP throttles via a heli set-up have been put on the back burner until later in the project, when I can run both motors and check out the individual rev curves against each other. However, the initial run of the aptly named Twister showed a weakness in the mounting method - it just wasn't strong enough. The answer was a purpose-made tubular mount with a welded motor mounting plate at one end and a circular fuselage-mounting flange at the other. The mount was made up for me by Carlisle-based Geoff Strachan from my drawings and it works a treat, being tons stronger - thanks, Geoff, a good job!

This month sees the structural build coming to an end and the start of the fiddly bits prior to final covering of all the surface - I've found a super glasscloth application system, too - OK, it's not new, but I've never used it before!.

I've decided to go the glasscloth covering path, due again to the need to have as strong a structural skin as possible due to the unknown stresses likely to be incurred with two contra-rotating motors at full chat, almost six feet apart! Using epoxy resin has always seemed to be a messy, smelly way to go - undoubtedly the strongest option, but using acrylic varnish as the bonding medium was highly recommended by a number of sources, being odourless, water-based and effective, so I decided to give it a go. I have found it very satisfactory and very, very easy to apply! But first, those fiddly bits...

FAIRINGS

The Dornier Do335 two-seater has several of what I would call fiddly bits - wing fairings, belly fairing, belly radiator intake, fuselage air intakes (2), 2nd cockpit fairing, cockpit glazings and undercarriage doors. The latter items aren't necessary to be done yet in the overall project plan and, as the techniques used are a bit special, I'll cover those separately, next time around. However, the wing fairings needed to be

ABOVE LEFT: Picture of the YT International BIG ARTF single-seater 335, showing how good uc doors look when fitted. TOP RIGHT: The new motor mount, for the rear electric motor, made by Geoff Strachan. The motor is a close fit, but the mount is a lot stronger than the original strap bracket. ABOVE RIGHT: The completed cowl, ready for covering. The RCV motor is totally enclosed. A front blanking plate will be fitted to direct the cooling air over the cylinder head.

done at this stage so that the wing position is finalised, and then the belly fairing can be done, followed by the radiator intake.

The first job with the wing fairings is to cut a pair of thin ply pieces to suit the wing seat and sit neatly along the fuselage side for the extent of the fairing length. Fit the wing to the fuselage loosely, insert the ply strips so that they sit up against the fuselage, then tighten the wing bolts to firmly hold them in place. The ply plates will need to be scored in line with the wing trailing edge, so that the rear end of the ply plate can be lifted to match the lower wing profile - some fine trimming may be needed to get a good fit - a little, often, is better than too much, once, remember.

When you are happy with the fit, you can mark the shape of the fairing on the top surface of the ply, marking a smoothly curved line (check your scale documentation to get the right shape). **Photo 1** shows the underside view of the completed fairings, showing the shape and the contour of the fitted ply plates. **Photo 2** shows the 'kicked up' trailing edge of the fairing, which matches the lower wing surface. Make sure the left hand plate is marked out the same size as the right hand one!

Loosen the wing bolts and slide out the plates. Trim to shape with scissors (don't use your wife's dressmaking scissors!), sand the edges nice and smooth and check both plates are the same.

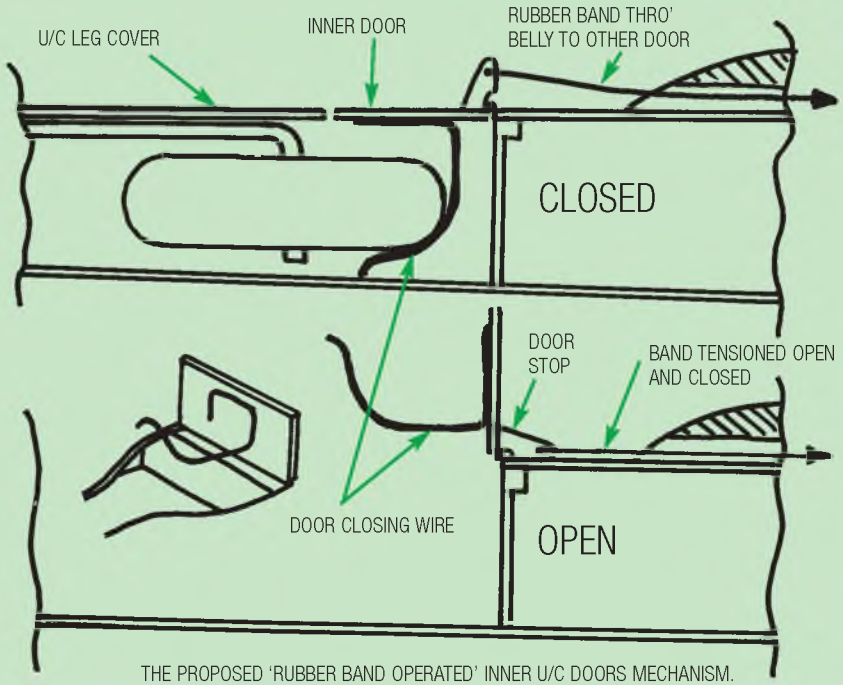
Wrap clingfilm around the centre section of the wing top surface and glue the plates in place, tighten the wing bolts to hold them firmly in place whilst the PVA dries - if you use epoxy, make sure it is the slow-curing variety, so that you have plenty of time to adjust the position of the plates. If the ply plates lift clear of the wing surface, pack small pieces of balsa between the plate and the wing seat so that the plates match the wing surface exactly. When the glue has dried thoroughly, carefully remove the wing and you should end up with flat plates

WHEEL DOORS

SIMPLE INNER UNDERCARRIAGE DOOR OPERATING MECHANISM

The photo at the top of this page is the *YT International* ARTF single seat Do335. it's a lot bigger than my version, but shows that the undercarriage doors add a lot of atmosphere to the aircraft - the legs are somewhat 'stalky', to provide ground clearance and the main leg covers are very distinctly 'cranked' in outline.

Through expediency (and because its too difficult), I've decided to omit the nosewheel door, but fit main leg doors. The main wheel wells were completely covered when retracted, with an inboard door covering lower the wheel half. I've worked out a simple scheme for fitting these inner doors - operated by a rubber band! The sketch shows the proposed mechanism - next month we'll see if it works!



THE PROPOSED 'RUBBER BAND OPERATED' INNER U/C DOORS MECHANISM.

The two-seat Do335 featured in this article, prior to flight testing!

looking just like **Photo 2**.

The next stage is to cut pieces of blue foam to shape to fit between the fairing plate and the fuselage side. They don't need to be a perfect fit, but as good as you can get, making sure there is enough glue area to hold them in place AND to allow them to be shaped to final section. I should have taken a picture of a typical fitted foam block, but I got carried away with it and only remembered after all the blocks had been fitted and initially shaped. **Photo 3** shows the rear of the fairing, with gaps filled with lightweight filler, ready for final contouring. Note also the balsa plate fitted under the rear of the ply plate to match the thickness of the wing trailing edge.

At the front end, the Do335 fairing is very small sectioned. I got over this by fitting short balsa blocks at the front, which allowed shaping to a very sharp point. **Photo 4** shows the small amount of foam left after initial trimming. Again, use of lightweight filler makes good any tears in the foam caused by overzealous sanding!

Final contouring of the fairing is done very carefully! Choose a tube of the right sort of diameter to give the required curvature and wrap some medium wet and dry paper around it. **Photo 5** shows the technique of holding the mandrel, rubbing fore and aft to remove the foam - gently or the foam can tear, or the mandrel 'dig' in. Make sure that you don't sand into the balsa fuselage skin - judicious use of number one eyeball is the best method of preventing this, or else stick masking tape to the fuselage side closely following the fairing edge. When you think it's done - stop! Take a hard look and locally sand where necessary and, when satisfied, use lighweight filler - applied by a finger tip, to seal gaps and smooth out any tears. Leave to dry and then carefully sand away excess filler - and there you are!

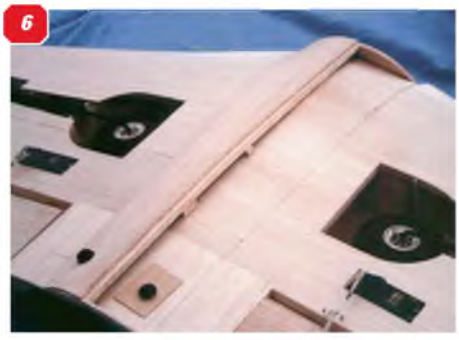
BELLY FAIRING

The fuselage curves are continued over the lower wing surface to give a nice, smooth surface. On the full size D0335, this was the bomb bay, comprising a pair of almost full chord doors that opened from the centre outwards. I could have used foam, but a balsa support frame and sheet skins was the preferred option - and probably easier, too. The important thing is to make sure the side profile curve is right, after positioning and shaping semi formers at the front and rear of the wing, matching the fuselage sections and allowing for a 3/32" skin. A piece of 1/4" square balsa was then positioned on the wing centre line, set into each of the fairing formers, then packed up to give a matching curvature to the belly profile between the front and back of the wing. **Photo 6** shows the formers, centre stringer, packing pieces and one half of the balsa skin already fitted. After cutting the skin half roughly to shape, a good soak in the bath in tepid water (doesn't have to be tepid, but it's a lot easier on the fingers!) makes the skin very malleable - it can be

FAIRINGS

1: The ply wing fairing plates finally trimmed and fitted. 2: The ply plate 'kicks' up at the rear to align with the lower wing surface.

3: Foam blocks have been roughly shaped, glued in place and sanded to match the ply plates and the fairing line on the fuselage side. 4: At the front, where the fairing is very narrow, balsa blocks allow a fine curvature to be carved. 5: Fine wet and dry, wrapped round a mandrel (Correction fluid bottle) of the right diameter is used to shape the curvature between the fuselage side and the edge of the fairing pate (wing surface). 6: Half of the belly fairing completed - formers at front and rear of the wing and a central stringer packed up to give a smooth curve, covered in carefully trimmed sheet balsa skin. 7: Foam can be used to quickly make complicated shapes - this is the belly radiator intake. Build up a smooth curve using lightweight filler.



curved, trimmed and glued in position and as it dries out will keep the true curved form. When gluing, use plenty of pins all round the periphery to ensure it follows what is, after all, a double curvature. When dry, remove pins, apply the good old lightweight filler and sand to a nice smooth, curved surface.

REAR RADIATOR INTAKE

Not a lot to say about this, really - carefully carve a block of foam to fit the fuse curvature and sit up against the bulkehead, then carve to section - I didn't bother hollowing it out - its going to take the full brunt of a wheels up landing, so it's almost sacrificial, anyway! Filler and sanding blends it into the balsa fuselage lines. **Photo 7** shows the competed thing, ready for covering.

COVERING SYSTEM

I was advised to use a proprietary Acrylic varnish that I could find at any DIY superstore - well, not in any superstore in my home town of Milton Keynes, as it turns out! Then, purely by chance - at one of the summer shows, I came across the Falcon Aviation trade stand - and there was just the thing called 'Skin-crylic'. Costing £9.99 for what seems to be a 500ml bottle of this milky white liquid, I was assured that this was the dogs dangleys - the test piece that they had on the stand certainly seemed to be just what I was looking for.

APPLYING GLASS CLOTH

Skin-crylic - the Falcon Aviation glasscloth bonding agent - use straight out of the bottle - no mixing, no smell - and washes off the brush and hands with water!

Cut an oversize piece of glasscloth and align the weave with the flattest surface (in this case, fore and aft).

I chose to use the lightest weight of glasscloth that I could find, 17g/sq.m. (0.6oz/sq.yd), sold in 3sq.m. packs by Flair Products.

As the acrylic bonding fluid is water-based, the smell is almost non-existent and you can wash the brushes out in water! However, being water-based, the bare balsa needs some sealing before its application. Otherwise the water can cause the wood to swell and being very cost-conscious, bare wood will also absorb a lot more of the expensive liquid!

So the first thing to do was to seal all the foam bits with a coat of 100% PVA brushed on, making sure that the foam/balsa joints are PVA'd too. When fully dry, the balsa was sealed with a coat of 50/50 thinned dope (apply the dope before the PVA and the foam will melt!). A light sand with fine wet & dry to remove any 'nibs' and you're ready to apply the glasscloth. Believe me, it's very easy!

One point is worth mentioning, before you study the step-by-step guide shown here; when cutting the pieces of cloth, carefully align the wave and weft of the cloth to suit the surface that you are covering. The weave runs along the length of the cloth, the weft runs across the width of the cloth - if the piece of cloth is square they are the same! When covering a relatively flat surface, or mainly curved in one direction, align the weave along the flattest surface, e.g. on a wing panel, lay the weave spanwise. On a very curved surface, or a double curved surface, e.g. a fuselage side, cut the piece of cloth with the weave/weft at 45° to the length of the fuselage. Cut the cloth generously so that you can pull the cloth round the curves as you apply the bonding agent.

Start brushing the goo through the cloth along the centre line of the cloth piece working outwards towards the edges. Use the brush to work the cloth around the curves, pulling the cloth gently to keep the surface smooth. Apply the goo generously and work it well into the cloth spreading it out evenly over the surface - it's a technique that has to be practiced, but it's about as easy as it gets. The varnish is claimed to dry in 8 - 10 minutes, but it can take up to an hour, depending on prevalent weather conditions. ■

SOURCES

Skin-crylic: Falcon Aviation, www.falcon-aviation.com
Glassfibre cloth: Flair Products. Packs of 3sq.m. available at model shops

APPLYING GLASS CLOTH CONT...

Brush the acrylic fluid through the cloth, starting at the centre working outwards.

At sharp changes in contour, work the cloth into the corner with the tip of the brush.

Don't trim the excess where it will be overlapped, work the agent into the cloth and work excess round the curves with the tip of the brush.

At the ends, trim the cloth to give a half inch overlap and snip the cloth every half inch with sharp scissors.

Finish off by using a loaded brush to smooth down the overlap 'flaps' to a smooth surface.

NEXT MONTH...

Those cockpit glazings and fuselage air intakes - a bit of vac-forming is called for!

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Techno Scale

Mike Evatt sc

Scale Flyers of Minnesota's website at *www.mnbigbirds.com* reveals David Andersen's latest offering - a Kawasaki Ki-45. This is an exact 1/5th Scale Kawasaki Ki-45 Toryu. Suitable for competition, museum static display and everyday enjoyment on the flying field. This 1/5th Scale design has a 120" wingspan, is an excellent flyer with stable flight and landing characteristics. Two 50cc IC motors can power the aircraft and it seems that a few flyers are building theirs with equivalent electric motors.

Having created 3D Printed scale parts for his own Fokker D.VII Nigel Wagstaff has had a number of enquiries from all around the world regarding commercial availability, particularly the Spandau Machine guns. As you would expect with **Flightline Graphics,** great care has gone into the design and construction of the parts to ensure they are of the highest quality. Yes, they are expensive, but we are talking SLS Nylon here, which is very durable and should withstand engine vibration.

Check them out at *www.flightlinegraphics.com*

The **Aichia D3A** series of aircraft, dubbed the 'VAL' by the allies, were thought to be all but extinct when the war on the Pacific began. The real awakening came in the form of the surprise attack on Pearl Harbour. The VAL was used effectively along with the Zeros and the Kate's as carrier based bombers and dive bombers in the Imperial Japanese Navy throughout the early part of WW2. **Willis Warbirds** at *www.williswarbirds.co.uk* sell an 82.5in wingspan replica. This model has a complete built up wing, fuselage and cowling with vacuum formed canopy and spats.

Micron R/C at *www.micronradiocontrol.co.uk* specialises in kits and components for micro R/C aero models. S-POU! inspired by the Pou De Ciel (Flying Flea) is based on the flight mechanics of Henri Minet's Flying Machine. This tandem wing delight explores pitch control of the main wing and provokes stares of disbelief at local indoor events. Designed for the Parkzone Vapor or Spektrum AR6400 receiver modules.

Ikara, at *www.ikara.eu* is a specialized manufacturer of free flight aircraft models, powered by rubber motors. They manufacture kits or ready-to-fly models for indoor and outdoor flying. The AVIONETTE is a semi scale model of this French historic plane. The model is powered by a rubber motor and is intended for fun flying indoors or outdoors.

AirWing Micro Spitfire 2.4GHz RTF sold by **Model Maniacs** at *www.modelmaniacs.co.uk* is enchanting. Each model in the AirWing range has been designed to not only look like its full-size counterpart, but also have a scale performance to match. From the iconic Spitfire, to one of the most exciting US fighters of WWII, the P-51D, to the barnstorming Waco biplane, each has all the charm and character of the original in a Ready to Fly format. All three models come complete with a high

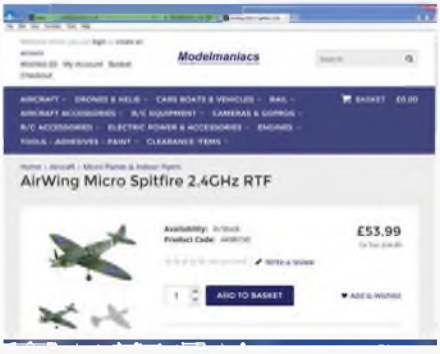
David Andersen's latest offering - a Kawasaki Ki-45.

Superb Spandau Machine guns from Flightline Graphics.

An Aichia D3A (Val) by Willis Warbirds.

S-POU! inspired by the 'Pou De Ciel' by Henri Minet.

The AVIONETTE is a semi scale model of French historic plane.



The AirWing Micro Spitfire 2.4GHz RTF sold by Model Maniacs.

ours cyberspace for more TechnoScale Topics...

quality 2.4GHz.

Nitrotek at *www.nitrotek.co.uk* market a very nice F-117 Blacknight Stealth model with 70mm Electric Ducted Fan RTF by Starmax. The Lockheed F-117 Nighthawk is a U.S. Airforce stealth ground attack aircraft. Its unique design was secretly worked out to deflect radar signals. This model is capable of high speed and aerobatics, including loops, rolls and vertical climbing. If you want to have a radio-controlled jet that cannot help but attract attention, then the F-117 Nighthawk is the plane for you!

For over 25 years, **Chief Aircraft Inc**. has been supplying General Aviation and Radio Control customers with products worldwide. If you want a big jet then check out their website at *http://jets.chiefaircraft.com* Their Skymaster X-Treme ARF Plus BAE Hawk T-1 might fulfil your needs. Particular when delivered in the RAF 2010 livery.

Roban Limited at *www.robanmodel.com* specialize in producing various radio control products including helicopters, airplanes and UA V systems. Roban's new 700 size HH-60 Superscale Jayhawk is now available. It's the eighth product in their Super Scale series. Their new True Scale Design locates the cockpit exactly at the right spot, unlike on most canopies based on 3D mechanics. The compact mechanics are built into the engine compartment, just like on the full-size helicopter. The fuselage of the UH-60 stands out through the detailed crafted surface details and the overall correctly scaled shape.

Finally! Two ideas for great days out!

Situated on the historic airfield at Hawkinge, about 3 miles inland from Folkestone on the A260 is the **Kent 'Battle of Britain' Museum**. The Museum's original 1940 buildings, some of which still bear the scars of war, contain the world's largest collection of authentic Battle of Britain relics and related memorabilia. The Museum is the oldest established Battle of Britain Museum and has been open to the public since 1971, the majority of the exhibits having been recovered in the late 1960's and early 1970's. Check it out at *www.kbobm.org* The Museum is entirely self-supporting and stands or falls by the number of visitors it attracts. It is run by eight enthusiasts and volunteers.

The Royal Air Force Museum Cosford is located in Shropshire and offers a fun, entertaining day out for all the entire family as well being one of the LMA's display venues. Their website at *www.rafmuseum.org.uk/cosford* reveals much more including the Bristol M1c.To meet the challenge of the Fokker monoplanes in 1916 Captain F.S. Barnwell designed a new single-seat monoplane incorporating much of the experience gained from earlier machines. Great things were expected of the M1 but a combination of prejudice against monoplanes, a dislike for its high landing speed and poor downward view meant it found little favour in the War Office and only 125 were ordered. ■

A nice F-117 Blacknight Stealth model with 70mm Electric Ducted Fan RTF by Starmax.

The Skymaster X-Treme ARF Plus BAE Hawk T-1 might fulfil your jet-set needs.

Roban's new 700 size HH-60 Superscale Jayhawk is now available.

The Kent 'Battle of Britain' Museum is based in original 1940 buildings.

The Royal Air Force Museum Cosford is well worth a visit.

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

mikeevatt@hotmail.com

On Silent Wings by Chris Williams

SCALE SOARING

The Zurivogel being rigged (Dave Pullinger left).

The Zurivogel under tow. Note the horizontal tow line...!

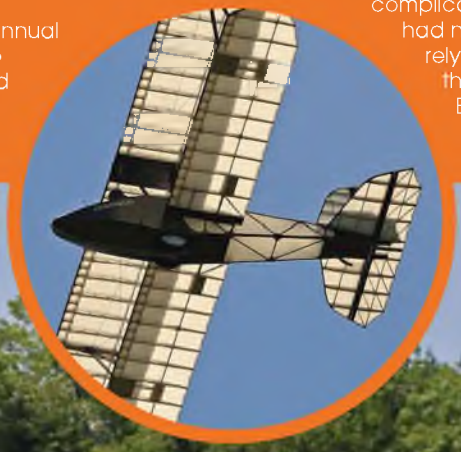
There are many scale sailplanes out there that impress mightily, but every now and again one comes along that takes your breath away. One such machine is Dave Pullinger's mighty Spalinger S10 biplane glider, a project fraught with much in the way of difficulty.

Dave first realised this subject in 1/4 scale many, many years ago and then, in his sunset years, decided to have another go, only this time at one-half scale, in keeping with the ethos of the Large Model Association.

I first caught wind of this project when it's successful maiden flight was announced on the SSUK forum, and since then I had been waiting for an opportunity to see the beast in the flesh. The chance came upon the occasion of the Ghost Squadron's annual pilgrimage to their adopted site near Cheddar in Somerset, and when I rolled up on the one day of the week-long affair that promised acceptable weather, the first thing I came upon was the S10 undergoing the long process of rigging.

Happier than a collie in kibble factory, I unleashed the camera and set about recording the affair. Spanning a deceptively small six meters, and weighing in at 108lbs, the project had taken six years to reach it's culmination and was indeed something to behold. Biplane gliders had a short-lived history, the idea presumably being to have as much wing area as possible to support the weight of the pilot, or in this case, two pilots. Alas, the extra drag of the struts and all that rigging left those early pioneers with a machine with all the aerodynamic efficiency of a grand piano with the lid open.

To add to the complication, the S10 had no ailerons, relying instead on that old Wright Brothers idea of wing



Eight square metres of lovely translucence slowly drifts by.

All out! Note the wing warping attempting to counter the crosswind.

Scene at the Ghost Squadron's aerotow event.

warping, the wing in question being the upper wing in this case. Dave's model is beautifully finished, to the extent that the modern technology of vinyl CNC cut lettering had been eschewed in favour of proper sign-writing, to which end a professional was employed. Two half-scale pilots, the cost of which must have equalled the GDP of a small banana republic, completed the ensemble, and by the time the model was rigged and flight-ready, I and all the other spectators were duly impressed and ready to witness some action.

By now it was nearing lunchtime, but despite the gnawing pangs of hunger, tug pilot Pat Marsden soon had his Greenley tug fired up and attached to the Zurivogel. It was at this stage that a few snags showed their colours. Despite this being the day of the week with the lightest winds forecast, there was still a good 10 mph breeze blowing directly crosswind to the runway. Compared to the glider, the tug looked pretty small, and when Pat pushed through the seal into full military power, the line tightened, but not much else happened.

The wing men looked at each other, shrugged and started pushing. With agonising slowness, the glider started to rumble along on its two mainwheels, whereupon another snag reared its ugly head. The crosswind was pushing the downwind wing into the ground, causing extra drag, and the wing warping was proving woefully inadequate to counter it. The tug/glider combo was reset, and another attempt made, with the same result.

Nothing daunted, another attempt was made, this time with success, and the pair staggered into the air. John Greenfield was at the controls of the glider, and described the process of initiating a roll response as comparable to 'turning an oil tanker'. Nevertheless, eventually a height of maybe some seven hundred feet was obtained before the glider released, and the tug sank gratefully back to earth. Given it's severely challenged glide angle, the Zurivogel's flight didn't last long, but what a magnificent sight it was, with the sun shining through all those translucent surfaces, and model's slow and stately progress. All too soon it was over, to the applause of the onlookers, and the giant model finally rolled to rest.

Twice more during the day, the process was repeated, but alas, on the third flight, disaster struck. The Zurivogel started a steep descent from which it never recovered, and the historic model itself

Bill Cooke's built-up Inteco L213A in action.

Author's 1:3.25 scale Slingsby Kite 2a takes a tow at Middle Wallop.

Cliff Charlesworth at the SSWSA event, surrounded by examples of his many designs.

became history. To say Dave was disappointed would be an understatement, but if a guy well into his eighties can say, "...oh well, on with the next project...", then I guess there's hope for all of us...!

GHOST SQUADRON AEROTOW, MIDDLE WALLOP, 11-12 JULY 2015

It's hard to find anybody in the model flying business these days who hasn't got a string of complaints about the weather, except maybe the indoor fliers. So it was with a feeling of resignations that scale soaring aficionados took in the weather forecast for this event: Saturday windy, Sunday windy & wet.

Sure enough, when we arrived on the Saturday morning, it was windy with a side order of freezing, and I wished that I had brought along my winter flying suit. Nevertheless, model fliers are a hardy lot, and we soon settled down to business.

Of immediate interest to me was Bill Cooke's 1/3rd scale Inteco L213A. This is widely available as a glass constructed kit, but Bill's version was built up from a free plan supplied to the SSUK website by Jilles Smit in Australia, and laser-kitted here in the UK by Cliff Evans. This produces an impressive-looking model, the only fly in the ointment being the retractable undercarriage. Jilles has supplied detailed drawing of the unit with the plan, but Bill had to cast around for someone to make it, and I seem to recall he said it was a dental engineer who produced the final result.

The model seems to fly well enough, although whether or not it's up to the strains of the aerobatics that the glass machines pull, is another matter. Alas, I didn't discover this information until after Bill had put the model away, so a closer inspection will have to wait for another time.

Terry Holland is another Middle Wallop regular, and the last occasion had seen the demise of his beautiful all-wood & varnish Nemere, seemingly a write-off. It was good to hear from Terry that the re-build was almost complete; meanwhile he had brought along his Luftikus, another glider from a similar era, but without the Nemere's elegance.

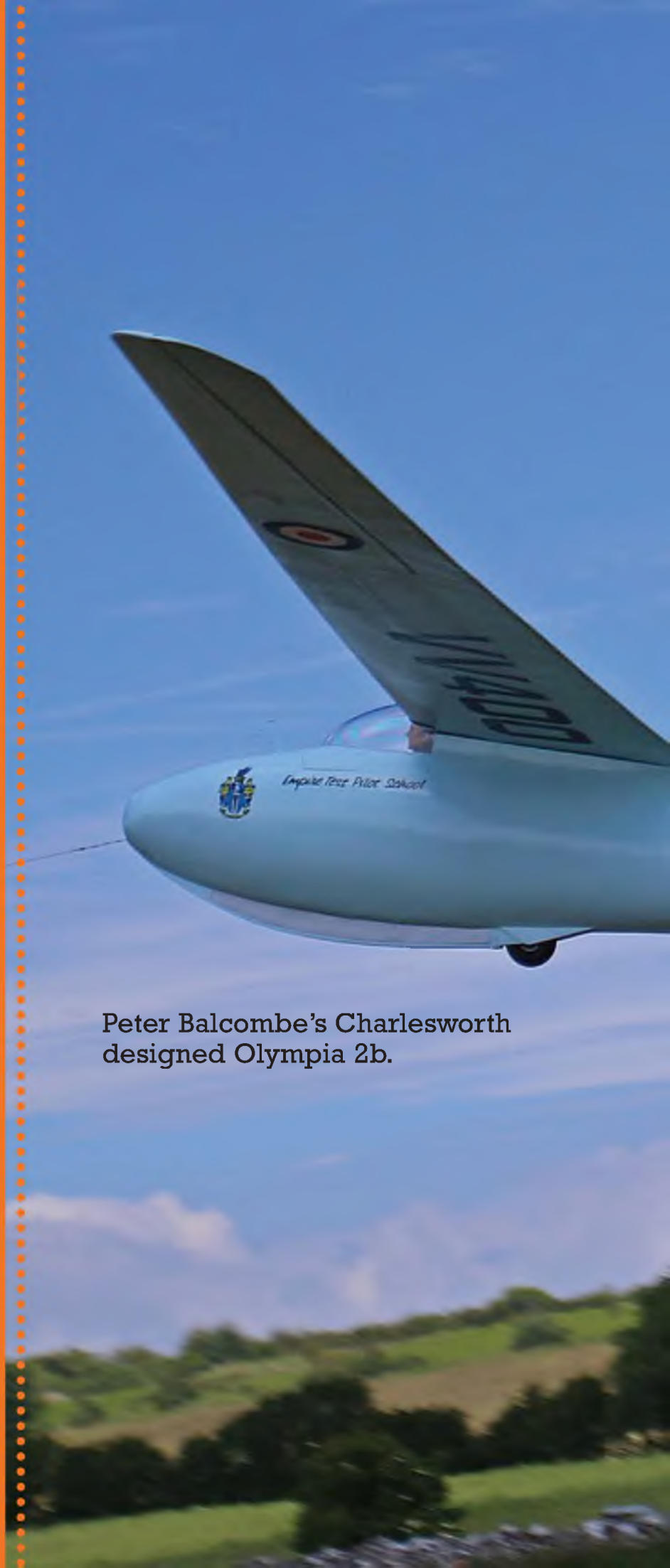
On a personal note, I was delighted to discover that my recently completed Kite 2a is as perfectly at home on a windy airfield as it is on a windy slope, and she had many flights on the day, even finding some lift on a few occasions. It wasn't a perfect day by any stretch of the imagination, but plenty of good flying was to be had, and thanks must go as always to the Ghost Squadron team and the tireless tug pilots for their efforts. Alas, it pee'd down the next day, so that was it, for that event.

Skipping ahead, the next event a couple of weeks later was almost a carbon copy of this one, but due to circumstances beyond my control, I was unable to make that one, so now it's the long wait until the last one in October...

SWSSA AEROTOW, CHEDDAR, SOMERSET 27-28th JUNE 2015

This was to be the second year of the South West Scale Soaring Association's aerotow event, held in a farmer's field near Cheddar, in Somerset. This time the event incorporated the Cliff Charlesworth Day to commemorate the vital input that Cliff's scale glider designs have had on the movement over the years.

Many glider builders will have Cliff's handbook on scale glider construction on their shelves, and on the cover is featured perhaps his most iconic and popular design, the



Peter Balcombe's Charlesworth designed Olympia 2b.

Olympia 2b. One of the event organisers, Cliff Evans, had tracked down this model, obtained it, and on the day it lay hidden under a tarpaulin, ready to be presented to it's original designer/builder.

To say that Mr Charlesworth was chuffed, is to put it mildly, and as an extra bonus, we assembled the many models there that were built from, or scaled up from his many plans, and photographed him in the middle of them all. On the day that I attended, the weather was delightful, with a light wind and plenty of lift. The venue was a very large, open field, with little in the way of stationary hazards, and the organisation ran smoothly with little or no fuss. Thanks must go, as usual, to the tug pilots and the organisers for a splendid weekend, and the signs are that we can do it all again next year...

c_williams30@sky.com

Terry Holland's Luftikus in action.

This ASH 31Mi leads the way in the plastic park.

Tug pilot Ray Watts brings his high-mileage Wilga in for another tow.

Yet another Charlesworth Oly at the Cheddar event.

That SE5a doing it's airborne thing. Designed by the author and built by Jonathan Rider.

PETER RAKE CONDUCTS HIS OWN VERSION OF WEIGHT-WATCHERS AS HE PROVIDES A GUIDE TO WORKABLE ALL-UP WEIGHTS FOR INDOOR MODELS - AND HOW TO ACHIEVE IT!

THE QUIET ZONE

R/C SCALE ELECTRICS WITH PETER RAKE

Here we go again, another thrilling instalment of electric flight meandering. This time around, I promise not to regale you with yet more detailing details. However, that leaves me with deciding precisely what I will write about.

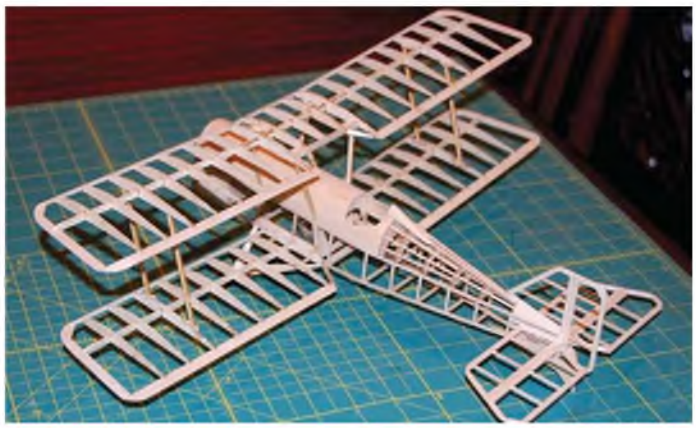
I would have discussed what a glorious summer of flying we'd had, if we'd actually had much of a summer at all in which to do all this flying. Apart from a few odd days (very odd when compared with the rest), if it hasn't been chucking it down with rain, it's been blowing half a gale.

Now I know there are some hardy souls who venture forth to fly in such conditions, but I'm not one of them. Modelling wimp is the term that immediately comes to mind. I'm afraid I'm a firm believer that modelling, and flying in particular, is supposed to be a pleasant pastime. So, not for me braving the teeth of the gale, or rushing out of my car for a quick flight while the rain lets up.

Not at all my friend (I'm sure I must have one somewhere), to me flying is something carried out in calm, warm, dry conditions. This year that seems to mean either staying at home building and designing, or flying models indoors. Well I never, how's that for a sneaky route into this months' topic?

Hmmm, October already ...well at lest that's what it says on the front cover anyway! Whilst autumn may be a time of mists and mellow fruitfulness, it's also (by strange coincidence) heading into indoor flying territory. Our own indoor sessions start

Just about the limit of our indoor venue's capability. 10 inch span and a ready to fly weight well below 10 grams.



Typical of the structure of these little models. Very rubber power influenced using mostly 1/16 balsa and not a lot else.

With a nicely done printed tissue finish the SE5a looks great and weighs less than 45 grams ready to fly.

in September (I write this well in advance) and I'm still on something of a small model kick myself, so that's what most of my designing (done whilst sheltering from the wind and rain) has been aimed at.

Some daring souls have asked to build some of these designs and that has led to some interesting discoveries. Well, I thought they were interesting, the rest of you will just have to bear with me while I expand on what it is I'm rambling on about.

WHAT MAKES AN INDOOR SCALE MODEL?

Well, to be perfectly honest, that rather depends on your definition of 'indoor'. What you can fly indoors will be directly governed by how big your indoor venue is. You'll have noticed that I say I'm on a small model kick, rather than an indoor model kick? This is solely because our particular indoor venue is far too restrictive for much more than small helicopters and Vapor style models. Yes, I have terrified all and sundry by attempting to fly larger, slightly heavier models there, but it really isn't much fun.

Some of the little foamies that have appeared in these pages are about the limit of the space available as far as 'scale' models are concerned. However, my problems aren't what we're here to discuss, although I'm quite happy to continue bemoaning my fate if you insist.

Seriously though (as serious as this column ever gets), most of us (you rotten lucky lot) have far more space than our small village hall in which to flit about and don't need to worry so much about size and weight. It's for those modellers that this is intended. If you've been at this 'micro' modelling lark for any time there's likely to be very little I can teach you, so you can just twiddle your thumbs while the less experienced, and those just thinking of trying small models (probably driven to it by the summer we've had) might just learn something that will help them avoid the mistakes I made along the way.

BASIC STUFF

One of the first things I learned was that it isn't so much the size of the model that matters as the model's wing loading. Finding that larger models didn't work, without bouncing off everything in sight, I tried smaller models - smaller, but not actually that much lighter (there is a limit to how light a model you can build). Surprise, surprise, these smaller models were both faster than the larger ones, and even more prone to bounce off things - walls, tables, other flyers. It didn't quite get to the stage of everyone taking cover when I got out a model, but it was definitely heading in that direction. Since, at the time, I was managing the local model shop, I could always refuse to serve them if they protested too loudly: such power over others!

No, as we all know, size doesn't matter, it's what you do with it that counts. This couldn't be more correct than in the field of indoor modelling. Big is fine, as long as it's big and light. To prove the point, one of my first successful models was an 18" span, Pennyplane (a lightweight rubber power class) style model equipped with two channel infra red equipment filched from an RTF foamie. Weighing just a little over 8 grams ready to fly, the model performed extremely well in the space available. It flew in a sort of radio interrupted free-flight fashion. Trim it with rudder to fly circuits and use throttle to adjust how high it flew. If it started to get close to an obstruction, just add a straight leg to stear away from obstacle part of the circuit and then return to leisurely circuits.

Now, don't get me wrong, I'm not trying to lead you all down the dark path to non-scale models. Not at all, just trying to highlight the need for your scale models to have the lowest possible wing loading that your flying venue allows. In its most basic terms, the larger the venue, the heavier the model can be. No you twit, that doesn't mean a .60 size pattern ship. Even an indoor sports hall might struggle with that. Watch what others are flying, consider whether you are capable of building and flying such a model and tailor your models to suit the venue.

Following on from that, but along the same lines, WATCH THE WEIGHT. Think light at all times and save every scrap of weight you can without sacrificing strength - and don't over build. When I say without sacrificing strength, that doesn't mean we need strong models, just that we need to avoid building

No, definitely not an indoor model but you can see that the basic construction isn't really much different - just a lot bigger and heavier.

in weak spots.

The beauty of lightweight, slow flying models is that they are very unlikely to damage themselves in the event of hitting something. Because they are light and slow there is very little momentum involved in such collisions. If I may use that Pennyplane style model as an example again, because it weighed next to nothing and flew at about walking pace, flying straight into a wall did no damage at all. It would simply slide down the wall most gracefully, still at the same angle as while flying, to land gently on the floor.

Handling such models, however, is another matter entirely. Mine met its end not because of a flying mishap, but when my wife knocked it off its stand and made the mistake of trying to catch it. The fall wouldn't have been a problem, the over enthusiastic catch was. One mangled mess of 1/16" square balsa and Mylar film.

STRUCTURES

Bearing in mind all that has already been said, build your models to fly, not to survive crashes. They don't need 'beefing up' because that just increases the likelihood of damage. The heavier they are, the faster they fly. The faster they fly, the more difficult it becomes to avoid walls. Combine faster flying and an increased risk of collision and the chances of damaging your model increase exponentially.

Many of these models will find their inspiration in rubber power designs. Goodness knows there are literally thousands of designs for rubber power scale models around. Many are still available as either kit or short-kit. However, with very few exceptions these models were all designed specifically to have a powerful rubber motor installed and required a fuselage that would withstand the twisting and compressive forces of a fully wound motor.

As such, they are often somewhat more substantial than we need. Not only will we not be fitting a rubber motor to our model, hopefully we should be able to control how it flies and where it lands. So that's another set of forces we don't need to protect against. You have to remember that, apart from very small models, rubber power scale models were intended for use in the great outdoors. As such the only restriction on weight was performance related and there was no restriction at all on how much space they required to do their airborne thing.

Our models however, being intended for radio controlled, electric powered, indoor flight can lose much of the strength built into a rubber model. Basically, the idea is to build JUST strong enough to do the job and no more. As long as you can safely handle the model, and nothing is likely to fall off (like the wings) in flight, you won't be far wrong in terms of the actual structure. Just ensure that you don't use wood that is far too soft in an attempt to save weight.

Spars and longerons are particularly load bearing, so use at least medium balsa for longerons and, unless they are very deep, even harder wood for spars. Wing trailing

Although not actually intended as an indoor model, lighter gear and a little weight saving could make this 18 inch model a viable contender.

Laminated outlines work out much lighter and stronger than those built up from shaped sections - like in most rubber power kits.

Another way of saving weight is to replace wire struts with bass ones built into formers.

This radiator grille could prove weighty, if it wasn't just printed onto paper and glued in place.

edges are also an area where harder is better than soft. Until you've seen just how much damage shrinking tissue can do to a wing on which the trailing edge is too soft you wouldn't believe how important this is.Once you start building 'micro' models you very quickly learn that it's very much a balancing act between the desire not to add weight, but without ending up with a structure that is too flimsy.

As we've discussed, although the models don't need to be overly strong to survive flying stresses, we need to watch how we go about that by avoiding building in weak spots. Although it may all sound quite complicated when you first begin to think about it, by the time you've actually built a couple of models things start to become much clearer.

HANDLING

As intimated by the untimely demise of my rubber power based model, mentioned earlier, it's clear that we have to build in a certain degree of durability. After all, who wants to spend the time building, equipping and covering a model only to find that attempting to hand launch it crushes the life out of it.

As I said earlier, I design my models primarily for outdoor use (on very calm days) so they can be a little more rugged than a pure indoor flyer. In fact, apart from a very few exceptions, they pretty much follow my practice with much larger models. As long as you watch the overall weight (wing loading), this also suits indoor models as long as space isn't too restrictive.

To this end, I like to have a relatively solid front end, which ties everything heavy together and braces them one against the other. Because the landing gear is built into this 'heavy duty' section, along with the motor, radio gear and wing mountings, each one supports the others. Just as the weighty components are trying to push through the bottom in a heavy landing, being firmly secured means they can't. Nor can the landing gear force its way up into the fuselage for the same reason.

The stresses placed on wings and tail are relatively light by comparison, so they can simply be 'hung' onto the more rigid section using the bare minimum of structure to hold them where they're supposed to be.

The added advantage of this method of construction (which can be further lightened should you feel the need simply by placing strategic holes in the sheet areas) is that as well as tying everything else together, it gives us somewhere sturdy to hold the model for connecting the battery and hand launching.

Because any struttery is also built into this section, and your wings firmly attached to said struttery, picking up the model by the centre section isn't a task fraught with peril.

A FEW NUMBERS

Although I usually avoid numbers like the plague, here a few figures might help explain the whole process. A figure I've seen bandied about as being the perfect wing loading for a single basketball court size gym is 2 ounces per square foot of wing area. Experience has shown to actually b a pretty hard target to achieve with a small scale model. There are those who can manage it, but I'm certainly not one of them. Think of the Hobbyzone Champ or Parkzone Cub, see how really lightweight they are and then realise that their wing loading is almost 150% of that magic number - about 2.99 ounces per square foot of wing.

Now that figure isn't anything like as difficult to match. My little biplane designs come in with a flying weight of around 2 ounces without the need to be particularly careful. Given that they average a wing area of around 100 square inches, that puts us right on a par with the RTF foamies in terms of wing loading. Since the most likely power and radio set-up will probably have come from just such a model, we have a very similar power-to-wing-loading ratio too.

So, if people can fly either of those in the indoor venue you use, similarly loaded models will also fly perfectly well there. As for the venue I use, no such luck so I'll stick to flying them outdoors. I couldn't even manage to fly the Ares Tiger Moth in there.

Well, that's it until next time. If you feel you'd like to contact me (and I always welcome column material), you'll find me at PETERRAKE@aol.com. ■

Lightweight structure, printed tissue and carbon rod struts offset the ex toy cycle wheels to give the author's White Monoplane a flying weight in the region of 35 grams.

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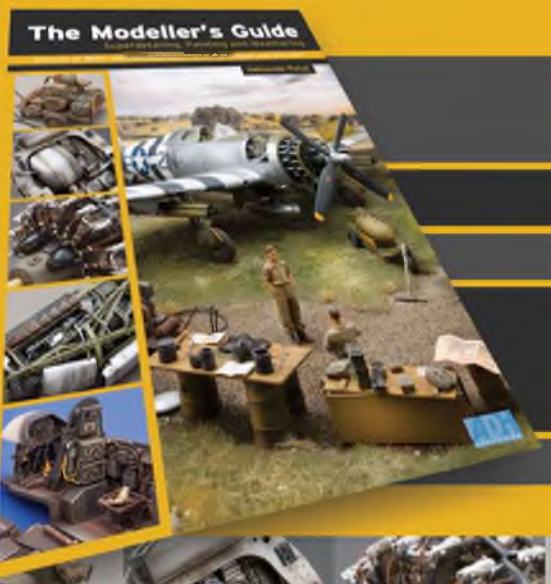

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