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Part 2: 58" wingspan for electric power

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THE ISSUE AHEAD...

# FORMATION...

FLYING SCALE MODELS - THE WORLD'S ONLY MAGAZINE FOR SCALE MODEL FLYERS



18



26



40

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## ON THE COVER

There has been a long fascination among scale modellers for the Fieseler Fi 156 Storch, which has a distinctive 'presence' all its own, Chris Harle built this masterpiece in 1/4 scale and powered it with a Laser 300 V-twin. Reviewed in detail on page 26, this issue.

## SEPTEMBER 2014 NO.178

### 6 CONTACT

Product news

### FULL-SIZE FREE PLAN FEATURE

### 8 GREAT LAKES TRAINER PART 2

Continuing the construction of the electric powered, scale model designed by Peter Rake and built and described by Pat Lynch.

### 12 GREAT LAKES SPECIAL

If you want to be a bit ambitious, then try using our full size free plan as a base to model this colourful aerobatic one-off

### 14 GREAT LAKES SCALE DRAWING

1:40 scale three-views

### 16 GREAT LAKES SKETCHPAGE

Detail study of Hal Krier's aerobatic Special

### 18 WESTON PARK SCALE 2014

Alex Whittaker takes his camera to one of the jewels in the Scale summer crown

### 24 TECHNO SCALE

Another scoop of scale-related web site worth a look

### 26 MASTER MODELS - FIESELER STORCH

A Look at Chris Harles' large and impressive quarter-scale scratch-built STOL

### 32 STORCH COLOURS

Richard Carruana's warpaint study for the Fieseler Storch

### 34 STORCH SCALE DRAWING

Fine-line three views to 1:50 scale

### 36 SCALE SOARING

An appreciation of ancient and modern - Chris Williams admires the best in model glass fibre super slickers and test fly yet another Minimoa

### 40 ARROW/ ACTIVE MK. 2

From New Zealand, Alistair Smith presents this truly elegant 96" (2430mm) 1/3rd scale biplane. Build it from his plans...

### 48 ARROW/ TYPE HISTORY

Designed for a perceived military requirement that did not exist, the designers did at least create a truly attractive little aircraft

### 52 ARROW/ SCALE DRAWING

1:35 scale three-views

### 54 ARROW/ IN DETAIL

Close-up study to help with piling on the detail

### 58 OFFICE HOURS

Technique for cockpit detailing

### 62 QUIET ZONE

Strictly for electric fliers



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# CONTACT



## QUARTER-SIZE CAMEL

**B**alsa USA has long been a premier supporter of the R/C scale modelling scene, for those who prefer a 'proper build' to ARTF 'quickie-assembly'.

Much of their range at the large side end of the scale modelling range, in quarter and 1/3rd scales and their latest introduction is a quarter-scale Sopwith Camel. At that scale, it spans 84" (2134mm) and is intended for 20-30cc petrol engines or 1.20-1.50 cu.in. four-stroke glow that will be fully enclosed within the 10.25" (260mm) ABS plastic cowl supplied with the kit.

The kit also features ABS moulded front upper fuselage deck (the famous 'hump' from which the Camel derived its name, one-piece bolt-on wings, die-cut shaped wood components, ready shaped wire undercarriage members and wing struts, balsa fairings, basic hardware pack and a set of rolled (rather than folded) plans to go with the written instructions.

Pegasis Models import the Balsa USA range and will have this one available shortly. Contact: 01603 419517/ [www.pegasusmodels.co.uk](http://www.pegasusmodels.co.uk)

#### **Specification:**

**Wing Span:** 84"  
**Wing Area:** 2264 sq in.  
**Wing Loading:** 15-18 oz/sq ft.  
**Flying Weight:** 15-18 lb;  
**Fuselage Length:** 55"  
**Engine range:** 20-30 petrol or 120 - 150 four-Stroke Glow

## POWERFUL 35CC. PETROL ENGINE

**T**he 35cc MLD-35 petrol engine delivers 4.2 HP and features crankcase design, which allows for an installation that can be rotated through a full 360 degrees to achieve the required internal cowling clearance thus allowing the engine to be completely hidden within a scale model cowl.

The engine features a one-piece

cylinder head and piston sleeve, eliminating head gasket problems

The MLD-35 is equipped with the well-proven Walbro carburetor that provides trouble free fuel metering to the engine throughout the operating range and swings propellers in the 18-21" range. Also supplied with the engine are CDI ignition, installation parts and user manual.

#### **Specification:**

**Displacement:** 35CC / 2.14ci  
**Power output:** 4.2 hp  
**RPM Range:** 1,500-9,500 rpm  
**Propeller range:** 18x8~21 x 8  
**Spark Plug:** Champion Y82  
**Weight:** 43 oz (1.22 kg) including ignition and muffler  
**Oil/Fuel ratio:** 1:30 to 1:45 two-stroke  
**Carburetor:** Walbro WT-805 carburetor with manual choke  
**Ignition:** CDI electronic ignition W/Auto timing advance  
**Power supply:** 4.8V-8.4V  
**Price:** From **Hobbyking UK** is \$244.72



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**Specifications**

Wingspan : 1100 mm / 43.3 in.	Battery : 11.1V 1300 mAh Li-poly
Length : 765 mm / 30.1 in.	ESC : 20A Brushless
Weight : 695 g / 24.5 oz	Motor : DST-1100
Propeller : 8x6(Two blade propeller)	Servo : 9g x 4
Recommended radio system : 4CH	



Available at [hobbyking.com](http://hobbyking.com)



## MITSUBISHI A6M 'ZERO' FROM HOBBICO UK

In the past, we've seen a large number of models of the **Mitsubishi A6M Zero**, all of which have demonstrated excellent flying characteristics. So one can confidently expect the same from the **TopFlite ART** kit. This 86" (2184mm) wingspan offering is scaled to 1:5.5 is designed for 50-60cc petrol engines and the kit comes with glass fibre moulded radial cowl and two-blade metal spinner, but if you would like to run a more authentic three-blade prop, a three-blade spinner is an optional extra.

Scale detailing items provided include pilot's seat, control column instrument panel, with cockpit side panels and a removable scale radio aerial that is magnetically attached when the model is assembled and is removed of safe transport and storage.

Available as an extra is a replica centre-line fuel tank, and the airframe is built to suit the installation of *Robart Retracts*, either pneumatic or electric versions as preferred.

The **TopFlite Giant Scale Zero ARTF** costs £468.75.



## TALKING-THE-TALK WITH SPECTRUM

The most up-to-date raft of high-end R/C systems now being offered by the leading brands offer a wide range of features that, a decade ago, were nowhere in sight - and there seems to be no end, now, to features and programmable options.

Telemetry, between airborne model and transmitter has been in leading brands for a while now, delivered to the operator at the transmitter end via audible means. Now, Horizon

Hobby's **Spektrum DX9** R/C system goes one further, delivering warnings and prompts by voice communication from the transmitter.

No need therefore, when flying, to take your eye off the model, to read an LCD screen to read a warning prompt.

The Spektrum DX9 transmitter includes a normal trainer cord jack, but another new option is a wireless 'buddybox' feature, operable with another DSM2/DSMX transmitter.

Once 'bound' to another transmitter (in much the same way as 2.4 GHz receivers are bound to transmitters, ModelMatch technology allows the DX9 to re-link without having to go through the 'bind' process again.

DX9 *AirWare* software v2.0 will equip DX9 owners for a new generation of Spektrum components that can be programmed directly through the transmitter, while the DX9 transmitter is equipped with enough on-board memory to store 250 model setups and it won't be necessary to scroll through empty slots or move models around if one is deleted as it does with any other transmitters in its class.

The **Spektrum DX9** from **Horizon Hobby UK** costs £344.99.



## TIGER MOTH IN 1/5TH SCALE

The **DH 82 Tiger Moth** must surely be one of the most modelled aircraft in aviation history - yet scale modelers seem never to be bored with the shape - and why should we?

**Hobbyking** have just introduced another rendition, which, at 1/5th scale is quite a handy size - big enough to fly well, yet still at a size that will fit easily into a typical family car for transport to the flying field. In ARTF format, it is finished in early WW2 RAF 'sand & spinach' camouflage and comes with scale rigging wires, wing struts and ready-former main undercarriage.

Practical features included a removable upper fuselage hatch that runs the length of the two tandem cockpits to permit convenient access to the internals. Designed for four-six function R/C systems with standard size servos, the model uses either I.C power using a .91 two-stroke engine or 1.20 four stroke glow or petrol engine - or electric power from a 60-65mm brushless motor controlled from a 90-120A Brushless ESC, the kit also includes an extensive hardware package.

### Specification

**Wingspan:** 71" (1800mm)

**Length:** 58.25" (1480mm)

**Wing Area:** 1426 sq. in. (92 sq.dm)

**Weight:** 9.9-10.3 lbs (4500-4700g).

**Power requirement:** 60-65mm brushless motor or .91 two-stroke, 1.20 four-stroke or 20cc gas engine

**Speed controller:** 90-120A brushless ESC (if using electric motor)

**Propeller:** 13-14"

**Price:** Direct from Hobbyking UK is \$400.



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- Ken McSpadden, Team Horizon Pilot



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# Great Lakes Trainer

PART 2: Continuing the construction of the electric powered, scale model designed by Peter Rake and built and described by Pat Lynch.

**W**ith the basic fuselage structure detailed last time, now we move on to the slightly more tricky aspects of the fuselage assembly. Nothing too complicated I hasten to add, and all

made much simpler if you wisely decided to invest in the set of laser-cut parts available from the Publisher. They really do make light work of building the model, especially considering the number of ply parts involved. Personally, I hate cutting out

ply parts, but don't mind just cutting through a few retaining tabs.

So, keeping my introduction brief, over to Pat to continue detailing how he built the prototype model.

**PETER RAKE**

As 'waffling' past as you can get with a model weighing five pounds. The GLT is a very smooth, stable flyer.







The laser cut cowl parts laminated and a few bits of balsa make up the basic cowl. Still to go on is the top block balsa part.

**P**ossibly the only difficult part of the Great Lakes Trainer is the cowl. A glass-fibre version could be built, but the prototype had one built up from sheet, block, strip-planking plus a handful of laser-cut parts. My technique was to lightly tack all the parts together with CA, do the required shaping and final sanding, and then separate the parts to finish them off. The whole cowl was given a couple of layers of glass cloth and epoxy resin to help cope with my less-than-perfect flying site and less-than-perfect landing skills!

The motor mount and battery tray assembly is built from 1/8" ply and located on the firewall with slots and tabs to get it right. The engine thrust line down and right angles are built in, so make sure you get the

parts the right way round. The inside of the cowl front section will need to be hollowed to accommodate the chosen motor (mine was a Turnigy 4250) plus some space for cooling. Not too much hollowing was done as front weight is usually needed anyway.

With the finishing done, the hatch was removed and the cowl glued permanently to the firewall using *Titebond*. This gives some working time to get it accurately aligned with the fuselage and the motor. I attached the hatch with two dowels at the rear and a nylon bolt through a front cooling hole at the front.

#### TAIL BITS

These are simplicity itself. The flat surfaces are all 1/4 inch thick, using the laminated outlines prepared earlier, some firm balsa spars at the

hinge line and a few 1/8" X 1/4" balsa strips as 'ribs'. When completed, the elevators and rudder were separated and all parts had their edges rounded off - except the fin and tailplane trailing edge which should be left square.

The two elevator halves were joined by a wire link epoxied into holes drilled in the elevator leading edges. But before gluing in place, a brass horn was fashioned from 1/4" X 1/32" strip and silver-soldered to the wire joiner angling it forward to allow some rear movement without hitting the rudder post. *(There's no visible elevator linkage on the full-size aircraft, so the model uses an internal horn and pushrod. Of course, that doesn't prevent you simplifying the linkage and using a 'snake' to an external horn should you so desire. PR).*



Once it was all shaped Pat treated the cowl to some reinforcing GRP which aids getting a smooth finish at the same time.



The combined motor mount and battery tray is fitted to the firewall AFTER you finish messing about with cowl parts tacked in place for shaping.

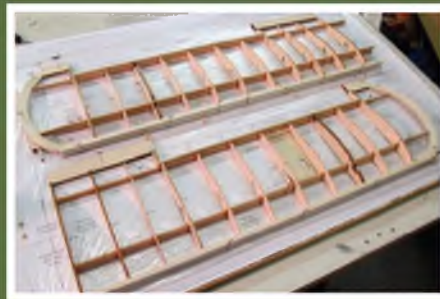




Nothing complicated about the tail surfaces. Just fill in those outlines with a few laser cut parts and some sticks.



Tail surfaces sanded, and the rather neat little tool Pat made for rounding off the edges.



The bottom wing panels under construction reveal their relatively simple nature.

Wedge-shaped balsa blocks were added each side of the fin and sanded to blend the fin into the fuselage. With the tail parts checked for good joints and given an overall sanding to give a good finish to the covering later, the wings were tackled.

## WINGS AND THINGS

The upper wing is quite simple - two outer panels plus a centre section. Ply braces join the sections together and keep the dihedral secure. The three panels are built separately and then glued together over the plan with spacers under the outer ribs to set the dihedral angle. The tips are laminated balsa and in the prototype were angled up slightly to give a more scale look. The centre section is covered in 1/16" sheet balsa with the grain span-wise. The centre trailing edge is built up from 1/4" sheet and sanded to match the rib shape then lightly rounded. This part might get a fair amount of handling when the model is picked up so the edges were not made too thin. Ply plates are fitted under the wing to support the wire centre struts and sockets are formed in some outer struts to locate the outer wing struts attaching under the wing.

The lower wings are also very simple. They are built separately and joined to the fuselage with 1/8" dia. wire dowels fitting into brass tubes glued into the fuselage and wing roots. The wings are secured by a brass strap screwed to each wing and passing through the fuselage. The root area is sheeted between the two inner ribs to provide extra strength in this area. The ailerons are fitted to these wings and are also very simple. The aileron leading edge is cut back at an angle and top-hinged using covering film. This allows almost unlimited up movement and a small amount of down - the differential easily dealt with using separate servos on different channels if required.

All ready to commit aviation. The Great Lakes Trainer makes an undeniably attractive model.





(As you'll notice the outermost rib on all the wing panels is a blank, shaped in situ. This isn't just laziness on my part, but allows you some scope with how you do the wingtips. Some will want to build them flat, while others follow Pat's lead and angle them up slightly. Since these ribs attach to the tip bow, creating them this way doesn't tie you in to any particular method. PR).

The servos are fixed to the inside of ply hatches under the wings - I used 18 gram GWS servos throughout, but I imagine even 9 gram units would be OK. The servo arms extend through the hatch and were connected to the ply aileron horns with a 1/16" wire link. There was no adjustment provided on the prototype - the servo and aileron was centred and the link bent to fit accurately. Fine tuning was done at the transmitter.

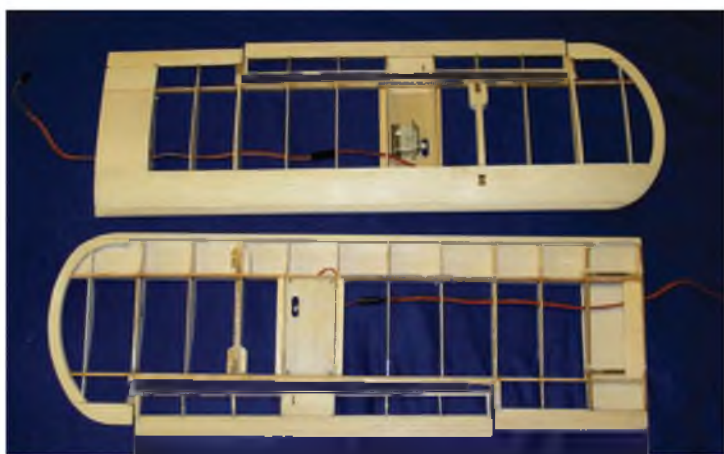
(While you are quite at liberty to arrange mounting blocks for the aileron servos, Pat usually wraps his servos with masking tape and simply glues them securely to the hatch. If you then need to remove a servo it's a simple case of cutting through the masking tape and peeling it off the servo. Although it sounds risky, Pat has never had problems with this method. PR).

#### OTHER STUFF

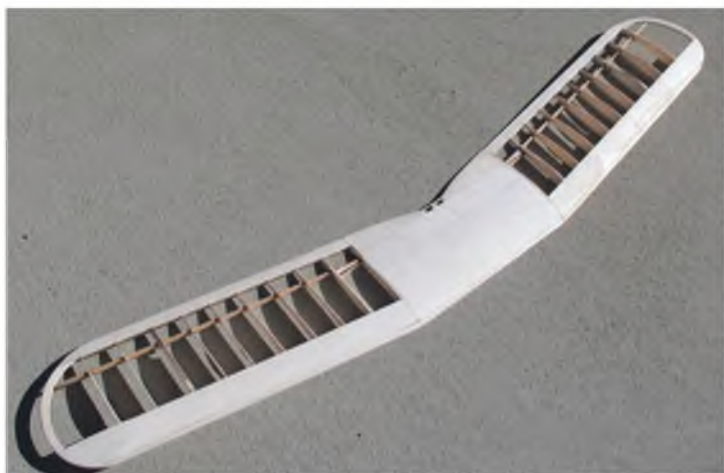
The outer wing struts are from 1/8"

bass - these are part of a laser-cut short kit but if cutting them manually, they should be made exactly as per plan and the model will go together without alignment problems. (Note that two struts are shown, assembled differently. This is so the joins in one set are reinforced by the straight parts of the other. Make both sets and glue them together. PR). That also applies to the undercarriage and centre section parts - keep adjusting until they fit the plan exactly and it will 'fall together!' (And hopefully not fall apart again. PR). The wire strut parts were clad with hard balsa after being soldered. I glued a strip to the wire front and rear and sanded to be the same as the wire thickness. Strips of flat balsa were then glued each side forming a rectangular box which could then be rounded off, filling and sanding as needed. Medium CA was used for all this stuff - epoxy was not used.

The rudder and elevator servos were fitted in the forward fuselage onto spruce strips glued across the fuselage. The rudder uses pull/pull cables made from plastic-coated stranded wire while the elevator is internally operated with a hard balsa pushrod fitted with a clevis at the back and wire at the front. These will be connected after covering and painting is done. ■



The completed bottom wings with servos attached to the ply plates. Note the scrap balsa strut sockets and joining tubes.



The completed top wing is uncomplicated by such things as joiners, ailerons or servos.

# CUT PARTS SET FOR THE

## GREAT LAKES TRAINER

Get straight down to construction without delay! This month's full size free plan feature is supported by a laser-cut set of ready-to-use balsa and plywood components. This provides all the parts that, otherwise, you would need to trace out onto the wood before cutting out.

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# Harold Krier's Great Lakes Special

If you want to be a bit ambitious, then try using our full size free plan as a basic to model this colourful aerobatic one-off

**N**owadays, flamboyant personalities are something of a rarity in aviation and positively unique aeroplanes equally unusual. For the older enthusiast this man-and-machine partnership recalls some of the romance of pre-WW2 days.

Harold Krier got into aviation the hard way - as a US Army Air Corps crew chief assigned to B-17 and B-24 bombers during World War II. He went on to get his pilot's license in 1945. By 1950, he had seen enough of air shows to know that he wanted to be a part of the action and by the beginning of the decade of the sixties, Harold Krier had become a dominant figure in the U.S. air show industry. He started in a Clipped Wing Piper Cub and became the operator of the Garden City Airport in Kansas. Later he moved up to the aircraft that assured his fame in aerobatics - a highly modified Great Lakes 2T-1A into which he installed a 185 horsepower Warner radial engine in place of the original in-line Menasco.

His gift for aerobatic flying really surfaced with his Great Lakes Special. This one-off aircraft considerably pre-dated the raft of

specialist, purpose-designed competition aerobatic aircraft that began to appear in the late 1960s with the Pitts S-1, Zinn 526, Yak 18, and the Extras, et-al.

Harold Krier selected an example of the Great Lakes Trainer as the basis of his personal aerobatic machine. After extensive restoration and redesigning there was little to identify the Great Lakes Special with the original aircraft, the 2T-1A Sports Trainer that was manufactured by the Great Lakes Aviation Corporation between 1929 and 1933. When the 2T-1A first appeared, it represented a considerable advance on contemporary trainers. It was small, light, responsive and, except for a reluctance to recover from spins, it was safe to fly. The spin-happiness was corrected at an early stage by enlarging the vertical tail surface and nearly all machines were converted to 'large tail models'.

The 2T-1A found immediate favour among flying schools and clubs and private-owner sport flyers. Even now it compares favourably with more modern types and it is among the most popular biplane in America for restoration by antique aircraft enthusiasts

and there are number still in use today.

The original Great Lakes was powered by an American built Cirrus four-cylinder in-line engine, enclosed in a cowling reminiscent of the De Havilland Moth. This cowl later gave way to a smoother but bulkier version. The fuselage was of welded chrome molybdenum steel tube with wooden formers and stringers. It was all fabric covered except for the nose panels, the underside as far aft as the rear spar, and a small headrest.

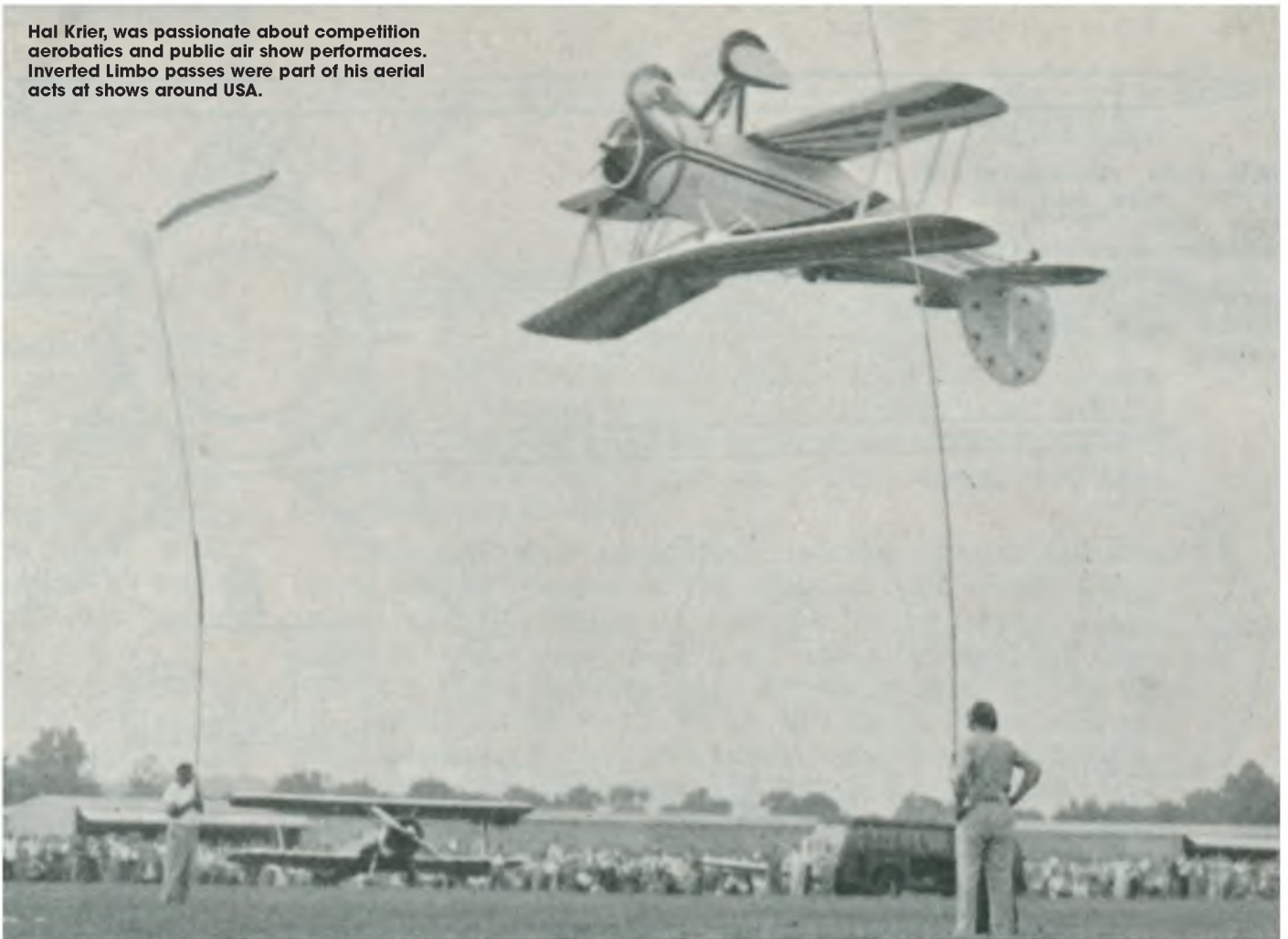
The wings consisted of routed spruce spars, dural tube compression members and steel wire drag bracing. The ribs were of spruce and Dural, and the leading edge was aluminium covered. The entire centre-section between the spars was occupied by the fuel tank, capping strips being attached to this to maintain the fabric contour.

When Harold Krier began restoring his 2T-1A in 1956 he completely stripped the airframe and cleaned it down to bare metal. The 125 h.p. Menasco in-line engine was replaced by a 185 h.p. Warner radial for which a cowling from a Fairchild 24 (radial version) was an exact fit. Frise type ailerons





**Hal Krier, was passionate about competition aerobatics and public air show performances. Inverted Limbo passes were part of his aerial acts at shows around USA.**



were fitted to the lower panels only, and these were operated by a torque tube from the rear cockpit control column. The upper wing was rigged with 3 degrees dihedral and 9 degrees 13 mins. sweep back. The lower wing, unswept, had 2 degrees dihedral. The tail was all-metal with fabric covering and characteristic split-axle undercarriage had a track of 5 ft. 10 in.

The 40 in. diameter cowl for the Warner radial engine dictated a more rounded forward fuselage, tapering to the original section aft of the rear cockpit, and this was achieved by means of aluminium formers and stringers. A six-gallon tank for smoke generating equipment, a 12-gallon fuel tank from a Piper J-3 Cub were installed in the front cockpit, and the opening faired over; an extra-long metal headrest completed the fuselage.

The wings were completely rebuilt, the rib spacing being altered because of the reduced span of the lower panels and the fitting of ailerons to the upper wings. A leading edge rib was added between each

of the full-chord ribs, and the metal leading edge covering was extended 13 in. aft. Incidence of both wings was reduced from three degrees to one; the upper wing dihedral was deleted, and the lower to one degree. The one pair of landing wires on each side of the aircraft was replaced by three single ones in 'N'-formation, and the interplane wires were fitted with balsa fillets as shown on the sketchpage overleaf.

An 84 inch diameter Curtiss Reed propeller was fitted to the new aeroplane, while wheels, brakes and spats from a Cessna 1708 completed the transformation, with the track revised to 6 ft. 3 in. At intervals, more changes were made, bringing the craft to its present form. 'I'-shape interplane struts of welded steel tube with balsa fairings and fabric covering replaced the 'N'-type, together with a variable-pitch propeller from a Ryan Navion. Lastly, a clever cockpit hood was devised for cross-country flights.

With the increased power of a 185 h.p. Warner radial replacing the Menasco inline engine, considerable cleaning up of the

airframe and a variable pitch prop, the Krier Great lakes Special had sufficient power for aerobatic manoeuvres from the ground up and needs no altitude for starting a manoeuvre.

For three years (1958, 1959 & 1960) Harold Krier won the Col. Joe Mackey Trophy for precision aerobatics flying his 'Special', by which time he was very much central to competition aerobatic flying in USA and had moved on from his Great Lakes Special to his Krier Kraft, a much lighter purpose-designed aerobatic biplane which he took to the 1964 World Aerobatic Championships, where the aerobatic monoplanes fielded by competing European aerobatic teams greatly impressed him and led him, together with fellow US aerobatic pilot Art Scholl, to adopt specially re-engineered versions of the De Havilland Chipmunk for competition aerobatics.

Harold went on to become US National Aerobatic Champion 1965 and 1968, but it was his Great Lakes Special with which he made his mark. ■



**Man and machine: smartly dressed Harold and his 'Special'.**



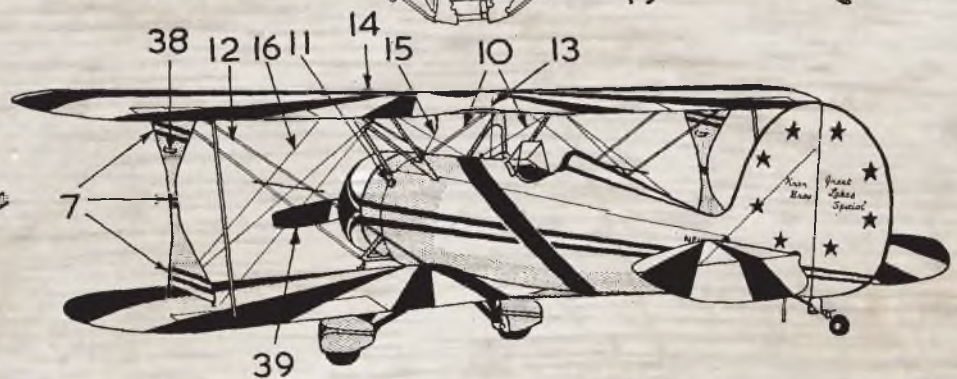
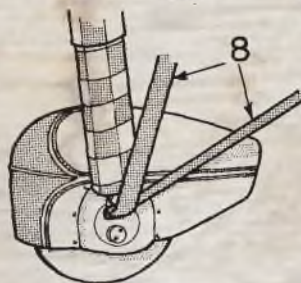
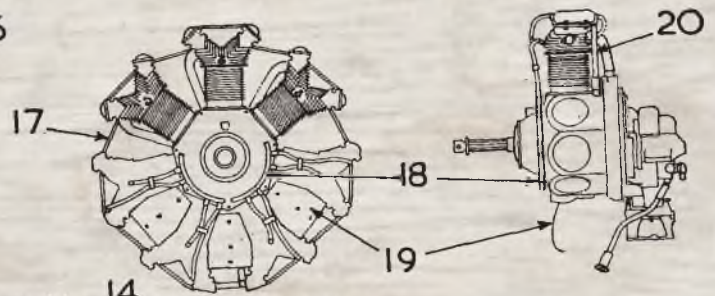
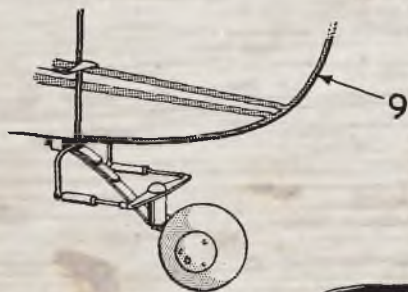
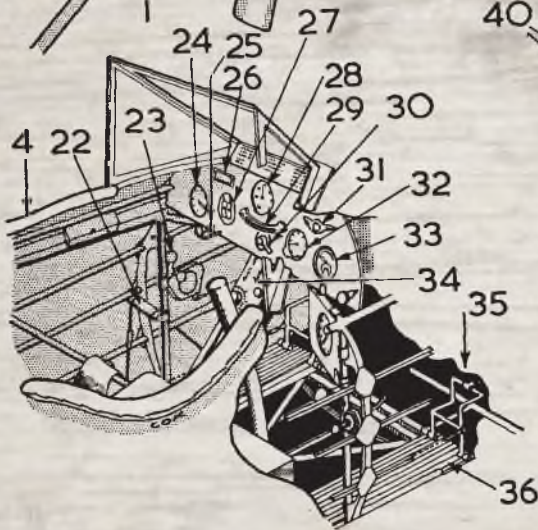
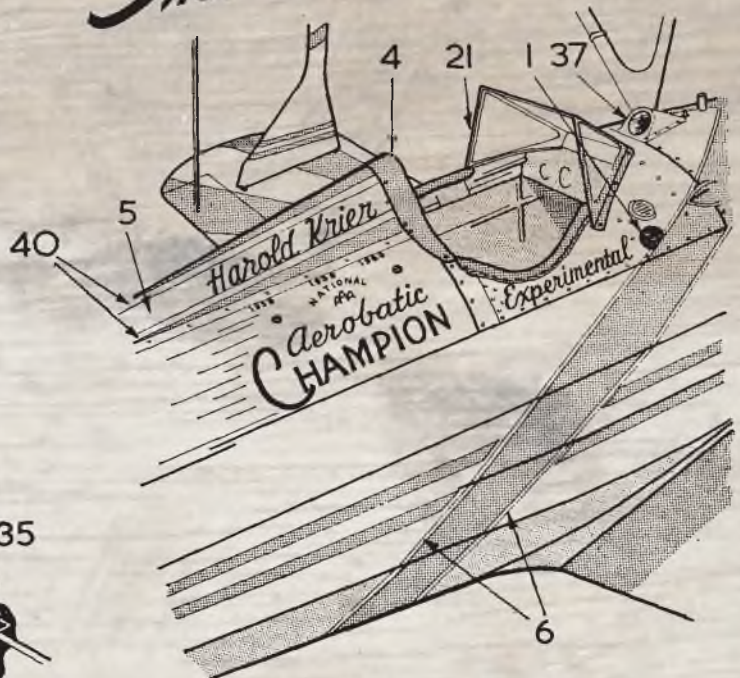
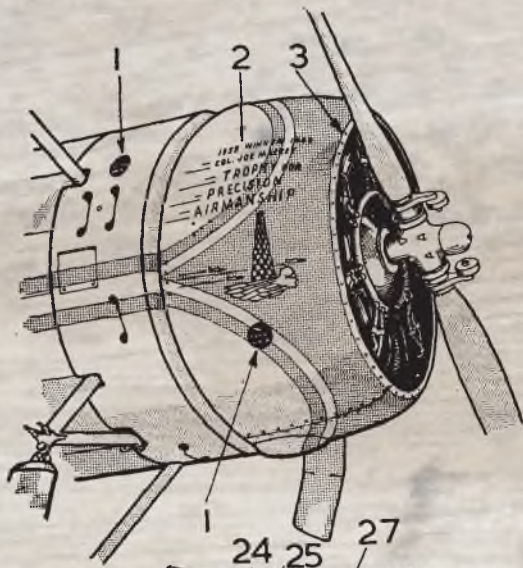
**The open cockpit - a cross country enclosed canopy was also devised.**



**Cowl for the Warner radial engine came from a Fairchild F.24 'Argus'.**



# Harold Krier's Great Lakes Special Sketchpage



## KEY TO DRAWING

1. Red and white Kendall Motor Oil trade mark.
2. Black lettering on cowling only.
3. Polished rim to cowling.
4. Red leather padding.
5. Metal headrest.
6. 1 in. wide chromium tape trimming to fuselage band.
7. 1 in. wide tape trimming to strut decoration.
8. Red undercarriage struts.
9. Red outline to fin and rudder.
10. Double wire bracing at front of centre-section, single at rear.
11. Oil filler cap.

12. Double flying wires.
13. Aerial.
14. Fuel filler cap.
15. Fuel pipe.
16. "N" formation single landing wires.
17. Oil pipes.
18. Ignition conduit.
19. Baffles between all cylinders.
20. Push rods at rear.
21. Red windshield frame.
22. Step.
23. Throttle.
24. R.P.M.
25. Engine primer.
26. Compass card.
27. Compass.

28. A.S.I.
  29. Level.
  30. Engine switch.
  31. Championship badge.
  32. G Meter.
  33. 3 in. I engine gauge.
  34. Airboy Senior V.H.F. radio.
  35. Rudder pedal.
  36. Corrugated heel boards.
  37. Altimeter.
  38. Winged head as on cowling.
  39. Black rear surface to propeller.
  40. 1/2 in. chrome strip around headrest decoration.
  41. This and alternate squares red.
- (on 3 view)



# LX B2 Spirit Stealth Bomber

**NEW!!**

**“World’s most expensive bomber”**

**RTF (READY TO FLY) £378.00**

**ARF (ALMOST READY TO FLY) £310.00**



## Features:

- Large Scale 1.6m Electric 6 Channel 2.4GHz radio controlled EDF Jet (Aileron, Elevator, Rudder, Throttle, Retracts, Bomb Doors)
- Scale retractable landing gear with 10 wheels and retract doors
- Hidden Bomb cabin ( can drop bombs in flight )
- Blue LED Strobe for night flying and stealth bombing
- Steerable front wheels for easy take offs
- Made from EPS material, to give fine scale appearance
- Unique model design copy of the most expensive plane in the world
- Superb stable inverted flight, nosing up and down, with excellent hedgehopping performance, and could complete all types of flying manouvers
- Loaded with twin 64mm EDFs motors.
- High speed (up to 120km/h).



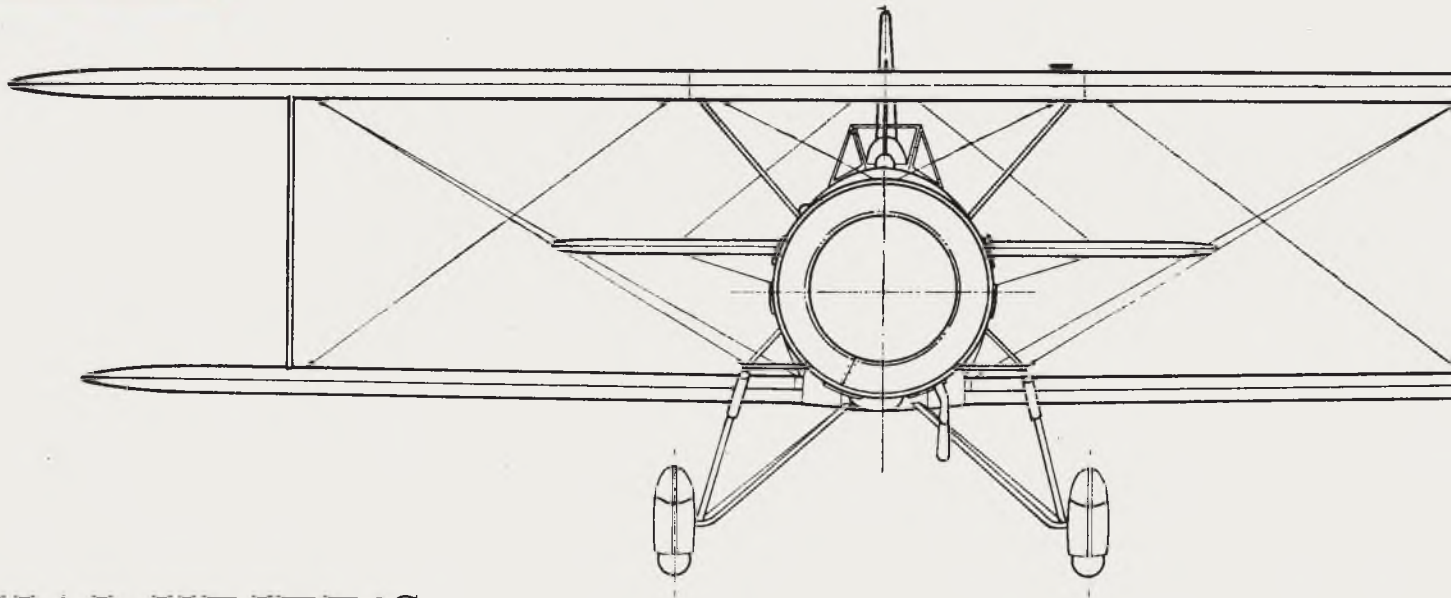
**Available from your local model shop or you can order direct, Free delivery within UK Mainland.**

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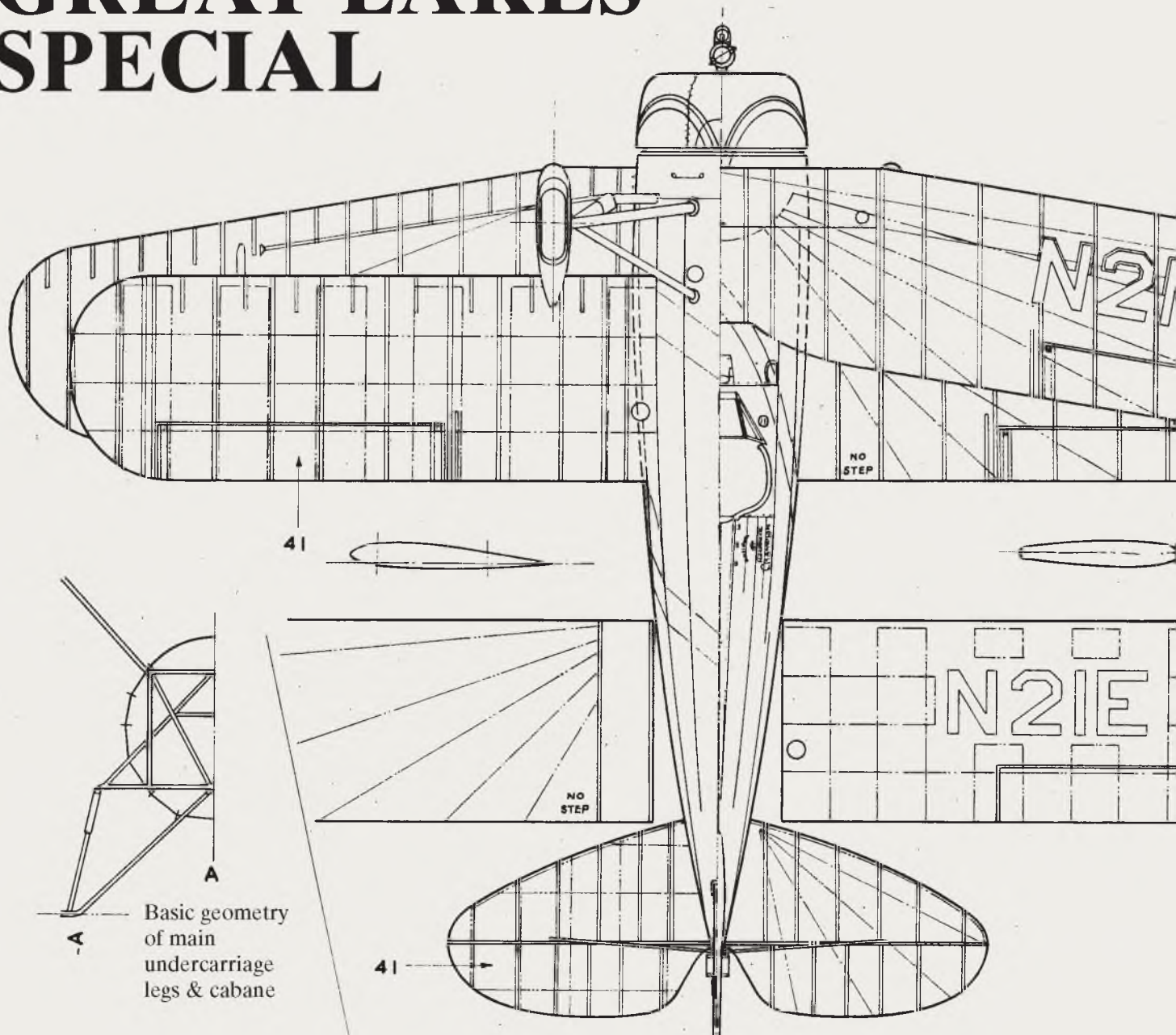
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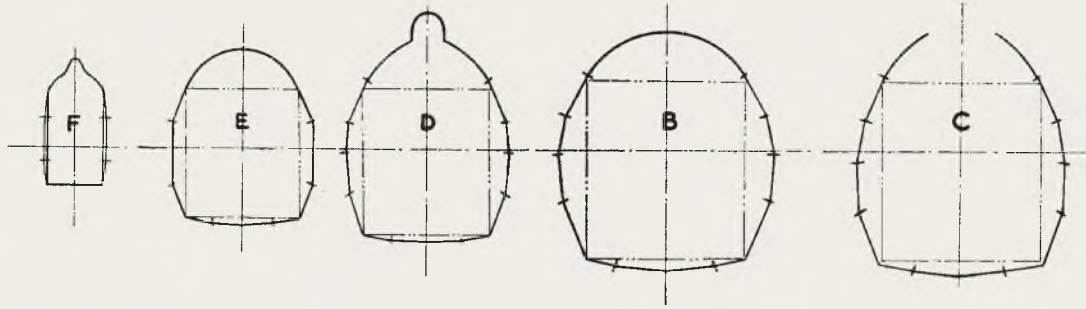
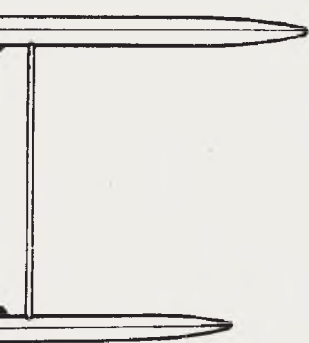


# HAL KRIER'S GREAT LAKES SPECIAL

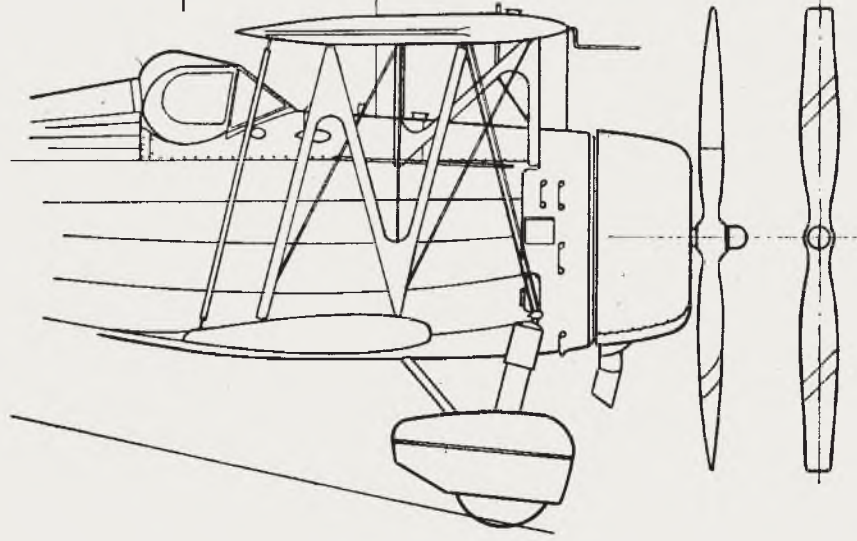
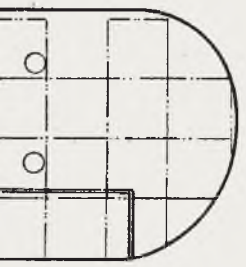
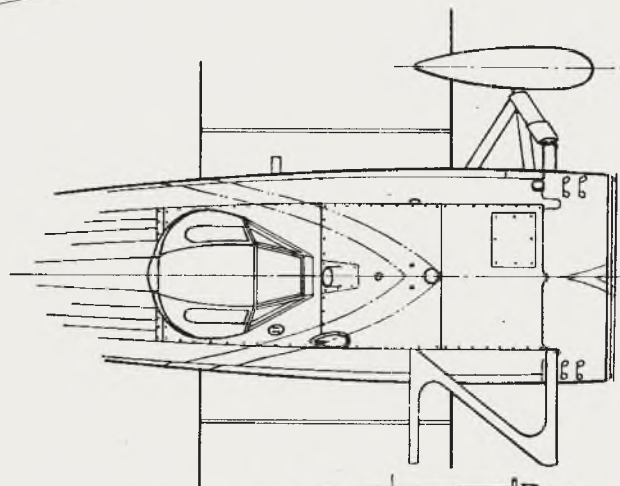
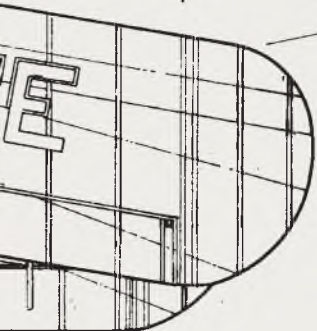
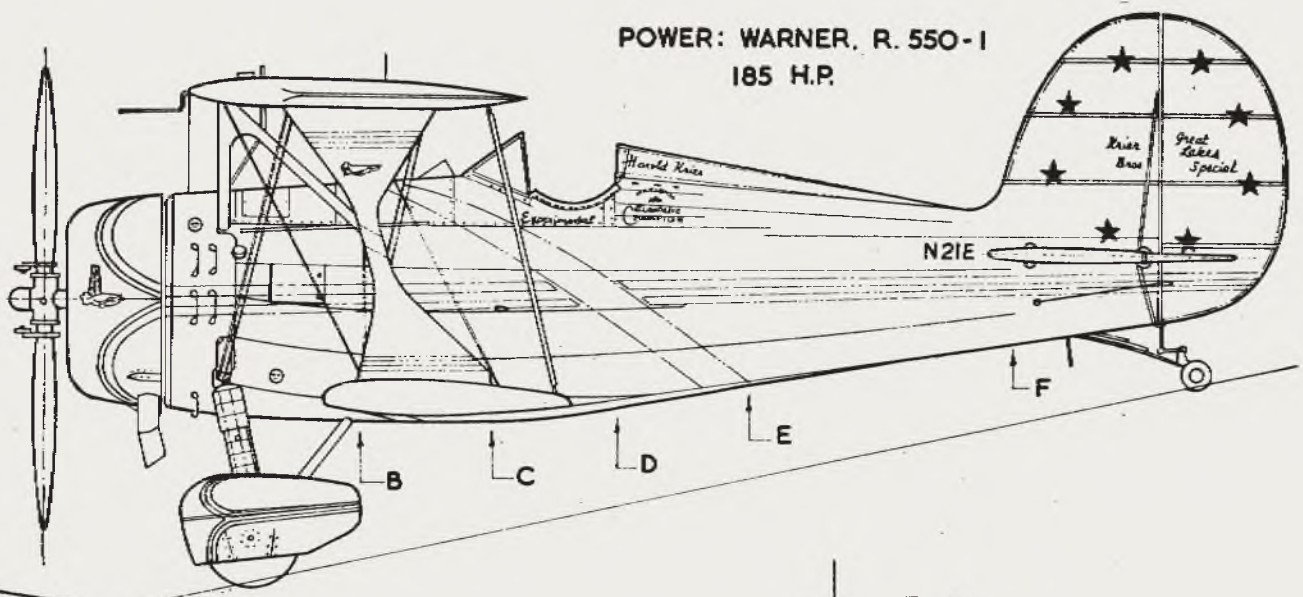


Basic geometry  
of main  
undercarriage  
legs & cabane





POWER: WARNER, R. 550-1  
185 H.P.





SCALE IN ACTION

# WESTON PARK SCALE 2014

Alex Whittaker takes his camera to one of the jewels in the Scale summer crown



**W**eston Park Show is one of those R/C events that provokes fierce affection amongst scale modellers. Indeed many pilots plan their summer circuit around the Weston dates. The event enjoys superb Trade support year after year, and I personally look forward to Weston Park as a great shopping opportunity for scale goodies. The secret of Weston's success has much to do with Steve Bishops's constant updating of the event. It is also an open secret that many pilots return year after year due to the support they receive whilst they are there. This year the German display team *Legendary Fighters* made a big splash with many interesting warbirds presented in a very absorbing and impressive manner.

**I Hate Trees**  
Before we get

into the photo report proper, I have to express something close to my heart. When it comes to flying strips - I hate trees! They spoil the composition, they mess about with the light, and generally irritate me (and sometimes do nothing for the health of the models!). Now unfortunately for a grumpy old photographer such as myself, Weston Park Show is held right slap-bang in the middle of a stately home arboretum. The strip also faces the daylight, so you are looking into the sun, and your camera has no option but to squint at back-lit shots all day. I had to be extra canny on the day, but no matter how much I love Weston, I hate that back light. (Whinge over).

#### Things I Saw

Top of my list this year has to be the German *Legendary Fighters Team* 1/4 scale Mitchell B-25 Apache Princess. This astounding model - built and flown by Roland and Michael Sabatschus - had real presence in the air, and on

low passes sounded truly thrilling. The fit-and-finish was exemplary, and the colourful graphics were really eye-catching. A real crowd pleaser. I think it is really satisfying that the UK circuit can attract such top-class scale display teams.

#### Dornier Do 335

We have seen her over in the UK before, but fore-mentioned Roland Sabatschus' wonderfully aggressive Dornier Do 335 Pfeil always impresses. The model, like the real thing, is a technically accomplished marvel. She really moves too! A truly magnificent flying scale model.

#### Flying Flea

Ian Redshaw had brought his almost finished Flying Flea to the show. If it flew on the day, it must have been when I was in the Pilot's Marquee, munching lunch. However, fear not ear dear reader, I will track down this intriguing flying model for you during

**The late afternoon pyrotechnics were truly spectacular.**







Spotted in the pits, this 1/4 scale Howard DGA-4 'Ike', sometimes known as "Miss Chevrolet".



The visiting German "Legendary Fighters team" also flew this lovely Mustang P-51 D.



Legendary Fighters Team Daniel Sabatschus with his 1/4 scale Typhoon.



Fine SE5a from the well regarded Dawn Patrol troupe.



This fine Fokker was part of the famed Dawn Patrol troupe.



Ansaldo SVA by Carlos Guerra. One third scale, spans 3 metres, and powered by a DLE 170cc twin. Weighs 37 kgs.

the summer. Watch this space.

### Howard DGA-4

A few years ago there were one or two radio scale kits available of the the appealing Howard DGA-4 Golden Age Racer. Although unattended every time

I looked, there was a very nice quarter scale DGA in the pits at Weston. This was modelled on the 'Ike' example, sometimes refinished as 'Miss Chevrolet'. She is bound to show on the circuit later in the year, so I will secure a full scale walk around then. A pretty

and practical scale model if you are looking for inspiration.

### Hawk Red Duo

Show organiser Steve Bishop and his son Matthew flew a brilliant two-hander with their matched BAe Hawks. They also





The Weather Gods smiled and the turn-out was excellent.



Huge input from Dawn Patrol!



Nicely rigged Fokker E III Eindekker on a low pass.



Andreas from Legendary Fighters showed me the impressive twin exhausts and his very clever close-fitting air-cooling ducting on his Me 109.



Andreas from the Legendary Fighters Team flew this superb Me 108.



Show organiser Steve Bishop and son Matthew gave scintillating displays with the Hawk Red Duo.



Another of Mark Hinton's steeds, a fine 1/4 scale Razorback P-47D Thunderbolt.



Legendary Fighter team B-25 Mitchel Apache Princess just lifting off.



The German Legendary Fighters Team members Roland (left) and Michael Sabatschus roll out Mitchell B-25 Apache Princess.



Mitchell B-25 Apache Princess has lovely tail /rudder graphics.



Impressive nose art on Apache Princess.

seemed to have cracked how to produce vast volumes of brightly coloured smoke!

### Pyrotechnics

It would not be Weston Park without a loud and impressive 'War' to end the

day. This year the display was well up to par, and the crowd cheered when the ground-to-air reclaimed a fun fighter. The final huge booming, mushrooming, ear-busting bang even took me by surprise!

Needless to say, the crowd were ecstatic.

### The Verdict

Weston Park is rightly an unmissable slot of the scale calendar. Besides the scale flying



As usual, Mark Hinton worked hard and displayed hard all weekend. His extensive airfleet included this blood red Cougar.



Spotted parked out on the grass, this immaculate and glossy Pitts Special.



Dawn Patrol's Pat Cuss, one of the very best scale men of his generation, with his new Albatros D.Va.





Roland Sabatschus' superb Dornier Do 335 Pfeil.



The visiting Legendary Fighters Team Roland Sabatschus' wonderfully aggressive Dornier Do 335 Pfeil on full flap approach.



Still going strong, The Voice of Summer, old DB Sound.



Mick Burrell's majestic Moki 250c radial powered HAWKER Sea Fury FB.11.



Mick folds the wings whilst back-tracking his Sea Fury.



Steve Bishop and his efficient Weston Park Show team seem to cater for any possible eventuality!

there are Trade flying slots, full-size arrivals and departures, full-size displays and a massive Trade presence out on the back field. It is an ideal family event, and probably

is situated as close as you are ever going to "centrally" in these far-flung islands. Every year it seems to go from strength to strength, and this year with bumper weather, it was

delight to attend. By the way, there is a 'Weston Park In The Dark' show coming up in the autumn. No idea what to expect, but if there is a scale component, I will attend. ■



Ian Redshaw's new Flying Flea. More details soon.



# Techno Scale

Mike Evatt w

**F**lightline Graphics at [www.flightlinegraphics.com](http://www.flightlinegraphics.com) have long been known for an excellent range of Paint Masks, Transfers and Stencils. Their latest venture is the production of 3D Printed scale parts for 1/3 scale WWI models! Having created scale parts for his own Fokker D.VII Nigel has had a number of enquiries from all around the world regarding the availability of some parts 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, his blog catalogues some of the frustrations he faced when perfecting the technique.

The **T-28 Trojan** produced by **ESM**, is yet another top-notch RC scale aircraft design to excite you with both appearance and performance. Not only are the ESM ARFs highly detailed, and great flying, they are extremely affordable for anyone to enjoy! The Trojan, as with all of ESM's RC scale airplanes, comes already painted at the factory, has pre-applied decals, factory functional flaps and comes with one of the more

complete hardware packages anywhere...including screws, rods, fuel tanks...etc. Check the spec. on the Troy Models website at [www.troybuiltmodels.com](http://www.troybuiltmodels.com)

The **Sierra Giant Scale Company** was founded in February 2000 to provide quality giant scale model products for the serious scale modeller. Their website at [www.sierragiant.com](http://www.sierragiant.com) shows a great number of excellently machined items for the scale aficionado. From scale wheels to bomb bay door hinges although by far the largest product area consists of retracts. The screen-shot shows one of their latest products - retracts for the ESM T-28 Trojan mentioned above. They will also produce custom parts to client's specifications.

**Balsa USA** have added a 1/3 Scale Albatros D5/D5a to their *Ultimate Series*. This Albatros was bigger, faster, stronger and more powerful than anything else in the skies at the time. This model version is also no lightweight. Its span is 118 inches and its flying weight is around 55 pounds. The suggested power is 80-100 cc. and the kit comes with a highly detailed dummy Mercedes engine. Take a look at

this mighty beast on their website at [www.balsausa.com](http://www.balsausa.com)

**Doug Lee** has been designing, building, and flying control-line and radio control aircraft for over forty years. His web presence at [www.dldesigns.net](http://www.dldesigns.net) reveals a good looking 1/5.5 scale, 60" wingspan Stampe SV-4B. This model is designed to handle very easily and be aerobatic and is suitable for Sport Scale or IMAC scale aerobatics competition. With a wing area of 980 square inches, the symmetrical airfoils used throughout the model provide a full aerobatic envelope. Recommended engine size is .60 - .90 two-stroke, .80 - .90 4-stroke. The design utilizes a mid-ship fuel tank location, pull-pull cable rudder, and functioning spring actuated tail wheel. Construction is of balsa, ply and spruce, and the flying weight is 7.5 lbs. The model requires a four-channel radio driving five servos.

When **Great Planes Model Manufacturing** at [www.greatplanes.com](http://www.greatplanes.com) started out in 1982, the company had a solid vision of what it wanted from its kits - better designs, higher quality parts, more helpful instruction manuals and easier flying characteristics. In the years since,



3D Printed scale parts from Flightline Graphics.



The T-28 Trojan produced by ESM is available from Troy Models.



The Sierra Giant Scale Company supplies retracts for the ESM T-28 Trojan.



Balsa USA have added a 1/3 Scale Albatros D5/D5a to their "Ultimate Series".



This Stampe is designed to handle very easily and be aerobatic.



The P6E Hawk was the last biplane fighter built for the Army Air Corp.



## Walks the web for more TechnoScale Topics...

Great Planes has managed to achieve all those goals and more with three key ingredients: great technology, great products and great people. The Curtiss P-6E Hawk was the last biplane fighter built for the Army Air Corps, and one of the most beautiful biplanes of the 1930s. Today, the only original P-6E Hawk still in existence is on display at the U.S. Air Force Museum in Dayton, Ohio. GP's 43.5 inch span model is a fitting tribute.

**Domansky s r o, Profimodel.CZ** of Prague markets an amazing section of scale kits such as a colourful Nieuport XI EP ARF park-flyer from their website at [www.rc-profimodel.com](http://www.rc-profimodel.com). This 900mm span delight is from the Electrify series of park-flyers. It is of classic lightweight balsa structure coated with MonoKote and is powered by an AXI class 2212th brushless motor and is very manoeuvrable. The model comes as an ARF kit with assembled and covered parts, which allows very rapid progress to the flying field.

Log-on to [www.modeexpo-online.com](http://www.modeexpo-online.com) and you will find a delightful walnut scale Fokker E.III from **Dumas**. This delight has over 60 laser cut parts and is probably

one of my favourite aircraft. Walnut scale planes are 17.5" wingspan and this range is chock full of quality features, that building has once again become part of the fun. Beginners will be astonished by the ease of construction, while experienced modellers will appreciate the quality materials and precision laser cut parts. This kit is just one of many selections representing exciting models that captures the best model aviation has to offer.

**Redfin Model Engines** was established in 2012 in the UK and they maintain a web presence at [www.redfinengines.com](http://www.redfinengines.com). Their objective is to provide a range of small diesel engines, parts and service, harking back to the 'Golden Age of Model Flight'. The initial concept was to design an engine in the 'old' style that could be readily scaled up or down depending on the demand and requirements of the modelling fraternity. This has led to their Redfin 049 as an entry-level engine followed by the Redfin 030 with others to follow. The range has now expanded and their 061SP Sports Diesel Engine is shown in the screenshot. Ideal for that small scale free-flight project.

If you are into high tech materials then you must visit <http://shop1.r-g.de>

**R&G Faserverbundwerkstoffe GmbH**, are based in Waldenbuch, Germany and is really your one-stop shop for all things hi-tech. They seem to stock everything from a vast range of reinforcement fabrics, glass, aramid and carbon in a variety of weaves and weights to release fabrics and agents and epoxy resins and gel-coats. There is much more to see if you give them a click. They may also have an agency in your part of the world.

For over 30 years **INSTANT JET(tm)**, **SUPER JET(tm)**, and **SLOW JET(tm)** from **Jet Glues** at [www.jetglues.com](http://www.jetglues.com) have set the standard for instant glues. Developed to withstand the heat and vibration common in flying model airplanes, JET's industrial-grade strength makes it ideal for use in mould making, auto repair, ceramic to metal bonds, wood working, trade show displays, jewellery making, prototyping, set design, electronics, and a wide range of craft projects and household repairs. JET(tm) glues are available in three viscosities and economical sizes ranging from 1/4 ounce to 1 pound.



A colourful Nieuport XI from Domansky s r o, Profimodel.CZ of Prague.



A delightful walnut scale Fokker E.III from Dumas.



061SP Sports Diesel Engine from Redfin.



If you are into high tech materials then you must visit <http://shop1.r-g.de>.



Jet Glues have set the standard for instant glues.



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

[mikeevatt@hotmail.com](mailto:mikeevatt@hotmail.com)



# Fieseler Fi 156-3 Trop WWII MILITARY

Alex Whittaker looks at Chris Harles' large and impressive scratch-built STOL

**E**ighty years on, the Fieseler Storch still possesses the power to amaze. It brought together a number of technological advances into a single airframe, with the sole aim of delivering outstanding Short Take Off and Landing (STOL) performance. A combination of fixed and hinged slats on the wing allowed unparalleled agility. On

take-off in a strong headwind she appeared to lift almost vertically. Landing into a stiff wind, Storchs would appear to land backwards. Storchs could get in and out of sticky situations. The Storch was also one of the first mass-produced military aircraft to have folding wings. (The first were American carrier borne aircraft like the Wildcat). She was also so light that she

could be towed behind a Kubelwagen, and her long travel suspension allowed operation from lumpy ground.

### An eventful war

For what was essentially a light aircraft in military guise, the Storch had an eventful war. For instance, when Hitler wished to rescue a humiliated Benito Mussolini,





# Storch ARY STOL

imprisoned on a defended mountain top, near Grand Sasso, the Fieseler Storch was Nazi Commando Otto Skorzeny's aircraft of choice to spring 'Il Duce' from his captors. In the dying days of WWII, in a devastated Berlin, Hanna Riesch flew a Storch into an improvised strip at the Tiergarten, not far from the Fuehrerbunker. Her cargo out was Generalfeldmarschall Robert Ritter von

Griem, whom Hitler appointed as the last commander of the Luftwaffe. The Storch was indeed a special aeroplane.

### Fighting on both sides

In order to win a German Air Ministry (Reichsluftfahrtministerium) Light Observation Aircraft Tender, the prototype Storch had to beat off stiff competition

from the Messerschmitt Bf 163 (*not to be confused with the Messerschmitt ME 163 Komet*) and the Siebel Si 201. The quirky Storch was selected and went into production immediately. By the end of WW2 in 1945, Storch production was spread over four Occupied countries. By a strange twist of history, and an odd German licensing deal, at the beginning of World War



Chris Harle's large and impressive 12 foot span Storch on a mission. Weighs in at 13.6 kgs.



1



2



3



**1:** This view displays the complex long-travel undercarriage in all its cantilevered glory. **2:** Detail shot of the long-travel undercarriage leg. **3:** Another view of that complex Storch undercarriage, showing the streamlined form of its telescopic elements.

ll Storchs were made available to both the German and the Soviet Russian air forces.

As the War progressed in the Allies' favour, captured Storchs even appeared in the Allied Order of Battle. It is a little known fact of aviation trivia that, in the final dogfight of WWII on the Western Front, two Americans in a Piper L-4 Grasshopper unarmed reconnaissance aircraft opened fire with their Colt.45 hand guns on a passing Storch. Their audacity forced it to land and surrender.

Captured Storchs also became famous status symbols. RAF Air Vice-Marshalls Coningham and Broadhurst both used captured examples as their personal aircraft. However, the most famous second-hand Storch owner in history has to be Field Marshall Bernard Montgomery.

### The model

Chris Harle is a well know large-scale modeller, who flies on the UK warbirds circuit all year around. (FSM featured Chris's son Malcolm's well-known Spitfire Mk. IX in last month's issue). Chris's Storch spans twelve feet, and weighs in at 13.6 kgs. She is powered by a Laser 300 V-Twin driving a 22"x10" wooden prop.

### Plan

Chris sourced his plan from an unusual source. He bought a Polish plan from an

advertisement found on ebay uk! It is drawn to 1/4 scale.

### Documentation

Chris documented his model on the Storch under restoration at Old Warden and a few magazine articles. The type chosen is a Storch 5F+YK(H) 14, serving with the Afrika Korps in Spring 1941. This aircraft was used for reconnaissance, and the recovery of downed pilots.

### Model construction

Chris Harle's Storch is of traditional all-wood construction, using mostly balsa and ply. The fuselage uses plywood formers and hardwood stringers. Balsa wing ribs were all hand-cut, with hard wood main spars, while the tail is all balsa and light ply.

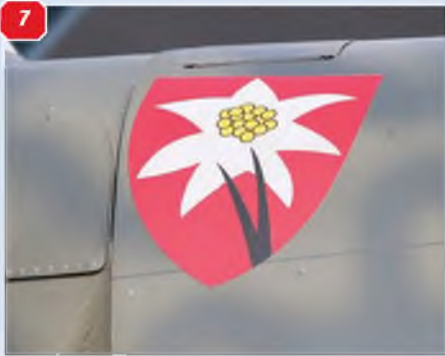
### Engine

Power is provided by a Laser 300 V-Twin with on-board glow system and drives a 22"x11" wood propeller. Chris designed and hand-fabricated the aluminium exhaust extensions for the Laser twin.

### Undercarriage

The main undercarriage of the full size Storch was designed to cope with the way-less-than-perfect improvised take-off/landing surfaces from which the aircraft was expected to operate. Chris replicated this



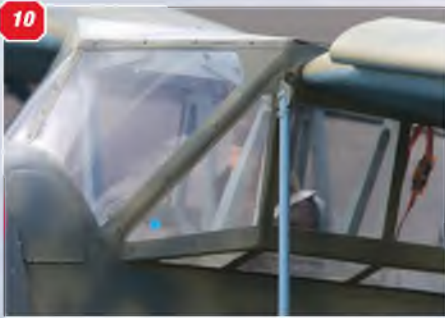


**4:** Chris has integrated the servos without being intrusive. Note telescopic tailwheel assembly. **5:** Neatly executed tailhook and strap. Note servo (colour-coded) at base of fin. **6:** Lots of detailing around the engine cowling. The Laser hardly intrudes! **7:** David Leftly supplied all the graphics. **8:** Chris has cleverly contained the Laser 300 V Twin, and home-designed exhaust within the bounds of the cowl. **9:** Chin detailing on the Storch. Notice also the undercarriage strut fixing hard points.

**There is nothing quite like a Storch, and Chris Harle's faithful model catches all the delightful quirks of the original.**







## MODEL SPECIFICATION

### Fieseler Storch Fi 156-3 Trop.

<b>Scale:</b>	1/4
<b>Wingspan:</b>	12 ft.
<b>Weight:</b>	13.6 kg.
<b>Engine:</b>	Laser 300 V twin.
<b>Prop:</b>	22"x10" wood

**10:** The front part of the distinctive Storch glass house is expertly done. **11:** The massive glasshouse is a key element of the Storch's appearance. Chris has fitted out the whole cockpit interior, right down to pilot's maps.



in miniature with a complete hand-made undercarriage with fully telescopic, two stage, springing and damping.

### Covering and finish

The whole model is covered in Solartex which was sprayed the model using car paint base coat topped off with matt

lacquer. Legending and Decals were sourced from David Leftly Graphics.

### Scale details

Naturally, the model has fully working scale flaps and landing gear! Such an enormous glasshouse-like cockpit demands a full scale cockpit and a

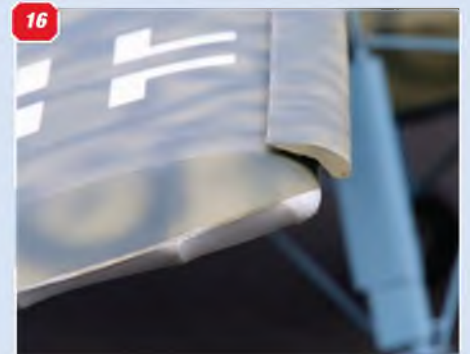
smart-looking scale pilot. The model took Chris three years to complete and makes one triumphant point: she is all hand-built. "...no laser-cut parts here!" says he.

### In the air

The model is now four years old and has been flown at many scale events and



**12:** Flap horns and linkages follow the scale pattern. **13:** Leading edge slat drive quadrant and associated servo. **14:** Functional landing light. Scale like and very bright, too. **15:** Outboard detailing on alleron. **16:** Carefully judged leading edge flaps contributed to the Storch's outstanding STOL performance.





Chris Harles' 1/4 scale model looks very convincing on a fly-by.



model shows, and Chris also flies her regularly at his local model flying Club at Teesside. The model's flight envelope accurately replicates the performance of the prototype, taking off and landing in ridiculously short distances. She looks extremely graceful in the air - an utterly convincing flying scale model. ■

Chris's model looks very convincing in the air.





# FIESELER STORCH FLYING COLOURS

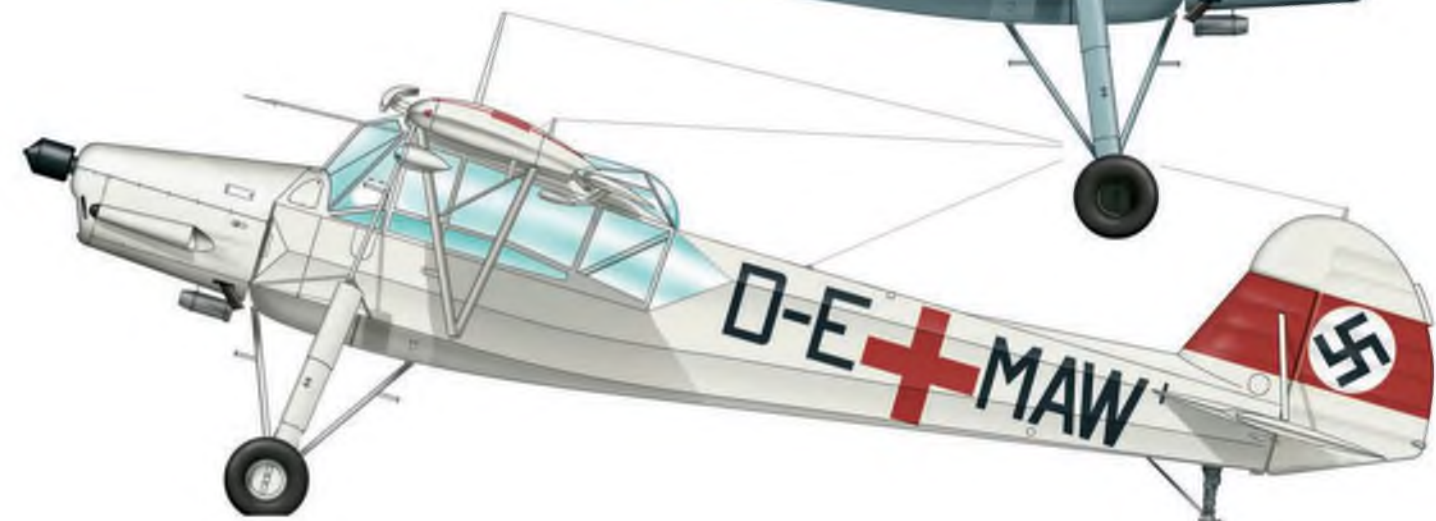
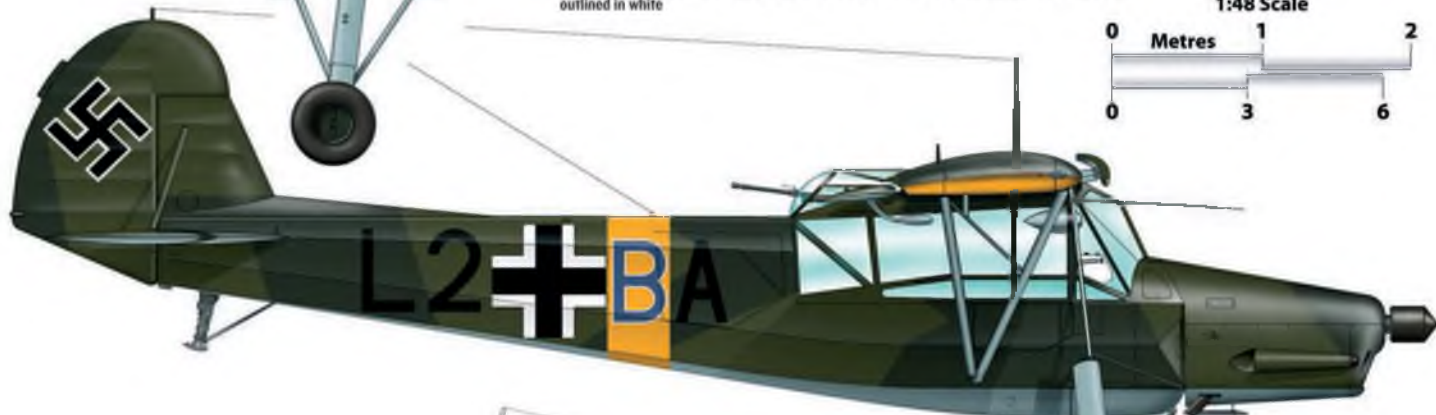
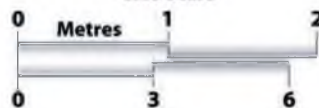


Fieseler Fi 156C-3/Trop Storch, 5F-YK, 2.(H)/14, Afrika Korps, Spring 1941, RLM79 Sandbraun upper surfaces with mottling in RLM71 Dunkelgrün, with RLM78 Hellblau undersides. Underside of wingtips, fuselage band and entire rudder in RLM21 Weiß, while 'Y' of code is in RLM23 Rot



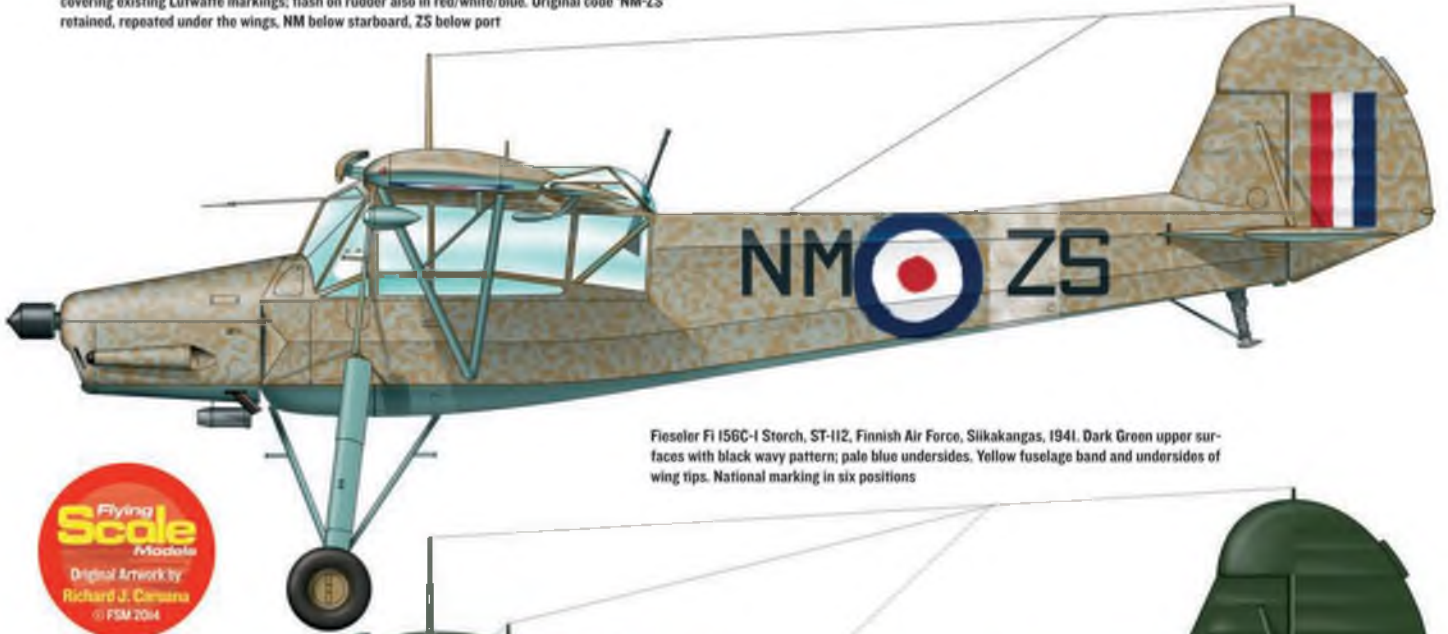
Fieseler Fi 156C-3, L2-BA, Kurierstaffel Ob. d.J., Eastern Front, 1942, RLM70/71/68 scheme with RLM04 Gelb underside wing tips and fuselage band. 'B' of code is in RLM24 Dunkelblau, outlined in white

PROFILES  
1:48 Scale

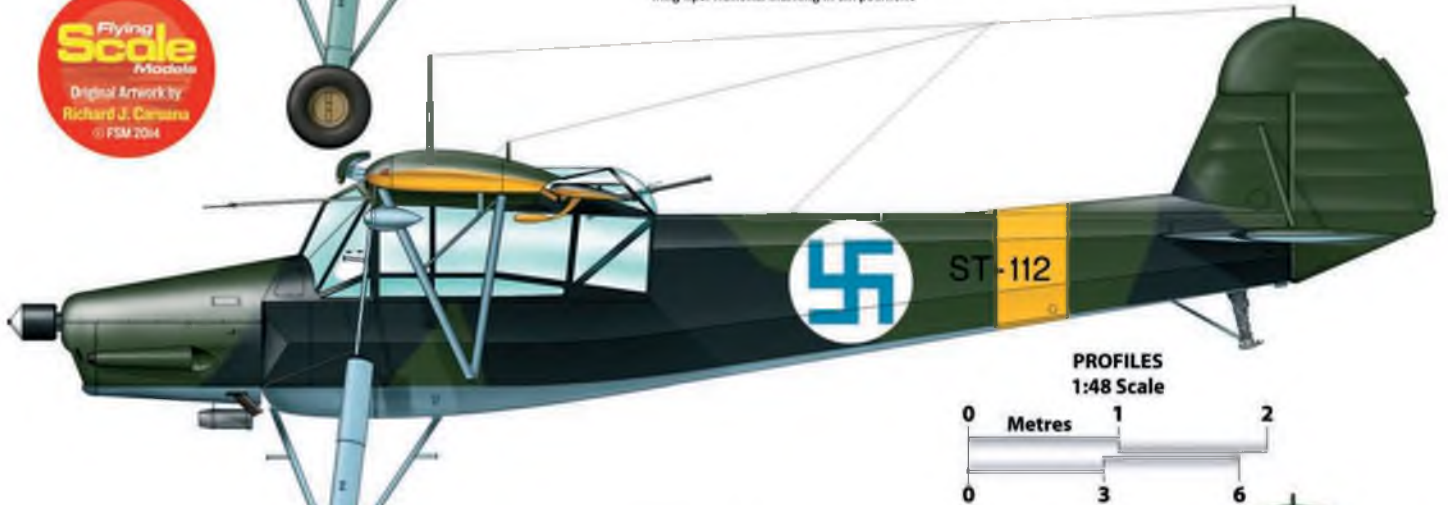




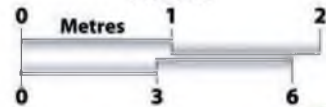
Fieseler Fi 156C-3/Trop, captured by the RAF, Western Desert. RLM79 on upper surfaces shaded in RLM76; undersides RLM76. Very rough hand-painted Blue/Red/White roundels in six positions covering existing Luftwaffe markings; flash on rudder also in red/white/blue. Original code 'NM-ZS' retained, repeated under the wings, NM below starboard, ZS below port



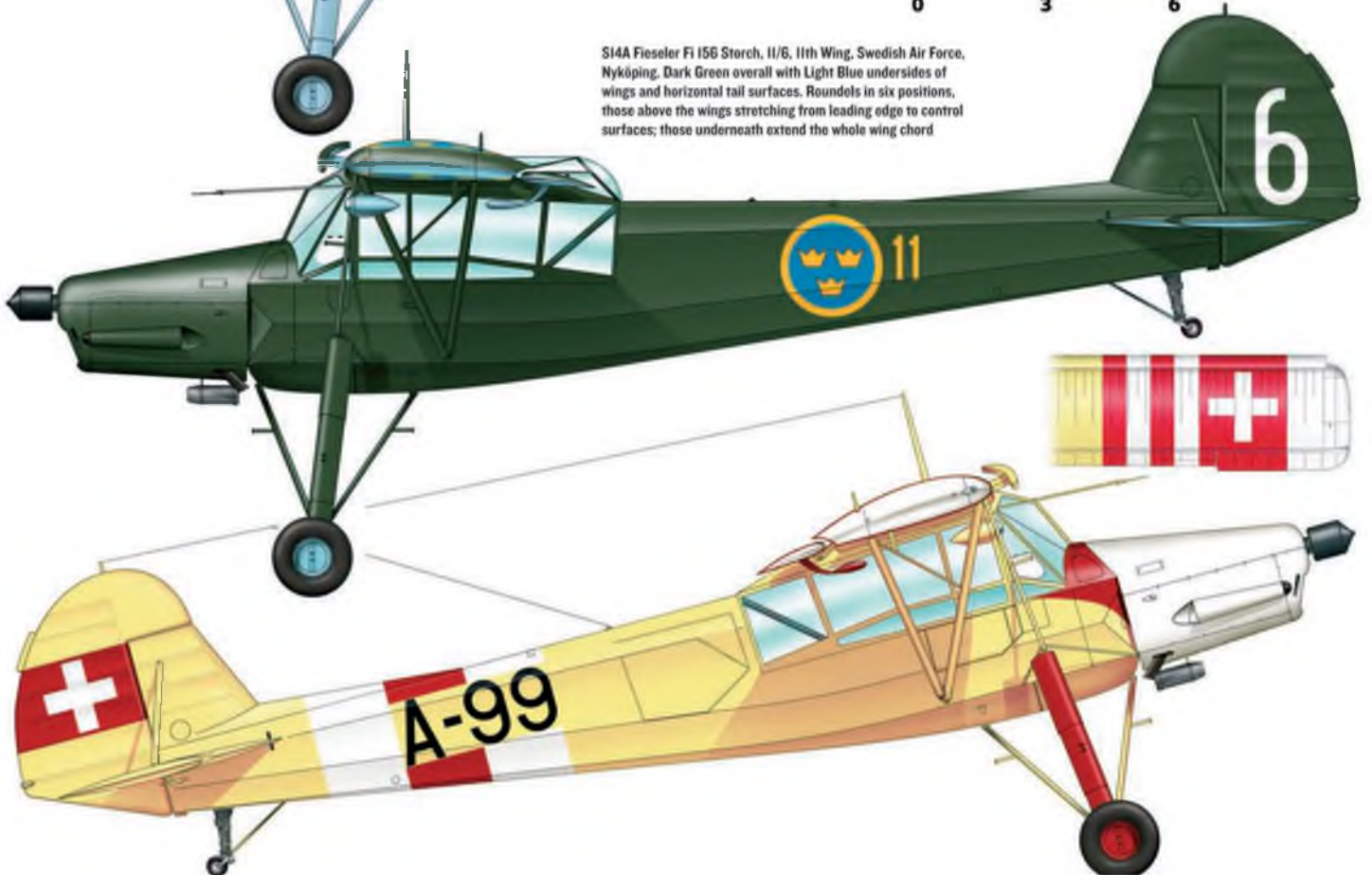
Fieseler Fi 156C-1 Storch, ST-112, Finnish Air Force, Siikakangas, 1941. Dark Green upper surfaces with black wavy pattern; pale blue undersides. Yellow fuselage band and undersides of wing tips. National marking in six positions



PROFILES  
1:48 Scale

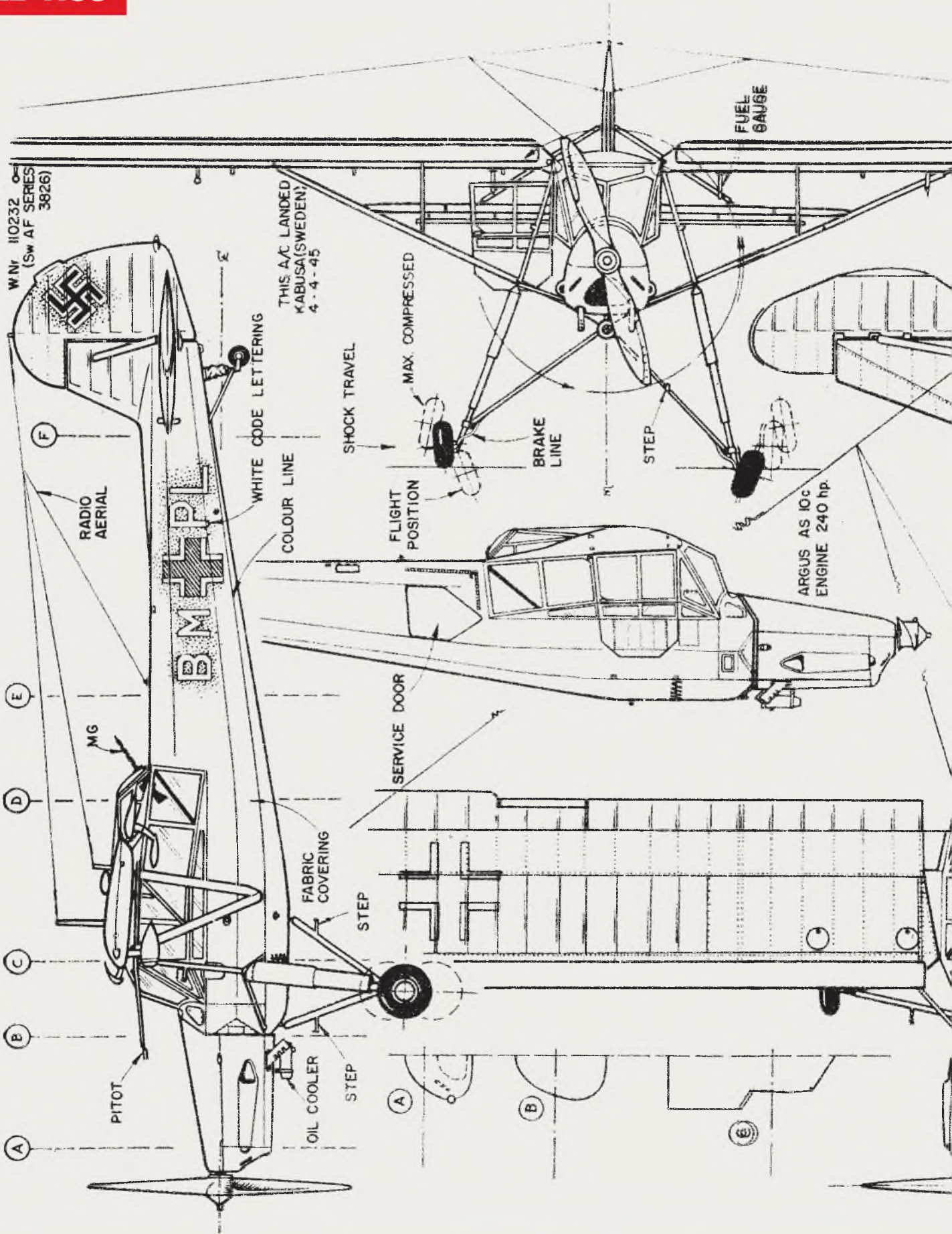


S14A Fieseler Fi 156 Storch, II/6, 11th Wing, Swedish Air Force, Nyköping. Dark Green overall with Light Blue undersides of wings and horizontal tail surfaces. Roundels in six positions, those above the wings stretching from leading edge to control surfaces; those underneath extend the whole wing chord

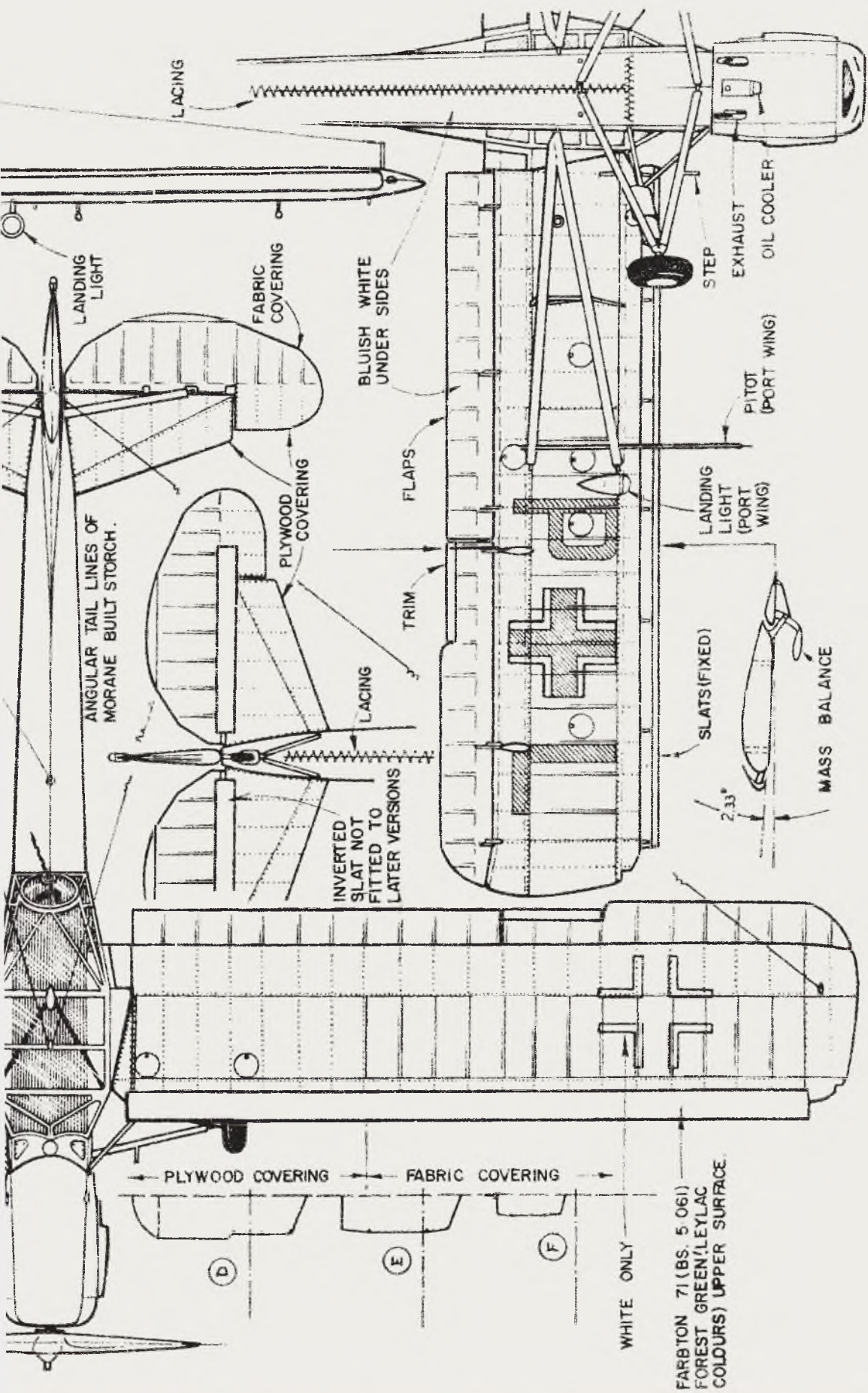




SCALE 1:50







# FIESELER FI 156 C-3 STORCH



On Silent Wings by Chris Williams

# SCALE SOARING

**T**he surly bonds of the Weather Gods were loosened slightly as summer arrived, the first event being one put together by Terry White, once well-known as the proprietor of Purbeck

Sailplanes, the products of which gained a loyal following over the period of time it was in production. Terry's playground is the Purbecks, a range of hills on Dorset's south coast, which boast a wide range of wind directions and some spectacular scenery. The Gods did have a trick left up their sleeve, though, causing the wind to blow on Terry's weekend on none of the usual slopes.

After some pretty hard work behind the scenes, Terry managed to get permission to use a northerly slope,

usually banned for motor vehicles, and with a conspicuous lack of the wet stuff and some hearty sunshine, the scene was set for an interesting weekend.

The first day dawned with a light and sometimes fitful breeze, not a problem for the bold-of-heart, until that is, you look out over the first obstacle - the fence - and see that both the slope and land below are robustly infested with trees and bushes. Given the organiser's provenance, that is to say the production of glass machines like the ASW27 and the Fox, it was not surprising to see that the shiny plastic creations were in the majority. What was surprising was to see so many of them boldly launched into the light wind and nearly all of them landing successfully on the hill afterwards.

It wasn't all plane sailing though,

as two of these expensive creations did connect with the fence after launching, both thankfully getting away with it, although not without their pilots incurring a hefty laundry bill. Given the cost and complexity of many of the all-moulded glass sailplanes, it has become relatively rare to see the more exotic variety flown off the hill, so as one participant, Phil Hoegger put it, it was like going back in a time machine to see all these white birds flying off the hill again.

On the Sunday, the wind was more co-operative and we were treated to the majestic sight of the big white birds being put through their aerobic paces. This is quite a sight, as the sheer aerodynamic efficiency of these models means that energy retention is so impressive that it almost seems

Ivan Goodchild's 1:3.5 scale Slingsby T.31b on landing approach.







**Happy campers at the Purbeck convention.**

that you are witnessing a demonstration of perpetual motion. Coupled to that the sound of tortured air as they whizz by is not only buttock-clenching, but pretty scale-like too!

One trend that is definitely on the increase is the use of electric-powered scale gliders, a definite advantage on days like the Saturday when the lift was less than reliable. There was little evidence of the up-and-go variety, rather to my surprise, but rather more of the propeller-in-the nose type. Until recently, this would have regarded as beyond the pale, but now even the full-size are getting into the act and putting motors in the nose and rather coyly calling them 'sustainers'.

Despite the challenges of wind and topography, then, a splendid weekend was enjoyed by all, and judging by Terry's smile at the end of the day, I can see another convention coming up before too long...

### A DAY IN THE COUNTRY

When the Ghost Squadron, headed by their leader John Greenfield, go flying, they don't mess about. It is their wont to hire a 'field' or an airfield in the middle of nowhere and spend a whole week of stick-twiddling. This time around they came to a field in the approximate area of my neck of the woods, not far from Cheddar Gorge in deepest Somerset. My pal Motley and I carefully studied the forecast for this period and chose the day that seemed to bode reasonably well for the purpose of flying, and we set off in the Big Blue Taxi.

For once, the forecast was right, and we arrived to sunshine and a relatively light wind. Antonia Gigg's adventures with her up-and-go ASH 25 have been well documented over the winter via the graces of the *Scale Soaring UK* forum, and we marvelled at her skill with composite repairs, and her refusal to abandon a job many of us, myself included, would have considered next door to impossible. This sailplane is crammed to the gunwales with electronics, as well as the more mundane power unit and retract, there is a whole bundle of telemetry and cameras. Small wonder then that on the day there was a great deal of concentrated Tx programming going on in concert with Mr

Greenfield, to whom the honour of the re- maiden had been bestowed. This proceeded without any undue catastrophe, and after some more intensive re-trimming and programming, the model was pronounce mission-capable. Credit, then, to Antonia for her determination to get the job done, and we look forward to seeing more of the model in action as the season progresses.

Another model to catch my eye was

that of Ivan Goodchild, whose Slingsby T.31b made a brave sight in its yellow and translucent livery. Built to 1:3.5 scale, this looks like a very handily-sized machine: big enough to look impressive, but not so big that it can't be thrown off a hill. A good day's aerotowing was had by all, the most unlikely aspect of the day being that the Weather Gods continued to smile upon us.

As it turned out, the rest of the week



**Andy Schafer gives an ASW 27 the heave-ho in the Purbecks.**



**The elegant lines of a Duo Discus.**



**Another Duo Discus, this one from the Paritech concern.**





Antonia Gigg with her up-and-go powered ASH 25.



Author with the new 2-seater version of the venerable Minimoa (MO2a).

wasn't so well favoured, but I guess that's what we expect of the UK weather these days. Next up in my area is the Ghost Squadron's big aerotow weekend at Middle Wallop, let us hope that the Gods will smiling rather than smiting...

### ANOTHER PROJECT CONCLUSION

I sometimes wonder if it would be worth contacting the Guinness Book of Records and lay claim to have built a larger number of Minimoa's than anyone else in the world. The Minimoa is an iconic 1930s glider built in pre-WW2 Germany and recognisable to many of us of a certain age from the little free-flight version that Kell Kraft used to do many, many years ago. (I built one of those, too). Until I felt the urge to start this current project, I already had a 1:3.25 scale version in my fleet, and my pal Smallpiece was campaigning my previous 1:3.5 scale prototype upon which my last published plan was based. (Stretching back previous to that were another four or five

Minimoa models)

What started this project off was a beautiful and meticulously researched drawing from Vincent Cockett, webmaster of the *Scale Soaring UK* website, of the little-known two-seater version of the Minimoa. This was a one-off version of the standard production model, with such additions as a lengthened nose section, flaps, and a headlight in the nose so essential for those duration flight record attempts of the day, when a landing in darkness might always be on the cards. I decided to build this version at 1:3.5 scale to match my plan, but this time the drawing was put together from scratch in CAD on the PC.

As it turned out, I had quite

a task on my hands, and it was some three months later before the completed model was ready for its maiden flight. A slope affair was the favoured option, as the photographic opportunities are always greater than at an aerotow, and by some miraculous mis-chance, the wind actually deigned to blow on one of our local slopes not more than few days after the model was completed. With Smallpiece behind the camera lens, my other oppo Motley gave the Minimoa the heave-ho and we were off. The Mini

sailed off serenely, despite the slightly gusty wind, and without touching the trims, all the control responses seemed satisfactory.

A quick stall test followed;



The MO2a in action at the WSA's Stoney Down site (Barry Cole pics).







Formation flying is not for the faint-of-heart (Geoff Crew pic).

full-up elevator producing a mushing-about regime without any wing drop, a result that is about as good as it gets. Then it was time to position the model for the camera in various attitudes, before the real test of the day came up. We persuaded Smallpiece to launch his Minimoa and proceeded to attempt to get them both in the frame simultaneously. As many before us have discovered, and no doubt many after will, flying two model aircraft in formation from the ground is not for the faint of heart. After achieving little in the way of success, I had a bright idea...why not photograph a simultaneous launch, at which point the models would at least start off in formation, however brief that period may be? Thus it turned out to be, and Motley caught action nicely, although with the camera taking seven photographs every second, he was in with a good chance. (Smallpiece declined my offer to do it again, and went off for a lie down in the shade.)

I had thought that flaps would be pretty much a waste of time on a wooden glider, and it certainly didn't really catch on with full-size woodies, but in this case I was pleasantly surprised. First off, the flaps on this model are mixed with up-going ailerons for an effective CROW configuration, with the spoilers coming into action at the same time. This makes for a very positive rate-of-descent control, yet with little in the way of pitch change. More surprisingly, early use of a small amount of flap deflection seem to show a very evident increase in the rate-of-climb, something I had thought to be unlikely, as I had reckoned the drag penalty would outweigh the lift benefit.

There it is, then, another project off the board and into the air, and I look forward to getting to know her better in the coming months...



The ASH 25 in action at Cheddar.



Rather more sedate action from the two Minimoas (Geoff Crew pic).



# ARROW ACTIVE

From New Zealand, Alistair Smith present this truly elegant 96" (2430mm) 1/3rd scale Arrow

I first became aware of the Arrow when I saw a photograph of it in Janes Encyclopaedia. After a call to Wayne Cartwright, a New Zealand modeller who has an extensive library of aircraft three-views and associated magazine articles, I had three-views and photos to work from.

I decided to model the Arrow as it appeared in the late '60s, when the fin and rudder had been modified, as I preferred that shape and the colour scheme. There have been several different schemes using red white and

silver. If you prefer the original specs to which the full size aircraft has been restored, the only change is the fin and rudder shape, and the colour.

Where there were discrepancies between the scale drawings and the photos, I went with the photos, notably the number of stringers in the rear fuselage. There are some scale details I haven't put on yet - the undercarriage fairings being the main one. The spinner I used is a 4.5 inch aluminium example, not the right shape, but when painted, it doesn't look too bad. The level of scale

detailing is of course a personal choice.

After several years (on and off) of design and building, I became a little impatient to see the plane fly. I did intend doing more, but haven't made the time yet.

The Zenoah G62 provides more than adequate power and with an exhaust header made from a 25mm copper pipe-bend silver soldered to brass flanges, which puts the muffler under the cylinder, and a carb bend from *Practical Models*, it fits inside the cowl with no cut outs or protrusions.





# MK 2

1/16 scale biplane.

There is a small amount of metalwork and silver soldering involved, using steel hydraulic tube and fittings made from 1/16 inch panel steel.

Note that with the folding wings, all rigging is fully functional, so make sure all mounting brackets and connectors are securely mounted. I used *Gerry Nelson's* streamlined flying wire (from USA) but the stainless strips from windscreen wiper blades should work as well. The wing rigging is secured using *DuBro 4:40* rod ends silver soldered to the wires on the inboard

ends, and to 4:40 bolts and threaded rod ends outboard to give some tension adjustment. The centre section rigging is silver soldered to slotted bolt heads and steel fittings.

I used stainless steel Dzus latches to hold the wings open, but overlapping plates and bolts would fit in the same locations (in front of the forward spar on the top wing, and behind on the bottom wing to allow for

undercarriage mountings).

I originally used *FM* radio with the aerial inside the fuselage, but the silver paint caused some glitching, so I had to run the aerial out to the top of the fin. I've since switched to *Spektrum 2.4 GHz* gear and have had no problem with the receivers on a shelf behind the instrument panel, together with two five-cell receiver packs and a Jomar battery backer for insurance. It is well worth the effort of making the folding wings, as set up at the field only takes a few minutes.

## Start with the Wings

It's probably convenient to start construction with the wings, as the fuselage can't be completed until the wings are mounted. I found it easier to mount the top centre section before fitting the end ribs and leading edge sheeting. Note that the width of the top wing centre section is the same as the ends of the bottom wing stubs. Make ply end plates for both spars, into which the spruce spars are inset, to which the cabanes and rigging wires will then be bolted. I had intended to make the fabric piece behind the rear spar, but found that when the wings were folded back, there wasn't much to hang on to.

I lift the model with one hand over the back of the centre section, and the other on the spinner. To facilitate this, shear web the rear of the rear spar with plywood extended to the level of the sheeting.

Before mounting the centre section, make the wing hinges, being sure to make left and right sets. Make the tongues over width, and shape after the pivot lines are established. When fitting to the rear spars, make sure to get a snug fit.

Wing construction is fairly straight forward. Note that the spar root ends on the top wing are tapered to accommodate the dihedral. I inserted ply in-fills between the spars at the rigging mount points. The holes for the mounting bracket bolts are in the ply, not the spruce spars. The mounting brackets are in two pieces, the right angled part has a nut soldered to the back for the rod end bracket bolt, and is permanently fixed in the wing. Bolt the brackets level with the rib tops and box around them when cap stripping the ribs.

I made a ply end plate for the spars and set the spruce into this to give a more solid surface to which to bolt the hinges and rigging plate. Later, after the centre section is mounted, the rear spars will need to be shortened by the length of the hinge flanges.





CUT PARTS  
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# ARROW ACTIVE Mk.2

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(Measure from the end of the centre section rear spar over both hinge parts to where the rear spar will be to keep the wing straight). The same will need to be done with the lower wing.

The root ribs will need to be shortened and boxed around the hinges. Note that the rear rib pieces on the top wings are angled back to the trailing edge, and on the bottom wings these are stepped out to clear the stub spar when folded. The inboard two ribs on all four wings are 1/8" ply. I cut rectangular lightening holes in them, which gave access to hinge bolts etc. At this stage, decide how you will lock the wings open and make allowances for this here. The first rib bays are sheeted top and bottom with 1/8" balsa after the wing mounts are finalised. The ribs at the I-strut location are ply. I used two *DuBro* 4:40 straps top and bottom to hold the struts.

The ailerons are centre hinged (as are the elevators and rudder). I used *Robart* large hinge points and pockets, which made this easy. Fit balsa blocks at the hinge locations to provide plenty of gluing surface. The aileron servos are mounted on the inboard side of the I-struts. Note that the scale pushrod exits are on the top surface of the wing. I made a thin ply hatch for access on the underside of the wing.

The wing tip bows are laminated with four strips of 1/16" balsa. I applied this directly onto the balsa tip shape using CA. It gives a rigid tip easily shaped with sharp sandpaper.

## Tail-end next

The horizontal tailplane is more

simple to build as two separate halves joined with a tube. It makes installation much simpler. I fitted the tube in front of the rear spar, which dictated the shortening of the inner hinges and pockets. Locating dowels at the leading edges, which fit into ply plates in the fuselage makes setting the tailplane incidence easy.

The elevator servos can be side-mounted in the first rib bay of each tailplane half, which makes for a nice short pushrod. The root rib is 1/8" ply, and rests against the moulded glass fibre tail cone fairing. The rudder horn is a dowel inside a brass tube, to which a steel horn is silver soldered. The horn tube and dowel are glued and pinned into the rudder. The rudder servo can be mounted under the tail cone. The outer edges of the fin and rudder are laminated in the same way as the wingtips.

## Fuselage

When building the fuselage, note that the front sheeting is not applied until after the wings are mounted. Chamfer the inside edge of the longerons where these meet the ply side sheets so that they sit flat on the building board with the sides angled in.

Build the bottom half of the fuselage upside down over the plan, with the firewall hanging over the end of the bench. Adjust the position of the firewall to suit the engine you will be using. I set the side and down thrust by angling the firewall between the ply side sheets. Make sure the firewall is pinned and braced well to the side sheets, likewise with the lower





wing spar stubs.

When the bottom fuselage is complete, make a jig to hold it upright and level in both axes. I used a channel box of MDF board at the rear, while the front rested on the spar stubs. Fit the top deck formers and stringers and peg the front deck stringers to the firewall. To add rigidity, I fitted 3/8" sheet either side of the top stringer and rounded it to shape. The 1/8" ply plates for the centre rigging attachments are glued to the underside of the stringers and the balsa sheets. The holes are drilled through from the top, in line with the front face of the wing spars, after the centre wing section has

been mounted.

I found the rear of the fuselage rather flexible with just spruce stringers on the turtle deck, so I cut the formers down and sheeted the deck with 3/32" balsa and glued balsa stringers to that. It may be stiff enough without sheeting when covered, but I was much happier with it. There is plenty of room under the front deck for a 32 ounce fuel tank. Mount it on ply cross pieces close to the centre of gravity to minimise changes as the fuel is used.

### Centre section struts

The cabane mounting blocks are braced with metal straps bolted to the ply sheet

side. I used 4mm machine screws and nylock nuts to secure the strut ends. Fit the wing hinge halves to the centre section now, as the bottom bolts are shared with the cabane struts and rigging eye ends.

To set up the wing centre section, I used temporary 1/4" square struts tacked to the fuselage frame and wing ribs with CA. Set with +2 degrees incidence.

Make the cabane struts (I used 1/4 inch o.d. hydraulic tube) flattening and bending the ends to fit. The rigging is also done at this time. The fuselage ends of the centre rigging are silver soldered to slotted cap screws which

# 43

1: The forward fuselage sheeting used for the prototype model was a 0.5mm composite material used for printing plates. An alternative would Mick Reeves Models 'Pro-Skin'. 2: Fuselage support block, cut from expanded polystyrene, holds fuselage upright during work. 3: Venturi on left fuselage side ahead of the cockpit. 4: Jury Strut between the wing panels, with wings folded back. 5: Engine cowl access panel hinge line. 6: Pitot head mounted on the left wing interplane strut. 7: Rear fuselage, showing the dummy locker access door and surface stringers.

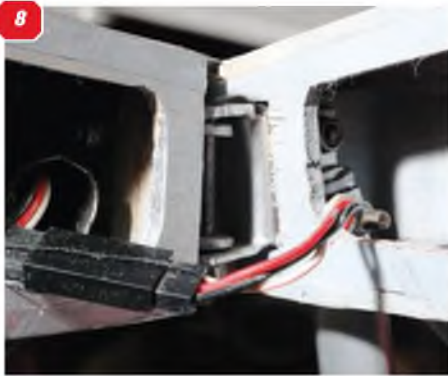
The bare bones, with Zenoah G.62 engine installed. Note that on the rear fuselage upper decking, there is balsa sheeting applied on the INSIDE of the fuselage former arches to provide rigidity, while stringers on the outer face preserve the scale open-frame effect.



# ARROW ACTIVE MK.2 (PLAN FSM/494)

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pass through the ply plates under the top sheeting, and are anchored with washers and nylock nuts. I used 5/8 inch K&S streamlined aluminium tube for the cabane fairings, with the aileron leads up both rear struts.

### Wing hinge and wing fold

Fit the lower wing hinge halves to the rear spar stubs. Using a straight edge, mark the pivot line through all four hinge tongues being certain that the line crosses the spar

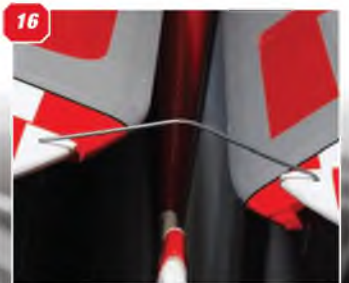
ends on the spar centre lines, then mark the bolt hole positions. Remove and drill. I used 4mm cap screws held with nylock nuts as the pivots.

Re-assemble the hinge halves to the airframe, and twist each hinge tongue so they are square to the pivot line. Make the twist as far in as possible to clear the bolt holes. To avoid binding, the holes must be in a straight line through top and bottom hinges. The angle of the pivot and the twisted tongues cause the wing

tips to lift and clear the ground as they swing back.

The outboard hinge halves need to be twisted to match and then drilled. Note that the top wing hinge tongues have to be bent up to allow for the dihedral, as well as being twisted. The tongues can now be shaped and filed to size.

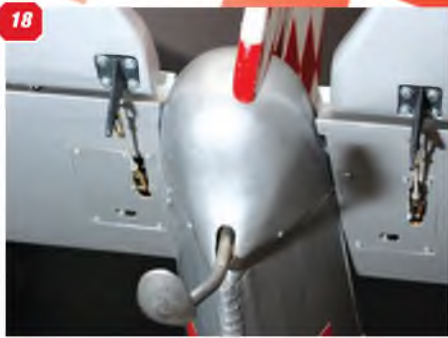
Mount the bottom wings first, using 1/4 square spruce tack glued to the top centre section to support them, avoiding the rigging attach points. Tack glue a



17

8 & 9: Two views of one of the upper wing-fold hinges and the servo leads.  
 10 & 11: Lower wing fold and hinge.  
 12: For the wing-fold, the inverted-gull wing-to-fuselage fairing hinges downwards through 90 degrees, hinged with Robart Hinge Points.  
 13: Upper wing hinge on uncovered wing structure.  
 14: The lower wing wing-to-fuselage fairing with the rear part folded down.  
 15: Dzus latch and fasteners.  
 16: Wire clip folds on wing panels in place.  
 17: Uncovered lower wing showing rigging attachment and balsa leading edge - latter unshaped at this stage.





balsa strip across the front spar ends to hold them temporarily. When set, the top wing can be set up and the I-struts and rigging made. I put two degrees of washout into both top and bottom wings, using rigging adjustments. There is three degrees dihedral in the top wing only. For the I-struts, I used 1/16" panel steel brackets top and bottom with 1/4" steel tube between, faired with 1/4" balsa.

The root ribs can be shortened and boxed around the hinges now. You will have to sort the wing locking method out at this stage. Fit the 1/8" ply bracing plates securely between the spar stubs, up to the ply side sheets.

For the forward section sheeting of the fuselage, I used a commercially produced fibreglass sheet (about 0.5 mm thick, made, I think, for the printing trade), glued to the stringers with CA in panels.

Put some extra support in the larger spaces, and around the undercarriage plate openings.

### Undercarriage

Make brackets to hold the undercarriage oleos to the front stub spar. Be sure to brace the brackets and spread the load along the spar. I used J&P oleos, intended to be attached to piano wire legs, drilled through the top end and bolted to the brackets. The axle hole is used to hold the bottom end. These looked to be the right length, but would be better extended a couple of inches. The rest of the undercarriage is made from 3/8" steel tube, bushed at the top for the mounting bolts, and brazed together with a stirrup for the bottom of the oleo. A 1/4" bolt fitted and brazed into the main strut

serves as the axle. Make sure the bolt has a long enough land on it that there is no thread in the wheel hub.

After masking the fuse around the fairing line with cling film, I used gap filling foam to fill the lower wing stubs back to the rear stub. It is very easy to carve and sand to shape. Cover with glass cloth. The piece that swings down to allow the wings to fold is made in place separately. Use 1/4" balsa for the front edge, and 1/8" ply for the trailing edge with balsa ribs between. Mask the fuselage and fill the frame with foam. A waxed cardboard sheet under the frame makes this easier. Glass after carving to shape. I used magnets to hold them up, one each side, a metal plate in the wing rib, and a matching magnet on the inside of the fuselage skin. The sections are mounted on a single *Robert Hinge Point*. I used another magnet under the trailing edge which holds them onto the undercarriage when open. They have never moved in flight.

### Mouldings, covering and finishing

My model is covered with silver *Solartex*.

48

18: Elevator servos are buried in the tailplane under hatches. Note also the tailskid and 'shoe'. 19: The tailplane mounting tube and locating peg. 20: Tailskid pivot and mounting. 21: The rudder horn and control link - also showing the tailplane mounting tube sleeve. 22: Rudder servo mounted inside the fuselage directly under the fin. Note also the tailskid spring. 23: The glass fibre tailcone fairing, moulded over a carved foam 'plug'. Cling Film used as sealing agent between foam and resin. 24: The rudder horn. 25: Main undercarriage top oleo mount. 26: Lower undercarriage oleo mount and axle. 27: Wing/Fuselage undersurface, showing the undercarriage mount. Note also the Robert Hinge Points that fold down the wing-to-fuselage fairing. 28: The front undercarriage mount, also showing the exhaust pipe.





which has worked well. It is well worth the effort of making the simulated fuselage and rib stitching, as it is a very obvious feature on the full sized aircraft.

The cowl, headrest and tailcone were made by glassing over shaped foam plugs. Wrapping the foam in cling film makes removal much simpler.

I couldn't find a spring strong enough for scale tailskid suspension, so I made a skid that pivots behind, and passes through, the end fuselage former, with an expansion spring mounted on the longerons. This works well, although I had to fit a shoe on the end of the skid as the model wouldn't turn on grass surfaces.

## Flying

With the Zenoah G62 turning a 22"x 8" prop, the Arrow takes off and flies happily on half throttle. As with any tail dragger, there's a bit of a balancing act with the elevator until it gains some ground speed. Control response is quick and positive and the model sits nicely in the air. Originally, I applied differential on the ailerons, but found the response sharper without it.

Moderate aerobatics are handled with ease, and I have found no nasty vices to date. Landings are very easy. With all the drag of a biplane, it slows quickly on approach, and I find I need to keep a little power on until almost on the ground, as the elevators tend to lose their bite as the model flares. Moving the c of g back may help with this, but I haven't experimented. ■



29

**29: The Zenoah G.62 engine installation, cranked slightly to provide clearance for the muffer inside the cowl.**

**30: A further view of the engine installation, showing the carburetor bend as referred in the text.**



30

## MODEL SPECIFICATIONS

**Scale:** 1:3

### Wingspan

**Top:** 2430 mm (96 inches)

**Bottom:** 2032 mm (80 inches)

**Length:** 7880 mm (74 inches)

### Width (wings folded back):

802 mm (32 1/4 inches) at tailplane

745 mm (29 5/16 inches) across wings

**Weight with Zenoah G62:** 12.7 kg (28lbs)





# ARROW ACTIVE

Designed for a perceived military requirement that did not exist, the designers did at least create a truly attractive little aircraft





In today's world 'shape', in general seems to have drifted inexorably towards commonality - perhaps with a few 'knobs on' to inject a degree, if only superficial, of individuality. The most obvious example of this is the mass-production car industry, busy churning out a range of barely indistinguishable 'jelly-mould' shapes. Today's aviation industry is much the same, with shapes so similar in any category of commercial aviation, dictated by specifications all cast to do the same job.

There was a time however, when creativity did produce some truly individual and attractive shapes in aircraft

- almost, one be allowed - an art form. Such can possibly be regarded as the case of the Arrow Active.

When times are hard, it takes considerable self-belief to abandon employment with an established aircraft producer to set up in business to create a new aircraft for which no likely customer, either military or civilian, has implied a need. It would take a brave man indeed, particularly so at the start of the 1930s when the world had been plunged into a Depression that showed no sign of easing.

Arthur Thornton had worked at the Blackburn Aeroplane & Motor Company, and designed the all-metal Blackburn *Bluebird* single engine, twin-seat biplane

light trainer/private touring aircraft in 1924 and also the *Lincock* single seat lightweight fighter aircraft in 1928.

Thornton was convinced of a market for an advanced aerobatic aircraft that could also be used as a fighter trainer and for bombing training. So he left Blackburn in early 1930 to form *Arrow Aircraft (Leeds) Ltd.* where he set to work with associate Sidney Oddy to produce their first aircraft, a diminutive sesquiplane type, with rearward, manually folding wings and Cirrus-Hermes IIB inverted inline engine.

Named *Arrow Active*, the first example was finished within the year and early in 1931 and after being registered as G-ABIX, the prototype was sent to the Air







Ministry's 'Aeroplane Experimental Unit' at Martlesham Heath, Suffolk, where its performance and handling qualities were warmly endorsed, eventually receiving a Certificate of Airworthiness in May 1931.

However, with no immediate order book, the aircraft was pressed into service as an air racer, presumably to demonstrate its performance in public, although there was no immediate success. The prototype Arrow Active featured slim 'Palmer' wheels typical of the period that dated back to the WW1 era.

When a second example appeared in 1932, the resultant *Arrow Active II* included a taller main undercarriage with 'doughnut' tyres. At that stage, both aircraft featured a fairing over the upper wing-to-fuselage attachment struts and the two aircraft were entered in the Kings Cup Air Race that year, a 1,200-plus mile circuit around the British Isles, but neither aircraft had any success then, or in the same race a year later.







The Arrow Active I (the prototype) was then acquired by noted racing and aerobatic pilot Alex Henshaw, who much enjoyed the aircraft's flying characteristics, but arranged for it to receive a more powerful engine. During the delivery flight in December 1935, Alex indulged in some practice aerobatics en-route. During an outside loop, the engine exploded and the fuel tank in front of his feet burst into flame. He wasted no time in 'going over the side', taking to the parachute that his father has given to him for his recent birthday and he drifted to the ground with the burning aircraft initially circling around him!

That then, was the end for Arrow Aircraft (Leeds) Ltd. as an aircraft manufacturing entity, since the perceived market did not exist, although the Company did remain as an aircraft components manufacturer for many years, passing through an interim ownership before, in 1957, the assets were

acquired by Slingsby Sailplanes Ltd. That may explain why the Arrow Active II was subsequently 'discovered' in the loft at the Slingsby factory and thereafter sold to Mr. Norman Jones, the man at the head of the Rollasons Group who did much to promote private flying in UK during the 1950s and 1960s.

At Rollasons, the Arrow Active II underwent extensive restoration back to airworthy condition, and was put back into service under the auspices of The Tiger Club, in which Norman Jones was a prime mover. Back in the air, it was entered for the 1959 UK National Air Races, but suffered a take off accident when too much throttle was applied during the initial take-off run and the machine nosed over, necessitating another rebuild.

Other 'incidents', including at least one ground loop, required further rebuild work, each time aided by the survival of a

complete set of working drawings for the type.

The final restoration and rebuild took place after the acquisition, (in 2003) by *The Real Aeroplane Company* which specialises in the rebuild and reconstruction of historic aircraft types at their Brighton airfield, near Selby in North Yorkshire. Prepared to a superb standard, the outline now exhibits some subtle changes from the original, and intermediate-period profile including a straight-line fall from the engine cowl upper surface rear, down o the nose cone as reflected in the 1/35th scale drawing presented in this issue.

With hindsight, it is easy to see now that designer Arthur Thornton's perceived need for the aircraft that the Arrow Active represents was misplaced - but one can only appreciate the attractive shape that makes this beautifully proportioned little sesquiplane a highly. ■



## SPECIFICATION

### (Active 2)

#### General characteristics

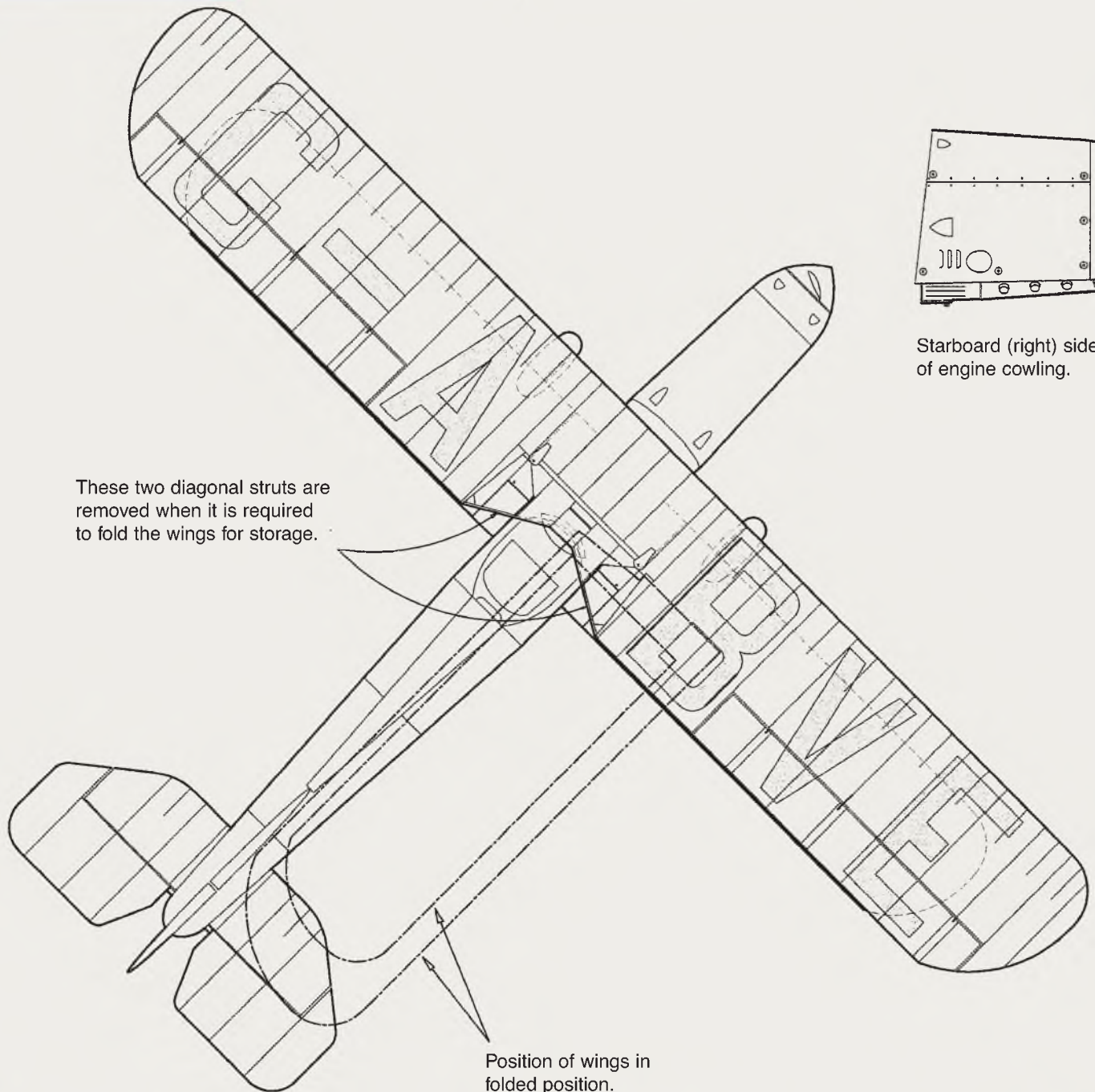
**Crew:** One pilot  
**Length:** 18 ft 10 in (5.74 m)  
**Wingspan:** 24 ft 0 in (7.32 m)  
**Height:** 7 ft 3 in (2.21 m)  
**Wing area:** 120 ft<sup>2</sup> (11.2 m<sup>2</sup>)  
**Empty weight:** 925 lb (420 kg)  
**Gross weight:** 1,325 lb (600 kg)  
**Powerplant:** 1 x de Havilland Gipsy III inverted inline engine, 120 hp (80 kW)

#### Performance

**Maximum speed:** 144 mph (230 km/h)  
**Cruise speed:** 128 mph (206 km/h)  
**Range:** 420 miles (676 km)

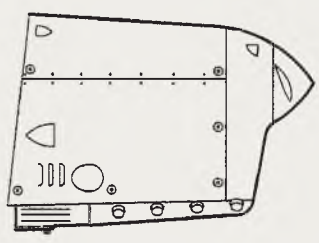


**SCALE 1:35**

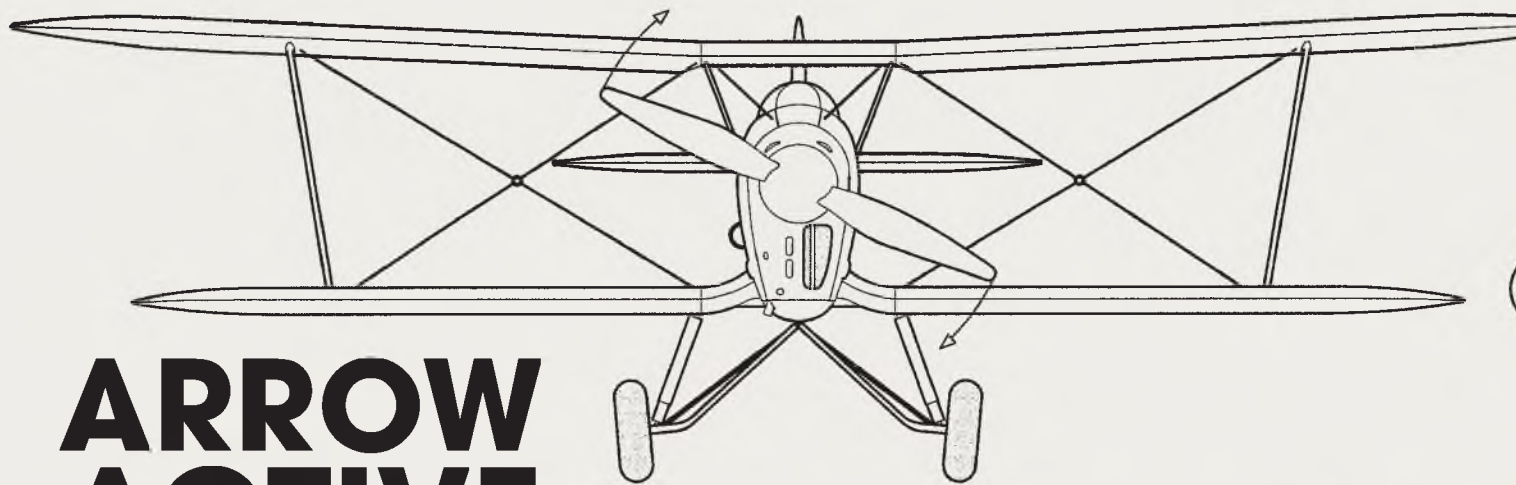


These two diagonal struts are removed when it is required to fold the wings for storage.

Position of wings in folded position.

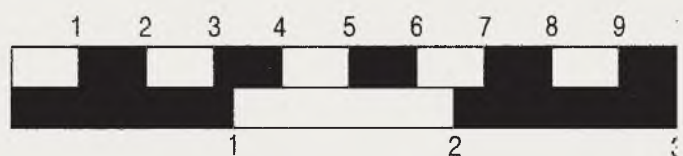


Starboard (right) side of engine cowling.

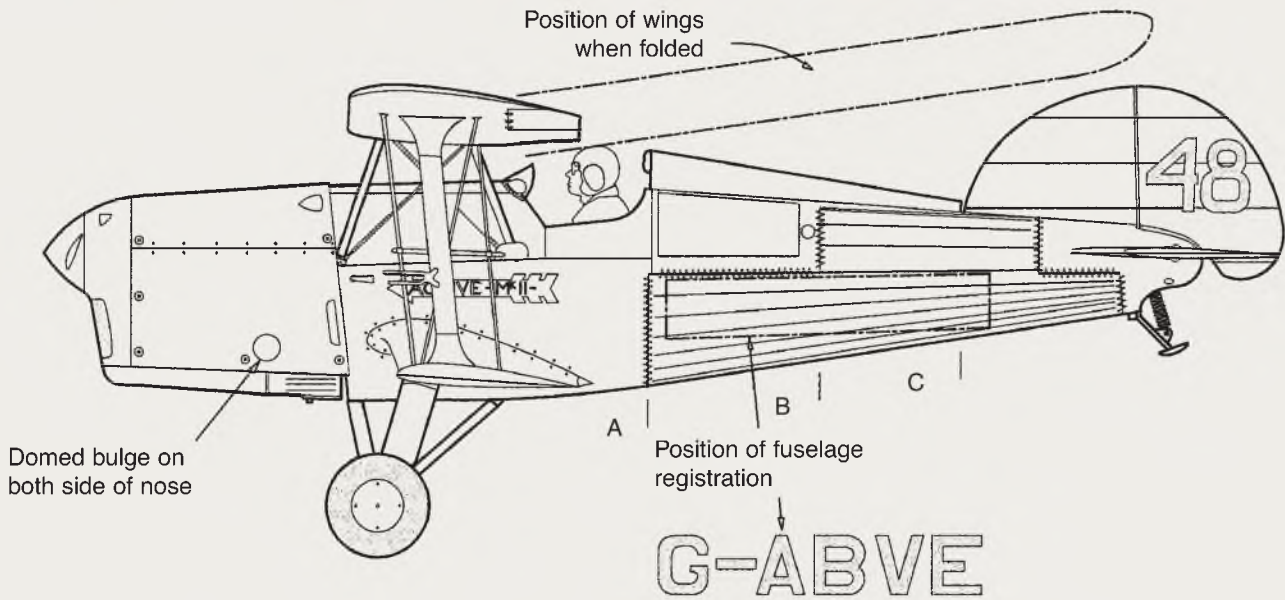


# ARROW ACTIVE

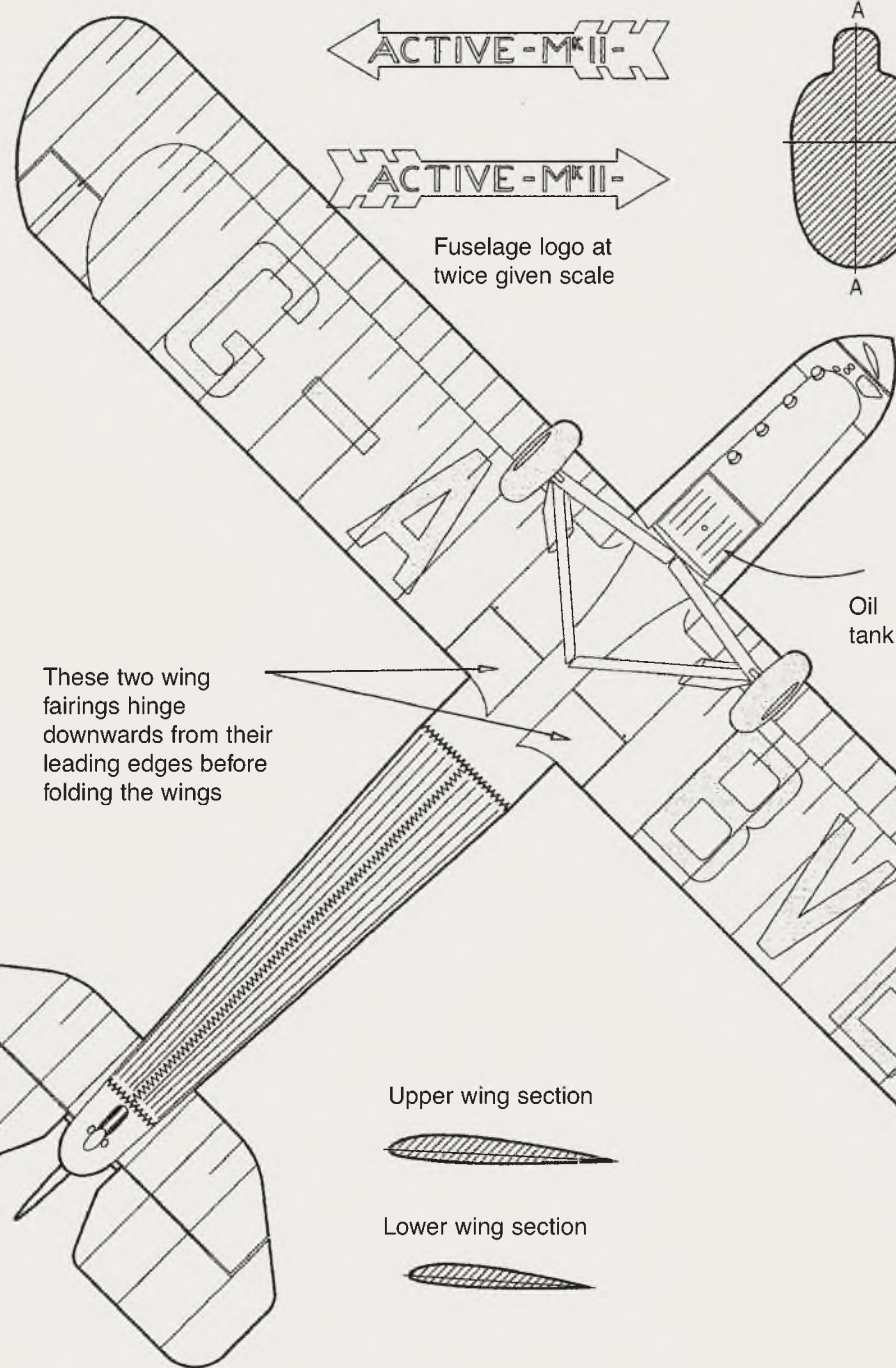
MK.II







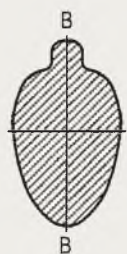
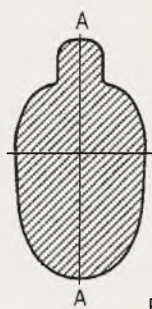
G-ABVE



← ACTIVE-MFII-K

ACTIVE-MFII- →

Fuselage logo at twice given scale



Fuselage cross sections

**DIMENSIONS**

- Wing Span: 24 ft (7.32m)
- Length: 18ft. 10in. (5.74m)
- Wing area: 120 sq.ft. (11.2 sq.m.)
- Empty weight: 925 lbs (420 kg.)
- Gross weight: 1325 lbs (600 kg.)
- Engine: 120 hp DH. Gipsy III

**PERFORMANCE**

- Max. speed: 144 mph (230 km/h)
- Cruise speed: 128 mph (206 km/h)
- Range: 420 miles (676 km)





# ARROW ACTIVE MK.II

A study of the aircraft in its present form after restoration to flying condition by the present owner, the Real Aeroplane Company based at Brighton Airfield, Selby, North Yorkshire





**1:** A view down into the cockpit well, showing instrument panel, control column and compass. Note also the hinged cockpit access down on the left. **2:** Profile of the cockpit rim. **3:** Pilot's headrest on the top of the dorsal fuselage fairing. **4:** View into the rear of the cockpit well, showing seat and pilot's safety straps. **5:** View into the cockpit showing the top of the instrument panel, windscreen and padded head protector. **6:** Another view into the cockpit well, showing the pilot's seat. **7-10:** Details of the engine cowl, showing louves, air scoops and bulges. Note four-pipe exhaust stack in the bottom of the cowl and the oil coolers, rear of the cowl bottom panel. Centre-section struts, wing fillet and undercarriage attachment also revealed.



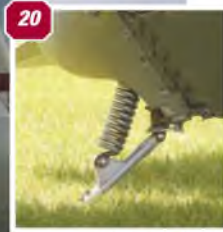




**11:** Tailplane, fin and rudder. Note the stitching below the fin.



**12:** Fuselage centre section showing the wing bracing wires and centre section wing strut anchor points. **13:** Lower wing fillet and detail of wing bracing wire anchor point. **14:** Further view of the lower wing fillet and louvres in the engine cowl. **15:** Upper wing centre section detail. **16:** Interplane wing struts and detail of the streamlined bracing wires.



**17:** Further view of the wing interplane strut. **18:** Detail of the spacer bar that steadies the backing wires at their cross-over points. **19:** Detail of the 'boot' fairing on the lower end of the interplane strut. Upper attachment point similar. Note also the pitot head. **20:** The sprung metal tailskid. Note also the stitching line of the fabric covering.







**21:** Full frontal view of the main undercarriage showing the oleo shock struts and main axle members. **22:** Side view shows the shape of the struts. **23:** Wheels hub and doughnut type tyres. **24:** The main undercarriage, viewed from the rear. **25:** Further view of the tailcone. **26:** Tailplane and elevator - note the aerodynamic balance. **27:** View along the upper wing showing the aileron and its control rod. **28:** A full close-up of the wing fairing. **29:** Upper wing centre section - top side. **30:** Close-up of the aileron control horn and drive rod. **31:** Lower wing bracing wing anchor point. **32:** Wing strut anchor point showing the streamlined fairing.





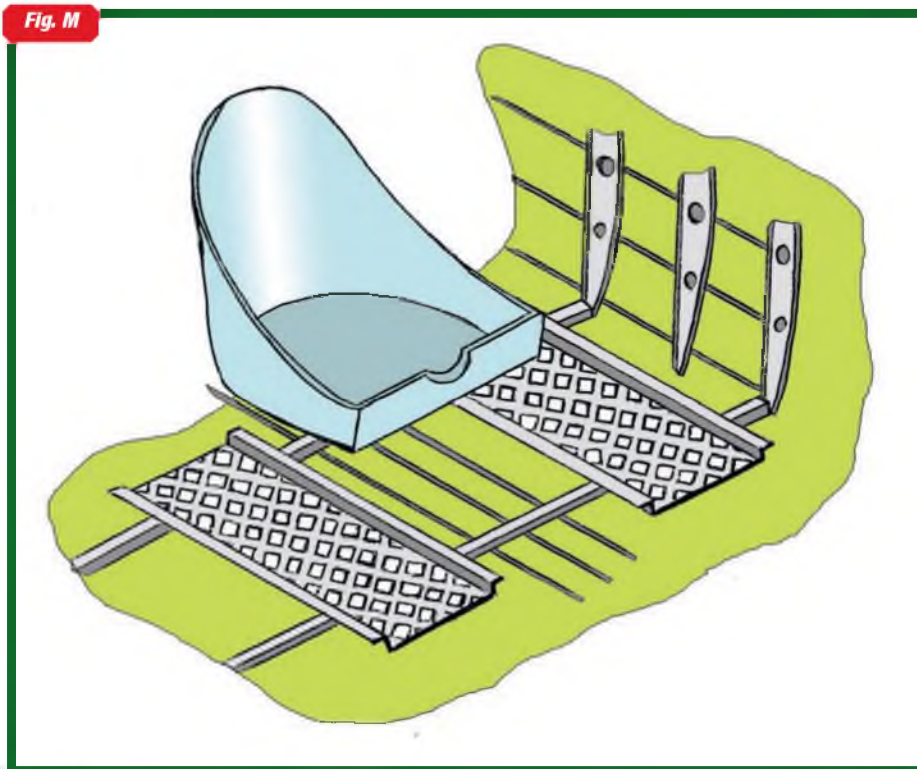
**LEFT & BELOW:** Early aircraft type with open cockpits have fewer instruments and fittings, but accessibility demands real precision in replicating cockpit contents. Two outstanding examples here are Pavel Fencel's Knoller C.1 (below) and Hans Amman's Curtiss JN4 (below right) - both World Champs standard examples.



## ICING ON THE CAKE... COCKPIT DETAILING

### A GUIDE TO TECHNIQUES FOR COCKPIT DETAILING: PART 3

Fig. M



#### Floor dance

Cockpit floors vary immensely from type to type. Some aircraft have virtually no floor (the F4U Corsair is an example). In some cases, the floor consists of aluminium rails, usually with a texture of raised lines in a grid pattern to give a grip. Aluminium foil, appropriately scored to the right pattern with a blunt knife or screwdriver against a straight edge, can give the right effect. Turn it over and you have raised lines.

When it is painted and some of the paint is scraped off with a knife and the usual dirt is added, the effect looks just right.

(Fig. M)

#### Hoses

These are usually wire-bound and this can be simulated with a suitably fine spring. The most difficult part may be to find a suitable spring of the correct diameter. A soft spring of the compression type is what is needed, but an extension type spring can be used if a little firm stretching is applied.

The next step is to wrap the spring in tissue soaked with P.V.A. glue. Then, before the glue is dry, bind it between the coils with brass or soft iron wire. Finally, when the whole assembly is quite dry, remove the spring by pulling both ends really hard to





No cockpit is complete without the driver. A realistic, properly proportioned figurine is important, including good facial features.

extend it beyond its natural form. The diameter of the coil is thus reduced and the wire can be extracted. (Fig. N).

By now, the box of prefabricated detail will be getting quite full. The interior will be coloured, dirtied and oilstained with scratches and peeling paint added with silver. The rest of the model will also be fairly complete and almost ready to paint. If you are anything like the rest of us, you will have assembled it several times just before going to bed to catch a foretaste of what it will look like.

### Cockpit canopy

If your model is one with a cockpit canopy, it would be as well to take a look at the canopy that houses all the detail, before the final painting takes place. There will always be some items that would be better fitted before the canopy goes on, for they will be almost impossible to fit afterwards. Rudder pedals and the control column are typical examples and there may be other details so delicate that your hands need room to manoeuvre as you fit them - trim controls and switch panels for example. It may be advisable to fit the cockpit seat now rather than later, and also the instrument panel itself.

The limitations of home moulding can make it difficult to produce a canopy in one piece. The degree of difficulty will depend on the cockpit shape, but it may be possible to restrict the moulding to just one or two sections between frames, for which, the plug-and-hole method may be used. The rest of the canopy can then be made in sheet acetate. (Fig. O).

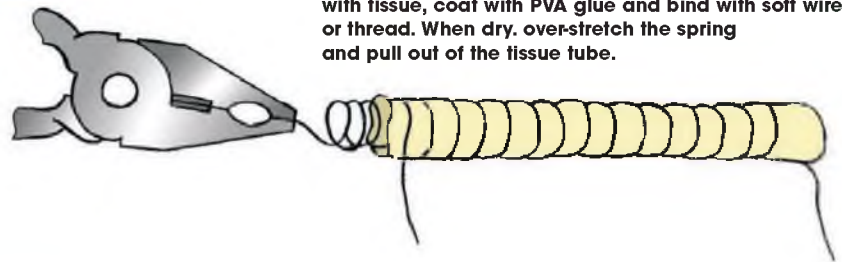
Cockpit frames always look better added as strips rather than moulded in, because the thickness of the basic acetate sheet tends to exaggerate the thickness of the frame members.

Card does not stand up to wear and washing very well, but strips of acetate sheet, scored against a straight edge, cracked off and then pulled through a fold of glasspaper, work very well.

Thinned-down contact adhesive is an effective method of securing the dummy frame strips in place, or cockpit canopy glue, but it can be a messy. To overcome this, mask out all the canopy except for the strips where the frame fits, then apply the glue. (Fig. P).

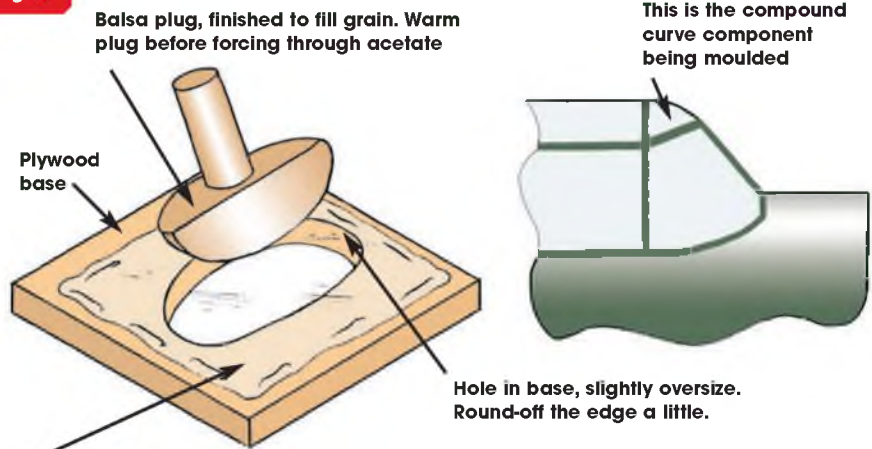
Constant cleaning tends to wear paint off acetate so an alternative is to use thin aluminium. The malleability of this material

Fig. N.



**FLEXIBLE HOSES:** use weak compression spring, wrap with tissue, coat with PVA glue and bind with soft wire or thread. When dry, over-stretch the spring and pull out of the tissue tube.

Fig. O.



Balsa plug, finished to fill grain. Warm plug before forcing through acetate

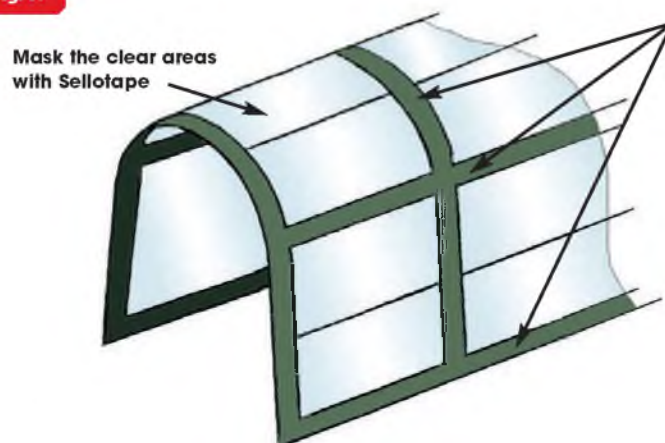
This is the compound curve component being moulded

Plywood base

Hole in base, slightly oversize. Round-off the edge a little.

Acetate sheet should have generous overlap and stapled to base. Heat until floppy.

Fig. P.

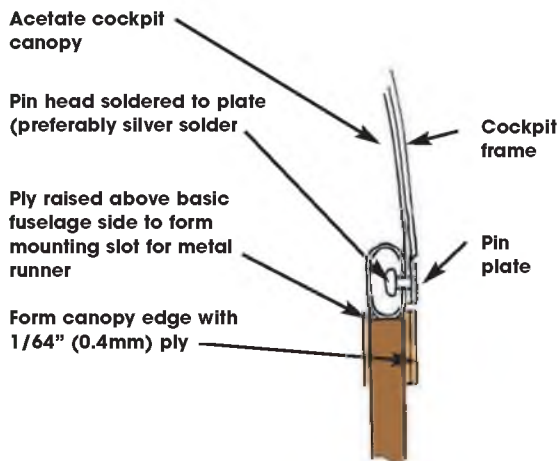


Mask the clear areas with Sellotape

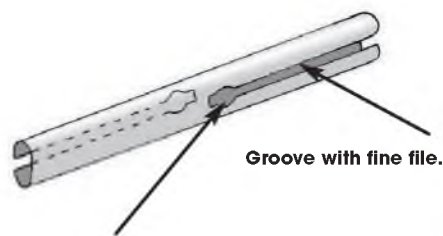
Apply THINNED contact adhesive to both canopy and frame members. Thin with cellulose thinners. Cockpit canopy glue is an alternative.



Fig. Q.

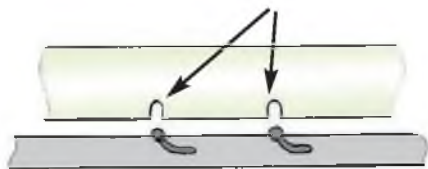


Flatten aluminium tube in vise to form basic cockpit canopy runner.

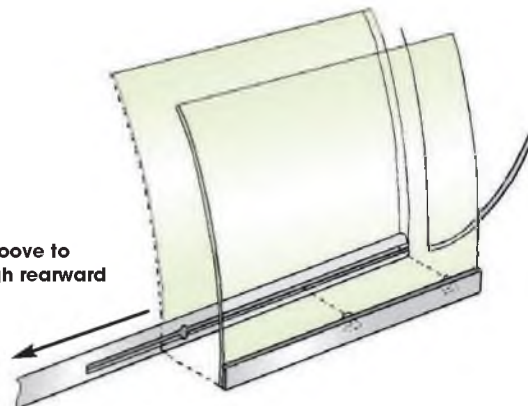


Hole for pin or screw head, positioned away from end to reduce chance of canopy jumping out of groove when closed

Pins/screws must be silver soldered. Slot cut in bottom edge of acetate sheet clears pin shank when glueing to tin-plate



Length of groove to allow enough rearward movement.



Front pins worked into the hole first, then canopy slid forward and back pin popped in. Canopy now free to slide rearwards to full open position with rear pin head clear of hole. When canopy forward, there is no chance of pin head coming free.



A real challenge here - the cockpit canopy on Max Schill's F&M C3603 is a real 'bird cage' with three independently sliding components.





**Note the multiple rivet lines on the canopy frames on Takashi Saruwatari's Nakajima Army Type 97. Sliding canopy guide on this one is an external rail.**

makes it easy to form, yet it is stiff enough to hold acetate sheet in shape, which is an important consideration if the canopy is meant to slide back and forward. In the case of aluminium, any 'wear' will reveal the bare metal - a scale effect! Contact adhesive is perfectly satisfactory for aluminium.

### Go by rail

Sliding canopy rails need to be built into the edge of the fuselage. How this is done will depend on the shape of the full size, but try the following.

Squeeze a length of aluminium tube in a vice to make it flat-sided and then cut a thin slot down the side using a jeweller's file or maybe a Dremel tool. The slot is then smoothed with a scalpel and/or fine abrasive paper until a pin will just slide along the tube with its head on the inside. Pins or watchmaker's screws are then used to hold the canopy in position. (Fig. 9).

### Shelling out

Here's a final thought. Part of the

problem in installing cockpit detail is the restrictive dimensions of the cockpit of some aircraft types - the Spitfire is one obvious example, but there are many others and it all depends on the scale of the model.

We might well take a look at the methods used by plastic kit modellers, where a standard technique is to do the cockpit detail before the twin half shells of the fuselage are joined.

It would require a major revision of flying model construction technique to build a scale flying model fuselage in similar, separate, half shells but it can - and has been done. The idea is that the twin half shells could be married together with peg guides so that the shells could be parted as required for working on a number of tasks that would otherwise be key-hole surgery jobs, like for instance, the installation of a steerable, retracting tailwheel.

Other problems might arise - for example, a firewall in two halves, but none of that is insurmountable. Worth a try eh?



**An extreme and unique piece of cockpit furniture in Berk Hazeborg's Koolhoven FK 49 is this aerial survey camera.**





maybe wing it would have been a better term to use. As you know by now, winging it is something at which I'm world class.

I know there are umpteen modellers out there who have highly organised, well equipped workshops in which to build their masterpieces. Then there are the rest of us, making do with what space S.W.M.B.O. (She Who Must Be Obeyed) allows us. In my case that's the smallest bedroom in the house. I did have designs on the medium sized one, but somehow that has ended up as a wardrobe filled with women's clothing. I'm still not sure how that came about, which just goes to show how devious these ladies can be.

To be fair to my wife, she does allow me quite a bit of liberty about precisely where I work on my models, including use of the dining table and the lounge coffee table. However, there were some fairly heavy hints being dropped about the increasing number of model helicopters taking up residence on the dining table on a more or less permanent basis. Time to do something to restore domestic harmony I think.

### HIGHLY ORGANISED CHAOS

As modellers, we tread a very fine line between collecting useful looking bits and pieces and becoming a compulsive hoarder. It's no use you trying to deny it, you know just how many useful looking bits of rubbish you have stashed away. The trouble is, of course, that sooner or later you end up with so many bits that might come in handy that you can no longer find the ones that actually are useful. You know you wouldn't have thrown the whatever it was away, but where the h\*\*l did you actually put it?

Similarly, you buy a few RTF models, fly them to destruction but end up keeping all the bits in case you get around to repairing it or find a use for some of them. What's

**Y**es, it's time for more electric model musings, but this time from a somewhat different angle. In the past we've looked at assorted models, how to make various items for said models and what models will be coming up for you to build. The one thing we haven't done, ever,

is to look more closely at just where those models are built.

### WHAT'S HE ON ABOUT?

Well, to be honest I rather wish someone would tell me. However, until such a revelation takes place I'll just have to play it by ear. Since we're talking modelling,

**IF YOU THOUGHT THAT SIDE OF THE BENCH WAS BAD, HOW ABOUT THIS? THIS IS AFTER MOST OF THE JUNK HAS BEEN DISPOSED OF.**





Yes, there really is a bench buried under that lot - somewhere. Time for some serious tidying.



worse, you also decide to keep the polystyrene packaging they came in case you find a use for that too. After all, you never know when you might want to hot wire some thin slices of foam, or carve some part of your latest creation from foam. Then, of course, there are the boxes they came in; always handy for storing things in.

Eventually, you end up with so much 'useful' stuff stashed away in your model room that you can't actually get in there to do any building in which to utilise these myriad items you kept.

### A SAD CASE

As intimated at the outset, this is pretty much the situation I found myself in recently - so many bits and pieces, stocks of materials I haven't used for years and completed models stored away, that it was all I could manage to do to fight my way into the model room, rummage around for what I wanted and beat a hasty retreat to the coffee table to do some building.

If I found half the tools I actually needed, I was doing well. Those I couldn't find were either done without, or replaced with new versions of the same thing., which is probably why I've discovered five sanding blocks, four cutting mats, two razor planes and countless sets of small screwdrivers since the great clear up began. Don't even ask about the number of modelling knives and packs of blades I uncovered. I knew they were there somewhere, finding them when I needed them was the problem.

When you start to add in the rolled plans and unstarted sets of laser cut parts collected over a few years (or many years in the case of the plans) you begin to see how it can all rapidly become something of a nightmare.

### THE RATIONALISATION BEGINS

Yes, I know that what I'm describing is possibly something of an extreme case, but it really can sneak up on you if you aren't careful. I do a lot of modelling, and tend to drift between types of models. As I drift from one style to another I've tended to keep

items that might come in handy for the other styles of model. To add further to the problem, technology keeps changing and what was state-of-the-art a few years ago is now just so much overweight junk. Given just a few years of hanging onto things because you just can't bear to bin them and you too could easily end up in the same situation.

As an example, I now restrict myself almost exclusively to small models that can be flown from local sports fields and the like. These weigh just a few ounces and use lightweight equipment and materials. So, with this in mind, why on earth am I keeping 12-cell Ni-Cad packs that are probably well past their 'best'? Afterall, it's more than ten years since I last used Ni-Cads or NiMHs ... so long in fact, that many of you will never even have seen such antiquities. So, into

the rubbish box they go.

Along similar lines; if I have chargers that will charge all manner of cell types, why do I need ones solely dedicated the type of cell I've just thrown away? Yes, they were expensive chargers at the time, but if I no longer use that type of cell they are just taking up space that can be put to much better use.

Right from the very outset you have to consider not might you use something but will you. If you only build lightweight models, do you really need those lumps of balsa block that are sufficiently hard that Nelson would have been proud to have ships built from them? By contrast, if you build big models, what use is all that 1/16" square balsa to you? Large models take up enough space as it is, without keeping stuff you're never likely to use.

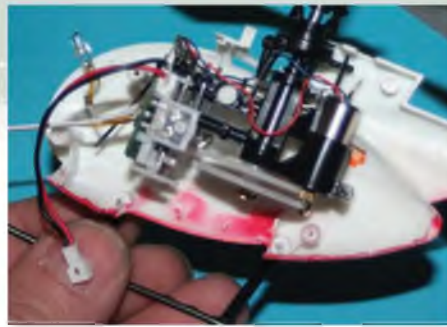


A selection of the 'scale' types. Note the number of MD 500 based types there are and there's another one not seen here.

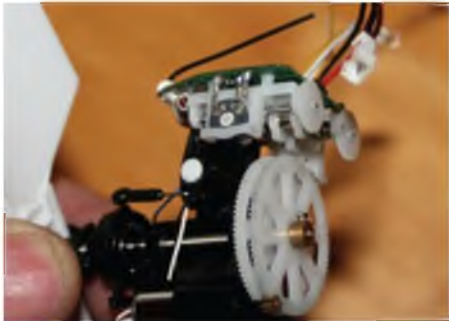




**The successfully working helicopters gleaned from my batch of dead ones. I suppose that puts me in profit before I go any further.**



**Once you split the body on the co-axial type this is what will be revealed.**



**Removed from the body the potential of the 'brick' becomes more easily visible - receiver, linear servos and ESC all in one neat, inexpensive lump.**



**The modified mainframe from the fixed pitch model demonstrates that it may even be possible to make use of the motor and gearbox.**

Pass it on to someone who actually will get benefit from it, use it to light the fire (you know, those old-fashioned things you have in grates) or simply bin it. Get rid of the clutter and there's just a chance that your model room may become something you don't have to keep behind closed doors, but a place of peace and tranquillity. No more fighting your way in there, rummaging around in a vain attempt to find what you're looking for and beating a hasty retreat when you fail miserably. Instead your models will have a safe haven, you'll be able to relax as you build because everything will be to hand and you'll feel proud enough of it to invite guests to see your latest creation. I haven't dared do that for years and the wife's enquiries about surely I'm not taking who ever it may be in there haven't helped.

## THE ROOT OF ALL EVIL

No, nothing whatsoever to do with filthy lucre. As far as I'm concerned that is the stuff of life for modellers - after all, without it, how are we going to buy all these models I've been talking about fighting my way past to get into the model room. In this particular instance the evil I refer to is those RTF helicopters that were beginning to take over the dining room. Following orders, and whilst the great reorganisation takes place, they have been moved to sit next to my chair in the lounge. Hardly ideal I grant you but at least they are no longer tending towards a pile of assorted helicopters, quadcopters, transmitters and charge leads.

Why are these rotary winged devils the root of evil? Because they're so darned addictive, that's why. Just when you think you have enough of them, you spot a simply 'must have' type. Okay, I'll be honest, another simply must have type. It's surprising just how quickly you can amass far more helicopters than you really have

room for just because they look interesting or give you something to fiddle around with. What, you may ask, is there to fiddle around with on an RTF helicopter? Nothing if you insist on only buying new ones, but any fool can do that. Why buy one new one when you can get half a dozen possibly dead ones for the same money - or less? As you can see, such 'bulk' buying just adds to the amount of clutter but isn't as daft as it at first sounds - let me explain.

As I mentioned earlier, apart from acquiring yet more helicopters, my main interest at the moment is small models. Even if you can't get the little helicopters to fly, as long as you're a little selective about which dead helicopter you buy a batch of there's always hope for useful items to be salvaged. Yes, I do know that's precisely how I got into such a mess in the first place, but that doesn't alter the fact that it's true.

## SO HOW'S IT WORK

Let me describe a recent 'acquisition' and we can take it from there. On a certain auction site (you know which one I mean), I spotted a batch of mixed Micro Twister helicopters that were listed as 'spares or repair'. Thinking I might be able to use one of the 'scale' fuselages (I'm rather partial to MD500 style helicopters) and that just maybe there might be a working helicopter to be found in there I took the plunge and bought them.

What turned up was two fixed pitch 'Sport' helicopters and five of the MD500 style 'Scale' jobs. Well, it was actually six of the latter because there was a very beat-up looking specimen in one of the boxes along with the one that belonged there. Beat-up it may have been, but it bound to a transmitter and the electrics seemed to work perfectly well.

In the end it turned out the two Sport types worked, after a new tail motor was fitted to one and one of the Scale jobs is a

perfectly good flyer. Just a hint of TBE (Toilet Bowl Effect), but still good enough for some buzzing around the lounge. In addition there was one that point blank refused to bind to any of the transmitters, one with a very sick gyro, a couple with a dead bank servo and a couple with working innards but sick bodies.

So, for my money, and little tinkering, I had three workable helicopters, a heap of spares AND some very promising looking receiver units. Suffice it to say I hardly felt ripped off.

## TAKING IT FURTHER

Looking more closely at the less than perfect specimens, but those that still appeared to do what they were supposed to electronically, what do we have?

Bear in mind that all these helicopters are fitted with a 'brick' type receiver consisting of receiver, gyro, servos and ESC all built into a compact unit. As long as it will bind to a transmitter that's a very good basis for use in small models. Which, as luck would have it (coincidence, or what) just happens to be what I build at the moment - or will do once I finish sorting out the model room.

It matters not one iota if a tail motor doesn't work or a gyro is up the chute because we won't be needing them in a three channel model. Both operate from the now redundant 'yaw' stick and needn't concern us in the least. The parts we need, (the servos) operate on what will now become rudder and elevator sticks. Okay, so maybe (I haven't had a chance to find out yet) the motor from the co-axial types might vary its' speed slightly in turns because the gyro is trying to correct the turn but that is surely something we can learn to live with and respond to by increasing or decreasing throttle input to compensate.

Range checks on these little beasts have revealed around 40 yards or so of operating distance. This is ideal for indoor flying and ought to be ample for close in outdoor use too. After all, small models need to be kept pretty close just to be able to see clearly what they are up to.

So, even if you have absolutely no interest in helicopters (there are such strange people about) these bundles are still a useful source of receiver bricks for fixed wing flying. I paid just a hint over £30 for my batch and salvaged two nice helicopters (I decided to strip down one of the fixed pitch types) and several bricks for use in model aircraft. Considering that at least a dozen of those sets of laser cut parts I mentioned are for precisely this type of model I consider that to be a good deal. Now I just have to figure out if it's possible to use any of the motors and gearboxes. Just visualise a radio control version of a rubber power classic that uses a suitable looking propeller. The possibilities are almost endless. Better get a move on clearing the junk from my model room I suppose.

If you'd like to contact me, you'll find me at the usual place [PETERRAKE@aol.com](mailto:PETERRAKE@aol.com) ■



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